



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

July 20, 2016

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

**RE: Notice of Exempt Modification for AT&T/ LTE 3C Crown Site BU: 881541**  
**AT&T Site ID: CT2158**  
**700 Grassy Hill Road, Orange, CT 06477**  
**Latitude: 41° 17' 7.75"/ Longitude: -73° 2' 33.27"**

Dear Ms. Bachman:

AT&T currently maintains six (6) antennas at the 106-foot level of the existing 139.5-foot monopole tower at 700 Grassy Hill Road in Orange, CT. The tower is owned by Crown Castle. The property is owned by the Town of Orange. AT&T now intends to replace three (3) Powerwave antennas with three (3) new CCI 700MHz antennas. AT&T also intends to install three (3) RR12/A2s.

This facility was approved by the by the Connecticut Siting Council in Docket No. 262 on January 12, 2004. This approval included the conditions that:

1. The tower shall be constructed as a monopole, no taller than necessary to provide the proposed telecommunications services, sufficient to accommodate the antennas of Sprint and other entities, both public and private, but such tower shall not exceed a height of 140 feet above ground level, with a total overall height of 143 feet above ground level including appurtenances. Antennas to be install on towers hall be on a T-bar antenna platform or flush mounted.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.S.C.A. § 16-50j-73, a copy of this letter is being sent to Mr. James Zeoli, First-Selectman, Town of Orange, as well as the property owner, and Crown Castle is the tower owner.

1. The proposed modifications will not result in an increase in the height of the existing tower.
2. The proposed modifications will not require the extension of the site boundary.

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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, AT&T 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: Jeffrey Barbadora.

Sincerely,

Jeffrey Barbadora  
Real Estate Specialist  
12 Gill Street, Suite 5800, Woburn, MA 01801  
781-729-0053  
[Jeff.Barbadora@crowncastle.com](mailto:Jeff.Barbadora@crowncastle.com)

Attachments:

Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes

Tab 2: Exhibit-2: Structural Modification Report

Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc: Mr. James Zeoli, First-Selectman  
Town of Orange  
617 Orange Center Road  
Orange, CT 06477

Town of Orange  
617 Orange Center Road  
Orange, CT 06477

## Connecticut Siting Council

### Decisions

<b>DOCKET NO. 262</b> - Sprint Spectrum, L.P. d/b/a Sprint	}	Connecticut
PCS application for a Certificate of Environmental	}	Siting
Compatibility and Public Need for the construction,	}	Council
maintenance and operation of a wireless telecommunications	}	
facility at 707 Cranberry Lane or off of Grassy Hill Road,	}	
Orange, Connecticut.	}	January 12, 2004

#### Decision and Order

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council (Council) finds that the effects associated with the construction, operation, and maintenance of a wireless telecommunications facility including effects on the natural environment; ecological integrity and balance; public health and safety; scenic, historic, and recreational values; forests and parks; air and water purity; and fish and wildlife are not disproportionate either alone or cumulatively with other effects when compared to need, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application and therefore directs that a Certificate of Environmental Compatibility and Public Need, as provided by General Statutes § 16-50k, be issued to Sprint Spectrum, L.P. d/b/a Sprint PCS (Sprint) for the construction, maintenance and operation of a wireless telecommunications facility at Site C off of Grassy Hill Road, Orange, Connecticut. The Council denies certification of Site A located at 707 Cranberry Lane and Site B located off of Grassy Hill Road, Orange, Connecticut.

The facility shall be constructed, operated, and maintained substantially as specified in the Council's record in this matter, and subject to the following conditions:

1. The tower shall be constructed as a monopole, no taller than necessary to provide the proposed telecommunications services, sufficient to accommodate the antennas of Sprint and other entities, both public and private, but such tower shall not exceed a height of 140 feet above ground level, with a total overall height of 143 feet above ground level including appurtenances. Antennas to be installed on the tower shall be on a T-bar antenna platform or flush mounted.
2. The Certificate Holder shall prepare a D&M Plan for this site in compliance with Sections 16-50j-75 through 16-50j-77 of the Regulations of Connecticut State Agencies. The D&M Plan shall be submitted to and approved by the Council prior to the commencement of facility construction and shall include:
  - a) a final site plan(s) of site development to include specifications for the tower, tower location, tower foundation, antennas, equipment building, access road, provisions for underground utilities, utility line, and landscaping; and
  - b) construction plans for site clearing, water drainage, and erosion and sedimentation control consistent with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, as amended.
3. The Certificate Holder shall, prior to the commencement of operation, provide the Council worst-case modeling of electromagnetic radio frequency power densities of all proposed entities'

antennas at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin No. 65, August 1997. The Certificate Holder shall provide a recalculated report of electromagnetic radio frequency power density if and when circumstances in operation cause a change in power density above the levels calculated and provided pursuant to this Decision and Order.

4. Upon the establishment of any new State or federal radio frequency standards applicable to frequencies of this facility, the facility granted herein shall be brought into compliance with such standards.
5. The Certificate Holder shall permit public or private entities to share space on the proposed tower for fair consideration, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing. The Certificate Holder shall provide reasonable space on the tower for no compensation for any municipal antennas, provided such antennas are compatible with the structural integrity of the tower.
6. If the facility does not initially provide wireless services within one year of completion of construction or ceases to provide wireless services for a period of one year, this Decision and Order shall be void, and the Certificate Holder shall dismantle the tower and remove all associated equipment or reapply for any continued or new use to the Council before any such use is made.
7. Any antenna that becomes obsolete and ceases to function shall be removed within 60 days after such antenna becomes obsolete and ceases to function.
8. Unless otherwise approved by the Council, this Decision and Order shall be void if the facility authorized herein is not operational within one year of the effective date of this Decision and Order or within one year after all appeals to this Decision and Order have been resolved.

Pursuant to General Statutes § 16-50p, we hereby direct that a copy of the Findings of Fact, Opinion, and Decision and Order be served on each person listed below, and notice of issuance shall be published in The New Haven Register, the Amity Observer and The Bulletin (Orange).

By this Decision and Order, the Council disposes of the legal rights, duties, and privileges of each party named or admitted to the proceeding in accordance with Section 16-50j-17 of the Regulations of Connecticut State Agencies.

The parties and intervenors to this proceeding are:

**Applicant**

Sprint Spectrum, L.P. d/b/a Sprint PCS

-

**Intervenor**

AT&T Wireless PCS, LLC d/b/a AT&T Wireless

**Its Representative**

Thomas J. Regan, Esquire  
Brown Rudnick Berlack Israels LLP  
CityPlace I, 38<sup>th</sup> Floor  
185 Asylum Street  
Hartford, CT 06103-3402

**Its Representative**

Christopher B. Fisher, Esq.  
Cuddy & Feder LLP  
90 Maple Avenue  
White Plains, NY 10601

**Intervenor**

Cellco Partnership d/b/a Verison Wireless

**Its Representative**

Kenneth C. Baldwin, Esq.  
Robinson & Cole LLP  
280 Trumbull Street  
Hartford, CT 06103-3597

Content Last Modified on 1/15/2004 8:25:11 AM

### 700 GRASSY HILL RD

<b>Location</b>	700 GRASSY HILL RD	<b>Assessment</b>	\$115,500
<b>Mblu</b>	60/ 6/ 1A/ /	<b>Appraisal</b>	\$164,900
<b>Acct#</b>	00182505	<b>PID</b>	5703
<b>Owner</b>	TOWN OF ORANGE	<b>Building Count</b>	1

#### Current Value

Appraisal			
Valuation Year	Improvements	Land	Total
2014	\$13,500	\$151,400	\$164,900
Assessment			
Valuation Year	Improvements	Land	Total
2014	\$9,500	\$106,000	\$115,500

#### Owner of Record

<b>Owner</b>	TOWN OF ORANGE	<b>Sale Price</b>	\$25,000
<b>Co-Owner</b>		<b>Certificate</b>	
<b>Address</b>	617 ORANGE CENTER ROAD ORANGE, CT 06477	<b>Book &amp; Page</b>	520/ 156
		<b>Sale Date</b>	05/28/2004
		<b>Instrument</b>	00

#### Ownership History

Ownership History					
Owner	Sale Price	Certificate	Book & Page	Instrument	Sale Date
TOWN OF ORANGE SCHEN JULIA ROGERS & SAYLOR ELLEN &	\$25,000		520/ 156	00	05/28/2004

#### Building Information

##### Building 1 : Section 1

**Year Built:**  
**Living Area:** 0  
**Replacement Cost**  
**Less Depreciation:** \$0

##### Building Photo

Building Attributes	
Field	Description
Style	Outbuildings
Model	
Stories	
Exterior Wall 1	
Exterior Wall 2	

Roof Structure	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Floor 1	
Interior Floor 2	
Heat Fuel	
Heat Type	
AC Type	
Bedrooms	
Full Baths	
Half Baths	
Extra Fixtures	
Total Rooms	
Stacks	
Fireplace(s)	
Gas Fireplace(s)	
Attic	
Frame	
Traffic	
Bsmt Gar(s)	
SF FBM	
Basement	
Bsmt Floor	



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

**Building Layout**

Building Layout

Building Sub-Areas	Legend
No Data for Building Sub-Areas	

**Extra Features**

Extra Features	Legend
No Data for Extra Features	

**Land**

**Land Use**

**Use Code** 510E  
**Description** Exempt Vac  
**Zone** RES  
**Neighborhood** 010  
**Alt Land Appr Category** No

**Land Line Valuation**

**Size (Acres)** 0.62  
**Frontage**  
**Depth**  
**Assessed Value** \$106,000  
**Appraised Value** \$151,400

**Outbuildings**

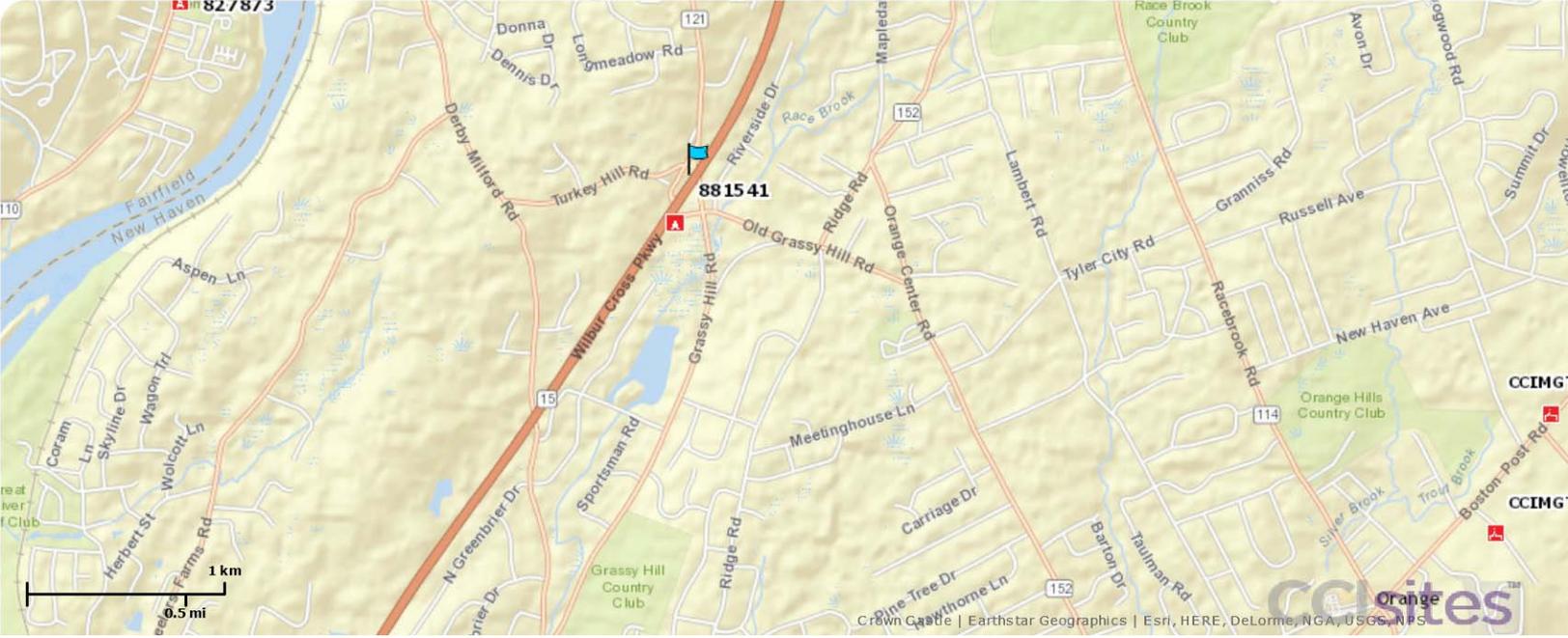
Outbuildings						Legend
Code	Description	Sub Code	Sub Description	Size	Value	Bldg #
SHD7	Cell Shed			240 UNITS	\$13,500	1

**Valuation History**

<b>Appraisal</b>			
<b>Valuation Year</b>	<b>Improvements</b>	<b>Land</b>	<b>Total</b>
2013	\$13,500	\$151,400	\$164,900
2012	\$13,500	\$151,400	\$164,900
2011	\$0	\$31,000	\$31,000

<b>Assessment</b>			
<b>Valuation Year</b>	<b>Improvements</b>	<b>Land</b>	<b>Total</b>
2013	\$9,500	\$106,000	\$115,500
2012	\$9,500	\$106,000	\$115,500
2011	\$0	\$21,700	\$21,700

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Crown Castle | Earthstar Geographics | Esri, HERE, DeLorme, NGA, USGS, NPS



# WIRELESS COMMUNICATIONS FACILITY

## CT3159 - LTE 2C

### ORANGE NW

#### CROWN CASTLE SITE NO.: 881541

#### 700 GRASSY HILL ROAD

#### ORANGE, CT 06477

### GENERAL NOTES

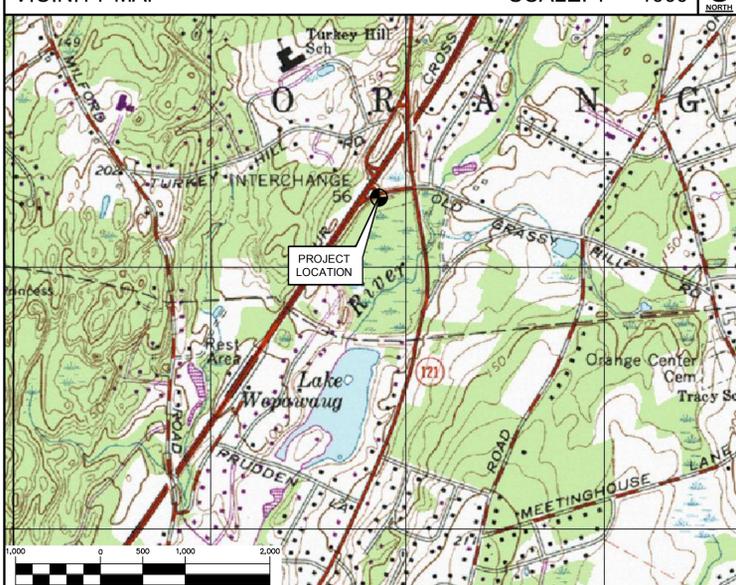
1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2005 CONNECTICUT SUPPLEMENT AND 2009 AMENDMENTS, INCLUDING THE TIA/EIA-222 REVISION "F" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2005 CONNECTICUT FIRE SAFETY CODE AND 2009 AMENDMENTS, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. THE COMPOUND, TOWER, PRIMARY GROUND RING, ELECTRICAL SERVICE TO THE METER BANK AND TELEPHONE SERVICE TO THE DEMARCATION POINT ARE PROVIDED BY SITE OWNER. AS BUILT FIELD CONDITIONS REGARDING THESE ITEMS SHALL BE CONFIRMED BY THE CONTRACTOR. SHOULD ANY FIELD CONDITIONS PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL NOT PROCEED WITH ANY AFFECTED WORK.
3. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
4. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
5. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
6. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
7. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN "AS-BUILT" SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
8. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING BUILDINGS/PROPERTY'S OPERATIONS, COORDINATE WORK WITH BUILDING/PROPERTY OWNER.
10. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
11. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
12. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
13. ANY AND ALL ERRORS, DISCREPANCIES, AND "MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE AT&T CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO "EXTRA" WILL BE ALLOWED FOR MISSED ITEMS.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
15. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
16. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
17. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
18. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER THE MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
19. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
20. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED PRIOR TO ANY EXCAVATION WORK. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
21. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

