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

October 31, 2014

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

RE: **Sprint PCS-Exempt Modification - Crown Site BU: 806939**
Sprint PCS Site ID: CT03XC019
Located at: 800 Ogg Meadow Road, Orange, CT 06477

Dear Ms. Bachman:

This letter and exhibits are submitted on behalf of Sprint PCS (Sprint). Sprint is making modifications to certain existing sites in its Connecticut system in order to implement their 2.5GHz LTE 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 Mr. James Zeoli, First Selectman for the Town of Orange and South Central CT, Regional Water Authority, Property Owner.

Sprint plans to modify the existing wireless communications facility owned by Crown Castle and located at **800 Ogg Meadow Road, Orange, CT 06477.** 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 Sprint'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. Sprint'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 Sprint'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 Sprint's modified facility is included as Exhibit-3.

For the foregoing reasons, Sprint 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: Donna Neal.

Sincerely,

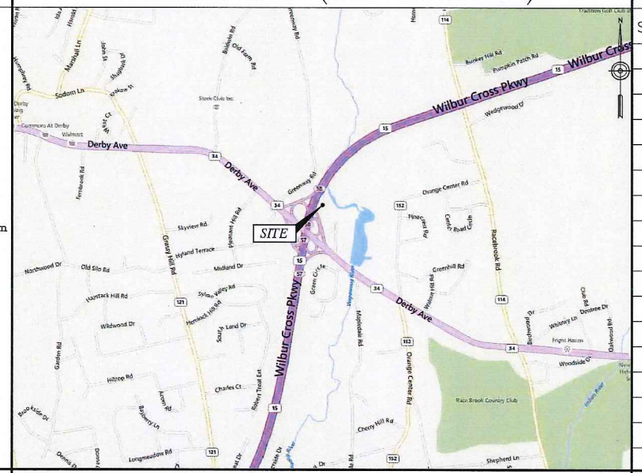
Susan Vale
Real Estate Specialist

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: Mr. James Zeoli, First Selectman
617 Orange Center Road
Orange, CT 06477

cc: South Central CT
90 Sargent Drive
Regional Water Authority
c/o Dianne L. Tompkins
New Haven, CT 06511-5966



Sprint

2.5 EQUIPMENT DEPLOYMENT

SITE NUMBER:
CT03XC019
SITE NAME:
ORANGE
SITE ADDRESS:
800 OGG MEADOW RD
ORANGE, CT 06477

CROWN ID#: 806939
CROWN SITE NAME: ORANGE

SHEET INFORMATION

SITE NUMBER:	CT03XC019
SITE NAME:	ORANGE
SITE ADDRESS:	800 OGG MEADOW RD ORANGE, CT 06477
COUNTY:	NEW HAVEN
COORDINATES: (NAD 83)	41° 18' 28.36"N 73° 1' 56.22"W
GROUND ELEV:	201'± AMSL
STRUCTURE TYPE:	MONOPOLE
STRUCTURE HEIGHT:	161'–0"± AGL
STRUCTURE RAD CENTER:	137'–0"± AGL
ZONING CLASSIFICATION:	RES
ZONING JURISDICTION:	TOWN OF ORANGE
PARCEL ID:	97 4 2–1

LANDLORD:	CROWN CASTLE USA 2000 CORPORATE DRIVE CANONSBURG, PA
LOCAL POWER COMPANY:	CONNECTICUT LIGHT AND POWER CONTACT CUSTOMER SERVICE (800) 286–2000
APPLICANT:	SPRINT 6580 SPRINT PARKWAY OVERLAND PARK, KANSAS 66251
ENGINEER:	JAMES QUICKSELL (845) 567–6656 EXT. 2835 JQuicksell@tectonicengineering.com
SPRINT CM:	GARY WOOD (860) 940–9168 gary.wood@sprint.com
CROWN CM:	JASON D'AMICO (860) 209–0104 jason.d'amico@crowncastle.com
AAV:	FIBERTECH

VICINITY MAP (NOT TO SCALE)

SHEET INDEX

SHT. NO.	SHEET DESCRIPTION
T–1	TITLE SHEET
SP–1	GENERAL NOTES
SP–2	GENERAL NOTES
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A–2	ELEVATION
A–3	ENLARGED EQUIPMENT LAYOUT PLANS
A–4	ANTENNA LAYOUT PLANS
A–5	RAN WIRING DIAGRAM
A–6	CABLE DETAILS
S–1	EQUIPMENT DETAILS
S–2	EQUIPMENT SCHEMATIC DETAILS
E–1	ELECTRICAL & GROUNDING PLANS
E–2	GROUNDING DETAILS & NOTES

GENERAL NOTES

1. THIS IS AN UNMANNED TELECOMMUNICATION FACILITY AND NOT FOR HUMAN HABITATION: HANDICAP ACCESS REQUIREMENTS ARE NOT REQUIRED. FACILITY HAS NO PLUMBING OR REFRIGERANTS. THIS FACILITY SHALL MEET OR EXCEED ALL FAA AND FCC REGULATOR REQUIREMENTS.
2. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE PROJECT OWNER'S REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.
3. DEVELOPMENT AND USE OF THIS SITE WILL CONFORM TO ALL APPLICABLE CODES AND ORDINANCES.
   - 2005 STATE OF CONNECTICUT BUILDING CODE.
   - ANSI/TIA/EIA–222–F–1996.
   - NATIONAL ELECTRICAL CODE, LATEST EDITION.

PROJECT DESCRIPTION

1. (1) NEW 2.5 EQUIPMENT RACK INSIDE EXIST MMBTS CABINET.
2. (3) NEW RFS APXVTM14–C–120 ANTENNAS.
3. (3) NEW TD–RRH8x20–25 RRH.
4. (1) NEW 5/8" FIBER CABLE.

AERIAL VIEW (NOT TO SCALE)

APPROVALS

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE CONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN. ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND MAY IMPOSE CHANGES OR MODIFICATIONS.

CONSTRUCTION: ____________________ DATE: __________

LEASING/ SITE ACQUISITION: ____________________ DATE: __________

LANDLORD/ PROPERTY OWNER: ____________________ DATE: __________

R.F. ENGINEER: ____________________ DATE: __________

Sprint
2.5 EQUIPMENT DEPLOYMENT
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

CROWN CASTLE

TECTONIC
- PLANNING
- ENGINEERING
- SURVEYING
- CONSTRUCTION MANAGEMENT

TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567–6656
Fax: (845) 567–8703
www.tectonicengineering.com

SUBMITTALS

PROJECT NO: 7225.CT03XC019

NO	DATE	DESCRIPTION	BY
0	06/11/14	FOR COMMENT	DC
1	10/28/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY

SEAL
STATE OF CONNECTICUT
MANOJKUMAR PATEL
No. 22038
LICENSED PROFESSIONAL ENGINEER

SITE NUMBER:
CT03XC019
SITE NAME:
ORANGE
SITE ADDRESS:
800 OGG MEADOW RD
ORANGE, CT 06477

SHEET TITLE:
TITLE SHEET

SHEET NO:
T–1

DIVISION 01000–GENERAL NOTES

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES.
2. THE ARCHITECT/ENGINEER HAVE MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE COMPLETE SCOPE OF WORK. THE CONTRACTOR BIDDING THE JOB IS NEVERTHELESS CAUTIONED THAT MINOR OMISSIONS OR ERRORS IN THE DRAWINGS AND OR SPECIFICATIONS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.
3. THE CONTRACTOR OR BIDDER SHALL BEAR THE RESPONSIBILITY OF NOTIFYING (IN WRITING) THE PROJECT OWNER'S REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK.
4. THE SCOPE OF WORK SHALL INCLUDE FURNISHING ALL MATERIALS, EQUIPMENT, LABOR AND ALL OTHER MATERIALS AND LABOR DEEMED NECESSARY TO COMPLETE THE WORK/PROJECT AS DESCRIBED HEREIN.
5. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO THE SUBMISSION OF BIDS OR PERFORMING WORK TO FAMILIARIZE HIMSELF WITH THE FIELD CONDITIONS AND TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
6. ONCE THE CONTRACTOR HAS RECEIVED AND ACCEPTED THE NOTICE TO PROCEED, CONTRACTOR WILL CONTACT THE CROWN CASTLE CONSTRUCTION MANAGER OF RECORD (NOTED ON THE FIRST PAGE ON THIS CONSTRUCTION DRAWING) A MINIMUM OF 48 HOURS PRIOR TO WORK START. UPON ARRIVAL TO THE JOB SITE, CONTRACTOR CREW IS REQUIRED CALL 1–800–788–7011 TO NOTIFY THE CROWN CASTLE NOC WORK HAS BEGUN.
7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO THE MANUFACTURER'S/VENDOR'S SPECIFICATIONS UNLESS NOTED OTHERWISE OR WHERE LOCAL CODES OR ORDINANCES TAKE PRECEDENCE.
8. THE CONTRACTOR SHALL PROVIDE A FULL SET OF CONSTRUCTION DOCUMENTS AT THE SITE UPDATED WITH THE LATEST REVISIONS AND ADDENDUMS OR CLARIFICATIONS AVAILABLE FOR THE USE BY ALL PERSONNEL INVOLVED WITH THE PROJECT.
9. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.
11. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS, EASEMENTS, PAVING, CURBING, ETC. DURING CONSTRUCTION. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL REPAIR ANY DAMAGE THAT MAY HAVE OCCURRED DUE TO CONSTRUCTION ON OR ABOUT THE PROPERTY.
12. THE CONTRACTOR SHALL KEEP THE GENERAL WORK AREA CLEAN AND HAZARD FREE DURING CONSTRUCTION AND DISPOSE OF ALL DIRT, DEBRIS, RUBBISH AND REMOVE EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY. PREMISES SHALL BE LEFT IN CLEAN CONDITION AND FREE FROM PAINT SPOTS, DUST, OR SMUDGES OF ANY NATURE.
13. THE CONTRACTOR SHALL COMPLY WITH ALL PERTINENT SECTIONS OF THE BASIC STATE BUILDING CODE, LATEST EDITION, AND ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJECT. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK SHALL BE RELOCATED AS DIRECTED BY THE ARCHITECT/ENGINEER. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR PIER DRILLING AROUND OR NEAR UTILITIES. THE CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT LIMITED TO A) FALL PROTECTION, B) CONFINED SPACE, C) ELECTRICAL SAFETY, D) TRENCHING AND EXCAVATION OF ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES WHICH INTERFERE WITH THE EXECUTION OF THE WORK SHALL BE REMOVED AND OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT THE POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK SUBJECT TO THE APPROVAL OF THE ARCHITECT/ENGINEER.
14. THE CONTRACTOR SHALL NOTIFY THE PROJECT OWNER'S REPRESENTATIVE IN WRITING WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE LESSEE/LICENSEE REPRESENTATIVE.
15. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, PROPERTY LINES, ETC. ON THE JOB.
16. THE CONTRACTOR SHALL NOTIFY THE THE RF ENGINEER FOR ANTENNA AZIMUTH VERIFICATION (DURING ANTENNA INSTALLATION) PRIOR TO CONDUCTING SWEEP TESTS.
17. THE CONTRACTOR SHALL SUBMIT AT THE END OF THE PROJECT A COMPLETE SET OF AS–BUILT DRAWINGS TO THE CLIENT REPRESENTATIVE.
18. REFER TO: CONSTRUCTION STANDARDS–SPRINT DOCUMENT EXHIBIT A–STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES REV. 4.0– 02.15.2011.DOCM.
19. REFER TO: WEATHER PROOFING SPECS: EXCERPT EXH A–WIHRPRF–STD CONSTR SPECS._157201110421855492.DOCM.
20. REFER TO: COLOR CODING–SPRINT NEXTEL ANT AND LINE COLOR CODING (DRAFT) V3 09–08–11.PDF
21. REFER TO LATEST DOCUMENTATION REVISION.

DIVISION 03000–CONCRETE

1.03 APPLICABLE STANDARDS (USE LATEST EDITIONS)

A. AC1–301 – SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS.
B. ACI–347 GUIDE TO FORM WORK FOR CONCRETE.
C. ASTM C33– CONCRETE AGGREGATE
D. ASTM C94 – READY MIXED CONCRETE e. ASTM C150 – PORTLAND CEMENT.
E. ASTM C260 – AIR–ENTRAINING ADMIXTURES FOR CONCRETE
F. ASTM C309– LIQUID MEMBRANE FORMING COMPOUNDS FOR CURING CONCRETE.
H. ASTM C494 – CHEMICAL ADMIXTURES FOR CONCRETE
I. ASTM A615– DEFORMED AND PLAIN BILLET–STEEL BARS FOR CONCRETE REINFORCEMENT
J. ASTM A185– STEEL WELDED WIRE FABRIC (PLAIN) FOR CONCRETE REINFORCEMENT

1.04 QUALITY ASSURANCE

CONCRETE MATERIALS AND OPERATIONS SHALL BE TESTED AND INSPECTED BY THE ARCHITECT/ENGINEER AS DIRECTED BY THE CLIENT'S REPRESENTATIVE.

3.04 SURFACE FINISHES

A. SURFACES AGAINST WHICH BACKFILL OR CONCRETE SHALL BE PLACED REQUIRE NO TREATMENT EXCEPT REPAIR OF DEFECTIVE AREAS.

B. SURFACES THAT WILL BE PERMANENTLY EXPOSED SHALL PRESENT A UNIFORM FINISH PROVIDED BY THE REMOVAL OF FINS AND THE FILLING HOLES AND OTHER IRREGULARITIES WITH DRY PACK GROUT, OR BY SACKING WITH UTILITY OR ORDINARY GROUT.

C. SURFACES THAT WOULD NORMALLY BE LEVEL AND WHICH WILL BE PERMANENTLY EXPOSED TO THE WEATHER SHALL BE SLOPED FOR DRAINAGE. UNLESS ENGINEER'S DESIGN DRAWING SPECIFIES A HORIZONTAL SURFACE OR SURFACES SUCH AS STAIR TREADS, WALLS, CURBS, AND PARAPETS SHALL BE SLOPED APPROXIMATELY 1/4" PER FOOT.

D. SURFACES THAT WILL BE COVERED BY BACKFILL OR CONCRETE SHALL BE SMOOTH SCREENED.

E. EXPOSED SLAB SURFACES SHALL BE CONSOLIDATED, SCREENED, FLOATED, AND STEEL TROWELED. HAND OR POWER–DRIVEN EQUIPMENT MAY BE USED FOR FLOATING. FLOATING SHALL BE STARTED AS SOON AS THE SCREENED SURFACE HAS ATTAINED A STIFFNESS TO PERMIT FINISHING OPERATIONS. OPERATIONS. ALL EDGES MUST HAVE A 3/4" CHAMFER.

1.04 QUALITY ASSURANCE CONCRETE MATERIALS AND OPERATIONS SHALL BE TESTED AND INSPECTED BY THE ENGINEER.

3.05 PATCHING

THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY UPON REMOVAL OF THE FORMS TO OBSERVE CONCRETE SURFACE CONDITIONS. IMPERFECTIONS SHALL BE PATCHED ACCORDING TO THE ENGINEER'S DIRECTION.

3.06 DEFECTIVE CONCRETE

THE CONTRACTOR SHALL NOTIFY OR REPLACE CONCRETE NOT CONFORMING TO REQUIRED LEVELS AND LINES, DETAILS, AND ELEVATIONS AS SPECIFIED IN ACI 301.

3.07 PROTECTION

A. IMMEDIATELY AFTER PLACEMENT. THE CONTRACTOR SHALL PROTECT THE CONCRETE FROM PREMATURE DRYING, EXCESSIVELY HOT OR COLD TEMPERATURES, AND MECHANICAL INJURY. FINISHED WORK SHALL BE PROTECTED.

B. CONCRETE SHALL BE MAINTAINED WITH MINIMAL MOISTURE LOSS AT RELATIVELY CONSTANT TEMPERATURE FOR PERIOD NECESSARY FOR HYDRATION OF CEMENT AND HARDENING OF CONCRETE.

C. ALL CONCRETE SHALL BE WATER CURED PER ACCEPTABLE PRACTICES SPECIFIED BY ACI CODE (LATEST EDITION)

DIVISION 05000 – METALS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. THE WORK CONSISTS OF THE FABRICATION AND INSTALLATION OF ALL MATERIALS TO BE FURNISHED. AND WITHOUT LIMITING THE GENERALITY THEREOF, INCLUDING ALL EQUIPMENT, LABOR AND SERVICES REQUIRED FOR ALL STRUCTURAL STEEL WORK AND ALL ITEMS INCIDENTAL AS SPECIFIED AND AS SHOWN ON THE DRAWINGS:

1. STEEL FRAMING INCLUDING BEAMS, ANGLES, CHANNELS AND PLATES.
2. WELDING AND BOLTING OF ATTACHMENTS.

1.02 REFERENCE STANDARDS

A. THE WORK SHALL CONFORM TO THE CODES AND STANDARDS OF THE FOLLOWING AGENCIES AS FURTHER CITED HEREIN:

1. ASTM: AMERICAN SOCIETY FOR TESTING AND MATERIALS AS PUBLISHED IN "COMPILATION OF ASTM STANDARDS IN BUILDING CODES" OR LATEST EDITION.
2. AWS: AMERICAN WELDING SOCIETY CODE OR LATEST EDITION.
3. AISC: AMERICAN INSTITUTE OF STEEL CONSTRUCTION, "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" (LATEST EDITION).

PART 2 – PRODUCTS

2.01 MATERIALS

A. STRUCTURAL STEEL: SHALL COMPLY WITH THE REQUIREMENTS OF ASTM A36 AND A992 FOR STRUCTURAL STEEL.

ALL PROPOSED STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH AISC CODE AND ASTM SPECIFICATIONS (LATEST EDITION) ALL NEW STEEL SHALL CONFORM TO THE FOLLOWING.

1. STRUCTURAL WIDE FLANGE: ASTM A992 Fy=50KSI.
2. MISCELLANEOUS STEEL (PLATES), CHANNELS, ANGLES, ETC): ASTM A36 (Fy=36KSI).
3. STRUCTURAL TUBING: ASTM A500 Gr. B (Fy=46KSI).
4. STEEL PIPE: ASTM A53 Gr B (Fy=35KSI).

2.02 WELDING

A. ALL WELDING SHALL BE DONE BY CERTIFIED WELDERS. CERTIFICATION DOCUMENTS SHALL BE MADE AVAILABLE FOR ENGINEER'S AND/OR OWNER'S REVIEW IF REQUESTED.

B. WELDING ELECTRODES FOR MANUAL SHIELDED METAL ARC WELDING SHALL CONFORM TO ASTM 1–233, E70 SERIES. BARE ELECTRODES AND GRANULAR FLUX USED IN THE SUBMERGED ARC PROCESS SHALL CONFORM TO AISC SPECIFICATIONS.

C. FIELD WELDING SHALL BE DONE AS PER AWS D1.1 REQUIREMENTS VISUAL INSPECTION IS ACCEPTABLE.

D. STUD WELDING SHALL BE ACCOMPLISHED BY CAPACITOR DISCHARGE (CD) WELDING TECHNIQUE USING CAPACITOR DISCHARGE STUD WELDER.

E. PROVIDE STUD FASTENERS OF MATERIALS AND SIZES SHOWN ON DRAWINGS OR AS RECOMMENDED BY THE MANUFACTURER FOR STRUCTURAL LOADINGS REQUIRED.

F. FOLLOW MANUFACTURERS SPECIFICATIONS AND INSTRUCTIONS TO PROPERLY SELECT AND INSTALL STUD WELDS.

2.03 BOLTING

A. BOLTS SHALL BE CONFORMING TO ASTM A35 HIGH STRENGTH HOT DIP GALVANIZED WITH ASTM A153 HEAVY HEX TYPE NUTS.

B. BOLTS SHALL BE 3/4" (MINIMUM) CONFORMING TO ASTM A325, HOT DIP GALVANIZED, ASTM A153 NUTS SHALL BE HEAVY HEX TYPE.

C. ALL CONNECTIONS SHALL BE 2 BOLTS MINIMUM.

D. EXCEPT WHERE SHOWN, ALL BEAM TO BEAM AND BEAM TO COLUMN CONNECTIONS TO BE DOUBLE ANGLED CONNECTIONS WITH HIGH STRENGTH BOLTS (THREADS EXCLUDED FROM SHEAR PLANE) AND HARDENED WASHERS.

E. STANDARD, OVERSIZED OR HORIZONTAL SHORT SLOTTED HOLES.

F. SNUG–TIGHT STRENGTH BEARING BOLTS MAY BE USED IN STANDARD HOLES CONFORMING TO ACIS, USING THE TURN OF THE NUT METHOD.

H. FULLY–TENSIONED HIGH STRENGTH (SLIP CRITICAL) SHALL BE USED IN OVERSIZED SLOT HOLES (RESPECTIVE OF SLOT ORIENTATION).

I. ALL BRACED CONNECTION, MOMENT CONNECTION AND CONNECTIONS NOTED AS "SLIP CRITICAL" SHALL BE BE SLIP CRITICAL JOINTS WITH CLASS A SURFACE CONDITIONS, UNLESS OTHERWISE NOTED.

J. EPOXY ANCHOR ASSEMBLIES SHALL BE AS MANUFACTURED BY HILTI OR ENGINEER APPROVED EQUAL, AS FOLLOWS:

BASE MATERIAL	ANCHOR SYSTEM
CONCRETE	HILTI HIT–HY 200
HOLLOW & GROUTED CMU OR BRICK	HILTI HIT–HY 70

2.04 FABRICATION

A. FABRICATION OF STEEL SHALL CONFORM TO THE AISC AND AWS

2.05 FINISH

A. STRUCTURAL STEEL EXPOSED TO WEATHER SHALL BE HOT–DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. (LATEST EDITION) UNLESS OTHERWISE NOTED.

2.06 PROTECTION

A. UPON COMPLETION OF ERECTION, INSPECT ALL GALVANIZED STEEL AND PAINT ANY FIELD CUTS, WELDS OR GALVANIZED BREAKS WITH (2) COATS OF ZINC–RICH COLD GALVANIZING PAINT.

PART 3 – ERECTION

A. PROVIDE ALL ERECTION, EQUIPMENT, BRACING, PLANKING, FIELD BOLTS, NUTS, WASHERS, DRIFT PINS, AND SIMILAR MATERIALS WHICH DO NOT FORM A PART OF THE COMPLETED CONSTRUCTION, BUT ARE NECESSARY FOR ITS PROPER ERECTION.

B. ERECT AND ANCHOR ALL STRUCTURAL STEEL IN ACCORDANCE WITH AISC REFERENCE STANDARDS. ALL WORK SHALL BE ACCURATELY SET TO ESTABLISHED SUITABLE ATTACHMENTS TO THE CONSTRUCTION OF THE BUILDING

C. TEMPORARY BRACING, GUYING, AND SUPPORT SHALL BE PROVIDED TO KEEP THE STRUCTURE SET AND ALIGNED AT ALL TIMES DURING CONSTRUCTION, AND TO PREVENT DANGER TO PERSONS AND PROPERTY. CHECK ALL TEMPORARY LOADS AND STAY WITHIN SAFE CAPACITY OF ALL BUILDING COMPONENTS.

Sprint

2.5 EQUIPMENT DEPLOYMENT
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

CROWN CASTLE

TECTONIC • PLANNING • ENGINEERING • SURVEYING • CONSTRUCTION MANAGEMENT

TECTONIC Engineering & Surveying Consultants P.C.

1279 Route 300
Newburgh, NY 12550

Phone: (845) 567–6656
Fax: (845) 567–8703

www.tectonicengineering.com

SUBMITTALS

PROJECT NO: 7225.CT03XC019

NO	DATE	DESCRIPTION	BY
0	06/11/14	FOR COMMENT	DC
1	10/28/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY

SEAL

STATE OF CONNECTICUT · KUMAR · No. 22008 · REGISTERED PROFESSIONAL ENGINEER

SITE NUMBER:
CT03XC019

SITE NAME:
ORANGE

SITE ADDRESS:
800 OGG MEADOW RD
ORANGE, CT 06477

SHEET TITLE:
GENERAL NOTES

SHEET NO:
SP–1

DIVISION 13000–SPECIAL CONSTRUCTION ANTENNA INSTALLATION

PART 1 – GENERAL

1.01 WORK INCLUDED

A. ANTENNAS AND HYBRIFLEX CABLES ARE FURNISHED BY CLIENT'S REPRESENTATIVE UNDER SEPARATE CONTRACT. THE CONTRACTOR SHALL ASSIST ANTENNA INSTALLATION CONTRACTOR IN TERMS OF COORDINATION AND SITE ACCESS. ERECTION SUBCONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPERTY.

B. INSTALL ANTENNAS AS INDICATED ON DRAWINGS AND CLIENT'S REPRESENTATIVE SPECIFICATIONS.

C. INSTALL GALVANIZED STEEL ANTENNA MOUNTS AS INDICATED ON DRAWINGS.

D. INSTALL FURNISHED GALVANIZED STEEL OR ALUMINUM WAVEGUIDE AND PROVIDE PRINTOUT OF THAT RESULT

F. INSTALL HYBRIFLEX CABLES AND TERMINATIONS BETWEEN ANTENNAS AND EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS. WEATHERPROOF ALL CONNECTORS BETWEEN THE ANTENNA AND EQUIPMENT PER MANUFACTURER'S REQUIREMENTS.

G. ANTENNA AND HYBRIFLEX CABLE GROUNDING:

1. ALL EXTERIOR #6 GREEN GROUND WIRE DAISY CHAIN CONNECTIONS ARE TO BE WEATHER SEALED WITH ANDREWS CONNECTOR/SPLICE WEATHERPROOFING KIT TYPE 3221213 OR EQUIVALENT.

2. ALL HYBRIFLEX CABLE GROUNDING KITS ARE TO BE INSTALLED ON STRAIGHT RUNS OF HYBRIFLEX CABLE (NOT WITHIN BENDS). 1.02 RELATED WORK FURNISH THE FOLLOWING WORK AS SPECIFIED UNDER CONSTRUCTION DOCUMENTS, BUT COORDINATE WITH QOTHER TRADES PRIOR TO BID:

   1. FLASHING OF OPENING INTO OUTSIDE WALLS.
   2. SEALING AND CAULKING ALL OPENINGS.
   3. PAINTING.
   4. CUTTING AND PATCHING.

1.03 REQUIREMENTS OF REGULATOR AGENCIES

A. FURNISH U.L. LISTED EQUIPMENT WHERE SUCH LABEL IS AVAILABLE. INSTALL IN CONFORMANCE WITH U.L. STANDARDS WHERE APPLICABLE.
B. INSTALL ANTENNA, ANTENNA CABLES, GROUNDING SYSTEM IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS IN EFFECT AT PROJECT LOCATION AND RECOMMENDATIONS OF STATE AND LOCAL BUILDING CODES HAVING JURISDICTION OVER SPECIFIC PORTIONS OF WORK. THIS WORK INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:

1. EIA – ELECTRONIC INDUSTRIES ASSOCIATION RS–22. STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES.

2. FAA – FEDERAL AVIATION ADMINISTRATION ADVISORY CIRCULAR AC 70/7480–IH, CONSTRUCTION MARKING AND LIGHTING.

3. FCC – FEDERAL COMMUNICATION COMMISSION RULES AND REGULATIONS FORM 715, OBSTRUCTION MARKING AND LIGHTING SPECIFICATION FOR ANTENNA STRUCTURES

4. AISC – AMERICAN INSTITUTE OF STEEL CONSTRUCTION FOR STRUCTURAL JOINTS USING ASTM 1325 OR A490 BOLTS.

5. NEC – NATIONAL ELECTRIC CODE – ON TOWER LIGHTING KITS.

6. UL – UNDERWRITER'S LABORATORIES APPROVED ELECTRICAL PRODUCTS.

7. IN ALL CASES, PART 77 OF THE FAA RULES AND PARTS 17 AND 22 OF THE FCC RULES ARE APPLICABLE AND IN THE EVENT OF CONFLICT, SUPERSEDE ANY OTHER STANDARDS OR SPECIFICATIONS.

