CROWN CASTLE
Crown Castle
3530 Toringdon Way Suite 300
Charlotte NC 28277
Tel (704) 405-6600

October 14, 2014

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

RE: **T-Mobile-Exempt Modification - Crown Site BU: 823666**
T-Mobile Site ID: CT11237C
Located at: 15 Pent Rd, Deep River, CT 06417

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 Richard Smith, First Selectman for Town of Deep River, and Stalsburg Express Inc., Property Owner.

T-Mobile plans to modify the existing wireless communications facility owned by Crown Castle and located at **15 Pent Rd, Deep River, CT 06417**. 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 replacement 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. The operation of the replacement 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.

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

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).

Sincerely,

Jerry Feathers
Real Estate Specialist

Enclosure

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 Richard Smith
Town of Deep River
174 Main Street
Deep River, CT 06417

cc: Stalsburg Express Inc.
15 Pent Rd
Deep River, CT 06417

T-MOBILE NORTHEAST LLC

T-MOBILE SITE #: CT11237C
CROWN CASTLE BU #: 823666
SITE NAME: DEEP RIVER / RT 9
15 PENT ROAD
DEEP RIVER, CT 06417
MIDDLESEX COUNTY

SITE CONFIGURATION: 704G

SITE INFORMATION

KEY MAP
N.T.S.

DIRECTIONS: (FROM PARSIPPANY):

START OUT GOING WEST ON SYLVAN WAY TOWARD CENTURY DR. TURN RIGHT ONTO LITTLETON RD / US-202 N, KEEP LEFT AT THE FORK TO GO TO LITTLETON RD E, MERGE ONTO I-287 N, MERGE ONTO I-87 S / I-287 E / NEW YORK TRWY S TOWARD I-87 S / TAPPAN ZEE BRG / NEW YORK CITY. KEEP LEFT TO TAKE I-287 E / CROSS WESTCHESTER EXPY E VIA EIXT 8 TOWARD WHITE PLAINS / RYE, STAY STRAIGHT TO GO ONTO I-95 N / NEW ENGLAND TRWY N. CONTINUE TO FOLLOW I-95 N, MERGE ONTO CT-9 N VIA EXIT 69 TOWARD ESSEX / HARTFORD. TAKE THE CT-154 / DEEP RIVER RD. CONTINUE TO FOLLOW CT-154, TURN LEFT ONTO PENT RD. DESTINATION IS ON THE LEFT.

PROJECT INFORMATION

T-MOBILE SITE #:	CT11237C
CROWN CASTLE BU #:	823666
SITE ADDRESS:	15 PENT ROAD DEEP RIVER, CT 06417 MIDDLESEX COUNTY
LATITUDE:	N 41° 22' 22.17"
LONGITUDE:	W 72° 26' 3.97"
TOWER OWNER:	CROWN CASTLE 1200 MACARTHUR BLVD., SUITE 200 MAHWAH, NJ 07430
CONTACT:	PETER TISI (201) 236-9224
APPLICANT:	T-MOBILE NORTHEAST, LLC 4 SYLVAN WAY PARSIPPANY, NJ 07054
CONTACT:	PHONE #: (973) 397-4800 FAX #: (973) 292-8893
ENGINEER:	DEWBERRY ENGINEERS INC. 600 PARSIPPANY ROAD, SUITE 301 PARSIPPANY, NJ 07054
CONTACT:	GREG NAWROTZKI (973) 576-9653
SCOPE OF WORK:	ADD (3) NEW ANTENNAS, ADD (3) NEW BIAS TEES, ADD (3) NEW RRU'S AT GRADE, ADD (6) NEW COAX CABLES

SHEET INDEX

SHEET NO.	SHEET DESCRIPTION
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C-2	ANTENNA LAYOUTS & ELEVATIONS
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E-1	GROUNDING NOTES & DETAILS

APPROVALS

T-MOBILE — DATE

OWNER/ LANDLORD — DATE

RF ENGINEER — DATE

ZONING — DATE

CONSTRUCTION — DATE

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

T-MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054
PHONE: (973) 397-4800
FAX: (973) 292-8893

DEEP RIVER / RT 9

CT11237C

15 PENT ROAD
DEEP RIVER, CT 06417
MIDDLESEX COUNTY

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

SEE SEAL

STATE OF CONNECTICUT — JIANG YU — LICENSED PROFESSIONAL ENGINEER — No. 28222

SCALE
AS SHOWN

REV.	DATE	BY	DESCRIPTION
0	09/12/14	HMP	ISSUED AS FINAL
A	08/26/14	HMP	ISSUED FOR REVIEW

REVISIONS

DRAWN BY HMP
CHECKED BY BSH
APPROVED BY GHN
DATE 08/21/14

TITLE

TITLE SHEET

PROJECT NO. 50066258/50066281

T-1

SHEET NO.

GENERAL NOTES:

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

SITE WORK GENERAL NOTES:

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

ELECTRICAL INSTALLATION NOTES:

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

CONCRETE AND REINFORCING STEEL NOTES:

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

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

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

STRUCTURAL STEEL NOTES:

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

CONSTRUCTION NOTES:

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

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DEEP RIVER / RT 9

CT11237C

15 PENT ROAD
DEEP RIVER, CT 06417
MIDDLESEX COUNTY

SEAL

SCALE

AS SHOWN

REV.	DATE	BY	DESCRIPTION
0	09/12/14	HMP	ISSUED AS FINAL
A	08/26/14	HMP	ISSUED FOR REVIEW

REVISIONS

DRAWN BY HMP
CHECKED BY BSH
APPROVED BY GHN
DATE 08/21/14

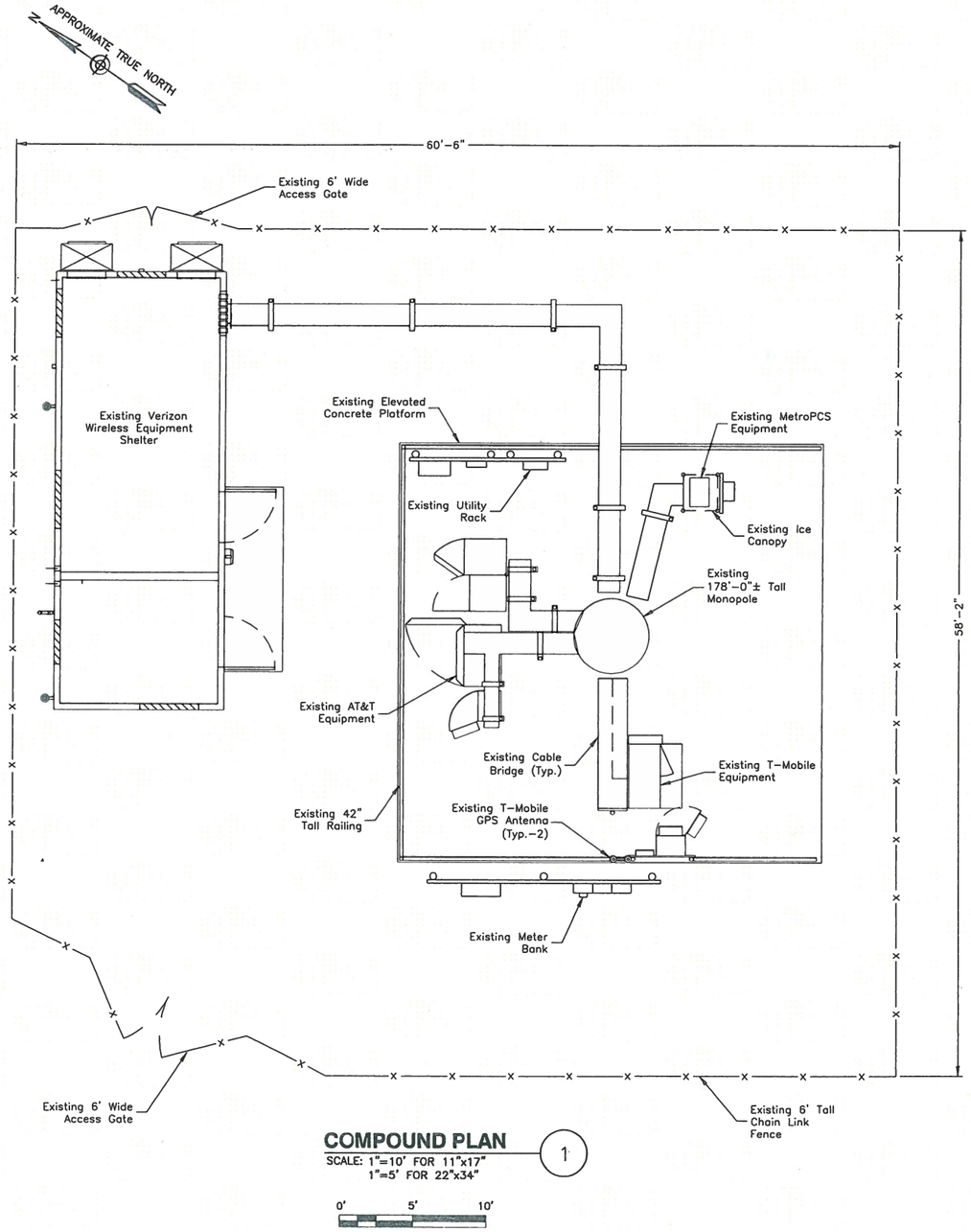
TITLE

GENERAL NOTES

PROJECT NO. 50066258/50066281

G - 1

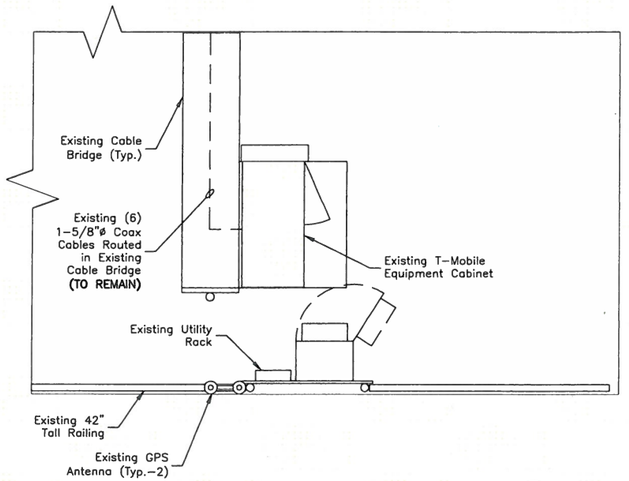
SHEET NO.



COMPOUND PLAN 1

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

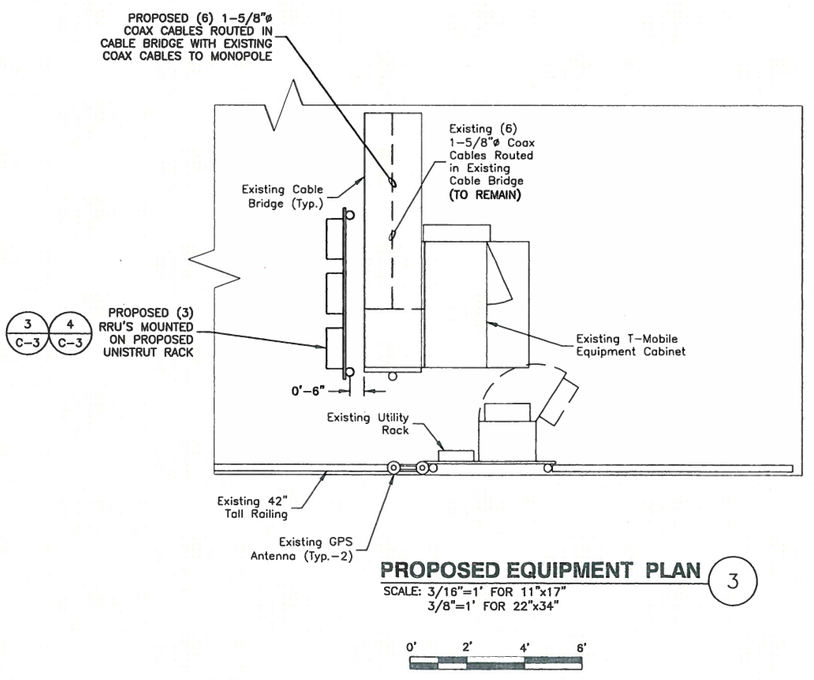
0' 5' 10'



EXISTING EQUIPMENT PLAN 2

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

0' 2' 4' 6'



PROPOSED EQUIPMENT PLAN 3

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

0' 2' 4' 6'

NOTES:

1. NORTH SHOWN AS APPROXIMATE.
2. NOT ALL INFORMATION IS SHOWN FOR CLARITY.
3. MOUNT ALL ANTENNAS, TMAS, COAX, ETC. IN ACCORDANCE WITH STRUCTURAL ANALYSIS TO BE COMPLETED BY OTHERS.

