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

June 3, 2015

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

RE: **T-Mobile - Exempt Modification - Crown Site BU: 876382**
T-Mobile Site ID: CT11604B
Located at: 1684 Chamberlain Highway, Berlin, CT 06037

Dear Ms. Bachman:

This letter and exhibits are submitted on behalf of T-Mobile. T-Mobile is making modifications to certain existing sites in its Connecticut system in order to implement their VoLTE technology. Please accept this letter and exhibits as notification, pursuant to § 16-50j-73 of the Regulations of Connecticut State Agencies ("R.C.S.A."), of construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In compliance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to The Honorable Rachel J. Rochette, Mayor for the Town of Berlin, and Ronald Laviana & Arlene Laviana, Property Owner.

T-Mobile plans to modify the existing wireless communications facility owned by Crown Castle and located at **1684 Chamberlain Highway, Berlin, CT 06037**. Attached are a compound plan and elevation depicting the planned changes (Exhibit-1), and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration (Exhibit-2). Also included is a power density table report reflecting the modification to T-Mobile's operations at the site (Exhibit-3).

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

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

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

3. The proposed modifications will not increase noise levels at the facility by six decibels or more.
4. A Structural Modification Report confirming that the tower and foundation can support T-Mobile's proposed modifications is included as Exhibit-2.

5. The operation of the additional antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted

safety standard. A cumulative General Power Density table report for T-Mobile's modified facility is included as Exhibit-3.

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

Sincerely,

Kimberly Myl
Real Estate Specialist

Enclosures

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

cc: The Honorable Rachel J. Rochette, Mayor
Town Council
240 Kensington Road
Berlin, CT 06037

Ronald Laviana
Arlene Laviana
1684 Chamberlain Highway
Kensington, CT 06037

SITE NAME: SPRINT BERLIN KENSINGTON

1684 CHAMBERLAIN HIGHWAY
BERLIN, CT 06037
HARTFORD COUNTY

SITE NUMBER: CT11604B

GENERAL NOTES

1. THIS DOCUMENT IS THE CREATION, DESIGN, PROPERTY AND COPYRIGHTED WORK OF T–MOBILE. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. DUPLICATION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.
2. THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.
3. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE T–MOBILE NORTHEAST, LLC REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

T-MOBILE TECHNICIAN SITE SAFETY NOTES

LOCATION	SPECIAL RESTRICTIONS
SECTOR A:	ACCESS NOT PERMITTED
SECTOR B:	ACCESS NOT PERMITTED
SECTOR C:	ACCESS NOT PERMITTED
GPS/LMU:	UNRESTRICTED
RADIO CABINETS:	UNRESTRICTED
PPC DISCONNECT:	UNRESTRICTED
MAIN CIRCUIT D/C:	UNRESTRICTED
NIU/T DEMARC:	UNRESTRICTED
OTHER/SPECIAL:	NONE

CONFIGURATION
4E-GU19

CROWN CASTLE SITE NAME: BERLIN/LAVIANA ORCHARD
CROWN CASTLE SITE ID: 876382

72 HOURS
BEFORE YOU DIG
CALL TOLL FREE 888–DIG–SAFE

UNDERGROUND SERVICE ALERT

PROJECT INFORMATION

SCOPE OF WORK:	UNMANNED TELECOMMUNICATIONS FACILITY T–MOBILE EQUIPMENT MODERNIZATION
ZONING JURISDICTION:	BASED ON INFORMATION PROVIDED BY T–MOBILE, THIS TELECOMMUNICATIONS EQUIPMENT DEPLOYMENT IS AN ELIGIBLE FACILITY UNDER THE TAX RELIEF ACT OF 2012, 47 USC 1455(A), AND IS SUBJECT TO AN EXPEDITED ELIGIBLE FACILITIES REQUEST/REVIEW AND ZONING PRE–EMPTION FOR LOCAL DISCRETIONARY PERMITS (VARIANCE, SPECIAL PERMIT, SITE PLAN REVIEW).
SITE ADDRESS:	1684 CHAMBERLAIN HIGHWAY BERLIN, CT 06037
LATITUDE:	41° 35' 23.07" N
LONGITUDE:	–72° 48' 19.2" W
JURISDICTION:	NATIONAL, STATE & LOCAL CODES OR ORDINANCES
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY
TOWER OWNER:	CROWN CASTLE INTERNATIONAL
CROWN CASTLE ID:	876382

DESIGN GUIDELINE: 4E-GU19

DRAWING INDEX

T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 648–1116

CROWN CASTLE
CROWN CASTLE
500 WEST CUMMINGS PARK, SUITE 3600
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DANIEL P. HAMM
No. 24178
LICENSED PROFESSIONAL ENGINEER

Daniel P. Hamm

APPROVALS

CONSTRUCTION	DATE
RF ENGINEERING	DATE
ZONING/SITE ACQ.	DATE
OPERATIONS	DATE
TOWER OWNER	DATE

PROJECT NO:	CT11604B
DRAWN BY:	MC
CHECKED BY:	RP

2	06/04/15	REVISED PER COMMENTS
1	05/26/15	REVISED PER RFDS
0	04/21/15	ISSUED FOR REVIEW

SITE NUMBER: CT11604B
SITE NAME: SPRINT BERLIN KENSINGTON
CROWN CASTLE ID: 876382
1684 CHAMBERLAIN HIGHWAY
BERLIN, CT 06037
HARTFORD COUNTY

SHEET TITLE
TITLE SHEET
(MODERNIZATION PROJECT)

SHEET NUMBER
T-1

GROUNDING NOTES

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ), THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.

2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.

3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR NEW GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.

4. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.

5. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS 2 AWG STRANDED COPPER FOR OUTDOOR BTS.

6. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.

7. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.

8. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR.

9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.

10. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.

11. METAL CONDUIT SHALL BE MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWS COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.

12. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE OF 1/2 IN. OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID BARE TINNED COPPER GROUND WIRE, PER NEC 250.50

GENERAL NOTES

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:

   CONTRACTOR – CROWN CASTLE INTERNATIONAL
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – T-MOBILE

2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.

3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

4. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.

5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.

6. "KITTING LIST" SUPPLIED WITH THE BID PACKAGE IDENTIFIES ITEMS THAT WILL BE SUPPLIED BY CONTRACTOR. ITEMS NOT INCLUDED IN THE BILL OF MATERIALS AND KITTING LIST SHALL BE SUPPLIED BY THE SUBCONTRACTOR.

7. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE CONTRACTOR.

9. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR.

10. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.

11. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.

12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.

13. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.

14. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL BE AIR-ENTRAINED AND SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS. ALL CONCRETE WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.

15. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (Fy = 36 ksi) UNLESS OTHERWISE NOTED. PIPES SHALL BE ASTM A53 TYPE E (Fy = 36 ksi). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCHUP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.

16. CONSTRUCTION SHALL COMPLY WITH UMTS SPECIFICATIONS AND "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF T-MOBILE SITES."

17. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.

18. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.

19. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

20. APPLICABLE BUILDING CODES:
SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.

   BUILDING CODE: 2003 IBC WITH 2005 CT SUPPLEMENT, 2009 & 2013 CT AMENDMENTS
   ELECTRICAL CODE: REFER TO ELECTRICAL DRAWINGS
   LIGHTNING CODE: REFER TO ELECTRICAL DRAWINGS

SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:

   AMERICAN CONCRETE INSTITUTE (ACI) 318; BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE;

   AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

   MANUAL OF STEEL CONSTRUCTION, ASD, 14TH EDITION;

   TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA) 222-F, STRUCTURAL STANDARDS FOR STEEL

   ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES; REFER TO ELECTRICAL DRAWINGS FOR SPECIFIC ELECTRICAL STANDARDS.

FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.

ABBREVIATIONS

AGL	ABOVE GRADE LEVEL	G.C.	GENERAL CONTRACTOR	RF	RADIO FREQUENCY
AWG	AMERICAN WIRE GAUGE	MGB	MASTER GROUND BUS		
BCW	BARE COPPER WIRE	MIN	MINIMUM	TBD	TO BE DETERMINED
BTS	BASE TRANSCEIVER STATION	PROPOSED	NEW	TBR	TO BE REMOVED
EXISTING	EXISTING	N.T.S.	NOT TO SCALE	TBRR	TO BE REMOVED AND REPLACED
EG	EQUIPMENT GROUND	REF	REFERENCE	TYP	TYPICAL
EGR	EQUIPMENT GROUND RING	REQ	REQUIRED		

T-MOBILE NORTHEAST LLC

35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 648-1116

CROWN CASTLE
500 WEST CUMMINGS PARK, SUITE 3600
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DANIEL P. HAMM
No. 24178
LICENSED PROFESSIONAL ENGINEER

Daniel P. Hamm

APPROVALS

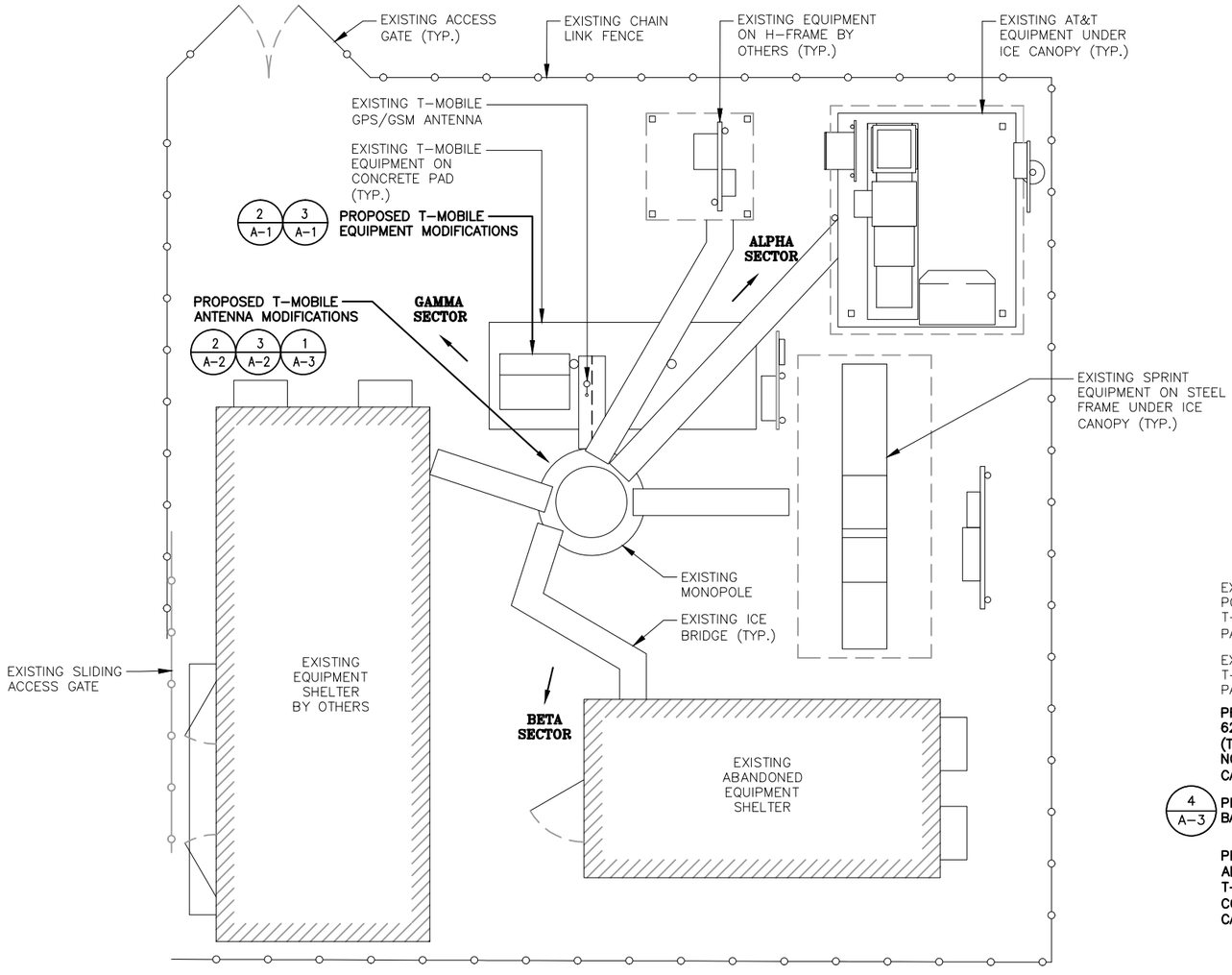
CONSTRUCTION	DATE
RF ENGINEERING	DATE
ZONING/SITE ACQ.	DATE
OPERATIONS	DATE
TOWER OWNER	DATE

PROJECT NO:		CT11604B
DRAWN BY:		MC
CHECKED BY:		RP
2	06/04/15	REVISED PER COMMENTS
1	05/26/15	REVISED PER RFDS
0	04/21/15	ISSUED FOR REVIEW

SITE NUMBER: CT11604B
SITE NAME: SPRINT BERLIN KENSINGTON
CROWN CASTLE ID: 876382
1684 CHAMBERLAIN HIGHWAY
BERLIN, CT 06037
HARTFORD COUNTY

SHEET TITLE
GENERAL NOTES
(MODERNIZATION PROJECT)

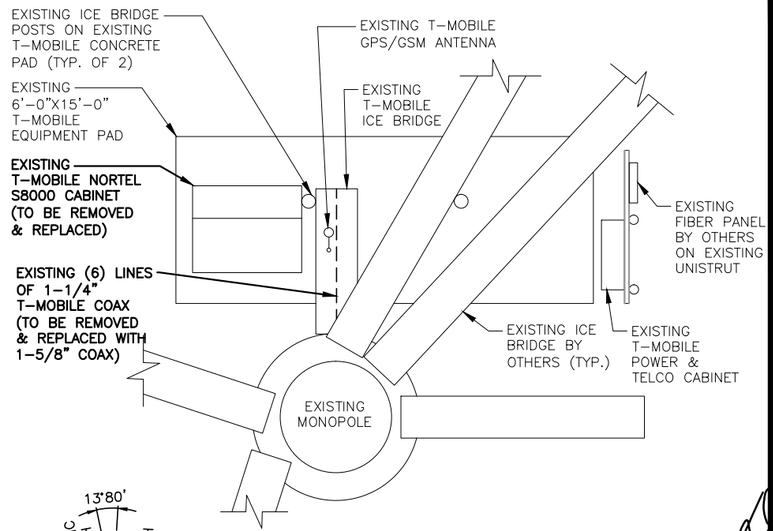
SHEET NUMBER
GN-1



13°80'
MAGNETIC NORTH
TRUE NORTH

1 A-1 **COMPOUND PLAN**
SCALE: 1/4"=1'-0"

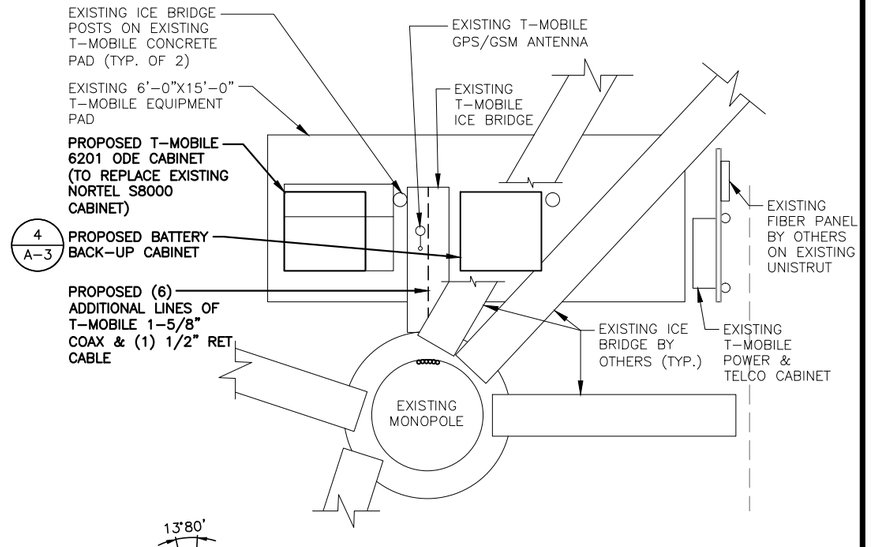
0 2'-0" 4'-0" 8'-0" 12'-0"



