Transcend Wireless

10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

July 15, 2019

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

RE: Notice of Exempt Modification
101 Talmadge Road, Hamden, CT 06518
Latitude: 41.422862400
Longitude: -72.9511365000
T-Mobile Site#: CT11474A – L600

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 315-foot level of the existing 765-foot lattice tower at 101 Talmadge Road, Hamden, CT. The 765-foot lattice tower and property are owned by LIN Television Corp. T-Mobile now intends to replace the six (6) existing antennas with six (6) new 600/700/1900/2100 MHz antennas. The new antennas will be installed at the same 315-foot level of the tower.

Planned Modifications:
Tower:

<u>Remove</u>
(12) 7/8" Coax
(3) TMA

<u>Remove and Replace</u>:
(3) LNX-6515DS (Remove) - APXVAARR24_43-U-NA20 Antenna (Replace) 600/700/1900 MHz
(3) APXV18-206517S-C-A20 (Remove) – APXV16DWV-16DWV-S-E-A20 (Replace) 2100 MHz

<u>Install New:</u>
(3) 1-3/8" Hybrid Cables
(3) Radio 4449 B71+B12
(3) Radio 4415 B25
(3) Radio 4415 B66
(1) 1.25 STD Mount Brace

<u>Existing to Remain</u>:
N/A

Ground:
Remove: (2) 6201 ODE Cabinets
Install: (1) 6102 Cabinet

There is no record of an original approval of this facility by the Siting Council. T-Mobile and other carriers have been approved previously for exempt modifications. T-Mobile was unable to obtain any documentation from the jurisdiction pertaining to an original approval. The proposed modification will not be violating any previous approvals.

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 -Curt B. Leng, Elected Official, and Daniel Kops, Town Planner for the Town of Hamden, 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: Curt Leng – Town of Hamden Mayor
Daniel Kops– Town of Hamden Town Planner
LIN Television Corp – owner

Kyle Richers

From: UPS Quantum View <pkginfo@ups.com>
Sent: Monday, July 15, 2019 12:24 PM
To: krichers@transcendwireless.com
Subject: UPS Ship Notification, Reference Number 1: CT11474A CSC ZO

You have a package coming.

Scheduled Delivery Date: Tuesday, 07/16/2019

This message was sent to you at the request of TRANSCEND WIRELESS to notify you that the shipment information below has been transmitted to UPS. The physical package may or may not have actually been tendered to UPS for shipment. To verify the actual transit status of your shipment, click on the tracking link below.

Shipment Details

From:	TRANSCEND WIRELESS
Tracking Number:	1ZV257424295937829
Ship To:	Daniel Kops Town of Hamden 2750 DIXWELL AVENUE HAMDEN, CT 065183320 US
UPS Service:	UPS GROUND
Number of Packages:	1
Scheduled Delivery:	07/16/2019
Signature Required:	A signature is required for package delivery
Weight:	1.0 LBS
Reference Number 1:	CT11474A CSC ZO

Download the UPS mobile app

Kyle Richers

From: UPS Quantum View <pkginfo@ups.com>
Sent: Monday, July 15, 2019 12:26 PM
To: krichers@transcendwireless.com
Subject: UPS Ship Notification, Reference Number 1: CT11474A CSC EO

You have a package coming.

Scheduled Delivery Date: Tuesday, 07/16/2019

This message was sent to you at the request of TRANSCEND WIRELESS to notify you that the shipment information below has been transmitted to UPS. The physical package may or may not have actually been tendered to UPS for shipment. To verify the actual transit status of your shipment, click on the tracking link below.

Shipment Details

From:	TRANSCEND WIRELESS
Tracking Number:	1ZV257424296607835
Ship To:	Curt Leng Town of Hamden 2750 Dixwell Avenue HAMDEN, CT 065183320 US
UPS Service:	UPS GROUND
Number of Packages:	1
Scheduled Delivery:	07/16/2019
Signature Required:	A signature is required for package delivery
Weight:	1.0 LBS
Reference Number 1:	CT11474A CSC EO

Download the UPS mobile app

Kyle Richers

From:	UPS Quantum View <pkginfo@ups.com>
Sent:	Monday, July 15, 2019 12:27 PM
To:	krichers@transcendwireless.com
Subject:	UPS Ship Notification, Reference Number 1: CT11474A CSC Owner

You have a package coming.

Scheduled Delivery Date: Wednesday, 07/17/2019

This message was sent to you at the request of TRANSCEND WIRELESS to notify you that the shipment information below has been transmitted to UPS. The physical package may or may not have actually been tendered to UPS for shipment. To verify the actual transit status of your shipment, click on the tracking link below.

Shipment Details

From:	TRANSCEND WIRELESS
Tracking Number:	**1ZV257424297297848**
Ship To:	LIN Television Corp 333 East Franklin Street RICHMOND, VA 232192213 US
UPS Service:	UPS GROUND
Number of Packages:	1
Scheduled Delivery:	07/17/2019
Signature Required:	A signature is required for package delivery
Weight:	1.0 LBS
Reference Number 1:	CT11474A CSC Owner

Download the UPS mobile app

0 TALMADGE RD

Location	0 TALMADGE RD	**Mblu**	3123/ 008/ / /
Acct#		**Owner**	L I N TELEVISION CORP
Assessment	$373,940	**Appraisal**	$534,200
PID	100690	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$34,500	$499,700	$534,200

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$24,150	$349,790	$373,940

Owner of Record

Owner	L I N TELEVISION CORP	**Sale Price**	$0
Co-Owner		**Certificate**	
Address	333 EAST FRANKLIN ST RICHMOND, VA 23219	**Book & Page**	1905/ 206
		Sale Date	11/29/1999

Ownership History

Ownership History				
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Sale Date**
L I N TELEVISION CORP	$0		1905/ 206	11/29/1999
L W W I BROADCASTING INC	$605,000		1470/ 283	12/29/1994
COOK INLET COMMUNICATIONS CORP	$0		740/ 459	01/03/1986

Building Information

Building 1 : Section 1

Year Built: 1965
Living Area: 812
Building Percent Good: 65

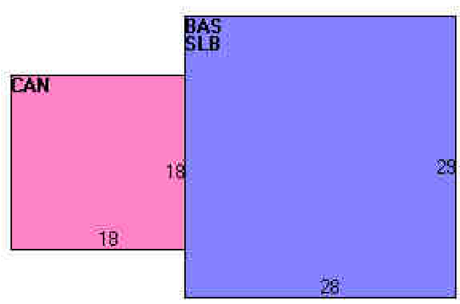
Building Attributes	
Field	**Description**
STYLE	Warehouse

MODEL	Ind/Comm
Grade	C
Stories:	1
Occupancy	1
Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	T&G/Rubber
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Hot Air-no Duc
AC Type	None
Bldg Use	RAD/TV TR M96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	4330
Heat/AC	NONE
Frame Type	STEEL
Baths/Plumbing	NONE
Ceiling/Wall	NONE
Rooms/Prtns	AVERAGE
Wall Height	10
% Comn Wall	0

Building Photo

(http://images.vgsi.com/photos/HamdenCTPhotos//\00\02\80/12

Building Layout



(http://images.vgsi.com/photos/HamdenCTPhotos//Sketches/10C

Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	812	812
CAN	Canopy	324	0
SLB	Slab	0	0
		1,136	812

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code 4330

Land Line Valuation

Size (Acres) 35.19

Description	RAD/TV TR M96	**Frontage**	0
Zone	R2	**Depth**	0
Neighborhood	140	**Assessed Value**	$349,790
Alt Land Appr	No	**Appraised Value**	$499,700
Category			

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
FN3	FENCE-6' CHAIN			770 L.F.	$3,500	1

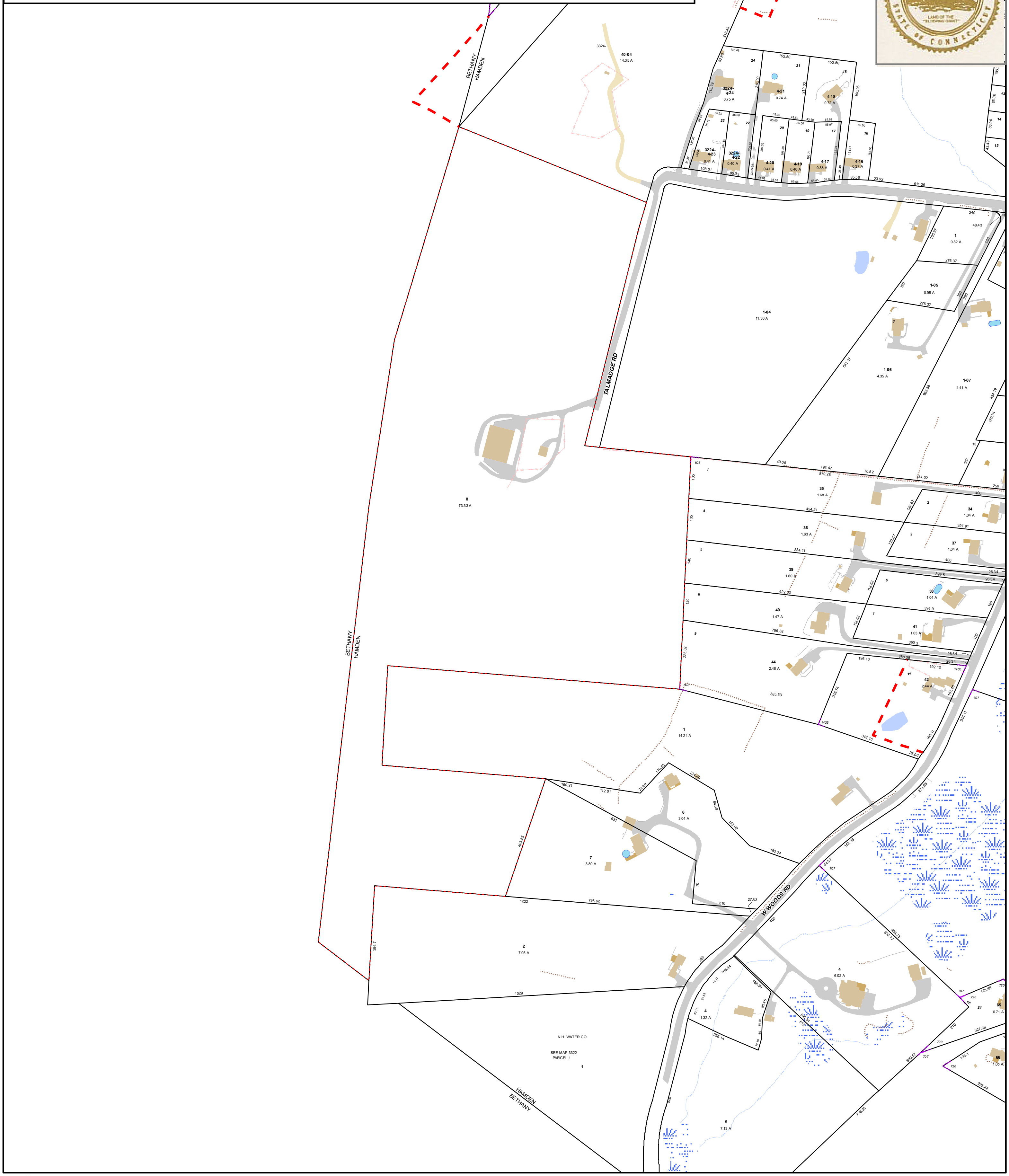
Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$34,500	$499,700	$534,200
2016	$34,500	$499,700	$534,200
2015	$477,600	$559,700	$1,037,300

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$24,150	$349,790	$373,940
2016	$24,150	$349,790	$373,940
2015	$334,320	$370,790	$705,110

Town of Hamden, Connecticut - Assessment Parcel Map

Parcel: 3123-008-00-0000 Address: 0 TALMADGE RD



Approximate Scale: 1 inch = 400 feet

0 200 400 600 800 Feet

Map Produced: April 2019

Disclaimer: This map is for informational purposes only. All information is subject to verification by any user. The Town of Hamden and its mapping contractors assume no legal responsibility for the information contained herein.

T-Mobile

WIRELESS COMMUNICATIONS FACILITY

WTNH HAMDEN
SITE ID: CT11474A
101 TALMADGE ROAD
HAMDEN, CT 06518

T-MOBILE RF CONFIGURATION

67D93D4_1QP+2HP
(U21 Market)

PROJECT SUMMARY

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

A. REMOVE (6) EXISTING ANTENNAS, (2) PER SECTOR

B. INSTALL (3) NEW AIR QUAD ANTENNAS, TYP. (1) PER SECTOR

C. INSTALL (3) NEW OCT-PORT ANTENNAS, TYP. (1) PER SECTOR

D. INSTALL (9) NEW RADIO REMOTE UNITS, TYP. (3) PER SECTOR

E. DECOMMISSION AND REMOVE (2) EXISTING EQUIPMENT CABINET

F. INSTALL ONE (1) NEW RBS 6102 MU AC EQUIPMENT CABINET

G. INSTALL (3) 6x12 NEW HYBRID CABLES

H. REMOVE EXISTING COAX CABLES

I. INSTALL (3) DUAL SWIVEL MOUNTS TO ACCOMMODATE PROPOSED RADIO REMOTE UNITS

J. UPGRADE TO 125 BREAKER

K. REMOVE (6) DIPLEXERS FROM GROUND

I. REMOVE (3) TMAs, TYP. (1) PER SECTOR

J. INSTALL (1) NEW MOUNT BRACE AT ALPHA SECTOR

PROJECT INFORMATION

SITE NAME:	WTNH HAMDEN
SITE ID:	CT11474A
SITE ADDRESS:	101 TALMADGE ROAD HAMDEN, CT 06518
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:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41°-25'-23.25" N LONGITUDE: 72°-57'-03.83" W GROUND ELEVATION: 636'± AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

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." 2018 CONNECTICUT FIRE SAFETY CODE, 2017 NATIONAL ELECTRICAL CODE AND LOCAL CODES.

2. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.

3. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.

4. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.

5. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.

6. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS-BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.

7. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.

8. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.

9. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.

10. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.

11. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.

12. ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE T-MOBILE CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.

13. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.

14. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.

15. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.

16. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

17. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.

18. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.

19. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

SITE DIRECTIONS

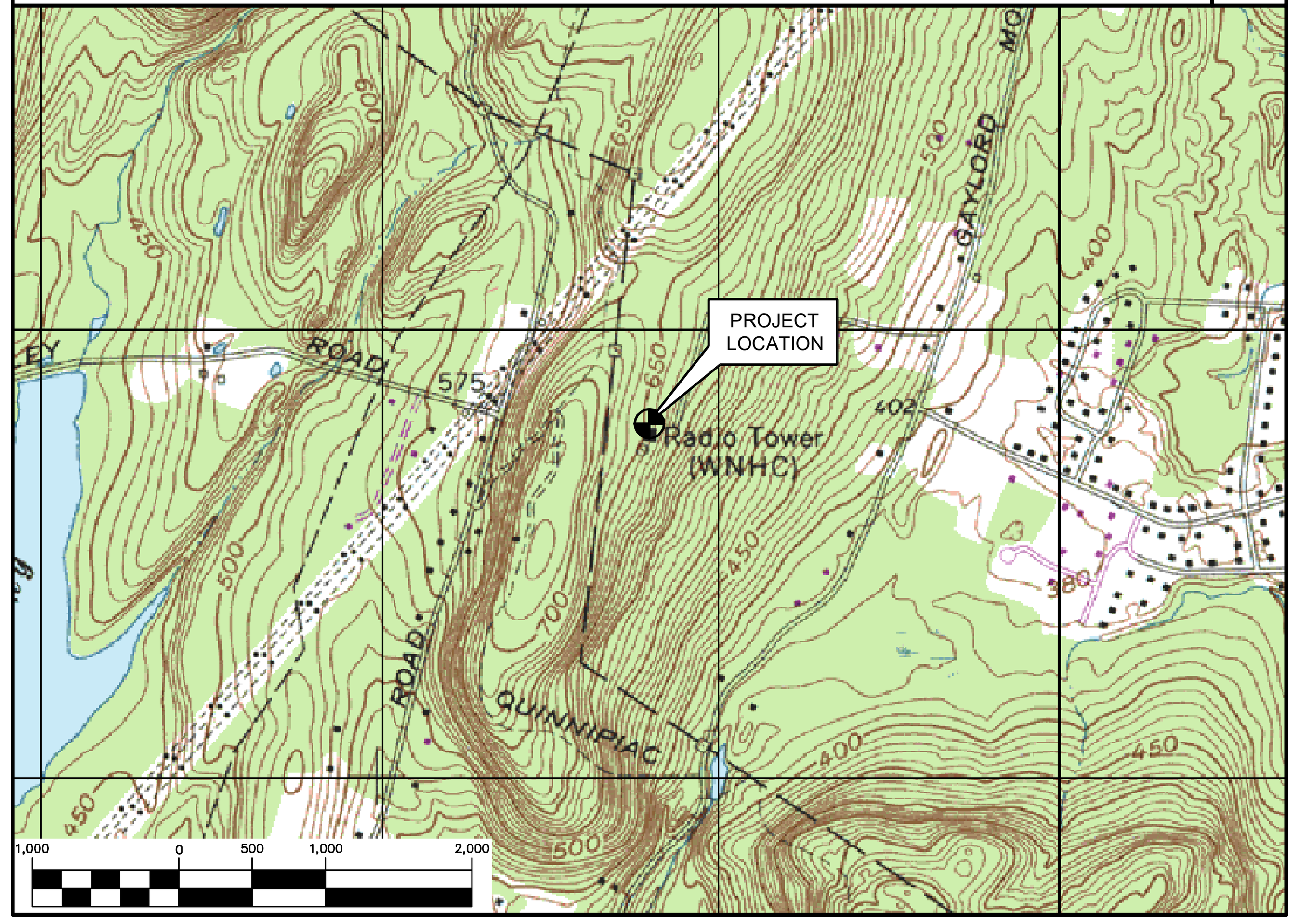
FROM: 35 GRIFFIN ROAD SOUTH, BLOOMFIELD, CT 06002
TO: 101 TALMADGE ROAD, HAMDEN, CT 06518

1. HEAD NORTH ON GRIFFIN ROAD S. TOWARD HARTMAN RD.	0.30 MI.
2. TAKE THE 2ND RIGHT ONTO DAY HILL RD.	3.64 MI.
3. MERGE ONTO I-91 S TOWARD HARTFORD	26.38 MI.
4. TAKE EXIT 64 TOWARD WALLINGFORD.	0.17 MI.
5. TURN LEFT ONTO QUINNIPIAC ST.	0.04 MI.
6. QUINNIPIAC ST BECOMES S TURNPIKE RD.	1.74 MI.
7. S TURNPIKE RD BECOMES MOUNT CARMEL AVE.	3.17 MI.
8. MOUNT CARMEL AVE BECOMES W WOODS RD.	0.98 MI.
9. TURN LEFT ONTO SHEPARD AVE.	0.06 MI.
10. TAKE THE 1ST RIGHT ONTO W WOODS RD.	0.44 MI.
11. TURN SLIGHT RIGHT ONTO CHOATE AVE.	0.54 MI.
12. CHOATE AVE BECOMES W WOODS RD.	0.30 MI.
13. TURN RIGHT ONTO GAYLORD MOUNTAIN RD.	0.11 MI.
14. TAKE THE 1ST LEFT ONTO TALMADGE RD.	0.21 MI.

