



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

December 28, 2020

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

RE: **Notice of Exempt Modification for T-Mobile:  
842876 - T-Mobile Site ID: CTHA133A  
1000 Old Country Circle, Windsor Locks, CT 06096  
Latitude: 41° 54' 36.88" / Longitude: -72° 39' 42.43"**

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 63-foot mount on the existing 101-foot Monopole Tower, located at 1000 Old Country Circle, Windsor Locks, CT. The tower is owned by Crown Castle and the property is owned by Stanley & Maria Rafalowski. T-Mobile now intends to add three (3) new 600/700 MHz antennas. The new antennas will be installed at the 63-ft level of the tower. These new antennas are capable of providing 5G services. T-Mobile is also proposing tower mount modification as shown on the enclosed Mount Analysis Report.

**Planned Modifications:**

**Tower:**

Remove:

(3) Coax

Remove and Replace:

(3) APXV18206516S-C-A20 Antenna (**REMOVE**) - (3) RFS-APXVAARR24\_43-U-NA20 Antenna 600/700 MHz (**REPLACE**)

(3) APX16DWV-16DWV-S-E-A20 Antenna (**REMOVE**) – (3) AIR32\_B66A\_B2A Antenna 1900/2100 MHz (**REPLACE**)

Install New:

(3) Radio 4449 B71/B12

(3) 1 5/8" Hybrid Fiber Line

Existing to Remain:

(9) Coax

(3) APXV18-206516S-C-A20 Antenna (Dormant)

(6) TMA

**Ground:**

Upgrade to existing ground cabinet. (Internally)

Upgrade existing breakers.

The Foundation for a Wireless World.

CrownCastle.com

The facility was originally approved by the Town of Windsor Locks. The original zoning approval could not be located despite diligent efforts, however the original building permit, permit number 23831 dated July 26, 2000 is enclosed. The Council approved T-Mobile's shared use of the tower on October 19, 2005.

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.C.S.A. § 16-50j-73, a copy of this letter is being sent to J. Christopher Kervick, First Selectman for the Town of Windsor Locks, Jennifer Rodriguez, Town Planner, Crown Castle as the tower owner, and Stanley & Maria Rafalowski, the property owners.

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: Anne Marie Zsamba.

Sincerely,

Anne Marie Zsamba  
Site Acquisition Specialist  
3 Corporate Park Drive, Suite 101  
Clifton Park, NY 12065  
(201) 236-9224  
AnneMarie.Zsamba@crowncastle.com

Attachments

cc:

J. Christopher Kervick, First Selectman (*via email only to ckervick@wlocks.com*)  
Town of Windsor Locks  
50 Church Street

Melanie A. Bachman

Page 3

Windsor Locks, CT 06096  
860-627-1444

Jennifer Rodriguez, Town Planner (*via email only to jrodriguez@wlocks.com*)  
Town of Windsor Locks  
50 Church Street  
Windsor Locks, CT 06096  
860-627-1447

Stanley & Maria Rafalowski, Property Owner  
1000 Old Country Circle #105  
Windsor Locks, CT 06096

Crown Castle, Tower Owner

ORIGIN ID: SCHA (518) 350-3639  
ANNE MARIE ZSAMBA  
CROWN CASTLE  
21 HEATHER DRIVE

GANSEVOORT, NY 12831  
UNITED STATES US

SHIP DATE: 28DEC20  
ACTWGT: 1.00 LB  
CAD: 104924194/NET4280

BILL SENDER

TO **MARIA & STANLEY RAFALOWSKI**

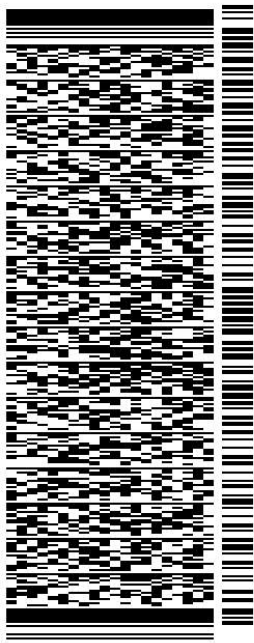
**1000 OLD COUNTRY CIRCLE**

**#105**

**WINDSOR LOCKS CT 06096**

(201) 236-9224 REF: 1734 7690  
INV/ PO/ DEPT:

56BJ29196/B766



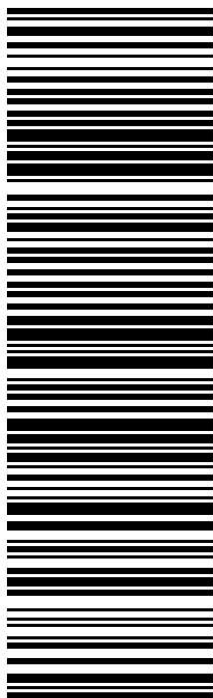
J202020071401uv

TRK# 0201 **7724 8156 4475**

**TUE - 29 DEC 10:30A**  
**PRIORITY OVERNIGHT**

**EB EHTA**

**06096**  
CT-US **BDL**



**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 Service Guide. Written claims must be filed within strict time limits, see current FedEx Service Guide.



**From:** [Zsamba, Anne Marie](#)  
**To:** ["jrodriguez@wlocks.com"](mailto:jrodriguez@wlocks.com)  
**Subject:** Notice of Exempt Modification - T-Mobile - 1000 Old Country Circle, Windsor Locks - 842876  
**Date:** Monday, December 28, 2020 10:40:00 AM  
**Attachments:** [EM-T-MOBILE-1000 OLD COUNTY CIRCLE WINDSOR LOCKS-842876-CTHA133A-NOTICE.pdf](#)

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Dear Town Planner Rodriguez:

Attached please find T-Mobile's exempt modification application that is being submitted to the Connecticut Siting Council today, December 28, 2020.

In light of the present circumstances with Covid-19, The Council has advised that electronic notification of this filing is acceptable. If you could kindly confirm receipt. Thank you.

Best,  
Anne Marie Zsamba

**ANNE MARIE ZSAMBA**  
Site Acquisition Specialist  
T: (201) 236-9224  
M: (518) 350-3639  
F: (724) 416-6112

**CROWN CASTLE**  
3 Corporate Park Drive, Suite 101  
Clifton Park, NY 12065  
[CrownCastle.com](http://CrownCastle.com)

**From:** [Zsamba, Anne Marie](#)  
**To:** [ckervick@wlocks.com](mailto:ckervick@wlocks.com)  
**Subject:** Notice of Exempt Modification - T-Mobile - 1000 Old Country Circle, Windsor Locks - 842876  
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Site Acquisition Specialist  
T: (201) 236-9224  
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F: (724) 416-6112

**CROWN CASTLE**  
3 Corporate Park Drive, Suite 101  
Clifton Park, NY 12065  
[CrownCastle.com](http://CrownCastle.com)

# Exhibit A

## **Original Facility Approval**

**TOWN OF WINDSOR LOCKS, CT  
BUILDING PERMIT  
No 23831**

DATE July 26, 2000  
CHECK NO 8330-\$790.  
C.O. FEE 8331-\$510. CASH

**ESTIMATED COST/VALUE \$ 78,000.  
(EXCLUDING ELECTRICAL, PLUMBING & HVAC)  
FEE \$ 790.**

**APPLICANT**

**NAME** Brois Construction Corp.  
**ADDRESS** 73 East Main Street  
Elmsford, NY 10523

**PHONE** 914-592-4848 **LICENSE NO.**

**OWNER** Old County Circle Industrial  
**NAME** Park Lots 5 & 6 Association II  
**ADDRESS** 37 Quail Hollow Road  
Agawam, MA 01001

Construction of an unmanned wireless communications site consisting of a (32' x 55' 6") fenced compound containing a prefab. equipment shelter & a (98') High monopole w/ antennas at 1000 Old County Circle.

All work to be done in accordance with this application and plans approved by the Building Department

  
\_\_\_\_\_  
Building Official

# Exhibit B

## Property Card

# 1000 OLD COUNTY CIRCLE #105

**Location** 1000 OLD COUNTY CIRCLE  
#105

**Mblu** 51/ 125/ 13/ 105/

**UID** 00324200

**Owner** RAFALOWSKI STANLEY &  
MARIA

**Assessment** \$83,400

**Appraisal** \$119,100

**PID** 966

**Building Count** 1

## Current Value

Appraisal			
Valuation Year	Improvements	Land	Total
2013	\$119,100	\$0	\$119,100

Assessment			
Valuation Year	Improvements	Land	Total
2013	\$83,400	\$0	\$83,400

## Owner of Record

**Owner** RAFALOWSKI STANLEY & MARIA  
**Co-Owner**  
**Address** 1000 OLD COUNTY CIRCLE #105  
WINDSOR LOCKS, CT 06096

**Sale Price** \$0  
**Certificate**  
**Book & Page** 196/765  
**Sale Date** 09/17/1990

## Ownership History

Ownership History				
Owner	Sale Price	Certificate	Book & Page	Sale Date
RAFALOWSKI STANLEY & MARIA	\$0		196/765	09/17/1990

## Building Information

### Building 1 : Section 1

**Year Built:** 1989  
**Living Area:** 3,375  
**Replacement Cost:** \$151,247  
**Building Percent Good:** 75


### Building Photo

  
(<http://images.vgsi.com/photos/WindsorlocksCTPhotos/\00\00\74\86.jpg>)

### Building Layout

**Replacement Cost****Less Depreciation:** \$113,400**Building Attributes**

Field	Description
STYLE	Indust Condo
MODEL	Com Condo
Stories:	1 Story
Occupancy	1
Interior Wall A	Minim/Masonry
Interior Wall B	
Interior Floor A	Concrete
Interior Floor B	
Heat Fuel:	Gas
Heat Type:	Forced Air-Duc
AC Type:	None
Total Bedrooms:	No Bedrooms
Total Bathrooms:	0
Total Half Baths:	0
Total Rooms:	
Bath Style:	
Kitchen Style:	
Cath. Ceiling	
Fireplace Gas	
Fin. Basement	
Basement Gar.	
Whirlpool	
Fireplace Types	
Fireplaces	
Grade	Below Average
Stories	1
Residential Units:	0
Exterior Wall A	Average
Exterior Wall B	
Roof Structure	Flat
Roof Cover	Tar and Gravel
Commercial Units	15
Res/Com Units:	0
Section #:	
Foundation	

 Building Layout

[http://images.vgsi.com/photos/WindsorlocksCTPhotos//Sketches/966\\_966](http://images.vgsi.com/photos/WindsorlocksCTPhotos//Sketches/966_966)
**Building Sub-Areas (sq ft)****Legend**

Code	Description	Gross Area	Living Area
BAS	First Floor	3,375	3,375
		3,375	3,375

**Extra Features**

Extra Features				Legend
Code	Description	Size	Value	Bldg #
MEZ	Mezzanine	300.00 S.F.	\$3,600	1
SPRK	Sprinklers	3375.00 S.F.	\$2,400	1

### Parcel Information

**Use Code** 305  
**Description** Ind Condo  
**Deeded Acres** 0

### Land

Land Use	Land Line Valuation
<b>Use Code</b> 305	<b>Size (Acres)</b> 0
<b>Description</b> Ind Condo	<b>Frontage</b> 0
<b>Zone</b> IND1	<b>Depth</b> 0
<b>Neighborhood</b>	<b>Assessed Value</b> \$0
<b>Alt Land Appr Category</b> No	<b>Appraised Value</b> \$0

### Outbuildings

Outbuildings	Legend
No Data for Outbuildings	

### Valuation History

Appraisal			
Valuation Year	Improvements	Land	Total
2013	\$119,100	\$0	\$119,100
2012	\$127,000	\$0	\$127,000
2007	\$117,000	\$0	\$117,000

Assessment			
Valuation Year	Improvements	Land	Total
2013	\$83,400	\$0	\$83,400
2012	\$88,900	\$0	\$88,900
2007	\$81,900	\$0	\$81,900





# Exhibit C

## **Construction Drawings**

**SCOPE OF WORK**

**ITEMS TO BE INSTALLED ON & REMOVED FROM EXISTING TOWER:**

- REMOVE T-MOBILE ANTENNA (APXV18206516S-C-A20) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- REMOVE T-MOBILE ANTENNA (APXV16DWV-16DWV-S-E-A20) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL T-MOBILE ANTENNA (AIR 32 B2A B66A\_B2A) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL T-MOBILE ANTENNA (APXVAARR24\_43-U-NA20) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL T-MOBILE RADIO (4449 B71+B12) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL T-MOBILE 6x12 HCS HYBRID CABLE (TOTAL OF 3).
- INSTALL FIBER JUMPERS (3 PER SECTOR, TOTAL OF 9).
- INSTALL COAX JUMPERS (2 PER SECTOR, TOTAL OF 6).
- INSTALL (1) SITEPRO1 PRK-1245
- INSTALL SITEPRO1 HRK 12-HD

**ITEMS TO BE INSTALLED ON EXISTING EQUIPMENT PAD:**

- REMOVE (1) DUS41
- INSTALL (2) ERICSSON BASEBAND 6630 UNITS
- REPLACE (1) EXISTING 60A BREAKER WITH (1) NEW 125A BREAKER

**ITEMS TO REMAIN:**

- (3) ANTENNAS, (6) TMAS, (9) COAX CABLES.

SITE ADDRESS: 1000 OLD COUNTY CIRCLE  
WINDSOR LOCKS, CT 06096

LATITUDE (NAD 83): N 41° 54' 36.88"

LONGITUDE (NAD 83): W 72° 39' 42.43"

COUNTY: HARTFORD

JURISDICTION: HARTFIELD

LANDLORD: CROWN CASTLE INTERNATIONAL  
500 W. CUMMINGS PARK, STE 3600  
WOBURN, MA 01801

STRUCTURE TYPE: MONOPOLE

STRUCTURE HEIGHT: 101'-0"

RAD CENTER: 65'-0"

CURRENT USE: TELECOMMUNICATIONS FACILITY

PROPOSED USE: TELECOMMUNICATIONS FACILITY

**NOTE:**

ALL CONSTRUCTION ACTIVITIES ARE TO BE COMPLETED DIRECTLY THROUGH CROWN. CONTRACTOR MUST HAVE CONSTRUCTION PO AND NTP FROM CROWN DIRECT IN ORDER TO BEGIN. PRE-APPROVAL TO ENTER THE PROPERTY MUST BE OBTAINED. FOR ACCESS AUTHORIZATION, PLEASE CONTACT CROWN.



**L600 PROJECT**

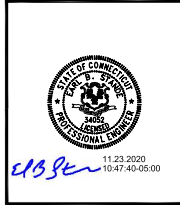
**SITE NUMBER: CTHA133A**

SITE NAME: HA133/CING/CONDO

CROWN SITE NAME: WINDSOR LOCKS

BU#: 842876

T-MOBILE RAN TEMPLATE: 67D94DB HYBRID



PROJECT NO: ERC0004

DRAWN BY: FLP

CHECKED BY: DC

SUBMITTALS	
3	11/23/20 CLIENT COMMENTS
2	08/21/19 ISSUED FOR CONSTRUCTION
1	07/28/19 ISSUED FOR CONSTRUCTION
0	07/16/19 ISSUED FOR PERMITTING

THIS DOCUMENT IS THE ORIGINAL DESIGN PROPERTY AND COPYRIGHTED WORK OF T-MOBILE. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. REPRODUCTION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.

HA133/CING/CONDO  
CTHA133A  
WINDSOR LOCKS  
842876  
1000 OLD COUNTY CIRCLE  
WINDSOR LOCKS, CT 06096

TITLE SHEET

T-1

**DRAWING INDEX**

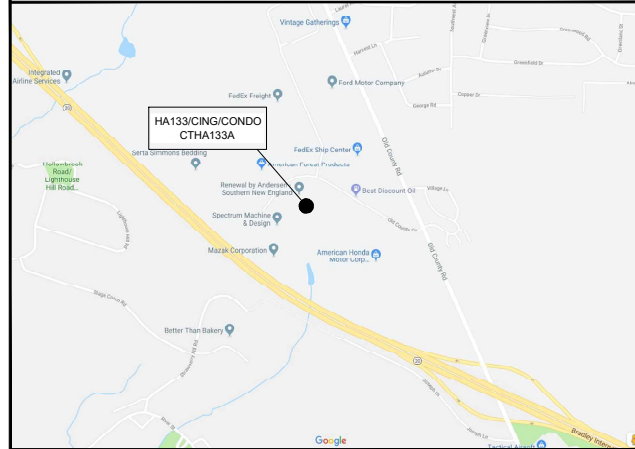
SHEET NO:	SHEET TITLE
T-1	TITLE SHEET
GN-1	GENERAL NOTES
C-1	SITE PLAN
S-1	PROPOSED TOWER ELEVATION & ANTENNA LAYOUT PLAN
S-2	EQUIPMENT DETAILS
S-3	PLATFORM DETAILS
S-4	PLATFORM DETAILS
RF-1	ANTENNA INFORMATION CHART
RF-2	RF EQUIPMENT SCHEMATIC
E-1	ONE LINE DIAGRAM
G-1	GROUNDING RISER DIAGRAM

**CROWN CASTLE SITE ID #: 842876**  
**CROWN CASTLE SITE NAME: WINDSOR LOCKS**

**ENGINEERING**

2018 CONNECTICUT STATE BUILDING CODE  
2018 AMENDMENT WITH 2015 INTERNATIONAL BUILDING CODE  
2009 ICC/ANSI A117.1 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES  
2015 INTERNATIONAL MECHANICAL CODE  
2015 INTERNATIONAL ENERGY CONSERVATION CODE  
2017 NATIONAL ELECTRICAL CODE (NFPA 70 2017)  
ANSI/TIA-222-G

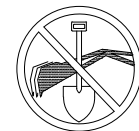
**VICINITY MAP**



HEAD WEST ON ST JAMES SAVE TOWARD TRINITY PL (0.1 MILE), MERGE ONTO I-90 W VIA THE RAMP TO NEW YORK (0.2 MILE), MERGE ONTO I-90 W (10.2 MILES), KEEP LEFT TO STAY ON I-90W (44.1 MILES), USE THE RIGHT 2 LANES TO TAKE EXIT 9 FOR I-84 TOWARD US-20/HARTFORD/NEW YORK CITY (0.7 MILE), CONTINUE ONTO I-84 (36.5 MILES), TAKE EXIT 2B TO MERGE ONTO I-91 N TOWARD SPRINGFIELD (5.7 MILES), RIGHT LANE TO TAKE EXIT 40 FOR CT-20 TOWARD BRADLEY INTERNATIONAL AIRPORT (0.6 MILE), CONTINUE ONTO CT-20W (0.5 MILE), TAKE OLD COUNTY RD EXIT TOWARD KENNEDY RD. (0.3 MILE), DRIVE TO OLD COUNTY CIRCLE (0.6 MILE), TURN LEFT THRU PARKING LOT SITE WILL BE LOCATED ON THE LEFT BEHIND BUILDING.

**GENERAL NOTES**

1. THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.
2. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE T-MOBILE REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.
3. HANDICAP REQUIREMENTS ARE NOT REQUIRED.
4. THIS FACILITY SHALL MEET OR EXCEED ALL FAA AND FCC REGULATORY REQUIREMENTS.
5. ALL NEW MATERIAL SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR UNLESS NOTED OTHERWISE. EQUIPMENT, ANTENNAS/RADIOS AND CABLES FURNISHED BY OWNER AND INSTALLED BY CONTRACTOR.
6. NO COMMERCIAL SIGNAGE IS PROPOSED.



CALL CONNECTICUT ONE CALL  
(800) 922-4455  
CALL 3 WORKING DAYS  
BEFORE YOU DIG!



**CROWN CASTLE USA INC. SITE ACTIVITY REQUIREMENTS:**

- NOTICE TO PROCEED- NO WORK SHALL COMMENCE PRIOR TO CROWN CASTLE USA INC. WRITTEN NOTICE TO PROCEED (NTP) AND THE ISSUANCE OF A PURCHASE ORDER. PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE CROWN CASTLE USA INC. NOC AT 800-789-7011 & THE CROWN CASTLE USA INC. CONSTRUCTION MANAGER.
- LOOK UP- CROWN CASTLE USA INC. SAFETY MANUAL AND SAFETY TRAINING. THE INTEGRITY OF THE SAFETY CLIMB AND ALL COMPONENTS OF THE CLIMBING FACILITY SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER MODIFICATION, MOUNT REINFORCEMENTS, AND/OR EQUIPMENT INSTALLATIONS SHALL BE WITHIN THE INTEGRITY OF THE SAFETY CLIMB OR ANY COMPONENTS OF THE CLIMBING FACILITY ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO, PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, IMPACT TO THE ANCHORAGE POINTS IN ANY WAY, OR TO IMPEDER/LOCK ITS INTENDED USE. ANY COMPROMISED SAFETY CLIMB, INCLUDING EXISTING CONDITIONS MUST BE TAGGED OUT AND REPORTED TO YOUR CROWN CASTLE USA INC. POC OR CALL THE NOC TO GENERATE A SAFETY CLIMB MAINTENANCE AND CONTRACTOR NOTICE TICKET.
- PRIOR TO THE START OF CONSTRUCTION, ALL REQUIRED JURISDICTIONAL PERMITS SHALL BE OBTAINED. THIS INCLUDES, BUT IS NOT LIMITED TO, BUILDING, ELECTRICAL, MECHANICAL, FIRE, FLOOD ZONE, ENVIRONMENTAL, AND ZONING. AFTER ON-SITE ACTIVITIES AND CONSTRUCTION ARE COMPLETED, ALL REQUIRED PERMITS SHALL BE SATISFIED AND CLOSED OUT ACCORDING TO LOCAL JURISDICTIONAL REQUIREMENTS.
- ALL CONSTRUCTION MEANS AND METHODS, INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN, AND SHALL MEET ANS/ASSE 110.48 (LATEST EDITION), FEDERAL, STATE, AND LOCAL REGULATIONS, AND ANY APPLICABLE INDUSTRY CONSENSUS STANDARDS RELATED TO THE CONSTRUCTION ACTIVITIES BEING PERFORMED. ALL RIGGING PLANS SHALL ADHERE TO ANS/ASSE 110.48 (LATEST EDITION) AND CROWN CASTLE USA INC. STANDARD CED-STD-10233, INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION, TO CERTIFY THE SUPPORTING STRUCTURE(S) IN ACCORDANCE WITH ANS/IRIA-322 (LATEST EDITION).
- ALL SITE WORK TO COMPLY WITH OAS-STD-1068 "INSTALLATION STANDARDS FOR CONSTRUCTION ACTIVITIES ON CROWN CASTLE USA INC. TOWER SITE" AND LATEST VERSION OF ANS/ISA-1019-2012 "STANDARD FOR INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS."
- IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE TO THE EQUIPMENT LISTED. THE ALTERNATIVE SHALL BE APPROVED BY CROWN CASTLE USA INC. PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
- ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. THE CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
- THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
- THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
- ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE IDENTIFIED AT ALL TIMES AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW; THIS WILL INCLUDE, BUT NOT BE LIMITED TO: (A) FALL PROTECTION (B) CONFINED SPACE (C) ELECTRICAL SAFETY (D) TRENCHING AND EXCAVATION (E) CONSTRUCTION SAFETY PROCEDURES.
- ALL SITE WORK SHALL BE AS INDICATED ON THE STAMPED CONSTRUCTION DRAWINGS AND PROJECT SPECIFICATIONS. LATEST APPROVED REVISION.
- CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH AT THE COMPLETION OF THE WORK. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
- ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF CONTRACTOR, TOWER OWNER, CROWN CASTLE USA INC., AND/OR LOCAL UTILITIES.
- THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE REQUIRED BY LOCAL JURISDICTION AND SIGNAGE REQUIRED ON INDIVIDUAL PIECES OF EQUIPMENT, ROOMS, AND SHELTERS. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE CARRIER'S EQUIPMENT AND TOWER AREAS.
- THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
- THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION AS SPECIFIED ON THE CONSTRUCTION DRAWINGS AND PROJECT SPECIFICATIONS.
- CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
- THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTORS EXPENSE TO THE SATISFACTION OF OWNER.
- CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNERS DESIGNATED LOCATION.
- CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.
- NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

**GENERAL NOTES:**

- FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:  
CONTRACTOR: GENERAL CONTRACTOR RESPONSIBLE FOR CONSTRUCTION  
CARRIER: CABLE  
TOWER OWNER: CROWN CASTLE USA INC.
- THESE DRAWINGS HAVE BEEN PREPARED USING STANDARDS OF PROFESSIONAL CARE AND COMPLETENESS NORMALLY EXERCISED UNDER SIMILAR CIRCUMSTANCES BY REPUTABLE ENGINEERS IN THIS OR SIMILAR LOCALITIES. IT IS ASSUMED THAT THE WORK DEPICTED WILL BE PERFORMED BY AN EXPERIENCED CONTRACTOR AND/OR WORKPEOPLE WHO HAVE A WORKING KNOWLEDGE OF THE APPLICABLE CODE STANDARDS AND REQUIREMENTS AND OF INDUSTRY ACCEPTED STANDARD GOOD PRACTICE. AS NOT EVERY CONDITION OR ELEMENT IS (OR CAN BE) EXPLICITLY SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL USE INDUSTRY ACCEPTED STANDARD GOOD PRACTICE FOR MISCELLANEOUS WORK NOT EXPLICITLY SHOWN.
- THESE DRAWINGS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE MEANS OR METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY FOR PROTECTION OF LIFE AND PROPERTY DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, FORMWORK, SHORING, ETC. SITE VISITS BY THE ENGINEER OR HIS REPRESENTATIVE WILL NOT INCLUDE INSPECTION OF THESE ITEMS AND IS FOR STRUCTURAL OBSERVATION OF THE FINISHED STRUCTURE ONLY. NOTES AND DETAILS IN THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS. WHERE NO DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT, AND/OR AS PROVIDED FOR IN THE CONTRACT DOCUMENTS. WHERE DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL NOTES, AND SPECIFICATIONS, THE GREATER, MORE STRICT REQUIREMENTS, SHALL GOVERN. IF FURTHER CLARIFICATION IS REQUIRED CONTACT THE ENGINEER OF RECORD.
- SUBSTANTIAL EFFORT HAS BEEN MADE TO PROVIDE ACCURATE DIMENSIONS AND MEASUREMENTS ON THE DRAWINGS TO ASSIST IN THE FABRICATION AND/OR PLACEMENT OF CONSTRUCTION ELEMENTS BUT IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE DIMENSIONS, MEASUREMENTS, AND/OR CLEARANCES SHOWN IN THE CONSTRUCTION DRAWINGS PRIOR TO FABRICATION OR CUTTING OF ANY NEW OR EXISTING CONSTRUCTION ELEMENTS. IF IT IS DETERMINED THAT THERE ARE DISCREPANCIES AND/OR CONFLICTS WITH THE CONSTRUCTION DRAWINGS THE ENGINEER OF RECORD IS TO BE NOTIFIED AS SOON AS POSSIBLE.
- PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CROWN CASTLE.
- ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
- UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
- THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
- IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CARRIER AND CROWN CASTLE PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
- THE CONTRACTOR IS TO PERFORM A SITE INVESTIGATION AND IS TO DETERMINE THE BEST ROUTING OF ALL CONDUITS FOR POWER, AND TELCO AND FOR GROUNDING CABLES AS SHOWN IN THE POWER, TELCO, AND GROUNDING PLAN DRAWINGS. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTORS EXPENSE TO THE SATISFACTION OF CROWN CASTLE USA INC.
- CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNERS DESIGNATED LOCATION.
- CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.

**ELECTRICAL INSTALLATION NOTES:**

- ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES/ORDINANCES.
- CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT OBSTRUCTED AND TRIP HAZARDS ARE ELIMINATED.
- WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC.
- ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC.
- ALL CONDUITS SHALL BEAR THE UNDERWRITERS LABORATORY LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.
- ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING THAT SHALL BE GREATER THAN THE RATED SHORT CIRCUIT CURRENT TO WHICH THEY ARE SUBJECTED, 20,000 AC MINIMUM. VERIFY AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT IN ACCORDANCE WITH ARTICLE 110.24 NEC OR THE MOST CURRENT ADOPTEE CODE PRE THE GOVERNING JURISDICTION.
- EACH END OF EVERY POWER PHASE CONDUCTOR, GROUNDING CONDUCTOR, AND TELCO CONDUCTOR OR CABLE SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2" PLASTIC ELECTRICAL TAPE WITH UV PROTECTOR, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA.
- ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH LAMINICOD TAGS SHOWING THEIR RATED VOLTAGE, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATINGS AND BRANCH CIRCUIT ID NUMBERS (i.e. PANEL BOARD AND CIRCUIT ID'S).
- PANEL BOARDS (ID NUMBERS) SHALL BE CLEARLY LABELED WITH PLASTIC LABELS.
- ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL. TO REMOVE SHARP EDGES.
- ALL POWER AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE COPPER CONDUCTOR (#14 OR LARGER) WITH TYPE THW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE OTHERWISE SPECIFIED.
- SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDORS SHALL BE SINGLE COPPER CONDUCTOR (#6 OR LARGER) WITH TYPE THW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.
- POWER AND CONTROL WIRING IN FLEXIBLE CORD SHALL BE MULTI-CONDUCTOR, TYPE SOOW CORD (#14 OR LARGER) UNLESS OTHERWISE SPECIFIED.
- POWER AND CONTROL WIRING FOR USE IN CABLE TRAY SHALL BE MULTI-CONDUCTOR, TYPE TC CABLE (#14 OR LARGER), WITH TYPE THW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.
- ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP-STYLE, COMPRESSION WIRE LUGS AND WIRE NUTS BY THOMAS AND BETTS (OR EQUAL), LUGS AND WIRE NUTS SHALL BE RATED FOR OPERATION NOT LESS THAN 75° C (165° F) AVAILABLE.
- POWER AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANS/IEEE AND NEC.
- ELECTRICAL METALLIC TUBING (EMT), INTERMEDIATE METAL CONDUIT (MC), OR RIGID METAL CONDUIT (RMC) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.
- ELECTRICAL METALLIC TUBING (EMT) OR METAL-CLAD CABLE (MC) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS. SCHEDULE 40 PVC UNDERGROUND ON STRAIGHTS AND SCHEDULE 80 PVC FOR ALL ELBOWS/90s AND ALL APPROVED ABOVE GRADE PVC CONDUIT.
- LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID-TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
- CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION-TYPE AND APPROVED FOR THE LOCATION USED. SET SCREW FITTINGS ARE NOT ACCEPTABLE.
- CABINETS, BOXES AND WIRE WAYS SHALL BE LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANS/IEEE AND THE NEC.
- WIREWAYS SHALL BE METAL WITH AN ENAMEL FINISH AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARDS (WIREMOLD SPECIMATE WIREWAY).
- SLOTTED WIRING DUCT SHALL BE PVC AND INCLUDE COVER (PANDUIT TYPE E OR EQUAL).
- CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON-PERFORATED STRAPS AND HANGERS. EXPOSIVE DEVICES (i.e. POWDER-ACTUATED) FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER, PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FINISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED FLUSH TO FINISH GRADE TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.
- EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES AND PULL BOXES SHALL BE GALVANIZED OR EPOXY-COATED SHEET STEEL. SHALL MEET OR EXCEED UL 50 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND NEMA 3R (OR BETTER) FOR EXTERIOR LOCATIONS.
- METAL RECEPTACLE, SWITCH AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY-COATED OR NON-CORRODING. SHALL MEET OR EXCEED UL 514A AND NEMA OS 1 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
- NONMETALLIC RECEPTACLE, SWITCH AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2 (NEWEST REVISION) AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
- THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CARRIER AND/OR CROWN CASTLE USA INC. BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
- THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING, LABELS AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD LIFE AND PROPERTY.
- ALL EMPTY SPARE CONDUITS THAT ARE INSTALLED ARE TO HAVE A METERED MULE TAPE FULLY CORDED INSTALLED.

**GROUNDING NOTES:**

- ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION AND AC POWER GE'S'S) SHALL BE BONDED TOGETHER AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
- THE CONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND #1) FOR GROUND ELECTRODE SYSTEMS, THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT 5 OHMS OR LESS.
- THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT AND PROVIDE TESTING RESULTS.
- METAL CONDUIT AND TRAY SHALL BE GROUNDING AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 COPPER WIRE. UNAPPROVED GROUNDING TYPE CONDUIT CLAMPS.
- METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO ITS EQUIPMENT.
- EACH CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, #6 STRANDED COPPER OR LARGER FOR INDOOR STS, #2 BARE SOLID TINNED COPPER FOR OUTDOOR STS.
- CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED BACK TO BACK CONNECTIONS ON OPPOSITE SIDE OF THE GROUND BUS ARE PERMITTED.
- ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT GROUND BARS AND THE GROUND RING SHALL BE #2 SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.
- ALUMINUM CONDUCTORS AND CONDUIT SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
- USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED.
- EXOTHERMIC WELD JOINTS SHALL BE USED FOR ALL GROUNDING CONNECTIONS.
- ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR AND EXTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS.
- COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.
- ICE BRIDGE BONDING CONNECTIONS SHALL BE BONDED BRIDGE AND THE TOWER GROUND BAR.
- APPROVED ANTIOXIDANT COATINGS (i.e. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
- ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
- MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
- BOND ALL METALLIC OBJECTS WITHIN 8' OF MAIN GROUND RING WITH #12 BARE SOLID TINNED COPPER GROUND CONDUCTOR.
- GROUND CONDUIT AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS, WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS. NON-METALLIC MATERIAL, SUCH AS PVC CONDUIT SHALL BE USED, WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (i.e. NONMETALLIC CONDUIT PROHIBITED BY LOCAL CODE). THE GROUND CONDUIT SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.
- ALL GROUNDING TRAYS OR TRAYS FROM BELOW TO ABOVE GRADE MUST BE #2 BARE SOLID TINNED COPPER IN 3/4" NON-METALLIC FLEXIBLE CONDUIT FROM 24" BELOW GRADE TO WITHIN 3" TO 6" OF CA-WELD TERMINATION POINT. THE EXPOSED END OF THE CONDUIT MUST BE SEALED WITH SILICONE CAULK, (AFTER TRANSITIONING GROUND STANDARD DETAIL AS WELL).
- BUILDINGS WHERE THE MAIN GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONDUCTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP. TOWERS, AND WATER TOWERS GROUNDING RING, TO THE EXISTING GROUNDING SYSTEM. THE GROUNDING CONDUCTORS SHALL NOT BE SMALLER THAN #2 COPPER. ROOFTOP GROUNDING RING SHALL BE BONDED TO THE EXISTING GROUNDING SYSTEM, THE BUILDING STEEL COLLARS, LIGHTNING PROTECTION SYSTEM, AND BUILDING MAIN WATER LINE (FERROUS OR NONFERROUS METAL PIPING ONLY).

CONDUCTOR COLOR CODE		
SYSTEM	CONDUCTOR	COLOR
120/240V, 1Ø	A PHASE	BLACK
	B PHASE	RED
	NEUTRAL	WHITE
	GROUND	GREEN
	A PHASE	BLACK
120/208V, 3Ø	B PHASE	RED
	C PHASE	BLUE
	NEUTRAL	WHITE
	GROUND	GREEN
	A PHASE	BROWN
277/480V, 3Ø	B PHASE	ORANGE OR PURPLE
	C PHASE	YELLOW
	NEUTRAL	GREY
	GROUND	GREEN
	POS (+)	RED**
DC VOLTAGE	NEG (-)	BLACK**

\* SEE NEC 210.5(C)(1) AND (2)  
\*\* POLARITY MARKED AT TERMINATION

**T-Mobile**  
STATE AND LOCAL CODES/ORDINANCES

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

**CROWN CASTLE**  
3 CORPORATE PARK DRIVE  
SUITE 101  
CLIFTON PARK, NY 12065

**JACOBS**  
JACOBS ENGINEERING GROUP, INC.  
120 ST. JAMES AVENUE, 5TH FLOOR  
BOSTON, MA 02115

PROJECT NO: ERC0004

DRAWN BY: JLP

CHECKED BY: DC

**SUBMITTALS**

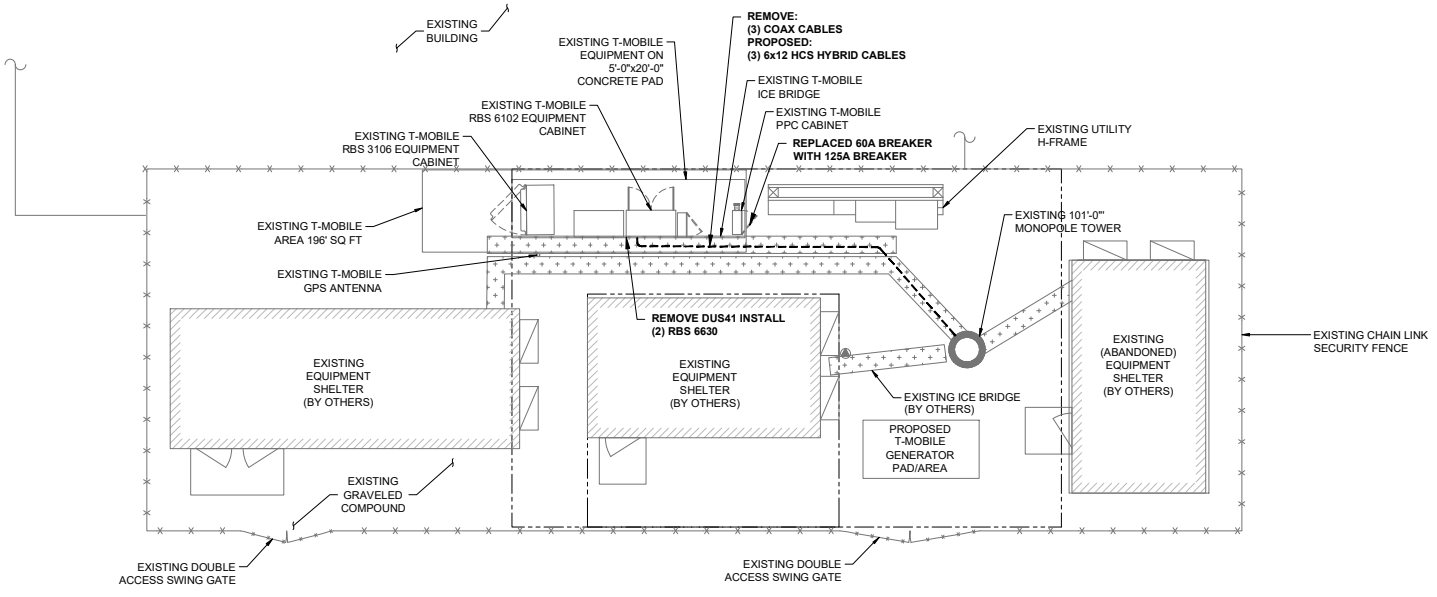
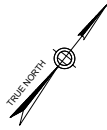
NO.	DATE	DESCRIPTION
3	11/23/20	CLIENT COMMENTS
2	08/21/19	ISSUED FOR CONSTRUCTION
1	07/29/19	ISSUED FOR CONSTRUCTION
0	07/16/19	ISSUED FOR PERMITTING

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HA133/CING/CONDO  
CTHA133A  
WINDSOR LOCKS  
842876  
1000 OLD COUNTY CIRCLE  
WINDSOR LOCKS, CT 06896

**GENERAL NOTES**

**GN-1**



**NOTES:**

1. PLAN BASED ON CONSTRUCTION DRAWINGS ISSUED BY NB&C ENGINEERING SERVICES, INC. ON 03/26/2014. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS AND LOCATION/ORIENTATION OF EXISTING EQUIPMENT.

