Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

January 4, 2019

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

RE: **Notice of Exempt Modification for T-Mobile / Crown Site BU: 826313**
T-Mobile Site ID: CT11331A
50 Clinton Avenue, Norwich, CT 06360
Latitude: 41° 33' 19.804" / Longitude: -72° 6' 37.08"

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 142-foot level of the existing 150-foot monopole at 50 Clinton Avenue in Norwich, CT. The tower is owned by Crown Castle. The property is owned by the City of Norwich. T-Mobile intends to replace three (3) antennas with three (3) new antennas and add three (3) RRUs. T-Mobile also intends to remove one existing radio cabinet and install one new 6102 cabinet.

A request for original zoning documents was sent to the City of Norwich but has not been answered, however, notice of recording has been included for reference.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.S.C.A. § 16-50j-73, a copy of this letter is being sent to The Honorable Deb Hinchey, Mayor, City of Norwich, Planning and Neighborhood Services, City of Norwich, as well as the property owner, and tower owner..

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

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

3. The proposed modification 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 Communication 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-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Please send approval/rejection letter to Attn: William Stone.

Sincerely,

William Stone
Real Estate Specialist
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065
518-373-3543
William.stone@crowncastle.com

Attachments:

Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes
Tab 2: Exhibit-2: Structural Modification Report
Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc:

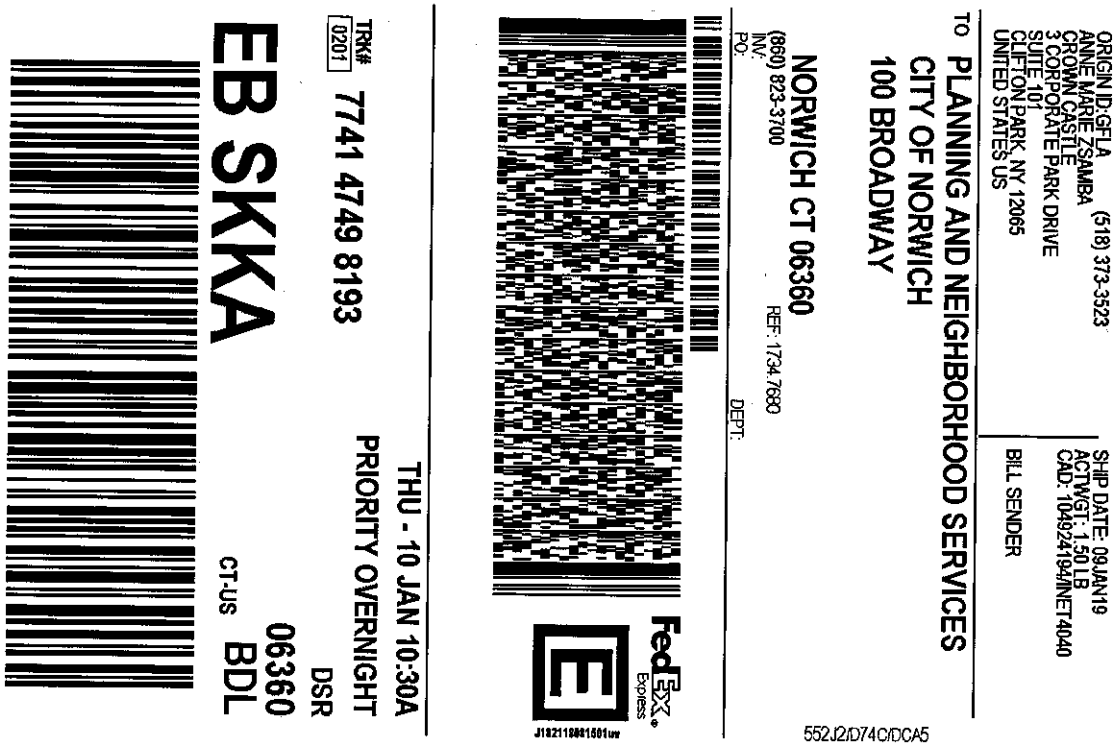
The Honorable Deb Hinchey, Mayor
City of Norwich
100 Broadway
Norwich, CT 06360
(860) 823-3700

Planning & Neighborhood Services
City of Noriwch
100 Broadway
Norwich, CT 06360
(860) 823-3700

Crown Castle

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.



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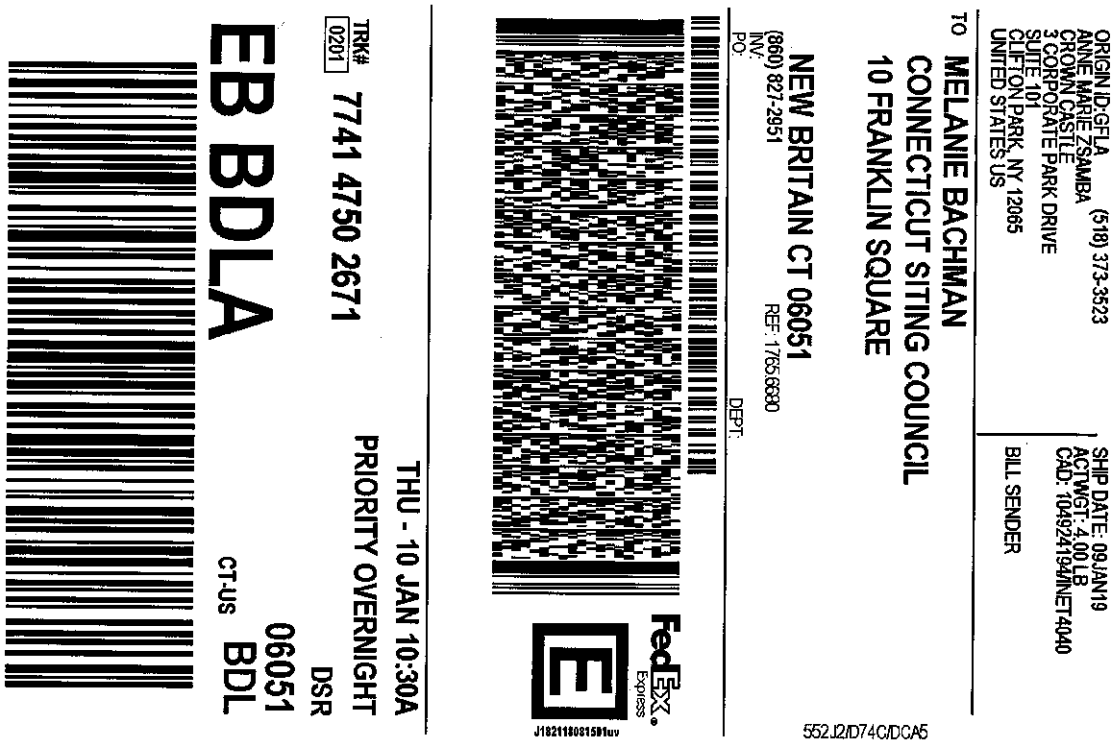

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CT1-331

VOL 517 PAGE 050

ORIGINAL

Special Permit #SP-00-9

COMMISSION ON THE CITY PLAN
CITY OF NORWICH, CONNECTICUT

NOTICE OF SPECIAL PERMIT RECORDED
PURSUANT TO PUBLIC ACT NO. 75-317 - CONNECTICUT STATUTES

Record owner of property City of Norwich

Property recorded in Norwich Land Records Vol. 707 Page 248

Location of property 50 Clinton Avenue

DESCRIPTION: Special permit pursuant to Section 7.5 of the Zoning Regulations to construct a 150-foot monopole multi-carrier telecommunications facility and associated equipment.

Effective date of decision: Aug. 17, 2000

Peter W. Davis WS

Peter W. Davis
Planning Director

NOT TO BE FILED WITH
CITY CLERK BEFORE 9/2/00

RECEIVED FOR RECORD AT NORWICH, CONN.
ON 9-5-2000 AT 10:40 A.M.
Attest Beverly C. Muldoon, Town Clerk

50 CLINTON AVE

Location	50 CLINTON AVE	**Mblu**	58/ 2/ 39/ /
Acct#	7125530001	**Owner**	NORWICH CITY OF-PW GARAGE+OFFICE
Assessment	$1,032,900	**Appraisal**	$1,475,400
PID	12548	**Building Count**	2

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2013	$1,125,600	$349,800	$1,475,400
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2013	$788,000	$244,900	$1,032,900

Parcel Addreses

Additional Addresses			
Line Number	**Address**	**City, State Zip**	**Type**
1	50 CLINTON AVE		Primary

Owner of Record

Owner NORWICH CITY OF-PW GARAGE+OFFICE
Address 100 BROADWAY
NORWICH, CT 06360

Sale Price $0
Certificate
Book & Page 0707/0248
Sale Date 02/19/1986

Ownership History

Ownership History				
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Sale Date**
NORWICH CITY OF-PW GARAGE+OFFICE	$0		0707/0248	02/19/1986
SOUTHERN NEW ENGLAND TELEPHONE			0282/0176	03/01/1956

Building Information

Building 1 : Section 1

Year Built: 1957
Living Area: 35040
Replacement Cost: $1,063,044

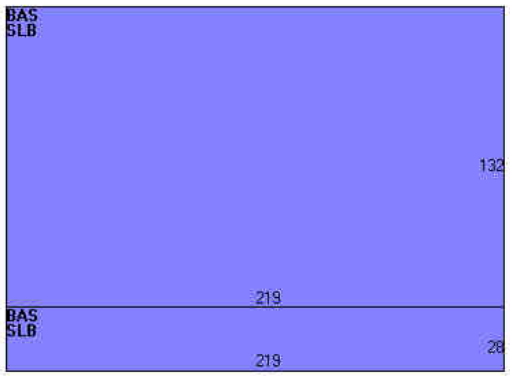
Building Photo

Building Percent Good: 71
Replacement Cost Less Depreciation: $754,800

Building Attributes	
Field	**Description**
STYLE	Warehouse
MODEL	Commercial
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	Drywall/Sheet
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Forced Air-Duc
AC Type	None
Bldg Use	MUNICIPAL MDL-96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	9030
Heat/AC	NONE
Frame Type	STEEL
Baths/Plumbing	AVERAGE
Ceiling/Wall	NONE
Rooms/Prtns	AVERAGE
Wall Height	12
% Comn Wall	0

(http://images.vgsi.com/photos/NorwichCTPhotos//\00\01\90/64.jpg)

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	35040	35040
SLB	Slab	35040	0
		70080	35040

Building 2 : Section 1

Year Built: 1996
Living Area: 3528
Replacement Cost: $131,287
Building Percent Good: 89
Replacement Cost Less Depreciation: $116,800

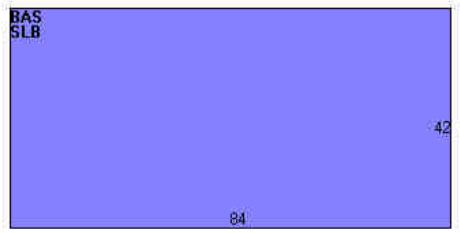
Building Attributes : Bldg 2 of 2	
Field	**Description**
STYLE	Pre-Eng Mfg

Building Photo

MODEL	Commercial
Grade	C+
Stories:	1
Occupancy	1
Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	
Roof Structure	Gable/Hip
Roof Cover	Metal/Tin
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	MUNICIPAL MDL-96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	9030
Heat/AC	NONE
Frame Type	STEEL
Baths/Plumbing	LIGHT
Ceiling/Wall	NONE
Rooms/Prtns	LIGHT
Wall Height	16
% Comn Wall	

(http://images.vgsi.com/photos/NorwichCTPhotos//\00\01\14/09.jpg)

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	3528	3528
SLB	Slab	3528	0
		7056	3528

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code	9030
Description	MUNICIPAL MDL-96
Zone	GC/NC
Neighborhood	C070
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	5.36
Frontage	0
Depth	0
Assessed Value	$244,900
Appraised Value	$349,800

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
PAV1	Paving Asphalt			80000 S.F.	$105,000	1
SHD4	Shed Comm. Wd.			5538 S.F.	$83,100	1
SHD4	Shed Comm. Wd.			3215 S.F.	$48,200	1
FN3	Fence Chain 6'			300 L.F.	$2,700	1
CNP2	Canopy Gas Sta.			600 S.F.	$15,000	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$1,125,600	$349,800	$1,475,400
2012	$1,706,000	$450,000	$2,156,000
2011	$1,706,000	$450,000	$2,156,000

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$788,000	$244,900	$1,032,900
2012	$1,194,000	$315,000	$1,509,000
2011	$1,194,000	$315,000	$1,509,000

50 CLINTON AVE CELL

Location	50 CLINTON AVE CELL	**Mblu**	58/ 2/ 39/ CELL/
Acct#	0580020039	**Owner**	T-MOBILE USA TOWER LLC
Assessment	$163,500	**Appraisal**	$233,500
PID	112076	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2013	$83,500	$150,000	$233,500
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2013	$58,500	$105,000	$163,500

Parcel Addreses

Additional Addresses
No Additional Addresses available for this parcel

Owner of Record

Owner T-MOBILE USA TOWER LLC
Address 12920 S.E. 38TH STREET
BELLEVUE, WA 98006

Sale Price $0
Certificate
Book & Page 2842/ 299
Sale Date 07/29/2013
Instrument 06

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
T-MOBILE USA TOWER LLC			2842/ 299	06	07/29/2013

Building Information

Building 1 : Section 1

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

Building Photo

Replacement Cost
Less Depreciation: $0

Building Attributes	
Field	**Description**
Style	Vacant
Model	
Grade:	
Stories:	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure:	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Total Bthrms:	
Total Half Baths:	
Total Xtra Fixtrs:	
Total Rooms:	
Bath Style:	
Kitchen Style:	
Fireplace (s)	
Whirlpool	
park	

(http://images.vgsi.com/photos/NorwichCTPhotos//default.jpg)

Building Layout

Building Layout

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

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code	431V
Description	TEL REL TW M00
Zone	GC
Neighborhood	
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	1
Frontage	
Depth	
Assessed Value	$105,000
Appraised Value	$150,000

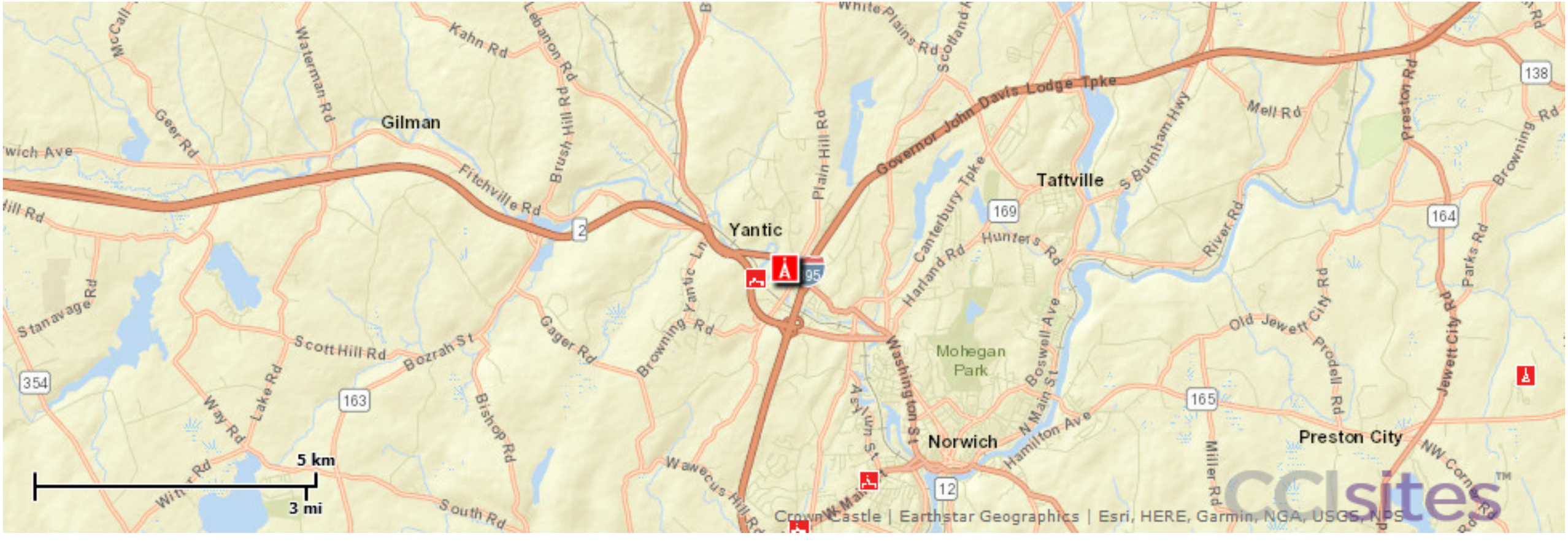
Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
TWR	CELL TOWER			150 UNITS	$83,500	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$83,500	$150,000	$233,500

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$58,500	$105,000	$163,500


Gilman
Yantic
Taftville
Norwich
Preston City
Mohegan Park
Fitchville Rd
Governor John Davis Lodge Tpke
Canterbury Tpke
Harland Rd
Hunters Rd
Plain Hill Rd
Brush Hill Rd
Lebanon Rd
Kahn Rd
Waterman Rd
Geer Rd
Gager Rd
Browning Yantic Ln
Browning Rd
Scott Hill Rd
Bozrah St
Bishop Rd
Lake Rd
Way Rd
South Rd
Stanavage Rd
Washington St
Asylum St
N Main St
Boswell Ave
Hamilton Ave
Old Jewett City Rd
Prodell Rd
Jewett City Rd
Parks Rd
Browning Rd
River Rd
Mell Rd
S Burnham Hwy
Preston Rd
Miller Rd
NW Corner Rd
Wawecus Hill Rd
White Plains Rd
2
95
354
163
169
164
165
12
138
5 km
3 mi
Crown Castle | Earthstar Geographics | Esri, HERE, Garmin, NGA, USGS, NPS
cclsites

SHEET INDEX

TOWER OWNER NOTIFICATION

ONCE THE CONTRACTOR HAS RECEIVED AND ACCEPTED THE NOTICE TO PROCEED, CONTRACTOR WILL CONTACT THE CROWN CASTLE CONSTRUCTION MANAGER OF RECORD (NOTED ON THE FIRST PAGE ON THIS CONSTRUCTION DRAWING) A MINIMUM OF 48 HOURS PRIOR TO WORK START. UPON ARRIVAL TO THE JOB SITE, CONTRACTOR CREW IS REQUIRED CALL 1-800-788-7011 TO NOTIFY THE CROWN CASTLE NOC WORK HAS BEGUN.

T-Mobile

CROWN CASTLE

CBU

826313

SITE ID

CT11331A

SITE NAME

NORWICH

SITE ADDRESS

50 CLINTON AVENUE
NORWICH, CT 06360

CONFIGURATION

67D05F

PROJECT SITE INFORMATION

SITE ID:	CT11331A
SITE NAME:	NORWICH
SITE ADDRESS:	50 CLINTON AVENUE NORWICH, CT 06360
PERMITTING JURISDICTION:	CITY OF NORWICH
COUNTY:	NEW LONDON
ZONING:	GC/NC
SITE COORDINATES:	
LATITUDE:	41° 33' 19.8" N (41.555489°) (NAD 83)
LONGITUDE:	72° 06' 37.1" W (-72.110249°) (NAD 83)
APPLICANT:	T-MOBILE NORTHEAST LLC 103 MONARCH DRIVE LIVERPOOL, NY 13088

STRUCTURAL ANALYSIS INFORMATION

TOWER ANALYSIS

INFINIGY ENGINEERING HAS NOT EVALUATED THE EXISTING **MONOPOLE** FOR THIS SITE AND ASSUMES NO RESPONSIBILITY FOR ITS STRUCTURAL INTEGRITY. REFER TO STRUCTURAL ANALYSIS FROM TOWER OWNER PRIOR TO ANY CONSTRUCTION.

ANTENNA MOUNTS

BASED ON THE MOUNT ANALYSIS COMPLETED BY **CENTEK** DATED **10/09/18.** THE EXISTING ANTENNA MOUNTS ARE CAPABLE OF SUPPORTING THE PROPOSED EQUIPMENT CONFIGURATION

PROJECT TEAM INFORMATION

CLIENT REPRESENTATIVE:	CROWN CASTLE 3 CORPORATE PARK DRIVE SUITE 101 CLIFTON PARK, NY 12065
CLIENT REP. CONTACT:	WILL STONE (518) 373-3543
ENGINEER:	INFINIGY 6865 DEERPATH ROAD SUITE 152 ELKRIDGE, MD 21075
ENGINEER CONTACT:	MATTHEW LIVERETTE (518) 690-0790

SCOPE OF WORK

SCOPE OF WORK:

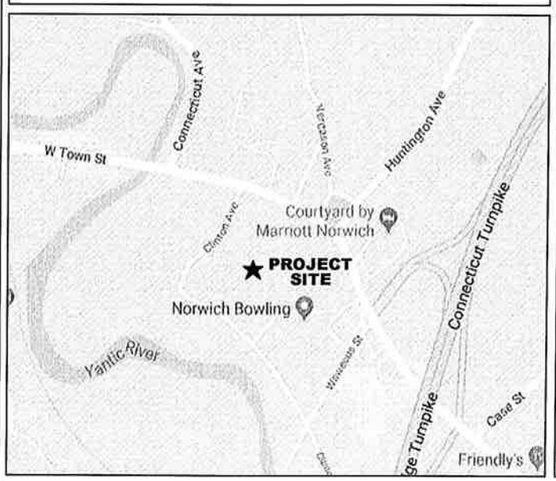
TMO L600 67D05F, REPLACING (3) ANTENNAS, ADDING (3) RRU'S, ADDING (1) HYBRID. REPLACE EXISTING CABINET WITH NEW 6102 CABINET.