VICINITY MAP

SCALE: 1" = 1000'

NORTH



SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	1
N-1	DESIGN BASIS AND SITE NOTES	1
C-1	SITE LOCATION PLAN	1
C-2	COMPOUND PLAN AND EQUIPMENT LAYOUT PLAN	1
C-3	ANTENNA CONFIGURATION & ELEVATION	1
E-1	TYPICAL ELECTRICAL DETAILS	1
E-2	DETAILS	1

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	07/03/19	KAWJR	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
0	05/13/19	KAWJR	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

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

WTNH HAMDEN
SITE ID: CT11474A
101 TALMADGE ROAD
HAMDEN, CT 06518

DATE:	04/11/19
SCALE:	AS NOTED
JOB NO.	19027.14

TITLE SHEET

T-1

Sheet No. 1 of 7

DESIGN BASIS:

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

1. DESIGN CRITERIA:

- WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS): 95-115 MPH (3 SECOND GUST)
- RISK CATEGORY: II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 97 MPH (Vasd) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-10) PER 2015 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2018 CONNECTICUT STATE BUILDING CODE.
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.
2. 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.
3. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.
4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.
5. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
6. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
7. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.
9. 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. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH NORTHEAST UTILITIES
10. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER FOUNDATION REMEDIATION WORK IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIEDOWNS, WHICH MIGHT BE NECESSARY.
11. 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.
12. SHOP DRAWINGS, CONCRETE MIX DESIGNS, TEST REPORTS, AND OTHER SUBMITTALS PERTAINING TO STRUCTURAL WORK SHALL BE FORWARDED TO THE OWNER FOR REVIEW BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL INCLUDE ERECTION DRAWINGS AND COMPLETE DETAILS OF CONNECTIONS AS WELL AS MANUFACTURER'S SPECIFICATION DATA WHERE APPROPRIATE. SHOP DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR AND BEAR THE CHECKER'S INITIALS BEFORE BEING SUBMITTED FOR REVIEW.
13. NO DRILLING WELDING OR TAPING ON EVERSOURCE OWNED EQUIPMENT.
14. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE---ASTM A53 (FY = 35 KSI)
   F. CONNECTION BOLTS---ASTM A325-N
   G. U-BOLTS---ASTM A36
   H. ANCHOR RODS---ASTM F 1554
   I. WELDING ELECTRODE---ASTM E 70XX

2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	07/03/19	KAWJR	CAG	CONSTRUCTION DRAWINGS - REVISED PER CLIENT COMMENTS
0	05/13/19	KAWJR	CAG	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

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
WTNH HAMDEN
SITE ID: CT11474A
101 TALMADGE ROAD
HAMDEN, CT 06518

DATE: 04/11/19
SCALE: AS NOTED
JOB NO. 19027.14

DESIGN BASIS AND SITE NOTES

N-1

Sheet No. 2 of 7

1
C-1

SITE LOCATION PLAN

SCALE: 1" = 250'

APPROX. NORTH

GRAPHIC SCALE

250 0 125 250 500 100

(IN FEET)
1 inch = 250 ft.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	07/03/19	KAWJR	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
0	05/13/19	KAWJR	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT CARLO A. GAUDIO 27517 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

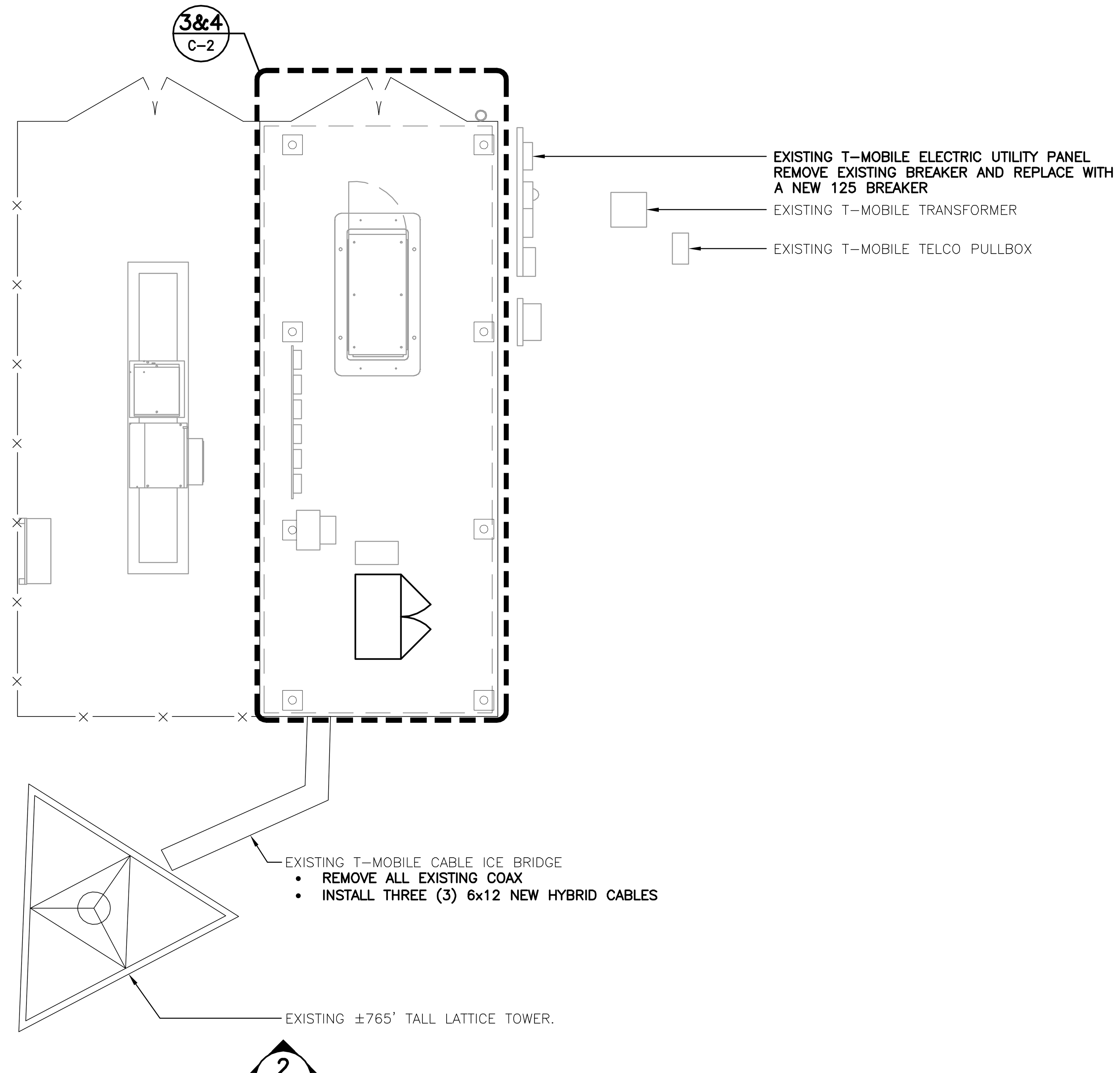
T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
WTNH HAMDEN
SITE ID: CT11474A
101 TALMADGE ROAD
HAMDEN, CT 06518

DATE:	04/11/19
SCALE:	AS NOTED
JOB NO.	19027.14

SITE LOCATION PLAN

C-1

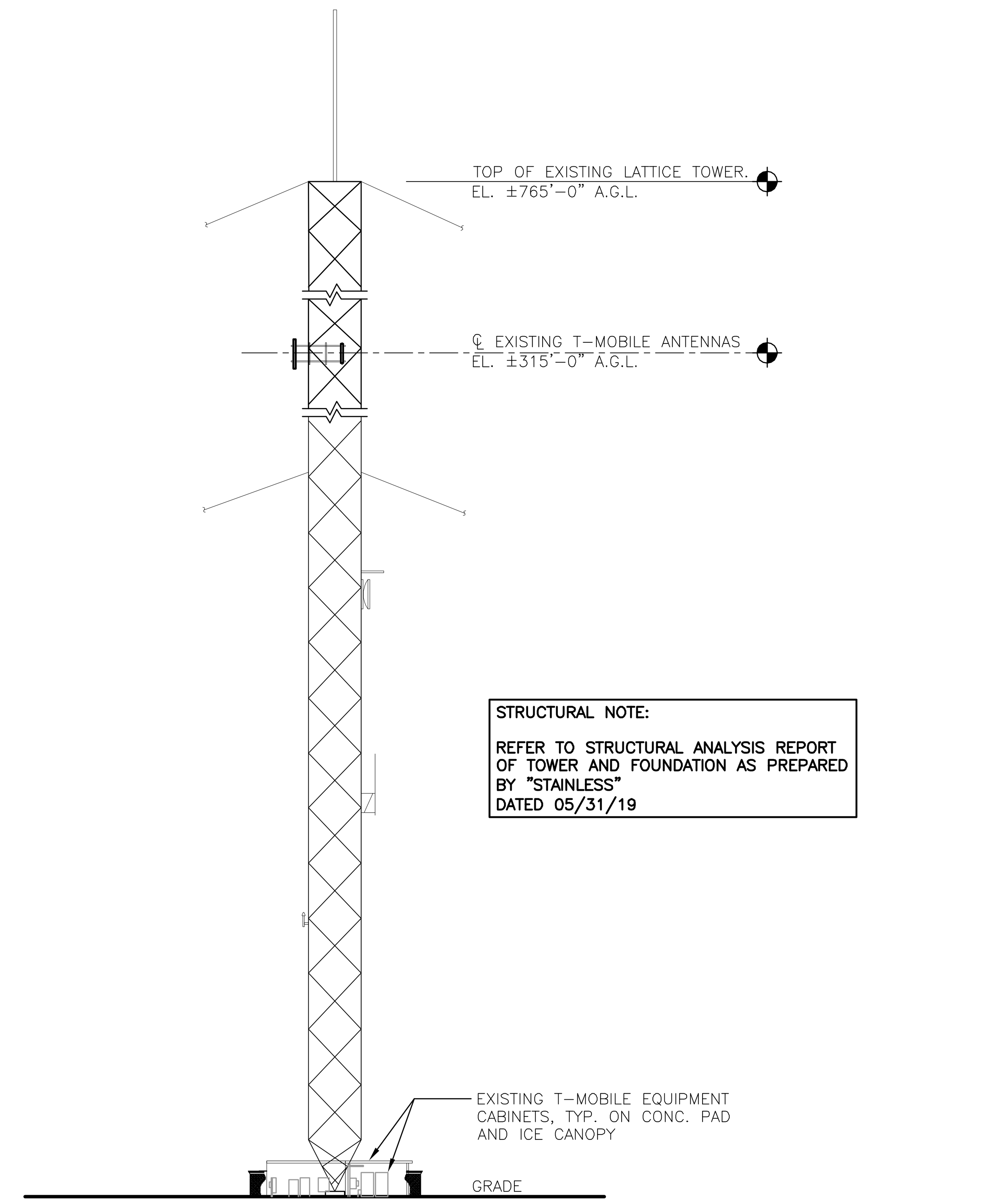
Sheet No. 3 of 7



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

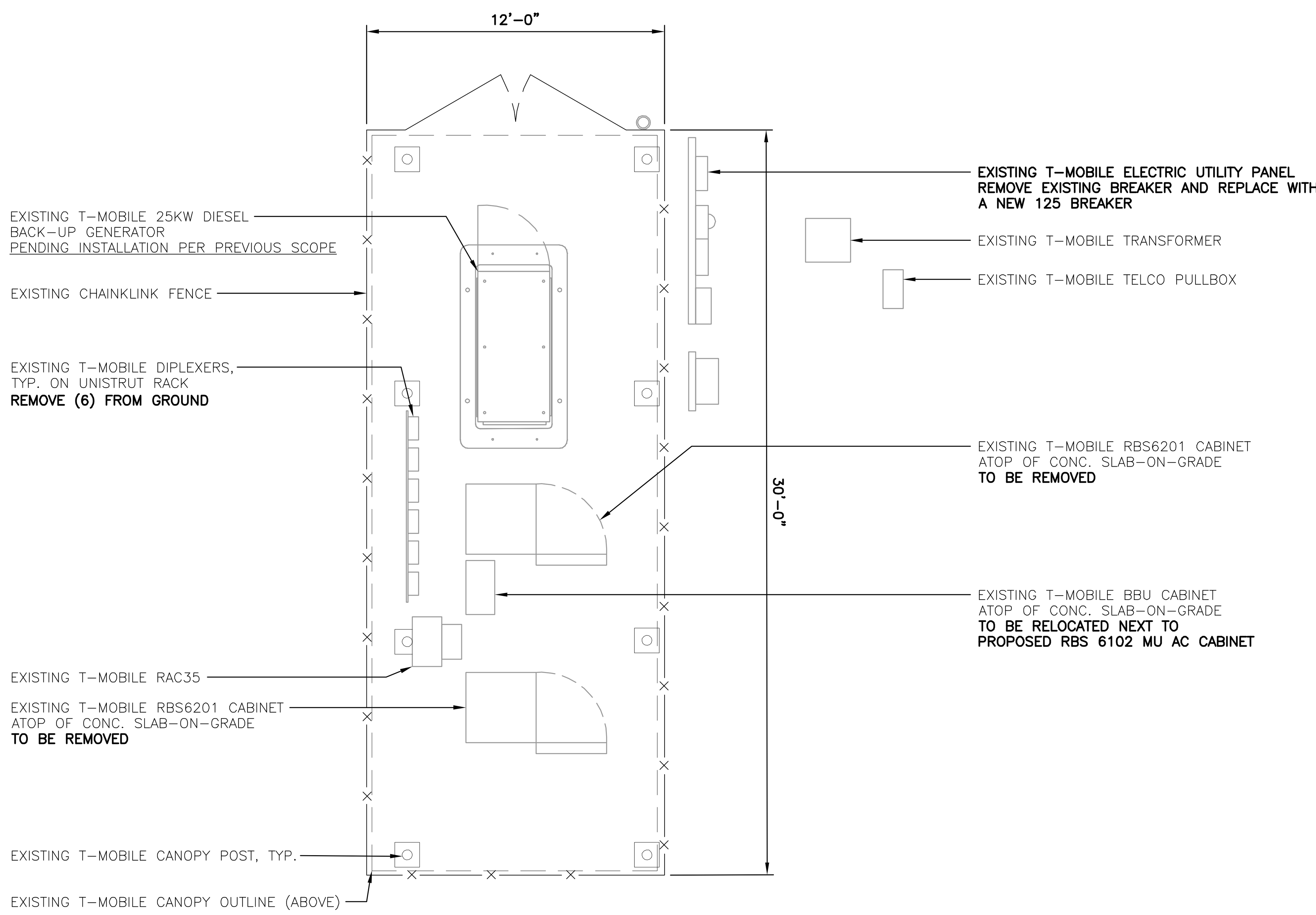
TRUE NORTH

GRAPHIC SCALE
5 0 2.5 5 10 20
(IN FEET)
1 inch = 5 ft.



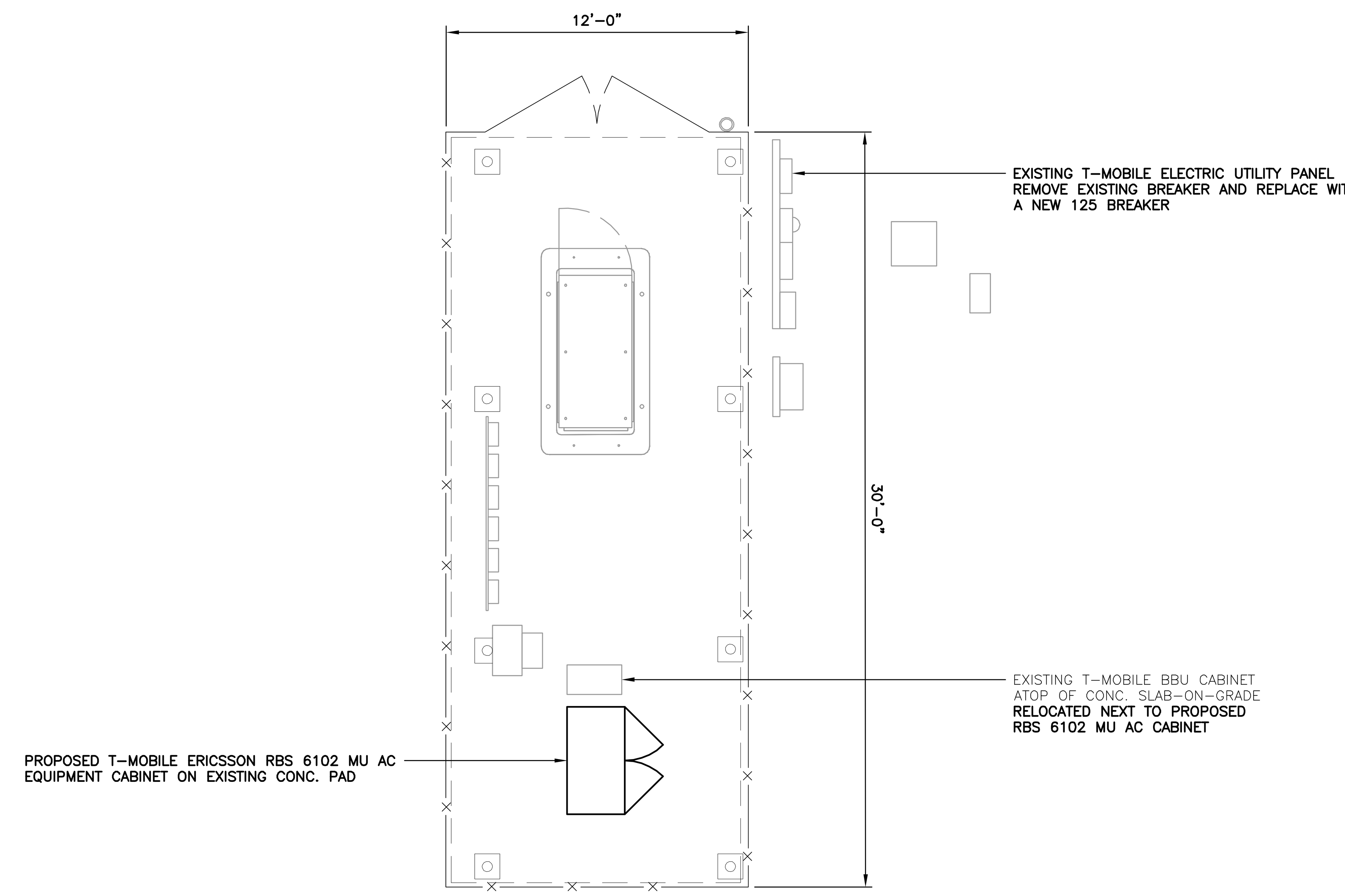
2
C-2
TOWER ELEVATION - PROPOSED
SCALE: 1" = 10'

GRAPHIC SCALE
10 0 5 10 20 40
(IN FEET)
1 inch = 10 ft.