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

**CROWN CASTLE**  
 3 CORPORATE PARK DRIVE  
 SUITE 101  
 CLIFTON PARK, NY 12065

**JACOBS**  
 JACOBS ENGINEERING GROUP, INC.  
 120 ST. JAMES AVENUE, 5TH FLOOR  
 BOSTON, MA 02115



11.23.2020  
 10:48:18-05:00  
 ERB

PROJECT NO:	ERC0004
DRAWN BY:	FLP
CHECKED BY:	DC

**SUBMITTALS**

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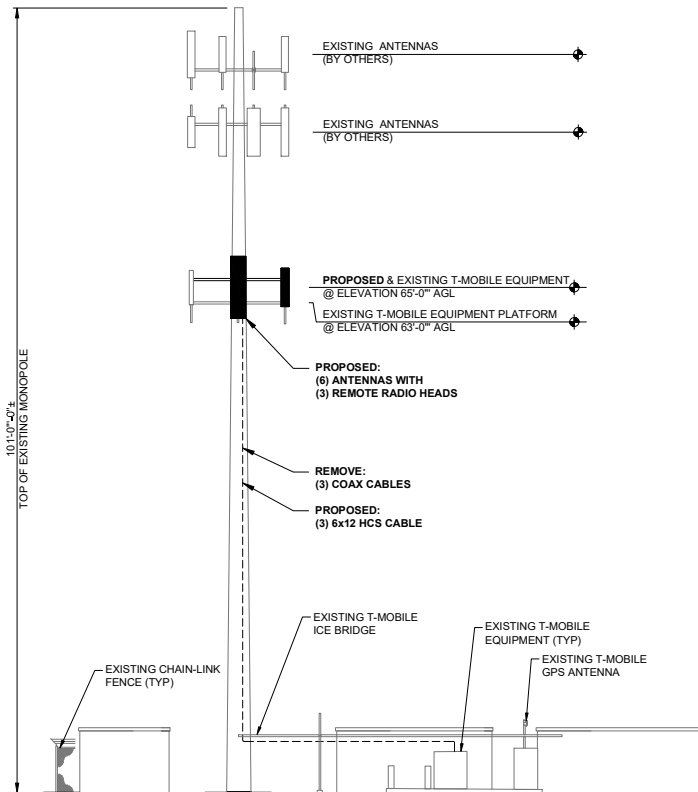
HA133/CING/CONDO  
 CTHA133A  
 WINDSOR LOCKS  
 842876  
 1000 OLD COUNTY CIRCLE  
 WINDSOR LOCKS, CT 06096

SITE PLAN

**C-1**

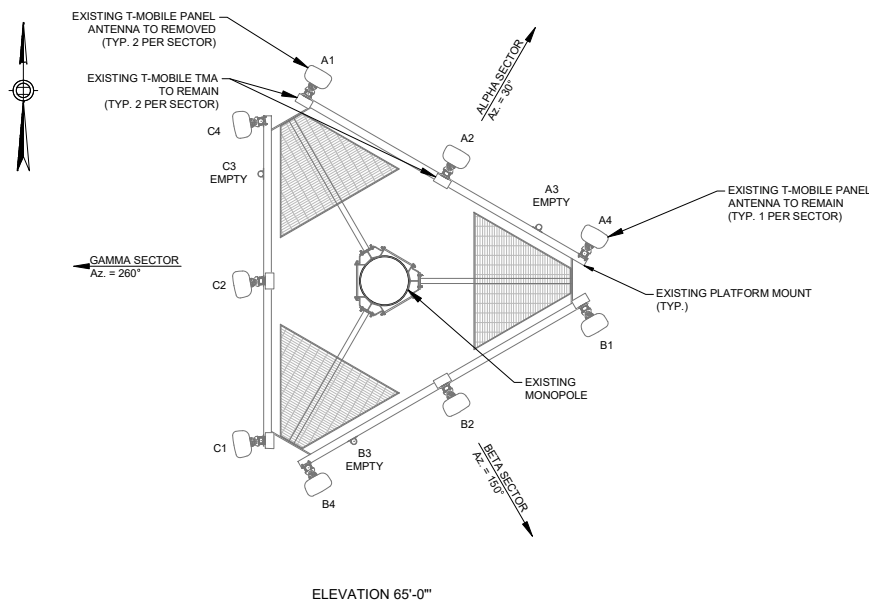
**NOTES:**

- CONTRACTOR SHALL REFER TO THE STRUCTURAL MODIFICATION REPORT; SITE NUMBER: CTHA133A; SITE NAME: HA133/CING/CONDO; CROWN BU NUMBER: 842876; CROWN SITE NAME: WINDSOR LOCKS; CROWN ORDER NUMBER: 479845 REV. 1; ISSUED BY B-T GROUP; DATED ON 07/02/19. THE STRUCTURAL MODIFICATIONS MUST BE PERFORMED PRIOR TO THE INSTALLATION OF THE EQUIPMENT SHOWN ON THE DRAWINGS. CONTRACTOR SHALL REFER TO SHEETS S1 THROUGH S2 FOR DETAILS. THE CONTRACTOR SHALL VERIFY ALL EXISTING MEMBERS AND HARDWARE ARE INSTALLED PROPERLY AS DESCRIBED IN THIS REPORT.



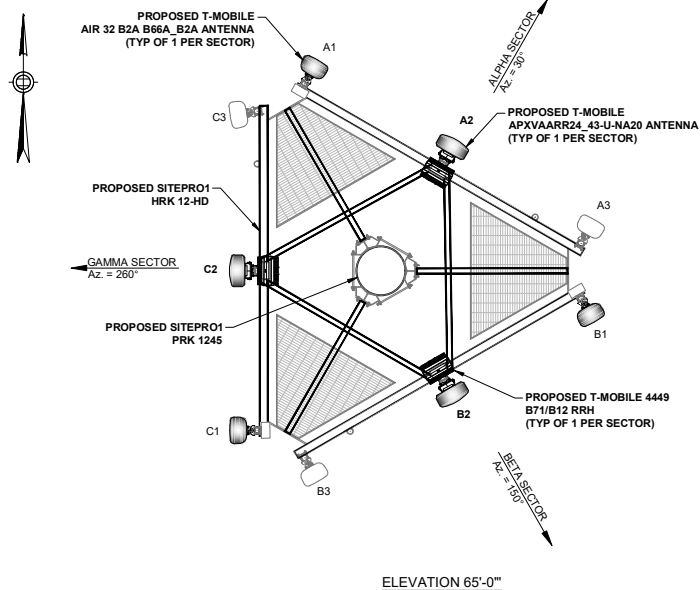
**1 TOWER ELEVATION**

SCALE: 1/8" = 1'-0"



**2 EXISTING ANTENNA LAYOUT**

SCALE: N.T.S.



**3 PROPOSED ANTENNA LAYOUT**

SCALE: N.T.S.

**NOTES:**

- CONTRACTOR SHALL REFER TO THE MOUNT MODIFICATION REPORT; SITE NUMBER: CTHA133A; SITE NAME: HA133/CING/CONDO; CROWN BU NUMBER: 842876; CROWN SITE NAME: WINDSOR LOCKS; CROWN ORDER NUMBER: 479845 REV. 1; ISSUED BY CLS ENGINEERING, DATED ON 05/30/19. THE MOUNT MODIFICATIONS MUST BE PERFORMED PRIOR TO THE INSTALLATION OF THE EQUIPMENT SHOWN ON THE DRAWINGS. CONTRACTOR SHALL REFER TO SHEETS S1 THROUGH S2 FOR DETAILS. THE CONTRACTOR SHALL VERIFY ALL EXISTING MEMBERS AND HARDWARE ARE INSTALLED PROPERLY AS DESCRIBED IN THIS REPORT.
- CONTRACTOR TO VERIFY FINAL RF CONFIGURATION AND NOTIFY CARRIER AND ENGINEER W/ ANY DISCREPANCIES PRIOR TO THE INSTALLATION.
- CONTRACTOR SHALL NOT EXCEED MOUNTING MORE THAN (2) RRHS PER ANTENNA MOUNTING PIPE - RELOCATE TO AN ADJACENT ANTENNA MOUNTING PIPE AS NEEDED.

**T-Mobile**

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

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**CROWN CASTLE**

3 CORPORATE PARK DRIVE  
SUITE 101  
CLIFTON PARK, NY 12065

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**JACOBS**  
JACOBS ENGINEERING GROUP, INC.

120 ST. JAMES AVENUE, 5TH FLOOR  
BOSTON, MA 02116

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11.23.2020  
10:48:38-05:00

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PROJECT NO: ERC0004

DRAWN BY: FLP

CHECKED BY: DC

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0	07/16/19	ISSUED FOR PERMITTING

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---

HA133/CING/CONDO  
CTHA133A  
WINDSOR LOCKS  
842876  
1000 OLD COUNTY CIRCLE  
WINDSOR LOCKS, CT 06096

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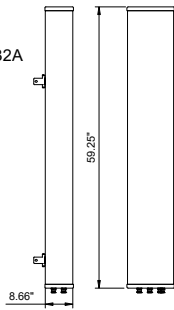
PROPOSED TOWER  
ELEVATION &  
ANTENNA LAYOUT  
PLAN

---

S-1

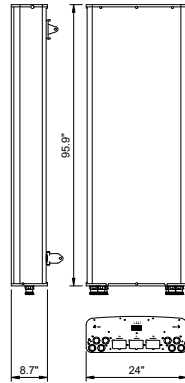
MANUFACTURER: ERICSSON  
 MODEL NO.: AIR32 KRD901146-1\_B66A\_B2A

COLOR: LIGHT GRAY  
 DIMENSIONS (LxWxD): 59.25" x 12.87" x 8.66"  
 1505mm x 327mm x 220mm  
 WEIGHT (lbs): 153  
 69.4kg  
 CONNECTOR: 7/16 IEC-169-4 INSERT TYPE  
 CABLE CONNECTOR: 7/16 INSERT-TYPE ON BOTH ENDS  
 MAX. WIND LOAD: @ 42m/s 900 N



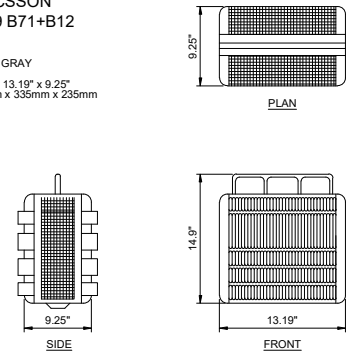
MANUFACTURER: RFS  
 MODEL NO.: APXVAARR24\_43-U-NA20

COLOR: LIGHT GRAY  
 DIMENSIONS (LxWxD): 95.9" x 24" x 8.7"  
 2436mm x 609mm x 222mm  
 WEIGHT (lbs): 58  
 CONNECTOR: 8 x 4.3-10 FEMALE AT BOTTOM +  
 6 AISG CONNECTORS (3 MALE/3 FEMALE)  
 SURVIVAL/RATED WIND VELOCITY (KMH): 241 (150)



MANUFACTURER: ERICSSON  
 MODEL NO.: 4449 B71+B12

COLOR: LIGHT GRAY  
 DIMENSIONS (LxWxD): 14.9" x 13.19" x 9.25"  
 378mm x 335mm x 235mm  
 WEIGHT (lbs): 74



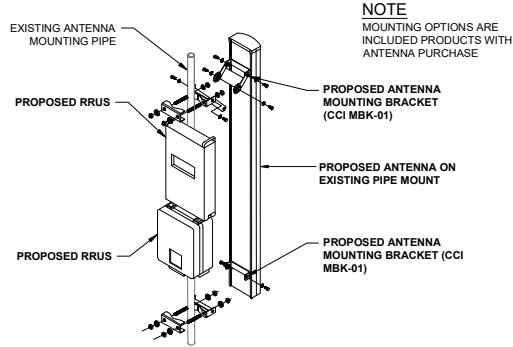
1 ANTENNA SPECIFICATIONS

SCALE: N.T.S.

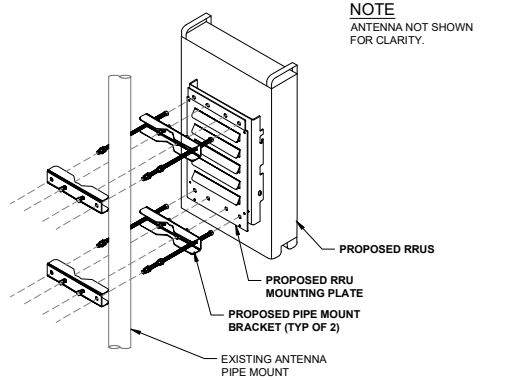
2 ANTENNA SPECIFICATIONS

3 RRU SPECIFICATIONS

SCALE: N.T.S.



NOTE  
 MOUNTING OPTIONS ARE INCLUDED PRODUCTS WITH ANTENNA PURCHASE



NOTE  
 ANTENNA NOT SHOWN FOR CLARITY.

4 RRU MOUNTING DETAIL W/ANTENNA

SCALE: N.T.S.

5 RRU MOUNTING DETAIL

SCALE: N.T.S.

6 DETAIL NOT USED

SCALE: N.T.S.

7 DETAIL NOT USED

SCALE: N.T.S.

8 DETAIL NOT USED

SCALE: N.T.S.

9 DETAIL NOT USED

SCALE: N.T.S.



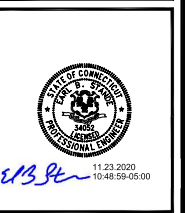
T-MOBILE NORTHEAST LLC  
 103 MONARCH DRIVE  
 LIVERPOOL, NY 13088



3 CORPORATE PARK DRIVE  
 SUITE 101  
 CLIFTON PARK, NY 12065



120 ST. JAMES AVENUE, 5TH FLOOR  
 BOSTON, MA 02116



PROJECT NO:	ERC0004
DRAWN BY:	FLP
CHECKED BY:	DC

SUBMITTALS	
3	11/23/20 CLIENT COMMENTS
2	08/21/19 ISSUED FOR CONSTRUCTION
1	07/28/19 ISSUED FOR CONSTRUCTION
0	07/16/19 ISSUED FOR PERMITTING

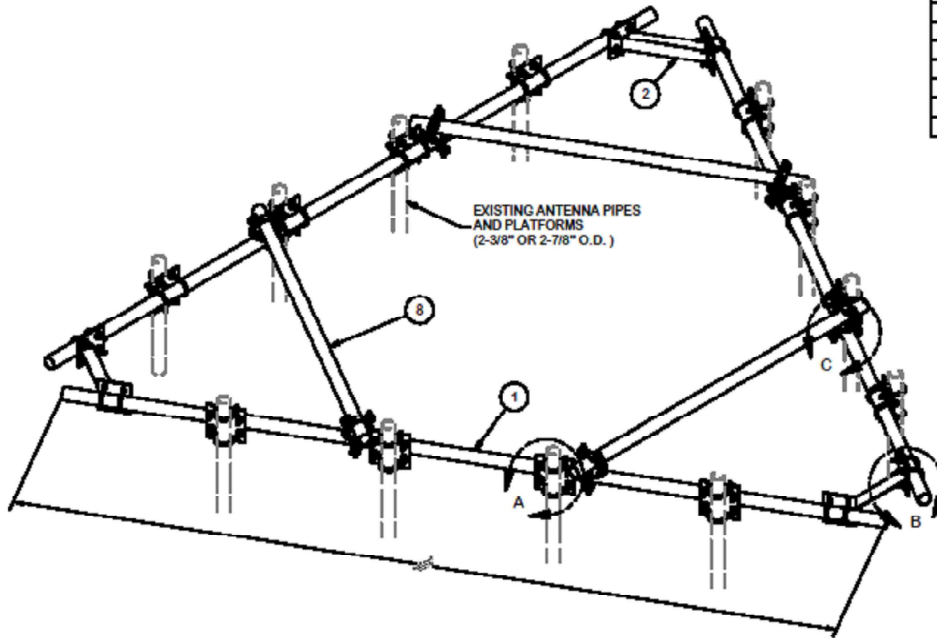
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HA133/CING/CONDO  
 CTHA133A  
 WINDSOR LOCKS  
 842876  
 1000 OLD COUNTY CIRCLE  
 WINDSOR LOCKS, CT 06096

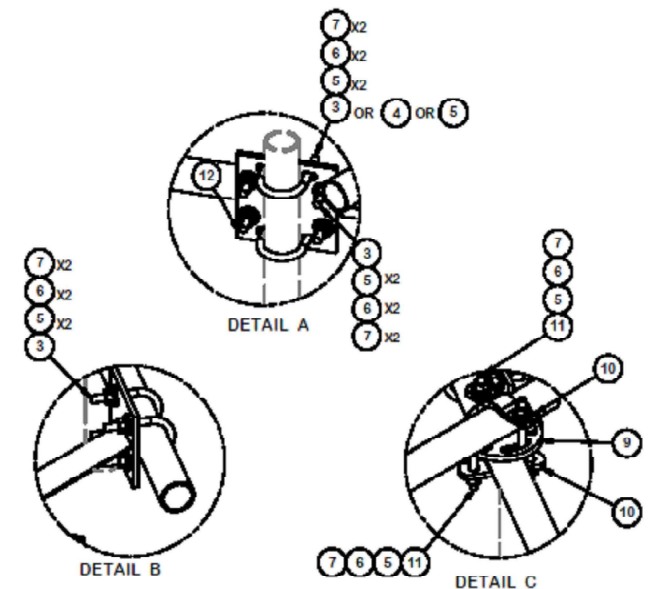
EQUIPMENT  
 DETAILS

S-2





PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	3	P2150	2-3/8" OD X 150" SCH 40 GALVANIZED PIPE	150 in	45.77	137.34
2	3	V.AHCP	ANGLE HANDRAIL CORNER PLATE		17.92	38.76
3	60	X-UB1212	1/2" X 2-1/2" X 4-1/2" X 2" U-BOLT (HDG.)		0.26	15.42
4	24	X-UB1300	1/2" X 3" X 5" X 2" U-BOLT (HDG.)		0.26	6.17
5	144	G12FW	1/2" HDG USS FLATWASHER		0.03	4.91
6	144	G12LW	1/2" HDG LOCKWASHER		0.01	2.00
7	144	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	10.31
8	3	P272	2-3/8" X 72" SCH 40 GALVANIZED PIPE	72 in	23.07	69.20
9	6	X-127594	FLAT DISK CLAMP PLATE 4" CENTERS (GALV.)		2.48	14.90
10	12	X-100064	CLAMP (S) (4" V-CLAMP) GALVANIZED		0.91	10.95
11	24	G1204	1/2" X 4" HDG HEX BOLT GR5 FULL THREAD	4 in	0.27	6.48
12	12	SCX2	CROSSOVER PLATE	7 in	4.80	57.56
<b>TOTAL WT. #</b>						<b>406.61</b>



**TOLERANCE NOTES**  
 TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:  
 SAWED, SHEARED AND GAS CUT EDGES ( $\pm 0.030"$ )  
 DRILLED AND GAS CUT HOLES ( $\pm 0.030"$ ) - NO CONING OF HOLES  
 LASER CUT EDGES AND HOLES ( $\pm 0.010"$ ) - NO CONING OF HOLES  
 BENDS ARE  $\pm 1/2$  DEGREE  
 ALL OTHER MACHINING ( $\pm 0.030"$ )  
 ALL OTHER ASSEMBLY ( $\pm 0.060"$ )

DESCRIPTION		HEAVY DUTY HANDRAIL KIT FOR 12' PLATFORMS WITH 2-3/8" OR 2-7/8" ANTENNA PIPES	
CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.
	CEK 3/31/2015		HRK12-HD
CLASS	SUB	DRAWING USAGE	CHECKED BY
81	01	CUSTOMER	BMC 3/31/2015

**Locations:**  
 New York, NY  
 Atlanta, GA  
 Los Angeles, CA  
 Plymouth, IN  
 Salem, OR  
 Dallas, TX

Engineering Support Team:  
 1-888-753-7446

**valmont**

DWG. NO. HRK12-HD

1 OF 1

PROPRIETARY NOTE:  
 THE DATA AND TECHNIQUES CONTAINED IN THIS DRAWING ARE PROPRIETARY INFORMATION OF VALMONT INDUSTRIES AND CONSIDERED A TRADE SECRET. ANY USE OR DISCLOSURE WITHOUT THE CONSENT OF VALMONT INDUSTRIES IS STRICTLY PROHIBITED.

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

**CROWN CASTLE**  
 3 CORPORATE PARK DRIVE  
 SUITE 101  
 CLIFTON PARK, NY 12065

**JACOBS**  
 JACOBS ENGINEERING GROUP, INC.  
 120 ST. JAMES AVENUE, 5TH FLOOR  
 BOSTON, MA 02116

Professional Engineer  
 11/23/2020  
 10:49:24-05:00

PROJECT NO.	ERC0004
DRAWN BY:	FLP
CHECKED BY:	DC

SUBMITTALS	
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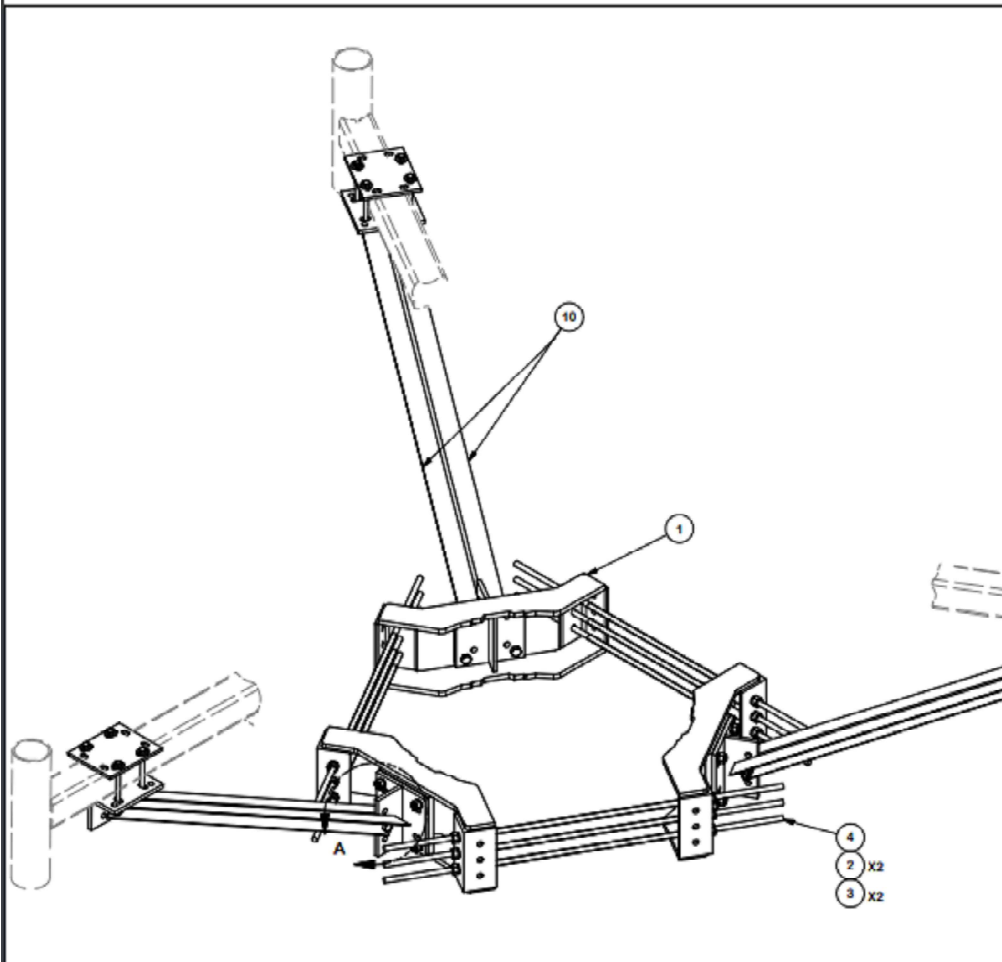
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HA133/CING/CONDO  
 CTHA133A  
 WINDSOR LOCKS  
 842876  
 1000 OLD COUNTRY CIRCLE  
 WINDSOR LOCKS, CT 06095

PLATFORM DETAILS

S-3





PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	3	X-LWRM	RING MOUNT WELDMENT		68.81	206.42
2	36	G58LW	5/8" HDG LOCKWASHER		0.03	0.94
3	36	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	4.68
4	9	G58R-24	5/8" x 24" THREADED ROD (HDG.)	24 in	0.40	3.59
4	9	G58R-48	5/8" x 48" THREADED ROD (HDG.)	48 in	0.40	3.59
5	18	A582114	5/8" x 2-1/4" HDG A325 HEX BOLT	2 1/4 in	0.31	5.62
6	24	G12FW	1/2" HDG USS FLATWASHER	3/32 in	0.03	0.82
7	12	G12LW	1/2" HDG LOCKWASHER	1/8 in	0.01	0.17
8	12	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	0.86
9	3	SCX4	CROSSOVER PLATE	8 1/2 in	6.02	18.06
10	6	X-253993	PLATFORM REINFORCEMENT KIT ANGLE	52 25/32 in	14.33	85.99
11	6	X-253992	T-BRACKET FOR REINFORCEMENT KIT		13.55	81.27
12	12	G12065	1/2" x 6-1/2" HDG HEX BOLT GR5 FULL THREAD	6 1/2 in	0.41	4.91
TOTAL WT. #						466.20

T-Mobile

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

CROWN CASTLE

3 CORPORATE PARK DRIVE  
SUITE 101  
CLIFTON PARK, NY 12065

JACOBS  
JACOBS ENGINEERING GROUP, INC.

120 ST. JAMES AVENUE, 5TH FLOOR  
BOSTON, MA 02115



11.23.2020  
10:49:47-05:00

PROJECT NO: ERC0004

DRAWN BY: FLP

CHECKED BY: DC

SUBMITTALS

REV	DATE	DESCRIPTION
3	11/23/20	CLIENT COMMENTS
2	08/21/19	ISSUED FOR CONSTRUCTION
1	07/28/19	ISSUED FOR CONSTRUCTION
0	07/16/19	ISSUED FOR PERMITTING

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HA133/CING/CONDO  
CTHA133A  
WINDSOR LOCKS  
842876  
1000 OLD COUNTRY CIRCLE  
WINDSOR LOCKS, CT 06095

PLATFORM DETAILS

S-4

**TOLERANCE NOTES**  
TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:  
SAWED, SHEARED AND GAS CUT EDGES (# 0.050")  
DRILLED AND GAS CUT HOLES (# 0.050") - NO CONING OF HOLES  
LASER CUT EDGES AND HOLES (# 0.010") - NO CONING OF HOLES  
BENDS ARE ± 1/2 DEGREE  
ALL OTHER MACHINING (# 0.000")  
ALL OTHER ASSEMBLY (# 0.060")

DESCRIPTION  
PLATFORM REINFORCEMENT  
ON A 12" TO 45" POLE  
4" 6" ANGLE

**SITE PRO**  
A valmont **concrete**

Locations:  
New York, NY  
Atlanta, GA  
Los Angeles, CA  
Plymouth, IN  
Salem, OR  
Dallas, TX

Engineering  
Support Teams:  
1-888-753-7446

REV	DESCRIPTION OF REVISIONS	CPD NO.	CEK BY	DATE
A	CHANGED ALL 5/8" BOLTS TO A582114	4488	CEK	10/11/2015
REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
REVISION HISTORY				

PROPRIETARY INFO:  
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CPD NO.	DRAWN BY	ENG. APPROVAL
4488	CEK 4/11/2014	
CLASS	SUB	DRAWING USAGE
81	01	CUSTOMER

PART NO.	DWG. NO.
PRK-1245	PRK-1245

1 OF 2  
PAGE

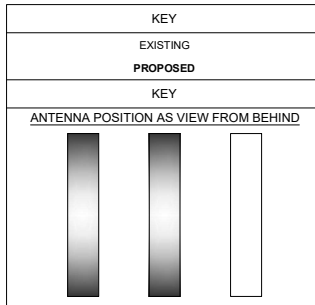
67D94DB HYBRID - TOWER TOP EQUIPMENT SCHEDULE (RE: HA133/CING/CONDO)													
ANTENNA NUMBER (FROM L TO R)	ANTENNA MODEL	ANTENNA AZIMUTH	MECH. TILT	ELEC. TILT	ANTENNA CENTERLINE FROM GROUND	TMA/RRUS MODEL	TMA/RRUS QUANTITY	COAX/HYBRID CABLE			JUMPERS		
								SIZE/TYPE	QUANTITY	LENGTH	TYPE	QTY	LENGTH
A1	AIR 32 B2A B66AA	30°	0°	2°	65'-0"	-	-	-	-	-	FIBER	2	10'
A2	APXVAARR24_43-U-NA20	30°	0°	2°	65'-0"	<b>RADIO 4449 B71+B12</b> KRY 112 144/1 TMA	1	7/8" COAX	3	105'	COAX	3	10'
A3	APXV18-206516S-C-A20	30°	0°	2°	65'-0"	-	-	-	-	-	-	-	-
B1	APXVAARR24_43-U-NA20	150°	0°	2°	65'-0"	-	-	-	-	-	FIBER	2	10'
B2	AIR 32 B2A B66AA	150°	0°	2°	65'-0"	<b>RADIO 4449 B71+B12</b> KRY 112 144/1 TMA	1	7/8" COAX	3	105'	COAX	3	10'
B3	APXV18-206516S-C-A20	150°	0°	2°	65'-0"	-	-	-	-	-	-	-	-
C1	APXVAARR24_43-U-NA20	260°	0°	2°	65'-0"	-	-	-	-	-	FIBER	2	10'
C2	AIR 32 B2A B66AA	260°	0°	2°	65'-0"	<b>RADIO 4449 B71+B12</b> KRY 112 144/1 TMA	1	7/8" COAX	3	113'	COAX	9	10'
C3	APXV18-206516S-C-A20	260°	0°	2°	65'-0"	-	-	-	-	-	-	-	-

NOTES:

- EQUIPMENT LISTED IN **BOLD**, DELINEATES THAT THE EQUIPMENT IS PROPOSED
- \* DENOTES THAT EQUIPMENT IS TO BE GROUND MOUNTED

1 EQUIPMENT INFORMATION CHART

SCALE: NONE



EQUIPMENT NOTES:

- THE HYBRID CABLE LENGTH SHOW IS ONLY AN ESTIMATE AND SHOULD NOT BE USED FOR ORDERING MATERIALS. CONFIRM THE REQUIRED HYBRID CABLE LENGTH WITH T-MOBILE PRIOR TO ORDERING OR INSTALLATION.
- THE CONTRACTOR SHALL TEST THE OPTICAL FIBER AFTER INSTALLATION IN ACCORDANCE WITH T-MOBILE STANDARDS AND SUPPLY THE RESULTS TO T-MOBILE.
- THE CONTRACTOR SHALL CONFIRM THE TOWER TOP EQUIPMENT LIST ABOVE WITH THE FINAL T-MOBILE RFDS PRIOR TO INSTALLATION.
- ALL EXISTING AND PROPOSED ANTENNA CABLES SHALL BE COLOR CODED PER T-MOBILE STANDARDS.
- REFER TO EQUIPMENT INSTALLATION STANDARDS FOR ADDITIONAL INFORMATION.
- REFER TO EQUIPMENT MANUFACTURER'S SPECIFICATION SHEETS FOR ADDITIONAL INFORMATION NOT LISTED ABOVE.

2 ANTENNA KEY

SCALE: NONE

3 ANTENNA & CABLE SCHEDULE

SCALE: NONE

67D94DB HYBRID - TOWER LOADING SUMMARY				
EQUIPMENT TYPE	EXISTING QUANTITY	QUANTITY REMOVED	QUANTITY ADDED	TOTAL QUANTITY
PANEL ANTENNA	9	3	3	9
COAX CABLE	12	3	0	9
HYBRID CABLE	0	0	3	3
FIBER JUMPER	0	0	9	9
COAX JUMPER	12	3	0	9
TMA	6	0	0	6
RADIO	0	0	3	3



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



3 CORPORATE PARK DRIVE  
SUITE 101  
CLIFTON PARK, NY 12065



JACOBS ENGINEERING GROUP, INC.  
120 ST. JAMES AVENUE, 5TH FLOOR  
BOSTON, MA 02116



11.23.2020  
10:50:10-05.00  
EJB

PROJECT NO:	ERC0004
DRAWN BY:	FLP
CHECKED BY:	DC

SUBMITTALS	
3	11/23/20 CLIENT COMMENTS
2	08/21/19 ISSUED FOR CONSTRUCTION
1	07/29/19 ISSUED FOR CONSTRUCTION
0	07/16/19 ISSUED FOR PERMITTING

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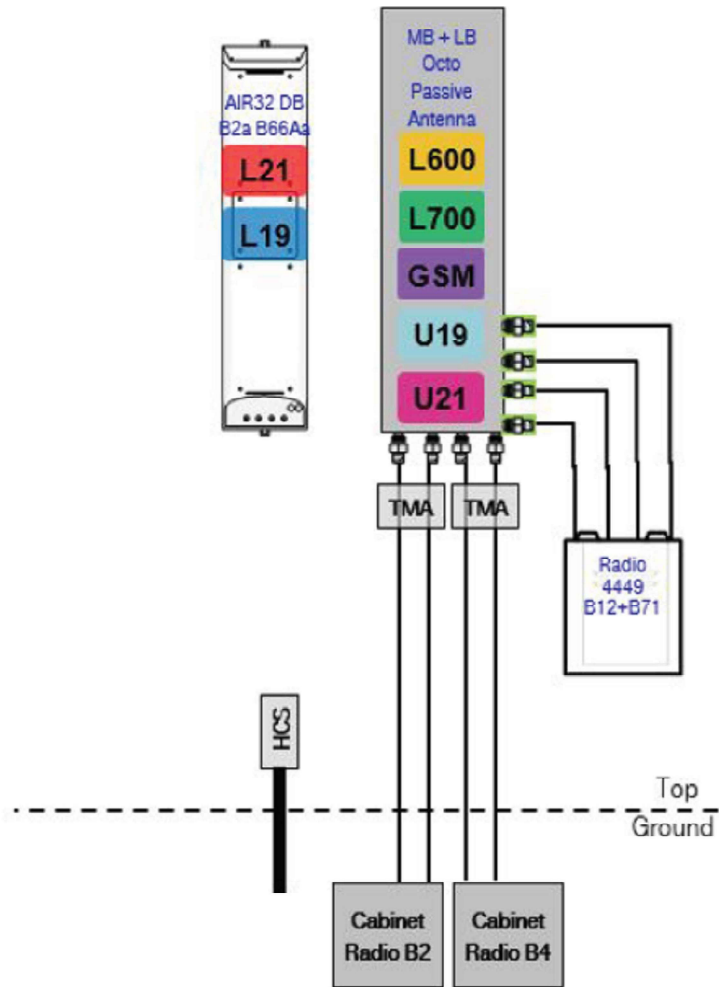
HA133/CING/CONDO  
CTHA133A  
WINDSOR LOCKS  
842876  
1000 OLD COUNTY CIRCLE  
WINDSOR LOCKS, CT 06096

ANTENNA  
INFORMATION CHART

RF-1

SITE CONFIGURATION: 67D94DB HYBRID

67D94DB\_1xAIR+10P.JPG



NOTE:  
ANTENNA DESIGN PER RFDS DATED 04/02/2019



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



3 CORPORATE PARK DRIVE  
SUITE 101  
CLIFTON PARK, NY 12065



120 ST. JAMES AVENUE, 5TH FLOOR  
BOSTON, MA 02116



11.23.2020  
10:50:35-05:00

PROJECT NO:	ERC0004
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SUBMITTALS		
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WINDSOR LOCKS, CT 06096

RF EQUIPMENT SCHEMATIC

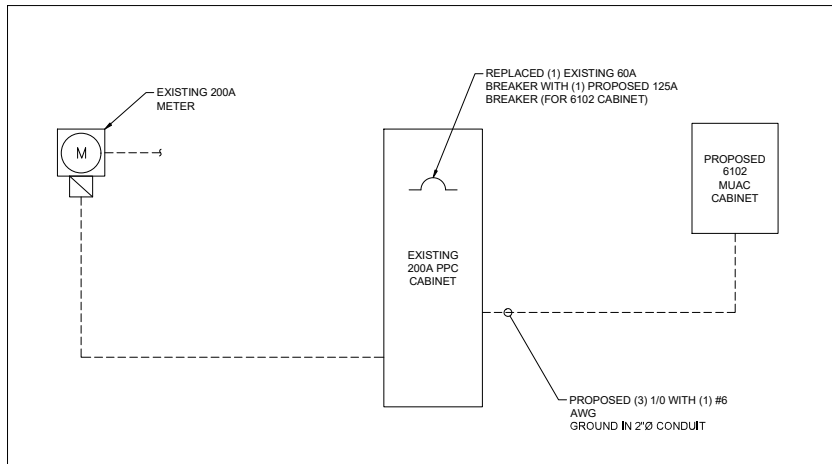
RF-2

ONE LINE DIAGRAM NOTES:

1. ELECTRICAL SERVICE SHALL BE 200A, 240/120V, 1Ø, 3W
2. FOR COMPLETE INTERNAL WIRING AND ARRANGEMENT, REFER TO VENDOR PRINTS PROVIDED BY EQUIPMENT MANUFACTURER.

NOTES:

1. CONTRACTOR SHALL VERIFY AVAILABLE FAULT CURRENT WITH POWER COMPANY AND ENSURE ALL ELECTRICAL EQUIPMENT IS SUITABLE FOR AVAILABLE FAULT CURRENT.
2. CONTRACTOR SHALL COORDINATE UTILITY SERVICES WITH LOCAL UTILITY COMPANIES. VERIFY ALL REQUIREMENTS WITH UTILITY COMPANY STANDARDS.
3. ONE-LINE DIAGRAM IS SCHEMATIC ONLY AND NOT INDICATIVE OF ACTUAL EQUIPMENT LAYOUT.
4. CONTRACTOR SHALL LABEL METER SOCKET WITH SERVICE OWNER NAMEPLATE W/ 1/2" MINIMUM LETTERS.



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



3 CORPORATE PARK DRIVE  
SUITE 101  
CLIFTON PARK, NY 12065



JACOBS ENGINEERING GROUP, INC.  
120 ST. JAMES AVENUE, 5TH FLOOR  
BOSTON, MA 02116



11.23.2020  
10:50:59-05:00  
*EJB Jett*

PROJECT NO: ERC0004

DRAWN BY: FLP

CHECKED BY: DC

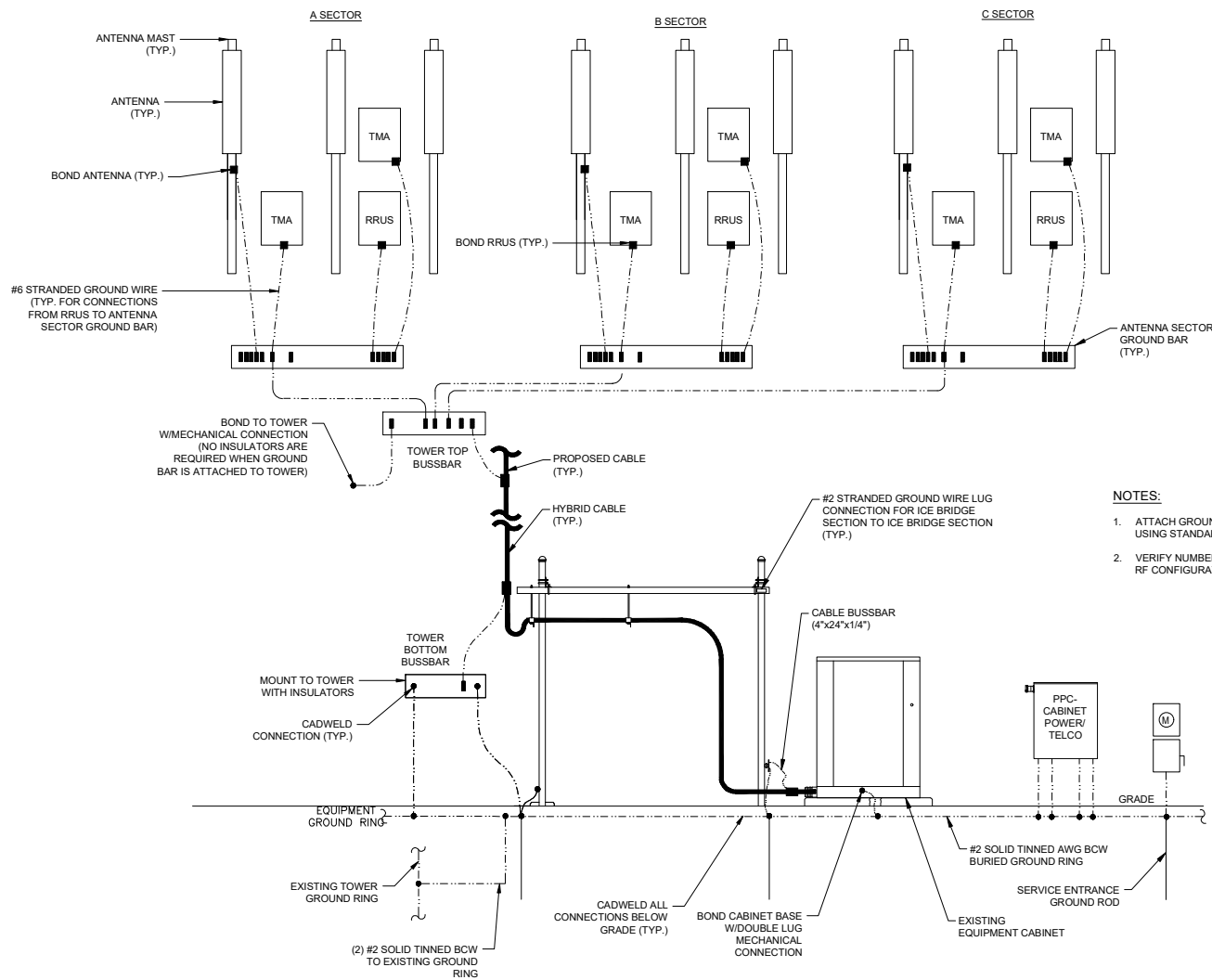
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WINDSOR LOCKS, CT 06096

ONE LINE  
DIAGRAM

E-1



**NOTES:**

1. ATTACH GROUND BAR DIRECTLY TO THE TOWER USING STANDARD ADAPTER.
2. VERIFY NUMBER OF CABLES/TMAS PER T-MOBILE RF CONFIGURATION.

**GROUNDING NOTES:**

1. BELOW GROUND ALL GROUNDING CONDUCTORS TO BE #2 AWG SOLID TINNED BARE COPPER WIRE (BCW) U.O.N.
2. ABOVE GROUND ALL GROUNDING CONDUCTORS TO BE #2 AWG STRANDED INSULATED COPPER WIRE U.O.N.
3. PROVIDE BONDING AND GROUNDING CONDUCTORS WITH GREEN TYPE THWN INSULATION, U.O.N.
4. LEAVE 4' EXCESS GROUND WIRE COILED UP ABOVE GRADE. SEAL/WEATHERPROOF CONDUIT.

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

**CROWN CASTLE**  
 3 CORPORATE PARK DRIVE  
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 CLIFTON PARK, NY 12065

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 JACOBS ENGINEERING GROUP, INC.  
 120 ST. JAMES AVENUE, 5TH FLOOR  
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 DRAWN BY: FLP  
 CHECKED BY: DC  
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1	07/28/19	ISSUED FOR CONSTRUCTION
0	07/16/19	ISSUED FOR PERMITTING

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HA133/CING/CONDO  
 CTHA133A  
 WINDSOR LOCKS  
 842876  
 1000 OLD COUNTY CIRCLE  
 WINDSOR LOCKS, CT 06096

GROUNDING RISER  
 DIAGRAM

**G-1**

# Exhibit D

## **Structural Analysis Report**



B+T Group  
 1717 S. Boulder, Suite 300  
 Tulsa, OK 74119  
 (918) 587-4630

Date: **July 02, 2019**

Mr. Steve Tuttle  
 Crown Castle  
 3 Corporate Dr  
 Clifton Park, NY 12065

**Subject:** **Structural Modification Report**

**Carrier Designation:** **T-Mobile Co-Locate**  
**Carrier Site Number:** CTHA133A  
**Carrier Site Name:** HA133/CING/Condo

**Crown Castle Designation:** **Crown Castle BU Number:** 842876  
**Crown Castle Site Name:** Windsor Locks  
**Crown Castle JDE Job Number:** 559277  
**Crown Castle Work Order Number:** 1757870  
**Crown Castle Order Number:** 479845 Rev. 1

**Engineering Firm Designation:** **B+T Group Project Number:** 136274.002.01

**Site Data:** **1000 Old County Circle, Windsor Locks, CT, Hartford County**  
**Latitude 41° 54' 36.88", Longitude -72° 39' 42.43"**  
**101 Foot - Monopole**

Dear Mr. Tuttle,

B+T Group is pleased to submit this "**Structural Modification Report**" to determine the structural integrity of the above mentioned tower.

