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

November 3, 2015

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

RE: **T-Mobile - Exempt Modification - Crown Site BU: 876331**
T-Mobile Site ID: CT11423B
Located at: 115 North Mountain Road, New Britain, CT 06053

Dear Ms. Bachman:

This letter and exhibits are submitted on behalf of T-Mobile. T-Mobile is making modifications to certain existing sites in its Connecticut system in order to implement their 700MHz technology. Please accept this letter and exhibits as notification, pursuant to § 16-50j-73 of the Regulations of Connecticut State Agencies ("R.C.S.A."), of construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In compliance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to The Honorable Erin E. Stewart, Mayor for the City of New Britain, and Crown Castle is the Property Owner.

T-Mobile plans to modify the existing wireless communications facility owned by Crown Castle and located at **115 North Mountain Road, New Britain, CT**. Attached are a compound plan and elevation depicting the planned changes (Exhibit-1), and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration (Exhibit-2). Also included is a power density table report reflecting the modification to T-Mobile's operations at the site (Exhibit-3).

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

1. The proposed modifications will not result in an increase in the height of the existing tower. T-Mobile's additional antennas will be located at the same elevation on the existing tower.

2. There will be no proposed modifications to the ground and no extension of boundaries.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

4. A Structural Modification Report confirming that the tower and foundation can support T-Mobile's proposed modifications is included as Exhibit-2.

5. The operation of the additional antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative General Power Density table report for T-Mobile's modified facility is included as Exhibit-3.

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

Sincerely,

Kimberly Myl
Real Estate Specialist

Enclosures

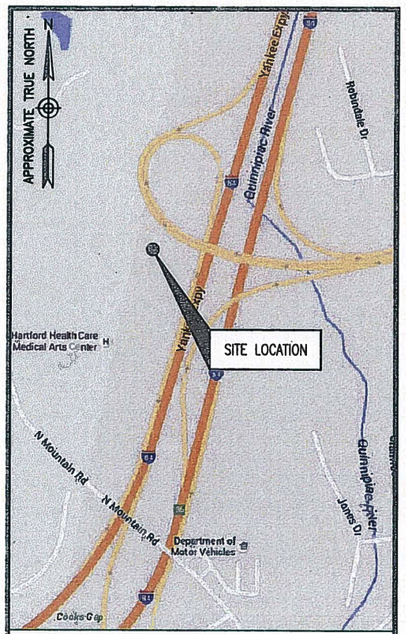
Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes
Tab 2: Exhibit-2: Structural Modification Report
Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc: The Honorable Erin E. Stewart, Mayor of the City of New Britain
City of New Britain
27 West Main Street
New Britain, CT 06051

T-Mobile®

T-MOBILE NORTHEAST LLC

T-MOBILE SITE #: CT11423B
CROWN CASTLE BU #: 876331
SITE NAME: NEW BRITAIN GRAVEL PIT
115 NORTH MOUNTAIN RD
NEW BRITAIN, CT 06053
HARTFORD COUNTY



VICINITY MAP

FROM PARSIPPANY, NJ:

DEPART SYLVAN WAY AND TAKE I-287 N TOWARD ALBANY. USE THE RIGHT 2 LANES TO MERGE ONTO I-287 E/I-87 S TOWARD TAPPAN ZEE BR. STAY ON I-87 S AND TAKE EXIT 8A FOR NY-119/SAW MILL PKWY N TOWARD ELMSFORD. KEEP LEFT, FOLLOW SIGNS FOR I-684/BREWSTER AND MERGE ONTO I-684 N. TAKE EXIT 9E FOR I-84 E. KEEP RIGHT AT THE FORK TO STAY ON I-84 E. TAKE EXIT 37 FOR FIENEMANN RD TOWARD US-6 W. USE THE LEFT 2 LANES TO TURN LEFT ONTO FIENEMANN RD. TURN LEFT ONTO I-84 W RAMP TO WATERBURY. TAKE EXIT 36. 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:
NEW BRITAIN GRAVEL PIT

SITE NUMBER:
CT11423B

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

APPLICANT/DEVELOPER:
T-MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054

COORDINATES:
LATITUDE: 41°-40'-35.72" N (NAD83)
LONGITUDE: 72°-49'-17.09" W (NAD83)
(PER CROWN CASTLE)

CONFIGURATION
702Cu

PROJECT SUMMARY

SITE ADDRESS:
115 NORTH MOUNTAIN RD
NEW BRITAIN, CT 06053
HARTFORD COUNTY

PROJECT DIRECTORY

- INSTALL (3) NEW ANTENNAS.
- INSTALL (3) NEW RRU'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
T-MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054

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

CT11423B
NEW BRITAIN
GRAVEL PIT

CONSTRUCTION DRAWINGS

0	10/29/15	ISSUED AS FINAL

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

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:	50074620
SITE ADDRESS:	

115 NORTH MOUNTAIN RD
NEW BRITAIN, CT 06053
HARTFORD 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.

T-Mobile
T–MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054

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

CT11423B
NEW BRITAIN
GRAVEL PIT

CONSTRUCTION DRAWINGS		
0	10/29/15	ISSUED AS FINAL

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

STATE OF CONNECTICUT
JIANG YU
No. 23222
LICENSED PROFESSIONAL ENGINEER
CONNECTICUT LICENSE NO. 0023222
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DRAWN BY:	RA
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50074620
SITE ADDRESS:	

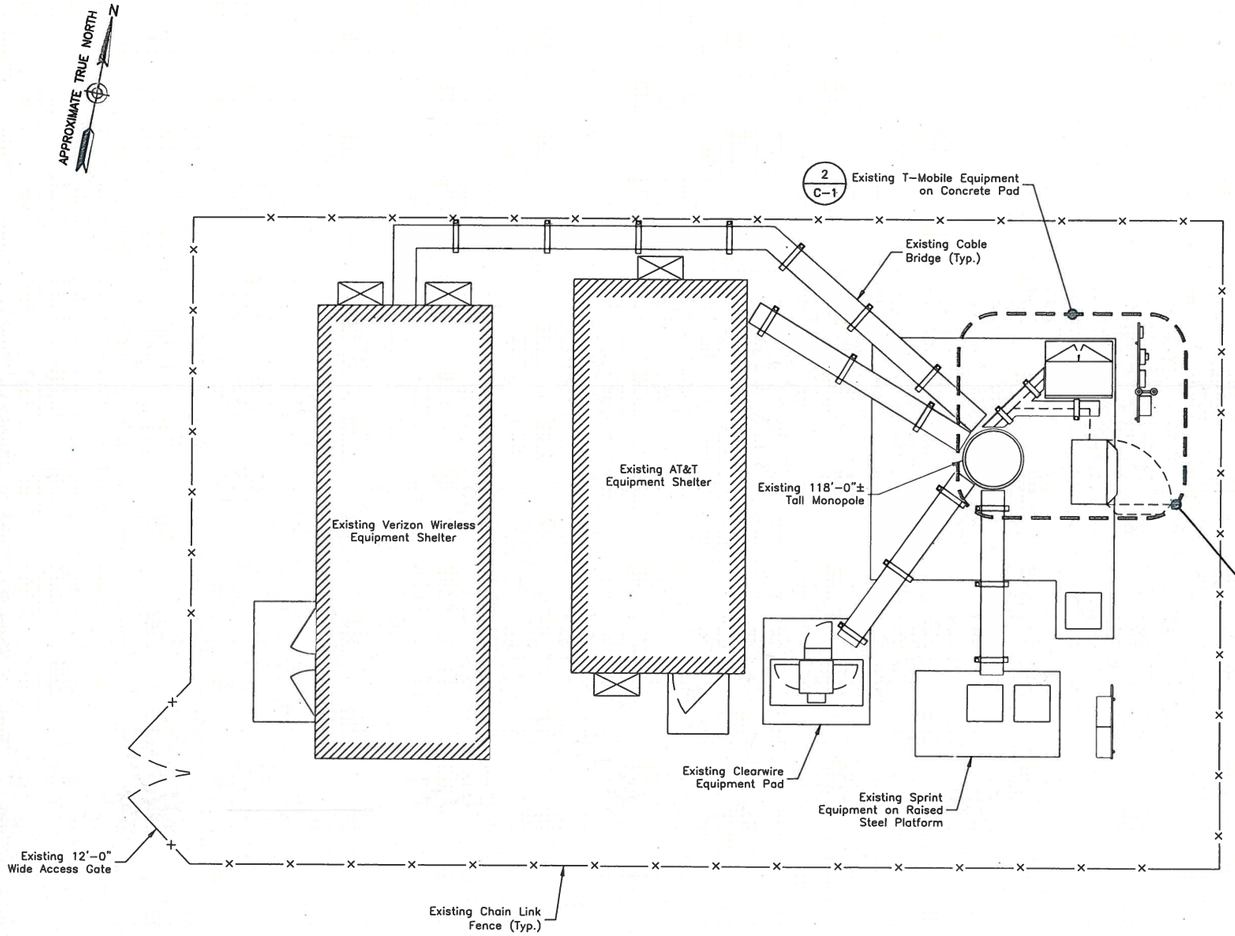
115 NORTH MOUNTAIN RD
NEW BRITAIN, CT 06053
HARTFORD COUNTY

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

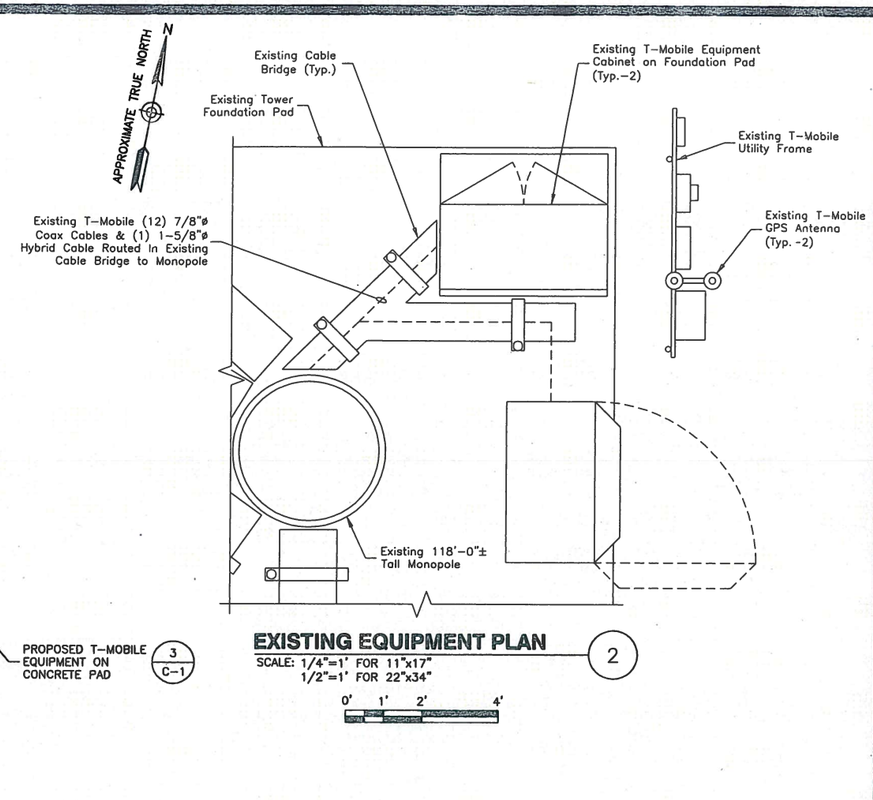
G–1



COMPOUND PLAN 1

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

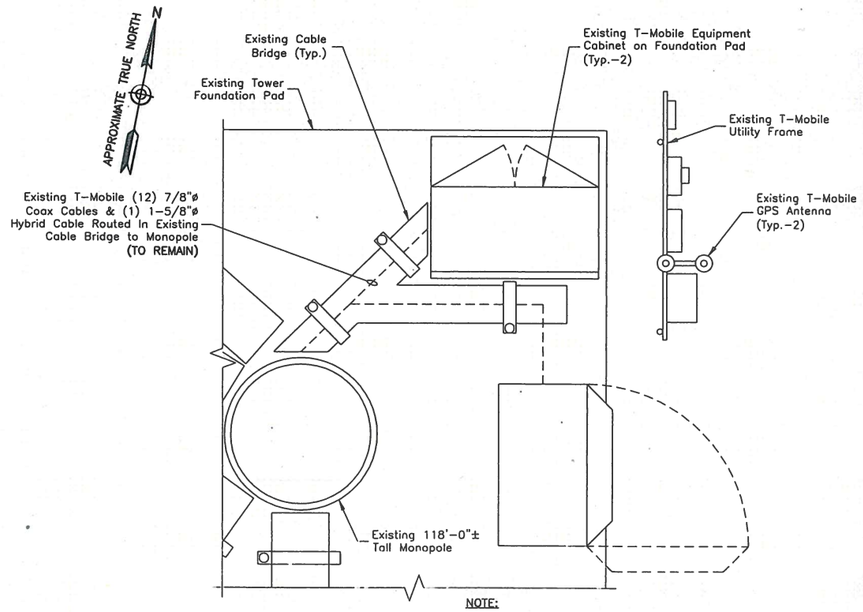
0' 5' 10'



EXISTING EQUIPMENT PLAN 2

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

0' 1' 2' 4'



NOTE:

1. NO EQUIPMENT IS PROPOSED AT GRADE.

PROPOSED EQUIPMENT PLAN 3

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

0' 1' 2' 4'

NOTES:

1. NORTH ARROW SHOWN AS APPROXIMATE.
2. NOT ALL INFORMATION IS SHOWN FOR CLARITY.
3. ALL PROPOSED EQUIPMENT, INCLUDING ANTENNAS, RRU'S, COAX, ETC., SHALL BE MOUNTED IN ACCORDANCE WITH THE TOWER STRUCTURAL ANALYSIS BY PAUL J. FORD AND COMPANY DATED SEPTEMBER 28, 2015 AND TOWER MODIFICATION DRAWINGS BY PAUL J. FORD AND COMPANY DATED SEPTEMBER 28, 2015.

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LICENSED PROFESSIONAL ENGINEER
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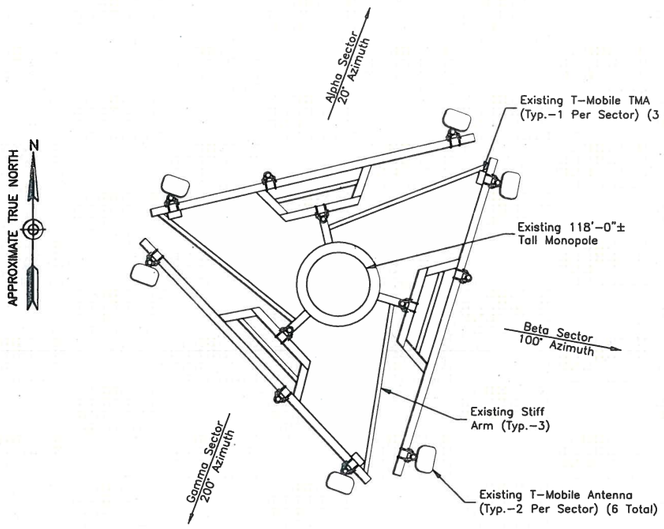
115 NORTH MOUNTAIN RD
NEW BRITAIN, CT 06053
HARTFORD COUNTY

SHEET TITLE

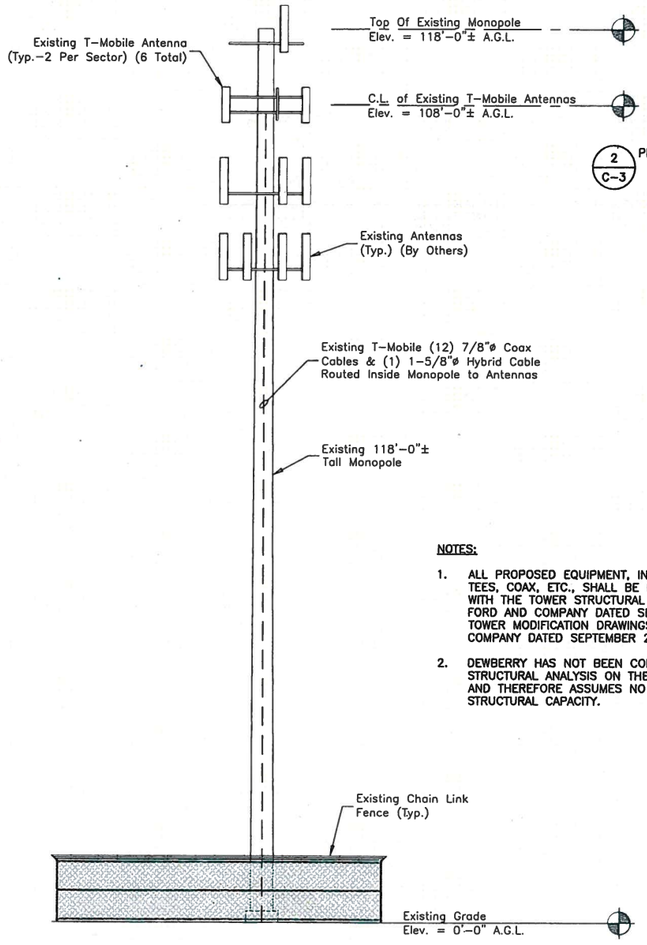
COMPOUND PLAN & EQUIPMENT PLANS

SHEET NUMBER

C-1



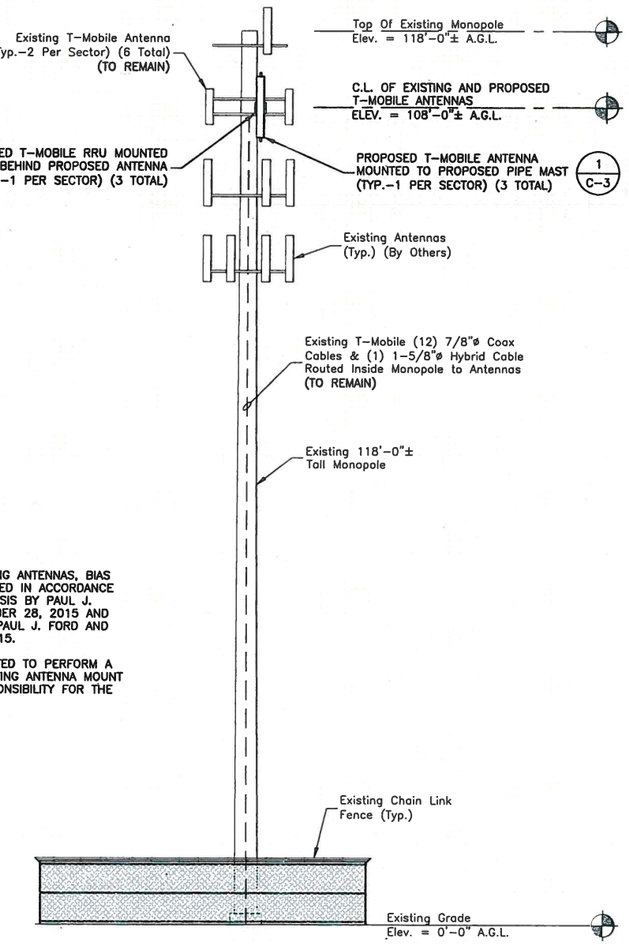
EXISTING ANTENNA LAYOUT (1)
SCALE: N.T.S.



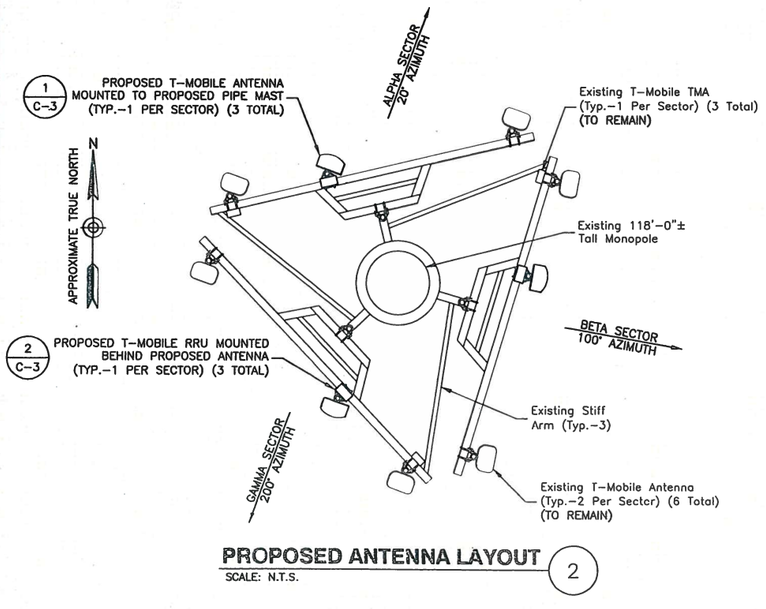
EXISTING ELEVATION (3)
SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"
0' 10' 20'

NOTES:

1. ALL PROPOSED EQUIPMENT, INCLUDING ANTENNAS, BIAS TEES, COAX, ETC., SHALL BE MOUNTED IN ACCORDANCE WITH THE TOWER STRUCTURAL ANALYSIS BY PAUL J. FORD AND COMPANY DATED SEPTEMBER 28, 2015 AND TOWER MODIFICATION DRAWINGS BY PAUL J. FORD AND COMPANY DATED SEPTEMBER 28, 2015.
2. DEWBERRY HAS NOT BEEN CONTRACTED TO PERFORM A STRUCTURAL ANALYSIS ON THE EXISTING ANTENNA MOUNT AND THEREFORE ASSUMES NO RESPONSIBILITY FOR THE STRUCTURAL CAPACITY.



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



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

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T-MOBILE NORTHEAST LLC
4 SYLVAN WAY
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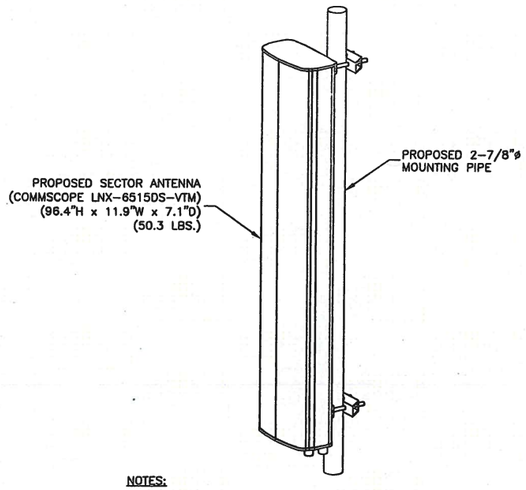
115 NORTH MOUNTAIN RD
NEW BRITAIN, CT 06053
HARTFORD COUNTY

SHEET TITLE
ANTENNA LAYOUTS & ELEVATIONS

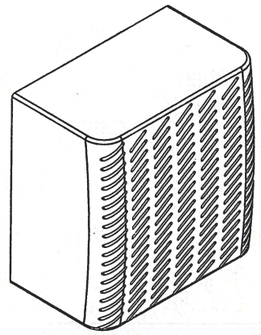
SHEET NUMBER
C-2



NOTES:

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

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



ERICSSON RRUS-11 B12

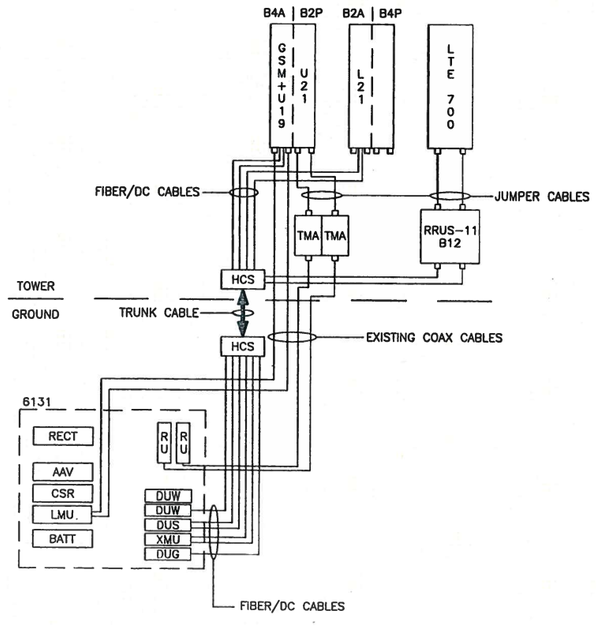
SPECIFICATIONS:

HEIGHT:	20.0"
WIDTH:	17.0"
DEPTH:	7.0"
WEIGHT:	50.7 LBS

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.



SITE CONFIGURATION 702Cu (3)
SCALE: N.T.S.

DESIGN CONFIGURATION

	ANTENNAS		COAX		COAX LENGTH	EXISTING HYBRID CABLE	RRU	
	EXISTING	PROPOSED	EXISTING	PROPOSED			EXISTING	PROPOSED
ALPHA	ERICSSON AIR21 B2A B4P	EXISTING TO REMAIN	(4) 7/8"ø	–	158'-0"	(1) 1-5/8"ø @ 158'-0"	–	–
	–	COMMSCOPE LNX-6515DS-VTM					–	RRUS-11 B12
	ERICSSON AIR21 B4A B2P	EXISTING TO REMAIN					–	–
BETA	ERICSSON AIR21 B2A B4P	EXISTING TO REMAIN	(4) 7/8"ø	–	158'-0"		–	–
	–	COMMSCOPE LNX-6515DS-VTM					–	RRUS-11 B12
	ERICSSON AIR21 B4A B2P	EXISTING TO REMAIN					–	–
GAMMA	ERICSSON AIR21 B2A B4P	EXISTING TO REMAIN	(4) 7/8"ø	–	158'-0"		–	–
	–	COMMSCOPE LNX-6515DS-VTM					–	RRUS-11 B12
	ERICSSON AIR21 B4A B2P	EXISTING TO REMAIN					–	–

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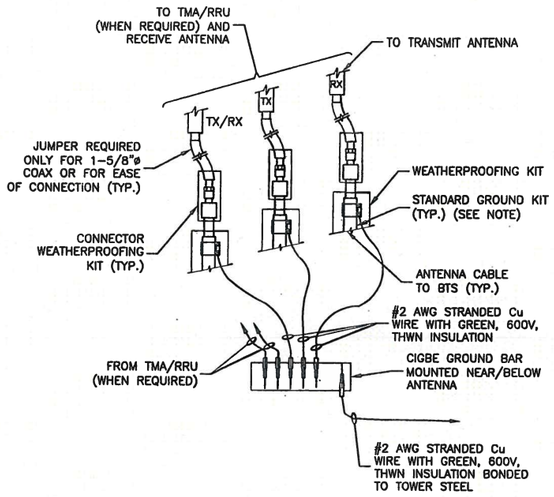
CONSTRUCTION DETAILS

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.

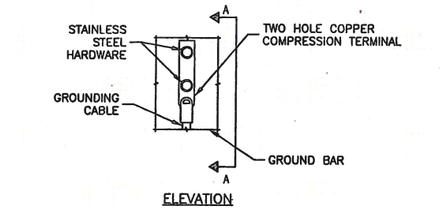


NOTE:

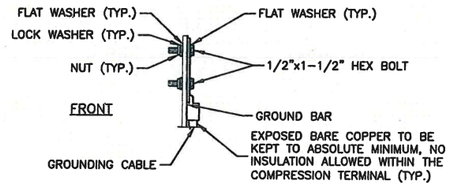
1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE.

CONNECTION OF GROUND WIRES TO GROUNDING BAR (CIGBE)

SCALE: N.T.S. — 1



ELEVATION



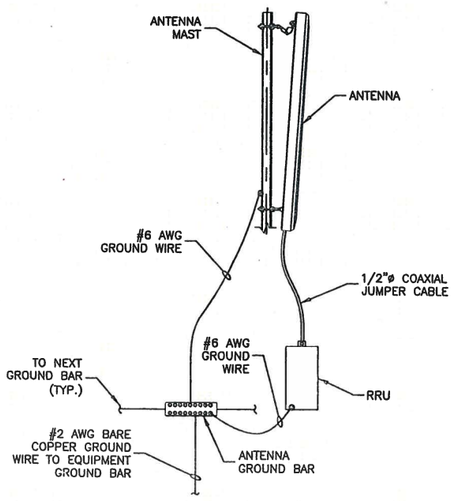
SECTION 'A-A'

NOTES:

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

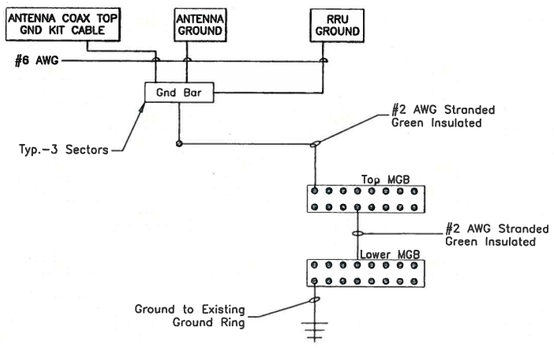
TYPICAL GROUND BAR MECHANICAL CONNECTION DETAIL

SCALE: N.T.S. — 2



TYPICAL ANTENNA GROUNDING DETAIL

SCALE: N.T.S — 3



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

SCALE: N.T.S. — 4

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STATE OF CONNECTICUT
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0023222
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HARTFORD COUNTY

SHEET TITLE

GROUNDING NOTES & DETAILS

SHEET NUMBER

E-1

PJF PAUL J. FORD & COMPANY

Date: **September 28, 2015**

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

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

Subject: **Structural Modification Report**

Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11423B
	Carrier Site Name:	I-84/New Britain
Crown Castle Designation:	**Crown Castle BU Number:**	876331
	Crown Castle Site Name:	NEW BRITAIN GRAVEL PIT
	Crown Castle JDE Job Number:	342166
	Crown Castle Work Order Number:	1114296
	Crown Castle Application Number:	303991 Rev. 0
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37515-0774.002.7700
Site Data:	**115 North Mountain Rd, NEW BRITAIN, Hartford County, CT**	
	Latitude *41° 40' 35.72"*, Longitude *-72° 49' 17.09"*	
	118 Foot - Monopole Tower	

Dear Timothy Howell,

Paul J. Ford and Company is pleased to submit this **"Structural Modification Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 821569, in accordance with application 303991, revision 0.

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

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 with 2009 amendment and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

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

We at *Paul J. Ford and Company* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:

Joshua Johnson RMR
Structural Designer

tnxTower Report - version 6.1.4.1

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

9.28.15

PAUL J. FORD & COMPANY

Date: **September 28, 2015**

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

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

Subject: Structural Modification Report

Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11423B
	Carrier Site Name:	I-84/New Britain
Crown Castle Designation:	**Crown Castle BU Number:**	876331
	Crown Castle Site Name:	NEW BRITAIN GRAVEL PIT
	Crown Castle JDE Job Number:	342166
	Crown Castle Work Order Number:	1114296
	Crown Castle Application Number:	303991 Rev. 0
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37515-0774.002.7700
Site Data:	**115 North Mountain Rd, NEW BRITAIN, Hartford County, CT**	
	Latitude *41° 40' 35.72"*, Longitude *-72° 49' 17.09"*	
	118 Foot - Monopole Tower	

Dear Timothy Howell,

Paul J. Ford and Company is pleased to submit this **"Structural Modification Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 821569, in accordance with application 303991, revision 0.

