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

March 23, 2016

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

RE: **Notice of Exempt Modification for T-Mobile / L700 Crown Site BU: 876323**
T-Mobile Site ID: CTNH506A
85 Plainfield Avenue, West Haven, CT 06516
Latitude: 41° 18' 4.59" / Longitude: -72° 58' 35.2"

Dear Ms. Bachman:

T-Mobile currently maintains three (3) antennas at the 146 foot level of the existing 149 foot monopole at 85 Plainfield Avenue in West Haven, CT. The tower is owned by Crown Castle and the property is owned by Shirley Frumento. T-Mobile now intends to keep all installed and move ACL up to 148'6", add three (3) antennas, twelve (12) coax and three (3) BiasT. Swapping one (1) cabinet and adding one (1) cabinet within existing ground space.

Please be advised I have included an email from Catherine Conniff with the zoning department at the City of West Haven indicating the only document they have on file is a correspondence from the Connecticut Siting Council dated 10/30/2009 as the notice of intent to modify the facility. I have included a copy as well. Please note Crown Castle, tower owner does not have the original zoning approval on file either. Please use both emails to replace the zoning approval requirement.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.S.C.A. § 16-50j-73, a copy of this letter is being sent to The Honorable Edward M. O'Brien, Mayor for the City of West Haven and Shirley Frumento as the property owner.

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

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

3. The proposed modification will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communication Commission safety standard.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

For the foregoing reasons, T-Mobile respectfully submits that the proposed modifications to the above-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Please send approval/rejection letter to Attn: Kimberly Myl.

Sincerely,

Kimberly Myl

Kimberly Myl
Real Estate Specialist
Crown Castle
1200 MacArthur Boulevard, Suite 200
Mahwah, New Jersey 07430
201-236-9069
kimberly.myl@crowncastle.com

Attachments:

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

cc: The Honorable Edward M. O'Brien, Mayor for the City of West Haven
City Hall
355 Main Street
West Haven, CT 06516

Shirley Frumento
PO Box 175
West Haven, CT 06516

Hanlon, Dashanna

From: Myl, Kimberly
Sent: Tuesday, March 08, 2016 2:20 PM
To: siting.council@ct.gov
Subject: Existing Telecommunications Facility - 85 Plainfield Avenue, West Haven (Crown Castle: 876323 / TMO: CTNH506A)
Attachments: 85 plainfield.pdf

Good Afternoon,
Please be advised the attached is what was received from the township and they are unable to locate the original zoning approval. Crown Castle as the tower owner does not have this information either. Kindly advise if I can use this email to fulfil the requirement of including the original zoning approval when submitting on behalf of T-Mobile.

KIMBERLY MYL
Real Estate Specialist
T: (201) 236-9069 | M: (201) 993-3697

CROWN CASTLE
1200 MacArthur Blvd, Suite 200
Mahwah, NJ 07430

From: Cathy Conniff [mailto:conniff@westhaven-ct.gov]
Sent: Wednesday, February 03, 2016 4:30 PM
To: Myl, Kimberly
Subject: 85 plainfield

Info request

Catherine Conniff
Zoning Enforcement Officer/ Inland Wetlands Officer
City of West Haven
Tel. (203) 937-3500 Ext 3006
Fax. (203) 937-3742
Email: conniff@westhaven-ct.gov

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

October 30, 2009

The Honorable John M. Picard
Mayor
City of West Haven
City Hall
355 Main Street
West Haven, CT 06516

RE: **EM-CLEARWIRE-156-091023** – Clearwire Corporation notice of intent to modify an existing telecommunications facility located at 85 Plainfield Avenue, West Haven, Connecticut.

Dear Mayor Picard:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

If you have any questions or comments regarding this proposal, please call me or inform the Council by November 13, 2009.

Thank you for your cooperation and consideration.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/jbw

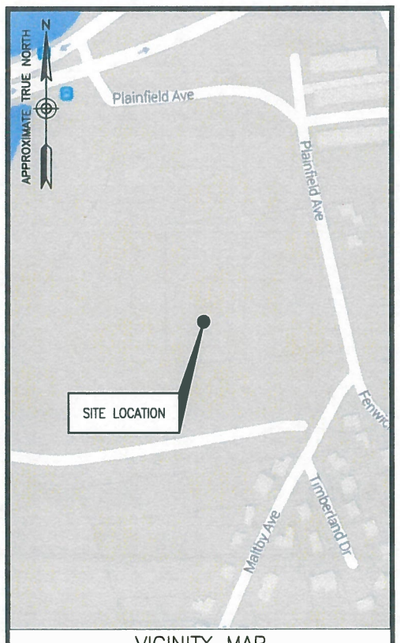
Enclosure: Notice of Intent

c: Edwin Selden, City Planner, City of West Haven

CSC
CONNECTICUT SITING COUNCIL

T-MOBILE NORTHEAST LLC

T-MOBILE SITE #: CTNH506A
CROWN CASTLE BU #: 876323
SITE NAME: HILLSIDE
85 PLAINFIELD AVENUE
WEST HAVEN, CT 06516
NEW HAVEN COUNTY



VICINITY MAP

FROM BLOOMFIELD, CT:

HEAD NORTHEAST ON GRIFFIN RD S TOWARD W NEWBERRY RD. TURN RIGHT ONTO DAY HILL RD. USE THE RIGHT LANE TO MERGE ONTO I-91 S VIA THE RAMP TO HARTFORD. MERGE ONTO I-91 S. TAKE EXIT 17 TO MERGE ONTO CT-15 S/WILBUR CROSS PKWY. TAKE EXIT 57 TO MERGE ONTO CT-34 E/DERBY AVE/DERBY TURNPIKE TOWARD ORANGE. MERGE ONTO CT-34 E/DERBY AVE/DERBY TURNPIKE. TURN RIGHT ONTO PLAINFIELD AVE. SITE WILL BE ON THE RIGHT.

CONSULTANT TEAM

ENGINEER
DEWBERRY ENGINEERS INC.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054

CONTACT: BRYAN HUFF
PHONE #: (973) 576-0147

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

CONTACT: PATRICIA PELON
PHONE #: (518) 373-3507

PROJECT SUMMARY

SITE NAME:
HILLSIDE

SITE NUMBER:
CTNH506A

TOWER OWNER:
CROWN CASTLE
3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

APPLICANT/DEVELOPER:
T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

COORDINATES:
LATITUDE: 41°-18'-4.59" N (NAD83)
LONGITUDE: 72°-58'-35.2" W (NAD83)
(PER CROWN CASTLE)

CONFIGURATION
705F

PROJECT DIRECTORY

SITE ADDRESS:
85 PLAINFIELD AVENUE
WEST HAVEN, CT 06516
NEW HAVEN COUNTY

SCOPE OF WORK

- REMOVE AND REPLACE EXISTING ANTENNA MOUNT WITH (1) NEW ANTENNA MOUNT.
- INSTALL (3) NEW ANTENNAS.
- RELOCATE (3) EXISTING ANTENNAS TO NEW MOUNT.
- INSTALL (3) NEW BIAS TEES.
- INSTALL (6) NEW LINES OF COAX ALONG MONOPOLE EXTERIOR.
- REMOVE AND REPLACE (1) EXISTING BBU CABINET WITH (1) NEW BBU CABINET AT GRADE.
- INSTALL (1) NEW EQUIPMENT CABINET AT GRADE.

THIS DOCUMENT WAS DEVELOPED TO REFLECT A SPECIFIC SITE AND ITS SITE CONDITIONS AND IS NOT TO BE USED FOR ANOTHER SITE OR WHEN OTHER CONDITIONS PERTAIN. REUSE OF THIS DOCUMENT IS AT THE SOLE RISK OF THE USER.

A.D.A. COMPLIANCE:
FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION.

SHEET INDEX

SHT. NO.	DESCRIPTION
T-1	TITLE SHEET
G-1	GENERAL NOTES
C-1	COMPOUND PLAN & EQUIPMENT PLANS
C-2	ANTENNA LAYOUTS & ELEVATIONS
C-3	CONSTRUCTION DETAILS
E-1	GROUNDING NOTES & DETAILS

T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

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

CTNH506A
HILLSIDE

CONSTRUCTION DRAWINGS

0	03/02/16	ISSUED AS FINAL
C	02/24/16	REVISED PER COMMENTS
B	02/12/16	REVISED PER COMMENTS
A	02/10/16	ISSUED FOR REVIEW

Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

STATE OF CONNECTICUT
JIANG YU
No. 23222
LICENSED PROFESSIONAL ENGINEER

CONNECTICUT LICENSE NO. 0023222

DRAWN BY:	RA
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50078110
SITE ADDRESS:	

85 PLAINFIELD AVENUE
WEST HAVEN, CT 06516
NEW HAVEN COUNTY

SHEET TITLE

TITLE SHEET

SHEET NUMBER

T-1

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   PROJECT MANAGEMENT – CROWN CASTLE
   CONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – T–MOBILE
   OEM – ORIGINAL EQUIPMENT MANUFACTURER
2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF PROJECT MANAGEMENT.
3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK.
4. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
5. DRAWINGS PROVIDED HERE ARE NOT TO SCALE UNLESS OTHERWISE NOTED AND ARE INTENDED TO SHOW OUTLINE ONLY.
6. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY PROJECT MANAGEMENT.
9. CONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. CONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. CONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH PROJECT MANAGEMENT.
10. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.
11. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
12. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
13. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
14. CONTRACTOR SHALL NOTIFY DEWBERRY 48 HOURS IN ADVANCE OF POURING CONCRETE, OR BACKFILLING TRENCHES, SEALING ROOF AND WALL PENETRATIONS & POST DOWNS, FINISHING NEW WALLS OR FINAL ELECTRICAL CONNECTIONS FOR ENGINEER REVIEW.
15. CONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. CONTRACTOR SHALL NOTIFY PROJECT MANAGEMENT OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
16. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY CONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
17. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

SITE WORK GENERAL NOTES:

1. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
2. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO:
   A) FALL PROTECTION
   B) CONFINED SPACE
   C) ELECTRICAL SAFETY
   D) TRENCHING & EXCAVATION.
3. ALL SITE WORK SHALL BE AS INDICATED ON THE DRAWINGS AND PROJECT SPECIFICATIONS.
4. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES, TOP SOIL AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
5. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF CONTRACTOR, OWNER AND/OR LOCAL UTILITIES.
6. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION.
7. THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE T–MOBILE SPECIFICATION FOR SITE SIGNAGE.
8. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE TRANSMISSION EQUIPMENT AND TOWER AREAS.
9. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.
10. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION, SEE SOIL COMPACTION NOTES.
11. THE AREAS OF THE OWNER'S PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION.
12. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL JURISDICTION'S GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

ELECTRICAL INSTALLATION NOTES:

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE LOCAL CODES.
2. CONTRACTOR SHALL MODIFY EXISTING CABLE TRAY SYSTEM AS REQUIRED TO SUPPORT RF AND TRANSPORT CABLING TO THE NEW BTS EQUIPMENT. CONTRACTOR SHALL SUBMIT MODIFICATIONS TO PROJECT MANAGEMENT FOR APPROVAL.
3. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED.
4. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC AND TELCORDIA.
5. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC AND TELCORDIA.
6. CABLES SHALL NOT BE ROUTED THROUGH LADDER–STYLE CABLE TRAY RUNGS.
7. EACH END OF EVERY POWER, POWER PHASE CONDUCTOR (I.E., HOTS), GROUNDING, AND T1 CONDUCTOR AND CABLE SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC & OSHA, AND MATCH EXISTING INSTALLATION REQUIREMENTS.
8. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS. ALL EQUIPMENT SHALL BE LABELED WITH THEIR VOLTAGE RATING, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING, AND BRANCH CIRCUIT ID NUMBERS (I.E., PANELBOARD AND CIRCUIT ID'S).
9. PANELBOARDS (ID NUMBERS) AND INTERNAL CIRCUIT BREAKERS (CIRCUIT ID NUMBERS) SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS.
10. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.
11. POWER, CONTROL, AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE CONDUCTOR (SIZE 14 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.
12. POWER PHASE CONDUCTORS (I.E., HOTS) SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL.) PHASE CONDUCTOR COLOR CODES SHALL CONFORM WITH THE NEC & OSHA AND MATCH EXISTING INSTALLATION REQUIREMENTS.
13. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE CONDUCTOR (SIZE 6 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN–2 GREEN INSULATION, CLASS B STRANDED COPPER CABLE RATED FOR 90°C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.
14. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED OUTDOORS, OR BELOW GRADE, SHALL BE SINGLE CONDUCTOR #2 AWG SOLID TINNED COPPER CABLE, UNLESS OTHERWISE SPECIFIED.
15. POWER AND CONTROL WIRING, NOT IN TUBING OR CONDUIT, SHALL BE MULTI–CONDUCTOR, TYPE TC CABLE (SIZE 14 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90°C (WET AND DRY) OPERATION; WITH OUTER JACKET; LISTED OR LABELED FOR THE LOCATION USED, UNLESS OTHERWISE SPECIFIED.
16. ALL POWER AND POWER GROUNDING CONNECTIONS SHALL BE CRIMP–STYLE, COMPRESSION WIRE LUGS AND WIRENUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRENUTS SHALL BE RATED FOR OPERATION AT NO LESS THAN 75°C (90°C IF AVAILABLE).
17. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.
18. NEW RACEWAY OR CABLE TRAY WILL MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.
19. ELECTRICAL METALLIC TUBING (EMT) OR RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40, OR RIGID PVC SCHEDULE 80 FOR LOCATIONS SUBJECT TO PHYSICAL DAMAGE) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.
20. ELECTRICAL METALLIC TUBING (EMT), ELECTRICAL NONMETALLIC TUBING (ENT), OR RIGID NONMETALLIC CONDUIT (RIGID PVC, SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
21. GALVANIZED STEEL INTERMEDIATE METALLIC CONDUIT (IMC) SHALL BE USED FOR OUTDOOR LOCATIONS ABOVE GRADE.
22. RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80) SHALL BE USED UNDERGROUND; DIRECT BURIED, IN AREAS OF OCCASIONAL LIGHT VEHICLE TRAFFIC OR ENCASED IN REINFORCED CONCRETE IN AREAS OF HEAVY VEHICLE TRAFFIC.
23. LIQUID–TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID–TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
24. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION–TYPE AND APPROVED FOR THE LOCATION USED. SETSCREW FITTINGS ARE NOT ACCEPTABLE.
25. CABINETS, BOXES, AND WIREWAYS SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.
26. CABINETS, BOXES, AND WIREWAYS TO MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.
27. WIREWAYS SHALL BE EPOXY–COATED (GRAY) AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARD; SHALL BE PANDUIT TYPE E (OR EQUAL); AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.
28. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES, AND PULL BOXES SHALL BE GALVANIZED OR EPOXY–COATED SHEET STEEL, SHALL MEET OR EXCEED UL 50, AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.
29. METAL RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY–COATED, OR NON–CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.
30. NONMETALLIC RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.
31. THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM PROJECT MANAGEMENT BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
32. THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD AGAINST LIFE AND PROPERTY.

CONCRETE AND REINFORCING STEEL NOTES:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST–IN–PLACE CONCRETE.
2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE. A HIGHER STRENGTH (4000 PSI) MAY BE USED. ALL CONCRETING WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.
3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60, DEFORMED UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 WELDED STEEL WIRE FABRIC UNLESS NOTED OTHERWISE (UNO). SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD, UNO.
4. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:

   CONCRETE CAST AGAINST EARTH.....3 IN.
   CONCRETE EXPOSED TO EARTH OR WEATHER:
   #6 AND LARGER .....2 IN.
   #5 AND SMALLER & WWF.....1 1/2 IN.
   CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:
   SLAB AND WALL .....3/4 IN.
   BEAMS AND COLUMNS.....1 1/2 IN.

5. A CHAMFER 3/4" SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNO, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.
6. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY RAMSET/REDHEAD OR APPROVED EQUAL.
7. CONCRETE CYLINDER TEST IS NOT REQUIRED FOR SLAB ON GRADE WHEN CONCRETE IS LESS THAN 50 CUBIC YARDS (IBC 1905.6.2.3) IN THAT EVENT THE FOLLOWING RECORDS SHALL BE PROVIDED BY THE CONCRETE SUPPLIER;
   (A) RESULTS OF CONCRETE CYLINDER TESTS PERFORMED AT THE SUPPLIER'S PLANT,
   (B) CERTIFICATION OF MINIMUM COMPRESSIVE STRENGTH FOR THE CONCRETE GRADE SUPPLIED.
   FOR GREATER THAN 50 CUBIC YARDS THE GC SHALL PERFORM THE CONCRETE CYLINDER TEST.
8. AS AN ALTERNATIVE TO ITEM 7, TEST CYLINDERS SHALL BE TAKEN INITIALLY AND THEREAFTER FOR EVERY 50 YARDS OF CONCRETE FROM EACH DIFFERENT BATCH PLANT.
9. EQUIPMENT SHALL NOT BE PLACED ON NEW PADS FOR SEVEN DAYS AFTER PAD IS POURED, UNLESS IT IS VERIFIED BY CYLINDER TESTS THAT COMPRESSIVE STRENGTH HAS BEEN ATTAINED.

STRUCTURAL STEEL NOTES:

1. ALL STEEL WORK SHALL BE PAINTED OR GALVANIZED IN ACCORDANCE WITH THE DRAWINGS UNLESS NOTED OTHERWISE. STRUCTURAL STEEL SHALL BE ASTM–A–36 UNLESS OTHERWISE NOTED ON THE SITE SPECIFIC DRAWINGS. STEEL DESIGN, INSTALLATION AND BOLTING SHALL BE PERFORMED IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) "MANUAL OF STEEL CONSTRUCTION".
2. ALL WELDING SHALL BE PERFORMED USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION". PAINTED SURFACES SHALL BE TOUCHED UP.
3. BOLTED CONNECTIONS SHALL BE ASTM A325 BEARING TYPE (3/4"Ø) CONNECTIONS AND SHALL HAVE MINIMUM OF TWO BOLTS UNLESS NOTED OTHERWISE.
4. NON–STRUCTURAL CONNECTIONS FOR STEEL GRATING MAY USE 5/8" DIA. ASTM A 307 BOLTS UNLESS NOTED OTHERWISE.
5. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY RAMSET/REDHEAD OR APPROVED EQUAL.
6. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ENGINEER REVIEW & APPROVAL ON PROJECTS REQUIRING STRUCTURAL STEEL.
7. ALL STRUCTURAL STEEL WORK SHALL BE DONE IN ACCORDANCE WITH AISC SPECIFICATIONS.

CONSTRUCTION NOTES:

1. FIELD VERIFICATION:
   CONTRACTOR SHALL FIELD VERIFY SCOPE OF WORK, T–MOBILE ANTENNA PLATFORM LOCATION AND ANTENNAS TO BE REPLACED.
2. COORDINATION OF WORK:
   CONTRACTOR SHALL COORDINATE RF WORK AND PROCEDURES WITH PROJECT MANAGEMENT.
3. CABLE LADDER RACK:
   CONTRACTOR SHALL FURNISH AND INSTALL CABLE LADDER RACK, CABLE TRAY, AND CONDUIT AS REQUIRED TO SUPPORT CABLES TO THE NEW BTS LOCATION.
4. GROUNDING OF ALL EQUIPMENT AND ANTENNAS IS NOT CONSIDERED PART OF THE SCOPE OF THIS PROJECT AND IS THE RESPONSIBILITY OF THE OWNER AND CONTRACTOR AT THE TIME OF CONSTRUCTION. ALL EQUIPMENT AND ANTENNAS TO BE INSTALLED AND GROUNDED IN ACCORDANCE WITH GOVERNING BUILDING CODE, MANUFACTURER RECOMMENDATIONS AND OWNER SPECIFICATIONS.

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HILLSIDE

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No. 28222
LICENSED
PROFESSIONAL ENGINEER
JIANG YU, P.E.
CONNECTICUT LICENSE NO. 0023222

DRAWN BY:	RA
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50078110
SITE ADDRESS:	

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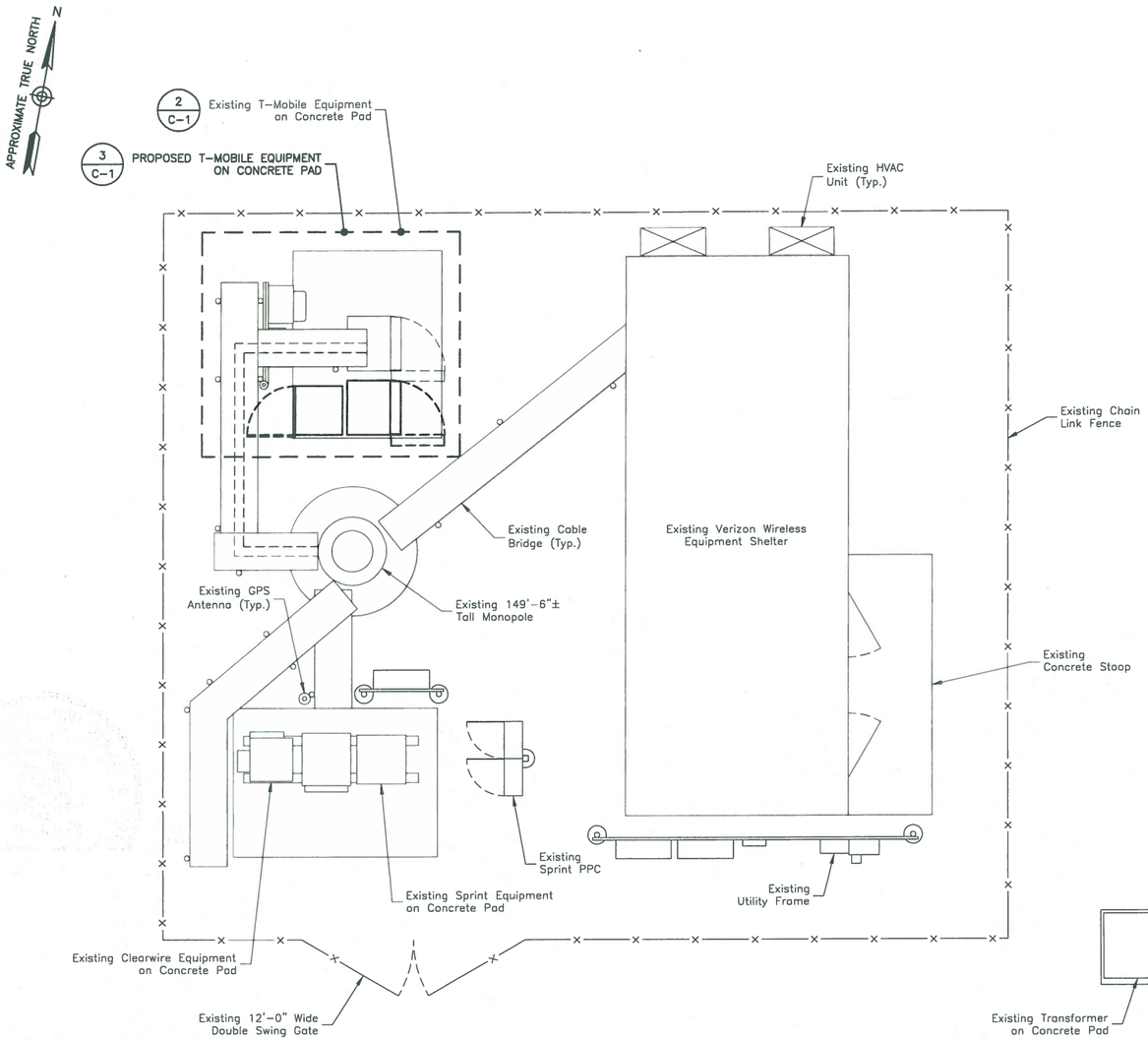
WEST HAVEN, CT 06516
NEW HAVEN COUNTY

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

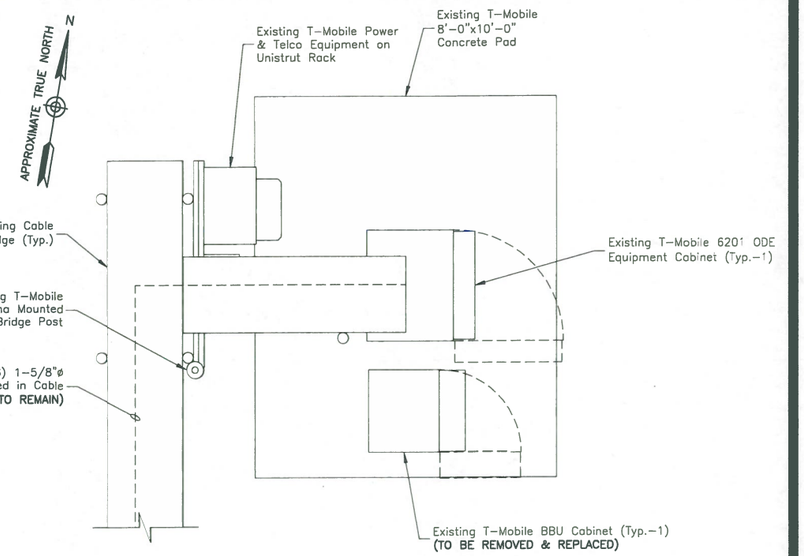
G–1



COMPOUND PLAN 1

SCALE: 1/8"=1' FOR 11"x17"
1/4"=1' FOR 22"x34"

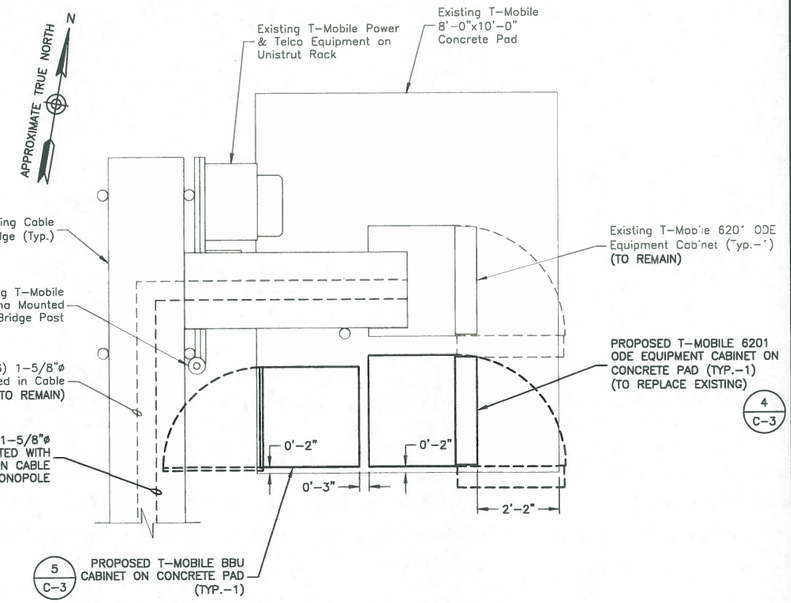
0' 2' 4' 8'



EXISTING EQUIPMENT PLAN 2

SCALE: 1/4"=1' FOR 11"x17"
1/2"=1' FOR 22"x34"

0' 1' 2' 4'



PROPOSED EQUIPMENT PLAN 3

SCALE: 1/4"=1' FOR 11"x17"
1/2"=1' FOR 22"x34"

0' 1' 2' 4'

NOTES:

1. NORTH ARROW SHOWN AS APPROXIMATE.
2. NOT ALL INFORMATION IS SHOWN FOR CLARITY.
3. ALL PROPOSED EQUIPMENT, INCLUDING ANTENNAS, RRU'S, COAX, ETC., SHALL BE MOUNTED IN ACCORDANCE WITH THE TOWER STRUCTURAL ANALYSIS BY PAUL J. FORD AND COMPANY DATED MARCH 21, 2016 & MODIFICATION DRAWINGS BY PAUL J. FORD & COMPANY DATED OCTOBER 26, 2015.