FINAL CONFIG: (6) ANTENNAS, (3) RRU'S, (6) TMA'S, (12) COAX, (1) HYBRID

811 Know what's below. Call before you dig.

TO OBTAIN LOCATION OF PARTICIPANTS UNDERGROUND FACILITIES BEFORE YOU DIG IN CONNECTICUT, CONTACT CALL BEFORE YOU DIG
TOLL FREE: 1-800-922-4455 OR www.cbyd.com
CONNECTICUT STATUTE REQUIRES MIN OF 2 WORKING DAYS NOTICE BEFORE YOU EXCAVATE

LOCATION MAP



GENERAL NOTES

- HANDICAP ACCESS REQUIREMENTS ARE NOT REQUIRED.
- FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION.
- FACILITY HAS NO PLUMBING OR REFRIGERANTS.
- THIS FACILITY SHALL MEET OR EXCEED ALL FAA AND FCC REGULATORY REQUIREMENTS.
- ALL NEW MATERIAL SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR UNLESS NOTED OTHERWISE. EQUIPMENT, ANTENNAS/RRH AND CABLES FURNISHED BY OWNER AND INSTALLED BY CONTRACTOR.
- THE PROJECT WILL NOT RESULT IN ANY SIGNIFICANT DISTURBANCE OR EFFECT ON STORMWATER DRAINAGE.
- NO SANITARY SEWER, POTABLE WATER, OR TRASH DISPOSAL SERVICE IS REQUIRED
- NO COMMERCIAL SIGNAGE IS PROPOSED

CODE COMPLIANCE

ALL WORK AND MATERIALS SHALL BE PERFORMED AND INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED WITH ANY LOCAL AMENDMENTS BY THE LOCAL GOVERNING AUTHORITIES:

- 2018 CONNECTICUT STATE BUILDING CODE
- 2018 CONNECTICUT STATE FIRE SAFETY CODE
- 2015 INTERNATIONAL BUILDING CODE
- 2017 NATIONAL ELECTRICAL CODE (NFPA 70)
- NATIONAL FIRE PROTECTION ASSOCIATION 101
- NATIONAL FIRE PROTECTION ASSOCIATION 1
- LOCAL BUILDING CODES
- CITY/COUNTY ORDINANCES
- AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATIONS (AISC)
- UNDERWRITERS LABORATORIES APPROVED ELECTRICAL PRODUCTS.
- ANSI EIA/TIA 222 REV. H
- TIA 607
- INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS 81
- IEEE C2 (LATEST EDITION)
- TELCORDIA GR-1275
- ANSI T1.311

STATE OF CONNECTICUT
JOHN S. STEVENS
No. 24705
LICENSED PROFESSIONAL ENGINEER
DEC 28 2018

T-Mobile

T-MOBILE NORTHEAST LLC
103 MONARCH DRIVE
LIVERPOOL, NY 13088

INFINIGY
6865 DEERPATH ROAD SUITE 152
ELKRIDGE, MD 21075
TEL (443) 592-3143

No	Submittal / Revision	App'd	Date
1	JURISDICTION CODE REQ'S	RMS	12/28/18
0	ISSUED FOR CONSTRUCTION	RMS	11/26/18
A	ISSUED FOR REVIEW	RMS	10/23/18

Drawn: RCD
Designed: MRL
Checked: AJD

Project Number: 600-007

Project Title:
CT11331A
NORWICH
50 CLINTON AVENUE
NORWICH, CT 06360

Prepared For:
CROWN CASTLE

Drawing Title
TITLE PAGE

Drawing Number
T1

GENERAL NOTES

PART 1 – GENERAL REQUIREMENTS

1.1 THE WORK SHALL COMPLY WITH APPLICABLE NATIONAL CODES AND STANDARDS, LATEST EDITION, AND PORTIONS THEREOF, INCLUDED BUT NOT LIMITED TO THE FOLLOWING:
- A. GR-63-CORE NEBS REQUIREMENTS: PHYSICAL PROTECTION
- B. GR-78-CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT.
- C. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE – "NEC").
- D. AND NFPA 101 (LIFE SAFETY CODE).
- E. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM).
- F. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE).

1.2 DEFINITIONS:
A: WORK: THE SUM OF TASKS AND RESPONSIBILITIES IDENTIFIED IN THE CONTRACT DOCUMENTS.
B: COMPANY: T-MOBILE CORPORATION
C. ENGINEER: SYNONYMOUS WITH ARCHITECT & ENGINEER AND "A&E". THE DESIGN PROFESSIONAL HAVING PROFESSIONAL RESPONSIBILITY FOR DESIGN OF THE PROJECT.
D: CONTRACTOR: CONSTRUCTION CONTRACTOR; CONSTRUCTION VENDOR; INDIVIDUAL OR ENTITY WHO AFTER EXECUTION OF A CONTRACT IS BOUND TO ACCOMPLISH THE WORK.
E: THIRD PARTY VENDOR OR AGENCY: A VENDOR OR AGENCY ENGAGED SEPARATELY BY THE COMPANY, A&E, OR CONTRACTOR TO PROVIDE MATERIALS OR TO ACCOMPLISH SPECIFIC TASKS RELATED TO BUT NOT INCLUDED IN THE WORK.

1.3 POINT OF CONTACT: COMMUNICATION BETWEEN THE COMPANY AND THE CONTRACTOR SHALL FLOW THROUGH THE SINGLE COMPANY SITE DEVELOPMENT SPECIALIST OR OTHER PROJECT COORDINATOR APPOINTED TO MANAGE THE PROJECT FOR THE COMPANY.

1.4 ON-SITE SUPERVISION: THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL EMPLOY A COMPETENT SUPERINTENDENT WHO SHALL BE IN ATTENDANCE AT THE SITE AT ALL TIMES DURING PERFORMANCE OF THE WORK.

1.5 DRAWINGS, SPECIFICATIONS AND DETAILS REQUIRED AT JOBSITE: THE CONSTRUCTION CONTRACTOR SHALL MAINTAIN A FULL SET OF THE CONSTRUCTION DRAWINGS, STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES, AND THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES AT THE JOBSITE FROM MOBILIZATION THROUGH CONSTRUCTION COMPLETION.
A. THE JOBSITE DRAWINGS, SPECIFICATIONS AND DETAILS SHALL BE CLEARLY MARKED DAILY IN PENCIL WITH ANY CHANGES IN CONSTRUCTION OVER WHAT IS DEPICTED IN THE DOCUMENTS. AT CONSTRUCTION COMPLETION, THIS JOBSITE MARKUP SET SHALL BE DELIVERED TO THE COMPANY OR COMPANY'S DESIGNATED REPRESENTATIVE TO BE FORWARDED TO THE COMPANY'S A&E VENDOR FOR PRODUCTION OF "AS-BUILT" DRAWINGS.

1.6 USE OF JOB SITE: THE CONTRACTOR SHALL CONFINE ALL CONSTRUCTION AND RELATED OPERATIONS INCLUDING STAGING AND STORAGE OF MATERIALS AND EQUIPMENT, PARKING, TEMPORARY FACILITIES, AND WASTE STORAGE TO THE LEASE PARCEL UNLESS OTHERWISE PERMITTED BY THE CONTRACT DOCUMENTS.

1.7 NOTICE TO PROCEED:
A. NO WORK SHALL COMMENCE PRIOR TO COMPANY'S WRITTEN NOTICE TO PROCEED.
B. UPON RECEIVING NOTICE TO PROCEED, CONTRACTOR SHALL FULLY PERFORM ALL WORK NECESSARY TO PROVIDE T-MOBILE WITH AN OPERATIONAL WIRELESS FACILITY.

PART 2 – EXECUTION

2.1 TEMPORARY UTILITIES AND FACILITIES: THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY UTILITIES AND FACILITIES NECESSARY EXCEPT AS OTHERWISE INDICATED IN THE CONSTRUCTION DOCUMENTS. TEMPORARY UTILITIES AND FACILITIES INCLUDE, POTABLE WATER, HEAT, HVAC, ELECTRICITY, SANITARY FACILITIES, WASTE DISPOSAL FACILITIES, AND TELEPHONE/COMMUNICATION SERVICES. PROVIDE TEMPORARY UTILITIES AND FACILITIES IN ACCORDANCE WITH OSHA AND THE AUTHORITY HAVING JURISDICTION. CONTRACTOR MAY UTILIZE THE COMPANY ELECTRICAL SERVICE IN THE COMPLETION OF THE WORK WHEN IT BECOMES AVAILABLE. USE OF THE LESSORS OR SITE OWNER'S UTILITIES OR FACILITIES IS EXPRESSLY FORBIDDEN EXCEPT AS OTHERWISE ALLOWED IN THE CONTRACT DOCUMENTS.

2.2 ACCESS TO WORK: THE CONTRACTOR SHALL PROVIDE ACCESS TO THE JOB SITE FOR AUTHORIZED COMPANY PERSONNEL AND AUTHORIZED REPRESENTATIVES OF THE ARCHITECT/ENGINEER DURING ALL PHASES OF THE WORK.

2.3 TESTING: REQUIREMENTS FOR TESTING BY THIS CONTRACTOR SHALL BE AS INDICATED HEREWITH, ON THE CONSTRUCTION DRAWINGS, AND IN THE INDIVIDUAL SECTIONS OF THESE SPECIFICATIONS. SHOULD COMPANY CHOOSE TO ENGAGE ANY THIRD-PARTY TO CONDUCT ADDITIONAL TESTING, THE CONTRACTOR SHALL COOPERATE WITH AND PROVIDE A WORK AREA FOR COMPANY'S TEST AGENCY.

2.4 COMPANY FURNISHED MATERIAL AND EQUIPMENT: ALL HANDLING, STORAGE AND INSTALLATION OF COMPANY FURNISHED MATERIAL AND EQUIPMENT SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS AND WITH THE MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.
A. CONTRACTOR SHALL PROCURE ALL OTHER REQUIRED WORK RELATED MATERIALS NOT PROVIDED BY T-MOBILE TO SUCCESSFULLY CONSTRUCT A WIRELESS FACILITY.

2.5 DIMENSIONS: VERIFY DIMENSIONS INDICATED ON DRAWINGS WITH FIELD DIMENSIONS BEFORE FABRICATION OR ORDERING OF MATERIALS. DO NOT SCALE DRAWINGS.

2.6 EXISTING CONDITIONS: NOTIFY THE COMPANY REPRESENTATIVE OF EXISTING CONDITIONS DIFFERING FROM THOSE INDICATED ON THE DRAWINGS. DO NOT REMOVE OR ALTER STRUCTURAL COMPONENTS WITHOUT PRIOR WRITTEN APPROVAL FROM THE ARCHITECT AND ENGINEER.

PART 3 – RECEIPT OF MATERIAL & EQUIPMENT

3.1 RECEIPT OF MATERIAL AND EQUIPMENT: CONTRACTOR IS RESPONSIBLE FOR T-MOBILE PROVIDED MATERIAL AND EQUIPMENT AND UPON RECEIPT SHALL:
- A. ACCEPT DELIVERIES AS SHIPPED AND TAKE RECEIPT.
- B. VERIFY COMPLETENESS AND CONDITION OF ALL DELIVERIES.
- C. TAKE RESPONSIBILITY FOR EQUIPMENT AND PROVIDE INSURANCE PROTECTION AS REQUIRED IN AGREEMENT.
- D. RECORD ANY DEFECTS OR DAMAGES AND WITHIN TWENTY-FOUR HOURS AFTER RECEIPT, REPORT TO T-MOBILE OR ITS DESIGNATED PROJECT REPRESENTATIVE OF SUCH.
- E. PROVIDE SECURE AND NECESSARY WEATHER PROTECTED WAREHOUSING.
- F. COORDINATE SAFE AND SECURE TRANSPORTATION OF MATERIAL AND EQUIPMENT, DELIVERING AND OFF-LOADING FROM CONTRACTOR'S WAREHOUSE TO SITE.

PART 4 – GENERAL REQUIREMENTS FOR CONSTRUCTION

4.1 CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH. AT THE COMPLETION OF THE WORK, CONTRACTOR SHALL REMOVE FROM THE SITE ALL REMAINING RUBBISH, IMPLEMENTS, TEMPORARY FACILITIES, AND SURPLUS MATERIALS.

4.2 EQUIPMENT ROOMS SHALL AT ALL TIMES BE MAINTAINED "BROOM CLEAN" AND CLEAR OF DEBRIS.

4.3 CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO DISCOVER AND LOCATE ANY HAZARDOUS CONDITION.
A. IN THE EVENT CONTRACTOR ENCOUNTERS ANY HAZARDOUS CONDITION WHICH HAS NOT BEEN ABATED OR OTHERWISE MITIGATED, CONTRACTOR AND ALL OTHER PERSONS SHALL IMMEDIATELY STOP WORK IN THE AFFECTED AREA AND NOTIFY COMPANY IN WRITING. THE WORK IN THE AFFECTED AREA SHALL NOT BE RESUMED EXCEPT BY WRITTEN NOTIFICATION BY COMPANY.
B. CONTRACTOR AGREES TO USE CARE WHILE ON THE SITE AND SHALL NOT TAKE ANY ACTION THAT WILL OR MAY RESULT IN OR CAUSE THE HAZARDOUS CONDITION TO BE FURTHER RELEASED IN THE ENVIRONMENT, OR TO FURTHER EXPOSE INDIVIDUALS TO THE HAZARD.

4.4 CONTRACTOR'S ACTIVITIES SHALL BE RESTRICTED TO THE PROJECT LIMITS. SHOULD AREAS OUTSIDE THE PROJECT LIMITS BE AFFECTED BY CONTRACTOR'S ACTIVITIES, CONTRACTOR SHALL IMMEDIATELY RETURN THEM TO ORIGINAL CONDITION.

4.5 CONDUCT TESTING AS REQUIRED HEREIN.

PART 5 – TESTS AND INSPECTIONS

5.1 TESTS AND INSPECTIONS:
- A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTS, INSPECTIONS AND PROJECT DOCUMENTATION.
- B. CONTRACTOR SHALL COORDINATE TEST AND INSPECTION SCHEDULES WITH COMPANY'S REPRESENTATIVE WHO MUST BE ON SITE TO WITNESS SUCH TESTS AND INSPECTIONS.
- C. WHEN THE USE OF A THIRD PARTY INDEPENDENT TESTING AGENCY IS REQUIRED, THE AGENCY THAT IS SELECTED MUST PERFORM SUCH WORK ON A REGULAR BASIS IN THE STATE WHERE THE PROJECT IS LOCATED AND HAVE A THOROUGH UNDERSTANDING OF LOCAL AVAILABLE MATERIALS, INCLUDING THE SOIL, ROCK, AND GROUNDWATER CONDITIONS.
- D. THE THIRD PARTY TESTING AGENCY IS TO BE FAMILIAR WITH THE APPLICABLE REQUIREMENTS FOR THE TESTS TO BE DONE, EQUIPMENT TO BE USED, AND ASSOCIATED HEALTH AND SAFETY ISSUES.
- E. SITE RESISTANCE TO EARTH TESTING PER EXHIBIT: CELL SITE GROUNDING SYSTEM DESIGN.
- F. ANTENNA AND COAX SWEEP TESTS PER EXHIBIT: ANTENNA TRANSMISSION LINE ACCEPTANCE STANDARDS.
- G. ALL OTHER TESTS REQUIRED BY COMPANY OR JURISDICTION.

PART 6 – TRENCHING AND BACKFILLING

6.1 TRENCHING AND BACKFILLING: THE CONTRACTOR SHALL PERFORM ALL EXCAVATION OF EVERY DESCRIPTION AND OF WHATEVER SUBSTANCES ENCOUNTERED, TO THE DEPTHS INDICATED ON THE CONSTRUCTION DRAWINGS OR AS OTHERWISE SPECIFIED.

A. PROTECTION OF EXISTING UTILITIES: THE CONTRACTOR SHALL CHECK WITH THE LOCAL UTILITIES AND THE RESPECTIVE UTILITY LOCATOR COMPANIES PRIOR TO STARTING EXCAVATION OPERATIONS IN EACH RESPECTIVE AREA TO ASCERTAIN THE LOCATIONS OF KNOWN UTILITY LINES. THE LOCATIONS, NUMBER AND TYPES OF EXISTING UTILITY LINES DETAILED ON THE CONSTRUCTION DRAWINGS ARE APPROXIMATE AND DO NOT REPRESENT EXACT INFORMATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ALL LINES DAMAGED DURING EXCAVATION AND ALL ASSOCIATED OPERATIONS. ALL UTILITY LINES UNCOVERED DURING THE EXCAVATION OPERATIONS, SHALL BE PROTECTED FROM DAMAGE DURING EXCAVATION AND ASSOCIATED OPERATIONS. ALL REPAIRS SHALL BE APPROVED BY THE UTILITY COMPANY.

B. HAND DIGGING: UNLESS APPROVED IN WRITING OTHERWISE, ALL DIGGING WITHIN AN EXISTING CELL SITE COMPOUND IS TO BE DONE BY HAND.

C. DURING EXCAVATION, MATERIAL SUITABLE FOR BACKFILLING SHALL BE STOCKPILED IN AN ORDERLY MANNER A SUFFICIENT DISTANCE FROM THE BANKS OF THE TRENCH TO AVOID OVERLOADING AND TO PREVENT SLIDES OR CAVE-INS. ALL EXCAVATED MATERIALS NOT REQUIRED OR SUITABLE FOR BACKFILL SHALL BE REMOVED AND DISPOSED OF AT THE CONTRACTOR'S EXPENSE.

D. GRADING SHALL BE DONE AS MAY BE NECESSARY TO PREVENT SURFACE WATER FROM FLOWING INTO TRENCHES OR OTHER EXCAVATIONS, AND ANY WATER ACCUMULATING THEREIN SHALL BE REMOVED BY PUMPING OR BY OTHER APPROVED METHOD.

E. SHEETING AND SHORING SHALL BE DONE AS NECESSARY FOR THE PROTECTION OF THE WORK AND FOR THE SAFETY OF PERSONNEL. UNLESS OTHERWISE INDICATED, EXCAVATION SHALL BE BY OPEN CUT, EXCEPT THAT SHORT SECTIONS OF A TRENCH MAY BE TUNNELED IF, THE CONDUIT CAN BE SAFELY AND PROPERLY INSTALLED AND BACKFILL CAN BE PROPERLY TAMPED IN SUCH TUNNEL SECTIONS. EARTH EXCAVATION SHALL COMPRISE ALL MATERIALS AND SHALL INCLUDE CLAY, SILT, SAND, MUCK, GRAVEL, HARDPAN, LOOSE SHALE, AND LOOSE STONE.

F. TRENCHES SHALL BE OF NECESSARY WIDTH FOR THE PROPER LAYING OF THE CONDUIT OR CABLE, AND THE BANKS SHALL BE AS NEARLY VERTICAL AS PRACTICABLE. THE BOTTOM OF THE TRENCHES SHALL BE ACCURATELY GRADED TO PROVIDE UNIFORM BEARING AND SUPPORT FOR EACH SECTION OF THE CONDUIT OR CABLE ON UNDISTURBED SOIL AT EVERY POINT ALONG ITS ENTIRE LENGTH. EXCEPT WHERE ROCK IS ENCOUNTERED, CARE SHALL BE TAKEN NOT TO EXCAVATE BELOW THE DEPTHS INDICATED. WHERE ROCK EXCAVATIONS ARE NECESSARY, THE ROCK SHALL BE EXCAVATED TO A MINIMUM OVER DEPTH OF 6 INCHES BELOW THE TRENCH DEPTHS INDICATED ON THE CONSTRUCTION DRAWINGS OR SPECIFIED. OVER DEPTHS IN THE ROCK EXCAVATION AND UNAUTHORIZED OVER DEPTHS SHALL BE THOROUGHLY BACK FILLED AND TAMPED TO THE APPROPRIATE GRADE. WHENEVER WET OR OTHERWISE UNSTABLE SOIL THAT IS INCAPABLE OF PROPERLY SUPPORTING THE CONDUIT OR CABLE IS ENCOUNTERED IN THE BOTTOM OF THE TRENCH, SUCH SOLID SHALL BE REMOVED TO A MINIMUM OVER DEPTH OF 6 INCHES AND THE TRENCH BACKFILLED TO THE PROPER GRADE WITH EARTH OF OTHER SUITABLE MATERIAL, AS HEREINAFTER SPECIFIED.

G. BACKFILLING OF TRENCHES. TRENCHES SHALL NOT BE BACKFILLED UNTIL ALL SPECIFIED TESTS HAVE BEEN PERFORMED AND ACCEPTED. WHERE COMPACTED BACKFILL IS NOT INDICATED THE TRENCHES SHALL BE CAREFULLY BACKFILLED WITH SELECT MATERIAL SUCH AS EXCAVATED SOILS THAT ARE FREE OF ROOTS, SOD, RUBBISH OR STONES, DEPOSITED IN 6 INCH LAYERS AND THOROUGHLY AND CAREFULLY RAMMED UNTIL THE CONDUIT OR CABLE HAS A COVER OF NOT LESS THAN 1 FOOT. THE REMAINDER OF THE BACKFILL MATERIAL SHALL BE GRANULAR IN NATURE AND SHALL NOT CONTAIN ROOTS, SOD, RUBBING, OR STONES OF 2-1/2 INCH MAXIMUM DIMENSION. BACKFILL SHALL BE CAREFULLY PLACED IN THE TRENCH AND IN 1 FOOT LAYERS AND EACH LAYER TAMPED. SETTLING THE BACKFILL WITH WATER WILL BE PERMITTED. THE SURFACE SHALL BE GRADED TO A REASONABLE UNIFORMITY AND THE MOUNDING OVER THE TRENCHES LEFT IN A UNIFORM AND NEAT CONDITION.

