Crown Castle
3530 Toringdon Way Suite 300
Charlotte NC 28277

Tel (704) 405-6600

June 5, 2015

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

RE: **T-Mobile-Exempt Modification - Crown Site BU: 857013**
T-Mobile Site ID: CTNL140B
Located at: 280 Ross Road, Killingly, CT 06239

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 John Hallbergh, Council Chairman for the Town of Killingly, and Snake Meadow Club Inc., Property Owner.

T-Mobile plans to modify the existing wireless communications facility owned by Crown Castle and located at **280 Ross Road, Killingly, CT 06239**. 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

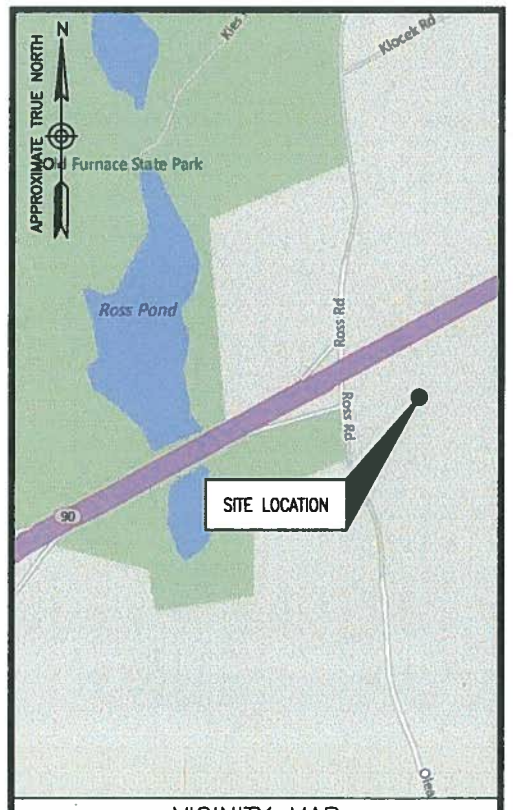
Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes
Tab 2: Exhibit-2: Structural Modification Report
Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc: The Honorable John Hallbergh, Council Chairman
172 Main Street
Killingly, CT 06239

Snake Meadow Club Inc.
P.O. Box 236
Central Village, CT 06332

T-MOBILE NORTHEAST LLC

T-MOBILE SITE #: CTNL140B
CROWN CASTLE BU #: 857013
SITE NAME: KILLINGLY ROSS ROAD
280 ROSS ROAD
KILLINGLY, CT 06239
WINDHAM COUNTY



VICINITY MAP

FROM PARSIPPANY, NJ:

HEAD NORTHWEST ON SYLVAN WAY. TURN RIGHT ONTO US-202 N. TAKE THE RAMP ONTO I-80 E. MERGE ONTO I-80 E. TAKE EXIT 43 FOR I-287 TOWARD MORRISTOWN/MAHWAH. KEEP LEFT AT THE FORK AND MERGE ONTO I-287 N. TAKE THE EXIT ONTO I-287 E/I-87 S TOWARD TAPPAN ZEE BR/NEW YORK CITY. KEEP LEFT AT THE FORK TO CONTINUE ON I-287 E, FOLLOW SIGNS FOR WHITE PLAINS/RYE. MERGE ONTO I-95 N. KEEP LEFT AT THE FORK TO CONTINUE ON I-395 N, FOLLOW SIGNS FOR INTERSTATE 395 N/NORWICH/PLAINFIELD. TAKE EXIT 90 TOWARD US-6 E/PROVIDENCE. CONTINUE ONTO CONNECTICUT TURNPIKE/GOVERNOR JOHN DAVIS LODGE TURNPIKE. TAKE THE EXIT TOWARD ROSS RD. TURN RIGHT ONTO ROSS RD. SITE WILL BE ON THE LEFT.

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

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

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

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

CONSULTANT TEAM

SITE NAME:
KILLINGLY ROSS ROAD

SITE NUMBER:
CTNL140B

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

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

COORDINATES:
LATITUDE: 41°-46'-17.59" N (NAD83)
LONGITUDE: 71°-51'-20.39" W (NAD83)
(PER CROWN CASTLE)

CONFIGURATION
704G

PROJECT SUMMARY

SITE ADDRESS:
280 ROSS ROAD
KILLINGLY, CT 06239
WINDHAM COUNTY

PROJECT DIRECTORY

- INSTALL (3) NEW ANTENNAS.
- INSTALL (3) NEW BIAS TEES.
- INSTALL (6) NEW LINES OF COAX.
- INSTALL (1) NEW BBU CABINET AT GRADE.

SCOPE OF WORK

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

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

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

SHEET INDEX

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

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

CTNL140B
KILLINGLY
ROSS ROAD

CONSTRUCTION DRAWINGS

0	06/01/15	ISSUED AS FINAL
A	05/27/15	ISSUED FOR REVIEW

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

STATE OF CONNECTICUT
JIANG YU
22222
REGISTERED
PROFESSIONAL ENGINEER

CONNECTICUT LICENSE NO. 0023222

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

DRAWN BY:	JC
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50072429
SITE ADDRESS:	

280 ROSS ROAD
KILLINGLY, CT 06239
WINDHAM COUNTY

SHEET TITLE

TITLE SHEET

SHEET NUMBER

T-1

GENERAL NOTES:

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

SITE WORK GENERAL NOTES:

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

ELECTRICAL INSTALLATION NOTES:

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

CONCRETE AND REINFORCING STEEL NOTES:

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

   CONCRETE CAST AGAINST EARTH.....3 IN.
   CONCRETE EXPOSED TO EARTH OR WEATHER:
   #6 AND LARGER .....2 IN.
   #5 AND SMALLER & WWF.....1 1/2 IN.

   CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:
   SLAB AND WALL .....3/4 IN.
   BEAMS AND COLUMNS.....1 1/2 IN.

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

STRUCTURAL STEEL NOTES:

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

CONSTRUCTION NOTES:

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

T-Mobile

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CTNL140B
KILLINGLY
ROSS ROAD

CONSTRUCTION DRAWINGS

0	06/01/15	ISSUED AS FINAL
A	05/27/15	ISSUED FOR REVIEW

Dewberry
Dewberry Engineers Inc.
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SUITE 301
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STATE OF CONNECTICUT
JIANG YU
10/31/2022
LICENSED PROFESSIONAL ENGINEER

JIANG YU, P.E.
CONNECTICUT LICENSE NO. 0023222

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DRAWN BY:	JC
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50072429
SITE ADDRESS:	

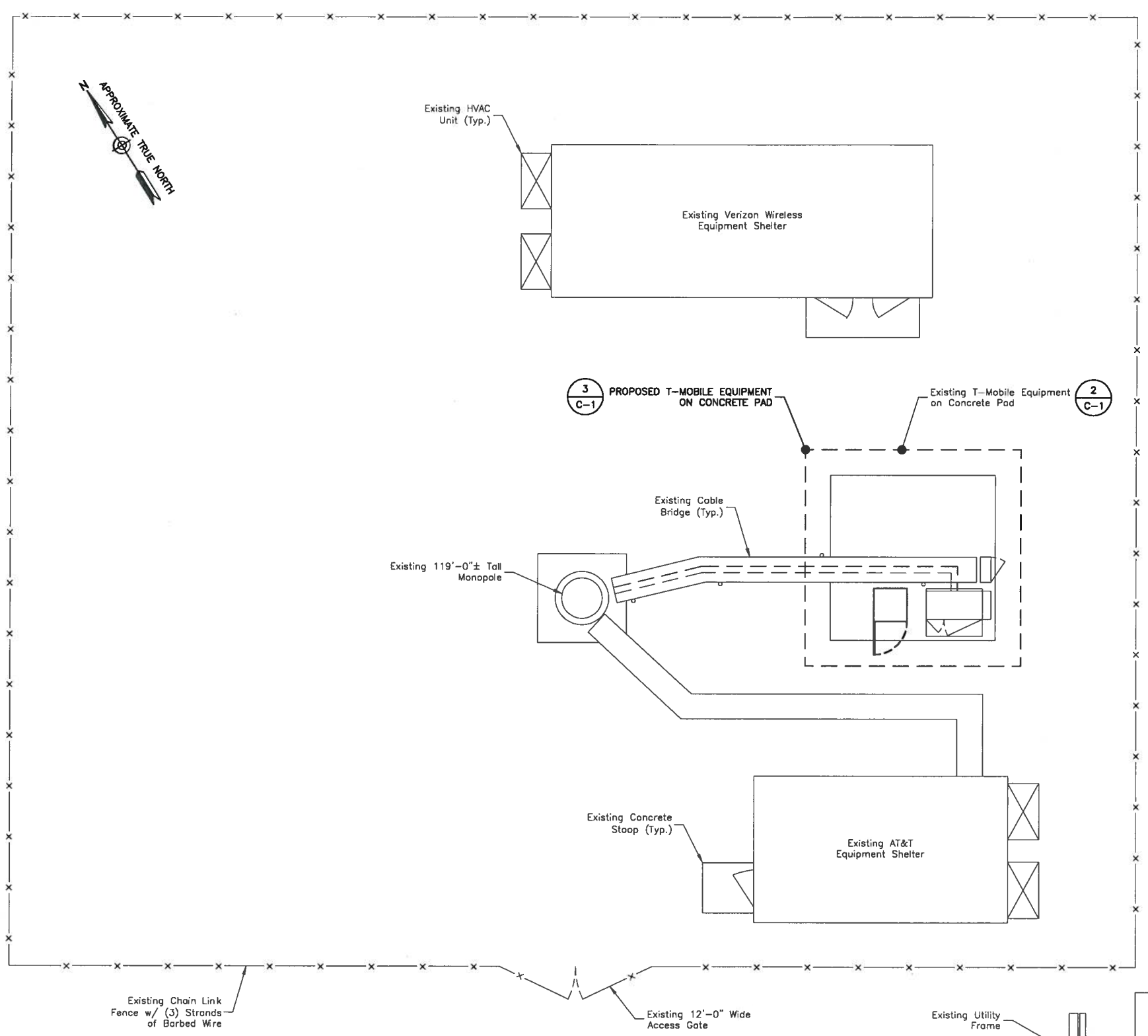
280 ROSS ROAD
KILLINGLY, CT 06239
WINDHAM COUNTY

