



**Crown Castle**  
3530 Torington Way, Suite 300  
Charlotte, NC 28277

October 13, 2014

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

**RE: Sprint PCS-Exempt Modification - Crown Site BU: 876381**  
**Sprint PCS Site ID: CT33XC535**  
**Located at: 2365 Long Hill Road, Guilford, CT 06437**

Dear Ms. Bachman:

This letter and exhibits are submitted on behalf of Sprint PCS (Sprint). Sprint is making modifications to certain existing sites in its Connecticut system in order to implement their 2.5GHz LTE technology. Please accept this letter and exhibits as notification, pursuant to § 16-50j-73 of the Regulations of Connecticut State Agencies (“R.C.S.A.”), of construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In compliance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Mr. Joseph S. Mazza, First Selectman for Town of Guilford, and Janice M. Ward Family Trust (c/o Janice Ward), Property Owner.

Sprint plans to modify the existing wireless communications facility owned by Crown Castle and located at **2365 Long Hill Road, Guilford, CT 06437**. 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.

Melanie A. Bachman

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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,



Raymond Perry  
Real Estate Specialist

Enclosures

Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes

Tab 2: Exhibit-2: Structural Modification Report

Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc: Mr. Joseph S. Mazza, First Selectman  
Town of Guilford  
31 Park Street  
Guilford, CT 06437

Janice M. Ward Family Trust  
c/o Janice M. Ward, Trustee  
2365 Long Hill Road  
Guilford, CT 06437



# 2.5 EQUIPMENT DEPLOYMENT

SITE NUMBER:  
CT33XC535

SITE NAME:  
WARD

SITE ADDRESS:  
2365 LONG HILL ROAD  
GUILFORD, CT 06437

CROWN ID#: 876381

CROWN SITE NAME: WARD



2.5 EQUIPMENT DEPLOYMENT  
6580 SPRINT PARKWAY  
OVERLAND PARK, KS 66251



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## SHEET INFORMATION

SITE NUMBER:	CT33XC535	LANDLORD:	CROWN CASTLE USA 2000 CORPORATE DRIVE CANONSBURG, PA
SITE NAME:	WARD	LOCAL POWER COMPANY:	CONNECTICUT LIGHT AND POWER CONTACT CUSTOMER SERVICE (800) 286-2000
SITE ADDRESS:	2365 LONG HILL RD GUILFORD, CT 06437	APPLICANT:	SPRINT 6580 SPRINT PARKWAY OVERLAND PARK, KS 66251
COUNTY:	NEW HAVEN	ENGINEER:	JAMES QUICKSELL (845) 567-6656 EXT. 2835 jquicksell@tectonicengineering.com
COORDINATES: (NAD 83)	41° 20' 47.34" N 72° 43' 23.15" W	SPRINT CM:	ANDY CLARK Andrew.Clark@sprint.com
GROUND ELEV:	177'± AMSL	CROWN CM:	JASON D'AMICO (860) 209-0104 jason.d'amico@crowncastle.com
STRUCTURE TYPE:	MONOPOLE	AAV:	AT&T
STRUCTURE HEIGHT:	176'-0"± AGL		
STRUCTURE RAD CENTER:	178'-0"± AGL		
ZONING CLASSIFICATION:	R-5 (RESIDENTIAL)		
MAP-BLOCK-LOT:	101023B		

## VICINITY MAP (NOT TO SCALE)



## SHEET INDEX

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S-2	EQUIPMENT SCHEMATIC DETAILS
E-1	ELECTRICAL & GROUNDING PLANS
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## SUBMITTALS

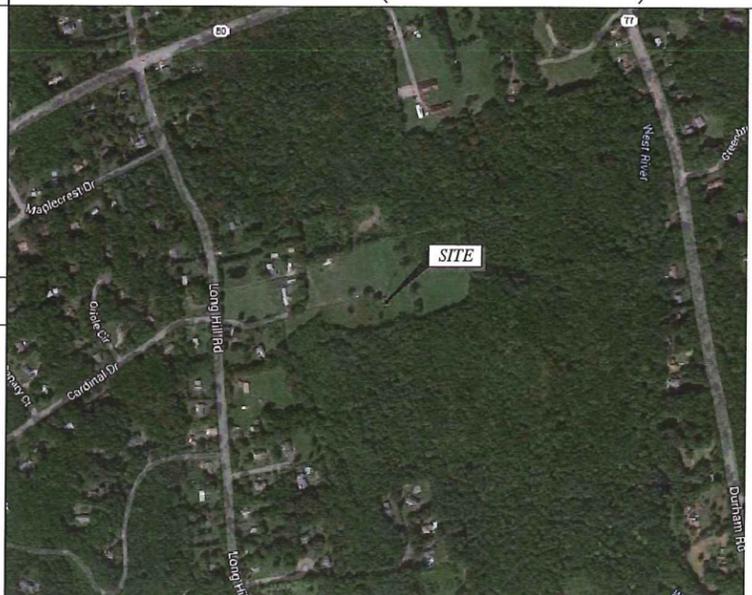
PROJECT NO: 7225.CT33XC535

NO	DATE	DESCRIPTION	BY
0	06/24/14	FOR COMMENT	MP
1	07/30/14	FOR CONSTRUCTION	KA
2	08/01/14	PER COMMENTS	KA
3	10/10/14	REVISED ADDRESS	KA

## GENERAL NOTES

- 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.
- 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.
- 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-1998.
  - NATIONAL ELECTRICAL CODE, LATEST EDITION.

## 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: \_\_\_\_\_



## PROJECT DESCRIPTION

- (1) NEW 2.5 EQUIPMENT RACK INSIDE EXIST MMBTS CABINET.
- (3) NEW RFS APXVTM4-C-120 ANTENNAS.
- (3) NEW TD-RRH8x20-25 RRH.
- (1) NEW 1-1/4" HYBRID CABLE.

SITE NUMBER:  
CT33XC535

SITE NAME:  
WARD

SITE ADDRESS:  
2365 LONG HILL ROAD  
GUILFORD, CT 06437

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 OR 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-STO CONSTR SPECS...157201110421855492.DOCM.
20. REFER TO: COLOR CODING-SPRINT NEXTEL ANT AND LINE COLOR CODING (DRAFT) V3 09-08-11.PDF
21. REFER TO LATEST DOCUMENTATION REVISION.

**DIVISION 03000-CONCRETE**

- 1.03 APPLICABLE STANDARDS (USE LATEST EDITIONS)
- A. 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 WDE 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:

<u>BASE MATERIAL</u>	<u>ANCHOR SYSTEM</u>
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.



2.5 EQUIPMENT DEPLOYMENT  
6580 SPRINT PARKWAY  
OVERLAND PARK, KS 66251




TECTONIC Engineering & Surveying  
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**SUBMITTALS**

PROJECT NO: 7225.CT33XC535

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DATE: 10/16/14 REVIEWED BY: [Signature]



SITE NUMBER:  
CT33XC535

SITE NAME:  
WARD

SITE ADDRESS:  
2365 LONG HILL ROAD  
GUILFORD, CT 06437

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 OTHER 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 FROM FINISHED GRADES OR SLOPES INDICATED.

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

C. DO NOT CREATE DEPRESSIONS WHERE WATER MAY POND.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3.04 FIELD QUALITY CONTROL

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

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

3.05 PROTECTION

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

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

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

SYMBOLS	ABBREVIATIONS
--- G --- G ---	GROUND WIRE
--- E --- E ---	ELECTRIC
--- T --- T ---	TELEPHONE
--- OW --- OW ---	OVERHEAD WIRE
---	PROPERTY LINE
-x-x-x-	CHAIN LINK FENCE
A-1	ANTENNA MARK
(E)	EXISTING
(P)	PROPOSED DETAIL
	REFERENCE
	SURFACE ELEVATION

**Sprint**

2.5 EQUIPMENT DEPLOYMENT  
6580 SPRINT PARKWAY  
OVERLAND PARK, KS 66251

**CROWN CASTLE**

**TECTONIC**

TECTONIC Engineering & Surveying  
Consultants P.C.

1279 Route 300  
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SUBMITTALS

PROJECT NO: 7225.CT33XC535

NO	DATE	DESCRIPTION	BY
0	06/24/14	FOR COMMENT	MP
1	07/30/14	FOR CONSTRUCTION	KA
2	08/01/14	PER COMMENTS	KA
3	10/10/14	REVISED ADDRESS	KA

DATE: 10/10/14  
REVIEWED BY: [Signature]



SITE NUMBER:  
CT33XC535

SITE NAME:  
WARD

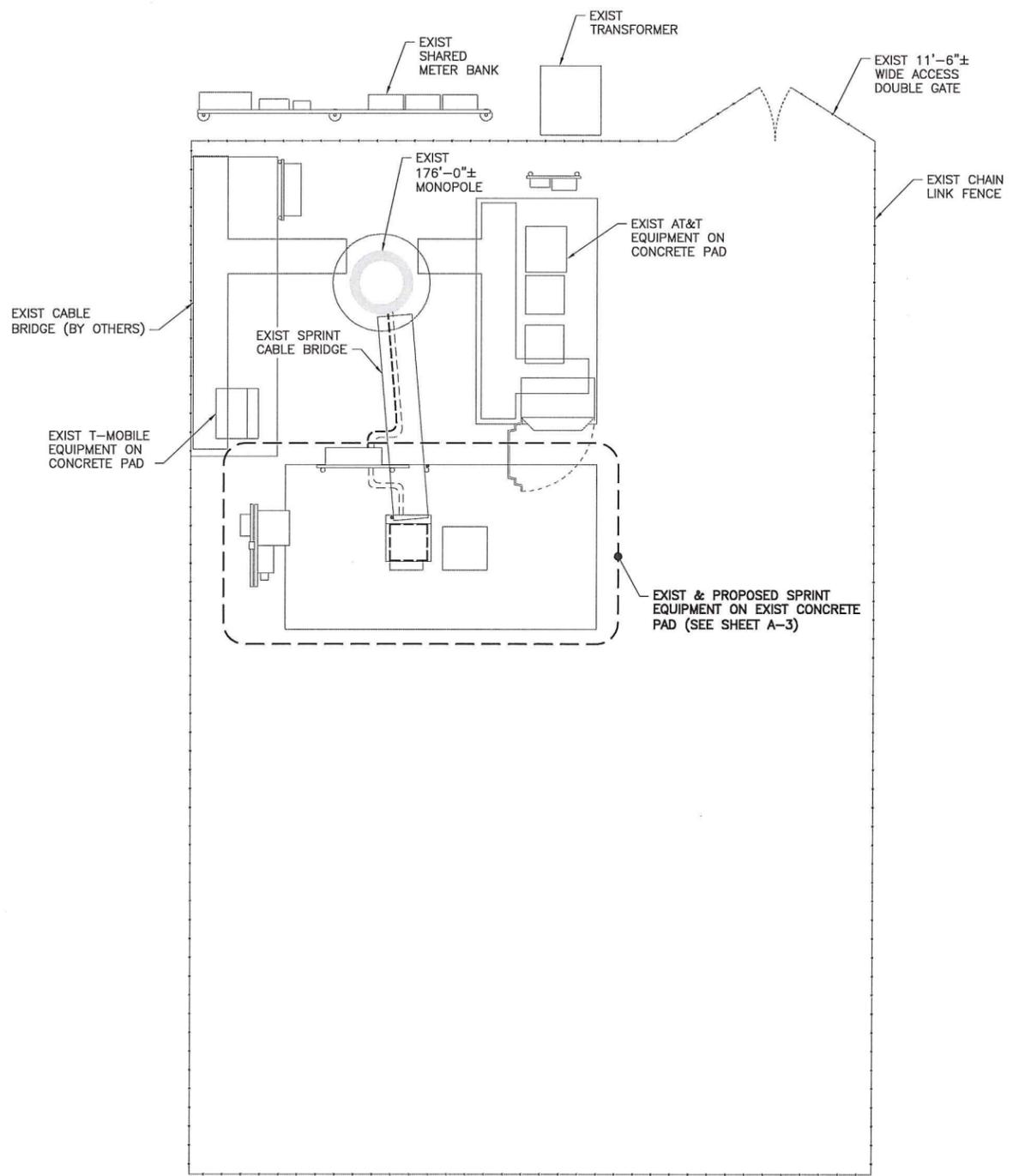
SITE ADDRESS:  
2365 LONG HILL ROAD  
GUILFORD, CT 06437

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.



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

**Sprint**  
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**SUBMITTALS**

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2	08/01/14	PER COMMENTS	KA
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DATE: 10/10/14 REVIEWED BY: [Signature]



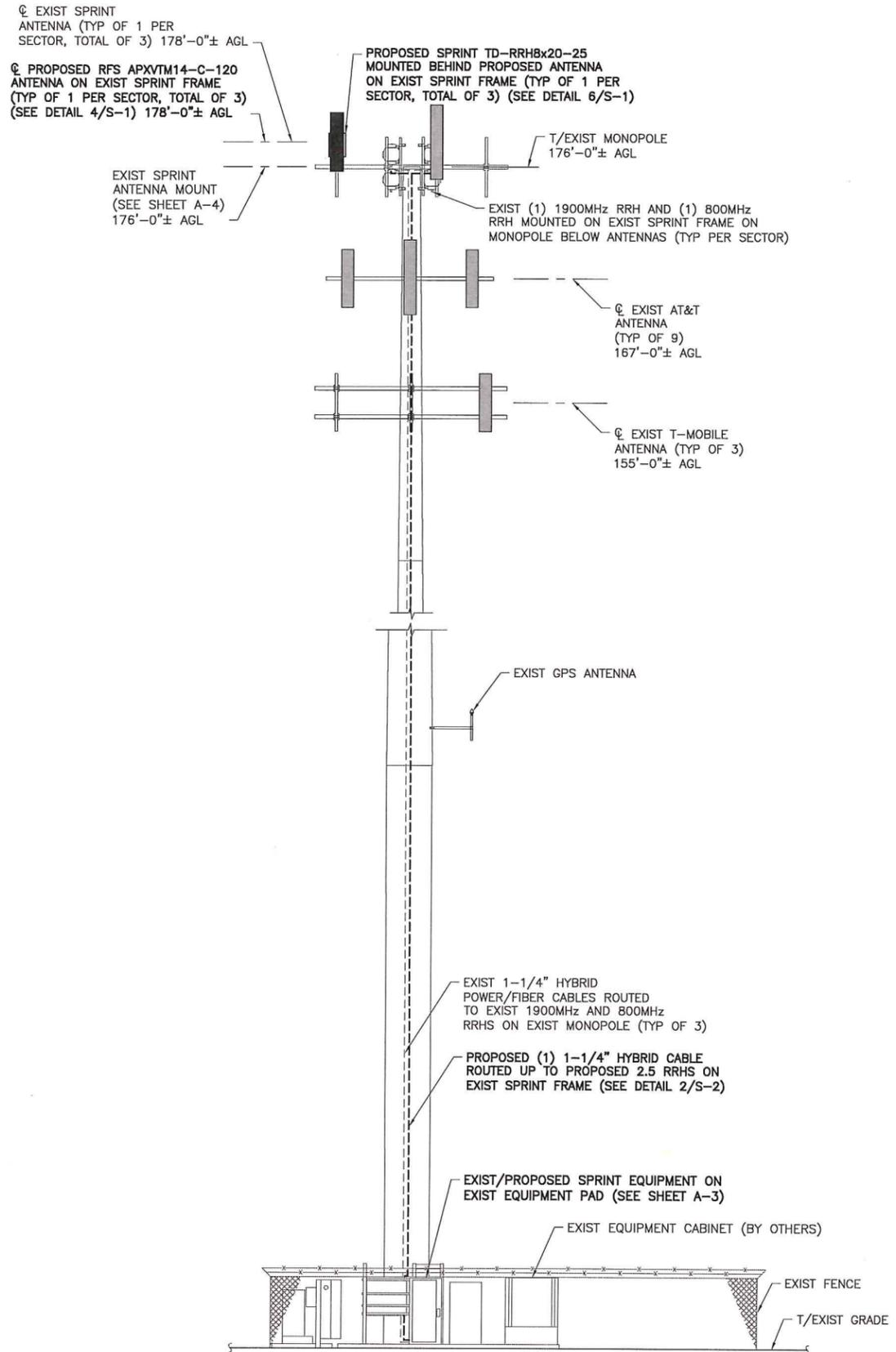
SITE NUMBER:  
 CT33XC535  
 SITE NAME:  
 WARD  
 SITE ADDRESS:  
 2365 LONG HILL ROAD  
 GUILFORD, CT 06437

SHEET TITLE:  
 SITE PLAN

SHEET NO:  
 A-1

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

THE EXISTING MOUNT HAS BEEN ANALYZED BY TECTONIC ENGINEERING AND FOUND TO BE ADEQUATE TO SUPPORT THE PROPOSED SPRINT UPGRADE AS DETAILED IN THE STRUCTURAL ANALYSIS EVALUATION LETTER DATED 7/30/14.



1  
A-2  
ELEVATION  
SCALE: 3/16" = 1'-0"

**Sprint**  
2.5 EQUIPMENT DEPLOYMENT  
6580 SPRINT PARKWAY  
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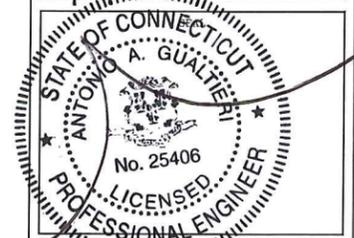
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3	10/10/14	REVISED ADDRESS	KA

DATE: 10/10/14  
REVIEWED BY: JMQ



SITE NUMBER:  
CT33XC535  
SITE NAME:  
WARD  
SITE ADDRESS:  
2365 LONG HILL ROAD  
GUILFORD, CT 06437

SHEET TITLE:  
ELEVATION

SHEET NO:  
A-2

**Sprint**  
 2.5 EQUIPMENT DEPLOYMENT  
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 OVERLAND PARK, KS 66251

**CROWN CASTLE**

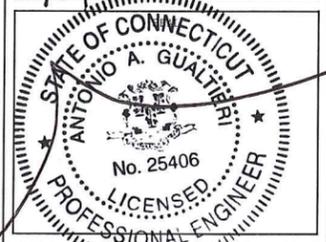
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DATE	REVIEWED BY
10/10/14	JMQ

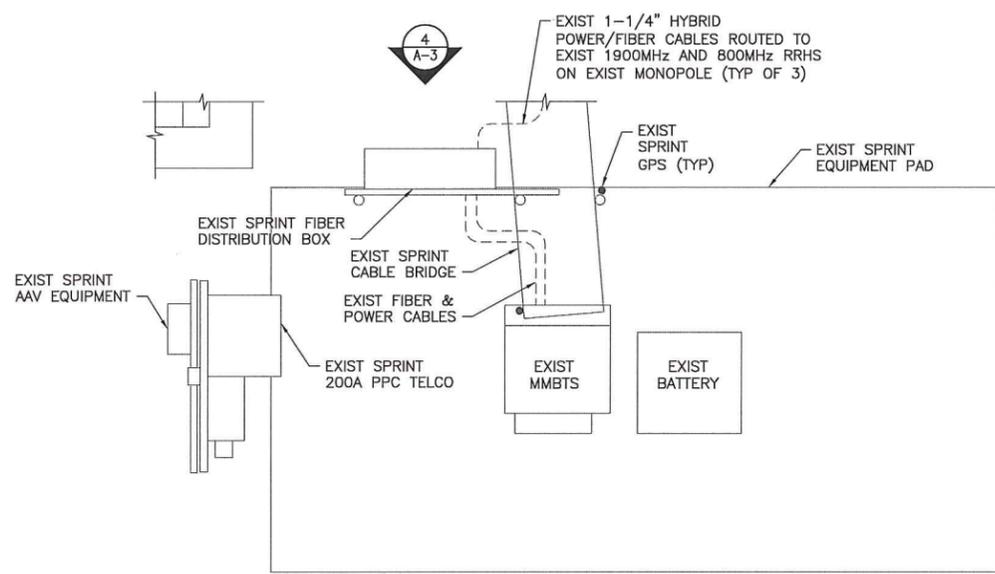


SITE NUMBER:  
 CT33XC535  
 SITE NAME:  
 WARD  
 SITE ADDRESS:  
 2365 LONG HILL ROAD  
 GUILFORD, CT 06437

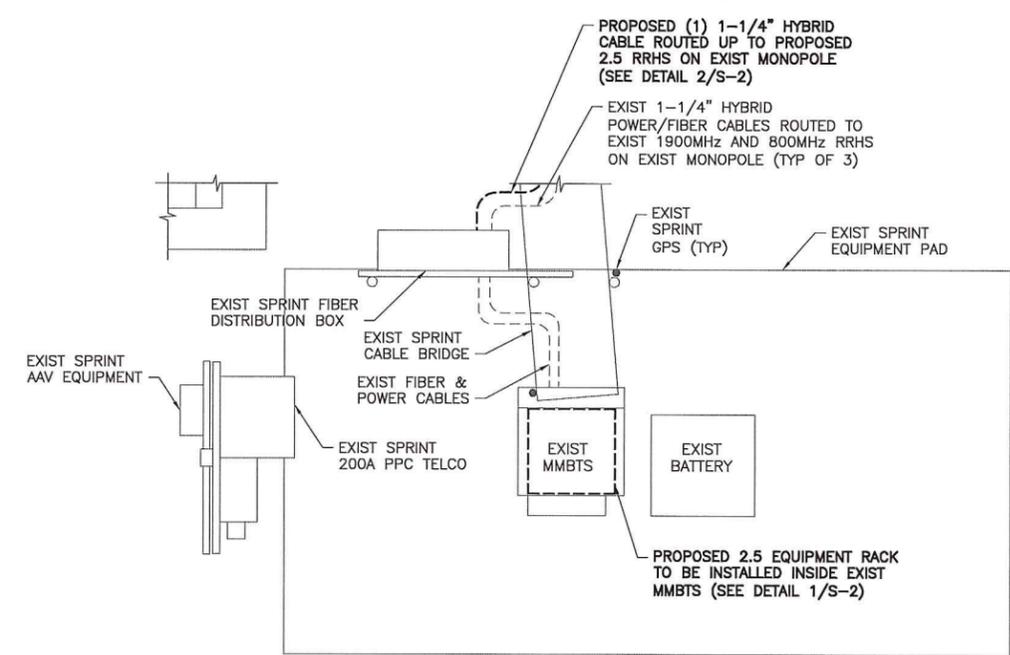
SHEET TITLE:  
 ENLARGED EQUIPMENT LAYOUT PLANS

SHEET NO:  
 A-3

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



**1 ENLARGED EQUIP. LAYOUT PLAN (EXIST)**  
 SCALE: 1/2" = 1'-0"



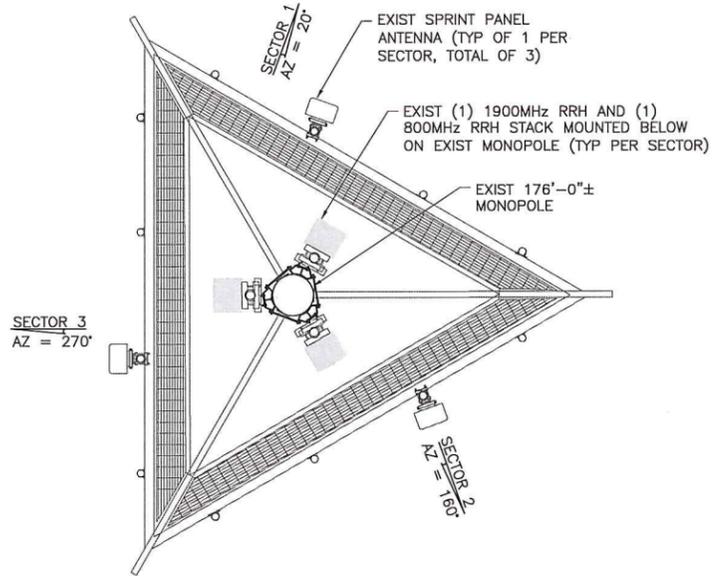
**2 ENLARGED EQUIP. LAYOUT PLAN (FINAL)**  
 SCALE: 1/2" = 1'-0"



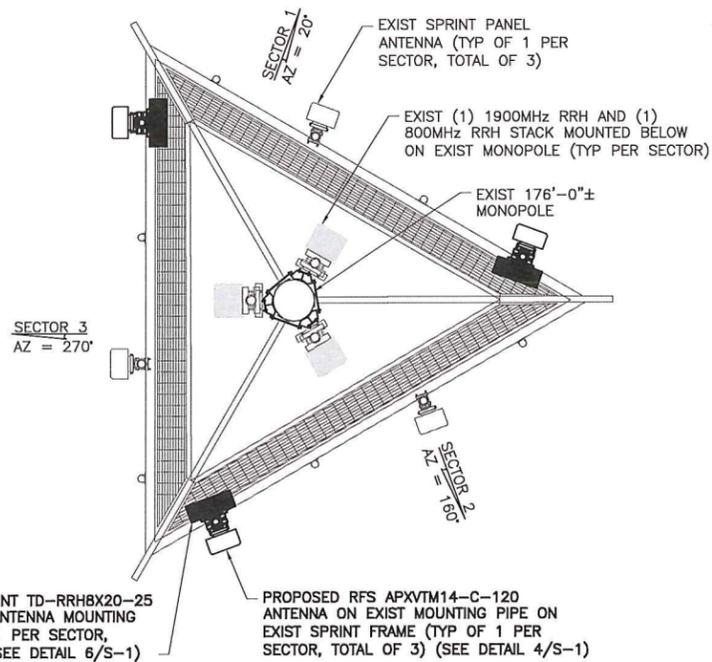
**3 EXIST EQUIPMENT PAD**  
 SCALE: NTS



**4 EXIST FIBER DISTRIBUTION BOX**  
 SCALE: NTS



1 ANTENNA LAYOUT PLAN (EXIST)  
A-4 SCALE: 3/8" = 1'-0"

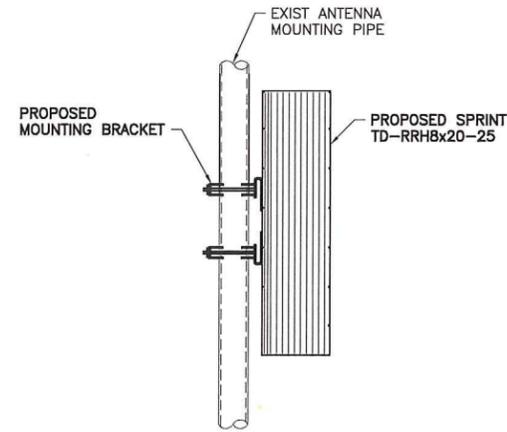


2 ANTENNA LAYOUT PLAN (FINAL)  
A-4 SCALE: 3/8" = 1'-0"



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3 RRH MOUNTING DETAIL  
A-4 SCALE: 1 1/2" = 1'-0"

**ANTENNA DATA**

Status	Exist	Proposed
Antenna Manufacturer	RFS-CEL WAVE	RFS-CEL WAVE
Antenna Model Number	APXVSP18C-A20	APXVTM14-C-120
Number of Antennas	3	3
Antenna RAD Center	178'	178'
Antenna Azimuth	20/160/270	20/160/270
Antenna RRH Model Number	1900MHz/800MHz RRHS	TD-RRH8x20-25
Number of RRH	6	3

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**SUBMITTALS**

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3	10/10/14	REVISED ADDRESS	KA

DATE: 10/10/14 REVIEWED BY: T.M.C.  
**STATE OF CONNECTICUT**  
ANTONIO A. GUALTIERI  
No. 25406  
PROFESSIONAL ENGINEER

SITE NUMBER: CT33XC535  
SITE NAME: WARD  
SITE ADDRESS: 2365 LONG HILL ROAD GUILFORD, CT 06437  
SHEET TITLE: ANTENNA LAYOUT PLANS  
SHEET NO: A-4



# Sprint

2.5 EQUIPMENT DEPLOYMENT  
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## CROWN CASTLE

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DATE	REVIEWED BY
10/10/14	GMG



SITE NUMBER:  
CT33XC535

SITE NAME:  
WARD

SITE ADDRESS:  
2365 LONG HILL ROAD  
GUILFORD, CT 06437

SHEET TITLE:  
CABLE DETAILS

SHEET NO:  
A-6

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

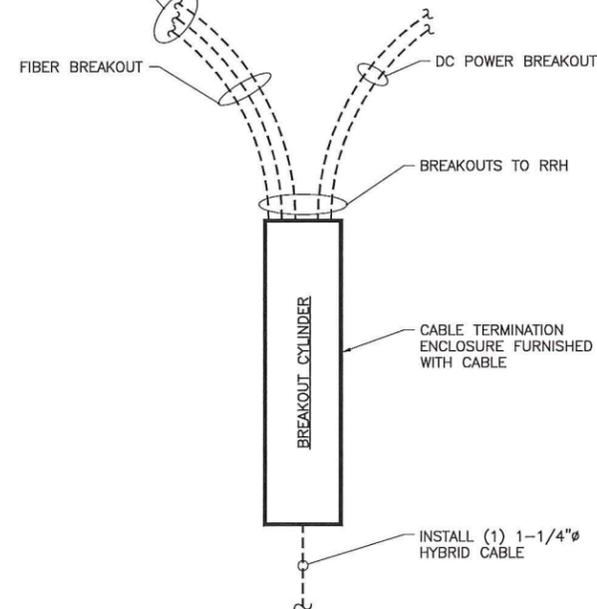


IMPORTANT! ROTATE THE BAYONET HOUSING CLOCKWISE UNTIL A CLICK SOUND IS HEARD TO ENSURE A GOOD CONNECTION

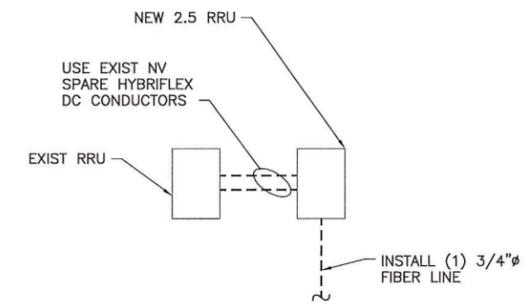


1 HYBRIFLEX RISER/JUMPER CONNECTION DETAILS  
A-6 SCALE: N.T.S.

TRUNK-LINE TO JUMPER CONNECTION (MPO) TO BE INSTALLED PER MANUFACTURER REQUIREMENTS. SEE DETAIL.