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

TRUE NORTH



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

TRUE NORTH

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	07/03/19	KAWJR	CAG	CONSTRUCTION DRAWINGS - REVISED PER CLIENT COMMENTS
0	05/13/19	KAWJR	CAG	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

T-Mobile
Transcend Wireless

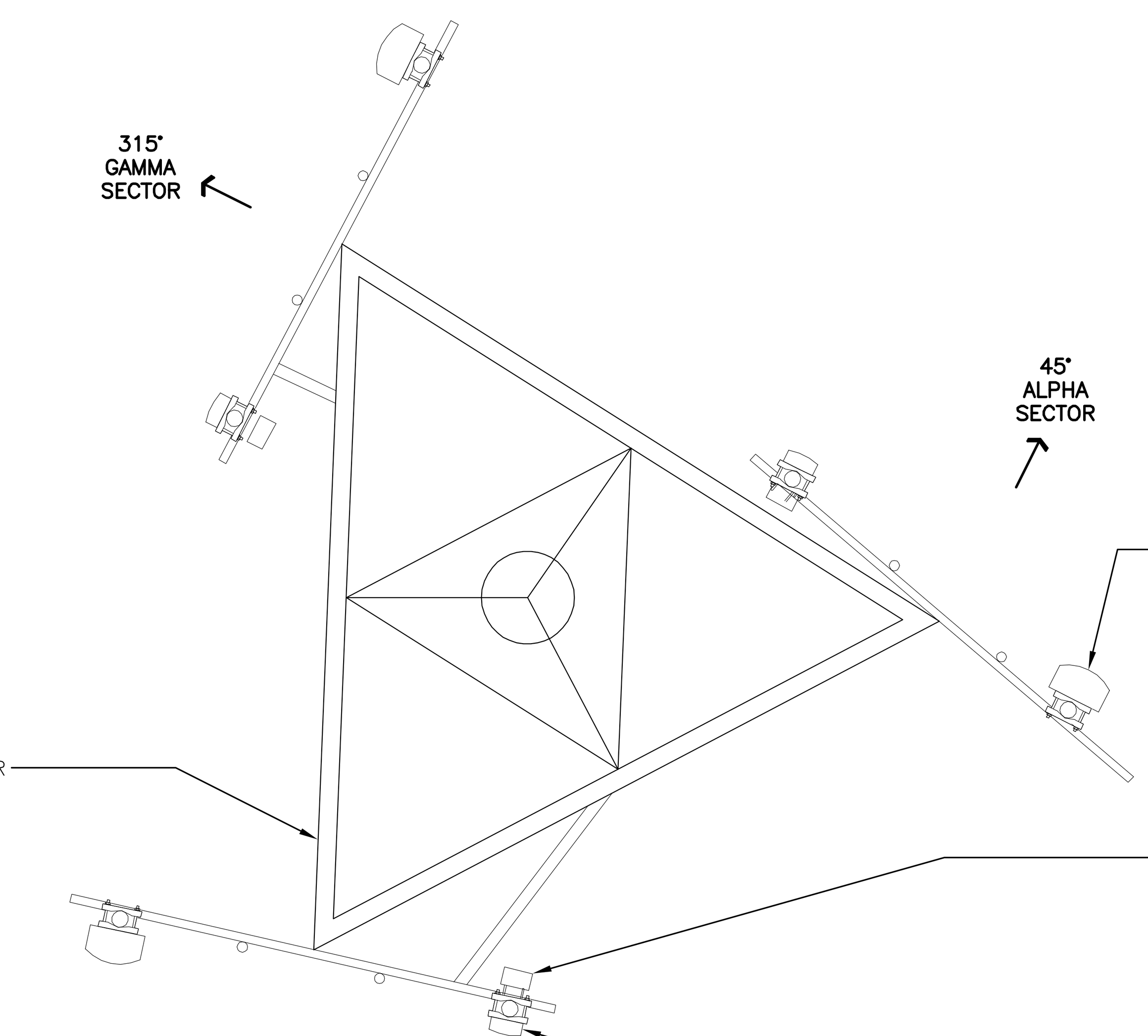
CENTEK engineering
Centered on Solutions
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
WTNH HAMDEN
SITE ID: CT11474A
101 TALMADGE ROAD
HAMDEN, CT 06518

DATE: 04/11/19
SCALE: AS NOTED
JOB NO. 19027.14

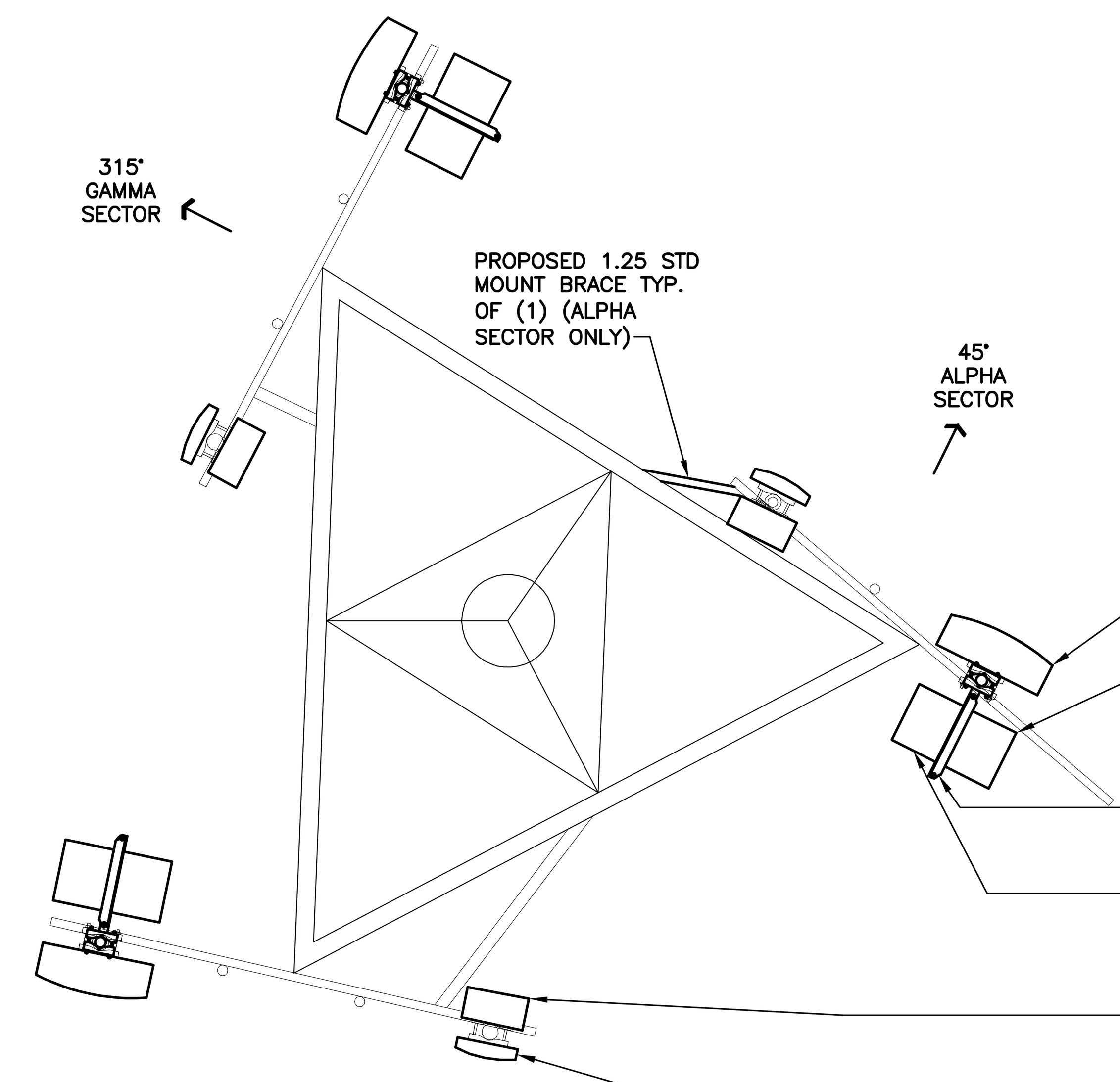
COMPOUND PLAN,
LAYOUT PLANS
& TWER ELEVATION

C-2
Sheet No. 4 of 7

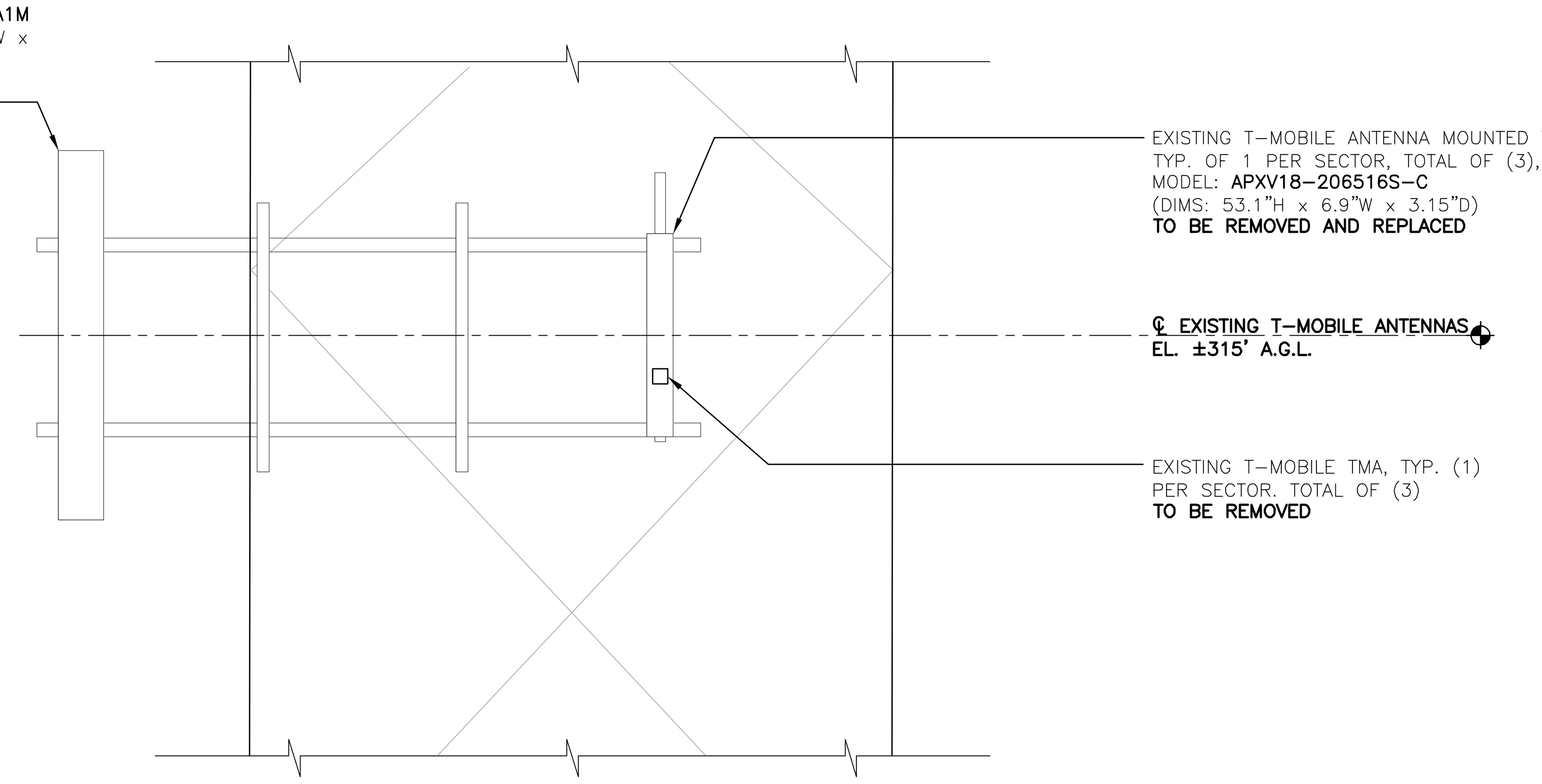


1 C-3 EXISTING ANTENNA MOUNTING CONFIGURATION
SCALE: 3/8" = 1' 315' ELEVATION TRUE NORTH

T-MOBILE RAN TEMPLATE: 67D93D4
T-MOBILE RF CONFIGURATION: 67D93D4_1QP+2HP (U21 Market)

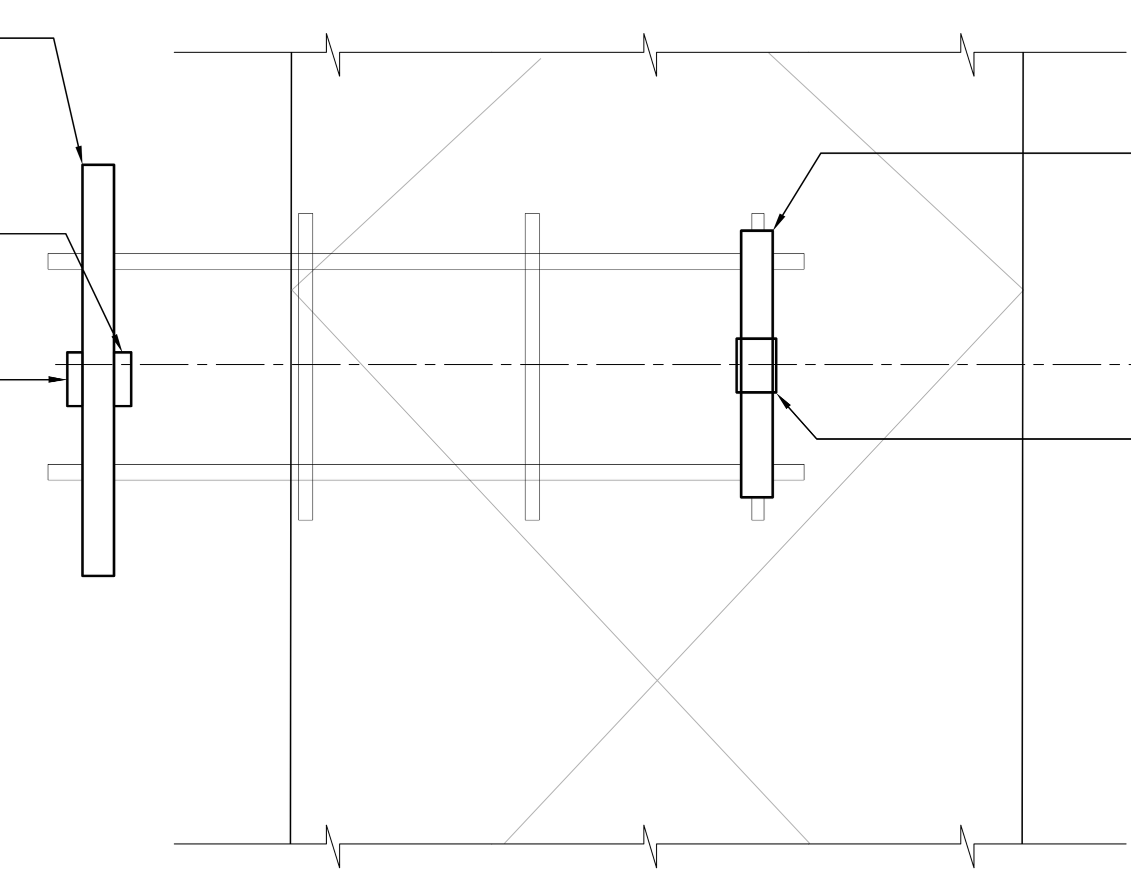


2 C-3 PROPOSED ANTENNA MOUNTING CONFIGURATION
SCALE: 3/8" = 1' 315' ELEVATION TRUE NORTH



TYPICAL SECTOR

3 C-3 ANTENNA ELEVATION - EXISTING
SCALE: NONE



TYPICAL SECTOR

4 C-3 ANTENNA ELEVATION - PROPOSED
SCALE: NONE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	07/03/19	KAWJR	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
0	05/13/19	KAWJR	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

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

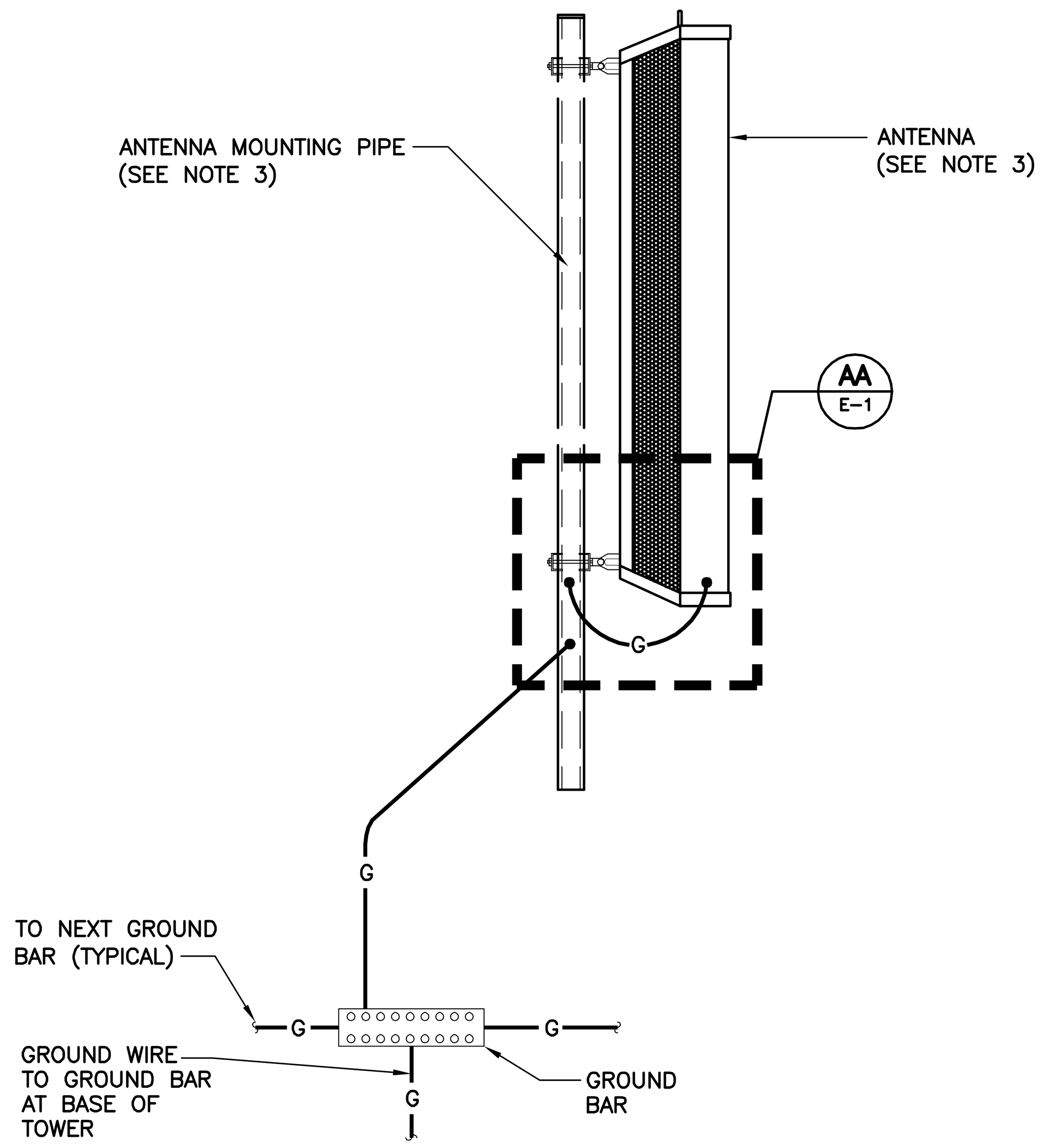
T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
WTNH HAMDEN
SITE ID: CT11474A
101 TALMADGE ROAD
HAMDEN, CT 06518

DATE:	04/11/19
SCALE:	AS NOTED
JOB NO.	19027.14

ANTENNA CONFIG. PLAN AND ELEVATION

C-3

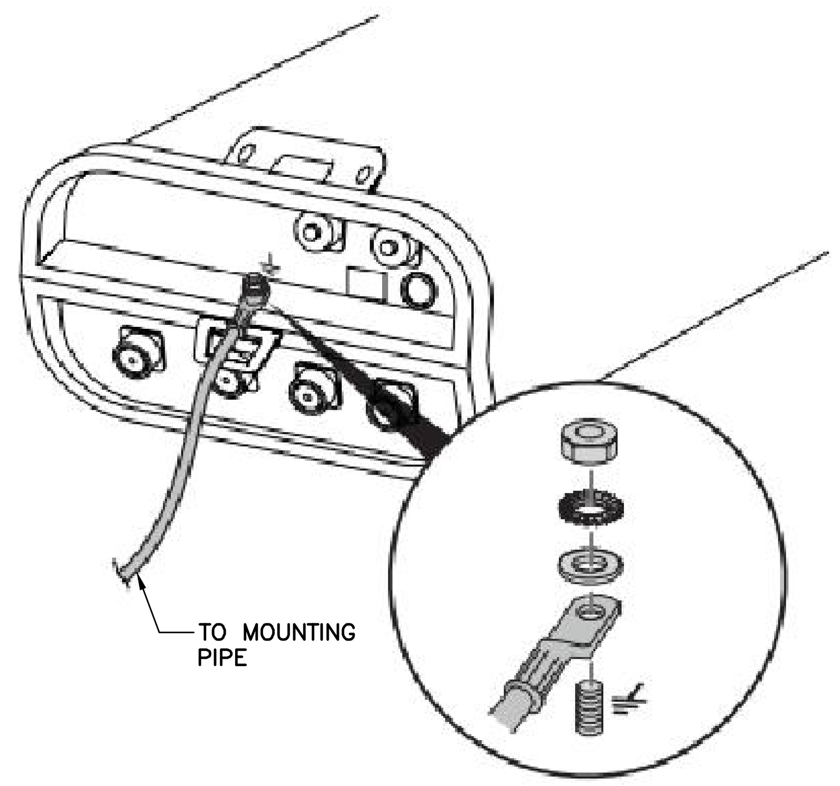
Sheet No. 5 of 7



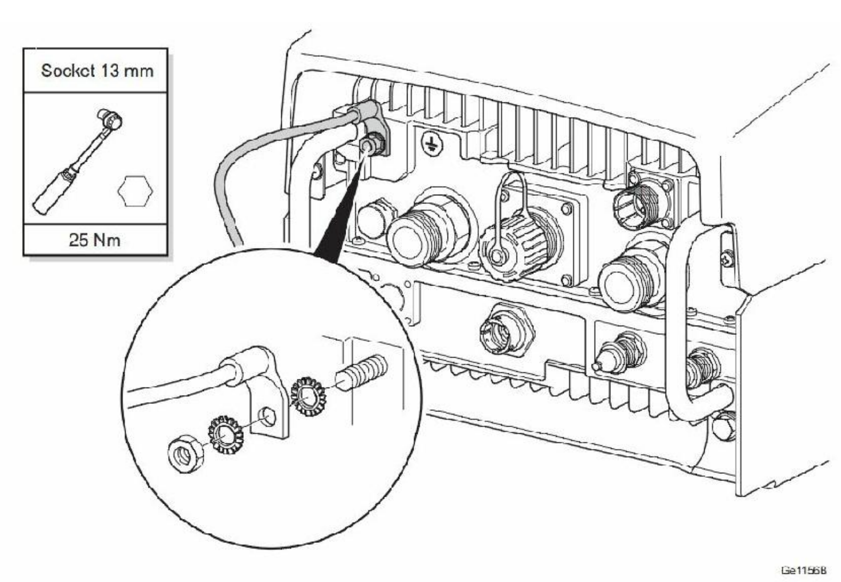
NOTES:

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.

