NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development

May 6, 2015

Members of the Siting Council
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RE: Notice of Exempt Modification
60 Clinton Ave., Norwich, CT 06360
Longitude:-72.11025000
Latitude: 41.55548833
T-Mobile Site#: CT11331A_VOLTE

Members of the Siting Council:

On behalf of T-Mobile, Northeast Site Solutions (NSS) is submitting an exempt modification application to the Connecticut Siting Council for modification of existing equipment at a tower facility located at 50 Clinton Ave., Norwich, CT 06360.

The 60 Clinton Ave., Norwich, CT 06360 facility consists of a 149'-1" Monopole Tower owned and operated by Crown. In order to accommodate technological changes and enhance system performance in the State of Connecticut, T-Mobile plans to modify the equipment configurations at many of its existing cell sites. Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter and attachments is being sent to the chief elected official of the municipality in which the affected cell site is located.

As part of T-Mobile's VOLTE Project, T-Mobile desires to upgrade their equipment to meet the new standards of 4G technology. The new equipment will allow customers to download files and browse the internet at a high rate of speed while also allowing their phones to be compatible with the latest 4G technology.

Attached is a summary of the planned modifications, including power density calculations reflecting the change in T-Mobile's operations at the site along with the required fee of $625.

The changes to the facility do not constitute modifications as defined in Connecticut General Statutes significantly changed or altered. Rather, the planned changes to

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the facility fall squarely within those activities explicitly provided for in R.C.S.A. Section 16-50j-72(b)(2).

1. The overall height of the structure will be unaffected.

2. The proposed changes will not extend the site boundaries. There will be no effect on the site compound other than the new equipment cabinet.

3. The proposed changes will not increase the noise level at the existing facility by six decibels or more.

4. The changes in radio frequency power density will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the applicable standard for uncontrolled environments as calculated for a mixed frequency site.

For the foregoing reasons, Northeast Site Solutions (NSS) on behalf of T-Mobile, respectfully submits that the proposed changes at the referenced site constitute exempt modifications under R.C.S.A. Section 16-50j-72(b)(2).

Please feel free to call me at 860.209.4690 with any questions you may have concerning this matter.

Sincerely,

Denise Sabo
Mobile: 860-209-4690
Fax: 413-521-0558
Office: 199 Brickyard Rd, Farmington, CT 06032
Email: denise@northeastsitesolutions.com

cc: City of Norwich, Acting City Manager John Bilda
Crown Castle
Eva Lynn Hantman

Exhibit A

T-MOBILE NORTHEAST LLC

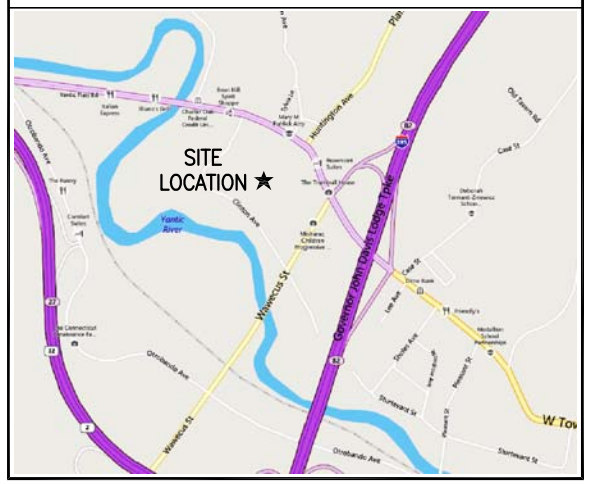
SITE #: CT11331A

SITE NAME: NORWICH

SITE ADDRESS:
50 CLINTON AVENUE
NORWICH, CT 06360

WIRELESS BROADBAND FACILITY
CONSTRUCTION DRAWINGS
(4E-GU19 CONFIGURATION)

VICINITY MAP



DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ARCHITECT IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

CALL BEFORE YOU DIG:

WWW.CBYD.COM

CALL 800 922 4455, OR 811

CALL THREE WORKING DAYS PRIOR TO DIGGING

SAFETY PRECAUTIONS SHALL BE IMPLEMENTED BY CONTRACTOR(S) AT ALL TRENCHING IN ACCORDANCE WITH CURRENT OSHA STANDARDS.

COLOR CODE FOR UTILITY LOCATIONS

ELECTRIC – RED		**SEWER**	**– GREEN**
GAS/OIL	– YELLOW	**SURVEY**	**– PINK**
TEL/CATV	– ORANGE	PROPOSED EXCAVATION	– WHITE
WATER	– BLUE	**RECLAIMED WATER**	**– PURPLE**

GENERAL NOTES

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES. RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES.
2. THE ARCHITECT/ENGINEER HAVE MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONSTRUCT DOCUMENTS THE COMPLETE SCOPE OF WORK. THE CONTRACTOR BIDDING THE JOB IS NEVERTHELESS CAUTIONED THAT MINOR OMISSIONS OR ERRORS IN THE DRAWINGS AND OR SPECIFICATIONS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.
3. THE CONTRACTOR OR BIDDER SHALL BEAR THE RESPONSIBILITY OF NOTIFYING (IN WRITING) THE T–MOBILE REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF THE CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK. IN THE EVENT OF DISCREPANCIES, THE CONTRACTOR SHALL PRICE THE MORE COSTLY OR EXPENSIVE WORK, UNLESS DIRECTED IN WRITING OTHERWISE.
4. THE SCOPE OF WORK SHALL INCLUDE FURNISHING OF ALL MATERIALS, EQUIPMENT, LABOR AND ALL OTHER MATERIALS AND LABOR DEEMED NECESSARY TO COMPLETE THE WORK/PROJECT AS DESCRIBED HEREIN.
5. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO THE SUBMISSION OF BIDS OR PERFORMING WORK TO FAMILIARIZE HIMSELF WITH THE FIELD CONDITIONS AND TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
6. THE CONTRACTOR SHALL OBTAIN AUTHORIZATION TO PROCEED WITH CONSTRUCTION PRIOR TO STARTING WORK ON ANY ITEM NOT CLEARLY DEFINED BY THE CONSTRUCTION DRAWINGS/CONTRACT DOCUMENTS.
7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO THE MANUFACTURER'S/VENDOR'S SPECIFICATIONS UNLESS NOTED OTHERWISE OR WHERE LOCAL CODES OR ORDINANCES TAKE PRECEDENCE.
8. THE CONTRACTOR SHALL PROVIDE A FULL SET OF CONSTRUCTION DOCUMENTS AT THE SITE UPDATED WITH THE LATEST REVISIONS AND ADDENDUM OR CLARIFICATIONS AVAILABLE FOR THE USE BY ALL PERSONNEL INVOLVED WITH THE PROJECT.
9. 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 CONTRACT.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ANY PERMITS AND INSPECTIONS WHICH ARE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY, OR LOCAL GOVERNMENT AUTHORITY.
11. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS, EASEMENTS, PAVING, CURBING, ETC., DURING CONSTRUCTION. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL REPAIR ANY DAMAGE THAT MAY HAVE OCCURRED DUE TO CONSTRUCTION ON OR ABOUT THE PROPERTY.
12. THE CONTRACTOR SHALL KEEP THE GENERAL WORK AREA CLEAN AND HAZARD FREE DURING CONSTRUCTION AND DISPOSE OF ALL DIRT, DEBRIS, RUBBISH AND REMOVE EQUIPMENT NOT SPECIFIED AS REMAINING ON PROPERTY. PREMISES SHALL BE LEFT IN CLEAN CONDITION AND FREE FROM PAINT SPOTS, DUST, OR SMUDGES OF ANY NATURE.
13. THE CONTRACTOR SHALL COMPLY WITH ALL OSHA REQUIREMENTS, AS WELL AS THE LATEST EDITIONS OF ANY PERTINENT STATE SAFETY REGULATIONS.
14. THE CONTRACTOR SHALL NOTIFY THE T–MOBILE REPRESENTATIVE WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE T–MOBILE REPRESENTATIVE.
15. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, PROPERTY LINES, ETC., ON THE JOB.
16. THE CONTRACTOR SHALL RETURN ALL DISTURBED AREAS TO THEIR ORIGINAL CONDITION AT THE COMPLETION OF WORK.
17. ATLANTIS GROUP, INC. HAS NOT CONDUCTED A STRUCTURAL ANALYSIS FOR THIS PROJECT AND DOES NOT ASSUME ANY LIABILITY FOR THE ADEQUACY OF THE STRUCTURE AND COMPONENTS.
18. REFER TO STRUCTURAL ANALYSIS DOCUMENT ENTITLED, "STRUCTURAL ANALYSIS REPORT" PREPARED BY FDH ENGINEERING, INC. "T–MOBILE SITE ID CT11331A", DATED MARCH 23, 2015.

SITE INFORMATION

SITE NUMBER:	CT11331A
SITE NAME:	NORWICH
SITE ADDRESS:	50 CLINTON AVENUE NORWICH, CT 06360
LAT./LONG.:	N 41.55549 / W –72.11025
JURISDICTION:	NEW LONDON COUNTY
PROPERTY OWNER:	WARREN KELLEHER, PROJECT MANAGER T: (781) 970–0055 | M: (978) 807–2700 CROWN CASTLE 500 WEST CUMMINGS PARK, SUITE 3600, WOBURN, MA 01801 WARREN.KELLEHER.VENDOR@CROWNCASTLE.COM

CODE COMPLIANCE

CONNECTICUT STATE BUILDING CODE

2005 CONNECTICUT BUILDING CODE WITH 2013 AMENDMENT
2011 NATIONAL ELECTRICAL CODE

CONSTRUCTION TYPE: 2B USE GROUP: N/A

PROJECT SUB–CONTRACTORS

APPLICANT:	T–MOBILE NORTHEAST, LLC. 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002 (860) 692–7100
PROJECT MANAGER	LISA LIN ALLEN NORTHEAST SITE SOLUTIONS 54 MAIN STREET STURBRIDGE, MA 01566 (508) 434–5237
ARCHITECT/ENGINEER:	ATLANTIS GROUP INC. 1340 CENTRE STREET SUITE 212 NEWTON CENTER, MA 02459 (617) 965–0789

SHEET INDEX

SHEET	DESCRIPTION
T–1	TITLE SHEET
N–1	GENERAL AND ELECTRICAL NOTES
A–1	PLOT PLAN, SITE PLAN AND ELEVATION
A–2	ANTENNA PLAN AND DETAILS
E–1	GROUNDING DIAGRAM
E–2	GROUNDING DETAILS

T-MOBILE NORTHEAST, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 692-7100
FAX:(860) 692-7159

ATLANTIS GROUP
1340 Centre Street, Suite 212
Newton Center, MA 02459
Office: 617–965–0789
Fax: 617–213–5056

SUBMITTALS

DATE	DESCRIPTION	REVISION
03/11/15	ISSUED FOR REVIEW	A
03/13/15	REVISION	0
04/22/15	FINAL CD	1

DEPT.	DATE	APP'D	REVISIONS
RFE			
RF MAN.			
ZONING			
OPS			
CONSTR.			
SITE AC.			

PROJECT NO:	CT11331A
DRAWN BY:	FG
CHECKED BY:	SM

PROFESSIONAL SEAL

SITE NAME
CT11331A
SITE NAME
NORWICH
SITE ADDRESS
50 CLINTON AVENUE
NORWICH, CT 06360

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1

ELECTRICAL NOTES:

WORK INCLUDED

1. INCLUDE ALL LABOR, MATERIALS, EQUIPMENT, PLANT SERVICES AND ADMINISTRATIVE TASKS REQUIRED TO COMPLETE AND MAKE OPERABLE THE ELECTRICAL WORK SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
   A. PREPARE AND SUBMIT SHOP DRAWINGS, DIAGRAMS AND ILLUSTRATIONS.
   B. PROCURE ALL NECESSARY PERMITS AND APPROVALS AND PAY ALL REQUIRED FEES AND CHARGES IN CONNECTION WITH THE WORK OF THIS CONTRACT.
   C. SUBMIT AS-BUILT DRAWINGS, OPERATING AND MAINTENANCE INSTRUCTIONS AND MANUALS.
   D. EXECUTE ALL CUTTING, DRILLING, ROUGH AND FINISH PATCHING OF EXISTING OR NEWLY INSTALLED CONSTRUCTION REQUIRED FOR THE WORK OF THIS CONTRACT. FOR SLAB PENETRATIONS THROUGH POST TENSION SLABS, X-RAY EXACT AREA OF PENETRATION PRIOR TO PERFORMING WORK. COORDINATE ALL X-RAY WORK WITH BUILDING ENGINEER.
   E. PROVIDE HANGERS, SUPPORTS, FOUNDATIONS, STRUCTURAL FRAMING SUPPORTS, AND BASES FOR CONDUIT AND EQUIPMENT PROVIDED OR INSTALLED UNDER THE WORK OF HIS CONTRACT. PROVIDE COUNTER FLASHING, SLEEVES AND SEALS FOR FLOOR AND WALL PENETRATIONS.
   F. MAINTAIN ALL EXISTING ELECTRICAL SERVICES IN THE BUILDING AREAS NOT AFFECTED BY THE ALTERATION DURING THE PROGRESS OF THE WORK INCLUDING PROVIDING ALL TEMPORARY JUMPERS, CONDUITS, CAPS, PROTECTIVE DEVICES, CONNECTIONS AND EQUIPMENT REQUIRED. PROVIDE TEMPORARY LIGHT AND POWER FOR CONSTRUCTION PURPOSES.
2. IT IS THE INTENT OF THESE DRAWINGS AND SPECIFICATIONS TO CALL FOR AN INSTALLATION THAT IS COMPLETE IN EVERY RESPECT. IT IS NOT THE INTENT TO GIVE EVERY DETAIL ON THE DRAWINGS AND IN THE SPECIFICATIONS. IF AN ITEM OF WORK IS INDICATED IN THE DRAWINGS, IT IS CONSIDERED SUFFICIENT FOR INCLUSION IN THE CONTRACT. FURNISH AND INSTALL ALL MATERIAL AND EQUIPMENT USUALLY FURNISHED OR NEEDED TO MAKE A COMPLETE INSTALLATION WHETHER OR NOT SPECIFICALLY MENTIONED IN THE CONTRACT DOCUMENTS.

GENERAL REQUIREMENTS

1. PROVIDE ALL WORK IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) AND LOCAL AND STATE ELECTRICAL CODES.
2. THE ELECTRICAL PLANS ARE DIAGRAMMATIC ONLY. REFER TO THE ARCHITECTURAL PLANS FOR THE EXACT DIMENSIONS OF THE BUILDING.
3. LOAD CALCULATIONS ARE BASED ON EXISTING BUILDING INFORMATION/DRAWINGS PROVIDED TO ENGINEERING. CONTRACTOR IS TO VERIFY ALL EXISTING RATINGS AND LOADS PRIOR TO PURCHASING OF SPECIFIED EQUIPMENT FOR COMPLIANCE TO NEC. CONTRACTOR TO NOTIFY ENGINEER OF ANY DISCREPANCIES AND REQUEST FURTHER DIRECTION BY ENGINEER.
4. EXISTING BUILDING EQUIPMENT IS NOTED ON THE DRAWINGS. NEW OR RELOCATED EQUIPMENT IS SHOWN WITH SOLID LINES. FUTURE EQUIPMENT (NOT IN THIS CONTRACT) IS DEPICTED WITH SHADED LINES. REQUEST CLARIFICATION OF DRAWINGS OR OF SPECIFICATIONS PRIOR TO PRICING OR INSTALLATION.
5. GENERAL
   A. AFTER CAREFULLY STUDYING THE DRAWINGS AND SPECIFICATIONS, AND BEFORE SUBMITTING THE PROPOSAL, MAKE A MANDATORY SITE VISIT TO ASCERTAIN CONDITIONS OF THE SITE, AND THE NATURE AND EXACT QUANTITY OF WORK TO BE PERFORMED. NO EXTRA COMPENSATION WILL BE ALLOWED FOR FAILURE TO NOTIFY THE OWNER, IN WRITING, OF ANY DISCREPANCIES THAT MAY HAVE BEEN NOTED BETWEEN THE EXISTING CONDITIONS AND THE DRAWINGS AND SPECIFICATIONS.
   B. VERIFY ALL MEASUREMENTS AT THE SITE AND BE RESPONSIBLE FOR CORRECTNESS OF SAME.
6. QUALITY, WORKMANSHIP, MATERIALS AND SAFETY
   A. PROVIDE NEW MATERIALS AND EQUIPMENT OF A DOMESTIC MANUFACTURER BY THOSE REGULARLY ENGAGED IN THE PRODUCTION AND MANUFACTURE OF SPECIFIED MATERIALS AND EQUIPMENT. WHERE UL, OR OTHER AGENCY, HAS ESTABLISHED STANDARDS FOR MATERIALS, PROVIDE MATERIALS WHICH ARE LISTED AND LABELED ACCORDINGLY. THE COMMERCIALLY STANDARD ITEMS OF EQUIPMENT AND THE SPECIFIC NAMES MENTIONED HEREIN ARE INTENDED FOR THE PROPER FUNCTIONING OF THE WORK.
   B. WORK SHALL BE PERFORMED BY WORKMEN SKILLED IN THE TRADE REQUIRED FOR THE WORK. INSTALL MATERIALS AND EQUIPMENT TO PRESENT A NEAT APPEARANCE WHEN COMPLETED AND IN ACCORDANCE WITH THE APPROVED RECOMMENDATIONS OF THE MANUFACTURER AND IN ACCORDANCE WITH CONTRACT DOCUMENTS.
   C. PROVIDE LABOR, MATERIALS, APPARATUS AND APPLIANCES ESSENTIAL TO THE FUNCTIONING OF THE SYSTEMS DESCRIBED OR INDICATED HEREIN, OR WHICH MAY BE REASONABLY IMPLIED AS ESSENTIAL WHENEVER MENTIONED IN THE CONTRACT DOCUMENT OR NOT.
   D. MAKE WRITTEN REQUESTS FOR SUPPLEMENTARY INSTRUCTIONS TO ARCHITECT/ENGINEER IN CASE OF DOUBT AS TO WORK INTENDED OR IN EVENT OF NEED FOR EXPLANATION THEREOF.
   E. PERFORMANCE AND MATERIAL REQUIREMENTS SCHEDULED OR SPECIFIED ARE MINIMUM STANDARD ACCEPTABLE. THE RIGHT TO JUDGE THE QUALITY OF EQUIPMENT THAT DEVIATES FROM THE CONTRACT DOCUMENT REMAINS SOLELY WITH ARCHITECT/ENGINEER. CONTRACT DOCUMENT OR NOT.