2.5 HYBRID CABLE W/FIBER & DC FEEDERS

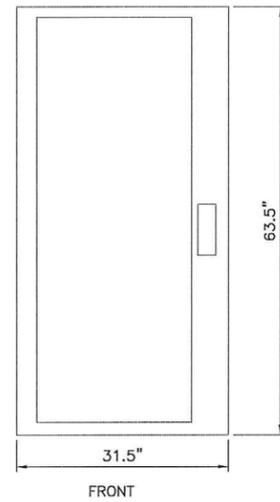


FIBER ONLY TRUNK LINES

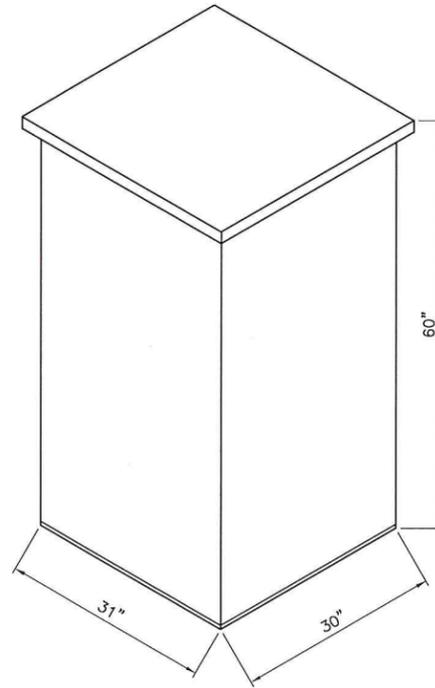
2 TRUNK LINE DETAILS (TYPICAL)  
A-6 SCALE: N.T.S.

#### 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 CODED 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.



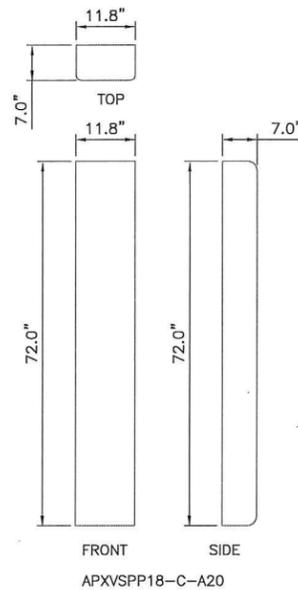
9927 MMBTS MODULAR CELL	
SPECIFICATIONS:	
HEIGHT:	63.5"
WIDTH:	31.5"
DEPTH:	38.0"



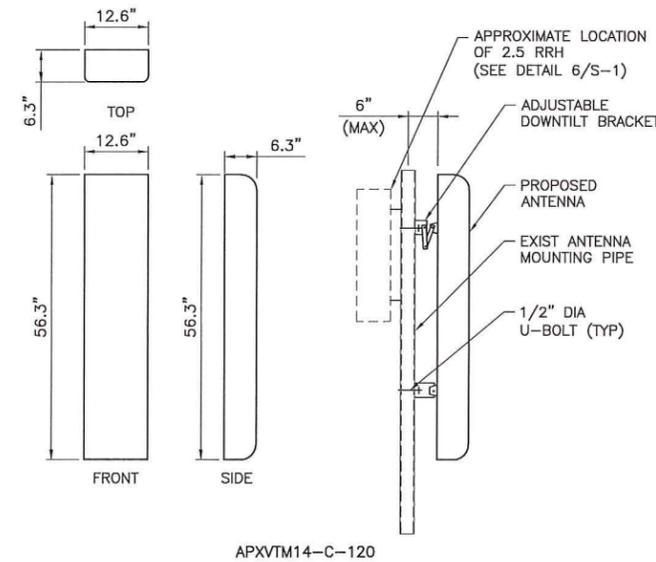
ANDREW 60ECv2	
SPECIFICATIONS:	
HEIGHT:	60"
WIDTH:	31"
DEPTH:	30"
WEIGHT:	2430 LBS.

1 (EXIST) MMBTS CABINET  
S-1 SCALE: 1" = 1'-0"

2 (EXIST) BATTERY CABINET  
S-1 SCALE: 1" = 1'-0"



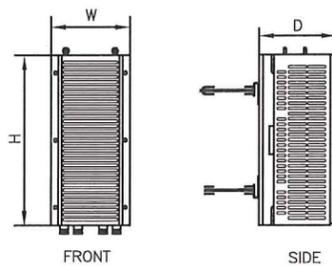
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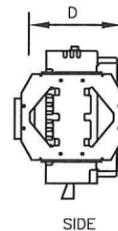
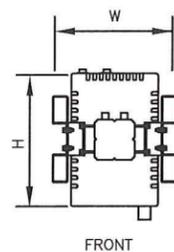
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3 (EXIST) ANTENNA DETAILS  
S-1 SCALE: 3/4"=1'-0"

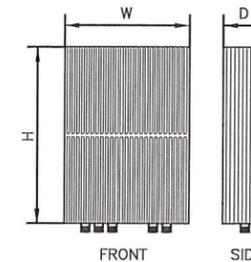
4 (PROPOSED) ANTENNA DETAIL  
S-1 SCALE: 3/4"=1'-0"



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 (EXIST) RRH DETAILS  
S-1 SCALE: 1 1/2"=1'-0"

6 (PROPOSED) RRH DETAIL  
S-1 SCALE: N.T.S.

**Sprint**  
2.5 EQUIPMENT DEPLOYMENT  
6580 SPRINT PARKWAY  
OVERLAND PARK, KS 66251

**CROWN CASTLE**

**TECTONIC**  
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**SUBMITTALS**

PROJECT NO: 7225.CT33XC535			
NO	DATE	DESCRIPTION	BY
0	06/24/14	FOR COMMENT	MP
1	07/30/14	FOR CONSTRUCTION	KA
2	08/01/14	PER COMMENTS	KA
3	10/10/14	REVISED ADDRESS	KA

DATE	REVIEWED BY
10/10/14	DMB



SITE NUMBER:  
CT33XC535  
SITE NAME:  
WARD  
SITE ADDRESS:  
2365 LONG HILL ROAD  
GUILFORD, CT 06437

SHEET TITLE:  
EQUIPMENT DETAILS

SHEET NO:  
S-1



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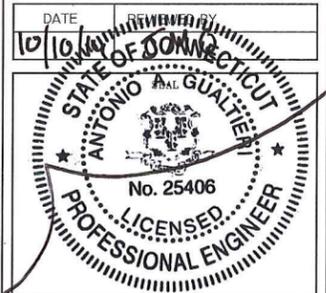


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SITE NUMBER:  
CT33XC535  
SITE NAME:  
WARD  
SITE ADDRESS:  
2365 LONG HILL ROAD  
GUILFORD, CT 06437

SHEET TITLE:  
EQUIPMENT  
SCHEMATIC DETAILS

SHEET NO:  
S-2

**RFS HYBRIFLEX RISER CABLES SCHEDULE**

Power	Hybrid cable	Length
Fiber Only (Existing DC Power)	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

Power	Hybrid cable	Length
8 AWG Power	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

Power	Hybrid cable	Length
6 AWG Power	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

Power	Hybrid cable	Length
4 AWG Power	MN: HB114-21U3M12-225F 3x 4 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**

Power	Hybrid Jumper cable	Length
Fiber Only	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

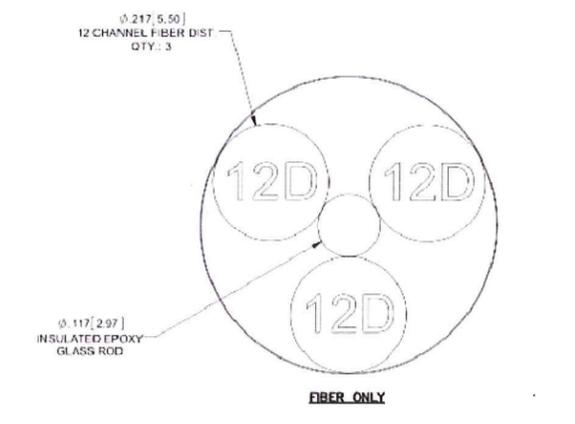
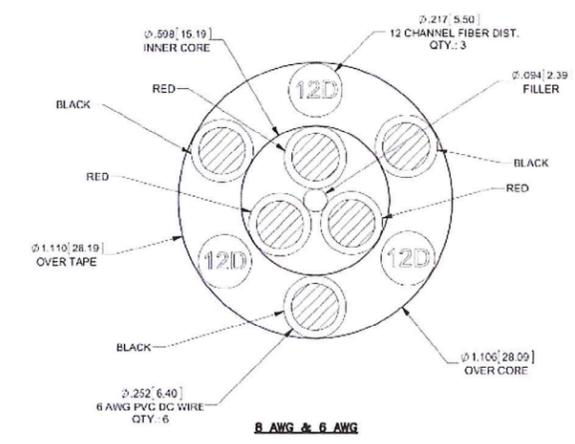
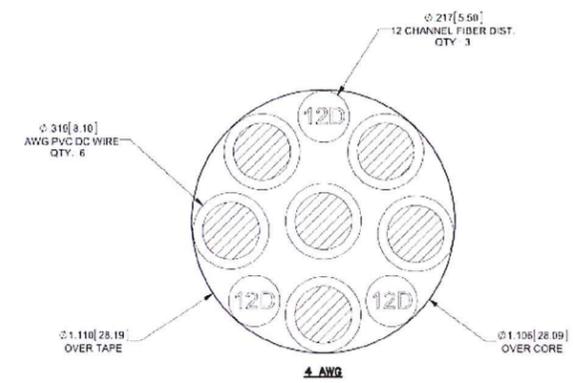
Power	Hybrid Jumper cable	Length
8 AWG Power	MN: HBF058-08U1M3-5F1 5 ft, 1x 8 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 5/8 cable	5 ft
	MN: HBF058-08U1M3-10F1	10 ft
	MN: HBF058-08U1M3-15F1	15 ft
	MN: HBF058-08U1M3-20F1	20 ft
	MN: HBF058-08U1M3-25F1	25 ft
	MN: HBF058-08U1M3-30F1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

Power	Hybrid Jumper cable	Length
6 AWG Power	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

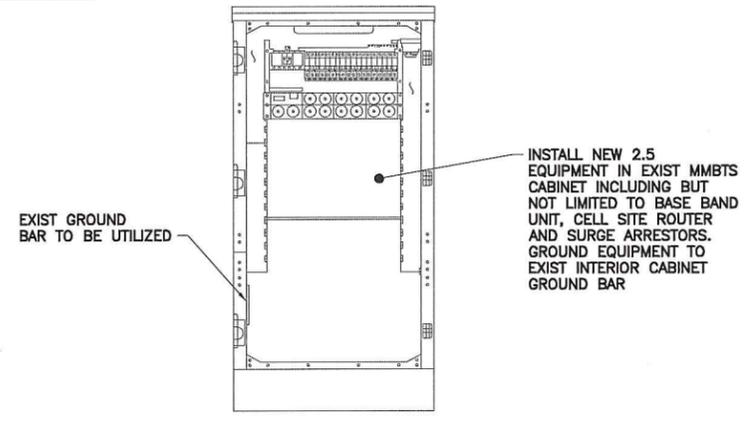
Power	Hybrid Jumper cable	Length
4 AWG Power	MN: HBF078-21U1M3-5F1 5 ft, 1x 4 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 7/8 cable	5 ft
	MN: HBF078-21U1M3-10F1	10 ft
	MN: HBF078-21U1M3-15F1	15 ft
	MN: HBF078-21U1M3-20F1	20 ft
	MN: HBF078-21U1M3-25F1	25 ft
	MN: HBF078-21U1M3-30F1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

**HYBRID CABLE DC CONDUCTOR SIZE GUIDELINE**

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



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.



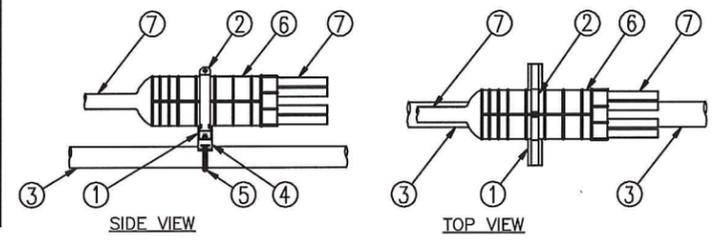
FRONT ELEVATION  
(CABINET INTERIOR)

**1 MMBTS INTERIOR DETAIL**  
SCALE: N.T.S.

INSTALL NEW 2.5  
EQUIPMENT IN EXIST  
MMBTS  
CABINET INCLUDING BUT  
NOT LIMITED TO BASE BAND  
UNIT, CELL SITE ROUTER  
AND SURGE ARRESTORS.  
GROUND EQUIPMENT TO  
EXIST INTERIOR CABINET  
GROUND BAR

EXIST GROUND  
BAR TO BE UTILIZED

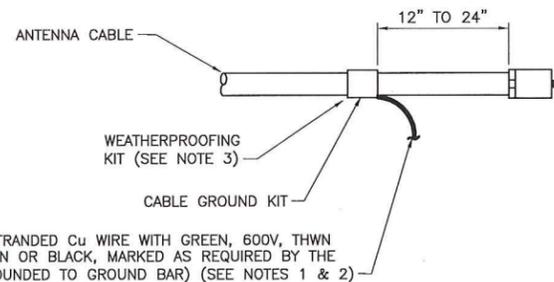
- LEGEND:**
- P1000T-HG UNISTRUT, 12" LONG.
  - 6" PIPE HANGER.
  - EXISTING SUPPORT PIPE.
  - NEW STANDOFF BRACKET, ANDREW PART# 30848-4.
  - NEW ROUND MEMBER ADAPTER SIZED FOR EXISTING PIPE SUPPORT.
  - BREAKOUT UNIT.
  - CABLE.



**3 MEDUSA HEAD DETAIL**  
SCALE: NTS

**2 2.5 HYBRID CABLE X-SECTION AND DATA**  
SCALE: NTS





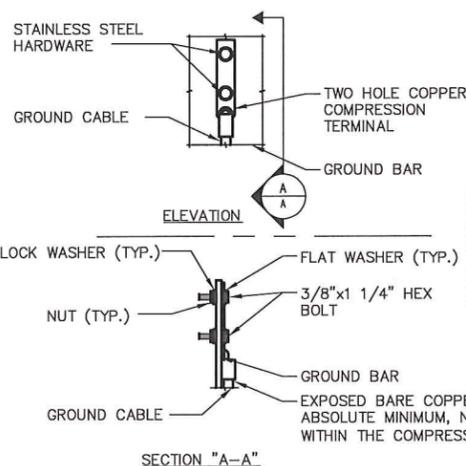
6 AWG STRANDED Cu WIRE WITH GREEN, 600V, THWN INSULATION OR BLACK, MARKED AS REQUIRED BY THE NEC (GROUNDED TO GROUND BAR) (SEE NOTES 1 & 2)

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.

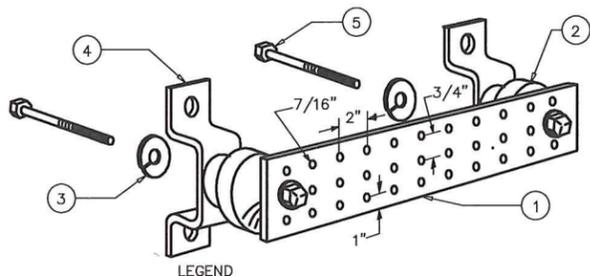
**1 CABLE GROUNDING KIT DETAIL**  
E-2 SCALE: N.T.S.



**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"

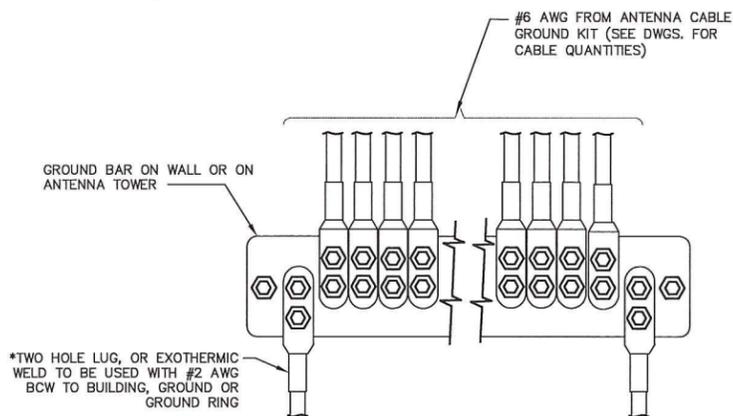
**2 GROUNDING BAR CONN. DETAIL**  
E-2 SCALE: NTS



- 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 GROUNDING BAR DETAIL**  
E-2 SCALE: NTS



\*TWO HOLE LUG, OR EXOTHERMIC WELD TO BE USED WITH #2 AWG BCW TO BUILDING, GROUND OR GROUND RING

\* - 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 ANTENNA GROUND BAR DETAIL**  
E-2 SCALE: NTS

**GROUNDING NOTES:**

- GROUNDING SHALL BE IN ACCORDANCE WITH NEC ARTICLE 250--GROUNDING AND BONDING.
- ALL GROUND WIRES SHALL BE #2 AWG UNLESS NOTED OTHERWISE.
- 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.
- 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.
- PROVIDE DEDICATED #2 AWG COPPER GROUND WIRE FROM EACH ANTENNA MOUNTING PIPE TO ASSOCIATED CIGBE.
- THE CONTRACTOR SHALL VERIFY THAT THE EXISTING GROUND BARS HAVE ENOUGH SPACE/HOLES FOR ADDITIONAL TWO HOLE LUGS.
- ALL CONDUITS SHALL BE RIGID GALVANIZED STEEL AND SHALL BE PROVIDED WITH GROUNDING BUSHINGS.
- PROVIDE GROUND CONNECTIONS FOR ALL METALLIC STRUCTURES, ENCLOSURES, RACEWAYS AND OTHER CONDUCTIVE ITEMS ASSOCIATED WITH THE INSTALLATION OF CARRIER'S EQUIPMENT.
- WHEN CABLE LENGTH IS OVER 20' THE MANUFACTURERS GROUND KIT MUST BE INSTALLED PER THE MANUFACTURERS SPECIFICATIONS.
- REFER TO "ANTI-THEFT UPDATE TO SPRINT GROUNDING 082412.PDF" FOR GUIDELINE TO SUSPECTED OR ACTUAL THEFT OF GROUNDING.
- 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:**

- 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.
- 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.
- ALL GROUNDING CONNECTIONS SHALL BE COATED WITH A COPPER SHIELD ANTI-CORROSIVE AGENT SUCH AS T&B KOPR SHIELD. VERIFY PRODUCT WITH PROJECT MANAGER.
- ALL BOLTS, WASHERS, AND NUTS USED ON GROUNDING CONNECTIONS SHALL BE STAINLESS STEEL.
- INSTALL GROUND BUSHING ON ALL METALLIC CONDUITS AND BOND TO THE EQUIPMENT GROUND BUS IN THE PANEL BOARD.
- 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.
- GROUND HYBRID CABLE SHIELD AT BOTH ENDS USING MANUFACTURER'S GUIDELINES.

**ELECTRICAL AND GROUNDING NOTES**

- ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.
- ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.
- 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.
- BURIED CONDUIT SHALL BE SCHEDULE 40 PVC.
- ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THHN INSULATION.
- 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.
- 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.
- ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.
- GROUNDING SHALL COMPLY WITH NEC ART. 250.
- GROUND HYBRID CABLE SHIELDS AT 3 LOCATIONS USING MANUFACTURER'S HYBRID CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.
- 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.
- 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.
- 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.
- CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LUGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.
- APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTIONS.
- BOND ANTENNA MOUNTING BRACKETS, HYBRID CABLE GROUND KITS, AND RRHs TO EGB PLACED NEAR THE ANTENNA LOCATION.
- BOND ANTENNA EGB'S AND MGB TO GROUND RING.
- CONTRACTOR SHALL TEST COMPLETED GROUND SYSTEM AND RECORD RESULT FOR PROJECT CLOSE-OUT DOCUMENTATION. 5 OHMS MINIMUM RESISTANCE REQUIRED.
- 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.
- 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.
- 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.
- 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, KS 66251

**CROWN CASTLE**

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**SUBMITTALS**

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1	07/30/14	FOR CONSTRUCTION	KA
2	08/01/14	PER COMMENTS	KA
3	10/10/14	REVISED ADDRESS	KA

DATE: 10/10/14  
REVIEWED BY: [Signature]  
STATE OF CONNECTICUT  
ANTONIO A. GUALTIERI  
No. 25406  
LICENSED PROFESSIONAL ENGINEER

SITE NUMBER:  
CT33XC535  
SITE NAME:  
WARD  
SITE ADDRESS:  
2365 LONG HILL ROAD  
GUILFORD, CT 06437

SHEET TITLE:  
GROUNDING DETAILS & NOTES

SHEET NO:  
E-2



Date: **September 5, 2014**

Steve Tuttle  
Crown Castle  
8 Parkmeadow Drive  
Pittsford, NY 14534  
(585) 899-3445

GPD Group  
520 S. Main St., Suite 2531  
Akron, OH 44311  
(614) 859-1607  
dpalkovic@gpdgroup.com

**Subject:** **Structural Modification Report**

**Carrier Designation:** **Sprint PCS Co-Locate** Scenario 2.5B  
**Carrier Site Number:** CT33XC535

**Crown Castle Designation:** **Crown Castle BU Number:** 876381  
**Crown Castle Site Name:** WARD  
**Crown Castle JDE Job Number:** 288222  
**Crown Castle Work Order Number:** 910828  
**Crown Castle Application Number:** 246013 Rev. 2

**Engineering Firm Designation:** **GPD Group Project Number:** 2014777.876381.03

**Site Data:** **2365 Long Hill Rd, GUILFORD, New Haven County, CT**  
**Latitude 41° 20' 47.34", Longitude -72° 43' 23.15"**  
**176 Foot – Modified EEI Monopole Tower**

Dear Steve Tuttle,

GPD Group is pleased to submit this **“Structural Modification 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 682500, in accordance with application 246013, revision 2.

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

The analysis has been performed in accordance with the TIA/EIA-222-F standard and 2013 CT State Building Code based upon a wind speed of 85 mph fastest mile.

**All modifications designed by GPD (Project #: 2014777.876381.03, dated 9/5/2014, see Appendix D) and equipment proposed in the reports shall be installed in accordance with the attached drawings for the determined structural capacity to be effective.**

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

Structural analysis prepared by: Ahmmed Hammada, EI

Respectfully submitted by:

John N. Kabak, P.E.  
Connecticut #: PEN.0028336

9/5/2014

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## 1) INTRODUCTION

The existing tapered monopole has four major sections connected by slip connections. The tower has an 18-sided cross section with a 16.5 inch top diameter and 54.0 inch bottom diameter. The structure is galvanized and has no tower lighting.

This tower is a 176 ft Monopole tower designed by Engineered Endeavors, Inc. in April of 2000. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

Modifications designed by TEP (Job #: 51819.13672, date January 27, 2014) which consisted of reinforcing the tower shaft from 0' to 119.25', installing portholes, and installing stiffener plates to the existing base plate were considered in this analysis.

Modifications designed by GPD Group (Job #: 2014777.876381.03, date August 27, 2014, see Appendix D) which consisted of installing additional anchor rods were considered in this analysis.

## 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, 38 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
176.0	178.0	3	Alcatel Lucent	TD-RRH8x20-25	1	1-1/4	1
		3	RFS Celwave	APXVTM14-C-120			

Notes:

- 1) See appendix B for proposed coax layout

**Table 2 - Existing and Reserved Antenna and Cable Information**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note	
176.0	178.0	6	Decibel	DB950G40E-M	6	1-5/8	1	
		3	RFS Celwave	APXVSP18-C-A20				
	176.0	176.0	1		Platform Mount [LP 712-1]	3	1/2	
			3	Alcatel Lucent	800 EXTERNAL NOTCH FILTER			
174.0	176.0	9	RFS Celwave	ACU-A20-N				
		3	Alcatel Lucent	PCS 1900MHz 4x45W-65MHz				
	174.0	1		Side Arm Mount [SO 102-3]				
169.0	169.0	3	Alcatel Lucent	TME-800MHZ RRH				
		1		Side Arm Mount [SO 102-3]				
		3	Ericsson	TME-RRUS-11				

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
167.0	167.0	1		Platform Mount [LP 303-1]	2 1 12	7/16 3/8 1-5/8	
		3	KMW Communications	AM-X-CD-16-65-00T-RET			
		6	Powerwave Technologies	7770.00			
		1	Raycap	DC6-48-60-18-8F			
	166.0	6	Powerwave Technologies	LGP21401			
		6	Powerwave Technologies	LGP21901			
155.0	155.0	1		Platform Mount [LP 301-1]	12	1-5/8	
		3	Ericsson	ERICSSON AIR 21 B2A B4P	1	1-5/8	2
		3	Ericsson	ERICSSON AIR 21 B4A B2P			
		3	Ericsson	KRY 112 144/1			
1		Platform Mount [LP 303-1]	14	1-5/8			
3	Alcatel Lucent	RRH2X40-07-U					
3	Alcatel Lucent	RRH2X40-AWS					
6	Amphenol	BXA-171063-12CF-EDIN-X					
6	Amphenol	BXA-70063-6CF-EDIN-X					
1	RFS Celwave	DB-B1-6C-8AB-0Z					
50.0	51.0	1	Lucent	KS24019-L112A	1	1/2	
	50.0	1		Side Arm Mount [SO 701-1]			
10.0	12.0	1	Kathrein	OG-860/1920/GPS-A	1	1/2	
	10.0	1		Side Arm Mount [SO 701-1]			

- Notes:  
 1) Equipment To Be Removed  
 2) Reserved Equipment

**Table 3 - Design Antenna and Cable Information**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
177.5	177.5	1		LP Platform		
		12	DAPA	48000		
167.5	167.5	1		LP Platform		
		12	DAPA	48000		
157.5	157.5	1		LP Platform		
		12	EMS	48000		

### 3) ANALYSIS PROCEDURE

**Table 4 - Documents Provided**

Document	Remarks	Reference	Source
4-TOWER MANUFACTURER DRAWINGS	EEl Project #: 11561, dated 7/7/2003	1613550	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	EEl Project #: 11561, dated 7/7/2003	1614617	CCISITES
4-GEOTECHNICAL REPORTS	JGI Project #: 03362G, dated 6/25/2003	1532993	CCISITES
4-POST-MODIFICATION INSPECTION	TEP Project Number:1819.16927, dated: 7/1/2014	5163807	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	TEP Project Number: 51819.13672, dated: 1/27/2014	4318894	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	GPD Group Project #: 2014777.876381.01, date: 9/5/14	D. Palkovic	GPD

#### 3.1) Analysis Method

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

#### 3.2) Assumptions

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA-222-G.