SYMBOL	DESCRIPTION
	CIRCUIT BREAKER
	NON-FUSIBLE DISCONNECT SWITCH
F	FUSIBLE DISCONNECT SWITCH
	SURFACE MOUNTED PANEL BOARD
T	TRANSFORMER
M	KILOWATT HOUR METER
JB	JUNCTION BOX
PB	PULL BOX TO NEC/TELCO STANDARDS
	UNDERGROUND UTILITIES
	EXOTHERMIC WELD CONNECTION
	MECHANICAL CONNECTION
OR	GROUND ROD
OR	GROUND ROD WITH INSPECTION SLEEVE
	GROUND BAR
	120AC DUPLEX RECEPTACLE
G	GROUND CONDUCTOR
	DC POWER AND FIBER OPTIC TRUNK CABLES
E	DC POWER CABLES
# / #	REPRESENTS DETAIL NUMBER / REF. DRAWING NUMBER

ABBREVIATIONS

CIGBE	COAX ISOLATED GROUND BAR EXTERNAL
MIGB	MASTER ISOLATED GROUND BAR
SST	SELF SUPPORTING TOWER
GPS	GLOBAL POSITIONING SYSTEM
TYP	TYPICAL
DWG	DRAWING
BCW	BARE COPPER WIRE
BFG	BELOW FINISH GRADE
PVC	POLYVINYL CHLORIDE
CAB	CABINET
C	CONDUIT
SS	STAINLESS STEEL
G	GROUND
AWG	AMERICAN WIRE GAUGE
RGS	RIGID GALVANIZED STEEL
AHJ	AUTHORITY HAVING JURISDICTION
TTLNA	TOWER TOP LOW NOISE AMPLIFIER
UNO	UNLESS NOTED OTHERWISE
EMT	ELECTRICAL METALLIC TUBING
AGL	ABOVE GROUND LEVEL

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STATE OF CONNECTICUT
JOHN S. STEVENS
No. 24705
LICENSED PROFESSIONAL ENGINEER
DEC 28 2018

No	Submittal / Revision	Appd	Date
1	JURISDICTION CODE REQ'S	RMS	12/28/18
0	ISSUED FOR CONSTRUCTION	RMS	11/26/18
A	ISSUED FOR REVIEW	RMS	10/23/18

Drawn: RCD
Designed: MRL
Checked: AJD

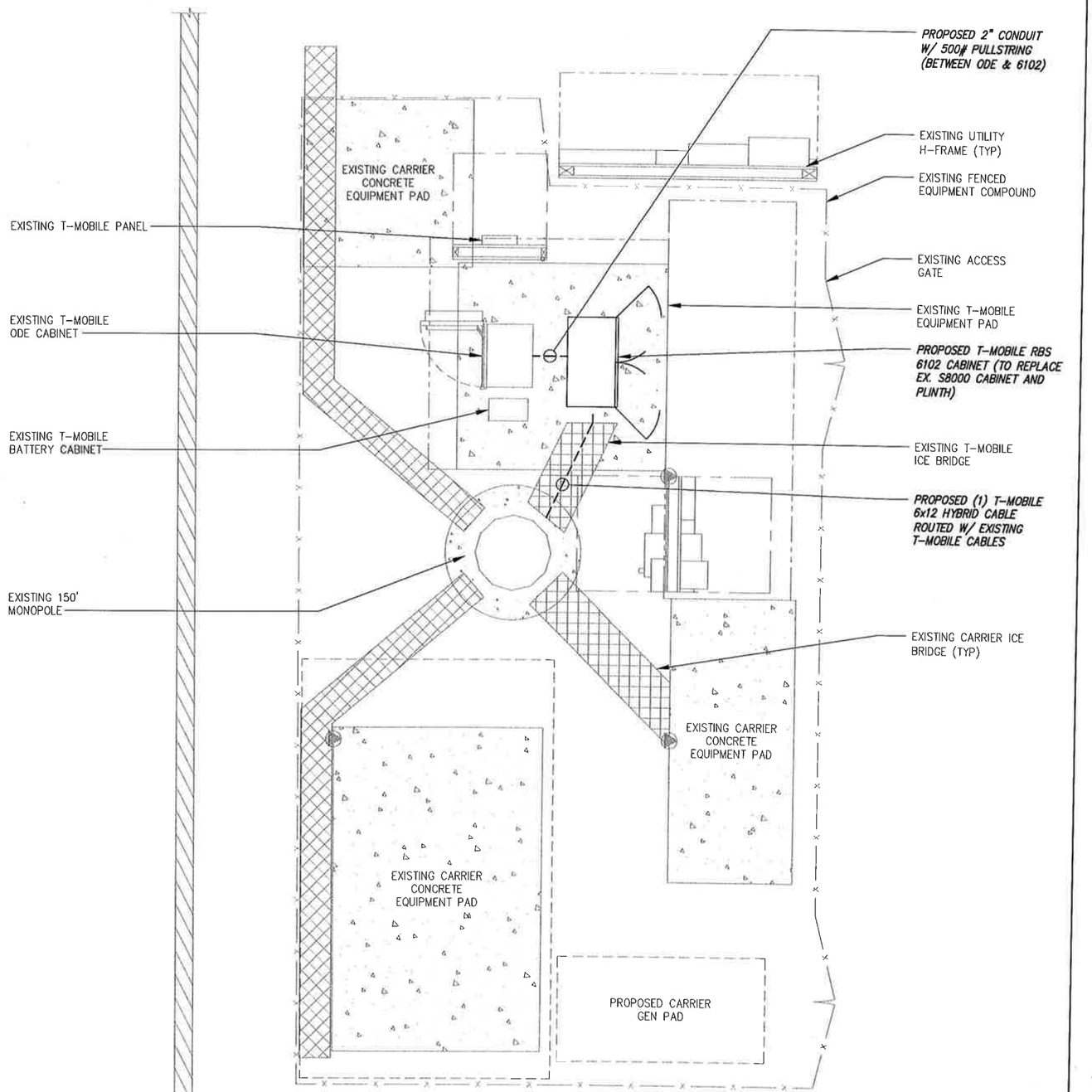
Project Number: 600-007

Project Title:
CT11331A
NORWICH
50 CLINTON AVENUE
NORWICH, CT 06360

Prepared For:
CROWN CASTLE

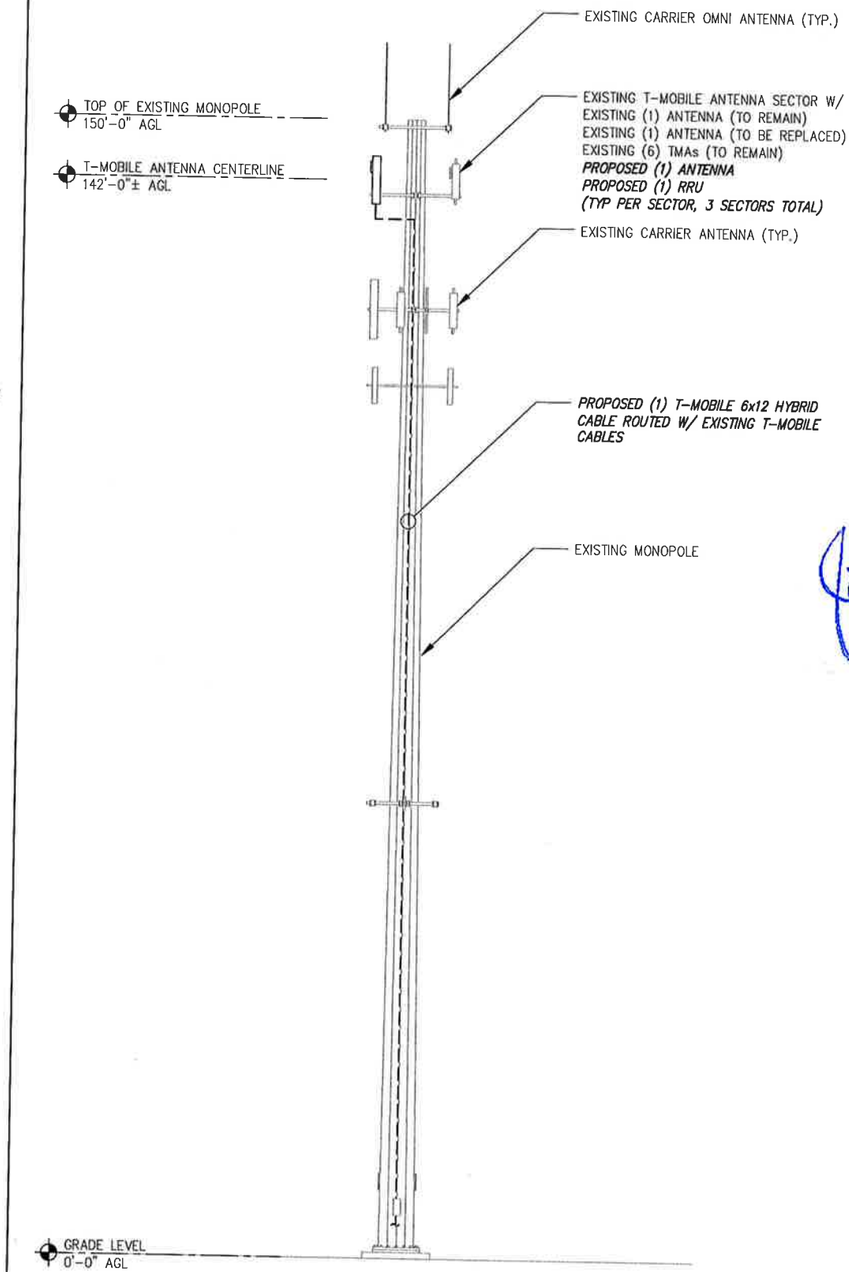
Drawing Title
NOTES

Drawing Number
N1



1 C1 PLAN VIEW
SCALE: AS NOTED

GRAPHIC SCALE:
6' 3' 0 3' 6'
SCALE (11x17): 1" = 6'-0"
SCALE (22x34): 1" = 3'-0"



2 C1 ELEVATION
SCALE: NOT TO SCALE

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REGISTERED PROFESSIONAL ENGINEER
DEC 28 2018

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Prepared For:
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Drawing Title
PLAN AND ELEVATION

Drawing Number
C1

SECTOR	ANTENNA POSITION	ANTENNA MODEL #	VENDOR	AZIMUTH	M-TILT	E-TILT	ANTENNA CENTERLINE	TMA/RRU MODEL #	CABLE LENGTH	CABLE TYPE AND QUANTITY
ALPHA	A-1	APX16DWV-16DWV-S-E-A20	RFS	50°	0	2/2	142'-0"	TWIN STYLE 1A - PCS/ 1B - AWS	187'±	(4) 1-5/8" COAX
	A-2	**APXVAARR24_43-U-NA20**	**RFS**	**50°**	0	2	142'-0"	**4449 B71+B12**	**187'±**	**(1) 6X12 HYBRID TRUNK CABLE (SHARED)**
	A-3	-	-	-	-	-	-	-	-	-
BETA	B-1	APX16DWV-16DWV-S-E-A20	RFS	170°	0	2/2	142'-0"	TWIN STYLE 1A - PCS/ 1B - AWS	187'±	(4) 1-5/8" COAX
	B-2	**APXVAARR24_43-U-NA20**	**RFS**	**170°**	0	2	142'-0"	**4449 B71+B12**	**187'±**	**(1) 6X12 HYBRID TRUNK CABLE (SHARED)**
	B-3	-	-	-	-	-	-	-	-	-
GAMMA	C-1	APX16DWV-16DWV-S-E-A20	RFS	290°	0	2/2	142'-0"	TWIN STYLE 1A - PCS/ 1B - AWS	187'±	(4) 1-5/8" COAX
	C-2	**APXVAARR24_43-U-NA20**	**RFS**	**290°**	0	2	142'-0"	**4449 B71+B12**	**187'±**	**(1) 6X12 HYBRID TRUNK CABLE (SHARED)**
	C-3	-	-	-	-	-	-	-	-	-

1 / C2 RF SYSTEM CHART
SCALE: NOT TO SCALE

KEY

EXISTING
PROPOSED

ANTENNA LOCATION KEY

VIEWED FROM BEHIND

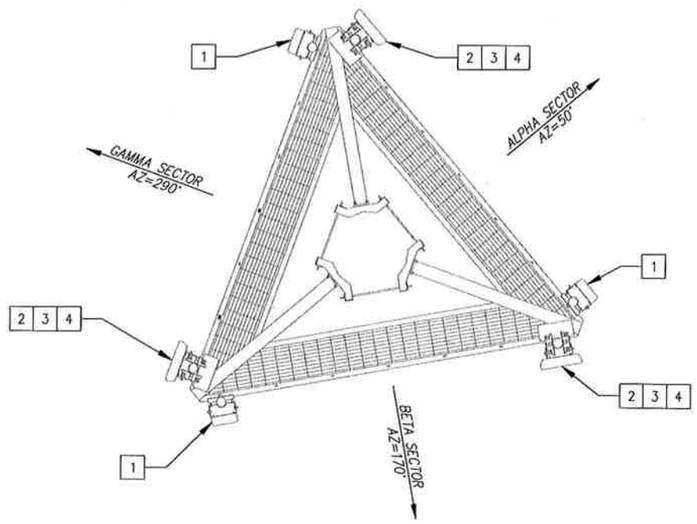
#1 #2

GENERAL NOTES:

1. CONTRACTOR TO VERIFY PROPOSED ANTENNA INFORMATION IS THE MOST CURRENT AT TIME OF CONSTRUCTION.
2. CONTRACTOR TO CONFIRM CABLE LENGTHS FOR ANY PROPOSED CABLES/JUMPERS PRIOR TO CONSTRUCTION.

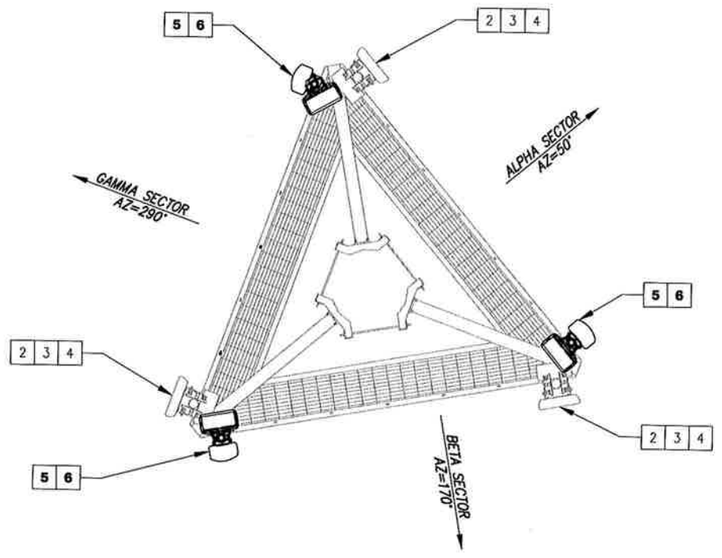
ORIENTATION PLAN KEY

KEY	DESCRIPTION	TYPE	QTY	STATUS
1	RV90-18-00DP	ANTENNA	3	REMOVED
2	APX16DWV-16DWV-S-E-A20	ANTENNA	3	REMAIN
3	TWIN STYLE 1A - PCS	TMA	3	REMAIN
4	TWIN STYLE 1B - AWS	TMA	3	REMAIN
5	**APXVAARR24_43-U-NA20**	**ANTENNA**	**3**	**PROPOSED**
6	**4449 B71+B12**	**RRU**	**3**	**PROPOSED**



NORTH

2 / C2 EXISTING ANTENNA ORIENTATION
SCALE: NOT TO SCALE



NORTH

3 / C2 PROPOSED ANTENNA ORIENTATION
SCALE: NOT TO SCALE

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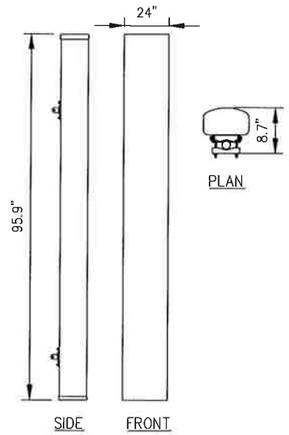
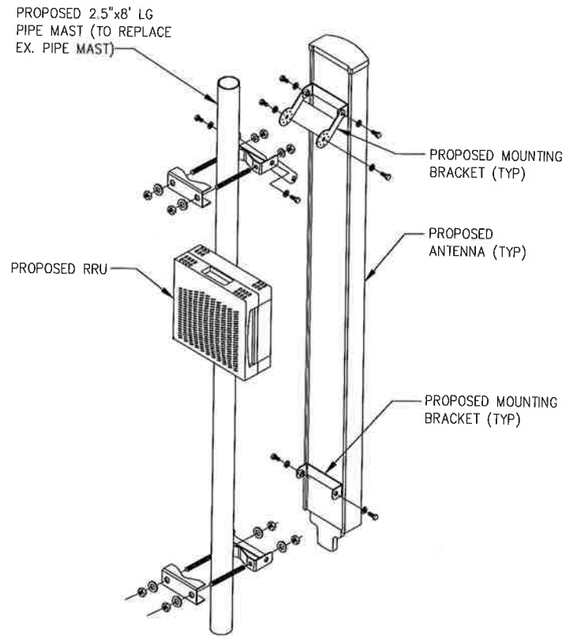
Drawing Title
RF CHART

Drawing Number
C2

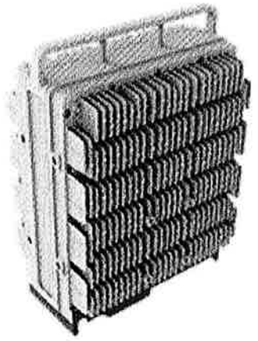


RFS MODEL NO.:	APXVAARR24_43-U-NA20
RADOME MATERIAL:	FIBERGLASS
RADOME COLOR:	LIGHT GREY
DIMENSIONS, HxWxD:	95.9"x24"x8.7"
WEIGHT, W/O MOUNTING KIT:	128 LBS

1 / D1 APX ANTENNA DETAIL
SCALE: NOT TO SCALE



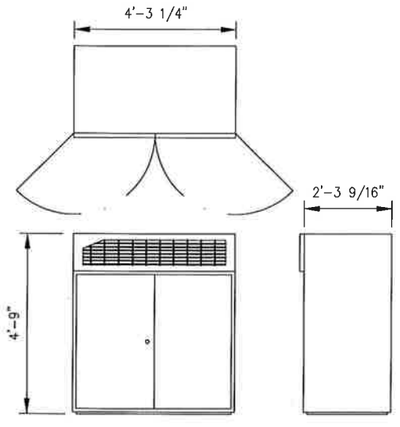
2 / D1 ANTENNA/RRU MOUNTING DETAIL
SCALE: NOT TO SCALE



ERICSSON 4449 B71+B12 SPECIFICATIONS

- HxWxD, (INCHES) : 17.91"x13.19"x10.63"
- WEIGHT (LBS) : 74.96
- COLOR : GRAY

3 / D1 4449 B71+B12 RRU DETAIL
SCALE: NOT TO SCALE



ERICSSON RBS 6102 RADIO CABINET

ERICSSON RBS COMPACT EQUIPMENT CABINET. SECURE PER MANUFACTURERS RECOMMENDATION (772 LBS FULLY EQUIPPED, **WITHOUT** BATTERIES)

4 / D1 RBS 6102 DETAIL
SCALE: NOT TO SCALE

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STATE OF CONNECTICUT
JOHN S. STEVENS
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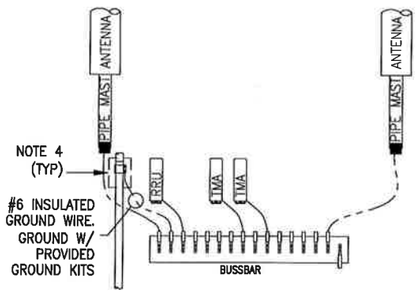
NORWICH
50 CLINTON AVENUE
NORWICH, CT 06360

Prepared For: CROWN CASTLE

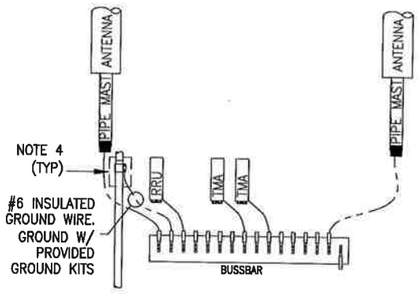
Drawing Title
EQUIPMENT DETAILS

Drawing Number
D1

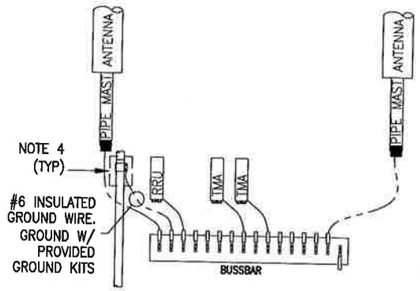
ALPHA SECTOR
(LAYOUT SHOWN GENERICALLY, SEE ANTENNA ORIENTATION)



BETA SECTOR
(LAYOUT SHOWN GENERICALLY, SEE ANTENNA ORIENTATION)

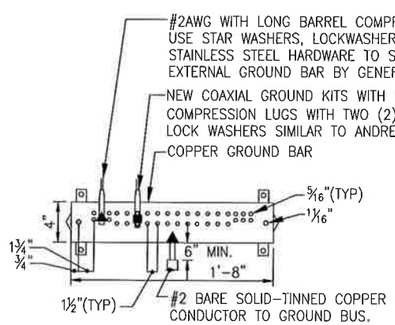


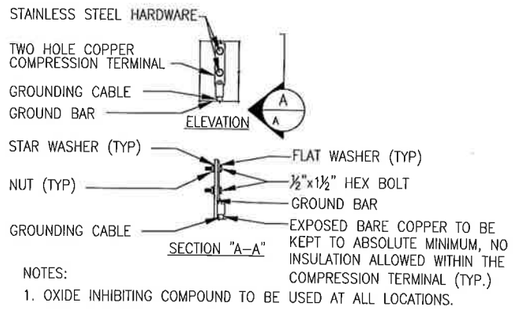
GAMMA SECTOR
(LAYOUT SHOWN GENERICALLY, SEE ANTENNA ORIENTATION)



NOTES:
1. PROVIDE #2AWG GROUNDING CONDUCTOR, U.O.N.
2. PROVIDE BONDING AND GROUNDING CONDUCTORS WITH GREEN TYPE THWN INSULATION, U.O.N.
3. PROVIDE SOLID TINNED BARE COPPER WIRE (BCW) GROUNDING CONDUCTOR.
4. PROVIDE STANDARD COAX OR HYBRID CABLE GROUNDING KIT OR FIELD FABRICATE TO SUIT CONDITIONS. TOTAL LENGTH OF GROUNDING CONDUCTOR SHALL NOT EXCEED 10'-0".
5. PROVIDE GROUNDING ELECTRODES QUANTITY, TYPE AND SIZE AS INDICATED ON SITE GROUNDING PLAN.
6. LEAVE GROUND WIRE COILED UP ABOVE GRADE. CAP END OF CONDUIT.
7. ADD COAX OR HYBRID CABLE GROUND KIT CONNECTION TO BUSSBAR WHEN LENGTH OF CABLE TRAY (FROM TOWER OR MONOPOLE TO EQUIPMENT) IS GREATER THAN 20'-0".
8. ADD #2/0 GREEN INSULATED CONDUCTOR BETWEEN CABLE TRAY AND GRIPSTRUT/COVER.
9. BUSSBARS ARE TO BE TINNED COPPER BARS (¼"X2"X12") MOUNTED ON INSULATORS, U.O.N.
10. GROUND ALL PROPOSED ANTENNAS, DIPLEXERS, TMAS, AND RRUS PER MANU. SPECS.

