



Crown Castle
12 Gill Street, Suite 5800
Woburn, MA 01801

January 17, 2017

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

RE: Notice of Exempt Modification for Sprint / Crown Site BU: 876360
Sprint Site ID: CT23XC411
Located at: 389 Rt. 2, Preston, CT 06365
Latitude: 41° 29' 25.25"/ Longitude: -71° 59' 29.55"

Dear Ms. Bachman,

Sprint currently maintains six (6) antennas at the 147-foot level of the existing 147-foot monopole at 389 Rt. 2, Preston, CT. The tower is owned by Crown Castle. The property is owned by the Town of Preston. Sprint now intends to replace six (6) antennas with three (3) RFS antennas and three (3) Argus antennas. Sprint also intends to remove six (6) 1-5/8" coax lines, as well as, install four (4) fiber lines, one (1) Ethernet line, one (1) Southwire Powere line inside of 1" conduit, three (3) Nokia Mini-Macro, three (3) 800 RRHs, three (3) 1900 RRHs, and one (1) junction box. The antennas would be installed at the same 147-foot level of the tower.

A request for original zoning documents was sent to the Town of Preston but has not been answered.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. §16-50j-72(b)(2). In accordance with R.S.C.A. § 16-50j-73, a copy of this letter is being sent to the Mr. Robert Congdon, First-Selectman, Town of Preston, as well as the property owner and the tower owner.

1. The proposed modifications will not result in an increase in the height of the existing tower.
2. The proposed modification will not require the extension of the site boundary.

3. The proposed modification will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communication Commission safety standard.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

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

Sincerely,

Amanda Goodall

Real Estate Specialist

12 Gill Street, Suite 5800, Woburn, MA 01801

339-205-7017

Amanda.Goodall@crowncastle.com

Attachments:

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. Robert Congdon, First-Selectman, Town of Preston
Town Hall 389 Rt. 2
Preston, CT 06365

Town of Preston
Town Hall 389 Rt. 2
Preston, CT 06365



Property Information

Owner	PRESTON TOWN OF
Address	389 ROUTE 2
Mailing Address	389 ROUTE 2 PRESTON , CT 06365
Land Use	9035 - MUN TOWN MDL-96
Land Class	E

Census Tract	7001
Neighborhood	8000
Zoning	R-C
Acreage	25.86
Utilities	Well,Septic
Lot Setting/ Desc	Rural / Low

Photo

No Photo Available

PARCEL VALUATIONS (Assessed value = 70% of Appraised Value)

	Appraised	Assessed
Buildings	459200	321400
Outbuildings	12900	9100
Improvements	477300	334100
Extras	5200	3600
Land	438450	306800
Total	915750	640900
Previous		

Construction Details

Year Built	1974
Stories	1
Building Style	City/Town Hall
Building Use	Comm/Ind
Building Condition	Average
Total Rooms	
Bedrooms	
Full Bathrooms	3
Half Bathrooms	
Bath Style	
Kitchen Style	
Roof Style	Gable/Hip
Roof Cover	Asph/F Gls/Cmp

EXTERIOR WALLS:

Primary	Brick/Masonry
Secondary	

INTERIOR WALLS:

Primary	Drywall/Sheet
Secondary	

FLOORS:

Primary	Inlaid Sht Gds
Secondary	

HEATING/AC:

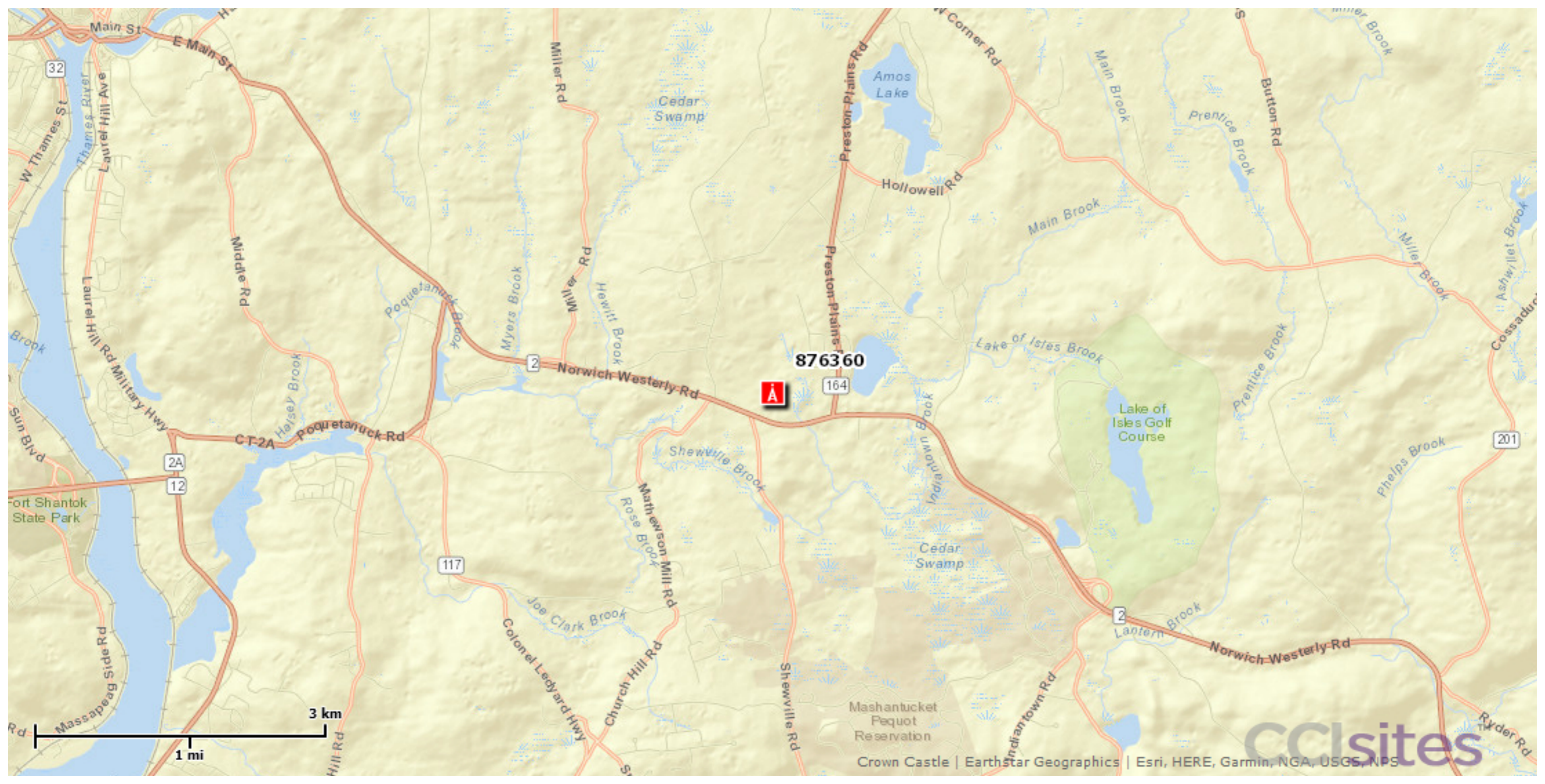
Heating Type	Electr Basebrd
Heating Fuel	Electric
AC Type	None

BUILDING AREA:

Effective Building Area	
Gross Building Area	7056
Total Living Area	5292

SALES HISTORY:

Sale Date	9/26/1973
Sale Price	17500
Book/ Page	56/ 174



876360





SPRINT SITE NUMBER:
SPRINT SITE NAME:
SITE TYPE:
TOWER HEIGHT:

CT23XC411

MONOPOLE
147'-0"