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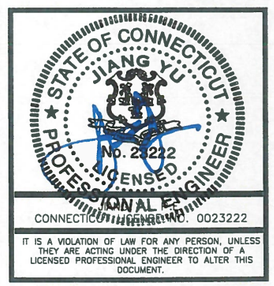

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DRAWN BY:	RA
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CHECKED BY:	GHN
PROJECT NUMBER:	50066258
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SITE ADDRESS:	

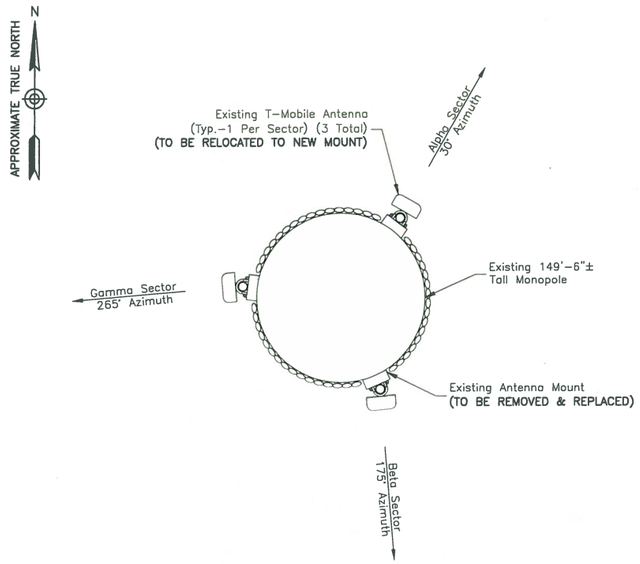
85 PLAINFIELD AVENUE
WEST HAVEN, CT 06516
NEW HAVEN COUNTY

SHEET TITLE

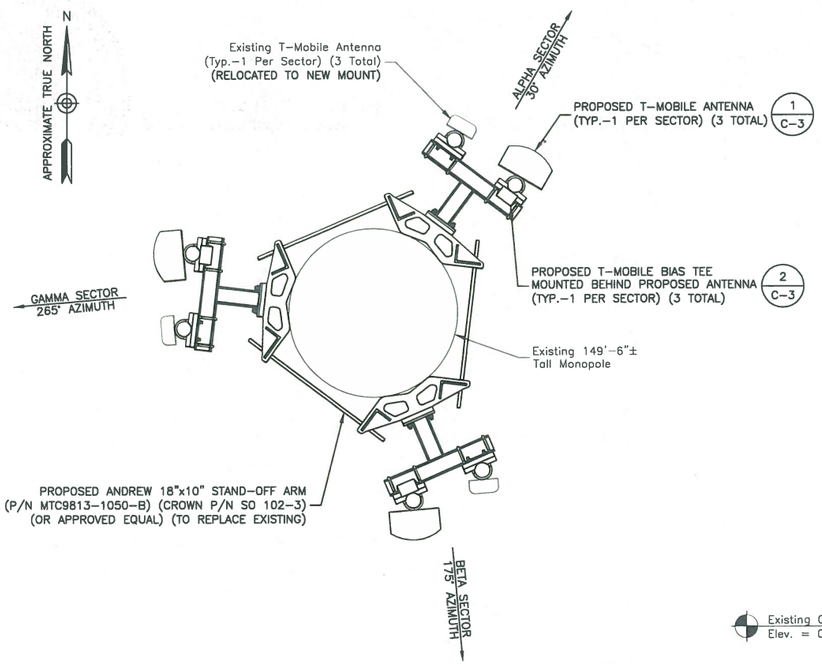
COMPOUND PLAN & EQUIPMENT PLANS

SHEET NUMBER

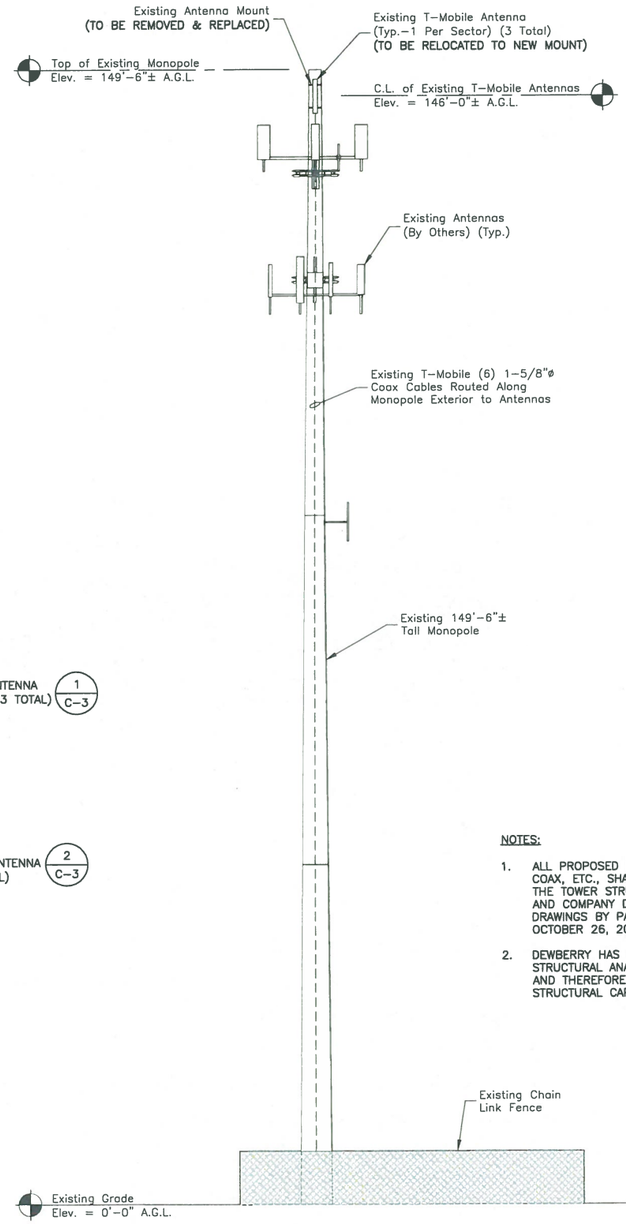
C-1



EXISTING ANTENNA LAYOUT (1)
SCALE: N.T.S.



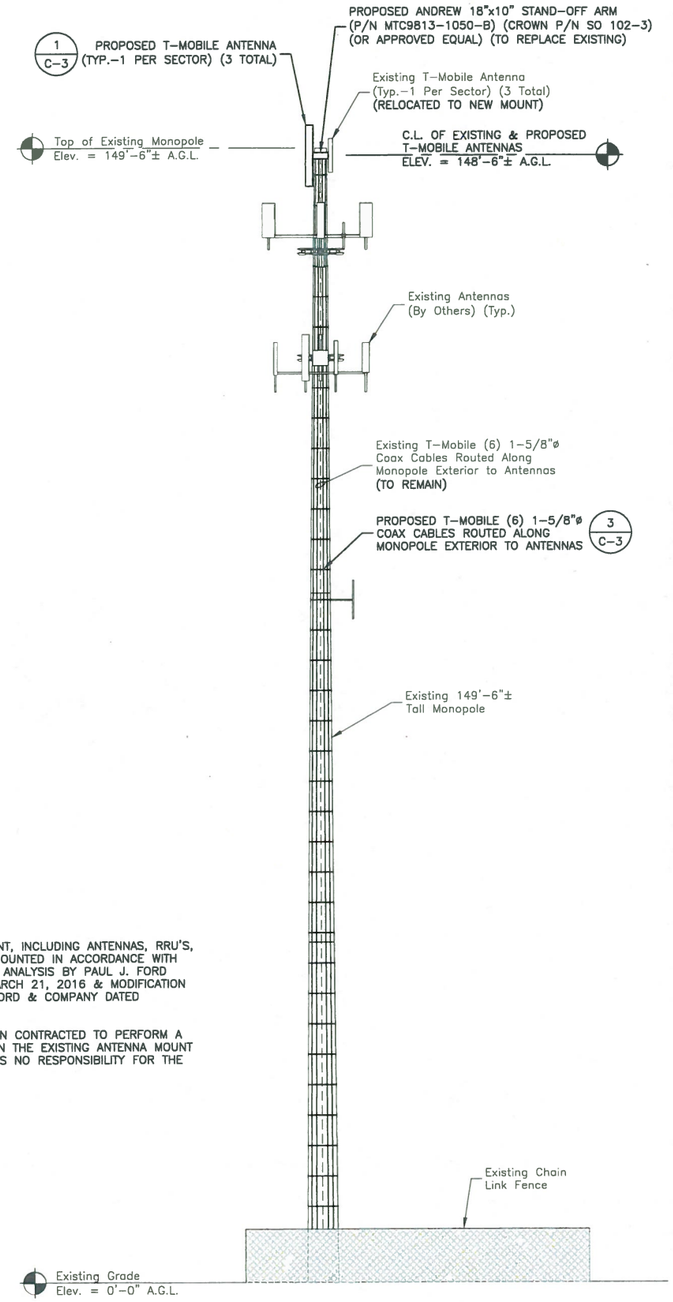
PROPOSED ANTENNA LAYOUT (2)
SCALE: N.T.S.



EXISTING ELEVATION (3)
SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"
0' 10' 20'

NOTES:

1. ALL PROPOSED EQUIPMENT, INCLUDING ANTENNAS, RRU'S, COAX, ETC., SHALL BE MOUNTED IN ACCORDANCE WITH THE TOWER STRUCTURAL ANALYSIS BY PAUL J. FORD AND COMPANY DATED MARCH 21, 2016 & MODIFICATION DRAWINGS BY PAUL J. FORD & COMPANY DATED OCTOBER 26, 2015.
2. DEWBERRY HAS NOT BEEN CONTRACTED TO PERFORM A STRUCTURAL ANALYSIS ON THE EXISTING ANTENNA MOUNT AND THEREFORE ASSUMES NO RESPONSIBILITY FOR THE STRUCTURAL CAPACITY.



PROPOSED ELEVATION (4)
SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"
0' 10' 20'

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STATE OF CONNECTICUT
JIANG YU
No. 23222
LICENSED PROFESSIONAL ENGINEER
JIANG YU, P.E.
CONNECTICUT LICENSE NO. 0023222

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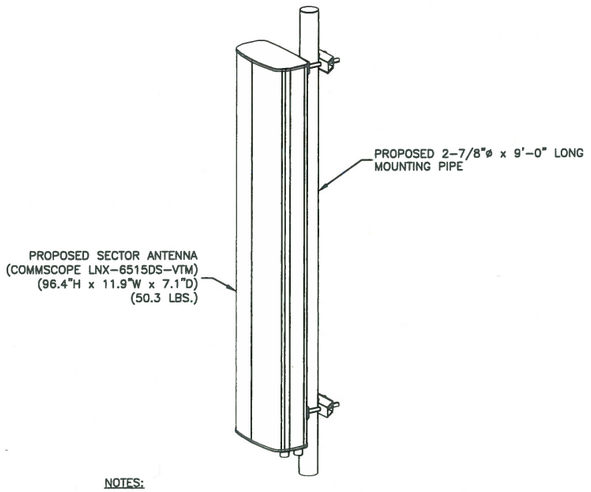
85 PLAINFIELD AVENUE
WEST HAVEN, CT 06516
NEW HAVEN COUNTY

SHEET TITLE

ANTENNA LAYOUTS & ELEVATIONS

SHEET NUMBER

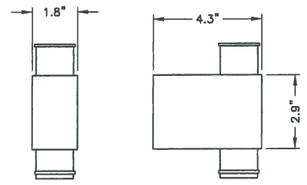
C-2



NOTES:

1. MOUNT ANTENNAS PER MANUFACTURER'S RECOMMENDATIONS.
2. GROUND ANTENNAS AND MOUNTS PER MANUFACTURER'S RECOMMENDATIONS AND T-MOBILE STANDARDS.
3. CONFIRM REQUIRED ANTENNAS WITH THE LATEST RFDS.

ISOMETRIC ANTENNA DETAIL (1)
SCALE: N.T.S.

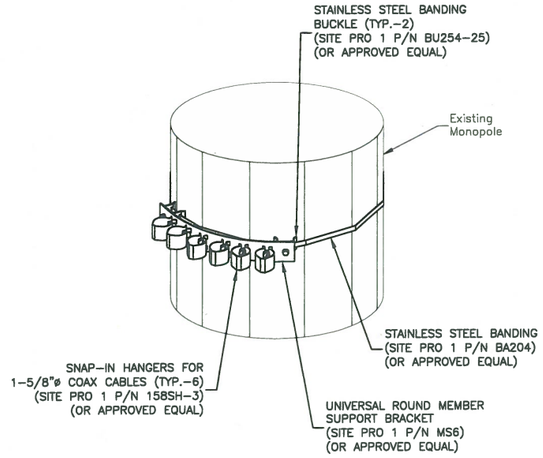


ANDREW ATBT-BOTTOM-24V

NOTES:

1. MOUNT EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS.
2. GROUND EQUIPMENT AND MOUNTS PER MANUFACTURER'S RECOMMENDATIONS AND T-MOBILE STANDARDS.
3. CONFIRM REQUIRED EQUIPMENT WITH THE LATEST RFDS.

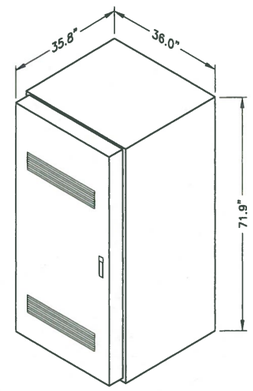
BIAS TEE DETAIL (2)
SCALE: N.T.S.



NOTES:

1. SUPPORT BRACKETS SHALL BE SPACED AT 4'-0" C-C MAX.
2. INSTALL BRACKETS, BANDING & CABLE HANGERS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

COAX SUPPORT DETAIL (3)
SCALE: N.T.S.



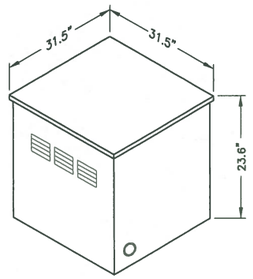
COMMSCOPE ODE6201 OUTDOOR ENCLOSURE

MATERIAL:	ANCHOR:
CONCRETE	3/8"ø HILTI KWIK BOLT 3 W/2-1/2" MIN. EMBED.
STRUCTURAL STEEL	1/2"ø STRUCTURAL BOLTS

NOTE:

1. CONTRACTOR SHALL ANCHOR CABINET IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.

6201 OUTDOOR CABINET DETAIL (4)
SCALE: N.T.S.



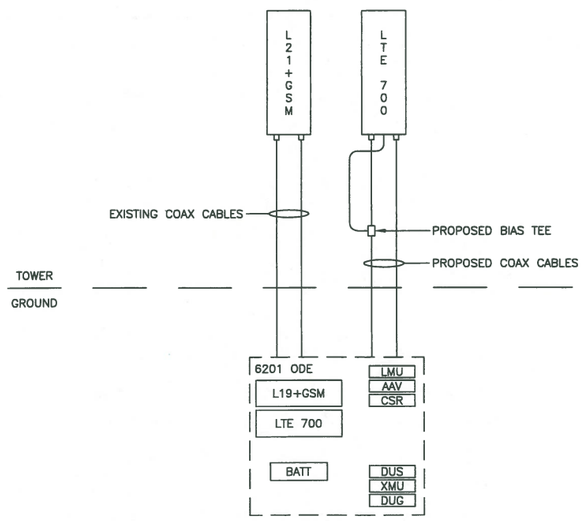
ALCATEL-LUCENT EZBFo BATTERY BACKUP SYSTEM

MATERIAL:	ANCHOR:
CONCRETE	3/8"ø HILTI KWIK BOLT 3 W/2-1/2" MIN. EMBED.
STRUCTURAL STEEL	1/2"ø STRUCTURAL BOLTS

NOTE:

1. CONTRACTOR SHALL ANCHOR CABINET IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.

BBU CABINET DETAIL (5)
SCALE: N.T.S.



SITE CONFIGURATION 705F (6)
SCALE: N.T.S

DESIGN CONFIGURATION

	ANTENNAS		COAX		COAX LENGTH	TMA	BIAS TEE
	EXISTING	PROPOSED	EXISTING	PROPOSED		EXISTING	PROPOSED
ALPHA	RFS APXV18-206516S-C-A20	EXISTING TO REMAIN	(2) 1-5/8"ø	(2) 1-5/8"ø	196'-0"	-	-
	-	COMMSCOPE LNX-6515DS-VTM				-	(1) ATBT-BOTTOM-24V
BETA	RFS APXV18-206516S-C-A20	EXISTING TO REMAIN	(2) 1-5/8"ø	(2) 1-5/8"ø	196'-0"	-	-
	-	COMMSCOPE LNX-6515DS-VTM				-	(1) ATBT-BOTTOM-24V
GAMMA	RFS APXV18-206516S-C-A20	EXISTING TO REMAIN	(2) 1-5/8"ø	(2) 1-5/8"ø	196'-0"	-	-
	-	COMMSCOPE LNX-6515DS-VTM				-	(1) ATBT-BOTTOM-24V

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JIANG YU
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JOB NUMBER:	50078110
SITE ADDRESS:	

85 PLAINFIELD AVENUE
WEST HAVEN, CT 06516
NEW HAVEN COUNTY

SHEET TITLE

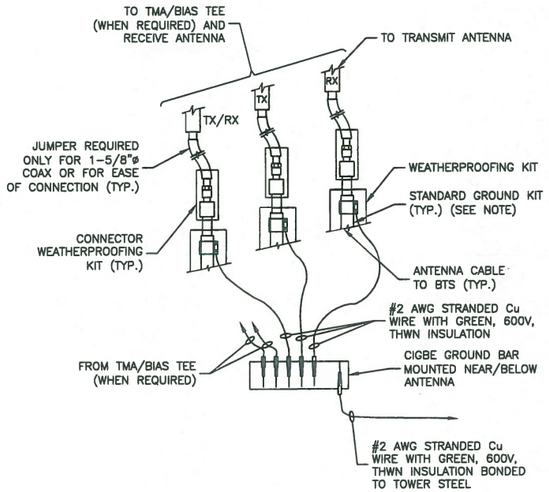
CONSTRUCTION DETAILS

SHEET NUMBER

C-3

GROUNDING NOTES:

1. THE CONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ). THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE CONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE ENGINEER FOR RESOLUTION.
2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS. ALL AVAILABLE GROUNDING ELECTRODES SHALL BE CONNECTED TOGETHER IN ACCORDANCE WITH THE NEC.
3. THE CONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS. USE OF OTHER METHODS MUST BE PRE-APPROVED BY THE ENGINEER IN WRITING.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS ON TOWER SITES AND 10 OHMS OR LESS ON ROOFTOP SITES. WHEN ADDING ELECTRODES, CONTRACTOR SHALL MAINTAIN A MINIMUM DISTANCE BETWEEN THE ADDED ELECTRODE AND ANY OTHER EXISTING ELECTRODE EQUAL TO THE BURIED LENGTH OF THE ROD. IDEALLY, CONTRACTOR SHALL STRIVE TO KEEP THE SEPARATION DISTANCE EQUAL TO TWICE THE BURIED LENGTH OF THE RODS.
5. THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT.
6. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWG COPPER WIRE AND UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
7. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO TRANSMISSION EQUIPMENT.
8. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED. BACK-TO-BACK CONNECTIONS ON OPPOSITE SIDES OF THE GROUND BUS ARE PERMITTED.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED. IN ALL CASES, BENDS SHALL BE MADE WITH A MINIMUM BEND RADIUS OF 8 INCHES.
11. EACH INTERIOR TRANSMISSION CABINET FRAME/PLINTH SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH 6 AWG STRANDED, GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRE UNLESS NOTED OTHERWISE IN THE DETAILS. EACH OUTDOOR CABINET FRAME/PLINTH SHALL BE DIRECTLY CONNECTED TO THE BURIED GROUND RING WITH 2 AWG SOLID TIN-PLATED COPPER WIRE UNLESS NOTED OTHERWISE IN THE DETAILS.
12. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING, SHALL BE 2 AWG SOLID TIN-PLATED COPPER UNLESS OTHERWISE INDICATED.
13. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE. CONNECTIONS TO ABOVE GRADE UNITS SHALL BE MADE WITH EXOTHERMIC WELDS WHERE PRACTICAL OR WITH 2 HOLE MECHANICAL TYPE BRASS CONNECTORS WITH STAINLESS STEEL HARDWARE, INCLUDING SET SCREWS. HIGH PRESSURE CRIMP CONNECTORS MAY ONLY BE USED WITH WRITTEN PERMISSION FROM T-MOBILE MARKET REPRESENTATIVE.
14. EXOTHERMIC WELDS SHALL BE PERMITTED ON TOWERS ONLY WITH THE EXPRESS APPROVAL OF THE TOWER MANUFACTURER OR THE CONTRACTORS STRUCTURAL ENGINEER.
15. ALL WIRE TO WIRE GROUND CONNECTIONS TO THE INTERIOR GROUND RING SHALL BE FORMED USING HIGH PRESS CRIMPS OR SPLIT BOLT CONNECTORS WHERE INDICATED IN THE DETAILS.
16. ON ROOFTOP SITES WHERE EXOTHERMIC WELDS ARE A FIRE HAZARD COPPER COMPRESSION CAP CONNECTORS MAY BE USED FOR WIRE TO WIRE CONNECTORS. 2 HOLE MECHANICAL TYPE BRASS CONNECTORS WITH STAINLESS STEEL HARDWARE, INCLUDING SET SCREWS SHALL BE USED FOR CONNECTION TO ALL ROOFTOP TRANSMISSION EQUIPMENT AND STRUCTURAL STEEL.
17. COAX BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR USING TWO-HOLE MECHANICAL TYPE BRASS CONNECTORS AND STAINLESS STEEL HARDWARE.
18. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
19. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
20. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
21. BOND ALL METALLIC OBJECTS WITHIN 6 FT OF THE BURIED GROUND RING WITH 2 AWG SOLID TIN-PLATED COPPER GROUND CONDUCTOR. DURING EXCAVATION FOR NEW GROUND CONDUCTORS, IF EXISTING GROUND CONDUCTORS ARE ENCOUNTERED, BOND EXISTING GROUND CONDUCTORS TO NEW CONDUCTORS.
22. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G., NON-METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT WITH LISTED BONDING FITTINGS.

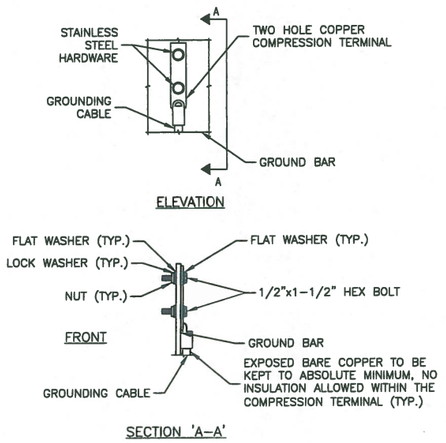


NOTE:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE.

CONNECTION OF GROUND WIRES TO GROUNDING BAR (CIGBE) 1

SCALE: N.T.S.

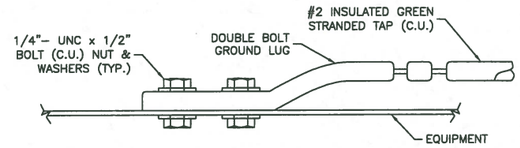


NOTES:

1. DOUBLING UP OR STACKING OF CONNECTIONS IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.

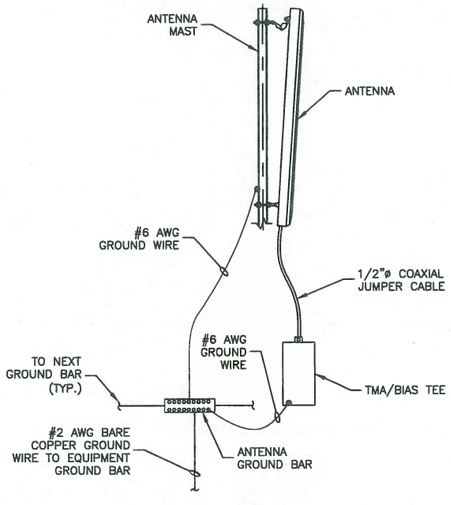
TYPICAL GROUND BAR MECHANICAL CONNECTION DETAIL 2

SCALE: N.T.S.