8. LIFE SAFETY CODE NFPA, LATEST EDITION.

DIVISION 13000–EARTHWORK

PART 1 GENERAL

1.01 WORK INCLUDED: REFER TO SURVEY AND SITE PLAN FOR WORK INCLUDED.

1.02 RELATED WORK

A. CONSTRUCTION OF EQUIPMENT FOUNDATIONS
B. INSTALLATION OF ANTENNA SYSTEM

PART 2 PRODUCTS

2.01 MATERIALS

A. ROAD AND SITE MATERIALS; FILL MATERIAL SHALL BE ACCEPTABLE, SELECT FILL SHALL BE IN ACCORDANCE WITH LOCAL DEPARTMENT OF HIGHWAY AND PUBLIC TRANSPORTATION STANDARD SPECIFICATIONS.

B. SOIL STERILIZER SHALL BE EPA REGISTERED OF LIQUID COMPOSITION AND OF PRE–EMERGENCE DESIGN.

C. SOIL STABILIZER FABRIC SHALL BE MIRAFI OR EQUAL – 600X AT ACCESS ROAD AND COMPOUND.

D. GRAVEL FILL; WELL GRADED, HARD, DURABLE, NATURAL SAND AND GRAVEL, FREE FROM ICE AND SNOW, ROOTS, SOD RUBBISH, AND OTHER DELETERIOUS OR ORGANIC MATTER.

MATERIAL SHALL CONFORM TO THE FOLLOWING GRADATION REQUIREMENTS.

GRAVEL FILL TO BE PLACED IN LIFTS OF 9" MAXIMUM THICKNESS AND 90 % DENSITY. COMPACTED TO 95

E. NO FILL OR EMBANKMENT MATERIALS SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OF EMBANKMENT

2.02 EQUIPMENT

A. COMPACTION SHALL BE ACCOMPLISHED BY MECHANICAL MEANS. LARGER AREAS SHALL BE COMPACTED BY SHEEPS FOOT, VIBRATORY OR RUBBER TIED ROLLERS WEIGHING AT LEAST FIVE TONS. SMALLER AREAS SHALL BE COMPACTED BY POWER–DRIVER, HAND HELD TAMPERS.

B. PRIOR TO OTHER EXCAVATION AND CONSTRUCTION EFFORTS GRUB ORGANIC MATERIAL TO A MINIMUM OF 6" BELOW ORIGINAL GROUND LEVEL.

C. UNLESS OTHERWISE INSTRUCTED BY CLIENT'S REPRESENTATIVE. REMOVE TREES, BRUSH AND DEBRIS FROM THE PROPERTY TO AN AUTHORIZED DISPOSAL LOCATION.

D. PRIOR TO PLACEMENT OF FILL OR BASE MATERIALS, ROLL THE SOIL.

E. WHERE UNSTABLE SOIL CONDITIONS ARE ENCOUNTERED, LINE THE GRUBBED AREAS WITH STABILIZER MAT PRIOR TO PLACEMENT OF FILL OR BASE MATERIAL.

3.03 INSTALLATION

A. THE SITE AND TURNAROUND AREAS SHALL BE AT THE SUB–BASE COURSE ELEVATION PRIOR TO FORMING FOUNDATIONS. GRADE OR FILL THE SITE AND ACCESS ROAD AS REQUIRED TO PRODUCE EVEN DISTRIBUTION OF SPOILS RESULTING FROM FOUNDATION EXCAVATIONS. THE RESULTING GRADE SHALL CORRESPOND WITH SAID SUB–BASE COURSE, ELEVATIONS ARE TO BE CALCULATED FORM FINISHED GRADES OR SLOPES INDICATED.

B. THE ACCESS ROAD SHALL BE BROUGHT TO BASE COURSE ELEVATION PRIOR TO FOUNDATION CONSTRUCTION.

C. DO NOT CREATE DEPRESSIONS WHERE WATER MAY POND.

D. THE CONTRACT INCLUDES ALL NECESSARY GRADING, BANKING, DITCHING AND COMPLETE SURFACE COURSE FOR ACCESS ROAD. ALL ROADS OR ROUTES UTILIZED FOR ACCESS TO PUBLIC THOROUGHFARE IS INCLUDED IN SCOPE OF WORK UNLESS OTHERWISE INDICATED.

E. WHEN IMPROVING AN EXISTING ACCESS ROAD, GRADE THE EXISTING ROAD TO REMOVE ANY ORGANIC MATTER AND SMOOTH THE SURFACE BEFORE PLACING FILL OR STONE.

F. PLACE FILL OR STONE IN 3" MAXIMUM LIFTS AND COMPACT BEFORE PLACING NEXT LIFT.

G. THE FINISH GRADE, INCLUDING TOP SURFACE COURSE, SHALL EXTEND A MINIMUM OF 12" BEYOND THE SITE FENCE AND SHALL COVER THE AREA AS INDICATED.

H. RIPRAP SHALL BE APPLIED TO THE SIDE SLOPES OF ALL FENCED AREAS, PARKING AREAS AND TO ALL OTHER SLOPES GREATER THAN 2:1.

I. RIPRAP SHALL BE APPLIED TO THE SIDES OF DITCHES OR DRAINAGE SWALES AS INDICATED ON PLANS.

J. RIPRAP ENTIRE DITCH FOR 6'–0" IN ALL DIRECTIONS AT CULVERT OPENINGS.

K. SEED, FERTILIZER AND STRAW COVER SHALL BE APPLIED TO ALL OTHER DISTURBED AREAS AND DITCHES, DRAINAGE, SWALES, NOT OTHERWISE RIP–RAPPED.

L. UNDER NO CIRCUMSTANCES SHALL DITCHES, SWALES OR CULVERTS BE PLACED SO THEY DIRECT WATER TOWARDS, OR PERMIT STANDING WATER IMMEDIATELY ADJACENT TO SITE. IF OWNER DESIGNS OR IF DESIGN ELEVATIONS CONFLICT WITH THIS GUIDANCE ADVISE THE OWNER IMMEDIATELY.

M. IF A DITCH LIES WITH SLOPE GREATER THAN TEN PERCENT, MOUND DIVERSIONARY HEADWALL IN THE DITCH AT CULVERT ENTRANCES. RIP–RAP THE UPSTREAM SIDE OF THE HEADWALL AS WELL AS THE DITCH FOR 6'–0" ABOVE THE CULVERT.

N. IF A DITCH LIES WITH SLOPES GREATER THAN TEN PERCENT, MOUND DIVERSIONARY HEADWALLS IN THE DITCH FOR 6'–0" ABOVE THE CULVERT ENTRANCE.

O. SEED AND FERTILIZER SHALL BE APPLIED TO SURFACE CONDITIONS WHICH WILL ENCOURAGE ROOTING. RAKE AREAS TO BE SEEDED TO EVEN THE SURFACE AND TO LOOSEN THE SOIL.

P. SOW SEED IN TWO DIRECTIONS IN TWICE THE QUANTITY RECOMMENDED BY THE SEED PRODUCER.

Q. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE GROWTH OF SEEDED AND LANDSCAPED AREAS BY WATERING UP TO THE POINT OF RELEASE FROM THE CONTRACT. CONTINUE TO REWORK BARE AREAS UNTIL COMPLETE COVERAGE IS OBTAINED.

3.04 FIELD QUALITY CONTROL

A. COMPACTION SHALL BE D–1557 FOR SITE WORK AND 95 % MAXIMUM DENSITY UNDER SLAB AREAS. AREAS OF SETTLEMENT WILL BE EXCAVATED AND REFILLED AT CONTRACTOR'S EXPENSE. REQUIRED. USE OF EROSION CONTROL MESH OR MULCH NET SHALL BE AN ACCEPTABLE ALTERNATIVE.

B. THE COMPACTION TEST RESULTS SHALL BE AVAILABLE PRIOR TO THE CONCRETE POUR.

3.05 PROTECTION

A. PROTECT SEEDED AREAS FORM EROSION BY SPREADING STRAW TO A UNIFORM LOOSE DEPTH OF 1"–2". STAKE AND TIE DOWN AS REQUIRED. USE OF EROSION CONTROL MESH OR MULCH NET SHALL BE AN ACCEPTABLE ALTERNATIVE.

B. ALL TREES PLACED IN CONJUNCTION WITH A LANDSCAPE CONTRACT SHALL BE WRAPPED, TIED WITH HOSE PROTECTED WIRE AND SECURED TO STAKES EXTENDING 2'–0" INTO THE GROUND ON FOUR SIDES OF THE TREE.

C. ALL EXPOSED AREAS SHALL BE PROTECTED AGAINST WASHOUTS AND SOIL EROSION. STRAW BALES SHALL BE PLACED AT THE INLET APPROACH TO ALL NEW OR EXISTING CULVERTS. REFER TO DETAILS ON DRAWINGS

SYMBOLS	ABBREVIATIONS
— — — G — — — G —	GROUND WIRE
— — — E — — — E —	ELECTRIC
— — — T — — — T —	TELEPHONE
—OHW—OHW—OHW—OHW—	OVERHEAD WIRE
——— — — ———	PROPERTY LINE
—X———X———X———	CHAIN LINK FENCE
A–1	ANTENNA MARK
(E)	EXISTING
(P)	PROPOSED DETAIL
(DET # / SHT #)	REFERENCE
⊕	SURFACE ELEVATION

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PROJECT NO: 7225.CT03XC019

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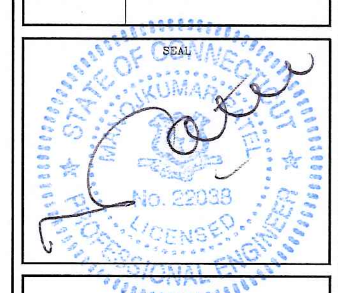
1	10/28/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY



SITE NUMBER:
CT03XC019

SITE NAME:
ORANGE

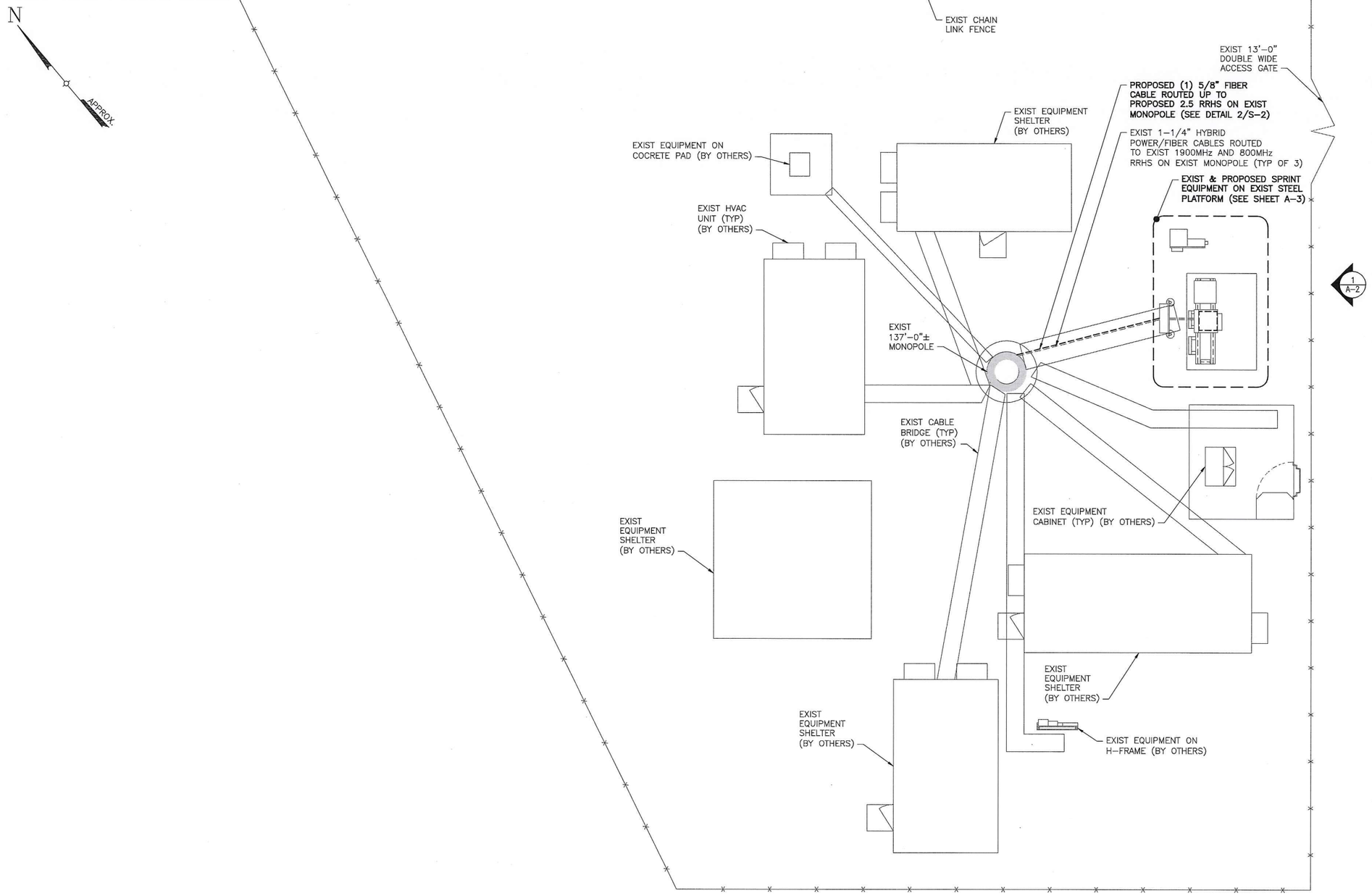
SITE ADDRESS:
800 OGG MEADOW RD
ORANGE, CT 06477

SHEET TITLE:
GENERAL NOTES

SHEET NO:
SP–2

NORTH NOTE:

NORTH SHOWN HAS BEEN ESTABLISHED USING THE USGS QUADRANGLE 7.5 MINUTE MAPS AND IS APPROXIMATE. VERIFY TRUE NORTH PRIOR TO INSTALLATION OF ANTENNAS.



1 A-1 SITE PLAN

SCALE: 3/8" = 1'-0"

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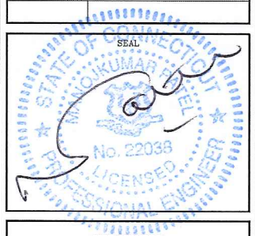


SITE NUMBER:
CT03XC019

SITE NAME:
ORANGE

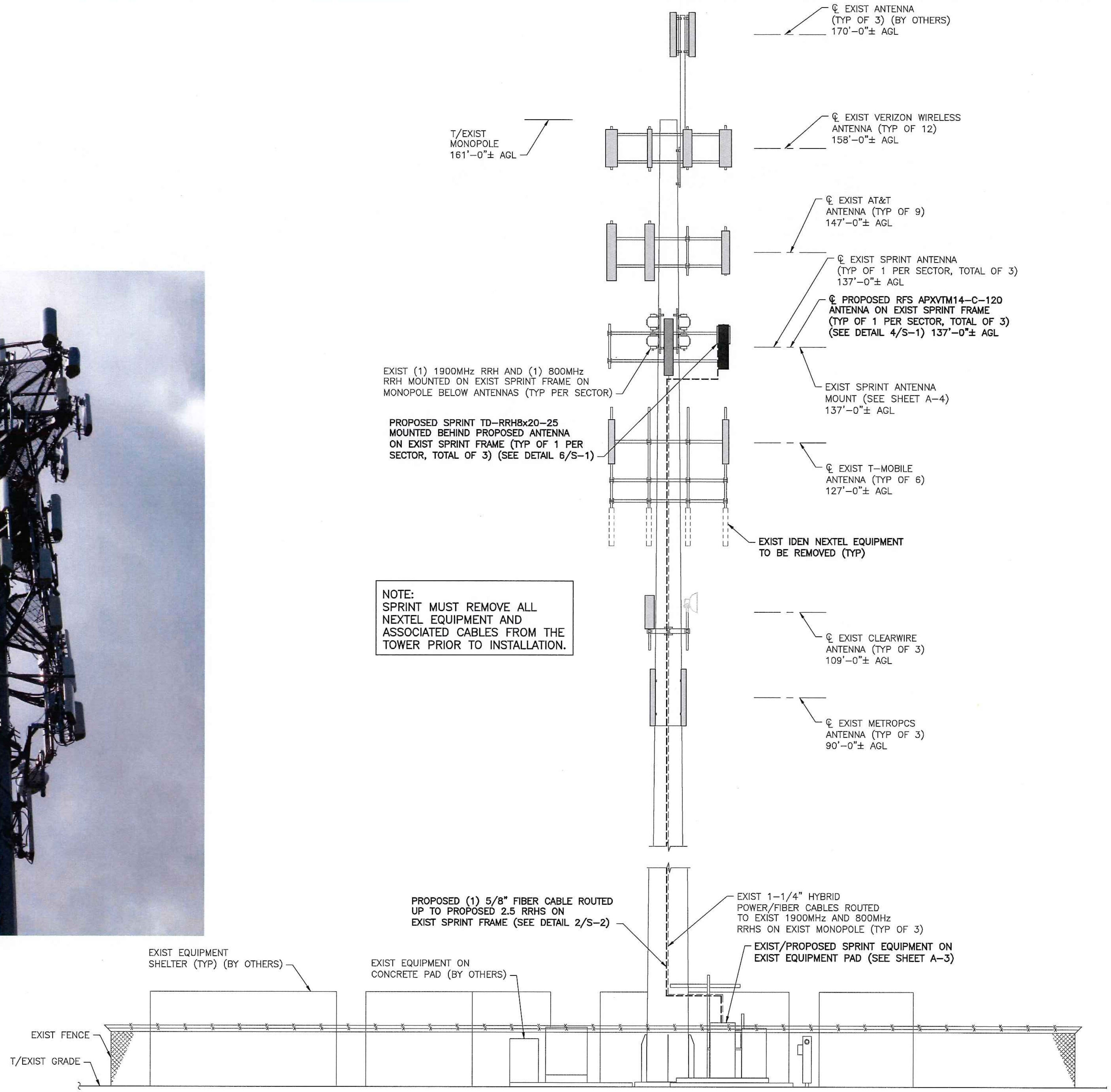
SITE ADDRESS:
800 OGG MEADOW RD
ORANGE, CT 06477

SHEET TITLE:
SITE PLAN

SHEET NO:
A-1

THE EXISTING MONOPOLE SHALL BE ANALYZED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT (TO BE COORDINATED BY OTHERS).

THE EXISTING MOUNT HAS BEEN ANALYZED BY TECTONIC ENGINEERING AND FOUND TO BE ADEQUATE TO SUPPORT THE PROPOSED SPRINT UPGRADE AS DETAILED IN THE STRUCTURAL ANALYSIS EVALUATION LETTER DATED 10/27/14.



1 / A-2 ELEVATION

SCALE: 3/16" = 1'-0"

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STATE OF CONNECTICUT · MANOJKUMAR ... · No. 22038 · LICENSED · PROFESSIONAL ENGINEER

SITE NUMBER:
CT03XC019

SITE NAME:
ORANGE

SITE ADDRESS:
800 OGG MEADOW RD
ORANGE, CT 06477

SHEET TITLE:
ELEVATION

SHEET NO:
A-2

NORTH NOTE:

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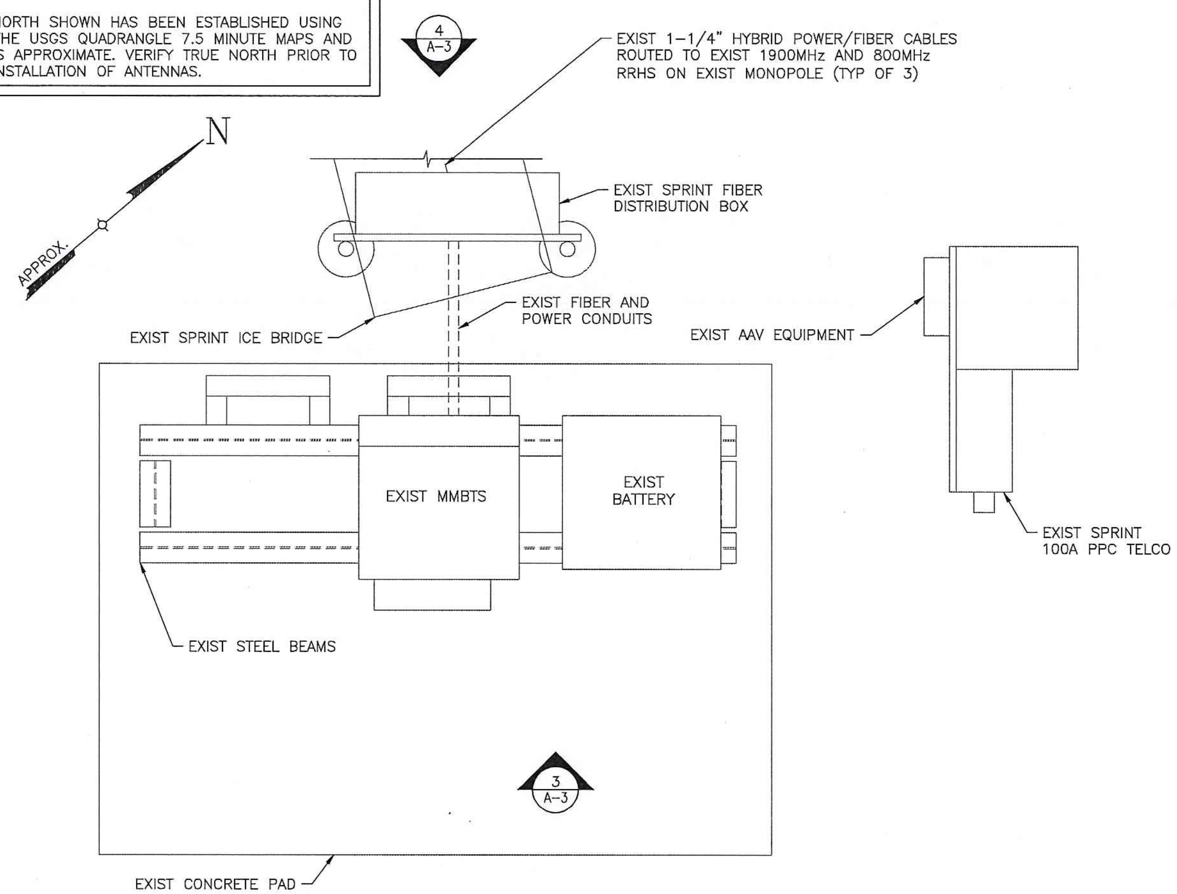
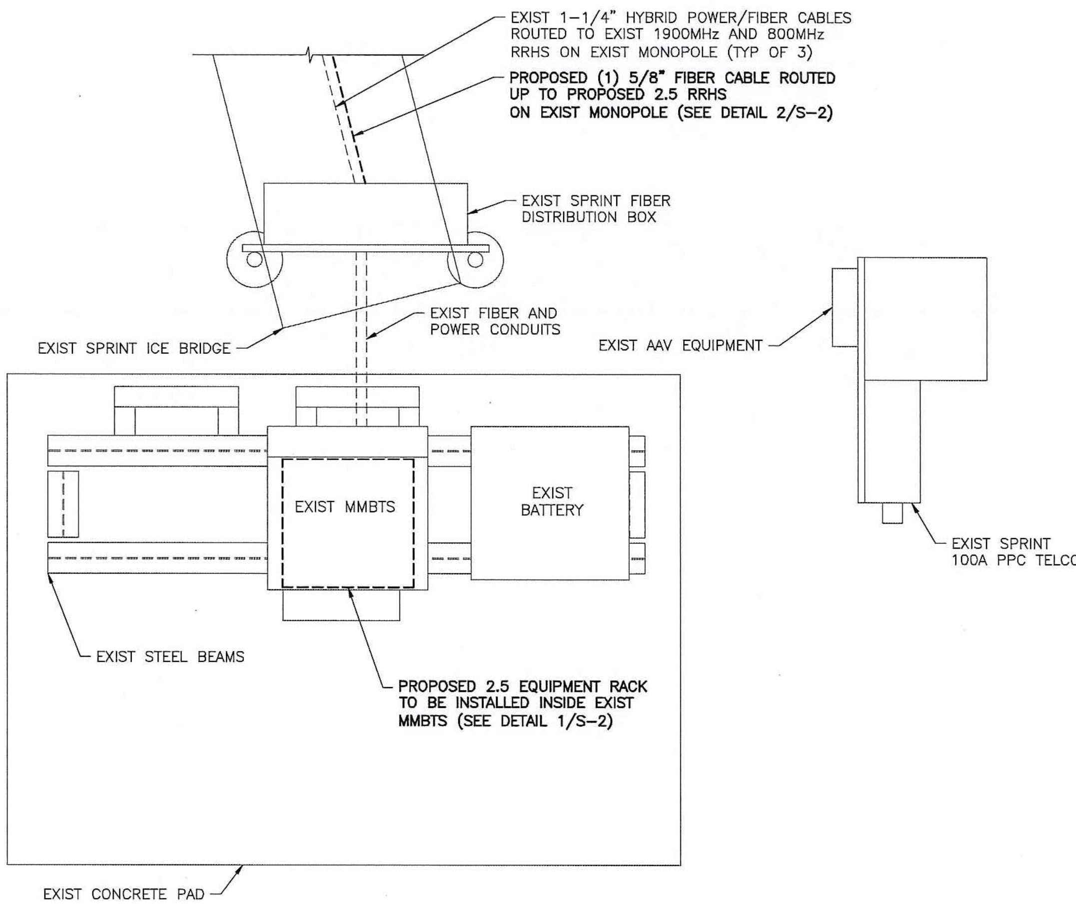


1 / A-3 ENLARGED EQUIP. LAYOUT PLAN (EXIST)

SCALE: 3/4" = 1'-0"



2 / A-3 ENLARGED EQUIP. LAYOUT PLAN (FINAL)

SCALE: 3/4" = 1'-0"

3 / A-3 EXIST EQUIPMENT PAD

SCALE: NTS

4 / A-3 EXIST FIBER DISTRIBUTION BOX

SCALE: NTS

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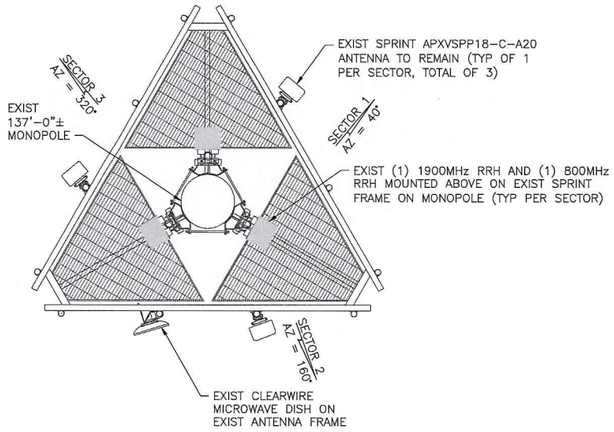
SHEET TITLE:
ENLARGED EQUIPMENT LAYOUT PLANS

SHEET NO:
A-3

N

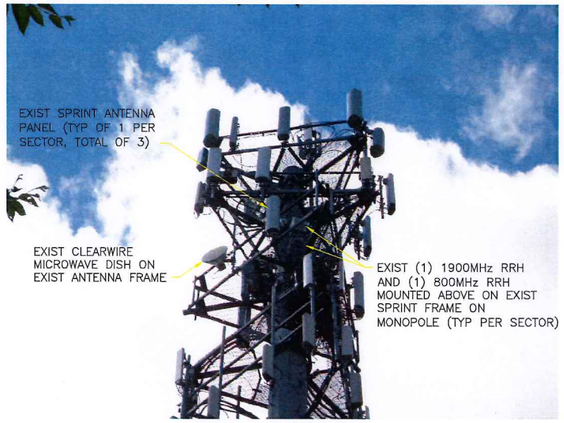
APPROX.