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

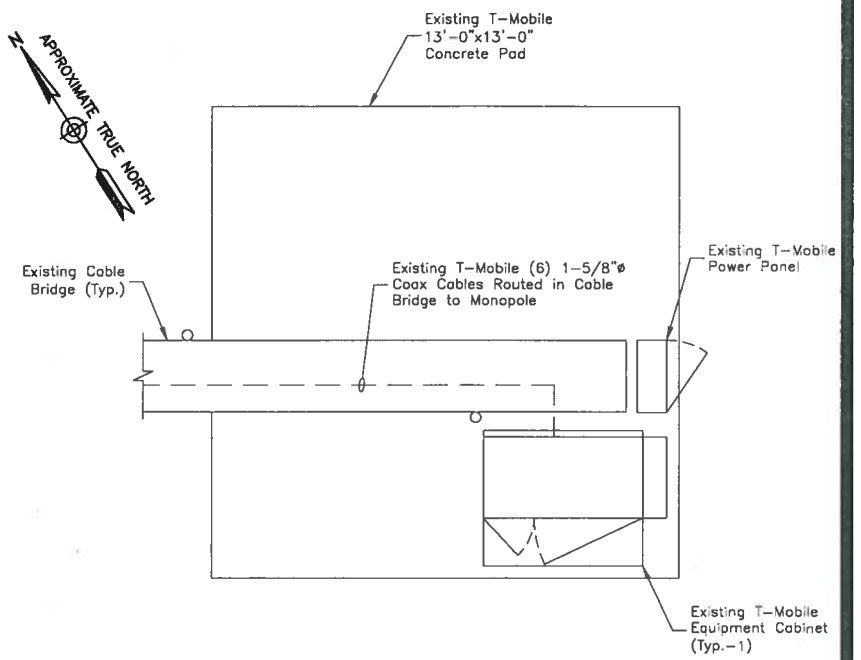
G–1



COMPOUND PLAN 1

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

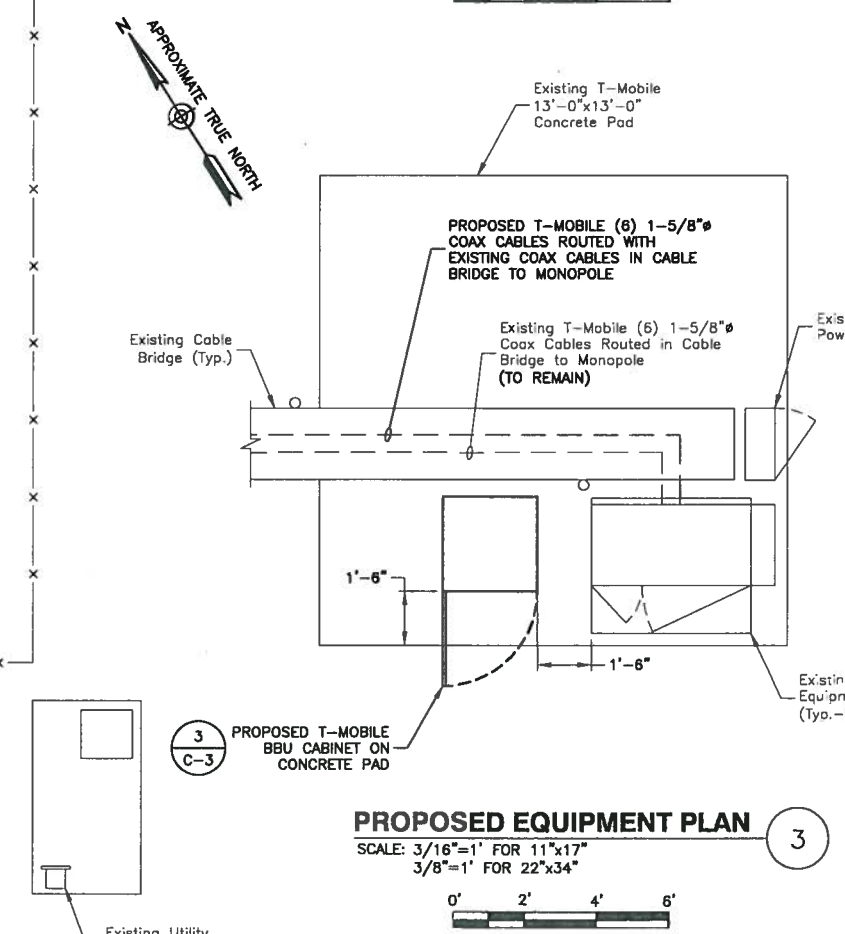
0' 5' 10'



EXISTING EQUIPMENT PLAN 2

SCALE: 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 ARROW SHOWN AS APPROXIMATE.
2. NOT ALL INFORMATION IS SHOWN FOR CLARITY.
3. ALL PROPOSED EQUIPMENT, INCLUDING ANTENNAS, BIAS TEES, COAX, ETC., SHALL BE MOUNTED IN ACCORDANCE WITH THE TOWER STRUCTURAL ANALYSIS BY GPD GROUP DATED APRIL 28, 2015.

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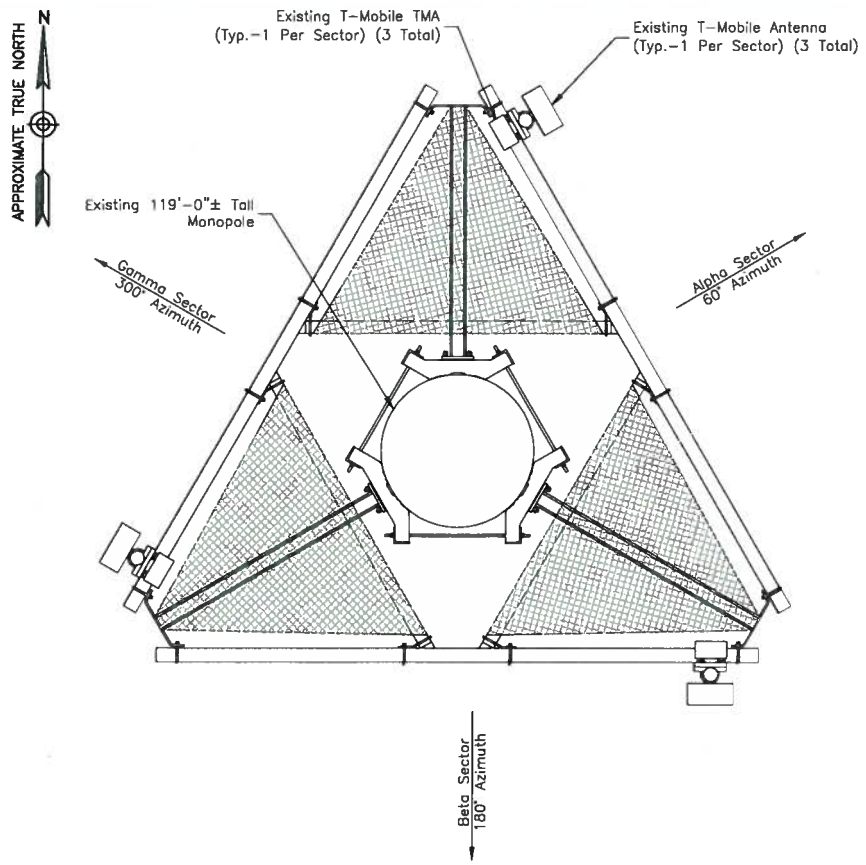
WINDHAM COUNTY

SHEET TITLE

COMPOUND PLAN & EQUIPMENT PLANS

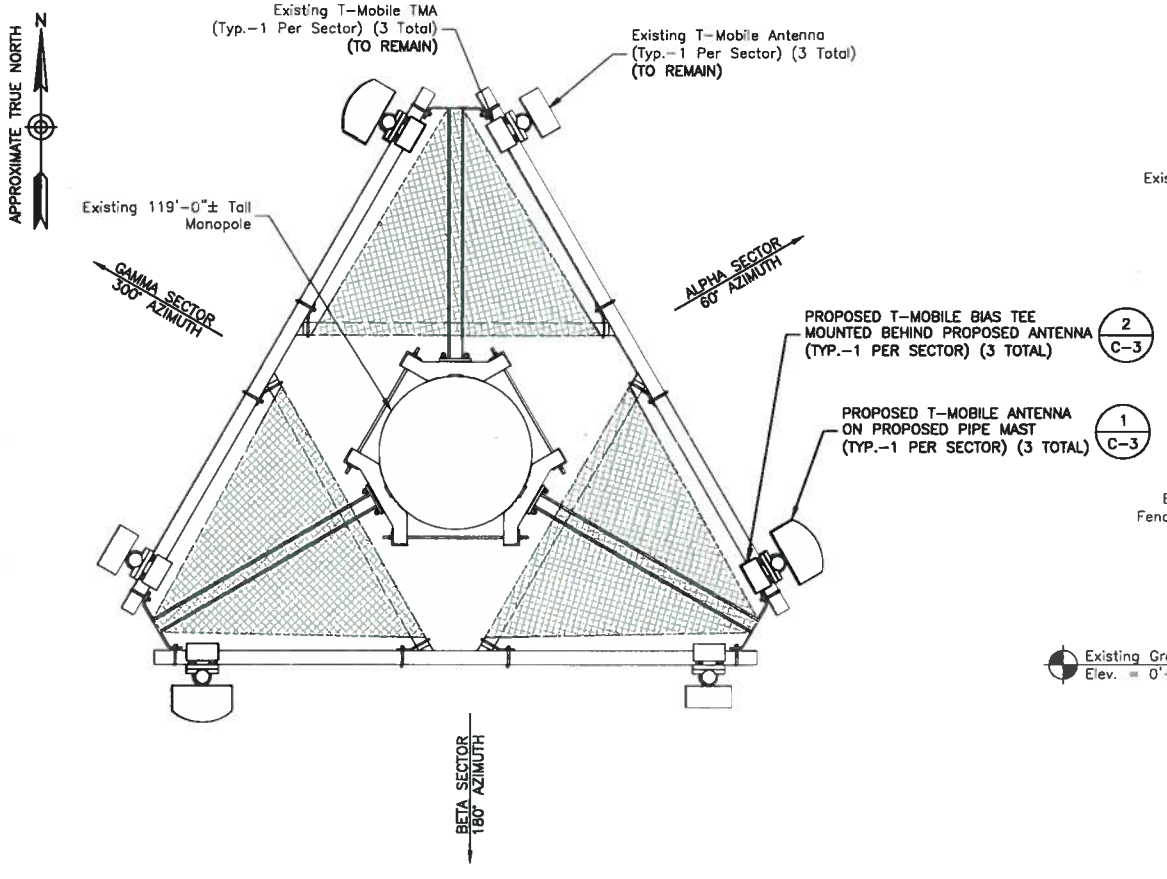
SHEET NUMBER

C-1



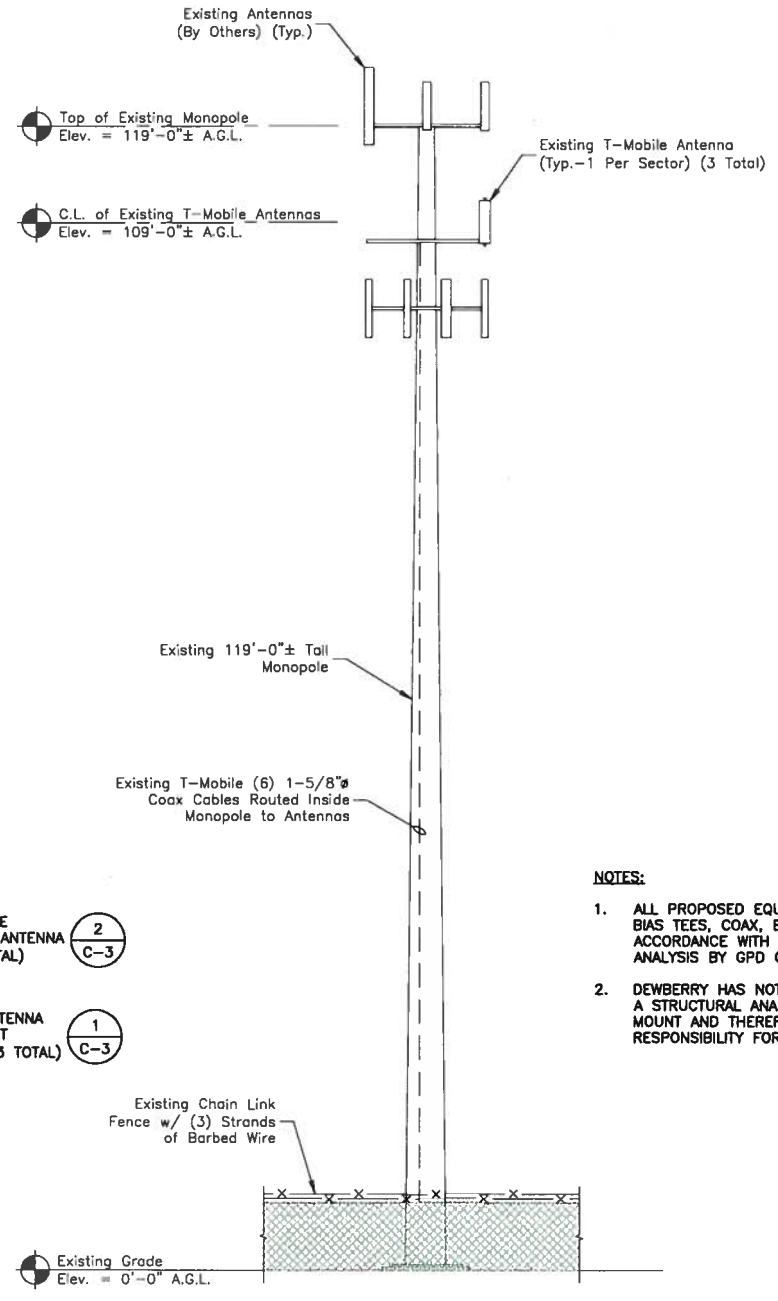
EXISTING ANTENNA LAYOUT (1)

SCALE: N.T.S.