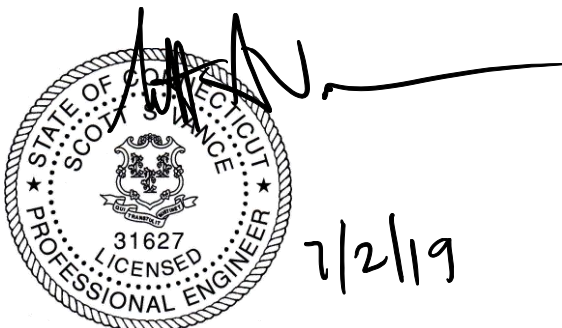
The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC4.5: Modified Structure w/ Considered + Proposed Equipment Configuration **Sufficient Capacity - 84.8%**

This analysis utilizes an ultimate 3-second gust wind speed of 125 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural modification prepared by: Saurav Shrestha, E.I.T.

Respectfully submitted by: B+T Engineering, Inc.  
 COA: PEC.0001564; Expires: 02/10/2020



Scott S. Vance, P.E.

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## 1) INTRODUCTION

This is a 101 ft. monopole designed by Engineered Endeavors, Inc. in July of 2000. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

The tower has been modified per reinforcement drawings prepared by B+T Group in July of 2012. Reinforcement consists of addition of base plate stiffeners. These base plate stiffeners were found to be ineffective and were not considered in this analysis.

## 2) ANALYSIS CRITERIA

<b>TIA-222 Revision:</b>	TIA-222-H
<b>Risk Category:</b>	II
<b>Wind Speed:</b>	125 mph
<b>Exposure Category:</b>	C
<b>Topographic Factor:</b>	1
<b>Ice Thickness:</b>	2 in
<b>Wind Speed with Ice:</b>	50 mph
<b>Service Wind Speed:</b>	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)
63.0	65.0	3	Ericsson	AIR 32 B2A B66AA	3 9	1-5/8 7/8
		3	Ericsson	KRY 112 144/1		
		3	Ericsson	KRY 112 489/2		
		3	Ericsson	RADIO 4449 B12/B71		
		3	RFS Celwave	APXV18-206516S-C-A20		
		3	RFS Celwave	APXVAARR24_43-U-NA20		
	63.0	1	Site Pro1	PRK-1245 Kicker Support		
		1	Site Pro1	HRK-12 Handrail kit		
		1	--	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)
93.0	97.0	1	Raycap	DC6-48-60-18-8F	12 2 1 1	7/8 3/4 3/8 1/8
	95.0	1	Andrew	SBNH-1D6565C		
		6	Ericsson	RRUS 11		
		1	KMW Comm.	AM-X-CD-16-65-00T-RET		
		6	Powerwave Tech.	7770.00		
		1	Powerwave Tech.	P65-17-XLH-RR		
	94.0	12	Powerwave Tech.	LGP21401		
	93.0	1	--	Platform Mount [LP 601-1]		
86.0	86.0	1	--	Platform Mount [LP 601-1]		
		3	Alcatel Lucent	B13 RRH 4X30		
		3	Alcatel Lucent	B25 RRH4X30		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
	85.0	3	Alcatel Lucent	RRH2X60-AWS	14	1-5/8
		3	Amphenol	QUAD656C0000X		
		6	Andrew	HBXX-6517DS-A2M		
		2	Antel	BXA-70080-4CF-2		
		1	Antel	BXA-80063-4CF-EDIN-2		
		2	Raycap	RXXDC-3315-PF-48		
		6	RFS Celwave	FD9R6004/2C-3L		

### 3) ANALYSIS PROCEDURE

**Table 3 - Documents Provided**

Document	Remarks	Reference	Source
Online Order Information	T-Mobile Co-Locate, Rev. 1	479845	CCIsites
Tower Manufacturer Drawing	EEl, Project No. 7845-100	4713154	CCIsites
Tower Modification Drawing	B+T Group, Project No. 84600.002	4964607	CCIsites
Legacy Modification Inspection	TEP, Project No. 75889.66001	6740106	CCIsites
Foundation Drawing	EEl, Project No. 7845-100	4713155	CCIsites
Geotech Report	Clarence Welti Assoc., Inc., Date: 02/15/2000	4291693	CCIsites
Antenna Configuration	Failing SA by B+T Group, Project No. 136274.001.01	8455887	CCIsites

#### 3.1) Analysis Method

tnxTower (version 8.0.5.0), a commercially available analysis software package, was used to determine the loads on the modified structure. Additional calculations were performed to determine the stresses in the pole and in the reinforcing elements. These calculations are presented in Appendix C.

#### 3.2) Assumptions

- 1) Tower and structures were built and have been maintained in accordance with the manufacturer's specifications.
- 2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 3) Mount areas and weights are assumed based on photographs provided.

This analysis may be affected if any assumptions are not valid or have been made in error. B+T Group should be notified to determine the effect on the structural integrity of the tower.

#### 4) ANALYSIS RESULTS

**Table 4 - Section Capacity (Summary) (Monopole) - LC4.5**

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	101 - 83.62	Pole	TP17.41x13x0.188	1	-2.937	604.070	19.0	Pass
L2	83.62 - 45.58	Pole	TP26.56x16.337x0.25	2	-13.149	1235.461	75.9	Pass
L3	45.58 - 0	Pole	TP37.5x25.098x0.313	3	-22.822	2265.679	78.2	Pass
							Summary	
						Pole (L3)	78.2	Pass
						Rating =	78.2	Pass

**Table 5 - Tower Component Stresses vs. Capacity (Monopole) - LC4.5**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	Base	47.3	Pass
1	Base Plate	Base	84.8	Pass
1	Base Foundation (Structure)	Base	50.3	Pass
1	Base Foundation (Soil Interaction)	Base	37.0	Pass

<b>Structure Rating (max from all components) =</b>	<b>84.8%</b>
-----------------------------------------------------	--------------

Notes:

- 1) See additional documentation in "Appendix C- Additional Calculations" for calculations supporting the % capacity consumed.
- 2) Rating per TIA-222-H Section 15.5

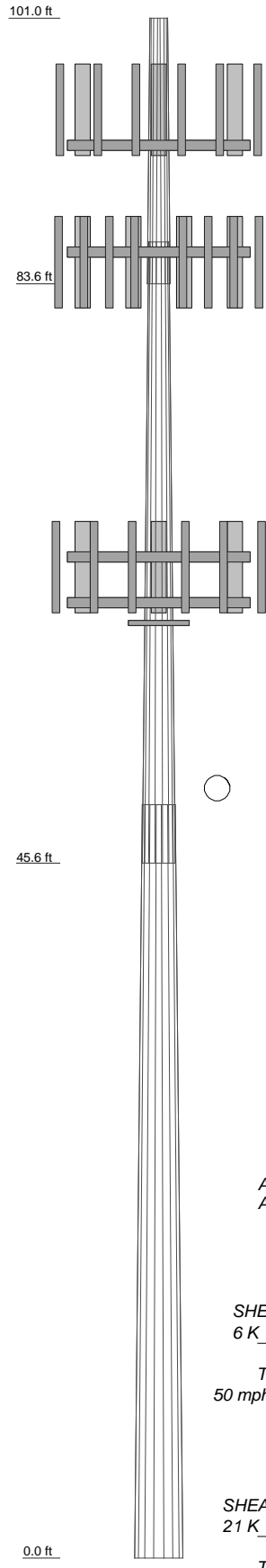
#### 4.1) Recommendations

Perform the modifications detailed in "Appendix D" to remedy the deficiencies identified in Crown Castle Work Order No. 1727670.

**APPENDIX A**

**TNXTOWER OUTPUT**

Section	1	2	3
Length (ft)	17.380	40.790	49.420
Number of Sides	18	18	18
Thickness (in)	0.188	0.250	0.313
Socket Length (ft)	2.750	3.840	25.098
Top Dia (in)	13.000	16.337	37.500
Bot Dia (in)	17.410	26.560	37.500
Grade		A572-65	
Weight (K)	0.5	2.3	5.2



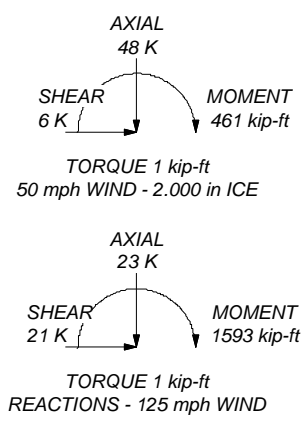
### MATERIAL STRENGTH

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

### TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 125 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 2.00 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: 78.2%

ALL REACTIONS  
ARE FACTORED



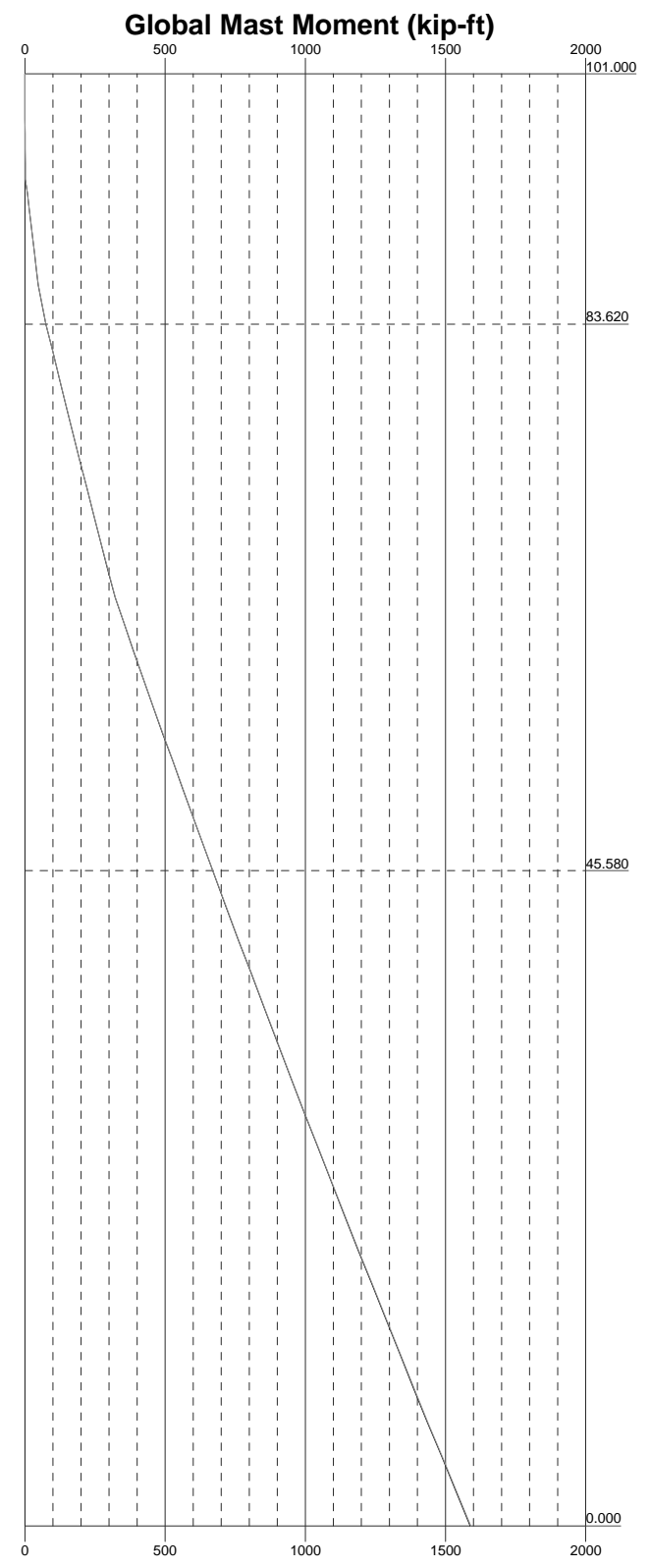
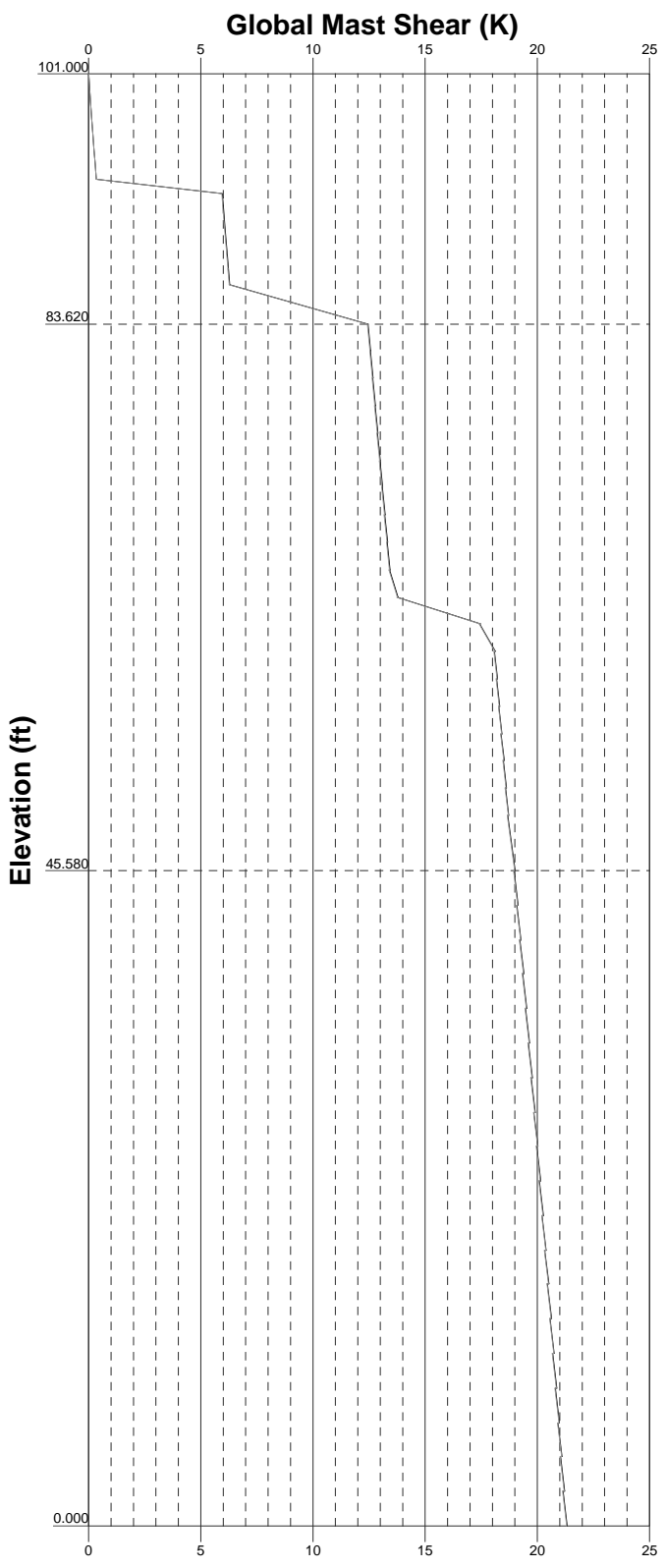
<b>B+T Group</b> 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 587-4630	<b>Job: 136274.002.01 - WINDSOR LOCKS, CT (BU# 84287)</b>		
	Project:		
	Client: Crown Castle	Drawn by: Adarsh S	App'd:
	Code: TIA-222-H	Date: 07/01/19	Scale: NTS
	Path:	Dwg No. E-1	

Vx

Vz

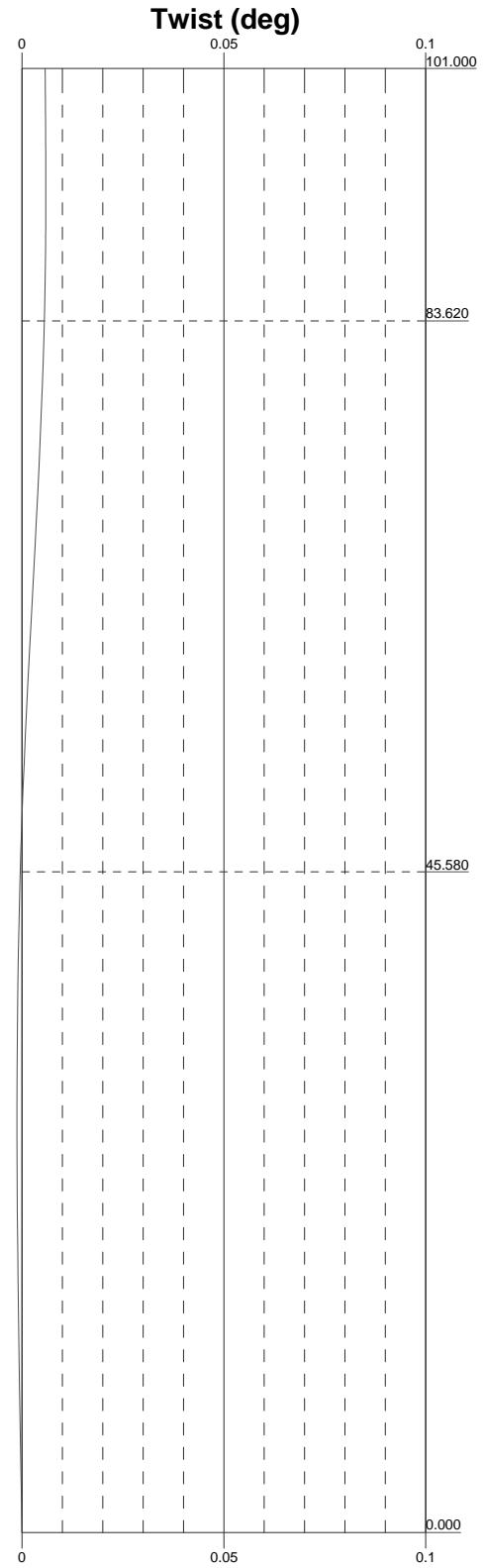
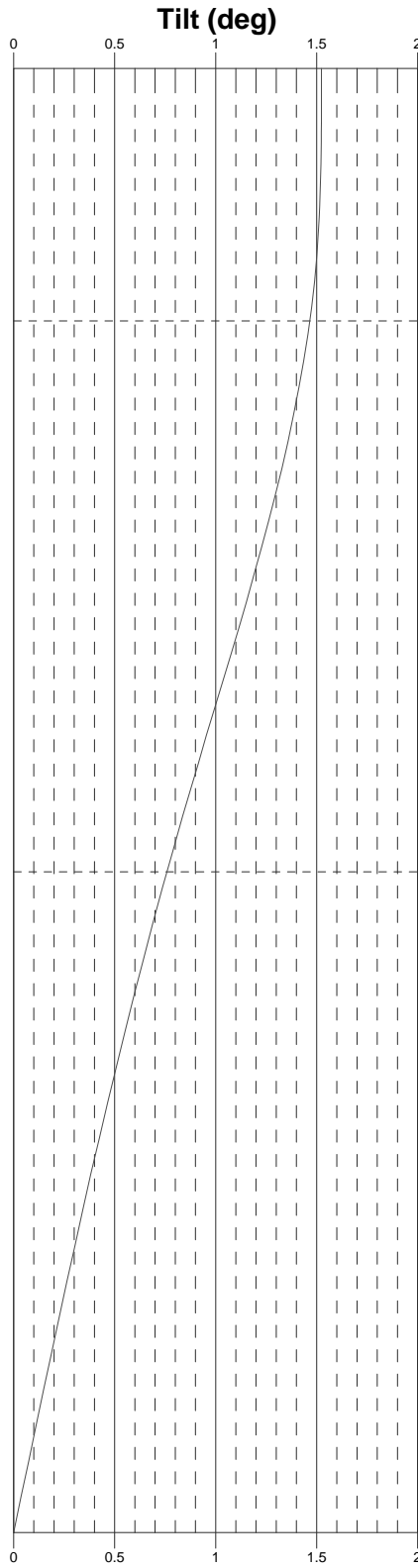
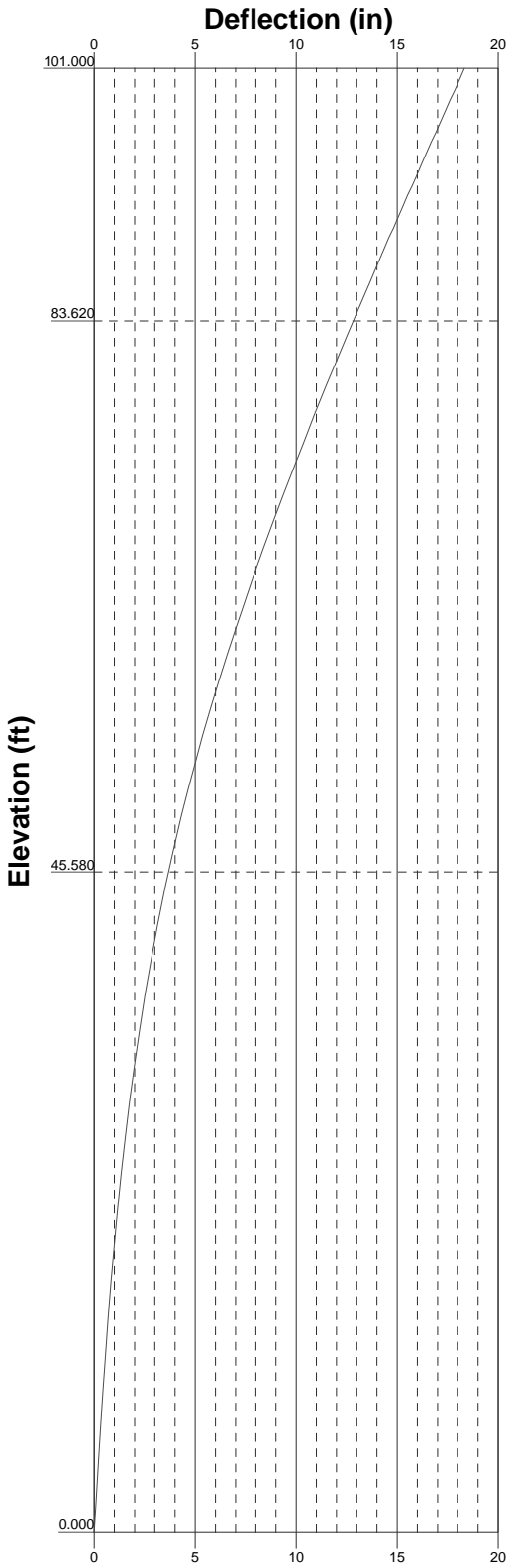
Mx

Mz



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	<p>Project:</p>		
	<p>Client: Crown Castle</p>	<p>Drawn by: Adarsh S</p>	<p>App'd:</p>
	<p>Code: TIA-222-H</p>	<p>Date: 07/01/19</p>	<p>Scale: NTS</p>
	<p>Path:</p>	<p>Dwg No. E-4</p>	

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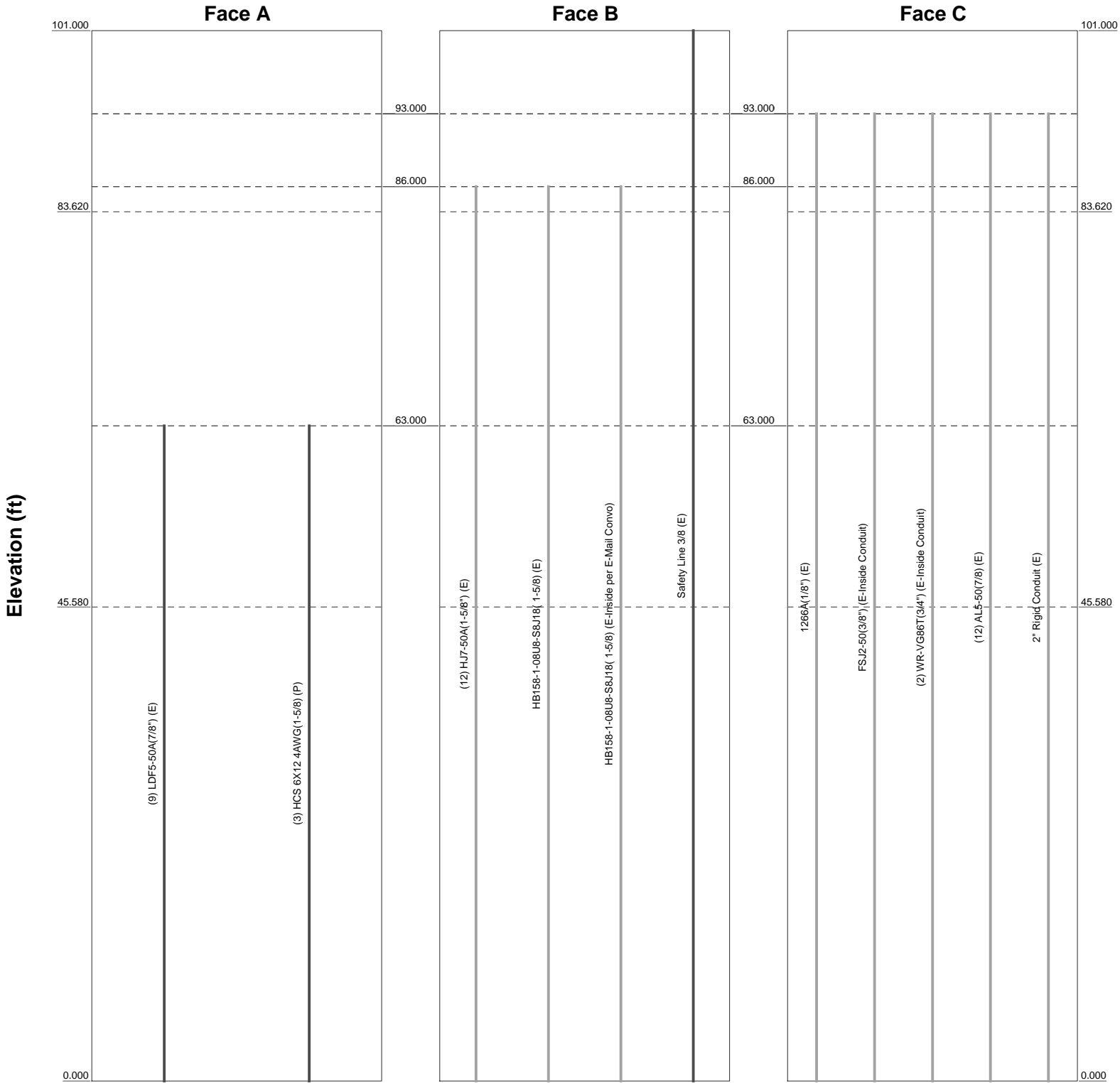


<p><b>B+T Group</b>                  1717 S. Boulder, Suite 300                  Tulsa, OK 74119                  Phone: (918) 587-4630                  FAX: (918) 587-4630</p>	Job: <b>136274.002.01 - WINDSOR LOCKS, CT (BU# 84287)</b>		
	Project:		
	Client: Crown Castle	Drawn by: Adarsh S	App'd:
	Code: TIA-222-H	Date: 07/01/19	Scale: NTS
	Path:	Dwg No. E-5	

# Feed Line Distribution Chart

## 0' - 101'

Round
Flat
App In Face
App Out Face
Truss Leg



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	Project:		
	Client: Crown Castle	Drawn by: Adarsh S	App'd:
	Code: TIA-222-H	Date: 07/01/19	Scale: NTS
	Path:	Dwg No. E-7	

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	<b>Project</b>	<b>Date</b> 10:43:32 07/01/19
	<b>Client</b> Crown Castle	<b>Designed by</b> Adarsh S

## 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 Hartford County, Connecticut.
- Tower base elevation above sea level: 148.000 ft.
- Basic wind speed of 125 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 2.000 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.
- TIA-222-H Annex S.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.05.
- Tower analysis based on target reliabilities in accordance with Annex S.
- Load Modification Factors used:  $K_{es}(F_w) = 0.95$ ,  $K_{es}(t_i) = 0.85$ .
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Options

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Consider Moments - Legs</li> <li>Consider Moments - Horizontals</li> <li>Consider Moments - Diagonals</li> <li>Use Moment Magnification</li> <li>Use Code Stress Ratios</li> <li>√ Use Code Safety Factors - Guys</li> <li>Escalate Ice</li> <li>Always Use Max Kz</li> <li>Use Special Wind Profile</li> <li>Include Bolts In Member Capacity</li> <li>Leg Bolts Are At Top Of Section</li> <li>Secondary Horizontal Braces Leg</li> <li>Use Diamond Inner Bracing (4 Sided)</li> <li>SR Members Have Cut Ends</li> <li>SR Members Are Concentric</li> </ul> | <ul style="list-style-type: none"> <li>Distribute Leg Loads As Uniform</li> <li>Assume Legs Pinned</li> <li>√ Assume Rigid Index Plate</li> <li>√ Use Clear Spans For Wind Area</li> <li>Use Clear Spans For KL/r</li> <li>Retension Guys To Initial Tension</li> <li>√ Bypass Mast Stability Checks</li> <li>√ Use Azimuth Dish Coefficients</li> <li>√ Project Wind Area of Appurt.</li> <li>Autocalc Torque Arm Areas</li> <li>Add IBC .6D+W Combination</li> <li>Sort Capacity Reports By Component</li> <li>Triangulate Diamond Inner Bracing</li> <li>Treat Feed Line Bundles As Cylinder</li> <li>Ignore KL/ry For 60 Deg. Angle Legs</li> </ul> | <ul style="list-style-type: none"> <li>Use ASCE 10 X-Brace Ly Rules</li> <li>Calculate Redundant Bracing Forces</li> <li>Ignore Redundant Members in FEA</li> <li>SR Leg Bolts Resist Compression</li> <li>All Leg Panels Have Same Allowable</li> <li>Offset Girt At Foundation</li> <li>√ Consider Feed Line Torque</li> <li>Include Angle Block Shear Check</li> <li>Use TIA-222-H Bracing Resist. Exemption</li> <li>Use TIA-222-H Tension Splice Exemption</li> <li style="text-align: center;">Poles</li> <li>√ Include Shear-Torsion Interaction</li> <li>Always Use Sub-Critical Flow</li> <li>Use Top Mounted Sockets</li> <li>Pole Without Linear Attachments</li> <li>Pole With Shroud Or No Appurtenances</li> <li>Outside and Inside Corner Radii Are Known</li> </ul> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



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	<b>Project</b>	<b>Date</b> 10:43:32 07/01/19
	<b>Client</b> Crown Castle	<b>Designed by</b> Adarsh S

### Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C <sub>AA</sub> ft <sup>2</sup> /ft	Weight klf
1266A(1/8") (E)	C	No	No	Inside Pole	93.000 - 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
FSJ2-50(3/8") (E-Inside Conduit)	C	No	No	Inside Pole	93.000 - 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-VG86T(3/4") (E-Inside Conduit)	C	No	No	Inside Pole	93.000 - 0.000	2	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
AL5-50(7/8) (E)	C	No	No	Inside Pole	93.000 - 0.000	12	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
2" Rigid Conduit (E)	C	No	No	Inside Pole	93.000 - 0.000	1	No Ice	0.000	0.003
							1/2" Ice	0.000	0.003
							1" Ice	0.000	0.003
							2" Ice	0.000	0.003
<b>**VR**</b>									
HJ7-50A(1-5/8") (E)	B	No	No	Inside Pole	86.000 - 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
HB158-1-08U8-S8J 18( 1-5/8) (E)	B	No	No	Inside Pole	86.000 - 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-S8J 18( 1-5/8) (E-Inside per E-Mail Convo)	B	No	No	Inside Pole	86.000 - 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
<b>**VR**</b>									

### Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight K
L1	101.000-83.620	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.652	0.000	0.040
		C	0.000	0.000	0.000	0.000	0.067
L2	83.620-45.580	A	0.000	0.000	18.169	0.000	0.177
		B	0.000	0.000	1.427	0.000	0.582
		C	0.000	0.000	0.000	0.000	0.274
L3	45.580-0.000	A	0.000	0.000	47.540	0.000	0.464
		B	0.000	0.000	1.709	0.000	0.697
		C	0.000	0.000	0.000	0.000	0.328

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	<b>Project</b>	<b>Date</b> 10:43:32 07/01/19
	<b>Client</b> Crown Castle	<b>Designed by</b> Adarsh S

### Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight K
L1	101.000-83.620	A	1.883	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	7.198	0.000	0.130
		C		0.000	0.000	0.000	0.000	0.067
L2	83.620-45.580	A	1.815	0.000	0.000	39.115	0.000	0.677
		B		0.000	0.000	15.755	0.000	0.780
		C		0.000	0.000	0.000	0.000	0.274
L3	45.580-0.000	A	1.635	0.000	0.000	100.789	0.000	1.711
		B		0.000	0.000	18.255	0.000	0.919
		C		0.000	0.000	0.000	0.000	0.328

### Feed Line Center of Pressure

Section	Elevation ft	CP <sub>X</sub> in	CP <sub>Z</sub> in	CP <sub>X</sub> Ice in	CP <sub>Z</sub> Ice in
L1	101.000-83.620	0.264	0.142	1.219	0.654
L2	83.620-45.580	-1.803	-2.570	-0.851	-1.854
L3	45.580-0.000	-3.246	-4.485	-2.187	-3.562

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 <sub>a</sub> No Ice	K <sub>a</sub> Ice
L1	16	Safety Line 3/8	83.62 - 101.00	1.0000	1.0000
L1	13	LDF5-50A(7/8")	83.62 - 63.00	1.0000	1.0000
L1	14	HCS 6X12 4AWG(1-5/8)	83.62 - 63.00	1.0000	1.0000
L2	13	LDF5-50A(7/8")	45.58 - 63.00	1.0000	1.0000
L2	14	HCS 6X12 4AWG(1-5/8)	45.58 - 63.00	1.0000	1.0000
L2	16	Safety Line 3/8	45.58 - 83.62	1.0000	1.0000

<b>tnxTower</b>  <b>B+T Group</b> 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 587-4630	<b>Job</b> 136274.002.01 - WINDSOR LOCKS, CT (BU# 842876)	<b>Page</b> 5 of 17
	<b>Project</b>	<b>Date</b> 10:43:32 07/01/19
	<b>Client</b> Crown Castle	<b>Designed by</b> Adarsh S

## Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz Lateral	Vert						
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
(2) 7770.00 w/ Mount Pipe (E)	A	From Leg	4.000	0.000	0.000	93.000	No Ice	5.746	4.254	0.055
			0.000				1/2" Ice	6.179	5.014	0.103
			2.000				1" Ice	6.607	5.711	0.157
							2" Ice	7.488	7.155	0.287
(2) 7770.00 w/ Mount Pipe (E)	B	From Leg	4.000	0.000	0.000	93.000	No Ice	5.746	4.254	0.055
			0.000				1/2" Ice	6.179	5.014	0.103
			2.000				1" Ice	6.607	5.711	0.157
							2" Ice	7.488	7.155	0.287
(2) 7770.00 w/ Mount Pipe (E)	C	From Leg	4.000	0.000	0.000	93.000	No Ice	5.746	4.254	0.055
			0.000				1/2" Ice	6.179	5.014	0.103
			2.000				1" Ice	6.607	5.711	0.157
							2" Ice	7.488	7.155	0.287
AM-X-CD-16-65-00T-RET w/ Mount Pipe (E)	A	From Leg	4.000	0.000	0.000	93.000	No Ice	4.630	3.270	0.074
			0.000				1/2" Ice	5.060	3.690	0.133
			2.000				1" Ice	5.510	4.120	0.203
							2" Ice	6.430	5.000	0.376
P65-17-XLH-RR w/ Mount Pipe (E)	B	From Leg	4.000	0.000	0.000	93.000	No Ice	11.704	8.938	0.092
			0.000				1/2" Ice	12.424	10.450	0.178
			2.000				1" Ice	13.153	11.986	0.273
							2" Ice	14.517	14.313	0.498
SBNH-1D6565C w/ Mount Pipe (E)	C	From Leg	4.000	0.000	0.000	93.000	No Ice	5.560	4.470	0.085
			0.000				1/2" Ice	6.070	4.970	0.167
			2.000				1" Ice	6.590	5.470	0.262
							2" Ice	7.650	6.520	0.495
(4) LGP21401 (E)	A	From Leg	4.000	0.000	0.000	93.000	No Ice	1.104	0.207	0.014
			0.000				1/2" Ice	1.239	0.274	0.021
			1.000				1" Ice	1.381	0.348	0.030
							2" Ice	1.688	0.521	0.055
(4) LGP21401 (E)	B	From Leg	4.000	0.000	0.000	93.000	No Ice	1.104	0.207	0.014
			0.000				1/2" Ice	1.239	0.274	0.021
			1.000				1" Ice	1.381	0.348	0.030
							2" Ice	1.688	0.521	0.055
(4) LGP21401 (E)	C	From Leg	4.000	0.000	0.000	93.000	No Ice	1.104	0.207	0.014
			0.000				1/2" Ice	1.239	0.274	0.021
			1.000				1" Ice	1.381	0.348	0.030
							2" Ice	1.688	0.521	0.055
(2) RRUS 11 (E)	A	From Leg	4.000	0.000	0.000	93.000	No Ice	2.784	1.187	0.048
			0.000				1/2" Ice	2.992	1.334	0.068
			2.000				1" Ice	3.207	1.490	0.092
							2" Ice	3.658	1.833	0.150
(2) RRUS 11 (E)	B	From Leg	4.000	0.000	0.000	93.000	No Ice	2.784	1.187	0.048
			0.000				1/2" Ice	2.992	1.334	0.068
			2.000				1" Ice	3.207	1.490	0.092
							2" Ice	3.658	1.833	0.150
(2) RRUS 11 (E)	C	From Leg	4.000	0.000	0.000	93.000	No Ice	2.784	1.187	0.048
			0.000				1/2" Ice	2.992	1.334	0.068
			2.000				1" Ice	3.207	1.490	0.092
							2" Ice	3.658	1.833	0.150
DC6-48-60-18-8F (E)	B	From Leg	2.000	0.000	0.000	93.000	No Ice	1.212	1.212	0.033
			0.000				1/2" Ice	1.892	1.892	0.055
			4.000				1" Ice	2.105	2.105	0.080
							2" Ice	2.570	2.570	0.138
6' x 2" Mount Pipe (E - For Raycap (Per Photo))	B	From Leg	1.000	0.000	0.000	93.000	No Ice	1.425	1.425	0.022
			0.000				1/2" Ice	1.925	1.925	0.033

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	<b>Project</b>				<b>Date</b>		10:43:32 07/01/19	
	<b>Client</b>		Crown Castle		<b>Designed by</b>		Adarsh S	

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz	Vert					
				2.000					
						1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
3' x 2" Pipe Mount (E - For TME (Per Photo))	B	From Leg	4.000	0.000	93.000	No Ice	0.583	0.583	0.011
			0.000			1/2" Ice	0.770	0.770	0.017
			2.000			1" Ice	0.967	0.967	0.024
						2" Ice	1.388	1.388	0.047
(4) 6' x 2" Mount Pipe (E - 3 Dual mount pipe + (1) Empty)	A	From Leg	4.000	0.000	93.000	No Ice	1.425	1.425	0.022
			0.000			1/2" Ice	1.925	1.925	0.033
			1.000			1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
(4) 6' x 2" Mount Pipe (E - 3 Dual mount pipe + (1) Empty)	B	From Leg	4.000	0.000	93.000	No Ice	1.425	1.425	0.022
			0.000			1/2" Ice	1.925	1.925	0.033
			1.000			1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
(4) 6' x 2" Mount Pipe (E - 3 Dual mount pipe + (1) Empty)	C	From Leg	4.000	0.000	93.000	No Ice	1.425	1.425	0.022
			0.000			1/2" Ice	1.925	1.925	0.033
			1.000			1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
Climbing Ladder (Flat) (E- Per Photo)	A	From Leg	3.000	0.000	93.000	No Ice	5.844	5.844	0.048
			0.000			1/2" Ice	10.300	10.300	0.071
			-3.000			1" Ice	14.756	14.756	0.094
						2" Ice	23.668	23.668	0.140
Platform Mount [LP 601-1] (E)	C	None		0.000	93.000	No Ice	28.470	28.470	1.122
						1/2" Ice	33.590	33.590	1.514
						1" Ice	38.710	38.710	1.905
						2" Ice	48.950	48.950	2.689
<b>**VR**</b>									
(2) HBXX-6517DS-A2M w/ Mount Pipe (E)	A	From Leg	4.000	0.000	86.000	No Ice	7.970	5.990	0.076
			0.000			1/2" Ice	8.730	6.720	0.139
			-1.000			1" Ice	9.510	7.470	0.214
						2" Ice	11.110	9.020	0.397
(2) HBXX-6517DS-A2M w/ Mount Pipe (E)	B	From Leg	4.000	0.000	86.000	No Ice	7.970	5.990	0.076
			0.000			1/2" Ice	8.730	6.720	0.139
			-1.000			1" Ice	9.510	7.470	0.214
						2" Ice	11.110	9.020	0.397
(2) HBXX-6517DS-A2M w/ Mount Pipe (E)	C	From Leg	4.000	0.000	86.000	No Ice	7.970	5.990	0.076
			0.000			1/2" Ice	8.730	6.720	0.139
			-1.000			1" Ice	9.510	7.470	0.214
						2" Ice	11.110	9.020	0.397
BXA-70080-4CF-2 w/ Mount Pipe (E)	A	From Leg	4.000	0.000	86.000	No Ice	3.807	3.970	0.030
			0.000			1/2" Ice	4.171	4.578	0.068
			-1.000			1" Ice	4.543	5.195	0.112
						2" Ice	5.314	6.460	0.219
BXA-80063-4CF-EDIN-2 w/ Mount Pipe (E)	B	From Leg	4.000	0.000	86.000	No Ice	4.945	3.693	0.028
			0.000			1/2" Ice	5.324	4.295	0.070
			-1.000			1" Ice	5.712	4.913	0.118
						2" Ice	6.514	6.181	0.235
BXA-70080-4CF-2 w/ Mount Pipe (E)	C	From Leg	4.000	0.000	86.000	No Ice	3.807	3.970	0.030
			0.000			1/2" Ice	4.171	4.578	0.068
			-1.000			1" Ice	4.543	5.195	0.112
						2" Ice	5.314	6.460	0.219
QUAD656C0000X w/ Mount Pipe (E-per mail)	A	From Leg	4.000	0.000	86.000	No Ice	13.479	7.331	0.080
			0.000			1/2" Ice	14.096	8.547	0.174
			-1.000			1" Ice	14.682	9.500	0.277
						2" Ice	15.867	11.376	0.512
QUAD656C0000X w/ Mount Pipe	B	From Leg	4.000	0.000	86.000	No Ice	13.479	7.331	0.080
			0.000			1/2" Ice	14.096	8.547	0.174

