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

December 23, 2015

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: 806352**
T-Mobile Site ID: CT11851C
126 Ledge Road, Darien, CT 06820
Latitude: 41° 4' 20.75" / Longitude: -73° 28' 41.4"

Dear Ms. Bachman:

T-Mobile currently maintains three (3) antennas at the 110 foot level of the existing 117 foot monopole at 126 Ledge Road in Darien, CT. The tower is owned by Crown Castle and the property is owned by the Town of Darien. T-Mobile now intends to remove three (3) TMA's, proposed installation of three (3) antennas and three (3) RRU's new 700MHz antennas. These antennas would be installed at the 110 foot level of the tower.

Please be advised I did reach out to the Town of Darien and received the enclosed email from Mr. Ginsberg, Zoning Officer, that they do not have the original zoning resolution on file. I have enclosed an email from myself as a Tower Owner on behalf of Crown Castle. In response to my December 15, 2015 email I have enclosed an email from Cymon Holzschuh outlining the below:

The Council approved the construction, maintenance and operation at a facility off Ledge Road in Docket 155. This appears to be the facility in question. Proposed modifications to this facility were approved in Petitions 791 and 803.

The Decision and Order for Docket 155 includes the condition the total height of the monopole, with antennas and appurtenances would not exceed 113 feet. However, this condition is rendered moot by the Approval for Petition 803 which, per the Staff Report, allows Sprint to install antennas at the 120-foot level. (The Approval Letter includes the condition that the applicant would flush-mount its antennas on the pipe extension, but this condition only applies to Sprint, not T-Mobile.)

The Approval Letter for Petition 791, T-Mobile's petition to extend the then-100-foot monopole by ten feet to 110 feet above ground level, doesn't appear to be available on the Council website. I've

attached a copy in case T-Mobile or Crown Castle would like it for their records. Petition 791 was approved without conditions restricting exempt modifications.

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 Jayme J. Stevenson, First Selectman, Town of Darien and the Town of Darien, as well 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
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 Jayme J. Stevenson, First Selectman, Town of Darien
Town of Darien
Office of the First Selectman
Town Hall
2 Renshaw Road, Room 202
Darrien, CT 06820

Town of Darien
Office of the First Selectman
Town Hall
2 Renshaw Road, Room 202
Darrien, CT 06820

From:	Holzschuh, Cymon
To:	Myl, Kimberly
Cc:	Helton, Heather (Contractor); Cunliffe, Fred; Bachman, Melanie
Subject:	RE: Existing Telecommunication Tower located at 126 Ledge Road (Crown Castle 806352 / TMO CT11851C)
Date:	Tuesday, December 15, 2015 11:02:40 AM
Attachments:	image003.png _1127105731_001.pdf

Hello,

Be advised that, per the Council website, the Council approved the construction, maintenance and operation at a facility off Ledge Road in Docket 155. This appears to be the facility in question. Proposed modifications to this facility were approved in Petitions 791 and 803.

The Decision and Order for Docket 155 includes the condition the total height of the monopole, with antennas and appurtenances, would not exceed 113 feet. However, this condition is rendered moot by the Approval for Petition 803 which, per the Staff Report, allows Sprint to install antennas at the 120-foot level. (The Approval Letter includes the condition that the applicant would flush-mount its antennas on the pipe extension, but this condition only applies to Sprint, not T-Mobile.)

The Approval Letter for Petition 791, T-Mobile's petition to extend the then-100-foot monopole by ten feet to 110 feet above ground level, doesn't appear to be available on the Council website. I've attached a copy in case T-Mobile or Crown Castle would like it for their records. Petition 791 was approved without conditions restricting exempt modifications.

No change to your current filing is required at this time – this information is simply being provided for future filings regarding this facility.

Note that municipalities may be unlikely to carry records of approval for facilities that were certificated by the Council.

Thanks,

Cymon Holzschuh
Siting Analyst
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051
P: 860.827.2941 | F: 860.827.2950

Conserving, improving and protecting our natural resources and environment;
Ensuring a clean, affordable, reliable, and sustainable energy supply.

From: Myl, Kimberly [mailto:Kimberly.Myl@crowncastle.com]
Sent: Tuesday, December 15, 2015 9:36 AM
To: CSC-DL Siting Council
Cc: Helton, Heather (Contractor)
Subject: Existing Telecommunication Tower located at 126 Ledge Road (Crown Castle 806352 / TMO CT11851C)

Good Morning – please see the below email from the town stating they do not have a copy of the resolution on file. Furthermore, Crown Castle, as tower owner does not have the original approval on file either. Kindly use both emails to waive this requirement when we submit the Exempt Modification package for the above mentioned telecommunications facility.

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

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

From: Ginsberg, Jeremy [mailto:JGinsberg@darienct.gov]
Sent: Tuesday, December 15, 2015 8:33 AM
To: Myl, Kimberly
Subject: RE: Existing Telecommunication Tower located at 126 Ledge Road (Crown Castle 806352 / TMO CT11851C)

The Town of Darien does not have the original approval on record.

From: Myl, Kimberly [mailto:Kimberly.Myl@crowncastle.com]
Sent: Monday, December 14, 2015 2:26 PM
To: Ginsberg, Jeremy
Subject: Existing Telecommunication Tower located at 126 Ledge Road (Crown Castle 806352 / TMO CT11851C)

Mr. Ginsberg,
Per my discussion with Michelle, in order for Crown Castle / T-Mobile to submit into CT Siting Council, they require us to provide a copy of the original zoning resolution for the above mentioned telecommunication tower. Can you kindly forward this over to me so I can submit on behalf of, T-Mobile, one of our tenants. If you do not have this document, kindly reply stating that the township does not have this on record and I can use your email in place of this requirement. Please call or email me if you have any questions or need additional information. Thank you in advance.

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

CROWN CASTLE
1200 MacArthur Blvd, Suite 200
Mahwah, NJ 07430
This email may contain confidential or privileged material. Use or disclosure of it by anyone

other than the recipient is unauthorized. If you are not an intended recipient, please delete this email.

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
Internet: ct.gov/csc

Daniel F. Caruso
Chairman

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

November 15, 2006

Karina Fournier
Zoning Department
T-Mobile
30 Cold Spring Road
Rocky Hill, CT 06067

RE: **PETITION NO. 791** - Omnipoint Communications, Inc. (T-Mobile) petition for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the proposed modification of an existing telecommunications facility located at 130 Ledge Road, Darien, Connecticut.

Dear Ms. Fournier:

At a public meeting held on October 31, 2006, the Connecticut Siting Council (Council) considered and ruled that this proposal would not have a substantial adverse environmental effect, and pursuant to General Statutes § 16-50k would not require a Certificate of Environmental Compatibility and Public Need with the condition that the height of the monopole not exceed 110 feet. The top of T-Mobile's antennas would reach 113 feet.

This decision is under the exclusive jurisdiction of the Council and is not applicable to any other modification or construction. All work is to be implemented as specified in the petition, dated September 22, 2006.

Enclosed for your information is a copy of the staff report on this project.

Very truly yours,

Daniel F. Caruso
Chairman

DFC/MP/laf

Enclosure: Staff Report dated October 31, 2006

c: The Honorable Evonne M. Klein, First Selectman, Town of Darien
John Crary, Town Administrator, Town of Darien
David J. Keating, Zoning Enforcement Officer, Town of Darien

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
Internet: ct.gov/csc

Daniel F. Caruso
Chairman

Petition No. 791
T-Mobile
130 Ledge Road, Darien
October 31, 2006
Staff Report

On September 22, 2006, the Connecticut Siting Council (Council) received a petition (Petition) from Omnipoint Communications, Inc. (T-Mobile) for declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the proposed modifications to an existing telecommunications facility located at 130 Ledge Road, Darien. Specifically, T-Mobile seeks to extend an existing 100-foot Crown Castle International-owned monopole by 10 feet and install three flush-mounted panel antennas centered at the 110' level of the tower. T-Mobile would also install three BTS cabinets and one battery backup cabinet on a 21'3" x 5' concrete pad within the existing fenced compound.

The proposed project site is located on the property of the Town of Darien's transfer station. There is a car dealership to the north of the site, Interstate 95 to the south, Darien Transfer Station and a small park to the west, and Ledge Road to the east. There are no wetlands at the site.

The site was field reviewed by Council Member Dr. Barbara Currier Bell and Mike Perrone of the Council staff on October 23, 2006. Karina Fournier and Brian Paul of T-Mobile also attended the field review. No residences were observed in the vicinity of the site.

The structural analysis report in the Petition takes into account a 17-foot extension of the tower (from 100' to 117'). It does so, even though the T-Mobile project (the current Petition) requires only 110', because the tower owner anticipates Sprint will be applying for an additional extension (from 110' to 117') in the future. Per the engineer's report, the tower will accommodate a 10-foot or 17-foot extension.

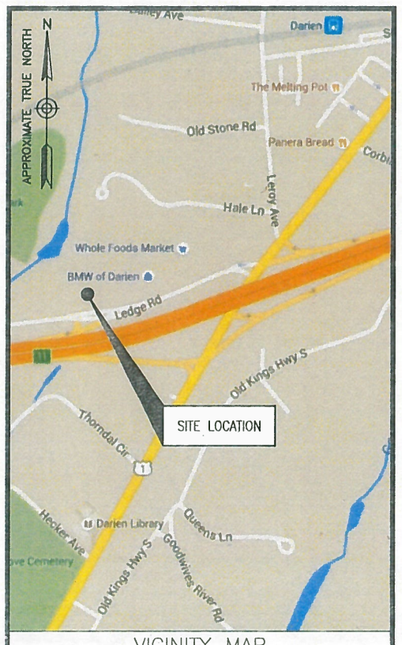
Flush-mounted antennas were selected by T-Mobile to conserve the structural capacity of the tower. This also results in less visual impact. With the proposed antennas centered at the 110' level of the tower, the total height with appurtenances would be 113'. The worst-case RF power density at the base of the tower would be approximately 42% of the applicable standard.

Given the location of the tower and the lack of residences in the vicinity, the visual impact of the tower extension is not expected to be significant.

Staff recommends that the monopole is extended by no more than ten feet.

T-MOBILE NORTHEAST LLC

T-MOBILE SITE #: CT11851C
CROWN CASTLE BU #: 806352
SITE NAME: BRG 302 943052
126 LEDGE ROAD
DARIEN, CT 06820
FAIRFIELD 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 52 FOR STATE ROUTE 108 S/STATE ROUTE 8 S TOWARD BRIDGEPORT. KEEP LEFT, FOLLOW SIGNS FOR CT-8 S/BRIDGEPORT AND MERGE ONTO CT-8 S. TAKE THE INTERSTATE 95 S EXIT TOWARD N.Y. CITY. MERGE ONTO I-95 S. TAKE EXIT 11 FOR US-1 TOWARD DARIEN/ROWAYTON. TAKE SLIGHT LEFT ONTO LEDGE RD (SIGNS FOR U.S. 1/NOROTON). SITE WILL BE ON THE RIGHT.

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

CONSULTANT TEAM

SITE NAME:
BRG 302 943052

SITE NUMBER:
CT11851C

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

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

COORDINATES:
LATITUDE: 41°-04'-20.75" N (NAD83)
LONGITUDE: 73°-28'-41.4" W (NAD83)
(PER CROWN CASTLE)

CONFIGURATION
702Cc

PROJECT SUMMARY

SITE ADDRESS:
126 LEDGE ROAD
DARIEN, CT 06820
FAIRFIELD COUNTY

PROJECT DIRECTORY

- REMOVE AND REPLACE EXISTING ANTENNA MOUNT WITH A NEW ANTENNA MOUNT.
- INSTALL (3) NEW ANTENNAS.
- INSTALL (3) NEW RRU'S.
- INSTALL (1) NEW HYBRID CABLE ALONG MONOPOLE EXTERIOR.
- REMOVE (3) EXISTING TMA'S.

SCOPE OF WORK

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.

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

SHEET INDEX

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

CROWN CASTLE

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

CT11851C
BRG 302 943052

CONSTRUCTION DRAWINGS

0	12/23/15	ISSUED AS FINAL
A	12/21/15	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
PROFESSIONAL ENGINEER
CONNECTICUT LICENSE NO. 23222
IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER TO ALTER THIS DOCUMENT.

DRAWN BY:	RA
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50078112
SITE ADDRESS:	

126 LEDGE ROAD
DARIEN, CT 06820
FAIRFIELD 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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CLIFTON PARK, NY 12065

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BRG 302 943052

CONSTRUCTION DRAWINGS		
0	12/23/15	ISSUED AS FINAL
A	12/21/15	ISSUED FOR REVIEW

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

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

DRAWN BY:	RA
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50078112
SITE ADDRESS:	

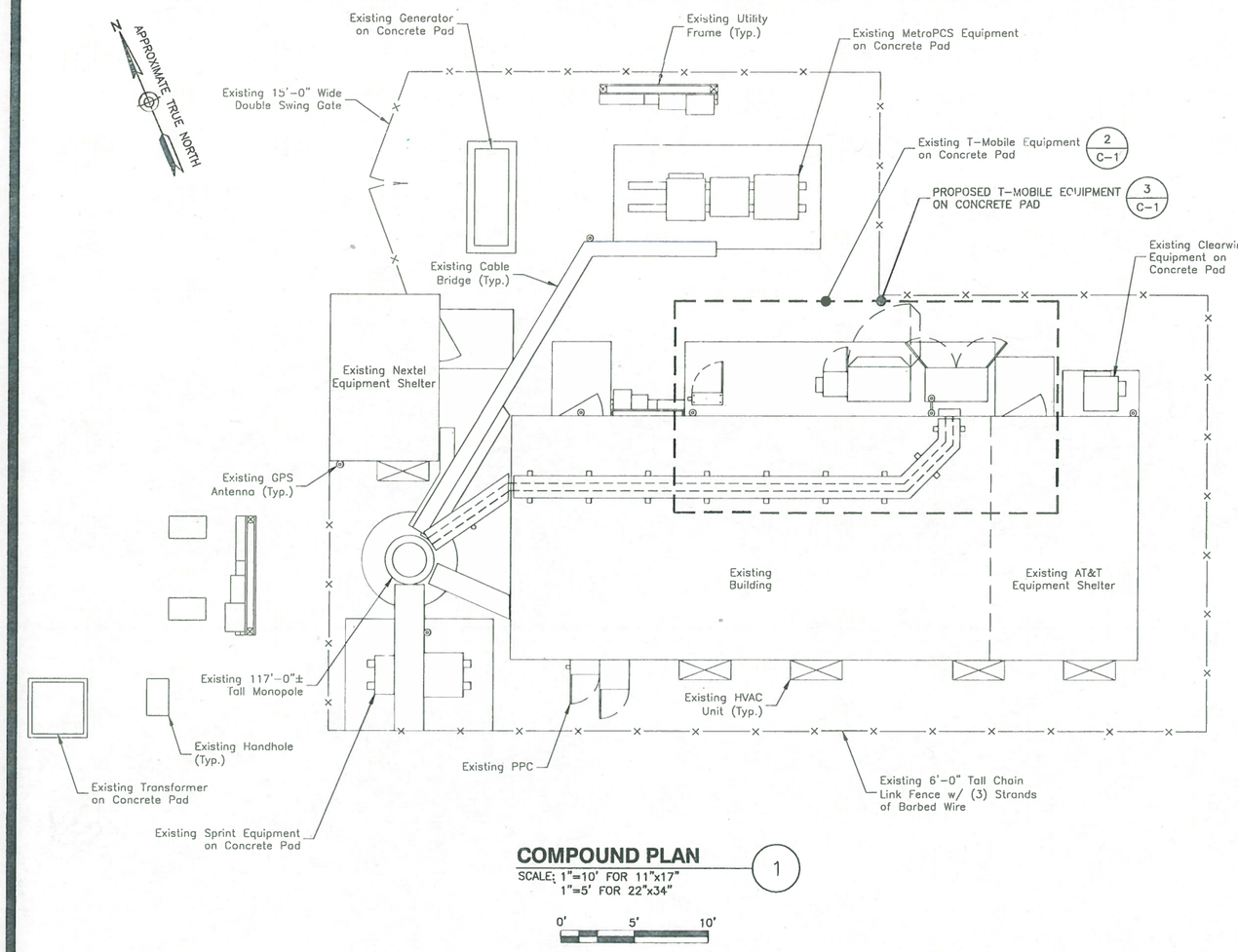
126 LEDGE ROAD
DARIEN, CT 06820
FAIRFIELD COUNTY

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

G–1

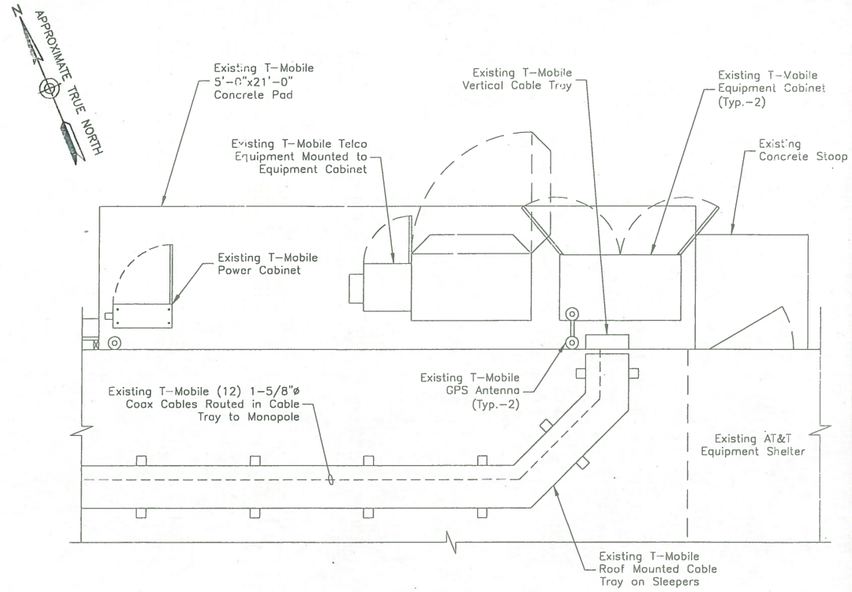


COMPOUND PLAN

SCALE: 1"=10' FOR 11"x17"
1"=5' FOR 22"x34"

1

0' 5' 10'

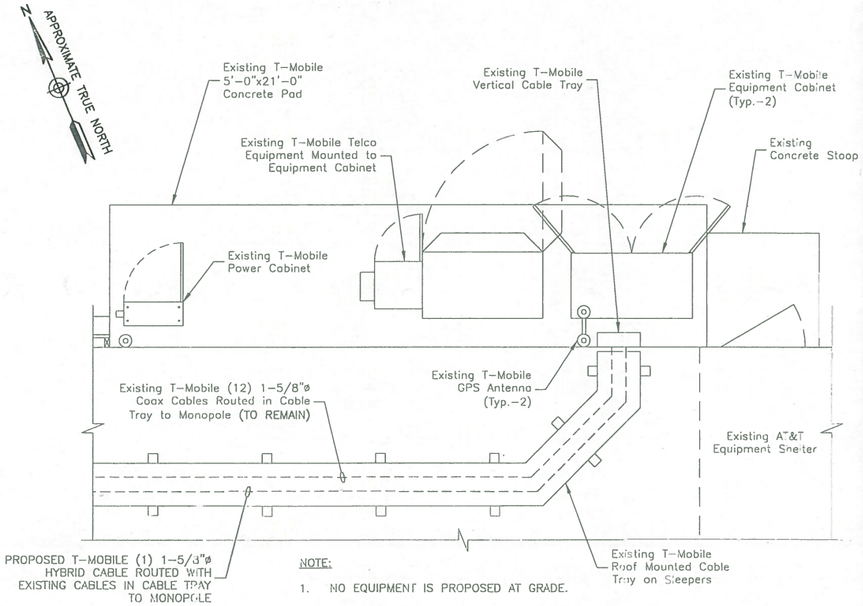


EXISTING EQUIPMENT PLAN

SCALE: 3/16"=1' FOR 11"x17"
3/8"=1' FOR 22"x34"

2

0' 2' 4' 6'



NOTE:

1. NO EQUIPMENT IS PROPOSED AT GRADE.

PROPOSED EQUIPMENT PLAN

SCALE: 3/16"=1' FOR 11"x17"
3/8"=1' FOR 22"x34"

3

0' 2' 4' 6'

NOTES:

1. NORTH ARROW SHOWN AS APPROXIMATE.
2. NOT ALL INFORMATION IS SHOWN FOR CLARITY.
3. ALL PROPOSED EQUIPMENT, INCLUDING ANTENNAS, BIAS TEES, COAX, ETC., SHALL BE MOUNTED IN ACCORDANCE WITH THE TOWER STRUCTURAL ANALYSIS & MODIFICATION DRAWINGS BY PAUL J. FORD AND COMPANY DATED NOVEMBER 10, 2015.

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BRG 302 943052

CONSTRUCTION DRAWINGS

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STATE OF CONNECTICUT
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126 LEDGE ROAD
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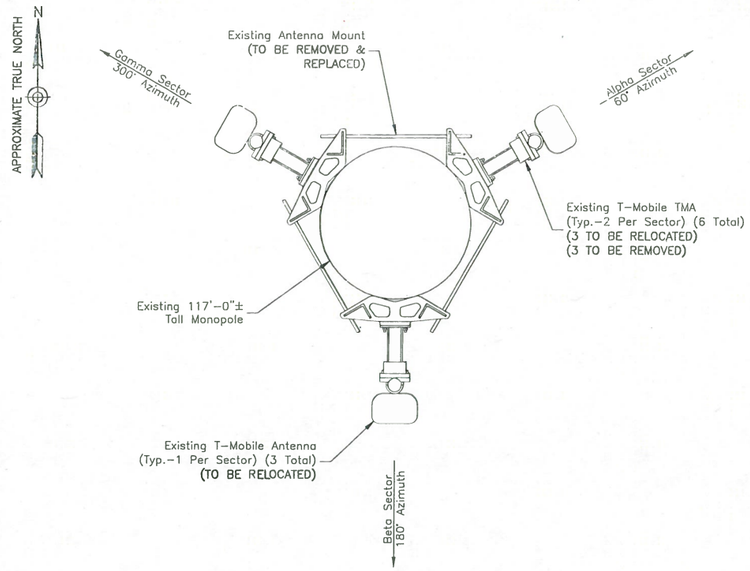
FAIRFIELD COUNTY

SHEET TITLE

COMPOUND PLAN & EQUIPMENT PLANS

SHEET NUMBER

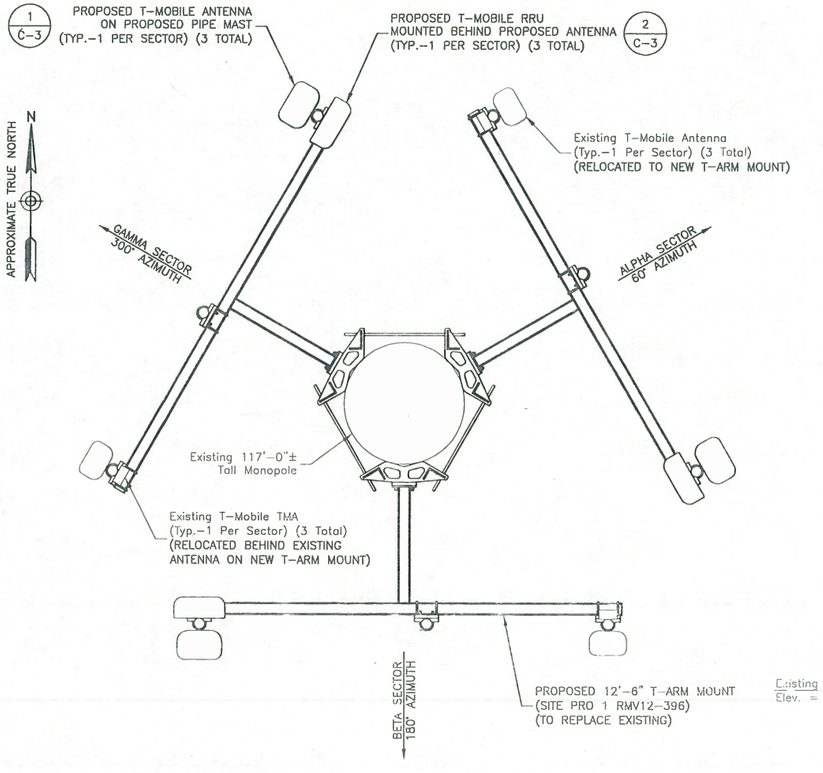
C-1



EXISTING ANTENNA LAYOUT

SCALE: N.T.S.

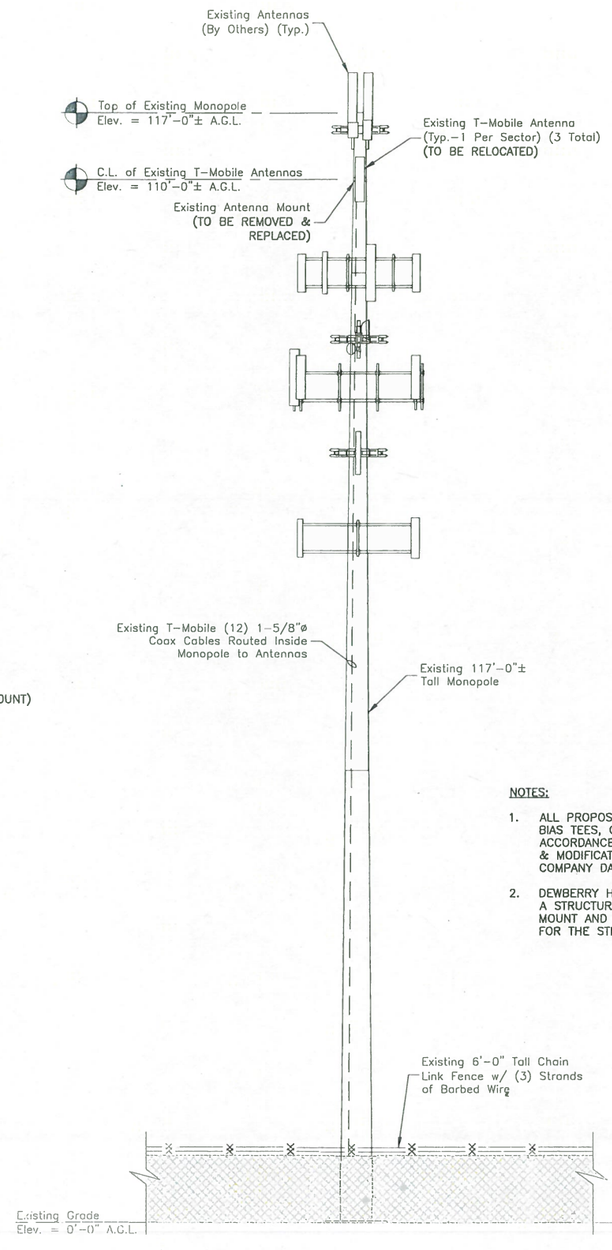
1



PROPOSED ANTENNA LAYOUT

SCALE: N.T.S.