GUARANTEE

1. GUARANTEE MATERIALS, PARTS AND LABOR FOR WORK FOR ONE YEAR FROM THE DATE OF ISSUANCE OF OCCUPANCY PERMIT. DURING THAT PERIOD, MAKE GOOD FAULTS OR IMPERFECTIONS THAT MAY ARISE DUE TO DEFECTS OR OMISSIONS IN MATERIALS OR WORKMANSHIP WITH NO ADDITIONAL COMPENSATION AND AS DIRECTED BY ARCHITECT.

CLEANING

1. REMOVE ALL CONSTRUCTION DEBRIS RESULTING FROM THE WORK.
2. CLEAN EQUIPMENT AND SYSTEMS FOLLOWING THE COMPLETION OF THE PROJECT TO THE SATISFACTION OF THE ENGINEER.

COORDINATION AND SUPERVISION

1. CAREFULLY LAY OUT ALL WORK IN ADVANCE TO AVOID UNNECESSARY CUTTING, CHANNELING, CHASING OR DRILLING OF FLOORS, WALLS, PARTITIONS, CEILINGS OR OTHER SURFACES. WHERE SUCH WORK IS NECESSARY, HOWEVER, PATCH AND REPAIR THE WORK IN AN APPROVED MANNER BY SKILLED MECHANICS AT NO ADDITIONAL COST TO THE OWNER. RENDER FULL COOPERATION TO OTHER TRADES WHERE WORK WILL BE INSTALLED IN CLOSE PROXIMITY TO WORK OF OTHER TRADES. ASSIST IN WORKING OUT SPACE CONDITIONS. IF WORK IS INSTALLED BEFORE COORDINATION WITH OTHER TRADES, OR CAUSES INTERFERENCE, MAKE CHANGES NECESSARY TO CORRECT CONDITIONS WITHOUT EXTRA CHARGE.

SUBMITTALS

1. AS-BUILT DRAWINGS:
   A. UPON COMPLETION OF THE WORK, FURNISH TO THE OWNER "AS-BUILT" DRAWINGS.
2. SERVICE MANUALS:
   A. UPON COMPLETION OF THE WORK, FULLY INSTRUCT T-MOBILE AS TO THE OPERATION AND MAINTENANCE OF ALL MATERIAL, EQUIPMENT AND SYSTEMS.
   B. PROVIDE 3 COMPLETE BOUND SETS OF INSTRUCTIONS FOR OPERATING AND MAINTAINING ALL SYSTEMS AND EQUIPMENT.

CUTTING AND PATCHING

1. PROVIDE ALL CUTTING, DRILLING, ROUGH AND FINISH PATCHING REQUIRED TO COMPLETE THE WORK.
2. OBTAIN OWNER APPROVAL PRIOR TO CUTTING THROUGH FLOORS OR WALLS FOR PIPING OR CONDUIT.

TESTS, INSPECTION AND APPROVAL

1. BEFORE ENERGIZING ANY ELECTRICAL INSTALLATION, INSPECT EACH UNIT IN DETAIL. TIGHTEN ALL BOLTS AND CONNECTIONS (TORQUE-TIGHTEN WHERE REQUIRED) AND DETERMINE THAT ALL COMPONENTS ARE ALIGNED, AND THE EQUIPMENT IS IN SAFE, OPERATIONAL CONDITION.
2. PROVIDE THE COMPLETE ELECTRICAL SYSTEM FREE OF GROUND FAULTS AND SHORT CIRCUITS SUCH THAT THE SYSTEM WILL OPERATE SATISFACTORILY UNDER FULL LOAD CONDITIONS, WITHOUT EXCESSIVE HEATING AT ANY POINT IN THE SYSTEM.

SPECIAL REQUIREMENTS

1. DO NOT LEAVE ANY WORK INCOMPLETE NOR ANY HAZARDOUS SITUATIONS CREATED WHICH WILL AFFECT THE LIFE OR SAFETY OF THE PUBLIC AND/OR BUILDING OCCUPANTS. DO NOT INTERFERE WITH OR CUTOFF ANY OF THE EXISTING SERVICES WITHOUT THE OWNER'S WRITTEN PERMISSION.
2. WHEN NECESSARY TO TEMPORARILY DISCONNECT ANY EXISTING BUILDING UTILITIES AND SERVICE SYSTEMS, INCLUDING FEEDER OR BRANCH CIRCUITING SUPPLYING EXISTING FACILITIES, CONFER WITH THE OWNER AND ARRANGE THE PERIOD OF INTERRUPTION FOR A TIME MUTUALLY AGREED UPON. SHUTDOWN NOTE: SCHEDULE AND NOTIFY OWNER 48 HOURS PRIOR TO SHUTDOWN. ALL SHUTDOWN WORK TO BE SCHEDULED AT A TIME CONVENIENT TO OWNER.

GROUNDING

1. ROUTE ALL GROUNDING CONDUCTORS AS SHOWN ON CONDUIT/GROUNDING RISER.
2. ROUTE 500 KCMIL CU. THHN CONDUCTOR FROM THE MGB LOCATION TO BUILDING STEEL. VERIFY BUILDING STEEL IS EFFECTIVELY GROUNDED PER NEC TO THE MAIN SERVICE GROUNDING ELECTRODE CONDUCTOR (GEC).
3. MAKE ALL GROUND CONNECTIONS FROM MGB TO ELECTRICAL EQUIPMENT WITH 2 HOLE, CRIMP TYPE, BURNDY COMPRESSION TERMINATIONS, SIZED AS REQUIRED.
4. USE 1 HOLE, CRIMP TYPE, BURNDY COMPRESSIONS TERMINATIONS, SIZED AS REQUIRED, AT EQUIPMENT GROUND CONNECTIONS.
5. HIRE AN INDEPENDENT LAB TO PERFORM THE SPECIFIED OHMS TESTING. PROVIDE 4 SETS OF THE CERTIFIED DOCUMENTS TO THE OWNER FOR VERIFICATION PRIOR TO THE PROJECT COMPLETION.

RACEWAYS

1. ALL WIRING TO BE INSTALLED IN CONDUIT SYSTEMS IN ACCORDANCE WITH THE FOLLOWING:
   A. EXTERIOR FEEDERS AND CONTROL, WHERE UNDERGROUND, TO BE IN SCH 40 PVC.
   B. EXTERIOR, ABOVE GROUND POWER CONDUITS TO BE GALVANIZED RIGID STEEL (RGS).
   C. ALL TELECOMMUNICATION CONDUITS, INTERIOR/EXTERIOR, TO BE EMT.
   D. INSTALL PULL ROPES IN ALL NEW EMPTY CONDUITS INSTALLED ON THIS PROJECT.
   E. ALL TELECOM CONDUITS AND PULL BOXES INSTALLED ON THIS PROJECT TO BE LABELED "T-MOBILE". OWNER WILL PROVIDE LABELS FOR CONTRACTOR TO INSTALL.
   F. INTERIOR FEEDERS TO BE INSTALLED IN E.M.T. WITH STEEL COMPRESSION FITTINGS.
   G. MINIMUM SIZE CONDUIT TO BE ¾" TRADE SIZE UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
   H. FINAL CONNECTIONS TO MOTORS AND VIBRATING EQUIPMENT TO BE INSTALLED IN LIQUID-TIGHT FLEXIBLE METAL CONDUIT.
   I. CONDUIT TO BE RUN CONCEALED IN CEILINGS, FINISHED AREAS OR DRYWALL PARTITIONS, UNLESS OTHERWISE NOTED.
   J. THE ROUTING OF CONDUITS INDICATED ON THE DRAWINGS IS DIAGRAMMATIC. BEFORE INSTALLING ANY WORK, EXAMINE THE WORKING LAYOUTS AND SHOP DRAWINGS OF THE OTHER TRADES TO DETERMINE THE EXACT LOCATIONS AND CLEARANCES.
   K. ALL EXTERIOR MOUNTING HARDWARE TO BE GALVANIZED STEEL. COORDINATE WITH BUILDING ENGINEER PRIOR TO ATTACHING TO BUILDING STRUCTURE.
   L. PENETRATIONS OF WALLS, FLOORS AND ROOFS, FOR THE PASSAGE OF ELECTRICAL RACEWAYS, TO BE PROPERLY SEALED AFTER INSTALLATION OF RACEWAYS SO AS TO MAINTAIN THE STRUCTURAL OR WATERPROOF INTEGRITY OF THE WALL, FLOOR OR ROOF SYSTEM TO BE PENETRATED. SEAL ALL CONDUIT PENETRATIONS THROUGH FIRE OR SMOKE RATED WALLS, CEILINGS OR SMOKE TIGHT CORRIDOR PARTITIONS TO MAINTAIN PROPER RATING OF WALL OR CEILING.
   M. PROVIDE ALL CONDUIT ENDS WITH INSULATED METALLIC GROUNDING BUSHINGS.
   N. CONDUIT TO BE SUPPORTED AT MAXIMUM DISTANCE OF 8'-0", OR AS REQUIRED BY NEC, IN HORIZONTAL AND VERTICAL DIRECTIONS.
   O. PROVIDE STAINLESS STEEL BLANK COVER PLATES FOR ALL JUNCTION BOXES AND/OR OUTLET BOXES NOT USED IN EXPOSED AREAS. PROVIDE ALL OTHER UNUSED BOXES WITH STANDARD STEEL COVER PLATES.
   P. WHERE APPLICABLE, PROVIDE ROOFTOP CONDUIT SUPPORT SYSTEM, CONFORMING TO ROOFTOP WARRANTY REQUIREMENTS, PER BUILDING.

WIRES AND CABLES

1. CONTRACTOR TO COORDINATE WITH EQUIPMENT SUPPLIER AND VENDOR FOR EXACT EQUIPMENT OVER-CURRENT PROTECTION VOLTAGE, WIRE SIZE AND PLUG CONFIGURATION, IF APPLICABLE, PRIOR TO BID.
2. ALL EQUIPMENT/DEVICES TO BE PROVIDED WITH INSULATED GROUND CONDUCTOR.
3. ALL WIRE AND CABLE TO BE 600VOLT, COPPER, WITH THWN/THHN INSULATION, EXCEPT AS NOTED.
4. WIRE FOR POWER AND LIGHTING WILL NOT BE LESS THAN NO. 12AWG. ALL WIRE NO. 8 AND LARGER TO BE STRANDED.
5. CONTROL WIRING IS NOT TO BE LESS THAN NO. 14AWG, FLEXIBLE IN SINGLE CONDUCTORS OR MULTI-CONDUCTOR CABLES. CONTROL WIRING WILL CONSIST OF MULTI-CONDUCTOR CABLES WHEREVER POSSIBLE. CABLES TO BE PROVIDED WITH AN OVERALL FLAME-RETARDANT, EXTRUDED JACKET AND RATED FOR PLENUM USE. ALL CONTROL WIRE TO BE 600VOLT RATED.
6. WIRE PREVIOUSLY PULLED INTO CONDUIT IS CONSIDERED USED AND IS NOT TO BE RE-PULLED.
7. HOME RUNS AND BRANCH CIRCUIT WIRING FOR 20A, 120V CIRCUITS:

LENGTH (FT.)	HOME RUN WIRE SIZE
0 TO 50	NO. 12
51 TO 100	NO. 10
101 TO 150	NO. 8

8. VOLTAGE DROP IS NOT TO EXCEED 3%.
9. MAKE ALL CONNECTIONS WITH UL APPROVED, SOLDERLESS, PRESSURE TYPE INSULATED CONNECTORS: SCOTCHLOK OR AND APPROVED EQUAL.

WIRING DEVICES

1. ALL RECEPTACLES INSTALLED IN THIS PROJECT TO BE GROUNDING TYPE, WITH GROUNDING PIN SLOT CONNECTED TO DEVICE GROUND SCREW FOR GROUND WIRE CONNECTION.

DISCONNECT SWITCHES AND FUSES

1. DISCONNECT SWITCHES TO BE VOLTAGE-RATED TO SUIT THE CHARACTERISTICS OF THE SYSTEM FROM WHICH THEY ARE SUPPLIED.
2. PROVIDE HEAVY-DUTY, METAL-ENCLOSED, EXTERNALLY-OPERATED DISCONNECT SWITCHES, FUSED OR UNFUSED, OF SUCH TYPE AND SIZE AS REQUIRED TO PROPERLY PROTECT OR DISCONNECT THE LOAD FOR WHICH THEY ARE INTENDED.
3. PROVIDE NEMA 1 DISCONNECT SWITCHES FOR INTERIOR INSTALLATION, NEMA 3R FOR EXTERIOR INSTALLATION.
4. DISCONNECT SWITCHES TO BE MANUFACTURED BY:
   A. GENERAL ELECTRIC COMPANY
   B. SQUARE-D
5. PROVIDE RK-1 TYPE FUSES, UNLESS NOTED OTHERWISE.

INSTALLATION

1. INSTALL DISCONNECT SWITCHES WHERE INDICATED ON DRAWINGS.
2. INSTALL FUSES IN FUSIBLE DISCONNECT SWITCHES. FUSES MUST MATCH IN TYPE AND RATING.
3. FUSES TO BE MOUNTED SO THAT THE LABELS SHOWING THEIR RATINGS CAN BE READ WITHOUT REQUIRING FUSE REMOVAL.
4. FURNISH AND DEPOSIT SPARE FUSES AT THE JOB SITE AS FOLLOWS:
   A. THREE SPARES FOR EACH TYPE AND SIZE, IN EXCESS OF 60A, USED FOR INITIAL FUSING.
   B. TEN PERCENT SPARES FOR EACH TYPE AND SIZE, UP TO AND INCLUDING 60A, USED FOR INITIAL FUSING. IN NO CASE WILL LESS THAN THREE FUSES OF ONE PARTICULAR TYPE AND SIZE BE FURNISHED.

GENERAL NOTES:

INTENT

1. THESE SPECIFICATIONS AND CONSTRUCTION DRAWINGS ACCOMPANYING THEM DESCRIBE THE WORK TO BE DONE AND THE MATERIALS TO BE FURNISHED FOR CONSTRUCTION.
2. THE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO BE FULLY EXPLANATORY AND SUPPLEMENTARY. HOWEVER, SHOULD ANYTHING BE SHOWN, INDICATED, OR SPECIFIED ON ONE AND NOT THE OTHER, IT SHALL BE DONE THE SAME AS IF SHOWN, INDICATED OR SPECIFIED IN BOTH
3. THE INTENTION OF THE DOCUMENTS IS TO INCLUDE ALL LABOR AND MATERIALS REASONABLY NECESSARY FOR THE PROPER EXECUTION AND COMPLETION OF THE WORK AS STIPULATED IN THE CONTRACT.
4. THE PURPOSE OF THE SPECIFICATIONS IS TO INTERPRET THE INTENT OF THE DRAWINGS AND TO DESIGNATE THE METHOD OF THE PROCEDURE, TYPE AND QUALITY OF MATERIALS REQUIRED TO COMPLETE THE WORK.
5. MINOR DEVIATIONS FROM THE DESIGN LAYOUT ARE ANTICIPATED AND SHALL BE CONSIDERED AS PART OF THE WORK. NO CHANGES THAT ALTER THE CHARACTER OF THE WORK WILL BE MADE OR PERMITTED BY THE OWNER WITHOUT ISSUING A CHANGE ORDER.

CONFLICTS

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATIONS OF ALL MEASUREMENTS AT THE SITE BEFORE ORDERING ANY MATERIALS OR DOING ANY WORK. NO EXTRA CHARGE OR COMPENSATION SHALL BE ALLOWED DUE TO DIFFERENCE BETWEEN ACTUAL DIMENSIONS AND DIMENSIONS INDICATED ON THE CONSTRUCTION DRAWINGS. ANY SUCH DISCREPANCY IN DIMENSION WHICH MAY BE FOUND SHALL BE SUBMITTED TO THE OWNER FOR CONSIDERATION BEFORE THE CONTRACTOR PROCEEDS WITH THE WORK IN THE AFFECTED AREAS.
2. THE BIDDER, IF AWARDED THE CONTRACT, WILL NOT BE ALLOWED ANY EXTRA COMPENSATION BY REASON OF ANY MATTER OR THING CONCERNING SUCH BIDDER MIGHT HAVE FULLY INFORMED THEMSELVES PRIOR TO THE BIDDING.
3. NO PLEA OF IGNORANCE OF CONDITIONS THAT EXIST, OR OF DIFFICULTIES OR CONDITIONS THAT MAY BE ENCOUNTERED, OR OF ANY OTHER RELEVANT MATTER CONCERNING THE WORK TO BE PERFORMED IN THE EXECUTION OF THE WORK WILL BE ACCEPTED AS AN EXCUSE FOR ANY FAILURE OR OMISSION ON THE PART OF THE CONTRACTOR TO FULFILL EVERY DETAIL OF ALL THE REQUIREMENTS OF THE CONTRACT DOCUMENTS GOVERNING THE WORK.