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	<b>Project</b>						<b>Date</b> 10:43:32 07/01/19	
	<b>Client</b> Crown Castle						<b>Designed by</b> Adarsh S	

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K
			Horz Lateral ft	Vert ft					
(E-per mail)				-1.000			1" Ice 14.682	9.500	0.277
QUAD656C0000X w/ Mount Pipe	C	From Leg	4.000	0.000	86.000		2" Ice 15.867	11.376	0.512
(E-per mail)			0.000				No Ice 13.479	7.331	0.080
			-1.000				1/2" Ice 14.096	8.547	0.174
(2) FD9R6004/2C-3L (E)	A	From Leg	4.000	0.000	86.000		1" Ice 14.682	9.500	0.277
							2" Ice 15.867	11.376	0.512
			0.000				No Ice 0.314	0.076	0.003
			-1.000				1/2" Ice 0.386	0.119	0.005
(2) FD9R6004/2C-3L (E)	B	From Leg	4.000	0.000	86.000		1" Ice 0.466	0.169	0.009
							2" Ice 0.647	0.294	0.020
			0.000				No Ice 0.314	0.076	0.003
			-1.000				1/2" Ice 0.386	0.119	0.005
(2) FD9R6004/2C-3L (E)	C	From Leg	4.000	0.000	86.000		1" Ice 0.466	0.169	0.009
							2" Ice 0.647	0.294	0.020
			0.000				No Ice 0.314	0.076	0.003
			-1.000				1/2" Ice 0.386	0.119	0.005
RRH2X60-AWS (E)	A	From Leg	4.000	0.000	86.000		1" Ice 0.466	0.169	0.009
							2" Ice 0.647	0.294	0.020
			0.000				No Ice 3.500	1.816	0.060
			-1.000				1/2" Ice 3.761	2.052	0.083
RRH2X60-AWS (E)	B	From Leg	4.000	0.000	86.000		1" Ice 4.029	2.289	0.109
							2" Ice 4.585	2.785	0.173
			0.000				No Ice 3.500	1.816	0.060
			-1.000				1/2" Ice 3.761	2.052	0.083
RRH2X60-AWS (E)	C	From Leg	4.000	0.000	86.000		1" Ice 4.029	2.289	0.109
							2" Ice 4.585	2.785	0.173
			0.000				No Ice 3.500	1.816	0.060
			-1.000				1/2" Ice 3.761	2.052	0.083
B13 RRH 4X30 (E-per mail)	A	From Leg	4.000	0.000	86.000		1" Ice 4.029	2.289	0.109
							2" Ice 4.585	2.785	0.173
			0.000				No Ice 2.055	1.320	0.056
			-1.000				1/2" Ice 2.241	1.475	0.073
B13 RRH 4X30 (E-per mail)	B	From Leg	4.000	0.000	86.000		1" Ice 2.433	1.638	0.093
							2" Ice 2.841	1.997	0.142
			0.000				No Ice 2.055	1.320	0.056
			-1.000				1/2" Ice 2.241	1.475	0.073
B13 RRH 4X30 (E-per mail)	C	From Leg	4.000	0.000	86.000		1" Ice 2.433	1.638	0.093
							2" Ice 2.841	1.997	0.142
			0.000				No Ice 2.055	1.320	0.056
			-1.000				1/2" Ice 2.241	1.475	0.073
B25 RRH4X30 (E-per mail)	A	From Leg	4.000	0.000	86.000		1" Ice 2.433	1.638	0.093
							2" Ice 2.841	1.997	0.142
			0.000				No Ice 2.120	1.293	0.053
			-1.000				1/2" Ice 2.308	1.448	0.070
B25 RRH4X30 (E-per mail)	B	From Leg	4.000	0.000	86.000		1" Ice 2.504	1.611	0.090
							2" Ice 2.917	1.962	0.140
			0.000				No Ice 2.120	1.293	0.053
			-1.000				1/2" Ice 2.308	1.448	0.070
B25 RRH4X30 (E-per mail)	C	From Leg	4.000	0.000	86.000		1" Ice 2.504	1.611	0.090
							2" Ice 2.917	1.962	0.140
			0.000				No Ice 2.120	1.293	0.053
			-1.000				1/2" Ice 2.308	1.448	0.070
RXXDC-3315-PF-48 (E-per mail)	A	From Leg	4.000	0.000	86.000		1" Ice 2.504	1.611	0.090
							2" Ice 2.917	1.962	0.140
			0.000				No Ice 3.364	2.192	0.032
			-1.000				1/2" Ice 3.597	2.395	0.061
							1" Ice 3.838	2.606	0.093

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	<b>Project</b>				<b>Date</b>		10:43:32 07/01/19	
	<b>Client</b>		Crown Castle		<b>Designed by</b>		Adarsh S	

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz	Lateral	Vert					
RXXDC-3315-PF-48 (E-per mail)	C	From Leg	4.000	0.000	86.000		2" Ice	4.343	3.049	0.168
			0.000				No Ice	3.364	2.192	0.032
			-1.000				1/2" Ice	3.597	2.395	0.061
							1" Ice	3.838	2.606	0.093
5' x 2' Pipe Mount (E- Per photo)	C	From Leg	1.000	0.000	86.000		2" Ice	4.343	3.049	0.168
			0.000				No Ice	1.188	1.188	0.018
			0.000				1/2" Ice	1.496	1.496	0.027
							1" Ice	1.807	1.807	0.040
Platform Mount [LP 601-1] (E)	C	None		0.000	86.000		2" Ice	2.458	2.458	0.076
							No Ice	28.470	28.470	1.122
							1/2" Ice	33.590	33.590	1.514
							1" Ice	38.710	38.710	1.905
						2" Ice	48.950	48.950	2.689	
<b>**VR**</b>										
APXV18-206516S-C-A20 w/ Mount Pipe (E - Installed)	A	From Leg	4.000	0.000	63.000		No Ice	2.550	2.150	0.039
			0.000				1/2" Ice	2.960	2.550	0.068
			2.000				1" Ice	3.380	2.960	0.106
							2" Ice	4.260	3.830	0.207
APXV18-206516S-C-A20 w/ Mount Pipe (E - Installed)	B	From Leg	4.000	0.000	63.000		No Ice	2.550	2.150	0.039
			0.000				1/2" Ice	2.960	2.550	0.068
			2.000				1" Ice	3.380	2.960	0.106
							2" Ice	4.260	3.830	0.207
APXV18-206516S-C-A20 w/ Mount Pipe (E - Installed)	C	From Leg	4.000	0.000	63.000		No Ice	2.550	2.150	0.039
			0.000				1/2" Ice	2.960	2.550	0.068
			2.000				1" Ice	3.380	2.960	0.106
							2" Ice	4.260	3.830	0.207
(3) KRY 112 144/1 (E - Installed)	A	From Leg	4.000	0.000	63.000		No Ice	0.350	0.175	0.011
			0.000				1/2" Ice	0.426	0.234	0.014
			2.000				1" Ice	0.509	0.301	0.019
							2" Ice	0.698	0.456	0.032
(3) KRY 112 489/2 (E - Installed)	B	From Leg	4.000	0.000	63.000		No Ice	0.559	0.365	0.015
			0.000				1/2" Ice	0.658	0.448	0.020
			2.000				1" Ice	0.764	0.542	0.027
							2" Ice	0.998	0.752	0.046
AIR 32 B2A B66AA w/ Mount Pipe (P)	A	From Leg	4.000	0.000	63.000		No Ice	7.651	6.399	0.165
			0.000				1/2" Ice	8.205	7.330	0.228
			2.000				1" Ice	8.747	8.148	0.298
							2" Ice	9.861	9.839	0.464
AIR 32 B2A B66AA w/ Mount Pipe (P)	B	From Leg	4.000	0.000	63.000		No Ice	7.651	6.399	0.165
			0.000				1/2" Ice	8.205	7.330	0.228
			2.000				1" Ice	8.747	8.148	0.298
							2" Ice	9.861	9.839	0.464
AIR 32 B2A B66AA w/ Mount Pipe (P)	C	From Leg	4.000	0.000	63.000		No Ice	7.651	6.399	0.165
			0.000				1/2" Ice	8.205	7.330	0.228
			2.000				1" Ice	8.747	8.148	0.298
							2" Ice	9.861	9.839	0.464
APXVAARR24_43-U-NA20 w/ Mount Pipe (P)	A	From Leg	4.000	0.000	63.000		No Ice	14.690	6.870	0.186
			0.000				1/2" Ice	15.460	7.550	0.315
			2.000				1" Ice	16.230	8.250	0.458
							2" Ice	17.820	9.670	0.788
APXVAARR24_43-U-NA20 w/ Mount Pipe (P)	B	From Leg	4.000	0.000	63.000		No Ice	14.690	6.870	0.186
			0.000				1/2" Ice	15.460	7.550	0.315
			2.000				1" Ice	16.230	8.250	0.458
							2" Ice	17.820	9.670	0.788
APXVAARR24_43-U-NA20 w/ Mount Pipe (P)	C	From Leg	4.000	0.000	63.000		No Ice	14.690	6.870	0.186
			0.000				1/2" Ice	15.460	7.550	0.315
			2.000				1" Ice	16.230	8.250	0.458
							2" Ice	17.820	9.670	0.788



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	<b>Project</b>	<b>Date</b> 10:43:32 07/01/19
	<b>Client</b> Crown Castle	<b>Designed by</b> Adarsh S

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Lateral						
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
RADIO 4449 B12/B71 (P)	A	From Leg	4.000	0.000	0.000	63.000	2" Ice	17.820	9.670	0.788
			0.000				No Ice	1.643	1.152	0.078
			2.000				1/2" Ice	1.803	1.291	0.094
							1" Ice	1.971	1.436	0.113
RADIO 4449 B12/B71 (P)	B	From Leg	4.000	0.000	0.000	63.000	2" Ice	2.328	1.749	0.159
			0.000				No Ice	1.643	1.152	0.078
			2.000				1/2" Ice	1.803	1.291	0.094
							1" Ice	1.971	1.436	0.113
RADIO 4449 B12/B71 (P)	C	From Leg	4.000	0.000	0.000	63.000	2" Ice	2.328	1.749	0.159
			0.000				No Ice	1.643	1.152	0.078
			2.000				1/2" Ice	1.803	1.291	0.094
							1" Ice	1.971	1.436	0.113
6' x 2" STD. Mount Pipe (E-Empty)	A	From Leg	4.000	0.000	0.000	63.000	2" Ice	2.328	1.749	0.159
			0.000				No Ice	1.425	1.425	0.028
			1.500				1/2" Ice	1.925	1.925	0.039
							1" Ice	2.294	2.294	0.054
6' x 2" STD. Mount Pipe (E-Empty)	B	From Leg	4.000	0.000	0.000	63.000	2" Ice	3.060	3.060	0.096
			0.000				No Ice	1.425	1.425	0.028
			1.500				1/2" Ice	1.925	1.925	0.039
							1" Ice	2.294	2.294	0.054
6' x 2" STD. Mount Pipe (E-Empty)	C	From Leg	4.000	0.000	0.000	63.000	2" Ice	3.060	3.060	0.096
			0.000				No Ice	1.425	1.425	0.028
			1.500				1/2" Ice	1.925	1.925	0.039
							1" Ice	2.294	2.294	0.054
Platform Mount [LP 303-1] (E - Installed)	C	None			0.000	63.000	2" Ice	3.060	3.060	0.096
							No Ice	14.660	14.660	1.250
							1/2" Ice	18.870	18.870	1.481
							1" Ice	23.080	23.080	1.713
Miscellaneous [NA 507-1] (P - HRK12-HD (Mount MOD))	C	None			0.000	66.000	2" Ice	31.500	31.500	2.175
							No Ice	4.800	4.800	0.245
							1/2" Ice	6.700	6.700	0.294
							1" Ice	8.600	8.600	0.343
Miscellaneous [NA 509-3] (P - PRK-1245 (Mount MOD))	C	None			0.000	61.500	2" Ice	12.400	12.400	0.441
							No Ice	11.840	11.840	0.275
							1/2" Ice	16.960	16.960	0.296
							1" Ice	22.080	22.080	0.317
						2" Ice	32.320	32.320	0.360	

\*\*VR\*\*

## 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

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Comb. No.	Description
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
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	101 - 83.62	Pole	Max Tension	31	0.063	-6.568	-3.745
			Max. Compression	26	-10.236	-0.696	-0.353
			Max. Mx	8	-2.940	-47.517	-0.249
			Max. My	2	-2.944	0.147	47.133
			Max. Vy	8	6.425	-34.240	-0.136
			Max. Vx	14	6.395	-0.170	-34.050
			Max. Torque	3			-0.977
L2	83.62 - 45.58	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-34.389	-0.067	0.592
			Max. Mx	8	-13.154	-597.983	-1.410
			Max. My	2	-13.156	1.638	597.096

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L3	45.58 - 0	Pole	Max. Vy	20	-18.727	597.843	1.973
			Max. Vx	2	-18.708	1.638	597.096
			Max. Torque	25			-0.809
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-47.900	1.905	2.063
			Max. Mx	20	-22.822	1590.153	4.548
			Max. My	2	-22.822	4.463	1588.181
			Max. Vy	20	-21.328	1590.153	4.548
			Max. Vx	2	-21.309	4.463	1588.181
			Max. Torque	25			-0.806

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	27	47.900	0.000	5.808
	Max. H <sub>x</sub>	21	17.140	21.294	0.042
	Max. H <sub>z</sub>	3	17.140	0.042	21.275
	Max. M <sub>x</sub>	2	1588.181	0.042	21.275
	Max. M <sub>z</sub>	8	1588.916	-21.294	-0.042
	Max. Torsion	13	0.800	-10.683	-18.446
	Min. Vert	11	17.140	-18.462	-10.674
	Min. H <sub>x</sub>	8	22.854	-21.294	-0.042
	Min. H <sub>z</sub>	15	17.140	-0.042	-21.275
	Min. M <sub>x</sub>	14	-1586.759	-0.042	-21.275
	Min. M <sub>z</sub>	20	-1590.153	21.294	0.042
	Min. Torsion	25	-0.803	10.683	18.446

### Tower Mast Reaction Summary

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead Only	19.045	0.000	0.000	-0.571	0.503	0.000
1.2 Dead+1.0 Wind 0 deg - No Ice	22.854	-0.042	-21.275	-1588.181	4.463	0.680
0.9 Dead+1.0 Wind 0 deg - No Ice	17.140	-0.042	-21.275	-1571.049	4.260	0.683
1.2 Dead+1.0 Wind 30 deg - No Ice	22.854	10.611	-18.404	-1373.597	-790.837	0.377
0.9 Dead+1.0 Wind 30 deg - No Ice	17.140	10.611	-18.404	-1358.758	-782.546	0.381
1.2 Dead+1.0 Wind 60 deg - No Ice	22.854	18.558	-10.681	-792.933	-1377.187	-0.026
0.9 Dead+1.0 Wind 60 deg - No Ice	17.140	18.558	-10.681	-784.306	-1362.653	-0.024
1.2 Dead+1.0 Wind 90 deg - No Ice	22.854	21.294	0.042	3.129	-1588.916	-0.422
0.9 Dead+1.0 Wind 90 deg - No Ice	17.140	21.294	0.042	3.267	-1572.104	-0.422
1.2 Dead+1.0 Wind 120 deg - No Ice	22.854	18.462	10.674	796.340	-1377.868	-0.704

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Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
0.9 Dead+1.0 Wind 120 deg - No Ice	17.140	18.462	10.674	788.011	-1363.304	-0.705
1.2 Dead+1.0 Wind 150 deg - No Ice	22.854	10.683	18.446	1375.984	-797.466	-0.798
0.9 Dead+1.0 Wind 150 deg - No Ice	17.140	10.683	18.446	1361.469	-789.099	-0.800
1.2 Dead+1.0 Wind 180 deg - No Ice	22.854	0.042	21.275	1586.759	-3.213	-0.679
0.9 Dead+1.0 Wind 180 deg - No Ice	17.140	0.042	21.275	1569.995	-3.327	-0.682
1.2 Dead+1.0 Wind 210 deg - No Ice	22.854	-10.611	18.404	1372.168	792.080	-0.378
0.9 Dead+1.0 Wind 210 deg - No Ice	17.140	-10.611	18.404	1357.699	783.474	-0.381
1.2 Dead+1.0 Wind 240 deg - No Ice	22.854	-18.558	10.681	791.505	1378.421	0.024
0.9 Dead+1.0 Wind 240 deg - No Ice	17.140	-18.558	10.681	783.248	1363.574	0.022
1.2 Dead+1.0 Wind 270 deg - No Ice	22.854	-21.294	-0.042	-4.547	1590.153	0.420
0.9 Dead+1.0 Wind 270 deg - No Ice	17.140	-21.294	-0.042	-4.319	1573.022	0.420
1.2 Dead+1.0 Wind 300 deg - No Ice	22.854	-18.462	-10.674	-797.751	1379.105	0.705
0.9 Dead+1.0 Wind 300 deg - No Ice	17.140	-18.462	-10.674	-789.057	1364.227	0.706
1.2 Dead+1.0 Wind 330 deg - No Ice	22.854	-10.683	-18.446	-1377.397	798.712	0.800
0.9 Dead+1.0 Wind 330 deg - No Ice	17.140	-10.683	-18.446	-1362.517	790.029	0.803
1.2 Dead+1.0 Ice+1.0 Temp	47.900	-0.000	-0.000	-2.063	1.905	0.000
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	47.900	-0.000	-5.808	-460.033	1.920	0.227
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	47.900	2.901	-5.030	-398.723	-226.720	-0.042
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	47.900	5.025	-2.904	-231.155	-394.079	-0.300
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	47.900	5.803	0.000	-2.230	-455.312	-0.478
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	47.900	5.025	2.904	226.709	-394.012	-0.528
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	47.900	2.901	5.030	394.319	-226.607	-0.436
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	47.900	0.000	5.808	455.689	2.046	-0.228
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	47.900	-2.901	5.030	394.379	230.681	0.042
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	47.900	-5.025	2.904	226.816	398.037	0.300
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	47.900	-5.803	-0.000	-2.104	459.272	0.478
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	47.900	-5.025	-2.904	-231.043	397.978	0.528
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	47.900	-2.901	-5.030	-398.658	230.576	0.436
Dead+Wind 0 deg - Service	19.045	-0.009	-4.617	-343.353	1.340	0.151
Dead+Wind 30 deg - Service	19.045	2.302	-3.994	-297.018	-170.376	0.084
Dead+Wind 60 deg - Service	19.045	4.027	-2.318	-171.646	-296.980	-0.005
Dead+Wind 90 deg - Service	19.045	4.621	0.009	0.236	-342.698	-0.093
Dead+Wind 120 deg - Service	19.045	4.006	2.316	171.506	-297.131	-0.156
Dead+Wind 150 deg - Service	19.045	2.318	4.003	296.661	-171.811	-0.177

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Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead+Wind 180 deg - Service	19.045	0.009	4.617	342.168	-0.317	-0.150
Dead+Wind 210 deg - Service	19.045	-2.302	3.994	295.833	171.399	-0.084
Dead+Wind 240 deg - Service	19.045	-4.027	2.318	170.461	298.003	0.005
Dead+Wind 270 deg - Service	19.045	-4.621	-0.009	-1.421	343.721	0.093
Dead+Wind 300 deg - Service	19.045	-4.006	-2.316	-172.690	298.154	0.156
Dead+Wind 330 deg - Service	19.045	-2.318	-4.003	-297.846	172.834	0.177

## Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.000	-19.045	0.000	0.000	19.045	0.000	0.000%
2	-0.042	-22.854	-21.275	0.042	22.854	21.275	0.000%
3	-0.042	-17.140	-21.275	0.042	17.140	21.275	0.000%
4	10.611	-22.854	-18.404	-10.611	22.854	18.404	0.000%
5	10.611	-17.140	-18.404	-10.611	17.140	18.404	0.000%
6	18.558	-22.854	-10.681	-18.558	22.854	10.681	0.000%
7	18.558	-17.140	-10.681	-18.558	17.140	10.681	0.000%
8	21.294	-22.854	0.042	-21.294	22.854	-0.042	0.000%
9	21.294	-17.140	0.042	-21.294	17.140	-0.042	0.000%
10	18.462	-22.854	10.674	-18.462	22.854	-10.674	0.000%
11	18.462	-17.140	10.674	-18.462	17.140	-10.674	0.000%
12	10.683	-22.854	18.446	-10.683	22.854	-18.446	0.000%
13	10.683	-17.140	18.446	-10.683	17.140	-18.446	0.000%
14	0.042	-22.854	21.275	-0.042	22.854	-21.275	0.000%
15	0.042	-17.140	21.275	-0.042	17.140	-21.275	0.000%
16	-10.611	-22.854	18.404	10.611	22.854	-18.404	0.000%
17	-10.611	-17.140	18.404	10.611	17.140	-18.404	0.000%
18	-18.558	-22.854	10.681	18.558	22.854	-10.681	0.000%
19	-18.558	-17.140	10.681	18.558	17.140	-10.681	0.000%
20	-21.294	-22.854	-0.042	21.294	22.854	0.042	0.000%
21	-21.294	-17.140	-0.042	21.294	17.140	0.042	0.000%
22	-18.462	-22.854	-10.674	18.462	22.854	10.674	0.000%
23	-18.462	-17.140	-10.674	18.462	17.140	10.674	0.000%
24	-10.683	-22.854	-18.446	10.683	22.854	18.446	0.000%
25	-10.683	-17.140	-18.446	10.683	17.140	18.446	0.000%
26	0.000	-47.900	0.000	0.000	47.900	0.000	0.000%
27	-0.000	-47.900	-5.808	0.000	47.900	5.808	0.000%
28	2.901	-47.900	-5.030	-2.901	47.900	5.030	0.000%
29	5.025	-47.900	-2.904	-5.025	47.900	2.904	0.000%
30	5.802	-47.900	0.000	-5.803	47.900	-0.000	0.000%
31	5.025	-47.900	2.904	-5.025	47.900	-2.904	0.000%
32	2.901	-47.900	5.030	-2.901	47.900	-5.030	0.000%
33	0.000	-47.900	5.808	-0.000	47.900	-5.808	0.000%
34	-2.901	-47.900	5.030	2.901	47.900	-5.030	0.000%
35	-5.025	-47.900	2.904	5.025	47.900	-2.904	0.000%
36	-5.802	-47.900	-0.000	5.803	47.900	0.000	0.000%
37	-5.025	-47.900	-2.904	5.025	47.900	2.904	0.000%
38	-2.901	-47.900	-5.030	2.901	47.900	5.030	0.000%
39	-0.009	-19.045	-4.617	0.009	19.045	4.617	0.000%
40	2.302	-19.045	-3.994	-2.302	19.045	3.994	0.000%
41	4.027	-19.045	-2.318	-4.027	19.045	2.318	0.000%
42	4.621	-19.045	0.009	-4.621	19.045	-0.009	0.000%
43	4.006	-19.045	2.316	-4.006	19.045	-2.316	0.000%
44	2.318	-19.045	4.003	-2.318	19.045	-4.003	0.000%
45	0.009	-19.045	4.617	-0.009	19.045	-4.617	0.000%
46	-2.302	-19.045	3.994	2.302	19.045	-3.994	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
47	-4.027	-19.045	2.318	4.027	19.045	-2.318	0.000%
48	-4.621	-19.045	-0.009	4.621	19.045	0.009	0.000%
49	-4.006	-19.045	-2.316	4.006	19.045	2.316	0.000%
50	-2.318	-19.045	-4.003	2.318	19.045	4.003	0.000%

### Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.0000001	0.0000001
2	Yes	5	0.0000001	0.00005712
3	Yes	4	0.0000001	0.00074236
4	Yes	6	0.0000001	0.00005861
5	Yes	5	0.0000001	0.00050657
6	Yes	6	0.0000001	0.00005752
7	Yes	5	0.0000001	0.00049615
8	Yes	4	0.0000001	0.00082010
9	Yes	4	0.0000001	0.00041601
10	Yes	6	0.0000001	0.00005579
11	Yes	5	0.0000001	0.00048038
12	Yes	6	0.0000001	0.00006013
13	Yes	5	0.0000001	0.00052022
14	Yes	5	0.0000001	0.00007499
15	Yes	4	0.0000001	0.00095805
16	Yes	6	0.0000001	0.00005631
17	Yes	5	0.0000001	0.00048540
18	Yes	6	0.0000001	0.00005740
19	Yes	5	0.0000001	0.00049533
20	Yes	5	0.0000001	0.00005006
21	Yes	4	0.0000001	0.00063213
22	Yes	6	0.0000001	0.00005996
23	Yes	5	0.0000001	0.00051834
24	Yes	6	0.0000001	0.00005560
25	Yes	5	0.0000001	0.00047836
26	Yes	4	0.0000001	0.00001802
27	Yes	5	0.0000001	0.00040471
28	Yes	5	0.0000001	0.00084803
29	Yes	5	0.0000001	0.00089634
30	Yes	5	0.0000001	0.00043509
31	Yes	5	0.0000001	0.00080813
32	Yes	5	0.0000001	0.00090487
33	Yes	5	0.0000001	0.00040149
34	Yes	5	0.0000001	0.00085645
35	Yes	5	0.0000001	0.00082125
36	Yes	5	0.0000001	0.00043661
37	Yes	5	0.0000001	0.00093493
38	Yes	5	0.0000001	0.00082419
39	Yes	4	0.0000001	0.00009713
40	Yes	4	0.0000001	0.00049438
41	Yes	4	0.0000001	0.00046787
42	Yes	4	0.0000001	0.00006191
43	Yes	4	0.0000001	0.00043099
44	Yes	4	0.0000001	0.00053226
45	Yes	4	0.0000001	0.00010201
46	Yes	4	0.0000001	0.00043862
47	Yes	4	0.0000001	0.00046214

<b>tnxTower</b>  <b>B+T Group</b> 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 587-4630	<b>Job</b> 136274.002.01 - WINDSOR LOCKS, CT (BU# 842876)	<b>Page</b> 15 of 17
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	<b>Client</b> Crown Castle	<b>Designed by</b> Adarsh S

48	Yes	4	0.00000001	0.00006706
49	Yes	4	0.00000001	0.00052875
50	Yes	4	0.00000001	0.00043146

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	101 - 83.62	18.329	49	1.525	0.005
L2	86.37 - 45.58	13.678	49	1.488	0.003
L3	49.42 - 0	4.310	49	0.838	0.001

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
93.000	(2) 7770.00 w/ Mount Pipe	49	15.761	1.518	0.004	12022
86.000	(2) HBXX-6517DS-A2M w/ Mount Pipe	49	13.564	1.486	0.003	6516
66.000	Miscellaneous [NA 507-1]	49	7.895	1.188	0.002	3173
63.000	APXV18-206516S-C-A20 w/ Mount Pipe	49	7.157	1.126	0.001	2947
61.500	Miscellaneous [NA 509-3]	49	6.801	1.095	0.001	2845

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	101 - 83.62	84.648	22	7.065	0.023
L2	86.37 - 45.58	63.197	22	6.891	0.015
L3	49.42 - 0	19.940	22	3.878	0.004

### Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
93.000	(2) 7770.00 w/ Mount Pipe	22	72.805	7.031	0.019	2692
86.000	(2) HBXX-6517DS-A2M w/ Mount Pipe	22	62.670	6.879	0.015	1455
66.000	Miscellaneous [NA 507-1]	22	36.502	5.500	0.008	698
63.000	APXV18-206516S-C-A20 w/ Mount Pipe	22	33.091	5.215	0.007	647
61.500	Miscellaneous [NA 509-3]	22	31.447	5.070	0.006	624

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	<b>Project</b>	<b>Date</b> 10:43:32 07/01/19
	<b>Client</b> Crown Castle	<b>Designed by</b> Adarsh S

### Compression Checks

### Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
L1	101 - 83.62 (1)	TP17.41x13x0.188	17.380	0.000	0.0	9.834	-2.937	575.305	0.005
L2	83.62 - 45.58 (2)	TP26.56x16.337x0.25	40.790	0.000	0.0	20.113	-13.149	1176.630	0.011
L3	45.58 - 0 (3)	TP37.5x25.098x0.313	49.420	0.000	0.0	36.885	-22.822	2157.790	0.011

### Pole Bending Design Data

Section No.	Elevation ft	Size	M <sub>ux</sub> kip-ft	φM <sub>nx</sub> kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M <sub>uy</sub> kip-ft	φM <sub>ny</sub> kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	101 - 83.62 (1)	TP17.41x13x0.188	47.644	247.417	0.193	0.000	247.417	0.000
L2	83.62 - 45.58 (2)	TP26.56x16.337x0.25	599.172	765.004	0.783	0.000	765.004	0.000
L3	45.58 - 0 (3)	TP37.5x25.098x0.313	1593.217	1968.725	0.809	0.000	1968.725	0.000

### Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V <sub>u</sub> K	φV <sub>n</sub> K	Ratio $\frac{V_u}{\phi V_n}$	Actual T <sub>u</sub> kip-ft	φT <sub>n</sub> kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	101 - 83.62 (1)	TP17.41x13x0.188	6.309	172.591	0.037	0.696	249.766	0.003
L2	83.62 - 45.58 (2)	TP26.56x16.337x0.25	18.761	352.989	0.053	0.708	783.571	0.001
L3	45.58 - 0 (3)	TP37.5x25.098x0.313	21.360	647.338	0.033	0.705	2108.183	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	101 - 83.62 (1)	0.005	0.193	0.000	0.037	0.003	0.199	1.050	4.8.2 ✓
L2	83.62 - 45.58 (2)	0.011	0.783	0.000	0.053	0.001	0.797	1.050	4.8.2 ✓
L3	45.58 - 0 (3)	0.011	0.809	0.000	0.033	0.000	0.821	1.050	4.8.2 ✓

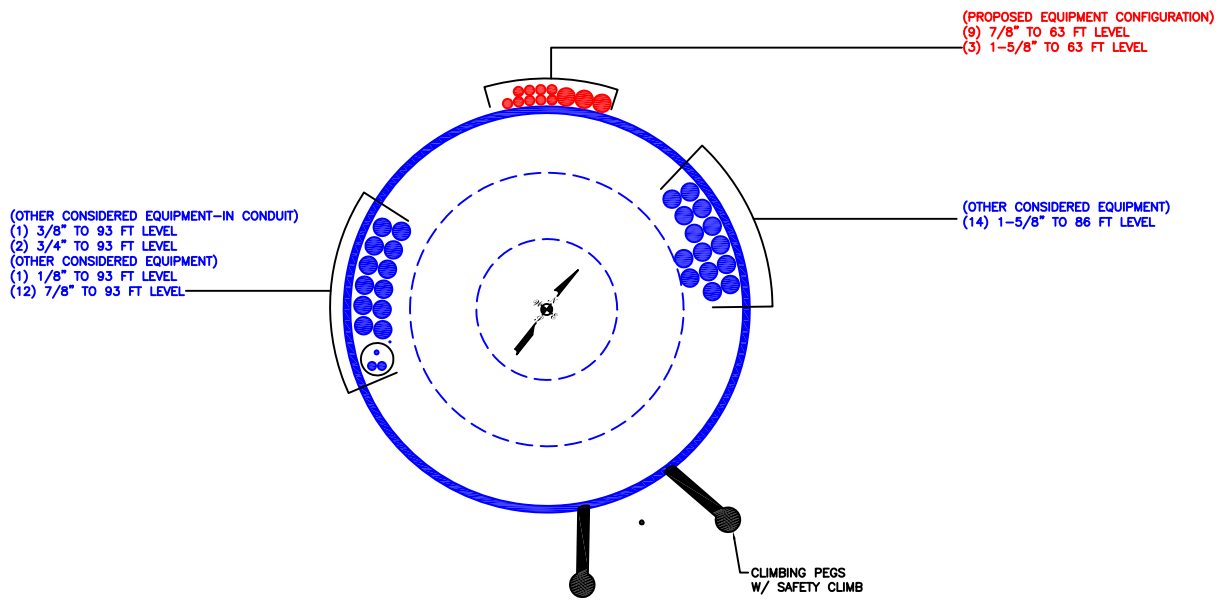


<b>tnxTower</b>  <b>B+T Group</b> 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 587-4630	<b>Job</b> 136274.002.01 - WINDSOR LOCKS, CT (BU# 842876)	<b>Page</b> 17 of 17
	<b>Project</b>	<b>Date</b> 10:43:32 07/01/19
	<b>Client</b> Crown Castle	<b>Designed by</b> Adarsh S

## Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$\phi P_{allow}$ K	% Capacity	Pass Fail	
L1	101 - 83.62	Pole	TP17.41x13x0.188	1	-2.937	604.070	19.0	Pass	
L2	83.62 - 45.58	Pole	TP26.56x16.337x0.25	2	-13.149	1235.461	75.9	Pass	
L3	45.58 - 0	Pole	TP37.5x25.098x0.313	3	-22.822	2265.679	78.2	Pass	
							Summary		
							Pole (L3)	78.2	Pass
							<b>RATING =</b>	<b>78.2</b>	<b>Pass</b>

**APPENDIX B**  
**BASE LEVEL DRAWING**



BUSINESS UNIT: 842876

**APPENDIX C**  
**ADDITIONAL CALCULATIONS**

PROJECT	<b>136274.002.01 - Windsor Locks,CT</b>
SUBJECT	<b>Anchor Rod Bracket Analysis</b>
DATE	<b>07/02/19</b>



V3.3.0

Analysis Criteria	
Design or Analysis?	Design
AR Load Considered	AR Capacity
AR Capacity	341.3 kips

Tower Type	Monopole
Is this a CA DSA site?	No

Post-Installed Adhesive AR Modification	
Size	2.25 in
Quantity	4
Bolt Circle	46.0 in
Grade	A193 Gr B7
Fy	105 ksi
Fu	125 ksi

TIA-222 Rev.	H
Apply TIA-222-H Section 15.5?	Yes

Anchor Rod Bracket Analysis Checks		
Tube Bearing	OK	0.611
Tube Compression	OK	0.917
Gusset Shear Yield	OK	0.222
Gusset Shear Rupture	OK	0.241
Gusset Flexure	N/A	-
Welds	Gusset to Tower and BP	OK 0.557
	Gusset to Tube	OK 0.630
	Geometry	OK 0.238
Tower Punching	OK	0.443
Tube Punching	OK	0.262
AF35LVE Embedment	6.0	ft
Hilti RE 500 V3 Embedment	6.0	ft
Target Tension	190.0	kips
Hole edge to vert rebar clear	5.5	in
Hole edge to tie clear	7.0	in
<b>Utilization</b>	<b>OK</b>	

Manufacturers Tower Properties	
Pole Thickness	0.3125 in
Pole Grade	A572-65
Fy	65 ksi
Fu	80 ksi
Base Plate Gr.	A572-60
Fy	60 ksi
Fu	75 ksi
Anchor Rods	
Size	2.25 in
Quantity	10
Bolt Circle	46 in
Grade	A615-75
Fy	75 ksi
Fu	100 ksi

Foundation Properties	
Type	Pier
Pier Diameter	6.0 ft
Pier Depth	21.0 ft
f'c	4.0 ksi
Clear Cover	4.2 in
Vert. Rebar	
Size	11
Quantity	15
Grade	60 ksi
Tie Size	5

Bracket Properties			
Gusset		Pipe/Tube	
Thickness	1.25 in	Size	HSS5x5x1/2
Width at Tube	3.25 in	Total Length	33 in
Height at Pole	36 in	Length above Gusset	3 in
Height at Tube	30 in	Length below Gusset	0 in
Grade	A572-65	Grade	A500 Grade C (Square)
Fy	65 ksi	Fy	50 ksi
Fu	80 ksi	Fu	62 ksi
Weld - Gusset to Tower		Weld - Gusset to Pipe/Tube	
FEXX	80 ksi	FEXX	80 ksi
Weld Type	Double Fillet	Weld Type	Double Fillet
Fillet Size	3/8 in	Fillet Size	3/8 in
Length	36 in		
Load Angle	45 deg.		
Weld - Gusset to Base Plate			
FEXX	80 ksi		
Weld Type	Double Bevel+Fillet		
Fillet Size	9/16 in		
Bevel Depth	9/16 in		
Gap	0 in		
Notch (horiz)	0.75 in		
Notch (vert)	1.25 in		
Pipe/Tube Welded to Base/Footpad?	Yes		
Fillet Size	1/2 in		

# Monopole Base Plate Connection

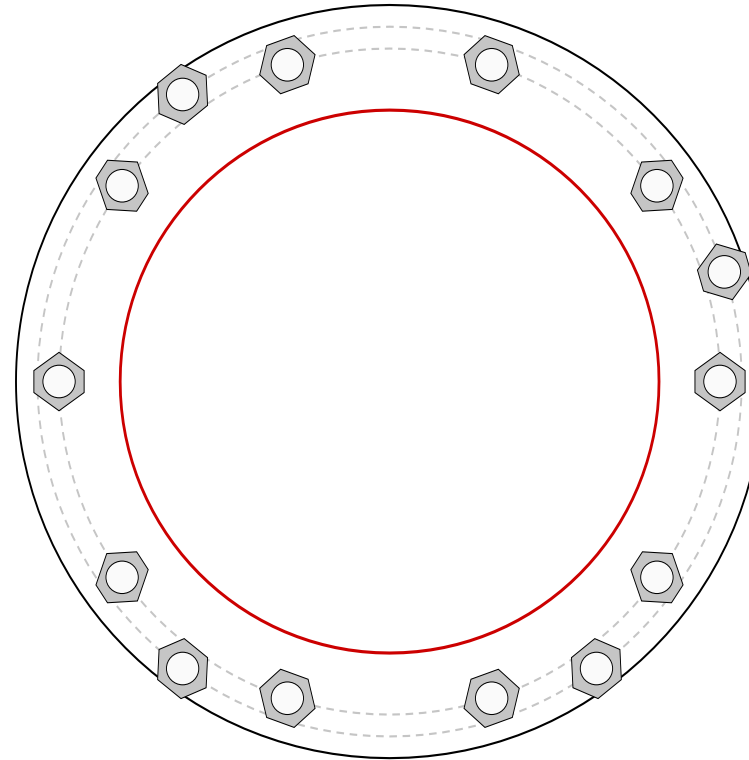


Site Info	
BU #	842876
Site Name	WINDSOR LOCKS,CT
Order #	479845 Rev. 1

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
$l_{ar}$ (in)	0.5

Applied Loads	
Moment (kip-ft)	1593.22
Axial Force (kips)	22.82
Shear Force (kips)	21.36

\*TIA-222-H Section 15.5 Applied



Connection Properties	Analysis Results
-----------------------	------------------

Anchor Rod Data
GROUP 1: (10) 2-1/4" $\phi$ bolts (A615-75 N; $F_y=75$ ksi, $F_u=100$ ksi) on 46" BC
GROUP 2: (4) 2-1/4" $\phi$ bolts (A193 Gr. B7 N; $F_y=105$ ksi, $F_u=125$ ksi) on 49" BC
<i>pos. (deg): 18, 126, 234, 306</i>
Base Plate Data
52" OD x 1.5" Plate (A572-60; $F_y=60$ ksi, $F_u=75$ ksi)
Stiffener Data
N/A
Pole Data
37.5" x 0.3125" 18-sided pole (A572-65; $F_y=65$ ksi, $F_u=80$ ksi)

Anchor Rod Summary <span style="float:right">(units of kips, kip-in)</span>		
GROUP 1:		
$P_{u_c} = 120.95$	$\phi P_{n_c} = 243.75$	<b>Stress Rating</b>
$V_u = 2.14$	$\phi V_n = 73.13$	<b>47.3%</b>
$M_u = n/a$	$\phi M_n = n/a$	<b>Pass</b>
GROUP 2:		
$P_{u_c} = 123.88$	$\phi P_{n_c} = 341.25$	<b>Stress Rating</b>
$V_u = 0$	$\phi V_n = 102.38$	<b>34.6%</b>
$M_u = n/a$	$\phi M_n = n/a$	<b>Pass</b>
Base Plate Summary		
Max Stress (ksi):	48.07	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	<b>84.8%</b>	<b>Pass</b>

## Drilled Pier Foundation

BU #: 842876  
 Site Name: WINDSOR LOCKS, CT  
 Order Number: 479845, Rev. 1

TIA-222 Revisor: H  
 Tower Type: Monopole



Applied Loads		
	Comp.	Uplift
Moment (kip-ft)	1593	
Axial Force (kips)	23	
Shear Force (kips)	21	

Material Properties	
Concrete Strength, f <sub>c</sub> :	4 ksi
Rebar Strength, F <sub>y</sub> :	60 ksi

Pier Design Data	
Depth	21 ft
Ext. Above Grade	1 ft
Pier Section 1	
<i>From 1' above grade to 21' below grade</i>	
Pier Diameter	6 ft
Rebar Quantity	15
Rebar Size	11
Rebar Cage Diameter	61 in
Tie Size	5

Analysis Results		
Soil Lateral Capacity	Compression	Uplift
D <sub>v=0</sub> (ft from TOC)	6.42	-
Soil Safety Factor	3.43	-
Max Moment (kip-ft)	1709.17	-
Rating*	37.0%	-
Soil Vertical Capacity	Compression	Uplift
Skin Friction (kips)	248.81	-
End Bearing (kips)	1272.35	-
Weight of Concrete (kips)	111.97	-
Total Capacity (kips)	1521.16	-
Axial (kips)	134.97	-
Rating*	8.5%	-
Reinforced Concrete Capacity	Compression	Uplift
Critical Depth (ft from TOC)	6.18	-
Critical Moment (kip-ft)	1708.82	-
Critical Moment Capacity	3236.55	-
Rating*	50.3%	-

Soil Interaction Rating*	37.0%
Structural Foundation Rating*	50.3%

\*Rating per TIA-222-H Section 15.5

Check Limitation	
Apply TIA-222-H Section 15.5:	<input checked="" type="checkbox"/>
	N/A <input type="checkbox"/>

Soil Profile				
Groundwater Depth	30	ft	# of Layers	4

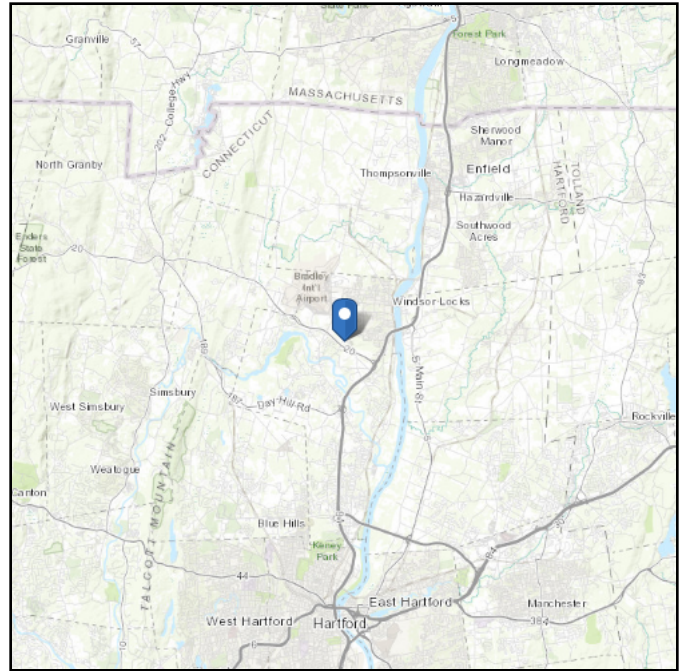
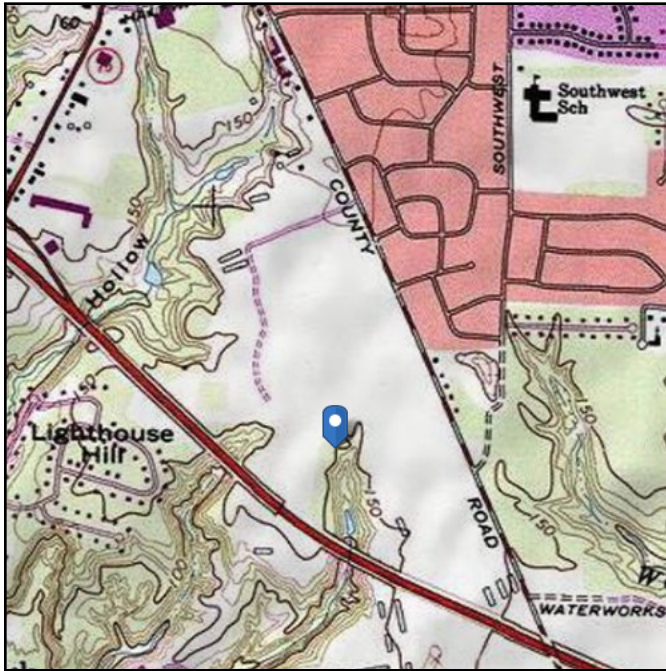
Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ <sub>soil</sub> (pcf)	γ <sub>concrete</sub> (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	3.33	3.33	125	150	0	0	0.000	0.000	0.00	0.00			Cohesionless
2	3.33	5	1.67	125	150	0	34	0.000	0.000	0.00	0.00			Cohesionless
3	5	15	10	125	150	0	34	0.000	0.000	0.80	0.80			Cohesionless
4	15	21	6	125	150	0	34	0.000	0.000	1.60	1.60	60		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:** 148.38 ft (NAVD 88)  
**Latitude:** 41.910244  
**Longitude:** -72.661786



## Wind

### Results:

Wind Speed:	121 Vmph <b>(125 mph used per jurisdiction's requirement)</b>
10-year MRI	76 Vmph
25-year MRI	86 Vmph
50-year MRI	92 Vmph
100-year MRI	99 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 Jun 05 2019

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.