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

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 with 2009 amendment and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

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

We at *Paul J. Ford and Company* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:

Joshua Johnson
Structural Designer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 118 ft. monopole tower designed by Rohn in October of 1996. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-E.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code with 2009 amendment and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1 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
108.0	108.0	3	commscope	LNX-6515DS-VTM w/ Mount Pipe	-	-	-
		3	ericsson	RRUS 11 B12			

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
116.0	116.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	--	--	1
		1	tower mounts	Pipe Mount [PM 601-3]			
	113.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
114.0	116.0	1	rfs celwave	APXV9ERR18-C-A20 w/ Mount Pipe	3	1-1/4	1
		2	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
	114.0	1	tower mounts	Platform Mount [LP 501-1]			
108.0	108.0	3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	12 1	7/8 1-5/8	1
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
		1	tower mounts	Sector Mount [SM 802-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
98.0	100.0	2	andrew	SBNH-1D6565C w/ Mount Pipe	1 2 12	3/8 3/4 7/8	1
		3	communication components inc.	DTMABP7819VG12A			
		3	ericsson	RRUS 11 B12			
		4	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP13519			
		1	raycap	DC6-48-60-18-8F			
	98.0	1	tower mounts	Platform Mount [LP 712-1]			
85.0	86.0	3	alcatel lucent	RRH2X60-AWS	-	-	2
		3	alcatel lucent	RRH2X60-PCS			
		6	andrew	HBXX-6517DS-A2M w/ Mount Pipe			
		2	antel	BXA-70040-6CF-EDIN-2 w/ Mount Pipe			
		2	antel	BXA-70063-6CF-2 w/ Mount Pipe			
		1	rfs celwave	DB-B1-6C-12AB-0Z			
		1	antel	BXA-171040-8CF-EDIN-2 w/ Mount Pipe	--	--	3
		2	antel	BXA-171063/8CFx2 w/ Mount Pipe			
		1	antel	BXA-70063-6CF-2 w/ Mount Pipe			
		2	antel	LPA-4016 w/ Mount Pipe			
		4	antel	LPA-80063/4CF w/ Mount Pipe			
		6	andrew	CBC721-DF	13	1-5/8	1
		2	antel	BXA-70063-6CF-2 w/ Mount Pipe			
	85.0	1	tower mounts	Platform Mount [LP 303-1]			
80.0	81.0	1	lucent	KS24019-L112A	1	1/2	1
	80.0	1	tower mounts	Side Arm Mount [SO 701-1]			

72.0	74.0	2	argus technologies	LLPX310R w/ Mount Pipe	3 3 2	5/8 1/4 1/2	1
		1	dragonwave	HORIZON COMPACT			
		1	samsung telecommunications	WIMAX DAP HEAD			
	73.0	1	andrew	VHLP1-23			
		1	samsung telecommunications	WIMAX DAP HEAD			
	72.0	1	argus technologies	LLPX310R w/ Mount Pipe			
		1	dragonwave	A-ANT-18G-2-C			
		1	dragonwave	HORIZON COMPACT			
		1	samsung telecommunications	WIMAX DAP HEAD			
		1	tower mounts	Side Arm Mount [SO 101-3]			

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, 07-11435G, 01/23/2008	2192549	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 126879, 03/17/2013	3684848	CCISITES
4-POST-MODIFICATION INSPECTION	SGS, 145041, 11/21/2014	5407775	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Rohn, 34738SW, 10/24/1996	1947809	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Rohn, 34738SW, 10/24/1996	1947800	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF, 41707-0508, 05/23/2008	2268906	CCISITES
4-TOWER PROPOSED REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF, 37513-0921.004.7700, 10/21/2014	5371260	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Monopole was reinforced in conformance with the referenced modification drawings.
5) The bridge stiffeners take the entire load through the flange connection.
6) Monopole will be reinforced in conformance with the 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	118 - 90	Pole	P24x0.25	1	-7.53	589.19	78.2	Pass
L2	90 - 76.5	Pole	P24x0.375	2	-11.70	934.94	93.8	Pass
L3	76.5 - 74	Pole	RPS 24" x 0.58167"	3	-12.16	1426.56	69.0	Pass
L4	74 - 68.875	Pole	RPS 24" x 0.82296"	4	-13.88	1528.35	79.4	Pass
L5	68.875 - 64.5	Pole	RPS 24" x 0.81081"	5	-14.95	1483.43	94.0	Pass
L6	64.5 - 63	Pole	RPS 24" x 0.9855"	6	-15.38	1763.24	83.8	Pass
L7	63 - 60	Pole	RPS 24" x 0.94656"	7	-16.21	1704.65	94.0	Pass
L8	60 - 49.08	Pole	RPS 30" x 0.62249"	8	-18.82	1742.86	92.2	Pass
L9	49.08 - 42	Pole	RPS 30" x 0.77273"	9	-20.84	2119.52	88.2	Pass
L10	42 - 34.5	Pole	RPS 30" x 0.89547"	10	-23.27	2456.35	87.7	Pass
L11	34.5 - 34	Pole	RPS 30" x 1.00259"	11	-23.45	2740.06	79.8	Pass
L12	34 - 30	Pole	RPS 30" x 0.87892"	12	-24.73	2407.17	96.2	Pass
L13	30 - 28	Pole	RPS 36" x 0.67999"	13	-25.33	2156.79	90.6	Pass
L14	28 - 23.25	Pole	RPS 36" x 0.82233"	14	-27.00	2581.77	81.9	Pass
L15	23.25 - 21	Pole	RPS 36" x 0.93797"	15	-27.88	2867.39	76.6	Pass
L16	21 - 19	Pole	RPS 36" x 0.7933"	16	-28.57	2390.92	93.8	Pass
L17	19 - 18.5	Pole	RPS 36" x 0.95054"	17	-28.77	2873.80	79.2	Pass
L18	18.5 - 12.7	Pole	RPS 36" x 0.83577"	18	-30.84	2607.45	93.7	Pass
L19	12.7 - 10.5	Pole	RPS 36" x 0.84294"	19	-31.64	2569.72	97.8	Pass
L20	10.5 - 10	Pole	RPS 36" x 1.22827"	20	-31.90	3641.12	70.9	Pass
L21	10 - 7.5	Pole	RPS 36" x 0.90812"	21	-32.85	2825.75	92.7	Pass
L22	7.5 - 6.25	Pole	RPS 36" x 0.94913"	22	-33.35	2806.12	94.9	Pass
L23	6.25 - 3.75	Pole	RPS 36" x 1.02583"	23	-34.42	3151.56	87.4	Pass
L24	3.75 - 2.75	Pole	RPS 36" x 1.59247"	24	-35.05	4497.85	63.9	Pass
L25	2.75 - 2	Pole	RPS 36" x 1.45929"	25	-35.49	3980.60	72.3	Pass
L26	2 - 1	Pole	RPS 36" x 1.29525"	26	-36.01	3573.64	80.8	Pass
L27	1 - 0	Pole	RPS 36" x 2.19555"	27	-36.84	3448.14	89.0	Pass
							Summary	
						Pole (L19)	97.8	Pass
						RATING =	**97.8**	**Pass**

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	95.4	Pass
1	Base Plate	0	74.0	Pass
1	Base Foundation Structural Steel	0	81.7	Pass
1	Base Foundation Soil Interaction	0	72.3	Pass
1	Flange Connection	30	98.0	Pass
1	Flange Connection	60	72.0	Pass
1	Flange Connection	90	34.1	Pass

Structure Rating (max from all components) =	98.0%

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

4.1) Recommendations

Install the proposed modifications per referenced drawings.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

1) Tower is located in Hartford County, Connecticut.
2) Basic wind speed of 80.0 mph.
3) Nominal ice thickness of 1.00 in.
4) Ice density of 56 pcf.
5) A wind speed of 37.6 mph is used in combination with ice.
6) Temperature drop of 50 °F.
7) Deflections calculated using a wind speed of 50.0 mph.
8) A non-linear (P-delta) analysis was used.
9) Pressures are calculated at each section.
10) Stress ratio used in pole design is 1.333.
11) 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		

Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Pole Size*	*Pole Grade*	*Socket Length* *ft*
L1	118.00-90.00	28.00	P24x0.25	A572-42 (42 ksi)	
L2	90.00-76.50	13.50	P24x0.375	A572-42 (42 ksi)	
L3	76.50-74.00	2.50	RPS 24" x 0.58167"	Reinf 41.68 ksi (42 ksi)	
L4	74.00-68.88	5.13	RPS 24" x 0.82296"	Reinf 31.89 ksi (32 ksi)	
L5	68.88-64.50	4.38	RPS 24" x 0.81081"	Reinf 31.40 ksi (31 ksi)	
L6	64.50-63.00	1.50	RPS 24" x 0.9855"	Reinf 30.94 ksi (31 ksi)	
L7	63.00-60.00	3.00	RPS 24" x 0.94656"	Reinf 31.09 ksi (31 ksi)	
L8	60.00-49.08	10.92	RPS 30" x 0.62249"	Reinf 37.93 ksi	

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L9	49.08-42.00	7.08	RPS 30" x 0.77273"	(38 ksi) Reinf 37.35 ksi	
L10	42.00-34.50	7.50	RPS 30" x 0.89547"	(37 ksi) Reinf 37.51 ksi	
L11	34.50-34.00	0.50	RPS 30" x 1.00259"	(38 ksi) Reinf 37.51 ksi	
L12	34.00-30.00	4.00	RPS 30" x 0.87892"	(38 ksi) Reinf 37.43 ksi	
L13	30.00-28.00	2.00	RPS 36" x 0.67999"	(37 ksi) Reinf 35.74 ksi	
L14	28.00-23.25	4.75	RPS 36" x 0.82233"	(36 ksi) Reinf 35.52 ksi	
L15	23.25-21.00	2.25	RPS 36" x 0.93797"	(36 ksi) Reinf 34.70 ksi	
L16	21.00-19.00	2.00	RPS 36" x 0.7933"	(35 ksi) Reinf 34.07 ksi	
L17	19.00-18.50	0.50	RPS 36" x 0.95054"	(34 ksi) Reinf 34.33 ksi	
L18	18.50-12.70	5.80	RPS 36" x 0.83577"	(34 ksi) Reinf 35.31 ksi	
L19	12.70-10.50	2.20	RPS 36" x 0.84294"	(35 ksi) Reinf 34.51 ksi	
L20	10.50-10.00	0.50	RPS 36" x 1.22827"	(35 ksi) Reinf 33.93 ksi	
L21	10.00-7.50	2.50	RPS 36" x 0.90812"	(34 ksi) Reinf 35.29 ksi	
L22	7.50-6.25	1.25	RPS 36" x 0.94913"	(35 ksi) Reinf 33.57 ksi	
L23	6.25-3.75	2.50	RPS 36" x 1.02583"	(34 ksi) Reinf 34.96 ksi	
L24	3.75-2.75	1.00	RPS 36" x 1.59247"	(35 ksi) Reinf 32.67 ksi	
L25	2.75-2.00	0.75	RPS 36" x 1.45929"	(33 ksi) Reinf 31.43 ksi	
L26	2.00-1.00	1.00	RPS 36" x 1.29525"	(31 ksi) Reinf 31.64 ksi	
L27	1.00-0.00	1.00	RPS 36" x 2.19555"	(32 ksi) Reinf 18.49 ksi (18 ksi)	

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
HB114-1-08U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	114.00 - 0.00	2	No Ice	0.00	1.08
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.18

Description	*Face or Leg*	*Allow Shield*	*Component Type*	*Placement* *ft*	*Total Number*		*C_AA_A* *ft^2/ft*	*Weight* *plf*
HB114-1-08U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	72.00 - 0.00	1	No Ice	0.00	1.08
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.18
HB114-1-08U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	114.00 - 72.00	1	No Ice	0.15	1.08
						1/2" Ice	0.25	2.33
						1" Ice	0.35	4.18
***								
AL5-50(7/8)	C	No	Inside Pole	108.00 - 0.00	12	No Ice	0.00	0.26
						1/2" Ice	0.00	0.26
						1" Ice	0.00	0.26
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	C	No	Inside Pole	108.00 - 0.00	1	No Ice	0.00	1.07
						1/2" Ice	0.00	1.07
						1" Ice	0.00	1.07
***								
LDF5-50A(7/8")	C	No	Inside Pole	98.00 - 0.00	12	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
						1" Ice	0.00	0.33
FB-L98B-002-75000(3/8")	C	No	Inside Pole	98.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	98.00 - 0.00	2	No Ice	0.00	0.59
						1/2" Ice	0.00	0.59
						1" Ice	0.00	0.59
2" Conduit	C	No	Inside Pole	98.00 - 0.00	1	No Ice	0.00	1.16
						1/2" Ice	0.00	1.16
						1" Ice	0.00	1.16
***								
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	85.00 - 0.00	10	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.46
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	85.00 - 0.00	2	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
						1" Ice	0.40	4.46
HB158-1-08U8-S8J18(1-5/8)	C	No	CaAa (Out Of Face)	85.00 - 0.00	1	No Ice	0.00	1.30
						1/2" Ice	0.00	2.81
						1" Ice	0.00	4.94
***								
LDF4-50A(1/2")	C	No	CaAa (Out Of Face)	80.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.84
						1" Ice	0.00	2.14
1" Conduit	C	No	CaAa (Out Of Face)	80.00 - 0.00	1	No Ice	0.00	0.46
						1/2" Ice	0.00	1.33
						1" Ice	0.00	2.81
***								
FSJ1-50A(1/4")	C	No	CaAa (Out Of Face)	72.00 - 0.00	3	No Ice	0.00	0.04
						1/2" Ice	0.00	0.53
						1" Ice	0.00	1.62
FSJ4P-50B-1(1/2")	C	No	CaAa (Out Of Face)	72.00 - 0.00	2	No Ice	0.00	0.14
						1/2" Ice	0.00	0.77
						1" Ice	0.00	2.01
HJ4.5-50(5/8")	C	No	CaAa (Out Of Face)	72.00 - 0.00	3	No Ice	0.00	0.40
						1/2" Ice	0.00	1.24
						1" Ice	0.00	2.69
2" Conduit	C	No	CaAa (Out Of Face)	72.00 - 0.00	1	No Ice	0.00	1.16
						1/2" Ice	0.00	2.53
						1" Ice	0.00	4.51
2" Conduit	C	No	CaAa (Out Of Face)	72.00 - 0.00	1	No Ice	0.17	1.16
						1/2" Ice	0.27	2.53
						1" Ice	0.37	4.51
***								
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	60.00 - 0.00	1	No Ice	0.17	0.00
						1/2" Ice	0.28	0.00
						1" Ice	0.39	0.00
3/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	75.00 - 60.00	1	No Ice	0.13	0.00
						1/2" Ice	0.24	0.00
						1" Ice	0.35	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	118.00-90.00	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	3.696	0.20
L2	90.00-76.50	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	5.445	0.28
L3	76.50-74.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.500	0.06
L4	74.00-68.88	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	3.522	0.14
L5	68.88-64.50	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	3.041	0.13
L6	64.50-63.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.043	0.04
L7	63.00-60.00	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	2.085	0.09
L8	60.00-49.08	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	8.044	0.32
L9	49.08-42.00	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	5.216	0.21
L10	42.00-34.50	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	5.525	0.22
L11	34.50-34.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.368	0.01
L12	34.00-30.00	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	2.947	0.12
L13	30.00-28.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.473	0.06
L14	28.00-23.25	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	3.499	0.14
L15	23.25-21.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.658	0.07
L16	21.00-19.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.473	0.06
L17	19.00-18.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.368	0.01
L18	18.50-12.70	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	4.273	0.17
L19	12.70-10.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.621	0.06
L20	10.50-10.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.368	0.01
L21	10.00-7.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.842	0.07
L22	7.50-6.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.921	0.04
L23	6.25-3.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C	0.000	0.000	0.000	1.842	0.07
L24	3.75-2.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.737	0.03
L25	2.75-2.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.553	0.02
L26	2.00-1.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.737	0.03
L27	1.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.737	0.03

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	118.00-90.00	A	1.000	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	8.496	0.43
L2	90.00-76.50	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	11.545	0.83
L3	76.50-74.00	A	1.000	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	3.222	0.22
L4	74.00-68.88	A	1.000	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	7.736	0.52
L5	68.88-64.50	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	6.638	0.49
L6	64.50-63.00	A	1.000	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	2.276	0.17
L7	63.00-60.00	A	1.000	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	4.552	0.34
L8	60.00-49.08	A	1.000	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	17.023	1.23
L9	49.08-42.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	11.037	0.80
L10	42.00-34.50	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	11.692	0.84
L11	34.50-34.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.779	0.06
L12	34.00-30.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	6.236	0.45
L13	30.00-28.00	A	1.000	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	3.118	0.22
L14	28.00-23.25	A	1.000	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	7.405	0.53
L15	23.25-21.00	A	1.000	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	3.508	0.25
L16	21.00-19.00	A	1.000	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	3.118	0.22

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
L17	19.00-18.50	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.779	0.06
L18	18.50-12.70	A	1.000	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	9.042	0.65
L19	12.70-10.50	A	1.000	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	3.430	0.25
L20	10.50-10.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.779	0.06
L21	10.00-7.50	A	1.000	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	3.897	0.28
L22	7.50-6.25	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.949	0.14
L23	6.25-3.75	A	1.000	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	3.897	0.28
L24	3.75-2.75	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.559	0.11
L25	2.75-2.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.169	0.08
L26	2.00-1.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.559	0.11
L27	1.00-0.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.559	0.11

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
PCS 1900MHz 4x45W-65MHz	A	From Leg	1.00 0.00 -3.00	0.000	116.00	No Ice 1/2" Ice 1" Ice	2.71 2.95 3.20	2.61 2.85 3.09	0.06 0.08 0.11
PCS 1900MHz 4x45W-65MHz	B	From Leg	1.00 0.00 -3.00	0.000	116.00	No Ice 1/2" Ice 1" Ice	2.71 2.95 3.20	2.61 2.85 3.09	0.06 0.08 0.11
PCS 1900MHz 4x45W-65MHz	C	From Leg	1.00 0.00 -3.00	0.000	116.00	No Ice 1/2" Ice 1" Ice	2.71 2.95 3.20	2.61 2.85 3.09	0.06 0.08 0.11
800MHz 2X50W RRH W/FILTER	A	From Leg	1.00 0.00 0.00	0.000	116.00	No Ice 1/2" Ice 1" Ice	2.40 2.61 2.83	2.25 2.46 2.68	0.06 0.09 0.11
800MHz 2X50W RRH W/FILTER	B	From Leg	1.00 0.00 0.00	0.000	116.00	No Ice 1/2" Ice 1" Ice	2.40 2.61 2.83	2.25 2.46 2.68	0.06 0.09 0.11
800MHz 2X50W RRH W/FILTER	C	From Leg	1.00 0.00 0.00	0.000	116.00	No Ice 1/2" Ice 1" Ice	2.40 2.61 2.83	2.25 2.46 2.68	0.06 0.09 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
Pipe Mount [PM 601-3]	C	None		0.000	116.00	No Ice 1/2" Ice 1" Ice	4.39 5.48 6.57	4.39 5.48 6.57	0.20 0.24 0.28
***									
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.000	114.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.95 8.13 9.02	0.08 0.15 0.23
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.000	114.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.95 8.13 9.02	0.08 0.15 0.23
APXV9ERR18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.000	114.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	7.47 8.66 9.56	0.09 0.16 0.24
(3) 2.375" OD x 4' Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	114.00	No Ice 1/2" Ice 1" Ice	0.87 1.11 1.36	0.87 1.11 1.36	0.02 0.03 0.04
(3) 2.375" OD x 4' Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	114.00	No Ice 1/2" Ice 1" Ice	0.87 1.11 1.36	0.87 1.11 1.36	0.02 0.03 0.04
(3) 2.375" OD x 4' Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	114.00	No Ice 1/2" Ice 1" Ice	0.87 1.11 1.36	0.87 1.11 1.36	0.02 0.03 0.04
Platform Mount [LP 501-1]	C	None		0.000	114.00	No Ice 1/2" Ice 1" Ice	32.04 45.28 58.51	32.04 45.28 58.51	0.98 1.28 1.57
***									
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	6.83 7.35 7.86	5.64 6.48 7.26	0.11 0.17 0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	6.83 7.35 7.86	5.64 6.48 7.26	0.11 0.17 0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	6.83 7.35 7.86	5.64 6.48 7.26	0.11 0.17 0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	6.82 7.34 7.85	5.63 6.47 7.25	0.11 0.17 0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	6.82 7.34 7.85	5.63 6.47 7.25	0.11 0.17 0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	6.82 7.34 7.85	5.63 6.47 7.25	0.11 0.17 0.23
KRY 112 144/1	A	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	0.41 0.50 0.59	0.20 0.27 0.35	0.01 0.01 0.02
KRY 112 144/1	B	From Leg	4.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice	0.41 0.50 0.59	0.20 0.27 0.35	0.01 0.01 0.02

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			
KRY 112 144/1	C	From Leg	4.00	0.000	108.00	No Ice	0.41	0.20	0.01
			0.00			1/2"	0.50	0.27	0.01
			0.00			Ice	0.59	0.35	0.02
						1" Ice			
2.375" OD x 4' Mount Pipe	A	From Leg	4.00	0.000	108.00	No Ice	0.87	0.87	0.02
			0.00			1/2"	1.11	1.11	0.03
			0.00			Ice	1.36	1.36	0.04
						1" Ice			
2.375" OD x 4' Mount Pipe	B	From Leg	4.00	0.000	108.00	No Ice	0.87	0.87	0.02
			0.00			1/2"	1.11	1.11	0.03
			0.00			Ice	1.36	1.36	0.04
						1" Ice			
2.375" OD x 4' Mount Pipe	C	From Leg	4.00	0.000	108.00	No Ice	0.87	0.87	0.02
			0.00			1/2"	1.11	1.11	0.03
			0.00			Ice	1.36	1.36	0.04
						1" Ice			
Sector Mount [SM 802-3]	C	None		0.000	108.00	No Ice	24.41	24.41	0.93
						1/2"	31.39	31.39	1.36
						Ice	38.37	38.37	1.79
						1" Ice			
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	4.00	0.000	108.00	No Ice	11.68	9.84	0.08
			0.00			1/2"	12.40	11.37	0.17
			0.00			Ice	13.14	12.91	0.27
						1" Ice			
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	4.00	0.000	108.00	No Ice	11.68	9.84	0.08
			0.00			1/2"	12.40	11.37	0.17
			0.00			Ice	13.14	12.91	0.27
						1" Ice			
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	4.00	0.000	108.00	No Ice	11.68	9.84	0.08
			0.00			1/2"	12.40	11.37	0.17
			0.00			Ice	13.14	12.91	0.27
						1" Ice			
RRUS 11 B12	A	From Leg	4.00	0.000	108.00	No Ice	3.31	1.36	0.05
			0.00			1/2"	3.55	1.54	0.07
			0.00			Ice	3.80	1.73	0.10
						1" Ice			
RRUS 11 B12	B	From Leg	4.00	0.000	108.00	No Ice	3.31	1.36	0.05
			0.00			1/2"	3.55	1.54	0.07
			0.00			Ice	3.80	1.73	0.10
						1" Ice			
RRUS 11 B12	C	From Leg	4.00	0.000	108.00	No Ice	3.31	1.36	0.05
			0.00			1/2"	3.55	1.54	0.07
			0.00			Ice	3.80	1.73	0.10
						1" Ice			
***									
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00	0.000	98.00	No Ice	8.50	6.30	0.07
			0.00			1/2"	9.15	7.48	0.14
			2.00			Ice	9.77	8.37	0.21
						1" Ice			
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	0.000	98.00	No Ice	8.50	6.30	0.07
			0.00			1/2"	9.15	7.48	0.14
			2.00			Ice	9.77	8.37	0.21
						1" Ice			
(2) AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00	0.000	98.00	No Ice	8.50	6.30	0.07
			0.00			1/2"	9.15	7.48	0.14
			2.00			Ice	9.77	8.37	0.21
						1" Ice			
7770.00 w/ Mount Pipe	A	From Leg	4.00	0.000	98.00	No Ice	6.22	4.82	0.09
			0.00			1/2"	6.71	5.51	0.14
			2.00			Ice	7.22	6.21	0.21
						1" Ice			
7770.00 w/ Mount Pipe	B	From Leg	4.00	0.000	98.00	No Ice	6.22	4.82	0.09
			0.00			1/2"	6.71	5.51	0.14
			2.00			Ice	7.22	6.21	0.21

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			
7770.00 w/ Mount Pipe	C	From Leg	4.00	0.000	98.00	No Ice	6.22	4.82	0.09
			0.00			1/2"	6.71	5.51	0.14
			2.00			Ice	7.22	6.21	0.21
						1" Ice			
SBNH-1D6565C w/ Mount Pipe	A	From Leg	4.00	0.000	98.00	No Ice	11.56	9.72	0.10
			0.00			1/2"	12.22	11.19	0.19
			2.00			Ice	12.89	12.59	0.28
						1" Ice			
SBNH-1D6565C w/ Mount Pipe	B	From Leg	4.00	0.000	98.00	No Ice	11.56	9.72	0.10
			0.00			1/2"	12.22	11.19	0.19
			2.00			Ice	12.89	12.59	0.28
						1" Ice			
RRUS 11 B12	A	From Leg	4.00	0.000	98.00	No Ice	3.31	1.36	0.05
			0.00			1/2"	3.55	1.54	0.07
			2.00			Ice	3.80	1.73	0.10
						1" Ice			
RRUS 11 B12	B	From Leg	4.00	0.000	98.00	No Ice	3.31	1.36	0.05
			0.00			1/2"	3.55	1.54	0.07
			2.00			Ice	3.80	1.73	0.10
						1" Ice			
RRUS 11 B12	C	From Leg	4.00	0.000	98.00	No Ice	3.31	1.36	0.05
			0.00			1/2"	3.55	1.54	0.07
			2.00			Ice	3.80	1.73	0.10
						1" Ice			
(2) LGP13519	A	From Leg	4.00	0.000	98.00	No Ice	0.34	0.21	0.01
			0.00			1/2"	0.42	0.28	0.01
			2.00			Ice	0.51	0.36	0.01
						1" Ice			
(2) LGP13519	B	From Leg	4.00	0.000	98.00	No Ice	0.34	0.21	0.01
			0.00			1/2"	0.42	0.28	0.01
			2.00			Ice	0.51	0.36	0.01
						1" Ice			
(2) LGP13519	C	From Leg	4.00	0.000	98.00	No Ice	0.34	0.21	0.01
			0.00			1/2"	0.42	0.28	0.01
			2.00			Ice	0.51	0.36	0.01
						1" Ice			
DTMABP7819VG12A	A	From Leg	4.00	0.000	98.00	No Ice	1.14	0.39	0.02
			0.00			1/2"	1.28	0.49	0.03
			2.00			Ice	1.44	0.59	0.04
						1" Ice			
DTMABP7819VG12A	B	From Leg	4.00	0.000	98.00	No Ice	1.14	0.39	0.02
			0.00			1/2"	1.28	0.49	0.03
			2.00			Ice	1.44	0.59	0.04
						1" Ice			
DTMABP7819VG12A	C	From Leg	4.00	0.000	98.00	No Ice	1.14	0.39	0.02
			0.00			1/2"	1.28	0.49	0.03
			2.00			Ice	1.44	0.59	0.04
						1" Ice			
DC6-48-60-18-8F	A	From Leg	4.00	0.000	98.00	No Ice	1.47	1.47	0.02
			0.00			1/2"	1.67	1.67	0.04
			2.00			Ice	1.88	1.88	0.06
						1" Ice			
Platform Mount [LP 712-1]	C	None		0.000	98.00	No Ice	24.53	24.53	1.34
						1/2"	29.94	29.94	1.65
						Ice	35.35	35.35	1.96
						1" Ice			
***									
BXA-70063-6CF-2 w/ Mount Pipe	B	From Leg	4.00	0.000	85.00	No Ice	7.97	5.80	0.04
			0.00			1/2"	8.61	6.95	0.10
			1.00			Ice	9.22	7.82	0.17
						1" Ice			
BXA-70063-6CF-2 w/ Mount Pipe	C	From Leg	4.00	0.000	85.00	No Ice	7.97	5.80	0.04
			0.00			1/2"	8.61	6.95	0.10
			1.00			Ice	9.22	7.82	0.17

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			
(2) CBC721-DF	B	From Leg	4.00	0.000	85.00	No Ice	0.45	0.12	0.00
			0.00			1/2" Ice	0.54	0.18	0.01
			1.00			1" Ice	0.64	0.26	0.01
(4) CBC721-DF	C	From Leg	4.00	0.000	85.00	No Ice	0.45	0.12	0.00
			0.00			1/2" Ice	0.54	0.18	0.01
			1.00			1" Ice	0.64	0.26	0.01
(2) HBXX-6517DS-A2M w/ Mount Pipe	A	From Leg	4.00	0.000	85.00	No Ice	8.98	6.96	0.07
			0.00			1/2" Ice	9.65	8.18	0.14
			1.00			1" Ice	10.29	9.14	0.21
(2) HBXX-6517DS-A2M w/ Mount Pipe	B	From Leg	4.00	0.000	85.00	No Ice	8.98	6.96	0.07
			0.00			1/2" Ice	9.65	8.18	0.14
			1.00			1" Ice	10.29	9.14	0.21
(2) HBXX-6517DS-A2M w/ Mount Pipe	C	From Leg	4.00	0.000	85.00	No Ice	8.98	6.96	0.07
			0.00			1/2" Ice	9.65	8.18	0.14
			1.00			1" Ice	10.29	9.14	0.21
(2) BXA-70040-6CF-EDIN-2 w/ Mount Pipe	A	From Leg	4.00	0.000	85.00	No Ice	16.76	7.37	0.06
			0.00			1/2" Ice	17.48	8.54	0.16
			1.00			1" Ice	18.17	9.42	0.27
BXA-70063-6CF-2 w/ Mount Pipe	B	From Leg	4.00	0.000	85.00	No Ice	7.97	5.80	0.04
			0.00			1/2" Ice	8.61	6.95	0.10
			1.00			1" Ice	9.22	7.82	0.17
BXA-70063-6CF-2 w/ Mount Pipe	C	From Leg	4.00	0.000	85.00	No Ice	7.97	5.80	0.04
			0.00			1/2" Ice	8.61	6.95	0.10
			1.00			1" Ice	9.22	7.82	0.17
(2) RRH2X60-AWS	A	From Leg	4.00	0.000	85.00	No Ice	2.19	1.43	0.04
			0.00			1/2" Ice	2.40	1.61	0.06
			1.00			1" Ice	2.61	1.80	0.08
RRH2X60-AWS	B	From Leg	4.00	0.000	85.00	No Ice	2.19	1.43	0.04
			0.00			1/2" Ice	2.40	1.61	0.06
			1.00			1" Ice	2.61	1.80	0.08
RRH2X60-PCS	B	From Leg	4.00	0.000	85.00	No Ice	2.57	2.01	0.06
			0.00			1/2" Ice	2.79	2.22	0.08
			1.00			1" Ice	3.02	2.43	0.10
(2) RRH2X60-PCS	C	From Leg	4.00	0.000	85.00	No Ice	2.57	2.01	0.06
			0.00			1/2" Ice	2.79	2.22	0.08
			1.00			1" Ice	3.02	2.43	0.10
DB-B1-6C-12AB-0Z	B	From Leg	4.00	0.000	85.00	No Ice	3.92	2.56	0.03
			0.00			1/2" Ice	4.20	2.79	0.06
			1.00			1" Ice	4.48	3.04	0.09
Platform Mount [LP 303-1]	C	None		0.000	85.00	No Ice	14.66	14.66	1.25
						1/2" Ice	18.87	18.87	1.48
						1" Ice	23.08	23.08	1.71
***									
KS24019-L112A	A	From Leg	3.00	0.000	80.00	No Ice	0.16	0.16	0.01
			0.00			1/2" Ice	0.22	0.22	0.01
			1.00			1" Ice	0.30	0.30	0.01
Side Arm Mount [SO 701-1]	A	None		0.000	80.00	No Ice	0.85	1.67	0.07
						1/2" Ice	1.14	2.34	0.08
						1" Ice	1.43	3.01	0.09