NOTE:
CONTRACTER TO FIELD VERIFY AZMITHS AND ADJUST EXIST ANTENNAS TO MATCH THE AZMITHS SHOWN IN THE FINAL LAYOUT.

1 / A-4 ANTENNA LAYOUT PLAN (EXIST)

SCALE: 3/8" = 1'-0"



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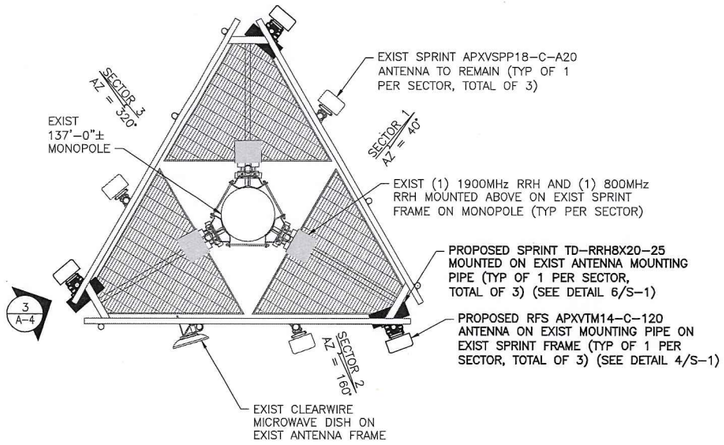
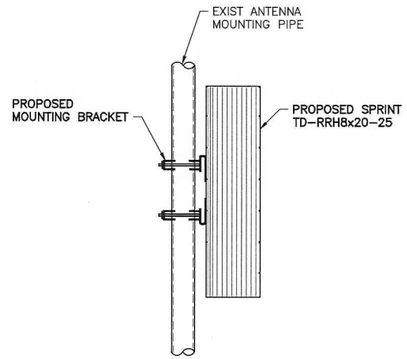


3 / A-4

2 / A-4 ANTENNA LAYOUT PLAN (FINAL)

SCALE: 3/8" = 1'-0"



3 / A-4 RRH MOUNTING DETAIL

SCALE: 1 1/2" = 1'-0"

ANTENNA DATA

Status	Exist	Proposed
Antenna Manufacturer	RFS-CEL WAVE	RFS-CEL WAVE
Antenna Model Number	APXVSPP18C-C-A20	APXVTM14-C-120
Number of Antennas	3	3
Antenna RAD Center	137'	137'
Antenna Azimuth	40/160/320	40/160/320
Antenna RRH Model Number	1900MHz/800MHz RRHS	TD-RRH8x20-25
Number of RRH	3	3

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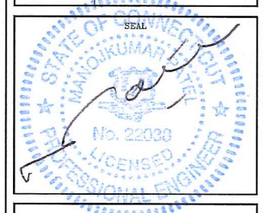

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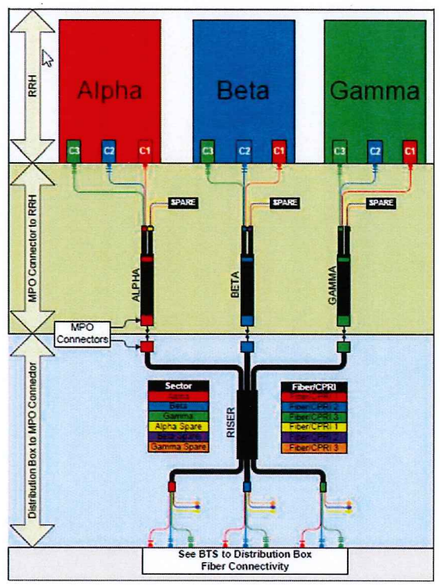
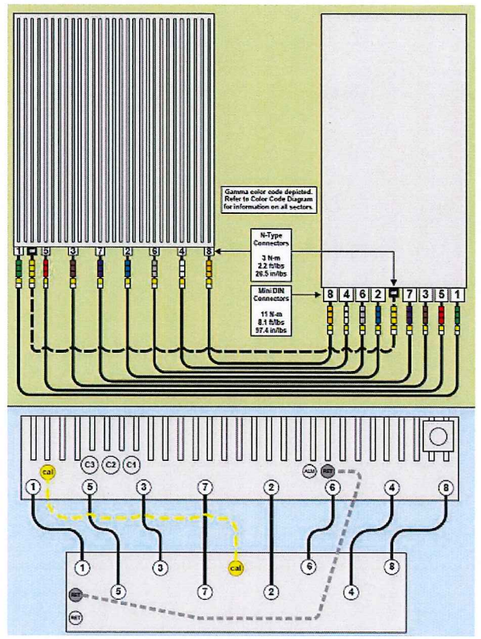
SHEET TITLE:
ANTENNA LAYOUT PLANS

SHEET NO:
A-4



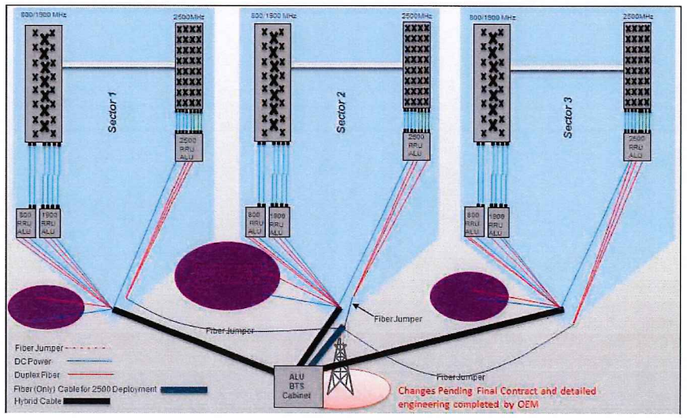
1 A–5 2.5 CABLE COLOR CODING

SCALE: N.T.S.



2 A–5 RRH CONNECTIVITY

SCALE: N.T.S.



3 A–5 RAN WIRING

SCALE: N.T.S.

4 A–5 CABLE SCENARIO

SCALE: N.T.S.

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STATE OF CONNECTICUT
MANOJKUMAR R. PATEL
No. 22038
LICENSED PROFESSIONAL ENGINEER

SITE NUMBER:
CT03XC019

SITE NAME:
ORANGE

SITE ADDRESS:
800 OGG MEADOW RD
ORANGE, CT 06477

SHEET TITLE:
RAN WIRING DIAGRAM

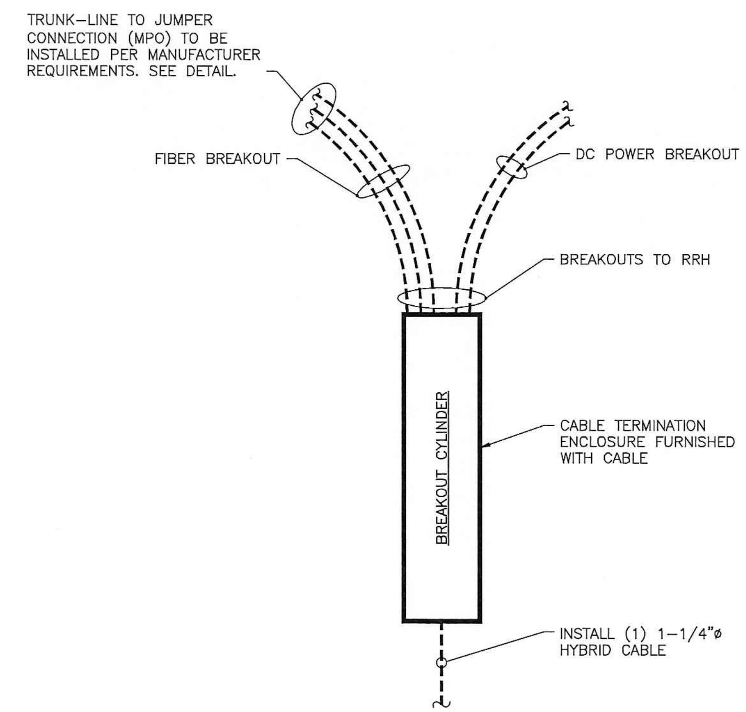
SHEET NO:
A–5

IMPORTANT!! LINE UP WHITE MARKINGS ON JUMPER AND RISER IP–MPO CONNECTOR. PUSH THE WHITE MARK ON THE JUMPER CONNECTOR FLUSH AGAINST THE RED SEAL ON THE RISER CONNECTION

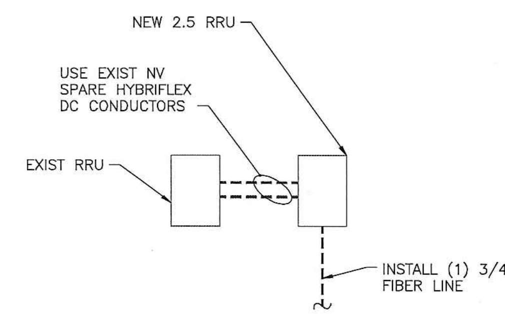
IMPORTANT!! ROTATE THE BAYONET HOUSING CLOCKWISE UNTIL A CLICK SOUND IS HEARD TO ENSURE A GOOD CONNECTION

(1/A-6) HYBRIFLEX RISER/JUMPER CONNECTION DETAILS

SCALE: N.T.S.



2.5 HYBRID CABLE W/FIBER & DC FEEDERS



FIBER ONLY TRUNK LINES

(2/A-6) TRUNK LINE DETAILS (TYPICAL)

SCALE: N.T.S.

SPECIAL NOTES: CABLE MARKINGS AT RAD CENTER AND ALL WALL/BLDG. PENETRATIONS

- ALL COLOR CODE TAPE SHALL BE 3M–35 AND SHALL BE INSTALLED USING A MINIMUM OF (3) WRAPS OF TAPE.
- ALL COLOR BANDS INSTALLED AT THE TOWER TOP SHALL BE A MINIMUM OF 3" WIDE AND SHALL HAVE A MINIMUM OF 3/4" OF SPACING BETWEEN EACH COLOR.
- ALL COLOR BANDS INSTALLED AT OR NEAR THE GROUND MAY BE ONLY 3/4" WIDE. EACH TOP–JUMPER SHALL BE COLOR CORDED WITH (1) SET OF 3" WIDE BANDS.
- EACH MAIN COAX SHALL BE COLOR CODED WITH (1) SET OF 3" BANDS NEAR THE TOP–JUMPER CONNECTION AND WITH 3/4" COLOR BANDS JUST PRIOR TO ENTERING THE BTS OR TRANSMITTER BUILDING.
- ALL BOTTOM JUMPERS SHALL BE COLOR CODED WITH (1) SET OF 3/4" BANDS ON EACH END OF THE BOTTOM JUMPER.
- ALL COLOR CODES SHALL BE INSTALLED SO AS TO ALIGN NEATLY WITH ONE ANOTHER FROM SIDE–TO–SIDE.
- EACH COLOR BAND SHALL HAVE A MINIMUM OF (3) WRAPS AND SHALL BE NEATLY TRIMMED AND SMOOTHED OUT AS TO AVOID UNRAVELING.
- X–POLE ANTENNAS SHOULD USE "XX–1" FOR THE "+45" PORT, "XX–2" FOR THE "–45" PORT.
- COLOR BAND #4 REFERS TO THE FREQUENCY BAND: ORANGE=850, VIOLET=1900. USED ON JUMPERS ONLY.
- RF FEEDLINE SHALL BE IDENTIFIED WITH A METAL TAG (STAINLESS OR BRASS) AND STAMPED WITH THE SECTOR, ANTENNA POSITION, AND CABLE NUMBER.
- ANTENNAS MUST BE IDENTIFIED, USING THE SECTOR LETTER AND ANTENNA NUMBER, WITH A BLACK MARKER PRIOR TO INSTALLATION.

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DATE	REVIEWED BY

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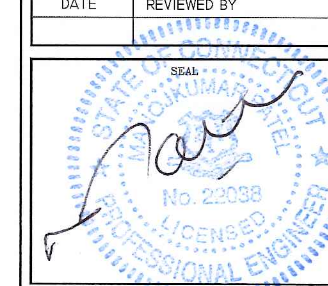


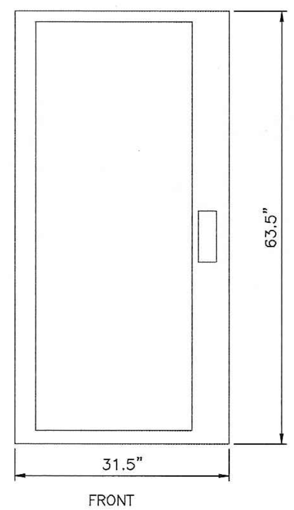
SITE NUMBER:
CT03XC019

SITE NAME:
ORANGE

SITE ADDRESS:
800 OGG MEADOW RD
ORANGE, CT 06477

SHEET TITLE:
CABLE DETAILS

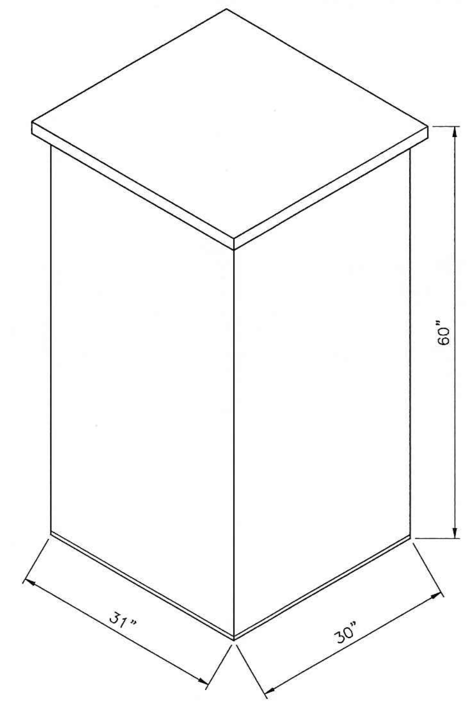
SHEET NO:
A–6



9927 MMBTS MODULAR CELL	
SPECIFICATIONS:	
HEIGHT:	63.5"
WIDTH:	31.5"
DEPTH:	38.0"

(1 / S-1) (EXIST) MMBTS CABINET

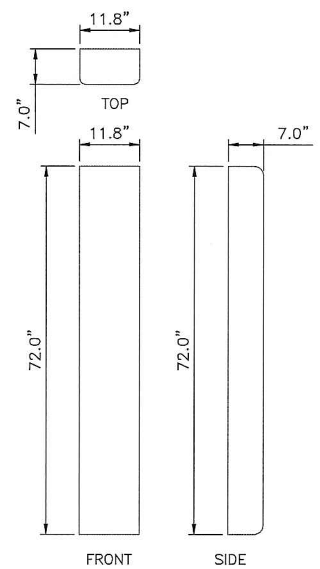
SCALE: 1" = 1'-0"



ANDREW 60ECv2	
SPECIFICATIONS:	
HEIGHT:	60"
WIDTH:	31"
DEPTH:	30"
WEIGHT:	2430 LBS.

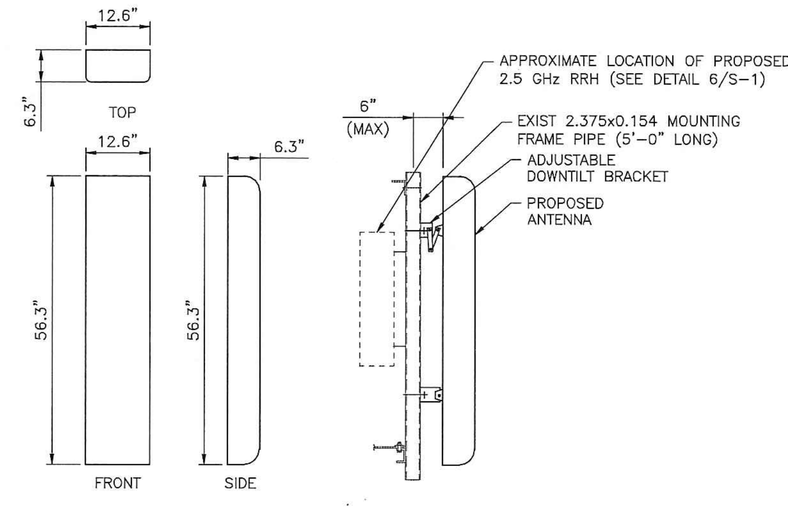
(2 / S-1) (EXIST) BATTERY CABINET

SCALE: 1" = 1'-0"



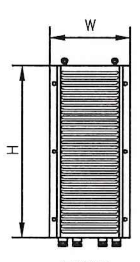
(3 / S-1) (EXIST) ANTENNA DETAILS

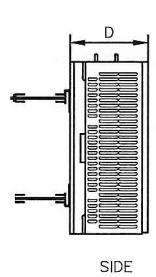
SCALE: 3/4"=1'-0"



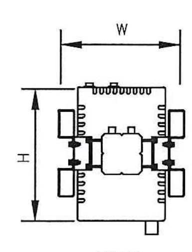
(4 / S-1) (PROPOSED) ANTENNA DETAIL

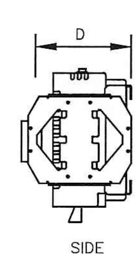
SCALE: 3/4"=1'-0"





TYPE:	1900 MHz 4x45W
MODEL #:	RRH 1900 4X45 65MHz
HEIGHT:	25.0"
WIDTH:	11.1"
DEPTH:	11.4"
WEIGHT:	±60 LBS.

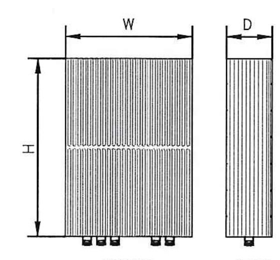




TYPE:	800 MHz 2x50W
MODEL #:	FD-RRH-2x50-800
HEIGHT:	19.7"
WIDTH:	13"
DEPTH:	10.8"
WEIGHT:	±53 LBS

(5 / S-1) (EXIST) RRH DETAILS

SCALE: 1 1/2"=1'-0"



TYPE:	2.5 RRH
MODEL #:	TD-RRH8x20-25
HEIGHT:	26.1"
WIDTH:	18.6"
DEPTH:	6.7"
WEIGHT:	±70 LBS

(6 / S-1) (PROPOSED) RRH DETAIL

SCALE: N.T.S.

Sprint

2.5 EQUIPMENT DEPLOYMENT
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

CROWN CASTLE

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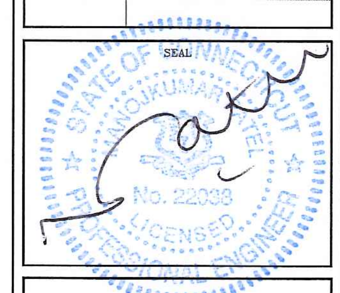
SUBMITTALS

PROJECT NO: 7225.CT03XC019

NO	DATE	DESCRIPTION	BY
0	06/11/14	FOR COMMENT	DC
1	10/28/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY

SEAL:



SITE NUMBER:
CT03XC019

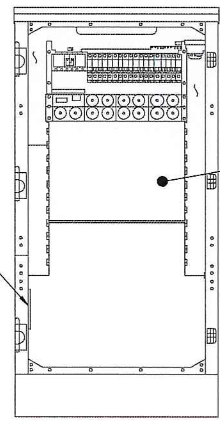
SITE NAME:
ORANGE

SITE ADDRESS:
800 OGG MEADOW RD
ORANGE, CT 06477

SHEET TITLE:
EQUIPMENT DETAILS

SHEET NO:
S-1

NOTE:
LOCATIONS SHOWN FOR INSTALLATION OF NEW EQUIPMENT IN EXISTING CABINET ARE APPROXIMATE. ACTUAL SPACE AVAILABLE TO BE VERIFIED IN FIELD ON A SITE BY SITE BASIS.

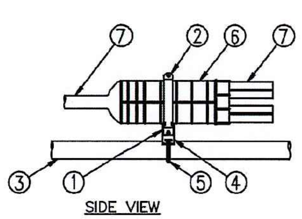


FRONT ELEVATION
(CABINET INTERIOR)

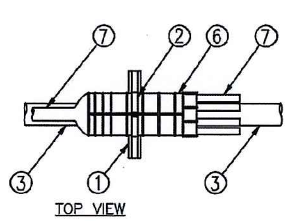
1/S-2 MMBTS INTERIOR DETAIL

SCALE: N.T.S.

LEGEND:
1. P1000T-HG UNISTRUT, 12" LONG.
2. 6" PIPE HANGER.
3. EXISTING SUPPORT PIPE.
4. NEW STANDOFF BRACKET, ANDREW PART# 30848-4.
5. NEW ROUND MEMBER ADAPTER SIZED FOR EXISTING PIPE SUPPORT.
6. BREAKOUT UNIT.
7. CABLE.



SIDE VIEW



TOP VIEW

3/S-2 MEDUSA HEAD DETAIL

SCALE: NTS

RFS HYBRIFLEX RISER CABLES SCHEDULE

Fiber Only (Existing DC Power)	**Hybrid cable** MN: HB058-M12-050F 12x multi-mode fiber pairs, Top: Outdoor protected connectors, Bottom:LC Connectors, 5/8 cable, 50ft	50 ft
	MN: HB058-M12-075F	75 ft
	MN: HB058-M12-100F	100 ft
	MN:HB058-M12-125F	125 ft
	MN:HB058-M12-150F	150 ft
	MN:HB058-M12-175F	175 ft
	MN:HB058-M12-200F	200 ft

8 AWG Power	**Hybrid cable** MN: HB114-08U3M12-050F 3x 8 AWG power pairs, 12x multi-mode fiber pairs, Outdoor rated connectors & LC Connectors, 1 1/4 cable, 50ft	50 ft
	MN: HB114-08U3M12-075F	75 ft
	MN: HB114-08U3M12-100F	100 ft
	MN: HB114-08U3M12-125F	125 ft
	MN: HB114-08U3M12-150F	150 ft
	MN: HB114-08U3M12-175F	175 ft
	MN: HB114-08U3M12-200F	200 ft

6 AWG Power	**Hybrid cable** MN: HB114-13U3M12-225F 3x 6 AWG power pairs, 12x multi-mode fiber pairs, Outdoor rated connectors & LC Connectors, 1 1/4 cable,225ft	225 ft
	MN: HB114-13U3M12-250F	250 ft
	MN: HB114-13U3M12-275F	275 ft
	MN: HB114-13U3M12-300F	300 ft

4 AWG Power	**Hybrid cable** MN: HB114-21U3M12-225F 3x 6 AWG power pairs, 12x multi-mode fiber pairs, Outdoor rated connectors & LC Connectors, 1 1/4 cable,225ft	325 ft
	MN: HB114-21U3M12-350F	350 ft
	MN: HB114-21U3M12-375F	375 ft

RFS HYBRIFLEX JUMPER CABLE SCHEDULE

Fiber Only	**Hybrid Jumper cable** MN: HBF012-M3-5F1 5 ft, 3x multi-mode fiber pairs, Outdoor & LC connectors, 1/2 cable	5 ft
	MN: HBF012-M3-10F1	10 ft
	MN: HBF012-M3-15F1	15 ft
	MN: HBF012-M3-20F1	20 ft
	MN: HBF012-M3-25F1	25 ft
	MN: HBF012-M3-30F1	30 ft

8 AWG Power	**Hybrid Jumper cable** MN: HBF058-08U1M3-5F1 5 ft, 1x 8 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 5/8 cable	5 ft
	MN: HBF058-08U1M3-10F1	10 ft
	MN: HBF058-08U1M3-15F1	15 ft
	MN: HBF058-08U1M3-20F1	20 ft
	MN: HBF058-08U1M3-25F1	25 ft
	MN: HBF058-08U1M3-30F1	30 ft

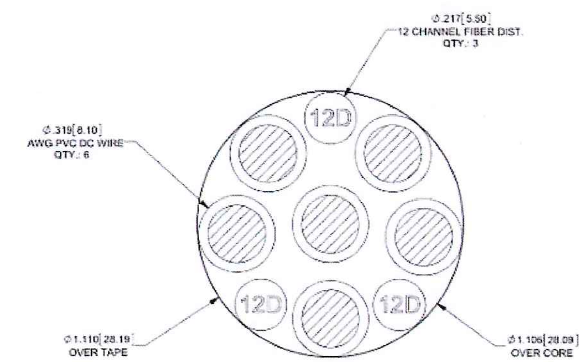
6 AWG Power	**Hybrid Jumper cable** MN: HBF058-13U1M3-5F1 5 ft, 1x 6 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 5/8 cable	5 ft
	MN: HBF058-13U1M3-10F1	10 ft
	MN: HBF058-13U1M3-15F1	15 ft
	MN: HBF058-13U1M3-20F1	20 ft
	MN: HBF058-13U1M3-25F1	25 ft
	MN: HBF058-13U1M3-30F1	30 ft

4 AWG Power	**Hybrid Jumper cable** MN: HBF078-21U1M3-5F1 5 ft, 1x 4 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 7/8 cable	5 ft
	MN: HBF078-21U1M3-10F1	10 ft
	MN: HBF078-21U1M3-15F1	15 ft
	MN: HBF078-21U1M3-20F1	20 ft
	MN: HBF078-21U1M3-25F1	25 ft
	MN: HBF078-21U1M3-30F1	30 ft

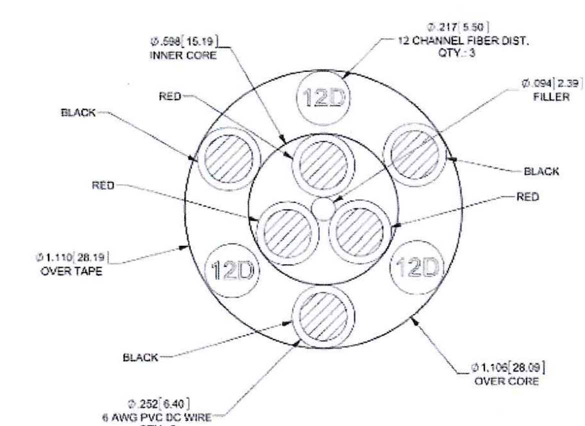
HYBRID CABLE DC CONDUCTOR SIZE GUIDELINE

MANUF: RFS

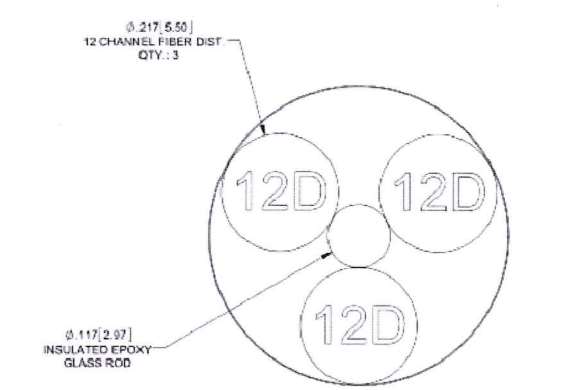
CABLE	LENGTH	DC CONDUCTOR	CABLE DIAMETER
FIBER ONLY	VARIES	USE NV HYBRIFLEX	7/8"
HYBRIFLEX	<200'	8 AWG	1-1/4"
HYBRIFLEX	225-300'	6 AWG	1-1/4"
HYBRIFLEX	325-375'	4 AWG	1-1/4"