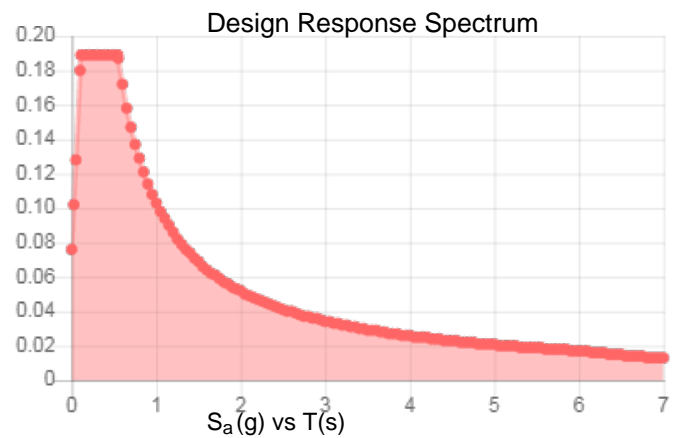
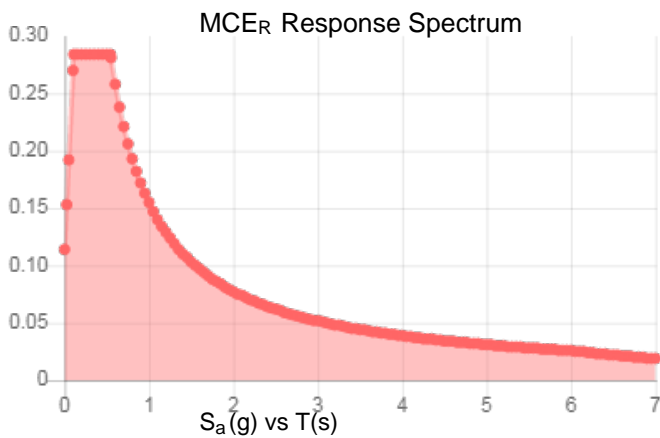


**Site Soil Class:** D - Stiff Soil

**Results:**

$S_S$ :	0.177	$S_{DS}$ :	0.189
$S_1$ :	0.064	$S_{D1}$ :	0.103
$F_a$ :	1.6	$T_L$ :	6
$F_v$ :	2.4	PGA :	0.088
$S_{MS}$ :	0.284	$PGA_M$ :	0.141
$S_{M1}$ :	0.155	$F_{PGA}$ :	1.6
		$I_e$ :	1

**Seismic Design Category** B



**Data Accessed:**

Wed Jun 05 2019

**Date Source:**

USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

## Ice

---

**Results:**

Ice Thickness: 1.00 in.

Concurrent Temperature: 5 F

Gust Speed: 50 mph

**Data Source:** Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8

**Date Accessed:** Wed Jun 05 2019

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.

---

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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**APPENDIX D**  
**MODIFICATION DRAWINGS**

# TOWER MODIFICATION DRAWINGS PREPARED FOR: CROWN CASTLE



**SAFETY CLIMB: 'LOOK UP'**  
THE INTEGRITY OF THE WIRE ROPE SAFETY CLIMB SYSTEM SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION AND INSPECTION. TOWER REINFORCEMENTS AND EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF ANY WIRE ROPE SAFETY CLIMB ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, OR IMPACT TO THE ANCHORAGE POINTS IN ANY WAY. ANY COMPROMISED SAFETY CLIMB MUST BE REPORTED TO YOUR CROWN POC FOR RESOLUTION, INCLUDING EXISTING CONDITIONS.

**SITE NAME:**  
WINDSOR LOCKS  
**BU NUMBER:**  
842876

**SITE ADDRESS:**  
1000 OLD COUNTY CIRCLE  
WINDSOR LOCKS, CT 06096  
HARTFORD COUNTY, USA

**PROJECT CONTACTS:**  
**CROWN PROJECT MANAGER**  
DAN VADNEY  
(518) 373-3510  
DAN.VADNEY@CROWNCastle.COM

**ENGINEERING RFI CONTACT**  
SAURAV SHRESTHA, E.I.T.  
(918) 587-4630  
SSHRESTHA@BTGRP.COM  
MODDWGS@BTGRP.COM  
1717 S BOULDER AVENUE, SUITE 300  
TULSA, OK 74119

ATTENTION ALL CONTRACTORS, ANYTIME YOU ACCESS A CROWN SITE FOR ANY REASON YOU ARE TO CALL THE CROWN NOC UPON ARRIVAL AND DEPARTURE, DAILY AT 800-788-7011.

HOT WORK INCLUDED	
N/A	BASE GRINDING ONLY
X	BASE WELDING (AND GRINDING)
N/A	AERIAL GRINDING ONLY
X	AERIAL WELDING (AND GRINDING)

## TOWER INFORMATION

TOWER MANUFACTURER / DWG #: EEI / GS52519  
TOWER HEIGHT / TYPE: 101' MONOPOLE  
TOWER LOCATION: LAT. 41° 54' 36.88"  
LONG. -72° 39' 42.43"  
STRUCTURAL DESIGN DRAWING REPORT: B+T GROUP / WO. # 1757870  
ORDER ID / REVISION #: 479845 / 1

## CODE COMPLIANCE

THIS REINFORCEMENT DESIGN HAS BEEN PERFORMED IN ACCORDANCE WITH THE TIA-222-H STANDARD. THIS REINFORCEMENT DESIGN UTILIZES AN ULTIMATE 3-SECOND GUST WIND SPEED OF 125 MPH AS REQUIRED BY THE 2018 CONNECTICUT STATE BUILDING CODE. EXPOSURE CATEGORY C AND RISK CATEGORY II WERE USED IN THIS REINFORCEMENT DESIGN.

## DRAWINGS INCLUDED

SHEET	DESCRIPTION
TS	TITLE SHEET
MI	MODIFICATION INSPECTION NOTES & CHECKLIST
GN1	GENERAL NOTES
GN2	GENERAL NOTES
S1	TOWER ELEVATION, SCHEDULES & TX LINE DIST. DIAGRAM
S2	TOWER SECTION AT BASE AND ANCHOR ROD BRACKET DETAILS

**B+T GRP**  
1717 S. BOULDER AVE.  
SUITE 300  
TULSA, OK 74119  
PH: (918) 587-4630  
www.btgrp.com

## CROWN CASTLE

### ISSUED FOR:

REV	DATE	DESCRIPTION
0	07/02/19	ISSUED FOR CONSTRUCTION

PROJECT NO: 136274.002.01  
PROJECT ENG: SAURAV SHRESTHA  
DRAWN BY: MRS  
CHECKED BY: KM / AK / PPK

B+T ENGINEERING, INC.  
PEC.0001564  
Expires 02/10/20



IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

WINDSOR LOCKS  
842876

1000 OLD COUNTY CIRCLE  
WINDSOR LOCKS, CT

EXISTING 101' MONOPOLE

SHEET TITLE

TITLE SHEET

SHEET NUMBER:

TS

REVISION:

0

\\tower-two\BT\_Telecom\_Services\Projects\Crown Castle\136274-842876-Windsor Locks\TOW\_MOD\136274-002\01\_Windsor Locks-842876.dwg - Sheet:MI - User: Lsmpson - July 2, 2019 - 4:33 PM

MI CHECKLIST			
REQUIRED	REPORT ITEM	APPLICABLE CROWN DOC #	BRIEF DESCRIPTION
<b>PRE-CONSTRUCTION</b>			
X	MI CHECKLIST DRAWING	CED-SOW-10007	THIS CHECKLIST SHALL BE INCLUDED IN THE MI REPORT.
X	EOR APPROVED SHOP DRAWINGS	CED-SOW-10007	ONCE THE PRE-MODIFICATION MAPPING IS COMPLETE AND PRIOR TO FABRICATION, THE CONTRACTOR SHALL PROVIDE DETAILED ASSEMBLY DRAWINGS AND/OR SHOP DRAWINGS. THESE ARE TO INCLUDE, BUT ARE NOT LIMITED TO, A VISUAL LAYOUT OF NEW REINFORCEMENT, EXISTING REINFORCEMENT CONFIGURATION, PORTHOLES, MOUNTS, STEP PEGS, SAFETY CLIMBS AND ANY OTHER MISCELLANEOUS ITEMS WHICH MAY AFFECT SUCCESSFUL INSTALLATION OF MODIFICATIONS ON THE TOWER. THESE DRAWINGS SHALL BE SUBMITTED TO THE EOR FOR APPROVAL. APPROVED ASSEMBLY/SHOP DRAWINGS SHALL BE SUBMITTED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	FABRICATION INSPECTION	CED-SOW-10007	A LETTER FROM THE FABRICATOR, STATING THAT THE WORK WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THE CONTRACT DOCUMENTS, SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	FABRICATOR CERTIFIED WELD INSPECTION	CED-SOW-10007 CED-STD-10069	A CWI SHALL INSPECT ALL WELDING PERFORMED ON STRUCTURAL MEMBERS DURING FABRICATION. A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	MATERIAL TEST REPORTS (MTR)	CED-SOW-10007	MATERIAL TEST REPORTS SHALL BE PROVIDED FOR MATERIAL USED AS REQUIRED PER SECTION 9.2.5 OF CED-SOW-10007. MTRS SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
N/A	FABRICATOR NDE INSPECTION REPORT	CED-SOW-10066 CED-STD-10069	CRITICAL SHOP WELDS THAT REQUIRE TESTING ARE NOTED ON THESE CONTRACT DRAWINGS. A CERTIFIED NDT INSPECTOR SHALL PERFORM NON-DESTRUCTIVE EXAMINATION AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	NDE OF MONOPOLE BASE PLATE	ENG-SOW-10033	A NDE OF THE POLE TO BASE PLATE CONNECTION IS REQUIRED AND A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	PACKING SLIPS	CED-SOW-10007	THE MATERIAL SHIPPING LIST SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
ADDITIONAL TESTING AND INSPECTIONS:			
N/A			
<b>CONSTRUCTION</b>			
N/A	FOUNDATION INSPECTIONS	CED-SOW-10144	A VISUAL OBSERVATION OF THE EXCAVATION AND REBAR SHALL BE PERFORMED BEFORE PLACING THE CONCRETE. A VISUAL OBSERVATION OF THE REBAR SHALL BE PERFORMED BEFORE PLACING THE EPOXY. A SEALED WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
N/A	CONCRETE COMP. STRENGTH AND SLUMP TEST	CED-SOW-10144	THE CONCRETE MIX DESIGN, SLUMP TEST, AND COMPRESSIVE STRENGTH TESTS SHALL BE PROVIDED AS PART OF THE FOUNDATION REPORT.
N/A	EARTHWORK	CED-SOW-10144	FOUNDATION SUB-GRADES SHALL BE INSPECTED AND APPROVED BY AN APPROVED FOUNDATION INSPECTOR AND RESULTS INCLUDED AS PART OF THE FOUNDATION REPORT.
N/A	MICROPILE/ROCK ANCHOR	CED-SOW-10144	MICROPILES/ROCK ANCHORS SHALL BE INSPECTED BY THE FOUNDATION INSPECTION VENDOR AND SHALL BE INCLUDED AS PART OF THE FOUNDATION INSPECTION REPORT, ADDITIONAL TESTING AND/OR INSPECTION REQUIREMENTS ARE NOTED IN THESE CONTRACT DOCUMENTS.
X	POST-INSTALLED ANCHOR ROD VERIFICATION	CED-SOW-10007	POST INSTALLED ANCHOR ROD VERIFICATION SHALL BE PERFORMED IN ACCORDANCE WITH CROWN REQUIREMENTS AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	BASE PLATE GROUT VERIFICATION	ENG-STD-10323	THE GENERAL CONTRACTOR SHALL PROVIDE DOCUMENTATION TO THE MI INSPECTOR THAT CERTIFIES THAT THE GROUT WAS REMOVED AND/OR INSTALLED IN ACCORDANCE WITH CROWN REQUIREMENTS FOR INCLUSION IN THE MI REPORT.
X	FIELD CERTIFIED WELD INSPECTION	CED-SOW-10066 CED-STD-10069	A CROWN APPROVED CERTIFIED WELD INSPECTOR SHALL INSPECT AND TEST FIELD WELDS, FOLLOWING ALL PROCEDURES SPECIFIED IN CROWN STANDARD DOCUMENTS APPLICABLE TO WELD INSPECTIONS. A REPORT SHALL BE PROVIDED. NDE OF FIELD WELDS SHALL BE PERFORMED AS REQUIRED BY CROWN STANDARDS AND CONTRACT DOCUMENTS. THE NDE REPORT SHALL BE INCLUDED IN THE CWI REPORT.
X	ON-SITE COLD GALVANIZING VERIFICATION	ENG-STD-10149 ENG-BUL-10149	THE GENERAL CONTRACTOR SHALL PROVIDE WRITTEN AND PHOTOGRAPHIC DOCUMENTATION TO THE MI INSPECTOR VERIFYING THAT ANY ON-SITE COLD GALVANIZING WAS APPLIED PER MANUFACTURER SPECIFICATIONS AND APPLICABLE STANDARDS.
N/A	TENSION TWIST AND PLUMB	CED-PRC-10182 CED-STD-10261	THE GENERAL CONTRACTOR SHALL PROVIDE A REPORT IN ACCORDANCE WITH APPLICABLE STANDARDS DOCUMENTING TENSION TWIST AND PLUMB.
X	GC AS-BUILT DRAWINGS	CED-SOW-10007	THE GENERAL CONTRACTOR SHALL SUBMIT A LEGIBLE COPY OF THE ORIGINAL DESIGN DRAWINGS EITHER STATING "INSTALLED AS DESIGNED" OR NOTING ANY CHANGES THAT WERE REQUIRED AND APPROVED BY THE ENGINEER OF RECORD. EOR/RFI FORMS APPROVING ALL CHANGES SHALL BE SUBMITTED WHEN THE EOR IS SPECIFYING ADDITIONAL INSPECTIONS DESCRIPTION AND APPLICABLE STANDARDS SHALL BE APPLIED.
ADDITIONAL TESTING AND INSPECTIONS:			
N/A			
<b>POST-CONSTRUCTION</b>			
X	CONSTRUCTION COMPLIANCE LETTER	CED-SOW-10007	A LETTER FROM THE GENERAL CONTRACTOR STATING THAT THE WORKMANSHIP WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THESE CONTRACT DRAWINGS, INCLUDING LISTING ADDITIONAL PARTIES TO THE MODIFICATION PROCESS.
X	POST-INSTALLED ANCHOR ROD PULL TESTS	CED-PRC-10119	POST-INSTALLED ANCHOR RODS SHALL BE TESTED BY A CROWN APPROVED PULL TEST INSPECTOR AND A REPORT SHALL BE PROVIDED INDICATING TESTING RESULTS.
X	PHOTOGRAPHS	CED-SOW-10007	PHOTOGRAPHS SHALL BE SUBMITTED TO THE MI. PHOTOS SHALL DOCUMENT ALL PHASES OF THE CONSTRUCTION. THE PHOTOS SHALL BE ORGANIZED IN A MANNER THAT EASILY IDENTIFIES THE EXACT LOCATION OF THE PHOTO.
N/A	BOLT INSTALLATION VERIFICATION REPORT	CED-SOW-10007	THE MI INSPECTOR SHALL VERIFY THE INSTALLATION AND TIGHTNESS 10% OF ALL NON PRE-TENSIONED BOLTS INSTALLED AS PART OF THE MODIFICATION. THE MI INSPECTOR SHALL LOOSEN THE NUT AND VERIFY THE BOLT HOLE SIZE AND CONDITION. THE MI REPORT SHALL CONTAIN THE COMPLETED BOLT INSTALLATION VERIFICATION REPORT, INCLUDING THE SUPPORTING PHOTOGRAPHS.
X	PUNCHLIST DEVELOPMENT AND CORRECTION DOCUMENTATION	CED-PRC-10283 CED-FRM-10285	FINAL PUNCHLIST INDICATING ALL NONCONFORMANCE(S) IDENTIFIED AND THE FINAL RESOLUTION AND APPROVAL.
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)	CED-SOW-10007	THE MI INSPECTOR SHALL OBSERVE AND REPORT ANY DISCREPANCIES BETWEEN THE CONTRACTOR'S REDLINE DRAWING AND THE ACTUAL COMPLETED INSTALLATION.
ADDITIONAL TESTING AND INSPECTIONS:			
N/A			
NOTE: "X" DENOTES A DOCUMENT NEEDED FOR THE MI REPORT AND "N/A" DENOTES A DOCUMENT THAT IS NOT REQUIRED FOR THE MI REPORT.			

**MODIFICATION INSPECTION NOTES**

**GENERAL**

THE MI IS AN ON-SITE VISUAL AND HANDS-ON INSPECTION OF TOWER MODIFICATIONS INCLUDING A REVIEW OF CONSTRUCTION REPORTS AND ADDITIONAL PERTINENT DOCUMENTATION PROVIDED BY THE GENERAL CONTRACTOR (GC), AS WELL AS ANY INSPECTION DOCUMENTS PROVIDED BY 3RD PARTY INSPECTORS. THE MI IS TO ENSURE THE INSTALLATION WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NAMELY THE MODIFICATION DRAWINGS; IN ACCORDANCE WITH APPLICABLE CROWN STANDARDS; AND AS DESIGNED BY THE ENGINEER OF RECORD (EOR).

NO DOCUMENT, CODE OR POLICY CAN ANTICIPATE EVERY SITUATION THAT MAY ARISE. ACCORDINGLY, THIS CHECKLIST IS INTENDED TO SERVE AS A SOURCE OF GUIDING PRINCIPLES IN ESTABLISHING GUIDELINES FOR MODIFICATION INSPECTION.

THE MI IS TO CONFIRM INSTALLATION CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A REVIEW OF THE MODIFICATION DESIGN ITSELF, AND THE MI INSPECTOR DOES NOT TAKE OWNERSHIP OF THE MODIFICATION DESIGN. OWNERSHIP OF THE STRUCTURAL MODIFICATION DESIGN EFFECTIVENESS AND INTEGRITY RESIDES WITH THE EOR AT ALL TIMES. THE MI INSPECTOR SHALL INSPECT AND NOTE CONFORMANCE/NONCONFORMANCE AND PROVIDE TO THE CROWN POINT OF CONTACT (CROWN POC) FOR EVALUATION.

ALL MI'S SHALL BE CONDUCTED BY A CROWN APPROVED MI INSPECTOR, WORKING FOR A CROWN APPROVED MI VENDOR. SEE CROWN CED-LST-10173, "APPROVED MI VENDORS".

TO ENSURE THAT THE REQUIREMENTS OF THE MI ARE MET, IT IS VITAL THAT THE GENERAL CONTRACTOR (GC) AND THE MI INSPECTOR BEGIN COMMUNICATING AND COORDINATING AS SOON AS A PURCHASE ORDER ( PO) IS RECEIVED. IT IS EXPECTED THAT EACH PARTY WILL BE PROACTIVE IN REACHING OUT TO THE OTHER PARTY. IF CONTACT INFORMATION IS NOT KNOWN THE GC AND/OR INSPECTOR SHALL CONTACT THE CROWN POINT OF CONTACT (POC).

REFER TO CROWN CED-SOW-10007, "MODIFICATION INSPECTION SOW", FOR FURTHER DETAILS AND REQUIREMENTS.

**SERVICE LEVEL COMMITMENT**

THE FOLLOWING RECOMMENDATIONS AND SUGGESTIONS ARE OFFERED TO ENHANCE THE EFFICIENCY AND EFFECTIVENESS OF DELIVERING AN MI REPORT:

- THE GC SHALL PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, PREFERABLY 10, TO THE MI INSPECTOR AS TO WHEN THE SITE WILL BE READY FOR THE MI TO BE CONDUCTED.
- THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE DURING THE MI TO HAVE ANY MINOR DEFICIENCIES CORRECTED DURING THE INITIAL MI. THEREFORE, THE GC MAY CHOOSE TO COORDINATE THE MI CAREFULLY TO ENSURE ALL CONSTRUCTION FACILITIES ARE AT THEIR DISPOSAL WHEN THE MI INSPECTOR IS ON SITE.

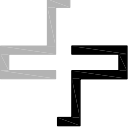
**REQUIRED PHOTOS**

BETWEEN THE GC AND THE MI INSPECTOR THE FOLLOWING PHOTOGRAPHS, AT A MINIMUM, ARE TO BE TAKEN AND INCLUDED IN THE MI REPORT:

- PRE-CONSTRUCTION GENERAL SITE CONDITION
- PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION
  - RAW MATERIALS
  - PHOTOS OF ALL CRITICAL DETAILS
  - FOUNDATION MODIFICATIONS
  - WELD PREPARATION
  - BOLT INSTALLATION
  - FINAL INSTALLED CONDITION
  - SURFACE COATING REPAIR
- POST CONSTRUCTION PHOTOGRAPHS
  - FINAL INFIELD CONDITION

PHOTOS OF ELEVATED MODIFICATIONS TAKEN ONLY FROM THE GROUND SHALL BE CONSIDERED INADEQUATE.

THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, PLEASE REFER TO CROWN DOCUMENT # CED-SOW-10007.



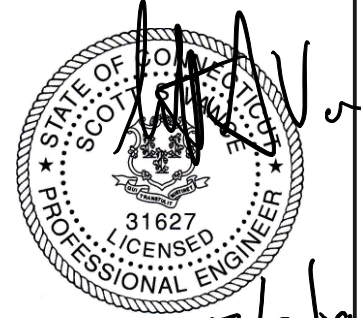
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# CROWN CASTLE

ISSUED FOR:		
REV	DATE	DESCRIPTION
0	07/02/19	ISSUED FOR CONSTRUCTION

PROJECT NO:	136274.002.01
PROJECT ENG:	SAURAV SHRESTHA
DRAWN BY:	MRS
CHECKED BY:	KM / AK / PPK

B+T ENGINEERING, INC.  
PEC.0001564  
Expires 02/10/20



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**WINDSOR LOCKS**  
842876  
1000 OLD COUNTY CIRCLE  
WINDSOR LOCKS, CT  
EXISTING 101' MONOPOLE

SHEET TITLE  
**MODIFICATION INSPECTION NOTES AND CHECKLIST**

SHEET NUMBER: <b>MI</b>	REVISION: <b>0</b>
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**GENERAL NOTES**

- The General Contractor (GC) shall reference CED-STD-10159, "Tower Modification Construction Specifications", as a continuation of the following General Notes. The GC shall keep a copy of this document with the Structural Design Drawings (SDD) at all times, and shall ensure that all Contractor Personnel are aware of the information enclosed within the General Notes and CED-STD-10159.
- The Contract Documents are the property of Crown Castle (Crown). They are provided to the GC and its Lower Tier Contractors and material suppliers for the limited purpose of use in completing the Work for this Site, and shall be kept in strict confidence and not disclosed to any third parties. The Contract Documents shall not be used for any other purpose whatsoever without the prior written consent of Crown.
- Detail drawings, including notes and tables, shall govern over general notes and typical details. Contact the Crown Point of Contact (POC) and Engineer of Record (EOR) for clarification as needed.
- Do not scale drawings.
- Any Work performed without a prefabrication mapping is done at the risk of the GC and/or fabricator. All dimensions of existing structural elements are assumed based on the available documentation and are preliminary until field-verified by the GC, unless noted otherwise (UNO). Where discrepancies are found, GC shall contact the Crown POC and EOR through RFI.
- For this analysis and modification, the tower has been assumed to be in good condition without any structural defects, UNO. If the GC discovers any indication of an existing structural defect, contact the Crown POC and EOR immediately.
- All construction means and methods, including but not limited to erection plans, rigging plans, climbing plans, and rescue plans, shall be the responsibility of the GC responsible for the execution of the Work contained herein, and shall meet ANSI/ASSE A10.48 (latest edition); federal, state, and local regulations; and any applicable industry consensus standards related to the construction activities being performed. All rigging plans shall adhere to ANSI/ASSE A10.48 (latest edition) and Crown standard CED-STD-10253, "Rigging Program", including the required involvement of a qualified engineer for class IV construction to certify the supporting structure(s) in accordance with the ANSI/TIA-322 (latest edition).
- The structural integrity of the modification design extends to the complete condition only. The GC must be cognizant that the removal of any structural component of an existing tower has the potential to cause the partial or complete collapse of the structure. All necessary precautions must be taken to ensure structural integrity, including, but not limited to, engineering assessment of construction stresses with installation maximum wind speed and/or temporary bracing and shoring.
- Aerial and underground utilities and facilities may or may not be shown on the drawings. The GC shall take every precaution to preserve and protect these items, which may include aerial or underground power lines, telephone lines, water lines, sewer lines, cable television facilities, pipelines, structures and other public and private improvements within or adjacent to the Work area. The responsibility for determining the actual on-site location of these items shall rest exclusively with the GC.
- All manufacturer's hardware assembly instructions shall be followed, UNO. Conflicting notes shall be brought to the attention of the EOR and the Crown POC.
- The GC shall fabricate all required items per the materials specified below, UNO on the detail drawing sheets. If the GC finds for any component that the materials have not been clearly specified, the GC shall submit an RFI to the EOR to confirm the required material.

All structural elements shall be new and shall conform to the following requirements, UNO:

**Monopoles:**

- Structural shapes and plates: ASTM A572 Grade 65 (FY = 65 KSI)
- Welding electrodes, SMAW: E80XX
- Welding electrodes, FCAW: E8XT-XX

**Self-Support and Guyed Towers:**

- Structural shapes and plates: ASTM A572 Grade 50 (FY = 50 KSI)
- Welding electrodes, SMAW: E70XX
- Welding electrodes, FCAW: E7XT-XX

**All tower types:**

- Steel angle: ASTM A572 Grade 50 (FY = 50 KSI)
- Solid rod: ASTM A36 (FY = 36 KSI)
- Pipe/tube (round): ASTM A500 Grade C (FY = 46 KSI)
- Pipe/tube (square): ASTM A500 Grade C (FY = 50 KSI)
- Bolts: ASTM F3125 Grade A325 Type 1
- U-bolts: ASTM A307 Grade A, or SAE J429 Grade 2
- Nuts: ASTM A563 Grade DH
- Washers: F436 Type 1
- Guy Wires: ASTM A475 Grade EHS
- Bridge Strand: ASTM A586 Grade 1

- After fabrication, hot-dip galvanize all steel items, UNO. Galvanize per ASTM A123, ASTM A153/A153M, or ASTM A653 G90, as applicable. ASTM A490 bolts shall not be hot-dip galvanized, but shall instead be coated with Magni 565 or EOR approved equivalent, per ASTM F2833.
- Contractor Personnel shall not drill holes in any new or existing structural members, other than those drilled holes shown on structural drawings, without the approval of the EOR.
- For a list of Crown-approved cold galvanizing compounds, refer to ENG-STD-10149, "Tower Protective Coatings Guidelines".
- All exposed structural steel as the result of this scope of Work including welds (after final inspection of the weld by the CWI), field drilled holes, and shaft interiors (where accessible), shall be cleaned and two (2) coats cold galvanizing shall be applied by brush in accordance with ENG-STD-10149, "Tower Protective Coatings Guidelines". Photo documentation is required to be submitted to the MI Inspector.
- If removal of existing modifications is required per the modification scope, the GC shall clean and cold galvanize any existing empty bolt holes, UNO. If additional unexpected, oversized, or slotted holes are found, the GC shall contact the EOR and Crown POC for guidance prior to proceeding with the modifications.
- All Work involving base plate grout scope items or resulting in disturbance of base plate grout shall reference ENG-STD-10323, "Base Plate Grout", and shall follow any Base Plate Grout Removal Notes contained herein.
- All tower grounding affected by the Work shall be repaired or replaced in accordance with OPS-STD-10090, "Tower Grounding", and OPS-BUL-10133, "Grounding Repair Recommendation".
- If scope of modification requires removal or covering of tower ID tag, the tag must be replaced.
- Any hardware removed from the existing tower shall be replaced with new hardware of equal size and quality, UNO. No existing fasteners shall be reused.
- All joints using ASTM A325 or A490 bolts, U-bolts, V-bolts, and threaded rods shall be snug tightened, UNO.
- A nut locking device shall be installed on all proposed and/or replaced snug tightened ASTM A325 or A490 bolts, U-bolts, V-bolts, and threaded rods.
- All joints are bearing type connections UNO. If no bolt length is given in the Bill of Materials, the connection may include threads in the shear planes, and the GC is responsible for sizing the length of the bolt.
- Blind bolts shall be installed per the installation specifications on the corresponding Approved Fastener sheets contained in CED-CAT-10300, "Monopole Standard Drawings and Approved Reinforcement Components".
- If ASTM A325 or A490 bolts, and/or threaded rods are specified to be pre-tensioned, these shall be installed and tightened to the pretensioned condition according to the requirements of the RCSC Specification for Structural Joints Using ASTM High Strength Bolts.
- All proposed and/or replaced bolts shall be of sufficient length such that the end of the bolt be at least flush with the face of the nut. It is not permitted for the bolt end to be below the face of the nut after tightening is completed.



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**WINDSOR LOCKS 842876**

1000 OLD COUNTY CIRCLE  
 WINDSOR LOCKS, CT

EXISTING 101' MONOPOLE

SHEET TITLE

GENERAL NOTES

SHEET NUMBER:

**GN**

REVISION:

**0**

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 EXISTING 101' MONOPOLE

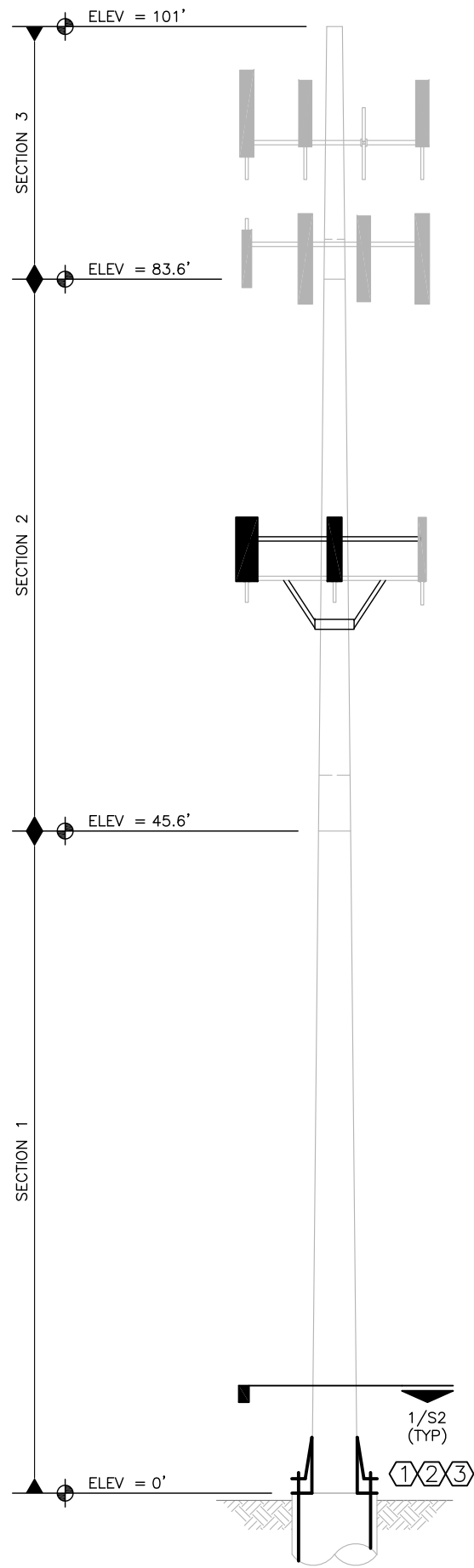
SHEET TITLE  
 GENERAL NOTES

SHEET NUMBER: **GN1**      REVISION: **0**

### BASE PLATE GROUT REMOVAL

1. The GC shall begin this procedure as early as possible during the modification process so that if issues arise, they can be resolved within the anticipated modification timeline.
2. If any deteriorated grout exists, begin at this location. Remove deteriorated grout and the grout around the nearest one or two anchor rods to fully expose the leveling nut. If the GC discovers that a half nut or jam nut was used as a leveling nut, or if no leveling nut is present, immediately contact CED and the Crown POC (typically the mod PM) for a resolution. Do not remove any additional grout until directed to by Crown.
3. Otherwise, check the leveling nut for tightness in accordance with section 7.2.3 of ENG-STD-10323 "base plate grout repair". If severe corrosion / material loss is found or corrosion exists to the point where the leveling nut is unable to be tightened when obviously loose, immediately notify the Crown POC (typically the mod PM). Reference ENG-BUL-10114 "rust classification" for examples of material loss. do not remove any additional grout until directed to by Crown.
4. In the event that severe corrosion is not encountered, and being sure to check each anchor rod for corrosion per ENG-BUL-10114 "rust classification", remove all existing base plate grout while checking each leveling nut for tightness in accordance with section 7.2.3 of ENG-STD-10323 "base plate grout repair".
5. Consistent with section 7.2.4 of ENG-STD-10323 "base plate grout repair", hand tool clean to SSPC-SP2 and solvent clean to SSPC-SP1, all exposed structural steel elements, including anchor rods, leveling nuts and underside of base plate to the greatest extent possible, ensure that all old grout is removed to allow cold galvanizing to adhere to the steel.
6. Apply by brush two coats of a Crown-approved cold-galvanizing compound to all exposed structural steel elements beneath the base plate and allow curing in accordance with the manufacturer's recommendation. A list of Crown-approved direct application cold-galvanizing compounds can be found in ENG-STD-10149 "tower protective coatings guidelines" section 2.1.1.
7. The GC shall provide photos of each anchor rod with leveling nut after cleaning but before cold-galvanization and also again after cold-galvanization, for inclusion in the mi report.

\\tower-two\BT\_Telecom\_Services\Projects\Crown Castle\136000\136274\_842876\_Windsor Locks\TOW MOD\136274\_002\01\_Windsor Locks-842876-Tow Mod.dwg - Sheet:S1 - User: Lsimpson - July 2, 2019 - 4:33 PM



**1** TOWER ELEVATION  
SCALE: N.T.S.

**TOWER MODIFICATIONS:**

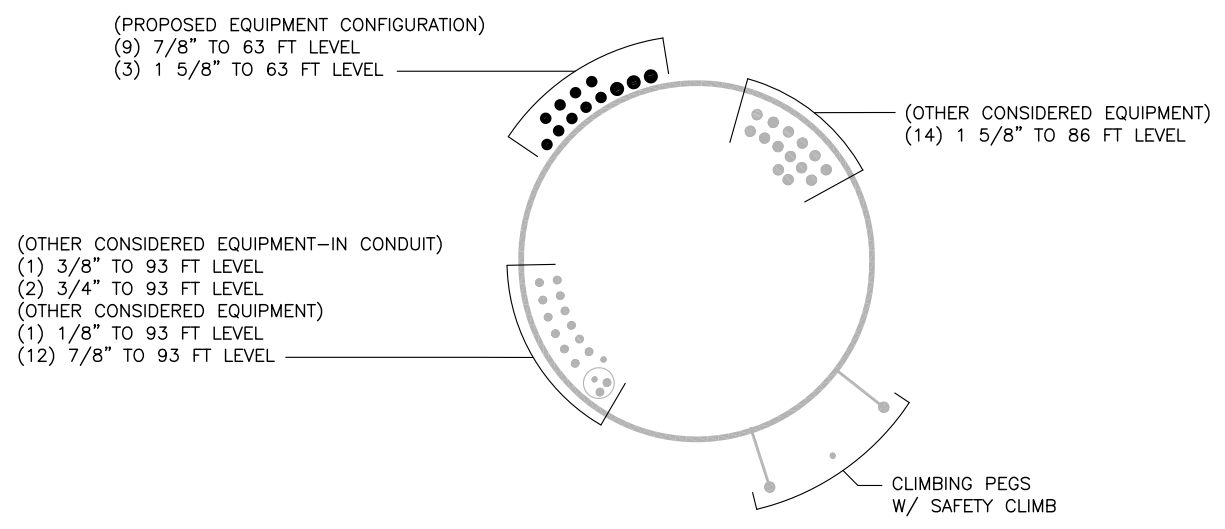
- ① REMOVE EXISTING BASE PLATE STIFFENERS AS REQUIRED AT 0'. REFER CCI DOC. ID: 4964607. RE: SHEET S2.
- ② INSTALL NEW ANCHOR RODS AND ANCHOR ROD BRACKETS AT 0'. RE: SHEET S2.
- ③ REMOVE AND RE-INSTALL BASE PLATE GROUT (AFTER ALL BASE WORK) PER ENG-STD-10323 "BASE PLATE GROUT REPAIR". REFER GROUT REMOVAL NOTES, SHEET GN1.