CONTRACTS AND WARRANTIES

1. CONTRACTOR IS RESPONSIBLE FOR APPLICATION AND PAYMENT OF CONTRACTOR LICENSES AND BONDS.
2. SEE MASTER CONTRACTION SERVICES AGREEMENT FOR ADDITIONAL DETAILS.

STORAGE

1. ALL MATERIALS MUST BE STORED IN A LEVEL AND DRY FASHION AND IN A MANNER THAT DOES NOT NECESSARILY OBSTRUCT THE FLOW OF OTHER WORK. ANY STORAGE METHOD MUST MEET ALL RECOMMENDATIONS OF THE ASSOCIATED MANUFACTURER.

CLEANUP

1. THE CONTRACTORS SHALL, AT ALL TIMES, KEEP THE SITE FREE FROM ACCUMULATION OF WASTE MATERIALS OR RUBBISH CAUSED BY THEIR EMPLOYEES AT WORK AND AT THE COMPLETION OF THE WORK. THEY SHALL REMOVE ALL RUBBISH FROM AND ABOUT THE BUILDING AREA, INCLUDING ALL THEIR TOOLS, SCAFFOLDING AND SURPLUS MATERIALS AND SHALL LEAVE THEIR WORK CLEAN AND READY TO USE.
2. EXTERIOR
   A. VISUALLY INSPECT EXTERIOR SURFACES AND REMOVE ALL TRACES OF SOIL, WASTE MATERIALS, SMUDGES AND OTHER FOREIGN MATTER.
   B. REMOVE ALL TRACES OF SPLASHED MATERIALS FROM ADJACENT SURFACES.
   C. IF NECESSARY, TO ACHIEVE A UNIFORM DEGREE OF CLEANLINESS, HOSE DOWN THE EXTERIOR OF THE STRUCTURE.
3. INTERIOR
   A. VISUALLY INSPECT INTERIOR SURFACE AND REMOVE ALL TRACES OF SOIL, WASTE MATERIALS, SMUDGES AND OTHER FOREIGN MATTER FROM WALLS, FLOOR, AND CEILING.
   B. REMOVE ALL TRACES OF SPLASHED MATERIALS FROM ADJACENT SURFACES.
   C. REMOVE PAINT DROPPINGS, SPOTS, STAINS, AND DIRT FROM FINISHED SURFACES.

CHANGE ORDER PROCEDURE:

1. REFER TO SECTION 17 OF SIGNED MCSA: SEE PROFESSIONAL SERVICE AGREEMENT FOR MCSA.

RELATED DOCUMENTS AND COORDINATION

1. GENERAL CARPENTRY, ELECTRICAL AND ANTENNA DRAWINGS ARE INTERRELATED. IN PERFORMANCE OF THE WORK, THE CONTRACTOR MUST REFER TO ALL DRAWINGS. ALL COORDINATION TO BE THE RESPONSIBILITY OF THE CONTRACTOR.

SHOP DRAWINGS

1. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AS REQUIRED AND LISTED IN THESE SPECIFICATIONS TO THE OWNER FOR APPROVAL.
2. ALL SHOP DRAWINGS SHALL BE REVIEWED, CHECKED AND CORRECTED BY CONTRACTOR PRIOR TO SUBMITTAL TO THE OWNER.

PRODUCTS AND SUBSTITUTIONS

1. SUBMIT 3 COPIES OF EACH REQUEST FOR SUBSTITUTION. IN EACH REQUEST, IDENTIFY THE PRODUCT OR FABRICATION OR INSTALLATION METHOD TO BE REPLACED BY THE SUBSTITUTION. INCLUDE RELATED SPECIFICATION SECTION AND DRAWING NUMBERS AND COMPLETE DOCUMENTATION SHOWING COMPLIANCE WITH THE REQUIREMENTS FOR SUBSTITUTIONS.
2. SUBMIT ALL NECESSARY PRODUCT DATA AND CUT SHEETS WHICH PROPERLY INDICATE AND DESCRIBE THE ITEMS, PRODUCTS AND MATERIALS BEING INSTALLED. THE CONTRACTOR SHALL, IF DEEMED NECESSARY BY THE OWNER, SUBMIT ACTUAL SAMPLES TO THE OWNER FOR APPROVAL IN LIEU OF CUT SHEETS.

QUALITY ASSURANCE

1. ALL WORK SHALL BE IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS. THESE SHALL INCLUDE, BUT NOT BE LIMITED TO THE APPLICABLE CODES SET FORTH BY THE LOCAL GOVERNING BODY. SEE "CODE COMPLIANCE" T-1.

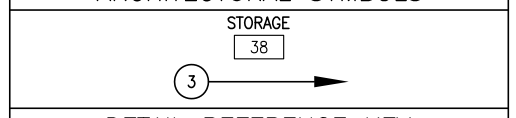
ADMINISTRATION

1. BEFORE THE COMMENCEMENT OF ANY WORK, THE CONTRACTOR WILL ASSIGN A PROJECT MANAGER WHO WILL ACT AS A SINGLE POINT OF CONTACT FOR ALL PERSONNEL INVOLVED IN THIS PROJECT. THIS PROJECT MANAGER WILL DEVELOP A MASTER SCHEDULE FOR THE PROJECT WHICH WILL BE SUBMITTED TO THE OWNER PRIOR TO THE COMMENCEMENT OF ANY WORK.
2. SUBMIT A BAR TYPE PROGRESS CHART, NOT MORE THAN 3 DAYS AFTER THE DATE ESTABLISHED FOR COMMENCEMENT OF THE WORK ON THE SCHEDULE, INDICATING A TIME BAR FOR EACH MAJOR CATEGORY OR UNIT OF WORK TO BE PERFORMED AT THE SITE, PROPERLY SEQUENCED AND COORDINATED WITH OTHER ELEMENTS OF WORK AND SHOWING COMPLETION OF THE WORK SUFFICIENTLY IN ADVANCE OF THE DATE ESTABLISHED FOR SUBSTANTIAL COMPLETION OF THE WORK.
3. PRIOR TO COMMENCING CONSTRUCTION, THE OWNER SHALL SCHEDULE AN ON-SITE MEETING WITH ALL MAJOR PARTIES. THIS WOULD INCLUDE, BUT NOT LIMITED TO, THE OWNER, PROJECT MANAGER, CONTRACTOR, LAND OWNER REPRESENTATIVE, LOCAL TELEPHONE COMPANY, TOWER ERECTION FOREMAN (IF SUBCONTRACTED).
4. CONTRACTOR SHALL BE EQUIPPED WITH SOME MEANS OF CONSTANT COMMUNICATIONS, SUCH AS A MOBILE PHONE OR A BEEPER. THIS EQUIPMENT WILL NOT BE SUPPLIED BY THE OWNER, NOR WILL WIRELESS SERVICE BE ARRANGED.
5. DURING CONSTRUCTION, CONTRACTOR MUST ENSURE THAT EMPLOYEES AND SUBCONTRACTORS WEAR HARD HATS AT ALL TIMES. CONTRACTOR WILL COMPLY WITH ALL WPCS SAFETY REQUIREMENTS IN THEIR AGREEMENT.
6. PROVIDE WRITTEN DAILY UPDATES ON SITE PROGRESS TO THE OWNER.
7. COMPLETE INVENTORY OF CONSTRUCTION MATERIALS AND EQUIPMENT IS REQUIRED PRIOR TO START OF CONSTRUCTION.
8. NOTIFY THE OWNER/PROJECT MANAGER IN WRITING NO LESS THAN 48 HOURS IN ADVANCE OF CONCRETE POURS, TOWER ERECTIONS, AND EQUIPMENT CABINET PLACEMENTS.

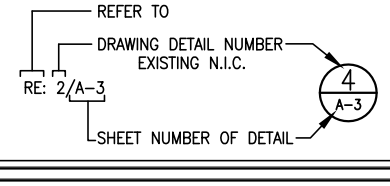
INSURANCE AND BONDS

1. CONTRACTOR, AT THEIR OWN EXPENSE, SHALL CARRY AND MAINTAIN, FOR THE DURATION OF THE PROJECT, ALL INSURANCE, AS REQUIRED AND LISTED, AND SHALL NOT COMMENCE WITH THEIR WORK UNTIL THEY HAVE PRESENTED AN ORIGINAL CERTIFICATE OF INSURANCE STATING ALL COVERAGES TO THE OWNER. REFER TO THE MASTER AGREEMENT FOR REQUIRED INSURANCE LIMITS.
2. THE OWNER SHALL BE NAMED AS AN ADDITIONAL INSURED ON ALL POLICIES.
3. CONTRACTOR MUST PROVIDE PROOF OF INSURANCE.

ARCHITECTURAL SYMBOLS



DETAIL REFERENCE KEY



ABBREVIATIONS

ADJ	ADJUSTABLE
AGL	ABOVE GROUND LINE
&	AND
APPROX	APPROXIMATE
@	AT
BTS	BASE TRANSMISSION STATION
CAB	CABINET
CLG	CEILING
CONC	CONCRETE
CONT	CONTINUOUS
DIA OR ø	DIAMETER
DWG	DRAWING
EA	EACH
ELEC	ELECTRICAL
ELEV	ELEVATION
EQ	EQUAL
EQUIP	EQUIPMENT
EGB	EQUIPMENT GROUND BAR
(E)	EXISTING
EXT	EXTERIOR
FF	FINISHED FLOOR
GA	GAUGE
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GRND	GROUND
LG	LONG
MAX	MAXIMUM
MECH	MECHANICAL
MW	MICROWAVE DISH
MFR	MANUFACTURER
MGB	MASTER GROUND BAR
MIN	MINIMUM
MTL	METAL
(N)	NEW
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OC	ON CENTER
OPP	OPPOSITE
(P)	PROPOSED
PCS	PERSONAL COMMUNICATION SYSTEM
PPC	POWER PROTECTION CABINET
SF	SQUARE FOOT
SHT	SHEET
SIM	SIMILAR
SS	STAINLESS STEEL
STL	STEEL
TOC	TOP OF CONCRETE
TOM	TOP OF MASONRY
TYP	TYPICAL
VIF	VERIFY IN FIELD
UON	UNLESS OTHERWISE NOTED
WWF	WELDED WIRE FABRIC
W/	WITH

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Newton Center, MA 02459
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SUBMITTALS		
DATE	DESCRIPTION	REVISION
03/11/15	ISSUED FOR REVIEW	A
03/13/15	REVISION	0
04/22/15	FINAL CD	1

DEPT.	DATE	APP'D	REVISIONS
RFE			
RF MAN.			
ZONING			
OPS			
CONSTR.			
SITE AC.			

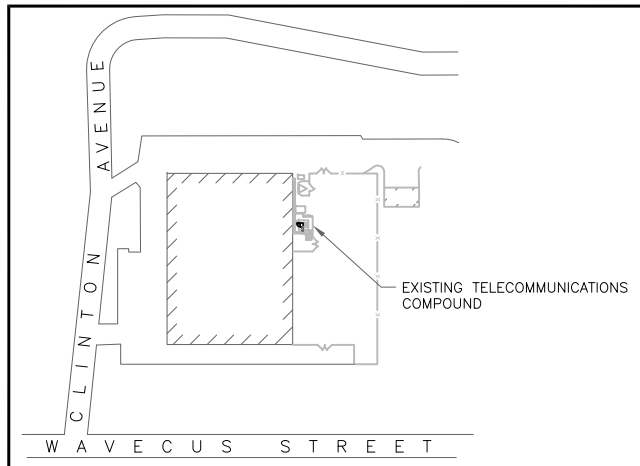
PROJECT NO:	CT11331A
DRAWN BY:	FG
CHECKED BY:	SM

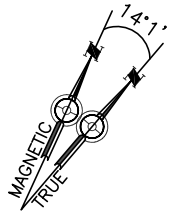
PROFESSIONAL SEAL

SITE NAME
CT11331A
SITE NAME
NORWICH
SITE ADDRESS
50 CLINTON AVENUE
NORWICH, CT 06360

SHEET TITLE
GENERAL AND ELECTRICAL NOTES

SHEET NUMBER
N-1

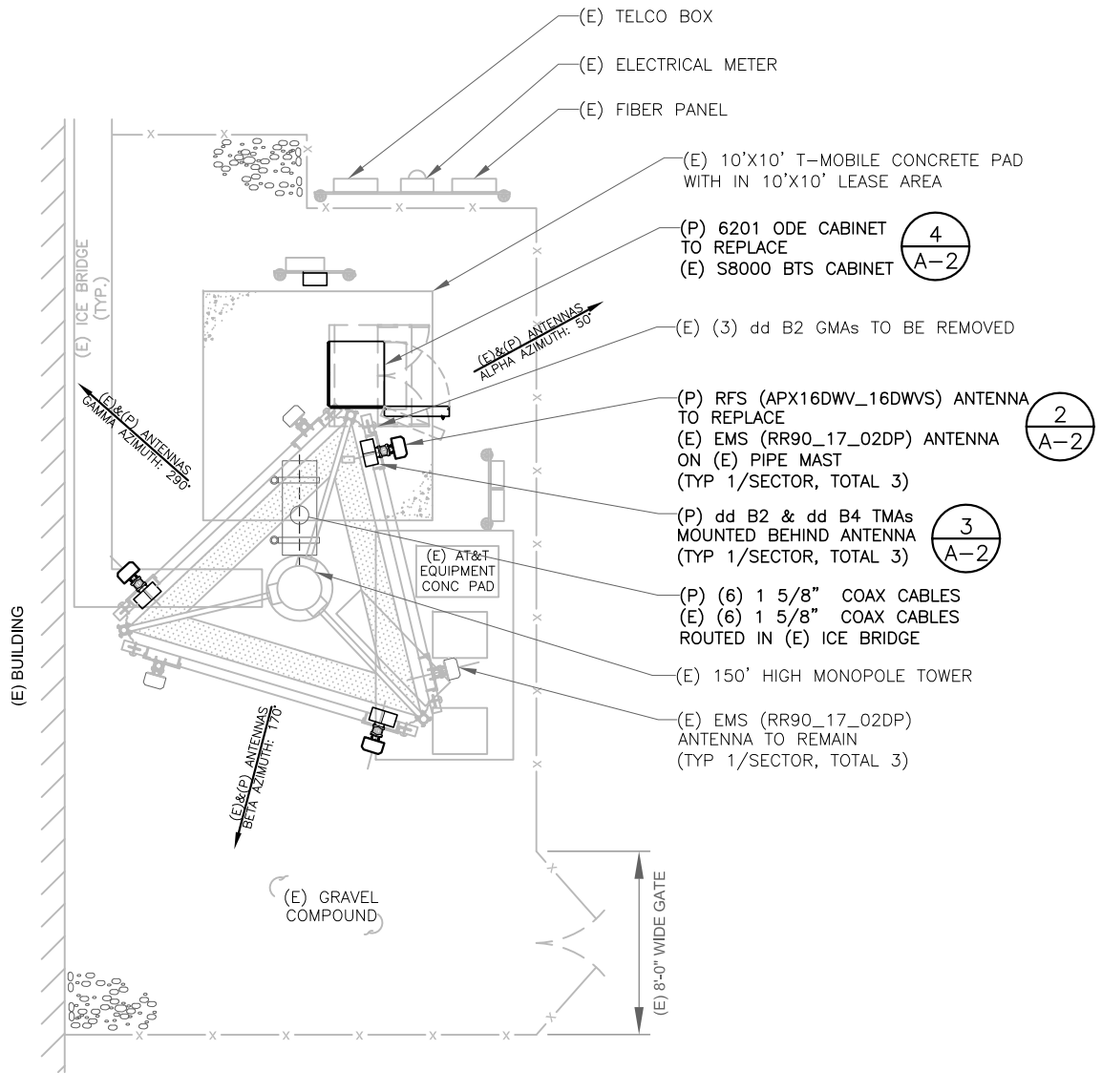




KEY PLAN

SCALE: N.T.S.