### SITE DIRECTIONS

FROM:	TO:
500 ENTERPRISE DRIVE ROCKY HILL, CONNECTICUT	700 GRASSY HILL ROAD ORANGE, CONNECTICUT
1. HEAD NORTHEAST ON ENTERPRISE DR TOWARD CAPITAL BLVD	0.31 MI
2. TURN LEFT ONTO CAPITAL BLVD	0.27 MI
3. TURN LEFT ONTO WEST ST	0.30 MI
4. TURN LEFT TO MERGE ONTO I-91 S TOWARD NEW HAVEN	9.59 MI
5. TAKE EXIT 17 FOR CT-15 S/W CROSS PKWY	0.40 MI
6. MERGE ONTO CT-15 S	23.00 MI
7. TAKE EXIT 56 TOWARD CT-121/ORANGE	0.10 MI
8. STAY STRAIGHT ON TURKEY HILL RD	0.06 MI
9. TURN LEFT ONTO GRASSY HILL RD	0.05 MI
10. ARRIVE AT 700 GRASSY HILL RD	

### VICINITY MAP

SCALE: 1" = 1000'



### PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:
  - A. REMOVE AND REPLACE EXISTING LTE ANTENNA FOR PROPOSED LTE HEXPORT ANTENNA, (1) PER SECTOR.
  - B. INSTALL (3) NEW RRUS-11+A2 WITHIN EXISTING EQUIPMENT SHELTER.

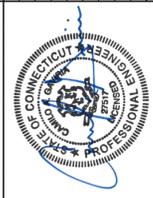
### PROJECT INFORMATION

AT&T SITE NUMBER:	CT3159
AT&T SITE NAME:	ORANGE NW
SITE ADDRESS:	CROWN CASTLE SITE NO.: 881541 700 GRASSY HILL RD ORANGE, CT 06477
LESSEE/APPLICANT:	NEW CINGULAR WIRELESS PCS, LLC 500 ENTERPRISE DRIVE, SUITE 3A ROCKY HILL, CT 06067
ENGINEER:	CENITEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT. 06405
PROJECT COORDINATES:	LATITUDE: 41°-17'-7.72116" N LONGITUDE: 73°-02'-33.26604" W GROUND ELEVATION: ±85' AMSL GROUND ELEVATION REFERENCED FROM GOOGLE EARTH. COORDINATES REFERENCED FROM RFDS DOCUMENTS.

### SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	NOTES AND SPECIFICATIONS	0
C-1	PLANS, ELEVATION AND DETAILS	0
C-2	LTE 2C EQUIPMENT DETAILS	0
E-1	LTE SCHEMATIC DIAGRAM AND NOTES	0
E-2	LTE WIRING DIAGRAM	0
E-3	TYPICAL ELECTRICAL DETAILS	0

PROFESSIONAL ENGINEER SEAL



**CENITEK** engineering  
 2031 488-0380  
 2031 488-3387  
 632 North Branford Road  
 Branford, CT 06405  
 www.CenitekEng.com

AT&T MOBILITY  
 WIRELESS COMMUNICATIONS FACILITY  
**ORANGE NW**  
**CT3159 - LTE 2C**  
**700 GRASSY HILL ROAD**  
**ORANGE, CT 06477**

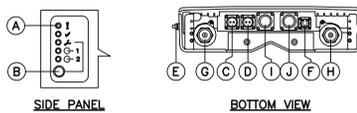
DATE: 05/17/16  
 SCALE: AS NOTED  
 JOB NO. 16071.08

TITLE SHEET

**T-1**

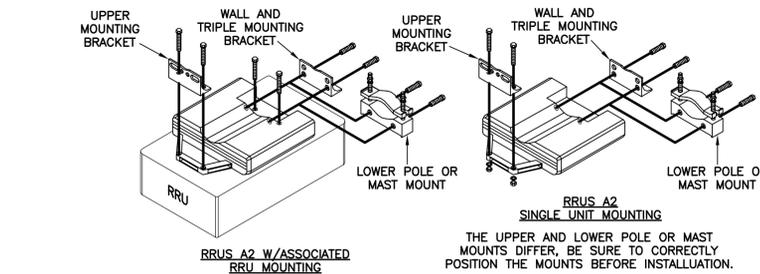
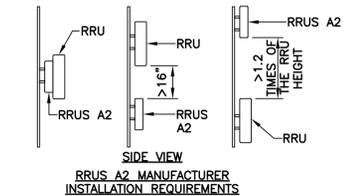
Sheet No. 1 of 7

0 REV. DATE 05/02/16 WNW DRAWN BY CHK'D BY ISSUED FOR CONSTRUCTION

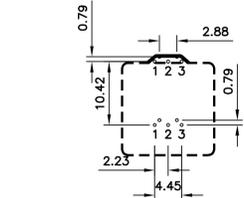


POSITION (ID)	DESCRIPTION	MARKING
A	OPTICAL INDICATORS	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100
B	MAINTENANCE	▲
C	-48V DC POWER SUPPLY	▲
D	-48V DC POWER SUPPLY TO RRU	▲
E	GROUNDING	⊥
F	RET	RET
G	ANTENNA B	⊥ - B
H	ANTENNA A	⊥ - A
I	OPTICAL CABLE 1	⊙-1
J	OPTICAL CABLE 2	⊙-2

- NOTES:**
1. STACKING OF RRU'S IS NOT PERMITTED.
  2. NO PAINTING OF RRU OR THE SOLAR SHIELD IS ALLOWED.
  3. A SINGLE RRU/A2 CAN BE INSTALLED AS A STAND ALONE UNIT OR MOUNTED TO THE BACK OF ITS ASSOCIATED RRU.



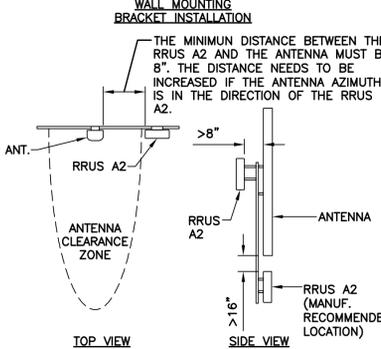
**1 ERICSSON RRU A2 DETAILS**  
N-1 NOT TO SCALE



THE NUMBER OF BOLT HOLES DEPENDS ON THE WALL MATERIAL AS SPECIFIED BY THE SITE ENGINEER. A MINIMUM OF TWO BOLT HOLES ARE RECOMMENDED FOR EACH BRACKET.

ONE OF THE FOLLOWING SOLUTIONS FOR HOLE POSITIONS MUST BE USED:

- 1, 3
- 1, 2, 3



**NOTES AND SPECIFICATIONS**

**DESIGN BASIS:**

- GOVERNING CODE: 2003 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2005 CT STATE BUILDING CODE AND 2009 AMENDMENTS.
1. DESIGN CRITERIA:
    - WIND LOAD: PER EIA/TIA 222 F-96 (ANTENNA MOUNTS): 85 MPH (FASTEST MILE), EQUIVALENT TO 105 MPH (3 SECOND GUST)
    - BUILDING CLASSIFICATION: II (BASED ON IBC TABLE 1604.5)
    - BASIC WIND SPEED (OTHER STRUCTURE): 110 MPH (3 SECOND GUST) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-02) PER 2003 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2005 CONNECTICUT SUPPLEMENT AND 2009 AMMENDMENT.
    - SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-02 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

**GENERAL NOTES:**

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

**STRUCTURAL STEEL**

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)
  - A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
  - B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI)
  - C. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
  - D. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
  - E. PIPE---ASTM A53 (FY = 35 KSI)
  - F. CONNECTION BOLTS---ASTM A325-N
  - G. U-BOLTS---ASTM A36
  - H. ANCHOR RODS---ASTM F 1554
  - I. WELDING ELECTRODE---ASTM E 70XX
2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

**PAINT NOTES**

- PAINTING SCHEDULE:**
1. **ANTENNA PANELS:**
    - A. SHERWIN WILLIAMS POLANE-B
    - B. COLOR TO BE MATCHED WITH EXISTING TOWER STRUCTURE.
  2. **COAXIAL CABLES:**
    - A. ONE COAT OF DTM BONDING PRIMER (2-5 MILS. DRY FINISH)
    - B. TWO COATS OF DTM ACRYLIC PRIMER/FINISH (2.5-5 MILS. DRY FINISH)
    - C. COLOR TO BE FIELD MATCHED WITH EXISTING STRUCTURE.
- EXAMINATION AND PREPARATION:**
1. DO NOT APPLY PAINT IN SNOW, RAIN, FOG OR MIST OR WHEN RELATIVE HUMIDITY EXCEEDS 85%. DO NOT APPLY PAINT TO DAMP OR WET SURFACES.
  2. VERIFY THAT SUBSTRATE CONDITIONS ARE READY TO RECEIVE WORK. EXAMINE SURFACE SCHEDULED TO BE FINISHED PRIOR TO COMMENCEMENT OF WORK. REPORT ANY CONDITION THAT MAY POTENTIALLY AFFECT PROPER APPLICATION.
  3. TEST SHOP APPLIED PRIMER FOR COMPATIBILITY WITH SUBSEQUENT COVER MATERIALS.
  4. PERFORM PREPARATION AND CLEANING PROCEDURE IN STRICT ACCORDANCE WITH COATING MANUFACTURER'S INSTRUCTIONS FOR EACH SUBSTRATE CONDITION.
  5. CORRECT DEFECTS AND CLEAN SURFACES WHICH AFFECT WORK OF THIS SECTION. REMOVE EXISTING COATINGS THAT EXHIBIT LOOSE SURFACE DEFECTS.
  6. IMPERVIOUS SURFACE: REMOVE MILDEW BY SCRUBBING WITH SOLUTION OF TRI-SODIUM PHOSPHATE AND BLEACH. RINSE WITH CLEAN WATER AND ALLOW SURFACE TO DRY.
  7. ALUMINUM SURFACE SCHEDULED FOR PAINT FINISH: REMOVE SURFACE CONTAMINATION BY STEAM OR HIGH-PRESSURE WATER. REMOVE OXIDATION WITH ACID ETCH AND SOLVENT WASHING. APPLY ETCHING PRIMER IMMEDIATELY FOLLOWING CLEANING.
  8. FERROUS METALS: CLEAN UNGALVANIZED FERROUS METAL SURFACES THAT HAVE NOT BEEN SHOP COATED; REMOVE OIL, GREASE, DIRT, LOOSE MILL SCALE, AND OTHER FOREIGN SUBSTANCES. USE SOLVENT OR MECHANICAL CLEANING METHODS THAT COMPLY WITH THE STEEL STRUCTURES PAINTING COUNCIL'S (SSPC) RECOMMENDATIONS. TOUCH UP BARE AREAS AND SHOP APPLIED PRIME COATS THAT HAVE BEEN DAMAGED. WIRE BRUSH, CLEAN WITH SOLVENTS RECOMMENDED BY PAINT MANUFACTURER, AND TOUCH UP WITH THE SAME PRIMER AS THE SHOP COAT.
  9. GALVANIZED SURFACES: CLEAN GALVANIZED SURFACES WITH NON-PETROLEUM-BASED SOLVENTS SO SURFACE IS FREE OF OIL AND SURFACE CONTAMINANTS. REMOVE PRETREATMENT FROM GALVANIZED SHEET METAL FABRICATED FROM COIL STOCK BY MECHANICAL METHODS.
  10. ANTENNA PANELS: REMOVE ALL OIL, DUST, GREASE, DIRT, AND OTHER FOREIGN MATERIAL TO ENSURE ADEQUATE ADHESION. PANELS MUST BE WIPED WITH METHYL ETHYL KETONE (MEK).
  11. COAXIAL CABLES: REMOVE ALL OIL, DUST, GREASE, DIRT, AND OTHER FOREIGN MATERIAL TO ENSURE ADEQUATE ADHESION.
- CLEANING:**
1. COLLECT WASTE MATERIAL, WHICH MAY CONSTITUTE A FIRE HAZARD, PLACE IN CLOSED METAL CONTAINERS AND REMOVE DAILY FROM SITE.
- APPLICATION:**
1. APPLY PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
  2. DO NOT APPLY FINISHES TO SURFACES THAT ARE NOT DRY.
  3. APPLY EACH COAT TO UNIFORM FINISH.
  4. APPLY EACH COAT OF PAINT SLIGHTLY DARKER THAN PRECEDING COAT UNLESS OTHERWISE APPROVED.
  5. SAND METAL LIGHTLY BETWEEN COATS TO ACHIEVE REQUIRED FINISH.
  6. VACUUM CLEAN SURFACES FREE OF LOOSE PARTICLES. USE TACK CLOTH JUST PRIOR TO APPLYING NEXT COAT.
  7. ALLOW APPLIED COAT TO DRY BEFORE NEXT COAT IS APPLIED.
- COMPLETED WORK:**
1. SAMPLES: PREPARE 24" x 24" SAMPLE AREA FOR REVIEW.
  2. MATCH APPROVED SAMPLES FOR COLOR, TEXTURE AND COVERAGE. REMOVE REFINISH OR REPAINT WORK NOT IN COMPLIANCE WITH SPECIFIED REQUIREMENTS.