CROWN CASTLE BU #: 876360
SITE ADDRESS:
COUNTY:
JURISDICTION:
PRESTON, CT 06365
NEW LONDON
TOWN OF PRESTON

SPRINT 2016-2017 LOCAL ASK INITIATIVE



SPRINT SITE NUMBER:
CT23XC411

BU #: **876360**
PRESTON / TOWN HALL

389 RT. 2
 PRESTON, CT 06365

EXISTING 147'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	11/17/16	CJ	PRELIMINARY	LR
0	1/5/17	ZTK	CONSTRUCTION	JL

DocuSigned by:

Justin Linette

1840058254764160



1/9/2017 11:41:00 AM EST

Justin Peter Linette, P.E.
 Professional Engineer License: 31965
 Crown Castle USA, Inc. Firm Registration #PEC.0001101
 IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

SHEET NUMBER: **T-1** REVISION: **0**

SITE INFORMATION

CROWN CASTLE SITE NAME: PRESTON / TOWN HALL
 SITE ADDRESS: 389 RT. 2 PRESTON, CT 06365
 COUNTY: NEW LONDON
 MAP/PARCEL #: PRES-000017-003000
 AREA OF CONSTRUCTION: EXISTING
 LATITUDE: 41° 29' 25.25"
 LONGITUDE: -71° 59' 29.55"
 LAT/LONG TYPE: NAD83
 GROUND ELEVATION: 138 FT.
 CURRENT ZONING: R-C
 JURISDICTION: TOWN OF PRESTON
 OCCUPANCY CLASSIFICATION: U
 TYPE OF CONSTRUCTION: VB
 A.D.A. COMPLIANCE: FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION
 PROPERTY OWNER: TOWN OF PRESTON TOWN HALL 389 RTE 2 PRESTON, CT 06365-8830
 TOWER OWNER: GLOBAL SIGNAL ACQUISITIONS II LLC 2000 CORPORATE DRIVE CANONSBURG, PA 15317
 CARRIER/APPLICANT: SPRINT 6391 SPRINT PARKWAY OVERLAND PARK, KS 66251-2650
 CROWN CASTLE APPLICATION ID: 363243
 ELECTRIC PROVIDER: NORTHEAST UTILITIES (800) 286-2000
 TELCO PROVIDER: AT&T (866) 620-6900

DRAWING INDEX

SHEET #	SHEET DESCRIPTION
T-1	TITLE SHEET
T-2	GENERAL NOTES
T-3	GENERAL NOTES
C-1	ENLARGED SITE PLAN
C-2	EXISTING AND NEW ELEVATION
C-3	ANTENNA PLANS AND SCHEMATIC
C-4	CONDUIT ROUTING SCHEMATIC
C-5	INSTALLATION SPECS AND DETAILS
C-6	EQUIPMENT SPECIFICATIONS
C-7	PLUMBING DIAGRAMS
E-1	ELECTRICAL PLAN & PANEL SCHEDULE
G-1	GROUNDING DETAILS
G-2	GROUNDING DETAILS

ALL DRAWINGS CONTAINED HEREIN ARE FORMATTED FOR 11X17. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

PROJECT DESCRIPTION

THE PURPOSE OF THIS PROJECT IS TO ENHANCE BROADBAND CONNECTIVITY AND CAPACITY TO THE EXISTING ELIGIBLE WIRELESS FACILITY.

