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

December 16, 2014

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

RE: **Sprint PCS-Exempt Modification - Crown Site BU: 829046**
Sprint PCS Site ID: CT03XC376
Located at: 56 Norfield Road, Weston, CT 06883

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 Mrs. Gayle Weinstein, First Selectman for Town of Weston. The Town is also the Property Owner. A copy of this letter is being sent to Mr. Tom Landry.

Sprint plans to modify the existing wireless communications facility owned by Crown Castle and located at **56 Norfield Road, Weston, CT 06883**. 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: Mrs. Gayle Weinstein, First Selectman
Town of Weston
56 Norfield Road
Weston, CT 06883

Town of Weston
56 Norfield Road
Attn: Tom Landry
Weston, CT 06883

Sprint

2.5 EQUIPMENT DEPLOYMENT

SITE NUMBER:

CT03XC376

SITE NAME:

WESTON / OMNIPOINT

SITE ADDRESS:

56 NORFIELD ROAD
WESTON, CT 06883

CROWN ID#: 829046

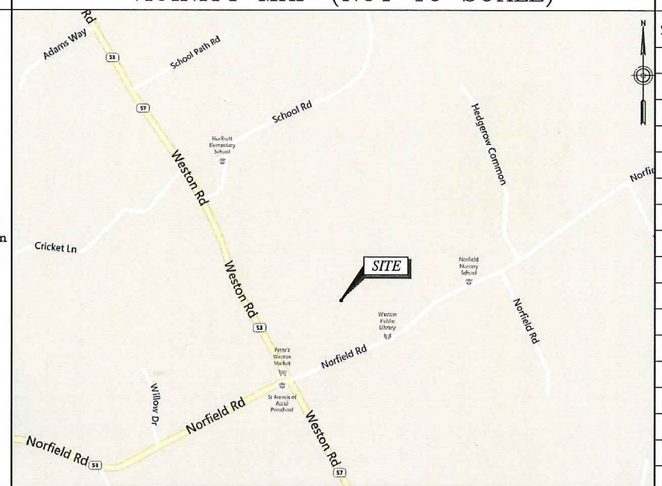
CROWN SITE NAME: WESTON/ RT-57/ NORFIELD R

SHEET INFORMATION

SITE NUMBER:	CT03XC376
SITE NAME:	WESTON / OMNIPOINT
SITE ADDRESS:	56 NORFIELD ROAD WESTON, CT 06883
COUNTY:	FAIRFIELD
COORDINATES: (NAD 83)	41° 12' 8.4" N 73° 22' 46.6" W
GROUND ELEV:	317'± AMSL
STRUCTURE TYPE:	MONOPOLE
STRUCTURE HEIGHT:	192'-0"± AGL
STRUCTURE RAD CENTER:	190'-0"± AGL
ZONING CLASSIFICATION:	200 COMMERCIAL
MAP-BLOCK-LOT:	22/6/28A

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:	PETER CULBERT Peter.Culbert@sprint.com
CROWN CM:	JASON D'AMICO (860) 209-0104 jason.d'amico@crowncastle.com
AAV:	AT&T

VICINITY MAP (NOT TO SCALE)



SHEET INDEX

SHT. NO.	SHEET DESCRIPTION
T-1	TITLE SHEET
SP-1	GENERAL NOTES
SP-2	GENERAL NOTES
A-1	SITE PLAN
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 1-1/4" HYBRID CABLE.
5. (3) NEW RFS APXVSPP18C-A20 ANTENNAS.

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: _____

CALL TOLL FREE FOR CONNECTICUT
1-800-922-4455 OR DIAL 811
CALL TWO FULL WORKING DAYS IN ADVANCE TO LOCATE BURIED UTILITY PIPES AND CABLES

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.CT03XC376

NO	DATE	DESCRIPTION	BY
0	07/08/14	FOR COMMENT	DC
1	12/12/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY
12/12/14	JMQ

SEAL

STATE OF CONNECTICUT
MANOJKUMAR PATEL
No. 22038
LICENSED PROFESSIONAL ENGINEER

SITE NUMBER:
CT03XC376

SITE NAME:
WESTON / OMNIPOINT

SITE ADDRESS:
56 NORFIELD ROAD
WESTON, CT 06883

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._15720111042185549 2.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. ACI–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

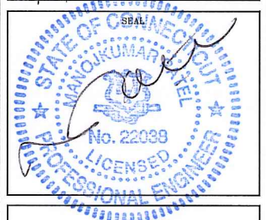
SUBMITTALS

PROJECT NO: 7225.CT03XC376

NO	DATE	DESCRIPTION	BY
0	07/08/14	FOR COMMENT	DC
1	12/12/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY
12/12/14	JMG

SEAL



SITE NUMBER:
CT03XC376

SITE NAME:
WESTON / OMNIPOINT

SITE ADDRESS:
56 NORFIELD ROAD
WESTON, CT 06883

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 TWCE 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

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.CT03XC376

NO	DATE	DESCRIPTION	BY
0	07/08/14	FOR COMMENT	DC
1	12/12/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY
12/12/14	JMQ

STATE OF CONNECTICUT · ANJOKUMAR PARIKH · No. 22038 · LICENSED PROFESSIONAL ENGINEER · SEAL

SITE NUMBER:
CT03XC376

SITE NAME:
WESTON / OMNIPOINT

SITE ADDRESS:
56 NORFIELD ROAD
WESTON, CT 06883

SHEET TITLE:
GENERAL NOTES

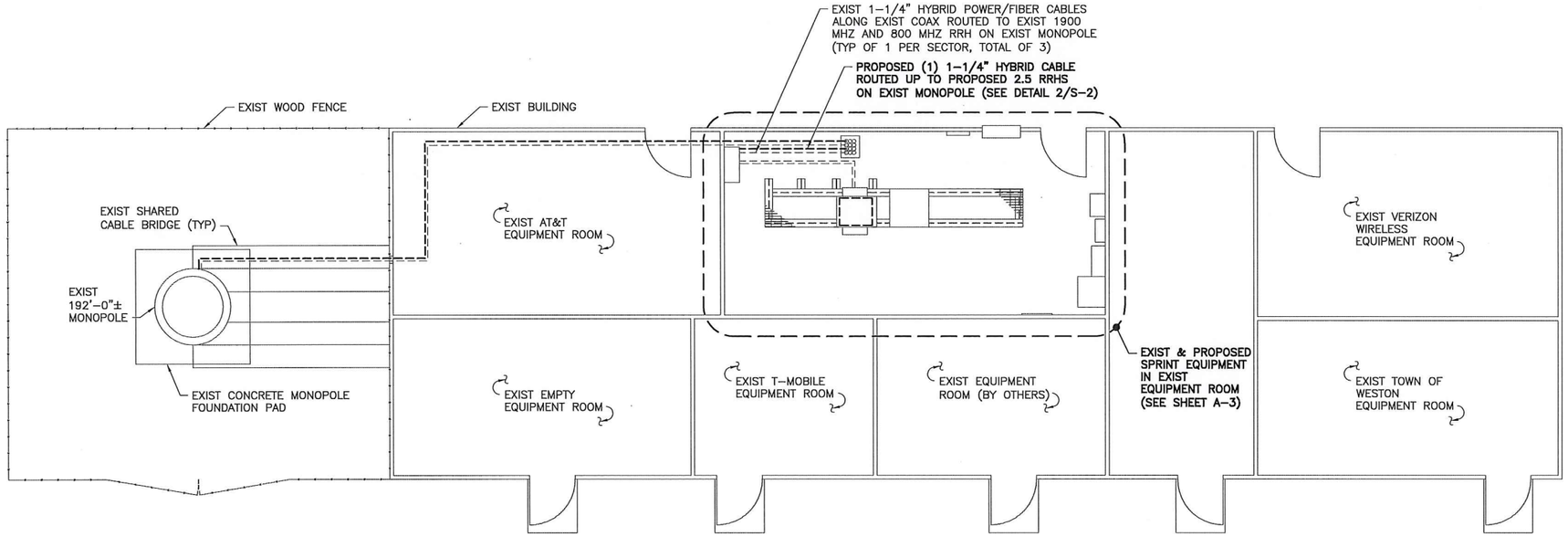
SHEET NO:
SP–2

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.

N

APPROX.



1 / A-2

1 / A-1 SITE PLAN

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

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.CT03XC376

NO	DATE	DESCRIPTION	BY
0	07/08/14	FOR COMMENT	DC
1	12/12/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY
12/12/14	JMG

SEAL

STATE OF CONNECTICUT
MANOJKUMAR PATEL
No. 22033
LICENSED PROFESSIONAL ENGINEER

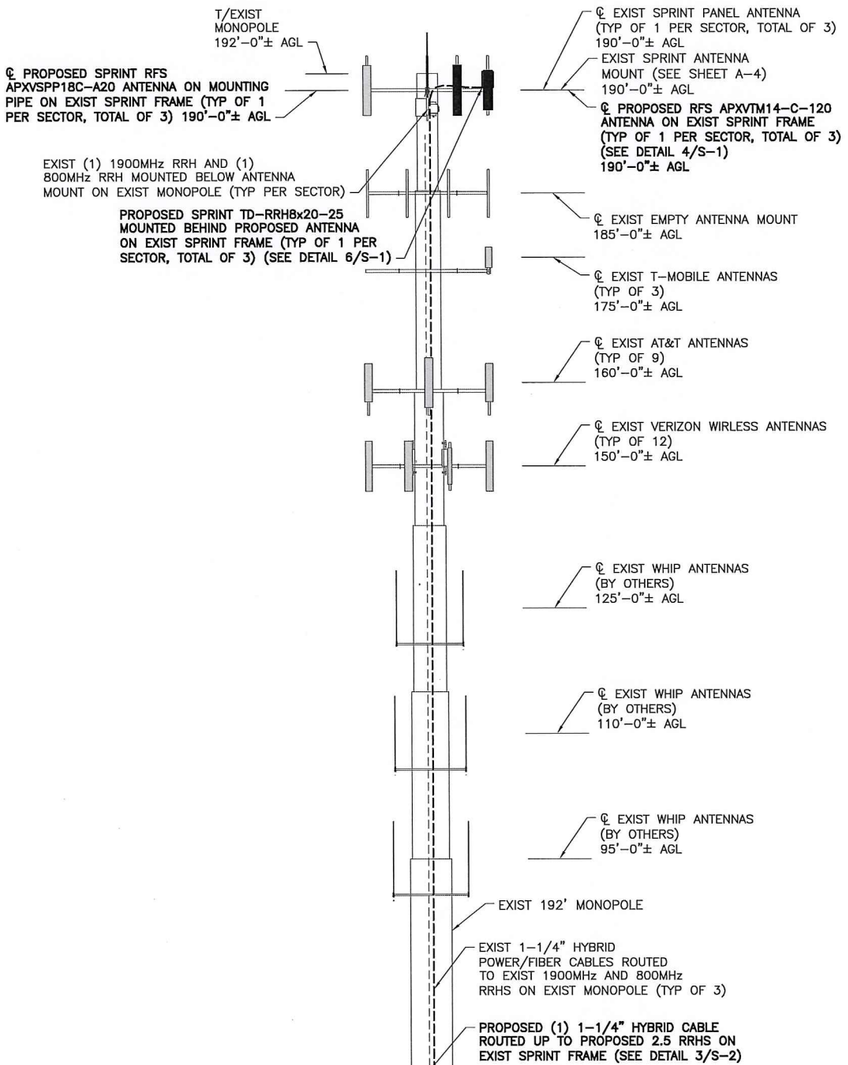
SITE NUMBER:
CT03XC376

SITE NAME:
WESTON / OMNIPOINT

SITE ADDRESS:
56 NORFIELD ROAD
WESTON, CT 06883

SHEET TITLE:
SITE PLAN

SHEET NO:
A-1

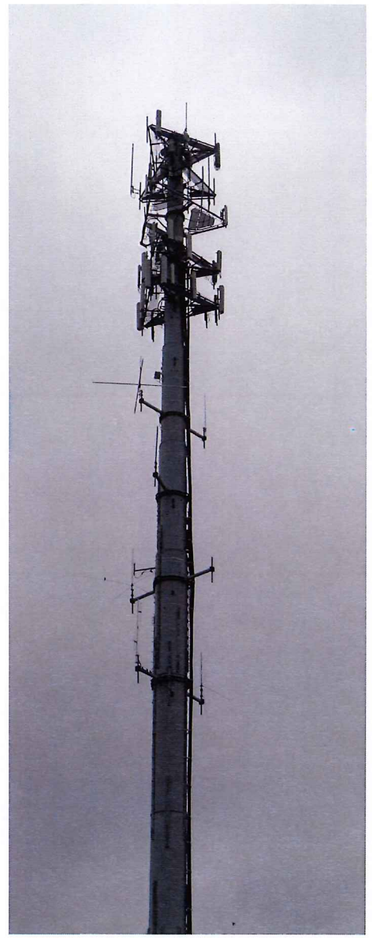


1 / A–2 ELEVATION

SCALE: 1/8" = 1'–0"

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 12/12/14.



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.CT03XC376

NO	DATE	DESCRIPTION	BY
0	07/08/14	FOR COMMENT	DC
1	12/12/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY
12/12/14	JMR

SEAL

STATE OF CONNECTICUT
MANOJKUMAR PATEL
No. 22038
LICENSED PROFESSIONAL ENGINEER

SITE NUMBER:
CT03XC376

SITE NAME:
WESTON / OMNIPOINT

SITE ADDRESS:
56 NORFIELD ROAD
WESTON, CT 06883

SHEET TITLE:
ELEVATION

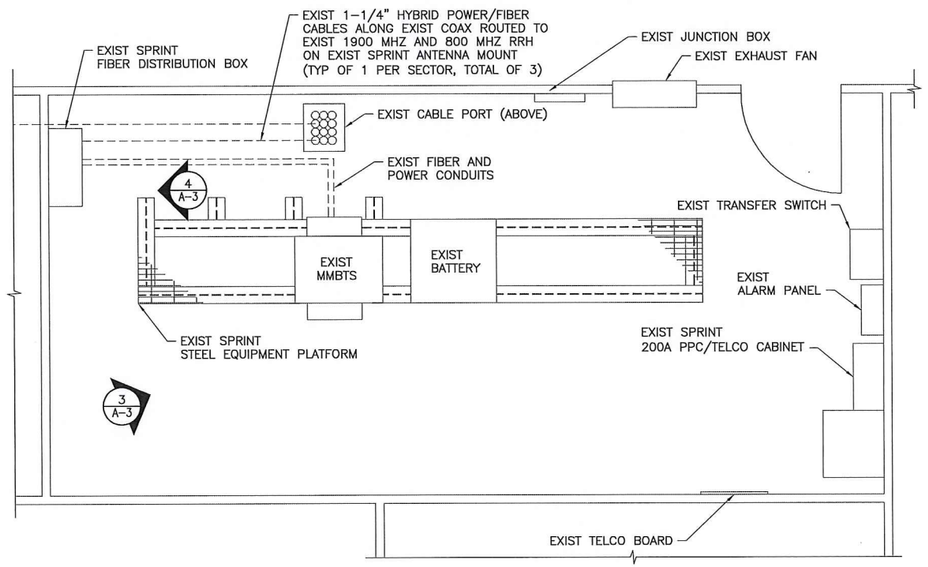
SHEET NO:
A–2

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.

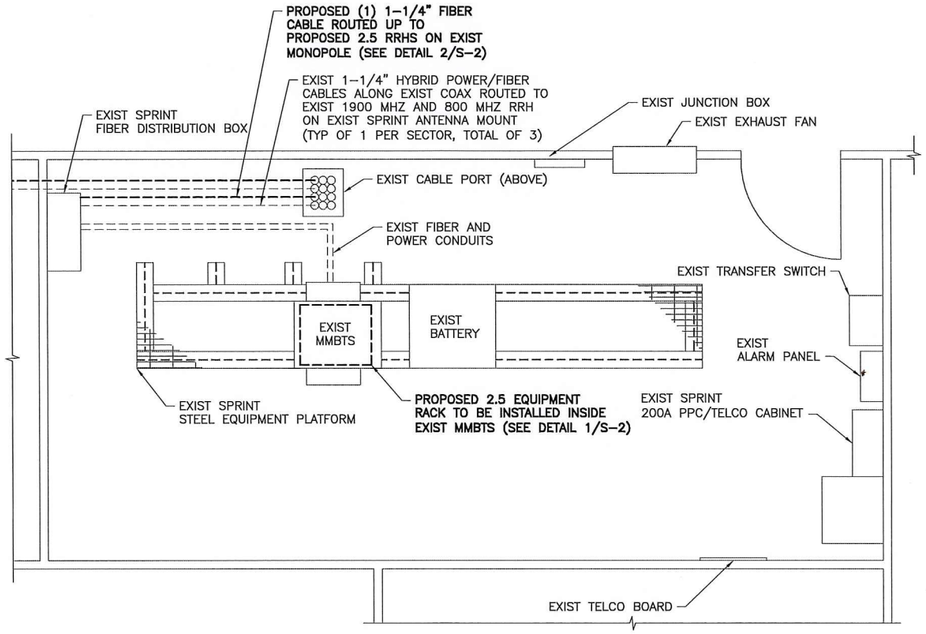
N

APPROX.



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

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

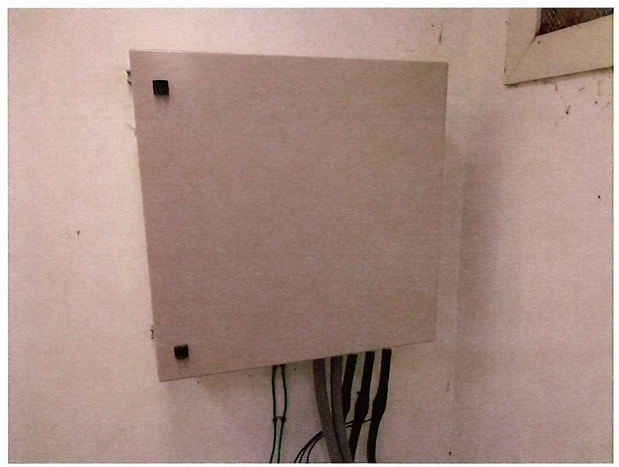


2 A-3 ENLARGED EQUIP. LAYOUT PLAN (FINAL)

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

3 A-3 EXIST EQUIPMENT ROOM

SCALE: NTS



4 A-3 EXIST FIBER DISTRIBUTION BOX

SCALE: NTS

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.CT03XC376

NO	DATE	DESCRIPTION	BY
0	07/08/14	FOR COMMENT	DC
1	12/12/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY
12/12/14	JMQ

SEAL

STATE OF CONNECTICUT
MANOJKUMAR PATEL
No. 22038
LICENSED
PROFESSIONAL ENGINEER

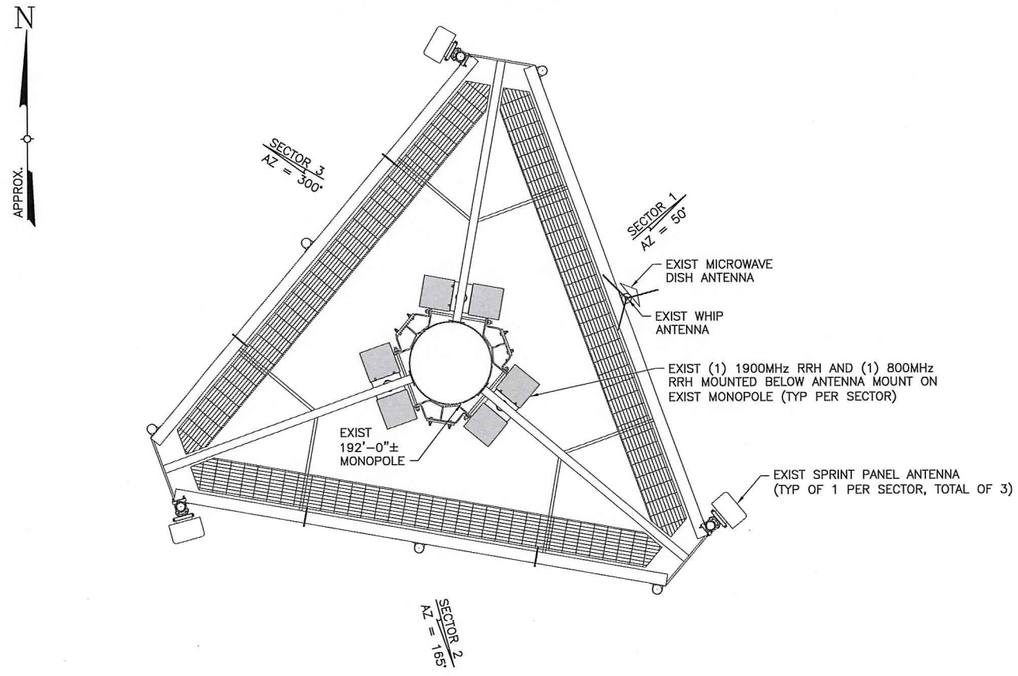
SITE NUMBER:
CT03XC376

SITE NAME:
WESTON / OMNIPOINT

SITE ADDRESS:
56 NORFIELD ROAD
WESTON, CT 06883

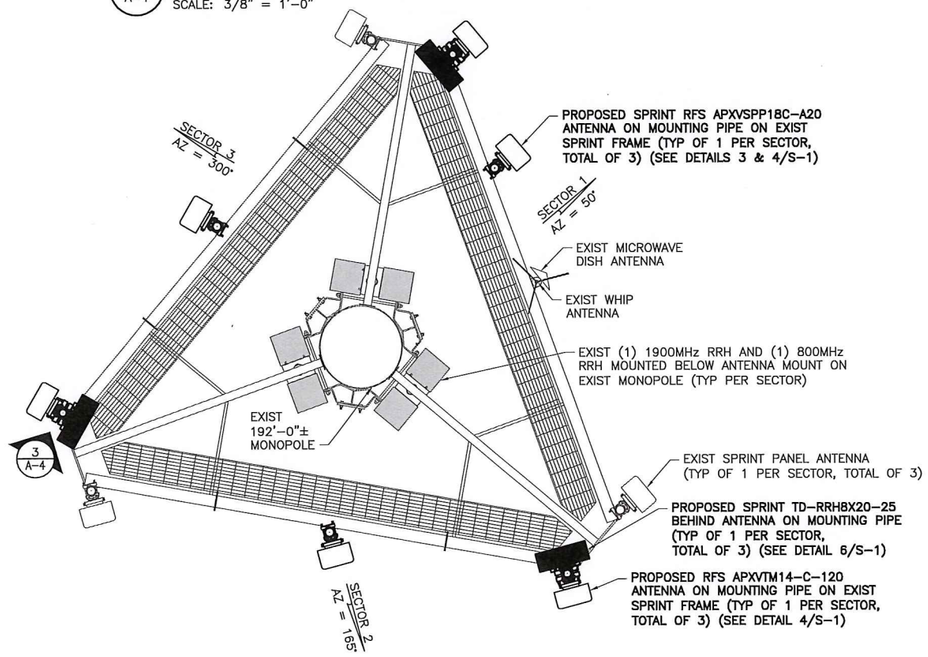
SHEET TITLE:
ENLARGED EQUIPMENT LAYOUT PLANS

SHEET NO:
A-3



1 A-4 ANTENNA LAYOUT PLAN (EXIST)

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

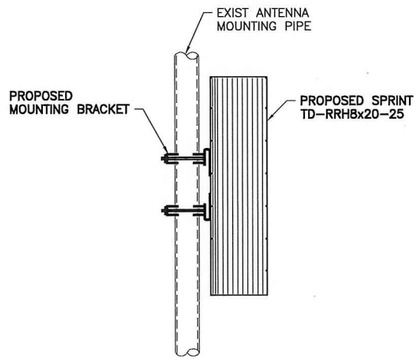


2 A-4 ANTENNA LAYOUT PLAN (FINAL)

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

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 12/12/14.