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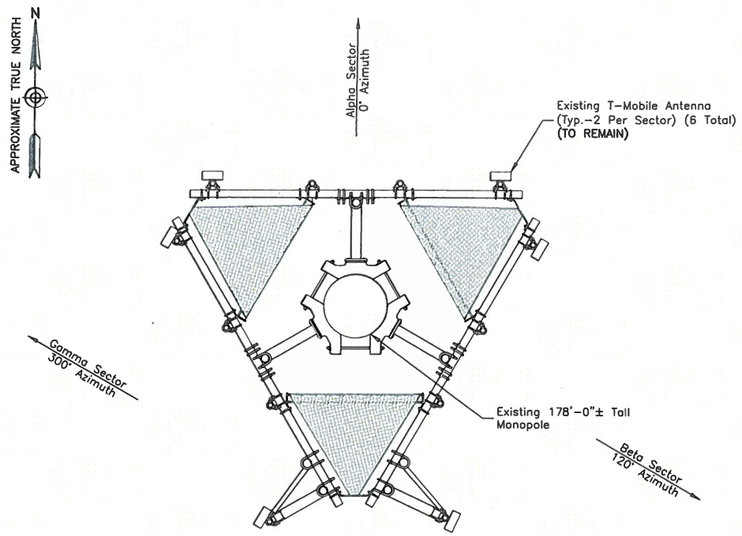
TITLE

COMPOUND PLAN & EQUIPMENT PLANS

PROJECT NO. 50066258/50066281

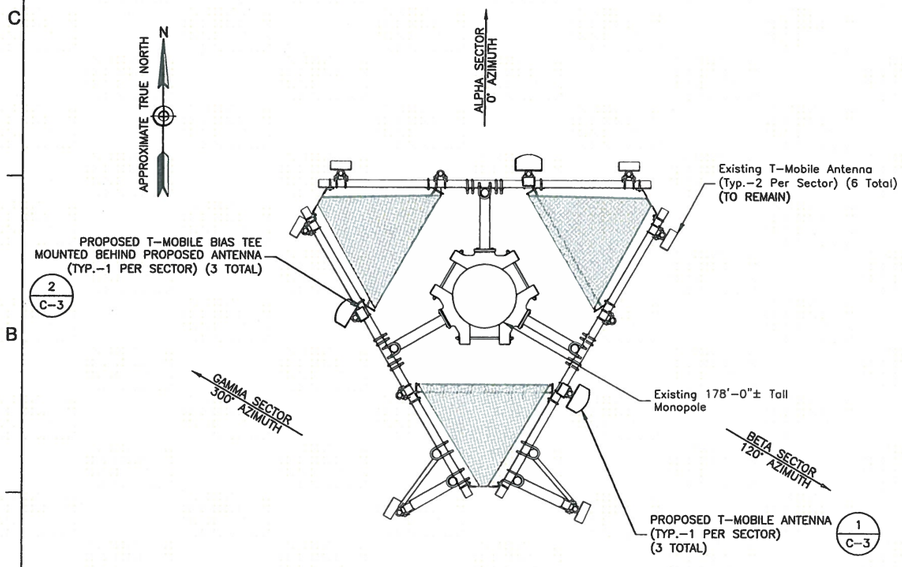
C - 1

SHEET NO.



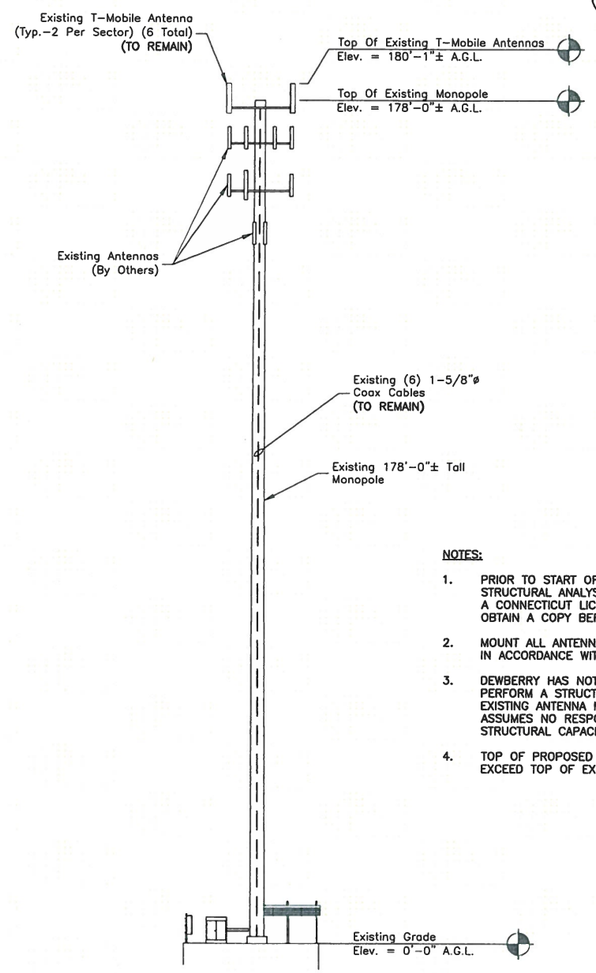
EXISTING ANTENNA LAYOUT (1)

SCALE: N.T.S.



PROPOSED ANTENNA LAYOUT (2)

SCALE: N.T.S.



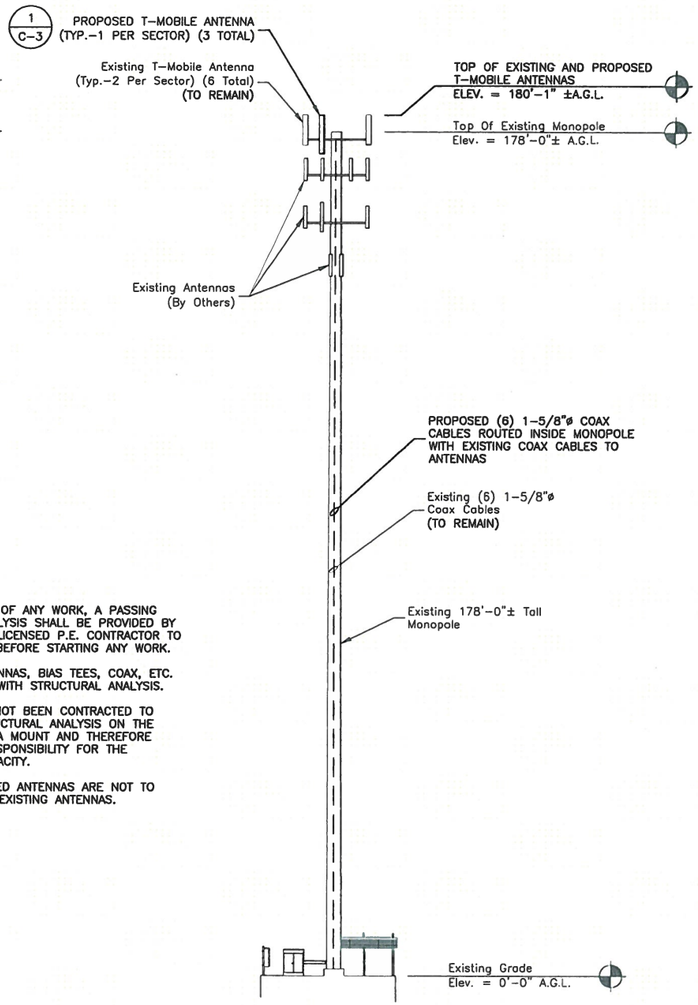
NOTES:

1. PRIOR TO START OF ANY WORK, A PASSING STRUCTURAL ANALYSIS SHALL BE PROVIDED BY A CONNECTICUT LICENSED P.E. CONTRACTOR TO OBTAIN A COPY BEFORE STARTING ANY WORK.
2. MOUNT ALL ANTENNAS, BIAS TEES, COAX, ETC. IN ACCORDANCE WITH STRUCTURAL ANALYSIS.
3. DEWBERRY HAS NOT BEEN CONTRACTED TO PERFORM A STRUCTURAL ANALYSIS ON THE EXISTING ANTENNA MOUNT AND THEREFORE ASSUMES NO RESPONSIBILITY FOR THE STRUCTURAL CAPACITY.
4. TOP OF PROPOSED ANTENNAS ARE NOT TO EXCEED TOP OF EXISTING ANTENNAS.

EXISTING ELEVATION (3)

SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"

0' 10' 20'



PROPOSED ELEVATION (4)

SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"

0' 10' 20'

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MIDDLESEX COUNTY

SEAL

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

SCALE
AS SHOWN

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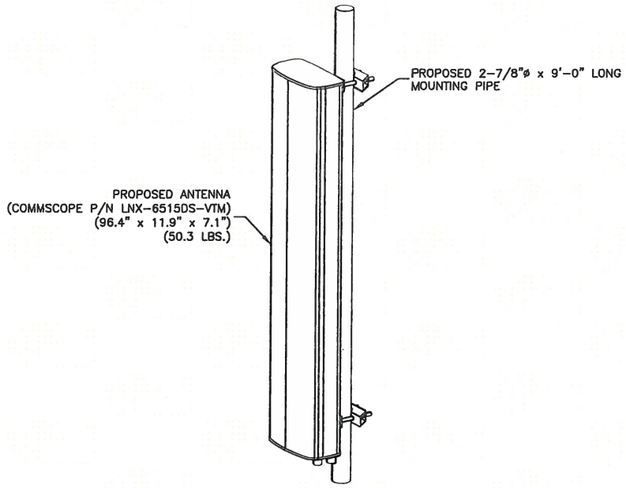
TITLE

ANTENNA LAYOUTS & ELEVATIONS

PROJECT NO. 50066258/50066281

C - 2

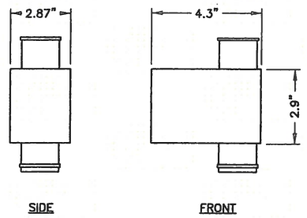
SHEET NO.



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.

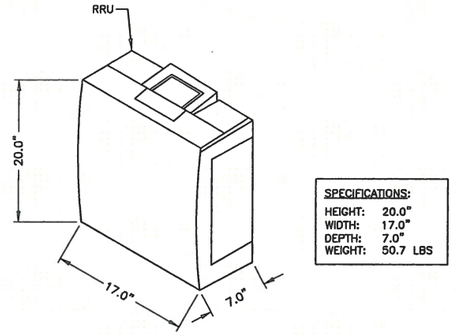


COMMSCOPE ATBT-BOTTOM-24V

NOTES:

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

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



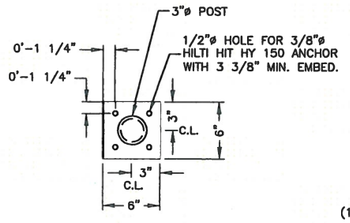
SPECIFICATIONS:	
HEIGHT:	20.0"
WIDTH:	17.0"
DEPTH:	7.0"
WEIGHT:	50.7 LBS

ERICSSON RRUS-11 B12

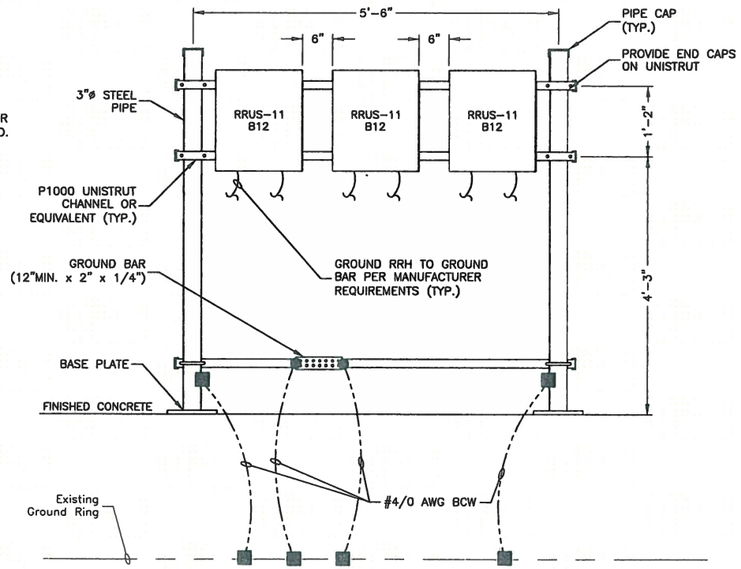
RRU NOTES:

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

RRUS-11 - REMOTE RADIO UNIT (3)
SCALE: N.T.S.