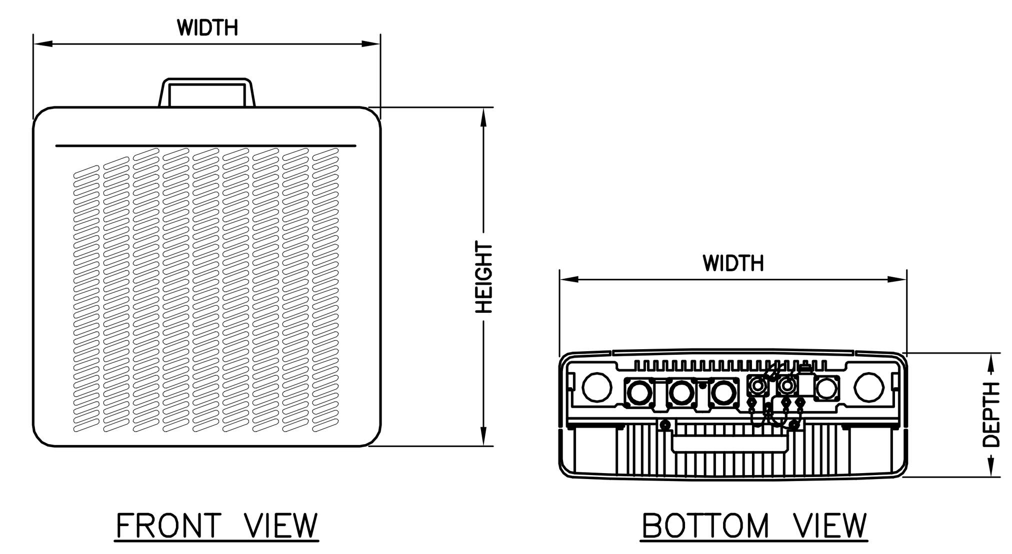
1 (E-1) TYPICAL ANTENNA GROUNDING DETAIL
SCALE: NOT TO SCALE



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

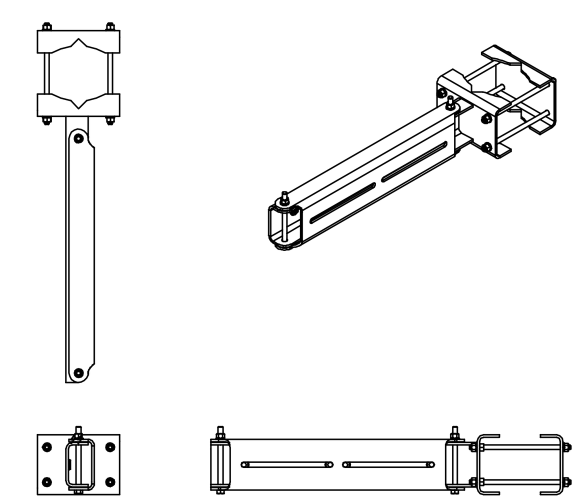


2 (E-1) TYPICAL RRU GROUNDING DETAIL
SCALE: NOT TO SCALE



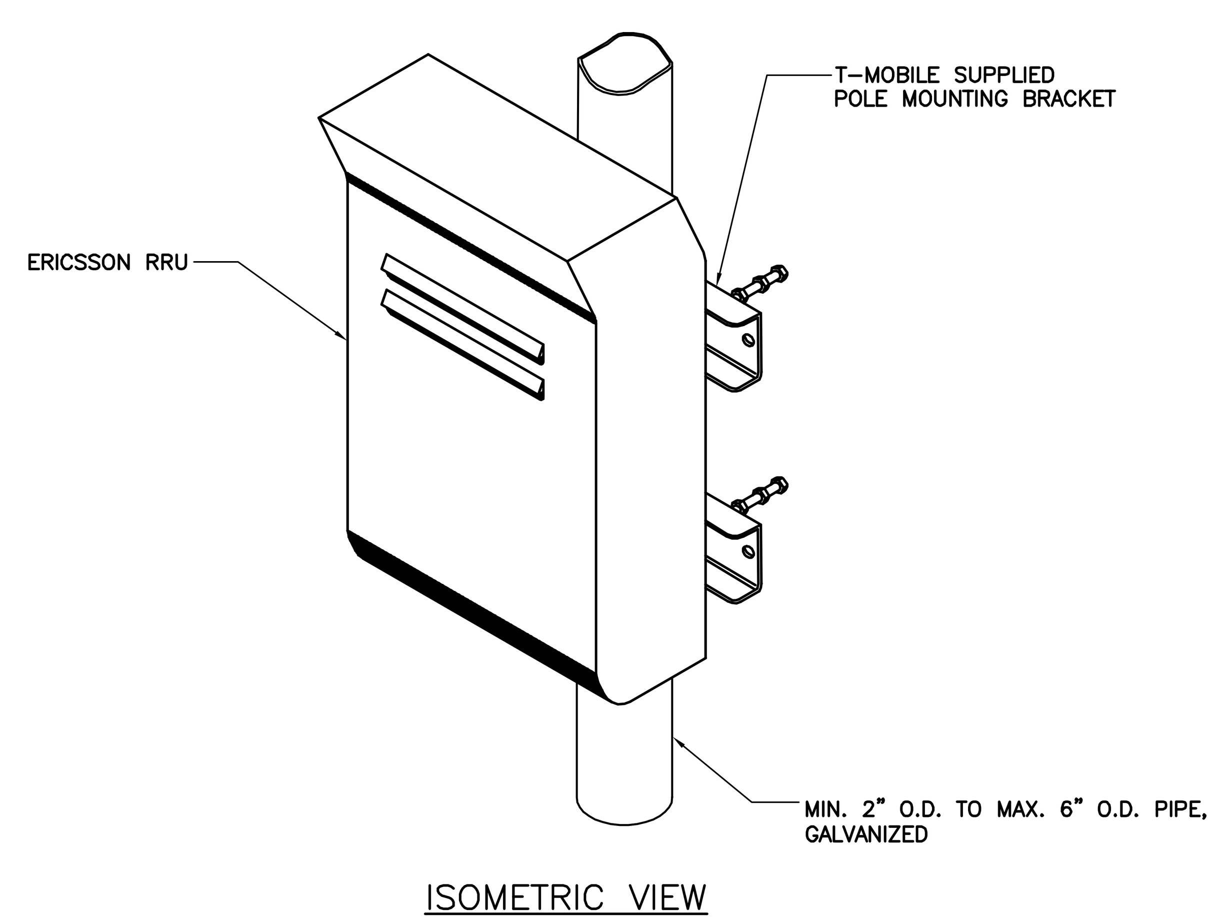
RRH (REMOTE RADIO HEAD)		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: RRU 4449 B71+B12	14.9"H x 13.2"W x 9.3"D	±74 LBS
MAKE: ERICSSON MODEL: RRU 4415 B25	16.5"H x 13.4"W x 5.9"D	±46 LBS
MAKE: ERICSSON MODEL: RRU 4415 B66A	16.5"H x 13.4"W x 5.9"D	±46 LBS

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



RRU DUAL SWIVEL MOUNT		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: SITE PRO 1 PART NO.: RRUDSM	27.75"L x 6.5"W x 4.7"D	39.4 LBS.

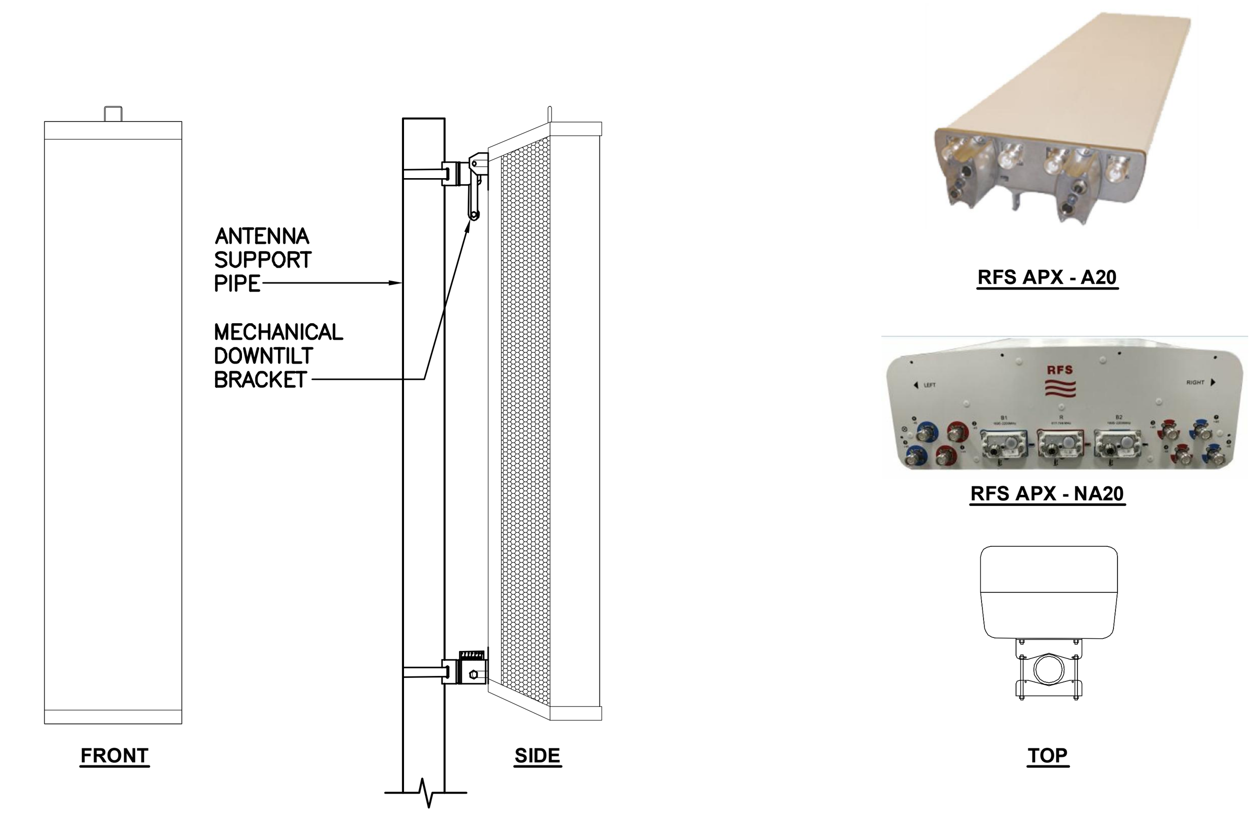
4 (E-1) RRH DUAL SWIVEL MOUNT DETAIL
SCALE: NOT TO SCALE



NOTES:

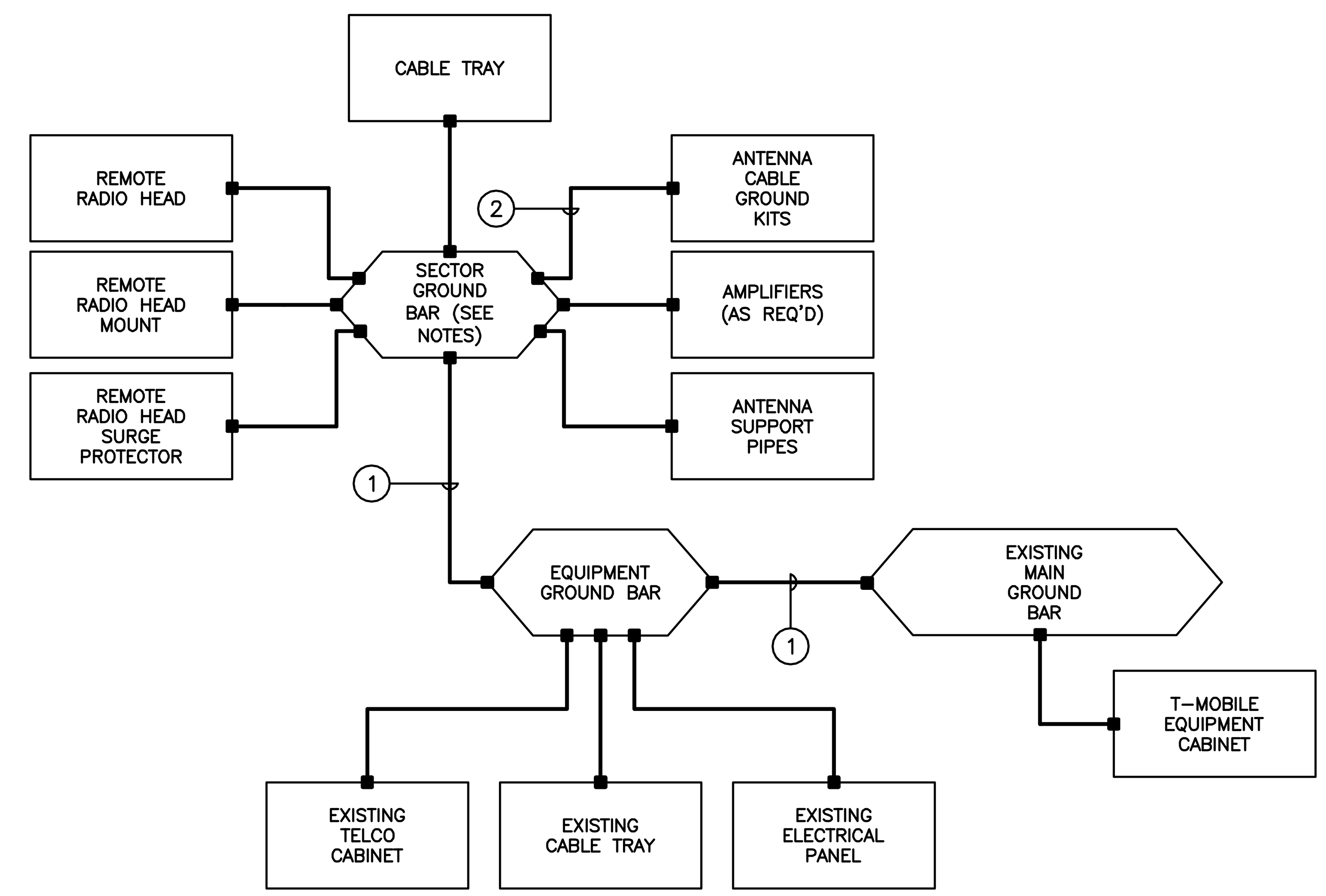
1. T-MOBILE SHALL SUPPLY RRU, AND RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL SUPPLY POLE/PIPE AND INSTALL ALL MOUNTING HARDWARE INCLUDING ERICSSON RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL INSTALLS RRU AND MAKES CABLE TERMINATIONS.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

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



ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: RFS MODEL: APXVAARR24_43-U-NA20	96.0"H x 24"W x 8.7"D	153 LBS
MAKE: RFS MODEL: APX16DWV-16DWVS-E-A20	59.9"H x 13.0"W x 3.15"D	40.7 LBS

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



GROUNDING SCHEMATIC NOTES

1. #2 AWG
2. #6 AWG

GENERAL NOTES:

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

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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	07/03/19	KAWJR	CAG	CONSTRUCTION DRAWINGS - REVISED PER CLIENT COMMENTS
0	05/13/19	KAWJR	CAG	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

T-Mobile
Transcend Wireless

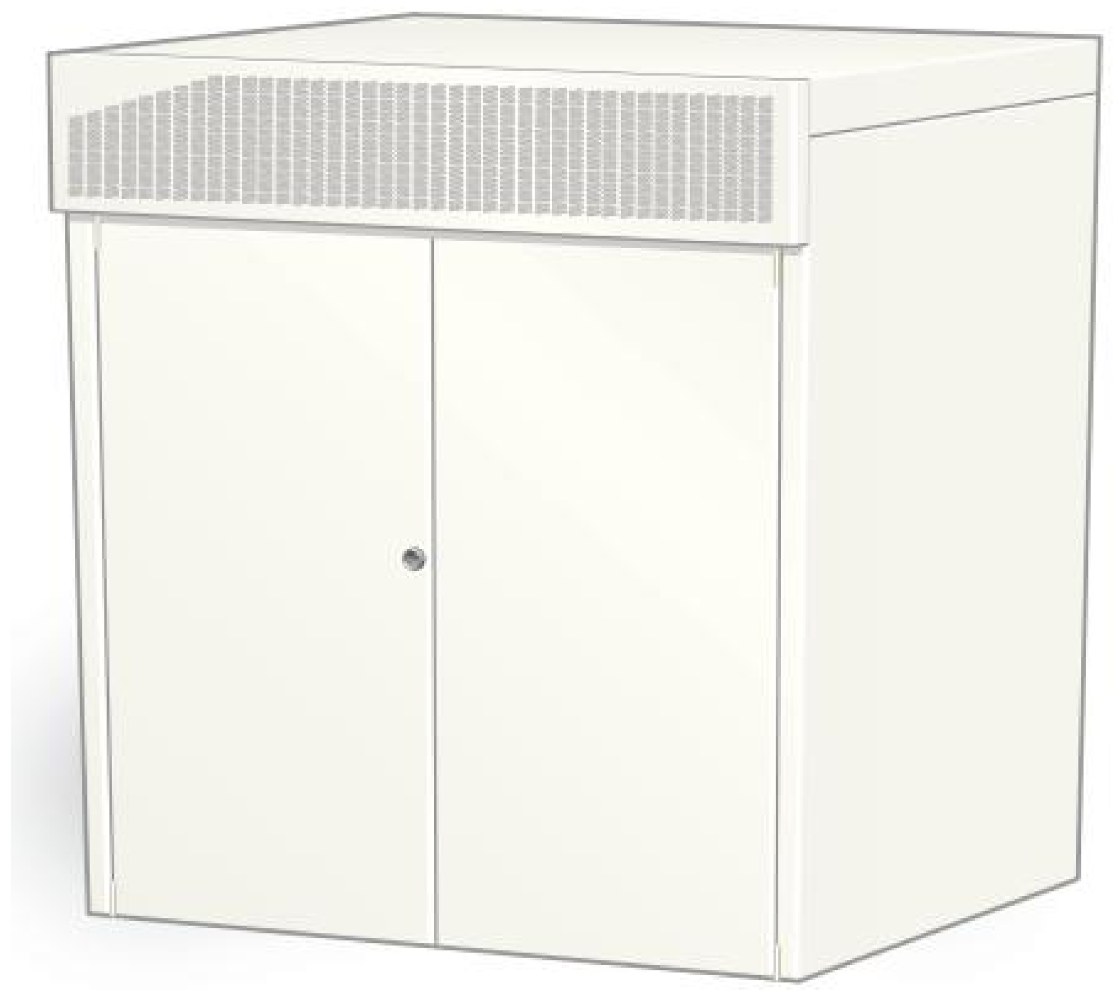
CENTEK engineering
Centered on Solutions
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
WTNH HAMDEN
SITE ID: CT11474A
101 TALMADGE ROAD
HAMDEN, CT 06518

DATE: 04/11/19
SCALE: AS NOTED
JOB NO. 19027.14

TYPICAL ELECTRICAL DETAILS

E-1



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

1
E–2
ERICSSON RADIO CABINET DETAIL
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	07/03/19	KAWJR	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
0	05/13/19	KAWJR	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

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
WTNH HAMDEN
SITE ID: CT11474A
101 TALMADGE ROAD
HAMDEN, CT 06518

DATE: 04/11/19
SCALE: AS NOTED
JOB NO. 19027.14

DETAILS

E–2

STAINLESS®

A BUSINESS OF FDH INFRASTRUCTURE SERVICES

REPORT 362024

DATE: 5/31/2019

SUFFICIENT CAPACITY – 97%

RIGOROUS STRUCTURAL ANALYSIS

FOR A 907' G-12 GUYED TOWER

NEW HAVEN (HAMDEN), CONNECTICUT

PREPARED BY: CD

CHECKED BY: AP

APPROVED: KP

STATE OF CONNECTICUT
KRYSTYNA M. PERZ
No. 32975
LICENSED
PROFESSIONAL ENGINEER

06/03/2019

Date	Pages	Remarks

Rev.	Date	Description

Rev.	Date	Description

A. AUTHORIZATION/PURPOSE

As authorized by Kyle Richers of Transcend Wireless, a structural analysis was performed to investigate the adequacy of a 907' overall height Stainless G-12 guyed tower located at 101 Talmadge Road in Hamden, Connecticut to support specified equipment.