2



EXISTING ELEVATION

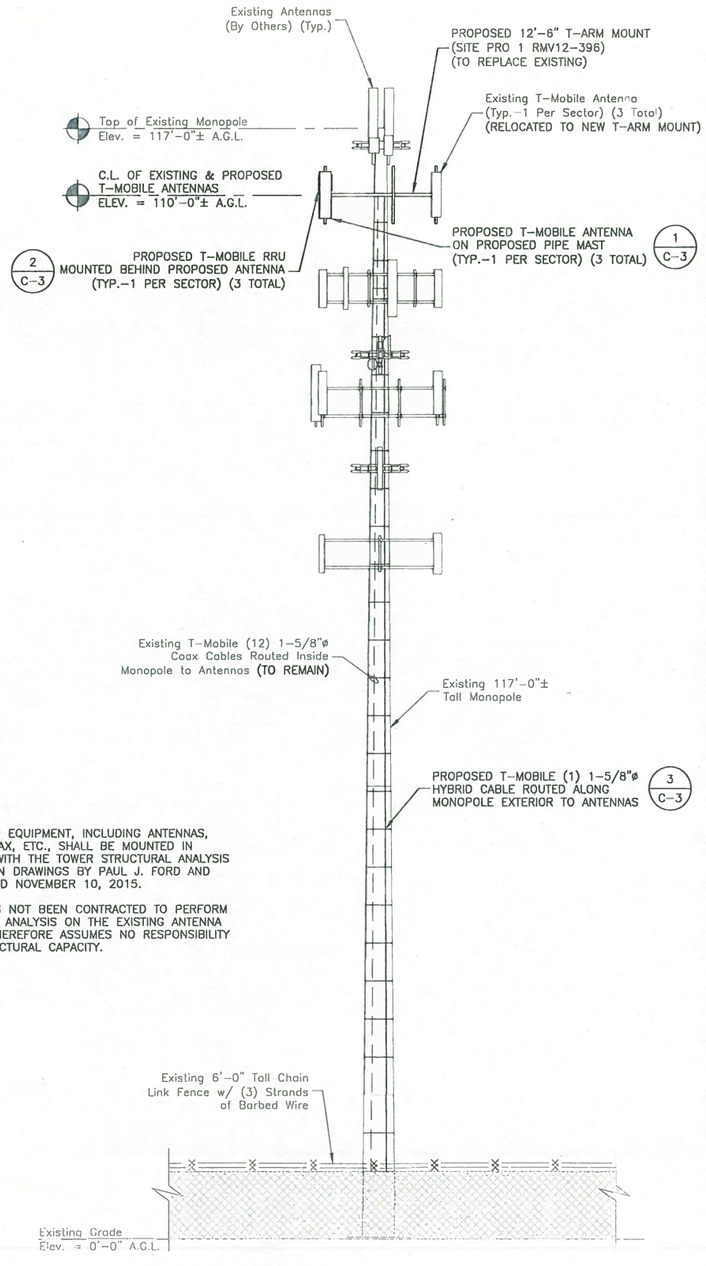
SCALE: 1/16"=1' FOR 11"x17"
1/8"=1' FOR 22"x34"

3

0' 4' 8' 16'

NOTES:

1. ALL PROPOSED EQUIPMENT, INCLUDING ANTENNAS, BIAS TEES, COAX, ETC., SHALL BE MOUNTED IN ACCORDANCE WITH THE TOWER STRUCTURAL ANALYSIS & MODIFICATION DRAWINGS BY PAUL J. FORD AND COMPANY DATED NOVEMBER 10, 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

SCALE: 1/16"=1' FOR 11"x17"
1/8"=1' FOR 22"x34"

4

0' 4' 8' 16'

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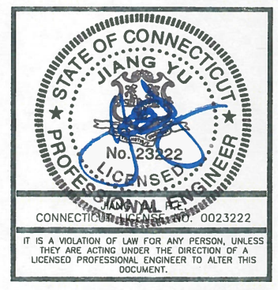

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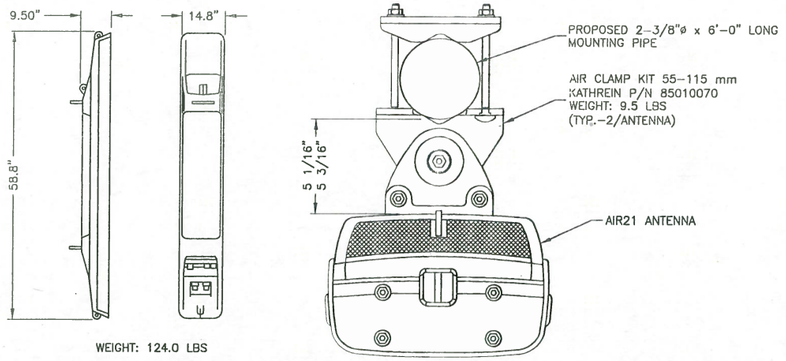
126 LEDGE ROAD
DARIEN, CT 06820
FAIRFIELD COUNTY

SHEET TITLE

ANTENNA LAYOUTS & ELEVATIONS

SHEET NUMBER

C-2

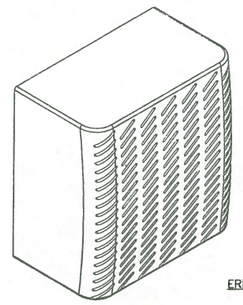


WEIGHT: 124.0 LBS

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.

AIR21 ANTENNA DETAIL (1)
SCALE: N.T.S.



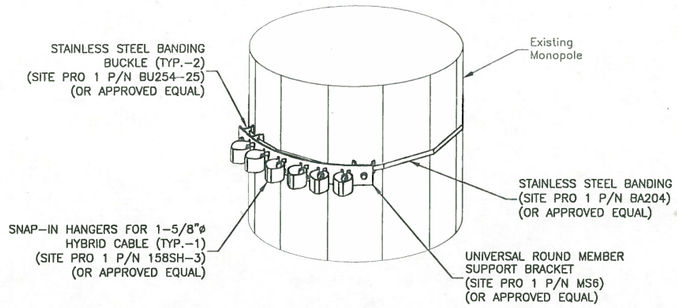
MANUF:	ERICSSON
MODEL:	RRUS-11 B12
HEIGHT:	20.0"
WIDTH:	17.0"
DEPTH:	7.0"
WEIGHT:	50.7 LBS

ERICSSON RRUS-11 B12

RRU NOTES:

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

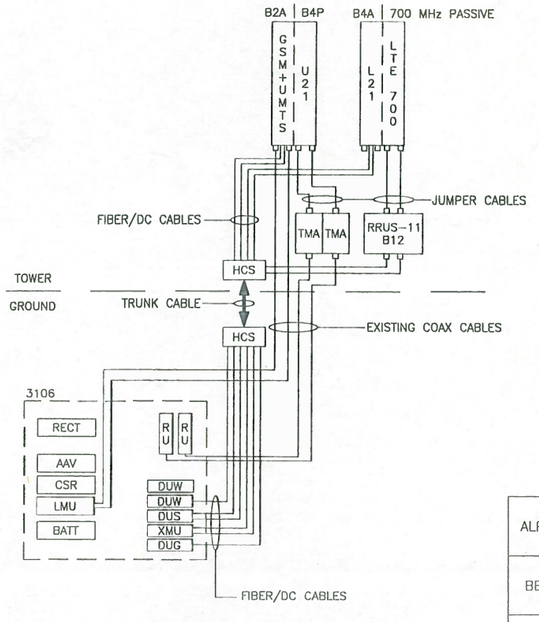
RRUS-11 - REMOTE RADIO UNIT (2)
SCALE: N.T.S.



NOTE:

1. SUPPORT BRACKETS SHALL BE SPACED AT 4'-0" C-C MAX.

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



SITE CONFIGURATION 702Cc (4)
SCALE: N.T.S.

DESIGN CONFIGURATION

	ANTENNAS		COAX		HYBRID	CABLE LENGTHS	RRU		TMA	
	EXISTING	PROPOSED	EXISTING	PROPOSED	PROPOSED		EXISTING	PROPOSED	EXISTING	PROPOSED
ALPHA	ERICSSON AIR21 B2A B4P	EXISTING ANTENNA TO REMAIN	(4) 1-5/8"ø	-	(1) 1-5/8"ø	182'-0"	-	-	(2) KRY 112 144/1	(1) TO BE REMOVED
	-	ERICSSON AIR21 B4A B12P-B8P 4FT					-	RRUS-11 B12	-	-
BETA	ERICSSON AIR21 B2A B4P	EXISTING ANTENNA TO REMAIN	(4) 1-5/8"ø	-		182'-0"	-	-	(2) KRY 112 144/1	(1) TO BE REMOVED
	-	ERICSSON AIR21 B4A B12P-B8P 4FT					-	RRUS-11 B12	-	-
GAMMA	ERICSSON AIR21 B2A B4P	EXISTING ANTENNA TO REMAIN	(4) 1-5/8"ø	-		182'-0"	-	-	(2) KRY 112 144/1	(1) TO BE REMOVED
	-	ERICSSON AIR21 B4A B12P-B8P 4FT					-	RRUS-11 B12	-	-

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CONSTRUCTION DRAWINGS

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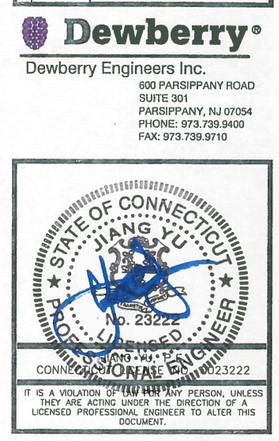

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126 LEDGE ROAD
DARIEN, CT 06820
FAIRFIELD COUNTY

SHEET TITLE

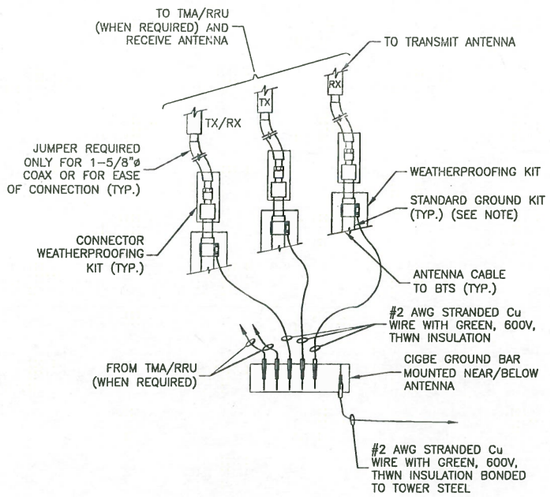
CONSTRUCTION DETAILS

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.

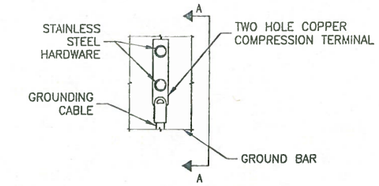


NOTE:

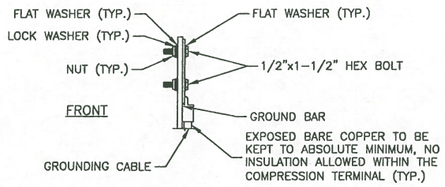
1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE.

CONNECTION OF GROUND WIRES TO GROUNDING BAR (CIGBE) 1

SCALE: N.T.S.



ELEVATION



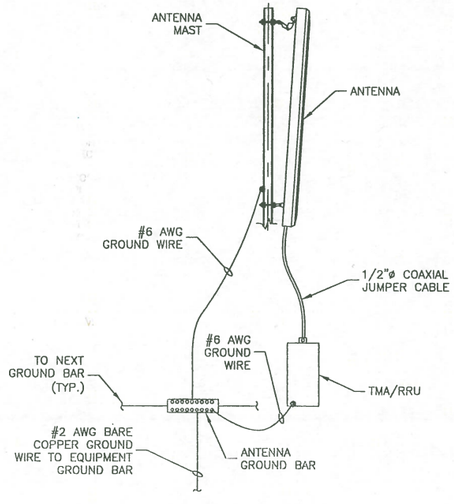
SECTION 'A-A'

NOTES:

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

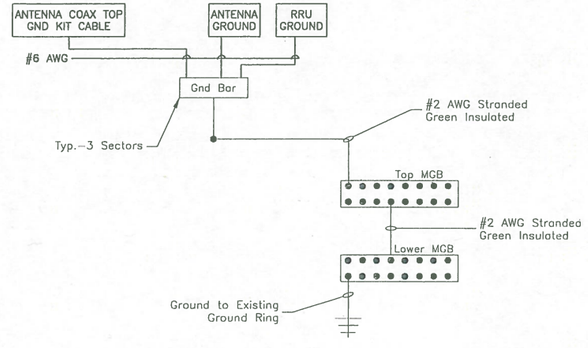
TYPICAL GROUND BAR MECHANICAL CONNECTION DETAIL 2

SCALE: N.T.S.



TYPICAL ANTENNA GROUNDING DETAIL 3

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 4

SCALE: N.T.S.

T-Mobile

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

CROWN CASTLE

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

CT11851C
BRG 302 943052

CONSTRUCTION DRAWINGS

0	12/23/15	ISSUED AS FINAL
A	12/21/15	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
LICENSED PROFESSIONAL ENGINEER
JIANG YU, P.E.
CONNECTICUT LICENSE NO. 0023222

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

DRAWN BY:	RA
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50078112
SITE ADDRESS:	

126 LEDGE ROAD
DARIEN, CT 06820
FAIRFIELD COUNTY

SHEET TITLE

GROUNDING NOTES & DETAILS

SHEET NUMBER

E-1

PJF PAUL J. FORD & COMPANY

Date: **November 10, 2015**

Adam Winters
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
980.209.8238

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

Subject: **Structural Modification Report**

Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11851C
	Carrier Site Name:	CT851/Crown Darien_MP
Crown Castle Designation:	**Crown Castle BU Number:**	806352
	Crown Castle Site Name:	BRG 302 943052
	Crown Castle JDE Job Number:	346377
	Crown Castle Work Order Number:	1140996
	Crown Castle Application Number:	310468 Rev. 1
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37515-1078.005.7700
Site Data:	**126 Ledge Road, DARIEN, Fairfield County, CT** **Latitude *41° 4' 20.75"*, Longitude *-73° 28' 41.4"*** **117 Foot - Monopole Tower**	

Dear Adam Winters,

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 838830, in accordance with application 310468, revision 1.

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

LC4.7: Modified Structure w/ Existing + Reserved + Proposed 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.

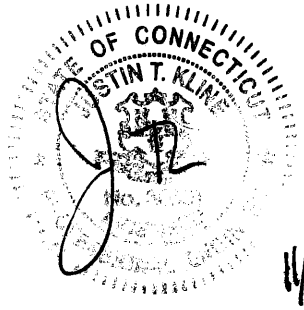
All modifications and equipment proposed in this report shall be installed in accordance with the referenced and attached proposed drawings for the determined available structural capacity to be effective.

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:

Bob Koors, E.I.
Structural Designer BKK

tnxTower Report - version 6.1.4.1



11/12/15

PAUL J. FORD & COMPANY

Date: **November 10, 2015**

Adam Winters
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
980.209.8238

Paul J Ford and Company
250 E. Broad Street, Suite 600
Columbus, OH 43215
614.221.6679
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Subject: Structural Modification Report

Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11851C
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Respectfully submitted by:

Bob Koors, E.I.
Structural Designer

tnxTower Report - version 6.1.4.1

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 117 ft Monopole tower designed by VALMONT in May of 1992. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-E. The tower has been modified multiple times in the past to accommodate additional loading.

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
110.0	110.0	3	ericsson	Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe	1	1-5/8	1
		3	ericsson	RRUS 11 B12			
		1	tower mounts	T-Arm Mount [TA 602-3]			

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
117.0	118.0	3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe	3	1-1/4	1
	117.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER			
		9	rfs celwave	ACU-A20-N			
		1	tower mounts	Pipe Mount [PM 601-3]			
115.0	115.0	3	alcatel lucent	TME-800MHZ RRH	-	-	1
		3	alcatel lucent	TME-PCS 1900MHz 4x45W-65MHz			
		1	tower mounts	Side Arm Mount [SO 102-3]			
110.0	110.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	12	1-5/8	1
		3	ericsson	KRY 112 144/1			
		1	tower mounts	Pipe Mount [PM 601-3]	-	-	3

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
100.0	100.0	3	alcatel lucent	RRH2X40-AWS	1	1/2	3
		3	andrew	LNX-6514DS-T4M w/ Mount Pipe			
		3	rymsa wireless	MG D3-800TV w/ Mount Pipe			
		3	alcatel lucent	RRH2X40-07-U	2	1-5/8	2
		3	alcatel lucent	RRH2X60-AWS			
		3	alcatel lucent	RRH2X60-PCS			
		6	andrew	HBXX-6516DS-A2M w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		3	kathrein	800 10735V01 w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z	12 1	7/8 1-1/4	1
		6	decibel	DB844G65ZAXY w/ Mount Pipe			
		1	gps	GPS_A			
		6	rfs celwave	FD9R6004/2C-3L			
		1	tower mounts	Platform Mount [LP 715-1]			
93.0	95.0	1	andrew	VHLP1-23	4	1/2	1
	94.0	1	andrew	VHLP2-11			
		1	andrew	VHLP2.5-11			
	93.0	1	tower mounts	Pipe Mount [PM 601-3]			
	92.0	1	andrew	VHLP1-23			
88.0	89.0	3	cci antennas	OPA-65R-LCUU-H6 w/ Mount Pipe	-	-	2
		3	ericsson	RRUS 32 B30			
		6	ericsson	RRUS-11	1 2 12	3/8 5/8 1-1/4	1
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		2	powerwave technologies	P65-16-XLH-RR w/ Mount Pipe			
		1	powerwave technologies	P65-17-XLH-RR w/ Mount Pipe			
	88.0	6	powerwave technologies	LGP13519			
		6	powerwave technologies	LGP2140X			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 715-1]			
81.0	81.0	3	kathrein	800 10504 w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	Pipe Mount [PM 601-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
72.0	72.0	3	andrew	LBX-9012DS-VTM w/ Mount Pipe	-	-	1
		3	decibel	DB844H90E-XY w/ Mount Pipe			
		1	tower mounts	Platform Mount (LP 101-1)			

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, 1307951600, 9/26/13	217769	CCISITES
4-POST-MODIFICATION INSPECTION	Sabre, 11-1114, 12/7/10	2785508	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 131001.806352, 11/7/13	4069331	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 25562, 5/12/14	5077215	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	FDH, 1308201500, 6/7/13	3907710	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont, 10844-92, 5/19/92	217772	CCISITES
4-POST-MODIFICATION INSPECTION	GPD, 2007278.24, 03/11/08	2218625	CCISITES
PROPOSED MODIFICATION DRAWINGS	PJF, 37515-1078.002.7700, 04/01/2015	5632030	CCISITES
MONOPOLE PRE-MOD MAPPING	FDH, 146IQW1500, 1/9/2015	-	PJF

3.1) Analysis Method

tnxTower (version 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Monopole was reinforced in conformance with the referenced modification drawings.
5) Monopole will be reinforced in conformance with the attached and referenced proposed modification drawings.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	117 - 110	Pole	TP15.94x14.36x0.188	1	-0.86	495.73	10.6	Pass
L2	110 - 100	Pole	TP18.2x15.94x0.188	2	-2.80	566.85	36.9	Pass
L3	100 - 83.6667	Pole	TP21.8935x18.2x0.25	3	-9.71	905.77	88.2	Pass
L4	83.6667 - 76.0833	Pole	TP23.6083x21.8935x0.3261	4	-11.04	1153.09	96.2	Pass
L5	76.0833 - 71	Pole	TP24.7578x23.6083x0.4532	5	-13.54	1450.73	91.0	Pass
L6	71 - 68.0833	Pole	TP25.4174x24.7578x0.6477	6	-14.19	1833.33	79.7	Pass
L7	68.0833 - 63.5	Pole	TP26.4538x25.4174x0.6838	7	-15.30	2117.82	77.7	Pass
L8	63.5 - 47.42	Pole	TP30.09x26.4538x0.8127	8	-18.66	2768.65	75.1	Pass
L9	47.42 - 38.0833	Pole	TP31.6978x27.4289x0.8034	9	-21.79	2747.90	86.9	Pass
L10	38.0833 - 35	Pole	TP32.3942x31.6978x0.7395	10	-25.04	2794.85	94.7	Pass
L11	35 - 12.5	Pole	TP37.4765x32.3942x0.7644	11	-32.81	3497.94	93.0	Pass
L12	12.5 - 2.5	Pole	TP39.7353x37.4765x0.7263	12	-36.44	3549.82	98.3	Pass
L13	2.5 - 0	Pole	TP40.3x39.7353x0.7719	13	-37.42	3966.50	89.6	Pass
							Summary	
						Pole (L12)	98.3	Pass
						RATING =	98.3	Pass

Table 5 - Tower Component Stresses vs. Capacity - LC4.7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	80.0	Pass
1	Base Plate	0	54.2	Pass
1	Base Foundation Steel	0	94.0	Pass
1	Base Foundation Soil Interaction	0	73.1	Pass
1	Flange	100	29.3	Pass
1	Flange	110	8.6	Pass

Structure Rating (max from all components) =	98.3%

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

4.1) Recommendations

Reinforce the monopole in conformance with the referenced and attached proposed modification drawings.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

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

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	117.0000-110.0000	7.0000	0.00	12	14.3600	15.9400	0.1880	0.7520	A572-65 (65 ksi)
L2	110.0000-100.0000	10.0000	0.00	12	15.9400	18.2000	0.1880	0.7520	A572-65 (65 ksi)
L3	100.0000-83.6667	16.3333	0.00	12	18.2000	21.8935	0.2500	1.0000	A572-65 (65 ksi)
L4	83.6667-76.0833	7.5834	0.00	12	21.8935	23.6083	0.3261	1.3042	Reinf 58.98 ksi (59 ksi)
L5	76.0833-71.0000	5.0833	0.00	12	23.6083	24.7578	0.4532	1.8128	Reinf 51.14 ksi (51 ksi)
L6	71.0000-68.0833	2.9167	0.00	12	24.7578	25.4174	0.6477	2.5909	Reinf 44.37 ksi (44 ksi)
L7	68.0833-63.5000	4.5833	0.00	12	25.4174	26.4538	0.6837	2.7350	Reinf 46.67 ksi (47 ksi)
L8	63.5000-47.4200	16.0800	4.58	12	26.4538	30.0900	0.8127	3.2508	Reinf 46.84 ksi (47 ksi)
L9	47.4200-38.0833	13.9167	0.00	12	27.4289	31.6978	0.8034	3.2135	Reinf 46.33 ksi (46 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L10	38.0833-35.0000	3.0833	0.00	12	31.6978	32.3942	0.7395	2.9580	Reinf 46.36 ksi (46 ksi)
L11	35.0000-12.5000	22.5000	0.00	12	32.3942	37.4765	0.7644	3.0576	Reinf 48.40 ksi (48 ksi)
L12	12.5000-2.5000	10.0000	0.00	12	37.4765	39.7353	0.7263	2.9052	Reinf 48.65 ksi (49 ksi)
L13	2.5000-0.0000	2.5000		12	39.7353	40.3000	0.7719	3.0875	Reinf 50.48 ksi (50 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	14.8666	8.5792	219.9344	5.0736	7.4385	29.5671	445.6467	4.2224	3.3446	17.791
	16.5023	9.5356	301.9999	5.6392	8.2569	36.5754	611.9336	4.6931	3.7681	20.043
L2	16.5023	9.5356	301.9999	5.6392	8.2569	36.5754	611.9336	4.6931	3.7681	20.043
	18.8420	10.9037	451.5288	6.4483	9.4276	47.8944	914.9198	5.3665	4.3738	23.265
L3	18.8420	14.4498	594.2582	6.4261	9.4276	63.0339	1204.1282	7.1117	4.2076	16.83
	22.6658	17.4230	1041.7490	7.7484	11.3408	91.8583	2110.8660	8.5751	5.1975	20.79
L4	22.6658	22.6439	1344.4168	7.7211	11.3408	118.5467	2724.1529	11.1446	4.9936	15.315
	24.4411	24.4444	1691.2770	8.3350	12.2291	138.2993	3426.9858	12.0308	5.4532	16.724
L5	24.4411	33.7911	2312.5006	8.2895	12.2291	189.0980	4685.7531	16.6309	5.1124	11.28
	25.6312	35.4686	2674.2825	8.7011	12.8246	208.5284	5418.8213	17.4566	5.4205	11.96
L6	25.6312	50.2862	3731.0608	8.6314	12.8246	290.9311	7560.1408	24.7493	4.8992	7.564
	26.3140	51.6618	4045.7116	8.8675	13.1662	307.2802	8197.7085	25.4264	5.0759	7.837
L7	26.3140	54.4554	4252.0877	8.8546	13.1662	322.9549	8615.8825	26.8013	4.9794	7.282
	27.3870	56.7373	4809.3341	9.2257	13.7031	350.9677	9745.0147	27.9244	5.2572	7.689
L8	27.3870	67.0992	5630.8921	9.1795	13.7031	410.9220	11409.7139	33.0242	4.9116	6.044
	31.1515	76.6147	8382.2431	10.4813	15.5866	537.7845	16984.6970	37.7074	5.8861	7.243
L9	29.8510	68.8772	6232.4514	9.5319	14.2082	438.6521	12628.6363	33.8993	5.1979	6.47
	32.8160	79.9202	9736.4930	11.0602	16.4195	592.9851	19728.7745	39.3343	6.3419	7.894
L10	32.8160	73.7176	9018.0137	11.0831	16.4195	549.2273	18272.9407	36.2815	6.5131	8.808
	33.5370	75.3760	9640.4266	11.3324	16.7802	574.5115	19534.1179	37.0977	6.6998	9.06
L11	33.5370	77.8527	9941.5359	11.3235	16.7802	592.4558	20144.2470	38.3167	6.6331	8.677
	38.7985	90.3620	15544.9933	13.1429	19.4128	800.7586	31498.3708	44.4734	7.9951	10.459
L12	38.7985	85.9484	14816.4093	13.1566	19.4128	763.2276	30022.0621	42.3012	8.0972	11.148
	41.1370	91.2310	17719.7652	13.9652	20.5829	860.8980	35905.0484	44.9011	8.7025	11.982
L13	41.1370	96.8405	18765.3871	13.9489	20.5829	911.6986	38023.7618	47.6620	8.5804	11.116
	41.7216	98.2441	19593.1738	14.1511	20.8754	938.5772	39701.0821	48.3527	8.7318	11.313