13°80'
MAGNETIC NORTH
TRUE NORTH

2 A-1 **EXISTING EQUIPMENT PLAN**
SCALE: 3/8"=1'-0"

0 1'-4" 2'-8" 5'-4" 8'-0"



13°80'
MAGNETIC NORTH
TRUE NORTH

3 A-1 **PROPOSED EQUIPMENT PLAN**
SCALE: 3/8"=1'-0"

0 1'-4" 2'-8" 5'-4" 8'-0"

T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 648-1116

CROWN CASTLE
CROWN CASTLE
500 WEST CUMMINGS PARK, SUITE 3600
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DANIEL P. HAMM
No. 24178
LICENSED PROFESSIONAL ENGINEER

Daniel P. Hamm

APPROVALS

CONSTRUCTION	DATE
RF ENGINEERING	DATE
ZONING/SITE ACQ.	DATE
OPERATIONS	DATE
TOWER OWNER	DATE

PROJECT NO:		CT11604B
DRAWN BY:		MC
CHECKED BY:		RP
2	06/04/15	REVISED PER COMMENTS
1	05/26/15	REVISED PER RFDS
0	04/21/15	ISSUED FOR REVIEW

SITE NUMBER: CT11604B
SITE NAME: SPRINT BERLIN KENSINGTON
CROWN CASTLE ID: 876382
1684 CHAMBERLAIN HIGHWAY
BERLIN, CT 06037
HARTFORD COUNTY

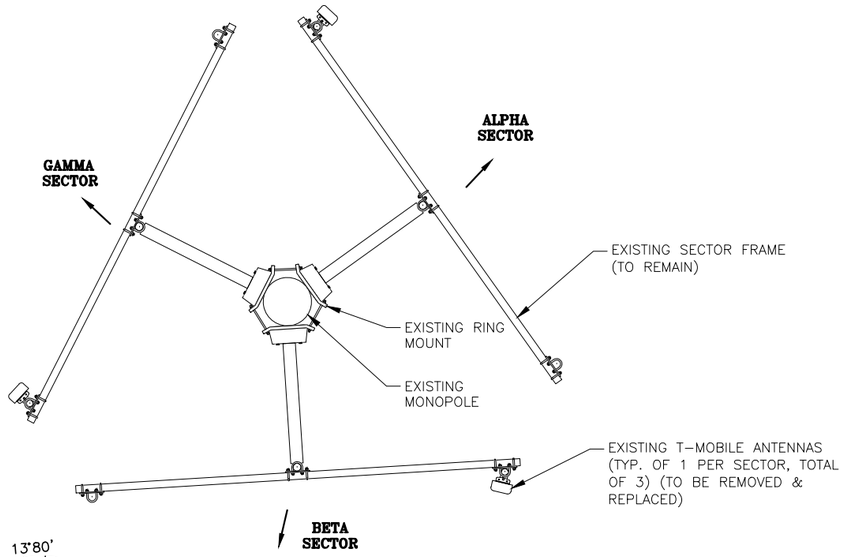
SHEET TITLE
COMPOUND & EQUIPMENT PLAN (MODERNIZATION PROJECT)

SHEET NUMBER
A-1

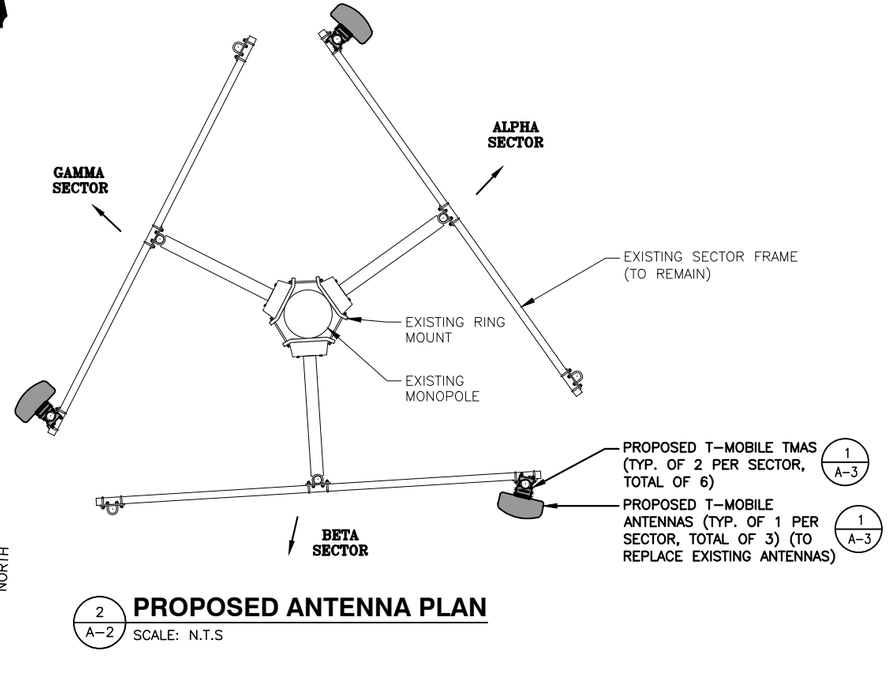
STRUCTURAL NOTES:
PRIOR TO COMMENCING CONSTRUCTION, GC SHALL REFER TO STRUCTURAL ANALYSIS PROVIDED BY PAUL J. FORD & COMPANY DATED 05/14/2015 TO DETERMINE IF THERE ANY SUPPLEMENTAL OR SPECIAL INSTALLATION REQUIREMENTS FOR RF EQUIPMENT AND FOR CABLE BUNDLING, SHIELDING, MOUNTING, OR RELOCATION ARRANGEMENTS.

NOTE:

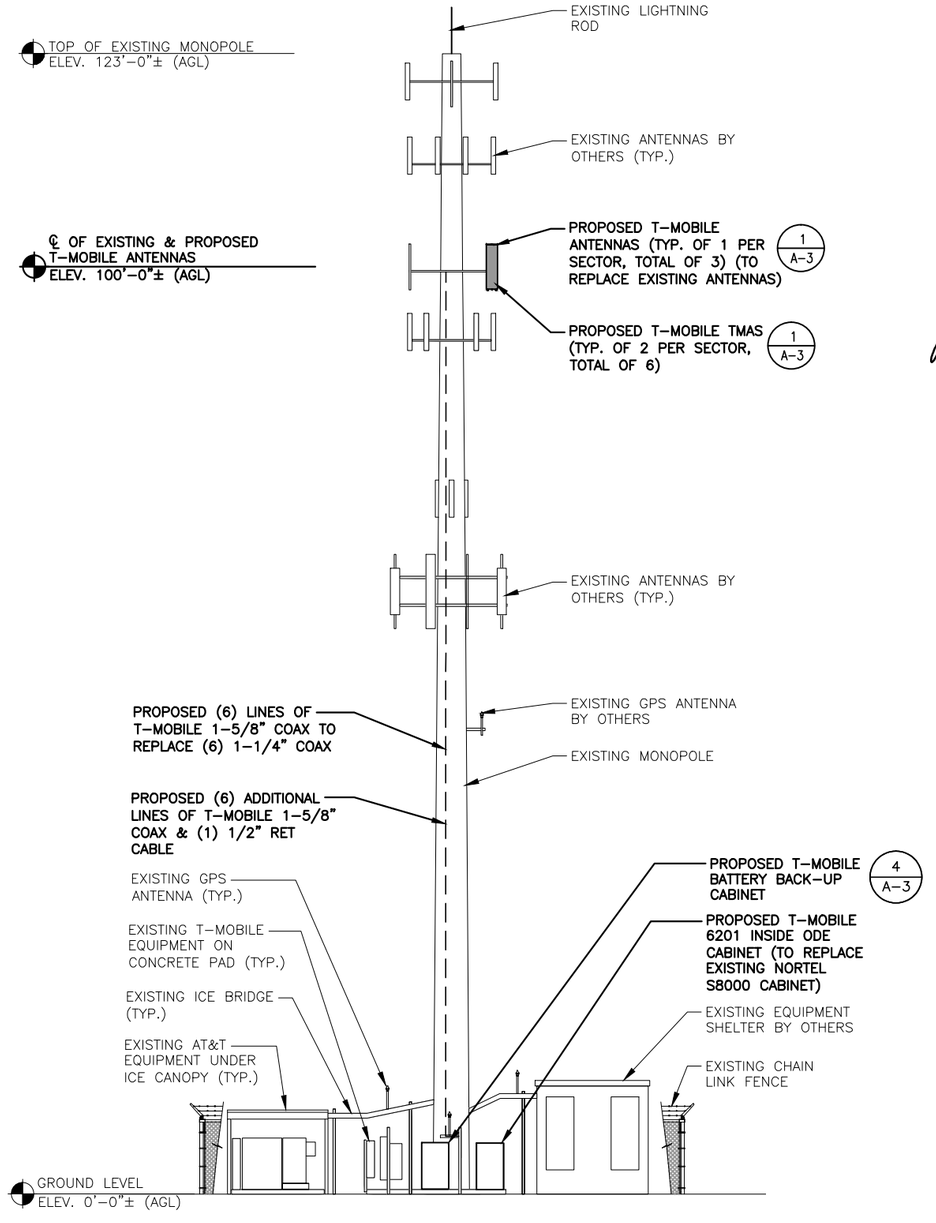
*RF DATA BASED ON PRELIMINARY INFORMATION. REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.



1 A-2 **EXISTING ANTENNA PLAN**
SCALE: N.T.S



2 A-2 **PROPOSED ANTENNA PLAN**
SCALE: N.T.S



3 A-2 **NORTH ELEVATION**
SCALE: 1/8"=1'-0"

0 4'-0" 8'-0" 16'-0" 24'-0"

T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 648-1116

CROWN CASTLE
CROWN CASTLE
500 WEST CUMMINGS PARK, SUITE 3600
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DANIEL P. HAMM
No. 24178
LICENSED PROFESSIONAL ENGINEER

Daniel P. Hamm

APPROVALS

CONSTRUCTION	DATE
RF ENGINEERING	DATE
ZONING/SITE ACQ.	DATE
OPERATIONS	DATE
TOWER OWNER	DATE
PROJECT NO:	CT11604B
DRAWN BY:	MC
CHECKED BY:	RP

2	06/04/15	REVISED PER COMMENTS
1	05/26/15	REVISED PER RFDS
0	04/21/15	ISSUED FOR REVIEW

SITE NUMBER: CT11604B
SITE NAME: SPRINT BERLIN KENSINGTON
CROWN CASTLE ID: 876382
1684 CHAMBERLAIN HIGHWAY
BERLIN, CT 06037
HARTFORD COUNTY

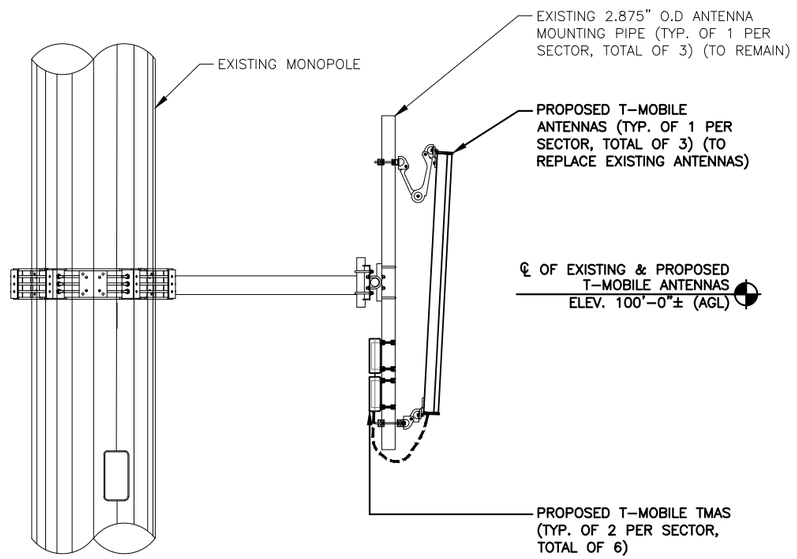
SHEET TITLE
ANTENNA LAYOUT AND ELEVATION
(MODERNIZATION PROJECT)

SHEET NUMBER
A-2

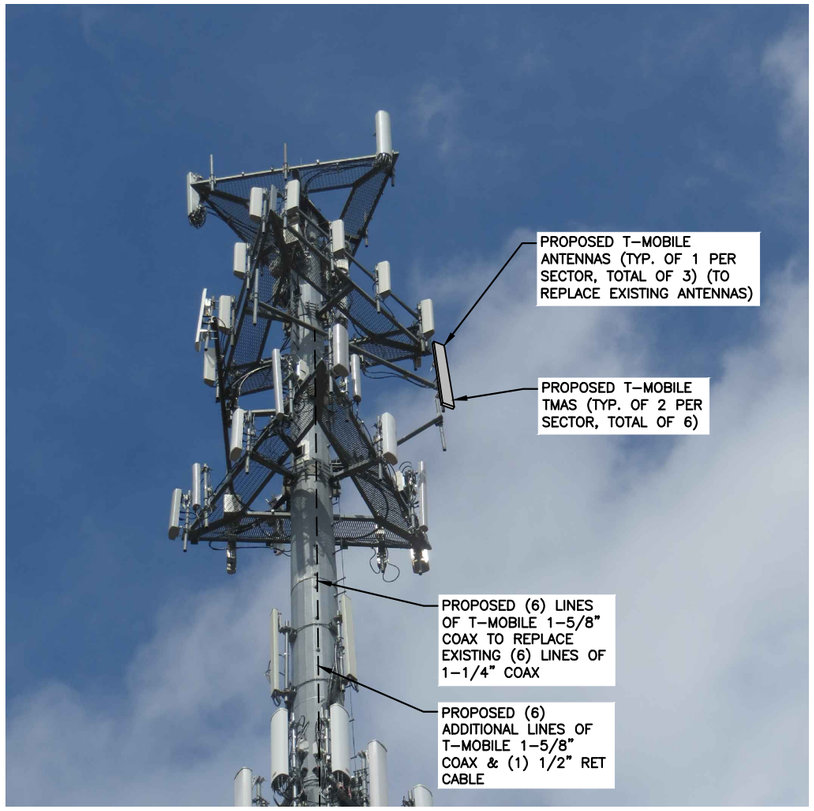
STRUCTURAL NOTES:
PRIOR TO COMMENCING CONSTRUCTION, GC SHALL REFER TO STRUCTURAL ANALYSIS PROVIDED BY PAUL J. FORD & COMPANY DATED 05/14/2015 TO DETERMINE IF THERE ANY SUPPLEMENTAL OR SPECIAL INSTALLATION REQUIREMENTS FOR RF EQUIPMENT AND FOR CABLE BUNDLING, SHIELDING, MOUNTING, OR RELOCATION ARRANGEMENTS.