B. TOWER HISTORY

The tower was originally designed and furnished in 1995 by Stainless. It was designed in accordance with TIA/EIA-222-E for a wind speed of 85 mph and 73.6 mph with 1/2" ice while supporting the following equipment:

1. One (1) top mounted Dielectric TCL-12A8 (S) antenna, fed by two (2) 6-1/8" rigid lines.
2. One (1) top mounted HDTV antenna, fed by one (1) WR1150 waveguide (future).
3. One (1) Dielectric TFU-28JSM Ch. 59 antenna, at the 730' level, fed by one (1) WR1150 waveguide.
4. One (1) Dielectric TFU-28JSM HDTV Ch. 14 antenna, at the 670' level, fed by one (1) WR1150 waveguide (future).
5. Two (2) ENG Super Quad antennas at the 760' level, fed by one (1) 1-5/8" line and one (1) 1/2" control cable (one future).
6. One (1) ERI 6-bay panel type FM antenna at the 610' level, fed by one (1) 6-1/8" rigid line (future).
7. Two (2) Andrew MMDS wireless cable antennas at the 565' level, fed by one (1) EW20 waveguide (future).
8. One (1) ERI SHPX-3AE FM antenna at the 545' level, fed by one (1) 3" line.
9. One (1) ERI SHPX-3AE FM antenna at the 520' level, fed by one (1) 3" line.
10. Three (3) whip antennas at the 750' level, fed by one (1) 1-5/8" line to each.
11. Three (3) whip antennas at the 500' level, fed by one (1) 1-5/8" line to each.
12. Three (3) whip antennas at the 400' level, fed by one (1) 1-5/8" line to each.
13. Three (3) whip antennas at the 350' level, fed by one (1) 1-5/8" line to each (future).
14. Three (3) whip antennas at the 325' level, fed by one (1) 1-5/8" line to each (future).
15. Three (3) whip antennas at the 300' level, fed by one (1) 1-5/8" line to each (future).
16. One (1) Scala PR-450U antenna at the 339' level, fed by one (1) 7/8" line.
17. One (1) Scala PR-450U antenna at the 247' level, fed by one (1) 7/8" line.
18. One (1) 6' grid dish at the 400' level, fed by one (1) 1-5/8" line.
19. Two (2) 6' grid dishes at the 325' level, fed by one (1) 1-5/8" line to each (future).
20. Two (2) 6' grid dishes at the 225' level, fed by one (1) 1-5/8" line to each (future).
21. Two (2) 8' dishes with radomes at the 325' level, fed by one (1) EW63 waveguide to each (one future).

Rev.	Date	Description

22. One (1) 8' dish with radome at the 166' level, fed by one (1) EW63 waveguide (future).
23. One (1) 8' dish with radome at the 150' level, fed by one (1) EW63 waveguide (future).
24. One (1) inside climbing ladder with cable type safety device for the full height of the tower.
25. One (1) single car elevator with guide rails, cables, motor and elevator equipment.
26. Ice shields for all side mounted antennas, except the whip antennas.
27. One (1) red lighting system with circuits in rigid conduit for the full height of the tower.

❖ In 1998, the bottom stack Dielectric THP-O-2-1 antenna of the top mounted stack system was installed per Stainless Report 362006. The guy wires of all the four levels were also re-tensioned.

❖ The tower was modified in 2015 by Stainless per Report 362017. The modifications were as follows:
- Installed additional horizontal sub-bracing at the midpoints of the following bay:

Location	No of bays
591.3' – 583.8'	1

- Replaced existing diagonal braces with new, higher capacity members at the following bay:

Location	No of bays
621.3' – 613.8'	1

❖ In 2018, the tower was modified per Stainless Report 362023. The modifications consisted the following:
- Installed additional horizontal sub-bracing at the midpoints of the following bay:

Location	No of bays
553.8' – 546.3'	1

Stainless has no record of any other modifications to the tower structure or its foundations.

C. CONDITIONS INVESTIGATED

The analysis was performed for the tower supporting the equipment listed below based on the following sources:

- Stainless Proposal P19_3620_001 dated 4/18/2019.
- Stainless Report 362022 dated 8/22/2018.
- Emails from Kyle Richers of Transcend Wireless dated 4/12/2019, 5/2/2019, 5/23/2019 and 5/24/2019 with details of proposed and existing equipment.

Rev.	Date	Description

- Mount analysis by Centek Engineering per Project No. 19027.14 Rev 1 dated 4/29/2019.
- CT11474A_Mount Analysis_Rev 1_19.04.29_L600.pdf

APPURTENANCE	ELEVATION, ft.	FEED LINES
Stacked TCL-12A8(S) Ch. 8 / THP-O-2-1 Ch. 10	Tower top	6-1/8”/3-1/8” rigid
10’ omni	758	1-5/8”*
5’ omni	750	7/8”
Super Quad ENG	744	1-5/8”* & 1/2” control cable
DB408	742	1-5/8”*
Ice shield	681	-
PL8 8’ diameter dish/radome	678	EW63 & 1/2” cable
PL6-65 6’ diameter dish/radome	630	EW63 & 1/2” cable
(2) Dualight 12004-rot-1r07-001	605	--
6015-2/3R FM	591	4-1/16” rigid
(2) DB408	529	7/8” to each
DB408	510	7/8”
6810-2R 2-bay FM	458	6-1/8” rigid**
15” omni (unused)	420	1/2”
10’ omni (unused)	420	1-5/8”
5” omni	348	7/8”
Ice shield	346	–
6’ diameter grid dish	339	7/8”
(3) RFS APX16DWV-16DWV-S-E-A20 (Proposed) **(3) RFS APXVAARR24 43-U-NA20 (Proposed)** **(3) Radio 4449 B71+B12 (Proposed)** **(3) Radio 4415 B25 (Proposed)** **(3) Radio 4415 B66 (Proposed)** (3) Sector mounts	315	**(3) 1-3/8” hybrid cables (Proposed)**
(2) Dualight 12004-rot-1r07-001	302	--
(3) APXVSPP18-C-A20 (3) APXVTM14-C-120 (3) TD-RRH8x20 (6) RRUs (3) sector mounts	200	(3) 1-1/4” Hybriflex (1) 1-1/4” Hybriflex cable
Ice shield	166	–
8’ diameter dish/radome	160	(2) EW63
15” omni (unused)	102	1/2”

Rev.	Date	Description

ASPG952 (unused)	100	2-1/4”
GPS unit	75	1/2”
(2) support conduits	To 200 & 45	1” conduit
Support conduit	To 315	1-1/4” conduit
(7) support conduits	To 200’, 348’, 2 x 420’, 529’, 758’, top of tower	1-1/2” conduit
Ladder with cable safety device	To top of tower	3/8” cable
Elevator system	To top of tower	-
FAA red lighting system	To top of tower	1” to 45 1-1/2”from 45’ to tower top

REMOVING EQUIPMENT		
(3) APXV18-206517S-C-A20 (3) LNX-6515DS-VTM	315	(12) 7/8”

* Shared line

** This coax was cut at the 440’ – 480’ level and a 20’ length of 3” heliax was used to connect the 6-1/8” rigid coax to the antenna. The remaining length of the 6-1/8” rigid coax from 480’ to the top of tower was left in place

The locations of the transmission lines have been based upon the cross section from Stainless Report 362022 dated 08/22/2018 and shown on Page A-2 of this Report. Proposed transmission lines have been located to minimize the wind load on the tower. Deviating from the line arrangement as shown may invalidate the results of this analysis.

D. LOADS AND STRESSES

The analysis was performed using the following design parameters in accordance with the 2018 Connecticut Building Code, based on the 2015 IBC, and ANSI/TIA 222-G-2005, Structural Standard for Antenna Supporting Structures and Antennas, including Addenda 1 & 2, dated 2007 and 2009 respectively.

- Risk Category II
- 125 mph ultimate design wind speed with no ice.
- 50 mph nominal design wind speed with 3/4” design ice thickness
- Exposure Category B
- Topographic Category 5 (Mad Mare Ridge, SEE wind direction, ridge, crest = 650’, base = 400’, L/2 = 980’, x = 390’ windward, Kzt max=1.546)
- 0.187 earthquake spectral response acceleration at short periods (Ss)
- Earthquake Site Class D

Rev.	Date	Description

The ultimate design wind speed is converted to a nominal design wind speed for use in ANSI/TIA 222-G based upon the following formula:

$$V_{asd} = V_{ult} * (0.6)^{1/2}$$
$$= 125 * (0.6)^{1/2}$$
$$= 97 \text{ mph}$$

Seismic effects need not be considered as the value of Ss is less than 1.0 per Section 2.7.3 of ANSI/TIA 222-G. Load and resistance factors used to evaluate the adequacy of the structure were in accordance with ANSI/TIA 222-G.

E. METHOD OF ANALYSIS

The analysis was performed using tnxTower, a computerized program which idealizes the tower as a structure consisting of finite elements, and subjected to simultaneous transverse and axial loads.

F. RESULTS

The results of the analysis show the following ratings:

COMPONENT	SPAN	% RATING
Tower top	--	92
Leg compression	4	97
	3	97
	2	79
	1	84
Leg tension	4	80
	3	--
	2	--
	1	--
Diagonals	4	60
	3	67
	2	72
	1	76
Horizontals	4	50
	3	68
	2	51
	1	47
Guys	4	69
	3	64
	2	69
	1	79

Rev.	Date	Description

COMPONENT	SPAN	% RATING
Foundations	Base	79
	Inner anchors	72
	Outer anchors	62

The rating is defined as the percentage of the component design capacity that is used up in supporting itself and the loading from the antennas and transmission lines under the design wind and ice loading conditions. Ratings of up to 105% for tower members, and up to 110% for foundations are considered acceptable due to tolerances in calculating the applied loads on the tower as well as member design capacities.

However the state of Connecticut mandates a maximum rating of 100%, and the tower has been reviewed based on 100% maximum rating.

The twist and sway of the dishes under a service wind load of 60 mph are as follows:

Dish	Elevation, ft.	Twist, degrees	Sway, degrees
PL8 8’ diameter dish/ radome	678	0.92	0.08
PL6-65 6’ diameter dish/ radome	630	0.91	0.08
6’ diameter grid dish	339	0.84	0.03
8’ diameter dish/ radome	160	0.71	0.07

G. CONCLUSIONS AND RECOMMENDATIONS

Based on the preceding results, the following conclusions may be drawn:

1. The tower supporting equipment as specified in Section C above is adequate to achieve an ultimate design wind speed of 125 mph with no ice, and a nominal design wind speed of 50 mph with 3/4” design ice thickness in accordance with the 2018 Connecticut Building Code, based on the 2015 IBC, and ANSI/TIA 222-G with the analysis parameters of Section D.
2. The existing mounts at 315’ have been analyzed by Centek Engineering per Project No. 19027.14 Rev 1 dated 4/29/2019. Based on the recommendations of this report, the mounts are adequate after installing pipe bracing to the existing mounts.

H. PROVISIONS OF ANALYSIS

The analysis performed and the conclusions contained herein are based on the assumption that the tower has been properly installed and maintained, including, but not limited to the following:

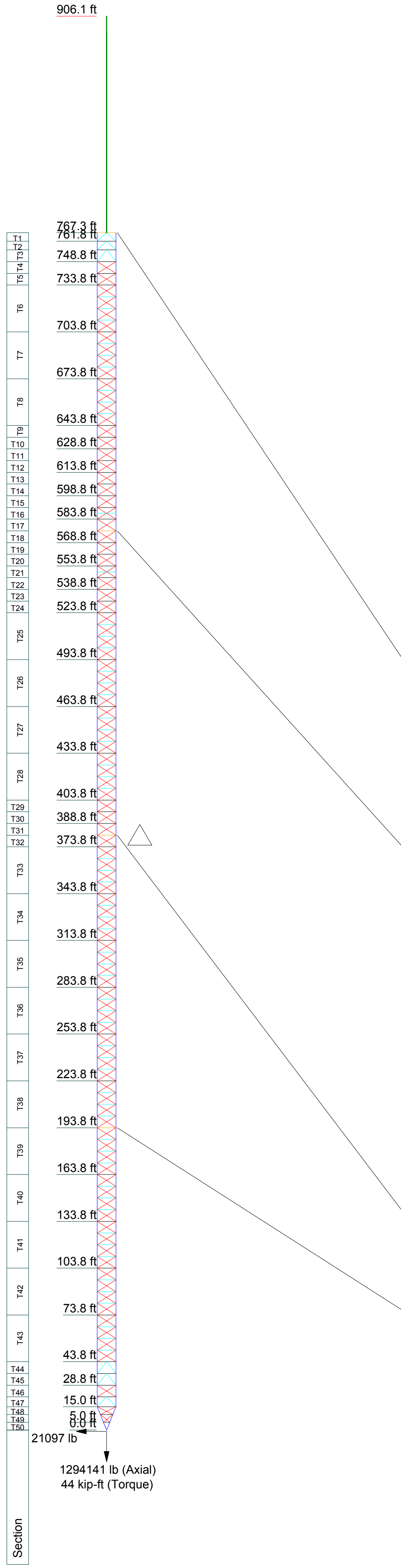
1. Proper alignment and plumbness.
2. Correct bolt tightness.
3. Correct guy tensions.

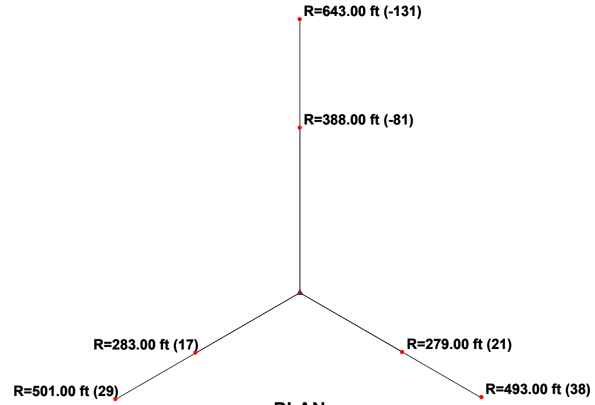
Rev.	Date	Description

4. No significant deterioration or damage to any component.

Furthermore, the information and conclusions contained in this Report were determined by application of the current "state-of-the-arts" engineering and analysis procedures and formulae, and Stainless assumes no obligations to revise any of the information or conclusions contained in this Report in the event that such engineering and analysis procedures and formulae are hereafter modified or revised. In addition, under no circumstances will Stainless have any obligation or responsibility whatsoever for or on account of consequential or incidental damages sustained by any person, firm or organization as a result of any information or conclusions contained in the Report, and the maximum liability of Stainless, if any, pursuant to this Report shall be limited to the total funds actually received by Stainless for preparation of this Report.
Customer has requested Stainless to prepare and submit to Customer an engineering analysis with respect to the Subject Tower and has further requested Stainless to make appropriate recommendations regarding suggested structural modifications and changes to the Subject Tower. In making such request of Stainless, Customer has informed Stainless that Customer will make a determination as to whether or not to implement any of the changes or modifications which may be suggested by Stainless and that Customer will have any such changes or modifications made by riggers, erectors and other subcontractors of Customer's choice.

Customer hereby agrees and acknowledges that Stainless shall have no liability whatsoever to Customer or to others for any work or services performed by any persons other than Stainless in connection with the implementation of any structural changes or modifications recommended by Stainless including but not limited to any services rendered for Customer or for others by riggers, erectors or other subcontractors. Customer acknowledges and agrees that any riggers, erectors or subcontractors retained or employed by Customer shall be solely responsible to Customer and to others for the quality of work performed by them and that Stainless shall have no liability or responsibility whatsoever as a result of any negligence or breach of contract by any such rigger, erector or subcontractor.





PLAN

DESIGNED APPURTENANCE LOADING

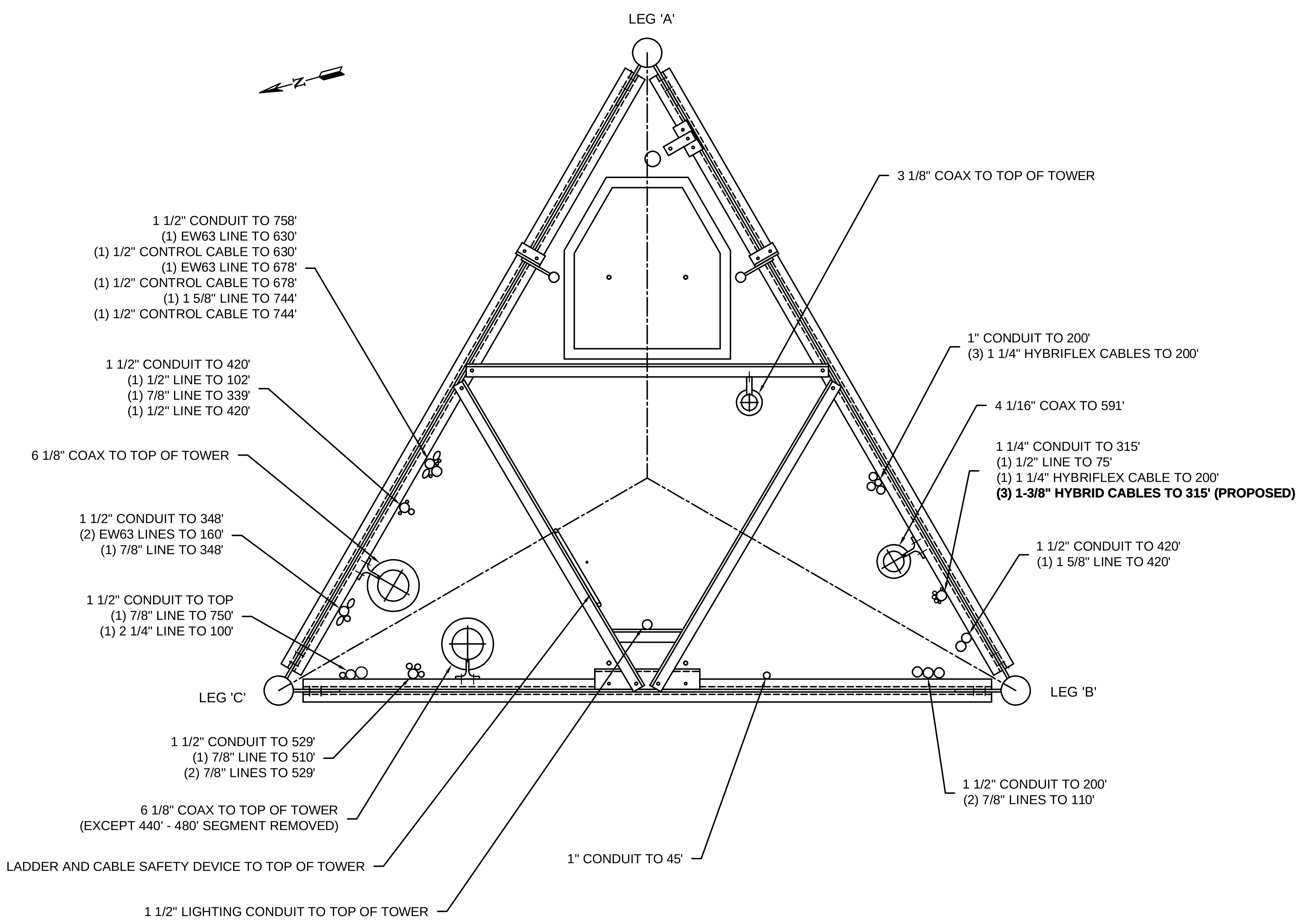
TYPE	ELEVATION	TYPE	ELEVATION
Dielectric THP-O2-1 wraparound	802.58	Radio 4415 B25 (Proposed)	315
ELEVATOR BEAMS_WEIGHT	767	Radio 4415 B25 (Proposed)	315
10' WHIP	758	Radio 4415 B25 (Proposed)	315
5' OMNI ANTENNA	750	Radio 4415 B66 (Proposed)	315
NURAD SUPERQUAD II ENG	744	Radio 4415 B66 (Proposed)	315
DB408	742	Radio 4415 B66 (Proposed)	315
ICE SHIELD	681	Sector mount	315
PL8	678	Sector mount	315
Andrew PL6-65	630	Sector mount	315
(2) Dualight 12004-RTO-1R07-001	605	(2) Dualight 12004-RTO-1R07-001	302
SHIVELY 6015-2/3R wraparound FM	591	APXSPP18-C-A20 w/ Mount Pipe	200
(2) DB408	529	APXSPP18-C-A20 w/ Mount Pipe	200
DB408	510	APXSPP18-C-A20 w/ Mount Pipe	200
SHVLY 6810 FW RAD_MT	458	APXVTM14-C-I20 w/ Mount Pipe	200
15' WHIP (UNUSED)	420	APXVTM14-C-I20 w/ Mount Pipe	200
10' WHIP (UNUSED)	420	APXVTM14-C-I20 w/ Mount Pipe	200
5' OMNI ANTENNA	348	TD-RRH8x20	200
ICE SHIELD	346	TD-RRH8x20	200
6' Grid Dish	339	TD-RRH8x20	200
APX16DWV-16DWVS-E-A20 w/ Mount Pipe (Proposed)	315	(2) 800 MHz RRH	200
		(2) 800 MHz RRH	200
APX16DWV-16DWVS-E-A20 w/ Mount Pipe (Proposed)	315	(2) 800 MHz RRH	200
		Sector mount	200
APX16DWV-16DWVS-E-A20 w/ Mount Pipe (Proposed)	315	Sector mount	200
		Sector mount	200
APXVAARR24_43-U-NA20 (Proposed)	315	ICE SHIELD	166
APXVAARR24_43-U-NA20 (Proposed)	315	8' MW Dish/radome	160
APXVAARR24_43-U-NA20 (Proposed)	315	DSiF03F36D-D on sidearm	110
Radio 4449 B71+B12 (Proposed)	315	15' WHIP (UNUSED)	102
Radio 4449 B71+B12 (Proposed)	315	ASGP952 ANTENNA (UNUSED)	100
Radio 4449 B71+B12 (Proposed)	315	GPS ANTENNA	75

TOWER DESIGN NOTES

1. Tower designed for Exposure B to the TIA-222-G Standard.
2. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 5 with Crest Height of 250.00 ft
7. 129.00 ft TCL-12A8 (S) is included for load transfer only.