A. PRIOR TO FABRICATION AND INSTALLATION, CONTRACTOR SHALL FIELD VERIFY ALL LENGTHS AND QUANTITIES GIVEN. LENGTH AND QUANTITIES PROVIDED ARE FOR QUOTING PURPOSES ONLY AND SHALL NOT BE USED FOR FABRICATION.

B. FOR PARTS NOT DETAILED WITHIN THE DRAWING AND STARTING WITH "CCI-", SEE THE FOLLOWING CATALOG FOR DETAILS: CED-CAT-10300, MONOPOLE TOWER STANDARD DRAWINGS AND APPROVED REINFORCEMENT COMPONENTS

EXISTING MEMBER SCHEDULE							
SECTION	NUMBER OF SIDES	THICKNESS	ASTM STEEL GRADE	Fy (ksi)	BOTTOM DIAMETER	TOP DIAMETER	LAP SPLICE
1	18	0.313"	A572	65	37.50"	24.96"	46"
2	18	0.250"	A572	65	26.56"	16.21"	33"
3	18	0.188"	A572	65	17.41"	13.00"	---
EXISTING BASE PLATE GRADE = 60 ksi (ASTM STEEL GRADE = A871)							
EXISTING ANCHOR RODS = 2 1/4"Ø AND GRADE = 75 ksi (ASTM STEEL GRADE = A615)							

EXISTING TOWER HAS BEEN PREVIOUSLY MODIFIED	
REFERENCE DRAWINGS BY:	DATE
B+T GROUP	07/03/12



**2** TX LINE DISTRIBUTION DIAGRAM  
SCALE: N.T.S.

**B+T GRP**  
1717 S. BOULDER AVE.  
SUITE 300  
TULSA, OK 74119  
PH: (918) 587-4630  
www.btgrp.com

# CROWN CASTLE

ISSUED FOR:

REV	DATE	DESCRIPTION
0	07/02/19	ISSUED FOR CONSTRUCTION

PROJECT NO:	136274.002.01
PROJECT ENG:	Saurav Shrestha
DRAWN BY:	MRS
CHECKED BY:	KM / AK / PPK

B+T ENGINEERING, INC.  
PEC.0001564  
Expires 02/10/20

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

**WINDSOR LOCKS**  
842876  
1000 OLD COUNTY CIRCLE  
WINDSOR LOCKS, CT  
EXISTING 101' MONOPOLE

SHEET TITLE  
**TOWER ELEVATION, SCHEDULES AND TX LINE DISTRIBUTION DIAGRAM**

SHEET NUMBER: <b>S1</b>	REVISION: <b>0</b>
----------------------------	-----------------------





# Exhibit E

## **Mount Analysis**

Date: May 30, 2019



Charles R. McGuirt II  
Crown Castle  
3530 Toringdon Way, Suite 300  
Charlotte, NC 28277  
(704) 405-6607

CLS Engineering PLLC  
319 Chapanoke Road, Suite 118  
Raleigh, NC 27603  
(405) 348-5460  
Engineering@clsengineeringpllc.com

**Subject:** Mount Modification Report

**Carrier Designation:** T-Mobile Equipment Change-Out  
**Carrier Site Number:** CTHA133A  
**Carrier Site Name:** HA133/CING/Condo

**Crown Castle Designation:** **Crown Castle BU Number:** 842876  
**Crown Castle Site Name:** Windsor Locks  
**Crown Castle JDE Job Number:** 559277  
**Crown Castle Order Number:** 479845 Rev. 1

**Engineering Firm Designation:** **CLS Engineering PLLC Project #:** 42284-CTHA133A-02-MOD

**Site Data:** **1000 Old County Circle, Windsor Locks, CT 06096, Hartford County**  
**Latitude: 41° 54' 36.88" Longitude: -72° 39' 42.43"**

**Structure Information:** **Tower Height & Type:** 101 ft Monopole  
**Mount Elevation:** 63 ft  
**Mount Width & Type:** 12.5 ft Low Profile Platform

Dear Charles R. McGuirt II,

CLS Engineering PLLC is pleased to submit this "**Mount Modification Report**" to determine the structural integrity of T-Mobile's antenna mounting system with the proposed appurtenance and equipment addition on the above mentioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point for fall protection or rigging is not part of this document.

The purpose of the analysis is to determine acceptability of the mount stress level. Based on our analysis we have determined the mount stress level to be:

**Low Profile Platform**

**Sufficient\***

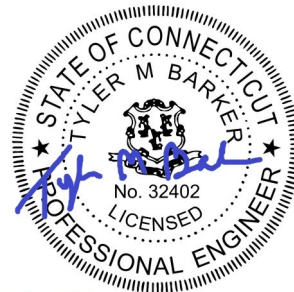
**\*Sufficient upon completion of the changes listed in the 'Conclusion and Recommendations' section of this report.**

This analysis utilizes an ultimate 3-second gust wind speed of 125 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Mount analysis prepared by: Jennifer Soza

Respectfully Submitted by:

Tyler M. Barker, P.E.  
Director of Engineering



Tyler M. Barker  
CLS Engineering, PLLC  
Director of Engineering  
PE # 32402 Exp. 1/31/2020  
COA # PEC.001833 Exp. 8/14/2019

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Mount Modification Design Drawings (MDD)

## 1. INTRODUCTION

The proposed equipment is to be mounted to the existing Low Profile Platform. This proposed mounting configuration was analyzed using RISA-3D, a commercially available finite element analysis software package. A selection of input and output from our analysis is attached to the end of this report.

## 2. ANALYSIS CRITERIA

STANDARD	2015 IBC / 2018 Connecticut State Building Code / TIA-222-H
BASIC WIND SPEED	125 mph, $V_{ult}$ (3-Second Gust)
BASIC WIND SPEED W/ ICE	50 mph (3-Second Gust) w/ 2" Radial Ice (Escalating)
EXPOSURE CATEGORY	C
MAX. TOPOGRAPHIC FACTOR,	1.00
RISK CATEGORY	II
MAINTENANCE LIVE LOAD	$L_M$ : 500 lb

Table 1 - Final Equipment Configuration

ELEVATION (ft)		ANTENNAS	
MOUNT	RAD.	#	NAME
63.0	65.0	3	RFS Celwave APXVAARR24_43-U-NA20
		3	Ericsson AIR 32 B2A/B66AA
		3	Ericsson RADIO 4449 B12/B71
		3	Ericsson KRY 112 489/2
		3	Ericsson KRY 112 144/1
		3	RFS Celwave APXV18-206516S-C-A20

## 3. ANALYSIS PROCEDURE

Table 2 - Documents Provided

STRUCTURAL DATA	Mount Mapping by Paul J. Ford & Company, Project #37519-1585, dated April 10, 2019
PREVIOUS ANALYSES	Structural Analysis by Jacobs Engineering Group, Inc, Project #1305317, dated October 4, 2016 Mount Analysis by CLS Engineering PLLC, Project #: 42284-CTHA133A-01-MA, dated April 29, 2019
LOADING DATA	Crown Castle Order ID 479845 Rev. 1, dated April 12, 2019

### 3.1. Analysis Method

RISA-3D, a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases. This analysis was performed in accordance with Crown Castle's ENG-SOW-10208 Tower Mount Analysis (Revision B).

#### 4. ANALYSIS RESULTS

Table 3 - Mount Component Stresses vs. Capacity

COMPONENT	PEAK USAGE	RESULT
Corner Plates	72%	Pass
Mount Pipes	65%	Pass
Support Rail	45%	Pass
Stand-Off Horizontals	21%	Pass
Platform Base	12%	Pass
Connections	12%	Pass

<b>Structure Rating (max from all components) =</b>	<b>72%</b>
-----------------------------------------------------	------------

Notes:

- 1) See additional documentation in "Appendix C - Software Analysis Output" for calculations supporting the % capacity consumed.

#### 4.1 Conclusion and Recommendations

According to our structural analysis, the mounts have been found to PASS PENDING MODIFICATIONS. The mounting configuration considered in this analysis will be capable of supporting the referenced loading pursuant to referenced standards once the referenced modifications are installed.

**This analysis incorporates modifications per CLS Engineering PLLC, dated June 3, 2019.**

- Install (1) proposed Site Pro 1 PRK-1245 as specified.
- Install Site Pro 1 HRK 12-HD support rail kit at 3'-0" above the existing platform face horizontal. Connect to all existing mount pipes using Site Pro 1 SCX1 crossover plate included in the support rail kit. Installed corner bracing pipes included in the kit in corners as shown in lieu of Site Pro 1 AHCP corner connection kit. Cut support rail pipes to length as needed.

See "Appendix E: Mount Modification Design Drawings (MDD)" for additional details.

## 5. ASSUMPTIONS AND CONDITIONS

This analysis is inclusive of the antenna supporting frames/mounts and all recorded connections that will support the equipment listed in this report. It considers only the theoretical capacity of structural components and it is not a condition assessment. The validity of the analysis may be dependent on the accuracy of structural information supplied by others. The client is responsible for verifying this information. If any provided information is revised after completion of this analysis, CLS Engineering PLLC should be notified immediately to revise results.

This analysis assumes the following:

1. The tower or other superstructure and mounts (if existing) were properly constructed as per the original design and have been properly maintained in accordance with applicable code standards.
2. Member sizes and strengths are accurate as supplied or are assumed as stated in the calculations.
3. In the absence of sufficient design information, all welds and connections are assumed to develop at least the capacity of the connected member, unless otherwise stated in this analysis.
4. All prior structural modifications, if any, are assumed to be correctly installed and fully effective.
5. The loading configuration is complete and accurate as supplied and/or as modeled in the previous analysis. All appurtenances are assumed to be properly installed and supported as per manufacturer requirements.
6. Some conservative assumptions may be used regarding appurtenances and their projected areas based on careful interpretation of data supplied, previous experience and standard industry practice.

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of the report. All opinions and conclusions contained herein are subject to revision based upon receipt of new or updated information. All services are provided exercising a level of care and diligence equivalent to the standard of our profession. No warranty or guarantee, either expressed or implied, is offered. All services are confidential in nature and this report will not be released to any other party without the client's consent. The use of this analysis is limited to the expressed purpose for which it was commissioned and it may not be reused, copied or disseminated for any other purpose without consent from CLS Engineering PLLC.

All services were performed, results obtained and recommendations made in accordance with generally accepted engineering principles and practices. CLS Engineering PLLC is not responsible for the conclusions, opinions or recommendations made by others based on the information supplied in this analysis.

It is not possible to have the fully detailed information necessary to perform a complete and thorough analysis of every structural sub-component of an existing structure. The structural analysis by CLS Engineering PLLC verifies the adequacy of the primary members of the structure. CLS Engineering PLLC provides a limited scope of service in that we cannot verify the adequacy of every weld, bolt, gusset, etc.

**APPENDIX A**  
**SOFTWARE INPUT CALCULATIONS**



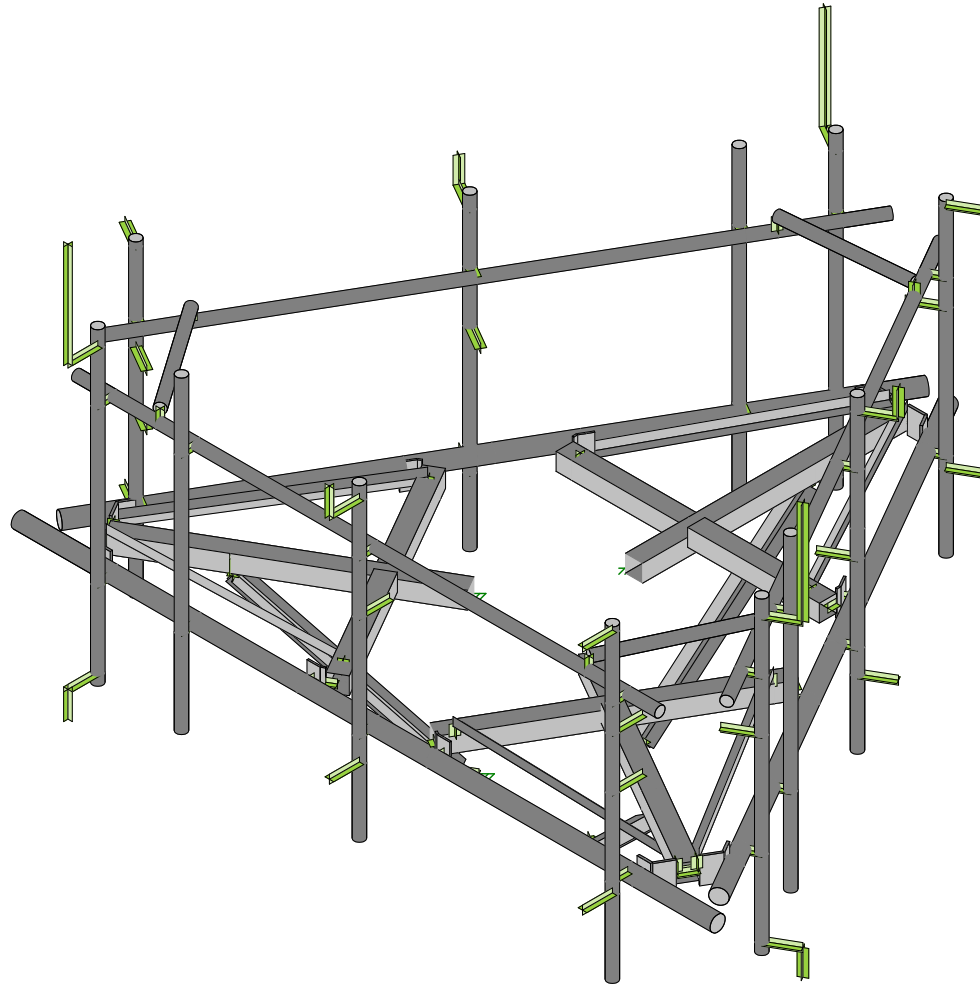
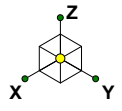
Wind & Ice Loading			
Nominal Mount Elevation (AGL), $z_{mount}$	63 ft	$K_a$	0.90
Nominal Rad Elevation (AGL), $z_{rad}$	65 ft	$K_d$	0.95
TIA Standard	H	$K_z$	1.15
Basic Wind Speed, $V_{ult}$ (bare)	125 mph	$K_{zt}$	1.00
Basic Wind Speed, $V$ (ice)	50 mph	$K_s$	1.00
Design Ice Thickness, $t_i$	2 in	$t_{iz}$	2.13 in
Exposure Category	C	$G_h$	1.00
Risk Category	II	$q_z$ (bare)	43.4 psf
Seismic Response Coeff., $C_s$	-	$q_z$ (ice)	6.9 psf

Live Loading	
At Mount Pipes, $L_M$	500 lb
Joint Labels Considered	m1
	m2
	m3
	m4

Member Distributed Loading				
Section Set Label	Shape Label	$F_A$ (lb/ft)		Ice Wt. (lb/ft)
		Bare	Ice	
Offset Tube	HSS4X4X4	26.04	2.98	18.84
Offset End Plate	0.5 x 6 Plate	39.06	6.43	16.35
Offset Side Plate	0.38 X 6 Plate	39.06	6.42	16.15
Platform Horizontal Pipe	PIPE_3.0	13.67	4.85	14.68
Grating Angle	L2x2x3	13.02	4.43	12.93
Mount Pipe	PIPE_2.0	9.28	4.15	11.75
MOD Support Rail	PIPE_2.0	9.28	4.15	11.75
MOD SR Bracing	PIPE_2.0	9.28	4.15	11.75
MOD PRK	L2.5x2.5x3	16.28	2.86	13.48

Appurtenances																														
Appurtenance Model	Status	Azimuth Offset (°, °)	Rad Elev. Override (ft)	Swap Width & Depth	Area Factor		Qty. per Azimuth			Total Qty. Override	0° Joints		120° Joints		240° Joints		Height (in)	Width (in)	Depth (in)	Weight (Bare) (lb)	Shape	Weight of Ice (lb)	EPA <sub>A</sub> (Bare) (ft²)		EPA <sub>A</sub> (Ice) (ft²)		F <sub>A</sub> (Bare) (lb)		F <sub>A</sub> (Ice) (lb)	
					Front	Side	0°	120°	240°		1	2	1	2	1	2							N	T	N	T	N	T	N	T
APXV18-206516S-C-A20				<input type="checkbox"/>			1	1	1		a1	a2	b1	b2	g1	g2	0	0	0	18.7	Generic	85.95	2.56	1.21	4.44	3.01	100.66	47.58	27.95	18.92
KRY 112 144/1				<input type="checkbox"/>	0.5		1	1	1		t1		t3		t5		7	6	3	11	Flat	13.59	0.18	0.18	0.48	0.68	6.88	6.88	3.04	4.31
RADIO 4449 B12/B71				<input type="checkbox"/>	0.5		1	1	1		r1		r2		r3		15	13.2	10.4	75	Flat	73.64	0.83	1.30	1.40	2.36	32.44	51.12	8.83	14.84
AIR 32 B2A/B66AA				<input type="checkbox"/>			1	1	1		a3	a4	b3	b4	g3	g4	56.6	12.9	8.7	132.2	Flat	196.15	6.51	4.71	9.05	7.12	255.97	185.29	56.96	44.79
KRY 112 489/2				<input type="checkbox"/>	0.2		1	1	1		t2		t4		t6		11	6.1	3.94	15.4	Flat	21.71	0.11	0.37	0.26	1.05	4.40	14.35	1.66	6.59
APXVAARR24_43-U-NA20				<input type="checkbox"/>			1	1	1		a5	a6	b5	b6	g5	g6	95.9	24	8.7	128	Flat	481.96	20.24	8.89	24.52	12.86	795.94	349.50	154.27	80.90

**APPENDIX B**  
**WIRE FRAME AND RENDERED MODELS**



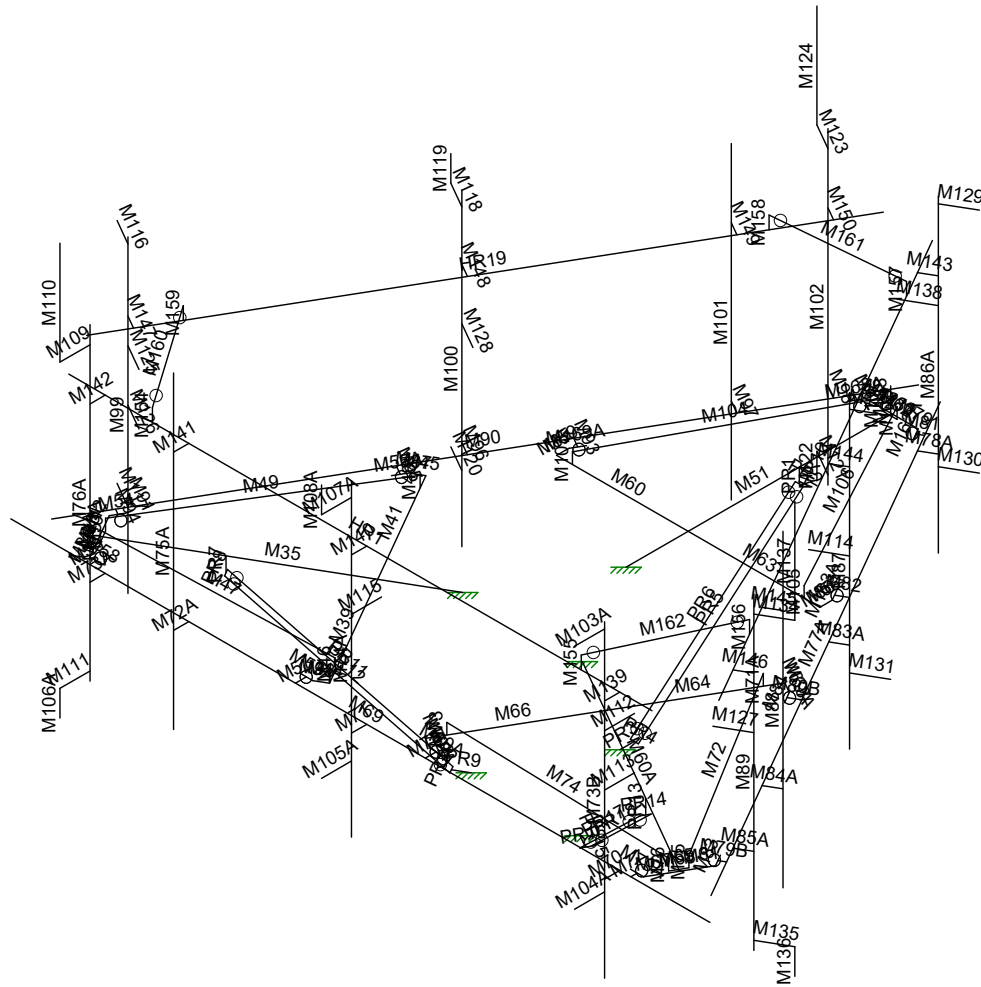
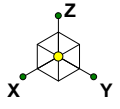
Envelope Only Solution

CLS
JLS
42284-CTHA133A-02-MOD

42284-CTHA133A-HA133/CING/Condo
Rendered

SK - 1
May 30, 2019 at 11:38 AM
42284-CTHA133A-02-MOD.r3d



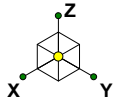


Envelope Only Solution

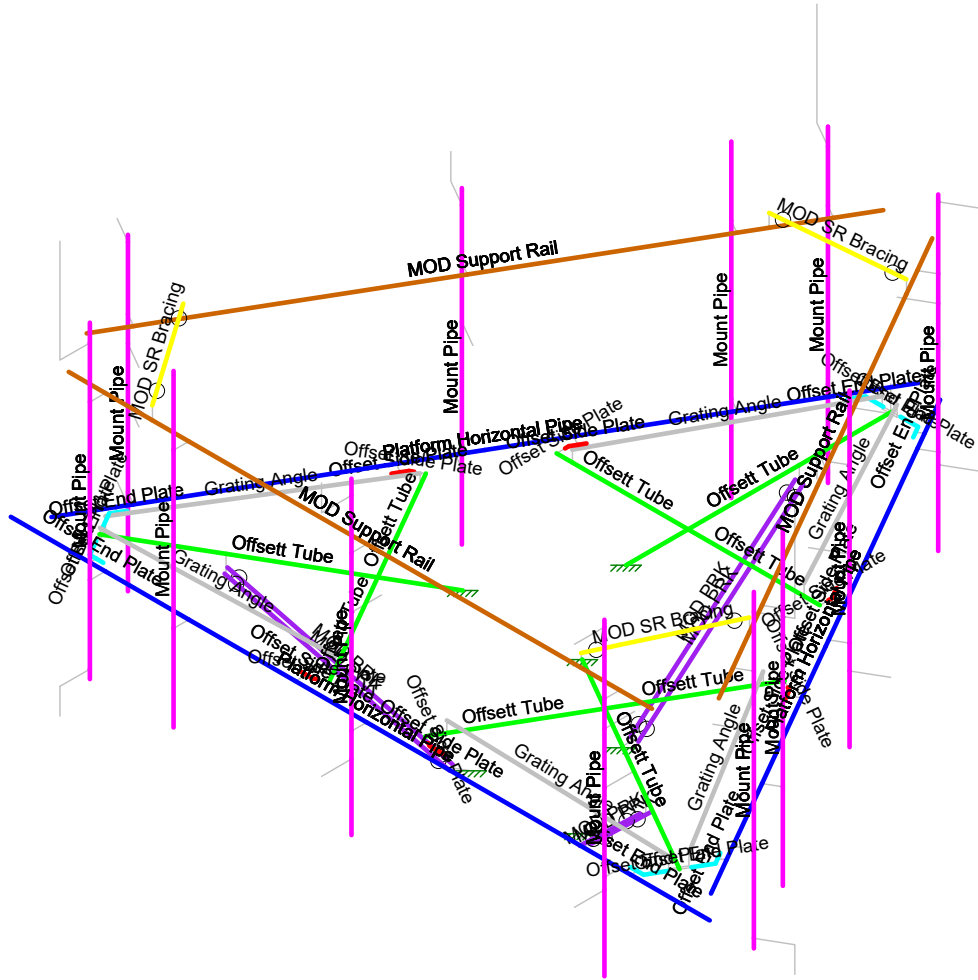
CLS
JLS
42284-CTHA133A-02-MOD

42284-CTHA133A-HA133/CING/Condo  
Member Labels

SK - 3
May 30, 2019 at 11:39 AM
42284-CTHA133A-02-MOD.r3d



Section Sets	
<span style="color: blue;">█</span>	Platform Horizontal Pipe
<span style="color: green;">█</span>	Offset Tube
<span style="color: red;">█</span>	Offset Side Plate
<span style="color: grey;">█</span>	Grating Angle
<span style="color: magenta;">█</span>	Mount Pipe
<span style="color: cyan;">█</span>	Offset End Plate
<span style="color: orange;">█</span>	MOD Support Rail
<span style="color: yellow;">█</span>	MOD SR Bracing
<span style="color: purple;">█</span>	MOD PRK
<span style="color: brown;">█</span>	RIGID



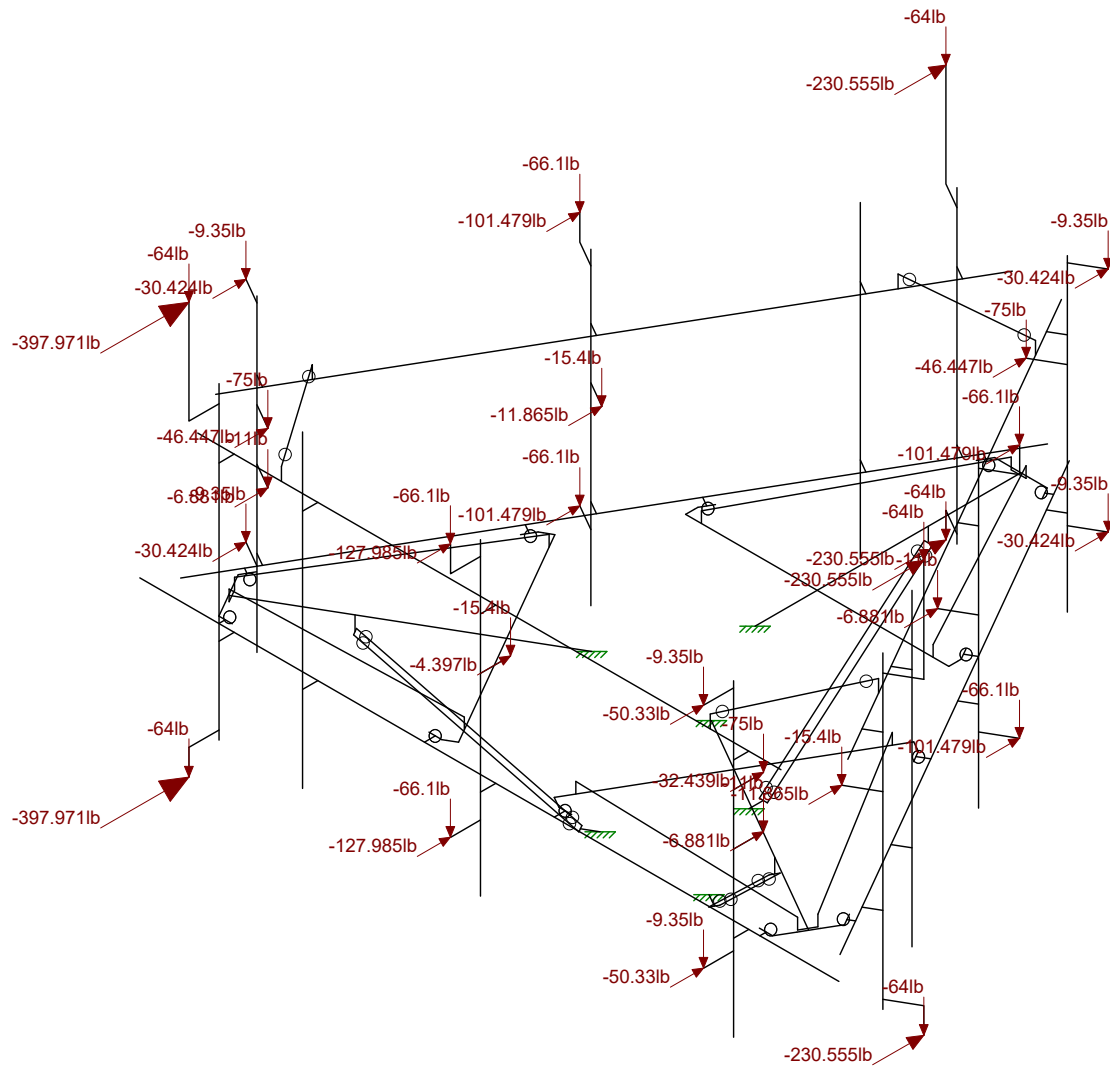
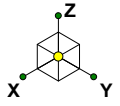
Envelope Only Solution

CLS
JLS
42284-CTHA133A-02-MOD

42284-CTHA133A-HA133/CING/Condo

Section Sets

SK - 4
May 30, 2019 at 11:39 AM
42284-CTHA133A-02-MOD.r3d



Loads: LC 1, DISPLAY (1.0D + 1.0W\_0°)  
Envelope Only Solution

CLS  
JLS  
42284-CTHA133A-02-MOD

42284-CTHA133A-HA133/CING/Condo  
Joint Loads - Dead and Normal Wind

SK - 5  
May 30, 2019 at 11:39 AM  
42284-CTHA133A-02-MOD.r3d











**APPENDIX C**  
**SOFTWARE ANALYSIS OUTPUT**

**Basic Load Cases**

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead	DL			-1	27				
2	Ice Dead	RL				27		66		
4	Structure Wind 0°	None						64		
5	Structure Wind 30°	None						112		
6	Structure Wind 45°	None						132		
7	Structure Wind 60°	None						128		
8	Structure Wind 90°	None						57		
9	Structure Wind 120°	None						128		
10	Structure Wind 135°	None						132		
11	Structure Wind 150°	None						112		
12	Structure Wind w/ Ice 0°	None						64		
13	Structure Wind w/ Ice 30°	None						114		
14	Structure Wind w/ Ice 45°	None						132		
15	Structure Wind w/ Ice 60°	None						128		
16	Structure Wind w/ Ice 90°	None						57		
17	Structure Wind w/ Ice 120°	None						128		
18	Structure Wind w/ Ice 135°	None						132		
19	Structure Wind w/ Ice 150°	None						114		
20	Antenna Wind 0°	None				27				
21	Antenna Wind 30°	None				54				
22	Antenna Wind 45°	None				54				
23	Antenna Wind 60°	None				54				
24	Antenna Wind 90°	None				27				
25	Antenna Wind 120°	None				54				
26	Antenna Wind 135°	None				54				
27	Antenna Wind 150°	None				54				
28	Antenna Wind w/ Ice 0°	None				27				
29	Antenna Wind w/ Ice 30°	None				54				
30	Antenna Wind w/ Ice 45°	None				54				
31	Antenna Wind w/ Ice 60°	None				54				
32	Antenna Wind w/ Ice 90°	None				27				
33	Antenna Wind w/ Ice 120°	None				54				
34	Antenna Wind w/ Ice 135°	None				54				
35	Antenna Wind w/ Ice 150°	None				54				
39	Maintenance Live 500 (1)	OL1				1				
40	Maintenance Live 500 (2)	OL2				1				
41	Maintenance Live 500 (3)	OL3				1				
42	Maintenance Live 500 (4)	OL4				1				

**Load Combinations**

	Description	S...P...S...	BLC	Factor	BLC	Factor	BLC	Factor	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	DISPLAY (1.0D + ...Y...	Y	DL	1	20	1												
2	1.4D	Y...	DL	1.4														
3	1.2D + 1.0W 0°	Y... Y	DL	1.2	4	1	20	1										
4	1.2D + 1.0W 30°	Y... Y	DL	1.2	5	1	21	1										
5	1.2D + 1.0W 45°	Y... Y	DL	1.2	6	1	22	1										
6	1.2D + 1.0W 60°	Y... Y	DL	1.2	7	1	23	1										
7	1.2D + 1.0W 90°	Y... Y	DL	1.2	8	1	24	1										
8	1.2D + 1.0W 120°	Y... Y	DL	1.2	9	1	25	1										
9	1.2D + 1.0W 135°	Y... Y	DL	1.2	10	1	26	1										
10	1.2D + 1.0W 150°	Y... Y	DL	1.2	11	1	27	1										
11	1.2D + 1.0W 180°	Y... Y	DL	1.2	4	-1	20	-1										
12	1.2D + 1.0W 210°	Y... Y	DL	1.2	5	-1	21	-1										
13	1.2D + 1.0W 225°	Y... Y	DL	1.2	6	-1	22	-1										

**Load Combinations (Continued)**

	Description	S...	P...	S...	BLC	Factor	BLC	Factor	BLC	Factor	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
14	1.2D + 1.0W_240°	Y...	Y		DL	1.2	7	-1	23	-1										
15	1.2D + 1.0W_270°	Y...	Y		DL	1.2	8	-1	24	-1										
16	1.2D + 1.0W_300°	Y...	Y		DL	1.2	9	-1	25	-1										
17	1.2D + 1.0W_315°	Y...	Y		DL	1.2	10	-1	26	-1										
18	1.2D + 1.0W_330°	Y...	Y		DL	1.2	11	-1	27	-1										
19	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	12	1	28	1	RL	1								
20	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	13	1	29	1	RL	1								
21	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	14	1	30	1	RL	1								
22	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	15	1	31	1	RL	1								
23	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	16	1	32	1	RL	1								
24	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	17	1	33	1	RL	1								
25	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	18	1	34	1	RL	1								
26	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	19	1	35	1	RL	1								
27	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	12	-1	28	-1	RL	1								
28	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	13	-1	29	-1	RL	1								
29	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	14	-1	30	-1	RL	1								
30	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	15	-1	31	-1	RL	1								
31	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	16	-1	32	-1	RL	1								
32	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	17	-1	33	-1	RL	1								
33	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	18	-1	34	-1	RL	1								
34	1.2D + 1.0Di + 1.0...	Y...	Y		DL	1.2	19	-1	35	-1	RL	1								
35	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	4	.061	20	.061	O...	1.5								
36	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	5	.061	21	.061	O...	1.5								
37	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	6	.061	22	.061	O...	1.5								
38	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	7	.061	23	.061	O...	1.5								
39	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	8	.061	24	.061	O...	1.5								
40	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	9	.061	25	.061	O...	1.5								
41	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	10	.061	26	.061	O...	1.5								
42	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	11	.061	27	.061	O...	1.5								
43	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	4	-.061	20	-.061	O...	1.5								
44	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	5	-.061	21	-.061	O...	1.5								
45	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	6	-.061	22	-.061	O...	1.5								
46	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	7	-.061	23	-.061	O...	1.5								
47	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	8	-.061	24	-.061	O...	1.5								
48	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	9	-.061	25	-.061	O...	1.5								
49	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	10	-.061	26	-.061	O...	1.5								
50	1.2D + 1.5Lm_1 +...	Y...	Y		DL	1.2	11	-.061	27	-.061	O...	1.5								
51	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	4	.061	20	.061	O...	1.5								
52	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	5	.061	21	.061	O...	1.5								
53	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	6	.061	22	.061	O...	1.5								
54	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	7	.061	23	.061	O...	1.5								
55	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	8	.061	24	.061	O...	1.5								
56	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	9	.061	25	.061	O...	1.5								
57	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	10	.061	26	.061	O...	1.5								
58	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	11	.061	27	.061	O...	1.5								
59	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	4	-.061	20	-.061	O...	1.5								
60	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	5	-.061	21	-.061	O...	1.5								
61	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	6	-.061	22	-.061	O...	1.5								
62	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	7	-.061	23	-.061	O...	1.5								
63	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	8	-.061	24	-.061	O...	1.5								
64	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	9	-.061	25	-.061	O...	1.5								
65	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	10	-.061	26	-.061	O...	1.5								
66	1.2D + 1.5Lm_2 +...	Y...	Y		DL	1.2	11	-.061	27	-.061	O...	1.5								
67	1.2D + 1.5Lm_3 +...	Y...	Y		DL	1.2	4	.061	20	.061	O...	1.5								
68	1.2D + 1.5Lm_3 +...	Y...	Y		DL	1.2	5	.061	21	.061	O...	1.5								
69	1.2D + 1.5Lm_3 +...	Y...	Y		DL	1.2	6	.061	22	.061	O...	1.5								
70	1.2D + 1.5Lm_3 +...	Y...	Y		DL	1.2	7	.061	23	.061	O...	1.5								

**Load Combinations (Continued)**

	Description	S...	P...	S...	BLC	Factor	BLC	Factor	BLC	Factor	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	
71	1.2D + 1.5Lm_3 +...	Y			DL	1.2	8	.061	24	.061	O...	1.5											
72	1.2D + 1.5Lm_3 +...	Y			DL	1.2	9	.061	25	.061	O...	1.5											
73	1.2D + 1.5Lm_3 +...	Y			DL	1.2	10	.061	26	.061	O...	1.5											
74	1.2D + 1.5Lm_3 +...	Y			DL	1.2	11	.061	27	.061	O...	1.5											
75	1.2D + 1.5Lm_3 +...	Y			DL	1.2	4	-.061	20	-.061	O...	1.5											
76	1.2D + 1.5Lm_3 +...	Y			DL	1.2	5	-.061	21	-.061	O...	1.5											
77	1.2D + 1.5Lm_3 +...	Y			DL	1.2	6	-.061	22	-.061	O...	1.5											
78	1.2D + 1.5Lm_3 +...	Y			DL	1.2	7	-.061	23	-.061	O...	1.5											
79	1.2D + 1.5Lm_3 +...	Y			DL	1.2	8	-.061	24	-.061	O...	1.5											
80	1.2D + 1.5Lm_3 +...	Y			DL	1.2	9	-.061	25	-.061	O...	1.5											
81	1.2D + 1.5Lm_3 +...	Y			DL	1.2	10	-.061	26	-.061	O...	1.5											
82	1.2D + 1.5Lm_3 +...	Y			DL	1.2	11	-.061	27	-.061	O...	1.5											
83	1.2D + 1.5Lm_4 +...	Y			DL	1.2	4	.061	20	.061	O...	1.5											
84	1.2D + 1.5Lm_4 +...	Y			DL	1.2	5	.061	21	.061	O...	1.5											
85	1.2D + 1.5Lm_4 +...	Y			DL	1.2	6	.061	22	.061	O...	1.5											
86	1.2D + 1.5Lm_4 +...	Y			DL	1.2	7	.061	23	.061	O...	1.5											
87	1.2D + 1.5Lm_4 +...	Y			DL	1.2	8	.061	24	.061	O...	1.5											
88	1.2D + 1.5Lm_4 +...	Y			DL	1.2	9	.061	25	.061	O...	1.5											
89	1.2D + 1.5Lm_4 +...	Y			DL	1.2	10	.061	26	.061	O...	1.5											
90	1.2D + 1.5Lm_4 +...	Y			DL	1.2	11	.061	27	.061	O...	1.5											
91	1.2D + 1.5Lm_4 +...	Y			DL	1.2	4	-.061	20	-.061	O...	1.5											
92	1.2D + 1.5Lm_4 +...	Y			DL	1.2	5	-.061	21	-.061	O...	1.5											
93	1.2D + 1.5Lm_4 +...	Y			DL	1.2	6	-.061	22	-.061	O...	1.5											
94	1.2D + 1.5Lm_4 +...	Y			DL	1.2	7	-.061	23	-.061	O...	1.5											
95	1.2D + 1.5Lm_4 +...	Y			DL	1.2	8	-.061	24	-.061	O...	1.5											
96	1.2D + 1.5Lm_4 +...	Y			DL	1.2	9	-.061	25	-.061	O...	1.5											
97	1.2D + 1.5Lm_4 +...	Y			DL	1.2	10	-.061	26	-.061	O...	1.5											
98	1.2D + 1.5Lm_4 +...	Y			DL	1.2	11	-.061	27	-.061	O...	1.5											

**Hot Rolled Steel Properties**

	Label	E [ksi]	G [ksi]	Nu	Therm (1/E...)	Density[k/ft...]	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	65	1.1
3	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2
7	A1085	29000	11154	.3	.65	.49	50	1.4	65	1.3

**Hot Rolled Steel Section Sets**

	Label	Shape	Type	Design List	Material	Design R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Platform Horizontal Pipe	PIPE 3.0	Beam	None	A53 Gr.B	Typical	2.07	2.85	2.85	5.69
2	Offset Tube	HSS4X4X4	Beam	None	A36 Gr.36	Typical	3.37	7.8	7.8	12.8
3	Offset Side Plate	0.38 X 6 Plate	Beam	None	A36 Gr.36	Typical	2.28	.027	6.84	.105
4	Grating Angle	L2x2x3	Beam	None	A36 Gr.36	Typical	.722	.271	.271	.009
5	Mount Pipe	PIPE 2.0	Beam	None	A53 Gr.B	Typical	1.02	.627	.627	1.25
6	Offset End Plate	0.5 x 6 Plate	Beam	None	A36 Gr.36	Typical	3	.063	9	.237
7	MOD Support Rail	PIPE 2.0	Beam	None	A53 Gr.B	Typical	1.02	.627	.627	1.25
8	MOD SR Bracing	PIPE 2.0	Beam	None	A53 Gr.B	Typical	1.02	.627	.627	1.25
9	MOD PRK	L2.5x2.5x3	Beam	None	A36 Gr.36	Typical	.901	.535	.535	.011