3 A-4 RRH MOUNTING DETAIL

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

ANTENNA DATA

Status	Exist	Proposed	Proposed
Antenna Manufacturer	RFS-CEL WAVE	RFS-CEL WAVE	RFS-CEL WAVE
Antenna Model Number	APXVSPP18C-A20	APXVSPP18C-A20	APXVTM14-C-120
Number of Antennas	3	3	3
Antenna RAD Center	190'	190'	190'
Antenna Azimuth	50/165/300	50/165/300	50/165/300
Antenna RRH Model Number	1900MHz/800MHz RRHS	N/A	TD-RRH8x20-25
Number of RRH	6	N/A	3

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.CT03XC376

NO	DATE	DESCRIPTION	BY
0	07/08/14	FOR COMMENT	DC
1	12/12/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY
12/22/14	JMC

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

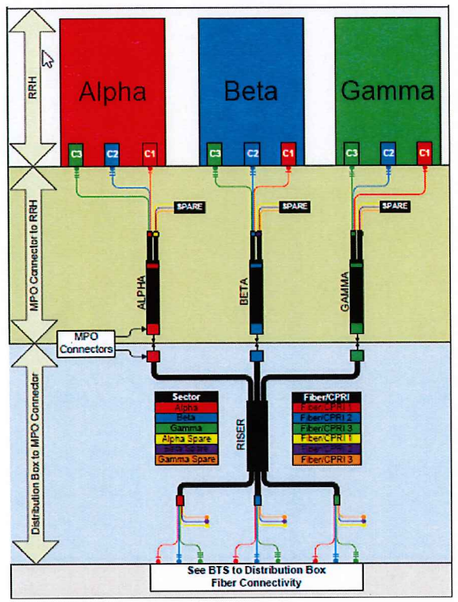
SITE NUMBER:
CT03XC376

SITE NAME:
WESTON / OMNIPOINT

SITE ADDRESS:
56 NORFIELD ROAD
WESTON, CT 06883

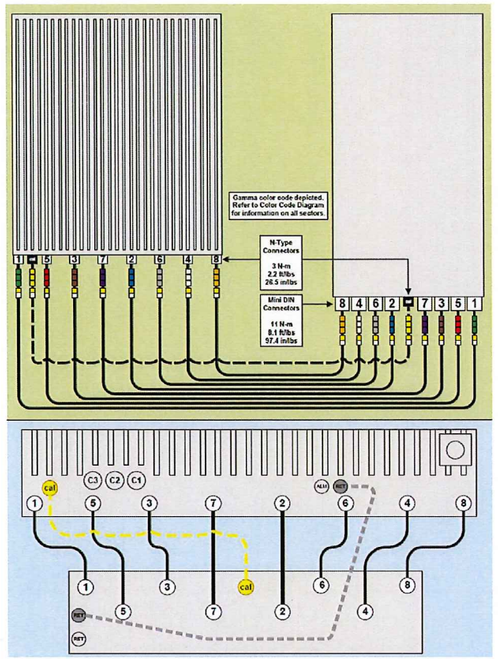
SHEET TITLE:
ANTENNA LAYOUT PLANS

SHEET NO:
A-4



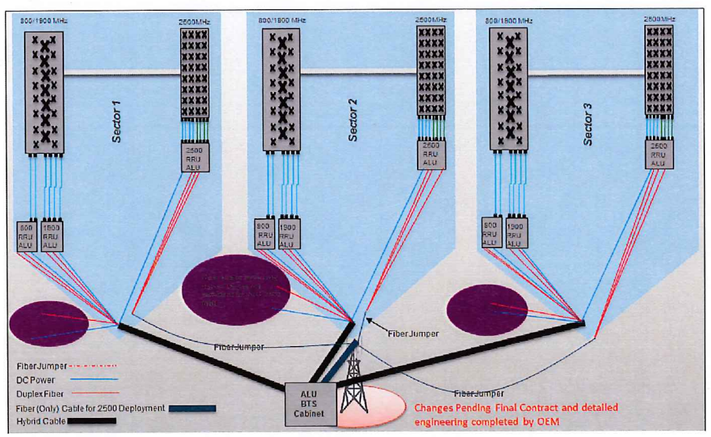
1 A–5 2.5 CABLE COLOR CODING

SCALE: N.T.S.



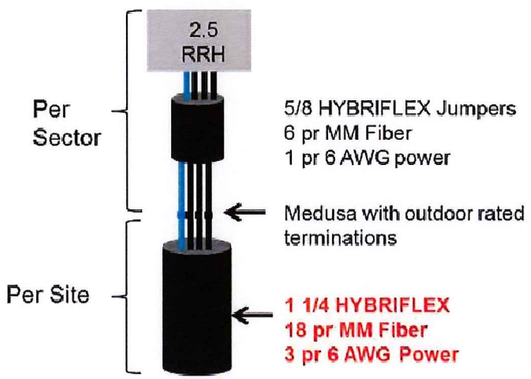
2 A–5 RRH CONNECTIVITY

SCALE: N.T.S.



3 A–5 RAN WIRING

SCALE: N.T.S.



4 A–5 CABLE SCENARIO

SCALE: N.T.S.

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.CT03XC376

NO	DATE	DESCRIPTION	BY
0	07/08/14	FOR COMMENT	DC
1	12/12/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY
12/12/14	TMG

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

SITE NUMBER:
CT03XC376

SITE NAME:
WESTON / OMNIPOINT

SITE ADDRESS:
56 NORFIELD ROAD
WESTON, CT 06883

SHEET TITLE:
RAN WIRING DIAGRAM

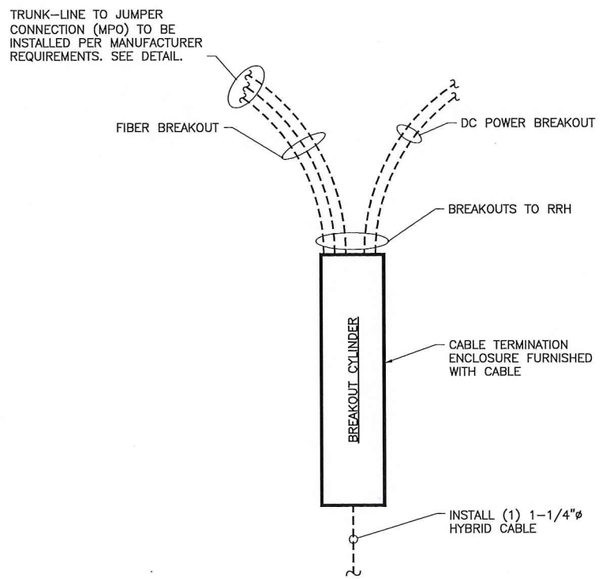
SHEET NO:
A–5

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

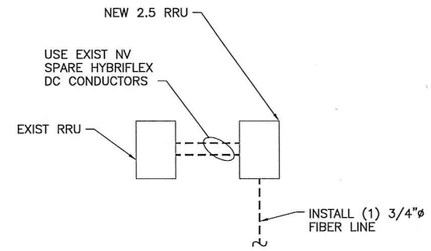
IMPORTANT!! ROTATE THE BAYONET HOUSING CLOCKWISE UNTIL A CLICK SOUND IS HEARD TO ENSURE A GOOD CONNECTION

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.

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.CT03XC376

NO	DATE	DESCRIPTION	BY
0	07/08/14	FOR COMMENT	DC
1	12/12/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY
12/12/14	JMQ

SEAL

STATE OF CONNECTICUT
MANOJKUMAR
No. 22038
LICENSED
PROFESSIONAL ENGINEER

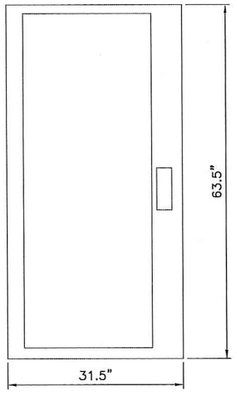
SITE NUMBER:
CT03XC376

SITE NAME:
WESTON / OMNIPOINT

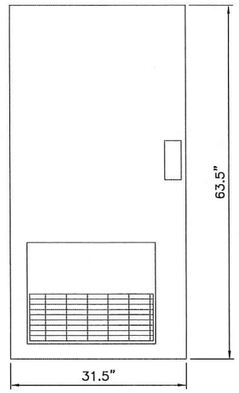
SITE ADDRESS:
56 NORFIELD ROAD
WESTON, CT 06883

SHEET TITLE:
CABLE DETAILS

SHEET NO:
A-6



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



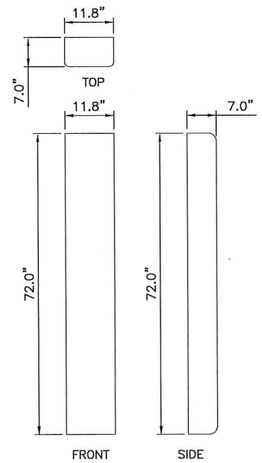
BATTERY
SPECIFICATIONS:
HEIGHT: 63.5"
WIDTH: 31.5"
DEPTH: 28.0"

1/S-1 (EXIST) MMBTS CABINET

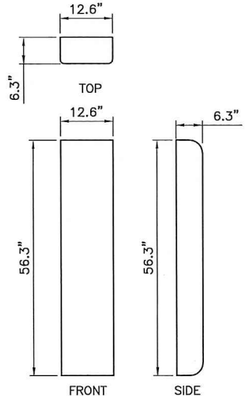
SCALE: 1" = 1'-0"

2/S-1 (EXIST) BATTERY CABINET

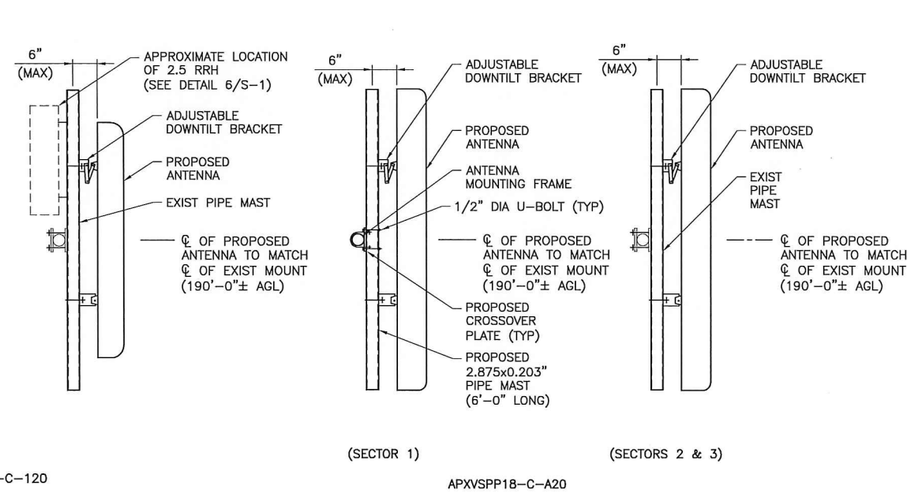
SCALE: 1" = 1'-0"



APXVSPP18-C-A20



APXVTM14-C-120



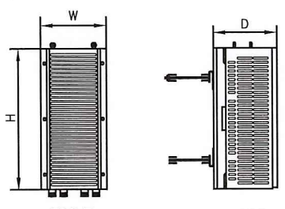
APXVSPP18-C-A20

3/S-1 (PROPOSED) ANTENNA DETAILS

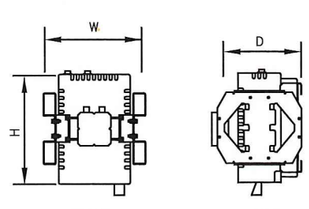
SCALE: 3/4"=1'-0"

5/S-1 (PROPOSED) ANTENNA DETAIL

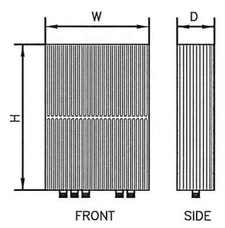
SCALE: 3/4"=1'-0"



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



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

5/S-1 (EXIST) RRH DETAILS

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

6/S-1 (PROPOSED) RRH DETAIL

SCALE: N.T.S.

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.CT03XC376

NO	DATE	DESCRIPTION	BY
0	07/08/14	FOR COMMENT	DC
1	12/12/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY
12/12/14	TMG

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

SITE NUMBER:
CT03XC376

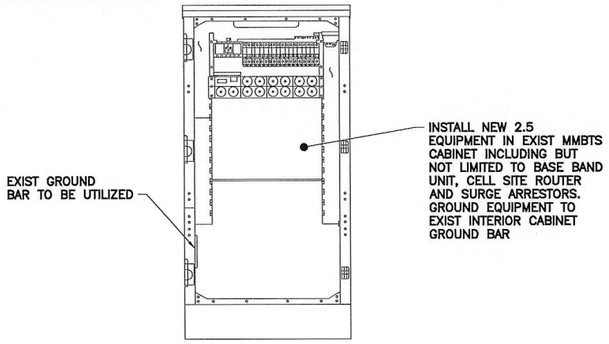
SITE NAME:
WESTON / OMNIPOINT

SITE ADDRESS:
56 NORFIELD ROAD
WESTON, CT 06883

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.

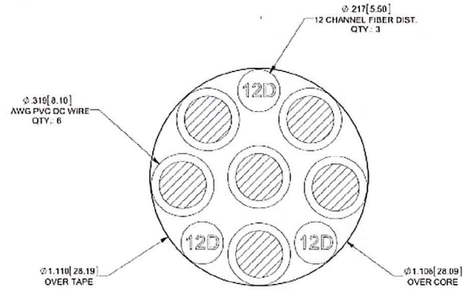
RFS HYBRIFLEX RISER CABLES SCHEDULE

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

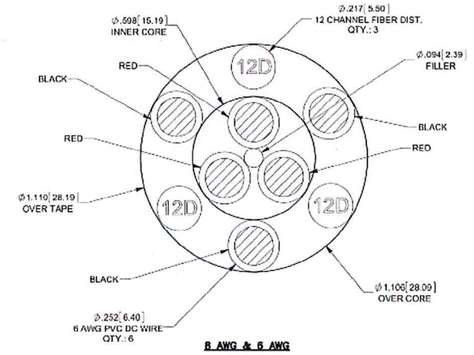
RFS HYBRIFLEX JUMPER CABLE SCHEDULE

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

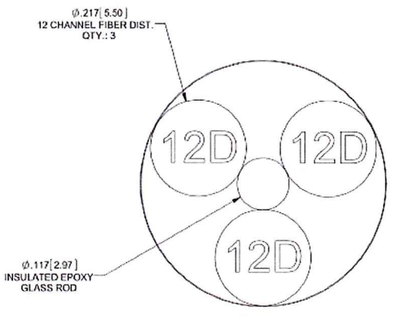
HYBRID CABLE DC CONDUCTOR SIZE GUIDELINE			
MANUF:	RFS		
CABLE	LENGTH	DC CONDUCTOR	CABLE DIAMETER
FIBER ONLY	VARIES	USE NV HYBRIFLEX	7/8"
HYBRIFLEX	<200'	8 AWG	1-1/4"
HYBRIFLEX	225-300'	6 AWG	1-1/4"
HYBRIFLEX	325-375'	4 AWG	1-1/4"



4 AWG



8 AWG & 6 AWG

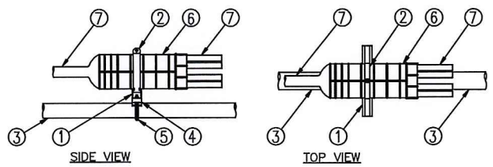


FIBER ONLY

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

SCALE: NTS

LEGEND:
1. P1000T-HG UNISTRUT, 12" LONG.
2. 6" PIPE HANGER.
3. EXISTING SUPPORT PIPE.
4. NEW STANDOFF BRACKET, ANDREW PART# 308488-4.
5. NEW ROUND MEMBER ADAPTER SIZED FOR EXISTING PIPE SUPPORT.
6. BREAKOUT UNIT.
7. CABLE.



3 / S-2 MEDUSA HEAD DETAIL

SCALE: NTS

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.CT03XC376

NO	DATE	DESCRIPTION	BY
0	07/08/14	FOR COMMENT	DC
1	12/12/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY
12/12/14	SMG

SEAL
STATE OF CONNECTICUT
MANJUKUMAR PATEL
No. 22033
LICENSED
PROFESSIONAL ENGINEER

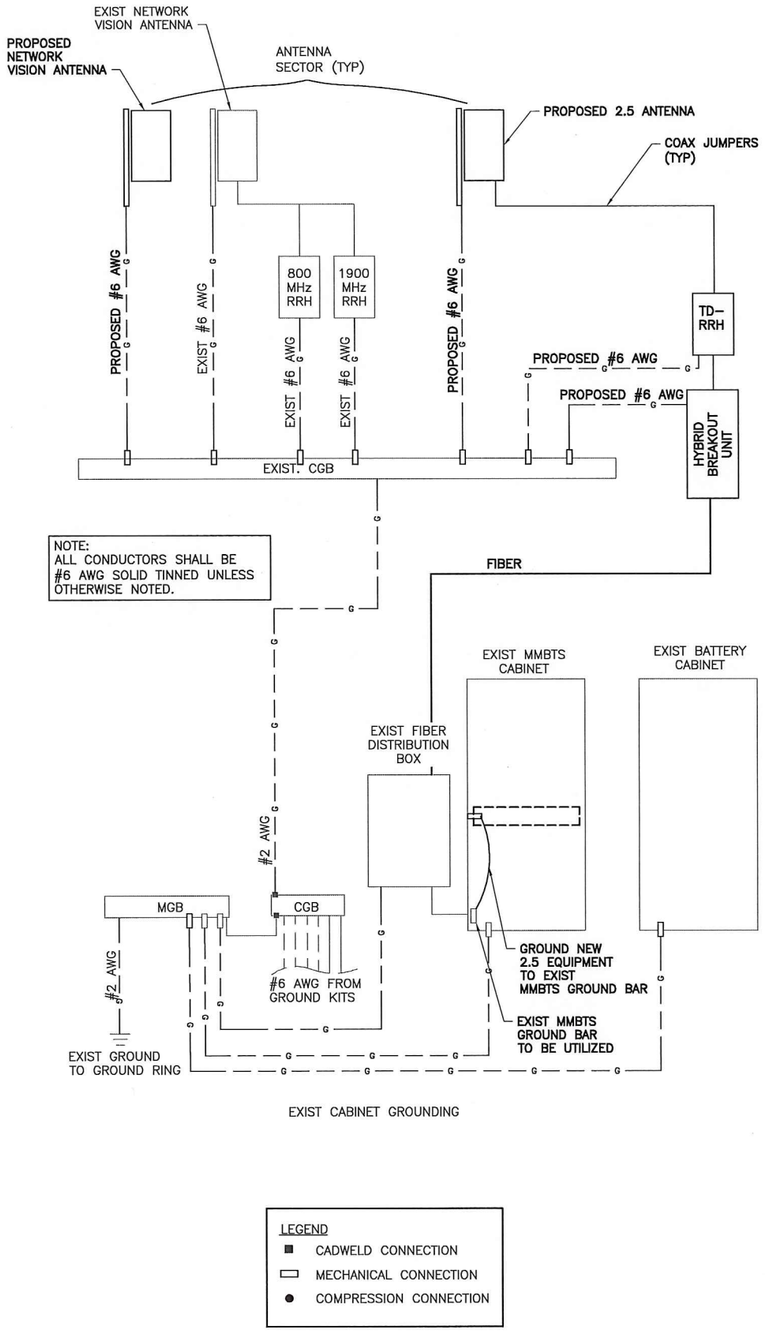
SITE NUMBER:
CT03XC376

SITE NAME:
WESTON / OMNIPOINT

SITE ADDRESS:
56 NORFIELD ROAD
WESTON, CT 06883

SHEET TITLE:
EQUIPMENT SCHEMATIC DETAILS

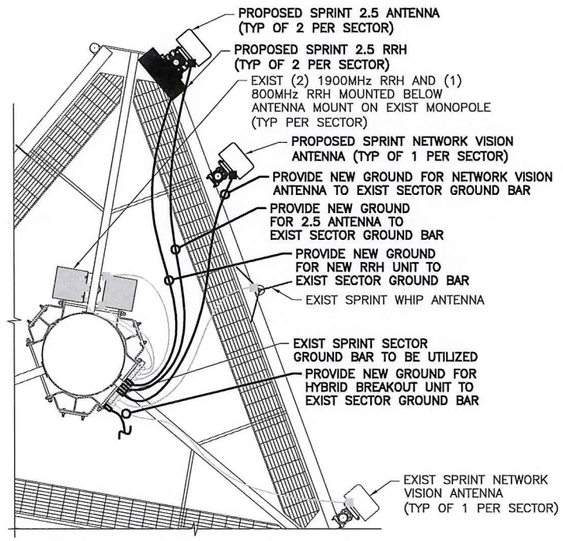
SHEET NO:
S-2



EXIST CABINET GROUNDING

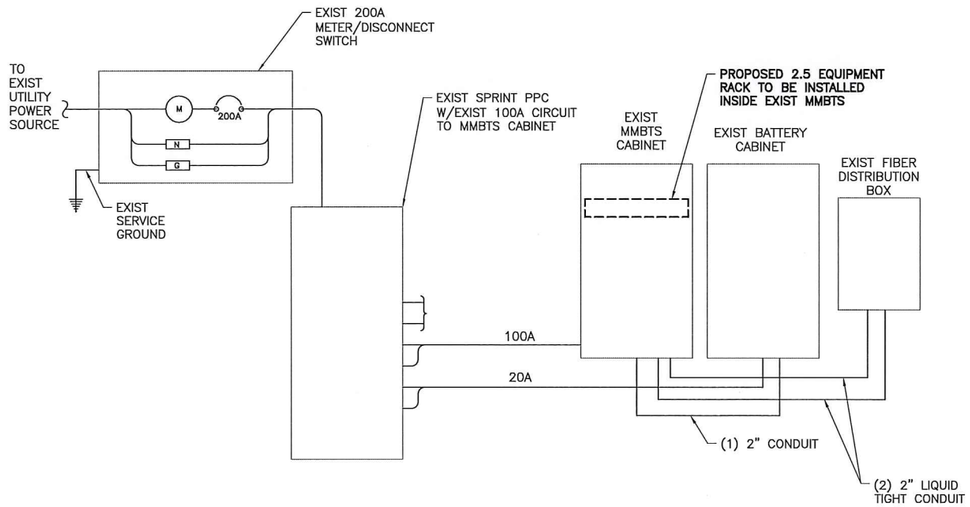
1 / E-1 TYPICAL GROUNDING ONE LINE DIAGRAM

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
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.CT03XC376

NO	DATE	DESCRIPTION	BY
0	07/08/14	FOR COMMENT	DC
1	12/12/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY
12/12/14	JMO

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

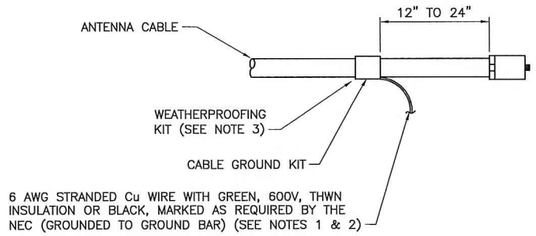
SITE NUMBER:
CT03XC376

SITE NAME:
WESTON / OMNIPOINT

SITE ADDRESS:
56 NORFIELD ROAD
WESTON, CT 06883

SHEET TITLE:
ELECTRICAL & GROUNDING PLANS

SHEET NO:
E-1



CONNECTION OF CABLE GROUND KIT TO ANTENNA CABLE

NOTES:

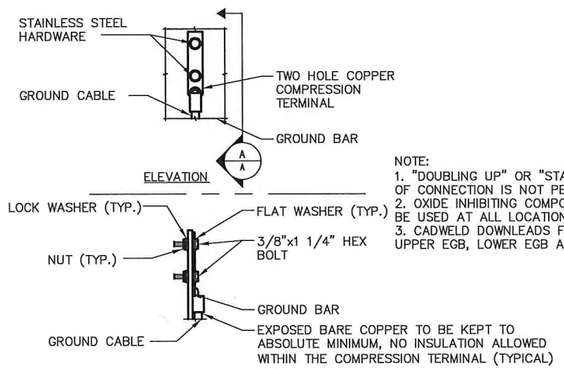
DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.

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.

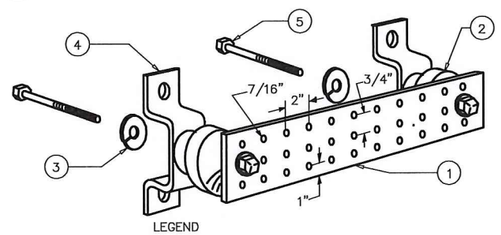


NOTE:
1. "DOUBLING UP" OR "STACKING" OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB AND MGB.

SECTION "A-A"

2 / E-2 GROUNDING BAR CONN. DETAIL

SCALE: NTS



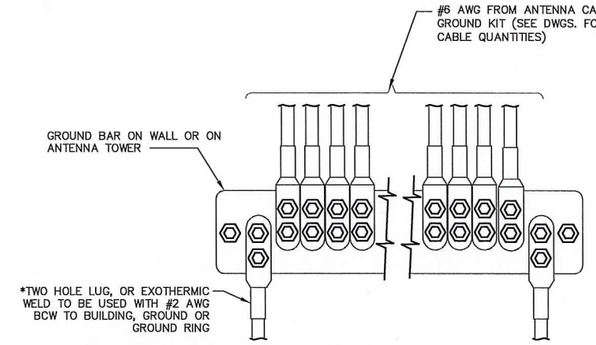
LEGEND

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



* - 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

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.CT03XC376

NO	DATE	DESCRIPTION	BY
0	07/08/14	FOR COMMENT	DC
1	12/12/14	FOR CONSTRUCTION	DC

DATE	REVIEWED BY
12/12/14	JMA

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

SITE NUMBER:
CT03XC376

SITE NAME:
WESTON / OMNIPOINT

SITE ADDRESS:
56 NORFIELD ROAD
WESTON, CT 06883

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 27, 2014**

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

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Sprint PCS* Co-Locate**	**Scenario 2.5B**
	Carrier Site Number:	CT03XC376
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	829046
	Crown Castle Site Name:	Weston/ Rt-57/ Norfield R
	Crown Castle JDE Job Number:	294306
	Crown Castle Work Order Number:	781882
	Crown Castle Application Number:	245869 Rev. 1
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37513-0787.002.7805
Site Data:	**56 Norfield Rd. (Town Hall), Weston, Fairfield County, CT** **Latitude *41° 12' 8.4"*, Longitude *-73° 22' 46.6"*** **190 Foot - Monopole Tower**	

Dear Sean Dempsey,

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 660618, in accordance with application 245869, revision 1.