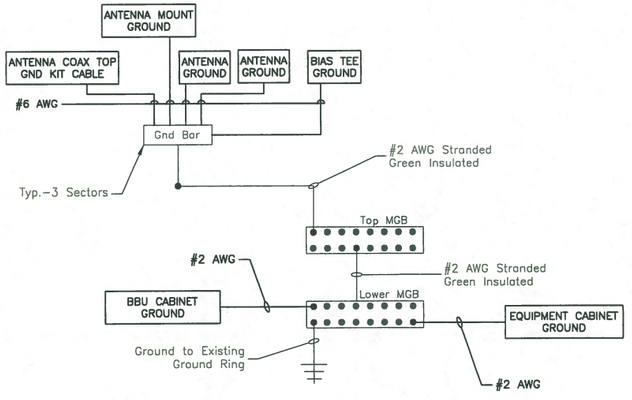
CONNECTION TO EQUIPMENT DETAIL 3

SCALE: N.T.S.



TYPICAL ANTENNA GROUNDING DETAIL 4

SCALE: N.T.S



NOTES:

1. BOND ANTENNA GROUNDING KIT CABLE TO TOP CIGBE
2. BOND ANTENNA GROUNDING KIT CABLE TO BOTTOM CIGBE.
3. SCHEMATIC GROUNDING DIAGRAM IS TYPICAL FOR EACH SECTOR.
4. VERIFY EXISTING GROUND SYSTEM IS INSTALLED PER T-MOBILE STANDARDS.

SCHEMATIC GROUNDING DIAGRAM 5

SCALE: N.T.S.

T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

CROWN CASTLE

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

CTNH506A
HILLSIDE

CONSTRUCTION DRAWINGS

0	03/02/16	ISSUED AS FINAL
C	02/24/16	REVISED PER COMMENTS
B	02/12/16	REVISED PER COMMENTS
A	02/10/16	ISSUED FOR REVIEW

Dewberry
Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

STATE OF CONNECTICUT
JIANG YU
No. 23222
LICENSED PROFESSIONAL ENGINEER
CONNECTICUT LICENSE NO. 0023222

DRAWN BY:	RA
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50078110
SITE ADDRESS:	

85 PLAINFIELD AVENUE
WEST HAVEN, CT 06516
NEW HAVEN COUNTY

SHEET TITLE

GROUNDING NOTES & DETAILS

SHEET NUMBER

E-1

PJF PAUL J. FORD & COMPANY

Date: **March 21, 2016**

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

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

Subject: **Structural Modification Report**

Carrier Designation:	***Metro PCS* Co-Locate**	
	Carrier Site Number:	CTNH506A
	Carrier Site Name:	Crown West Haven Monopole
Crown Castle Designation:	**Crown Castle BU Number:**	876323
	Crown Castle Site Name:	HILLSIDE
	Crown Castle JDE Job Number:	346379
	Crown Castle Work Order Number:	1211268
	Crown Castle Application Number:	310059 Rev. 25
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37516-0917.002.7700
Site Data:	**85 Plainfield Ave, WEST HAVEN, New Haven County, CT**	
	Latitude *41° 18' 4.59"*, Longitude *-72° 58' 35.2"*	
	148 Foot - Monopole Tower	

Dear Timothy Howell,

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 885073, in accordance with application 310059, revision 25.

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 Equipment **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 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

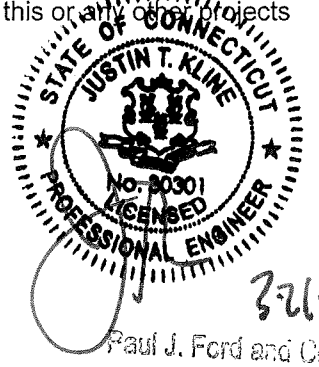
All modifications and equipment proposed in this report shall be installed in accordance with the referenced drawings for the determined available structural capacity to be effective.

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:

Jared Smith, E.I.
Structural Designer

tnxTower Report - version 6.1.4.1



3.21.16

Paul J. Ford and Company
F-2728

PAUL J. FORD & COMPANY

Date: **March 21, 2016**

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

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

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tnxTower Report - version 6.1.4.1

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 148-ft Monopole tower designed by SUMMIT in June of 1997. 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 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
146.0	149.0	3	andrew	LNX-6515DS-VTM w/ Mount Pipe	6	1-5/8	-
		3	commscope	ATBT-BOTTOM-24V			
	146.0	1	tower mounts	Side Arm Mount [SO 102-3]			

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
146.0	149.0	3	rfs celwave	APXV18-206516S-C-A20 w/ Mount Pipe	6	1-5/8	1
	146.0	1	tower mounts	Pipe Mount [PM 601-3]	-	-	3
138.0	140.0	3	alcatel lucent	TD-RRH8x20-25	1	1-1/4	2
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			
		6	powerwave	P40-16-XLPP-RR-A w/ Mount Pipe	1 3	1/2 1-1/4	1
	138.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER			
		18	rfs celwave	ACU-A20-N			
		1	tower mounts	Miscellaneous [NA 507-1]			
		1	tower mounts	Platform Mount [LP 303-1]			
136.0	139.0	3	alcatel lucent	800MHz RRH w/ Mount Pipe	-	-	1
	137.0	3	alcatel lucent	1900MHz RRH (25MHz) w/ Mount Pipe			
	136.0	1	tower mounts	Side Arm Mount [SO 102-3]			
	135.0	3	alcatel lucent	1900MHz RRH (25MHz) w/ Mount Pipe			
122.0	122.0	1	rfs celwave	DB-T1-6Z-8AB-0Z	-	-	1
		1	tower mounts	Side Arm Mount [SO 102-1]			
120.0	126.0	1	gps	GPS_A	1 12	1/2 1-5/8	1
	122.0	3	alcatel lucent	RRH2X40-AWS			
		3	antel	BXA-171063-8BF-EDIN-0 w/ Mount Pipe			
		2	antel	BXA-80063/4CF w/ Mount Pipe			
		1	antel	BXA-80063/6CF w/ Mount Pipe			
		3	commscope	LNX-6514DS-A1M w/ Mount Pipe			
		2	rfs celwave	FD9R6004/2C-3L			
		3	rymsa wireless	MG D3-800TV w/ Mount Pipe			
	120.0	1	tower mounts	Platform Mount [LP 712-1]			
90.0	91.0	1	lucent	KS24019-L112A	1	1/2	1
	90.0	1	tower mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH, 1205093EG1, 5/31/2012	2134228	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Summit, 29297-0288, 6/5/1997	1614608	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Summit, 29297-0288, 6/5/1997	1615021	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PSG, 0801F202-A060140, 2/6/2009	2384593	CCISITES
4-PROPOSED TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF, 37515-2871.001.7700, 10/26/2015	5957618	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 has been reinforced in conformance with the referenced modification documents.
5) Monopole will be reinforced in conformance with the referenced modification documents.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	148 - 138	Pole	TP24x24x0.25	1	-0.86	670.56	8.7	Pass
L2	138 - 90.75	Pole	TP31.924x24x0.25	2	-9.40	1180.55	87.4	Pass
L3	90.75 - 74.5	Pole	TP34.8373x30.7532x0.3125	3	-12.86	1643.31	89.5	Pass
L4	74.5 - 44.75	Pole	TP41.086x34.8373x0.4295	4	-18.08	2051.59	93.8	Pass
L5	44.75 - 0	Pole	TP49.86x39.1242x0.375	5	-30.36	2826.47	96.6	Pass
							Summary	
						Pole (L5)	96.6	Pass
						Rating =	96.6	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	97.7	Pass
1	Base Plate	0	80.6	Pass
1	Base Foundation Structural Steel	0	62.7	Pass
1	Base Foundation Soil Interaction	0	78.4	Pass
1	Extension Flange	138	63.0	Pass

Structure Rating (max from all components) =	**97.7%**

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed.

4.1) Recommendations

See referenced 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 New Haven County, Connecticut.
2) Basic wind speed of 85 mph.
3) Nominal ice thickness of 0.7500 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		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
√	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg		Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric				

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	148.0000-138.0000	10.0000	0.00	Round	24.0000	24.0000	0.2500		A500-50 (50 ksi)
L2	138.0000-90.7500	47.2500	4.00	18	24.0000	31.9240	0.2500	1.0000	A607-60 (60 ksi)
L3	90.7500-74.5000	20.2500	0.00	18	30.7532	34.8372	0.3125	1.2500	A607-60 (60 ksi)
L4	74.5000-44.7500	29.7500	5.25	18	34.8372	41.0860	0.4295	1.7181	Reinf 47.57 ksi (48 ksi)
L5	44.7500-0.0000	50.0000		18	39.1242	49.8600	0.3750	1.5000	A607-60 (60 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^3	w in	w/t
L1	24.0000	18.6532	1315.3425	8.3974	12.0000	109.6119	2630.6850	9.3210	0.0000	0
	24.0000	18.6532	1315.3425	8.3974	12.0000	109.6119	2630.6850	9.3210	0.0000	0
L2	24.3702	18.8456	1342.9976	8.4313	12.1920	110.1540	2687.7623	9.4246	3.7840	15.136
	32.4165	25.1333	3185.6138	11.2443	16.2174	196.4319	6375.4192	12.5690	5.1786	20.714
L3	32.0468	30.1934	3534.7416	10.8064	15.6226	226.2580	7074.1342	15.0995	4.8626	15.56
	35.3747	34.2442	5156.8681	12.2563	17.6973	291.3926	10320.5217	17.1254	5.5814	17.86
L4	35.3747	46.9079	7016.1009	12.2147	17.6973	396.4498	14041.4338	23.4584	5.3754	12.515
	41.7198	55.4268	11574.8958	14.4331	20.8717	554.5740	23165.0221	27.7187	6.4752	15.075
L5	40.8724	46.1213	8749.1364	13.7560	19.8751	440.2056	17509.7851	23.0650	6.2259	16.602
	50.6292	58.8995	18222.0135	17.5672	25.3289	719.4165	36468.0040	29.4554	8.1154	21.641

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 148.0000-138.0000				1	1	1			
L2 138.0000-90.7500				1	1	1			
L3 90.7500-74.5000				1	1	1			
L4 74.5000-44.7500				1	1	1			
L5 44.7500-0.0000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
***										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
***								
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	146.0000 - 0.0000	1	No Ice	0.1980	0.82
						1/2" Ice	0.2980	2.33
						1" Ice	0.3980	4.46
						2" Ice	0.5980	10.54
						4" Ice	0.9980	30.04
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	146.0000 - 0.0000	11	No Ice	0.0000	0.82
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.46
						2" Ice	0.0000	10.54
						4" Ice	0.0000	30.04
***								

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
*								
HB114-1-0813U4-M5J(1 1/4")	C	No	Inside Pole	138.0000 - 0.0000	3	No Ice	0.0000	1.20
						1/2" Ice	0.0000	1.20
						1" Ice	0.0000	1.20
						2" Ice	0.0000	1.20
						4" Ice	0.0000	1.20
HB114-21U3M12-XXXF(1-1/4")	C	No	CaAa (Out Of Face)	138.0000 - 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
***								
HB158-1-08U8-S8J18(1-5/8)	C	No	CaAa (Out Of Face)	120.0000 - 0.0000	1	No Ice	0.1980	1.30
						1/2" Ice	0.2980	2.81
						1" Ice	0.3980	4.94
						2" Ice	0.5980	11.02
						4" Ice	0.9980	30.52
561(1-5/8")	C	No	Inside Pole	120.0000 - 0.0000	11	No Ice	0.0000	1.35
						1/2" Ice	0.0000	1.35
						1" Ice	0.0000	1.35
						2" Ice	0.0000	1.35
						4" Ice	0.0000	1.35
FSJ4-50B(1/2")	C	No	Inside Pole	120.0000 - 0.0000	1	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
***								
LDF4-50A(1/2")	C	No	Inside Pole	90.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.15
						1" Ice	0.0000	0.15
						2" Ice	0.0000	0.15
						4" Ice	0.0000	0.15
***								
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	76.0000 - 46.0000	1	No Ice	0.1667	0.00
						1/2" Ice	0.2778	0.00
						1" Ice	0.3889	0.00
						2" Ice	0.6111	0.00
						4" Ice	1.0556	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	148.0000-138.0000	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	1.584	0.08
L2	138.0000-90.7500	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	15.147	1.17
L3	90.7500-74.5000	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	6.685	0.51
L4	74.5000-44.7500	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	16.531	0.93
L5	44.7500-0.0000	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	17.721	1.39

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	148.0000-138.0000	A	0.894	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	3.015	0.39
L2	138.0000-90.7500	A	0.870	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	28.457	3.13
L3	90.7500-74.5000	A	0.837	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	12.630	1.20
L4	74.5000-44.7500	A	0.805	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	31.200	2.08
L5	44.7500-0.0000	A	0.750	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	32.122	3.13

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	148.0000-138.0000	-0.1907	0.1101	-0.3196	0.1845
L2	138.0000-90.7500	-0.3736	0.2157	-0.6046	0.3491
L3	90.7500-74.5000	-0.4660	0.2690	-0.7587	0.4380
L4	74.5000-44.7500	-0.6134	0.3541	-0.9905	0.5719
L5	44.7500-0.0000	-0.4653	0.2687	-0.7600	0.4388

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
***									
APXV18-206516S-C-A20 w/ Mount Pipe	A	From Leg	2.0000 0.00 3.00	30.00	146.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.8586 4.2736 4.7274 5.6860 7.7274	3.2963 4.0044 4.6717 6.0562 9.0382	0.04 0.07 0.11 0.21 0.53
APXV18-206516S-C-A20 w/ Mount Pipe	B	From Leg	2.0000 0.00 3.00	30.00	146.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.8586 4.2736 4.7274 5.6860 7.7274	3.2963 4.0044 4.6717 6.0562 9.0382	0.04 0.07 0.11 0.21 0.53
APXV18-206516S-C-A20 w/ Mount Pipe	C	From Leg	2.0000 0.00 3.00	30.00	146.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.8586 4.2736 4.7274 5.6860 7.7274	3.2963 4.0044 4.6717 6.0562 9.0382	0.04 0.07 0.11 0.21 0.53
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	2.0000 0.00 3.00	0.00	146.0000	No Ice 1/2" Ice Ice 1" Ice 2" Ice	11.6382 12.3560 13.0830 14.5347 17.7991	9.8359 11.3566 12.9014 15.2444 20.1092	0.08 0.17 0.27 0.50 1.15

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
ATBT-BOTTOM-24V	A	From Leg	2.0000 0.00 3.00	0.00	146.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.1212 0.1722 0.2319 0.3770 0.7711	0.0752 0.1191 0.1716 0.3025 0.6681	0.00 0.00 0.01 0.01 0.04
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	2.0000 0.00 3.00	0.00	146.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.6382 12.3560 13.0830 14.5347 17.7991	9.8359 11.3566 12.9014 15.2444 20.1092	0.08 0.17 0.27 0.50 1.15
ATBT-BOTTOM-24V	B	From Leg	2.0000 0.00 3.00	0.00	146.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.1212 0.1722 0.2319 0.3770 0.7711	0.0752 0.1191 0.1716 0.3025 0.6681	0.00 0.00 0.01 0.01 0.04
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	2.0000 0.00 3.00	0.00	146.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.6382 12.3560 13.0830 14.5347 17.7991	9.8359 11.3566 12.9014 15.2444 20.1092	0.08 0.17 0.27 0.50 1.15
ATBT-BOTTOM-24V	C	From Leg	2.0000 0.00 3.00	0.00	146.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.1212 0.1722 0.2319 0.3770 0.7711	0.0752 0.1191 0.1716 0.3025 0.6681	0.00 0.00 0.01 0.01 0.04
Side Arm Mount [SO 102-3]	C	None		0.00	146.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.0000 3.4800 3.9600 4.9200 6.8400	3.0000 3.4800 3.9600 4.9200 6.8400	0.08 0.11 0.14 0.20 0.32
***									
(2) P40-16-XLPP-RR-A w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	50.00	138.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	9.3725 9.9120 10.4497 11.5558 13.8921	4.8250 5.5706 6.2654 7.8034 11.1071	0.07 0.14 0.21 0.37 0.82
(2) P40-16-XLPP-RR-A w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	80.00	138.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	9.3725 9.9120 10.4497 11.5558 13.8921	4.8250 5.5706 6.2654 7.8034 11.1071	0.07 0.14 0.21 0.37 0.82
(2) P40-16-XLPP-RR-A w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	40.00	138.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	9.3725 9.9120 10.4497 11.5558 13.8921	4.8250 5.5706 6.2654 7.8034 11.1071	0.07 0.14 0.21 0.37 0.82
800 EXTERNAL NOTCH FILTER	A	From Leg	4.0000 0.00 0.00	0.00	138.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.7701 0.8898 1.0181 1.3007 1.9696	0.3747 0.4647 0.5634 0.7868 1.3372	0.01 0.02 0.02 0.04 0.11
800 EXTERNAL NOTCH FILTER	B	From Leg	4.0000 0.00 0.00	0.00	138.0000	No Ice 1/2" Ice	0.7701 0.8898 1.0181	0.3747 0.4647 0.5634	0.01 0.02 0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	1.3007	0.7868	0.04
						2" Ice	1.9696	1.3372	0.11
						4" Ice			
800 EXTERNAL NOTCH FILTER	C	From Leg	4.0000 / 0.00 / 0.00	0.00	138.0000	No Ice	0.7701	0.3747	0.01
						1/2" Ice	0.8898	0.4647	0.02
						1" Ice	1.0181	0.5634	0.02
						2" Ice	1.3007	0.7868	0.04
						4" Ice	1.9696	1.3372	0.11
(6) ACU-A20-N	A	From Leg	4.0000 / 0.00 / 0.00	0.00	138.0000	No Ice	0.0778	0.1361	0.00
						1/2" Ice	0.1210	0.1890	0.00
						1" Ice	0.1728	0.2506	0.00
						2" Ice	0.3025	0.3997	0.01
						4" Ice	0.6654	0.8015	0.04
(6) ACU-A20-N	B	From Leg	4.0000 / 0.00 / 0.00	0.00	138.0000	No Ice	0.0778	0.1361	0.00
						1/2" Ice	0.1210	0.1890	0.00
						1" Ice	0.1728	0.2506	0.00
						2" Ice	0.3025	0.3997	0.01
						4" Ice	0.6654	0.8015	0.04
(6) ACU-A20-N	C	From Leg	4.0000 / 0.00 / 0.00	0.00	138.0000	No Ice	0.0778	0.1361	0.00
						1/2" Ice	0.1210	0.1890	0.00
						1" Ice	0.1728	0.2506	0.00
						2" Ice	0.3025	0.3997	0.01
						4" Ice	0.6654	0.8015	0.04
TD-RRH8x20-25	A	From Leg	4.0000 / 0.00 / 2.00	0.00	138.0000	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
						2" Ice	5.9478	2.6224	0.20
						4" Ice	7.3141	3.6805	0.40
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.0000 / 0.00 / 2.00	0.00	138.0000	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
						4" Ice	11.5262	11.4120	0.75
TD-RRH8x20-25	B	From Leg	4.0000 / 0.00 / 2.00	0.00	138.0000	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
						2" Ice	5.9478	2.6224	0.20
						4" Ice	7.3141	3.6805	0.40
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.0000 / 0.00 / 2.00	0.00	138.0000	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
						4" Ice	11.5262	11.4120	0.75
TD-RRH8x20-25	C	From Leg	4.0000 / 0.00 / 2.00	0.00	138.0000	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
						2" Ice	5.9478	2.6224	0.20
						4" Ice	7.3141	3.6805	0.40
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.0000 / 0.00 / 2.00	0.00	138.0000	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
						4" Ice	11.5262	11.4120	0.75
Platform Mount [LP 303-1]	C	None		0.00	138.0000	No Ice	14.6600	14.6600	1.25
						1/2" Ice	18.8700	18.8700	1.48

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						Ice	23.0800	23.0800	1.71
						1" Ice	31.5000	31.5000	2.18
						2" Ice	48.3400	48.3400	3.10
						4" Ice			
Miscellaneous [NA 507-1]	C	None		0.00	138.0000	No Ice	4.8000	4.8000	0.25
						1/2" Ice	6.7000	6.7000	0.29
						1" Ice	8.6000	8.6000	0.34
						2" Ice	12.4000	12.4000	0.44
						4" Ice	20.0000	20.0000	0.64
****									
800MHz RRH w/ Mount Pipe	A	From Leg	2.0000 0.00 3.00	50.00	136.0000	No Ice	2.7537	2.6511	0.06
						1/2" Ice	3.0548	3.0406	0.09
						1" Ice	3.3688	3.4480	0.13
						2" Ice	4.0482	4.3450	0.21
						4" Ice	5.6103	6.4626	0.45
800MHz RRH w/ Mount Pipe	B	From Leg	2.0000 0.00 3.00	80.00	136.0000	No Ice	2.7537	2.6511	0.06
						1/2" Ice	3.0548	3.0406	0.09
						1" Ice	3.3688	3.4480	0.13
						2" Ice	4.0482	4.3450	0.21
						4" Ice	5.6103	6.4626	0.45
800MHz RRH w/ Mount Pipe	C	From Leg	2.0000 0.00 3.00	40.00	136.0000	No Ice	2.7537	2.6511	0.06
						1/2" Ice	3.0548	3.0406	0.09
						1" Ice	3.3688	3.4480	0.13
						2" Ice	4.0482	4.3450	0.21
						4" Ice	5.6103	6.4626	0.45
1900MHz RRH (25MHz) w/ Mount Pipe	A	From Leg	2.0000 0.00 1.00	50.00	136.0000	No Ice	3.3579	4.6671	0.10
						1/2" Ice	3.7231	5.1756	0.14
						1" Ice	4.1017	5.7020	0.19
						2" Ice	4.8994	6.8084	0.30
						4" Ice	6.7313	9.3798	0.62
1900MHz RRH (25MHz) w/ Mount Pipe	B	From Leg	2.0000 0.00 1.00	50.00	136.0000	No Ice	3.3579	4.6671	0.10
						1/2" Ice	3.7231	5.1756	0.14
						1" Ice	4.1017	5.7020	0.19
						2" Ice	4.8994	6.8084	0.30
						4" Ice	6.7313	9.3798	0.62
1900MHz RRH (25MHz) w/ Mount Pipe	C	From Leg	2.0000 0.00 1.00	80.00	136.0000	No Ice	3.3579	4.6671	0.10
						1/2" Ice	3.7231	5.1756	0.14
						1" Ice	4.1017	5.7020	0.19
						2" Ice	4.8994	6.8084	0.30
						4" Ice	6.7313	9.3798	0.62
1900MHz RRH (25MHz) w/ Mount Pipe	A	From Leg	2.0000 0.00 -1.00	80.00	136.0000	No Ice	3.3579	4.6671	0.10
						1/2" Ice	3.7231	5.1756	0.14
						1" Ice	4.1017	5.7020	0.19
						2" Ice	4.8994	6.8084	0.30
						4" Ice	6.7313	9.3798	0.62
1900MHz RRH (25MHz) w/ Mount Pipe	B	From Leg	2.0000 0.00 -1.00	40.00	136.0000	No Ice	3.3579	4.6671	0.10
						1/2" Ice	3.7231	5.1756	0.14
						1" Ice	4.1017	5.7020	0.19
						2" Ice	4.8994	6.8084	0.30
						4" Ice	6.7313	9.3798	0.62
1900MHz RRH (25MHz) w/ Mount Pipe	C	From Leg	2.0000 0.00 -1.00	40.00	136.0000	No Ice	3.3579	4.6671	0.10
						1/2" Ice	3.7231	5.1756	0.14
						1" Ice	4.1017	5.7020	0.19
						2" Ice	4.8994	6.8084	0.30
						4" Ice	6.7313	9.3798	0.62