1 / A-1



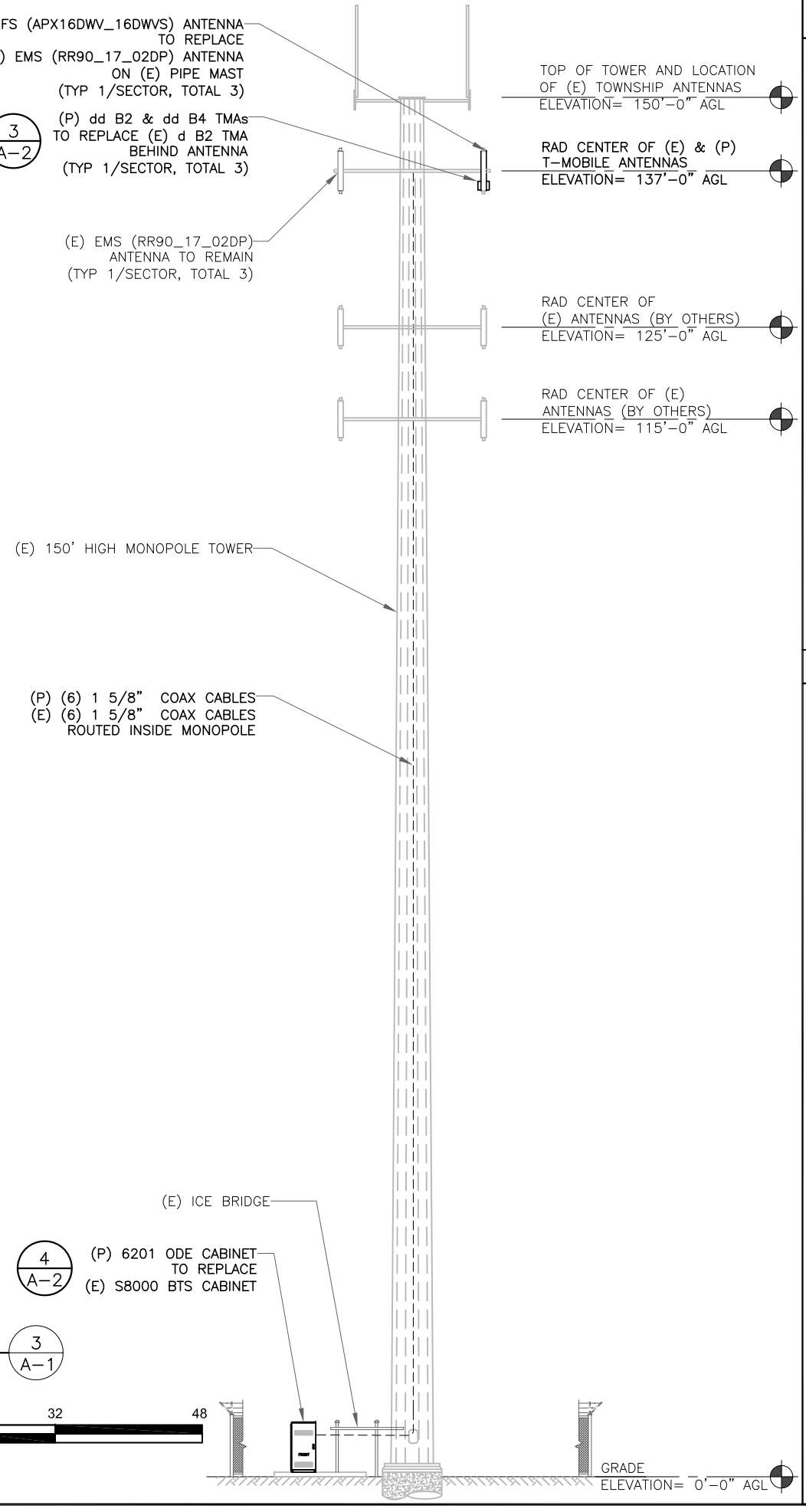
SITE PLAN

SCALE: 1/8" = 1' (11x17)
1/4" = 1' (24x36)

2 / A-1

0 8 16 24

SCALE 1/8"=1' (11x17)
1/4"=1' (24x36)



ELEVATION

SCALE: 1/16" = 1' (11x17)
1/8" = 1' (24x36)

3 / A-1

0 16 32 48

SCALE 1/16"=1' (11x17)
1/8" =1' (24x36)

GENERAL SITE NOTES

1. SITE INFORMATION WAS OBTAINED FROM A FIELD INVESTIGATION PERFORMED BY ATLANTIS GROUP, INC. CONTRACTOR TO FIELD VERIFY DIMENSIONS AS NECESSARY BEFORE CONSTRUCTION.

2. THE PROPOSED DEVELOPMENT DOES NOT INCLUDE SIGNS OF ADVERTISING.

3. THE PROPOSED DEVELOPMENT IS UNMANNED AND THEREFORE DOES NOT REQUIRE A MEANS OF WATER SUPPLY OR SEWAGE DISPOSAL.

4. NO LANDSCAPING WORK IS PROPOSED IN CONJUNCTION WITH THIS DEVELOPMENT OTHER THAN THAT WHICH IS SHOWN.

5. THE PROPOSED DEVELOPMENT DOES NOT INCLUDE OUTDOOR STORAGE OR ANY SOLID WASTE RECEPTACLES.

6. UTILITIES SHOWN ON PLAN ARE TAKEN FROM OWNERS RECORDS AND FIELD LOCATION OF VISIBLE SURFACE FEATURES. THE EXISTENCE, EXTENT AND EXACT HORIZONTAL AND VERTICAL LOCATIONS OF UTILITIES HAS NOT BEEN VERIFIED. ANY CONTRACTOR PERFORMING WORK ON THIS SITE MUST CONTACT CALL BEFORE YOU DIG THREE WORKING DAYS PRIOR TO COMMENCING WORK.

7. ALL OBSOLETE OR UNUSED FACILITIES SHALL BE REMOVED WITHIN 12 MONTHS OF CESSATION OF OPERATIONS.

SITE LEGEND

- SITE PROPERTY LINE
- STREET OR ROAD
- CHAIN LINK FENCE
- OPAQUE WOODEN FENCE
- BOARD ON BOARD FENCE
- DECIDUOUS TREES/SHRUBS
- EVERGREEN TREES/SHRUBS
- TREE LINE
- UTILITY POLE
- (E) EXISTING
- (N) NEW
- (P) PROPOSED
- (F) FUTURE
- PROP. LTE ANTENNA
- PROP. UMTS/GSM ANTENNA
- EX. GSM ANTENNA
- EX. UMTS ANTENNA

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RF MAN.			
ZONING			
OPS			
CONSTR.			
SITE AC.			

PROJECT NO:	CT11331A
DRAWN BY:	FG
CHECKED BY:	SM

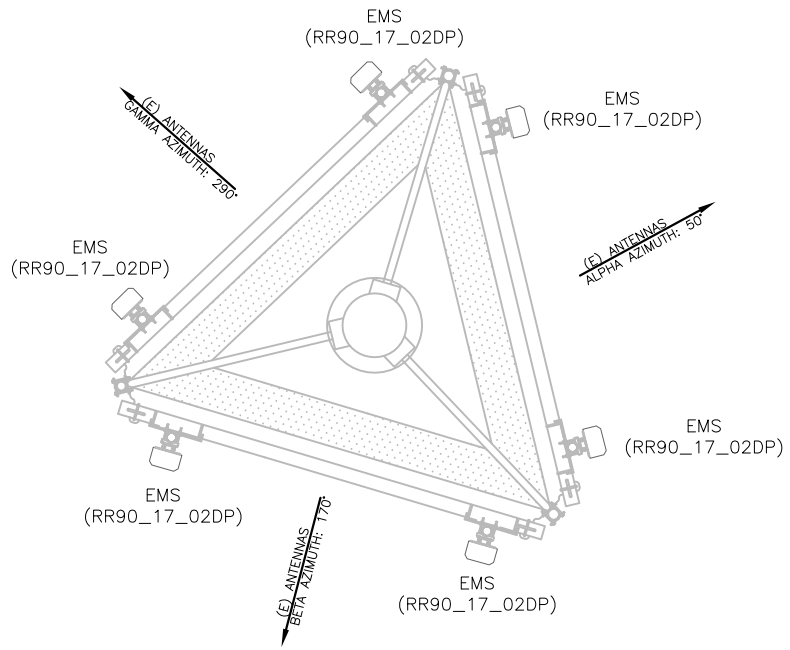
PROFESSIONAL SEAL

SITE NAME
CT11331A
SITE NAME
NORWICH
SITE ADDRESS
50 CLINTON AVENUE
NORWICH, CT 06360

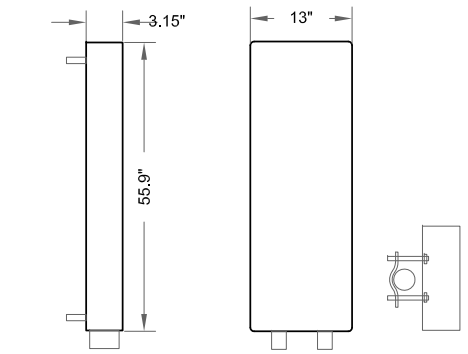
SHEET TITLE
PLOT PLAN,
SITE PLAN
AND
ELEVATION

SHEET NUMBER
A-1

REFER TO STRUCTURAL ANALYSIS DOCUMENT ENTITLED, "STRUCTURAL ANALYSIS REPORT"
PREPARED BY FDH ENGINEERING, INC. "T-MOBILE SITE ID CT11331A", DATED MARCH 23, 2015.



EXISTING ANTENNA

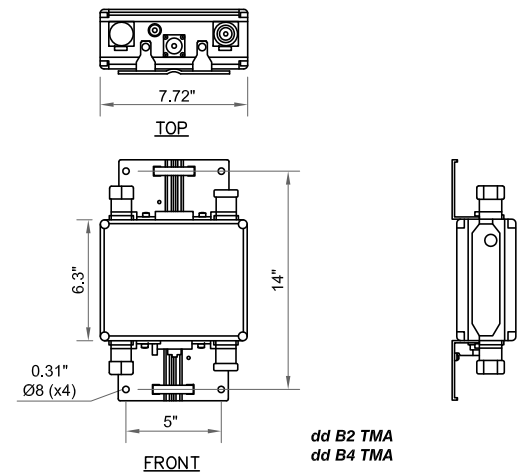


SIDEVIEW FRONT VIEW TOPVIEW

MANUFACTURE: RFS:
MODEL NO. APX16DWV-16DWVS
DIMENSIONS - HxWxD, (IN) 55.9x13x3.15

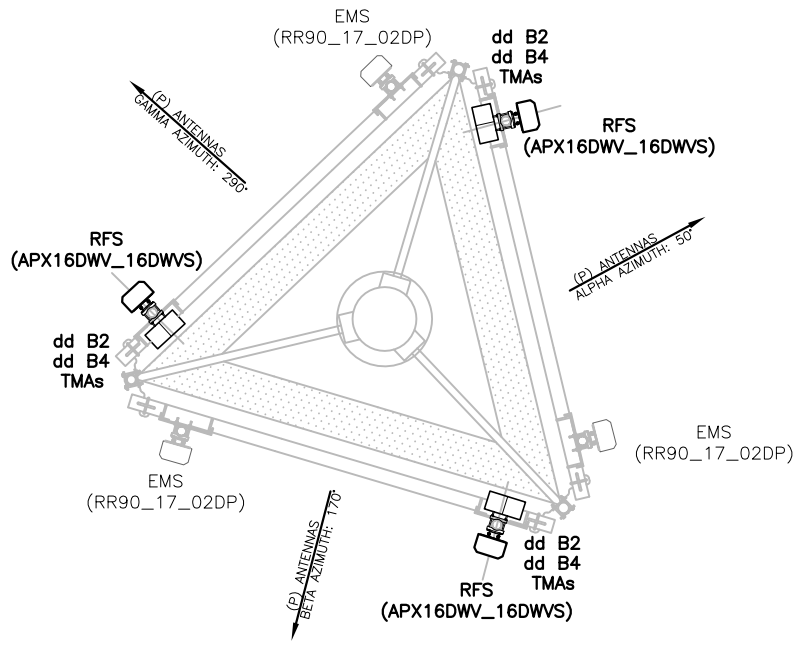
RFS ANTENNA DETAILS 2 A-2

SCALE: N.T.S



TMA DETAIL 3 A-2

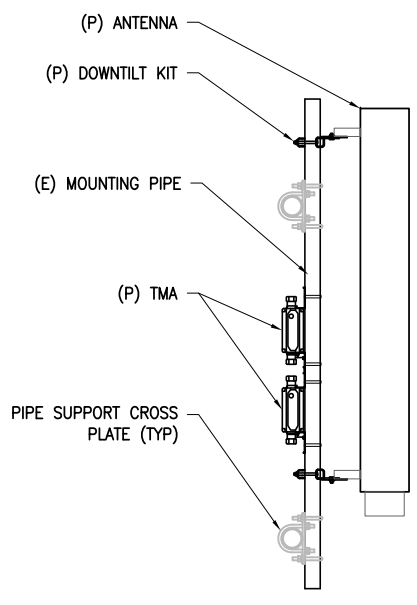
SCALE: N.T.S



PROPOSED ANTENNA

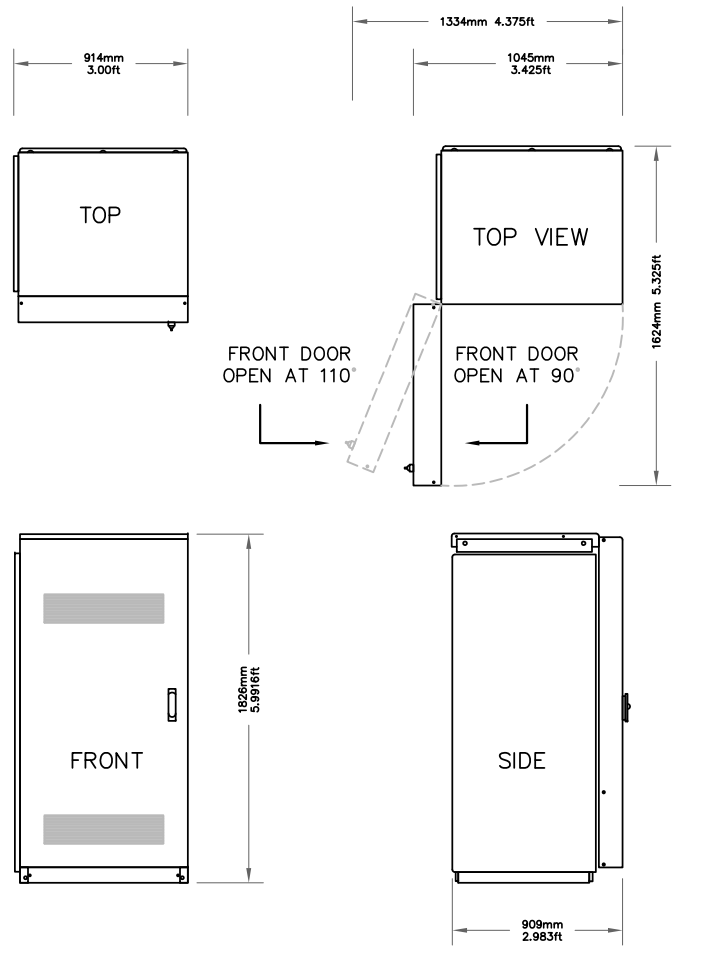
ANTENNA PLAN 1 A-2

SCALE: N.T.S



ANTENNA MOUNTING DETAIL 3 A-2

SCALE: N.T.S



ERICSSON RBS 6201 EQUIPMENT CABINET 4 A-2

SCALE: N.T.S

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RF MAN.			
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PROJECT NO:	CT11331A
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CHECKED BY:	SM

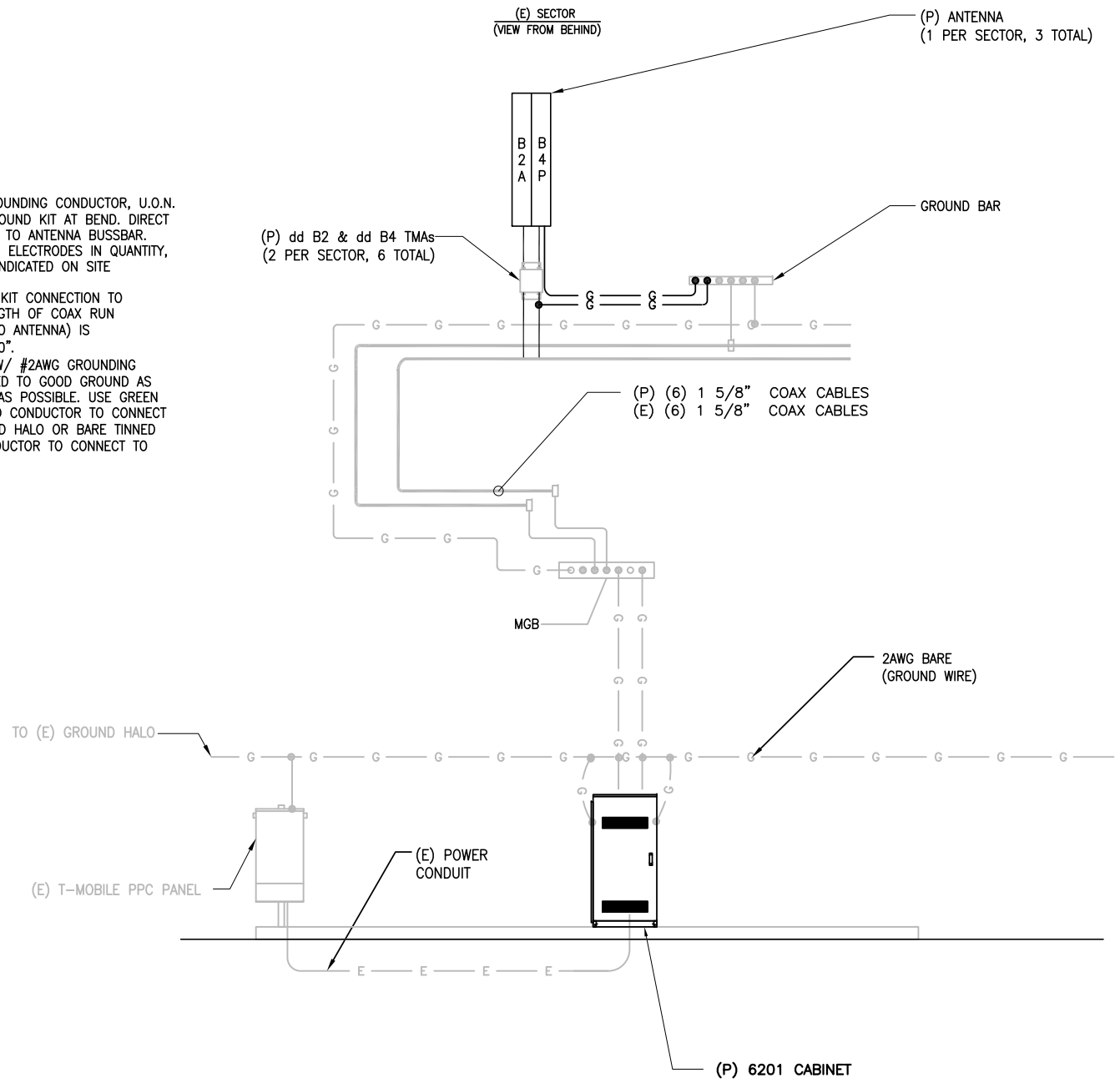
PROFESSIONAL SEAL

SITE NAME
CT11331A
SITE NAME
NORWICH
SITE ADDRESS
50 CLINTON AVENUE
NORWICH, CT 06360

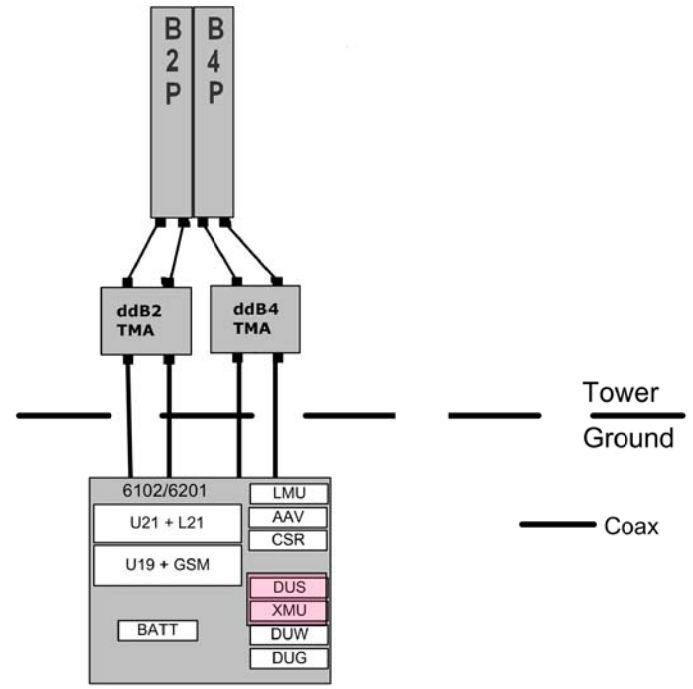
SHEET TITLE
ANTENNA PLAN
AND
DETAILS

SHEET NUMBER
A-2

NOTES:
A. PROVIDE #2AWG GROUNDING CONDUCTOR, U.O.N.
B. DO NOT INSTALL GROUND KIT AT BEND. DIRECT GROUND WIRE DOWN TO ANTENNA BUSSBAR.
C. PROVIDE GROUNDING ELECTRODES IN QUANTITY, TYPE AND SIZE AS INDICATED ON SITE GROUNDING PLAN.
D. ADD COAX GROUND KIT CONNECTION TO BUSSBAR WHEN LENGTH OF COAX RUN (FROM EQUIPMENT TO ANTENNA) IS GREATER THAN 20'-0".
E. GROUND HCS BOX W/ #2AWG GROUNDING CONDUCTOR ATTACHED TO GOOD GROUND AS DIRECT AND SHORT AS POSSIBLE. USE GREEN STRANDED INSULATED CONDUCTOR TO CONNECT TO BUSSBAR/GROUND HALO OR BARE TINNED SOLID COPPER CONDUCTOR TO CONNECT TO GROUND RING.