PROFESSIONAL ENGINEER SEAL

DATE: 05/02/16  
REV: 0

WWW: 05/02/16  
DRAWN BY: CHKD

CAG: CONSTRUCTION DOCUMENTS - ISSUED FOR CONSTRUCTION

at&t  
EMPIRE telecom

CENTEK engineering  
Centered on Solutions  
(203) 498-0380  
(203) 498-3387 Fax  
632 North Branford Road  
Branford, CT 06460  
www.CentekEng.com

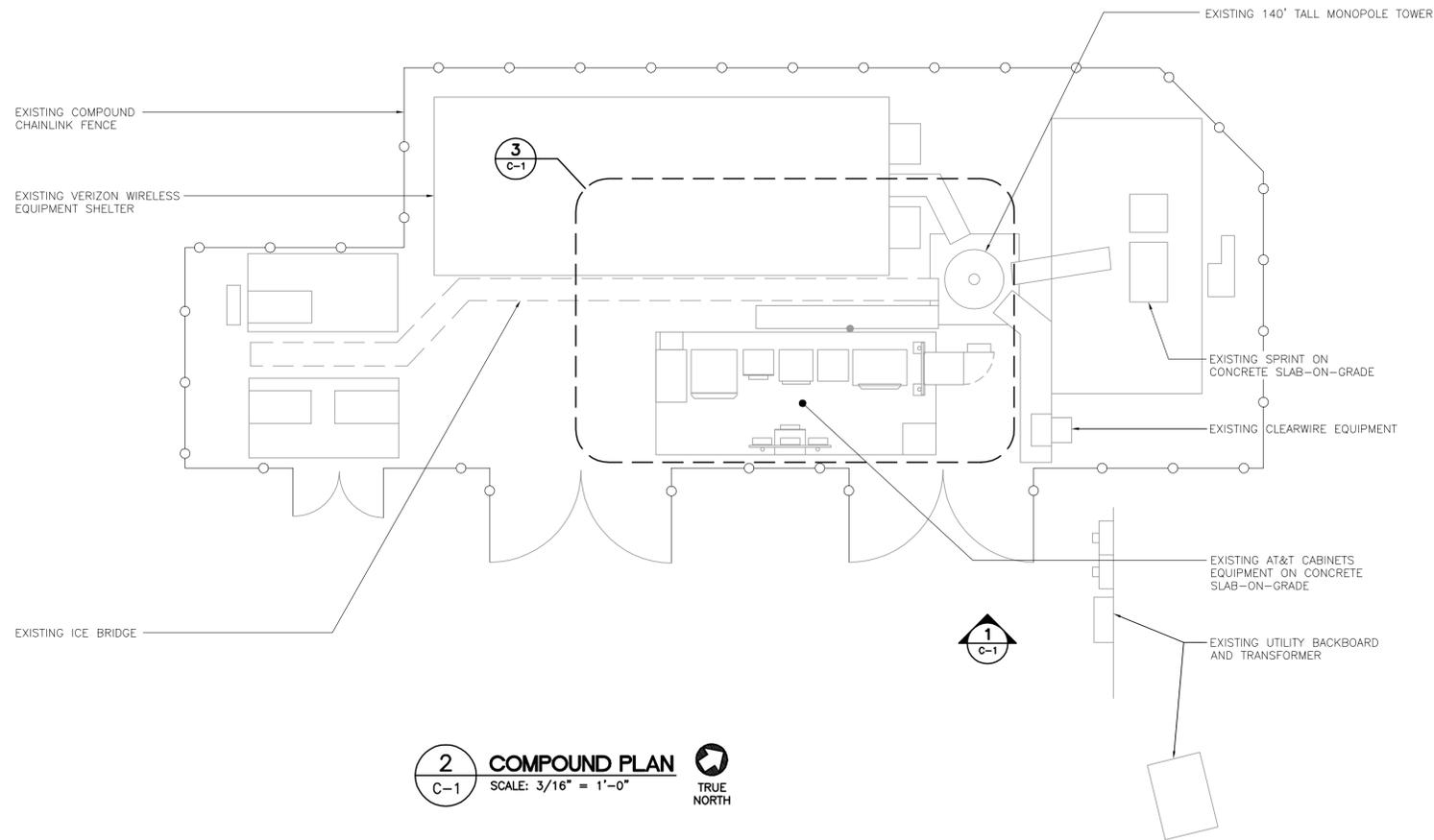
AT&T MOBILITY  
WIRELESS COMMUNICATIONS FACILITY  
ORANGE NW  
CT3159 - LTE 2C  
700 CRASSY HILL ROAD  
ORANGE, CT 06477

DATE: 05/17/16  
SCALE: AS NOTED  
JOB NO. 16071.08

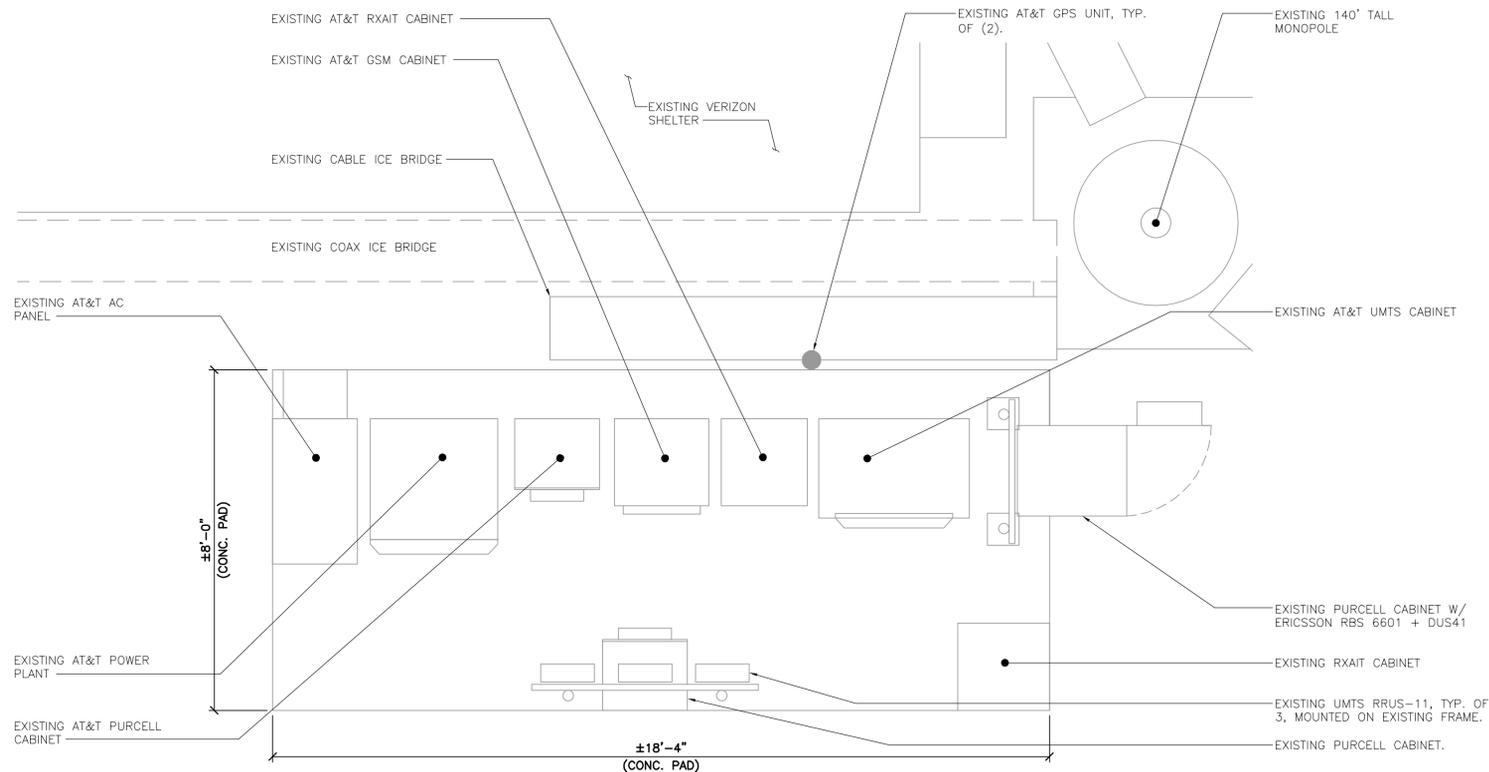
NOTES AND SPECIFICATIONS

N-1

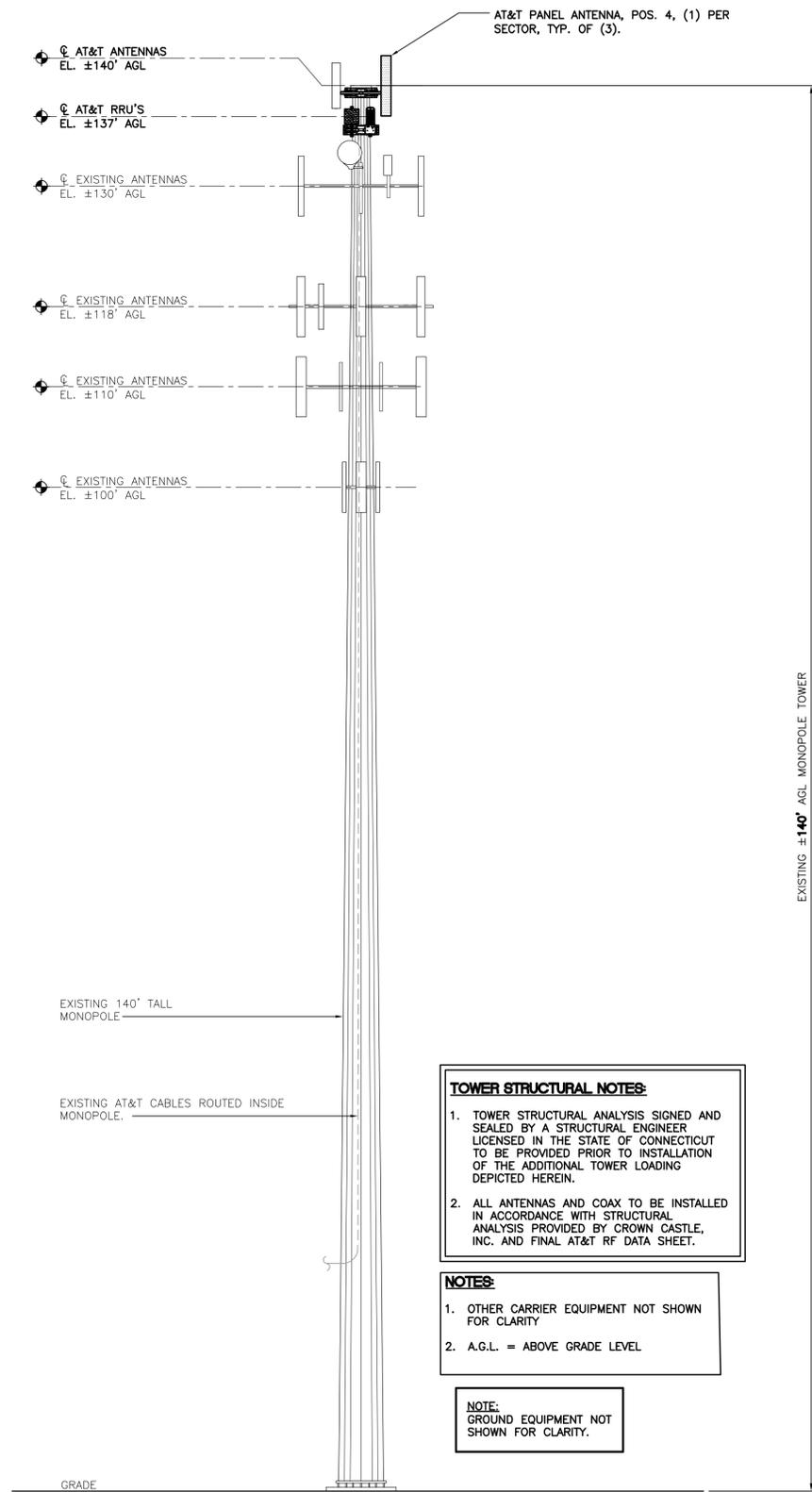
Sheet No. 2 of 7



**2** **COMPOUND PLAN**  
 C-1 SCALE: 3/16" = 1'-0" TRUE NORTH



**3** **EQUIPMENT LAYOUT PLAN**  
 C-1 SCALE: 3/4" = 1'-0" TRUE NORTH



**1** **EQUIPMENT LAYOUT PLAN**  
 C-1 SCALE: 1" = 20'

**TOWER STRUCTURAL NOTES:**

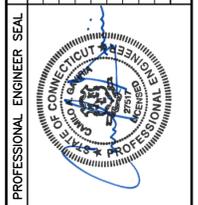
- TOWER STRUCTURAL ANALYSIS SIGNED AND SEALED BY A STRUCTURAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT TO BE PROVIDED PRIOR TO INSTALLATION OF THE ADDITIONAL TOWER LOADING DEPICTED HEREIN.
- ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS PROVIDED BY CROWN CASTLE, INC. AND FINAL AT&T RF DATA SHEET.

**NOTES:**

- OTHER CARRIER EQUIPMENT NOT SHOWN FOR CLARITY
- A.G.L. = ABOVE GRADE LEVEL

**NOTE:**  
 GROUND EQUIPMENT NOT SHOWN FOR CLARITY.

REV.	DATE	BY	CHKD	DESCRIPTION
0	05/02/16	MMW	CAG	ISSUED FOR CONSTRUCTION



**CENTEK engineering**  
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AT&T MOBILITY  
 WIRELESS COMMUNICATIONS FACILITY  
**ORANGE NW**  
**CT3159 - LTE 2C**  
 700 CRASSY HILL ROAD  
 ORANGE, CT 06477

DATE: 05/17/16  
 SCALE: AS NOTED  
 JOB NO. 16071.08

PLANS, ELEVATION AND DETAILS

**C-1**  
 Sheet No. 3 of 7









Date: **June 21, 2016**

Charles McGuirt  
Crown Castle  
3530 Toringdon Way Suite 300  
Charlotte, NC 28277

**JACOBS**<sup>®</sup>  
Jacobs Engineering Group, Inc.  
5449 Bells Ferry Road  
Acworth, GA 30102  
(770) 701-2500

**Subject:** **Structural Analysis Report**

**Carrier Designation:** **AT&T Mobility Co-Locate**  
**Carrier Site Number:** CTL03159  
**Carrier Site Name:** Orange NW

**Crown Castle Designation:** **Crown Castle BU Number:** 881541  
**Crown Castle Site Name:** ROGERS PROPERTY  
**Crown Castle JDE Job Number:** 382812  
**Crown Castle Work Order Number:** 1254370  
**Crown Castle Application Number:** 344903 Rev. 0

**Engineering Firm Designation:** **Jacobs Engineering Group, Inc. Project Number:** 1254370

**Site Data:** **700 Grassy Hill Road, Orange, New Haven County, CT**  
**Latitude 41° 17' 7.75", Longitude -73° 2' 33.27"**  
**139.5 Foot - Monopole Tower**

Dear Charles McGuirt,

Jacobs Engineering Group, Inc. is pleased to submit this "**Structural Analysis Report**" to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 915851, in accordance with application 344903, revision 0.

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

LC5: Existing + Proposed Equipment **Sufficient Capacity**  
Note: See Table I and Table II for the proposed and existing loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and the 2005 Connecticut State Building Code with 2009 amendment based upon a wind speed of 85 mph fastest mile.