NOTE:

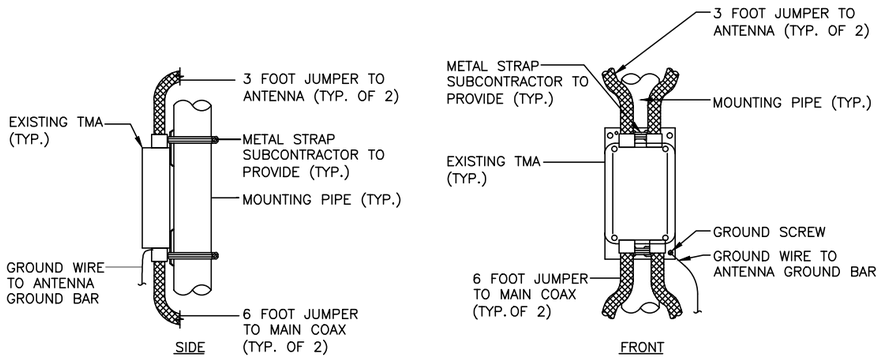
*RF DATA BASED ON PRELIMINARY INFORMATION. REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.



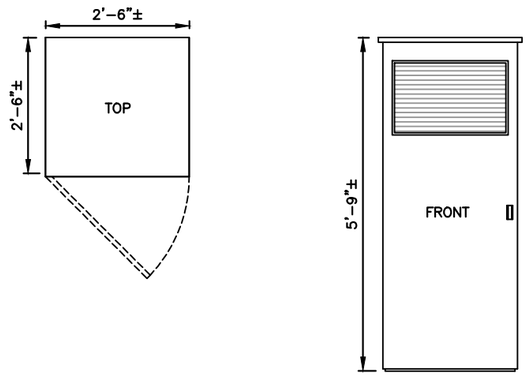
1 A-3 **PROPOSED ANTENNA MOUNT (TYPICAL)**
SCALE: 3/4"=1'-0"



3 A-3 **T-MOBILE ELEVATION PHOTO DETAIL**
SCALE: N.T.S.



2 A-3 **TMA MOUNTING DETAIL**
SCALE: N.T.S.



4 A-3 **PROPOSED BATTERY BACK-UP (TYPICAL)**
SCALE: N.T.S.

T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 648-1116

CROWN CASTLE
500 WEST CUMMINGS PARK, SUITE 3600
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DANIEL P. HAMM
No. 24178
LICENSED PROFESSIONAL ENGINEER

Daniel P. Hamm

APPROVALS

CONSTRUCTION	DATE
RF ENGINEERING	DATE
ZONING/SITE ACQ.	DATE
OPERATIONS	DATE
TOWER OWNER	DATE

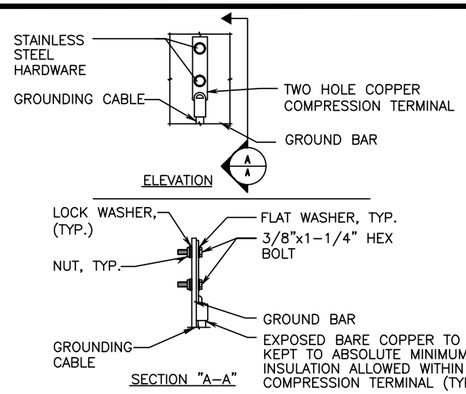
PROJECT NO: CT11604B
DRAWN BY: MC
CHECKED BY: RP

2	06/04/15	REVISED PER COMMENTS
1	05/26/15	REVISED PER RFDS
0	04/21/15	ISSUED FOR REVIEW

SITE NUMBER: CT11604B
SITE NAME: SPRINT BERLIN KENSINGTON
CROWN CASTLE ID: 876382
1684 CHAMBERLAIN HIGHWAY
BERLIN, CT 06037
HARTFORD COUNTY

SHEET TITLE
DETAILS
(MODERNIZATION PROJECT)

SHEET NUMBER
A-3



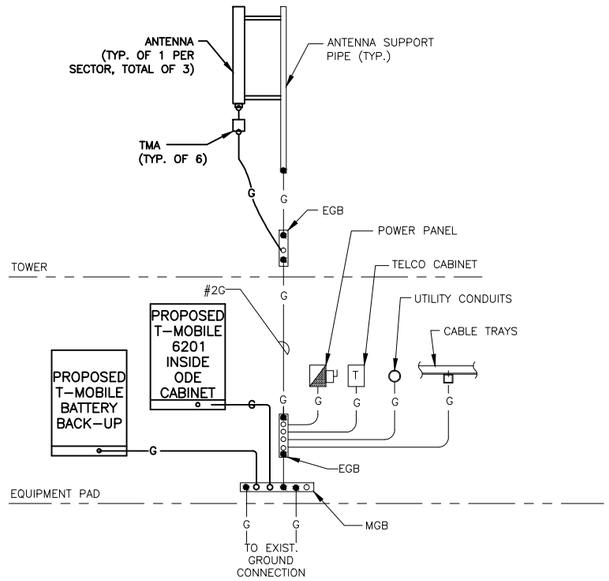
NOTE:
1. "DOUBLING UP" OR "STACKING " OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB, AND MGB.

1 TYPICAL GROUND BAR CONNECTION DETAIL

N.T.S.

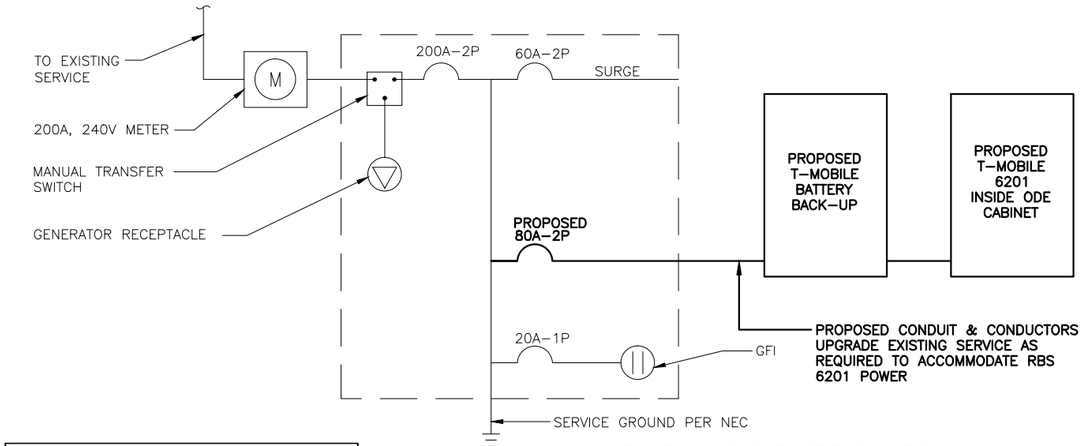
NOTE:

G.C. TO VERIFY THAT THE EXISTING CONDUITS AND WIRE SIZES ARE ADEQUATE FOR THE PROPOSED LOADING AND INCLUDE ELECTRICAL UPGRADES IN THE SCOPE OF WORK AS REQUIRED.



2 GROUNDING RISER DIAGRAM

N.T.S.



4 ONE LINE POWER DIAGRAM

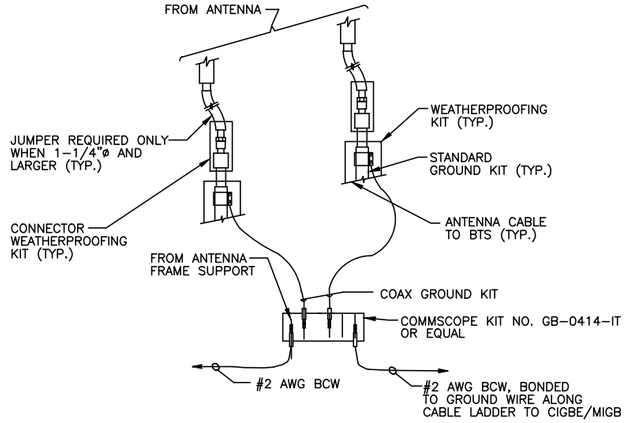
N.T.S.

ELECTRICAL LEGEND

A	AMPERE
V	VOLT
KWH	KILOWATT - HOUR
C	CONDUIT
GRC	GALVANIZED RIGID CONDUIT
G	GROUND
	GROUND
MGB	MASTER GROUND BAR (○ MECHANICAL CONNECTION ● CADWELD CONNECTION)
EGB	EQUIPMENT GROUND BAR
G	GROUND COPPER WIRE, SIZE AS NOTED
	EXPOSED WIRING
	COAXIAL CABLE
	5/8"x8' COPPER CLAD STAINLESS STEEL GROUND ROD
	● EXOTHERMIC (CAD WELD) OR ○ MECHANICAL (COMPRESSION TYPE) CONNECTION
PPC	POWER PROTECTION CABINET
	OMNI-DIRECTIONAL ELECTRONIC MARKER SYSTEM (EMS) BALL

ELECTRICAL & GROUNDING NOTES:

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.
3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATION INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.
4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.
5. ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.
6. RIGID STEEL CONDUITS SHALL BE GROUNDED AT BOTH ENDS.
7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THIN INSULATION.
8. RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL ROOM AND PROPOSED CELL SITE POWER PEDESTAL AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.
9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROPOSED CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON DRAWING A-1. PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
10. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.
11. GROUNDING SHALL COMPLY WITH NEC ART. 250.
12. GROUND COAXIAL CABLE SHIELDS MINIMUM AT BOTH ENDS USING MANUFACTURERS COAX CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.
13. USE #6 COPPER STRANDED WIRE WITH GREEN COLOR INSULATION FOR ABOVE GRADE GROUNDING (UNLESS OTHERWISE SPECIFIED) AND #2 SOLID TINNED BARE COPPER WIRE FOR BELOW GRADE GROUNDING AS INDICATED ON THE DRAWING.
14. ALL GROUND CONNECTIONS TO BE BURNDY HYGROUND COMPRESSION TYPE CONNECTORS OR CADWELD EXOTHERMIC WELD. DO NOT ALLOW BARE COPPER WIRE TO BE IN CONTACT WITH GALVANIZED STEEL.
15. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AT RIGHT ANGLE. ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY. BOND ANY METAL OBJECTS WITHIN 7 FEET OF PROPOSED EQUIPMENT OR CABINET TO MASTER GROUND BAR.

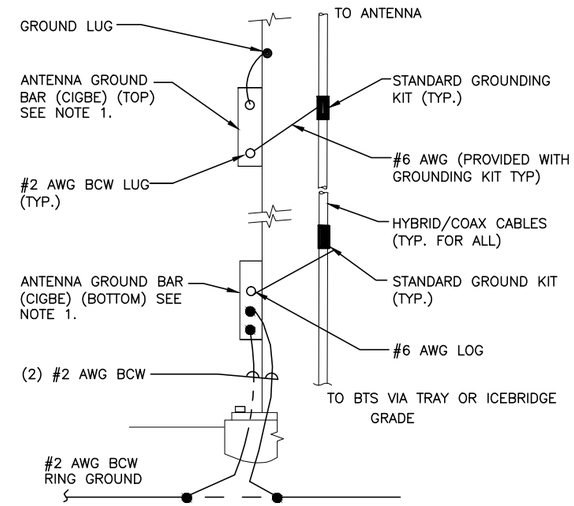


NOTE:

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

3 GROUND WIRE TO GROUND BAR CONNECTION DETAIL

N.T.S.



NOTE:

1. NUMBER OF GROUND BARS MAY VARY DEPENDING ON THE TYPE OF TOWER. ANTENNA LOCATION AND CONNECTION ANTENNA LOCATION AND CONNECTION ORIENTATION. PROVIDE AS REQUIRED.
2. A SEPARATE GROUND BAR TO BE USED FOR GPS ANTENNA IF REQUIRED.

5 ANTENNA CABLE GROUNDING

N.T.S.

ELECTRICAL & GROUNDING NOTES (CONT.):

16. CONNECTIONS TO MGB SHALL BE ARRANGED IN THREE MAIN GROUPS: SURGE PRODUCERS (COAXIAL CABLE GROUND KITS, TELCO AND POWER PANEL GROUND); (GROUNDING ELECTRODE RING OR BUILDING STEEL); NON-SURGING OBJECTS (EGB GROUND IN BTS UNIT).
17. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LUGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.
18. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTIONS.
19. BOND ANTENNA MOUNTING BRACKETS, COAXIAL CABLE GROUND KITS, AND ALNA TO EGB PLACED NEAR THE ANTENNA LOCATION.
20. BOND ANTENNA EGB'S AND MGB TO WATER MAIN.
21. TEST COMPLETED GROUND SYSTEM AND RECORD RESULTS FOR PROJECT CLOSE-OUT DOCUMENTATION.
22. BOND ANY METAL OBJECTS WITHIN 7 FEET OF PROPOSED EQUIPMENT OR CABINET TO MASTER GROUND BAR.
23. VERIFY PROPOSED SERVICE UPGRADE WITH LOCAL UTILITY COMPANY PRIOR TO CONSTRUCTION.

T-MOBILE NORTHEAST LLC

35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 648-1116

CROWN CASTLE
500 WEST CUMMINGS PARK, SUITE 3600
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DANIEL P. HAMM
No. 24178
LICENSED PROFESSIONAL ENGINEER

Daniel P. Hamm

APPROVALS

CONSTRUCTION	DATE
RF ENGINEERING	DATE
ZONING/SITE ACQ.	DATE
OPERATIONS	DATE
TOWER OWNER	DATE

PROJECT NO:	CT11604B
DRAWN BY:	MC
CHECKED BY:	RP

2	06/04/15	REVISED PER COMMENTS
1	05/26/15	REVISED PER RFDS
0	04/21/15	ISSUED FOR REVIEW

SITE NUMBER: CT11604B
SITE NAME: SPRINT BERLIN KENSINGTON
CROWN CASTLE ID: 876382
1684 CHAMBERLAIN HIGHWAY
BERLIN, CT 06037
HARTFORD COUNTY

SHEET TITLE
GROUNDING DETAILS
(MODERNIZATION PROJECT)

SHEET NUMBER
G-1

PJF PAUL J. FORD & COMPANY

Date: **May 14, 2015**

Rebecca Klein
Crown Castle
525 Alderman Lane
Fort Mill, SC 29715

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

Subject: Structural Analysis Report

Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11604B
	Carrier Site Name:	Sprint Berlin Kensington
Crown Castle Designation:	**Crown Castle BU Number:**	876382
	Crown Castle Site Name:	BERLIN / LAVIANA ORCHARD
	Crown Castle JDE Job Number:	331291
	Crown Castle Work Order Number:	1059167
	Crown Castle Application Number:	289627 Rev. 3
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37515-0149.004.7805
Site Data:	**1684 Chamberlain Highway, BERLIN, Hartford County, CT**	
	Latitude *41° 35' 23.07"*, Longitude *-72° 48' 19.2"*	
	123 Foot - Monopole Tower	

Dear Rebecca Klein,

Paul J. Ford and Company 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 786177, in accordance with application 289627, revision 3.