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Side Arm Mount [SO 102-3]	C	None		0.00	136.0000	No Ice	3.0000	3.0000	0.08
						1/2" Ice	3.4800	3.4800	0.11
						1" Ice	3.9600	3.9600	0.14
						2" Ice	4.9200	4.9200	0.20
						4" Ice	6.8400	6.8400	0.32
***									
DB-T1-6Z-8AB-0Z	C	From Leg	1.0000 0.00 0.00	30.00	122.0000	No Ice	5.6000	2.3333	0.04
						1/2" Ice	5.9154	2.5580	0.08
						1" Ice	6.2395	2.7914	0.12
						2" Ice	6.9136	3.2840	0.21
						4" Ice	8.3654	4.3728	0.45
Side Arm Mount [SO 102-1]	C	None		0.00	122.0000	No Ice	1.5000	1.5000	0.03
						1/2" Ice	1.7400	1.7500	0.04
						1" Ice	1.9800	2.0000	0.04
						2" Ice	2.4600	2.5000	0.07
						4" Ice	3.4200	3.5000	0.11
***									
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.00	120.0000	No Ice	3.1789	3.3530	0.03
						1/2" Ice	3.5550	3.9709	0.06
						1" Ice	3.9637	4.5951	0.10
						2" Ice	4.8533	5.8933	0.19
						4" Ice	6.7671	8.8855	0.49
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.00	120.0000	No Ice	3.1789	3.3530	0.03
						1/2" Ice	3.5550	3.9709	0.06
						1" Ice	3.9637	4.5951	0.10
						2" Ice	4.8533	5.8933	0.19
						4" Ice	6.7671	8.8855	0.49
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.00	120.0000	No Ice	3.1789	3.3530	0.03
						1/2" Ice	3.5550	3.9709	0.06
						1" Ice	3.9637	4.5951	0.10
						2" Ice	4.8533	5.8933	0.19
						4" Ice	6.7671	8.8855	0.49
BXA-80063/4CF w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.00	120.0000	No Ice	5.3988	3.4238	0.03
						1/2" Ice	5.8435	4.0221	0.07
						1" Ice	6.2986	4.6369	0.12
						2" Ice	7.2405	5.9176	0.23
						4" Ice	9.2612	8.9263	0.56
BXA-80063/4CF w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.00	120.0000	No Ice	5.3988	3.4238	0.03
						1/2" Ice	5.8435	4.0221	0.07
						1" Ice	6.2986	4.6369	0.12
						2" Ice	7.2405	5.9176	0.23
						4" Ice	9.2612	8.9263	0.56
BXA-80063/6CF w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.00	120.0000	No Ice	7.9795	5.4071	0.04
						1/2" Ice	8.6208	6.5581	0.10
						1" Ice	9.2281	7.4216	0.17
						2" Ice	10.4727	9.1985	0.33
						4" Ice	13.0817	12.9523	0.79
RRH2X40-AWS	A	From Leg	4.0000 0.00 2.00	0.00	120.0000	No Ice	2.5217	1.5894	0.04
						1/2" Ice	2.7530	1.7953	0.06
						1" Ice	2.9930	2.0098	0.08
						2" Ice	3.4990	2.4648	0.13
						4" Ice	4.6146	3.4785	0.28
RRH2X40-AWS	B	From Leg	4.0000 0.00 2.00	0.00	120.0000	No Ice	2.5217	1.5894	0.04
						1/2" Ice	2.7530	1.7953	0.06
						1" Ice	2.9930	2.0098	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	3.4990	2.4648	0.13
						2" Ice	4.6146	3.4785	0.28
						4" Ice			
RRH2X40-AWS	C	From Leg	4.0000 0.00 2.00	0.00	120.0000	No Ice	2.5217	1.5894	0.04
						1/2" Ice	2.7530	1.7953	0.06
						1" Ice	2.9930	2.0098	0.08
						2" Ice	3.4990	2.4648	0.13
						4" Ice	4.6146	3.4785	0.28
FD9R6004/2C-3L	A	From Leg	4.0000 0.00 2.00	0.00	120.0000	No Ice	0.3665	0.0846	0.00
						1/2" Ice	0.4506	0.1362	0.01
						1" Ice	0.5433	0.1965	0.01
						2" Ice	0.7546	0.3430	0.02
						4" Ice	1.2808	0.7396	0.06
FD9R6004/2C-3L	B	From Leg	4.0000 0.00 2.00	0.00	120.0000	No Ice	0.3665	0.0846	0.00
						1/2" Ice	0.4506	0.1362	0.01
						1" Ice	0.5433	0.1965	0.01
						2" Ice	0.7546	0.3430	0.02
						4" Ice	1.2808	0.7396	0.06
GPS_A	A	From Leg	4.0000 0.00 6.00	0.00	120.0000	No Ice	0.2975	0.2975	0.00
						1/2" Ice	0.3739	0.3739	0.00
						1" Ice	0.4589	0.4589	0.01
						2" Ice	0.6549	0.6549	0.02
						4" Ice	1.1506	1.1506	0.08
MG D3-800TV w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	30.00	120.0000	No Ice	3.5703	3.4178	0.04
						1/2" Ice	3.9790	4.1193	0.07
						1" Ice	4.3870	4.7842	0.11
						2" Ice	5.3253	6.1642	0.21
						4" Ice	7.3410	9.1751	0.52
MG D3-800TV w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	30.00	120.0000	No Ice	3.5703	3.4178	0.04
						1/2" Ice	3.9790	4.1193	0.07
						1" Ice	4.3870	4.7842	0.11
						2" Ice	5.3253	6.1642	0.21
						4" Ice	7.3410	9.1751	0.52
MG D3-800TV w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	30.00	120.0000	No Ice	3.5703	3.4178	0.04
						1/2" Ice	3.9790	4.1193	0.07
						1" Ice	4.3870	4.7842	0.11
						2" Ice	5.3253	6.1642	0.21
						4" Ice	7.3410	9.1751	0.52
LNX-6514DS-A1M w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.00	120.0000	No Ice	8.6485	7.0817	0.06
						1/2" Ice	9.3051	8.2729	0.13
						1" Ice	9.9298	9.1847	0.21
						2" Ice	11.2040	11.0232	0.39
						4" Ice	13.8719	15.0629	0.90
LNX-6514DS-A1M w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.00	120.0000	No Ice	8.6485	7.0817	0.06
						1/2" Ice	9.3051	8.2729	0.13
						1" Ice	9.9298	9.1847	0.21
						2" Ice	11.2040	11.0232	0.39
						4" Ice	13.8719	15.0629	0.90
LNX-6514DS-A1M w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.00	120.0000	No Ice	8.6485	7.0817	0.06
						1/2" Ice	9.3051	8.2729	0.13
						1" Ice	9.9298	9.1847	0.21
						2" Ice	11.2040	11.0232	0.39
						4" Ice	13.8719	15.0629	0.90
Platform Mount [LP 712-1]	C	None		0.00	120.0000	No Ice	24.5300	24.5300	1.34
						1/2"	29.9400	29.9400	1.65

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						Ice	35.3500	35.3500	1.96
						1" Ice	46.1700	46.1700	2.58
						2" Ice	67.8100	67.8100	3.82
						4" Ice			
***									
KS24019-L112A	A	From Leg	4.0000 0.00 1.00	0.00	90.0000	No Ice	0.1556	0.1556	0.01
						1/2" Ice	0.2247	0.2247	0.01
						1" Ice	0.3025	0.3025	0.01
						2" Ice	0.4840	0.4840	0.02
						4" Ice	0.9506	0.9506	0.06
Side Arm Mount [SO 701-1]	C	None		0.00	90.0000	No Ice	0.8500	1.6700	0.07
						1/2" Ice	1.1400	2.3400	0.08
						1" Ice	1.4300	3.0100	0.09
						2" Ice	2.0100	4.3500	0.12
						4" Ice	3.1700	7.0300	0.18

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % 	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 148.0000-138.0000	143.0000	1.52	28.12	20.000	A	0.000	20.000	20.000	100.00	0.000	0.000
					B	0.000	20.000		100.00	0.000	0.000
					C	0.000	20.000		100.00	0.000	1.584
L2 138.0000-90.7500	113.6075	1.424	26.28	110.100	A	0.000	110.100	110.100	100.00	0.000	0.000
					B	0.000	110.100		100.00	0.000	0.000
					C	0.000	110.100		100.00	0.000	15.147
L3 90.7500-74.5000	82.4913	1.299	24.03	44.956	A	0.000	44.956	44.956	100.00	0.000	0.000
					B	0.000	44.956		100.00	0.000	0.000
					C	0.000	44.956		100.00	0.000	6.685
L4 74.5000-44.7500	59.2169	1.182	21.86	94.113	A	0.000	94.113	94.113	100.00	0.000	0.000
					B	0.000	94.113		100.00	0.000	0.000
					C	0.000	94.113		100.00	0.000	16.531
L5 44.7500-0.0000	21.5966	1	18.52	168.020	A	0.000	168.020	168.020	100.00	0.000	0.000
					B	0.000	168.020		100.00	0.000	0.000
					C	0.000	168.020		100.00	0.000	17.721

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % 	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 148.0000-138.0000	143.0000	1.52	5.50	0.8943	21.490	A	0.000	21.490	21.490	100.00	0.000	0.000
						B	0.000	21.490		100.00	0.000	0.000
						C	0.000	21.490		100.00	0.000	3.015
L2 138.0000-90.7500	113.6075	1.424	5.14	0.8699	116.951	A	0.000	116.951	116.951	100.00	0.000	0.000
						B	0.000	116.951		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
						C	0.000	116.951		100.00	0.000	28.457
L3 90.7500-74.5000	82.4913	1.299	4.70	0.8372	47.312	A	0.000	47.312	47.312	100.00	0.000	0.000
						B	0.000	47.312		100.00	0.000	0.000
						C	0.000	47.312		100.00	0.000	12.630
L4 74.5000-44.7500	59.2169	1.182	4.28	0.8045	98.102	A	0.000	98.102	98.102	100.00	0.000	0.000
						B	0.000	98.102		100.00	0.000	0.000
						C	0.000	98.102		100.00	0.000	31.200
L5 44.7500-0.0000	21.5966	1	3.62	0.7500	174.021	A	0.000	174.021	174.021	100.00	0.000	0.000
						B	0.000	174.021		100.00	0.000	0.000
						C	0.000	174.021		100.00	0.000	32.122

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 148.0000-138.0000	143.0000	1.52	9.73	20.000	A	0.000	20.000	20.000	100.00	0.000	0.000
					B	0.000	20.000		100.00	0.000	0.000
					C	0.000	20.000		100.00	0.000	1.584
L2 138.0000-90.7500	113.6075	1.424	9.09	110.100	A	0.000	110.100	110.100	100.00	0.000	0.000
					B	0.000	110.100		100.00	0.000	0.000
					C	0.000	110.100		100.00	0.000	15.147
L3 90.7500-74.5000	82.4913	1.299	8.32	44.956	A	0.000	44.956	44.956	100.00	0.000	0.000
					B	0.000	44.956		100.00	0.000	0.000
					C	0.000	44.956		100.00	0.000	6.685
L4 74.5000-44.7500	59.2169	1.182	7.56	94.113	A	0.000	94.113	94.113	100.00	0.000	0.000
					B	0.000	94.113		100.00	0.000	0.000
					C	0.000	94.113		100.00	0.000	16.531
L5 44.7500-0.0000	21.5966	1	6.41	168.020	A	0.000	168.020	168.020	100.00	0.000	0.000
					B	0.000	168.020		100.00	0.000	0.000
					C	0.000	168.020		100.00	0.000	17.721

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
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

Comb. No.	Description
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	148 - 138	Pole	Max Tension	5	0.00	0.00	0.00
			Max. Compression	14	-2.51	0.34	-0.20
			Max. Mx	11	-0.87	27.88	-0.06
			Max. My	8	-0.87	0.08	-27.84
			Max. Vy	11	-2.96	27.88	-0.06
			Max. Vx	8	2.96	0.08	-27.84
			Max. Torque	2			0.02
L2	138 - 90.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-19.46	3.28	-1.84
			Max. Mx	11	-9.44	641.23	-14.95
			Max. My	8	-9.48	15.32	-629.77
			Max. Vy	11	-17.68	641.23	-14.95
			Max. Vx	8	17.37	15.32	-629.77
			Max. Torque	11			1.45
L3	90.75 - 74.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-24.41	4.68	-2.61
			Max. Mx	11	-12.88	1019.24	-21.81
			Max. My	8	-12.91	22.31	-1001.41
			Max. Vy	11	-19.57	1019.24	-21.81
			Max. Vx	8	19.27	22.31	-1001.41
			Max. Torque	11			1.45
L4	74.5 - 44.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-31.28	6.51	-3.66
			Max. Mx	11	-18.10	1526.67	-30.13
			Max. My	8	-18.12	30.80	-1501.12
			Max. Vy	11	-21.86	1526.67	-30.13
			Max. Vx	8	21.55	30.80	-1501.12
			Max. Torque	11			1.52
L5	44.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-47.01	10.66	-6.06
			Max. Mx	11	-30.36	2718.86	-46.89
			Max. My	8	-30.36	47.97	-2677.72
			Max. Vy	11	-25.69	2718.86	-46.89
			Max. Vx	8	25.39	47.97	-2677.72
			Max. Torque	11			1.62

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	47.01	-0.00	0.00
	Max. H_x	11	30.39	25.67	-0.32
	Max. H_z	2	30.39	-0.32	25.37
	Max. M_x	2	2674.95	-0.32	25.37
	Max. M_z	5	2713.72	-25.66	0.32
	Max. Torsion	11	1.62	25.67	-0.32
	Min. Vert	5	30.39	-25.66	0.32
	Min. H_x	5	30.39	-25.66	0.32
	Min. H_z	8	30.39	0.32	-25.37
	Min. M_x	8	-2677.72	0.32	-25.37
	Min. M_z	11	-2718.86	25.67	-0.32
	Min. Torsion	5	-1.58	-25.66	0.32

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	30.39	0.00	-0.00	1.34	2.38	0.00
Dead+Wind 0 deg - No Ice	30.39	0.32	-25.37	-2674.95	-43.05	-0.32
Dead+Wind 30 deg - No Ice	30.39	13.11	-22.13	-2339.11	-1395.16	0.52
Dead+Wind 60 deg - No Ice	30.39	22.39	-12.96	-1376.14	-2372.72	1.20
Dead+Wind 90 deg - No Ice	30.39	25.66	-0.32	-44.12	-2713.72	1.58
Dead+Wind 120 deg - No Ice	30.39	22.07	12.41	1300.22	-2327.47	1.54
Dead+Wind 150 deg - No Ice	30.39	12.56	21.81	2296.61	-1316.48	1.10
Dead+Wind 180 deg - No Ice	30.39	-0.32	25.37	2677.72	47.97	0.36
Dead+Wind 210 deg - No Ice	30.39	-13.11	22.13	2341.87	1400.08	-0.49
Dead+Wind 240 deg - No Ice	30.39	-22.39	12.96	1378.90	2377.64	-1.22
Dead+Wind 270 deg - No Ice	30.39	-25.67	0.32	46.89	2718.86	-1.62
Dead+Wind 300 deg - No Ice	30.39	-22.07	-12.41	-1297.45	2332.38	-1.57
Dead+Wind 330 deg - No Ice	30.39	-12.56	-21.81	-2293.83	1321.40	-1.09
Dead+Ice+Temp	47.01	0.00	-0.00	6.06	10.66	0.00
Dead+Wind 0 deg+Ice+Temp	47.01	0.06	-6.06	-657.87	2.42	-0.20
Dead+Wind 30 deg+Ice+Temp	47.01	3.11	-5.28	-573.10	-332.23	0.01
Dead+Wind 60 deg+Ice+Temp	47.01	5.33	-3.08	-333.12	-574.97	0.22
Dead+Wind 90 deg+Ice+Temp	47.01	6.12	-0.06	-2.24	-660.75	0.37
Dead+Wind 120 deg+Ice+Temp	47.01	5.27	2.98	330.89	-566.59	0.42
Dead+Wind 150 deg+Ice+Temp	47.01	3.01	5.22	577.01	-317.72	0.36
Dead+Wind 180 deg+Ice+Temp	47.01	-0.06	6.06	670.16	19.19	0.20
Dead+Wind 210 deg+Ice+Temp	47.01	-3.11	5.28	585.38	353.84	-0.01
Dead+Wind 240 deg+Ice+Temp	47.01	-5.33	3.08	345.40	596.58	-0.22
Dead+Wind 270 deg+Ice+Temp	47.01	-6.12	0.06	14.52	682.36	-0.37
Dead+Wind 300 deg+Ice+Temp	47.01	-5.27	-2.98	-318.61	588.20	-0.42
Dead+Wind 330 deg+Ice+Temp	47.01	-3.01	-5.22	-564.72	339.33	-0.36
Dead+Wind 0 deg - Service	30.39	0.11	-8.78	-925.72	-13.30	-0.12
Dead+Wind 30 deg - Service	30.39	4.53	-7.66	-809.55	-481.79	0.18
Dead+Wind 60 deg - Service	30.39	7.75	-4.48	-475.91	-820.51	0.42
Dead+Wind 90 deg - Service	30.39	8.88	-0.11	-14.38	-938.54	0.56
Dead+Wind 120 deg - Service	30.39	7.64	4.29	451.38	-804.75	0.54
Dead+Wind 150 deg - Service	30.39	4.35	7.55	796.57	-454.48	0.38
Dead+Wind 180 deg -	30.39	-0.11	8.78	928.50	18.24	0.12

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Service						
Dead+Wind 210 deg - Service	30.39	-4.53	7.66	812.33	486.72	-0.18
Dead+Wind 240 deg - Service	30.39	-7.75	4.48	478.69	825.45	-0.43
Dead+Wind 270 deg - Service	30.39	-8.88	0.11	17.16	943.48	-0.56
Dead+Wind 300 deg - Service	30.39	-7.64	-4.29	-448.60	809.69	-0.54
Dead+Wind 330 deg - Service	30.39	-4.35	-7.55	-793.79	459.41	-0.38

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-30.39	0.00	-0.00	30.39	0.00	0.001%
2	0.32	-30.39	-25.37	-0.32	30.39	25.37	0.003%
3	13.11	-30.39	-22.13	-13.11	30.39	22.13	0.000%
4	22.39	-30.39	-12.96	-22.39	30.39	12.96	0.000%
5	25.67	-30.39	-0.32	-25.66	30.39	0.32	0.006%
6	22.07	-30.39	12.41	-22.07	30.39	-12.41	0.000%
7	12.56	-30.39	21.81	-12.56	30.39	-21.81	0.000%
8	-0.32	-30.39	25.37	0.32	30.39	-25.37	0.003%
9	-13.11	-30.39	22.13	13.11	30.39	-22.13	0.000%
10	-22.39	-30.39	12.96	22.39	30.39	-12.96	0.000%
11	-25.67	-30.39	0.32	25.67	30.39	-0.32	0.001%
12	-22.07	-30.39	-12.41	22.07	30.39	12.41	0.000%
13	-12.56	-30.39	-21.81	12.56	30.39	21.81	0.000%
14	0.00	-47.01	0.00	-0.00	47.01	0.00	0.002%
15	0.06	-47.01	-6.07	-0.06	47.01	6.06	0.001%
16	3.11	-47.01	-5.28	-3.11	47.01	5.28	0.001%
17	5.33	-47.01	-3.08	-5.33	47.01	3.08	0.001%
18	6.12	-47.01	-0.06	-6.12	47.01	0.06	0.001%
19	5.27	-47.01	2.98	-5.27	47.01	-2.98	0.001%
20	3.01	-47.01	5.22	-3.01	47.01	-5.22	0.001%
21	-0.06	-47.01	6.07	0.06	47.01	-6.06	0.001%
22	-3.11	-47.01	5.28	3.11	47.01	-5.28	0.001%
23	-5.33	-47.01	3.08	5.33	47.01	-3.08	0.001%
24	-6.12	-47.01	0.06	6.12	47.01	-0.06	0.001%
25	-5.27	-47.01	-2.98	5.27	47.01	2.98	0.001%
26	-3.01	-47.01	-5.22	3.01	47.01	5.22	0.001%
27	0.11	-30.39	-8.78	-0.11	30.39	8.78	0.006%
28	4.54	-30.39	-7.66	-4.53	30.39	7.66	0.001%
29	7.75	-30.39	-4.48	-7.75	30.39	4.48	0.001%
30	8.88	-30.39	-0.11	-8.88	30.39	0.11	0.006%
31	7.64	-30.39	4.29	-7.64	30.39	-4.29	0.001%
32	4.35	-30.39	7.55	-4.35	30.39	-7.55	0.001%
33	-0.11	-30.39	8.78	0.11	30.39	-8.78	0.006%
34	-4.54	-30.39	7.66	4.53	30.39	-7.66	0.001%
35	-7.75	-30.39	4.48	7.75	30.39	-4.48	0.001%
36	-8.88	-30.39	0.11	8.88	30.39	-0.11	0.006%
37	-7.64	-30.39	-4.29	7.64	30.39	4.29	0.001%
38	-4.35	-30.39	-7.55	4.35	30.39	7.55	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	16	0.00002730	0.00009811

3	Yes	20	0.00000001	0.00009653
4	Yes	20	0.00000001	0.00009336
5	Yes	15	0.00005953	0.00009070
6	Yes	20	0.00000001	0.00008921
7	Yes	20	0.00000001	0.00008519
8	Yes	16	0.00002729	0.00010065
9	Yes	20	0.00000001	0.00009456
10	Yes	20	0.00000001	0.00009855
11	Yes	17	0.00000001	0.00010087
12	Yes	20	0.00000001	0.00008460
13	Yes	20	0.00000001	0.00008792
14	Yes	10	0.00000001	0.00006258
15	Yes	17	0.00000001	0.00008881
16	Yes	17	0.00000001	0.00011530
17	Yes	17	0.00000001	0.00011509
18	Yes	17	0.00000001	0.00008933
19	Yes	17	0.00000001	0.00011415
20	Yes	17	0.00000001	0.00011206
21	Yes	17	0.00000001	0.00009086
22	Yes	17	0.00000001	0.00012212
23	Yes	17	0.00000001	0.00012345
24	Yes	17	0.00000001	0.00009281
25	Yes	17	0.00000001	0.00011424
26	Yes	17	0.00000001	0.00011534
27	Yes	14	0.00013438	0.00008589
28	Yes	16	0.00000001	0.00013341
29	Yes	16	0.00000001	0.00012072
30	Yes	14	0.00013437	0.00010194
31	Yes	16	0.00000001	0.00012506
32	Yes	16	0.00000001	0.00010905
33	Yes	14	0.00013438	0.00008639
34	Yes	16	0.00000001	0.00012571
35	Yes	16	0.00000001	0.00014176
36	Yes	14	0.00013436	0.00013336
37	Yes	16	0.00000001	0.00010689
38	Yes	16	0.00000001	0.00011988

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
L1	148 - 138	35.34	35	2.05	0.01
L2	138 - 90.75	31.05	35	2.04	0.01
L3	94.75 - 74.5	14.49	35	1.47	0.00
L4	74.5 - 44.75	8.93	35	1.12	0.00
L5	50 - 0	4.11	35	0.76	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation	*Appurtenance*	*Gov. Load Comb.*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature*
ft			*in*	°	°	*ft*
146.0000	APXV18-206516S-C-A20 w/ Mount Pipe	35	34.48	2.05	0.01	27926
138.0000	(2) P40-16-XLPP-RR-A w/ Mount Pipe	35	31.05	2.04	0.01	14046
136.0000	800MHz RRH w/ Mount Pipe	35	30.20	2.04	0.01	11788
122.0000	DB-T1-6Z-8AB-0Z	35	24.39	1.91	0.00	5616
120.0000	BXA-171063-8BF-EDIN-0 w/ Mount Pipe	35	23.59	1.89	0.00	5225
90.0000	KS24019-L112A	35	13.04	1.39	0.00	2973

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	148 - 138	101.50	10	5.90	0.02
L2	138 - 90.75	89.20	10	5.88	0.02
L3	94.75 - 74.5	41.68	10	4.24	0.01
L4	74.5 - 44.75	25.69	10	3.22	0.00
L5	50 - 0	11.83	10	2.19	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
146.0000	APXV18-206516S-C-A20 w/ Mount Pipe	10	99.04	5.90	0.02	9995
138.0000	(2) P40-16-XLPP-RR-A w/ Mount Pipe	10	89.20	5.88	0.02	5022
136.0000	800MHz RRH w/ Mount Pipe	10	86.76	5.85	0.02	4210
122.0000	DB-T1-6Z-8AB-0Z	10	70.10	5.50	0.01	1993
120.0000	BXA-171063-8BF-EDIN-0 w/ Mount Pipe	10	67.80	5.43	0.01	1853
90.0000	KS24019-L112A	10	37.53	3.99	0.01	1046

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	148 - 138 (1)	TP24x24x0.25	10.0000	0.0000	0.0	26.97	18.6532	-0.86	503.05	0.002
L2	138 - 90.75 (2)	TP31.924x24x0.25	47.2500	0.0000	0.0	36.00	24.6010	-9.40	885.64	0.011
L3	90.75 - 74.5 (3)	TP34.8373x30.7532x0.3125	20.2500	0.0000	0.0	36.00	34.2442	-12.86	1232.79	0.010
L4	74.5 - 44.75 (4)	TP41.086x34.8373x0.4295	29.7500	0.0000	0.0	28.54	53.9235	-18.08	1539.08	0.012
L5	44.75 - 0 (5)	TP49.86x39.1242x0.375	50.0000	0.0000	0.0	36.00	58.8995	-30.36	2120.38	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	148 - 138 (1)	TP24x24x0.25	27.90	3.05	26.90	0.114	0.00	0.00	26.90	0.000
L2	138 - 90.75 (2)	TP31.924x24x0.25	651.11	41.52	36.00	1.153	0.00	0.00	36.00	0.000
L3	90.75 - 74.5 (3)	TP34.8373x30.7532x0.3125	1033.38	42.56	36.00	1.182	0.00	0.00	36.00	0.000
L4	74.5 - 44.75 (4)	TP41.086x34.8373x0.4295	1545.97	35.35	28.54	1.239	0.00	0.00	28.54	0.000
L5	44.75 - 0 (5)	TP49.86x39.1242x0.375	2748.5	45.85	36.00	1.274	0.00	0.00	36.00	0.000

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
			5							

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	148 - 138 (1)	TP24x24x0.25	2.97	0.16	20.00	0.016	0.00	0.00	12.09	0.000
L2	138 - 90.75 (2)	TP31.924x24x0.25	17.89	0.73	24.00	0.061	1.26	0.04	24.00	0.002
L3	90.75 - 74.5 (3)	TP34.8373x30.7532x0.3125	19.78	0.58	24.00	0.048	1.22	0.02	24.00	0.001
L4	74.5 - 44.75 (4)	TP41.086x34.8373x0.4295	22.07	0.41	19.03	0.043	1.22	0.01	19.03	0.001
L5	44.75 - 0 (5)	TP49.86x39.1242x0.375	25.89	0.44	24.00	0.037	1.22	0.01	24.00	0.000