All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

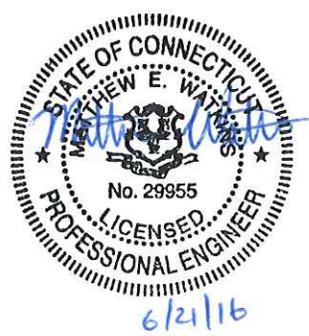
We at *Jacobs Engineering Group, Inc.* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by:



Ankit Gupta  
Structural Engineer

tnxTower Report - version 7.0.5.1



Reviewed by:

Matthew E. Watkins, P.E.  
Engineering Project Manager

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## 1) INTRODUCTION

This tower is a 139.5 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in February of 2004. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

## 2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

**Table 1 - Proposed Antenna and Cable Information**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
136.0	140.0	3	cci antennas	HPA-65R-BUU-H6 w/ Mount Pipe	-	-	-
		3	ericsson	RRUS12/RRUS A2			

**Table 2 - Existing Antenna and Cable Information**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note	
136.0	140.0	3	powerwave technologies	P65-16-XLH-RR w/ Mount Pipe	-	-	2	
		3	ericsson	RRUS-11				
		3	kathrein	800 10121 w/ mount pipe				
	136.0	136.0	6	powerwave technologies	LGP21401	2 1 6	3/8 5/8 1-5/8	1
			1	raycap	DC6-48-60-18-8F			
132.0	132.0	3	alcatel lucent	TME-1900MHz RRH (65MHz)	-	-	1	
		3	alcatel lucent	TME-800MHZ RRH				
		1	tower mounts (crown)	Side Arm Mount [SO 102-3]				
130.0	134.0	1	andrew	VHLP2-11	3 3 3	5/16 1/2 1-1/4	1	
	132.0	3	argus technologies	LLPX310R w/ Mount Pipe				
		1	dragonwave	A-ANT-23G-2-C (VSI)				
	130.0	130.0	3	samsung telecommunications				FDD_R6_RRH TMA
			3	alcatel lucent				800 External Notch Filter
			9	celwave				ACU-A20-N
			3	celwave				APXVSP18-C-A20 w/ Mount Pipe
1	tower mounts (crown)	T-Arm Mount [TA 602-3]						

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
118.0	118.0	3	alcatel lucent	RRH2X40-AWS	12	1-1/4 1-5/8	1
		3	antel	BXA-171063-8BF-EDIN-0 w/ Mount Pipe			
		3	antel	BXA-70063-6CF-EDIN-0 w/ Mount Pipe			
		6	decibel	DB846F65ZAXY w/Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		3	rymsa	MG D3-800Tx w/ Mount Pipe			
		1	tower mounts (crown)	T-Arm Mount [TA 602-3]			
108.0	109.0	3	commscope	LNx-6515DS-A1M w/ Mount Pipe	7	1-5/8	1
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe			
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
		3	ericsson	RRUS 11 B12			
	108.0	1	tower mounts (crown)	T-Arm Mount [TA 602-3]			
100.0	100.0	3	rfs celwave	APXV18-206517S-C	6	1-5/8	1
		1	tower mounts (crown)	Pipe Mount [PM 601-3]			
75.0	77.0	1	lucent	KS24019-L112A	-	-	1
	75.0	1	tower mounts (crown)	Side Arm Mount [SO 701-1]			

Notes:

- 1) Existing Equipment
- 2) Equipment to be removed; Not considered in this analysis

**Table 3 - Design Antenna and Cable Information**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
140	140	12	dapa	48000	-	-
130	130	12	dapa	48000	-	-
120	120	12	dapa	48000	-	-
110	110	12	dapa	48000	-	-
100	100	12	dapa	48000	-	-
75	75	1	Generic	GPS	-	-

### 3) ANALYSIS PROCEDURE

**Table 4 - Documents Provided**

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, P.E., P.C.	2245154	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Engineered Endeavors Incorporated	2208511	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Engineered Endeavors Incorporated	2207700	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	B+T GRP	4024239	CCISITES
4-POST-MODIFICATION INSPECTION	SGS	4432995	CCISITES

#### 3.1) Analysis Method

tnxTower (version 7.0.5.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

#### 3.2) Assumptions

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.

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

### 4) ANALYSIS RESULTS

**Table 5 - Section Capacity (Summary)**

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P <sub>allow</sub> (K)	% Capacity	Pass / Fail
L1	139.5 - 93.04	Pole	TP26.99x15.5x0.25	1	-7.03	1063.08	87.8	Pass
L2	93.04 - 46.38	Pole	TP37.91x25.5205x0.375	2	-15.82	2243.00	88.7	Pass
L3	46.38 - 0	Pole	TP48.5x35.874x0.375	3	-24.54	2719.29	95.4	Pass
							Summary	
						Pole (L3)	95.4	Pass
						<b>RATING =</b>	<b>95.4</b>	<b>Pass</b>

**Table 6 - Tower Component Stresses vs. Capacity – LC5**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	74.0	Pass
1	Base Plate	0	71.4	Pass
1	Base Foundation Structural	0	58.8	Pass
1	Base Foundation Soil Interaction	0	99.4	Pass

<b>Structure Rating (max from all components) =</b>	<b>99.4%</b>
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Notes:

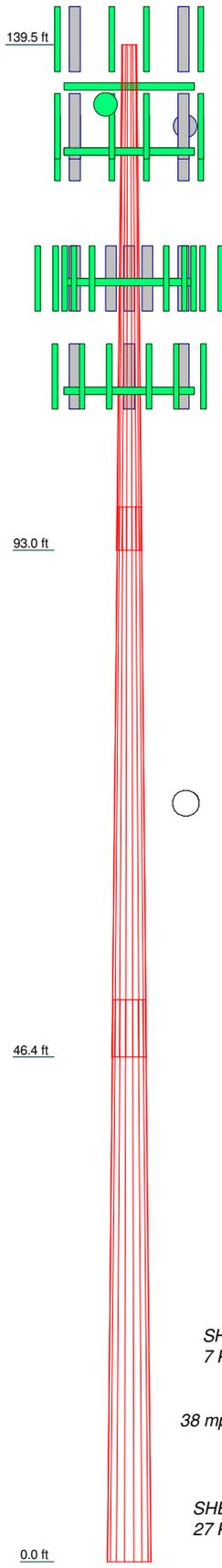
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity.

#### 4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

**APPENDIX A**  
**TNXTOWER OUTPUT**

Section	1	2	3
Length (ft)	46.46	50.58	51.63
Number of Sides	18	18	18
Thickness (in)	0.2500	0.3750	0.3750
Socket Length (ft)	3.92	5.25	35.8740
Top Dia (in)	15.5000	25.5205	48.5000
Bot Dia (in)	26.9900	37.9100	48.5000
Grade	A572-65	A572-65	A572-65
Weight (K)	2.6	6.4	8.7



### DESIGNED APPURTENANCE LOADING

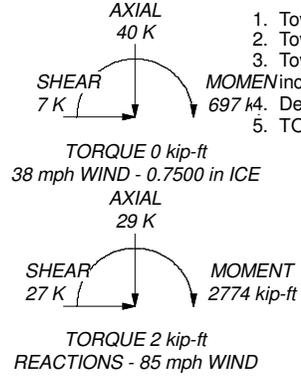
TYPE	ELEVATION	TYPE	ELEVATION
HPA-65R-BUU-H6 w/ Mount Pipe	136	BXA-171063-8BF-EDIN-0 w/ Mount Pipe	118
HPA-65R-BUU-H6 w/ Mount Pipe	136	BXA-171063-8BF-EDIN-0 w/ Mount Pipe	118
HPA-65R-BUU-H6 w/ Mount Pipe	136	BXA-171063-8BF-EDIN-0 w/ Mount Pipe	118
RRUS12/RRUS A2	136	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	118
RRUS12/RRUS A2	136	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	118
RRUS12/RRUS A2	136	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	118
800 10121 w/ mount pipe	136	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	118
800 10121 w/ mount pipe	136	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	118
800 10121 w/ mount pipe	136	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	118
(2) LGP21401	136	(2) FD9R6004/2C-3L	118
(2) LGP21401	136	(2) FD9R6004/2C-3L	118
(2) LGP21401	136	(2) FD9R6004/2C-3L	118
RRUS-11	136	RRH2X40-AWS	118
RRUS-11	136	RRH2X40-AWS	118
RRUS-11	136	RRH2X40-AWS	118
DC6-48-60-18-8F	136	T-Arm Mount [TA 602-3]	118
T-Arm Mount [TA 702-3]	136	(2) DB846F65ZAXY w/Mount Pipe	118
TME-1900MHz RRH (65MHz)	132	(2) DB846F65ZAXY w/Mount Pipe	118
TME-1900MHz RRH (65MHz)	132	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	108
TME-1900MHz RRH (65MHz)	132	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	108
TME-800MHz RRH	132	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	108
TME-800MHz RRH	132	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	108
TME-800MHz RRH	132	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	108
Side Arm Mount [SO 102-3]	132	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	108
APXVSP18-C-A20 w/ Mount Pipe	130	LNK-6515DS-A1M w/ Mount Pipe	108
APXVSP18-C-A20 w/ Mount Pipe	130	LNK-6515DS-A1M w/ Mount Pipe	108
APXVSP18-C-A20 w/ Mount Pipe	130	LNK-6515DS-A1M w/ Mount Pipe	108
LLPX310R w/ Mount Pipe	130	LLPX310R w/ Mount Pipe	108
LLPX310R w/ Mount Pipe	130	LLPX310R w/ Mount Pipe	108
LLPX310R w/ Mount Pipe	130	LLPX310R w/ Mount Pipe	108
800 External Notch Filter	130	800 External Notch Filter	108
800 External Notch Filter	130	800 External Notch Filter	108
800 External Notch Filter	130	800 External Notch Filter	108
(3) ACU-A20-N	130	(3) ACU-A20-N	108
(3) ACU-A20-N	130	(3) ACU-A20-N	108
(3) ACU-A20-N	130	(3) ACU-A20-N	108
FDD_R6_RRH TMA	130	FDD_R6_RRH TMA	108
FDD_R6_RRH TMA	130	FDD_R6_RRH TMA	108
FDD_R6_RRH TMA	130	FDD_R6_RRH TMA	108
6"x4" Pipe Mount	130	6"x4" Pipe Mount	100
6"x4" Pipe Mount	130	6"x4" Pipe Mount	100
6"x4" Pipe Mount	130	6"x4" Pipe Mount	100
T-Arm Mount [TA 602-3]	130	T-Arm Mount [TA 602-3]	100
A-ANT-23G-2-C (VSI)	130	A-ANT-23G-2-C (VSI)	100
VHLP2-11	130	VHLP2-11	75
(2) DB846F65ZAXY w/Mount Pipe	118	(2) DB846F65ZAXY w/Mount Pipe	75
MG D3-800Tx w/ Mount Pipe	118	MG D3-800Tx w/ Mount Pipe	75
MG D3-800Tx w/ Mount Pipe	118	MG D3-800Tx w/ Mount Pipe	75
MG D3-800Tx w/ Mount Pipe	118	MG D3-800Tx w/ Mount Pipe	75
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	118	BXA-171063-8BF-EDIN-0 w/ Mount Pipe	75

### MATERIAL STRENGTH

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

### TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 95.4%



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	Project: <b>BU881541_WO1254370</b>		
	Client: Crown Castle	Drawn by: J. Earnest	App'd:
	Code: TIA/EIA-222-F	Date: 06/21/16	Scale: NTS
	Path: C:\Users\EARNESJT\Desktop\881541\BU881541_WO1254370_LCS.er		Dwg No. E-1

<b>tnxTower</b>  <b>Jacobs Engineering Group, Inc.</b> 5449 Bells Ferry Rd Acworth, GA 30102 Phone: 770-701-2500 FAX: 770-701-2501	<b>Job</b>	139.5 Ft MP - Rogers Property	<b>Page</b>	1 of 18
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## Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Tower is located in New Haven County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.7500 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 38 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

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> </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-G Bracing Resist. Exemption</li> <li>Use TIA-222-G Tension Splice Exemption</li> </ul> <div style="background-color: #e0e0e0; text-align: center; padding: 2px;"><b>Poles</b></div> <ul style="list-style-type: none"> <li>Include Shear-Torsion Interaction</li> <li>Always Use Sub-Critical Flow</li> <li>Use Top Mounted Sockets</li> </ul>
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## Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	139.50-93.04	46.46	3.92	18	15.5000	26.9900	0.2500	1.0000	A572-65 (65 ksi)
L2	93.04-46.38	50.58	5.25	18	25.5205	37.9100	0.3750	1.5000	A572-65 (65 ksi)
L3	46.38-0.00	51.63		18	35.8740	48.5000	0.3750	1.5000	A572-65 (65 ksi)

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### Tapered Pole Properties

Section	Tip Dia. in	Area in <sup>2</sup>	I in <sup>4</sup>	r in	C in	I/C in <sup>3</sup>	J in <sup>4</sup>	I/Q in <sup>2</sup>	w in	w/t
L1	15.7391	12.1009	355.5445	5.4138	7.8740	45.1542	711.5567	6.0516	2.2880	9.152
	27.4064	21.2182	1916.7638	9.4927	13.7109	139.7983	3836.0497	10.6111	4.3102	17.241
L2	26.8892	29.9295	2390.8861	8.9267	12.9644	184.4188	4784.9182	14.9676	3.8316	10.218
	38.4948	44.6760	7952.1562	13.3249	19.2583	412.9214	15914.7760	22.3423	6.0122	16.032
L3	37.7311	42.2527	6727.0539	12.6022	18.2240	369.1315	13462.9594	21.1304	5.6538	15.077
	49.2482	57.2808	16760.5346	17.0844	24.6380	680.2717	33543.1232	28.6458	7.8760	21.003

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A <sub>f</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft <sup>2</sup>	in					in	in	in
L1 139.50-93.04				1	1	1			
L2 93.04-46.38				1	1	1			
L3 46.38-0.00				1	1	1			

### Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement	Total Number	Number Per Row	Start/End Position	Width or Diameter	Perimeter	Weight
			ft				in	in	plf
2" Rigid Conduit	A	Surface Ar (CaAa)	130.00 - 0.00	1	1	0.180 0.200	2.0000		2.80
** 108 **									
MLE Hybrid 9Power/18Fiber RL 2( 1 5/8)	B	Surface Ar (CaAa)	108.00 - 0.00	1	1	0.080 0.100	1.6250		1.07
*****									
Safety Line 3/8	C	Surface Ar (CaAa)	139.50 - 0.00	1	1	-0.450 -0.430	0.3750		0.22
***									

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

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number	C <sub>AA</sub>	Weight	
				ft		ft <sup>2</sup> /ft	plf	
** 136 **								
LDF7-50A(1-5/8")	B	No	Inside Pole	136.00 - 0.00	6	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.82 0.82 0.82 0.82 0.82
FB-L98B-002-75000(3/8")	B	No	Inside Pole	136.00 - 0.00	2	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.06 0.06 0.06 0.06 0.06
WR-VG82ST-BRDA(5/8")	B	No	Inside Pole	136.00 - 0.00	1	No Ice 1/2" Ice	0.00 0.00	0.31 0.31



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### 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	139.50-93.04	A	0.000	0.000	7.392	0.000	0.84
		B	0.000	0.000	2.431	0.000	0.47
		C	0.000	0.000	1.742	0.000	0.01
L2	93.04-46.38	A	0.000	0.000	9.332	0.000	1.31
		B	0.000	0.000	7.582	0.000	0.89
		C	0.000	0.000	1.750	0.000	0.01
L3	46.38-0.00	A	0.000	0.000	9.276	0.000	1.30
		B	0.000	0.000	7.537	0.000	0.89
		C	0.000	0.000	1.739	0.000	0.01

### 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	139.50-93.04	A	0.871	0.000	0.000	13.829	0.000	0.95
		B		0.000	0.000	5.036	0.000	0.51
		C		0.000	0.000	9.833	0.000	0.07
L2	93.04-46.38	A	0.819	0.000	0.000	17.458	0.000	1.45
		B		0.000	0.000	15.708	0.000	1.02
		C		0.000	0.000	9.876	0.000	0.07
L3	46.38-0.00	A	0.750	0.000	0.000	16.875	0.000	1.43
		B		0.000	0.000	15.136	0.000	1.00
		C		0.000	0.000	9.339	0.000	0.07