4 AWG



8 AWG & 6 AWG



FIBER ONLY

2/S-2 2.5 HYBRID CABLE X-SECTION AND DATA

SCALE: NTS

Sprint
2.5 EQUIPMENT DEPLOYMENT
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

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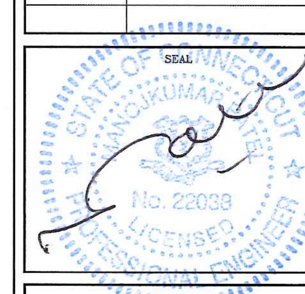


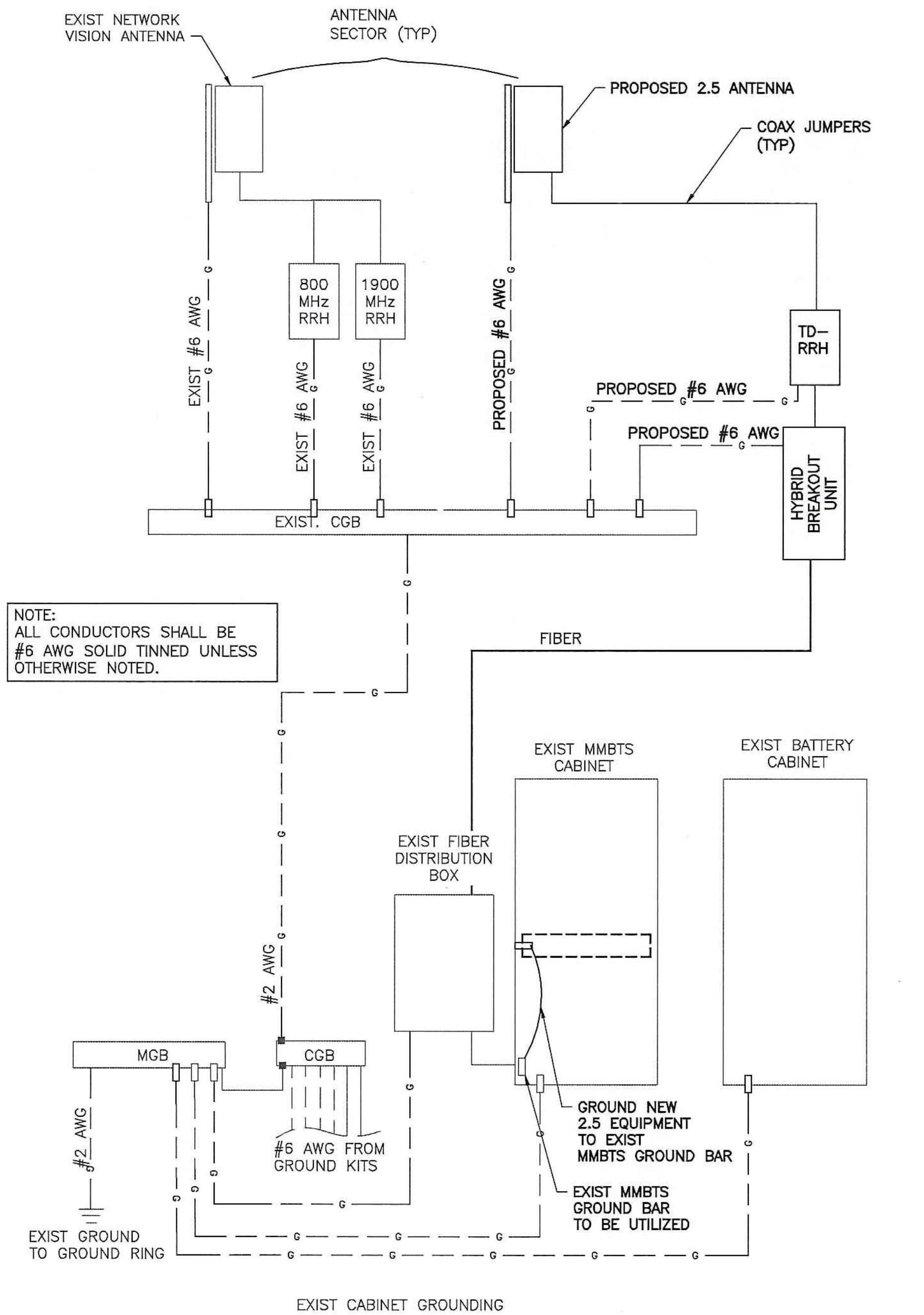
SITE NUMBER:
CT03XC019

SITE NAME:
ORANGE

SITE ADDRESS:
800 OGG MEADOW RD
ORANGE, CT 06477

SHEET TITLE:
EQUIPMENT SCHEMATIC DETAILS

SHEET NO:
S-2

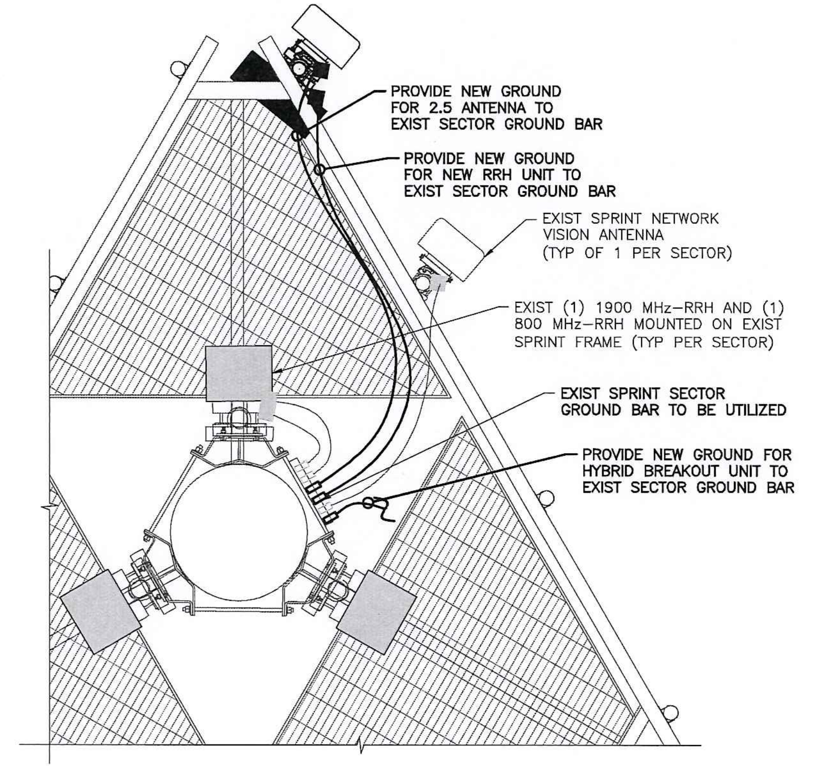


LEGEND

- ■ CADWELD CONNECTION
- ▭ MECHANICAL CONNECTION
- ● COMPRESSION CONNECTION

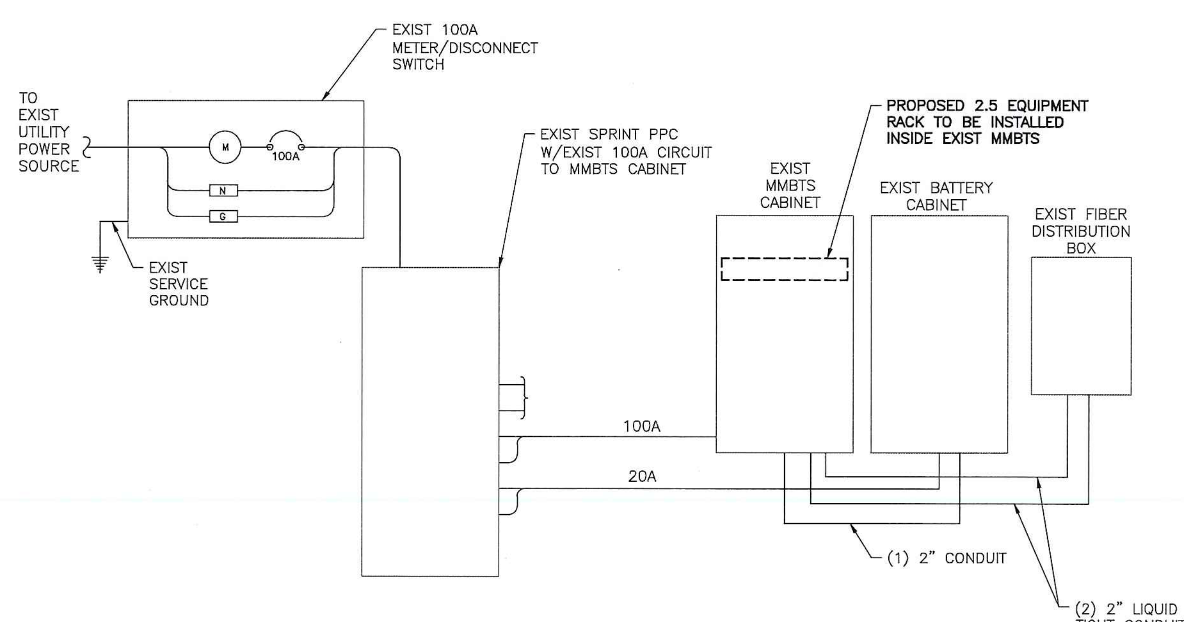
1/E-1 TYPICAL GROUNDING ONE LINE DIAGRAM

SCALE: NTS



2/E-1 TYPICAL ANTENNA GROUNDING PLAN

SCALE: NTS



3/E-1 TYPICAL ELECTRICAL & TELCO PLAN

SCALE: NTS

Sprint

2.5 EQUIPMENT DEPLOYMENT
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DATE	REVIEWED BY

SEAL — STATE OF CONNECTICUT, No. 22033, LICENSED PROFESSIONAL ENGINEER

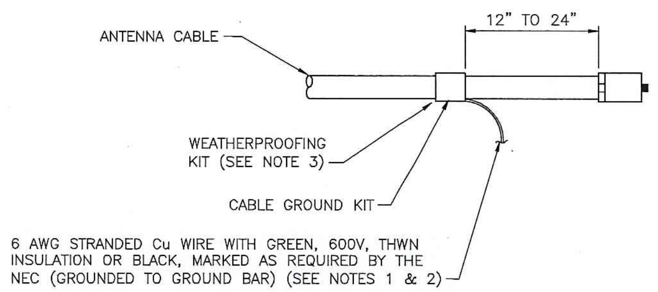
SITE NUMBER:
CT03XC019

SITE NAME:
ORANGE

SITE ADDRESS:
800 OGG MEADOW RD
ORANGE, CT 06477

SHEET TITLE:
ELECTRICAL & GROUNDING PLANS

SHEET NO:
E-1



CONNECTION OF CABLE GROUND KIT TO ANTENNA CABLE

NOTES:

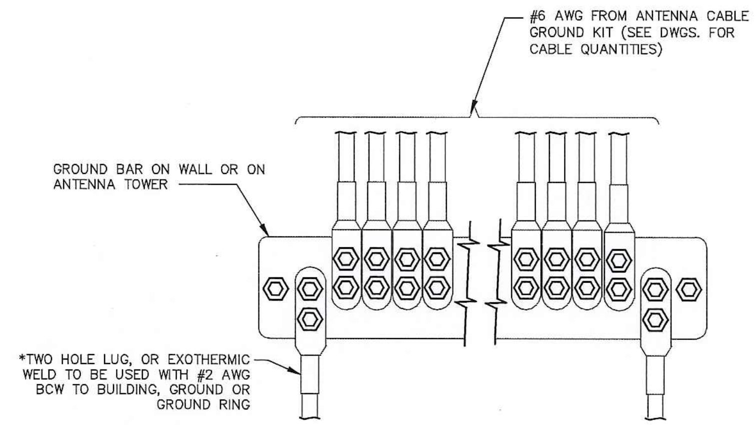
DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.

GROUNDING KIT SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.

WEATHER PROOFING SHALL BE (TYPE AND PART NUMBER) AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER AND APPROVED BY CONTRACTOR.

1 / E-2 CABLE GROUNDING KIT DETAIL

SCALE: N.T.S.



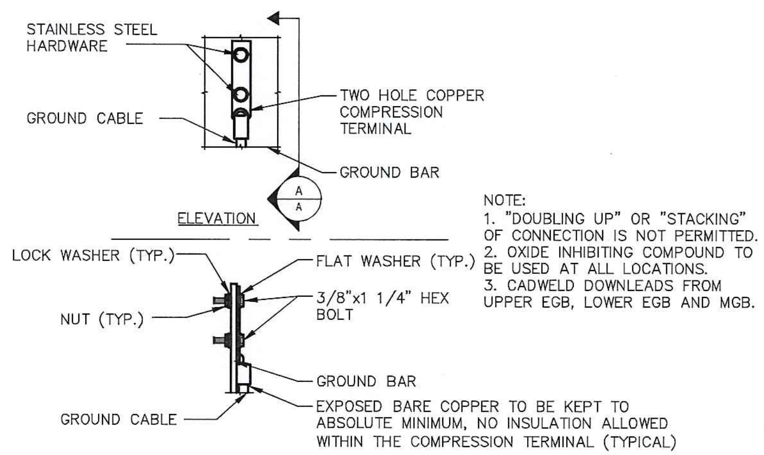
* – GROUND BARS AT THE BOTTOM OF TOWERS/MONOPOLES SHALL ONLY USE EXOTHERMIC WELDS.

– ATTACH "DO NOT DISCONNECT" LABELS TO GROUND BARS. CAN USE BRASS TAG "DO NOT DISCONNECT" AT EACH HYBRID GROUND POINT OR BACK–A–LITE PLATE LABEL ON GROUND BAR.

– CONNECT SEQUENCE– BOLT/WASHER/NO–OX/GROUND BAR/NO–OX/WASHER/LOCK–WASHER/NUT. THIS IS REPEATED FOR EACH LUG CONNECTION POINT.

4 / E-2 ANTENNA GROUND BAR DETAIL

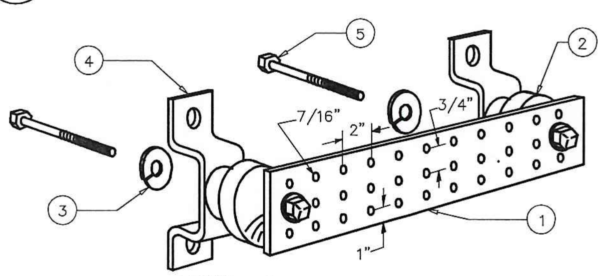
SCALE: NTS



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.

2 / E-2 GROUNDING BAR CONN. DETAIL

SCALE: NTS



LEGEND

1– COPPER TINNED GROUND BAR, 1/4"X 4"X 20", OR OTHER LENGTH AS REQUIRED, HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION
2– INSULATORS, NEWTON INSTRUMENT CAT. NO. 3061–4 OR EQUAL
3– 5/8" LOCKWASHERS OR EQUAL
4– WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT NO. A–6056 OR EQUAL
5– 5/8–11 X 1" H.H.C.S.BOLTS

NOTE:
ALL BOLTS, NUTS, WASHERS AND LOCK WASHERS SHALL BE 18–8 STAINLESS STEEL.

3 / E-2 GROUNDING BAR DETAIL

SCALE: NTS

GROUNDING NOTES:

1. GROUNDING SHALL BE IN ACCORDANCE WITH NEC ARTICLE 250–GROUNDING AND BONDING.
2. ALL GROUND WIRES SHALL BE #2 AWG UNLESS NOTED OTHERWISE.
3. ALL GROUNDING WIRES SHALL PROVIDE A STRAIGHT, DOWNWARD PATH TO GROUND WITH GRADUAL BENDS AS REQUIRED. GROUND WIRES SHALL NOT BE LOOPED OR SHARPLY BENT.
4. EACH EQUIPMENT CABINET SHALL BE CONNECTED TO THE MASTER ISOLATION GROUND BAR (MGB) WITH #2 AWG INSULATED STRANDED COPPER WIRE. EQUIPMENT CABINETS WALL HAVE (2) CONNECTIONS.
5. PROVIDE DEDICATED #2 AWG COPPER GROUND WIRE FROM EACH ANTENNA MOUNTING PIPE TO ASSOCIATED CIGBE.
6. THE CONTRACTOR SHALL VERIFY THAT THE EXISTING GROUND BARS HAVE ENOUGH SPACE/HOLES FOR ADDITIONAL TWO HOLE LUGS.
7. ALL CONDUITS SHALL BE RIGID GALVANIZED STEEL AND SHALL BE PROVIDED WITH GROUNDING BUSHINGS.
8. PROVIDE GROUND CONNECTIONS FOR ALL METALLIC STRUCTURES, ENCLOSURES, RACEWAYS AND OTHER CONDUCTIVE ITEMS ASSOCIATED WITH THE INSTALLATION OF CARRIER'S EQUIPMENT.
9. WHEN CABLE LENGTH IS OVER 20' THE MANUFACTURERS GROUND KIT MUST BE INSTALLED PER THE MANUFACTURERS SPECIFICATIONS.
10. REFER TO "ANTI–THEFT UPDATE TO SPRINT GROUNDING 082412.PDF" FOR GUIDELINE TO SUSPECTED OR ACTUAL THEFT OF GROUNDING.
11. HOME RUN GROUNDS ARE NOT APPROVED BY CROWN CASTLE CONSTRUCTION STANDARDS AND THAT ANTENNA BUSS BARS SHOULD BE INSTALLED DIRECTLY TO TOWER STEEL WITHOUT INSULATORS OR DOWN CONDUCTORS.

PROTECTIVE GROUNDING SYSTEM GENERAL NOTES:

1. AT ALL TERMINATIONS AT EQUIPMENT ENCLOSURES, PANEL, AND FRAMES OF EQUIPMENT AND WHERE EXPOSED FOR GROUNDING. CONDUCTOR TERMINATION SHALL BE PERFORMED UTILIZING TWO HOLE BOLTED TONGUE COMPRESSION TYPE LUGS WITH STAINLESS STEEL SELF–TAPPING SCREWS.
2. ALL CLAMPS AND SUPPORTS USED TO SUPPORT THE GROUNDING SYSTEM CONDUCTORS AND PVC CONDUITS SHALL BE PVC TYPE (NON CONDUCTIVE). DO NOT USE METAL BRACKETS OR SUPPORTS WHICH WOULD FORM A COMPLETE RING AROUND ANY GROUNDING CONDUCTOR.
3. ALL GROUNDING CONNECTIONS SHALL BE COATED WITH A COPPER SHIELD ANTI–CORROSIVE AGENT SUCH AS T&B KOPR SHIELD. VERIFY PRODUCT WITH PROJECT MANAGER.
4. ALL BOLTS, WASHERS, AND NUTS USED ON GROUNDING CONNECTIONS SHALL BE STAINLESS STEEL.
5. INSTALL GROUND BUSHING ON ALL METALLIC CONDUITS AND BOND TO THE EQUIPMENT GROUND BUS IN THE PANEL BOARD.
6. GROUND ANTENNA BASES, FRAMES, CABLE RACKS, AND OTHER METALLIC COMPONENTS WITH #2 INSULATED TINNED STRANDED COPPER GROUNDING CONDUCTORS AND CONNECT TO INSULATED SURFACE MOUNTED GROUND BARS. CONNECTION DETAILS SHALL FOLLOW MANUFACTURER'S SPECIFICATIONS FOR GROUNDING.
7. GROUND HYBRID CABLE SHIELD AT BOTH ENDS USING MANUFACTURER'S GUIDELINES.

ELECTRICAL AND 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. 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.
4. BURIED CONDUIT SHALL BE SCHEDULE 40 PVC.
5. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THNN INSULATION.
6. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON THIS DRAWING PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
7. WHERE CONDUIT BETWEEN BTS AND PROJECT OWNER CELL SITE PPC AND BETWEEN BTS AND PROJECT OWNER CELL SITE TELCO SERVICE CABINET ARE UNDERGROUND USE PVC, SCHEDULE 40 CONDUIT. ABOVE THE GROUND PORTION OF THESE CONDUITS SHALL BE PVC CONDUIT.
8. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.
9. GROUNDING SHALL COMPLY WITH NEC ART. 250.
10. GROUND HYBRID CABLE SHIELDS AT 3 LOCATIONS USING MANUFACTURER'S HYBRID CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.
11. USE #2 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.
12. 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.
13. 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. #2 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY. BOND ANY METAL OBJECTS WITHIN 6 FEET OF PROJECT OWNER EQUIPMENT OR CABINET TO MASTER GROUND BAR OR GROUNDING RING.
14. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LUGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.
15. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTIONS.
16. BOND ANTENNA MOUNTING BRACKETS, HYBRID CABLE GROUND KITS, AND RRHs TO EGB PLACED NEAR THE ANTENNA LOCATION.
17. BOND ANTENNA EGB'S AND MGB TO GROUND RING.
18. CONTRACTOR SHALL TEST COMPLETED GROUND SYSTEM AND RECORD RESULT FOR PROJECT CLOSE–OUT DOCUMENTATION. 5 OHMS MINIMUM RESISTANCE REQUIRED.
19. CONTRACTOR SHALL CONDUCT ANTENNA, HYBRID CABLES, GPS COAX AND RRH RETURN–LOSS AND DISTANCE– TO–FAULT MEASUREMENTS (SWEEP TESTS) AND RECORD RESULTS FOR PROJECT CLOSE OUT.
20. CONTRACTOR SHALL CHECK CAPACITY OF EXISTING SERVICE & PANEL ON SITE TO DETERMINE IF CAPACITY EXISTS TO ACCOMMODATE THE ADDED LOAD OF THIS PROJECT. ADVISE ENGINEER OF ANY DISCREPANCY.
21. LOCATION OF ALL OUTLET, BOXES, ETC, AND THE TYPE OF CONNECTION (PLUG OR DIRECT) SHALL BE CONFIRMED WITH THE OWNER'S REPRESENTATIVE PRIOR TO ROUGH–IN.
22. ELECTRICAL CHARACTERISTICS OF ALL EQUIPMENT (NEW AND EXISTING) SHALL BE FIELD VERIFIED WITH THE OWNERS REPRESENTATIVE AND EQUIPMENT SUPPLIER PRIOR TO ROUGH–IN OF CONDUIT AND WIRE. ALL EQUIPMENT SHALL BE PROPERLY CONNECTED ACCORDING TO THE NAMEPLATE DATA FURNISHED ON THE EQUIPMENT.

Sprint
2.5 EQUIPMENT DEPLOYMENT
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

CROWN CASTLE

TECTONIC
• PLANNING
• ENGINEERING
• SURVEYING
• CONSTRUCTION MANAGEMENT

TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567–6656
Fax: (845) 567–8703
www.tectonicengineering.com

SUBMITTALS

PROJECT NO: 7225.CT03XC019

NO	DATE	DESCRIPTION	BY
0	06/11/14	FOR COMMENT	DC
1	10/28/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY

SEAL: STATE OF CONNECTICUT — No. 22038 — LICENSED PROFESSIONAL ENGINEER

SITE NUMBER:
CT03XC019

SITE NAME:
ORANGE

SITE ADDRESS:
800 OGG MEADOW RD
ORANGE, CT 06477

SHEET TITLE:
GROUNDING DETAILS & NOTES

SHEET NO:
E–2

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

Date: **June 17, 2014**

Veronica Harris
Crown Castle
1200 McArthur Blvd
Mahwah, NJ 07430
201.236.9094

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Sprint PCS* Co-Locate**	Scenario 2.5A
	Carrier Site Number:	CT03XC019
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	806939
	Crown Castle Site Name:	NHV 2071 143137
	Crown Castle JDE Job Number:	288074
	Crown Castle Work Order Number:	773529
	Crown Castle Application Number:	245533 Rev. 0
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37513-2007.003.7805
Site Data:	**OFF OGG MEADOW ROAD, ORANGE, New Haven County, CT** **Latitude *41° 18' 28.36"*, Longitude *-73° 1' 56.22"*** **160 Foot - Monopole Tower**	

Dear Veronica Harris,

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 656961, in accordance with application 245533, revision 0.