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:

LC4.7: Existing + Reserved + Proposed Equipment w/ Proposed Modifications **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 the 2005 Connecticut State Building Code 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:

John J. Woolley, E.I.
Structural Designer

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

JUN 27 2014

tnxTower Report - version 6.1.4.1

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

Date: **June 27, 2014**

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

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

Subject: Structural Analysis Report

Carrier Designation:	***Sprint PCS* Co-Locate**	**Scenario 2.5B**
	Carrier Site Number:	CT03XC376
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	829046
	Crown Castle Site Name:	Weston/ Rt-57/ Norfield R
	Crown Castle JDE Job Number:	294306
	Crown Castle Work Order Number:	781882
	Crown Castle Application Number:	245869 Rev. 1
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37513-0787.002.7805
Site Data:	**56 Norfield Rd. (Town Hall), Weston, Fairfield County, CT** **Latitude *41° 12' 8.4"*, Longitude *-73° 22' 46.6"*** **190 Foot - Monopole Tower**	

Dear Sean Dempsey,

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 660618, in accordance with application 245869, revision 1.

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:

LC4.7: Existing + Reserved + Proposed Equipment w/ Proposed Modifications **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 the 2005 Connecticut State Building Code 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:

John J. Woolley, E.I.
Structural Designer

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA
Table 1 - Proposed Antenna and Cable Information
Table 2 – Existing and Reserved Antenna and Cable Information

3) ANALYSIS PROCEDURE
Table 3 - Documents Provided
3.1) Analysis Method
3.2) Assumptions

4) ANALYSIS RESULTS
Table 4 – Section Capacity (Summary)
Table 5 - Tower Component Stresses vs. Capacity
4.1) Recommendations

5) APPENDIX A
TNX Tower Output

6) APPENDIX B
Base Level Drawing

7) APPENDIX C
Additional Calculations

1) INTRODUCTION

This tower is a 190 ft Monopole tower designed by PIROD MANUFACTURES INC. in January of 2000. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 28.1 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
190.0	190.0	3	alcatel lucent	TD-RRH8x20-25	4	1-1/4	-
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		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
190.0	193.0	1	rfs celwave	PD201-7	-	-	1
	190.0	3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 403-1]			
		-	-	-	3	1-1/4	3
188.0	188.0	3	alcatel lucent	1900MHz RRH	-	-	1
		3	alcatel lucent	800MHZ RRH			
		1	tower mounts	Side Arm Mount [SO 102-3]			
182.0	182.0	1	tower mounts	Platform Mount [LP 403-1]	-	-	1
173.0	173.0	1	tower mounts	Platform Mount [LP 405-1]	6	1-5/8	1
	170.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	7	1-5/8	2
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
162.0	163.0	6	ericsson	RRUS-11	1 2 12	3/4 7/8 1-5/8	1
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		3	powerwave technologies	P65-16-XLH-RR w/ Mount Pipe			
		3	powerwave technologies	TT19-08BP111-001			
		1	raycap	DC6-48-60-18-8F			
	162.0	1	tower mounts	Platform Mount [LP 403-1]			
151.0	151.0	3	alcatel lucent	RRH2X40-AWS	-	-	2
		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
150.0	150.0	2	andrew	LNX-6514DS-T4M w/ Mount Pipe	12	1-5/8	1
		2	antel	LPA-80080/6CF w/ Mount Pipe			
		4	decibel	DB846F65ZAXY w/ Mount Pipe			
		1	powerwave technologies	P65-16-XL-R w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		1	tower mounts	Platform Mount [LP 403-1]			
		1	rfs celwave	DB-T1-6Z-8AB-0Z	1	1-5/8	2
		6	antel	BXA-171063-12CF-EDIN-X w/ Mount Pipe			
125.0	130.0	1	rfs celwave	PD128-1	1 1	1/2 7/8	1
		1	rfs celwave	PD201-1			
	125.0	1	tower mounts	Side Arm Mount [SO 701-3]			
110.0	115.0	2	rfs celwave	PD128-1	2	7/8	1
	110.0	1	tower mounts	Side Arm Mount [SO 701-3]			
95.0	100.0	2	rfs celwave	PD128-1	2	1/2	1
	95.0	1	tower mounts	Side Arm Mount [SO 701-3]			
80.0	85.0	1	decibel	DB222	2	1/2	1
		1	rfs celwave	PD128-1			
	80.0	1	tower mounts	Side Arm Mount [SO 701-3]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Arcnet, A99.506-247B, 10/15/1999	3529916	CCISITES
4-POST-MODIFICATION INSPECTION	Sabre, 61801, 11/19/2012	3673725	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PiRod, A-116331, 1/5/2000	3529917	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	TEP, 1/25/2012	3667108	CCISITES
FABRICATION DRAWINGS	Sabre, 61801-MR, 8/2/2012	-	SABRE
4-TOWER PROPOSED REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF, 37513-0787 BP, 4/15/2013	3801440	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 has been reinforced in conformance with the referenced modification drawings.
5) Monopole will be reinforced in conformance with the referenced proposed modification drawings.
6) The rock anchors have been analyzed assuming reinforced concrete-type action in the interaction between the rock anchors and the rock.
7) The existing anchor brackets have been welded through their chamfer region. This analysis assumes no damage to the weld from the pole shaft to the base plate has occurred and that the weld is complete and effective.
8) In accordance with discussions with CCI Corporate Engineering: Based on the assumption that the monopole manufacturer (ROHN/PiRod) has designed the flange plates at splices to adequately develop the full capacity of the unreinforced shaft section using unpublished and/or proprietary methodologies, we are assuming that if our analysis shows that both the existing shaft and the existing flange bolts are at a usage capacity of 105% or less, then the existing flange plates are at a usage capacity of 105% or less and no additional analysis of the flange plate is required.

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	190 - 180	Pole	30" x 0.375"	1	-5.314	1166.570	9.9	Pass
L2	180 - 160	Pole	36" x 0.375"	2	-12.990	1325.678	33.3	Pass
L3	160 - 140	Pole	42" x 0.375"	3	-19.165	1484.549	64.2	Pass
L4	140 - 120	Pole	P48x3/8	4	-23.977	1643.282	89.0	Pass
L5	120 - 113.33	Pole	P54x3/8	5	-25.685	1801.923	83.3	Pass
L6	113.33 - 103	Pole	RPS 54" x 0.49054"	6	-29.221	2350.759	77.9	Pass
L7	103 - 100	Pole	RPS 54" x 0.49054"	7	-30.194	2350.759	82.1	Pass
L8	100 - 85.5	Pole	RPS 60" x 0.47803"	8	-35.440	2493.470	87.5	Pass
L9	85.5 - 84	Pole	RPS 60" x 0.55603"	9	-36.034	2896.062	77.1	Pass
L10	84 - 80	Pole	RPS 60" x 0.50354"	10	-37.499	2625.597	89.9	Pass
L11	80 - 60	Pole	RPS 60" x 0.57817"	11	-46.028	3211.717	94.9	Pass
L12	60 - 58.5	Pole	RPS 60" x 0.70417"	12	-46.768	3764.312	75.3	Pass
L13	58.5 - 47.25	Pole	P60x5/8	13	-51.823	3682.439	95.4	Pass
L14	47.25 - 40	Pole	RPS 60" x 0.76962"	14	-55.733	4113.078	84.1	Pass
L15	40 - 32.25	Pole	RPS 60" x 0.76962"	15	-59.926	4113.078	90.7	Pass
L16	32.25 - 29.75	Pole	RPS 60" x 0.96202"	16	-61.574	5123.199	75.0	Pass
L17	29.75 - 20	Pole	RPS 60" x 0.81453"	17	-67.143	4346.166	96.0	Pass
L18	20 - 4.25	Pole	RPS 60" x 0.94201"	18	-77.401	5311.885	89.9	Pass
L19	4.25 - 0	Pole	RPS 60" x 1.08084"	19	-80.535	6074.014	81.6	Pass
							Summary	
						Pole (L17)	96.0	Pass
						Rating =	96.0	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	89.6	Pass
1	Base Plate	0	72.7	Pass
1	Base Foundation	0	78.0	Pass
1	Flange Connection	20	78.5	Pass
1	Flange Connection	40	80.1	Pass
1	Flange Connection	60	77.4	Pass
1	Flange Connection	80	75.3	Pass
1	Flange Connection	100	59.9	Pass
1, 2	Flange Connection	120	89.0	Pass
1, 2	Flange Connection	140	64.2	Pass
1, 2	Flange Connection	160	33.3	Pass
1, 2	Flange Connection	180	9.9	Pass

Structure Rating (max from all components) =	**96.0%**

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed.
2) See assumption #8.

4.1) Recommendations

Reinforce the pole as shown in PJF job 37513-0787 BP, dated 4/15/2013.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

1) Tower is located in Fairfield County, Connecticut.
2) Basic wind speed of 85 mph.
3) Nominal ice thickness of 0.750 in.
4) Ice density of 56.000 pcf.
5) A wind speed of 28 mph is used in combination with ice.
6) Temperature drop of 50.000 °F.
7) Deflections calculated using a wind speed of 50 mph.
8) A non-linear (P-delta) analysis was used.
9) Pressures are calculated at each section.
10) Stress ratio used in pole design is 1.333.
11) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Pole Size*	*Pole Grade*	*Socket Length* *ft*
L1	190.000-180.000	10.000	30" x 0.375"	A53-B-42 (42 ksi)	5.000
L2	175.000-155.000	20.000	36" x 0.375"	A53-B-42 (42 ksi)	5.000
L3	155.000-135.000	20.000	42" x 0.375"	A53-B-42 (42 ksi)	5.000
L4	135.000-115.000	20.000	P48x3/8	A53-B-42 (42 ksi)	5.000
L5	115.000-108.330	6.670	P54x3/8	A53-B-42 (42 ksi)	5.000
L6	108.330-98.000	10.330	RPS 54" x 0.49054"	Reinf 38.43 ksi (38 ksi)	5.000
L7	98.000-95.000	3.000	RPS 54" x 0.49054"	Reinf 38.43 ksi (38 ksi)	5.000
L8	95.000-80.500	14.500	RPS 60" x 0.47803"	Reinf 39.13 ksi (39 ksi)	5.000

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L9	80.500-79.000	1.500	RPS 60" x 0.55603"	Reinf 36.97 ksi (37 ksi)	5.000
L10	79.000-75.000	4.000	RPS 60" x 0.50354"	Reinf 38.43 ksi (38 ksi)	5.000
L11	75.000-55.000	20.000	RPS 60" x 0.57817"	Reinf 39.86 ksi (40 ksi)	5.000
L12	55.000-53.500	1.500	RPS 60" x 0.70417"	Reinf 35.88 ksi (36 ksi)	5.000
L13	53.500-42.250	11.250	P60x5/8	A53-B-42 (42 ksi)	5.000
L14	42.250-35.000	7.250	RPS 60" x 0.76962"	Reinf 35.91 ksi (36 ksi)	5.000
L15	35.000-27.250	7.750	RPS 60" x 0.76962"	Reinf 35.91 ksi (36 ksi)	5.000
L16	27.250-24.750	2.500	RPS 60" x 0.96202"	Reinf 35.90 ksi (36 ksi)	5.000
L17	24.750-15.000	9.750	RPS 60" x 0.81453"	Reinf 35.88 ksi (36 ksi)	5.000
L18	15.000-0.750	15.750	RPS 60" x 0.94201"	Reinf 38.00 ksi (38 ksi)	5.000
L19	0.750-3.500	4.250	RPS 60" x 1.08084"	Reinf 37.96 ksi (38 ksi)	

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 190.000-180.000				1	1	1		
L2 180.000-160.000				1	1	1		
L3 160.000-140.000				1	1	1		
L4 140.000-120.000				1	1	1		
L5 120.000-113.330				1	1	1		
L6 113.330-103.000				1	1	1		
L7 103.000-100.000				1	1	1		
L8 100.000-85.500				1	1	1		
L9 85.500-84.000				1	1	1		
L10 84.000-80.000				1	1	1		
L11 80.000-60.000				1	1	1		
L12 60.000-58.500				1	1	1		
L13 58.500-47.250				1	1	1		
L14 47.250-40.000				1	1	1		
L15 40.000-				1	1	1		

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
32.250								
L16 32.250-29.750				1	1	1		
L17 29.750-20.000				1	1	1		
L18 20.000-4.250				1	1	1		
L19 4.250-0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
HB114-21U3M12-XXXF(1-1/4")	C	No	CaAa (Out Of Face)	190.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
TYPE I(1-1/4")	C	No	Inside Pole	190.000 - 0.000	3	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
LDF7-50A(1-5/8")	C	No	Inside Pole	173.000 - 0.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
LDF5-50A(7/8")	C	No	CaAa (Out Of Face)	162.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.003
LDF5-50A(7/8")	C	No	CaAa (Out Of Face)	162.000 - 0.000	1	No Ice	0.109	0.000
						1/2" Ice	0.209	0.001
						1" Ice	0.309	0.003
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	162.000 - 0.000	2	No Ice	0.198	0.001
						1/2" Ice	0.298	0.002
						1" Ice	0.398	0.004
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	162.000 - 0.000	10	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
9776(3/4")	C	No	CaAa (Out Of Face)	162.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.002
LDF7-50A(1-5/8")	C	No	Inside Pole	150.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
LDF5-50A(7/8")	C	No	Inside Pole	125.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
LDF5-50A(7/8")	C	No	Inside Pole	110.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
LDF5-50A(7/8")	C	No	Inside Pole	95.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
LDF5-50A(7/8")	C	No	Inside Pole	80.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
***								
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	15.000 - 0.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	112.500 - 57.500	1	No Ice	0.167	0.000
						1/2" Ice	0.278	0.000
						1" Ice	0.389	0.000
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	35.000 - 25.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
						1" Ice	0.431	0.000
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	45.000 - 35.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	51.000 - 45.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	25.000 - 15.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	45.000 - 35.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	65.000 - 55.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	87.250 - 75.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	150.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	173.000 - 0.000	5	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	173.000 - 0.000	1	No Ice	0.198	0.001
						1/2" Ice	0.298	0.002
						1" Ice	0.398	0.004
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	C	No	CaAa (Out Of Face)	173.000 - 0.000	1	No Ice	0.163	0.001
						1/2" Ice	0.263	0.002
						1" Ice	0.362	0.004

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	190.000-180.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.031
L2	180.000-160.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	5.697	0.226
L3	160.000-140.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	17.310	0.608
L4	140.000-120.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	17.310	0.723
L5	120.000-113.330	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	5.773	0.244
L6	113.330-103.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	10.524	0.383
L7	103.000-100.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	3.097	0.112
L8	100.000-85.500	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	15.331	0.547
L9	85.500-84.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	1.861	0.057
L10	84.000-80.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000

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
		C	0.000	0.000	0.000	4.962	0.152
L11	80.000-60.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	22.727	0.772
L12	60.000-58.500	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	1.861	0.058
L13	58.500-47.250	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	11.414	0.434
L14	47.250-40.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	8.827	0.280
L15	40.000-32.250	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	9.364	0.299
L16	32.250-29.750	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	2.685	0.097
L17	29.750-20.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	10.470	0.376
L18	20.000-4.250	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	16.913	0.608
L19	4.250-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	4.564	0.164

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	190.000-180.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.053
L2	180.000-160.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	10.497	0.571
L3	160.000-140.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	32.310	1.724
L4	140.000-120.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	32.310	1.838
L5	120.000-113.330	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	10.775	0.616
L6	113.330-103.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	19.855	0.959
L7	103.000-100.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	5.847	0.279
L8	100.000-85.500	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	28.914	1.356
L9	85.500-84.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	3.486	0.141
L10	84.000-80.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	9.295	0.375
L11	80.000-60.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000

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
		C		0.000	0.000	0.000	42.727	1.888
L12	60.000-58.500	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	3.486	0.142
L13	58.500-47.250	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	21.226	1.062
L14	47.250-40.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	16.306	0.684
L15	40.000-32.250	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	17.301	0.732
L16	32.250-29.750	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	4.976	0.236
L17	29.750-20.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	19.407	0.920
L18	20.000-4.250	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	31.350	1.487
L19	4.250-0.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	8.460	0.401

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	190.000-180.000	0.000	0.000	0.000	0.000
L2	180.000-160.000	-0.338	0.195	-0.560	0.324
L3	160.000-140.000	-0.901	0.520	-1.402	0.809
L4	140.000-120.000	-0.924	0.534	-1.462	0.844
L5	120.000-113.330	-0.943	0.544	-1.513	0.874
L6	113.330-103.000	-1.079	0.623	-1.716	0.991
L7	103.000-100.000	-1.091	0.630	-1.733	1.001
L8	100.000-85.500	-1.134	0.655	-1.819	1.050
L9	85.500-84.000	-1.291	0.745	-2.026	1.170
L10	84.000-80.000	-1.291	0.745	-2.026	1.170
L11	80.000-60.000	-1.203	0.694	-1.911	1.103
L12	60.000-58.500	-1.291	0.745	-2.026	1.170
L13	58.500-47.250	-1.096	0.633	-1.748	1.009
L14	47.250-40.000	-1.272	0.734	-1.981	1.144
L15	40.000-32.250	-1.264	0.730	-1.971	1.138
L16	32.250-29.750	-1.148	0.663	-1.817	1.049
L17	29.750-20.000	-1.148	0.663	-1.817	1.049
L18	20.000-4.250	-1.148	0.663	-1.817	1.049
L19	4.250-0.000	-1.148	0.663	-1.817	1.049

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
PD201-7	C	From Leg	4.000 / 0.000		190.000	No Ice	1.015	1.015	0.004

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
			0.000			1/2" Ice	1.809	1.809	0.013
			3.000			1" Ice	2.620	2.620	0.026
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.000	50.000	190.000	No Ice	8.498	6.946	0.083
			0.000			1/2" Ice	9.149	8.127	0.151
			0.000			1" Ice	9.767	9.021	0.227
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.000	45.000	190.000	No Ice	8.498	6.946	0.083
			0.000			1/2" Ice	9.149	8.127	0.151
			0.000			1" Ice	9.767	9.021	0.227
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.000	60.000	190.000	No Ice	8.498	6.946	0.083
			0.000			1/2" Ice	9.149	8.127	0.151
			0.000			1" Ice	9.767	9.021	0.227
800MHZ RRH	A	From Leg	4.000	50.000	188.000	No Ice	2.490	2.068	0.053
			0.000			1/2" Ice	2.706	2.271	0.074
			0.000			1" Ice	2.931	2.481	0.098
800MHZ RRH	B	From Leg	4.000	45.000	188.000	No Ice	2.490	2.068	0.053
			0.000			1/2" Ice	2.706	2.271	0.074
			0.000			1" Ice	2.931	2.481	0.098
800MHZ RRH	C	From Leg	4.000	60.000	188.000	No Ice	2.490	2.068	0.053
			0.000			1/2" Ice	2.706	2.271	0.074
			0.000			1" Ice	2.931	2.481	0.098
1900MHz RRH	A	From Leg	4.000	50.000	188.000	No Ice	2.907	3.801	0.044
			0.000			1/2" Ice	3.145	4.065	0.075
			0.000			1" Ice	3.391	4.337	0.110
1900MHz RRH	B	From Leg	4.000	45.000	188.000	No Ice	2.907	3.801	0.044
			0.000			1/2" Ice	3.145	4.065	0.075
			0.000			1" Ice	3.391	4.337	0.110
1900MHz RRH	C	From Leg	4.000	60.000	188.000	No Ice	2.907	3.801	0.044
			0.000			1/2" Ice	3.145	4.065	0.075
			0.000			1" Ice	3.391	4.337	0.110
Platform Mount [LP 403-1]	C	None		0.000	190.000	No Ice	18.850	18.850	1.500
						1/2" Ice	24.300	24.300	1.797
						1" Ice	29.750	29.750	2.093
Side Arm Mount [SO 102-3]	C	None		0.000	188.000	No Ice	3.000	3.000	0.081
						1/2" Ice	3.480	3.480	0.111
						1" Ice	3.960	3.960	0.141
TD-RRH8x20-25	A	From Leg	4.000	50.000	190.000	No Ice	4.720	1.703	0.070
			0.000			1/2" Ice	5.014	1.920	0.097
			0.000			1" Ice	5.316	2.145	0.128
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.000	45.000	190.000	No Ice	8.498	6.946	0.083
			0.000			1/2" Ice	9.149	8.127	0.151
			0.000			1" Ice	9.767	9.021	0.227
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.000	60.000	190.000	No Ice	7.134	4.959	0.077
			0.000			1/2" Ice	7.662	5.754	0.131
			0.000			1" Ice	8.183	6.472	0.193
TD-RRH8x20-25	B	From Leg	4.000	50.000	190.000	No Ice	4.720	1.703	0.070
			0.000			1/2" Ice	5.014	1.920	0.097
			0.000			1" Ice	5.316	2.145	0.128
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.000	45.000	190.000	No Ice	8.498	6.946	0.083
			0.000			1/2"	9.149	8.127	0.151

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*
			0.000			Ice	9.767	9.021	0.227
						1" Ice			
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.000	60.000	190.000	No Ice	7.134	4.959	0.077
			0.000			1/2"	7.662	5.754	0.131
			0.000			Ice	8.183	6.472	0.193
						1" Ice			
TD-RRH8x20-25	C	From Leg	4.000	50.000	190.000	No Ice	4.720	1.703	0.070
			0.000			1/2"	5.014	1.920	0.097
			0.000			Ice	5.316	2.145	0.128
						1" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.000	45.000	190.000	No Ice	8.498	6.946	0.083
			0.000			1/2"	9.149	8.127	0.151
			0.000			Ice	9.767	9.021	0.227
						1" Ice			
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.000	60.000	190.000	No Ice	7.134	4.959	0.077
			0.000			1/2"	7.662	5.754	0.131
			0.000			Ice	8.183	6.472	0.193
						1" Ice			
****									
Platform Mount [LP 403-1]	C	None		0.000	182.000	No Ice	18.850	18.850	1.500
						1/2"	24.300	24.300	1.797
						Ice	29.750	29.750	2.093
						1" Ice			
(4) 6' x 2" Mount Pipe	A	From Leg	4.000	0.000	182.000	No Ice	1.425	1.425	0.022
			0.000			1/2"	1.925	1.925	0.033
			0.000			Ice	2.294	2.294	0.048
						1" Ice			
(4) 6' x 2" Mount Pipe	B	From Leg	4.000	0.000	182.000	No Ice	1.425	1.425	0.022
			0.000			1/2"	1.925	1.925	0.033
			0.000			Ice	2.294	2.294	0.048
						1" Ice			
(4) 6' x 2" Mount Pipe	C	From Leg	4.000	0.000	182.000	No Ice	1.425	1.425	0.022
			0.000			1/2"	1.925	1.925	0.033
			0.000			Ice	2.294	2.294	0.048
						1" Ice			
***									
Platform Mount [LP 405-1]	C	None		0.000	173.000	No Ice	20.800	20.800	1.800
						1/2"	28.100	28.100	2.066
						Ice	35.400	35.400	2.332
						1" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.000	0.000	173.000	No Ice	6.825	5.642	0.112
			0.000			1/2"	7.347	6.480	0.169
			-3.000			Ice	7.863	7.257	0.233
						1" Ice			
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.000	0.000	173.000	No Ice	6.815	5.633	0.112
			0.000			1/2"	7.337	6.472	0.169
			-3.000			Ice	7.853	7.248	0.232
						1" Ice			
KRY 112 144/1	A	From Leg	4.000	0.000	173.000	No Ice	0.408	0.204	0.011
			0.000			1/2"	0.497	0.273	0.014
			-3.000			Ice	0.594	0.351	0.019
						1" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.000	0.000	173.000	No Ice	6.825	5.642	0.112
			0.000			1/2"	7.347	6.480	0.169
			-3.000			Ice	7.863	7.257	0.233
						1" Ice			
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.000	0.000	173.000	No Ice	6.815	5.633	0.112
			0.000			1/2"	7.337	6.472	0.169
			-3.000			Ice	7.853	7.248	0.232
						1" Ice			
KRY 112 144/1	B	From Leg	4.000	0.000	173.000	No Ice	0.408	0.204	0.011
			0.000			1/2"	0.497	0.273	0.014
			-3.000			Ice	0.594	0.351	0.019
						1" Ice			
ERICSSON AIR 21 B2A	C	From Leg	4.000	0.000	173.000	No Ice	6.825	5.642	0.112