### 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	139.50-93.04	-0.0236	-0.1897	0.0982	-0.1962
L2	93.04-46.38	0.0822	-0.2642	0.2836	-0.3255
L3	46.38-0.00	0.0848	-0.2689	0.2928	-0.3400

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K	
** 136 ** HPA-65R-BUU-H6 w/	A	From Leg	4.00	0.0000	136.00	No Ice	10.60	8.11	0.08

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K
Mount Pipe			0.00 4.00			1/2" Ice 11.27 1" Ice 11.91 2" Ice 13.21 4" Ice 15.93	9.30 10.21 12.17 16.35	0.16 0.25 0.46 1.02
HPA-65R-BUU-H6 w/ Mount Pipe	B	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 10.60 1/2" Ice 11.27 1" Ice 11.91 2" Ice 13.21 4" Ice 15.93	8.11 9.30 10.21 12.17 16.35	0.08 0.16 0.25 0.46 1.02
HPA-65R-BUU-H6 w/ Mount Pipe	C	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 10.60 1/2" Ice 11.27 1" Ice 11.91 2" Ice 13.21 4" Ice 15.93	8.11 9.30 10.21 12.17 16.35	0.08 0.16 0.25 0.46 1.02
RRUS12/RRUS A2	A	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 3.67 1/2" Ice 3.92 1" Ice 4.19 2" Ice 4.74 4" Ice 5.96	2.14 2.35 2.56 3.02 4.03	0.07 0.10 0.13 0.20 0.40
RRUS12/RRUS A2	B	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 3.67 1/2" Ice 3.92 1" Ice 4.19 2" Ice 4.74 4" Ice 5.96	2.14 2.35 2.56 3.02 4.03	0.07 0.10 0.13 0.20 0.40
RRUS12/RRUS A2	C	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 3.67 1/2" Ice 3.92 1" Ice 4.19 2" Ice 4.74 4" Ice 5.96	2.14 2.35 2.56 3.02 4.03	0.07 0.10 0.13 0.20 0.40
800 10121 w/ mount pipe	A	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 5.69 1/2" Ice 6.18 1" Ice 6.68 2" Ice 7.70 4" Ice 9.86	4.60 5.35 6.05 7.53 10.83	0.07 0.11 0.17 0.30 0.68
800 10121 w/ mount pipe	B	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 5.69 1/2" Ice 6.18 1" Ice 6.68 2" Ice 7.70 4" Ice 9.86	4.60 5.35 6.05 7.53 10.83	0.07 0.11 0.17 0.30 0.68
800 10121 w/ mount pipe	C	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 5.69 1/2" Ice 6.18 1" Ice 6.68 2" Ice 7.70 4" Ice 9.86	4.60 5.35 6.05 7.53 10.83	0.07 0.11 0.17 0.30 0.68
(2) LGP21401	A	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 1.29 1/2" Ice 1.45 1" Ice 1.61 2" Ice 1.97 4" Ice 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	B	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 1.29 1/2" Ice 1.45 1" Ice 1.61 2" Ice 1.97 4" Ice 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	C	From Leg	4.00 0.00 4.00	0.0000	136.00	No Ice 1.29 1/2" Ice 1.45 1" Ice 1.61	0.23 0.31 0.40	0.01 0.02 0.03

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Lateral						Vert
RRUS-11	A	From Leg	4.00	0.00	0.0000	136.00	2" Ice	1.97	0.61	0.05
							4" Ice	2.79	1.12	0.14
							No Ice	2.94	1.25	0.06
							1/2" Ice	3.17	1.41	0.07
							1" Ice	3.41	1.59	0.10
RRUS-11	B	From Leg	4.00	0.00	0.0000	136.00	2" Ice	3.91	1.96	0.15
							4" Ice	5.02	2.82	0.30
							No Ice	2.94	1.25	0.06
							1/2" Ice	3.17	1.41	0.07
							1" Ice	3.41	1.59	0.10
RRUS-11	C	From Leg	4.00	0.00	0.0000	136.00	2" Ice	3.91	1.96	0.15
							4" Ice	5.02	2.82	0.30
							No Ice	2.94	1.25	0.06
							1/2" Ice	3.17	1.41	0.07
							1" Ice	3.41	1.59	0.10
DC6-48-60-18-8F	C	From Leg	4.00	0.00	0.0000	136.00	2" Ice	3.91	1.96	0.15
							4" Ice	5.02	2.82	0.30
							No Ice	1.47	1.47	0.03
							1/2" Ice	1.67	1.67	0.05
							1" Ice	1.88	1.88	0.07
T-Arm Mount [TA 702-3]	A	None	4.00	0.00	0.0000	136.00	2" Ice	2.33	2.33	0.12
							4" Ice	3.38	3.38	0.25
							No Ice	5.64	5.64	0.34
							1/2" Ice	6.55	6.55	0.43
							1" Ice	7.46	7.46	0.52
** 132 ** TME-1900MHz RRH (65MHz)	A	From Leg	4.00	0.00	0.0000	132.00	2" Ice	9.28	9.28	0.70
							4" Ice	12.92	12.92	1.06
							No Ice	2.70	2.77	0.06
							1/2" Ice	2.94	3.01	0.08
							1" Ice	3.18	3.26	0.11
TME-1900MHz RRH (65MHz)	B	From Leg	4.00	0.00	0.0000	132.00	2" Ice	3.70	3.78	0.18
							4" Ice	4.85	4.93	0.35
							No Ice	2.70	2.77	0.06
							1/2" Ice	2.94	3.01	0.08
							1" Ice	3.18	3.26	0.11
TME-1900MHz RRH (65MHz)	C	From Leg	4.00	0.00	0.0000	132.00	2" Ice	3.70	3.78	0.18
							4" Ice	4.85	4.93	0.35
							No Ice	2.70	2.77	0.06
							1/2" Ice	2.94	3.01	0.08
							1" Ice	3.18	3.26	0.11
TME-800MHZ RRH	A	From Leg	4.00	0.00	0.0000	132.00	2" Ice	3.70	3.78	0.18
							4" Ice	4.85	4.93	0.35
							No Ice	2.49	2.07	0.05
							1/2" Ice	2.71	2.27	0.07
							1" Ice	2.93	2.48	0.10
TME-800MHZ RRH	B	From Leg	4.00	0.00	0.0000	132.00	2" Ice	3.41	2.93	0.16
							4" Ice	4.46	3.93	0.32
							No Ice	2.49	2.07	0.05
							1/2" Ice	2.71	2.27	0.07
							1" Ice	2.93	2.48	0.10
TME-800MHZ RRH	C	From Leg	4.00	0.00	0.0000	132.00	2" Ice	3.41	2.93	0.16
							4" Ice	4.46	3.93	0.32
							No Ice	2.49	2.07	0.05
							1/2" Ice	2.71	2.27	0.07
							1" Ice	2.93	2.48	0.10

<b>tnxTower</b>  <b>Jacobs Engineering Group, Inc.</b> 5449 Bells Ferry Rd Acworth, GA 30102 Phone: 770-701-2500 FAX: 770-701-2501	<b>Job</b>		139.5 Ft MP - Rogers Property		<b>Page</b>		7 of 18	
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	<b>Client</b>		Crown Castle		<b>Designed by</b>		J. Earnest	

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Lateral						Vert
Side Arm Mount [SO 102-3]	C	None			0.0000	132.00	4" Ice	4.46	3.93	0.32
							No Ice	3.00	3.00	0.08
							1/2" Ice	3.48	3.48	0.11
							1" Ice	3.96	3.96	0.14
							2" Ice	4.92	4.92	0.20
							4" Ice	6.84	6.84	0.32
** 130 **										
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	130.00	No Ice	8.50	6.95	0.08
							1/2" Ice	9.15	8.13	0.15
							1" Ice	9.77	9.02	0.23
							2" Ice	11.03	10.84	0.41
							4" Ice	13.68	14.85	0.91
							No Ice	8.50	6.95	0.08
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	130.00	1/2" Ice	9.15	8.13	0.15
							1" Ice	9.77	9.02	0.23
							2" Ice	11.03	10.84	0.41
							4" Ice	13.68	14.85	0.91
							No Ice	8.50	6.95	0.08
							1/2" Ice	9.15	8.13	0.15
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	130.00	1" Ice	9.77	9.02	0.23
							2" Ice	11.03	10.84	0.41
							4" Ice	13.68	14.85	0.91
							No Ice	8.50	6.95	0.08
							1/2" Ice	9.15	8.13	0.15
							1" Ice	9.77	9.02	0.23
LLPX310R w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	130.00	2" Ice	11.03	10.84	0.41
							4" Ice	13.68	14.85	0.91
							No Ice	5.07	2.98	0.05
							1/2" Ice	5.48	3.53	0.08
							1" Ice	5.91	4.09	0.13
							2" Ice	6.79	5.31	0.23
LLPX310R w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	130.00	4" Ice	8.70	8.13	0.54
							No Ice	5.07	2.98	0.05
							1/2" Ice	5.48	3.53	0.08
							1" Ice	5.91	4.09	0.13
							2" Ice	6.79	5.31	0.23
							4" Ice	8.70	8.13	0.54
LLPX310R w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	130.00	No Ice	5.07	2.98	0.05
							1/2" Ice	5.48	3.53	0.08
							1" Ice	5.91	4.09	0.13
							2" Ice	6.79	5.31	0.23
							4" Ice	8.70	8.13	0.54
							No Ice	5.07	2.98	0.05
800 External Notch Filter	A	From Leg	4.00	0.00	0.0000	130.00	1/2" Ice	0.77	0.37	0.01
							1" Ice	0.89	0.46	0.02
							2" Ice	1.02	0.56	0.02
							4" Ice	1.30	0.79	0.04
							No Ice	0.77	0.37	0.01
							1/2" Ice	0.89	0.46	0.02
800 External Notch Filter	B	From Leg	4.00	0.00	0.0000	130.00	1" Ice	1.02	0.56	0.02
							2" Ice	1.30	0.79	0.04
							4" Ice	1.97	1.34	0.11
							No Ice	0.77	0.37	0.01
							1/2" Ice	0.89	0.46	0.02
							1" Ice	1.02	0.56	0.02
800 External Notch Filter	C	From Leg	4.00	0.00	0.0000	130.00	2" Ice	1.30	0.79	0.04
							4" Ice	1.97	1.34	0.11
							No Ice	0.77	0.37	0.01
							1/2" Ice	0.89	0.46	0.02
							1" Ice	1.02	0.56	0.02
							2" Ice	1.30	0.79	0.04
(3) ACU-A20-N	A	From Leg	4.00	0.00	0.0000	130.00	4" Ice	1.97	1.34	0.11
							No Ice	0.08	0.14	0.00
							1/2" Ice	0.12	0.19	0.00
							1" Ice	0.17	0.25	0.00
							2" Ice	0.30	0.40	0.01
							4" Ice	0.67	0.80	0.04

<b>tnxTower</b>  <b>Jacobs Engineering Group, Inc.</b> 5449 Bells Ferry Rd Acworth, GA 30102 Phone: 770-701-2500 FAX: 770-701-2501	<b>Job</b>	139.5 Ft MP - Rogers Property	<b>Page</b>	8 of 18
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	<b>Client</b>	Crown Castle	<b>Designed by</b>	J. Earnest

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz	Lateral					
(3) ACU-A20-N	B	From Leg	4.00	0.0000	130.00	No Ice	0.08	0.14	0.00
			0.00	0.00		1/2" Ice	0.12	0.19	0.00
			0.00	0.00		1" Ice	0.17	0.25	0.00
						2" Ice	0.30	0.40	0.01
						4" Ice	0.67	0.80	0.04
(3) ACU-A20-N	C	From Leg	4.00	0.0000	130.00	No Ice	0.08	0.14	0.00
			0.00	0.00		1/2" Ice	0.12	0.19	0.00
			0.00	0.00		1" Ice	0.17	0.25	0.00
						2" Ice	0.30	0.40	0.01
						4" Ice	0.67	0.80	0.04
FDD_R6_RRH TMA	A	From Leg	4.00	0.0000	130.00	No Ice	1.79	0.78	0.03
			0.00	0.00		1/2" Ice	1.97	0.92	0.04
			2.00	0.00		1" Ice	2.16	1.07	0.06
						2" Ice	2.57	1.39	0.09
						4" Ice	3.49	2.14	0.20
FDD_R6_RRH TMA	B	From Leg	4.00	0.0000	130.00	No Ice	1.79	0.78	0.03
			0.00	0.00		1/2" Ice	1.97	0.92	0.04
			2.00	0.00		1" Ice	2.16	1.07	0.06
						2" Ice	2.57	1.39	0.09
						4" Ice	3.49	2.14	0.20
FDD_R6_RRH TMA	C	From Leg	4.00	0.0000	130.00	No Ice	1.79	0.78	0.03
			0.00	0.00		1/2" Ice	1.97	0.92	0.04
			2.00	0.00		1" Ice	2.16	1.07	0.06
						2" Ice	2.57	1.39	0.09
						4" Ice	3.49	2.14	0.20
6'x4" Pipe Mount	B	From Leg	4.00	0.0000	130.00	No Ice	2.25	2.25	0.07
			0.00	0.00		1/2" Ice	2.62	2.62	0.08
			0.00	0.00		1" Ice	3.00	3.00	0.11
						2" Ice	3.78	3.78	0.17
						4" Ice	5.56	5.56	0.35
6'x4" Pipe Mount	C	From Leg	4.00	0.0000	130.00	No Ice	2.25	2.25	0.07
			0.00	0.00		1/2" Ice	2.62	2.62	0.08
			0.00	0.00		1" Ice	3.00	3.00	0.11
						2" Ice	3.78	3.78	0.17
						4" Ice	5.56	5.56	0.35
T-Arm Mount [TA 602-3]	C	None		0.0000	130.00	No Ice	11.59	11.59	0.26
						1/2" Ice	15.44	15.44	0.33
						1" Ice	19.29	19.29	0.42
						2" Ice	26.99	26.99	0.69
						4" Ice	42.39	42.39	1.85
** 118 **									
(2) DB846F65ZAXY w/Mount Pipe	A	From Leg	6.00	0.0000	118.00	No Ice	7.27	7.82	0.05
			0.00	0.00		1/2" Ice	7.88	9.01	0.11
			0.00	0.00		1" Ice	8.48	9.91	0.19
						2" Ice	9.72	11.81	0.37
						4" Ice	12.33	15.98	0.87
(2) DB846F65ZAXY w/Mount Pipe	B	From Leg	6.00	0.0000	118.00	No Ice	7.27	7.82	0.05
			0.00	0.00		1/2" Ice	7.88	9.01	0.11
			0.00	0.00		1" Ice	8.48	9.91	0.19
						2" Ice	9.72	11.81	0.37
						4" Ice	12.33	15.98	0.87
(2) DB846F65ZAXY w/Mount Pipe	C	From Leg	6.00	0.0000	118.00	No Ice	7.27	7.82	0.05
			0.00	0.00		1/2" Ice	7.88	9.01	0.11
			0.00	0.00		1" Ice	8.48	9.91	0.19
						2" Ice	9.72	11.81	0.37
						4" Ice	12.33	15.98	0.87
MG D3-800Tx w/ Mount	A	From Leg	6.00	0.0000	118.00	No Ice	3.71	3.56	0.04