BASE PLATE



NOTES:

1. CONTRACTOR SHALL SUPPLY AND INSTALL UNISTRUT (OR EQUIVALENT) MOUNTING CHANNELS.
2. CONTRACTOR SHALL SUPPLY (BUT NOT INSTALL) 3/8"ø UNISTRUT BOLTING HARDWARE AND SPRING NUTS. TYPICAL FOUR PER RRU. CONTRACTOR SHALL BAG THE BOLTING HARDWARE AND HANG FROM INSTALLED UNISTRUT FRAME.
3. SPACING MAY VARY BASED ON SELECTED EQUIPMENT. ADJUSTMENTS TO SPACING WILL BE MADE BY RRU INSTALLER.
4. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

RRU RACK DETAIL (4)
SCALE: N.T.S

DESIGN CONFIGURATION

	ANTENNAS		COAX		COAX LENGTH
	EXISTING	PROPOSED	EXISTING	PROPOSED	
ALPHA	EMS RV90-17-02DP	EXISTING TO REMAIN	(2) 1-5/8"	(4) 1-5/8"	227'
	—	COMMSCOPE LNX-6515DS-VTM			
	EMS RV90-17-02DP	EXISTING TO REMAIN			
BETA	EMS RV90-17-02DP	EXISTING TO REMAIN	(2) 1-5/8"	(4) 1-5/8"	227'
	—	COMMSCOPE LNX-6515DS-VTM			
	EMS RV90-17-02DP	EXISTING TO REMAIN			
GAMMA	ALLGON 7221.14	EXISTING TO REMAIN	(2) 1-5/8"	(4) 1-5/8"	227'
	—	COMMSCOPE LNX-6515DS-VTM			
	ALLGON 7221.14	EXISTING TO REMAIN			

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TITLE

CONSTRUCTION DETAILS

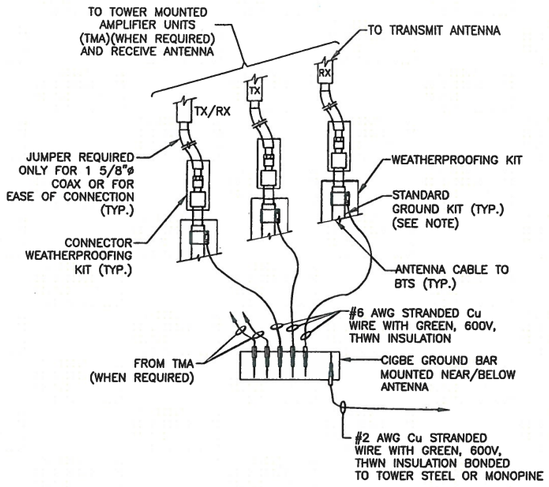
PROJECT NO. 50066258/50066281

C - 3

SHEET NO.

GROUNDING NOTES:

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

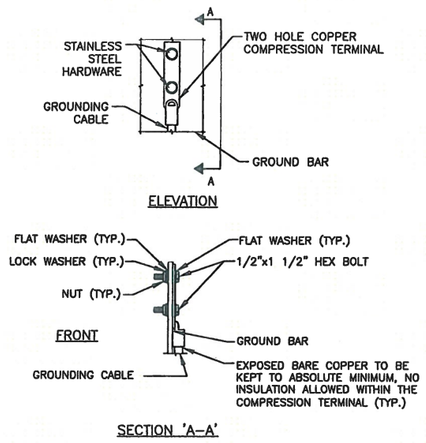


NOTE:

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

CONNECTION OF GROUND WIRES TO GROUNDING BAR (CIGBE) — 1

SCALE: N.T.S.

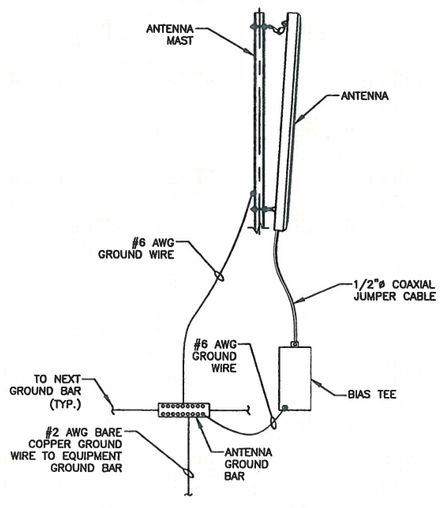


NOTES:

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

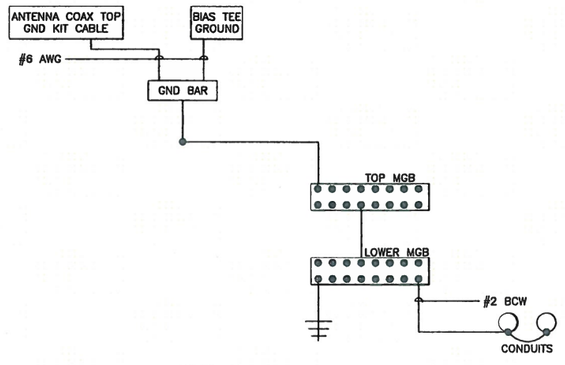
TYPICAL GROUND BAR MECHANICAL CONNECTION DETAIL — 2

SCALE: N.T.S.



TYPICAL ANTENNA GROUNDING DETAIL — 3

SCALE: N.T.S



NOTES:

1. BOND ANTENNA GROUNDING KIT CABLE TO TOP CIGBE
2. BOND ANTENNA GROUNDING KIT CABLE TO BOTTOM CIGBE.
3. SCHEMATIC GROUNDING DIAGRAM IS TYPICAL FOR EACH SECTOR.

SCHEMATIC GROUNDING DIAGRAM — 4

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TITLE

GROUNDING NOTES & DETAILS

PROJECT NO. 50066258/50066281

E - 1

SHEET NO.

Pier Structural Engineering Corp.
55 Northfield Drive E, Suite 198
Waterloo, ON N2K 3T6
Tel: 519-885-3806
Fax: 519-886-0076
www.p-sec.ca

September 23, 2014

Darcy Tarr, Tower Structural Analyst
Crown Castle USA Inc.
3530 Toringdon Way Suite 300
Charlotte, NC 28277

Subject:	**Structural Analysis Report**	
Carrier Designation:	Carrier Co-Locate:	**T-Mobile**
	Carrier Site Number:	**CT11237C**
	Carrier Site Name:	**Deep River/Rt 9**
Crown Castle Designation:	Crown Castle BU Number:	**823666**
	Crown Castle Site Name:	**Deep River/Rt 9**
	Crown Castle JDE Job Number:	**302454**
	Crown Castle WO Number:	**930537**
Engineering Firm Designation:	P-SEC Project Number:	**12411**
Site Data:	**15 Pent Rd., Deep River, Middlesex County, CT** **Latitude *41° 22' 22.17"*, Longitude *-72° 26' 3.97"*** **178-ft Monopole Tower**	

Dear Darcy Tarr,

Pier Structural Engineering Corp. (P-SEC) is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 706616, in accordance with application 261532, revision 7.

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:

LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

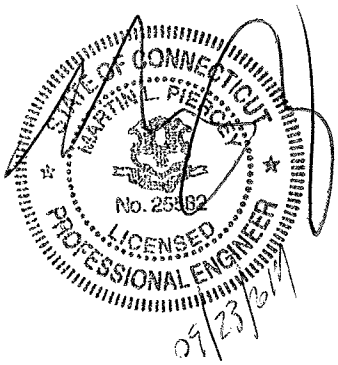
The analysis has been performed in accordance with the TIA/EIA-222-F Standard and 2005 CT State Building code requirements based upon a wind speed of 85 mph fastest mile.

We at P-SEC appreciate the opportunity of providing our continuing professional services to you and Crown Castle USA Inc. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Quzzafi Rehman, P.Eng.

Respectfully submitted by:

Martin Piercey, P.E., P.Eng.
CT PE# 25582



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September 23, 2014

Darcy Tarr, Tower Structural Analyst
Crown Castle USA Inc.
3530 Toringdon Way Suite 300
Charlotte, NC 28277

Subject:	**Structural Analysis Report**	
Carrier Designation:	Carrier Co-Locate:	**T-Mobile**
	Carrier Site Number:	**CT11237C**
	Carrier Site Name:	**Deep River/Rt 9**
Crown Castle Designation:	Crown Castle BU Number:	**823666**
	Crown Castle Site Name:	**Deep River/Rt 9**
	Crown Castle JDE Job Number:	**302454**
	Crown Castle WO Number:	**930537**
Engineering Firm Designation:	P-SEC Project Number:	**12411**
Site Data:	**15 Pent Rd., Deep River, Middlesex County, CT** **Latitude *41° 22' 22.17"*, Longitude *-72° 26' 3.97"*** **178-ft Monopole Tower**	

Dear Darcy Tarr,

Pier Structural Engineering Corp. (P-SEC) is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 706616, in accordance with application 261532, revision 7.

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:

LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F Standard and 2005 CT State Building code requirements based upon a wind speed of 85 mph fastest mile.

We at P-SEC appreciate the opportunity of providing our continuing professional services to you and Crown Castle USA Inc. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Quzzafi Rehman, P.Eng.

Respectfully submitted by:

Martin Piercey, P.E., P.Eng.
CT PE# 25582

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 178-ft Monopole tower originally designed by PIROD MANUFACTURES INC. in August of 2000 for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The following design parameters have been used in our analysis:

Design Standard:		TIA/EIA-222-F Standard and 2005 CT Building Code requirements
County/State:		Middlesex County, CT
Wind Speeds:	*CASE 1*	85 mph (fastest mile)
	CASE 2	37.6 mph (fastest mile) with 0.75" radial solid ice *(per ASCE7 ice map)*
	CASE 3	50 mph (fastest mile) for Serviceability
Allowable Stress:		Increased 1/3rd

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
178.0	177.0	3	commscope	LNX-6515DS-VTM	6	1-5/8	1
		3	commscope	ATBT-BOTTOM-24V			

Notes:
1) Proposed equipment

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
178.0	178.0	3	tower mounts	5' x 2" Pipe Mount	6	1-5/8	1
		1	--	Platform Mount [LP 405-1]			
	177.0	3	ems wireless	RR90-17-02DP			
		4	andrew	ETW190VS12UB			
		1	andrew	ETW190VS12UB	--	--	3
		3	allgon	7221.14			
170.0	170.0	3	antel	BXA-70063/6CF	12	1-5/8	1
		3	antel	BXA-171085-8BF-EDIN-2			
		6	rfs celwave	FD9R6004/2C-3L			
		3	andrew	LNX-6514DS-VTM	1	1-5/8	2
		3	andrew	HBX-6517DS-VTM			
		3	alcatel lucent	RRH2X40-AWS			
		1	rfs celwave	DB-B1-6C-8AB-0Z			
		6	antel	LPA-80080/4CF	--	--	3
		1	--	Platform Mount [LP 303-1]	--	--	1
160.0	160.0	6	powerwave tech.	7770.00	12	1-5/8	1
		2	kmw comm.	AM-X-CD-17-65-00T-RET			
		1	commscope	SBNH-1D6565C			
		6	powerwave tech.	219nn			
		6	powerwave tech.	LGP21401			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		6	ericsson	RRUS 11			
		1	raycap	DC6-48-60-18-8F			
		1	--	Platform Mount [LP 303-1]			
150.0	150.0	3	rfs celwave	APXV18-206517LS	6	1-5/8	1
		1	--	Pipe Mount [PM 602-3]			

Notes:
1) Existing equipment
2) Reserved equipment
3) Existing equipment to be replaced

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
180	180	9	--	1'x5' Panels	9	1-5/8
		1	--	Low Profile Platform		
170	170	9	--	1'x5' Panels	9	1-5/8
		1	--	Low Profile Platform		
160	160	12	--	1'x5' Panels	12	1-5/8
		1	--	Low Profile Platform		
150	150	12	--	1'x5' Panels	12	1-5/8
		1	--	Low Profile Platform		
140	140	12	--	1'x5' Panels	12	1-5/8
		1	--	Low Profile Platform		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti Report dated 5/1/2000	3585271	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PIROD File No. A-117035 dated 8/28/2000	3845247	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PIROD File No. A-117035 dated 8/28/2000	3585272	CCISITES
APPLICATION	T-Mobile Revision #7 dated 9/15/2014	261532	CCISITES

3.1) Analysis Method

tnxTower (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) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
5) P-SEC did not analyze antenna supporting mounts as part of this analysis report and assumed they are structurally sufficient. It is the carrier's responsibility to ensure structural compliance of their existing and/or proposed antenna supporting mounts.
6) All equipment model numbers, quantities, and centerline elevations are as provided in the CCI CAD package dated 16/9/2014.