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			
***									
LLPX310R w/ Mount Pipe	A	From Leg	2.00 0.00 2.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	4.96 5.35 5.75	2.85 3.37 3.90	0.04 0.08 0.12
LLPX310R w/ Mount Pipe	B	From Leg	2.00 0.00 0.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	4.96 5.35 5.75	2.85 3.37 3.90	0.04 0.08 0.12
LLPX310R w/ Mount Pipe	C	From Leg	2.00 0.00 2.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	4.96 5.35 5.75	2.85 3.37 3.90	0.04 0.08 0.12
WIMAX DAP HEAD	A	From Leg	2.00 0.00 2.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
WIMAX DAP HEAD	B	From Leg	2.00 0.00 0.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
WIMAX DAP HEAD	B	From Leg	2.00 0.00 1.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
HORIZON COMPACT	A	From Leg	2.00 0.00 0.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	0.84 0.97 1.10	0.43 0.52 0.63	0.01 0.02 0.03
HORIZON COMPACT	C	From Leg	2.00 0.00 2.00	0.000	72.00	No Ice 1/2" Ice 1" Ice	0.84 0.97 1.10	0.43 0.52 0.63	0.01 0.02 0.03
Side Arm Mount [SO 101-3]	C	None		0.000	72.00	No Ice 1/2" Ice 1" Ice	7.50 8.90 10.30	7.50 8.90 10.30	0.25 0.33 0.41
***									
Bridge Stiffener (84" x 14.5" x 1.25")	A	None		0.000	90.00	No Ice 1/2" Ice 1" Ice	11.84 12.48 13.14	1.46 2.25 3.06	0.43 0.48 0.53

Dishes

Description	*Face or Leg*	*Dish Type*	*Offset Type*	*Offsets: Horz Lateral Vert* ft	*Azimuth Adjustment* °	*3 dB Beam Width* °	*Elevation* ft	*Outside Diameter* ft		*Aperture Area* ft^2	*Weight* K
A-ANT-18G-2-C	A	Paraboloid w/Radome	From Leg	2.00 0.00 0.00	0.000		72.00	2.17	No Ice 1/2" Ice 1" Ice	3.72 4.01 4.30	0.03 0.04 0.05
VHLP1-23	B	Paraboloid w/o Radome	From Leg	2.00 0.00 1.00	0.000		72.00	1.27	No Ice 1/2" Ice 1" Ice	1.28 1.45 1.62	0.01 0.02 0.03

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 118.00-90.00	104.00	1.388	23	56.000	A	0.000	56.000	56.000	100.00	0.000	0.000
					B	0.000	56.000		100.00	0.000	0.000
					C	0.000	56.000		100.00	0.000	3.696
L2 90.00-76.50	83.25	1.303	21	27.000	A	0.000	27.000	27.000	100.00	0.000	0.000
					B	0.000	27.000		100.00	0.000	0.000
					C	0.000	27.000		100.00	0.000	5.445
L3 76.50-74.00	75.25	1.266	21	5.000	A	0.000	5.000	5.000	100.00	0.000	0.000
					B	0.000	5.000		100.00	0.000	0.000
					C	0.000	5.000		100.00	0.000	1.500
L4 74.00-68.88	71.44	1.247	20	10.250	A	0.000	10.250	10.250	100.00	0.000	0.000
					B	0.000	10.250		100.00	0.000	0.000
					C	0.000	10.250		100.00	0.000	3.522
L5 68.88-64.50	66.69	1.223	20	8.750	A	0.000	8.750	8.750	100.00	0.000	0.000
					B	0.000	8.750		100.00	0.000	0.000
					C	0.000	8.750		100.00	0.000	3.041
L6 64.50-63.00	63.75	1.207	20	3.000	A	0.000	3.000	3.000	100.00	0.000	0.000
					B	0.000	3.000		100.00	0.000	0.000
					C	0.000	3.000		100.00	0.000	1.043
L7 63.00-60.00	61.50	1.195	20	6.000	A	0.000	6.000	6.000	100.00	0.000	0.000
					B	0.000	6.000		100.00	0.000	0.000
					C	0.000	6.000		100.00	0.000	2.085
L8 60.00-49.08	54.54	1.154	19	27.300	A	0.000	27.300	27.300	100.00	0.000	0.000
					B	0.000	27.300		100.00	0.000	0.000
					C	0.000	27.300		100.00	0.000	8.044
L9 49.08-42.00	45.54	1.096	18	17.700	A	0.000	17.700	17.700	100.00	0.000	0.000
					B	0.000	17.700		100.00	0.000	0.000
					C	0.000	17.700		100.00	0.000	5.216
L10 42.00-34.50	38.25	1.043	17	18.750	A	0.000	18.750	18.750	100.00	0.000	0.000
					B	0.000	18.750		100.00	0.000	0.000
					C	0.000	18.750		100.00	0.000	5.525
L11 34.50-34.00	34.25	1.011	17	1.250	A	0.000	1.250	1.250	100.00	0.000	0.000
					B	0.000	1.250		100.00	0.000	0.000
					C	0.000	1.250		100.00	0.000	0.368
L12 34.00-30.00	32.00	1	16	10.000	A	0.000	10.000	10.000	100.00	0.000	0.000
					B	0.000	10.000		100.00	0.000	0.000
					C	0.000	10.000		100.00	0.000	2.947
L13 30.00-28.00	29.00	1	16	6.000	A	0.000	6.000	6.000	100.00	0.000	0.000
					B	0.000	6.000		100.00	0.000	0.000
					C	0.000	6.000		100.00	0.000	1.473
L14 28.00-23.25	25.63	1	16	14.250	A	0.000	14.250	14.250	100.00	0.000	0.000
					B	0.000	14.250		100.00	0.000	0.000
					C	0.000	14.250		100.00	0.000	3.499
L15 23.25-21.00	22.13	1	16	6.750	A	0.000	6.750	6.750	100.00	0.000	0.000
					B	0.000	6.750		100.00	0.000	0.000
					C	0.000	6.750		100.00	0.000	1.658
L16 21.00-19.00	20.00	1	16	6.000	A	0.000	6.000	6.000	100.00	0.000	0.000
					B	0.000	6.000		100.00	0.000	0.000
					C	0.000	6.000		100.00	0.000	1.473
L17 19.00-18.50	18.75	1	16	1.500	A	0.000	1.500	1.500	100.00	0.000	0.000
					B	0.000	1.500		100.00	0.000	0.000
					C	0.000	1.500		100.00	0.000	0.368
L18 18.50-12.70	15.60	1	16	17.400	A	0.000	17.400	17.400	100.00	0.000	0.000
					B	0.000	17.400		100.00	0.000	0.000
					C	0.000	17.400		100.00	0.000	4.273
L19 12.70-10.50	11.60	1	16	6.600	A	0.000	6.600	6.600	100.00	0.000	0.000
					B	0.000	6.600		100.00	0.000	0.000
					C	0.000	6.600		100.00	0.000	1.621
L20 10.50-10.00	10.25	1	16	1.500	A	0.000	1.500	1.500	100.00	0.000	0.000
					B	0.000	1.500		100.00	0.000	0.000
					C	0.000	1.500		100.00	0.000	0.368
L21 10.00-7.50	8.75	1	16	7.500	A	0.000	7.500	7.500	100.00	0.000	0.000
					B	0.000	7.500		100.00	0.000	0.000
					C	0.000	7.500		100.00	0.000	1.842
L22 7.50-6.25	6.88	1	16	3.750	A	0.000	3.750	3.750	100.00	0.000	0.000
					B	0.000	3.750		100.00	0.000	0.000
					C	0.000	3.750		100.00	0.000	0.921
L23 6.25-3.75	5.00	1	16	7.500	A	0.000	7.500	7.500	100.00	0.000	0.000
					B	0.000	7.500		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
					C	0.000	7.500		100.00	0.000	1.842
L24 3.75-2.75	3.25	1	16	3.000	A	0.000	3.000	3.000	100.00	0.000	0.000
					B	0.000	3.000		100.00	0.000	0.000
					C	0.000	3.000		100.00	0.000	0.737
L25 2.75-2.00	2.38	1	16	2.250	A	0.000	2.250	2.250	100.00	0.000	0.000
					B	0.000	2.250		100.00	0.000	0.000
					C	0.000	2.250		100.00	0.000	0.553
L26 2.00-1.00	1.50	1	16	3.000	A	0.000	3.000	3.000	100.00	0.000	0.000
					B	0.000	3.000		100.00	0.000	0.000
					C	0.000	3.000		100.00	0.000	0.737
L27 1.00-0.00	0.50	1	16	3.000	A	0.000	3.000	3.000	100.00	0.000	0.000
					B	0.000	3.000		100.00	0.000	0.000
					C	0.000	3.000		100.00	0.000	0.737

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 118.00-90.00	104.00	1.388	5	1.00	60.667	A	0.000	60.667	60.667	100.00	0.000	0.000
						B	0.000	60.667		100.00	0.000	0.000
						C	0.000	60.667		100.00	0.000	8.496
L2 90.00-76.50	83.25	1.303	5	1.00	29.250	A	0.000	29.250	29.250	100.00	0.000	0.000
						B	0.000	29.250		100.00	0.000	0.000
						C	0.000	29.250		100.00	0.000	11.545
L3 76.50-74.00	75.25	1.266	5	1.00	5.417	A	0.000	5.417	5.417	100.00	0.000	0.000
						B	0.000	5.417		100.00	0.000	0.000
						C	0.000	5.417		100.00	0.000	3.222
L4 74.00-68.88	71.44	1.247	5	1.00	11.104	A	0.000	11.104	11.104	100.00	0.000	0.000
						B	0.000	11.104		100.00	0.000	0.000
						C	0.000	11.104		100.00	0.000	7.736
L5 68.88-64.50	66.69	1.223	4	1.00	9.479	A	0.000	9.479	9.479	100.00	0.000	0.000
						B	0.000	9.479		100.00	0.000	0.000
						C	0.000	9.479		100.00	0.000	6.638
L6 64.50-63.00	63.75	1.207	4	1.00	3.250	A	0.000	3.250	3.250	100.00	0.000	0.000
						B	0.000	3.250		100.00	0.000	0.000
						C	0.000	3.250		100.00	0.000	2.276
L7 63.00-60.00	61.50	1.195	4	1.00	6.500	A	0.000	6.500	6.500	100.00	0.000	0.000
						B	0.000	6.500		100.00	0.000	0.000
						C	0.000	6.500		100.00	0.000	4.552
L8 60.00-49.08	54.54	1.154	4	1.00	29.120	A	0.000	29.120	29.120	100.00	0.000	0.000
						B	0.000	29.120		100.00	0.000	0.000
						C	0.000	29.120		100.00	0.000	17.023
L9 49.08-42.00	45.54	1.096	4	1.00	18.880	A	0.000	18.880	18.880	100.00	0.000	0.000
						B	0.000	18.880		100.00	0.000	0.000
						C	0.000	18.880		100.00	0.000	11.037
L10 42.00-34.50	38.25	1.043	4	1.00	20.000	A	0.000	20.000	20.000	100.00	0.000	0.000
						B	0.000	20.000		100.00	0.000	0.000
						C	0.000	20.000		100.00	0.000	11.692
L11 34.50-34.00	34.25	1.011	4	1.00	1.333	A	0.000	1.333	1.333	100.00	0.000	0.000
						B	0.000	1.333		100.00	0.000	0.000
						C	0.000	1.333		100.00	0.000	0.779
L12 34.00-30.00	32.00	1	4	1.00	10.667	A	0.000	10.667	10.667	100.00	0.000	0.000
						B	0.000	10.667		100.00	0.000	0.000
						C	0.000	10.667		100.00	0.000	6.236
L13 30.00-28.00	29.00	1	4	1.00	6.333	A	0.000	6.333	6.333	100.00	0.000	0.000
						B	0.000	6.333		100.00	0.000	0.000
						C	0.000	6.333		100.00	0.000	3.118
L14 28.00-23.25	25.63	1	4	1.00	15.042	A	0.000	15.042	15.042	100.00	0.000	0.000
						B	0.000	15.042		100.00	0.000	0.000
						C	0.000	15.042		100.00	0.000	7.405
L15 23.25-21.00	22.13	1	4	1.00	7.125	A	0.000	7.125	7.125	100.00	0.000	0.000
						B	0.000	7.125		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
						C	0.000	7.125		100.00	0.000	3.508
L16 21.00-19.00	20.00	1	4	1.00	6.333	A	0.000	6.333	6.333	100.00	0.000	0.000
						B	0.000	6.333		100.00	0.000	0.000
						C	0.000	6.333		100.00	0.000	3.118
L17 19.00-18.50	18.75	1	4	1.00	1.583	A	0.000	1.583	1.583	100.00	0.000	0.000
						B	0.000	1.583		100.00	0.000	0.000
						C	0.000	1.583		100.00	0.000	0.779
L18 18.50-12.70	15.60	1	4	1.00	18.367	A	0.000	18.367	18.367	100.00	0.000	0.000
						B	0.000	18.367		100.00	0.000	0.000
						C	0.000	18.367		100.00	0.000	9.042
L19 12.70-10.50	11.60	1	4	1.00	6.967	A	0.000	6.967	6.967	100.00	0.000	0.000
						B	0.000	6.967		100.00	0.000	0.000
						C	0.000	6.967		100.00	0.000	3.430
L20 10.50-10.00	10.25	1	4	1.00	1.583	A	0.000	1.583	1.583	100.00	0.000	0.000
						B	0.000	1.583		100.00	0.000	0.000
						C	0.000	1.583		100.00	0.000	0.779
L21 10.00-7.50	8.75	1	4	1.00	7.917	A	0.000	7.917	7.917	100.00	0.000	0.000
						B	0.000	7.917		100.00	0.000	0.000
						C	0.000	7.917		100.00	0.000	3.897
L22 7.50-6.25	6.88	1	4	1.00	3.958	A	0.000	3.958	3.958	100.00	0.000	0.000
						B	0.000	3.958		100.00	0.000	0.000
						C	0.000	3.958		100.00	0.000	1.949
L23 6.25-3.75	5.00	1	4	1.00	7.917	A	0.000	7.917	7.917	100.00	0.000	0.000
						B	0.000	7.917		100.00	0.000	0.000
						C	0.000	7.917		100.00	0.000	3.897
L24 3.75-2.75	3.25	1	4	1.00	3.167	A	0.000	3.167	3.167	100.00	0.000	0.000
						B	0.000	3.167		100.00	0.000	0.000
						C	0.000	3.167		100.00	0.000	1.559
L25 2.75-2.00	2.38	1	4	1.00	2.375	A	0.000	2.375	2.375	100.00	0.000	0.000
						B	0.000	2.375		100.00	0.000	0.000
						C	0.000	2.375		100.00	0.000	1.169
L26 2.00-1.00	1.50	1	4	1.00	3.167	A	0.000	3.167	3.167	100.00	0.000	0.000
						B	0.000	3.167		100.00	0.000	0.000
						C	0.000	3.167		100.00	0.000	1.559
L27 1.00-0.00	0.50	1	4	1.00	3.167	A	0.000	3.167	3.167	100.00	0.000	0.000
						B	0.000	3.167		100.00	0.000	0.000
						C	0.000	3.167		100.00	0.000	1.559

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 118.00-90.00	104.00	1.388	9	56.000	A	0.000	56.000	56.000	100.00	0.000	0.000
					B	0.000	56.000		100.00	0.000	0.000
					C	0.000	56.000		100.00	0.000	3.696
L2 90.00-76.50	83.25	1.303	8	27.000	A	0.000	27.000	27.000	100.00	0.000	0.000
					B	0.000	27.000		100.00	0.000	0.000
					C	0.000	27.000		100.00	0.000	5.445
L3 76.50-74.00	75.25	1.266	8	5.000	A	0.000	5.000	5.000	100.00	0.000	0.000
					B	0.000	5.000		100.00	0.000	0.000
					C	0.000	5.000		100.00	0.000	1.500
L4 74.00-68.88	71.44	1.247	8	10.250	A	0.000	10.250	10.250	100.00	0.000	0.000
					B	0.000	10.250		100.00	0.000	0.000
					C	0.000	10.250		100.00	0.000	3.522
L5 68.88-64.50	66.69	1.223	8	8.750	A	0.000	8.750	8.750	100.00	0.000	0.000
					B	0.000	8.750		100.00	0.000	0.000
					C	0.000	8.750		100.00	0.000	3.041
L6 64.50-63.00	63.75	1.207	8	3.000	A	0.000	3.000	3.000	100.00	0.000	0.000
					B	0.000	3.000		100.00	0.000	0.000
					C	0.000	3.000		100.00	0.000	1.043
L7 63.00-60.00	61.50	1.195	8	6.000	A	0.000	6.000	6.000	100.00	0.000	0.000
					B	0.000	6.000		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
					C	0.000	6.000		100.00	0.000	2.085
L8 60.00-49.08	54.54	1.154	7	27.300	A	0.000	27.300	27.300	100.00	0.000	0.000
					B	0.000	27.300		100.00	0.000	0.000
					C	0.000	27.300		100.00	0.000	8.044
L9 49.08-42.00	45.54	1.096	7	17.700	A	0.000	17.700	17.700	100.00	0.000	0.000
					B	0.000	17.700		100.00	0.000	0.000
					C	0.000	17.700		100.00	0.000	5.216
L10 42.00-34.50	38.25	1.043	7	18.750	A	0.000	18.750	18.750	100.00	0.000	0.000
					B	0.000	18.750		100.00	0.000	0.000
					C	0.000	18.750		100.00	0.000	5.525
L11 34.50-34.00	34.25	1.011	6	1.250	A	0.000	1.250	1.250	100.00	0.000	0.000
					B	0.000	1.250		100.00	0.000	0.000
					C	0.000	1.250		100.00	0.000	0.368
L12 34.00-30.00	32.00	1	6	10.000	A	0.000	10.000	10.000	100.00	0.000	0.000
					B	0.000	10.000		100.00	0.000	0.000
					C	0.000	10.000		100.00	0.000	2.947
L13 30.00-28.00	29.00	1	6	6.000	A	0.000	6.000	6.000	100.00	0.000	0.000
					B	0.000	6.000		100.00	0.000	0.000
					C	0.000	6.000		100.00	0.000	1.473
L14 28.00-23.25	25.63	1	6	14.250	A	0.000	14.250	14.250	100.00	0.000	0.000
					B	0.000	14.250		100.00	0.000	0.000
					C	0.000	14.250		100.00	0.000	3.499
L15 23.25-21.00	22.13	1	6	6.750	A	0.000	6.750	6.750	100.00	0.000	0.000
					B	0.000	6.750		100.00	0.000	0.000
					C	0.000	6.750		100.00	0.000	1.658
L16 21.00-19.00	20.00	1	6	6.000	A	0.000	6.000	6.000	100.00	0.000	0.000
					B	0.000	6.000		100.00	0.000	0.000
					C	0.000	6.000		100.00	0.000	1.473
L17 19.00-18.50	18.75	1	6	1.500	A	0.000	1.500	1.500	100.00	0.000	0.000
					B	0.000	1.500		100.00	0.000	0.000
					C	0.000	1.500		100.00	0.000	0.368
L18 18.50-12.70	15.60	1	6	17.400	A	0.000	17.400	17.400	100.00	0.000	0.000
					B	0.000	17.400		100.00	0.000	0.000
					C	0.000	17.400		100.00	0.000	4.273
L19 12.70-10.50	11.60	1	6	6.600	A	0.000	6.600	6.600	100.00	0.000	0.000
					B	0.000	6.600		100.00	0.000	0.000
					C	0.000	6.600		100.00	0.000	1.621
L20 10.50-10.00	10.25	1	6	1.500	A	0.000	1.500	1.500	100.00	0.000	0.000
					B	0.000	1.500		100.00	0.000	0.000
					C	0.000	1.500		100.00	0.000	0.368
L21 10.00-7.50	8.75	1	6	7.500	A	0.000	7.500	7.500	100.00	0.000	0.000
					B	0.000	7.500		100.00	0.000	0.000
					C	0.000	7.500		100.00	0.000	1.842
L22 7.50-6.25	6.88	1	6	3.750	A	0.000	3.750	3.750	100.00	0.000	0.000
					B	0.000	3.750		100.00	0.000	0.000
					C	0.000	3.750		100.00	0.000	0.921
L23 6.25-3.75	5.00	1	6	7.500	A	0.000	7.500	7.500	100.00	0.000	0.000
					B	0.000	7.500		100.00	0.000	0.000
					C	0.000	7.500		100.00	0.000	1.842
L24 3.75-2.75	3.25	1	6	3.000	A	0.000	3.000	3.000	100.00	0.000	0.000
					B	0.000	3.000		100.00	0.000	0.000
					C	0.000	3.000		100.00	0.000	0.737
L25 2.75-2.00	2.38	1	6	2.250	A	0.000	2.250	2.250	100.00	0.000	0.000
					B	0.000	2.250		100.00	0.000	0.000
					C	0.000	2.250		100.00	0.000	0.553
L26 2.00-1.00	1.50	1	6	3.000	A	0.000	3.000	3.000	100.00	0.000	0.000
					B	0.000	3.000		100.00	0.000	0.000
					C	0.000	3.000		100.00	0.000	0.737
L27 1.00-0.00	0.50	1	6	3.000	A	0.000	3.000	3.000	100.00	0.000	0.000
					B	0.000	3.000		100.00	0.000	0.000
					C	0.000	3.000		100.00	0.000	0.737

Load Combinations

Comb. No.	Description

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	118 - 90	Pole	Max Tension	2	0.00	0	0
			Max. Compression	14	-15.55	0	0
			Max. Mx	5	-7.54	-220	0
			Max. My	2	-7.53	0	220
			Max. Vy	11	-13.21	220	0
			Max. Vx	8	13.22	0	-220
			Max. Torque	12			-1
L2	90 - 76.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-23.63	0	1
			Max. Mx	5	-11.75	-454	0
			Max. My	2	-11.70	0	459
			Max. Vy	11	-19.16	453	0
			Max. Vx	8	19.65	0	-459
			Max. Torque	13			-1
L3	76.5 - 74	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-24.29	0	1
			Max. Mx	5	-12.21	-502	0
			Max. My	2	-12.16	0	508
			Max. Vy	11	-19.31	502	1
			Max. Vx	8	19.80	-1	-508
			Max. Torque	13			-1
L4	74 - 68.875	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-27.10	-1	1
			Max. Mx	5	-13.93	-605	0

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	2	-13.88	1	614
			Max. Vy	11	-20.63	605	1
			Max. Vx	8	21.16	-1	-614
			Max. Torque	7			1
L5	68.875 - 64.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-28.61	-1	1
			Max. Mx	5	-14.99	-696	-1
			Max. My	2	-14.95	1	707
			Max. Vy	11	-20.90	696	1
			Max. Vx	8	21.43	-1	-707
			Max. Torque	7			1
L6	64.5 - 63	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-29.19	-1	1
			Max. Mx	5	-15.42	-727	-1
			Max. My	2	-15.38	1	740
			Max. Vy	11	-21.00	727	1
			Max. Vx	8	21.53	-1	-739
			Max. Torque	7			1
L7	63 - 60	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-30.32	-1	1
			Max. Mx	5	-16.25	-791	-1
			Max. My	2	-16.21	1	804
			Max. Vy	11	-21.18	790	1
			Max. Vx	8	21.70	-1	-804
			Max. Torque	7			1
L8	60 - 49.08	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-34.09	-1	1
			Max. Mx	11	-18.85	1026	2
			Max. My	2	-18.82	3	1045
			Max. Vy	11	-21.90	1026	2
			Max. Vx	8	22.42	-2	-1045
			Max. Torque	7			1
L9	49.08 - 42	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-36.87	-1	1
			Max. Mx	11	-20.87	1182	2
			Max. My	2	-20.84	3	1206
			Max. Vy	11	-22.32	1182	2
			Max. Vx	8	22.85	-2	-1205
			Max. Torque	7			1
L10	42 - 34.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-40.08	-1	1
			Max. Mx	11	-23.29	1351	3
			Max. My	2	-23.27	4	1378
			Max. Vy	11	-22.74	1351	3
			Max. Vx	8	23.26	-3	-1378
			Max. Torque	7			1
L11	34.5 - 34	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-40.31	-1	1
			Max. Mx	11	-23.47	1362	3
			Max. My	2	-23.45	4	1390
			Max. Vy	11	-22.76	1362	3
			Max. Vx	8	23.29	-3	-1390
			Max. Torque	7			1
L12	34 - 30	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-42.01	-1	1
			Max. Mx	11	-24.75	1454	3
			Max. My	2	-24.73	5	1483
			Max. Vy	11	-22.95	1454	3
			Max. Vx	8	23.48	-3	-1483
			Max. Torque	7			1
L13	30 - 28	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-42.84	-1	1
			Max. Mx	11	-25.35	1500	3
			Max. My	2	-25.33	5	1530
			Max. Vy	11	-23.07	1500	3
			Max. Vx	8	23.59	-3	-1530
			Max. Torque	7			1
L14	28 - 23.25	Pole	Max Tension	1	0.00	0	0

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	14	-45.06	-1	1
			Max. Mx	11	-27.01	1610	4
			Max. My	2	-27.00	5	1643
			Max. Vy	11	-23.35	1610	4
			Max. Vx	8	23.88	-3	-1643
			Max. Torque	7			1
L15	23.25 - 21	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-46.20	-1	1
			Max. Mx	11	-27.90	1663	4
			Max. My	2	-27.88	5	1697
			Max. Vy	11	-23.49	1663	4
			Max. Vx	8	24.01	-3	-1697
			Max. Torque	7			1
L16	21 - 19	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-47.12	-1	1
			Max. Mx	11	-28.58	1710	4
			Max. My	2	-28.57	6	1745
			Max. Vy	11	-23.60	1710	4
			Max. Vx	8	24.12	-3	-1745
			Max. Torque	7			1
L17	19 - 18.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-47.37	-1	1
			Max. Mx	11	-28.78	1722	4
			Max. My	2	-28.77	6	1757
			Max. Vy	11	-23.63	1722	4
			Max. Vx	8	24.15	-3	-1757
			Max. Torque	7			1
L18	18.5 - 12.7	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-50.11	-1	1
			Max. Mx	11	-30.85	1860	4
			Max. My	2	-30.84	6	1898
			Max. Vy	11	-23.95	1860	4
			Max. Vx	8	24.47	-4	-1898
			Max. Torque	7			1
L19	12.7 - 10.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-51.15	-1	1
			Max. Mx	11	-31.65	1912	4
			Max. My	2	-31.64	6	1952
			Max. Vy	11	-24.06	1912	4
			Max. Vx	8	24.58	-4	-1952
			Max. Torque	7			1
L20	10.5 - 10	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-51.46	-1	1
			Max. Mx	11	-31.90	1924	4
			Max. My	8	-31.90	-4	-1964
			Max. Vy	11	-24.08	1924	4
			Max. Vx	8	24.60	-4	-1964
			Max. Torque	7			1
L21	10 - 7.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-52.71	-1	1
			Max. Mx	11	-32.86	1985	5
			Max. My	8	-32.85	-4	-2026
			Max. Vy	11	-24.22	1985	5
			Max. Vx	8	24.73	-4	-2026
			Max. Torque	7			1
L22	7.5 - 6.25	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-53.35	-1	1
			Max. Mx	11	-33.36	2015	5
			Max. My	8	-33.35	-4	-2057
			Max. Vy	11	-24.28	2015	5
			Max. Vx	8	24.80	-4	-2057
			Max. Torque	7			1
L23	6.25 - 3.75	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-54.70	-1	1
			Max. Mx	11	-34.42	2076	5
			Max. My	8	-34.42	-4	-2119
			Max. Vy	11	-24.40	2076	5
			Max. Vx	8	24.92	-4	-2119
			Max. Torque	7			1

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L24	3.75 - 2.75	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-55.44	-1	1
			Max. Mx	11	-35.05	2100	5
			Max. My	8	-35.05	-4	-2144
			Max. Vy	11	-24.45	2100	5
			Max. Vx	8	24.97	-4	-2144
			Max. Torque	7			1
L25	2.75 - 2	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-55.97	-1	1
			Max. Mx	11	-35.49	2119	5
			Max. My	8	-35.49	-4	-2163
			Max. Vy	11	-24.49	2119	5
			Max. Vx	8	25.01	-4	-2163
			Max. Torque	7			1
L26	2 - 1	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-56.61	-1	1
			Max. Mx	11	-36.01	2143	5
			Max. My	8	-36.01	-4	-2188
			Max. Vy	11	-24.55	2143	5
			Max. Vx	8	25.06	-4	-2188
			Max. Torque	7			1
L27	1 - 0	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-57.56	-1	1
			Max. Mx	11	-36.84	2168	5
			Max. My	8	-36.84	-4	-2213
			Max. Vy	11	-24.60	2168	5
			Max. Vx	8	25.12	-4	-2213
			Max. Torque	7			1

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	57.56	0.00	-0.00
	Max. H_x	11	36.85	24.60	0.06
	Max. H_z	2	36.85	0.10	25.11
	Max. M_x	2	2213	0.10	25.11
	Max. M_z	5	2167	-24.58	-0.06
	Max. Torsion	7	1	-12.35	-21.78
	Min. Vert	2	36.85	0.10	25.11
	Min. H_x	5	36.85	-24.58	-0.06
	Min. H_z	8	36.85	-0.05	-25.11
	Min. M_x	8	-2213	-0.05	-25.11
	Min. M_z	11	-2168	24.60	0.06
	Min. Torsion	12	-1	21.33	12.58

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	36.85	0.00	-0.00	0	0	0
Dead+Wind 0 deg - No Ice	36.85	-0.10	-25.11	-2213	8	1
Dead+Wind 30 deg - No Ice	36.85	12.25	-21.69	-1912	-1080	0
Dead+Wind 60 deg - No Ice	36.85	21.26	-12.48	-1101	-1874	0
Dead+Wind 90 deg - No Ice	36.85	24.58	0.06	5	-2167	-1
Dead+Wind 120 deg - No Ice	36.85	21.33	12.60	1110	-1880	-1
Dead+Wind 150 deg - No Ice	36.85	12.35	21.78	1919	-1089	-1
Dead+Wind 180 deg - No Ice	36.85	0.05	25.11	2213	-4	-1
Dead+Wind 210 deg - No Ice	36.85	-12.27	21.72	1914	1081	0
Dead+Wind 240 deg - No Ice	36.85	-21.32	12.48	1100	1878	0
Dead+Wind 270 deg - No Ice	36.85	-24.60	-0.06	-5	2168	1
Dead+Wind 300 deg - No Ice	36.85	-21.33	-12.58	-1109	1880	1

