



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

January 14, 2015

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

**RE: Sprint PCS-Exempt Modification - Crown Site BU: 806376**  
**Sprint PCS Site ID: CT03XC251**  
**Located at: 1455 Forbes Street, East Hartford, CT 06118**

Dear Ms. Bachman:

This letter and exhibits are submitted on behalf of Sprint PCS (Sprint). Sprint is making modifications to certain existing sites in its Connecticut system in order to implement their 2.5GHz LTE technology. Please accept this letter and exhibits as notification, pursuant to § 16-50j-73 of the Regulations of Connecticut State Agencies (“R.C.S.A.”), of construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In compliance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to The Honorable Marcia A. Leclerc, Mayor for Town of East Hartford, and Mr. and Mrs. Robert Handel, Property Owners.

Sprint plans to modify the existing wireless communications facility owned by Crown Castle and located at **1455 Forbes Street, East Hartford, CT 06118**. Attached are a compound plan and elevation depicting the planned changes (Exhibit-1), and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration (Exhibit-2). Also included is a power density table report reflecting the modification to Sprint’s operations at the site (Exhibit-3).

The changes to the facility do not constitute a modification as defined in Connecticut General Statutes (“C.G.S.”) § 16-50i(d) because the general physical characteristics of the facility will not be significantly changed. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for in the R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing tower. Sprint’s additional antennas will be located at the same elevation on the existing tower.
2. There will be no proposed modifications to the ground and no extension of boundaries.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

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4. A Structural Modification Report confirming that the tower and foundation can support Sprint's proposed modifications is included as Exhibit-2.
5. The operation of the additional antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative General Power Density table report for Sprint's modified facility is included as Exhibit-3.

For the foregoing reasons, Sprint respectfully submits 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: Donna Neal.

Sincerely,



Susan Vale  
Real Estate Specialist

Enclosures

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

Tab 2: Exhibit-2: Structural Modification Report

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

cc: The Honorable Marcia A. Leclerc, Mayor  
Town of East Hartford  
740 Main Street  
East Hartford, CT 06108

Mr. and Mrs. Robert Handel  
1473 Forbes Street  
East Hartford, CT, 06118

6028

**CROWN CASTLE - ETA PROPERTY**

3530 TORINGDON WAY, SUITE 300  
CHARLOTTE, NC 28277

DATE 1/14/15

32-61-1110

PAY TO THE ORDER OF CONNECTICUT SITING COUNCIL

\$ 625.00

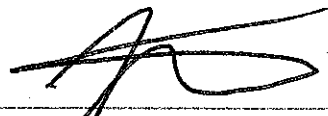
SIX HUNDRED TWENTY FIVE & 250/100

DOLLARS  Security Features Included. Details on Back.

VALID FOR 180 DAYS

*SPRINT* **CHASE**  
CT03XC251 JPMorgan Chase Bank, N.A.  
www.Chase.com

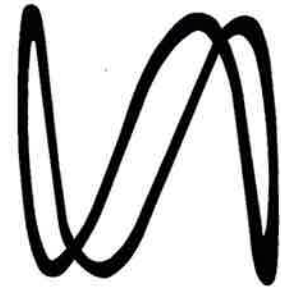
FOR 286420 806376 ZONING



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464638118⑈

# Sprint



# CROWN CASTLE

PROJECT: 2.5 EQUIPMENT DEPLOYMENT  
 SITE NAME: EAST HARTFORD  
 SITE CASCADE: CT03XC251  
 SITE NUMBER: 806376  
 SITE ADDRESS: 1455 FORBES STREET  
 EAST HARTFORD, CT 06118  
 SITE TYPE: MONOPOLE  
 MARKET: NORTHERN CONNECTICUT

PLANS PREPARED FOR:

6580 Sprint Parkway  
Overland Park, Kansas 66251

PLANS PREPARED BY:

1033 Watervliet Shaker Rd  
Albany, NY 12205  
Office # (518) 690-0790  
Fax # (518) 690-0793  
JOB NUMBER 353-XXX

MLA PARTNER:

ENGINEERING LICENSE:

DRAWING NOTICE:  
 THESE DOCUMENTS ARE CONFIDENTIAL AND ARE THE SOLE PROPERTY OF SPRINT AND MAY NOT BE REPRODUCED, DISSEMINATED OR REDISTRIBUTED WITHOUT THE EXPRESS WRITTEN CONSENT OF SPRINT.

REVISIONS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	5/22/14	J.M	0

SITE NAME:  
**EAST HARTFORD**

SITE CASCADE:  
**CT03XC251**

SITE ADDRESS:  
 1455 FORBES STREET  
 EAST HARTFORD, CT 06118

SHEET DESCRIPTION:  
**TITLE SHEET & PROJECT DATA**

SHEET NUMBER:  
**T-1**

SITE INFORMATION	AREA MAP	PROJECT DESCRIPTION	DRAWING INDEX																																										
<p><b>TOWER OWNER:</b>            CROWN ATLANTIC COMPANY LLC            2000 CORPORATE DRIVE            CANONSBURG, PA 15317            (704) 405-6555</p> <p><b>LATITUDE (NAD83):</b>            41° 43' 53.3" N            41.731472°</p> <p><b>LONGITUDE (NAD83):</b>            -72° 36' 28.0" W            -72.607778°</p> <p><b>COUNTY:</b>            HARTFORD</p> <p><b>ZONING JURISDICTION:</b>            CONNECTICUT SITING COUNCIL            EAST HARTFORD</p> <p><b>ZONING DISTRICT:</b>            TBD</p> <p><b>POWER COMPANY:</b>            CL&amp;P            (860) 947-2000</p> <p><b>SPRINT PM:</b>            PETER GIARD            (508) 801-0074            peter.giard@sprint.com</p> <p><b>SPRINT CM:</b>            PETER CULBERT            (803) 203-6446            (803) 969-0686            peter.culbert@sprint.com</p> <p><b>CROWN CASTLE CM:</b>            JASON D'AMICO            (860) 209-0104            JASON.D'AMICO@CROWNCastle.COM</p>		<p>SPRINT PROPOSES TO MODIFY AN EXISTING UNMANNED TELECOMMUNICATIONS FACILITY.</p> <ul style="list-style-type: none"> <li>INSTALL 2.5 EQUIPMENT IN EXISTING N.V. MMBS CABINET</li> <li>INSTALL (3) PANEL ANTENNAS</li> <li>INSTALL (3) RRU'S TO TOWER</li> <li>INSTALL (27) JUMPER CABLES</li> <li>INSTALL (1) FIBER CABLE</li> <li>INSTALL (4) BATTERIES IN EXISTING BBU CABINET</li> </ul> <p>THESE PLANS HAVE BEEN DEVELOPED FOR THE MODIFICATION OF AN EXISTING UNMANNED TELECOMMUNICATIONS FACILITY OWNED OR LEASED BY SPRINT IN ACCORDANCE WITH THE SCOPE OF WORK PROVIDED BY SPRINT. INFINIGY HAS INCORPORATED THIS SCOPE OF WORK IN THE PLANS. THESE PLANS ARE NOT FOR CONSTRUCTION UNLESS ACCOMPANIED BY A PASSING STRUCTURAL STABILITY ANALYSIS PREPARED BY A LICENSED STRUCTURAL ENGINEER. STRUCTURAL ANALYSIS MUST INCLUDE BOTH TOWER AND MOUNT.</p>	<table border="1"> <thead> <tr> <th>SHEET NO:</th> <th>SHEET TITLE</th> <th>REV</th> </tr> </thead> <tbody> <tr> <td>T-1</td> <td>TITLE SHEET &amp; PROJECT DATA</td> <td>0</td> </tr> <tr> <td>SP-1</td> <td>SPRINT SPECIFICATIONS</td> <td>0</td> </tr> <tr> <td>SP-2</td> <td>SPRINT SPECIFICATIONS</td> <td>0</td> </tr> <tr> <td>SP-3</td> <td>SPRINT SPECIFICATIONS</td> <td>0</td> </tr> <tr> <td>A-1</td> <td>SITE PLAN</td> <td>0</td> </tr> <tr> <td>A-2</td> <td>TOWER ELEVATION &amp; CABLE PLAN</td> <td>0</td> </tr> <tr> <td>A-3</td> <td>ANTENNA LAYOUT &amp; MOUNTING DETAILS</td> <td>0</td> </tr> <tr> <td>A-4</td> <td>COLOR CODING &amp; NOTES</td> <td>0</td> </tr> <tr> <td>A-5</td> <td>EQUIPMENT &amp; MOUNTING DETAILS</td> <td>0</td> </tr> <tr> <td>A-6</td> <td>CIVIL DETAILS</td> <td>0</td> </tr> <tr> <td>A-7</td> <td>PLUMBING DIAGRAM</td> <td>0</td> </tr> <tr> <td>E-1</td> <td>ELECTRICAL &amp; GROUNDING PLAN</td> <td>0</td> </tr> <tr> <td>E-2</td> <td>ELECTRICAL &amp; GROUNDING DETAILS</td> <td>0</td> </tr> </tbody> </table>	SHEET NO:	SHEET TITLE	REV	T-1	TITLE SHEET & PROJECT DATA	0	SP-1	SPRINT SPECIFICATIONS	0	SP-2	SPRINT SPECIFICATIONS	0	SP-3	SPRINT SPECIFICATIONS	0	A-1	SITE PLAN	0	A-2	TOWER ELEVATION & CABLE PLAN	0	A-3	ANTENNA LAYOUT & MOUNTING DETAILS	0	A-4	COLOR CODING & NOTES	0	A-5	EQUIPMENT & MOUNTING DETAILS	0	A-6	CIVIL DETAILS	0	A-7	PLUMBING DIAGRAM	0	E-1	ELECTRICAL & GROUNDING PLAN	0	E-2	ELECTRICAL & GROUNDING DETAILS	0
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		<p><b>APPLICABLE CODES</b></p> <p>ALL WORK SHALL BE PERFORMED AND MATERIALS INSTALL IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES.</p> <ol style="list-style-type: none"> <li>INTERNATIONAL BUILDING CODE (2012 IBC)</li> <li>TIA-EIA-222-F OR LATEST EDITION</li> <li>NFPA 780 - LIGHTNING PROTECTION CODE</li> <li>2011 NATIONAL ELECTRIC CODE OR LATEST EDITION</li> <li>ANY OTHER NATIONAL OR LOCAL APPLICABLE CODES, MOST RECENT EDITIONS</li> <li>CT BUILDING CODE</li> <li>LOCAL BUILDING CODE</li> <li>CITY/COUNTY ORDINANCES</li> </ol>																																											



THESE OUTLINE SPECIFICATIONS IN CONJUNCTION WITH THE SPRINT STANDARD CONSTRUCTION SPECIFICATIONS, INCLUDING CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

**SECTION 01 100 – SCOPE OF WORK**

**PART 1 – GENERAL**

- 1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE SPRINT CONSTRUCTION STANDARDS FOR WIRELESS SITES, CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.
- 1.2 RELATED DOCUMENTS:
  - A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.
  - B. SPRINT 'STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES' ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.
- 1.3 PRECEDENCE: SHOULD CONFLICTS OCCUR BETWEEN THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES INCLUDING THE STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES AND THE CONSTRUCTION DRAWINGS, INFORMATION ON THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE. NOTIFY SPRINT CONSTRUCTION MANAGER IF THIS OCCURS.
- 1.4 NATIONALLY RECOGNIZED CODES AND STANDARDS:
  - A. THE WORK SHALL COMPLY WITH APPLICABLE NATIONAL AND LOCAL CODES AND STANDARDS, LATEST EDITION, AND PORTIONS THEREOF, INCLUDED BUT NOT LIMITED TO THE FOLLOWING:
    - 1. GR-63-CORE NEBS REQUIREMENTS: PHYSICAL PROTECTION
    - 5. GR-78-CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT.
    - 3. GR-1089 CORE, ELECTROMAGNETIC COMPATIBILITY AND ELECTRICAL SAFETY -GENERIC CRITERIA FOR NETWORK TELECOMMUNICATIONS EQUIPMENT.
    - 4. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE - "NEC") AND NFPA 101 (LIFE SAFETY CODE).
    - 5. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM)
    - 6. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE)
    - 7. AMERICAN CONCRETE INSTITUTE (ACI)
    - 8. AMERICAN WIRE PRODUCERS ASSOCIATION (AWPA)
    - 9. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
    - 10. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
    - 11. PORTLAND CEMENT ASSOCIATION (PCA)
    - 12. NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA)
    - 13. BRICK INDUSTRY ASSOCIATION (BIA)
    - 14. AMERICAN WELDING SOCIETY (AWS)
    - 15. NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)
    - 16. SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)
    - 17. DOOR AND HARDWARE INSTITUTE (DHI)
    - 18. OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
    - 19. APPLICABLE BUILDING CODES INCLUDING UNIFORM BUILDING CODE, SOUTHERN BUILDING CODE, BOCA, AND THE INTERNATIONAL BUILDING CODE.

**1.5 DEFINITIONS:**

- A. WORK: THE SUM OF TASKS AND RESPONSIBILITIES IDENTIFIED IN THE CONTRACT DOCUMENTS.
- B. COMPANY: SPRINT CORPORATION
- C. ENGINEER: SYNONYMOUS WITH ARCHITECT & ENGINEER AND 'A&E'. THE DESIGN PROFESSIONAL HAVING PROFESSIONAL RESPONSIBILITY FOR DESIGN OF THE PROJECT.
- D. CONTRACTOR: CONSTRUCTION CONTRACTOR; CONSTRUCTION VENDOR; INDIVIDUAL OR ENTITY WHO AFTER EXECUTION OF A CONTRACT IS BOUND TO ACCOMPLISH THE WORK.
- E. THIRD PARTY VENDOR OR AGENCY: A VENDOR OR AGENCY ENGAGED SEPARATELY BY THE COMPANY, A&E, OR CONTRACTOR TO PROVIDE MATERIALS OR TO ACCOMPLISH SPECIFIC TASKS RELATED TO BUT NOT INCLUDED IN THE WORK.
- F. OFCI: OWNER FURNISHED, CONTRACTOR INSTALLED EQUIPMENT.
- G. CONSTRUCTION MANAGER – ALL PROJECTS RELATED COMMUNICATION TO FLOW THROUGH SPRINT REPRESENTATIVE IN CHARGE OF PROJECT...

- 1.6 SITE FAMILIARITY: CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING HIMSELF WITH ALL CONTRACT DOCUMENTS, FIELD CONDITIONS AND DIMENSIONS PRIOR TO PROCEEDING WITH CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE SPRINT CONSTRUCTION MANAGER PRIOR TO THE COMMENCEMENT OF WORK. NO COMPENSATION WILL BE AWARDED BASED ON CLAIM OF LACK OF KNOWLEDGE OR FIELD CONDITIONS.
- 1.7 POINT OF CONTACT: COMMUNICATION BETWEEN SPRINT AND THE CONTRACTOR SHALL FLOW THROUGH THE SINGLE SPRINT CONSTRUCTION MANAGER APPOINTED TO MANAGE THE PROJECT FOR SPRINT.
- 1.8 ON-SITE SUPERVISION: THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL EMPLOY A COMPETENT SUPERINTENDENT WHO SHALL BE IN ATTENDANCE AT THE SITE AT ALL TIMES DURING PERFORMANCE OF THE WORK.
- 1.9 DRAWINGS, SPECIFICATIONS AND DETAILS REQUIRED AT JOBSITE: THE CONSTRUCTION CONTRACTOR SHALL MAINTAIN A FULL SET OF THE CONSTRUCTION DRAWINGS, STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES AND THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES AT THE JOBSITE FROM MOBILIZATION THROUGH CONSTRUCTION COMPLETION.
  - A. THE JOBSITE DRAWINGS, SPECIFICATIONS AND DETAILS SHALL BE CLEARLY MARKED DAILY IN RED PENCIL WITH ANY CHANGES IN CONSTRUCTION OVER WHAT IS DEPICTED IN THE DOCUMENTS. AT CONSTRUCTION COMPLETION, THIS JOBSITE MARKUP SET SHALL BE DELIVERED TO THE COMPANY OR COMPANY'S DESIGNATED REPRESENTATIVE TO BE FORWARDED TO THE COMPANY'S A&E VENDOR FOR PRODUCTION OF 'AS-BUILT' DRAWINGS.
  - B. DETAILS ARE INTENDED TO SHOW DESIGN INTENT. MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS, AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK. CONTRACTOR SHALL NOTIFY SPRINT CONSTRUCTION MANAGER OF ANY VARIATIONS PRIOR TO PROCEEDING WITH THE WORK.
  - C. DIMENSIONS SHOWN ARE TO FINISH SURFACES UNLESS NOTED OTHERWISE. SPACING BETWEEN EQUIPMENT IS THE REQUIRED CLEARANCE. SHOULD THERE BE ANY QUESTIONS REGARDING THE CONTRACT DOCUMENTS, EXISTING CONDITIONS AND/OR DESIGN INTENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CLARIFICATION FROM THE SPRINT CONSTRUCTION MANAGER PRIOR TO PROCEEDING WITH THE WORK.
- 1.10 USE OF JOB SITE: THE CONTRACTOR SHALL CONFINE ALL CONSTRUCTION AND RELATED OPERATIONS INCLUDING STAGING AND STORAGE OF MATERIALS AND EQUIPMENT, PARKING, TEMPORARY FACILITIES, AND WASTE STORAGE TO THE LEASE PARCEL UNLESS OTHERWISE PERMITTED BY THE CONTRACT DOCUMENTS.
- 1.11 UTILITIES SERVICES: WHERE NECESSARY TO CUT EXISTING PIPES, ELECTRICAL WIRES, CONDUITS, CABLES, ETC., OF UTILITY SERVICES, OR OF FIRE PROTECTION OR COMMUNICATIONS SYSTEMS, THEY SHALL BE CUT AND CAPPED AT SUITABLE PLACES OR WHERE SHOWN. ALL SUCH ACTIONS SHALL BE COORDINATED WITH THE UTILITY COMPANY INVOLVED.
- 1.12 PERMITS / FEES: WHEN REQUIRED THAT A PERMIT OR CONNECTION FEE BE PAID TO A PUBLIC UTILITY PROVIDER FOR NEW SERVICE TO THE CONSTRUCTION PROJECT, PAYMENT OF SUCH FEE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
- 1.13 CONTRACTOR SHALL TAKE ALL MEASURES AND PROVIDE ALL MATERIAL NECESSARY FOR PROTECTING EXISTING EQUIPMENT AND PROPERTY.
- 1.14 METHODS OF PROCEDURE (MOPS) FOR CONSTRUCTION: CONTRACTOR SHALL PERFORM WORK AS DESCRIBED IN THE FOLLOWING INSTALLATION AND COMMISSIONING MOPS.
 

NOTE: IN SHORT-FORM SPECIFICATIONS ON THE DRAWINGS, A/E TO INSERT LIST OF APPLICABLE MOPS INCLUDING EN-2012-001, EN-2013-002, EL-0568, AND TS-0193
- 1.15 USE OF ELECTRONIC PROJECT MANAGEMENT SYSTEMS:

**PART 2 – PRODUCTS (NOT USED)**

**PART 3 – EXECUTION**

- 3.1 TEMPORARY UTILITIES AND FACILITIES: THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY UTILITIES AND FACILITIES NECESSARY EXCEPT AS OTHERWISE INDICATED IN THE CONSTRUCTION DOCUMENTS. TEMPORARY UTILITIES AND FACILITIES INCLUDE POTABLE WATER, HEAT, HVAC, ELECTRICITY, SANITARY FACILITIES, WASTE DISPOSAL FACILITIES, AND TELEPHONE/COMMUNICATION SERVICES. PROVIDE TEMPORARY UTILITIES AND FACILITIES IN ACCORDANCE WITH OSHA AND THE AUTHORITY HAVING JURISDICTION. CONTRACTOR MAY UTILIZE THE COMPANY ELECTRICAL SERVICE IN THE COMPLETION OF THE WORK WHEN IT BECOMES AVAILABLE. USE OF THE LESSORS OR SITE OWNER'S UTILITIES OR FACILITIES IS EXPRESSLY FORBIDDEN EXCEPT AS OTHERWISE ALLOWED IN THE CONTRACT DOCUMENTS.
- 3.2 ACCESS TO WORK: THE CONTRACTOR SHALL PROVIDE ACCESS TO THE JOB SITE FOR AUTHORIZED COMPANY PERSONNEL AND AUTHORIZED REPRESENTATIVES OF THE ARCHITECT/ENGINEER DURING ALL PHASES OF THE WORK.
- 3.3 TESTING: REQUIREMENTS FOR TESTING BY THIS CONTRACTOR SHALL BE AS INDICATED HEREWITH, ON THE CONSTRUCTION DRAWINGS, AND IN THE INDIVIDUAL SECTIONS OF THESE SPECIFICATIONS. SHOULD COMPANY CHOOSE TO ENGAGE ANY THIRD-PARTY TO CONDUCT ADDITIONAL TESTING, THE CONTRACTOR SHALL COOPERATE WITH AND PROVIDE A WORK AREA FOR COMPANY'S TEST AGENCY.
- 3.4 DIMENSIONS: VERIFY DIMENSIONS INDICATED ON DRAWINGS WITH FIELD DIMENSIONS BEFORE FABRICATION OR ORDERING OF MATERIALS. DO NOT SCALE DRAWINGS.

3.5 EXISTING CONDITIONS: NOTIFY THE SPRINT CONSTRUCTION MANAGER OF EXISTING CONDITIONS DIFFERING FROM THOSE INDICATED ON THE DRAWINGS. DO NOT REMOVE OR ALTER STRUCTURAL COMPONENTS WITHOUT PRIOR WRITTEN APPROVAL FROM THE ARCHITECT AND ENGINEER.

**SECTION 01 200 – COMPANY FURNISHED MATERIAL AND EQUIPMENT**

**PART 1 – GENERAL**

- 1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.
- 1.2 RELATED DOCUMENTS:
  - A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.
  - B. SPRINT 'STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES' ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

**PART 2 – PRODUCTS (NOT USED)**

**PART 3 – EXECUTION**

- 3.1 RECEIPT OF MATERIAL AND EQUIPMENT:
  - A. A COMPANY FURNISHED MATERIAL AND EQUIPMENT IS IDENTIFIED ON THE RF DATA SHEET IN THE CONSTRUCTION DOCUMENTS.
  - B. THE CONTRACTOR IS RESPONSIBLE FOR SPRINT PROVIDED MATERIAL AND EQUIPMENT AND UPON RECEIPT SHALL:
    - 1. ACCEPT DELIVERIES AS SHIPPED AND TAKE RECEIPT.
    - 2. VERIFY COMPLETENESS AND CONDITION OF ALL DELIVERIES.
    - 3. TAKE RESPONSIBILITY FOR EQUIPMENT AND PROVIDE INSURANCE PROTECTION AS REQUIRED IN AGREEMENT.
    - 4. RECORD ANY DEFECTS OR DAMAGES AND WITHIN TWENTY-FOUR HOURS AFTER RECEIPT, REPORT TO SPRINT OR ITS DESIGNATED PROJECT REPRESENTATIVE OF SUCH.
    - 5. PROVIDE SECURE AND NECESSARY WEATHER PROTECTED WAREHOUSING.
    - 6. COORDINATE SAFE AND SECURE TRANSPORTATION OF MATERIAL AND EQUIPMENT, DELIVERING AND OFF-LOADING FROM CONTRACTOR'S WAREHOUSE TO SITE.
- 3.2 DELIVERABLES:
  - A. COMPLETE SHIPPING AND RECEIPT DOCUMENTATION IN ACCORDANCE WITH COMPANY PRACTICE.
  - B. IF APPLICABLE, COMPLETE LOST/STOLEN/DAMAGED DOCUMENTATION REPORT AS NECESSARY IN ACCORDANCE WITH COMPANY PRACTICE, AND AS DIRECTED BY COMPANY.
  - C. UPLOAD DOCUMENTATION INTO SPRINT SITE MANAGEMENT SYSTEM (SMS) AND/OR PROVIDE HARD COPY DOCUMENTATION AS REQUESTED.

**SECTION 01 300 – CELL SITE CONSTRUCTION CO.**

**PART 1 – GENERAL**

- 1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.
- 1.2 RELATED DOCUMENTS:
  - A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.
  - B. SPRINT 'STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES' ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.
- 1.3 NOTICE TO PROCEED
  - A. NO WORK SHALL COMMENCE PRIOR TO COMPANY'S WRITTEN NOTICE TO PROCEED AND THE ISSUANCE OF THE WORK ORDER.
  - B. UPON RECEIVING NOTICE TO PROCEED, CONTRACTOR SHALL FULLY PERFORM ALL WORK NECESSARY TO PROVIDE SPRINT WITH AN OPERATIONAL WIRELESS FACILITY.

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

**PART 2 – PRODUCTS (NOT USED)**

**PART 3 – EXECUTION**


- 3.1 FUNCTIONAL REQUIREMENTS:
  - A. THE ACTIVITIES DESCRIBED IN THIS PARAGRAPH REPRESENT MINIMUM ACTIONS AND PROCESSES REQUIRED TO SUCCESSFULLY COMPLETE THE WORK. THE ACTIVITIES DESCRIBED ARE NOT EXHAUSTIVE, AND CONTRACTOR SHALL TAKE ANY AND ALL ACTIONS AS NECESSARY TO SUCCESSFULLY COMPLETE THE CONSTRUCTION OF A FULLY FUNCTIONING WIRELESS FACILITY AT THE SITE IN ACCORDANCE WITH COMPANY PROCESSES.
  - B. SUBMIT SPECIFIC DOCUMENTATION AS INDICATED HEREIN, AND OBTAIN REQUIRED APPROVALS WHILE THE WORK IS BEING PERFORMED.
  - C. MANAGE AND CONDUCT ALL FIELD CONSTRUCTION SERVICE RELATED ACTIVITIES
  - D. PROVIDE CONSTRUCTION ACTIVITIES TO THE EXTENT REQUIRED BY THE CONTRACT DOCUMENTS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

PLANS PREPARED FOR:



6580 Sprint Parkway  
Overland Park, Kansas 66251


PLANS PREPARED BY:



1033 Watervliet Shaker Rd  
Albany, NY 12205  
Office # (518) 690-0790  
Fax # (518) 690-0793

JOB NUMBER 353-XXX

MLA PARTNER:



ENGINEERING LICENSE:



DRAWING NOTICE:

THESE DOCUMENTS ARE CONFIDENTIAL AND ARE THE SOLE PROPERTY OF SPRINT AND MAY NOT BE REPRODUCED, DISSEMINATED OR REDISTRIBUTED WITHOUT THE EXPRESS WRITTEN CONSENT OF SPRINT.

REVISIONS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	5/22/14	JLM	0

SITE NAME:

**EAST HARTFORD**

SITE CASCADE:

**CT03XC251**

SITE ADDRESS:

1455 FORBES STREET  
EAST HARTFORD, CT 06118

SHEET DESCRIPTION:

**SPRINT SPECIFICATIONS**

SHEET NUMBER:

**SP-1**



**CONTINUE FROM SP-1**

1. PERFORM ANY REQUIRED SITE ENVIRONMENTAL MITIGATION.
2. PREPARE GROUND SITES; PROVIDE DE-GRUBBING; AND ROUGH AND FINAL GRADING, AND COMPOUND SURFACE TREATMENTS.
3. MANAGE AND CONDUCT ALL ACTIVITIES FOR INSTALLATION OF UTILITIES INCLUDING ELECTRICAL AND TELCO BACKHAUL
4. INSTALL UNDERGROUND FACILITIES INCLUDING UNDERGROUND POWER AND COMMUNICATIONS CONDUITS, AND UNDERGROUND GROUNDING SYSTEM.
5. INSTALL ABOVE GROUND GROUNDING SYSTEMS.
6. PROVIDE NEW HVAC INSTALLATIONS AND MODIFICATIONS.
7. INSTALL "H-FRAMES", CABINETS AND SHELTERS AS INDICATED.
8. INSTALL ROADS, ACCESS WAYS, CURBS AND DRAINS AS INDICATED.
9. ACCOMPLISH REQUIRED MODIFICATION OF EXISTING FACILITIES.
10. PROVIDE ANTENNA SUPPORT STRUCTURE FOUNDATIONS.
11. PROVIDE SLABS AND EQUIPMENT PLATFORMS.
12. INSTALL COMPOUND FENCING, SIGHT SHIELDING, LANDSCAPING AND ACCESS BARRIERS.
13. PERFORM INSPECTION AND MATERIAL TESTING AS REQUIRED HEREINAFTER.
14. CONDUCT SITE RESISTANCE TO EARTH TESTING AS REQUIRED HEREINAFTER
15. INSTALL FIXED GENERATOR SETS AND OTHER STANDBY POWER SOLUTIONS.
16. INSTALL TOWERS, ANTENNA SUPPORT STRUCTURES AND PLATFORMS ON EXISTING TOWERS AS REQUIRED.
17. INSTALL CELL SITE RADIOS, MICROWAVE, GPS, COAXIAL MAINLINE, ANTENNAS, CROSS BAND COUPLERS, TOWER TOP AMPLIFIERS, LOW NOISE AMPLIFIERS AND RELATED EQUIPMENT.
18. PERFORM, DOCUMENT, AND CLOSE OUT ANY CONSTRUCTION CONTROL DOCUMENTS THAT MAY BE REQUIRED BY GOVERNMENT AGENCIES AND LANDLORDS.
19. PERFORM ANTENNA AND COAX SWEEP TESTING AND MAKE ANY AND ALL NECESSARY CORRECTIONS.
20. REMAIN ON SITE MOBILIZED THROUGHOUT HAND-OFF AND INTEGRATION TO ASSIST AS NEEDED UNTIL SITE IS DEEMED SUBSTANTIALLY COMPLETE AND PLACED "ON AIR."

**3.2 GENERAL REQUIREMENTS FOR CIVIL CONSTRUCTION:**

- A. CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH. AT THE COMPLETION OF THE WORK, CONTRACTOR SHALL REMOVE FROM THE SITE ALL REMAINING RUBBISH, IMPLEMENTS, TEMPORARY FACILITIES, AND SURPLUS MATERIALS.
- B. EQUIPMENT ROOMS SHALL AT ALL TIMES BE MAINTAINED "BROOM CLEAN" AND CLEAR OF DEBRIS.
- C. CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO DISCOVER AND LOCATE ANY HAZARDOUS CONDITION.
  1. IN THE EVENT CONTRACTOR ENCOUNTERS ANY HAZARDOUS CONDITION WHICH HAS NOT BEEN ABATED OR OTHERWISE MITIGATED, CONTRACTOR AND ALL OTHER PERSONS SHALL IMMEDIATELY STOP WORK IN THE AFFECTED AREA AND NOTIFY COMPANY IN WRITING. THE WORK IN THE AFFECTED AREA SHALL NOT BE RESUMED EXCEPT BY WRITTEN NOTIFICATION BY COMPANY.
  2. CONTRACTOR AGREES TO USE CARE WHILE ON THE SITE AND SHALL NOT TAKE ANY ACTION THAT WILL OR MAY RESULT IN OR CAUSE THE HAZARDOUS CONDITION TO BE FURTHER RELEASED IN THE ENVIRONMENT, OR TO FURTHER EXPOSE INDIVIDUALS TO THE HAZARD.
- D. CONTRACTOR'S ACTIVITIES SHALL BE RESTRICTED TO THE PROJECT LIMITS. SHOULD AREAS OUTSIDE THE PROJECT LIMITS BE AFFECTED BY CONTRACTOR'S ACTIVITIES, CONTRACTOR SHALL IMMEDIATELY RETURN THEM TO ORIGINAL CONDITION
- E. CONDUCT TESTING AS REQUIRED HEREIN.

**3.3 DELIVERABLES:**

- A. CONTRACTOR SHALL REVIEW, APPROVE, AND SUBMIT TO SPRINT SHOP DRAWINGS, PRODUCT DATA, SAMPLES, AND SIMILAR SUBMITTALS AS REQUIRED HEREINAFTER
- B. PROVIDE DOCUMENTATION INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING. DOCUMENTATION SHALL BE FORWARDED IN ORIGINAL FORMAT AND/OR UPLOADED INTO SMS.
  1. ALL CORRESPONDENCE AND PRELIMINARY CONSTRUCTION REPORTS.
  2. PROJECT PROGRESS REPORTS.
  3. CIVIL CONSTRUCTION START DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
  4. ELECTRICAL SERVICE COMPLETION DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).

5. LINES AND ANTENNA INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
6. POWER INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
7. TELCO READY DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
8. PPC (OR SHELTER) INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
9. TOWER CONSTRUCTION START DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
10. TOWER CONSTRUCTION COMPLETE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
11. BTS AND RADIO EQUIPMENT DELIVERED AT SITE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
12. NETWORK OPERATIONS HANDOFF CHECKLIST (HOC WALK) COMPLETE (UPLOAD FORM IN SMS)
13. CIVIL CONSTRUCTION COMPLETE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
14. SITE CONSTRUCTION PROGRESS PHOTOS UNLOADED INTO SMS.

**SECTION 01 400 - SUBMITTALS & TESTS**

**PART 1 - GENERAL**

- 1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.
- 1.2 RELATED DOCUMENTS:
  - A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.
  - B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HERewith.
- 1.3 SUBMITTALS:
  - A. THE WORK IN ALL ASPECTS SHALL COMPLY WITH THE CONSTRUCTION DRAWINGS AND THESE SPECIFICATIONS.
  - B. SUBMIT THE FOLLOWING TO COMPANY REPRESENTATIVE FOR APPROVAL
    1. CONCRETE MIX-DESIGNS FOR TOWER FOUNDATIONS, ANCHORS PIERS, AND CONCRETE PAVING.
    2. CONCRETE BREAK TESTS AS SPECIFIED HEREIN.
    3. SPECIAL FINISHES FOR INTERIOR SPACES, IF ANY.
    4. ALL EQUIPMENT AND MATERIALS SO IDENTIFIED ON THE CONSTRUCTION DRAWINGS.
    5. CHEMICAL GROUNDING DESIGN
  - D. ALTERNATES: AT THE COMPANY'S REQUEST, ANY ALTERNATIVES TO THE MATERIALS OR METHODS SPECIFIED SHALL BE SUBMITTED TO SPRINT'S CONSTRUCTION MANAGER FOR APPROVAL PRIOR TO BEING SHIPPED TO SITE. SPRINT WILL REVIEW AND APPROVE ONLY THOSE REQUESTS MADE IN WRITING. NO VERBAL APPROVALS WILL BE CONSIDERED. SUBMITTAL FOR APPROVAL SHALL INCLUDE A STATEMENT OF COST REDUCTION PROPOSED FOR USE OF ALTERNATE PRODUCT.

**1.4 TESTS AND INSPECTIONS:**

- A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTS, INSPECTIONS AND PROJECT DOCUMENTATION.
- B. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
  1. COAX SWEEPS AND FIBER TESTS PER TS-0200 REV 4 ANTENNA LINE ACCEPTANCE STANDARDS.
  2. AGL, AZIMUTH AND DOWNTILT USING ELECTRONIC COMMERCIAL MADE-FOR-THE-PURPOSE ANTENNA ALIGNMENT TOOL.
  3. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES AND/OR AS A RESULT OF TESTING.
- C. REQUIRED CLOSEOUT DOCUMENTATION INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:
  1. AZIMUTH, DOWNTILT, AGL - UPLOAD REPORT FROM ANTENNA ALIGNMENT TOOL TO SITERRA TASK 465. INSTALLED AZIMUTH, DOWNTILT, AND AGL MUST CONFORM TO THE RF DATA SHEETS. SWEEP AND FIBER TESTS
  2. SCANABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT
  3. ALL AVAILABLE JURISDICTIONAL INFORMATION
  4. PDF SCAN OF REDLINES PRODUCED IN FIELD

5. ELECTRONIC AS-BUILT DRAWINGS IN AUTOCAD AND PDF FORMATS. ANY FIELD CHANGE MUST BE REFLECTED BY MODIFYING THE PLANS, ELEVATIONS, AND DETAILS IN THE DRAWING SETS. GENERAL NOTES INDICATING MODIFICATIONS WILL NOT BE ACCEPTED. CHANGES SHALL BE HIGHLIGHTED AS "CLOUDS" IDENTIFIED AS THE "AS-BUILT" CONDITION.
6. LIEN WAIVERS
7. FINAL PAYMENT APPLICATION
8. REQUIRED FINAL CONSTRUCTION PHOTOS
9. CONSTRUCTION AND COMMISSIONING CHECKLIST COMPLETE WITH NO DEFICIENT ITEMS
10. ALL POST NTP TASKS INCLUDING DOCUMENT UPLOADS COMPLETED IN SITERRA (SPRINTS DOCUMENT REPOSITORY OF RECORD).

1.5 COMMISSIONING: PERFORM ALL COMMISSIONING AS REQUIRED BY APPLICABLE MOPs

1.6 INTEGRATION: PERFORM ALL INTEGRATION ACTIVITIES AS REQUIRED BY APPLICABLE MOPs

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

**3.1 REQUIREMENTS FOR TESTING:**

**A. THIRD PARTY TESTING AGENCY:**

1. WHEN THE USE OF A THIRD PARTY INDEPENDENT TESTING AGENCY IS REQUIRED, THE AGENCY THAT IS SELECTED MUST PERFORM SUCH WORK ON A REGULAR BASIS IN THE STATE WHERE THE PROJECT IS LOCATED AND HAVE A THOROUGH UNDERSTANDING OF LOCAL AVAILABLE MATERIALS, INCLUDING THE SOIL, ROCK, AND GROUNDWATER CONDITIONS.
2. THE THIRD PARTY TESTING AGENCY IS TO BE FAMILIAR WITH THE APPLICABLE REQUIREMENTS FOR THE TESTS TO BE DONE, EQUIPMENT TO BE USED, AND ASSOCIATED HEALTH AND SAFETY ISSUES.
3. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.
4. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.

**3.2 REQUIRED TESTS:**

**A. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:**

1. CONCRETE CYLINDER BREAK TESTS FOR THE TOWER AND ANCHOR FOUNDATIONS AS SPECIFIED IN SECTION: PORTLAND CEMENT CONCRETE PAVING.
2. ASPHALT ROADWAY COMPACTED THICKNESS, SURFACE SMOOTHNESS, AND COMPACTED DENSITY TESTING AS SPECIFIED IN SECTION: HOT MIX ASPHALT PAVING.
3. FIELD QUALITY CONTROL TESTING AS SPECIFIED IN SECTION: PORTLAND CEMENT CONCRETE PAVING.
4. TESTING REQUIRED UNDER SECTION: AGGREGATE BASE FOR ACCESS ROADS, PADS AND ANCHOR LOCATIONS
5. STRUCTURAL BACKFILL COMPACTION TESTS FOR THE TOWER FOUNDATION.
6. SITE RESISTANCE TO EARTH TESTING PER EXHIBIT: CELL SITE GROUNDING SYSTEM DESIGN.
7. ANTENNA AND COAX SWEEP TESTS PER EXHIBIT: ANTENNA TRANSMISSION LINE ACCEPTANCE STANDARDS.
8. GROUNDING AT ANTENNA MASTS FOR GPS AND ANTENNAS
9. ALL OTHER TESTS REQUIRED BY COMPANY OR JURISDICTION.

**3.3 REQUIRED INSPECTIONS**

**A. SCHEDULE INSPECTIONS WITH COMPANY REPRESENTATIVE.**

**B. CONDUCT INSPECTIONS INCLUDING BUT NOT LIMITED TO THE FOLLOWING:**

1. GROUNDING SYSTEM INSTALLATION PRIOR TO EARTH CONCEALMENT DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
2. FORMING FOR CONCRETE AND REBAR PLACEMENT PRIOR TO POUR DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
3. COMPACTION OF BACKFILL MATERIALS; AGGREGATE BASE FOR ROADS, PADS, AND ANCHORS; ASPHALT PAVING; AND SHAFT BACKFILL FOR CONCRETE AND WOOD POLES, BY INDEPENDENT THIRD PARTY AGENCY.
4. PRE- AND POST-CONSTRUCTION ROOFTOP AND STRUCTURAL INSPECTIONS ON EXISTING FACILITIES.
5. TOWER ERECTION SECTION STACKING AND PLATFORM ATTACHMENT DOCUMENTED BY DIGITAL PHOTOGRAPHS BY THIRD PARTY AGENCY.
6. ANTENNA AZIMUTH, DOWN TILT AND PER SUNLIGHT TOOL SUNSIGHT INSTRUMENTS - ANTENNALIGN ALIGNMENT TOOL (AAT)

PLANS PREPARED FOR:



PLANS PREPARED BY:



MLA PARTNER:



ENGINEERING LICENSE:



DRAWING NOTICE:

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REVISIONS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	5/22/14	JJM	0

SITE NAME:

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SITE CASCADE:

**CT03XC251**

SITE ADDRESS:

1455 FORBES STREET  
EAST HARTFORD, CT 06118

SHEET DESCRIPTION:

**SPRINT SPECIFICATIONS**

SHEET NUMBER:

**SP-2**



**CONTINUE FROM SP-2**

- 7. VERIFICATION DOCUMENTED WITH THE ANTENNA CHECKLIST REPORT, BY A&E, SITE DEVELOPMENT REP, OR RF REP.
  - 8. FINAL INSPECTION CHECKLIST AND HANDOFF WALK (HOC). SIGNED FORM SHOWING ACCEPTANCE BY FIELD OPS IS TO BE UPLOADED INTO SMS.
  - 9. COAX SWEEP AND FIBER TESTING DOCUMENTS SUBMITTED VIA SMS FOR RF APPROVAL.
  - 10. SCAN-ABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT
  - 11. ALL AVAILABLE JURISDICTIONAL INFORMATION
  - 12. PDF SCAN OF REDLINES PRODUCED IN FIELD
- C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES AND/OR AS A RESULT OF TESTING.
- D. CONSTRUCTION INSPECTIONS AND CORRECTIVE MEASURES SHALL BE DOCUMENTED BY THE CONTRACTOR WITH WRITTEN REPORTS AND PHOTOGRAPHS. PHOTOGRAPHS MUST BE DIGITAL AND OF SUFFICIENT QUALITY TO CLEARLY SHOW THE SITE CONSTRUCTION. PHOTOGRAPHS MUST CLEARLY IDENTIFY THE PHOTOGRAPHED ITEM AND BE LABELED WITH THE SITE CASCADE NUMBER, SITE NAME, DESCRIPTION, AND DATE.
- 3.4 DELIVERABLES: TEST AND INSPECTION REPORTS AND CLOSEOUT DOCUMENTATION SHALL BE UPLOADED TO THE SMS AND/OR FORWARDED TO SPRINT FOR INCLUSION INTO THE PERMANENT SITE FILES.
- A. THE FOLLOWING TEST AND INSPECTION REPORTS SHALL BE PROVIDED AS APPLICABLE.
- 1. CONCRETE MIX AND CYLINDER BREAK REPORTS.
  - 2. STRUCTURAL BACKFILL COMPACTION REPORTS.
  - 3. SITE RESISTANCE TO EARTH TEST.
  - 4. ANTENNA AZIMUTH AND DOWN TILT VERIFICATION
  - 5. TOWER ERECTION INSPECTIONS AND MEASUREMENTS DOCUMENTING TOWER INSTALLED PER SUPPLIER'S REQUIREMENTS AND THE APPLICABLE SECTIONS HEREIN.
  - 6. COAX CABLE SWEEP TESTS PER COMPANY'S "ANTENNA LINE ACCEPTANCE STANDARDS".
- B. REQUIRED CLOSEOUT DOCUMENTATION INCLUDES THE FOLLOWING;
- 1. TEST WELLS AND TRENCHES: PHOTOGRAPHS OF ALL TEST WELLS; PHOTOGRAPHS SHOWING ALL OPEN EXCAVATIONS AND TRENCHING PRIOR TO BACKFILLING SHOWING A TAPE MEASURE VISIBLE IN THE EXCAVATIONS INDICATING DEPTH.
  - 2. CONDUITS, CONDUCTORS AND GROUNDING: PHOTOGRAPHS SHOWING TYPICAL INSTALLATION OF CONDUCTORS AND CONNECTORS; PHOTOGRAPHS SHOWING TYPICAL BEND RADIUS OF INSTALLED GROUND WIRES AND GROUND ROD SPACING;
  - 3. CONCRETE FORMS AND REINFORCING: CONCRETE FORMING AT TOWER AND EQUIPMENT/SHELTER PAD/FOUNDATIONS - PHOTOGRAPHS SHOWING ALL REINFORCING STEEL, UTILITY AND CONDUIT STUB OUTS; PHOTOGRAPHS SHOWING CONCRETE POUR OF SHELTER SLAB/FOUNDATION, TOWER FOUNDATION AND GUY ANCHORS WITH VIBRATOR IN USE; PHOTOGRAPHS SHOWING EACH ANCHOR ON GUYED TOWERS, BEFORE CONCRETE POUR.
  - 4. TOWER, ANTENNAS AND MAINLINE: INSPECTION AND PHOTOGRAPHS OF SECTION STACKING; INSPECTION AND PHOTOGRAPHS OF PLATFORM COMPONENT ATTACHMENT POINTS; PHOTOGRAPHS OF TOWER TOP GROUNDING; PHOTOS OF TOWER COAX LINE COLOR CODING AT THE TOP AND AT GROUND LEVEL; INSPECTION AND PHOTOGRAPHS OF OPERATIONAL OF TOWER LIGHTING, AND PLACEMENT OF FAA REGISTRATION SIGN; PHOTOGRAPHS SHOWING ADDITIONAL GROUNDING POINTS FOR TOWERS GREATER THAN 200 FEET.; PHOTOS OF ANTENNA GROUND BAR, EQUIPMENT GROUND BAR, AND MASTER GROUND BAR; PHOTOS OF GPS ANTENNA(S); PHOTOS OF EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA; PHOTOS OF COAX WEATHERPROOFING - TOP AND BOTTOM; PHOTOS OF COAX GROUNDING--TOP AND BOTTOM; PHOTOS OF ANTENNA AND MAST GROUNDING; PHOTOS OF COAX CABLE ENTRY INTO SHELTER; PHOTOS OF PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.
  - 5. ROOF TOPS: PRE-CONSTRUCTION AND POST-CONSTRUCTION VISUAL INSPECTION AND PHOTOGRAPHS OF THE ROOF AND INTERIOR TO DETERMINE AND DOCUMENT CONDITIONS; ROOF TOP CONSTRUCTION INSPECTIONS AS REQUIRED BY THE JURISDICTION; PHOTOGRAPHS OF CABLE TRAY AND/OR ICE BRIDGE; PHOTOGRAPHS OF DOGHOUSE/CABLE EXIT FROM ROOF;
  - 6. SITE LAYOUT - PHOTOGRAPHS OF THE OVERALL COMPOUND, INCLUDING EQUIPMENT PLATFORM FROM ALL FOUR CORNERS.
  - 7. FINISHED UTILITIES: CLOSE-UP PHOTOGRAPHS OF THE PPC BREAKER PANEL; CLOSE-UP PHOTOGRAPH OF THE INSIDE OF THE TELCO PANEL AND NIU; CLOSE-UP PHOTOGRAPH OF THE POWER METER AND DISCONNECT; PHOTOS OF POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE; PHOTOGRAPHS AT METER BOX AND/OR FACILITY DISTRIBUTION PANEL.
  - 8. REQUIRED MATERIALS CERTIFICATIONS: CONCRETE MIX DESIGNS; MILL CERTIFICATION FOR ALL REINFORCING AND STRUCTURAL STEEL; AND ASPHALT PAVING MIX DESIGN.
  - 9. ANY AND ALL SUBMITTALS BY THE JURISDICTION OR COMPANY.