This analysis may be affected if any assumptions are not valid or have been made in error. P-SEC should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	178 - 164.25	Pole	TP26x12.75x0.25	1	-4.13	946.29	13.1	Pass
L2	164.25 - 129.667	Pole	TP34.0625x22.6894x0.3125	2	-10.58	1680.35	51.9	Pass
L3	129.667 - 96	Pole	TP41.75x32.2749x0.375	3	-17.02	2487.22	61.2	Pass
L4	96 - 63.1667	Pole	TP49.0625x39.8209x0.375	4	-24.74	2928.79	71.0	Pass
L5	63.1667 - 31.1667	Pole	TP56.125x46.9571x0.375	5	-33.58	3355.12	76.8	Pass
L6	31.1667 - 0	Pole	TP62.9375x53.847x0.375	6	-45.52	3684.96	84.6	Pass
							Summary	
						Pole (L6)	84.6	Pass
						RATING =	**84.6**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
2	Anchor Rods	0	75.4	Pass
2	Base Plate	0	--	Pass
2	Base Foundation Soil Interaction	0	91.5	Pass
2	Base Foundation Rebar	0	41.9	Pass

Structure Rating (max from all components) =	**91.5%**

Notes: 1) See full member breakdown and section capacities in Appendix A.
2) See additional documentation in Appendix C for supporting calculations.
3) Stresses up to 105% (steel) and 110% (foundations) are within engineering tolerance and considered acceptable.

4.1) Recommendations

The existing 178-ft monopole located in Middlesex County (DEEP RIVER/RT9), CT **is structurally acceptable** based on the TIA/EIA-222-F Standard and 2005 CT State Building Code requirements based upon a wind speed of 85 mph fastest mile.

No modifications are required for the proposed loading.

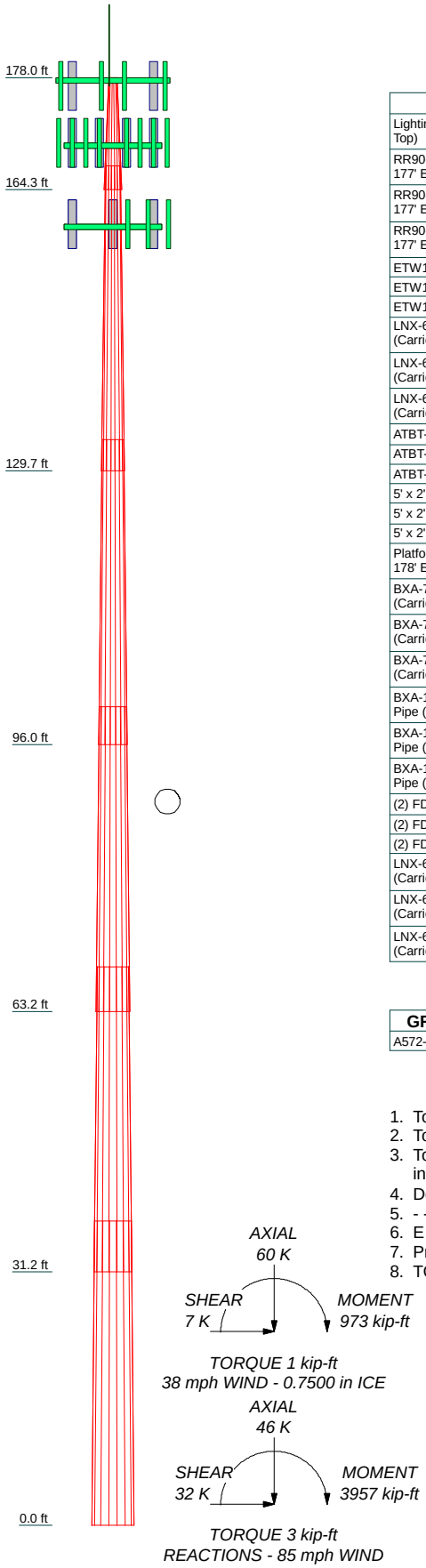
Should you have any questions, please call us anytime at 519-885-3806.

encl.
823666_261532 SA Report_20140923.doc

APPENDIX A

TNXTOWER OUTPUT

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	13'9"	18	0.2500	2'11-1/32"	12.7500	26.0000		0.7
2	37'6"	18	0.3125	3'9-31/32"	22.6894	34.0625		3.6
3	37'6"	18	0.3750	4'8-1/32"	32.2749	41.7500		5.6
4	37'6"	18	0.3750	5'6"	39.8209	49.0625		6.7
5	37'6"	18	0.3750	6'3"	46.9571	56.1250		7.8
6	37'5-1/32"	18	0.3750		53.8470	62.9375		8.8
							A572-65	33.1



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lighting Rod 5/8" x 4' on 4' Pole (At Top)	178	HBX-6517DS-VTM w/ Mount Pipe (Carrier 170' R)	170
RR90-17-02DP w/ Mount Pipe (Carrier 177' E)	178	HBX-6517DS-VTM w/ Mount Pipe (Carrier 170' R)	170
RR90-17-02DP w/ Mount Pipe (Carrier 177' E)	178	HBX-6517DS-VTM w/ Mount Pipe (Carrier 170' R)	170
RR90-17-02DP w/ Mount Pipe (Carrier 177' E)	178	RRH2X40-AWS (Carrier 170' R)	170
		RRH2X40-AWS (Carrier 170' R)	170
ETW190VS12UB (Carrier 177' E)	178	RRH2X40-AWS (Carrier 170' R)	170
ETW190VS12UB (Carrier 177' E)	178	DB-B1-6C-8AB-0Z (Carrier 170' R)	170
ETW190VS12UB (Carrier 177' E)	178	Platform Mount [LP 303-1] (Carrier 170' E)	170
LNX-6515DS-VTM w/ Mount Pipe (Carrier 177' P)	178	(2) 7770.00 w/ Mount Pipe (Carrier 160' E)	160
LNX-6515DS-VTM w/ Mount Pipe (Carrier 177' P)	178	(2) 7770.00 w/ Mount Pipe (Carrier 160' E)	160
LNX-6515DS-VTM w/ Mount Pipe (Carrier 177' P)	178	(2) 7770.00 w/ Mount Pipe (Carrier 160' E)	160
ATBT-BOTTOM-24V (Carrier 177' P)	178	AM-X-CD-17-65-00T-RET w/ Mount Pipe (Carrier 160' E)	160
ATBT-BOTTOM-24V (Carrier 177' P)	178	AM-X-CD-17-65-00T-RET w/ Mount Pipe (Carrier 160' E)	160
ATBT-BOTTOM-24V (Carrier 177' P)	178	SBNH-1D6565C w/ Mount Pipe (Carrier 160' E)	160
5' x 2" Pipe Mount (Carrier 178' E)	178	(2) 219nn (Carrier 160' E)	160
5' x 2" Pipe Mount (Carrier 178' E)	178	(2) 219nn (Carrier 160' E)	160
5' x 2" Pipe Mount (Carrier 178' E)	178	(2) 219nn (Carrier 160' E)	160
Platform Mount [LP 405-1] (Carrier 178' E)	178	(2) LGP21401 (Carrier 160' E)	160
BXA-70063/6CF w/ Mount Pipe (Carrier 170' E)	170	(2) LGP21401 (Carrier 160' E)	160
BXA-70063/6CF w/ Mount Pipe (Carrier 170' E)	170	(2) LGP21401 (Carrier 160' E)	160
BXA-70063/6CF w/ Mount Pipe (Carrier 170' E)	170	(2) RRUS 11 (Carrier 160' E)	160
BXA-171085-8BF-EDIN-2 w/ Mount Pipe (Carrier 170' E)	170	(2) RRUS 11 (Carrier 160' E)	160
BXA-171085-8BF-EDIN-2 w/ Mount Pipe (Carrier 170' E)	170	(2) RRUS 11 (Carrier 160' E)	160
BXA-171085-8BF-EDIN-2 w/ Mount Pipe (Carrier 170' E)	170	DC6-48-60-18-8F (Carrier 160' E)	160
(2) FD9R6004/2C-3L (Carrier 170' E)	170	Platform Mount [LP 303-1] (Carrier 160' E)	160
(2) FD9R6004/2C-3L (Carrier 170' E)	170	APXV18-206517LS w/ Mount Pipe (Carrier 150' E)	150
(2) FD9R6004/2C-3L (Carrier 170' E)	170	APXV18-206517LS w/ Mount Pipe (Carrier 150' E)	150
LNX-6514DS-VTM w/ Mount Pipe (Carrier 170' R)	170	APXV18-206517LS w/ Mount Pipe (Carrier 150' E)	150
LNX-6514DS-VTM w/ Mount Pipe (Carrier 170' R)	170	Pipe Mount [PM 602-3] (Carrier 150' E)	150
LNX-6514DS-VTM w/ Mount Pipe (Carrier 170' R)	170		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Middlesex County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. -
6. E - Existing, R/MLA - Reserved, P - Proposed
7. Proposed loading at 178ft elevation
8. TOWER RATING: 84.6%

Pier Structural Engineering Corp.
198-55 Northfield Drive East
Waterloo, Ontario, N2K 3T6
Phone: 519-885-3806
FAX: 519-884-3806
Consulting Engineers

Job: PSEC 12411 (for T-MOBILE)			
Project: 823666 - DEEP RIVER/RT9			
Client: CROWN CASTLE	Drawn by: Q.Rehman	App'd:	
Code: TIA/EIA-222-F	Date: 09/23/14	Scale: NTS	
Path: H:\PROJECTS\JOB 12000 - 12999\JOB 12400 - 12499\12411 - CCI - 823666 - Deep River\Rt 9\823666_LC7_20140923.eri		Dwg No. E-1	

Tower Input Data

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

- Tower is located in Middlesex County, Connecticut.
- Basic wind speed of 85 mph.
- Nominal ice thickness of 0.7500 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 38 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 50 mph.
- ----------.
- E - Existing, R/MLA - Reserved, P - Proposed.
- Proposed loading at 178ft elevation.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.333.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	178'-164'3"	13'9"	2'11-1/32"	18	12.7500	26.0000	0.2500	1.0000	A572-65 (65 ksi)
L2	164'3"-129'8-1/32"	37'6"	3'9-31/32"	18	22.6894	34.0625	0.3125	1.2500	A572-65 (65 ksi)
L3	129'8-1/32"-96'	37'6"	4'8-1/32"	18	32.2749	41.7500	0.3750	1.5000	A572-65 (65 ksi)
L4	96'-63'2-1/32"	37'6"	5'6"	18	39.8209	49.0625	0.3750	1.5000	A572-65 (65 ksi)
L5	63'2-1/32"-31'2-1/32"	37'6"	6'3"	18	46.9571	56.1250	0.3750	1.5000	A572-65 (65 ksi)
L6	31'2-1/32"-0'	37'5-1/32"		18	53.8470	62.9375	0.3750	1.5000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	12.9467	9.9187	195.8008	4.4375	6.4770	30.2302	391.8592	4.9603	1.8040	7.216
	26.4011	20.4326	1711.6544	9.1412	13.2080	129.5922	3425.5610	10.2183	4.1360	16.544
L2	23.9376	22.1951	1404.0863	7.9438	11.5262	121.8168	2810.0202	11.0996	3.4433	11.019
	34.5880	33.4758	4817.4335	11.9812	17.3038	278.4040	9641.2058	16.7411	5.4450	17.424
L3	33.7563	37.9689	4881.3984	11.3245	16.3957	297.7251	9769.2200	18.9880	5.0204	13.388
	42.3941	49.2466	10650.9822	14.6881	21.2090	502.1916	21315.9793	24.6280	6.6880	17.835
L4	41.6030	46.9505	9229.5499	14.0033	20.2290	456.2533	18471.2443	23.4797	6.3485	16.929
	49.8194	57.9503	17355.1378	17.2841	24.9238	696.3293	34733.1119	28.9807	7.9750	21.267
L5	49.0468	55.4443	15199.5863	16.5366	23.8542	637.1873	30419.1726	27.7274	7.6044	20.279
	56.9908	66.3564	26056.1506	19.7913	28.5115	913.8821	52146.5865	33.1845	9.2180	24.581
L6	56.2196	63.6451	22990.8574	18.9826	27.3543	840.4848	46011.9669	31.8286	8.8171	23.512
	63.9084	74.4650	36822.8946	22.2097	31.9722	1151.7142	73694.2417	37.2396	10.4170	27.779