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 330 deg - No Ice	36.85	-12.38	-21.75	-1917	1090	1
Dead+Ice+Temp	57.56	-0.00	0.00	-1	-1	0
Dead+Wind 0 deg+Ice+Temp	57.56	-0.02	-7.35	-661	1	0
Dead+Wind 30 deg+Ice+Temp	57.56	3.61	-6.35	-571	-325	0
Dead+Wind 60 deg+Ice+Temp	57.56	6.26	-3.66	-330	-563	0
Dead+Wind 90 deg+Ice+Temp	57.56	7.24	0.01	0	-650	0
Dead+Wind 120 deg+Ice+Temp	57.56	6.28	3.68	329	-564	0
Dead+Wind 150 deg+Ice+Temp	57.56	3.63	6.37	570	-326	0
Dead+Wind 180 deg+Ice+Temp	57.56	0.01	7.35	658	-2	0
Dead+Wind 210 deg+Ice+Temp	57.56	-3.62	6.36	569	323	0
Dead+Wind 240 deg+Ice+Temp	57.56	-6.28	3.66	327	562	0
Dead+Wind 270 deg+Ice+Temp	57.56	-7.24	-0.01	-2	649	0
Dead+Wind 300 deg+Ice+Temp	57.56	-6.28	-3.68	-331	562	0
Dead+Wind 330 deg+Ice+Temp	57.56	-3.64	-6.37	-572	325	0
Dead+Wind 0 deg - Service	36.85	-0.04	-9.81	-865	3	0
Dead+Wind 30 deg - Service	36.85	4.79	-8.47	-747	-422	0
Dead+Wind 60 deg - Service	36.85	8.30	-4.87	-430	-733	0
Dead+Wind 90 deg - Service	36.85	9.60	0.02	2	-847	0
Dead+Wind 120 deg - Service	36.85	8.33	4.92	434	-735	0
Dead+Wind 150 deg - Service	36.85	4.83	8.51	750	-426	0
Dead+Wind 180 deg - Service	36.85	0.02	9.81	865	-2	0
Dead+Wind 210 deg - Service	36.85	-4.79	8.48	748	422	0
Dead+Wind 240 deg - Service	36.85	-8.33	4.87	430	734	0
Dead+Wind 270 deg - Service	36.85	-9.61	-0.02	-2	847	0
Dead+Wind 300 deg - Service	36.85	-8.33	-4.91	-433	734	0
Dead+Wind 330 deg - Service	36.85	-4.83	-8.50	-749	426	0

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	-36.85	0.00	-0.00	36.85	0.00	0.000%
2	-0.10	-36.85	-25.11	0.10	36.85	25.11	0.005%
3	12.25	-36.85	-21.69	-12.25	36.85	21.69	0.000%
4	21.26	-36.85	-12.48	-21.26	36.85	12.48	0.000%
5	24.58	-36.85	0.06	-24.58	36.85	-0.06	0.005%
6	21.33	-36.85	12.60	-21.33	36.85	-12.60	0.000%
7	12.35	-36.85	21.78	-12.35	36.85	-21.78	0.000%
8	0.05	-36.85	25.11	-0.05	36.85	-25.11	0.002%
9	-12.27	-36.85	21.72	12.27	36.85	-21.72	0.000%
10	-21.32	-36.85	12.48	21.32	36.85	-12.48	0.000%
11	-24.60	-36.85	-0.06	24.60	36.85	0.06	0.002%
12	-21.33	-36.85	-12.58	21.33	36.85	12.58	0.000%
13	-12.38	-36.85	-21.75	12.38	36.85	21.75	0.000%
14	0.00	-57.56	0.00	0.00	57.56	-0.00	0.000%
15	-0.02	-57.56	-7.35	0.02	57.56	7.35	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
16	3.61	-57.56	-6.35	-3.61	57.56	6.35	0.000%
17	6.26	-57.56	-3.66	-6.26	57.56	3.66	0.000%
18	7.24	-57.56	0.01	-7.24	57.56	-0.01	0.000%
19	6.28	-57.56	3.68	-6.28	57.56	-3.68	0.000%
20	3.63	-57.56	6.37	-3.63	57.56	-6.37	0.000%
21	0.01	-57.56	7.35	-0.01	57.56	-7.35	0.000%
22	-3.62	-57.56	6.36	3.62	57.56	-6.36	0.000%
23	-6.28	-57.56	3.66	6.28	57.56	-3.66	0.000%
24	-7.24	-57.56	-0.01	7.24	57.56	0.01	0.000%
25	-6.28	-57.56	-3.68	6.28	57.56	3.68	0.000%
26	-3.64	-57.56	-6.37	3.64	57.56	6.37	0.000%
27	-0.04	-36.85	-9.81	0.04	36.85	9.81	0.002%
28	4.79	-36.85	-8.47	-4.79	36.85	8.47	0.001%
29	8.30	-36.85	-4.87	-8.30	36.85	4.87	0.001%
30	9.60	-36.85	0.02	-9.60	36.85	-0.02	0.002%
31	8.33	-36.85	4.92	-8.33	36.85	-4.92	0.001%
32	4.83	-36.85	8.51	-4.83	36.85	-8.51	0.001%
33	0.02	-36.85	9.81	-0.02	36.85	-9.81	0.002%
34	-4.79	-36.85	8.48	4.79	36.85	-8.48	0.001%
35	-8.33	-36.85	4.87	8.33	36.85	-4.87	0.001%
36	-9.61	-36.85	-0.02	9.61	36.85	0.02	0.002%
37	-8.33	-36.85	-4.91	8.33	36.85	4.91	0.001%
38	-4.83	-36.85	-8.50	4.83	36.85	8.50	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	12	0.00006233	0.00014010
3	Yes	15	0.00000001	0.00011911
4	Yes	15	0.00000001	0.00011868
5	Yes	12	0.00006243	0.00014131
6	Yes	15	0.00000001	0.00011479
7	Yes	15	0.00000001	0.00012389
8	Yes	13	0.00000001	0.00006287
9	Yes	15	0.00000001	0.00011684
10	Yes	15	0.00000001	0.00011643
11	Yes	13	0.00000001	0.00006273
12	Yes	15	0.00000001	0.00012305
13	Yes	15	0.00000001	0.00011494
14	Yes	6	0.00000001	0.00001111
15	Yes	14	0.00000001	0.00010937
16	Yes	14	0.00000001	0.00011981
17	Yes	14	0.00000001	0.00011911
18	Yes	14	0.00000001	0.00010784
19	Yes	14	0.00000001	0.00011853
20	Yes	14	0.00000001	0.00011957
21	Yes	14	0.00000001	0.00010860
22	Yes	14	0.00000001	0.00011850
23	Yes	14	0.00000001	0.00011794
24	Yes	14	0.00000001	0.00010736
25	Yes	14	0.00000001	0.00011908
26	Yes	14	0.00000001	0.00011938
27	Yes	12	0.00000001	0.00005439
28	Yes	13	0.00000001	0.00007055
29	Yes	13	0.00000001	0.00006974
30	Yes	12	0.00000001	0.00005348
31	Yes	13	0.00000001	0.00006243
32	Yes	13	0.00000001	0.00007801
33	Yes	12	0.00000001	0.00005573
34	Yes	13	0.00000001	0.00006647
35	Yes	13	0.00000001	0.00006576
36	Yes	12	0.00000001	0.00005487
37	Yes	13	0.00000001	0.00007655
38	Yes	13	0.00000001	0.00006268

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	118 - 90	21.91	27	1.620	0.003
L2	90 - 76.5	12.67	27	1.442	0.003
L3	76.5 - 74	8.91	27	1.186	0.002
L4	74 - 68.875	8.30	27	1.140	0.002
L5	68.875 - 64.5	7.12	27	1.061	0.001
L6	64.5 - 63	6.18	27	0.980	0.001
L7	63 - 60	5.88	27	0.954	0.001
L8	60 - 49.08	5.29	27	0.898	0.001
L9	49.08 - 42	3.44	27	0.716	0.001
L10	42 - 34.5	2.46	27	0.599	0.001
L11	34.5 - 34	1.62	27	0.475	0.000
L12	34 - 30	1.57	27	0.467	0.000
L13	30 - 28	1.21	27	0.392	0.000
L14	28 - 23.25	1.05	27	0.364	0.000
L15	23.25 - 21	0.72	27	0.304	0.000
L16	21 - 19	0.58	27	0.278	0.000
L17	19 - 18.5	0.47	27	0.250	0.000
L18	18.5 - 12.7	0.44	27	0.244	0.000
L19	12.7 - 10.5	0.20	27	0.161	0.000
L20	10.5 - 10	0.13	27	0.128	0.000
L21	10 - 7.5	0.12	27	0.123	0.000
L22	7.5 - 6.25	0.06	27	0.087	0.000
L23	6.25 - 3.75	0.04	27	0.069	0.000
L24	3.75 - 2.75	0.01	27	0.036	0.000
L25	2.75 - 2	0.01	27	0.026	0.000
L26	2 - 1	0.00	27	0.019	0.000
L27	1 - 0	0.00	27	0.007	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
116.00	PCS 1900MHz 4x45W-65MHz	27	21.22	1.617	0.003	23150
114.00	APXVSPP18-C-A20 w/ Mount Pipe	27	20.53	1.613	0.003	23150
108.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	27	18.49	1.597	0.003	11575
98.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	27	15.17	1.538	0.003	5787
90.00	Bridge Stiffener (84" x 14.5" x 1.25")	27	12.67	1.442	0.003	4067
85.00	BXA-70063-6CF-2 w/ Mount Pipe	27	11.19	1.355	0.002	3240
80.00	KS24019-L112A	27	9.81	1.255	0.002	2677
73.00	VHLP1-23	27	8.06	1.124	0.002	3409
72.00	A-ANT-18G-2-C	27	7.83	1.109	0.002	3508

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	118 - 90	55.98	2	4.141	0.008
L2	90 - 76.5	32.38	2	3.686	0.007
L3	76.5 - 74	22.77	2	3.032	0.005
L4	74 - 68.875	21.21	2	2.914	0.004
L5	68.875 - 64.5	18.19	2	2.712	0.004
L6	64.5 - 63	15.80	2	2.505	0.003
L7	63 - 60	15.03	2	2.439	0.003
L8	60 - 49.08	13.54	2	2.295	0.003
L9	49.08 - 42	8.80	2	1.832	0.002
L10	42 - 34.5	6.30	2	1.533	0.001

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L11	34.5 - 34	4.13	2	1.215	0.001
L12	34 - 30	4.01	2	1.195	0.001
L13	30 - 28	3.09	2	1.003	0.001
L14	28 - 23.25	2.68	2	0.930	0.001
L15	23.25 - 21	1.83	2	0.778	0.001
L16	21 - 19	1.48	2	0.710	0.001
L17	19 - 18.5	1.20	2	0.638	0.001
L18	18.5 - 12.7	1.13	2	0.623	0.000
L19	12.7 - 10.5	0.50	2	0.412	0.000
L20	10.5 - 10	0.33	2	0.328	0.000
L21	10 - 7.5	0.30	2	0.314	0.000
L22	7.5 - 6.25	0.16	2	0.222	0.000
L23	6.25 - 3.75	0.10	2	0.177	0.000
L24	3.75 - 2.75	0.03	2	0.091	0.000
L25	2.75 - 2	0.02	2	0.067	0.000
L26	2 - 1	0.01	2	0.048	0.000
L27	1 - 0	0.00	2	0.019	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
116.00	PCS 1900MHz 4x45W-65MHz	2	54.23	4.132	0.008	9149
114.00	APXVSPP18-C-A20 w/ Mount Pipe	2	52.47	4.122	0.008	9149
108.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	2	47.25	4.080	0.008	4574
98.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	2	38.78	3.930	0.008	2285
90.00	Bridge Stiffener (84" x 14.5" x 1.25")	2	32.38	3.686	0.007	1605
85.00	BXA-70063-6CF-2 w/ Mount Pipe	2	28.61	3.463	0.006	1277
80.00	KS24019-L112A	2	25.08	3.209	0.005	1053
73.00	VHLP1-23	2	20.61	2.873	0.004	1340
72.00	A-ANT-18G-2-C	2	20.01	2.835	0.004	1379

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	118 - 90 (1)	P24x0.25	28.00	0.00	0.0	23.70	18.65	-7.53	442.00	0.017
L2	90 - 76.5 (2)	P24x0.375	13.50	0.00	0.0	25.20	27.83	-11.70	701.38	0.017
L3	76.5 - 74 (3)	RPS 24" x 0.58167"	2.50	0.00	0.0	25.01	42.79	-12.16	1070.19	0.011
L4	74 - 68.875 (4)	RPS 24" x 0.82296"	5.13	0.00	0.0	19.13	59.92	-13.88	1146.55	0.012
L5	68.875 - 64.5 (5)	RPS 24" x 0.81081"	4.38	0.00	0.0	18.84	59.07	-14.95	1112.85	0.013
L6	64.5 - 63 (6)	RPS 24" x 0.9855"	1.50	0.00	0.0	18.56	71.25	-15.38	1322.76	0.012
L7	63 - 60 (7)	RPS 24" x 0.94656"	3.00	0.00	0.0	18.65	68.55	-16.21	1278.81	0.013
L8	60 - 49.08 (8)	RPS 30" x 0.62249"	10.92	0.00	0.0	22.76	57.45	-18.82	1307.47	0.014
L9	49.08 - 42 (9)	RPS 30" x 0.77273"	7.08	0.00	0.0	22.41	70.95	-20.84	1590.04	0.013
L10	42 - 34.5 (10)	RPS 30" x 0.89547"	7.50	0.00	0.0	22.51	81.88	-23.27	1842.72	0.013
L11	34.5 - 34 (11)	RPS 30" x 1.00259"	0.50	0.00	0.0	22.51	91.33	-23.45	2055.56	0.011
L12	34 - 30 (12)	RPS 30" x 0.87892"	4.00	0.00	0.0	22.46	80.41	-24.73	1805.83	0.014
L13	30 - 28 (13)	RPS 36" x 0.67999"	2.00	0.00	0.0	21.44	75.45	-25.33	1618.00	0.016
L14	28 - 23.25 (14)	RPS 36" x 0.82233"	4.75	0.00	0.0	21.31	90.88	-27.00	1936.81	0.014
L15	23.25 - 21 (15)	RPS 36" x 0.93797"	2.25	0.00	0.0	20.82	103.32	-27.88	2151.08	0.013
L16	21 - 19 (16)	RPS 36" x 0.7933"	2.00	0.00	0.0	20.44	87.74	-28.57	1793.64	0.016
L17	19 - 18.5 (17)	RPS 36" x 0.95054"	0.50	0.00	0.0	20.60	104.67	-28.77	2155.89	0.013
L18	18.5 - 12.7 (18)	RPS 36" x 0.83577"	5.80	0.00	0.0	21.19	92.33	-30.84	1956.08	0.016

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 $\frac{P}{P_a}$
L19	12.7 - 10.5 (19)	RPS 36" x 0.84294"	2.20	0.00	0.0	20.71	93.10	-31.64	1927.77	0.016
L20	10.5 - 10 (20)	RPS 36" x 1.22827"	0.50	0.00	0.0	20.36	134.18	-31.90	2731.52	0.012
L21	10 - 7.5 (21)	RPS 36" x 0.90812"	2.50	0.00	0.0	21.17	100.11	-32.85	2119.84	0.015
L22	7.5 - 6.25 (22)	RPS 36" x 0.94913"	1.25	0.00	0.0	20.14	104.51	-33.35	2105.12	0.016
L23	6.25 - 3.75 (23)	RPS 36" x 1.02583"	2.50	0.00	0.0	20.98	112.71	-34.42	2364.26	0.015
L24	3.75 - 2.75 (24)	RPS 36" x 1.59247"	1.00	0.00	0.0	19.60	172.14	-35.05	3374.23	0.010
L25	2.75 - 2 (25)	RPS 36" x 1.45929"	0.75	0.00	0.0	18.86	158.35	-35.49	2986.20	0.012
L26	2 - 1 (26)	RPS 36" x 1.29525"	1.00	0.00	0.0	18.98	141.22	-36.01	2680.90	0.013
L27	1 - 0 (27)	RPS 36" x 2.19555"	1.00	0.00	0.0	11.09	233.17	-36.84	2586.75	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	118 - 90 (1)	P24x0.25	220	24.13	23.70	1.018	0	0.00	23.70	0.000
L2	90 - 76.5 (2)	P24x0.375	459	34.00	27.72	1.227	0	0.00	27.72	0.000
L3	76.5 - 74 (3)	RPS 24" x 0.58167"	508	24.92	27.51	0.906	0	0.00	27.51	0.000
L4	74 - 68.875 (4)	RPS 24" x 0.82296"	614	21.96	21.05	1.043	0	0.00	21.05	0.000
L5	68.875 - 64.5 (5)	RPS 24" x 0.81081"	707	25.63	20.72	1.237	0	0.00	20.72	0.000
L6	64.5 - 63 (6)	RPS 24" x 0.9855"	740	22.54	20.42	1.104	0	0.00	20.42	0.000
L7	63 - 60 (7)	RPS 24" x 0.94656"	804	25.39	20.52	1.238	0	0.00	20.52	0.000
L8	60 - 49.08 (8)	RPS 30" x 0.62249"	1045	30.35	25.03	1.212	0	0.00	25.03	0.000
L9	49.08 - 42 (9)	RPS 30" x 0.77273"	1206	28.62	24.65	1.161	0	0.00	24.65	0.000
L10	42 - 34.5 (10)	RPS 30" x 0.89547"	1378	28.59	24.76	1.155	0	0.00	24.76	0.000
L11	34.5 - 34 (11)	RPS 30" x 1.00259"	1390	26.03	24.76	1.051	0	0.00	24.76	0.000
L12	34 - 30 (12)	RPS 30" x 0.87892"	1483	31.30	24.70	1.267	0	0.00	24.70	0.000
L13	30 - 28 (13)	RPS 36" x 0.67999"	1531	28.09	23.59	1.191	0	0.00	23.59	0.000
L14	28 - 23.25 (14)	RPS 36" x 0.82233"	1643	25.23	23.44	1.076	0	0.00	23.44	0.000
L15	23.25 - 21 (15)	RPS 36" x 0.93797"	1697	23.07	22.90	1.007	0	0.00	22.90	0.000
L16	21 - 19 (16)	RPS 36" x 0.7933"	1745	27.71	22.49	1.232	0	0.00	22.49	0.000
L17	19 - 18.5 (17)	RPS 36" x 0.95054"	1757	23.60	22.66	1.042	0	0.00	22.66	0.000
L18	18.5 - 12.7 (18)	RPS 36" x 0.83577"	1898	28.71	23.30	1.232	0	0.00	23.30	0.000
L19	12.7 - 10.5 (19)	RPS 36" x 0.84294"	1952	29.30	22.78	1.286	0	0.00	22.78	0.000
L20	10.5 - 10 (20)	RPS 36" x 1.22827"	1964	20.90	22.39	0.933	0	0.00	22.39	0.000
L21	10 - 7.5 (21)	RPS 36" x 0.90812"	2026	28.38	23.29	1.218	0	0.00	23.29	0.000
L22	7.5 - 6.25 (22)	RPS 36" x 0.94913"	2057	27.66	22.16	1.248	0	0.00	22.16	0.000
L23	6.25 - 3.75 (23)	RPS 36" x 1.02583"	2119	26.54	23.07	1.150	0	0.00	23.07	0.000
L24	3.75 - 2.75 (24)	RPS 36" x 1.59247"	2144	18.14	21.56	0.841	0	0.00	21.56	0.000
L25	2.75 - 2 (25)	RPS 36" x 1.45929"	2163	19.75	20.74	0.952	0	0.00	20.74	0.000
L26	2 - 1 (26)	RPS 36" x 1.29525"	2188	22.20	20.88	1.063	0	0.00	20.88	0.000
L27	1 - 0 (27)	RPS 36" x 2.19555"	2213	14.29	12.20	1.171	0	0.00	12.20	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	118 - 90 (1)	P24x0.25	13.22	1.42	16.80	0.084	1	0.04	11.90	0.003
L2	90 - 76.5 (2)	P24x0.375	19.65	1.41	16.80	0.084	1	0.03	16.80	0.002
L3	76.5 - 74 (3)	RPS 24" x 0.58167"	19.80	0.93	16.67	0.056	1	0.02	16.67	0.001
L4	74 - 68.875	RPS 24" x 0.82296"	21.15	0.71	12.76	0.055	1	0.02	12.76	0.001

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
	(4)									
L5	68.875 - 64.5 (5)	RPS 24" x 0.81081"	21.43	0.73	12.56	0.058	1	0.02	12.56	0.001
L6	64.5 - 63 (6)	RPS 24" x 0.9855"	21.52	0.60	12.38	0.049	1	0.01	12.38	0.001
L7	63 - 60 (7)	RPS 24" x 0.94656"	21.70	0.63	12.44	0.051	1	0.01	12.44	0.001
L8	60 - 49.08 (8)	RPS 30" x 0.62249"	22.42	0.78	15.17	0.051	1	0.01	15.17	0.001
L9	49.08 - 42 (9)	RPS 30" x 0.77273"	22.85	0.64	14.94	0.043	1	0.01	14.94	0.001
L10	42 - 34.5 (10)	RPS 30" x 0.89547"	23.26	0.57	15.00	0.038	1	0.01	15.00	0.001
L11	34.5 - 34 (11)	RPS 30" x 1.00259"	23.28	0.51	15.00	0.034	1	0.01	15.00	0.001
L12	34 - 30 (12)	RPS 30" x 0.87892"	23.47	0.58	14.97	0.039	1	0.01	14.97	0.001
L13	30 - 28 (13)	RPS 36" x 0.67999"	23.59	0.63	14.30	0.044	1	0.01	14.30	0.001
L14	28 - 23.25 (14)	RPS 36" x 0.82233"	23.87	0.53	14.21	0.037	1	0.01	14.21	0.000
L15	23.25 - 21 (15)	RPS 36" x 0.93797"	24.01	0.46	13.88	0.033	1	0.01	13.88	0.000
L16	21 - 19 (16)	RPS 36" x 0.7933"	24.12	0.55	13.63	0.040	1	0.01	13.63	0.001
L17	19 - 18.5 (17)	RPS 36" x 0.95054"	24.14	0.46	13.73	0.034	1	0.01	13.73	0.000
L18	18.5 - 12.7 (18)	RPS 36" x 0.83577"	24.46	0.53	14.12	0.038	1	0.01	14.12	0.000
L19	12.7 - 10.5 (19)	RPS 36" x 0.84294"	24.57	0.53	13.80	0.038	1	0.01	13.80	0.000
L20	10.5 - 10 (20)	RPS 36" x 1.22827"	24.59	0.37	13.57	0.027	1	0.00	13.57	0.000
L21	10 - 7.5 (21)	RPS 36" x 0.90812"	24.73	0.49	14.12	0.035	1	0.01	14.12	0.000
L22	7.5 - 6.25 (22)	RPS 36" x 0.94913"	24.80	0.47	13.43	0.035	1	0.01	13.43	0.000
L23	6.25 - 3.75 (23)	RPS 36" x 1.02583"	24.92	0.44	13.98	0.032	1	0.01	13.98	0.000
L24	3.75 - 2.75 (24)	RPS 36" x 1.59247"	24.97	0.29	13.07	0.022	1	0.00	13.07	0.000
L25	2.75 - 2 (25)	RPS 36" x 1.45929"	25.01	0.32	12.57	0.025	1	0.00	12.57	0.000
L26	2 - 1 (26)	RPS 36" x 1.29525"	25.06	0.35	12.66	0.028	1	0.00	12.66	0.000
L27	1 - 0 (27)	RPS 36" x 2.19555"	25.12	0.22	7.40	0.029	1	0.00	7.40	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	118 - 90 (1)	0.017	1.018	0.000	0.084	0.003	1.043 ✔	1.333	H1-3+VT ✔
L2	90 - 76.5 (2)	0.017	1.227	0.000	0.084	0.002	1.251 ✔	1.333	H1-3+VT ✔
L3	76.5 - 74 (3)	0.011	0.906	0.000	0.056	0.001	0.920 ✔	1.333	H1-3+VT ✔
L4	74 - 68.875 (4)	0.012	1.043	0.000	0.055	0.001	1.059 ✔	1.333	H1-3+VT ✔
L5	68.875 - 64.5 (5)	0.013	1.237	0.000	0.058	0.001	1.254 ✔	1.333	H1-3+VT ✔
L6	64.5 - 63 (6)	0.012	1.104	0.000	0.049	0.001	1.118 ✔	1.333	H1-3+VT ✔
L7	63 - 60 (7)	0.013	1.238	0.000	0.051	0.001	1.253 ✔	1.333	H1-3+VT ✔
L8	60 - 49.08 (8)	0.014	1.212	0.000	0.051	0.001	1.229 ✔	1.333	H1-3+VT ✔
L9	49.08 - 42 (9)	0.013	1.161	0.000	0.043	0.001	1.176 ✔	1.333	H1-3+VT ✔
L10	42 - 34.5 (10)	0.013	1.155	0.000	0.038	0.001	1.169 ✔	1.333	H1-3+VT ✔
L11	34.5 - 34 (11)	0.011	1.051	0.000	0.034	0.001	1.064 ✔	1.333	H1-3+VT ✔
L12	34 - 30 (12)	0.014	1.267	0.000	0.039	0.001	1.282 ✔	1.333	H1-3+VT ✔
L13	30 - 28 (13)	0.016	1.191	0.000	0.044	0.001	1.208 ✔	1.333	H1-3+VT ✔

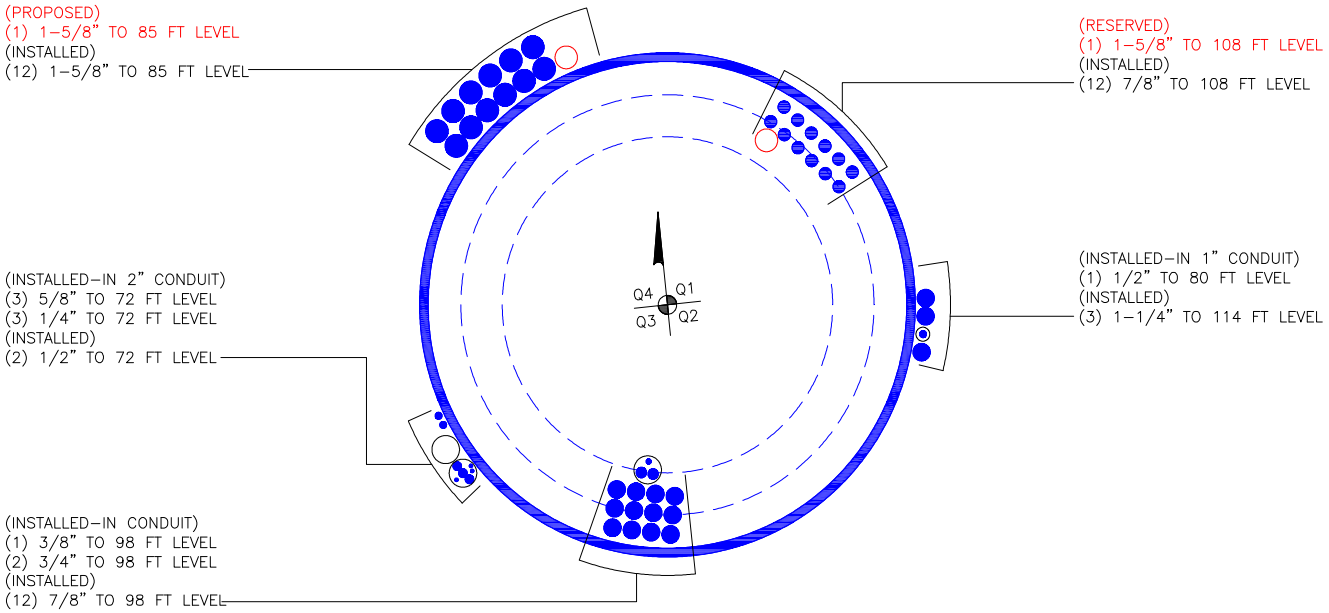
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L14	28 - 23.25 (14)	0.014	1.076	0.000	0.037	0.000	1.092 ✔	1.333	H1-3+VT ✔
L15	23.25 - 21 (15)	0.013	1.007	0.000	0.033	0.000	1.021 ✔	1.333	H1-3+VT ✔
L16	21 - 19 (16)	0.016	1.232	0.000	0.040	0.001	1.250 ✔	1.333	H1-3+VT ✔
L17	19 - 18.5 (17)	0.013	1.042	0.000	0.034	0.000	1.056 ✔	1.333	H1-3+VT ✔
L18	18.5 - 12.7 (18)	0.016	1.232	0.000	0.038	0.000	1.249 ✔	1.333	H1-3+VT ✔
L19	12.7 - 10.5 (19)	0.016	1.286	0.000	0.038	0.000	1.304 ✔	1.333	H1-3+VT ✔
L20	10.5 - 10 (20)	0.012	0.933	0.000	0.027	0.000	0.946 ✔	1.333	H1-3+VT ✔
L21	10 - 7.5 (21)	0.015	1.218	0.000	0.035	0.000	1.235 ✔	1.333	H1-3+VT ✔
L22	7.5 - 6.25 (22)	0.016	1.248	0.000	0.035	0.000	1.266 ✔	1.333	H1-3+VT ✔
L23	6.25 - 3.75 (23)	0.015	1.150	0.000	0.032	0.000	1.166 ✔	1.333	H1-3+VT ✔
L24	3.75 - 2.75 (24)	0.010	0.841	0.000	0.022	0.000	0.852 ✔	1.333	H1-3+VT ✔
L25	2.75 - 2 (25)	0.012	0.952	0.000	0.025	0.000	0.964 ✔	1.333	H1-3+VT ✔
L26	2 - 1 (26)	0.013	1.063	0.000	0.028	0.000	1.077 ✔	1.333	H1-3+VT ✔
L27	1 - 0 (27)	0.014	1.171	0.000	0.029	0.000	1.186 ✔	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	118 - 90	Pole	P24x0.25	1	-7.53	589.19	78.2	Pass
L2	90 - 76.5	Pole	P24x0.375	2	-11.70	934.94	93.8	Pass
L3	76.5 - 74	Pole	RPS 24" x 0.58167"	3	-12.16	1426.56	69.0	Pass
L4	74 - 68.875	Pole	RPS 24" x 0.82296"	4	-13.88	1528.35	79.4	Pass
L5	68.875 - 64.5	Pole	RPS 24" x 0.81081"	5	-14.95	1483.43	94.0	Pass
L6	64.5 - 63	Pole	RPS 24" x 0.9855"	6	-15.38	1763.24	83.8	Pass
L7	63 - 60	Pole	RPS 24" x 0.94656"	7	-16.21	1704.65	94.0	Pass
L8	60 - 49.08	Pole	RPS 30" x 0.62249"	8	-18.82	1742.86	92.2	Pass
L9	49.08 - 42	Pole	RPS 30" x 0.77273"	9	-20.84	2119.52	88.2	Pass
L10	42 - 34.5	Pole	RPS 30" x 0.89547"	10	-23.27	2456.35	87.7	Pass
L11	34.5 - 34	Pole	RPS 30" x 1.00259"	11	-23.45	2740.06	79.8	Pass
L12	34 - 30	Pole	RPS 30" x 0.87892"	12	-24.73	2407.17	96.2	Pass
L13	30 - 28	Pole	RPS 36" x 0.67999"	13	-25.33	2156.79	90.6	Pass
L14	28 - 23.25	Pole	RPS 36" x 0.82233"	14	-27.00	2581.77	81.9	Pass
L15	23.25 - 21	Pole	RPS 36" x 0.93797"	15	-27.88	2867.39	76.6	Pass
L16	21 - 19	Pole	RPS 36" x 0.7933"	16	-28.57	2390.92	93.8	Pass
L17	19 - 18.5	Pole	RPS 36" x 0.95054"	17	-28.77	2873.80	79.2	Pass
L18	18.5 - 12.7	Pole	RPS 36" x 0.83577"	18	-30.84	2607.45	93.7	Pass
L19	12.7 - 10.5	Pole	RPS 36" x 0.84294"	19	-31.64	2569.72	97.8	Pass
L20	10.5 - 10	Pole	RPS 36" x 1.22827"	20	-31.90	3641.12	70.9	Pass
L21	10 - 7.5	Pole	RPS 36" x 0.90812"	21	-32.85	2825.75	92.7	Pass
L22	7.5 - 6.25	Pole	RPS 36" x 0.94913"	22	-33.35	2806.12	94.9	Pass
L23	6.25 - 3.75	Pole	RPS 36" x 1.02583"	23	-34.42	3151.56	87.4	Pass
L24	3.75 - 2.75	Pole	RPS 36" x 1.59247"	24	-35.05	4497.85	63.9	Pass
L25	2.75 - 2	Pole	RPS 36" x 1.45929"	25	-35.49	3980.60	72.3	Pass
L26	2 - 1	Pole	RPS 36" x 1.29525"	26	-36.01	3573.64	80.8	Pass
L27	1 - 0	Pole	RPS 36" x 2.19555"	27	-36.84	3448.14	89.0	Pass
							Summary	
						Pole (L19)	97.8	Pass
						RATING =	**97.8**	**Pass**