PROPOSED ANTENNA LAYOUT (2)

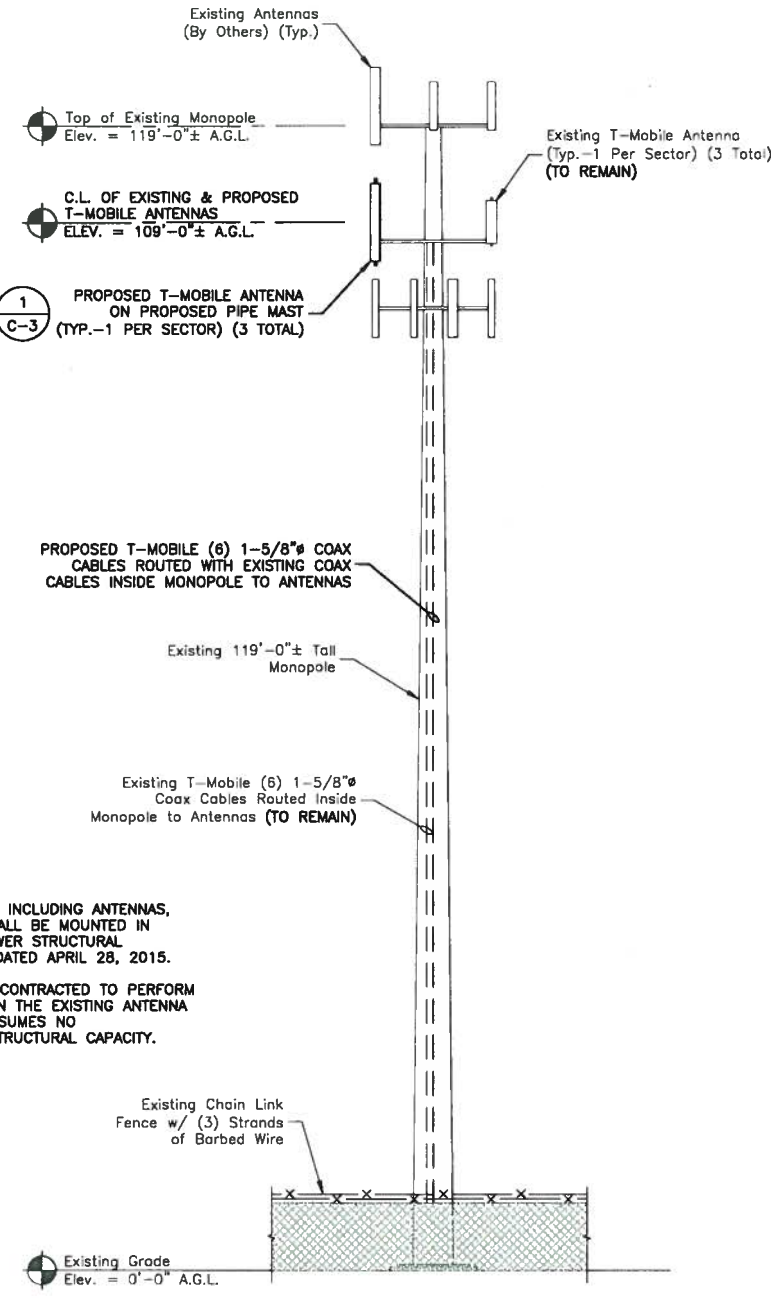
SCALE: N.T.S.



EXISTING ELEVATION (3)

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

0' 10' 20'



PROPOSED ELEVATION (4)

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

0' 10' 20'

NOTES:

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

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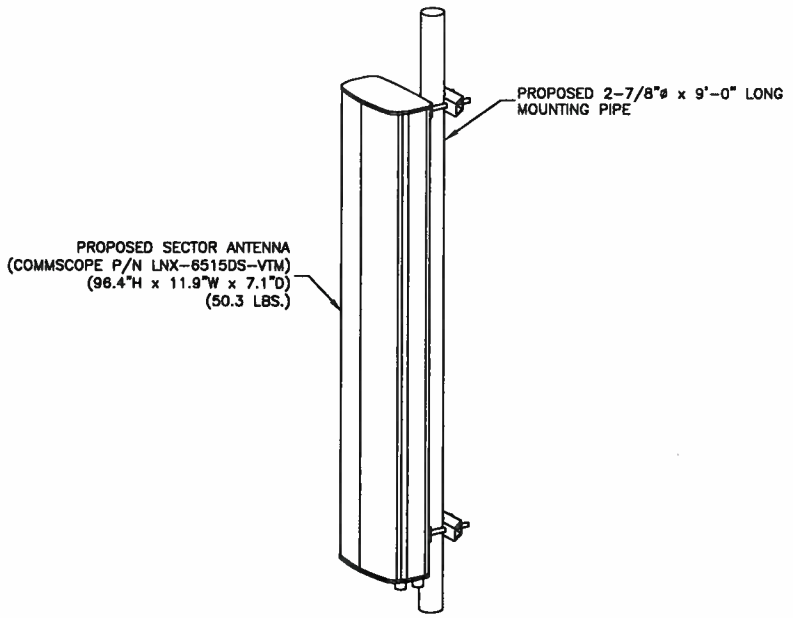
WINDHAM COUNTY

SHEET TITLE

ANTENNA LAYOUTS & ELEVATIONS

SHEET NUMBER

C-2

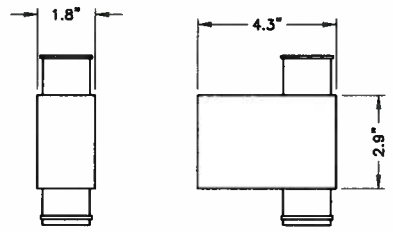


NOTES:

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

ISOMETRIC ANTENNA DETAIL 1

SCALE: N.T.S.



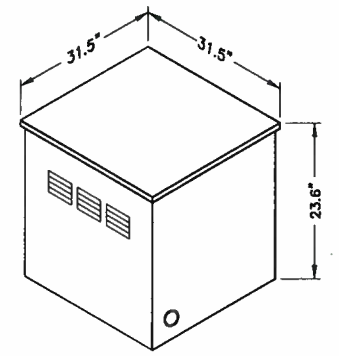
ANDREW ATBT-BOTTOM-24V

NOTES:

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

BIAS TEE DETAIL 2

SCALE: N.T.S.



ALCATEL-LUCENT EZBFo BATTERY BACKUP SYSTEM

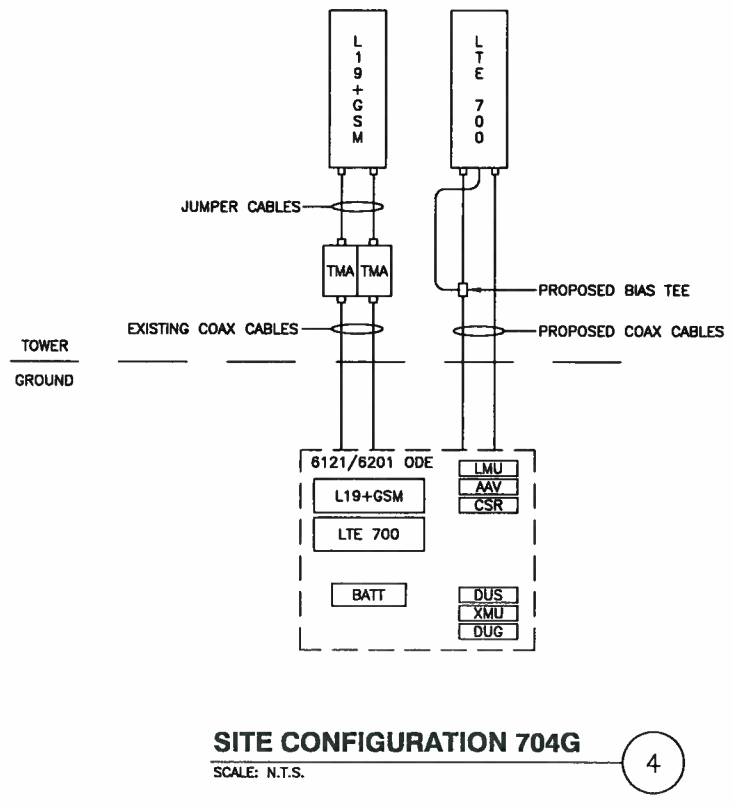
MATERIAL:	ANCHOR:
CONCRETE	3/8"ø HILTI KWIK BOLT 3 W/2-1/2" MIN. EMBED.
STRUCTURAL STEEL	1/2"ø STRUCTURAL BOLTS

NOTE:

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

BBU CABINET DETAIL 3

SCALE: N.T.S.



SITE CONFIGURATION 704G 4

SCALE: N.T.S.