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

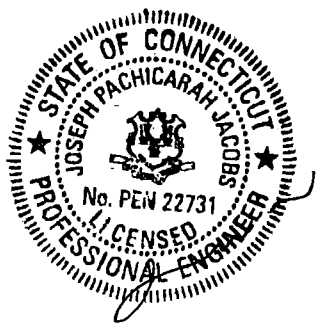
LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

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:

Bob Koors, E.I.
Structural Designer



tnxTower Report - version 6.1.4.1

JUN 17 2014

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

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TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 160 ft Monopole tower designed by VALMONT in June of 1998. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
137.0	137.0	3	alcatel lucent	TD-RRH8x20-25	1	1-1/4	-
		3	rfs celwave	APXVTM14-C-120 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
158.0	162.0	3	alcatel lucent	RRH2X40-AWS	3	1-5/8	2
		2	amphenol	BXA-80063-6BF-EDIN-X w/ Mount Pipe			
		1	antel	BXA-171063-12BF w/ Mount Pipe			
		1	antel	BXA-171063-12BF-EDIN-X w/ Mount Pipe			
		1	antel	BXA-171063-8BF-EDIN-0 w/ Mount Pipe			
		3	antel	BXA-70040/6CF w/ Mount Pipe			
		1	antel	BXA-80063/4CF w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		2	antel	BXA-171063-12BF w/ Mount Pipe	10 1	1-5/8 1/2	1
		1	antel	BXA-171063-8BF-2 w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
	158.0	1	tower mounts	Platform Mount [LP 713-1]			
	165.0	1	gps	GPS_A			
156.0	170.0	3	ems wireless	RR90-17-00DP w/ Mount Pipe	6	1-5/8	1
		4	nokia	CS72993.07			
	156.0	1	pole mounts	4.5" OD x 15' Pipe			
		1	tower mounts	Pipe Mount [PM 601-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
147.0	152.0	6	ericsson	RRUS-11	12 2 1	1-1/4 3/8 5/8	1
		3	kathrein	800 10121 w/ Mount Pipe			
		6	powerwave technologies	P65-16-XLH-RR w/ Mount Pipe			
		6	powerwave technologies	TTAW-07BP111-001			
		1	raycap	DC6-48-60-18-8F			
	147.0	1	tower mounts	Platform Mount [LP 602-1]			
137.0	137.0	3	alcatel lucent	1900MHz RRH (65MHz)	3 1	1-1/4 1/2	1
		3	alcatel lucent	800 EXTERNAL NOTCH FILTER			
		3	alcatel lucent	800MHZ RRH			
		9	rfs celwave	ACU-A20-N			
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 602-1]			
127.0	129.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	1	1-5/8	2
		3	ericsson	KRY 112 144/1			
	127.0	1	tower mounts	Platform Mount [LP 713-1]	12 12	1-1/4 1-5/8	1
	118.0	12	decibel	DB844H90-XY w/ Mount Pipe			
107.0	110.0	1	andrew	PX2F-52	3 6	5/8 1/2	1
		1	andrew	VHLP2-11			
		3	argus technologies	LLPX310R w/ Mount Pipe			
		2	dragonwave	HORIZON COMPACT			
		3	samsung telecommunications	WIMAX DAP HEAD			
	107.0	1	tower mounts	Side Arm Mount [SO 101-3]			
100.0	100.0	3	rfs celwave	APXV18-206517S-C w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	Pipe Mount [PM 601-3]			
80.0	81.0	1	kathrein	OG-860/1920/GPS-A	1	1/2	1
	80.0	2	tower mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
GEOTECHNICAL REPORTS	FDH, 9/26/2006	1257473	CCISITES
TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	FDH, 1320361500, 10/24/2013	1060127	CCISITES
TOWER MANUFACTURER DRAWINGS	Valmont, 6/15/1998	822032	CCISITES
POST MODIFICATION INSPECTION	SGS, 130639, 02/24/2014	4489413	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 modified in conformance with the referenced modification drawings.
5) We have assumed the foundation is the pad and pier found in the referenced foundation mapping.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	160 - 121.33	Pole	TP29.77x21.65x0.25	1	-11.02	1194.36	80.3	Pass
L2	121.33 - 102.5	Pole	TP33.2244x28.2894x0.375	2	-16.24	2062.10	92.7	Pass
L3	102.5 - 81.33	Pole	TP37.67x33.2244x0.5458	3	-20.91	2668.45	93.9	Pass
L4	81.33 - 67.5	Pole	TP39.8236x35.3877x0.5	4	-27.87	3291.35	97.8	Pass
L5	67.5 - 50.5	Pole	TP43.3929x39.8236x0.6964	5	-34.61	4116.62	91.9	Pass
L6	50.5 - 48	Pole	TP43.9178x43.3929x0.6937	6	-35.63	4151.22	92.9	Pass
L7	48 - 30.5	Pole	TP46.5936x43.9178x0.745	7	-43.50	4736.83	94.2	Pass
L8	30.5 - 26.5	Pole	TP47.4338x46.5936x0.759	8	-45.39	4811.80	95.1	Pass
L9	26.5 - 0	Pole	TP53x47.4338x0.6981	9	-57.84	5657.78	92.8	Pass
							Summary	
						Pole (L4)	97.8	Pass
						Rating =	97.8	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	90.7	Pass
1	Base Plate	0	73.1	Pass
1	Base Foundation Steel	0	87.0	Pass
1	Base Foundation Soil Interaction	0	51.0	Pass

Structure Rating (max from all components) =	97.8%

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

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:

3) Tower is located in New Haven County, Connecticut.
4) Basic wind speed of 85.00 mph.
5) Nominal ice thickness of 0.7500 in.
6) Ice thickness is considered to increase with height.
7) Ice density of 56.00 pcf.
8) A wind speed of 37.60 mph is used in combination with ice.
9) Deflections calculated using a wind speed of 50.00 mph.
10) A non-linear (P-delta) analysis was used.
11) Pressures are calculated at each section.
12) Stress ratio used in pole design is 1.333.
13) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*	*Sides*	*in*	*in*	*in*	*in*	
L1	160.0000-121.3300	38.6700	4.67	12	21.6500	29.7700	0.2500	1.0000	A572-65 (65 ksi)
L2	121.3300-102.5000	23.5000	0.00	12	28.2894	33.2244	0.3750	1.5000	A572-65 (65 ksi)
L3	102.5000-81.3300	21.1700	5.67	12	33.2244	37.6700	0.5458	2.1832	Reinf 52.83 ksi (53 ksi)
L4	81.3300-67.5000	19.5000	0.00	12	35.3877	39.8236	0.5000	2.0000	A572-65 (65 ksi)
L5	67.5000-50.5000	17.0000	0.00	12	39.8236	43.3929	0.6964	2.7856	Reinf 53.76 ksi (54 ksi)
L6	50.5000-48.0000	2.5000	0.00	12	43.3929	43.9178	0.6937	2.7747	Reinf 53.76 ksi (54 ksi)
L7	48.0000-30.5000	17.5000	0.00	12	43.9178	46.5936	0.7450	2.9799	Reinf 53.85 ksi (54 ksi)
L8	30.5000-26.5000	4.0000	0.00	12	46.5936	47.4338	0.7590	3.0360	Reinf 52.74 ksi (53 ksi)
L9	26.5000-0.0000	26.5000		12	47.4338	53.0000	0.6981	2.7924	Reinf 60.17 ksi (60 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	22.4137	17.2270	1006.9853	7.6612	11.2147	89.7916	2040.4253	8.4786	5.1322	20.529
	30.8202	23.7636	2643.2053	10.5682	15.4209	171.4045	5355.8505	11.6957	7.3084	29.233
L2	30.3026	33.7066	3352.4112	9.9933	14.6539	228.7726	6792.8940	16.5894	6.5766	17.537
	34.3964	39.6656	5463.2796	11.7601	17.2102	317.4440	11070.0857	19.5222	7.8991	21.064
L3	34.3964	57.4328	7828.3682	11.6989	17.2102	454.8676	15862.3964	28.2667	7.4414	13.634
	38.9989	65.2461	11477.6842	13.2905	19.5131	588.2052	23256.8999	32.1121	8.6328	15.816
L4	37.9713	56.1692	8726.2687	12.4898	18.3308	476.0434	17681.7862	27.6448	8.1439	16.288
	41.2284	63.3109	12495.9797	14.0778	20.6286	605.7598	25320.2427	31.1597	9.3327	18.665
L5	41.2284	87.7378	17144.6909	14.0075	20.6286	831.1125	34739.7919	43.1819	8.8064	12.646
	44.9236	95.7416	22277.7736	15.2854	22.4775	991.1132	45140.8090	47.1211	9.7630	14.019
L6	44.9236	95.3738	22195.0010	15.2863	22.4775	987.4307	44973.0895	46.9401	9.7703	14.085
	45.4671	96.5462	23023.6471	15.4742	22.7494	1012.0538	46652.1510	47.5171	9.9109	14.288
L7	45.4671	103.5632	24638.4148	15.4559	22.7494	1083.0343	49924.1082	50.9706	9.7735	13.119
	48.2372	109.9818	29509.3535	16.4138	24.1355	1222.6543	59793.9506	54.1297	10.4906	14.082
L8	48.2372	112.0203	30037.8865	16.4088	24.1355	1244.5529	60864.9018	55.1330	10.4529	13.772
	49.1071	114.0737	31720.2176	16.7096	24.5707	1290.9772	64273.7607	56.1436	10.6781	14.068
L9	49.1071	105.0548	29288.6594	16.7314	24.5707	1192.0155	59346.7646	51.7048	10.8414	15.53
	54.8696	117.5668	41049.3123	18.7241	27.4540	1495.2033	83177.0358	57.8628	12.3331	17.667

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 160.0000-121.3300				1	1	1		
L2 121.3300-102.5000				1	1	1		
L3 102.5000-81.3300				1	1	1		
L4 81.3300-67.5000				1	1	1		
L5 67.5000-50.5000				1	1	1		
L6 50.5000-48.0000				1	1	1		
L7 48.0000-30.5000				1	1	1		
L8 30.5000-26.5000				1	1	1		
L9 26.5000-0.0000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

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
HJ7-50A(1-5/8")	C	No	Inside Pole	158.0000 - 0.0000	10	No Ice	0.0000	1.04
						1/2" Ice	0.0000	1.04
						1" Ice	0.0000	1.04
						2" Ice	0.0000	1.04
						4" Ice	0.0000	1.04
LDF4-50A(1/2")	C	No	Inside Pole	158.0000 - 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
HJ7-50A(1-5/8")	C	No	CaAa (Out Of Face)	158.0000 - 0.0000	2	No Ice	0.0000	1.04
						1/2" Ice	0.0000	2.55
						1" Ice	0.0000	4.68
						2" Ice	0.0000	10.76
						4" Ice	0.0000	30.26
HB158-1-08U8-S8J18(1-5/8)	C	No	CaAa (Out Of Face)	158.0000 - 0.0000	1	No Ice	0.1980	1.30
						1/2" Ice	0.2980	2.81
						1" Ice	0.3980	4.94
						2" Ice	0.5980	11.02
						4" Ice	0.9980	30.52
**								
LDF7-50A(1-5/8")	C	No	Inside Pole	156.0000 - 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
**								
LDF6-50A(1-1/4")	C	No	Inside Pole	147.0000 - 0.0000	12	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
FB-L98B-002-75000(3/8")	C	No	Inside Pole	147.0000 - 0.0000	2	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-VG82ST-BRDA(5/8")	C	No	Inside Pole	147.0000 - 0.0000	1	No Ice	0.0000	0.31
						1/2" Ice	0.0000	0.31
						1" Ice	0.0000	0.31
						2" Ice	0.0000	0.31
						4" Ice	0.0000	0.31
**								
EC4-50(1/2")	C	No	Inside Pole	137.0000 - 0.0000	1	No Ice	0.0000	0.16
						1/2" Ice	0.0000	0.16
						1" Ice	0.0000	0.16
						2" Ice	0.0000	0.16
						4" Ice	0.0000	0.16
HB114-1-0813U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	127.0000 - 0.0000	3	No Ice	0.0000	1.20
						1/2" Ice	0.0000	2.45
						1" Ice	0.0000	4.30
						2" Ice	0.0000	9.85
						4" Ice	0.0000	28.27
HB114-1-0813U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	137.0000 - 127.0000	2	No Ice	0.0000	1.20
						1/2" Ice	0.0000	2.45
						1" Ice	0.0000	4.30
						2" Ice	0.0000	9.85

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						4" Ice	0.0000	28.27
HB114-1-0813U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	137.0000 - 127.0000	1	No Ice	0.1540	1.20
						1/2" Ice	0.2540	2.45
						1" Ice	0.3540	4.30
						2" Ice	0.5540	9.85
						4" Ice	0.9540	28.27
HB114-21U3M12-XXXF(1-1/4")	C	No	CaAa (Out Of Face)	137.0000 - 0.0000	1	No Ice	0.0000	1.22
						1/2" Ice	0.0000	2.47
						1" Ice	0.0000	4.32
						2" Ice	0.0000	9.87
						4" Ice	0.0000	28.29
**								
LDF6-50A(1-1/4")	C	No	Inside Pole	127.0000 - 0.0000	12	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
FLC 158-50J(1-5/8")	C	No	Inside Pole	127.0000 - 0.0000	12	No Ice	0.0000	0.92
						1/2" Ice	0.0000	0.92
						1" Ice	0.0000	0.92
						2" Ice	0.0000	0.92
						4" Ice	0.0000	0.92
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	C	No	CaAa (Out Of Face)	127.0000 - 0.0000	1	No Ice	0.1625	1.07
						1/2" Ice	0.2625	2.37
						1" Ice	0.3625	4.28
						2" Ice	0.5625	9.93
						4" Ice	0.9625	28.56
**								
FSJ4-50B(1/2")	C	No	CaAa (Out Of Face)	107.0000 - 0.0000	3	No Ice	0.0000	0.14
						1/2" Ice	0.0000	0.76
						1" Ice	0.0000	2.00
						2" Ice	0.0000	6.30
						4" Ice	0.0000	22.23
HJ4.5-50(5/8")	C	No	CaAa (Out Of Face)	107.0000 - 0.0000	3	No Ice	0.0000	0.40
						1/2" Ice	0.0000	1.24
						1" Ice	0.0000	2.69
						2" Ice	0.0000	7.42
						4" Ice	0.0000	24.22
EC4-50(1/2")	C	No	CaAa (Out Of Face)	107.0000 - 0.0000	3	No Ice	0.0000	0.16
						1/2" Ice	0.0000	0.85
						1" Ice	0.0000	2.15
						2" Ice	0.0000	6.59
						4" Ice	0.0000	22.79
2" Conduit (1 1/2" EMT)	C	No	CaAa (Out Of Face)	107.0000 - 0.0000	1	No Ice	0.0000	1.16
						1/2" Ice	0.0000	2.53
						1" Ice	0.0000	4.51
						2" Ice	0.0000	10.30
						4" Ice	0.0000	29.21
**								
CR 50 1873(1-5/8")	C	No	Inside Pole	100.0000 - 0.0000	6	No Ice	0.0000	0.83
						1/2" Ice	0.0000	0.83
						1" Ice	0.0000	0.83
						2" Ice	0.0000	0.83
						4" Ice	0.0000	0.83
**								
LDF4-50A(1/2")	C	No	Inside Pole	80.0000 - 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)	70.5000 - 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
						4" Ice	1.0972	0.00
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	104.7500 - 84.7500	1	No Ice	0.1667	0.00
						1/2" Ice	0.2778	0.00
						1" Ice	0.3889	0.00

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						2" Ice	0.6111	0.00
						4" Ice	1.0556	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	160.0000-121.3300	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	9.722	1.09
		D	0.000	0.000	0.000	0.000	0.00
L2	121.3300-102.5000	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	7.163	1.00
		D	0.000	0.000	0.000	0.000	0.00
L3	102.5000-81.3300	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	10.590	1.27
		D	0.000	0.000	0.000	0.000	0.00
L4	81.3300-67.5000	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	5.611	0.84
		D	0.000	0.000	0.000	0.000	0.00
L5	67.5000-50.5000	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	9.670	1.03
		D	0.000	0.000	0.000	0.000	0.00
L6	50.5000-48.0000	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	1.422	0.15
		D	0.000	0.000	0.000	0.000	0.00
L7	48.0000-30.5000	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	9.955	1.06
		D	0.000	0.000	0.000	0.000	0.00
L8	30.5000-26.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.275	0.24
		D	0.000	0.000	0.000	0.000	0.00
L9	26.5000-0.0000	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	15.074	1.61
		D	0.000	0.000	0.000	0.000	0.00

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	160.0000-121.3300	A	0.892	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	19.058	1.62
		D		0.000	0.000	0.000	0.000	0.00
L2	121.3300-102.5000	A	0.868	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	14.327	1.52
		D		0.000	0.000	0.000	0.000	0.00
L3	102.5000-81.3300	A	0.848	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	21.114	2.10
		D		0.000	0.000	0.000	0.000	0.00

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
L4	81.3300-67.5000	A	0.827	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	10.866	1.38
		D		0.000	0.000	0.000	0.000	0.00
L5	67.5000-50.5000	A	0.804	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	18.174	1.65
		D		0.000	0.000	0.000	0.000	0.00
L6	50.5000-48.0000	A	0.787	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.646	0.24
		D		0.000	0.000	0.000	0.000	0.00
L7	48.0000-30.5000	A	0.766	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	18.291	1.66
		D		0.000	0.000	0.000	0.000	0.00
L8	30.5000-26.5000	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	4.142	0.38
		D		0.000	0.000	0.000	0.000	0.00
L9	26.5000-0.0000	A	0.750	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	27.441	2.49
		D		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	160.0000-121.3300	0.2458	0.2458	0.4151	0.4151
L2	121.3300-102.5000	0.3531	0.3531	0.6000	0.6000
L3	102.5000-81.3300	0.4525	0.4525	0.7612	0.7612
L4	81.3300-67.5000	0.3831	0.3831	0.6479	0.6479
L5	67.5000-50.5000	0.5183	0.5183	0.8418	0.8418
L6	50.5000-48.0000	0.5218	0.5218	0.8460	0.8460
L7	48.0000-30.5000	0.5243	0.5243	0.8456	0.8456
L8	30.5000-26.5000	0.5268	0.5268	0.8473	0.8473
L9	26.5000-0.0000	0.5311	0.5311	0.8599	0.8599

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-171063-8BF-2 w/ Mount Pipe	A	From Face	4.0000 0.00 4.00	0.0000	158.0000	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-171063-12BF w/ Mount Pipe	B	From Face	4.0000 0.00 4.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice	4.9710 5.5211 6.0361 7.0911	5.2283 6.3892 7.2610 9.0462	0.04 0.09 0.14 0.27

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	9.3593	12.8165	0.67
BXA-171063-12BF w/ Mount Pipe	C	From Face	4.0000 0.00 4.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.9710 5.5211 6.0361 7.0911 9.3593	5.2283 6.3892 7.2610 9.0462 12.8165	0.04 0.09 0.14 0.27 0.67
GPS_A	A	From Face	4.0000 0.00 7.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.2975 0.3739 0.4589 0.6549 1.1506	0.2975 0.3739 0.4589 0.6549 1.1506	0.00 0.00 0.01 0.02 0.08
(2) FD9R6004/2C-3L	A	From Face	4.0000 0.00 4.00	0.0000	158.0000	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 Face	4.0000 0.00 4.00	0.0000	158.0000	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 Face	4.0000 0.00 4.00	0.0000	158.0000	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
BXA-80063/4CF w/ Mount Pipe	A	From Face	4.0000 0.00 4.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.3988 5.8435 6.2986 7.2405 9.2612	3.4238 4.0221 4.6369 5.9176 8.9263	0.03 0.07 0.12 0.23 0.56
BXA-80063-6BF-EDIN-X w/ Mount Pipe	B	From Face	4.0000 0.00 4.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.7073 8.3278 8.9190 10.1316 12.6769	5.6302 6.7191 7.5606 9.2937 12.9684	0.04 0.10 0.17 0.33 0.79
BXA-80063-6BF-EDIN-X w/ Mount Pipe	C	From Face	4.0000 0.00 4.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.7073 8.3278 8.9190 10.1316 12.6769	5.6302 6.7191 7.5606 9.2937 12.9684	0.04 0.10 0.17 0.33 0.79
BXA-70040/6CF w/ Mount Pipe	A	From Face	4.0000 0.00 4.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	16.5490 17.2696 17.9568 19.3612 22.2894	7.3636 8.5309 9.4122 11.2283 15.3369	0.06 0.16 0.27 0.52 1.17
BXA-70040/6CF w/ Mount Pipe	B	From Face	4.0000 0.00 4.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	16.5490 17.2696 17.9568 19.3612 22.2894	7.3636 8.5309 9.4122 11.2283 15.3369	0.06 0.16 0.27 0.52 1.17
BXA-70040/6CF w/ Mount Pipe	C	From Face	4.0000 0.00 4.00	0.0000	158.0000	No Ice 1/2" Ice	16.5490 17.2696 17.9568	7.3636 8.5309 9.4122	0.06 0.16 0.27

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	19.3612	11.2283	0.52
						2" Ice	22.2894	15.3369	1.17
						4" Ice			
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	A	From Face	4.0000 0.00 4.00	0.0000	158.0000	No Ice	3.1789	3.3530	0.03
						1/2" Ice	3.5550	3.9709	0.06
						1" Ice	3.9637	4.5951	0.10
						2" Ice	4.8533	5.8933	0.19
						4" Ice	6.7671	8.8855	0.49
BXA-171063-12BF-EDIN-X w/ Mount Pipe	B	From Face	4.0000 0.00 4.00	0.0000	158.0000	No Ice	5.0373	5.2974	0.04
						1/2" Ice	5.5919	6.4695	0.08
						1" Ice	6.1129	7.3603	0.14
						2" Ice	7.1769	9.1623	0.27
						4" Ice	9.4492	12.9662	0.68
BXA-171063-12BF w/ Mount Pipe	C	From Face	4.0000 0.00 4.00	0.0000	158.0000	No Ice	4.9710	5.2283	0.04
						1/2" Ice	5.5211	6.3892	0.09
						1" Ice	6.0361	7.2610	0.14
						2" Ice	7.0911	9.0462	0.27
						4" Ice	9.3593	12.8165	0.67
RRH2X40-AWS	A	From Face	4.0000 0.00 4.00	0.0000	158.0000	No Ice	2.5217	1.5894	0.04
						1/2" Ice	2.7530	1.7953	0.06
						1" Ice	2.9930	2.0098	0.08
						2" Ice	3.4990	2.4648	0.13
						4" Ice	4.6146	3.4785	0.28
RRH2X40-AWS	B	From Face	4.0000 0.00 4.00	0.0000	158.0000	No Ice	2.5217	1.5894	0.04
						1/2" Ice	2.7530	1.7953	0.06
						1" Ice	2.9930	2.0098	0.08
						2" Ice	3.4990	2.4648	0.13
						4" Ice	4.6146	3.4785	0.28
RRH2X40-AWS	C	From Face	4.0000 0.00 4.00	0.0000	158.0000	No Ice	2.5217	1.5894	0.04
						1/2" Ice	2.7530	1.7953	0.06
						1" Ice	2.9930	2.0098	0.08
						2" Ice	3.4990	2.4648	0.13
						4" Ice	4.6146	3.4785	0.28
DB-T1-6Z-8AB-0Z	B	From Face	4.0000 0.00 4.00	0.0000	158.0000	No Ice	5.6000	2.3333	0.04
						1/2" Ice	5.9154	2.5580	0.08
						1" Ice	6.2395	2.7914	0.12
						2" Ice	6.9136	3.2840	0.21
						4" Ice	8.3654	4.3728	0.45
Platform Mount [LP 713-1]	C	None		0.0000	158.0000	No Ice	31.2700	31.2700	1.51
						1/2" Ice	39.6800	39.6800	1.93
						1" Ice	48.0900	48.0900	2.35
						2" Ice	64.9100	64.9100	3.19
						4" Ice	98.5500	98.5500	4.86
**									
RR90-17-00DP w/ Mount Pipe	A	From Face	1.0000 0.00 14.00	0.0000	156.0000	No Ice	4.5931	3.3194	0.03
						1/2" Ice	5.0883	4.0888	0.07
						1" Ice	5.5778	4.7844	0.12
						2" Ice	6.5876	6.2255	0.22
						4" Ice	8.7306	9.3076	0.56
RR90-17-00DP w/ Mount Pipe	B	From Face	1.0000 0.00 14.00	0.0000	156.0000	No Ice	4.5931	3.3194	0.03
						1/2" Ice	5.0883	4.0888	0.07
						1" Ice	5.5778	4.7844	0.12
						2" Ice	6.5876	6.2255	0.22
						4" Ice	8.7306	9.3076	0.56
RR90-17-00DP w/ Mount	C	From Face	1.0000	0.0000	156.0000	No Ice	4.5931	3.3194	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Pipe			0.00 14.00			1/2" Ice 1" Ice 2" Ice 4" Ice	5.0883 5.5778 6.5876 8.7306	4.0888 4.7844 6.2255 9.3076	0.07 0.12 0.22 0.56
CS72993.07	A	From Face	1.0000 0.00 14.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.4292 1.5923 1.7640 2.1335 2.9761	0.4219 0.5371 0.6609 0.9344 1.5852	0.02 0.03 0.04 0.06 0.15
CS72993.07	B	From Face	1.0000 0.00 14.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.4292 1.5923 1.7640 2.1335 2.9761	0.4219 0.5371 0.6609 0.9344 1.5852	0.02 0.03 0.04 0.06 0.15
(2) CS72993.07	C	From Face	1.0000 0.00 14.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.4292 1.5923 1.7640 2.1335 2.9761	0.4219 0.5371 0.6609 0.9344 1.5852	0.02 0.03 0.04 0.06 0.15
4.5" OD x 15' Pipe	C	From Face	1.0000 0.00 0.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.7500 8.2958 9.8583 12.2241 15.9713	6.7500 8.2958 9.8583 12.2241 15.9713	0.50 0.55 0.60 0.75 1.15
Pipe Mount [PM 601-3]	C	None		0.0000	156.0000	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
**									
800 10121 w/ Mount Pipe	A	From Face	4.0000 0.00 5.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.0334 6.7136 7.2991 8.4999 11.0444	4.9479 6.0222 6.8104 8.4586 12.1015	0.07 0.12 0.18 0.32 0.73
800 10121 w/ Mount Pipe	B	From Face	4.0000 0.00 5.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.0334 6.7136 7.2991 8.4999 11.0444	4.9479 6.0222 6.8104 8.4586 12.1015	0.07 0.12 0.18 0.32 0.73
800 10121 w/ Mount Pipe	C	From Face	4.0000 0.00 5.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.0334 6.7136 7.2991 8.4999 11.0444	4.9479 6.0222 6.8104 8.4586 12.1015	0.07 0.12 0.18 0.32 0.73
(2) P65-16-XLH-RR w/ Mount Pipe	A	From Face	4.0000 0.00 5.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6375 9.2903 9.9098 11.1763 13.8289	6.3625 7.5378 8.4270 10.2390 14.0988	0.08 0.14 0.22 0.39 0.89
(2) P65-16-XLH-RR w/ Mount Pipe	B	From Face	4.0000 0.00 5.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice	8.6375 9.2903 9.9098 11.1763 13.8289	6.3625 7.5378 8.4270 10.2390 14.0988	0.08 0.14 0.22 0.39 0.89

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
(2) P65-16-XLH-RR w/ Mount Pipe	C	From Face	4.0000 0.00 5.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6375 9.2903 9.9098 11.1763 13.8289	6.3625 7.5378 8.4270 10.2390 14.0988	0.08 0.14 0.22 0.39 0.89
(2) TTAW-07BP111-001	A	From Face	4.0000 0.00 5.00	0.0000	147.0000	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) TTAW-07BP111-001	B	From Face	4.0000 0.00 5.00	0.0000	147.0000	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) TTAW-07BP111-001	C	From Face	4.0000 0.00 5.00	0.0000	147.0000	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) RRUS-11	A	From Face	4.0000 0.00 5.00	0.0000	147.0000	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 5.00	0.0000	147.0000	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	C	From Face	4.0000 0.00 5.00	0.0000	147.0000	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	C	From Face	4.0000 0.00 5.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.5667 2.7978 3.0377 3.5432 4.6580	2.5667 2.7978 3.0377 3.5432 4.6580	0.02 0.04 0.07 0.13 0.30
Platform Mount [LP 602-1]	C	None		0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	32.0300 38.7100 45.3900 58.7500 85.4700	32.0300 38.7100 45.3900 58.7500 85.4700	1.34 1.80 2.26 3.17 5.00
2.375" OD x 6' Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.4250 1.9250 2.2939 3.0596 4.7022	1.4250 1.9250 2.2939 3.0596 4.7022	0.03 0.04 0.05 0.09 0.23
2.375" OD x 6' Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice	1.4250 1.9250 2.2939 3.0596	1.4250 1.9250 2.2939 3.0596	0.03 0.04 0.05 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice 4" Ice	4.7022	4.7022	0.23
2.375" OD x 6' Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.4250 1.9250 2.2939 3.0596 4.7022	1.4250 1.9250 2.2939 3.0596 4.7022	0.03 0.04 0.05 0.09 0.23
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APXVSPP18-C-A20 w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	137.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.9458 8.1266 9.0212 10.8440 14.8507	0.08 0.15 0.23 0.41 0.91
APXVSPP18-C-A20 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	137.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.9458 8.1266 9.0212 10.8440 14.8507	0.08 0.15 0.23 0.41 0.91
APXVSPP18-C-A20 w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	137.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.9458 8.1266 9.0212 10.8440 14.8507	0.08 0.15 0.23 0.41 0.91
800 EXTERNAL NOTCH FILTER	A	From Face	4.0000 0.00 0.00	0.0000	137.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.7701 0.8898 1.0181 1.3007 1.9696	0.3747 0.4647 0.5634 0.7868 1.3372	0.01 0.02 0.02 0.04 0.11
800 EXTERNAL NOTCH FILTER	B	From Face	4.0000 0.00 0.00	0.0000	137.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.7701 0.8898 1.0181 1.3007 1.9696	0.3747 0.4647 0.5634 0.7868 1.3372	0.01 0.02 0.02 0.04 0.11
800 EXTERNAL NOTCH FILTER	C	From Face	4.0000 0.00 0.00	0.0000	137.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.7701 0.8898 1.0181 1.3007 1.9696	0.3747 0.4647 0.5634 0.7868 1.3372	0.01 0.02 0.02 0.04 0.11
(3) ACU-A20-N	A	From Face	4.0000 0.00 0.00	0.0000	137.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.0778 0.1210 0.1728 0.3025 0.6654	0.1361 0.1890 0.2506 0.3997 0.8015	0.00 0.00 0.00 0.01 0.04
(3) ACU-A20-N	B	From Face	4.0000 0.00 0.00	0.0000	137.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.0778 0.1210 0.1728 0.3025 0.6654	0.1361 0.1890 0.2506 0.3997 0.8015	0.00 0.00 0.00 0.01 0.04
(3) ACU-A20-N	C	From Face	4.0000 0.00 0.00	0.0000	137.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.0778 0.1210 0.1728 0.3025 0.6654	0.1361 0.1890 0.2506 0.3997 0.8015	0.00 0.00 0.00 0.01 0.04
1900MHz RRH (65MHz)	A	From Face	4.0000 0.00	0.0000	137.0000	No Ice 1/2"	2.7087 2.9477	2.6087 2.8450	0.06 0.08