APPENDIX B

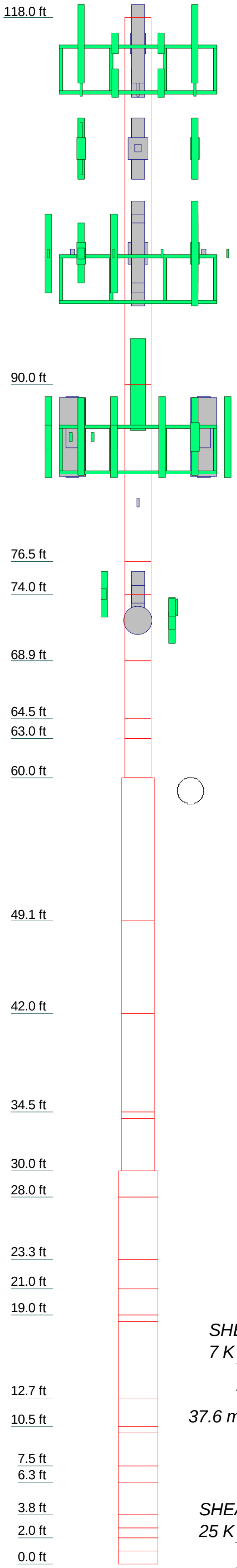
BASE LEVEL DRAWING



APPENDIX C

ADDITIONAL CALCULATIONS

Section	Size	Length (ft)	Grade	Weight (K)
1	P24x0.25	28.00	A572-42	1.8
2	P24x0.375	13.50	A572-42	1.3
3	[illegible]	2.50	Reinf 41.68 ksi	0.4
4	[illegible]	5.13	[illegible]	1.0
5	[illegible]	4.38	[illegible]	0.9
6	[illegible]	1.50	[illegible]	0.4
7	[illegible]	3.00	[illegible]	0.7
8	[illegible]	10.92	Reinf 37.93 ksi	2.1
9	RPS 30" x 0.77273"	7.08	Reinf 37.35 ksi	1.7
10	[illegible]	7.50	Reinf 37.51 ksi	2.1
11	[illegible]	0.50	[illegible]	0.2
12	[illegible]	4.00	[illegible]	1.1
13	[illegible]	2.00	[illegible]	0.5
14	[illegible]	4.75	[illegible]	1.5
15	[illegible]	2.25	[illegible]	0.8
16	[illegible]	2.00	[illegible]	0.6
17	[illegible]	0.50	[illegible]	0.2
18	[illegible]	5.80	[illegible]	1.8
19	[illegible]	2.20	[illegible]	0.7
20	[illegible]	0.50	[illegible]	0.2
21	[illegible]	2.50	[illegible]	0.9
22	[illegible]	1.25	[illegible]	0.4
23	[illegible]	2.50	[illegible]	1.0
24	[illegible]	[illegible]	[illegible]	0.6
25	[illegible]	[illegible]	[illegible]	[illegible]
26	[illegible]	[illegible]	[illegible]	[illegible]
27	[illegible]	1.00	[illegible]	[illegible]
				24.4

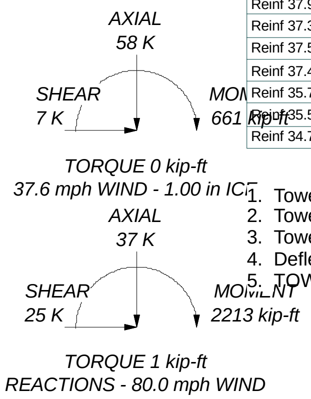


DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
PCS 1900MHz 4x45W-65MHz	116	7770.00 w/ Mount Pipe	98
PCS 1900MHz 4x45W-65MHz	116	7770.00 w/ Mount Pipe	98
PCS 1900MHz 4x45W-65MHz	116	SBNH-1D6565C w/ Mount Pipe	98
800MHz 2X50W RRH W/FILTER	116	SBNH-1D6565C w/ Mount Pipe	98
800MHz 2X50W RRH W/FILTER	116	RRUS 11 B12	98
800MHz 2X50W RRH W/FILTER	116	RRUS 11 B12	98
Pipe Mount [PM 601-3]	116	RRUS 11 B12	98
APXVSPP18-C-A20 w/ Mount Pipe	114	(2) LGP13519	98
APXVSPP18-C-A20 w/ Mount Pipe	114	(2) LGP13519	98
APXV9ERR18-C-A20 w/ Mount Pipe	114	(2) LGP13519	98
(3) 2.375" OD x 4' Mount Pipe	114	DTMABP7819VG12A	98
(3) 2.375" OD x 4' Mount Pipe	114	DTMABP7819VG12A	98
(3) 2.375" OD x 4' Mount Pipe	114	DTMABP7819VG12A	98
Platform Mount [LP 501-1]	114	DC6-48-60-18-8F	98
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	108	Platform Mount [LP 712-1]	98
		Bridge Stiffener (84" x 14.5" x 1.25")	90
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	108	BXA-70063-6CF-2 w/ Mount Pipe	85
		(2) CBC721-DF	85
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	108	(4) CBC721-DF	85
		(2) HBXX-6517DS-A2M w/ Mount Pipe	85
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	108	(2) HBXX-6517DS-A2M w/ Mount Pipe	85
		(2) HBXX-6517DS-A2M w/ Mount Pipe	85
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	108	(2) BXA-70040-6CF-EDIN-2 w/ Mount Pipe	85
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	108	BXA-70063-6CF-2 w/ Mount Pipe	85
		BXA-70063-6CF-2 w/ Mount Pipe	85
KRY 112 144/1	108	(2) RRH2X60-AWS	85
KRY 112 144/1	108	RRH2X60-AWS	85
KRY 112 144/1	108	RRH2X60-PCS	85
2.375" OD x 4' Mount Pipe	108	(2) RRH2X60-PCS	85
2.375" OD x 4' Mount Pipe	108	DB-B1-6C-12AB-0Z	85
2.375" OD x 4' Mount Pipe	108	Platform Mount [LP 303-1]	85
Sector Mount [SM 802-3]	108	BXA-70063-6CF-2 w/ Mount Pipe	85
LNX-6515DS-VTM w/ Mount Pipe	108	Side Arm Mount [SO 701-1]	80
LNX-6515DS-VTM w/ Mount Pipe	108	KS24019-L112A	80
LNX-6515DS-VTM w/ Mount Pipe	108	LLPX310R w/ Mount Pipe	72
RRUS 11 B12	108	LLPX310R w/ Mount Pipe	72
RRUS 11 B12	108	WIMAX DAP HEAD	72
RRUS 11 B12	108	WIMAX DAP HEAD	72
AM-X-CD-16-65-00T-RET w/ Mount Pipe	98	WIMAX DAP HEAD	72
		HORIZON COMPACT	72
AM-X-CD-16-65-00T-RET w/ Mount Pipe	98	HORIZON COMPACT	72
(2) AM-X-CD-16-65-00T-RET w/ Mount Pipe	98	Side Arm Mount [SO 101-3]	72
		LLPX310R w/ Mount Pipe	72
7770.00 w/ Mount Pipe	98	A-ANT-18G-2-C	72
		VHLP1-23	72

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-42	42 ksi	60 ksi	Reinf 34.07 ksi	34 ksi	43 ksi
Reinf 41.68 ksi	42 ksi	53 ksi	Reinf 34.33 ksi	34 ksi	43 ksi
Reinf 31.89 ksi	32 ksi	40 ksi	Reinf 35.31 ksi	35 ksi	45 ksi
Reinf 31.40 ksi	31 ksi	40 ksi	Reinf 34.51 ksi	35 ksi	44 ksi
Reinf 30.94 ksi	31 ksi	39 ksi	Reinf 33.93 ksi	34 ksi	43 ksi
Reinf 31.09 ksi	31 ksi	39 ksi	Reinf 35.29 ksi	35 ksi	45 ksi
Reinf 37.93 ksi	38 ksi	48 ksi	Reinf 33.57 ksi	34 ksi	42 ksi
Reinf 37.35 ksi	37 ksi	47 ksi	Reinf 34.96 ksi	35 ksi	44 ksi
Reinf 37.51 ksi	38 ksi	47 ksi	Reinf 32.67 ksi	33 ksi	41 ksi
Reinf 37.43 ksi	37 ksi	47 ksi	Reinf 31.43 ksi	31 ksi	40 ksi
Reinf 35.74 ksi	36 ksi	45 ksi	Reinf 31.64 ksi	32 ksi	40 ksi
Reinf 35.52 ksi	36 ksi	45 ksi	Reinf 18.49 ksi	18 ksi	24 ksi
Reinf 34.70 ksi	35 ksi	44 ksi			



TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80.0 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 37.6 mph basic wind with 1.00 in ice.
4. Deflections are based upon a 50.0 mph wind.
5. TOWER RATING: 97.8%

Paul J. Ford and Company
250 East Broad St., Suite 600
Columbus, Ohio
Phone: 614.221.6679
FAX:

Job: **118 ft Monopole / New Gravel Pit**	
Project: **PJF 37515-0774 / BU 876331**	
Client: CCI	Drawn by: jjohnson
App'd:	
Code: TIA/EIA-222-F	Date: 09/28/15
Scale: NTS	
Path: G:\TOWER\375_Crown_Castle\2015\37515-0774_876331_NEW BRITAIN GRAVEL PIT\37515-0774.002.7700_SDD_1114296\37515-0774.002.7700_Reinforced.eri	Dwg No. E-1

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

v2.0, Effective Date: 1-12-12

Date: 9/28/2015
Project No: 37515-0774.002.7700
Site Name: New Britain Gravel Pit
Site Number/BUN: 876331
Description:
Owner:
Engineer:

Welded Bridge Stiffener Analysis per TIA/EIA-222-F & AISC 9th Ed. (Green)

General Parameters and Loading:

Flange Elevation:	90.00	ft
TIA Reference Standard:	TIA/EIA-222-F	
AISC Manual:	9th Ed. (Green)	
Method:	ASD	
ASD Stress Increase, ASIF:	1.333333333	
Moment, Mf:	220.0	k-ft
Axial, Pf:	7.5	kips
Shear, Vf:	13.2	kips

Pole Parameters:

	Upper Pole	Lower Pole	
Pole Diameter, Dp:	24.00	24.00	in
Pole Thickness, tp:	0.2500	0.3750	in
Pole Fy:	42	42	ksi
Pole Fu:	60	60	ksi
Flange Diameter, Df:	32.00	32.00	in

Bridge Stiffener Parameters:

	Stiffener Type 1	Stiffener Type 2	
Qty. Stiffeners:	3	0	
Upper Weld Length, L1:	39.00	0.00	in
Lower Weld Length, L2:	39.00	0.00	in
Weld Size, w:	0.3750	0.0000	in
Electrode:	E70	E70	
Effective Stiffener Width, Ws:	4.50	0.00	in
Stiffener Thickness, ts:	1.25	0.00	in
Notch, n:	0.50	0.00	in
Stiffener Fy:	65	0	ksi
Stiffener Fu:	80	0	ksi
Unbraced Length, L:	4.63	0.00	in
K:	0.80	0.00	
Stiffener Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Stiffener Circle:	37.50	32.00	in = Df + 2 n + Ws
Upper Eccentricity, e1:	6.75	4.00	in = (Df - Dp) / 2 + n + Ws / 2
Lower Eccentricity, e2:	6.75	4.00	in = (Df - Dp) / 2 + n + Ws / 2

Flange Bolt Parameters:

Number of Bolt Circles: (1) Bolt Circle

	Bolt Circle 1	Bolt Circle 2	
Qty. Bolts:	0	0	
Bolt Diameter:	1.00	0.00	in
Bolt Circle:	29.00	0.00	in
Bolt Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Bolt Area, Ag:	0.0000	0.0000	in
Max. Tension:	0.00	0.00	kips
Max. Net Tension:	0.00	0.00	kips
Max. Net Compression:	0.00	0.00	kips
Moment to Bolt Circle:	0.00	0.00	k-ft
Axial to Bolt Circle:	0.00	0.00	kips
Shear to Bolt Circle:	0.00	0.00	kips
Equivalent Bolt Circle:	0.00	0.00	in

Weld Analysis per AISC Table XIX & pg. 4-72:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
D:	6	0	Num. of Sixteenths in Weld
a:	0.1731	0.0000	= e1 / L1
k:	0	0	
C:	1.4546	0.0000	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
ASIF:	1.3333	1.3333	
Stiffener Axial, Ps:	96.7	0.0	kips
Allowable Axial, Pa:	453.8	0.0	kips = ASIF C C1 D L
Ratio:	21.3%	0.0%	

Lower Pole			
D:	6	0	Num. of Sixteenths in Weld
a:	0.1731	0.0000	= e2 / L2
k:	0	0	
C:	1.4546	0.0000	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
ASIF:	1.3333	1.3333	
Stiffener Axial, Ps:	96.7	0.0	kips
Allowable Axial, Pa:	453.8	0.0	kips = ASIF C C1 D L
Ratio:	21.3%	0.0%	

Pole Analysis per AISC Sect. F4:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
Stiffener Axial, P:	96.7	0.0	kips
Effective Throat, te:	0.2651	0.0000	in = 0.707 w
Shear Stress, fv:	1.2	0.0	kips/in= P / (2 L1)
Section Modulus, S:	507.0	0.0	in^2 = $L1^2$ / 3
Bending Stress, fb:	1.3	0.0	kips/in = P e1 / S
Combined Stress, f:	1.8	0.0	kips/in = $(fv^2 + fb^2)^{1/2}$
ASIF:	1.3333	0.0000	
Allowable Stress, F:	5.6	0.0	kips/in = ASIF (0.4 Fy) tp
Ratio:	31.9%	0.0%	

Lower Pole			
Stiffener Axial, P:	96.7	0.0	kips
Effective Throat, te:	0.2651	0.0000	in = 0.707 w
Shear Stress, fv:	1.2	0.0	ksi = P / (2 L2)
Section Modulus, S:	507.0	0.0	in^2 = $L2^2$ / 3
Bending Stress, fb:	1.3	0.0	ksi = P e2 / S
Combined Stress, f:	1.8	0.0	kips/in = $(fv^2 + fb^2)^{1/2}$
ASIF:	1.3333	0.0000	
Allowable Stress, F:	8.4	0.0	kips/in = ASIF (0.4 Fy) tp
Ratio:	21.3%	0.0%	

Stiffener 1 Analysis per AISC Sect. D1, E2, F1.2 & App. B

	Stiffener Type 1	
Gross Area, Ag:	5.6250	in^2
Net Area, An:	5.6250	in^2
Stiffener Axial, P:	96.7	kips
Stiffener Stress, f:	17.2	ksi = P / Ag
b:	9.0000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	7.2000	in
Q, Where Qa = 1.0:	1.0000	
r:	0.3608	in^3
K L / r:	10.2537	
ASIF:	1.3333	
Allowable Axial, Fa:	50.45	ksi = ASIF [1 - (K L / r) / 2 Cc^2] Fy / [5/3 + 3(K L / r) / 8 Cc - (K L / r)^3 / 8 Cc^3]
ASIF:	1.3333	
Allowable Bending, Fb:	52.00	ksi = ASIF 0.6 Fy
ASIF:	1.3333	
Allowable Net Tension, Ft:	53.33	ksi = ASIF 0.5 Fu
Ratio:	34.1%	

Stiffener 2 Analysis per AISC Sect. D1, E2, F1.2 & App. B

	Stiffener Type 2	
Gross Area, Ag:	0.0000	in^2
Net Area, An:	0.0000	in^2
Stiffener Axial, P:	0.0	kips
Stiffener Stress, f:	0.0	ksi = P / Ag
b:	0.0000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	0.0000	in
Q, Where Qa = 1.0:	0.0000	
r:	0.0000	in^3
K L / r:	0.0000	
ASIF:	0.0000	
Allowable Axial, Fa:	0.00	ksi = ASIF [1 - (K L / r) / 2 Cc^2] Fy / [5/3 + 3(K L / r) / 8 Cc - (K L / r)^3 / 8 Cc^3]
ASIF:	0.0000	
Allowable Bending, Fb:	0.00	ksi = ASIF 0.6 Fy
ASIF:	0.0000	
Allowable Net Tension, Ft:	0.00	ksi = ASIF 0.5 Fu
Ratio:	0.0%	

Analysis Summary:

Bridge Stiffener Type 1	Bridge Stiffener Type 2
Weld Analysis Ratio: 21.3% PASS	Weld Analysis Ratio: 0.0% PASS
Pole Analysis Ratio: 31.9% PASS	Pole Analysis Ratio: 0.0% PASS
Stiffener Analysis Ratio: 34.1% PASS	Stiffener Analysis Ratio: 0.0% PASS

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

v2.0, Effective Date: 1-12-12

Date: 9/28/2015
Project No: 37515-0774.002.7700
Site Name: New Britain Gravel Pit
Site Number/BUN: 876331
Description:
Owner:
Engineer:

Welded Bridge Stiffener Analysis per TIA/EIA-222-F & AISC 9th Ed. (Green)

General Parameters and Loading:

Flange Elevation:	60.00	ft
TIA Reference Standard:	TIA/EIA-222-F	
AISC Manual:	9th Ed. (Green)	
Method:	ASD	
ASD Stress Increase, ASIF:	1.333333333	
Moment, Mf:	804.0	k-ft
Axial, Pf:	16.2	kips
Shear, Vf:	21.7	kips

Pole Parameters:

	Upper Pole	Lower Pole	
Pole Diameter, Dp:	24.00	30.00	in
Pole Thickness, tp:	0.3750	0.3750	in
Pole Fy:	42	42	ksi
Pole Fu:	60	60	ksi
Flange Diameter, Df:	41.00	41.00	in

Bridge Stiffener Parameters:

	Stiffener Type 1	Stiffener Type 2	
Qty. Stiffeners:	3	3	
Upper Weld Length, L1:	39.00	23.25	in
Lower Weld Length, L2:	39.00	20.00	in
Weld Size, w:	0.3750	0.3750	in
Electrode:	E70	E70	
Effective Stiffener Width, Ws:	4.50	3.00	in
Stiffener Thickness, ts:	1.25	1.00	in
Notch, n:	0.50	0.50	in
Stiffener Fy:	65	65	ksi
Stiffener Fu:	80	80	ksi
Unbraced Length, L:	5.63	5.63	in
K:	0.80	0.80	
Stiffener Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Stiffener Circle:	46.50	45.00	in = Df + 2 n + Ws
Upper Eccentricity, e1:	11.25	10.50	in = (Df - Dp) / 2 + n + Ws / 2
Lower Eccentricity, e2:	8.25	7.50	in = (Df - Dp) / 2 + n + Ws / 2

Flange Bolt Parameters:

Number of Bolt Circles: (1) Bolt Circle

	Bolt Circle 1	Bolt Circle 2	
Qty. Bolts:	0	0	
Bolt Diameter:	1.50	0.00	in
Bolt Circle:	35.00	0.00	in
Bolt Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Bolt Area, Ag:	0.0000	0.0000	in
Max. Tension:	0.00	0.00	kips
Max. Net Tension:	0.00	0.00	kips
Max. Net Compression:	0.00	0.00	kips
Moment to Bolt Circle:	0.00	0.00	k-ft
Axial to Bolt Circle:	0.00	0.00	kips
Shear to Bolt Circle:	0.00	0.00	kips
Equivalent Bolt Circle:	0.00	0.00	in

Weld Analysis per AISC Table XIX & pg. 4-72:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
D:	6	6	Num. of Sixteenths in Weld
a:	0.2885	0.4516	= e1 / L1
k:	0	0	
C:	1.1677	0.8605	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
ASIF:	1.3333	1.3333	
Stiffener Axial, Ps:	188.2	97.2	kips
Allowable Axial, Pa:	364.3	160.1	kips = ASIF C C1 D L
Ratio:	51.7%	60.7%	
Lower Pole			
D:	6	6	Num. of Sixteenths in Weld
a:	0.2115	0.3750	= e2 / L2
k:	0	0	
C:	1.3600	0.9893	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
ASIF:	1.3333	1.3333	
Stiffener Axial, Ps:	188.2	97.2	kips
Allowable Axial, Pa:	424.3	158.3	kips = ASIF C C1 D L
Ratio:	44.4%	61.4%	

Pole Analysis per AISC Sect. F4:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
Stiffener Axial, P:	188.2	97.2	kips
Effective Throat, te:	0.2651	0.2651	in = 0.707 w
Shear Stress, fv:	2.4	2.1	kips/in= P / (2 L1)
Section Modulus, S:	507.0	180.2	in^2 = $L1^2$ / 3
Bending Stress, fb:	4.2	5.7	kips/in = P e1 / S
Combined Stress, f:	4.8	6.0	kips/in = $(fv^2 + fb^2)^{1/2}$
ASIF:	1.3333	1.3333	
Allowable Stress, F:	8.4	8.4	kips/in = ASIF (0.4 Fy) tp
Ratio:	57.4%	71.9%	
Lower Pole			
Stiffener Axial, P:	188.2	97.2	kips
Effective Throat, te:	0.2651	0.2651	in = 0.707 w
Shear Stress, fv:	2.4	2.4	ksi = P / (2 L2)
Section Modulus, S:	507.0	133.3	in^2 = $L2^2$ / 3
Bending Stress, fb:	3.1	5.5	ksi = P e2 / S
Combined Stress, f:	3.9	6.0	kips/in = $(fv^2 + fb^2)^{1/2}$
ASIF:	1.3333	1.3333	
Allowable Stress, F:	8.4	8.4	kips/in = ASIF (0.4 Fy) tp
Ratio:	46.4%	71.2%	

Stiffener 1 Analysis per AISC Sect. D1, E2, F1.2 & App. B

	Stiffener Type 1	
Gross Area, Ag:	5.6250	in^2
Net Area, An:	5.6250	in^2
Stiffener Axial, P:	188.2	kips
Stiffener Stress, f:	33.5	ksi = P / Ag
b:	13.5000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	10.8000	in
Q, Where Qa = 1.0:	0.9508	= Qa 1.340 - 0.00447 (b / ts) $Fy^{1/2}$
r:	0.3608	in^3
K L / r:	12.4708	
ASIF:	1.3333	
Allowable Axial, Fa:	47.64	ksi = ASIF Q [1 - (K L / r) / 2 Cc'^2] Fy / [5/3 + 3(K L / r) / 8 Cc' - (K L / r)^3 / 8 Cc'^3]
ASIF:	1.3333	
Allowable Bending, Fb:	49.44	ksi = ASIF 0.6 Fy Q
ASIF:	1.3333	
Allowable Net Tension, Ft:	53.33	ksi = ASIF 0.5 Fu
Ratio:	70.2%	

Stiffener 2 Analysis per AISC Sect. D1, E2, F1.2 & App. B

	Stiffener Type 2	
Gross Area, Ag:	3.0000	in^2
Net Area, An:	3.0000	in^2
Stiffener Axial, P:	97.2	kips
Stiffener Stress, f:	32.4	ksi = P / Ag
b:	12.0000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	12.0000	in
Q, Where Qa = 1.0:	0.9075	= Qa 1.340 - 0.00447 (b / ts) $Fy^{1/2}$
r:	0.2887	in^3
K L / r:	15.5885	
ASIF:	1.3333	
Allowable Axial, Fa:	45.01	ksi = ASIF Q [1 - (K L / r) / 2 Cc'^2] Fy / [5/3 + 3(K L / r) / 8 Cc' - (K L / r)^3 / 8 Cc'^3]
ASIF:	1.3333	
Allowable Bending, Fb:	47.19	ksi = ASIF 0.6 Fy Q
ASIF:	1.3333	
Allowable Net Tension, Ft:	53.33	ksi = ASIF 0.5 Fu
Ratio:	72.0%	

Analysis Summary:

Bridge Stiffener Type 1	Bridge Stiffener Type 2
Weld Analysis Ratio: 51.7% PASS	Weld Analysis Ratio: 61.4% PASS
Pole Analysis Ratio: 57.4% PASS	Pole Analysis Ratio: 71.9% PASS
Stiffener Analysis Ratio: 70.2% PASS	Stiffener Analysis Ratio: 72.0% PASS

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

v2.0, Effective Date: 1-12-12

Date: 9/28/2015
Project No: 37515-0774.002.7700
Site Name: New Britain Gravel Pit
Site Number/BUN: 876331
Description:
Owner:
Engineer:

Welded Bridge Stiffener Analysis per TIA/EIA-222-F & AISC 9th Ed. (Green)

General Parameters and Loading:

Flange Elevation:	30.00	ft
TIA Reference Standard:	TIA/EIA-222-F	
AISC Manual:	9th Ed. (Green)	
Method:	ASD	
ASD Stress Increase, ASIF:	1.333333333	
Moment, Mf:	1483.0	k-ft
Axial, Pf:	24.7	kips
Shear, Vf:	23.5	kips

Pole Parameters:

	Upper Pole	Lower Pole	
Pole Diameter, Dp:	30.00	36.00	in
Pole Thickness, tp:	0.3750	0.3750	in
Pole Fy:	42	42	ksi
Pole Fu:	60	60	ksi
Flange Diameter, Df:	47.00	47.00	in

Bridge Stiffener Parameters:

	Stiffener Type 1	Stiffener Type 2	
Qty. Stiffeners:	3	3	
Upper Weld Length, L1:	39.00	32.25	in
Lower Weld Length, L2:	39.00	28.25	in
Weld Size, w:	0.3750	0.3750	in
Electrode:	E70	E70	
Effective Stiffener Width, Ws:	7.20	5.50	in
Stiffener Thickness, ts:	1.47	1.00	in
Notch, n:	0.50	0.50	in
Stiffener Fy:	65	65	ksi
Stiffener Fu:	80	80	ksi
Unbraced Length, L:	5.63	5.63	in
K:	0.80	0.80	
Stiffener Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Stiffener Circle:	55.20	53.50	in = Df + 2 n + Ws
Upper Eccentricity, e1:	12.60	11.75	in = (Df - Dp) / 2 + n + Ws / 2
Lower Eccentricity, e2:	9.60	8.75	in = (Df - Dp) / 2 + n + Ws / 2

Flange Bolt Parameters:

Number of Bolt Circles: (1) Bolt Circle

	Bolt Circle 1	Bolt Circle 2	
Qty. Bolts:	0	0	
Bolt Diameter:	1.50	0.00	in
Bolt Circle:	41.00	0.00	in
Bolt Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Bolt Area, Ag:	0.0000	0.0000	in
Max. Tension:	0.00	0.00	kips
Max. Net Tension:	0.00	0.00	kips
Max. Net Compression:	0.00	0.00	kips
Moment to Bolt Circle:	0.00	0.00	k-ft
Axial to Bolt Circle:	0.00	0.00	kips
Shear to Bolt Circle:	0.00	0.00	kips
Equivalent Bolt Circle:	0.00	0.00	in

Weld Analysis per AISC Table XIX & pg. 4-72:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
D:	6	6	Num. of Sixteenths in Weld
a:	0.3231	0.3643	= e1 / L1
k:	0	0	
C:	1.0936	1.0107	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
ASIF:	1.3333	1.3333	
Stiffener Axial, Ps:	294.4	148.4	kips
Allowable Axial, Pa:	341.2	260.8	kips = ASIF C C1 D L
Ratio:	86.3%	56.9%	
Lower Pole			
D:	6	6	Num. of Sixteenths in Weld
a:	0.2462	0.3097	= e2 / L2
k:	0	0	
C:	1.2700	1.1204	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
ASIF:	1.3333	1.3333	
Stiffener Axial, Ps:	294.4	148.4	kips
Allowable Axial, Pa:	396.2	253.2	kips = ASIF C C1 D L
Ratio:	74.3%	58.6%	

Pole Analysis per AISC Sect. F4:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
Stiffener Axial, P:	294.4	148.4	kips
Effective Throat, te:	0.2651	0.2651	in = 0.707 w
Shear Stress, fv:	3.8	2.3	kips/in= P / (2 L1)
Section Modulus, S:	507.0	346.7	in^2 = $L1^2$ / 3
Bending Stress, fb:	7.3	5.0	kips/in = P e1 / S
Combined Stress, f:	8.2	5.5	kips/in = $(fv^2 + fb^2)^{1/2}$
ASIF:	1.3333	1.3333	
Allowable Stress, F:	8.4	8.4	kips/in = ASIF (0.4 Fy) tp
Ratio:	98.0%	65.8%	
Lower Pole			
Stiffener Axial, P:	294.4	148.4	kips
Effective Throat, te:	0.2651	0.2651	in = 0.707 w
Shear Stress, fv:	3.8	2.6	ksi = P / (2 L2)
Section Modulus, S:	507.0	266.0	in^2 = $L2^2$ / 3
Bending Stress, fb:	5.6	4.9	ksi = P e2 / S
Combined Stress, f:	6.7	5.5	kips/in = $(fv^2 + fb^2)^{1/2}$
ASIF:	1.3333	1.3333	
Allowable Stress, F:	8.4	8.4	kips/in = ASIF (0.4 Fy) tp
Ratio:	80.1%	66.0%	

Stiffener 1 Analysis per AISC Sect. D1, E2, F1.2 & App. B

	Stiffener Type 1	
Gross Area, Ag:	10.5840	in^2
Net Area, An:	10.5840	in^2
Stiffener Axial, P:	294.4	kips
Stiffener Stress, f:	27.8	ksi = P / Ag
b:	16.2000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	11.0204	in
Q, Where Qa = 1.0:	0.9428	= Qa 1.340 - 0.00447 (b / ts) $Fy^{1/2}$
r:	0.4244	in^3
K L / r:	10.6044	
ASIF:	1.3333	
Allowable Axial, Fa:	47.56	ksi = ASIF Q [1 - (K L / r) / 2 Cc'^2] Fy / [5/3 + 3(K L / r) / 8 Cc' - (K L / r)^3 / 8 Cc'^3]
ASIF:	1.3333	
Allowable Bending, Fb:	49.03	ksi = ASIF 0.6 Fy Q
ASIF:	1.3333	
Allowable Net Tension, Ft:	53.33	ksi = ASIF 0.5 Fu
Ratio:	58.5%	

Stiffener 2 Analysis per AISC Sect. D1, E2, F1.2 & App. B

	Stiffener Type 2	
Gross Area, Ag:	5.5000	in^2
Net Area, An:	5.5000	in^2
Stiffener Axial, P:	148.4	kips
Stiffener Stress, f:	27.0	ksi = P / Ag
b:	14.5000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	14.5000	in
Q, Where Qa = 1.0:	0.8174	= Qa 1.340 - 0.00447 (b / ts) $Fy^{1/2}$
r:	0.2887	in^3
K L / r:	15.5885	
ASIF:	1.3333	
Allowable Axial, Fa:	40.66	ksi = ASIF Q [1 - (K L / r) / 2 Cc'^2] Fy / [5/3 + 3(K L / r) / 8 Cc' - (K L / r)^3 / 8 Cc'^3]
ASIF:	1.3333	
Allowable Bending, Fb:	42.51	ksi = ASIF 0.6 Fy Q
ASIF:	1.3333	
Allowable Net Tension, Ft:	53.33	ksi = ASIF 0.5 Fu
Ratio:	66.3%	

Analysis Summary:

Bridge Stiffener Type 1	Bridge Stiffener Type 2
Weld Analysis Ratio: 86.3% PASS	Weld Analysis Ratio: 58.6% PASS
Pole Analysis Ratio: 98.0% PASS	Pole Analysis Ratio: 66.0% PASS
Stiffener Analysis Ratio: 58.5% PASS	Stiffener Analysis Ratio: 66.3% PASS

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

v4.4 - Effective 7-12-13

Date: 9/24/2015
PJF Project: 37515-0774.002.7700
Client Ref. # 876331
Site Name: Great Britain Gravel Pit
Description: 118' Pole
Owner: CCI
Engineer: JRJ

Asymmetric Anchor Rod Analysis

Moment =	2213	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 =	25.0	kips	Max Ratio =	100.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	23							

**** 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	1.500	A354 Gr BC	109	125	0.0	41.00	0.00	1.77	69.58	66.88	66.88	0.00	97.19	68.8%
2	1.500	A354 Gr BC	109	125	22.5	41.00	0.00	1.77	72.93	70.23	70.23	0.00	97.19	72.3%
3	1.500	A354 Gr BC	109	125	45.0	41.00	0.00	1.77	76.44	73.74	73.74	0.00	97.19	75.9%
4	1.500	A354 Gr BC	109	125	67.5	41.00	0.00	1.77	77.55	74.85	74.85	0.00	97.19	77.0%
5	1.500	A354 Gr BC	109	125	90.0	41.00	0.00	1.77	75.14	72.44	72.44	0.00	97.19	74.5%
6	1.500	A354 Gr BC	109	125	112.5	41.00	0.00	1.77	69.97	67.27	67.27	0.00	97.19	69.2%
7	1.500	A354 Gr BC	109	125	135.0	41.00	0.00	1.77	64.62	61.92	61.92	0.00	97.19	63.7%
8	1.500	A354 Gr BC	109	125	157.5	41.00	0.00	1.77	62.61	59.91	59.91	0.00	97.19	61.6%
9	1.500	A354 Gr BC	109	125	180.0	41.00	0.00	1.77	65.77	63.07	63.07	0.00	97.19	64.9%
10	1.500	A354 Gr BC	109	125	202.5	41.00	0.00	1.77	72.32	69.62	69.62	0.00	97.19	71.6%
11	1.500	A354 Gr BC	109	125	225.0	41.00	0.00	1.77	78.70	76.00	76.00	0.00	97.19	78.2%
12	1.500	A354 Gr BC	109	125	247.5	41.00	0.00	1.77	82.16	79.46	79.46	0.00	97.19	81.8%
13	1.500	A354 Gr BC	109	125	270.0	41.00	0.00	1.77	81.59	78.89	78.89	0.00	97.19	81.2%
14	1.500	A354 Gr BC	109	125	292.5	41.00	0.00	1.77	77.64	74.94	74.94	0.00	97.19	77.1%
15	1.500	A354 Gr BC	109	125	315.0	41.00	0.00	1.77	72.51	69.81	69.81	0.00	97.19	71.8%
16	1.500	A354 Gr BC	109	125	337.5	41.00	0.00	1.77	69.17	66.47	66.47	0.00	97.19	68.4%
17	1.750	Dywidag (150 ksi)	127.7	150	60.0	51.50	0.00	2.71	149.68	145.53	145.53	0.00	178.99	81.3%
18	1.750	Dywidag (150 ksi)	127.7	150	146.0	51.50	0.00	2.71	122.43	118.28	118.28	0.00	178.99	66.1%
19	1.750	Dywidag (150 ksi)	127.7	150	244.0	51.50	0.00	2.71	156.42	152.27	152.27	0.00	178.99	85.1%
20	1.750	Dywidag (150 ksi)	127.7	150	326.0	51.50	0.00	2.71	133.86	129.71	129.71	0.00	178.99	72.5%
21	2.250	A193 Gr B7	105	125	191.3	51.50	0.00	3.98	194.30	188.23	188.23	0.00	218.68	86.1%
22	1.750	Williams R71	127.7	150	350.0	64.50	0.00	2.66	159.90	155.83	155.83	0.00	175.76	88.7%
23	1.750	Williams R71	127.7	150	106.0	64.50	0.00	2.66	171.82	167.75	167.75	0.00	175.76	95.4%
								48.42						

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

TIA Rev F

Site Data

BU#: *876331*
Site Name: *Great Britain Gravel Pit*
App #:

Pole Manufacturer:	*Other*

Reactions		
Moment:	1104.4	ft-kips
Axial:	21.6	kips
Shear:	14.6	kips

Reactions adjusted to account for additional anchor rods.