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

### 4) ANALYSIS RESULTS

**Table 5 - Section Capacity (Summary)**

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	176 - 171	Pole	TP17.626x16.5x0.1875	1	-2.03	539.53	12.1	Pass
L2	171 - 166	Pole	TP18.752x17.626x0.1875	2	-3.78	574.36	22.6	Pass
L3	166 - 161	Pole	TP19.878x18.752x0.1875	3	-4.04	609.20	36.6	Pass
L4	161 - 156	Pole	TP21.0039x19.878x0.1875	4	-4.34	644.03	48.5	Pass
L5	156 - 151	Pole	TP22.1299x21.0039x0.1875	5	-6.55	678.87	62.1	Pass
L6	151 - 144.25	Pole	TP23.65x22.1299x0.1875	6	-6.85	701.52	70.2	Pass
L7	144.25 - 142.75	Pole	TP23.6005x22.4868x0.3125	7	-8.94	1200.84	49.3	Pass
L8	142.75 - 137.75	Pole	TP24.7142x23.6005x0.3125	8	-9.64	1258.27	56.9	Pass
L9	137.75 -	Pole	TP25.8279x24.7142x0.3125	9	-10.38	1315.69	63.2	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
	132.7							
L10	132.75 - 127.75	Pole	TP26.9416x25.8279x0.3125	10	-11.15	1373.12	68.4	Pass
L11	127.75 - 122.75	Pole	TP28.0554x26.9416x0.3125	11	-11.95	1430.55	72.7	Pass
L12	122.75 - 117.75	Pole	TP29.1691x28.0554x0.3125	12	-12.77	1487.97	76.4	Pass
L13	117.75 - 116.75	Pole	TP29.3918x29.1691x0.3125	13	-12.94	1499.46	77.1	Pass
L14	116.75 - 111.75	Pole	TP30.5055x29.3918x0.5275	14	-14.02	2609.32	76.8	Pass
L15	111.75 - 106.75	Pole	TP31.6192x30.5055x0.5175	15	-15.12	2655.80	80.4	Pass
L16	106.75 - 101.75	Pole	TP32.7329x31.6192x0.5075	16	-16.25	2698.59	83.7	Pass
L17	101.75 - 94.58	Pole	TP34.33x32.7329x0.5025	17	-16.78	2715.63	85.1	Pass
L18	94.58 - 94.41	Pole	TP33.7415x32.6292x0.565	18	-18.83	3093.01	80.7	Pass
L19	94.41 - 89.41	Pole	TP34.8539x33.7415x0.56	19	-20.10	3168.89	82.9	Pass
L20	89.41 - 89.25	Pole	TP34.8895x34.8539x0.56	20	-20.15	3172.17	82.9	Pass
L21	89.25 - 84.25	Pole	TP36.0018x34.8895x0.55	21	-21.44	3217.38	84.9	Pass
L22	84.25 - 79.25	Pole	TP37.1142x36.0018x0.545	22	-22.77	3288.62	86.6	Pass
L23	79.25 - 74.25	Pole	TP38.2265x37.1142x0.54	23	-24.13	3358.01	88.1	Pass
L24	74.25 - 69.25	Pole	TP39.3389x38.2265x0.535	24	-25.51	3425.56	89.5	Pass
L25	69.25 - 64.25	Pole	TP40.4512x39.3389x0.53	25	-26.92	3491.26	90.7	Pass
L26	64.25 - 63.1667	Pole	TP40.6922x40.4512x0.53	26	-27.22	3512.33	91.0	Pass
L27	63.1667 - 58.1667	Pole	TP41.8046x40.6922x0.58	27	-28.76	3945.36	82.2	Pass
L28	58.1667 - 53.1667	Pole	TP42.917x41.8046x0.575	28	-30.31	4017.36	83.3	Pass
L29	53.1667 - 46.95	Pole	TP44.3x42.917x0.575	29	-30.37	4020.25	83.3	Pass
L30	46.95 - 45.95	Pole	TP43.7731x42.1974x0.57	30	-34.15	4063.42	87.1	Pass
L31	45.95 - 40.95	Pole	TP44.886x43.7731x0.565	31	-35.14	4090.50	87.9	Pass
L32	40.95 - 35.95	Pole	TP45.9988x44.886x0.56	32	-35.78	4095.88	88.6	Pass
L33	35.95 - 31.5	Pole	TP46.9892x45.9988x0.555	33	-37.42	4161.68	89.2	Pass
L34	31.5 - 26.5	Pole	TP48.102x46.9892x0.605	34	-38.89	4630.50	81.1	Pass
L35	26.5 - 21.5	Pole	TP49.2149x48.102x0.6	35	-40.69	4702.89	81.7	Pass
L36	21.5 - 16.5	Pole	TP50.3277x49.2149x0.595	36	-42.52	4773.45	82.3	Pass
L37	16.5 - 11.5	Pole	TP51.4405x50.3277x0.59	37	-44.37	4842.16	82.8	Pass
L38	11.5 - 6.5	Pole	TP52.5533x51.4405x0.585	38	-46.24	4909.03	83.2	Pass
L39	6.5 - 1.5	Pole	TP53.6662x52.5533x0.58	39	-48.15	4974.05	83.7	Pass
L40	1.5 - 0	Pole	TP54x53.6662x0.575	40	-49.87	5037.23	83.8	Pass
							Summary	
						Pole (L13)	77.1	Pass
						Rating =	91.0	Pass

**Table 6 - Tower Component Stresses vs. Capacity – LC4.7**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	93.3	Pass
1	Base Plate	0	77.1	Pass
1,2	Base Foundation	0	97.8	Pass
1	Base Foundation Soil Interaction	0	54.4	Pass

<b>Structure Rating (max from all components) =</b>	<b>97.8%</b>
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Notes:

- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
- 2) Capacities up to 100% are considered acceptable based on analysis methods used.

**4.1) Recommendations**

The design of the modified tower will be sufficient for the proposed loading once the modifications are installed in reference to the design drawings by GPD Group (Project #:2014777.876381.03, dated 9/8/2014, see Appendix D).

## 5) DISCLAIMER OF WARRANTIES

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

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

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

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

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

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

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

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

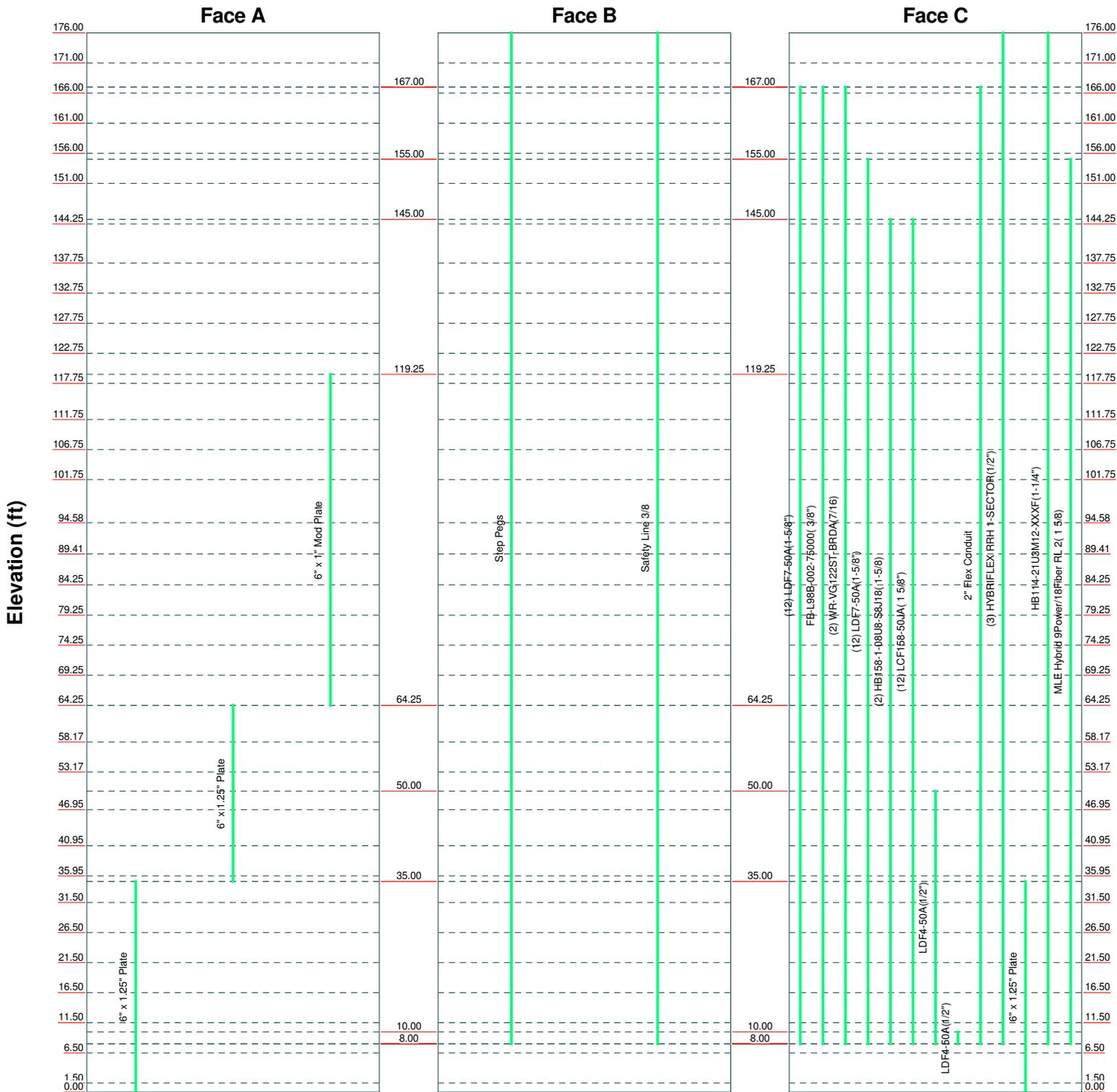
GPD GROUP makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. GPD GROUP will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any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

**APPENDIX A**  
**TNXTOWER OUTPUT**



# Feed Line Distribution Chart 0' - 176'

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



<p><b>GPD Group</b> 520 S. Main St., Suite 2531 Akron, OH 44311 Phone: 330-572-2100 FAX: 330-572-2101</p>	Job: <b>WARD - BU # 876381</b>		
	Project: <b>2013777.876381.03</b>		
Client: Crown Castle	Drawn by: ahammad	App'd:	
Code: TIA/EIA-222-F	Date: 09/05/14	Scale: NTS	
Path: \\AKRN05.gpdco.com\TELECOM\Crown\876381\03_Mods\TX\876381_Modified_1.er			Dwg No. E-7

## Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

- 1) Tower is located in New Haven County, Connecticut.
- 2) Basic wind speed of 85 mph.
- 3) Nominal ice thickness of 0.7500 in.
- 4) Ice thickness is considered to increase with height.
- 5) Ice density of 56 pcf.
- 6) A wind speed of 38 mph is used in combination with ice.
- 7) Temperature drop of 50 °F.
- 8) Deflections calculated using a wind speed of 50 mph.
- 9) A non-linear (P-delta) analysis was used.
- 10) Pressures are calculated at each section.
- 11) Stress ratio used in pole design is 1.333.
- 12) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification ✓ Use Code Stress Ratios ✓ Use Code Safety Factors - Guys ✓ Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) Add IBC .6D+W Combination	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate ✓ Use Clear Spans For Wind Area ✓ Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt. Autocalc Torque Arm Areas SR Members Have Cut Ends Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Use TIA-222-G Tension Splice Capacity Exemption	Treat Feedline Bundles As Cylinder Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feedline Torque Include Angle Block Shear Check <div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
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## Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	176.00-171.00	5.00	0.00	18	16.5000	17.6260	0.1875	0.7500	A572-65 (65 ksi)
L2	171.00-166.00	5.00	0.00	18	17.6260	18.7520	0.1875	0.7500	A572-65 (65 ksi)
L3	166.00-161.00	5.00	0.00	18	18.7520	19.8780	0.1875	0.7500	A572-65 (65 ksi)
L4	161.00-156.00	5.00	0.00	18	19.8780	21.0039	0.1875	0.7500	A572-65 (65 ksi)
L5	156.00-151.00	5.00	0.00	18	21.0039	22.1299	0.1875	0.7500	A572-65 (65 ksi)
L6	151.00-144.25	6.75	3.50	18	22.1299	23.6500	0.1875	0.7500	A572-65 (65 ksi)
L7	144.25-142.75	5.00	0.00	18	22.4868	23.6005	0.3125	1.2500	A572-65 (65 ksi)
L8	142.75-137.75	5.00	0.00	18	23.6005	24.7142	0.3125	1.2500	A572-65 (65 ksi)
L9	137.75-132.75	5.00	0.00	18	24.7142	25.8279	0.3125	1.2500	A572-65 (65 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L10	132.75-127.75	5.00	0.00	18	25.8279	26.9416	0.3125	1.2500	A572-65 (65 ksi)
L11	127.75-122.75	5.00	0.00	18	26.9416	28.0554	0.3125	1.2500	A572-65 (65 ksi)
L12	122.75-117.75	5.00	0.00	18	28.0554	29.1691	0.3125	1.2500	A572-65 (65 ksi)
L13	117.75-116.75	1.00	0.00	18	29.1691	29.3918	0.3125	1.2500	A572-65 (65 ksi)
L14	116.75-111.75	5.00	0.00	18	29.3918	30.5055	0.5275	2.1100	A572-65 (65 ksi)
L15	111.75-106.75	5.00	0.00	18	30.5055	31.6192	0.5175	2.0700	A572-65 (65 ksi)
L16	106.75-101.75	5.00	0.00	18	31.6192	32.7329	0.5075	2.0300	A572-65 (65 ksi)
L17	101.75-94.58	7.17	4.83	18	32.7329	34.3300	0.5025	2.0100	A572-65 (65 ksi)
L18	94.58-94.41	5.00	0.00	18	32.6292	33.7415	0.5650	2.2600	A572-65 (65 ksi)
L19	94.41-89.41	5.00	0.00	18	33.7415	34.8539	0.5600	2.2400	A572-65 (65 ksi)
L20	89.41-89.25	0.16	0.00	18	34.8539	34.8895	0.5600	2.2400	A572-65 (65 ksi)
L21	89.25-84.25	5.00	0.00	18	34.8895	36.0018	0.5500	2.2000	A572-65 (65 ksi)
L22	84.25-79.25	5.00	0.00	18	36.0018	37.1142	0.5450	2.1800	A572-65 (65 ksi)
L23	79.25-74.25	5.00	0.00	18	37.1142	38.2265	0.5400	2.1600	A572-65 (65 ksi)
L24	74.25-69.25	5.00	0.00	18	38.2265	39.3389	0.5350	2.1400	A572-65 (65 ksi)
L25	69.25-64.25	5.00	0.00	18	39.3389	40.4512	0.5300	2.1200	A572-65 (65 ksi)
L26	64.25-63.17	1.08	0.00	18	40.4512	40.6923	0.5300	2.1200	A572-65 (65 ksi)
L27	63.17-58.17	5.00	0.00	18	40.6923	41.8046	0.5800	2.3200	A572-65 (65 ksi)
L28	58.17-53.17	5.00	0.00	18	41.8046	42.9170	0.5750	2.3000	A572-65 (65 ksi)
L29	53.17-46.95	6.22	6.08	18	42.9170	44.3000	0.5750	2.3000	A572-65 (65 ksi)
L30	46.95-45.95	7.08	0.00	18	42.1974	43.7731	0.5700	2.2800	A572-65 (65 ksi)
L31	45.95-40.95	5.00	0.00	18	43.7731	44.8860	0.5650	2.2600	A572-65 (65 ksi)
L32	40.95-35.95	5.00	0.00	18	44.8860	45.9988	0.5600	2.2400	A572-65 (65 ksi)
L33	35.95-31.50	4.45	0.00	18	45.9988	46.9892	0.5550	2.2200	A572-65 (65 ksi)
L34	31.50-26.50	5.00	0.00	18	46.9892	48.1020	0.6050	2.4200	A572-65 (65 ksi)
L35	26.50-21.50	5.00	0.00	18	48.1020	49.2149	0.6000	2.4000	A572-65 (65 ksi)
L36	21.50-16.50	5.00	0.00	18	49.2149	50.3277	0.5950	2.3800	A572-65 (65 ksi)
L37	16.50-11.50	5.00	0.00	18	50.3277	51.4405	0.5900	2.3600	A572-65 (65 ksi)
L38	11.50-6.50	5.00	0.00	18	51.4405	52.5533	0.5850	2.3400	A572-65 (65 ksi)
L39	6.50-1.50	5.00	0.00	18	52.5533	53.6662	0.5800	2.3200	A572-65 (65 ksi)
L40	1.50-0.00	1.50		18	53.6662	54.0000	0.5750	2.3000	A572-65 (65 ksi)

**Tapered Pole Properties**

Section	Tip Dia. in	Area in <sup>2</sup>	I in <sup>4</sup>	r in	C in	I/C in <sup>3</sup>	J in <sup>4</sup>	It/Q in <sup>2</sup>	w in	w/t
L1	16.7545	9.7080	326.3677	5.7909	8.3820	38.9367	653.1649	4.8549	2.5740	13.728
	17.8979	10.3781	398.7235	6.1907	8.9540	44.5302	797.9716	5.1900	2.7722	14.785
L2	17.8979	10.3781	398.7235	6.1907	8.9540	44.5302	797.9716	5.1900	2.7722	14.785
	19.0412	11.0482	481.0533	6.5904	9.5260	50.4990	962.7397	5.5251	2.9703	15.842
L3	19.0412	11.0482	481.0533	6.5904	9.5260	50.4990	962.7397	5.5251	2.9703	15.842
	20.1846	11.7183	574.0012	6.9901	10.0980	56.8431	1148.7576	5.8603	3.1685	16.899
L4	20.1846	11.7183	574.0012	6.9901	10.0980	56.8431	1148.7576	5.8603	3.1685	16.899
	21.3280	12.3884	678.2110	7.3898	10.6700	63.5624	1357.3144	6.1954	3.3667	17.956
L5	21.3280	12.3884	678.2110	7.3898	10.6700	63.5624	1357.3144	6.1954	3.3667	17.956
	22.4713	13.0585	794.3269	7.7896	11.2420	70.6571	1589.6990	6.5305	3.5649	19.013
L6	22.4713	13.0585	794.3269	7.7896	11.2420	70.6571	1589.6990	6.5305	3.5649	19.013
	24.0148	13.9631	971.1102	8.3292	12.0142	80.8302	1943.4981	6.9829	3.8324	20.439
L7	23.6253	21.9941	1366.2960	7.8719	11.4233	119.6061	2734.3898	10.9992	3.4077	10.905
	23.9646	23.0988	1582.6765	8.2672	11.9891	132.0100	3167.4355	11.5516	3.6037	11.532
L8	23.9646	23.0988	1582.6765	8.2672	11.9891	132.0100	3167.4355	11.5516	3.6037	11.532
	25.0955	24.2035	1820.7749	8.6626	12.5548	145.0259	3643.9455	12.1040	3.7997	12.159
L9	25.0955	24.2035	1820.7749	8.6626	12.5548	145.0259	3643.9455	12.1040	3.7997	12.159
	26.2264	25.3081	2081.6302	9.0580	13.1206	158.6537	4165.9995	12.6565	3.9957	12.786
L10	26.2264	25.3081	2081.6302	9.0580	13.1206	158.6537	4165.9995	12.6565	3.9957	12.786
	27.3573	26.4128	2366.2809	9.4533	13.6864	172.8934	4735.6755	13.2089	4.1917	13.414
L11	27.3573	26.4128	2366.2809	9.4533	13.6864	172.8934	4735.6755	13.2089	4.1917	13.414
	28.4882	27.5174	2675.7657	9.8487	14.2521	187.7451	5355.0523	13.7613	4.3877	14.041
L12	28.4882	27.5174	2675.7657	9.8487	14.2521	187.7451	5355.0523	13.7613	4.3877	14.041
	29.6190	28.6221	3011.1228	10.2441	14.8179	203.2087	6026.2078	14.3138	4.5838	14.668
L13	29.6190	28.6221	3011.1228	10.2441	14.8179	203.2087	6026.2078	14.3138	4.5838	14.668
	29.8452	28.8430	3081.3904	10.3232	14.9310	206.3748	6166.8355	14.4243	4.6230	14.793
L14	29.8452	28.8430	3081.3904	10.3232	14.9310	206.3748	6166.8355	14.4243	4.6230	14.793
	30.9761	50.1918	5698.6990	10.6422	15.4968	367.7338	11404.8964	25.1006	4.4406	8.418
L15	30.9761	49.2567	5596.2634	10.6457	15.4968	361.1237	11199.8905	24.6330	4.4582	8.615
	32.1070	51.0860	6243.2167	11.0411	16.0626	388.6811	12494.6484	25.5479	4.6542	8.994
L16	32.1070	50.1149	6128.4824	11.0447	16.0626	381.5381	12265.0289	25.0622	4.6718	9.205
	33.2379	51.9089	6810.4685	11.4400	16.6283	409.5701	13629.8983	25.9594	4.8678	9.592
L17	33.2379	51.4055	6746.5096	11.4418	16.6283	405.7237	13501.8964	25.7076	4.8766	9.705
	34.8596	53.9527	7799.9200	12.0088	17.4396	447.2523	15610.1033	26.9815	5.1577	10.264
L18	34.2236	57.5010	7468.8246	11.3828	16.5756	450.5912	14947.4768	28.7559	4.7483	8.404
	34.2620	59.4958	8273.4193	11.7777	17.1407	482.6772	16557.7249	29.7535	4.9441	8.751
L19	34.2620	58.9781	8203.9113	11.7794	17.1407	478.6220	16418.6179	29.4947	4.9529	8.844
	35.3915	60.9553	9056.9476	12.1743	17.7058	511.5253	18125.8125	30.4834	5.1487	9.194
L20	35.3915	60.9553	9056.9476	12.1743	17.7058	511.5253	18125.8125	30.4834	5.1487	9.194
	35.4277	61.0186	9085.1794	12.1870	17.7238	512.5963	18182.3132	30.5151	5.1549	9.205
L21	35.4277	59.9464	8930.7439	12.1905	17.7238	503.8829	17873.2391	29.9789	5.1725	9.405
	36.5572	61.8882	9827.0396	12.5854	18.2889	537.3219	19667.0098	30.9500	5.3683	9.761
L22	36.5572	61.3343	9741.8236	12.5872	18.2889	532.6624	19496.4658	30.6730	5.3771	9.866
	37.6867	63.2585	10687.7545	12.9821	18.8540	566.8693	21389.5723	31.6352	5.5729	10.225
L23	37.6867	62.6867	10594.0460	12.9838	18.8540	561.8990	21202.0320	31.3493	5.5817	10.336
	38.8162	64.5932	11590.3547	13.3787	19.4191	596.8540	23195.9602	32.3027	5.7775	10.699
L24	38.8162	64.0036	11487.6076	13.3805	19.4191	591.5629	22990.3310	32.0079	5.7863	10.815
	39.9458	65.8925	12534.9888	13.7754	19.9842	627.2463	25086.4714	32.9525	5.9820	11.181

Section	Tip Dia. in	Area in <sup>2</sup>	I in <sup>4</sup>	r in	C in	I/C in <sup>3</sup>	J in <sup>4</sup>	It/Q in <sup>2</sup>	w in	w/t
L25	39.9458	65.2851	12422.640	13.7772	19.9842	621.6245	24861.626	32.6487	5.9908	11.303
	41.0753	67.1563	13521.738	14.1720	20.5492	658.0167	27061.269	33.5845	6.1866	11.673
L26	41.0753	67.1563	13521.738	14.1720	20.5492	658.0167	27061.269	33.5845	6.1866	11.673
	41.3200	67.5617	13768.110	14.2576	20.6717	666.0379	27554.337	33.7873	6.2290	11.753
L27	41.3200	73.8434	15010.786	14.2398	20.6717	726.1528	30041.323	36.9287	6.1410	10.588
	42.4495	75.8912	16294.532	14.6347	21.2367	767.2803	32610.505	37.9528	6.3368	10.926
L28	42.4495	75.2461	16159.941	14.6365	21.2367	760.9426	32341.145	37.6302	6.3456	11.036
	43.5790	77.2762	17503.511	15.0314	21.8018	802.8464	35030.054	38.6454	6.5414	11.376
L29	43.5790	77.2762	17503.511	15.0314	21.8018	802.8464	35030.054	38.6454	6.5414	11.376
	44.9834	79.8003	19275.323	15.5224	22.5044	856.5135	38576.009	39.9077	6.7848	11.8
L30	44.2224	75.3114	16487.556	14.7777	21.4363	769.1431	32996.808	37.6629	6.4235	11.269
	44.4484	78.1622	18431.683	15.3371	22.2368	828.8838	36887.620	39.0886	6.7009	11.756
L31	44.4484	77.4856	18276.346	15.3389	22.2368	821.8982	36576.741	38.7502	6.7097	11.876
	45.5784	79.4812	19725.150	15.7339	22.8021	865.0597	39476.255	39.7482	6.9055	12.222
L32	45.5784	78.7867	19557.209	15.7357	22.8021	857.6945	39140.152	39.4009	6.9143	12.347
	46.7084	80.7647	21067.478	16.1308	23.3674	901.5763	42162.678	40.3900	7.1102	12.697
L33	46.7084	80.0524	20886.269	16.1325	23.3674	893.8215	41800.021	40.0338	7.1190	12.827
	47.7141	81.7971	22281.850	16.4841	23.8705	933.4466	44593.020	40.9063	7.2933	13.141
L34	47.7141	89.0702	24210.845	16.4664	23.8705	1014.2574	48453.548	44.5436	7.2053	11.91
	48.8441	91.2071	25995.549	16.8614	24.4358	1063.8292	52025.304	45.6122	7.4012	12.233
L35	48.8441	90.4629	25788.852	16.8632	24.4358	1055.3705	51611.639	45.2400	7.4100	12.35
	49.9741	92.5821	27644.102	17.2583	25.0011	1105.7135	55324.580	46.2999	7.6058	12.676
L36	49.9741	91.8200	27422.194	17.2600	25.0011	1096.8376	54880.472	45.9187	7.6146	12.798
	51.1041	93.9217	29348.561	17.6551	25.5665	1147.9322	58735.741	46.9697	7.8105	13.127
L37	51.1041	93.1418	29110.713	17.6569	25.5665	1138.6291	58259.731	46.5797	7.8193	13.253
	52.2341	95.2257	31108.718	18.0519	26.1318	1190.4556	62258.370	47.6219	8.0151	13.585
L38	52.2341	94.4280	30854.184	18.0537	26.1318	1180.7152	61748.968	47.2230	8.0239	13.716
	53.3640	96.4943	32924.292	18.4488	26.6971	1233.2540	65891.906	48.2563	8.2198	14.051
L39	53.3640	95.6787	32652.310	18.4505	26.6971	1223.0663	65347.586	47.8485	8.2286	14.187
	54.4940	97.7274	34794.941	18.8456	27.2624	1276.2976	69635.666	48.8730	8.4244	14.525
L40	54.4940	96.8940	34504.732	18.8474	27.2624	1265.6525	69054.867	48.4562	8.4332	14.667
	54.8330	97.5033	35159.752	18.9659	27.4320	1281.7058	70365.769	48.7609	8.4920	14.769