ALL REACTIONS ARE FACTORED

STAINLESS® A BUSINESS OF FDH INFRASTRUCTURE SERVICES Tower Engineers	***STAINLESS*** 100 West Main Street, Suite 400 Lansdale, PA - 19446 Phone: 215-372-1378 FAX:	Job: ***362024 New Haven (Hamden) CT*** Project: ***907' overall height Stainless G-12 guyed towe*** Client: Transcend Wireless · Drawn by: CD · App'd: Code: TIA-222-G · Date: 05/31/19 · Scale: NTS Path: \\192.168.4.90\Project\362024\eng\tnxTower\362024.eri · Dwg No. E-1



STAINLESS®
A BUSINESS OF FDH INFRASTRUCTURE SERVICES
100 West Main Street, Suite 400
Lansdale, PA 19446

LINEAR APPURTENANCES
NEW HAVEN (HAMDEN), CT

REV	BY	DATE	REVISION DESCRIPTION	D.CK	DATE	E.CK	DATE
*							
*							
*							
*							
*							
*							

PREPARED BY	TM	5/23/2019
CHECKED BY		
ENGINEER REVIEW		
PROJECT NUMBER	362024	
DRAWING NUMBER	A-2	

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

T-Mobile Site #: CT11474A

101 Talmadge Road
Hamden, CT

Centek Project No. 19027.14

~~Date: April 24, 2019~~
Rev 1: April 29, 2019

Max Stress Ratio = 92.1%

STATE OF CONNECTICUT
CAMILO A. GAVIRIA
27517
LICENSED
PROFESSIONAL ENGINEER

Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

CENTEK engineering

Centered on Solutions℠

April 29, 2019

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

Re: *Structural Letter ~ Antenna Mount*
T-Mobile – Site Ref: CT11474A
101 Talmadge Road
Hamden, CT 06518

Centek Project No. 19027.14

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) custom-made T-Frames attached to the existing structure, to support the equipment configuration. The review considered the effects of wind load, dead load and ice load. 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) Ericsson RFS APX16DWV-16DWV-S-E-A20 panel antennas, three (3) RFS APXVAARR24-43-NA20 panel antennas, three (3) Ericsson 4415 B66 remote radio units, three (3) Ericsson 4415 B25 remote radio units, three (3) Ericsson 4449 B71_B12 remote radio units mounted on three (3) T-Frames with a RAD center elevation of 315-ft +/- AGL. (NOTE: APXVAARR24-43 antenna must be mounted at a maximum of 3-ft away from outrigger arm.)**
- The antenna mount was analyzed per the requirements of the 2015 International Building Code as modified by the 2018 Connecticut State Building Code considering a nominal design wind speed of 97 mph for Hamden 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 existing T-frames with the installation of one (1) Pipe 1.25 STD mount brace are structurally adequate to support the proposed antenna configuration.** If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:

STATE OF CONNECTICUT
CAMILO A. GAVIRIA
27517
LICENSED
PROFESSIONAL ENGINEER

Camilo A. Gaviria, PE
Structural Engineer

Prepared by:

Fernando J. Palacios
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

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

Wind Speeds

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

Input

Structure Type =	Structure_Type := Lattice		(User Input)
Structure Category =	SC := II		(User Input)
Exposure Category =	Exp := C		(User Input)
Structure Height =	$h := 765$	ft	(User Input)
Height to Center of Antennas =	$z := 315$	ft	(User Input)
Radial Ice Thickness =	$t_i := 0.75$	in	(User Input per Annex B of TIA-222-G)
Radial Ice Density =	$Id := 56.00$	pcf	(User Input)
Topograpic Factor =	$K_{zt} := 1.0$		(User Input)
	$K_a := 1.0$		(User Input)
Gust Response Factor =	$G_H = 1.165$		(User Input)

Output

Wind Direction Probability Factor =

$K_d :=$ if Structure_Type = Pole → 0.95; if Structure_Type = Lattice → 0.85 $= 0.85$

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

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

Importance Factors =

$I_{Wind} :=$ if SC = 1 → 0.87; if SC = 2 → 1.00; if SC = 3 → 1.15 $= 1$

$I_{Wind\_w\_Ice} :=$ if SC = 1 → 0; if SC = 2 → 1.00; if SC = 3 → 1.00 $= 1$

$I_{ice} :=$ if SC = 1 → 0; if SC = 2 → 1.00; if SC = 3 → 1.25 $= 1$

$$K_{iz} := \left(\frac{z}{33}\right)^{0.1} = 1.253$$

Velocity Pressure Coefficient Antennas =

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.88$$

$$Kz := 2.01 \cdot \left(\left(\frac{z}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.611$$

Velocity Pressure w/o Ice Antennas = $qz := 0.00256 \cdot K_d \cdot Kz \cdot V^2 \cdot I_{Wind} = 32.992$ psf

Velocity Pressure with Ice Antennas = $qz_{ice} := 0.00256 \cdot K_d \cdot Kz \cdot V_i^2 \cdot I_{Wind} = 8.766$ psf

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS APXVAARR24_43		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 95.9$	in	(User Input)
Antenna Width =	$W_{ant} := 19.7$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 133.4$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.9$		
Antenna Force Coefficient =	$Ca_{ant} = 1.31$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 13.1$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 658$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 5.8$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 291$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 16.2$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 216$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 8.6$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 115$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \cdot 10^4$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 1 \cdot 10^4$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 411$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 411$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS APX16DWV-16DWVS-E-A20		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 55.9$	in	(User Input)
Antenna Width =	$W_{ant} := 13$	in	(User Input)
Antenna Thickness =	$T_{ant} := 3.15$	in	(User Input)
Antenna Weight =	$WT_{ant} := 40.7$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.3$		
Antenna Force Coefficient =	$Ca_{ant} = 1.28$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 5$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 248$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.2$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 60$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6.9$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 91$	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 Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 37$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2289$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 4619$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 150$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 150$	lbs

Development of Wind & Ice Load on RRUS's

RRUS Data:

RRUS Model = Ericsson 4449 B71B12

RRUS Shape = Flat (User Input)

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

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

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

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

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

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

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

Wind Load (without ice)

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

Total RRUS Wind Force = $F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 63$ lbs

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

Total RRUS Wind Force = $F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 50$ lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSF} := \frac{\left(L_{RRUS} + 2 \cdot t_{iz}\right) \cdot \left(W_{RRUS} + 2 \cdot t_{iz}\right)}{144} = 2.2$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 27$ lbs

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

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 22$ 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 = $V_{ice} := \left(L_{RRUS} + 2 \cdot t_{iz}\right) \cdot \left(W_{RRUS} + 2 \cdot t_{iz}\right) \cdot \left(T_{RRUS} + 2 \cdot t_{iz}\right) - V_{RRUS} = 2435$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 79$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 79$ lbs

Development of Wind & Ice Load on RRUS's

RRUS Data:

RRUS Model = Ericsson 4415 B66A

RRUS Shape = Flat (User Input)

RRUS Height = $L_{RRUS} := 16.5$ in (User Input)

RRUS Width = $W_{RRUS} := 13.4$ in (User Input)

RRUS Thickness = $T_{RRUS} := 5.9$ in (User Input)

RRUS Weight = $WT_{RRUS} := 47.40$ lbs (User Input)

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

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

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

Wind Load (without ice)

Surface Area for One RRUS = $SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 1.5$ sf

Total RRUS Wind Force = $F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 71$ lbs

Surface Area for One RRUS = $SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 0.7$ sf

Total RRUS Wind Force = $F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 31$ lbs

Wind Load (with ice)

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

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 30$ lbs

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.4$ sf

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

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each RRUS = $V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 1304$ cu in

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2053$ 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

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

Development of Wind & Ice Load on RRUS's

RRUS Data:

RRUS Model = Ericsson 4415 B25

RRUS Shape = Flat (User Input)

RRUS Height = $L_{RRUS} := 16.5$ in (User Input)

RRUS Width = $W_{RRUS} := 13.4$ in (User Input)

RRUS Thickness = $T_{RRUS} := 5.9$ in (User Input)

RRUS Weight = $WT_{RRUS} := 46$ lbs (User Input)

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

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

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

Wind Load (without ice)

Surface Area for One RRUS = $SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 1.5$ sf

Total RRUS Wind Force = $F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 71$ lbs

Surface Area for One RRUS = $SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 0.7$ sf

Total RRUS Wind Force = $F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 31$ lbs

Wind Load (with ice)

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

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 30$ lbs

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSS} := \frac{\left(L_{RRUS} + 2 \cdot t_{iz}\right) \cdot \left(T_{RRUS} + 2 \cdot t_{iz}\right)}{144} = 1.4$ sf

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

Gravity Load (without ice)

Weight of All RRUSs = $WT_{RRUS} \cdot N_{RRUS} = 46$ lbs

Gravity Loads (ice only)

Volume of Each RRUS = $V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 1304$ cu in

Volume of Ice on Each RRUS = $V_{ice} := \left(L_{RRUS} + 2 \cdot t_{iz}\right) \cdot \left(W_{RRUS} + 2 \cdot t_{iz}\right) \cdot \left(T_{RRUS} + 2 \cdot t_{iz}\right) - V_{RRUS} = 2053$ 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 TMA's

TMA Data:

TMA Model = Ericsson KRY112 TMA

TMA Shape = Flat in (User Input)

TMA Height = $L_{TMA} := 6.9$ in (User Input)

TMA Width = $W_{TMA} := 6.1$ in (User Input)

TMA Thickness = $T_{TMA} := 2.8$ lbs (User Input)

TMA Weight = $WT_{TMA} := 11$ (User Input)

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

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

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

Wind Load (without ice)

Surface Area for One TMA = $SA_{TMAF} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.3$ sf

Total TMA Wind Force = $F_{TMA} := qz \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAF} = 13$ lbs

Surface Area for One TMA = $SA_{TMAS} := \frac{L_{TMA} \cdot T_{TMA}}{144} = 0.1$ sf

Total TMA Wind Force = $F_{TMA} := qz \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAS} = 6$ lbs

Wind Load (with ice)

Surface Area for One TMA w/ Ice = $SA_{ICETMAF} := \frac{(L_{TMA} + 2 \cdot t_{iz}) \cdot (W_{TMA} + 2 \cdot t_{iz})}{144} = 0.7$ sf

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

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

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

Gravity Load (without ice)

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

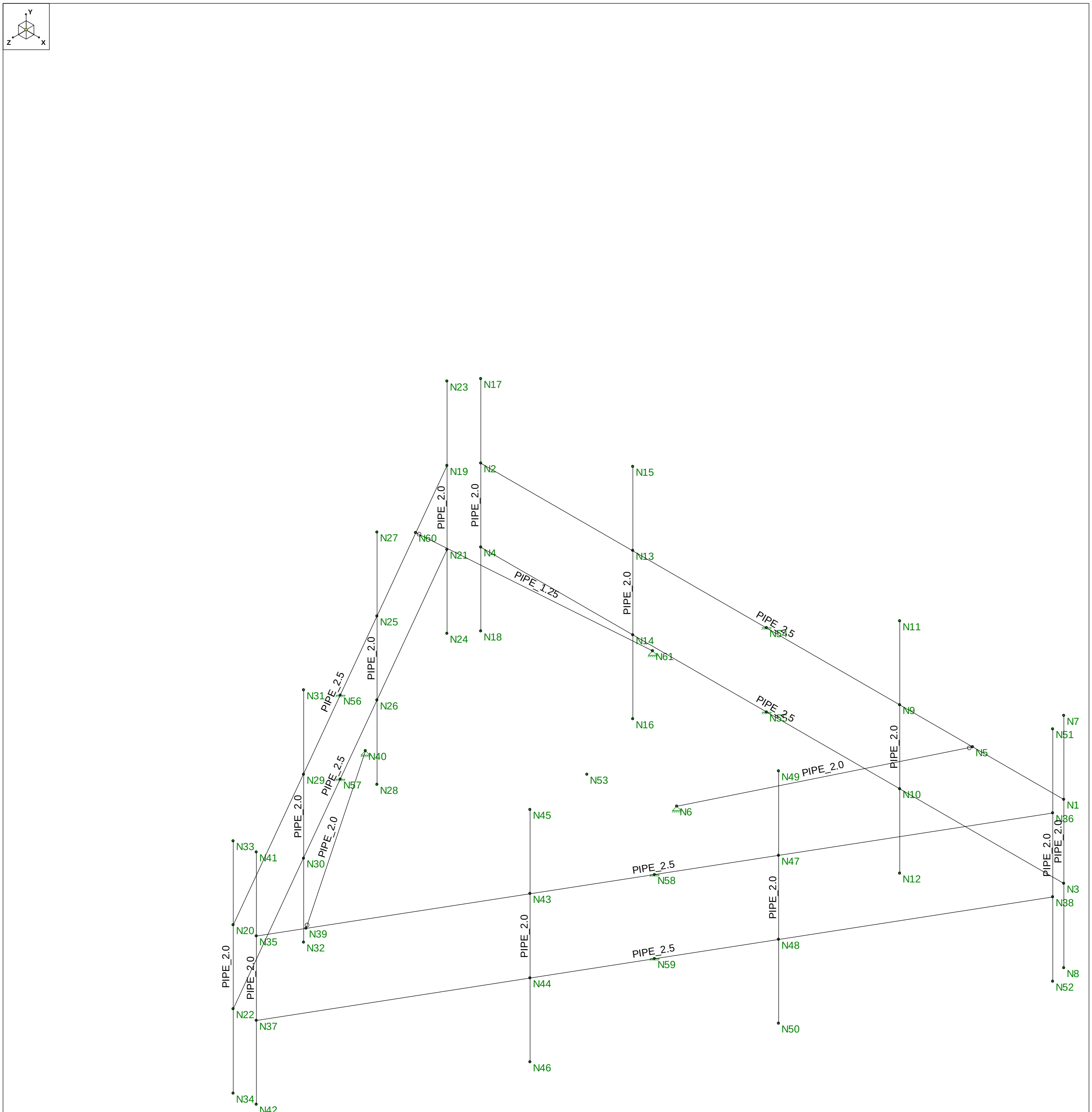
Gravity Loads (ice only)

Volume of Each TMA = $V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 118$ cu in

Volume of Ice on Each TMA = $V_{ice} := (L_{TMA} + 2 \cdot t_{iz}) \cdot (W_{TMA} + 2 \cdot t_{iz}) \cdot (T_{TMA} + 2 \cdot t_{iz}) - V_{TMA} = 571$ cu in

Weight of Ice on Each TMA = $W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 19$ lbs

Weight of Ice on All TMAs = $W_{ICETMA} \cdot N_{TMA} = 19$ lbs



Envelope Only Solution

Centek		
FJP	CT11474A_AMA	Apr 24, 2019 at 2:24 PM
19027.14	Member Framing	CT11474A_AMA.R3D

(Global) Model Settings

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

Hot Rolled Steel Code	AISC 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?	Yes
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	1
Cd X	1
Rho Z	1
Rho X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	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 Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...	Lcomp bot[...	L-torq...	Kyy	Kzz	Cb	Functi...
1	M1	(E) Stiff Arm	6.083			Lbyy						Lateral
2	M2	(E) Stiff Arm	6.083			Lbyy						Lateral
3	M3	(E) Horz	16	Segment	Segment	Segment	Segment	Segm...				Lateral
4	M4	(E) Horz	16	Segment	Segment	Segment	Segment	Segm...				Lateral
5	M5	(E) Horz	16	Segment	Segment	Segment	Segment	Segm...				Lateral
6	M6	(E) Horz	16	Segment	Segment	Segment	Segment	Segm...				Lateral
7	M7	(E) Horz	16	Segment	Segment	Segment	Segment	Segm...				Lateral
8	M8	(E) Horz	16	Segment	Segment	Segment	Segment	Segm...				Lateral
9	M9	(E)Antenn...	6			Lbyy						Lateral
10	M10	(E)Antenn...	6			Lbyy						Lateral
11	M11	(E)Antenn...	6			Lbyy						Lateral
12	M12	(E)Antenn...	6			Lbyy						Lateral
13	M13	(E)Antenn...	6			Lbyy						Lateral
14	M14	(E)Antenn...	6			Lbyy						Lateral
15	M15	(E)Antenn...	6			Lbyy						Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...	Lcomp bot[...	L-torq...	Kyy	Kzz	Cb	Functi...
16	M16	(E)Antenn...	6			Lbyy						Lateral
17	M17	(E)Antenn...	6			Lbyy						Lateral
18	M18	(E)Antenn...	6			Lbyy						Lateral
19	M19	(E)Antenn...	6			Lbyy						Lateral
20	M20	(E)Antenn...	6			Lbyy						Lateral
21	M21	(P) Stiff Arm	6.083			Lbyy						Lateral

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Desig...	A [in2]	Iyy [i...	Izz [i...	J [in4]
1	(E) Horz	PIPE_2.5	Beam	Pipe	A53 Grade B	Typical	1.61	1.45	1.45	2.89
2	(E) Stiff Arm	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
3	(E)Antenna Mast	PIPE_2.0	Colu...	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	(P) Stiff Arm	PIPE_1.25	Beam	Pipe	A53 Grade B	Typical	.625	.184	.184	.368