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
			0.00			Ice	3.1953	3.0899	0.11
						1" Ice	3.7164	3.6057	0.17
						2" Ice	4.8623	4.7410	0.35
						4" Ice			
1900MHz RRH (65MHz)	B	From Face	4.0000	0.0000	137.0000	No Ice	2.7087	2.6087	0.06
			0.00			1/2"	2.9477	2.8450	0.08
			0.00			Ice	3.1953	3.0899	0.11
						1" Ice	3.7164	3.6057	0.17
						2" Ice	4.8623	4.7410	0.35
						4" Ice			
1900MHz RRH (65MHz)	C	From Face	4.0000	0.0000	137.0000	No Ice	2.7087	2.6087	0.06
			0.00			1/2"	2.9477	2.8450	0.08
			0.00			Ice	3.1953	3.0899	0.11
						1" Ice	3.7164	3.6057	0.17
						2" Ice	4.8623	4.7410	0.35
						4" Ice			
800MHZ RRH	A	From Face	4.0000	0.0000	137.0000	No Ice	2.4899	2.0685	0.05
			0.00			1/2"	2.7061	2.2705	0.07
			0.00			Ice	2.9310	2.4812	0.10
						1" Ice	3.4068	2.9284	0.16
						2" Ice	4.4620	3.9265	0.32
						4" Ice			
800MHZ RRH	B	From Face	4.0000	0.0000	137.0000	No Ice	2.4899	2.0685	0.05
			0.00			1/2"	2.7061	2.2705	0.07
			0.00			Ice	2.9310	2.4812	0.10
						1" Ice	3.4068	2.9284	0.16
						2" Ice	4.4620	3.9265	0.32
						4" Ice			
800MHZ RRH	C	From Face	4.0000	0.0000	137.0000	No Ice	2.4899	2.0685	0.05
			0.00			1/2"	2.7061	2.2705	0.07
			0.00			Ice	2.9310	2.4812	0.10
						1" Ice	3.4068	2.9284	0.16
						2" Ice	4.4620	3.9265	0.32
						4" Ice			
APXVTM14-C-120 w/ Mount Pipe	A	From Face	4.0000	0.0000	137.0000	No Ice	7.1342	4.9591	0.08
			0.00			1/2"	7.6618	5.7544	0.13
			0.00			Ice	8.1830	6.4723	0.19
						1" Ice	9.2563	8.0099	0.34
						2" Ice	11.5262	11.4120	0.75
						4" Ice			
APXVTM14-C-120 w/ Mount Pipe	B	From Face	4.0000	0.0000	137.0000	No Ice	7.1342	4.9591	0.08
			0.00			1/2"	7.6618	5.7544	0.13
			0.00			Ice	8.1830	6.4723	0.19
						1" Ice	9.2563	8.0099	0.34
						2" Ice	11.5262	11.4120	0.75
						4" Ice			
APXVTM14-C-120 w/ Mount Pipe	C	From Face	4.0000	0.0000	137.0000	No Ice	7.1342	4.9591	0.08
			0.00			1/2"	7.6618	5.7544	0.13
			0.00			Ice	8.1830	6.4723	0.19
						1" Ice	9.2563	8.0099	0.34
						2" Ice	11.5262	11.4120	0.75
						4" Ice			
TD-RRH8x20-25	A	From Face	4.0000	0.0000	137.0000	No Ice	4.7198	1.7027	0.07
			0.00			1/2"	5.0138	1.9196	0.10
			0.00			Ice	5.3165	2.1453	0.13
						1" Ice	5.9478	2.6224	0.20
						2" Ice	7.3141	3.6805	0.40
						4" Ice			
TD-RRH8x20-25	B	From Face	4.0000	0.0000	137.0000	No Ice	4.7198	1.7027	0.07
			0.00			1/2"	5.0138	1.9196	0.10
			0.00			Ice	5.3165	2.1453	0.13
						1" Ice	5.9478	2.6224	0.20
						2" Ice	7.3141	3.6805	0.40
						4" Ice			
TD-RRH8x20-25	C	From Face	4.0000	0.0000	137.0000	No Ice	4.7198	1.7027	0.07

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
			0.00 0.00			1/2" Ice 1" Ice 2" Ice 4" Ice	5.0138 5.3165 5.9478 7.3141	1.9196 2.1453 2.6224 3.6805	0.10 0.13 0.20 0.40
Platform Mount [LP 602-1]	C	None		0.0000	137.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	32.0300 38.7100 45.3900 58.7500 85.4700	32.0300 38.7100 45.3900 58.7500 85.4700	1.34 1.80 2.26 3.17 5.00
**									
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Face	4.0000 0.00 2.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.8253 7.3471 7.8631 8.9261 11.1755	5.6424 6.4800 7.2567 8.8640 12.2932	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Face	4.0000 0.00 2.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.8253 7.3471 7.8631 8.9261 11.1755	5.6424 6.4800 7.2567 8.8640 12.2932	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Face	4.0000 0.00 2.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.8253 7.3471 7.8631 8.9261 11.1755	5.6424 6.4800 7.2567 8.8640 12.2932	0.11 0.17 0.23 0.38 0.81
KRY 112 144/1	A	From Face	4.0000 0.00 2.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.4083 0.4969 0.5941 0.8145 1.3590	0.2042 0.2733 0.3511 0.5326 0.9992	0.01 0.01 0.02 0.03 0.08
KRY 112 144/1	B	From Face	4.0000 0.00 2.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.4083 0.4969 0.5941 0.8145 1.3590	0.2042 0.2733 0.3511 0.5326 0.9992	0.01 0.01 0.02 0.03 0.08
KRY 112 144/1	C	From Face	4.0000 0.00 2.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.4083 0.4969 0.5941 0.8145 1.3590	0.2042 0.2733 0.3511 0.5326 0.9992	0.01 0.01 0.02 0.03 0.08
(4) DB844H90-XY w/ Mount Pipe	A	From Face	4.0000 0.00 -9.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.1042 3.4760 3.8787 4.7607 6.6604	5.1542 5.8328 6.5235 7.9586 11.0923	0.03 0.07 0.11 0.22 0.55
(4) DB844H90-XY w/ Mount Pipe	B	From Face	4.0000 0.00 -9.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.1042 3.4760 3.8787 4.7607 6.6604	5.1542 5.8328 6.5235 7.9586 11.0923	0.03 0.07 0.11 0.22 0.55
(4) DB844H90-XY w/ Mount Pipe	C	From Face	4.0000 0.00 -9.00	0.0000	127.0000	No Ice 1/2" Ice 1" Ice 2" Ice	3.1042 3.4760 3.8787 4.7607 6.6604	5.1542 5.8328 6.5235 7.9586 11.0923	0.03 0.07 0.11 0.22 0.55

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
Platform Mount [LP 713-1]	C	None		0.0000	127.0000	No Ice	31.2700	31.2700	1.51
						1/2" Ice	39.6800	39.6800	1.93
						1" Ice	48.0900	48.0900	2.35
						2" Ice	64.9100	64.9100	3.19
						4" Ice	98.5500	98.5500	4.86
Miscellaneous [NA 507-1]	C	From Face	0.0000 0.00 -7.00	0.0000	127.0000	No Ice	4.8000	4.8000	0.25
						1/2" Ice	6.7000	6.7000	0.29
						1" Ice	8.6000	8.6000	0.34
						2" Ice	12.4000	12.4000	0.44
						4" Ice	20.0000	20.0000	0.64
**									
LLPX310R w/ Mount Pipe	A	From Face	4.0000 0.00 3.00	0.0000	107.0000	No Ice	4.9623	2.8484	0.04
						1/2" Ice	5.3512	3.3668	0.08
						1" Ice	5.7501	3.9019	0.12
						2" Ice	6.5777	5.0799	0.23
						4" Ice	8.3714	7.8368	0.53
LLPX310R w/ Mount Pipe	B	From Face	4.0000 0.00 3.00	0.0000	107.0000	No Ice	4.9623	2.8484	0.04
						1/2" Ice	5.3512	3.3668	0.08
						1" Ice	5.7501	3.9019	0.12
						2" Ice	6.5777	5.0799	0.23
						4" Ice	8.3714	7.8368	0.53
LLPX310R w/ Mount Pipe	C	From Face	4.0000 0.00 3.00	0.0000	107.0000	No Ice	4.9623	2.8484	0.04
						1/2" Ice	5.3512	3.3668	0.08
						1" Ice	5.7501	3.9019	0.12
						2" Ice	6.5777	5.0799	0.23
						4" Ice	8.3714	7.8368	0.53
WIMAX DAP HEAD	A	From Face	4.0000 0.00 3.00	0.0000	107.0000	No Ice	1.8044	0.7778	0.03
						1/2" Ice	1.9877	0.9182	0.04
						1" Ice	2.1795	1.0673	0.06
						2" Ice	2.5891	1.3914	0.09
						4" Ice	3.5121	2.1432	0.20
WIMAX DAP HEAD	B	From Face	4.0000 0.00 3.00	0.0000	107.0000	No Ice	1.8044	0.7778	0.03
						1/2" Ice	1.9877	0.9182	0.04
						1" Ice	2.1795	1.0673	0.06
						2" Ice	2.5891	1.3914	0.09
						4" Ice	3.5121	2.1432	0.20
WIMAX DAP HEAD	C	From Face	4.0000 0.00 3.00	0.0000	107.0000	No Ice	1.8044	0.7778	0.03
						1/2" Ice	1.9877	0.9182	0.04
						1" Ice	2.1795	1.0673	0.06
						2" Ice	2.5891	1.3914	0.09
						4" Ice	3.5121	2.1432	0.20
HORIZON COMPACT	A	From Face	4.0000 0.00 3.00	0.0000	107.0000	No Ice	0.8409	0.4295	0.01
						1/2" Ice	0.9658	0.5249	0.02
						1" Ice	1.0993	0.6289	0.03
						2" Ice	1.3922	0.8629	0.05
						4" Ice	2.0819	1.4345	0.12
HORIZON COMPACT	C	From Face	4.0000 0.00 3.00	0.0000	107.0000	No Ice	0.8409	0.4295	0.01
						1/2" Ice	0.9658	0.5249	0.02
						1" Ice	1.0993	0.6289	0.03
						2" Ice	1.3922	0.8629	0.05
						4" Ice	2.0819	1.4345	0.12
Side Arm Mount [SO 101-3]	C	None		0.0000	107.0000	No Ice	7.5000	7.5000	0.25
						1/2" Ice	8.9000	8.9000	0.33
							10.3000	10.3000	0.41

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	13.1000	13.1000	0.58
						2" Ice	18.7000	18.7000	0.90
						4" Ice			
**									
APXV18-206517S-C w/ Mount Pipe	A	From Face	1.0000 0.00 0.00	0.0000	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.4042 5.9597 6.4808 7.5467 9.9193	4.7000 5.8600 6.7338 8.5150 12.2774	0.05 0.10 0.15 0.28 0.68
APXV18-206517S-C w/ Mount Pipe	B	From Face	1.0000 0.00 0.00	0.0000	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.4042 5.9597 6.4808 7.5467 9.9193	4.7000 5.8600 6.7338 8.5150 12.2774	0.05 0.10 0.15 0.28 0.68
APXV18-206517S-C w/ Mount Pipe	C	From Face	1.0000 0.00 0.00	0.0000	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.4042 5.9597 6.4808 7.5467 9.9193	4.7000 5.8600 6.7338 8.5150 12.2774	0.05 0.10 0.15 0.28 0.68
Pipe Mount [PM 601-3]	C	None		0.0000	100.0000	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
**									
OG-860/1920/GPS-A	A	From Face	3.0000 0.00 1.00	0.0000	80.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3286 0.4340 0.5481 0.8022 1.4140	0.4044 0.5138 0.6317 0.8936 1.5210	0.00 0.01 0.01 0.02 0.08
Side Arm Mount [SO 701-1]	A	None		0.0000	80.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.8500 1.1400 1.4300 2.0100 3.1700	1.6700 2.3400 3.0100 4.3500 7.0300	0.07 0.08 0.09 0.12 0.18
Side Arm Mount [SO 701-1]	B	None		0.0000	80.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.8500 1.1400 1.4300 2.0100 3.1700	1.6700 2.3400 3.0100 4.3500 7.0300	0.07 0.08 0.09 0.12 0.18
**									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
VHLP2-11	A	Paraboloid w/o Radome	From Face	2.0000 0.00 3.00	0.0000		107.0000	2.1750	No Ice 1/2" Ice 1" Ice	3.7200 4.0100 4.3000	0.03 0.05 0.07

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
									2" Ice	4.8800	0.11
									4" Ice	6.0400	0.19
PX2F-52	C	Paraboloid w/o Radome	From Face	2.0000 0.00 3.00	0.0000		107.0000	2.0917	No Ice	3.4400	0.02
									1/2" Ice	3.7200	0.04
									1" Ice	3.9900	0.06
									2" Ice	4.5500	0.09
									4" Ice	5.6700	0.17
**											

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 160.0000-121.3300	139.8360	1.511	27.92	82.850	A	0.000	82.850	82.850	100.00	0.000	0.000
					B	0.000	82.850		100.00	0.000	0.000
					C	0.000	82.850		100.00	0.000	9.722
					D	0.000	82.850		100.00	0.000	0.000
L2 121.3300-102.5000	111.7164	1.417	26.21	49.032	A	0.000	49.032	49.032	100.00	0.000	0.000
					B	0.000	49.032		100.00	0.000	0.000
					C	0.000	49.032		100.00	0.000	7.163
					D	0.000	49.032		100.00	0.000	0.000
L3 102.5000-81.3300	91.6937	1.339	24.77	62.535	A	0.000	62.535	62.535	100.00	0.000	0.000
					B	0.000	62.535		100.00	0.000	0.000
					C	0.000	62.535		100.00	0.000	10.590
					D	0.000	62.535		100.00	0.000	0.000
L4 81.3300-67.5000	74.3202	1.261	23.32	44.084	A	0.000	44.084	44.084	100.00	0.000	0.000
					B	0.000	44.084		100.00	0.000	0.000
					C	0.000	44.084		100.00	0.000	5.611
					D	0.000	44.084		100.00	0.000	0.000
L5 67.5000-50.5000	58.8785	1.18	21.82	58.945	A	0.000	58.945	58.945	100.00	0.000	0.000
					B	0.000	58.945		100.00	0.000	0.000
					C	0.000	58.945		100.00	0.000	9.670
					D	0.000	58.945		100.00	0.000	0.000
L6 50.5000-48.0000	49.2475	1.121	20.74	9.095	A	0.000	9.095	9.095	100.00	0.000	0.000
					B	0.000	9.095		100.00	0.000	0.000
					C	0.000	9.095		100.00	0.000	1.422
					D	0.000	9.095		100.00	0.000	0.000
L7 48.0000-30.5000	39.1638	1.05	19.42	65.998	A	0.000	65.998	65.998	100.00	0.000	0.000
					B	0.000	65.998		100.00	0.000	0.000
					C	0.000	65.998		100.00	0.000	9.955
					D	0.000	65.998		100.00	0.000	0.000
L8 30.5000-26.5000	28.4940	1	18.50	15.671	A	0.000	15.671	15.671	100.00	0.000	0.000
					B	0.000	15.671		100.00	0.000	0.000
					C	0.000	15.671		100.00	0.000	2.275
					D	0.000	15.671		100.00	0.000	0.000
L9 26.5000-0.0000	13.0052	1	18.50	110.896	A	0.000	110.896	110.896	100.00	0.000	0.000
					B	0.000	110.896		100.00	0.000	0.000
					C	0.000	110.896		100.00	0.000	15.074
					D	0.000	110.896		100.00	0.000	0.000

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 160.0000-121.3300	139.8360	1.511	5.46	0.8919	88.599	A	0.000	88.599	88.599	100.00	0.000	0.000
						B	0.000	88.599		100.00	0.000	0.000
						C	0.000	88.599		100.00	0.000	19.058
						D	0.000	88.599		100.00	0.000	0.000
L2 121.3300-102.5000	111.7164	1.417	5.13	0.8682	51.831	A	0.000	51.831	51.831	100.00	0.000	0.000
						B	0.000	51.831		100.00	0.000	0.000
						C	0.000	51.831		100.00	0.000	14.327
						D	0.000	51.831		100.00	0.000	0.000
L3 102.5000-81.3300	91.6937	1.339	4.85	0.8479	65.526	A	0.000	65.526	65.526	100.00	0.000	0.000
						B	0.000	65.526		100.00	0.000	0.000
						C	0.000	65.526		100.00	0.000	21.114
						D	0.000	65.526		100.00	0.000	0.000
L4 81.3300-67.5000	74.3202	1.261	4.56	0.8267	46.038	A	0.000	46.038	46.038	100.00	0.000	0.000
						B	0.000	46.038		100.00	0.000	0.000
						C	0.000	46.038		100.00	0.000	10.866
						D	0.000	46.038		100.00	0.000	0.000
L5 67.5000-50.5000	58.8785	1.18	4.27	0.8040	61.223	A	0.000	61.223	61.223	100.00	0.000	0.000
						B	0.000	61.223		100.00	0.000	0.000
						C	0.000	61.223		100.00	0.000	18.174
						D	0.000	61.223		100.00	0.000	0.000
L6 50.5000-48.0000	49.2475	1.121	4.06	0.7869	9.423	A	0.000	9.423	9.423	100.00	0.000	0.000
						B	0.000	9.423		100.00	0.000	0.000
						C	0.000	9.423		100.00	0.000	2.646
						D	0.000	9.423		100.00	0.000	0.000
L7 48.0000-30.5000	39.1638	1.05	3.80	0.7656	68.231	A	0.000	68.231	68.231	100.00	0.000	0.000
						B	0.000	68.231		100.00	0.000	0.000
						C	0.000	68.231		100.00	0.000	18.291
						D	0.000	68.231		100.00	0.000	0.000
L8 30.5000-26.5000	28.4940	1	3.62	0.7500	16.171	A	0.000	16.171	16.171	100.00	0.000	0.000
						B	0.000	16.171		100.00	0.000	0.000
						C	0.000	16.171		100.00	0.000	4.142
						D	0.000	16.171		100.00	0.000	0.000
L9 26.5000-0.0000	13.0052	1	3.62	0.7500	114.208	A	0.000	114.208	114.208	100.00	0.000	0.000
						B	0.000	114.208		100.00	0.000	0.000
						C	0.000	114.208		100.00	0.000	27.441
						D	0.000	114.208		100.00	0.000	0.000