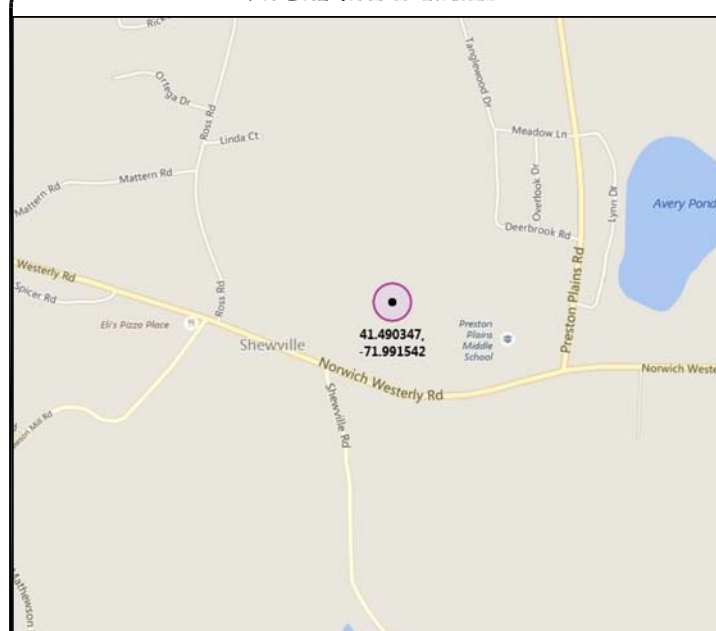
- REMOVE (6) ANTENNAS
- REMOVE (6) 1-5/8" COAX CABLES
- RELOCATE (3) RRHS FROM GROUND TO TOWER
- INSTALL (6) ANTENNAS
- INSTALL (3) 1-1/4" HYBRID CABLES IN 1" CONDUIT
- INSTALL (1) 7/8" POWER LINE INSIDE 1" CONDUIT
- INSTALL (4) 17/64" FIBER LINES & (1) 1/8" ETHERNET LINE INSIDE 1" CONDUIT
- INSTALL (6) RRHS
- INSTALL (1) JUNCTION BOX