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N5	N6			(E) Stiff Arm	Beam	Pipe	A53 Grad...	Typical
2	M2	N39	N40			(E) Stiff Arm	Beam	Pipe	A53 Grad...	Typical
3	M3	N1	N2			(E) Horz	Beam	Pipe	A53 Grad...	Typical
4	M4	N3	N4			(E) Horz	Beam	Pipe	A53 Grad...	Typical
5	M5	N19	N20			(E) Horz	Beam	Pipe	A53 Grad...	Typical
6	M6	N21	N22			(E) Horz	Beam	Pipe	A53 Grad...	Typical
7	M7	N35	N36			(E) Horz	Beam	Pipe	A53 Grad...	Typical
8	M8	N37	N38			(E) Horz	Beam	Pipe	A53 Grad...	Typical
9	M9	N8	N7		60	(E)Antenna Mast	Column	Pipe	A53 Grad...	Typical
10	M10	N12	N11		60	(E)Antenna Mast	Column	Pipe	A53 Grad...	Typical
11	M11	N16	N15		60	(E)Antenna Mast	Column	Pipe	A53 Grad...	Typical
12	M12	N18	N17		60	(E)Antenna Mast	Column	Pipe	A53 Grad...	Typical
13	M13	N24	N23		60	(E)Antenna Mast	Column	Pipe	A53 Grad...	Typical
14	M14	N28	N27		60	(E)Antenna Mast	Column	Pipe	A53 Grad...	Typical
15	M15	N32	N31		60	(E)Antenna Mast	Column	Pipe	A53 Grad...	Typical
16	M16	N34	N33		60	(E)Antenna Mast	Column	Pipe	A53 Grad...	Typical
17	M17	N42	N41		60	(E)Antenna Mast	Column	Pipe	A53 Grad...	Typical
18	M18	N46	N45		60	(E)Antenna Mast	Column	Pipe	A53 Grad...	Typical
19	M19	N50	N49		60	(E)Antenna Mast	Column	Pipe	A53 Grad...	Typical
20	M20	N52	N51		60	(E)Antenna Mast	Column	Pipe	A53 Grad...	Typical
21	M21	N60	N61			(P) Stiff Arm	Beam	Pipe	A53 Grad...	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diaphragm
1	N1	8.014156	1	-5.32078	0	
2	N2	-7.985844	1	-5.32078	0	
3	N3	8.014156	-1	-5.32078	0	
4	N4	-7.985844	-1	-5.32078	0	
5	N5	5.514156	1	-5.32078	0	
6	N6	2.852155	1	0.149196	0	
7	N7	8.014156	3	-5.32078	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diaphragm
8	N8	8.014156	-3	-5.32078	0	
9	N9	3.514156	1	-5.32078	0	
10	N10	3.514156	-1	-5.32078	0	
11	N11	3.514156	3	-5.32078	0	
12	N12	3.514156	-3	-5.32078	0	
13	N13	-3.819177	1	-5.32078	0	
14	N14	-3.819177	-1	-5.32078	0	
15	N15	-3.819177	3	-5.32078	0	
16	N16	-3.819177	-3	-5.32078	0	
17	N17	-7.985844	3	-5.32078	0	
18	N18	-7.985844	-3	-5.32078	0	
19	N19	-8.400106	1	-4.796633	0	
20	N20	-0.400106	1	9.059773	0	
21	N21	-8.400106	-1	-4.796633	0	
22	N22	-0.400106	-1	9.059773	0	
23	N23	-8.400106	3	-4.796633	0	
24	N24	-8.400106	-3	-4.796633	0	
25	N25	-5.775106	1	-0.25	0	
26	N26	-5.775106	-1	-0.25	0	
27	N27	-5.775106	3	-0.25	0	
28	N28	-5.775106	-3	-0.25	0	
29	N29	-3.025106	1	4.51314	0	
30	N30	-3.025106	-1	4.51314	0	
31	N31	-3.025106	3	4.51314	0	
32	N32	-3.025106	-3	4.51314	0	
33	N33	-0.400106	3	9.059773	0	
34	N34	-0.400106	-3	9.059773	0	
35	N35	0.177616	1	9.012123	0	
36	N36	8.177616	1	-4.844283	0	
37	N37	0.177616	-1	9.012123	0	
38	N38	8.177616	-1	-4.844283	0	
39	N39	0.677616	1	8.146098	0	
40	N40	-2.728521	1	3.10575	0	
41	N41	0.177616	3	9.012123	0	
42	N42	0.177616	-3	9.012123	0	
43	N43	2.927616	1	4.248984	0	
44	N44	2.927616	-1	4.248984	0	
45	N45	2.927616	3	4.248984	0	
46	N46	2.927616	-3	4.248984	0	
47	N47	5.427616	1	-0.081143	0	
48	N48	5.427616	-1	-0.081143	0	
49	N49	5.427616	3	-0.081143	0	
50	N50	5.427616	-3	-0.081143	0	
51	N51	8.177616	3	-4.844283	0	
52	N52	8.177616	-3	-4.844283	0	
53	N53	-0.125	0	-0.36843	0	
54	N54	-0.152511	1	-5.32078	0	
55	N55	-0.152511	-1	-5.32078	0	
56	N56	-4.400106	1	2.13157	0	
57	N57	-4.400106	-1	2.13157	0	
58	N58	4.177616	1	2.08392	0	
59	N59	4.177616	-1	2.08392	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diaphragm
60	N60	-7.233439	1	-2.775907	0	
61	N61	-1.165301	1	-3.205535	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	N6	Reaction	Reaction	Reaction			
2	N40	Reaction	Reaction	Reaction			
3	N54	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N55	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	N56	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
6	N57	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
7	N58	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
8	N59	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
9	N61	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Equipment Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M16	Y	-.021	.75
2	M16	Y	-.021	5
3	M12	Y	-.021	.75
4	M12	Y	-.021	5
5	M20	Y	-.021	.75
6	M20	Y	-.021	5
7	M13	Y	-.067	.75
8	M13	Y	-.067	5
9	M9	Y	-.067	.75
10	M9	Y	-.067	5
11	M17	Y	-.067	.75
12	M17	Y	-.067	5
13	M16	Y	-.047	2.5
14	M12	Y	-.047	2.5
15	M20	Y	-.047	2.5
16	M13	Y	-.047	2.5
17	M9	Y	-.047	2.5
18	M17	Y	-.047	2.5
19	M16	Y	-.074	4.583
20	M12	Y	-.074	4.583
21	M20	Y	-.074	4.583

Member Point Loads (BLC 3 : Ice Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M16	Y	-.075	.75
2	M16	Y	-.075	5
3	M12	Y	-.075	.75
4	M12	Y	-.075	5
5	M20	Y	-.075	.75
6	M20	Y	-.075	5
7	M13	Y	-.205	.75

Member Point Loads (BLC 3 : Ice Weight) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
8	M13	Y	-.205	5
9	M9	Y	-.205	.75
10	M9	Y	-.205	5
11	M17	Y	-.205	.75
12	M17	Y	-.205	5
13	M16	Y	-.067	2.5
14	M12	Y	-.067	2.5
15	M20	Y	-.067	2.5
16	M13	Y	-.067	2.5
17	M9	Y	-.067	2.5
18	M17	Y	-.067	2.5
19	M16	Y	-.079	4.583
20	M12	Y	-.079	4.583
21	M20	Y	-.079	4.583

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M16	X	-.091	.75
2	M16	X	-.091	5
3	M12	X	-.018	.75
4	M12	X	-.018	5
5	M20	X	-.091	.75
6	M20	X	-.091	5
7	M13	X	-.108	.75
8	M13	X	-.108	5
9	M9	X	-.058	.75
10	M9	X	-.058	5
11	M17	X	-.108	.75
12	M17	X	-.108	5
13	M16	X	-.03	2.5
14	M12	X	-.017	2.5
15	M20	X	-.03	2.5
16	M13	X	-.03	2.5
17	M9	X	-.017	2.5
18	M17	X	-.03	2.5
19	M16	X	-.027	4.583
20	M12	X	-.022	4.583
21	M20	X	-.027	4.583

Member Point Loads (BLC 5 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M16	X	-.124	.75
2	M16	X	-.124	5
3	M12	X	-.03	.75
4	M12	X	-.03	5
5	M20	X	-.124	.75
6	M20	X	-.124	5
7	M13	X	-.329	.75
8	M13	X	-.329	5
9	M9	X	-.145	.75
10	M9	X	-.145	5

Member Point Loads (BLC 5 : Wind X) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
11	M17	X	-.329	.75
12	M17	X	-.329	5
13	M16	X	-.071	2.5
14	M12	X	-.031	2.5
15	M20	X	-.071	2.5
16	M13	X	-.071	2.5
17	M9	X	-.031	2.5
18	M17	X	-.071	2.5
19	M16	X	-.063	4.583
20	M12	X	-.05	4.583
21	M20	X	-.063	4.583

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M16	Z	-.018	.75
2	M16	Z	-.018	5
3	M12	Z	-.091	.75
4	M12	Z	-.091	5
5	M20	Z	-.018	.75
6	M20	Z	-.018	5
7	M13	Z	-.058	.75
8	M13	Z	-.058	5
9	M9	Z	-.108	.75
10	M9	Z	-.108	5
11	M17	Z	-.058	.75
12	M17	Z	-.058	5
13	M16	Z	-.017	2.5
14	M12	Z	-.03	2.5
15	M20	Z	-.017	2.5
16	M13	Z	-.017	2.5
17	M9	Z	-.03	2.5
18	M17	Z	-.017	2.5
19	M16	Z	-.022	4.583
20	M12	Z	-.027	4.583
21	M20	Z	-.022	4.583

Member Point Loads (BLC 7 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M16	Z	-.03	.75
2	M16	Z	-.03	5
3	M12	Z	-.124	.75
4	M12	Z	-.124	5
5	M20	Z	-.03	.75
6	M20	Z	-.03	5
7	M13	Z	-.145	.75
8	M13	Z	-.145	5
9	M9	Z	-.329	.75
10	M9	Z	-.329	5
11	M17	Z	-.145	.75
12	M17	Z	-.145	5
13	M16	Z	-.031	2.5

Member Point Loads (BLC 7 : Wind Z) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
14	M12	Z	-.071	2.5
15	M20	Z	-.031	2.5
16	M13	Z	-.031	2.5
17	M9	Z	-.071	2.5
18	M17	Z	-.031	2.5
19	M16	Z	-.05	4.583
20	M12	Z	-.063	4.583
21	M20	Z	-.05	4.583

Joint Loads and Enforced Displacements

Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (i...
No Data to Print ...			

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M5	X	-.002	-.002	0	0
2	M6	X	-.002	-.002	0	0
3	M7	X	-.002	-.002	0	0
4	M8	X	-.002	-.002	0	0
5	M14	X	-.002	-.002	0	0
6	M15	X	-.002	-.002	0	0
7	M18	X	-.002	-.002	0	0
8	M19	X	-.002	-.002	0	0
9	M10	X	-.002	-.002	0	0
10	M11	X	-.002	-.002	0	0
11	M9	X	-.002	-.002	0	0
12	M12	X	-.002	-.002	0	0
13	M1	X	-.002	-.002	0	0
14	M2	X	-.002	-.002	0	0

Member Distributed Loads (BLC 5 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M5	X	-.008	-.008	0	0
2	M6	X	-.008	-.008	0	0
3	M7	X	-.008	-.008	0	0
4	M8	X	-.008	-.008	0	0
5	M14	X	-.008	-.008	0	0
6	M15	X	-.008	-.008	0	0
7	M18	X	-.008	-.008	0	0
8	M19	X	-.008	-.008	0	0
9	M10	X	-.008	-.008	0	0
10	M11	X	-.008	-.008	0	0
11	M9	X	-.008	-.008	0	0
12	M12	X	-.008	-.008	0	0
13	M1	X	-.006	-.006	0	0
14	M2	X	-.006	-.006	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M3	Z	-.002	-.002	0	0
2	M4	Z	-.002	-.002	0	0
3	M10	Z	-.002	-.002	0	0
4	M11	Z	-.002	-.002	0	0
5	M14	Z	-.002	-.002	0	0
6	M15	Z	-.002	-.002	0	0
7	M18	Z	-.002	-.002	0	0
8	M19	Z	-.002	-.002	0	0
9	M1	Z	-.002	-.002	0	0
10	M2	Z	-.002	-.002	0	0
11	M21	Z	-.001	-.001	0	0

Member Distributed Loads (BLC 7 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M3	Z	-.008	-.008	0	0
2	M4	Z	-.008	-.008	0	0
3	M10	Z	-.008	-.008	0	0
4	M11	Z	-.008	-.008	0	0
5	M14	Z	-.008	-.008	0	0
6	M15	Z	-.008	-.008	0	0
7	M18	Z	-.008	-.008	0	0
8	M19	Z	-.008	-.008	0	0
9	M1	Z	-.006	-.006	0	0
10	M2	Z	-.006	-.006	0	0
11	M21	Z	-.005	-.005	0	0

Basic Load Cases

	BLC Description	Category	X Gr...	Y Gr...	Z Gr...	Joint	Point	Distri...	Area(...	Surface(Plate/Wall)
1	Self Weight	None		-1						
2	Equipment Weight	None					21			
3	Ice Weight	None					21			
4	Wind w/ Ice X	None					21	14		
5	Wind X	None					21	14		
6	Wind w/ Ice Z	None					21	11		
7	Wind Z	None					21	11		

Load Combinations

	Description	Solve	P...	SR...	BLC	F...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.2D + 1.6W (X-direction)	Yes	Y		1	1...	2	1.2	5	1.6																
2	0.9D + 1.6W (X-direction)	Yes	Y		1	.9	2	.9	5	1.6																
3	1.2D + 1.0Di + 1.0Wi (X...	Yes	Y		1	1...	2	1.2	3	1	4	1														
4	1.2D + 1.6W (X-direction)	Yes	Y		1	1...	2	1.2	7	1.6																
5	0.9D + 1.6W (X-direction)	Yes	Y		1	.9	2	.9	7	1.6																
6	1.2D + 1.0Di + 1.0Wi (X...	Yes	Y		1	1...	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	N6	max	.032	2	.017	4	1.994	4	0	6	0	6	0	6
2		min	-.955	4	.01	2	0	2	0	1	0	1	0	1
3	N40	max	.819	1	.012	6	1.165	1	0	6	0	6	0	6
4		min	.049	6	.007	2	.078	6	0	1	0	1	0	1
5	N54	max	.86	5	.765	6	.042	6	0	2	3.877	5	.289	6
6		min	-.547	3	.264	2	-.045	5	-.688	4	0	2	.022	2
7	N55	max	.812	3	.743	3	.455	5	0	2	2.23	4	.3	3
8		min	.094	5	.273	5	0	3	-.881	4	0	2	.035	5
9	N56	max	.375	6	.765	6	.641	6	.301	1	3.388	2	.415	2
10		min	-.12	2	.288	2	-.129	2	-.021	5	-.713	5	-.148	6
11	N57	max	.692	2	.739	3	.331	5	.346	1	1.897	1	.604	2
12		min	-.265	6	.256	2	-.443	3	-.07	5	-.324	5	-.155	6
13	N58	max	.792	1	.766	3	.178	5	-.051	5	-.19	6	.286	2
14		min	-.072	5	.259	5	-1.011	1	-.257	3	-3.019	2	-.102	6
15	N59	max	.805	2	.747	6	.64	6	-.103	5	-.113	6	.481	2
16		min	-.333	6	.257	2	-.172	2	-.29	1	-1.87	1	-.096	6
17	N61	max	1.768	1	.011	1	.054	4	0	6	0	6	0	6
18		min	-.44	4	.005	5	-.125	1	0	1	0	1	0	1
19	Totals:	max	5.853	2	4.55	6	4.3	5						
20		min	0	4	1.671	2	0	1						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
1	N1	max	.004	3	-.158	5	.002	3	1.846e-02	4	2.422e-02	5	-7.235e-05	2
2		min	0	5	-.559	3	-.625	5	8.961e-07	2	-2.904e-05	3	-3.399e-03	6
3	N2	max	0	5	-.13	5	0	3	0	3	0	3	2.421e-03	3
4		min	-.003	3	-.361	3	-2.921	5	-2.183e-03	5	-4.567e-02	5	7.913e-04	5
5	N3	max	-.001	5	-.158	5	.002	3	2.672e-02	4	2.213e-02	4	-8.766e-04	5
6		min	-.004	3	-.559	3	-1.201	4	8.952e-07	2	-3.041e-05	3	-3.68e-03	3
7	N4	max	.003	6	-.13	5	0	3	1.252e-03	4	0	3	2.311e-03	6
8		min	0	2	-.361	3	-2.91	4	0	1	-4.557e-02	4	5.789e-04	2
9	N5	max	.003	3	-.105	5	.001	3	1.485e-02	4	1.233e-02	5	-2.231e-03	5
10		min	0	5	-.362	3	-.008	5	7.007e-07	2	-3.066e-05	3	-8.205e-03	3
11	N6	max	0	6	0	6	0	6	2.162e-03	5	8.646e-04	2	-2.915e-03	2
12		min	0	1	0	1	0	1	-1.573e-03	3	3.636e-05	6	-1.012e-02	6
13	N7	max	.085	6	-.158	5	.003	3	1.587e-02	4	2.422e-02	5	1.249e-03	2
14		min	-.025	2	-.56	3	-.235	5	8.967e-07	2	-2.904e-05	3	-3.409e-03	6
15	N8	max	-.022	5	-.158	5	.002	3	3.076e-02	4	2.213e-02	4	-8.76e-04	5
16		min	-.101	3	-.56	3	-1.921	4	8.946e-07	2	-3.041e-05	3	-4.253e-03	1
17	N9	max	.002	3	-.058	5	.109	4	1.195e-02	4	2.158e-04	5	-1.326e-03	5
18		min	0	5	-.192	3	0	2	5.444e-07	2	-2.794e-05	3	-4.663e-03	3
19	N10	max	0	5	-.058	5	0	3	1.409e-02	4	1.04e-02	4	-1.248e-03	2
20		min	-.003	3	-.192	3	-.23	4	5.442e-07	2	-2.399e-05	3	-4.591e-03	6
21	N11	max	.114	3	-.058	5	.393	4	1.178e-02	4	2.158e-04	5	-1.326e-03	5
22		min	.031	5	-.192	3	0	2	5.444e-07	2	-2.794e-05	3	-4.636e-03	3
23	N12	max	-.032	5	-.058	5	0	3	1.426e-02	4	1.04e-02	4	-1.314e-03	5
24		min	-.113	3	-.192	3	-.571	4	5.441e-07	2	-2.399e-05	3	-4.605e-03	3
25	N13	max	0	5	-.052	5	0	3	0	3	0	3	3.2e-03	6
26		min	-.002	3	-.137	6	-.832	5	-7.252e-04	5	-3.367e-02	5	1.159e-03	2