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 structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

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

Respectfully submitted by:

Christopher Poelking, E.I.
Structural Designer

STATE OF CONNECTICUT
JOSEPH PACHICARAH JACOBS
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER

for jacobs

tnxTower Report - version 6.1.4.1

MAY 14 2015

PAUL J. FORD & COMPANY

Date: **May 14, 2015**

Rebecca Klein
Crown Castle
525 Alderman Lane
Fort Mill, SC 29715

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

Subject: **Structural Analysis Report**

Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11604B
	Carrier Site Name:	Sprint Berlin Kensington
Crown Castle Designation:	**Crown Castle BU Number:**	876382
	Crown Castle Site Name:	BERLIN / LAVIANA ORCHARD
	Crown Castle JDE Job Number:	331291
	Crown Castle Work Order Number:	1059167
	Crown Castle Application Number:	289627 Rev. 3
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37515-0149.004.7805
Site Data:	**1684 Chamberlain Highway, BERLIN, Hartford County, CT**	
	Latitude *41° 35' 23.07"*, Longitude *-72° 48' 19.2"*	
	123 Foot - Monopole Tower	

Dear Rebecca Klein,

Paul J. Ford and Company 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 786177, in accordance with application 289627, revision 3.

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 structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

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

Respectfully submitted by:

Christopher Poelking, E.I.
Structural Designer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 123-ft Monopole tower designed by SUMMIT in July 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 the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
100.0	101.0	3	andrew	ETT19V2S12UB	6	1-5/8	-
		3	ericsson	KRY 112 144/1			
		3	rfs celwave	APX16DWV-16DWVS-C 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
120.0	121.0	3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe	3	1-1/4	1
	120.0	1	tower mounts	Platform Mount [LP 1201-1]			
118.0	118.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	-	-	1
		3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
		1	tower mounts	Side Arm Mount [SO 102-3]			
112.0	113.0	12	decibel	DB844H90E-XY w/Mount Pipe	12	7/8	1
	112.0	1	tower mounts	Platform Mount [LP 713-1]			
100.0	101.0	3	ems wireless	RR65-18-02DP w/ Mount Pipe	-	-	3
		3	remec	S20057A1			
	100.0	1	tower mounts	T-Arm Mount [TA 602-3]	6	1-5/8	1

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
93.0	94.0	3	andrew	LNX-6514DS-A1M w/ Mount Pipe	1	1-5/8	2
		3	alcatel lucent	RRH2X40-AWS	12	1-5/8	1
		3	antel	BXA-171063-12CF-EDIN-X w/ Mount Pipe			
		2	antel	BXA-171063-8BF-2 w/ Mount Pipe			
		1	antel	BXA-171085-8BF-EDIN-0 w/ Mount Pipe			
		3	antel	BXA-70063-4CF-EDIN-X w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		6	rfs celwave	FD9R6004/2C-3L			
	93.0	1	tower mounts	Platform Mount [LP 1201-1]			
75.0	75.0	3	rfs celwave	APXV18-206517S-C	6	1-5/8	1
		1	tower mounts	Pipe Mount [PM 601-3]			
65.0	66.0	6	powerwave technologies	P65-15-XLH-RR w/ Mount Pipe	1* 2* 12	3/8 3/4 1-5/8	1
		6	powerwave technologies	TT19-08BP111-001			
	65.0	6	ericsson	RRUS-11			
		3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	T-Arm Mount [TA 601-3]			
50.0	51.0	1	lucent	KS24019-L112A	1	1/2	1
	50.0	1	tower mounts	Side Arm Mount [SO 702-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment to be Removed

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)
-	-	-	-	-	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, 05/05/2000	1629353	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PJF, 29200-0802, 06/06/2000	1629413	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PJF, 29200-0802, 06/06/2000	1629384	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	PJF, 37512-1129, 4/24/2012	3157202	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Vertical Solutions, 080828.04, 12/11/2008	2611098	CCISITES
4-POST-MODIFICATION INSPECTION	SGS, 145202, 9/8/2014	5287888	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF, 37508-0979, 10/29/2008	2339268	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

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

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	123 - 82.25	Pole	TP28.114x22x0.1875	1	-10.06	782.55	67.9	Pass
L2	82.25 - 57.75	Pole	TP31.4152x27.2139x0.25	2	-15.46	1285.62	91.8	Pass
L3	57.75 - 40.75	Pole	TP33.966x31.4152x0.4476	3	-18.15	1796.16	83.7	Pass
L4	40.75 - 29.75	Pole	TP35.1164x32.4332x0.4681	4	-22.24	1982.96	94.8	Pass
L5	29.75 - 0	Pole	TP39.58x35.1164x0.487	5	-29.78	2506.49	99.5	Pass
							Summary	
						Pole (L5)	99.5	Pass
						Rating =	99.5	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1, 3	Anchor Rods	0	87.4	Pass
1	Base Plate	0	65.0	Pass
1	Base Foundation Structural Steel	0	79.8	Pass
1, 2	Base Foundation Soil Interaction	0	65.5	Pass

Structure Rating (max from all components) =	**99.5%**

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed.
2) Foundation Analysis Notes: According to the procedures prescribed and agreed to by the Crown Castle Engineering Foundation Committee, held in January 2010, the existing caisson foundation was analyzed using the methodology in the software ‘PLS-Caisson’ (Version 8.10, or newer, by Power Line Systems, Inc.). Per the methods in PLS-Caisson, the soil reactions of cohesive soils are calculated using 8CD independent of the depth of the soil layer. The depth of soil to be ignored at the top of the caisson is the greater of the geotechnical report’s recommendation, the frost depth of the site or half of the caisson diameter.
3) Worst-case scenario between original anchor rods and post-installed anchor rods.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

1) Tower is located in Hartford County, Connecticut.
2) Basic wind speed of 80 mph.
3) Nominal ice thickness of 1.0000 in.
4) Ice thickness is considered to increase with height.
5) Ice density of 56.00 pcf.
6) A wind speed of 38 mph is used in combination with ice.
7) Deflections calculated using a wind speed of 50 mph.
8) A non-linear (P-delta) analysis was used.
9) Pressures are calculated at each section.
10) Stress ratio used in pole design is 1.333.
11) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

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	123.0000-82.2500	40.7500	3.50	18	22.0000	28.1140	0.1875	0.7500	A607-60 (60 ksi)
L2	82.2500-57.7500	28.0000	0.00	18	27.2139	31.4152	0.2500	1.0000	A607-65 (65 ksi)
L3	57.7500-40.7500	17.0000	4.25	18	31.4152	33.9660	0.4476	1.7902	Reinf 48.08 ksi (48 ksi)
L4	40.7500-29.7500	15.2500	0.00	18	32.4332	35.1164	0.4681	1.8725	Reinf 48.16 ksi (48 ksi)
L5	29.7500-0.0000	29.7500		18	35.1164	39.5800	0.4870	1.9481	Reinf 51.86 ksi (52 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

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	22.3394	12.9812	780.3007	7.7434	11.1760	69.8193	1561.6281	6.4918	3.5420	18.891
	28.5477	16.6198	1637.5523	9.9139	14.2819	114.6592	3277.2593	8.3115	4.6181	24.63
L2	28.1670	21.3958	1965.3102	9.5722	13.8246	142.1599	3933.2064	10.6999	4.3496	17.399
	31.8998	24.7296	3034.5518	11.0636	15.9589	190.1476	6073.0965	12.3671	5.0891	20.356
L3	31.8998	43.9913	5329.9163	10.9935	15.9589	333.9771	10666.8458	21.9998	4.7414	10.594
	34.4900	47.6148	6758.4488	11.8990	17.2547	391.6868	13525.7906	23.8119	5.1903	11.597
L4	33.6928	47.4941	6130.9566	11.3476	16.4761	372.1131	12269.9805	23.7516	4.8843	10.434
	35.6581	51.4808	7808.1088	12.3001	17.8391	437.6958	15626.4918	25.7453	5.3566	11.443
L5	35.6581	53.5301	8110.0693	12.2934	17.8391	454.6227	16230.8100	26.7701	5.3233	10.93
	40.1906	60.4300	11667.7604	13.8780	20.1066	580.2939	23350.8735	30.2207	6.1089	12.543

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 123.0000-82.2500				1	1	1		
L2 82.2500-57.7500				1	1	1		
L3 57.7500-40.7500				1	1	1		
L4 40.7500-29.7500				1	1	1		
L5 29.7500-0.0000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF6-50A(1-1/4")	C	No	Inside Pole	120.0000 - 0.0000	3	No Ice	0.0000	0.66
						1/2" Ice	0.0000	0.66
						1" Ice	0.0000	0.66
						2" Ice	0.0000	0.66
						4" Ice	0.0000	0.66
***								
LDF5-50A(7/8")	C	No	Inside Pole	112.0000 - 0.0000	12	No Ice	0.0000	0.33
						1/2" Ice	0.0000	0.33
						1" Ice	0.0000	0.33
						2" Ice	0.0000	0.33
						4" Ice	0.0000	0.33
***								
LDF7-50A(1-5/8")	C	No	Inside Pole	100.0000 - 0.0000	6	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
						2" Ice	0.0000	0.82
						4" Ice	0.0000	0.82
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	100.0000 - 0.0000	5	No Ice	0.0000	0.82
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.46
						2" Ice	0.0000	10.54
						4" Ice	0.0000	30.04
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	75.0000 - 0.0000	1	No Ice	0.0000	0.82
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.46
						2" Ice	0.0000	10.54
						4" Ice	0.0000	30.04
LDF7-50A(1-5/8")	C	No	CaAa (Out Of	100.0000 -	1	No Ice	0.1980	0.82

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
			Face)	75.0000		1/2" Ice	0.2980	2.33
						1" Ice	0.3980	4.46
						2" Ice	0.5980	10.54
						4" Ice	0.9980	30.04
***								
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	93.0000 - 0.0000	1	No Ice	0.1980	0.82
						1/2" Ice	0.2980	2.33
						1" Ice	0.3980	4.46
						2" Ice	0.5980	10.54
						4" Ice	0.9980	30.04
LDF7-50A(1-5/8")	C	No	Inside Pole	93.0000 - 0.0000	12	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
						2" Ice	0.0000	0.82
						4" Ice	0.0000	0.82
***								
AVA7-50(1-5/8)	C	No	Inside Pole	75.0000 - 0.0000	4	No Ice	0.0000	0.70
						1/2" Ice	0.0000	0.70
						1" Ice	0.0000	0.70
						2" Ice	0.0000	0.70
						4" Ice	0.0000	0.70
AVA7-50(1-5/8)	C	No	CaAa (Out Of Face)	75.0000 - 0.0000	1	No Ice	0.0000	0.70
						1/2" Ice	0.0000	2.23
						1" Ice	0.0000	4.38
						2" Ice	0.0000	10.50
						4" Ice	0.0000	30.07
AVA7-50(1-5/8)	C	No	CaAa (Out Of Face)	75.0000 - 0.0000	1	No Ice	0.2010	0.70
						1/2" Ice	0.3010	2.23
						1" Ice	0.4010	4.38
						2" Ice	0.6010	10.50
						4" Ice	1.0010	30.07
***								
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	65.0000 - 0.0000	6	No Ice	0.0000	0.82
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.46
						2" Ice	0.0000	10.54
						4" Ice	0.0000	30.04
LDF7-50A(1-5/8")	C	No	Inside Pole	65.0000 - 0.0000	6	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
						2" Ice	0.0000	0.82
						4" Ice	0.0000	0.82
FB-L98B-002-75000(3/8")	C	No	Inside Pole	65.0000 - 0.0000	1	No Ice	0.0000	0.06
						1/2" Ice	0.0000	0.06
						1" Ice	0.0000	0.06
						2" Ice	0.0000	0.06
						4" Ice	0.0000	0.06
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	65.0000 - 0.0000	2	No Ice	0.0000	0.59
						1/2" Ice	0.0000	0.59
						1" Ice	0.0000	0.59
						2" Ice	0.0000	0.59
						4" Ice	0.0000	0.59
2" (Nominal) Conduit	C	No	Inside Pole	65.0000 - 0.0000	1	No Ice	0.0000	0.72
						1/2" Ice	0.0000	0.72
						1" Ice	0.0000	0.72
						2" Ice	0.0000	0.72
						4" Ice	0.0000	0.72
***								
LDF4-50A(1/2")	C	No	Inside Pole	50.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.15
						1" Ice	0.0000	0.15
						2" Ice	0.0000	0.15
						4" Ice	0.0000	0.15
********** ********								
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	59.5000 - 0.0000	1	No Ice	0.2083	0.00
						1/2" Ice	0.3194	0.00
						1" Ice	0.4306	0.00
						2" Ice	0.6528	0.00

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						4" Ice	1.0972	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	123.0000-82.2500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	5.643	0.48
L2	82.2500-57.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	10.118	0.81
L3	57.7500-40.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	10.325	0.72
L4	40.7500-29.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.681	0.47
L5	29.7500-0.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	18.068	1.27

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	123.0000-82.2500	A	1.145	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	12.170	1.01
L2	82.2500-57.7500	A	1.094	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	21.786	1.94
L3	57.7500-40.7500	A	1.049	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	21.420	1.73
L4	40.7500-29.7500	A	1.008	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	13.860	1.12
L5	29.7500-0.0000	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	36.580	2.89

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	123.0000-82.2500	-0.1817	0.1049	-0.3384	0.1954
L2	82.2500-57.7500	-0.4605	0.2659	-0.8049	0.4647
L3	57.7500-40.7500	-0.6451	0.3725	-1.0721	0.6190
L4	40.7500-29.7500	-0.6502	0.3754	-1.0882	0.6282
L5	29.7500-0.0000	-0.6601	0.3811	-1.1026	0.6366