Anchor Rod Data		
Qty:	16	
Diam:	1.5	in
Rod Material:	Other	
Strength (Fu):	125	ksi
Yield (Fy):	109	ksi
Bolt Circle:	41	in

Plate Data		
Diam:	47	in
Thick:	2	in
Grade:	36	ksi
Single-Rod B-eff:	7.07	in

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

Pole Data		
Diam:	36	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

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

Anchor Rod Results

Maximum Rod Tension:	79.5	Kips	Rigid
Allowable Tension:	97.2	Kips	Service, ASD
Anchor Rod Stress Ratio:	81.8%	**Pass**	Fty*ASIF

Base Plate Results Flexural Check

Base Plate Stress:	26.6	ksi	Rigid
Allowable Plate Stress:	36.0	ksi	Service ASD
Base Plate Stress Ratio:	74.0%	**Pass**	0.75*Fy*ASIF
			Y.L. Length: 19.62

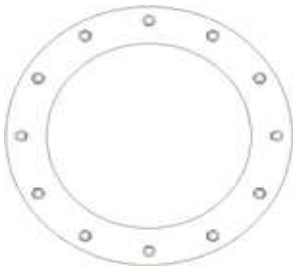
n/a

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

Current Moment =

By Comparison the capacities are:

$\left(\frac{2213}{2024\ k\text{-}ft}\right) 0.661 = \boxed{72.3\%}$, $\left(\frac{2213\ k\text{-}ft}{2024\ k\text{-}ft}\right) 0.747 = \boxed{81.7\%}$

Foundation Analysis

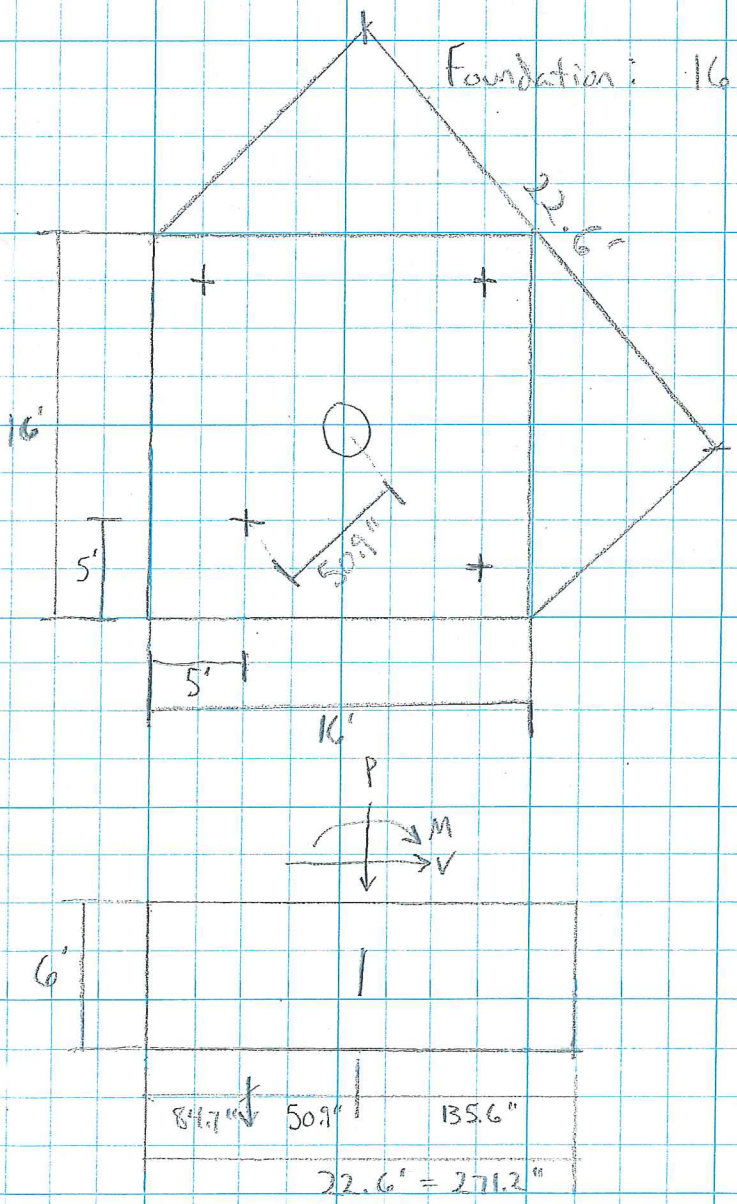
Base Reactions: M = 2624 k-ft
V = 23 k
P = 33 k

Foundation: 16' x 16' x 6' Mat w/ (4) Soil anchors

wt. Mat = (16)(16)(6)(0.145) =
= 222.7 k

Pallow Soil = 130 k
Anchor

Allow Soil = 10 ksf
Brg Pressure



M of P = 2624 + 23(6) =
= 2762 k-ft = 25,944 k-in

Foundation Analysis Cont.

$M_{resist\ wt.} = (33 + 222.7)(135.6) = 34672.92$ k-in

$M_{resist\ soil\ Anchor} = (130)(135.6)(50.9) = 24245$ k-in

$M_{resist\ TOT} = 34672.92 + 24245 = 58917.92$ k-in

$F.S. = \frac{58917.92}{25944} = 2.27$

F.S. req.d = 1.5

Stress Ratio $= \frac{1.5}{2.27} = 66.1\%$ ok

Note: F.S. w/o Soil Anchor $= \frac{34672.92}{25944} = 1.34$ - Not ok

Check overturning Across major axis (x,y):

$M_{resist\ wt} = (33 + 222.7)\left(\frac{(16)(12)}{2}\right) = 24547.2$ k-in

$M_{resist\ Soil\ Anchor} = [(130)(16-5) + (130)(16-2)](12) = 39000$ k-in

$M_{resist\ TOT} = 24547.2 + 39000 = 63547.2$ k-in

$F.S. = \frac{63547.2}{25944} = 2.45$

Stress Ratio $= \frac{1.5}{2.45} = 61.2\%$

Foundation Analysis Cont.

Check Reinf. Stl in Mat'l:

BRG Pressure from Weight = $\left(\frac{33+222.7}{16^2}\right)$ = 1 ksf

That leaves a 9 ksf Allow BRG Pressure Remaining

Area of Soil Req'D to support (2) soil Anchors*:
* Assumes soil Anchors fully effective

$\frac{260\text{ k}}{9\text{ ksf}}$ = 28.89 ft²

Length = $\frac{28.89}{16}$ = 1.806'

M_{Mat}:

1. Axial Load doesn't contribute too much moment to mat so it was not considered
2. Conservatively considers soil Anchors to be fully effective
3. Conservatively takes moment about ℄ of monopole

$M_u = (1.3)(260)\left(\frac{16}{2} - \frac{1.806}{2}\right)$ = 3009 k-ft = 36110 k-in

Foundation Analysis Cont.

Check Reinf. STL in Mat Cont:

Mat has (17) #8 Bars

$A_s = 13.43 \text{ in}^2$

$b = (16)(12) = 192 \text{ in}$

$d = (60)(12) - 3 - (1.5)(1) = 67.5 \text{ in}$

$f'_c = 3 \text{ ksi}$

$$a = \frac{A_s f_y}{(0.85)(f'_c)(b)} = \frac{(13.43)(60)}{(0.85)(3)(192)} = 1.646 \text{ in}$$

$$z = d - \frac{a}{2} = 67.5 - \frac{1.646}{2} = 66.677 \text{ in}$$

$$\phi M_n = (0.9)(13.43)(60)(66.677) = 48355 \text{ k-in}$$

or

$$(0.9)(0.85)(3)(1.646)(192)(66.677) = 48360 \text{ k-in}$$

$$\text{Stress Ratio} = \frac{36110}{48355} = 74.7\%$$

MODIFICATION OF AN EXISTING 118' MONOPOLE

BU #876331; NEW BRITAIN GRAVEL PIT

115 NORTH MOUNTAIN RD
NEW BRITAIN, CONNECTICUT 06053
HARTFORD COUNTY
LAT: 41° 40' 35.72"; LONG: -72° 49' 17.09"
APP: 303991 REV. 0; WO: 1114296

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

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

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 OF EXISITNG STIFFENERS
FIELD WELDED STIFFENERS
HIGH STRENGTH GROUT

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	2006 IBC
BASIC WIND SPEED (FASTEST-MILE)	80 MPH
ICE THICKNESS	1.0 IN
ICE WIND SPEED	37.6 MPH
SERVICE WIND SPEED	50 MPH

THE ASSOCIATED FAILING SA WO NUMBER FOR THIS PROJECT IS 1099088

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.

MODIFICATION OF AN EXISTING 118' MONOPOLE
BU #876331; NEW BRITAIN GRAVEL PIT
NEW BRITAIN, CONNECTICUT

PROJECT No:	37515-0774.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	J.R.J.
CHECKED BY:	
DATE:	9-28-2015

TITLE SHEET

T-1

37515-0774.002.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. 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**

3.1. NEW GROUT FOR THE POLE BASE SHALL BE NON-SHRINK, NON-METALLIC, GROUT (NS GROUT BY EUCLID, OR APPROVED EQUAL) WITH A 7500 PSI MINIMUM COMPRESSIVE STRENGTH. CONTRACTOR SHALL SUBMIT PROPOSED GROUT SPECIFICATION INFORMATION TO CROWN CASTLE FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION. CONTRACTOR SHALL FOLLOW GROUT MANUFACTURER'S SPECIFICATIONS FOR COLD WEATHER GROUTING PROCEDURES (IF NECESSARY) AND THE TESTING AGENCY SHALL PREPARE GROUT SAMPLE SPECIMENS FOR COMPRESSIVE STRENGTH TESTING AND VERIFICATION.

3.2. GROUT SHALL BE INSTALLED TIGHT UNDER THE BASE PLATE AND BEARING PLATE REGION WITH NO VOIDS REMAINING BETWEEN THE TOP OF THE EXISTING CONCRETE AND THE UNDERSIDE OF THE EXISTING BASE PLATE AND BEARING PLATE.

3.3. CAULK AROUND ANCHOR RODS WHEN GROUTING.

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".

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

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

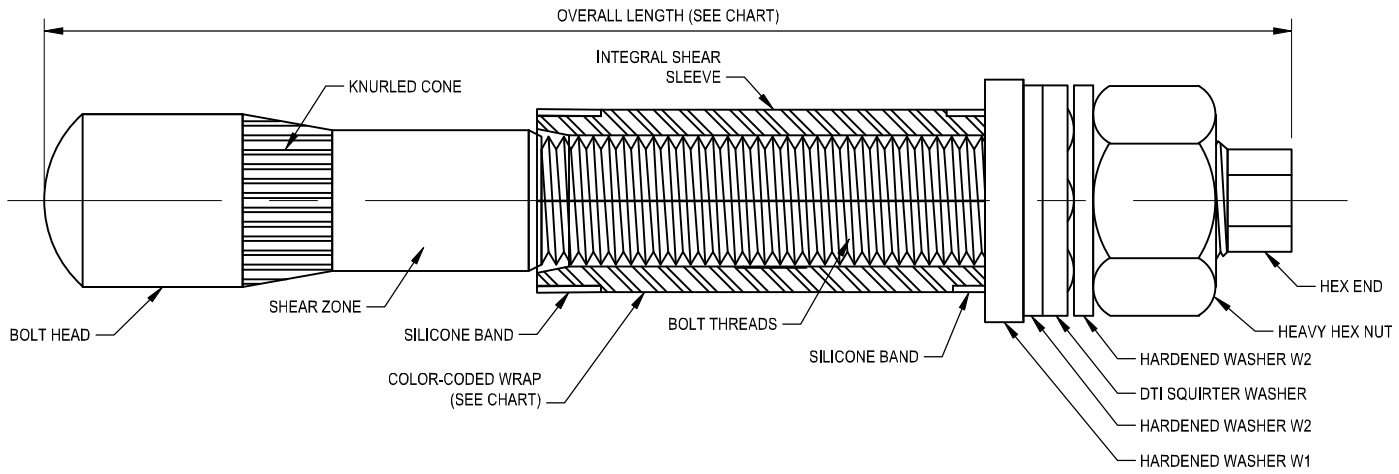
MODIFICATION OF AN EXISTING 118' MONOPOLE

BU #876331; NEW BRITAIN GRAVEL PIT
NEW BRITAIN, CONNECTICUT

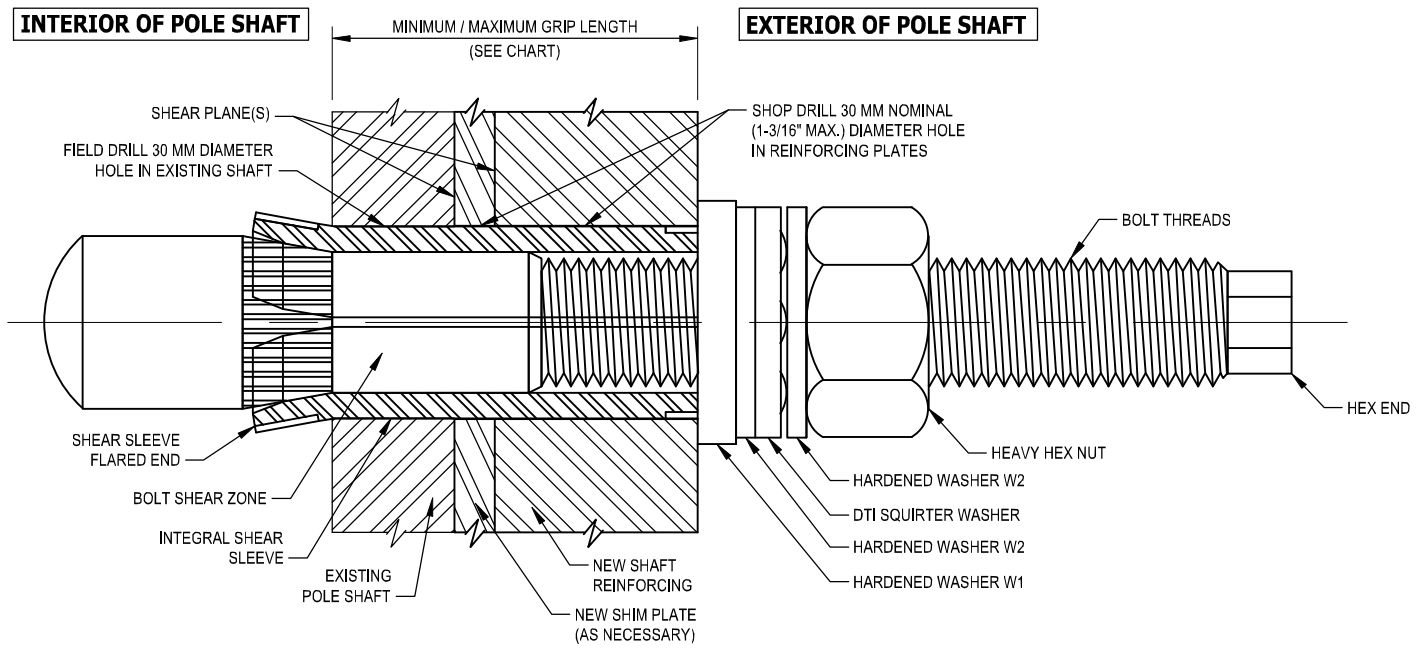
PROJECT No:	37515-0774.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	J.R.J.
CHECKED BY:	
DATE:	9-28-2015

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

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

PJF PAUL J. FORD & COMPANY
250 E Broad St. Ste 600- Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com
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MODIFICATION OF AN EXISTING 118' MONOPOLE
BU #876331; NEW BRITAIN GRAVEL PIT
NEW BRITAIN, CONNECTICUT

PROJECT No:	37515-0774.002.7700
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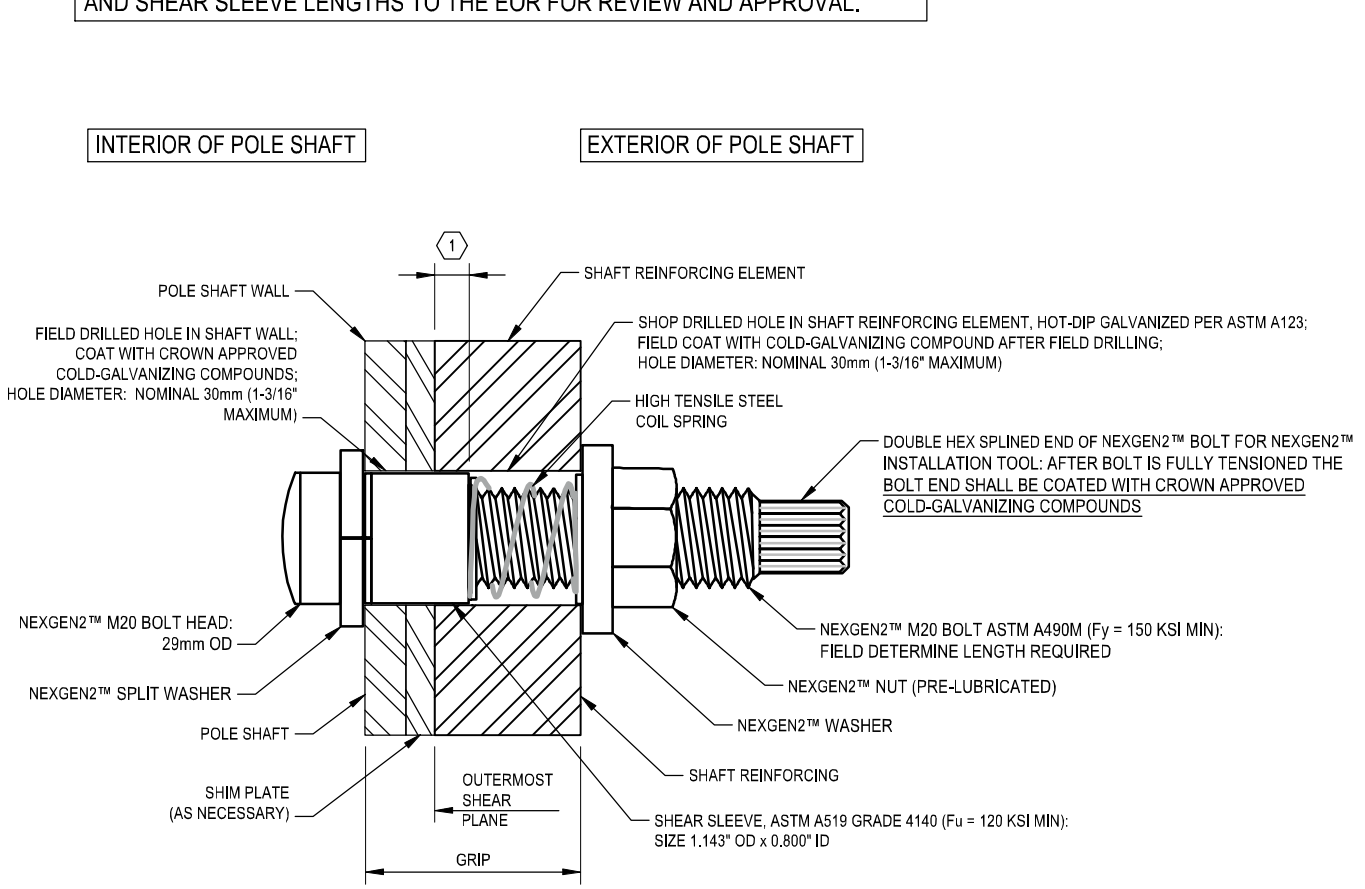
FORGBolt™ DETAILS

S-2A

37515-0774.002.DWG

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

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



TYPICAL NEXGEN2™ BOLT DETAIL 1 / S-2B

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

BOLT HOLE NOTES:

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

BOLT TIGHTENING AND INSPECTION NOTES:

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

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

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

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

PJF PAUL J. FORD & COMPANY
250 E Broad St. Ste 600- Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com
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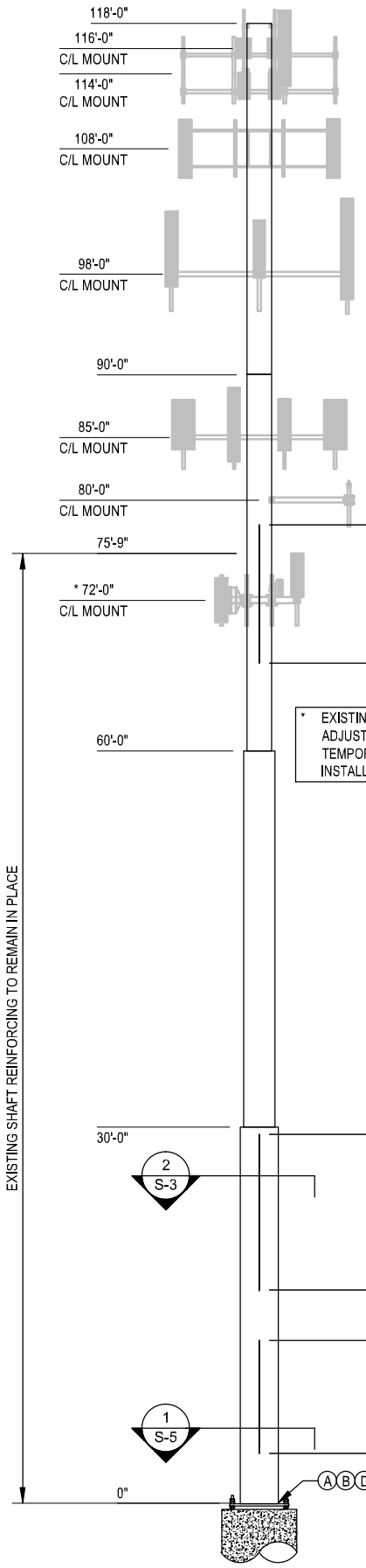
MODIFICATION OF AN EXISTING 118' MONOPOLE
BU #876331; NEW BRITAIN GRAVEL PIT
NEW BRITAIN, CONNECTICUT

PROJECT No:	37515-0774.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	J.R.J.
CHECKED BY:	
DATE:	9-28-2015

NEXGEN2™ BOLT DETAIL

S-2B

37515-0774.002.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
4' - 0"	13' - 0"	160	1-1/4" x 7" WCFP #1	9' - 0"	1	0	0	0	0	0	268 LBS.
17' - 0"	29' - 6"	50 & 253	1" x 4-1/2" CFP #2	12' - 6"	2	17	34	6	6	20"	381 LBS.
67' - 0"	78' - 0"	40, 160 & 275	1" x 4-1/2" CFP #3	11' - 0"	3	16	48	6	6	20"	506 LBS.
							82				1155 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.

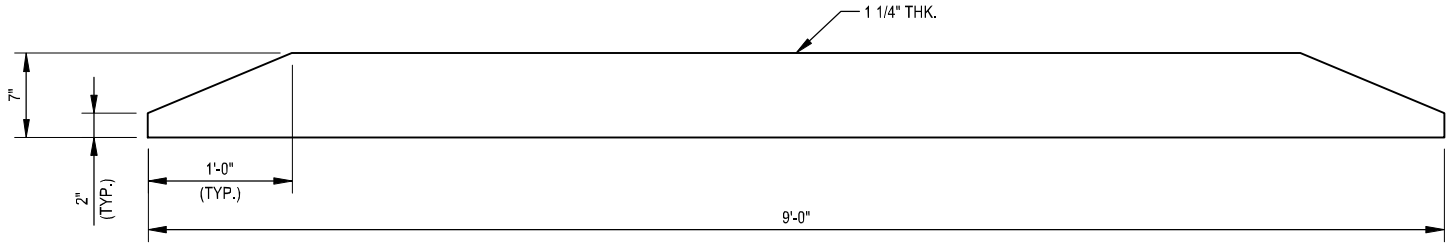
3.) WELDS SHALL BE E80XX OR GREATER. TERMINATION WELDS SHALL BE 3/8" FILLET WELDS.

4.) HOLES FOR BOLTS ARE 30mm UNLESS NOTED OTHERWISE.

5.) ALL SHIMS SHALL BE ASTM A-36.

CUSTOM BOLTED BAR DETAIL

NOTE: "A" DIMENSION MAY VARY, NOT TO EXCEED MAXIMUM INTERMEDIATE BOLT SPACING



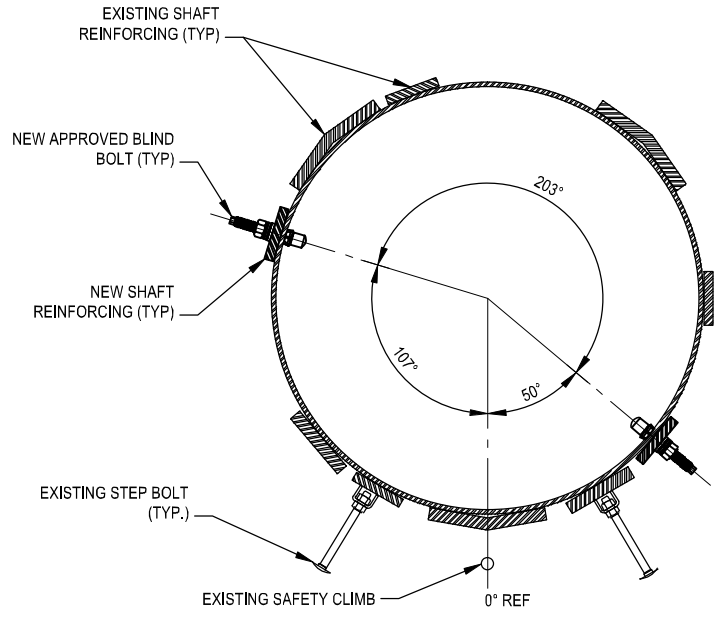
WELDED FLAT PLATE WCFP #1

(1 REQUIRED) (SEE CHART ABOVE)

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	28.00	0.2500		24.000	24.000	42	ROUND
2	30.00	0.3750		24.000	24.000	42	ROUND
3	30.00	0.3750		30.000	30.000	42	ROUND
4	30.00	0.3750		36.000	36.000	42	ROUND
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 TRANSITION STIFFENERS AT BASE PLATE. SEE SHEET S-4.
- (C) INSTALL NEW SHAFT REINFORCING. SEE CHART ON THIS SHEET.
- (D) REMOVAL OF EXISTING STIFFENERS AT BASE PLATE. SEE SHEET S-4.