<b>tnxTower</b>  <b>Jacobs Engineering Group, Inc.</b> 5449 Bells Ferry Rd Acworth, GA 30102 Phone: 770-701-2500 FAX: 770-701-2501	<b>Job</b>		139.5 Ft MP - Rogers Property		<b>Page</b>		9 of 18	
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	<b>Client</b>		Crown Castle		<b>Designed by</b>		J. Earnest	

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Vert						ft
Pipe			0.00			1/2" Ice	4.19	4.39	0.07	
			0.00			1" Ice	4.63	5.09	0.11	
						2" Ice	5.65	6.54	0.22	
						4" Ice	7.82	9.69	0.54	
MG D3-800Tx w/ Mount Pipe	B	From Leg	6.00		0.0000	118.00	No Ice	3.71	3.56	0.04
			0.00				1/2" Ice	4.19	4.39	0.07
			0.00				1" Ice	4.63	5.09	0.11
							2" Ice	5.65	6.54	0.22
							4" Ice	7.82	9.69	0.54
MG D3-800Tx w/ Mount Pipe	C	From Leg	6.00		0.0000	118.00	No Ice	3.71	3.56	0.04
			0.00				1/2" Ice	4.19	4.39	0.07
			0.00				1" Ice	4.63	5.09	0.11
							2" Ice	5.65	6.54	0.22
							4" Ice	7.82	9.69	0.54
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	A	From Leg	6.00		0.0000	118.00	No Ice	3.18	3.35	0.03
			0.00				1/2" Ice	3.56	3.97	0.06
			0.00				1" Ice	3.96	4.60	0.10
							2" Ice	4.85	5.89	0.19
							4" Ice	6.77	8.89	0.49
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	B	From Leg	6.00		0.0000	118.00	No Ice	3.18	3.35	0.03
			0.00				1/2" Ice	3.56	3.97	0.06
			0.00				1" Ice	3.96	4.60	0.10
							2" Ice	4.85	5.89	0.19
							4" Ice	6.77	8.89	0.49
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	C	From Leg	6.00		0.0000	118.00	No Ice	3.18	3.35	0.03
			0.00				1/2" Ice	3.56	3.97	0.06
			0.00				1" Ice	3.96	4.60	0.10
							2" Ice	4.85	5.89	0.19
							4" Ice	6.77	8.89	0.49
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	A	From Leg	6.00		0.0000	118.00	No Ice	7.97	5.80	0.04
			0.00				1/2" Ice	8.61	6.95	0.10
			0.00				1" Ice	9.22	7.82	0.17
							2" Ice	10.46	9.60	0.34
							4" Ice	13.07	13.37	0.80
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	B	From Leg	6.00		0.0000	118.00	No Ice	7.97	5.80	0.04
			0.00				1/2" Ice	8.61	6.95	0.10
			0.00				1" Ice	9.22	7.82	0.17
							2" Ice	10.46	9.60	0.34
							4" Ice	13.07	13.37	0.80
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	C	From Leg	6.00		0.0000	118.00	No Ice	7.97	5.80	0.04
			0.00				1/2" Ice	8.61	6.95	0.10
			0.00				1" Ice	9.22	7.82	0.17
							2" Ice	10.46	9.60	0.34
							4" Ice	13.07	13.37	0.80
(2) FD9R6004/2C-3L	A	From Leg	6.00		0.0000	118.00	No Ice	0.00	0.08	0.00
			0.00				1/2" Ice	0.00	0.14	0.01
			0.00				1" Ice	0.00	0.20	0.01
							2" Ice	0.00	0.34	0.02
							4" Ice	0.00	0.74	0.06
(2) FD9R6004/2C-3L	B	From Leg	6.00		0.0000	118.00	No Ice	0.00	0.08	0.00
			0.00				1/2" Ice	0.00	0.14	0.01
			0.00				1" Ice	0.00	0.20	0.01
							2" Ice	0.00	0.34	0.02
							4" Ice	0.00	0.74	0.06
(2) FD9R6004/2C-3L	C	From Leg	6.00		0.0000	118.00	No Ice	0.00	0.08	0.00
			0.00				1/2" Ice	0.00	0.14	0.01
			0.00				1" Ice	0.00	0.20	0.01

<b>tnxTower</b>  <b>Jacobs Engineering Group, Inc.</b> 5449 Bells Ferry Rd Acworth, GA 30102 Phone: 770-701-2500 FAX: 770-701-2501	<b>Job</b>	139.5 Ft MP - Rogers Property	<b>Page</b>	10 of 18
	<b>Project</b>	BU881541_WO1254370	<b>Date</b>	14:02:22 06/21/16
	<b>Client</b>	Crown Castle	<b>Designed by</b>	J. Earnest

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Vert						ft
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
RRH2X40-AWS	A	From Leg	6.00	0.00	0.0000	118.00	2" Ice	0.00	0.34	0.02
							4" Ice	0.00	0.74	0.06
							No Ice	0.00	1.59	0.04
							1/2" Ice	0.00	1.80	0.06
							1" Ice	0.00	2.01	0.08
RRH2X40-AWS	B	From Leg	6.00	0.00	0.0000	118.00	2" Ice	0.00	2.46	0.13
							4" Ice	0.00	3.48	0.28
							No Ice	0.00	1.59	0.04
							1/2" Ice	0.00	1.80	0.06
							1" Ice	0.00	2.01	0.08
RRH2X40-AWS	C	From Leg	6.00	0.00	0.0000	118.00	2" Ice	0.00	2.46	0.13
							4" Ice	0.00	3.48	0.28
							No Ice	0.00	1.59	0.04
							1/2" Ice	0.00	1.80	0.06
							1" Ice	0.00	2.01	0.08
T-Arm Mount [TA 602-3]	C	None			0.0000	118.00	2" Ice	0.00	2.46	0.13
							4" Ice	0.00	3.48	0.28
							No Ice	11.59	11.59	0.26
							1/2" Ice	15.44	15.44	0.33
							1" Ice	19.29	19.29	0.42
** 108 ** ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	108.00	2" Ice	26.99	26.99	0.69
							4" Ice	42.39	42.39	1.85
							No Ice	6.83	5.64	0.11
							1/2" Ice	7.35	6.48	0.17
							1" Ice	7.86	7.26	0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	108.00	2" Ice	8.93	8.86	0.38
							4" Ice	11.18	12.29	0.81
							No Ice	6.83	5.64	0.11
							1/2" Ice	7.35	6.48	0.17
							1" Ice	7.86	7.26	0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	108.00	2" Ice	8.93	8.86	0.38
							4" Ice	11.18	12.29	0.81
							No Ice	6.83	5.64	0.11
							1/2" Ice	7.35	6.48	0.17
							1" Ice	7.86	7.26	0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	108.00	2" Ice	8.93	8.86	0.38
							4" Ice	11.18	12.29	0.81
							No Ice	6.83	5.64	0.11
							1/2" Ice	7.35	6.48	0.17
							1" Ice	7.86	7.26	0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	108.00	2" Ice	8.93	8.86	0.38
							4" Ice	11.18	12.29	0.81
							No Ice	6.83	5.64	0.11
							1/2" Ice	7.35	6.48	0.17
							1" Ice	7.86	7.26	0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	108.00	2" Ice	8.93	8.86	0.38
							4" Ice	11.18	12.29	0.81
							No Ice	6.83	5.64	0.11
							1/2" Ice	7.35	6.48	0.17
							1" Ice	7.86	7.26	0.23
LNX-6515DS-A1M w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	108.00	2" Ice	8.93	8.86	0.38
							4" Ice	11.18	12.29	0.81
							No Ice	11.45	9.36	0.08
							1/2" Ice	12.06	10.68	0.16
							1" Ice	12.69	11.71	0.25
							2" Ice	14.03	13.82	0.47

<b>tnxTower</b>  <b>Jacobs Engineering Group, Inc.</b> 5449 Bells Ferry Rd Acworth, GA 30102 Phone: 770-701-2500 FAX: 770-701-2501	<b>Job</b>		139.5 Ft MP - Rogers Property				<b>Page</b>		11 of 18	
	<b>Project</b>		BU881541_WO1254370				<b>Date</b>		14:02:22 06/21/16	
	<b>Client</b>		Crown Castle				<b>Designed by</b>		J. Earnest	

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Lateral						Vert
LNX-6515DS-A1M w/ Mount Pipe	B	From Leg	4.00	0.0000	108.00	4" Ice	17.05	18.22	1.08	
			0.00	0.0000		108.00	No Ice	11.45	9.36	0.08
			1.00			1/2" Ice	12.06	10.68	0.16	
						1" Ice	12.69	11.71	0.25	
						2" Ice	14.03	13.82	0.47	
LNX-6515DS-A1M w/ Mount Pipe	C	From Leg	4.00	0.0000	108.00	4" Ice	17.05	18.22	1.08	
			0.00	0.0000		108.00	No Ice	11.45	9.36	0.08
			1.00			1/2" Ice	12.06	10.68	0.16	
						1" Ice	12.69	11.71	0.25	
						2" Ice	14.03	13.82	0.47	
KRY 112 144/1	A	From Leg	4.00	0.0000	108.00	4" Ice	17.05	18.22	1.08	
			0.00	0.0000		108.00	No Ice	0.41	0.19	0.01
			1.00			1/2" Ice	0.50	0.26	0.01	
						1" Ice	0.60	0.33	0.02	
						2" Ice	0.82	0.51	0.03	
KRY 112 144/1	B	From Leg	4.00	0.0000	108.00	4" Ice	1.36	0.97	0.08	
			0.00	0.0000		108.00	No Ice	0.41	0.19	0.01
			1.00			1/2" Ice	0.50	0.26	0.01	
						1" Ice	0.60	0.33	0.02	
						2" Ice	0.82	0.51	0.03	
KRY 112 144/1	C	From Leg	4.00	0.0000	108.00	4" Ice	1.36	0.97	0.08	
			0.00	0.0000		108.00	No Ice	0.41	0.19	0.01
			1.00			1/2" Ice	0.50	0.26	0.01	
						1" Ice	0.60	0.33	0.02	
						2" Ice	0.82	0.51	0.03	
RRUS 11 B12	A	From Leg	4.00	0.0000	108.00	4" Ice	1.36	0.97	0.08	
			0.00	0.0000		108.00	No Ice	3.31	1.36	0.05
			1.00			1/2" Ice	3.55	1.54	0.07	
						1" Ice	3.80	1.73	0.10	
						2" Ice	4.33	2.13	0.15	
RRUS 11 B12	B	From Leg	4.00	0.0000	108.00	4" Ice	5.50	3.04	0.31	
			0.00	0.0000		108.00	No Ice	3.31	1.36	0.05
			1.00			1/2" Ice	3.55	1.54	0.07	
						1" Ice	3.80	1.73	0.10	
						2" Ice	4.33	2.13	0.15	
RRUS 11 B12	C	From Leg	4.00	0.0000	108.00	4" Ice	5.50	3.04	0.31	
			0.00	0.0000		108.00	No Ice	3.31	1.36	0.05
			1.00			1/2" Ice	3.55	1.54	0.07	
						1" Ice	3.80	1.73	0.10	
						2" Ice	4.33	2.13	0.15	
T-Arm Mount [TA 602-3]	C	None		0.0000	108.00	4" Ice	5.50	3.04	0.31	
				0.0000		108.00	No Ice	11.59	11.59	0.26
						1/2" Ice	15.44	15.44	0.33	
						1" Ice	19.29	19.29	0.42	
						2" Ice	26.99	26.99	0.69	
** 100 **					4" Ice	42.39	42.39	1.85		
APXV18-206517S-C	A	From Leg	2.00	0.0000	100.00	No Ice	5.17	3.04	0.03	
			0.00	0.0000		100.00	1/2" Ice	5.62	3.47	0.05
			0.00			1" Ice	6.08	3.91	0.09	
						2" Ice	7.02	4.81	0.17	
						4" Ice	9.12	6.70	0.40	
APXV18-206517S-C	B	From Leg	2.00	0.0000	100.00	No Ice	5.17	3.04	0.03	
			0.00	0.0000		100.00	1/2" Ice	5.62	3.47	0.05
			0.00			1" Ice	6.08	3.91	0.09	
						2" Ice	7.02	4.81	0.17	
						4" Ice	9.12	6.70	0.40	

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub>		Weight
			Horz	Lateral			Front	Side	
			Vert						
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K
			ft						
APXV18-206517S-C	C	From Leg	2.00	0.0000	100.00	No Ice	5.17	3.04	0.03
			0.00			1/2" Ice	5.62	3.47	0.05
			0.00			1" Ice	6.08	3.91	0.09
						2" Ice	7.02	4.81	0.17
						4" Ice	9.12	6.70	0.40
Pipe Mount [PM 601-3]	C	None		0.0000	100.00	No Ice	4.39	4.39	0.20
						1/2" Ice	5.48	5.48	0.24
						1" Ice	6.57	6.57	0.28
						2" Ice	8.75	8.75	0.36
						4" Ice	13.11	13.11	0.53
** 75 **									
Side Arm Mount [SO 701-1]	C	From Leg	2.75	0.0000	75.00	No Ice	0.85	1.67	0.07
			0.00			1/2" Ice	1.14	2.34	0.08
			0.00			1" Ice	1.43	3.01	0.09
						2" Ice	2.01	4.35	0.12
						4" Ice	3.17	7.03	0.18
KS24019-L112A	C	From Leg	4.25	0.0000	75.00	No Ice	0.10	0.10	0.01
			0.00			1/2" Ice	0.18	0.18	0.01
			2.00			1" Ice	0.26	0.26	0.01
						2" Ice	0.42	0.42	0.01
						4" Ice	0.74	0.74	0.02
*****									

## Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight		
				Horz	Lateral								
			Vert										
			ft	ft	°	°	ft	ft	ft <sup>2</sup>	K			
A-ANT-23G-2-C (VSI)	B	Paraboloid w/Shroud (HP)	From	4.75	10.0000			130.00	2.17	No Ice	3.72	0.01	
			Centroid	2.25						1/2" Ice	4.01	0.03	
			-Face	2.00							1" Ice	4.30	0.05
											2" Ice	4.88	0.09
											4" Ice	6.04	0.18
VHLP2-11	C	Paraboloid w/o Radome	From	4.75	-30.0000			130.00	2.17	No Ice	3.72	0.03	
			Centroid	2.25						1/2" Ice	4.01	0.05	
			-Face	4.00							1" Ice	4.30	0.07
											2" Ice	4.88	0.11
											4" Ice	6.04	0.19
***													

## Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice

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<i>Comb. No.</i>	<i>Description</i>
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

### Maximum Member Forces

<i>Section No.</i>	<i>Elevation ft</i>	<i>Component Type</i>	<i>Condition</i>	<i>Gov. Load Comb.</i>	<i>Force K</i>	<i>Major Axis Moment kip-ft</i>	<i>Minor Axis Moment kip-ft</i>
L1	139.5 - 93.04	Pole	Max Tension	8	0.00	-0.00	0.00
			Max. Compression	14	-15.92	0.19	-0.81
			Max. Mx	11	-7.03	489.75	6.69
			Max. My	2	-7.04	3.44	487.68
			Max. Vy	11	-19.70	489.75	6.69
			Max. Vx	2	-19.65	3.44	487.68
			Max. Torque	11			2.10
			Max Tension	1	0.00	0.00	0.00
L2	93.04 - 46.38	Pole	Max. Compression	14	-25.92	0.47	-0.70
			Max. Mx	11	-15.82	1467.22	15.56
			Max. My	2	-15.83	8.06	1463.19
			Max. Vy	11	-23.43	1467.22	15.56
			Max. Vx	2	-23.40	8.06	1463.19
			Max. Torque	11			2.16
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-40.50	0.38	-0.25
L3	46.38 - 0	Pole	Max. Mx	11	-28.86	2773.15	26.11