Pole Interaction Design Data

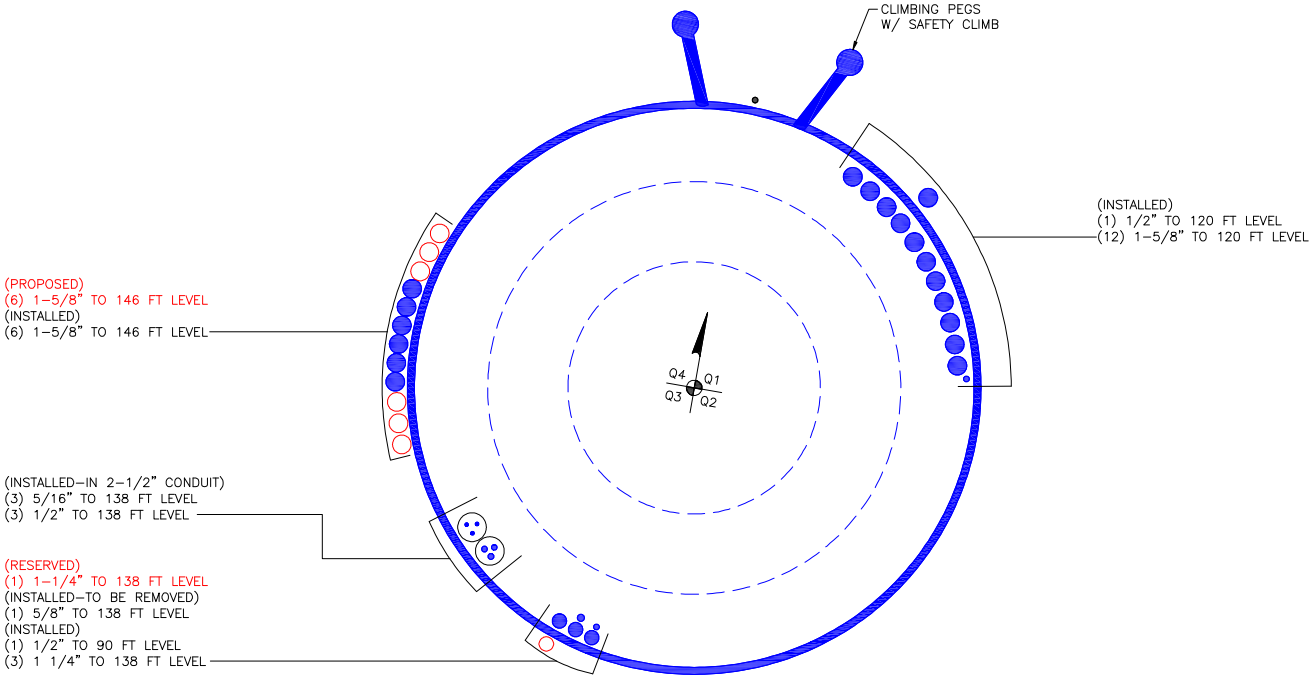
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	148 - 138 (1)	0.002	0.114	0.000	0.016	0.000	0.115 ✔	1.333	H1-3+VT ✔
L2	138 - 90.75 (2)	0.011	1.153	0.000	0.061	0.002	1.165 ✔	1.333	H1-3+VT ✔
L3	90.75 - 74.5 (3)	0.010	1.182	0.000	0.048	0.001	1.193 ✔	1.333	H1-3+VT ✔
L4	74.5 - 44.75 (4)	0.012	1.239	0.000	0.043	0.001	1.251 ✔	1.333	H1-3+VT ✔
L5	44.75 - 0 (5)	0.014	1.274	0.000	0.037	0.000	1.288 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	148 - 138	Pole	TP24x24x0.25	1	-0.86	670.56	8.7	Pass
L2	138 - 90.75	Pole	TP31.924x24x0.25	2	-9.40	1180.55	87.4	Pass
L3	90.75 - 74.5	Pole	TP34.8373x30.7532x0.3125	3	-12.86	1643.31	89.5	Pass
L4	74.5 - 44.75	Pole	TP41.086x34.8373x0.4295	4	-18.08	2051.59	93.8	Pass
L5	44.75 - 0	Pole	TP49.86x39.1242x0.375	5	-30.36	2826.47	96.6	Pass
							Summary	
						Pole (L5)	96.6	Pass
						RATING =	**96.6**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

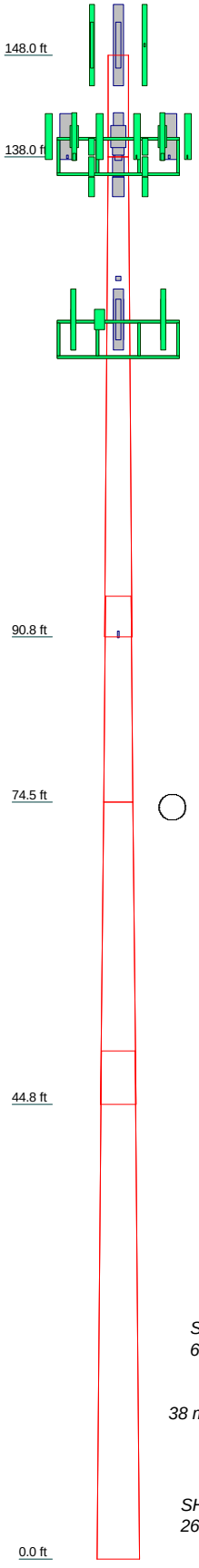


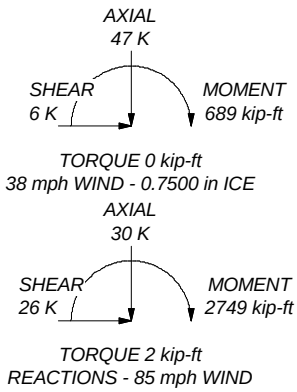
APPENDIX C

ADDITIONAL CALCULATIONS

Program Version 7.0.5.1 - 2/1/2016 File:G:/TOWER/375_Crown_Castle/2016/37516-0917_876323_HILLSIDE/37516-0917.001.7700_SDD_1204975/37516-0917.001.7700.eri

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	10.0000	1	0.2500		24.0000	24.0000	A500-50	0.6
2	47.2500	18	0.2500	4.0000	24.0000	31.9240	A500-50	3.5
3	20.2500	18	0.3125		30.7532	34.8372	A607-60	2.2
4	29.7500	18	0.4295	5.2500	34.8372	41.0860	A607-60	5.2
5	50.0000	18	0.3750		39.1242	49.8600	A607-60	8.9
							Reinf 47.57 ksi	
								20.5





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
APXV18-206516S-C-A20 w/ Mount Pipe	146	1900MHz RRH (25MHz) w/ Mount Pipe	136
APXV18-206516S-C-A20 w/ Mount Pipe	146	1900MHz RRH (25MHz) w/ Mount Pipe	136
APXV18-206516S-C-A20 w/ Mount Pipe	146	1900MHz RRH (25MHz) w/ Mount Pipe	136
LNX-6515DS-VTM w/ Mount Pipe	146	1900MHz RRH (25MHz) w/ Mount Pipe	136
ATBT-BOTTOM-24V	146	Side Arm Mount [SO 102-3]	136
LNX-6515DS-VTM w/ Mount Pipe	146	DB-T1-6Z-8AB-0Z	122
ATBT-BOTTOM-24V	146	Side Arm Mount [SO 102-1]	122
LNX-6515DS-VTM w/ Mount Pipe	146	BXA-171063-8BF-EDIN-0 w/ Mount Pipe	120
ATBT-BOTTOM-24V	146	BXA-171063-8BF-EDIN-0 w/ Mount Pipe	120
Side Arm Mount [SO 102-3]	146	BXA-171063-8BF-EDIN-0 w/ Mount Pipe	120
(2) P40-16-XLPP-RR-A w/ Mount Pipe	138	BXA-80063/4CF w/ Mount Pipe	120
(2) P40-16-XLPP-RR-A w/ Mount Pipe	138	BXA-80063/4CF w/ Mount Pipe	120
(2) P40-16-XLPP-RR-A w/ Mount Pipe	138	BXA-80063/6CF w/ Mount Pipe	120
800 EXTERNAL NOTCH FILTER	138	RRH2X40-AWS	120
800 EXTERNAL NOTCH FILTER	138	RRH2X40-AWS	120
800 EXTERNAL NOTCH FILTER	138	RRH2X40-AWS	120
(6) ACU-A20-N	138	FD9R6004/2C-3L	120
(6) ACU-A20-N	138	FD9R6004/2C-3L	120
(6) ACU-A20-N	138	GPS_A	120
TD-RRH8x20-25	138	MG D3-800TV w/ Mount Pipe	120
APXVTM14-C-120 w/ Mount Pipe	138	MG D3-800TV w/ Mount Pipe	120
TD-RRH8x20-25	138	MG D3-800TV w/ Mount Pipe	120
APXVTM14-C-120 w/ Mount Pipe	138	LNX-6514DS-A1M w/ Mount Pipe	120
TD-RRH8x20-25	138	LNX-6514DS-A1M w/ Mount Pipe	120
APXVTM14-C-120 w/ Mount Pipe	138	LNX-6514DS-A1M w/ Mount Pipe	120
Platform Mount [LP 303-1]	138	Platform Mount [LP 712-1]	120
Miscellaneous [NA 507-1]	138	KS24019-L112A	90
800MHz RRH w/ Mount Pipe	136	Side Arm Mount [SO 701-1]	90
800MHz RRH w/ Mount Pipe	136		
800MHz RRH w/ Mount Pipe	136		
1900MHz RRH (25MHz) w/ Mount Pipe	136		
1900MHz RRH (25MHz) w/ Mount Pipe	136		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	Reinf 47.57 ksi	48 ksi	60 ksi
A607-60	60 ksi	75 ksi			

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 96.6%

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

Job:	***148' MP; Hillside; West Haven, CT***		
Project:	***PJF# 37516-0917 (BU# 876323)***		
Client: CCI	Drawn by: Jared Smith	App'd:	
Code: TIA/EIA-222-F	Date: 03/21/16	Scale: NTS	
Path: G:\TOWER\375_Crown_Castle\2016\37516-0917_876323_HILLSIDE\37516-0917.002.7700_SDD_121126\37516-0917.002.7700.eri		Dwg No. E-1	

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

Site Data

BU#: *876323*
Site Name: *Hillside*
App #:

Manufacturer:	Other

Reactions

Moment:	27.9	ft-kips
Axial:	0.86	kips
Shear:	2.95	kips
Exterior Flange Run, T+Q:	5.87	kips

Flange spacer plate

Elevation: 138 feet

Bolt Data

Qty:	18		
Diam:	0.75	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle:	19	in	

Interior Flange Bolt Results

Maximum Bolt Tension:	5.9	Kips, Ext. Flange T+Q
Allowable Tension:	25.9	Kips
Bolt Stress Ratio:	22.7%	**Pass**

Plate Data

Plate Outer Diam:	32	in
Plate Inner Diam:	15	in (Hole @ Ctr)
Thick:	1	in
Grade:	50	ksi
Effective Width:	4.82	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	5.9	Kips, Ext. Flange T+Q
Plate Stress:	31.5	ksi
Allowable Plate Stress:	50.0	ksi
Plate Stress Ratio:	63.0%	**Pass**

Stiffener Data (Welding at Both Sides)

Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.375	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

n/a

Stiffener Results

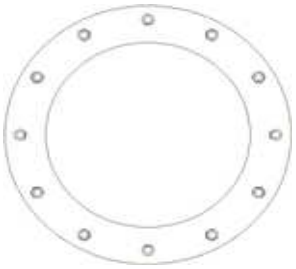
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data

Pole OuterDiam:	28	in
Thick:	0.1875	in
Pole Inner Diam:	27.625	in
Grade:	60	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi



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, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#: *876323*
Site Name: *Hillside*
App #:

Manufacturer:	Other

Reactions

Moment:	27.9	ft-kips
Axial:	0.86	kips
Shear:	2.95	kips
Exterior Flange Run, T+Q:	5.87	kips

Existing Top Plate

Elevation: 138 feet

Bolt Data

Qty:	18		
Diam:	0.75	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle:	19	in	

Interior Flange Bolt Results

Maximum Bolt Tension:	5.9	Kips, Ext. Flange T+Q
Allowable Tension:	25.9	Kips
Bolt Stress Ratio:	22.7%	**Pass**

Plate Data

Plate Outer Diam:	32	in
Plate Inner Diam:	15	in (Hole @ Ctr)
Thick:	0.75	in
Grade:	50	ksi
Effective Width:	3.79	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	5.9	Kips, Ext. Flange T+Q
Plate Stress:	20.6	ksi
Allowable Plate Stress:	50.0	ksi
Plate Stress Ratio:	41.3%	**Pass**

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

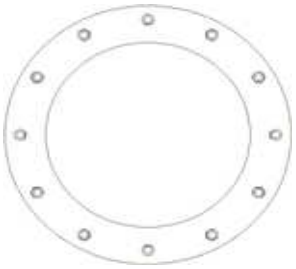
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data

Pole OuterDiam:	22	in
Thick:	0.25	in
Pole Inner Diam:	21.5	in
Grade:	60	ksi
# of Sides:	18	"0" IF Round
Fu	75	ksi



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#: *876323*
Site Name: *Hillside*
App #:

Pole Manufacturer:	Other

Reactions		
Moment:	27.9	ft-kips
Axial:	0.86	kips
Shear:	2.95	kips
Elevation:	138	feet

Extension Bottom Flange

Bolt Data			
Qty:	8		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	75	<-- Disregard	Bolt Fty:
N/A:	55	<-- Disregard	44.00
Circle (in.):	28		

Plate Data		
Diam:	32	in
Thick, t:	0.75	in
Grade (Fy):	50	ksi
Strength, Fu:	65	ksi
Single-Rod B-eff:	9.00	in

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

Pole Data		
Diam:	24	in
Thick:	0.25	in
Grade:	50	ksi
# of Sides:	0	"0" IF Round
Fu	65	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

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

Flange Bolt Results — Non-Rigid (Service, ASD; Fty*ASIF)

Bolt Tension Capacity, **B**:	46.07	kips	
Max Bolt directly applied T:	5.87	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	0.960	in	
Min PL "treq" for actual **T w/ Pry**:	0.250	in	
Min PL "t1" for actual **T w/o Pry**:	0.343	in	
T allowable with Prying:	39.33	kips	0≤α'≤1 case
Prying Force, Q:	0.00	kips	
Total Bolt Tension=T+Q:	5.87	kips	
Prying Bolt Stress Ratio=(T+Q)/(B):	12.7%	**Pass**	

Exterior Flange Plate Results — Flexural Check — Non-Rigid (Service ASD; 0.75*Fy*ASIF; Comp. Y.L. Length: 7.50)

Compression Side Plate Stress:	17.3	ksi
Allowable Plate Stress:	50.0	ksi
Compression Plate Stress Ratio:	34.6%	**Pass**
No Prying		
Tension Side Stress Ratio, (treq/t)^2:	11.1%	**Pass**

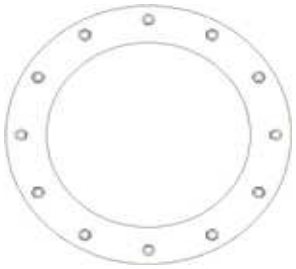
n/a

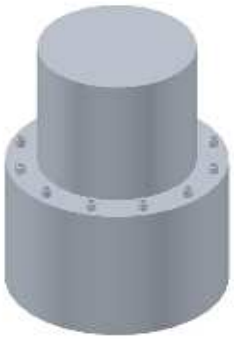
Stiffener Results

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





* 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

PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 • Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

Job Number: 37516-0917.002
Site Number: 876323
Site Name: Hillside

By: JWS
Date: 3/21/2016

DRILLED PIER SOIL AND STEEL ANALYSIS - TIA/EIA-222-F

Unfactored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, M =	2749.0		k-ft
Shear, V =	26.0		kips
Axial Load, P =	30.0		kips
OTM =	2762.0	0.0	k-ft @ Ground

Safety Factors / Load Factors / Φ Factors

Tower Type =	Monopole DP
ACI Code =	ACI 318-02
Seismic Design Category =	D
Reference Standard =	TIA/EIA-222-F
Use 1.3 Load Factor?	Yes
Load Factor =	1.30

Drilled Pier Parameters

Diameter =	7	ft
Height Above Grade =	0.5	ft
Depth Below Grade =	21.5	ft
fc' =	3	ksi
εc =	0.003	in/in
L / D Ratio =	3.14	
Mat Ftdn. Cap Width =		ft
Mat Ftdn. Cap Length =		ft
Depth Below Grade =		ft

	Safety Factor	Φ Factor
Soil Lateral Resistance =	2.00	0.75
Skin Friction =	2.00	0.75
End Bearing =	2.00	0.75
Concrete Wt. Resist Uplift =	1.25	

Load Combinations Checked per TIA/EIA-222-F

1. Ult. Skin Friction/2.00 + Ult. End Bearing/2.00
+ Effective Soil Wt. - Buoyant Conc. Wt. ≥ Comp.
2. Ult. Skin Friction/2.00 + Buoyant Conc. Wt./1.25 ≥ Uplift
3. Ult. Skin Friction/1.50 + Buoyant Conc. Wt./1.50 ≥ Uplift

Steel Parameters

Number of Bars =	38	
Rebar Size =	#9	
Rebar Fy =	60	ksi
Rebar MOE =	29000	ksi
Tie Size =	#5	
Side Clear Cover to Ties =	4	in

Soil Parameters

Water Table Depth =	5.00	ft
Depth to Ignore Soil =	3.50	ft
Depth to Full Cohesion =	0	ft
Full Cohesion Starts at?*	Ground	

Above Full Cohesion Lateral Resistance = 4(Cohesion)(Dia)(H)
Below Full Cohesion Lateral Resistance = 8(Cohesion)(Dia)(H)

Direct Embed Pole Shaft Parameters

Dia @ Grade =		in
Dia @ Depth Below Grade =		in
Number of Sides =		
Thickness =		in
Fy =		ksi
Backfill Condition =		

Maximum Capacity Ratios

Maximum Soil Ratio =	100.0%
Maximum Steel Ratio =	100.0%

Note: The drilled pier 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 drilled pier is based the recommendations of the site specific geotechnical report. In the absence of any recommendations, the frost depth at the site or one half of the drilled pier diameter (whichever is greater) shall be ignored.

Define Soil Layers

Note: Cohesion = Undrained Shear Strengh = Unconfined Compressive Strength / 2

Layer	Thickness ft	Unit Weight pcf	Cohesion psf	Friction Angle degrees	Soil Type	Ultimate End Bearing psf	Comp. Ult. Skin Friction psf	Tension Ult. Skin Friction psf	Depth ft
1	5	115		31	Sand				5
2	3	130		40	Sand				8
3	17	130		42	Sand	11700			25
4									
5									
6									
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	15.31	ft, from Grade	Shear, V =	26.00	kips
Bending Moment, M =	3160.04	k-ft, from COR	Resisting Shear, Va =	33.15	kips
Resisting Moment, Ma =	4028.55	k-ft, from COR			

MOMENT RATIO = 78.4% OK **SHEAR RATIO = 78.4% OK**

Soil Results: Uplift

Uplift, T =	0.00	kips
Allowable Uplift Cap., Ta =	69.90	kips

UPLIFT RATIO = 0.0% OK

Soil Results: Compression

Compression, C =	30.00	kips
Allowable Comp. Cap., Ca =	202.81	kips

COMPRESSION RATIO = 14.8% OK

Steel Results (ACI 318-02):

Minimum Steel Area =	18.47	sq in	Axial Load, P =	61.75	kips @ 5.00 ft Below Grade
Actual Steel Area =	38.00	sq in	Moment, M =	2878.68	k-ft @ 5.00 ft Below Grade
			Allowable Moment, Ma =	4592.77	k-ft
Allowable Min Axial, Pa =	-1578.46	kips, Where Ma = 0 k-ft			
Allowable Max Axial, Pa =	6525.84	kips, Where Ma = 0 k-ft			

MOMENT RATIO = 62.7% OK

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#: *876323*
Site Name: *Hillside*
App #:

Enter Load Factors Below:		
For M (WL)	1.3	<---- Enter Factor
For P (DL)	1.3	<---- Enter Factor

Pier Properties

Concrete:

Pier Diameter =	7.0	ft
Concrete Area =	5541.8	in^2

Reinforcement:

Clear Cover to **Tie**=	4.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	6.14	ft
Vert. Cage Diameter =	73.62	in
Vertical Bar Size =	9	
Bar Diameter =	1.13	in
Bar Area =	1	in^2
Number of Bars =	38	
As Total=	38	in^2
A s/ Aconc, Rho:	0.0069	0.69%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(f'c)/Fy:	0.0027
200 / Fy:	0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.69%	**OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	8483.60	kips
at Mu=(ϕ=0.65)Mn=	5130.87	ft-kips
Max Tu, (φ=0.9) Tn =	2052	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	2878.68	ft-kips **(* Note)**
Max. Service Shaft P:	61.75	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	**Shaft Factored Loads**		
1.30	Mu:	3742.284	ft-kips
1.30	Pu:	80.275	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code=	2002

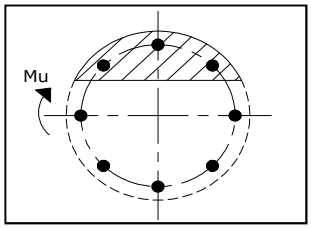
Seismic Properties

Seismic Design Category =	D
Seismic Risk =	**High**

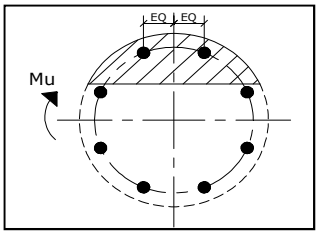
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **1**



Case 1



Case 2

Dist. From Edge to Neutral Axis:	**15.09**	in
Extreme Steel Strain, ϵt:	**0.0127**	
	ϵt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	80.27	kips
Drilled Shaft Moment Capacity, φMn:	**5970.60**	ft-kips
Drilled Shaft Superimposed Mu:	**3742.28**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**62.7%**

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F /G

Assumptions: 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: *876323*
Site Name: *Hillside*
App #:

Anchor Rod Data		
Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	57	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	53	in
Thick:	3	in
Grade:	60	ksi
Clip Distance:	3.5	in

Stiffener Data (Welding at both sides)		
Configuration:	Unstiffened	
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

Pole Data		
Diam:	49.86	in
Thick:	0.375	in
Grade:	60	ksi
# of Sides:	18	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	2749	ft-kips
Unfactored Axial, P:	30	kips
Unfactored Shear, V:	26	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension	190.4 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	97.7% **Pass**

Base Plate Results Flexural Check

Base Plate Stress:	48.4 ksi
Allowable PL Bending Stress:	60.0 ksi
Base Plate Stress Ratio:	80.6% **Pass**

PL Ref. Data
Yield Line (in):
25.09
Max PL Length:
25.09

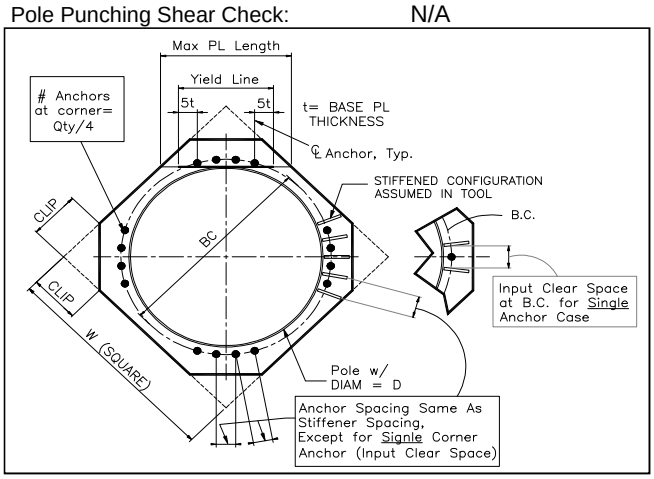
N/A - Unstiffened

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



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

MODIFICATION OF AN EXISTING 148' MONOPOLE

BU #876323; HILLSIDE

85 PLAINFIELD AVE
WEST HAVEN, CONNECTICUT 06516
NEW HAVEN COUNTY
LAT: 41° 18' 4.59"; LONG: -72° 58' 35.2"
APP: 310059 REV. 11; WO: 1128591

PROJECT CONTACTS

STRUCTURE OWNER:
CROWN CASTLE
MOD PM: DAN VADNEY AT DAN.VADNEY@CROWNCASTLE.COM
PH: (518) 373-3510
MOD CM: JASON D'AMICO AT JASON.D'AMICO@CROWNCASTLE.COM
PH: (860) 209-0104

ENGINEER OF RECORD:
PJFMOD@PJFWEB.COM

THIS PROJECT INCLUDES THE FOLLOWING ITEMS
SHAFT REINFORCING

SHEET INDEX	
SHEET NUMBER	DESCRIPTION
T-1	TITLE SHEET
S-1	GENERAL NOTES
S-2A	FORGBOLT™ DETAILS
S-2B	NEXGEN2™ BOLT DETAIL
S-3	MONOPOLE PROFILE
S-4	MI CHECKLIST

WIND DESIGN DATA	
REFERENCE STANDARD	TIA/EIA-222-F
LOCAL CODE	2005 CT STATE BUILDING CODE
BASIC WIND SPEED (FASTEST-MILE)	85 MPH
ICE THICKNESS	0.75 IN
ICE WIND SPEED	38 MPH
SERVICE WIND SPEED	50 MPH

THE ASSOCIATED FAILING SA WO NUMBER FOR THIS PROJECT IS 1117617

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

PJF PAUL J. FORD & COMPANY
250 E Broad St. Ste 600- Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 148' MONOPOLE
BU #876323; HILLSIDE
WEST HAVEN, CONNECTICUT

PROJECT No:	37515-2871.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.J.W.
CHECKED BY:	
DATE:	10-26-2015

TITLE SHEET

T-1

37515-2871.001.DWG

MONOPOLE RETROFIT PROJECT MASTER NOTES DOCUMENT (REV. 3, 02/05/2015)

1. GENERAL NOTES

1.1. THE MONOPOLE STRUCTURE IN ITS EXISTING CONDITION DOES NOT HAVE THE STRUCTURAL CAPACITY TO CARRY ALL OF THE PROPOSED AND EXISTING LOADS FROM THE ATTACHED STRUCTURAL MODIFICATION REPORT AT THE REQUIRED MINIMUM WIND SPEEDS. DO NOT INSTALL ANY NEW LOADS UNTIL THE MONOPOLE REINFORCING SYSTEM IS COMPLETELY AND SUCCESSFULLY INSTALLED.