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
3/4" x 8 ft lightning rod	C	None		0.00	123.0000	No Ice	0.6000	0.6000	0.01
						1/2" Ice	1.4146	1.4146	0.02
						1" Ice	2.2458	2.2458	0.03
						2" Ice	3.6690	3.6690	0.07
						4" Ice	5.7417	5.7417	0.21
***									
(2) 2.375" OD x 5' Mount Pipe	A	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice	1.1875	1.1875	0.02
						1/2" Ice	1.4956	1.4956	0.03
						1" Ice	1.8071	1.8071	0.04
						2" Ice	2.4580	2.4580	0.08
						4" Ice	3.9194	3.9194	0.20
(2) 2.375" OD x 5' Mount Pipe	B	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice	1.1875	1.1875	0.02
						1/2" Ice	1.4956	1.4956	0.03
						1" Ice	1.8071	1.8071	0.04
						2" Ice	2.4580	2.4580	0.08
						4" Ice	3.9194	3.9194	0.20
(2) 2.375" OD x 5' Mount Pipe	C	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice	1.1875	1.1875	0.02
						1/2" Ice	1.4956	1.4956	0.03
						1" Ice	1.8071	1.8071	0.04
						2" Ice	2.4580	2.4580	0.08
						4" Ice	3.9194	3.9194	0.20
APXVSPP18-C-A20 w/ Mount Pipe	A	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice	8.4975	6.9458	0.08
						1/2" Ice	9.1490	8.1266	0.15
						1" Ice	9.7672	9.0212	0.23
						2" Ice	11.0311	10.8440	0.41
						4" Ice	13.6786	14.8507	0.91
APXVSPP18-C-A20 w/ Mount Pipe	B	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice	8.4975	6.9458	0.08
						1/2" Ice	9.1490	8.1266	0.15
						1" Ice	9.7672	9.0212	0.23
						2" Ice	11.0311	10.8440	0.41
						4" Ice	13.6786	14.8507	0.91
APXVSPP18-C-A20 w/ Mount Pipe	C	From Face	4.0000 0.00 1.00	0.00	120.0000	No Ice	8.4975	6.9458	0.08
						1/2" Ice	9.1490	8.1266	0.15
						1" Ice	9.7672	9.0212	0.23
						2" Ice	11.0311	10.8440	0.41
						4" Ice	13.6786	14.8507	0.91
Platform Mount [LP 1201-1]	C	None		0.00	120.0000	No Ice	23.1000	23.1000	2.10
						1/2" Ice	26.8000	26.8000	2.50
						1" Ice	30.5000	30.5000	2.90
						2" Ice	37.9000	37.9000	3.70
						4" Ice	52.7000	52.7000	5.30
**									
800MHz 2X50W RRH W/FILTER	A	From Face	2.0000 0.00 0.00	0.00	118.0000	No Ice	2.4014	2.2536	0.06
						1/2" Ice	2.6131	2.4602	0.09
						1" Ice	2.8335	2.6753	0.11
						2" Ice	3.3002	3.1316	0.17
						4" Ice	4.3372	4.1479	0.34
800MHz 2X50W RRH W/FILTER	B	From Face	2.0000 0.00 0.00	0.00	118.0000	No Ice	2.4014	2.2536	0.06
						1/2" Ice	2.6131	2.4602	0.09
						1" Ice	2.8335	2.6753	0.11
						2" Ice	3.3002	3.1316	0.17
						4" Ice	4.3372	4.1479	0.34

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
800MHz 2X50W RRH W/FILTER	C	From Face	2.0000 0.00 0.00	0.00	118.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.4014 2.6131 2.8335 3.3002 4.3372	2.2536 2.4602 2.6753 3.1316 4.1479	0.06 0.09 0.11 0.17 0.34
PCS 1900MHz 4x45W-65MHz	A	From Face	2.0000 0.00 0.00	0.00	118.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.7087 2.9477 3.1953 3.7164 4.8623	2.6111 2.8475 3.0925 3.6084 4.7439	0.06 0.08 0.11 0.17 0.35
PCS 1900MHz 4x45W-65MHz	B	From Face	2.0000 0.00 0.00	0.00	118.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.7087 2.9477 3.1953 3.7164 4.8623	2.6111 2.8475 3.0925 3.6084 4.7439	0.06 0.08 0.11 0.17 0.35
PCS 1900MHz 4x45W-65MHz	C	From Face	2.0000 0.00 0.00	0.00	118.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.7087 2.9477 3.1953 3.7164 4.8623	2.6111 2.8475 3.0925 3.6084 4.7439	0.06 0.08 0.11 0.17 0.35
Side Arm Mount [SO 102-3]	C	None		0.00	118.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.0000 3.4800 3.9600 4.9200 6.8400	3.0000 3.4800 3.9600 4.9200 6.8400	0.08 0.11 0.14 0.20 0.32
**									
(4) DB844H90E-XY w/Mount Pipe	A	From Face	4.0000 0.00 1.00	0.00	112.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.5792 4.2014 4.7281 5.8573 8.2671	5.3958 6.4912 7.3017 8.9600 12.4914	0.04 0.08 0.13 0.25 0.62
(4) DB844H90E-XY w/Mount Pipe	B	From Face	4.0000 0.00 1.00	0.00	112.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.5792 4.2014 4.7281 5.8573 8.2671	5.3958 6.4912 7.3017 8.9600 12.4914	0.04 0.08 0.13 0.25 0.62
(4) DB844H90E-XY w/Mount Pipe	C	From Face	4.0000 0.00 1.00	0.00	112.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.5792 4.2014 4.7281 5.8573 8.2671	5.3958 6.4912 7.3017 8.9600 12.4914	0.04 0.08 0.13 0.25 0.62
Platform Mount [LP 713-1]	C	None		0.00	112.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	31.2700 39.6800 48.0900 64.9100 98.5500	31.2700 39.6800 48.0900 64.9100 98.5500	1.51 1.93 2.35 3.19 4.86
****									
APX16DWV-16DWVS-C w/ Mount Pipe	A	From Leg	4.0000 0.00 1.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.4657 7.9944 8.5176 9.5949 11.8728	3.4938 4.2631 4.9598 6.4031 9.4897	0.06 0.11 0.16 0.30 0.68
APX16DWV-16DWVS-C w/ Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	100.0000	No Ice 1/2" Ice	7.4657 7.9944 8.5176	3.4938 4.2631 4.9598	0.06 0.11 0.16

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	9.5949	6.4031	0.30
						2" Ice	11.8728	9.4897	0.68
						4" Ice			
APX16DWV-16DWVS-C w/ Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	100.0000	No Ice	7.4657	3.4938	0.06
						1/2" Ice	7.9944	4.2631	0.11
						1" Ice	8.5176	4.9598	0.16
						2" Ice	9.5949	6.4031	0.30
						4" Ice	11.8728	9.4897	0.68
KRY 112 144/1	A	From Leg	4.0000 0.00 1.00	0.00	100.0000	No Ice	0.4083	0.2042	0.01
						1/2" Ice	0.4969	0.2733	0.01
						1" Ice	0.5941	0.3511	0.02
						2" Ice	0.8145	0.5326	0.03
						4" Ice	1.3590	0.9992	0.08
KRY 112 144/1	B	From Leg	4.0000 0.00 1.00	0.00	100.0000	No Ice	0.4083	0.2042	0.01
						1/2" Ice	0.4969	0.2733	0.01
						1" Ice	0.5941	0.3511	0.02
						2" Ice	0.8145	0.5326	0.03
						4" Ice	1.3590	0.9992	0.08
KRY 112 144/1	C	From Leg	4.0000 0.00 1.00	0.00	100.0000	No Ice	0.4083	0.2042	0.01
						1/2" Ice	0.4969	0.2733	0.01
						1" Ice	0.5941	0.3511	0.02
						2" Ice	0.8145	0.5326	0.03
						4" Ice	1.3590	0.9992	0.08
ETT19V2S12UB	A	From Leg	4.0000 0.00 1.00	0.00	100.0000	No Ice	0.6671	0.3199	0.01
						1/2" Ice	0.7797	0.4078	0.02
						1" Ice	0.9009	0.5044	0.03
						2" Ice	1.1692	0.7234	0.04
						4" Ice	1.8096	1.2653	0.11
ETT19V2S12UB	B	From Leg	4.0000 0.00 1.00	0.00	100.0000	No Ice	0.6671	0.3199	0.01
						1/2" Ice	0.7797	0.4078	0.02
						1" Ice	0.9009	0.5044	0.03
						2" Ice	1.1692	0.7234	0.04
						4" Ice	1.8096	1.2653	0.11
ETT19V2S12UB	C	From Leg	4.0000 0.00 1.00	0.00	100.0000	No Ice	0.6671	0.3199	0.01
						1/2" Ice	0.7797	0.4078	0.02
						1" Ice	0.9009	0.5044	0.03
						2" Ice	1.1692	0.7234	0.04
						4" Ice	1.8096	1.2653	0.11
2.375" OD x 6' Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	100.0000	No Ice	1.4250	1.4250	0.03
						1/2" Ice	1.9250	1.9250	0.04
						1" Ice	2.2939	2.2939	0.05
						2" Ice	3.0596	3.0596	0.09
						4" Ice	4.7022	4.7022	0.23
2.375" OD x 6' Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	100.0000	No Ice	1.4250	1.4250	0.03
						1/2" Ice	1.9250	1.9250	0.04
						1" Ice	2.2939	2.2939	0.05
						2" Ice	3.0596	3.0596	0.09
						4" Ice	4.7022	4.7022	0.23
2.375" OD x 6' Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	100.0000	No Ice	1.4250	1.4250	0.03
						1/2" Ice	1.9250	1.9250	0.04
						1" Ice	2.2939	2.2939	0.05
						2" Ice	3.0596	3.0596	0.09
						4" Ice	4.7022	4.7022	0.23
T-Arm Mount [TA 602-3]	C	None		0.00	100.0000	No Ice	11.5900	11.5900	0.77
						1/2" Ice	15.4400	15.4400	0.99

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						Ice	19.2900	19.2900	1.21
						1" Ice	26.9900	26.9900	1.64
						2" Ice	42.3900	42.3900	2.50
						4" Ice			
***									
BXA-70063-4CF-EDIN-X w/ Mount Pipe	A	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.3988 5.8435 6.2986 7.2405 9.2612	3.6927 4.2947 4.9133 6.2583 9.2851	0.03 0.07 0.12 0.23 0.58
BXA-70063-4CF-EDIN-X w/ Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.3988 5.8435 6.2986 7.2405 9.2612	3.6927 4.2947 4.9133 6.2583 9.2851	0.03 0.07 0.12 0.23 0.58
BXA-70063-4CF-EDIN-X w/ Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.3988 5.8435 6.2986 7.2405 9.2612	3.6927 4.2947 4.9133 6.2583 9.2851	0.03 0.07 0.12 0.23 0.58
BXA-171063-12CF-EDIN-X w/ Mount Pipe	A	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.0290 5.5830 6.1033 7.1662 9.4380	5.2887 6.4594 7.3479 9.1478 12.9475	0.04 0.09 0.14 0.27 0.68
BXA-171063-12CF-EDIN-X w/ Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.0290 5.5830 6.1033 7.1662 9.4380	5.2887 6.4594 7.3479 9.1478 12.9475	0.04 0.09 0.14 0.27 0.68
BXA-171063-12CF-EDIN-X w/ Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.0290 5.5830 6.1033 7.1662 9.4380	5.2887 6.4594 7.3479 9.1478 12.9475	0.04 0.09 0.14 0.27 0.68
BXA-171063-8BF-2 w/ Mount Pipe	A	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.1789 3.5550 3.9637 4.8533 6.7671	3.3530 3.9709 4.5951 5.8933 8.8855	0.03 0.06 0.10 0.19 0.49
BXA-171063-8BF-2 w/ Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.1789 3.5550 3.9637 4.8533 6.7671	3.3530 3.9709 4.5951 5.8933 8.8855	0.03 0.06 0.10 0.19 0.49
BXA-171085-8BF-EDIN-0 w/ Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.1789 3.5550 3.9637 4.8533 6.7671	3.3530 3.9709 4.5951 5.8933 8.8855	0.03 0.06 0.10 0.19 0.49
DB-T1-6Z-8AB-0Z	A	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.6000 5.9154 6.2395 6.9136 8.3654	2.3333 2.5580 2.7914 3.2840 4.3728	0.04 0.08 0.12 0.21 0.45

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* °	*Placement* *ft*		*C_AA_A Front* *ft^2*	*C_AA_A Side* *ft^2*	*Weight* *K*
(2) FD9R6004/2C-3L	A	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2808	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.01 0.01 0.02 0.06
(2) FD9R6004/2C-3L	B	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2808	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.01 0.01 0.02 0.06
(2) FD9R6004/2C-3L	C	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2808	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.01 0.01 0.02 0.06
RRH2X40-AWS	A	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.5217 2.7530 2.9930 3.4990 4.6146	1.5894 1.7953 2.0098 2.4648 3.4785	0.04 0.06 0.08 0.13 0.28
RRH2X40-AWS	B	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.5217 2.7530 2.9930 3.4990 4.6146	1.5894 1.7953 2.0098 2.4648 3.4785	0.04 0.06 0.08 0.13 0.28
RRH2X40-AWS	C	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.5217 2.7530 2.9930 3.4990 4.6146	1.5894 1.7953 2.0098 2.4648 3.4785	0.04 0.06 0.08 0.13 0.28
LNX-6514DS-A1M w/ Mount Pipe	A	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6485 9.3051 9.9298 11.2040 13.8719	7.0817 8.2729 9.1847 11.0232 15.0629	0.06 0.13 0.21 0.39 0.90
LNX-6514DS-A1M w/ Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6485 9.3051 9.9298 11.2040 13.8719	7.0817 8.2729 9.1847 11.0232 15.0629	0.06 0.13 0.21 0.39 0.90
LNX-6514DS-A1M w/ Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6485 9.3051 9.9298 11.2040 13.8719	7.0817 8.2729 9.1847 11.0232 15.0629	0.06 0.13 0.21 0.39 0.90
Platform Mount [LP 1201-1]	C	None		0.00	93.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	23.1000 26.8000 30.5000 37.9000 52.7000	23.1000 26.8000 30.5000 37.9000 52.7000	2.10 2.50 2.90 3.70 5.30
***									
APXV18-206517S-C	A	From Face	1.0000 0.00 0.00	0.00	75.0000	No Ice 1/2" Ice 1" Ice	5.1667 5.6182 6.0772 7.0173	3.0375 3.4693 3.9086 4.8093	0.03 0.05 0.09 0.17

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice 4" Ice	9.1225	6.6995	0.40
APXV18-206517S-C	B	From Face	1.0000 0.00 0.00	0.00	75.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.1667 5.6182 6.0772 7.0173 9.1225	3.0375 3.4693 3.9086 4.8093 6.6995	0.03 0.05 0.09 0.17 0.40
APXV18-206517S-C	C	From Face	1.0000 0.00 0.00	0.00	75.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.1667 5.6182 6.0772 7.0173 9.1225	3.0375 3.4693 3.9086 4.8093 6.6995	0.03 0.05 0.09 0.17 0.40
Pipe Mount [PM 601-3]	C	None		0.00	75.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.3900 5.4800 6.5700 8.7500 13.1100	4.3900 5.4800 6.5700 8.7500 13.1100	0.20 0.24 0.28 0.36 0.53
***									
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.3042 7.4790 8.3676 10.1785 14.0237	0.07 0.14 0.21 0.38 0.87
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.3042 7.4790 8.3676 10.1785 14.0237	0.07 0.14 0.21 0.38 0.87
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.3042 7.4790 8.3676 10.1785 14.0237	0.07 0.14 0.21 0.38 0.87
(2) RRUS-11	C	From Face	4.0000 0.00 0.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.2486 3.4905 3.7411 4.2682 5.4260	1.3726 1.5510 1.7380 2.1381 3.0418	0.05 0.07 0.09 0.15 0.31
(2) RRUS-11	B	From Face	4.0000 0.00 0.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.2486 3.4905 3.7411 4.2682 5.4260	1.3726 1.5510 1.7380 2.1381 3.0418	0.05 0.07 0.09 0.15 0.31
(2) RRUS-11	A	From Face	4.0000 0.00 0.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.2486 3.4905 3.7411 4.2682 5.4260	1.3726 1.5510 1.7380 2.1381 3.0418	0.05 0.07 0.09 0.15 0.31
DC6-48-60-18-8F	A	From Face	4.0000 0.00 0.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.4667 1.6667 1.8778 2.3333 3.3778	1.4667 1.6667 1.8778 2.3333 3.3778	0.02 0.04 0.06 0.11 0.24
(2) P65-15-XLH-RR w/ Mount Pipe	A	From Face	4.0000 0.00	0.00	65.0000	No Ice 1/2"	6.0666 6.5095	4.1885 4.8037	0.06 0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			1.00			Ice	6.9621	5.4357	0.16
						1" Ice	7.8961	6.8365	0.29
						2" Ice	9.8876	9.9536	0.65
						4" Ice			
(2) P65-15-XLH-RR w/ Mount Pipe	B	From Face	4.0000 0.00 1.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.0666 6.5095 6.9621 7.8961 9.8876	4.1885 4.8037 5.4357 6.8365 9.9536	0.06 0.11 0.16 0.29 0.65
(2) P65-15-XLH-RR w/ Mount Pipe	C	From Face	4.0000 0.00 1.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.0666 6.5095 6.9621 7.8961 9.8876	4.1885 4.8037 5.4357 6.8365 9.9536	0.06 0.11 0.16 0.29 0.65
(2) TT19-08BP111-001	A	From Face	4.0000 0.00 1.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.6449 0.7568 0.8773 1.1444 1.7822	0.5198 0.6232 0.7354 0.9856 1.5896	0.02 0.02 0.03 0.05 0.12
(2) TT19-08BP111-001	B	From Face	4.0000 0.00 1.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.6449 0.7568 0.8773 1.1444 1.7822	0.5198 0.6232 0.7354 0.9856 1.5896	0.02 0.02 0.03 0.05 0.12
(2) TT19-08BP111-001	C	From Face	4.0000 0.00 1.00	0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.6449 0.7568 0.8773 1.1444 1.7822	0.5198 0.6232 0.7354 0.9856 1.5896	0.02 0.02 0.03 0.05 0.12
T-Arm Mount [TA 601-3]	C	None		0.00	65.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.9000 14.6500 18.4000 25.9000 40.9000	10.9000 14.6500 18.4000 25.9000 40.9000	0.73 0.93 1.13 1.52 2.32
***									
KS24019-L112A	C	From Face	2.0000 0.00 1.00	0.00	50.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.1556 0.2247 0.3025 0.4840 0.9506	0.1556 0.2247 0.3025 0.4840 0.9506	0.01 0.01 0.01 0.02 0.06
Side Arm Mount [SO 702-1]	C	None		0.00	50.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.0000 1.0000 1.0000 1.0000 1.0000	1.4300 2.0500 2.6700 3.9100 6.3900	0.03 0.04 0.05 0.07 0.12
****									