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
27	N14	max	.002	6	-.052	5	0	3	3.453e-04	4	0	3	3.212e-03	3
28		min	0	2	-.137	6	-.828	4	0	1	-3.354e-02	4	1.165e-03	5
29	N15	max	-.029	5	-.052	5	0	3	0	3	0	3	3.219e-03	3
30		min	-.079	3	-.137	6	-.853	5	-8.938e-04	5	-3.367e-02	5	1.165e-03	5
31	N16	max	.079	6	-.052	5	0	3	5.138e-04	4	0	3	3.2e-03	6
32		min	.026	2	-.137	6	-.839	4	0	1	-3.354e-02	4	1.024e-03	2
33	N17	max	-.02	5	-.13	5	0	3	0	3	0	3	2.585e-03	3
34		min	-.064	3	-.361	3	-2.997	5	-3.337e-03	5	-4.567e-02	5	7.92e-04	5
35	N18	max	.058	6	-.13	5	0	3	2.786e-03	4	0	3	2.308e-03	6
36		min	.004	2	-.361	3	-2.969	4	0	1	-4.557e-02	4	3.911e-05	2
37	N19	max	.105	5	-.164	2	.245	2	2.466e-04	5	1.99e-02	2	4.156e-03	4
38		min	-.424	2	-.6	6	-.063	4	-9.422e-03	1	-4.943e-03	4	-1.191e-02	2
39	N20	max	.463	5	-.154	5	1.357	2	2.443e-03	3	8.185e-03	5	1.443e-03	2
40		min	-2.35	2	-.439	3	-.267	5	1.298e-04	5	-4.165e-02	2	-1.501e-03	6
41	N21	max	.208	4	-.164	2	.485	1	2.589e-03	5	1.741e-02	1	4.986e-03	4
42		min	-.84	1	-.6	6	-.119	5	-1.124e-02	1	-4.347e-03	4	-1.932e-02	2
43	N22	max	.449	5	-.154	5	1.351	1	2.407e-03	6	8.057e-03	4	-8.495e-04	5
44		min	-2.343	1	-.439	3	-.261	4	6.342e-04	2	-4.158e-02	1	-2.222e-03	3
45	N23	max	.009	5	-.164	2	.026	2	-9.062e-04	5	1.99e-02	2	4.16e-03	4
46		min	-.195	1	-.601	6	-.097	6	-9.43e-03	1	-4.943e-03	4	-9.306e-03	2
47	N24	max	.327	4	-.164	2	.755	1	4.387e-03	5	1.741e-02	1	4.981e-03	4
48		min	-1.382	2	-.601	6	-.216	5	-1.123e-02	1	-4.347e-03	4	-2.337e-02	2
49	N25	max	.063	2	-.033	2	.008	5	-2.249e-04	5	4.489e-04	5	2.5e-03	6
50		min	-.016	4	-.11	6	-.037	1	-4.667e-03	1	-1.862e-03	1	-5.275e-03	2
51	N26	max	.025	4	-.033	2	.06	1	-1.433e-04	5	6.738e-03	1	2.657e-03	4
52		min	-.103	2	-.11	6	-.014	5	-5.672e-03	1	-1.642e-03	4	-6.485e-03	2
53	N27	max	.186	2	-.033	2	0	5	-3.935e-04	5	4.489e-04	5	2.5e-03	6
54		min	-.068	4	-.11	6	-.149	1	-4.667e-03	1	-1.862e-03	1	-5.107e-03	2
55	N28	max	.089	4	-.033	2	.196	1	2.521e-05	5	6.738e-03	1	2.657e-03	4
56		min	-.262	2	-.11	6	-.014	5	-5.672e-03	1	-1.642e-03	4	-6.653e-03	2
57	N29	max	.076	4	-.03	5	.22	1	2.805e-03	3	4.833e-03	5	-1.711e-04	2
58		min	-.381	2	-.081	3	-.043	5	8.574e-04	5	-2.455e-02	2	-1.632e-03	6
59	N30	max	.072	5	-.03	5	.218	2	2.724e-03	6	4.677e-03	4	-6.419e-04	5
60		min	-.379	1	-.081	3	-.042	4	8.419e-04	2	-2.445e-02	1	-1.733e-03	3
61	N31	max	.1	4	-.03	5	.259	1	2.805e-03	3	4.833e-03	5	-2.541e-06	2
62		min	-.38	2	-.081	3	-.026	5	6.889e-04	5	-2.455e-02	2	-1.632e-03	6
63	N32	max	.057	5	-.03	5	.198	2	2.752e-03	6	4.677e-03	4	-6.419e-04	5
64		min	-.406	1	-.081	3	-.081	6	8.418e-04	2	-2.445e-02	1	-1.76e-03	3
65	N33	max	.493	4	-.154	5	1.396	1	2.449e-03	3	8.185e-03	5	2.597e-03	2
66		min	-2.409	2	-.439	3	-.272	5	-2.427e-04	5	-4.165e-02	2	-1.505e-03	6
67	N34	max	.429	5	-.154	5	1.335	2	2.548e-03	6	8.057e-03	4	-8.493e-04	5
68		min	-2.416	1	-.439	3	-.293	4	6.34e-04	2	-4.158e-02	1	-3.354e-03	1
69	N35	max	-.009	6	-.184	2	-.001	6	9.532e-03	1	-5.917e-04	6	1.068e-03	6
70		min	-.091	1	-.641	6	-.048	2	2.061e-03	5	-8.614e-03	1	-1.169e-02	2
71	N36	max	-.147	6	-.164	2	-.088	6	-1.415e-03	2	4.155e-02	2	1.439e-03	2
72		min	-2.344	2	-.463	3	-1.354	2	-2.637e-03	6	2.645e-03	6	-1.284e-03	6
73	N37	max	-.032	6	-.184	2	-.023	6	1.135e-02	1	-6.143e-04	6	8.861e-04	6
74		min	-.507	1	-.641	6	-.293	1	4.306e-03	6	-8.873e-03	1	-1.916e-02	2
75	N38	max	-.147	6	-.164	2	-.082	6	-6.673e-04	2	4.148e-02	1	-1.114e-04	5
76		min	-2.336	1	-.463	3	-1.347	1	-2.404e-03	6	2.623e-03	6	-2.279e-03	3
77	N39	max	-.002	5	-.155	2	.002	6	9.255e-03	1	-4.574e-04	6	3.086e-03	6
78		min	-.007	1	-.571	6	0	2	3.17e-03	5	-6.51e-03	1	-9.879e-03	2

Envelope Joint Displacements (Continued)

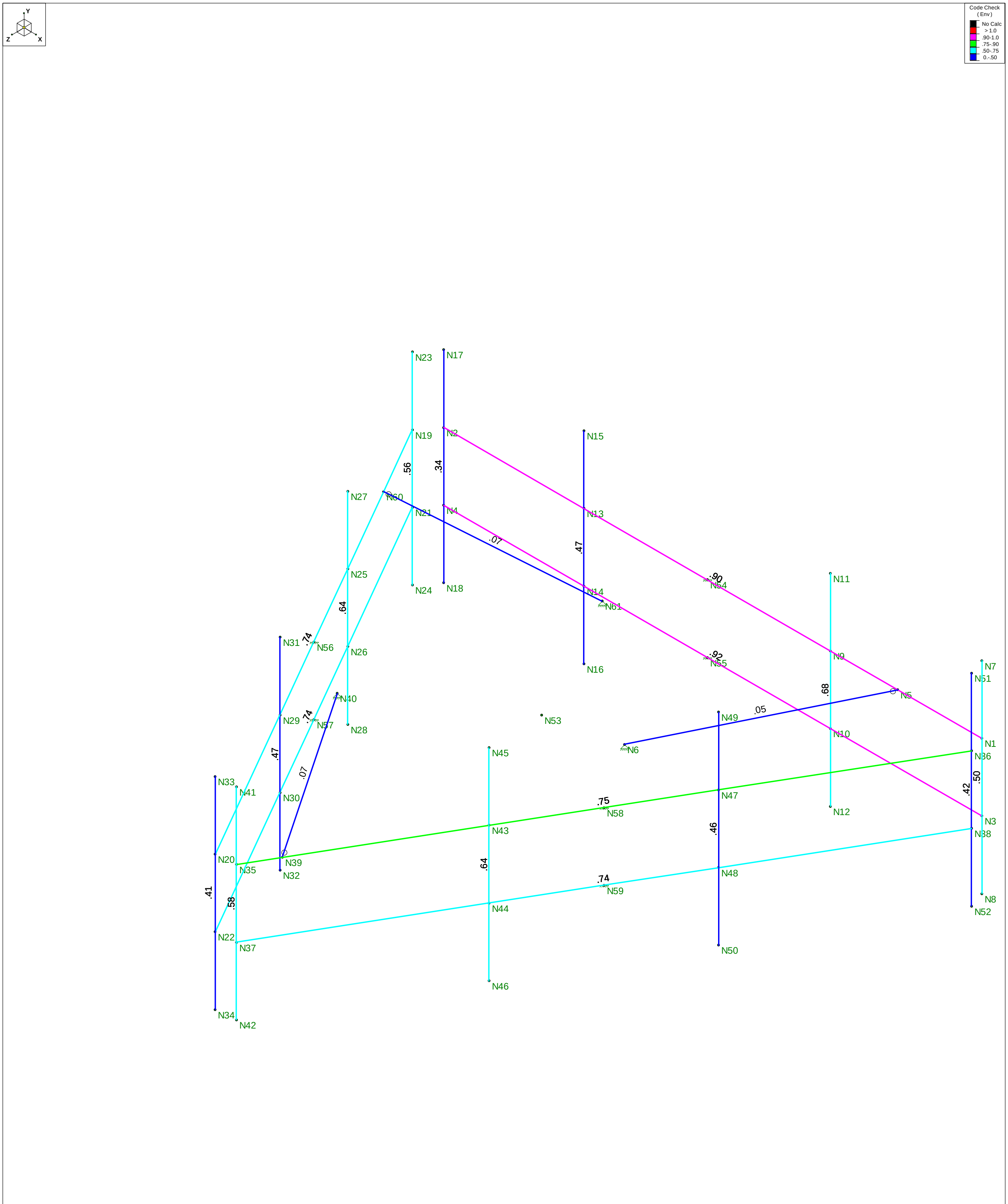
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
79	N40	max	0	6	0	6	0	6	1.042e-02	6	5.224e-04	5	7.555e-04	6
80		min	0	1	0	1	0	1	1.281e-04	2	-8.804e-04	1	-4.131e-03	2
81	N41	max	.137	2	-.184	2	.181	1	9.541e-03	1	-5.917e-04	6	1.071e-03	6
82		min	-.035	6	-.641	6	.014	5	9.093e-04	5	-8.614e-03	1	-9.088e-03	2
83	N42	max	-.011	6	-.184	2	-.134	6	1.134e-02	1	-6.143e-04	6	8.836e-04	6
84		min	-1.045	2	-.641	6	-.565	1	4.737e-03	6	-8.873e-03	1	-2.322e-02	2
85	N43	max	.031	2	-.029	2	.02	1	4.148e-03	3	1.366e-03	2	1.901e-03	6
86		min	.001	6	-.094	6	.003	6	1.727e-03	5	8.151e-05	6	-3.341e-03	2
87	N44	max	-.004	6	-.029	2	-.004	6	4.578e-03	1	-2.877e-04	6	1.793e-03	6
88		min	-.073	2	-.094	6	-.042	1	1.792e-03	5	-4.549e-03	1	-4.477e-03	2
89	N45	max	.108	2	-.029	2	.107	1	4.148e-03	3	1.366e-03	2	1.901e-03	6
90		min	-.044	6	-.094	6	.043	5	1.558e-03	5	8.151e-05	6	-3.173e-03	2
91	N46	max	.039	6	-.029	2	-.057	5	4.577e-03	1	-2.877e-04	6	1.793e-03	6
92		min	-.183	2	-.094	6	-.152	1	1.961e-03	5	-4.549e-03	1	-4.646e-03	2
93	N47	max	-.019	6	-.026	2	-.013	6	-1.112e-03	5	2.273e-02	2	-1.899e-04	2
94		min	-.318	2	-.069	3	-.184	1	-2.754e-03	3	1.424e-03	6	-1.501e-03	6
95	N48	max	-.02	6	-.026	2	-.01	6	-8.307e-04	2	2.263e-02	1	-5.184e-04	5
96		min	-.317	1	-.069	3	-.182	2	-2.693e-03	6	1.395e-03	6	-1.691e-03	3
97	N49	max	.017	6	-.026	2	-.066	5	-1.25e-03	2	2.273e-02	2	-2.134e-05	2
98		min	-.317	2	-.069	3	-.222	1	-2.754e-03	3	1.424e-03	6	-1.501e-03	6
99	N50	max	-.057	6	-.026	2	.054	6	-8.306e-04	2	2.263e-02	1	-5.183e-04	5
100		min	-.343	1	-.069	3	-.162	2	-2.665e-03	6	1.395e-03	6	-1.719e-03	3
101	N51	max	-.116	6	-.164	2	-.154	6	-1.417e-03	2	4.155e-02	2	2.593e-03	2
102		min	-2.402	2	-.463	3	-1.393	1	-2.773e-03	6	2.645e-03	6	-1.288e-03	6
103	N52	max	-.18	6	-.164	2	-.027	6	-5.055e-04	5	4.148e-02	1	-1.114e-04	5
104		min	-2.411	1	-.463	3	-1.331	2	-2.259e-03	6	2.623e-03	6	-3.393e-03	1
105	N53	max	0	6	0	6	0	6	0	6	0	6	0	6
106		min	0	1	0	1	0	1	0	1	0	1	0	1
107	N54	max	0	6	0	6	0	6	0	6	0	6	0	6
108		min	0	1	0	1	0	1	0	1	0	1	0	1
109	N55	max	0	6	0	6	0	6	0	6	0	6	0	6
110		min	0	1	0	1	0	1	0	1	0	1	0	1
111	N56	max	0	6	0	6	0	6	0	6	0	6	0	6
112		min	0	1	0	1	0	1	0	1	0	1	0	1
113	N57	max	0	6	0	6	0	6	0	6	0	6	0	6
114		min	0	1	0	1	0	1	0	1	0	1	0	1
115	N58	max	0	6	0	6	0	6	0	6	0	6	0	6
116		min	0	1	0	1	0	1	0	1	0	1	0	1
117	N59	max	0	6	0	6	0	6	0	6	0	6	0	6
118		min	0	1	0	1	0	1	0	1	0	1	0	1
119	N60	max	.002	5	-.1	2	.005	2	-8.155e-04	5	1.071e-02	2	5.348e-03	6
120		min	-.009	1	-.392	6	-.004	6	-9.391e-03	3	-2.659e-03	4	-8.546e-03	2
121	N61	max	0	6	0	6	0	6	-9.182e-04	5	6.069e-05	2	6.823e-03	3
122		min	0	1	0	1	0	1	-9.094e-03	3	-2.418e-03	4	2.129e-03	5

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

	Me...	Shape	Code C...	Loc...	LC	Shear C...	Loc[ft]	Dir	LC	phi*Pn...	phi*P...	phi*Mn...	phi*...	Cb	Eqn
1	M1	PIPE_2.0	.049	3.1...	4	.003	6.083		1	20.616	32.13	1.872	1.872	1.136	H1-1b
2	M2	PIPE_2.0	.069	6.0...	1	.003	6.083		1	20.616	32.13	1.872	1.872	1.136	H1-1b*
3	M3	PIPE_2.5	.903	8.1...	4	.291	4.5		4	45.431	50.715	3.596	3.596	2.207	H3-6

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

	Me...	Shape	Code C...	Loc...	LC	Shear C...	Loc[ft]	Dir	LC	phi*Pn...	phi*P...	phi*Mn...	phi*...	Cb	Eqn
4	M4	PIPE_2.5	.921	8.1...	4	.303	8.167		4	45.431	50.715	3.596	3.596	2.208	H3-6
5	M5	PIPE_2.5	.740	8	1	.206	5.333		1	47.672	50.715	3.596	3.596	2.156	H1-1b
6	M6	PIPE_2.5	.738	8	1	.241	8		1	47.672	50.715	3.596	3.596	1.863	H1-1b
7	M7	PIPE_2.5	.751	8	1	.195	1		1	48.186	50.715	3.596	3.596	2.168	H1-1b
8	M8	PIPE_2.5	.736	8	1	.224	5.5		1	48.186	50.715	3.596	3.596	2.14	H1-1b
9	M9	PIPE_2.0	.502	4	4	.118	2.5		4	20.867	32.13	1.872	1.872	2.093	H1-1b
10	M10	PIPE_2.0	.682	4	3	.359	4		4	20.867	32.13	1.872	1.872	4.949	H1-1b
11	M11	PIPE_2.0	.471	2	3	.093	2		6	20.867	32.13	1.872	1.872	4.955	H1-1b
12	M12	PIPE_2.0	.339	4	3	.064	2		6	20.867	32.13	1.872	1.872	4.635	H1-1b
13	M13	PIPE_2.0	.558	4	3	.131	2.5		1	20.867	32.13	1.872	1.872	3.727	H1-1b
14	M14	PIPE_2.0	.639	2	6	.302	4		1	20.867	32.13	1.872	1.872	4.919	H1-1b
15	M15	PIPE_2.0	.471	4	3	.093	2		3	20.867	32.13	1.872	1.872	4.742	H1-1b
16	M16	PIPE_2.0	.406	2	3	.078	2		3	20.867	32.13	1.872	1.872	3.696	H1-1b
17	M17	PIPE_2.0	.585	4	3	.111	2		6	20.867	32.13	1.872	1.872	4.509	H1-1b
18	M18	PIPE_2.0	.636	4	6	.222	4		1	20.867	32.13	1.872	1.872	4.961	H1-1b
19	M19	PIPE_2.0	.463	4	3	.091	2		3	20.867	32.13	1.872	1.872	4.96	H1-1b
20	M20	PIPE_2.0	.423	2	3	.081	2		3	20.867	32.13	1.872	1.872	4.432	H1-1b
21	M21	PIPE_1.25	.074	3.0...	4	.004	0		4	7.795	19.688	.801	.801	1.136	H1-1b



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek	CT11474A_AMA	
FJP		Apr 24, 2019 at 2:24 PM
19027.14	Member Unity Check	CT11474A_AMA.R3D

EBI Consulting
environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CT11474A

WTNH Hamden
101 Talmadge Road
Hamden, Connecticut 06518

May 28, 2019

EBI Project Number: 6219001816

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**0.96%**

May 28, 2019

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

Emissions Analysis for Site: CT11474A - WTNH Hamden

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **101 Talmadge Road** in **Hamden, 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 101 Talmadge Road in Hamden, Connecticut using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report, the sample point is the top of a 6-foot person standing at the base of the tower.

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

1) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 4 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

5) 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.

6) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

7) For the following calculations, the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna 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.

8) The antennas used in this modeling are the for the channel(s), the for the 2100 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 1900 MHz / 600 MHz / 700 MHz / 1900 MHz channel(s) in Sector A, , the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 1900 MHz / 600 MHz / 700 MHz / 1900 MHz channel(s) in Sector B, , the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 1900 MHz / 600 MHz / 700 MHz / 1900 MHz channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

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

10) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

T-Mobile Site Inventory and Power Data

Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APX16DWV-16DWV-S-E-A20	Make / Model:	RFS APX16DWV-16DWV-S-E-A20	Make / Model:	RFS APX16DWV-16DWV-S-E-A20
Frequency Bands:	2100 MHz	Frequency Bands:	2100 MHz	Frequency Bands:	2100 MHz
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	315 feet	Height (AGL):	315 feet	Height (AGL):	315 feet
Channel Count:	2	Channel Count:	2	Channel Count:	2
Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A2 MPE %:	**0.17%**	Antenna B2 MPE %:	**0.17%**	Antenna C2 MPE %:	**0.17%**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Frequency Bands:	1900 MHz / 600 MHz / 700 MHz / 1900 MHz	Frequency Bands:	1900 MHz / 600 MHz / 700 MHz / 1900 MHz	Frequency Bands:	1900 MHz / 600 MHz / 700 MHz / 1900 MHz
Gain:	15.65 dBd / 12.95 dBd / 13.35 dBd / 15.65 dBd	Gain:	15.65 dBd / 12.95 dBd / 13.35 dBd / 15.65 dBd	Gain:	15.65 dBd / 12.95 dBd / 13.35 dBd / 15.65 dBd
Height (AGL):	315 feet	Height (AGL):	315 feet	Height (AGL):	315 feet
Channel Count:	10	Channel Count:	10	Channel Count:	10
Total TX Power (W):	360 Watts	Total TX Power (W):	360 Watts	Total TX Power (W):	360 Watts
ERP (W):	11,295.86	ERP (W):	11,295.86	ERP (W):	11,295.86
Antenna A3 MPE %:	**0.53%**	Antenna B3 MPE %:	**0.53%**	Antenna C3 MPE %:	**0.53%**

Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	0.70%
Sprint	0.26%
Site Total MPE % :	0.96%

T-Mobile Sector A Total:	0.70%
T-Mobile Sector B Total:	0.70%
T-Mobile Sector C Total:	0.70%
Site Total:	0.96%

T-Mobile Maximum MPE Power Values (Sector A)

T-Mobile Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm²)	Frequency (MHz)	Allowable MPE (μW/cm²)	Calculated % MPE
T-Mobile 2100 MHz LTE	2	2334.27	315.0	1.69	2100 MHz LTE	1000	0.17%
T-Mobile 1900 MHz GSM	4	1101.85	315.0	1.60	1900 MHz GSM	1000	0.16%
T-Mobile 600 MHz LTE	2	591.73	315.0	0.43	600 MHz LTE	400	0.11%
T-Mobile 700 MHz LTE	2	648.82	315.0	0.47	700 MHz LTE	467	0.10%
T-Mobile 1900 MHz LTE	2	2203.69	315.0	1.60	1900 MHz LTE	1000	0.16%
						Total:	**0.70%**

• 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:	0.70%
Sector B:	0.70%
Sector C:	0.70%
T-Mobile Maximum MPE % (Sector A):	0.70%
Site Total:	0.96%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **0.96%** 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.