DESIGN CONFIGURATION

	ANTENNAS		COAX		COAX LENGTH
	EXISTING	PROPOSED	EXISTING	PROPOSED	
ALPHA	RFS APX16PV-16PVL	EXISTING TO REMAIN	(2) 1-5/8"ø	(2) 1-5/8"ø	159'-0"
	-	COMMSCOPE LNX-6515DS-VTM			
BETA	RFS APX16PV-16PVL	EXISTING TO REMAIN	(2) 1-5/8"ø	(2) 1-5/8"ø	159'-0"
	-	COMMSCOPE LNX-6515DS-VTM			
GAMMA	RFS APX16PV-16PVL	EXISTING TO REMAIN	(2) 1-5/8"ø	(2) 1-5/8"ø	159'-0"
	-	COMMSCOPE LNX-6515DS-VTM			

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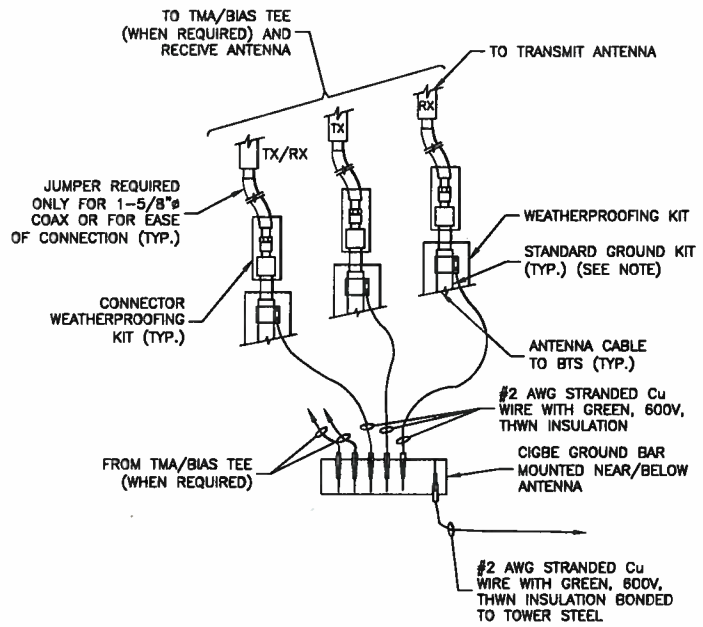
CONSTRUCTION DETAILS

SHEET NUMBER

C-3

GROUNDING NOTES:

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

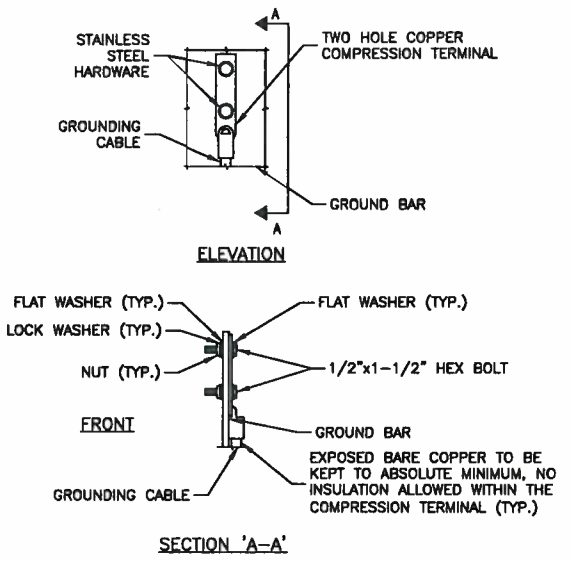


NOTE:

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

CONNECTION OF GROUND WIRES TO GROUNDING BAR (CIGBE) 1

SCALE: N.T.S.

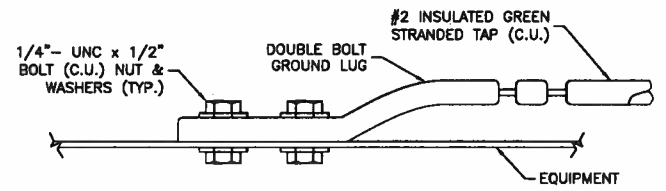


NOTES:

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

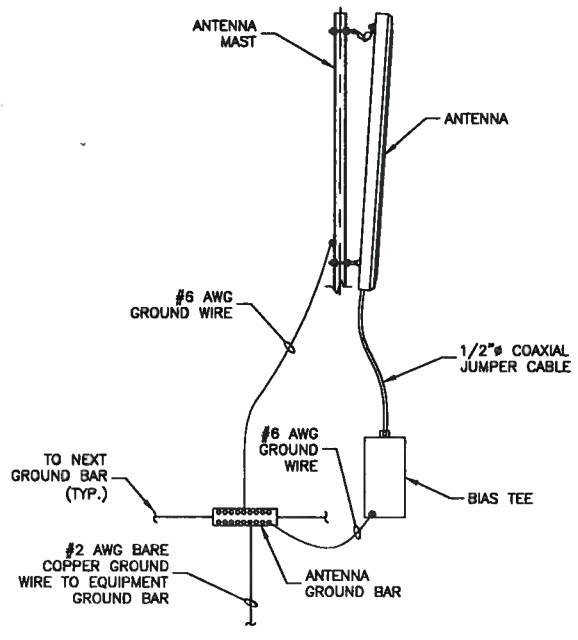
TYPICAL GROUND BAR MECHANICAL CONNECTION DETAIL 2

SCALE: N.T.S.



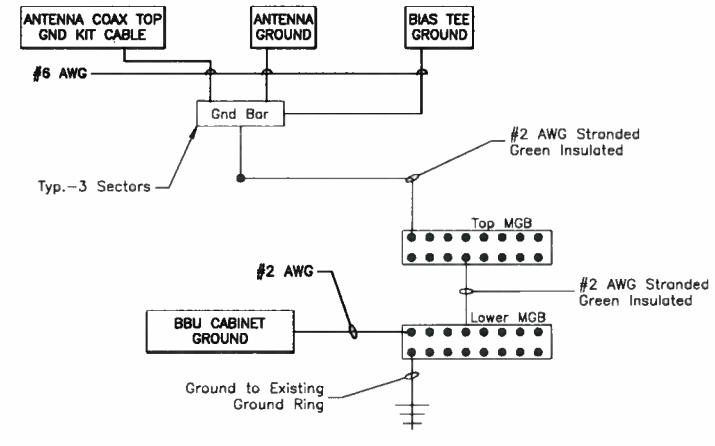
CONNECTION TO EQUIPMENT DETAIL 3

SCALE: N.T.S.



TYPICAL ANTENNA GROUNDING DETAIL 4

SCALE: N.T.S



NOTES:

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

SCHEMATIC GROUNDING DIAGRAM 5

SCALE: N.T.S.

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SHEET TITLE

GROUNDING NOTES & DETAILS

SHEET NUMBER

E-1

GPD Engineering and Architecture
Professional Corporation

Date: **April 28, 2015**

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520 South Main Street, Suite 2531
Akron, OH 44311
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dpalkovic@gpdgroup.com

Subject:	**Structural Analysis Report**	
Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CTNL140B
	Carrier Site Name:	NL140/CingularRossRd_MP
Crown Castle Designation:	**Crown Castle BU Number:**	857013
	Crown Castle Site Name:	KILLINGLY ROSS ROAD
	Crown Castle JDE Job Number:	331620
	Crown Castle Work Order Number:	1048275
	Crown Castle Application Number:	293312 Rev. 0
Engineering Firm Designation:	**GPD Group Project Number:**	2015777.857013.03
Site Data:	**280 Ross Road, Killingly, Windham County, CT 06239** **Latitude *41° 46' 17.59"*, Longitude *-71° 51' 20.39"*** **119 Foot - Monopole Tower**	

Dear Darcy Tarr,

GPD 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 779529, in accordance with application 293312, revision 0.

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

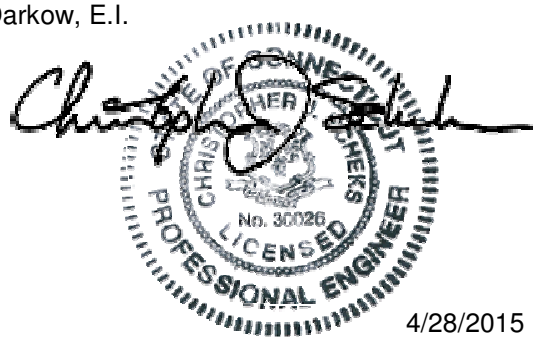
LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

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

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

Structural analysis prepared by: Benjamin Darkow, E.I.

Respectfully submitted by:



Christopher J. Scheks, P.E.
Connecticut #: 0030026

4/28/2015

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1) INTRODUCTION

This tower is a 119 ft Monopole tower which was mapped by GPD in January of 2009. The original tower design code, wind speed and loading are unknown.

The existing monopole tower has three major sections connected by slip joints. It has 18 sides and is evenly tapered from 50.4674" (flat-flat) at the base to 18.9450" (flat-flat) at the top. The structure is galvanized and has no tower lighting.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 40 mph with 0.75 inch ice thickness (in accordance with ASCE 7-05 ice conditions) and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
107.0	109.0	3	Commscope	ATBT-BOTTOM-24V	6	1-5/8	1
		3	Commscope	LNX-6515DS-VTM			

Notes:
1) See Appendix B for the proposed coax layout

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
119.0	121.0	6	Andrew	E15S08P77	1 2 12	1/2 7/8 1-5/8	
		6	Ericsson	RBS 6601			
		3	KMW	AM-X-CD-17-65-00T-RET			
		6	Nextnet Wireless	BTS-2500			
		6	Powerwave	7770.00			
		6	Powerwave	LGP21401			
		1	Raycap	DC6-48-60-18-8F			
	119.0	1		20' Low Profile Platform			
107.0	109.0				6	1-5/8	2
		3	Allgon	LGP 13903	6	1-5/8	
		3	RFS Celwave	APX16PV-16PVL			
	107.0	1		Platform Mount [LP 304-1]			
100.0	100.0	3	Alcatel Lucent	RRH2X60-AWS	1	1-5/8	1
		3	Alcatel Lucent	RRH2X60-1900A-4R			
		3	Antel	BXA-70080-6CF-EDIN-X			
		3	Antel	BXA-70063-6CF-EDIN-0			
		6	Commscope	HBXX-6517DS-A2M			
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			
		1		Platform Mount [LP 303-1]	18	1-5/8	

Notes:
1) Reserved equipment; considered in this analysis
2) Existing equipment to be removed; not considered in this analysis

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
GEOTECHNICAL REPORTS	WEI Project No. 2009-872, dated 8/7/2009	4908007	CCISITES
TOWER FOUNDATION DRAWINGS	WEI Project No. 2009-872, dated 8/7/2009	4908012	CCISITES
TOWER MAPPING REPORT	GPD, dated 1/19/2009	4908008	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	119 - 84.33	Pole	TP28.7844x18.945x0.5	1	-11.09	1723.00	36.7	Pass
L2	84.33 - 45.5	Pole	TP38.8044x26.6492x0.625	2	-21.36	2916.20	46.5	Pass
L3	45.5 - 0	Pole	TP50.4674x36.1354x0.6875	3	-33.19	3869.50	47.0	Pass
							Summary	
						Pole (L3)	47.0	Pass
						Rating =	47.0	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	52.1	Pass
1	Base Plate	0	78.9	Pass
1	Base Foundation	0	40.7	Pass
1	Base Foundation Soil Interaction	0	31.5	Pass

Structure Rating (max from all components) =	78.9%

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

4.1) Recommendations

The existing tower and its foundation are sufficient for the proposed loading and do not require modifications.

5) DISCLAIMER OF WARRANTIES

GPD has not performed a site visit to the tower to verify the member sizes or antenna/coax loading. If the existing conditions are not as represented on the tower elevation contained in this report, we should be contacted immediately to evaluate the significance of the discrepancy. This is not a condition assessment of the tower or foundation. This report does not replace a full tower inspection. The tower and foundations are assumed to have been properly fabricated, erected, maintained, in good condition, twist free, and plumb.

The engineering services rendered by GPD in connection with this Structural Analysis are limited to a computer analysis of the tower structure and theoretical capacity of its main structural members. No allowance was made for any damaged, bent, missing, loose, or rusted members (above and below ground). No allowance was made for loose bolts or cracked welds.

This analysis is limited to the designated maximum wind and seismic conditions per the governing tower standards and code. Wind forces resulting in tower vibrations near the structure's resonant frequencies were not considered in this analysis and are outside the scope of this analysis. Lateral loading from any dynamic response was not evaluated under a time-domain based fatigue analysis.

GPD does not analyze the fabrication of the structure (including welding). It is not possible to have all the very detailed information needed to perform a thorough analysis of every structural sub-component and connection of an existing tower. GPD provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc. The purpose of this report is to assess the capability of adding appurtenances usually accompanied by transmission lines to the structure.