**SECTION 01 400 - SUBMITTALS & TESTS**

**PART 1 - GENERAL**

- 1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.
- 1.2 RELATED DOCUMENTS:
  - A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.
  - B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HERewith.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

- 3.1 WEEKLY REPORTS:
  - A. CONTRACTOR SHALL PROVIDE SPRINT WITH WEEKLY REPORTS SHOWING PROJECT STATUS. THIS STATUS REPORT FORMAT WILL BE PROVIDED TO THE CONTRACTOR BY SPRINT. THE REPORT WILL CONTAIN SITE ID NUMBER, THE MILESTONES FOR EACH SITE, INCLUDING THE BASELINE DATE, ESTIMATED COMPLETION DATE AND ACTUAL COMPLETION DATE.
  - B. REPORT INFORMATION WILL BE TRANSMITTED TO SPRINT VIA ELECTRONIC MEANS AS REQUIRED. THIS INFORMATION WILL PROVIDE A BASIS FOR PROGRESS MONITORING AND PAYMENT.
- 3.2 PROJECT CONFERENCE CALLS:
  - A. SPRINT MAY HOLD WEEKLY PROJECT CONFERENCE CALLS. CONTRACTOR WILL BE REQUIRED TO COMMUNICATE SITE STATUS, MILESTONE COMPLETIONS AND UPCOMING MILESTONE PROJECTIONS, AND ANSWER ANY OTHER SITE STATUS QUESTIONS AS NECESSARY.
- 3.3 PROJECT TRACKING IN SMS:
  - A. CONTRACTOR SHALL PROVIDE SCHEDULE UPDATES AND PROJECTIONS IN THE SMS SYSTEM ON A WEEKLY BASIS.
- 3.4 ADDITIONAL REPORTING:
  - A. ADDITIONAL OR ALTERNATE REPORTING REQUIREMENTS MAY BE ADDED TO THE REPORT AS DETERMINED TO BE REASONABLY NECESSARY BY COMPANY.
- 3.5 PROJECT PHOTOGRAPHS:
  - A. FILE DIGITAL PHOTOGRAPHS OF COMPLETED SITE IN JPEG FORMAT IN THE SMS PHOTO LIBRARY FOR THE RESPECTIVE SITE. PHOTOGRAPHS SHALL BE CLEARLY LABELED WITH SITE NUMBER, NAME AND DESCRIPTION, AND SHALL INCLUDE AT A MINIMUM THE FOLLOWING AS APPLICABLE:
    - 1. SHELTER AND TOWER OVERVIEW.
    - 2. TOWER FOUNDATION(S) - FORMS AND STEEL BEFORE POUR (EACH ANCHOR ON GUYED TOWERS).
    - 3. TOWER FOUNDATION(S) POUR WITH VIBRATOR IN USE (EACH ANCHOR ON GUYED TOWERS).
    - 4. TOWER STEEL AS BEING INSTALLED INTO HOLE (SHOW ANCHOR STEEL ON GUYED TOWERS).
    - 5. PHOTOS OF TOWER SECTION STACKING.
    - 6. CONCRETE TESTING / SAMPLES.
    - 7. PLACING OF ANCHOR BOLTS IN TOWER FOUNDATION.
    - 8. BUILDING/WATER TANK FROM ROAD FOR TENANT IMPROVEMENTS OR COMMENTS.
    - 9. SHELTER FOUNDATION--FORMS AND STEEL BEFORE POURING.
    - 10. SHELTER FOUNDATION POUR WITH VIBRATOR IN USE.
    - 11. COAX CABLE ENTRY INTO SHELTER.
    - 12. PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.
    - 13. ROOFTOP PRE AND POST CONSTRUCTION PHOTOS TO INCLUDE PENETRATIONS AND INTERIOR CEILING.
    - 14. PHOTOS OF TOWER TOP COAX LINE COLOR CODING AND COLOR CODING AT GROUND LEVEL.
    - 15. PHOTOS OF ALL APPROPRIATE COMPANY OR REGULATORY SIGNAGE.
    - 16. PHOTOS OF EQUIPMENT BOLT DOWN INSIDE SHELTER.
    - 17. POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE AND POWER AND TELCO SUPPLY LOCATIONS INCLUDING METER/DISCONNECT.
    - 18. ELECTRICAL TRENCH(S) WITH ELECTRICAL / CONDUIT BEFORE BACKFILL.
    - 19. ELECTRICAL TRENCH(S) WITH FOIL-BACKED TAPE BEFORE FURTHER BACKFILL.
    - 20. TELCO TRENCH WITH TELEPHONE / CONDUIT BEFORE BACKFILL.
    - 21. TELCO TRENCH WITH FOIL-BACKED TAPE BEFORE FURTHER BACKFILL.
    - 22. SHELTER GROUND-RING TRENCH WITH GROUND-WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).
    - 23. TOWER GROUND-RING TRENCH WITH GROUND-WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).


- 24. FENCE GROUND-RING TRENCH WITH GROUND-WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).
  - 25. ALL BTS GROUND CONNECTIONS.
  - 26. ALL GROUND TEST WELLS.
  - 27. ANTENNA GROUND BAR AND EQUIPMENT GROUND BAR.
  - 28. ADDITIONAL GROUNDING POINTS ON TOWERS ABOVE 200'.
  - 29. HVAC UNITS INCLUDING CONDENSERS ON SPLIT SYSTEMS.
  - 30. GPS ANTENNAS.
  - 31. CABLE TRAY AND/OR WAVEGUIDE BRIDGE.
  - 32. DOGHOUSE/CABLE EXIT FROM ROOF.
  - 33. EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA.
  - 34. MASTER BUS BAR.
  - 35. TELCO BOARD AND NIU.
  - 36. ELECTRICAL DISTRIBUTION WALL.
  - 37. CABLE ENTRY WITH SURGE SUPPRESSION.
  - 38. ENTRANCE TO EQUIPMENT ROOM.
  - 39. COAX WEATHERPROOFING--TOP AND BOTTOM OF TOWER.
  - 40. COAX GROUNDING --TOP AND BOTTOM OF TOWER.
  - 41. ANTENNA AND MAST GROUNDING.
  - 42. LANDSCAPING - WHERE APPLICABLE.
- 3.6 FINAL PROJECT ACCEPTANCE: COMPLETE ALL REQUIRED REPORTING TASKS PER CONTRACT, CONTRACT DOCUMENTS OR THE SPRINT INTEGRATED CONSTRUCTION STANDARDS FOR WIRELESS SITES AND UPLOAD INTO SITERRA.

PLANS PREPARED FOR:



6580 Sprint Parkway  
Overland Park, Kansas 66251


PLANS PREPARED BY:



1033 Watervliet Shaker Rd  
Albany, NY 12205  
Office # (518) 690-0790  
Fax # (518) 690-0793

JOB NUMBER 353-300X

MLA PARTNER:



ENGINEERING LICENSE:



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REVISIONS:

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**EAST HARTFORD**

SITE CASCADE:

**CT03XC251**

SITE ADDRESS:

1455 FORBES STREET  
EAST HARTFORD, CT 06118

SHEET DESCRIPTION:

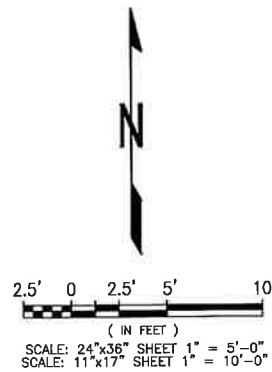
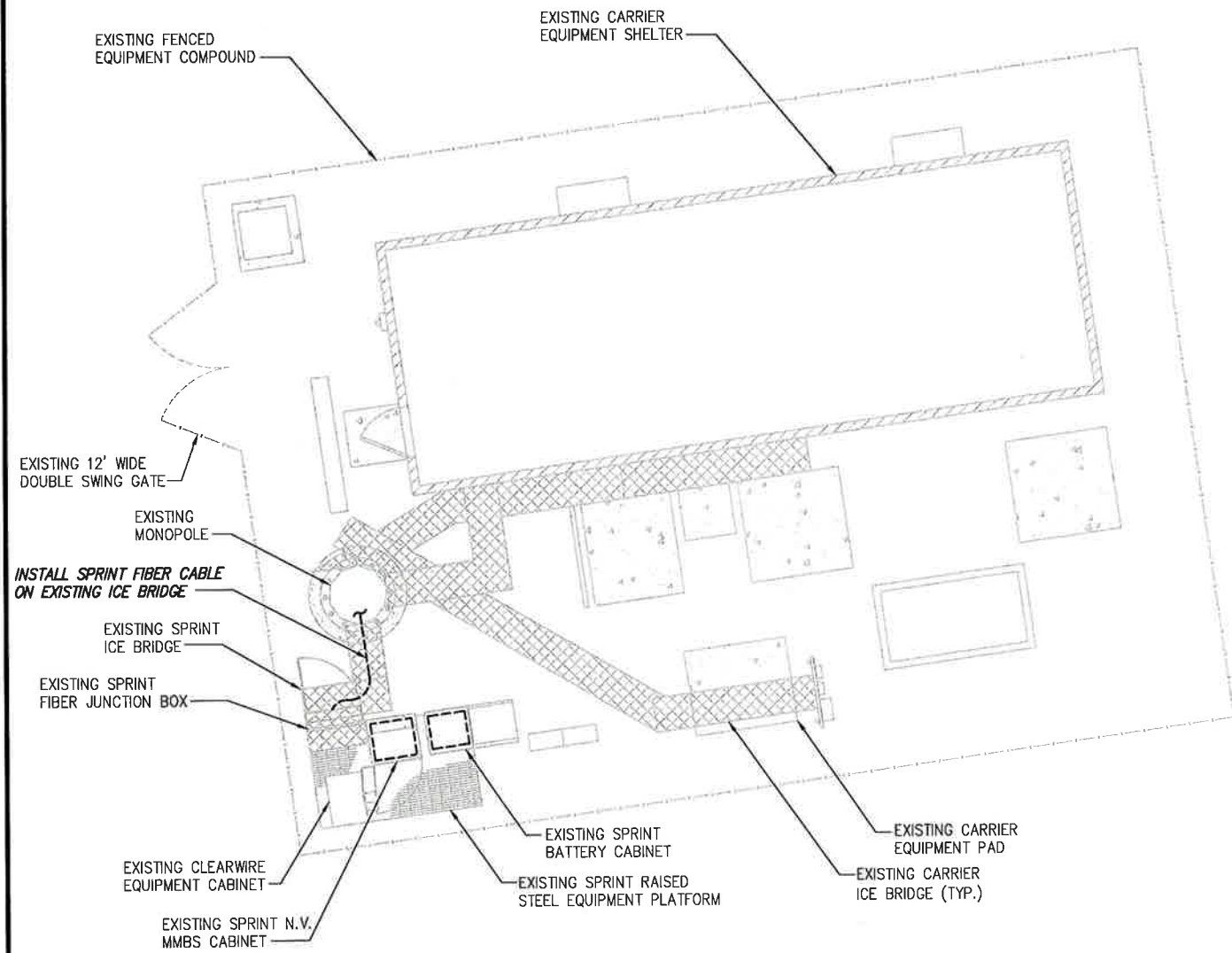
**SPRINT SPECIFICATIONS**

SHEET NUMBER:

**SP-3**

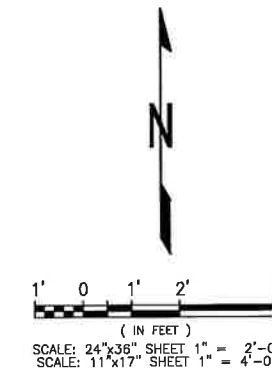
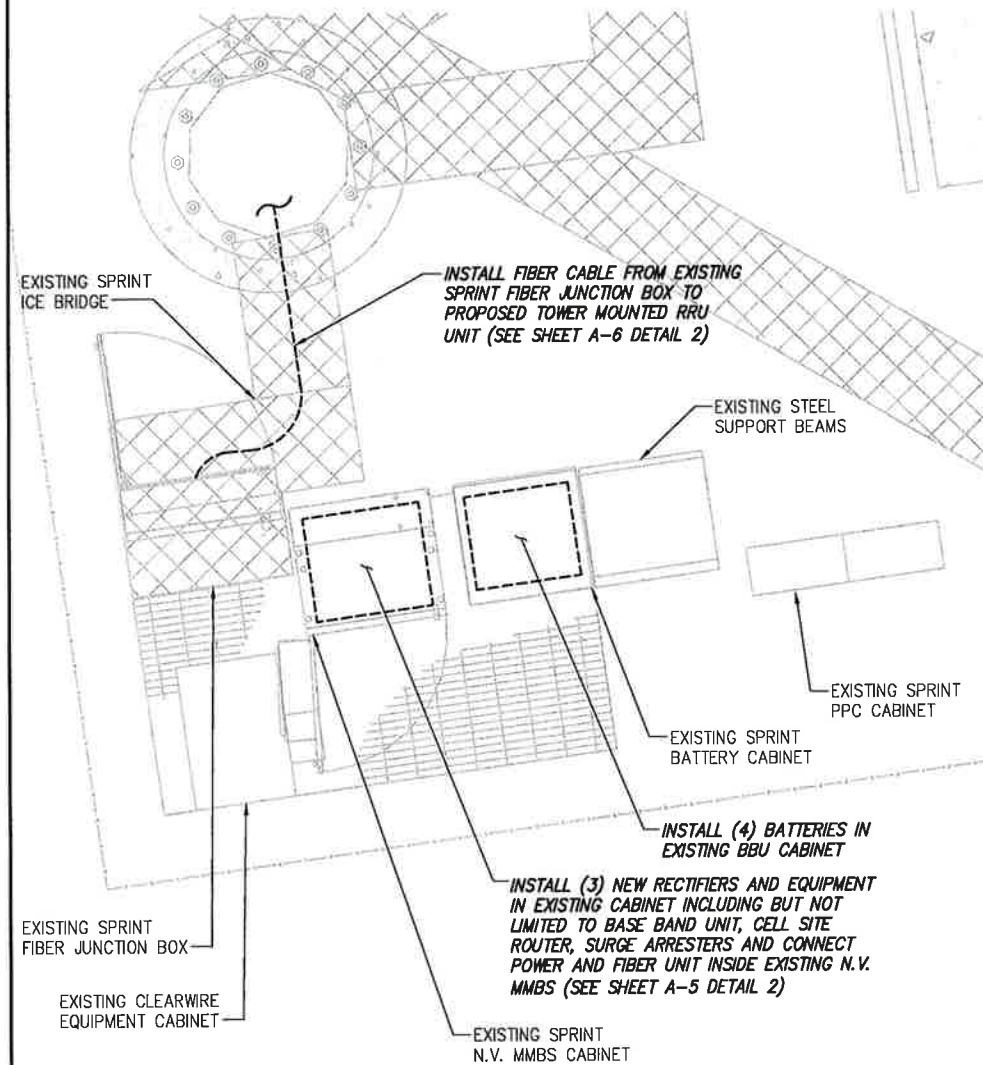


INFORMATION CONTAINED WITHIN DRAWINGS ARE BASED ON PROVIDED INFORMATION AND ARE NOT THE RESULT OF A FIELD SURVEY.



OVERALL SITE PLAN

SCALE: AS NOTED 1



SPRINT EQUIPMENT PLAN

SCALE: AS NOTED 2

PLANS PREPARED FOR:




6580 Sprint Parkway  
Overland Park, Kansas 66251

PLANS PREPARED BY:




1033 Watervliet Shaker Rd  
Albany, NY 12205  
Office # (518) 690-0790  
Fax # (518) 690-0793  
JOB NUMBER 353-XXX

MLA PARTNER:



ENGINEERING LICENSE:



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REVISIONS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	5/22/14	JJM	0

SITE NAME:  
**EAST HARTFORD**

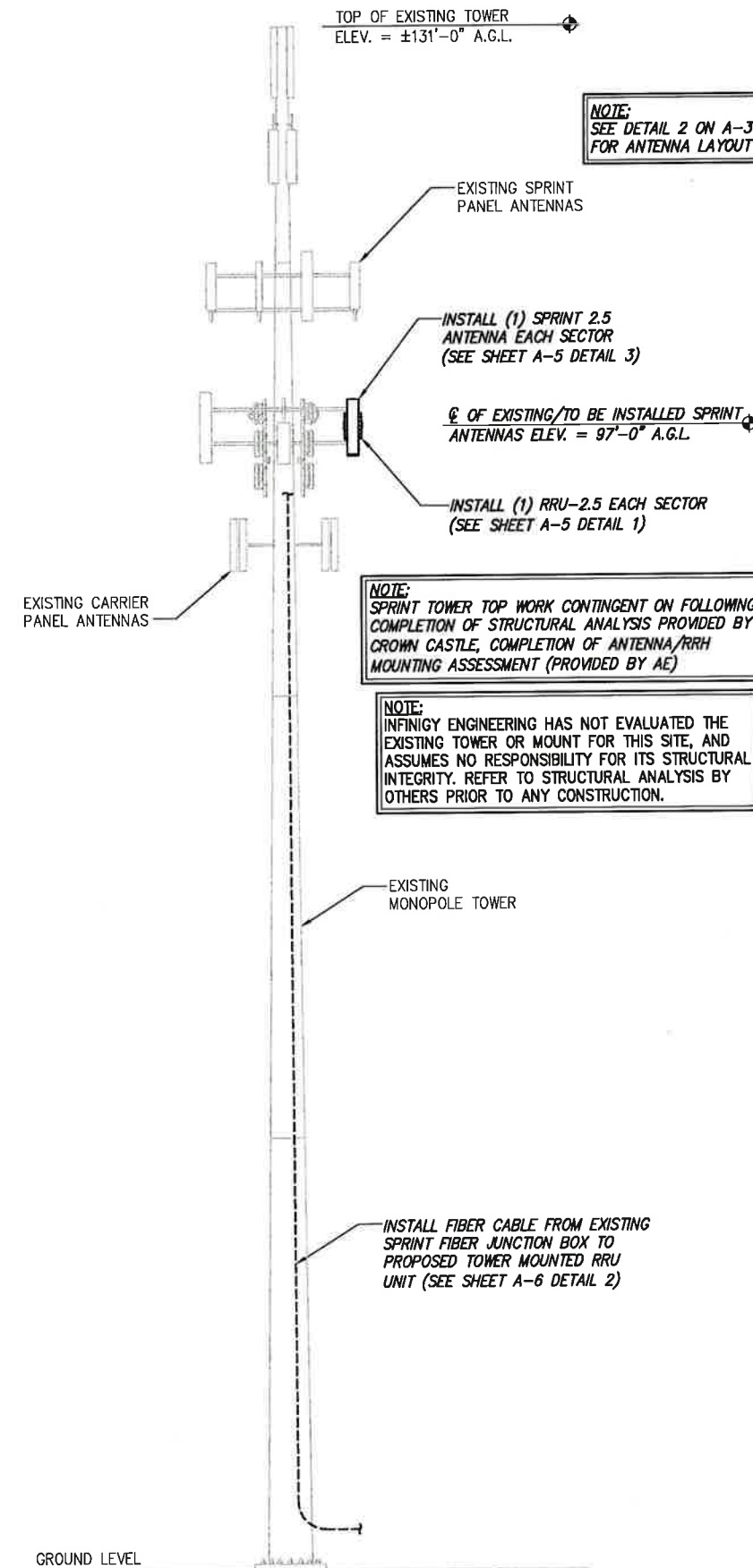
SITE CASCADE:  
**CT03XC251**

SITE ADDRESS:  
**1455 FORBES STREET  
EAST HARTFORD, CT 06118**

SHEET DESCRIPTION:  
**SITE PLAN**

SHEET NUMBER:  
**A-1**





**NOTE:**  
SEE DETAIL 2 ON A-3  
FOR ANTENNA LAYOUT

**NOTE:**  
SPRINT TOWER TOP WORK CONTINGENT ON FOLLOWING:  
COMPLETION OF STRUCTURAL ANALYSIS PROVIDED BY  
CROWN CASTLE, COMPLETION OF ANTENNA/RRH  
MOUNTING ASSESSMENT (PROVIDED BY AE)

**NOTE:**  
INFINIGY ENGINEERING HAS NOT EVALUATED THE  
EXISTING TOWER OR MOUNT FOR THIS SITE, AND  
ASSUMES NO RESPONSIBILITY FOR ITS STRUCTURAL  
INTEGRITY. REFER TO STRUCTURAL ANALYSIS BY  
OTHERS PRIOR TO ANY CONSTRUCTION.

DETAIL NOT USED      NO SCALE      2

DETAIL NOT USED      NO SCALE      3

DETAIL NOT USED      NO SCALE      4

PLANS PREPARED FOR:

6580 Sprint Parkway  
Overland Park, Kansas 66251

PLANS PREPARED BY:

Design.  
Build.  
Deliver.

1033 Watervliet Shaker Rd  
Albany, NY 12205  
Office # (518) 690-0790  
Fax # (518) 690-0793

JOB NUMBER 353-XXX

MLA PARTNER:

ENGINEERING LICENSE:

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DESCRIPTION	DATE	BY	REV
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SITE NAME:

EAST HARTFORD

SITE CASCADE:

CT03XC251

SITE ADDRESS:

1455 FORBES STREET  
EAST HARTFORD, CT 06118

SHEET DESCRIPTION:

TOWER ELEVATION  
& CABLE PLAN

SHEET NUMBER:

A-2

TOWER ELEVATION      NO SCALE      1



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SITE NAME: EAST HARTFORD

SITE CASCADE: CT03XC251

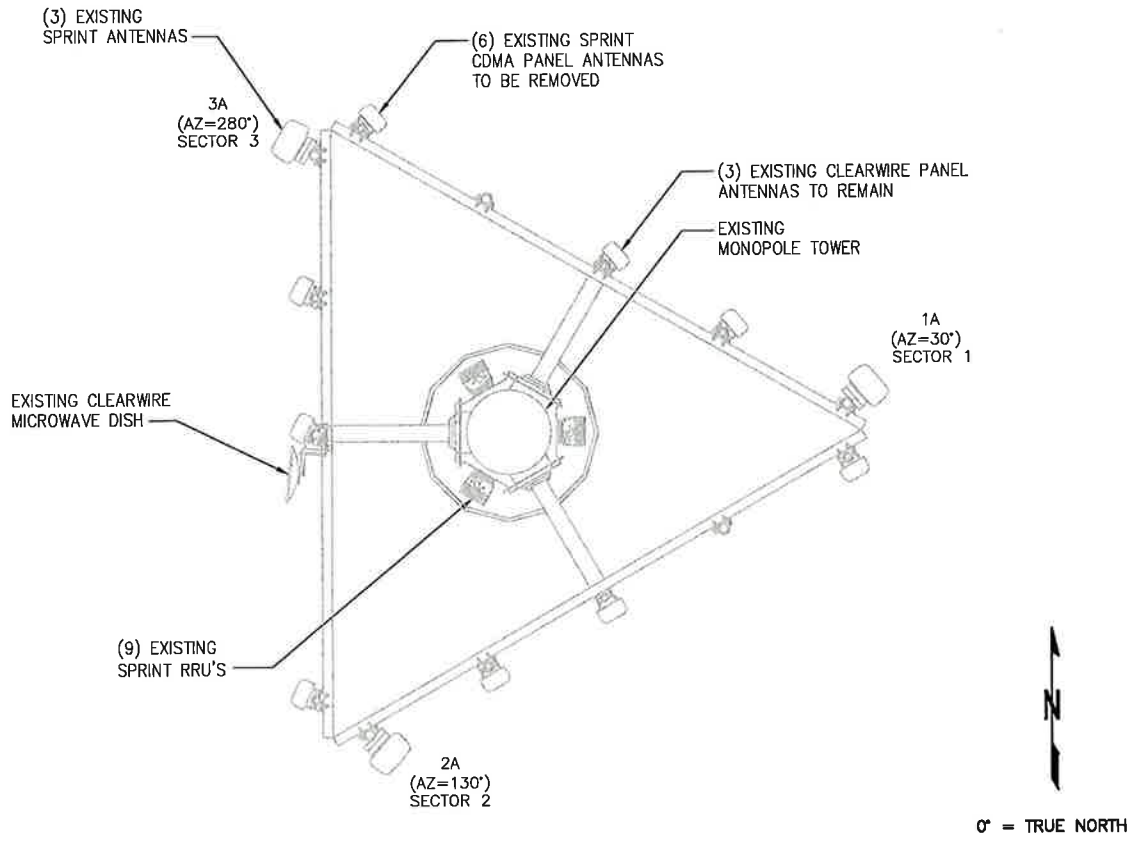
SITE ADDRESS: 1455 FORBES STREET, EAST HARTFORD, CT 06118

SHEET DESCRIPTION: ANTENNA LAYOUT & MOUNTING DETAILS

SHEET NUMBER: A-3

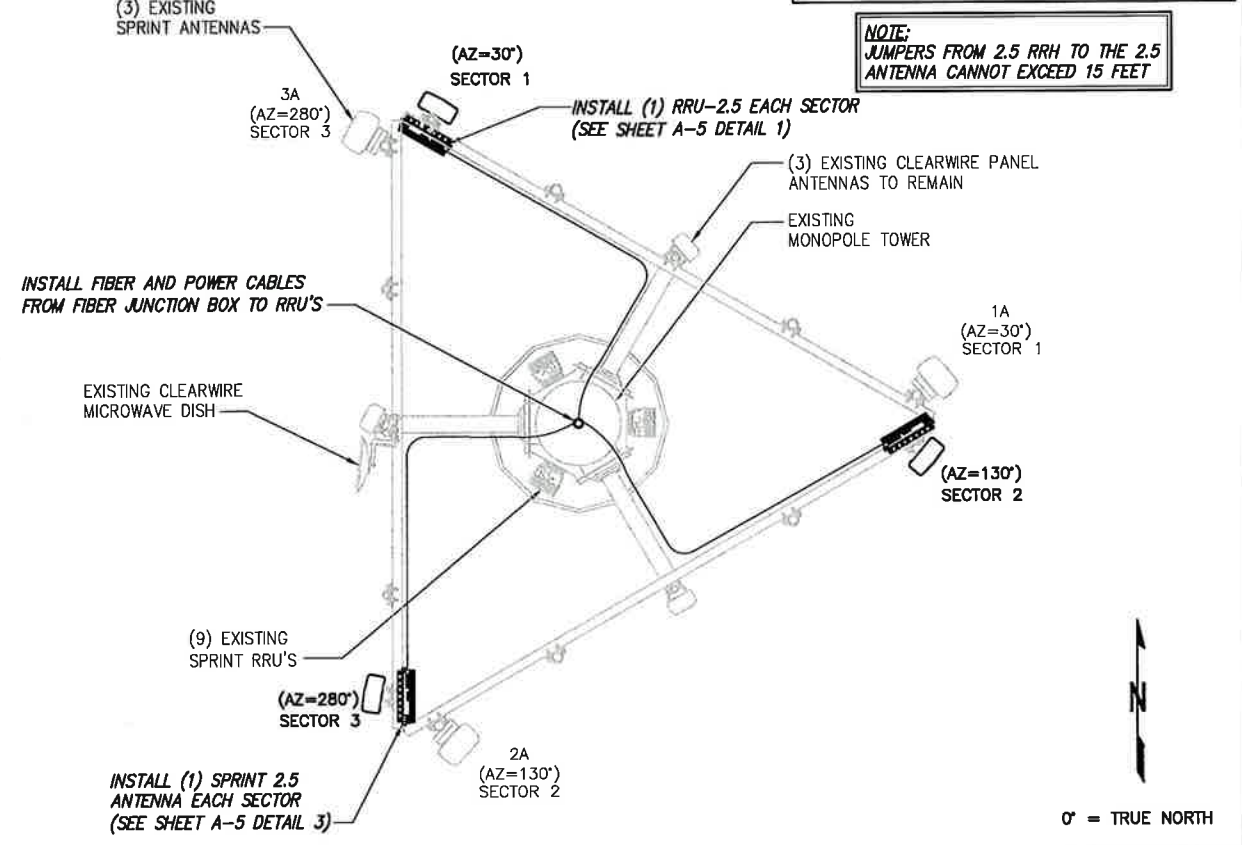
THE CONFIGURATION PLANS ARE BASED ON PROVIDED INFORMATION AND ARE FOR CONCEPTUAL PURPOSES ONLY. CONTRACTOR TO VERIFY FIELD CONDITIONS PRIOR TO CONSTRUCTION.

NOTE: JUMPERS FROM 2.5 RRH TO THE 2.5 ANTENNA CANNOT EXCEED 15 FEET



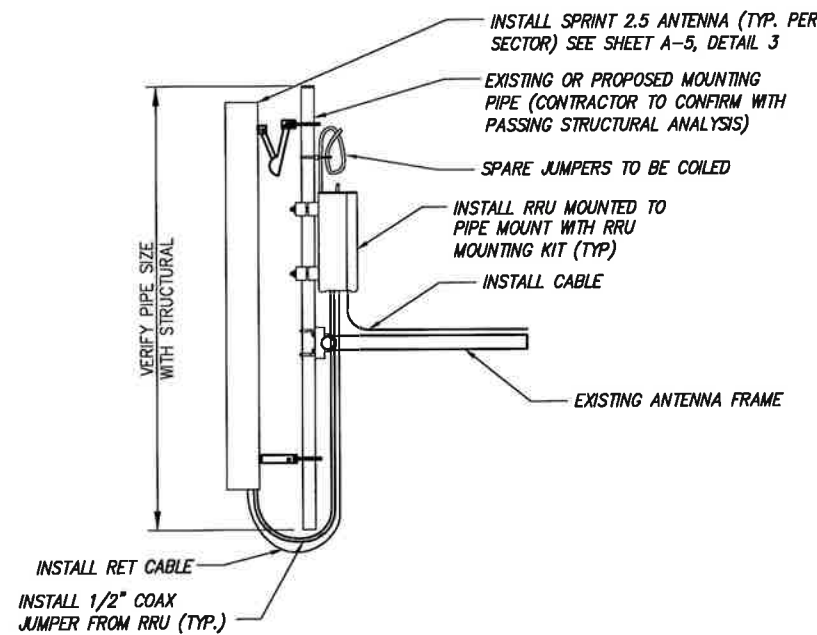
EXISTING ANTENNA & RRU LAYOUT

NO SCALE 1



FINAL ANTENNA LAYOUT

NO SCALE 2



- NOTES:
- CUT DC CONDUCTORS TO LENGTH.
  - COIL FIBER CABLE AND SECURE AT SIDE OF RRU.
  - DO NOT EXCEED BEND RADIUS.

NOTE: CONTRACTOR TO POSITION RRU ON MOUNT BEHIND ANTENNA SUCH THAT THE RRU DOES NOT INTERFERE WITH THE EXISTING PLATFORM/T-ARM MOUNTING HARDWARE.

NOTE: SPARE DC CABLES ARE COILED UP ON NV RRHS AT SPRINT ARRAY. THESE ARE TO BE USED TO POWER UP THE 2.5 RRHS AND TIED INTO EXISTING DC BREAKERS INSIDE THE FIBER JUNCTION BOX LOCATED AT EQUIPMENT.

NOTE: THE DIAGRAM IS FOR CONCEPTUAL PURPOSES ONLY. CONTRACTOR IS TO REFER TO PASSING STRUCTURAL ANALYSIS FOR ANTENNA AND RRU MOUNTING DETAILS.

DETAIL NOT USED

NO SCALE 3

TYPICAL ANTENNA & RRU MOUNTING DETAILS

NO SCALE 4

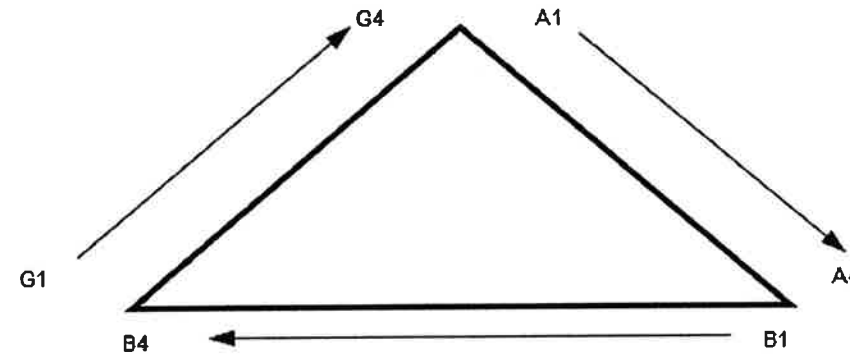


NV CABLES				
BAND	INDICATOR	PORT	COLOR	
800-1	YEL GRN	NV-1	GRN	
1900-1	YEL RED	NV-2	BLU	
1900-2	YEL BRN	NV-3	BRN	
1900-3	YEL BLU	NV-4	WHT	
1900-4	YEL SLT	NV-5	RED	
800-2	YEL ORG	NV-6	SLT	
SPARE	YEL WHT	NV-7	PPL	
2500	YEL PPL	NV-8	ORG	

HYBRID	
HYBRID	COLOR
1	GRN
2	BLU
3	BRN
4	WHT
5	RED
6	SLT
7	PPL
8	ORG

2.5 Band		
2500 Radio 1	COLOR	
YEL WHT	GRN	
YEL WHT	BLU	
YEL WHT	BRN	
YEL WHT	WHT	
YEL WHT	RED	
YEL WHT	SLT	
YEL WHT	PPL	
YEL WHT	ORG	

Figure 1: Antenna Orientation



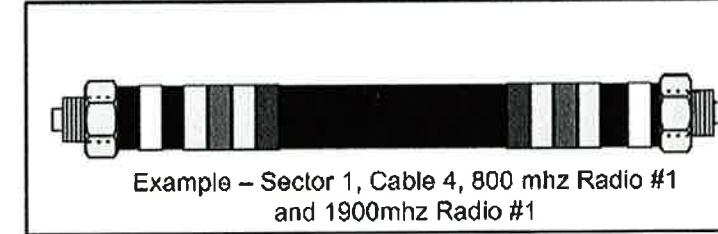
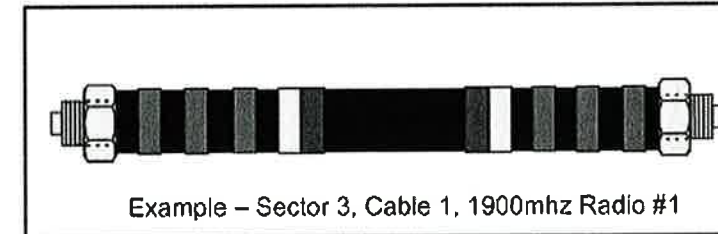
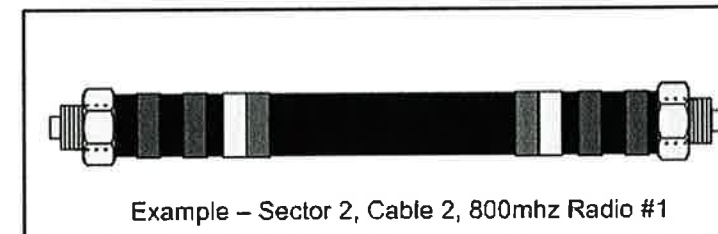
NOTES:

- ALL CABLES SHALL BE MARKED WITH 2" WIDE, UV STABILIZED, UL APPROVED TAPE.
- THE FIRST RING SHALL BE CLOSEST TO THE END OF THE CABLE AND SPACED APPROXIMATELY 2" FROM THE END CONNECTOR, WEATHERPROOFING, OR BREAK-OUT CYLINDER. THERE SHALL BE A 1" SPACE BETWEEN EACH RING FOR THE CABLE IDENTIFIER, AND NO SPACES BETWEEN THE FREQUENCY BANDS.
- A 2" GAP SHALL SEPARATE THE CABLE COLOR CODE FROM THE FREQUENCY COLOR CODE. THE 2" COLOR RINGS FOR THE FREQUENCY CODE SHALL BE PLACED NEXT TO EACH OTHER WITH NO SPACES.
- THE 2" COLORED TAPE(S) SHALL EACH BE WRAPPED A MINIMUM OF 3 TIMES AROUND THE INDIVIDUAL CABLES, AND THE TAPE SHALL BE KEPT IN THE SAME LOCATION AS MUCH AS POSSIBLE.
- SITES WITH MORE THAN FOUR (4) SECTORS WILL REQUIRE ADDITIONAL RINGS FOR EACH SECTOR, FOLLOWING THE PATTERN. HIGH CAPACITY SITES WILL USE THE NEXT COLOR IN THE SEQUENCE FOR ADDITIONAL CABLES IN EACH SECTOR.
- HYBRID FIBER CABLE SHALL BE SECTOR IDENTIFIED INSIDE THE CABINET ON FREQUENCY BUNDLES, ON THE SEALTITE, ON THE MAIN LINE UPON EXIT OF SEALTITE, AND BEFORE AND AFTER THE BREAKOUT UNIT (MEDUSA), AS WELL AS BEFORE AND AFTER ANY ENTRANCE OR EXIT.
- HFC "MAIN TRUNK" WILL NOT BE MARKED WITH THE FREQUENCY CODES, AS IT CONTAINS ALL FREQUENCIES.
- INDIVIDUAL POWER PAIRS AND FIBER BUNDLES SHALL BE LABELED WITH BOTH THE CABLE AND FREQUENCY.

Sector	Cable	First Ring	Second Ring	Third Ring
1 Alpha	1	Green	No Tape	No Tape
	2	No Tape	No Tape	No Tape
	3	Brown	No Tape	No Tape
	4	White	No Tape	No Tape
	5	Red	No Tape	No Tape
	6	Grey	No Tape	No Tape
	7	Purple	No Tape	No Tape
	8	Orange	No Tape	No Tape
2 Beta	1	Green	Green	No Tape
	2	No Tape	No Tape	No Tape
	3	Brown	Brown	No Tape
	4	White	White	No Tape
	5	Red	Red	No Tape
	6	Grey	Grey	No Tape
	7	Purple	Purple	No Tape
	8	Orange	Orange	No Tape
3 Gamma	1	Green	Green	Green
	2	No Tape	No Tape	No Tape
	3	Brown	Brown	Brown
	4	White	White	White
	5	Red	Red	Red
	6	Grey	Grey	Grey
	7	Purple	Purple	Purple
	8	Orange	Orange	Orange

NV FREQUENCY	INDICATOR	ID
800-1	YEL GRN	
1900-1	YEL RED	
1900-2	YEL BRN	
1900-3	YEL BLU	
1900-4	YEL SLT	
800-1	YEL ORG	
RESERVED	YEL WHT	
RESERVED	YEL PPL	

2.5 FREQUENCY	INDICATOR	ID
2500 -1	YEL WHT GRN	
2500 -2	YEL WHT RED	
2500 -3	YEL WHT BRN	
2500 -4	YEL WHT BLU	
2500 -5	YEL WHT SLT	
2500 -6	YEL WHT ORG	
2500 -7	YEL WHT WHT	
2500 -8	YEL WHT PPL	



PLANS PREPARED FOR:

6580 Sprint Parkway  
Overland Park, Kansas 66251

PLANS PREPARED BY:

1033 Watervliet Shaker Rd  
Albany, NY 12205  
Office # (518) 690-0790  
Fax # (518) 690-0793  
JOB NUMBER 353-XXX

MLA PARTNER:

ENGINEERING LICENSE:

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ISSUED FOR CONSTRUCTION 5/22/14 JLM 0

SITE NAME:

EAST HARTFORD

SITE CASCADE:

CT03XC251

SITE ADDRESS:

1455 FORBES STREET  
EAST HARTFORD, CT 06118

SHEET DESCRIPTION:

COLOR CODING AND NOTES

SHEET NUMBER:

A-4

PLANS PREPARED FOR:



PLANS PREPARED BY:



MLA PARTNER:



ENGINEERING LICENSE:



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REVISIONS:	DESCRIPTION	DATE	BY	REV
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SITE NAME:

EAST HARTFORD

SITE CASCADE:

CT03XC251

SITE ADDRESS:

1455 FORBES STREET  
EAST HARTFORD, CT 06118

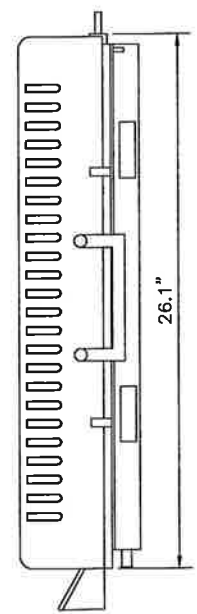
SHEET DESCRIPTION:

EQUIPMENT &  
MOUNTING DETAILS

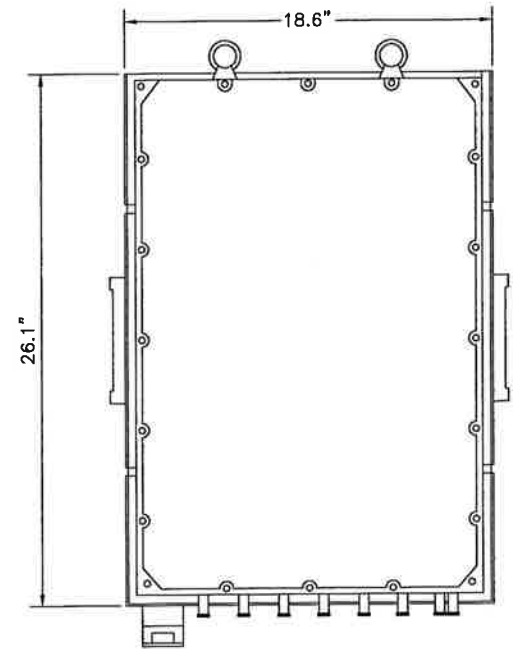
SHEET NUMBER:

A-5

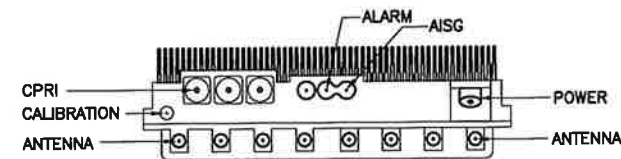
RRU: ALCATEL LUCENT TD-RRH8X20  
COLOR: LIGHT GREY  
WEIGHT: 70 LBS.