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor $A_r$	Adjust. Factor $A_r$	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
ft	ft <sup>2</sup>	in						
L1 176.00-171.00				1	1	1		
L2 171.00-166.00				1	1	1		
L3 166.00-161.00				1	1	1		
L4 161.00-156.00				1	1	1		
L5 156.00-151.00				1	1	1		
L6 151.00-144.25				1	1	1		
L7 144.25-142.75				1	1	1		
L8 142.75-137.75				1	1	1		
L9 137.75-132.75				1	1	1		
L10 132.75-127.75				1	1	1		
L11 127.75-122.75				1	1	1		
L12 122.75-117.75				1	1	1		
L13 117.75-116.75				1	1	1		
L14 116.75-111.75				1	1	0.955303		
L15 111.75-106.75				1	1	0.960205		
L16 106.75-101.75				1	1	0.966263		
L17 101.75-94.58				1	1	0.970096		
L18 94.58-94.41				1	1	0.970071		
L19 94.41-89.41				1	1	0.968564		
L20 89.41-89.25				1	1	0.968254		
L21 89.25-84.25				1	1	0.976041		
L22 84.25-79.25				1	1	0.975829		
L23 79.25-74.25				1	1	0.976162		
L24 74.25-69.25				1	1	0.977007		
L25 69.25-64.25				1	1	0.978335		
L26 64.25-63.17				1	1	0.97671		
L27 63.17-58.17				1	1	0.970962		
L28 58.17-53.17				1	1	0.970693		
L29 53.17-46.95				1	1	0.970464		
L30 46.95-45.95				1	1	0.972727		
L31 45.95-40.95				1	1	0.973249		
L32 40.95-35.95				1	1	0.974183		
L33 35.95-31.50				1	1	0.976299		
L34 31.50-				1	1	0.979181		

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor $A_r$	Adjust. Factor $A_r$	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
ft	ft <sup>2</sup>	in						
26.50								
L35 26.50-21.50				1	1	0.978945		
L36 21.50-16.50				1	1	0.979086		
L37 16.50-11.50				1	1	0.979587		
L38 11.50-6.50				1	1	0.980436		
L39 6.50-1.50				1	1	0.981618		
L40 1.50-0.00				1	1	0.987949		

### Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		$C_{AA}$ ft <sup>2</sup> /ft	Weight plf
Step Pegs	B	No	CaAa (Out Of Face)	176.00 - 8.00	1	No Ice	0.08	2.72
						1/2" Ice	0.18	3.51
						1" Ice	0.28	4.92
						2" Ice	0.48	9.56
						4" Ice	0.88	26.18
Safety Line 3/8	B	No	CaAa (Out Of Face)	176.00 - 8.00	1	No Ice	0.04	0.22
						1/2" Ice	0.14	0.75
						1" Ice	0.24	1.28
						2" Ice	0.44	2.34
						4" Ice	0.84	4.46
LDF7-50A(1-5/8")	C	No	Inside Pole	167.00 - 8.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
FB-L98B-002-75000(3/8")	C	No	Inside Pole	167.00 - 8.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
						2" Ice	0.00	0.06
						4" Ice	0.00	0.06
WR-VG122ST-BRDA(7/16)	C	No	Inside Pole	167.00 - 8.00	2	No Ice	0.00	0.14
						1/2" Ice	0.00	0.14
						1" Ice	0.00	0.14
						2" Ice	0.00	0.14
						4" Ice	0.00	0.14
LDF7-50A(1-5/8")	C	No	Inside Pole	155.00 - 8.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	145.00 - 8.00	2	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
						2" Ice	0.00	1.30
						4" Ice	0.00	1.30
LCF158-50JA( 1 5/8")	C	No	Inside Pole	145.00 - 8.00	12	No Ice	0.00	0.92
						1/2" Ice	0.00	0.92
						1" Ice	0.00	0.92
						2" Ice	0.00	0.92
						4" Ice	0.00	0.92
LDF4-50A(1/2")	C	No	Inside Pole	50.00 - 8.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
LDF4-50A(1/2")	C	No	Inside Pole	10.00 - 8.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C <sub>A</sub> A <sub>A</sub>		Weight
						ft <sup>2</sup> /ft	plf	
2" Flex Conduit	C	No	Inside Pole	167.00 - 8.00	1	1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
						No Ice	0.00	0.32
						1/2" Ice	0.00	0.32
						1" Ice	0.00	0.32
HYBRIFLEX RRH 1-SECTOR(1/2")	C	No	CaAa (Out Of Face)	176.00 - 8.00	3	2" Ice	0.00	0.32
						4" Ice	0.00	0.32
						No Ice	0.00	0.15
						1/2" Ice	0.00	0.83
						1" Ice	0.00	2.13
						2" Ice	0.00	6.55
						4" Ice	0.00	22.73
6" x 1.25" Plate	A	No	CaAa (Out Of Face)	35.00 - 0.00	1	No Ice	0.21	0.00
						1/2" Ice	0.32	0.00
						1" Ice	0.43	0.00
						2" Ice	0.65	0.00
						4" Ice	1.10	0.00
6" x 1.25" Plate	C	No	CaAa (Out Of Face)	35.00 - 0.00	1	No Ice	0.21	0.00
						1/2" Ice	0.32	0.00
						1" Ice	0.43	0.00
						2" Ice	0.65	0.00
						4" Ice	1.10	0.00
6" x 1.25" Plate	A	No	CaAa (Out Of Face)	64.25 - 35.00	1	No Ice	0.21	0.00
						1/2" Ice	0.32	0.00
						1" Ice	0.43	0.00
						2" Ice	0.65	0.00
						4" Ice	1.10	0.00
6" x 1" Mod Plate	A	No	CaAa (Out Of Face)	119.25 - 64.25	1	No Ice	0.17	0.00
						1/2" Ice	0.28	0.00
						1" Ice	0.39	0.00
						2" Ice	0.61	0.00
						4" Ice	1.06	0.00
HB114-21U3M12-XXXF(1-1/4")	C	No	CaAa (Out Of Face)	176.00 - 8.00	1	No Ice	0.15	1.22
						1/2" Ice	0.25	2.47
						1" Ice	0.35	4.32
						2" Ice	0.55	9.87
						4" Ice	0.95	28.29
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	C	No	CaAa (Out Of Face)	155.00 - 8.00	1	No Ice	0.00	1.07
						1/2" Ice	0.00	2.37
						1" Ice	0.00	4.28
						2" Ice	0.00	9.93
						4" Ice	0.00	28.56

**Feed Line/Linear Appurtenances Section Areas**

Tower Sectio n	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight K
L1	176.00-171.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.01
L2	171.00-166.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.02
L3	166.00-161.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.06
L4	161.00-156.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.06
L5	156.00-151.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.10
L6	151.00-144.25	A	0.000	0.000	0.000	0.000	0.00

Tower Sectio n	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight K
		B	0.000	0.000	0.000	0.793	0.02
		C	0.000	0.000	0.000	1.039	0.17
L7	144.25-142.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.176	0.00
		C	0.000	0.000	0.000	0.231	0.06
L8	142.75-137.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L9	137.75-132.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L10	132.75-127.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L11	127.75-122.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L12	122.75-117.75	A	0.000	0.000	0.000	0.250	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L13	117.75-116.75	A	0.000	0.000	0.000	0.167	0.00
		B	0.000	0.000	0.000	0.117	0.00
		C	0.000	0.000	0.000	0.154	0.04
L14	116.75-111.75	A	0.000	0.000	0.000	0.833	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L15	111.75-106.75	A	0.000	0.000	0.000	0.833	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L16	106.75-101.75	A	0.000	0.000	0.000	0.833	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L17	101.75-94.58	A	0.000	0.000	0.000	1.195	0.00
		B	0.000	0.000	0.000	0.842	0.02
		C	0.000	0.000	0.000	1.104	0.26
L18	94.58-94.41	A	0.000	0.000	0.000	0.028	0.00
		B	0.000	0.000	0.000	0.020	0.00
		C	0.000	0.000	0.000	0.026	0.01
L19	94.41-89.41	A	0.000	0.000	0.000	0.833	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L20	89.41-89.25	A	0.000	0.000	0.000	0.027	0.00
		B	0.000	0.000	0.000	0.019	0.00
		C	0.000	0.000	0.000	0.025	0.01
L21	89.25-84.25	A	0.000	0.000	0.000	0.833	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L22	84.25-79.25	A	0.000	0.000	0.000	0.833	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L23	79.25-74.25	A	0.000	0.000	0.000	0.833	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L24	74.25-69.25	A	0.000	0.000	0.000	0.833	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L25	69.25-64.25	A	0.000	0.000	0.000	0.833	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L26	64.25-63.17	A	0.000	0.000	0.000	0.226	0.00
		B	0.000	0.000	0.000	0.127	0.00
		C	0.000	0.000	0.000	0.167	0.04
L27	63.17-58.17	A	0.000	0.000	0.000	1.042	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L28	58.17-53.17	A	0.000	0.000	0.000	1.042	0.00
		B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
L29	53.17-46.95	A	0.000	0.000	0.000	1.295	0.00

Tower Section <i>n</i>	Tower Elevation <i>ft</i>	Face	$A_R$ <i>ft<sup>2</sup></i>	$A_F$ <i>ft<sup>2</sup></i>	$C_{AA}$ In Face <i>ft<sup>2</sup></i>	$C_{AA}$ Out Face <i>ft<sup>2</sup></i>	Weight <i>K</i>
L30	46.95-45.95	B	0.000	0.000	0.000	0.730	0.02
		C	0.000	0.000	0.000	0.957	0.23
		A	0.000	0.000	0.000	0.208	0.00
L31	45.95-40.95	B	0.000	0.000	0.000	0.117	0.00
		C	0.000	0.000	0.000	0.154	0.04
		A	0.000	0.000	0.000	1.042	0.00
L32	40.95-35.95	B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
		A	0.000	0.000	0.000	1.042	0.00
L33	35.95-31.50	B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	0.770	0.18
		A	0.000	0.000	0.000	0.927	0.00
L34	31.50-26.50	B	0.000	0.000	0.000	0.523	0.01
		C	0.000	0.000	0.000	1.414	0.16
		A	0.000	0.000	0.000	1.042	0.00
L35	26.50-21.50	B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	1.812	0.18
		A	0.000	0.000	0.000	1.042	0.00
L36	21.50-16.50	B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	1.812	0.18
		A	0.000	0.000	0.000	1.042	0.00
L37	16.50-11.50	B	0.000	0.000	0.000	0.588	0.01
		C	0.000	0.000	0.000	1.812	0.18
		A	0.000	0.000	0.000	1.042	0.00
L38	11.50-6.50	B	0.000	0.000	0.000	0.411	0.01
		C	0.000	0.000	0.000	1.581	0.13
		A	0.000	0.000	0.000	1.042	0.00
L39	6.50-1.50	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.042	0.00
		A	0.000	0.000	0.000	0.312	0.00
L40	1.50-0.00	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.312	0.00
		A	0.000	0.000	0.000	0.312	0.00

**Feed Line/Linear Appurtenances Section Areas - With Ice**

Tower Section <i>n</i>	Tower Elevation <i>ft</i>	Face or Leg	Ice Thickness <i>in</i>	$A_R$ <i>ft<sup>2</sup></i>	$A_F$ <i>ft<sup>2</sup></i>	$C_{AA}$ In Face <i>ft<sup>2</sup></i>	$C_{AA}$ Out Face <i>ft<sup>2</sup></i>	Weight <i>K</i>
L1	176.00-171.00	A	0.915	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	2.418	0.03
		C		0.000	0.000	0.000	1.685	0.05
L2	171.00-166.00	A	0.912	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	2.412	0.03
		C		0.000	0.000	0.000	1.682	0.06
L3	166.00-161.00	A	0.909	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	2.405	0.03
		C		0.000	0.000	0.000	1.679	0.10
L4	161.00-156.00	A	0.905	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	2.398	0.03
		C		0.000	0.000	0.000	1.675	0.10
L5	156.00-151.00	A	0.902	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	2.391	0.03
		C		0.000	0.000	0.000	1.672	0.16
L6	151.00-144.25	A	0.898	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	3.217	0.04
		C		0.000	0.000	0.000	2.251	0.24
L7	144.25-142.75	A	0.895	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.715	0.01
		C		0.000	0.000	0.000	0.500	0.07
L8	142.75-137.75	A	0.892	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	2.372	0.03
		C		0.000	0.000	0.000	1.662	0.24
L9	137.75-132.75	A	0.888	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_{AA}$ In Face ft <sup>2</sup>	$C_{AA}$ Out Face ft <sup>2</sup>	Weight K
		B		0.000	0.000	0.000	2.364	0.03
		C		0.000	0.000	0.000	1.658	0.24
L10	132.75-127.75	A	0.884	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	2.356	0.03
		C		0.000	0.000	0.000	1.654	0.24
L11	127.75-122.75	A	0.880	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	2.348	0.03
		C		0.000	0.000	0.000	1.650	0.24
L12	122.75-117.75	A	0.876	0.000	0.000	0.000	0.542	0.00
		B		0.000	0.000	0.000	2.339	0.03
		C		0.000	0.000	0.000	1.646	0.24
L13	117.75-116.75	A	0.873	0.000	0.000	0.000	0.361	0.00
		B		0.000	0.000	0.000	0.467	0.01
		C		0.000	0.000	0.000	0.329	0.05
L14	116.75-111.75	A	0.871	0.000	0.000	0.000	1.801	0.00
		B		0.000	0.000	0.000	2.329	0.03
		C		0.000	0.000	0.000	1.641	0.23
L15	111.75-106.75	A	0.866	0.000	0.000	0.000	1.795	0.00
		B		0.000	0.000	0.000	2.319	0.03
		C		0.000	0.000	0.000	1.636	0.23
L16	106.75-101.75	A	0.861	0.000	0.000	0.000	1.790	0.00
		B		0.000	0.000	0.000	2.309	0.03
		C		0.000	0.000	0.000	1.631	0.23
L17	101.75-94.58	A	0.855	0.000	0.000	0.000	2.557	0.00
		B		0.000	0.000	0.000	3.294	0.04
		C		0.000	0.000	0.000	2.330	0.34
L18	94.58-94.41	A	0.851	0.000	0.000	0.000	0.061	0.00
		B		0.000	0.000	0.000	0.078	0.00
		C		0.000	0.000	0.000	0.055	0.01
L19	94.41-89.41	A	0.848	0.000	0.000	0.000	1.776	0.00
		B		0.000	0.000	0.000	2.284	0.03
		C		0.000	0.000	0.000	1.618	0.23
L20	89.41-89.25	A	0.845	0.000	0.000	0.000	0.057	0.00
		B		0.000	0.000	0.000	0.073	0.00
		C		0.000	0.000	0.000	0.052	0.01
L21	89.25-84.25	A	0.842	0.000	0.000	0.000	1.769	0.00
		B		0.000	0.000	0.000	2.272	0.03
		C		0.000	0.000	0.000	1.612	0.23
L22	84.25-79.25	A	0.836	0.000	0.000	0.000	1.762	0.00
		B		0.000	0.000	0.000	2.260	0.03
		C		0.000	0.000	0.000	1.606	0.23
L23	79.25-74.25	A	0.830	0.000	0.000	0.000	1.755	0.00
		B		0.000	0.000	0.000	2.247	0.03
		C		0.000	0.000	0.000	1.600	0.23
L24	74.25-69.25	A	0.823	0.000	0.000	0.000	1.748	0.00
		B		0.000	0.000	0.000	2.234	0.03
		C		0.000	0.000	0.000	1.593	0.23
L25	69.25-64.25	A	0.816	0.000	0.000	0.000	1.740	0.00
		B		0.000	0.000	0.000	2.220	0.03
		C		0.000	0.000	0.000	1.586	0.23
L26	64.25-63.17	A	0.812	0.000	0.000	0.000	0.421	0.00
		B		0.000	0.000	0.000	0.479	0.01
		C		0.000	0.000	0.000	0.343	0.05
L27	63.17-58.17	A	0.807	0.000	0.000	0.000	1.938	0.00
		B		0.000	0.000	0.000	2.201	0.03
		C		0.000	0.000	0.000	1.577	0.23
L28	58.17-53.17	A	0.799	0.000	0.000	0.000	1.929	0.00
		B		0.000	0.000	0.000	2.185	0.03
		C		0.000	0.000	0.000	1.569	0.23
L29	53.17-46.95	A	0.788	0.000	0.000	0.000	2.384	0.00
		B		0.000	0.000	0.000	2.691	0.03
		C		0.000	0.000	0.000	1.938	0.28
L30	46.95-45.95	A	0.781	0.000	0.000	0.000	0.384	0.00
		B		0.000	0.000	0.000	0.433	0.01
		C		0.000	0.000	0.000	0.312	0.05
L31	45.95-40.95	A	0.775	0.000	0.000	0.000	1.903	0.00
		B		0.000	0.000	0.000	2.138	0.03
		C		0.000	0.000	0.000	1.545	0.23
L32	40.95-35.95	A	0.764	0.000	0.000	0.000	1.890	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_{AA}$ In Face ft <sup>2</sup>	$C_{AA}$ Out Face ft <sup>2</sup>	Weight K
		B		0.000	0.000	0.000	2.115	0.03
		C		0.000	0.000	0.000	1.534	0.23
L33	35.95-31.50	A	0.752	0.000	0.000	0.000	1.671	0.00
		B		0.000	0.000	0.000	1.861	0.02
		C		0.000	0.000	0.000	2.669	0.20
L34	31.50-26.50	A	0.750	0.000	0.000	0.000	1.875	0.00
		B		0.000	0.000	0.000	2.087	0.03
		C		0.000	0.000	0.000	3.395	0.23
L35	26.50-21.50	A	0.750	0.000	0.000	0.000	1.875	0.00
		B		0.000	0.000	0.000	2.087	0.03
		C		0.000	0.000	0.000	3.395	0.23
L36	21.50-16.50	A	0.750	0.000	0.000	0.000	1.875	0.00
		B		0.000	0.000	0.000	2.087	0.03
		C		0.000	0.000	0.000	3.395	0.23
L37	16.50-11.50	A	0.750	0.000	0.000	0.000	1.875	0.00
		B		0.000	0.000	0.000	2.087	0.03
		C		0.000	0.000	0.000	3.395	0.23
L38	11.50-6.50	A	0.750	0.000	0.000	0.000	1.875	0.00
		B		0.000	0.000	0.000	1.461	0.02
		C		0.000	0.000	0.000	2.939	0.16
L39	6.50-1.50	A	0.750	0.000	0.000	0.000	1.875	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.875	0.00
L40	1.50-0.00	A	0.750	0.000	0.000	0.000	0.563	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.563	0.00

### Feed Line Center of Pressure

Section	Elevation ft	$CP_x$ in	$CP_z$ in	$CP_x$ Ice in	$CP_z$ Ice in
L1	176.00-171.00	-0.0398	0.1710	0.1130	0.3654
L2	171.00-166.00	-0.0402	0.1727	0.1155	0.3743
L3	166.00-161.00	-0.0406	0.1742	0.1178	0.3825
L4	161.00-156.00	-0.0409	0.1756	0.1199	0.3900
L5	156.00-151.00	-0.0412	0.1769	0.1217	0.3969
L6	151.00-144.25	-0.0415	0.1783	0.1236	0.4042
L7	144.25-142.75	-0.0416	0.1788	0.1246	0.4074
L8	142.75-137.75	-0.0418	0.1794	0.1250	0.4103
L9	137.75-132.75	-0.0420	0.1804	0.1263	0.4155
L10	132.75-127.75	-0.0422	0.1812	0.1273	0.4201
L11	127.75-122.75	-0.0424	0.1821	0.1283	0.4244
L12	122.75-117.75	-0.0418	0.1124	0.1250	0.3005
L13	117.75-116.75	-0.0402	-0.0393	0.1170	0.0362
L14	116.75-111.75	-0.0403	-0.0395	0.1176	0.0363
L15	111.75-106.75	-0.0405	-0.0397	0.1184	0.0364
L16	106.75-101.75	-0.0408	-0.0399	0.1190	0.0365
L17	101.75-94.58	-0.0410	-0.0401	0.1197	0.0366
L18	94.58-94.41	-0.0410	-0.0401	0.1199	0.0366
L19	94.41-89.41	-0.0411	-0.0402	0.1195	0.0363
L20	89.41-89.25	-0.0412	-0.0403	0.1197	0.0363
L21	89.25-84.25	-0.0413	-0.0404	0.1198	0.0363
L22	84.25-79.25	-0.0414	-0.0405	0.1200	0.0362
L23	79.25-74.25	-0.0416	-0.0407	0.1201	0.0360
L24	74.25-69.25	-0.0417	-0.0408	0.1200	0.0358
L25	69.25-64.25	-0.0419	-0.0410	0.1198	0.0355
L26	64.25-63.17	-0.0415	-0.0953	0.1185	-0.0103
L27	63.17-58.17	-0.0416	-0.0955	0.1182	-0.0108
L28	58.17-53.17	-0.0417	-0.0958	0.1177	-0.0116
L29	53.17-46.95	-0.0419	-0.0962	0.1169	-0.0125
L30	46.95-45.95	-0.0419	-0.0962	0.1169	-0.0125
L31	45.95-40.95	-0.0420	-0.0964	0.1151	-0.0138
L32	40.95-35.95	-0.0421	-0.0966	0.1139	-0.0149
L33	35.95-31.50	-0.2236	0.0123	-0.1699	0.1443

Section	Elevation	CP <sub>x</sub>	CP <sub>z</sub>	CP <sub>x</sub> Ice	CP <sub>z</sub> Ice
	ft	in	in	in	in
L34	31.50-26.50	-0.2710	0.0404	-0.2421	0.1852
L35	26.50-21.50	-0.2719	0.0405	-0.2437	0.1865
L36	21.50-16.50	-0.2728	0.0406	-0.2453	0.1876
L37	16.50-11.50	-0.2736	0.0408	-0.2468	0.1888
L38	11.50-6.50	-0.2664	-0.0124	-0.2914	0.0731
L39	6.50-1.50	-0.2473	-0.1428	-0.4067	-0.2348
L40	1.50-0.00	-0.2476	-0.1430	-0.4076	-0.2353

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K	
5' Lightning Rod	C	None		0.0000	178.50	No Ice	0.16	0.16	0.07
						1/2" Ice	0.67	0.67	0.07
						1" Ice	1.19	1.19	0.07
						2" Ice	1.87	1.87	0.10
						4" Ice	3.24	3.24	0.18
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	176.00	No Ice	7.13	4.96	0.08
						1/2" Ice	7.66	5.75	0.13
						1" Ice	8.18	6.47	0.19
						2" Ice	9.26	8.01	0.34
						4" Ice	11.53	11.41	0.75
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	176.00	No Ice	7.13	4.96	0.08
						1/2" Ice	7.66	5.75	0.13
						1" Ice	8.18	6.47	0.19
						2" Ice	9.26	8.01	0.34
						4" Ice	11.53	11.41	0.75
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	176.00	No Ice	7.13	4.96	0.08
						1/2" Ice	7.66	5.75	0.13
						1" Ice	8.18	6.47	0.19
						2" Ice	9.26	8.01	0.34
						4" Ice	11.53	11.41	0.75
TD-RRH8x20-25	A	From Leg	4.00 0.00 2.00	0.0000	176.00	No Ice	4.72	1.70	0.07
						1/2" Ice	5.01	1.92	0.10
						1" Ice	5.32	2.15	0.13
						2" Ice	5.95	2.62	0.20
						4" Ice	7.31	3.68	0.40
TD-RRH8x20-25	B	From Leg	4.00 0.00 2.00	0.0000	176.00	No Ice	4.72	1.70	0.07
						1/2" Ice	5.01	1.92	0.10
						1" Ice	5.32	2.15	0.13
						2" Ice	5.95	2.62	0.20
						4" Ice	7.31	3.68	0.40
TD-RRH8x20-25	C	From Leg	4.00 0.00 2.00	0.0000	176.00	No Ice	4.72	1.70	0.07
						1/2" Ice	5.01	1.92	0.10
						1" Ice	5.32	2.15	0.13
						2" Ice	5.95	2.62	0.20
						4" Ice	7.31	3.68	0.40
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	176.00	No Ice	8.26	6.71	0.08
						1/2" Ice	8.81	7.66	0.14
						1" Ice	9.36	8.49	0.22
						2" Ice	10.50	10.20	0.39
						4" Ice	12.88	13.98	0.87

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz	Lateral					
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K
APXVSP18-C-A20 w/ Mount Pipe	B	From Leg	4.00	0.0000	176.00	No Ice	8.26	6.71	0.08
			0.00			1/2"	8.81	7.66	0.14
			2.00			Ice	9.36	8.49	0.22
						1" Ice	10.50	10.20	0.39
						2" Ice	12.88	13.98	0.87
APXVSP18-C-A20 w/ Mount Pipe	C	From Leg	4.00	0.0000	176.00	No Ice	8.26	6.71	0.08
			0.00			1/2"	8.81	7.66	0.14
			2.00			Ice	9.36	8.49	0.22
						1" Ice	10.50	10.20	0.39
						2" Ice	12.88	13.98	0.87
800 EXTERNAL NOTCH FILTER	A	From Leg	4.00	0.0000	176.00	No Ice	0.77	0.37	0.01
			0.00			1/2"	0.89	0.46	0.02
			0.00			Ice	1.02	0.56	0.02
						1" Ice	1.30	0.79	0.04
						2" Ice	1.97	1.34	0.11
800 EXTERNAL NOTCH FILTER	B	From Leg	4.00	0.0000	176.00	No Ice	0.77	0.37	0.01
			0.00			1/2"	0.89	0.46	0.02
			0.00			Ice	1.02	0.56	0.02
						1" Ice	1.30	0.79	0.04
						2" Ice	1.97	1.34	0.11
800 EXTERNAL NOTCH FILTER	C	From Leg	4.00	0.0000	176.00	No Ice	0.77	0.37	0.01
			0.00			1/2"	0.89	0.46	0.02
			0.00			Ice	1.02	0.56	0.02
						1" Ice	1.30	0.79	0.04
						2" Ice	1.97	1.34	0.11
(3) ACU-A20-N	A	From Leg	4.00	0.0000	176.00	No Ice	0.08	0.14	0.00
			0.00			1/2"	0.12	0.19	0.00
			0.00			Ice	0.17	0.25	0.00
						1" Ice	0.30	0.40	0.01
						2" Ice	0.67	0.80	0.04
(3) ACU-A20-N	B	From Leg	4.00	0.0000	176.00	No Ice	0.08	0.14	0.00
			0.00			1/2"	0.12	0.19	0.00
			0.00			Ice	0.17	0.25	0.00
						1" Ice	0.30	0.40	0.01
						2" Ice	0.67	0.80	0.04
(3) ACU-A20-N	C	From Leg	4.00	0.0000	176.00	No Ice	0.08	0.14	0.00
			0.00			1/2"	0.12	0.19	0.00
			0.00			Ice	0.17	0.25	0.00
						1" Ice	0.30	0.40	0.01
						2" Ice	0.67	0.80	0.04
(2) Pipe Mount 4'x2.375"	A	From Leg	4.00	0.0000	176.00	No Ice	0.87	0.87	0.02
			0.00			1/2"	1.11	1.11	0.03
			0.00			Ice	1.36	1.36	0.04
						1" Ice	1.90	1.90	0.07
						2" Ice	3.23	3.23	0.17
(2) Pipe Mount 4'x2.375"	B	From Leg	4.00	0.0000	176.00	No Ice	0.87	0.87	0.02
			0.00			1/2"	1.11	1.11	0.03
			0.00			Ice	1.36	1.36	0.04
						1" Ice	1.90	1.90	0.07
						2" Ice	3.23	3.23	0.17
(2) Pipe Mount 4'x2.375"	C	From Leg	4.00	0.0000	176.00	No Ice	0.87	0.87	0.02
			0.00			1/2"	1.11	1.11	0.03
			0.00			Ice	1.36	1.36	0.04
						1" Ice	1.90	1.90	0.07
						2" Ice	3.23	3.23	0.17