1.2. THESE DRAWINGS WERE PREPARED FROM INFORMATION PROVIDED BY CROWN CASTLE. THE INFORMATION PROVIDED HAS NOT BEEN FIELD VERIFIED BY THE ENGINEER OF RECORD (EOR) FOR ACCURACY AND THEREFORE DISCREPANCIES BETWEEN THESE DRAWINGS AND ACTUAL SITE CONDITIONS SHOULD BE ANTICIPATED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS. THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT DRAWINGS AND THEIR FIELD VERIFIED CONDITIONS AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. THE CONTRACTOR SHALL IMMEDIATELY REPORT ANY AND ALL DISCREPANCIES TO THE EOR AND CROWN CASTLE BEFORE PROCEEDING WITH THE WORK.

1.3. 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.

1.4. THIS STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE INSTALLATION OF THE REINFORCING REPAIR SYSTEM HAS BEEN SUCCESSFULLY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO ENSURE 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.

1.5. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN AND SHALL MEET ANSI/TIA-1019 (LATEST EDITION), OSHA AND GENERAL INDUSTRY STANDARDS. ALL RIGGING PLANS SHALL ADHERE TO ANSI/TIA-1019 (LATEST EDITION) INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION.

1.6. OBSERVATION VISITS TO THE SITE BY CROWN CASTLE AND/OR THE EOR SHALL NOT INCLUDE INSPECTIONS OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES. ANY SUPPORT SERVICES PERFORMED BY THE EOR DURING CONSTRUCTION ARE SOLELY FOR THE PURPOSE OF ACHIEVING GENERAL CONFORMANCE WITH THE CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE THE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.

1.7. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL 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 CROWN CASTLE AND EOR PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF MATERIALS AND EQUIPMENT BEING SUBSTITUTED.

1.8. 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.

1.9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING AND NEW COAXIAL CABLES AND OTHER EQUIPMENT DURING CONSTRUCTION.

1.10. 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 RELOCATED, REPLACED, OR RE-INSTALLED AS REQUIRED AFTER THE REINFORCING IS SUCCESSFULLY COMPLETED. THE CONTRACTOR SHALL IDENTIFY AND COORDINATE THESE ITEMS PRIOR TO CONSTRUCTION WITH CROWN CASTLE, TESTING AGENCY, AND EOR.

1.11. 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.

1.12. THE CLIMBING FACILITIES, SAFETY CLIMB AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED OR ALTERED WITHOUT THE EXPRESS APPROVAL OF THE EOR.

1.13. FOR STANDARD CROWN PARTS SEE THE MOST RECENT VERSION OF THE "CCI APPROVED REINFORCEMENT COMPONENTS" CATALOG.

1.14. ALL SOLUTIONS FOR THE REPLACEMENT, RELOCATION OR MODIFICATION OF THE SAFETY CLIMB AND/OR ANY OF THE MONOPOLE CLIMBING FACILITIES SHALL BE COORDINATED WITH TUF-TUG PRODUCTS. CONTACT DETAILS:
3434 ENCRETE LANE, MORAINE, OHIO 45439
PHONE: 937-299-1213 EMAIL: TUFTUG@AOL.COM

2. STRUCTURAL STEEL

2.1. STRUCTURAL STEEL MATERIALS, FABRICATION, DETAILING, AND WORKMANSHIP SHALL CONFORM TO THE LATEST EDITION OF THE FOLLOWING REFERENCE STANDARDS:
2.1.1. BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC):
2.1.1.1. "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS."
2.1.1.2. "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM HIGH STRENGTH BOLTS," AS APPROVED BY THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS.
2.1.1.3. "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"
2.1.2. BY THE AMERICAN WELDING SOCIETY (AWS):
2.1.2.1. "STRUCTURAL WELDING CODE – STEEL D1.1."
2.1.2.2. "STANDARD SYMBOLS FOR WELDING, BRAZING, AND NONDESTRUCTIVE EXAMINATION"

2.2. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM HIGH STRENGTH BOLTS', DEC. 31, 2009.

2.3. 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.

2.4. 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.

2.5. ALL WELDED CONNECTIONS SHALL BE MADE BY WELDERS CERTIFIED BY AWS. CONTRACTOR SHALL SUBMIT WELDERS' CERTIFICATION AND QUALIFICATION DOCUMENTATION TO CROWN CASTLE'S TESTING AGENCY FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.

2.6. STRUCTURAL STEEL PLATES SHALL CONFORM TO ASTM A572 GRADE 65(FY = 65 KSI MIN.) UNLESS NOTED OTHERWISE ON THE DRAWINGS.

2.7. 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.

2.8. NO WELDING SHALL BE DONE TO THE EXISTING STRUCTURE WITHOUT THE PRIOR APPROVAL AND SUPERVISION OF THE TESTING AGENCY.

2.9. FIELD CUTTING OF STEEL:
2.9.1. IMPORTANT CUTTING AND WELDING SAFTEY GUIDELINES: THE CONTRACTOR SHALL FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE PREVENTION AND SAFTEY GUIDELINES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A COPY OF THE CURRENT CROWN CASTLE GUIDELINES. 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 SAFETY PLAN' (DOC # ENG-PLN-10015) ON AN ONGOING BASIS THROUGHOUT THE ENTIRE LIFE OF THE PROJECT". 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.
2.9.2. 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. CONTRACTOR TO AVOID 90 DEGREE CORNERS. IT MAY BE NECESSARY TO DRILL STARTER HOLES AS REQUIRED TO MAKE THE CUTS.

3. BASE PLATE GROUT - (NOT REQUIRED)

4. FOUNDATION WORK - (NOT REQUIRED)

5. CAST-IN-PLACE CONCRETE - (NOT REQUIRED)

6. EPOXY GROUTED REINFORCING ANCHOR RODS - (NOT REQUIRED)

7. TOUCH UP OF GALVANIZING

7.1. THE CONTRACTOR SHALL TOUCH UP ANY AND 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 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.

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

7.3. CROWN CASTLE'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 ADEQUATELY COATED, SHALL BE RE-COATED BY THE CONTRACTOR AND RE-TESTED BY THE TESTING AGENCY.

8. HOT-DIP GALVANIZING

8.1. HOT-DIP GALVANIZE ALL STRUCTURAL STEEL MEMBERS AND ALL STEEL ACCESSORIES, BOLTS, WASHERS, ETC. PER ASTM A123 OR PER ASTM A153, AS APPROPRIATE.

8.2. PROPERLY PREPARE STEEL ITEMS FOR GALVANIZING. DRILL OR PUNCH WEEP AND/OR DRAINAGE HOLES WITH EOR APPROVAL OF LOCATIONS.

8.3. ALL GALVANIZING SHALL BE DONE AFTER FABRICATION IS COMPLETED AND PRIOR TO FIELD INSTALLATION.

9. PERPETUAL INSPECTION AND MAINTENANCE BY THE OWNER

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

9.2. ANY 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 EXISTING GALVANIZED STEEL POLE STRUCTURE AND THE WELDED 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 CROWN CASTLE REGULARLY INSPECTS, MAINTAINS, AND REPAIRS AS NECESSARY, ALL OF THESE WELDS, CONNECTIONS, AND COMPONENTS FOR THE LIFE OF THE STRUCTURE.

9.3. CROWN CASTLE 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 CROWN CASTLE BASED UPON ACTUAL SITE AND ENVIRONMENTAL CONDITIONS. THE EOR 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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PH: (724) 416-2000

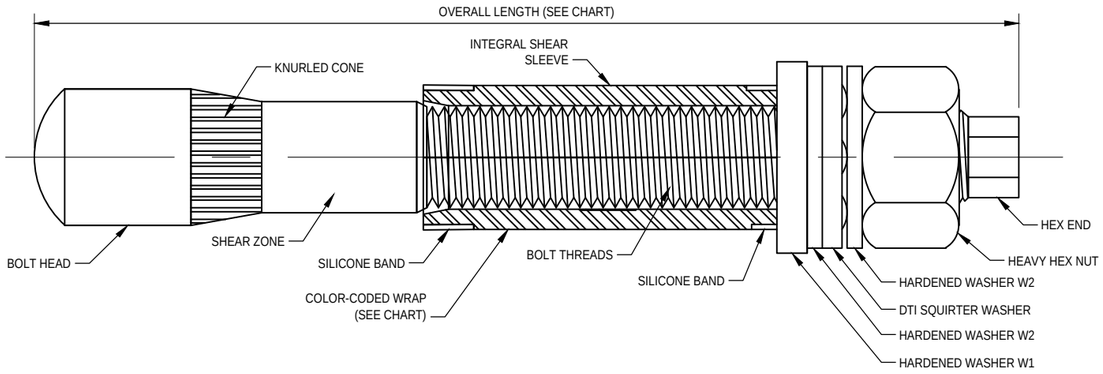
MODIFICATION OF AN EXISTING 148' MONOPOLE
BU #876323; HILLSIDE
WEST HAVEN, CONNECTICUT

PROJECT No:	37515-2871.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.J.W.
CHECKED BY:	
DATE:	10-26-2015

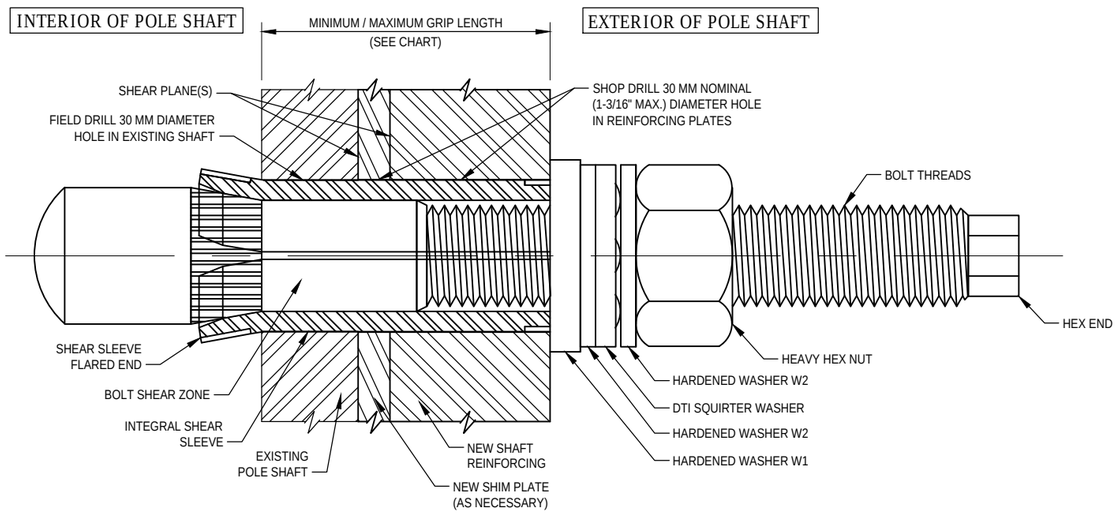
GENERAL NOTES

S-1

37515-2871.001.DWG



PRE-INSTALLED FORGBolt™ ASSEMBLY DETAIL 1 S-2A



INSTALLED FORGBolt™ ASSEMBLY DETAIL 2 S-2A

FORGBolt™		AISC Group A Material: ASTM A325 and PC8.8 (Tensile Stress, Fu = 120 ksi minimum)				
GROUP A	FORGBolt™ Size (mm)	Overall Length (inches)	Estimated Weight Each (lbs)	Grip Range (inch)	Comment	Color Code
FORGBolt™ A325 - PC8.8 1	**135**	5.31	1.3	3/8" to 1"	--	**RED**
2	**160**	6.30	1.6	3/4" to 1-1/2"	--	**GREEN**
3	**195**	7.68	1.9	1-1/4" to 2-1/4"	--	**BLUE**
4	**260**	10.24	2.6	2" to 3-1/2"	Splice Bolt	**YELLOW**
5	**365**	14.37	3.6	3-1/2" to 5-1/2"	Flange Jump Bolt	**ORANGE**
6	**440**	17.32	4.3	5-1/2" to 8-1/2"	Flange Jump Bolt	**BLACK**
DTI Note	Each Group A (A325/PC8.8) FORGBolt™ assembly shall have a 'Squirter' DTI that is compatible with a M20-PC8.8 bolt.					

FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

INSTALLATION NOTES:
1. FIELD DRILL HOLES TO 30 MM DIAMETER.
2. SELECT CORRECT BOLT SIZE FOR INSTALLATION GRIP (REFER TO PLANS).
3. INSERT BOLT ASSEMBLY THROUGH HOLES IN SHAFT REINFORCING PLATES AND SEAT THE HARDENED WASHER W1 FLUSH AGAINST OUTSIDE OF PLATE.
4. HAND TIGHTEN NUT TO FINGER TIGHT.
5. TIGHTEN NUT TO PRETENSIONED CONDITION AND UNTIL DTI SHOWS PROPER INDICATION.
6. PROPERLY DOCUMENT AND INSPECT BOLT TIGHTENING PER PLAN REQUIREMENTS.

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

BOLT TIGHTENING AND INSPECTION 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.

AISC GROUP A MATERIAL: ASTM A325 AND PC8.8
(Fu = 120 KSI MIN. TENSILE STRESS)

CONTAINS PROPRIETARY INFORMATION PATENT PENDING

DISTRIBUTOR CONTACT:
PRECISION TOWER PRODUCTS
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EMAIL: info@precisiontowerproducts.com
WEB: www.precisiontowerproducts.com

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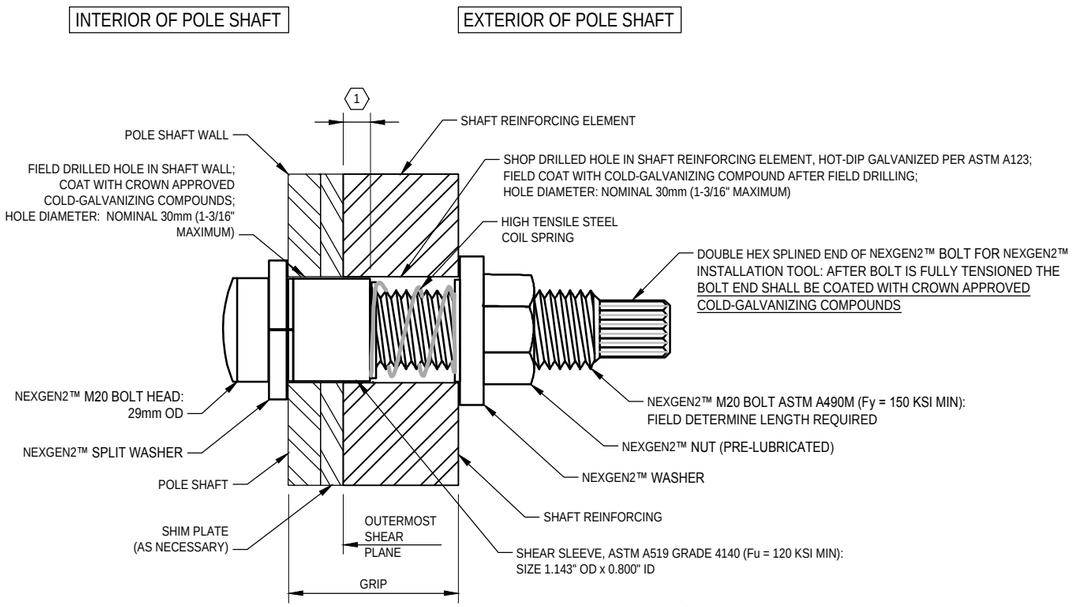
FORGBolt™ DETAILS

S-2A

37515-2871.001.DWG

NEXGEN2™ BOLT NOTE SHEET: REV. 1.01, 04-15-2015

1 NOTE: SHEAR SLEEVE LENGTH: THE SHEAR SLEEVE SHALL PROJECT A MINIMUM OF 3/8" BEYOND THE OUTERMOST SHEAR PLANE. THE CONTRACTOR SHALL SUBMIT FABRICATION DRAWINGS SHOWING NEXGEN2™ BOLT LENGTHS AND SHEAR SLEEVE LENGTHS TO THE EOR FOR REVIEW AND APPROVAL.



TYPICAL NEXGEN2™ BOLT DETAIL 1 / S-2B

FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

BOLT HOLE NOTES:

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

BOLT TIGHTENING AND INSPECTION NOTES:

1. ALL NEXGEN2™ BOLT ASSEMBLIES SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF SECTION 8.2.3 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. PER SECTION 8.2.3: ALL FASTENER ASSEMBLIES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS IN AISC SECTION 8.1 WITHOUT SEVERING THE SPLINED END AND WITH WASHERS POSITIONED AS REQUIRED IN AISC SECTION 6.2. PER REQUIREMENTS IN SECTION 8.1: PRIOR TO BOLT PRETENSIONING, THE JOINT SHALL FIRST BE COMPACTED TO THE SNUG-TIGHT CONDITION. SNUG TIGHT IS THE CONDITION THAT EXISTS WHEN ALL OF THE PLIES IN THE CONNECTION HAVE BEEN PULLED INTO FIRM CONTACT BY THE BOLTS AND THE BOLTS HAVE BEEN TIGHTENED SUFFICIENTLY TO PREVENT THE REMOVAL OF THE NUTS WITHOUT THE USE OF A WRENCH. ONCE THE SNUG TIGHT CONDITION IS ACHIEVED, THEN THE BOLT ASSEMBLY CAN BE TIGHTENED TO THE PRETENSIONED CONDITION.
2. ALL NEXGEN2™ BOLT ASSEMBLIES SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF SECTION 9.2.3 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. NOTE THAT COMPLETE INSPECTION OF ALL NEXGEN2™ BOLT ASSEMBLIES IS REQUIRED IN ADDITION TO ROUTINE OBSERVATION.
3. ALL NEXGEN2™ BOLTS SHALL BE INSPECTED BY A QUALIFIED BOLT INSPECTOR PER NOTES 1 AND 2, ABOVE. DURING INSTALLATION, THE BOLT INSPECTOR SHALL VERIFY AND DOCUMENT: THE SHOP-DRILLED AND FIELD-DRILLED HOLE SIZES; THE INSTALLATION OF THE NEXGEN2™ BOLT ASSEMBLY, INCLUDING THE SHEAR SLEEVE PLACEMENT AND NUT LUBRICATION; AND THE CONTRACTOR'S TENSIONING PROCEDURE. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THAT THE DOUBLE HEX SPLINED END OF THE BOLTS HAVE BEEN TWISTED OFF AND COATED WITH CROWN APPROVED COLD-GALVANIZING COMPOUND..

NOTE: NEXGEN2™ BOLT ASSEMBLY SHALL BE MAGNI 565 COATED PER ASTM F2833 AND MANUFACTURER SPECIFICATIONS.

NOTE: INSTALL NEXGEN2™ BOLT ASSEMBLY PER MANUFACTURER'S INSTRUCTIONS.

DISTRIBUTOR CONTACT DETAILS:
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15401 COMMERCE PARK DR.
BROOKPARK, OHIO 44142
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MODIFICATION OF AN EXISTING 148' MONOPOLE
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NEXGEN2™ BOLT DETAIL

S-2B

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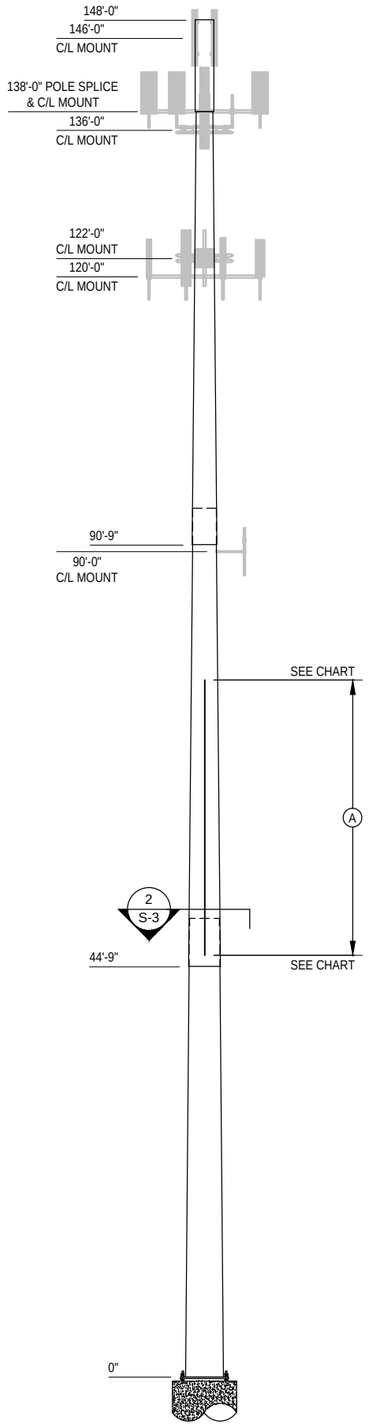


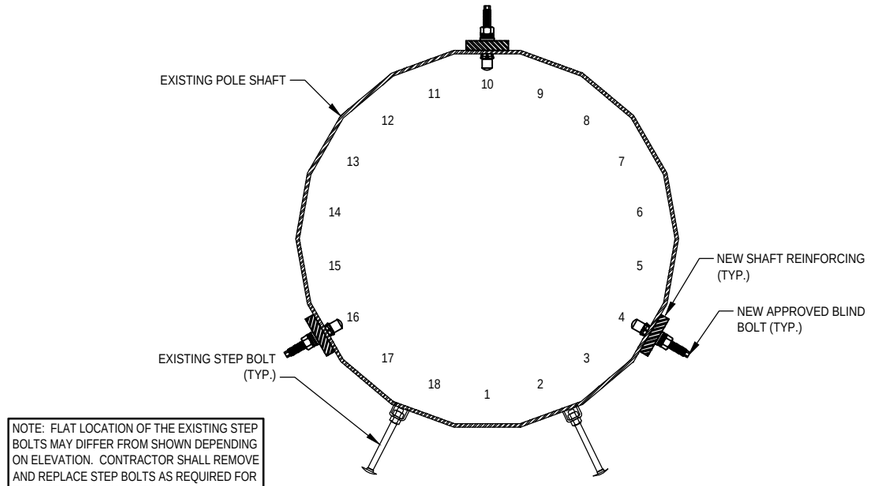
POLE ELEVATION 1 S-3

NEW CCI FLAT PLATE (65 KSI) REINFORCING SCHEDULE

BOTTOM ELEVATION	TOP ELEVATION	FLAT # / DEGREE SEPARATION	ELEMENT	ELEMENT LENGTH	ELEMENT QUANTITY	APPROXIMATE BOLTS PER ELEMENT	APPROXIMATE TOTAL BOLT QUANTITY	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAXIMUM INTERMEDIATE BOLT SPACING	ESTIMATED TOTAL STEEL WEIGHT
46' - 0"	76' - 0"	F4, F10 & F16	CCI-SFP-04510030	30' - 0"	3	28	84	6	6	20"	1378 LBS.
							84				1378 LBS.

NOTES:

1.) 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.
2.) ALL REINFORCING SHALL BE ASTM A572 GR. 65.
3.) WELDS SHALL BE E80XX OR GREATER. TERMINATION WELDS SHALL BE 3/8" FILLET WELDS.
4.) HOLES FOR BOLTS ARE 30mm UNLESS NOTED OTHERWISE.
5.) ALL SHIMS SHALL BE ASTM A-36.



NOTE: FLAT LOCATION OF THE EXISTING STEP BOLTS MAY DIFFER FROM SHOWN DEPENDING ON ELEVATION. CONTRACTOR SHALL REMOVE AND REPLACE STEP BOLTS AS REQUIRED FOR REINFORCING INSTALLATION

SECTION 2 S-3

SHAFT SECTION DATA							
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN) @ TOP	DIAMETER ACROSS FLATS (IN) @ BOTTOM	POLE GRADE (ksi)	POLE SHAPE
1	10.00	0.2500	48.00 63.00	24.000	24.000	50	ROUND
2	47.25	0.2500		22.000	31.924	60	18-SIDED
3	50.00	0.3125		30.584	41.086	60	18-SIDED
4	50.00	0.3750		39.358	49.860	60	18-SIDED
NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES							

MODIFICATIONS:

(A) INSTALL NEW SHAFT REINFORCING. SEE CHART ON THIS SHEET.

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

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MONOPOLE PROFILE

S-3

37515-2871.001.DWG

MODIFICATION INSPECTION NOTES:

1. GENERAL

1.1. 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 EOR.

1.2. 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.

1.3. ALL MI'S SHALL BE CONDUCTED BY A CROWN CASTLE ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN CASTLE.

1.4. 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 CASTLE POINT OF CONTACT (POC).

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

2. MI INSPECTOR

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

2.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.

2.1.2. WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.

2.1.3. THE MI INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL 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 CASTLE.

3. GENERAL CONTRACTOR

3.1. 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:

3.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.

3.1.2. WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.

3.1.3. BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS.

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

4. RECOMMENDATIONS

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

4.1.1. 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.

4.1.2. THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.

4.1.3. WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS.

4.1.4. 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.

4.1.5. 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.

5. CANCELLATION OR DELAYS IN SCHEDULED MI

5.1. IF THE GC AND MI INSPECTOR AGREE TO A DATE ON WHICH THE MI WILL BE CONDUCTED, AND EITHER PARTY CANCELS OR DELAYS, CROWN CASTLE 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 CASTLE 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.

6. CORRECTION OF FAILING MI'S

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

6.1.1. CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENT MI.

6.1.2. OR, WITH CROWN CASTLE'S APPROVAL, THE GC MAY WORK WITH THE EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION.

7. MI VERIFICATION INSPECTIONS

7.1. CROWN CASTLE 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.

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

7.3. 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.

8. PHOTOGRAPHS

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

8.1.1. PRECONSTRUCTION GENERAL SITE CONDITION

8.1.2. PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION

8.1.3. RAW MATERIALS

8.1.4. PHOTOS OF ALL CRITICAL DETAILS

8.1.5. FOUNDATION MODIFICATIONS

8.1.6. WELD PREPARATION

8.1.7. BOLT INSTALLATION AND TORQUE

8.1.8. FINAL INSTALLED CONDITION

8.1.9. SURFACE COATING REPAIR

8.1.10. POST CONSTRUCTION PHOTOGRAPHS

8.1.11. FINAL INFIELD CONDITION

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

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

9. INSPECTION AND TESTING

9.1. ALL WORK SHALL BE SUBJECT TO REVIEW AND OBSERVATION BY CROWN CASTLE'S REPRESENTATIVE AND CROWN CASTLE'S AUTHORIZED INDEPENDENT INSPECTION AND TESTING AGENCY.