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	2	-28.86	13.27	2767.83
			Max. Vy	11	-27.12	2773.15	26.11
			Max. Vx	2	-27.10	13.27	2767.83
			Max. Torque	11			2.10

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	24	40.50	6.65	0.05
	Max. H <sub>x</sub>	11	28.89	27.09	0.20
	Max. H <sub>z</sub>	2	28.89	0.10	27.07
	Max. M <sub>x</sub>	2	2767.83	0.10	27.07
	Max. M <sub>z</sub>	5	2755.99	-26.98	-0.01
	Max. Torsion	11	2.01	27.09	0.20
	Min. Vert	1	28.89	0.00	0.00
	Min. H <sub>x</sub>	5	28.89	-26.98	-0.01
	Min. H <sub>z</sub>	8	28.89	0.06	-26.99
	Min. M <sub>x</sub>	8	-2756.98	0.06	-26.99
	Min. M <sub>z</sub>	11	-2773.15	27.09	0.20
	Min. Torsion	6	-1.42	-23.42	-13.45

### 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	28.89	0.00	0.00	0.20	0.50	0.00
Dead+Wind 0 deg - No Ice	28.89	-0.10	-27.07	-2767.83	13.27	-1.02
Dead+Wind 30 deg - No Ice	28.89	13.37	-23.49	-2404.67	-1361.96	-0.81
Dead+Wind 60 deg - No Ice	28.89	23.33	-13.45	-1372.95	-2382.06	0.81
Dead+Wind 90 deg - No Ice	28.89	26.98	0.01	0.75	-2755.99	1.26
Dead+Wind 120 deg - No Ice	28.89	23.42	13.45	1372.53	-2393.52	1.42
Dead+Wind 150 deg - No Ice	28.89	13.55	23.38	2388.83	-1384.93	0.98
Dead+Wind 180 deg - No Ice	28.89	-0.06	26.99	2756.98	9.32	0.23
Dead+Wind 210 deg - No Ice	28.89	-13.54	23.35	2385.81	1386.33	-0.31
Dead+Wind 240 deg - No Ice	28.89	-23.37	13.47	1375.99	2388.67	-0.83
Dead+Wind 270 deg - No Ice	28.89	-27.09	-0.20	-26.11	2773.15	-2.01
Dead+Wind 300 deg - No Ice	28.89	-23.46	-13.59	-1391.42	2400.03	-1.83
Dead+Wind 330 deg - No Ice	28.89	-13.58	-23.46	-2398.82	1390.17	-1.36
Dead+Ice+Temp	40.50	-0.00	0.00	0.25	0.38	0.00
Dead+Wind 0 deg+Ice+Temp	40.50	-0.02	-6.64	-695.64	3.47	-0.22
Dead+Wind 30 deg+Ice+Temp	40.50	3.28	-5.76	-604.10	-342.43	-0.17
Dead+Wind 60 deg+Ice+Temp	40.50	5.72	-3.30	-345.06	-598.73	0.20
Dead+Wind 90 deg+Ice+Temp	40.50	6.62	0.00	0.55	-692.72	0.30
Dead+Wind 120 deg+Ice+Temp	40.50	5.75	3.30	345.70	-601.49	0.33
Dead+Wind 150 deg+Ice+Temp	40.50	3.32	5.74	601.09	-347.92	0.22
Dead+Wind 180 deg+Ice+Temp	40.50	-0.01	6.62	693.64	2.29	0.04
Dead+Wind 210 deg+Ice+Temp	40.50	-3.32	5.73	600.27	348.59	-0.09
Dead+Wind 240 deg+Ice+Temp	40.50	-5.73	3.30	346.26	600.83	-0.21
Dead+Wind 270 deg+Ice+Temp	40.50	-6.65	-0.05	-5.87	697.26	-0.47
Dead+Wind 300 deg+Ice+Temp	40.50	-5.75	-3.34	-349.54	603.58	-0.42

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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 330 deg+Ice+Temp	40.50	-3.33	-5.76	-602.90	349.71	-0.31
Dead+Wind 0 deg - Service	28.89	-0.03	-9.37	-959.42	4.94	-0.36
Dead+Wind 30 deg - Service	28.89	4.63	-8.13	-833.51	-471.82	-0.28
Dead+Wind 60 deg - Service	28.89	8.07	-4.65	-475.81	-825.46	0.28
Dead+Wind 90 deg - Service	28.89	9.33	0.00	0.41	-955.10	0.44
Dead+Wind 120 deg - Service	28.89	8.10	4.66	475.98	-829.44	0.50
Dead+Wind 150 deg - Service	28.89	4.69	8.09	828.31	-479.79	0.35
Dead+Wind 180 deg - Service	28.89	-0.02	9.34	955.94	3.57	0.08
Dead+Wind 210 deg - Service	28.89	-4.68	8.08	827.26	480.95	-0.11
Dead+Wind 240 deg - Service	28.89	-8.09	4.66	477.18	828.44	-0.29
Dead+Wind 270 deg - Service	28.89	-9.38	-0.07	-8.90	961.76	-0.71
Dead+Wind 300 deg - Service	28.89	-8.12	-4.70	-482.24	832.41	-0.65
Dead+Wind 330 deg - Service	28.89	-4.70	-8.12	-831.49	482.30	-0.48

## 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	0.00	-28.89	0.00	0.00	28.89	0.00	0.000%
2	-0.10	-28.89	-27.07	0.10	28.89	27.07	0.000%
3	13.37	-28.89	-23.49	-13.37	28.89	23.49	0.000%
4	23.33	-28.89	-13.45	-23.33	28.89	13.45	0.000%
5	26.98	-28.89	0.01	-26.98	28.89	-0.01	0.000%
6	23.42	-28.89	13.45	-23.42	28.89	-13.45	0.000%
7	13.55	-28.89	23.38	-13.55	28.89	-23.38	0.000%
8	-0.06	-28.89	26.99	0.06	28.89	-26.99	0.000%
9	-13.54	-28.89	23.35	13.54	28.89	-23.35	0.000%
10	-23.37	-28.89	13.47	23.37	28.89	-13.47	0.000%
11	-27.09	-28.89	-0.20	27.09	28.89	0.20	0.000%
12	-23.46	-28.89	-13.59	23.46	28.89	13.59	0.000%
13	-13.58	-28.89	-23.46	13.58	28.89	23.46	0.000%
14	0.00	-40.50	0.00	0.00	40.50	-0.00	0.000%
15	-0.02	-40.50	-6.64	0.02	40.50	6.64	0.000%
16	3.28	-40.50	-5.76	-3.28	40.50	5.76	0.000%
17	5.72	-40.50	-3.30	-5.72	40.50	3.30	0.000%
18	6.62	-40.50	0.00	-6.62	40.50	-0.00	0.000%
19	5.75	-40.50	3.30	-5.75	40.50	-3.30	0.000%
20	3.32	-40.50	5.74	-3.32	40.50	-5.74	0.000%
21	-0.01	-40.50	6.62	0.01	40.50	-6.62	0.000%
22	-3.32	-40.50	5.73	3.32	40.50	-5.73	0.000%
23	-5.73	-40.50	3.30	5.73	40.50	-3.30	0.000%
24	-6.65	-40.50	-0.05	6.65	40.50	0.05	0.000%
25	-5.75	-40.50	-3.34	5.75	40.50	3.34	0.000%
26	-3.33	-40.50	-5.76	3.33	40.50	5.76	0.000%
27	-0.03	-28.89	-9.37	0.03	28.89	9.37	0.000%
28	4.63	-28.89	-8.13	-4.63	28.89	8.13	0.000%
29	8.07	-28.89	-4.65	-8.07	28.89	4.65	0.000%
30	9.33	-28.89	0.00	-9.33	28.89	-0.00	0.000%
31	8.10	-28.89	4.66	-8.10	28.89	-4.66	0.000%
32	4.69	-28.89	8.09	-4.69	28.89	-8.09	0.000%
33	-0.02	-28.89	9.34	0.02	28.89	-9.34	0.000%
34	-4.68	-28.89	8.08	4.68	28.89	-8.08	0.000%
35	-8.09	-28.89	4.66	8.09	28.89	-4.66	0.000%
36	-9.38	-28.89	-0.07	9.38	28.89	0.07	0.000%
37	-8.12	-28.89	-4.70	8.12	28.89	4.70	0.000%
38	-4.70	-28.89	-8.12	4.70	28.89	8.12	0.000%

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## Non-Linear Convergence Results

<i>Load Combination</i>	<i>Converged?</i>	<i>Number of Cycles</i>	<i>Displacement Tolerance</i>	<i>Force Tolerance</i>
1	Yes	4	0.0000001	0.0000001
2	Yes	4	0.0000001	0.00045786
3	Yes	5	0.0000001	0.00028425
4	Yes	5	0.0000001	0.00028273
5	Yes	4	0.0000001	0.00046280
6	Yes	5	0.0000001	0.00029976
7	Yes	5	0.0000001	0.00028432
8	Yes	4	0.0000001	0.00017781
9	Yes	5	0.0000001	0.00028791
10	Yes	5	0.0000001	0.00029609
11	Yes	4	0.0000001	0.00046168
12	Yes	5	0.0000001	0.00028058
13	Yes	5	0.0000001	0.00030138
14	Yes	4	0.0000001	0.0000001
15	Yes	5	0.0000001	0.00008919
16	Yes	5	0.0000001	0.00012042
17	Yes	5	0.0000001	0.00011976
18	Yes	5	0.0000001	0.00008905
19	Yes	5	0.0000001	0.00012310
20	Yes	5	0.0000001	0.00012142
21	Yes	5	0.0000001	0.00008913
22	Yes	5	0.0000001	0.00012205
23	Yes	5	0.0000001	0.00012280
24	Yes	5	0.0000001	0.00009006
25	Yes	5	0.0000001	0.00012145
26	Yes	5	0.0000001	0.00012383
27	Yes	4	0.0000001	0.00008665
28	Yes	4	0.0000001	0.00075655
29	Yes	4	0.0000001	0.00074630
30	Yes	4	0.0000001	0.00010380
31	Yes	4	0.0000001	0.00084274
32	Yes	4	0.0000001	0.00076087
33	Yes	4	0.0000001	0.00003880
34	Yes	4	0.0000001	0.00078059
35	Yes	4	0.0000001	0.00082346
36	Yes	4	0.0000001	0.00013973
37	Yes	4	0.0000001	0.00074723
38	Yes	4	0.0000001	0.00085346

## Maximum Tower Deflections - Service Wind

<i>Section No.</i>	<i>Elevation ft</i>	<i>Horz. Deflection in</i>	<i>Gov. Load Comb.</i>	<i>Tilt °</i>	<i>Twist °</i>
L1	139.5 - 93.04	38.601	36	2.5120	0.0100
L2	96.96 - 46.38	18.246	36	1.8486	0.0028
L3	51.63 - 0	4.993	37	0.9169	0.0009

<b>tnxTower</b>  <b>Jacobs Engineering Group, Inc.</b> 5449 Bells Ferry Rd Acworth, GA 30102 Phone: 770-701-2500 FAX: 770-701-2501	<b>Job</b>	139.5 Ft MP - Rogers Property	<b>Page</b>	17 of 18
	<b>Project</b>	BU881541_WO1254370	<b>Date</b>	14:02:22 06/21/16
	<b>Client</b>	Crown Castle	<b>Designed by</b>	J. Earnest

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

Elevation	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
136.00	HPA-65R-BUU-H6 w/ Mount Pipe	36	36.801	2.4625	0.0140	20068
134.00	VHLP2-11	36	35.774	2.4341	0.0134	18244
132.00	A-ANT-23G-2-C (VSI)	36	34.749	2.4056	0.0127	13379
130.00	APXVSPP18-C-A20 w/ Mount Pipe	36	33.729	2.3769	0.0121	10562
118.00	(2) DB846F65ZAXY w/Mount Pipe	36	27.734	2.1999	0.0087	4666
108.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	36	23.014	2.0413	0.0062	3184
100.00	APXV18-206517S-C	36	19.503	1.9039	0.0046	2541
75.00	Side Arm Mount [SO 701-1]	37	10.547	1.4066	0.0019	2409

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	139.5 - 93.04	110.961	11	7.2226	0.0290
L2	96.96 - 46.38	52.521	11	5.3214	0.0081
L3	51.63 - 0	14.390	12	2.6424	0.0025

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

Elevation	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
136.00	HPA-65R-BUU-H6 w/ Mount Pipe	11	105.794	7.0808	0.0408	7166
134.00	VHLP2-11	11	102.847	6.9995	0.0390	6514
132.00	A-ANT-23G-2-C (VSI)	11	99.907	6.9179	0.0372	4776
130.00	APXVSPP18-C-A20 w/ Mount Pipe	11	96.978	6.8359	0.0355	3770
118.00	(2) DB846F65ZAXY w/Mount Pipe	11	79.772	6.3288	0.0254	1663
108.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	11	66.218	5.8744	0.0181	1132
100.00	APXV18-206517S-C	11	56.135	5.4800	0.0133	902
75.00	Side Arm Mount [SO 701-1]	11	30.381	4.0516	0.0053	846

### Compression Checks

### Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>a</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P/P <sub>a</sub>
L1	139.5 - 93.04 (1)	TP26.99x15.5x0.25	46.46	0.00	0.0	39.000	20.4489	-7.03	797.51	0.009
L2	93.04 - 46.38 (2)	TP37.91x25.5205x0.375	50.58	0.00	0.0	39.000	43.1454	-15.82	1682.67	0.009

<b>tnxTower</b>  <b>Jacobs Engineering Group, Inc.</b> 5449 Bells Ferry Rd Acworth, GA 30102 Phone: 770-701-2500 FAX: 770-701-2501	<b>Job</b>	139.5 Ft MP - Rogers Property	<b>Page</b>	18 of 18
	<b>Project</b>	BU881541_WO1254370	<b>Date</b>	14:02:22 06/21/16
	<b>Client</b>	Crown Castle	<b>Designed by</b>	J. Earnest

Section No.	Elevation ft	Size	L ft	L <sub>a</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
L3	46.38 - 0 (3)	TP48.5x35.874x0.375	51.63	0.00	0.0	39.000	52.3071	-24.54	2039.98	0.012

### Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M <sub>x</sub> kip-ft	Actual f <sub>bx</sub> ksi	Allow. F <sub>bx</sub> ksi	Ratio f <sub>bx</sub> F <sub>bx</sub>	Actual M <sub>y</sub> kip-ft	Actual f <sub>by</sub> ksi	Allow. F <sub>by</sub> ksi	Ratio f <sub>by</sub> F <sub>by</sub>
L1	139.5 - 93.04 (1)	TP26.99x15.5x0.25	489.79	-45.281	39.000	1.161	0.00	0.000	39.000	0.000
L2	93.04 - 46.38 (2)	TP37.91x25.5205x0.375	1467.37	-45.739	39.000	1.173	0.00	0.000	39.000	0.000
L3	46.38 - 0 (3)	TP48.5x35.874x0.375	2321.32	-49.142	39.000	1.260	0.00	0.000	39.000	0.000