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
L1 117.0000-110.0000				1	1	1		
L2 110.0000-100.0000				1	1	1		
L3 100.0000-83.6667				1	1	1		
L4 83.6667-				1	1	1		

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
76.0833								
L5 76.0833-71.0000				1	1	1		
L6 71.0000-68.0833				1	1	1		
L7 68.0833-63.5000				1	1	1		
L8 63.5000-47.4200				1	1	1		
L9 47.4200-38.0833				1	1	1		
L10 38.0833-35.0000				1	1	1		
L11 35.0000-12.5000				1	1	1		
L12 12.5000-2.5000				1	1	1	47	
L13 2.5000-0.0000				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
LDF6-50A(1-1/4")	C	No	Inside Pole	117.0000 - 0.0000	3	No Ice	0.0000	0.66
						1/2" Ice	0.0000	0.66
						1" Ice	0.0000	0.66
						2" Ice	0.0000	0.66
						4" Ice	0.0000	0.66
***								
LDF7-50A(1-5/8")	C	No	Inside Pole	110.0000 - 0.0000	12	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
						2" Ice	0.0000	0.82
						4" Ice	0.0000	0.82
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	C	No	CaAa (Out Of Face)	100.0000 - 0.0000	1	No Ice	0.0000	1.07
						1/2" Ice	0.0000	2.37
						1" Ice	0.0000	4.28
						2" Ice	0.0000	9.93
						4" Ice	0.0000	28.56
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	C	No	CaAa (Out Of Face)	110.0000 - 100.0000	1	No Ice	0.1625	1.07
						1/2" Ice	0.2625	2.37
						1" Ice	0.3625	4.28
						2" Ice	0.5625	9.93
						4" Ice	0.9625	28.56
***								
LDF6-50A(1-1/4")	C	No	Inside Pole	100.0000 - 0.0000	1	No Ice	0.0000	0.66
						1/2" Ice	0.0000	0.66
						1" Ice	0.0000	0.66
						2" Ice	0.0000	0.66
						4" Ice	0.0000	0.66
LDF5-50A(7/8")	C	No	Inside Pole	100.0000 - 0.0000	12	No Ice	0.0000	0.33

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						1/2" Ice	0.0000	0.33
						1" Ice	0.0000	0.33
						2" Ice	0.0000	0.33
						4" Ice	0.0000	0.33
HB158-1-08U8-S8J18(1-5/8)	C	No	CaAa (Out Of Face)	100.0000 - 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
HB158-1-08U8-S8J18(1-5/8)	C	No	CaAa (Out Of Face)	100.0000 - 0.0000	1	No Ice	0.0000	1.30
						1/2" Ice	0.0000	2.81
						1" Ice	0.0000	4.94
						2" Ice	0.0000	11.02
						4" Ice	0.0000	30.52
***								
7983A(1/2")	C	No	CaAa (Out Of Face)	93.0000 - 0.0000	3	No Ice	0.0000	0.08
						1/2" Ice	0.0000	0.74
						1" Ice	0.0000	2.01
						2" Ice	0.0000	6.39
						4" Ice	0.0000	22.47
7983A(1/2")	C	No	CaAa (Out Of Face)	81.0000 - 0.0000	1	No Ice	0.0000	0.08
						1/2" Ice	0.0000	0.74
						1" Ice	0.0000	2.01
						2" Ice	0.0000	6.39
						4" Ice	0.0000	22.47
7983A(1/2")	C	No	CaAa (Out Of Face)	93.0000 - 81.0000	1	No Ice	0.0580	0.08
						1/2" Ice	0.1580	0.74
						1" Ice	0.2580	2.01
						2" Ice	0.4580	6.39
						4" Ice	0.8580	22.47
***								
LDF6-50A(1-1/4")	C	No	Inside Pole	88.0000 - 0.0000	12	No Ice	0.0000	0.66
						1/2" Ice	0.0000	0.66
						1" Ice	0.0000	0.66
						2" Ice	0.0000	0.66
						4" Ice	0.0000	0.66
FB-L98-002-XXX(3/8)	C	No	Inside Pole	88.0000 - 0.0000	1	No Ice	0.0000	0.06
						1/2" Ice	0.0000	0.06
						1" Ice	0.0000	0.06
						2" Ice	0.0000	0.06
						4" Ice	0.0000	0.06
WR-VG82ST-BRDA(5/8")	C	No	Inside Pole	88.0000 - 0.0000	2	No Ice	0.0000	0.31
						1/2" Ice	0.0000	0.31
						1" Ice	0.0000	0.31
						2" Ice	0.0000	0.31
						4" Ice	0.0000	0.31
2" Rigid Conduit	C	No	Inside Pole	88.0000 - 0.0000	1	No Ice	0.0000	2.80
						1/2" Ice	0.0000	2.80
						1" Ice	0.0000	2.80
						2" Ice	0.0000	2.80
						4" Ice	0.0000	2.80
***								
AVA7-50(1-5/8)	C	No	CaAa (Out Of Face)	81.0000 - 0.0000	2	No Ice	0.2010	0.70
						1/2" Ice	0.3010	2.23
						1" Ice	0.4010	4.38
						2" Ice	0.6010	10.50
						4" Ice	1.0010	30.07
AVA7-50(1-5/8)	C	No	CaAa (Out Of Face)	81.0000 - 0.0000	4	No Ice	0.0000	0.70
						1/2" Ice	0.0000	2.23
						1" Ice	0.0000	4.38
						2" Ice	0.0000	10.50
						4" Ice	0.0000	30.07
**								
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	72.5000 - 0.0000	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
3/4" Flat	C	No	CaAa (Out Of	77.0800 - 72.5000	1	No Ice	0.1250	0.00

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
Reinforcement			Face)			1/2" Ice	0.2361	0.00
						1" Ice	0.3472	0.00
						2" Ice	0.5694	0.00
						4" Ice	1.0139	0.00
***								
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	85.7500 - 0.0000	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	117.0000-	A	0.000	0.000	0.000	0.000	0.00
	110.0000	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.01
L2	110.0000-	A	0.000	0.000	0.000	0.000	0.00
	100.0000	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.625	0.13
L3	100.0000-	A	0.000	0.000	0.000	0.000	0.00
	83.6667	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	4.123	0.38
L4	83.6667-76.0833	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	5.021	0.26
L5	76.0833-71.0000	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	4.595	0.18
L6	71.0000-68.0833	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.722	0.11
L7	68.0833-63.5000	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	4.278	0.17
L8	63.5000-47.4200	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	15.008	0.58
L9	47.4200-38.0833	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	8.714	0.34
L10	38.0833-35.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.878	0.11
L11	35.0000-12.5000	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	21.000	0.81
L12	12.5000-2.5000	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	9.333	0.36
L13	2.5000-0.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.333	0.09

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	117.0000-	A	0.870	0.000	0.000	0.000	0.000	0.00

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
	110.0000	B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.01
L2	110.0000-100.0000	A	0.862	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	3.348	0.16
L3	100.0000-83.6667	A	0.848	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	8.867	0.58
L4	83.6667-76.0833	A	0.834	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	9.961	0.46
L5	76.0833-71.0000	A	0.826	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	8.979	0.35
L6	71.0000-68.0833	A	0.820	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	5.221	0.20
L7	68.0833-63.5000	A	0.815	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	8.178	0.31
L8	63.5000-47.4200	A	0.798	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	28.409	1.07
L9	47.4200-38.0833	A	0.774	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	16.495	0.62
L10	38.0833-35.0000	A	0.759	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	5.323	0.20
L11	35.0000-12.5000	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	38.625	1.45
L12	12.5000-2.5000	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	17.167	0.64
L13	2.5000-0.0000	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	4.292	0.16

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	117.0000-110.0000	0.0000	0.0000	0.0000	0.0000
L2	110.0000-100.0000	-0.1895	0.1094	-0.3255	0.1879
L3	100.0000-83.6667	-0.2882	0.1664	-0.5084	0.2935
L4	83.6667-76.0833	-0.6409	0.3700	-0.9703	0.5602
L5	76.0833-71.0000	-0.8108	0.4681	-1.1800	0.6813
L6	71.0000-68.0833	-0.8382	0.4839	-1.2101	0.6986
L7	68.0833-63.5000	-0.8468	0.4889	-1.2274	0.7086
L8	63.5000-47.4200	-0.8684	0.5014	-1.2705	0.7336
L9	47.4200-38.0833	-0.8850	0.5109	-1.3090	0.7558
L10	38.0833-35.0000	-0.8984	0.5187	-1.3239	0.7644
L11	35.0000-12.5000	-0.9181	0.5301	-1.3659	0.7886
L12	12.5000-2.5000	-0.9398	0.5426	-1.4182	0.8188
L13	2.5000-0.0000	-0.9473	0.5469	-1.4366	0.8294

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
APXVSPP18-C-A20 w/ Mount Pipe	A	From Face	4.0000 0.00 1.00	0.00	117.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.9458 8.1266 9.0212 10.8440 14.8507	0.08 0.15 0.23 0.41 0.91
APXVSPP18-C-A20 w/ Mount Pipe	B	From Face	4.0000 0.00 1.00	0.00	117.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.9458 8.1266 9.0212 10.8440 14.8507	0.08 0.15 0.23 0.41 0.91
APXVSPP18-C-A20 w/ Mount Pipe	C	From Face	4.0000 0.00 1.00	0.00	117.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.9458 8.1266 9.0212 10.8440 14.8507	0.08 0.15 0.23 0.41 0.91
800 EXTERNAL NOTCH FILTER	A	From Face	4.0000 0.00 0.00	0.00	117.0000	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 Face	4.0000 0.00 0.00	0.00	117.0000	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	C	From Face	4.0000 0.00 0.00	0.00	117.0000	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
(3) ACU-A20-N	A	From Face	4.0000 0.00 0.00	0.00	117.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.0778 0.1210 0.1728 0.3025 0.6654	0.1361 0.1890 0.2506 0.3997 0.8015	0.00 0.00 0.00 0.01 0.04
(3) ACU-A20-N	B	From Face	4.0000 0.00 0.00	0.00	117.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.0778 0.1210 0.1728 0.3025 0.6654	0.1361 0.1890 0.2506 0.3997 0.8015	0.00 0.00 0.00 0.01 0.04
(3) ACU-A20-N	C	From Face	4.0000 0.00 0.00	0.00	117.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.0778 0.1210 0.1728 0.3025 0.6654	0.1361 0.1890 0.2506 0.3997 0.8015	0.00 0.00 0.00 0.01 0.04
Pipe Mount [PM 601-3]	C	None		0.00	117.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.3900 5.4800 6.5700 8.7500 13.1100	4.3900 5.4800 6.5700 8.7500 13.1100	0.20 0.24 0.28 0.36 0.53
***									
TME-PCS 1900MHz 4x45W-65MHz	A	From Face	2.0000 0.00 0.00	0.00	115.0000	No Ice 1/2" Ice	2.7087 2.9477 3.1953	2.6111 2.8475 3.0925	0.06 0.08 0.11

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	3.7164	3.6084	0.17
						2" Ice	4.8623	4.7439	0.35
						4" Ice			
TME-PCS 1900MHz 4x45W-65MHz	B	From Face	2.0000 0.00 0.00	0.00	115.0000	No Ice	2.7087	2.6111	0.06
						1/2" Ice	2.9477	2.8475	0.08
						1" Ice	3.1953	3.0925	0.11
						2" Ice	3.7164	3.6084	0.17
						4" Ice	4.8623	4.7439	0.35
TME-PCS 1900MHz 4x45W-65MHz	C	From Face	2.0000 0.00 0.00	0.00	115.0000	No Ice	2.7087	2.6111	0.06
						1/2" Ice	2.9477	2.8475	0.08
						1" Ice	3.1953	3.0925	0.11
						2" Ice	3.7164	3.6084	0.17
						4" Ice	4.8623	4.7439	0.35
TME-800MHZ RRH	A	From Face	2.0000 0.00 0.00	0.00	115.0000	No Ice	2.4899	2.0685	0.05
						1/2" Ice	2.7061	2.2705	0.07
						1" Ice	2.9310	2.4812	0.10
						2" Ice	3.4068	2.9284	0.16
						4" Ice	4.4620	3.9265	0.32
TME-800MHZ RRH	B	From Face	2.0000 0.00 0.00	0.00	115.0000	No Ice	2.4899	2.0685	0.05
						1/2" Ice	2.7061	2.2705	0.07
						1" Ice	2.9310	2.4812	0.10
						2" Ice	3.4068	2.9284	0.16
						4" Ice	4.4620	3.9265	0.32
TME-800MHZ RRH	C	From Face	2.0000 0.00 0.00	0.00	115.0000	No Ice	2.4899	2.0685	0.05
						1/2" Ice	2.7061	2.2705	0.07
						1" Ice	2.9310	2.4812	0.10
						2" Ice	3.4068	2.9284	0.16
						4" Ice	4.4620	3.9265	0.32
Side Arm Mount [SO 102-3]	C	None		0.00	115.0000	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
***									
Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice	8.6756	7.0193	0.16
						1/2" Ice	9.2033	7.8091	0.23
						1" Ice	9.7410	8.6169	0.31
						2" Ice	10.8459	10.2860	0.49
						4" Ice	13.1747	13.8405	0.98
Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice	8.6756	7.0193	0.16
						1/2" Ice	9.2033	7.8091	0.23
						1" Ice	9.7410	8.6169	0.31
						2" Ice	10.8459	10.2860	0.49
						4" Ice	13.1747	13.8405	0.98
Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice	8.6756	7.0193	0.16
						1/2" Ice	9.2033	7.8091	0.23
						1" Ice	9.7410	8.6169	0.31
						2" Ice	10.8459	10.2860	0.49
						4" Ice	13.1747	13.8405	0.98
RRUS 11 B12	A	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice	3.3056	1.3611	0.05
						1/2" Ice	3.5497	1.5404	0.07
						1" Ice	3.8025	1.7284	0.10
						2" Ice	4.3340	2.1302	0.15
						4" Ice	5.5006	3.0377	0.31
RRUS 11 B12	B	From Face	4.0000	0.00	110.0000	No Ice	3.3056	1.3611	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00 0.00			1/2" Ice	3.5497 3.8025	1.5404 1.7284	0.07 0.10
						1" Ice	4.3340	2.1302	0.15
						2" Ice	5.5006	3.0377	0.31
						4" Ice			
RRUS 11 B12	C	From Face	4.0000 0.00 0.00	0.00	110.0000	No Ice 1/2" Ice	3.3056 3.5497	1.3611 1.5404	0.05 0.07
							3.8025	1.7284	0.10
						1" Ice	4.3340	2.1302	0.15
						2" Ice	5.5006	3.0377	0.31
						4" Ice			
T-Arm Mount [TA 602-3]	C	None		0.00	110.0000	No Ice	11.5900	11.5900	0.77
						1/2" Ice	15.4400	15.4400	0.99
							19.2900	19.2900	1.21
						1" Ice	26.9900	26.9900	1.64
						2" Ice	42.3900	42.3900	2.50
						4" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Face	1.0000 0.00 0.00	0.00	110.0000	No Ice 1/2" Ice	6.8253 7.3471	5.6424 6.4800	0.11 0.17
							7.8631	7.2567	0.23
						1" Ice	8.9261	8.8640	0.38
						2" Ice	11.1755	12.2932	0.81
						4" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Face	1.0000 0.00 0.00	0.00	110.0000	No Ice 1/2" Ice	6.8253 7.3471	5.6424 6.4800	0.11 0.17
							7.8631	7.2567	0.23
						1" Ice	8.9261	8.8640	0.38
						2" Ice	11.1755	12.2932	0.81
						4" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Face	1.0000 0.00 0.00	0.00	110.0000	No Ice 1/2" Ice	6.8253 7.3471	5.6424 6.4800	0.11 0.17
							7.8631	7.2567	0.23
						1" Ice	8.9261	8.8640	0.38
						2" Ice	11.1755	12.2932	0.81
						4" Ice			
KRY 112 144/1	A	From Face	1.0000 0.00 0.00	0.00	110.0000	No Ice 1/2" Ice	0.4083 0.4969	0.2042 0.2733	0.01 0.01
							0.5941	0.3511	0.02
						1" Ice	0.8145	0.5326	0.03
						2" Ice	1.3590	0.9992	0.08
						4" Ice			
KRY 112 144/1	B	From Face	1.0000 0.00 0.00	0.00	110.0000	No Ice 1/2" Ice	0.4083 0.4969	0.2042 0.2733	0.01 0.01
							0.5941	0.3511	0.02
						1" Ice	0.8145	0.5326	0.03
						2" Ice	1.3590	0.9992	0.08
						4" Ice			
KRY 112 144/1	B	From Face	1.0000 0.00 0.00	0.00	110.0000	No Ice 1/2" Ice	0.4083 0.4969	0.2042 0.2733	0.01 0.01
							0.5941	0.3511	0.02
						1" Ice	0.8145	0.5326	0.03
						2" Ice	1.3590	0.9992	0.08
						4" Ice			
***									
(2) HBXX-6516DS-A2M w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice	7.1872 8.1406	5.5365 6.8440	0.07 0.13
							9.1119	8.2071	0.19
						1" Ice	10.6910	10.2892	0.35
						2" Ice	13.8831	14.4310	0.82
						4" Ice			
(2) HBXX-6516DS-A2M w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice	7.1872 8.1406	5.5365 6.8440	0.07 0.13
							9.1119	8.2071	0.19
						1" Ice	10.6910	10.2892	0.35
						2" Ice	13.8831	14.4310	0.82

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			
(2) HBXX-6516DS-A2M w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.1872 8.1406 9.1119 10.6910 13.8831	5.5365 6.8440 8.2071 10.2892 14.4310	0.07 0.13 0.19 0.35 0.82
RRH2X60-AWS	A	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.1904 2.3976 2.6134 3.0710 4.0899	1.4290 1.6109 1.8015 2.2085 3.1263	0.04 0.06 0.08 0.13 0.26
RRH2X60-AWS	B	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.1904 2.3976 2.6134 3.0710 4.0899	1.4290 1.6109 1.8015 2.2085 3.1263	0.04 0.06 0.08 0.13 0.26
RRH2X60-AWS	C	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.1904 2.3976 2.6134 3.0710 4.0899	1.4290 1.6109 1.8015 2.2085 3.1263	0.04 0.06 0.08 0.13 0.26
RRH2X60-PCS	A	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.5667 2.7914 3.0247 3.5173 4.6062	2.0106 2.2184 2.4349 2.8938 3.9152	0.06 0.08 0.10 0.16 0.31
RRH2X60-PCS	B	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.5667 2.7914 3.0247 3.5173 4.6062	2.0106 2.2184 2.4349 2.8938 3.9152	0.06 0.08 0.10 0.16 0.31
RRH2X60-PCS	C	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.5667 2.7914 3.0247 3.5173 4.6062	2.0106 2.2184 2.4349 2.8938 3.9152	0.06 0.08 0.10 0.16 0.31
800 10735V01 w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	9.0418 9.7204 10.3733 11.6912 14.4457	5.4888 6.7103 7.6880 9.5633 13.5141	0.06 0.12 0.19 0.36 0.85
800 10735V01 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	9.0418 9.7204 10.3733 11.6912 14.4457	5.4888 6.7103 7.6880 9.5633 13.5141	0.06 0.12 0.19 0.36 0.85
800 10735V01 w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	9.0418 9.7204 10.3733 11.6912 14.4457	5.4888 6.7103 7.6880 9.5633 13.5141	0.06 0.12 0.19 0.36 0.85
RRH2X40-07-U	A	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice	2.2458 2.4472 2.6572 3.1031	1.2277 1.3850 1.5509 1.9087	0.05 0.07 0.09 0.13

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
						2" Ice 4" Ice	4.0987	2.7280	0.27
RRH2X40-07-U	B	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.2458 2.4472 2.6572 3.1031 4.0987	1.2277 1.3850 1.5509 1.9087 2.7280	0.05 0.07 0.09 0.13 0.27
RRH2X40-07-U	C	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.2458 2.4472 2.6572 3.1031 4.0987	1.2277 1.3850 1.5509 1.9087 2.7280	0.05 0.07 0.09 0.13 0.27
DB-T1-6Z-8AB-0Z	A	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.6000 5.9154 6.2395 6.9136 8.3654	2.3333 2.5580 2.7914 3.2840 4.3728	0.04 0.08 0.12 0.21 0.45
(2) DB844G65ZAXY w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.9042 5.3460 5.7972 6.7311 8.7345	4.9208 5.5962 6.2837 7.7123 10.8330	0.03 0.08 0.13 0.26 0.62
(2) DB844G65ZAXY w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.9042 5.3460 5.7972 6.7311 8.7345	4.9208 5.5962 6.2837 7.7123 10.8330	0.03 0.08 0.13 0.26 0.62
(2) DB844G65ZAXY w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.9042 5.3460 5.7972 6.7311 8.7345	4.9208 5.5962 6.2837 7.7123 10.8330	0.03 0.08 0.13 0.26 0.62
GPS_A	C	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.2975 0.3739 0.4589 0.6549 1.1506	0.2975 0.3739 0.4589 0.6549 1.1506	0.00 0.00 0.01 0.02 0.08
(2) FD9R6004/2C-3L	A	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2808	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.01 0.01 0.02 0.06
(2) FD9R6004/2C-3L	B	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2808	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.01 0.01 0.02 0.06
(2) FD9R6004/2C-3L	C	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2808	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.01 0.01 0.02 0.06
DB-T1-6Z-8AB-0Z	A	From Face	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice	5.6000 5.9154 6.2395	2.3333 2.5580 2.7914	0.04 0.08 0.12

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment ° ft	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	6.9136	3.2840	0.21
						2" Ice	8.3654	4.3728	0.45
						4" Ice			
Platform Mount [LP 715-1]	C	None		0.00	100.0000	No Ice	44.2100	44.2100	1.77
						1/2" Ice	53.9700	53.9700	2.32
						1" Ice	63.7300	63.7300	2.87
						2" Ice	83.2500	83.2500	3.97
						4" Ice	122.2900	122.2900	6.16
***									
Pipe Mount [PM 601-3]	C	None		0.00	93.0000	No Ice	4.3900	4.3900	0.20
						1/2" Ice	5.4800	5.4800	0.24
						1" Ice	6.5700	6.5700	0.28
						2" Ice	8.7500	8.7500	0.36
						4" Ice	13.1100	13.1100	0.53
***									
P65-17-XLH-RR w/ Mount Pipe	A	From Face	4.0000 0.00 1.00	0.00	88.0000	No Ice	11.8229	9.0563	0.09
						1/2" Ice	12.5940	10.6186	0.18
						1" Ice	13.3752	12.2051	0.28
						2" Ice	14.9400	14.6968	0.51
						4" Ice	18.3336	19.6430	1.14
P65-16-XLH-RR w/ Mount Pipe	B	From Face	4.0000 0.00 1.00	0.00	88.0000	No Ice	8.6375	6.3625	0.08
						1/2" Ice	9.2903	7.5378	0.14
						1" Ice	9.9098	8.4270	0.22
						2" Ice	11.1763	10.2390	0.39
						4" Ice	13.8289	14.0988	0.89
P65-16-XLH-RR w/ Mount Pipe	C	From Face	4.0000 0.00 1.00	0.00	88.0000	No Ice	8.6375	6.3625	0.08
						1/2" Ice	9.2903	7.5378	0.14
						1" Ice	9.9098	8.4270	0.22
						2" Ice	11.1763	10.2390	0.39
						4" Ice	13.8289	14.0988	0.89
7770.00 w/ Mount Pipe	A	From Face	4.0000 0.00 1.00	0.00	88.0000	No Ice	6.2208	4.8204	0.09
						1/2" Ice	6.7144	5.5082	0.14
						1" Ice	7.2182	6.2127	0.21
						2" Ice	8.2568	7.6716	0.36
						4" Ice	10.4762	11.0613	0.76
7770.00 w/ Mount Pipe	B	From Face	4.0000 0.00 1.00	0.00	88.0000	No Ice	6.2208	4.8204	0.09
						1/2" Ice	6.7144	5.5082	0.14
						1" Ice	7.2182	6.2127	0.21
						2" Ice	8.2568	7.6716	0.36
						4" Ice	10.4762	11.0613	0.76
7770.00 w/ Mount Pipe	C	From Face	4.0000 0.00 1.00	0.00	88.0000	No Ice	6.2208	4.8204	0.09
						1/2" Ice	6.7144	5.5082	0.14
						1" Ice	7.2182	6.2127	0.21
						2" Ice	8.2568	7.6716	0.36
						4" Ice	10.4762	11.0613	0.76
(2) LGP2140X	A	From Face	4.0000 0.00 -1.00	0.00	88.0000	No Ice	1.2600	0.3780	0.01
						1/2" Ice	1.4160	0.4932	0.02
						1" Ice	1.5806	0.6170	0.03
						2" Ice	1.9358	0.8905	0.05
						4" Ice	2.7499	1.5412	0.13
(2) LGP2140X	B	From Face	4.0000 0.00 -1.00	0.00	88.0000	No Ice	1.2600	0.3780	0.01
						1/2" Ice	1.4160	0.4932	0.02
						1" Ice	1.5806	0.6170	0.03
						2" Ice	1.9358	0.8905	0.05
						4" Ice	2.7499	1.5412	0.13