It is the owner's responsibility to determine the amount of ice accumulation in excess of the code specified amount, if any, that should be considered in the structural analysis.

The attached sketches are a schematic representation of the analyzed tower. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions, proper fit, and clearance in the field. Any mentions of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from GPD, but are beyond the scope of this report.

Miscellaneous items such as antenna mounts, etc., have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

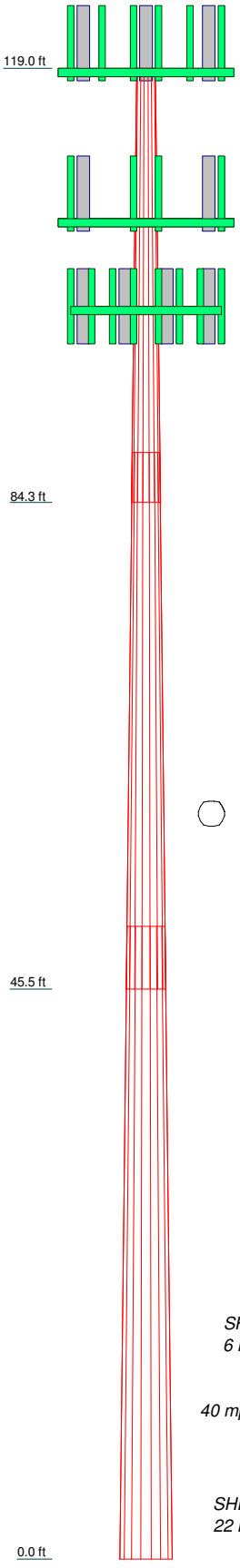
Towers are designed to carry gravity, wind, and ice loads. All members, legs, diagonals, struts, and redundant members provide structural stability to the tower with little redundancy. Absence or removal of a member can trigger catastrophic failure unless a substitute is provided before any removal. Legs carry axial loads and derive their strength from shorter unbraced lengths by the presence of redundant members and their connection to the diagonals with bolts or welds. If the bolts or welds are removed without providing any substitute to the frame, the leg is subjected to a higher unbraced length that immediately reduces its load carrying capacity. If a diagonal is also removed in addition to the connection, the unbraced length of the leg is greatly increased, jeopardizing its load carrying capacity. Failure of one leg can result in a tower collapse because there is no redundancy. Redundant members and diagonals are critical to the stability of the tower.

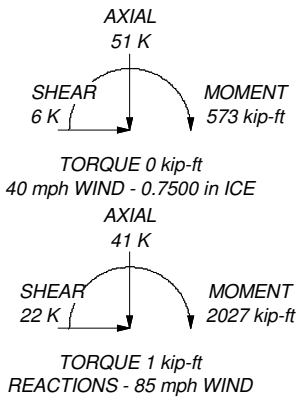
GPD makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. GPD will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report. The maximum liability of GPD pursuant to this report will be limited to the total fee received for preparation of this report.

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	34.67	18	0.5000	4.00	18.9450	28.7844	A572-50	4.4
2	42.83	18	0.6250	5.00	26.6492	38.8044		9.3
3	50.50	18	0.6875		36.1354	50.4674		16.0
								29.6





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) 7770.00 w/ Mount Pipe	119	LGP 13903	107
(2) 7770.00 w/ Mount Pipe	119	LGP 13903	107
(2) 7770.00 w/ Mount Pipe	119	LGP 13903	107
AM-X-CD-17-65-00T-RET w/ Mount Pipe	119	ATBT-BOTTOM-24V	107
AM-X-CD-17-65-00T-RET w/ Mount Pipe	119	ATBT-BOTTOM-24V	107
AM-X-CD-17-65-00T-RET w/ Mount Pipe	119	ATBT-BOTTOM-24V	107
(3) LGP21401	119	Platform Mount [LP 304-1]	107
(3) LGP21401	119	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	100
(3) E15S08P77	119	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	100
(3) E15S08P77	119	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	100
(2) RBS 6601	119	BXA-70080-6CF-EDIN-X w/ Mount Pipe	100
(2) RBS 6601	119	BXA-70080-6CF-EDIN-X w/ Mount Pipe	100
(2) RBS 6601	119	BXA-70080-6CF-EDIN-X w/ Mount Pipe	100
(3) BTS-2500	119	(2) HBXX-6517DS-A2M w/ Mount Pipe	100
(3) BTS-2500	119	(2) HBXX-6517DS-A2M w/ Mount Pipe	100
DC6-48-60-18-8F Surge Suppression Unit	119	(2) HBXX-6517DS-A2M w/ Mount Pipe	100
Pipe Mount 8'x2.375"	119	RRH2X60-1900A-4R	100
Pipe Mount 8'x2.375"	119	RRH2X60-1900A-4R	100
Pipe Mount 8'x2.375"	119	RRH2X60-1900A-4R	100
20' Low Profile Platform	119	RRH2X60-AWS	100
APX16PV-16PVL w/ Mount Pipe	107	RRH2X60-AWS	100
APX16PV-16PVL w/ Mount Pipe	107	RRH2X60-AWS	100
APX16PV-16PVL w/ Mount Pipe	107	DB-T1-6Z-8AB-0Z	100
LNX-6515DS-VTM w/ Mount Pipe	107	Platform Mount [LP 303-1]	100
LNX-6515DS-VTM w/ Mount Pipe	107		
LNX-6515DS-VTM w/ Mount Pipe	107		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi			

TOWER DESIGN NOTES

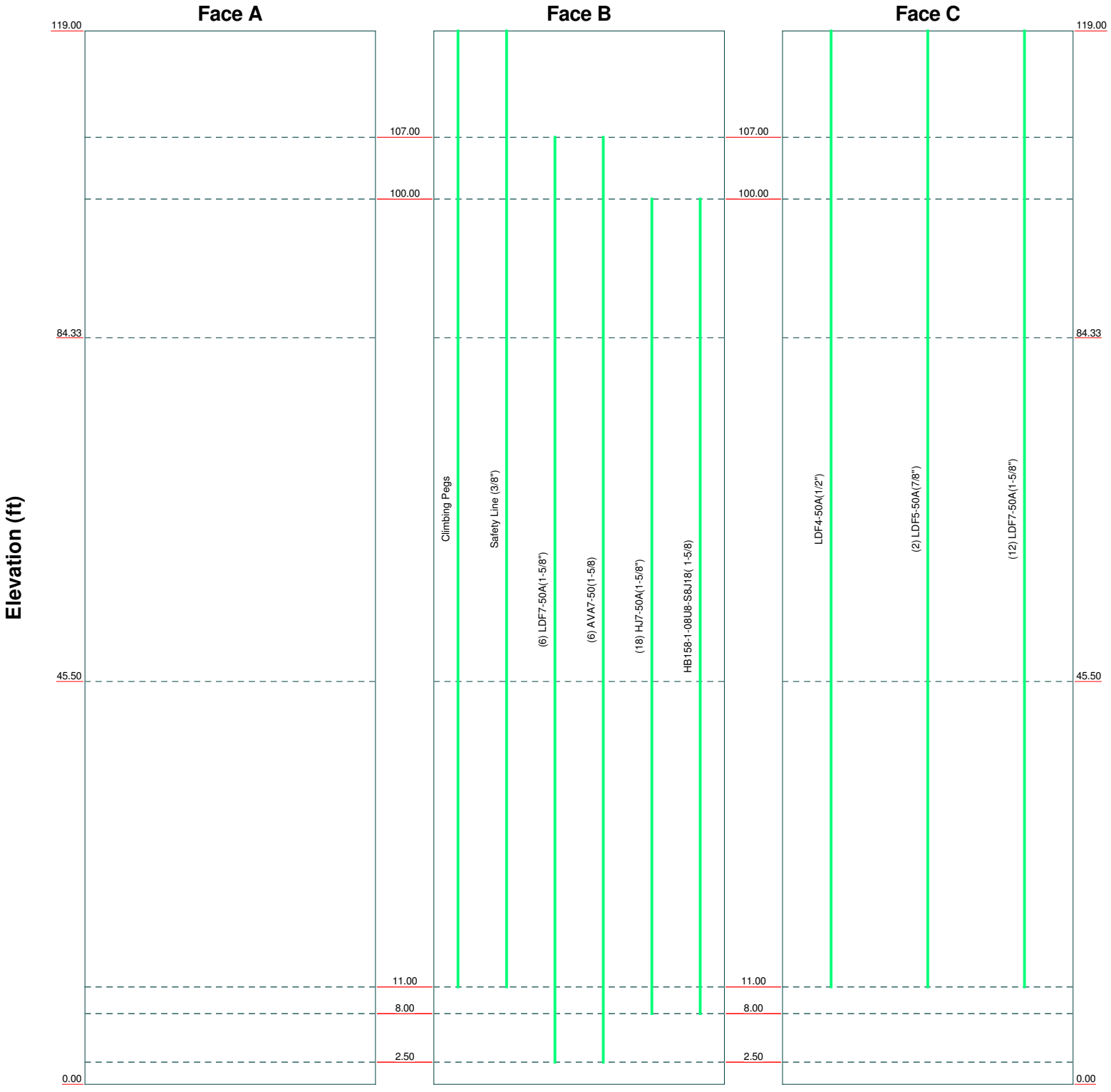
1. Tower is located in Windham County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 40 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 47%

GPD
520 South Main Street, Suite 2531
Akron, OH 44311
Phone: (330) 572-2100
FAX: (330) 572-2101

Job:	BU #: 857013, KILLINGLY ROSS ROAD		
Project:	2015777.857013.03		
Client: Crown Castle USA, Inc.	Drawn by: B Darkow	App'd:	
Code: TIA/EIA-222-F	Date: 04/28/15	Scale: NTS	
Path: \\AKRN05.gpdco.com\TELECOM\Crown\857013\03\TNX\857013.eri		Dwg No. E-1	

Feed Line Distribution Chart
0' - 119'

Round | Flat | App In Face | App Out Face | Truss Leg



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520 South Main Street, Suite 2531
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Client: Crown Castle USA, Inc.		Drawn by: B Darkow	App'd:
Code: TIA/EIA-222-F		Date: 04/28/15	Scale: NTS
Path: \\AKRN05.gpdco.com\TELECOM\Crown\857013\03\TNX\857013.eri			Dwg No. E-7

Tower Input Data

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

1) Tower is located in Windham County, Connecticut.
2) Basic wind speed of 85 mph.
3) Nominal ice thickness of 0.7500 in.
4) Ice thickness is considered to increase with height.
5) Ice density of 56 pcf.
6) A wind speed of 40 mph is used in combination with ice.
7) Temperature drop of 50 °F.
8) Deflections calculated using a wind speed of 50 mph.
9) A non-linear (P-delta) analysis was used.
10) Pressures are calculated at each section.
11) Stress ratio used in pole design is 1.333.
12) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	119.00-84.33	34.67	4.00	18	18.9450	28.7844	0.5000	2.0000	A572-50 (50 ksi)
L2	84.33-45.50	42.83	5.00	18	26.6492	38.8044	0.6250	2.5000	A572-50 (50 ksi)
L3	45.50-0.00	50.50		18	36.1354	50.4674	0.6875	2.7500	A572-50 (50 ksi)