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 160.0000-121.3300	139.8360	1.511	9.66	82.850	A	0.000	82.850	82.850	100.00	0.000	0.000
					B	0.000	82.850		100.00	0.000	0.000
					C	0.000	82.850		100.00	0.000	9.722
					D	0.000	82.850		100.00	0.000	0.000
L2 121.3300-102.5000	111.7164	1.417	9.07	49.032	A	0.000	49.032	49.032	100.00	0.000	0.000
					B	0.000	49.032		100.00	0.000	0.000
					C	0.000	49.032		100.00	0.000	7.163
					D	0.000	49.032		100.00	0.000	0.000
L3 102.5000-81.3300	91.6937	1.339	8.57	62.535	A	0.000	62.535	62.535	100.00	0.000	0.000
					B	0.000	62.535		100.00	0.000	0.000
					C	0.000	62.535		100.00	0.000	10.590
					D	0.000	62.535		100.00	0.000	0.000
L4 81.3300-67.5000	74.3202	1.261	8.07	44.084	A	0.000	44.084	44.084	100.00	0.000	0.000
					B	0.000	44.084		100.00	0.000	0.000
					C	0.000	44.084		100.00	0.000	5.611
					D	0.000	44.084		100.00	0.000	0.000
L5 67.5000-50.5000	58.8785	1.18	7.55	58.945	A	0.000	58.945	58.945	100.00	0.000	0.000
					B	0.000	58.945		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	0.000	58.945		100.00	0.000	9.670
					D	0.000	58.945		100.00	0.000	0.000
L6 50.5000-48.0000	49.2475	1.121	7.18	9.095	A	0.000	9.095	9.095	100.00	0.000	0.000
					B	0.000	9.095		100.00	0.000	0.000
					C	0.000	9.095		100.00	0.000	1.422
					D	0.000	9.095		100.00	0.000	0.000
L7 48.0000-30.5000	39.1638	1.05	6.72	65.998	A	0.000	65.998	65.998	100.00	0.000	0.000
					B	0.000	65.998		100.00	0.000	0.000
					C	0.000	65.998		100.00	0.000	9.955
					D	0.000	65.998		100.00	0.000	0.000
L8 30.5000-26.5000	28.4940	1	6.40	15.671	A	0.000	15.671	15.671	100.00	0.000	0.000
					B	0.000	15.671		100.00	0.000	0.000
					C	0.000	15.671		100.00	0.000	2.275
					D	0.000	15.671		100.00	0.000	0.000
L9 26.5000-0.0000	13.0052	1	6.40	110.896	A	0.000	110.896	110.896	100.00	0.000	0.000
					B	0.000	110.896		100.00	0.000	0.000
					C	0.000	110.896		100.00	0.000	15.074
					D	0.000	110.896		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 160.0000-121.3300	1.09	2.70	A	1	1.03	1	1	1	82.850	4.48	115.98	D
			B	1	1.03	1	1	1	82.850			
			C	1	1.03	1	1	1	82.850			
			D	1	1.03	1	1	1	82.850			
L2 121.3300-102.5000	1.00	2.93	A	1	1.03	1	1	1	49.032	2.55	135.63	D
			B	1	1.03	1	1	1	49.032			
			C	1	1.03	1	1	1	49.032			
			D	1	1.03	1	1	1	49.032			
L3 102.5000-81.3300	1.27	4.42	A	1	1.03	1	1	1	62.535	3.14	148.29	D
			B	1	1.03	1	1	1	62.535			
			C	1	1.03	1	1	1	62.535			
			D	1	1.03	1	1	1	62.535			
L4 81.3300-67.5000	0.84	3.96	A	1	1.03	1	1	1	44.084	2.01	145.41	D
			B	1	1.03	1	1	1	44.084			
			C	1	1.03	1	1	1	44.084			
			D	1	1.03	1	1	1	44.084			
L5 67.5000-50.5000	1.03	5.31	A	1	1.03	1	1	1	58.945	2.60	152.70	D
			B	1	1.03	1	1	1	58.945			
			C	1	1.03	1	1	1	58.945			
			D	1	1.03	1	1	1	58.945			
L6 50.5000-48.0000	0.15	0.82	A	1	1.03	1	1	1	9.095	0.38	151.26	D
			B	1	1.03	1	1	1	9.095			
			C	1	1.03	1	1	1	9.095			
			D	1	1.03	1	1	1	9.095			
L7 48.0000-30.5000	1.06	6.36	A	1	1.03	1	1	1	65.998	2.56	146.18	D
			B	1	1.03	1	1	1	65.998			
			C	1	1.03	1	1	1	65.998			
			D	1	1.03	1	1	1	65.998			
L8 30.5000-26.5000	0.24	1.54	A	1	1.03	1	1	1	15.671	0.58	143.92	D
			B	1	1.03	1	1	1	15.671			
			C	1	1.03	1	1	1	15.671			
			D	1	1.03	1	1	1	15.671			
L9 26.5000-0.0000	1.61	10.04	A	1	1.03	1	1	1	110.896	4.04	152.51	D
			B	1	1.03	1	1	1	110.896			
			C	1	1.03	1	1	1	110.896			
			D	1	1.03	1	1	1	110.896			
Sum Weight:	8.28	38.07						OTM	1690.39 kip-ft	22.34		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 160.0000-121.3300	1.09	2.70	A	1	1.03	1	1	1	82.850	4.48	115.98	D
			B	1	1.03	1	1	1	82.850			
			C	1	1.03	1	1	1	82.850			
			D	1	1.03	1	1	1	82.850			
L2 121.3300-102.5000	1.00	2.93	A	1	1.03	1	1	1	49.032	2.55	135.63	D
			B	1	1.03	1	1	1	49.032			
			C	1	1.03	1	1	1	49.032			
			D	1	1.03	1	1	1	49.032			
L3 102.5000-81.3300	1.27	4.42	A	1	1.03	1	1	1	62.535	3.14	148.29	D
			B	1	1.03	1	1	1	62.535			
			C	1	1.03	1	1	1	62.535			
			D	1	1.03	1	1	1	62.535			
L4 81.3300-67.5000	0.84	3.96	A	1	1.03	1	1	1	44.084	2.01	145.41	D
			B	1	1.03	1	1	1	44.084			
			C	1	1.03	1	1	1	44.084			
			D	1	1.03	1	1	1	44.084			
L5 67.5000-50.5000	1.03	5.31	A	1	1.03	1	1	1	58.945	2.60	152.70	D
			B	1	1.03	1	1	1	58.945			
			C	1	1.03	1	1	1	58.945			
			D	1	1.03	1	1	1	58.945			
L6 50.5000-48.0000	0.15	0.82	A	1	1.03	1	1	1	9.095	0.38	151.26	D
			B	1	1.03	1	1	1	9.095			
			C	1	1.03	1	1	1	9.095			
			D	1	1.03	1	1	1	9.095			
L7 48.0000-30.5000	1.06	6.36	A	1	1.03	1	1	1	65.998	2.56	146.18	D
			B	1	1.03	1	1	1	65.998			
			C	1	1.03	1	1	1	65.998			
			D	1	1.03	1	1	1	65.998			
L8 30.5000-26.5000	0.24	1.54	A	1	1.03	1	1	1	15.671	0.58	143.92	D
			B	1	1.03	1	1	1	15.671			
			C	1	1.03	1	1	1	15.671			
			D	1	1.03	1	1	1	15.671			
L9 26.5000-0.0000	1.61	10.04	A	1	1.03	1	1	1	110.896	4.04	152.51	D
			B	1	1.03	1	1	1	110.896			
			C	1	1.03	1	1	1	110.896			
			D	1	1.03	1	1	1	110.896			
Sum Weight:	8.28	38.07						OTM	1690.39 kip-ft	22.34		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 160.0000-121.3300	1.62	3.85	A	1	1.03	1	1	1	88.599	1.02	26.34	D
			B	1	1.03	1	1	1	88.599			
			C	1	1.03	1	1	1	88.599			
			D	1	1.03	1	1	1	88.599			
L2 121.3300-102.5000	1.52	3.59	A	1	1.03	1	1	1	51.831	0.59	31.16	D
			B	1	1.03	1	1	1	51.831			
			C	1	1.03	1	1	1	51.831			
			D	1	1.03	1	1	1	51.831			
L3 102.5000-81.3300	2.10	5.23	A	1	1.03	1	1	1	65.526	0.73	34.28	D
			B	1	1.03	1	1	1	65.526			
			C	1	1.03	1	1	1	65.526			
			D	1	1.03	1	1	1	65.526			
L4 81.3300-67.5000	1.38	4.52	A	1	1.03	1	1	1	46.038	0.45	32.51	D
			B	1	1.03	1	1	1	46.038			
			C	1	1.03	1	1	1	46.038			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
			D	1	1.03	1	1	1	46.038			
L5 67.5000-50.5000	1.65	6.03	A	1	1.03	1	1	1	61.223	0.59	34.49	D
			B	1	1.03	1	1	1	61.223			
			C	1	1.03	1	1	1	61.223			
			D	1	1.03	1	1	1	61.223			
L6 50.5000-48.0000	0.24	0.93	A	1	1.03	1	1	1	9.423	0.08	33.88	D
			B	1	1.03	1	1	1	9.423			
			C	1	1.03	1	1	1	9.423			
			D	1	1.03	1	1	1	9.423			
L7 48.0000-30.5000	1.66	7.13	A	1	1.03	1	1	1	68.231	0.57	32.51	D
			B	1	1.03	1	1	1	68.231			
			C	1	1.03	1	1	1	68.231			
			D	1	1.03	1	1	1	68.231			
L8 30.5000-26.5000	0.38	1.72	A	1	1.03	1	1	1	16.171	0.13	31.80	D
			B	1	1.03	1	1	1	16.171			
			C	1	1.03	1	1	1	16.171			
			D	1	1.03	1	1	1	16.171			
L9 26.5000-0.0000	2.49	11.31	A	1	1.03	1	1	1	114.208	0.89	33.48	D
			B	1	1.03	1	1	1	114.208			
			C	1	1.03	1	1	1	114.208			
			D	1	1.03	1	1	1	114.208			
Sum Weight:	13.05	44.31						OTM	384.06 kip-ft	5.03		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 160.0000-121.3300	1.62	3.85	A	1	1.03	1	1	1	88.599	1.02	26.34	D
			B	1	1.03	1	1	1	88.599			
			C	1	1.03	1	1	1	88.599			
			D	1	1.03	1	1	1	88.599			
L2 121.3300-102.5000	1.52	3.59	A	1	1.03	1	1	1	51.831	0.59	31.16	D
			B	1	1.03	1	1	1	51.831			
			C	1	1.03	1	1	1	51.831			
			D	1	1.03	1	1	1	51.831			
L3 102.5000-81.3300	2.10	5.23	A	1	1.03	1	1	1	65.526	0.73	34.28	D
			B	1	1.03	1	1	1	65.526			
			C	1	1.03	1	1	1	65.526			
			D	1	1.03	1	1	1	65.526			
L4 81.3300-67.5000	1.38	4.52	A	1	1.03	1	1	1	46.038	0.45	32.51	D
			B	1	1.03	1	1	1	46.038			
			C	1	1.03	1	1	1	46.038			
			D	1	1.03	1	1	1	46.038			
L5 67.5000-50.5000	1.65	6.03	A	1	1.03	1	1	1	61.223	0.59	34.49	D
			B	1	1.03	1	1	1	61.223			
			C	1	1.03	1	1	1	61.223			
			D	1	1.03	1	1	1	61.223			
L6 50.5000-48.0000	0.24	0.93	A	1	1.03	1	1	1	9.423	0.08	33.88	D
			B	1	1.03	1	1	1	9.423			
			C	1	1.03	1	1	1	9.423			
			D	1	1.03	1	1	1	9.423			
L7 48.0000-30.5000	1.66	7.13	A	1	1.03	1	1	1	68.231	0.57	32.51	D
			B	1	1.03	1	1	1	68.231			
			C	1	1.03	1	1	1	68.231			
			D	1	1.03	1	1	1	68.231			
L8 30.5000-26.5000	0.38	1.72	A	1	1.03	1	1	1	16.171	0.13	31.80	D
			B	1	1.03	1	1	1	16.171			
			C	1	1.03	1	1	1	16.171			
			D	1	1.03	1	1	1	16.171			
L9 26.5000-0.0000	2.49	11.31	A	1	1.03	1	1	1	114.208	0.89	33.48	D
			B	1	1.03	1	1	1	114.208			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
			C	1	1.03	1	1	1	114.208			
			D	1	1.03	1	1	1	114.208			
Sum Weight:	13.05	44.31						OTM	384.06 kip-ft	5.03		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 160.0000-121.3300	1.09	2.70	A	1	1.03	1	1	1	82.850	1.55	40.13	D
			B	1	1.03	1	1	1	82.850			
			C	1	1.03	1	1	1	82.850			
			D	1	1.03	1	1	1	82.850			
L2 121.3300-102.5000	1.00	2.93	A	1	1.03	1	1	1	49.032	0.88	46.93	D
			B	1	1.03	1	1	1	49.032			
			C	1	1.03	1	1	1	49.032			
			D	1	1.03	1	1	1	49.032			
L3 102.5000-81.3300	1.27	4.42	A	1	1.03	1	1	1	62.535	1.09	51.31	D
			B	1	1.03	1	1	1	62.535			
			C	1	1.03	1	1	1	62.535			
			D	1	1.03	1	1	1	62.535			
L4 81.3300-67.5000	0.84	3.96	A	1	1.03	1	1	1	44.084	0.70	50.32	D
			B	1	1.03	1	1	1	44.084			
			C	1	1.03	1	1	1	44.084			
			D	1	1.03	1	1	1	44.084			
L5 67.5000-50.5000	1.03	5.31	A	1	1.03	1	1	1	58.945	0.90	52.84	D
			B	1	1.03	1	1	1	58.945			
			C	1	1.03	1	1	1	58.945			
			D	1	1.03	1	1	1	58.945			
L6 50.5000-48.0000	0.15	0.82	A	1	1.03	1	1	1	9.095	0.13	52.34	D
			B	1	1.03	1	1	1	9.095			
			C	1	1.03	1	1	1	9.095			
			D	1	1.03	1	1	1	9.095			
L7 48.0000-30.5000	1.06	6.36	A	1	1.03	1	1	1	65.998	0.89	50.58	D
			B	1	1.03	1	1	1	65.998			
			C	1	1.03	1	1	1	65.998			
			D	1	1.03	1	1	1	65.998			
L8 30.5000-26.5000	0.24	1.54	A	1	1.03	1	1	1	15.671	0.20	49.80	D
			B	1	1.03	1	1	1	15.671			
			C	1	1.03	1	1	1	15.671			
			D	1	1.03	1	1	1	15.671			
L9 26.5000-0.0000	1.61	10.04	A	1	1.03	1	1	1	110.896	1.40	52.77	D
			B	1	1.03	1	1	1	110.896			
			C	1	1.03	1	1	1	110.896			
			D	1	1.03	1	1	1	110.896			
Sum Weight:	8.28	38.07						OTM	584.91 kip-ft	7.73		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 160.0000-121.3300	1.09	2.70	A	1	1.03	1	1	1	82.850	1.55	40.13	D
			B	1	1.03	1	1	1	82.850			
			C	1	1.03	1	1	1	82.850			
			D	1	1.03	1	1	1	82.850			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L2 121.3300-102.5000	1.00	2.93	A	1	1.03	1	1	1	49.032	0.88	46.93	D
			B	1	1.03	1	1	1	49.032			
			C	1	1.03	1	1	1	49.032			
			D	1	1.03	1	1	1	49.032			
L3 102.5000-81.3300	1.27	4.42	A	1	1.03	1	1	1	62.535	1.09	51.31	D
			B	1	1.03	1	1	1	62.535			
			C	1	1.03	1	1	1	62.535			
			D	1	1.03	1	1	1	62.535			
L4 81.3300-67.5000	0.84	3.96	A	1	1.03	1	1	1	44.084	0.70	50.32	D
			B	1	1.03	1	1	1	44.084			
			C	1	1.03	1	1	1	44.084			
			D	1	1.03	1	1	1	44.084			
L5 67.5000-50.5000	1.03	5.31	A	1	1.03	1	1	1	58.945	0.90	52.84	D
			B	1	1.03	1	1	1	58.945			
			C	1	1.03	1	1	1	58.945			
			D	1	1.03	1	1	1	58.945			
L6 50.5000-48.0000	0.15	0.82	A	1	1.03	1	1	1	9.095	0.13	52.34	D
			B	1	1.03	1	1	1	9.095			
			C	1	1.03	1	1	1	9.095			
			D	1	1.03	1	1	1	9.095			
L7 48.0000-30.5000	1.06	6.36	A	1	1.03	1	1	1	65.998	0.89	50.58	D
			B	1	1.03	1	1	1	65.998			
			C	1	1.03	1	1	1	65.998			
			D	1	1.03	1	1	1	65.998			
L8 30.5000-26.5000	0.24	1.54	A	1	1.03	1	1	1	15.671	0.20	49.80	D
			B	1	1.03	1	1	1	15.671			
			C	1	1.03	1	1	1	15.671			
			D	1	1.03	1	1	1	15.671			
L9 26.5000-0.0000	1.61	10.04	A	1	1.03	1	1	1	110.896	1.40	52.77	D
			B	1	1.03	1	1	1	110.896			
			C	1	1.03	1	1	1	110.896			
			D	1	1.03	1	1	1	110.896			
Sum Weight:	8.28	38.07						OTM	584.91 kip-ft	7.73		

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 45 deg - No Ice
4	Dead+Wind 90 deg - No Ice
5	Dead+Wind 135 deg - No Ice
6	Dead+Wind 180 deg - No Ice
7	Dead+Wind 225 deg - No Ice
8	Dead+Wind 270 deg - No Ice
9	Dead+Wind 315 deg - No Ice
10	Dead+Ice
11	Dead+Wind 0 deg+Ice
12	Dead+Wind 45 deg+Ice
13	Dead+Wind 90 deg+Ice
14	Dead+Wind 135 deg+Ice
15	Dead+Wind 180 deg+Ice
16	Dead+Wind 225 deg+Ice
17	Dead+Wind 270 deg+Ice
18	Dead+Wind 315 deg+Ice
19	Dead+Wind 0 deg - Service
20	Dead+Wind 45 deg - Service
21	Dead+Wind 90 deg - Service
22	Dead+Wind 135 deg - Service
23	Dead+Wind 180 deg - Service
24	Dead+Wind 225 deg - Service
25	Dead+Wind 270 deg - Service

Comb. No.	Description
26	Dead+Wind 315 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	160 - 121.33	Pole	Max Tension	11	0.00	0.00	0.00
			Max. Compression	10	-24.31	-3.15	15.96
			Max. Mx	4	-11.02	-547.71	4.92
			Max. My	2	-11.27	-1.53	509.16
			Max. Vy	4	28.26	-547.71	4.92
			Max. Vx	2	-27.09	-1.53	509.16
			Max. Torque	8			-23.13
L2	121.33 - 102.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	10	-31.35	-3.99	16.52
			Max. Mx	4	-16.24	-1260.96	5.82
			Max. My	2	-16.48	-1.81	1191.11
			Max. Vy	4	33.11	-1260.96	5.82
			Max. Vx	2	-31.45	-1.81	1191.11
			Max. Torque	8			-23.85
L3	102.5 - 81.33	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	10	-37.33	-4.92	16.20
			Max. Mx	4	-20.91	-1803.32	6.04
			Max. My	2	-21.13	-2.06	1707.00
			Max. Vy	4	36.29	-1803.32	6.04
			Max. Vx	2	-34.59	-2.06	1707.00
			Max. Torque	8			-24.27
L4	81.33 - 67.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	10	-45.67	-6.09	15.27
			Max. Mx	4	-27.87	-2542.09	6.07
			Max. My	2	-28.04	-2.37	2412.16
			Max. Vy	4	39.28	-2542.09	6.07
			Max. Vx	2	-37.59	-2.37	2412.16
			Max. Torque	8			-24.13
L5	67.5 - 50.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	10	-53.36	-7.19	14.36
			Max. Mx	4	-34.61	-3230.69	5.97
			Max. My	2	-34.73	-2.66	3071.53
			Max. Vy	4	41.74	-3230.69	5.97
			Max. Vx	2	-40.06	-2.66	3071.53
			Max. Torque	8			-24.04
L6	50.5 - 48	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	10	-54.52	-7.36	14.22
			Max. Mx	4	-35.63	-3335.49	5.95
			Max. My	2	-35.75	-2.70	3172.04
			Max. Vy	4	42.09	-3335.49	5.95
			Max. Vx	2	-40.41	-2.70	3172.04
			Max. Torque	8			-23.90
L7	48 - 30.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	10	-63.32	-8.47	13.15
			Max. Mx	4	-43.50	-4092.21	5.73
			Max. My	2	-43.58	-3.01	3898.80
			Max. Vy	4	44.38	-4092.21	5.73
			Max. Vx	2	-42.71	-3.01	3898.80
			Max. Torque	8			-23.88
L8	30.5 - 26.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	10	-65.41	-8.73	12.90
			Max. Mx	4	-45.39	-4270.72	5.67
			Max. My	2	-45.46	-3.08	4070.49
			Max. Vy	4	44.87	-4270.72	5.67
			Max. Vx	2	-43.20	-3.08	4070.49
			Max. Torque	8			-23.75
L9	26.5 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	10	-79.21	-10.53	11.10

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	4	-57.84	-5502.06	5.14
			Max. My	2	-57.85	-3.57	5257.11
			Max. Vy	4	48.08	-5502.06	5.14
			Max. Vx	2	-46.45	-3.57	5257.11
			Max. Torque	8			-23.72

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	11	79.21	0.00	11.15
	Max. H_x	8	57.87	48.05	0.00
	Max. H_z	2	57.87	0.00	46.42
	Max. M_x	2	5257.11	0.00	46.42
	Max. M_z	4	5502.06	-48.05	0.00
	Max. Torsion	4	23.53	-48.05	0.00
	Min. Vert	1	57.87	-0.00	0.00
	Min. H_x	4	57.87	-48.05	0.00
	Min. H_z	6	57.87	0.00	-46.42
	Min. M_x	6	-5246.53	0.00	-46.42
	Min. M_z	8	-5494.19	48.05	0.00
	Min. Torsion	8	-23.54	48.05	0.00

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	57.87	0.00	-0.00	-5.29	-3.58	-0.00
Dead+Wind 0 deg - No Ice	57.87	-0.00	-46.42	-5257.11	-3.57	3.56
Dead+Wind 45 deg - No Ice	57.87	34.03	-32.83	-3718.53	-3898.03	-13.97
Dead+Wind 90 deg - No Ice	57.87	48.05	-0.00	-5.14	-5502.06	-23.53
Dead+Wind 135 deg - No Ice	57.87	34.03	32.83	3708.10	-3897.90	-19.35
Dead+Wind 180 deg - No Ice	57.87	-0.00	46.42	5246.53	-3.57	-3.56
Dead+Wind 225 deg - No Ice	57.87	-34.02	32.83	3708.67	3889.18	14.31
Dead+Wind 270 deg - No Ice	57.87	-48.05	-0.00	-5.14	5494.19	23.54
Dead+Wind 315 deg - No Ice	57.87	-34.02	-32.83	-3719.09	3889.32	19.01
Dead+Ice	79.21	0.00	-0.00	-11.10	-10.53	-0.00
Dead+Wind 0 deg+Ice	79.21	-0.00	-11.15	-1325.36	-10.60	1.04
Dead+Wind 45 deg+Ice	79.21	8.07	-7.88	-940.47	-969.25	-3.39
Dead+Wind 90 deg+Ice	79.21	11.40	-0.00	-11.17	-1364.39	-5.93
Dead+Wind 135 deg+Ice	79.21	8.07	7.88	918.12	-969.23	-4.99
Dead+Wind 180 deg+Ice	79.21	-0.00	11.15	1303.00	-10.60	-1.05
Dead+Wind 225 deg+Ice	79.21	-8.07	7.89	918.24	947.69	3.51
Dead+Wind 270 deg+Ice	79.21	-11.40	-0.00	-11.17	1343.03	5.92
Dead+Wind 315 deg+Ice	79.21	-8.07	-7.89	-940.59	947.70	4.87
Dead+Wind 0 deg - Service	57.87	-0.00	-16.06	-1825.17	-3.62	1.25
Dead+Wind 45 deg - Service	57.87	11.78	-11.36	-1292.17	-1353.21	-4.88
Dead+Wind 90 deg - Service	57.87	16.63	0.00	-5.35	-1909.24	-8.26
Dead+Wind 135 deg - Service	57.87	11.78	11.36	1281.44	-1353.19	-6.81
Dead+Wind 180 deg - Service	57.87	-0.00	16.06	1814.43	-3.62	-1.25
Dead+Wind 225 deg - Service	57.87	-11.77	11.36	1281.64	1345.41	5.04
Dead+Wind 270 deg - Service	57.87	-16.63	0.00	-5.35	1901.76	8.26
Dead+Wind 315 deg - Service	57.87	-11.77	-11.36	-1292.36	1345.43	6.64

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-57.87	0.00	-0.00	57.87	0.00	0.000%
2	-0.00	-57.87	-46.42	0.00	57.87	46.42	0.000%
3	34.03	-57.87	-32.83	-34.03	57.87	32.83	0.000%
4	48.05	-57.87	0.00	-48.05	57.87	0.00	0.000%
5	34.03	-57.87	32.83	-34.03	57.87	-32.83	0.000%
6	-0.00	-57.87	46.42	0.00	57.87	-46.42	0.000%
7	-34.02	-57.87	32.83	34.02	57.87	-32.83	0.000%
8	-48.05	-57.87	0.00	48.05	57.87	0.00	0.000%
9	-34.02	-57.87	-32.83	34.02	57.87	32.83	0.000%
10	0.00	-79.21	0.00	-0.00	79.21	0.00	0.000%
11	-0.00	-79.21	-11.15	0.00	79.21	11.15	0.000%
12	8.07	-79.21	-7.88	-8.07	79.21	7.88	0.000%
13	11.40	-79.21	0.00	-11.40	79.21	0.00	0.000%
14	8.07	-79.21	7.88	-8.07	79.21	-7.88	0.000%
15	-0.00	-79.21	11.15	0.00	79.21	-11.15	0.000%
16	-8.07	-79.21	7.89	8.07	79.21	-7.89	0.000%
17	-11.40	-79.21	0.00	11.40	79.21	0.00	0.000%
18	-8.07	-79.21	-7.89	8.07	79.21	7.89	0.000%
19	-0.00	-57.87	-16.06	0.00	57.87	16.06	0.000%
20	11.78	-57.87	-11.36	-11.78	57.87	11.36	0.000%
21	16.63	-57.87	0.00	-16.63	57.87	0.00	0.000%
22	11.78	-57.87	11.36	-11.78	57.87	-11.36	0.000%
23	-0.00	-57.87	16.06	0.00	57.87	-16.06	0.000%
24	-11.77	-57.87	11.36	11.77	57.87	-11.36	0.000%
25	-16.63	-57.87	0.00	16.63	57.87	0.00	0.000%
26	-11.77	-57.87	-11.36	11.77	57.87	11.36	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000762
2	Yes	5	0.00000001	0.00008219
3	Yes	6	0.00000001	0.00005021
4	Yes	5	0.00000001	0.00058179
5	Yes	6	0.00000001	0.00004977
6	Yes	5	0.00000001	0.00008223
7	Yes	6	0.00000001	0.00004833
8	Yes	5	0.00000001	0.00058201
9	Yes	6	0.00000001	0.00005204
10	Yes	4	0.00000001	0.00001348
11	Yes	4	0.00000001	0.00069315
12	Yes	5	0.00000001	0.00024505
13	Yes	5	0.00000001	0.00023424
14	Yes	5	0.00000001	0.00024733
15	Yes	4	0.00000001	0.00065352
16	Yes	5	0.00000001	0.00021512
17	Yes	5	0.00000001	0.00022943
18	Yes	5	0.00000001	0.00026424
19	Yes	4	0.00000001	0.00048588
20	Yes	5	0.00000001	0.00016541
21	Yes	5	0.00000001	0.00013423
22	Yes	5	0.00000001	0.00016786
23	Yes	4	0.00000001	0.00047799
24	Yes	5	0.00000001	0.00015360
25	Yes	5	0.00000001	0.00013349
26	Yes	5	0.00000001	0.00017790

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	160 - 121.33	40.520	21	2.3984	0.0606
L2	126 - 102.5	24.486	21	1.9723	0.0320
L3	102.5 - 81.33	15.735	21	1.5323	0.0176
L4	87 - 67.5	11.175	21	1.2742	0.0123
L5	67.5 - 50.5	6.565	21	0.9399	0.0077
L6	50.5 - 48	3.660	21	0.6930	0.0050
L7	48 - 30.5	3.306	21	0.6571	0.0047
L8	30.5 - 26.5	1.331	21	0.4197	0.0027
L9	26.5 - 0	1.002	21	0.3662	0.0023

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
158.0000	BXA-171063-8BF-2 w/ Mount Pipe	21	39.528	2.3777	0.0589	18894
156.0000	RR90-17-00DP w/ Mount Pipe	21	38.537	2.3569	0.0571	18894
147.0000	800 10121 w/ Mount Pipe	21	34.117	2.2598	0.0492	7266
137.0000	APXVSPP18-C-A20 w/ Mount Pipe	21	29.368	2.1375	0.0407	4106
127.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	21	24.911	1.9890	0.0327	2901
110.0000	VHLP2-11	21	18.275	1.6724	0.0213	2865
107.0000	LLPX310R w/ Mount Pipe	21	17.231	1.6151	0.0197	2882
100.0000	APXV18-206517S-C w/ Mount Pipe	21	14.940	1.4888	0.0165	3058
80.0000	OG-860/1920/GPS-A	21	9.371	1.1530	0.0105	3629

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	160 - 121.33	116.361	4	6.8796	0.1736
L2	126 - 102.5	70.416	4	5.6688	0.0914
L3	102.5 - 81.33	45.282	4	4.4083	0.0501
L4	87 - 67.5	32.170	4	3.6672	0.0352
L5	67.5 - 50.5	18.905	4	2.7062	0.0218
L6	50.5 - 48	10.542	4	1.9958	0.0143
L7	48 - 30.5	9.524	4	1.8925	0.0133
L8	30.5 - 26.5	3.835	4	1.2092	0.0077
L9	26.5 - 0	2.887	4	1.0551	0.0066

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
158.0000	BXA-171063-8BF-2 w/ Mount Pipe	4	113.520	6.8211	0.1685	6782
156.0000	RR90-17-00DP w/ Mount Pipe	4	110.681	6.7623	0.1634	6782
147.0000	800 10121 w/ Mount Pipe	4	98.021	6.4873	0.1407	2606

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
137.0000	APXVSPP18-C-A20 w/ Mount Pipe	4	84.412	6.1399	0.1163	1471
127.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	4	71.634	5.7165	0.0935	1036
110.0000	VHLP2-11	4	52.581	4.8101	0.0609	1013
107.0000	LLPX310R w/ Mount Pipe	4	49.581	4.6456	0.0563	1017
100.0000	APXV18-206517S-C w/ Mount Pipe	4	42.997	4.2834	0.0472	1075
80.0000	OG-860/1920/GPS-A	4	26.980	3.3190	0.0299	1271

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	160 - 121.33 (1)	TP29.77x21.65x0.25	38.6700	0.0000	0.0	39.000	22.9742	-11.02	895.99	0.012
L2	121.33 - 102.5 (2)	TP33.2244x28.2894x0.375	23.5000	0.0000	0.0	39.000	39.6656	-16.24	1546.96	0.010
L3	102.5 - 81.33 (3)	TP37.67x33.2244x0.5458	21.1700	0.0000	0.0	31.698	63.1534	-20.91	2001.84	0.010
L4	81.33 - 67.5 (4)	TP39.8236x35.3877x0.5	19.5000	0.0000	0.0	39.000	63.3109	-27.87	2469.13	0.011
L5	67.5 - 50.5 (5)	TP43.3929x39.8236x0.6964	17.0000	0.0000	0.0	32.256	95.7416	-34.61	3088.24	0.011
L6	50.5 - 48 (6)	TP43.9178x43.3929x0.6937	2.5000	0.0000	0.0	32.256	96.5462	-35.63	3114.19	0.011
L7	48 - 30.5 (7)	TP46.5936x43.9178x0.745	17.5000	0.0000	0.0	32.310	109.9820	-43.50	3553.51	0.012
L8	30.5 - 26.5 (8)	TP47.4338x46.5936x0.759	4.0000	0.0000	0.0	31.644	114.0740	-45.39	3609.75	0.013
L9	26.5 - 0 (9)	TP53x47.4338x0.6981	26.5000	0.0000	0.0	36.102	117.5670	-57.84	4244.40	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	160 - 121.33 (1)	TP29.77x21.65x0.25	547.74	41.039	39.000	1.052	0.00	0.000	39.000	0.000
L2	121.33 - 102.5 (2)	TP33.2244x28.2894x0.375	1260.97	47.667	39.000	1.222	0.00	0.000	39.000	0.000
L3	102.5 - 81.33 (3)	TP37.67x33.2244x0.5458	1803.33	39.287	31.698	1.239	0.00	0.000	31.698	0.000
L4	81.33 - 67.5 (4)	TP39.8236x35.3877x0.5	2542.09	50.358	39.000	1.291	0.00	0.000	39.000	0.000
L5	67.5 - 50.5 (5)	TP43.3929x39.8236x0.6964	3230.70	39.116	32.256	1.213	0.00	0.000	32.256	0.000
L6	50.5 - 48 (6)	TP43.9178x43.3929x0.6937	3335.50	39.549	32.256	1.226	0.00	0.000	32.256	0.000
L7	48 - 30.5 (7)	TP46.5936x43.9178x0.745	4092.22	40.164	32.310	1.243	0.00	0.000	32.310	0.000
L8	30.5 - 26.5 (8)	TP47.4338x46.5936x0.759	4270.73	39.698	31.644	1.255	0.00	0.000	31.644	0.000
L9	26.5 - 0 (9)	TP53x47.4338x0.6981	5502.0	44.158	36.102	1.223	0.00	0.000	36.102	0.000

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 $\frac{f_{by}}{F_{by}}$
			6							

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	160 - 121.33 (1)	TP29.77x21.65x0.25	28.26	1.230	26.000	0.096	23.12	0.818	26.000	0.031
L2	121.33 - 102.5 (2)	TP33.2244x28.2894x0.375	33.11	0.835	26.000	0.065	23.82	0.424	26.000	0.016
L3	102.5 - 81.33 (3)	TP37.67x33.2244x0.5458	36.29	0.575	21.132	0.055	24.18	0.247	21.132	0.012
L4	81.33 - 67.5 (4)	TP39.8236x35.3877x0.5	39.28	0.620	26.000	0.048	24.04	0.224	26.000	0.009
L5	67.5 - 50.5 (5)	TP43.3929x39.8236x0.6964	41.74	0.436	21.504	0.041	23.91	0.136	21.504	0.006
L6	50.5 - 48 (6)	TP43.9178x43.3929x0.6937	42.09	0.436	21.504	0.041	23.89	0.133	21.504	0.006
L7	48 - 30.5 (7)	TP46.5936x43.9178x0.745	44.38	0.404	21.540	0.038	23.76	0.109	21.540	0.005
L8	30.5 - 26.5 (8)	TP47.4338x46.5936x0.759	44.87	0.393	21.096	0.038	23.73	0.103	21.096	0.005
L9	26.5 - 0 (9)	TP53x47.4338x0.6981	48.08	0.409	24.068	0.035	23.54	0.089	24.068	0.004