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
(2) LGP2140X	C	From Face	4.0000 0.00 -1.00	0.00	88.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.2600 1.4160 1.5806 1.9358 2.7499	0.3780 0.4932 0.6170 0.8905 1.5412	0.01 0.02 0.03 0.05 0.13
(2) LGP13519	A	From Face	4.0000 0.00 -1.00	0.00	88.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3379 0.4220 0.5147 0.7260 1.2523	0.2074 0.2804 0.3621 0.5513 1.0335	0.01 0.01 0.01 0.02 0.07
(2) LGP13519	B	From Face	4.0000 0.00 -1.00	0.00	88.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3379 0.4220 0.5147 0.7260 1.2523	0.2074 0.2804 0.3621 0.5513 1.0335	0.01 0.01 0.01 0.02 0.07
(2) LGP13519	C	From Face	4.0000 0.00 -1.00	0.00	88.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3379 0.4220 0.5147 0.7260 1.2523	0.2074 0.2804 0.3621 0.5513 1.0335	0.01 0.01 0.01 0.02 0.07
(2) RRUS-11	A	From Face	4.0000 0.00 1.00	0.00	88.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.2486 3.4905 3.7411 4.2682 5.4260	1.3726 1.5510 1.7380 2.1381 3.0418	0.05 0.07 0.09 0.15 0.31
(2) RRUS-11	B	From Face	4.0000 0.00 1.00	0.00	88.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.2486 3.4905 3.7411 4.2682 5.4260	1.3726 1.5510 1.7380 2.1381 3.0418	0.05 0.07 0.09 0.15 0.31
(2) RRUS-11	C	From Face	4.0000 0.00 1.00	0.00	88.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.2486 3.4905 3.7411 4.2682 5.4260	1.3726 1.5510 1.7380 2.1381 3.0418	0.05 0.07 0.09 0.15 0.31
DC6-48-60-18-8F	A	From Face	4.0000 0.00 -1.00	0.00	88.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.4667 1.6667 1.8778 2.3333 3.3778	1.4667 1.6667 1.8778 2.3333 3.3778	0.02 0.04 0.06 0.11 0.24
OPA-65R-LCUU-H6 w/ Mount Pipe	A	From Face	4.0000 0.00 1.00	0.00	88.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.5975 11.2684 11.9061 13.2089 15.9341	7.1792 8.3621 9.2588 11.0860 15.1514	0.10 0.18 0.26 0.46 1.00
OPA-65R-LCUU-H6 w/ Mount Pipe	B	From Face	4.0000 0.00 1.00	0.00	88.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.5975 11.2684 11.9061 13.2089 15.9341	7.1792 8.3621 9.2588 11.0860 15.1514	0.10 0.18 0.26 0.46 1.00
OPA-65R-LCUU-H6 w/ Mount Pipe	C	From Face	4.0000 0.00 1.00	0.00	88.0000	No Ice 1/2" Ice 1" Ice 2" Ice	10.5975 11.2684 11.9061 13.2089 15.9341	7.1792 8.3621 9.2588 11.0860 15.1514	0.10 0.18 0.26 0.46 1.00

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			
RRUS 32 B30	A	From Face	4.0000 0.00 1.00	0.00	88.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.8662 4.1506 4.4435 5.0554 6.3828	2.7616 3.0213 3.2896 3.8522 5.0811	0.08 0.10 0.14 0.21 0.41
RRUS 32 B30	B	From Face	4.0000 0.00 1.00	0.00	88.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.8662 4.1506 4.4435 5.0554 6.3828	2.7616 3.0213 3.2896 3.8522 5.0811	0.08 0.10 0.14 0.21 0.41
RRUS 32 B30	C	From Face	4.0000 0.00 1.00	0.00	88.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.8662 4.1506 4.4435 5.0554 6.3828	2.7616 3.0213 3.2896 3.8522 5.0811	0.08 0.10 0.14 0.21 0.41
Platform Mount [LP 715-1]	C	None		0.00	88.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	44.2100 53.9700 63.7300 83.2500 122.2900	44.2100 53.9700 63.7300 83.2500 122.2900	1.77 2.32 2.87 3.97 6.16
***									
800 10504 w/ Mount Pipe	A	From Face	1.0000 0.00 0.00	0.00	81.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.5887 4.0069 4.4217 5.3391 7.3849	3.1779 3.9053 4.5808 5.9816 8.9834	0.04 0.07 0.11 0.21 0.51
800 10504 w/ Mount Pipe	B	From Face	1.0000 0.00 0.00	0.00	81.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.5887 4.0069 4.4217 5.3391 7.3849	3.1779 3.9053 4.5808 5.9816 8.9834	0.04 0.07 0.11 0.21 0.51
800 10504 w/ Mount Pipe	C	From Face	1.0000 0.00 0.00	0.00	81.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.5887 4.0069 4.4217 5.3391 7.3849	3.1779 3.9053 4.5808 5.9816 8.9834	0.04 0.07 0.11 0.21 0.51
Pipe Mount [PM 601-3]	C	None		0.00	81.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.3900 5.4800 6.5700 8.7500 13.1100	4.3900 5.4800 6.5700 8.7500 13.1100	0.20 0.24 0.28 0.36 0.53
***									
LBX-9012DS-VTM w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	72.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.4437 5.9137 6.3874 7.3659 9.4512	3.9976 4.6725 5.3288 6.7088 9.8613	0.05 0.09 0.14 0.26 0.61
LBX-9012DS-VTM w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	72.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.4437 5.9137 6.3874 7.3659 9.4512	3.9976 4.6725 5.3288 6.7088 9.8613	0.05 0.09 0.14 0.26 0.61
LBX-9012DS-VTM w/ Mount Pipe	C	From Face	4.0000 0.00	0.00	72.0000	No Ice 1/2"	5.4437 5.9137	3.9976 4.6725	0.05 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00				Ice	6.3874	5.3288	0.14
							1" Ice	7.3659	6.7088	0.26
							2" Ice	9.4512	9.8613	0.61
							4" Ice			
DB844H90E-XY w/ Mount Pipe	A	From Face	4.0000	0.00	0.00	72.0000	No Ice	3.2986	4.9208	0.03
			0.00				1/2" Ice	3.6900	5.5962	0.07
			0.00				1" Ice	4.1185	6.2837	0.12
							2" Ice	5.0070	7.7123	0.23
							4" Ice	6.9197	10.8330	0.56
DB844H90E-XY w/ Mount Pipe	B	From Face	4.0000	0.00	0.00	72.0000	No Ice	3.2986	4.9208	0.03
			0.00				1/2" Ice	3.6900	5.5962	0.07
			0.00				1" Ice	4.1185	6.2837	0.12
							2" Ice	5.0070	7.7123	0.23
							4" Ice	6.9197	10.8330	0.56
DB844H90E-XY w/ Mount Pipe	C	From Face	4.0000	0.00	0.00	72.0000	No Ice	3.2986	4.9208	0.03
			0.00				1/2" Ice	3.6900	5.5962	0.07
			0.00				1" Ice	4.1185	6.2837	0.12
							2" Ice	5.0070	7.7123	0.23
							4" Ice	6.9197	10.8330	0.56
Platform Mount (LP 101-1)	C	None			0.00	72.0000	No Ice	36.2100	36.2100	1.50
							1/2" Ice	42.8200	42.8200	2.30
							1" Ice	49.4300	49.4300	3.10
							2" Ice	62.6500	62.6500	4.70
							4" Ice	89.0900	89.0900	7.89
**										

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
VHLP2-11	A	Paraboloid w/o Radome	From Leg	2.0000	0.00	48.00		93.0000	2.1750	No Ice	3.7200	0.03
				0.00						1/2" Ice	4.0100	0.05
				1.00						1" Ice	4.3000	0.07
										2" Ice	4.8800	0.11
										4" Ice	6.0400	0.19
VHLP1-23	A	Paraboloid w/o Radome	From Leg	2.0000	0.00	68.00		93.0000	1.2750	No Ice	1.2800	0.01
				0.00						1/2" Ice	1.4500	0.02
				2.00						1" Ice	1.6200	0.03
										2" Ice	1.9700	0.04
										4" Ice	2.6600	0.07
VHLP2.5-11	C	Paraboloid w/Shroud (HP)	From Leg	2.0000	0.00	-2.00		93.0000	2.9167	No Ice	6.6800	0.05
				0.00						1/2" Ice	7.0700	0.08
				1.00						1" Ice	7.4600	0.12
										2" Ice	8.2300	0.19
										4" Ice	9.7800	0.34
VHLP1-23	A	Paraboloid w/o Radome	From Leg	2.0000	0.00	68.00		93.0000	1.2750	No Ice	1.2800	0.01
				0.00						1/2" Ice	1.4500	0.02
				-1.00						1" Ice	1.6200	0.03
										2" Ice	1.9700	0.04
										4" Ice	2.6600	0.07
**												

Tower Pressures - No Ice

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 117.0000-110.0000	113.4392	1.423	26.320	8.838	A	0.000	8.838	8.838	100.00	0.000	0.000
					B	0.000	8.838		100.00	0.000	0.000
					C	0.000	8.838		100.00	0.000	0.000
L2 110.0000-100.0000	104.8897	1.392	25.738	14.225	A	0.000	14.225	14.225	100.00	0.000	0.000
					B	0.000	14.225		100.00	0.000	0.000
					C	0.000	14.225		100.00	0.000	1.625
L3 100.0000-83.6667	91.5826	1.339	24.759	27.286	A	0.000	27.286	27.286	100.00	0.000	0.000
					B	0.000	27.286		100.00	0.000	0.000
					C	0.000	27.286		100.00	0.000	4.123
L4 83.6667-76.0833	79.8274	1.287	23.806	14.377	A	0.000	14.377	14.377	100.00	0.000	0.000
					B	0.000	14.377		100.00	0.000	0.000
					C	0.000	14.377		100.00	0.000	5.021
L5 76.0833-71.0000	73.5215	1.257	23.253	10.244	A	0.000	10.244	10.244	100.00	0.000	0.000
					B	0.000	10.244		100.00	0.000	0.000
					C	0.000	10.244		100.00	0.000	4.595
L6 71.0000-68.0833	69.5353	1.237	22.886	6.098	A	0.000	6.098	6.098	100.00	0.000	0.000
					B	0.000	6.098		100.00	0.000	0.000
					C	0.000	6.098		100.00	0.000	2.722
L7 68.0833-63.5000	65.7764	1.218	22.525	9.906	A	0.000	9.906	9.906	100.00	0.000	0.000
					B	0.000	9.906		100.00	0.000	0.000
					C	0.000	9.906		100.00	0.000	4.278
L8 63.5000-47.4200	55.2877	1.159	21.434	37.884	A	0.000	37.884	37.884	100.00	0.000	0.000
					B	0.000	37.884		100.00	0.000	0.000
					C	0.000	37.884		100.00	0.000	15.008
L9 47.4200-38.0833	42.6780	1.076	19.906	23.549	A	0.000	23.549	23.549	100.00	0.000	0.000
					B	0.000	23.549		100.00	0.000	0.000
					C	0.000	23.549		100.00	0.000	8.714
L10 38.0833-35.0000	36.5361	1.03	19.042	8.234	A	0.000	8.234	8.234	100.00	0.000	0.000
					B	0.000	8.234		100.00	0.000	0.000
					C	0.000	8.234		100.00	0.000	2.878
L11 35.0000-12.5000	23.4772	1	18.496	65.504	A	0.000	65.504	65.504	100.00	0.000	0.000
					B	0.000	65.504		100.00	0.000	0.000
					C	0.000	65.504		100.00	0.000	21.000
L12 12.5000-2.5000	7.4512	1	18.496	32.172	A	0.000	32.172	32.172	100.00	0.000	0.000
					B	0.000	32.172		100.00	0.000	0.000
					C	0.000	32.172		100.00	0.000	9.333
L13 2.5000-0.0000	1.2471	1	18.496	8.337	A	0.000	8.337	8.337	100.00	0.000	0.000
					B	0.000	8.337		100.00	0.000	0.000
					C	0.000	8.337		100.00	0.000	2.333

Tower Pressure - With Ice

G_H = 1.690

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
L1 117.0000-110.0000	113.4392	1.423	5.150	0.8698	9.852	A	0.000	9.852	9.852	100.00	0.000	0.000
						B	0.000	9.852		100.00	0.000	0.000
						C	0.000	9.852		100.00	0.000	0.000
L2 110.0000-100.0000	104.8897	1.392	5.036	0.8616	15.661	A	0.000	15.661	15.661	100.00	0.000	0.000
						B	0.000	15.661		100.00	0.000	0.000
						C	0.000	15.661		100.00	0.000	3.348
L3 100.0000-83.6667	91.5826	1.339	4.845	0.8477	29.593	A	0.000	29.593	29.593	100.00	0.000	0.000
						B	0.000	29.593		100.00	0.000	0.000
						C	0.000	29.593		100.00	0.000	8.867
L4 83.6667-	79.8274	1.287	4.658	0.8339	15.431	A	0.000	15.431	15.431	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
76.0833						B	0.000	15.431		100.00	0.000	0.000
						C	0.000	15.431		100.00	0.000	9.961
L5 76.0833-71.0000	73.5215	1.257	4.550	0.8257	10.944	A	0.000	10.944	10.944	100.00	0.000	0.000
						B	0.000	10.944		100.00	0.000	0.000
						C	0.000	10.944		100.00	0.000	8.979
L6 71.0000-68.0833	69.5353	1.237	4.478	0.8202	6.496	A	0.000	6.496	6.496	100.00	0.000	0.000
						B	0.000	6.496		100.00	0.000	0.000
						C	0.000	6.496		100.00	0.000	5.221
L7 68.0833-63.5000	65.7764	1.218	4.408	0.8147	10.528	A	0.000	10.528	10.528	100.00	0.000	0.000
						B	0.000	10.528		100.00	0.000	0.000
						C	0.000	10.528		100.00	0.000	8.178
L8 63.5000-47.4200	55.2877	1.159	4.194	0.7979	40.023	A	0.000	40.023	40.023	100.00	0.000	0.000
						B	0.000	40.023		100.00	0.000	0.000
						C	0.000	40.023		100.00	0.000	28.409
L9 47.4200-38.0833	42.6780	1.076	3.895	0.7735	24.790	A	0.000	24.790	24.790	100.00	0.000	0.000
						B	0.000	24.790		100.00	0.000	0.000
						C	0.000	24.790		100.00	0.000	16.495
L10 38.0833-35.0000	36.5361	1.03	3.726	0.7592	8.624	A	0.000	8.624	8.624	100.00	0.000	0.000
						B	0.000	8.624		100.00	0.000	0.000
						C	0.000	8.624		100.00	0.000	5.323
L11 35.0000-12.5000	23.4772	1	3.619	0.7500	68.316	A	0.000	68.316	68.316	100.00	0.000	0.000
						B	0.000	68.316		100.00	0.000	0.000
						C	0.000	68.316		100.00	0.000	38.625
L12 12.5000-2.5000	7.4512	1	3.619	0.7500	33.422	A	0.000	33.422	33.422	100.00	0.000	0.000
						B	0.000	33.422		100.00	0.000	0.000
						C	0.000	33.422		100.00	0.000	17.167
L13 2.5000-0.0000	1.2471	1	3.619	0.7500	8.650	A	0.000	8.650	8.650	100.00	0.000	0.000
						B	0.000	8.650		100.00	0.000	0.000
						C	0.000	8.650		100.00	0.000	4.292

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 117.0000-110.0000	113.4392	1.423	9.107	8.838	A	0.000	8.838	8.838	100.00	0.000	0.000
					B	0.000	8.838		100.00	0.000	0.000
					C	0.000	8.838		100.00	0.000	0.000
L2 110.0000-100.0000	104.8897	1.392	8.906	14.225	A	0.000	14.225	14.225	100.00	0.000	0.000
					B	0.000	14.225		100.00	0.000	0.000
					C	0.000	14.225		100.00	0.000	1.625
L3 100.0000-83.6667	91.5826	1.339	8.567	27.286	A	0.000	27.286	27.286	100.00	0.000	0.000
					B	0.000	27.286		100.00	0.000	0.000
					C	0.000	27.286		100.00	0.000	4.123
L4 83.6667-76.0833	79.8274	1.287	8.237	14.377	A	0.000	14.377	14.377	100.00	0.000	0.000
					B	0.000	14.377		100.00	0.000	0.000
					C	0.000	14.377		100.00	0.000	5.021
L5 76.0833-71.0000	73.5215	1.257	8.046	10.244	A	0.000	10.244	10.244	100.00	0.000	0.000
					B	0.000	10.244		100.00	0.000	0.000
					C	0.000	10.244		100.00	0.000	4.595
L6 71.0000-68.0833	69.5353	1.237	7.919	6.098	A	0.000	6.098	6.098	100.00	0.000	0.000
					B	0.000	6.098		100.00	0.000	0.000
					C	0.000	6.098		100.00	0.000	2.722
L7 68.0833-63.5000	65.7764	1.218	7.794	9.906	A	0.000	9.906	9.906	100.00	0.000	0.000
					B	0.000	9.906		100.00	0.000	0.000
					C	0.000	9.906		100.00	0.000	4.278
L8 63.5000-47.4200	55.2877	1.159	7.417	37.884	A	0.000	37.884	37.884	100.00	0.000	0.000
					B	0.000	37.884		100.00	0.000	0.000
					C	0.000	37.884		100.00	0.000	15.008
L9 47.4200-	42.6780	1.076	6.888	23.549	A	0.000	23.549	23.549	100.00	0.000	0.000

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
38.0833					B	0.000	23.549		100.00	0.000	0.000
					C	0.000	23.549		100.00	0.000	8.714
L10 38.0833-35.0000	36.5361	1.03	6.589	8.234	A	0.000	8.234	8.234	100.00	0.000	0.000
					B	0.000	8.234		100.00	0.000	0.000
					C	0.000	8.234		100.00	0.000	2.878
L11 35.0000-12.5000	23.4772	1	6.400	65.504	A	0.000	65.504	65.504	100.00	0.000	0.000
					B	0.000	65.504		100.00	0.000	0.000
					C	0.000	65.504		100.00	0.000	21.000
L12 12.5000-2.5000	7.4512	1	6.400	32.172	A	0.000	32.172	32.172	100.00	0.000	0.000
					B	0.000	32.172		100.00	0.000	0.000
					C	0.000	32.172		100.00	0.000	9.333
L13 2.5000-0.0000	1.2471	1	6.400	8.337	A	0.000	8.337	8.337	100.00	0.000	0.000
					B	0.000	8.337		100.00	0.000	0.000
					C	0.000	8.337		100.00	0.000	2.333

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
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	117 - 110	Pole	Max Tension	36	0.00	-0.00	-0.00
			Max. Compression	14	-2.06	0.00	0.00
			Max. Mx	11	-0.86	16.45	0.00
			Max. My	8	-0.87	0.01	-16.45
			Max. Vy	11	-2.66	16.45	0.00
			Max. Vx	8	2.65	0.01	-16.45
			Max. Torque	12			-0.00
L2	110 - 100	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-5.73	0.01	0.04
			Max. Mx	5	-2.80	-75.47	0.07
			Max. My	2	-2.81	-0.02	75.33
			Max. Vy	11	-6.28	75.47	-0.01
			Max. Vx	8	6.26	0.10	-75.29
			Max. Torque	12			-0.03
L3	100 - 83.6667	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-19.81	1.84	0.84
			Max. Mx	11	-9.71	345.75	-1.27
			Max. My	8	-9.75	3.04	-340.91
			Max. Vy	11	-21.86	345.75	-1.27
			Max. Vx	8	21.58	3.04	-340.91
			Max. Torque	9			-3.01
L4	83.6667 - 76.0833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-21.62	2.07	0.73
			Max. Mx	11	-11.04	517.26	-2.87
			Max. My	8	-11.08	5.44	-510.29
			Max. Vy	11	-23.21	517.26	-2.87
			Max. Vx	8	22.93	5.44	-510.29
			Max. Torque	9			-3.03
L5	76.0833 - 71	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-26.18	2.25	0.62
			Max. Mx	11	-13.54	639.21	-3.94
			Max. My	8	-13.57	7.05	-630.80
			Max. Vy	11	-26.32	639.21	-3.94
			Max. Vx	8	26.04	7.05	-630.80
			Max. Torque	9			-3.05
L6	71 - 68.0833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-26.96	2.36	0.56
			Max. Mx	11	-14.19	716.48	-4.56
			Max. My	8	-14.22	7.98	-707.25
			Max. Vy	11	-26.67	716.48	-4.56
			Max. Vx	8	26.39	7.98	-707.25
			Max. Torque	9			-3.06
L7	68.0833 - 63.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-28.26	2.54	0.46
			Max. Mx	11	-15.30	839.93	-5.54
			Max. My	8	-15.33	9.44	-829.41
			Max. Vy	11	-27.21	839.93	-5.54
			Max. Vx	8	26.93	9.44	-829.41
			Max. Torque	9			-3.08
L8	63.5 - 47.42	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-32.12	2.99	0.20
			Max. Mx	11	-18.66	1160.62	-7.99
			Max. My	8	-18.68	13.09	-1146.85
			Max. Vy	11	-28.58	1160.62	-7.99
			Max. Vx	8	28.30	13.09	-1146.85
			Max. Torque	8			-3.17
L9	47.42 - 38.0833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-38.29	3.55	-0.14
			Max. Mx	11	-24.08	1570.46	-10.97
			Max. My	8	-24.10	17.51	-1552.74
			Max. Vy	11	-30.24	1570.46	-10.97
			Max. Vx	8	29.96	17.51	-1552.74
			Max. Torque	8			-3.29
L10	38.0833 - 35	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-39.37	3.67	-0.22

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	11	-25.04	1664.20	-11.63
			Max. My	8	-25.06	18.49	-1645.62
			Max. Vy	11	-30.57	1664.20	-11.63
			Max. Vx	8	30.29	18.49	-1645.62
			Max. Torque	8			-3.32
L11	35 - 12.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-48.01	4.67	-0.82
			Max. Mx	11	-32.81	2378.38	-16.44
			Max. My	8	-32.82	25.58	-2353.48
			Max. Vy	11	-32.95	2378.38	-16.44
			Max. Vx	8	32.68	25.58	-2353.48
			Max. Torque	8			-3.52
L12	12.5 - 2.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-52.04	5.16	-1.11
			Max. Mx	11	-36.44	2713.23	-18.56
			Max. My	8	-36.44	28.70	-2685.55
			Max. Vy	11	-34.03	2713.23	-18.56
			Max. Vx	8	33.76	28.70	-2685.55
			Max. Torque	8			-3.63
L13	2.5 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-53.12	5.28	-1.19
			Max. Mx	11	-37.42	2798.64	-19.09
			Max. My	8	-37.42	29.48	-2770.27
			Max. Vy	11	-34.31	2798.64	-19.09
			Max. Vx	8	34.04	29.48	-2770.27
			Max. Torque	8			-3.66

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	53.12	-0.00	-0.00
	Max. H_x	11	37.43	34.29	-0.20
	Max. H_z	2	37.43	-0.09	33.93
	Max. M_x	2	2761.11	-0.09	33.93
	Max. M_z	5	2789.50	-34.23	0.00
	Max. Torsion	3	2.69	-17.11	29.40
	Min. Vert	11	37.43	34.29	-0.20
	Min. H_x	5	37.43	-34.23	0.00
	Min. H_z	8	37.43	0.30	-34.02
	Min. M_x	8	-2770.27	0.30	-34.02
	Min. M_z	11	-2798.64	34.29	-0.20
	Min. Torsion	8	-3.66	0.30	-34.02

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	37.43	0.00	0.00	0.11	1.37	0.00
Dead+Wind 0 deg - No Ice	37.43	0.09	-33.93	-2761.11	-6.64	-2.67
Dead+Wind 30 deg - No Ice	37.43	17.11	-29.40	-2392.83	-1393.75	-2.69
Dead+Wind 60 deg - No Ice	37.43	29.64	-16.97	-1380.31	-2415.33	-2.18
Dead+Wind 90 deg - No Ice	37.43	34.23	-0.00	0.46	-2789.50	-0.94
Dead+Wind 120 deg - No Ice	37.43	29.68	16.86	1371.61	-2419.35	0.57
Dead+Wind 150 deg - No Ice	37.43	17.00	29.44	2397.01	-1383.63	2.38
Dead+Wind 180 deg - No Ice	37.43	-0.30	34.02	2770.27	29.48	3.66
Dead+Wind 210 deg - No Ice	37.43	-17.29	29.38	2390.90	1412.94	3.42
Dead+Wind 240 deg - No Ice	37.43	-29.69	17.03	1386.35	2423.10	2.45
Dead+Wind 270 deg - No Ice	37.43	-34.29	0.20	19.09	2798.64	1.18