SIDE VIEW



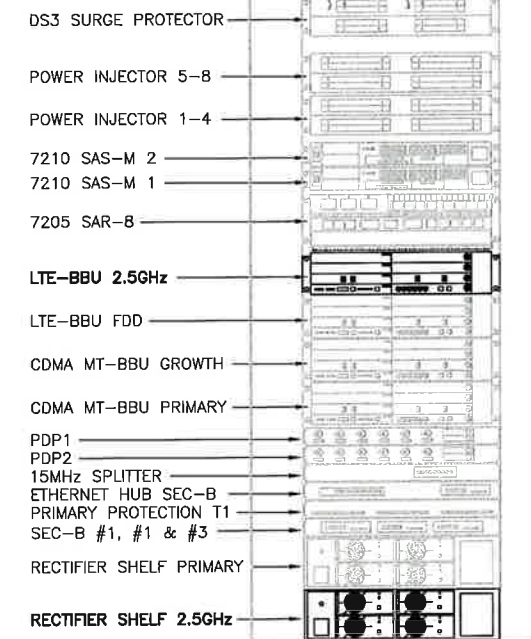
FRONT VIEW



PLAN VIEW

NOTES

COMPLY WITH MANUFACTURERS INSTRUCTIONS TO ENSURE THAT ALL RRU'S RECEIVE ELECTRICAL POWER WITHIN 24 HOURS OF BEING REMOVED FROM THE MANUFACTURER'S PACKAGING. DO NOT OPEN RRU PACKAGES IN THE RAIN



FRONT VIEW

2.5 RRU

NO SCALE

1

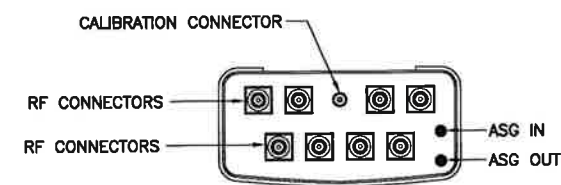
NEW EQUIPMENT IN EXISTING CABINET

NO SCALE

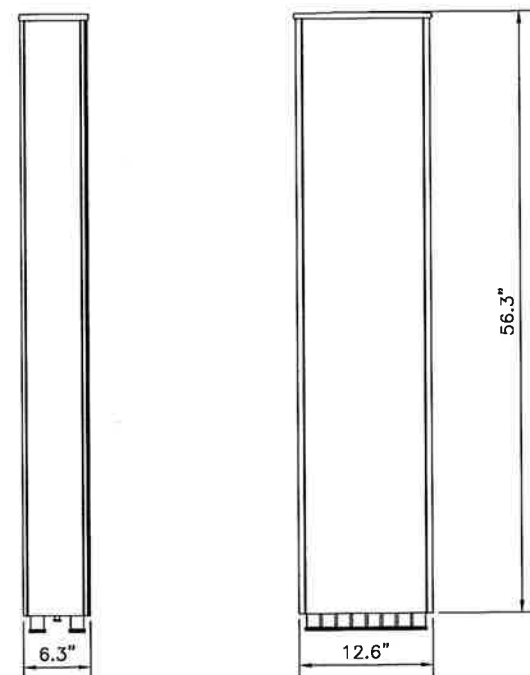
2

ANTENNA: RFS APXVTM14-C-I20

RADOME MATERIAL: ASA  
RADOME COLOR: LIGHT GRAY  
DIMENSIONS, HxWxD.in(mim): 56.3"x12.6"x6.3" (1430x320x160mm)  
WEIGHT: 52.9 lbs  
CONNECTORS: (8) 4.1/9.5 DIN FEMALE  
(1) NF - CALIBRATION CONNECTOR



PLAN VIEW



2.5 ANTENNA

NO SCALE

3

DETAIL NOT USED

NO SCALE

4



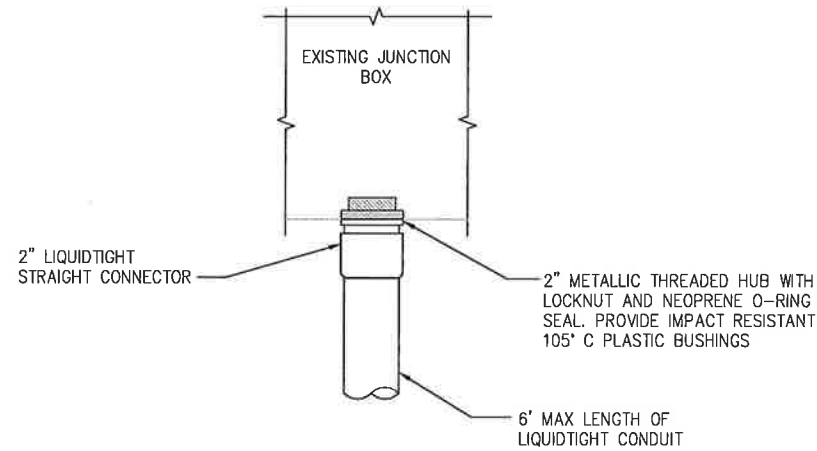
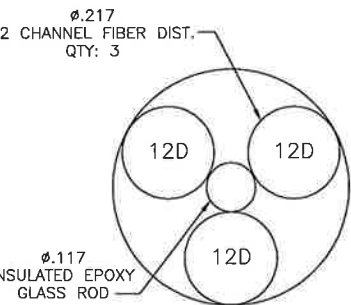
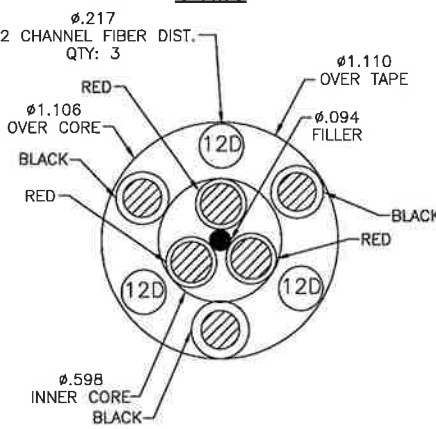
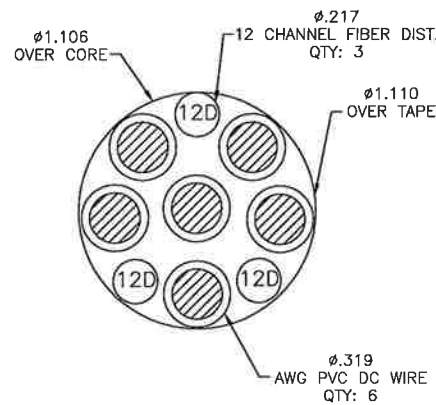
**RFS HYBRIFLEX RISER CABLE SCHEDULE**

Fiber Only (Existing DC Power)	Hybrid cable MN: HB058-M12-050F 12x multi-mode fiber pairs, Top: Outdoor protected connectors, Bottom: LC Connectors, 5/8 cable, 50 ft	50 ft
	MN: HB058-M12-075F	75 ft
	MN: HB058-M12-100F	100 ft
	MN: HB058-M12-125F	125 ft
	MN: HB058-M12-150F	150 ft
	MN: HB058-M12-175F	175 ft
8 AWG Power	Hybrid cable MN: HB114-08U3M12-050F 3x 8 AWG power pairs, 12x multi-mode fiber pairs, Outdoor rated connectors & LC Connectors, 1 1/4 cable, 50 ft	50 ft
	MN: HB114-08U3M12-075F	75 ft
	MN: HB114-08U3M12-100F	100 ft
	MN: HB114-08U3M12-125F	125 ft
	MN: HB114-08U3M12-150F	150 ft
	MN: HB114-08U3M12-175F	175 ft
6 AWG Power	Hybrid cable MN: HB114-13U3M12-225F 3x 6 AWG power pair, 12x multi-mode fiber pairs, Outdoor rated connectors & LC Connectors, 1 1/4 cable, 225 ft	225 ft
	MN: HB114-13U3M12-250F	250 ft
	MN: HB114-13U3M12-275F	275 ft
4 AWG Power	Hybrid cable MN: HB114-21U3M12-325F 3x 4 AWG power pair, 12x multi-mode fiber pairs, Outdoor rated connectors & LC Connectors, 1 1/4 cable, 325 ft	325 ft
	MN: HB114-21U3M12-350F	350 ft
	MN: HB114-21U3M12-375F	375 ft

**RFS HYBRIFLEX JUMPER CABLE SCHEDULE**

Fiber Only	Hybrid Jumper cable MN: HBF012-M3-5F1 5 ft, 3x multi-mode fiber pairs, Outdoor & LC connectors, 1/2 cable	5 ft
	MN: HBF012-M3-10F1	10 ft
	MN: HBF012-M3-15F1	15 ft
	MN: HBF012-M3-20F1	20 ft
	MN: HBF012-M3-25F1	25 ft
	MN: HBF012-M3-30F1	30 ft
8 AWG Power	Hybrid Jumper cable MN: HBF058-08U1M3-5F1 5 ft, 1x 8 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 5/8 cable	5 ft
	MN: HBF058-08U1M3-10F1	10 ft
	MN: HBF058-08U1M3-15F1	15 ft
	MN: HBF058-08U1M3-20F1	20 ft
	MN: HBF058-08U1M3-25F1	25 ft
	MN: HBF058-08U1M3-30F1	30 ft
6 AWG Power	Hybrid Jumper cable MN: HBF058-13U1M3-5F1 5 ft, 1x 6 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 5/8 cable	5 ft
	MN: HBF058-13U1M3-10F1	10 ft
	MN: HBF058-13U1M3-15F1	15 ft
	MN: HBF058-13U1M3-20F1	20 ft
	MN: HBF058-13U1M3-25F1	25 ft
	MN: HBF058-13U1M3-30F1	30 ft
4 AWG Power	Hybrid Jumper cable MN: HBF078-21U1M3-5F1 5 ft, 1x 4 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 7/8 cable	5 ft
	MN: HBF078-21U1M3-10F1	10 ft
	MN: HBF078-21U1M3-15F1	15 ft
	MN: HBF078-21U1M3-20F1	20 ft
	MN: HBF078-21U1M3-25F1	25 ft
	MN: HBF078-21U1M3-30F1	30 ft

**NOTE:**  
SPRINT CM TO CONFIRM HYBRID OR FIBER RISER CABLE AND HYBRID OR FIBER JUMPER CABLE MODEL NUMBERS IF HYBRID CABLES ARE REQUIRED BEFORE PREPARING BOM.



**FIBER JUNCTION BOX PENETRATION**

NO SCALE

2

**2.5 CABLE CROSS SECTION DATA**

NO SCALE

1

**DETAIL NOT USED**

NO SCALE

3

PLANS PREPARED FOR:

6580 Sprint Parkway  
Overland Park, Kansas 66251

PLANS PREPARED BY:

Design. Build. Deliver.

1033 Watervliet Shaker Rd  
Albany, NY 12205  
Office # (518) 690-0790  
Fax # (518) 690-0793

JOB NUMBER 353-100X

MLA PARTNER:

ENGINEERING LICENSE:

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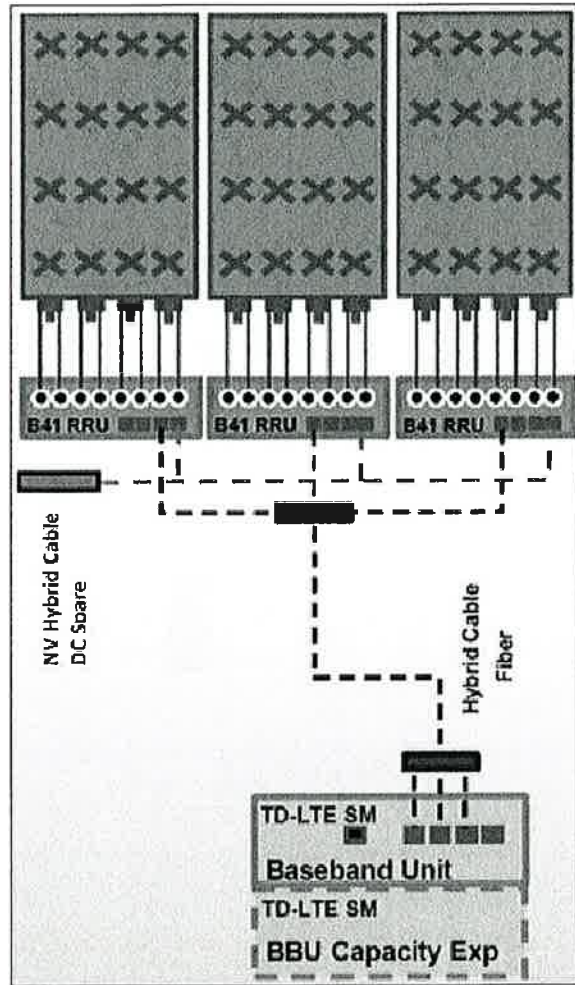
SITE NAME:  
**EAST HARTFORD**

SITE CASCADE:  
**CT03XC251**

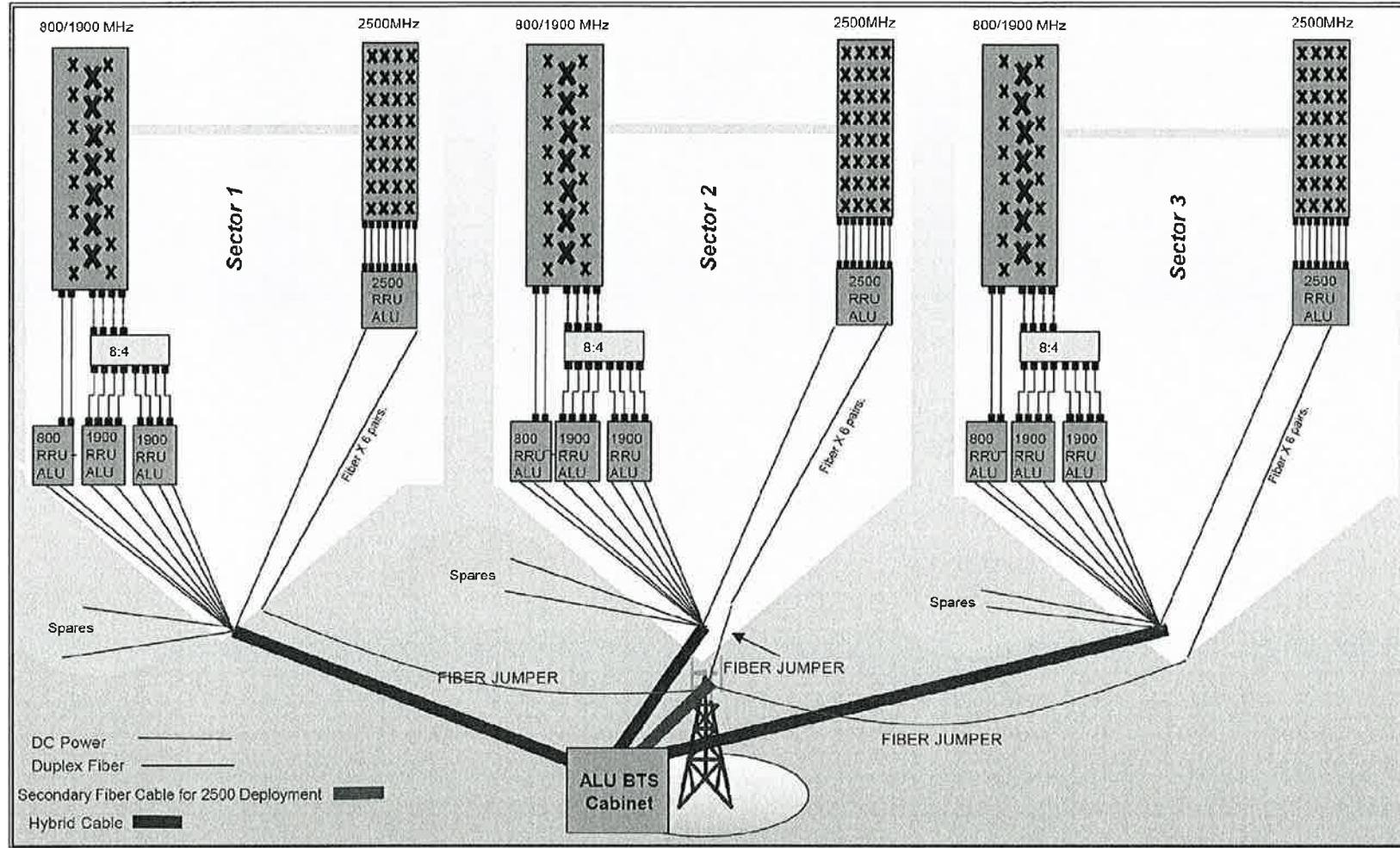
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1455 FORBES STREET  
EAST HARTFORD, CT 06118

SHEET DESCRIPTION:  
**CIVIL DETAILS**

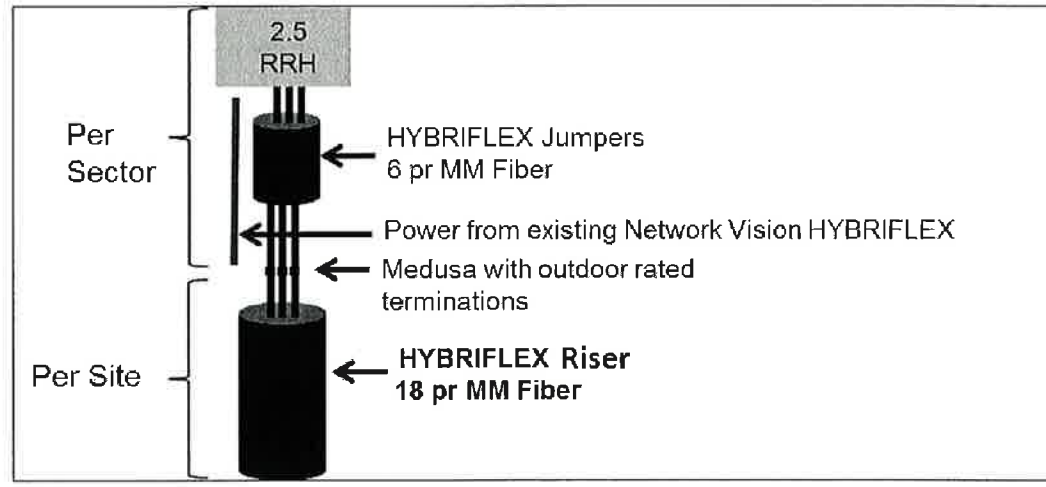
SHEET NUMBER:  
**A-6**



ALU 2.5 ALU SCENARIO 1



RAN WIRING DIAGRAM



RF 2.5 ALU SCENARIO 1

PLUMBING DIAGRAM

PLANS PREPARED FOR:  
**Sprint**  
 6580 Sprint Parkway  
 Overland Park, Kansas 66251

PLANS PREPARED BY:  
**INFINIGY** Design. Build. Deliver.  
 1033 Watervliet Shaker Rd  
 Albany, NY 12205  
 Office # (518) 690-0790  
 Fax # (518) 690-0793  
 JOB NUMBER 353-100X

MLA PARTNER:  
**CROWN CASTLE**

ENGINEERING LICENSE:  
  
 JOHN S. STEVENS  
 No. 24705  
 LICENSED PROFESSIONAL ENGINEER

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DESCRIPTION	DATE	BY	REV
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SITE NAME:  
**EAST HARTFORD**

SITE CASCADE:  
**CT03XC251**

SITE ADDRESS:  
 1455 FORBES STREET  
 EAST HARTFORD, CT 06118

SHEET DESCRIPTION:  
**CIVIL DETAILS**

SHEET NUMBER:  
**A-7**



PLANS PREPARED FOR:



PLANS PREPARED BY:



MLA PARTNER:



ENGINEERING LICENSE:

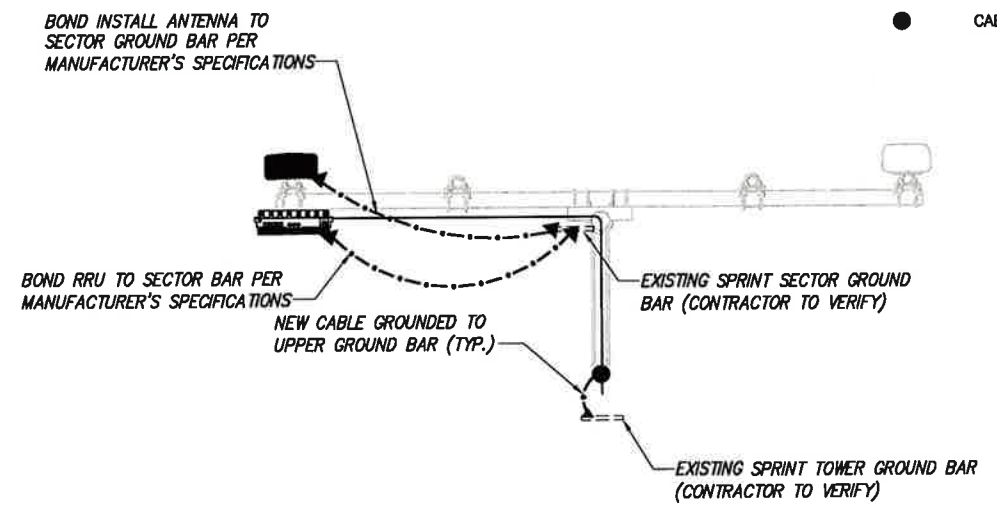


PLAN NOT USED

NO SCALE

1

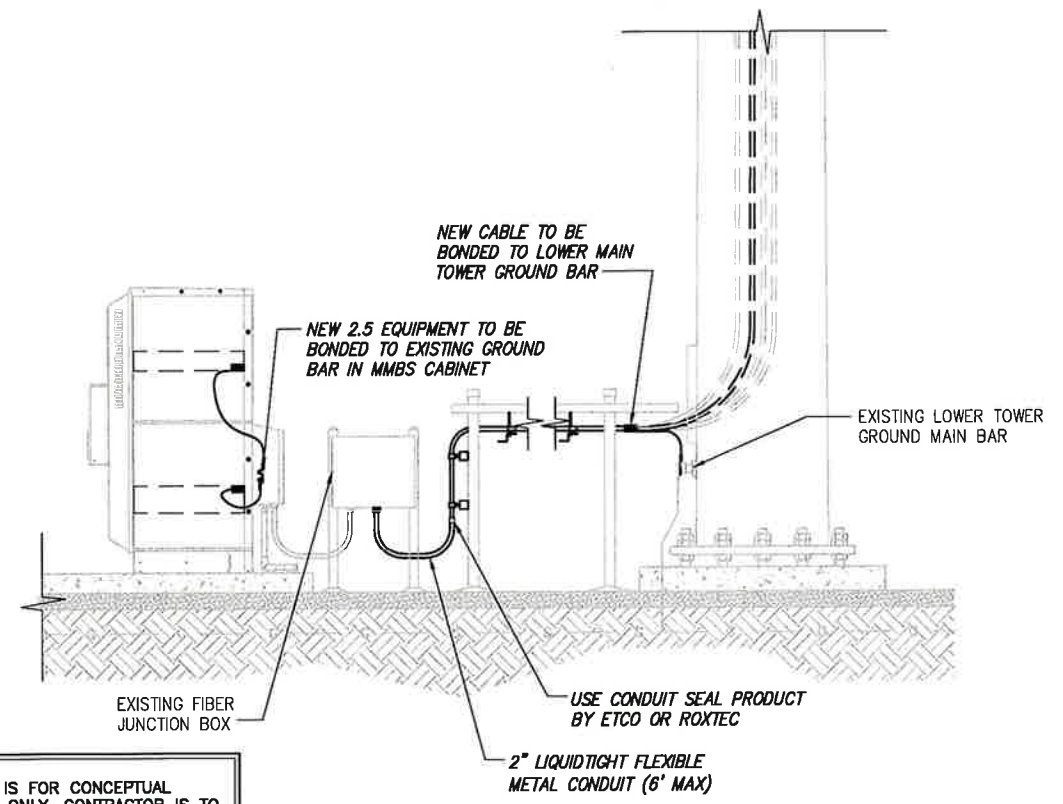
- LEGEND:**
- G — EXISTING GROUND RING
  - CADWELD CONNECTION (EXOTHERMIC WELD)
  - ▲ MECHANICAL CONNECTION
  - ⊗ GROUND ROD
  - CABLE GROUND KIT



TYPICAL ANTENNA GROUNDING PLAN

NO SCALE

2



NOTE: DEPICTION IS FOR CONCEPTUAL PURPOSES ONLY. CONTRACTOR IS TO FIELD VERIFY PRIOR TO CONSTRUCTION

TYPICAL EQUIPMENT GROUNDING PLAN (ELEVATION)

NO SCALE

3

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REVISIONS:

DESCRIPTION	DATE	BY	REV
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SITE NAME:

EAST HARTFORD

SITE CASCADE:

CT03XC251

SITE ADDRESS:

1455 FORBES STREET  
EAST HARTFORD, CT 06118

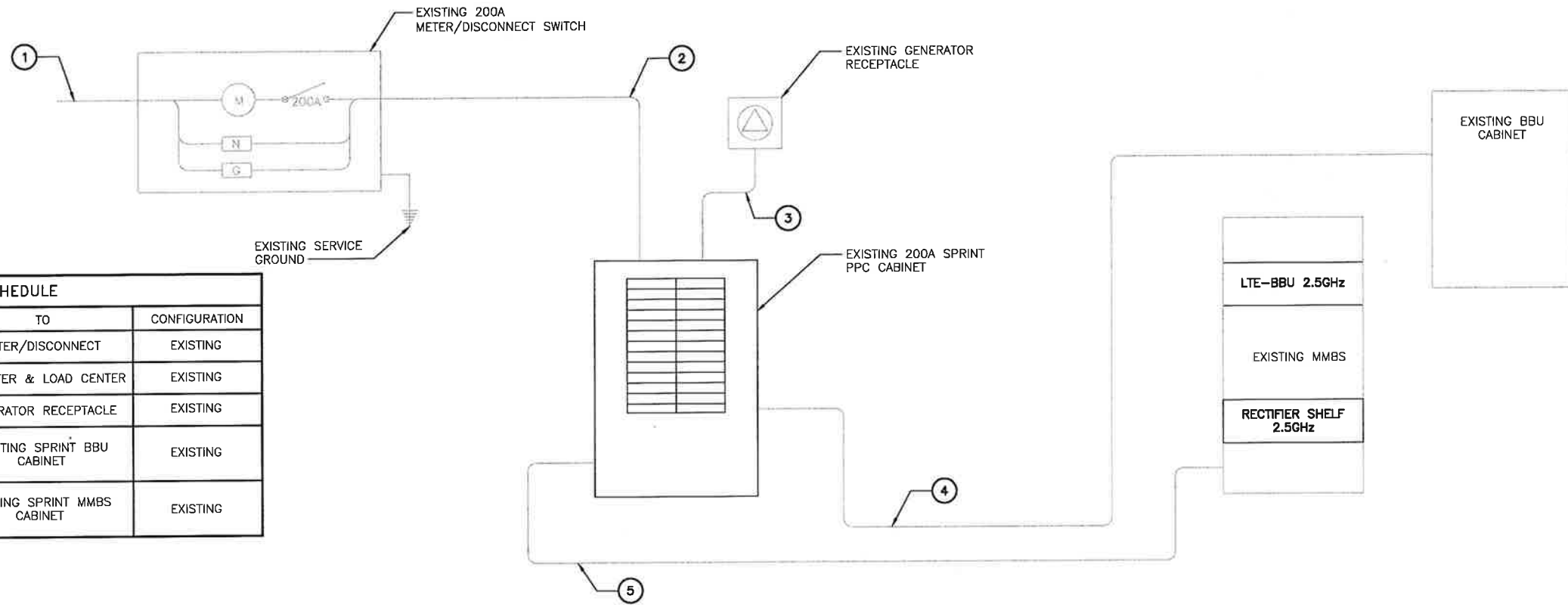
SHEET DESCRIPTION:

ELECTRICAL &  
GROUNDING PLAN

SHEET NUMBER:

E-1

**NOTES**  
CG SHALL REFERENCE ALL SPECS FOR "CONNECTING THE POWER SUPPLY" OF THE NEW INSTALLATION DOCUMENTS, FOR ALL CONNECTION SPECIFICATIONS.

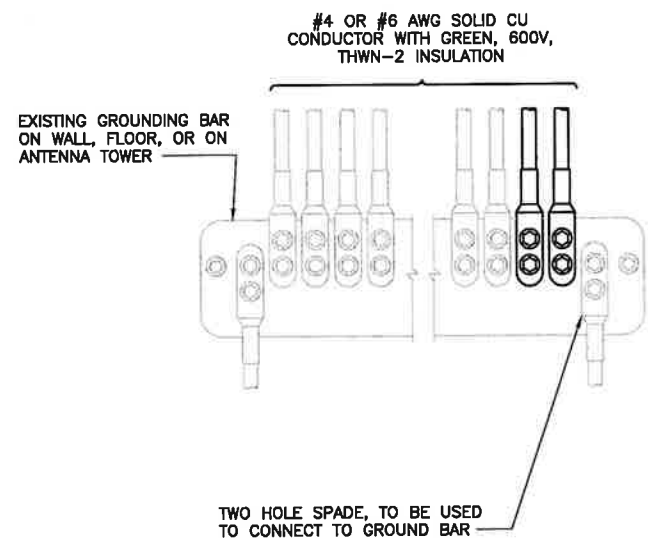


CIRCUIT SCHEDULE			
NO	FROM	TO	CONFIGURATION
①	UTILITY SOURCE	METER/DISCONNECT	EXISTING
②	METER/DISCONNECT	TRANSFER & LOAD CENTER	EXISTING
③	TRANSFER & LOAD CENTER	GENERATOR RECEPTACLE	EXISTING
④	TRANSFER & LOAD CENTER	EXISTING SPRINT BBU CABINET	EXISTING
⑤	TRANSFER & LOAD CENTER	EXISTING SPRINT MMBS CABINET	EXISTING

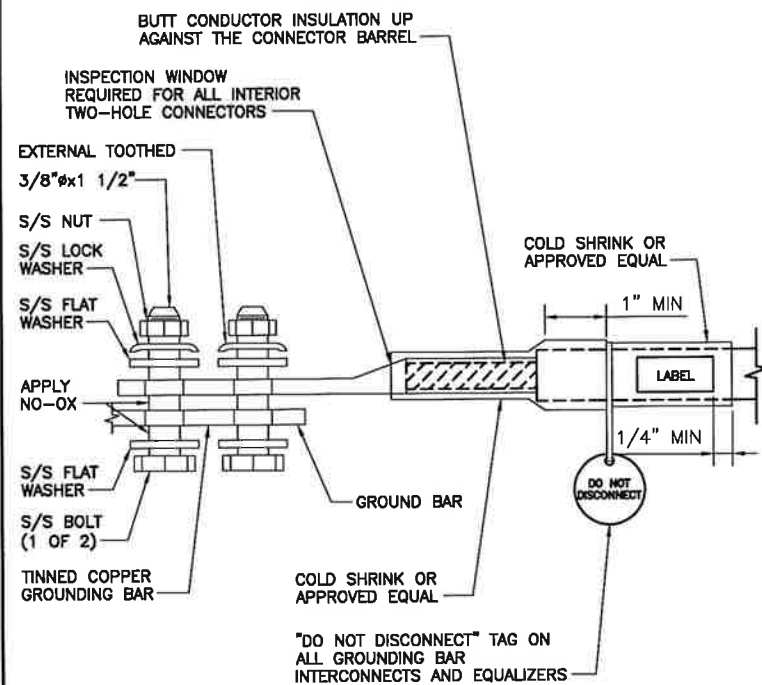
**ELECTRICAL ONE-LINE DIAGRAM**

NO SCALE

1



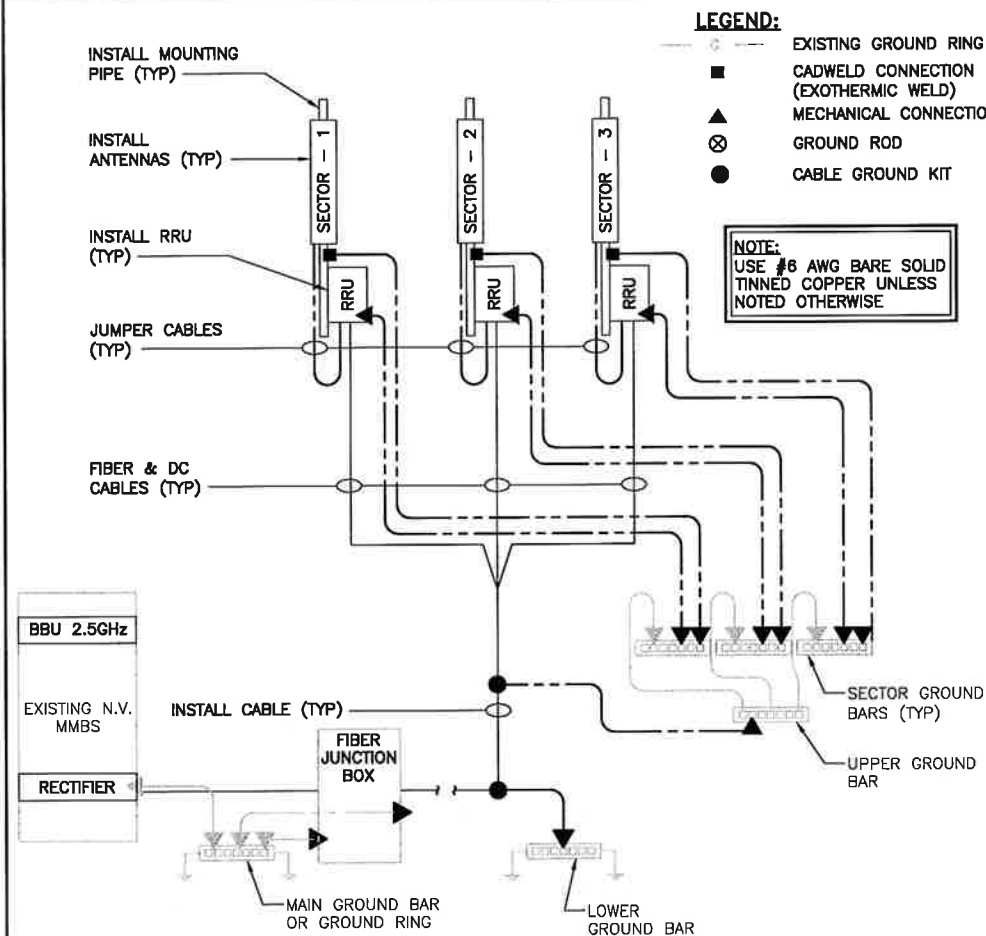
**NOTES**  
1. APPLY NO-OX TO LUG AND BAR CONTACT SURFACE. DO NOT COAT INLINE LUG.  
2. IF STOLEN GROUND BARS ARE ENCOUNTERED, CONTACT SPRINT CM FOR REPLACEMENT THREADED ROD KIT.



**TWO HOLE LUG**

NO SCALE

3



**GROUNDING RISER DIAGRAM**

NO SCALE

4

PLANS PREPARED FOR:

6580 Sprint Parkway  
Overland Park, Kansas 66251

PLANS PREPARED BY:

Design. Build. Deliver.  
1033 Watervliet Shaker Rd  
Albany, NY 12205  
Office # (518) 690-0790  
Fax # (518) 690-0793  
JOB NUMBER 353-XXX

MLA PARTNER:

ENGINEERING LICENSE:

DRAWING NOTICE:  
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REVISIONS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	5/22/14	JJM	0

SITE NAME:  
**EAST HARTFORD**

SITE CASCADE:  
**CT03XC251**

SITE ADDRESS:  
1455 FORBES STREET  
EAST HARTFORD, CT 06118

SHEET DESCRIPTION:  
**ELECTRICAL & GROUNDING DETAILS**

SHEET NUMBER:  
**E-2**

**INSTALLATION OF GROUNDING CONDUCTOR TO GROUNDING BAR**

NO SCALE

2





**PAUL J. FORD AND COMPANY**  
**STRUCTURAL ENGINEERS**  
 250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **August 05, 2014**

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

Paul J Ford and Company  
 250 E. Broad Street Suite 600  
 Columbus, OH 43215  
 614.221.6679

**Subject: Structural Analysis Report**

**Carrier Designation:** *Sprint PCS Co-Locate*  
**Carrier Site Number:** CT03XC251  
**Carrier Site Name:** N/A

**Crown Castle Designation:**  
**Crown Castle BU Number:** 806376  
**Crown Castle Site Name:** HRT 100 943239  
**Crown Castle JDE Job Number:** 286420  
**Crown Castle Work Order Number:** 802825  
**Crown Castle Application Number:** 245658 Rev. 1

**Engineering Firm Designation:** **Paul J Ford and Company Project Number:** 37513-0342.002, **1700**

**Site Data:** **1455 FORBES STREET, EAST HARTFORD, Hartford County, CT**  
**Latitude 41° 43' 53.3", Longitude -72° 36' 28"**  
**131 Foot - Monopole Tower**

Dear Andrew Bazinet,

*Paul J Ford and Company* is pleased to submit this "**Structural Modification 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 676251, in accordance with application 245658, revision 1.

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

LC4.7: Modified Structure w/ Existing + Reserved + Proposed **Sufficient Capacity**  
 Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1.25 inch ice thickness and 50 mph under service loads.

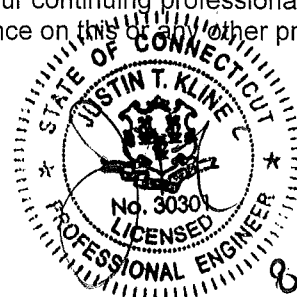
All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at *Paul J Ford and Company* 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 other projects please give us a call.

Respectfully submitted by:

*Seth Tschanen*

Seth Tschanen *JTK*  
 Structural Designer





PAUL J. FORD AND COMPANY  
STRUCTURAL ENGINEERS  
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **August 05, 2014**

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

Paul J Ford and Company  
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614.221.6679

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**Carrier Site Number:** CT03XC251  
**Carrier Site Name:** N/A

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**Crown Castle JDE Job Number:** 286420  
**Crown Castle Work Order Number:** 802825  
**Crown Castle Application Number:** 245658 Rev. 1

**Engineering Firm Designation:** **Paul J Ford and Company Project Number:** 37513-0342.002.7700

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**131 Foot - Monopole Tower**

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**Sufficient Capacity**

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The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1.25 inch ice thickness and 50 mph under service loads.

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 Paul J Ford and Company 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.

Respectfully submitted by:

Seth Tschanen  
Structural Designer

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## 1) INTRODUCTION

This tower is a 131 ft Monopole tower designed by VALMONT in January of 1999. 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 the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1.25 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
97.0	97.0	3	alcatel lucent	TD-RRH8x20-25	1	1 1/4	--
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			

**Table 2 - Existing and Reserved 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
128.0	128.0	3	rfs	APX18-206517S-C w/ Mount Pipe	6	1 5/8	1
		1	tower mounts	Pipe Mount [PM 601-3]			
121.0	121.0	3	ericsson	RRUS-11	1 2 6	3/8 3/4 1 1/4	1
		3	kathrein	800 10121 w/ Mount Pipe			
		3	kmw	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave	LGP21401			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	T-Arm Mount [TA 601-3]			
107.0	109.0	2	adc	DUAL BAND 800/1900 FULL BAND MASTHEAD	13	1 5/8	1
		6	alcatel lucent	RRH2X40-AWS			
		3	antel	BXA-171085-8CF-EDIN-2 w/ Mount Pipe			
		1	antel	BXA-185060/8CFx2 w/ Mount Pipe			
		2	antel	BXA-185090/8CF w/ Mount Pipe			
		3	antel	BXA-70063/6CFx4 w/ Mount Pipe			
		3	antel	BXA-80063/4CF w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		6	rfs celwave	FD9R6004/2C-3L			
	107.0	1	tower mounts	Platform Mount (LP 101-1)			



Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
99.0	100.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	--	--	1
	99.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
		1	tower mounts	Side Arm Mount [SO 101-3]			
	98.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
97.0	101.0	2	andrew	VHLP2.5-11	3 3 3	1/2 5/16 1 1/4	1
		2	dragonwave	HORIZON COMPACT			
	97.0	3	kathrein	840 10054 w/ Mount Pipe			
		1	motorola	TIMING 2000			
		3	rfs celwave	APXVSP18-C-A20 w/ Mount Pipe			
		3	rfs celwave	IBC1900BB-1			
		3	rfs celwave	IBC1900HG-2A			
		3	samsung	WIMAX DAP HEAD			
		1	tower mounts	Platform Mount [LP 301-1]			
87.0	87.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	1	1 5/8	2
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
		1	tower mounts	Side Arm Mount [SO 702-3]	12	1 1/4	1

Notes:

- 1) Existing Equipment
- 2) Reserved Equipment

**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)
--	--	--	--	--	--	--

### 3) ANALYSIS PROCEDURE

**Table 4 - Documents Provided**

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Welti, 11/11/91	262381	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Valmont, 10613-91 & 10614-91, 11/30/91	262389	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont, 1/22/91	262386	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF, 37512-1659BP_SABRE, 6/22/12	3249954	CCISITES

#### 3.1) Analysis Method

tnxTower (version 6.1.4.1), 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) Monopole was reinforced in conformance with the referenced modification drawings.
- 5) Monopole will be reinforced in conformance with the attached proposed modification drawings.

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

#### 4) ANALYSIS RESULTS

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

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	131 - 110	Pole	TP15.525x10.525x0.188	1	-1.84	482.67	38.3	Pass
L2	110 - 92.5833	Pole	TP19.8818x15.525x0.25	2	-7.88	821.58	79.2	Pass
L3	92.5833 - 84.5833	Pole	TP21.883x19.8818x0.3962	3	-9.60	1004.98	92.1	Pass
L4	84.5833 - 70	Pole	TP25.531x21.883x0.3779	4	-11.21	1470.87	84.9	Pass
L5	70 - 67.0833	Pole	TP25.76x23.7745x0.4358	5	-12.77	1780.87	82.7	Pass
L6	67.0833 - 44.5833	Pole	TP31.3879x25.76x0.4109	6	-17.05	2065.58	96.6	Pass
L7	44.5833 - 34.08	Pole	TP34.015x31.3879x0.4062	7	-18.20	2135.44	98.7	Pass
L8	34.08 - 23	Pole	TP36.1553x31.9719x0.4282	8	-20.62	2341.72	98.8	Pass
L9	23 - 18.75	Pole	TP37.2168x36.1553x0.5937	9	-23.39	2946.50	86.0	Pass
L10	18.75 - 3	Pole	TP41.1507x37.2168x0.5587	10	-23.70	2748.14	92.7	Pass
L11	3 - 2.25	Pole	TP41.338x41.1507x0.6429	11	-28.37	3878.08	72.7	Pass
L12	2.25 - 0	Pole	TP41.9x41.338x0.5718	12	-28.63	3532.04	79.9	Pass
							Summary	
						Pole (L8)	98.8	Pass
						Rating =	98.8	Pass

**Table 6 - Tower Component Stresses vs. Capacity - LC4.7**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	96.2	Pass
1	Base Plate	0	69.0	Pass
1	Base Foundation Steel	0	57.9	Pass
1,3	Base Foundation Soil Interaction	0	67.0	Pass
1	Flange Connection	110	30.1	Pass

<b>Structure Rating (max from all components) =</b>	<b>98.8%</b>
---	--------------

Notes:

- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
- 2) Capacities up to 105% are considered acceptable based on analysis methods used.
- 3) According to the procedures prescribed and agreed to by the Crown Castle Engineering Foundation Committee, held in January 2010, the existing caisson foundation was analyzed using the methodology in the software 'PLS-Caisson' (Version 8.10, or newer, by Power Line Systems, Inc.). Per the methods in PLS-Caisson, the soil reactions of cohesive soils are calculated using 8CD independent of the depth of the soil layer. The depth of soil to be ignored at the top of the caisson is the greater of the geotechnical report's recommendation, the frost depth of the site or half of the caisson diameter.

#### 4.1) Recommendations

- See attached proposed modification drawings

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

## Tower Input Data

There is a pole section.