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 123.0000-82.2500	102.0855	1.381	22.582	85.089	A	0.000	85.089	85.089	100.00	0.000	0.000
					B	0.000	85.089		100.00	0.000	0.000
					C	0.000	85.089		100.00	0.000	5.643
L2 82.2500-57.7500	69.7462	1.238	20.290	60.387	A	0.000	60.387	60.387	100.00	0.000	0.000
					B	0.000	60.387		100.00	0.000	0.000
					C	0.000	60.387		100.00	0.000	10.118
L3 57.7500-40.7500	49.1395	1.12	18.358	46.312	A	0.000	46.312	46.312	100.00	0.000	0.000
					B	0.000	46.312		100.00	0.000	0.000
					C	0.000	46.312		100.00	0.000	10.325
L4 40.7500-29.7500	35.1980	1.019	16.689	31.303	A	0.000	31.303	31.303	100.00	0.000	0.000
					B	0.000	31.303		100.00	0.000	0.000
					C	0.000	31.303		100.00	0.000	6.681
L5 29.7500-0.0000	14.5787	1	16.384	92.592	A	0.000	92.592	92.592	100.00	0.000	0.000
					B	0.000	92.592		100.00	0.000	0.000
					C	0.000	92.592		100.00	0.000	18.068

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 123.0000-82.2500	102.0855	1.381	4.988	1.1451	92.867	A	0.000	92.867	92.867	100.00	0.000	0.000
						B	0.000	92.867		100.00	0.000	0.000
						C	0.000	92.867		100.00	0.000	12.170
L2 82.2500-57.7500	69.7462	1.238	4.482	1.0940	65.063	A	0.000	65.063	65.063	100.00	0.000	0.000
						B	0.000	65.063		100.00	0.000	0.000
						C	0.000	65.063		100.00	0.000	21.786
L3 57.7500-40.7500	49.1395	1.12	4.055	1.0489	49.284	A	0.000	49.284	49.284	100.00	0.000	0.000
						B	0.000	49.284		100.00	0.000	0.000
						C	0.000	49.284		100.00	0.000	21.420
L4 40.7500-29.7500	35.1980	1.019	3.687	1.0078	33.226	A	0.000	33.226	33.226	100.00	0.000	0.000
						B	0.000	33.226		100.00	0.000	0.000
						C	0.000	33.226		100.00	0.000	13.860
L5 29.7500-0.0000	14.5787	1	3.619	1.0000	97.551	A	0.000	97.551	97.551	100.00	0.000	0.000
						B	0.000	97.551		100.00	0.000	0.000
						C	0.000	97.551		100.00	0.000	36.580

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 123.0000-82.2500	102.0855	1.381	8.821	85.089	A	0.000	85.089	85.089	100.00	0.000	0.000
					B	0.000	85.089		100.00	0.000	0.000
					C	0.000	85.089		100.00	0.000	5.643
L2 82.2500-57.7500	69.7462	1.238	7.926	60.387	A	0.000	60.387	60.387	100.00	0.000	0.000
					B	0.000	60.387		100.00	0.000	0.000
					C	0.000	60.387		100.00	0.000	10.118
L3 57.7500-40.7500	49.1395	1.12	7.171	46.312	A	0.000	46.312	46.312	100.00	0.000	0.000
					B	0.000	46.312		100.00	0.000	0.000
					C	0.000	46.312		100.00	0.000	10.325
L4 40.7500-29.7500	35.1980	1.019	6.519	31.303	A	0.000	31.303	31.303	100.00	0.000	0.000
					B	0.000	31.303		100.00	0.000	0.000
					C	0.000	31.303		100.00	0.000	6.681

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L5 29.7500-0.0000	14.5787	1	6.400	92.592	A	0.000	92.592	92.592	100.00	0.000	0.000
					B	0.000	92.592		100.00	0.000	0.000
					C	0.000	92.592		100.00	0.000	18.068

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
15	Dead+Wind 0 deg+Ice
16	Dead+Wind 30 deg+Ice
17	Dead+Wind 60 deg+Ice
18	Dead+Wind 90 deg+Ice
19	Dead+Wind 120 deg+Ice
20	Dead+Wind 150 deg+Ice
21	Dead+Wind 180 deg+Ice
22	Dead+Wind 210 deg+Ice
23	Dead+Wind 240 deg+Ice
24	Dead+Wind 270 deg+Ice
25	Dead+Wind 300 deg+Ice
26	Dead+Wind 330 deg+Ice
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	123 - 82.25	Pole	Max Tension	24	0.00	-0.00	-0.00
			Max. Compression	14	-20.93	0.67	0.33
			Max. Mx	11	-10.08	292.32	0.14
			Max. My	2	-10.06	0.10	293.48
			Max. Vy	11	-13.99	292.32	0.14
			Max. Vx	2	-14.11	0.10	293.48
			Max. Torque	5			0.42
L2	82.25 - 57.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-30.88	2.59	-0.41

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	11	-15.47	741.32	0.07
			Max. My	2	-15.46	0.42	745.60
			Max. Vy	11	-19.22	741.32	0.07
			Max. Vx	8	19.35	0.42	-745.45
			Max. Torque	10			-0.60
L3	57.75 - 40.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-34.76	3.72	-1.09
			Max. Mx	11	-18.16	992.23	-0.05
			Max. My	8	-18.15	0.61	-997.91
			Max. Vy	11	-20.14	992.23	-0.05
			Max. Vx	8	20.27	0.61	-997.91
			Max. Torque	10			-0.60
L4	40.75 - 29.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-40.42	5.12	-1.88
			Max. Mx	11	-22.24	1307.51	-0.18
			Max. My	8	-22.24	0.84	-1315.00
			Max. Vy	11	-21.13	1307.51	-0.18
			Max. Vx	8	21.25	0.84	-1315.00
			Max. Torque	10			-0.59
L5	29.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-50.49	7.80	-3.43
			Max. Mx	11	-29.78	1960.49	-0.46
			Max. My	8	-29.78	1.33	-1971.46
			Max. Vy	11	-22.75	1960.49	-0.46
			Max. Vx	8	22.87	1.33	-1971.46
			Max. Torque	9			-0.66

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	24	50.49	6.71	-0.00
	Max. H_x	11	29.80	22.73	0.00
	Max. H_z	2	29.80	0.00	22.85
	Max. M_x	2	1970.54	0.00	22.85
	Max. M_z	5	1957.84	-22.73	0.00
	Max. Torsion	3	0.65	-11.37	19.79
	Min. Vert	1	29.80	0.00	0.00
	Min. H_x	5	29.80	-22.73	0.00
	Min. H_z	8	29.80	0.00	-22.85
	Min. M_x	8	-1971.46	0.00	-22.85
	Min. M_z	11	-1960.49	22.73	0.00
	Min. Torsion	9	-0.66	11.37	-19.79

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	29.80	0.00	0.00	0.45	1.29	0.00
Dead+Wind 0 deg - No Ice	29.80	-0.00	-22.85	-1970.54	1.33	-0.55
Dead+Wind 30 deg - No Ice	29.80	11.37	-19.79	-1706.49	-978.25	-0.65
Dead+Wind 60 deg - No Ice	29.80	19.69	-11.43	-985.05	-1695.36	-0.58
Dead+Wind 90 deg - No Ice	29.80	22.73	-0.00	0.46	-1957.84	-0.36
Dead+Wind 120 deg - No Ice	29.80	19.69	11.43	985.97	-1695.36	-0.04
Dead+Wind 150 deg - No Ice	29.80	11.37	19.79	1707.41	-978.25	0.29
Dead+Wind 180 deg - No Ice	29.80	-0.00	22.85	1971.46	1.33	0.55
Dead+Wind 210 deg - No Ice	29.80	-11.37	19.79	1707.41	980.90	0.66

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 240 deg - No Ice	29.80	-19.69	11.43	985.97	1698.01	0.59
Dead+Wind 270 deg - No Ice	29.80	-22.73	-0.00	0.46	1960.49	0.36
Dead+Wind 300 deg - No Ice	29.80	-19.69	-11.43	-985.05	1698.01	0.04
Dead+Wind 330 deg - No Ice	29.80	-11.37	-19.79	-1706.49	980.90	-0.30
Dead+Ice	50.49	-0.00	0.00	3.43	7.80	-0.00
Dead+Wind 0 deg+Ice	50.49	-0.00	-6.74	-602.19	7.86	-0.22
Dead+Wind 30 deg+Ice	50.49	3.35	-5.83	-521.07	-293.54	-0.22
Dead+Wind 60 deg+Ice	50.49	5.81	-3.37	-299.38	-514.17	-0.16
Dead+Wind 90 deg+Ice	50.49	6.71	0.00	3.45	-594.91	-0.05
Dead+Wind 120 deg+Ice	50.49	5.81	3.37	306.29	-514.17	0.06
Dead+Wind 150 deg+Ice	50.49	3.35	5.83	527.97	-293.54	0.17
Dead+Wind 180 deg+Ice	50.49	-0.00	6.74	609.09	7.86	0.22
Dead+Wind 210 deg+Ice	50.49	-3.35	5.83	527.97	309.25	0.22
Dead+Wind 240 deg+Ice	50.49	-5.81	3.37	306.28	529.88	0.16
Dead+Wind 270 deg+Ice	50.49	-6.71	0.00	3.45	610.62	0.05
Dead+Wind 300 deg+Ice	50.49	-5.81	-3.37	-299.38	529.89	-0.06
Dead+Wind 330 deg+Ice	50.49	-3.35	-5.83	-521.07	309.25	-0.17
Dead+Wind 0 deg - Service	29.80	-0.00	-8.93	-770.20	1.33	-0.22
Dead+Wind 30 deg - Service	29.80	4.44	-7.73	-666.95	-381.68	-0.26
Dead+Wind 60 deg - Service	29.80	7.69	-4.46	-384.87	-662.07	-0.23
Dead+Wind 90 deg - Service	29.80	8.88	-0.00	0.46	-764.69	-0.14
Dead+Wind 120 deg - Service	29.80	7.69	4.46	385.79	-662.07	-0.02
Dead+Wind 150 deg - Service	29.80	4.44	7.73	667.87	-381.68	0.12
Dead+Wind 180 deg - Service	29.80	-0.00	8.93	771.11	1.33	0.22
Dead+Wind 210 deg - Service	29.80	-4.44	7.73	667.87	384.34	0.26
Dead+Wind 240 deg - Service	29.80	-7.69	4.46	385.79	664.73	0.23
Dead+Wind 270 deg - Service	29.80	-8.88	-0.00	0.46	767.35	0.14
Dead+Wind 300 deg - Service	29.80	-7.69	-4.46	-384.87	664.73	0.02
Dead+Wind 330 deg - Service	29.80	-4.44	-7.73	-666.95	384.34	-0.12

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-29.80	0.00	0.00	29.80	0.00	0.000%
2	0.00	-29.80	-22.85	0.00	29.80	22.85	0.000%
3	11.37	-29.80	-19.79	-11.37	29.80	19.79	0.000%
4	19.69	-29.80	-11.43	-19.69	29.80	11.43	0.000%
5	22.73	-29.80	0.00	-22.73	29.80	0.00	0.000%
6	19.69	-29.80	11.43	-19.69	29.80	-11.43	0.000%
7	11.37	-29.80	19.79	-11.37	29.80	-19.79	0.000%
8	0.00	-29.80	22.85	0.00	29.80	-22.85	0.000%
9	-11.37	-29.80	19.79	11.37	29.80	-19.79	0.000%
10	-19.69	-29.80	11.43	19.69	29.80	-11.43	0.000%
11	-22.73	-29.80	0.00	22.73	29.80	0.00	0.000%
12	-19.69	-29.80	-11.43	19.69	29.80	11.43	0.000%
13	-11.37	-29.80	-19.79	11.37	29.80	19.79	0.000%
14	0.00	-50.49	0.00	0.00	50.49	-0.00	0.000%
15	0.00	-50.49	-6.74	0.00	50.49	6.74	0.000%
16	3.35	-50.49	-5.83	-3.35	50.49	5.83	0.000%
17	5.81	-50.49	-3.37	-5.81	50.49	3.37	0.000%
18	6.71	-50.49	0.00	-6.71	50.49	-0.00	0.000%
19	5.81	-50.49	3.37	-5.81	50.49	-3.37	0.000%
20	3.35	-50.49	5.83	-3.35	50.49	-5.83	0.000%
21	0.00	-50.49	6.74	0.00	50.49	-6.74	0.000%
22	-3.35	-50.49	5.83	3.35	50.49	-5.83	0.000%
23	-5.81	-50.49	3.37	5.81	50.49	-3.37	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
24	-6.71	-50.49	0.00	6.71	50.49	-0.00	0.000%
25	-5.81	-50.49	-3.37	5.81	50.49	3.37	0.000%
26	-3.35	-50.49	-5.83	3.35	50.49	5.83	0.000%
27	0.00	-29.80	-8.93	0.00	29.80	8.93	0.000%
28	4.44	-29.80	-7.73	-4.44	29.80	7.73	0.000%
29	7.69	-29.80	-4.46	-7.69	29.80	4.46	0.000%
30	8.88	-29.80	0.00	-8.88	29.80	0.00	0.000%
31	7.69	-29.80	4.46	-7.69	29.80	-4.46	0.000%
32	4.44	-29.80	7.73	-4.44	29.80	-7.73	0.000%
33	0.00	-29.80	8.93	0.00	29.80	-8.93	0.000%
34	-4.44	-29.80	7.73	4.44	29.80	-7.73	0.000%
35	-7.69	-29.80	4.46	7.69	29.80	-4.46	0.000%
36	-8.88	-29.80	0.00	8.88	29.80	0.00	0.000%
37	-7.69	-29.80	-4.46	7.69	29.80	4.46	0.000%
38	-4.44	-29.80	-7.73	4.44	29.80	7.73	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	0.00044613
3	Yes	5	0.00000001	0.00069368
4	Yes	5	0.00000001	0.00071546
5	Yes	4	0.00000001	0.00047035
6	Yes	5	0.00000001	0.00070005
7	Yes	5	0.00000001	0.00070272
8	Yes	4	0.00000001	0.00044618
9	Yes	5	0.00000001	0.00071746
10	Yes	5	0.00000001	0.00069453
11	Yes	4	0.00000001	0.00047082
12	Yes	5	0.00000001	0.00070948
13	Yes	5	0.00000001	0.00070792
14	Yes	4	0.00000001	0.00000525
15	Yes	4	0.00000001	0.00043501
16	Yes	5	0.00000001	0.00013767
17	Yes	5	0.00000001	0.00014618
18	Yes	4	0.00000001	0.00040875
19	Yes	5	0.00000001	0.00014430
20	Yes	5	0.00000001	0.00014159
21	Yes	4	0.00000001	0.00043835
22	Yes	5	0.00000001	0.00015599
23	Yes	5	0.00000001	0.00014681
24	Yes	4	0.00000001	0.00041952
25	Yes	5	0.00000001	0.00014830
26	Yes	5	0.00000001	0.00015148
27	Yes	4	0.00000001	0.00015972
28	Yes	5	0.00000001	0.00006823
29	Yes	5	0.00000001	0.00007261
30	Yes	4	0.00000001	0.00016206
31	Yes	5	0.00000001	0.00006945
32	Yes	5	0.00000001	0.00006999
33	Yes	4	0.00000001	0.00015976
34	Yes	5	0.00000001	0.00007318
35	Yes	5	0.00000001	0.00006852
36	Yes	4	0.00000001	0.00016255
37	Yes	5	0.00000001	0.00007147
38	Yes	5	0.00000001	0.00007119