DESIGN PACKAGE BASED ON RF DATA SHEET
 VERSION: 3.15
 ISSUED: 10/04/16

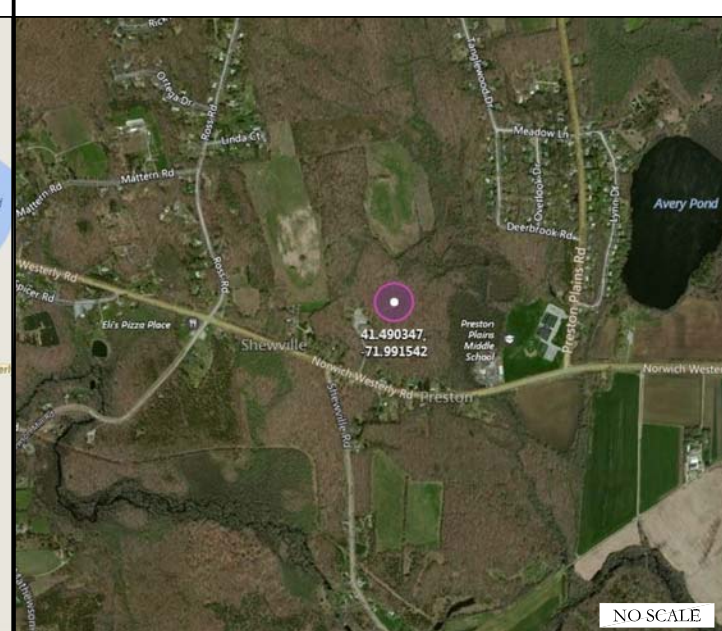
DESIGN PACKAGE BASED ON THE APPLICATION
 ID: 363243
 REVISION: 2

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

VICINITY MAP



AERIAL MAP



NO SCALE

DRIVING DIRECTIONS FROM BRADLEY INTERNATIONAL AIRPORT:
 EXIT BRADLEY INTERNATIONAL AIRPORT VIA SHOEPHOESTER RD TOWARD CT-20 E. CONTINUE ONTO CT-20 E/BRADLEY INTERNATIONAL AIRPORT CON, THEN USE THE RIGHT TWO LANES TO MERGE ONTO I-91 S TOWARD HARTFORD. USE THE LEFT LANE TO TAKE EXIT 30 FOR I-84 E TOWARD CT-2/EAST HARTFORD/NEW LONDON. MERGE ONTO I-84 E THEN TAKE EXIT 55 FOR CT-2 E TOWARD NORWICH/NEW LONDON/I-84 E. CONTINUE ONTO CT-2 E THEN AFTER APPROXIMATELY 23 MILES, KEEP LEFT AT THE FORK TO CONTINUE ON CT-2 E/HWY 2 E. AFTER APPROXIMATELY 13 MILES, TAKE THE CT-2 E/CT-32 S EXIT TOWARD NORWICH/HARBOR AREA/DOWNTOWN. TURN RIGHT ONTO CT-2 E/CT-32 S/WASHINGTON ST THEN TURN RIGHT ONTO WATER ST. CONTINUE ONTO N MAIN ST/VIA DUCT RD THEN TURN RIGHT ONTO MAIN ST. CONTINUE ONTO PALMER ST THEN MAKE A SLIGHT LEFT ONTO CT-2 E/STONINGTON RD. TURN LEFT ONTO HALL RD, SITE ACCESS IS IN THE EASTERN CORNER OF THE NORTH PARKING LOT.

APPLICABLE CODES/REFERENCE DOCUMENTS

ALL WORK SHALL BE PERFORMED AND MATERIALS INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES:

CODE TYPE	CODE
BUILDING	2016 CONNECTICUT STATE BUILDING CODE/2012 IBC W/ CT AMENDMENTS
MECHANICAL	2016 CONNECTICUT STATE BUILDING CODE/2012 IMC W/ CT AMENDMENTS
ELECTRICAL	2016 CONNECTICUT STATE BUILDING CODE/2014 NEC W/ CT AMENDMENTS

REFERENCE DOCUMENTS:
 STRUCTURAL ANALYSIS & TOWER MODIFICATION DESIGN: BY PAUL J. FORD & COMPANY DATED DECEMBER 28, 2016



CALL CONNECTICUT ONE CALL
 (800) 922-4455
 CALL 3 WORKING DAYS BEFORE YOU DIG!



APPROVALS

APPROVAL	SIGNATURE	DATE
SITE ACQ. & ZONING	_____	_____
CONSTRUCTION MGR	_____	_____
A&E MGR	_____	_____
PLANNING CONSULTANT	_____	_____
RF MGR	_____	_____
PROPERTY OWNER	_____	_____
SPRINT REP.	_____	_____

PROJECT TEAM

CROWN CASTLE A&E FIRM:
 CROWN CASTLE
 2000 CORPORATE DRIVE
 CANONSBURG, PA 15317
 CROWNAE.APPROVAL@CROWNCastle.COM
 CROWN CASTLE CONTACTS:
 3 CORPORATE PARK DRIVE, SUITE 101
 CLIFTON PARK, NY 12065
 MARYELLEN PERROTTA - PROJECT MANAGER
 (781) 970-0057
 JASON D'AMICO - CONSTRUCTION MANAGER
 (860) 209-0104
 WILLIAM STONE - A&E PROJECT MANAGER
 WILLIAM.STONE.CONTRACTOR@CROWNCastle.COM
 (518) 373-3543
 SPRINT CONTACT:
 FLORENCE NICOLAS
 FLORENCE.NICOLAS@SPRINT.COM

WEATHERPROOFING EXTERIOR CONNECTORS AND HYBRID CABLE GROUND KITS:

- A. ALL FIBER AND COAX CONNECTORS AND GROUND KITS SHALL BE WEATHERPROOFED.
- B. WEATHERPROOFED USING ONE OF THE FOLLOWING METHODS. ALL INSTALLATIONS MUST BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INDUSTRY BEST PRACTICES.