9.2. INSPECTION SERVICES WHICH ARE FURNISHED BY OTHERS ARE STILL REQUIRED WHEN THE EOR PERFORMS SUPPORT SERVICES DURING CONSTRUCTION.

9.3. OBSERVED DISCREPANCIES BETWEEN THE WORK AND THE CONTRACT DOCUMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST.

9.4. AN INDEPENDENT QUALIFIED INSPECTION/TESTING AGENCY SHALL BE SELECTED, RETAINED AND PAID FOR BY CROWN CASTLE FOR THE SOLE PURPOSE OF INSPECTING, TESTING, DOCUMENTING, AND APPROVING ALL WELDING AND FIELD WORK PERFORMED BY THE CONTRACTOR.

9.4.1. ACCESS TO ANY PLACE WHERE WORK IS BEING DONE SHALL BE PERMITTED AT ALL TIMES.

9.4.2. 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.

9.5. THE INSPECTION AND TESTING AGENCY SHALL BE RESPONSIBLE TO PERFORM THE FOLLOWING SERVICES AND 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.

9.6. GENERAL

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

9.7. FOUNDATIONS AND SOIL PREPARATION - (NOT REQUIRED)

9.8. CONCRETE TESTING PER ACI - (NOT REQUIRED)

9.9. STRUCTURAL STEEL

9.9.1. CHECK STEEL ON THE JOB WITH THE PLANS.

9.9.2. CHECK MILL CERTIFICATIONS. CALL FOR LABORATORY TEST REPORTS WHEN MILL CERTIFICATION IS IN QUESTION.

9.9.3. CHECK GRADE OF STEEL MEMBERS, AND BOLTS FOR CONFORMANCE WITH DRAWINGS.

9.9.4. INSPECT 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.

9.9.5. INSPECT STEEL MEMBERS FOR DISTORTION, EXCESSIVE RUST, FLAWS AND BURNED HOLES.

9.9.6. CHECK STEEL MEMBERS FOR SIZES, SWEEP AND DIMENSIONAL TOLERANCES.

9.9.7. CHECK FOR SURFACE FINISH SPECIFIED, GALVANIZED.

9.9.8. CHECK THAT BOLTS HAVE BEEN TIGHTENED PROPERLY.

9.9.9. PRIOR TO ANY FIELD CUTTING THE CONTRACTOR SHALL MARK THE CUTOUT LINES ON THE STEEL AND THE INSPECTION/TESTING AGENCY SHALL VERIFY PROPOSED LAYOUT, LOCATION, AND DIMENSIONS. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.

9.10. WELDING:

9.10.1. VERIFY FIELD WELDING PROCEDURES, WELDERS, AND WELDING OPERATORS, NOT DEEMED PREQUALIFIED, IN ACCORDANCE WITH AWS D1.1.

9.10.2. INSPECT FIELD WELDED CONNECTIONS IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED AND WITH AWS D1.1.

9.10.3. APPROVE FIELD WELDING SEQUENCE.

9.10.4. A PROGRAM OF THE APPROVED SEQUENCES SHALL BE SUBMITTED TO CROWN CASTLE BEFORE WELDING BEGINS. NO CHANGE IN APPROVED SEQUENCES MAY BE MADE WITHOUT PERMISSION FROM CROWN CASTLE.

9.10.5. INSPECT WELDED CONNECTIONS AS FOLLOWS AND IN ACCORDANCE WITH AWS D1.1:

9.10.5.1. INSPECT WELDING EQUIPMENT FOR CAPACITY, MAINTENANCE, AND WORKING CONDITIONS.

9.10.5.2. VERIFY SPECIFIED ELECTRODES AND HANDLING AND STORAGE OF ELECTRODES FOR CONFORMANCE TO SPECIFICATIONS.

9.10.5.3. INSPECT PREHEATING AND INTERPASS TEMPERATURES FOR CONFORMANCE WITH AWS D1.1.

9.10.5.4. VISUALLY INSPECT ALL WELDS AND VERIFY THAT QUALITY OF WELDS MEETS THE REQUIREMENTS OF AWS D1.1. OTHER TESTS MAY ALSO BE PERFORMED ON THE WELDS BY THE TESTING AGENCY IN ORDER FOR THEM TO PERFORM THEIR DUTIES FOR THIS PROJECT.

9.10.5.5. SPOT TEST AT LEAST ONE FILLET WELD OF EACH MEMBER USING MAGNETIC PARTICLE.

9.10.5.6. INSPECT FOR SIZE, SPACING, TYPE AND LOCATION AS PER APPROVED DRAWINGS.

9.10.5.7. VERIFY THAT THE BASE METAL CONFORMS TO THE DRAWINGS.

9.10.5.8. REVIEW THE REPORTS BY TESTING LABS.

9.10.5.9. CHECK TO SEE THAT WELDS ARE CLEAN AND FREE FROM SLAG.

9.10.5.10. INSPECT RUST PROTECTION OF WELDS AS PER SPECIFICATIONS.

9.10.5.11. CHECK THAT DEFECTIVE WELDS ARE CLEARLY MARKED AND HAVE BEEN ADEQUATELY REPAIRED.

9.10.5.12. FULL PENETRATION WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 100% NDE INSPECTED BY UT IN ACCORDANCE WITH AWS D1.1.

9.10.5.13. PARTIAL PENETRATION AND FILLET WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 50% NDE INSPECTED BY MP IN ACCORDANCE WITH AWS D1.1.

9.11. REPORTS:

9.11.1. COMPILE AND PERIODICALLY SUBMIT DAILY INSPECTION REPORTS TO CROWN CASTLE.

9.11.2. 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 OR PROBLEMS SHALL BE BROUGHT IMMEDIATELY TO CROWN CASTLE'S ATTENTION. RESOLUTIONS ARE NOT TO BE MADE WITHOUT CROWN CASTLE'S REVIEW AND SPECIFIC WRITTEN CONSENT. CROWN CASTLE RESERVES THE RIGHT TO DETERMINE WHETHER OR NOT A RESOLUTION IS ACCEPTABLE.

9.11.3. 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 CROWN CASTLE. THIS WRITTEN ACTION WILL GIVE THE CONTRACTOR A LIST OF ITEMS TO BE CORRECTED, PRIOR TO CONTINUING CONSTRUCTION, AND/OR LOADING OF STRUCTURAL ITEMS.

9.11.4. 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.

MI CHECKLIST

CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
PRE-CONSTRUCTION	
X	MI CHECKLIST DRAWINGS
X	EOR REVIEW
X	FABRICATION INSPECTION
NA	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
NA	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
CONSTRUCTION	
X	CONSTRUCTION INSPECTIONS
NA	FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
NA	POST INSTALLED ANCHOR ROD VERIFICATION
NA	BASE PLATE GROUT VERIFICATION
NA	CONTRACTOR'S CERTIFIED WELD INSPECTION
NA	EARTHWORK: PROVIDE PHOTO DOCUMENTATION OF EXCAVATION QUALITY AND COMPACTION
X	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
NA	MICROPILE/ROCK ANCHOR INSTALLER'S DRILLING AND INSTALLATION LOGS AND QA/QC DOCUMENTS
ADDITIONAL TESTING AND INSPECTIONS:	
POST-CONSTRUCTION	
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
NA	POST INSTALLED ANCHOR ROD TARGET TENSION LOAD TESTING
NA	REFER TO MICROPILE/ROCK ANCHOR NOTES FOR SPECIAL INSPECTION AND TESTING REQUIREMENTS.
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

PJF PAUL J. FORD & COMPANY
250 E Broad St. Ste 600- Columbus, OH 43215
Phone 614.221.6679
www.pauljford.com

CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 148' MONOPOLE

BU #876323; HILLSIDE
WEST HAVEN, CONNECTICUT

PROJECT No:	37515-2871.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.J.W.
CHECKED BY:	
DATE:	10-26-2015

MI CHECKLIST

S-4

37515-2871.001.DWG

MODIFICATION OF AN EXISTING 148' MONOPOLE

BU #876323; HILLSIDE

85 PLAINFIELD AVE
WEST HAVEN, CONNECTICUT 06516
NEW HAVEN COUNTY
LAT: 41° 18' 4.59"; LONG: -72° 58' 35.2"
APP: 310059 REV. 11; WO: 1128591

PROJECT CONTACTS

STRUCTURE OWNER:
CROWN CASTLE
MOD PM: DAN VADNEY AT DAN.VADNEY@CROWNCASTLE.COM
PH: (518) 373-3510
MOD CM: JASON D'AMICO AT JASON.D'AMICO@CROWNCASTLE.COM
PH: (860) 209-0104

ENGINEER OF RECORD:
PJFMOD@PJFWEB.COM

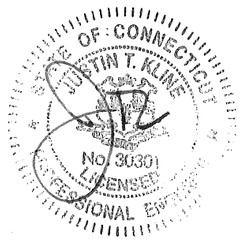
THIS PROJECT INCLUDES THE FOLLOWING ITEMS
SHAFT REINFORCING

SHEET INDEX	
SHEET NUMBER	DESCRIPTION
T-1	TITLE SHEET
S-1	GENERAL NOTES
S-2A	FORGBOLT™ DETAILS
S-2B	NEXGEN2™ BOLT DETAIL
S-3	MONOPOLE PROFILE
S-4	MI CHECKLIST

WIND DESIGN DATA	
REFERENCE STANDARD	TIA/EIA-222-F
LOCAL CODE	2005 CT STATE BUILDING CODE
BASIC WIND SPEED (FASTEST-MILE)	85 MPH
ICE THICKNESS	0.75 IN
ICE WIND SPEED	38 MPH
SERVICE WIND SPEED	50 MPH

THE ASSOCIATED FAILING SA WO NUMBER FOR THIS PROJECT IS 1117617

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



10.30.15

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TITLE SHEET

T-1

37515-2871.001.DWG

MONOPOLE RETROFIT PROJECT MASTER NOTES DOCUMENT (REV. 3, 02/05/2015)

1. GENERAL NOTES

1.1. THE MONOPOLE STRUCTURE IN ITS EXISTING CONDITION DOES NOT HAVE THE STRUCTURAL CAPACITY TO CARRY ALL OF THE PROPOSED AND EXISTING LOADS FROM THE ATTACHED STRUCTURAL MODIFICATION REPORT AT THE REQUIRED MINIMUM WIND SPEEDS. DO NOT INSTALL ANY NEW LOADS UNTIL THE MONOPOLE REINFORCING SYSTEM IS COMPLETELY AND SUCCESSFULLY INSTALLED.

1.2. THESE DRAWINGS WERE PREPARED FROM INFORMATION PROVIDED BY CROWN CASTLE. THE INFORMATION PROVIDED HAS NOT BEEN FIELD VERIFIED BY THE ENGINEER OF RECORD (EOR) FOR ACCURACY AND THEREFORE DISCREPANCIES BETWEEN THESE DRAWINGS AND ACTUAL SITE CONDITIONS SHOULD BE ANTICIPATED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS. THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT DRAWINGS AND THEIR FIELD VERIFIED CONDITIONS AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. THE CONTRACTOR SHALL IMMEDIATELY REPORT ANY AND ALL DISCREPANCIES TO THE EOR AND CROWN CASTLE BEFORE PROCEEDING WITH THE WORK.

1.3. 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.

1.4. THIS STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE INSTALLATION OF THE REINFORCING REPAIR SYSTEM HAS BEEN SUCCESSFULLY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO ENSURE 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.

1.5. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN AND SHALL MEET ANSI/TIA-1019 (LATEST EDITION), OSHA AND GENERAL INDUSTRY STANDARDS. ALL RIGGING PLANS SHALL ADHERE TO ANSI/TIA-1019 (LATEST EDITION) INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION.

1.6. OBSERVATION VISITS TO THE SITE BY CROWN CASTLE AND/OR THE EOR SHALL NOT INCLUDE INSPECTIONS OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES. ANY SUPPORT SERVICES PERFORMED BY THE EOR DURING CONSTRUCTION ARE SOLELY FOR THE PURPOSE OF ACHIEVING GENERAL CONFORMANCE WITH THE CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE THE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.

1.7. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL 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 CROWN CASTLE AND EOR PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF MATERIALS AND EQUIPMENT BEING SUBSTITUTED.

1.8. 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.

1.9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING AND NEW COAXIAL CABLES AND OTHER EQUIPMENT DURING CONSTRUCTION.

1.10. 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 RELOCATED, REPLACED, OR RE-INSTALLED AS REQUIRED AFTER THE REINFORCING IS SUCCESSFULLY COMPLETED. THE CONTRACTOR SHALL IDENTIFY AND COORDINATE THESE ITEMS PRIOR TO CONSTRUCTION WITH CROWN CASTLE, TESTING AGENCY, AND EOR.

1.11. 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.

1.12. THE CLIMBING FACILITIES, SAFETY CLIMB AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED OR ALTERED WITHOUT THE EXPRESS APPROVAL OF THE EOR.

1.13. FOR STANDARD CROWN PARTS SEE THE MOST RECENT VERSION OF THE "CCI APPROVED REINFORCEMENT COMPONENTS" CATALOG.

1.14. ALL SOLUTIONS FOR THE REPLACEMENT, RELOCATION OR MODIFICATION OF THE SAFETY CLIMB AND/OR ANY OF THE MONOPOLE CLIMBING FACILITIES SHALL BE COORDINATED WITH TUF-TUG PRODUCTS. CONTACT DETAILS:
3434 ENCRETE LANE, MORAINE, OHIO 45439
PHONE: 937-299-1213 EMAIL: TUFTUG@AOL.COM

2. STRUCTURAL STEEL

2.1. STRUCTURAL STEEL MATERIALS, FABRICATION, DETAILING, AND WORKMANSHIP SHALL CONFORM TO THE LATEST EDITION OF THE FOLLOWING REFERENCE STANDARDS:
2.1.1. BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC):
2.1.1.1. "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS."
2.1.1.2. "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM HIGH STRENGTH BOLTS," AS APPROVED BY THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS.
2.1.1.3. "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"
2.1.2. BY THE AMERICAN WELDING SOCIETY (AWS):
2.1.2.1. "STRUCTURAL WELDING CODE – STEEL D1.1."
2.1.2.2. "STANDARD SYMBOLS FOR WELDING, BRAZING, AND NONDESTRUCTIVE EXAMINATION"

2.2. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM HIGH STRENGTH BOLTS', DEC. 31, 2009.

2.3. 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.

2.4. 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.

2.5. ALL WELDED CONNECTIONS SHALL BE MADE BY WELDERS CERTIFIED BY AWS. CONTRACTOR SHALL SUBMIT WELDERS' CERTIFICATION AND QUALIFICATION DOCUMENTATION TO CROWN CASTLE'S TESTING AGENCY FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.

2.6. STRUCTURAL STEEL PLATES SHALL CONFORM TO ASTM A572 GRADE 65(FY = 65 KSI MIN.) UNLESS NOTED OTHERWISE ON THE DRAWINGS.

2.7. 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.

2.8. NO WELDING SHALL BE DONE TO THE EXISTING STRUCTURE WITHOUT THE PRIOR APPROVAL AND SUPERVISION OF THE TESTING AGENCY.

2.9. FIELD CUTTING OF STEEL:
2.9.1. IMPORTANT CUTTING AND WELDING SAFTEY GUIDELINES: THE CONTRACTOR SHALL FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE PREVENTION AND SAFTEY GUIDELINES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A COPY OF THE CURRENT CROWN CASTLE GUIDELINES. 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 SAFETY PLAN' (DOC # ENG-PLN-10015) ON AN ONGOING BASIS THROUGHOUT THE ENTIRE LIFE OF THE PROJECT". 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.
2.9.2. 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. CONTRACTOR TO AVOID 90 DEGREE CORNERS. IT MAY BE NECESSARY TO DRILL STARTER HOLES AS REQUIRED TO MAKE THE CUTS.

3. BASE PLATE GROUT - (NOT REQUIRED)

4. FOUNDATION WORK - (NOT REQUIRED)

5. CAST-IN-PLACE CONCRETE - (NOT REQUIRED)

6. EPOXY GROUTED REINFORCING ANCHOR RODS - (NOT REQUIRED)

7. TOUCH UP OF GALVANIZING

7.1. THE CONTRACTOR SHALL TOUCH UP ANY AND 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 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.

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

7.3. CROWN CASTLE'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 ADEQUATELY COATED, SHALL BE RE-COATED BY THE CONTRACTOR AND RE-TESTED BY THE TESTING AGENCY.

8. HOT-DIP GALVANIZING

8.1. HOT-DIP GALVANIZE ALL STRUCTURAL STEEL MEMBERS AND ALL STEEL ACCESSORIES, BOLTS, WASHERS, ETC. PER ASTM A123 OR PER ASTM A153, AS APPROPRIATE.

8.2. PROPERLY PREPARE STEEL ITEMS FOR GALVANIZING. DRILL OR PUNCH WEEP AND/OR DRAINAGE HOLES WITH EOR APPROVAL OF LOCATIONS.

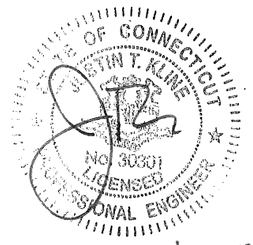
8.3. ALL GALVANIZING SHALL BE DONE AFTER FABRICATION IS COMPLETED AND PRIOR TO FIELD INSTALLATION.

9. PERPETUAL INSPECTION AND MAINTENANCE BY THE OWNER

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

9.2. ANY 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 EXISTING GALVANIZED STEEL POLE STRUCTURE AND THE WELDED 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 CROWN CASTLE REGULARLY INSPECTS, MAINTAINS, AND REPAIRS AS NECESSARY, ALL OF THESE WELDS, CONNECTIONS, AND COMPONENTS FOR THE LIFE OF THE STRUCTURE.

9.3. CROWN CASTLE 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 CROWN CASTLE BASED UPON ACTUAL SITE AND ENVIRONMENTAL CONDITIONS. THE EOR 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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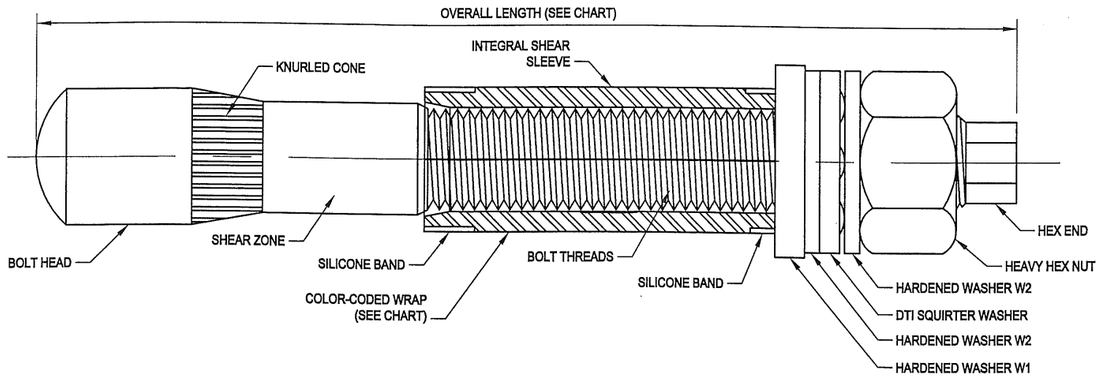
MODIFICATION OF AN EXISTING MONOPOLE 148'
BU #876323; HILLSIDE
WEST HAVEN, CONNECTICUT

PROJECT No:	37515-2871.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.J.W.
CHECKED BY:	BKK
DATE:	10-26-2015

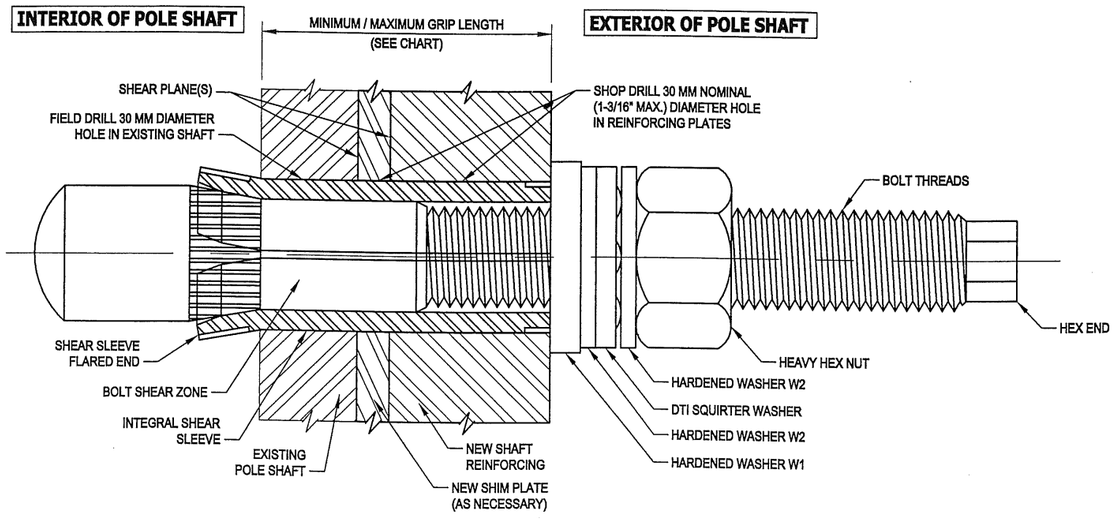
GENERAL NOTES

S-1

37515-2871.001.DWG



PRE-INSTALLED FORGBolt™ ASSEMBLY DETAIL 1 / S-2A



INSTALLED FORGBolt™ ASSEMBLY DETAIL 2 / S-2A

FORGBolt™		AISC Group A Material: ASTM A325 and PC8.8 (Tensile Stress, Fu = 120 ksi minimum)				
GROUP A		FORGBolt™ Size (mm)	Overall Length (inches)	Estimated Weight Each (lbs)	Grip Range (inch)	Comment	Color Code
FORGBolt™ A325 - PC8.8	1	135	5.31	1.3	3/8" to 1"	--	RED
	2	160	6.30	1.6	3/4" to 1-1/2"	--	GREEN
	3	195	7.68	1.9	1-1/4" to 2-1/4"	--	BLUE
	4	260	10.24	2.6	2" to 3-1/2"	Splice Bolt	YELLOW
	5	365	14.37	3.6	3-1/2" to 5-1/2"	Flange Jump Bolt	ORANGE
	6	440	17.32	4.3	5-1/2" to 8-1/2"	Flange Jump Bolt	BLACK
DTI Note		Each Group A (A325/PC8.8) FORGBolt™ assembly shall have a 'Squirter' DTI that is compatible with a M20-PC8.8 bolt.					

FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

INSTALLATION NOTES:
1. FIELD DRILL HOLES TO 30 MM DIAMETER.
2. SELECT CORRECT BOLT SIZE FOR INSTALLATION GRIP (REFER TO PLANS).
3. INSERT BOLT ASSEMBLY THROUGH HOLES IN SHAFT REINFORCING PLATES AND SEAT THE HARDENED WASHER W1 FLUSH AGAINST OUTSIDE OF PLATE.
4. HAND TIGHTEN NUT TO FINGER TIGHT.
5. TIGHTEN NUT TO PRETENSIONED CONDITION AND UNTIL DTI SHOWS PROPER INDICATION.
6. PROPERLY DOCUMENT AND INSPECT BOLT TIGHTENING PER PLAN REQUIREMENTS.

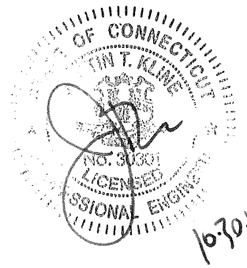
BOLT HOLE NOTES:
1. ALL SHOP-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM SHOP-DRILLED HOLE DIAMETER PERMITTED IS 1-3/16".
2. ALL FIELD-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM FIELD-DRILLED HOLE DIAMETER PERMITTED IS 30 MM.

BOLT TIGHTENING AND INSPECTION 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.