GROUNDING DIAGRAM 1/E-1
SCALE: N.T.S



TRUNK FIBER NOTES:
1. IN GENERAL THIS CABLE WILL HANDLE SIMILARLY TO ⅞" COAXIAL CABLE, AND SIMILAR INSTALLATION TECHNIQUES APPLY. ALL CABLES ARE INDIVIDUALLY SERIALIZED, BE SURE TO WRITE DOWN THE CABLE SERIAL NUMBER FOR FUTURE REFERENCE.
2. THE TERMINATED FIBER ENDS (THE BROKEN OUT FIBERS PLUS CONNECTORS) HOWEVER ARE FRAGILE, AND THESE MUST BE PROTECTED DURING THE INSTALLATION PROCESS.
3. LEAVE THE PROTECTIVE TUBE AND SOCK AROUND THE FIBER TAILS AND CONNECTORS IN PLACE DURING HOISTING AND SECURING THE CABLE. REMOVE THIS ONLY JUST PRIOR TO MAKING THE FINAL CONNECTIONS TO THE OVP BOX.
4. DO NOT BEND THE FIBER ENDS (IN THE ORANGE FURCATION TUBES) TIGHTER THAN ¾" (19MM) BEND RADIUS, ELSE THERE IS A RISK OF BREAKING THE GLASS FIBERS.
5. BE SURE THAT THE LACE UP ENDS AND FIBER CONNECTORS ARE NOT DAMAGED BY ATTACHMENT OF A HOISTING GRIP OR DURING THE HOISTING PROCESS. ATTACH A HOISTING GRIP ON THE JACKETED CABLE NO LESS THAN 6 INCHES BELOW THE FIBER BREAKOUT POINT. IF A HOISTING GRIP IS NOT EASILY ATTACHED, USE A SIMPLE LINE ATTACHED BELOW THE FIBER BREAK-OUT POINT (I.E. AT THE CABLE OUTER JACKET). PREVENT THE FIBER TAILS (IN PROTECTIVE TUBE) AT THE CABLE END FROM UNDUE MOVEMENT DURING HOISTING BY SECURING THE PROTECTIVE TUBE (WITH OUTER SOCK) TO THE HOISTING LINE.
6. DURING HOISTING ENSURE THAT THERE IS A FREE PATH AND THAT THE CABLE, AND ESPECIALLY THE FIBER ENDS, WILL NOT BE SNAGGED ON TOWER MEMBERS OR OTHER OBSTACLES.
7. INSTALLATION TEMPERATURE RANGE IS -22F TO 158F (-30C TO +70C).
8. MINIMUM CABLE BEND RADII ARE 22.2" (565MM) LOADED (WITH TENSION ON THE CABLE) AND 11.1" (280MM) UNLOADED.
9. MAXIMUM CABLE TENSILE LOAD IS 3560 N (800 LB) SHORT TERM (DURING INSTALLATION) AND 1070 N (240 LB) LONG TERM.
10. COMMSCOPE NON LACE UP GRIP RECOMMENDED FOR MONOPOLE INSTALLATIONS.
11. MAXIMUM HANGER SPACING 3FT (0.9 M).

HYBRID FIBER/POWER JUMPER NOTES:
1. IN GENERAL THIS CABLE WILL HANDLE SIMILARLY TO A ⅜" COAXIAL CABLE.
2. THE TERMINATED FIBER ENDS HOWEVER ARE FRAGILE AND MUST BE PROTECTED DURING INSTALLATION. LEAVE THE PACKAGING AROUND THE FIBER ENDS IN PLACE UNTIL READY TO CONNECT THE JUMPER BETWEEN OVP AND RRU OR BBU.
3. DO NOT BEND THE FIBER BREAKOUT CABLE (BETWEEN THE MAIN CABLE AND THE FIBER CONNECTOR) TIGHTER THAN ¾" (19MM) RADIUS, ELSE THERE IS A RISK OF BREAKING THE GLASS.
4. ATTACH THE MAIN CABLE SECURELY TO THE STRUCTURE OR EQUIPMENT USING HANGERS AND/OR CABLE TIES TO PREVENT STRAIN ON CONNECTIONS FROM MOVEMENT IN WIND OR SNOW/ICE CONDITIONS.
5. ENSURE THE LC FIBER CONNECTORS ARE SEATED FIRMLY IN PANEL IN OVP OR IN EQUIPMENT.
6. INSTALLATION TEMPERATURE RANGE IS -22F TO 158F (-30C TO 70C).
7. MINIMUM CABLE BEND RADII ARE 10.3 INCH (265MM) LOADED (WITH TENSION ON THE CABLE) AND 5.2 INCH (130MM) UNLOADED.
8. MAXIMUM CABLE TENSILE LOAD IS 350 LB (1560N) SHORT TERM (DURING INSTALLATION) AND 105 LB (470N) LONG TERM.
9. STANDARD LENGTHS AVAILABLE ARE 6 FEET, 15 FEET AND 20 FEET

4E-GU19 CONFIGURATION
COAX/FIBER PLUMBING DIAGRAM 2/E-1
SCALE: N.T.S

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Newton Center, MA 02459
Office: 617-965-0789
Fax: 617-213-5056

SUBMITTALS

DATE	DESCRIPTION	REVISION
03/11/15	ISSUED FOR REVIEW	A
03/13/15	REVISION	0
04/22/15	FINAL CD	1

DEPT.	DATE	APP'D	REVISIONS
RFE			
RF MAN.			
ZONING			
OPS			
CONSTR.			
SITE AC.			

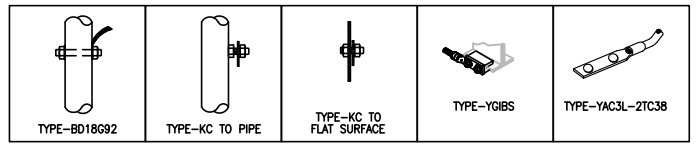
PROJECT NO:	CT11331A
DRAWN BY:	FG
CHECKED BY:	SM

PROFESSIONAL SEAL

SITE NAME
CT11331A
SITE NAME
NORWICH
SITE ADDRESS
50 CLINTON AVENUE
NORWICH, CT 06360

SHEET TITLE
GROUNDING DIAGRAM AND POWER ONE LINE DIAGRAM

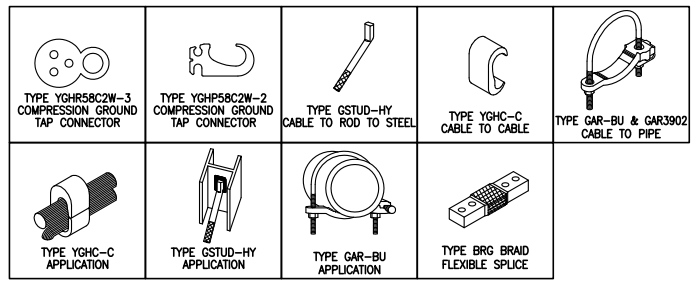
SHEET NUMBER
E-1



BURNDY GROUNDING DETAILS

1 E-2

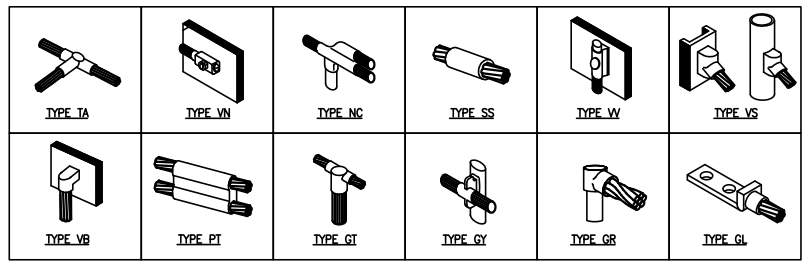
SCALE: N.T.S.



BURNDY GROUNDING PRODUCTS

2 E-2

SCALE: N.T.S.



CADWELD GROUNDING CONNECTION PRODUCTS

3 E-2

SCALE: N.T.S.

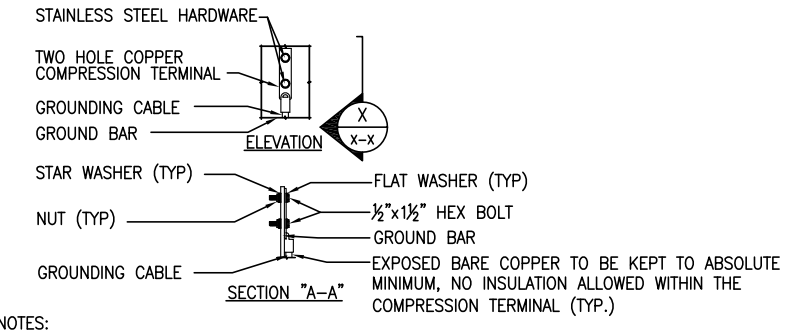
TERMINATION TYPES:
A. MECHANICAL COMPRESSION LUG
B. DOUBLE BARRELL COMPRESSION CONNECTOR
C. EXOTHERMIC TERMINATION
D. BEAM CLAMP

	SOLID #2 TINNED COPPER	#6 GROUND LEAD	#2/0 STRANDED MAIN DOWN CONDUCTOR	MASTER GRND BAR	STRUCTURAL OR TOWER STEEL	BLDG SERVICE ENTR OR GRND RING	GROUND ROD
SOLID #2 TINNED COPPER	B OR C	B OR C		C	A, C, OR D		C
#6 GROUND LEAD	B OR C			A	A, C, OR D		
#2/0 STRANDED GRNDG ELECTRODE CONDUCTOR				A	A, C, OR D	A	
MASTER GROUND BAR	C	A	A				
STRUCTURAL OR TOWER STEEL	A, C, OR D	A, C, OR D	A, C, OR D				
GROUND RING	C		C				C

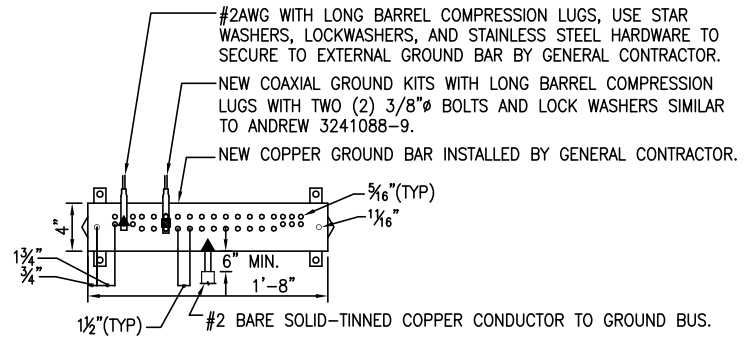
GROUNDING TERMINATION MARTIX

4 E-2

SCALE: N.T.S.



NOTES:
1. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.

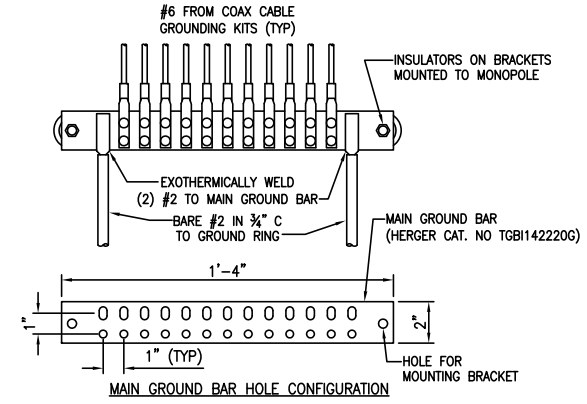


NOTES:
1. ALL HARDWARE STAINLESS STEEL COAT ALL SURFACES WITH KOPR-SHIELD BEFORE MATING.
2. FOR GROUND BOND TO STEEL ONLY: INSERT A TOOTH WASHER BETWEEN LUG AND STEEL, COAT ALL SURFACES WITH KOPR-SHIELD.
3. ALL HOLES ARE COUNTERSUNK 1/16".

TYPICAL GROUND BAR CONNECTIONS DETAIL

5 E-2

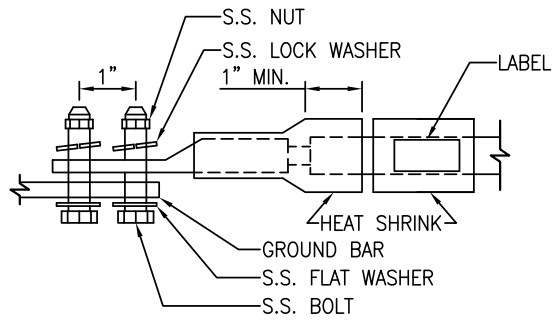
SCALE: N.T.S.



GROUND BAR DETAIL

6 E-2

SCALE: N.T.S.



LUG NOTES:
1. ALL HARDWARE IS 18-8 STAINLESS STEEL, INCLUDING LOCK WASHERS.
2. ALL HARDWARE SHALL BE S.S. ⅜"ø OR LARGER.
3. FOR GROUND BOND TO STEEL ONLY: INSERT A DRAGON TOOTH WASHER BETWEEN LUG AND STEEL. COAT ALL SURFACES WITH ANTI-OXIDIZATION COMPOUND PRIOR TO MATING.

GROUND BAR DETAIL

7 E-2

SCALE: N.T.S.

T-MOBILE NORTHEAST, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 692-7100
FAX:(860) 692-7159

ATLANTIS GROUP
1340 Centre Street, Suite 212
Newton Center, MA 02459
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Fax: 617-213-5056

SUBMITTALS

DATE	DESCRIPTION	REVISION
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RFE			
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PROJECT NO:	CT11331A
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PROFESSIONAL SEAL

SITE NAME
CT11331A
SITE NAME
NORWICH
SITE ADDRESS
50 CLINTON AVENUE
NORWICH, CT 06360

SHEET TITLE
GROUNDING DETAILS

SHEET NUMBER
E-2

Exhibit B

Date: **March 23, 2015**

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

FDH Engineering, Inc.
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
(919) 755-1012

Subject: Structural Analysis Report

Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11331A
	Carrier Site Name:	Norwich
Crown Castle Designation:	**Crown Castle BU Number:**	826313
	Crown Castle Site Name:	NORWICH
	Crown Castle JDE Job Number:	326643
	Crown Castle Work Order Number:	1026443
	Crown Castle Application Number:	286073 Rev. 0
Engineering Firm Designation:	**FDH Engineering, Inc. Project Number:**	15BHRE1400
Site Data:	**50 Clinton Avenue, Norwich, New London County, CT**	
	Latitude *41° 33' 19.804"*, Longitude *-72° 6' 37.08"*	
	149.083 Foot - Monopole Tower	

Dear Sean Dempsey,

FDH Engineering, Inc. 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 767461, in accordance with application 286073, 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 2005 CT State Building Code with 2009 amendment based upon a wind speed of 85 mph fastest mile.