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
Dead+Wind 300 deg - No Ice	37.43	-29.84	-16.75	-1360.40	2437.58	-0.23
Dead+Wind 330 deg - No Ice	37.43	-17.12	-29.35	-2388.08	1398.64	-2.12
Dead+Ice+Temp	53.12	0.00	0.00	1.19	5.28	0.00
Dead+Wind 0 deg+Ice+Temp	53.12	0.02	-8.33	-688.86	3.36	-0.75
Dead+Wind 30 deg+Ice+Temp	53.12	4.20	-7.22	-597.00	-342.81	-0.71
Dead+Wind 60 deg+Ice+Temp	53.12	7.27	-4.17	-344.17	-597.57	-0.53
Dead+Wind 90 deg+Ice+Temp	53.12	8.39	-0.00	0.89	-690.74	-0.17
Dead+Wind 120 deg+Ice+Temp	53.12	7.27	4.14	343.86	-598.02	0.24
Dead+Wind 150 deg+Ice+Temp	53.12	4.17	7.22	599.78	-339.90	0.68
Dead+Wind 180 deg+Ice+Temp	53.12	-0.07	8.35	693.32	12.47	0.98
Dead+Wind 210 deg+Ice+Temp	53.12	-4.24	7.22	598.90	357.85	0.88
Dead+Wind 240 deg+Ice+Temp	53.12	-7.28	4.18	347.88	609.95	0.60
Dead+Wind 270 deg+Ice+Temp	53.12	-8.41	0.05	5.96	703.41	0.23
Dead+Wind 300 deg+Ice+Temp	53.12	-7.31	-4.11	-338.84	612.81	-0.15
Dead+Wind 330 deg+Ice+Temp	53.12	-4.20	-7.20	-595.45	353.78	-0.62
Dead+Wind 0 deg - Service	37.43	0.03	-11.74	-956.01	-1.36	-0.93
Dead+Wind 30 deg - Service	37.43	5.92	-10.17	-828.58	-481.73	-0.94
Dead+Wind 60 deg - Service	37.43	10.26	-5.87	-477.94	-835.51	-0.76
Dead+Wind 90 deg - Service	37.43	11.84	-0.00	0.23	-965.04	-0.33
Dead+Wind 120 deg - Service	37.43	10.27	5.83	475.07	-836.90	0.20
Dead+Wind 150 deg - Service	37.43	5.88	10.19	830.16	-478.22	0.83
Dead+Wind 180 deg - Service	37.43	-0.10	11.77	959.33	11.14	1.27
Dead+Wind 210 deg - Service	37.43	-5.98	10.17	828.05	490.24	1.19
Dead+Wind 240 deg - Service	37.43	-10.27	5.89	480.17	840.07	0.86
Dead+Wind 270 deg - Service	37.43	-11.86	0.07	6.68	970.08	0.41
Dead+Wind 300 deg - Service	37.43	-10.32	-5.80	-471.05	845.09	-0.08
Dead+Wind 330 deg - Service	37.43	-5.93	-10.15	-826.93	485.29	-0.74

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	-37.43	0.00	-0.00	37.43	-0.00	0.000%
2	0.09	-37.43	-33.93	-0.09	37.43	33.93	0.001%
3	17.12	-37.43	-29.40	-17.11	37.43	29.40	0.000%
4	29.64	-37.43	-16.97	-29.64	37.43	16.97	0.000%
5	34.23	-37.43	-0.00	-34.23	37.43	0.00	0.004%
6	29.68	-37.43	16.86	-29.68	37.43	-16.86	0.000%
7	17.00	-37.43	29.44	-17.00	37.43	-29.44	0.000%
8	-0.30	-37.43	34.02	0.30	37.43	-34.02	0.001%
9	-17.29	-37.43	29.38	17.29	37.43	-29.38	0.000%
10	-29.69	-37.43	17.03	29.69	37.43	-17.03	0.000%
11	-34.29	-37.43	0.20	34.29	37.43	-0.20	0.004%
12	-29.84	-37.43	-16.75	29.84	37.43	16.75	0.000%
13	-17.12	-37.43	-29.35	17.12	37.43	29.35	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
14	0.00	-53.12	0.00	-0.00	53.12	-0.00	0.003%
15	0.02	-53.12	-8.33	-0.02	53.12	8.33	0.001%
16	4.20	-53.12	-7.22	-4.20	53.12	7.22	0.001%
17	7.27	-53.12	-4.17	-7.27	53.12	4.17	0.001%
18	8.39	-53.12	-0.00	-8.39	53.12	0.00	0.001%
19	7.27	-53.12	4.14	-7.27	53.12	-4.14	0.001%
20	4.17	-53.12	7.22	-4.17	53.12	-7.22	0.001%
21	-0.07	-53.12	8.35	0.07	53.12	-8.35	0.001%
22	-4.24	-53.12	7.22	4.24	53.12	-7.22	0.001%
23	-7.28	-53.12	4.18	7.28	53.12	-4.18	0.001%
24	-8.41	-53.12	0.05	8.41	53.12	-0.05	0.001%
25	-7.31	-53.12	-4.11	7.31	53.12	4.11	0.001%
26	-4.20	-53.12	-7.20	4.20	53.12	7.20	0.001%
27	0.03	-37.43	-11.74	-0.03	37.43	11.74	0.005%
28	5.92	-37.43	-10.17	-5.92	37.43	10.17	0.002%
29	10.26	-37.43	-5.87	-10.26	37.43	5.87	0.002%
30	11.84	-37.43	-0.00	-11.84	37.43	0.00	0.005%
31	10.27	-37.43	5.84	-10.27	37.43	-5.83	0.002%
32	5.88	-37.43	10.19	-5.88	37.43	-10.19	0.002%
33	-0.10	-37.43	11.77	0.10	37.43	-11.77	0.005%
34	-5.98	-37.43	10.17	5.98	37.43	-10.17	0.002%
35	-10.27	-37.43	5.89	10.27	37.43	-5.89	0.002%
36	-11.87	-37.43	0.07	11.86	37.43	-0.07	0.005%
37	-10.32	-37.43	-5.80	10.32	37.43	5.80	0.002%
38	-5.93	-37.43	-10.15	5.93	37.43	10.15	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	14	0.00000001	0.00007450
3	Yes	16	0.00000001	0.00010541
4	Yes	16	0.00000001	0.00011760
5	Yes	13	0.00004742	0.00011921
6	Yes	16	0.00000001	0.00011115
7	Yes	16	0.00000001	0.00010610
8	Yes	14	0.00000001	0.00012945
9	Yes	16	0.00000001	0.00012162
10	Yes	16	0.00000001	0.00010637
11	Yes	13	0.00004740	0.00011188
12	Yes	16	0.00000001	0.00011198
13	Yes	16	0.00000001	0.00011592
14	Yes	6	0.00000001	0.00005261
15	Yes	14	0.00000001	0.00012938
16	Yes	14	0.00000001	0.00014439
17	Yes	14	0.00000001	0.00014609
18	Yes	14	0.00000001	0.00012870
19	Yes	14	0.00000001	0.00014474
20	Yes	14	0.00000001	0.00014386
21	Yes	14	0.00000001	0.00012997
22	Yes	14	0.00000001	0.00014950
23	Yes	14	0.00000001	0.00014794
24	Yes	14	0.00000001	0.00013190
25	Yes	14	0.00000001	0.00014821
26	Yes	14	0.00000001	0.00014806
27	Yes	12	0.00012841	0.00010981
28	Yes	13	0.00000001	0.00008055
29	Yes	13	0.00000001	0.00011779
30	Yes	12	0.00012838	0.00009512
31	Yes	13	0.00000001	0.00009666
32	Yes	13	0.00000001	0.00008236
33	Yes	12	0.00012839	0.00013712
34	Yes	13	0.00000001	0.00012894
35	Yes	13	0.00000001	0.00008193

36	Yes	12	0.00012840	0.00009726
37	Yes	13	0.00000001	0.00009975
38	Yes	13	0.00000001	0.00011137

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	117 - 110	23.84	36	1.94	0.01
L2	110 - 100	21.00	36	1.92	0.01
L3	100 - 83.6667	17.08	36	1.81	0.01
L4	83.6667 - 76.0833	11.47	36	1.42	0.01
L5	76.0833 - 71	9.37	36	1.21	0.00
L6	71 - 68.0833	8.14	36	1.09	0.00
L7	68.0833 - 63.5	7.49	36	1.04	0.00
L8	63.5 - 47.42	6.52	36	0.97	0.00
L9	52 - 38.0833	4.40	36	0.79	0.00
L10	38.0833 - 35	2.34	36	0.60	0.00
L11	35 - 12.5	1.97	36	0.55	0.00
L12	12.5 - 2.5	0.24	36	0.19	0.00
L13	2.5 - 0	0.01	36	0.04	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
117.0000	APXVSPP18-C-A20 w/ Mount Pipe	36	23.84	1.94	0.01	12598
115.0000	TME-PCS 1900MHz 4x45W-65MHz	36	23.03	1.94	0.01	12598
110.0000	Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe	36	21.00	1.92	0.01	8991
100.0000	(2) HBXX-6516DS-A2M w/ Mount Pipe	36	17.08	1.81	0.01	3648
95.0000	VHLP1-23	36	15.23	1.71	0.01	2825
94.0000	VHLP2-11	36	14.87	1.69	0.01	2704
93.0000	Pipe Mount [PM 601-3]	36	14.52	1.67	0.01	2592
92.0000	VHLP1-23	36	14.17	1.64	0.01	2490
88.0000	P65-17-XLH-RR w/ Mount Pipe	36	12.82	1.54	0.01	2150
81.0000	800 10504 w/ Mount Pipe	36	10.69	1.35	0.01	1977
72.0000	LBX-9012DS-VTM w/ Mount Pipe	36	8.37	1.11	0.00	2691

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	117 - 110	68.61	11	5.59	0.03
L2	110 - 100	60.46	11	5.53	0.03
L3	100 - 83.6667	49.19	11	5.20	0.03
L4	83.6667 - 76.0833	33.04	11	4.10	0.02
L5	76.0833 - 71	27.01	11	3.49	0.01
L6	71 - 68.0833	23.47	11	3.15	0.01
L7	68.0833 - 63.5	21.59	11	3.01	0.01
L8	63.5 - 47.42	18.81	11	2.79	0.01

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L9	52 - 38.0833	12.69	11	2.29	0.01
L10	38.0833 - 35	6.74	11	1.73	0.00
L11	35 - 12.5	5.67	11	1.58	0.00
L12	12.5 - 2.5	0.70	11	0.55	0.00
L13	2.5 - 0	0.03	11	0.10	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
117.0000	APXVSPP18-C-A20 w/ Mount Pipe	11	68.61	5.59	0.03	4461
115.0000	TME-PCS 1900MHz 4x45W-65MHz	11	66.27	5.58	0.03	4461
110.0000	Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe	11	60.46	5.53	0.03	3180
100.0000	(2) HBXX-6516DS-A2M w/ Mount Pipe	11	49.19	5.20	0.03	1292
95.0000	VHLP1-23	11	43.87	4.92	0.03	998
94.0000	VHLP2-11	11	42.84	4.86	0.03	955
93.0000	Pipe Mount [PM 601-3]	11	41.82	4.79	0.03	915
92.0000	VHLP1-23	11	40.82	4.73	0.03	879
88.0000	P65-17-XLH-RR w/ Mount Pipe	11	36.95	4.44	0.02	757
81.0000	800 10504 w/ Mount Pipe	11	30.81	3.88	0.01	694
72.0000	LBX-9012DS-VTM w/ Mount Pipe	11	24.14	3.21	0.01	941

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	117 - 110 (1)	TP15.94x14.36x0.188	7.0000	0.0000	0.0	39.00	9.5356	-0.86	371.89	0.002
L2	110 - 100 (2)	TP18.2x15.94x0.188	10.0000	0.0000	0.0	39.00	10.9037	-2.80	425.25	0.007
L3	100 - 83.6667 (3)	TP21.8935x18.2x0.25	16.3333	0.0000	0.0	39.00	17.4230	-9.71	679.50	0.014
L4	83.6667 - 76.0833 (4)	TP23.6083x21.8935x0.3261	7.5834	0.0000	0.0	35.39	24.4444	-11.04	865.04	0.013
L5	76.0833 - 71 (5)	TP24.7578x23.6083x0.4532	5.0833	0.0000	0.0	30.68	35.4686	-13.54	1088.32	0.012
L6	71 - 68.0833 (6)	TP25.4174x24.7578x0.6477	2.9167	0.0000	0.0	26.62	51.6618	-14.19	1375.34	0.010
L7	68.0833 - 63.5 (7)	TP26.4538x25.4174x0.6838	4.5833	0.0000	0.0	28.00	56.7373	-15.30	1588.76	0.010
L8	63.5 - 47.42 (8)	TP30.09x26.4538x0.8127	16.0800	0.0000	0.0	28.10	73.9044	-18.66	2077.01	0.009
L9	47.42 - 38.0833 (9)	TP31.6978x27.4289x0.8034	13.9167	0.0000	0.0	27.80	74.1579	-21.79	2061.44	0.011
L10	38.0833 - 35 (10)	TP32.3942x31.6978x0.7395	3.0833	0.0000	0.0	27.82	75.3760	-25.04	2096.66	0.012
L11	35 - 12.5 (11)	TP37.4765x32.3942x0.7644	22.5000	0.0000	0.0	29.04	90.3620	-32.81	2624.11	0.013
L12	12.5 - 2.5 (12)	TP39.7353x37.4765x0.7263	10.0000	0.0000	0.0	29.19	91.2310	-36.44	2663.03	0.014
L13	2.5 - 0 (13)	TP40.3x39.7353x0.7719	2.5000	0.0000	0.0	30.29	98.2441	-37.42	2975.62	0.013

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	

Pole Bending Design Data

Section No.	Elevation	Size	Actual M_x	Actual f_{bx}	Allow. F_{bx}	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y	Actual f_{by}	Allow. F_{by}	Ratio $\frac{f_{by}}{F_{by}}$
	ft		kip-ft	ksi	ksi		kip-ft	ksi	ksi	
L1	117 - 110 (1)	TP15.94x14.36x0.188	16.46	5.40	39.00	0.138	0.00	0.00	39.00	0.000
L2	110 - 100 (2)	TP18.2x15.94x0.188	75.48	18.91	39.00	0.485	0.00	0.00	39.00	0.000
L3	100 - 83.6667 (3)	TP21.8935x18.2x0.25	345.75	45.17	39.00	1.158	0.00	0.00	39.00	0.000
L4	83.6667 - 76.0833 (4)	TP23.6083x21.8935x0.3261	517.27	44.88	35.39	1.268	0.00	0.00	35.39	0.000
L5	76.0833 - 71 (5)	TP24.7578x23.6083x0.4532	639.22	36.78	30.68	1.199	0.00	0.00	30.68	0.000
L6	71 - 68.0833 (6)	TP25.4174x24.7578x0.6477	716.49	27.98	26.62	1.051	0.00	0.00	26.62	0.000
L7	68.0833 - 63.5 (7)	TP26.4538x25.4174x0.6838	839.95	28.72	28.00	1.026	0.00	0.00	28.00	0.000
L8	63.5 - 47.42 (8)	TP30.09x26.4538x0.8127	1160.65	27.86	28.10	0.991	0.00	0.00	28.10	0.000
L9	47.42 - 38.0833 (9)	TP31.6978x27.4289x0.8034	1353.84	31.88	27.80	1.147	0.00	0.00	27.80	0.000
L10	38.0833 - 35 (10)	TP32.3942x31.6978x0.7395	1664.24	34.76	27.82	1.250	0.00	0.00	27.82	0.000
L11	35 - 12.5 (11)	TP37.4765x32.3942x0.7644	2378.44	35.64	29.04	1.227	0.00	0.00	29.04	0.000
L12	12.5 - 2.5 (12)	TP39.7353x37.4765x0.7263	2713.29	37.82	29.19	1.296	0.00	0.00	29.19	0.000
L13	2.5 - 0 (13)	TP40.3x39.7353x0.7719	2798.71	35.78	30.29	1.181	0.00	0.00	30.29	0.000

Pole Shear Design Data

Section No.	Elevation	Size	Actual V	Actual f_v	Allow. F_v	Ratio $\frac{f_v}{F_v}$	Actual T	Actual f_{vt}	Allow. F_{vt}	Ratio $\frac{f_{vt}}{F_{vt}}$
	ft		K	ksi	ksi		kip-ft	ksi	ksi	
L1	117 - 110 (1)	TP15.94x14.36x0.188	2.66	0.28	26.00	0.022	0.00	0.00	26.00	0.000
L2	110 - 100 (2)	TP18.2x15.94x0.188	6.28	0.58	26.00	0.045	0.01	0.00	26.00	0.000
L3	100 - 83.6667 (3)	TP21.8935x18.2x0.25	21.86	1.25	26.00	0.098	1.61	0.10	26.00	0.004
L4	83.6667 - 76.0833 (4)	TP23.6083x21.8935x0.3261	23.21	0.95	23.59	0.082	1.59	0.06	23.59	0.003
L5	76.0833 - 71 (5)	TP24.7578x23.6083x0.4532	26.32	0.74	20.46	0.074	1.56	0.04	20.46	0.002
L6	71 - 68.0833 (6)	TP25.4174x24.7578x0.6477	26.67	0.52	17.75	0.059	1.55	0.03	17.75	0.002
L7	68.0833 - 63.5 (7)	TP26.4538x25.4174x0.6838	27.21	0.48	18.67	0.052	1.53	0.02	18.67	0.001
L8	63.5 - 47.42 (8)	TP30.09x26.4538x0.8127	28.58	0.39	18.74	0.042	1.47	0.02	18.74	0.001
L9	47.42 - 38.0833 (9)	TP31.6978x27.4289x0.8034	29.55	0.40	18.53	0.043	1.43	0.02	18.53	0.001
L10	38.0833 - 35 (10)	TP32.3942x31.6978x0.7395	30.57	0.41	18.54	0.044	1.38	0.01	18.54	0.001
L11	35 - 12.5 (11)	TP37.4765x32.3942x0.7644	32.95	0.36	19.36	0.038	1.26	0.01	19.36	0.000
L12	12.5 - 2.5 (12)	TP39.7353x37.4765x0.7263	34.03	0.37	19.46	0.039	1.20	0.01	19.46	0.000
L13	2.5 - 0 (13)	TP40.3x39.7353x0.7719	34.31	0.35	20.19	0.035	1.18	0.01	20.19	0.000

Pole Interaction Design Data

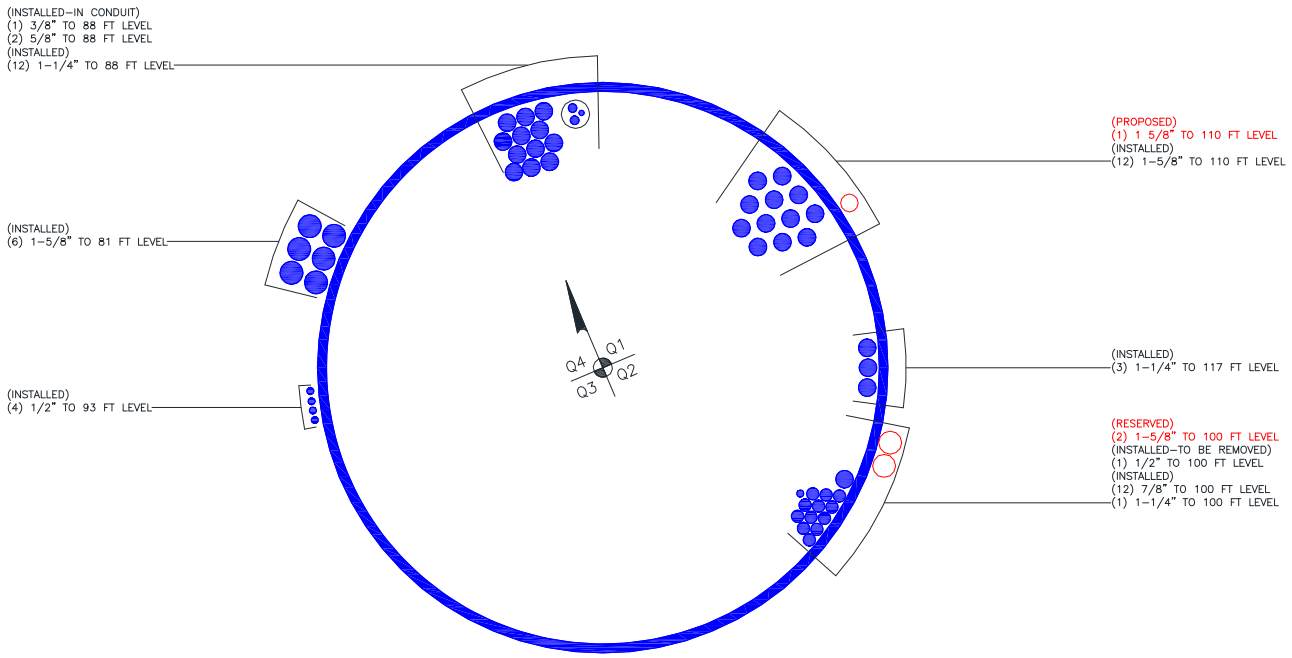
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	117 - 110 (1)	0.002	0.138	0.000	0.022	0.000	0.141 ✔	1.333	H1-3+VT ✔
L2	110 - 100 (2)	0.007	0.485	0.000	0.045	0.000	0.492 ✔	1.333	H1-3+VT ✔
L3	100 - 83.6667 (3)	0.014	1.158	0.000	0.098	0.004	1.175 ✔	1.333	H1-3+VT ✔
L4	83.6667 - 76.0833 (4)	0.013	1.268	0.000	0.082	0.003	1.283 ✔	1.333	H1-3+VT ✔
L5	76.0833 - 71 (5)	0.012	1.199	0.000	0.074	0.002	1.213 ✔	1.333	H1-3+VT ✔
L6	71 - 68.0833 (6)	0.010	1.051	0.000	0.059	0.002	1.062 ✔	1.333	H1-3+VT ✔
L7	68.0833 - 63.5 (7)	0.010	1.026	0.000	0.052	0.001	1.036 ✔	1.333	H1-3+VT ✔
L8	63.5 - 47.42 (8)	0.009	0.991	0.000	0.042	0.001	1.001 ✔	1.333	H1-3+VT ✔
L9	47.42 - 38.0833 (9)	0.011	1.147	0.000	0.043	0.001	1.158 ✔	1.333	H1-3+VT ✔
L10	38.0833 - 35 (10)	0.012	1.250	0.000	0.044	0.001	1.262 ✔	1.333	H1-3+VT ✔
L11	35 - 12.5 (11)	0.013	1.227	0.000	0.038	0.000	1.240 ✔	1.333	H1-3+VT ✔
L12	12.5 - 2.5 (12)	0.014	1.296	0.000	0.039	0.000	1.310 ✔	1.333	H1-3+VT ✔
L13	2.5 - 0 (13)	0.013	1.181	0.000	0.035	0.000	1.194 ✔	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	117 - 110	Pole	TP15.94x14.36x0.188	1	-0.86	495.73	10.6	Pass
L2	110 - 100	Pole	TP18.2x15.94x0.188	2	-2.80	566.85	36.9	Pass
L3	100 - 83.6667	Pole	TP21.8935x18.2x0.25	3	-9.71	905.77	88.2	Pass
L4	83.6667 - 76.0833	Pole	TP23.6083x21.8935x0.3261	4	-11.04	1153.09	96.2	Pass
L5	76.0833 - 71	Pole	TP24.7578x23.6083x0.4532	5	-13.54	1450.73	91.0	Pass
L6	71 - 68.0833	Pole	TP25.4174x24.7578x0.6477	6	-14.19	1833.33	79.7	Pass
L7	68.0833 - 63.5	Pole	TP26.4538x25.4174x0.6838	7	-15.30	2117.82	77.7	Pass
L8	63.5 - 47.42	Pole	TP30.09x26.4538x0.8127	8	-18.66	2768.65	75.1	Pass
L9	47.42 - 38.0833	Pole	TP31.6978x27.4289x0.8034	9	-21.79	2747.90	86.9	Pass
L10	38.0833 - 35	Pole	TP32.3942x31.6978x0.7395	10	-25.04	2794.85	94.7	Pass
L11	35 - 12.5	Pole	TP37.4765x32.3942x0.7644	11	-32.81	3497.94	93.0	Pass
L12	12.5 - 2.5	Pole	TP39.7353x37.4765x0.7263	12	-36.44	3549.82	98.3	Pass
L13	2.5 - 0	Pole	TP40.3x39.7353x0.7719	13	-37.42	3966.50	89.6	Pass
						Summary		
						Pole (L12)	98.3	Pass
						RATING =	**98.3**	**Pass**

APPENDIX B

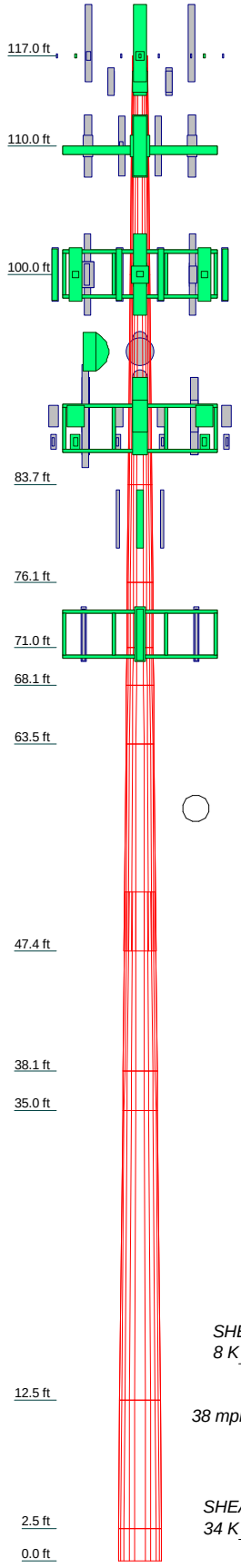
BASE LEVEL DRAWING

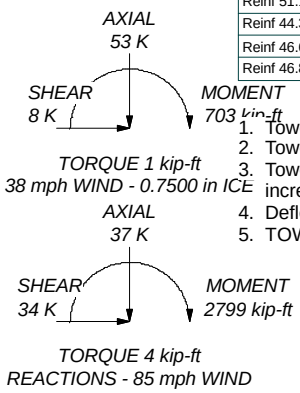

(INSTALLED–IN CONDUIT)
(1) 3/8" TO 88 FT LEVEL
(2) 5/8" TO 88 FT LEVEL
(INSTALLED)
(12) 1–1/4" TO 88 FT LEVEL
(PROPOSED)
(1) 1 5/8" TO 110 FT LEVEL
(INSTALLED)
(12) 1–5/8" TO 110 FT LEVEL
(INSTALLED)
(6) 1–5/8" TO 81 FT LEVEL
(INSTALLED)
(3) 1–1/4" TO 117 FT LEVEL
(INSTALLED)
(4) 1/2" TO 93 FT LEVEL
(RESERVED)
(2) 1–5/8" TO 100 FT LEVEL
(INSTALLED–TO BE REMOVED)
(1) 1/2" TO 100 FT LEVEL
(INSTALLED)
(12) 7/8" TO 100 FT LEVEL
(1) 1–1/4" TO 100 FT LEVEL
Q1
Q2
Q3
Q4

APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5	6	7	8	9	10	11	12	13
Length (ft)	7.0000	10.0000	16.3333	7.5834	5.0833	2.9167	4.5833	16.0800	13.9167	3.0833	22.5000	10.0000	2.5000
Number of Sides	12	12	12	12	12	12	12	12	12	12	12	12	12
Thickness (in)	0.1880	0.1880	0.2500	0.3261	0.4532	0.6477	0.6837	0.8127	0.8034	0.7395	0.7644	0.7263	0.7719
Socket Length (ft)								4.5800					
Top Dia (in)	14.3600	15.9400	18.2000	21.8935	23.6083	24.7578	25.4174	26.4538	27.4289	31.6978	32.3942	37.4765	39.7353
Bot Dia (in)	15.9400	18.2000	21.8935	23.6083	24.7578	25.4174	26.4538	30.0900	31.6978	32.3942	37.4765	39.7353	40.3000
Grade	A572-65	A572-65	A572-65	Reinf 58.98 ksi	Reinf 51.14 ksi	Reinf 44.37 ksi	Reinf 46.67 ksi	Reinf 46.84 ksi	Reinf 46.33 ksi	Reinf 46.36 ksi	Reinf 48.40 ksi	Reinf 48.65 ksi	Reinf 50.48 ksi
Weight (K)	0.2	0.3	0.9	0.6	0.6	0.5	0.9	3.9	3.5	0.8	6.4	3.0	0.8





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
APXVSPP18-C-A20 w/ Mount Pipe	117	RRH2X40-07-U	100
APXVSPP18-C-A20 w/ Mount Pipe	117	DB-T1-6Z-8AB-0Z	100
APXVSPP18-C-A20 w/ Mount Pipe	117	(2) DB844G65ZAXY w/ Mount Pipe	100
800 EXTERNAL NOTCH FILTER	117	(2) DB844G65ZAXY w/ Mount Pipe	100
800 EXTERNAL NOTCH FILTER	117	(2) DB844G65ZAXY w/ Mount Pipe	100
800 EXTERNAL NOTCH FILTER	117	GPS_A	100
(3) ACU-A20-N	117	(2) FD9R6004/2C-3L	100
(3) ACU-A20-N	117	(2) FD9R6004/2C-3L	100
(3) ACU-A20-N	117	(2) FD9R6004/2C-3L	100
Pipe Mount [PM 601-3]	117	DB-T1-6Z-8AB-0Z	100
TME-PCS 1900MHz 4x45W-65MHz	115	Platform Mount [LP 715-1]	100
TME-PCS 1900MHz 4x45W-65MHz	115	Pipe Mount [PM 601-3]	93
TME-PCS 1900MHz 4x45W-65MHz	115	VHLP2-11	93
TME-800MHZ RRH	115	VHLP1-23	93
TME-800MHZ RRH	115	VHLP2.5-11	93
TME-800MHZ RRH	115	VHLP1-23	93
Side Arm Mount [SO 102-3]	115	7770.00 w/ Mount Pipe	88
Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe	110	7770.00 w/ Mount Pipe	88
		(2) LGP2140X	88
Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe	110	(2) LGP2140X	88
		(2) LGP2140X	88
Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe	110	(2) LGP13519	88
		(2) LGP13519	88
RRUS 11 B12	110	(2) LGP13519	88
RRUS 11 B12	110	(2) RRUS-11	88
RRUS 11 B12	110	(2) RRUS-11	88
T-Arm Mount [TA 602-3]	110	(2) RRUS-11	88
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	110	DC6-48-60-18-8F	88
		OPA-65R-LCUU-H6 w/ Mount Pipe	88
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	110	OPA-65R-LCUU-H6 w/ Mount Pipe	88
		OPA-65R-LCUU-H6 w/ Mount Pipe	88
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	110	RRUS 32 B30	88
KRY 112 144/1	110	RRUS 32 B30	88
KRY 112 144/1	110	RRUS 32 B30	88
KRY 112 144/1	110	Platform Mount [LP 715-1]	88
(2) HBXX-6516DS-A2M w/ Mount Pipe	100	P65-17-XLH-RR w/ Mount Pipe	88
(2) HBXX-6516DS-A2M w/ Mount Pipe	100	P65-16-XLH-RR w/ Mount Pipe	88
(2) HBXX-6516DS-A2M w/ Mount Pipe	100	P65-16-XLH-RR w/ Mount Pipe	88
RRH2X60-AWS	100	7770.00 w/ Mount Pipe	88
RRH2X60-AWS	100	800 10504 w/ Mount Pipe	81
RRH2X60-AWS	100	800 10504 w/ Mount Pipe	81
RRH2X60-PCS	100	800 10504 w/ Mount Pipe	81
RRH2X60-PCS	100	Pipe Mount [PM 601-3]	81
RRH2X60-PCS	100	DB844H90E-XY w/ Mount Pipe	72
800 10735V01 w/ Mount Pipe	100	DB844H90E-XY w/ Mount Pipe	72
800 10735V01 w/ Mount Pipe	100	Platform Mount (LP 101-1)	72
800 10735V01 w/ Mount Pipe	100	LBX-9012DS-VTM w/ Mount Pipe	72
RRH2X40-07-U	100	LBX-9012DS-VTM w/ Mount Pipe	72
RRH2X40-07-U	100	LBX-9012DS-VTM w/ Mount Pipe	72
		DB844H90E-XY w/ Mount Pipe	72

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi	Reinf 46.33 ksi	46 ksi	58 ksi
Reinf 58.98 ksi	59 ksi	74 ksi	Reinf 46.36 ksi	46 ksi	58 ksi
Reinf 51.14 ksi	51 ksi	64 ksi	Reinf 48.40 ksi	48 ksi	61 ksi
Reinf 44.37 ksi	44 ksi	56 ksi	Reinf 48.65 ksi	49 ksi	61 ksi
Reinf 46.67 ksi	47 ksi	59 ksi	Reinf 50.48 ksi	50 ksi	64 ksi
Reinf 46.84 ksi	47 ksi	59 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield 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: 98.3%

Paul J Ford and Company
250 E. Broad Street Suite 600
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.44105

Job: **117' Monopole / Darien, CT**			
Project: **PJF 37515-1078 / BU 806352**			
Client: Crown Castle	Drawn by: Robert Koors	App'd:	
Code: TIA/EIA-222-F	Date: 11/10/15	Scale: NTS	
Path:		Dwg No. E-1	

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

Site Data

BU#: *806352*
Site Name:
App #:

Pole Manufacturer:	Other

Reactions		
Moment:	16.46	ft-kips
Axial:	0.86	kips
Shear:	2.66	kips
Elevation:	110	feet

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

Bolt Data			
Qty:	10		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle (in.):	19.5		

Plate Data		
Diam:	22	in
Thick, t:	1.5	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	5.13	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:	15.94	in
Thick:	0.188	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Flange Bolt Results

			Rigid
Bolt Tension Capacity, **B**:	46.07	kips	Service, ASD
Max Bolt directly applied T:	3.97	Kips	Fty*ASIF
Min. PL "tc" for **B** cap. **w/o** Pry:	1.401	in	
Min PL "treq" for actual **T w/ Pry**:	0.307	in	
Min PL "t1" for actual **T w/o Pry**:	0.411	in	
T allowable w/o Prying:	46.07	kips	α'<0 case
Prying Force, Q:	0.00	kips	
Total Bolt Tension=T+Q:	3.97	kips	
Non-Prying Bolt Stress Ratio, T/B:	8.6%	**Pass**	

Exterior Flange Plate Results Flexural Check

			Rigid
Compression Side Plate Stress:	2.4	ksi	Service ASD
Allowable Plate Stress:	36.0	ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	6.8%	**Pass**	Comp. Y.L. Length:
No Prying			11.23
Tension Side Stress Ratio, (treq/t)^2:	4.2%	**Pass**	

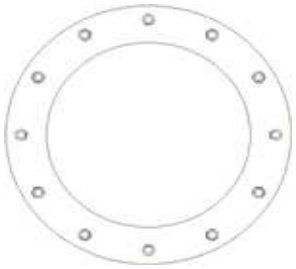
n/a

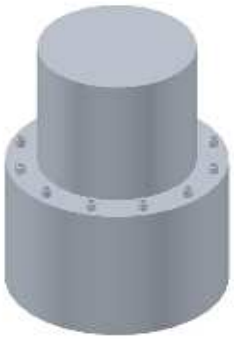
Stiffener Results

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

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

Site Data

BU#: *806352*
Site Name:
App #:

Pole Manufacturer:	Other

Reactions		
Moment:	75.48	ft-kips
Axial:	2.8	kips
Shear:	6.28	kips
Elevation:	100	feet

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

Bolt Data			
Qty:	12		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle (in.):	22		

Plate Data		
Diam:	24	in
Thick, t:	1.5	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	4.88	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:	18.2	in
Thick:	0.188	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Flange Bolt Results

Bolt Tension Capacity, **B**:	46.07	kips	Rigid
Max Bolt directly applied T:	13.49	Kips	Service, ASD
Min. PL "tc" for **B** cap. **w/o** Pry:	1.502	in	Fty*ASIF
Min PL "treq" for actual **T w/ Pry**:	0.610	in	
Min PL "t1" for actual **T w/o Pry**:	0.813	in	
T allowable with Prying:	46.00	kips	0≤α'≤1 case
Prying Force, Q:	0.00	kips	
Total Bolt Tension=T+Q:	13.49	kips	
Prying Bolt Stress Ratio=(T+Q)/(B):	29.3%	**Pass**	

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	8.9	ksi	Rigid
Allowable Plate Stress:	36.0	ksi	Service ASD
Compression Plate Stress Ratio:	24.7%	**Pass**	0.75*Fy*ASIF
No Prying			Comp. Y.L. Length:
Tension Side Stress Ratio, (treq/t)^2:	16.5%	**Pass**	12.36

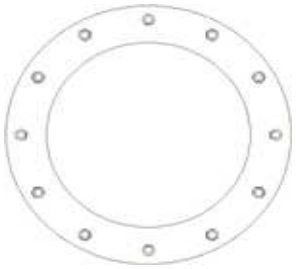
n/a

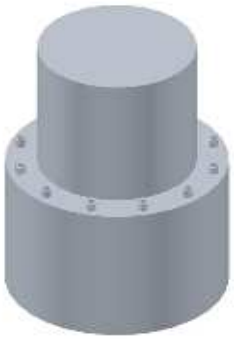
Stiffener Results

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

v4.4 - Effective 7-12-13

Date: 11/10/2015
PJF Project: 37515-1078.005.7700
Client Ref. # BU 806352
Site Name: BRG 302 943052
Description: 100-ft Tapered Pole w/ 10-ft and 7-ft Extensions
Owner: Crown Castle
Engineer: RMK

Asymmetric Anchor Rod Analysis

Moment =	2799	k-ft	TIA Ref.	F	Location =	Base Plate		
Axial =	37.0	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	34.0	kips	Max Ratio =	100.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	18							

**** For Post Installed Anchors: Check anchors for embedment, epoxy/grout bond, and capacity based on proof load. ****

Item	Nominal Anchor Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	2.250	#18J A615 Gr 75	75	100	0.0	48.22	0.00	3.98	147.83	143.42	143.42	0.00	195.00	73.6%
2	2.250	#18J A615 Gr 75	75	100	30.0	48.22	0.00	3.98	147.83	143.42	143.42	0.00	195.00	73.6%
3	2.250	#18J A615 Gr 75	75	100	60.0	48.22	0.00	3.98	147.83	143.42	143.42	0.00	195.00	73.6%
4	2.250	#18J A615 Gr 75	75	100	90.0	48.22	0.00	3.98	147.83	143.42	143.42	0.00	195.00	73.6%
5	2.250	#18J A615 Gr 75	75	100	120.0	48.22	0.00	3.98	147.83	143.42	143.42	0.00	195.00	73.6%
6	2.250	#18J A615 Gr 75	75	100	150.0	48.22	0.00	3.98	147.83	143.42	143.42	0.00	195.00	73.6%
7	2.250	#18J A615 Gr 75	75	100	180.0	48.22	0.00	3.98	147.83	143.42	143.42	0.00	195.00	73.6%
8	2.250	#18J A615 Gr 75	75	100	210.0	48.22	0.00	3.98	147.83	143.42	143.42	0.00	195.00	73.6%
9	2.250	#18J A615 Gr 75	75	100	240.0	48.22	0.00	3.98	147.83	143.42	143.42	0.00	195.00	73.6%
10	2.250	#18J A615 Gr 75	75	100	270.0	48.22	0.00	3.98	147.83	143.42	143.42	0.00	195.00	73.6%
11	2.250	#18J A615 Gr 75	75	100	300.0	48.22	0.00	3.98	147.83	143.42	143.42	0.00	195.00	73.6%
12	2.250	#18J A615 Gr 75	75	100	330.0	48.22	0.00	3.98	147.83	143.42	143.42	0.00	195.00	73.6%
13	1.750	A193 Gr B7	105	125	105.0	58.72	0.00	2.41	108.50	105.84	105.84	0.00	132.29	80.0%
14	1.750	A193 Gr B7	105	125	225.0	58.72	0.00	2.41	108.50	105.84	105.84	0.00	132.29	80.0%
15	1.750	A193 Gr B7	105	125	345.0	58.72	0.00	2.41	108.50	105.84	105.84	0.00	132.29	80.0%
16	2.250	A193 Gr B7	105	125	15.0	58.72	0.00	3.98	179.36	174.96	174.96	0.00	218.68	80.0%
17	2.250	A193 Gr B7	105	125	135.0	58.72	0.00	3.98	179.36	174.96	174.96	0.00	218.68	80.0%
18	2.250	A193 Gr B7	105	125	255.0	58.72	0.00	3.98	179.36	174.96	174.96	0.00	218.68	80.0%
								66.90						

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Stiffened or Unstiffened, Ungrouted, Circular Base Plate - Any Rod Material

TIA Rev F

Site Data

BU#:	*806352*
Site Name:	
App #:	
Pole Manufacturer:	*Other*

Reactions		
Moment:	1755.5	ft-kips
Axial:	26.4	kips
Shear:	24.3	kips

Reactions adjusted to account for additional anchor rods.

Anchor Rod Data		
Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	48.22	in

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

Anchor Rod Results

Maximum Rod Tension:	143.4 Kips	Rigid
Allowable Tension:	195.0 Kips	Service, ASD
See asymmetric spreadsheet		Fty*ASIF

Plate Data		
Diam:	54.22	in
Thick:	2.5	in
Grade:	60	ksi
Single-Rod B-eff:	10.80	in

Base Plate Results Flexural Check

Base Plate Stress:	32.5 ksi	Rigid
Allowable Plate Stress:	60.0 ksi	Service ASD
Base Plate Stress Ratio:	54.2% **Pass**	0.75*Fy*ASIF
		Y.L. Length: 26.48

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

n/a

Stiffener Results

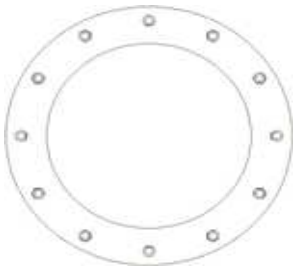
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	40.3	in
Thick:	0.344	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	



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

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

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

Job Number: 37515-1078.005.7700
Site Number: 806352
Site Name: BRG 302 943052

By: RMK
Date: 11/10/2015

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

Unfactored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, M =	2799.0		k-ft
Shear, V =	34.0		kips
Axial Load, P =	37.0		kips
OTM =	2805.8	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 =	6.5	ft
Height Above Grade =	0.2	ft
Depth Below Grade =	16.4	ft
fc' =	3	ksi
εc =	0.003	in/in
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 =	22	
Rebar Size =	#10	
Rebar Fy =	60	ksi
Rebar MOE =	29000	ksi
Tie Size =	#6	
Side Clear Cover to Ties =	5	in

Soil Parameters

Water Table Depth =	99.00	ft
Depth to Ignore Soil =	4.00	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	4	115		30	Sand				4
2	2	120		39	Sand	23000	420		6
3	5	135		45	Sand	30900	2150		11
4	5.4	155	14000		Clay	36900	4740		16.4
5									
6									
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	13.29	ft, from Grade	Shear, V =	34.00	kips
Bending Moment, M =	3257.68	k-ft, from COR	Resisting Shear, Va =	46.50	kips
Resisting Moment, Ma =	4455.61	k-ft, from COR			

MOMENT RATIO = 73.1% OK **SHEAR RATIO = 73.1% OK**

Soil Results: Uplift

Uplift, T =	0.00	kips
Allowable Uplift Cap., Ta =	66.10	kips

UPLIFT RATIO = 0.0% OK

Soil Results: Compression

Compression, C =	37.00	kips
Allowable Comp. Cap., Ca =	982.68	kips

COMPRESSION RATIO = 3.8% OK

Steel Results (ACI 318-02):

Minimum Steel Area =	15.93	sq in	Axial Load, P =	63.34	kips @ 5.50 ft Below Grade
Actual Steel Area =	27.94	sq in	Moment, M =	2974.47	k-ft @ 5.50 ft Below Grade
			Allowable Moment, Ma =	3165.47	k-ft
Allowable Min Axial, Pa =	-1160.58	kips, Where Ma = 0 k-ft			
Allowable Max Axial, Pa =	5515.99	kips, Where Ma = 0 k-ft			

MOMENT RATIO = 94.0% OK

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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#: *806352*
Site Name: *BRG 302 943052*
App #:

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

Pier Properties

Concrete:

Pier Diameter =	6.5	ft
Concrete Area =	4778.4	in^2

Reinforcement:

Clear Cover to **Tie**=	5.00	in
Horiz. **Tie** Bar Size=	6	
Vert. Cage Diameter =	5.44	ft
Vert. Cage Diameter =	65.23	in
Vertical Bar Size =	10	
Bar Diameter =	1.27	in
Bar Area =	1.27	in^2
Number of Bars =	22	
As Total=	27.94	in^2
A s/ Aconc, Rho:	0.0058	0.58%

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:	0.58%	**OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	7170.79	kips
at Mu=(ϕ=0.65)Mn=	3988.84	ft-kips
Max Tu, (φ=0.9) Tn =	1508.76	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	2974.47	ft-kips **(* Note)**
Max. Service Shaft P:	63.34	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:	3866.811	ft-kips
1.30	Pu:	82.342	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

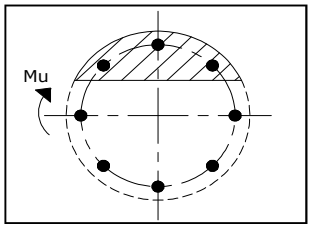
Seismic Properties

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

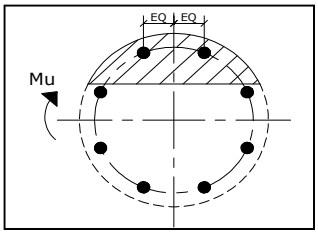
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **2**



Case 1



Case 2

Dist. From Edge to Neutral Axis:	**13.61**	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:	82.34	kips
Drilled Shaft Moment Capacity, φMn:	**4115.10**	ft-kips
Drilled Shaft Superimposed Mu:	**3866.81**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**94.0%**

MODIFICATION OF AN EXISTING 117'-0" MONOPOLE

BU #806352; BRG 302 943052

126 LEDGE ROAD
DARIEN, CONNECTICUT 06820
FAIRFIELD COUNTY
LAT: 41° 4' 20.75"; LONG: -73° 28' 41.4"
APP: 310468 REV. 1; WO: 1140996

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.VENDOR@CROWNCASTLE.COM
PH: (860) 209-0104

ENGINEER OF RECORD:
PJFMOD@PJFWEB.COM

WIND DESIGN DATA	
REFERENCE STANDARD	TIA/EIA-222-F
LOCAL CODE	2005 CONNECTICUT BUILDING CODE
BASIC WIND SPEED (FASTEST-MILE)	85 MPH
ICE THICKNESS	0.75 MPH
ICE WIND SPEED	37.6 MPH
SERVICE WIND SPEED	50 MPH

THIS PROJECT INCLUDES THE FOLLOWING ITEMS
SHAFT REINFORCING
FIELD WELDED ANCHOR BRACKETS
POST INSTALLED ANCHOR RODS
REMOVAL AND REINSTALLATION OF EXISTING STEP BOLTS

THE ASSOCIATED FAILING SA WO NUMBER FOR THIS PROJECT IS 1118887

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.

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	BASE PLATE DETAILS
S-5	MISC DETAILS
S-6	MI CHECKLIST

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

MODIFICATION OF AN EXISTING
117'-0" MONOPOLE
BU #806352; BRG 302 943052
DARIEN, CONNECTICUT

PROJECT No:	37515-1078.005.7700
DRAWN BY:	C.A.W.
DESIGNED BY:	R.M.K.
CHECKED BY:	
DATE:	11/10/2015

TITLE SHEET

T-1

37515-1078.005.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

6.1. UNLESS OTHERWISE NOTED, REINFORCING ANCHOR RODS SHALL BE 150 KSI ALL-THREAD BARS CONFORMING TO ASTM A722. RECOMMENDED MANUFACTURERS/SUPPLIERS OF 150 KSI ALL-THREAD BARS ARE WILLIAMS FORM ENGINEERING CORPORATION AND DYWIDAG SYSTEMS INTERNATIONAL.

6.2. ALL REINFORCING ANCHOR RODS SHALL BE HOT DIP GALVANIZED PER ASTM A123.

6.3. THE CORE-DRILLED HOLES IN THE CONCRETE FOR THE ANCHOR RODS SHALL BE CLEAN AND DRY, AND OTHERWISE PROPERLY PREPARED ACCORDING TO THE ANCHOR ROD AND EPOXY MANUFACTURERS' INSTRUCTIONS, PRIOR TO PLACEMENT OF ANCHOR RODS AND EPOXY. CONTRACTOR SHALL FOLLOW ALL ANCHOR ROD AND EPOXY MANUFACTURER RECOMMENDATIONS REGARDING HANDLING OF RODS, EPOXY, ACCEPTABLE AMBIENT TEMPERATURE RANGE DURING INSTALLATION AND POST-INSTALLATION CURING, THE EFFECT OF TEMPERATURE ON EPOXY CURING TIME, PREPARATION OF HOLE, ETC.

6.4. HILTI HIT RE-500 SD OR ITW RED HEAD EPCON G5 EPOXY SHALL BE USED TO ANCHOR THE BAR IN THE DRILL HOLES. IF THE DESIGNED EMBEDMENT IS GREATER THAN 12 FT, CONTRACTOR HAS THE OPTION TO USE PILE ANCHOR GROUT BY E-CHEM AS AN ALTERNATE. IF CONTRACTOR WISHES TO USE A DIFFERENT EPOXY, A REQUEST INCLUDING THE EPOXY TECHNICAL DATA SHEET(S) SHALL BE SUBMITTED TO THE EOR FOR REVIEW PRIOR TO CONSTRUCTION.

6.5. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN INSTALLED AND ALL EPOXY AND GROUT HAVE CURED (IF BASE PLATE AND/OR BEARING PLATES HAVE BEEN GROUTED PRIOR TO TESTING), ALL REINFORCING ANCHORS SHALL BE LOAD TESTED PER CROWN CASTLE ENGINEERING DOCUMENT #ENG-PRC-10119. REFER TO THE NEW ANCHOR & BRACKET DETAIL ON FOLLOWING SHEETS FOR SPECIFIED ANCHOR ROD TARGET TENSION LOAD.

6.6. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN SUCCESSFULLY LOAD TESTED AND APPROVED THE CONTRACTOR SHALL TIGHTEN ALL HEAVY HEX ANCHOR NUTS TO SNUG TIGHT PLUS 1/8 TURN OF NUT.