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

The following design criteria apply:

- 1) Tower is located in Hartford County, Connecticut.
- 2) Basic wind speed of 80 mph.
- 3) Nominal ice thickness of 1.2500 in.
- 4) Ice thickness is considered to increase with height.
- 5) Ice density of 56.00 pcf.
- 6) A wind speed of 38 mph is used in combination with ice.
- 7) Temperature drop of 50 °F.
- 8) Deflections calculated using a wind speed of 50 mph.
- 9) A non-linear (P-delta) analysis was used.
- 10) Pressures are calculated at each section.
- 11) Stress ratio used in pole design is 1.333.
- 12) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification ✓ Use Code Stress Ratios ✓ Use Code Safety Factors - Guys ✓ Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) Add IBC .6D+W Combination	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate ✓ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Apurt. Autocalc Torque Arm Areas SR Members Have Cut Ends Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Use TIA-222-G Tension Splice Capacity Exemption	Treat Feedline Bundles As Cylinder Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feedline Torque Include Angle Block Shear Check <div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
--	---	--

## Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	131.0000- 110.0000	21.0000	0.00	12	10.5250	15.5250	0.1880	0.7520	A572-65 (65 ksi)
L2	110.0000- 92.5833	17.4167	0.00	12	15.5250	19.8818	0.2500	1.0000	A572-65 (65 ksi)
L3	92.5833- 84.5833	8.0000	0.00	12	19.8818	21.8830	0.3962	1.5848	Reinf 45.84 ksi (46 ksi)
L4	84.5833- 70.0000	14.5833	4.00	12	21.8830	25.5310	0.3779	1.5117	Reinf 62.57 ksi (63 ksi)
L5	70.0000- 67.0833	6.9167	0.00	12	23.7745	25.7600	0.4358	1.7431	Reinf 62.66 ksi (63 ksi)
L6	67.0833- 44.5833	22.5000	0.00	12	25.7600	31.3879	0.4109	1.6437	Reinf 63.01 ksi (63 ksi)
L7	44.5833- 34.0800	10.5033	4.92	12	31.3879	34.0150	0.4062	1.6250	Reinf 63.04 ksi (63 ksi)
L8	34.0800- 23.0000	16.0000	0.00	12	31.9719	36.1553	0.4282	1.7128	Reinf 63.16 ksi (63 ksi)
L9	23.0000- 18.7500	4.2500	0.00	12	36.1553	37.2168	0.5937	2.3750	Reinf 53.00 ksi (53 ksi)
L10	18.7500- 3.0000	15.7500	0.00	12	37.2168	41.1507	0.5587	2.2349	Reinf 52.10 ksi (52 ksi)
L11	3.0000-2.2500	0.7500	0.00	12	41.1507	41.3380	0.6429	2.5717	Reinf 57.82 ksi

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L12	2.2500-0.0000	2.2500		12	41.3380	41.9000	0.5718	2.2870	(58 ksi) Reinf 58.84 ksi (59 ksi)

### 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>	It/Q in <sup>2</sup>	w in	w/t
L1	10.8963	6.2576	85.3460	3.7006	5.4520	15.6542	172.9342	3.0798	2.3169	12.324
	16.0727	9.2844	278.7539	5.4906	8.0419	34.6625	564.8309	4.5695	3.6569	19.451
L2	16.0727	12.2964	366.2060	5.4684	8.0419	45.5370	742.0327	6.0519	3.4907	13.963
	20.5831	15.8036	777.4304	7.0282	10.2988	75.4877	1575.2848	7.7780	4.6583	18.633
L3	20.5831	24.8584	1204.7216	6.9758	10.2988	116.9773	2441.0925	12.2345	4.2665	10.769
	22.6549	27.4114	1615.3274	7.6923	11.3354	142.5030	3273.0912	13.4911	4.8029	12.123
L4	22.6549	26.1703	1544.8103	7.6988	11.3354	136.2821	3130.2045	12.8802	4.8518	12.838
	26.4316	30.6096	2471.8732	9.0048	13.2251	186.9083	5008.6852	15.0651	5.8295	15.425
L5	25.8020	32.7492	2276.8921	8.3553	12.3152	184.8845	4613.6007	16.1182	5.2037	11.941
	26.6688	35.5353	2908.8371	9.0661	13.3437	217.9933	5894.0927	17.4894	5.7358	13.162
L6	26.6688	33.5410	2750.9821	9.0750	13.3437	206.1634	5574.2355	16.5079	5.8024	14.121
	32.4951	40.9875	5020.1263	11.0897	16.2589	308.7615	10172.136	20.1728	7.3107	17.791
L7	32.4951	40.5268	4965.2015	11.0914	16.2589	305.3834	10060.844	19.9461	7.3232	18.027
	35.2149	43.9634	6338.4340	12.0319	17.6198	359.7342	12843.385	21.6374	8.0273	19.76
L8	34.4315	43.4936	5523.7767	11.2926	16.5614	333.5323	11192.669	21.4062	7.4209	17.33
	37.4307	49.2618	8025.8664	12.7903	18.7285	428.5387	16262.581	24.2452	8.5420	19.948
L9	37.4307	67.9881	10974.403	12.7310	18.7285	585.9750	22237.116	33.4617	8.0984	13.64
	38.5297	70.0176	11986.795	13.1111	19.2783	621.7760	24288.496	34.4605	8.3829	14.119
L10	38.5297	65.9508	11312.178	13.1236	19.2783	586.7824	22921.540	32.4590	8.4767	15.172
	42.6023	73.0281	15358.769	14.5319	21.3161	720.5258	31121.031	35.9422	9.5310	17.059
L11	42.6023	83.8606	17563.869	14.5018	21.3161	823.9736	35589.161	41.2736	9.3053	14.473
	42.7963	84.2484	17808.672	14.5688	21.4131	831.6721	36085.199	41.4645	9.3555	14.551
L12	42.7963	75.0534	15920.554	14.5943	21.4131	743.4962	32259.360	36.9390	9.5463	16.696
	43.3781	76.0881	16588.087	14.7955	21.7042	764.2801	33611.963	37.4482	9.6969	16.96

Tower Elevation ft	Gusset Area (per face) ft <sup>2</sup>	Gusset Thickness in	Gusset Grade	Adjust. Factor A <sub>r</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 131.0000-110.0000				1	1	1		
L2 110.0000-92.5833				1	1	1		
L3 92.5833-84.5833				1	1	1		
L4 84.5833-70.0000				1	1	1		
L5 70.0000-67.0833				1	1	1		
L6 67.0833-44.5833				1	1	1		
L7 44.5833-34.0800				1	1	1		
L8 34.0800-23.0000				1	1	1		

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor $A_r$	Adjust. Factor $A_r$	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
ft	ft <sup>2</sup>	in						
L9 23.0000-18.7500				1	1	1		
L10 18.7500-3.0000				1	1	1		
L11 3.0000-2.2500				1	1	1		
L12 2.2500-0.0000				1	1	1		

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

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		$C_A A_A$ ft <sup>2</sup> /ft	Weight plf
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	25.5000 - 0.0000	1	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.1667 0.2778 0.3889 0.6111 1.0556	0.00 0.00 0.00 0.00 0.00
3/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	93.5800 - 72.0000	1	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.1250 0.2361 0.3472 0.5694 1.0139	0.00 0.00 0.00 0.00 0.00
***								
CR 50 1873(1-5/8")	C	No	CaAa (Out Of Face)	128.0000 - 0.0000	2	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.1980 0.2980 0.3980 0.5980 0.9980	0.83 2.34 4.47 10.55 30.05
CR 50 1873(1-5/8")	C	No	CaAa (Out Of Face)	128.0000 - 0.0000	4	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.83 2.34 4.47 10.55 30.05
***								
LDF6-50A(1-1/4")	C	No	CaAa (Out Of Face)	121.0000 - 0.0000	6	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.66 1.91 3.78 9.33 27.78
FB-L98B-002-75000(3/8")	C	No	Inside Pole	121.0000 - 0.0000	1	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.06 0.06 0.06 0.06 0.06
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	121.0000 - 0.0000	2	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.59 0.59 0.59 0.59 0.59
2" (Nominal) Conduit	C	No	CaAa (Out Of Face)	87.0000 - 0.0000	1	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.72 2.48 4.84 11.41 31.87
2" (Nominal) Conduit	C	No	CaAa (Out Of Face)	121.0000 - 87.0000	1	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.2375 0.3375 0.4375 0.6375 1.0375	0.72 2.48 4.84 11.41 31.87
***								
HJ7-50A(1-5/8")	C	No	Inside Pole	107.0000 - 0.0000	12	No Ice 1/2" Ice 1" Ice	0.0000 0.0000 0.0000	1.04 1.04 1.04



Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C <sub>AA</sub> ft <sup>2</sup> /ft	Weight plf
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	107.0000 - 0.0000	1	2" Ice	0.0000	1.04
						4" Ice	0.0000	1.04
						No Ice	0.0000	1.30
						1/2" Ice	0.0000	1.30
						1" Ice	0.0000	1.30
						2" Ice	0.0000	1.30
4" Ice	0.0000	1.30						
***								
ATCB-B01-005( 5/16)	C	No	Inside Pole	97.0000 - 0.0000	3	No Ice	0.0000	0.07
						1/2" Ice	0.0000	0.07
						1" Ice	0.0000	0.07
						2" Ice	0.0000	0.07
						4" Ice	0.0000	0.07
FSJ4-50B(1/2")	C	No	Inside Pole	97.0000 - 0.0000	2	No Ice	0.0000	0.14
						1/2" Ice	0.0000	0.14
						1" Ice	0.0000	0.14
						2" Ice	0.0000	0.14
						4" Ice	0.0000	0.14
FSJ4-50B(1/2")	C	No	CaAa (Out Of Face)	97.0000 - 0.0000	1	No Ice	0.0000	0.14
						1/2" Ice	0.0000	0.76
						1" Ice	0.0000	2.00
						2" Ice	0.0000	6.30
						4" Ice	0.0000	22.23
HB114-1-08U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	97.0000 - 0.0000	3	No Ice	0.0000	1.08
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.18
						2" Ice	0.0000	9.73
						4" Ice	0.0000	28.15
HB114-21U3M12-XXXF(1-1/4")	C	No	CaAa (Out Of Face)	97.0000 - 0.0000	1	No Ice	0.0000	1.22
						1/2" Ice	0.0000	2.47
						1" Ice	0.0000	4.32
						2" Ice	0.0000	9.87
						4" Ice	0.0000	28.29
2" (Nominal) Conduit	C	No	CaAa (Out Of Face)	97.0000 - 0.0000	2	No Ice	0.0000	0.72
						1/2" Ice	0.0000	2.48
						1" Ice	0.0000	4.84
						2" Ice	0.0000	11.41
						4" Ice	0.0000	31.87
***								
LCF114-50J(1-1/4")	C	No	CaAa (Out Of Face)	87.0000 - 0.0000	10	No Ice	0.0000	0.70
						1/2" Ice	0.0000	1.97
						1" Ice	0.0000	3.85
						2" Ice	0.0000	9.45
						4" Ice	0.0000	27.97
LCF114-50J(1-1/4")	C	No	CaAa (Out Of Face)	87.0000 - 0.0000	2	No Ice	0.1580	0.70
						1/2" Ice	0.2580	1.97
						1" Ice	0.3580	3.85
						2" Ice	0.5580	9.45
						4" Ice	0.9580	27.97
MLE Hybrid 9Power/18Fiber RL 2( 1 5/8)	C	No	CaAa (Out Of Face)	87.0000 - 0.0000	1	No Ice	0.1625	1.07
						1/2" Ice	0.2625	2.37
						1" Ice	0.3625	4.28
						2" Ice	0.5625	9.93
						4" Ice	0.9625	28.56

**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	131.0000-110.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	9.741	0.15
L2	110.0000-92.5833	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	11.158	0.42
L3	92.5833-84.5833	A	0.000	0.000	0.000	0.000	0.00

Tower Sectio n	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight K
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.651	0.27
L4	84.5833-70.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	14.326	0.59
L5	70.0000-67.0833	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.551	0.12
L6	67.0833-44.5833	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	19.677	0.92
L7	44.5833-34.0800	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	9.185	0.43
L8	34.0800-23.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	10.106	0.45
L9	23.0000-18.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	4.425	0.17
L10	18.7500-3.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	16.399	0.64
L11	3.0000-2.2500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.781	0.03
L12	2.2500-0.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.343	0.09

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

Tower Sectio n	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>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight K
L1	131.0000-110.0000	A	1.459	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	23.457	1.30
L2	110.0000-92.5833	A	1.429	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	26.413	1.94
L3	92.5833-84.5833	A	1.407	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	17.266	1.36
L4	84.5833-70.0000	A	1.384	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	38.379	3.23
L5	70.0000-67.0833	A	1.365	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	6.587	0.65
L6	67.0833-44.5833	A	1.330	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	49.609	4.75
L7	44.5833-34.0800	A	1.276	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	22.591	2.11
L8	34.0800-23.0000	A	1.250	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	24.957	2.23
L9	23.0000-18.7500	A	1.250	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	10.918	0.83
L10	18.7500-3.0000	A	1.250	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	40.461	3.09
L11	3.0000-2.2500	A	1.250	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00

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
L12	2.2500-0.0000	C		0.000	0.000	0.000	1.927	0.15
		A	1.250	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	5.780	0.44

### 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	131.0000-110.0000	-0.4410	0.2546	-0.6719	0.3879
L2	110.0000-92.5833	-0.5810	0.3354	-0.9015	0.5205
L3	92.5833-84.5833	-0.7329	0.4232	-1.1849	0.6841
L4	84.5833-70.0000	-0.8513	0.4915	-1.3939	0.8048
L5	70.0000-67.0833	-0.8033	0.4638	-1.3466	0.7775
L6	67.0833-44.5833	-0.8309	0.4797	-1.4186	0.8190
L7	44.5833-34.0800	-0.8600	0.4965	-1.4963	0.8639
L8	34.0800-23.0000	-0.9020	0.5208	-1.5819	0.9133
L9	23.0000-18.7500	-1.0089	0.5825	-1.7486	1.0096
L10	18.7500-3.0000	-1.0255	0.5921	-1.8033	1.0412
L11	3.0000-2.2500	-1.0381	0.5993	-1.8457	1.0656
L12	2.2500-0.0000	-1.0402	0.6006	-1.8532	1.0699

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustmen t °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K	
APX18-206517S-C w/ Mount Pipe	A	From Face	1.0000	0.00	128.0000	No Ice	5.1667	3.1653	0.03
			0.00			1/2" Ice	5.6182	3.6631	0.06
			0.00			Ice	6.0772	4.1794	0.09
						1" Ice	7.0173	5.2676	0.18
						2" Ice	9.1225	7.6662	0.46
APX18-206517S-C w/ Mount Pipe	B	From Face	1.0000	0.00	128.0000	No Ice	5.1667	3.1653	0.03
			0.00			1/2" Ice	5.6182	3.6631	0.06
			0.00			Ice	6.0772	4.1794	0.09
						1" Ice	7.0173	5.2676	0.18
						2" Ice	9.1225	7.6662	0.46
APX18-206517S-C w/ Mount Pipe	C	From Face	1.0000	0.00	128.0000	No Ice	5.1667	3.1653	0.03
			0.00			1/2" Ice	5.6182	3.6631	0.06
			0.00			Ice	6.0772	4.1794	0.09
						1" Ice	7.0173	5.2676	0.18
						2" Ice	9.1225	7.6662	0.46
Pipe Mount [PM 601-3]	C	None		0.00	128.0000	No Ice	4.3900	4.3900	0.20
						1/2" Ice	5.4800	5.4800	0.24
						Ice	6.5700	6.5700	0.28
						1" Ice	8.7500	8.7500	0.36
						2" Ice	13.1100	13.1100	0.53
		4" Ice							
800 10121 w/ Mount Pipe	A	From Face	4.0000	0.00	121.0000	No Ice	6.0334	4.9479	0.07
			0.00			1/2" Ice	6.7136	6.0222	0.12
			0.00			Ice	7.2991	6.8104	0.18
						1" Ice	8.4999	8.4586	0.32
						2" Ice	11.0444	12.1015	0.73
800 10121 w/ Mount Pipe	B	From Face	4.0000	0.00	121.0000	No Ice	6.0334	4.9479	0.07
			0.00			1/2" Ice	6.7136	6.0222	0.12



Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> <sub>Front</sub>	C <sub>AA</sub> <sub>Side</sub>	Weight
			Horz	Lateral					
			0.00						
						Ice	7.2991	6.8104	0.18
						1" Ice	8.4999	8.4586	0.32
						2" Ice	11.0444	12.1015	0.73
						4" Ice			
800 10121 w/ Mount Pipe	C	From Face	4.0000	0.00	121.0000	No Ice	6.0334	4.9479	0.07
			0.00			1/2"	6.7136	6.0222	0.12
			0.00			Ice	7.2991	6.8104	0.18
						1" Ice	8.4999	8.4586	0.32
						2" Ice	11.0444	12.1015	0.73
						4" Ice			
(2) LGP21401	A	From Face	4.0000	0.00	121.0000	No Ice	1.2880	0.3640	0.01
			0.00			1/2"	1.4453	0.4785	0.02
			0.00			Ice	1.6112	0.6017	0.03
						1" Ice	1.9690	0.8739	0.05
						2" Ice	2.7882	1.5220	0.14
						4" Ice			
(2) LGP21401	B	From Face	4.0000	0.00	121.0000	No Ice	1.2880	0.3640	0.01
			0.00			1/2"	1.4453	0.4785	0.02
			0.00			Ice	1.6112	0.6017	0.03
						1" Ice	1.9690	0.8739	0.05
						2" Ice	2.7882	1.5220	0.14
						4" Ice			
(2) LGP21401	C	From Face	4.0000	0.00	121.0000	No Ice	1.2880	0.3640	0.01
			0.00			1/2"	1.4453	0.4785	0.02
			0.00			Ice	1.6112	0.6017	0.03
						1" Ice	1.9690	0.8739	0.05
						2" Ice	2.7882	1.5220	0.14
						4" Ice			
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Face	4.0000	0.00	121.0000	No Ice	8.4975	6.3042	0.07
			0.00			1/2"	9.1490	7.4790	0.14
			0.00			Ice	9.7672	8.3676	0.21
						1" Ice	11.0311	10.1785	0.38
						2" Ice	13.6786	14.0237	0.87
						4" Ice			
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Face	4.0000	0.00	121.0000	No Ice	8.4975	6.3042	0.07
			0.00			1/2"	9.1490	7.4790	0.14
			0.00			Ice	9.7672	8.3676	0.21
						1" Ice	11.0311	10.1785	0.38
						2" Ice	13.6786	14.0237	0.87
						4" Ice			
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Face	4.0000	0.00	121.0000	No Ice	8.4975	6.3042	0.07
			0.00			1/2"	9.1490	7.4790	0.14
			0.00			Ice	9.7672	8.3676	0.21
						1" Ice	11.0311	10.1785	0.38
						2" Ice	13.6786	14.0237	0.87
						4" Ice			
DC6-48-60-18-8F	A	From Face	4.0000	0.00	121.0000	No Ice	2.5667	2.5667	0.02
			0.00			1/2"	2.7978	2.7978	0.04
			0.00			Ice	3.0377	3.0377	0.07
						1" Ice	3.5432	3.5432	0.13
						2" Ice	4.6580	4.6580	0.30
						4" Ice			
RRUS-11	A	From Face	4.0000	0.00	121.0000	No Ice	3.2486	1.3726	0.05
			0.00			1/2"	3.4905	1.5510	0.07
			0.00			Ice	3.7411	1.7380	0.09
						1" Ice	4.2682	2.1381	0.15
						2" Ice	5.4260	3.0418	0.31
						4" Ice			
RRUS-11	B	From Face	4.0000	0.00	121.0000	No Ice	3.2486	1.3726	0.05
			0.00			1/2"	3.4905	1.5510	0.07
			0.00			Ice	3.7411	1.7380	0.09
						1" Ice	4.2682	2.1381	0.15
						2" Ice	5.4260	3.0418	0.31
						4" Ice			
RRUS-11	C	From Face	4.0000	0.00	121.0000	No Ice	3.2486	1.3726	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K	
			0.00			1/2"	3.4905	1.5510	0.07
			0.00			Ice	3.7411	1.7380	0.09
						1" Ice	4.2682	2.1381	0.15
						2" Ice	5.4260	3.0418	0.31
						4" Ice			
T-Arm Mount [TA 601-3]	C	None		0.00	121.0000	No Ice	10.9000	10.9000	0.73
						1/2"	14.6500	14.6500	0.93
						Ice	18.4000	18.4000	1.13
						1" Ice	25.9000	25.9000	1.52
						2" Ice	40.9000	40.9000	2.32
						4" Ice			
***									
BXA-70063/6CFx4 w/ Mount Pipe	A	From Face	4.0000 0.00 2.00	0.00	107.0000	No Ice	7.9686	5.3981	0.04
						1/2"	8.6091	6.5465	0.10
						Ice	9.2158	7.4089	0.17
						1" Ice	10.4591	9.1837	0.33
						2" Ice	13.0655	12.9333	0.79
						4" Ice			
BXA-70063/6CFx4 w/ Mount Pipe	B	From Face	4.0000 0.00 2.00	0.00	107.0000	No Ice	7.9686	5.3981	0.04
						1/2"	8.6091	6.5465	0.10
						Ice	9.2158	7.4089	0.17
						1" Ice	10.4591	9.1837	0.33
						2" Ice	13.0655	12.9333	0.79
						4" Ice			
BXA-70063/6CFx4 w/ Mount Pipe	C	From Face	4.0000 0.00 2.00	0.00	107.0000	No Ice	7.9686	5.3981	0.04
						1/2"	8.6091	6.5465	0.10
						Ice	9.2158	7.4089	0.17
						1" Ice	10.4591	9.1837	0.33
						2" Ice	13.0655	12.9333	0.79
						4" Ice			
BXA-185090/8CF w/ Mount Pipe	A	From Face	4.0000 0.00 2.00	0.00	107.0000	No Ice	3.1574	3.3303	0.03
						1/2"	3.5312	3.9423	0.06
						Ice	3.9415	4.5633	0.10
						1" Ice	4.8273	5.8553	0.19
						2" Ice	6.7342	8.8407	0.49
						4" Ice			
BXA-185090/8CF w/ Mount Pipe	B	From Face	4.0000 0.00 2.00	0.00	107.0000	No Ice	3.1574	3.3303	0.03
						1/2"	3.5312	3.9423	0.06
						Ice	3.9415	4.5633	0.10
						1" Ice	4.8273	5.8553	0.19
						2" Ice	6.7342	8.8407	0.49
						4" Ice			
BXA-185060/8CFx2 w/ Mount Pipe	C	From Face	4.0000 0.00 2.00	0.00	107.0000	No Ice	3.2005	3.0198	0.03
						1/2"	3.5789	3.6389	0.06
						Ice	3.9859	4.2613	0.10
						1" Ice	4.8794	5.5562	0.19
						2" Ice	6.8000	8.4566	0.47
						4" Ice			
(2) FD9R6004/2C-3L	A	From Face	4.0000 0.00 2.00	0.00	107.0000	No Ice	0.3665	0.0846	0.00
						1/2"	0.4506	0.1362	0.01
						Ice	0.5433	0.1965	0.01
						1" Ice	0.7546	0.3430	0.02
						2" Ice	1.2808	0.7396	0.06
						4" Ice			
(2) FD9R6004/2C-3L	B	From Face	4.0000 0.00 2.00	0.00	107.0000	No Ice	0.3665	0.0846	0.00
						1/2"	0.4506	0.1362	0.01
						Ice	0.5433	0.1965	0.01
						1" Ice	0.7546	0.3430	0.02
						2" Ice	1.2808	0.7396	0.06
						4" Ice			
(2) FD9R6004/2C-3L	C	From Face	4.0000 0.00 2.00	0.00	107.0000	No Ice	0.3665	0.0846	0.00
						1/2"	0.4506	0.1362	0.01
						Ice	0.5433	0.1965	0.01
						1" Ice	0.7546	0.3430	0.02
						2" Ice	1.2808	0.7396	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft		C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	A	From Face	4.0000 0.00 2.00	0.00	107.0000	4" Ice			
						No Ice	1.5490	0.8088	0.03
						1/2"	1.7180	0.9427	0.04
						Ice	1.8956	1.0853	0.05
						1" Ice	2.2767	1.3964	0.09
						2" Ice	3.1426	2.1224	0.19
BXA-80063/4CF w/ Mount Pipe	A	From Face	4.0000 0.00 2.00	0.00	107.0000	4" Ice			
						No Ice	5.3988	3.4238	0.03
						1/2"	5.8435	4.0221	0.07
						Ice	6.2986	4.6369	0.12
						1" Ice	7.2405	5.9176	0.23
						2" Ice	9.2612	8.9263	0.56
BXA-80063/4CF w/ Mount Pipe	B	From Face	4.0000 0.00 2.00	0.00	107.0000	4" Ice			
						No Ice	5.3988	3.4238	0.03
						1/2"	5.8435	4.0221	0.07
						Ice	6.2986	4.6369	0.12
						1" Ice	7.2405	5.9176	0.23
						2" Ice	9.2612	8.9263	0.56
BXA-80063/4CF w/ Mount Pipe	C	From Face	4.0000 0.00 2.00	0.00	107.0000	4" Ice			
						No Ice	5.3988	3.4238	0.03
						1/2"	5.8435	4.0221	0.07
						Ice	6.2986	4.6369	0.12
						1" Ice	7.2405	5.9176	0.23
						2" Ice	9.2612	8.9263	0.56
BXA-171085-8CF-EDIN-2 w/ Mount Pipe	A	From Face	4.0000 0.00 2.00	0.00	107.0000	4" Ice			
						No Ice	3.1789	3.3530	0.03
						1/2"	3.5550	3.9709	0.06
						Ice	3.9637	4.5951	0.10
						1" Ice	4.8533	5.8933	0.19
						2" Ice	6.7671	8.8855	0.49
BXA-171085-8CF-EDIN-2 w/ Mount Pipe	B	From Face	4.0000 0.00 2.00	0.00	107.0000	4" Ice			
						No Ice	3.1789	3.3530	0.03
						1/2"	3.5550	3.9709	0.06
						Ice	3.9637	4.5951	0.10
						1" Ice	4.8533	5.8933	0.19
						2" Ice	6.7671	8.8855	0.49
BXA-171085-8CF-EDIN-2 w/ Mount Pipe	C	From Face	4.0000 0.00 2.00	0.00	107.0000	4" Ice			
						No Ice	3.1789	3.3530	0.03
						1/2"	3.5550	3.9709	0.06
						Ice	3.9637	4.5951	0.10
						1" Ice	4.8533	5.8933	0.19
						2" Ice	6.7671	8.8855	0.49
(2) RRH2X40-AWS	A	From Face	4.0000 0.00 2.00	0.00	107.0000	4" Ice			
						No Ice	2.5217	1.5894	0.04
						1/2"	2.7530	1.7953	0.06
						Ice	2.9930	2.0098	0.08
						1" Ice	3.4990	2.4648	0.13
						2" Ice	4.6146	3.4785	0.28
(2) RRH2X40-AWS	B	From Face	4.0000 0.00 2.00	0.00	107.0000	4" Ice			
						No Ice	2.5217	1.5894	0.04
						1/2"	2.7530	1.7953	0.06
						Ice	2.9930	2.0098	0.08
						1" Ice	3.4990	2.4648	0.13
						2" Ice	4.6146	3.4785	0.28
(2) RRH2X40-AWS	C	From Face	4.0000 0.00 2.00	0.00	107.0000	4" Ice			
						No Ice	2.5217	1.5894	0.04
						1/2"	2.7530	1.7953	0.06
						Ice	2.9930	2.0098	0.08
						1" Ice	3.4990	2.4648	0.13
						2" Ice	4.6146	3.4785	0.28
DB-T1-6Z-8AB-OZ	C	From Face	4.0000 0.00 2.00	0.00	107.0000	4" Ice			
						No Ice	5.6000	2.3333	0.04
						1/2"	5.9154	2.5580	0.08
						Ice	6.2395	2.7914	0.12
						1" Ice	6.9136	3.2840	0.21

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C <sub>AA</sub> <sub>Front</sub>	C <sub>AA</sub> <sub>Side</sub>	Weight	
			Horz	Lateral	Vert						ft
			ft	ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
Platform Mount (LP 101-1)	C	None				0.00	107.0000	2" Ice	8.3654	4.3728	0.45
								4" Ice			
								No Ice	36.2100	36.2100	1.50
								1/2" Ice	42.8200	42.8200	2.30
								1" Ice	49.4300	49.4300	3.10
								2" Ice	62.6500	62.6500	4.70
*** 800MHz 2X50W RRH W/FILTER	A	From Leg	4.0000	0.00	0.00	99.0000	No Ice	2.4014	2.2536	0.06	
							1/2" Ice	2.6131	2.4602	0.09	
							1" Ice	2.8335	2.6753	0.11	
							2" Ice	3.3002	3.1316	0.17	
							4" Ice	4.3372	4.1479	0.34	
							No Ice	2.4014	2.2536	0.06	
800MHz 2X50W RRH W/FILTER	B	From Leg	4.0000	0.00	0.00	99.0000	1/2" Ice	2.6131	2.4602	0.09	
							1" Ice	2.8335	2.6753	0.11	
							2" Ice	3.3002	3.1316	0.17	
							4" Ice	4.3372	4.1479	0.34	
							No Ice	2.4014	2.2536	0.06	
							1/2" Ice	2.6131	2.4602	0.09	
800MHz 2X50W RRH W/FILTER	C	From Leg	4.0000	0.00	0.00	99.0000	Ice	2.8335	2.6753	0.11	
							1" Ice	3.3002	3.1316	0.17	
							2" Ice	4.3372	4.1479	0.34	
							4" Ice				
							No Ice	2.4014	2.2536	0.06	
							1/2" Ice	2.6131	2.4602	0.09	
PCS 1900MHz 4x45W-65MHz	A	From Leg	4.0000	0.00	0.00	99.0000	Ice	2.8335	2.6753	0.11	
							1" Ice	3.3002	3.1316	0.17	
							2" Ice	4.3372	4.1479	0.34	
							4" Ice				
							No Ice	2.7087	2.6111	0.06	
							1/2" Ice	2.9477	2.8475	0.08	
PCS 1900MHz 4x45W-65MHz	B	From Leg	4.0000	0.00	0.00	99.0000	Ice	3.1953	3.0925	0.11	
							1" Ice	3.7164	3.6084	0.17	
							2" Ice	4.8623	4.7439	0.35	
							4" Ice				
							No Ice	2.7087	2.6111	0.06	
							1/2" Ice	2.9477	2.8475	0.08	
PCS 1900MHz 4x45W-65MHz	C	From Leg	4.0000	0.00	0.00	99.0000	Ice	3.1953	3.0925	0.11	
							1" Ice	3.7164	3.6084	0.17	
							2" Ice	4.8623	4.7439	0.35	
							4" Ice				
							No Ice	2.7087	2.6111	0.06	
							1/2" Ice	2.9477	2.8475	0.08	
PCS 1900MHz 4x45W-65MHz	A	From Leg	4.0000	0.00	0.00	99.0000	Ice	3.1953	3.0925	0.11	
							1" Ice	3.7164	3.6084	0.17	
							2" Ice	4.8623	4.7439	0.35	
							4" Ice				
							No Ice	2.7087	2.6111	0.06	
							1/2" Ice	2.9477	2.8475	0.08	
PCS 1900MHz 4x45W-65MHz	B	From Leg	4.0000	0.00	0.00	99.0000	Ice	3.1953	3.0925	0.11	
							1" Ice	3.7164	3.6084	0.17	
							2" Ice	4.8623	4.7439	0.35	
							4" Ice				
							No Ice	2.7087	2.6111	0.06	
							1/2" Ice	2.9477	2.8475	0.08	
PCS 1900MHz 4x45W-65MHz	C	From Leg	4.0000	0.00	0.00	99.0000	Ice	3.1953	3.0925	0.11	
							1" Ice	3.7164	3.6084	0.17	
							2" Ice	4.8623	4.7439	0.35	
							4" Ice				
							No Ice	2.7087	2.6111	0.06	
							1/2" Ice	2.9477	2.8475	0.08	
Side Arm Mount [SO 101-3]	C	None				0.00	99.0000	No Ice	7.5000	7.5000	0.25
								1/2" Ice	8.9000	8.9000	0.33



Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K	
						Ice	10.3000	10.3000	0.41
						1" Ice	13.1000	13.1000	0.58
						2" Ice	18.7000	18.7000	0.90
						4" Ice			
**Clearwire** TIMING 2000	A	From Face	4.0000 0.00 0.00	0.00	97.0000	No Ice	0.1258	0.1258	0.00
						1/2"	0.1771	0.1771	0.00
						Ice	0.2370	0.2370	0.01
						1" Ice	0.3827	0.3827	0.01
						2" Ice	0.7778	0.7778	0.05
						4" Ice			
840 10054 w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	97.0000	No Ice	5.4134	2.3851	0.05
						1/2"	5.8330	2.9173	0.09
						Ice	6.2634	3.4662	0.13
						1" Ice	7.1562	4.6140	0.23
						2" Ice	9.0928	7.3165	0.53
						4" Ice			
840 10054 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	97.0000	No Ice	5.4134	2.3851	0.05
						1/2"	5.8330	2.9173	0.09
						Ice	6.2634	3.4662	0.13
						1" Ice	7.1562	4.6140	0.23
						2" Ice	9.0928	7.3165	0.53
						4" Ice			
840 10054 w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	97.0000	No Ice	5.4134	2.3851	0.05
						1/2"	5.8330	2.9173	0.09
						Ice	6.2634	3.4662	0.13
						1" Ice	7.1562	4.6140	0.23
						2" Ice	9.0928	7.3165	0.53
						4" Ice			
WIMAX DAP HEAD	A	From Face	4.0000 0.00 0.00	0.00	97.0000	No Ice	1.8044	0.7778	0.03
						1/2"	1.9877	0.9182	0.04
						Ice	2.1795	1.0673	0.06
						1" Ice	2.5891	1.3914	0.09
						2" Ice	3.5121	2.1432	0.20
						4" Ice			
WIMAX DAP HEAD	B	From Face	4.0000 0.00 0.00	0.00	97.0000	No Ice	1.8044	0.7778	0.03
						1/2"	1.9877	0.9182	0.04
						Ice	2.1795	1.0673	0.06
						1" Ice	2.5891	1.3914	0.09
						2" Ice	3.5121	2.1432	0.20
						4" Ice			
WIMAX DAP HEAD	C	From Face	4.0000 0.00 0.00	0.00	97.0000	No Ice	1.8044	0.7778	0.03
						1/2"	1.9877	0.9182	0.04
						Ice	2.1795	1.0673	0.06
						1" Ice	2.5891	1.3914	0.09
						2" Ice	3.5121	2.1432	0.20
						4" Ice			
HORIZON COMPACT	B	From Face	4.0000 0.00 4.00	0.00	97.0000	No Ice	0.8409	0.4295	0.01
						1/2"	0.9658	0.5249	0.02
						Ice	1.0993	0.6289	0.03
						1" Ice	1.3922	0.8629	0.05
						2" Ice	2.0819	1.4345	0.12
						4" Ice			
HORIZON COMPACT	C	From Face	4.0000 0.00 4.00	0.00	97.0000	No Ice	0.8409	0.4295	0.01
						1/2"	0.9658	0.5249	0.02
						Ice	1.0993	0.6289	0.03
						1" Ice	1.3922	0.8629	0.05
						2" Ice	2.0819	1.4345	0.12
						4" Ice			
**Sprint** APXVSP18-C-A20 w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	97.0000	No Ice	8.4975	6.9458	0.08
						1/2"	9.1490	8.1266	0.15
						Ice	9.7672	9.0212	0.23
						1" Ice	11.0311	10.8440	0.41
						2" Ice	13.6786	14.8507	0.91

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
APXVSP18-C-A20 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	97.0000	4" Ice			
						No Ice	8.4975	6.9458	0.08
						1/2" Ice	9.1490	8.1266	0.15
						1" Ice	9.7672	9.0212	0.23
						2" Ice	11.0311	10.8440	0.41
APXVSP18-C-A20 w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	97.0000	4" Ice			
						No Ice	8.4975	6.9458	0.08
						1/2" Ice	9.1490	8.1266	0.15
						1" Ice	9.7672	9.0212	0.23
						2" Ice	11.0311	10.8440	0.41
IBC1900HG-2A	A	From Face	4.0000 0.00 0.00	0.00	97.0000	4" Ice			
						No Ice	1.1270	0.5329	0.02
						1/2" Ice	1.2726	0.6471	0.03
						1" Ice	1.4269	0.7699	0.04
						2" Ice	1.7613	1.0415	0.06
IBC1900HG-2A	B	From Face	4.0000 0.00 0.00	0.00	97.0000	4" Ice			
						No Ice	1.1270	0.5329	0.02
						1/2" Ice	1.2726	0.6471	0.03
						1" Ice	1.4269	0.7699	0.04
						2" Ice	1.7613	1.0415	0.06
IBC1900HG-2A	C	From Face	4.0000 0.00 0.00	0.00	97.0000	4" Ice			
						No Ice	1.1270	0.5329	0.02
						1/2" Ice	1.2726	0.6471	0.03
						1" Ice	1.4269	0.7699	0.04
						2" Ice	1.7613	1.0415	0.06
IBC1900BB-1	A	From Face	4.0000 0.00 0.00	0.00	97.0000	4" Ice			
						No Ice	1.1270	0.5329	0.02
						1/2" Ice	1.2726	0.6471	0.03
						1" Ice	1.4269	0.7699	0.04
						2" Ice	1.7613	1.0415	0.06
IBC1900BB-1	B	From Face	4.0000 0.00 0.00	0.00	97.0000	4" Ice			
						No Ice	1.1270	0.5329	0.02
						1/2" Ice	1.2726	0.6471	0.03
						1" Ice	1.4269	0.7699	0.04
						2" Ice	1.7613	1.0415	0.06
IBC1900BB-1	C	From Face	4.0000 0.00 0.00	0.00	97.0000	4" Ice			
						No Ice	1.1270	0.5329	0.02
						1/2" Ice	1.2726	0.6471	0.03
						1" Ice	1.4269	0.7699	0.04
						2" Ice	1.7613	1.0415	0.06
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	97.0000	4" Ice			
						No Ice	7.1342	4.9591	0.08
						1/2" Ice	7.6618	5.7544	0.13
						1" Ice	8.1830	6.4723	0.19
						2" Ice	9.2563	8.0099	0.34
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	97.0000	4" Ice			
						No Ice	7.1342	4.9591	0.08
						1/2" Ice	7.6618	5.7544	0.13
						1" Ice	8.1830	6.4723	0.19
						2" Ice	9.2563	8.0099	0.34
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	97.0000	4" Ice			
						No Ice	7.1342	4.9591	0.08
						1/2" Ice	7.6618	5.7544	0.13
						1" Ice	8.1830	6.4723	0.19
						2" Ice	9.2563	8.0099	0.34

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> <sub>Front</sub>	C <sub>AA</sub> <sub>Side</sub>	Weight	
			Horz	Lateral						Vert
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
TD-RRH8x20-25	A	From Leg	4.0000	0.00	0.00	97.0000	2" Ice	11.5262	11.4120	0.75
							4" Ice			
							No Ice	4.7198	1.7027	0.07
							1/2" Ice	5.0138	1.9196	0.10
							1" Ice	5.3165	2.1453	0.13
TD-RRH8x20-25	B	From Leg	4.0000	0.00	0.00	97.0000	2" Ice	5.9478	2.6224	0.20
							4" Ice	7.3141	3.6805	0.40
							No Ice	4.7198	1.7027	0.07
							1/2" Ice	5.0138	1.9196	0.10
							1" Ice	5.3165	2.1453	0.13
TD-RRH8x20-25	C	From Leg	4.0000	0.00	0.00	97.0000	2" Ice	5.9478	2.6224	0.20
							4" Ice	7.3141	3.6805	0.40
							No Ice	4.7198	1.7027	0.07
							1/2" Ice	5.0138	1.9196	0.10
							1" Ice	5.3165	2.1453	0.13
Platform Mount [LP 301-1]	C	None			0.00	97.0000	2" Ice	7.3141	3.6805	0.40
							4" Ice			
							No Ice	30.1000	30.1000	1.59
							1/2" Ice	40.8000	40.8000	2.03
							1" Ice	51.5000	51.5000	2.47
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Face	4.0000	0.00	0.00	87.0000	1" Ice	72.9000	72.9000	3.35
							2" Ice	115.7000	115.7000	5.11
							4" Ice			
							No Ice	6.8253	5.6424	0.11
							1/2" Ice	7.3471	6.4800	0.17
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Face	4.0000	0.00	0.00	87.0000	1" Ice	7.8631	7.2567	0.23
							2" Ice	11.1755	12.2932	0.81
							4" Ice			
							No Ice	6.8253	5.6424	0.11
							1/2" Ice	7.3471	6.4800	0.17
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Face	4.0000	0.00	0.00	87.0000	1" Ice	7.8631	7.2567	0.23
							2" Ice	11.1755	12.2932	0.81
							4" Ice			
							No Ice	6.8253	5.6424	0.11
							1/2" Ice	7.3471	6.4800	0.17
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Face	4.0000	0.00	0.00	87.0000	1" Ice	8.9261	8.8640	0.38
							2" Ice	11.1755	12.2932	0.81
							4" Ice			
							No Ice	6.8155	5.6334	0.11
							1/2" Ice	7.3373	6.4717	0.17
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Face	4.0000	0.00	0.00	87.0000	1" Ice	7.8532	7.2478	0.23
							2" Ice	11.1650	12.2804	0.81
							4" Ice			
							No Ice	6.8155	5.6334	0.11
							1/2" Ice	7.3373	6.4717	0.17
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Face	4.0000	0.00	0.00	87.0000	1" Ice	8.9160	8.8537	0.38
							2" Ice	11.1650	12.2804	0.81
							4" Ice			
							No Ice	6.8155	5.6334	0.11
							1/2" Ice	7.3373	6.4717	0.17
KRY 112 144/1	A	From Face	4.0000	0.00	0.00	87.0000	No Ice	0.4083	0.2042	0.01
							1/2" Ice	0.4969	0.2733	0.01

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	
			0.00			Ice	0.5941	0.3511	0.02
						1" Ice	0.8145	0.5326	0.03
						2" Ice	1.3590	0.9992	0.08
						4" Ice			
KRY 112 144/1	B	From Face	4.0000	0.00	87.0000	No Ice	0.4083	0.2042	0.01
			0.00			1/2"	0.4969	0.2733	0.01
			0.00			Ice	0.5941	0.3511	0.02
						1" Ice	0.8145	0.5326	0.03
						2" Ice	1.3590	0.9992	0.08
						4" Ice			
KRY 112 144/1	C	From Face	4.0000	0.00	87.0000	No Ice	0.4083	0.2042	0.01
			0.00			1/2"	0.4969	0.2733	0.01
			0.00			Ice	0.5941	0.3511	0.02
						1" Ice	0.8145	0.5326	0.03
						2" Ice	1.3590	0.9992	0.08
						4" Ice			
Side Arm Mount [SO 702-3]	C	None		0.00	87.0000	No Ice	3.2200	3.2200	0.08
						1/2"	4.1500	4.1500	0.11
						Ice	5.0800	5.0800	0.15
						1" Ice	6.9400	6.9400	0.21
						2" Ice	10.6600	10.6600	0.34
						4" Ice			

### Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft <sup>2</sup>	Weight K	
VHLP2.5-11	A	Paraboloid w/Shroud (HP)	From Leg	1.0000 0.00 4.00	0.00		97.0000	2.9167	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.6800 7.0700 7.4600 8.2300 9.7800	0.05 0.08 0.12 0.19 0.34
VHLP2.5-11	B	Paraboloid w/Shroud (HP)	From Leg	1.0000 0.00 4.00	0.00		97.0000	2.9167	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.6800 7.0700 7.4600 8.2300 9.7800	0.05 0.08 0.12 0.19 0.34

### Tower Pressures - No Ice

$$G_H = 1.690$$

Section Elevation ft	z ft	K <sub>z</sub>	q <sub>z</sub> psf	A <sub>G</sub> ft <sup>2</sup>	F a c e	A <sub>F</sub> ft <sup>2</sup>	A <sub>R</sub> ft <sup>2</sup>	A <sub>leg</sub> ft <sup>2</sup>	Leg %	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>
L1 131.0000-110.0000	119.8282	1.445	23.68 3	22.794	A	0.000	22.794	22.794	100.00	0.000	0.000
					B	0.000	22.794		100.00	0.000	0.000
					C	0.000	22.794		100.00	0.000	9.741
L2 110.0000-92.5833	100.9345	1.376	22.55 0	25.695	A	0.000	25.695	25.695	100.00	0.000	0.000
					B	0.000	25.695		100.00	0.000	0.000
					C	0.000	25.695		100.00	0.000	11.158
L3 92.5833-84.5833	88.5194	1.326	21.72 0	13.922	A	0.000	13.922	13.922	100.00	0.000	0.000
					B	0.000	13.922		100.00	0.000	0.000
					C	0.000	13.922		100.00	0.000	6.651
L4 84.5833-70.0000	77.1046	1.274	20.88 0	28.811	A	0.000	28.811	28.811	100.00	0.000	0.000
					B	0.000	28.811		100.00	0.000	0.000
					C	0.000	28.811		100.00	0.000	14.326



Section Elevation ft	z ft	K <sub>z</sub>	q <sub>z</sub> psf	A <sub>G</sub> ft <sup>2</sup>	F a c e	A <sub>F</sub> ft <sup>2</sup>	A <sub>R</sub> ft <sup>2</sup>	A <sub>leg</sub> ft <sup>2</sup>	Leg %	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>
L5 70.0000-67.0833	68.5336	1.232	20.188	6.159	A	0.000	6.159	6.159	100.00	0.000	0.000
					B	0.000	6.159		100.00	0.000	0.000
					C	0.000	6.159		100.00	0.000	2.551
L6 67.0833-44.5833	55.4640	1.16	19.004	53.576	A	0.000	53.576	53.576	100.00	0.000	0.000
					B	0.000	53.576		100.00	0.000	0.000
					C	0.000	53.576		100.00	0.000	19.677
L7 44.5833-34.0800	39.2613	1.051	17.218	28.623	A	0.000	28.623	28.623	100.00	0.000	0.000
					B	0.000	28.623		100.00	0.000	0.000
					C	0.000	28.623		100.00	0.000	9.185
L8 34.0800-23.0000	28.4629	1	16.384	32.046	A	0.000	32.046	32.046	100.00	0.000	0.000
					B	0.000	32.046		100.00	0.000	0.000
					C	0.000	32.046		100.00	0.000	10.106
L9 23.0000-18.7500	20.8648	1	16.384	12.993	A	0.000	12.993	12.993	100.00	0.000	0.000
					B	0.000	12.993		100.00	0.000	0.000
					C	0.000	12.993		100.00	0.000	4.425
L10 18.7500-3.0000	10.7432	1	16.384	51.429	A	0.000	51.429	51.429	100.00	0.000	0.000
					B	0.000	51.429		100.00	0.000	0.000
					C	0.000	51.429		100.00	0.000	16.399
L11 3.0000-2.2500	2.6247	1	16.384	2.578	A	0.000	2.578	2.578	100.00	0.000	0.000
					B	0.000	2.578		100.00	0.000	0.000
					C	0.000	2.578		100.00	0.000	0.781
L12 2.2500-0.0000	1.1225	1	16.384	7.804	A	0.000	7.804	7.804	100.00	0.000	0.000
					B	0.000	7.804		100.00	0.000	0.000
					C	0.000	7.804		100.00	0.000	2.343

### Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K <sub>z</sub>	q <sub>z</sub> psf	t <sub>z</sub> in	A <sub>G</sub> ft <sup>2</sup>	F a c e	A <sub>F</sub> ft <sup>2</sup>	A <sub>R</sub> ft <sup>2</sup>	A <sub>leg</sub> ft <sup>2</sup>	Leg %	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>
L1 131.0000-110.0000	119.8282	1.445	5.232	1.4592	27.901	A	0.000	27.901	27.901	100.00	0.000	0.000
						B	0.000	27.901		100.00	0.000	0.000
						C	0.000	27.901		100.00	0.000	23.457
L2 110.0000-92.5833	100.9345	1.376	4.981	1.4295	29.844	A	0.000	29.844	29.844	100.00	0.000	0.000
						B	0.000	29.844		100.00	0.000	0.000
						C	0.000	29.844		100.00	0.000	26.413
L3 92.5833-84.5833	88.5194	1.326	4.798	1.4071	15.798	A	0.000	15.798	15.798	100.00	0.000	0.000
						B	0.000	15.798		100.00	0.000	0.000
						C	0.000	15.798		100.00	0.000	17.266
L4 84.5833-70.0000	77.1046	1.274	4.612	1.3840	32.174	A	0.000	32.174	32.174	100.00	0.000	0.000
						B	0.000	32.174		100.00	0.000	0.000
						C	0.000	32.174		100.00	0.000	38.379
L5 70.0000-67.0833	68.5336	1.232	4.460	1.3646	6.832	A	0.000	6.832	6.832	100.00	0.000	0.000
						B	0.000	6.832		100.00	0.000	0.000
						C	0.000	6.832		100.00	0.000	6.587
L6 67.0833-44.5833	55.4640	1.16	4.198	1.3304	58.565	A	0.000	58.565	58.565	100.00	0.000	0.000
						B	0.000	58.565		100.00	0.000	0.000
						C	0.000	58.565		100.00	0.000	49.609
L7 44.5833-34.0800	39.2613	1.051	3.803	1.2763	30.857	A	0.000	30.857	30.857	100.00	0.000	0.000
						B	0.000	30.857		100.00	0.000	0.000
						C	0.000	30.857		100.00	0.000	22.591
L8 34.0800-23.0000	28.4629	1	3.619	1.2500	34.403	A	0.000	34.403	34.403	100.00	0.000	0.000
						B	0.000	34.403		100.00	0.000	0.000
						C	0.000	34.403		100.00	0.000	24.957
L9 23.0000-18.7500	20.8648	1	3.619	1.2500	13.878	A	0.000	13.878	13.878	100.00	0.000	0.000
						B	0.000	13.878		100.00	0.000	0.000
						C	0.000	13.878		100.00	0.000	10.918
L10 18.7500-3.0000	10.7432	1	3.619	1.2500	54.710	A	0.000	54.710	54.710	100.00	0.000	0.000
						B	0.000	54.710		100.00	0.000	0.000
						C	0.000	54.710		100.00	0.000	40.461
L11 3.0000-2.2500	2.6247	1	3.619	1.2500	2.734	A	0.000	2.734	2.734	100.00	0.000	0.000
						B	0.000	2.734		100.00	0.000	0.000
						C	0.000	2.734		100.00	0.000	1.927

Section Elevation ft	z ft	K <sub>Z</sub>	q <sub>z</sub> psf	t <sub>z</sub> in	A <sub>G</sub> ft <sup>2</sup>	F a c e ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	A <sub>R</sub> ft <sup>2</sup>	A <sub>leg</sub> ft <sup>2</sup>	Leg %	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>
L12 2.2500-0.0000	1.1225	1	3.619	1.2500	8.272	A B C	0.000 0.000 0.000	8.272 8.272 8.272	8.272	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 5.780

### Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K <sub>Z</sub>	q <sub>z</sub> psf	A <sub>G</sub> ft <sup>2</sup>	F a c e	A <sub>F</sub> ft <sup>2</sup>	A <sub>R</sub> ft <sup>2</sup>	A <sub>leg</sub> ft <sup>2</sup>	Leg %	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>
L1 131.0000-110.0000	119.8282	1.445	9.251	22.794	A B C	0.000 0.000 0.000	22.794 22.794 22.794	22.794	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 9.741
L2 110.0000-92.5833	100.9345	1.376	8.808	25.695	A B C	0.000 0.000 0.000	25.695 25.695 25.695	25.695	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 11.158
L3 92.5833-84.5833	88.5194	1.326	8.484	13.922	A B C	0.000 0.000 0.000	13.922 13.922 13.922	13.922	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 6.651
L4 84.5833-70.0000	77.1046	1.274	8.156	28.811	A B C	0.000 0.000 0.000	28.811 28.811 28.811	28.811	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 14.326
L5 70.0000-67.0833	68.5336	1.232	7.886	6.159	A B C	0.000 0.000 0.000	6.159 6.159 6.159	6.159	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 2.551
L6 67.0833-44.5833	55.4640	1.16	7.423	53.576	A B C	0.000 0.000 0.000	53.576 53.576 53.576	53.576	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 19.677
L7 44.5833-34.0800	39.2613	1.051	6.726	28.623	A B C	0.000 0.000 0.000	28.623 28.623 28.623	28.623	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 9.185
L8 34.0800-23.0000	28.4629	1	6.400	32.046	A B C	0.000 0.000 0.000	32.046 32.046 32.046	32.046	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 10.106
L9 23.0000-18.7500	20.8648	1	6.400	12.993	A B C	0.000 0.000 0.000	12.993 12.993 12.993	12.993	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 4.425
L10 18.7500-3.0000	10.7432	1	6.400	51.429	A B C	0.000 0.000 0.000	51.429 51.429 51.429	51.429	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 16.399
L11 3.0000-2.2500	2.6247	1	6.400	2.578	A B C	0.000 0.000 0.000	2.578 2.578 2.578	2.578	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 0.781
L12 2.2500-0.0000	1.1225	1	6.400	7.804	A B C	0.000 0.000 0.000	7.804 7.804 7.804	7.804	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 2.343

### Load Combinations

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

Comb. No.	Description
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

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	131 - 110	Pole	Max Tension	8	0.00	-0.00	0.00
			Max. Compression	14	-6.77	1.12	-0.20
			Max. Mx	11	-1.84	56.87	-0.00
			Max. My	2	-1.84	0.13	56.75
			Max. Vy	11	-4.84	56.87	-0.00
			Max. Vx	2	-4.84	0.13	56.75
			Max. Torque	9			-0.49
			Max Tension	1	0.00	0.00	0.00
L2	110 - 92.5833	Pole	Max. Compression	14	-25.10	2.76	-1.37
			Max. Mx	11	-7.91	253.23	1.39
			Max. My	8	-7.88	-0.90	-255.42
			Max. Vy	11	-16.55	253.23	1.39
			Max. Vx	8	16.73	-0.90	-255.42
			Max. Torque	2			0.74
			Max Tension	1	0.00	0.00	0.00
			L3	92.5833 - 84.5833	Pole	Max. Compression	14
Max. Mx	11	-9.63				392.59	2.56
Max. My	8	-9.60				-1.77	-396.15
Max. Vy	11	-18.91				392.59	2.56
Max. Vx	8	19.09				-1.77	-396.15
Max. Torque	2						0.63
Max Tension	1	0.00				0.00	0.00
L4	84.5833 - 70	Pole				Max. Compression	14
			Max. Mx	11	-11.23	598.46	4.06
			Max. My	8	-11.21	-2.84	-603.81
			Max. Vy	11	-19.98	598.46	4.06
			Max. Vx	8	20.16	-2.84	-603.81
			Max. Torque	2			0.70
			Max Tension	1	0.00	0.00	0.00
			L5	70 - 67.0833	Pole	Max. Compression	14
Max. Mx	11	-12.79				739.59	5.05
Max. My	8	-12.77				-3.54	-746.13
Max. Vy	11	-20.77				739.59	5.05
Max. Vx	8	20.77				-3.54	-746.13

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L6	67.0833 - 44.5833	Pole	Max. Vx	8	20.95	-3.54	-746.13
			Max. Torque	2			0.76
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-45.25	12.48	-6.96
			Max. Mx	11	-17.06	1231.01	8.17
			Max. My	8	-17.05	-5.72	-1241.31
			Max. Vy	11	-22.94	1231.01	8.17
L7	44.5833 - 34.08	Pole	Max. Vx	8	23.12	-5.72	-1241.31
			Max. Torque	2			0.92
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-47.47	13.80	-7.72
			Max. Mx	11	-18.21	1360.59	8.93
			Max. My	8	-18.20	-6.23	-1371.81
			Max. Vy	11	-23.44	1360.59	8.93
L8	34.08 - 23	Pole	Max. Vx	8	23.62	-6.23	-1371.81
			Max. Torque	2			0.96
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-55.10	17.66	-9.95
			Max. Mx	11	-22.44	1748.61	11.08
			Max. My	8	-22.43	-7.68	-1762.44
			Max. Vy	11	-24.96	1748.61	11.08
L9	23 - 18.75	Pole	Max. Vx	8	25.14	-7.68	-1762.44
			Max. Torque	2			1.09
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-57.18	18.71	-10.55
			Max. Mx	11	-23.69	1855.70	11.64
			Max. My	8	-23.68	-8.06	-1870.21
			Max. Vy	11	-25.39	1855.70	11.64
L10	18.75 - 3	Pole	Max. Vx	8	25.57	-8.06	-1870.21
			Max. Torque	7			-1.13
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-64.99	22.77	-12.90
			Max. Mx	11	-28.36	2268.80	13.67
			Max. My	8	-28.36	-9.39	-2285.81
			Max. Vy	11	-27.03	2268.80	13.67
L11	3 - 2.25	Pole	Max. Vx	8	27.21	-9.39	-2285.81
			Max. Torque	7			-1.32
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-65.41	22.98	-13.02
			Max. Mx	11	-28.62	2289.12	13.77
			Max. My	8	-28.62	-9.45	-2306.25
			Max. Vy	11	-27.11	2289.12	13.77
L12	2.25 - 0	Pole	Max. Vx	8	27.28	-9.45	-2306.25
			Max. Torque	7			-1.33
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-66.58	23.58	-13.37
			Max. Mx	11	-29.33	2350.46	14.05
			Max. My	8	-29.33	-9.64	-2367.95
			Max. Vy	11	-27.36	2350.46	14.05
			Max. Vx	8	27.53	-9.64	-2367.95
			Max. Torque	7			-1.36

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	66.58	-0.00	0.00
	Max. H <sub>x</sub>	11	29.34	27.35	0.15
	Max. H <sub>z</sub>	2	29.34	0.18	27.47
	Max. M <sub>x</sub>	2	2359.81	0.18	27.47
	Max. M <sub>z</sub>	5	2337.85	-27.28	-0.07
	Max. Torsion	13	1.35	13.74	23.85
	Min. Vert	8	29.34	-0.12	-27.52

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. H <sub>x</sub>	5	29.34	-27.28	-0.07
	Min. H <sub>z</sub>	8	29.34	-0.12	-27.52
	Min. M <sub>x</sub>	8	-2367.95	-0.12	-27.52
	Min. M <sub>z</sub>	11	-2350.46	27.35	0.15
	Min. Torsion	7	-1.36	-13.71	-23.87

### 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	29.34	0.00	-0.00	1.60	2.91	-0.00
Dead+Wind 0 deg - No Ice	29.34	-0.18	-27.47	-2359.81	21.99	-1.33
Dead+Wind 30 deg - No Ice	29.34	13.58	-23.75	-2039.39	-1160.77	-0.80
Dead+Wind 60 deg - No Ice	29.34	23.61	-13.68	-1172.91	-2021.82	-0.29
Dead+Wind 90 deg - No Ice	29.34	27.28	0.07	9.52	-2337.85	0.30
Dead+Wind 120 deg - No Ice	29.34	23.62	13.89	1198.93	-2023.21	1.04
Dead+Wind 150 deg - No Ice	29.34	13.71	23.87	2055.30	-1174.80	1.36
Dead+Wind 180 deg - No Ice	29.34	0.12	27.52	2367.95	-9.64	1.21
Dead+Wind 210 deg - No Ice	29.34	-13.55	23.85	2052.30	1163.30	0.73
Dead+Wind 240 deg - No Ice	29.34	-23.63	13.69	1177.69	2030.42	0.28
Dead+Wind 270 deg - No Ice	29.34	-27.35	-0.15	-14.05	2350.46	-0.24
Dead+Wind 300 deg - No Ice	29.34	-23.69	-13.86	-1192.66	2036.75	-0.92
Dead+Wind 330 deg - No Ice	29.34	-13.74	-23.85	-2049.98	1184.34	-1.35
Dead+Ice+Temp	66.58	0.00	-0.00	13.37	23.58	-0.00
Dead+Wind 0 deg+Ice+Temp	66.58	-0.05	-8.90	-803.54	28.82	-0.63
Dead+Wind 30 deg+Ice+Temp	66.58	4.41	-7.69	-693.02	-380.37	-0.38
Dead+Wind 60 deg+Ice+Temp	66.58	7.66	-4.43	-393.41	-678.60	-0.08
Dead+Wind 90 deg+Ice+Temp	66.58	8.85	0.02	15.54	-788.00	0.24
Dead+Wind 120 deg+Ice+Temp	66.58	7.66	4.49	426.40	-678.96	0.55
Dead+Wind 150 deg+Ice+Temp	66.58	4.44	7.73	723.27	-384.18	0.68
Dead+Wind 180 deg+Ice+Temp	66.58	0.03	8.91	831.72	20.21	0.60
Dead+Wind 210 deg+Ice+Temp	66.58	-4.40	7.72	722.46	426.72	0.36
Dead+Wind 240 deg+Ice+Temp	66.58	-7.67	4.44	420.62	726.60	0.08
Dead+Wind 270 deg+Ice+Temp	66.58	-8.87	-0.04	9.13	837.10	-0.22
Dead+Wind 300 deg+Ice+Temp	66.58	-7.68	-4.48	-398.77	728.33	-0.52
Dead+Wind 330 deg+Ice+Temp	66.58	-4.45	-7.72	-695.90	432.45	-0.68
Dead+Wind 0 deg - Service	29.34	-0.07	-10.73	-922.17	10.45	-0.52
Dead+Wind 30 deg - Service	29.34	5.30	-9.28	-796.80	-452.24	-0.32
Dead+Wind 60 deg - Service	29.34	9.22	-5.34	-457.83	-789.07	-0.11
Dead+Wind 90 deg - Service	29.34	10.66	0.03	4.73	-912.77	0.12
Dead+Wind 120 deg - Service	29.34	9.22	5.43	470.03	-789.64	0.41
Dead+Wind 150 deg - Service	29.34	5.36	9.32	805.06	-457.75	0.53
Dead+Wind 180 deg - Service	29.34	0.05	10.75	927.44	-1.92	0.48
Dead+Wind 210 deg - Service	29.34	-5.29	9.31	803.87	456.93	0.29
Dead+Wind 240 deg - Service	29.34	-9.23	5.35	461.72	796.14	0.11
Dead+Wind 270 deg - Service	29.34	-10.68	-0.06	-4.49	921.41	-0.09
Dead+Wind 300 deg - Service	29.34	-9.25	-5.42	-465.57	798.63	-0.36



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
Service Dead+Wind 330 deg - Service	29.34	-5.37	-9.32	-800.96	465.17	-0.53

### 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	-29.34	0.00	-0.00	29.34	0.00	0.002%
2	-0.18	-29.34	-27.47	0.18	29.34	27.47	0.005%
3	13.58	-29.34	-23.75	-13.58	29.34	23.75	0.000%
4	23.61	-29.34	-13.68	-23.61	29.34	13.68	0.000%
5	27.29	-29.34	0.07	-27.28	29.34	-0.07	0.009%
6	23.62	-29.34	13.89	-23.62	29.34	-13.89	0.000%
7	13.71	-29.34	23.87	-13.71	29.34	-23.87	0.000%
8	0.12	-29.34	27.52	-0.12	29.34	-27.52	0.009%
9	-13.55	-29.34	23.85	13.55	29.34	-23.85	0.000%
10	-23.63	-29.34	13.69	23.63	29.34	-13.69	0.000%
11	-27.35	-29.34	-0.15	27.35	29.34	0.15	0.009%
12	-23.69	-29.34	-13.86	23.69	29.34	13.86	0.000%
13	-13.74	-29.34	-23.85	13.74	29.34	23.85	0.000%
14	0.00	-66.58	0.00	-0.00	66.58	0.00	0.001%
15	-0.05	-66.58	-8.90	0.05	66.58	8.90	0.002%
16	4.41	-66.58	-7.70	-4.41	66.58	7.69	0.001%
17	7.66	-66.58	-4.43	-7.66	66.58	4.43	0.001%
18	8.85	-66.58	0.02	-8.85	66.58	-0.02	0.002%
19	7.66	-66.58	4.49	-7.66	66.58	-4.49	0.001%
20	4.44	-66.58	7.73	-4.44	66.58	-7.73	0.001%
21	0.03	-66.58	8.91	-0.03	66.58	-8.91	0.002%
22	-4.40	-66.58	7.72	4.40	66.58	-7.72	0.001%
23	-7.67	-66.58	4.44	7.67	66.58	-4.44	0.001%
24	-8.87	-66.58	-0.04	8.87	66.58	0.04	0.002%
25	-7.68	-66.58	-4.48	7.68	66.58	4.48	0.001%
26	-4.45	-66.58	-7.72	4.45	66.58	7.72	0.001%
27	-0.07	-29.34	-10.73	0.07	29.34	10.73	0.005%
28	5.30	-29.34	-9.28	-5.30	29.34	9.28	0.003%
29	9.22	-29.34	-5.34	-9.22	29.34	5.34	0.002%
30	10.66	-29.34	0.03	-10.66	29.34	-0.03	0.005%
31	9.23	-29.34	5.43	-9.22	29.34	-5.43	0.003%
32	5.36	-29.34	9.33	-5.36	29.34	-9.32	0.003%
33	0.05	-29.34	10.75	-0.05	29.34	-10.75	0.005%
34	-5.29	-29.34	9.31	5.29	29.34	-9.31	0.003%
35	-9.23	-29.34	5.35	9.23	29.34	-5.35	0.003%
36	-10.68	-29.34	-0.06	10.68	29.34	0.06	0.005%
37	-9.25	-29.34	-5.42	9.25	29.34	5.42	0.003%
38	-5.37	-29.34	-9.32	5.37	29.34	9.32	0.003%

### Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000423
2	Yes	18	0.00004592	0.00009838
3	Yes	22	0.00000001	0.00013127
4	Yes	22	0.00000001	0.00013373
5	Yes	17	0.00008428	0.00008919
6	Yes	22	0.00000001	0.00013760
7	Yes	22	0.00000001	0.00013375
8	Yes	17	0.00008412	0.00009971
9	Yes	22	0.00000001	0.00013580
10	Yes	22	0.00000001	0.00013332
11	Yes	17	0.00008421	0.00009809
12	Yes	22	0.00000001	0.00013549
13	Yes	22	0.00000001	0.00013906
14	Yes	15	0.00000001	0.00002266

15	Yes	19	0.00012830	0.00010494
16	Yes	20	0.00007375	0.00010093
17	Yes	20	0.00007375	0.00010273
18	Yes	19	0.00012835	0.00010099
19	Yes	20	0.00007370	0.00011055
20	Yes	20	0.00007370	0.00010599
21	Yes	19	0.00012822	0.00010762
22	Yes	20	0.00007361	0.00011841
23	Yes	20	0.00007361	0.00011617
24	Yes	19	0.00012819	0.00010700
25	Yes	20	0.00007365	0.00011094
26	Yes	20	0.00007364	0.00011575
27	Yes	17	0.00008981	0.00005564
28	Yes	18	0.00000001	0.00011751
29	Yes	18	0.00000001	0.00012369
30	Yes	17	0.00008983	0.00004835
31	Yes	18	0.00000001	0.00012945
32	Yes	18	0.00000001	0.00012007
33	Yes	17	0.00008980	0.00005173
34	Yes	18	0.00000001	0.00012909
35	Yes	18	0.00000001	0.00012216
36	Yes	17	0.00008980	0.00004894
37	Yes	18	0.00000001	0.00012377
38	Yes	18	0.00000001	0.00013358

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	131 - 110	41.23	33	2.89	0.01
L2	110 - 92.5833	28.76	33	2.69	0.00
L3	92.5833 - 84.5833	19.69	33	2.22	0.00
L4	84.5833 - 70	16.14	33	2.02	0.00
L5	74 - 67.0833	12.01	33	1.70	0.00
L6	67.0833 - 44.5833	9.64	33	1.56	0.00
L7	44.5833 - 34.08	3.88	33	0.90	0.00
L8	39 - 23	2.92	33	0.75	0.00
L9	23 - 18.75	0.94	33	0.40	0.00
L10	18.75 - 3	0.62	33	0.32	0.00
L11	3 - 2.25	0.01	33	0.05	0.00
L12	2.25 - 0	0.01	33	0.04	0.00

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
128.0000	APX18-206517S-C w/ Mount Pipe	33	39.40	2.88	0.01	11888
121.0000	800 10121 w/ Mount Pipe	33	35.18	2.84	0.01	5943
107.0000	BXA-70063/6CFx4 w/ Mount Pipe	33	27.09	2.62	0.01	2591
101.0000	VHLP2.5-11	33	23.87	2.46	0.00	2209
99.0000	800MHz 2X50W RRH W/FILTER	33	22.84	2.40	0.00	2104
97.0000	TIMING 2000	33	21.83	2.35	0.00	2008
87.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	33	17.17	2.08	0.00	1939

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	131 - 110	104.96	8	7.36	0.02
L2	110 - 92.5833	73.27	8	6.86	0.01
L3	92.5833 - 84.5833	50.20	8	5.67	0.01
L4	84.5833 - 70	41.14	8	5.14	0.01
L5	74 - 67.0833	30.64	8	4.33	0.00
L6	67.0833 - 44.5833	24.59	8	3.97	0.00
L7	44.5833 - 34.08	9.90	8	2.30	0.00
L8	39 - 23	7.45	8	1.91	0.00
L9	23 - 18.75	2.39	8	1.01	0.00
L10	18.75 - 3	1.57	8	0.82	0.00
L11	3 - 2.25	0.04	8	0.12	0.00
L12	2.25 - 0	0.02	8	0.09	0.00

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
128.0000	APX18-206517S-C w/ Mount Pipe	8	100.32	7.33	0.02	4831
121.0000	800 10121 w/ Mount Pipe	8	89.58	7.23	0.02	2414
107.0000	BXA-70063/6CFx4 w/ Mount Pipe	8	69.01	6.69	0.01	1047
101.0000	VHLP2.5-11	8	60.83	6.27	0.01	887
99.0000	800MHz 2X50W RRH W/FILTER	8	58.20	6.13	0.01	844
97.0000	TIMING 2000	8	55.64	5.98	0.01	805
87.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	8	43.77	5.31	0.01	773

### Compression Checks

### Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</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	131 - 110 (1)	TP15.525x10.525x0.188	21.0000	0.0000	0.0	39.00	9.2844	-1.84	362.09	0.005
L2	110 - 92.5833 (2)	TP19.8818x15.525x0.25	17.4167	0.0000	0.0	39.00	15.8036	-7.88	616.34	0.013
L3	92.5833 - 84.5833 (3)	TP21.883x19.8818x0.3962	8.0000	0.0000	0.0	27.50	27.4114	-9.60	753.92	0.013
L4	84.5833 - 70 (4)	TP25.531x21.883x0.3779	14.5833	0.0000	0.0	37.54	29.3920	-11.21	1103.43	0.010
L5	70 - 67.0833 (5)	TP25.76x23.7745x0.4358	6.9167	0.0000	0.0	37.60	35.5353	-12.77	1335.99	0.010
L6	67.0833 - 44.5833 (6)	TP31.3879x25.76x0.4109	22.5000	0.0000	0.0	37.81	40.9875	-17.05	1549.57	0.011
L7	44.5833 - 34.08 (7)	TP34.015x31.3879x0.4062	10.5033	0.0000	0.0	37.82	42.3536	-18.20	1601.98	0.011
L8	34.08 - 23 (8)	TP36.1553x31.9719x0.4282	16.0000	0.0000	0.0	37.90	46.3567	-20.62	1756.73	0.012
L9	23 - 18.75 (9)	TP37.2168x36.1553x0.5937	4.2500	0.0000	0.0	31.80	69.5102	-23.39	2210.43	0.011
L10	18.75 - 3 (10)	TP41.1507x37.2168x0.5587	15.7500	0.0000	0.0	31.26	65.9508	-23.70	2061.62	0.011
L11	3 - 2.25 (11)	TP41.338x41.1507x0.6429	0.7500	0.0000	0.0	34.69	83.8606	-28.37	2909.29	0.010
L12	2.25 - 0 (12)	TP41.9x41.338x0.5718	2.2500	0.0000	0.0	35.30	75.0534	-28.63	2649.69	0.011

Section No.	Elevation ft	Size	L ft	L <sub>u</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>
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**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 $\frac{f_{bx}}{F_{bx}}$	Actual M <sub>y</sub> kip-ft	Actual f <sub>by</sub> ksi	Allow. F <sub>by</sub> ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	131 - 110 (1)	TP15.525x10.525x0.188	56.88	19.69	39.00	0.505	0.00	0.00	39.00	0.000
L2	110 - 92.5833 (2)	TP19.8818x15.525x0.25	255.44	40.61	39.00	1.041	0.00	0.00	39.00	0.000
L3	92.5833 - 84.5833 (3)	TP21.883x19.8818x0.396	396.18	33.36	27.50	1.213	0.00	0.00	27.50	0.000
L4	84.5833 - 70 (4)	TP25.531x21.883x0.3779	603.83	42.07	37.54	1.121	0.00	0.00	37.54	0.000
L5	70 - 67.0833 (5)	TP25.76x23.7745x0.4358	746.13	41.07	37.60	1.092	0.00	0.00	37.60	0.000
L6	67.0833 - 44.5833 (6)	TP31.3879x25.76x0.4109	1241.3	48.24	37.81	1.276	0.00	0.00	37.81	0.000
L7	44.5833 - 34.08 (7)	TP34.015x31.3879x0.406	1371.8	49.33	37.82	1.304	0.00	0.00	37.82	0.000
L8	34.08 - 23 (8)	TP36.1553x31.9719x0.42	1562.7	49.45	37.90	1.305	0.00	0.00	37.90	0.000
L9	23 - 18.75 (9)	TP37.2168x36.1553x0.59	1843.1	36.10	31.80	1.135	0.00	0.00	31.80	0.000
L10	18.75 - 3 (10)	TP41.1507x37.2168x0.55	1870.2	38.25	31.26	1.224	0.00	0.00	31.26	0.000
L11	3 - 2.25 (11)	TP41.338x41.1507x0.642	2285.8	33.29	34.69	0.960	0.00	0.00	34.69	0.000
L12	2.25 - 0 (12)	TP41.9x41.338x0.5718	2306.2	37.22	35.30	1.054	0.00	0.00	35.30	0.000

**Pole Shear Design Data**

Section No.	Elevation ft	Size	Actual V K	Actual f <sub>v</sub> ksi	Allow. F <sub>v</sub> ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f <sub>vt</sub> ksi	Allow. F <sub>vt</sub> ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	131 - 110 (1)	TP15.525x10.525x0.188	4.85	0.52	26.00	0.041	0.05	0.01	26.00	0.000
L2	110 - 92.5833 (2)	TP19.8818x15.525x0.25	16.74	1.06	26.00	0.083	0.49	0.04	26.00	0.001
L3	92.5833 - 84.5833 (3)	TP21.883x19.8818x0.396	19.10	0.70	18.34	0.077	0.54	0.02	18.34	0.001
L4	84.5833 - 70 (4)	TP25.531x21.883x0.3779	20.18	0.69	25.03	0.056	0.63	0.02	25.03	0.001
L5	70 - 67.0833 (5)	TP25.76x23.7745x0.4358	20.95	0.59	25.06	0.048	0.64	0.02	25.06	0.001
L6	67.0833 - 44.5833 (6)	TP31.3879x25.76x0.4109	23.12	0.56	25.20	0.045	0.80	0.01	25.20	0.001
L7	44.5833 - 34.08 (7)	TP34.015x31.3879x0.406	23.62	0.56	25.22	0.045	0.84	0.01	25.22	0.001
L8	34.08 - 23 (8)	TP36.1553x31.9719x0.42	24.51	0.53	25.26	0.042	0.91	0.01	25.26	0.001
L9	23 - 18.75 (9)	TP37.2168x36.1553x0.59	25.57	0.37	21.20	0.035	1.01	0.01	21.20	0.000
L10	18.75 - 3 (10)	TP41.1507x37.2168x0.55	25.67	0.39	20.84	0.038	1.02	0.01	20.84	0.000
L11	3 - 2.25 (11)	TP41.338x41.1507x0.642	27.28	0.33	23.13	0.028	1.18	0.01	23.13	0.000
L12	2.25 - 0 (12)	TP41.9x41.338x0.5718	27.41	0.37	23.54	0.031	1.20	0.01	23.54	0.000

### Pole Interaction Design Data

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$P_a$	$F_{bx}$	$F_{by}$	$F_v$	$F_{vt}$			
L1	131 - 110 (1)	0.005	0.505	0.000	0.041	0.000	0.510	1.333	H1-3+VT ✓
L2	110 - 92.5833 (2)	0.013	1.041	0.000	0.083	0.001	1.056	1.333	H1-3+VT ✓
L3	92.5833 - 84.5833 (3)	0.013	1.213	0.000	0.077	0.001	1.227	1.333	H1-3+VT ✓
L4	84.5833 - 70 (4)	0.010	1.121	0.000	0.056	0.001	1.132	1.333	H1-3+VT ✓
L5	70 - 67.0833 (5)	0.010	1.092	0.000	0.048	0.001	1.103	1.333	H1-3+VT ✓
L6	67.0833 - 44.5833 (6)	0.011	1.276	0.000	0.045	0.001	1.288	1.333	H1-3+VT ✓
L7	44.5833 - 34.08 (7)	0.011	1.304	0.000	0.045	0.001	1.316	1.333	H1-3+VT ✓
L8	34.08 - 23 (8)	0.012	1.305	0.000	0.042	0.001	1.317	1.333	H1-3+VT ✓
L9	23 - 18.75 (9)	0.011	1.135	0.000	0.035	0.000	1.146	1.333	H1-3+VT ✓
L10	18.75 - 3 (10)	0.011	1.224	0.000	0.038	0.000	1.235	1.333	H1-3+VT ✓
L11	3 - 2.25 (11)	0.010	0.960	0.000	0.028	0.000	0.970	1.333	H1-3+VT ✓
L12	2.25 - 0 (12)	0.011	1.054	0.000	0.031	0.000	1.065	1.333	H1-3+VT ✓

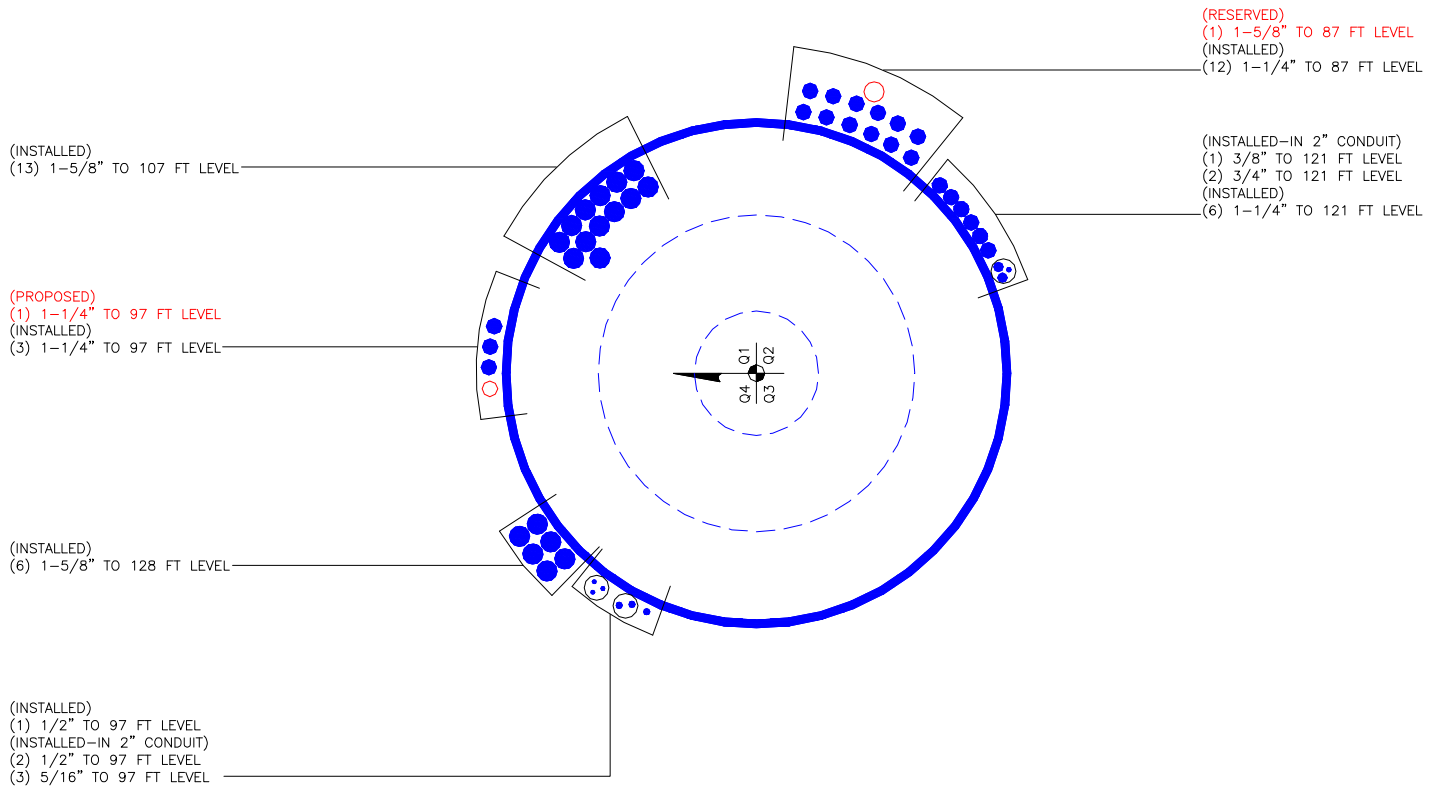
### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P <sub>allow</sub> K	% Capacity	Pass Fail	
L1	131 - 110	Pole	TP15.525x10.525x0.188	1	-1.84	482.67	38.3	Pass	
L2	110 - 92.5833	Pole	TP19.8818x15.525x0.25	2	-7.88	821.58	79.2	Pass	
L3	92.5833 - 84.5833	Pole	TP21.883x19.8818x0.3962	3	-9.60	1004.98	92.1	Pass	
L4	84.5833 - 70	Pole	TP25.531x21.883x0.3779	4	-11.21	1470.87	84.9	Pass	
L5	70 - 67.0833	Pole	TP25.76x23.7745x0.4358	5	-12.77	1780.87	82.7	Pass	
L6	67.0833 - 44.5833	Pole	TP31.3879x25.76x0.4109	6	-17.05	2065.58	96.6	Pass	
L7	44.5833 - 34.08	Pole	TP34.015x31.3879x0.4062	7	-18.20	2135.44	98.7	Pass	
L8	34.08 - 23	Pole	TP36.1553x31.9719x0.4282	8	-20.62	2341.72	98.8	Pass	
L9	23 - 18.75	Pole	TP37.2168x36.1553x0.5937	9	-23.39	2946.50	86.0	Pass	
L10	18.75 - 3	Pole	TP41.1507x37.2168x0.5587	10	-23.70	2748.14	92.7	Pass	
L11	3 - 2.25	Pole	TP41.338x41.1507x0.6429	11	-28.37	3878.08	72.7	Pass	
L12	2.25 - 0	Pole	TP41.9x41.338x0.5718	12	-28.63	3532.04	79.9	Pass	
							Summary		
							Pole (L8)	98.8	Pass
							<b>RATING =</b>	<b>98.8</b>	<b>Pass</b>



## APPENDIX B

### BASE LEVEL DRAWING



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

131.0 ft

110.0 ft

92.6 ft

84.6 ft

70.0 ft

67.1 ft

44.6 ft

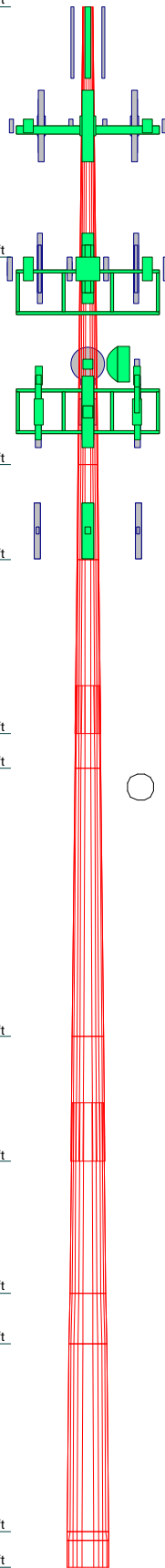
34.1 ft

23.0 ft

18.8 ft

3.0 ft

0.0 ft



**DESIGNED APPURTENANCE LOADING**

TYPE	ELEVATION	TYPE	ELEVATION
APX18-206517S-C w/ Mount Pipe	128	PCS 1900MHz 4x45W-65MHz	99
APX18-206517S-C w/ Mount Pipe	128	PCS 1900MHz 4x45W-65MHz	99
APX18-206517S-C w/ Mount Pipe	128	PCS 1900MHz 4x45W-65MHz	99
Pipe Mount [PM 601-3]	128	PCS 1900MHz 4x45W-65MHz	99
800 10121 w/ Mount Pipe	121	PCS 1900MHz 4x45W-65MHz	99
800 10121 w/ Mount Pipe	121	Side Arm Mount [SO 101-3]	99
800 10121 w/ Mount Pipe	121	TIMING 2000	97
(2) LGP21401	121	840 10054 w/ Mount Pipe	97
(2) LGP21401	121	840 10054 w/ Mount Pipe	97
(2) LGP21401	121	840 10054 w/ Mount Pipe	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	121	WIMAX DAP HEAD	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	121	WIMAX DAP HEAD	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	121	WIMAX DAP HEAD	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	121	HORIZON COMPACT	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	121	HORIZON COMPACT	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	121	HORIZON COMPACT	97
DC6-48-60-18-8F	121	APXVSP18-C-A20 w/ Mount Pipe	97
RRUS-11	121	APXVSP18-C-A20 w/ Mount Pipe	97
RRUS-11	121	APXVSP18-C-A20 w/ Mount Pipe	97
RRUS-11	121	IBC1900HG-2A	97
T-Arm Mount [TA 601-3]	121	IBC1900HG-2A	97
BXA-70063/6CFx4 w/ Mount Pipe	107	IBC1900BB-1	97
BXA-70063/6CFx4 w/ Mount Pipe	107	IBC1900BB-1	97
BXA-70063/6CFx4 w/ Mount Pipe	107	IBC1900BB-1	97
BXA-185090/8CF w/ Mount Pipe	107	IBC1900BB-1	97
BXA-185090/8CF w/ Mount Pipe	107	IBC1900BB-1	97
BXA-185090/8CF w/ Mount Pipe	107	IBC1900BB-1	97
BXA-185060/8CFx2 w/ Mount Pipe	107	APXVTM14-C-120 w/ Mount Pipe	97
BXA-185060/8CFx2 w/ Mount Pipe	107	APXVTM14-C-120 w/ Mount Pipe	97
(2) FD9R6004/2C-3L	107	APXVTM14-C-120 w/ Mount Pipe	97
(2) FD9R6004/2C-3L	107	TD-RRH8x20-25	97
(2) FD9R6004/2C-3L	107	TD-RRH8x20-25	97
(2) FD9R6004/2C-3L	107	TD-RRH8x20-25	97
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	107	TD-RRH8x20-25	97
BXA-80063/4CF w/ Mount Pipe	107	Platform Mount [LP 301-1]	97
BXA-80063/4CF w/ Mount Pipe	107	VHLP2.5-11	97
BXA-80063/4CF w/ Mount Pipe	107	VHLP2.5-11	97
BXA-80063/4CF w/ Mount Pipe	107	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	87
BXA-171085-8CF-EDIN-2 w/ Mount Pipe	107	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	87
BXA-171085-8CF-EDIN-2 w/ Mount Pipe	107	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	87
BXA-171085-8CF-EDIN-2 w/ Mount Pipe	107	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	87
BXA-171085-8CF-EDIN-2 w/ Mount Pipe	107	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	87
(2) RRH2X40-AWS	107	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	87
(2) RRH2X40-AWS	107	KRY 112 144/1	87
(2) RRH2X40-AWS	107	KRY 112 144/1	87
(2) RRH2X40-AWS	107	KRY 112 144/1	87
DB-T1-6Z-8AB-0Z	107	KRY 112 144/1	87
Platform Mount (LP 101-1)	107	Side Arm Mount [SO 702-3]	87
800MHz 2X50W RRR W/FILTER	99	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	87
800MHz 2X50W RRR W/FILTER	99	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	87
800MHz 2X50W RRR W/FILTER	99	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	87
PCS 1900MHz 4x45W-65MHz	99	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	87

**MATERIAL STRENGTH**

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi	Reinf 63.16 ksi	63 ksi	79 ksi
Reinf 45.84 ksi	46 ksi	58 ksi	Reinf 53.00 ksi	53 ksi	67 ksi
Reinf 62.57 ksi	63 ksi	79 ksi	Reinf 52.10 ksi	52 ksi	66 ksi
Reinf 62.66 ksi	63 ksi	79 ksi	Reinf 57.82 ksi	58 ksi	73 ksi
Reinf 63.01 ksi	63 ksi	79 ksi	Reinf 58.84 ksi	59 ksi	74 ksi
Reinf 63.04 ksi	63 ksi	79 ksi			

**TOWER DESIGN NOTES**

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.25 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.

Section	12 11	12 10	12 9	12 8	12 7	12 6	12 5	12 4	12 3	12 2	12 1
Length (ft)	2.260500	15.7500	4.2500	16.0000	10.5033	22.5000	6.9167	14.5833	8.0000	17.4167	21.0000
Number of Sides	12	12	12	12	12	12	12	12	12	12	12
Thickness (in)	0.508329	0.5587	0.5937	0.4282	0.4062	0.4109	0.4358	0.3779	0.3962	0.2500	0.1880
Socket Length (ft)					4.9200			4.0000			
Top Dia (in)	41.834507	37.2168	36.1553	31.9719	25.7600	23.7745	21.8830	19.8818	15.5250	10.5250	15.5250
Bot Dia (in)	41.800380	41.1507	37.2168	36.1553	34.0150	31.3879	25.5310	21.8830	19.8818	15.5250	15.5250
Grade	Reinf 52.10 ksi	Reinf 53.00 ksi	Reinf 63.16 ksi	Reinf 63.04 ksi	Reinf 63.01 ksi	Reinf 62.86 ksi	Reinf 62.57 ksi	Reinf 45.84 ksi	A572-65		
Weight (K)	16.70602	3.7	1.0	2.5	1.5	2.9	0.8	1.4	0.7	0.8	0.6

**Paul J Ford and Company**  
 250 E. Broad Street Suite 600  
 Columbus, OH 43215  
 Phone: 614.221.6679  
 FAX: 614.448.4105

Job: **131' Monopole / HRT 100 943239**  
 Project: **37513-0342.002.7700 / BU 806376**  
 Client: Crown Castle  
 Drawn by: Seth Tschanen  
 App'd:  
 Code: TIA/EIA-222-F  
 Date: 08/11/14  
 Scale: NTS  
 Path:  
 Dwg No. E-1

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

## TIA Rev F

Site Data	
BU#:	806376
Site Name:	HRT 100 943239
App #:	
Pole Manufacturer:	Other

Reactions		
Moment:	2368	ft-kips
Axial:	29	kips
Shear:	28	kips

Anchor Rod Data		
Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	49.88	in

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

Anchor Rod Results						
Maximum Rod Tension:	187.5 Kips		<table border="1"> <tr><td>Rigid</td></tr> <tr><td>Service, ASD</td></tr> <tr><td>Fty*ASIF</td></tr> </table>	Rigid	Service, ASD	Fty*ASIF
Rigid						
Service, ASD						
Fty*ASIF						
Allowable Tension:	195.0 Kips					
Anchor Rod Stress Ratio:	96.2% <b>Pass</b>					

Plate Data		
Diam:	55.88	in
Thick:	2.5	in
Grade:	60	ksi
Single-Rod B-eff:	11.23	in

Base Plate Results		Flexural Check					
Base Plate Stress:	41.4 ksi		<table border="1"> <tr><td>Rigid</td></tr> <tr><td>Service ASD</td></tr> <tr><td>0.75*Fy*ASIF</td></tr> <tr><td>Y.L. Length: 27.06</td></tr> </table>	Rigid	Service ASD	0.75*Fy*ASIF	Y.L. Length: 27.06
Rigid							
Service ASD							
0.75*Fy*ASIF							
Y.L. Length: 27.06							
Allowable Plate Stress:	60.0 ksi						
Base Plate Stress Ratio:	69.0% <b>Pass</b>						
<b>n/a</b>							

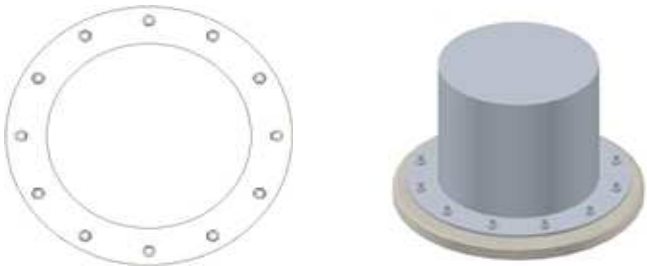
Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Stiffener Results	
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results	
Pole Punching Shear Check:	n/a

Pole Data		
Diam:	41.9	in
Thick:	0.344	in
Grade:	65	ksi
# of Sides:	12	"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

# Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev F

## Site Data

BU#: 806376  
 Site Name: HRT 100 943239  
 App #:

Reactions		
Moment:	56.88	ft-kips
Axial:	1.84	kips
Shear:	4.85	kips
Elevation:	110	feet

Pole Manufacturer:	Other
--------------------	-------

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

## Flange Bolt Results

Bolt Tension Capacity, **B**: 46.07 kips  
 Max Bolt directly applied T: 13.85 Kips  
 Min. PL "tc" for **B** cap. **w/o** Pry: 1.286 in  
 Min PL "treq" for actual **T w/o** Pry: 0.528 in  
 Min PL "t1" for actual **T w/o** Pry: 0.705 in  
 T allowable w/o Prying: 46.07 kips  
 Prying Force, Q: 0.00 kips  
 Total Bolt Tension=T+Q: 13.85 kips  
 Non-Prying Bolt Stress Ratio, T/B: 30.1% **Pass**

Rigid
Service, ASD
Fty*ASIF

Bolt Data		
Qty:	10	
Diameter (in.):	1	Bolt Fu: 120
Bolt Material:	A325	Bolt Fy: 92
N/A:	75	<-- Disregard
N/A:	55	<-- Disregard
Circle (in.):	19.45	Bolt Fty: 44.00

Plate Data		
Diam:	21.95	in
Thick, t:	1.375	in
Grade (Fy):	50	ksi
Strength, Fu:	65	ksi
Single-Rod B-eff:	4.99	in

## Exterior Flange Plate Results

Flexural Check  
 Compression Side Plate Stress: 10.9 ksi  
 Allowable Plate Stress: 50.0 ksi  
 Compression Plate Stress Ratio: 21.8% **Pass**  
**No Prying**  
 Tension Side Stress Ratio, (treq/t)^2: 14.8% **Pass**

Rigid
Service ASD
0.75*Fy*ASIF
Comp. Y.L. Length:
11.71

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

## Stiffener Results

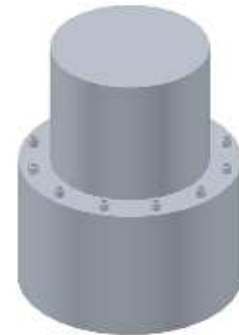
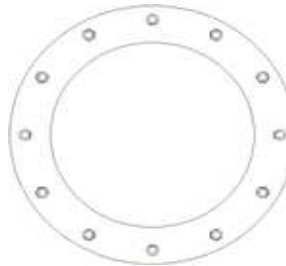
Horizontal Weld : n/a  
 Vertical Weld: n/a  
 Plate Flex+Shear, fb/Fb+(fv/Fv)^2: n/a  
 Plate Tension+Shear, ft/Ft+(fv/Fv)^2: n/a  
 Plate Comp. (AISC Bracket): n/a

## Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	15.53	in
Thick:	0.1875	in
Grade:	65	ksi
# of Sides:	12	"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



**Foundation Loads:**

Pole weight or tower leg compression = 29 (kips)  
 Horizontal load at top of pier = 28 (kips)  
 Overturning moment at top of pier = 2368 (ft-kips)

**Design criteria:**

Safety factor against overturning = 1.5

**Soil Properties:**

Soil density = 115 (pcf)  
 Allowable soil bearing = 5 (ksf)  
 Depth to water table = 12 (ft)

**Dimensions:**

Pier shape (round or square) R ("R" or "S")  
 Pier width = 6 (ft)  
 Pier height above grade = 0.5 (ft)  
 depth to bottom of footing = 8 (ft)  
 Footing thickness = 3 (ft)  
 Footing width = 22 (ft)  
 Footing length = 22 (ft)