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	123 - 82.25	28.57	33	1.94	0.00
L2	85.75 - 57.75	14.21	33	1.61	0.00
L3	57.75 - 40.75	6.34	33	1.01	0.00
L4	45 - 29.75	3.93	33	0.79	0.00
L5	29.75 - 0	1.73	33	0.55	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
123.0000	3/4" x 8 ft lightning rod	33	28.57	1.94	0.00	24165
120.0000	(2) 2.375" OD x 5' Mount Pipe	33	27.35	1.92	0.00	24165
118.0000	800MHz 2X50W RRH W/FILTER	33	26.53	1.92	0.00	24165
112.0000	(4) DB844H90E-XY w/Mount Pipe	33	24.10	1.88	0.00	10984
100.0000	APX16DWV-16DWVS-C w/ Mount Pipe	33	19.38	1.79	0.00	5252
93.0000	BXA-70063-4CF-EDIN-X w/ Mount Pipe	33	16.76	1.72	0.00	4026
75.0000	APXV18-206517S-C	33	10.78	1.38	0.00	2815
65.0000	AM-X-CD-16-65-00T-RET w/ Mount Pipe	33	8.04	1.16	0.00	2508
50.0000	KS24019-L112A	33	4.81	0.87	0.00	3596

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	123 - 82.25	72.97	8	4.95	0.00
L2	85.75 - 57.75	36.30	8	4.10	0.00
L3	57.75 - 40.75	16.21	8	2.57	0.00
L4	45 - 29.75	10.05	8	2.03	0.00
L5	29.75 - 0	4.43	8	1.41	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
123.0000	3/4" x 8 ft lightning rod	8	72.97	4.95	0.00	9585
120.0000	(2) 2.375" OD x 5' Mount Pipe	8	69.84	4.92	0.00	9585
118.0000	800MHz 2X50W RRH W/FILTER	8	67.76	4.89	0.00	9585
112.0000	(4) DB844H90E-XY w/Mount Pipe	8	61.55	4.81	0.00	4356
100.0000	APX16DWV-16DWVS-C w/ Mount Pipe	8	49.50	4.59	0.00	2081
93.0000	BXA-70063-4CF-EDIN-X w/ Mount Pipe	8	42.82	4.39	0.00	1594
75.0000	APXV18-206517S-C	8	27.55	3.54	0.00	1110
65.0000	AM-X-CD-16-65-00T-RET w/ Mount Pipe	8	20.54	2.96	0.00	987
50.0000	KS24019-L112A	8	12.29	2.23	0.00	1411

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	123 - 82.25 (1)	TP28.114x22x0.1875	40.7500	0.0000	0.0	36.00	16.3072	-10.06	587.06	0.017
L2	82.25 - 57.75 (2)	TP31.4152x27.2139x0.25	28.0000	0.0000	0.0	39.00	24.7296	-15.46	964.45	0.016
L3	57.75 - 40.75 (3)	TP33.966x31.4152x0.4476	17.0000	0.0000	0.0	28.85	46.7089	-18.15	1347.46	0.013
L4	40.75 - 29.75 (4)	TP35.1164x32.4332x0.4681	15.2500	0.0000	0.0	28.90	51.4808	-22.24	1487.59	0.015
L5	29.75 - 0 (5)	TP39.58x35.1164x0.487	29.7500	0.0000	0.0	31.12	60.4300	-29.78	1880.34	0.016

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	123 - 82.25 (1)	TP28.114x22x0.1875	293.48	31.91	36.00	0.886	0.00	0.00	36.00	0.000
L2	82.25 - 57.75 (2)	TP31.4152x27.2139x0.25	745.60	47.05	39.00	1.207	0.00	0.00	39.00	0.000
L3	57.75 - 40.75 (3)	TP33.966x31.4152x0.4476	997.91	31.78	28.85	1.102	0.00	0.00	28.85	0.000
L4	40.75 - 29.75 (4)	TP35.1164x32.4332x0.4681	1315.00	36.05	28.90	1.248	0.00	0.00	28.90	0.000
L5	29.75 - 0 (5)	TP39.58x35.1164x0.487	1971.46	40.77	31.12	1.310	0.00	0.00	31.12	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	123 - 82.25 (1)	TP28.114x22x0.1875	14.11	0.87	24.00	0.072	0.03	0.00	24.00	0.000
L2	82.25 - 57.75 (2)	TP31.4152x27.2139x0.25	19.35	0.78	26.00	0.060	0.32	0.01	26.00	0.000
L3	57.75 - 40.75 (3)	TP33.966x31.4152x0.4476	20.27	0.43	19.23	0.045	0.37	0.01	19.23	0.000
L4	40.75 - 29.75 (4)	TP35.1164x32.4332x0.4681	21.25	0.41	19.26	0.043	0.43	0.01	19.26	0.000
L5	29.75 - 0 (5)	TP39.58x35.1164x0.487	22.87	0.38	20.74	0.036	0.55	0.01	20.74	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	123 - 82.25 (1)	0.017	0.886	0.000	0.072	0.000	0.905	1.333	H1-3+VT ✔

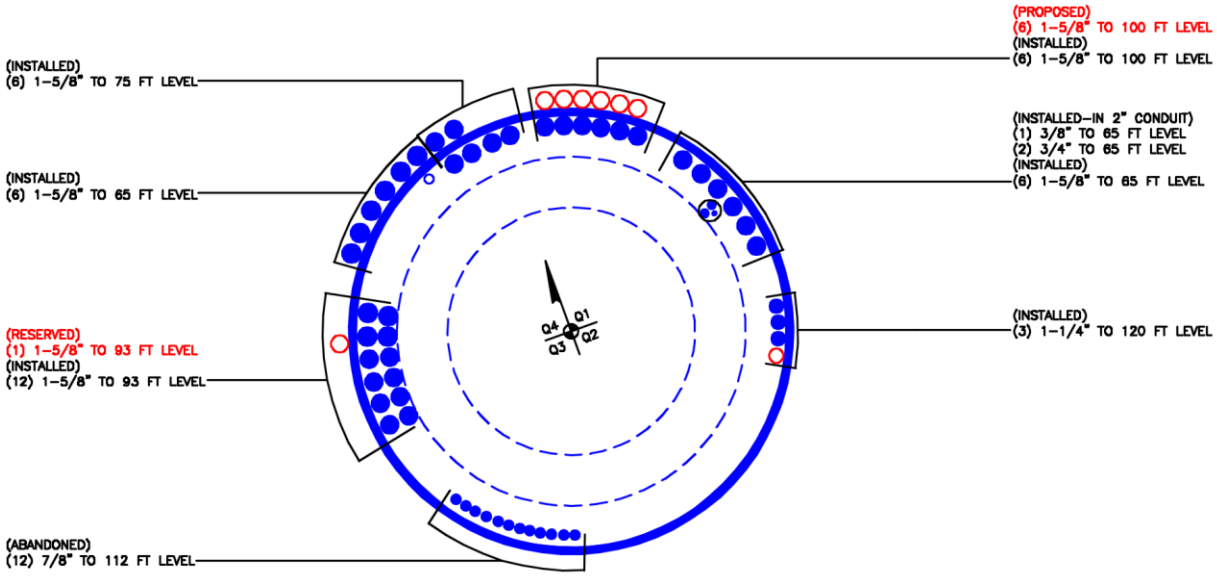
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L2	82.25 - 57.75 (2)	0.016	1.207	0.000	0.060	0.000	1.223 ✔	1.333	H1-3+VT ✔
L3	57.75 - 40.75 (3)	0.013	1.102	0.000	0.045	0.000	1.116 ✔	1.333	H1-3+VT ✔
L4	40.75 - 29.75 (4)	0.015	1.248	0.000	0.043	0.000	1.263 ✔	1.333	H1-3+VT ✔
L5	29.75 - 0 (5)	0.016	1.310	0.000	0.036	0.000	1.326 ✔	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	123 - 82.25	Pole	TP28.114x22x0.1875	1	-10.06	782.55	67.9	Pass
L2	82.25 - 57.75	Pole	TP31.4152x27.2139x0.25	2	-15.46	1285.62	91.8	Pass
L3	57.75 - 40.75	Pole	TP33.966x31.4152x0.4476	3	-18.15	1796.16	83.7	Pass
L4	40.75 - 29.75	Pole	TP35.1164x32.4332x0.4681	4	-22.24	1982.96	94.8	Pass
L5	29.75 - 0	Pole	TP39.58x35.1164x0.487	5	-29.78	2506.49	99.5	Pass
							Summary	
						Pole (L5)	99.5	Pass
						RATING =	**99.5**	**Pass**

APPENDIX B

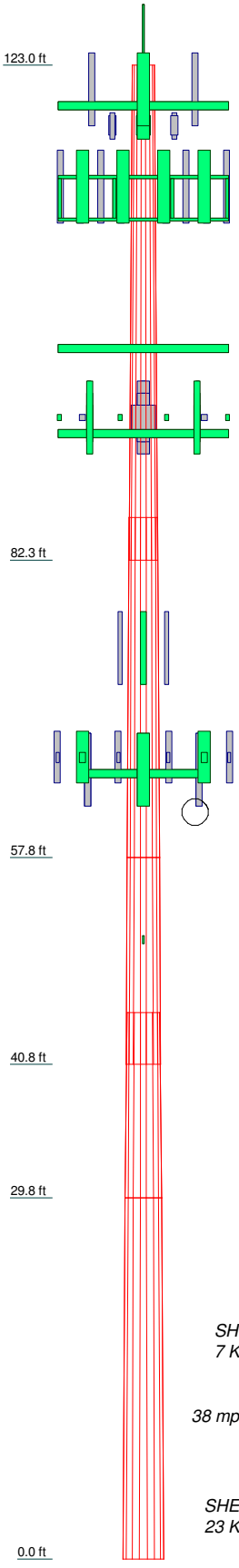
BASE LEVEL DRAWING

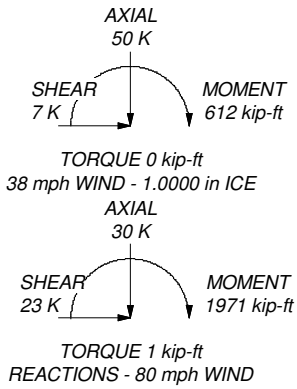

(PROPOSED)
(6) 1-5/8" TO 100 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 100 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 75 FT LEVEL
(INSTALLED-IN 2" CONDUIT)
(1) 3/8" TO 65 FT LEVEL
(2) 3/4" TO 65 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 65 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 65 FT LEVEL
(INSTALLED)
(3) 1-1/4" TO 120 FT LEVEL
(RESERVED)
(1) 1-5/8" TO 93 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 93 FT LEVEL
(ABANDONED)
(12) 7/8" TO 112 FT LEVEL
Q1
Q2
Q3
Q4

APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5
Length (ft)	40.7500	28.0000	17.0000	15.2500	29.7500
Number of Sides	18	18	18	18	18
Thickness (in)	0.1875	0.2500	0.4476	0.4681	0.4870
Socket Length (ft)	3.5000		4.2500		
Top Dia (in)	22.0000	27.2139	31.4152	32.4332	35.1164
Bot Dia (in)	28.1140	31.4152	33.9660	35.1164	39.5800
Grade	A607-60	A607-65	Reinf 48.08 ksi	Reinf 48.16 ksi	Reinf 51.86 ksi
Weight (K) 15.2	2.1	2.2	2.6	2.6	5.8