1. SELF-AMALGAMATING TAPE: CLEAN SURFACES. APPLY A DOUBLE WRAP OF SELF AMALGAMATING TAPE 2" BEYOND CONNECTOR. APPLY A SECOND WRAP OF SELF-AMALGAMATING TAPE IN OPPOSITE DIRECTION. APPLY DOUBLE WRAP OF 2" WIDE ELECTRICAL TAPE EXTENDING 2" BEYOND THE SELF AMALGAMATING TAPE.
2. 3M SLIM LOCK CLOSURE 716: SUBSTITUTIONS WILL NOT BE ALLOWED.
3. JMA-WPS SERIES ENCLOSURE.
4. BUTYL AND TAPE, 1 COMPLETE WRAP OF 3/4" PRE-TAPE, BUTYL WRAPPED IN HALF INCH LAP LAYERS, ENDED WITH SHINGLED DOWNWARD 3 WRAPS OF 2" TAPE, 3 WRAPS OF 3/4" TAPE SHINGLED DOWNWARD, FREE OF WRINKLES, BUCKLES AND FLAGGING.
5. OPEN FLAME ON JOB SITE IS NOT ACCEPTABLE

- C. ANTENNA MOUNTING REQUIREMENTS: PROVIDE ANTENNA MOUNTING HARDWARE AS INDICATED ON THE CONSTRUCTION DRAWINGS.

FIBER CABLE INSTALLATION:

- A. THE CONTRACTOR SHALL ROUTE, TEST AND INSTALL ALL CABLES AS INDICATED ON THE CONSTRUCTION DRAWINGS AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

- B. THE INSTALLED RADIUS OF THE CABLES SHALL NOT BE LESS THAT THE MANUFACTURER'S SPECIFICATIONS FOR BENDING RADII.

- C. EXTREME CARE SHALL BE TAKEN TO AVOID DAMAGE TO THE CABLES DURING HANDLING AND INSTALLATION.

- 1. FASTENING MAIN FIBER CABLES:

a. LATTICE AND GUYED TOWERS:

ALL CABLES SHALL BE PERMANENTLY FASTENED TO THE COAX LADDER AT 4'-0" OC USING NON-MAGNETIC STAINLESS STEEL CLIPS. HOISTING GRIPS SHOULD BE INSTALLED AT MID-POINT IF CABLE RUN EXCEEDS 200' AS WELL AS TOP SIDE.

b. MONOPOLE:

ALL CABLES SHALL BE PERMANENTLY SUPPORTED WITH HOISTING GRIPS AT INTERVALS OF NO MORE THAN 200' (ONE HOISTING GRIP PER COAX).

- 2. FASTENING INDIVIDUAL FIBER AND DC CABLES ABOVE BREAKOUT ENCLOSURE (MEDUSA). WITHIN THE MMBS CABINET AND ANY INTERMEDIATE DISTRIBUTION BOXES.

a. FIBER: SUPPORT FIBER BUNDLES USING 1/2" VELCRO STRAPS OF THE REQUIRED LENGTH AT 18" O.C. STRAPS SHALL BE UV, OIL AND WATER RESISTANT AND SUITABLE FOR INDUSTRIAL INSTALLATIONS AS MANUFACTURED BY TEXTOL OR APPROVED EQUAL.

b. DC: SUPPORT DC BUNDLES WITH ZIP TIES OF THE ADEQUATE LENGTH. ZIP TIES TO BE UV STABILIZED, BLACK NYLON, WITH TENSILE STRENGTH AT 12,000 PSI AS MANUFACTURED BY NELCO PRODUCTS OR EQUAL.

- 3. FASTENING OR SECURING JUMPERS SHOULD CONSIST OF STAINLESS STEEL CLIPS, 18" FROM REAR OF CONNECTOR AND 24" THEREAFTER AND AT NO TIME SHALL THEY CONTACT TOWER OR STRUCTURAL STEEL.

- 4. CABLE INSTALLATION:

a. INSPECT CABLE PRIOR TO USE FOR SHIPPING DAMAGE. NOTIFY THE CONSTRUCTION MANAGER.

b. CABLE ROUTING CABLE INSTALLATION SHALL BE PLANNED TO ENSURE THAT THE LINES WILL BE PROPERLY ROUTED IN THE CABLE ENVELOPE AS INDICATED ON THE DRAWINGS. AVOID TWISTING AND CROSOVERS.

c. HOIST CABLE USING PROPER HOISTING GRIPS. DO NOT EXCEED MANUFACTURER'S RECOMMENDED MAXIMUM BEND RADIUS.