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K	
Platform Mount [LP 712-1]	C	None		0.0000	176.00	4" Ice			
						No Ice	24.53	24.53	1.34
						1/2"	29.94	29.94	1.65
						Ice	35.35	35.35	1.96
						1" Ice	46.17	46.17	2.58
Side Arm Mount [SO 102-3]	C	None		0.0000	174.00	2" Ice	67.81	67.81	3.82
						4" Ice			
						No Ice	3.00	3.00	0.08
						1/2"	3.48	3.48	0.11
						Ice	3.96	3.96	0.14
PCS 1900MHz 4x45W-65MHz	A	From Leg	4.00 0.00 2.00	0.0000	174.00	1" Ice	4.92	4.92	0.20
						2" Ice	6.84	6.84	0.32
						4" Ice			
						No Ice	2.71	2.61	0.06
						1/2"	2.95	2.85	0.08
PCS 1900MHz 4x45W-65MHz	B	From Leg	4.00 0.00 2.00	0.0000	174.00	Ice	3.20	3.09	0.11
						1" Ice	3.72	3.61	0.17
						2" Ice	4.86	4.74	0.35
						4" Ice			
						No Ice	2.71	2.61	0.06
PCS 1900MHz 4x45W-65MHz	C	From Leg	4.00 0.00 2.00	0.0000	174.00	1/2"	2.95	2.85	0.08
						Ice	3.20	3.09	0.11
						1" Ice	3.72	3.61	0.17
						2" Ice	4.86	4.74	0.35
						4" Ice			
TME-800MHZ RRH	A	From Leg	4.00 0.00 0.00	0.0000	174.00	No Ice	2.49	2.07	0.05
						1/2"	2.71	2.27	0.07
						Ice	2.93	2.48	0.10
						1" Ice	3.41	2.93	0.16
						2" Ice	4.46	3.93	0.32
TME-800MHZ RRH	B	From Leg	4.00 0.00 0.00	0.0000	174.00	4" Ice			
						No Ice	2.49	2.07	0.05
						1/2"	2.71	2.27	0.07
						Ice	2.93	2.48	0.10
						1" Ice	3.41	2.93	0.16
TME-800MHZ RRH	C	From Leg	4.00 0.00 0.00	0.0000	174.00	2" Ice	4.46	3.93	0.32
						4" Ice			
						No Ice	2.49	2.07	0.05
						1/2"	2.71	2.27	0.07
						Ice	2.93	2.48	0.10
Pipe Mount 5'x2.375"	A	From Leg	4.00 0.00 0.00	0.0000	174.00	1" Ice	3.41	2.93	0.16
						2" Ice	4.46	3.93	0.32
						4" Ice			
						No Ice	1.19	1.19	0.02
						1/2"	1.50	1.50	0.03
Pipe Mount 5'x2.375"	B	From Leg	4.00 0.00 0.00	0.0000	174.00	Ice	1.81	1.81	0.04
						1" Ice	2.46	2.46	0.08
						2" Ice	3.92	3.92	0.20
						4" Ice			
						No Ice	1.19	1.19	0.02
Pipe Mount 5'x2.375"	C	From Leg	4.00 0.00 0.00	0.0000	174.00	1/2"	1.50	1.50	0.03
						Ice	1.81	1.81	0.04
						1" Ice	2.46	2.46	0.08
						2" Ice	3.92	3.92	0.20
						4" Ice			
Pipe Mount 5'x2.375"	C	From Leg	4.00 0.00 0.00	0.0000	174.00	No Ice	1.19	1.19	0.02
						1/2"	1.50	1.50	0.03
						Ice	1.81	1.81	0.04
						1" Ice	2.46	2.46	0.08
						2" Ice	3.92	3.92	0.20

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K
			Horz ft	Lateral ft					
						2" Ice	3.92	3.92	0.20
						4" Ice			
Side Arm Mount [SO 102-3]	C	None			0.0000	No Ice	3.00	3.00	0.08
						1/2" Ice	3.48	3.48	0.11
						1" Ice	3.96	3.96	0.14
						2" Ice	4.92	4.92	0.20
						4" Ice	6.84	6.84	0.32
TME-RRUS-11	A	From Leg	4.00		0.0000	No Ice	3.25	1.37	0.05
			0.00			1/2" Ice	3.49	1.55	0.07
			0.00			1" Ice	3.74	1.74	0.09
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
TME-RRUS-11	B	From Leg	4.00		0.0000	No Ice	3.25	1.37	0.05
			0.00			1/2" Ice	3.49	1.55	0.07
			0.00			1" Ice	3.74	1.74	0.09
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
TME-RRUS-11	C	From Leg	4.00		0.0000	No Ice	3.25	1.37	0.05
			0.00			1/2" Ice	3.49	1.55	0.07
			0.00			1" Ice	3.74	1.74	0.09
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
Pipe Mount 5'x2.375"	A	From Leg	4.00		0.0000	No Ice	1.19	1.19	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
						2" Ice	2.46	2.46	0.08
						4" Ice	3.92	3.92	0.20
Pipe Mount 5'x2.375"	B	From Leg	4.00		0.0000	No Ice	1.19	1.19	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
						2" Ice	2.46	2.46	0.08
						4" Ice	3.92	3.92	0.20
Pipe Mount 5'x2.375"	C	From Leg	4.00		0.0000	No Ice	1.19	1.19	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
						2" Ice	2.46	2.46	0.08
						4" Ice	3.92	3.92	0.20
Platform Mount [LP 303-1]	C	None			0.0000	No Ice	14.66	14.66	1.25
						1/2" Ice	18.87	18.87	1.48
						1" Ice	23.08	23.08	1.71
						2" Ice	31.50	31.50	2.18
						4" Ice	48.34	48.34	3.10
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00		0.0000	No Ice	6.22	4.35	0.06
			0.00			1/2" Ice	6.77	5.20	0.11
			0.00			1" Ice	7.30	5.92	0.16
						2" Ice	8.38	7.41	0.29
						4" Ice	10.69	10.76	0.68
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00		0.0000	No Ice	6.22	4.35	0.06
			0.00			1/2" Ice	6.77	5.20	0.11
			0.00			1" Ice	7.30	5.92	0.16
						2" Ice	8.38	7.41	0.29
						4" Ice	10.69	10.76	0.68
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00		0.0000	No Ice	6.22	4.35	0.06
			0.00			1/2" Ice	6.77	5.20	0.11
			0.00			1" Ice	7.30	5.92	0.16

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K	
			Horz ft	Lateral ft						Vert ft
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00	0.0000	167.00	1" Ice	8.38	7.41	0.29	
						2" Ice	10.69	10.76	0.68	
						4" Ice				
						No Ice	8.50	6.30	0.07	
						1/2" Ice	9.15	7.48	0.14	
						1" Ice	9.77	8.37	0.21	
						2" Ice	11.03	10.18	0.38	
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	0.0000	167.00	2" Ice	13.68	14.02	0.87	
						4" Ice				
						No Ice	8.50	6.30	0.07	
						1/2" Ice	9.15	7.48	0.14	
						1" Ice	9.77	8.37	0.21	
						1" Ice	11.03	10.18	0.38	
						2" Ice	13.68	14.02	0.87	
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00	0.0000	167.00	4" Ice				
						No Ice	8.50	6.30	0.07	
						1/2" Ice	9.15	7.48	0.14	
						1" Ice	9.77	8.37	0.21	
						1" Ice	11.03	10.18	0.38	
						2" Ice	13.68	14.02	0.87	
						4" Ice				
DC6-48-60-18-8F	B	From Leg	4.00	0.0000	167.00	No Ice	2.57	2.57	0.02	
						1/2" Ice	2.80	2.80	0.04	
						1" Ice	3.04	3.04	0.07	
						1" Ice	3.54	3.54	0.13	
						2" Ice	4.66	4.66	0.30	
						4" Ice				
						No Ice	2.57	2.57	0.02	
(2) LGP21401	A	From Leg	4.00	0.0000	167.00	1/2" Ice	1.29	0.23	0.01	
						1" Ice	1.45	0.31	0.02	
						1" Ice	1.61	0.40	0.03	
						1" Ice	1.97	0.61	0.05	
						2" Ice	2.79	1.12	0.14	
						4" Ice				
						No Ice	1.29	0.23	0.01	
(2) LGP21401	B	From Leg	4.00	0.0000	167.00	1/2" Ice	1.29	0.23	0.01	
						1" Ice	1.45	0.31	0.02	
						1" Ice	1.61	0.40	0.03	
						1" Ice	1.97	0.61	0.05	
						2" Ice	2.79	1.12	0.14	
						4" Ice				
						No Ice	1.29	0.23	0.01	
(2) LGP21401	C	From Leg	4.00	0.0000	167.00	1/2" Ice	1.29	0.23	0.01	
						1" Ice	1.45	0.31	0.02	
						1" Ice	1.61	0.40	0.03	
						1" Ice	1.97	0.61	0.05	
						2" Ice	2.79	1.12	0.14	
						4" Ice				
						No Ice	1.29	0.23	0.01	
(2) LGP21901	A	From Leg	4.00	0.0000	167.00	1/2" Ice	0.27	0.18	0.01	
						1" Ice	0.34	0.25	0.01	
						1" Ice	0.43	0.32	0.01	
						1" Ice	0.62	0.49	0.02	
						2" Ice	1.10	0.94	0.07	
						4" Ice				
						No Ice	0.27	0.18	0.01	
(2) LGP21901	B	From Leg	4.00	0.0000	167.00	1/2" Ice	0.27	0.18	0.01	
						1" Ice	0.34	0.25	0.01	
						1" Ice	0.43	0.32	0.01	
						1" Ice	0.62	0.49	0.02	
						2" Ice	1.10	0.94	0.07	
						4" Ice				
						No Ice	0.27	0.18	0.01	
(2) LGP21901	C	From Leg	4.00	0.0000	167.00	1/2" Ice	0.27	0.18	0.01	
						1" Ice	0.34	0.25	0.01	
						1" Ice	0.43	0.32	0.01	
						1" Ice	0.62	0.49	0.02	
						2" Ice	1.10	0.94	0.07	
						4" Ice				
						No Ice	0.27	0.18	0.01	
Platform Mount [LP 301-1]	C	None			0.0000	155.00	No Ice	30.10	30.10	1.59
							1/2" Ice	40.80	40.80	2.03



Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C <sub>AA</sub> <sub>Front</sub>	C <sub>AA</sub> <sub>Side</sub>	Weight K	
			Horz ft	Lateral ft			Vert ft	ft <sup>2</sup>		ft <sup>2</sup>
EDIN-X w/ Mount Pipe							1/2"	5.24	5.98	0.08
							Ice	5.70	6.80	0.13
							1" Ice	6.64	8.48	0.26
							2" Ice	8.64	12.04	0.64
							4" Ice			
(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	C	From Leg	4.00	0.0000	145.00		No Ice	4.79	5.04	0.04
							1/2"	5.24	5.98	0.08
							Ice	5.70	6.80	0.13
							1" Ice	6.64	8.48	0.26
							2" Ice	8.64	12.04	0.64
(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	A	From Leg	4.00	0.0000	145.00		No Ice	7.97	5.80	0.04
							1/2"	8.61	6.95	0.10
							Ice	9.22	7.82	0.17
							1" Ice	10.46	9.60	0.34
							2" Ice	13.07	13.37	0.80
(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	B	From Leg	4.00	0.0000	145.00		No Ice	7.97	5.80	0.04
							1/2"	8.61	6.95	0.10
							Ice	9.22	7.82	0.17
							1" Ice	10.46	9.60	0.34
							2" Ice	13.07	13.37	0.80
(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	C	From Leg	4.00	0.0000	145.00		No Ice	7.97	5.80	0.04
							1/2"	8.61	6.95	0.10
							Ice	9.22	7.82	0.17
							1" Ice	10.46	9.60	0.34
							2" Ice	13.07	13.37	0.80
RRH2X40-07-U	A	From Leg	4.00	0.0000	145.00		No Ice	2.25	1.23	0.05
							1/2"	2.45	1.39	0.07
							Ice	2.66	1.55	0.09
							1" Ice	3.10	1.91	0.13
							2" Ice	4.10	2.73	0.27
RRH2X40-07-U	B	From Leg	4.00	0.0000	145.00		No Ice	2.25	1.23	0.05
							1/2"	2.45	1.39	0.07
							Ice	2.66	1.55	0.09
							1" Ice	3.10	1.91	0.13
							2" Ice	4.10	2.73	0.27
RRH2X40-07-U	C	From Leg	4.00	0.0000	145.00		No Ice	2.25	1.23	0.05
							1/2"	2.45	1.39	0.07
							Ice	2.66	1.55	0.09
							1" Ice	3.10	1.91	0.13
							2" Ice	4.10	2.73	0.27
DB-B1-6C-8AB-0Z	A	From Leg	4.00	0.0000	145.00		No Ice	5.60	2.33	0.04
							1/2"	5.92	2.56	0.08
							Ice	6.24	2.79	0.12
							1" Ice	6.91	3.28	0.21
							2" Ice	8.37	4.37	0.45
RRH2X40-AWS	A	From Leg	4.00	0.0000	145.00		No Ice	2.52	1.59	0.04
							1/2"	2.75	1.80	0.06
							Ice	2.99	2.01	0.08
							1" Ice	3.50	2.46	0.13
							2" Ice	4.61	3.48	0.28
RRH2X40-AWS	B	From Leg	4.00	0.0000	145.00		No Ice	2.52	1.59	0.04
							1/2"	2.75	1.80	0.06
							Ice	2.99	2.01	0.08
							1" Ice	3.50	2.46	0.13
							2" Ice	4.61	3.48	0.28

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>A</sub> A <sub>Front</sub>	C <sub>A</sub> A <sub>Side</sub>	Weight
			Horz	Lateral					
RRH2X40-AWS	C	From Leg	4.00	0.0000	145.00	No Ice	2.52	1.59	0.04
			0.00			1/2"	2.75	1.80	0.06
			0.00			Ice	2.99	2.01	0.08
						1" Ice	3.50	2.46	0.13
						2" Ice	4.61	3.48	0.28
						4" Ice			
Platform Mount [LP 303-1]	C	None		0.0000	145.00	No Ice	14.66	14.66	1.25
						1/2"	18.87	18.87	1.48
						Ice	23.08	23.08	1.71
						1" Ice	31.50	31.50	2.18
						2" Ice	48.34	48.34	3.10
						4" Ice			
KS24019-L112A	A	From Leg	4.00	0.0000	50.00	No Ice	0.16	0.16	0.01
			0.00			1/2"	0.22	0.22	0.01
			1.00			Ice	0.30	0.30	0.01
						1" Ice	0.48	0.48	0.02
						2" Ice	0.95	0.95	0.06
						4" Ice			
Side Arm Mount [SO 701-1]	A	From Leg	1.50	0.0000	50.00	No Ice	0.85	1.67	0.07
			0.00			1/2"	1.14	2.34	0.08
			0.00			Ice	1.43	3.01	0.09
						1" Ice	2.01	4.35	0.12
						2" Ice	3.17	7.03	0.18
						4" Ice			
OG-860/1920/GPS-A	A	From Leg	4.00	0.0000	10.00	No Ice	0.14	0.14	0.00
			0.00			1/2"	0.23	0.23	0.00
			2.00			Ice	0.33	0.33	0.01
						1" Ice	0.57	0.57	0.02
						2" Ice	1.17	1.17	0.05
						4" Ice			
Side Arm Mount [SO 701-1]	A	From Leg	1.50	0.0000	10.00	No Ice	0.85	1.67	0.07
			0.00			1/2"	1.14	2.34	0.08
			0.00			Ice	1.43	3.01	0.09
						1" Ice	2.01	4.35	0.12
						2" Ice	3.17	7.03	0.18
						4" Ice			

## 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

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

**Maximum Tower Deflections - Service Wind**

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	176 - 171	52.155	33	3.1747	0.0035
L2	171 - 166	48.842	33	3.1504	0.0036
L3	166 - 161	45.570	33	3.0957	0.0034
L4	161 - 156	42.375	33	3.0044	0.0028
L5	156 - 151	39.292	33	2.8820	0.0022
L6	151 - 144.25	36.350	33	2.7345	0.0018
L7	147.75 - 142.75	34.526	33	2.6255	0.0016
L8	142.75 - 137.75	31.816	33	2.5393	0.0015
L9	137.75 - 132.75	29.226	33	2.4076	0.0013
L10	132.75 - 127.75	26.779	33	2.2651	0.0011
L11	127.75 - 122.75	24.485	33	2.1156	0.0009
L12	122.75 - 117.75	22.350	33	1.9616	0.0008
L13	117.75 - 116.75	20.378	33	1.8053	0.0007
L14	116.75 - 111.75	20.003	33	1.7743	0.0006
L15	111.75 - 106.75	18.195	33	1.6791	0.0006
L16	106.75 - 101.75	16.488	33	1.5824	0.0005
L17	101.75 - 94.58	14.882	33	1.4848	0.0005
L18	99.41 - 94.41	14.166	33	1.4390	0.0004
L19	94.41 - 89.41	12.684	33	1.3904	0.0004
L20	89.41 - 89.25	11.275	33	1.2995	0.0004
L21	89.25 - 84.25	11.232	33	1.2966	0.0004
L22	84.25 - 79.25	9.922	33	1.2059	0.0003
L23	79.25 - 74.25	8.706	33	1.1162	0.0003
L24	74.25 - 69.25	7.584	33	1.0276	0.0003
L25	69.25 - 64.25	6.554	33	0.9401	0.0002
L26	64.25 - 63.1667	5.615	33	0.8539	0.0002
L27	63.1667 - 58.1667	5.423	33	0.8356	0.0002
L28	58.1667 - 53.1667	4.589	33	0.7587	0.0002
L29	53.1667 - 46.95	3.834	33	0.6830	0.0002
L30	53.03 - 45.95	3.814	33	0.6810	0.0002
L31	45.95 - 40.95	2.845	33	0.6194	0.0001
L32	40.95 - 35.95	2.236	33	0.5430	0.0001
L33	35.95 - 31.5	1.707	33	0.4678	0.0001
L34	31.5 - 26.5	1.302	33	0.4018	0.0001
L35	26.5 - 21.5	0.916	33	0.3352	0.0001
L36	21.5 - 16.5	0.600	33	0.2697	0.0001
L37	16.5 - 11.5	0.351	33	0.2053	0.0000
L38	11.5 - 6.5	0.170	33	0.1419	0.0000
L39	6.5 - 1.5	0.054	33	0.0795	0.0000

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L40	1.5 - 0	0.003	33	0.0181	0.0000

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.50	5' Lightning Rod	33	52.155	3.1747	0.0035	7225
176.00	APXVTM14-C-120 w/ Mount Pipe	33	52.155	3.1747	0.0035	7225
174.00	Side Arm Mount [SO 102-3]	33	50.827	3.1670	0.0036	7225
169.00	Side Arm Mount [SO 102-3]	33	47.526	3.1329	0.0035	5434
167.00	Platform Mount [LP 303-1]	33	46.220	3.1095	0.0035	4387
155.00	Platform Mount [LP 301-1]	33	38.691	2.8553	0.0021	2032
145.00	(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	33	33.022	2.5740	0.0015	2661
50.00	KS24019-L112A	33	3.388	0.6503	0.0002	6108
10.00	OG-860/1920/GPS-A	33	0.128	0.1231	0.0000	4604

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	176 - 171	149.729	8	9.1169	0.0101
L2	171 - 166	140.249	8	9.0473	0.0101
L3	166 - 161	130.888	8	8.8907	0.0097
L4	161 - 156	121.741	8	8.6299	0.0079
L5	156 - 151	112.913	8	8.2800	0.0063
L6	151 - 144.25	104.484	8	7.8583	0.0052
L7	147.75 - 142.75	99.255	8	7.5463	0.0048
L8	142.75 - 137.75	91.486	8	7.2997	0.0043
L9	137.75 - 132.75	84.055	8	6.9221	0.0037
L10	132.75 - 127.75	77.034	8	6.5137	0.0031
L11	127.75 - 122.75	70.449	8	6.0849	0.0026
L12	122.75 - 117.75	64.318	8	5.6433	0.0022
L13	117.75 - 116.75	58.651	8	5.1947	0.0019
L14	116.75 - 111.75	57.574	8	5.1055	0.0018
L15	111.75 - 106.75	52.377	8	4.8322	0.0016
L16	106.75 - 101.75	47.468	8	4.5547	0.0014
L17	101.75 - 94.58	42.850	8	4.2741	0.0013
L18	99.41 - 94.41	40.789	8	4.1426	0.0012
L19	94.41 - 89.41	36.525	8	4.0029	0.0012
L20	89.41 - 89.25	32.473	8	3.7415	0.0010
L21	89.25 - 84.25	32.348	8	3.7332	0.0010
L22	84.25 - 79.25	28.578	8	3.4724	0.0009
L23	79.25 - 74.25	25.079	8	3.2144	0.0008
L24	74.25 - 69.25	21.849	8	2.9596	0.0008
L25	69.25 - 64.25	18.883	8	2.7081	0.0007
L26	64.25 - 63.1667	16.178	8	2.4599	0.0006
L27	63.1667 - 58.1667	15.626	8	2.4074	0.0006
L28	58.1667 - 53.1667	13.222	8	2.1860	0.0005
L29	53.1667 - 46.95	11.048	8	1.9680	0.0005
L30	53.03 - 45.95	10.992	8	1.9622	0.0005
L31	45.95 - 40.95	8.199	8	1.7849	0.0004
L32	40.95 - 35.95	6.446	8	1.5647	0.0004
L33	35.95 - 31.5	4.921	8	1.3480	0.0003
L34	31.5 - 26.5	3.754	8	1.1580	0.0003
L35	26.5 - 21.5	2.642	8	0.9661	0.0002

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L36	21.5 - 16.5	1.729	8	0.7774	0.0002
L37	16.5 - 11.5	1.013	8	0.5917	0.0001
L38	11.5 - 6.5	0.489	8	0.4091	0.0001
L39	6.5 - 1.5	0.155	8	0.2293	0.0001
L40	1.5 - 0	0.008	8	0.0522	0.0000

### Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.50	5' Lightning Rod	8	149.729	9.1169	0.0103	2634
176.00	APXVTM14-C-120 w/ Mount Pipe	8	149.729	9.1169	0.0103	2634
174.00	Side Arm Mount [SO 102-3]	8	145.930	9.0949	0.0103	2634
169.00	Side Arm Mount [SO 102-3]	8	136.485	8.9972	0.0103	1982
167.00	Platform Mount [LP 303-1]	8	132.747	8.9304	0.0101	1601
155.00	Platform Mount [LP 301-1]	8	111.192	8.2038	0.0061	736
145.00	(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	8	94.943	7.3990	0.0045	957
50.00	KS24019-L112A	8	9.763	1.8739	0.0004	2125
10.00	OG-860/1920/GPS-A	8	0.369	0.3548	0.0001	1597

### Compression Checks

### Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
L1	176 - 171 (1)	TP17.626x16.5x0.1875	5.00	0.00	0.0	39.000	10.3781	-2.01	404.75	0.005
L2	171 - 166 (2)	TP18.752x17.626x0.1875	5.00	0.00	0.0	39.000	11.0482	-3.69	430.88	0.009
L3	166 - 161 (3)	TP19.878x18.752x0.1875	5.00	0.00	0.0	39.000	11.7183	-3.95	457.01	0.009
L4	161 - 156 (4)	TP21.0039x19.878x0.1875	5.00	0.00	0.0	39.000	12.3884	-4.25	483.15	0.009
L5	156 - 151 (5)	TP22.1299x21.0039x0.1875	5.00	0.00	0.0	39.000	13.0585	-6.33	509.28	0.012
L6	151 - 144.25 (6)	TP23.65x22.1299x0.1875	6.75	0.00	0.0	39.000	13.4940	-6.62	526.27	0.013
L7	144.25 - 142.75 (7)	TP23.6005x22.4868x0.3125	5.00	0.00	0.0	39.000	23.0988	-8.73	900.85	0.010
L8	142.75 - 137.75 (8)	TP24.7142x23.6005x0.3125	5.00	0.00	0.0	39.000	24.2035	-9.43	943.93	0.010
L9	137.75 - 132.75 (9)	TP25.8279x24.7142x0.3125	5.00	0.00	0.0	39.000	25.3081	-10.15	987.02	0.010
L10	132.75 - 127.75 (10)	TP26.9417x25.8279x0.3125	5.00	0.00	0.0	39.000	26.4128	-10.91	1030.10	0.011
L11	127.75 - 122.75 (11)	TP28.0554x26.9417x0.3125	5.00	0.00	0.0	39.000	27.5174	-11.70	1073.18	0.011
L12	122.75 - 117.75 (12)	H1-3+VT (1.39 CR) - 11 TP29.1691x28.0554x0.3125	5.00	0.00	0.0	39.000	28.6221	-12.51	1116.26	0.011
L13	117.75 - 116.75 (13)	H1-3+VT (1.46 CR) - 12 TP29.3918x29.1691x0.3125	1.00	0.00	0.0	39.000	28.8430	-12.67	1124.88	0.011
L14	116.75 - 111.75 (14)	H1-3+VT (1.47 CR) - 13 TP30.5055x29.3918x0.5275	5.00	0.00	0.0	39.000	50.1917	-13.75	1957.48	0.007
L15	111.75 -	TP31.6192x30.5055x0.517	5.00	0.00	0.0	39.000	51.0860	-14.84	1992.35	0.007

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
L16	106.75 (15)	5								
L16	106.75 - 101.75 (16)	TP32.7329x31.6192x0.5075	5.00	0.00	0.0	39.000	51.9089	-15.96	2024.45	0.008
L17	101.75 - 94.58 (17)	TP34.33x32.7329x0.5025	7.17	0.00	0.0	39.000	52.2368	-16.49	2037.23	0.008
L18	94.58 - 94.41 (18)	TP33.7415x32.6292x0.565	5.00	0.00	0.0	39.000	59.4958	-18.53	2320.34	0.008
L19	94.41 - 89.41 (19)	TP34.8539x33.7415x0.56	5.00	0.00	0.0	39.000	60.9553	-19.79	2377.26	0.008
L20	89.41 - 89.25 (20)	TP34.8895x34.8539x0.56	0.16	0.00	0.0	39.000	61.0186	-19.84	2379.72	0.008
L21	89.25 - 84.25 (21)	TP36.0018x34.8895x0.55	5.00	0.00	0.0	39.000	61.8882	-21.13	2413.64	0.009
L22	84.25 - 79.25 (22)	TP37.1142x36.0018x0.545	5.00	0.00	0.0	39.000	63.2585	-22.45	2467.08	0.009
L23	79.25 - 74.25 (23)	TP38.2265x37.1142x0.54	5.00	0.00	0.0	39.000	64.5932	-23.80	2519.14	0.009
L24	74.25 - 69.25 (24)	TP39.3389x38.2265x0.535	5.00	0.00	0.0	39.000	65.8925	-25.17	2569.81	0.010
L25	69.25 - 64.25 (25)	TP40.4512x39.3389x0.53	5.00	0.00	0.0	39.000	67.1563	-26.57	2619.10	0.010
L26	64.25 - 63.1667 (26)	TP40.6923x40.4512x0.53	1.08	0.00	0.0	39.000	67.5617	-26.87	2634.91	0.010
L27	63.1667 - 58.1667 (27)	TP41.8046x40.6923x0.58	5.00	0.00	0.0	39.000	75.8912	-28.40	2959.76	0.010
L28	58.1667 - 53.1667 (28)	TP42.917x41.8046x0.575	5.00	0.00	0.0	39.000	77.2762	-29.95	3013.77	0.010
L29	53.1667 - 46.95 (29)	TP44.3x42.917x0.575	6.22	0.00	0.0	39.000	77.3317	-30.00	3015.94	0.010
L30	46.95 - 45.95 (30)	TP43.7731x42.1974x0.57	7.08	0.00	0.0	39.000	78.1622	-33.78	3048.33	0.011
L31	45.95 - 40.95 (31)	TP44.886x43.7731x0.565	5.00	0.00	0.0	39.000	79.4812	-35.38	3099.77	0.011
L32	40.95 - 35.95 (32)	TP45.9988x44.886x0.56	5.00	0.00	0.0	39.000	79.1823	-35.73	3088.11	0.012
L33	35.95 - 31.5 (33)	TP46.9892x45.9988x0.555	4.45	0.00	0.0	39.000	80.0524	-37.03	3122.04	0.012
L34	31.5 - 26.5 (34)	TP48.102x46.9892x0.605	5.00	0.00	0.0	39.000	89.0702	-38.50	3473.74	0.011
L35	26.5 - 21.5 (35)	TP49.2149x48.102x0.6	5.00	0.00	0.0	39.000	90.4629	-40.29	3528.05	0.011
L36	21.5 - 16.5 (36)	TP50.3277x49.2149x0.595	5.00	0.00	0.0	39.000	91.8200	-42.11	3580.98	0.012
L37	16.5 - 11.5 (37)	TP51.4405x50.3277x0.59	5.00	0.00	0.0	39.000	93.1418	-43.96	3632.53	0.012
L38	11.5 - 6.5 (38)	TP52.5533x51.4405x0.585	5.00	0.00	0.0	39.000	94.4280	-45.83	3682.69	0.012
L39	6.5 - 1.5 (39)	TP53.6662x52.5533x0.58	5.00	0.00	0.0	39.000	95.6787	-47.72	3731.47	0.013
L40	1.5 - 0 (40)	TP54x53.6662x0.575	1.50	0.00	0.0	39.000	96.8940	-49.45	3778.87	0.013