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 178'-164'3"				1	1	1		
L2 164'3"-129'8-1/32"				1	1	1		
L3 129'8-1/32"-96'				1	1	1		
L4 96'-63'2-1/32"				1	1	1		
L5 63'2-1/32"-31'2-1/32"				1	1	1		
L6 31'2-1/32"-0'				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF7-50A(1-5/8")	C	No	Inside Pole	178' - 0'	6	No Ice	0.00	0.82
(Carrier 178' E)						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
LDF7-50A(1-5/8'')	**C**	**No**	**Inside Pole**	**178' - 0'**	**6**	**No Ice**	**0.00**	**0.82**
(Carrier 178' P)						**1/2'' Ice**	**0.00**	**0.82**
						1'' Ice	**0.00**	**0.82**
						2'' Ice	**0.00**	**0.82**
						4'' Ice	**0.00**	**0.82**
**								
LDF7-50A(1-5/8")	A	No	Inside Pole	170' - 0'	12	No Ice	0.00	0.82
(Carrier 170' E)						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
HB158-1-08U8-S8J18(	A	No	Inside Pole	170' - 0'	1	No Ice	0.00	1.30
1-5/8)						1/2" Ice	0.00	1.30
(Carrier 170' R)						1" Ice	0.00	1.30
						2" Ice	0.00	1.30
						4" Ice	0.00	1.30
**								
LDF7-50A(1-5/8")	A	No	Inside Pole	160' - 0'	7	No Ice	0.00	0.82
(Carrier 160' E)						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
LDF7-50A(1-5/8")	A	No	CaAa (Out Of	160' - 0'	4	No Ice	0.00	0.00
(shielded)			Face)			1/2" Ice	0.00	0.00
(Carrier 160' E)						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00
LDF7-50A(1-5/8")	A	No	CaAa (Out Of	160' - 0'	1	No Ice	0.20	0.82
(Carrier 160' E)			Face)			1/2" Ice	0.30	2.33
						1" Ice	0.40	4.46
						2" Ice	0.60	10.54
						4" Ice	1.00	30.04
**								
LDF7-50A(1-5/8")	B	No	Inside Pole	150' - 0'	6	No Ice	0.00	0.82
(Carrier 150' E)						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
**********									
Lighting Rod 5/8" x 4' on 4' Pole (At Top)	C	From Leg	0.00 0' 4'	0.0000	178'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.46 2.13 2.70 3.80 6.42	1.46 2.13 2.70 3.80 6.42	0.07 0.09 0.11 0.17 0.37
RR90-17-02DP w/ Mount Pipe (Carrier 177' E)	A	From Leg	4.00 0' -1'	0.0000	178'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.59 5.09 5.58 6.59 8.73	3.32 4.09 4.78 6.23 9.31	0.03 0.07 0.12 0.22 0.56
RR90-17-02DP w/ Mount Pipe (Carrier 177' E)	B	From Leg	4.00 0' -1'	0.0000	178'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.59 5.09 5.58 6.59 8.73	3.32 4.09 4.78 6.23 9.31	0.03 0.07 0.12 0.22 0.56
RR90-17-02DP w/ Mount Pipe (Carrier 177' E)	C	From Leg	4.00 0' -1'	0.0000	178'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.59 5.09 5.58 6.59 8.73	3.32 4.09 4.78 6.23 9.31	0.03 0.07 0.12 0.22 0.56
ETW190VS12UB (Carrier 177' E)	A	From Leg	4.00 0' -1'	0.0000	178'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.66 0.78 0.90 1.17 1.82	0.37 0.46 0.56 0.80 1.36	0.01 0.02 0.03 0.04 0.11
ETW190VS12UB (Carrier 177' E)	B	From Leg	4.00 0' -1'	0.0000	178'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.66 0.78 0.90 1.17 1.82	0.37 0.46 0.56 0.80 1.36	0.01 0.02 0.03 0.04 0.11
ETW190VS12UB (Carrier 177' E)	C	From Leg	4.00 0' -1'	0.0000	178'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.66 0.78 0.90 1.17 1.82	0.37 0.46 0.56 0.80 1.36	0.01 0.02 0.03 0.04 0.11
LNX-6515DS-VTM w/ Mount Pipe (Carrier 177' P)	**A**	**From Leg**	**4.00 0' -1'**	**0.0000**	**178'**	**No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice**	**11.68 12.40 13.14 14.60 17.87**	**9.84 11.37 12.91 15.27 20.14**	**0.08 0.17 0.27 0.51 1.15**
LNX-6515DS-VTM w/ Mount Pipe (Carrier 177' P)	**B**	**From Leg**	**4.00 0' -1'**	**0.0000**	**178'**	**No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice**	**11.68 12.40 13.14 14.60 17.87**	**9.84 11.37 12.91 15.27 20.14**	**0.08 0.17 0.27 0.51 1.15**
LNX-6515DS-VTM w/ Mount Pipe (Carrier 177' P)	**C**	**From Leg**	**4.00 0' -1'**	**0.0000**	**178'**	**No Ice 1/2" Ice 1" Ice**	**11.68 12.40 13.14 14.60**	**9.84 11.37 12.91 15.27**	**0.08 0.17 0.27 0.51**

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
						2'' Ice	17.87	20.14	1.15
						4'' Ice			
ATBT-BOTTOM-24V (Carrier 177' P)	**A**	**From Leg**	**4.00 0' -1'**	**0.0000**	**178'**	**No Ice**	**0.12**	**0.08**	**0.00**
						1/2'' Ice	**0.17**	**0.12**	**0.00**
						1'' Ice	**0.23**	**0.17**	**0.01**
						2'' Ice	**0.38**	**0.30**	**0.01**
						4'' Ice	**0.77**	**0.67**	**0.04**
ATBT-BOTTOM-24V (Carrier 177' P)	**B**	**From Leg**	**4.00 0' -1'**	**0.0000**	**178'**	**No Ice**	**0.12**	**0.08**	**0.00**
						1/2'' Ice	**0.17**	**0.12**	**0.00**
						1'' Ice	**0.23**	**0.17**	**0.01**
						2'' Ice	**0.38**	**0.30**	**0.01**
						4'' Ice	**0.77**	**0.67**	**0.04**
ATBT-BOTTOM-24V (Carrier 177' P)	**C**	**From Leg**	**4.00 0' -1'**	**0.0000**	**178'**	**No Ice**	**0.12**	**0.08**	**0.00**
						1/2'' Ice	**0.17**	**0.12**	**0.00**
						1'' Ice	**0.23**	**0.17**	**0.01**
						2'' Ice	**0.38**	**0.30**	**0.01**
						4'' Ice	**0.77**	**0.67**	**0.04**
5' x 2" Pipe Mount (Carrier 178' E)	A	From Leg	4.00 0' 0'	0.0000	178'	No Ice	1.00	1.00	0.03
						1/2" Ice	1.39	1.39	0.04
						1" Ice	1.70	1.70	0.05
						2" Ice	2.35	2.35	0.08
						4" Ice	3.78	3.78	0.20
5' x 2" Pipe Mount (Carrier 178' E)	B	From Leg	4.00 0' 0'	0.0000	178'	No Ice	1.00	1.00	0.03
						1/2" Ice	1.39	1.39	0.04
						1" Ice	1.70	1.70	0.05
						2" Ice	2.35	2.35	0.08
						4" Ice	3.78	3.78	0.20
5' x 2" Pipe Mount (Carrier 178' E)	C	From Leg	4.00 0' 0'	0.0000	178'	No Ice	1.00	1.00	0.03
						1/2" Ice	1.39	1.39	0.04
						1" Ice	1.70	1.70	0.05
						2" Ice	2.35	2.35	0.08
						4" Ice	3.78	3.78	0.20
Platform Mount [LP 405-1] (Carrier 178' E)	C	None		0.0000	178'	No Ice	20.80	20.80	1.80
						1/2" Ice	28.10	28.10	2.07
						1" Ice	35.40	35.40	2.33
						2" Ice	50.00	50.00	2.86
						4" Ice	79.20	79.20	3.93
**********									
BXA-70063/6CF w/ Mount Pipe (Carrier 170' E)	A	From Leg	4.00 0' 0'	0.0000	170'	No Ice	7.98	5.70	0.04
						1/2" Ice	8.62	6.85	0.10
						1" Ice	9.23	7.71	0.17
						2" Ice	10.47	9.50	0.33
						4" Ice	13.08	13.26	0.80
BXA-70063/6CF w/ Mount Pipe (Carrier 170' E)	B	From Leg	4.00 0' 0'	0.0000	170'	No Ice	7.98	5.70	0.04
						1/2" Ice	8.62	6.85	0.10
						1" Ice	9.23	7.71	0.17
						2" Ice	10.47	9.50	0.33
						4" Ice	13.08	13.26	0.80
BXA-70063/6CF w/ Mount Pipe (Carrier 170' E)	C	From Leg	4.00 0' 0'	0.0000	170'	No Ice	7.98	5.70	0.04
						1/2" Ice	8.62	6.85	0.10
						1" Ice	9.23	7.71	0.17
						2" Ice	10.47	9.50	0.33
						4" Ice	13.08	13.26	0.80
BXA-171085-8BF-EDIN-2	A	From Leg	4.00	0.0000	170'	No Ice	3.16	3.33	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
w/ Mount Pipe			0'			1/2" Ice	3.53	3.94	0.06
(Carrier 170' E)			0'			1" Ice	3.94	4.56	0.10
						2" Ice	4.83	5.86	0.19
						4" Ice	6.73	8.84	0.48
BXA-171085-8BF-EDIN-2	B	From Leg	4.00	0.0000	170'	No Ice	3.16	3.33	0.03
w/ Mount Pipe			0'			1/2" Ice	3.53	3.94	0.06
(Carrier 170' E)			0'			1" Ice	3.94	4.56	0.10
						2" Ice	4.83	5.86	0.19
						4" Ice	6.73	8.84	0.48
BXA-171085-8BF-EDIN-2	C	From Leg	4.00	0.0000	170'	No Ice	3.16	3.33	0.03
w/ Mount Pipe			0'			1/2" Ice	3.53	3.94	0.06
(Carrier 170' E)			0'			1" Ice	3.94	4.56	0.10
						2" Ice	4.83	5.86	0.19
						4" Ice	6.73	8.84	0.48
(2) FD9R6004/2C-3L	A	From Leg	4.00	0.0000	170'	No Ice	0.37	0.08	0.00
(Carrier 170' E)			0'			1/2" Ice	0.45	0.14	0.01
			0'			1" Ice	0.54	0.20	0.01
						2" Ice	0.75	0.34	0.02
						4" Ice	1.28	0.74	0.06
(2) FD9R6004/2C-3L	B	From Leg	4.00	0.0000	170'	No Ice	0.37	0.08	0.00
(Carrier 170' E)			0'			1/2" Ice	0.45	0.14	0.01
			0'			1" Ice	0.54	0.20	0.01
						2" Ice	0.75	0.34	0.02
						4" Ice	1.28	0.74	0.06
(2) FD9R6004/2C-3L	C	From Leg	4.00	0.0000	170'	No Ice	0.37	0.08	0.00
(Carrier 170' E)			0'			1/2" Ice	0.45	0.14	0.01
			0'			1" Ice	0.54	0.20	0.01
						2" Ice	0.75	0.34	0.02
						4" Ice	1.28	0.74	0.06
LNX-6514DS-VTM w/	A	From Leg	4.00	0.0000	170'	No Ice	8.57	7.00	0.06
Mount Pipe			0'			1/2" Ice	9.22	8.19	0.13
(Carrier 170' R)			0'			1" Ice	9.84	9.08	0.20
						2" Ice	11.10	10.90	0.38
						4" Ice	13.75	14.93	0.89
LNX-6514DS-VTM w/	B	From Leg	4.00	0.0000	170'	No Ice	8.57	7.00	0.06
Mount Pipe			0'			1/2" Ice	9.22	8.19	0.13
(Carrier 170' R)			0'			1" Ice	9.84	9.08	0.20
						2" Ice	11.10	10.90	0.38
						4" Ice	13.75	14.93	0.89
LNX-6514DS-VTM w/	C	From Leg	4.00	0.0000	170'	No Ice	8.57	7.00	0.06
Mount Pipe			0'			1/2" Ice	9.22	8.19	0.13
(Carrier 170' R)			0'			1" Ice	9.84	9.08	0.20
						2" Ice	11.10	10.90	0.38
						4" Ice	13.75	14.93	0.89
HBX-6517DS-VTM w/	A	From Leg	4.00	0.0000	170'	No Ice	5.54	5.02	0.05
Mount Pipe			0'			1/2" Ice	6.11	6.22	0.09
(Carrier 170' R)			0'			1" Ice	6.65	7.17	0.15
						2" Ice	7.75	9.01	0.28
						4" Ice	10.11	12.90	0.69
HBX-6517DS-VTM w/	B	From Leg	4.00	0.0000	170'	No Ice	5.54	5.02	0.05
Mount Pipe			0'			1/2" Ice	6.11	6.22	0.09
(Carrier 170' R)			0'			1" Ice	6.65	7.17	0.15
						2" Ice	7.75	9.01	0.28
						4" Ice	10.11	12.90	0.69
HBX-6517DS-VTM w/	C	From Leg	4.00	0.0000	170'	No Ice	5.54	5.02	0.05
Mount Pipe			0'			1/2" Ice	6.11	6.22	0.09
(Carrier 170' R)			0'			1" Ice	6.65	7.17	0.15