Tapered Pole Properties

Section	*Tip Dia.*	*Area*	*I*	*r*	*C*	*I/C*	*J*	*It/Q*	*w*	*w/t*
	in	in^2	in^4	*in*	*in*	in^3	in^4	in^2	*in*	
L1	19.2373	29.2722	1258.2020	6.5480	9.6241	130.7350	2518.0595	14.6389	2.4543	4.909
	29.2284	44.8873	4536.8610	10.0410	14.6225	310.2662	9079.6917	22.4479	4.1861	8.372
L2	28.2130	51.6255	4417.2955	9.2386	13.5378	326.2936	8840.4034	25.8177	3.5903	5.744
	39.4030	75.7384	13948.018 2	13.5537	19.7126	707.5670	27914.389 6	37.8764	5.7296	9.167

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
L3	38.1338	77.3518	12279.7397	12.5840	18.3568	668.9481	24575.6375	38.6832	5.1498	7.491
	51.2459	108.6260	34007.8467	17.6719	25.6374	1326.4916	68060.4419	54.3233	7.6723	11.16

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 119.00-84.33				1	1	1		
L2 84.33-45.50				1	1	1		
L3 45.50-0.00				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
Climbing Pegs	B	No	CaAa (Out Of Face)	119.00 - 11.00	1	No Ice	0.01	0.31
						1/2" Ice	0.12	0.71
						1" Ice	0.22	1.71
						2" Ice	0.41	5.56
						4" Ice	0.82	20.59
Safety Line (3/8")	B	No	CaAa (Out Of Face)	119.00 - 11.00	1	No Ice	0.04	0.22
						1/2" Ice	0.14	0.75
						1" Ice	0.24	1.28
						2" Ice	0.44	2.34
						4" Ice	0.84	4.46
LDF4-50A(1/2")	C	No	Inside Pole	119.00 - 11.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
LDF5-50A(7/8")	C	No	Inside Pole	119.00 - 11.00	2	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
						1" Ice	0.00	0.33
						2" Ice	0.00	0.33
						4" Ice	0.00	0.33
LDF7-50A(1-5/8")	C	No	Inside Pole	119.00 - 11.00	12	No Ice	0.00	0.82
						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")	B	No	Inside Pole	107.00 - 2.50	6	No Ice	0.00	0.82
						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
AVA7-50(1-5/8)	B	No	Inside Pole	107.00 - 2.50	6	No Ice	0.00	0.70
						1/2" Ice	0.00	0.70
						1" Ice	0.00	0.70
						2" Ice	0.00	0.70
						4" Ice	0.00	0.70
HJ7-50A(1-5/8")	B	No	Inside Pole	100.00 - 8.00	18	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
						2" Ice	0.00	1.04
						4" Ice	0.00	1.04
HB158-1-08U8-S8J18(1-5/8)	B	No	Inside Pole	100.00 - 8.00	1	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
						2" Ice	0.00	1.30
						4" Ice	0.00	1.30

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	119.00-84.33	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	1.820	0.54
		C	0.000	0.000	0.000	0.000	0.37
L2	84.33-45.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	2.039	1.15
		C	0.000	0.000	0.000	0.000	0.41
L3	45.50-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	1.811	1.16
		C	0.000	0.000	0.000	0.000	0.37

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	119.00-84.33	A	0.857	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	13.711	0.61
		C		0.000	0.000	0.000	0.000	0.37
L2	84.33-45.50	A	0.812	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	15.356	1.23
		C		0.000	0.000	0.000	0.000	0.41
L3	45.50-0.00	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	13.023	1.23
		C		0.000	0.000	0.000	0.000	0.37

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	119.00-84.33	0.0664	0.0384	0.4043	0.2334
L2	84.33-45.50	0.0669	0.0386	0.4302	0.2484
L3	45.50-0.00	0.0493	0.0285	0.3216	0.1857

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) 7770.00 w/ Mount Pipe	A	From Centroid-Leg	4.00 / 0.00 / 2.00	0.0000	119.00	No Ice	6.22	4.35	0.06
						1/2" Ice	6.77	5.20	0.11
						1" Ice	7.30	5.92	0.16
						2" Ice	8.38	7.41	0.29
						4" Ice	10.69	10.76	0.68
(2) 7770.00 w/ Mount Pipe	B	From Centroid-Leg	4.00 / 0.00 / 2.00	0.0000	119.00	No Ice	6.22	4.35	0.06
						1/2" Ice	6.77	5.20	0.11
						1" Ice	7.30	5.92	0.16
						2" Ice	8.38	7.41	0.29
						4" Ice	10.69	10.76	0.68
(2) 7770.00 w/ Mount Pipe	C	From Centroid-Leg	4.00 / 0.00 / 2.00	0.0000	119.00	No Ice	6.22	4.35	0.06
						1/2" Ice	6.77	5.20	0.11
						1" Ice	7.30	5.92	0.16

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	8.38	7.41	0.29
						2" Ice	10.69	10.76	0.68
						4" Ice			
AM-X-CD-17-65-00T-RET w/ Mount Pipe	A	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice	11.31	8.70	0.09
						1/2" Ice	11.93	10.11	0.17
						1" Ice	12.55	11.38	0.26
						2" Ice	13.88	13.58	0.48
						4" Ice	16.88	18.18	1.08
AM-X-CD-17-65-00T-RET w/ Mount Pipe	B	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice	11.31	8.70	0.09
						1/2" Ice	11.93	10.11	0.17
						1" Ice	12.55	11.38	0.26
						2" Ice	13.88	13.58	0.48
						4" Ice	16.88	18.18	1.08
AM-X-CD-17-65-00T-RET w/ Mount Pipe	C	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice	11.31	8.70	0.09
						1/2" Ice	11.93	10.11	0.17
						1" Ice	12.55	11.38	0.26
						2" Ice	13.88	13.58	0.48
						4" Ice	16.88	18.18	1.08
(3) LGP21401	A	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice	1.29	0.36	0.01
						1/2" Ice	1.45	0.48	0.02
						1" Ice	1.61	0.60	0.03
						2" Ice	1.97	0.87	0.05
						4" Ice	2.79	1.52	0.14
(3) LGP21401	B	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice	1.29	0.36	0.01
						1/2" Ice	1.45	0.48	0.02
						1" Ice	1.61	0.60	0.03
						2" Ice	1.97	0.87	0.05
						4" Ice	2.79	1.52	0.14
(3) E15S08P77	A	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice	0.54	0.24	0.01
						1/2" Ice	0.64	0.31	0.01
						1" Ice	0.75	0.39	0.02
						2" Ice	0.99	0.58	0.03
						4" Ice	1.59	1.07	0.09
(3) E15S08P77	C	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice	0.54	0.24	0.01
						1/2" Ice	0.64	0.31	0.01
						1" Ice	0.75	0.39	0.02
						2" Ice	0.99	0.58	0.03
						4" Ice	1.59	1.07	0.09
(2) RBS 6601	A	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice	0.55	0.40	0.02
						1/2" Ice	0.70	0.52	0.03
						1" Ice	0.86	0.64	0.05
						2" Ice	1.19	0.91	0.09
						4" Ice	1.97	1.55	0.21
(2) RBS 6601	B	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice	0.55	0.40	0.02
						1/2" Ice	0.70	0.52	0.03
						1" Ice	0.86	0.64	0.05
						2" Ice	1.19	0.91	0.09
						4" Ice	1.97	1.55	0.21
(2) RBS 6601	C	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice	0.55	0.40	0.02
						1/2" Ice	0.70	0.52	0.03
						1" Ice	0.86	0.64	0.05
						2" Ice	1.19	0.91	0.09
						4" Ice	1.97	1.55	0.21
(3) BTS-2500	B	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice	2.12	0.96	0.04
						1/2" Ice	2.32	1.12	0.05
						1" Ice	2.53	1.29	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	2.98	1.66	0.10
						2" Ice	3.98	2.50	0.22
						4" Ice			
(3) BTS-2500	C	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.12 2.32 2.53 2.98 3.98	0.96 1.12 1.29 1.66 2.50	0.04 0.05 0.06 0.10 0.22
DC6-48-60-18-8F Surge Suppression Unit	C	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.47 1.67 1.88 2.33 3.38	1.47 1.67 1.88 2.33 3.38	0.02 0.04 0.06 0.11 0.24
Pipe Mount 8'x2.375"	A	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.90 2.73 3.40 4.40 6.50	1.90 2.73 3.40 4.40 6.50	0.03 0.05 0.07 0.12 0.30
Pipe Mount 8'x2.375"	B	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.90 2.73 3.40 4.40 6.50	1.90 2.73 3.40 4.40 6.50	0.03 0.05 0.07 0.12 0.30
Pipe Mount 8'x2.375"	C	From Centroid-Leg	4.00 0.00 2.00	0.0000	119.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.90 2.73 3.40 4.40 6.50	1.90 2.73 3.40 4.40 6.50	0.03 0.05 0.07 0.12 0.30
20' Low Profile Platform	B	None		0.0000	119.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	44.21 53.97 63.73 83.25 122.29	44.21 53.97 63.73 83.25 122.29	1.77 2.32 2.87 3.97 6.16
APX16PV-16PVL w/ Mount Pipe	A	From Centroid-Leg	4.00 0.00 2.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.79 7.23 7.68 8.60 10.54	3.05 3.65 4.27 5.55 8.43	0.06 0.11 0.16 0.28 0.63
APX16PV-16PVL w/ Mount Pipe	B	From Centroid-Leg	4.00 0.00 2.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.79 7.23 7.68 8.60 10.54	3.05 3.65 4.27 5.55 8.43	0.06 0.11 0.16 0.28 0.63
APX16PV-16PVL w/ Mount Pipe	C	From Centroid-Leg	4.00 0.00 2.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.79 7.23 7.68 8.60 10.54	3.05 3.65 4.27 5.55 8.43	0.06 0.11 0.16 0.28 0.63
LNX-6515DS-VTM w/ Mount Pipe	A	From Centroid-Leg	4.00 0.00 2.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.64 12.34 13.04 14.48 17.71	9.79 11.30 12.80 15.12 19.94	0.08 0.17 0.27 0.50 1.14
LNX-6515DS-VTM w/ Mount Pipe	B	From Centroid-Leg	4.00 0.00 2.00	0.0000	107.00	No Ice 1/2" Ice	11.64 12.34 13.04	9.79 11.30 12.80	0.08 0.17 0.27