**Concrete:**

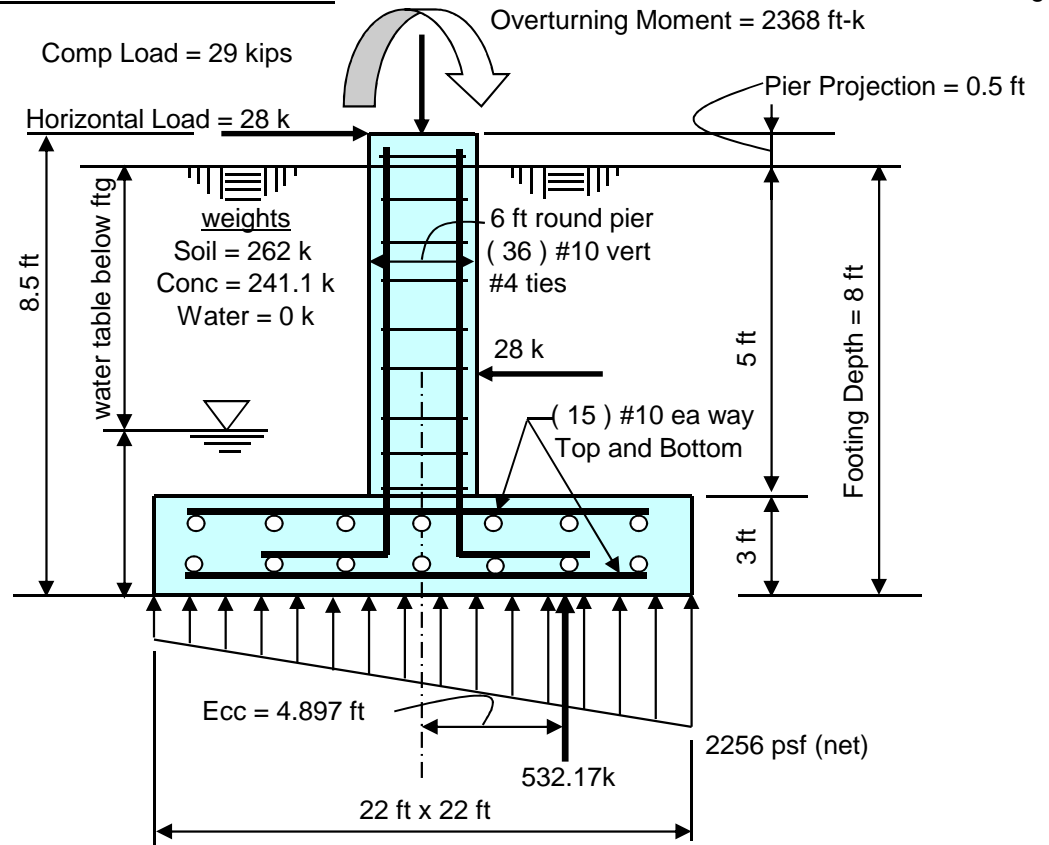
Concrete strength = 3 (ksi)  
 Rebar strength = 60 (ksi)  
 ultimate load factor = 1.3

**Reinforcing Steel:**

Pad  
 minimum cover over rebar = 3 inches  
 size of pad rebar = #10 bar  
 quantity of pad rebar = 15 (ea direction)

**Reinforcing Steel:**

Pier  
 size of vert rebar in pier = #10 bar  
 vertical rebar quantity = 36  
 size of pier ties = #4 bar  
 minimum cover over rebar = 3 inches  
 Total volume of concrete = 59.5 cu yd



Summary of analysis results	
Maximum Net Soil Bearing = 2.256 ksf Allowable Net Soil Bearing = 5 ksf <b>Soil Bearing Stress Ratio = 0.45 Okay</b>	Ult Bending Shear Capacity = 110 psi Ult Bending Shear Stress = 31 psi <b>Bending Shear Stress Ratio = 0.28 Okay</b>
Ftg Overturning Resistance = 5854 ft-kips Overturning Moment = 2606 ft-kips Required Overturning Safety Factor = 1.5 Overturning Safety Factor = 2.246 <b>Ratio = 0.67 Okay</b>	Pad Bending Moment Capacity = 2595 ft-k Pad Bending Moment = 1128 ft-k <b>Bending Moment Stress Ratio = 0.43 OK</b>

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                        spColumn v4.80 (TM)
    Computer program for the Strength Design of Reinforced Concrete Sections
                        Copyright © 1988-2011, STRUCTUREPOINT, LLC.
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General Information:

```

=====
File Name: g:\tower\375_crown_castle\2013\37513-0342 bu 806376\wo802825 b...\37513-0342.002.7700.col
Project: 37512-1659
Column:                               Engineer: DSK
Code:   ACI 318-08                     Units: English

Run Option: Investigation               Slenderness: Not considered
Run Axis:  X-axis                       Column Type: Structural
    
```

Material Properties:

```

=====
f'c   = 3 ksi                          fy   = 60 ksi
Ec    = 3122.02 ksi                     Es   = 29000 ksi
Ultimate strain = 0.003 in/in
Beta1 = 0.85
    
```

Section:

```

=====
Circular:   Diameter = 72 in

Gross section area, Ag = 4071.5 in^2
Ix = 1.31917e+006 in^4                Iy = 1.31917e+006 in^4
rx = 18 in                             ry = 18 in
Xo = 0 in                               Yo = 0 in
    
```

Reinforcement:

```

=====
Bar Set: ASTM A615
Size Diam (in) Area (in^2)   Size Diam (in) Area (in^2)   Size Diam (in) Area (in^2)
-----
# 3      0.38      0.11   # 4      0.50      0.20   # 5      0.63      0.31
# 6      0.75      0.44   # 7      0.88      0.60   # 8      1.00      0.79
# 9      1.13      1.00   # 10     1.27      1.27   # 11     1.41      1.56
# 14     1.69      2.25   # 18     2.26      4.00
    
```

Confinement: Tied; #3 ties with #10 bars, #4 with larger bars.  
 phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

Layout: Circular  
 Pattern: All Sides Equal (Cover to longitudinal reinforcement)  
 Total steel area: As = 45.72 in^2 at rho = 1.12%  
 Minimum clear spacing = 4.37 in

36 #10 Cover = 3 in

Factored Loads and Moments with Corresponding Capacities:

```

=====
No.      Pu      Mux      PhiMnx  PhiMn/Mu  NA depth  Dt depth  eps_t  Phi
-----
1        29.00    3354.26    5790.15    1.726    15.57    68.37    0.01017  0.900
    
```

\*\*\* End of output \*\*\*

# MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

BU NUMBER; SITE NAME  
**BU #806376; HRT 100 943239**  
 APP: 245658 REV. 1; WO: 802825

SITE ADDRESS  
**1455 FORBES STREET**  
**EAST HARTFORD, CONNECTICUT 06118**  
**HARTFORD COUNTY**

## PROJECT NOTES

- DETAILED FIELD INFORMATION REGARDING INTERFERENCES AND/OR EXISTING FIELD CONDITIONS MAY BE AVAILABLE ON CROWN'S CCISITES AND FROM CONTRACTOR'S PRE-MOD MAPPING. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS AND COORDINATE WITH THE AVAILABLE SOURCES OF INFORMATION ABOVE AND WITH THE PROJECT PLANS BEFORE PROCEEDING WITH THE WORK. CONTRACTOR SHALL IMMEDIATELY REPORT ANY AND ALL DISCREPANCIES TO PAUL J. FORD AND COMPANY AND CROWN CASTLE FIELD PERSONNEL BEFORE PROCEEDING WITH THE WORK.
- ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
- ALL STRUCTURAL BOLTS SHALL BE FIELD INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
- (A.) DTI'S REQUIRED: ALL AJAX BOLTS SHALL BE INSTALLED USING DIRECT TENSION INDICATORS (DTI'S) AND HARDENED WASHERS. ALL AJAX M20 BOLTS WITH SHEAR SLEEVES SHALL BE PRETENSIONED AND TIGHTENED UNTIL THE DIRECT TENSION INDICATOR (DTI) WASHERS SHOW THAT THE PROPER BOLT TENSION HAS BEEN REACHED. SEE NOTES AND DETAILS ON SHEET S-3 FOR REQUIREMENTS ON THE USE OF DIRECT TENSION INDICATOR (DTI) WASHERS WITH THE AJAX M20 BOLTS.  
  
(B.) EFFECTIVE 5/30/2012: UNTIL FURTHER NOTICE, CROWN CASTLE WILL ACCEPT AJAX BOLTS TIGHTENED USING AISC "TURN-OF-NUT" METHOD. INSTALLERS SHALL FOLLOW CROWN GUIDELINES FOR AISC "TURN-OF-NUT" METHOD AND ALSO PROVIDE COMPLETE INSPECTION DOCUMENTATION IN THE PMI. PRIOR TO STARTING WORK, CONTRACTOR SHALL CONSULT WITH CROWN ENGINEERING TO DETERMINE WHETHER THIS POLICY IS STILL IN PLACE.  
  
(C.) REQUIREMENT EFFECTIVE 04/20/2013, PER CROWN CASTLE DIRECTIVE: ANY AND ALL STRUCTURAL BOLTS THAT ARE TIGHTENED TO THE PRETENSIONED CONDITION USING THE AISC "TURN-OF-NUT" TENSIONING PROCEDURE (NON-TENSION CONTROLLED [NON-TC] BOLTS AND/OR BOLTS WITHOUT DTI'S INSTALLED) SHALL BE INSPECTED ONSITE BY AN INDEPENDENT THIRD-PARTY BOLT INSPECTOR, AS APPROVED BY CROWN. **THIS INSPECTION IS REQUIRED TO BE AN ONSITE FIELD INSPECTION.** THE THIRD-PARTY BOLT INSPECTOR SHALL FOLLOW THE PUBLISHED CROWN CASTLE INSPECTION PROCEDURE "MI NON-TC BOLT INSPECTION", DATED APRIL 2013. THE THIRD-PARTY BOLT INSPECTOR SHALL PREPARE A FULLY DOCUMENTED BOLT INSPECTION REPORT, AS SPECIFIED BY CROWN, AND SHALL SUBMIT A COPY OF THE BOLT INSPECTION REPORT TO THE MI INSPECTOR, THE EOR, AND TO CROWN CASTLE.
- NDE OF THE CIRCUMFERENTIAL WELD OF THE BASE PLATE TO SHAFT CONNECTION IS REQUIRED. SEE CCI DOCUMENTS ENG-SOW-1033 'TOWER BASE PLATE NDE' AND ENG-BUL-10051 'NDE REQUIREMENTS FOR MONOPOLE BASE PLATE TO PREVENT CONNECTION FAILURE'. NOTIFY THE EOR AND CROWN ENGINEERING IMMEDIATELY IF ANY CRACKS ARE SUSPECTED OR HAVE BEEN IDENTIFIED. THE NDE SHALL INCLUDE ALL EXISTING REINFORCEMENTS THAT HAVE BEEN WELDED TO THE BASE PLATE. ANY FULL PENETRATION WELDING TO THE BASE PLATE REQUIRED AS PART OF THIS ACTIVE REINFORCEMENT DESIGN SHALL BE INCLUDED IN THE NDE SCOPE OF WORK.

## PROJECT CONTACTS:

### MONOPOLE OWNER:

CROWN CASTLE  
 46 BROADWAY, ALBANY, NEW YORK 21204  
 TSA CONTACT: ANDREW BAZINET AT ANDREW.BAZINET@CROWNCastle.COM  
 PH: (585) 899-3442  
 MOD PM: ROY PYPTIUK AT ROY.PYPTIUK@CROWNCastle.COM  
 PH: (607) 659-3493

### STRUCTURAL ENGINEER OF RECORD (EOR):

PAUL J. FORD AND COMPANY  
 250 EAST BROAD STREET, SUITE 600  
 COLUMBUS, OHIO 43215-3708  
 CONTACT: SETH TSCHANEN AT STSCHANEN@PJFWEB.COM  
 PHONE: 614-221-6679

## DESIGN STANDARD

THIS REINFORCEMENT DESIGN IS BASED UPON THE REQUIREMENTS OF THE TIA/EIA-222-F-1996 STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS, USING A DESIGN BASIC WIND SPEED OF 80 MPH (FASTEST MILE) WITH NO ICE, 38 MPH WITH 1/4 INCH ICE AND 50 MPH SERVICE LOADS.

REFER TO THE POLE DESIGN AND ANTENNA LOADING DOCUMENTED IN THE PJF STRUCTURAL ANALYSIS FOR THIS SITE (PJF#37513-0342.002.7700), DATED 8-5-2014.

## THIS PROJECT INCLUDES THE FOLLOWING REINFORCING ELEMENTS:

SHAFT REINFORCING  
 FIELD WELDED STIFFENERS

## SHEET INDEX

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S-2	GENERAL NOTES
S-3	AJAX BOLT DETAIL
S-4	MONOPOLE PROFILE
S-5	BASE PLATE DETAILS
S-6	MI CHECKLIST

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PAUL J. FORD AND COMPANY  
 STRUCTURAL ENGINEERS  
 250 East Broad Street · Suite 600 · Columbus, Ohio 43215  
 (614) 221-6679 www.pjfweb.com

**CROWN CASTLE**

46 BROADWAY, ALBANY, NEW YORK 21204  
 PH: (585) 899-3442

BU #806376; HRT 100 943239  
 EAST HARTFORD, CONNECTICUT  
 MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37513-0342.002.7700

DRAWN BY:  
B.M.S.

CHECKED BY:  
S.J.T.

APPROVED BY:

DATE:  
8-5-2014

TITLE SHEET

T-1

**A. GENERAL NOTES**

1. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS PRIOR TO FABRICATION AND CONSTRUCTION. THESE DRAWINGS WERE PREPARED FROM INFORMATION AND DOCUMENTS PROVIDED TO PAUL J. FORD & COMPANY BY CROWN CASTLE. THIS INFORMATION PROVIDED HAS NOT BEEN FIELD VERIFIED BY PAUL J. FORD & COMPANY FOR ACCURACY AND THEREFORE DISCREPANCIES BETWEEN THESE DRAWINGS AND ACTUAL SITE CONDITIONS SHOULD BE ANTICIPATED. ANY DISCREPANCIES AND/OR CHANGES BETWEEN THE INFORMATION CONTAINED IN THESE DRAWINGS AND THE ACTUAL VERIFIED SITE CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF CROWN CASTLE AND PAUL J. FORD & COMPANY SO THAT ANY CHANGES AND/OR ADJUSTMENTS, IF NECESSARY, CAN BE MADE TO THE DESIGN AND DRAWINGS.
2. THE EXISTING UNREINFORCED MONOPOLE STRUCTURE DOES NOT HAVE THE STRUCTURAL CAPACITY TO CARRY ALL OF THE ANTENNA AND PLATFORM LOADS SHOWN ON THESE DRAWINGS AT THE REQUIRED MINIMUM TIA/EIA-222-F BASIC WIND SPEEDS. DO NOT INSTALL ANY ADDITIONAL OR NEW ANTENNA AND PLATFORM LOADS UNTIL THE MONOPOLE REINFORCING SYSTEM IS COMPLETELY AND SUCCESSFULLY INSTALLED.
3. IF MATERIALS, QUANTITIES, STRENGTHS OR SIZES INDICATED BY THE DRAWINGS OR SPECIFICATIONS ARE NOT IN AGREEMENT WITH THESE NOTES, THE BETTER QUALITY AND/OR GREATER QUANTITY, STRENGTH OR SIZE INDICATED, SPECIFIED OR NOTED SHALL BE PROVIDED.
4. THIS STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE INSTALLATION OF THE REINFORCING REPAIR SYSTEM HAS BEEN PROPERLY AND ADEQUATELY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO INSURE THE SAFETY AND STABILITY OF THE MONOPOLE AND ITS COMPONENT PARTS DURING FIELD MODIFICATIONS. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF WHATEVER TEMPORARY BRACING, GUYS OR TIE DOWNS THAT MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER THE COMPLETION OF THE PROJECT. **IMPORTANT CUTTING, WELDING AND SAFETY GUIDELINES:** THE CONTRACTOR SHALL FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE PREVENTION AND SAFETY GUIDELINES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A COPY OF THE CURRENT CROWN CASTLE GUIDELINES FROM CROWN CASTLE. PER THE 12-01-2005 CROWN CASTLE DIRECTIVE: **"ALL CUTTING AND WELDING ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH CROWN CASTLE POLICY 'CUTTING AND WELDING PLAN' (DOC # ENG-PLN-10015) ON AN ONGOING BASIS THROUGHOUT THE ENTIRE LIFE OF THE PROJECT"**.
5. THE STRUCTURAL CONTRACT DOCUMENTS DO NOT INDICATE THE METHOD OR MEANS OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. OBSERVATION VISITS TO THE SITE BY THE OWNER AND/OR THE ENGINEER SHALL NOT INCLUDE INSPECTIONS OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES.
6. ANY SUPPORT SERVICES PERFORMED BY THE ENGINEER DURING CONSTRUCTION SHALL BE DISTINGUISHED FROM CONTINUOUS AND DETAILED INSPECTION SERVICES WHICH ARE FURNISHED BY THE INSPECTION/TESTING AGENCY. THESE SUPPORT SERVICES PERFORMED BY THE ENGINEER ARE SOLELY FOR THE PURPOSE OF ASSISTING IN QUALITY CONTROL AND IN ACHIEVING CONFORMANCE WITH CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.
7. ALL MATERIALS AND EQUIPMENT FURNISHED WILL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANY AND ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF MATERIALS AND EQUIPMENT BEING SUBSTITUTED.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT THIS PROJECT AND RELATED WORK COMPLIES WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY CODES AND REGULATIONS GOVERNING THIS WORK AS WELL AS CROWN CASTLE SAFETY GUIDELINES.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING AND NEW COAXIAL CABLES AND OTHER EQUIPMENT DURING CONSTRUCTION.
10. ANY EXISTING ATTACHMENTS AND/OR PROJECTIONS ON THE POLE THAT MAY INTERFERE WITH THE INSTALLATION OF THE REINFORCING SYSTEM WILL HAVE TO BE REMOVED, AND/OR RELOCATED, AND/OR REPLACED AND RE-INSTALLED AFTER THE REINFORCING IS SUCCESSFULLY COMPLETED. THE CONTRACTOR SHALL IDENTIFY AND COORDINATE THESE ITEMS PRIOR TO CONSTRUCTION WITH THE OWNER, TESTING AGENCY, AND ENGINEER.
11. ANY AND ALL EXISTING PLATFORMS THAT ARE LOCATED IN AREAS OF THE POLE SHAFT WHERE SHAFT REINFORCING MUST BE APPLIED SHALL BE TEMPORARILY REMOVED OR OTHERWISE SUPPORTED TO PERMIT NEW CONTINUOUS REINFORCEMENT TO BE ATTACHED. AFTER THE CONTRACTOR HAS SUCCESSFULLY INSTALLED THE MONOPOLE REINFORCEMENT SYSTEM, THE CONTRACTOR SHALL RE-INSTALL THE PLATFORMS. IN NO CASE SHALL ANY NEW AND/OR ADDITIONAL PLATFORMS AND/OR ANTENNAS AND/OR COAX CABLES AND/OR OTHER EQUIPMENT BE INSTALLED ON THE MONOPOLE UNTIL THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF ALL OF THE REQUIRED STRUCTURAL REINFORCING SYSTEM COMPONENTS.

**B. (SECTION NOT USED)**

**C. SPECIAL INSPECTION AND TESTING**

1. ALL WORK SHALL BE SUBJECT TO REVIEW AND OBSERVATION BY THE OWNER'S REPRESENTATIVE AND THE OWNER'S AUTHORIZED INDEPENDENT INSPECTION AND TESTING AGENCY. REFER TO CROWN CASTLE DOCUMENT ENG-SOW-10066 FOR SPECIFICATION.
  2. ANY SUPPORT SERVICES PERFORMED BY THE ENGINEER DURING CONSTRUCTION SHALL BE DISTINGUISHED FROM CONTINUOUS AND DETAILED INSPECTION SERVICES WHICH ARE FURNISHED BY OTHERS. THESE SUPPORT SERVICES PERFORMED BY THE ENGINEER ARE PERFORMED SOLELY FOR THE PURPOSE OF ASSISTING IN QUALITY CONTROL AND IN ACHIEVING CONFORMANCE WITH CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.
  3. OBSERVED DISCREPANCIES BETWEEN THE WORK AND THE CONTRACT DOCUMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST.
  4. AN INDEPENDENT QUALIFIED INSPECTION/TESTING AGENCY SHALL BE SELECTED, RETAINED AND PAID FOR BY THE OWNER FOR THE SOLE PURPOSE OF INSPECTING, TESTING, DOCUMENTING, AND APPROVING ALL WELDING AND FIELD WORK PERFORMED BY THE CONTRACTOR.
    - (A.) ACCESS TO ANY PLACE WHERE WORK IS BEING DONE SHALL BE PERMITTED AT ALL TIMES.
    - (B.) THE INSPECTION AGENCY SHALL SO SCHEDULE THIS WORK AS TO CAUSE A MINIMUM OF INTERRUPTION TO, AND COORDINATE WITH, THE WORK IN PROGRESS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE THE WORK SCHEDULE WITH THE TESTING AGENCY. THE CONTRACTOR SHALL ALLOW FOR ADEQUATE TIME AND ACCESS FOR THE TESTING AGENCY TO PERFORM THEIR DUTIES.
  5. THE INSPECTION AND TESTING AGENCY SHALL BE RESPONSIBLE TO PERFORM THE FOLLOWING SERVICES FOR THE OWNER. THE TESTING AGENCY SHALL INSPECT THE FOLLOWING ITEMS IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS. THE TESTING AGENCY SHALL INSPECT ITEMS ON THIS LIST AND OTHER ITEMS AS NECESSARY TO FULFILL THEIR RESPONSIBILITY. THE TESTING AGENCY SHALL UTILIZE EXPERIENCED, TRAINED INSPECTORS INCLUDING AWS CERTIFIED WELDING INSPECTORS (CWI). INSPECTORS SHALL HAVE THE TRAINING, CREDENTIALS, AND EXPERIENCE APPROPRIATE FOR AND COMMENSURATE WITH THE SCOPE AND TYPE OF INSPECTION WORK TO BE PERFORMED.
    - A. GENERAL:
      - (1.) PERFORM PERIODIC ON-SITE OBSERVATION, INSPECTION, VERIFICATION, AND TESTING DURING THE TIME THE CONTRACTOR IS WORKING ON-SITE. AGENCY SHALL NOTIFY OWNER IMMEDIATELY WHEN FIELD PROBLEMS OR DISCREPANCIES OCCUR.
    - B. FOUNDATIONS, CONCRETE, AND SOIL PREPARATION - (NOT REQUIRED)
    - C. CONCRETE TESTING PER ACI - (NOT REQUIRED)
    - D. STRUCTURAL STEEL
      - (1.) CHECK THE STEEL ON THE JOB WITH THE PLANS.
      - (2.) CHECK MILL CERTIFICATIONS.
      - (3.) CHECK GRADE OF STEEL MEMBERS, AND BOLTS FOR CONFORMANCE WITH DRAWINGS.
      - (4.) INSPECT STEEL MEMBERS FOR DISTORTION, EXCESSIVE RUST, FLAWS AND BURNED HOLES.
      - (5.) CALL FOR LABORATORY TEST REPORTS WHEN IN DOUBT.
      - (6.) CHECK STEEL MEMBERS FOR SIZES, SWEEP AND DIMENSIONAL TOLERANCES.
      - (7.) CHECK FOR SURFACE FINISH SPECIFIED, GALVANIZED.
      - (8.) CHECK BOLT TIGHTENING ACCORDING TO AISC "TURN OF THE NUT" METHOD.
    - E. WELDING:
      - (1.) VERIFY FIELD WELDING PROCEDURES, WELDERS, AND WELDING OPERATORS, NOT DEEMED PREQUALIFIED, IN ACCORDANCE WITH AWS D1.1.
      - (2.) INSPECT FIELD WELDED CONNECTIONS IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED AND IN ACCORDANCE WITH AWS D1.1.
      - (3.) APPROVE FIELD WELDING SEQUENCE.
        - (A.) A PROGRAM OF THE APPROVED SEQUENCES SHALL BE SUBMITTED TO THE OWNER BEFORE WELDING BEGINS. NO CHANGE IN APPROVED SEQUENCES MAY BE MADE WITHOUT PERMISSION FROM THE OWNER.
      - (4.) INSPECT WELDED CONNECTIONS AS FOLLOWS AND IN ACCORDANCE WITH AWS D1.1:
        - (A.) INSPECT WELDING EQUIPMENT FOR CAPACITY, MAINTENANCE AND WORKING CONDITIONS.
        - (B.) VERIFY SPECIFIED ELECTRODES AND HANDLING AND STORAGE OF ELECTRODES FOR CONFORMANCE TO SPECIFICATIONS.
        - (C.) INSPECT PREHEATING AND INTERPASS TEMPERATURES FOR CONFORMANCE WITH AWS D1.1.
        - (D.) VISUALLY INSPECT ALL WELDS AND VERIFY THAT QUALITY OF WELDS MEETS THE REQUIREMENTS OF AWS D1.1.
        - (E.) SPOT TEST AT LEAST ONE FILLET WELD OF EACH MEMBER USING MAGNETIC PARTICLE OR DYE PENETRANT.
        - (F.) INSPECT FOR SIZE, SPACING, TYPE AND LOCATION AS PER APPROVED PLANS.
        - (G.) VERIFY THAT THE BASE METAL CONFORMS TO THE DRAWINGS.
        - (H.) REVIEW THE REPORTS BY TESTING LABS.
        - (I.) CHECK TO SEE THAT WELDS ARE CLEAN AND FREE FROM SLAG.
        - (J.) INSPECT RUST PROTECTION OF WELDS AS PER SPECIFICATIONS.
        - (K.) CHECK THAT DEFECTIVE WELDS ARE CLEARLY MARKED AND HAVE BEEN ADEQUATELY REPAIRED.
    - F. REPORTS:
      - (1.) COMPILE AND PERIODICALLY SUBMIT DAILY INSPECTION REPORTS TO THE OWNER.
6. THE INSPECTION PLAN OUTLINED HEREIN IS INTENDED AS A DESCRIPTION OF GENERAL AND SPECIFIC ITEMS OF CONCERN. IT IS NOT INTENDED TO BE ALL-INCLUSIVE. IT DOES NOT LIMIT THE TESTING AND INSPECTION AGENCY TO THE ITEMS LISTED. ADDITIONAL TESTING, INSPECTION, AND CHECKING MAY BE REQUIRED AND SHOULD BE ANTICIPATED. THE TESTING AGENCY SHALL USE THEIR PROFESSIONAL JUDGMENT AND KNOWLEDGE OF THE JOB SITE CONDITIONS AND THE CONTRACTOR'S PERFORMANCE TO DECIDE WHAT OTHER ITEMS REQUIRE ADDITIONAL ATTENTION. THE TESTING AGENCY'S JUDGMENT MUST PREVAIL ON ITEMS NOT SPECIFICALLY COVERED. ANY DISCREPANCIES AND PROBLEMS SHALL BE BROUGHT IMMEDIATELY TO THE OWNER'S ATTENTION. RESOLUTIONS ARE NOT TO BE MADE WITHOUT THE OWNER'S REVIEW AND SPECIFIC WRITTEN CONSENT. THE OWNER RESERVES THE RIGHT TO DETERMINE WHAT IS AN ACCEPTABLE RESOLUTION OF DISCREPANCIES AND PROBLEMS.
7. AFTER EACH INSPECTION, THE TESTING AGENCY WILL PREPARE A WRITTEN ACCEPTANCE OR REJECTION WHICH WILL BE GIVEN TO THE CONTRACTOR AND FILED AS DAILY REPORTS TO THE OWNER. THIS WRITTEN ACTION WILL GIVE THE CONTRACTOR A LIST OF ITEMS TO BE CORRECTED, PRIOR TO CONTINUING CONSTRUCTION, AND/OR LOADING OF STRUCTURAL ITEMS.
8. RESPONSIBILITY: THE TESTING AGENCY DOES NOT RELIEVE THE CONTRACTOR'S CONTRACTUAL OR STATUTORY OBLIGATIONS. THE CONTRACTOR HAS THE SOLE RESPONSIBILITY FOR ANY DEVIATIONS FROM THE OFFICIAL CONTRACT DOCUMENTS. THE TESTING AGENCY WILL NOT REPLACE THE CONTRACTOR'S QUALITY CONTROL PERSONNEL.

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**PAUL J. FORD AND COMPANY**  
 STRUCTURAL ENGINEERS  
 250 East Broad Street · Suite 600 · Columbus, Ohio 43215  
 (614) 221-6679 www.pjfw.com

**CROWN CASTLE**  
 46 BROADWAY, ALBANY, NEW YORK 21204  
 PH: (585) 899-3442

**BU #806376; HRT 100 943239**  
**EAST HARTFORD, CONNECTICUT**  
**MONOPOLE REINFORCEMENT AND RETROFIT PROJECT**

PROJECT: 37513-0342.002.7700

DRAWN BY:  
B.M.S.

CHECKED BY:  
S.J.T.

APPROVED BY:

DATE:  
8-5-2014

GENERAL NOTES

S-1



**D. STRUCTURAL STEEL**

1. STRUCTURAL STEEL MATERIALS, FABRICATION, DETAILING, AND WORKMANSHIP SHALL CONFORM TO THE LATEST EDITION OF THE FOLLOWING REFERENCE STANDARDS:  
BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC):
- A. (A.) "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS."  
(B.) "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS," AS APPROVED BY THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS OF THE ENGINEERING FOUNDATION.  
(C.) "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES" (PARAGRAPH 4.2.1 SPECIFICALLY EXCLUDED).
- B. BY THE AMERICAN WELDING SOCIETY (AWS):  
(A.) "STRUCTURAL WELDING CODE - STEEL D1.1."  
(B.) "SYMBOLS FOR WELDING AND NON-DESTRUCTIVE TESTING"
2. ANY MATERIAL OR WORKMANSHIP WHICH IS OBSERVED TO BE DEFECTIVE OR INCONSISTENT WITH THE CONTRACT DOCUMENTS SHALL BE CORRECTED, MODIFIED, OR REPLACED AT THE CONTRACTOR'S EXPENSE.
3. TIGHTEN ALL STRUCTURAL BOLTS, INCLUDING THE AJAX M20 BOLTS WITH SHEAR SLEEVES, ACCORDING TO THE REQUIREMENTS OF THE AISC "TURN OF THE NUT" METHOD. TIGHTEN BOLTS 1/3 TURN PAST THE SNUG TIGHT CONDITION AS DEFINED BY AISC.
4. WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY, AWS D1.1. ALL WELD ELECTRODES SHALL BE E80XX UNLESS NOTED OTHERWISE ON THE DRAWINGS.
5. ALL WELDED CONNECTIONS SHALL BE MADE BY WELDERS CERTIFIED BY AWS. CONTRACTOR SHALL SUBMIT WELDERS' CERTIFICATION AND QUALIFICATION DOCUMENTATION TO THE OWNER'S TESTING AGENCY FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
6. STRUCTURAL STEEL PLATES SHALL CONFORM TO ASTM A572 GRADE 65 (FY = 65 KSI MIN.) UNLESS NOTED OTHERWISE ON THE DRAWINGS.
7. SURFACES OF EXISTING STEEL SHALL BE PREPARED AS REQUIRED FOR FIELD WELDING PER AWS. SEE SECTION I NOTES REGARDING TOUCH-UP OF GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS FIELD WELDING.
8. UNLESS OTHERWISE NOTED, ALL STEEL MEMBERS SHALL BE HOT-DIP GALVANIZED, AFTER FABRICATION, IN ACCORDANCE WITH ASTM A123. SEE SECTION J FOR FURTHER NOTES AND FOR EXCEPTIONS (IF ANY).
9. ALL WELDS SHALL BE VISUALLY INSPECTED BY THE OWNER'S APPROVED TESTING AGENCY. OTHER TESTS MAY ALSO BE PERFORMED ON THE WELDS BY THE TESTING AGENCY IN ORDER FOR THEM TO PERFORM THEIR DUTIES FOR THIS PROJECT. THE CONTRACTOR SHALL COOPERATE WITH THE TESTING AGENCY IN THEIR TESTING EFFORTS.
10. NO WELDING SHALL BE DONE TO THE EXISTING STRUCTURE WITHOUT THE PRIOR APPROVAL AND SUPERVISION OF THE TESTING AGENCY.
11. FIELD CUTTING OF STEEL:  
(A.) PRIOR TO ANY FIELD CUTTING, THE CONTRACTOR SHALL MARK THE CUT OUTLINES ON THE STEEL AND THE INSPECTION/TESTING AGENCY SHALL VERIFY PROPOSED LAYOUT, LOCATION, AND DIMENSIONS.  
(B.) ANY REQUIRED CUTS IN THE STEEL SHALL BE CAREFULLY CUT BY MECHANICAL METHODS SUCH AS DRILLING, SAW CUTTING, AND GRINDING. THE CONTRACTOR IS RESPONSIBLE TO PREVENT ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, DURING THE CUTTING WORK. ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, RESULTING FROM THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.  
(C.) ALL REQUIRED CUTS SHALL BE CUT WITHIN THE DIMENSIONS SHOWN ON THE DRAWINGS. NO CUTS SHALL EXTEND BEYOND THE OUTLINE OF THE DIMENSIONS SHOWN ON THE DRAWINGS. ALL CUT EDGES SHALL BE GROUND SMOOTH AND DE-BURRED. CUT EDGES THAT ARE TO BE FIELD WELDED SHALL BE PREPARED FOR FIELD WELDING PER AWS D1.1 AND AS SHOWN ON THE DRAWINGS. IT MAY BE NECESSARY TO DRILL STARTER HOLES AS REQUIRED TO MAKE THE CUTS. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.

**E. BASE PLATE GROUT - (NOT REQUIRED)**

**F. FOUNDATION WORK - (NOT REQUIRED)**

**G. CAST-IN-PLACE CONCRETE - (NOT REQUIRED)**

**H. EPOXY GROUTED REINFORCING ANCHOR RODS - (NOT REQUIRED)**

**I. TOUCH UP OF GALVANIZING**

1. THE CONTRACTOR SHALL TOUCH UP ANY AND/OR ALL AREAS OF GALVANIZING ON THE EXISTING STRUCTURE OR NEW COMPONENTS THAT ARE DAMAGED OR ABRADED DURING CONSTRUCTION. **GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS ANY AND ALL ABRASIONS, CUTS, FIELD DRILLING, AND ALL FIELD WELDING SHALL BE TOUCHED UP WITH TWO (2) COATS OF ZRC-BRAND ZINC-RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.**
2. CONTRACTOR SHALL CLEAN AND PREPARE ALL FIELD WELDS ON GALVANIZED AND PRIME PAINTED SURFACES FOR TOUCH-UP COATING IN ACCORDANCE WITH AWS D1.1. THE OWNER'S TESTING AGENCY SHALL VERIFY THE PREPARED SURFACE PRIOR TO APPLICATION OF THE TOUCH-UP COATING.
3. THE OWNER'S TESTING AGENCY SHALL TEST AND VERIFY THE COATING THICKNESS AFTER THE CONTRACTOR HAS APPLIED THE ZRC COLD GALVANIZING COMPOUND AND IT HAS SUFFICIENTLY DRIED. AREAS FOUND TO BE INADEQUATELY COATED, SHALL BE RE-COATED BY THE CONTRACTOR AND RE-TESTED BY THE TESTING AGENCY.

**J. HOT DIP GALVANIZING**

1. HOT-DIP GALVANIZE ALL STRUCTURAL STEEL MEMBERS AND ALL STEEL ACCESSORIES, BOLTS, WASHERS, ETC. PER ASTM A123 OR PER ASTM A153, AS APPROPRIATE.
2. PROPERLY PREPARE STEEL ITEMS FOR GALVANIZING.
3. DRILL OR PUNCH WEEP AND/OR DRAINAGE HOLES AS REQUIRED.
4. ALL GALVANIZING SHALL BE DONE AFTER FABRICATION IS COMPLETED AND PRIOR TO FIELD INSTALLATION.

**K. PERPETUAL INSPECTION AND MAINTENANCE BY THE OWNER**

1. AFTER THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF THE MONOPOLE REINFORCING SYSTEM AND THE WORK HAS BEEN ACCEPTED BY THE OWNER, THE OWNER WILL BE RESPONSIBLE FOR THE LONG TERM AND PERPETUAL INSPECTION AND MAINTENANCE OF THE POLE AND REINFORCING SYSTEM.
2. THE MONOPOLE REINFORCING SYSTEM INDICATED IN THESE DOCUMENTS USES REINFORCING COMPONENTS THAT INVOLVE FIELD WELDING STEEL MEMBERS TO THE EXISTING GALVANIZED STEEL POLE STRUCTURE. THESE FIELD WELDED CONNECTIONS ARE SUBJECT TO CORROSION DAMAGE AND DETERIORATION IF THEY ARE NOT PROPERLY MAINTAINED AND COVERED WITH CORROSION PREVENTIVE COATING SUCH AS THE ZRC GALVANIZING COMPOUND SPECIFIED PREVIOUSLY. THE STRUCTURAL LOAD CARRYING CAPACITY OF THE REINFORCED POLE SYSTEM IS DEPENDENT UPON THE INSTALLED SIZE AND QUALITY, MAINTAINED SOUND CONDITION AND STRENGTH OF THESE FIELD WELDED CONNECTIONS. **ANY CORROSION OF, DAMAGE TO, FATIGUE, FRACTURE, AND/OR DETERIORATION OF THESE WELDS AND/OR THE CONNECTED COMPONENTS WILL RESULT IN THE LOSS OF STRUCTURAL LOAD CARRYING CAPACITY AND MAY LEAD TO FAILURE OF THE STRUCTURAL SYSTEM. THEREFORE, IT IS IMPERATIVE THAT THE OWNER REGULARLY INSPECTS, MAINTAINS, AND REPAIRS AS NECESSARY, ALL OF THESE WELDS, CONNECTIONS, AND COMPONENTS FOR THE LIFE OF THE STRUCTURE.**
3. THE OWNER SHALL REFER TO TIA/EIA-222-F-1996, SECTION 14 AND ANNEX E FOR RECOMMENDATIONS FOR MAINTENANCE AND INSPECTION. THE FREQUENCY OF THE INSPECTION AND MAINTENANCE INTERVALS IS TO BE DETERMINED BY THE OWNER BASED UPON ACTUAL SITE AND ENVIRONMENTAL CONDITIONS. **PAUL J. FORD & COMPANY RECOMMENDS THAT A COMPLETE AND THOROUGH INSPECTION OF THE ENTIRE REINFORCED MONOPOLE STRUCTURAL SYSTEM BE PERFORMED YEARLY AND/OR AS FREQUENTLY AS CONDITIONS WARRANT.** ACCORDING TO TIA/EIA-222-F-1996 SECTION 14.1, NOTE 1: "IT IS RECOMMENDED THAT THE STRUCTURE BE INSPECTED AFTER SEVERE WIND AND/OR ICE STORMS OR OTHER EXTREME LOADING CONDITIONS".

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**PAUL J. FORD AND COMPANY**  
 STRUCTURAL ENGINEERS  
 250 East Broad Street • Suite 600 • Columbus, Ohio 43215  
 (614) 221-6679 www.pjfweb.com

**CROWN CASTLE**  
 46 BROADWAY, ALBANY, NEW YORK 21204  
 PH: (585) 899-3442

**BU #806376; HRT 100 943239**  
**EAST HARTFORD, CONNECTICUT**  
 MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37513-0342.002.7700

DRAWN BY:  
B.M.S.

CHECKED BY:  
S.J.T.

APPROVED BY:

DATE:  
8-5-2014

GENERAL NOTES

S-2

- NOTES:**
1. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
  2. ALL STRUCTURAL BOLTS SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
  3. ALL AJAX M20 BOLTS WITH SHEAR SLEEVES SHALL BE PRETENSIONED AND TIGHTENED UNTIL THE DIRECT TENSION INDICATOR (DTI) WASHERS SHOW THAT THE PROPER BOLT TENSION HAS BEEN REACHED. SEE NOTES AND DETAIL BELOW FOR THE USE OF DIRECT TENSION INDICATOR (DTI) WASHERS WITH THE AJAX M20 BOLTS.
  4. ALL AJAX BOLTS SHALL BE INSTALLED USING DIRECT TENSION INDICATORS (DTI'S) AND HARDENED WASHERS. DTI'S SHALL BE THE SQUIRTER® STYLE, MADE TO ASTM F959 LATEST REVISION; AND HARDENED WASHERS SHALL CONFORM TO ASTM F436 AND HAVE A HARDNESS OF RC 38 OR HIGHER.

**NOTES FOR AJAX M20 'ONE-SIDE BOLTS WITH DIRECT TENSION INDICATORS (DTI'S):**

**DTI'S REQUIRED:** DTI'S SHALL BE "SELF-INDICATING" SQUIRTER® STYLE DTI'S MADE WITH RED DURABLE SQUIRT MEDIA EMBEDDED IN THEM, INSPECTED BY MEANS OF THE VISUAL EJECTION OF SILICONE AS THE DTI PROTRUSIONS COMPRESS. SQUIRTER® DTI'S SHALL BE CALIBRATED PER MANUFACTURER'S INSTRUCTIONS PRIOR TO USE.

THE DIRECT TENSION INDICATOR (DTI) WASHERS SHALL BE THE "SQUIRTER® STYLE" AS MANUFACTURED BY APPLIED BOLTING TECHNOLOGY PRODUCTS' INC.:

**PART NUMBER:** 2DTIM208MGAFSIF

**DESCRIPTION:** P.C. 8.8 DTI SQUIRTER WASHER WITH RED DURABLE SQUIRT MEDIA DESIGNED SPECIFICALLY FOR THE AJAX M20 ONESIDE BOLT. FINISH SHALL BE ZINC GALVANIZED AS PROVIDED BY THE DTI MANUFACTURER.

**DISTRIBUTOR CONTACT DETAILS:**

ALLFASTENERS  
 15401 COMMERCE PARK DR.  
 BROOKPARK, OHIO 44142  
 PHONE: 440-232-6060  
 E-MAIL: SALES@ALLFASTENERS.COM

**DTI:** USE DIRECT TENSION INDICATOR (DTI) WASHERS COMPATIBLE WITH 20 MM (M20) NOMINAL A325 BOLTS FOR THE AJAX M20 BOLTS. DTI'S SHALL NOT BE HOT-DIP GALVANIZED. DTI'S SHALL BE MECHANICALLY GALVANIZED (MG) BY THE COLD MECHANICAL PROCESS ONLY AS PROVIDED BY THE DTI MANUFACTURER.

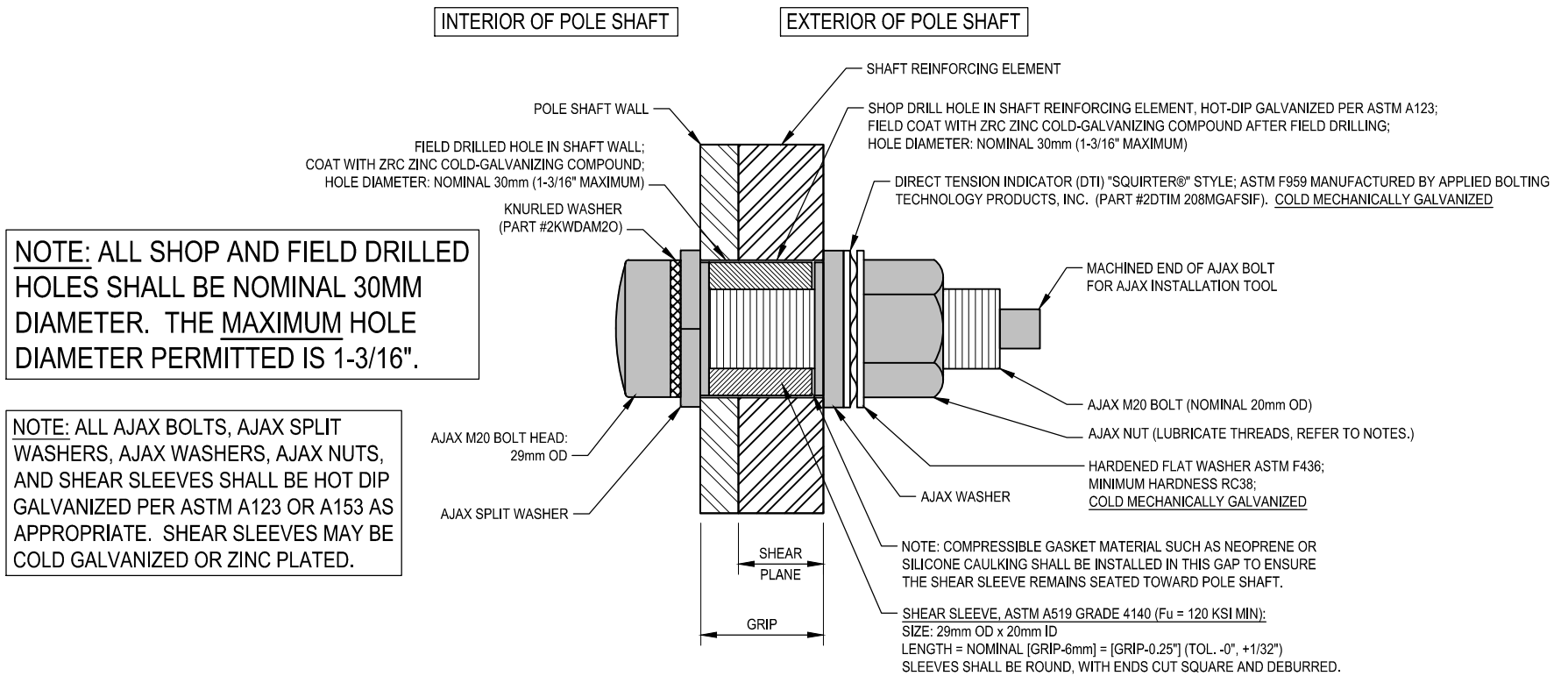
**HARDENED WASHERS REQUIRED:** USE A HARDENED WASHER FOR A 20 MM (M20) NOMINAL BOLT BETWEEN THE TOP OF THE DIRECT TENSION INDICATOR (DTI) WASHER AND THE NUT OF THE AJAX M20 BOLTS. HARDENED WASHERS SHALL CONFORM TO ASTM F436 AND HAVE A MINIMUM HARDNESS OF RC 38 OR HIGHER. THE HARDENED WASHERS SHALL BE MECHANICALLY GALVANIZED BY THE COLD MECHANICAL PROCESS. ALTERNATIVELY, CORRECTLY MADE HOT DIP GALVANIZED HARDENED FLAT WASHERS HAVING A MINIMUM HARDNESS OF RC 38 CAN BE USED; CONTRACTOR SHALL PROVIDE DOCUMENTATION OF WASHER SPECIFICATION AND HARDNESS.