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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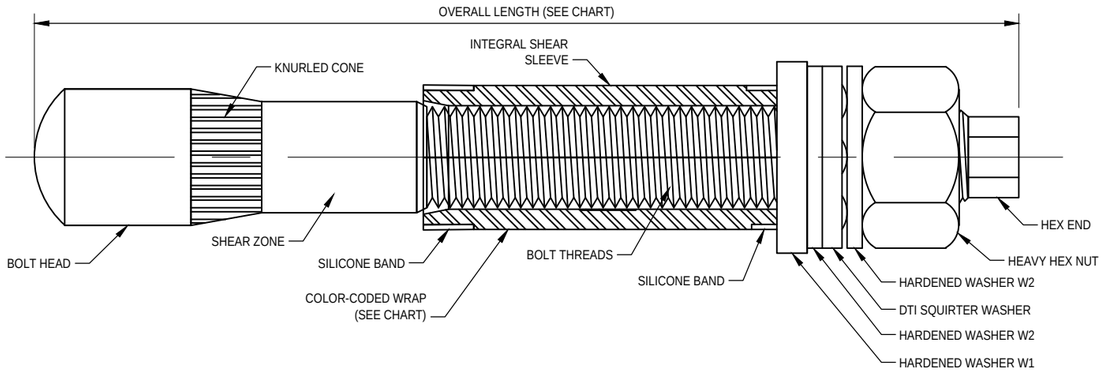
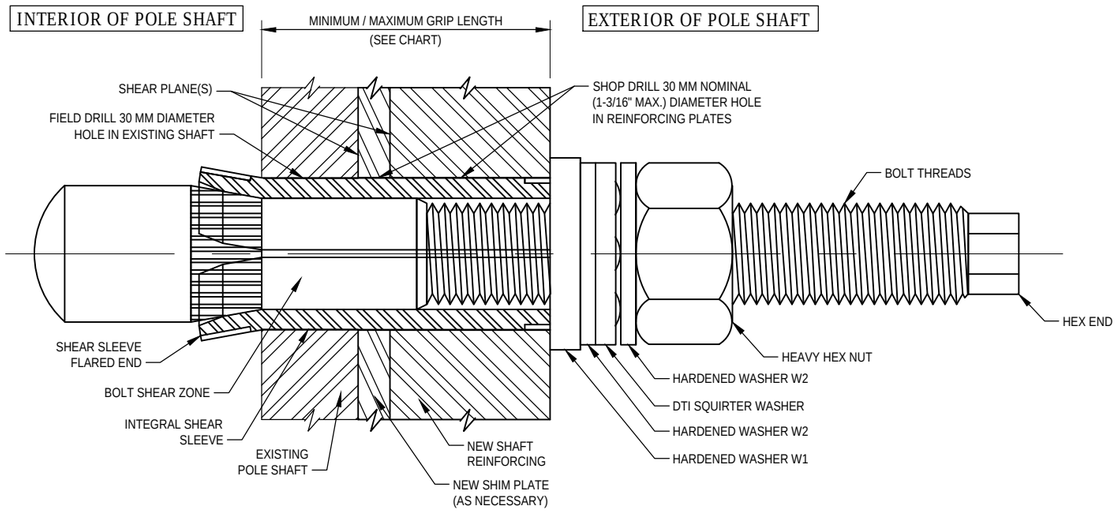
GENERAL NOTES

S-1



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

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FORGBolt™ DETAILS

S-2A

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

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

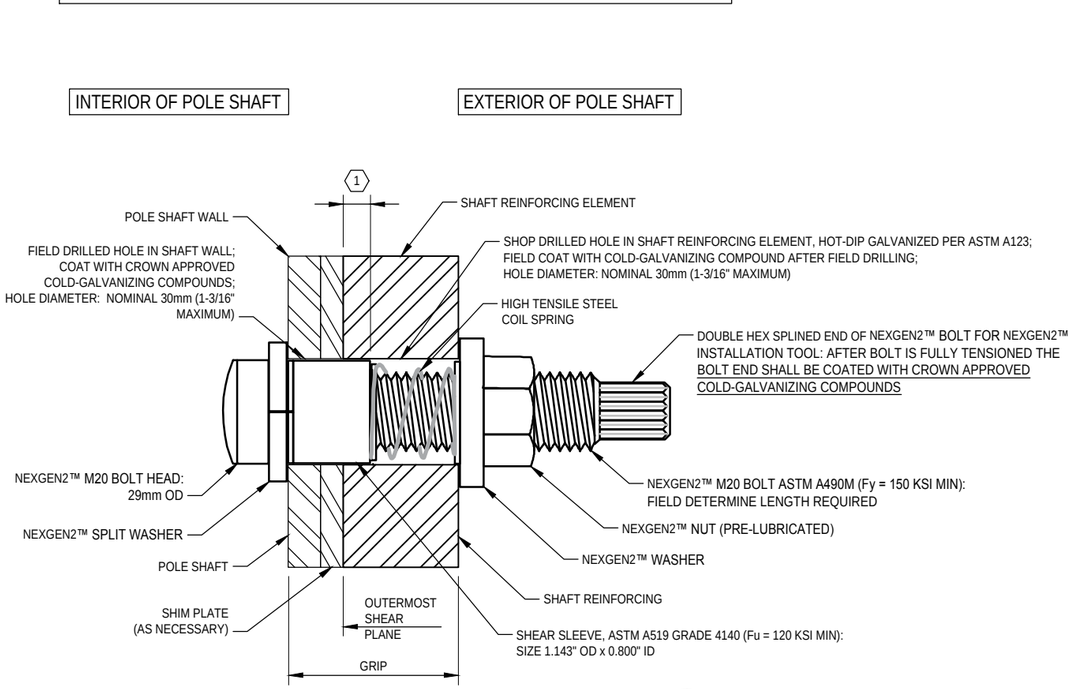
BOLT HOLE NOTES:

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

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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

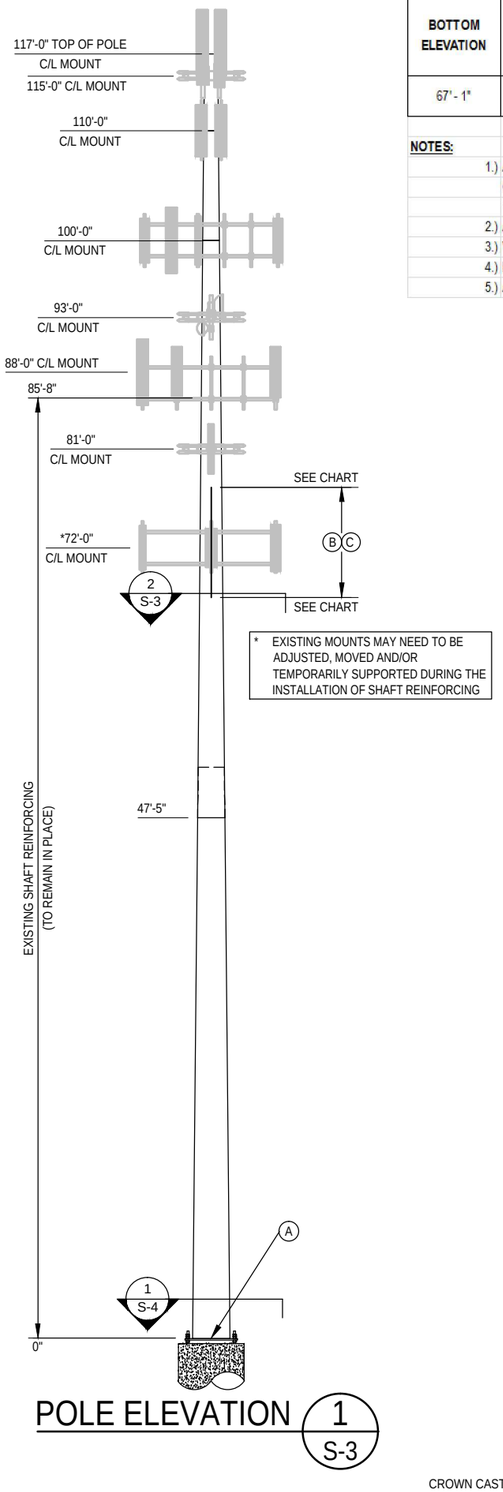
MODIFICATION OF AN EXISTING 117'-0" MONOPOLE
BU #806352; BRG 302 943052
DARIEN, CONNECTICUT

PROJECT No:	37515-1078.005.7700
DRAWN BY:	C.A.W.
DESIGNED BY:	R.M.K.
CHECKED BY:	
DATE:	11/10/2015

NEXGEN2™ BOLT DETAIL

S-2B

37515-1078.005.DWG



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

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
67' - 1"	77' - 1"	F3, F7 & F11	CCI-SFP-04007510	10' - 0"	3	13	39	4	4	16"	306 LBS.
							39				306 LBS.

NOTES:

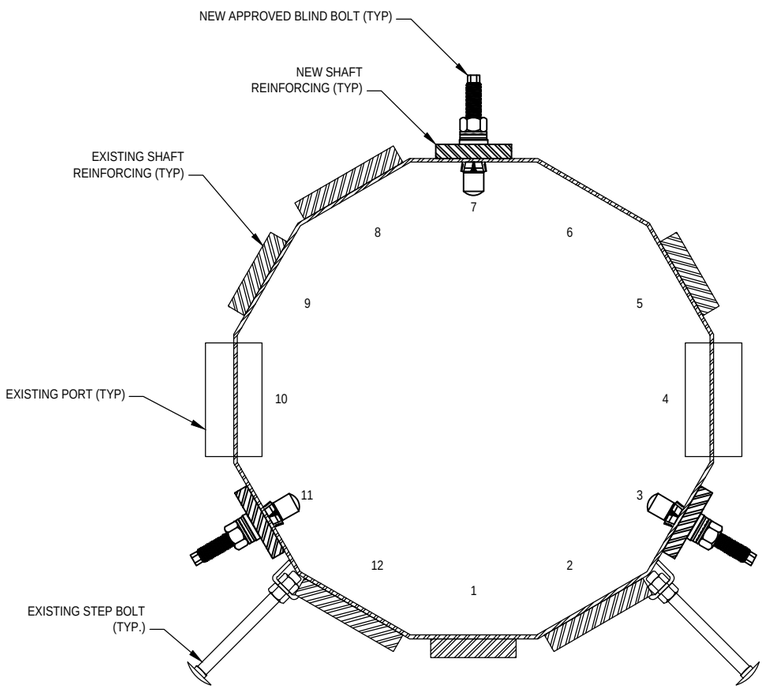
1.) ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. ALTERNATIVELY, ALL NEW STIFFENER PLATE STEEL REINFORCING MAY BE COLD GALVANIZED AS FOLLOWS: APPLY A MINIMUM OF TWO COATS OF ZRC-BRAND ZINC-RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 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.



SECTION 2 / S-3

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

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	7.00	0.1875	55.00	14.360	15.940	A572-65	12-SIDED
2	10.00	0.1875		15.940	18.200	A572-65	12-SIDED
3	52.58	0.2500		18.200	30.090	A572-65	12-SIDED
4	52.00	0.3438		28.472	40.300	A572-65	12-SIDED

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

MODIFICATIONS:

(A) INSTALL NEW ANCHOR RODS AND BRACKETS AT BASE PLATE. SEE SHEET S-4.

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

(C) REMOVE AND REPLACE STEP BOLTS AS REQUIRED FOR INSTALLATION OF SHAFT REINFORCING. COORDINATE WITH TUF-TUG. SEE NOTE 1.14 ON SHEET S-1.

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

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DARIEN, CONNECTICUT

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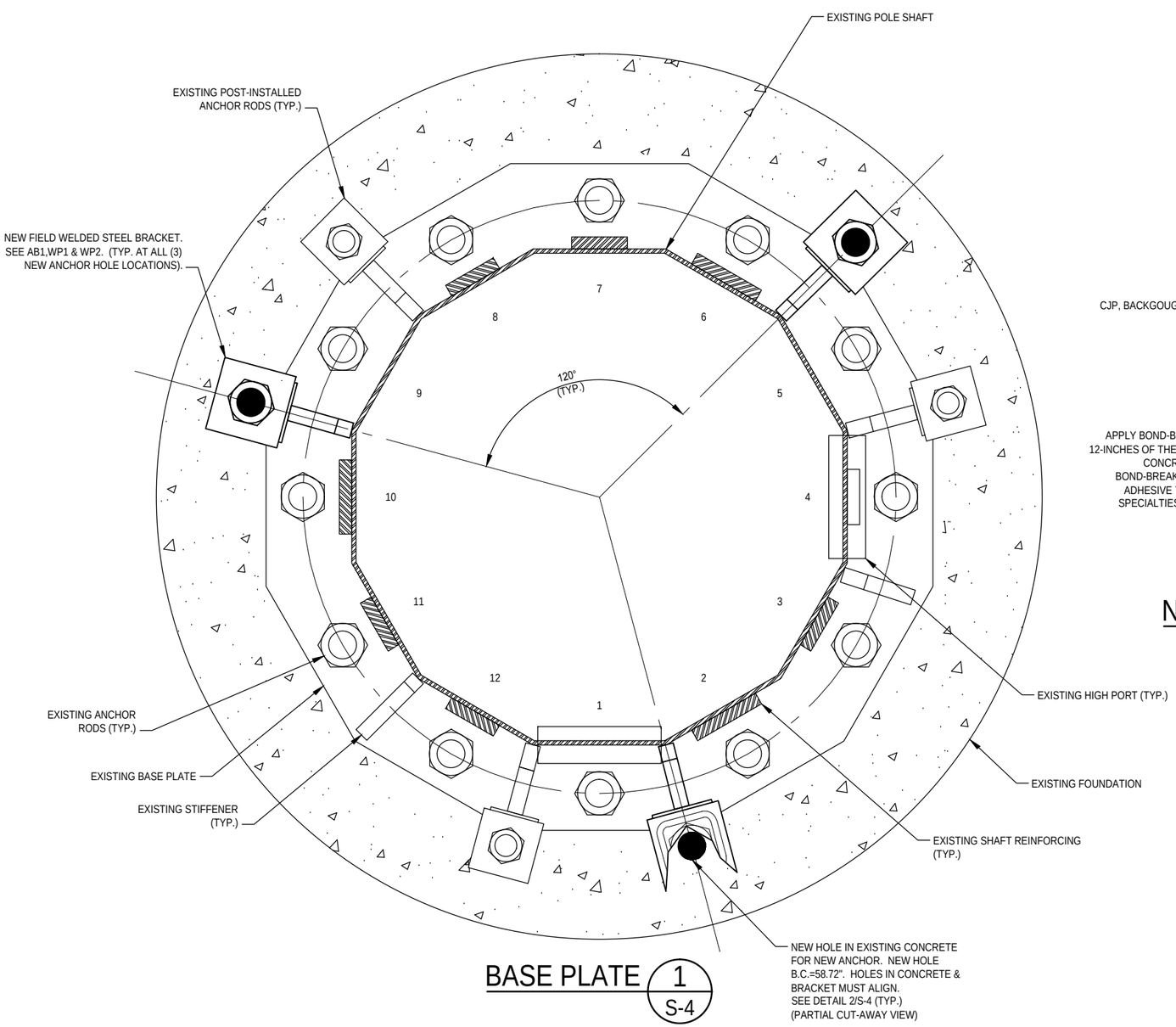
DESIGNED BY:	R.M.K.
CHECKED BY:	
DATE:	11/10/2015

MONOPOLE PROFILE

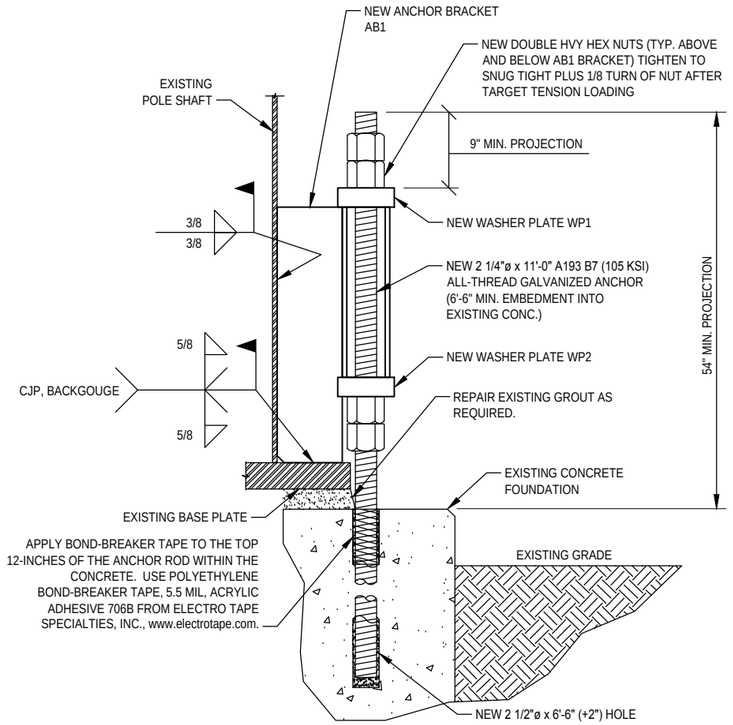
S-3

37515-1078.005.DWG

BASE SPECIFICATIONS	
BASE PLATE:	54.22" 12-SIDED; 2 1/2" THK.; Fy=60 KSI
ANCHOR RODS:	(12) 2 1/4"ø; A615 GRADE 75; 48.22" B.C. ; (3) 1 3/4" ø A193 GR B7 ; 58.72" B.C.



BASE PLATE 1 / S-4



NEW ANCHOR & BRACKET DETAIL 2 / S-4

NEW ANCHOR ROD REINFORCING SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. ONCE ALL RESIN HAS CURED, ALL NEW ANCHOR ROD REINFORCING SHALL BE PROOF LOADED TO 195 KIPS. ONCE THE PROOF LOAD HAS BEEN RELEASED. TIGHTEN HEAVY HEX NUT TO SNUG TIGHT PLUS 1/8 TURN OF NUT. REFER TO SHEET S-2, SECTION H FOR ADDITIONAL INFORMATION.

NEW ANCHOR RODS

PART #	DIAMETER (IN)	LENGTH (IN)	MATERIAL	CUSTOM EMBEDMENT DEPTH (IN)
CCI-AR-0225	2 1/4	132	A193 GR B7	78

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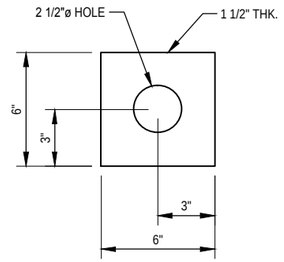
BASE PLATE DETAILS

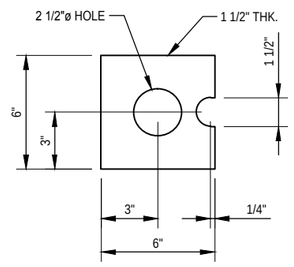
S-4

37515-1078.005.DWG



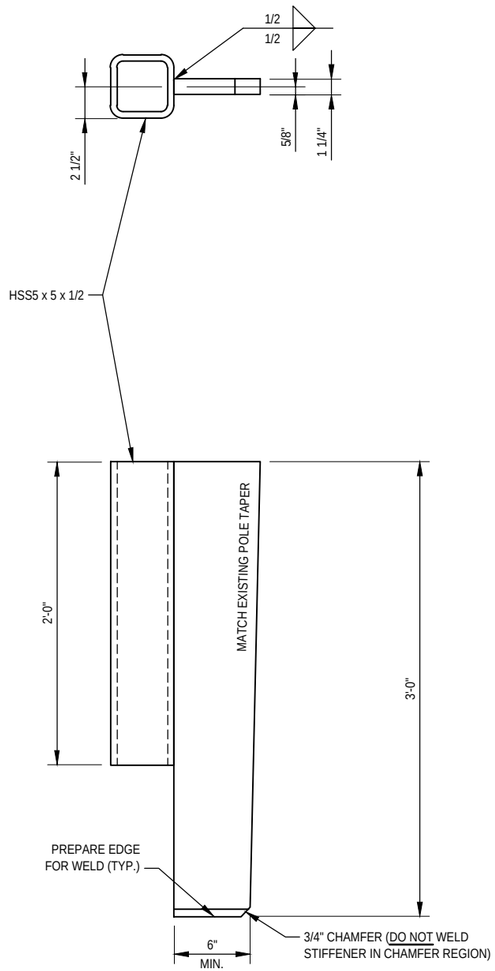
WASHER PLATE MK~WP1

(3 REQUIRED) (Fy = 50 KSI)



WASHER PLATE MK~WP2

(3 REQUIRED) (Fy = 50 KSI)



ANCHOR BRACKET MK~AB1

(3 REQUIRED) (TUBE Fy = 46 KSI) (STIFFENER Fy = 65 KSI)

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MISC DETAILS

S-5

37515-1078.005.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
X	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
N/A	FABRICATOR NDE INSPECTION
N/A	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
CONSTRUCTION	
X	CONSTRUCTION INSPECTIONS
N/A	FOUNDATION INSPECTIONS
N/A	CONCRETE COMP. STRENGTH AND SLUMP TESTS
X	POST INSTALLED ANCHOR ROD VERIFICATION
N/A	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION
N/A	EARTHWORK: PROVIDE PHOTO DOCUMENTATION OF EXCAVATION QUALITY AND COMPACTION
X	ON SITE COLD GALVANIZING VERIFICATION
N/A	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
N/A	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)
X	POST INSTALLED ANCHOR ROD TARGET TENSION LOAD TESTING
N/A	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

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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 117'-0" MONOPOLE

BU #806352; BRG 302 943052
DARIEN, CONNECTICUT

PROJECT No:	37515-1078.005.7700
DRAWN BY:	C.A.W.
DESIGNED BY:	R.M.K.
CHECKED BY:	
DATE:	11/10/2015

MI CHECKLIST

S-6

MODIFICATION OF AN EXISTING 117'-0" MONOPOLE

BU #806352; BRG 302 943052

126 LEDGE ROAD
DARIEN, CONNECTICUT 06820
FAIRFIELD COUNTY
LAT: 41° 4' 20.75"; LONG: -73° 28' 41.4"
APP: 310468 REV. 1; WO: 1140996

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.VENDOR@CROWNCASTLE.COM
PH: (860) 209-0104

ENGINEER OF RECORD:
PJFMOD@PJFWEB.COM

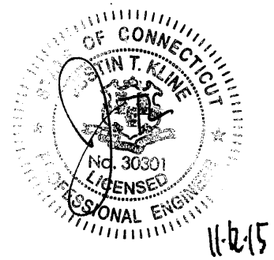
THIS PROJECT INCLUDES THE FOLLOWING ITEMS
SHAFT REINFORCING
FIELD WELDED ANCHOR BRACKETS
POST INSTALLED ANCHOR RODS
REMOVAL AND REINSTALLATION OF EXISTING STEP BOLTS

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	BASE PLATE DETAILS
S-5	MISC DETAILS
S-6	MI CHECKLIST

WIND DESIGN DATA	
REFERENCE STANDARD	TIA/EIA-222-F
LOCAL CODE	2005 CONNECTICUT BUILDING CODE
BASIC WIND SPEED (FASTEST-MILE)	85 MPH
ICE THICKNESS	0.75 MPH
ICE WIND SPEED	37.6 MPH
SERVICE WIND SPEED	50 MPH

THE ASSOCIATED FAILING SA WO NUMBER FOR THIS PROJECT IS 1118887

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.



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TITLE SHEET

T-1

37515-1078.005.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

6.1. UNLESS OTHERWISE NOTED, REINFORCING ANCHOR RODS SHALL BE 150 KSI ALL-THREAD BARS CONFORMING TO ASTM A722. RECOMMENDED MANUFACTURERS/SUPPLIERS OF 150 KSI ALL-THREAD BARS ARE WILLIAMS FORM ENGINEERING CORPORATION AND DYWIDAG SYSTEMS INTERNATIONAL.

6.2. ALL REINFORCING ANCHOR RODS SHALL BE HOT DIP GALVANIZED PER ASTM A123.

6.3. THE CORE-DRILLED HOLES IN THE CONCRETE FOR THE ANCHOR RODS SHALL BE CLEAN AND DRY, AND OTHERWISE PROPERLY PREPARED ACCORDING TO THE ANCHOR ROD AND EPOXY MANUFACTURERS' INSTRUCTIONS, PRIOR TO PLACEMENT OF ANCHOR RODS AND EPOXY. CONTRACTOR SHALL FOLLOW ALL ANCHOR ROD AND EPOXY MANUFACTURER RECOMMENDATIONS REGARDING HANDLING OF RODS, EPOXY, ACCEPTABLE AMBIENT TEMPERATURE RANGE DURING INSTALLATION AND POST-INSTALLATION CURING, THE EFFECT OF TEMPERATURE ON EPOXY CURING TIME, PREPARATION OF HOLE, ETC.

6.4. HILTI HIT RE-500 SD OR ITW RED HEAD EPCON G5 EPOXY SHALL BE USED TO ANCHOR THE BAR IN THE DRILL HOLES. IF THE DESIGNED EMBEDMENT IS GREATER THAN 12 FT, CONTRACTOR HAS THE OPTION TO USE PILE ANCHOR GROUT BY E-CHEM AS AN ALTERNATE. IF CONTRACTOR WISHES TO USE A DIFFERENT EPOXY, A REQUEST INCLUDING THE EPOXY TECHNICAL DATA SHEET(S) SHALL BE SUBMITTED TO THE EOR FOR REVIEW PRIOR TO CONSTRUCTION.

6.5. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN INSTALLED AND ALL EPOXY AND GROUT HAVE CURED (IF BASE PLATE AND/OR BEARING PLATES HAVE BEEN GROUTED PRIOR TO TESTING), ALL REINFORCING ANCHORS SHALL BE LOAD TESTED PER CROWN CASTLE ENGINEERING DOCUMENT #ENG-PRC-10119. REFER TO THE NEW ANCHOR & BRACKET DETAIL ON FOLLOWING SHEETS FOR SPECIFIED ANCHOR ROD TARGET TENSION LOAD.

6.6. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN SUCCESSFULLY LOAD TESTED AND APPROVED THE CONTRACTOR SHALL TIGHTEN ALL HEAVY HEX ANCHOR NUTS TO SNUG TIGHT PLUS 1/8 TURN OF NUT.

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".