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
B4P w/ Mount Pipe			0.000 -3.000			1/2" Ice 1" Ice	7.347 7.863	6.480 7.257	0.169 0.233
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.000 0.000 -3.000	0.000	173.000	No Ice 1/2" Ice 1" Ice	6.815 7.337 7.853	5.633 6.472 7.248	0.112 0.169 0.232
KRY 112 144/1	C	From Leg	4.000 0.000 -3.000	0.000	173.000	No Ice 1/2" Ice 1" Ice	0.408 0.497 0.594	0.204 0.273 0.351	0.011 0.014 0.019
***									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice 1/2" Ice 1" Ice	6.119 6.626 7.128	4.254 5.014 5.711	0.055 0.103 0.157
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice 1/2" Ice 1" Ice	6.119 6.626 7.128	4.254 5.014 5.711	0.055 0.103 0.157
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice 1/2" Ice 1" Ice	6.119 6.626 7.128	4.254 5.014 5.711	0.055 0.103 0.157
TT19-08BP111-001	A	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice 1/2" Ice 1" Ice	0.645 0.757 0.877	0.520 0.623 0.735	0.016 0.022 0.029
TT19-08BP111-001	B	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice 1/2" Ice 1" Ice	0.645 0.757 0.877	0.520 0.623 0.735	0.016 0.022 0.029
TT19-08BP111-001	C	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice 1/2" Ice 1" Ice	0.645 0.757 0.877	0.520 0.623 0.735	0.016 0.022 0.029
P65-16-XLH-RR w/ Mount Pipe	A	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice 1/2" Ice 1" Ice	8.637 9.290 9.910	6.362 7.538 8.427	0.079 0.144 0.218
P65-16-XLH-RR w/ Mount Pipe	B	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice 1/2" Ice 1" Ice	8.637 9.290 9.910	6.362 7.538 8.427	0.079 0.144 0.218
P65-16-XLH-RR w/ Mount Pipe	C	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice 1/2" Ice 1" Ice	8.637 9.290 9.910	6.362 7.538 8.427	0.079 0.144 0.218
(2) RRUS-11	A	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice 1/2" Ice 1" Ice	3.249 3.491 3.741	1.373 1.551 1.738	0.048 0.068 0.092
(2) RRUS-11	B	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice 1/2" Ice 1" Ice	3.249 3.491 3.741	1.373 1.551 1.738	0.048 0.068 0.092
(2) RRUS-11	C	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice 1/2" Ice 1" Ice	3.249 3.491 3.741	1.373 1.551 1.738	0.048 0.068 0.092
(2) LGP21401	A	From Leg	4.000 0.000 1.000	0.000	162.000	No Ice 1/2" Ice 1" Ice	1.288 1.445 1.611	0.233 0.313 0.403	0.014 0.021 0.030
(2) LGP21401	B	From Leg	4.000	0.000	162.000	No Ice	1.288	0.233	0.014

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*
			0.000			1/2" Ice	1.445	0.313	0.021
			1.000			1" Ice	1.611	0.403	0.030
(2) LGP21401	C	From Leg	4.000	0.000	162.000	No Ice	1.288	0.233	0.014
			0.000			1/2" Ice	1.445	0.313	0.021
			1.000			1" Ice	1.611	0.403	0.030
DC6-48-60-18-8F	C	From Leg	4.000	0.000	162.000	No Ice	2.567	2.567	0.020
			0.000			1/2" Ice	2.798	2.798	0.043
			1.000			1" Ice	3.038	3.038	0.068
Platform Mount [LP 403-1]	C	None		0.000	162.000	No Ice	18.850	18.850	1.500
						1/2" Ice	24.300	24.300	1.797
						1" Ice	29.750	29.750	2.093
6' x 2" Mount Pipe	A	From Leg	4.000	0.000	162.000	No Ice	1.425	1.425	0.022
			0.000			1/2" Ice	1.925	1.925	0.033
			1.000			1" Ice	2.294	2.294	0.048
(2) 6' x 2" Mount Pipe	B	From Leg	4.000	0.000	162.000	No Ice	1.425	1.425	0.022
			0.000			1/2" Ice	1.925	1.925	0.033
			1.000			1" Ice	2.294	2.294	0.048
(2) 6' x 2" Mount Pipe	C	From Leg	4.000	0.000	162.000	No Ice	1.425	1.425	0.022
			0.000			1/2" Ice	1.925	1.925	0.033
			1.000			1" Ice	2.294	2.294	0.048
***									
LNX-6514DS-T4M w/ Mount Pipe	A	From Leg	4.000	0.000	150.000	No Ice	8.449	6.885	0.056
			0.000			1/2" Ice	9.044	7.951	0.124
			0.000			1" Ice	9.631	8.809	0.199
LNX-6514DS-T4M w/ Mount Pipe	B	From Leg	4.000	0.000	150.000	No Ice	8.449	6.885	0.056
			0.000			1/2" Ice	9.044	7.951	0.124
			0.000			1" Ice	9.631	8.809	0.199
(2) DB846F65ZAXY w/ Mount Pipe	A	From Leg	4.000	0.000	150.000	No Ice	7.271	7.821	0.047
			0.000			1/2" Ice	7.877	9.010	0.114
			0.000			1" Ice	8.484	9.912	0.189
(2) DB846F65ZAXY w/ Mount Pipe	B	From Leg	4.000	0.000	150.000	No Ice	7.271	7.821	0.047
			0.000			1/2" Ice	7.877	9.010	0.114
			0.000			1" Ice	8.484	9.912	0.189
P65-16-XL-R w/ Mount Pipe	C	From Leg	4.000	0.000	150.000	No Ice	8.544	6.569	0.082
			0.000			1/2" Ice	9.128	7.480	0.149
			0.000			1" Ice	9.716	8.335	0.225
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.000	0.000	150.000	No Ice	4.564	10.728	0.046
			0.000			1/2" Ice	5.105	11.990	0.113
			0.000			1" Ice	5.612	12.968	0.187
(2) FD9R6004/2C-3L	A	From Leg	4.000	0.000	150.000	No Ice	0.367	0.085	0.003
			0.000			1/2" Ice	0.451	0.136	0.005
			0.000			1" Ice	0.543	0.196	0.009
(2) FD9R6004/2C-3L	B	From Leg	4.000	0.000	150.000	No Ice	0.367	0.085	0.003
			0.000			1/2" Ice	0.451	0.136	0.005
			0.000			1" Ice	0.543	0.196	0.009
(2) FD9R6004/2C-3L	C	From Leg	4.000	0.000	150.000	No Ice	0.367	0.085	0.003
			0.000			1/2" Ice	0.451	0.136	0.005
			0.000			1" Ice	0.543	0.196	0.009
Platform Mount [LP 403-1]	C	None		0.000	150.000	No Ice	18.850	18.850	1.500

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
						1/2" Ice	24.300	24.300	1.797
						1" Ice	29.750	29.750	2.093
(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	5.029 5.583 6.103	5.289 6.459 7.348	0.041 0.087 0.140
(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	5.029 5.583 6.103	5.289 6.459 7.348	0.041 0.087 0.140
DB-T1-6Z-8AB-0Z	B	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	5.600 5.915 6.240	2.333 2.558 2.791	0.044 0.080 0.120
(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	5.029 5.583 6.103	5.289 6.459 7.348	0.041 0.087 0.140
***									
Pipe Mount [PM 601-3]	C	None		0.000	151.000	No Ice 1/2" Ice 1" Ice	4.390 5.480 6.570	4.390 5.480 6.570	0.195 0.237 0.280
RRH2X40-AWS	A	From Leg	0.500 0.000 0.000	0.000	151.000	No Ice 1/2" Ice 1" Ice	2.522 2.753 2.993	1.589 1.795 2.010	0.044 0.061 0.082
RRH2X40-AWS	B	From Leg	0.500 0.000 0.000	0.000	151.000	No Ice 1/2" Ice 1" Ice	2.522 2.753 2.993	1.589 1.795 2.010	0.044 0.061 0.082
RRH2X40-AWS	C	From Leg	0.500 0.000 0.000	0.000	151.000	No Ice 1/2" Ice 1" Ice	2.522 2.753 2.993	1.589 1.795 2.010	0.044 0.061 0.082
****									
PD128-1	A	From Leg	4.000 0.000 5.000	0.000	125.000	No Ice 1/2" Ice 1" Ice	1.277 2.272 3.282	1.277 2.272 3.282	0.013 0.024 0.041
PD201-1	A	From Leg	4.000 0.000 5.000	0.000	125.000	No Ice 1/2" Ice 1" Ice	0.628 1.539 2.467	0.628 1.539 2.467	0.004 0.011 0.023
Side Arm Mount [SO 701-3]	C	None		0.000	125.000	No Ice 1/2" Ice 1" Ice	2.830 3.920 5.010	2.830 3.920 5.010	0.195 0.237 0.279
***									
PD128-1	A	From Leg	4.000 0.000 5.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	1.277 2.272 3.282	1.277 2.272 3.282	0.013 0.024 0.041
PD128-1	A	From Leg	4.000 0.000 5.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	1.277 2.272 3.282	1.277 2.272 3.282	0.013 0.024 0.041
Side Arm Mount [SO 701-3]	C	None		0.000	110.000	No Ice 1/2" Ice 1" Ice	2.830 3.920 5.010	2.830 3.920 5.010	0.195 0.237 0.279
***									
PD128-1	A	From Leg	4.000 0.000	0.000	95.000	No Ice 1/2"	1.277 2.272	1.277 2.272	0.013 0.024

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
			5.000			Ice	3.282	3.282	0.041
						1" Ice			
PD128-1	A	From Leg	4.000	0.000	95.000	No Ice	1.277	1.277	0.013
			0.000			1/2"	2.272	2.272	0.024
			5.000			Ice	3.282	3.282	0.041
						1" Ice			
Side Arm Mount [SO 701-3]	C	None		0.000	95.000	No Ice	2.830	2.830	0.195
						1/2"	3.920	3.920	0.237
						Ice	5.010	5.010	0.279
						1" Ice			
***									
DB222	A	From Leg	4.000	0.000	80.000	No Ice	1.600	1.600	0.016
			0.000			1/2"	2.880	2.880	0.021
			5.000			Ice	4.160	4.160	0.026
						1" Ice			
PD128-1	C	From Leg	4.000	0.000	80.000	No Ice	1.277	1.277	0.013
			0.000			1/2"	2.272	2.272	0.024
			5.000			Ice	3.282	3.282	0.041
						1" Ice			
Side Arm Mount [SO 701-3]	C	None		0.000	80.000	No Ice	2.830	2.830	0.195
						1/2"	3.920	3.920	0.237
						Ice	5.010	5.010	0.279
						1" Ice			
****									
*****									

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z ksf	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 190.000-180.000	185.000	1.636	0.030	25.000	A	0.000	25.000	25.000	100.00	0.000	0.000
					B	0.000	25.000		100.00	0.000	0.000
					C	0.000	25.000		100.00	0.000	0.000
L2 180.000-160.000	170.000	1.597	0.030	60.000	A	0.000	60.000	60.000	100.00	0.000	0.000
					B	0.000	60.000		100.00	0.000	0.000
					C	0.000	60.000		100.00	0.000	5.697
L3 160.000-140.000	150.000	1.541	0.029	70.000	A	0.000	70.000	70.000	100.00	0.000	0.000
					B	0.000	70.000		100.00	0.000	0.000
					C	0.000	70.000		100.00	0.000	17.310
L4 140.000-120.000	130.000	1.48	0.027	80.000	A	0.000	80.000	80.000	100.00	0.000	0.000
					B	0.000	80.000		100.00	0.000	0.000
					C	0.000	80.000		100.00	0.000	17.310
L5 120.000-113.330	116.665	1.434	0.027	30.015	A	0.000	30.015	30.015	100.00	0.000	0.000
					B	0.000	30.015		100.00	0.000	0.000
					C	0.000	30.015		100.00	0.000	5.773
L6 113.330-103.000	108.165	1.404	0.026	46.485	A	0.000	46.485	46.485	100.00	0.000	0.000
					B	0.000	46.485		100.00	0.000	0.000
					C	0.000	46.485		100.00	0.000	10.524
L7 103.000-100.000	101.500	1.379	0.025	13.500	A	0.000	13.500	13.500	100.00	0.000	0.000
					B	0.000	13.500		100.00	0.000	0.000
					C	0.000	13.500		100.00	0.000	3.097
L8 100.000-85.500	92.750	1.343	0.025	72.500	A	0.000	72.500	72.500	100.00	0.000	0.000
					B	0.000	72.500		100.00	0.000	0.000
					C	0.000	72.500		100.00	0.000	15.331
L9 85.500-	84.750	1.309	0.024	7.500	A	0.000	7.500	7.500	100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z ksf	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
84.000					B	0.000	7.500		100.00	0.000	0.000
					C	0.000	7.500		100.00	0.000	1.861
L10 84.000-80.000	82.000	1.297	0.024	20.000	A	0.000	20.000	20.000	100.00	0.000	0.000
					B	0.000	20.000		100.00	0.000	0.000
					C	0.000	20.000		100.00	0.000	4.962
L11 80.000-60.000	70.000	1.24	0.023	100.000	A	0.000	100.000	100.000	100.00	0.000	0.000
					B	0.000	100.000		100.00	0.000	0.000
					C	0.000	100.000		100.00	0.000	22.727
L12 60.000-58.500	59.250	1.182	0.022	7.500	A	0.000	7.500	7.500	100.00	0.000	0.000
					B	0.000	7.500		100.00	0.000	0.000
					C	0.000	7.500		100.00	0.000	1.861
L13 58.500-47.250	52.875	1.144	0.021	56.250	A	0.000	56.250	56.250	100.00	0.000	0.000
					B	0.000	56.250		100.00	0.000	0.000
					C	0.000	56.250		100.00	0.000	11.414
L14 47.250-40.000	43.625	1.083	0.020	36.250	A	0.000	36.250	36.250	100.00	0.000	0.000
					B	0.000	36.250		100.00	0.000	0.000
					C	0.000	36.250		100.00	0.000	8.827
L15 40.000-32.250	36.125	1.026	0.019	38.750	A	0.000	38.750	38.750	100.00	0.000	0.000
					B	0.000	38.750		100.00	0.000	0.000
					C	0.000	38.750		100.00	0.000	9.364
L16 32.250-29.750	31.000	1	0.018	12.500	A	0.000	12.500	12.500	100.00	0.000	0.000
					B	0.000	12.500		100.00	0.000	0.000
					C	0.000	12.500		100.00	0.000	2.685
L17 29.750-20.000	24.875	1	0.018	48.750	A	0.000	48.750	48.750	100.00	0.000	0.000
					B	0.000	48.750		100.00	0.000	0.000
					C	0.000	48.750		100.00	0.000	10.470
L18 20.000-4.250	12.125	1	0.018	78.750	A	0.000	78.750	78.750	100.00	0.000	0.000
					B	0.000	78.750		100.00	0.000	0.000
					C	0.000	78.750		100.00	0.000	16.913
L19 4.250-0.000	2.125	1	0.018	21.250	A	0.000	21.250	21.250	100.00	0.000	0.000
					B	0.000	21.250		100.00	0.000	0.000
					C	0.000	21.250		100.00	0.000	4.564

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z ksf	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 190.000-180.000	185.000	1.636	0.003	0.750	26.250	A	0.000	26.250	26.250	100.00	0.000	0.000
						B	0.000	26.250		100.00	0.000	0.000
						C	0.000	26.250		100.00	0.000	0.000
L2 180.000-160.000	170.000	1.597	0.003	0.750	62.500	A	0.000	62.500	62.500	100.00	0.000	0.000
						B	0.000	62.500		100.00	0.000	0.000
						C	0.000	62.500		100.00	0.000	10.497
L3 160.000-140.000	150.000	1.541	0.003	0.750	72.500	A	0.000	72.500	72.500	100.00	0.000	0.000
						B	0.000	72.500		100.00	0.000	0.000
						C	0.000	72.500		100.00	0.000	32.310
L4 140.000-120.000	130.000	1.48	0.003	0.750	82.500	A	0.000	82.500	82.500	100.00	0.000	0.000
						B	0.000	82.500		100.00	0.000	0.000
						C	0.000	82.500		100.00	0.000	32.310
L5 120.000-113.330	116.665	1.434	0.003	0.750	30.849	A	0.000	30.849	30.849	100.00	0.000	0.000
						B	0.000	30.849		100.00	0.000	0.000
						C	0.000	30.849		100.00	0.000	10.775
L6 113.330-103.000	108.165	1.404	0.003	0.750	47.776	A	0.000	47.776	47.776	100.00	0.000	0.000
						B	0.000	47.776		100.00	0.000	0.000
						C	0.000	47.776		100.00	0.000	19.855
L7 103.000-100.000	101.500	1.379	0.003	0.750	13.875	A	0.000	13.875	13.875	100.00	0.000	0.000
						B	0.000	13.875		100.00	0.000	0.000
						C	0.000	13.875		100.00	0.000	5.847
L8 100.000-85.500	92.750	1.343	0.003	0.750	74.313	A	0.000	74.313	74.313	100.00	0.000	0.000
						B	0.000	74.313		100.00	0.000	0.000
						C	0.000	74.313		100.00	0.000	28.914

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	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
L9 85.500-84.000	84.750	1.309	0.003	0.750	7.688	A	0.000	7.688	7.688	100.00	0.000	0.000
						B	0.000	7.688		100.00	0.000	0.000
						C	0.000	7.688		100.00	0.000	3.486
L10 84.000-80.000	82.000	1.297	0.003	0.750	20.500	A	0.000	20.500	20.500	100.00	0.000	0.000
						B	0.000	20.500		100.00	0.000	0.000
						C	0.000	20.500		100.00	0.000	9.295
L11 80.000-60.000	70.000	1.24	0.003	0.750	102.500	A	0.000	102.500	102.500	100.00	0.000	0.000
						B	0.000	102.500		100.00	0.000	0.000
						C	0.000	102.500		100.00	0.000	42.727
L12 60.000-58.500	59.250	1.182	0.002	0.750	7.688	A	0.000	7.688	7.688	100.00	0.000	0.000
						B	0.000	7.688		100.00	0.000	0.000
						C	0.000	7.688		100.00	0.000	3.486
L13 58.500-47.250	52.875	1.144	0.002	0.750	57.656	A	0.000	57.656	57.656	100.00	0.000	0.000
						B	0.000	57.656		100.00	0.000	0.000
						C	0.000	57.656		100.00	0.000	21.226
L14 47.250-40.000	43.625	1.083	0.002	0.750	37.156	A	0.000	37.156	37.156	100.00	0.000	0.000
						B	0.000	37.156		100.00	0.000	0.000
						C	0.000	37.156		100.00	0.000	16.306
L15 40.000-32.250	36.125	1.026	0.002	0.750	39.719	A	0.000	39.719	39.719	100.00	0.000	0.000
						B	0.000	39.719		100.00	0.000	0.000
						C	0.000	39.719		100.00	0.000	17.301
L16 32.250-29.750	31.000	1	0.002	0.750	12.813	A	0.000	12.813	12.813	100.00	0.000	0.000
						B	0.000	12.813		100.00	0.000	0.000
						C	0.000	12.813		100.00	0.000	4.976
L17 29.750-20.000	24.875	1	0.002	0.750	49.969	A	0.000	49.969	49.969	100.00	0.000	0.000
						B	0.000	49.969		100.00	0.000	0.000
						C	0.000	49.969		100.00	0.000	19.407
L18 20.000-4.250	12.125	1	0.002	0.750	80.719	A	0.000	80.719	80.719	100.00	0.000	0.000
						B	0.000	80.719		100.00	0.000	0.000
						C	0.000	80.719		100.00	0.000	31.350
L19 4.250-0.000	2.125	1	0.002	0.750	21.781	A	0.000	21.781	21.781	100.00	0.000	0.000
						B	0.000	21.781		100.00	0.000	0.000
						C	0.000	21.781		100.00	0.000	8.460

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z ksf	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 190.000-180.000	185.000	1.636	0.010	25.000	A	0.000	25.000	25.000	100.00	0.000	0.000
					B	0.000	25.000		100.00	0.000	0.000
					C	0.000	25.000		100.00	0.000	0.000
L2 180.000-160.000	170.000	1.597	0.010	60.000	A	0.000	60.000	60.000	100.00	0.000	0.000
					B	0.000	60.000		100.00	0.000	0.000
					C	0.000	60.000		100.00	0.000	5.697
L3 160.000-140.000	150.000	1.541	0.010	70.000	A	0.000	70.000	70.000	100.00	0.000	0.000
					B	0.000	70.000		100.00	0.000	0.000
					C	0.000	70.000		100.00	0.000	17.310
L4 140.000-120.000	130.000	1.48	0.009	80.000	A	0.000	80.000	80.000	100.00	0.000	0.000
					B	0.000	80.000		100.00	0.000	0.000
					C	0.000	80.000		100.00	0.000	17.310
L5 120.000-113.330	116.665	1.434	0.009	30.015	A	0.000	30.015	30.015	100.00	0.000	0.000
					B	0.000	30.015		100.00	0.000	0.000
					C	0.000	30.015		100.00	0.000	5.773
L6 113.330-103.000	108.165	1.404	0.009	46.485	A	0.000	46.485	46.485	100.00	0.000	0.000
					B	0.000	46.485		100.00	0.000	0.000
					C	0.000	46.485		100.00	0.000	10.524
L7 103.000-100.000	101.500	1.379	0.009	13.500	A	0.000	13.500	13.500	100.00	0.000	0.000
					B	0.000	13.500		100.00	0.000	0.000
					C	0.000	13.500		100.00	0.000	3.097

Section Elevation ft	z ft	K_Z	q_z ksf	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
L8 100.000-85.500	92.750	1.343	0.009	72.500	A	0.000	72.500	72.500	100.00	0.000	0.000
					B	0.000	72.500		100.00	0.000	0.000
					C	0.000	72.500		100.00	0.000	15.331
L9 85.500-84.000	84.750	1.309	0.008	7.500	A	0.000	7.500	7.500	100.00	0.000	0.000
					B	0.000	7.500		100.00	0.000	0.000
					C	0.000	7.500		100.00	0.000	1.861
L10 84.000-80.000	82.000	1.297	0.008	20.000	A	0.000	20.000	20.000	100.00	0.000	0.000
					B	0.000	20.000		100.00	0.000	0.000
					C	0.000	20.000		100.00	0.000	4.962
L11 80.000-60.000	70.000	1.24	0.008	100.000	A	0.000	100.000	100.000	100.00	0.000	0.000
					B	0.000	100.000		100.00	0.000	0.000
					C	0.000	100.000		100.00	0.000	22.727
L12 60.000-58.500	59.250	1.182	0.008	7.500	A	0.000	7.500	7.500	100.00	0.000	0.000
					B	0.000	7.500		100.00	0.000	0.000
					C	0.000	7.500		100.00	0.000	1.861
L13 58.500-47.250	52.875	1.144	0.007	56.250	A	0.000	56.250	56.250	100.00	0.000	0.000
					B	0.000	56.250		100.00	0.000	0.000
					C	0.000	56.250		100.00	0.000	11.414
L14 47.250-40.000	43.625	1.083	0.007	36.250	A	0.000	36.250	36.250	100.00	0.000	0.000
					B	0.000	36.250		100.00	0.000	0.000
					C	0.000	36.250		100.00	0.000	8.827
L15 40.000-32.250	36.125	1.026	0.007	38.750	A	0.000	38.750	38.750	100.00	0.000	0.000
					B	0.000	38.750		100.00	0.000	0.000
					C	0.000	38.750		100.00	0.000	9.364
L16 32.250-29.750	31.000	1	0.006	12.500	A	0.000	12.500	12.500	100.00	0.000	0.000
					B	0.000	12.500		100.00	0.000	0.000
					C	0.000	12.500		100.00	0.000	2.685
L17 29.750-20.000	24.875	1	0.006	48.750	A	0.000	48.750	48.750	100.00	0.000	0.000
					B	0.000	48.750		100.00	0.000	0.000
					C	0.000	48.750		100.00	0.000	10.470
L18 20.000-4.250	12.125	1	0.006	78.750	A	0.000	78.750	78.750	100.00	0.000	0.000
					B	0.000	78.750		100.00	0.000	0.000
					C	0.000	78.750		100.00	0.000	16.913
L19 4.250-0.000	2.125	1	0.006	21.250	A	0.000	21.250	21.250	100.00	0.000	0.000
					B	0.000	21.250		100.00	0.000	0.000
					C	0.000	21.250		100.00	0.000	4.564