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

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

Respectfully submitted by:

Drew Alexander, EI
Project Engineer

Reviewed by:

Dennis D. Abel, PE
Director – Structural Engineering
CT PE License No. 23247

STATE OF CONNECTICUT
DENNIS D. ABEL
No. 23247
LICENSED PROFESSIONAL ENGINEER

03-23-2015

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 149.083 ft Monopole tower designed by PIROD MANUFACTURES INC. in October of 2000. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

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, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
137.0	137.0	6	ericsson	KRY 112 71	6	1-5/8	--
		3	rfs celwave	APX16DWV-16DWVS-C-A20 w/ Mount Pipe			

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
149.0	154.0	2	decibel	DB809T6E-XC	2	7/8	1
	149.0	2	tower mounts	Side Arm Mount [SO 702-1]			
137.0	137.0	3	ems wireless	RR90-17-02DP w/ Mount Pipe	--	--	3
		3	ems wireless	RR90-17-02DP w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	Platform Mount [LP 401-1]			
125.0	125.0	6	ericsson	RRU-11	12 2 1	1-1/4 7/16 3/8	1
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		6	powerwave technologies	LGP21901			
		3	powerwave technologies	P65-17-XLH-RR w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 303-1]			
115.0	117.0	3	kathrein	800 10504 w/ Mount Pipe	3	1-5/8	1
		3	kathrein	860 10025			
	115.0	1	tower mounts	T-Arm Mount [TA 602-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
60.0	60.0	1		EEI Low Profile	1	1-5/8	2
		2	alcatel lucent	RRH2X60-AWS BAND 4			
		2	andrew	HBX-6513DS-A1M w/ Mount Pipe			
		1	raycap	RRFDC-3315-PF-48			

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

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)
150	150	6	EMS	RR90-17	6	1-5/8
133	133	2	Generic	10' Whip Antennas	2	1-5/8
125	125	6	EMS	RR90-17	6	1-5/8
115	115	6	EMS	RR90-17	6	1-5/8
105	105	6	EMS	RR90-17	6	1-5/8

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	GEI Consultants, Inc.	3503439	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PiROD Inc.	3876096	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PiROD Inc.	3503440	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) 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. FDH Engineering, Inc. 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	149.083 - 133.083	Pole	TP26x12.75x0.25	1	-2.768	962.582	3.6	Pass
L2	133.083 - 98.5	Pole	TP34.063x23.084x0.313	2	-10.007	1682.446	28.0	Pass
L3	98.5 - 64.833	Pole	TP41.75x32.315x0.375	3	-16.355	2487.525	37.6	Pass
L4	64.833 - 32	Pole	TP49.063x39.826x0.375	4	-25.753	2928.841	47.0	Pass
L5	32 - 0	Pole	TP56.125x46.958x0.375	5	-36.143	3449.671	53.9	Pass
							Summary	
						Pole (L5)	53.9	Pass
						Rating =	53.9	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	61.1	Pass
2	Base Plate	0	53.9	Pass
1	Base Foundation	0	70.3	Pass

Structure Rating (max from all components) =	70.3%

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed.
2) Base plates have the same capacity as their respective splice bolts or shaft.

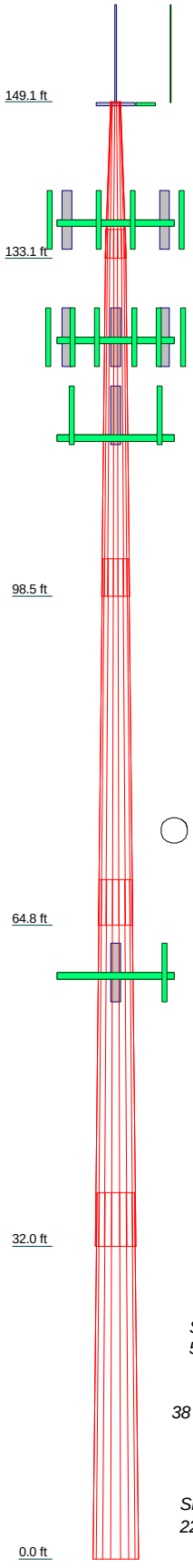
4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the existing, reserved, and proposed loads. No modifications are required at this time.

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	16.000	18	0.250	2.917	12.750	26.000		0.8
2	37.500	18	0.313	3.833	23.084	34.063		3.6
3	37.500	18	0.375	4.667	32.315	41.750	A572-65	5.6
4	37.500	18	0.375	5.500	39.826	49.063		6.7
5	37.500	18	0.375		46.958	56.125		7.8
								24.4



AXIAL 48 K
SHEAR 5 K
MOMENT 518 kip-ft
TORQUE 1 kip-ft
38 mph WIND - 0.750 in ICE
AXIAL 36 K
SHEAR 22 K
MOMENT 2090 kip-ft
TORQUE 3 kip-ft
REACTIONS - 85 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
DB809T6E-XC	149	(2) RRU-11	125
DB809T6E-XC	149	(2) RRU-11	125
4' x 2" Pipe Mount	149	(2) LGP21401	125
4' x 2" Pipe Mount	149	(2) LGP21401	125
Side Arm Mount [SO 702-1]	149	(2) LGP21401	125
Side Arm Mount [SO 702-1]	149	(2) LGP21901	125
RR90-17-02DP w/ Mount Pipe	137	(2) LGP21901	125
RR90-17-02DP w/ Mount Pipe	137	(2) LGP21901	125
RR90-17-02DP w/ Mount Pipe	137	DC6-48-60-18-8F	125
APX16DWV-16DWVS-C-A20 w/ Mount Pipe	137	Platform Mount [LP 303-1]	125
		800 10504 w/ Mount Pipe	115
APX16DWV-16DWVS-C-A20 w/ Mount Pipe	137	800 10504 w/ Mount Pipe	115
APX16DWV-16DWVS-C-A20 w/ Mount Pipe	137	800 10504 w/ Mount Pipe	115
		860 10025	115
(2) KRY 112 71	137	860 10025	115
(2) KRY 112 71	137	860 10025	115
(2) KRY 112 71	137	6' x 2" Mount Pipe	115
Platform Mount [LP 401-1]	137	6' x 2" Mount Pipe	115
(2) 7770.00 w/ Mount Pipe	125	6' x 2" Mount Pipe	115
(2) 7770.00 w/ Mount Pipe	125	T-Arm Mount [TA 602-3]	115
(2) 7770.00 w/ Mount Pipe	125	HBX-6513DS-A1M w/ Mount Pipe	60
P65-17-XLH-RR w/ Mount Pipe	125	HBX-6513DS-A1M w/ Mount Pipe	60
P65-17-XLH-RR w/ Mount Pipe	125	RRH2X60-AWS BAND 4	60
P65-17-XLH-RR w/ Mount Pipe	125	RRH2X60-AWS BAND 4	60
(2) RRU-11	125	RRFDC-3315-PF-48	60
		EEI Low Profile	60

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 53.9%

FDH Engineering, Inc.
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
Phone: 9197551012
FAX: 9197551031

Tower Analysis

Job: 826313 - NORWICH			
Project: 15BHRE1400			
Client: Crown Castle	Drawn by: DAlexander		App'd:
Code: TIA/EIA-222-F	Date: 03/23/15		Scale: NTS
Path:			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 New London County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.750 in.
Ice thickness is considered to increase with height.
Ice density of 56.000 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50.000 °F.
Deflections calculated using a wind speed of 50 mph.
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	149.083-133.083	16.000	2.917	18	12.750	26.000	0.250	1.000	A572-65 (65 ksi)
L2	133.083-98.500	37.500	3.833	18	23.084	34.063	0.313	1.250	A572-65 (65 ksi)
L3	98.500-64.833	37.500	4.667	18	32.315	41.750	0.375	1.500	A572-65 (65 ksi)
L4	64.833-32.000	37.500	5.500	18	39.826	49.063	0.375	1.500	A572-65 (65 ksi)
L5	32.000-0.000	37.500		18	46.958	56.125	0.375	1.500	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	12.947	9.919	195.801	4.438	6.477	30.230	391.859	4.960	1.804	7.216
	26.401	20.433	1711.654	9.141	13.208	129.592	3425.561	10.218	4.136	16.544
L2	24.308	22.587	1479.755	8.084	11.727	126.185	2961.457	11.296	3.513	11.241
	34.588	33.476	4817.433	11.981	17.304	278.404	9641.206	16.741	5.445	17.424
L3	33.793	38.017	4900.001	11.339	16.416	298.485	9806.450	19.012	5.028	13.407
	42.394	49.247	10650.982	14.688	21.209	502.192	21315.979	24.628	6.688	17.835
L4	41.607	46.956	9233.027	14.005	20.232	456.368	18478.203	23.483	6.349	16.932
	49.819	57.950	17355.138	17.284	24.924	696.329	34733.112	28.981	7.975	21.267
L5	49.047	55.445	15200.298	16.537	23.855	637.207	30420.596	27.728	7.605	20.279
	56.991	66.356	26056.151	19.791	28.511	913.882	52146.587	33.185	9.218	24.581

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 149.083-133.083				1	1	1		
L2 133.083-98.500				1	1	1		
L3 98.500-64.833				1	1	1		
L4 64.833-32.000				1	1	1		
L5 32.000-0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#		C_AA_A ft^2/ft	Weight klf
LDF5-50A(7/8")	A	No	Inside Pole	149.000 - 0.000	0.000	0	2	No Ice	0.000	0.000
								1/2" Ice	0.000	0.000
								1" Ice	0.000	0.000
								2" Ice	0.000	0.000
								4" Ice	0.000	0.000
@										

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#		C_AA_A ft^2/ft	Weight klf
LDF7-50A(1-5/8")	A	No	Inside Pole	137.000 - 0.000	0.000	0	12	No Ice	0.000	0.001
								1/2" Ice	0.000	0.001
								1" Ice	0.000	0.001
								2" Ice	0.000	0.001
								4" Ice	0.000	0.001
@										
LDF6-50A(1-1/4")	B	No	Inside Pole	125.000 - 0.000	0.000	0	12	No Ice	0.000	0.001
								1/2" Ice	0.000	0.001
								1" Ice	0.000	0.001
								2" Ice	0.000	0.001
								4" Ice	0.000	0.001
FB-L98-002-XXX(3/8)	B	No	Inside Pole	125.000 - 0.000	0.000	0	1	No Ice	0.000	0.000
								1/2" Ice	0.000	0.000
								1" Ice	0.000	0.000
								2" Ice	0.000	0.000
								4" Ice	0.000	0.000
WR-VG122ST-BRDA(7/16)	B	No	Inside Pole	125.000 - 0.000	0.000	0	2	No Ice	0.000	0.000
								1/2" Ice	0.000	0.000
								1" Ice	0.000	0.000
								2" Ice	0.000	0.000
								4" Ice	0.000	0.000
3" Rigid Conduit	B	No	Inside Pole	125.000 - 0.000	0.000	0	1	No Ice	0.000	0.003
								1/2" Ice	0.000	0.003
								1" Ice	0.000	0.003
								2" Ice	0.000	0.003
								4" Ice	0.000	0.003
@										
LDF7-50A(1-5/8")	C	No	Inside Pole	115.000 - 0.000	0.000	0	3	No Ice	0.000	0.001
								1/2" Ice	0.000	0.001
								1" Ice	0.000	0.001
								2" Ice	0.000	0.001
								4" Ice	0.000	0.001
@										
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	60.000 - 0.000	0.000	0	1	No Ice	0.000	0.001
								1/2" Ice	0.000	0.001
								1" Ice	0.000	0.001
								2" Ice	0.000	0.001
								4" Ice	0.000	0.001
@										
Climbing Rung	C	No	CaAa (Out Of Face)	149.083 - 0.000	12.000	0	1	No Ice	0.100	0.008
								1/2" Ice	0.200	0.009
								1" Ice	0.300	0.011
								2" Ice	0.500	0.016
								4" Ice	0.900	0.033
**										

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	149.083-133.083	A	0.000	0.000	0.000	0.000	0.049
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	1.600	0.134
L2	133.083-98.500	A	0.000	0.000	0.000	0.000	0.363
		B	0.000	0.000	0.000	0.000	0.304
		C	0.000	0.000	0.000	3.458	0.331
L3	98.500-64.833	A	0.000	0.000	0.000	0.000	0.354

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
		B	0.000	0.000	0.000	0.000	0.386
		C	0.000	0.000	0.000	3.367	0.366
L4	64.833-32.000	A	0.000	0.000	0.000	0.000	0.345
		B	0.000	0.000	0.000	0.000	0.376
		C	0.000	0.000	0.000	3.283	0.393
L5	32.000-0.000	A	0.000	0.000	0.000	0.000	0.336
		B	0.000	0.000	0.000	0.000	0.367
		C	0.000	0.000	0.000	3.200	0.389

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	149.083-133.083	A	0.892	0.000	0.000	0.000	0.000	0.049
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	4.455	0.168
L2	133.083-98.500	A	0.871	0.000	0.000	0.000	0.000	0.363
		B		0.000	0.000	0.000	0.000	0.304
		C		0.000	0.000	0.000	9.629	0.404
L3	98.500-64.833	A	0.836	0.000	0.000	0.000	0.000	0.354
		B		0.000	0.000	0.000	0.000	0.386
		C		0.000	0.000	0.000	9.233	0.435
L4	64.833-32.000	A	0.785	0.000	0.000	0.000	0.000	0.345
		B		0.000	0.000	0.000	0.000	0.376
		C		0.000	0.000	0.000	8.771	0.457
L5	32.000-0.000	A	0.750	0.000	0.000	0.000	0.000	0.336
		B		0.000	0.000	0.000	0.000	0.367
		C		0.000	0.000	0.000	8.225	0.446

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	149.083-133.083	-0.122	0.071	-0.286	0.165
L2	133.083-98.500	-0.125	0.072	-0.307	0.177
L3	98.500-64.833	-0.126	0.073	-0.314	0.181
L4	64.833-32.000	-0.127	0.073	-0.313	0.181
L5	32.000-0.000	-0.127	0.073	-0.307	0.177

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
DB809T6E-XC	A	From Leg	6.000 0.000 5.000	0.000	149.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.000 4.033 5.027 6.257 8.830	3.000 4.033 5.027 6.257 8.830	0.019 0.041 0.069 0.146 0.386
DB809T6E-XC	B	From Leg	6.000 0.000 5.000	0.000	149.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.000 4.033 5.027 6.257 8.830	3.000 4.033 5.027 6.257 8.830	0.019 0.041 0.069 0.146 0.386
4' x 2" Pipe Mount	A	From Leg	6.000 0.000 0.000	0.000	149.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.785 1.028 1.281 1.814 3.111	0.785 1.028 1.281 1.814 3.111	0.029 0.035 0.044 0.072 0.167
4' x 2" Pipe Mount	B	From Leg	6.000 0.000 0.000	0.000	149.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.785 1.028 1.281 1.814 3.111	0.785 1.028 1.281 1.814 3.111	0.029 0.035 0.044 0.072 0.167
Side Arm Mount [SO 702-1]	A	From Leg	3.000 0.000 0.000	0.000	149.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.000 1.250 1.500 2.000 3.000	1.430 2.050 2.670 3.910 6.390	0.027 0.038 0.049 0.071 0.115
Side Arm Mount [SO 702-1]	B	From Leg	3.000 0.000 0.000	0.000	149.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.000 1.250 1.500 2.000 3.000	1.430 2.050 2.670 3.910 6.390	0.027 0.038 0.049 0.071 0.115
@ RR90-17-02DP w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.593 5.088 5.578 6.588 8.731	3.319 4.089 4.784 6.225 9.308	0.034 0.072 0.115 0.224 0.557
RR90-17-02DP w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.593 5.088 5.578 6.588 8.731	3.319 4.089 4.784 6.225 9.308	0.034 0.072 0.115 0.224 0.557
RR90-17-02DP w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.593 5.088 5.578 6.588 8.731	3.319 4.089 4.784 6.225 9.308	0.034 0.072 0.115 0.224 0.557
APX16DWV-16DWVS-C-A20 w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.466 7.994 8.518 9.595 11.873	3.494 4.263 4.960 6.403 9.490	0.061 0.110 0.165 0.298 0.683
APX16DWV-16DWVS-C-A20 w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.466 7.994 8.518 9.595 11.873	3.494 4.263 4.960 6.403 9.490	0.061 0.110 0.165 0.298 0.683
APX16DWV-16DWVS-C-A	C	From Leg	4.000	0.000	137.000	No Ice	7.466	3.494	0.061

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
20 w/ Mount Pipe			0.000 0.000			1/2" Ice	7.994	4.263	0.110
						1" Ice	8.518	4.960	0.165
						2" Ice	9.595	6.403	0.298
						4" Ice	11.873	9.490	0.683
(2) KRY 112 71	A	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice	0.681	0.450	0.013
						1/2" Ice	0.802	0.559	0.018
						1" Ice	0.932	0.677	0.025
						2" Ice	1.219	0.939	0.044
						4" Ice	1.896	1.566	0.111
(2) KRY 112 71	B	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice	0.681	0.450	0.013
						1/2" Ice	0.802	0.559	0.018
						1" Ice	0.932	0.677	0.025
						2" Ice	1.219	0.939	0.044
						4" Ice	1.896	1.566	0.111
(2) KRY 112 71	C	From Leg	4.000 0.000 0.000	0.000	137.000	No Ice	0.681	0.450	0.013
						1/2" Ice	0.802	0.559	0.018
						1" Ice	0.932	0.677	0.025
						2" Ice	1.219	0.939	0.044
						4" Ice	1.896	1.566	0.111
Platform Mount [LP 401-1]	C	None		0.000	137.000	No Ice	24.330	24.330	1.645
						1/2" Ice	30.220	30.220	2.030
						1" Ice	36.110	36.110	2.415
						2" Ice	47.890	47.890	3.184
						4" Ice	71.450	71.450	4.723
@									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	125.000	No Ice	6.119	4.254	0.055
						1/2" Ice	6.626	5.014	0.103
						1" Ice	7.128	5.711	0.157
						2" Ice	8.164	7.155	0.287
						4" Ice	10.360	10.412	0.665
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	125.000	No Ice	6.119	4.254	0.055
						1/2" Ice	6.626	5.014	0.103
						1" Ice	7.128	5.711	0.157
						2" Ice	8.164	7.155	0.287
						4" Ice	10.360	10.412	0.665
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	125.000	No Ice	6.119	4.254	0.055
						1/2" Ice	6.626	5.014	0.103
						1" Ice	7.128	5.711	0.157
						2" Ice	8.164	7.155	0.287
						4" Ice	10.360	10.412	0.665
P65-17-XLH-RR w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	125.000	No Ice	11.704	8.938	0.092
						1/2" Ice	12.424	10.450	0.178
						1" Ice	13.153	11.986	0.273
						2" Ice	14.639	14.313	0.498
						4" Ice	17.906	19.144	1.126
P65-17-XLH-RR w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	125.000	No Ice	11.704	8.938	0.092
						1/2" Ice	12.424	10.450	0.178
						1" Ice	13.153	11.986	0.273
						2" Ice	14.639	14.313	0.498
						4" Ice	17.906	19.144	1.126
P65-17-XLH-RR w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	125.000	No Ice	11.704	8.938	0.092
						1/2" Ice	12.424	10.450	0.178
						1" Ice	13.153	11.986	0.273
						2" Ice	14.639	14.313	0.498
						4" Ice	17.906	19.144	1.126
(2) RRU-11	A	From Leg	4.000 0.000	0.000	125.000	No Ice	1.912	1.472	0.044
						1/2" Ice	2.102	1.645	0.060