- 5. GROUNDING OF TRANSMISSION LINES: ALL TRANSMISSION LINES SHALL BE GROUNDED AS INDICATED ON DRAWINGS.

- 6. HYBRID CABLE COLOR CODING: ALL COLOR CODING SHALL BE AS REQUIRED IN TS 0200 REV 5.

- 7. HYBRID CABLE LABELING: INDIVIDUAL HYBRID AND DC BUNDLES SHALL BE LABELED ALPHA-NUMERICALLY ACCORDING TO SPRINT CELL SITE ENGINEERING NOTICE - EN 2012-001, REV 1.

WEATHERPROOFING EXTERIOR CONNECTORS AND HYBRID CABLE GROUND KITS:

- A. ALL FIBER AND COAX CONNECTORS AND GROUND KITS SHALL BE WEATHERPROOFED.

- B. WEATHERPROOFED USING ONE OF THE FOLLOWING METHODS. ALL INSTALLATIONS MUST BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INDUSTRY BEST PRACTICES.

1. SELF-AMALGAMATING TAPE: CLEAN SURFACES. APPLY A DOUBLE WRAP OF SELF AMALGAMATING TAPE 2" BEYOND CONNECTOR. APPLY A SECOND WRAP OF SELF-AMALGAMATING TAPE IN OPPOSITE DIRECTION. APPLY DOUBLE WRAP OF 2" WIDE ELECTRICAL TAPE EXTENDING 2" BEYOND THE SELF AMALGAMATING TAPE.
2. 3M SLIM LOCK CLOSURE 716: SUBSTITUTIONS WILL NOT BE ALLOWED.
3. JMA-WPS SERIES ENCLOSURE.
4. BUTYL AND TAPE, 1 COMPLETE WRAP OF 3/4" PRE-TAPE, BUTYL WRAPPED IN HALF INCH LAP LAYERS, ENDED WITH SHINGLED DOWNWARD 3 WRAPS OF 2" TAPE, 3 WRAPS OF 3/4" TAPE SHINGLED DOWNWARD, FREE OF WRINKLES, BUCKLES AND FLAGGING.
5. OPEN FLAME ON JOB SITE IS NOT ACCEPTABLE

SECTION 11 800 - INSTALLATION OF MULTIMODAL BASE STATIONS (MMBS) AND RELATED EQUIPMENT

SUMMARY:

A. THIS SECTION SPECIFIES MMBS CABINETS, POWER CABINETS, AND INTERNAL EQUIPMENT INCLUDING BUT NOT LIMITED TO RECTIFIERS, POWER DISTRIBUTION UNITS, BASE BAND UNITS, SURGE ARRESTORS, BATTERIES, AND SIMILAR EQUIPMENT FURNISHED BY THE COMPANY FOR INSTALLATION BY THE CONTRACTOR (OFC).

B. CONTRACTOR SHALL PROVIDE AND INSTALL ALL MISCELLANEOUS MATERIALS AND PROVIDE ALL LABOR REQUIRED FOR INSTALLATION EQUIPMENT IN EXISTING CABINET OR NEW CABINET AS SHOWN ON DRAWINGS AND AS REQUIRED

BY THE APPLICABLE INSTALLATION MOPS.

- C. COMPLY WITH MANUFACTURER'S INSTALLATION AND START-UP REQUIREMENTS.

DC CIRCUIT BREAKER LABELING:

- A. LABEL CIRCUIT BREAKERS ACCORDING TO SPRINT CELL SITE ENGINEERING NOTICE - EN 2012-001, REV 1. SECTION 26 100 - BASIC ELECTRICAL REQUIREMENTS

SUMMARY:

THIS SECTION SPECIFIES BASIC ELECTRICAL REQUIREMENTS FOR SYSTEMS AND COMPONENTS.