**Pole Bending Design Data**

Section No.	Elevation ft	Size	Actual M <sub>x</sub> kip-ft	Actual f <sub>bx</sub> ksi	Allow. F <sub>bx</sub> ksi	Ratio f <sub>bx</sub> /F <sub>bx</sub>	Actual M <sub>y</sub> kip-ft	Actual f <sub>by</sub> ksi	Allow. F <sub>by</sub> ksi	Ratio f <sub>by</sub> /F <sub>by</sub>
L1	176 - 171 (1)	TP17.626x16.5x0.1875	32.57	8.776	39.000	0.225	0.00	0.000	39.000	0.000
L2	171 - 166 (2)	TP18.752x17.626x0.1875	69.16	16.433	39.000	0.421	0.00	0.000	39.000	0.000
L3	166 - 161 (3)	TP19.878x18.752x0.1875	125.40	26.474	39.000	0.679	0.00	0.000	39.000	0.000
L4	161 - 156 (4)	TP21.0039x19.878x0.1875	183.39	34.622	39.000	0.888	0.00	0.000	39.000	0.000
L5	156 - 151 (5)	TP22.1299x21.0039x0.1875	256.62	43.583	39.000	1.118	0.00	0.000	39.000	0.000
L6	151 - 144.25 (6)	TP23.65x22.1299x0.1875	307.35	48.869	39.000	1.253	0.00	0.000	39.000	0.000
L7	144.25 - 142.75 (7)	TP23.6005x22.4868x0.3125	398.49	36.224	39.000	0.929	0.00	0.000	39.000	0.000

Section No.	Elevation ft	Size	Actual $M_x$ kip-ft	Actual $f_{bx}$ ksi	Allow. $F_{bx}$ ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual $M_y$ kip-ft	Actual $f_{by}$ ksi	Allow. $F_{by}$ ksi	Ratio $\frac{f_{by}}{F_{by}}$
L8	142.75 - 137.75 (8)	TP24.7142x23.6005x0.3125	505.70	41.844	39.000	1.073	0.00	0.000	39.000	0.000
L9	137.75 - 132.75 (9)	TP25.8279x24.7142x0.3125	614.83	46.504	39.000	1.192	0.00	0.000	39.000	0.000
L10	132.75 - 127.75 (10)	TP26.9417x25.8279x0.3125	725.88	50.381	39.000	1.292	0.00	0.000	39.000	0.000
L11	127.75 - 122.75 (11)	TP28.0554x26.9417x0.3125	838.83	53.615	39.000	1.375	0.00	0.000	39.000	0.000
L12	122.75 - 117.75 (12)	TP29.1691x28.0554x0.3125	953.70	56.319	39.000	1.444	0.00	0.000	39.000	0.000
L13	117.75 - 116.75 (13)	TP29.3918x29.1691x0.3125	976.92	56.805	39.000	1.457	0.00	0.000	39.000	0.000
L14	116.75 - 111.75 (14)	TP30.5055x29.3918x0.5275	1094.4	35.714	39.000	0.916	0.00	0.000	39.000	0.000
L15	111.75 - 106.75 (15)	TP31.6192x30.5055x0.5175	1214.3	37.491	39.000	0.961	0.00	0.000	39.000	0.000
L16	106.75 - 101.75 (16)	TP32.7329x31.6192x0.5075	1336.6	39.162	39.000	1.004	0.00	0.000	39.000	0.000
L17	101.75 - 94.58 (17)	TP34.33x32.7329x0.5025	1394.6	39.938	39.000	1.024	0.00	0.000	39.000	0.000
L18	94.58 - 94.41 (18)	TP33.7415x32.6292x0.565	1520.7	37.807	39.000	0.969	0.00	0.000	39.000	0.000
L19	94.41 - 89.41 (19)	TP34.8539x33.7415x0.561	1649.4	38.694	39.000	0.992	0.00	0.000	39.000	0.000
L20	89.41 - 89.25 (20)	TP34.8895x34.8539x0.567	1653.5	38.710	39.000	0.993	0.00	0.000	39.000	0.000
L21	89.25 - 84.25 (21)	TP36.0018x34.8895x0.558	1784.6	39.857	39.000	1.022	0.00	0.000	39.000	0.000
L22	84.25 - 79.25 (22)	TP37.1142x36.0018x0.545	1918.1	40.604	39.000	1.041	0.00	0.000	39.000	0.000
L23	79.25 - 74.25 (23)	TP38.2265x37.1142x0.545	2053.8	41.294	39.000	1.059	0.00	0.000	39.000	0.000
L24	74.25 - 69.25 (24)	TP39.3389x38.2265x0.535	2191.8	41.933	39.000	1.075	0.00	0.000	39.000	0.000
L25	69.25 - 64.25 (25)	TP40.4512x39.3389x0.539	2332.0	42.529	39.000	1.090	0.00	0.000	39.000	0.000
L26	64.25 - 63.1667 (26)	TP40.6923x40.4512x0.537	2362.7	42.570	39.000	1.092	0.00	0.000	39.000	0.000
L27	63.1667 - 58.1667 (27)	TP41.8046x40.6923x0.584	2505.7	39.189	39.000	1.005	0.00	0.000	39.000	0.000
L28	58.1667 - 53.1667 (28)	TP42.917x41.8046x0.575	2650.9	39.623	39.000	1.016	0.00	0.000	39.000	0.000
L29	53.1667 - 46.95 (29)	TP44.3x42.917x0.575	2654.9	39.626	39.000	1.016	0.00	0.000	39.000	0.000
L30	46.95 - 45.95 (30)	TP43.7731x42.1974x0.572	2864.8	41.475	39.000	1.063	0.00	0.000	39.000	0.000
L31	45.95 - 40.95 (31)	TP44.886x43.7731x0.565	3016.0	41.838	39.000	1.073	0.00	0.000	39.000	0.000
L32	40.95 - 35.95 (32)	TP45.9988x44.886x0.561	3046.5	42.196	39.000	1.082	0.00	0.000	39.000	0.000
L33	35.95 - 31.5 (33)	TP46.9892x45.9988x0.555	3169.1	42.548	39.000	1.091	0.00	0.000	39.000	0.000
L34	31.5 - 26.5 (34)	TP48.102x46.9892x0.605	3307.1	39.128	39.000	1.003	0.00	0.000	39.000	0.000
L35	26.5 - 21.5 (35)	TP49.2149x48.102x0.6	3464.0	39.387	39.000	1.010	0.00	0.000	39.000	0.000
L36	21.5 - 16.5 (36)	TP50.3277x49.2149x0.595	3622.9	39.637	39.000	1.016	0.00	0.000	39.000	0.000
L37	16.5 - 11.5 (37)	TP51.4405x50.3277x0.591	3783.9	39.879	39.000	1.023	0.00	0.000	39.000	0.000
L38	11.5 - 6.5 (38)	TP52.5533x51.4405x0.585	3946.9	40.114	39.000	1.029	0.00	0.000	39.000	0.000
L39	6.5 - 1.5 (39)	TP53.6662x52.5533x0.586	4111.8	40.343	39.000	1.034	0.00	0.000	39.000	0.000
L40	1.5 - 0 (40)	TP54x53.6662x0.575	4278.9	40.570	39.000	1.040	0.00	0.000	39.000	0.000

### Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual $f_v$ ksi	Allow. $F_v$ ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual $f_{vt}$ ksi	Allow. $F_{vt}$ ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	176 - 171 (1)	TP17.626x16.5x0.1875	5.95	0.573	26.000	0.044	0.00	0.000	26.000	0.000
L2	171 - 166 (2)	TP18.752x17.626x0.1875	11.08	1.003	26.000	0.077	0.30	0.035	26.000	0.001
L3	166 - 161 (3)	TP19.878x18.752x0.1875	11.42	0.975	26.000	0.075	0.30	0.031	26.000	0.001
L4	161 - 156 (4)	TP21.0039x19.878x0.1875	11.77	0.950	26.000	0.073	0.30	0.027	26.000	0.001
L5	156 - 151 (5)	TP22.1299x21.0039x0.1875	15.50	1.187	26.000	0.091	0.29	0.024	26.000	0.001
L6	151 - 144.25 (6)	TP23.65x22.1299x0.1875	15.72	1.165	26.000	0.090	0.29	0.023	26.000	0.001
L7	144.25 - 142.75 (7)	TP23.6005x22.4868x0.3125	21.26	0.920	26.000	0.071	0.52	0.023	26.000	0.001
L8	142.75 - 137.75 (8)	TP24.7142x23.6005x0.3125	21.64	0.894	26.000	0.069	0.52	0.021	26.000	0.001
L9	137.75 - 132.75 (9)	TP25.8279x24.7142x0.3125	22.03	0.870	26.000	0.067	0.52	0.019	26.000	0.001
L10	132.75 - 127.75 (10)	TP26.9417x25.8279x0.3125	22.41	0.849	26.000	0.065	0.52	0.017	26.000	0.001
L11	127.75 - 122.75 (11)	TP28.0554x26.9417x0.3125	22.79	0.828	26.000	0.064	0.52	0.016	26.000	0.001
L12	122.75 - 117.75 (12)	TP29.1691x28.0554x0.3125	23.18	0.810	26.000	0.062	0.51	0.015	26.000	0.001
L13	117.75 - 116.75 (13)	TP29.3918x29.1691x0.3125	23.27	0.807	26.000	0.062	0.51	0.015	26.000	0.001
L14	116.75 - 111.75 (14)	TP30.5055x29.3918x0.5275	23.75	0.473	26.000	0.036	0.51	0.008	26.000	0.000
L15	111.75 - 106.75 (15)	TP31.6192x30.5055x0.5175	24.22	0.474	26.000	0.036	0.51	0.008	26.000	0.000
L16	106.75 - 101.75 (16)	TP32.7329x31.6192x0.5075	24.70	0.476	26.000	0.037	0.51	0.007	26.000	0.000
L17	101.75 - 94.58 (17)	TP34.33x32.7329x0.5025	24.92	0.477	26.000	0.037	0.51	0.007	26.000	0.000
L18	94.58 - 94.41 (18)	TP33.7415x32.6292x0.565	25.50	0.429	26.000	0.033	0.51	0.006	26.000	0.000
L19	94.41 - 89.41 (19)	TP34.8539x33.7415x0.56	25.98	0.426	26.000	0.033	0.50	0.006	26.000	0.000
L20	89.41 - 89.25 (20)	TP34.8895x34.8539x0.56	25.99	0.426	26.000	0.033	0.50	0.006	26.000	0.000
L21	89.25 - 84.25 (21)	TP36.0018x34.8895x0.55	26.46	0.428	26.000	0.033	0.50	0.005	26.000	0.000
L22	84.25 - 79.25 (22)	TP37.1142x36.0018x0.545	26.92	0.426	26.000	0.033	0.50	0.005	26.000	0.000
L23	79.25 - 74.25 (23)	TP38.2265x37.1142x0.54	27.38	0.424	26.000	0.033	0.50	0.005	26.000	0.000
L24	74.25 - 69.25 (24)	TP39.3389x38.2265x0.535	27.83	0.422	26.000	0.032	0.50	0.005	26.000	0.000
L25	69.25 - 64.25 (25)	TP40.4512x39.3389x0.53	28.28	0.421	26.000	0.032	0.49	0.004	26.000	0.000
L26	64.25 - 63.1667 (26)	TP40.6923x40.4512x0.53	28.37	0.420	26.000	0.032	0.49	0.004	26.000	0.000
L27	63.1667 - 58.1667 (27)	TP41.8046x40.6923x0.58	28.83	0.380	26.000	0.029	0.49	0.004	26.000	0.000
L28	58.1667 - 53.1667 (28)	TP42.917x41.8046x0.575	29.27	0.379	26.000	0.029	0.49	0.004	26.000	0.000
L29	53.1667 - 46.95 (29)	TP44.3x42.917x0.575	29.28	0.379	26.000	0.029	0.49	0.004	26.000	0.000
L30	46.95 - 45.95 (30)	TP43.7731x42.1974x0.57	30.05	0.384	26.000	0.030	0.49	0.003	26.000	0.000
L31	45.95 - 40.95 (31)	TP44.886x43.7731x0.565	30.45	0.383	26.000	0.029	0.49	0.003	26.000	0.000
L32	40.95 - 35.95 (32)	TP45.9988x44.886x0.56	30.60	0.386	26.000	0.030	0.48	0.003	26.000	0.000
L33	35.95 - 31.5 (33)	TP46.9892x45.9988x0.555	30.92	0.386	26.000	0.030	0.48	0.003	26.000	0.000
L34	31.5 - 26.5 (34)	TP48.102x46.9892x0.605	31.26	0.351	26.000	0.027	0.47	0.003	26.000	0.000

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 $\frac{f_{vt}}{F_{vt}}$
L35	26.5 - 21.5 (35)	TP49.2149x48.102x0.6	31.67	0.350	26.000	0.027	0.46	0.003	26.000	0.000
L36	21.5 - 16.5 (36)	TP50.3277x49.2149x0.595	32.08	0.349	26.000	0.027	0.45	0.002	26.000	0.000
L37	16.5 - 11.5 (37)	TP51.4405x50.3277x0.59	32.49	0.349	26.000	0.027	0.44	0.002	26.000	0.000
L38	11.5 - 6.5 (38)	TP52.5533x51.4405x0.585	32.90	0.348	26.000	0.027	0.43	0.002	26.000	0.000
L39	6.5 - 1.5 (39)	TP53.6662x52.5533x0.58	33.32	0.348	26.000	0.027	0.42	0.002	26.000	0.000
L40	1.5 - 0 (40)	TP54x53.6662x0.575	33.74	0.348	26.000	0.027	0.40	0.002	26.000	0.000

**Pole Interaction Design Data**

Section No.	Elevation ft	Ratio P $P_a$	Ratio $f_{bx}$ $F_{bx}$	Ratio $f_{by}$ $F_{by}$	Ratio $f_v$ $F_v$	Ratio $f_{vt}$ $F_{vt}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	176 - 171 (1)	0.005	0.225	0.000	0.044	0.000	0.230	1.333	H1-3+VT ✓
L2	171 - 166 (2)	0.009	0.421	0.000	0.077	0.001	0.432	1.333	H1-3+VT ✓
L3	166 - 161 (3)	0.009	0.679	0.000	0.075	0.001	0.689	1.333	H1-3+VT ✓
L4	161 - 156 (4)	0.009	0.888	0.000	0.073	0.001	0.898	1.333	H1-3+VT ✓
L5	156 - 151 (5)	0.012	1.118	0.000	0.091	0.001	1.132	1.333	H1-3+VT ✓
L6	151 - 144.25 (6)	0.013	1.253	0.000	0.090	0.001	1.268	1.333	H1-3+VT ✓
L7	144.25 - 142.75 (7)	0.010	0.929	0.000	0.071	0.001	0.940	1.333	H1-3+VT ✓
L8	142.75 - 137.75 (8)	0.010	1.073	0.000	0.069	0.001	1.084	1.333	H1-3+VT ✓
L9	137.75 - 132.75 (9)	0.010	1.192	0.000	0.067	0.001	1.204	1.333	H1-3+VT ✓
L10	132.75 - 127.75 (10)	0.011	1.292	0.000	0.065	0.001	1.304	1.333	H1-3+VT ✓
L11	127.75 - 122.75 (11)	0.011	1.375	0.000	0.064	0.001	1.387	1.333	H1-3+VT ✓
L12	122.75 - 117.75 (12)	0.011	1.444	0.000	0.062	0.001	1.456	1.333	H1-3+VT ✓
L13	117.75 - 116.75 (13)	0.011	1.457	0.000	0.062	0.001	1.469	1.333	H1-3+VT ✓
L14	116.75 - 111.75 (14)	0.007	0.916	0.000	0.036	0.000	0.923	1.333	H1-3+VT ✓
L15	111.75 - 106.75 (15)	0.007	0.961	0.000	0.036	0.000	0.969	1.333	H1-3+VT ✓
L16	106.75 - 101.75 (16)	0.008	1.004	0.000	0.037	0.000	1.012	1.333	H1-3+VT ✓
L17	101.75 - 94.58 (17)	0.008	1.024	0.000	0.037	0.000	1.032	1.333	H1-3+VT ✓
L18	94.58 - 94.41 (18)	0.008	0.969	0.000	0.033	0.000	0.978	1.333	H1-3+VT ✓
L19	94.41 - 89.41 (19)	0.008	0.992	0.000	0.033	0.000	1.001	1.333	H1-3+VT ✓
L20	89.41 - 89.25 (20)	0.008	0.993	0.000	0.033	0.000	1.001	1.333	H1-3+VT ✓
L21	89.25 - 84.25	0.009	1.022	0.000	0.033	0.000	1.031	1.333	H1-3+VT ✓

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$P$ $P_a$	$f_{bx}$ $F_{bx}$	$f_{by}$ $F_{by}$	$f_v$ $F_v$	$f_{vt}$ $F_{vt}$			
	(21)						✓		
L22	84.25 - 79.25	0.009	1.041	0.000	0.033	0.000	1.051	1.333	H1-3+VT ✓
	(22)						✓		
L23	79.25 - 74.25	0.009	1.059	0.000	0.033	0.000	1.069	1.333	H1-3+VT ✓
	(23)						✓		
L24	74.25 - 69.25	0.010	1.075	0.000	0.032	0.000	1.085	1.333	H1-3+VT ✓
	(24)						✓		
L25	69.25 - 64.25	0.010	1.090	0.000	0.032	0.000	1.101	1.333	H1-3+VT ✓
	(25)						✓		
L26	64.25 - 63.1667 (26)	0.010	1.092	0.000	0.032	0.000	1.102	1.333	H1-3+VT ✓
	(26)						✓		
L27	63.1667 - 58.1667 (27)	0.010	1.005	0.000	0.029	0.000	1.015	1.333	H1-3+VT ✓
	(27)						✓		
L28	58.1667 - 53.1667 (28)	0.010	1.016	0.000	0.029	0.000	1.026	1.333	H1-3+VT ✓
	(28)						✓		
L29	53.1667 - 46.95 (29)	0.010	1.016	0.000	0.029	0.000	1.026	1.333	H1-3+VT ✓
	(29)						✓		
L30	46.95 - 45.95 (30)	0.011	1.063	0.000	0.030	0.000	1.075	1.333	H1-3+VT ✓
	(30)						✓		
L31	45.95 - 40.95 (31)	0.011	1.073	0.000	0.029	0.000	1.084	1.333	H1-3+VT ✓
	(31)						✓		
L32	40.95 - 35.95 (32)	0.012	1.082	0.000	0.030	0.000	1.094	1.333	H1-3+VT ✓
	(32)						✓		
L33	35.95 - 31.5 (33)	0.012	1.091	0.000	0.030	0.000	1.103	1.333	H1-3+VT ✓
	(33)						✓		
L34	31.5 - 26.5 (34)	0.011	1.003	0.000	0.027	0.000	1.015	1.333	H1-3+VT ✓
	(34)						✓		
L35	26.5 - 21.5 (35)	0.011	1.010	0.000	0.027	0.000	1.022	1.333	H1-3+VT ✓
	(35)						✓		
L36	21.5 - 16.5 (36)	0.012	1.016	0.000	0.027	0.000	1.028	1.333	H1-3+VT ✓
	(36)						✓		
L37	16.5 - 11.5 (37)	0.012	1.023	0.000	0.027	0.000	1.035	1.333	H1-3+VT ✓
	(37)						✓		
L38	11.5 - 6.5 (38)	0.012	1.029	0.000	0.027	0.000	1.041	1.333	H1-3+VT ✓
	(38)						✓		
L39	6.5 - 1.5 (39)	0.013	1.034	0.000	0.027	0.000	1.047	1.333	H1-3+VT ✓
	(39)						✓		
L40	1.5 - 0 (40)	0.013	1.040	0.000	0.027	0.000	1.054	1.333	H1-3+VT ✓
	(40)						✓		

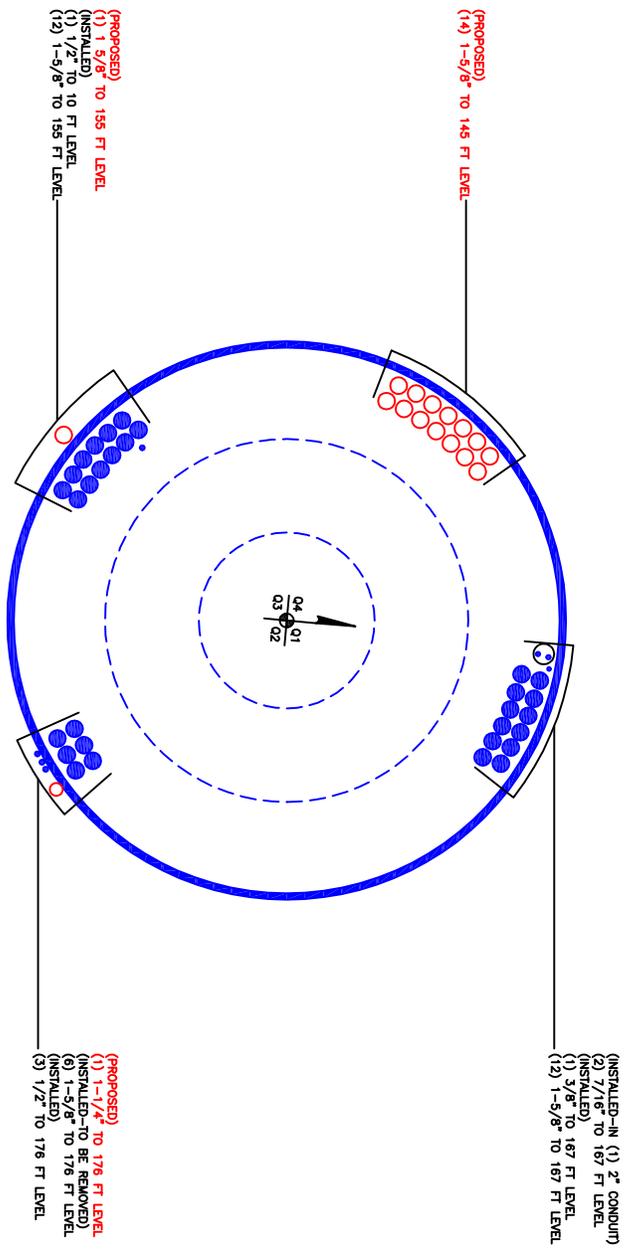
### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P <sub>allow</sub> K	% Capacity	Pass Fail
L1	176 - 171	Pole	TP17.626x16.5x0.1875	1	-2.01	539.53	12.1	Pass
L2	171 - 166	Pole	TP18.752x17.626x0.1875	2	-3.69	574.36	22.6	Pass
L3	166 - 161	Pole	TP19.878x18.752x0.1875	3	-3.95	609.20	36.6	Pass
L4	161 - 156	Pole	TP21.0039x19.878x0.1875	4	-4.25	644.03	48.5	Pass
L5	156 - 151	Pole	TP22.1299x21.0039x0.1875	5	-6.33	678.87	62.1	Pass
L6	151 - 144.25	Pole	TP23.65x22.1299x0.1875	6	-6.62	701.52	70.2	Pass
L7	144.25 - 142.75	Pole	TP23.6005x22.4868x0.3125	7	-8.73	1200.84	49.3	Pass
L8	142.75 - 137.75	Pole	TP24.7142x23.6005x0.3125	8	-9.43	1258.27	56.9	Pass
L9	137.75 - 132.75	Pole	TP25.8279x24.7142x0.3125	9	-10.15	1315.69	63.2	Pass
L10	132.75 - 127.75	Pole	TP26.9417x25.8279x0.3125	10	-10.91	1373.12	68.4	Pass
L11	127.75 - 122.75	Pole	TP28.0554x26.9417x0.3125	11	-11.70	1430.55	72.7	Pass
L12	122.75 - 117.75	Pole	TP29.1691x28.0554x0.3125	12	-12.51	1487.97	76.4	Pass
L13	117.75 - 116.75	Pole	TP29.3918x29.1691x0.3125	13	-12.67	1499.46	77.1	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P <sub>allow</sub> K	% Capacity	Pass Fail
L14	116.75 - 111.75	Pole	TP30.5055x29.3918x0.5275	14	-13.75	2609.32	76.8	Pass
L15	111.75 - 106.75	Pole	TP31.6192x30.5055x0.5175	15	-14.84	2655.80	80.4	Pass
L16	106.75 - 101.75	Pole	TP32.7329x31.6192x0.5075	16	-15.96	2698.59	83.7	Pass
L17	101.75 - 94.58	Pole	TP34.33x32.7329x0.5025	17	-16.49	2715.63	85.1	Pass
L18	94.58 - 94.41	Pole	TP33.7415x32.6292x0.565	18	-18.53	3093.01	80.7	Pass
L19	94.41 - 89.41	Pole	TP34.8539x33.7415x0.56	19	-19.79	3168.89	82.9	Pass
L20	89.41 - 89.25	Pole	TP34.8895x34.8539x0.56	20	-19.84	3172.17	82.9	Pass
L21	89.25 - 84.25	Pole	TP36.0018x34.8895x0.55	21	-21.13	3217.38	84.9	Pass
L22	84.25 - 79.25	Pole	TP37.1142x36.0018x0.545	22	-22.45	3288.62	86.6	Pass
L23	79.25 - 74.25	Pole	TP38.2265x37.1142x0.54	23	-23.80	3358.01	88.1	Pass
L24	74.25 - 69.25	Pole	TP39.3389x38.2265x0.535	24	-25.17	3425.56	89.5	Pass
L25	69.25 - 64.25	Pole	TP40.4512x39.3389x0.53	25	-26.57	3491.26	90.7	Pass
L26	64.25 - 63.1667	Pole	TP40.6923x40.4512x0.53	26	-26.87	3512.33	91.0	Pass
L27	63.1667 - 58.1667	Pole	TP41.8046x40.6923x0.58	27	-28.40	3945.36		Pass
L28	58.1667 - 53.1667	Pole	TP42.917x41.8046x0.575	28	-29.95	4017.36	82.2	Pass
L29	53.1667 - 46.95	Pole	TP44.3x42.917x0.575	29	-30.00	4020.25	83.3	Pass
L30	46.95 - 45.95	Pole	TP43.7731x42.1974x0.57	30	-33.78	4063.42	87.1	Pass
L31	45.95 - 40.95	Pole	TP44.886x43.7731x0.565	31	-35.38	4131.99	87.9	Pass
L32	40.95 - 35.95	Pole	TP45.9988x44.886x0.56	32	-35.73	4116.45	88.6	Pass
L33	35.95 - 31.5	Pole	TP46.9892x45.9988x0.555	33	-37.03	4161.68	89.2	Pass
L34	31.5 - 26.5	Pole	TP48.102x46.9892x0.605	34	-38.50	4630.50	81.1	Pass
L35	26.5 - 21.5	Pole	TP49.2149x48.102x0.6	35	-40.29	4702.89	81.7	Pass
L36	21.5 - 16.5	Pole	TP50.3277x49.2149x0.595	36	-42.11	4773.45	82.3	Pass
L37	16.5 - 11.5	Pole	TP51.4405x50.3277x0.59	37	-43.96	4842.16	82.8	Pass
L38	11.5 - 6.5	Pole	TP52.5533x51.4405x0.585	38	-45.83	4909.03	83.2	Pass
L39	6.5 - 1.5	Pole	TP53.6662x52.5533x0.58	39	-47.72	4974.05	83.7	Pass
L40	1.5 - 0	Pole	TP54x53.6662x0.575	40	-49.45	5037.23	83.8	Pass