Load Combinations

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

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	190 - 180	Pole	Max Tension	11	0.000	-0.000	0.002
			Max. Compression	14	-8.533	0.139	-0.081
			Max. Mx	11	-5.319	66.140	0.111
			Max. My	8	-5.317	-0.106	-66.257
			Max. Vy	11	-8.754	66.140	0.111
			Max. Vx	8	8.767	-0.106	-66.257
			Max. Torque	7			-0.361
L2	180 - 160	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-20.323	1.063	-0.837
			Max. Mx	11	-13.000	312.369	0.143
			Max. My	8	-12.995	-0.134	-312.793
			Max. Vy	11	-19.217	312.369	0.143
			Max. Vx	8	19.232	-0.134	-312.793
			Max. Torque	13			1.299
L3	160 - 140	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-30.825	3.004	-2.537
			Max. Mx	11	-19.198	792.105	2.940
			Max. My	8	-19.182	-2.960	-794.770
			Max. Vy	11	-28.650	792.105	2.940
			Max. Vx	8	28.848	-2.960	-794.770
			Max. Torque	6			-2.810
L4	140 - 120	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-37.682	5.665	-3.777
			Max. Mx	11	-24.007	1397.738	8.884
			Max. My	8	-23.993	-8.536	-1404.072
			Max. Vy	11	-31.915	1397.738	8.884
			Max. Vx	8	32.113	-8.536	-1404.072
			Max. Torque	6			-2.981
L5	120 - 113.33	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-40.067	6.659	-4.350
			Max. Mx	11	-25.714	1614.329	10.828
			Max. My	8	-25.700	-10.373	-1621.915
			Max. Vy	11	-32.980	1614.329	10.828
			Max. Vx	8	33.177	-10.373	-1621.915
			Max. Torque	13			2.835
L6	113.33 - 103	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-44.766	8.201	-4.832
			Max. Mx	11	-29.248	1966.372	13.978
			Max. My	8	-29.235	-13.221	-1975.741
			Max. Vy	11	-34.929	1966.372	13.978
			Max. Vx	8	35.126	-13.221	-1975.741
			Max. Torque	13			2.886
L7	103 - 100	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-46.038	8.648	-5.090
			Max. Mx	11	-30.220	2071.947	14.854
			Max. My	8	-30.208	-14.049	-2081.882
			Max. Vy	11	-35.410	2071.947	14.854

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	8	35.607	-14.049	-2081.882
			Max. Torque	13			2.701
L8	100 - 85.5	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-52.935	11.041	-6.047
			Max. Mx	11	-35.464	2606.486	19.201
			Max. My	8	-35.453	-17.996	-2618.968
			Max. Vy	11	-38.110	2606.486	19.201
			Max. Vx	8	38.306	-17.996	-2618.968
			Max. Torque	13			2.777
L9	85.5 - 84	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-53.689	11.285	-6.187
			Max. Mx	11	-36.058	2663.879	19.636
			Max. My	8	-36.046	-18.405	-2676.643
			Max. Vy	11	-38.366	2663.879	19.636
			Max. Vx	8	38.566	-18.405	-2676.643
			Max. Torque	2			2.701
L10	84 - 80	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-55.567	11.948	-6.569
			Max. Mx	11	-37.522	2818.799	20.796
			Max. My	8	-37.511	-19.494	-2832.313
			Max. Vy	11	-39.044	2818.799	20.796
			Max. Vx	8	39.239	-19.494	-2832.313
			Max. Torque	2			2.773
L11	80 - 60	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-66.228	15.419	-8.420
			Max. Mx	11	-46.046	3636.760	26.643
			Max. My	8	-46.037	-24.877	-3653.894
			Max. Vy	11	-42.375	3636.760	26.643
			Max. Vx	8	42.571	-24.877	-3653.894
			Max. Torque	2			3.386
L12	60 - 58.5	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-67.122	15.663	-8.560
			Max. Mx	11	-46.786	3700.521	27.077
			Max. My	8	-46.778	-25.285	-3717.939
			Max. Vy	5	42.599	-3693.232	-31.225
			Max. Vx	8	42.799	-25.285	-3717.939
			Max. Torque	2			3.411
L13	58.5 - 47.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-73.273	17.442	-9.587
			Max. Mx	11	-51.838	4188.402	30.325
			Max. My	8	-51.831	-28.342	-4207.928
			Max. Vy	11	-44.081	4188.402	30.325
			Max. Vx	8	44.278	-28.342	-4207.928
			Max. Torque	2			3.556
L14	47.25 - 40	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-77.894	18.589	-10.249
			Max. Mx	11	-55.746	4511.597	32.414
			Max. My	8	-55.740	-30.307	-4532.480
			Max. Vy	11	-45.030	4511.597	32.414
			Max. Vx	8	45.228	-30.307	-4532.480
			Max. Torque	2			3.664
L15	40 - 32.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-82.834	19.812	-10.955
			Max. Mx	11	-59.936	4864.343	34.641
			Max. My	8	-59.931	-32.405	-4886.673
			Max. Vy	5	45.954	-4855.092	-39.994
			Max. Vx	8	46.152	-32.405	-4886.673
			Max. Torque	2			3.772
L16	32.25 - 29.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-84.727	20.207	-11.184
			Max. Mx	11	-61.584	4979.635	35.358
			Max. My	8	-61.579	-33.080	-5002.432
			Max. Vy	5	46.238	-4970.199	-40.826
			Max. Vx	8	46.436	-33.080	-5002.432
			Max. Torque	2			3.802
L17	29.75 - 20	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-91.215	21.746	-12.072
			Max. Mx	11	-67.149	5435.749	38.148

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	8	-67.146	-35.708	-5460.358
			Max. Vy	5	47.273	-5425.590	-44.060
			Max. Vx	8	47.470	-35.708	-5460.358
			Max. Torque	2			3.919
L18	20 - 4.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-102.946	24.232	-13.508
			Max. Mx	11	-77.402	6193.387	42.624
			Max. My	8	-77.402	-39.926	-6220.905
			Max. Vy	5	48.869	-6182.068	-49.248
			Max. Vx	8	49.065	-39.926	-6220.905
			Max. Torque	2			4.109
L19	4.25 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-106.477	24.902	-13.895
			Max. Mx	11	-80.535	6402.045	43.824
			Max. My	8	-80.535	-41.058	-6430.342
			Max. Vy	5	49.284	-6390.414	-50.639
			Max. Vx	8	49.479	-41.058	-6430.342
			Max. Torque	2			4.160

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	106.477	-0.001	0.001
	Max. H_x	11	80.544	49.264	0.304
	Max. H_z	2	80.545	0.304	49.463
	Max. M_x	2	6423.533	0.304	49.463
	Max. M_z	5	6390.414	-49.269	-0.304
	Max. Torsion	2	4.160	0.304	49.463
	Min. Vert	11	80.544	49.264	0.304
	Min. H_x	5	80.545	-49.269	-0.304
	Min. H_z	8	80.545	-0.304	-49.463
	Min. M_x	8	-6430.342	-0.304	-49.463
	Min. M_z	11	-6402.045	49.264	0.304
	Min. Torsion	8	-4.159	-0.304	-49.463

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	80.545	-0.000	0.000	3.321	6.035	0.000
Dead+Wind 0 deg - No Ice	80.545	-0.304	-49.463	-6423.533	53.415	-4.160
Dead+Wind 30 deg - No Ice	80.545	24.373	-42.686	-5539.092	-3151.482	-3.092
Dead+Wind 60 deg - No Ice	80.545	42.519	-24.469	-3169.291	-5510.300	-1.195
Dead+Wind 90 deg - No Ice	80.545	49.269	0.304	50.639	-6390.414	1.021
Dead+Wind 120 deg - No Ice	80.545	42.823	24.996	3257.879	-5557.469	2.964
Dead+Wind 150 deg - No Ice	80.545	24.900	42.990	5593.069	-3233.261	4.113
Dead+Wind 180 deg - No Ice	80.545	0.304	49.463	6430.342	-41.058	4.159
Dead+Wind 210 deg - No Ice	80.545	-24.373	42.686	5545.903	3163.841	3.092
Dead+Wind 240 deg - No Ice	80.545	-42.519	24.469	3176.103	5522.662	1.195
Dead+Wind 270 deg - No Ice	80.544	-49.264	-0.304	-43.824	6402.045	-1.021
Dead+Wind 300 deg - No Ice	80.545	-42.823	-24.996	-3251.072	5569.830	-2.964
Dead+Wind 330 deg - No Ice	80.545	-24.900	-42.990	-5586.262	3245.619	-4.113
Dead+Ice+Temp	106.477	0.001	-0.001	13.895	24.902	-0.000
Dead+Wind 0 deg+Ice+Temp	106.477	-0.034	-6.812	-878.383	30.601	-0.759
Dead+Wind 30 deg+Ice+Temp	106.477	3.366	-5.882	-756.189	-414.748	-0.659
Dead+Wind 60	106.477	5.864	-3.377	-427.580	-742.168	-0.382

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
deg+Ice+Temp						
Dead+Wind 90 deg+Ice+Temp	106.477	6.791	0.034	19.392	-863.928	-0.003
Dead+Wind 120 deg+Ice+Temp	106.477	5.898	3.435	464.961	-747.403	0.377
Dead+Wind 150 deg+Ice+Temp	106.477	3.425	5.916	789.737	-423.814	0.656
Dead+Wind 180 deg+Ice+Temp	106.477	0.034	6.812	906.697	20.131	0.759
Dead+Wind 210 deg+Ice+Temp	106.477	-3.366	5.882	784.502	465.480	0.659
Dead+Wind 240 deg+Ice+Temp	106.477	-5.864	3.377	455.894	792.900	0.382
Dead+Wind 270 deg+Ice+Temp	106.477	-6.791	-0.034	8.923	914.660	0.003
Dead+Wind 300 deg+Ice+Temp	106.477	-5.898	-3.435	-436.646	798.135	-0.377
Dead+Wind 330 deg+Ice+Temp	106.477	-3.425	-5.916	-761.423	474.546	-0.656
Dead+Wind 0 deg - Service	80.545	-0.105	-17.113	-2221.025	22.537	-1.443
Dead+Wind 30 deg - Service	80.545	8.433	-14.769	-1915.057	-1086.796	-1.072
Dead+Wind 60 deg - Service	80.545	14.711	-8.466	-1094.778	-1903.268	-0.414
Dead+Wind 90 deg - Service	80.545	17.046	0.105	19.758	-2207.844	0.355
Dead+Wind 120 deg - Service	80.545	14.817	8.649	1129.972	-1919.713	1.028
Dead+Wind 150 deg - Service	80.545	8.615	14.874	1938.223	-1115.115	1.427
Dead+Wind 180 deg - Service	80.545	0.105	17.113	2227.842	-10.161	1.443
Dead+Wind 210 deg - Service	80.545	-8.433	14.770	1921.972	1099.229	1.072
Dead+Wind 240 deg - Service	80.545	-14.711	8.466	1101.596	1915.646	0.414
Dead+Wind 270 deg - Service	80.545	-17.046	-0.105	-12.940	2220.220	-0.355
Dead+Wind 300 deg - Service	80.545	-14.817	-8.649	-1123.097	1931.994	-1.028
Dead+Wind 330 deg - Service	80.545	-8.616	-14.875	-1931.503	1127.550	-1.427

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.000	-80.545	0.000	0.000	80.545	-0.000	0.000%
2	-0.304	-80.545	-49.465	0.304	80.545	49.463	0.002%
3	24.373	-80.545	-42.686	-24.373	80.545	42.686	0.000%
4	42.519	-80.545	-24.469	-42.519	80.545	24.469	0.000%
5	49.272	-80.545	0.304	-49.269	80.545	-0.304	0.004%
6	42.823	-80.545	24.996	-42.823	80.545	-24.996	0.000%
7	24.900	-80.545	42.990	-24.900	80.545	-42.990	0.000%
8	0.304	-80.545	49.465	-0.304	80.545	-49.463	0.002%
9	-24.373	-80.545	42.686	24.373	80.545	-42.686	0.000%
10	-42.519	-80.545	24.469	42.519	80.545	-24.469	0.000%
11	-49.272	-80.545	-0.304	49.264	80.544	0.304	0.009%
12	-42.823	-80.545	-24.996	42.823	80.545	24.996	0.000%
13	-24.900	-80.545	-42.990	24.900	80.545	42.990	0.000%
14	0.000	-106.477	0.000	-0.001	106.477	0.001	0.002%
15	-0.034	-106.477	-6.812	0.034	106.477	6.812	0.000%
16	3.366	-106.477	-5.882	-3.366	106.477	5.882	0.000%
17	5.864	-106.477	-3.377	-5.864	106.477	3.377	0.000%
18	6.791	-106.477	0.034	-6.791	106.477	-0.034	0.000%
19	5.898	-106.477	3.435	-5.898	106.477	-3.435	0.000%
20	3.425	-106.477	5.916	-3.425	106.477	-5.916	0.000%
21	0.034	-106.477	6.812	-0.034	106.477	-6.812	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
22	-3.366	-106.477	5.882	3.366	106.477	-5.882	0.000%
23	-5.864	-106.477	3.377	5.864	106.477	-3.377	0.000%
24	-6.791	-106.477	-0.034	6.791	106.477	0.034	0.000%
25	-5.898	-106.477	-3.435	5.898	106.477	3.435	0.000%
26	-3.425	-106.477	-5.916	3.425	106.477	5.916	0.000%
27	-0.105	-80.545	-17.116	0.105	80.545	17.113	0.004%
28	8.433	-80.545	-14.770	-8.433	80.545	14.769	0.002%
29	14.712	-80.545	-8.467	-14.711	80.545	8.466	0.002%
30	17.049	-80.545	0.105	-17.046	80.545	-0.105	0.004%
31	14.818	-80.545	8.649	-14.817	80.545	-8.649	0.001%
32	8.616	-80.545	14.875	-8.615	80.545	-14.874	0.002%
33	0.105	-80.545	17.116	-0.105	80.545	-17.113	0.004%
34	-8.433	-80.545	14.770	8.433	80.545	-14.770	0.001%
35	-14.712	-80.545	8.467	14.711	80.545	-8.466	0.002%
36	-17.049	-80.545	-0.105	17.046	80.545	0.105	0.004%
37	-14.818	-80.545	-8.649	14.817	80.545	8.649	0.002%
38	-8.616	-80.545	-14.875	8.616	80.545	14.875	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00002139	0.00012130
3	Yes	18	0.00000001	0.00009779
4	Yes	18	0.00000001	0.00010086
5	Yes	14	0.00005069	0.00013459
6	Yes	18	0.00000001	0.00010788
7	Yes	18	0.00000001	0.00010100
8	Yes	15	0.00002139	0.00007610
9	Yes	18	0.00000001	0.00010374
10	Yes	18	0.00000001	0.00010023
11	Yes	13	0.00011672	0.00010644
12	Yes	18	0.00000001	0.00010188
13	Yes	18	0.00000001	0.00010920
14	Yes	8	0.00000001	0.00005117
15	Yes	16	0.00000001	0.00007236
16	Yes	16	0.00000001	0.00007239
17	Yes	16	0.00000001	0.00007196
18	Yes	16	0.00000001	0.00007111
19	Yes	16	0.00000001	0.00007427
20	Yes	16	0.00000001	0.00007547
21	Yes	16	0.00000001	0.00007483
22	Yes	16	0.00000001	0.00007720
23	Yes	16	0.00000001	0.00007732
24	Yes	16	0.00000001	0.00007546
25	Yes	16	0.00000001	0.00007671
26	Yes	16	0.00000001	0.00007581
27	Yes	13	0.00011889	0.00007608
28	Yes	14	0.00000001	0.00013462
29	Yes	14	0.00000001	0.00014667
30	Yes	13	0.00011890	0.00004178
31	Yes	15	0.00000001	0.00007768
32	Yes	14	0.00000001	0.00013843
33	Yes	13	0.00011889	0.00006663
34	Yes	15	0.00000001	0.00007443
35	Yes	14	0.00000001	0.00014422
36	Yes	13	0.00011889	0.00003528
37	Yes	14	0.00000001	0.00014154
38	Yes	15	0.00000001	0.00008034

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	190 - 180	25.809	32	1.119	0.002
L2	180 - 160	23.470	32	1.112	0.002
L3	160 - 140	18.896	38	1.061	0.002
L4	140 - 120	14.630	38	0.962	0.001
L5	120 - 113.33	10.860	38	0.826	0.001
L6	113.33 - 103	9.737	38	0.782	0.001
L7	103 - 100	8.110	38	0.720	0.001
L8	100 - 85.5	7.665	38	0.699	0.001
L9	85.5 - 84	5.666	38	0.614	0.001
L10	84 - 80	5.474	38	0.606	0.001
L11	80 - 60	4.978	38	0.579	0.001
L12	60 - 58.5	2.821	38	0.445	0.000
L13	58.5 - 47.25	2.683	38	0.435	0.000
L14	47.25 - 40	1.757	38	0.349	0.000
L15	40 - 32.25	1.264	38	0.299	0.000
L16	32.25 - 29.75	0.824	38	0.242	0.000
L17	29.75 - 20	0.701	38	0.226	0.000
L18	20 - 4.25	0.316	38	0.150	0.000
L19	4.25 - 0	0.014	38	0.031	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
190.000	PD201-7	32	25.809	1.119	0.002	91299
188.000	800MHZ RRH	32	25.341	1.118	0.002	91299
182.000	Platform Mount [LP 403-1]	32	23.937	1.114	0.002	57111
173.000	Platform Mount [LP 405-1]	32	21.847	1.100	0.002	27264
162.000	(2) 7770.00 w/ Mount Pipe	38	19.343	1.068	0.002	16675
151.000	Pipe Mount [PM 601-3]	38	16.927	1.022	0.002	12104
150.000	LNX-6514DS-T4M w/ Mount Pipe	38	16.713	1.017	0.002	11811
125.000	PD128-1	38	11.747	0.861	0.001	7789
110.000	PD128-1	38	9.197	0.762	0.001	9481
95.000	PD128-1	38	6.946	0.668	0.001	9817
80.000	DB222	38	4.978	0.579	0.001	9217

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	190 - 180	74.498	7	3.232	0.006
L2	180 - 160	67.750	7	3.210	0.006
L3	160 - 140	54.553	13	3.063	0.006
L4	140 - 120	42.240	13	2.778	0.004
L5	120 - 113.33	31.359	13	2.385	0.003
L6	113.33 - 103	28.115	13	2.258	0.003
L7	103 - 100	23.420	13	2.078	0.002
L8	100 - 85.5	22.133	13	2.019	0.002
L9	85.5 - 84	16.361	13	1.774	0.002
L10	84 - 80	15.808	13	1.749	0.002
L11	80 - 60	14.375	13	1.673	0.002
L12	60 - 58.5	8.148	13	1.284	0.001
L13	58.5 - 47.25	7.749	13	1.257	0.001
L14	47.25 - 40	5.073	13	1.009	0.001
L15	40 - 32.25	3.650	13	0.865	0.001
L16	32.25 - 29.75	2.379	13	0.699	0.001

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L17	29.75 - 20	2.025	13	0.653	0.001
L18	20 - 4.25	0.913	13	0.433	0.000
L19	4.25 - 0	0.040	13	0.088	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
190.000	PD201-7	7	74.498	3.232	0.006	31856
188.000	800MHZ RRH	7	73.146	3.229	0.006	31856
182.000	Platform Mount [LP 403-1]	7	69.096	3.216	0.006	19926
173.000	Platform Mount [LP 405-1]	7	63.066	3.175	0.006	9506
162.000	(2) 7770.00 w/ Mount Pipe	13	55.842	3.084	0.006	5816
151.000	Pipe Mount [PM 601-3]	13	48.869	2.952	0.005	4220
150.000	LNX-6514DS-T4M w/ Mount Pipe	13	48.250	2.937	0.005	4117
125.000	PD128-1	13	33.919	2.486	0.003	2710
110.000	PD128-1	13	26.558	2.201	0.003	3295
95.000	PD128-1	13	20.058	1.928	0.002	3408
80.000	DB222	13	14.375	1.673	0.002	3198

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	190 - 180 (1)	30" x 0.375"	10.000	0.000	0.0	25.075	34.901	-5.314	875.146	0.006
L2	180 - 160 (2)	36" x 0.375"	20.000	0.000	0.0	23.696	41.970	-12.990	994.507	0.013
L3	160 - 140 (3)	42" x 0.375"	20.000	0.000	0.0	22.711	49.038	-19.165	1113.690	0.017
L4	140 - 120 (4)	P48x3/8	20.000	0.000	0.0	21.972	56.107	-23.977	1232.770	0.019
L5	120 - 113.33 (5)	P54x3/8	6.670	0.000	0.0	21.397	63.175	-25.685	1351.780	0.019
L6	113.33 - 103 (6)	RPS 54" x 0.49054"	10.330	0.000	0.0	21.386	82.462	-29.221	1763.510	0.017
L7	103 - 100 (7)	RPS 54" x 0.49054"	3.000	0.000	0.0	21.386	82.462	-30.194	1763.510	0.017
L8	100 - 85.5 (8)	RPS 60" x 0.47803"	14.500	0.000	0.0	20.926	89.389	-35.440	1870.570	0.019
L9	85.5 - 84 (9)	RPS 60" x 0.55603"	1.500	0.000	0.0	20.923	103.838	-36.034	2172.590	0.017
L10	84 - 80 (10)	RPS 60" x 0.50354"	4.000	0.000	0.0	20.928	94.118	-37.499	1969.690	0.019
L11	80 - 60 (11)	RPS 60" x 0.57817"	20.000	0.000	0.0	22.323	107.932	-46.028	2409.390	0.019
L12	60 - 58.5 (12)	RPS 60" x 0.70417"	1.500	0.000	0.0	21.528	131.175	-46.768	2823.940	0.017
L13	58.5 - 47.25 (13)	P60x5/8	11.250	0.000	0.0	23.696	116.583	-51.823	2762.520	0.019
L14	47.25 - 40 (14)	RPS 60" x 0.76962"	7.250	0.000	0.0	21.546	143.209	-55.733	3085.580	0.018
L15	40 - 32.25 (15)	RPS 60" x 0.76962"	7.750	0.000	0.0	21.546	143.209	-59.926	3085.580	0.019
L16	32.25 - 29.75 (16)	RPS 60" x 0.96202"	2.500	0.000	0.0	21.540	178.429	-61.574	3843.360	0.016
L17	29.75 - 20 (17)	RPS 60" x 0.81453"	9.750	0.000	0.0	21.528	151.451	-67.143	3260.440	0.021
L18	20 - 4.25 (18)	RPS 60" x 0.94201"	15.750	0.000	0.0	22.800	174.777	-77.401	3984.910	0.019
L19	4.25 - 0 (19)	RPS 60" x 1.08084"	4.250	0.000	0.0	22.776	200.063	-80.535	4556.650	0.018