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
LICENSED
PROFESSIONAL ENGINEER
11-12-15

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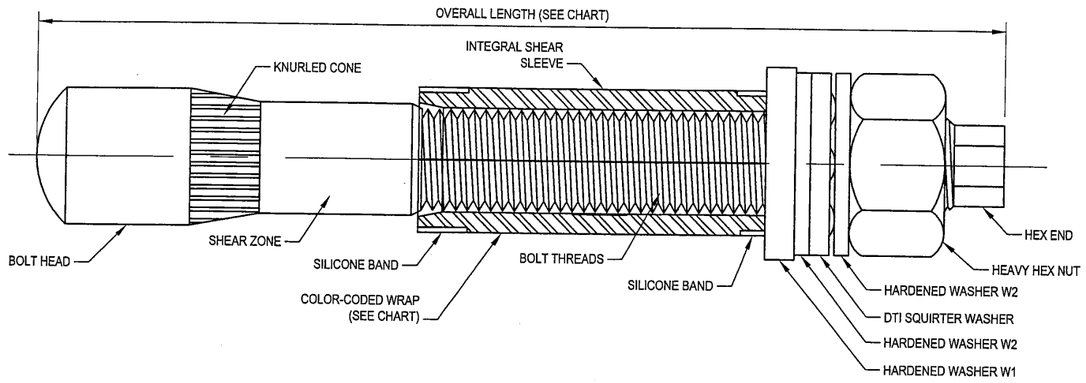
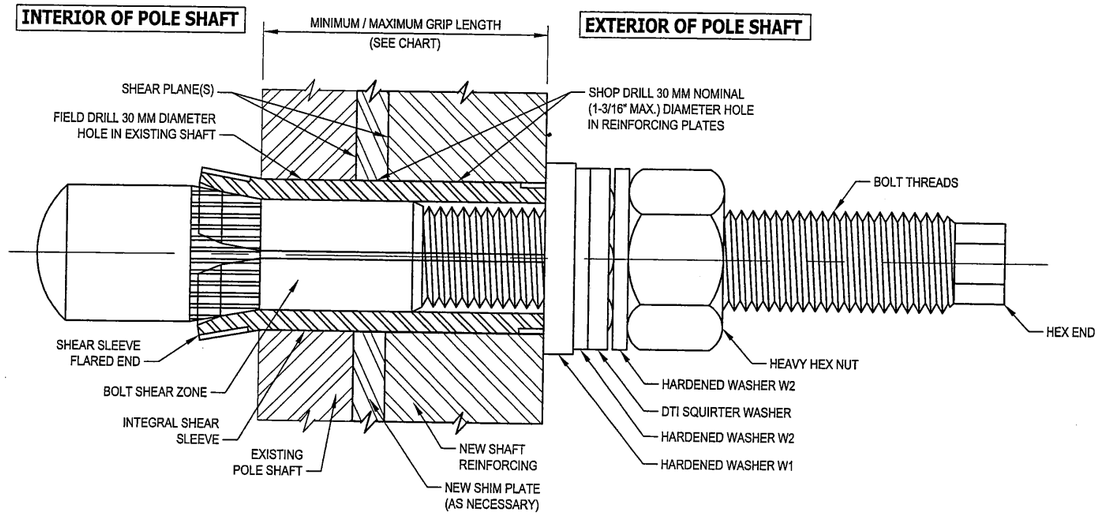


PRE-INSTALLED FORGBolt™ ASSEMBLY DETAIL 1 / S-2A



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

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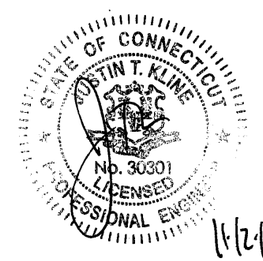
DISTRIBUTOR CONTACT:
PRECISION TOWER PRODUCTS
PHONE: 888-926-4857
EMAIL: info@precisiontowerproducts.com
WEB: www.precisiontowerproducts.com



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PJF PAUL J. FORD & COMPANY
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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
117'-0" MONOPOLE
BU #806352; BRG 302 943052
DARIEN, CONNECTICUT

PROJECT No:	37515-1078.005.7700
DRAWN BY:	C.A.W.
DESIGNED BY:	R.M.K.
CHECKED BY:	BKK
DATE:	11/10/2015

FORGBolt™ DETAILS

S-2A

37515-1078.005.DWG

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

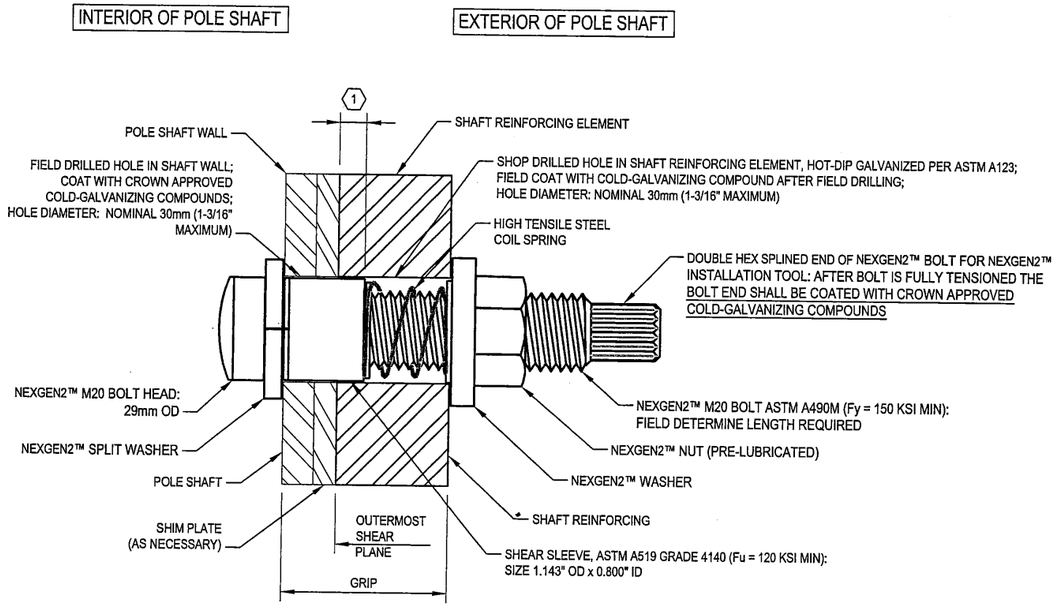
BOLT HOLE NOTES:

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.

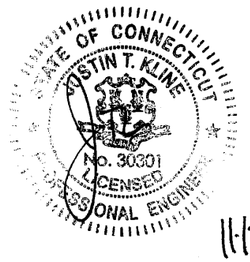


TYPICAL NEXGEN2™ BOLT DETAIL (1) S-2B

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



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BU #806352; BRG 302 943052
DARIEN, CONNECTICUT

PROJECT No:	37515-1078.005.7700
DRAWN BY:	C.A.W.
DESIGNED BY:	R.M.K.
CHECKED BY:	BKK
DATE:	11/10/2015

NEXGEN2™ BOLT DETAIL

S-2B

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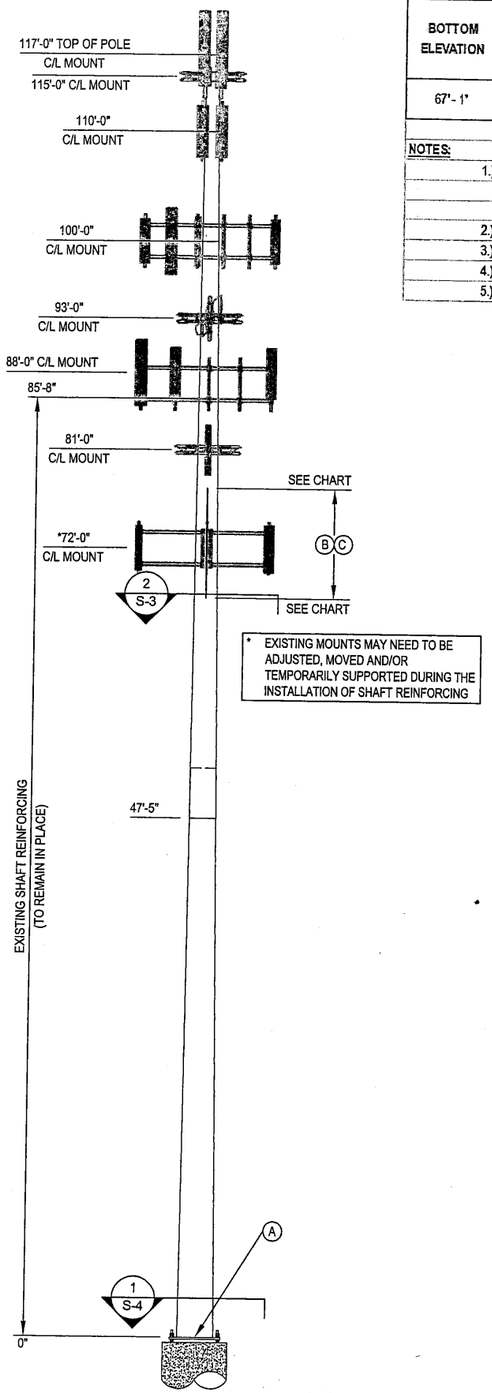


* EXISTING MOUNTS MAY NEED TO BE ADJUSTED, MOVED AND/OR TEMPORARILY SUPPORTED DURING THE INSTALLATION OF SHAFT REINFORCING

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
67'-1"	77'-1"	F3, F7 & F11	CCI-SFP-04007510	10'-0"	3	13	39	4	4	16"	306 LBS.
							39				306 LBS.

NOTES:

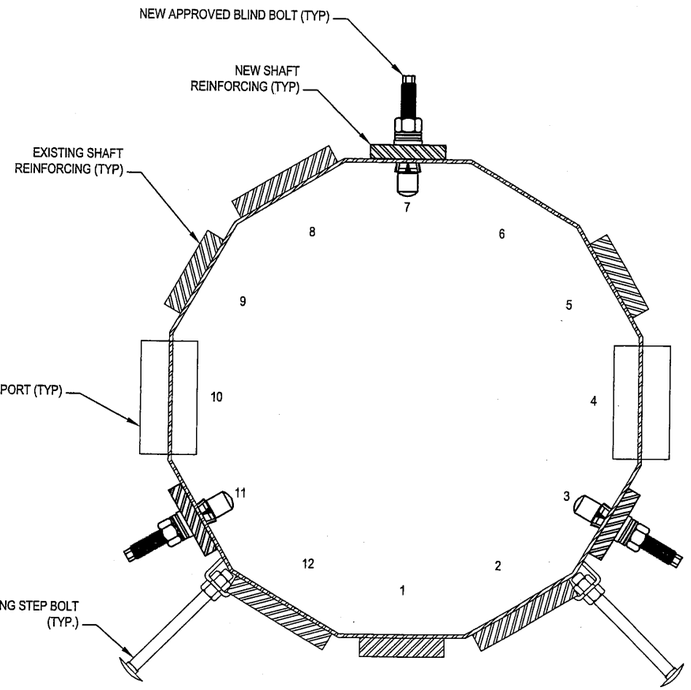
1.) ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. ALTERNATIVELY, ALL NEW STIFFENER PLATE STEEL REINFORCING MAY BE COLD GALVANIZED AS FOLLOWS: APPLY A MINIMUM OF TWO COATS OF ZRC-BRAND ZINC-RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 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.



SECTION 2 / S-3

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

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	7.00	0.1875	55.00	14.360	15.940	A572-65	12-SIDED
2	10.00	0.1875		15.940	18.200	A572-65	12-SIDED
3	52.58	0.2500		18.200	30.090	A572-65	12-SIDED
4	52.00	0.3438		28.472	40.300	A572-65	12-SIDED

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

MODIFICATIONS:

(A) INSTALL NEW ANCHOR RODS AND BRACKETS AT BASE PLATE. SEE SHEET S-4.

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

(C) REMOVE AND REPLACE STEP BOLTS AS REQUIRED FOR INSTALLATION OF SHAFT REINFORCING. COORDINATE WITH TUF-TUG. SEE NOTE 1.14 ON SHEET S-1.

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BU #806352; BRG 302 943052
DARIEN, CONNECTICUT

PROJECT No:	37515-1078.005.7700
DRAWN BY:	C.A.W.
DESIGNED BY:	R.M.K.
CHECKED BY:	BKK
DATE:	11/10/2015

MONOPOLE PROFILE

S-3

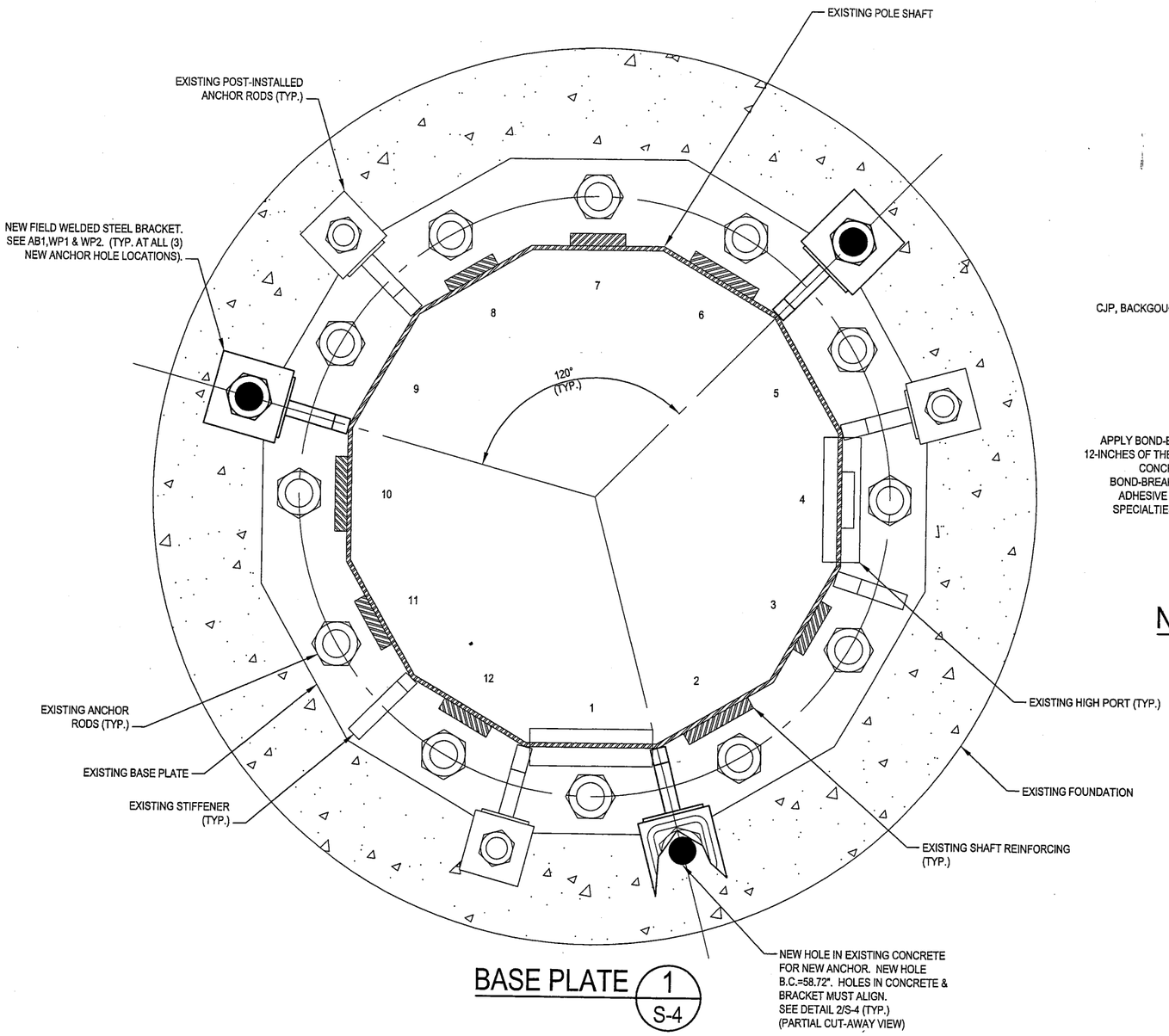
STATE OF CONNECTICUT
JUSTIN T. KLINE
NO. 30301
LICENSED
PROFESSIONAL ENGINEER

11.12.15

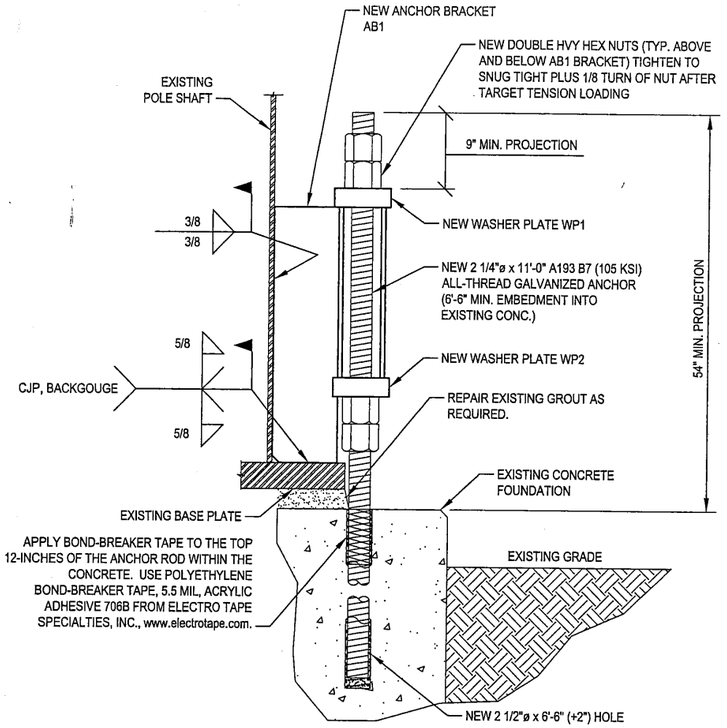
CROWN CASTLE US PATENT NOS 8,046,972; 8,156,712; 7,849,659; 8,424,269 AND PATENT PENDING

37515-1078.005.DWG

BASE SPECIFICATIONS	
BASE PLATE:	54.22" 12-SIDED; 2 1/2" THK.; Fy=60 KSI
ANCHOR RODS:	(12) 2 1/4"ø; A615 GRADE 75; 48.22" B.C. ; (3) 1 3/4" ø A193 GR B7 ; 58.72" B.C.



BASE PLATE 1 / S-4



NEW ANCHOR & BRACKET DETAIL 2 / S-4

NEW ANCHOR ROD REINFORCING SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. ONCE ALL RESIN HAS CURED, ALL NEW ANCHOR ROD REINFORCING SHALL BE PROOF LOADED TO 195 KIPS. ONCE THE PROOF LOAD HAS BEEN RELEASED. TIGHTEN HEAVY HEX NUT TO SNUG TIGHT PLUS 1/8 TURN OF NUT. REFER TO SHEET S-2, SECTION H FOR ADDITIONAL INFORMATION.

NEW ANCHOR RODS

PART #	DIAMETER (IN)	LENGTH (IN)	MATERIAL	CUSTOM EMBEDMENT DEPTH (IN)
CCI-AR-0225	2 1/4	132	A193 GR B7	78

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DESIGNED BY:	R.M.K.
CHECKED BY:	BKK
DATE:	11/10/2015

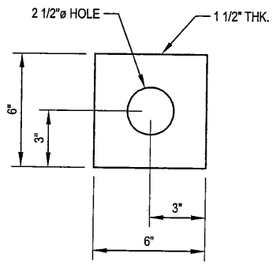
BASE PLATE DETAILS

S-4

STATE OF CONNECTICUT
JUSTIN T. KLINE
NO. 30
LICENSED PROFESSIONAL E...

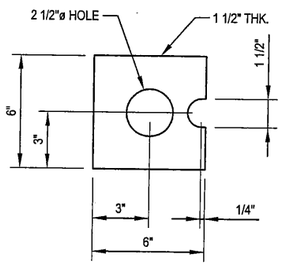
11.12.15

37515-1078.005.DWG



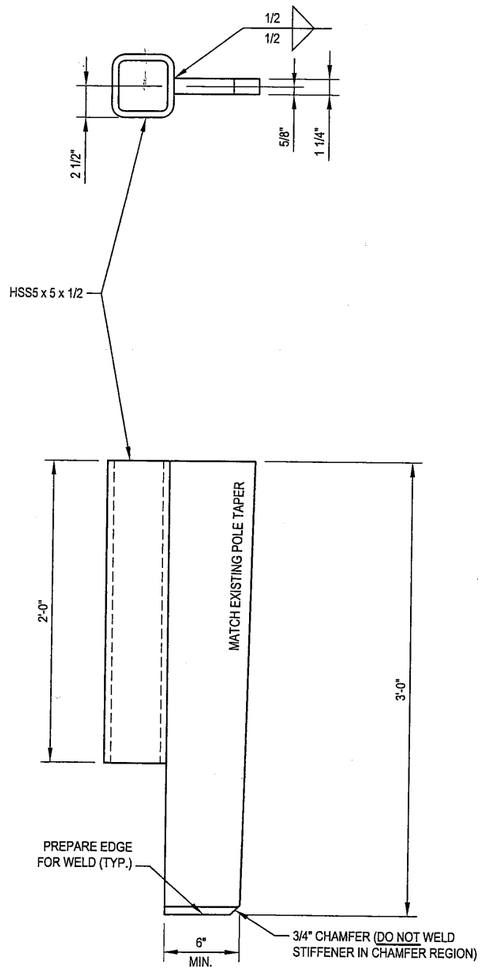
WASHER PLATE MK~WP1

(3 REQUIRED) (Fy = 50 KSI)



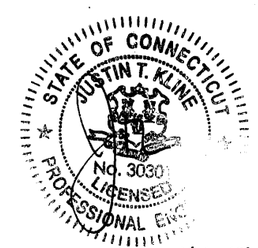
WASHER PLATE MK~WP2

(3 REQUIRED) (Fy = 50 KSI)



ANCHOR BRACKET MK~AB1

(3 REQUIRED) (TUBE Fy = 46 KSI) (STIFFENER Fy = 65 KSI)



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MISC DETAILS

S-5

37515-1078.005.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
X	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
N/A	FABRICATOR NDE INSPECTION
N/A	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
	CONSTRUCTION
X	CONSTRUCTION INSPECTIONS
N/A	FOUNDATION INSPECTIONS
N/A	CONCRETE COMP. STRENGTH AND SLUMP TESTS
X	POST INSTALLED ANCHOR ROD VERIFICATION
N/A	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION
N/A	EARTHWORK: PROVIDE PHOTO DOCUMENTATION OF EXCAVATION QUALITY AND COMPACTION
X	ON SITE COLD GALVANIZING VERIFICATION
N/A	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
N/A	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)
X	POST INSTALLED ANCHOR ROD TARGET TENSION LOAD TESTING
N/A	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

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

MODIFICATION OF AN EXISTING 117'-0" MONOPOLE

BU #806352; BRG 302 943052
DARIEN, CONNECTICUT

PROJECT No:	37515-1078.005.7700
DRAWN BY:	C.A.W.
DESIGNED BY:	R.M.K.
CHECKED BY:	BKK
DATE:	11/10/2015

MI CHECKLIST

S-6

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
LICENSED PROFESSIONAL ENGINEER

11.12.15

37515-1078.005.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: CT11851C

CT851/Crown Darien_MP
130 Ledge Road
Darien, CT 06820

October 30, 2015

EBI Project Number: 6215005468

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	19.95 %

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EBI Consulting
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October 30, 2015

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

Emissions Analysis for Site: **CT11851C – CT851/Crown Darien_MP**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **130 Ledge Road, Darien, 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 **130 Ledge Road, Darien, 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) 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.

6) 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.

7) The antennas used in this modeling are the **Ericsson AIR21 B2A/B4P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Ericsson AIR21 B4A/B12P** for 2100 MHz (AWS) and 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR21 B2A/B4P** has a maximum gain of **15.9 dBd** at its main lobe. The **Ericsson AIR21 B4A/B12P** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz and has a maximum gain of **13.6 dBd** at its main lobe at 700 MHz. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

8) The antenna mounting height centerline of the proposed antennas is **110 feet** above ground level (AGL).

9) 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:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	110	Height (AGL):	110	Height (AGL):	110
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	# PCS Channels:	4
Total TX Power:	120	Total TX Power:	120	# AWS Channels:	120
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A1 MPE%	1.55	Antenna B1 MPE%	1.55	Antenna C1 MPE%	1.55
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Ericsson AIR21 B4A/B12P	Make / Model:	Ericsson AIR21 B4A/B12P	Make / Model:	Ericsson AIR21 B4A/B12P
Gain:	15.9 / 13.6 dBd	Gain:	15.9 / 13.6 dBd	Gain:	15.9 / 13.6 dBd
Height (AGL):	110	Height (AGL):	110	Height (AGL):	110
Frequency Bands	2100 MHz (AWS) / 700 MHz	Frequency Bands	2100 MHz (AWS) / 700 MHz	Frequency Bands	2100 MHz (AWS) / 700 MHz
Channel Count	3	Channel Count	3	Channel Count	3
Total TX Power:	150	Total TX Power:	150	Total TX Power:	150
ERP (W):	5,355.80	ERP (W):	5,355.80	ERP (W):	5,355.80
Antenna A2 MPE%	1.78	Antenna B2 MPE%	1.78	Antenna C2 MPE%	1.78

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**3.59 %**
AT&T	4.74 %
Verizon Wireless	5.78 %
Clearwire	0.33 %
Sprint	2.12 %
MetroPCS	3.39 %
Site Total MPE %:	**19.95 %**

T-Mobile Sector 1 Total:	3.59 %
T-Mobile Sector 2 Total:	3.59 %
T-Mobile Sector 3 Total:	3.59 %
Site Total:	19.95 %

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**	**2334.27**	**110**	**15.52**	**2100**	**1000**	**1.55 %**
T-Mobile 1900 MHz (PCS) GSM/UMTS	**2**	**1167.14**	**110**	**7.76**	**1900**	**1000**	**0.78 %**
T-Mobile 2100 MHz (AWS) UMTS	**2**	**1167.14**	**110**	**7.76**	**2100**	**1000**	**0.78 %**
T-Mobile 700 MHz LTE	**1**	**687.26**	**110**	**2.28**	**700**	**467**	**0.49 %**
						Total:	**3.59%**

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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:	3.59 %
Sector 2:	3.59 %
Sector 3 :	3.59 %
T-Mobile Per Sector Maximum:	3.59 %
Site Total:	19.95 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **19.95%** 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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