Summary ELC: Load Case 7  
 Pole (L13) Rating = 77.1 Pass  
 91.0 Pass

**APPENDIX B**  
**BASE LEVEL DRAWING**



(INSTALLED-IN (1) 2" CONDUIT)  
 (2) 7/8" TO 167 FT LEVEL  
 (INSTALLED)  
 (1) 1/2" TO 167 FT LEVEL  
 (12) 1-5/8" TO 167 FT LEVEL

(PROPOSED)  
 (14) 1-5/8" TO 145 FT LEVEL

(PROPOSED)  
 (1) 1-5/8" TO 155 FT LEVEL  
 (INSTALLED)  
 (1) 1/2" TO 10 FT LEVEL  
 (12) 1-5/8" TO 155 FT LEVEL

(PROPOSED)  
 (1) 1-1/4" TO 176 FT LEVEL  
 (INSTALLED--TO BE REMOVED)  
 (6) 1-5/8" TO 176 FT LEVEL  
 (INSTALLED)  
 (3) 1/2" TO 176 FT LEVEL

BUSINESS UNIT: 876381 TOWER ID: C\_BASELEVEL

BASE LEVEL DRAWING

SHEET NUMBER 1

PROJECT: 04/09/14 CHINA: 876381 BASE LEVEL  
 USER: 04/09/14 USER: 04/09/14 USER: 04/09/14

CROWN REGION ADDRESS  
 USA

02/10/09	AS-BUILT INFORMATION ADDED PER WORK ORDER # 284336	SAC
20/06/11	AS-BUILT INFORMATION ADDED PER WORK ORDER # 418816	FLW
09/08/12	APPLICATION ADDED PER WORK ORDER # 518887	AM
04/10/12	UPDATED PER WORK ORDER # 637402	SF
22/07/13	UPDATED PER WORK ORDER # 630073	DS
03/10/13	UPDATED PER WORK ORDER # 657111	ESB
14/01/14	UPDATED PER WORK ORDER # 700180	CM
20/03/14	UPDATED PER WORK ORDER # 730607	CAK
27/06/14	UPDATED PER WORK ORDER # 772825	ALM

DRAWN BY: JPO  
 CHECKED BY: JPO  
 DRAWING STATE: 04/09/07

SHEET NUMBER:

SITE NUMBER:

SITE NAME:

WARD:

BUSINESS UNIT NUMBER:

876381

SITE ADDRESS:

2365 LONG HILL RD  
 GUILDFORD, CT 06437  
 NEW HAVEN COUNTY  
 USA

SHEET TITLE:

BASE LEVEL

SHEET NUMBER:

A1-0

**APPENDIX C**  
**ADDITIONAL CALCULATIONS**

## Anchor Rod Information for TIA/EIA-222-F and TIA-222-G-2

Site Information	
ID:	876381
Name:	WARD
App. #:	246013 Rev. 2

Base Reactions	
Moment:	4329 ft-kip
Axial:	50 kip
Shear:	34 kip
Base Plate Type:	Circular

Design Information	
TIA Code:	F
ASIF:	1.333
Failure:	100%
eta Factor:	0.50

Original Anchor Rod Data	
Quantity:	16
Diameter:	2.25 in
Material:	A615 GR 75
Bolt Circle:	63.0 in
Bolt Spacing:	10 in
Bolt Group Area:	63.62 in <sup>2</sup>
Bolt Group MOIx:	31567 in <sup>4</sup>
<u>Reactions Seen by Original AR Group</u>	
Moment:	3884.2 kip-ft
Axial:	50.0 kip
Shear:	34.0 kip
<u>Original AR Capacity Check</u>	
Tension Load:	183.4 kip
Allowable load:	194.8 kip
AR Capacity:	94.1% <span style="color: green;">Pass</span>

First Added Anchor Rod Data	
Quantity:	3
Diameter:	1.75 in
Material:	A193 B7
Bolt Circle:	68.0 in
Bolt Group Area:	7.22 in <sup>2</sup>
Bolt Group MOIx:	3615 in <sup>4</sup>
<u>Reactions Seen by First Added AR Group</u>	
Moment:	444.8 kip-ft
Axial:	0.0 kip
Shear:	0.0 kip
<u>First Added AR Capacity Check</u>	
Tension Load:	66.7 kip
Allowable load:	132.3 kip
AR Capacity:	50.4% <span style="color: green;">Pass</span>

Second Added Anchor Rod Data	
Quantity:	
Diameter:	
Material:	
Bolt Circle:	
Bolt Group Area:	0.00 in <sup>2</sup>
Bolt Group MOIx:	0 in <sup>4</sup>
<u>Reactions Seen by Second Added AR Group</u>	
Moment:	0.0 kip-ft
Axial:	0.0 kip
Shear:	0.0 kip
<u>Second Added AR Capacity Check</u>	
Tension Load:	0.0 kip
Allowable load:	0.0 kip
AR Capacity:	0.0%

Third Added Anchor Rod Data	
Quantity:	
Diameter:	
Material:	
Bolt Circle:	
Bolt Group Area:	0.00 in <sup>2</sup>
Bolt Group MOIx:	0 in <sup>4</sup>
<u>Reactions Seen by Second Added AR Group</u>	
Moment:	0.0 kip-ft
Axial:	0.0 kip
Shear:	0.0 kip
<u>Second Added AR Capacity Check</u>	
Tension Load:	0.0 kip
Allowable load:	0.0 kip
AR Capacity:	0.0%

# Stiffened or Unstiffened, UngROUTED, Circular Base Plate - Any Rod Material

## TIA Rev F

### Site Data

BU#: 876381
Site Name: WARD
App #: 246013 Rev. 2
Pole Manufacturer: <b>Other</b>

Reactions	
Moment:	3884.2125 ft-kips
Axial:	50 kips
Shear:	34 kips

### Anchor Rod Data

Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	63	in

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

### Anchor Rod Results

Maximum Rod Tension:	181.8 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	93.3% <b>Pass</b>

Stiffened
Service, ASD
Fty*ASIF

### Plate Data

Diam:	69	in
Thick:	2	in
Grade:	60	ksi
Single-Rod B-eff:	10.71	in

### Base Plate Results

Base Plate Stress:	46.3 ksi	Flexural Check
Allowable Plate Stress:	60.0 ksi	
Base Plate Stress Ratio:	77.1% <b>Pass</b>	

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

### Stiffener Data (Welding at both sides)

Config:	1	*
Weld Type:	Both	
Groove Depth:	0.375	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	6.5	in
Height:	15	in
Thick:	0.75	in
Notch:	0.75	in
Grade:	65	ksi
Weld str.:	80	ksi

### Stiffener Results

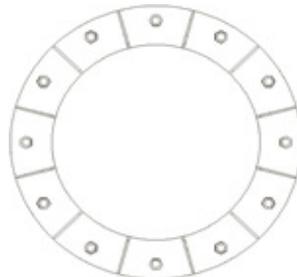
Horizontal Weld :	58.7% <b>Pass</b>
Vertical Weld:	67.7% <b>Pass</b>
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	23.1% <b>Pass</b>
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	57.5% <b>Pass</b>
Plate Comp. (AISC Bracket):	67.7% <b>Pass</b>

### Pole Results

Pole Punching Shear Check:	20.9% <b>Pass</b>
----------------------------	-------------------

### Pole Data

Diam:	54	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None



### Stress Increase Factor

ASIF:	1.333
-------	-------

\* 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

Site Number	876381
Site Name	Ward

# Caisson Analysis

Pier Properties		Analysis Properties	
Moment	4329 kip-ft	TIA Code	F
Shear	34 kip	Soil Safety Factor	2.00
Pier Diameter	7.0 ft	Water Table Depth	9.0 ft
Height Above Grade	1.00 ft	Ignored Soil Depth	3.5 ft
Depth Below Grade	29.00 ft	Cohesion Based on	PLS Caisson
Donut Diameter	ft	Max Soil Capacity	110%
Donut Depth	ft		

Soil Properties						
Layer	Top of Soil Layer (ft)	Layer Thickness (ft)	Bottom of Soil Layer (ft)	Soil Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
<i>Soil.Layer</i>	<i>Soil.Top</i>	<i>Soil.Thick</i>	<i>Soil.Bottom</i>	<i>Soil.Weight</i>	<i>Soil.Cohesion</i>	<i>Soil.Phi</i>
1	0.00	30	30.00	130		35
2						
3						
4						
5						
6						
7						
8						
9						
10						

Critical Depths Below Grade		Results	
Rotation Axis	20.04 ft	Soil Capacity	54.4% <b>OK</b>
Zero Shear	6.09 ft	Max Pier Moment	4530 kip-ft

Moment At User Defined Depths Below Grade	
	kip-ft
	kip-ft

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

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

## Site Data

BU#: 876381
Site Name: Ward
App #: 246013 Rev. 2

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

Pier Properties	
<b>Concrete:</b>	
Pier Diameter =	7.0 ft
Concrete Area =	5541.8 in <sup>2</sup>
<b>Reinforcement:</b>	
Clear Cover to Tie =	4.00 in
Horiz. Tie Bar Size =	4
Vert. Cage Diameter =	6.13 ft
Vert. Cage Diameter =	73.59 in
Vertical Bar Size =	11
Bar Diameter =	1.41 in
Bar Area =	1.56 in <sup>2</sup>
Number of Bars =	24
As Total =	37.44 in <sup>2</sup>
A s/ Aconc, Rho:	0.0068 0.68%

ACI 10.5 , ACI 21.10.4, and IBC 1810.  
 Min As for Flexural, Tension Controlled, Shafts:  
 $(3) * (\text{Sqrt}(f'c) / Fy) = 0.0032$   
 $200 / Fy = 0.0033$

<b>Minimum Rho Check:</b>	
Actual Req'd Min. Rho:	0.33% Flexural
Provided Rho:	0.68% <b>OK</b>

<b>Ref. Shaft Max Axial Capacities, <math>\phi</math> Max(Pn or Tn):</b>		
Max Pu = ( $\phi=0.65$ ) Pn.		
Pn per ACI 318 (10-2)	10899.78	kips
at Mu=( $\phi=0.65$ )Mn=	6623.15	ft-kips
Max Tu, ( $\phi=0.9$ ) Tn =	2021.76	kips
at Mu= $\phi=(0.90)$ Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces		
TIA Revision:	F	
Max. Service Shaft M:	4529.976	ft-kips (* Note)
Max. Service Shaft P:	50	kips
Max Axial Force Type:	Comp.	

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

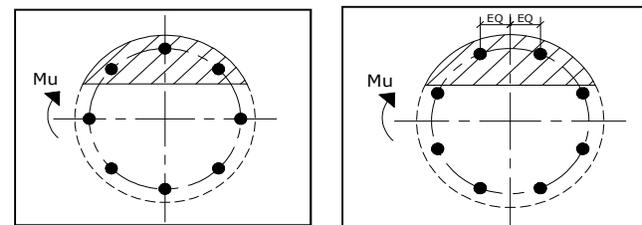
Load Factor	Shaft Factored Loads	
1.30	Mu:	5888.969 ft-kips
1.30	Pu:	65 kips

Material Properties	
Concrete Comp. strength, f'c =	4000 psi
Reinforcement yield strength, Fy =	60 ksi
Reinforcing Modulus of Elasticity, E =	29000 ksi
Reinforcement yield strain =	0.00207
Limiting compressive strain =	0.003
ACI 318 Code	
Select Analysis ACI Code=	2005
Seismic Properties	
Seismic Design Category =	B
Seismic Risk =	Low

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

## Results:

Governing Orientation Case: 2



Case 1

Case 2

Dist. From Edge to Neutral Axis: 13.00 in  
 Extreme Steel Strain, et: 0.0151

**et > 0.0050, Tension Controlled**

Reduction Factor,  $\phi$ : 0.900

**Output Note:** Negative Pu=Tension  
 For Axial Compression,  $\phi$  Pn = Pu: 65.00 kips  
 Drilled Shaft Moment Capacity,  $\phi$ Mn: 6018.76 ft-kips  
 Drilled Shaft Superimposed Mu: 5888.97 ft-kips

<b>(Mu/<math>\phi</math>Mn, Drilled Shaft Flexure CSR):</b>	<b>97.8%</b>
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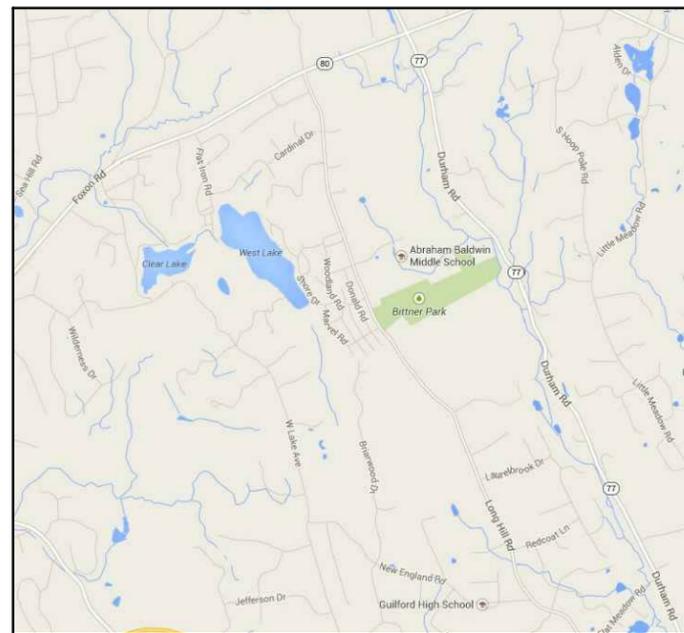
**APPENDIX D**  
**MODIFICATION DRAWINGS**

# MONOPOLE REINFORCEMENT DRAWINGS

## PREPARED FOR CROWN CASTLE

SITE NAME: WARD  
BU NUMBER: 876381

SITE ADDRESS:  
2365 LONG HILL ROAD  
GUILFORD, CT 06437  
NEW HAVEN COUNTY, USA



DIRECTIONS: I 95 NORTH TO (EXIT 48) 91 NORTH TO EXIT 8, KEEP RIGHT ON TO RTE 80 THEN MAKE A RIGHT ON LONG HILL RD, TOWER IS LOCATED AT 2365 LONG HILL RD ( BLUE HOUSE) FOLLOW DRIVE TO THE REAR. (LOCK GATES SO THE CATTLE WILL NOT GET OUT)

### PROJECT CONTACTS:

#### 1. CROWN TOWER STRUCTURAL ANALYST

STEVE TUTTLE  
(585) 899-3445  
STEVE.TUTTLE@CROWNCastle.COM  
8 PARKMEADOW DRIVE  
PITTSFORD, NY 14534

#### 2. CROWN PROJECT MANAGER

JERRY BRUNO  
(502) 318-1363  
JERRY.BRUNO.CONTRACTOR@CROWNCastle.COM  
500 WEST CUMMINGS PARK, SUITE 3600  
WOBURN, MA 01801

#### 3. GPD DESIGN ENGINEER (EOR)

JOHN N. KABAK, P.E.  
(614) 859-1607  
DPALKOVIC@GPDGROUP.COM  
520 SOUTH MAIN STREET, SUITE 2531  
AKRON, OH 44311

### DRAWINGS INCLUDED

SHEET NUMBER	DESCRIPTION
S-1	TITLE PAGE
S-2	MODIFICATION INSPECTION CHECKLIST
S-3	NOTES
S-4	ADDITIONAL NOTES
S-5	TOWER ELEVATION
S-6	TOWER SECTIONS

### TOWER INFORMATION

TOWER MANUFACTURER / JOB #: EEI / PROJECT #: 11561  
TOWER HEIGHT / TYPE: 176' MODIFIED MONOPOLE TOWER  
TOWER LOCATION: LAT 41° 20' 47.34"  
DATUM: (NAD 1983) LONG -72° 43' 23.15"  
ELEV 177 FT AMSL  
STRUCTURAL DESIGN DRAWING: CCI / WO # 910828  
STRUCTURAL ANALYSIS REPORT: TEP / WO # 773005  
STRUCTURAL ANALYSIS DATE: 06/17/2014  
APPLICATION ID: 246013 REV 2  
CCSITES DOCUMENT ID: 5129976

### CODE COMPLIANCE

THIS REINFORCEMENT DESIGN IS IN ACCORDANCE WITH TIA/EIA-222-F STRUCTURAL DESIGN STADARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES AND 2005 CT BUILDING CODE USING A FASTEST MILE WIND SPEED OF 85 MPH WITH NO ICE, 37.6 MPH WITH 0.75 INCH ESCALATING ICE THICKNESS AND 50 MPH UNDER SERVICE LOADS.

 <small>Glaus, Pyle, Schomer, Burns &amp; DeHaven, Inc. 520 South Main Street, Suite 2531 Akron, OH 44311 330.572.2100 Copyright: Glaus, Pyle, Schomer, Burns &amp; DeHaven, Inc. 2014</small>			
<b>GPD PROJECT NUMBER</b> 2014777.876381.03			
<b>SITE NAME:</b> WARD <b>BU NUMBER:</b> 876381 <b>WO NUMBER:</b> 910828 <b>SITE ADDRESS:</b> 2365 LONG HILL ROAD GUILFORD, CT 06437 NEW HAVEN COUNTY			
ENG/QA BY: AH		DATE: 09/05/14	
DFT BY: EWS		DATE: 09/05/14	
DFT/QA BY: BPS		DATE: 09/05/14	
APR'V'D BY: JNK		DATE: 09/05/14	
SCALE: N.T.S.			
<b>TITLE PAGE</b>			
<b>S-1</b>			REV 0



## MODIFICATION INSPECTION NOTES

### MI CHECKLIST

CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
<b>PRE-CONSTRUCTION</b>	
X	MI CHECKLIST DRAWING
X	EOR REVIEW
X	FABRICATION INSPECTION
X	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
NA	NDE REPORT OF MONOPOLE BASE PLATE PER ENG-SOW-10033
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
<b>CONSTRUCTION</b>	
X	CONSTRUCTION INSPECTIONS
NA	FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
X	POST INSTALLED ANCHOR ROD VERIFICATION
NA	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION AND NDE REPORTS
NA	EARTHWORK: LIFT AND DENSITY
X	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
ADDITIONAL TESTING AND INSPECTIONS:	
<b>POST-CONSTRUCTION</b>	
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
X	POST INSTALLED ANCHOR ROD PULL-OUT TESTING
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS:	

NOTE: X DENOTES A DOCUMENT REQUIRED FOR THE MI REPORT  
NA DENOTES A DOCUMENT THAT IS NOT REQUIRED FOR THE MI REPORT

### GENERAL

THE MODIFICATION INSPECTION (MI) IS A VISUAL INSPECTION OF TOWER MODIFICATIONS AND A REVIEW OF CONSTRUCTION INSPECTIONS AND OTHER REPORTS TO ENSURE THE INSTALLATION WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NAMELY THE MODIFICATION DRAWINGS, AS DESIGNED BY THE ENGINEER OF RECORD (EOR).

THE MI IS TO CONFIRM INSTALLATION CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A REVIEW OF THE MODIFICATION DESIGN ITSELF, NOR DOES THE MI INSPECTOR TAKE OWNERSHIP OF THE MODIFICATION DESIGN. OWNERSHIP OF THE STRUCTURAL MODIFICATION DESIGN EFFECTIVENESS AND INTEGRITY RESIDES WITH THE EOR AT ALL TIMES.

ALL MI'S SHALL BE CONDUCTED BY A CROWN ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN. SEE CROWN ENG-BUL-10173, "APPROVED MI VENDORS".

TO ENSURE THAT THE REQUIREMENTS OF THE MI ARE MET, IT IS VITAL THAT THE GENERAL CONTRACTOR (GC) AND THE MI INSPECTOR BEGIN COMMUNICATING AND COORDINATING AS SOON AS A PURCHASE ORDER ( PO) IS RECEIVED. IT IS EXPECTED THAT EACH PARTY WILL BE PROACTIVE IN REACHING OUT TO THE OTHER PARTY. IF CONTACT INFORMATION IS NOT KNOWN, CONTACT YOUR CROWN POINT OF CONTACT (POC).

REFER TO CROWN ENG-SOW-10007, "MODIFICATION INSPECTION SOW", FOR FURTHER DETAILS AND REQUIREMENTS.

### MI INSPECTOR

THE MI INSPECTOR IS REQUIRED TO CONTACT THE GC AS SOON AS RECEIVING A PO FOR THE MI TO, AT A MINIMUM:

- REVIEW THE REQUIREMENTS OF THE MI CHECKLIST
- WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS

THE MI INSPECTOR IS RESPONSIBLE FOR COLLECTING ALL GC INSPECTION AND TEST REPORTS, REVIEWING THE DOCUMENTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING THE IN-FIELD INSPECTIONS, AND SUBMITTING THE MI REPORT TO CROWN.

### GENERAL CONTRACTOR

THE GC IS REQUIRED TO CONTACT THE MI INSPECTOR AS SOON AS RECEIVING A PO FOR THE MODIFICATION INSTALLATION OR TURNKEY PROJECT TO, AT A MINIMUM:

- REVIEW THE REQUIREMENTS OF THE MI CHECKLIST
- WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE MI INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS
- BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS

THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE MI CHECKLIST AND CROWN ENG-SOW-10007.

### RECOMMENDATIONS

THE FOLLOWING RECOMMENDATIONS AND SUGGESTIONS ARE OFFERED TO ENHANCE THE EFFICIENCY AND EFFECTIVENESS OF DELIVERING AN MI REPORT:

- IT IS SUGGESTED THAT THE GC PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, PREFERABLY 10, TO THE MI INSPECTOR AS TO WHEN THE SITE WILL BE READY FOR THE MI TO BE CONDUCTED.
- THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS.
- IT MAY BE BENEFICIAL TO INSTALL ALL TOWER MODIFICATIONS PRIOR TO CONDUCTING THE FOUNDATION INSPECTIONS TO ALLOW THE FOUNDATION AND MI INSPECTION(S) TO COMMENCE WITH ONE SITE VISIT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE DURING THE MI TO HAVE ANY DEFICIENCIES CORRECTED DURING THE INITIAL MI. THEREFORE, THE GC MAY CHOOSE TO COORDINATE THE MI CAREFULLY TO ENSURE ALL CONSTRUCTION FACILITIES ARE AT THEIR DISPOSAL WHEN THE MI INSPECTOR IS ON SITE.

### CANCELLATION OR DELAYS IN SCHEDULED MI

IF THE GC AND MI INSPECTOR AGREE TO A DATE ON WHICH THE MI WILL BE CONDUCTED, AND EITHER PARTY CANCELS OR DELAYS. CROWN SHALL NOT BE RESPONSIBLE FOR ANY COSTS, FEES, LOSS OF DEPOSITS AND/OR OTHER PENALTIES RELATED TO THE CANCELLATION OR DELAY INCURRED BY EITHER PARTY, NOR FOR ANY TIME (E.G. TRAVEL AND LODGING, COSTS OF KEEPING EQUIPMENT ON-SITE, ETC.). IF CROWN CONTRACTS DIRECTLY FOR A THIRD PARTY MI, EXCEPTIONS MAY BE MADE IN THE EVENT THAT THE DELAY/CANCELLATION IS CAUSED BY WEATHER OR OTHER CONDITIONS THAT MAY COMPROMISE THE SAFETY OF THE PARTIES INVOLVED.

### CORRECTION OF FAILING MI'S

IF THE MODIFICATION INSTALLATION WOULD FAIL THE MI ("FAILED MI"), THE GC SHALL WORK WITH CROWN TO COORDINATE A REMEDIATION PLAN IN ONE OF TWO WAYS:

- CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENT MI.
- OR, WITH CROWN'S APPROVAL, THE GC MAY WORK WITH THE EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION

### MI VERIFICATION INSPECTIONS

CROWN RESERVES THE RIGHT TO CONDUCT AN MI VERIFICATION INSPECTION TO VERIFY THE ACCURACY AND COMPLETENESS OF PREVIOUSLY COMPLETED MI INSPECTION(S) ON TOWER MODIFICATION PROJECTS.

ALL VERIFICATION INSPECTIONS SHALL BE HELD TO THE SAME SPECIFICATIONS AND REQUIREMENTS IN THE CONTRACT DOCUMENTS AND IN ACCORDANCE WITH CROWN ENG-SOW-10007.

VERIFICATION INSPECTION MAY BE CONDUCTED BY AN INDEPENDENT AEV/AESV FIRM AFTER A MODIFICATION PROJECT IS COMPLETED, AS MARKED BY THE DATE OF AN ACCEPTED **"PASSING MI"** OR **"PASS AS NOTED MI"** REPORT FOR THE ORIGINAL PROJECT.

### REQUIRED PHOTOS

BETWEEN THE GC AND THE MI INSPECTOR THE FOLLOWING PHOTOGRAPHS, AT A MINIMUM, ARE TO BE TAKEN AND INCLUDED IN THE MI REPORT:

- PRE-CONSTRUCTION GENERAL SITE CONDITION
- PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION
  - RAW MATERIALS
  - PHOTOS OF ALL CRITICAL DETAILS
  - FOUNDATION MODIFICATIONS
  - WELD PREPARATION
  - BOLT INSTALLATION
  - FINAL INSTALLED CONDITION
  - SURFACE COATING REPAIR
- POST CONSTRUCTION PHOTOGRAPHS
  - FINAL INFIELD CONDITION

PHOTOS OF ELEVATED MODIFICATIONS TAKEN ONLY FROM THE GROUND SHALL BE CONSIDERED INADEQUATE.

THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, PLEASE REFER TO CROWN ENG-SOW-10007.