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	190 - 180 (1)	30" x 0.375"	66.320	3.117	25.075	0.124	0.000	0.000	25.075	0.000
L2	180 - 160 (2)	36" x 0.375"	312.871	10.149	23.696	0.428	0.000	0.000	23.696	0.000
L3	160 - 140 (3)	42" x 0.375"	796.862	18.906	22.711	0.832	0.000	0.000	22.711	0.000
L4	140 - 120 (4)	P48x3/8	1410.233	25.531	21.972	1.162	0.000	0.000	21.972	0.000
L5	120 - 113.33 (5)	P54x3/8	1629.425	23.247	21.397	1.086	0.000	0.000	21.397	0.000
L6	113.33 - 103 (6)	RPS 54" x 0.49054"	1985.350	21.793	21.386	1.019	0.000	0.000	21.386	0.000
L7	103 - 100 (7)	RPS 54" x 0.49054"	2092.092	22.965	21.386	1.074	0.000	0.000	21.386	0.000
L8	100 - 85.5 (8)	RPS 60" x 0.47803"	2632.208	23.936	20.926	1.144	0.000	0.000	20.926	0.000
L9	85.5 - 84 (9)	RPS 60" x 0.55603"	2690.183	21.114	20.923	1.009	0.000	0.000	20.923	0.000
L10	84 - 80 (10)	RPS 60" x 0.50354"	2846.650	24.606	20.928	1.176	0.000	0.000	20.928	0.000
L11	80 - 60 (11)	RPS 60" x 0.57817"	3672.375	27.750	22.323	1.243	0.000	0.000	22.323	0.000
L12	60 - 58.5 (12)	RPS 60" x 0.70417"	3736.717	23.330	23.681	0.985	0.000	0.000	23.681	0.000
L13	58.5 - 47.25 (13)	P60x5/8	4228.950	29.630	23.696	1.250	0.000	0.000	23.696	0.000
L14	47.25 - 40 (14)	RPS 60" x 0.76962"	4554.942	26.106	23.701	1.102	0.000	0.000	23.701	0.000
L15	40 - 32.25 (15)	RPS 60" x 0.76962"	4910.675	28.145	23.701	1.188	0.000	0.000	23.701	0.000
L16	32.25 - 29.75 (16)	RPS 60" x 0.96202"	5026.925	23.273	23.694	0.982	0.000	0.000	23.694	0.000
L17	29.75 - 20 (17)	RPS 60" x 0.81453"	5486.775	29.780	23.681	1.258	0.000	0.000	23.681	0.000
L18	20 - 4.25 (18)	RPS 60" x 0.94201"	6250.417	29.522	25.080	1.177	0.000	0.000	25.080	0.000
L19	4.25 - 0 (19)	RPS 60" x 1.08084"	6460.675	26.782	25.054	1.069	0.000	0.000	25.054	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	190 - 180 (1)	30" x 0.375"	8.777	0.503	16.800	0.030	0.335	0.008	15.644	0.001
L2	180 - 160 (2)	36" x 0.375"	19.244	0.917	16.800	0.055	1.299	0.021	11.901	0.002
L3	160 - 140 (3)	42" x 0.375"	29.071	1.186	16.800	0.071	2.742	0.033	9.619	0.003
L4	140 - 120 (4)	P48x3/8	32.337	1.153	16.800	0.069	2.740	0.025	8.021	0.003
L5	120 - 113.33 (5)	P54x3/8	33.401	1.057	16.800	0.063	2.835	0.020	7.343	0.003
L6	113.33 - 103 (6)	RPS 54" x 0.49054"	35.351	0.857	15.372	0.056	2.651	0.015	10.272	0.001
L7	103 - 100 (7)	RPS 54" x 0.49054"	35.831	0.869	15.372	0.057	2.701	0.015	10.272	0.001
L8	100 - 85.5 (8)	RPS 60" x 0.47803"	38.530	0.862	15.652	0.055	2.610	0.012	9.190	0.001
L9	85.5 - 84 (9)	RPS 60" x 0.55603"	38.789	0.747	14.788	0.051	2.641	0.010	11.101	0.001
L10	84 - 80 (10)	RPS 60" x 0.50354"	39.463	0.839	15.372	0.055	2.726	0.012	9.807	0.001
L11	80 - 60 (11)	RPS 60" x 0.57817"	42.793	0.793	15.944	0.050	3.219	0.012	11.656	0.001
L12	60 - 58.5 (12)	RPS 60" x 0.70417"	43.021	0.656	14.352	0.046	3.248	0.010	14.352	0.001
L13	58.5 - 47.25 (13)	P60x5/8	44.499	0.763	16.800	0.045	3.415	0.012	12.848	0.001
L14	47.25 - 40 (14)	RPS 60" x 0.76962"	45.448	0.635	14.364	0.044	3.540	0.010	14.364	0.001
L15	40 - 32.25 (15)	RPS 60" x 0.76962"	46.371	0.648	14.364	0.045	3.665	0.011	14.364	0.001
L16	32.25 - 29.75 (16)	RPS 60" x 0.96202"	46.656	0.523	14.360	0.036	3.700	0.009	14.360	0.001

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 $\frac{f_{vt}}{F_{vt}}$
L17	29.75 - 20 (17)	RPS 60" x 0.81453"	47.689	0.630	14.352	0.044	3.835	0.010	14.352	0.001
L18	20 - 4.25 (18)	RPS 60" x 0.94201"	49.282	0.564	15.200	0.037	4.054	0.010	15.200	0.001
L19	4.25 - 0 (19)	RPS 60" x 1.08084"	49.696	0.497	15.184	0.033	4.113	0.009	15.184	0.001

Pole Interaction Design Data

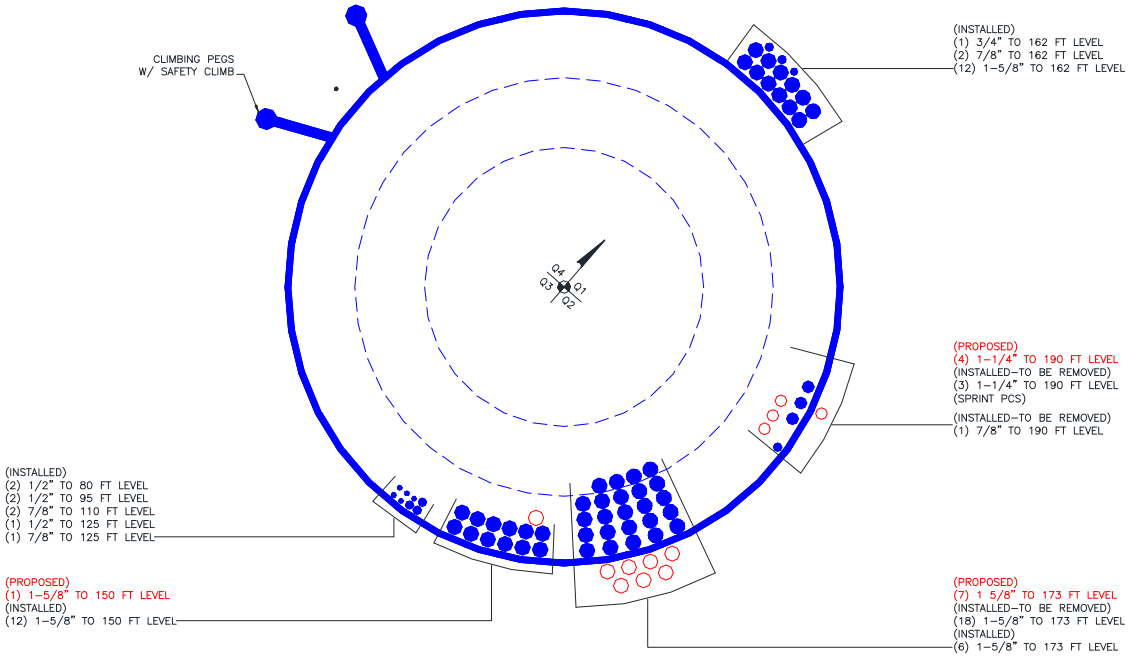
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	190 - 180 (1)	0.006	0.124	0.000	0.030	0.001	0.131 ✔	1.333	H1-3+VT ✔
L2	180 - 160 (2)	0.013	0.428	0.000	0.055	0.002	0.445 ✔	1.333	H1-3+VT ✔
L3	160 - 140 (3)	0.017	0.832	0.000	0.071	0.003	0.855 ✔	1.333	H1-3+VT ✔
L4	140 - 120 (4)	0.019	1.162	0.000	0.069	0.003	1.187 ✔	1.333	H1-3+VT ✔
L5	120 - 113.33 (5)	0.019	1.086	0.000	0.063	0.003	1.110 ✔	1.333	H1-3+VT ✔
L6	113.33 - 103 (6)	0.017	1.019	0.000	0.056	0.001	1.039 ✔	1.333	H1-3+VT ✔
L7	103 - 100 (7)	0.017	1.074	0.000	0.057	0.001	1.094 ✔	1.333	H1-3+VT ✔
L8	100 - 85.5 (8)	0.019	1.144	0.000	0.055	0.001	1.166 ✔	1.333	H1-3+VT ✔
L9	85.5 - 84 (9)	0.017	1.009	0.000	0.051	0.001	1.028 ✔	1.333	H1-3+VT ✔
L10	84 - 80 (10)	0.019	1.176	0.000	0.055	0.001	1.198 ✔	1.333	H1-3+VT ✔
L11	80 - 60 (11)	0.019	1.243	0.000	0.050	0.001	1.265 ✔	1.333	H1-3+VT ✔
L12	60 - 58.5 (12)	0.017	0.985	0.000	0.046	0.001	1.004 ✔	1.333	H1-3+VT ✔
L13	58.5 - 47.25 (13)	0.019	1.250	0.000	0.045	0.001	1.271 ✔	1.333	H1-3+VT ✔
L14	47.25 - 40 (14)	0.018	1.102	0.000	0.044	0.001	1.122 ✔	1.333	H1-3+VT ✔
L15	40 - 32.25 (15)	0.019	1.188	0.000	0.045	0.001	1.209 ✔	1.333	H1-3+VT ✔
L16	32.25 - 29.75 (16)	0.016	0.982	0.000	0.036	0.001	1.000 ✔	1.333	H1-3+VT ✔
L17	29.75 - 20 (17)	0.021	1.258	0.000	0.044	0.001	1.280 ✔	1.333	H1-3+VT ✔
L18	20 - 4.25 (18)	0.019	1.177	0.000	0.037	0.001	1.198 ✔	1.333	H1-3+VT ✔
L19	4.25 - 0 (19)	0.018	1.069	0.000	0.033	0.001	1.088 ✔	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	190 - 180	Pole	30" x 0.375"	1	-5.314	1166.570	9.9	Pass
L2	180 - 160	Pole	36" x 0.375"	2	-12.990	1325.678	33.3	Pass
L3	160 - 140	Pole	42" x 0.375"	3	-19.165	1484.549	64.2	Pass
L4	140 - 120	Pole	P48x3/8	4	-23.977	1643.282	89.0	Pass
L5	120 - 113.33	Pole	P54x3/8	5	-25.685	1801.923	83.3	Pass
L6	113.33 - 103	Pole	RPS 54" x 0.49054"	6	-29.221	2350.759	77.9	Pass
L7	103 - 100	Pole	RPS 54" x 0.49054"	7	-30.194	2350.759	82.1	Pass
L8	100 - 85.5	Pole	RPS 60" x 0.47803"	8	-35.440	2493.470	87.5	Pass
L9	85.5 - 84	Pole	RPS 60" x 0.55603"	9	-36.034	2896.062	77.1	Pass
L10	84 - 80	Pole	RPS 60" x 0.50354"	10	-37.499	2625.597	89.9	Pass
L11	80 - 60	Pole	RPS 60" x 0.57817"	11	-46.028	3211.717	94.9	Pass
L12	60 - 58.5	Pole	RPS 60" x 0.70417"	12	-46.768	3764.312	75.3	Pass
L13	58.5 - 47.25	Pole	P60x5/8	13	-51.823	3682.439	95.4	Pass
L14	47.25 - 40	Pole	RPS 60" x 0.76962"	14	-55.733	4113.078	84.1	Pass
L15	40 - 32.25	Pole	RPS 60" x 0.76962"	15	-59.926	4113.078	90.7	Pass
L16	32.25 - 29.75	Pole	RPS 60" x 0.96202"	16	-61.574	5123.199	75.0	Pass
L17	29.75 - 20	Pole	RPS 60" x 0.81453"	17	-67.143	4346.166	96.0	Pass
L18	20 - 4.25	Pole	RPS 60" x 0.94201"	18	-77.401	5311.885	89.9	Pass
L19	4.25 - 0	Pole	RPS 60" x 1.08084"	19	-80.535	6074.014	81.6	Pass
							Summary	
						Pole (L17)	96.0	Pass
						RATING =	**96.0**	**Pass**

APPENDIX B

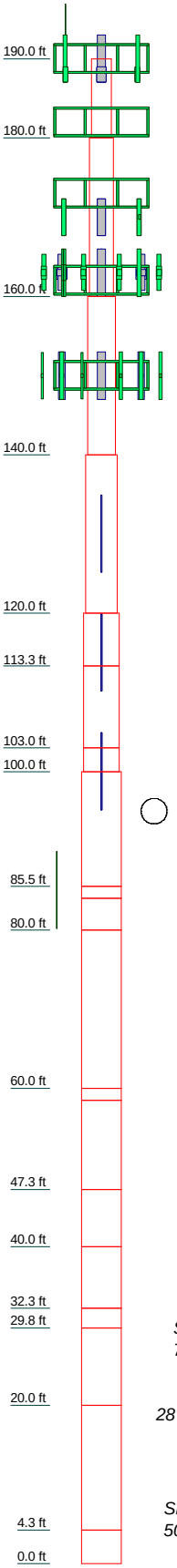
BASE LEVEL DRAWING

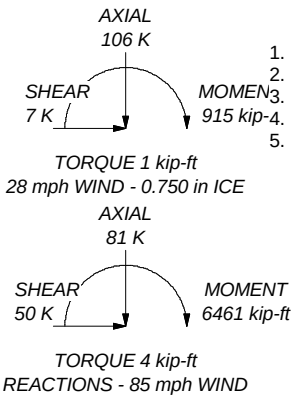

CLIMBING PEGS
W/ SAFETY CLIMB
(INSTALLED)
(1) 3/4" TO 162 FT LEVEL
(2) 7/8" TO 162 FT LEVEL
(12) 1-5/8" TO 162 FT LEVEL
Q4
Q3
Q1
Q2
(PROPOSED)
(4) 1-1/4" TO 190 FT LEVEL
(INSTALLED-TO BE REMOVED)
(3) 1-1/4" TO 190 FT LEVEL
(SPRINT PCS)
(INSTALLED-TO BE REMOVED)
(1) 7/8" TO 190 FT LEVEL
(INSTALLED)
(2) 1/2" TO 80 FT LEVEL
(2) 1/2" TO 95 FT LEVEL
(2) 7/8" TO 110 FT LEVEL
(1) 1/2" TO 125 FT LEVEL
(1) 7/8" TO 125 FT LEVEL
(PROPOSED)
(1) 1-5/8" TO 150 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 150 FT LEVEL
(PROPOSED)
(7) 1 5/8" TO 173 FT LEVEL
(INSTALLED-TO BE REMOVED)
(18) 1-5/8" TO 173 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 173 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Section	Size	Length (ft)	Socket Length (ft)	Grade	Weight (K)
1	30" x 0.375"	10.000	5.000	A53-B-42	1.2
2	36" x 0.375"	20.000	5.000		2.9
3	42" x 0.375"	20.000	5.000		3.3
4	P48x3/8	20.000	5.000		3.8
5	P54x3/8	6.670	5.000		1.4
6	P54x0.490	10.330	5.000	Reinf 38.43 ksi	2.9
7	P54x0.490	3.000	5.000		0.8
8	P54x0.672	14.500	5.000	Reinf 39.13 ksi	4.4
9	P54x0.672	1.500	5.000		0.5
10	P54x0.672	4.000	5.000	Reinf 39.13 ksi	1.3
11	P54x0.672	20.000	5.000	Reinf 39.86 ksi	7.3
12	P54x0.672	1.500	5.000	Reinf 35.88 ksi	0.7
13	P54x0.672	11.250	5.000	A53-B-42	4.5
14	P54x0.762	7.250	5.000	Reinf 35.91 ksi	3.5
15	P54x0.762	7.750	5.000	Reinf 35.90 ksi	3.8
16	P54x0.762	2.500	5.000	Reinf 35.90 ksi	1.5
17	P54x0.762	9.750	5.000	Reinf 35.90 ksi	5.0
18	P54x0.942	15.750	5.000	Reinf 38.00 ksi	9.4
19	P54x1.000	4.250		Reinf 37.96 ksi	2.9
	RPS 60" x 1.000				61.2





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
PD201-7	190	P65-16-XLH-RR w/ Mount Pipe	162
APXVSPP18-C-A20 w/ Mount Pipe	190	P65-16-XLH-RR w/ Mount Pipe	162
APXVSPP18-C-A20 w/ Mount Pipe	190	P65-16-XLH-RR w/ Mount Pipe	162
APXVSPP18-C-A20 w/ Mount Pipe	190	(2) RRUS-11	162
Platform Mount [LP 403-1]	190	(2) RRUS-11	162
TD-RRH8x20-25	190	(2) RRUS-11	162
APXVSPP18-C-A20 w/ Mount Pipe	190	(2) LGP21401	162
APXVTM14-C-120 w/ Mount Pipe	190	(2) LGP21401	162
TD-RRH8x20-25	190	(2) LGP21401	162
APXVSPP18-C-A20 w/ Mount Pipe	190	DC6-48-60-18-8F	162
APXVTM14-C-120 w/ Mount Pipe	190	Platform Mount [LP 403-1]	162
TD-RRH8x20-25	190	6' x 2" Mount Pipe	162
APXVSPP18-C-A20 w/ Mount Pipe	190	(2) 6' x 2" Mount Pipe	162
APXVTM14-C-120 w/ Mount Pipe	190	(2) 6' x 2" Mount Pipe	162
1900MHz RRH	188	Pipe Mount [PM 601-3]	151
1900MHz RRH	188	RRH2X40-AWS	151
1900MHz RRH	188	RRH2X40-AWS	151
800MHZ RRH	188	RRH2X40-AWS	151
Side Arm Mount [SO 102-3]	188	P65-16-XL-R w/ Mount Pipe	150
800MHZ RRH	188	(2) LPA-80080/6CF w/ Mount Pipe	150
800MHZ RRH	188	(2) FD9R6004/2C-3L	150
Platform Mount [LP 403-1]	182	(2) FD9R6004/2C-3L	150
(4) 6' x 2" Mount Pipe	182	(2) FD9R6004/2C-3L	150
(4) 6' x 2" Mount Pipe	182	Platform Mount [LP 403-1]	150
(4) 6' x 2" Mount Pipe	182	(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	150
Platform Mount [LP 405-1]	173		
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	173	(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	150
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	173	DB-T1-6Z-8AB-0Z	150
		(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	150
KRY 112 144/1	173		
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	173	LNX-6514DS-T4M w/ Mount Pipe	150
		LNX-6514DS-T4M w/ Mount Pipe	150
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	173	(2) DB846F65ZAXY w/ Mount Pipe	150
		(2) DB846F65ZAXY w/ Mount Pipe	150
KRY 112 144/1	173	PD128-1	125
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	173	PD201-1	125
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	173	Side Arm Mount [SO 701-3]	125
		PD128-1	110
KRY 112 144/1	173	PD128-1	110
(2) 7770.00 w/ Mount Pipe	162	Side Arm Mount [SO 701-3]	110
(2) 7770.00 w/ Mount Pipe	162	PD128-1	95
(2) 7770.00 w/ Mount Pipe	162	PD128-1	95
TT19-08BP111-001	162	Side Arm Mount [SO 701-3]	95
TT19-08BP111-001	162	DB222	80
TT19-08BP111-001	162	PD128-1	80
		Side Arm Mount [SO 701-3]	80

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-42	42 ksi	63 ksi	Reinf 35.88 ksi	36 ksi	45 ksi
Reinf 38.43 ksi	38 ksi	49 ksi	Reinf 35.91 ksi	36 ksi	45 ksi
Reinf 39.13 ksi	39 ksi	49 ksi	Reinf 35.90 ksi	36 ksi	45 ksi
Reinf 36.97 ksi	37 ksi	47 ksi	Reinf 38.00 ksi	38 ksi	48 ksi
Reinf 39.86 ksi	40 ksi	50 ksi	Reinf 37.96 ksi	38 ksi	48 ksi

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 28 mph basic wind with 0.75 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 96%

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

Job: **190' Monopole / Weston Rt-57 Norfield R**			
Project: **PJF 37513-0787 / BU 829046**			
Client: CCI	Drawn by: John J Woolley	App'd:	
Code: TIA/EIA-222-F	Date: 06/27/14	Scale: NTS	
Path:		Dwg No. E-1	

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
Phone 614-221-6679 • Fax 614-448-4105 • www.PJFweb.com

v4.1 - Effective 7-3-12

Date: 6/27/2014
PJF Project: 37513-0787.002.7805
Client Ref. # 829046
Site Name:
Description:
Owner:
Engineer: JJW

Asymmetric Anchor Rod Analysis

Moment =	6461	k-ft	TIA Ref.	F	Location =	Base Plate		
Axial =	81.0	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	50.0	kips	Max Ratio =	100.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	60							

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

Item	Nominal Anchor Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	1.250	A687	105	150	0.0	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
2	1.250	A687	105	150	6.9	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
3	1.250	A687	105	150	13.8	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
4	1.250	A687	105	150	20.8	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
5	1.250	A687	105	150	27.7	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
6	1.250	A687	105	150	34.6	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
7	1.250	A687	105	150	41.5	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
8	1.250	A687	105	150	48.5	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
9	1.250	A687	105	150	55.4	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
10	1.250	A687	105	150	62.3	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
11	1.250	A687	105	150	69.2	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
12	1.250	A687	105	150	76.2	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
13	1.250	A687	105	150	83.1	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
14	1.250	A687	105	150	90.0	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
15	1.250	A687	105	150	96.9	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
16	1.250	A687	105	150	103.8	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
17	1.250	A687	105	150	110.8	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
18	1.250	A687	105	150	117.7	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
19	1.250	A687	105	150	124.6	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
20	1.250	A687	105	150	131.5	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
21	1.250	A687	105	150	138.5	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
22	1.250	A687	105	150	145.4	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
23	1.250	A687	105	150	152.3	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
24	1.250	A687	105	150	159.2	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
25	1.250	A687	105	150	166.2	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
26	1.250	A687	105	150	173.1	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
27	1.250	A687	105	150	180.0	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
28	1.250	A687	105	150	186.9	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
29	1.250	A687	105	150	193.8	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
30	1.250	A687	105	150	200.8	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
31	1.250	A687	105	150	207.7	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
32	1.250	A687	105	150	214.6	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
33	1.250	A687	105	150	221.5	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
34	1.250	A687	105	150	228.5	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
35	1.250	A687	105	150	235.4	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
36	1.250	A687	105	150	242.3	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
37	1.250	A687	105	150	249.2	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
38	1.250	A687	105	150	256.2	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
39	1.250	A687	105	150	263.1	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
40	1.250	A687	105	150	270.0	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
41	1.250	A687	105	150	276.9	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
42	1.250	A687	105	150	283.8	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
43	1.250	A687	105	150	290.8	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
44	1.250	A687	105	150	297.7	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
45	1.250	A687	105	150	304.6	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
46	1.250	A687	105	150	311.5	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
47	1.250	A687	105	150	318.5	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
48	1.250	A687	105	150	325.4	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
49	1.250	A687	105	150	332.3	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
50	1.250	A687	105	150	339.2	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
51	1.250	A687	105	150	346.2	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
52	1.250	A687	105	150	353.1	67.00	0.00	1.23	55.27	53.19	53.19	0.00	80.99	65.7%
53	2.250	F1554 Gr 105	105	125	3.5	76.00	0.00	3.98	202.68	195.95	195.95	0.00	218.68	89.6%
54	2.250	F1554 Gr 105	105	125	48.5	76.00	0.00	3.98	202.68	195.95	195.95	0.00	218.68	89.6%
55	2.250	F1554 Gr 105	105	125	93.5	76.00	0.00	3.98	202.68	195.95	195.95	0.00	218.68	89.6%
56	2.250	F1554 Gr 105	105	125	138.5	76.00	0.00	3.98	202.68	195.95	195.95	0.00	218.68	89.6%
57	2.250	F1554 Gr 105	105	125	183.5	76.00	0.00	3.98	202.68	195.95	195.95	0.00	218.68	89.6%

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
Phone 614-221-6679 • Fax 614-448-4105 • www.PJFweb.com

v4.1 - Effective 7-3-12

Date: 6/27/2014
PJF Project: 37513-0787.002.7805
Client Ref. # 829046
Site Name:
Description:
Owner:
Engineer: JJW

Asymmetric Anchor Rod Analysis

Moment =	6461	k-ft	TIA Ref.	F	Location =	Base Plate		
Axial =	81.0	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	50.0	kips	Max Ratio =	100.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	60							

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

58	2.250	F1554 Gr 105	105	125	228.5	76.00	0.00	3.98	202.68	195.95	195.95	0.00	218.68	89.6%
59	2.250	F1554 Gr 105	105	125	273.5	76.00	0.00	3.98	202.68	195.95	195.95	0.00	218.68	89.6%
60	2.250	F1554 Gr 105	105	125	318.5	76.00	0.00	3.98	202.68	195.95	195.95	0.00	218.68	89.6%
								95.62						

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

TIA Rev F

Site Data

BU#:	*829046*
Site Name:	
App #:	
Pole Manufacturer:	*Other*

Reactions		
Moment:	3936.34	ft-kips
Axial:	54.1	kips
Shear:	33.4	kips

Reactions adjusted to account for additional anchors

Anchor Rod Data		
Qty:	52	
Diam:	1.25	in
Rod Material:	Other	
Strength (Fu):	150	ksi
Yield (Fy):	105	ksi
Bolt Circle:	67	in

Plate Data		
Diam:	70	in
Thick:	1.25	in
Grade:	36	ksi
Single-Rod B-eff:	3.62	in

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	4.5	in
Height:	8	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	60	in
Thick:	0.75	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

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

Anchor Rod Results

Maximum Rod Tension:	53.2 Kips	
Allowable Tension:	81.0 Kips	
Anchor Rod Stress Ratio:	65.7% **Pass**	

Stiffened
Service, ASD
Fty*ASIF

Base Plate Results Shear Check Only

Base Plate Stress:	4.9 ksi	
Allowable Plate Stress:	19.2 ksi	
Base Plate Stress Ratio:	25.6% **Pass**	

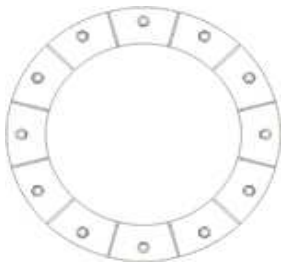
Stiffened
Service, ASD
0.75*Fy*ASIF
Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld :	67.0% **Pass**
Vertical Weld:	43.1% **Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	30.7% **Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	50.2% **Pass**
Plate Comp. (AISC Bracket):	72.7% **Pass**