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
			0.000			1" Ice	2.301	1.827	0.078
						2" Ice	2.725	2.218	0.123
						4" Ice	3.676	3.102	0.254
(2) RRU-11	B	From Leg	4.000	0.000	125.000	No Ice	1.912	1.472	0.044
			0.000			1/2" Ice	2.102	1.645	0.060
			0.000			1" Ice	2.301	1.827	0.078
						2" Ice	2.725	2.218	0.123
						4" Ice	3.676	3.102	0.254
(2) RRU-11	C	From Leg	4.000	0.000	125.000	No Ice	1.912	1.472	0.044
			0.000			1/2" Ice	2.102	1.645	0.060
			0.000			1" Ice	2.301	1.827	0.078
						2" Ice	2.725	2.218	0.123
						4" Ice	3.676	3.102	0.254
(2) LGP21401	A	From Leg	4.000	0.000	125.000	No Ice	1.288	0.233	0.014
			0.000			1/2" Ice	1.445	0.313	0.021
			0.000			1" Ice	1.611	0.403	0.030
						2" Ice	1.969	0.608	0.055
						4" Ice	2.788	1.121	0.135
(2) LGP21401	B	From Leg	4.000	0.000	125.000	No Ice	1.288	0.233	0.014
			0.000			1/2" Ice	1.445	0.313	0.021
			0.000			1" Ice	1.611	0.403	0.030
						2" Ice	1.969	0.608	0.055
						4" Ice	2.788	1.121	0.135
(2) LGP21401	C	From Leg	4.000	0.000	125.000	No Ice	1.288	0.233	0.014
			0.000			1/2" Ice	1.445	0.313	0.021
			0.000			1" Ice	1.611	0.403	0.030
						2" Ice	1.969	0.608	0.055
						4" Ice	2.788	1.121	0.135
(2) LGP21901	A	From Leg	4.000	0.000	125.000	No Ice	0.270	0.184	0.006
			0.000			1/2" Ice	0.343	0.248	0.008
			0.000			1" Ice	0.425	0.322	0.011
						2" Ice	0.616	0.494	0.022
						4" Ice	1.101	0.943	0.066
(2) LGP21901	B	From Leg	4.000	0.000	125.000	No Ice	0.270	0.184	0.006
			0.000			1/2" Ice	0.343	0.248	0.008
			0.000			1" Ice	0.425	0.322	0.011
						2" Ice	0.616	0.494	0.022
						4" Ice	1.101	0.943	0.066
(2) LGP21901	C	From Leg	4.000	0.000	125.000	No Ice	0.270	0.184	0.006
			0.000			1/2" Ice	0.343	0.248	0.008
			0.000			1" Ice	0.425	0.322	0.011
						2" Ice	0.616	0.494	0.022
						4" Ice	1.101	0.943	0.066
DC6-48-60-18-8F	B	From Leg	4.000	0.000	125.000	No Ice	2.567	4.317	0.033
			0.000			1/2" Ice	2.798	4.596	0.064
			0.000			1" Ice	3.038	4.885	0.099
						2" Ice	3.543	5.488	0.181
						4" Ice	4.658	6.797	0.397
Platform Mount [LP 303-1]	C	None		0.000	125.000	No Ice	14.660	14.660	1.250
						1/2" Ice	18.870	18.870	1.481
						1" Ice	23.080	23.080	1.713
						2" Ice	31.500	31.500	2.175
						4" Ice	48.340	48.340	3.101
@ 800 10504 w/ Mount Pipe	A	From Leg	4.000	0.000	115.000	No Ice	3.482	3.188	0.049
			0.000			1/2" Ice	3.857	3.820	0.082
			2.000			1" Ice	4.241	4.469	0.123

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	5.094	5.815	0.221
						4" Ice	7.010	8.794	0.525
800 10504 w/ Mount Pipe	B	From Leg	4.000 0.000 2.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.482 3.857 4.241 5.094 7.010	3.188 3.820 4.469 5.815 8.794	0.049 0.082 0.123 0.221 0.525
800 10504 w/ Mount Pipe	C	From Leg	4.000 0.000 2.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.482 3.857 4.241 5.094 7.010	3.188 3.820 4.469 5.815 8.794	0.049 0.082 0.123 0.221 0.525
860 10025	A	From Leg	4.000 0.000 2.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.163 0.229 0.302 0.476 0.927	0.136 0.199 0.270 0.439 0.879	0.001 0.003 0.005 0.014 0.051
860 10025	B	From Leg	4.000 0.000 2.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.163 0.229 0.302 0.476 0.927	0.136 0.199 0.270 0.439 0.879	0.001 0.003 0.005 0.014 0.051
860 10025	C	From Leg	4.000 0.000 2.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.163 0.229 0.302 0.476 0.927	0.136 0.199 0.270 0.439 0.879	0.001 0.003 0.005 0.014 0.051
6' x 2" Mount Pipe	A	From Leg	4.000 0.000 2.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.925 2.294 3.060 4.702	1.425 1.925 2.294 3.060 4.702	0.022 0.033 0.048 0.090 0.231
6' x 2" Mount Pipe	B	From Leg	4.000 0.000 2.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.925 2.294 3.060 4.702	1.425 1.925 2.294 3.060 4.702	0.022 0.033 0.048 0.090 0.231
6' x 2" Mount Pipe	C	From Leg	4.000 0.000 2.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.925 2.294 3.060 4.702	1.425 1.925 2.294 3.060 4.702	0.022 0.033 0.048 0.090 0.231
T-Arm Mount [TA 602-3]	C	None		0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.590 15.440 19.290 26.990 42.390	11.590 15.440 19.290 26.990 42.390	0.774 0.990 1.206 1.639 2.503
@ HBX-6513DS-A1M w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	60.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.940 2.226 2.524 3.156 4.606	1.562 1.944 2.366 3.277 5.474	0.018 0.038 0.061 0.121 0.316
HBX-6513DS-A1M w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	60.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.940 2.226 2.524 3.156	1.562 1.944 2.366 3.277	0.018 0.038 0.061 0.121

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
						4" Ice	4.606	5.474	0.316
RRH2X60-AWS BAND 4	A	From Leg	4.000 0.000 0.000	0.000	60.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.189 2.396 2.612 3.069 4.088	1.485 1.669 1.862 2.272 3.198	0.044 0.060 0.079 0.126 0.261
RRH2X60-AWS BAND 4	B	From Leg	4.000 0.000 0.000	0.000	60.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.189 2.396 2.612 3.069 4.088	1.485 1.669 1.862 2.272 3.198	0.044 0.060 0.079 0.126 0.261
RRFDC-3315-PF-48	A	From Leg	4.000 0.000 0.000	0.000	60.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.528 3.783 4.048 4.602 5.815	2.290 2.510 2.738 3.221 4.290	0.032 0.058 0.088 0.158 0.347
EEI Low Profile	C	None		0.000	60.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.330 30.220 36.110 47.890 71.450	24.330 30.220 36.110 47.890 71.450	1.645 2.030 2.415 3.184 4.723
@									

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

Comb. No.	Description
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	149.083 - 133.083	Pole	Max Tension	24	0.000	-0.000	-0.000
			Max. Compression	14	-4.655	-0.647	0.374
			Max. Mx	5	-2.769	-15.018	0.247
			Max. My	2	-2.769	-0.344	14.767
			Max. Vy	5	3.913	-15.018	0.247
			Max. Vx	8	3.903	-0.108	-14.447
			Max. Torque	7			1.449
L2	133.083 - 98.5	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-15.802	-0.688	-0.065
			Max. Mx	5	-10.011	-307.033	1.143
			Max. My	8	-10.009	1.142	-307.437
			Max. Vy	11	-12.193	306.763	-1.326
			Max. Vx	8	12.223	1.142	-307.437
			Max. Torque	8			2.110
L3	98.5 - 64.833	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-23.580	-0.235	-0.326
			Max. Mx	11	-16.359	753.954	-3.003
			Max. My	8	-16.357	2.950	-755.486
			Max. Vy	11	-15.040	753.954	-3.003
			Max. Vx	8	15.071	2.950	-755.486
			Max. Torque	2			-2.089
L4	64.833 - 32	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-35.313	-0.327	0.166
			Max. Mx	11	-25.756	1308.630	-3.945
			Max. My	8	-25.753	4.112	-1312.404
			Max. Vy	11	-19.044	1308.630	-3.945
			Max. Vx	8	19.141	4.112	-1312.404
			Max. Torque	13			-2.763
L5	32 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-47.583	0.380	-0.242
			Max. Mx	11	-36.143	2080.361	-5.287
			Max. My	8	-36.143	5.702	-2087.503
			Max. Vy	11	-22.097	2080.361	-5.287
			Max. Vx	8	22.193	5.702	-2087.503
			Max. Torque	13			-2.733

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	47.583	0.000	0.000
	Max. H_x	11	36.151	22.085	-0.026
	Max. H_z	2	36.151	-0.026	22.181
	Max. M_x	2	2086.446	-0.026	22.181
	Max. M_z	5	2078.483	-22.085	0.026
	Max. Torsion	7	2.697	-11.020	-19.196
	Min. Vert	1	36.151	0.000	0.000
	Min. H_x	5	36.151	-22.085	0.026
	Min. H_z	8	36.151	0.026	-22.181
	Min. M_x	8	-2087.503	0.026	-22.181
	Min. M_z	11	-2080.361	22.085	-0.026
	Min. Torsion	13	-2.697	11.020	19.196

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	36.151	0.000	0.000	0.519	0.926	0.000
Dead+Wind 0 deg - No Ice	36.151	0.026	-22.181	-2086.446	-3.812	2.558
Dead+Wind 30 deg - No Ice	36.151	11.065	-19.222	-1809.224	-1042.886	1.733
Dead+Wind 60 deg - No Ice	36.151	19.139	-11.113	-1047.080	-1802.268	0.445
Dead+Wind 90 deg - No Ice	36.151	22.085	-0.026	-4.227	-2078.483	-0.963
Dead+Wind 120 deg - No Ice	36.151	19.113	11.068	1039.903	-1797.516	-2.113
Dead+Wind 150 deg - No Ice	36.151	11.020	19.196	1805.530	-1034.648	-2.697
Dead+Wind 180 deg - No Ice	36.151	-0.026	22.181	2087.503	5.702	-2.557
Dead+Wind 210 deg - No Ice	36.151	-11.065	19.222	1810.276	1044.771	-1.733
Dead+Wind 240 deg - No Ice	36.151	-19.139	11.113	1048.134	1804.148	-0.445
Dead+Wind 270 deg - No Ice	36.151	-22.085	0.026	5.287	2080.361	0.963
Dead+Wind 300 deg - No Ice	36.151	-19.113	-11.068	-1038.839	1799.398	2.113
Dead+Wind 330 deg - No Ice	36.151	-11.020	-19.196	-1804.468	1036.536	2.697
Dead+Ice+Temp	47.583	0.000	0.000	0.242	0.380	0.000
Dead+Wind 0 deg+Ice+Temp	47.583	0.009	-5.273	-516.847	-1.073	0.668
Dead+Wind 30 deg+Ice+Temp	47.583	2.636	-4.571	-448.287	-258.901	0.439
Dead+Wind 60 deg+Ice+Temp	47.583	4.557	-2.644	-259.543	-447.260	0.093
Dead+Wind 90 deg+Ice+Temp	47.583	5.258	-0.009	-1.189	-515.680	-0.278
Dead+Wind 120 deg+Ice+Temp	47.583	4.549	2.629	257.548	-445.828	-0.575
Dead+Wind 150 deg+Ice+Temp	47.583	2.621	4.563	447.341	-256.419	-0.717
Dead+Wind 180 deg+Ice+Temp	47.583	-0.009	5.273	517.334	1.793	-0.668
Dead+Wind 210 deg+Ice+Temp	47.583	-2.636	4.571	448.773	259.620	-0.439
Dead+Wind 240 deg+Ice+Temp	47.583	-4.557	2.644	260.029	447.979	-0.093
Dead+Wind 270 deg+Ice+Temp	47.583	-5.258	0.009	1.676	516.399	0.278
Dead+Wind 300 deg+Ice+Temp	47.583	-4.549	-2.629	-257.061	446.547	0.575
Dead+Wind 330 deg+Ice+Temp	47.583	-2.621	-4.563	-446.853	257.139	0.717
Dead+Wind 0 deg - Service	36.151	0.009	-7.675	-721.810	-0.707	0.887
Dead+Wind 30 deg - Service	36.151	3.829	-6.651	-625.858	-360.348	0.601
Dead+Wind 60 deg - Service	36.151	6.623	-3.845	-362.067	-623.183	0.154
Dead+Wind 90 deg - Service	36.151	7.642	-0.009	-1.118	-718.784	-0.334
Dead+Wind 120 deg - Service	36.151	6.614	3.830	360.272	-621.536	-0.732
Dead+Wind 150 deg - Service	36.151	3.813	6.642	625.269	-357.496	-0.935
Dead+Wind 180 deg - Service	36.151	-0.009	7.675	722.867	2.587	-0.887
Dead+Wind 210 deg - Service	36.151	-3.829	6.651	626.915	362.228	-0.601
Dead+Wind 240 deg - Service	36.151	-6.623	3.845	363.124	625.061	-0.154

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 - Service	36.151	-7.642	0.009	2.176	720.663	0.334
Dead+Wind 300 deg - Service	36.151	-6.614	-3.830	-359.214	623.415	0.732
Dead+Wind 330 deg - Service	36.151	-3.813	-6.642	-624.211	359.376	0.935

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.000	-36.151	0.000	0.000	36.151	0.000	0.000%
2	0.026	-36.151	-22.181	-0.026	36.151	22.181	0.000%
3	11.065	-36.151	-19.222	-11.065	36.151	19.222	0.000%
4	19.139	-36.151	-11.113	-19.139	36.151	11.113	0.000%
5	22.085	-36.151	-0.026	-22.085	36.151	0.026	0.000%
6	19.113	-36.151	11.068	-19.113	36.151	-11.068	0.000%
7	11.020	-36.151	19.196	-11.020	36.151	-19.196	0.000%
8	-0.026	-36.151	22.181	0.026	36.151	-22.181	0.000%
9	-11.065	-36.151	19.222	11.065	36.151	-19.222	0.000%
10	-19.139	-36.151	11.113	19.139	36.151	-11.113	0.000%
11	-22.085	-36.151	0.026	22.085	36.151	-0.026	0.000%
12	-19.113	-36.151	-11.068	19.113	36.151	11.068	0.000%
13	-11.020	-36.151	-19.196	11.020	36.151	19.196	0.000%
14	0.000	-47.583	0.000	0.000	47.583	0.000	0.000%
15	0.009	-47.583	-5.273	-0.009	47.583	5.273	0.000%
16	2.636	-47.583	-4.571	-2.636	47.583	4.571	0.000%
17	4.557	-47.583	-2.644	-4.557	47.583	2.644	0.000%
18	5.258	-47.583	-0.009	-5.258	47.583	0.009	0.000%
19	4.549	-47.583	2.629	-4.549	47.583	-2.629	0.000%
20	2.621	-47.583	4.563	-2.621	47.583	-4.563	0.000%
21	-0.009	-47.583	5.273	0.009	47.583	-5.273	0.000%
22	-2.636	-47.583	4.571	2.636	47.583	-4.571	0.000%
23	-4.557	-47.583	2.644	4.557	47.583	-2.644	0.000%
24	-5.258	-47.583	0.009	5.258	47.583	-0.009	0.000%
25	-4.549	-47.583	-2.629	4.549	47.583	2.629	0.000%
26	-2.621	-47.583	-4.563	2.621	47.583	4.563	0.000%
27	0.009	-36.151	-7.675	-0.009	36.151	7.675	0.000%
28	3.829	-36.151	-6.651	-3.829	36.151	6.651	0.000%
29	6.623	-36.151	-3.845	-6.623	36.151	3.845	0.000%
30	7.642	-36.151	-0.009	-7.642	36.151	0.009	0.000%
31	6.614	-36.151	3.830	-6.614	36.151	-3.830	0.000%
32	3.813	-36.151	6.642	-3.813	36.151	-6.642	0.000%
33	-0.009	-36.151	7.675	0.009	36.151	-7.675	0.000%
34	-3.829	-36.151	6.651	3.829	36.151	-6.651	0.000%
35	-6.623	-36.151	3.845	6.623	36.151	-3.845	0.000%
36	-7.642	-36.151	0.009	7.642	36.151	-0.009	0.000%
37	-6.614	-36.151	-3.830	6.614	36.151	3.830	0.000%
38	-3.813	-36.151	-6.642	3.813	36.151	6.642	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001