Pole Interaction Design Data

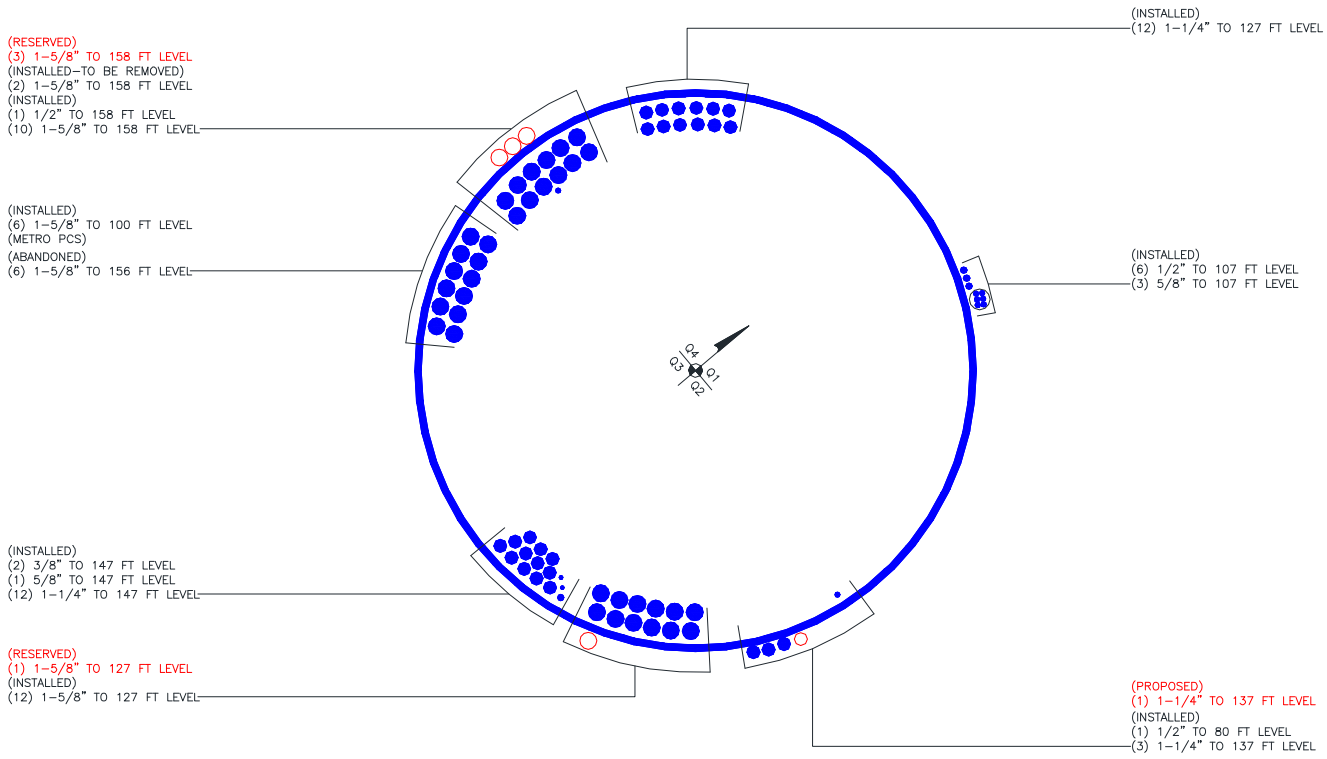
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	160 - 121.33 (1)	0.012	1.052	0.000	0.096	0.031	1.071 ✔	1.333	H1-3+VT ✔
L2	121.33 - 102.5 (2)	0.010	1.222	0.000	0.065	0.016	1.235 ✔	1.333	H1-3+VT ✔
L3	102.5 - 81.33 (3)	0.010	1.239	0.000	0.055	0.012	1.251 ✔	1.333	H1-3+VT ✔
L4	81.33 - 67.5 (4)	0.011	1.291	0.000	0.048	0.009	1.304 ✔	1.333	H1-3+VT ✔
L5	67.5 - 50.5 (5)	0.011	1.213	0.000	0.041	0.006	1.225 ✔	1.333	H1-3+VT ✔
L6	50.5 - 48 (6)	0.011	1.226	0.000	0.041	0.006	1.238 ✔	1.333	H1-3+VT ✔
L7	48 - 30.5 (7)	0.012	1.243	0.000	0.038	0.005	1.256 ✔	1.333	H1-3+VT ✔
L8	30.5 - 26.5 (8)	0.013	1.255	0.000	0.038	0.005	1.268 ✔	1.333	H1-3+VT ✔
L9	26.5 - 0 (9)	0.014	1.223	0.000	0.035	0.004	1.237 ✔	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	160 - 121.33	Pole	TP29.77x21.65x0.25	1	-11.02	1194.36	80.3	Pass
L2	121.33 - 102.5	Pole	TP33.2244x28.2894x0.375	2	-16.24	2062.10	92.7	Pass
L3	102.5 - 81.33	Pole	TP37.67x33.2244x0.5458	3	-20.91	2668.45	93.9	Pass
L4	81.33 - 67.5	Pole	TP39.8236x35.3877x0.5	4	-27.87	3291.35	97.8	Pass
L5	67.5 - 50.5	Pole	TP43.3929x39.8236x0.6964	5	-34.61	4116.62	91.9	Pass
L6	50.5 - 48	Pole	TP43.9178x43.3929x0.6937	6	-35.63	4151.22	92.9	Pass
L7	48 - 30.5	Pole	TP46.5936x43.9178x0.745	7	-43.50	4736.83	94.2	Pass
L8	30.5 - 26.5	Pole	TP47.4338x46.5936x0.759	8	-45.39	4811.80	95.1	Pass
L9	26.5 - 0	Pole	TP53x47.4338x0.6981	9	-57.84	5657.78	92.8	Pass
							Summary	
						Pole (L4)	97.8	Pass
						RATING =	**97.8**	**Pass**

APPENDIX B

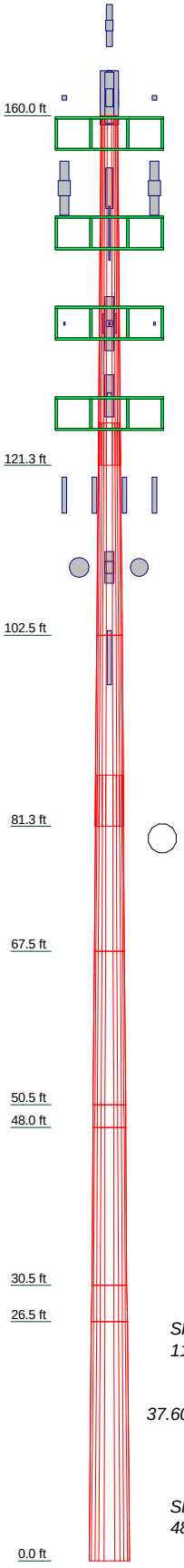
BASE LEVEL DRAWING

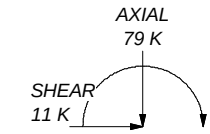

(RESERVED)
(3) 1-5/8" TO 158 FT LEVEL
(INSTALLED-TO BE REMOVED)
(2) 1-5/8" TO 158 FT LEVEL
(INSTALLED)
(1) 1/2" TO 158 FT LEVEL
(10) 1-5/8" TO 158 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 100 FT LEVEL
(METRO PCS)
(ABANDONED)
(6) 1-5/8" TO 156 FT LEVEL
(INSTALLED)
(2) 3/8" TO 147 FT LEVEL
(1) 5/8" TO 147 FT LEVEL
(12) 1-1/4" TO 147 FT LEVEL
(RESERVED)
(1) 1-5/8" TO 127 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 127 FT LEVEL
(INSTALLED)
(12) 1-1/4" TO 127 FT LEVEL
(INSTALLED)
(6) 1/2" TO 107 FT LEVEL
(3) 5/8" TO 107 FT LEVEL
(PROPOSED)
(1) 1-1/4" TO 137 FT LEVEL
(INSTALLED)
(1) 1/2" TO 80 FT LEVEL
(3) 1-1/4" TO 137 FT LEVEL
Q4
Q1
Q3
Q2

APPENDIX C

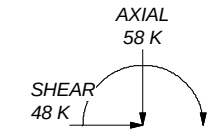
ADDITIONAL CALCULATIONS

Section	1	2	3	4	5	6	7	8	9
Length (ft)	38.6700	23.5000	21.1700	19.5000	17.0000	2.5000	17.5000	4.0000	26.5000
Number of Sides	12	12	12	12	12	12	12	12	12
Thickness (in)	0.2500	0.3750	0.5458	0.5000	0.6964	0.6937	0.7450	0.7590	0.6981
Socket Length (ft)	4.6700		5.6700						
Top Dia (in)	21.6500	28.2894	33.2244	35.3877	39.8236	43.3929	43.9178	46.5936	47.4338
Bot Dia (in)	29.7700	33.2244	37.6700	39.8236	43.3929	43.9178	46.5936	47.4338	53.0000
Grade	A572-65			A572-65		Reinf 53.76 ksi	Reinf 53.85 ksi	Reinf 53.85 ksi	Reinf 52.74 ksi / Reinf 60.17 ksi
Weight (K)	2.7	2.9	4.4	4.0	5.3	0.8	6.4	1.5	10.0
			Reinf 52.83 ksi						38.1





TORQUE 6 kip-ft
37.60 mph WIND - 0.7500 in ICE



TORQUE 24 kip-ft
REACTIONS - 85.00 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
BXA-171063-8BF-2 w/ Mount Pipe	158	APXVSPP18-C-A20 w/ Mount Pipe	137
BXA-171063-12BF w/ Mount Pipe	158	800 EXTERNAL NOTCH FILTER	137
BXA-171063-12BF w/ Mount Pipe	158	800 EXTERNAL NOTCH FILTER	137
GPS_A	158	800 EXTERNAL NOTCH FILTER	137
(2) FD9R6004/2C-3L	158	(3) ACU-A20-N	137
(2) FD9R6004/2C-3L	158	(3) ACU-A20-N	137
(2) FD9R6004/2C-3L	158	(3) ACU-A20-N	137
BXA-80063/4CF w/ Mount Pipe	158	1900MHz RRH (65MHz)	137
BXA-80063-6BF-EDIN-X w/ Mount Pipe	158	1900MHz RRH (65MHz)	137
		1900MHz RRH (65MHz)	137
BXA-80063-6BF-EDIN-X w/ Mount Pipe	158	800MHZ RRH	137
		800MHZ RRH	137
BXA-70040/6CF w/ Mount Pipe	158	800MHZ RRH	137
BXA-70040/6CF w/ Mount Pipe	158	APXVTM14-C-120 w/ Mount Pipe	137
BXA-70040/6CF w/ Mount Pipe	158	APXVTM14-C-120 w/ Mount Pipe	137
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	158	APXVTM14-C-120 w/ Mount Pipe	137
BXA-171063-12BF-EDIN-X w/ Mount Pipe	158	TD-RRH8x20-25	137
		TD-RRH8x20-25	137
BXA-171063-12BF w/ Mount Pipe	158	TD-RRH8x20-25	137
RRH2X40-AWS	158	Platform Mount [LP 602-1]	137
RRH2X40-AWS	158	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	127
RRH2X40-AWS	158	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	127
DB-T1-6Z-8AB-0Z	158	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	127
Platform Mount [LP 713-1]	158	KRY 112 144/1	127
RR90-17-00DP w/ Mount Pipe	156	KRY 112 144/1	127
RR90-17-00DP w/ Mount Pipe	156	KRY 112 144/1	127
RR90-17-00DP w/ Mount Pipe	156	(4) DB844H90-XY w/ Mount Pipe	127
CS72993.07	156	(4) DB844H90-XY w/ Mount Pipe	127
CS72993.07	156	(4) DB844H90-XY w/ Mount Pipe	127
(2) CS72993.07	156	Platform Mount [LP 713-1]	127
4.5" OD x 15' Pipe	156	Miscellaneous [NA 507-1]	127
Pipe Mount [PM 601-3]	156	LLPX310R w/ Mount Pipe	107
800 10121 w/ Mount Pipe	147	LLPX310R w/ Mount Pipe	107
800 10121 w/ Mount Pipe	147	LLPX310R w/ Mount Pipe	107
800 10121 w/ Mount Pipe	147	WIMAX DAP HEAD	107
(2) P65-16-XLH-RR w/ Mount Pipe	147	WIMAX DAP HEAD	107
(2) P65-16-XLH-RR w/ Mount Pipe	147	WIMAX DAP HEAD	107
(2) P65-16-XLH-RR w/ Mount Pipe	147	HORIZON COMPACT	107
(2) TTAW-07BP111-001	147	HORIZON COMPACT	107
(2) TTAW-07BP111-001	147	Side Arm Mount [SO 101-3]	107
(2) TTAW-07BP111-001	147	VHLP2-11	107
(2) RRUS-11	147	PX2F-52	107
(2) RRUS-11	147	APXV18-206517S-C w/ Mount Pipe	100
(2) RRUS-11	147	Pipe Mount [PM 601-3]	100
DC6-48-60-18-8F	147	APXV18-206517S-C w/ Mount Pipe	100
Platform Mount [LP 602-1]	147	APXV18-206517S-C w/ Mount Pipe	100
2.375" OD x 6' Mount Pipe	147	Side Arm Mount [SO 701-1]	80
2.375" OD x 6' Mount Pipe	147	OG-860/1920/GPS-A	80
2.375" OD x 6' Mount Pipe	147	Side Arm Mount [SO 701-1]	80
APXVSPP18-C-A20 w/ Mount Pipe	137		
APXVSPP18-C-A20 w/ Mount Pipe	137		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi	Reinf 53.85 ksi	54 ksi	68 ksi
Reinf 52.83 ksi	53 ksi	67 ksi	Reinf 52.74 ksi	53 ksi	66 ksi
Reinf 53.76 ksi	54 ksi	68 ksi	Reinf 60.17 ksi	60 ksi	76 ksi

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85.00 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 37.60 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50.00 mph wind.
5. TOWER RATING: 97.8%

Paul J Ford and Company
250 E. Broad Street Suite 600
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.44105

Job: **160 FT Monopole / NHV 2071 143137**			
Project: **PJF 37513-2007 R2 / BU 806939**			
Client: Crown Castle	Drawn by: Robert Koors	App'd:	
Code: TIA/EIA-222-F	Date: 06/17/14	Scale: NTS	
Path: T:\375_Crown_Castle\2013\37513-2007 BU 806939\WO 773529 BU 806939 - SA 009\37513-2007.003.7805_Reinforced.eri		Dwg No. E-1	

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

TIA Rev F

Site Data

BU#:	*806939*
Site Name:	
App #:	
Pole Manufacturer:	*Other*

Reactions

Moment:	5502	ft-kips
Axial:	58	kips
Shear:	48	kips

Anchor Rod Data

Qty:	24	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	61.37	in

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

Anchor Rod Results

Maximum Rod Tension:	176.9	Kips
Allowable Tension:	195.0	Kips
Anchor Rod Stress Ratio:	90.7%	**Pass**

Rigid
Service, ASD
Fty*ASIF

Plate Data

Diam:	67.37	in
Thick:	3	in
Grade:	60	ksi
Single-Rod B-eff:	7.10	in

Base Plate Results

	Flexural Check	
Base Plate Stress:	43.9	ksi
Allowable Plate Stress:	60.0	ksi
Base Plate Stress Ratio:	73.1%	**Pass**

Rigid
Service ASD
0.75*Fy*ASIF
Y.L. Length: 30.94

Stiffener Data (Welding at both sides)

Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

Stiffener Results

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

Pole Results

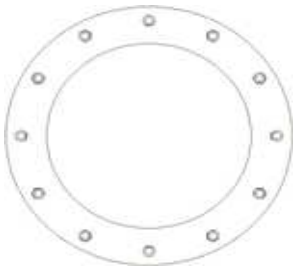
Pole Punching Shear Check:	n/a

Pole Data

Diam:	53	in
Thick:	0.563	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor

ASIF:	1.333	



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

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

Foundation Loads:

Pole weight or tower leg compression =	**58**	(kips)
Horizontal load at top of pier =	**48**	(kips)
Overturning moment at top of pier=	**5502**	(ft-kips)

Design criteria:

Safety factor against overturning =	**1.5**	

Soil Properties:

Soil density =	**115**	(pcf)
Allowable soil bearing =	**5**	(ksf)
Depth to water table =	**8**	(ft)

Dimensions:

Pier shape (round or square)	**R**	("R" or "S")
Pier width =	**7**	(ft)
Pier height above grade =	**0.5**	(ft)
depth to bottom of footing =	**9.5**	(ft)
Footing thickness =	**3.5**	(ft)
Footing width =	**30**	(ft)
Footing length =	**30**	(ft)

Concrete:

Concrete strength =	**4**	(ksi)
Rebar strength =	**60**	(ksi)
ultimate load factor =	**1.3**	

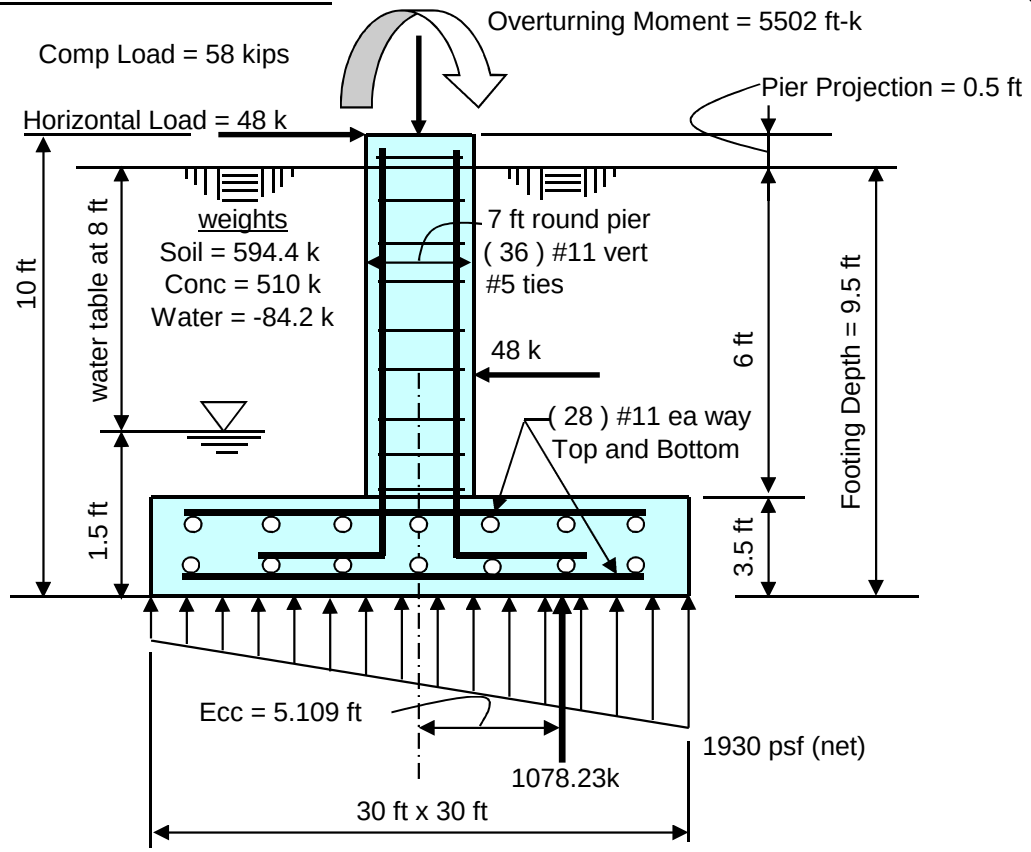
Reinforcing Steel:

	Pad	
minimum cover over rebar =	**3**	inches
size of pad rebar =	**#11**	bar
quantity of pad rebar =	**28**	(ea direction)

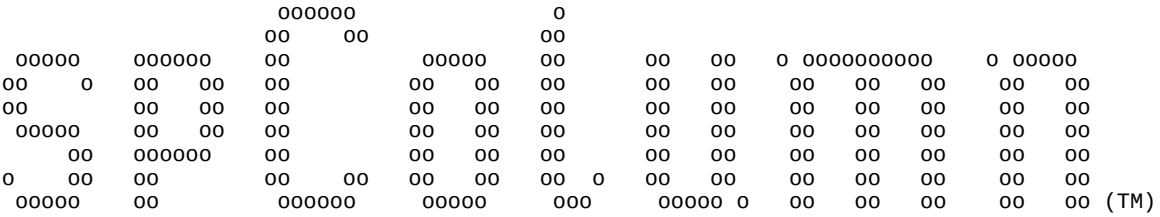
Reinforcing Steel:

	Pier	
size of vert rebar in pier=	**#11**	bar
vertical rebar quantity =	**36**	
size of pier ties =	**#5**	bar
minimum cover over rebar =	**3**	inches

Total volume of concrete = #### cu yd



Summary of analysis results	
Maximum Net Soil Bearing = 1.93 ksf Allowable Net Soil Bearing = 5 ksf **Soil Bearing Stress Ratio = 0.39 Okay**	Ult Bending Shear Capacity = 126 psi Ult Bending Shear Stress = 31 psi **Bending Shear Stress Ratio = 0.24 Okay**
Ftg Overturning Resistance = 16173 ft-kips Overturning Moment = 5509 ft-kips Required Overturning Safety Factor = 1.5 Overturning Safety Factor = 2.936 **Ratio = 0.51 Okay**	Pad Bending Moment Capacity= 7050 ft-k Pad Bending Moment = 2548 ft-k **Bending Moment Stress Ratio = 0.36 OK**



spColumn v4.80 (TM)
Computer program for the Strength Design of Reinforced Concrete Sections

General Information:
==========
File Name: T:\375_Crown_Castle\2013\37513-2007 BU 806939\WO 773529 BU 806...\37513-2007.003.7805.col
Project: 37513-2007_R1
Column: Engineer: LGR
Code: ACI 318-08 Units: English

Run Option: Investigation Slenderness: Not considered
Run Axis: X-axis Column Type: Structural

Material Properties:
==========
f'c = 4 ksi fy = 60 ksi
Ec = 3605 ksi Es = 29000 ksi
Ultimate strain = 0.003 in/in
Beta1 = 0.85

Section:
========
Circular: Diameter = 84 in

Gross section area, Ag = 5541.77 in^2
Ix = 2.44392e+006 in^4 Iy = 2.44392e+006 in^4
rx = 21 in ry = 21 in
Xo = 0 in Yo = 0 in

Reinforcement:
==========
Bar Set: ASTM A615

Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)
# 3	0.38	0.11	# 4	0.50	0.20	# 5	0.63	0.31
# 6	0.75	0.44	# 7	0.88	0.60	# 8	1.00	0.79
# 9	1.13	1.00	# 10	1.27	1.27	# 11	1.41	1.56
# 14	1.69	2.25	# 18	2.26	4.00			

Confinement: Tied; #5 ties with #10 bars, #5 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

Layout: Circular
Pattern: All Sides Equal (Cover to transverse reinforcement)
Total steel area: As = 56.16 in^2 at rho = 1.01%
Minimum clear spacing = 5.16 in

36 #11 Cover = 3 in

Factored Loads and Moments with Corresponding Capacities:
==========

No.	Pu kip	Mux k-ft	PhiMnx k-ft	PhiMn/Mu	NA depth in	Dt depth in	eps_t	Phi
1	58.00	7558.20	8685.10	1.149	15.33	79.67	0.01259	0.900

*** End of output ***

EBI Consulting
environmental | engineering | due diligence

RADIO FREQUENCY FCC REGULATORY COMPLIANCE MAXIMUM PERMISSIBLE EXPOSURE (MPE) ASSESSMENT

Sprint Existing Facility

Site ID: CT03XC019

Orange

800 Ogg Meadow Road
Orange, CT 06477

July 10, 2014

EBI Project Number: 62143778

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

EBI Consulting
environmental | engineering | due diligence

July 10, 2014

Sprint
Attn: RF Engineering Manager
1 International Boulevard, Suite 800
Mahwah, NJ 07495

Re: Radio Frequency Maximum Permissible Exposure (MPE) Assessment for Site:
CT03XC019 - Orange

Site Total: 46.20% - MPE% in full compliance

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at 800 Ogg Meadow Road, Orange, CT, for the purpose of determining whether the radio frequency (RF) exposure levels from the proposed Sprint equipment upgrades 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 µW/cm2 calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for the cellular band (850 MHz Band) is approximately 567 $\mu W/cm^2$, and the general population exposure limit for the 1900 MHz and 2500 MHz 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 upgrades to the existing Sprint Wireless antenna facility located at 800 Ogg Meadow Road, Orange, CT, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. 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 emissions were calculated using the following assumptions:

1) 4 channels in the 1900 MHz Band were considered for each sector of the proposed installation.
2) 1 channel in the 800 MHz Band was considered for each sector of the proposed installation
3) 2 channels in the 2500 MHz Band were considered for each sector of the proposed installation.
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 APXVSPP18-C-A20 and the RFS APXVTM14-C-I20. This is based on feedback from the carrier with regards to anticipated antenna selection. The RFS APXVSPP18-C-A20 has a 15.9 dBd gain value at its main lobe at 1900 MHz and 13.4 dBd at its main lobe for 850 MHz. The RFS APXVTM14-C-I20 has a 15.9 dBd gain value at its main lobe at 2500 MHz. 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 for the proposed antennas is **137 feet** above ground level (AGL).
8) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

Site ID	CT03XC019 - Orange
Site Addresss	800 Ogg Meadow Road, Orange, CT, 06477
Site Type	Monopole

Sector 1

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain (10 db reduction)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss (dB)	ERP	Power Density Percentage
1a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	4	80	5.9	137	131	1/2 "	0.5	0	277.39	0.58%
1a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	137	131	1/2 "	0.5	0	39.00	0.14%
1B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	137	131	1/2 "	0.5	0	138.69	0.51%
														Sector total Power Density Value:		1.24%

Sector 2

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain (10 db reduction)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss (dB)	ERP	Power Density Percentage
2a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	4	80	5.9	137	131	1/2 "	0.5	0	277.39	0.58%
2a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	137	131	1/2 "	0.5	0	39.00	0.14%
2B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	137	131	1/2 "	0.5	0	138.69	0.51%
														Sector total Power Density Value:		1.24%

Sector 3

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain (10 db reduction)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss (dB)	ERP	Power Density Percentage
3a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	4	80	5.9	137	131	1/2 "	0.5	0	277.39	0.58%
3a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	137	131	1/2 "	0.5	0	39.00	0.14%
3B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	137	131	1/2 "	0.5	0	138.69	0.51%
														Sector total Power Density Value:		1.24%

Site Composite MPE %	
Carrier	MPE %
Sprint	3.71%
AT&T	16.31%
MetroPCS	6.81%
Verizon Wireless	15.02%
Clearwire	1.54%
T-Mobile	0.20%
Metricom	0.57%
XM Satellite Radio	2.04%
Total Site MPE %	**46.20%**

Summary

All calculations performed for this analysis yielded results that were well within the allowable limits for general public Maximum Permissible Exposure (MPE) to radio frequency energy.

The anticipated Maximum Composite contributions from the Sprint facility are **3.71% (1.24% from sector 1, 1.24% from sector 2 and 1.24% from sector 3)** of the allowable FCC established general public limit considering all three sectors simultaneously sampled at the ground level.

The anticipated composite MPE value for this site assuming all carriers present is **46.20%** of the allowable FCC established general public limit sampled at 6 feet above ground level. This total composite site value is based upon MPE values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Scott Heffernan
RF Engineering Director

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