### Pole Interaction Design Data

Section No.	Elevation ft	Size	Ratio P P <sub>a</sub>	Ratio f <sub>bx</sub> F <sub>bx</sub>	Ratio f <sub>by</sub> F <sub>by</sub>	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	139.5 - 93.04 (1)	TP26.99x15.5x0.25	0.009	1.161	0.000	1.170	1.333	H1-3 ✓
L2	93.04 - 46.38 (2)	TP37.91x25.5205x0.375	0.009	1.173	0.000	1.182	1.333	H1-3 ✓
L3	46.38 - 0 (3)	TP48.5x35.874x0.375	0.012	1.260	0.000	1.272	1.333	H1-3 ✓

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P <sub>allow</sub> K	% Capacity	Pass Fail
L1	139.5 - 93.04	Pole	TP26.99x15.5x0.25	1	-7.03	1063.08	87.8	Pass
L2	93.04 - 46.38	Pole	TP37.91x25.5205x0.375	2	-15.82	2243.00	88.7	Pass
L3	46.38 - 0	Pole	TP48.5x35.874x0.375	3	-24.54	2719.29	95.4	Pass
						Summary		
						Pole (L3)	95.4	Pass
						<b>RATING =</b>	<b>95.4</b>	<b>Pass</b>

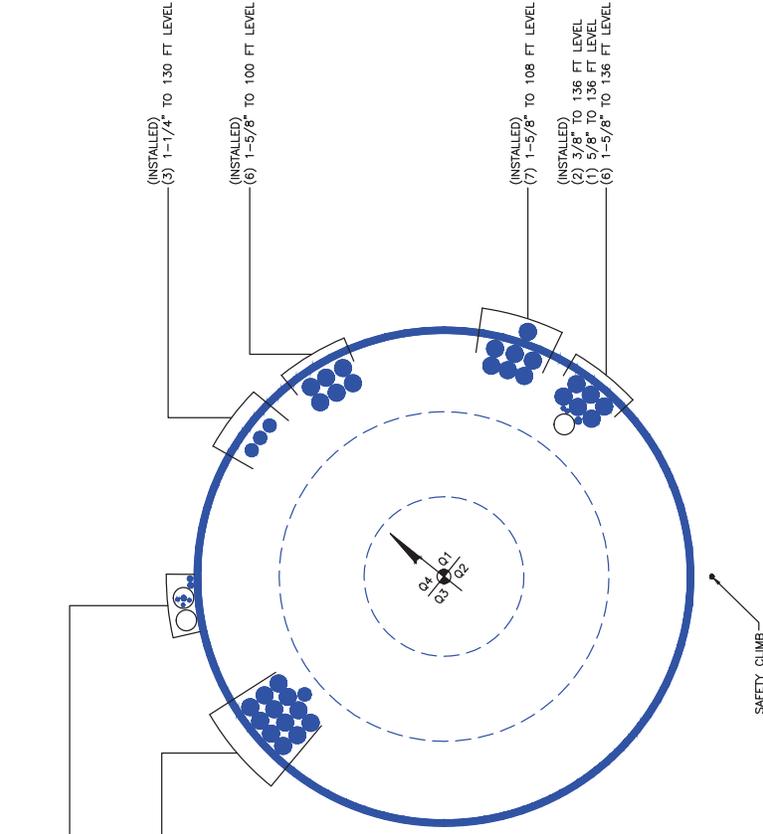
**APPENDIX B**  
**BASE LEVEL DRAWING**

(INSTALLED—BUNDLED IN 2" CONDUIT)  
 (3) 5/16" TO 130 FT LEVEL  
 (1) 1/2" TO 130 FT LEVEL  
 (INSTALLED)  
 (2) 1/2" TO 130 FT LEVEL

(INSTALLED)  
 (1) 1-1/4" TO 116 FT LEVEL  
 (12) 1-5/8" TO 116 FT LEVEL

(INSTALLED)  
 (3) 1-1/4" TO 130 FT LEVEL  
 (INSTALLED)  
 (6) 1-5/8" TO 100 FT LEVEL

(INSTALLED)  
 (7) 1-5/8" TO 108 FT LEVEL  
 (INSTALLED)  
 (2) 5/8" TO 136 FT LEVEL  
 (1) 5/8" TO 136 FT LEVEL  
 (6) 1-5/8" TO 136 FT LEVEL



DRAWN BY: VSG  
 CHECKED BY: GPK  
 DRAWING DATE: 25/02/08

SITE NUMBER:  
 SITE NAME:

SITE NAME:  
 ROGERS PROPERTY

BUSINESS UNIT NUMBER  
 881541

SITE ADDRESS  
 NEW HAVEN, CT 06477  
 NEW HAVEN  
 UNITED STATES COUNTY  
 USA

SHEET TITLE  
 BASE LEVEL

SHEET NUMBER

PORT INFORMATION			
ELEV.	SIZE	LOCATION	STATUS
10'-0"	10"x30"	E & W	.
7'-0"	10"x30"	S	.
3'-3"	10"x30"	E & W	.

BASE LEVEL DRAWING SCALE: 1" = 1'-0" 1

- 18/09/13 UPDATED PER WORK ORDER # 65132
- 18/09/13 UPDATED PER WORK ORDER # 65174
- 18/12/13 UPDATED PER WORK ORDER # 674962
- 09/10/14 UPDATED PER WORK ORDER # 93434
- 27/10/2014 UPDATED PER WORK ORDER 917863
- 14/7/2015 UPDATED PER WORK ORDER 112093
- 15/9/2015 UPDATED PER WORK ORDER 1227481

ALM  
 TJO  
 SAT  
 CS3  
 AOE  
 SAT

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

# Stiffened or Unstiffened, UngROUTED, Circular Base Plate - Any Rod Material

## TIA Rev F

### Site Data

BU#: 881541
Site Name: ROGERS PROPERTY
App #: 309486 Rev#0
Pole Manufacturer: <b>Other</b>

Reactions		
Moment:	2774	ft-kips
Axial:	29	kips
Shear:	27	kips

### Anchor Rod Data

Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	57	in

If No stiffeners, Criteria: **AISC ASD** <-Only Applicable to Unstiffened Cases

### Anchor Rod Results

Maximum Rod Tension: 144.2 Kips  
 Allowable Tension: 195.0 Kips  
 Anchor Rod Stress Ratio: 74.0% **Pass**

Stiffened
Service, ASD
Fty*ASIF

### Plate Data

Diam:	63	in
Thick:	2	in
Grade:	60	ksi
Single-Rod B-eff:	9.62	in

### Base Plate Results

Base Plate Stress: 38.2 ksi  
 Allowable Plate Stress: 60.0 ksi  
 Base Plate Stress Ratio: 63.8% **Pass**

### Flexural Check

Stiffened
Service, ASD
0.75*Fy*ASIF
Y.L. Length:
N/A, Roark

### Stiffener Data (Welding at both sides)

Config:	1	*
Weld Type:	Both	
Groove Depth:	0.375	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	6	in
Height:	15	in
Thick:	0.75	in
Notch:	0.75	in
Grade:	50	ksi
Weld str.:	70	ksi

### Stiffener Results

Horizontal Weld : 64.4% **Pass**  
 Vertical Weld: 60.4% **Pass**  
 Plate Flex+Shear, fb/Fb+(fv/Fv)^2: 23.3% **Pass**  
 Plate Tension+Shear, ft/Ft+(fv/Fv)^2: 65.1% **Pass**  
 Plate Comp. (AISC Bracket): 71.4% **Pass**

### Pole Results

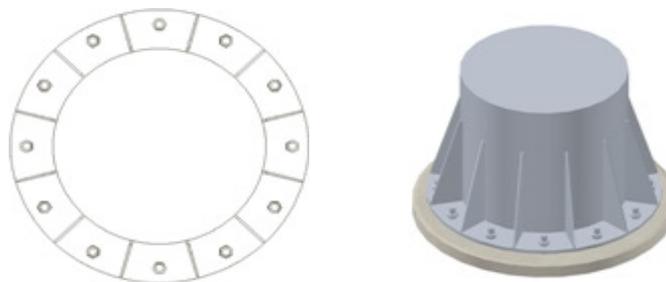
Pole Punching Shear Check: 15.5% **Pass**

### Pole Data

Diam:	48.5	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

### Stress Increase Factor

ASIF:	1.333
-------	-------



\* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

\*\* Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Project Name:	ROGERS PROPERTY
Project Number:	881541
Job Number:	1120700
Date:	6/21/2016



Created On:	8/8/2014
Checked By:	JTE
Revised On:	
Revision No:	0

### Drilled Caisson Foundation with Pad

Analysis Parameters		
Code:	F	
Axial:	29	kip
Shear:	27	kip
Moment:	2774	kip-ft

Reactions in Pad:		
Axial:	29.000	kip
Shear:	27.000	kip
Moment:	669.753	kip-ft
Capacity:	100.0%	Pass

Soil Parameters		
Unit Weight	125	pcf
Friction Angle	34	degrees
Cohesion	0	psf
Ultimate Bearing Capacity	8	ksf

Reactions in Caisson:		
Axial:	0.00	kip
Shear:	0.00	kip
Moment:	2104.25	kip-ft

Foundation Parameters		
Pad Steel Known?	Yes	
Concrete Density:	150	pcf
Pad Length	16	ft
Pad Thickness	3	ft
Pad Bearing Depth	7	ft
Caisson Diameter	6.5	ft

Pad Structural Capacity:		
Beam Shear:	13.4%	Pass
Flexural:	19.5%	Pass

Foundation Structure		
Concrete Strength ( $f'_c$ )	4000	psi
Rebar Strength ( $f_y$ )	60	ksi
Rebar Size	8	
Rebar Quantity	16	
Clear Cover	3	in





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

AT&T Existing Facility

Site ID: CT3159

Orange NW  
700 Grassy Hill Rd  
Orange, CT 06477

**July 7, 2016**

**EBI Project Number: 6216003133**

Site Compliance Summary	
Compliance Status:	<b>COMPLIANT</b>
Site total MPE% of FCC general public allowable limit:	<b>11.07 %</b>



July 7, 2016

AT&T Mobility – New England  
Attn: Cameron Syme, RF Manager  
550 Cochituate Road  
Suite 550 – 13&14  
Framingham, MA 06040

## Emissions Analysis for Site: **CT3159 – Orange NW**

EBI Consulting was directed to analyze the proposed AT&T facility located at **700 Grassy Hill Rd, Orange, CT**, for the purpose of determining whether the emissions from the Proposed AT&T 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 public 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 public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ). The general population exposure limits for the 700 and 850 MHz Bands are approximately  $467 \mu\text{W}/\text{cm}^2$  and  $567 \mu\text{W}/\text{cm}^2$  respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) 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.



Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

## CALCULATIONS

Calculations were done for the proposed AT&T Wireless antenna facility located at **700 Grassy Hill Rd, Orange, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T 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, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

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

- 1) 2 UMTS channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 2) 2 UMTS channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 3) 2 GSM channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 4) 2 LTE channels (700 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.
- 5) 2 LTE channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.



- 6) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
- 7) For the following calculations the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 8) The antennas used in this modeling are the **Kathrein 800-10121** and the **CCI HPA-65R-BUU-H6** for transmission in the 700 MHz, 850 MHz and 1900 MHz (PCS) 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, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 9) The antenna mounting height centerlines of the proposed antennas are **140 feet** above ground level (AGL) for **Sector A**, **140 feet** above ground level (AGL) for **Sector B** and **140 feet** above ground level (AGL) for Sector C.
- 10) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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



## AT&T Site Inventory and Power Data by Antenna

Sector:	A	Sector:	B	Sector:	C
Antenna #:	<b>1</b>	Antenna #:	<b>1</b>	Antenna #:	<b>1</b>
Make / Model:	Kathrein 800-10121	Make / Model:	Kathrein 800-10121	Make / Model:	Kathrein 800-10121
Gain:	11.45 / 14.35 / 11.45/11.25 dBd	Gain:	11.45 / 14.35 / 11.45 / 11.25 dBd	Gain:	11.45 / 14.35 / 11.45 / 11.25 dBd
Height (AGL):	<b>140 feet</b>	Height (AGL):	<b>140 feet</b>	Height (AGL):	<b>140 feet</b>
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	6	Channel Count	6	Channel Count	6
Total TX Power(W):	180 Watts	Total TX Power(W):	180 Watts	Total TX Power(W):	180 Watts
ERP (W):	3,309.26	ERP (W):	3,309.26	ERP (W):	3,309.26
Antenna A1 MPE%	<b>0.92 %</b>	Antenna B1 MPE%	<b>0.92 %</b>	Antenna C1 MPE%	<b>0.92 %</b>
Antenna #:	<b>2</b>	Antenna #:	<b>2</b>	Antenna #:	<b>2</b>
Make / Model:	CCI HPA-65R-BUU-H6	Make / Model:	CCI HPA-65R-BUU-H6	Make / Model:	CCI HPA-65R-BUU-H6
Gain:	11.95 / 14.75 dBd	Gain:	11.95 / 14.75 dBd	Gain:	11.95 / 14.75 dBd
Height (AGL):	<b>140 feet</b>	Height (AGL):	<b>140 feet</b>	Height (AGL):	<b>140 feet</b>
Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	240 Watts	Total TX Power(W):	240 Watts	Total TX Power(W):	240 Watts
ERP (W):	5,462.56	ERP (W):	5,462.56	ERP (W):	5,462.56
Antenna A2 MPE%	<b>1.52 %</b>	Antenna B2 MPE%	<b>1.52 %</b>	Antenna C2 MPE%	<b>1.52 %</b>

Site Composite MPE%	
Carrier	MPE%
AT&T – Max per sector	<b>2.44 %</b>
Sprint	1.20 %
Verizon Wireless	2.75 %
MetroPCS	0.77 %
Clearwire	0.12 %
T-Mobile	3.79 %
<b>Site Total MPE %:</b>	<b>11.07 %</b>

AT&T Sector A Total:	2.44 %
AT&T Sector B Total:	2.44 %
AT&T Sector C Total:	2.44 %
<b>Site Total:</b>	<b>11.07 %</b>

AT&T _ Max 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
AT&T 850 MHz UMTS	2	418.91	140	1.68	850 MHz	567	0.30 %
AT&T 1900 MHz (PCS) UMTS	2	816.81	140	3.27	1900 MHz (PCS)	1000	0.33 %
AT&T 850 MHz GSM	2	418.91	140	1.68	850 MHz	567	0.30 %
AT&T 700 MHz LTE	2	940.05	140	3.76	700 MHz	467	0.81 %
AT&T 1900 MHz (PCS) LTE	2	1,791.23	140	7.17	1900 MHz (PCS)	1000	0.72 %
						<b>Total:</b>	<b>2.44 %</b>



## Summary

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

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

AT&T Sector	Power Density Value (%)
Sector A:	2.44 %
Sector B:	2.44 %
Sector C:	2.44 %
AT&T Maximum Total (per sector):	2.44 %
Site Total:	11.07 %
Site Compliance Status:	<b>COMPLIANT</b>

The anticipated composite MPE value for this site assuming all carriers present is **11.07 %** of the allowable FCC established general public 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.