1 / E1 GROUNDING DIAGRAM
SCALE: NOT TO SCALE

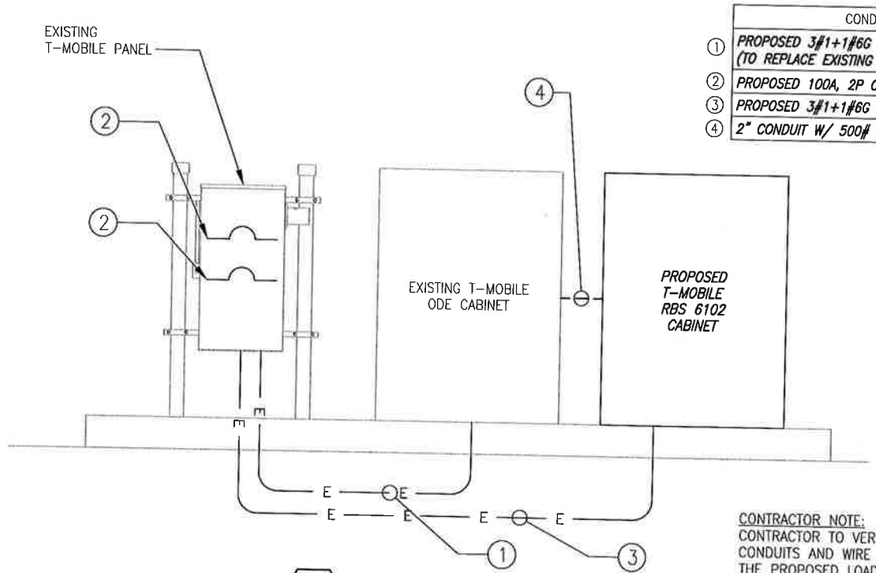




NOTES:
1. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.

NOTES:
1. ALL HARDWARE STAINLESS STEEL COAT ALL SURFACES WITH KOPR-SHIELD BEFORE MATING.
2. FOR GROUND BOND TO STEEL ONLY: INSERT A TOOTH WASHER BETWEEN LUG AND STEEL, COAT ALL SURFACES WITH KOPR-SHIELD.
3. ALL HOLES ARE COUNTERSUNK 1/16".

2 / E1 GROUND BAR CONNECTION DETAIL
SCALE: NOT TO SCALE



CONDUIT SCHEDULE
① PROPOSED 3#1+1#6G IN 1-1/2" CONDUIT (TO REPLACE EXISTING CONDUCTOR AND CONDUIT)
② PROPOSED 100A, 2P C.B.
③ PROPOSED 3#1+1#6G IN 1-1/2" CONDUIT
④ 2" CONDUIT W/ 500# PULLSTRING

3 / E1 ONE LINE DIAGRAM
SCALE: NOT TO SCALE

CONTRACTOR NOTE:
CONTRACTOR TO VERIFY THAT THE EXISTING CONDUITS AND WIRE SIZES ARE ADEQUATE FOR THE PROPOSED LOADING IN ACCORDANCE WITH NEC AND INCLUDE ELECTRICAL UPGRADES IN THE SCOPE OF WORK AS REQUIRED.

T-Mobile
T-MOBILE NORTHEAST LLC
103 MONARCH DRIVE
LIVERPOOL, NY 13088

INFINIGY
6855 DEERPATH ROAD SUITE 152
ELKRIDGE, MD 21075
TEL (443) 592-3143

STATE OF CONNECTICUT
JOHN S. STEVENS
No. 21792
LICENSED PROFESSIONAL ENGINEER
DEC 28 2018

No	Submittal / Revision	Appd	Date
1	JURISDICTION CODE REQ'S	RMS	12/28/18
0	ISSUED FOR CONSTRUCTION	RMS	11/26/18
A	ISSUED FOR REVIEW	RMS	10/23/18

Drawn: RCD
Designed: MRL
Checked: AJD

Project Number: 600-007

Project Title:
CT11331A
NORWICH
50 CLINTON AVENUE
NORWICH, CT 06360

Prepared For:
CROWN CASTLE

Drawing Title
GROUNDING & ELECTRICAL DETAILS

Drawing Number
E1

ALPHA

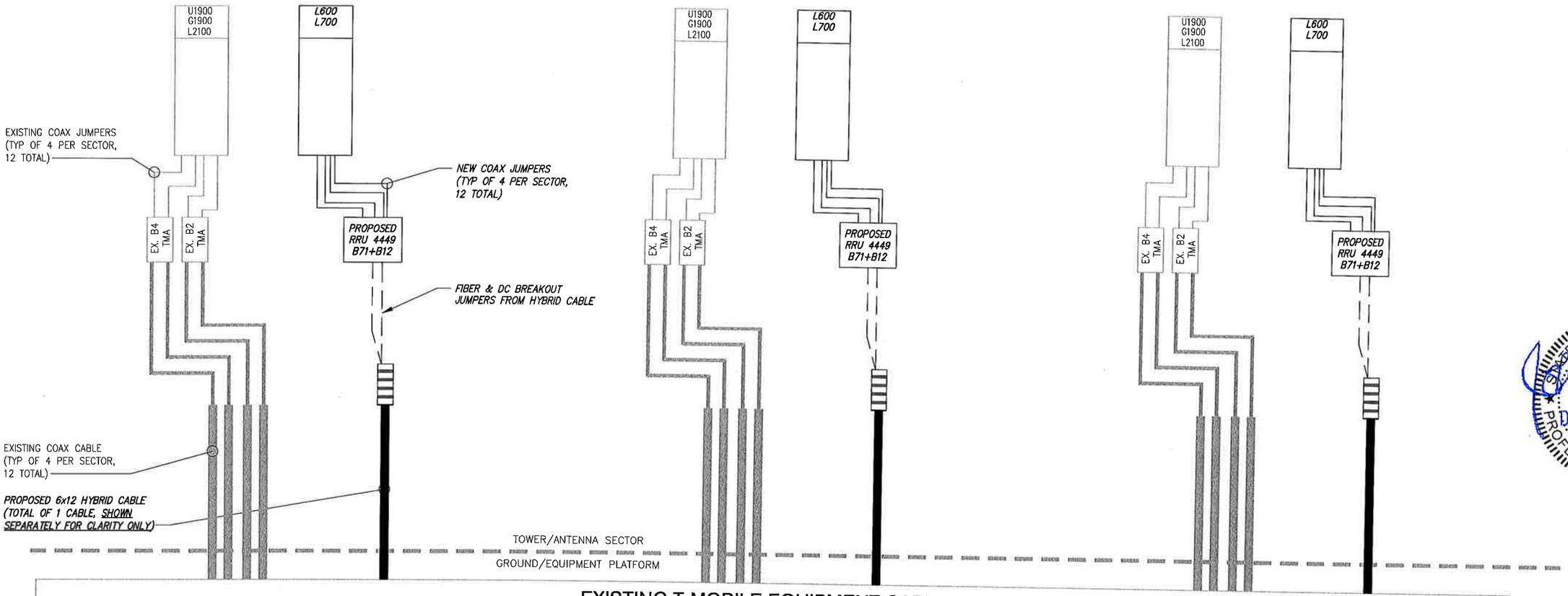
(ANTENNA, TMA, AND RRU LOCATION SHOWN GENERICALLY, SEE ORIENTATION PLAN FOR EXACT LAYOUT)

BETA

(ANTENNA, TMA, AND RRU LOCATION SHOWN GENERICALLY, SEE ORIENTATION PLAN FOR EXACT LAYOUT)

GAMMA

(ANTENNA, TMA, AND RRU LOCATION SHOWN GENERICALLY, SEE ORIENTATION PLAN FOR EXACT LAYOUT)



EXISTING T-MOBILE EQUIPMENT CABINET W/ EQUIPMENT RETROFIT FOR RF CONFIGURATION: 67D05F

NOTES:
1. TAG ALL EXISTING AND PROPOSED CABLES/JUMPERS PER T-MOBILE SPECIFICATIONS.
2. SEE RF SCHEDULE FOR CABLE AND JUMPER LENGTHS.
3. REFER TO ANTENNA ORIENTATION PLANS FOR EXACT ANTENNA AND RRU POSITIONING.

1 / E2 RF PLUMBING DIAGRAM
SCALE: AS NOTED

T-MOBILE NORTHEAST LLC
103 MONARCH DRIVE
LIVERPOOL, NY 13088

INFINIGY
6865 DEERPATH ROAD SUITE 152
ELKRIDGE, MD 21075
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STATE OF CONNECTICUT
JOHN S. STEVENS
No. 24705
PROFESSIONAL ENGINEER
LICENSED
DEC 28 2018

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CT11331A
NORWICH
50 CLINTON AVENUE
NORWICH, CT 06360

Prepared For: CROWN CASTLE

Drawing Title
RF PLUMBING DIAGRAM

Drawing Number
E2

PAUL J. FORD & COMPANY

Date: **October 31, 2018**

Denice Nicholson
Crown Castle
3 Corporate Park Drive Suite 101
Clifton Park, NY 12065

Paul J. Ford and Company
250 East Broad st., Suite 600
Columbus, OH 43215
(614) 221-6679

Subject:	**Structural Analysis Report**	
Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11331A
	Carrier Site Name:	NORWICH
Crown Castle Designation:	**Crown Castle BU Number:**	826313
	Crown Castle Site Name:	NORWICH
	Crown Castle JDE Job Number:	537518
	Crown Castle Work Order Number:	1652002
	Crown Castle Order Number:	463032 Rev. 0
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37518-3568.001.7805
Site Data:	**50 Clinton Avenue, Norwich, New London County, CT** **Latitude *41° 33' 19.804"*, Longitude *-72° 6' 37.08"*** **149.083 Foot - Monopole Tower**	

Dear Denice Nicholson,

Paul J. Ford and Company is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC5: Proposed Equipment Configuration **Sufficient Capacity**

This analysis utilizes an ultimate 3-second gust wind speed of 135 mph as required by the 2018 Connecticut State Building Code, Appendix N. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Respectfully submitted by:

Udaykiran Yerra
Structural Designer

RMF

STATE OF CONNECTICUT
JOSEPH PACHICARAH JACOBS
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER

NOV 01 2018

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 149.083 ft Monopole tower designed by PIROD MANUFACTURES INC.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	135 mph
Exposure Category:	C
Topographic Factor:	1
Ice Thickness:	1.5 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
137.0	137.0	6	ericsson	KRY 112 71	12 1	1-5/8 1 1/4
		3	ericsson	RADIO 4449 B12/B71		
		3	rfs celwave	APX16DWV-16DWVS-C-A20 w/ Mount Pipe		
		3	rfs celwave	APXVAARR24_43-U-NA20 w/ 8'-0" 2.5" STD Mount Pipe		
		1	tower mounts	Platform Mount [LP 303-1]		

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
149.0	154.0	2	decibel	DB809T6E-XC	2	7/8
	149.0	2	tower mounts	Side Arm Mount [SO 702-1]		
125.0	125.0	3	cci antennas	HPA-65R-BUU-H8 w/ Mount Pipe	1 2 12 1	3/8 7/16 1 1/4 Conduit
		3	ericsson	RRUS 32 B2		
		3	ericsson	RRUS-11		
		3	powerwave technologies	1001983		
		12	powerwave technologies	7020.00		
		6	powerwave technologies	7770.00 w/ Mount Pipe		
		6	powerwave technologies	LGP21401		
		6	powerwave technologies	LGP21901		
		1	raycap	DC6-48-60-18-8F		
		1	tower mounts	Platform Mount [LP 303-1]		
115.0	117.0	3	kathrein	800 10504 w/ Mount Pipe	6	1 5/8
		3	kathrein	860 10025		
	115.0	1	tower mounts	T-Arm Mount [TA 602-3]		
60.0	60.0	2	alcatel lucent	B4 RRH2X60-4R	1	1 5/8
		2	andrew	ATM200-A20		
		2	andrew	HBX-6513DS-A1M w/ Mount Pipe		
		1	raycap	RRFDC-3315-PF-48		
		1	tower mounts	Platform Mount [LP 405-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	GEI Consultants, Inc., 00337, 9/20/2000	3503439	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PiROD Inc., 151460-B, 10/16/2000	3876096	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PiROD Inc., 151460-B, 10/16/2000	3503440	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.4.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) For existing modifications: monopole was modified in conformance with the referenced modification drawings.
5) In accordance with discussions with CCI Corporate Engineering: Based on the assumption that the monopole manufacturer (ROHN/PiRod) has designed the flange plates at splices to adequately develop the full capacity of the unreinforced shaft section using unpublished and/or proprietary methodologies, we are assuming that if our analysis shows that both the existing shaft and the existing flange bolts are at a usage capacity of 100% or less, then the existing flange plates are at a usage capacity of 100% or less and no additional analysis of the flange plate is required.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J. Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	149.083 - 133.083	Pole	TP26x12.75x0.25	1	-3.257	1444.411	3.1	Pass
L2	133.083 - 98.5	Pole	TP34.063x23.084x0.313	2	-11.566	2465.442	26.2	Pass
L3	98.5 - 64.833	Pole	TP41.75x32.315x0.375	3	-18.898	3619.056	35.2	Pass
L4	64.833 - 32	Pole	TP49.063x39.826x0.375	4	-30.177	4051.509	46.6	Pass
L5	32 - 0	Pole	TP56.125x46.958x0.375	5	-42.494	4480.633	57.3	Pass
							Summary	
						Pole (L5)	57.3	Pass
						Rating =	57.3	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	60.9	Pass
1, 2	Base Plate	0	57.3	Pass
1	Base Foundation Steel	0	70.8	Pass
1	Base Foundation Soil Interaction	0	23.0	Pass

Structure Rating (max from all components) =	**70.8%**

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed. All structural rating are per TIA-222-H Section 15.5.
2) See assumption #5.

4.1) Recommendations

The monopole and its foundation have sufficient capacity to carry the proposed loading configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

Tower is located in New London County, Connecticut.
Tower base elevation above sea level: 95.000 ft.
Basic wind speed of 135 mph.
Risk Category II.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height 0.000 ft.
Nominal ice thickness of 1.275 in.
Ice thickness is considered to increase with height.
Ice density of 56.000 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50.000 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.05.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	149.083-133.083	16.000	2.917	18	12.750	26.000	0.250	1.000	A572-65 (65 ksi)
L2	133.083-98.500	37.500	3.833	18	23.084	34.063	0.313	1.250	A572-65 (65 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L3	98.500-64.833	37.500	4.667	18	32.315	41.750	0.375	1.500	A572-65 (65 ksi)
L4	64.833-32.000	37.500	5.500	18	39.826	49.063	0.375	1.500	A572-65 (65 ksi)
L5	32.000-0.000	37.500		18	46.958	56.125	0.375	1.500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	12.908	9.919	195.801	4.438	6.477	30.230	391.859	4.960	1.804	7.216
	26.363	20.433	1711.654	9.141	13.208	129.592	3425.561	10.218	4.136	16.544
L2	24.259	22.587	1479.755	8.084	11.727	126.185	2961.457	11.296	3.513	11.241
	34.540	33.476	4817.433	11.981	17.304	278.404	9641.206	16.741	5.445	17.424
L3	33.735	38.017	4900.001	11.339	16.416	298.485	9806.450	19.012	5.028	13.407
	42.336	49.247	10650.982	14.688	21.209	502.192	21315.979	24.628	6.688	17.835
L4	41.550	46.956	9233.027	14.005	20.232	456.368	18478.203	23.483	6.349	16.932
	49.762	57.950	17355.138	17.284	24.924	696.329	34733.112	28.981	7.975	21.267
L5	48.990	55.445	15200.298	16.537	23.855	637.207	30420.596	27.728	7.605	20.279
	56.933	66.356	26056.151	19.791	28.511	913.882	52146.587	33.185	9.218	24.581

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 149.083-133.083				1	1	1			
L2 133.083-98.500				1	1	1			
L3 98.500-64.833				1	1	1			
L4 64.833-32.000				1	1	1			
L5 32.000-0.000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
LDF5-50A(7/8)	C	No	No	Inside Pole	149.000 - 0.000	2	No Ice	0.000	0.000
							1/2" Ice	0.000	0.000
							1" Ice	0.000	0.000
							2" Ice	0.000	0.000
LDF7-50A(1-5/8)	C	No	No	Inside Pole	137.000 - 0.000	12	No Ice	0.000	0.001
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
							2" Ice	0.000	0.001
LDF6-50A(1-1/4")	C	No	No	Inside Pole	137.000 - 0.000	1	No Ice	0.000	0.001
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
							2" Ice	0.000	0.001
LDF6-50A(1-1/4)	C	No	No	Inside Pole	125.000 - 0.000	12	No Ice	0.000	0.001
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
							2" Ice	0.000	0.001

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
FB-L98-002-XXX(3/8)	C	No	No	Inside Pole	125.000 - 0.000	1	No Ice	0.000	0.000
							1/2" Ice	0.000	0.000
							1" Ice	0.000	0.000
							2" Ice	0.000	0.000
WR-VG122ST-BRDA(7/16)	C	No	No	Inside Pole	125.000 - 0.000	2	No Ice	0.000	0.000
							1/2" Ice	0.000	0.000
							1" Ice	0.000	0.000
							2" Ice	0.000	0.000
LDF7-50A(1-5/8)	C	No	No	Inside Pole	115.000 - 0.000	6	No Ice	0.000	0.001
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
							2" Ice	0.000	0.001
3" (Nominal) Conduit	C	No	No	Inside Pole	125.000 - 0.000	1	No Ice	0.000	0.001
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
							2" Ice	0.000	0.001
HB158-1-08U8-S8J18(1-5/8)	C	No	No	Inside Pole	60.000 - 0.000	1	No Ice	0.000	0.001
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
							2" Ice	0.000	0.001

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	149.083-133.083	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.052
L2	133.083-98.500	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.707
L3	98.500-64.833	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.846
L4	64.833-32.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.861
L5	32.000-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.845

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	149.083-133.083	A	1.473	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.052
L2	133.083-98.500	A	1.444	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.707
L3	98.500-64.833	A	1.395	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.846
L4	64.833-32.000	A	1.324	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.861

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L5	32.000-0.000	A	1.186	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.845

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	149.083-133.083	0.000	0.000	0.000	0.000
L2	133.083-98.500	0.000	0.000	0.000	0.000
L3	98.500-64.833	0.000	0.000	0.000	0.000
L4	64.833-32.000	0.000	0.000	0.000	0.000
L5	32.000-0.000	0.000	0.000	0.000	0.000

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

Shielding Factor Ka

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

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
DB809T6E-XC	A	From Leg	4.000 0.000 5.000	0.000	149.000	No Ice 1/2" Ice 1" Ice 2" Ice	2.960 4.033 5.027 6.257	2.960 4.033 5.027 6.257	0.019 0.041 0.069 0.146
DB809T6E-XC	B	From Leg	4.000 0.000 5.000	0.000	149.000	No Ice 1/2" Ice 1" Ice 2" Ice	2.960 4.033 5.027 6.257	2.960 4.033 5.027 6.257	0.019 0.041 0.069 0.146
Side Arm Mount [SO 702-1]	A	None		0.000	149.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.000 1.000 1.000 1.000	1.430 2.050 2.670 3.910	0.027 0.038 0.049 0.071
Side Arm Mount [SO 702-1]	B	None		0.000	149.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.000 1.000 1.000 1.000	1.430 2.050 2.670 3.910	0.027 0.038 0.049 0.071
***									
(2) KRY 112 71	A	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice	0.583 0.688 0.799	0.398 0.488 0.586	0.013 0.018 0.025