Pole Results

Pole Punching Shear Check:	10.5% **Pass**



* 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

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
Phone 614-221-6679 • Fax 614-448-4105 • www.PJFweb.com

v4.1 - Effective 7-3-12

Date: 6/27/2014
PJF Project: 37513-0787.002.7805
Client Ref. # 829046
Site Name:
Description: Flange at 20'
Owner:
Engineer: JJW

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	4250	k-ft	TIA Ref.	F		Location =	Flange Plate	
Axial =	67.1	kips	ASIF =	1.3333		η =	N/A	for BP, Rev. G Sect. 4.9.9
Shear =	47.7	kips	Max Ratio =	100.0%		Threads =	N/A	for FP, Rev. G
Anchor Qty =	70							

**** For Flange Plates: Prying action is not considered in the bolt loads. ****

Item	Nominal Bolt Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Bolt Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	1.250	A325	81	105	0.0	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
2	1.250	A325	81	105	11.3	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
3	1.250	A325	81	105	22.5	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
4	1.250	A325	81	105	33.8	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
5	1.250	A325	81	105	45.0	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
6	1.250	A325	81	105	56.3	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
7	1.250	A325	81	105	67.5	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
8	1.250	A325	81	105	78.8	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
9	1.250	A325	81	105	90.0	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
10	1.250	A325	81	105	101.3	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
11	1.250	A325	81	105	112.5	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
12	1.250	A325	81	105	123.8	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
13	1.250	A325	81	105	135.0	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
14	1.250	A325	81	105	146.3	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
15	1.250	A325	81	105	157.5	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
16	1.250	A325	81	105	168.8	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
17	1.250	A325	81	105	180.0	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
18	1.250	A325	81	105	191.3	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
19	1.250	A325	81	105	202.5	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
20	1.250	A325	81	105	213.8	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
21	1.250	A325	81	105	225.0	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
22	1.250	A325	81	105	236.3	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
23	1.250	A325	81	105	247.5	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
24	1.250	A325	81	105	258.8	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
25	1.250	A325	81	105	270.0	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
26	1.250	A325	81	105	281.3	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
27	1.250	A325	81	105	292.5	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
28	1.250	A325	81	105	303.8	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
29	1.250	A325	81	105	315.0	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
30	1.250	A325	81	105	326.3	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
31	1.250	A325	81	105	337.5	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
32	1.250	A325	81	105	348.8	53.00	0.00	1.23	35.57	34.28	34.28	0.00	71.99	47.6%
33	1.250	A325	81	105	0.0	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
34	1.250	A325	81	105	11.3	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
35	1.250	A325	81	105	22.5	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
36	1.250	A325	81	105	33.8	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
37	1.250	A325	81	105	45.0	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
38	1.250	A325	81	105	56.3	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
39	1.250	A325	81	105	67.5	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
40	1.250	A325	81	105	78.8	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
41	1.250	A325	81	105	90.0	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
42	1.250	A325	81	105	101.3	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
43	1.250	A325	81	105	112.5	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
44	1.250	A325	81	105	123.8	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
45	1.250	A325	81	105	135.0	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
46	1.250	A325	81	105	146.3	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
47	1.250	A325	81	105	157.5	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
48	1.250	A325	81	105	168.8	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
49	1.250	A325	81	105	180.0	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
50	1.250	A325	81	105	191.3	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
51	1.250	A325	81	105	202.5	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
52	1.250	A325	81	105	213.8	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
53	1.250	A325	81	105	225.0	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
54	1.250	A325	81	105	236.3	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
55	1.250	A325	81	105	247.5	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
56	1.250	A325	81	105	258.8	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
57	1.250	A325	81	105	270.0	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
Phone 614-221-6679 • Fax 614-448-4105 • www.PJFweb.com

v4.1 - Effective 7-3-12

Date: 6/27/2014
PJF Project: 37513-0787.002.7805
Client Ref. # 829046
Site Name:
Description: Flange at 20'
Owner:
Engineer: JJW

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	4250	k-ft	TIA Ref.	F	Location =	Flange Plate		
Axial =	67.1	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	47.7	kips	Max Ratio =	100.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	70							

**** For Flange Plates: Prying action is not considered in the bolt loads. ****

58	1.250	A325	81	105	281.3	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
59	1.250	A325	81	105	292.5	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
60	1.250	A325	81	105	303.8	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
61	1.250	A325	81	105	315.0	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
62	1.250	A325	81	105	326.3	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
63	1.250	A325	81	105	337.5	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
64	1.250	A325	81	105	348.8	47.00	0.00	1.23	31.62	30.32	30.32	0.00	71.99	42.1%
65	0.000	Sabre 6.5 x 1.25	65	80	0.0	61.25	8.13	8.13	271.51	262.93	271.51	345.86	345.86	78.5%
66	0.000	Sabre 6.5 x 1.25	65	80	60.0	61.25	8.13	8.13	271.51	262.93	271.51	345.86	345.86	78.5%
67	0.000	Sabre 6.5 x 1.25	65	80	120.0	61.25	8.13	8.13	271.51	262.93	271.51	345.86	345.86	78.5%
68	0.000	Sabre 6.5 x 1.25	65	80	180.0	61.25	8.13	8.13	271.51	262.93	271.51	345.86	345.86	78.5%
69	0.000	Sabre 6.5 x 1.25	65	80	240.0	61.25	8.13	8.13	271.51	262.93	271.51	345.86	345.86	78.5%
70	0.000	Sabre 6.5 x 1.25	65	80	300.0	61.25	8.13	8.13	271.51	262.93	271.51	345.86	345.86	78.5%
								127.29						

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data	20' Flange
BU#:	*829046*
Site Name:	
App #:	

Manufacturer:	Other

Reactions		
Moment:	2204.4	ft-kips
Axial:	67.1	kips
Shear:	47.7	kips
Exterior Flange Run, T+Q:	0	kips

Reactions adjusted to account for flange jumps

Elevation: 20 feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	100	<-- Disregard	Bolt Fty:
N/A:	75	<-- Disregard	44.00
Circle:	50	in	

PLATE CHECK ONLY

Plate Data		
Plate Outer Diam:	58.75	in
Plate Inner Diam:	41	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.77	in

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	7	in
Height:	10	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Pole OuterDiam:	60	in
Thick:	0.625	in
Pole Inner Diam:	58.75	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi

Stress Increase Factor	
ASIF:	1.333

Interior Flange Plate Results Flexural Check

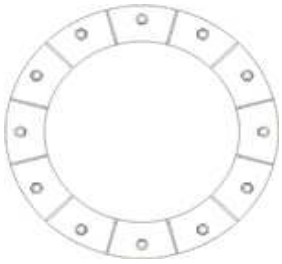
Controlling Bolt Axial Force:	68.2	Kips, Ext. C= Interior C
Plate Stress:	27.8	ksi
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	77.2%	**Pass**

Stiffener Results

Horizontal Weld :	43.2%	**Pass**
Vertical Weld:	37.8%	**Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	26.0%	**Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	30.7%	**Pass**
Plate Comp. (AISC Bracket):	62.2%	**Pass**

Pole Results

Pole Punching Shear Check:	12.2%	**Pass**



* 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

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
Phone 614-221-6679 • Fax 614-448-4105 • www.PJFweb.com

v4.1 - Effective 7-3-12

Date: 6/27/2014
PJF Project: 37513-0787.002.7805
Client Ref. # 829046
Site Name:
Description: Flange at 40'
Owner:
Engineer: JJW

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	3726	k-ft	TIA Ref.	F	Location =	Flange Plate		
Axial =	55.7	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	45.4	kips	Max Ratio =	100.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	70							

**** For Flange Plates: Prying action is not considered in the bolt loads. ****

Item	Nominal Bolt Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Bolt Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	1.250	A325	81	105	0.0	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
2	1.250	A325	81	105	11.3	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
3	1.250	A325	81	105	22.5	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
4	1.250	A325	81	105	33.8	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
5	1.250	A325	81	105	45.0	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
6	1.250	A325	81	105	56.3	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
7	1.250	A325	81	105	67.5	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
8	1.250	A325	81	105	78.8	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
9	1.250	A325	81	105	90.0	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
10	1.250	A325	81	105	101.3	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
11	1.250	A325	81	105	112.5	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
12	1.250	A325	81	105	123.8	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
13	1.250	A325	81	105	135.0	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
14	1.250	A325	81	105	146.3	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
15	1.250	A325	81	105	157.5	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
16	1.250	A325	81	105	168.8	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
17	1.250	A325	81	105	180.0	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
18	1.250	A325	81	105	191.3	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
19	1.250	A325	81	105	202.5	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
20	1.250	A325	81	105	213.8	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
21	1.250	A325	81	105	225.0	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
22	1.250	A325	81	105	236.3	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
23	1.250	A325	81	105	247.5	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
24	1.250	A325	81	105	258.8	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
25	1.250	A325	81	105	270.0	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
26	1.250	A325	81	105	281.3	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
27	1.250	A325	81	105	292.5	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
28	1.250	A325	81	105	303.8	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
29	1.250	A325	81	105	315.0	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
30	1.250	A325	81	105	326.3	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
31	1.250	A325	81	105	337.5	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
32	1.250	A325	81	105	348.8	53.00	0.00	1.23	35.74	34.54	34.54	0.00	71.99	48.0%
33	1.250	A325	81	105	0.0	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
34	1.250	A325	81	105	11.3	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
35	1.250	A325	81	105	22.5	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
36	1.250	A325	81	105	33.8	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
37	1.250	A325	81	105	45.0	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
38	1.250	A325	81	105	56.3	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
39	1.250	A325	81	105	67.5	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
40	1.250	A325	81	105	78.8	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
41	1.250	A325	81	105	90.0	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
42	1.250	A325	81	105	101.3	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
43	1.250	A325	81	105	112.5	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
44	1.250	A325	81	105	123.8	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
45	1.250	A325	81	105	135.0	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
46	1.250	A325	81	105	146.3	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
47	1.250	A325	81	105	157.5	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
48	1.250	A325	81	105	168.8	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
49	1.250	A325	81	105	180.0	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
50	1.250	A325	81	105	191.3	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
51	1.250	A325	81	105	202.5	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
52	1.250	A325	81	105	213.8	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
53	1.250	A325	81	105	225.0	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
54	1.250	A325	81	105	236.3	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
55	1.250	A325	81	105	247.5	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
56	1.250	A325	81	105	258.8	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
57	1.250	A325	81	105	270.0	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
Phone 614-221-6679 • Fax 614-448-4105 • www.PJFweb.com

v4.1 - Effective 7-3-12

Date: 6/27/2014
PJF Project: 37513-0787.002.7805
Client Ref. # 829046
Site Name:
Description: Flange at 40'
Owner:
Engineer: JJW

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	3726	k-ft	TIA Ref.	F	Location =	Flange Plate		
Axial =	55.7	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	45.4	kips	Max Ratio =	100.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	70							

**** For Flange Plates: Prying action is not considered in the bolt loads. ****

58	1.250	A325	81	105	281.3	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
59	1.250	A325	81	105	292.5	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
60	1.250	A325	81	105	303.8	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
61	1.250	A325	81	105	315.0	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
62	1.250	A325	81	105	326.3	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
63	1.250	A325	81	105	337.5	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
64	1.250	A325	81	105	348.8	47.00	0.00	1.23	31.76	30.57	30.57	0.00	71.99	42.5%
65	0.000	Sabre 6 x 1	65	80	0.0	61.00	6.00	6.00	200.67	194.83	200.67	250.40	250.40	80.1%
66	0.000	Sabre 6 x 1	65	80	60.0	61.00	6.00	6.00	200.67	194.83	200.67	250.40	250.40	80.1%
67	0.000	Sabre 6 x 1	65	80	120.0	61.00	6.00	6.00	200.67	194.83	200.67	250.40	250.40	80.1%
68	0.000	Sabre 6 x 1	65	80	180.0	61.00	6.00	6.00	200.67	194.83	200.67	250.40	250.40	80.1%
69	0.000	Sabre 6 x 1	65	80	240.0	61.00	6.00	6.00	200.67	194.83	200.67	250.40	250.40	80.1%
70	0.000	Sabre 6 x 1	65	80	300.0	61.00	6.00	6.00	200.67	194.83	200.67	250.40	250.40	80.1%
								114.54						

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data	40' Flange
BU#:	829046
Site Name:	
App #:	

Manufacturer:	Other

Reactions		
Moment:	2218.2	ft-kips
Axial:	55.7	kips
Shear:	45.4	kips
Exterior Flange Run, T+Q:	0	kips

Reactions adjusted to account for flange jumps

Elevation: 40 feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	100	<-- Disregard	Bolt Fty:
N/A:	75	<-- Disregard	44.00
Circle:	50	in	

PLATE CHECK ONLY

Plate Data		
Plate Outer Diam:	59	in
Plate Inner Diam:	41	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.79	in

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	7	in
Height:	10	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Pole OuterDiam:	60	in
Thick:	0.5	in
Pole Inner Diam:	59	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi

Stress Increase Factor	
ASIF:	1.333

Interior Flange Plate Results — Flexural Check

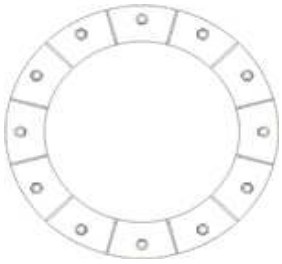
Controlling Bolt Axial Force:	68.3	Kips, Ext. C= Interior C
Plate Stress:	27.8	ksi
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	77.3%	**Pass**

Stiffener Results

Horizontal Weld :	48.3%	**Pass**
Vertical Weld:	42.2%	**Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	30.0%	**Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	34.9%	**Pass**
Plate Comp. (AISC Bracket):	69.6%	**Pass**

Pole Results

Pole Punching Shear Check:	17.0%	**Pass**



* 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

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
Phone 614-221-6679 • Fax 614-448-4105 • www.PJFweb.com

v4.1 - Effective 7-3-12

Date: 6/27/2014
PJF Project: 37513-0787.002.7805
Client Ref. # 829046
Site Name:
Description: Flange at 60'
Owner:
Engineer: JJW

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	3188	k-ft	TIA Ref.	F	Location =	Flange Plate		
Axial =	46.0	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	42.8	kips	Max Ratio =	100.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	67							

**** For Flange Plates: Prying action is not considered in the bolt loads. ****

Item	Nominal Bolt Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Bolt Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	1.250	A325	81	105	0.0	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
2	1.250	A325	81	105	11.3	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
3	1.250	A325	81	105	22.5	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
4	1.250	A325	81	105	33.8	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
5	1.250	A325	81	105	45.0	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
6	1.250	A325	81	105	56.3	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
7	1.250	A325	81	105	67.5	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
8	1.250	A325	81	105	78.8	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
9	1.250	A325	81	105	90.0	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
10	1.250	A325	81	105	101.3	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
11	1.250	A325	81	105	112.5	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
12	1.250	A325	81	105	123.8	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
13	1.250	A325	81	105	135.0	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
14	1.250	A325	81	105	146.3	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
15	1.250	A325	81	105	157.5	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
16	1.250	A325	81	105	168.8	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
17	1.250	A325	81	105	180.0	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
18	1.250	A325	81	105	191.3	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
19	1.250	A325	81	105	202.5	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
20	1.250	A325	81	105	213.8	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
21	1.250	A325	81	105	225.0	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
22	1.250	A325	81	105	236.3	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
23	1.250	A325	81	105	247.5	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
24	1.250	A325	81	105	258.8	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
25	1.250	A325	81	105	270.0	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
26	1.250	A325	81	105	281.3	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
27	1.250	A325	81	105	292.5	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
28	1.250	A325	81	105	303.8	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
29	1.250	A325	81	105	315.0	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
30	1.250	A325	81	105	326.3	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
31	1.250	A325	81	105	337.5	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
32	1.250	A325	81	105	348.8	53.00	0.00	1.23	35.05	33.95	33.95	0.00	71.99	47.2%
33	1.250	A325	81	105	0.0	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
34	1.250	A325	81	105	11.3	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
35	1.250	A325	81	105	22.5	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
36	1.250	A325	81	105	33.8	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
37	1.250	A325	81	105	45.0	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
38	1.250	A325	81	105	56.3	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
39	1.250	A325	81	105	67.5	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
40	1.250	A325	81	105	78.8	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
41	1.250	A325	81	105	90.0	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
42	1.250	A325	81	105	101.3	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
43	1.250	A325	81	105	112.5	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
44	1.250	A325	81	105	123.8	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
45	1.250	A325	81	105	135.0	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
46	1.250	A325	81	105	146.3	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
47	1.250	A325	81	105	157.5	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
48	1.250	A325	81	105	168.8	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
49	1.250	A325	81	105	180.0	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
50	1.250	A325	81	105	191.3	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
51	1.250	A325	81	105	202.5	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
52	1.250	A325	81	105	213.8	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
53	1.250	A325	81	105	225.0	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
54	1.250	A325	81	105	236.3	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
55	1.250	A325	81	105	247.5	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
56	1.250	A325	81	105	258.8	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
57	1.250	A325	81	105	270.0	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
Phone 614-221-6679 • Fax 614-448-4105 • www.PJFweb.com

v4.1 - Effective 7-3-12

Date: 6/27/2014
PJF Project: 37513-0787.002.7805
Client Ref. # 829046
Site Name:
Description: Flange at 60'
Owner:
Engineer: JJW

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	3188	k-ft	TIA Ref.	F	Location =	Flange Plate		
Axial =	46.0	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	42.8	kips	Max Ratio =	100.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	67							

**** For Flange Plates: Prying action is not considered in the bolt loads. ****

58	1.250	A325	81	105	281.3	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
59	1.250	A325	81	105	292.5	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
60	1.250	A325	81	105	303.8	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
61	1.250	A325	81	105	315.0	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
62	1.250	A325	81	105	326.3	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
63	1.250	A325	81	105	337.5	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
64	1.250	A325	81	105	348.8	47.00	0.00	1.23	31.14	30.05	30.05	0.00	71.99	41.7%
65	0.000	Sabre 6.5 x 1.25	65	80	0.0	61.25	8.13	8.13	267.62	260.36	267.62	345.86	345.86	77.4%
66	0.000	Sabre 6.5 x 1.25	65	80	120.0	61.25	8.13	8.13	267.62	260.36	267.62	345.86	345.86	77.4%
67	0.000	Sabre 6.5 x 1.25	65	80	240.0	61.25	8.13	8.13	267.62	260.36	267.62	345.86	345.86	77.4%
								102.91						

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data	60' Flange
BU#:	*829046*
Site Name:	
App #:	

Reactions		
Moment:	2177.8	ft-kips
Axial:	46	kips
Shear:	42.8	kips
Exterior Flange Run, T+Q:	0	kips

Reactions adjusted to account for flange jumps

Manufacturer:	Other

Elevation: 60 feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	100	<-- Disregard	Bolt Fty:
N/A:	75	<-- Disregard	44.00
Circle:	50	in	

PLATE CHECK ONLY

Plate Data		
Plate Outer Diam:	59	in
Plate Inner Diam:	41	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.79	in

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	7	in
Height:	10	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Pole OuterDiam:	60	in
Thick:	0.5	in
Pole Inner Diam:	59	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi

Stress Increase Factor	
ASIF:	1.333

Interior Flange Plate Results Flexural Check

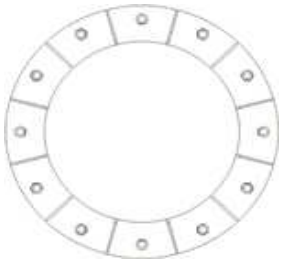
Controlling Bolt Axial Force:	66.8	Kips, Ext. C= Interior C
Plate Stress:	27.2	ksi
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	75.6%	**Pass**

Stiffener Results

Horizontal Weld :	47.2%	**Pass**
Vertical Weld:	41.2%	**Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	29.1%	**Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	34.0%	**Pass**
Plate Comp. (AISC Bracket):	68.0%	**Pass**

Pole Results

Pole Punching Shear Check:	16.6%	**Pass**



* 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

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
Phone 614-221-6679 • Fax 614-448-4105 • www.PJFweb.com

v4.1 - Effective 7-3-12

Date: 6/27/2014
PJF Project: 37513-0787.002.7805
Client Ref. # 829046
Site Name:
Description: Flange at 80'
Owner:
Engineer: JJW

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	2370	k-ft	TIA Ref.	F		Location =	Flange Plate	
Axial =	37.5	kips	ASIF =	1.3333		η =	N/A	for BP, Rev. G Sect. 4.9.9
Shear =	39.5	kips	Max Ratio =	100.0%		Threads =	N/A	for FP, Rev. G
Anchor Qty =	67							

**** For Flange Plates: Prying action is not considered in the bolt loads. ****

Item	Nominal Bolt Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Bolt Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	1.250	A325	81	105	0.0	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
2	1.250	A325	81	105	11.3	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
3	1.250	A325	81	105	22.5	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
4	1.250	A325	81	105	33.8	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
5	1.250	A325	81	105	45.0	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
6	1.250	A325	81	105	56.3	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
7	1.250	A325	81	105	67.5	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
8	1.250	A325	81	105	78.8	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
9	1.250	A325	81	105	90.0	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
10	1.250	A325	81	105	101.3	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
11	1.250	A325	81	105	112.5	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
12	1.250	A325	81	105	123.8	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
13	1.250	A325	81	105	135.0	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
14	1.250	A325	81	105	146.3	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
15	1.250	A325	81	105	157.5	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
16	1.250	A325	81	105	168.8	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
17	1.250	A325	81	105	180.0	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
18	1.250	A325	81	105	191.3	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
19	1.250	A325	81	105	202.5	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
20	1.250	A325	81	105	213.8	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
21	1.250	A325	81	105	225.0	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
22	1.250	A325	81	105	236.3	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
23	1.250	A325	81	105	247.5	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
24	1.250	A325	81	105	258.8	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
25	1.250	A325	81	105	270.0	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
26	1.250	A325	81	105	281.3	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
27	1.250	A325	81	105	292.5	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
28	1.250	A325	81	105	303.8	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
29	1.250	A325	81	105	315.0	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
30	1.250	A325	81	105	326.3	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
31	1.250	A325	81	105	337.5	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
32	1.250	A325	81	105	348.8	53.00	0.00	1.23	30.42	29.42	29.42	0.00	71.99	40.9%
33	1.250	A325	81	105	0.0	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
34	1.250	A325	81	105	11.3	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
35	1.250	A325	81	105	22.5	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
36	1.250	A325	81	105	33.8	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
37	1.250	A325	81	105	45.0	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
38	1.250	A325	81	105	56.3	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
39	1.250	A325	81	105	67.5	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
40	1.250	A325	81	105	78.8	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
41	1.250	A325	81	105	90.0	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
42	1.250	A325	81	105	101.3	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
43	1.250	A325	81	105	112.5	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
44	1.250	A325	81	105	123.8	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
45	1.250	A325	81	105	135.0	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
46	1.250	A325	81	105	146.3	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
47	1.250	A325	81	105	157.5	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
48	1.250	A325	81	105	168.8	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
49	1.250	A325	81	105	180.0	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
50	1.250	A325	81	105	191.3	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
51	1.250	A325	81	105	202.5	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
52	1.250	A325	81	105	213.8	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
53	1.250	A325	81	105	225.0	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
54	1.250	A325	81	105	236.3	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
55	1.250	A325	81	105	247.5	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
56	1.250	A325	81	105	258.8	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
57	1.250	A325	81	105	270.0	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
Phone 614-221-6679 • Fax 614-448-4105 • www.PJFweb.com

v4.1 - Effective 7-3-12

Date: 6/27/2014
PJF Project: 37513-0787.002.7805
Client Ref. # 829046
Site Name:
Description: Flange at 80'
Owner:
Engineer: JJW

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	2370	k-ft	TIA Ref.	F	Location =	Flange Plate		
Axial =	37.5	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	39.5	kips	Max Ratio =	100.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	67							

**** For Flange Plates: Prying action is not considered in the bolt loads. ****

58	1.250	A325	81	105	281.3	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
59	1.250	A325	81	105	292.5	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
60	1.250	A325	81	105	303.8	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
61	1.250	A325	81	105	315.0	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
62	1.250	A325	81	105	326.3	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
63	1.250	A325	81	105	337.5	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
64	1.250	A325	81	105	348.8	47.00	0.00	1.23	27.03	26.03	26.03	0.00	71.99	36.2%
65	0.000	Sabre 4.5 x 1	65	80	0.0	61.00	4.50	4.50	128.11	124.44	128.11	170.16	170.16	75.3%
66	0.000	Sabre 4.5 x 1	65	80	120.0	61.00	4.50	4.50	128.11	124.44	128.11	170.16	170.16	75.3%
67	0.000	Sabre 4.5 x 1	65	80	240.0	61.00	4.50	4.50	128.11	124.44	128.11	170.16	170.16	75.3%
								92.04						

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data	80' Flange
BU#:	*829046*
Site Name:	
App #:	

Reactions		
Moment:	1888.6	ft-kips
Axial:	37.5	kips
Shear:	39.5	kips
Exterior Flange Run, T+Q:	0	kips

Reactions adjusted to account for flange jumps

Manufacturer:	Other

Elevation: 80 feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	100	<-- Disregard	Bolt Fty:
N/A:	75	<-- Disregard	44.00
Circle:	50	in	

PLATE CHECK ONLY

Plate Data		
Plate Outer Diam:	59.25	in
Plate Inner Diam:	41	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.82	in

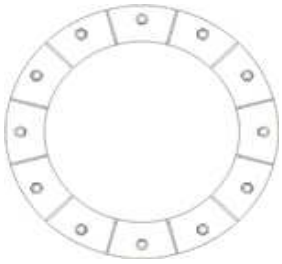
Interior Flange Plate Results	Flexural Check	
Controlling Bolt Axial Force:	57.8	Kips, Ext. C= Interior C
Plate Stress:	23.6	ksi
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	65.4%	**Pass**

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	7	in
Height:	10	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Stiffener Results		
Horizontal Weld :	46.4%	**Pass**
Vertical Weld:	40.5%	**Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	28.5%	**Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	33.3%	**Pass**
Plate Comp. (AISC Bracket):	66.8%	**Pass**

Pole Results		
Pole Punching Shear Check:	21.8%	**Pass**

Pole Data		
Pole OuterDiam:	60	in
Thick:	0.375	in
Pole Inner Diam:	59.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi



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

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#: *829046*
Site Name:
App #:

Pole Manufacturer:	Other

Reactions		
Moment:	1609.669	ft-kips
Axial:	30.194	kips
Shear:	35.83	kips
Elevation:	100	feet

Reactions adjusted to account for load in flat plate shaft reinforcing.