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<b>GPD PROJECT NUMBER</b> 2014777.876381.03			
<b>SITE NAME: WARD</b>			
<b>BU NUMBER: 876381</b>			
<b>WO NUMBER: 910828</b>			
<b>SITE ADDRESS:</b> 2365 LONG HILL ROAD GUILFORD, CT 06437 NEW HAVEN COUNTY			
ENG/QA BY: <b>AH</b>		DATE: <b>09/05/14</b>	
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APR'VD BY: <b>JNK</b>		DATE: <b>09/05/14</b>	
SCALE: N.T.S.			
<b>MODIFICATION INSPECTION CHECKLIST</b>			
<b>S-2</b>			REV <b>0</b>



## GENERAL NOTES

- ALL WORK PRESENTED ON THESE DRAWINGS MUST BE COMPLETED BY THE CONTRACTOR UNLESS NOTED OTHERWISE. THE CONTRACTOR MUST BE EXPERIENCED IN THE PERFORMANCE OF WORK SIMILAR TO THAT DESCRIBED HEREIN. BY ACCEPTANCE OF THIS ASSIGNMENT, THE CONTRACTOR IS ATTESTING THAT HE DOES HAVE SUFFICIENT EXPERIENCE AND ABILITY, THAT HE IS KNOWLEDGEABLE OF THE WORK TO BE PERFORMED, THAT HE IS PROPERLY LICENSED, AND THAT HE IS PROPERLY REGISTERED TO DO THIS WORK IN THE STATE AND/OR COUNTY IN WHICH IT IS TO BE PERFORMED.
- THE GENERAL NOTES AND TYPICAL DETAILS ARE APPLICABLE TO ALL PARTS OF THE STRUCTURE AND SHALL BE READ IN CONJUNCTION WITH THE STRUCTURAL DRAWINGS AND PROJECT SPECIFICATIONS.
- THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING APPROVALS FROM ALL AUTHORITIES HAVING JURISDICTION FOR THIS PROJECT AND SHALL NOTIFY THE APPLICABLE JURISDICTIONAL (STATE, COUNTY, OR CITY) ENGINEER 24 HOURS PRIOR TO THE BEGINNING OF CONSTRUCTION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ABIDING BY ALL CONDITIONS AND REQUIREMENTS OF THE PERMITS.
- ERECT GUARDS AND BARRIERS PER APPLICABLE LABOR AND CONSTRUCTION SAFETY REGULATIONS.
- THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS, POSSIBLE INTERFERENCES, AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. REPORT ANY AND ALL DISCREPANCIES TO THE ENGINEER OF RECORD (EOR) AND FIELD PERSONNEL IMMEDIATELY. ANY AND ALL FIELD CHANGES SHALL BE APPROVED AND DOCUMENTED BY THE EOR PRIOR TO FIELD IMPLEMENTATION.
- ALL MATERIALS AND WORKMANSHIP SHALL BE WARRANTED FOR TWO (2) YEARS FROM THE DATE OF COMPLETED CONSTRUCTION.
- USE ONLY THE LATEST ISSUES OF ANY APPLICABLE CODES, STANDARDS, OR REGULATIONS MENTIONED IN THE FOLLOWING NOTES AND SPECIFICATIONS, UNO.
- ALL WORKMANSHIP SHALL BE IN ACCORDANCE WITH ANSI, ASTM, ACI, TIA, AND AISC STANDARDS AS REFERENCED IN THE APPLICABLE CODE.
- STRUCTURAL ELEMENTS SHOWN ON THESE DRAWINGS ARE DESIGNED IN ACCORDANCE WITH APPLICABLE BUILDING CODES/STANDARDS. ALL CONSTRUCTION, EXCEPT WHERE NOTED OTHERWISE, SHALL COMPLY WITH THOSE CODES/STANDARDS.
- ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS, AND IN CONFORMANCE WITH THE DRAWINGS. ANY AND ALL SUBSTITUTIONS MUST BE DULY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER OF RECORD PRIOR TO FABRICATION AND INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF THE MATERIALS AND EQUIPMENT BEING SUBSTITUTED.
- ALL MANUFACTURER'S HARDWARE ASSEMBLY INSTRUCTIONS SHALL BE FOLLOWED EXACTLY AND SHALL SUPERSEDE ANY CONFLICTING NOTES ENCLOSED HEREIN.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS ALSO RESPONSIBLE FOR ENSURING THAT ALL CONSTRUCTION PROCEDURES MEET THE REQUIREMENTS OF OSHA, THE OWNER, AND ALL OTHER APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY REGULATIONS.
- ACCESS TO THE PROPOSED WORK SITE MAY BE RESTRICTED. THE CONTRACTOR SHALL COORDINATE INTENDED CONSTRUCTION ACTIVITY, INCLUDING WORK SCHEDULE AND MATERIAL ACCESS, WITH THE RESIDENT LEASING AGENT.
- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO SAFEGUARD ALL EXISTING STRUCTURES OR BURIED SERVICES AFFECTED BY THIS CONSTRUCTION. CONTRACTOR IS ALSO RESPONSIBLE FOR TEMPORARILY RELOCATING ANY LINES OR STRUTS AS NECESSARY TO COMPLETE THE REQUIRED WORK.
- STRUCTURAL DESIGN IS FOR THE COMPLETE CONDITION ONLY. THE CONTRACTOR MUST BE COGNIZANT THAT THE REMOVAL OF ANY STRUCTURAL COMPONENT OF AN EXISTING TOWER HAS THE POTENTIAL TO CAUSE THE PARTIAL OR COMPLETE COLLAPSE OF THE STRUCTURE. ALL NECESSARY PRECAUTIONS MUST BE TAKEN TO ENSURE STRUCTURAL INTEGRITY, INCLUDING, BUT NOT LIMITED TO, ENGINEERING ASSESSMENT OF CONSTRUCTION STRESSES WITH INSTALLATION MAXIMUM WIND SPEED AND/OR TEMPORARY BRACING AND SHORING.
- DO NOT SCALE DRAWINGS.
- THE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF CROWN CASTLE. THEY MAY NOT BE REPRODUCED IN ANY FORM WITHOUT THE EXPRESSED WRITTEN CONSENT/PERMISSION OF CROWN CASTLE
- FOR THIS ANALYSIS AND MODIFICATION, THE TOWER HAS BEEN ASSUMED TO BE IN GOOD CONDITION WITHOUT ANY DEFECTS. IF THE CONTRACTOR DISCOVERS ANY INDICATION OF AN EXISTING STRUCTURAL DEFECT, CONTACT THE ENGINEER OF RECORD IMMEDIATELY.
- MODIFICATION WORK SHALL BE COMPLETED IN CALM WIND CONDITIONS / OR APPROPRIATE WIND SPEED FOR THE TYPE OF MODIFICATION WORK TO BE INSTALLED.
- THE CLIMBING FACILITIES, SAFETY CLIMB AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED OR ALTERED WITHOUT THE EXPRESS APPROVAL OF THE ENGINEER OF RECORD.

## WELDING NOTES

- ALL WELDING SHALL BE IN ACCORDANCE WITH THE AWS D1.1/D1.1M, "STRUCTURAL WELDING CODE-STEEL".
- THE CERTIFIED WELD INSPECTOR SHALL INDICATE, IN A WRITTEN CWI REPORT, THAT ALL WELDING OPERATIONS, PRE-DURING-POST, WERE CONDUCTED IN ACCORDANCE WITH AWS D1.1 WITH PHOTOGRAPHS AND DOCUMENTATION SUPPORTING THE ACCEPTANCE OR REJECTION OF ALL WELDING. FOR INFORMATION, SEE ENG-STD-10069: GC INSPECTION STANDARD FOR FABRICATION AND FIELD WELDING OF STRUCTURAL STEEL AND ENG-SOW-10007 POST MODIFICATION INSPECTION SOW. ALL CWI WELD INSPECTION DOCUMENTATION AND PHOTOS SHALL BE SUBMITTED TO THE PMI INSPECTOR.
- PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE CONTRACTOR SHALL PERFORM A NONDESTRUCTIVE TEST ON THE EXISTING BASE PERIMETER WELD TO INSURE ITS STRUCTURAL INTEGRITY IN ACCORDANCE WITH AWS D1.1. IF ANY FLAWS ARE DISCOVERED, THE PROJECT SHALL BE PUT ON HOLD UNTIL REMEDIES TO CORRECT THE DEFICIENCIES ARE DESIGNED AND INSTALLED. THE TOWER OWNER AND THE ENGINEER SHALL BE CONTACTED IMMEDIATELY UPON A FAILING NONDESTRUCTIVE TESTING RESULT.
- ALL WELDING SHALL BE PERFORMED BY AWS CERTIFIED WELDERS.
- ALL ARC WELDING ON CROWN STRUCTURES SHALL BE DONE IN ACCORDANCE WITH THE CROWN ENG-PLN-10015, "CUTTING AND WELDING SAFETY PLAN" AND AWS D1.1 (LATEST EDITION). THIS SHALL INCLUDE A CERTIFIED WELDING INSPECTOR (CWI) FOR ACCEPTANCE OR REJECTION OF ALL WELDING OPERATIONS, PRE-DURING-POST, USING THE ACCEPTANCE CRITERIA OF AWS D1.1. THE CWI SHALL WORK WITH THE GC ON THE LEVEL OF INTERACTION NEEDED TO CONDUCT THE WELDING INSPECTION. THE CERTIFIED WELDING INSPECTION IS THE RESPONSIBILITY OF THE GC.
- FOR ALL WELDING, USE E80XX ELECTRODES FOR SMAW PROCESS AND E8XT-XX ELECTRODES FOR FCAW PROCESS, UNO.
- SURFACES TO BE WELDED SHALL BE FREE FROM SCALE, SLAG, RUST, MOISTURE, GREASE OR ANY OTHER FOREIGN MATERIAL THAT WOULD PREVENT PROPER WELDING. GRIND THE SURFACE ADJACENT TO THE WELD FOR A DISTANCE OF 2" MINIMUM ALL AROUND. ENSURE BOTH AREAS ARE 100% FREE OF ALL GALVANIZING.
- DO NOT WELD IF THE TEMPERATURE OF THE STEEL IN THE VICINITY OF THE WELD AREA IS BELOW 0° F. WHEN THE TEMPERATURE IS BETWEEN 0° F AND 32° F, PREHEAT AND MAINTAIN THE STEEL IN THE VICINITY OF THE WELD AREA AT 70° F DURING THE WELDING PROCESS.
- DO NOT WELD ON WET OR FROST-COVERED SURFACES & PROVIDE ADEQUATE PROTECTION FROM HIGH WINDS.
- FULL PENETRATION WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 100% NDE INSPECTED BY UT IN ACCORDANCE WITH AWS D1.1.
- PARTIAL PENETRATION AND FILLET WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 50% NDE INSPECTED BY MP IN ACCORDANCE WITH AWS D1.1.
- WELDING CERTIFICATES MUST BE PROVIDED TO CWI AND GPD GROUP PRIOR TO WELDING CONTRACTOR BEGINNING WORK ON SITE. CERTIFICATE WILL BE ASKED FOR AS PART OF INSPECTION PROCESS. ALL WELDING SHOULD BE PERFORMED BY AN AWS QUALIFIED WELDER WHO HAS EXPERIENCE WITH GALVANIZED SURFACES AND IN ACCORDANCE WITH ANSI/AWS D1.1 AND ANSI Z 49.1 OR LATEST EDITIONS.
- OXY FUEL GAS WELDING OR BRAZING IS STRICTLY PROHIBITED. SPECIFICALLY, NO TORCH CUTTING IS PERMITTED ON SITE. ALL HOLES SHALL BE CUT WITH A GRINDER.
- INSTALL 3000° (NFPA 701) FIRE BLANKET AROUND ALL COAX.
- MORE SPLATTER AND SPARKS SHALL BE ANTICIPATED GIVEN THE PREVIOUSLY GALV. SURFACE.
- COAX IS FLAMMABLE AND CAN CATCH FIRE IF PROPER PRECAUTIONS ARE NOT MADE TO SHIELD COAX FROM ALL WELDING PROCEDURES. ALL COAX SHALL BE SHIELDED AT AND BELOW EACH WELDING PROCEDURE AND ELEVATION. IN ADDITION, COAX SHALL BE PUSHED AWAY FROM TOWER FACE WHERE WELDING IS BEING PERFORMED.
- FUMES CREATED FROM WELDING ON A PREVIOUSLY GALV. SURFACE CAN BE HAZARDOUS.
- PRIOR TO WELDING, ALL SURFACES SHALL BE PROPERLY GROUND TO REMOVE GALVANIZING.
- ALL FIELD WELDS SHALL BE TOUCHED UP WITH A GALVANIZING PAINT REPAIR (ZRC OR APPROVED EQUIVALENT).
- WATER SHALL BE ON SITE, OF ADEQUATE AMOUNT, AND AVAILABLE AT SHORT NOTICE AT ALL TIMES DURING WELDING ACTIVITY. A MINIMUM OF 500 GAL. OF WATER SHALL BE PROVIDED. WATER SHALL BE CAPABLE OF REACHING HEIGHT WHERE WELDING IS BEING PERFORMED. IN ADDITION, A MINIMUM OF SIX (6) 10 LB. CLASS ABC MULTIPURPOSE FIRE EXTINGUISHERS FULLY CHARGED AND CAPABLE OF DISCHARGE WITHIN 30 SECONDS OF DETECTING A FIRE SHALL BE PROVIDED. FIRE EXTINGUISHERS SHALL BE STRATEGICALLY LOCATED AROUND COMPOUND AND IN THE AIR (I.E. ON THE MAN LIFT WHERE WELDING IS BEING PERFORMED).

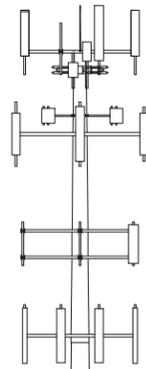
## STRUCTURAL STEEL NOTES

- DESIGN, FABRICATION, ERECTION, ALTERATION AND MAINTENANCE SHALL CONFORM TO THE FOLLOWING, UNLESS NOTED OTHERWISE (UNO).
  - TIA-222-F: STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS
  - TIA-1019-A: INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS
  - AISC: MANUAL OF STEEL CONSTRUCTION
- ALL STRUCTURAL ELEMENTS SHALL CONFORM TO THE FOLLOWING REQUIREMENTS, UNO.
  - STRUCTURAL STEEL, ASTM A572 GRADE 65 (FY = 65 KSI),
  - ALL BOLTS, ASTM A325 TYPE 1 GALVANIZED HIGH STRENGTH BOLTS.
  - ALL NUTS, ASTM A563 CARBON AND ALLOY STEEL NUTS.
  - ALL WASHERS, ASTM F436 HARDENED STEEL WASHERS.
  - ALL PIPE, ASTM A53 GRADE B (FY = 42 KSI),
  - ALL ANCHOR RODS, ASTM A193-B7 (FU = 125)
- HOLES SHALL NOT BE FLAME CUT THRU STEEL UNLESS APPROVED BY THE ENGINEER OF RECORD.
- ALL FASTENERS SHALL NOT BE REUSED.
- A NUT LOCKING DEVICE SHALL BE INSTALLED ON ALL PROPOSED AND/OR REPLACED ASTM A325 BOLTS.
- ALL PROPOSED AND/OR REPLACED BOLTS SHALL BE OF SUFFICIENT LENGTH SUCH THAT THE END OF THE BOLT BE AT LEAST FLUSH WITH THE FACE OF THE NUT. IT IS NOT PERMITTED FOR THE BOLT END TO BE BELOW THE FACE OF THE NUT AFTER TIGHTENING IS COMPLETED.
- HOT-DIP GALVANIZE ALL ITEMS, UNO. GALVANIZE PER ASTM A123, ASTM A153/A153M OR ASTM A653 G90, AS APPLICABLE.
- FOR A LIST OF CROWN APPROVED COLD GALVANIZING COMPOUNDS, REFER TO CROWN ENG-BUL-10149, "TOWER PROTECTIVE COATINGS BULLETIN".
- AFTER FINAL INSPECTION, ALL EXPOSED STRUCTURAL STEEL AS THE RESULT OF THIS SCOPE OF WORK INCLUDING WELDS, FIELD DRILLED HOLES, AND SHAFT INTERIORS (WHERE ACCESSIBLE), SHALL BE CLEANED AND COLD GALVANIZING APPLIED BY BRUSH IN ACCORDANCE WITH CROWN ENG-BUL-10149, "TOWER PROTECTIVE COATINGS BULLETIN". PHOTO DOCUMENTATION IS REQUIRED TO BE SUBMITTED TO THE MI INSPECTOR.

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				<b>SITE NAME: WARD</b>			
				<b>BU NUMBER: 876381</b> <b>WO NUMBER: 910828</b> <b>SITE ADDRESS:</b> <b>2365 LONG HILL ROAD</b> <b>GUILFORD, CT 06437</b> <b>NEW HAVEN COUNTY</b>			
 <p>09/05/2014</p>				<b>ENG/QA BY: AH</b> <b>DATE: 09/05/14</b> <b>DFT BY: EWS</b> <b>DATE: 09/05/14</b> <b>DFT/QA BY: BPS</b> <b>DATE: 09/05/14</b> <b>APR'V'D BY: JNK</b> <b>DATE: 09/05/14</b>			
<b>SCALE: N.T.S.</b>				<b>NOTES</b>			
<div style="display: flex; justify-content: space-between; align-items: center;"> <span style="font-size: 2em; font-weight: bold;">S-3</span> <table border="1"> <tr> <td>REV</td> <td>0</td> </tr> </table> </div>				REV	0		
				REV	0		



176.0 FT  
174.0 FT  
169.0 FT  
167.0 FT  
155.0 FT  
145.0 FT  
144.3 FT



POLE SPECIFICATIONS	
POLE SHAPE TYPE:	18-SIDED
TAPER:	0.2131 IN/FT
SHAFT STEEL:	ASTM A572 GRADE 65
BASE PL STEEL:	ASTM A572 GRADE 60
ANCHOR RODS:	2-1/4"Ø A615J GRADE 75

POLE MODIFICATION SCHEDULE			
	ELEVATION (FT)	MODIFICATION	REFERENCE SHEET
A	0.0	INSTALL (3) NEW 1-3/4"Ø ANCHOR RODS WITH BRACKETS	S-6

SHAFT SECTION DATA					
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN)	
				@ TOP	@ BOTTOM
1	31.75	0.1875	42	16.500	23.650
2	53.17	0.3125		22.360	34.330
3	52.46	0.3750	58	32.490	44.300
4	53.03	0.3750	73	42.400	54.000

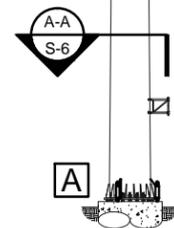
NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

94.6 FT

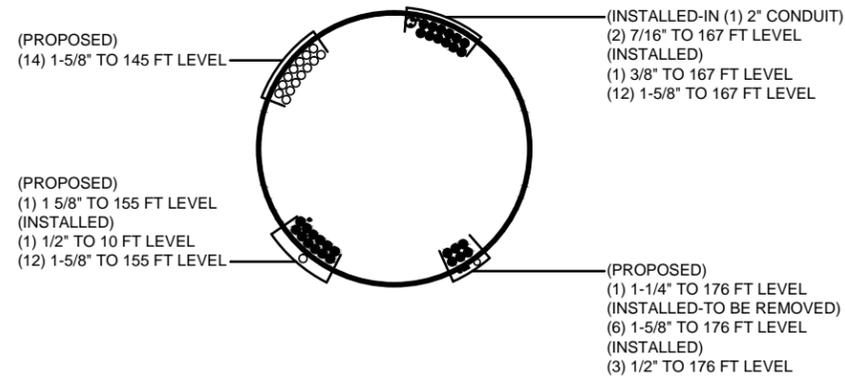
50.0 FT  
47.0 FT

10.0 FT

0.0 FT  
TOP OF BASE PLATE

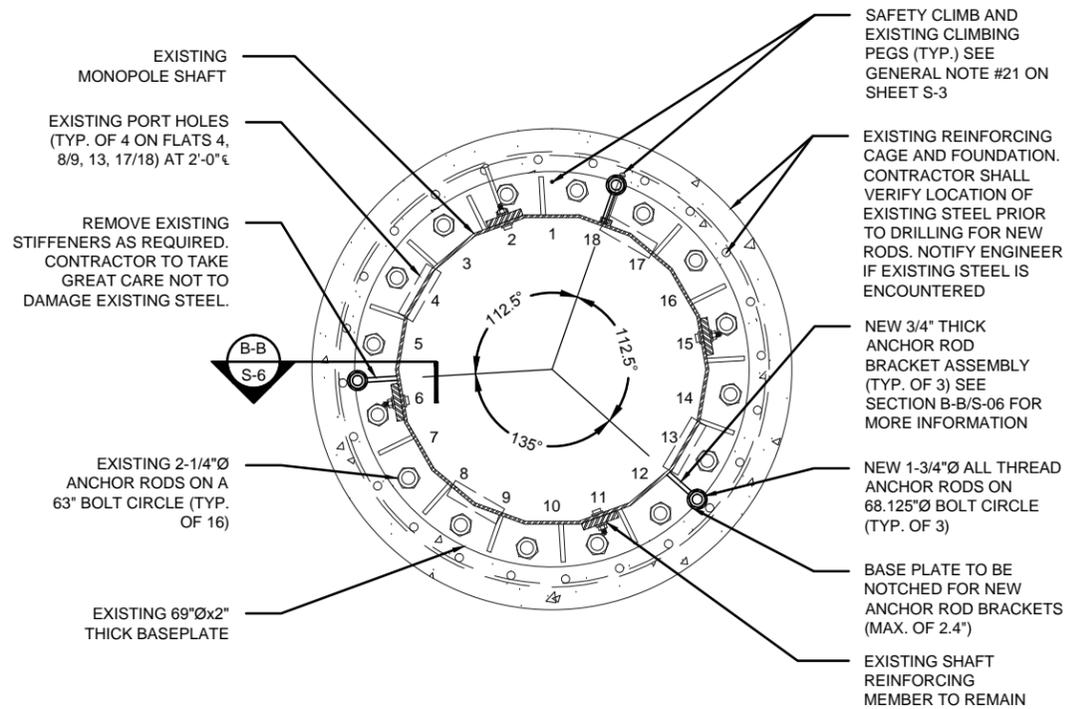


POLE ELEVATION

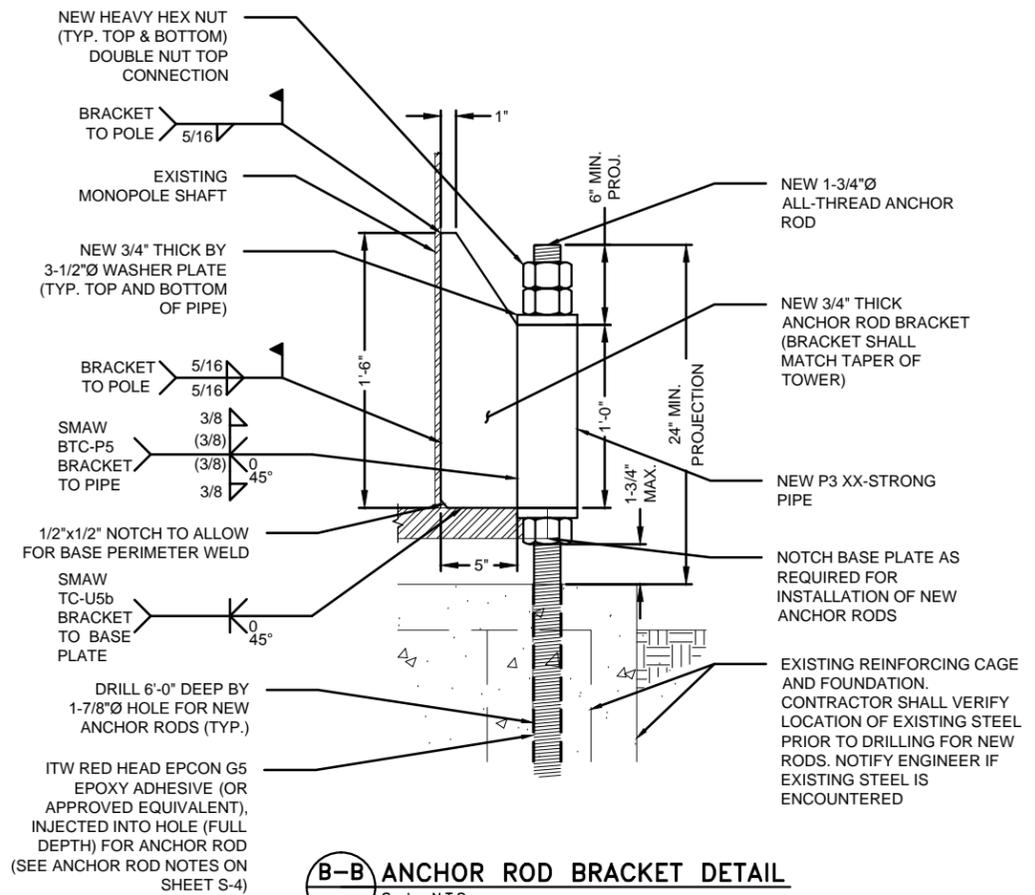


COAX LAYOUT

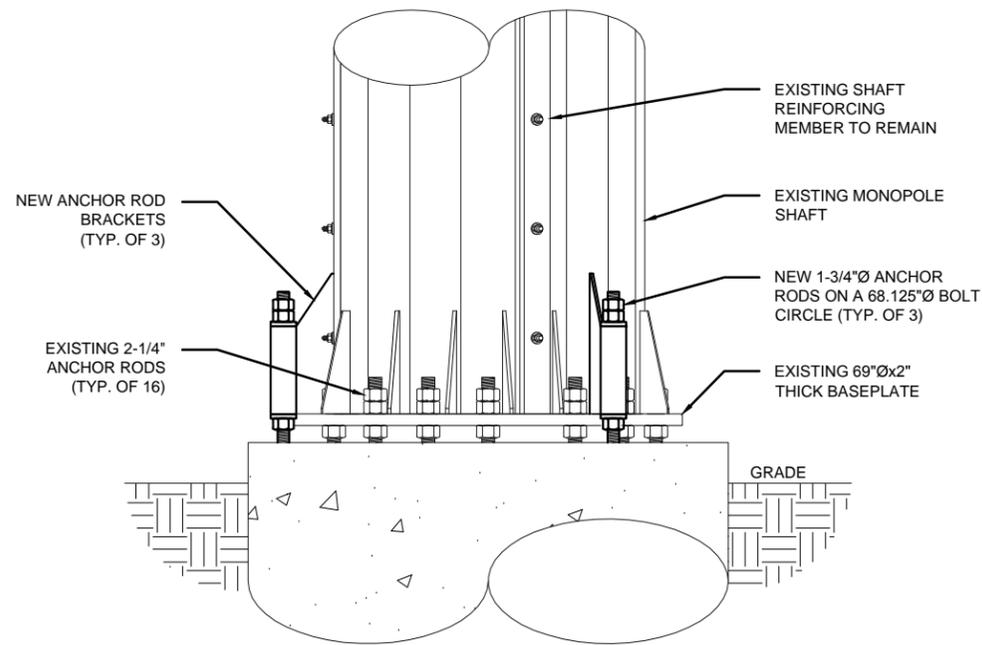
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<b>REVISIONS</b>			
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<b>TOWER ELEVATION</b>			
<b>S-5</b>			REV 0



**A-A TOWER SECTION**  
S-6 Scale: N.T.S.



**B-B ANCHOR ROD BRACKET DETAIL**  
S-6 Scale: N.T.S.



**1 ELEVATION**  
S-6 Scale: N.T.S.

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SCALE: N.T.S.				
  09/05/2014				
TOWER SECTIONS				
S-6			REV	0

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

Sprint Existing Facility

Site ID: CT33XC535

Ward

2381 Long Hill Road  
Guilford, CT 06437

**October 10, 2014**

**EBI Project Number: 62145451**

October 10, 2014

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

Re: Radio Frequency Maximum Permissible Exposure (MPE) Assessment for Site:  
**CT33XC535 - Ward**

**Site Total: 34.69% - MPE% in full compliance**

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at **2381 Long Hill Road, Guilford, 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 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ). The number of  $\mu\text{W}/\text{cm}^2$  calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ). The general population exposure limit for the cellular band (850 MHz Band) is approximately  $567 \mu\text{W}/\text{cm}^2$ , and the general population exposure limit for the 1900 MHz and 2500 MHz bands is  $1000 \mu\text{W}/\text{cm}^2$ . 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 **2381 Long Hill Road, Guilford, 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 **178 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	CT33XC535 - Ward
Site Address	2381 Long Hill Road, Guilford, CT, 06437
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	APXVSP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	2	40	5.9	178	172	1/2 "	0.5	0	138.69	0.17%
1a	RFS	APXVSP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	178	172	1/2 "	0.5	0	39.00	0.08%
1B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	178	172	1/2 "	0.5	0	138.69	0.30%
Sector total Power Density Value:																0.55%

**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	APXVSP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	2	40	5.9	178	172	1/2 "	0.5	0	138.69	0.17%
2a	RFS	APXVSP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	178	172	1/2 "	0.5	0	39.00	0.08%
2B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	178	172	1/2 "	0.5	0	138.69	0.30%
Sector total Power Density Value:																0.55%

**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	APXVSP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	2	40	5.9	178	172	1/2 "	0.5	0	138.69	0.17%
3a	RFS	APXVSP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	3.4	178	172	1/2 "	0.5	0	39.00	0.08%
3B	RFS	APXVTMM14-C-120	RRH	2500 MHz	CDMA / LTE	20	2	40	5.9	178	172	1/2 "	0.5	0	138.69	0.30%
Sector total Power Density Value:																0.55%

Site Composite MPE %	
Carrier	MPE %
Sprint	1.65%
AT&T	11.53%
T-Mobile	0.14%
Verizon Wireless	21.37%
<b>Total Site MPE %</b>	<b>34.69%</b>

## 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 **1.65% (0.55% from sector 1, 0.55% from sector 2 and 0.55% 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 **34.69%** 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.



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