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice 2" Ice	1.045	0.805	0.044
APX16DWV-16DWVS-C-A20 w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice	6.824 7.275 7.719 8.633	3.494 4.263 4.960 6.403	0.061 0.110 0.165 0.298
(2) KRY 112 71	B	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.583 0.688 0.799 1.045	0.398 0.488 0.586 0.805	0.013 0.018 0.025 0.044
APX16DWV-16DWVS-C-A20 w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice	6.824 7.275 7.719 8.633	3.494 4.263 4.960 6.403	0.061 0.110 0.165 0.298
APX16DWV-16DWVS-C-A20 w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice	6.824 7.275 7.719 8.633	3.494 4.263 4.960 6.403	0.061 0.110 0.165 0.298
(2) KRY 112 71	C	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.583 0.688 0.799 1.045	0.398 0.488 0.586 0.805	0.013 0.018 0.025 0.044
Platform Mount [LP 303-1]	C	None		0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice	14.660 18.870 23.080 31.500	14.660 18.870 23.080 31.500	1.250 1.481 1.713 2.175
APXVAARR24_43-U-NA20 w/ 8'-0" 2.5" STD Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice	20.245 20.893 21.548 22.879	11.189 12.619 13.713 15.946	0.174 0.312 0.461 0.792
APXVAARR24_43-U-NA20 w/ 8'-0" 2.5" STD Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice	20.245 20.893 21.548 22.879	11.189 12.619 13.713 15.946	0.174 0.312 0.461 0.792
APXVAARR24_43-U-NA20 w/ 8'-0" 2.5" STD Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice	20.245 20.893 21.548 22.879	11.189 12.619 13.713 15.946	0.174 0.312 0.461 0.792
RADIO 4449 B12/B71	A	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.650 1.810 1.978 2.336	1.163 1.301 1.447 1.762	0.074 0.090 0.109 0.155
RADIO 4449 B12/B71	B	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.650 1.810 1.978 2.336	1.163 1.301 1.447 1.762	0.074 0.090 0.109 0.155
RADIO 4449 B12/B71	C	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.650 1.810 1.978 2.336	1.163 1.301 1.447 1.762	0.074 0.090 0.109 0.155
***									
RRUS-11	A	From Leg	4.000 0.000	0.000	125.000	No Ice 1/2"	2.791 2.998	1.192 1.340	0.050 0.071

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000			Ice	3.213	1.496	0.095
						1" Ice	3.666	1.839	0.153
						2" Ice			
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.000	0.000	125.000	No Ice	5.746	4.254	0.055
			0.000			1/2"	6.179	5.014	0.103
			0.000			Ice	6.607	5.711	0.157
						1" Ice	7.488	7.155	0.287
						2" Ice			
(2) LGP21401	A	From Leg	4.000	0.000	125.000	No Ice	1.104	0.347	0.014
			0.000			1/2"	1.239	0.442	0.021
			0.000			Ice	1.381	0.544	0.030
						1" Ice	1.688	0.770	0.055
						2" Ice			
(2) LGP21901	A	From Leg	4.000	0.000	125.000	No Ice	0.231	0.158	0.006
			0.000			1/2"	0.294	0.213	0.008
			0.000			Ice	0.365	0.276	0.011
						1" Ice	0.528	0.423	0.022
						2" Ice			
HPA-65R-BUU-H8 w/ Mount Pipe	A	From Leg	4.000	0.000	125.000	No Ice	13.213	9.582	0.100
			0.000			1/2"	13.899	11.052	0.196
			0.000			Ice	14.587	12.496	0.303
						1" Ice	15.910	14.752	0.550
						2" Ice			
RRUS 32 B2	A	From Leg	4.000	0.000	125.000	No Ice	2.731	1.668	0.053
			0.000			1/2"	2.953	1.855	0.074
			0.000			Ice	3.182	2.049	0.098
						1" Ice	3.663	2.458	0.157
						2" Ice			
1001983	A	From Leg	4.000	0.000	125.000	No Ice	0.052	0.176	0.004
			0.000			1/2"	0.086	0.232	0.006
			0.000			Ice	0.127	0.295	0.009
						1" Ice	0.232	0.444	0.017
						2" Ice			
(4) 7020.00	A	From Leg	4.000	0.000	125.000	No Ice	0.102	0.175	0.002
			0.000			1/2"	0.147	0.239	0.005
			0.000			Ice	0.199	0.311	0.009
						1" Ice	0.326	0.476	0.022
						2" Ice			
RRUS-11	B	From Leg	4.000	0.000	125.000	No Ice	2.791	1.192	0.050
			0.000			1/2"	2.998	1.340	0.071
			0.000			Ice	3.213	1.496	0.095
						1" Ice	3.666	1.839	0.153
						2" Ice			
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.000	0.000	125.000	No Ice	5.746	4.254	0.055
			0.000			1/2"	6.179	5.014	0.103
			0.000			Ice	6.607	5.711	0.157
						1" Ice	7.488	7.155	0.287
						2" Ice			
(2) LGP21401	B	From Leg	4.000	0.000	125.000	No Ice	1.104	0.347	0.014
			0.000			1/2"	1.239	0.442	0.021
			0.000			Ice	1.381	0.544	0.030
						1" Ice	1.688	0.770	0.055
						2" Ice			
(2) LGP21901	B	From Leg	4.000	0.000	125.000	No Ice	0.231	0.158	0.006
			0.000			1/2"	0.294	0.213	0.008
			0.000			Ice	0.365	0.276	0.011
						1" Ice	0.528	0.423	0.022
						2" Ice			
DC6-48-60-18-8F	B	From Leg	4.000	0.000	125.000	No Ice	0.917	0.917	0.019
			0.000			1/2"	1.458	1.458	0.037
			0.000			Ice	1.643	1.643	0.057
						1" Ice	2.042	2.042	0.105
						2" Ice			
HPA-65R-BUU-H8 w/ Mount Pipe	B	From Leg	4.000	0.000	125.000	No Ice	13.213	9.582	0.100
			0.000			1/2"	13.899	11.052	0.196

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000			Ice	14.587	12.496	0.303
						1" Ice	15.910	14.752	0.550
						2" Ice			
RRUS 32 B2	B	From Leg	4.000	0.000	125.000	No Ice	2.731	1.668	0.053
			0.000			1/2"	2.953	1.855	0.074
			0.000			Ice	3.182	2.049	0.098
						1" Ice	3.663	2.458	0.157
						2" Ice			
1001983	B	From Leg	4.000	0.000	125.000	No Ice	0.052	0.176	0.004
			0.000			1/2"	0.086	0.232	0.006
			0.000			Ice	0.127	0.295	0.009
						1" Ice	0.232	0.444	0.017
						2" Ice			
(4) 7020.00	B	From Leg	4.000	0.000	125.000	No Ice	0.102	0.175	0.002
			0.000			1/2"	0.147	0.239	0.005
			0.000			Ice	0.199	0.311	0.009
						1" Ice	0.326	0.476	0.022
						2" Ice			
RRUS-11	C	From Leg	4.000	0.000	125.000	No Ice	2.791	1.192	0.050
			0.000			1/2"	2.998	1.340	0.071
			0.000			Ice	3.213	1.496	0.095
						1" Ice	3.666	1.839	0.153
						2" Ice			
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.000	0.000	125.000	No Ice	5.746	4.254	0.055
			0.000			1/2"	6.179	5.014	0.103
			0.000			Ice	6.607	5.711	0.157
						1" Ice	7.488	7.155	0.287
						2" Ice			
(2) LGP21401	C	From Leg	4.000	0.000	125.000	No Ice	1.104	0.347	0.014
			0.000			1/2"	1.239	0.442	0.021
			0.000			Ice	1.381	0.544	0.030
						1" Ice	1.688	0.770	0.055
						2" Ice			
(2) LGP21901	C	From Leg	4.000	0.000	125.000	No Ice	0.231	0.158	0.006
			0.000			1/2"	0.294	0.213	0.008
			0.000			Ice	0.365	0.276	0.011
						1" Ice	0.528	0.423	0.022
						2" Ice			
HPA-65R-BUU-H8 w/ Mount Pipe	C	From Leg	4.000	0.000	125.000	No Ice	13.213	9.582	0.100
			0.000			1/2"	13.899	11.052	0.196
			0.000			Ice	14.587	12.496	0.303
						1" Ice	15.910	14.752	0.550
						2" Ice			
RRUS 32 B2	C	From Leg	4.000	0.000	125.000	No Ice	2.731	1.668	0.053
			0.000			1/2"	2.953	1.855	0.074
			0.000			Ice	3.182	2.049	0.098
						1" Ice	3.663	2.458	0.157
						2" Ice			
1001983	C	From Leg	4.000	0.000	125.000	No Ice	0.052	0.176	0.004
			0.000			1/2"	0.086	0.232	0.006
			0.000			Ice	0.127	0.295	0.009
						1" Ice	0.232	0.444	0.017
						2" Ice			
(4) 7020.00	C	From Leg	4.000	0.000	125.000	No Ice	0.102	0.175	0.002
			0.000			1/2"	0.147	0.239	0.005
			0.000			Ice	0.199	0.311	0.009
						1" Ice	0.326	0.476	0.022
						2" Ice			
Platform Mount [LP 303-1]	C	None		0.000	125.000	No Ice	14.660	14.660	1.250
						1/2"	18.870	18.870	1.481
						Ice	23.080	23.080	1.713
						1" Ice	31.500	31.500	2.175
						2" Ice			
****									
800 10504 w/ Mount Pipe	A	From Leg	4.000	0.000	115.000	No Ice	3.589	3.178	0.038

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000 2.000			1/2" Ice 1" Ice 2" Ice	4.007 4.422 5.258	3.905 4.581 5.982	0.070 0.109 0.207
860 10025	A	From Leg	4.000 0.000 2.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.137 0.190 0.252 0.400	0.116 0.167 0.225 0.368	0.001 0.003 0.005 0.013
800 10504 w/ Mount Pipe	B	From Leg	4.000 0.000 2.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice	3.589 4.007 4.422 5.258	3.178 3.905 4.581 5.982	0.038 0.070 0.109 0.207
860 10025	B	From Leg	4.000 0.000 2.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.137 0.190 0.252 0.400	0.116 0.167 0.225 0.368	0.001 0.003 0.005 0.013
800 10504 w/ Mount Pipe	C	From Leg	4.000 0.000 2.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice	3.589 4.007 4.422 5.258	3.178 3.905 4.581 5.982	0.038 0.070 0.109 0.207
860 10025	C	From Leg	4.000 0.000 2.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.137 0.190 0.252 0.400	0.116 0.167 0.225 0.368	0.001 0.003 0.005 0.013
5' x 2' Pipe Mount	A	From Leg	4.000 0.000 0.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.000 1.393 1.703 2.351	1.000 1.393 1.703 2.351	0.029 0.037 0.048 0.082
5' x 2' Pipe Mount	B	From Leg	4.000 0.000 0.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.000 1.393 1.703 2.351	1.000 1.393 1.703 2.351	0.029 0.037 0.048 0.082
5' x 2' Pipe Mount	C	From Leg	4.000 0.000 0.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.000 1.393 1.703 2.351	1.000 1.393 1.703 2.351	0.029 0.037 0.048 0.082
T-Arm Mount [TA 602-3]	A	None		0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice	11.590 15.440 19.290 26.990	11.590 15.440 19.290 26.990	0.774 0.990 1.206 1.639
****									
HBX-6513DS-A1M w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	60.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.785 2.032 2.290 2.834	1.562 1.944 2.333 3.160	0.018 0.038 0.061 0.121
RRFDC-3315-PF-48	A	From Leg	4.000 0.000 0.000	0.000	60.000	No Ice 1/2" Ice 1" Ice 2" Ice	3.364 3.597 3.838 4.343	2.192 2.395 2.606 3.049	0.032 0.061 0.093 0.168
HBX-6513DS-A1M w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	60.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.785 2.032 2.290 2.834	1.562 1.944 2.333 3.160	0.018 0.038 0.061 0.121

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Platform Mount [LP 405-1]	A	None		0.000	60.000	No Ice	20.800	20.800	1.800
						1/2" Ice	28.100	28.100	2.066
						1" Ice	35.400	35.400	2.332
						2" Ice	50.000	50.000	2.864
B4 RRH2X60-4R	A	From Leg	4.000 0.000 0.000	0.000	60.000	No Ice	3.355	2.005	0.060
						1/2" Ice	3.612	2.237	0.083
						1" Ice	3.876	2.476	0.110
						2" Ice	4.424	2.975	0.175
B4 RRH2X60-4R	B	From Leg	4.000 0.000 0.000	0.000	60.000	No Ice	3.355	2.005	0.060
						1/2" Ice	3.612	2.237	0.083
						1" Ice	3.876	2.476	0.110
						2" Ice	4.424	2.975	0.175
ATM200-A20	A	From Leg	4.000 0.000 0.000	0.000	60.000	No Ice	0.189	0.147	0.001
						1/2" Ice	0.250	0.204	0.002
						1" Ice	0.321	0.269	0.005
						2" Ice	0.486	0.424	0.015
ATM200-A20	A	From Leg	4.000 0.000 0.000	0.000	60.000	No Ice	0.189	0.147	0.001
						1/2" Ice	0.250	0.204	0.002
						1" Ice	0.321	0.269	0.005
						2" Ice	0.486	0.424	0.015

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp

Comb. No.	Description
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	149.083 - 133.083	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-7.166	-0.436	0.251
			Max. Mx	8	-3.257	-19.603	0.027
			Max. My	2	-3.257	-0.047	19.565
			Max. Vy	8	6.092	-19.603	0.027
			Max. Vx	2	-6.093	-0.047	19.565
			Max. Torque	12			0.860
L2	133.083 - 98.5	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-22.471	-0.801	0.040
			Max. Mx	8	-11.566	-423.247	-0.008
			Max. My	14	-11.566	-0.178	-423.066
			Max. Vy	8	16.494	-423.247	-0.008
			Max. Vx	2	-16.494	-0.170	423.058
			Max. Torque	12			0.974
L3	98.5 - 64.833	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-32.118	-0.801	0.040
			Max. Mx	8	-18.899	-1033.958	0.008
			Max. My	2	-18.898	-0.197	1033.786
			Max. Vy	8	20.751	-1033.958	0.008
			Max. Vx	2	-20.752	-0.197	1033.786
			Max. Torque	12			0.973
L4	64.833 - 32	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-47.014	-1.951	1.530
			Max. Mx	8	-30.180	-1803.570	-0.163
			Max. My	2	-30.178	-0.009	1805.385
			Max. Vy	8	26.612	-1803.570	-0.163
			Max. Vx	2	-26.699	-0.009	1805.385
			Max. Torque	12			2.135
L5	32 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-62.158	-1.951	1.530
			Max. Mx	8	-42.494	-2887.305	-1.240
			Max. My	2	-42.494	1.067	2892.355
			Max. Vy	8	31.044	-2887.305	-1.240
			Max. Vx	2	-31.130	1.067	2892.355
			Max. Torque	12			2.134

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	27	62.158	0.004	7.481
	Max. H_x	20	42.508	31.024	0.029
	Max. H_z	2	42.508	0.029	31.110
	Max. M_x	2	2892.355	0.029	31.110
	Max. M_z	8	2887.305	-31.024	-0.029
	Max. Torsion	12	2.133	-15.537	-26.956
	Min. Vert	19	31.881	26.853	-15.530
	Min. H_x	8	42.508	-31.024	-0.029
	Min. H_z	14	42.508	-0.029	-31.110
	Min. M_x	14	-2891.344	-0.029	-31.110
	Min. M_z	20	-2885.945	31.024	0.029
	Min. Torsion	24	-2.133	15.537	26.956

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	35.424	0.000	0.000	-0.409	-0.547	0.000
1.2 Dead+1.0 Wind 0 deg - No Ice	42.508	-0.029	-31.110	-2892.355	1.067	1.686
0.9 Dead+1.0 Wind 0 deg - No Ice	31.881	-0.029	-31.110	-2872.468	1.234	1.685
1.2 Dead+1.0 Wind 30 deg - No Ice	42.508	15.487	-26.928	-2504.054	-1442.481	0.787
0.9 Dead+1.0 Wind 30 deg - No Ice	31.881	15.487	-26.928	-2486.815	-1432.444	0.786
1.2 Dead+1.0 Wind 60 deg - No Ice	42.508	26.853	-15.530	-1444.923	-2499.701	-0.323
0.9 Dead+1.0 Wind 60 deg - No Ice	31.881	26.853	-15.530	-1434.920	-2482.436	-0.323
1.2 Dead+1.0 Wind 90 deg - No Ice	42.508	31.024	0.029	1.240	-2887.305	-1.347
0.9 Dead+1.0 Wind 90 deg - No Ice	31.881	31.024	0.029	1.362	-2867.393	-1.346
1.2 Dead+1.0 Wind 120 deg - No Ice	42.508	26.882	15.580	1446.935	-2501.441	-2.009
0.9 Dead+1.0 Wind 120 deg - No Ice	31.881	26.882	15.580	1437.177	-2484.169	-2.008
1.2 Dead+1.0 Wind 150 deg - No Ice	42.508	15.537	26.956	2504.786	-1445.497	-2.133
0.9 Dead+1.0 Wind 150 deg - No Ice	31.881	15.537	26.956	2487.798	-1435.448	-2.132
1.2 Dead+1.0 Wind 180 deg - No Ice	42.508	0.029	31.110	2891.344	-2.419	-1.685
0.9 Dead+1.0 Wind 180 deg - No Ice	31.881	0.029	31.110	2871.715	-2.238	-1.684
1.2 Dead+1.0 Wind 210 deg - No Ice	42.508	-15.487	26.928	2503.041	1441.125	-0.786
0.9 Dead+1.0 Wind 210 deg - No Ice	31.881	-15.487	26.928	2486.061	1431.437	-0.786
1.2 Dead+1.0 Wind 240 deg - No Ice	42.508	-26.853	15.530	1443.913	2498.341	0.324
0.9 Dead+1.0 Wind 240 deg - No Ice	31.881	-26.853	15.530	1434.168	2481.425	0.323
1.2 Dead+1.0 Wind 270 deg - No Ice	42.508	-31.024	-0.029	-2.246	2885.945	1.346
0.9 Dead+1.0 Wind 270 deg - No Ice	31.881	-31.024	-0.029	-2.110	2866.383	1.345
1.2 Dead+1.0 Wind 300 deg - No Ice	42.508	-26.882	-15.580	-1447.938	2500.085	2.009

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
0.9 Dead+1.0 Wind 300 deg - No Ice	31.881	-26.882	-15.580	-1437.924	2483.162	2.007
1.2 Dead+1.0 Wind 330 deg - No Ice	42.508	-15.537	-26.956	-2505.792	1444.146	2.133
0.9 Dead+1.0 Wind 330 deg - No Ice	31.881	-15.537	-26.956	-2488.547	1434.444	2.132
1.2 Dead+1.0 Ice+1.0 Temp	62.158	0.000	0.000	-1.530	-1.951	0.000
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	62.158	-0.004	-7.481	-710.146	-1.840	0.454
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	62.158	3.730	-6.477	-615.099	-355.696	0.230
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	62.158	6.465	-3.737	-355.668	-614.801	-0.056
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	62.158	7.467	0.004	-1.368	-709.730	-0.327
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	62.158	6.469	3.744	352.865	-615.046	-0.511
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	62.158	3.737	6.481	612.117	-356.119	-0.557
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	62.158	0.004	7.481	706.920	-2.330	-0.454
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	62.158	-3.730	6.477	611.872	351.525	-0.230
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	62.158	-6.465	3.737	352.441	610.630	0.056
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	62.158	-7.467	-0.004	-1.858	705.559	0.327
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	62.158	-6.469	-3.744	-356.091	610.875	0.511
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	62.158	-3.737	-6.481	-615.343	351.949	0.557
Dead+Wind 0 deg - Service	35.424	-0.005	-5.498	-509.471	-0.257	0.299
Dead+Wind 30 deg - Service	35.424	2.737	-4.759	-441.117	-254.363	0.140
Dead+Wind 60 deg - Service	35.424	4.746	-2.745	-254.679	-440.464	-0.057
Dead+Wind 90 deg - Service	35.424	5.483	0.005	-0.112	-508.694	-0.239
Dead+Wind 120 deg - Service	35.424	4.751	2.754	254.372	-440.771	-0.356
Dead+Wind 150 deg - Service	35.424	2.746	4.764	440.585	-254.895	-0.378
Dead+Wind 180 deg - Service	35.424	0.005	5.498	508.631	-0.872	-0.299
Dead+Wind 210 deg - Service	35.424	-2.737	4.759	440.278	253.234	-0.140
Dead+Wind 240 deg - Service	35.424	-4.746	2.745	253.840	439.335	0.057
Dead+Wind 270 deg - Service	35.424	-5.483	-0.005	-0.727	507.565	0.239
Dead+Wind 300 deg - Service	35.424	-4.751	-2.754	-255.211	439.642	0.356
Dead+Wind 330 deg - Service	35.424	-2.746	-4.764	-441.425	253.767	0.378