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	7.75	9.01	0.28
						4" Ice	10.11	12.90	0.69
RRH2X40-AWS	A	From Leg	4.00	0.0000	170'	No Ice	2.52	1.59	0.04
(Carrier 170' R)			0'			1/2" Ice	2.75	1.80	0.06
			0'			1" Ice	2.99	2.01	0.08
						2" Ice	3.50	2.46	0.13
						4" Ice	4.61	3.48	0.28
RRH2X40-AWS	B	From Leg	4.00	0.0000	170'	No Ice	2.52	1.59	0.04
(Carrier 170' R)			0'			1/2" Ice	2.75	1.80	0.06
			0'			1" Ice	2.99	2.01	0.08
						2" Ice	3.50	2.46	0.13
						4" Ice	4.61	3.48	0.28
RRH2X40-AWS	C	From Leg	4.00	0.0000	170'	No Ice	2.52	1.59	0.04
(Carrier 170' R)			0'			1/2" Ice	2.75	1.80	0.06
			0'			1" Ice	2.99	2.01	0.08
						2" Ice	3.50	2.46	0.13
						4" Ice	4.61	3.48	0.28
DB-B1-6C-8AB-0Z	B	From Leg	4.00	0.0000	170'	No Ice	5.60	2.33	0.04
(Carrier 170' R)			0'			1/2" Ice	5.92	2.56	0.08
			0'			1" Ice	6.24	2.79	0.12
						2" Ice	6.91	3.28	0.21
						4" Ice	8.37	4.37	0.45
Platform Mount [LP 303-1]	C	None		0.0000	170'	No Ice	14.66	14.66	1.25
(Carrier 170' E)						1/2" Ice	18.87	18.87	1.48
						1" Ice	23.08	23.08	1.71
						2" Ice	31.50	31.50	2.18
						4" Ice	48.34	48.34	3.10
**********									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00	0.0000	160'	No Ice	6.12	4.25	0.06
(Carrier 160' E)			0'			1/2" Ice	6.63	5.01	0.10
			0'			1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00	0.0000	160'	No Ice	6.12	4.25	0.06
(Carrier 160' E)			0'			1/2" Ice	6.63	5.01	0.10
			0'			1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00	0.0000	160'	No Ice	6.12	4.25	0.06
(Carrier 160' E)			0'			1/2" Ice	6.63	5.01	0.10
			0'			1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
AM-X-CD-17-65-00T-RET	A	From Leg	4.00	0.0000	160'	No Ice	11.55	8.94	0.09
w/ Mount Pipe			0'			1/2" Ice	12.27	10.45	0.18
(Carrier 160' E)			0'			1" Ice	13.00	11.99	0.27
						2" Ice	14.45	14.31	0.50
						4" Ice	17.71	19.14	1.12
AM-X-CD-17-65-00T-RET	B	From Leg	4.00	0.0000	160'	No Ice	11.55	8.94	0.09
w/ Mount Pipe			0'			1/2" Ice	12.27	10.45	0.18
(Carrier 160' E)			0'			1" Ice	13.00	11.99	0.27
						2" Ice	14.45	14.31	0.50
						4" Ice	17.71	19.14	1.12
SBNH-1D6565C w/ Mount	C	From Leg	4.00	0.0000	160'	No Ice	11.68	9.84	0.09
Pipe			0'			1/2" Ice	12.40	11.37	0.18
(Carrier 160' E)			0'			1" Ice	13.14	12.91	0.28
						2" Ice	14.60	15.27	0.52

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice	17.87	20.14	1.16
(2) 219nn	A	From Leg	4.00	0.0000	160'	No Ice	0.27	0.18	0.01
(Carrier 160' E)			0'			1/2" Ice	0.34	0.25	0.01
			0'			1" Ice	0.43	0.32	0.01
						2" Ice	0.62	0.49	0.02
						4" Ice	1.10	0.94	0.07
(2) 219nn	B	From Leg	4.00	0.0000	160'	No Ice	0.27	0.18	0.01
(Carrier 160' E)			0'			1/2" Ice	0.34	0.25	0.01
			0'			1" Ice	0.43	0.32	0.01
						2" Ice	0.62	0.49	0.02
						4" Ice	1.10	0.94	0.07
(2) 219nn	C	From Leg	4.00	0.0000	160'	No Ice	0.27	0.18	0.01
(Carrier 160' E)			0'			1/2" Ice	0.34	0.25	0.01
			0'			1" Ice	0.43	0.32	0.01
						2" Ice	0.62	0.49	0.02
						4" Ice	1.10	0.94	0.07
(2) LGP21401	A	From Leg	4.00	0.0000	160'	No Ice	1.29	0.23	0.01
(Carrier 160' E)			0'			1/2" Ice	1.45	0.31	0.02
			0'			1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(2) LGP21401	B	From Leg	4.00	0.0000	160'	No Ice	1.29	0.23	0.01
(Carrier 160' E)			0'			1/2" Ice	1.45	0.31	0.02
			0'			1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(2) LGP21401	C	From Leg	4.00	0.0000	160'	No Ice	1.29	0.23	0.01
(Carrier 160' E)			0'			1/2" Ice	1.45	0.31	0.02
			0'			1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(2) RRUS 11	A	From Leg	4.00	0.0000	160'	No Ice	3.25	1.37	0.05
(Carrier 160' E)			0'			1/2" Ice	3.49	1.55	0.07
			0'			1" Ice	3.74	1.74	0.10
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
(2) RRUS 11	B	From Leg	4.00	0.0000	160'	No Ice	3.25	1.37	0.05
(Carrier 160' E)			0'			1/2" Ice	3.49	1.55	0.07
			0'			1" Ice	3.74	1.74	0.10
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
(2) RRUS 11	C	From Leg	4.00	0.0000	160'	No Ice	3.25	1.37	0.05
(Carrier 160' E)			0'			1/2" Ice	3.49	1.55	0.07
			0'			1" Ice	3.74	1.74	0.10
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
DC6-48-60-18-8F	C	From Leg	4.00	0.0000	160'	No Ice	2.57	2.57	0.02
(Carrier 160' E)			0'			1/2" Ice	2.80	2.80	0.04
			0'			1" Ice	3.04	3.04	0.07
						2" Ice	3.54	3.54	0.13
						4" Ice	4.66	4.66	0.30
Platform Mount [LP 303-1]	C	None		0.0000	160'	No Ice	14.66	14.66	1.25
(Carrier 160' E)						1/2" Ice	18.87	18.87	1.48
						1" Ice	23.08	23.08	1.71
						2" Ice	31.50	31.50	2.18
						4" Ice	48.34	48.34	3.10

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
APXV18-206517LS w/ Mount Pipe (Carrier 150' E)	A	From Leg	4.00 0' 0'	0.0000	150'	No Ice	5.29	4.67	0.05
						1/2" Ice	5.84	5.82	0.10
						1" Ice	6.36	6.69	0.15
						2" Ice	7.42	8.46	0.28
						4" Ice	9.77	12.21	0.67
APXV18-206517LS w/ Mount Pipe (Carrier 150' E)	B	From Leg	4.00 0' 0'	0.0000	150'	No Ice	5.29	4.67	0.05
						1/2" Ice	5.84	5.82	0.10
						1" Ice	6.36	6.69	0.15
						2" Ice	7.42	8.46	0.28
						4" Ice	9.77	12.21	0.67
APXV18-206517LS w/ Mount Pipe (Carrier 150' E)	C	From Leg	4.00 0' 0'	0.0000	150'	No Ice	5.29	4.67	0.05
						1/2" Ice	5.84	5.82	0.10
						1" Ice	6.36	6.69	0.15
						2" Ice	7.42	8.46	0.28
						4" Ice	9.77	12.21	0.67
Pipe Mount [PM 602-3] (Carrier 150' E)	C	None		0.0000	150'	No Ice	7.68	7.68	0.28
						1/2" Ice	9.50	9.50	0.35
						1" Ice	11.32	11.32	0.43
						2" Ice	14.96	14.96	0.58
						4" Ice	22.24	22.24	0.87

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service

Comb. No.	Description
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 Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	60.36	0.00	-0.00
	Max. H_x	11	45.53	31.26	0.17
	Max. H_z	2	45.53	0.17	31.47
	Max. M_x	2	3940.79	0.17	31.47
	Max. M_z	5	3906.47	-31.26	-0.17
	Max. Torsion	6	3.11	-27.16	-15.88
	Min. Vert	2	45.53	0.17	31.47
	Min. H_x	5	45.53	-31.26	-0.17
	Min. H_z	8	45.53	-0.17	-31.48
	Min. M_x	8	-3939.05	-0.17	-31.48
	Min. M_z	11	-3905.26	31.26	0.17
	Min. Torsion	12	-3.12	27.16	15.88

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	45.53	0.00	-0.00	-0.98	-0.57	0.00
Dead+Wind 0 deg - No Ice	45.53	-0.17	-31.47	-3940.79	27.75	1.49
Dead+Wind 30 deg - No Ice	45.53	15.49	-27.18	-3399.38	-1929.11	-0.08
Dead+Wind 60 deg - No Ice	45.53	26.99	-15.60	-1946.71	-3369.27	-1.63
Dead+Wind 90 deg - No Ice	45.53	31.26	0.17	27.33	-3906.47	-2.73
Dead+Wind 120 deg - No Ice	45.53	27.16	15.88	1993.71	-3397.50	-3.11
Dead+Wind 150 deg - No Ice	45.53	15.78	27.34	3425.56	-1978.15	-2.66
Dead+Wind 180 deg - No Ice	45.53	0.17	31.48	3939.05	-28.95	-1.49
Dead+Wind 210 deg - No Ice	45.53	-15.49	27.18	3397.31	1927.90	0.08
Dead+Wind 240 deg - No Ice	45.53	-26.99	15.60	1944.66	3368.06	1.63
Dead+Wind 270 deg - No Ice	45.53	-31.26	-0.17	-29.37	3905.26	2.74
Dead+Wind 300 deg - No Ice	45.53	-27.16	-15.88	-1995.76	3396.32	3.12
Dead+Wind 330 deg - No Ice	45.53	-15.78	-27.34	-3427.60	1976.96	2.66
Dead+Ice+Temp	60.36	-0.00	0.00	-2.84	-1.37	-0.00
Dead+Wind 0 deg+Ice+Temp	60.36	-0.03	-7.34	-971.20	3.68	0.39
Dead+Wind 30 deg+Ice+Temp	60.36	3.63	-6.34	-838.95	-478.74	-0.05
Dead+Wind 60 deg+Ice+Temp	60.36	6.32	-3.65	-482.67	-833.30	-0.47
Dead+Wind 90 deg+Ice+Temp	60.36	7.31	0.03	2.11	-964.92	-0.76
Dead+Wind 120 deg+Ice+Temp	60.36	6.35	3.70	485.48	-838.52	-0.85
Dead+Wind 150 deg+Ice+Temp	60.36	3.68	6.37	837.94	-487.79	-0.72
Dead+Wind 180 deg+Ice+Temp	60.36	0.03	7.34	964.96	-6.77	-0.39
Dead+Wind 210 deg+Ice+Temp	60.36	-3.63	6.34	832.72	475.65	0.05
Dead+Wind 240 deg+Ice+Temp	60.36	-6.32	3.65	476.44	830.21	0.47