**Hot Rolled Steel Design Parameters**

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torq...	Kyy	Kzz	Cb	Function
1	M51	Offset Tube	62									Lateral
2	M52	Offset End ...	4.128			Lbyy						Lateral
3	M55	Offset Side ...	.875			Lbyy						Lateral
4	M59	Offset Side ...	.875			Lbyy						Lateral
5	M60	Offset Tube	30.688			Lbyy						Lateral
6	M63	Offset Tube	30.687			Lbyy						Lateral
7	M69	Platform Ho...	163			Lbyy						Lateral
8	M79	Offset End ...	4.128			Lbyy						Lateral
9	M104	Grating Angle	53.32			Lbyy						Lateral
10	M106	Grating Angle	53.32			Lbyy						Lateral
11	M162A	Offset End ...	3.122			Lbyy						Lateral
12	M163A	Offset Side ...	3			Lbyy						Lateral
13	M168A	Offset End ...	3.122			Lbyy						Lateral
14	M169A	Offset Side ...	3			Lbyy						Lateral
15	M35	Offset Tube	62									Lateral
16	M36	Offset End ...	4.128			Lbyy						Lateral
17	M37	Offset Side ...	.875			Lbyy						Lateral
18	M38	Offset Side ...	.875			Lbyy						Lateral
19	M39	Offset Tube	30.688			Lbyy						Lateral
20	M41	Offset Tube	30.687			Lbyy						Lateral
21	M42	Offset End ...	4.128			Lbyy						Lateral
22	M47	Grating Angle	53.32			Lbyy						Lateral
23	M49	Grating Angle	53.32			Lbyy						Lateral
24	M54	Offset End ...	3.122			Lbyy						Lateral
25	M55A	Offset Side ...	3			Lbyy						Lateral
26	M58	Offset End ...	3.122			Lbyy						Lateral
27	M59A	Offset Side ...	3			Lbyy						Lateral
28	M60A	Offset Tube	62									Lateral
29	M61	Offset End ...	4.128			Lbyy						Lateral
30	M62A	Offset Side ...	.875			Lbyy						Lateral
31	M63A	Offset Side ...	.875			Lbyy						Lateral
32	M64	Offset Tube	30.688			Lbyy						Lateral
33	M66	Offset Tube	30.687			Lbyy						Lateral
34	M67	Offset End ...	4.128			Lbyy						Lateral
35	M72	Grating Angle	53.32			Lbyy						Lateral
36	M74	Grating Angle	53.32			Lbyy						Lateral
37	M79A	Offset End ...	3.122			Lbyy						Lateral
38	M80A	Offset Side ...	3			Lbyy						Lateral
39	M83	Offset End ...	3.122			Lbyy						Lateral
40	M84	Offset Side ...	3			Lbyy						Lateral
41	M73B	Mount Pipe	72			Lbyy						Lateral
42	M74A	Mount Pipe	72			Lbyy						Lateral
43	M75A	Mount Pipe	72			Lbyy						Lateral
44	M76A	Mount Pipe	72			Lbyy						Lateral
45	M77A	Platform Ho...	146			Lbyy						Lateral
46	M86A	Mount Pipe	72			Lbyy						Lateral
47	M87	Mount Pipe	72			Lbyy						Lateral
48	M88	Mount Pipe	72			Lbyy						Lateral
49	M89	Mount Pipe	72			Lbyy						Lateral
50	M90	Platform Ho...	148			Lbyy						Lateral
51	M99	Mount Pipe	72			Lbyy						Lateral
52	M100	Mount Pipe	72			Lbyy						Lateral
53	M101	Mount Pipe	72			Lbyy						Lateral
54	M102	Mount Pipe	72			Lbyy						Lateral
55	HR1	MOD Supp...	136									Lateral
56	HR10	MOD Supp...	136									Lateral



**Hot Rolled Steel Design Parameters (Continued)**

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torg...	Kyy	Kzz	Cb	Function
57	HR19	MOD Supp...	136									Lateral
58	M160	MOD SR Br...	29.541			Lbyy						Lateral
59	M161	MOD SR Br...	29.541			Lbyy						Lateral
60	M162	MOD SR Br...	29.541			Lbyy						Lateral
61	PR5	MOD PRK	50.531			Lbyy						Lateral
62	PR6	MOD PRK	50.531			Lbyy						Lateral
63	PR11	MOD PRK	50.531			Lbyy						Lateral
64	PR12	MOD PRK	50.531			Lbyy						Lateral
65	PR17	MOD PRK	50.531			Lbyy						Lateral
66	PR18	MOD PRK	50.531			Lbyy						Lateral

**Envelope Joint Reactions**

Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC	
1	N90A	max	1066.167	16	1995.092	16	452.269	64	460.099	3	395.513	5	2070.665	13
2		min	-1873.266	8	-3387.567	8	-58.583	40	-200.538	11	-696.237	61	-2067.719	4
3	N56	max	1581.591	3	3306.204	14	428.99	54	191.62	91	420.102	17	2060.388	18
4		min	-2363.663	11	-1951.074	6	-43.021	94	-419.801	3	-690.419	57	-2067.328	10
5	N88	max	3805.259	3	1379.348	15	347.055	29	507.485	7	373.362	27	2031.888	7
6		min	-2320.182	11	-1379.175	7	12.183	1	-529.414	15	-10.578	3	-2036.476	15
7	P21	max	1663.945	24	2881.272	24	2913.542	24	718.964	24	7.029	16	98.488	13
8		min	-32.836	16	-56.9	16	-65.05	16	-17.067	16	-393.97	25	-104.276	4
9	P13	max	1645.263	30	88.732	6	2882.845	30	22.003	6	19.678	5	98.442	18
10		min	-51.253	6	-2850.449	30	-96.386	6	-693.12	30	-421.904	29	-104.01	10
11	P5	max	125.168	11	67.655	15	2795.041	19	66.541	7	786.105	19	97.063	7
12		min	-3188.127	19	-67.54	7	-115.725	11	-71.626	15	-32.548	11	-102.955	15
13	Totals:	max	4881.748	3	4863.712	15	8689.462	34						
14		min	-4881.748	11	-4863.708	7	2351.383	1						

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

Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	Dir	LC	phi*Pn...	phi*Pn...	phi*Mn...	phi*Mn.....	Eqn	
1	M59A	0.38 X 6 Plate	.326	1.5	4	.720	3	y	11	71019...	73872	584.82	9234 ...	H1-1b
2	M84	0.38 X 6 Plate	.325	1.5	15	.715	3	y	6	71019...	73872	584.82	9234 ...	H1-1b
3	M169A	0.38 X 6 Plate	.336	1.5	9	.711	3	y	17	71019...	73872	584.82	9234 ...	H1-1b
4	M79A	0.5 x 6 Plate	.083	1.479	9	.674	1.479	y	13	94834...	97200	1012.5	12150 ...	H1-1b
5	M80A	0.38 X 6 Plate	.234	3	18	.668	3	y	12	71020...	73872	584.82	9234 ...	H1-1b
6	M55A	0.38 X 6 Plate	.226	3	7	.668	3	y	18	71020...	73872	584.82	9234 ...	H1-1b
7	M163A	0.38 X 6 Plate	.229	3	12	.666	3	y	7	71020...	73872	584.82	9234 ...	H1-1b
8	M54	0.5 x 6 Plate	.081	1.479	14	.647	0	y	18	94834...	97200	1012.5	12150 ...	H1-1b
9	M162A	0.5 x 6 Plate	.082	1.479	3	.634	0	y	7	94834...	97200	1012.5	12150 ...	H1-1b
10	M168A	0.5 x 6 Plate	.108	0	18	.625	0	y	16	94834...	97200	1012.5	12150 ...	H1-1b
11	M58	0.5 x 6 Plate	.108	0	12	.618	0	y	11	94834...	97200	1012.5	12150 ...	H1-1b
12	M83	0.5 x 6 Plate	.107	0	7	.616	0	y	6	94834...	97200	1012.5	12150 ...	H1-1b
13	M38	0.38 X 6 Plate	.323	.875	4	.605	.875	y	11	73624...	73872	584.82	9234 ...	H1-1b
14	M63A	0.38 X 6 Plate	.321	.875	15	.601	.875	y	6	73624...	73872	584.82	9234 ...	H1-1b
15	M59	0.38 X 6 Plate	.326	.875	10	.597	.875	y	17	73624...	73872	584.82	9234 ...	H1-1b
16	M62A	0.38 X 6 Plate	.281	.875	18	.569	.875	y	12	73624...	73872	584.82	9234 ...	H1-1b
17	M55	0.38 X 6 Plate	.275	.875	12	.568	.875	y	7	73624...	73872	584.82	9234 ...	H1-1b
18	M37	0.38 X 6 Plate	.270	.875	7	.568	.875	y	18	73624...	73872	584.82	9234 ...	H1-1b
19	HR10	PIPE 2.0	.376	10.737	7	.445	17.895		5	7658.2...	32130	1871.6...	1871.6.....	H3-6
20	HR1	PIPE 2.0	.365	10.737	12	.427	17.895		11	7658.2...	32130	1871.6...	1871.6.....	H3-6
21	HR19	PIPE 2.0	.357	10.737	18	.423	17.895		16	7658.2...	32130	1871.6...	1871.6.....	H3-6
22	M67	0.5 x 6 Plate	.283	0	10	.348	0	y	5	93104...	97200	1012.5	12150 ...	H1-1b
23	M42	0.5 x 6 Plate	.278	0	15	.332	0	y	10	93104...	97200	1012.5	12150 ...	H1-1b
24	M160	PIPE 2.0	.111	13.216	11	.330	0		11	29878...	32130	1871.6...	1871.6.....	H3-6

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

Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	Dir	LC	phi*Pn	phi*Pn	phi*Mn	phi*Mn	Eqn
25	M162	PIPE 2.0	.111	16.325	6	.330	0	6	29878...	32130	1871.6...	1871.6...	H3-6
26	M161	PIPE 2.0	.108	16.325	16	.325	0	16	29878...	32130	1871.6...	1871.6...	H3-6
27	M79	0.5 x 6 Plate	.278	0	4	.321	0	y	15	93104...	97200	1012.5	12150 ... H1-1b
28	M61	0.5 x 6 Plate	.347	4.128	7	.286	4.128	y	5	93104...	97200	1012.5	12150 ... H1-1b
29	M52	0.5 x 6 Plate	.348	4.128	18	.282	4.128	y	15	93104...	97200	1012.5	12150 ... H1-1b
30	M36	0.5 x 6 Plate	.348	4.128	12	.280	4.128	y	10	93104...	97200	1012.5	12150 ... H1-1b
31	M89	PIPE 2.0	.652	15.158	6	.124	51.158		13	20866...	32130	1871.6...	1871.6... H1-1b
32	M76A	PIPE 2.0	.652	15.158	11	.123	51.158		18	20866...	32130	1871.6...	1871.6... H1-1b
33	M100	PIPE 2.0	.354	49.263	10	.119	26.526		12	20866...	32130	1871.6...	1871.6... H1-1b
34	M74A	PIPE 2.0	.359	49.263	5	.119	26.526		7	20866...	32130	1871.6...	1871.6... H1-1b
35	M87	PIPE 2.0	.348	49.263	15	.118	32.211		17	20866...	32130	1871.6...	1871.6... H1-1b
36	M90	PIPE 3.0	.112	116.8...	11	.117	136.3...		16	28883...	65205	5748.75	5748.75... H1-1b
37	M77A	PIPE 3.0	.096	34.579	16	.117	11.526		5	29521...	65205	5748.75	5748.75... H1-1b
38	M102	PIPE 2.0	.652	15.158	16	.116	51.158		7	20866...	32130	1871.6...	1871.6... H1-1b
39	M69	PIPE 3.0	.097	42.895	6	.115	21.447		11	24233...	65205	5748.75	5748.75... H1-1b
40	M35	HSS4X4X4	.207	40.79	29	.099	0	z	10	10004...	109188	12663	12663 ... H1-1b
41	M60A	HSS4X4X4	.209	40.79	24	.099	0	z	5	10004...	109188	12663	12663 ... H1-1b
42	M101	PIPE 2.0	.375	51.158	8	.096	51.158		7	20866...	32130	1871.6...	1871.6... H1-1b
43	M88	PIPE 2.0	.366	51.158	14	.096	51.158		12	20866...	32130	1871.6...	1871.6... H1-1b
44	M51	HSS4X4X4	.199	40.79	19	.096	0	z	15	10004...	109188	12663	12663 ... H1-1b
45	M75A	PIPE 2.0	.360	51.158	3	.095	51.158		18	20866...	32130	1871.6...	1871.6... H1-1b
46	M86A	PIPE 2.0	.466	51.158	16	.084	20.842		18	20866...	32130	1871.6...	1871.6... H1-1b
47	M99	PIPE 2.0	.469	51.158	11	.076	20.842		12	20866...	32130	1871.6...	1871.6... H1-1b
48	M73B	PIPE 2.0	.468	51.158	6	.072	20.842		7	20866...	32130	1871.6...	1871.6... H1-1b
49	M41	HSS4X4X4	.160	0	30	.052	0	y	28	10687...	109188	12663	12663 ... H1-1b
50	M66	HSS4X4X4	.161	0	25	.052	0	y	23	10687...	109188	12663	12663 ... H1-1b
51	M63	HSS4X4X4	.159	0	19	.051	0	y	33	10687...	109188	12663	12663 ... H1-1b
52	M39	HSS4X4X4	.147	30.688	29	.048	3.23	z	11	10687...	109188	12663	12663 ... H1-1b
53	M64	HSS4X4X4	.148	30.688	23	.048	3.23	z	6	10687...	109188	12663	12663 ... H1-1b
54	M60	HSS4X4X4	.143	30.688	34	.047	3.23	z	17	10687...	109188	12663	12663 ... H1-1b
55	M106	L2x2x3	.201	53.32	33	.012	53.32	z	33	8681.4...	23392.8	557.717	1239.29... H2-1
56	M49	L2x2x3	.201	53.32	27	.012	53.32	z	27	8681.4...	23392.8	557.717	1239.29... H2-1
57	M74	L2x2x3	.202	53.32	22	.012	53.32	z	22	8681.4...	23392.8	557.717	1239.29... H2-1
58	M72	L2x2x3	.189	0	6	.008	53.32	y	23	8681.4...	23392.8	557.717	1166.57... H2-1
59	M47	L2x2x3	.189	0	11	.008	53.32	y	28	8681.4...	23392.8	557.717	1169.8... H2-1
60	M104	L2x2x3	.188	0	16	.008	53.32	y	34	8681.4...	23392.8	557.717	1175.0... H2-1
61	PR18	L2.5x2.5x3	.188	25.266	22	.005	50.531	z	23	16255...	29192.4	872.574	1733.1... H2-1
62	PR17	L2.5x2.5x3	.166	25.266	27	.005	0	y	23	16255...	29192.4	872.574	1733.1... H2-1
63	PR11	L2.5x2.5x3	.164	25.266	32	.005	50.531	y	28	16255...	29192.4	872.574	1733.1... H2-1
64	PR12	L2.5x2.5x3	.186	25.266	27	.005	50.531	z	28	16255...	29192.4	872.574	1733.1... H2-1
65	PR6	L2.5x2.5x3	.182	25.266	33	.005	0	z	34	16255...	29192.4	872.574	1733.1... H2-1
66	PR5	L2.5x2.5x3	.160	25.266	22	.005	50.531	y	34	16255...	29192.4	872.574	1733.1... H2-1

**APPENDIX D**  
**ADDITIONAL CALCULATIONS**

Member/Node Number	Load Comb.	Tensile Load, $T_u$ (kips)	Shear Load, $V_u$ (kips)	Bolt Diameter (in)	Number of Bolts	Shear Planes per Bolt	Bolt Tensile Strength, $F_{nt}$ (ksi)	Bolt Shear Strength, $F_{nv}$ (ksi)	Connected Member Thickness (in)	Connected Member Edge Clear Distance (in)	Connected Member Ultimate Strength, $F_u$ (ksi)	Bolt Tensile Usage	Bolt Shear Usage	Member Bearing Usage
M183	15	2.498	0.658	0.625	1	1	90	54	0.625	1.5	58	<b>12%</b>	<b>5%</b>	<b>2%</b>
M73A	3	0.528	0.207	0.5	2	1	45	27				<b>4%</b>	<b>3%</b>	-

**APPENDIX E**  
**MOUNT MODIFICATION DESIGN DRAWINGS (MDD)**



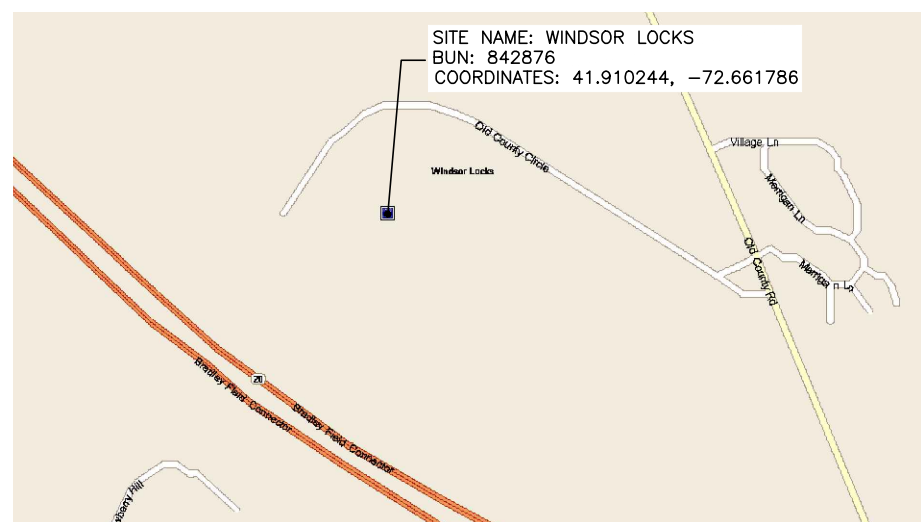
12920 SE 38TH STREET  
BELLEVUE, WA 98006

CARRIER SITE NAME | NUMBER: HA133/CING/CONDO | CTHA133A  
BUN | ORDER ID: 842876 | 479845 REV. #1  
CROWN CASTLE SITE NAME: WINDSOR LOCKS  
STRUCTURE TYPE: 101'-0" MONOPOLE  
PROJECT SCOPE: MOUNT REINFORCEMENT

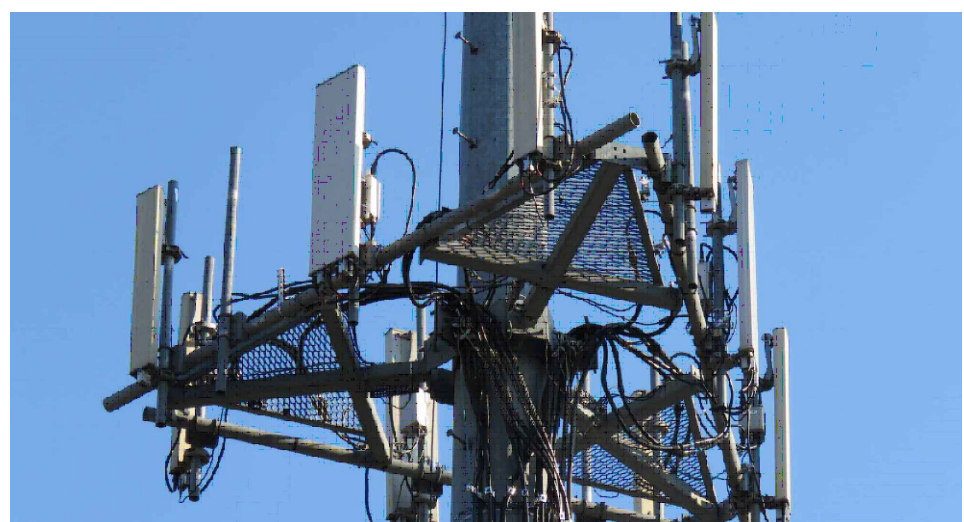


CLS PROJECT ID: 42284-842876-479845  
COA# PEC.001833 EXP. 08/14/2019

**LOCATION MAP**



**STRUCTURE ELEVATION PHOTOGRAPH**



**DRAWING INDEX**

SHEET	SHEET DESCRIPTION	REV
T-1	TITLE SHEET & DRAWING INDEX	0
GN-1	STRUCTURAL NOTES	0
IN-1	MODIFICATION INSPECTION NOTES	0
S-1	MOUNT VIEWS & MODIFICATION SCHEDULE	0
S-2	MODIFICATION DETAIL VIEWS	0

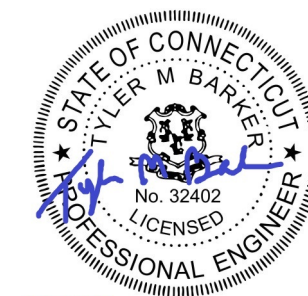
**REVISIONS**

REV.	DATE	DESCRIPTION	INITIALS
A	06/03/19	PRELIMINARY ISSUE	CWD
0	06/03/19	FOR CONSTRUCTION	CWD

NOT FOR CONSTRUCTION UNLESS LABELED AS CONSTRUCTION SET

**SCOPE OF WORK**

- THIS MODIFICATION PLAN HAS BEEN DESIGNED UTILIZING THE STRUCTURAL ANALYSIS BY CLS ENGINEERING, REPORT #42284-CTHA133A-02-MOD, DATED MAY 30, 2019.
- FULL MODIFICATION SCHEDULE CAN BE FOUND ON S-1.
- CONTRACTOR SHALL SCHEDULE A SITE VISIT TO CONFIRM ALL EXISTING STRUCTURE DIMENSIONS, SITE CONSTRAINTS, PROPOSED REINFORCING DIMENSIONS, THE CLEARANCES OF THE PROPOSED REINFORCING, EXISTING FOUNDATION INFORMATION, EXISTING SITE UTILITIES, AND ALL OTHER INFORMATION NECESSARY TO PERFORM THE WORK ON THESE DRAWINGS IN ORDER TO ELIMINATE THE RISK OF RFIS ONCE CONSTRUCTION AND FABRICATION HAVE BEGUN. THE CONTRACTOR SHALL NOT BEGIN FABRICATION OR CONSTRUCTION PRIOR TO PERFORMING THIS SITE VISIT AND VALIDATING THE INFORMATION ON THESE DRAWINGS AND ANY ADDITIONAL INFORMATION THE CONTRACTOR NEEDS TO PERFORM THE WORK.
- THE CONTRACTOR SHALL PERFORM THIS PRE-CONSTRUCTION WORK AND REPORT ALL DISCREPANCIES TO THE CUSTOMER AND THE ENGINEER OF RECORD OR BE LIABLE FOR THE LABOR & MATERIALS FOR DISCREPANCIES NOT CAUGHT BY THE CONTRACTOR'S DUE DILIGENCE SITE VISIT.



Tyler M. Barker  
CLS Engineering, PLLC  
Director of Engineering  
PE # 32402 Exp. 1/31/2020  
COA # PEC.001833 Exp. 8/14/2019  
6/3/2019

PE# 32402 EXP: 1/31/2020

HA133/CING/CONDO  
CARRIER SITE NUMBER: CTHA133A  
BUN: 842876  
1000 OLD COUNTY CIRCLE  
WINDSOR LOCKS, CT 06096

SHEET TITLE  
TITLE SHEET &  
DRAWING INDEX

SHEET NUMBER

**T-1**

**DRIVING DIRECTIONS**

FROM BRADLEY INTERNATIONAL AIRPORT.  
DEPART BRADLEY INTL. AIRPORT TOWARD BRADLEY FIELD CONNECTOR. IN 0.4 MILES KEEP RIGHT ONTO BRADLEY FIELD CONNECTOR. IN 0.9 MILES ROAD NAME CHANGES TO CT-20 E. IN 2.3 MILES TAKE RAMP RIGHT AND FOLLOW SIGNS FOR KENNEDY RD/ OLD COUNTY RD. IN 0.3 MILES TURN LEFT ONTO KENNEDY RD. IN 282 FT ROAD NAME CHANGES TO OLD COUNTY RD. IN 0.4 MILES TURN LEFT ONTO OLD COUNTY CIRCLE. IN 0.3 MILES ARRIVE AT SITE ACCESS ON THE LEFT.

**PROJECT TEAM**

**ENGINEER/ARCHITECT:**  
CLS ENGINEERING, PLLC.  
319 CHAPANOKE ROAD, SUITE 118  
RALEIGH, NC 27603  
(405) 348-5460

**STRUCTURE OWNER:**  
CROWN CASTLE  
2000 CORPORATE DRIVE  
CANONSBURG, PA 15317

**OWNER SITE NAME:**  
WINDSOR LOCKS

**APPLICANT/CUSTOMER:**  
T-MOBILE  
12920 SE 38TH STREET  
BELLEVUE, WA 98006

**BUN:**  
842876

**PROJECT INFORMATION**

STRUCTURE TYPE:	MONOPOLE
STRUCTURE HEIGHT:	101'-0"
LATITUDE:	41.910244 (NAD 83)
LONGITUDE:	-72.661786 (NAD 83)
ADDRESS:	842876 - WINDSOR LOCKS 1000 OLD COUNTY CIRCLE WINDSOR LOCKS, CT 06096
COUNTY:	HARTFORD
CODE JURISDICTION:	TOWN OF WINDSOR LOCKS
GROUND ELEVATION:	148' AMSL

**ONE CALL**



CALL CONNECTICUT ONE-CALL  
3 DAYS BEFORE YOU DIG  
811 OR 1-800-922-4455

**DO NOT SCALE DRAWINGS**

CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ARCHITECT OR ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR THE SAME.

T:\CROWN CASTLE\42284 - CROWN MOUNT ANALYSIS\842876-479845.DWG - MOD\CAD\42284-842876-479845.DWG - CLS PROJECT ID: 42284-842876-479845



## GENERAL NOTES

- THESE MODIFICATIONS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE GOVERNING PROVISIONS OF TIA/EIA-222, ASCE 7, AWS, ACI, AND AISC. MATERIALS AND SERVICES PROVIDED BY THE CONTRACTOR SHALL CONFORM TO THE ABOVE-MENTIONED CODES AND THE CONTRACT SPECIFICATIONS.
- ALL MATERIALS UTILIZED FOR THIS PROJECT MUST BE NEW AND FREE OF ANY DEFECTS.
- ALL PRODUCT OR MATERIAL SUBSTITUTIONS PROPOSED BY THE CONTRACTOR SHALL BE APPROVED IN WRITING BY THE ENGINEER. CONTRACTOR SHALL PROVIDE DOCUMENTATION TO ENGINEER SUITABLE TO DETERMINE IF SUBSTITUTE IS ACCEPTABLE FOR USE AND MEETS THE ORIGINAL DESIGN CRITERIA. DIFFERENCES FROM THE ORIGINAL DESIGN, INCLUDING MAINTENANCE, REPAIR AND REPLACEMENT, SHALL BE NOTED. ESTIMATES OF COSTS/CREDITS ASSOCIATED WITH THE SUBSTITUTION (INCLUDING RE-DESIGN COSTS AND COSTS TO SUB-CONTRACTORS) SHALL BE PROVIDED TO THE ENGINEER. CONTRACTOR SHALL PROVIDE ADDITIONAL DOCUMENTATION AND/OR SPECIFICATIONS TO THE ENGINEER AS REQUESTED.
- PROVIDE STRUCTURAL STEEL SHOP DRAWING(S) TO THE ENGINEER OF RECORD FOR APPROVAL PRIOR TO FABRICATION.
- UNLESS NOTED OTHERWISE, ALL NEW MEMBERS AND REINFORCING SHALL MAINTAIN THE EXISTING MEMBER WORK LINES AND NOT INTRODUCE ECCENTRICITIES INTO THE STRUCTURE.
- ANY CONTRACTOR-CAUSED DAMAGE TO PROPERTY OF THE LAND OWNER, PROPERTY OF THE STRUCTURE OWNER, PROPERTY OF THE CUSTOMER, SITE FENCING OR GATES, ANY AND ALL UTILITY AND/OR SERVICE LINES, SHOWN OR NOT SHOWN ON THE PLANS, SHALL BE REPAIRED OR REPLACED AT THE SOLE COST OF THE CONTRACTOR AND SHALL BE ACCOMPLISHED BY THE CONTRACTOR OR SUBCONTRACTOR AS APPROVED BY THE ENGINEER OF RECORD AND LAND OWNER. DAMAGE TO EQUIPMENT OR PROPERTY OF ANY KIND BELONGING TO OTHER COMPANIES (BESIDES THE INDICATED CUSTOMER) SHALL BE ADDRESSED BY THE CONTRACTOR WITH THE COMPANIES THAT OWN THE DAMAGED ITEMS.

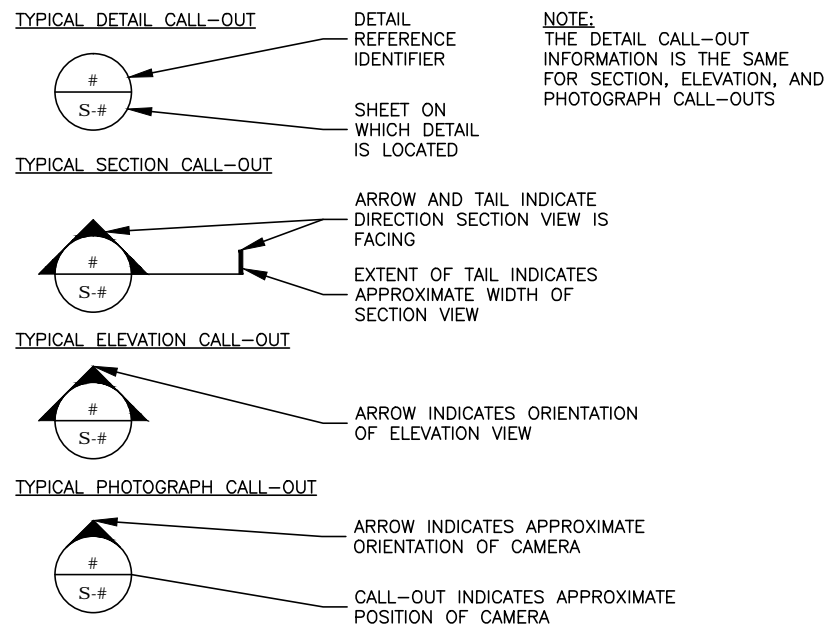
## STRUCTURAL STEEL NOTES

- STRUCTURAL STEEL SHALL COMPLY WITH THE FOLLOWING SPECIFICATIONS:
  - STRUCTURAL STEEL SHAPES, PLATES AND BARS (EXCEPT W-SHAPES)- ASTM A36,  $F_y=36$  KSI
  - PIPES - ASTM A53, GRADE B,  $F_y=35$  KSI
  - HSS-SHAPES - ASTM A500, GRADE B,  $F_y=42$  KSI (ROUND)  
 $F_y=46$  KSI (SQUARE & RECTANGULAR)
  - ANCHOR & ALL-THREAD RODS - ASTM F1554, GRADE 55
  - STRUCTURAL BOLTS  $1/2"$  AND LARGER - ASTM A325
  - STRUCTURAL BOLTS SMALLER THAN  $1/2"$  - DIMENSIONS: ASME B18.2.1  
MATERIAL: SAE J429 GRADE 5 | THREADING: ASME B1.1, UNC, CLASS 2A | FINISH: HOT-DIP GALVANIZED OR ZINC-PLATED
  - SHEET METAL SCREWS - DIMENSIONS: ASME B18.6.3  
MATERIAL: SAE J933 | FINISH: HOT-DIP GALVANIZED OR ZINC-PLATED
  - NUTS FOR BOLTS/ALL-THREAD - ASTM A563 (THREADING TO MATCH BOLT)
  - WASHERS FOR BOLTS/ALL-THREAD - ASTM F436
  - W & WT SHAPES - ASTM A36,  $F_y=36$  KSI  
ALTERNATE SPEC: ASTM A992 (IF OTHER SPEC IS UNAVAILABLE)
- STRUCTURAL BOLTS SHALL CONFORM TO THIS NOTE. ALL BOLT HOLES SHALL BE STANDARD SIZE BOLT HOLES PER AISC 360, UNLESS OTHERWISE NOTED. ALL HOLES SHALL BE SHOP DRILLED OR SUB-PUNCHED AND REAMED. BURNING OF HOLES IS NOT PERMITTED. WHERE SLOTTED OR OVERSIZE HOLES ARE SPECIFIED ON THE DRAWINGS, EXTRA-THICK ASTM F436 PLATE WASHERS SHALL BE USED ( $5/16"$  MINIMUM THICKNESS) WITH A DIAMETER SUITABLE TO COVER THE EXTENTS OF THE SLOT OR HOLE. BOLTS SHALL BE HEAVY-HEX WHERE AVAILABLE IN THE SIZE AND GRADE SPECIFIED, OTHERWISE BOLTS SHALL BE HEX HEAD CAP SCREWS.
- ALL STEEL HARDWARE, INCLUDING ADHESIVE OR EMBEDDED ANCHOR BOLTS AND THEIR ACCESSORIES, SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153 (EXCEPT BOLTS SMALLER THAN  $1/2"$  SHALL CONFORM TO FE/ZN 3 AT PER ASTM F1941 WHERE HOT-DIP GALVANIZED BOLTS ARE NOT AVAILABLE). ALL STEEL MEMBERS, INCLUDING WELDMENTS, SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A123. REPAIR DAMAGE TO GALVANIZED COATINGS USING ASTM A780 PROCEDURES WITH A ZINC RICH PAINT (SUCH AS ZRC GALVILITE) FOR GALVANIZING DAMAGED BY HANDLING, TRANSPORTING, CUTTING, WELDING, OR BOLTING. DO NOT HEAT SURFACES TO WHICH REPAIR PAINT HAS BEEN APPLIED. CALL OUT HOLES REQUIRED FOR HOT-DIP GALVANIZING ON SHOP DRAWINGS.
- WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1 "STRUCTURAL WELDING CODE - STEEL". WELD ELECTRODES SHALL BE E70XX. UNLESS OTHERWISE NOTED, PROVIDE CONTINUOUS FILLET WELDS WITH MINIMUM SIZE OF  $3/16$  INCH OR OF A SIZE EQUAL TO THE THICKNESS OF THE THINNER MATERIAL BEING JOINED (WHICHEVER IS LESS). FOR ACUTE OR OBTUSE JOINT ANGLES, THE FILLET WELD LEG SIZE SHALL BE ADJUSTED AS REQUIRED TO MAINTAIN THE EFFECTIVE THROAT OF A  $3/16$  INCH FILLET WELD IN A  $90^\circ$  JOINT. ALL WELD SIZES SHOWN IN INCHES.
- PRIOR TO WELDING, THE CONTRACTOR SHALL SUBMIT CERTIFICATION FOR EACH WELDER STATING THE TYPE OF WELDING AND POSITIONS QUALIFIED FOR, THE CODE AND PROCEDURE QUALIFIED UNDER, DATE QUALIFIED, AND THE FIRM AND INDIVIDUAL CERTIFYING THE QUALIFICATION TESTS. THIS INFORMATION SHALL BE SUBMITTED TO THE MODIFICATION INSPECTOR (SEE SHEET S-003) AS WELL AS ANY THIRD-PARTY CERTIFIED WELD INSPECTOR (CWI).
- MEMBERS SHALL BE SHOP-FABRICATED AND WELDED TO THE EXTENT PRACTICABLE IN ORDER TO REDUCE FIELD INSTALLATION COSTS.

## CONTRACTOR NOTES

- PRIOR TO BEGINNING CONSTRUCTION, ALL CONTRACTORS AND SUBCONTRACTORS MUST ACKNOWLEDGE IN WRITING TO STRUCTURE OWNER THAT THEY HAVE OBTAINED, UNDERSTAND, AND WILL FOLLOW STRUCTURE OWNER STANDARDS OF PRACTICE, CONSTRUCTION GUIDELINES, ALL SITE AND STRUCTURE/TOWER SAFETY PROCEDURES, ALL PRODUCT LIMITATIONS AND INSTALLATION PROCEDURES USED ON SITE, AND PROPOSED MODIFICATIONS DESCRIBED. RECEIPT OF ACKNOWLEDGEMENT MUST OCCUR PRIOR TO BEGINNING CONSTRUCTION OR CLIMBING. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO PROVIDE THIS DOCUMENTATION FOR STRUCTURE OWNER ON COMPANY LETTERHEAD AND THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO OBTAIN THIS DOCUMENTATION FROM ANY SUBCONTRACTORS (ON SUBCONTRACTOR LETTERHEAD) AND DELIVER IT TO THE STRUCTURE OWNER.
- IF THE CONTRACTOR DISCOVERS ANY EXISTING CONDITIONS THAT ARE NOT REPRESENTED ON THESE DRAWINGS, OR ANY CONDITIONS THAT WOULD INTERFERE WITH THE INSTALLATION OF THE MODIFICATIONS, THE ENGINEER OF RECORD SHALL BE CONTACTED IMMEDIATELY TO EVALUATE THE SIGNIFICANCE OF THE DEVIATION.
- THE CONTRACTOR SHALL SOLICIT AND HIRE THE SERVICES OF A QUALIFIED MODIFICATION INSPECTOR PRIOR TO BEGINNING CONSTRUCTION. THE MODIFICATION INSPECTOR MAY BE AN EMPLOYEE OF THE CONTRACTOR'S FIRM, HOWEVER THE INSPECTOR'S ONLY DUTIES SHALL BE INSPECTION, TESTING, AND REPORT CREATION AS REQUIRED ON THE "MODIFICATION INSPECTION NOTES" SHEET. THE INSPECTOR SHALL BE QUALIFIED AS A REGISTERED PROFESSIONAL ENGINEER (PE) OR AS AN ENGINEERING INTERN (EI) OR ENGINEER IN TRAINING (EIT) UNDER THE SUPERVISION OF A REGISTERED PROFESSIONAL ENGINEER (PE). IT IS ALSO ACCEPTABLE FOR THE CONTRACTOR TO SUBCONTRACT THE MODIFICATION INSPECTOR DUTIES TO A THIRD PARTY FIRM MEETING THE ABOVE REQUIREMENTS.
- THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF RECORD AND TOWER OWNER OF THE PLANNED CONSTRUCTION & INSPECTION SCHEDULE, AS WELL AS ANY CHANGES TO THE SCHEDULE, WITHIN TWO BUSINESS DAYS OF THE COMPLETION OF THE SCHEDULE OR SCHEDULE REVISION BOTH PRIOR TO BEGINNING CONSTRUCTION AND DURING CONSTRUCTION AS THE SCHEDULE CHANGES. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF RECORD WHEN PHASES OF CONSTRUCTION HAVE BEEN MOVED UP AND SHALL GIVE THE ENGINEER ADEQUATE NOTICE SO THAT THE ENGINEER OF RECORD MAY, AT THEIR DISCRETION, INSPECT PORTIONS OF THE WORK THAT ARE DEEMED CRITICAL TO THE INTEGRITY OF THE STRUCTURE. FAILURE TO PROVIDE THIS NOTICE MAY RESULT IN REJECTION OF THE CONTRACTOR'S WORK. THE CONTRACTOR SHALL ALSO NOTIFY THE ENGINEER OF RECORD AND THE STRUCTURE OWNER WHEN THE WORK HAS BEEN COMPLETED WITHIN 2 BUSINESS DAYS OF THE COMPLETION OF THE WORK AND ASSOCIATED MODIFICATION INSPECTIONS & TESTING.
- IT IS ASSUMED THAT ANY STRUCTURAL MODIFICATION WORK SPECIFIED ON THESE PLANS WILL BE ACCOMPLISHED BY KNOWLEDGEABLE WORKMEN WITH TOWER CONSTRUCTION EXPERIENCE. THIS INCLUDES PROVIDING THE NECESSARY CERTIFICATIONS TO THE STRUCTURE OWNER AND ENGINEER INCLUDING BUT NOT LIMITED TO TOWER CLIMBER AND RESCUE CLIMBER CERTIFICATIONS, QUALIFIED WELDER CERTIFICATES, CERTIFIED WELDING INSPECTOR CREDENTIALS, ET CETERA.
- THESE DRAWINGS DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION METHODS, MEANS, TECHNIQUES, SEQUENCES AND PROCEDURES.
- CONTRACTOR SHALL WORK WITHIN THE LIMITS OF THE STRUCTURE OWNER'S PROPERTY OR LEASE AREA AND APPROVED EASEMENTS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY WORK IS WITHIN THESE BOUNDARIES. CONTRACTOR SHALL EMPLOY A SURVEYOR AS REQUIRED. ANY WORK OUTSIDE THESE BOUNDARIES SHALL BE APPROVED IN WRITING BY THE LAND OWNER PRIOR TO MOBILIZATION. CONSTRUCTION STAKING AND BOUNDARY MARKING IS THE RESPONSIBILITY OF THE CONTRACTOR.