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.000	-35.424	0.000	0.000	35.424	0.000	0.000%
2	-0.029	-42.508	-31.110	0.029	42.508	31.110	0.000%
3	-0.029	-31.881	-31.110	0.029	31.881	31.110	0.000%
4	15.487	-42.508	-26.928	-15.487	42.508	26.928	0.000%
5	15.487	-31.881	-26.928	-15.487	31.881	26.928	0.000%
6	26.853	-42.508	-15.530	-26.853	42.508	15.530	0.000%
7	26.853	-31.881	-15.530	-26.853	31.881	15.530	0.000%
8	31.024	-42.508	0.029	-31.024	42.508	-0.029	0.000%
9	31.024	-31.881	0.029	-31.024	31.881	-0.029	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
10	26.882	-42.508	15.580	-26.882	42.508	-15.580	0.000%
11	26.882	-31.881	15.580	-26.882	31.881	-15.580	0.000%
12	15.537	-42.508	26.956	-15.537	42.508	-26.956	0.000%
13	15.537	-31.881	26.956	-15.537	31.881	-26.956	0.000%
14	0.029	-42.508	31.110	-0.029	42.508	-31.110	0.000%
15	0.029	-31.881	31.110	-0.029	31.881	-31.110	0.000%
16	-15.487	-42.508	26.928	15.487	42.508	-26.928	0.000%
17	-15.487	-31.881	26.928	15.487	31.881	-26.928	0.000%
18	-26.853	-42.508	15.530	26.853	42.508	-15.530	0.000%
19	-26.853	-31.881	15.530	26.853	31.881	-15.530	0.000%
20	-31.024	-42.508	-0.029	31.024	42.508	0.029	0.000%
21	-31.024	-31.881	-0.029	31.024	31.881	0.029	0.000%
22	-26.882	-42.508	-15.580	26.882	42.508	15.580	0.000%
23	-26.882	-31.881	-15.580	26.882	31.881	15.580	0.000%
24	-15.537	-42.508	-26.956	15.537	42.508	26.956	0.000%
25	-15.537	-31.881	-26.956	15.537	31.881	26.956	0.000%
26	0.000	-62.158	0.000	0.000	62.158	0.000	0.000%
27	-0.004	-62.158	-7.481	0.004	62.158	7.481	0.000%
28	3.730	-62.158	-6.477	-3.730	62.158	6.477	0.000%
29	6.465	-62.158	-3.737	-6.465	62.158	3.737	0.000%
30	7.467	-62.158	0.004	-7.467	62.158	-0.004	0.000%
31	6.469	-62.158	3.744	-6.469	62.158	-3.744	0.000%
32	3.737	-62.158	6.481	-3.737	62.158	-6.481	0.000%
33	0.004	-62.158	7.481	-0.004	62.158	-7.481	0.000%
34	-3.730	-62.158	6.477	3.730	62.158	-6.477	0.000%
35	-6.465	-62.158	3.737	6.465	62.158	-3.737	0.000%
36	-7.467	-62.158	-0.004	7.467	62.158	0.004	0.000%
37	-6.469	-62.158	-3.744	6.469	62.158	3.744	0.000%
38	-3.737	-62.158	-6.481	3.737	62.158	6.481	0.000%
39	-0.005	-35.424	-5.498	0.005	35.424	5.498	0.000%
40	2.737	-35.424	-4.759	-2.737	35.424	4.759	0.000%
41	4.746	-35.424	-2.745	-4.746	35.424	2.745	0.000%
42	5.483	-35.424	0.005	-5.483	35.424	-0.005	0.000%
43	4.751	-35.424	2.754	-4.751	35.424	-2.754	0.000%
44	2.746	-35.424	4.764	-2.746	35.424	-4.764	0.000%
45	0.005	-35.424	5.498	-0.005	35.424	-5.498	0.000%
46	-2.737	-35.424	4.759	2.737	35.424	-4.759	0.000%
47	-4.746	-35.424	2.745	4.746	35.424	-2.745	0.000%
48	-5.483	-35.424	-0.005	5.483	35.424	0.005	0.000%
49	-4.751	-35.424	-2.754	4.751	35.424	2.754	0.000%
50	-2.746	-35.424	-4.764	2.746	35.424	4.764	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00042638
3	Yes	4	0.00000001	0.00026879
4	Yes	5	0.00000001	0.00018260
5	Yes	5	0.00000001	0.00008283
6	Yes	5	0.00000001	0.00017885
7	Yes	5	0.00000001	0.00008103
8	Yes	4	0.00000001	0.00027395
9	Yes	4	0.00000001	0.00016931
10	Yes	5	0.00000001	0.00017205
11	Yes	5	0.00000001	0.00007775
12	Yes	5	0.00000001	0.00018737
13	Yes	5	0.00000001	0.00008514
14	Yes	4	0.00000001	0.00043615
15	Yes	4	0.00000001	0.00027507
16	Yes	5	0.00000001	0.00017444
17	Yes	5	0.00000001	0.00007895
18	Yes	5	0.00000001	0.00017806
19	Yes	5	0.00000001	0.00008071

20	Yes	4	0.00000001	0.00028341
21	Yes	4	0.00000001	0.00017551
22	Yes	5	0.00000001	0.00018622
23	Yes	5	0.00000001	0.00008461
24	Yes	5	0.00000001	0.00017102
25	Yes	5	0.00000001	0.00007727
26	Yes	4	0.00000001	0.00000001
27	Yes	5	0.00000001	0.00009861
28	Yes	5	0.00000001	0.00010878
29	Yes	5	0.00000001	0.00010860
30	Yes	5	0.00000001	0.00009868
31	Yes	5	0.00000001	0.00010806
32	Yes	5	0.00000001	0.00010852
33	Yes	5	0.00000001	0.00009811
34	Yes	5	0.00000001	0.00010721
35	Yes	5	0.00000001	0.00010727
36	Yes	5	0.00000001	0.00009778
37	Yes	5	0.00000001	0.00010805
38	Yes	5	0.00000001	0.00010770
39	Yes	4	0.00000001	0.00002335
40	Yes	4	0.00000001	0.00005253
41	Yes	4	0.00000001	0.00004899
42	Yes	4	0.00000001	0.00002005
43	Yes	4	0.00000001	0.00004534
44	Yes	4	0.00000001	0.00005762
45	Yes	4	0.00000001	0.00002335
46	Yes	4	0.00000001	0.00004594
47	Yes	4	0.00000001	0.00004823
48	Yes	4	0.00000001	0.00002002
49	Yes	4	0.00000001	0.00005618
50	Yes	4	0.00000001	0.00004514

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	149.083 - 133.083	11.727	40	0.631	0.003
L2	136 - 98.5	10.009	40	0.623	0.002
L3	102.333 - 64.833	5.879	40	0.523	0.001
L4	69.5 - 32	2.775	39	0.368	0.001
L5	37.5 - 0	0.832	39	0.200	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
149.000	DB809T6E-XC	40	11.716	0.631	0.003	155118
137.000	(2) KRY 112 71	40	10.140	0.624	0.002	63083
125.000	RRUS-11	40	8.592	0.602	0.001	26256
115.000	800 10504 w/ Mount Pipe	40	7.350	0.572	0.001	17424
60.000	HBX-6513DS-A1M w/ Mount Pipe	39	2.073	0.319	0.000	10869

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	149.083 - 133.083	66.597	2	3.582	0.017
L2	136 - 98.5	56.846	2	3.538	0.009
L3	102.333 - 64.833	33.392	2	2.971	0.005
L4	69.5 - 32	15.760	2	2.090	0.003
L5	37.5 - 0	4.725	2	1.136	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
149.000	DB809T6E-XC	2	66.535	3.582	0.017	28178
137.000	(2) KRY 112 71	2	57.587	3.545	0.009	11440
125.000	RRUS-11	2	48.798	3.420	0.005	4685
115.000	800 10504 w/ Mount Pipe	2	41.747	3.249	0.004	3094
60.000	HBX-6513DS-A1M w/ Mount Pipe	2	11.774	1.811	0.002	1917

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	149.083 - 133.083 (1)	TP26x12.75x0.25	16.000	0.000	0.0	18.516	-3.257	1375.630	0.002
L2	133.083 - 98.5 (2)	TP34.063x23.084x0.313	37.500	0.000	0.0	32.363	-11.566	2348.040	0.005
L3	98.5 - 64.833 (3)	TP41.75x32.315x0.375	37.500	0.000	0.0	47.849	-18.898	3446.720	0.005
L4	64.833 - 32 (4)	TP49.063x39.826x0.375	37.500	0.000	0.0	56.338	-30.177	3858.580	0.008
L5	32 - 0 (5)	TP56.125x46.958x0.375	37.500	0.000	0.0	66.356	-42.494	4267.270	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	149.083 - 133.083 (1)	TP26x12.75x0.25	19.603	658.207	0.030	0.000	658.207	0.000
L2	133.083 - 98.5 (2)	TP34.063x23.084x0.313	423.229	1572.700	0.269	0.000	1572.700	0.000
L3	98.5 - 64.833 (3)	TP41.75x32.315x0.375	1033.950	2845.125	0.363	0.000	2845.125	0.000
L4	64.833 - 32 (4)	TP49.063x39.826x0.375	1805.383	3755.392	0.481	0.000	3755.392	0.000
L5	32 - 0 (5)	TP56.125x46.958x0.375	2892.358	4897.525	0.591	0.000	4897.525	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	149.083 - 133.083 (1)	TP26x12.75x0.25	6.093	324.953	0.019	0.430	649.890	0.001
L2	133.083 - 98.5 (2)	TP34.063x23.084x0.313	16.494	567.967	0.029	0.745	1591.967	0.000
L3	98.5 - 64.833 (3)	TP41.75x32.315x0.375	20.751	839.751	0.025	0.743	2901.517	0.000
L4	64.833 - 32 (4)	TP49.063x39.826x0.375	26.699	980.916	0.027	1.686	4033.767	0.000
L5	32 - 0 (5)	TP56.125x46.958x0.375	31.130	1164.560	0.027	1.686	5609.483	0.000

Pole Interaction Design Data

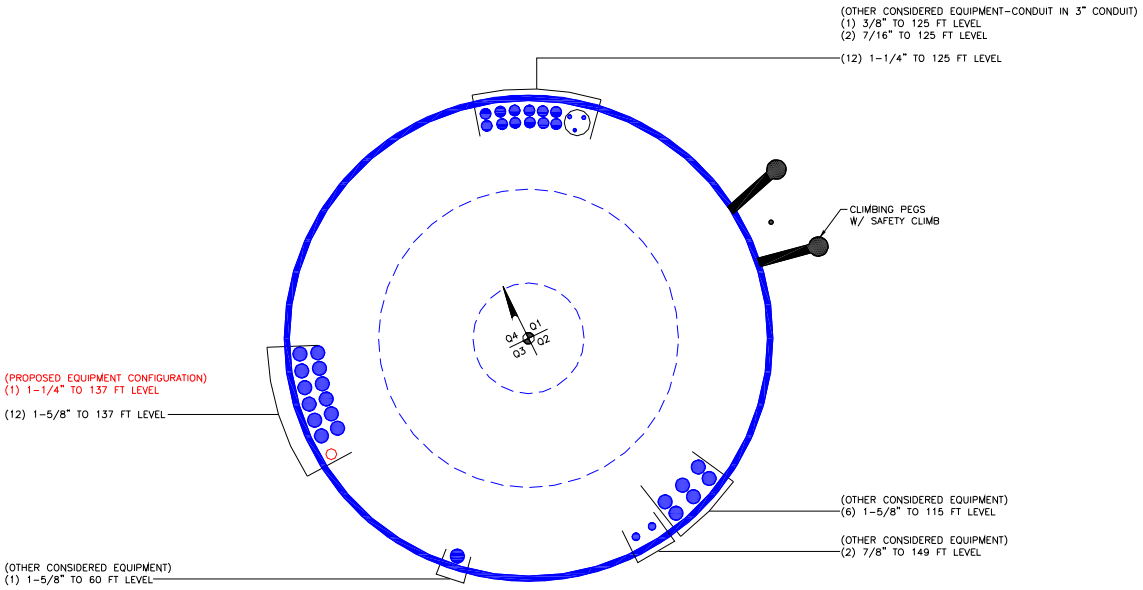
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	149.083 - 133.083 (1)	0.002	0.030	0.000	0.019	0.001	0.033	1.050	4.8.2
L2	133.083 - 98.5 (2)	0.005	0.269	0.000	0.029	0.000	0.275	1.050	4.8.2
L3	98.5 - 64.833 (3)	0.005	0.363	0.000	0.025	0.000	0.370	1.050	4.8.2
L4	64.833 - 32 (4)	0.008	0.481	0.000	0.027	0.000	0.489	1.050	4.8.2
L5	32 - 0 (5)	0.010	0.591	0.000	0.027	0.000	0.601	1.050	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	149.083 - 133.083	Pole	TP26x12.75x0.25	1	-3.257	1444.411	3.1	Pass
L2	133.083 - 98.5	Pole	TP34.063x23.084x0.313	2	-11.566	2465.442	26.2	Pass
L3	98.5 - 64.833	Pole	TP41.75x32.315x0.375	3	-18.898	3619.056	35.2	Pass
L4	64.833 - 32	Pole	TP49.063x39.826x0.375	4	-30.177	4051.509	46.6	Pass
L5	32 - 0	Pole	TP56.125x46.958x0.375	5	-42.494	4480.633	57.3	Pass
							Summary	
						Pole (L5)	57.3	Pass
						RATING =	**57.3**	**Pass**

APPENDIX B

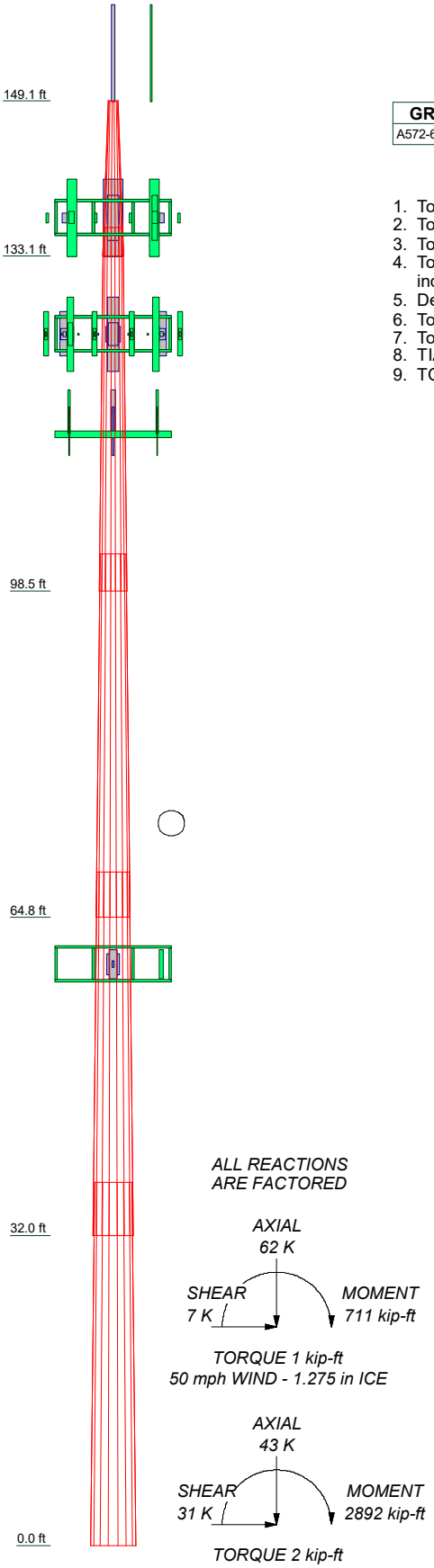
BASE LEVEL DRAWING



APPENDIX C

ADDITIONAL CALCULATIONS

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	16.000	18	0.250	2.917	12.750	26.000	A572-65	0.8
2	37.500	18	0.313	3.833	23.084	34.063		3.6
3	37.500	18	0.375	4.667	32.315	41.750		5.6
4	37.500	18	0.375	5.500	39.826	49.063		6.7
5	37.500	18	0.375		46.958	56.125		7.8
								24.4



ALL REACTIONS ARE FACTORED

AXIAL 62 K

SHEAR 7 K — *MOMENT 711 kip-ft*

TORQUE 1 kip-ft
50 mph WIND - 1.275 in ICE

AXIAL 43 K

SHEAR 31 K — *MOMENT 2892 kip-ft*

TORQUE 2 kip-ft
REACTIONS - 135 mph WIND

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 135 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.27 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.000 ft
8. TIA-222-H Annex S.
9. TOWER RATING: 57.3%

Paul J. Ford and Company
250 East Broad st., Suite 600
Columbus, OH 43215
Phone: (614) 221-6679
FAX:

Job:	***150' MP. Norwich, CT***		
Project:	***BU 826313 PJF 37517-0691***		
Client: Crown Castle	Drawn by: uyerra		App'd:
Code: TIA-222-H	Date: 10/31/18		Scale: NTS
Path: G:\TOWER\375_Crown_Castle\2018\37518-3568_826313_NORWICH\37518-3568.001.7805_SA_1652002\37518-3568.001.7805.eri			Dwg No. E-1

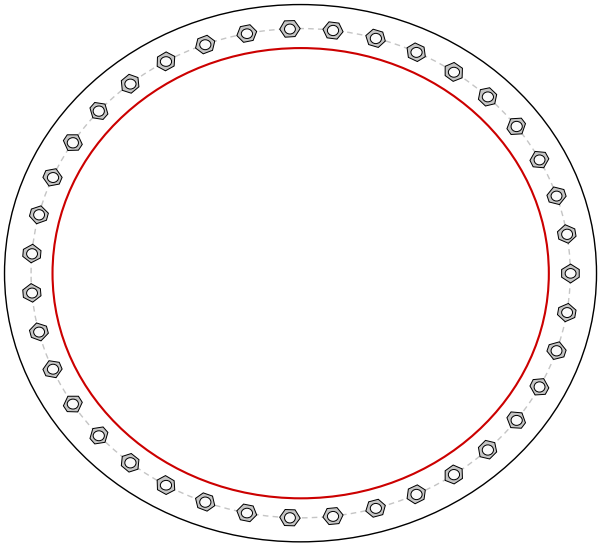
Monopole Base Plate Connection

Site Info	
BU #	826313
Site Name	
Order #	

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	2.25

Applied Loads	
Moment (kip-ft)	2892.36
Axial Force (kips)	42.49
Shear Force (kips)	31.13

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(39) 1-1/4" ø bolts (Other N; Fy=105 ksi, Fu=125 ksi) on 61" BC

Base Plate Data

67" OD x 1.5" Plate (A572-50; Fy=50 ksi, Fu=65 ksi)

Stiffener Data

N/A

Pole Data

56.125" x 0.375" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

Pu_c = 59.44	ϕPn_c = 101.75	**Stress Rating**
Vu = 0.8	ϕVn = 30.52	**60.9%**
Mu = 1.17	ϕMn = 21.58	**Pass**

Base Plate Summary

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**

Drilled Pier Foundation

BU # :	826313
Site Name:	
Order Number:	

TIA-222 Revison:	H
Tower Type:	Monopole

Applied Loads	Comp.	Uplift
Moment (kip-ft)	2892	
Axial Force (kips)	43	
Shear Force (kips)	31	

Material Properties		
Concrete Strength, f'c:	3	ksi
Rebar Strength, Fy:	60	ksi

Pier Design Data		
Depth	37	ft
Ext. Above Grade	0.5	ft
Pier Section 1		
From 0.5' above grade to 37' below grade		
Pier Diameter	6.5	ft
Rebar Quantity	28	
Rebar Size	9	
Clear Cover to Ties	3	in
Tie Size	5	

Analysis Results		
Soil Lateral Capacity	*Compression*	*Uplift*
$D_{v=0}$ (ft from TOC)	9.19	-
Soil Safety Factor	8.37	-
Max Moment (kip-ft)	3110.50	-
Rating*	*15.1%*	-
Soil Vertical Capacity	*Compression*	*Uplift*
Skin Friction (kips)	428.39	-
End Bearing (kips)	398.20	-
Weight of Concrete (kips)	156.90	-
Total Capacity (kips)	826.59	-
Axial (kips)	199.90	-
Rating*	*23.0%*	-
Reinforced Concrete Capacity	*Compression*	*Uplift*
Critical Depth (ft from TOC)	9.15	-
Critical Moment (kip-ft)	3110.50	-
Critical Moment Capacity	4187.04	-
Rating*	*70.8%*	-

Soil Interaction Rating*	**23.0%**
Structural Foundation Rating*	**70.8%**

*Rating per TIA-222-H Section 15.5

Check Limitation	
Apply TIA-222-H Section 15.5:	☑

Soil Profile

Groundwater Depth	10	ft	# of Layers: 5

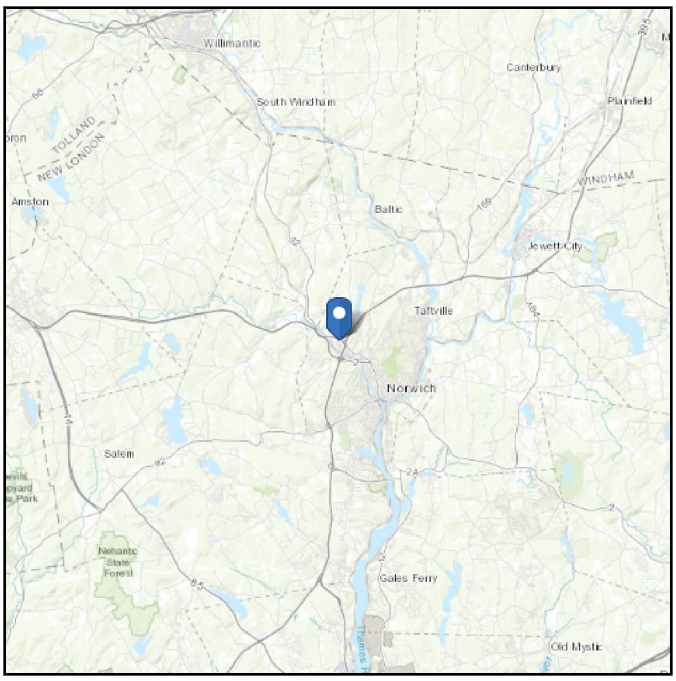
Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ_{soil} (pcf)	$\gamma_{concrete}$ (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	3.25	3.25	120	150	0	0	0.000	0.000	0.00	0.00			Cohesionless
2	3.25	7	3.75	120	150		31	0.735	0.735				21	Cohesionless
3	7	10	3	130	150		36	1.145	1.145				28	Cohesionless
4	10	20	10	67.6	87.6		36	1.532	1.532				28	Cohesionless
5	20	37	17	62.6	87.6		30	0.380	0.380			16	3	Cohesionless

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 95.92 ft (NAVD 88)
Latitude: 41.555501
Longitude: -72.1103



Wind

Results:	**79 Vmph**
Wind Speed:	131 Vmph
10-year MRI	79 Vmph
25-year MRI	89 Vmph
50-year MRI	98 Vmph
100-year MRI	107 Vmph
Data Source:	ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014
Date Accessed:	Wed Oct 31 2018

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

Ice

Results:

Ice Thickness:	0.75 in.
Concurrent Temperature:	15 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Wed Oct 31 2018

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

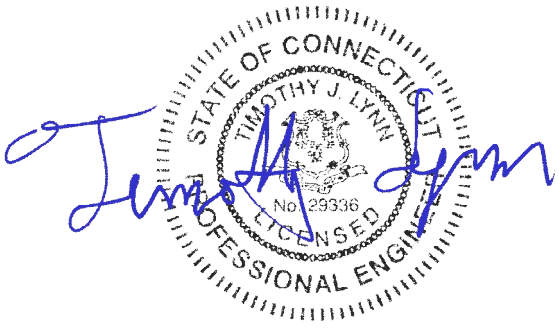
T-Mobile Site #: CT11331A

50 Clinton Avenue
Norwich, CT

Centek Project No. 18127.21

Date: October 9, 2018

Max Stress Ratio = 73.3%



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

CENTEK engineering

Centered on Solutions℠

October 9, 2018

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

Re: Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CT11331A
50 Clinton Avenue
Norwich, CT 06360

Centek Project No. 18127.21

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 one (1) low profile platform to support the equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2015 International Building Code as modified by the 2018 Connecticut State Building Code (CTBC) including ASCE 7-10 and ANSI/TIA-222-G *Structural Standards for Steel Antenna Towers and Supporting Structures*.