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

SECTION 2 / S-3

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

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

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MODIFICATION OF AN EXISTING 118' MONOPOLE

BU #876331; NEW BRITAIN GRAVEL PIT
NEW BRITAIN, CONNECTICUT

PROJECT No:	37515-0774.002.7700
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MONOPOLE PROFILE

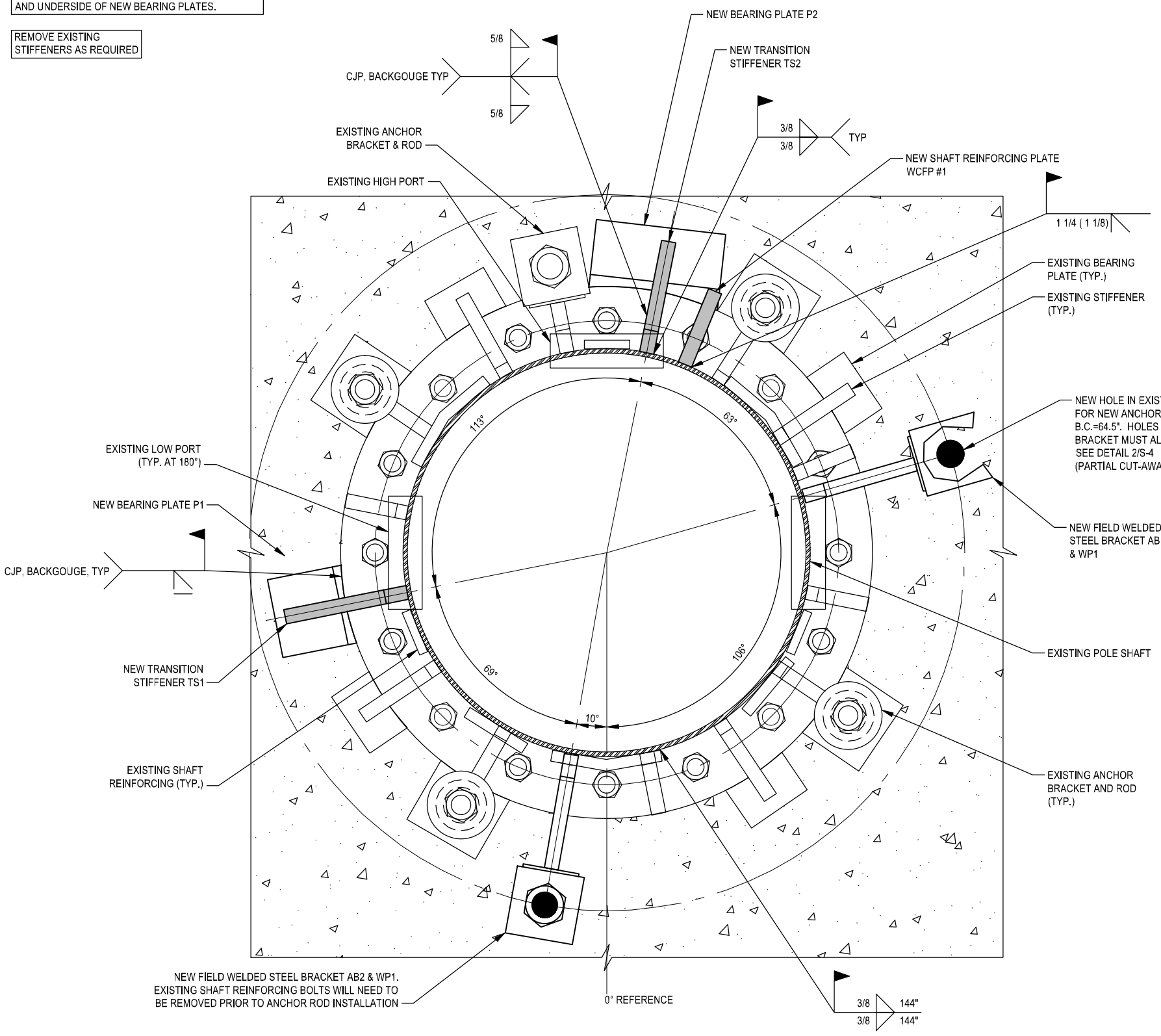
S-3

37515-0774.002.DWG

BASE SPECIFICATIONS	
BASE PLATE:	47"ø ROUND; 2" THK.; Fy=36 KSI
ANCHOR RODS:	(16) 1 1/2"ø; A354 GR. BC; 41" B.C.

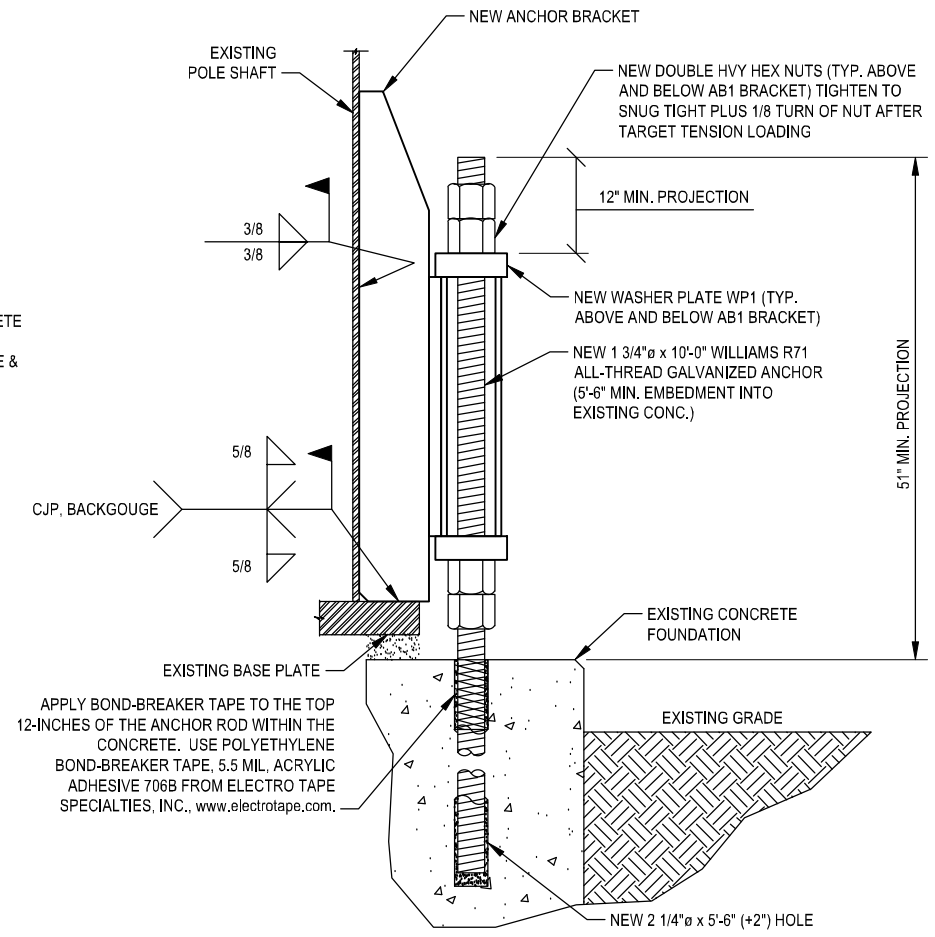
PROVIDE NON-SHRINK GROUT (NS GROUT BY EUCLID OR APPROVED. EQUAL; 7500 PSI MIN.) BELOW NEW BEARING PLATES. GROUT SHALL BE INSTALLED TIGHT UNDER NEW BEARING PLATES WITH NO VOIDS REMAINING BETWEEN TOP OF EXISTING CONCRETE AND UNDERSIDE OF NEW BEARING PLATES.

REMOVE EXISTING STIFFENERS AS REQUIRED



BASE PLATE 1 / 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 TESTED TO A TARGET TENSION LOAD OF 195 KIPS. ONCE THE TENSION LOAD HAS BEEN RELEASED, TIGHTEN HEAVY HEX NUT TO SNUG TIGHT PLUS 1/8 TURN OF NUT. REFER TO SHEET S-1, SECTION 6 FOR ADDITIONAL INFORMATION.



NEW ANCHOR & BRACKET DETAIL 2 / S-4

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

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

MODIFICATION OF AN EXISTING 118' MONOPOLE

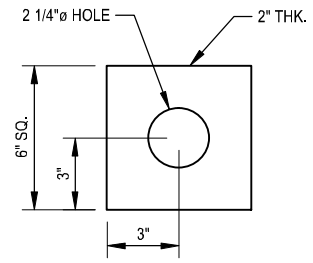
BU #876331; NEW BRITAIN GRAVEL PIT
NEW BRITAIN, CONNECTICUT

PROJECT No:	37515-0774.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	J.R.J.
CHECKED BY:	
DATE:	9-28-2015

BASE PLATE DETAILS

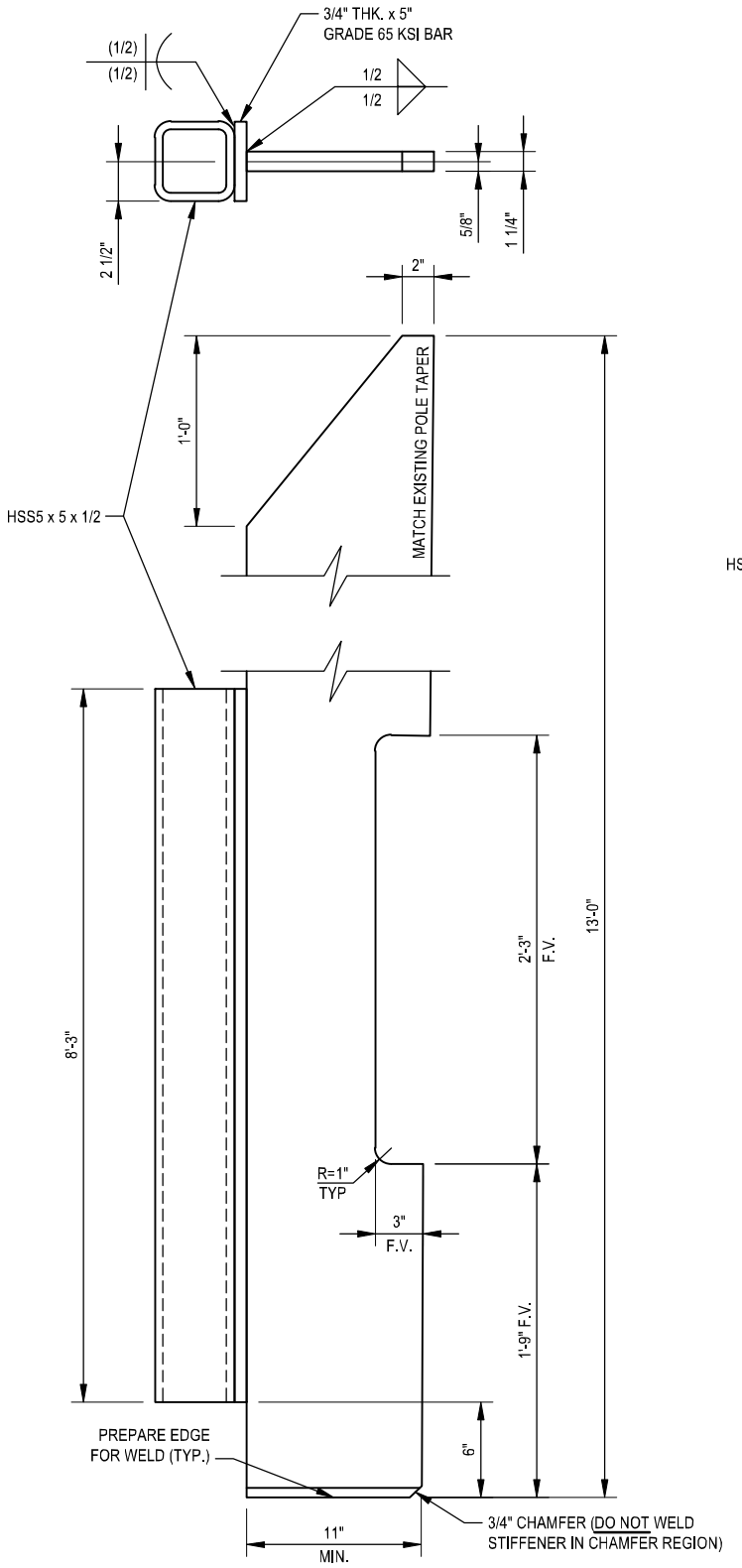
S-4

37515-0774.002.DWG



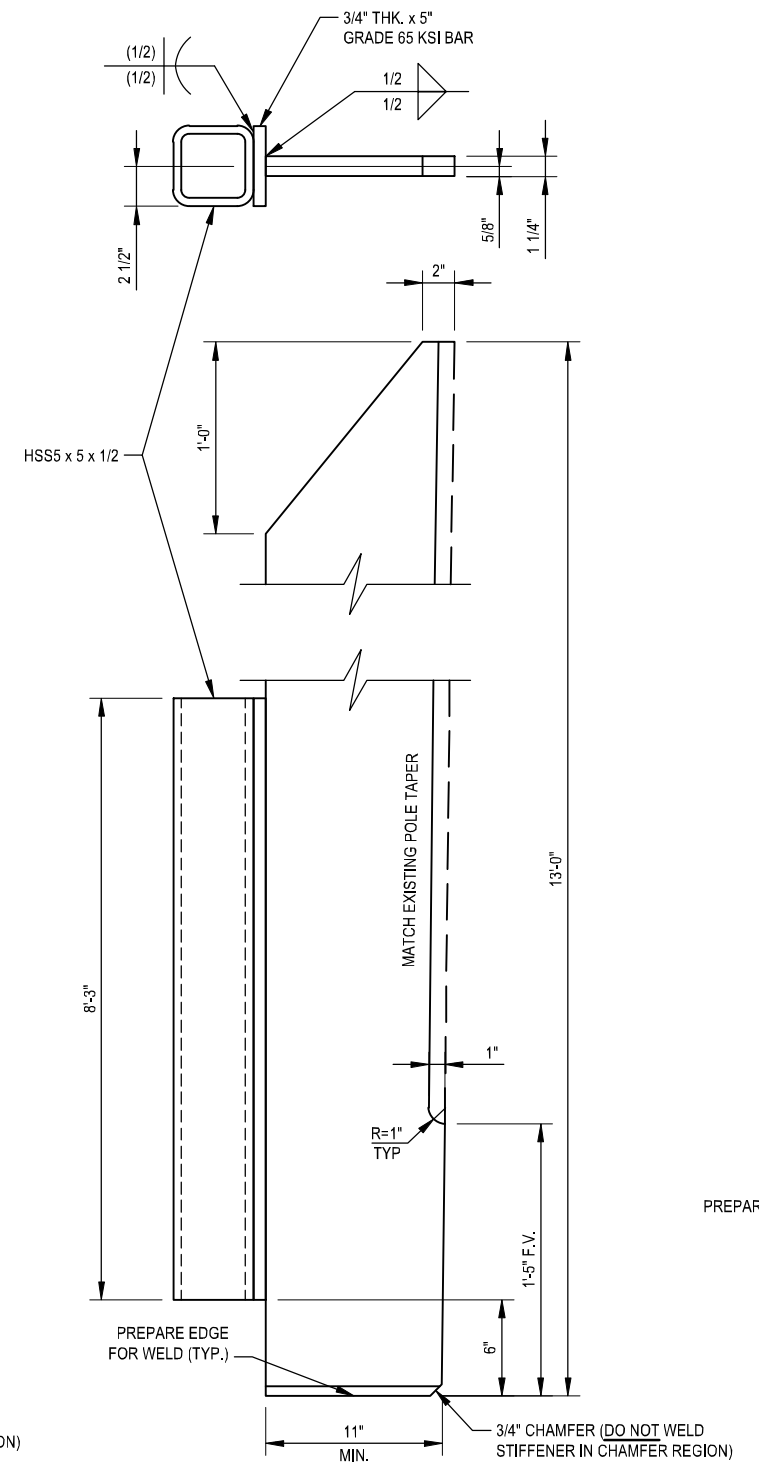
WASHER PLATE MK~WP1

(4 REQUIRED) (Fy = 50 KSI)



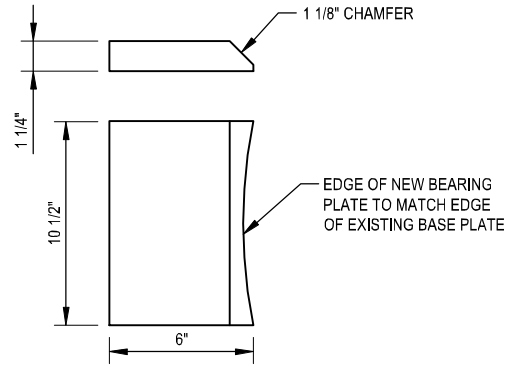
ANCHOR BRACKET MK~AB1

(1 REQUIRED @ 106°) (TUBE Fy = 46 KSI) (STIFFENER Fy = 65 KSI)



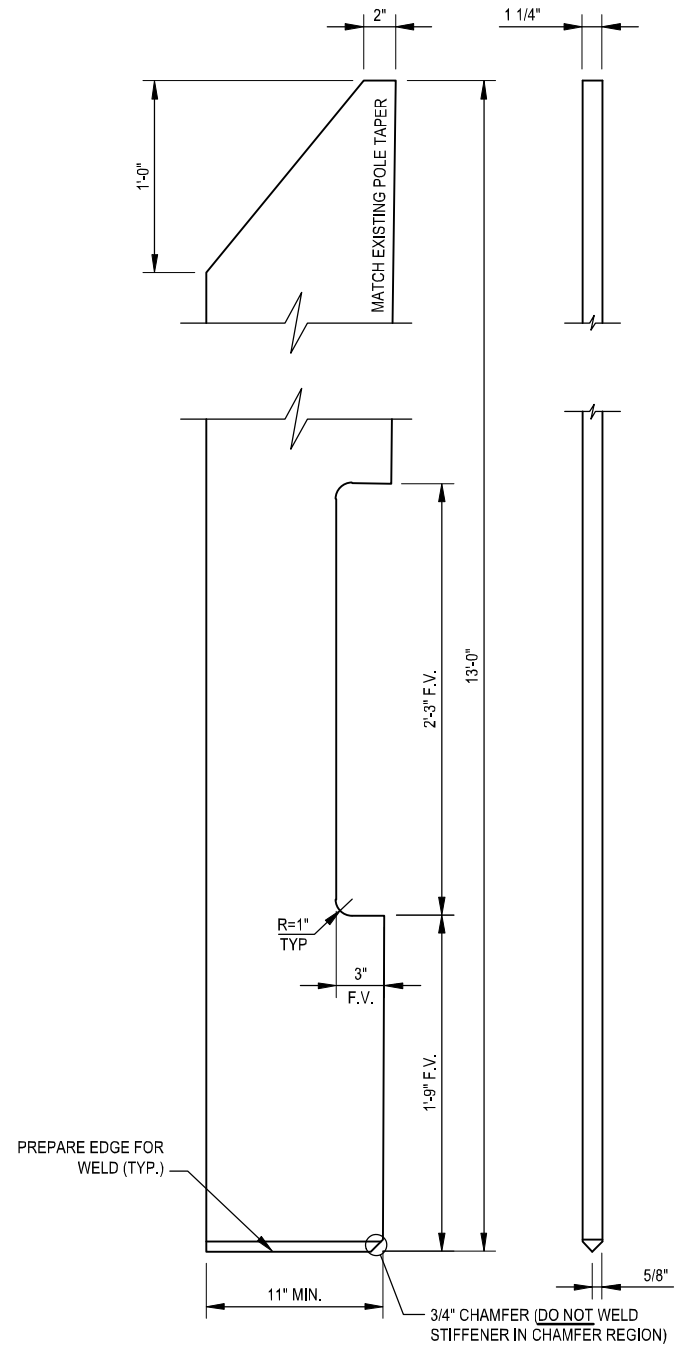
ANCHOR BRACKET MK~AB2

(1 REQUIRED @ 350°) (TUBE Fy = 46 KSI) (STIFFENER Fy = 65 KSI)



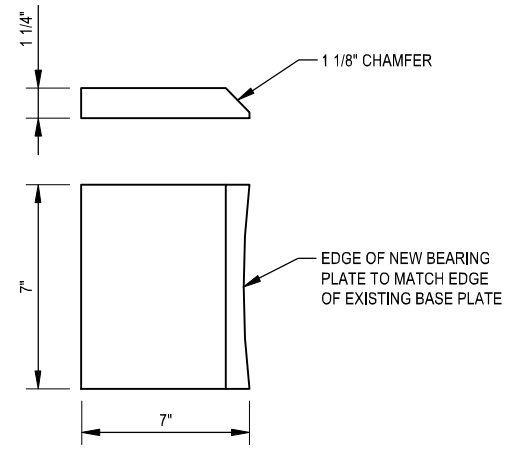
BEARING PLATE MK~P2

(1 REQUIRED) (Fy = 50 KSI)



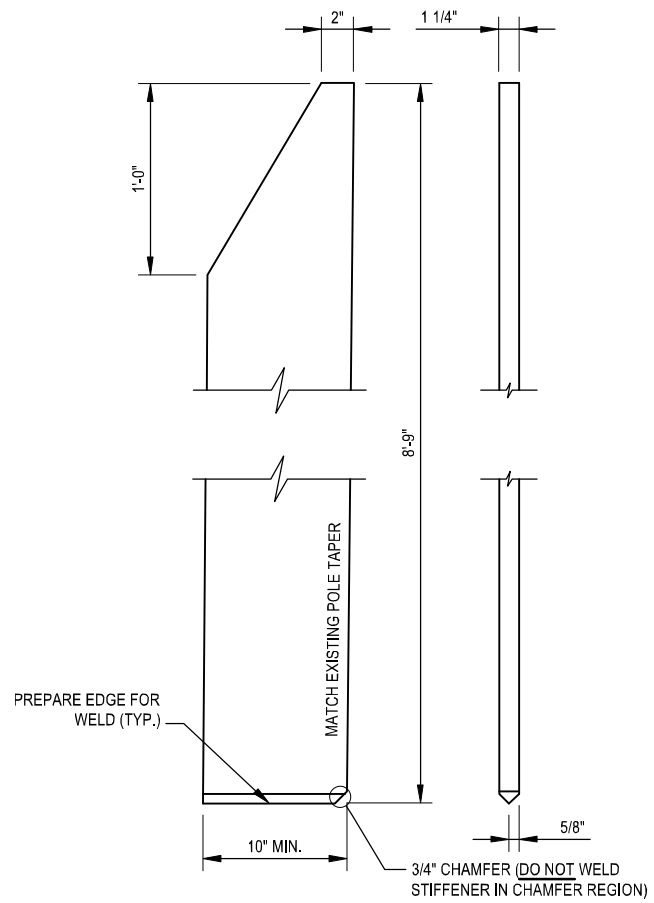
TRANSITION STIFFENER MK~TS1

(1 REQUIRED @ 282°) (Fy = 65 KSI)



BEARING PLATE MK~P1

(1 REQUIRED) (Fy = 50 KSI)



TRANSITION STIFFENER MK~TS2

(1 REQUIRED @ 169°) (Fy = 65 KSI)

PJF PAUL J. FORD & COMPANY
250 E Broad St. Ste 600- Columbus, OH 43215
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PH: (724) 416-2000

MODIFICATION OF AN EXISTING 118' MONOPOLE

BU #876331; NEW BRITAIN GRAVEL PIT
NEW BRITAIN, CONNECTICUT

PROJECT No:	37515-0774.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	J.R.J.
CHECKED BY:	
DATE:	9-28-2015

MISC. DETAILS

S-5

37515-0774.002.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 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 CARRYFLUT 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 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 ACCORDANCE WITH AWS D1.1.

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 OTHER 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.

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.

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

ADDITIONAL TESTING AND INSPECTIONS:

X	PACKING SLIPS
NA	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
NA	FABRICATOR NDE INSPECTION
X	MATERIAL TEST REPORT (MTR)
X	FABRICATOR CERTIFIED WELD INSPECTION
X	FABRICATION INSPECTION
X	EOR REVIEW
X	MI CHECKLIST DRAWINGS

PRE-CONSTRUCTION

CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM

MI CHECKLIST

CONSTRUCTION

X	CONSTRUCTION INSPECTIONS
NA	FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
X	POST INSTALLED ANCHOR ROD VERIFICATION
X	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION
NA	EARTHWORK: PROVIDE PHOTO DOCUMENTATION OF EXCAVATION QUALITY AND COMPACTION
X	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
NA	MICROPILE/ROCK ANCHOR INSTALLER'S DRILLING AND INSTALLATION LOGS AND QA/QC DOCUMENTS

ADDITIONAL TESTING AND INSPECTIONS:

X	MI CHECKLIST DRAWINGS
X	EOR REVIEW
X	FABRICATION INSPECTION
X	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
NA	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS

ADDITIONAL TESTING AND INSPECTIONS:

X	CONSTRUCTION INSPECTIONS
NA	FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
X	POST INSTALLED ANCHOR ROD VERIFICATION
X	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION
NA	EARTHWORK: PROVIDE PHOTO DOCUMENTATION OF EXCAVATION QUALITY AND COMPACTION
X	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
NA	MICROPILE/ROCK ANCHOR INSTALLER'S DRILLING AND INSTALLATION LOGS AND QA/QC DOCUMENTS

ADDITIONAL TESTING AND INSPECTIONS:

POST-CONSTRUCTION

X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
X	POST INSTALLED ANCHOR ROD TARGET TENSION LOAD TESTING
NA	REFER TO MICROPILE/ROCK ANCHOR NOTES FOR SPECIAL INSPECTION AND TESTING REQUIREMENTS.
X	PHOTOGRAPHS

ADDITIONAL TESTING AND INSPECTIONS:

MODIFICATION OF AN EXISTING 118' MONOPOLE

BU #876331; NEW BRITAIN GRAVEL PIT
NEW BRITAIN, CONNECTICUT

CROWN CASTLE

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PROJECT No:	37515-0774.002.7700
DRAWN BY:	L.M.
DESIGNED BY:	J.R.J.
CHECKED BY:	
DATE:	9-28-2015

MI CHECKLIST

S-6

37515-0774.002.DWG

MODIFICATION OF AN EXISTING 118' MONOPOLE

BU #876331; NEW BRITAIN GRAVEL PIT

115 NORTH MOUNTAIN RD
NEW BRITAIN, CONNECTICUT 06053
HARTFORD COUNTY
LAT: 41° 40' 35.72"; LONG: -72° 49' 17.09"
APP: 303991 REV. 0; WO: 1114296

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 OF EXISITNG STIFFENERS
FIELD WELDED STIFFENERS
HIGH STRENGTH GROUT

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	2006 IBC
BASIC WIND SPEED (FASTEST-MILE)	80 MPH
ICE THICKNESS	1.0 IN
ICE WIND SPEED	37.6 MPH
SERVICE WIND SPEED	50 MPH

THE ASSOCIATED FAILING SA WO NUMBER FOR THIS PROJECT IS 1099088

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.

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30307
LICENSED
PROFESSIONAL ENGINEER
9-28-15

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

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

MODIFICATION OF AN EXISTING 118' MONOPOLE
BU #876331; NEW BRITAIN GRAVEL PIT
NEW BRITAIN, CONNECTICUT

PROJECT No:	37515-0774.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	J.R.J.
CHECKED BY:	RMK
DATE:	9-28-2015

TITLE SHEET

T-1

37515-0774.002.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. 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

3.1. NEW GROUT FOR THE POLE BASE SHALL BE NON-SHRINK, NON-METALLIC, GROUT (NS GROUT BY EUCLID, OR APPROVED EQUAL) WITH A 7500 PSI MINIMUM COMPRESSIVE STRENGTH. CONTRACTOR SHALL SUBMIT PROPOSED GROUT SPECIFICATION INFORMATION TO CROWN CASTLE FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION. CONTRACTOR SHALL FOLLOW GROUT MANUFACTURER'S SPECIFICATIONS FOR COLD WEATHER GROUTING PROCEDURES (IF NECESSARY) AND THE TESTING AGENCY SHALL PREPARE GROUT SAMPLE SPECIMENS FOR COMPRESSIVE STRENGTH TESTING AND VERIFICATION.

3.2. GROUT SHALL BE INSTALLED TIGHT UNDER THE BASE PLATE AND BEARING PLATE REGION WITH NO VOIDS REMAINING BETWEEN THE TOP OF THE EXISTING CONCRETE AND THE UNDERSIDE OF THE EXISTING BASE PLATE AND BEARING PLATE.

3.3. CAULK AROUND ANCHOR RODS WHEN GROUTING.

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.

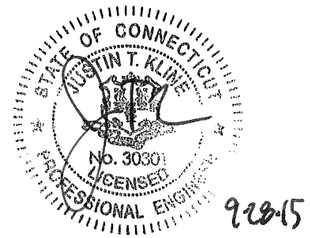
8.3. ALL GALVANIZING SHALL BE DONE AFTER FABRICATION IS COMPLETED AND PRIOR TO FIELD INSTALLATION.

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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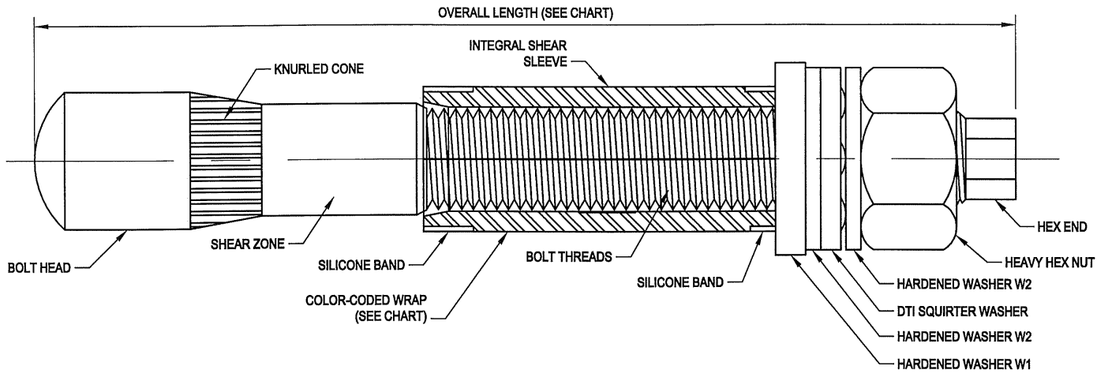
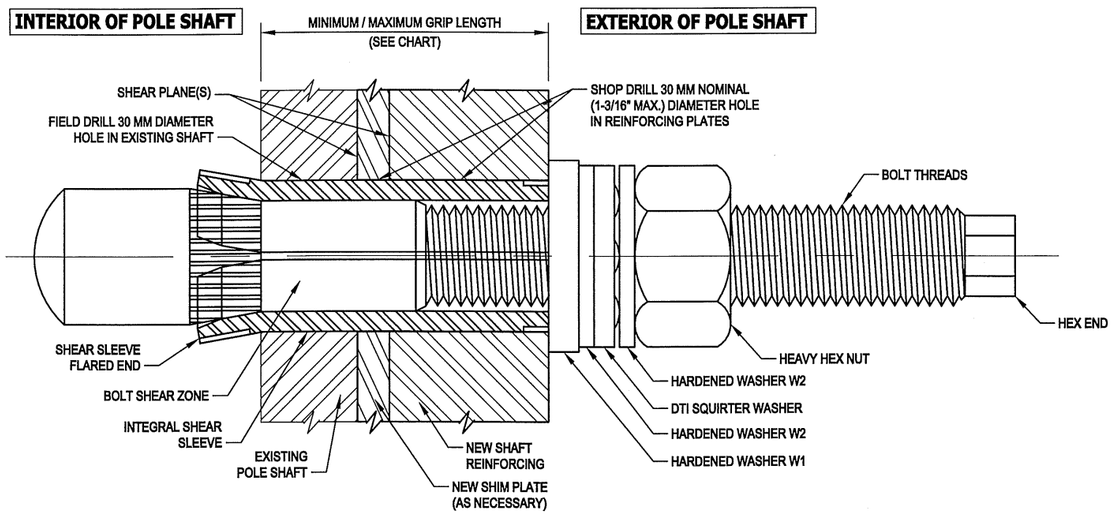
GENERAL NOTES

S-1

37515-0774.002.DWG



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



INSTALLED FORGBolt™ ASSEMBLY DETAIL 2 / S-2A

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

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

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

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

BOLT TIGHTENING AND INSPECTION NOTES:
1. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
2. ALL STRUCTURAL BOLTS SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.