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	14.48	15.12	0.50
						2" Ice	17.71	19.94	1.14
						4" Ice			
LNX-6515DS-VTM w/ Mount Pipe	C	From Centroid-Leg	4.00 / 0.00 / 2.00	0.0000	107.00	No Ice	11.64	9.79	0.08
						1/2" Ice	12.34	11.30	0.17
						1" Ice	13.04	12.80	0.27
						2" Ice	14.48	15.12	0.50
						4" Ice	17.71	19.94	1.14
LGP 13903	A	From Centroid-Leg	4.00 / 0.00 / 2.00	0.0000	107.00	No Ice	0.59	0.28	0.01
						1/2" Ice	0.69	0.36	0.01
						1" Ice	0.81	0.46	0.02
						2" Ice	1.06	0.67	0.04
						4" Ice	1.68	1.19	0.09
LGP 13903	B	From Centroid-Leg	4.00 / 0.00 / 2.00	0.0000	107.00	No Ice	0.59	0.28	0.01
						1/2" Ice	0.69	0.36	0.01
						1" Ice	0.81	0.46	0.02
						2" Ice	1.06	0.67	0.04
						4" Ice	1.68	1.19	0.09
LGP 13903	C	From Centroid-Leg	4.00 / 0.00 / 2.00	0.0000	107.00	No Ice	0.59	0.28	0.01
						1/2" Ice	0.69	0.36	0.01
						1" Ice	0.81	0.46	0.02
						2" Ice	1.06	0.67	0.04
						4" Ice	1.68	1.19	0.09
ATBT-BOTTOM-24V	A	From Centroid-Leg	4.00 / 0.00 / 2.00	0.0000	107.00	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	B	From Centroid-Leg	4.00 / 0.00 / 2.00	0.0000	107.00	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	C	From Centroid-Leg	4.00 / 0.00 / 2.00	0.0000	107.00	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
Platform Mount [LP 304-1]	B	None		0.0000	107.00	No Ice	17.46	17.46	1.35
						1/2" Ice	22.44	22.44	1.62
						1" Ice	27.42	27.42	1.90
						2" Ice	37.38	37.38	2.45
						4" Ice	57.30	57.30	3.55
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	A	From Centroid-Leg	4.00 / 0.00 / 0.00	0.0000	100.00	No Ice	7.75	5.58	0.04
						1/2" Ice	8.29	6.52	0.10
						1" Ice	8.85	7.33	0.16
						2" Ice	9.97	9.01	0.32
						4" Ice	12.34	12.57	0.77
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	B	From Centroid-Leg	4.00 / 0.00 / 0.00	0.0000	100.00	No Ice	7.75	5.58	0.04
						1/2" Ice	8.29	6.52	0.10
						1" Ice	8.85	7.33	0.16
						2" Ice	9.97	9.01	0.32
						4" Ice	12.34	12.57	0.77
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	C	From Centroid-Leg	4.00 / 0.00 / 0.00	0.0000	100.00	No Ice	7.75	5.58	0.04
						1/2" Ice	8.29	6.52	0.10
						Ice	8.85	7.33	0.16

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	9.97	9.01	0.32
						2" Ice	12.34	12.57	0.77
						4" Ice			
BXA-70080-6CF-EDIN-X w/ Mount Pipe	A	From Centroid-Leg	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.79 6.25 6.71 7.68 9.96	5.99 6.93 7.74 9.43 13.04	0.04 0.09 0.15 0.30 0.72
BXA-70080-6CF-EDIN-X w/ Mount Pipe	B	From Centroid-Leg	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.79 6.25 6.71 7.68 9.96	5.99 6.93 7.74 9.43 13.04	0.04 0.09 0.15 0.30 0.72
BXA-70080-6CF-EDIN-X w/ Mount Pipe	C	From Centroid-Leg	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.79 6.25 6.71 7.68 9.96	5.99 6.93 7.74 9.43 13.04	0.04 0.09 0.15 0.30 0.72
(2) HBXX-6517DS-A2M w/ Mount Pipe	A	From Centroid-Leg	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.98 9.65 10.29 11.59 14.32	6.96 8.18 9.14 11.02 15.03	0.07 0.14 0.21 0.40 0.91
(2) HBXX-6517DS-A2M w/ Mount Pipe	B	From Centroid-Leg	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.98 9.65 10.29 11.59 14.32	6.96 8.18 9.14 11.02 15.03	0.07 0.14 0.21 0.40 0.91
(2) HBXX-6517DS-A2M w/ Mount Pipe	C	From Centroid-Leg	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.98 9.65 10.29 11.59 14.32	6.96 8.18 9.14 11.02 15.03	0.07 0.14 0.21 0.40 0.91
RRH2X60-1900A-4R	A	From Centroid-Leg	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.18 2.39 2.60 3.06 4.08	1.48 1.66 1.85 2.26 3.19	0.05 0.06 0.08 0.13 0.26
RRH2X60-1900A-4R	B	From Centroid-Leg	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.18 2.39 2.60 3.06 4.08	1.48 1.66 1.85 2.26 3.19	0.05 0.06 0.08 0.13 0.26
RRH2X60-1900A-4R	C	From Centroid-Leg	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.18 2.39 2.60 3.06 4.08	1.48 1.66 1.85 2.26 3.19	0.05 0.06 0.08 0.13 0.26
RRH2X60-AWS	A	From Centroid-Leg	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.19 2.40 2.61 3.07 4.09	1.43 1.61 1.80 2.21 3.13	0.04 0.06 0.08 0.13 0.26
RRH2X60-AWS	B	From Centroid-Leg	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.19 2.40 2.61	1.43 1.61 1.80	0.04 0.06 0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	3.07	2.21	0.13
						2" Ice	4.09	3.13	0.26
						4" Ice			
RRH2X60-AWS	C	From Centroid-Leg	4.00 / 0.00 / 0.00	0.0000	100.00	No Ice	2.19	1.43	0.04
						1/2" Ice	2.40	1.61	0.06
						1" Ice	2.61	1.80	0.08
						2" Ice	3.07	2.21	0.13
						4" Ice	4.09	3.13	0.26
DB-T1-6Z-8AB-0Z	B	From Centroid-Leg	4.00 / 0.00 / 0.00	0.0000	100.00	No Ice	5.60	2.33	0.04
						1/2" Ice	5.92	2.56	0.08
						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]	B	None		0.0000	100.00	No Ice	14.66	14.66	1.25
						1/2" Ice	18.87	18.87	1.48
						1" Ice	23.08	23.08	1.71
						2" Ice	31.50	31.50	2.18
						4" Ice	48.34	48.34	3.10

Load Combinations

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

Comb. No.	Description
38	Dead+Wind 330 deg - Service

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	119 - 84.33	10.195	31	0.7776	0.0016
L2	88.33 - 45.5	5.568	31	0.6240	0.0006
L3	50.5 - 0	1.739	31	0.3290	0.0002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
119.00	(2) 7770.00 w/ Mount Pipe	31	10.195	0.7776	0.0016	44763
107.00	APX16PV-16PVL w/ Mount Pipe	31	8.299	0.7249	0.0012	18651
100.00	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	31	7.230	0.6910	0.0010	11779

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	119 - 84.33	29.423	6	2.2433	0.0047
L2	88.33 - 45.5	16.075	6	1.8013	0.0019
L3	50.5 - 0	5.021	6	0.9500	0.0006

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
119.00	(2) 7770.00 w/ Mount Pipe	6	29.423	2.2433	0.0047	15577
107.00	APX16PV-16PVL w/ Mount Pipe	6	23.955	2.0918	0.0034	6490
100.00	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	6	20.871	1.9942	0.0028	4098

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	119 - 84.33 (1)	TP28.7844x18.945x0.5	34.67	0.00	0.0	30.000	43.0858	-11.09	1292.57	0.009
L2	84.33 - 45.5 (2)	TP38.8044x26.6492x0.625	42.83	0.00	0.0	30.000	72.9235	-21.36	2187.70	0.010
L3	45.5 - 0 (3)	TP50.4674x36.1354x0.6875	50.50	0.00	0.0	30.000	96.7617	-33.19	2902.85	0.011

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 $\frac{P}{P_a}$

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	119 - 84.33 (1)	TP28.7844x18.945x0.5	343.32	14.422	30.000	0.481	0.00	0.000	30.000	0.000
L2	84.33 - 45.5 (2)	TP38.8044x26.6492x0.625	999.11	18.289	30.000	0.610	0.00	0.000	30.000	0.000
L3	45.5 - 0 (3)	TP50.4674x36.1354x0.6875	1616.90	18.465	30.000	0.615	0.00	0.000	30.000	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	119 - 84.33 (1)	TP28.7844x18.945x0.5	16.04	0.372	20.000	0.037	0.52	0.011	20.000	0.001
L2	84.33 - 45.5 (2)	TP38.8044x26.6492x0.625	18.65	0.256	20.000	0.026	0.52	0.005	20.000	0.000
L3	45.5 - 0 (3)	TP50.4674x36.1354x0.6875	20.92	0.216	20.000	0.021	0.52	0.003	20.000	0.000

Pole Interaction Design Data

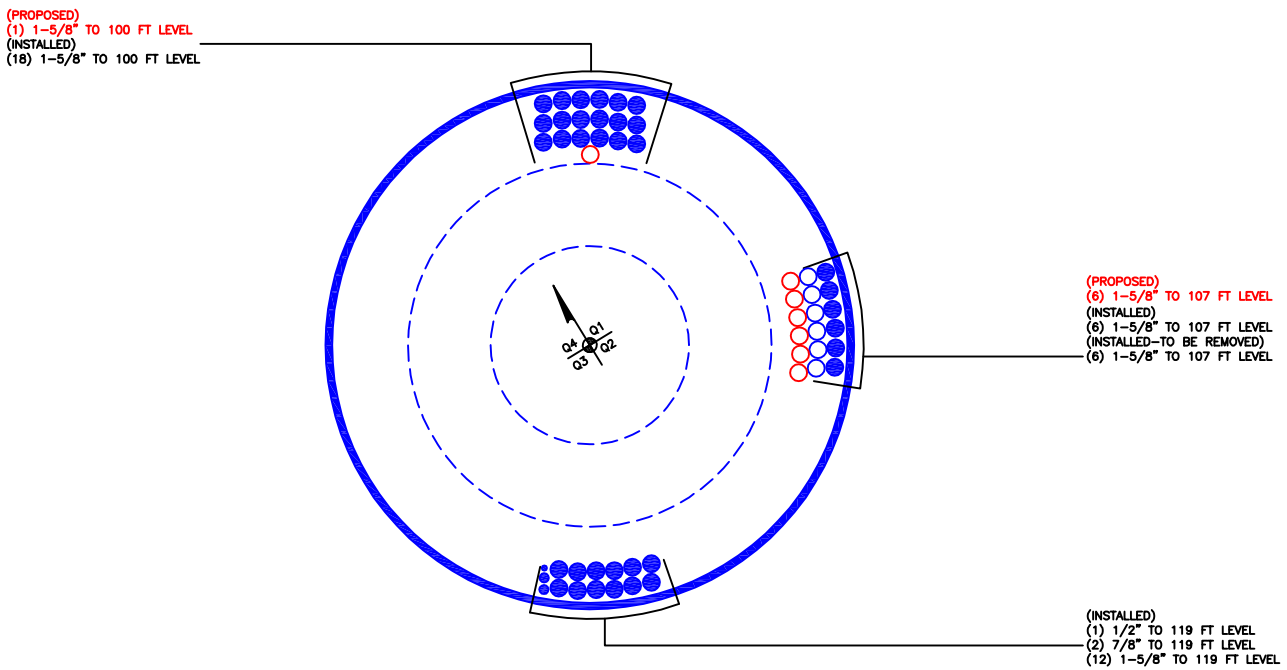
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	119 - 84.33 (1)	0.009	0.481	0.000	0.037	0.001	0.490 ✔	1.333	H1-3+VT ✔
L2	84.33 - 45.5 (2)	0.010	0.610	0.000	0.026	0.000	0.620 ✔	1.333	H1-3+VT ✔
L3	45.5 - 0 (3)	0.011	0.615	0.000	0.021	0.000	0.627 ✔	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	119 - 84.33	Pole	TP28.7844x18.945x0.5	1	-11.09	1723.00	36.7	Pass
L2	84.33 - 45.5	Pole	TP38.8044x26.6492x0.625	2	-21.36	2916.20	46.5	Pass
L3	45.5 - 0	Pole	TP50.4674x36.1354x0.6875	3	-33.19	3869.50	47.0	Pass
						Summary	ELC:	Load Case 7
						Pole (L3)	47.0	Pass
						Rating =	47.0	Pass

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 857013 TOWER ID: C_BASELEVEL