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

Bolt Data			
Qty:	48		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	75	<-- Disregard	Bolt Fty:
N/A:	55	<-- Disregard	44.00
Circle (in.):	57		

Plate Data		
Diam:	60	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.53	in

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	5	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	54	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Flange Bolt Results

			Stiffened
Bolt Tension Capacity, **B**:	46.07	kips	Service, ASD
Max Bolt directly applied T:	27.61	Kips	Fty*ASIF
Min. PL "tc" for **B** cap. **w/o** Pry:	Stiffened	in	
Min PL "treq" for actual **T w/ Pry**:	Stiffened	in	
Min PL "t1" for actual **T w/o Pry**:	Stiffened	in	
T allowable	46.07	kips	<-- B, Stiffened
Prying Force, Q:	0.00	kips	Stiffened
Total Bolt Tension=T+Q:	27.61	kips	
Non-Prying Bolt Stress Ratio, T/B:	59.9%	**Pass**	

Exterior Flange Plate Results — Shear Check Only

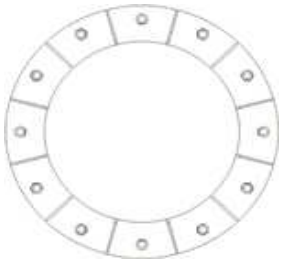
			Stiffened
Compression Side Plate Stress:	3.8	ksi	Service, ASD
Allowable Plate Stress:	19.2	ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	20.1%	**Pass**	Comp. Y.L. Length:
Stiffened			N/A, Roark
Tension Side Stress Ratio, (treq/t)^2:	N/A		

Stiffener Results

Horizontal Weld :	60.1%	**Pass**
Vertical Weld:	40.8%	**Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	28.6%	**Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	44.8%	**Pass**
Plate Comp. (AISC Bracket):	64.6%	**Pass**

Pole Results

Pole Punching Shear Check:	20.6%	**Pass**



* 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

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#: *829046*
Site Name:
App #:

Manufacturer:	Other

Reactions		
Moment:	1609.669	ft-kips
Axial:	30.194	kips
Shear:	35.83	kips
Exterior Flange Run, T+Q:	27.61	kips

Reactions adjusted to account for load in flat plate shaft reinforcing

Elevation: 100 feet

Bolt Data				
Qty:	48			
Diam:	1	Bolt Fu:	120	
Bolt Material:	A325	Bolt Fy:	92	
N/A:	100	<-- Disregard	Bolt Fty:	
N/A:	75	<-- Disregard	44.00	
Circle:	57	in		

Interior Flange Bolt Results

Maximum Bolt Tension:	27.6	Kips, Ext. T=Interior T
Allowable Tension:	46.1	Kips
Bolt Stress Ratio:	59.9%	**Pass**

Plate Data		
Plate Outer Diam:	59.25	in
Plate Inner Diam:	54	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	3.88	in

Interior Flange Plate Results Shear Check Only

Controlling Bolt Axial Force:	28.9	Kips, Ext. C= Interior C
Plate Stress:	4.4	ksi
Allowable Plate Stress:	19.2	ksi
Plate Stress Ratio:	22.9%	**Pass**

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	5	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

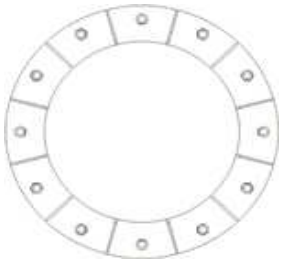
Stiffener Results

Horizontal Weld :	59.8%	**Pass**
Vertical Weld:	33.5%	**Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	21.8%	**Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	44.0%	**Pass**
Plate Comp. (AISC Bracket):	55.8%	**Pass**

Pole Results

Pole Punching Shear Check:	15.9%	**Pass**

Pole Data		
Pole OuterDiam:	60	in
Thick:	0.375	in
Pole Inner Diam:	59.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi



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

Moment Capacity of Rock Anchored Foundation - Wind into Corner

PJF job no. 37513-0787.002

Note: For purposes of this check, max allowable rock anchor cap limited to proved rock anchor cap / lock-off load of 172 kips

Determination of effective rock compression area (for moment loads)

Controlling foundation % Capacity = **62.8%** **OK**

Elevation = **0** feet Total pole plus soil & fdn weight = **371.4** kips

Diagonal dimension = **305.40** in 1/2 x diagonal dimension = **152.70** in

Neutral axis location = **108.73** in (Measured from max. compression fiber)

Therefore c= **108.73** inches and a = β_1 x c = **92.42** inches β_1 = **0.85**

Area of fdn-rock contact, Afr = **8541.1** square inches Net area of Afr = **8451.8** square inches

Centroid of Afr located **243.79** inches from maximum tension fiber of cross-section

Check fdn-rock contact area compression capacity versus actual rock compressive stress

Rock f'c = **277** psi Gross area of rock, Ac = **######** sq. in. $\Sigma T - \Sigma C$ = **0.0**

Total rock anchor load, T_L, on annulus area, ΣT = **731.7** kips

Usable rock and rock anchor compression capacity, SC = **1103.1** kips

Rock contribution to Mn = **4331.1** ft-kips

Pole / foundation / soil wt contribution to Mn = **1361.0** ft-kips

Cross-section Moment Cap.		
M_{cap} =	12075.0	ft-kips

M_{actual} = **6836** ft-kips (At bottom of pad)

Mact / Mcap = **56.6%**

Rock anchor steel capacity = **200** kips (SF = 2)

Rock anchor % Cap = **48.7%** **OK**

Max rock strain = **0.0015** (SF=2)

Rock % Cap = **62.8%** **OK**

Additional bar reinforcement information

No. of bars, Nb = 4 Number of bar group locations = 3 No. of bars per group location = 1

Separation angle between bar groups = 90 degrees Area of bar = 2.6 sq. in.

Bar edge distance = 44.5 inches (measured to center of bar group) Modulus of elasticity of bar, E_b = 29000 ksi

Bar strain calculations

Assumed rock strain = 0.001663

Location	No. of bar groups, N_{BG}	Dist. to neutral axis	ε (Tension)	Tension per bar, T_B	$T_L = N_{BG} \times T_B$	Mn Contribution
1	1	152.17	0.0023	172.0	172.0	2181.2
2	2	43.97	0.0006	47.2	94.4	346.1
3	1	-64.23	0.0000	0.0	0.0	0.0
4	0	- - -	- - -	- - -	- - -	- - -
5	0	- - -	- - -	- - -	- - -	- - -
6	0	- - -	- - -	- - -	- - -	- - -
7	0	- - -	- - -	- - -	- - -	- - -
8	0	- - -	- - -	- - -	- - -	- - -
9	0	- - -	- - -	- - -	- - -	- - -
10	0	- - -	- - -	- - -	- - -	- - -

Determination of bar contribution to ultimate moment capacity

Location	No. of bar groups, N_{BG}	ε (C)	Comp. per bar, C_B	$C_L = N_{BG} \times C_B$	Mn Contribution	Area Occupied by Bar
1	1	0.0000	0.0	0.0	0.0	- - -
2	2	0.0000	0.0	0.0	0.0	- - -
3	1	-0.0010	-77.6	0.0	0.0	28.27
4	0	- - -	- - -	- - -	- - -	- - -
5	0	- - -	- - -	- - -	- - -	- - -
6	0	- - -	- - -	- - -	- - -	- - -
7	0	- - -	- - -	- - -	- - -	- - -
8	0	- - -	- - -	- - -	- - -	- - -
9	0	- - -	- - -	- - -	- - -	- - -
10	0	- - -	- - -	- - -	- - -	- - -

$M_n = \Sigma$ (Load in bar groups x bar group distance to N.A.) = **2527.2** ft-kips

$M_u = \phi M_n = 0.75 \times M_n =$ **1895.4** ft-kips

Bar yield strength = **332.000** kips

Additional bar reinforcement information

No. of bar, Nf = 12 Number of bar group locations = 7 No. of bar per group location = 1

Separation angle between bar groups = 30 degrees Area of bar = 2.6 sq. in.

bar edge distance = 72.1 inches (measured to center of bar group) Modulus of elasticity of bar, Ef = 29000 ksi

Bar strain calculations

(Type of bar = B ("B" for bar, "T" for tape or "L" for laminate)

Assumed rock strain = 0.001663

Location	No. of bar groups, NFG	Dist. to neutral axis	ε (Tension)	Tension per bar, TF	$T_L = N_{FG} \times T_F$	Mn Contribution
1	0	124.57	0.0019	143.7	0.0	0.0
2	2	113.77	0.0017	131.2	262.4	2488.1
3	2	84.27	0.0013	97.2	194.4	1365.0
4	0	43.97	0.0007	50.7	0.0	0.0
5	2	3.67	0.0001	4.2	8.5	2.6
6	2	-25.83	0.0000	0.0	0.0	0.0
7	0	-36.63	0.0000	0.0	0.0	0.0
8	0	- - -	- - -	- - -	- - -	- - -
9	0	- - -	- - -	- - -	- - -	- - -
10	0	- - -	- - -	- - -	- - -	- - -

Determination of bar contribution to ultimate moment capacity

Location	No. of bar groups, NFG	ε (Comp)	Comp. per bar, CF	$C_L = N_{FG} \times C_F$	Mn Contribution	Area Occupied by bar
1	0	0.0000	0.0	0.0	0.0	- - -
2	2	0.0000	0.0	0.0	0.0	- - -
3	2	0.0000	0.0	0.0	0.0	- - -
4	0	0.0000	0.0	0.0	0.0	- - -
5	2	0.0000	0.0	0.0	0.0	- - -
6	2	-0.0004	-29.8	0.0	0.0	28.27
7	0	-0.0006	-42.2	0.0	0.0	28.27
8	0	- - -	- - -	- - -	- - -	- - -
9	0	- - -	- - -	- - -	- - -	- - -
10	0	- - -	- - -	- - -	- - -	- - -

Mn = S (Load in bar groups x bar group distance to N.A.) = **3855.7** ft-kips

$M_u = \phi M_n = 0.9 \times M_n =$ **3470.1** ft-kips

bar yield strength = **332.000** kips

Rock Anchored Foundation Structural and Overturning Checks

PJF job no. 37513-0787.002

Beam Shear, Tension Side - Wind into corner

b =	151	in	(Critical section at distance of d away from center of anchor, towards face of pier)
d=	31	in	
f'c=	5000	psi	
Vu=	223.6	kips	(Assumed to be 1.3 times max proven anchor capacity)
ϕ=	0.85		
ϕVc=	562.7	kips	
% Cap=	22.5%	OK	(Vu adjusted for actual rock bolt load)

Beam Shear, Compression Side - Wind into corner

b =	270.8	in	(Critical section at distance of a plus d away from corner of foundation)
d=	43	in	
f'c=	5000	psi	
Vu=	811.9	kips	(1.3 times SC, adjusted for overall foundation % Capacity)
ϕ=	0.85		
ϕVc=	1399.9	kips	
% Cap=	58.0%	OK	

Punching Shear, Tension Side - Wind into corner

b =	94	in	(Critical section at distance of 0.5d away from center of anchor in all applicable directions)
d=	31	in	
f'c=	5000	psi	
Vu=	223.6	kips	(Assumed to be 1.3 times max proven anchor capacity)
ϕ=	0.85		
ϕVc=	700.6	kips	
% Cap=	18.1%	OK	(Adjusted for actual rock bolt load)

Centroid of loads on tension and compression sides of foundation less than distance of d away from face of pier. Therefore, load assumed to be transferred through deep beam type action (bending is negligible)

Overturning / Stability - Worst case assumed to be wind into the side

Rock anchor proof load, PL =	259	kips	(Assumed to be ultimate anchor capacity)
# of anchors in Line 1, N1 =	4		
Line 1 distance to rotation pt, d1 =	13.75	feet	
# of anchors in Line 2, N2 =	4		(Combined anchors on either side of foundation centerline)
Line 2 distance to rotation pt, d2 =	9	feet	
Foundation / pole / soil wt, W =	371.4	kips	
Distance to rotation pt, dw =	9	feet	
Foundation actual OTM, Mo =	6836	ft-k	(At bottom of foundation)
Overturning resistance, Mr =	23691	ft-k	(N1 x d1 x PL + N2 x d2 x [d2/d1 x PL] + W x dw)
% Cap = Mo / 0.5Mr =	57.7%	OK	(Min SF=2)

Note - Overturning % Cap conservative due to:

1) Line of anchors closest to point of overturning not included in calculation
2) Ultimate / maximum anchor capacity likely greater than proof load applied to anchor during installation

Moment Capacity of Rock Anchored Foundation - Wind into Side

PJF job no. 37513-0787.002

Note: For purposes of this check, max allowable rock anchor cap limited to proved rock anchor cap / lock-off load of 172 kips

Determination of effective rock compression area (for moment loads)

Controlling foundation % Capacity = **78.0%** **OK**

Elevation = **0** feet Total pole plus soil & fdn weight = **371.4** kips

Side dimension = **216.00** in 1/2 x diagonal dimension = **108.00** in

Neutral axis location = **68.10** in (Measured from max. compression fiber)

Therefore c= **68.10** inches and a = β_1 x c = **57.88** inches β_1 = **0.85**

Area of fdn-rock contact, Afr = **12503.0** square inches Net area of Afr = **12329.3** square inches

Centroid of Afr located **187.06** inches from maximum tension fiber of cross-section

Check fdn-rock contact area compression capacity versus actual rock compressive stress

Rock f'c = **277** psi Gross area of rock, Ac = **######** sq. in. $\Sigma T - \Sigma C$ = **0.0**

Total rock anchor load, T_L, on annulus area, ΣT = **918.3** kips

Usable rock and rock anchor compression capacity, SC = **1289.7** kips

Rock contribution to Mn = **4208.3** ft-kips

Pole / foundation / soil wt contribution to Mn = **1234.9** ft-kips

Cross-section Moment Cap.		
M_{cap} =	13158.7	ft-kips

M_{actual} = **6836** ft-kips (At bottom of pad)

Mact / Mcap = **52.0%**

Rock anchor steel capacity = **200** kips (SF = 2)

Rock anchor % Cap = **44.7%** **OK**

Max rock strain = **0.0015** (SF=2)

Rock % Cap = **46.2%** **OK**

Additional bar reinforcement information

No. of bars, Nb = 8 Number of bar group locations = 5 No. of bars per group location = 1

Separation angle between bar groups = 45 degrees Area of bar = 2.6 sq. in.

Bar edge distance = -0.187 inches (measured to center of bar group) Modulus of elasticity of bar, E_b = 29000 ksi

Bar strain calculations

Assumed rock strain = 0.0013328

Location	No. of bar groups, N_{BG}	Dist. to neutral axis	ε (Tension)	Tension per bar, T_B	$T_L = N_{BG} \times T_B$	Mn Contribution
1	0	148.09	0.0029	216.1	0.0	0.0
2	2	116.40	0.0022	169.4	338.8	3285.9
3	0	39.90	0.0007	56.5	0.0	0.0
4	2	-36.60	0.0000	0.0	0.0	0.0
5	0	-68.29	0.0000	0.0	0.0	0.0
6	0	- - -	- - -	- - -	- - -	- - -
7	0	- - -	- - -	- - -	- - -	- - -
8	0	- - -	- - -	- - -	- - -	- - -
9	0	- - -	- - -	- - -	- - -	- - -
10	0	- - -	- - -	- - -	- - -	- - -

Determination of bar contribution to ultimate moment capacity

Location	No. of bar groups, N_{BG}	ε (C)	Comp. per bar, C_B	$C_L = N_{BG} \times C_B$	Mn Contribution	Area Occupied by Bar
1	0	0.0000	0.0	0.0	0.0	- - -
2	2	0.0000	0.0	0.0	0.0	- - -
3	0	0.0000	0.0	0.0	0.0	- - -
4	2	-0.0007	-54.0	0.0	0.0	28.27
5	0	-0.0013	-100.8	0.0	0.0	28.27
6	0	- - -	- - -	- - -	- - -	- - -
7	0	- - -	- - -	- - -	- - -	- - -
8	0	- - -	- - -	- - -	- - -	- - -
9	0	- - -	- - -	- - -	- - -	- - -
10	0	- - -	- - -	- - -	- - -	- - -

$M_n = \Sigma$ (Load in bar groups x bar group distance to N.A.) = **3285.9** ft-kips

$M_u = \phi M_n = 0.75 \times M_n =$ **2464.4** ft-kips

Bar yield strength = **332.000** kips

Additional bar reinforcement information

No. of bar, Nf = 20 Number of bar group locations = 11 No. of bar per group location = 1

Separation angle between bar groups = 18 degrees Area of bar = 2.6 sq. in.

bar edge distance = 27.4 inches (measured to center of bar group) Modulus of elasticity of bar, Ef = 29000 ksi

Bar strain calculations

(Type of bar = B ("B" for bar, "T" for tape or "L" for laminate)

Assumed rock strain = 0.0013328

Location	No. of bar groups, NFG	Dist. to neutral axis	ε (Tension)	Tension per bar, TF	$T_L = N_{FG} \times T_F$	Mn Contribution
1	0	120.50	0.0024	177.8	0.0	0.0
2	2	116.56	0.0023	172.0	344.0	3341.3
3	0	105.11	0.0021	155.1	0.0	0.0
4	0	87.28	0.0017	128.8	0.0	0.0
5	2	64.81	0.0013	95.6	191.3	1033.0
6	0	39.90	0.0008	58.9	0.0	0.0
7	2	14.99	0.0003	22.1	44.3	55.3
8	0	-7.47	0.0000	0.0	0.0	0.0
9	0	-25.31	0.0000	0.0	0.0	0.0
10	2	-36.75	0.0000	0.0	0.0	0.0
11	0	-40.70	0.0000	0.0	0.0	0.0
12	0	- - -	- - -	- - -	- - -	- - -
13	0	- - -	- - -	- - -	- - -	- - -

Determination of bar contribution to ultimate moment capacity

Location	No. of bar groups, NFG	ε (Comp)	Comp. per bar, CF	$C_L = N_{FG} \times C_F$	Mn Contribution	Area Occupied by bar
1	0	0.0000	0.0	0.0	0.0	- - -
2	2	0.0000	0.0	0.0	0.0	- - -
3	0	0.0000	0.0	0.0	0.0	- - -
4	0	0.0000	0.0	0.0	0.0	- - -
5	2	0.0000	0.0	0.0	0.0	- - -
6	0	0.0000	0.0	0.0	0.0	- - -
7	2	0.0000	0.0	0.0	0.0	- - -
8	0	-0.0001	-11.0	0.0	0.0	28.27
9	0	-0.0005	-37.3	0.0	0.0	28.27
10	2	-0.0007	-54.2	0.0	0.0	28.27
11	0	-0.0008	-60.1	0.0	0.0	28.27
12	0	- - -	- - -	- - -	- - -	- - -
13	0	- - -	- - -	- - -	- - -	- - -

Mn = S (Load in bar groups x bar group distance to N.A.) = **4429.5** ft-kips

$M_u = \phi M_n = 0.9 \times M_n =$ **3986.6** ft-kips

bar yield strength = **332.000** kips

Rock Anchored Foundation Structural and Overturning Checks

Beam Shear, Tension Side - Wind into Side

b =	216.00	in	(Equal to width of mat)
d=	31	in	
f'c=	5000	psi	
Vu=	464.6	kips	(1.3 times max proven anchor capacity, adjusted for overall foundation % Capacity)
ϕ=	0.85		
ϕVc=	804.9	kips	
% Cap=	57.7%	OK	

Beam Shear, Compression Side - Wind into Side

b =	216.0	in	(Equal to width of mat)
d=	43	in	
f'c=	5000	psi	
Vu=	871.0	kips	(1.3 times SC, adjusted for overall foundation % Capacity)
ϕ=	0.85		
ϕVc=	1116.5	kips	
% Cap=	78.0%	OK	

Punching Shear, Tension Side - Wind into Side

b =	94	in	(Critical section at distance of 0.5d away from center of anchor in all applicable directions)
d=	31	in	
f'c=	5000	psi	
Vu=	223.6	kips	(Assumed to be 1.3 times max proven anchor capacity)
ϕ=	0.85		
ϕVc=	700.6	kips	
% Cap=	16.6%	OK	(Adjusted for actual rock bolt load)

Centroid of loads on tension and compression sides of foundation less than distance of d away from face of pier. Therefore, load assumed to be transferred through deep beam type action (bending is negligible)

Overturning / Stability - Worst case assumed to be wind into the side

Rock anchor proof load, PL =	259	kips	(Assumed to be ultimate anchor capacity)
# of anchors in Line 1, N1 =	4		
Line 1 distance to rotation pt, d1 =	13.75	feet	
# of anchors in Line 2, N2 =	4		(Combined anchors on either side of foundation centerline)
Line 2 distance to rotation pt, d2 =	9	feet	
Foundation / pole / soil wt, W =	371.4	kips	
Distance to rotation pt, dw =	9	feet	
Foundation actual OTM, Mo =	6836	ft-k	(At bottom of foundation)
Overturning resistance, Mr =	23691	ft-k	(N1 x d1 x PL + N2 x d2 x [d2/d1 x PL] + W x dw)
% Cap = Mo / 0.5Mr =	57.7%	OK	(Min SF=2)

Note - Overturning % Cap conservative due to:

1) Line of anchors closest to point of overturning not included in calculation
2) Ultimate / maximum anchor capacity likely greater than proof load applied to anchor during installation

EBI Consulting
environmental | engineering | due diligence

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

Sprint Existing Facility

Site ID: CT03XC376

Weston Omnipoint

56 Norfield Road
Weston, CT 06883

September 8, 2014

EBI Project Number: 62144517

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

EBI Consulting
environmental | engineering | due diligence

September 8, 2014

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

Re: Radio Frequency Maximum Permissible Exposure (MPE) Assessment for Site:
CT03XC376 - Weston Omnipoint

Site Total: 44.25% - MPE% in full compliance

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at **56 Norfield Road, Weston, 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 **56 Norfield Road, Weston, 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) 2 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 **190 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	CT03XC376 - Weston Omnipoint
Site Addresss	56 Norfield Road, Weston, CT, 06883
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	2	40	5.9	190	184	1/2 "	0.5	0	138.69	0.15%
1a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	190	184	1/2 "	0.5	0	39.00	0.07%
1B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	190	184	1/2 "	0.5	0	138.69	0.26%
														Sector total Power Density Value:	0.48%	

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	2	40	5.9	190	184	1/2 "	0.5	0	138.69	0.15%
2a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	190	184	1/2 "	0.5	0	39.00	0.07%
2B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	190	184	1/2 "	0.5	0	138.69	0.26%
														Sector total Power Density Value:	0.48%	

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	2	40	5.9	190	184	1/2 "	0.5	0	138.69	0.15%
3a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	190	184	1/2 "	0.5	0	39.00	0.07%
3B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	190	184	1/2 "	0.5	0	138.69	0.26%
														Sector total Power Density Value:	0.48%	

Site Composite MPE %	
Carrier	MPE %
Sprint	1.44%
Town Fire Dept	3.98%
Town of Weston	5.91%
EMS	2.97%
AT&T	5.46%
Verizon Wireless	24.37%
T-Mobile	0.12%
Total Site MPE %	**44.25%**

EBI Consulting
environmental | engineering | due diligence

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 **1.44% (0.48% from sector 1, 0.48% from sector 2 and 0.48% 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 **44.25%** 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

EBI Consulting
21 B Street
Burlington, MA 01803