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

CONTAINS PROPRIETARY INFORMATION PATENT PENDING

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

STATE OF CONNECTICUT JUSTIN T. KLIME No. 30301 LICENSED PROFESSIONAL ENGINEER 9-28-15

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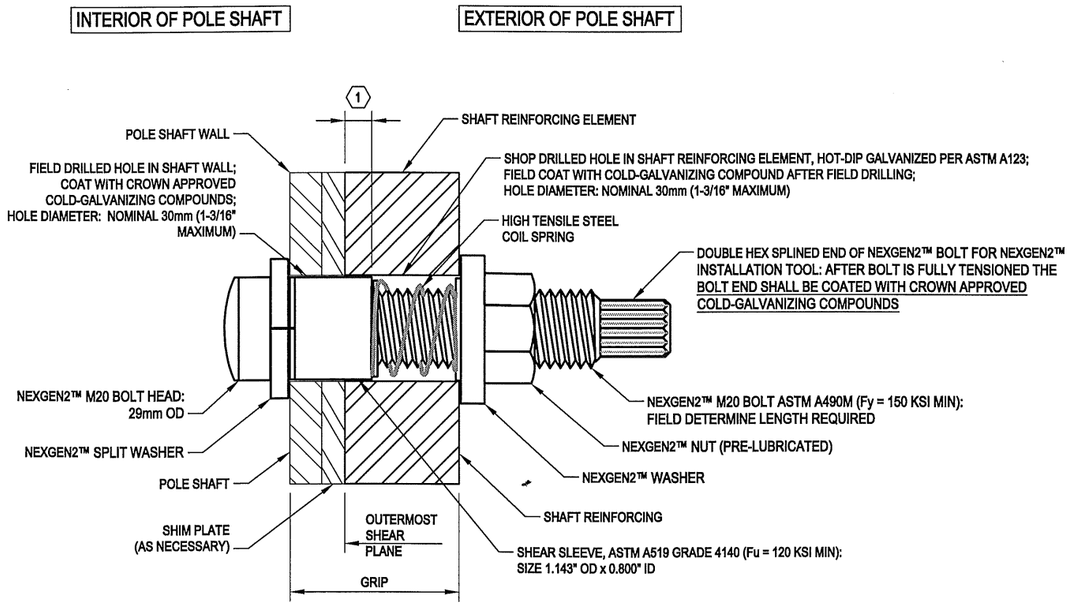
FORGBolt™ DETAILS

S-2A

37515-0774.002.DWG

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

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



TYPICAL NEXGEN2™ BOLT DETAIL ⟨1 / S-2B⟩

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

BOLT HOLE NOTES:

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

BOLT TIGHTENING AND INSPECTION NOTES:

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

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

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

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

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
LICENSED
PROFESSIONAL ENGINEER
9-28-15

PJF PAUL J. FORD & COMPANY
250 E Broad St. Ste 600 · Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com
CROWN CASTLE
3530 TORRINGDON WAY SUITE 300 CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 118' MONOPOLE
BU #876331; NEW BRITAIN GRAVEL PIT
NEW BRITAIN, CONNECTICUT

PROJECT No:	37515-0774.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	J.R.J.
CHECKED BY:	RMK
DATE:	9-28-2015

NEXGEN2™ BOLT DETAIL

S-2B

37515-0774.002.DWG

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
4' - 0"	13' - 0"	160	1-1/4" x 7" WCFP #1	9' - 0"	1	0	0	0	0	0	268 LBS.
17' - 0"	29' - 6"	50 & 253	1" x 4-1/2" CFP #2	12' - 6"	2	17	34	6	6	20"	381 LBS.
67' - 0"	78' - 0"	40, 160 & 275	1" x 4-1/2" CFP #3	11' - 0"	3	16	48	6	6	20"	506 LBS.
							82				1155 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.

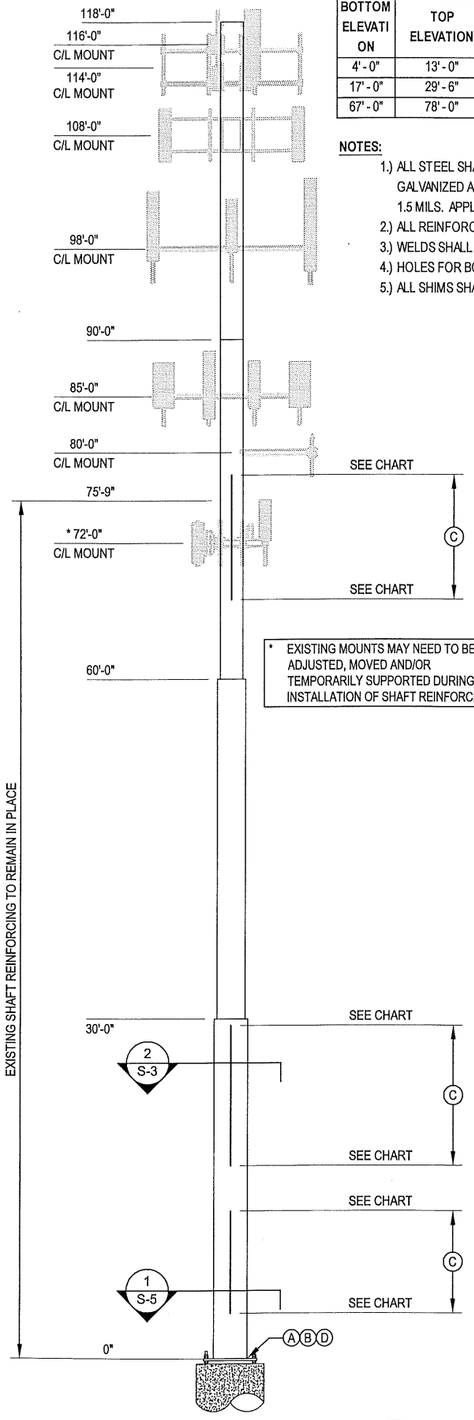
SHAFT SECTION DATA

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	28.00	0.2500		24.000	24.000	42	ROUND
2	30.00	0.3750		24.000	24.000	42	ROUND
3	30.00	0.3750		30.000	30.000	42	ROUND
4	30.00	0.3750		36.000	36.000	42	ROUND

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

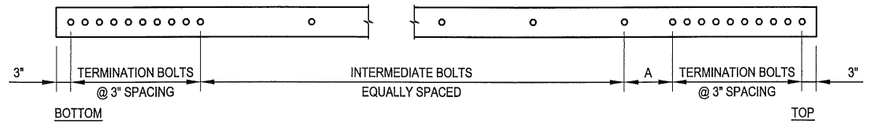
MODIFICATIONS:

- (A) INSTALL NEW ANCHOR RODS AND BRACKETS AT BASE PLATE. SEE SHEET S-4.
- (B) INSTALL NEW TRANSITION STIFFENERS AT BASE PLATE. SEE SHEET S-4.
- (C) INSTALL NEW SHAFT REINFORCING. SEE CHART ON THIS SHEET.
- (D) REMOVAL OF EXISTING STIFFENERS AT BASE PLATE. SEE SHEET S-4.



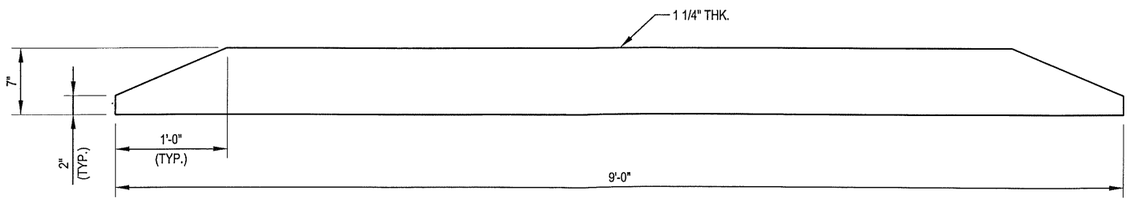
* EXISTING MOUNTS MAY NEED TO BE ADJUSTED, MOVED AND/OR TEMPORARILY SUPPORTED DURING THE INSTALLATION OF SHAFT REINFORCING

POLE ELEVATION 1 / S-3



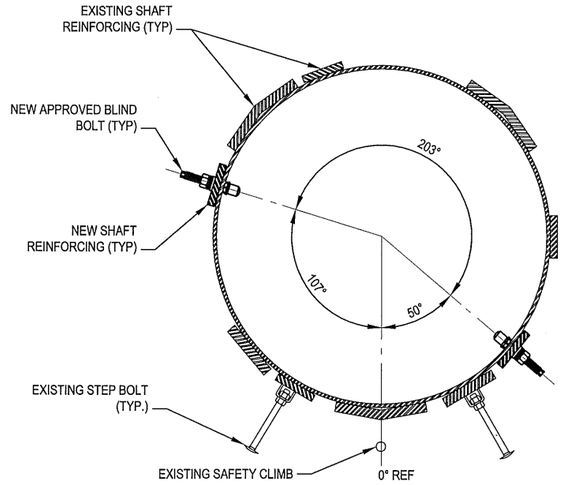
CUSTOM BOLTED BAR DETAIL

NOTE: "A" DIMENSION MAY VARY, NOT TO EXCEED MAXIMUM INTERMEDIATE BOLT SPACING



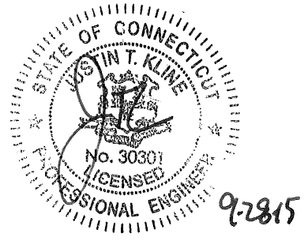
WELDED FLAT PLATE WCFP #1

(1 REQUIRED) (SEE CHART ABOVE)



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

SECTION 2 / S-3



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

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

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

MODIFICATION OF AN EXISTING 118' MONOPOLE

BU #876331; NEW BRITAIN GRAVEL PIT
NEW BRITAIN, CONNECTICUT

PROJECT No:	37515-0774.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	J.R.J.
CHECKED BY:	RMK
DATE:	9-28-2015

MONOPOLE PROFILE

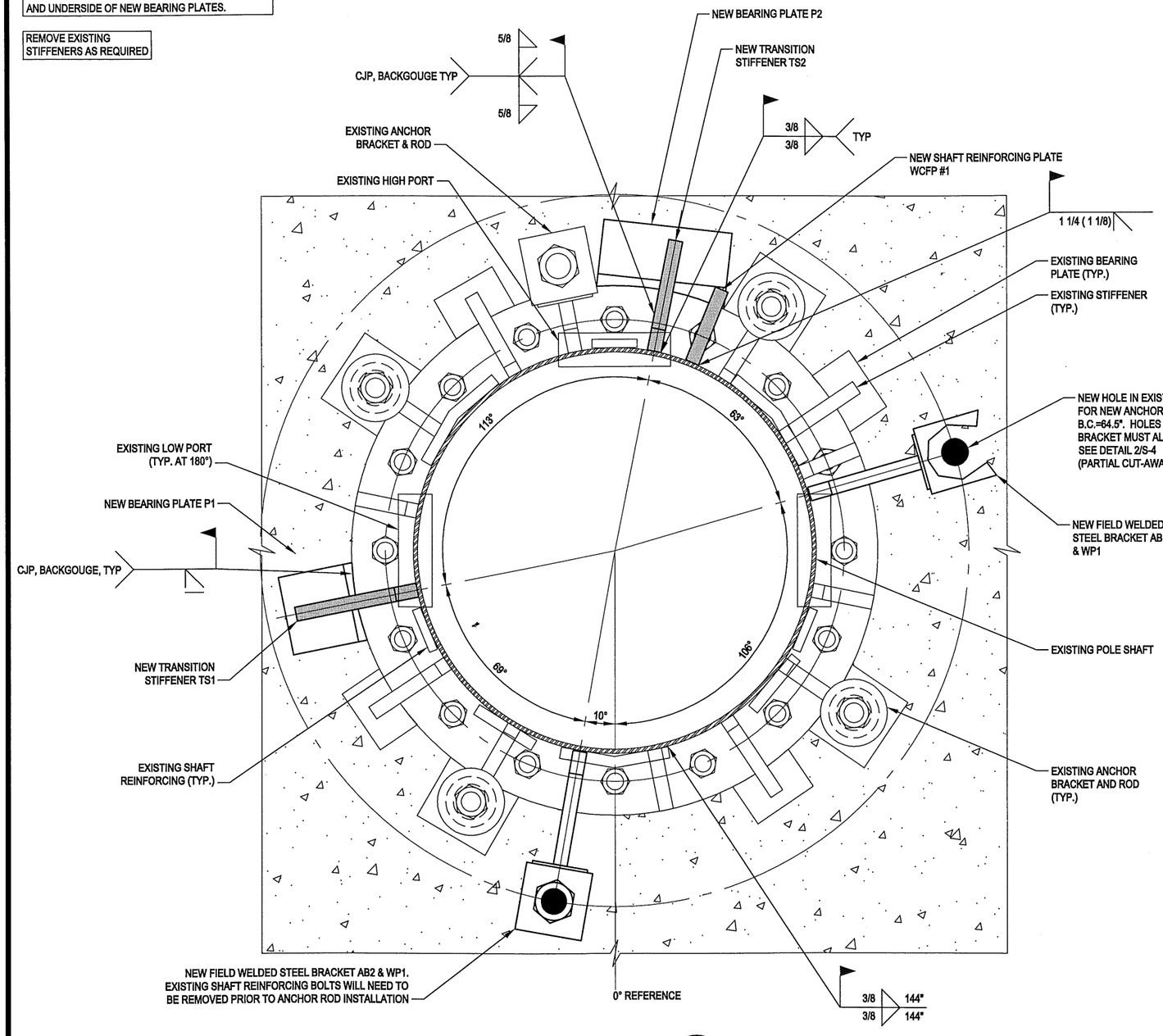
S-3

37515-0774.002.DWG

BASE SPECIFICATIONS	
BASE PLATE:	47"ø ROUND; 2" THK.; Fy=36 KSI
ANCHOR RODS:	(16) 1 1/2"ø; A354 GR. BC; 41" B.C.

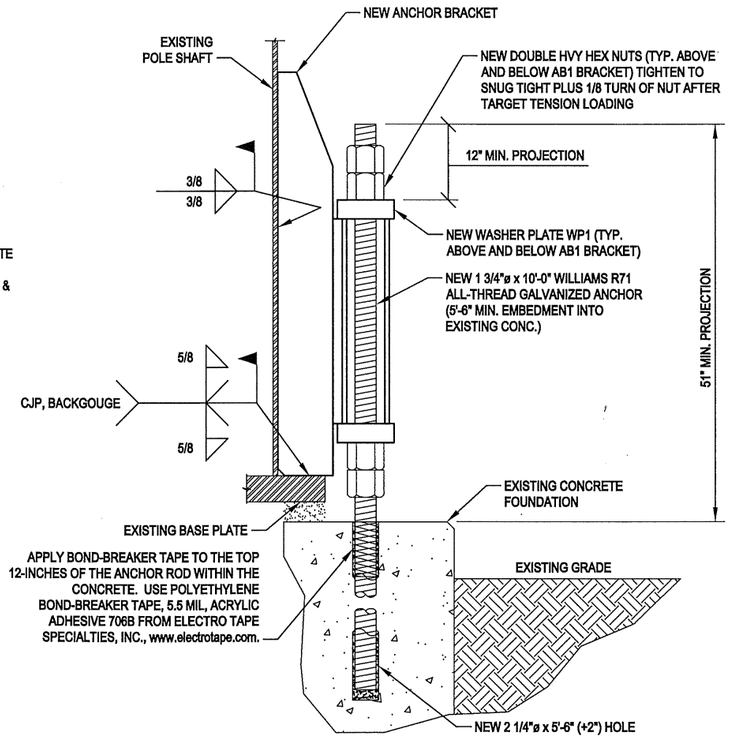
PROVIDE NON-SHRINK GROUT (NS GROUT BY EUCLID OR APPROVED. EQUAL; 7500 PSI MIN.) BELOW NEW BEARING PLATES. GROUT SHALL BE INSTALLED TIGHT UNDER NEW BEARING PLATES WITH NO VOIDS REMAINING BETWEEN TOP OF EXISTING CONCRETE AND UNDERSIDE OF NEW BEARING PLATES.

REMOVE EXISTING STIFFENERS AS REQUIRED



BASE PLATE 1 / 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 TESTED TO A TARGET TENSION LOAD OF 195 KIPS. ONCE THE TENSION LOAD HAS BEEN RELEASED, TIGHTEN HEAVY HEX NUT TO SNUG TIGHT PLUS 1/8 TURN OF NUT. REFER TO SHEET S-1, SECTION 6 FOR ADDITIONAL INFORMATION.



NEW ANCHOR & BRACKET DETAIL 2 / S-4

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

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PH: (724) 416-2000

MODIFICATION OF AN EXISTING 118' MONOPOLE

BU #876331; NEW BRITAIN GRAVEL PIT
NEW BRITAIN, CONNECTICUT

PROJECT No:	37515-0774.002.7700
DRAWN BY:	I.M.
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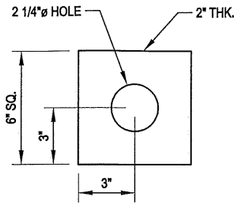
CHECKED BY:	JRMK
DATE:	9-28-2015

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
LICENSED
PROFESSIONAL ENGINEER
9-28-15

BASE PLATE DETAILS

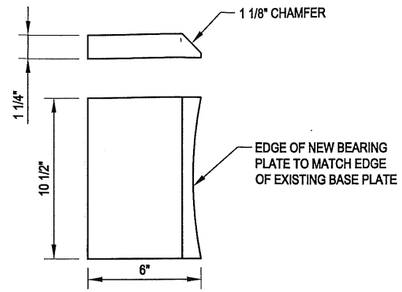
S-4

37515-0774.002.DWG



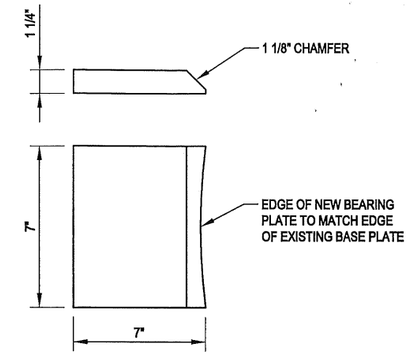
WASHER PLATE MK~WP1

(4 REQUIRED) (Fy = 50 KSI)



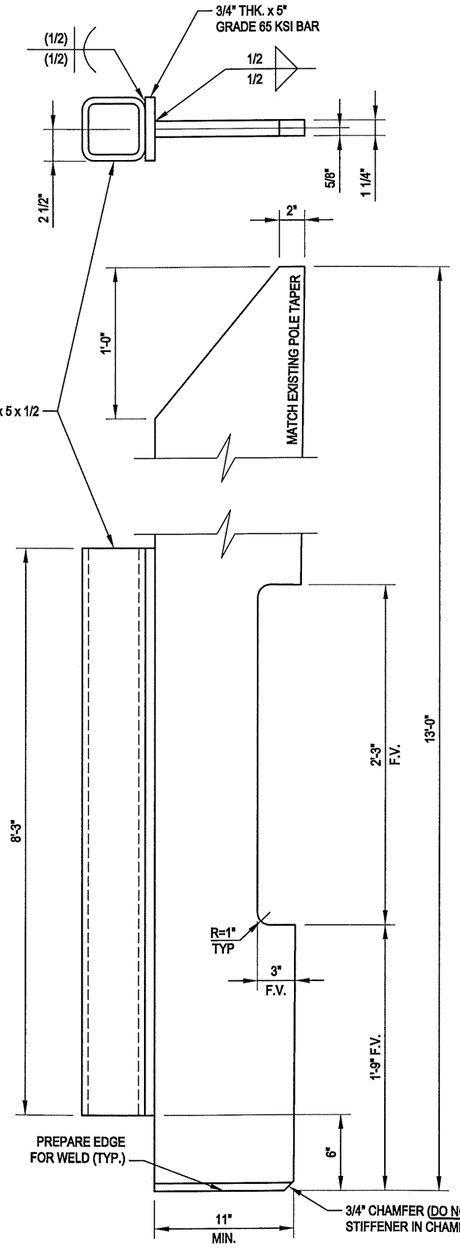
BEARING PLATE MK~P2

(1 REQUIRED) (Fy = 50 KSI)



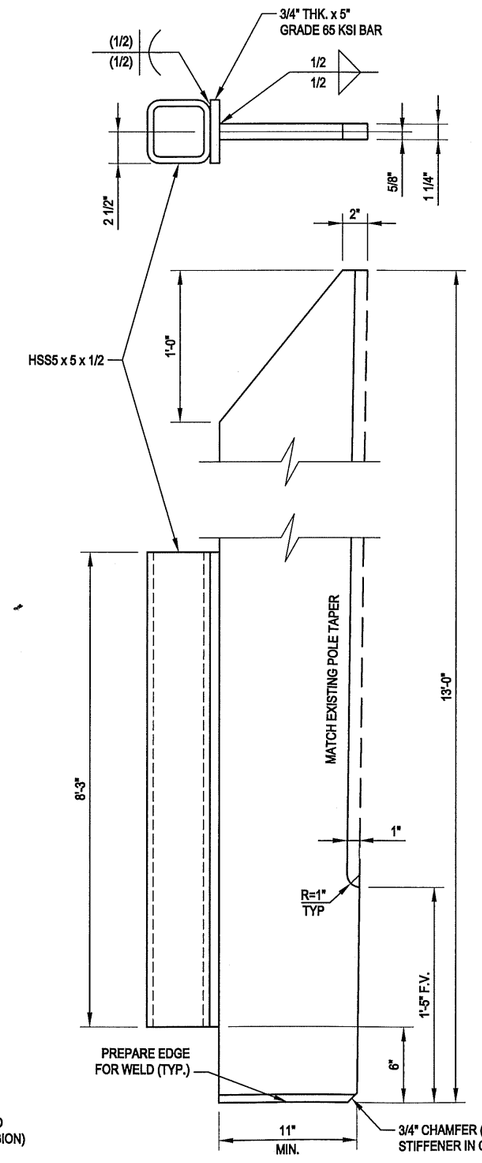
BEARING PLATE MK~P1

(1 REQUIRED) (Fy = 50 KSI)



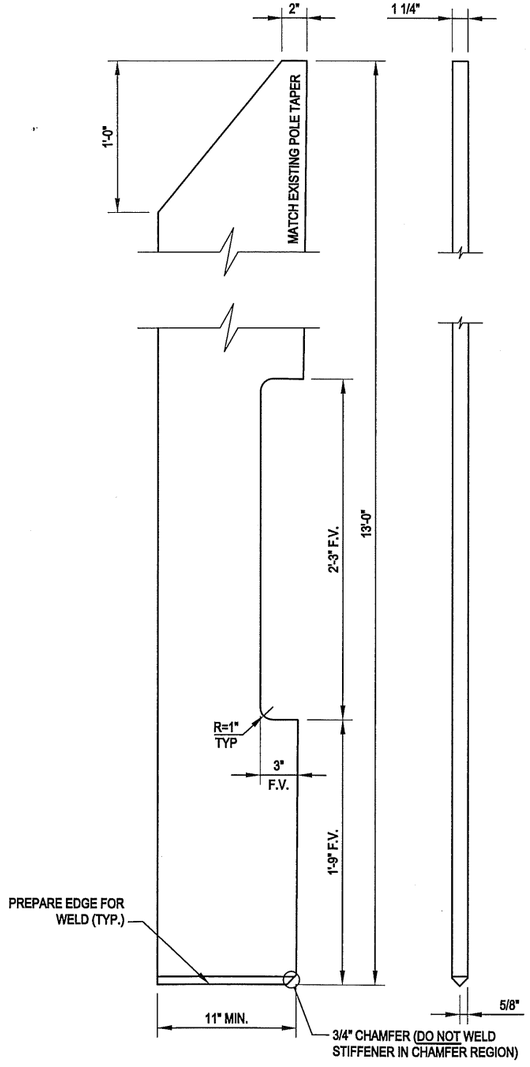
ANCHOR BRACKET MK~AB1

(1 REQUIRED @ 106°) (TUBE Fy = 46 KSI) (STIFFENER Fy = 65 KSI)



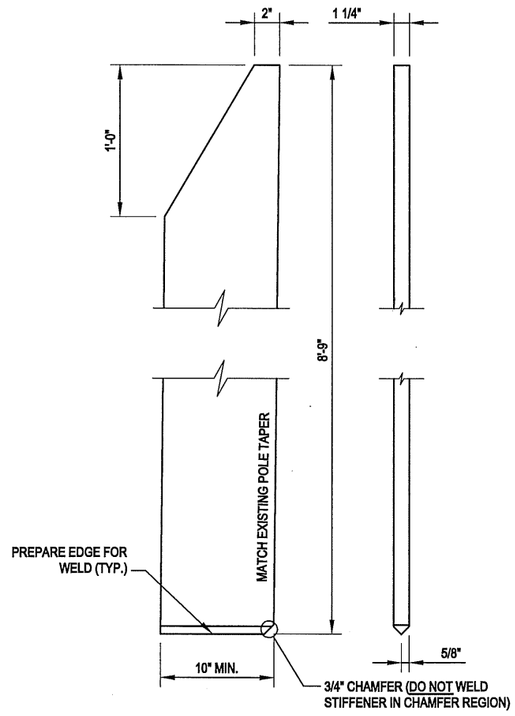
ANCHOR BRACKET MK~AB2

(1 REQUIRED @ 350°) (TUBE Fy = 46 KSI) (STIFFENER Fy = 65 KSI)



TRANSITION STIFFENER MK~TS1

(1 REQUIRED @ 282°) (Fy = 65 KSI)



TRANSITION STIFFENER MK~TS2

(1 REQUIRED @ 169°) (Fy = 65 KSI)

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

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

MODIFICATION OF AN EXISTING 118' MONOPOLE

BU #876331; NEW BRITAIN GRAVEL PIT
NEW BRITAIN, CONNECTICUT

PROJECT No:	37515-0774.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	J.R.J.
CHECKED BY:	RMK
DATE:	9-28-2015

MISC. DETAILS

S-5

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30361
LICENSED PROFESSIONAL ENGINEER
9-28-15

37515-0774.002.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.

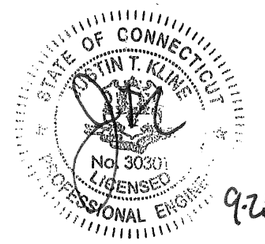
8. **PHOTOGRAPHS**
   - 8.1. BETWEEN THE GC AND THE MI INSPECTOR THE FOLLOWING PHOTOGRAPHS, AT A MINIMUM, ARE TO BE TAKEN AND INCLUDED IN THE MI REPORT:
     - 8.1.1. PRECONSTRUCTION GENERAL SITE CONDITION
     - 8.1.2. PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION
     - 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)
NA	FABRICATOR NDE INSPECTION
NA	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
CONSTRUCTION	
X	CONSTRUCTION INSPECTIONS
NA	FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
X	POST INSTALLED ANCHOR ROD VERIFICATION
X	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION
NA	EARTHWORK: PROVIDE PHOTO DOCUMENTATION OF EXCAVATION QUALITY AND COMPACTION
X	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
NA	MICROPILE/ROCK ANCHOR INSTALLER'S DRILLING AND INSTALLATION LOGS AND QA/QC DOCUMENTS
ADDITIONAL TESTING AND INSPECTIONS:	
POST-CONSTRUCTION	
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
X	POST INSTALLED ANCHOR ROD TARGET TENSION LOAD TESTING
NA	REFER TO MICROPILE/ROCK ANCHOR NOTES FOR SPECIAL INSPECTION AND TESTING REQUIREMENTS.
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS:	

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



9-28-15

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

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

MODIFICATION OF AN EXISTING 118' MONOPOLE

BU #876331; NEW BRITAIN GRAVEL PIT
NEW BRITAIN, CONNECTICUT

PROJECT No:	37515-0774.002.7700
DRAWN BY:	I.M.
DESIGNED BY:	J.R.J.
CHECKED BY:	RJMK
DATE:	9-28-2015

MI CHECKLIST

S-6

37515-0774.002.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: CT11423B

I-84/ New Britain
125 North Mountain Road
New Britain, CT 06053

October 5, 2015

EBI Project Number: 6215004943

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	19.79 %

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

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October 5, 2015

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

Emissions Analysis for Site: **CT11423B – I-84/ New Britain**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **125 North Mountain Road, New Britain, 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 **125 North Mountain Road, New Britain, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

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

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

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

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

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

5) Since the 1900 MHz and 2100 MHz radios are ground mounted there are additional cabling losses accounted for. For each RF path the following losses were calculated. 2.02 dB of additional cable loss for all 1900 MHz and 2.08 dB of additional cable loss at 2100 MHz. This is based on manufacturers Specifications for 120 feet of 7/8” coax cable on each path.

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

7) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

8) The antennas used in this modeling are the **Ericsson AIR21 (B4A/B2P** & **B2A/B4P)** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR21 (B4A/B2P** & **B2A/B4P)** have a maximum gain of **15.9 dBd** at their main lobe. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antenna mounting height centerline of the proposed antennas is **108 feet** above ground level (AGL).

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

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

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T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	108	Height (AGL):	108	Height (AGL):	108
Frequency Bands	2100 MHz (AWS)	Frequency Bands	2100 MHz (AWS)	Frequency Bands	2100 MHz (AWS)
Channel Count	2	Channel Count	2	# PCS Channels:	2
Total TX Power:	120	Total TX Power:	120	# AWS Channels:	120
ERP (W):	2,891.89	ERP (W):	2,891.89	ERP (W):	2,891.89
Antenna A1 MPE%	1.00	Antenna B1 MPE%	1.00	Antenna C1 MPE%	1.00
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
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):	108	Height (AGL):	108	Height (AGL):	108
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	Channel Count	4
Total TX Power:	120	Total TX Power:	120	Total TX Power:	120
ERP (W):	2,912.00	ERP (W):	2,912.00	ERP (W):	2,912.00
Antenna A2 MPE%	1.01	Antenna B2 MPE%	1.01	Antenna C2 MPE%	1.01
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	108	Height (AGL):	108	Height (AGL):	108
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power:	30	Total TX Power:	30	Total TX Power:	30
ERP (W):	865.21	ERP (W):	865.21	ERP (W):	865.21
Antenna A3 MPE%	0.64	Antenna B3 MPE%	0.64	Antenna C3 MPE%	0.64

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**2.65 %**
AT&T	4.01 %
Clearwire	0.36 %
Sprint	1.13 %
Verizon Wireless	11.64 %
Site Total MPE %:	**19.79 %**

T-Mobile Sector 1 Total:	2.65 %
T-Mobile Sector 2 Total:	2.65 %
T-Mobile Sector 3 Total:	2.65 %
Site Total:	19.79 %

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**	**1445.94**	**108**	**9.99**	**2100**	**1000**	**1.00 %**
T-Mobile 700 MHz LTE	**1**	**865.21**	**108**	**2.99**	**700**	**467**	**0.64 %**
T-Mobile 1900 MHz (PCS) GSM/UMTS	**2**	**733.03**	**108**	**5.07**	**1900**	**1000**	**0.51 %**
T-Mobile 2100 MHz (AWS) UMTS	**2**	**722.97**	**108**	**5.00**	**2100**	**1000**	**0.50 %**
						Total:	**4.31%**

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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:	2.65 %
Sector 2:	2.65 %
Sector 3 :	2.65 %
T-Mobile Per Sector Maximum:	2.65 %
Site Total:	19.79 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **19.79%** 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

EBI Consulting
21 B Street
Burlington, MA 01803