**NUT LUBRICATION REQUIRED:** PROPERLY LUBRICATE THE THREADS OF THE NUT OF THE AJAX BOLT SO THAT IT CAN BE PROPERLY TIGHTENED WITHOUT GALLING AND/OR LOCKING UP ON THE BOLT THREADS. CONTRACTOR SHALL FOLLOW DTI MANUFACTURER INSTRUCTIONS FOR PROPER LUBRICATION AND TIGHTENING.

**NOTE:** COMPLETELY COMPRESSED DTI'S SHOWING NO VISIBLE REMAINING GAP ARE ACCEPTABLE. DTI WASHERS SHALL BE PLACED DIRECTLY AGAINST THE OUTER AJAX WASHER WITH THE DTI BUMPS FACING AWAY FROM THE AJAX WASHER. PLACE A HARDENED WASHER BETWEEN THE DTI AND THE AJAX NUT. THE DTI BUMPS SHALL BEAR AGAINST THE UNDERSIDE OF A HARDENED FLAT WASHER, NEVER DIRECTLY AGAINST THE NUT.

CONTRACTOR SHALL FOLLOW DTI MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION, LUBRICATION, TIGHTENING AND INSPECTION.

**INSPECTION REQUIRED:** ALL AJAX BOLTS SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009, BY A QUALIFIED BOLT INSPECTOR. DURING INSTALLATION, THE BOLT INSPECTOR SHALL VERIFY AND DOCUMENT: THE SHOP-DRILLED AND FIELD-DRILLED HOLE SIZES; THE INSTALLATION OF THE AJAX BOLT ASSEMBLY, INCLUDING THE SHEAR SLEEVE PLACEMENT AND NUT LUBRICATION; AND THE CONTRACTOR'S TENSIONING PROCEDURE. IN ADDITION, ALL AJAX BOLTS AND DTI'S SHALL BE VISUALLY INSPECTED ACCORDING TO THE DTI MANUFACTURER'S INSTRUCTIONS. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE PHOTO DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THE CONDITION OF THE DTI'S.



**NOTE:** ALL SHOP AND FIELD DRILLED HOLES SHALL BE NOMINAL 30MM DIAMETER. THE MAXIMUM HOLE DIAMETER PERMITTED IS 1-3/16".

**NOTE:** ALL AJAX BOLTS, AJAX SPLIT WASHERS, AJAX WASHERS, AJAX NUTS, AND SHEAR SLEEVES SHALL BE HOT DIP GALVANIZED PER ASTM A123 OR A153 AS APPROPRIATE. SHEAR SLEEVES MAY BE COLD GALVANIZED OR ZINC PLATED.

**TYPICAL AJAX BOLT DETAIL** 1  
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**PAUL J. FORD AND COMPANY**  
 STRUCTURAL ENGINEERS  
 250 East Broad Street · Suite 600 · Columbus, Ohio 43215  
 (614) 221-6679 www.pjfweb.com

**CROWN CASTLE**  
 46 BROADWAY, ALBANY, NEW YORK 21204  
 PH: (585) 899-3442

**BU #806376; HRT 100 943239**  
**EAST HARTFORD, CONNECTICUT**  
 MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37513-0342.002.7700

DRAWN BY: B.M.S.	AJAX BOLT DETAIL
CHECKED BY: S.J.T.	
APPROVED BY:	<b>S-3</b>
DATE: 8-5-2014	

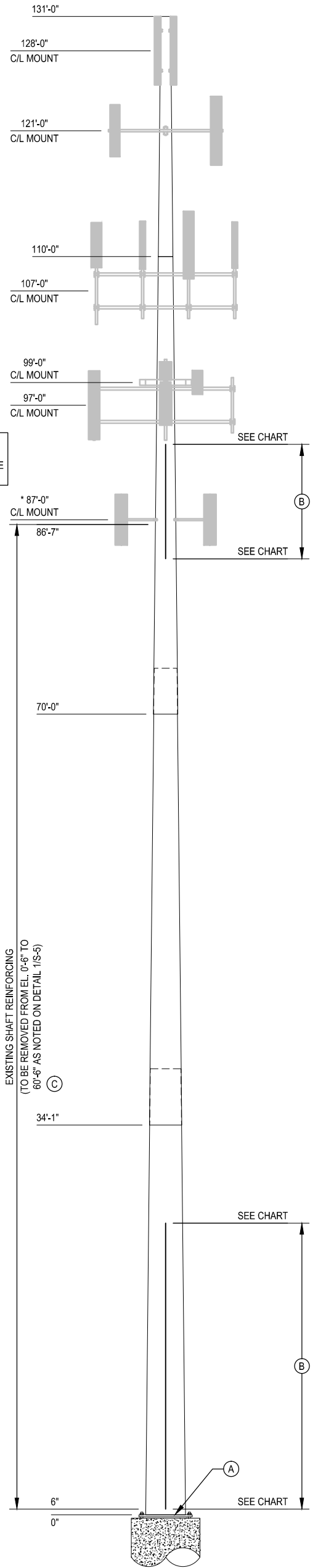
POLE SPECIFICATIONS	
POLE SHAPE TYPE:	12-SIDED POLYGON
TAPER:	0.249795 IN/FT
SHAFT STEEL:	ASTM A572 GRADE 65
BASE PL STEEL:	ASTM A633 GR. E (60 KSI)
ANCHOR RODS:	2 1/4"Ø #18J ASTM A615 GRADE 75

SHAFT SECTION DATA					
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN)	
				@ TOP	@ BOTTOM
1	21.00	0.1875		10.525	15.525
2	40.00	0.2500	48.00	15.525	25.531
3	39.92	0.3125	59.00	24.030	34.015
4	39.00	0.3438		32.158	41.900

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

MODIFICATIONS:	
(A)	INSTALL NEW TRANSITION STIFFENERS AT BASE PLATE. SEE SHEET S-5.
(B)	INSTALL NEW SHAFT REINFORCING. SEE CHART.
(C)	EXISTING SHAFT REINFORCING TO BE REMOVED ON FLATS.

\* EXISTING MOUNTS MAY NEED TO BE ADJUSTED, MOVED AND/OR TEMPORARILY SUPPORTED DURING THE INSTALLATION OF SHAFT REINFORCING



NEW CCI FLAT PLATE (65 KSI) REINFORCING SCHEDULE											
BOTTOM ELEVATION	TOP ELEVATION	FLAT # / DEGREE SEPARATION	ELEMENT	ELEMENT LENGTH	ELEMENT QUANTITY	APPROXIMATE AJAX BOLTS PER ELEMENT	APPROXIMATE TOTAL AJAX BOLT QUANTITY	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAXIMUM INTERMEDIATE BOLT SPACING	ESTIMATED TOTAL STEEL WEIGHT
0' - 6"	25' - 6"	F2, F6 & F10	CCI-AFP-06010025	25' - 0"	3	34	102	10	10	16"	1531 LBS.
83' - 7"	93' - 7"	F2, F6 & F10	CCI-SFP-04007510	10' - 0"	3	13	39	4	4	16"	306 LBS.
							141				1837 LBS.

- NOTES:
- 1.) AJAX BOLTS ARE TO BE 20mm DIAMETER WITH CORRESPONDING 29mm DIAMETER SLEEVE WITH MATCHING STEEL GRADE.
  - 2.) ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. ALTERNATIVELY, ALL NEW STIFFENER PLATE STEEL REINFORCING MAY BE COLD GALVANIZED AS FOLLOWS: APPLY A MINIMUM OF TWO COATS OF ZRC-BRAND ZINC-RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS, DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.
  - 3.) ALL REINFORCING SHALL BE ASTM A672 GR. 65.
  - 4.) WELDS SHALL BE E80XX OR GREATER. TERMINATION WELDS SHALL BE 3/8" FILLET WELDS.
  - 5.) HOLES FOR AJAX BOLTS AND SHEAR SLEEVES ARE 30mm UNLESS NOTED OTHERWISE.
  - 6.) ALL SHIMS SHALL BE ASTM A-36.

POLE ELEVATION 1 S-4

CROWN CASTLE US PATENT NOS 8,046,972; 8,156,712; 7,849,659; 8,424,269 AND PATENT PENDING

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STRUCTURAL ENGINEERS  
250 East Broad Street · Suite 600 · Columbus, Ohio 43215  
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46 BROADWAY, ALBANY, NEW YORK 21204  
PH: (585) 899-3442

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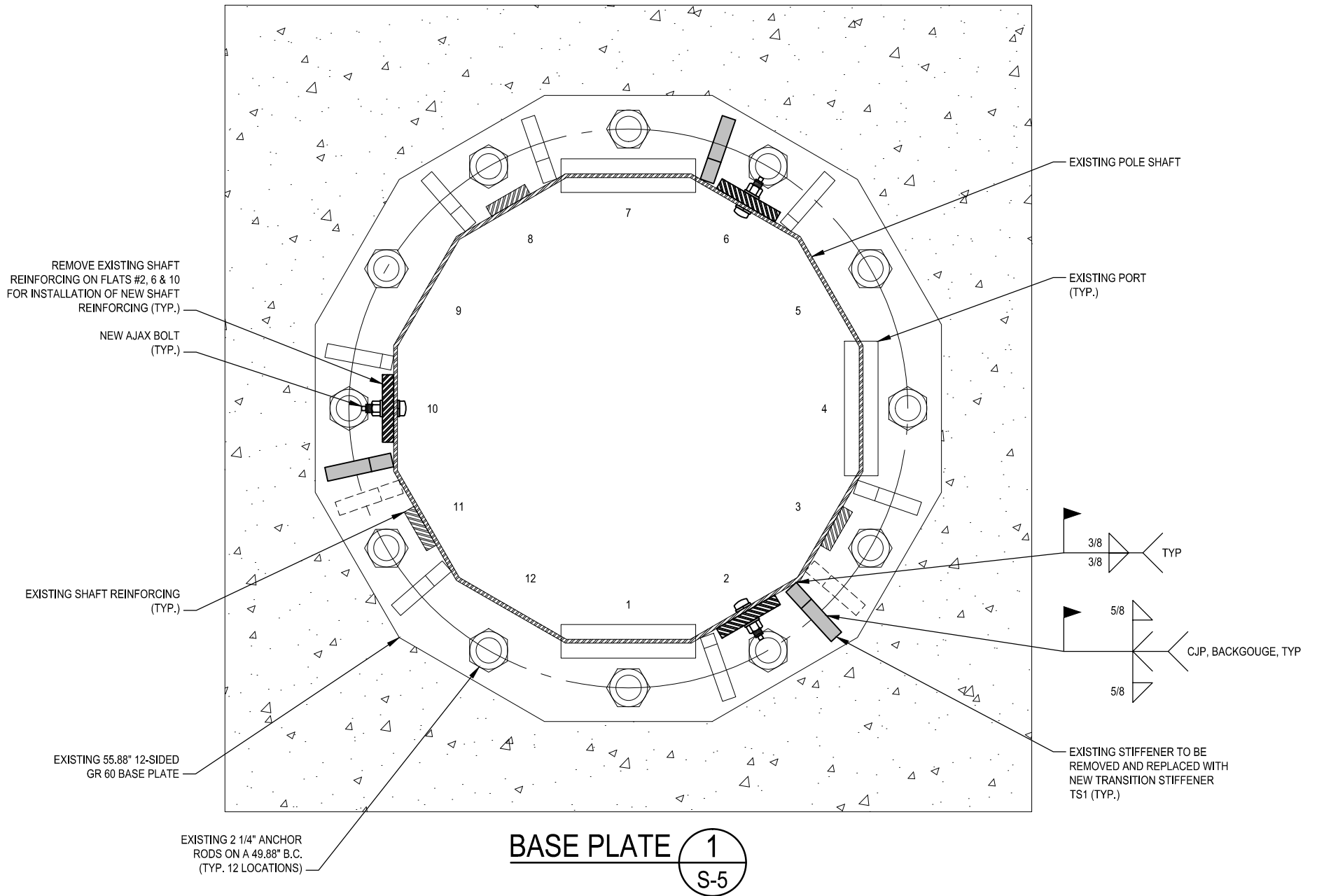
DRAWN BY: B.M.S.  
CHECKED BY: S.J.T.  
APPROVED BY:

DATE: 8-5-2014

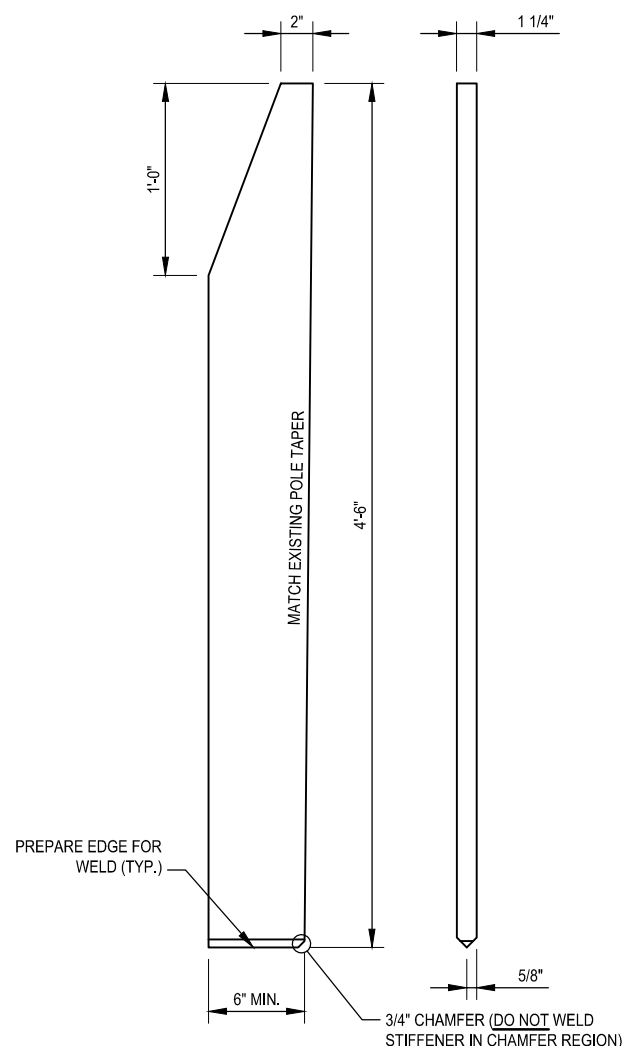
MONOPOLE PROFILE

**S-4**

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**BASE PLATE 1**  
S-5



**TRANSITION STIFFENER MK~TS1**  
(3 REQUIRED) (Fy = 65 KSI)

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**MONOPOLE REINFORCEMENT AND RETROFIT PROJECT**

PROJECT: 37513-0342.002.7700

DRAWN BY: B.M.S.	BASE PLATE DETAILS
CHECKED BY: S.J.T.	
APPROVED BY:	<b>S-5</b>
DATE: 8-5-2014	

**MODIFICATION INSPECTION NOTES:**

**GENERAL**

THE MODIFICATION INSPECTION (MI) IS A VISUAL INSPECTION OF TOWER MODIFICATIONS AND A REVIEW OF CONSTRUCTION INSPECTIONS AND OTHER REPORTS TO ENSURE THE INSTALLATION WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NAMELY THE MODIFICATION DRAWINGS, AS DESIGNED BY THE ENGINEER OF RECORD (EOR).

THE MI IS TO CONFIRM INSTALLATION CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A REVIEW OF THE MODIFICATION DESIGN ITSELF, NOR DOES THE MI INSPECTOR TAKE OWNERSHIP OF THE MODIFICATION DESIGN. OWNERSHIP OF THE STRUCTURAL MODIFICATION DESIGN EFFECTIVENESS AND INTEGRITY RESIDES WITH THE EOR AT ALL TIMES.

ALL MI'S SHALL BE CONDUCTED BY A CROWN ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN. SEE ENG-BUL-10173 LIST OF APPROVED MI VENDORS..

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

REFER TO ENG-SOW-10007 : MODIFICATION INSPECTION SOW FOR FURTHER DETAILS AND REQUIREMENTS.

**MI INSPECTOR**

THE MI INSPECTOR IS REQUIRED TO CONTACT THE GC AS SOON AS RECEIVING A PO FOR THE MI TO, AT A MINIMUM:

- REVIEW THE REQUIREMENTS OF THE MI CHECKLIST
- WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS

THE MI INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL GENERAL CONTRACTOR (GC) INSPECTION AND TEST REPORTS, REVIEWING THE DOCUMENTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING THE IN-FIELD INSPECTIONS, AND SUBMITTING THE MI REPORT TO CROWN.

**GENERAL CONTRACTOR**

THE GC IS REQUIRED TO CONTACT THE MI INSPECTOR AS SOON AS RECEIVING A PO FOR THE MODIFICATION INSTALLATION OR TURNKEY PROJECT TO, AT A MINIMUM:

- REVIEW THE REQUIREMENTS OF THE MI CHECKLIST
- WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS
- BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS

THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE MI CHECKLIST AN DENG-SOW-10007.

**RECOMMENDATIONS**

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

- IT IS SUGGESTED THAT THE GC PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, PREFERABLE 10, TO THE MI INSPECTOR AS TO WHEN THE SITE WILL BE READY FOR THE MI TO BE CONDUCTED.
- THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS
- IT MAY BE BENEFICIAL TO INSTALL ALL TOWER MODIFICATIONS PRIOR TO CONDUCTING THE FOUNDATION INSPECTIONS TO ALLOW FOUNDATION AND MI INSPECTION(S) TO COMMENCE WITH ONE SITE VISIT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE DURING THE MI TO HAVE ANY DEFICIENCIES CORRECTED DURING THE INITIAL MI. THEREFORE, THE GC MAY CHOOSE TO COORDINATE THE MI CAREFULLY TO ENSURE ALL CONSTRUCTION FACILITIES ARE AT THEIR DISPOSAL WHEN THE MI INSPECTOR IS ON SITE.

**CANCELLATION OR DELAYS IN SCHEDULED MI**

IF THE GC AND MI INSPECTOR AGREE TO A DATE ON WHICH THE MI WILL BE CONDUCTED, AND EITHER PARTY CANCELS OR DELAYS, CROWN SHALL NOT BE RESPONSIBLE FOR ANY COSTS, FEES, LOSS OF DEPOSITS AND/OR OTHER PENALTIES RELATED TO THE CANCELLATION OR DELAY INCURRED BY EITHER PARTY FOR ANY TIME (E.G. TRAVEL AND LODGING, COSTS OF KEEPING EQUIPMENT ON-SITE, ETC.). IF CROWN CONTRACTS DIRECTLY FOR A THIRD PARTY MI, EXCEPTIONS MAY BE MADE IN THE EVENT THAT THE DELAY/CANCELLATION IS CAUSED BY WEATHER OR OTHER CONDITIONS THAT MAY COMPROMISE THE SAFETY OF THE PARTIES INVOLVED.

**CORRECTION OF FAILING MI'S**

IF THE MODIFICATION INSTALLATION WOULD FAIL THE MI ("FAILED MI"), THE GC SHALL WORK WITH CROWN TO COORDINATE A REMEDIATION PLAN IN ONE OF TWO WAYS:

- CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENT MI.
- OR, WITH CROWN'S APPROVAL, THE GC MAY WORK WITH THE EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION

**MI VERIFICATION INSPECTIONS**

CROWN RESERVES THE RIGHT TO CONDUCT A MI VERIFICATION INSPECTION TO VERIFY THE ACCURACY AND COMPLETENESS OF PREVIOUSLY COMPLETED MI INSPECTION(S) ON TOWER MODIFICATION PROJECTS.

ALL VERIFICATION INSPECTIONS SHALL BE HELD TO THE SAME SPECIFICATIONS AND REQUIREMENTS IN THE CONTRACT DOCUMENTS AND IN ACCORDANCE WITH ENG-SOW-10007.

VERIFICATION INSPECTION MAY BE CONDUCTED BY AN INDEPENDENT AEV/AESV FIRM AFTER A MODIFICATION PROJECT IS COMPLETED, AS MARKED BY THE DATE OF AN ACCEPTED "PASSING MI" OR "PASS AS NOTED MI" REPORT FOR THE ORIGINAL PROJECT.

**PHOTOGRAPHS**

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

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

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

THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, PLEASE REFER TO ENG-SOW-10007.

**MI CHECKLIST**

CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
<b>PRE-CONSTRUCTION</b>	
X	MI CHECKLIST DRAWINGS
X	EOR REVIEW
X	FABRICATION INSPECTION
NA	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
X	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS: -----	
<b>CONSTRUCTION</b>	
X	CONSTRUCTION INSPECTIONS
NA	FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
NA	POST INSTALLED ANCHOR ROD VERIFICATION
NA	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION
NA	EARTHWORK: LIFT AND DENSITY
X	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
X	INSPECTION OF AJAX BOLTS AND DTIS PER REQUIREMENTS ON SHEET S-3
NA	MICROPILE/ROCK ANCHOR INSTALLER'S DRILLING AND INSTALLATION LOGS AND QA/QC DOCUMENTS
NA	REFER TO MICROPILE/ROCK ANCHOR NOTES FOR SPECIAL INSPECTION AND TESTING REQUIREMENTS.
ADDITIONAL TESTING AND INSPECTIONS: -----	
<b>POST-CONSTRUCTION</b>	
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
NA	POST INSTALLED ANCHOR ROD PULL-OUT TESTING
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS: -----	

NOTE: X DENOTES A DOCUMENT NEEDED FOR THE PMI REPORT  
NA DENOTES A DOCUMENT THAT IS NOT REQUIRED FOR THE PMI REPORT

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**PAUL J. FORD AND COMPANY**  
**STRUCTURAL ENGINEERS**  
 250 East Broad Street · Suite 600 · Columbus, Ohio 43215  
 (614) 221-6679 www.pjfweb.com

**CROWN CASTLE**

46 BROADWAY, ALBANY, NEW YORK 21204  
 PH: (585) 899-3442

**BU #806376; HRT 100 943239**  
**EAST HARTFORD, CONNECTICUT**  
**MONOPOLE REINFORCEMENT AND RETROFIT PROJECT**

PROJECT: 37513-0342.002.7700

DRAWN BY:  
B.M.S.

CHECKED BY:  
S.J.T.

APPROVED BY:

DATE:  
8-5-2014

MI CHECKLIST

**S-6**



# MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

BU NUMBER; SITE NAME  
**BU #806376; HRT 100 943239**  
 APP: 245658 REV. 1; WO: 802825

SITE ADDRESS  
**1455 FORBES STREET  
 EAST HARTFORD, CONNECTICUT 06118  
 HARTFORD COUNTY**

## PROJECT NOTES

- DETAILED FIELD INFORMATION REGARDING INTERFERENCES AND/OR EXISTING FIELD CONDITIONS MAY BE AVAILABLE ON CROWN'S CCISITES AND FROM CONTRACTOR'S PRE-MOD MAPPING. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS AND COORDINATE WITH THE AVAILABLE SOURCES OF INFORMATION ABOVE AND WITH THE PROJECT PLANS BEFORE PROCEEDING WITH THE WORK. CONTRACTOR SHALL IMMEDIATELY REPORT ANY AND ALL DISCREPANCIES TO PAUL J. FORD AND COMPANY AND CROWN CASTLE FIELD PERSONNEL BEFORE PROCEEDING WITH THE WORK.
- ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
- ALL STRUCTURAL BOLTS SHALL BE FIELD INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
- (A.) DTIS REQUIRED: ALL AJAX BOLTS SHALL BE INSTALLED USING DIRECT TENSION INDICATORS (DTIS) AND HARDENED WASHERS. ALL AJAX M20 BOLTS WITH SHEAR SLEEVES SHALL BE PRETENSIONED AND TIGHTENED UNTIL THE DIRECT TENSION INDICATOR (DTI) WASHERS SHOW THAT THE PROPER BOLT TENSION HAS BEEN REACHED. SEE NOTES AND DETAILS ON SHEET S-3 FOR REQUIREMENTS ON THE USE OF DIRECT TENSION INDICATOR (DTI) WASHERS WITH THE AJAX M20 BOLTS.  
 (B.) EFFECTIVE 5/30/2012: UNTIL FURTHER NOTICE, CROWN CASTLE WILL ACCEPT AJAX BOLTS TIGHTENED USING AISC "TURN-OF-NUT" METHOD. INSTALLERS SHALL FOLLOW CROWN GUIDELINES FOR AISC "TURN-OF-NUT" METHOD AND ALSO PROVIDE COMPLETE INSPECTION DOCUMENTATION IN THE PMI. PRIOR TO STARTING WORK, CONTRACTOR SHALL CONSULT WITH CROWN ENGINEERING TO DETERMINE WHETHER THIS POLICY IS STILL IN PLACE.  
 (C.) REQUIREMENT EFFECTIVE 04/20/2013, PER CROWN CASTLE DIRECTIVE: ANY AND ALL STRUCTURAL BOLTS THAT ARE TIGHTENED TO THE PRETENSIONED CONDITION USING THE AISC "TURN-OF-NUT" TENSIONING PROCEDURE (NON-TENSION CONTROLLED [NON-TC] BOLTS AND/OR BOLTS WITHOUT DTIS INSTALLED) SHALL BE INSPECTED ONSITE BY AN INDEPENDENT THIRD-PARTY BOLT INSPECTOR, AS APPROVED BY CROWN. THIS INSPECTION IS REQUIRED TO BE AN ONSITE FIELD INSPECTION. THE THIRD-PARTY BOLT INSPECTOR SHALL FOLLOW THE PUBLISHED CROWN CASTLE INSPECTION PROCEDURE "MI NON-TC BOLT INSPECTION", DATED APRIL 2013. THE THIRD-PARTY BOLT INSPECTOR SHALL PREPARE A FULLY DOCUMENTED BOLT INSPECTION REPORT, AS SPECIFIED BY CROWN, AND SHALL SUBMIT A COPY OF THE BOLT INSPECTION REPORT TO THE MI INSPECTOR, THE EOR, AND TO CROWN CASTLE.
- NDE OF THE CIRCUMFERENTIAL WELD OF THE BASE PLATE TO SHAFT CONNECTION IS REQUIRED. SEE CCI DOCUMENTS ENG-SOW-1033 'TOWER BASE PLATE NDE' AND ENG-BUL-10051 'NDE REQUIREMENTS FOR MONOPOLE BASE PLATE TO PREVENT CONNECTION FAILURE'. NOTIFY THE EOR AND CROWN ENGINEERING IMMEDIATELY IF ANY CRACKS ARE SUSPECTED OR HAVE BEEN IDENTIFIED. THE NDE SHALL INCLUDE ALL EXISTING REINFORCEMENTS THAT HAVE BEEN WELDED TO THE BASE PLATE. ANY FULL PENETRATION WELDING TO THE BASE PLATE REQUIRED AS PART OF THIS ACTIVE REINFORCEMENT DESIGN SHALL BE INCLUDED IN THE NDE SCOPE OF WORK.

## PROJECT CONTACTS:

### MONOPOLE OWNER:

CROWN CASTLE  
 46 BROADWAY, ALBANY, NEW YORK 21204  
 TSA CONTACT: ANDREW BAZINET AT ANDREW.BAZINET@CROWNCastle.COM  
 PH: (585) 899-3442  
 MOD PM: ROY PYPTIUK AT ROY.PYPTIUK@CROWNCastle.COM  
 PH: (607) 659-3493

### STRUCTURAL ENGINEER OF RECORD (EOR):

PAUL J. FORD AND COMPANY  
 250 EAST BROAD STREET, SUITE 600  
 COLUMBUS, OHIO 43215-3708  
 CONTACT: SETH TSCHANEN AT STSCHANEN@PJFWEB.COM  
 PHONE: 614-221-6679

## DESIGN STANDARD

THIS REINFORCEMENT DESIGN IS BASED UPON THE REQUIREMENTS OF THE TIA/EIA-222-F-1996 STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS, USING A DESIGN BASIC WIND SPEED OF 80 MPH (FASTEST MILE) WITH NO ICE, 38 MPH WITH 1/4 INCH ICE AND 50 MPH SERVICE LOADS.

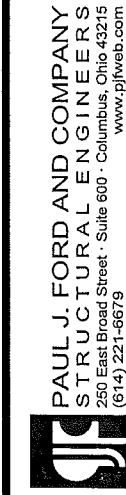
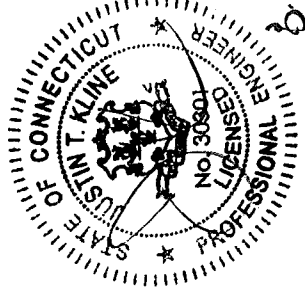
REFER TO THE POLE DESIGN AND ANTENNA LOADING DOCUMENTED IN THE PJF STRUCTURAL ANALYSIS FOR THIS SITE (PJF#37513-0342.002.7700), DATED 8-5-2014.

## THIS PROJECT INCLUDES THE FOLLOWING REINFORCING ELEMENTS:

SHAFT REINFORCING  
 FIELD WELDED STIFFENERS

## SHEET INDEX

SHEET NUMBER	DESCRIPTION
T-1	TITLE SHEET
S-1	GENERAL NOTES
S-2	GENERAL NOTES
S-3	AJAX BOLT DETAIL
S-4	MONOPOLE PROFILE
S-5	BASE PLATE DETAILS
S-6	MI CHECKLIST



**CROWN CASTLE**  
 46 BROADWAY, ALBANY, NEW YORK 21204  
 PH: (607) 659-3442

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PROJECT: 37513-0342.002.7700

DRAWN BY:  
B.M.S.

CHECKED BY:  
S.J.T.

APPROVED BY:  
*[Signature]*

DATE:  
8-5-2014

BU #806376; HRT 100 943239  
 EAST HARTFORD, CONNECTICUT  
 MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

TITLE SHEET

T-1

CROWN CASTLE PROJECT: BU #806376; HRT 100 943239; EAST HARTFORD, CONNECTICUT  
MONOPOLE RETROFIT PROJECT MASTER NOTES DOCUMENT (REV. 2, 1/22/2009)

**A. GENERAL NOTES**

- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS PRIOR TO FABRICATION AND CONSTRUCTION. THESE DRAWINGS WERE PREPARED FROM INFORMATION AND DOCUMENTS PROVIDED TO PAUL J. FORD & COMPANY BY CROWN CASTLE. THIS INFORMATION PROVIDED HAS NOT BEEN FIELD VERIFIED BY PAUL J. FORD & COMPANY FOR ACCURACY AND THEREFORE DISCREPANCIES BETWEEN THESE DRAWINGS AND ACTUAL SITE CONDITIONS SHOULD BE ANTICIPATED. ANY DISCREPANCIES AND/OR CHANGES BETWEEN THE INFORMATION CONTAINED IN THESE DRAWINGS AND THE ACTUAL VERIFIED SITE CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF CROWN CASTLE AND PAUL J. FORD & COMPANY SO THAT ANY CHANGES AND/OR ADJUSTMENTS, IF NECESSARY, CAN BE MADE TO THE DESIGN AND DRAWINGS.
- THE EXISTING UNREINFORCED MONOPOLE STRUCTURE DOES NOT HAVE THE STRUCTURAL CAPACITY TO CARRY ALL OF THE ANTENNA AND PLATFORM LOADS SHOWN ON THESE DRAWINGS AT THE REQUIRED MINIMUM TIAEIA-222-F BASIC WIND SPEEDS. DO NOT INSTALL ANY ADDITIONAL OR NEW ANTENNA AND PLATFORM LOADS UNTIL THE MONOPOLE REINFORCING SYSTEM IS COMPLETELY AND SUCCESSFULLY INSTALLED.
- IF MATERIALS, QUANTITIES, STRENGTHS OR SIZES INDICATED BY THE DRAWINGS OR SPECIFICATIONS ARE NOT IN AGREEMENT WITH THESE NOTES, THE BETTER QUALITY AND/OR GREATER QUANTITY, STRENGTH OR SIZE INDICATED, SPECIFIED OR NOTED SHALL BE PROVIDED.
- THIS STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE INSTALLATION OF THE REINFORCING REPAIR SYSTEM HAS BEEN PROPERLY AND ADEQUATELY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO INSURE THE SAFETY AND STABILITY OF THE MONOPOLE AND ITS COMPONENT PARTS DURING FIELD MODIFICATIONS. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF WHATEVER TEMPORARY BRACING, GUYS OR TIE DOWNS THAT MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER THE COMPLETION OF THE PROJECT. IMPORTANT CUTTING, WELDING AND SAFETY GUIDELINES: THE CONTRACTOR SHALL FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE PREVENTION AND SAFETY GUIDELINES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A COPY OF THE CURRENT CROWN CASTLE GUIDELINES FROM CROWN CASTLE. PER THE 12-01-2005 CROWN CASTLE DIRECTIVE: "ALL CUTTING AND WELDING ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH CROWN CASTLE POLICY CUTTING AND WELDING PLAN" (DOC # ENG-PLN-10015) ON AN ONGOING BASIS THROUGHOUT THE ENTIRE LIFE OF THE PROJECT.
- THE STRUCTURAL CONTRACT DOCUMENTS DO NOT INDICATE THE METHOD OR MEANS OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. OBSERVATION VISITS TO THE SITE BY THE OWNER AND/OR THE ENGINEER SHALL NOT INCLUDE INSPECTIONS OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES.
- ANY SUPPORT SERVICES PERFORMED BY THE ENGINEER DURING CONSTRUCTION SHALL BE DISTINGUISHED FROM CONTINUOUS AND DETAILED INSPECTION SERVICES WHICH ARE FURNISHED BY THE INSPECTION/TESTING AGENCY. THESE SUPPORT SERVICES PERFORMED BY THE ENGINEER ARE SOLELY FOR THE PURPOSE OF ASSISTING IN QUALITY CONTROL AND IN ACHIEVING CONFORMANCE WITH CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.
- ALL MATERIALS AND EQUIPMENT FURNISHED WILL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANY AND ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF MATERIALS AND EQUIPMENT BEING SUBSTITUTED.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT THIS PROJECT AND RELATED WORK COMPLIES WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY CODES AND REGULATIONS GOVERNING THIS WORK AS WELL AS CROWN CASTLE SAFETY GUIDELINES.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING AND NEW COAXIAL CABLES AND OTHER EQUIPMENT DURING CONSTRUCTION.
- ANY EXISTING ATTACHMENTS AND/OR PROJECTIONS ON THE POLE THAT MAY INTERFERE WITH THE INSTALLATION OF THE REINFORCING SYSTEM WILL HAVE TO BE REMOVED AND/OR RELOCATED, AND/OR REPLACED AND RE-INSTALLED AFTER THE REINFORCING IS SUCCESSFULLY COMPLETED. THE CONTRACTOR SHALL IDENTIFY AND COORDINATE THESE ITEMS PRIOR TO CONSTRUCTION WITH THE OWNER, TESTING AGENCY, AND ENGINEER.
- ANY AND ALL EXISTING PLATFORMS THAT ARE LOCATED IN AREAS OF THE POLE SHAFT WHERE SHAFT REINFORCING MUST BE APPLIED SHALL BE TEMPORARILY REMOVED OR OTHERWISE SUPPORTED TO PERMIT NEW CONTINUOUS REINFORCEMENT TO BE ATTACHED. AFTER THE CONTRACTOR HAS SUCCESSFULLY INSTALLED THE MONOPOLE REINFORCEMENT SYSTEM, THE CONTRACTOR SHALL RE-INSTALL THE PLATFORMS. IN NO CASE SHALL ANY NEW AND/OR ADDITIONAL PLATFORMS AND/OR ANTENNAS AND/OR COAX CABLES AND/OR OTHER EQUIPMENT BE INSTALLED ON THE MONOPOLE UNTIL THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF ALL OF THE REQUIRED STRUCTURAL REINFORCING SYSTEM COMPONENTS.

**B. (SECTION NOT USED)**

**C. SPECIAL INSPECTION AND TESTING**

- ALL WORK SHALL BE SUBJECT TO REVIEW AND OBSERVATION BY THE OWNER'S REPRESENTATIVE AND THE OWNER'S AUTHORIZED INDEPENDENT INSPECTION AND TESTING AGENCY. REFER TO CROWN CASTLE DOCUMENT ENG-SOW-10066 FOR SPECIFICATION.
- ANY SUPPORT SERVICES PERFORMED BY THE ENGINEER DURING CONSTRUCTION SHALL BE DISTINGUISHED FROM CONTINUOUS AND DETAILED INSPECTION SERVICES WHICH ARE FURNISHED BY OTHERS. THESE SUPPORT SERVICES PERFORMED BY THE ENGINEER ARE PERFORMED SOLELY FOR THE PURPOSE OF ASSISTING IN QUALITY CONTROL AND IN ACHIEVING CONFORMANCE WITH CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.
- OBSERVED DISCREPANCIES BETWEEN THE WORK AND THE CONTRACT DOCUMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST.
- FOR BY THE OWNER FOR THE SOLE PURPOSE OF INSPECTING, TESTING, DOCUMENTING, AND APPROVING ALL WELDING AND FIELD WORK PERFORMED BY THE CONTRACTOR.  
(A) ACCESS TO ANY PLACE WHERE WORK IS BEING DONE SHALL BE PERMITTED AT ALL TIMES. THE INSPECTION AGENCY SHALL SO SCHEDULE THIS WORK AS TO CAUSE A MINIMUM OF INTERRUPTION TO, AND COORDINATE WITH, THE WORK IN PROGRESS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE THE WORK SCHEDULE WITH THE TESTING AGENCY. THE CONTRACTOR SHALL ALLOW FOR ADEQUATE TIME AND ACCESS FOR THE TESTING AGENCY TO PERFORM THEIR DUTIES.

THE INSPECTION AND TESTING AGENCY SHALL BE RESPONSIBLE TO PERFORM THE FOLLOWING SERVICES FOR THE OWNER. THE TESTING AGENCY SHALL INSPECT THE FOLLOWING ITEMS IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS. THE TESTING AGENCY SHALL INSPECT ITEMS ON THIS LIST AND OTHER ITEMS AS NECESSARY TO FULFILL THEIR RESPONSIBILITY. THE TESTING AGENCY SHALL UTILIZE EXPERIENCED, TRAINED INSPECTORS INCLUDING AWS CERTIFIED WELDING INSPECTORS (CWI). INSPECTORS SHALL HAVE THE TRAINING, CREDENTIALS, AND EXPERIENCE APPROPRIATE FOR AND COMMENSURATE WITH THE SCOPE AND TYPE OF INSPECTION WORK TO BE PERFORMED.

**A. GENERAL:**

- PERFORM PERIODIC ON-SITE OBSERVATION, INSPECTION, VERIFICATION, AND TESTING DURING THE TIME THE CONTRACTOR IS WORKING ON-SITE. AGENCY SHALL NOTIFY OWNER IMMEDIATELY WHEN FIELD PROBLEMS OR DISCREPANCIES OCCUR.

FOUNDATIONS, CONCRETE, AND SOIL PREPARATION - (NOT REQUIRED)

**C. CONCRETE TESTING PER AGI - (NOT REQUIRED)**

**D. STRUCTURAL STEEL**

- CHECK THE STEEL ON THE JOB WITH THE PLANS.
- CHECK MILL CERTIFICATIONS.
- CHECK GRADE OF STEEL MEMBERS, AND BOLTS FOR CONFORMANCE WITH DRAWINGS.
- INSPECT STEEL MEMBERS FOR DISTORTION, EXCESSIVE RUST, FLAWS AND BURNED HOLES.
- CALL FOR LABORATORY TEST REPORTS WHEN IN DOUBT.
- CHECK STEEL MEMBERS FOR SIZES, SWEEP AND DIMENSIONAL TOLERANCES.
- CHECK FOR SURFACE FINISH SPECIFIED; GALVANIZED.
- CHECK BOLT TIGHTENING ACCORDING TO AISC "TURN OF THE NUT" METHOD.

**E. WELDING:**

- VERIFY FIELD WELDING PROCEDURES, WELDERS, AND WELDING OPERATORS, NOT DEEMED PREQUALIFIED, IN ACCORDANCE WITH AWS D1.1.
- INSPECT FIELD WELDED CONNECTIONS IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED AND IN ACCORDANCE WITH AWS D1.1.
- APPROVE FIELD WELDING SEQUENCE.
  - A PROGRAM OF THE APPROVED SEQUENCES SHALL BE SUBMITTED TO THE OWNER BEFORE WELDING BEGINS. NO CHANGE IN APPROVED SEQUENCES MAY BE MADE WITHOUT PERMISSION FROM THE OWNER.

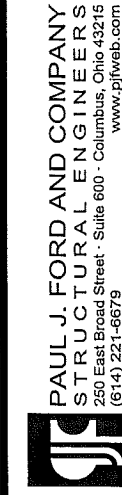
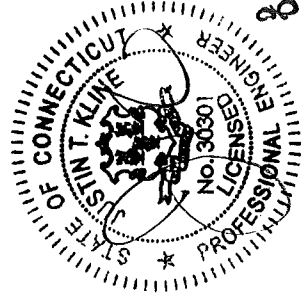
(4) INSPECT WELDED CONNECTIONS AS FOLLOWS AND IN ACCORDANCE WITH AWS D1.1:

- INSPECT WELDING EQUIPMENT FOR CAPACITY, MAINTENANCE AND WORKING CONDITIONS.
- VERIFY SPECIFIED ELECTRODES AND HANDLING AND STORAGE OF ELECTRODES FOR CONFORMANCE TO SPECIFICATIONS.
- INSPECT PREHEATING AND INTERPASS TEMPERATURES FOR CONFORMANCE WITH AWS D1.1.
- VISUALLY INSPECT ALL WELDS AND VERIFY THAT QUALITY OF WELDS MEETS THE REQUIREMENTS OF AWS D1.1.
- SPOT TEST AT LEAST ONE FILLET WELD OF EACH MEMBER USING MAGNETIC PARTICLE OR DYE PENETRANT.
- INSPECT FOR SIZE, SPACING, TYPE AND LOCATION AS PER APPROVED PLANS.
- VERIFY THAT THE BASE METAL CONFORMS TO THE DRAWINGS.
- REVIEW THE REPORTS BY TESTING LABS.
- CHECK TO SEE THAT WELDS ARE CLEAN AND FREE FROM SLAG.
- INSPECT RUST PROTECTION OF WELDS AS PER SPECIFICATIONS.
- CHECK THAT DEFECTIVE WELDS ARE CLEARLY MARKED AND HAVE BEEN ADEQUATELY REPAIRED.

**F. REPORTS:**

- COMPILE AND PERIODICALLY SUBMIT DAILY INSPECTION REPORTS TO THE OWNER.

- THE INSPECTION PLAN OUTLINED HEREIN IS INTENDED AS A DESCRIPTION OF GENERAL AND SPECIFIC ITEMS OF CONCERN. IT IS NOT INTENDED TO BE ALL-INCLUSIVE. IT DOES NOT LIMIT THE TESTING AND INSPECTION AGENCY TO THE ITEMS LISTED. ADDITIONAL TESTING, INSPECTION, AND CHECKING MAY BE REQUIRED AND SHOULD BE ANTICIPATED. THE TESTING AGENCY SHALL USE THEIR PROFESSIONAL JUDGMENT AND KNOWLEDGE OF THE JOB SITE CONDITIONS AND THE CONTRACTOR'S PERFORMANCE TO DECIDE WHAT OTHER ITEMS REQUIRE ADDITIONAL ATTENTION. THE TESTING AGENCY'S JUDGMENT MUST PREVAIL ON ITEMS NOT SPECIFICALLY COVERED. ANY DISCREPANCIES AND PROBLEMS SHALL BE BROUGHT IMMEDIATELY TO THE OWNER'S ATTENTION. RESOLUTIONS ARE NOT TO BE MADE WITHOUT THE OWNER'S REVIEW AND SPECIFIC WRITTEN CONSENT. THE OWNER RESERVES THE RIGHT TO DETERMINE WHAT IS AN ACCEPTABLE RESOLUTION OF DISCREPANCIES AND PROBLEMS.
- AFTER EACH INSPECTION, THE TESTING AGENCY WILL PREPARE A WRITTEN ACCEPTANCE OR REJECTION WHICH WILL BE GIVEN TO THE CONTRACTOR AND FILED AS DAILY REPORTS TO THE OWNER. THIS WRITTEN ACTION WILL GIVE THE CONTRACTOR A LIST OF ITEMS TO BE CORRECTED, PRIOR TO CONTINUING CONSTRUCTION, AND/OR LOADING OF STRUCTURAL ITEMS.
- RESPONSIBILITY: THE TESTING AGENCY DOES NOT RELIEVE THE CONTRACTOR'S CONTRACTUAL OR STATUTORY OBLIGATIONS. THE CONTRACTOR HAS THE SOLE RESPONSIBILITY FOR ANY DEVIATIONS FROM THE OFFICIAL CONTRACT DOCUMENTS. THE TESTING AGENCY WILL NOT REPLACE THE CONTRACTOR'S QUALITY CONTROL PERSONNEL.



PAUL J. FORD AND COMPANY  
STRUCTURAL ENGINEERS  
260 East Broad Street - Suite 600 - Columbus, Ohio 43215  
(614) 221-6679 www.pjfweb.com

**CROWN CASTLE**

46 BROADWAY, ALBANY, NEW YORK 21204  
PH: (685) 899-3442

PROJECT: 37513-0342.002.7700

DRAWN BY:

B.M.S.

CHECKED BY:

S.J.T.