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 270 deg+Ice+Temp	60.36	-7.31	-0.03	-8.34	961.83	0.76
Dead+Wind 300 deg+Ice+Temp	60.36	-6.35	-3.70	-491.72	835.44	0.85
Dead+Wind 330 deg+Ice+Temp	60.36	-3.68	-6.37	-844.17	484.70	0.72
Dead+Wind 0 deg - Service	45.53	-0.06	-10.89	-1365.76	9.21	0.52
Dead+Wind 30 deg - Service	45.53	5.36	-9.40	-1178.02	-668.53	-0.03
Dead+Wind 60 deg - Service	45.53	9.34	-5.40	-674.90	-1167.30	-0.57
Dead+Wind 90 deg - Service	45.53	10.82	0.06	8.78	-1353.45	-0.95
Dead+Wind 120 deg - Service	45.53	9.40	5.50	689.82	-1177.11	-1.09
Dead+Wind 150 deg - Service	45.53	5.46	9.46	1185.75	-685.53	-0.93
Dead+Wind 180 deg - Service	45.53	0.06	10.89	1363.68	-10.43	-0.52
Dead+Wind 210 deg - Service	45.53	-5.36	9.40	1175.93	667.30	0.03
Dead+Wind 240 deg - Service	45.53	-9.34	5.40	672.81	1166.07	0.57
Dead+Wind 270 deg - Service	45.53	-10.82	-0.06	-10.86	1352.23	0.96
Dead+Wind 300 deg - Service	45.53	-9.40	-5.50	-691.91	1175.89	1.09
Dead+Wind 330 deg - Service	45.53	-5.46	-9.46	-1187.83	684.31	0.93

Maximum Tower Deflections - Service Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	178 - 164.25	36.829	38	1.8563	0.0068
L2	167.167 - 129.667	32.646	38	1.8245	0.0069
L3	133.5 - 96	20.712	38	1.5022	0.0035
L4	100.667 - 63.1667	11.631	38	1.1161	0.0019
L5	68.6667 - 31.1667	5.351	38	0.7356	0.0010
L6	37.4167 - 0	1.603	38	0.3867	0.0005

Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
178'	Lighting Rod 5/8" x 4' on 4' Pole	38	36.829	1.8563	0.0068	22572
170'	BXA-70063/6CF w/ Mount Pipe	38	33.733	1.8358	0.0069	14180
160'	(2) 7770.00 w/ Mount Pipe	38	29.941	1.7808	0.0065	8238
150'	APXV18-206517LS w/ Mount Pipe	38	26.295	1.6907	0.0055	6355

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	178 - 164.25 (1)	TP26x12.75x0.25	13'9"	0'	0.0	39.000	18.2024	-4.13	709.89	0.006
L2	164.25 - 129.667 (2)	TP34.0625x22.6894x0.3125	37'6"	0'	0.0	39.000	32.3226	-10.58	1260.58	0.008
L3	129.667 - 96 (3)	TP41.75x32.2749x0.375	37'6"	0'	0.0	39.000	47.8431	-17.02	1865.88	0.009
L4	96 - 63.1667 (4)	TP49.0625x39.8209x0.375	37'6"	0'	0.0	39.000	56.3370	-24.74	2197.14	0.011
L5	63.1667 - 31.1667 (5)	TP56.125x46.9571x0.375	37'6"	0'	0.0	39.000	64.5378	-33.58	2516.97	0.013
L6	31.1667 - 0 (6)	TP62.9375x53.847x0.375	37'5-1/32' '	0'	0.0	37.124	74.4650	-45.52	2764.41	0.016

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	178 - 164.25 (1)	TP26x12.75x0.25	56.42	6.590	39.000	0.169	0.00	0.000	39.000	0.000
L2	164.25 - 129.667 (2)	TP34.0625x22.6894x0.3125	575.81	26.630	39.000	0.683	0.00	0.000	39.000	0.000
L3	129.667 - 96 (3)	TP41.75x32.2749x0.375	1241.77	31.447	39.000	0.806	0.00	0.000	39.000	0.000
L4	96 - 63.1667 (4)	TP49.0625x39.8209x0.375	1998.08	36.442	39.000	0.934	0.00	0.000	39.000	0.000
L5	63.1667 - 31.1667 (5)	TP56.125x46.9571x0.375	2836.31	39.379	39.000	1.010	0.00	0.000	39.000	0.000
L6	31.1667 - 0 (6)	TP62.9375x53.847x0.375	3956.87	41.228	37.124	1.111	0.00	0.000	37.124	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	178 - 164.25 (1)	TP26x12.75x0.25	9.41	0.517	26.000	0.040	0.04	0.002	26.000	0.000
L2	164.25 - 129.667 (2)	TP34.0625x22.6894x0.3125	18.63	0.576	26.000	0.044	2.51	0.057	26.000	0.002
L3	129.667 - 96 (3)	TP41.75x32.2749x0.375	21.96	0.459	26.000	0.035	2.54	0.031	26.000	0.001
L4	96 - 63.1667 (4)	TP49.0625x39.8209x0.375	25.27	0.448	26.000	0.034	2.57	0.023	26.000	0.001
L5	63.1667 - 31.1667 (5)	TP56.125x46.9571x0.375	28.28	0.438	26.000	0.034	2.61	0.018	26.000	0.001
L6	31.1667 - 0 (6)	TP62.9375x53.847x0.375	31.59	0.424	26.000	0.033	2.66	0.014	26.000	0.001

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	178 - 164.25 (1)	0.006	0.169	0.000	0.040	0.000	0.175 ✔	1.333	H1-3+VT ✔
L2	164.25 - 129.667 (2)	0.008	0.683	0.000	0.044	0.002	0.692 ✔	1.333	H1-3+VT ✔
L3	129.667 - 96 (3)	0.009	0.806	0.000	0.035	0.001	0.816 ✔	1.333	H1-3+VT ✔
L4	96 - 63.1667 (4)	0.011	0.934	0.000	0.034	0.001	0.946 ✔	1.333	H1-3+VT ✔
L5	63.1667 - 31.1667 (5)	0.013	1.010	0.000	0.034	0.001	1.023 ✔	1.333	H1-3+VT ✔
L6	31.1667 - 0 (6)	0.016	1.111	0.000	0.033	0.001	1.127 ✔	1.333	H1-3+VT ✔

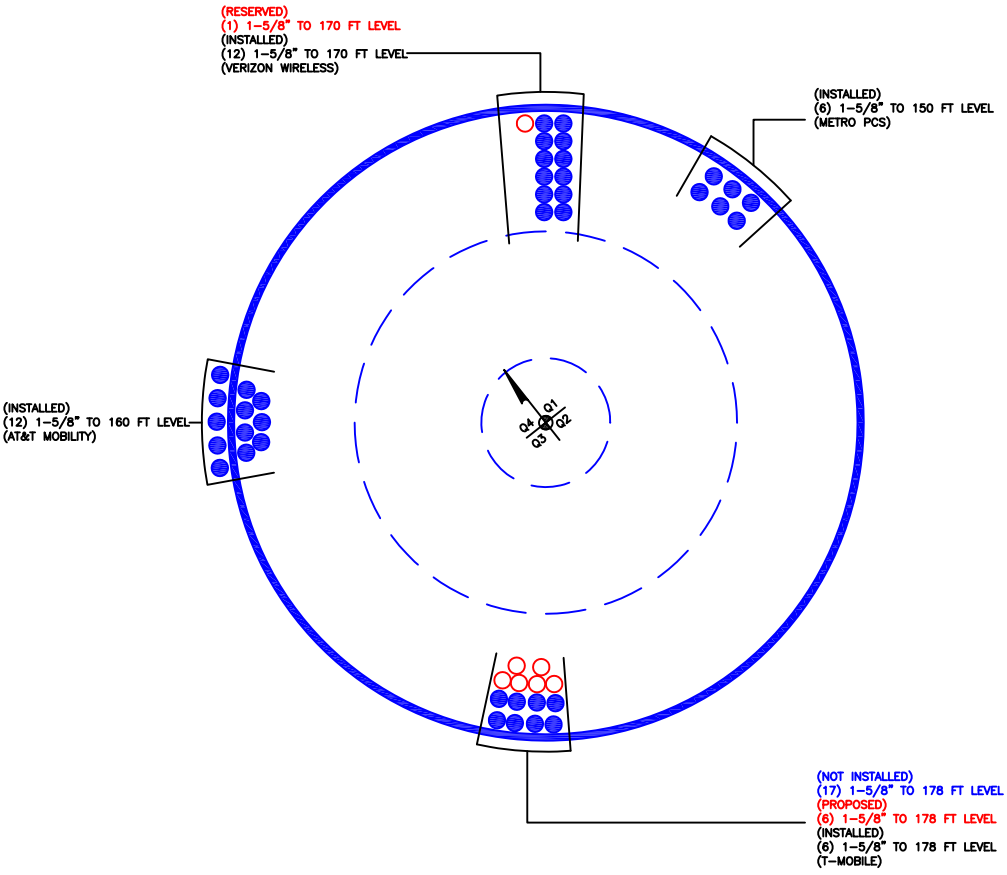
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	178 - 164.25	Pole	TP26x12.75x0.25	1	-4.13	946.29	13.1	Pass
L2	164.25 - 129.667	Pole	TP34.0625x22.6894x0.3125	2	-10.58	1680.35	51.9	Pass
L3	129.667 - 96	Pole	TP41.75x32.2749x0.375	3	-17.02	2487.22	61.2	Pass
L4	96 - 63.1667	Pole	TP49.0625x39.8209x0.375	4	-24.74	2928.79	71.0	Pass
L5	63.1667 - 31.1667	Pole	TP56.125x46.9571x0.375	5	-33.58	3355.12	76.8	Pass
L6	31.1667 - 0	Pole	TP62.9375x53.847x0.375	6	-45.52	3684.96	84.6	Pass
							Summary	
						Pole (L6)	84.6	Pass
						RATING =	**84.6**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

TX LINE LAYOUT



Clients

CROWN CASTLE

Professional Stamp

Revisions

No.	Description	Date
A	ISSUED FOR REVIEW	09.22.14

Engineering Firm

P-SEC

ph: 519-885-3806
fx: 519-886-0076
www.p-sec.ca

PIER STRUCTURAL ENGINEERING CORP
55 NORTHFIELD DR. E, SUITE 198
WATERLOO, ON N2K 3T6

PSEC Job No.

12411

Site Name

82366
DEEP RIVER/RT9

Site Design

Sheet Title

TX LINES

Drawn by QR

Checked by

Approved By

Sheet

A-1

APPENDIX C

ADDITIONAL CALCULATIONS

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

TIA Rev F

Site Data

BU#: *823666*
Site Name: *Deep River/Rt 9*
App #: *261532 REV 7*

Pole Manufacturer:	*Pirod*

Reactions		
Moment:	3957	ft-kips
Axial:	46	kips
Shear:	32	kips

Anchor Rod Data		
Qty:	45	
Diam:	1.25	in
Rod Material:	Other	
Strength (Fu):	150	ksi
Yield (Fy):	105	ksi
Bolt Circle:	68	in

Plate Data		
Diam:	73	in
Thick:	1.375	in
Grade:	50	ksi
Single-Rod B-eff:	4.44	in

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

Pole Data		
Diam:	62.9375	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

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

Anchor Rod Results

Maximum Rod Tension:	61.0 Kips	Rigid
Allowable Tension:	81.0 Kips	Service, ASD
Anchor Rod Stress Ratio:	75.4% **Pass**	Fty*ASIF

Base Plate Results

Base Plate Stress:	Flexural Check	Rigid
Allowable Plate Stress:	Rohn/Pirod, OK	Service ASD
Base Plate Stress Ratio:	50.0 ksi	0.75*Fy*ASIF
	Rohn/Pirod, OK	Y.L. Length: 25.75

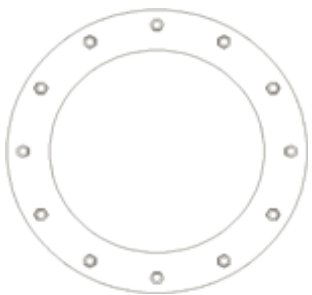
n/a

Stiffener Results N/A for Rohn / Pirod

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

PIER STRUCTURAL ENGINEERING CORP.