The loads considered in this analysis consist of the following:

- T-Mobile:
  Platform: Three (3) RFS APX16DWV-16DWVS-E-A20 panel antennas, three (3) RFS APXVAARR24-43-NA20 panel antennas, six (6) TMAs and three (3) Ericsson 4449 B71_B12 remote radio units mounted on one (1) low profile platform with a RAD center elevation of 142-ft +/- AGL.

The antenna mount was analyzed per the requirements of the 2015 International Building Code as modified by the 2018 Connecticut State Building Code considering a nominal design wind speed of 105 mph for Norwich as required in Appendix N of the 2018 Connecticut State Building Code.

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

Based on our review of the installation, it is our opinion that the subject antenna mount has sufficient capacity to support the aforementioned antenna configuration. Replacement of three (3) existing antenna pipes with 2.5 Std. x 8'-0" long pipes is required (One per sector at proposed RFS antenna). If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

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

Section 2 - Calculations

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

Subject: TIA-222-G Loads

Location: Norwich, CT

Rev. 0: 10/9/18

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 18127.21

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

Wind Speeds

Basic Wind Speed $V := 105$ mph (User Input - 2016 CSBC Appendix N)

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

Input

Structure Type = Structure_Type := Pole (User Input)

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

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

Structure Height = $h := 150$ ft (User Input)

Height to Center of Antennas = $z_{Ant} := 142$ ft (User Input)

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

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

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

$K_a := 1.0$ (User Input)

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

Output

Wind Direction Probability Factor =

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

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

Importance Factors =

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

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

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

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

$$K_{iz} := \left(\frac{z_{Ant}}{33}\right)^{0.1} = 1.157$$

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.736$$

Velocity Pressure Coefficient Antennas =

$$Kz_{Ant} := 2.01\left(\left(\frac{z_{Ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.363$$

Velocity Pressure w/o Ice Antennas =

$$qz_{Ant} := 0.00256 \cdot K_d \cdot Kz_{Ant} \cdot V^2 \cdot I_{Wind} = 36.535$$

Velocity Pressure with Ice Antennas =

$$qz_{ice.Ant} := 0.00256 \cdot K_d \cdot Kz_{Ant} \cdot V_i^2 \cdot I_{Wind} = 8.285$$

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Subject:	TIA-222-G Loads
Location:	Norwich, CT
Rev. 0: 10/9/18	Prepared by: T.J.L. Checked by: C.F.C. Job No. 18127.21

Development of Wind & Ice Load on Antennas

Antenna Data:

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

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 16$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 814$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 5.8$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 295$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 19$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 219$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 8.4$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 97$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \times 10^4$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 1 \times 10^4$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 428$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 428$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFSAPX16DWV-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 =	$WT_{ant} := 41$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.3$		
Antenna Force Coefficient =	$Ca_{ant} = 1.28$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 5$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 260$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.2$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 63$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6.8$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 79$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 2.7$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 32$	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 =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 4186$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 136$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 136$	lbs

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Subject:	TIA-222-G Loads
Location:	Norwich, CT
Rev. 0: 10/9/18	Prepared by: T.J.L. Checked by: C.F.C. Job No. 18127.21

Development of Wind & Ice Load on TMA's

TMA Data:

TMA Model = TMA

TMA Shape = Flat (User Input)

TMA Height = $L_{TMA} := 7.7$ in (User Input)

TMA Width = $W_{TMA} := 7.5$ in (User Input)

TMA Thickness = $T_{TMA} := 3.4$ in (User Input)

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

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

TMA Aspect Ratio = $Ar_{TMA} := \frac{L_{TMA}}{W_{TMA}} = 1$

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

Wind Load (without ice)

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

Total TMA Wind Force = $F_{TMA} := qz_{Ant} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAF} = 19$ lbs

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

Total TMA Wind Force = $F_{TMA} := qz_{Ant} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAS} = 9$ lbs

Wind Load (with ice)

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

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

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

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

Gravity Load (without ice)

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

Gravity Loads (ice only)

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

Volume of Ice on Each TMA = $V_{ice} := (L_{TMA} + 2 \cdot t_{iz})(W_{TMA} + 2 \cdot t_{iz}) \cdot (T_{TMA} + 2 \cdot t_{iz}) - V_{TMA} = 646$ cu in

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

Weight of Ice on All TMAs = $W_{ICETMA} \cdot N_{TMA} = 21$ 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 = $N_{RRUS} := 1$ (User Input)

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

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

Wind Load (without ice)

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

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 66$ lbs

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

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 52$ lbs

Wind Load (with ice)

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

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 23$ lbs

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

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

Gravity Load (without ice)

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

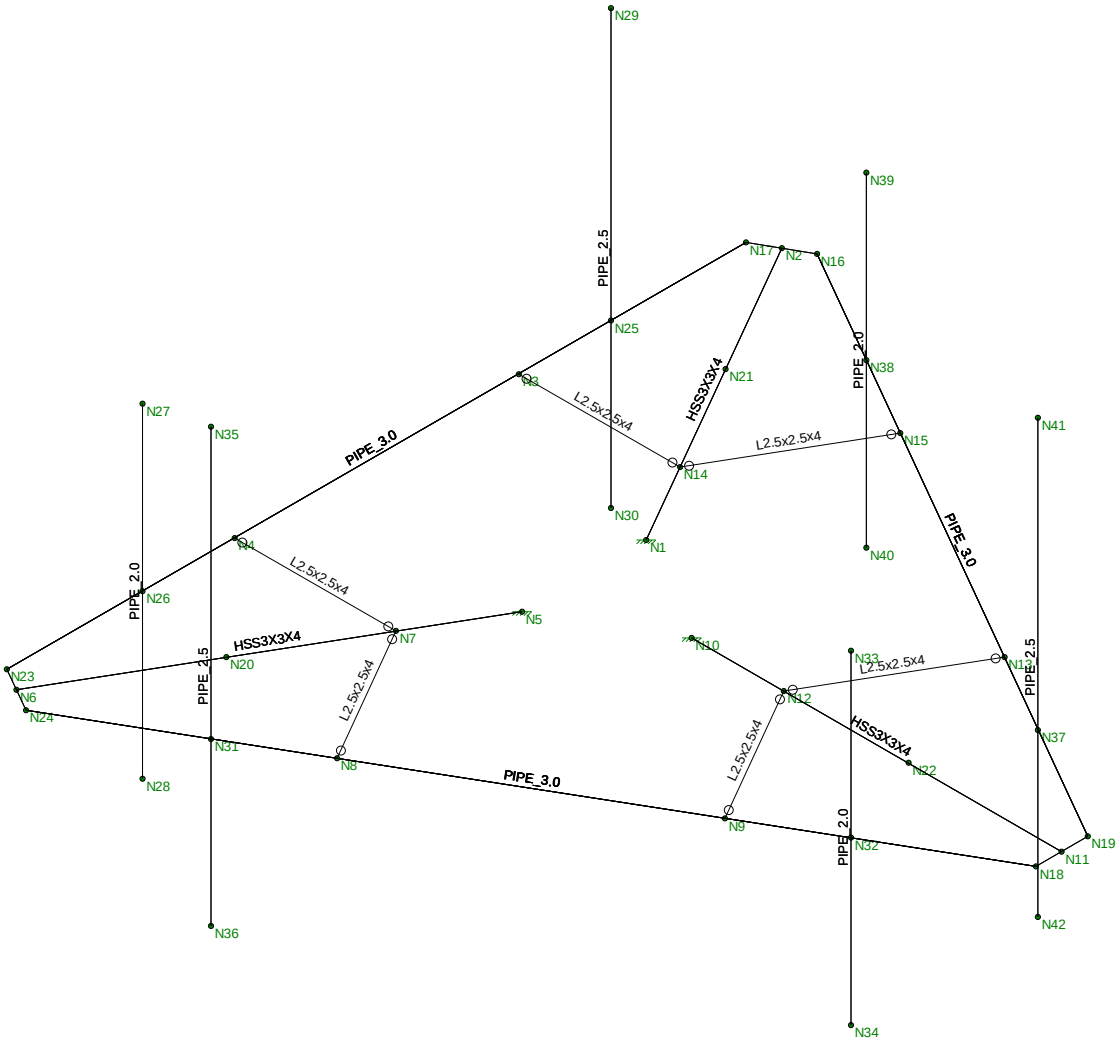
Gravity Loads (ice only)

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

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2408$

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

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



Envelope Only Solution

Centek		
TJL	CT11331A - Mount	Oct 9, 2018 at 3:12 PM
18127.21	Member Framing	Mount.r3d

(Global) Model Settings

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

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

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

(Global) Model Settings, Continued

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

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Outrigger	HSS3X3X4	Beam	Tube	A500 Gr.46	Typical	2.44	3.02	3.02	5.08
2	Horz	PIPE_3.0	Beam	Pipe	A53 Grade B	Typical	2.07	2.85	2.85	5.69
3	Antenna Mast	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	Catwalk Support	L2.5x2.5x4	Beam	Single Angle	A36 Gr.36	Typical	1.19	.692	.692	.026
5	New Pipe Mast	PIPE_2.5	Column	Pipe	A53 Grade B	Typical	1.61	1.45	1.45	2.89

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	Outrigger	6.837			Lbyy						Lateral
2	M2	Outrigger	6.837			Lbyy						Lateral
3	M3	Outrigger	6.837			Lbyy						Lateral
4	M4	Horz	13.665			Lbyy						Lateral
5	M5	Horz	13.665			Lbyy						Lateral
6	M6	Horz	13.665			Lbyy						Lateral
7	M10	Catwalk Su...	2.983			Lbyy						Lateral
8	M11	Catwalk Su...	2.983			Lbyy						Lateral
9	M12	Catwalk Su...	2.983			Lbyy						Lateral
10	M13	Catwalk Su...	2.983			Lbyy						Lateral
11	M14	Catwalk Su...	2.983			Lbyy						Lateral
12	M15	Catwalk Su...	2.983			Lbyy						Lateral
13	M16	New Pipe M...	8									Lateral
14	M17	Antenna Mast	6									Lateral
15	M18	New Pipe M...	8									Lateral
16	M19	Antenna Mast	6									Lateral
17	M20	New Pipe M...	8									Lateral
18	M21	Antenna Mast	6									Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
1	M1	N5	N6			Outrigger	Beam	Tube	A500 Gr...	Typical
2	M2	N1	N2			Outrigger	Beam	Tube	A500 Gr...	Typical
3	M3	N10	N11			Outrigger	Beam	Tube	A500 Gr...	Typical
4	M4	N24	N18			Horz	Beam	Pipe	A53 Gra...	Typical
5	M5	N23	N17			Horz	Beam	Pipe	A53 Gra...	Typical
6	M6	N16	N19			Horz	Beam	Pipe	A53 Gra...	Typical
7	M7	N17	N16			RIGID	None	None	RIGID	Typical
8	M8	N19	N18			RIGID	None	None	RIGID	Typical
9	M9	N23	N24			RIGID	None	None	RIGID	Typical
10	M10	N8	N7		270	Catwalk Support	Beam	Single Angle	A36 Gr.36	Typical
11	M11	N7	N4		270	Catwalk Support	Beam	Single Angle	A36 Gr.36	Typical
12	M12	N3	N14		270	Catwalk Support	Beam	Single Angle	A36 Gr.36	Typical
13	M13	N14	N15		270	Catwalk Support	Beam	Single Angle	A36 Gr.36	Typical
14	M14	N13	N12		270	Catwalk Support	Beam	Single Angle	A36 Gr.36	Typical
15	M15	N12	N9		270	Catwalk Support	Beam	Single Angle	A36 Gr.36	Typical
16	M16	N29	N30			New Pipe Mast	Column	Pipe	A53 Gra...	Typical
17	M17	N27	N28			Antenna Mast	Column	Pipe	A53 Gra...	Typical
18	M18	N35	N36			New Pipe Mast	Column	Pipe	A53 Gra...	Typical
19	M19	N33	N34			Antenna Mast	Column	Pipe	A53 Gra...	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
20	M20	N41	N42			New Pipe Mast	Column	Pipe	A53 Gra...	Typical
21	M21	N39	N40			Antenna Mast	Column	Pipe	A53 Gra...	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
1	N1	-0.664712	0	-1.151314	0	
2	N2	-4.083281	0	-7.07245	0	
3	N3	-4.49894	0	-2.625697	0	
4	N4	-4.49894	0	2.625697	0	
5	N5	-0.664712	0	1.151314	0	
6	N6	-4.083281	0	7.07245	0	
7	N7	-1.515947	0	2.625697	0	
8	N8	-0.02445	0	5.209045	0	
9	N9	4.52339	0	2.583348	0	
10	N10	1.329423	0	0	0	
11	N11	8.166562	0	0	0	
12	N12	3.031894	0	9.475e-15	0	
13	N13	4.52339	0	-2.583348	0	
14	N14	-1.515947	0	-2.625697	0	
15	N15	-0.02445	0	-5.209045	0	
16	N16	-3.667622	0	-7.312431	0	
17	N17	-4.49894	0	-6.83247	0	
18	N18	8.166562	0	0.479961	0	
19	N19	8.166562	0	-0.479961	0	
20	N20	-2.665607	0	4.616966	0	
21	N21	-2.665607	0	-4.616966	0	
22	N22	5.331213	0	0	0	
23	N23	-4.49894	0	6.83247	0	
24	N24	-3.667622	0	7.312431	0	
25	N25	-4.49894	0	-4.33247	0	
26	N26	-4.49894	0	4.33247	0	
27	N27	-4.49894	3	4.33247	0	
28	N28	-4.49894	-3	4.33247	0	
29	N29	-4.49894	5	-4.33247	0	
30	N30	-4.49894	-3	-4.33247	0	
31	N31	-1.502559	0	6.062431	0	
32	N32	6.001499	0	1.729961	0	
33	N33	6.001499	3	1.729961	0	
34	N34	6.001499	-3	1.729961	0	
35	N35	-1.502559	5	6.062431	0	
36	N36	-1.502559	-3	6.062431	0	
37	N37	6.001499	0	-1.729961	0	
38	N38	-1.502559	0	-6.062431	0	
39	N39	-1.502559	3	-6.062431	0	
40	N40	-1.502559	-3	-6.062431	0	
41	N41	6.001499	5	-1.729961	0	
42	N42	6.001499	-3	-1.729961	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N5	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N10	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Point Loads (BLC 2 : Equipment Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M17	Y	-.021	.5
2	M19	Y	-.021	.5
3	M21	Y	-.021	.5
4	M17	Y	-.021	4.5
5	M19	Y	-.021	4.5
6	M21	Y	-.021	4.5
7	M17	Y	-.011	1.5
8	M19	Y	-.011	1.5
9	M21	Y	-.011	1.5
10	M16	Y	-.077	1
11	M18	Y	-.077	1
12	M20	Y	-.077	1
13	M16	Y	-.077	7
14	M18	Y	-.077	7
15	M20	Y	-.077	7
16	M16	Y	-.074	3
17	M18	Y	-.074	3
18	M20	Y	-.074	3

Member Point Loads (BLC 3 : Ice Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M17	Y	-.068	.5
2	M19	Y	-.068	.5
3	M21	Y	-.068	.5
4	M17	Y	-.068	4.5
5	M19	Y	-.068	4.5
6	M21	Y	-.068	4.5
7	M17	Y	-.021	1.5
8	M19	Y	-.021	1.5
9	M21	Y	-.021	1.5
10	M16	Y	-.214	1
11	M18	Y	-.214	1
12	M20	Y	-.214	1
13	M16	Y	-.214	7
14	M18	Y	-.214	7
15	M20	Y	-.214	7
16	M16	Y	-.071	3
17	M18	Y	-.071	3
18	M20	Y	-.071	3

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M19	X	.016	.5
2	M21	X	.016	.5
3	M19	X	.016	4.5
4	M21	X	.016	4.5
5	M17	X	.04	.5
6	M17	X	.04	4.5
7	M19	X	.006	1.5
8	M21	X	.006	1.5
9	M18	X	.049	1
10	M20	X	.049	1
11	M18	X	.049	7
12	M20	X	.049	7
13	M16	X	.11	1
14	M16	X	.11	7
15	M18	X	.019	3
16	M20	X	.019	3

Member Point Loads (BLC 5 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M19	X	.032	.5
2	M21	X	.032	.5
3	M19	X	.032	4.5
4	M21	X	.032	4.5
5	M17	X	.13	.5
6	M17	X	.13	4.5
7	M19	X	.009	1.5
8	M21	X	.009	1.5
9	M18	X	.148	1
10	M20	X	.148	1
11	M18	X	.148	7
12	M20	X	.148	7
13	M16	X	.407	1
14	M16	X	.407	7
15	M18	X	.052	3
16	M20	X	.052	3

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M19	Z	.04	.5
2	M21	Z	.04	.5
3	M19	Z	.04	4.5
4	M21	Z	.04	4.5
5	M17	Z	.016	.5
6	M17	Z	.016	4.5
7	M17	Z	.006	1.5
8	M18	Z	.11	1
9	M20	Z	.11	1
10	M18	Z	.11	7
11	M20	Z	.11	7
12	M16	Z	.049	1
13	M16	Z	.049	7

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
14	M16	Z	.019	3

Member Point Loads (BLC 7 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M19	Z	.13	.5
2	M21	Z	.13	.5
3	M19	Z	.13	4.5
4	M21	Z	.13	4.5
5	M17	Z	.032	.5
6	M17	Z	.032	4.5
7	M17	Z	.009	1.5
8	M18	Z	.407	1
9	M20	Z	.407	1
10	M18	Z	.407	7
11	M20	Z	.407	7
12	M16	Z	.148	1
13	M16	Z	.148	7
14	M16	Z	.052	3

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M18	X	.003	.003	0	0
2	M19	X	.003	.003	0	0
3	M20	X	.003	.003	0	0
4	M21	X	.003	.003	0	0
5	M5	X	.003	.003	0	0

Member Distributed Loads (BLC 5 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M18	X	.01	.01	0	0
2	M19	X	.01	.01	0	0
3	M20	X	.01	.01	0	0
4	M21	X	.01	.01	0	0
5	M5	X	.01	.01	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M6	Z	.003	.003	0	0
2	M17	Z	.003	.003	0	0
3	M16	Z	.003	.003	0	0

Member Distributed Loads (BLC 7 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M6	Z	.01	.01	0	0
2	M17	Z	.01	.01	0	0
3	M16	Z	.01	.01	0	0

Member Distributed Loads (BLC 8 : BLC 2 Transient Area Loads)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.007	-.007	4.102	6.837
2	M3	Y	-.007	-.007	4.102	6.837
3	M8	Y	-.157	-.157	.721	.743
4	M9	Y	-.157	-.157	.721	.743
5	M10	Y	-.019	-.019	0	2.088
6	M15	Y	-.019	-.019	.895	2.983
7	M2	Y	-.007	-.007	4.102	6.837
8	M7	Y	-.157	-.157	.217	.239
9	M9	Y	-.157	-.157	.217	.239
10	M11	Y	-.019	-.019	.895	2.983
11	M12	Y	-.019	-.019	0	2.088
12	M7	Y	-.157	-.157	.721	.743
13	M8	Y	-.157	-.157	.217	.239
14	M13	Y	-.019	-.019	.895	2.983
15	M14	Y	-.019	-.019	0	2.088

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribu...	Area(M...	Surface...
1	Self Weight	DL		-1						
2	Equipment Weight	None					18		3	
3	Ice Weight	None					18			
4	Wind w/ Ice X	None					16	5		
5	Wind X	None					16	5		
6	Wind w/ Ice Z	None					14	3		
7	Wind Z	None					14	3		
8	BLC 2 Transient Area Loads	None						15		