APPROVED BY:

JJK

DATE:

8-5-2014

BU #806376; HRT 100 943239  
EAST HARTFORD, CONNECTICUT  
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

GENERAL NOTES

S-1

- D. STRUCTURAL STEEL**  
STRUCTURAL STEEL MATERIALS, FABRICATION, DETAILING, AND WORKMANSHIP SHALL CONFORM TO THE LATEST EDITION OF THE FOLLOWING REFERENCE STANDARDS:
- A. BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC):  
(A) "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS,"  
(B) "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS," AS APPROVED BY THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS OF THE ENGINEERING FOUNDATION.  
(C) "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES" (PARAGRAPH 4.2.1 SPECIFICALLY EXCLUDED).
- B. BY THE AMERICAN WELDING SOCIETY (AWS):  
(A) "STRUCTURAL WELDING CODE - STEEL D1.1,"  
(B) "SYMBOLS FOR WELDING AND NON-DESTRUCTIVE TESTING"
2. ANY MATERIAL OR WORKMANSHIP WHICH IS OBSERVED TO BE DEFECTIVE OR INCONSISTENT WITH THE CONTRACT DOCUMENTS SHALL BE CORRECTED, MODIFIED, OR REPLACED AT THE CONTRACTOR'S EXPENSE.
3. TIGHTEN ALL STRUCTURAL BOLTS, INCLUDING THE AJAX M20 BOLTS WITH SHEAR SLEEVES, ACCORDING TO THE REQUIREMENTS OF THE AISC "TURN OF THE NUT" METHOD. TIGHTEN BOLTS 1/3 TURN PAST THE SNUG TIGHT CONDITION AS DEFINED BY AISC.
4. WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY, AWS D1.1. ALL WELD ELECTRODES SHALL BE E80XX UNLESS NOTED OTHERWISE ON THE DRAWINGS.
5. ALL WELDED CONNECTIONS SHALL BE MADE BY WELDERS CERTIFIED BY AWS. CONTRACTOR SHALL SUBMIT WELDERS' CERTIFICATION AND QUALIFICATION DOCUMENTATION TO THE OWNER'S TESTING AGENCY FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
6. STRUCTURAL STEEL PLATES SHALL CONFORM TO ASTM A572 GRADE 65 (FY = 65 KSI MIN.) UNLESS NOTED OTHERWISE ON THE DRAWINGS.
7. SURFACES OF EXISTING STEEL SHALL BE PREPARED AS REQUIRED FOR FIELD WELDING PER AWS. SEE SECTION I NOTES REGARDING TOUCH-UP OF GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS FIELD WELDING.
8. UNLESS OTHERWISE NOTED, ALL STEEL MEMBERS SHALL BE HOT-DIP GALVANIZED, AFTER FABRICATION, IN ACCORDANCE WITH ASTM A123. SEE SECTION J FOR FURTHER NOTES AND FOR EXCEPTIONS (IF ANY).
9. ALL WELDS SHALL BE VISUALLY INSPECTED BY THE OWNER'S APPROVED TESTING AGENCY. OTHER TESTS MAY ALSO BE PERFORMED ON THE WELDS BY THE TESTING AGENCY IN ORDER FOR THEM TO PERFORM THEIR DUTIES FOR THIS PROJECT. THE CONTRACTOR SHALL COOPERATE WITH THE TESTING AGENCY IN THEIR TESTING EFFORTS.
10. NO WELDING SHALL BE DONE TO THE EXISTING STRUCTURE WITHOUT THE PRIOR APPROVAL AND SUPERVISION OF THE TESTING AGENCY.
11. FIELD CUTTING OF STEEL:  
(A) PRIOR TO ANY FIELD CUTTING, THE CONTRACTOR SHALL MARK THE CUT OUTLINES ON THE STEEL AND THE INSPECTION/TESTING AGENCY SHALL VERIFY PROPOSED LAYOUT, LOCATION, AND DIMENSIONS.  
(B) AS DRILLING, SAW CUTTING, AND GRINDING, THE CONTRACTOR IS RESPONSIBLE TO PREVENT ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, DURING THE CUTTING WORK. ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, RESULTING FROM THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.  
(C) ALL REQUIRED CUTS SHALL BE CUT WITHIN THE DIMENSIONS SHOWN ON THE DRAWINGS. NO CUTS SHALL EXTEND BEYOND THE OUTLINE OF THE DIMENSIONS SHOWN ON THE DRAWINGS. ALL CUT EDGES SHALL BE GROUND SMOOTH AND DE-BURRED. CUT EDGES THAT ARE TO BE FIELD WELDED SHALL BE PREPARED FOR FIELD WELDING PER AWS D1.1 AND AS SHOWN ON THE DRAWINGS. IT MAY BE NECESSARY TO DRILL STARTER HOLES AS REQUIRED TO MAKE THE CUTS. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.

**E. BASE PLATE GROUT - (NOT REQUIRED)**

**F. FOUNDATION WORK - (NOT REQUIRED)**

**G. CAST-IN-PLACE CONCRETE - (NOT REQUIRED)**

**H. EPOXY GROUTED REINFORCING ANCHOR RODS - (NOT REQUIRED)**

**I. TOUCH UP OF GALVANIZING**

THE CONTRACTOR SHALL TOUCH UP ANY AND/OR ALL AREAS OF GALVANIZING ON THE EXISTING STRUCTURE OR NEW COMPONENTS THAT ARE DAMAGED OR ABRADED DURING CONSTRUCTION. GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS ANY AND ALL ABRASIONS, CUTS, FIELD DRILLING, AND ALL FIELD WELDING SHALL BE TOUCHED UP WITH TWO (2) COATS OF ZRC-BRAND ZINC-RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.

CONTRACTOR SHALL CLEAN AND PREPARE ALL FIELD WELDS ON GALVANIZED AND PRIME PAINTED SURFACES FOR TOUCH-UP COATING IN ACCORDANCE WITH AWS D1.1. THE OWNER'S TESTING AGENCY SHALL VERIFY THE PREPARED SURFACE PRIOR TO APPLICATION OF THE TOUCH-UP COATING.

THE OWNER'S TESTING AGENCY SHALL TEST AND VERIFY THE COATING THICKNESS AFTER THE CONTRACTOR HAS APPLIED THE ZRC COLD GALVANIZING COMPOUND AND IT HAS SUFFICIENTLY DRIED. AREAS FOUND TO BE INADEQUATELY COATED, SHALL BE RE-COATED BY THE CONTRACTOR AND RE-TESTED BY THE TESTING AGENCY.

**J. HOT DIP GALVANIZING**

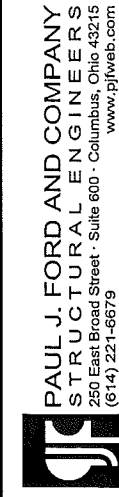
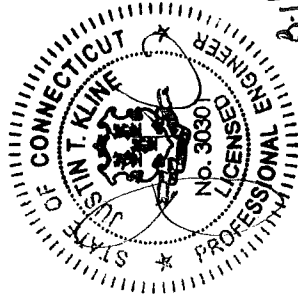
HOT-DIP GALVANIZE ALL STRUCTURAL STEEL MEMBERS AND ALL STEEL ACCESSORIES, BOLTS, WASHERS, ETC. PER ASTM A123 OR PER ASTM A153, AS APPROPRIATE. PROPERLY PREPARE STEEL ITEMS FOR GALVANIZING. DRILL OR PUNCH WEEP AND/OR DRAINAGE HOLES AS REQUIRED. ALL GALVANIZING SHALL BE DONE AFTER FABRICATION IS COMPLETED AND PRIOR TO FIELD INSTALLATION.

**K. PERPETUAL INSPECTION AND MAINTENANCE BY THE OWNER**

AFTER THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF THE MONOPOLE REINFORCING SYSTEM AND THE WORK HAS BEEN ACCEPTED BY THE OWNER, THE OWNER WILL BE RESPONSIBLE FOR THE LONG TERM AND PERPETUAL INSPECTION AND MAINTENANCE OF THE POLE AND REINFORCING SYSTEM.

THE MONOPOLE REINFORCING SYSTEM INDICATED IN THESE DOCUMENTS USES REINFORCING COMPONENTS THAT INVOLVE FIELD WELDING STEEL MEMBERS TO THE EXISTING GALVANIZED STEEL POLE STRUCTURE. THESE FIELD WELDED CONNECTIONS ARE SUBJECT TO CORROSION DAMAGE AND DETERIORATION IF THEY ARE NOT PROPERLY MAINTAINED AND COVERED WITH CORROSION PREVENTIVE COATING SUCH AS THE ZRC GALVANIZING COMPOUND SPECIFIED PREVIOUSLY. THE STRUCTURAL LOAD CARRYING CAPACITY OF THE REINFORCED POLE SYSTEM IS DEPENDENT UPON THE INSTALLED SIZE AND QUALITY, MAINTAINED SOUND CONDITION AND STRENGTH OF THESE FIELD WELDED CONNECTIONS. ANY CORROSION OF, DAMAGE TO, FATIGUE, FRACTURE, AND/OR DETERIORATION OF THESE WELDS AND/OR THE CONNECTED COMPONENTS WILL RESULT IN THE LOSS OF STRUCTURAL LOAD CARRYING CAPACITY AND MAY LEAD TO FAILURE OF THE STRUCTURAL SYSTEM. THEREFORE, IT IS IMPERATIVE THAT THE OWNER REGULARLY INSPECTS, MAINTAINS, AND REPAIRS AS NECESSARY, ALL OF THESE WELDS, CONNECTIONS, AND COMPONENTS FOR THE LIFE OF THE STRUCTURE.

THE OWNER SHALL REFER TO TIA/EIA-222-F-1996, SECTION 14 AND ANNEX E FOR RECOMMENDATIONS FOR MAINTENANCE AND INSPECTION. THE FREQUENCY OF THE INSPECTION AND MAINTENANCE INTERVALS IS TO BE DETERMINED BY THE OWNER BASED UPON ACTUAL SITE AND ENVIRONMENTAL CONDITIONS. PAUL J. FORD & COMPANY RECOMMENDS THAT A COMPLETE AND THOROUGH INSPECTION OF THE ENTIRE REINFORCED MONOPOLE STRUCTURAL SYSTEM BE PERFORMED YEARLY AND/OR AS FREQUENTLY AS CONDITIONS WARRANT. ACCORDING TO TIA/EIA-222-F-1996 SECTION 14.1, NOTE 1: "IT IS RECOMMENDED THAT THE STRUCTURE BE INSPECTED AFTER SEVERE WIND AND/OR ICE STORMS OR OTHER EXTREME LOADING CONDITIONS".



**CROWN CASTLE**  
46 BROADWAY, ALBANY, NEW YORK 12204  
PH: (518) 899-3442

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PROJECT: 37513-0342.002.7700

DRAWN BY:

B.M.S.

CHECKED BY:

S.J.T.

APPROVED BY:

JJK

DATE:

8-5-2014

BU #806376; HRT 100 943239  
EAST HARTFORD, CONNECTICUT  
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

GENERAL NOTES

S-2

AJAX BOLT NOTE SHEET: REV. 1.5, 5-12-2014

- NOTES:**
1. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
  2. ALL STRUCTURAL BOLTS SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
  3. ALL AJAX M20 BOLTS WITH SHEAR SLEEVES SHALL BE PRETENSIONED AND TIGHTENED UNTIL THE DIRECT TENSION INDICATOR (DTI) WASHERS SHOW THAT THE PROPER BOLT TENSION HAS BEEN REACHED. SEE NOTES AND DETAIL BELOW FOR THE USE OF DIRECT TENSION INDICATOR (DTI) WASHERS WITH THE AJAX M20 BOLTS.
  4. ALL AJAX BOLTS SHALL BE INSTALLED USING DIRECT TENSION INDICATORS (DTI'S) AND HARDENED WASHERS. DTI'S SHALL BE THE SQUIRTER® STYLE, MADE TO ASTM F959 LATEST REVISION; AND HARDENED WASHERS SHALL CONFORM TO ASTM F436 AND HAVE A HARDNESS OF RC 38 OR HIGHER.

**NOTES FOR AJAX M20 'ONE-SIDE BOLTS WITH DIRECT TENSION INDICATORS (DTI'S):**

**DTI'S REQUIRED:** DTI'S SHALL BE "SELF-INDICATING" SQUIRTER® STYLE DTI'S MADE WITH RED DURABLE SQUIRT MEDIA EMBEDDED IN THEM, INSPECTED BY MEANS OF THE VISUAL EJECTION OF SILICONE AS THE DTI PROTRUSIONS COMPRESS. SQUIRTER® DTI'S SHALL BE CALIBRATED PER MANUFACTURER'S INSTRUCTIONS PRIOR TO USE.

THE DIRECT TENSION INDICATOR (DTI) WASHERS SHALL BE THE "SQUIRTER® STYLE" AS MANUFACTURED BY APPLIED BOLTING TECHNOLOGY PRODUCTS' INC.:

**PART NUMBER:** 2DTIM208MGAFSIF

**DESCRIPTION:** P.C. 8.8 DTI SQUIRTER WASHER WITH RED DURABLE SQUIRT MEDIA DESIGNED SPECIFICALLY FOR THE AJAX M20 ONESIDE BOLT. FINISH SHALL BE ZINC GALVANIZED AS PROVIDED BY THE DTI MANUFACTURER.

**DISTRIBUTOR CONTACT DETAILS:**

ALLFASTENERS  
15401 COMMERCE PARK DR.  
BROOKPARK, OHIO 44142  
PHONE: 440-232-6060  
E-MAIL: SALES@ALLFASTENERS.COM

**DTI:** USE DIRECT TENSION INDICATOR (DTI) WASHERS COMPATIBLE WITH 20 MM (M20) NOMINAL A325 BOLTS FOR THE AJAX M20 BOLTS. DTI'S SHALL NOT BE HOT-DIP GALVANIZED. DTI'S SHALL BE MECHANICALLY GALVANIZED (MG) BY THE COLD MECHANICAL PROCESS ONLY AS PROVIDED BY THE DTI MANUFACTURER.

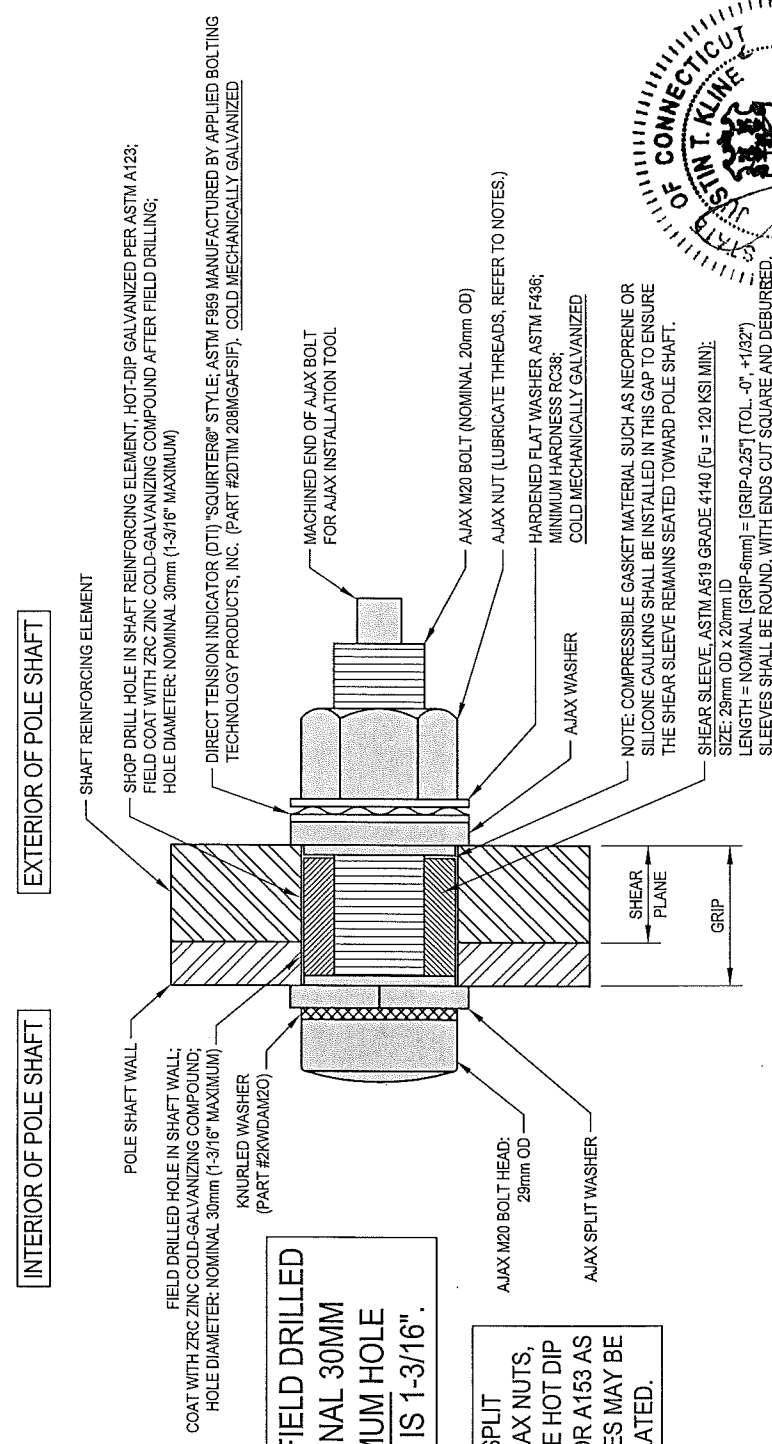
**HARDENED WASHERS REQUIRED:** USE A HARDENED WASHER FOR A 20 MM (M20) NOMINAL BOLT BETWEEN THE TOP OF THE DIRECT TENSION INDICATOR (DTI) WASHER AND THE NUT OF THE AJAX M20 BOLTS. HARDENED WASHERS SHALL CONFORM TO ASTM F436 AND HAVE A MINIMUM HARDNESS OF RC 38 OR HIGHER. THE HARDENED WASHERS SHALL BE MECHANICALLY GALVANIZED BY THE COLD MECHANICAL PROCESS. ALTERNATIVELY, CORRECTLY MADE HOT DIP GALVANIZED HARDENED FLAT WASHERS HAVING A MINIMUM HARDNESS OF RC 38 CAN BE USED; CONTRACTOR SHALL PROVIDE DOCUMENTATION OF WASHER SPECIFICATION AND HARDNESS.

**NUT LUBRICATION REQUIRED:** PROPERLY LUBRICATE THE THREADS OF THE NUT OF THE AJAX BOLT SO THAT IT CAN BE PROPERLY TIGHTENED WITHOUT GALLING AND/OR LOCKING UP ON THE BOLT THREADS. CONTRACTOR SHALL FOLLOW DTI MANUFACTURER INSTRUCTIONS FOR PROPER LUBRICATION AND TIGHTENING.

**NOTE:** COMPLETELY COMPRESSED DTI'S SHOWING NO VISIBLE REMAINING GAP ARE ACCEPTABLE. DTI WASHERS SHALL BE PLACED DIRECTLY AGAINST THE OUTER AJAX WASHER WITH THE DTI BUMPS FACING AWAY FROM THE AJAX WASHER. PLACE A HARDENED WASHER BETWEEN THE DTI AND THE AJAX NUT. THE DTI BUMPS SHALL BEAR AGAINST THE UNDERSIDE OF A HARDENED FLAT WASHER, NEVER DIRECTLY AGAINST THE NUT.

CONTRACTOR SHALL FOLLOW DTI MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION, LUBRICATION, TIGHTENING AND INSPECTION.

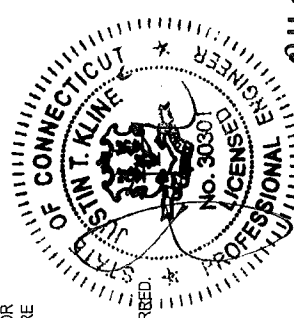
**INSPECTION REQUIRED:** ALL AJAX BOLTS SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009, BY A QUALIFIED BOLT INSPECTOR. DURING INSTALLATION, THE BOLT INSPECTOR SHALL VERIFY AND DOCUMENT: THE SHOP-DRILLED AND FIELD-DRILLED HOLE SIZES; THE INSTALLATION OF THE AJAX BOLT ASSEMBLY, INCLUDING THE SHEAR SLEEVE PLACEMENT AND NUT LUBRICATION; AND THE CONTRACTOR'S TENSIONING PROCEDURE. IN ADDITION, ALL AJAX BOLTS AND DTI'S SHALL BE VISUALLY INSPECTED ACCORDING TO THE DTI MANUFACTURER'S INSTRUCTIONS. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE PHOTO DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THE CONDITION OF THE DTI'S.



**NOTE: ALL SHOP AND FIELD DRILLED HOLES SHALL BE NOMINAL 30MM DIAMETER. THE MAXIMUM HOLE DIAMETER PERMITTED IS 1-3/16".**

**NOTE: ALL AJAX BOLTS, AJAX SPLIT WASHERS, AJAX WASHERS, AJAX NUTS, AND SHEAR SLEEVES SHALL BE HOT DIP GALVANIZED PER ASTM A123 OR A153 AS APPROPRIATE. SHEAR SLEEVES MAY BE COLD GALVANIZED OR ZINC PLATED.**

**TYPICAL AJAX BOLT DETAIL 1**  
S-3



**PJ**  
PAUL J. FORD AND COMPANY  
STRUCTURAL ENGINEERS  
250 East Broad Street - Suite 600 - Columbus, Ohio 43215  
(614) 221-6675  
www.pjweb.com

**CROWN CASTLE**  
46 BROADWAY, ALBANY, NEW YORK 12104  
PH: (605) 899-3442

PROJECT: 37513-0342.002.7700

DRAWN BY:  
B.M.S.

CHECKED BY:  
S.J.T.

APPROVED BY:  
[Signature]

DATE:  
8-5-2014

BU #806376; HRT 100 943239  
EAST HARTFORD, CONNECTICUT  
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

AJAX BOLT DETAIL

S-3

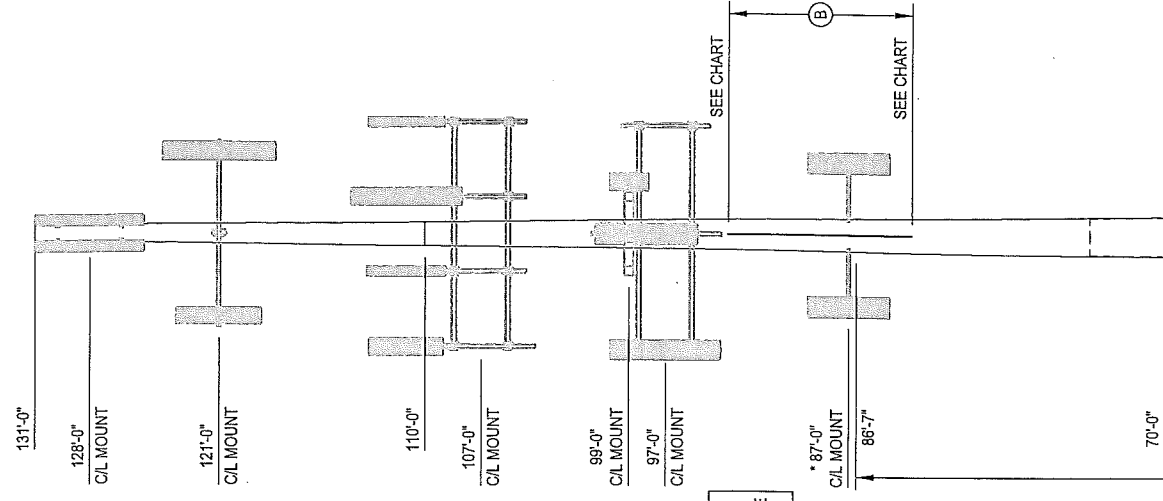


POLE SPECIFICATIONS	
POLE SHAPE TYPE:	12-SIDED POLYGON
TAPER:	0.249795 IN/FT
SHAFT STEEL:	ASTM A572 GRADE 65
BASE PL STEEL:	ASTM A633 GR. E (60 KSI)
ANCHOR RODS:	2 1/4"Ø #18J ASTM A615 GRADE 75

SHAFT SECTION DATA					
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN)	
				@ TOP	@ BOTTOM
1	21.00	0.1875		10.525	15.525
2	40.00	0.2500	48.00	15.525	25.531
3	39.92	0.3125	59.00	24.030	34.015
4	39.00	0.3438		32.158	41.900

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

MODIFICATIONS:	
(A)	INSTALL NEW TRANSITION STIFFENERS AT BASE PLATE. SEE SHEET S-5.
(B)	INSTALL NEW SHAFT REINFORCING. SEE CHART.
(C)	EXISTING SHAFT REINFORCING TO BE REMOVED ON FLATS.



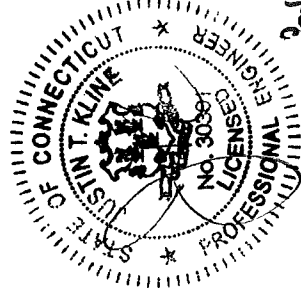
\* EXISTING MOUNTS MAY NEED TO BE ADJUSTED, MOVED AND/OR TEMPORARILY SUPPORTED DURING THE INSTALLATION OF SHAFT REINFORCING

(TO BE REMOVED FROM EL. 0'-6" TO 60'-6" AS NOTED ON DETAIL 1/5-5) EXISTING SHAFT REINFORCING

NEW CCI FLAT PLATE (65 KSI) REINFORCING SCHEDULE										
BOTTOM ELEVATION	TOP ELEVATION	FLAT #/ DEGREE SEPARATION	ELEMENT LENGTH	ELEMENT QUANTITY	APPROXIMATE AJAX BOLTS PER ELEMENT	APPROXIMATE TOTAL AJAX BOLT QUANTITY	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAXIMUM INTERMEDIATE BOLT SPACING	ESTIMATED TOTAL STEEL WEIGHT
0'-6"	25'-6"	F2, F6 & F10	25'-0"	3	34	102	10	10	16"	1531 LBS.
88'-7"	93'-7"	F2, F6 & F10	10'-0"	3	13	39	4	4	16"	306 LBS.
						141				1837 LBS.

NOTES:

- 1.) AJAX BOLTS ARE TO BE 20mm DIAMETER WITH CORRESPONDING 29mm DIAMETER SLEEVE WITH MATCHING STEEL GRADE.
- 2.) ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. ALTERNATIVELY, ALL NEW STIFFENER PLATE STEEL REINFORCING MAY BE COLD GALVANIZED AS FOLLOWS: APPLY A MINIMUM OF TWO COATS OF ZRC-BRAND ZINC-RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.
- 3.) ALL REINFORCING SHALL BE ASTM A672 GR. 65.
- 4.) WELDS SHALL BE E60XX OR GREATER. TERMINATION WELDS SHALL BE 3/8" FILLET WELDS.
- 5.) HOLES FOR AJAX BOLTS AND SHEAR SLEEVES ARE 30mm UNLESS NOTED OTHERWISE.
- 6.) ALL SHIMS SHALL BE ASTM A-36.



2011/14

POLE ELEVATION 1  
S-4

**PAUL J. FORD AND COMPANY**  
STRUCTURAL ENGINEERS  
250 East Broad Street - Suite 600 - Columbus, Ohio 43215  
(614) 221-6679  
www.pjfweb.com

**CROWN CASTLE**  
46 BROADWAY, ALBANY, NEW YORK 12204  
PH: (518) 889-3442

CROWN CASTLE US PATENT NOS 8,046,972; 8,156,712; 7,849,659; 8,424,269 AND PATENT PENDING

BU #806376; HRT 100 943239  
EAST HARTFORD, CONNECTICUT  
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37513-0342.002.7700

DRAWN BY:  
B.M.S.

CHECKED BY:  
S.J.T.

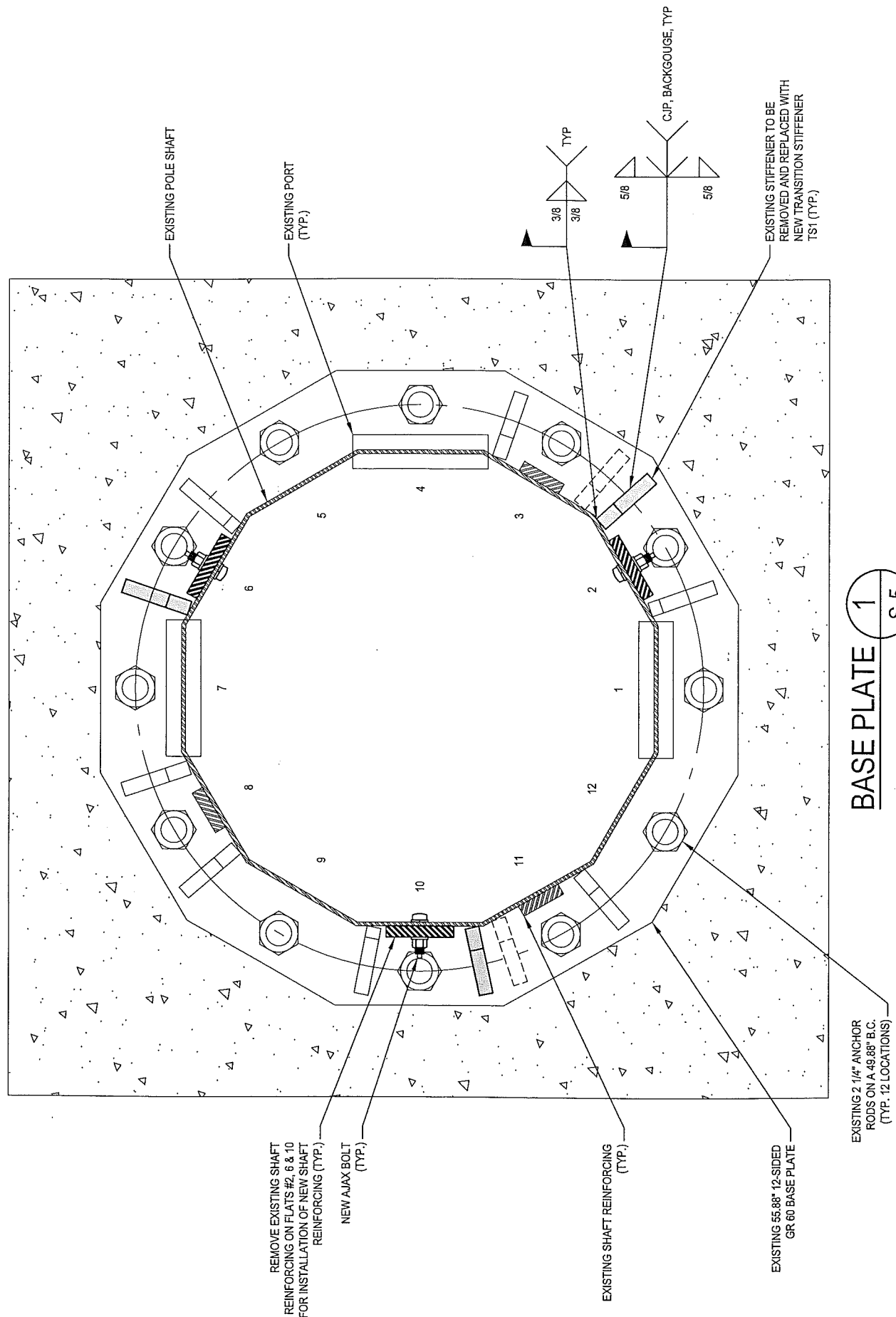
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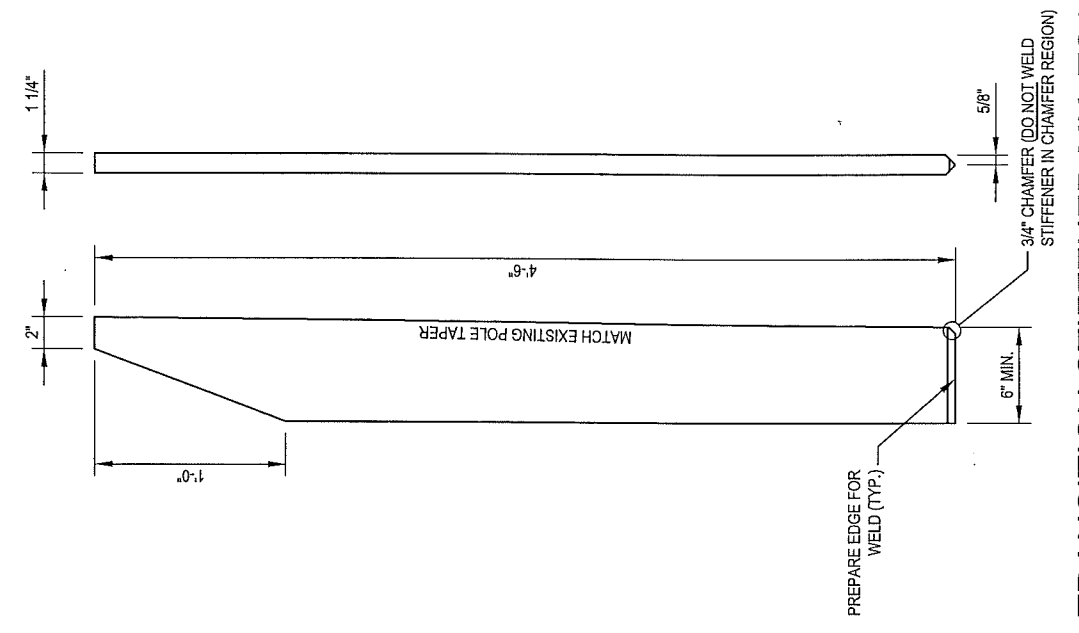
MONOPOLE PROFILE

S-4

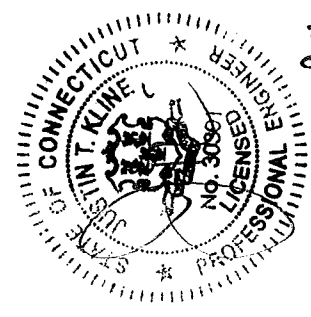




**BASE PLATE** 1 S-5



**TRANSITION STIFFENER MK~TS1**  
(3 REQUIRED) (Fy = 65 KSI)



**PAUL J. FORD AND COMPANY**  
STRUCTURAL ENGINEERS  
250 East Broad Street · Suite 600 · Columbus, Ohio 43215  
(614) 221-6679  
www.pjfweb.com

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46 BROADWAY, ALBANY, NEW YORK 12204  
PH: (585) 899-3442

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DRAWN BY:  
B.M.S.

CHECKED BY:  
S.J.T.

APPROVED BY:  
*JTK*

DATE:  
8-5-2014

BASE PLATE DETAILS

**S-5**

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**MODIFICATION INSPECTION NOTES:****GENERAL**

THE MODIFICATION INSPECTION (MI) IS A VISUAL INSPECTION OF TOWER MODIFICATIONS AND A REVIEW OF CONSTRUCTION INSPECTIONS AND OTHER REPORTS TO ENSURE THE INSTALLATION WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NAMELY THE MODIFICATION DRAWINGS, AS DESIGNED BY THE ENGINEER (EOR).

THE MI IS TO CONFIRM INSTALLATION CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A REVIEW OF THE MODIFICATION DESIGN ITSELF, NOR DOES THE MI INSPECTOR TAKE OWNERSHIP OF THE MODIFICATION DESIGN. OWNERSHIP OF THE STRUCTURAL MODIFICATION DESIGN EFFECTIVENESS AND INTEGRITY RESIDES WITH THE EOR AT ALL TIMES.

ALL MTS SHALL BE CONDUCTED BY A CROWN ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN. SEE ENG-BUL-10173 LIST OF APPROVED MI VENDORS.

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

REFER TO ENG-SOW-10007 : MODIFICATION INSPECTION SOW FOR FURTHER DETAILS AND REQUIREMENTS.

**MI INSPECTOR**

THE MI INSPECTOR IS REQUIRED TO CONTACT THE GC AS SOON AS RECEIVING A PO FOR THE MI TO, AT A MINIMUM:

- REVIEW THE REQUIREMENTS OF THE MI CHECKLIST
- WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS

THE MI INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL GENERAL CONTRACTOR (GC) INSPECTION AND TEST REPORTS, REVIEWING THE DOCUMENTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING THE IN-FIELD INSPECTIONS, AND SUBMITTING THE MI REPORT TO CROWN.

**GENERAL CONTRACTOR**

THE GC IS REQUIRED TO CONTACT THE MI INSPECTOR AS SOON AS RECEIVING A PO FOR THE MODIFICATION INSTALLATION OR TURNKEY PROJECT TO, AT A MINIMUM:

- REVIEW THE REQUIREMENTS OF THE MI CHECKLIST
- WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS
- BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS

THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE MI CHECKLIST AN ENG-SOW-10007.

**RECOMMENDATIONS**

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

- IT IS SUGGESTED THAT THE GC PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, PREFERABLE 10, TO THE MI INSPECTOR AS TO WHEN THE SITE WILL BE READY FOR THE MI TO BE CONDUCTED
- THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS
- IT MAY BE BENEFICIAL TO INSTALL ALL TOWER MODIFICATIONS PRIOR TO CONDUCTING THE FOUNDATION INSPECTIONS TO ALLOW FOUNDATION AND MI INSPECTIONS TO COMMENCE WITH ONE SITE VISIT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE DURING THE MI TO HAVE ANY DEFICIENCIES CORRECTED DURING THE INITIAL MI. THEREFORE, THE GC MAY CHOOSE TO COORDINATE THE MI CAREFULLY TO ENSURE ALL CONSTRUCTION FACILITIES ARE AT THEIR DISPOSAL WHEN THE MI INSPECTOR IS ON SITE.

**CANCELLATION OR DELAYS IN SCHEDULED MI**

IF THE GC AND MI INSPECTOR AGREE TO A DATE ON WHICH THE MI WILL BE CONDUCTED, AND EITHER PARTY CANCELS OR DELAYS, CROWN SHALL NOT BE RESPONSIBLE FOR ANY COSTS, FEES, LOSS OF DEPOSITS AND/OR OTHER PENALTIES RELATED TO THE CANCELLATION OR DELAY INCURRED BY EITHER PARTY FOR ANY TIME (E.G. TRAVEL AND LODGING, COSTS OF KEEPING EQUIPMENT ON-SITE, ETC.). IF CROWN CONTRACTS DIRECTLY FOR A THIRD PARTY MI, EXCEPTIONS MAY BE MADE IN THE EVENT THAT THE DELAY/CANCELLATION IS CAUSED BY WEATHER OR OTHER CONDITIONS THAT MAY COMPROMISE THE SAFETY OF THE PARTIES INVOLVED.

**CORRECTION OF FAILING MTS**

IF THE MODIFICATION INSTALLATION WOULD FAIL THE MI ("FAILED MI"), THE GC SHALL WORK WITH CROWN TO COORDINATE A REMEDIATION PLAN IN ONE OF TWO WAYS:

- CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENT MI.
- OR, WITH CROWN'S APPROVAL, THE GC MAY WORK WITH THE EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION

**MI VERIFICATION INSPECTIONS**

CROWN RESERVES THE RIGHT TO CONDUCT A MI VERIFICATION INSPECTION TO VERIFY THE ACCURACY AND COMPLETENESS OF PREVIOUSLY COMPLETED MI INSPECTION(S) ON TOWER MODIFICATION PROJECTS.

ALL VERIFICATION INSPECTIONS SHALL BE HELD TO THE SAME SPECIFICATIONS AND REQUIREMENTS IN THE CONTRACT DOCUMENTS AND IN ACCORDANCE WITH ENG-SOW-10007.

VERIFICATION INSPECTION MAY BE CONDUCTED BY AN INDEPENDENT AEA/AESV FIRM AFTER A MODIFICATION PROJECT IS COMPLETED, AS MARKED BY THE DATE OF AN ACCEPTED "PASSING MI" OR "PASS AS NOTED MI" REPORT FOR THE ORIGINAL PROJECT.

**PHOTOGRAPHS**

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

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

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

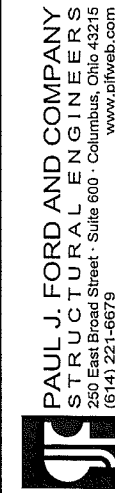
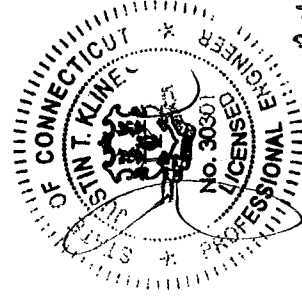
THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, PLEASE REFER TO ENG-SOW-10007.

**MI CHECKLIST**

CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
<b>PRE-CONSTRUCTION</b>	
X	MI CHECKLIST DRAWINGS
X	EOR REVIEW
X	FABRICATION INSPECTION
NA	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
X	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
<b>CONSTRUCTION</b>	
X	CONSTRUCTION INSPECTIONS
NA	FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
NA	POST INSTALLED ANCHOR ROD VERIFICATION
NA	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION
NA	EARTHWORK: LIFT AND DENSITY
X	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
X	INSPECTION OF AJAX BOLTS AND DTI'S PER REQUIREMENTS ON SHEET S-3 MICROPILE/ROCK ANCHOR INSTALLER'S DRILLING AND INSTALLATION LOGS AND QA/QC DOCUMENTS
NA	REFER TO MICROPILE/ROCK ANCHOR NOTES FOR SPECIAL INSPECTION AND TESTING REQUIREMENTS.
NA	REFER TO MICROPILE/ROCK ANCHOR NOTES FOR SPECIAL INSPECTION AND TESTING REQUIREMENTS.
ADDITIONAL TESTING AND INSPECTIONS:	
<b>POST-CONSTRUCTION</b>	
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
NA	POST INSTALLED ANCHOR ROD PULL-OUT TESTING
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS:	

NOTE: X DENOTES A DOCUMENT NEEDED FOR THE PMI REPORT

NA DENOTES A DOCUMENT THAT IS NOT REQUIRED FOR THE PMI REPORT



**CROWN CASTLE**  
46 BROADWAY, ALBANY, NEW YORK 12204  
PH: (518) 895-3442

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BU #806376; HRT 100 943239

EAST HARTFORD, CONNECTICUT  
MONOPOLE REINFORCEMENT AND RETROFIT PROJECT

PROJECT: 37513-0342.002.7700

DRAWN BY:

B.M.S.

CHECKED BY:

S.J.T.

APPROVED BY:

JJK

DATE:

8-5-2014

MI CHECKLIST

S-6

RADIO FREQUENCY FCC REGULATORY COMPLIANCE  
MAXIMUM PERMISSIBLE EXPOSURE (MPE) ASSESSMENT

Sprint Existing Facility

Site ID: CT03XC251

East Hartford

1455 Forbes Street  
East Hartford, CT 06118

**December 17, 2014**

**EBI Project Number: 62146519**

December 17, 2014

Sprint  
Attn: RF Engineering Manager  
1 International Boulevard, Suite 800  
Mahwah, NJ 07495

Re: Radio Frequency Maximum Permissible Exposure (MPE) Assessment for Site:  
**CT03XC251 - East Hartford**

**Site Total: 90.10% - MPE% in full compliance**

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at **1455 Forbes Street, East Hartford, CT**, for the purpose of determining whether the radio frequency (RF) exposure levels from the proposed Sprint equipment upgrades 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 limit for the cellular band (850 MHz Band) is approximately  $567 \mu\text{W}/\text{cm}^2$ , and the general population exposure limit for the 1900 MHz and 2500 MHz 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 upgrades to the existing Sprint Wireless antenna facility located at **1455 Forbes Street, East Hartford, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. 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 emissions were calculated using the following assumptions:

- 1) 6 channels in the 1900 MHz Band were considered for each sector of the proposed installation.
- 2) 1 channel in the 800 MHz Band was considered for each sector of the proposed installation.
- 3) 2 channels in the 2500 MHz Band were considered for each sector of the proposed installation.
- 4) 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.

- 5) For the following calculations the sample point was the top of a six 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.
- 6) The antennas used in this modeling are the RFS APXVSPP18-C-A20 and the RFS APXVTM14-C-I20. This is based on feedback from the carrier with regards to anticipated antenna selection. The RFS APXVSPP18-C-A20 has a 15.9 dBd gain value at its main lobe at 1900 MHz and 13.4 dBd at its main lobe for 850 MHz. The RFS APXVTM14-C-I20 has a 15.9 dBd gain value at its main lobe at 2500 MHz. 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.
- 7) The antenna mounting height centerline for the proposed antennas is **97 feet** above ground level (AGL).
- 8) 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 calculation were done with respect to uncontrolled / general public threshold limits



Site ID	CT03XC251 - East Hartford
Site Address	1455 Forbes Street, East Hartford, CT, 06118
Site Type	Monopole

**Sector 1**

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain (10 db reduction)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss (dB)	ERP	Power Density Percentage
1a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	6	120	5.9	97	91	1/2 "	0.5	0	416.08	1.81%
1a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	97	91	1/2 "	0.5	0	39.00	0.30%
1B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	97	91	1/2 "	0.5	0	138.69	1.06%
Sector total Power Density Value:															3.17%	

**Sector 2**

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain (10 db reduction)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss (dB)	ERP	Power Density Percentage
2a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	6	120	5.9	97	91	1/2 "	0.5	0	416.08	1.81%
2a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	97	91	1/2 "	0.5	0	39.00	0.30%
2B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	97	91	1/2 "	0.5	0	138.69	1.06%
Sector total Power Density Value:															3.17%	

**Sector 3**

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain (10 db reduction)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss (dB)	ERP	Power Density Percentage
3a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	6	120	5.9	97	91	1/2 "	0.5	0	416.08	1.81%
3a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	97	91	1/2 "	0.5	0	39.00	0.30%
3B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	97	91	1/2 "	0.5	0	138.69	1.06%
Sector total Power Density Value:															3.17%	

Site Composite MPE %	
Carrier	MPE %
Sprint	9.50%
Clearwire	1.91%
MetroPCS	7.42%
AT&T	24.54%
Verizon Wireless	46.27%
T-Mobile	0.46%
<b>Total Site MPE %</b>	<b>90.10%</b>

## Summary

All calculations performed for this analysis yielded results that were well within the allowable limits for general public Maximum Permissible Exposure (MPE) to radio frequency energy.

The anticipated Maximum Composite contributions from the Sprint facility are **9.50% (3.17% from sector 1, 3.17% from sector 2 and 3.17% from sector 3)** of the allowable FCC established general public limit considering all three sectors simultaneously sampled at the ground level.

The anticipated composite MPE value for this site assuming all carriers present is **90.10%** of the allowable FCC established general public limit sampled at 6 feet above ground level. This total composite site value is based upon MPE 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.



**Scott Heffernan**  
RF Engineering Director

**EBI Consulting**  
21 B Street  
Burlington, MA 01803