CROWN REGION ADDRESS

USA

21/04/14	NEW BUILD PER WORK ORDER #746867	AMT	
03/05/14	UPDATED PER WORK ORDER # 757719	TE	
8/9/2014	UPDATED PER WORK ORDER 771843	CMP	
22/4/2015	UPDATED PER WORK ORDER 1048274	SAT	

DRAWN BY: VJL
CHECKED BY: AMT
DRAWING DATE: 21/04/14

SITE NUMBER:
SITE NAME:

SITE NAME

KILLINGLY ROSS ROAD

BUSINESS UNIT NUMBER

857013

SITE ADDRESS

280 ROSS ROAD
KILLINGLY, CT 06239
WINDHAM COUNTY
USA

SHEET TITLE

BASE LEVEL

SHEET NUMBER

A1-0

BASE LEVEL DRAWING	1" = 1'-0"	1

PLOT DATE: 4/22/2015 FILE NAME: 857013_BASELEVEL.dwg
Xref R:\TEMPLATES\TYPICAL BLOCKS FOR TEMPLATES\TITLE BLOCK STD-VER 5.1.dwg

APPENDIX C

ADDITIONAL CALCULATIONS

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

TIA Rev F

Site Data

BU#: *857013*
Site Name: *KILLINGLY ROSS ROAD*
App #: *293312 Rev. 0*
Pole Manufacturer: *Other*

Reactions		
Moment:	2027	ft-kips
Axial:	41	kips
Shear:	22	kips

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	58.4674	in

Plate Data		
Diam:	64.4674	in
Thick:	2	in
Grade:	50	ksi
Single-Rod B-eff:	10.01	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:	50.4674	in
Thick:	0.6875	in
Grade:	50	ksi
# of Sides:	18	"0" IF Round
Fu	65	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

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

Anchor Rod Results

Maximum Rod Tension:	101.5 Kips	Rigid
Allowable Tension:	195.0 Kips	Service, ASD
Anchor Rod Stress Ratio:	52.1% **Pass**	Fty*ASIF

Base Plate Results Flexural Check

Base Plate Stress:	39.5 ksi	Rigid
Allowable Plate Stress:	50.0 ksi	Service ASD
Base Plate Stress Ratio:	78.9% **Pass**	0.75*Fy*ASIF
		Y.L. Length: 29.52

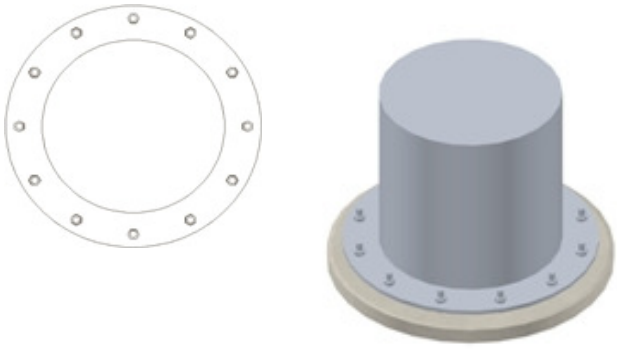
n/a

Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a



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

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

Mat Foundation Analysis
BU #: 857013, KILLINGLY ROSS ROAD
2015777.857013.02

General Info	
Code	TIA/EIA-222-F (LRFD)
Bearing On	Soil
Foundation Type	Mono Pad
Pier Type	Square
Reinforcing Known	No
Max Capacity	1.1

Tower Reactions		
Moment, M	2027	k-ft
Axial, P	41	k
Shear, V	22	k

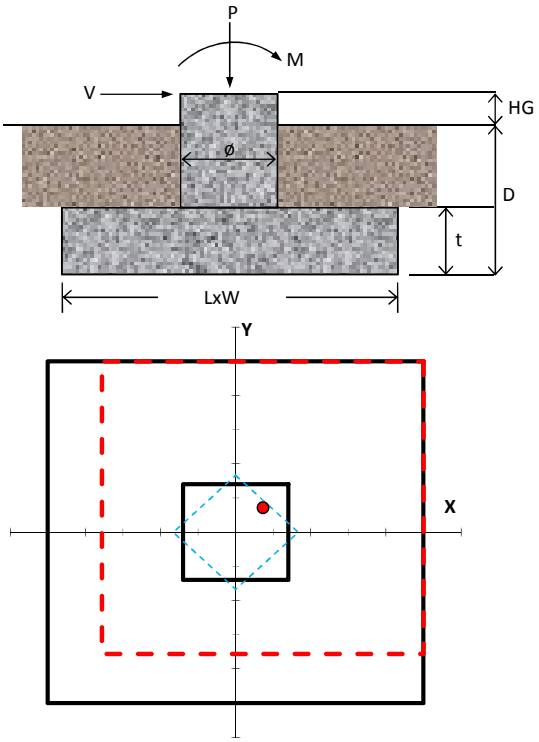
Pad & Pier Geometry		
Pier Width, ø	7	ft
Pad Length, L	25	ft
Pad Width, W	25	ft
Pad Thickness, t	3	ft
Depth, D	7	ft
Height Above Grade, HG	0.5	ft

Pad & Pier Reinforcing		
Rebar Fy	60	ksi
Concrete Fc'	3	ksi
Clear Cover	3	in
Reinforced Top & Bottom?	Yes	
Pad Reinforcing Size	# 9	
Pad Quantity Per Layer	10	
Pier Rebar Size	# 10	
Pier Quantity of Rebar	39	

Soil Properties		
Soil Type	Granular	
Soil Unit Weight	125	pcf
Angle of Friction, ø	32	°
Bearing Type	Net	
Ultimate Bearing	15	ksf
Water Table Depth	99	ft
Frost Depth	3.33	ft

Bearing Summary			Load Case
Qxmax	1.63	ksf	1.2D+1.6W
Qymax	1.63	ksf	1.2D+1.6W
Qmax @ 45°	1.69	ksf	1.2D+1.6W
$Q_{(all)\ Gross}$	11.91	ksf	
Controlling Capacity	**14.2%**	**Pass**	

Overturning Summary (Required FS=1.0)			Load Case
FS(ot)x	3.17	≥1.0	0.9D+1.6W
FS(ot)y	3.17	≥1.0	0.9D+1.6W
Controlling Capacity	**31.5%**	**Pass**	



GPD GROUP

Base Foundation Reinforcement Check
BU #: 857013, KILLINGLY ROSS ROAD
2015777.857013.02

Code
TIA/EIA-222-F

Tower Reactions		
Moment	2027.355	k-ft
Axial	40.642	k
Shear	22.121	k

Pad & Pier Geometry		
Height	7	ft
Height above Grade	0.5	ft
Pad Length, L	25	ft
Pad Width, W	25	ft
Pad Thickness	3	ft
Pier Shape	Square	
Square Pier Width	7	ft

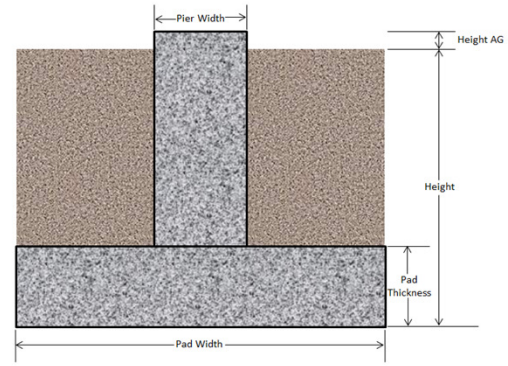
Pad & Pier Reinforcing		
Reinforcing Known	No	
f_c'	3	ksi
Clear Cover	3	in
Rebar Fy	60	ksi
Reinforced Top & Bottom?	Yes	
Pad Rebar Size	# 9	
Pad Rebar Quantity	10	
Pier Rebar Size	# 10	
Pier Rebar Quantity	39	

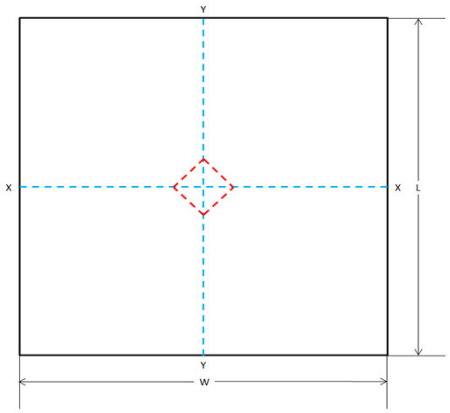
Unit Weights		
Concrete Unit Weight	150	pcf
Soil Unit Weight	125	pcf

Orthogonal Bearing		
Q_{max}	2.03	ksf
Q_{min}	0.06	ksf

Overall Capacities		
Reinforcement Capacity	40.7%	**OK**
As Min Met?	Yes	
Controlling Capacity	**40.7%**	**OK**

<--- Reinforcement unknown; minimums assumed





Pad Moment Capacity		
M_u=	22.62	k-ft
ϕM_n=	55.65	k-ft
Moment Capacity	40.7%	**OK**
One-Way (Wide-Beam) Shear		
V_u=	86.79	kips
ϕV_n=	771.66	kips
Shear Capacity	11.2%	**OK**
Two-Way (Punching) Shear		
V_u=	384.08	kips
ϕV_n=	2372.78	kips
Shear Capacity	16.2%	**OK**
Pier Compression		
P_u=	52.83	kips
ϕP_n=	10835.92	kips
Compression Capacity	0.5%	**OK**

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

T-Mobile Existing Facility

Site ID: CTNL140B

NL140/CingularRossRd_MP
280 Ross Road
Killingly, CT 06239

June 4, 2015

EBI Project Number: 6215003320

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	68.80 %

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

EBI Consulting
environmental | engineering | due diligence

June 4, 2015

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

Emissions Analysis for Site: **CTNL140B – NL140/CingularRossRd_MP**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **280 Ross Road, Killingly, 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 **280 Ross Road, Killingly, 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 **RFS APX16PV-16PVL-C-A20** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **RFS APX16PV-16PVL-C-A20** has a maximum gain of **16.3 dBd** at its main lobe. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

8) The antenna mounting height centerline of the proposed antennas is **109 feet** above ground level (AGL).

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

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	RFS APX16PV-16PVL-C-A20	Make / Model:	RFS APX16PV-16PVL-C-A20	Make / Model:	RFS APX16PV-16PVL-C-A20
Gain:	16.3 dBd	Gain:	16.3 dBd	Gain:	16.3 dBd
Height (AGL):	109	Height (AGL):	109	Height (AGL):	109
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):	10,237.91	ERP (W):	10,237.91	ERP (W):	10,237.91
Antenna A1 MPE%	3.47	Antenna B1 MPE%	3.47	Antenna C1 MPE%	3.47
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):	109	Height (AGL):	109	Height (AGL):	109
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power:	30	Total TX Power:	30	Total TX Power:	30
ERP (W):	865.21	ERP (W):	865.21	ERP (W):	865.21
Antenna A2 MPE%	0.63	Antenna B2 MPE%	0.63	Antenna C2 MPE%	0.63

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**12.29**
AT&T	24.26 %
MetroPCS	5.91 %
Verizon Wireless	26.34 %
Site Total MPE %:	**68.80 %**

T-Mobile Sector 1 Total:	4.10 %
T-Mobile Sector 2 Total:	4.10 %
T-Mobile Sector 3 Total:	4.10 %
Site Total:	68.80 %

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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:	4.10 %
Sector 2:	4.10 %
Sector 3 :	4.10 %
T-Mobile Total:	12.29 %
Site Total:	68.80 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **68.80%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Scott Heffernan
RF Engineering Director

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