PROJECT No:	12411	**ENG:**	QR
PROJECT NAME:	823666 - DEEP RIVER RT9	**CHK:**	SH
	CROWN CASTLE		
DATE:	9/23/2014 14:55	**PAGE:**	of

EIA-222-F

SURFACE RAFT FOUNDATION CHECKS

Capacity up to 105% considered accepable

Global Tower Reactions	*Allowable Loads*		*Calculated Reactions*		**Allowable Resistance**			**% Capacity**	
○ TIA-G	Maximum Moment	**3,957.00**	k-ft	Disturbing Moment	**4,085.0**	**5,322.5**	k-ft	PASS	**76.8%**	
◉ EIA-F	Axial Load	**46.00**	kips	Maximum Bearing	**1.79**	**12.00**	kips	PASS	**14.9%**	
	Shear Load	**32.00**	kips	Maximum Shear	**1,329.8**	**1,453.9**	kips	PASS	**91.5%**	**[GOVERNS]**
	Face Width	**5.24**	ft							**SF=2.19**
	Pad Rebar Required	**(18) # 8 @ 20.12 in**		Actual Pad Rebar		**(32) # 8 bars**		PASS	**41.9%**	

Concrete & Soil Parameters	**Soils Report**			**Raft Foundation Geometry**		**FDN Dwgs**		
Water Level	**20.00**	ft	(6.10 m)	B (bredth)		**29.00**	ft	Minimum Fdn
Conc Dry Density (γ_{dry})	**0.150**	kcf	(23.6 kN/m^3)	D (depth)	**** overall thickness*	**4.00**	ft	Width 10.1 ft
Conc Sub Density (γ_{sub})	**0.087**	kcf	(13.7 kN/m^3)	W (width)		**29.00**	ft	**Okay**
Passive Earth Coeff.	**1.000**			H (height above ground)		**0.50**	ft	
All. Bearing Pressure	**12.000**	ksf	(574.6 kPa)	Depth to Bottom Surface		**3.50**	ft	

	Concrete (124.6cuyd)		
Volume of Concrete			3364.0 cuft
depth (above)	0.50	ft	420.50
depth (dry)	3.50	ft	2943.50
depth (submerged)	0.00	ft	0.00
Concrete Reinforcing Design			
f'c	**4.000**	ksi	(27.6 MPa)
fy	**60.000**	ksi	(413.7 MPa)

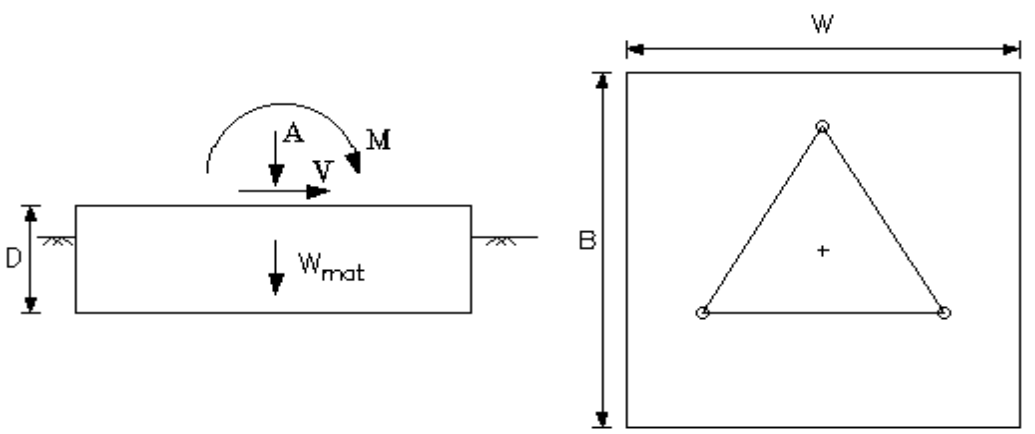
	MAT			
Steel (Metric/ASTM)	**ASTM**			
Bar Quantity	**32**		Bar Area	
Bar size	**8**	#	0.790	in²
Slab Reinforcing				
½ Disturbing Moment	2042.50	kip-ft		
Ku	37.22			
d (depth)	43.50	in	**Wgt of Rebar**	
ρ	0.00069		**5,516**	**lbs**
4/3•ρ if ρ < ρ min	0.00092			
ρ min = 0.002 / 2sides	0.00100		**18**	
As Required (based on ρ)	13.980	in²	**20.12**	in c/c
As Actual	25.280	in²	ϕMn= 4,875.6	kip-ft

Note: The 1/2 moment is derived from a bending moment diagram that considered the uplift and download components at the exact face width of the tower.

Calculations	*Factored*	*Allowable*	
Axial Download	--	46.0	kips
Weight of Concrete (not factored)	--	504.6	kips
Total Download (P)	--	**550.6**	kips
Resisting Moment Arm	--	**14.5**	ft
Moment Resistance	--	**5322.5**	k-ft
		(divide by 1.5 - cl 7.2.4.5)	

Bearing Capacity Check			
Contact Area	--	841.00	ft²
Calculate eccentricity e	--	7.42	**ft [>L/6]**
Calculate (c = L/2 - e)	--	7.08	ft
1) q_{max} = P/A • (1+6e/L)	--	--	
2) q_{max} = 2P / b•3c	--	**1.79**	**ksf [GOV]**
q allowable	--	12.00	ksf
		(not factored)	

Check for 1-Way Shear			
Shear Area (b_w x d)	--	106.43	ft²
Factored Shear Force (M/0.866D+P/3)	--	1329.81	kips
Factored Shear Resistance	--	**1453.94**	kips
Check for 1-Way Shear	--	**0.91**	
		(ACI-318)	



M =	3957.0	k-ft
A =	46.0	kips
V =	32.0	kips
B =	29.00	ft
W =	29.00	ft
D =	4.00	ft
V_{mat} =	3364	cuft
Rebar =	(32) # 8 bars	

BU: 823666
Deep River/Rt 9

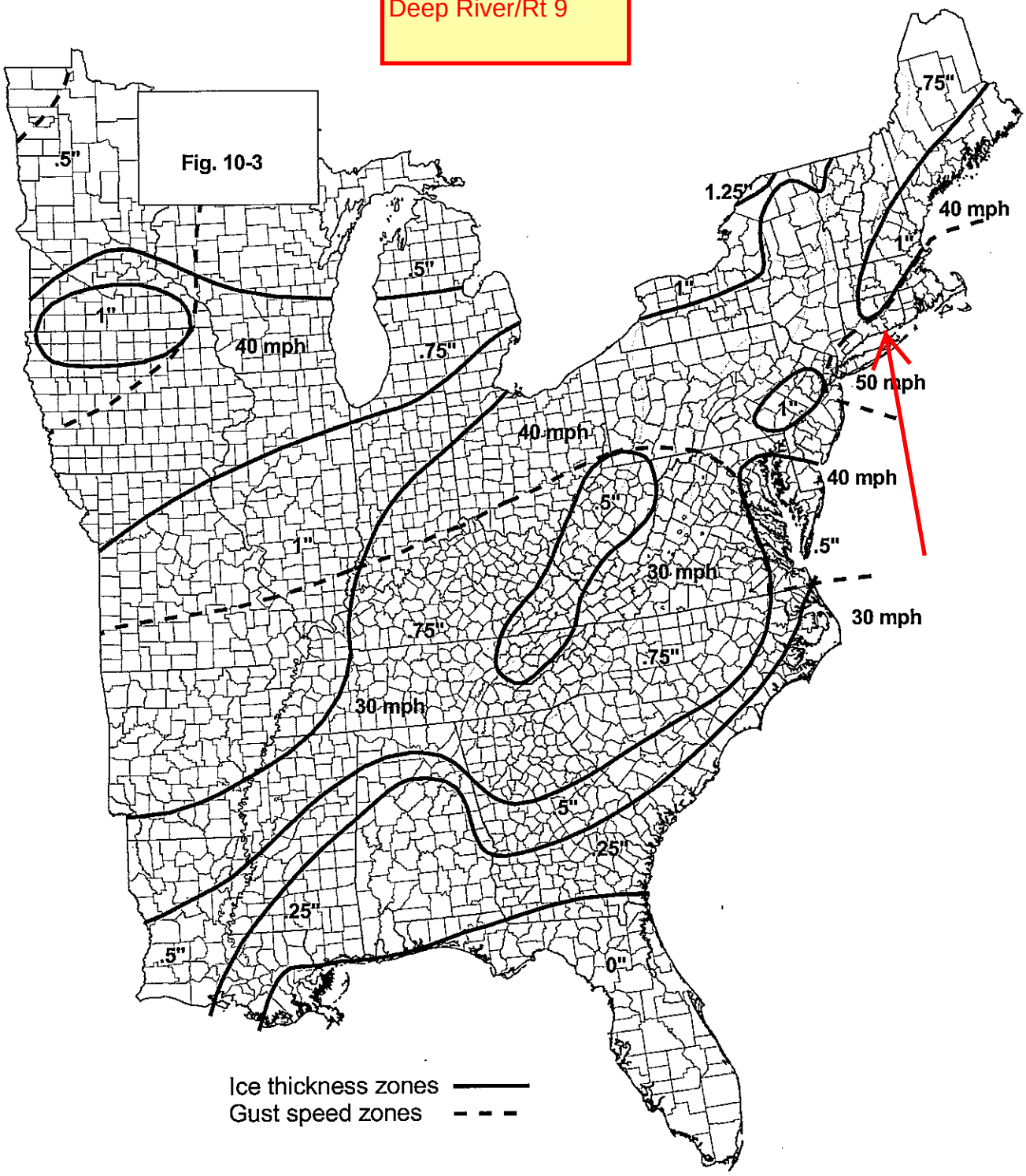


FIGURE 10-2 (continued) 50-YEAR MEAN RECURRENCE INTERVAL UNIFORM ICE THICKNESSES DUE TO FREEZING RAIN WITH CONCURRENT 3-SECOND GUST SPEEDS: CONTIGUOUS 48 STATES.

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

T-Mobile Existing Facility

Site ID: CT11237C

Deep River / Rt9
15 Pent Road
Deep River, CT 06417

October 14, 2014

EBI Project Number: 62145507

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	27.95 %

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

EBI Consulting
environmental | engineering | due diligence

October 14, 2014

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

Emissions Analysis for Site: **CT11237C – Deep River / Rt9**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **15 Pent Road, Deep River, 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 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 **15 Pent Road, Deep River, 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 channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel

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

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

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

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

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

7) The antennas used in this modeling are the **Andrew RR90_17_02DP** 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 **Andrew RR90_17_02DP** has a maximum gain of **14.4 dBd** at its main lobe. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

8) The antenna mounting height centerline of the proposed antennas is **177 feet** above ground level (AGL).

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

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

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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:	Andrew RR90_17_02DP	Make / Model:	Andrew RR90_17_02DP	Make / Model:	Andrew RR90_17_02DP
Gain:	14.4 dBd	Gain:	14.4 dBd	Gain:	14.4 dBd
Height (AGL):	177	Height (AGL):	177	Height (AGL):	177
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	6	Channel Count	6	# PCS Channels:	6
Total TX Power:	240	Total TX Power:	240	# AWS Channels:	240
ERP (W):	3,505.81	ERP (W):	3,505.81	ERP (W):	3,505.81
Antenna A1 MPE%	0.81	Antenna B1 MPE%	0.81	Antenna C1 MPE%	0.81
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	177	Height (AGL):	177	Height (AGL):	177
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):	445.37	ERP (W):	445.37	ERP (W):	445.37
Antenna A2 MPE%	0.23	Antenna B2 MPE%	0.23	Antenna C2 MPE%	0.23

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**3.12**
AT&T	13.87 %
Verizon Wireless	10.96 %
Site Total MPE %:	**27.95 %**

T-Mobile Sector 1 Total:	1.04 %
T-Mobile Sector 2 Total:	1.04 %
T-Mobile Sector 3 Total:	1.04 %
Site Total:	27.95 %

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Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector 1:	1.04 %
Sector 2:	1.04 %
Sector 3 :	1.04 %
T-Mobile Total:	3.12 %
Site Total:	27.95 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **27.95%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

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