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
3/4" x 8 ft lightning rod	123	BXA-171063-12CF-EDIN-X w/ Mount Pipe	93
(2) 2.375" OD x 5' Mount Pipe	120	BXA-171063-12CF-EDIN-X w/ Mount Pipe	93
(2) 2.375" OD x 5' Mount Pipe	120	BXA-171063-8BF-2 w/ Mount Pipe	93
(2) 2.375" OD x 5' Mount Pipe	120	BXA-171063-8BF-2 w/ Mount Pipe	93
APXVSPP18-C-A20 w/ Mount Pipe	120	BXA-171085-8BF-EDIN-0 w/ Mount Pipe	93
APXVSPP18-C-A20 w/ Mount Pipe	120	DB-T1-6Z-8AB-0Z	93
APXVSPP18-C-A20 w/ Mount Pipe	120	(2) FD9R6004/2C-3L	93
Platform Mount [LP 1201-1]	120	(2) FD9R6004/2C-3L	93
800MHz 2X50W RRH W/FILTER	118	(2) FD9R6004/2C-3L	93
800MHz 2X50W RRH W/FILTER	118	RRH2X40-AWS	93
800MHz 2X50W RRH W/FILTER	118	RRH2X40-AWS	93
PCS 1900MHz 4x45W-65MHz	118	RRH2X40-AWS	93
PCS 1900MHz 4x45W-65MHz	118	LNX-6514DS-A1M w/ Mount Pipe	93
PCS 1900MHz 4x45W-65MHz	118	LNX-6514DS-A1M w/ Mount Pipe	93
Side Arm Mount [SO 102-3]	118	LNX-6514DS-A1M w/ Mount Pipe	93
(4) DB844H90E-XY w/Mount Pipe	112	Platform Mount [LP 1201-1]	93
(4) DB844H90E-XY w/Mount Pipe	112	APXV18-206517S-C	75
(4) DB844H90E-XY w/Mount Pipe	112	APXV18-206517S-C	75
Platform Mount [LP 713-1]	112	APXV18-206517S-C	75
APX16DWV-16DWVS-C w/ Mount Pipe	100	Pipe Mount [PM 601-3]	75
APX16DWV-16DWVS-C w/ Mount Pipe	100	AM-X-CD-16-65-00T-RET w/ Mount Pipe	65
APX16DWV-16DWVS-C w/ Mount Pipe	100	AM-X-CD-16-65-00T-RET w/ Mount Pipe	65
KRY 112 144/1	100	AM-X-CD-16-65-00T-RET w/ Mount Pipe	65
KRY 112 144/1	100	(2) RRUS-11	65
KRY 112 144/1	100	(2) RRUS-11	65
ETT19V2S12UB	100	(2) RRUS-11	65
ETT19V2S12UB	100	DC6-48-60-18-8F	65
ETT19V2S12UB	100	(2) P65-15-XLH-RR w/ Mount Pipe	65
2.375" OD x 6' Mount Pipe	100	(2) P65-15-XLH-RR w/ Mount Pipe	65
2.375" OD x 6' Mount Pipe	100	(2) P65-15-XLH-RR w/ Mount Pipe	65
2.375" OD x 6' Mount Pipe	100	(2) TT19-08BP111-001	65
T-Arm Mount [TA 602-3]	100	(2) TT19-08BP111-001	65
BXA-70063-4CF-EDIN-X w/ Mount Pipe	93	(2) TT19-08BP111-001	65
BXA-70063-4CF-EDIN-X w/ Mount Pipe	93	T-Arm Mount [TA 601-3]	65
BXA-70063-4CF-EDIN-X w/ Mount Pipe	93	KS24019-L112A	50
BXA-171063-12CF-EDIN-X w/ Mount Pipe	93	Side Arm Mount [SO 702-1]	50

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi	Reinf 48.16 ksi	48 ksi	61 ksi
A607-65	65 ksi	80 ksi	Reinf 51.86 ksi	52 ksi	65 ksi
Reinf 48.08 ksi	48 ksi	61 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 99.5%

Paul J. Ford and Company
250 E. Broad Street Suite 600
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.4105

Job: 123' Monopole / Berlin / Laviana Orchard			
Project: PJF# 37515-0149.003.7805 / BU# 876382			
Client: Crown Castle International	Drawn by: Chris Poelking		App'd:
Code: TIA/EIA-222-F	Date: 05/14/15		Scale: NTS
Path:			Dwg No. E-1

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

v4.4 - Effective 7-12-13

Date: 5/14/2015
PJF Project: 37515-0149.004.7805
Client Ref. # BU 876382
Site Name: Berlin/ Laviana Orchard
Description: 123 ft MP
Owner: CCI
Engineer: CP

Asymmetric Anchor Rod Analysis

Moment =	1971	k-ft	TIA Ref.	F	Location =	Base Plate		
Axial =	30.0	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	23.0	kips	Max Ratio =	105.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	12							

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

Item	Nominal Anchor Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	2.250	#18J A615 Gr 75	75	100	37.5	46.00	0.00	3.98	170.80	165.80	165.80	0.00	195.00	85.0%
2	2.250	#18J A615 Gr 75	75	100	52.5	46.00	0.00	3.98	170.80	165.80	165.80	0.00	195.00	85.0%
3	2.250	#18J A615 Gr 75	75	100	127.5	46.00	0.00	3.98	170.80	165.80	165.80	0.00	195.00	85.0%
4	2.250	#18J A615 Gr 75	75	100	142.5	46.00	0.00	3.98	170.80	165.80	165.80	0.00	195.00	85.0%
5	2.250	#18J A615 Gr 75	75	100	217.5	46.00	0.00	3.98	170.80	165.80	165.80	0.00	195.00	85.0%
6	2.250	#18J A615 Gr 75	75	100	232.5	46.00	0.00	3.98	170.80	165.80	165.80	0.00	195.00	85.0%
7	2.250	#18J A615 Gr 75	75	100	307.5	46.00	0.00	3.98	170.80	165.80	165.80	0.00	195.00	85.0%
8	2.250	#18J A615 Gr 75	75	100	322.5	46.00	0.00	3.98	170.80	165.80	165.80	0.00	195.00	85.0%
9	2.250	#18J A615 Gr 75	75	100	0.0	47.25	0.00	3.98	175.37	170.37	170.37	0.00	195.00	87.4%
10	2.250	#18J A615 Gr 75	75	100	90.0	47.25	0.00	3.98	175.37	170.37	170.37	0.00	195.00	87.4%
11	2.250	#18J A615 Gr 75	75	100	180.0	47.25	0.00	3.98	175.37	170.37	170.37	0.00	195.00	87.4%
12	2.250	#18J A615 Gr 75	75	100	270.0	47.25	0.00	3.98	175.37	170.37	170.37	0.00	195.00	87.4%
					.			47.76						

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F /G

Assumptions: 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: *876382*
Site Name: *Berlin / Laviana Orchard*
App #:

Anchor Rod Data		
Qty:	8	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	46	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	44	in
Thick:	2.75	in
Grade:	55	ksi
Clip Distance:	5	in

Stiffener Data (Welding at both sides)		
Configuration:	Unstiffened	
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:	39.58	in
Thick:	0.2812	in
Grade:	65	ksi
# of Sides:	0	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	1290.3	ft-kips
Unfactored Axial, P:	20	kips
Unfactored Shear, V:	15.3	kips

Reactions adjusted to account for post installed anchor rods

Anchor Rod Results

TIA F --> Maximum Rod Tension	165.8	Kips
Allowable Tension:	195.0	Kips
Anchor Rod Stress Ratio:	85.0%	**Pass**

Refer to "Asymmetric Anchor Rod Analysis" spreadsheet for post-installed anchor capacities.

Base Plate Results	Flexural Check	
Base Plate Stress:	35.8	ksi
Allowable PL Bending Stress:	55.0	ksi
Base Plate Stress Ratio:	65.0%	**Pass**

PL Ref. Data
Yield Line (in): 22.65
Max PL Length: 22.65

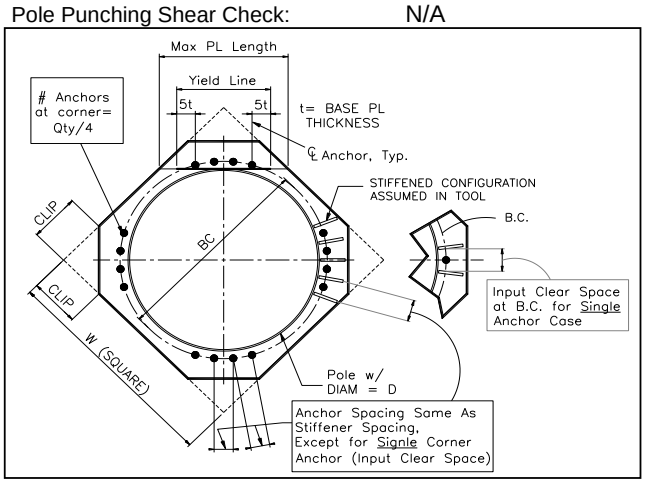
N/A - Unstiffened

Stiffener Results

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

Pole Results

Pole Punching Shear Check:	N/A



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

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

Job Number: 37515-0149.004.7805
Site Number: 876382
Site Name: Berlin/Laviana Orchard

By: CP
Date: 5/14/2015

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

Unfactored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, M =	1971.0		k-ft
Shear, V =	23.0		kips
Axial Load, P =	30.0		kips
OTM =	1982.5	0.0	k-ft @ Ground

Safety Factors / Load Factors / Φ Factors

Tower Type =	Monopole DP
ACI Code =	ACI 318-02
Seismic Design Category =	D
Reference Standard =	TIA/EIA-222-F
Use 1.3 Load Factor?	Yes
Load Factor =	1.30

Drilled Pier Parameters

Diameter =	6	ft
Height Above Grade =	0.5	ft
Depth Below Grade =	20	ft
fc' =	3	ksi
εc =	0.003	in/in
Mat Ftdn. Cap Width =		ft
Mat Ftdn. Cap Length =		ft
Depth Below Grade =		ft

	Safety Factor	Φ Factor
Soil Lateral Resistance =	2.00	0.75
Skin Friction =	2.00	0.75
End Bearing =	2.00	0.75
Concrete Wt. Resist Uplift =	1.25	

Load Combinations Checked per TIA/EIA-222-F

1. Ult. Skin Friction/2.00 + Ult. End Bearing/2.00
+ Effective Soil Wt. - Buoyant Conc. Wt. ≥ Comp.
2. Ult. Skin Friction/2.00 + Buoyant Conc. Wt./1.25 ≥ Uplift
3. Ult. Skin Friction/1.50 + Buoyant Conc. Wt./1.50 ≥ Uplift

Steel Parameters

Number of Bars =	16	
Rebar Size =	#11	
Rebar Fy =	60	ksi
Rebar MOE =	29000	ksi
Tie Size =	#5	
Side Clear Cover to Ties =	4	in

Soil Parameters

Water Table Depth =	15.00	ft
Depth to Ignore Soil =	3.33	ft
Depth to Full Cohesion =	0	ft
Full Cohesion Starts at?	Ground	

Above Full Cohesion Lateral Resistance = 4(Cohesion)(Dia)(H)
Below Full Cohesion Lateral Resistance = 8(Cohesion)(Dia)(H)

Direct Embed Pole Shaft Parameters

Dia @ Grade =		in
Dia @ Depth Below Grade =		in
Number of Sides =		
Thickness =		in
Fy =		ksi
Backfill Condition =		

Maximum Capacity Ratios

Maximum Soil Ratio =	100.0%
Maximum Steel Ratio =	100.0%

Define Soil Layers

Note: Cohesion = Undrained Shear Strengh = Unconfined Compressive Strength / 2

Layer	Thickness ft	Unit Weight pcf	Cohesion psf	Friction Angle degrees	Soil Type	Ultimate End Bearing psf	Comp. Ult. Skin Friction psf	Tension Ult. Skin Friction psf	Depth ft
1	5	135		38	Sand				5
2	10	135		38	Sand		600		15
3	5	135		38	Sand	40000	600		20
4									
5									
6									
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	14.38	ft, from Grade
Bending Moment, M =	2313.13	k-ft, from COR
Resisting Moment, Ma =	3532.16	k-ft, from COR

MOMENT RATIO = 65.5% OK

Shear, V =	23.00	kips
Resisting Shear, Va =	35.12	kips

SHEAR RATIO = 65.5% OK

Soil Results: Uplift

Uplift, T =	0.00	kips
Allowable Uplift Cap., Ta =	62.50	kips

UPLIFT RATIO = 0.0% OK

Soil Results: Compression

Compression, C =	30.00	kips
Allowable Comp. Cap., Ca =	639.71	kips

COMPRESSION RATIO = 4.7% OK

Steel Results (ACI 318-02):

Minimum Steel Area =	13.57	sq in
Actual Steel Area =	24.96	sq in
Allowable Min Axial, Pa =	-1036.80	kips, Where Ma = 0 k-ft
Allowable Max Axial, Pa =	4726.51	kips, Where Ma = 0 k-ft

Axial Load, P =	51.21	kips @ 4.50 ft Below Grade
Moment, M =	2077.48	k-ft @ 4.50 ft Below Grade
Allowable Moment, Ma =	2602.27	k-ft

MOMENT RATIO = 79.8% OK

EBI Consulting
environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CT11604B

Sprint Berlin Kensington
1684 Chamberlain Highway
Berlin, CT 06037

May 4, 2015

EBI Project Number: 6215002774

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	53.96 %

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

EBI Consulting
environmental | engineering | due diligence

May 4, 2015

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

Emissions Analysis for Site: **CT11604B – Sprint Berlin Kensington**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **1684 Chamberlain Highway, Berlin, 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 both the PCS and AWS bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **1684 Chamberlain Highway, Berlin, 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-C-A20** for 1900 MHz (PCS) and 2100 MHz (AWS) channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **RFS APX16DWV-16DWVS-C-A20** has a maximum gain of **16.3 dBd** at its main lobe. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

7) The antenna mounting height centerline of the proposed antennas is **101 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-C-A20	Make / Model:	RFS APX16DWV-16DWVS-C-A20	Make / Model:	RFS APX16DWV-16DWVS-C-A20
Gain:	16.3 dBd	Gain:	16.3 dBd	Gain:	16.3 dBd
Height (AGL):	101	Height (AGL):	101	Height (AGL):	101
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%	4.08	Antenna B1 MPE%	4.08	Antenna C1 MPE%	4.08

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**12.23**
Town	0.05 %
MetroPCS	12.10 %
Clearwire	1.28 %
Sprint	8.50 %
Verizon Wireless	10.64 %
AT&T	9.16 %
Site Total MPE %:	**53.96 %**

T-Mobile Sector 1 Total:	4.08 %
T-Mobile Sector 2 Total:	4.08 %
T-Mobile Sector 3 Total:	4.08 %
Site Total:	53.96 %

EBI Consulting
environmental | engineering | due diligence

Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector 1:	4.08 %
Sector 2:	4.08 %
Sector 3 :	4.08 %
T-Mobile Total:	12.23 %
Site Total:	53.96 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **53.96%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#: *876382*
Site Name: *Berlin/Laviana Orchard*
App #:

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

Pier Properties

Concrete:

Pier Diameter =	6.0	ft
Concrete Area =	4071.5	in^2

Reinforcement:

Clear Cover to **Tie**=	4.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	5.11	ft
Vert. Cage Diameter =	61.34	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	16	
As Total=	24.96	in^2
A s/ Aconc, Rho:	0.0061	0.61%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(f'c)/Fy:	0.0027
200 / Fy:	0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.61%	**OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	6144.47	kips
at Mu=(ϕ=0.65)Mn=	3164.92	ft-kips
Max Tu, (φ=0.9) Tn =	1347.84	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	2077.48	ft-kips **(* Note)**
Max. Service Shaft P:	51.21	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	**Shaft Factored Loads**		
1.30	Mu:	2700.724	ft-kips
1.30	Pu:	66.573	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code=	2002

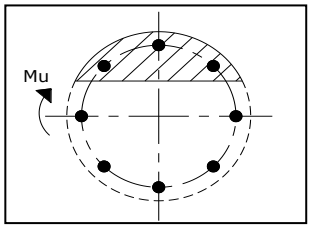
Seismic Properties

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

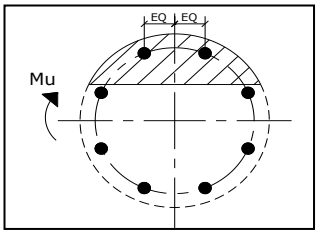
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **2**



Case 1



Case 2

Dist. From Edge to Neutral Axis:	**12.65**	in
Extreme Steel Strain, ϵt:	**0.0127**	
	ϵt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	66.57	kips
Drilled Shaft Moment Capacity, φMn:	**3382.96**	ft-kips
Drilled Shaft Superimposed Mu:	**2700.72**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**79.8%**