AISC GROUP A MATERIAL: ASTM A325 AND PC8.8
(Fu = 120 KSI MIN. TENSILE STRESS)

CONTAINS PROPRIETARY INFORMATION PATENT PENDING

DISTRIBUTOR CONTACT:
PRECISION TOWER PRODUCTS
PHONE: 888-926-4857
EMAIL: info@precisiontowerproducts.com
WEB: www.precisiontowerproducts.com



10-30-15

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CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 148' MONOPOLE
BU #876323; HILLSIDE
WEST HAVEN, CONNECTICUT

PROJECT No:	37515-2871.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.J.W.
CHECKED BY:	BKK
DATE:	10-26-2015

FORGBolt™ DETAILS

S-2A

37515-2871.001.DWG

NEXGEN2™ BOLT NOTE SHEET: REV. 1.01, 04-15-2015

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FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

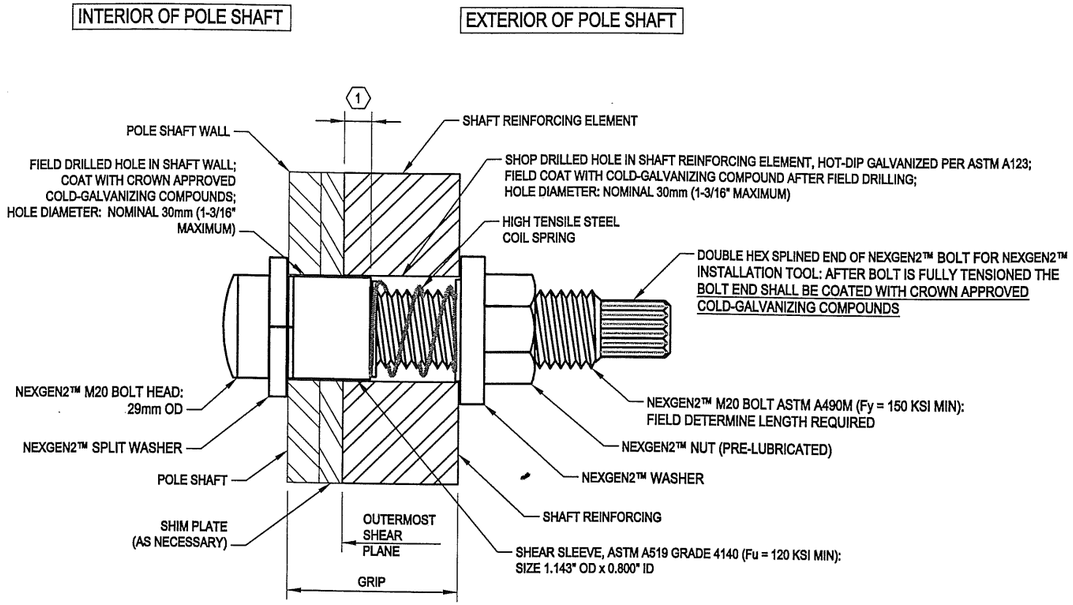
BOLT HOLE NOTES:

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

BOLT TIGHTENING AND INSPECTION NOTES:

1. ALL NEXGEN2™ BOLT ASSEMBLIES SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF SECTION 8.2.3 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. PER SECTION 8.2.3: ALL FASTENER ASSEMBLIES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS IN AISC SECTION 8.1 WITHOUT SEVERING THE SPLINED END AND WITH WASHERS POSITIONED AS REQUIRED IN AISC SECTION 6.2. PER REQUIREMENTS IN SECTION 8.1: PRIOR TO BOLT PRETENSIONING, THE JOINT SHALL FIRST BE COMPACTED TO THE SNUG-TIGHT CONDITION. SNUG TIGHT IS THE CONDITION THAT EXISTS WHEN ALL OF THE PLIES IN THE CONNECTION HAVE BEEN PULLED INTO FIRM CONTACT BY THE BOLTS AND THE BOLTS HAVE BEEN TIGHTENED SUFFICIENTLY TO PREVENT THE REMOVAL OF THE NUTS WITHOUT THE USE OF A WRENCH. ONCE THE SNUG TIGHT CONDITION IS ACHIEVED, THEN THE BOLT ASSEMBLY CAN BE TIGHTENED TO THE PRETENSIONED CONDITION.
2. ALL NEXGEN2™ BOLT ASSEMBLIES SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF SECTION 9.2.3 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. NOTE THAT COMPLETE INSPECTION OF ALL NEXGEN2™ BOLT ASSEMBLIES IS REQUIRED IN ADDITION TO ROUTINE OBSERVATION.
3. ALL NEXGEN2™ BOLTS SHALL BE INSPECTED BY A QUALIFIED BOLT INSPECTOR PER NOTES 1 AND 2, ABOVE. DURING INSTALLATION, THE BOLT INSPECTOR SHALL VERIFY AND DOCUMENT: THE SHOP-DRILLED AND FIELD-DRILLED HOLE SIZES; THE INSTALLATION OF THE NEXGEN2™ BOLT ASSEMBLY, INCLUDING THE SHEAR SLEEVE PLACEMENT AND NUT LUBRICATION; AND THE CONTRACTOR'S TENSIONING PROCEDURE. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THAT THE DOUBLE HEX SPLINED END OF THE BOLTS HAVE BEEN TWISTED OFF AND COATED WITH CROWN APPROVED COLD-GALVANIZING COMPOUND..

(1) NOTE: SHEAR SLEEVE LENGTH: THE SHEAR SLEEVE SHALL PROJECT A MINIMUM OF 3/8" BEYOND THE OUTERMOST SHEAR PLANE. THE CONTRACTOR SHALL SUBMIT FABRICATION DRAWINGS SHOWING NEXGEN2™ BOLT LENGTHS AND SHEAR SLEEVE LENGTHS TO THE EOR FOR REVIEW AND APPROVAL.



TYPICAL NEXGEN2™ BOLT DETAIL 1 S-2B

NOTE: NEXGEN2™ BOLT ASSEMBLY SHALL BE MAGNI 565 COATED PER ASTM F2833 AND MANUFACTURER SPECIFICATIONS.

NOTE: INSTALL NEXGEN2™ BOLT ASSEMBLY PER MANUFACTURER'S INSTRUCTIONS.

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

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
LICENSED
PROFESSIONAL ENGINEER
10-30-15

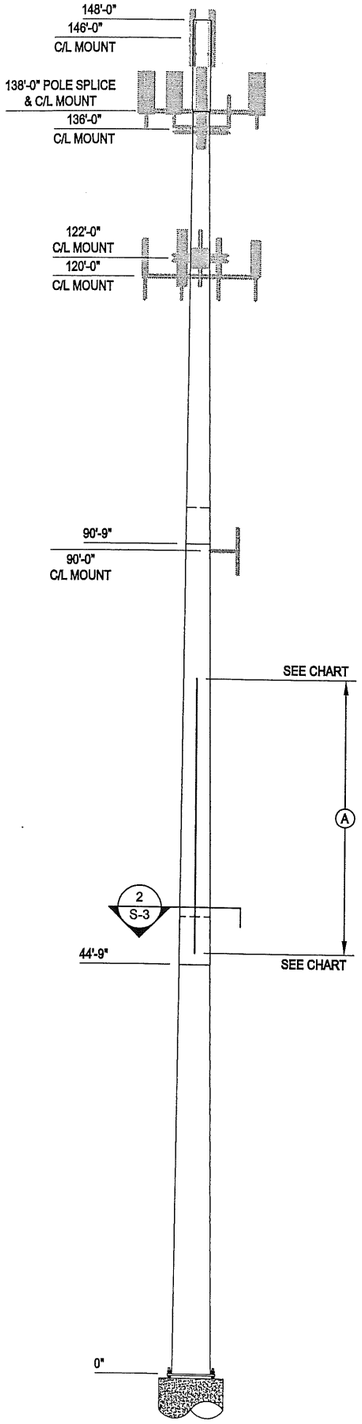
MODIFICATION OF AN EXISTING 148' MONOPOLE
BU #876323; HILLSIDE
WEST HAVEN, CONNECTICUT

PROJECT No:	37515-2871.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.J.W.
CHECKED BY:	BKK
DATE:	10-26-2015

NEXGEN2™ BOLT DETAIL

S-2B

7515-2871.001.DWG



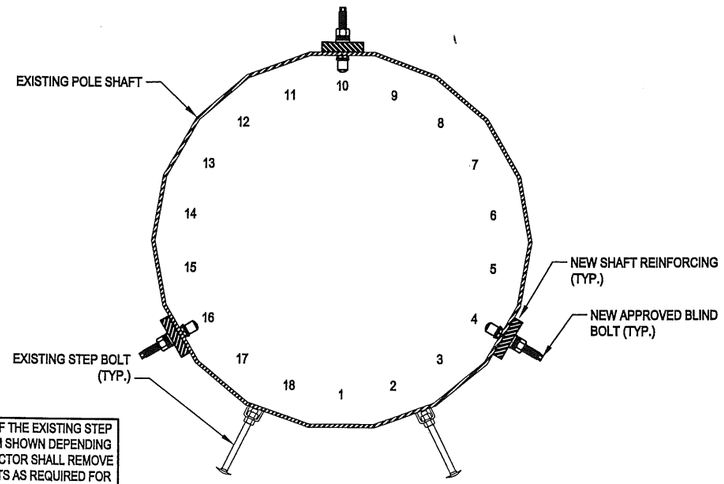
POLE ELEVATION 1 / S-3

NEW CCI FLAT PLATE (65 KSI) REINFORCING SCHEDULE

BOTTOM ELEVATION	TOP ELEVATION	FLAT # / DEGREE SEPARATION	ELEMENT	ELEMENT LENGTH	ELEMENT QUANTITY	APPROXIMATE BOLTS PER ELEMENT	APPROXIMATE TOTAL BOLT QUANTITY	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAXIMUM INTERMEDIATE BOLT SPACING	ESTIMATED TOTAL STEEL WEIGHT
46' - 0"	76' - 0"	F4, F10 & F16	CCI-SFP-04510030	30' - 0"	3	28	84	6	6	20"	1378 LBS.
							84				1378 LBS.

NOTES:

1.) 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.
2.) ALL REINFORCING SHALL BE ASTM A572 GR. 65.
3.) WELDS SHALL BE E80XX OR GREATER. TERMINATION WELDS SHALL BE 3/8" FILLET WELDS.
4.) HOLES FOR BOLTS ARE 30mm UNLESS NOTED OTHERWISE.
5.) ALL SHIMS SHALL BE ASTM A-36.



NOTE: FLAT LOCATION OF THE EXISTING STEP BOLTS MAY DIFFER FROM SHOWN DEPENDING ON ELEVATION. CONTRACTOR SHALL REMOVE AND REPLACE STEP BOLTS AS REQUIRED FOR REINFORCING INSTALLATION

SECTION 2 / S-3

SHAFT SECTION DATA

SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN) @ TOP	DIAMETER ACROSS FLATS (IN) @ BOTTOM	POLE GRADE (ksi)	POLE SHAPE
1	10.00	0.2500	48.00 63.00	24.000	24.000	50	ROUND
2	47.25	0.2500		22.000	31.924	60	18-SIDED
3	50.00	0.3125		30.584	41.086	60	18-SIDED
4	50.00	0.3750		39.358	49.860	60	18-SIDED

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

MODIFICATIONS:

(A) INSTALL NEW SHAFT REINFORCING. SEE CHART ON THIS SHEET.

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MODIFICATION OF AN EXISTING 148' MONOPOLE

BU #876323; HILLSIDE
WEST HAVEN, CONNECTICUT

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CHECKED BY:	BKK
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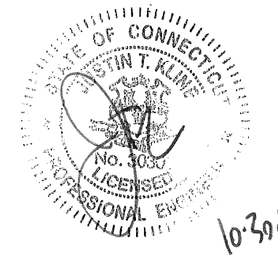
MONOPOLE PROFILE

S-3



10.30.15

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

7515-2871.001.DWG

MODIFICATION INSPECTION NOTES:

1. **GENERAL**
   - 1.1. 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 EOR.
   - 1.2. 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.
   - 1.3. ALL MI'S SHALL BE CONDUCTED BY A CROWN CASTLE ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN CASTLE.
   - 1.4. 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 CASTLE POINT OF CONTACT (POC).
   - 1.5. REFER TO ENG-SOW-10007: MODIFICATION INSPECTION SOW FOR FURTHER DETAILS AND REQUIREMENTS.

2. **MI INSPECTOR**
   - 2.1. THE MI INSPECTOR IS REQUIRED TO CONTACT THE GC AS SOON AS RECEIVING A PO FOR THE MI TO, AT A MINIMUM:
     - 2.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.
     - 2.1.2. WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
     - 2.1.3. THE MI INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL 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 CASTLE.

3. **GENERAL CONTRACTOR**
   - 3.1. 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:
     - 3.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.
     - 3.1.2. WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
     - 3.1.3. BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS.
     - 3.1.4. THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE MI CHECKLIST AND ENG-SOW-10007.

4. **RECOMMENDATIONS**
   - 4.1. THE FOLLOWING RECOMMENDATIONS AND SUGGESTIONS ARE OFFERED TO ENHANCE THE EFFICIENCY AND EFFECTIVENESS OF DELIVERING AN MI REPORT:
     - 4.1.1. 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.
     - 4.1.2. THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
     - 4.1.3. WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS.
     - 4.1.4. 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.
     - 4.1.5. 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.

5. **CANCELLATION OR DELAYS IN SCHEDULED MI**
   - 5.1. IF THE GC AND MI INSPECTOR AGREE TO A DATE ON WHICH THE MI WILL BE CONDUCTED, AND EITHER PARTY CANCELS OR DELAYS, CROWN CASTLE 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 CASTLE 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.

6. **CORRECTION OF FAILING MI'S**
   - 6.1. IF THE MODIFICATION INSTALLATION WOULD FAIL THE MI ("FAILED MI"), THE GC SHALL WORK WITH CROWN CASTLE TO COORDINATE A REMEDIATION PLAN IN ONE OF TWO WAYS:
     - 6.1.1. CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENT MI.
     - 6.1.2. OR, WITH CROWN CASTLE'S APPROVAL, THE GC MAY WORK WITH THE EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION.

7. **MI VERIFICATION INSPECTIONS**
   - 7.1. CROWN CASTLE 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.
   - 7.2. ALL VERIFICATION INSPECTIONS SHALL BE HELD TO THE SAME SPECIFICATIONS AND REQUIREMENTS IN THE CONTRACT DOCUMENTS AND IN ACCORDANCE WITH ENG-SOW-10007.
   - 7.3. 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.

8. **PHOTOGRAPHS**
   - 8.1. BETWEEN THE GC AND THE MI INSPECTOR THE FOLLOWING PHOTOGRAPHS, AT A MINIMUM, ARE TO BE TAKEN AND INCLUDED IN THE MI REPORT:
     - 8.1.1. PRECONSTRUCTION GENERAL SITE CONDITION
     - 8.1.2. PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION
     - 8.1.3. RAW MATERIALS
     - 8.1.4. PHOTOS OF ALL CRITICAL DETAILS
     - 8.1.5. FOUNDATION MODIFICATIONS
     - 8.1.6. WELD PREPARATION
     - 8.1.7. BOLT INSTALLATION AND TORQUE
     - 8.1.8. FINAL INSTALLED CONDITION
     - 8.1.9. SURFACE COATING REPAIR
     - 8.1.10. POST CONSTRUCTION PHOTOGRAPHS
     - 8.1.11. FINAL INFIELD CONDITION
     - 8.1.12. PHOTOS OF ELEVATED MODIFICATIONS TAKEN FROM THE GROUND SHALL BE CONSIDERED INADEQUATE.
     - 8.1.13. THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, PLEASE REFER TO ENG-SOW-10007.

9. **INSPECTION AND TESTING**
   - 9.1. ALL WORK SHALL BE SUBJECT TO REVIEW AND OBSERVATION BY CROWN CASTLE'S REPRESENTATIVE AND CROWN CASTLE'S AUTHORIZED INDEPENDENT INSPECTION AND TESTING AGENCY.
   - 9.2. INSPECTION SERVICES WHICH ARE FURNISHED BY OTHERS ARE STILL REQUIRED WHEN THE EOR PERFORMS SUPPORT SERVICES DURING CONSTRUCTION.
   - 9.3. OBSERVED DISCREPANCIES BETWEEN THE WORK AND THE CONTRACT DOCUMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST.
   - 9.4. AN INDEPENDENT QUALIFIED INSPECTION/TESTING AGENCY SHALL BE SELECTED, RETAINED AND PAID FOR BY CROWN CASTLE FOR THE SOLE PURPOSE OF INSPECTING, TESTING, DOCUMENTING, AND APPROVING ALL WELDING AND FIELD WORK PERFORMED BY THE CONTRACTOR.
     - 9.4.1. ACCESS TO ANY PLACE WHERE WORK IS BEING DONE SHALL BE PERMITTED AT ALL TIMES.
     - 9.4.2. 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.
   - 9.5. THE INSPECTION AND TESTING AGENCY SHALL BE RESPONSIBLE TO PERFORM THE FOLLOWING SERVICES AND 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.
   - 9.6. GENERAL
     - 9.6.1. PERFORM PERIODIC ON-SITE OBSERVATION, INSPECTION, VERIFICATION, AND TESTING DURING THE TIME THE CONTRACTOR IS WORKING ON-SITE. AGENCY SHALL NOTIFY CROWN CASTLE AND THE EOR IMMEDIATELY WHEN FIELD PROBLEMS OR DISCREPANCIES OCCUR.
   - 9.7. FOUNDATIONS AND SOIL PREPARATION - (NOT REQUIRED)
   - 9.8. CONCRETE TESTING PER ACI - (NOT REQUIRED)
   - 9.9. STRUCTURAL STEEL
     - 9.9.1. CHECK STEEL ON THE JOB WITH THE PLANS.
     - 9.9.2. CHECK MILL CERTIFICATIONS. CALL FOR LABORATORY TEST REPORTS WHEN MILL CERTIFICATION IS IN QUESTION.
     - 9.9.3. CHECK GRADE OF STEEL MEMBERS, AND BOLTS FOR CONFORMANCE WITH DRAWINGS.
     - 9.9.4. INSPECT 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.
     - 9.9.5. INSPECT STEEL MEMBERS FOR DISTORTION, EXCESSIVE RUST, FLAWS AND BURNED HOLES.
     - 9.9.6. CHECK STEEL MEMBERS FOR SIZES, SWEEP AND DIMENSIONAL TOLERANCES.
     - 9.9.7. CHECK FOR SURFACE FINISH SPECIFIED, GALVANIZED.
     - 9.9.8. CHECK THAT BOLTS HAVE BEEN TIGHTENED PROPERLY.
     - 9.9.9. PRIOR TO ANY FIELD CUTTING THE CONTRACTOR SHALL MARK THE CUTOUT LINES ON THE STEEL AND THE INSPECTION/TESTING AGENCY SHALL VERIFY PROPOSED LAYOUT, LOCATION, AND DIMENSIONS. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.
   - 9.10. WELDING:
     - 9.10.1. VERIFY FIELD WELDING PROCEDURES, WELDERS, AND WELDING OPERATORS, NOT DEEMED PREQUALIFIED, IN ACCORDANCE WITH AWS D1.1.
     - 9.10.2. INSPECT FIELD WELDED CONNECTIONS IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED AND WITH AWS D1.1.
     - 9.10.3. APPROVE FIELD WELDING SEQUENCE.
     - 9.10.4. A PROGRAM OF THE APPROVED SEQUENCES SHALL BE SUBMITTED TO CROWN CASTLE BEFORE WELDING BEGINS. NO CHANGE IN APPROVED SEQUENCES MAY BE MADE WITHOUT PERMISSION FROM CROWN CASTLE.
     - 9.10.5. INSPECT WELDED CONNECTIONS AS FOLLOWS AND IN ACCORDANCE WITH AWS D1.1:
       - 9.10.5.1. INSPECT WELDING EQUIPMENT FOR CAPACITY, MAINTENANCE, AND WORKING CONDITIONS.
       - 9.10.5.2. VERIFY SPECIFIED ELECTRODES AND HANDLING AND STORAGE OF ELECTRODES FOR CONFORMANCE TO SPECIFICATIONS.
       - 9.10.5.3. INSPECT PREHEATING AND INTERPASS TEMPERATURES FOR CONFORMANCE WITH AWS D1.1.
       - 9.10.5.4. VISUALLY INSPECT ALL WELDS AND VERIFY THAT QUALITY OF WELDS MEETS THE REQUIREMENTS OF AWS D1.1. OTHER TESTS MAY ALSO BE PERFORMED ON THE WELDS BY THE TESTING AGENCY IN ORDER FOR THEM TO PERFORM THEIR DUTIES FOR THIS PROJECT.
       - 9.10.5.5. SPOT TEST AT LEAST ONE FILLET WELD OF EACH MEMBER USING MAGNETIC PARTICLE.
       - 9.10.5.6. INSPECT FOR SIZE, SPACING, TYPE AND LOCATION AS PER APPROVED DRAWINGS.
       - 9.10.5.7. VERIFY THAT THE BASE METAL CONFORMS TO THE DRAWINGS.
       - 9.10.5.8. REVIEW THE REPORTS BY TESTING LABS.
       - 9.10.5.9. CHECK TO SEE THAT WELDS ARE CLEAN AND FREE FROM SLAG.
       - 9.10.5.10. INSPECT RUST PROTECTION OF WELDS AS PER SPECIFICATIONS.
       - 9.10.5.11. CHECK THAT DEFECTIVE WELDS ARE CLEARLY MARKED AND HAVE BEEN ADEQUATELY REPAIRED.
       - 9.10.5.12. FULL PENETRATION WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 100% NDE INSPECTED BY UT IN ACCORDANCE WITH AWS D1.1.
       - 9.10.5.13. PARTIAL PENETRATION AND FILLET WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 50% NDE INSPECTED BY MP IN ACCORDANCE WITH AWS D1.1.
   - 9.11. REPORTS:
     - 9.11.1. COMPILE AND PERIODICALLY SUBMIT DAILY INSPECTION REPORTS TO CROWN CASTLE.
     - 9.11.2. 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 OR PROBLEMS SHALL BE BROUGHT IMMEDIATELY TO CROWN CASTLE'S ATTENTION. RESOLUTIONS ARE NOT TO BE MADE WITHOUT CROWN CASTLE'S REVIEW AND SPECIFIC WRITTEN CONSENT. CROWN CASTLE RESERVES THE RIGHT TO DETERMINE WHETHER OR NOT A RESOLUTION IS ACCEPTABLE.
     - 9.11.3. 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 CROWN CASTLE. THIS WRITTEN ACTION WILL GIVE THE CONTRACTOR A LIST OF ITEMS TO BE CORRECTED, PRIOR TO CONTINUING CONSTRUCTION, AND/OR LOADING OF STRUCTURAL ITEMS.
     - 9.11.4. 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.

MI CHECKLIST

CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
	PRE-CONSTRUCTION
X	MI CHECKLIST DRAWINGS
X	EOR REVIEW
X	FABRICATION INSPECTION
NA	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
NA	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
	CONSTRUCTION
X	CONSTRUCTION INSPECTIONS
NA	FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
NA	POST INSTALLED ANCHOR ROD VERIFICATION
NA	BASE PLATE GROUT VERIFICATION
NA	CONTRACTOR'S CERTIFIED WELD INSPECTION
NA	EARTHWORK: PROVIDE PHOTO DOCUMENTATION OF EXCAVATION QUALITY AND COMPACTION
X	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
NA	MICROPILE/ROCK ANCHOR INSTALLER'S DRILLING AND INSTALLATION LOGS AND QA/QC DOCUMENTS
ADDITIONAL TESTING AND INSPECTIONS:	
	POST-CONSTRUCTION
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
NA	POST INSTALLED ANCHOR ROD TARGET TENSION LOAD TESTING
NA	REFER TO MICROPILE/ROCK ANCHOR NOTES FOR SPECIAL INSPECTION AND TESTING REQUIREMENTS.
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

10.30.15

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CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 148' MONOPOLE

BU #876323; HILLSIDE
WEST HAVEN, CONNECTICUT

PROJECT No:	37515-2871.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.J.W.
CHECKED BY:	BTK
DATE:	10-26-2015

MI CHECKLIST

S-4

37515-2871.001.DWG

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

T-Mobile Existing Facility

Site ID: CTNH506A

Crown West Haven Monopole
85 Plainfield Avenue
West Haven, CT 06516

March 22, 2016

EBI Project Number: 6215003140

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	5.90 %

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

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March 22, 2016

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

Emissions Analysis for Site: **CTNH506A – Crown West Haven Monopole**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **85 Plainfield Avenue, West Haven, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general 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 ($\mu W/cm^2$). The general population exposure limit for the 700 MHz Band is approximately 467 $\mu W/cm^2$, and the general population exposure limit for the PCS and AWS bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **85 Plainfield Avenue, West Haven, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

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

1) 2 GSM / UMTS channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel

2) 2 UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

4) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

5) Since the radios are ground mounted there are additional cabling losses accounted for. For each RF path the following losses were calculated. 2.06 dB of additional cable loss for all 1900 MHz and 2100 MHz channels and 1.12 dB of additional cable loss at 700 MHz. This is based on manufacturers Specifications for 200 feet of 1-5/8” coax cable on each path.

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

7) For the following calculations the sample point was the top of a 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.

8) The antennas used in this modeling are the **RFS APXV18-206516S-C-A20** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **RFS APXV18-206516S-C-A20** has a maximum gain of **16.3 dBd** at its main lobe. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antenna mounting height centerline of the proposed antennas is **149 feet** above ground level (AGL).

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

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	RFS APXV18-206516S-C-A20	Make / Model:	RFS APXV18-206516S-C-A20	Make / Model:	RFS APXV18-206516S-C-A20
Gain:	16.3 dBd	Gain:	16.3 dBd	Gain:	16.3 dBd
Height (AGL):	149	Height (AGL):	149	Height (AGL):	149
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	6	Channel Count	6	# PCS Channels:	6
Total TX Power:	240	Total TX Power:	240	# AWS Channels:	240
ERP (W):	6,371.05	ERP (W):	6,371.05	ERP (W):	6,371.05
Antenna A1 MPE%	1.12	Antenna B1 MPE%	1.12	Antenna C1 MPE%	1.12
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	149	Height (AGL):	149	Height (AGL):	149
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power:	30	Total TX Power:	30	Total TX Power:	30
ERP (W):	668.22	ERP (W):	668.22	ERP (W):	668.22
Antenna A2 MPE%	0.25	Antenna B2 MPE%	0.25	Antenna C2 MPE%	0.25

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**1.37 %**
Verizon Wireless	2.85 %
Metro PCS	0.56 %
Clearwire	0.10 %
Sprint	1.02 %
Sprint MW	0.00 %
Site Total MPE %:	**5.90 %**

T-Mobile Sector 1 Total:	1.37 %
T-Mobile Sector 2 Total:	1.37 %
T-Mobile Sector 3 Total:	1.37 %
Site Total:	5.90 %

T-Mobile _per sector	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile 2100 MHz (AWS) LTE	**2**	**1592.76**	**149**	**5.60**	**2100**	**1000**	**0.56 %**
T-Mobile 700 MHz LTE	**1**	**668.22**	**149**	**1.17**	**700**	**467**	**0.25 %**
T-Mobile 1900 MHz (PCS) GSM/UMTS	**2**	**796.38**	**149**	**2.80**	**1900**	**1000**	**0.28 %**
T-Mobile 2100 MHz (AWS) UMTS	**2**	**796.38**	**149**	**2.80**	**2100**	**1000**	**0.28 %**
						Total:	**1.37%**

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Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector 1:	1.37 %
Sector 2:	1.37 %
Sector 3 :	1.37 %
T-Mobile Per Sector Maximum:	1.37 %
Site Total:	5.90 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **5.90%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

Scott Heffernan
RF Engineering Director

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