2	Yes	4	0.00000001	0.00051828
3	Yes	5	0.00000001	0.00006247
4	Yes	5	0.00000001	0.00005478
5	Yes	4	0.00000001	0.00015824
6	Yes	5	0.00000001	0.00005149
7	Yes	5	0.00000001	0.00006406
8	Yes	4	0.00000001	0.00049288
9	Yes	5	0.00000001	0.00005237
10	Yes	5	0.00000001	0.00005868
11	Yes	4	0.00000001	0.00013574
12	Yes	5	0.00000001	0.00006153
13	Yes	5	0.00000001	0.00005034
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00085735
16	Yes	4	0.00000001	0.00090787
17	Yes	4	0.00000001	0.00090461
18	Yes	4	0.00000001	0.00085560
19	Yes	4	0.00000001	0.00089852
20	Yes	4	0.00000001	0.00090383
21	Yes	4	0.00000001	0.00085743
22	Yes	4	0.00000001	0.00090272
23	Yes	4	0.00000001	0.00090288
24	Yes	4	0.00000001	0.00085263
25	Yes	4	0.00000001	0.00089915
26	Yes	4	0.00000001	0.00089695
27	Yes	4	0.00000001	0.00007998
28	Yes	4	0.00000001	0.00015403
29	Yes	4	0.00000001	0.00011488
30	Yes	4	0.00000001	0.00003285
31	Yes	4	0.00000001	0.00010923
32	Yes	4	0.00000001	0.00016682
33	Yes	4	0.00000001	0.00007882
34	Yes	4	0.00000001	0.00011125
35	Yes	4	0.00000001	0.00013260
36	Yes	4	0.00000001	0.00003210
37	Yes	4	0.00000001	0.00015171
38	Yes	4	0.00000001	0.00011160

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	149.083 - 133.083	16.778	34	0.903	0.010
L2	136 - 98.5	14.327	34	0.889	0.005
L3	102.333 - 64.833	8.413	34	0.750	0.002
L4	69.5 - 32	3.963	34	0.527	0.001
L5	37.5 - 0	1.185	34	0.285	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
149.000	DB809T6E-XC	34	16.762	0.903	0.010	109336
137.000	RR90-17-02DP w/ Mount Pipe	34	14.513	0.891	0.006	44462

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
125.000	(2) 7770.00 w/ Mount Pipe	34	12.300	0.861	0.003	18495
115.000	800 10504 w/ Mount Pipe	34	10.522	0.819	0.003	12275
60.000	HBX-6513DS-A1M w/ Mount Pipe	34	2.958	0.456	0.001	7541

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	149.083 - 133.083	48.429	9	2.605	0.029
L2	136 - 98.5	41.349	9	2.568	0.015
L3	102.333 - 64.833	24.284	9	2.166	0.007
L4	69.5 - 32	11.439	9	1.520	0.004
L5	37.5 - 0	3.422	9	0.824	0.002

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
149.000	DB809T6E-XC	9	48.384	2.605	0.029	39964
137.000	RR90-17-02DP w/ Mount Pipe	9	41.887	2.573	0.016	16195
125.000	(2) 7770.00 w/ Mount Pipe	9	35.499	2.485	0.010	6517
115.000	800 10504 w/ Mount Pipe	9	30.369	2.364	0.008	4284
60.000	HBX-6513DS-A1M w/ Mount Pipe	9	8.540	1.316	0.003	2615

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	149.083 - 133.083 (1)	TP26x12.75x0.25	16.000	0.000	0.0	39.000	18.516	-2.768	722.117	0.004
L2	133.083 - 98.5 (2)	TP34.063x23.084x0.313	37.500	0.000	0.0	39.000	32.363	-10.007	1262.150	0.008
L3	98.5 - 64.833 (3)	TP41.75x32.315x0.375	37.500	0.000	0.0	39.000	47.849	-16.355	1866.110	0.009
L4	64.833 - 32 (4)	TP49.063x39.826x0.375	37.500	0.000	0.0	39.000	56.338	-25.753	2197.180	0.012
L5	32 - 0 (5)	TP56.125x46.958x0.375	37.500	0.000	0.0	39.000	66.356	-36.143	2587.900	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	149.083 - 133.083 (1)	TP26x12.75x0.25	15.129	1.708	39.000	0.044	0.000	0.000	39.000	0.000
L2	133.083 - 98.5 (2)	TP34.063x23.084x0.313	308.314	14.224	39.000	0.365	0.000	0.000	39.000	0.000
L3	98.5 - 64.833 (3)	TP41.75x32.315x0.375	757.541	19.180	39.000	0.492	0.000	0.000	39.000	0.000
L4	64.833 - 32 (4)	TP49.063x39.826x0.375	1314.817	23.979	39.000	0.615	0.000	0.000	39.000	0.000
L5	32 - 0 (5)	TP56.125x46.958x0.375	2090.133	27.445	39.000	0.704	0.000	0.000	39.000	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	149.083 - 133.083 (1)	TP26x12.75x0.25	3.919	0.212	26.000	0.016	0.000	0.000	26.000	0.000
L2	133.083 - 98.5 (2)	TP34.063x23.084x0.313	12.254	0.379	26.000	0.029	1.710	0.038	26.000	0.001
L3	98.5 - 64.833 (3)	TP41.75x32.315x0.375	15.102	0.316	26.000	0.024	1.693	0.021	26.000	0.001
L4	64.833 - 32 (4)	TP49.063x39.826x0.375	19.140	0.340	26.000	0.026	1.755	0.016	26.000	0.001
L5	32 - 0 (5)	TP56.125x46.958x0.375	22.192	0.334	26.000	0.026	1.734	0.011	26.000	0.000

Pole Interaction Design Data

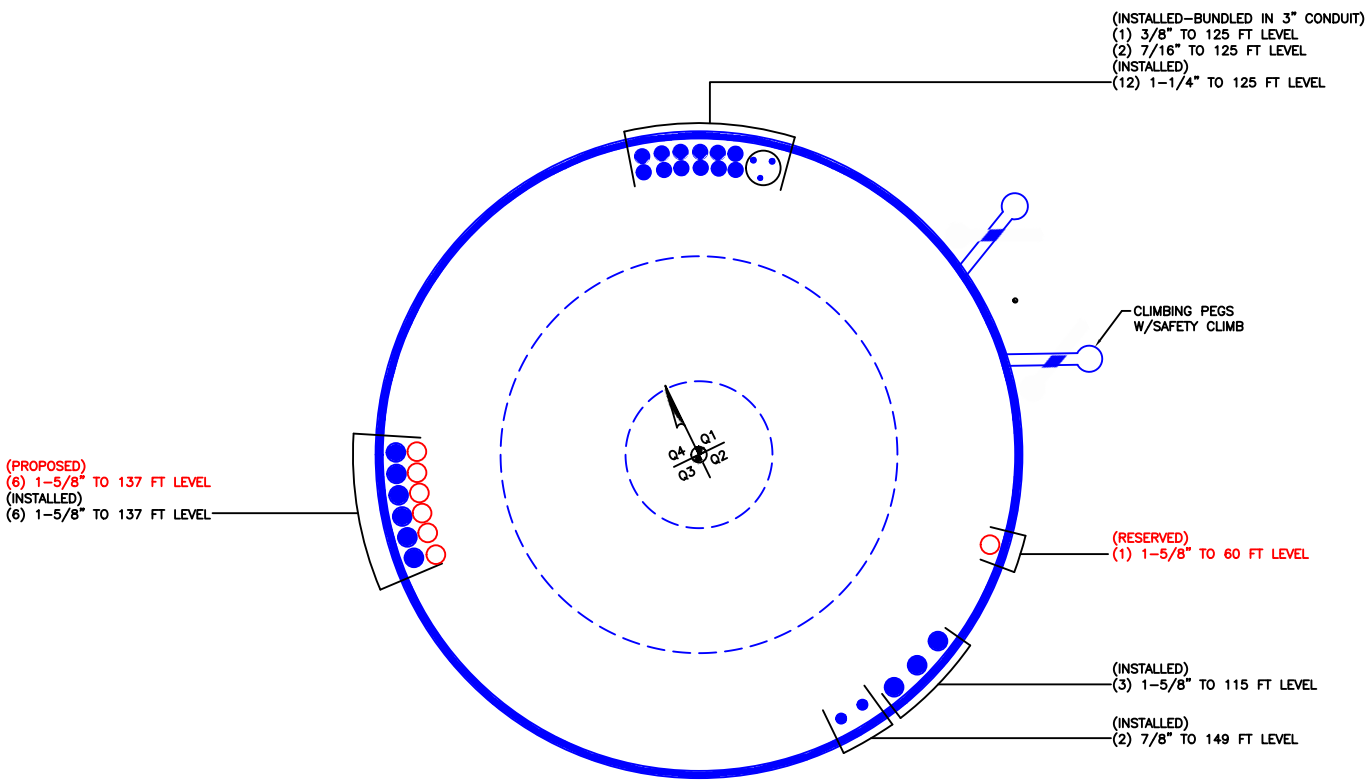
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	149.083 - 133.083 (1)	0.004	0.044	0.000	0.016	0.000	0.048 ✔	1.333	H1-3+VT ✔
L2	133.083 - 98.5 (2)	0.008	0.365	0.000	0.029	0.001	0.373 ✔	1.333	H1-3+VT ✔
L3	98.5 - 64.833 (3)	0.009	0.492	0.000	0.024	0.001	0.501 ✔	1.333	H1-3+VT ✔
L4	64.833 - 32 (4)	0.012	0.615	0.000	0.026	0.001	0.627 ✔	1.333	H1-3+VT ✔
L5	32 - 0 (5)	0.014	0.704	0.000	0.026	0.000	0.718 ✔	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	149.083 - 133.083	Pole	TP26x12.75x0.25	1	-2.768	962.582	3.6	Pass
L2	133.083 - 98.5	Pole	TP34.063x23.084x0.313	2	-10.007	1682.446	28.0	Pass
L3	98.5 - 64.833	Pole	TP41.75x32.315x0.375	3	-16.355	2487.525	37.6	Pass
L4	64.833 - 32	Pole	TP49.063x39.826x0.375	4	-25.753	2928.841	47.0	Pass
L5	32 - 0	Pole	TP56.125x46.958x0.375	5	-36.143	3449.671	53.9	Pass
							Summary	
						Pole (L5)	53.9	Pass
						RATING =	**53.9**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 826313 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

TIA Rev F

Site Data

Project No. *826313*
Site Name: *Norwich*
Site ID: *286073 Rev. 0*

Pole Manufacturer:	*Pirod*

Reactions		
Moment:	2090	ft-kips
Axial:	36	kips
Shear:	22	kips

Anchor Rod Data		
Qty:	39	
Diam:	1.25	in
Rod Material:	Other	
Strength (Fu):	125	ksi
Yield (Fy):	105	ksi
Bolt Circle:	61	in

Plate Data		
Diam:	67	in
Thick:	1.5	in
Grade:	50	ksi
Single-Rod B-eff:	4.57	in

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

Pole Data		
Diam:	56.125	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:	41.2 Kips	Rigid
Allowable Tension:	67.5 Kips	Service, ASD
Anchor Rod Stress Ratio:	61.1% **Pass**	Fty*ASIF

Base Plate Results Flexural Check

Base Plate Stress:	Rohn/Pirod, OK	Rigid
Allowable Plate Stress:	50.0 ksi	Service ASD
Base Plate Stress Ratio:	Rohn/Pirod, OK	0.75*Fy*ASIF
		Y.L. Length: 23.90

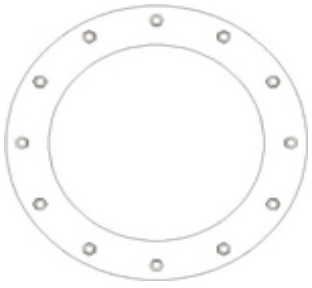
n/a

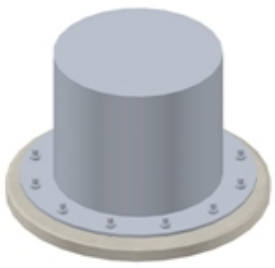
Stiffener Results N/A for Rohn / Pirod

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

CCI Foundation Tool Suite - Monopole Pier - Beta Release

CCI Foundation Tool Suite - v1.0 Date: 3/23/2015

BU:	826313
Site Name:	NORWICH
App Number:	286073 Rev. 0
Work Order:	1026443

Monopole Drilled Pier

Input

Criteria

TIA Revision:	F
ACI 318 Revision:	2002
Seismic Category:	B

Forces

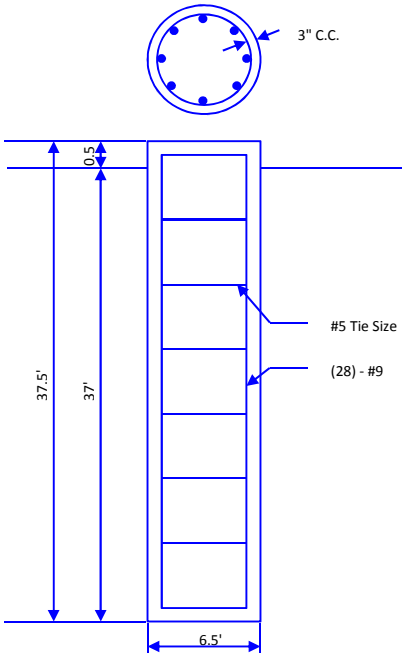
Compression	36	kips
Shear	22	kips
Moment	2090	k-ft
Swelling Force	0	kips

Foundation Dimensions

Pier Diameter:	6.5	ft
Ext. above grade:	0.5	ft
Depth below grade:	37	ft

Material Properties

Number of Rebar:	28	
Rebar Size:	9	
Tie Size	5	
Rebar tensile strength:	60	ksi
Concrete Strength:	3000	psi
Ultimate Concrete Strain	0.003	in/in
Clear Cover to Ties:	3	in



Soil Profile: NORWICH

Layer	Thickness (ft)	From (ft)	To (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)	Ultimate Uplift Skin Friction (ksf)	Ultimate Comp. Skin Friction (ksf)	Ultimate Bearing Capacity (ksf)	SPT 'N' Counts
1	3.3	0	3.3	120	0	0	0	0	0	
2	3.7	3.3	7	120		31			0	
3	3	7	10	130		36			0	
4	10	10	20	68		36			0	
5	17	20	37	58		30			24	

Analysis Results

Soil Lateral Capacity

Depth to Zero Shear:	8.47	ft
Max Moment, Mu:	2247.15	k-ft
Soil Safety Factor:	11.64	
Safety Factor Req'd:	2	
RATING:	17.18%	

Soil Axial Capacity

Skin Friction (k):	236.60	kips
End Bearing (k):	398.20	kips
Comp. Capacity (k), ϕCn:	634.80	kips
Comp. (k), Cu:	36.00	kips
RATING:	5.67%	

Concrete/Steel Check

Mu (from soil analysis)	2921.29	k-ft
ϕMn	4156.60	k-ft
RATING:	70.28%	

rho provided	0.59	
rho required	0.33	OK

Rebar Spacing	6.68	
Spacing required	18.05	OK

Dev. Length required	28.28	
Dev. Length provided	49.43	OK

Overall Foundation Rating: 70.28%

Exhibit C

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

T-Mobile Existing Facility

Site ID: CT11331A

Norwich
50 Clinton Avenue
Norwich, CT 06360

April 20, 2015

EBI Project Number: 6215002683

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	21.22 %

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April 20, 2015

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

Emissions Analysis for Site: **CT11331A – Norwich**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **50 Clinton Avenue, Norwich, 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 1900 MHz (PCS) and 2100 MHz (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 **50 Clinton Avenue, Norwich, 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) 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.

5) 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.

6) The antennas used in this modeling are the **RFS APX16DWV-16DWVS-E-A20** for 1900 MHz (PCS) and 2100 MHz (AWS) channels. Additionally there are three (3) **EMS RR90-17-02DP** antennas that are remaining on the tower but are dormant at this time. 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.

7) The antenna mounting height centerline of the proposed antennas is **137 feet** above ground level (AGL).

8) 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 APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20
Gain:	16.3 dBd	Gain:	16.3 dBd	Gain:	16.3 dBd
Height (AGL):	137	Height (AGL):	137	Height (AGL):	137
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%	2.14	Antenna B1 MPE%	2.14	Antenna C1 MPE%	2.14
Antenna #:	**2 (Dormant)**	Antenna #:	**2 (Dormant)**	Antenna #:	**2 (Dormant)**
Make / Model:	EMS RR90-17-02DP	Make / Model:	EMS RR90-17-02DP	Make / Model:	EMS RR90-17-02DP
Gain:	14.4 dBd	Gain:	14.4 dBd	Gain:	14.4 dBd
Height (AGL):	137	Height (AGL):	137	Height (AGL):	137
Frequency Bands	1900 MHz(PCS)	Frequency Bands	1900 MHz(PCS)	Frequency Bands	1900 MHz(PCS)
Channel Count	0	Channel Count	0	Channel Count	0
Total TX Power:	0	Total TX Power:	0	Total TX Power:	0
ERP (W):	0.00	ERP (W):	0.00	ERP (W):	0.00
Antenna A2 MPE%	0.00	Antenna B2 MPE%	0.00	Antenna C2 MPE%	0.00

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**6.43**
AT&T	5.30 %
MetroPCS	7.89 %
Norwich Police	0.80 %
Norwich PWD	0.80 %
Site Total MPE %:	**21.22 %**

T-Mobile Sector 1 Total:	2.14 %
T-Mobile Sector 2 Total:	2.14 %
T-Mobile Sector 3 Total:	2.14 %
Site Total:	21.22 %

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Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector 1:	2.14 %
Sector 2:	2.14 %
Sector 3 :	2.14 %
T-Mobile Total:	6.43 %
Site Total:	21.22 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **21.22%** 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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