Load Combinations

	Description	So...	P...	S...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...
1	1.2D + 1.6W (X-d..	Yes	Y		1	1.2	2	1.2	5	1.6														
2	0.9D + 1.6W (X-d..	Yes	Y		1	.9	2	.9	5	1.6														
3	1.2D + 1.0Di + 1....	Yes	Y		1	1.2	2	1.2	3	1	4	1												
4	1.2D + 1.6W (Z-d..	Yes	Y		1	1.2	2	1.2	7	1.6														
5	0.9D + 1.6W (Z-d..	Yes	Y		1	.9	2	.9	7	1.6														
6	1.2D + 1.0Di + 1....	Yes	Y		1	1.2	2	1.2	3	1	6	1												

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N1	max	-.166	6	1.384	3	-.103	3	4.67	3	1.462	2	-.344	2
2		min	-1.484	1	.311	5	-1.362	4	.579	5	.052	6	-2.806	6
3	N5	max	.715	5	1.457	6	.433	2	-1.5	2	-.044	6	-.353	2
4		min	-.697	1	.443	2	-1.849	4	-5.075	6	-.441	1	-2.728	6
5	N10	max	.262	5	1.458	3	.066	2	.123	3	2.122	5	5.759	3
6		min	-1.551	1	.561	5	-1.342	4	-.554	5	-.01	3	2.112	5
7	Totals:	max	0	5	4.228	3	0	3						
8		min	-3.732	1	1.695	5	-4.553	4						

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	0	6	0	6	0	6	0	6	0	6	0	6
2		min	0	1	0	1	0	1	0	1	0	1	0	1
3	N2	max	.154	5	-.116	5	-.005	3	3.831e-03	5	7.842e-04	2	8.342e-03	6
4		min	.009	3	-1.36	3	-.086	4	-1.001e-02	3	-3.673e-03	4	-6.154e-03	2
5	N3	max	.03	2	-.142	2	-.004	3	3.346e-03	5	-1.335e-04	6	7.117e-03	6
6		min	.002	6	-1.166	6	-.104	4	-2.967e-03	3	-2.041e-03	1	-1.164e-02	2
7	N4	max	.008	2	-.136	2	-.003	3	3.926e-03	4	4.617e-04	2	5.547e-03	6
8		min	-.003	4	-1.123	6	-.105	4	9.077e-04	2	-8.856e-04	4	-9.195e-03	2
9	N5	max	0	6	0	6	0	6	0	6	0	6	0	6
10		min	0	1	0	1	0	1	0	1	0	1	0	1
11	N6	max	-.003	3	-.307	2	-.002	3	1.469e-02	4	-2.779e-04	3	4.287e-03	6
12		min	-.148	4	-1.476	6	-.083	4	4.942e-03	2	-4.472e-03	4	-6.052e-03	2
13	N7	max	.008	2	-.044	2	.004	2	1.409e-02	6	3.916e-04	2	7.265e-03	6
14		min	-.003	4	-.179	6	0	4	4.295e-03	2	-6.453e-04	4	2.602e-04	2
15	N8	max	-.002	3	-.537	2	.054	5	1.621e-02	4	3.386e-04	2	-1.745e-03	6
16		min	-.096	4	-1.226	6	.003	3	5.602e-03	2	4.768e-06	4	-6.374e-03	1
17	N9	max	-.003	3	-.637	5	.094	5	1.279e-02	4	-5.741e-05	3	-4.814e-03	3
18		min	-.074	4	-1.143	3	.002	3	4.161e-03	2	-2.458e-03	4	-6.273e-03	4
19	N10	max	0	6	0	6	0	6	0	6	0	6	0	6
20		min	0	1	0	1	0	1	0	1	0	1	0	1
21	N11	max	.002	2	-.524	5	.207	5	9.618e-03	5	-1.449e-04	6	-4.703e-03	5
22		min	0	4	-1.473	3	.006	3	-2.154e-03	3	-1.608e-03	4	-1.375e-02	3
23	N12	max	0	2	-.065	5	.051	5	2.398e-03	5	-1.448e-05	3	-5.727e-03	5
24		min	0	4	-.179	3	0	3	-5.339e-04	3	-3.428e-03	4	-1.583e-02	3
25	N13	max	.073	5	-.163	5	.095	5	1.097e-02	5	1.657e-05	3	2.101e-03	5
26		min	.004	3	-1.205	3	.002	3	-5.396e-03	1	-2.984e-03	4	-7.788e-03	1
27	N14	max	.029	2	-.024	5	0	6	-1.101e-03	5	-1.591e-04	6	7.913e-03	6
28		min	.002	6	-.168	3	-.016	1	-1.276e-02	3	-2.023e-03	1	2.416e-04	2
29	N15	max	.102	5	-.063	5	.043	5	7.241e-03	5	-7.396e-05	6	3.89e-03	5
30		min	.006	3	-1.108	3	-.01	1	-6.261e-03	3	-1.095e-03	1	-5.626e-03	1
31	N16	max	.165	5	-.085	5	-.006	3	3.831e-03	5	7.842e-04	2	8.342e-03	6
32		min	.008	3	-1.356	3	-.068	4	-1.001e-02	3	-3.673e-03	4	-6.154e-03	2
33	N17	max	.144	5	-.147	5	-.004	3	3.831e-03	5	7.842e-04	2	8.342e-03	6
34		min	.009	3	-1.365	3	-.105	4	-1.001e-02	3	-3.673e-03	4	-6.154e-03	2
35	N18	max	0	3	-.579	5	.207	5	9.618e-03	5	-1.449e-04	6	-4.703e-03	5
36		min	-.009	4	-1.461	3	.006	3	-2.154e-03	3	-1.608e-03	4	-1.375e-02	3
37	N19	max	.009	5	-.468	5	.207	5	9.618e-03	5	-1.449e-04	6	-4.703e-03	5
38		min	0	6	-1.486	3	.006	3	-2.154e-03	3	-1.608e-03	4	-1.375e-02	3
39	N20	max	.005	2	-.18	2	.002	2	2.169e-02	6	-7.524e-05	3	1.047e-02	6
40		min	-.043	4	-.766	6	-.023	4	6.756e-03	2	-2.568e-03	4	-1.313e-03	2
41	N21	max	.062	5	-.09	5	-.004	6	-3.145e-04	5	-8.972e-05	3	1.238e-02	6
42		min	.008	6	-.715	3	-.034	4	-1.906e-02	3	-2.524e-03	4	-1.363e-03	2
43	N22	max	.001	2	-.275	5	.135	5	5.631e-03	5	-9.034e-05	3	-8.528e-03	5
44		min	0	4	-.765	3	.001	3	-1.259e-03	3	-2.638e-03	4	-2.399e-02	3
45	N23	max	-.002	3	-.263	2	-.003	3	1.469e-02	4	-2.779e-04	3	4.287e-03	6
46		min	-.135	4	-1.458	6	-.105	4	4.942e-03	2	-4.472e-03	4	-6.052e-03	2
47	N24	max	-.004	3	-.352	2	0	3	1.469e-02	4	-2.779e-04	3	4.287e-03	6
48		min	-.161	4	-1.493	6	-.06	4	4.942e-03	2	-4.472e-03	4	-6.052e-03	2
49	N25	max	.073	2	-.164	2	-.004	3	5.344e-03	5	-1.747e-04	3	7.627e-03	6
50		min	.006	6	-1.213	6	-.104	4	-3.575e-03	3	-2.388e-03	4	-1.244e-02	2
51	N26	max	.013	2	-.165	2	-.003	3	6.98e-03	4	-2.511e-05	3	5.036e-03	6

Envelope Joint Displacements (Continued)

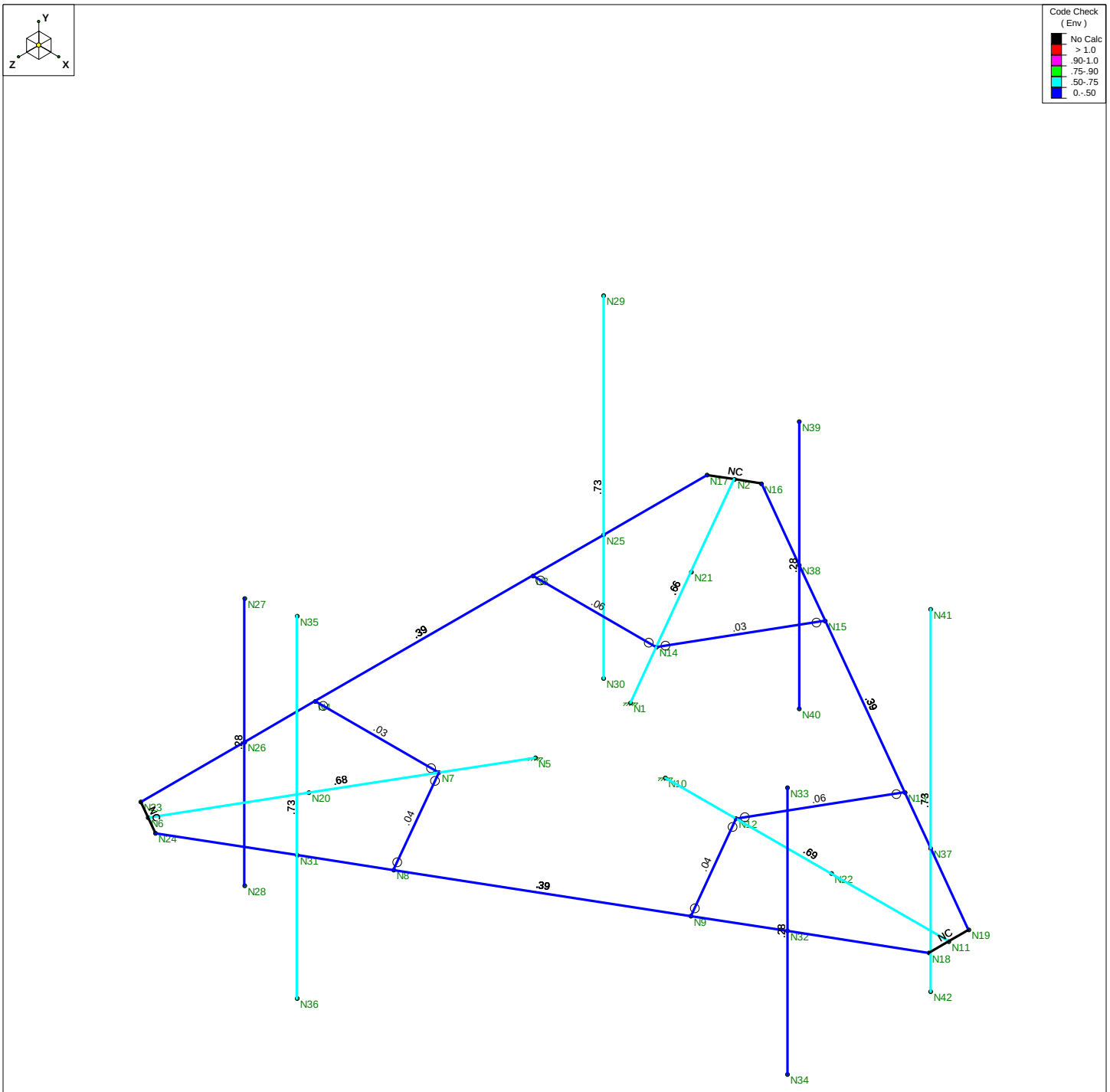
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
52		min	-.035	4	-1.194	6	-.105	4	1.978e-03	2	-2.251e-03	4	-8.399e-03	2
53	N27	max	.484	2	-.165	2	.213	4	9.447e-03	4	-2.511e-05	3	5.052e-03	6
54		min	-.185	6	-1.194	6	.045	2	1.98e-03	2	-2.251e-03	4	-1.485e-02	2
55	N28	max	.177	6	-.165	2	-.098	2	5.692e-03	4	-2.511e-05	3	5.024e-03	6
56		min	-.22	2	-1.194	6	-.319	4	1.977e-03	2	-2.251e-03	4	-6.079e-03	2
57	N29	max	1.809	2	-.164	2	.678	5	1.565e-02	5	-1.747e-04	3	7.73e-03	6
58		min	-.456	6	-1.214	6	-.22	3	-3.624e-03	3	-2.388e-03	4	-3.486e-02	2
59	N30	max	.28	6	-.164	2	.125	3	3.005e-03	5	-1.747e-04	3	7.604e-03	6
60		min	-.217	2	-1.213	6	-.231	5	-3.564e-03	3	-2.388e-03	4	-6.855e-03	2
61	N31	max	-.001	3	-.466	2	.042	5	1.786e-02	4	-3.122e-05	3	-1.297e-03	6
62		min	-.103	4	-1.304	6	.004	3	5.237e-03	2	-2.09e-03	4	-8.16e-03	1
63	N32	max	-.002	3	-.611	5	.146	5	1.198e-02	4	-8.388e-05	3	-5.269e-03	5
64		min	-.044	4	-1.209	3	.003	3	2.661e-03	3	-2.954e-03	4	-7.16e-03	3
65	N33	max	.305	1	-.611	5	.747	4	1.843e-02	4	-8.388e-05	3	-5.273e-03	5
66		min	.146	5	-1.209	3	.099	3	2.669e-03	3	-2.954e-03	4	-9.531e-03	1
67	N34	max	-.208	2	-.611	5	-.073	2	9.654e-03	4	-8.388e-05	3	-5.069e-03	2
68		min	-.263	4	-1.209	3	-.214	4	2.654e-03	3	-2.954e-03	4	-6.857e-03	6
69	N35	max	.937	1	-.466	2	2.106	4	4.035e-02	4	-3.122e-05	3	-1.314e-03	6
70		min	.066	6	-1.304	6	.336	2	5.26e-03	2	-2.09e-03	4	-1.85e-02	1
71	N36	max	-.059	6	-.466	2	-.168	2	1.227e-02	4	-3.122e-05	3	-1.293e-03	6
72		min	-.248	4	-1.304	6	-.443	4	5.233e-03	2	-2.09e-03	4	-5.818e-03	1
73	N37	max	.038	5	-.26	5	.157	5	1.277e-02	5	-6.474e-05	3	5.173e-04	5
74		min	.004	3	-1.287	3	.002	3	-5.161e-03	3	-3.04e-03	4	-9.717e-03	1
75	N38	max	.117	5	-.062	5	.017	5	6.394e-03	5	-1.496e-04	3	3.931e-03	4
76		min	.008	3	-1.155	3	-.03	1	-7.123e-03	3	-2.3e-03	4	-5.904e-03	2
77	N39	max	.331	2	-.062	5	.416	5	1.284e-02	5	-1.496e-04	3	3.935e-03	4
78		min	-.048	6	-1.155	3	-.262	3	-7.145e-03	3	-2.3e-03	4	-8.368e-03	2
79	N40	max	.258	4	-.062	5	.251	3	4.074e-03	5	-1.496e-04	3	3.927e-03	4
80		min	-.123	2	-1.155	3	-.143	5	-7.106e-03	3	-2.3e-03	4	-4.618e-03	2
81	N41	max	1.071	1	-.26	5	1.913	5	3.519e-02	5	-6.474e-05	3	5.195e-04	5
82		min	.007	5	-1.288	3	-.311	3	-5.231e-03	3	-3.04e-03	4	-2.006e-02	1
83	N42	max	.056	5	-.26	5	.187	3	7.185e-03	5	-6.474e-05	3	5.168e-04	5
84		min	-.275	3	-1.287	3	-.144	5	-5.145e-03	3	-3.04e-03	4	-7.639e-03	3

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

	Member	Shape	Code Check	Loc...	LC	Shea...	Loc.....	L...	phi*Pn...	phi*Pn...	phi*M...	phi*M...	...	Eqn
1	M18	PIPE 2.5	.733	5	4	.043	1.0...	4	30.038	50.715	3.596	3.596	1...	H1-1b
2	M20	PIPE 2.5	.732	5	4	.043	1.0...	4	30.038	50.715	3.596	3.596	1...	H1-1b
3	M16	PIPE 2.5	.732	5	1	.043	1.0...	1	30.038	50.715	3.596	3.596	1...	H1-1b
4	M3	HSS3X3X4	.687	0	6	.125	0	z 5	70.065	101.016	8.556	8.556	2...	H1-1b
5	M1	HSS3X3X4	.680	0	6	.087	0	y 4	70.065	101.016	8.556	8.556	2...	H1-1b
6	M2	HSS3X3X4	.664	0	3	.097	0	z 2	70.065	101.016	8.556	8.556	2...	H1-1b
7	M6	PIPE 3.0	.392	13....	3	.218	13....	4	23.945	65.205	5.749	5.749	2...	H1-1b
8	M4	PIPE 3.0	.388	0	6	.219	0	4	23.945	65.205	5.749	5.749	2...	H1-1b
9	M5	PIPE 3.0	.387	13....	3	.252	13....	1	23.945	65.205	5.749	5.749	2...	H1-1b
10	M19	PIPE 2.0	.280	3	4	.022	.5	4	20.867	32.13	1.872	1.872	1...	H1-1b
11	M17	PIPE 2.0	.280	3	1	.022	.5	1	20.867	32.13	1.872	1.872	1...	H1-1b
12	M21	PIPE 2.0	.279	3	4	.022	.5	4	20.867	32.13	1.872	1.872	1...	H1-1b
13	M14	L2.5x2.5x4	.060	1.3...	4	.036	0	z 3	28.84	38.556	1.114	2.527	1...	H2-1
14	M12	L2.5x2.5x4	.058	1.3...	1	.037	0	z 6	28.84	38.556	1.114	2.527	1...	H2-1

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

	Member	Shape	Code Check	Loc...	LC	Shea..	Loc.....	L..	phi*Pn..	phi*Pn..	phi*M...	phi*M...	...	Eqn
15	M10	L2.5x2.5x4	.037	1.3...	4	.037	0	z	3	28.84	38.556	1.114	2.527	1...	H2-1
16	M15	L2.5x2.5x4	.037	1.6...	4	.044	2.9...	z	3	28.84	38.556	1.114	2.527	1...	H2-1
17	M11	L2.5x2.5x4	.033	1.6...	1	.043	2.9...	z	6	28.84	38.556	1.114	2.527	1...	H2-1
18	M13	L2.5x2.5x4	.030	1.6...	1	.043	2.9...	z	3	28.84	38.556	1.114	2.527	1...	H2-1



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek		
TJL	CT11331A - Mount	Oct 9, 2018 at 3:12 PM
18127.21	Unity Check	Mount.r3d

EBI Consulting
environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CT11331A

Norwich
50 Clinton Avenue
Norwich, CT 06360

November 12, 2018

EBI Project Number: 6218007157

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	8.20 %

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

EBI Consulting
environmental | engineering | due diligence

November 12, 2018

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

Emissions Analysis for Site: **CT11331A – Norwich**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **50 Clinton Avenue, Norwich, CT**, 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 (μW/cm2). 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) and 2100 MHz (AWS) 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 **50 Clinton Avenue, Norwich, CT**, 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 manufactures supplied specifications, minus 10 dB for directional panel antennas, 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) 1 GSM channels (PCS Band - 1900 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 15 Watts per Channel.

2) 1 UMTS channel (AWS Band – 2100 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

3) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

4) 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.

5) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

6) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.

7) 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.

8) 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 manufactures supplied specifications, minus 10 dB for directional panel antennas, 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.

9) The antennas used in this modeling are the **RFS APX16DWV-16DWVS-E-A20** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **RFS APXVAARR24_43-U-NA20** for 600 MHz and 700 MHz channels. 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 manufactures supplied specifications, minus 10 dB for directional panel antennas, 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.

10) The antenna mounting height centerline of the proposed is **137 feet** above ground level (AGL).

11) 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.

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20
Gain:	16.3 dBd	Gain:	16.3 dBd	Gain:	16.3 dBd
Height (AGL):	137 feet	Height (AGL):	137 feet	Height (AGL):	137 feet
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	175	Total TX Power(W):	175	Total TX Power(W):	175
ERP (W):	7,465.14	ERP (W):	7,465.14	ERP (W):	7,465.14
Antenna A1 MPE%	**1.56**	Antenna B1 MPE%	**1.56**	Antenna C1 MPE%	**1.56**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Gain:	12.95 / 13.35 dBd	Gain:	12.95 / 13.35 dBd	Gain:	12.95 / 13.35 dBd
Height (AGL):	137 feet	Height (AGL):	137 feet	Height (AGL):	137 feet
Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	2,443.03	ERP (W):	2,443.03	ERP (W):	2,443.03
Antenna A2 MPE%	**1.22**	Antenna B2 MPE%	**1.22**	Antenna C2 MPE%	**1.22**

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**2.78 %**
AT&T	**3.38** %
MetroPCS	**0.40** %
Norwich Police	**0.09** %
Norwich PWD	**0.09** %
Verizon Wireless	**1.46** %
Site Total MPE %:	**8.20 %**

T-Mobile Sector A Total:	2.78 %
T-Mobile Sector B Total:	2.78 %
T-Mobile Sector C Total:	2.78 %
Site Total:	8.20 %

T-Mobile Maximum MPE Power Values (Per Sector)

T-Mobile _Frequency Band / Technology (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile PCS - 1900 MHz GSM	1	639.87	137	1.34	PCS - 1900 MHz	1000.00	0.13%
T-Mobile PCS - 1900 MHz UMTS	1	1,706.32	137	3.57	PCS - 1900 MHz	1000.00	0.36%
T-Mobile AWS - 2100 MHz LTE	2	2,559.48	137	10.72	AWS - 2100 MHz	1000.00	1.07%
T-Mobile 600 MHz LTE	2	788.97	137	3.31	600 MHz	400.00	0.83%
T-Mobile 700 MHz LTE	2	432.54	137	1.81	700 MHz	467.00	0.39%
						Total:	**2.78 %**

Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector A:	2.78 %
Sector B:	2.78 %
Sector C:	2.78 %
T-Mobile Maximum MPE % (Per Sector):	2.78 %
Site Total:	8.20 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **8.20%** 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.