## SYMBOLS AND CALL-OUTS



## STANDARD ABBREVIATIONS

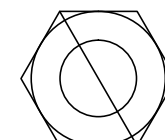
AFF	ABOVE FINISHED FLOOR	LONG	LONGITUDINAL
ARCH	ARCHITECT, -URAL	MAS	MASONRY
BLDG	BUILDING	MATL	MATERIAL
BOD	BOTTOM OF DECK	MAX	MAXIMUM
BOT	BOTTOM	MECH	MECHANICAL
BRCG	BRACING	MFR	MANUFACTURER
BRDG	BRIDGING	MIN	MINIMUM
C	CHANNEL	MOD	MODIFICATION
CL	CENTER LINE	MPH	MILES PER HOUR
CLR	CLEAR	MRI	MEAN RECURRENCE INTERVAL
CMU	CONCRETE MASONRY UNIT	#	NUMBER
CONC	CONCRETE	NTS	NOT TO SCALE
CONT	CONTINUOUS	OC	ON CENTER
DIA (OR) Ø	DIAMETER	OPH	OPPOSITE HAND
DWGS	DRAWINGS	OPNG	OPENING
EA	EACH	PC	PIECE
EL	ELEVATION	PL	PLATE
EQ, EQUIV	EQUAL, EQUIVALENT	PSF	POUNDS PER SQUARE FOOT
EW	EACH WAY	PSI	POUNDS PER SQUARE INCH
EXIST	EXISTING	REF	REFERENCE
' OR FT	FEET (DIMENSION)	REINF	REINFORCE/REINFORCEMENT
f'c	COMPRESSIVE STRESS	REQD	REQUIRED
FDN	FOUNDATION	REV	REVISION
FTG	FOOTING	SF	SQUARE FEET
GALV	GALVANIZED	SIM	SIMILAR
HORIZ	HORIZONTAL	SR	SOLID ROUND (SHAPE)
HSS	HOLLOW STRUCTURAL SHAPES	STD	STANDARD
		T&B	TOP AND BOTTOM
KIP	KILOPOUNDS (1000 LBS PER UNIT)	THK	THICKNESS
KSI	KIPS PER SQUARE INCH	TOF	TOP OF FOOTING
" OR IN	INCH	TOM	TOP OF MASONRY
L	ANGLE	TOS	TOP OF STEEL
LB	POUND	TYP	TYPICAL
LLH	LONG LEG HORIZONTAL	UON	UNLESS OTHERWISE NOTED
LLV	LONG LEG VERTICAL	VERT	VERTICAL
		W/	WITH

## BOLT TIGHTENING PROCEDURE

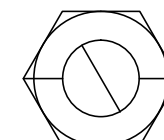
- TIGHTEN BOLTS BY AISC "TURN OF THE NUT" METHOD USING THE CHART BELOW:
  - BOLT LENGTHS UP TO AND INCLUDING FOUR DIAMETERS:  
+1/3 TURN BEYOND SNUG TIGHT
  - BOLT LENGTHS OVER FOUR AND UP TO EIGHT DIAMETERS:  
+1/2 TURN BEYOND SNUG TIGHT
  - BOLT LENGTHS OVER EIGHT AND UP TO TWELVE DIAMETERS:  
+2/3 TURN BEYOND SNUG TIGHT
- SPLICE BOLTS SUBJECT TO DIRECT TENSION SHALL BE INSTALLED AND TIGHTENED AS PER SECTION 8(d)(1) OF THE AISC MANUAL OF STEEL CONSTRUCTION. THE INSTALLATION PROCEDURE IS AS FOLLOWS:
 

"FASTENERS SHALL BE INSTALLED IN PROPERLY ALIGNED HOLES AND BE TIGHTENED BY ONE OF THE METHODS DESCRIBED IN SUBSECTION 8(d)(1) THROUGH 8(d)(4).

8(d)(1) TURN-OF-THE-NUT TIGHTENING.  
BOLTS SHALL BE INSTALLED IN ALL HOLES OF THE CONNECTION AND BROUGHT TO A SNUG TIGHT CONDITION. SNUG TIGHT IS DEFINED AS THE TIGHTNESS THAT EXISTS WHEN THE PLIES OF A JOINT ARE IN FIRM CONTACT. THIS MAY BE OBTAINED BY A FEW IMPACTS OF AN IMPACT WRENCH OR THE FULL EFFORT OF A MAN USING AN ORDINARY SPUD WRENCH. SNUG TIGHTENING SHALL PROGRESS SYSTEMATICALLY...UNTIL ALL THE BOLTS ARE SIMULTANEOUSLY SNUG TIGHT AND THE CONNECTION IS FULLY COMPACTED. FOLLOWING THIS INITIAL OPERATION, ALL BOLTS IN THE CONNECTION SHALL BE TIGHTENED FURTHER BY THE APPLICABLE AMOUNT OF ROTATION SPECIFIED ABOVE. DURING THE TIGHTENING OPERATION, THERE SHALL BE NO ROTATION OF THE PART NOT TURNED BY THE WRENCH. TIGHTENING SHALL PROGRESS SYSTEMATICALLY.

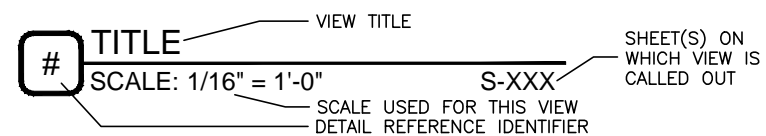


BEFORE 1/3 TURN



AFTER 1/3 TURN

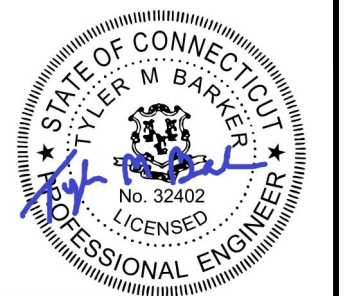
## SECTION / ELEVATION / DETAIL VIEW CALLOUTS



CLS PROJECT ID: 42284-842876-479845  
COA # PEC.001833 EXP. 08/14/2019

REVISIONS			
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NOT FOR CONSTRUCTION UNLESS LABELED AS CONSTRUCTION SET



Tyler M. Barker  
CLS Engineering, PLLC  
Director of Engineering  
PE # 32402 Exp. 1/31/2020  
COA # PEC.001833 Exp. 8/14/2019

6/3/2019

PE# 32402 EXP: 1/31/2020

HA133/CING/CONDO  
CARRIER SITE NUMBER: CTHA133A  
BUN: 842876  
1000 OLD COUNTY CIRCLE  
WINDSOR LOCKS, CT 06096

SHEET TITLE  
STRUCTURAL NOTES

SHEET NUMBER  
GN-1

T:\CROWN CASTLE\42284 - CROWN MOUNT ANALYSIS\842876-42284 - MOD\CAD\42284-842876-479845.DWG - CLS PROJECT ID: 42284-842876-479845

PRE-CONSTRUCTION INSPECTION CHECKLIST	
CONSTRUCTION AND/OR INSTALLATION INSPECTIONS REQUIRED FOR REPORT? (CHECK=YES, BLANK=NO)	INSPECTION REPORT ITEM
✓	MODIFICATION INSPECTION CHECKLIST
✓	SHOP DRAWINGS APPROVED BY ENGINEER OF RECORD (LATEST REVISION)
✓	FABRICATION INSPECTION
	FABRICATOR'S CERTIFIED WELD INSPECTOR (CWI)
	FABRICATOR'S QUALIFIED PERSONNEL FOR WELDING
✓	MATERIAL TEST REPORT(S) / MILL CERTIFICATE(S)
	FABRICATOR'S NON-DESTRUCTIVE TESTING (NDT) TECHNICIAN
✓	PACKING SLIPS FOR STRUCTURAL MATERIALS

CONSTRUCTION INSPECTION CHECKLIST	
CONSTRUCTION AND/OR INSTALLATION INSPECTIONS REQUIRED FOR REPORT? (CHECK=YES, BLANK=NO)	INSPECTION REPORT ITEM
✓	CONSTRUCTION INSPECTIONS
	FOUNDATION INSPECTIONS
	CONCRETE COMPRESSIVE STRENGTH AND SLUMP TESTING RESULTS/CERTIFICATES
	ADHESIVE ANCHOR ROD(S) INSTALLATION INSPECTION
	BASE PLATE GROUT INSPECTION
	THIRD-PARTY CERTIFIED WELD INSPECTION (INCLUDING IBC SPECIAL INSPECTIONS)
	SOIL EXCAVATION - DENSITY TESTING, COMPACTION INSPECTION/VERIFICATION, USE OF SUITABLE FILL
✓	GALVANIZING REPAIR MATERIAL PREPARATION, INSPECTION, & PAINT APPLICATION
	GUY WIRE (RE-)TENSION REPORT AND INSPECTION
✓	PRIME CONTRACTOR'S AS-BUILT DOCUMENTS (SIGNED & DATED)

POST-CONSTRUCTION INSPECTION CHECKLIST	
CONSTRUCTION AND/OR INSTALLATION INSPECTIONS REQUIRED FOR REPORT? (CHECK=YES, BLANK=NO)	INSPECTION REPORT ITEM
✓	MODIFICATION INSPECTOR'S ISSUE LIST (INCLUDING CORRECTIVE ACTIONS TAKEN) AND/OR REDLINED RECORD DRAWINGS
	POST-INSTALLED ADHESIVE ANCHOR ROD PULL-OUT TESTING
✓	PHOTOGRAPHS OF MODIFICATIONS (INCLUDE PHOTOS OF BOTH SIDES OF WELDED OR BOLTED CONNECTIONS, OF OVERALL AND DETAIL VIEWS OF INSTALLED MODIFICATIONS, AND BEFORE/AFTER PHOTOS OF ANY ISSUES IDENTIFIED BY THE INSPECTOR)

### GENERAL NOTES

- THE POST-MODIFICATION INSPECTION IS A VISUAL EXAMINATION OF STRUCTURE MODIFICATIONS AND A REVIEW OF ANY REQUIRED CONSTRUCTION INSPECTIONS, TESTING, AND OTHER DATA TO VERIFY THAT THE MODIFICATIONS ARE INSTALLED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AS DESIGNED BY THE ENGINEER OF RECORD. THE CONTRACT DOCUMENTS INCLUDE THESE MODIFICATION DRAWINGS, ANY PROJECT SPECIFICATIONS REFERENCED TO IN THE PROJECT NOTES OR OTHERWISE PROVIDED WITH THE DRAWINGS, AND OTHER DOCUMENTS OR DRAWINGS PROVIDED WITH THE MODIFICATION DRAWINGS WITH THE INTENT THAT THEY BE USED AS A DESIGN AID OR GUIDELINE FOR CONSTRUCTION.
- THE POST-MODIFICATION INSPECTION SHALL CONFIRM INSTALLATION CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A QUALITATIVE REVIEW OF THE ENGINEERING ASPECTS OF THE DESIGN OR THE DESIGN DRAWINGS. THE MODIFICATION INSPECTOR IS NOT TAKING OWNERSHIP OF THE MODIFICATION DESIGN IN THE PERFORMANCE OF THEIR DUTIES. OWNERSHIP OF THE MODIFICATION DESIGN'S EFFECTIVENESS AND INTENT, AS WELL AS ALL ASSOCIATED RISK, LIES WITH THE ENGINEER OF RECORD AT ALL TIMES.
- TO ENSURE THAT THE REQUIREMENTS OF THE POST-MODIFICATION INSPECTION ARE MET, IT IS ESSENTIAL THAT COORDINATION BETWEEN THE PRIME CONTRACTOR AND THE MODIFICATION INSPECTOR BEGIN AS SOON AS THE PROJECT IS FUNDED AND WORK ENTERS THE PLANNING STAGE. THE PRIME CONTRACTOR AND MODIFICATION INSPECTOR SHALL BE PROACTIVE IN IDENTIFYING CONSTRUCTION ISSUES AND COMMUNICATING THESE ISSUES TO EACH OTHER AND TO THE ENGINEER OF RECORD AND STRUCTURE OWNER & CUSTOMER, AS REQUIRED.

### INSPECTION AND REPORT RECOMMENDATIONS

- THE FOLLOWING ARE PROVIDED WITH THE INTENT OF ENHANCING THE EFFECTIVENESS OF THE MODIFICATION INSPECTION AND IMPROVING THE EFFICIENCY OF THE PROCESS OF COLLECTING AND COMPILING THE INFORMATION INTO A USABLE REPORT:
  - IT IS RECOMMENDED THAT THE PRIME CONTRACTOR PROVIDE THE MODIFICATION INSPECTOR AT LEAST 5 BUSINESS DAYS NOTICE FOR WHEN THE SITE WILL BE READY FOR THE MODIFICATION INSPECTION.
  - THE PRIME CONTRACTOR AND THE MODIFICATION INSPECTOR SHALL COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
  - THE PRIME CONTRACTOR AND MODIFICATION INSPECTOR SHALL BOTH BE PRESENT DURING THE INITIAL INSPECTION IN ORDER TO ALLOW FOR THE REMEDIATION OF DEFICIENCIES DURING THE INSPECTION, AS PRACTICABLE. IT MAY BE PREFERABLE TO KEEP WORK CREWS AND THEIR EQUIPMENT ON-SITE TO REMEDIATE DEFICIENCIES DURING INSPECTIONS.

### INSPECTION RESCHEDULING AND CANCELLATION

- IF THE PRIME CONTRACTOR AND MODIFICATION INSPECTOR HAVE AGREED UPON A TIME AND DATE FOR A GIVEN INSPECTION AND EITHER PARTY RESCHEDULES OR CANCELS THE INSPECTION, THE STRUCTURE OWNER SHALL NOT BE RESPONSIBLE FOR COSTS, FEES, LOST DEPOSITS, OR OTHER EXPENSES INCURRED BY THE PRIME CONTRACTOR, THEIR SUBCONTRACTOR(S), OR THE MODIFICATION INSPECTOR DUE TO THESE SCHEDULING CHANGES. EXCEPTIONS MAY BE MADE IN THE EVENT OF UNCONTROLLABLE SITUATIONS SUCH AS NATURAL DISASTERS, SEVERE WEATHER, OR OTHER CONDITIONS THAT COMPROMISE THE SAFETY OF THE PARTIES INVOLVED.

### REMEDATION OF FAILING INSPECTION

- IN THE EVENT THAT ANY PORTION OF THE MODIFICATION WORK IS DETERMINED TO BE UNSATISFACTORY BY THE MODIFICATION INSPECTOR, THE PRIME CONTRACTOR SHALL WORK WITH THE MODIFICATION INSPECTOR TO CREATE A PLAN OF ACTION THAT WILL EITHER:
  - REPAIR THE DEFICIENT WORK TO SATISFACTORY CONDITION AND INCLUDE A SUBSEQUENT RE-INSPECTION OF THE WORK TO VERIFY THAT IT IS SATISFACTORY
  - OR, WITH THE PERMISSION OF THE STRUCTURE OWNER AND/OR CUSTOMER, THE PRIME CONTRACTOR MAY WORK WITH THE ENGINEER OF RECORD TO REVIEW THE AS-BUILT CONDITION OF THE MODIFICATION TO DETERMINE IF IT IS STRUCTURALLY ACCEPTABLE. IF THIS ACTION IS NOT ACCEPTABLE TO ANY PARTY, THE PRIME CONTRACTOR SHALL PROCEED TO REPAIR THE DEFICIENT WORK TO A SATISFACTORY CONDITION.

### MODIFICATION INSPECTOR'S RESPONSIBILITIES

- THE MODIFICATION INSPECTOR SHALL CONTACT THE PRIME CONTRACTOR AS SOON AS THEY HAVE RECEIVED A PURCHASE ORDER OR PAYMENT FOR THIS INSPECTION. THE MODIFICATION INSPECTOR SHALL REVIEW THE REQUIREMENTS OF THE INSPECTION CHECKLIST, SHALL WORK WITH THE PRIME CONTRACTOR TO DEVELOP A SCHEDULE OF NECESSARY ON-SITE INSPECTIONS, AND SHALL DISCUSS ANY SITE-SPECIFIC INSPECTION REQUIREMENTS OR OTHER CONCERNS.
- THE MODIFICATION INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL PRIME CONTRACTOR INSPECTION AND TEST REPORTS (INCLUDING THOSE OF ASSIGNED SUB-CONTRACTORS), SHALL REVIEW THE REPORTS FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS, SHALL CONDUCT THE NECESSARY ON-SITE INSPECTIONS, AND SHALL COMPIL AND SUBMIT THE MODIFICATION INSPECTION REPORT.

### PRIME CONTRACTOR'S RESPONSIBILITIES

- THE PRIME CONTRACTOR SHALL CONTACT THE MODIFICATION INSPECTOR AS SOON AS THEY HAVE RECEIVED A PURCHASE ORDER OR PAYMENT FOR THE MODIFICATION INSTALLATION OR PROJECT. THE PRIME CONTRACTOR SHALL REVIEW THE REQUIREMENTS OF THE MODIFICATION INSPECTION CHECKLIST, SHALL WORK WITH THE MODIFICATION INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, AND SHALL DISCUSS SPECIFIC INSPECTION AND TESTING REQUIREMENTS WITH THE MODIFICATION INSPECTOR IN DETAIL TO OBTAIN A FULL UNDERSTANDING OF THE REQUIRED INSPECTIONS AND TESTING.
- THE PRIME CONTRACTOR SHALL PERFORM AND RECORD THE TESTING AND INSPECTION RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE MODIFICATION INSPECTION CHECKLIST.

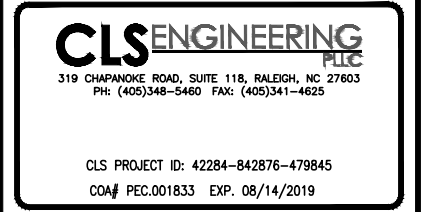
### PHOTOGRAPHY REQUIREMENTS

- THE PRIME CONTRACTOR AND MODIFICATION INSPECTOR SHALL, BETWEEN THE EFFORTS OF BOTH PARTIES AND THEIR EMPLOYED PERSONNEL, PROVIDE PHOTOGRAPHS WITH THE INSPECTION REPORT TO INCLUDE THE FOLLOWING:
  - GENERAL SITE PHOTOGRAPHS PRE-CONSTRUCTION
  - MODIFICATION INSTALLATION PHOTOGRAPHS DURING CONSTRUCTION/ERECTION OPERATIONS AND INSPECTIONS
    - RAW MATERIALS
    - PHOTOS OF DETAILED WORK REQUIRED ON THE DRAWINGS (CONNECTIONS, WELDMENTS, FIELD-FABRICATED MEMBERS, ETC)
    - WELD PREPARATION AND COMPLETED WELD INSPECTION (INCLUDING A FILLET WELD SIZE GAUGE, AS APPLICABLE)
    - BOLT INSTALLATION AND TORQUE/PRETENSION.
    - FINAL INSTALLED CONDITION (AFTER DEFICIENT CONDITIONS, IF ANY, ARE REMEDIATED).
    - REPAIR OF SURFACE COATINGS (INCLUDING GALVANIZING AND/OR PAINT COATING)
  - POST-MODIFICATION PHOTOGRAPHS OF THE SITE & WORK.
  - PHOTOGRAPHS OF THE FINAL STATE OF THE SITE AT CONCLUSION OF THE WORK BY THE PRIME CONTRACTOR, ASSOCIATED SUBCONTRACTORS, AND THE MODIFICATION INSPECTOR.
  - OTHER PHOTOS MAY BE INCLUDED AT PRIME CONTRACTOR & MODIFICATION INSPECTOR'S DISCRETION.

NOTE: PHOTOS OF MODIFICATIONS INSTALLED ON THE STRUCTURE ABOVE AN ELEVATION OF 20 FT SHALL REQUIRE PHOTOS TAKEN FROM THE STRUCTURE AS WELL AS OVERALL PHOTOGRAPHS OF THE MODIFICATIONS TAKEN FROM THE GROUND.

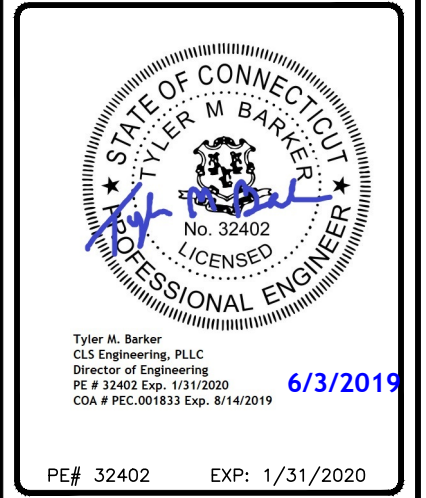
### OWNER INSPECTIONS

- THE STRUCTURE OWNER MAY CONDUCT INSPECTIONS TO VERIFY THE QUALITY AND COMPLETENESS OF THE PREVIOUSLY COMPLETED MODIFICATION INSPECTION REPORTS FOR THE MODIFICATION INSTALLATION WORK.
- INSPECTIONS MAY BE COMPLETED BY A 3RD-PARTY FIRM OF THE STRUCTURE OWNER'S CHOOSING AFTER A MODIFICATION PROJECT IS COMPLETED AND A PASSING MODIFICATION INSPECTION REPORT IS ISSUED.



REVISIONS			
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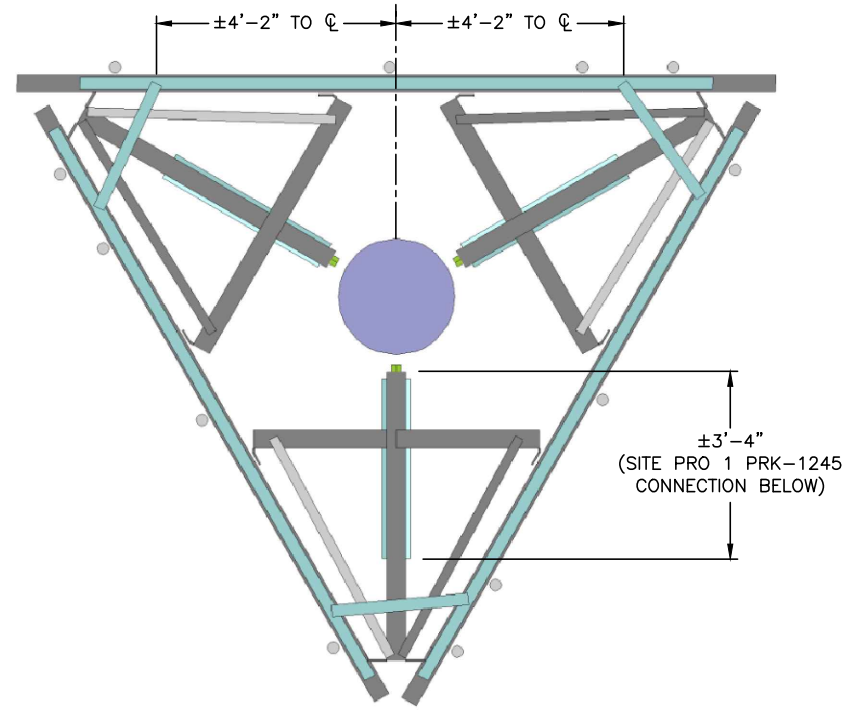
HA133/CING/CONDO  
 CARRIER SITE NUMBER: CTHA133A  
 BUN: 842876  
 1000 OLD COUNTY CIRCLE  
 WINDSOR LOCKS, CT 06096

SHEET TITLE  
**MODIFICATION INSPECTION NOTES**

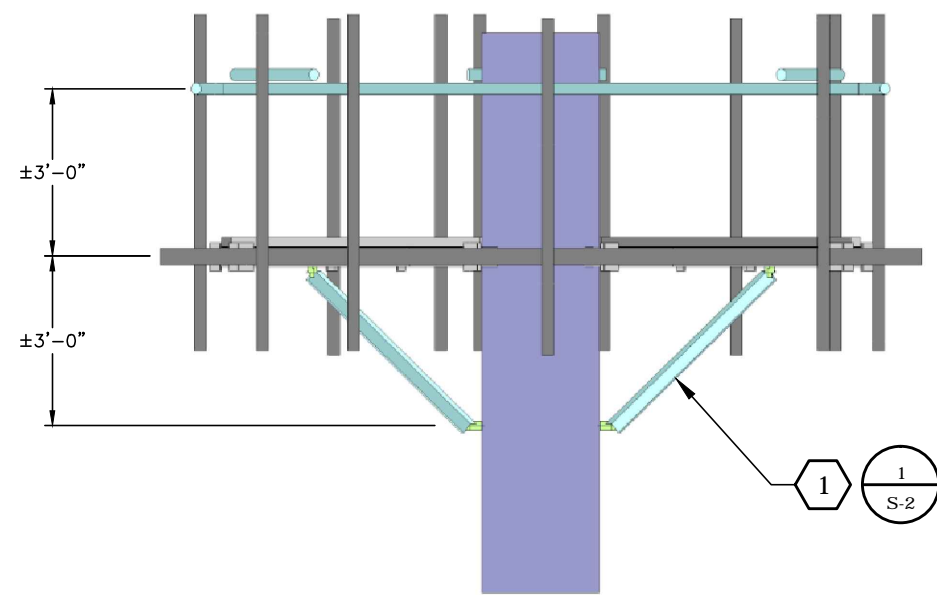
SHEET NUMBER  
**IN-1**



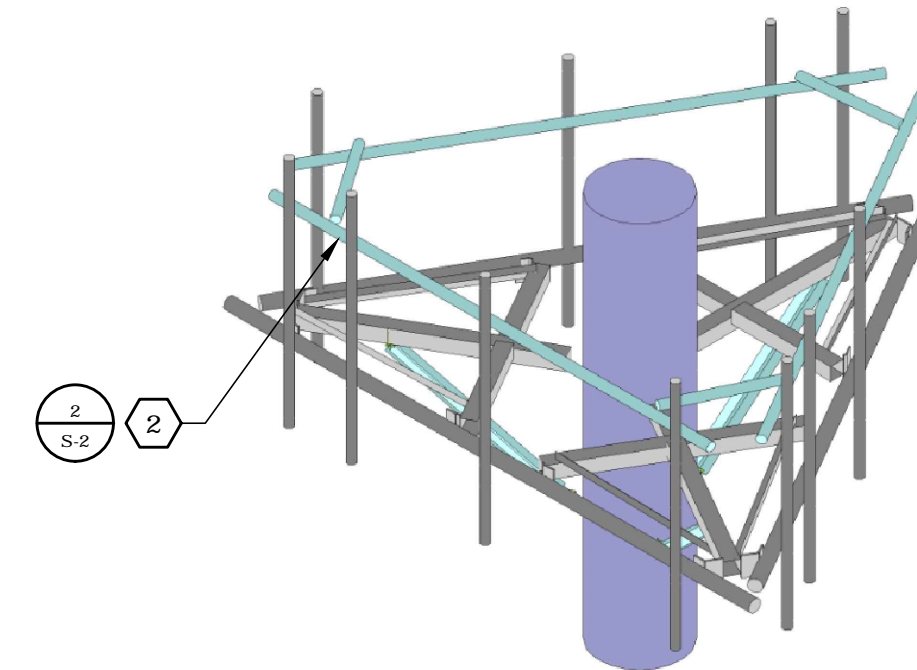
NOTE:  
EXISTING MOUNT SHOWN IS REPRESENTATIVE  
TO ILLUSTRATE MODIFICATION AND MAY  
DIFFER SLIGHTLY ON SITE



**2** MOUNT - PLAN VIEW  
SCALE: N.T.S.



**1** MOUNT - FRONT ELEVATION VIEW  
SCALE: N.T.S.



**3** MOUNT - ISOMETRIC VIEW  
SCALE: N.T.S.

**CONSTRUCTION NOTES**

- SCOPE OF WORK MUST BE COMPLETED AT WIND SPEEDS < 20 MPH.
- ALL DIMENSIONS ARE APPROXIMATE. CONTRACTOR SHOULD FIELD VERIFY ALL DIMENSIONS BEFORE FABRICATION OF STEEL AND COMMENCEMENT OF WORK. FIELD CUT MEMBERS AS REQUIRED.
- ALL HARDWARE FOR SITE PRO 1 PUCK CONNECTIONS TO SUPPORT RAILS SHOULD BE INSTALLED WITH "TURN OF THE NUT" METHOD (RE: GN-1).

**MODIFICATION SCHEDULE**

LABEL	ELEVATION	SCOPE	MATERIAL	NOTES
1	±63'-0"	INSTALL (1) PROPOSED SITE PRO 1 PRK-1245 AS SPECIFIED.	SITE PRO 1 PRK-1245	S-1 S-2
2	±63'-0"	INSTALL SITE PRO 1 HRK 12-HD SUPPORT RAIL KIT AT 3'-0" ABOVE THE EXISTING PLATFORM FACE HORIZONTAL. CONNECT TO ALL EXISTING MOUNT PIPES USING SITE PRO 1 SCX1 CROSSOVER PLATE INCLUDED IN THE SUPPORT RAIL KIT. <b>INSTALL CORNER BRACING PIPES INCLUDED IN THE KIT IN CORNERS AS SHOWN IN LIEU OF SITE PRO 1 AHCP CORNER CONNECTION KIT. CUT SUPPORT RAIL PIPES TO LENGTH AS NEEDED.</b>	SITE PRO 1 HRK12-HD	S-1 S-2

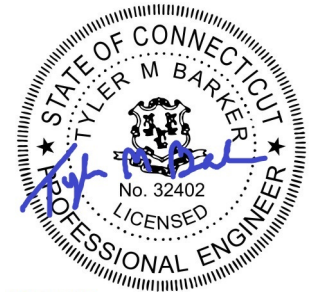


CLS PROJECT ID: 42284-842876-479845  
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CLS Engineering, PLLC  
Director of Engineering  
PE # 32402 Exp. 1/31/2020  
COA # PEC.001833 Exp. 8/14/2019

6/3/2019

PE# 32402 EXP: 1/31/2020

HA133/CING/CONDO  
CARRIER SITE NUMBER: CTHA133A  
BUN: 842876  
1000 OLD COUNTY CIRCLE  
WINDSOR LOCKS, CT 06096

SHEET TITLE  
**MOUNT VIEWS &  
MODIFICATION SCHEDULE**

SHEET NUMBER

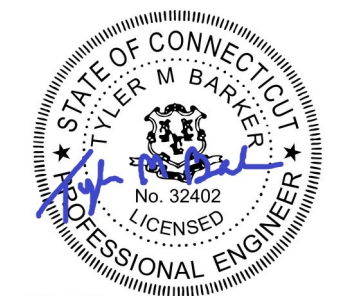
**S-1**



CLS PROJECT ID: 42284-842876-479845  
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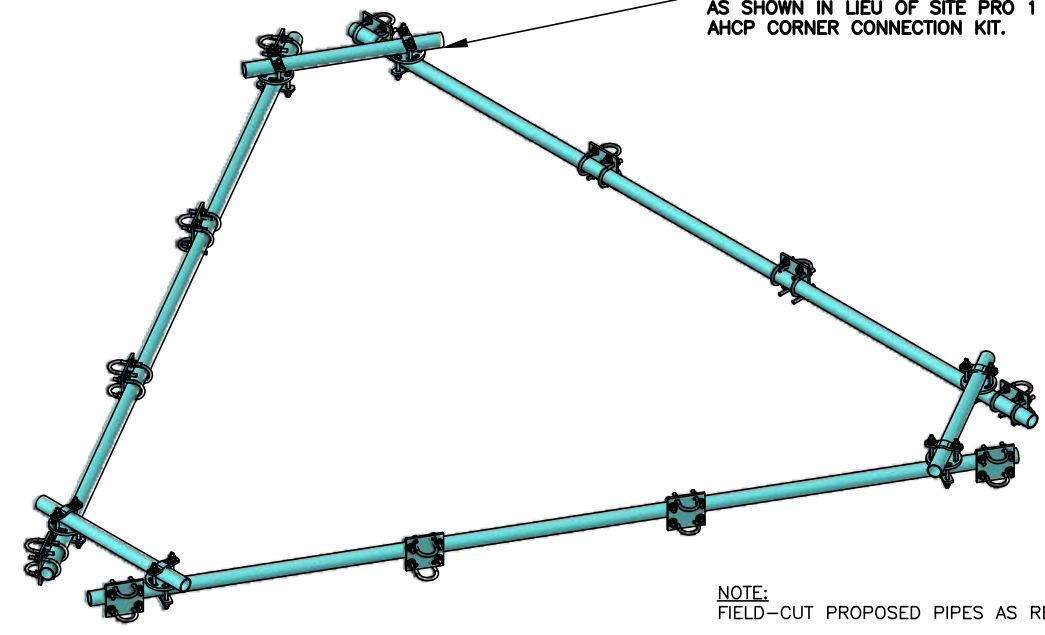
PE# 32402 EXP: 1/31/2020

HA133/CING/CONDO  
CARRIER SITE NUMBER: CTHA133A  
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SHEET TITLE  
MODIFICATION  
DETAIL VIEWS

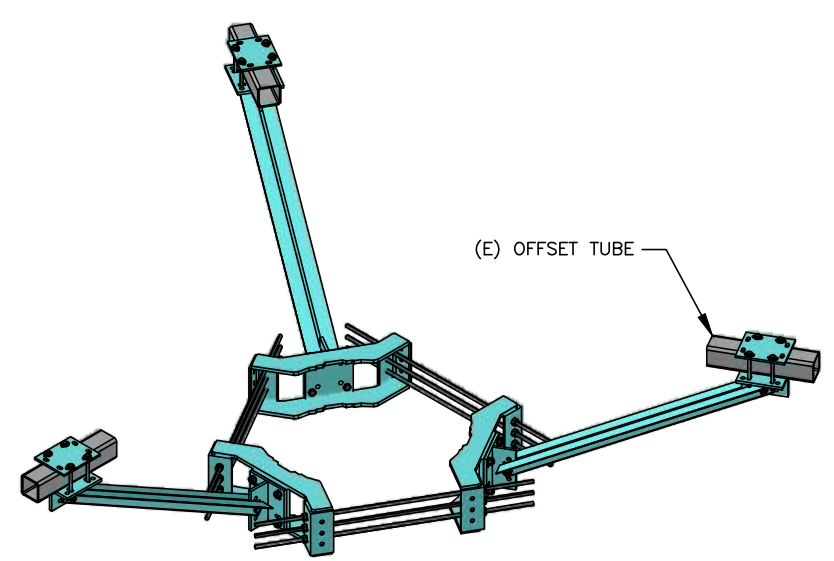
SHEET NUMBER  
**S-2**

INSTALL CORNER BRACING PIPES INCLUDED IN THE KIT IN CORNERS AS SHOWN IN LIEU OF SITE PRO 1 AHCP CORNER CONNECTION KIT.



NOTE:  
FIELD-CUT PROPOSED PIPES AS REQUIRED.

**2** SITE PRO 1 HRK12-HD  
SCALE: N.T.S.



**1** SITE PRO 1 PRK-1245  
SCALE: N.T.S.

T:\CROWN CASTLE\42284 - CROWN MOUNT ANALYSIS\842876-479845.DWG - MOD\CAD\42284-842876-479845.DWG - CLS PROJECT ID: 42284-842876-479845

# Exhibit F

## **Power Density/RF Emissions Report**

# Transcom Engineering, Inc.

Wireless Network Design and Deployment

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## Radio Frequency Emissions Analysis Report

**T-MOBILE** Existing Facility

**Site ID: CTHA133A**

HA133/CING/Condo  
1000 Old County Circle Road  
Windsor Locks, CT 06096

May 24, 2019

Transcom Engineering Project Number: 737001-0039

Site Compliance Summary	
Compliance Status:	<b>COMPLIANT</b>
Site total MPE% of FCC general population allowable limit:	<b>36.59 %</b>

# Transcom Engineering, Inc.

Wireless Network Design and Deployment

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May 24, 2019

T-MOBILE

Attn: Jason Overbey, RF Manager  
35 Griffin Road South  
Bloomfield, CT 6009

## Emissions Analysis for Site: **CTHA133A – HA133/CING/Condo**

Transcom Engineering, Inc (“Transcom”) was directed to analyze the proposed upgrades to the T-MOBILE facility located at **1000 Old County Circle Road, Windsor Locks, 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 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ). The number of  $\mu\text{W}/\text{cm}^2$  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.

Population exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ). The general population exposure limits for the 600 & 700 MHz bands are approximately  $400 \mu\text{W}/\text{cm}^2$  and  $467 \mu\text{W}/\text{cm}^2$  respectively. The general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS) bands is  $1000 \mu\text{W}/\text{cm}^2$ . 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.

# Transcom Engineering, Inc.

Wireless Network Design and Deployment

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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.

# Transcom Engineering, Inc.

Wireless Network Design and Deployment

## CALCULATIONS

Calculations were performed for the proposed upgrades to the T-MOBILE antenna facility located at **1000 Old County Circle Road, Windsor Locks, 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.

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. All power values expressed and analyzed are maximum power levels expected to be used on all radios.

All emissions values for additional carriers were taken from the Connecticut Siting Council (CSC) active MPE database. Values in this database are provided by the individual carriers themselves

For each sector the following channel counts, frequency bands and power levels were utilized as shown in *Table 1*:

Technology	Frequency Band	Channel Count	Transmit Power per Channel (W)
LTE	1900 MHz (PCS)	4	40
LTE	2100 MHz (AWS)	2	60
LTE / 5G NR	600 MHz	2	40
LTE	700 MHz	2	20
GSM	1900 MHz (PCS)	1	15
UMTS	2100 MHz (AWS)	1	40

*Table 1: Channel Data Table*

# Transcom Engineering, Inc.

Wireless Network Design and Deployment

The following antennas listed in *Table 2* were used in the modeling for transmission in the 600, 700 MHz, 1900 MHz (PCS) and 2100 MHz (AWS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the 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.

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	Ericsson AIR32 B66A / B2A	65
A	2	RFS APXVAARR24_43-U-NA20	65
A	3	RFS APXV18-206516S-C-A20 (Dormant)	65
B	1	Ericsson AIR32 B66A / B2A	65
B	2	RFS APXVAARR24_43-U-NA20	65
B	3	RFS APXV18-206516S-C-A20 (Dormant)	65
C	1	Ericsson AIR32 B66A / B2A	65
C	2	RFS APXVAARR24_43-U-NA20	65
C	3	RFS APXV18-206516S-C-A20 (Dormant)	65

Table 2: Antenna Data

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

Cable losses were factored in the calculations for this site. Since all **1900 MHz (PCS) GSM** and **2100 MHz (AWS) UMTS** radios are ground mounted the following cable loss values were used. For each ground mounted **1900 MHz (PCS) GSM** radio there was **1.76 dB** of cable loss calculated into the system gains / losses for this site. For each ground mounted **2100 MHz (AWS) UMTS** radio there was **1.82 dB** of cable loss calculated into the system gains / losses for this site. These values were calculated based upon the manufacturers specifications for **105 feet** of **7/8"** coax.



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## RESULTS

Per the calculations completed for the proposed T-MOBILE configurations *Table 3* shows resulting emissions power levels and percentages of the FCC's allowable general population limit.

Antenna ID	Antenna Make / Model	Frequency Bands	Antenna Gain (dBd)	Channel Count	Total TX Power (W)	ERP (W)	MPE %
Antenna A1	Ericsson AIR32 B66A / B2A	1900 MHz (PCS) / 2100 MHz (AWS)	15.85	6	280	10,768.57	11.13
Antenna A2	RFS APXVAARR24_43-U-NA20	600 MHz / 700 MHz / 1900 MHz (PCS) / 2100 MHz (AWS)	12.95 / 13.35 / 15.65 / 16.35	6	175	3,945.55	7.53
Antenna A3	RFS APXV18-206516S-C-A20	Dormant	N/A	0	0	0.00	0.00
Sector A Composite MPE%							<b>18.66</b>
Antenna B1	Ericsson AIR32 B66A / B2A	1900 MHz (PCS) / 2100 MHz (AWS)	15.85	6	280	10,768.57	11.13
Antenna B2	RFS APXVAARR24_43-U-NA20	600 MHz / 700 MHz / 1900 MHz (PCS) / 2100 MHz (AWS)	12.95 / 13.35 / 15.65 / 16.35	6	175	3,945.55	7.53
Antenna B3	RFS APXV18-206516S-C-A20	Dormant	N/A	0	0	0.00	0.00
Sector B Composite MPE%							<b>18.66</b>
Antenna C1	Ericsson AIR32 B66A / B2A	1900 MHz (PCS) / 2100 MHz (AWS)	15.85	6	280	10,768.57	11.13
Antenna C2	RFS APXVAARR24_43-U-NA20	600 MHz / 700 MHz / 1900 MHz (PCS) / 2100 MHz (AWS)	12.95 / 13.35 / 15.65 / 16.35	6	175	3,945.55	7.53
Antenna C3	RFS APXV18-206516S-C-A20	Dormant	N/A	0	0	0.00	0.00
Sector C Composite MPE%							<b>18.66</b>

*Table 3: T-MOBILE Emissions Levels*

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The Following table (*table 4*) shows all additional carriers on site and their MPE% as recorded in the CSC active MPE database for this facility along with the newly calculated maximum T-MOBILE MPE contributions per this report. FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. For this site, all three sectors have the same configuration yielding the same results on all three sectors. *Table 5* below shows a summary for each T-MOBILE Sector as well as the composite MPE value for the site.

Site Composite MPE%	
Carrier	MPE%
T-MOBILE – Max Per Sector Value	<b>18.66 %</b>
Nextel	1.20 %
Verizon Wireless	12.42 %
AT&T	4.31 %
<b>Site Total MPE %:</b>	<b>36.59 %</b>

*Table 4: All Carrier MPE Contributions*

T-MOBILE Sector A Total:	18.66 %
T-MOBILE Sector B Total:	18.66 %
T-MOBILE Sector C Total:	18.66 %
Site Total:	36.59 %

*Table 5: Site MPE Summary*

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FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. *Table 6* below details a breakdown by frequency band and technology for the MPE power values for the maximum calculated T-MOBILE sector(s). For this site, all three sectors have the same configuration yielding the same results on all three sectors.

T-MOBILE _ Frequency Band / Technology Max Power Values (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ( $\mu\text{W}/\text{cm}^2$ )	Frequency (MHz)	Allowable MPE ( $\mu\text{W}/\text{cm}^2$ )	Calculated % MPE
T-Mobile 1900 MHz (PCS) LTE	4	1,538.37	65	63.55	1900 MHz (PCS)	1000	6.36%
T-Mobile 2100 MHz (AWS) LTE	2	2,307.55	65	47.66	2100 MHz (AWS)	1000	4.77%
T-Mobile 600 MHz LTE / 5G NR	2	788.97	65	16.30	600 MHz	400	4.07%
T-Mobile 700 MHz LTE	2	432.54	65	8.93	700 MHz	467	1.91%
T-Mobile 1900 MHz (PCS) GSM	1	367.36	65	3.79	1900 MHz (PCS)	1000	0.38%
T-Mobile 2100 MHz (AWS) UMTS	1	1,135.17	65	11.72	2100 MHz (AWS)	1000	1.17%
						<b>Total:</b>	<b>18.66%</b>

*Table 6: T-MOBILE Maximum Sector MPE Power Values*

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## 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:	18.66 %
Sector B:	18.66 %
Sector C:	18.66 %
T-MOBILE Maximum Total (per sector):	18.66 %
Site Total:	36.59 %
Site Compliance Status:	<b>COMPLIANT</b>

The anticipated composite MPE value for this site assuming all carriers present is **36.59 %** 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.



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