QUALITY ASSURANCE:

A. ALL EQUIPMENT FURNISHED UNDER DIVISION 26 SHALL CARRY UL LABELS AND LISTINGS WHERE SUCH LABELS AND LISTING ARE AVAILABLE IN THE INDUSTRY.

B. MANUFACTURERS OF EQUIPMENT SHALL HAVE A MINIMUM OF THREE YEARS EXPERIENCE WITH THEIR EQUIPMENT INSTALLED AND OPERATING IN THE FIELD IN A USE SIMILAR TO THE NEW USE FOR THIS PROJECT.

C. MATERIALS AND EQUIPMENT: ALL MATERIALS AND EQUIPMENT SPECIFIED IN DIVISION 26 OF THE SAME TYPE SHALL BE OF THE SAME MANUFACTURER AND SHALL BE NEW, OF THE BEST QUALITY AND DESIGN, AND FREE FROM DEFECTS.

SUPPORTING DEVICES:

A. MANUFACTURED STRUCTURAL SUPPORT MATERIALS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS. PROVIDE PRODUCTS BY THE FOLLOWING:

1. ALLIED TUBE AND CONDUIT.
2. B-LINE SYSTEM.
3. UNISTRUT DIVERSIFIED PRODUCTS.
4. THOMAS & BETTS

B. FASTENERS: TYPES, MATERIALS AND CONSTRUCTION FEATURES AS FOLLOWS:

1. EXPANSION ANCHORS: CARBON STEEL WEDGE OR SLEEVE TYPE.
2. POWER-DRIVEN THREADED STUDS: HEAT-TREATED STEEL. DESIGNED SPECIFICALLY FOR THE INTENDED SERVICE.
3. FASTEN BY MEANS OF WOOD SCREWS IN WOOD.
4. TOGGLE BOLTS ON HOLLOW MASONRY UNITS.
5. CONCRETE INSERTS OR EXPANSION BOLTS ON CONCRETE OR SOLID MASONRY.
6. MACHINE SCREWS, WELDED THREADED STUDS, OR SPRING-TENSION CLAMPS ON STEEL.
7. EXPLOSIVE DEVICES FOR ATTACHING HANGERS TO STRUCTURE SHALL NOT BE PERMITTED.
8. DO NOT WELD CONDUIT, PIPE STRAPS, OR ITEMS OTHER THAN THREADED STUDS TO STEEL STRUCTURES.
9. IN PARTITIONS OF LIGHT STEEL CONSTRUCTION, USE SHEET METAL SCREWS.

SUPPORTING DEVICES:

A. INSTALL SUPPORTING DEVICES TO FASTEN ELECTRICAL COMPONENTS SECURELY AND PERMANENTLY IN ACCORDANCE WITH NEC.

B. COORDINATE WITH THE BUILDING STRUCTURAL SYSTEM AND WITH OTHER TRADES.

C. UNLESS OTHERWISE INDICATED ON THE DRAWINGS, FASTEN ELECTRICAL ITEMS AND THEIR SUPPORTING HARDWARE SECURELY TO THE STRUCTURE IN ACCORDANCE WITH THE FOLLOWING:

1. ENSURE THAT THE LOAD APPLIED BY ANY FASTENER DOES NOT EXCEED 25 PERCENT OF THE PROOF TEST LOAD.
2. USE VIBRATION AND SHOCK-RESISTANT FASTNERS FOR ATTACHMENTS TO CONCRETE SLABS.

ELECTRICAL IDENTIFICATION:

A. UPDATE AND PROVIDE TYPED CIRCUIT BREAKER SCHEDULES IN THE MOUNTING BRACKET, INSIDE DOORS OF AC PANEL BOARDS WITH ANY CHANGES MADE TO THE AC SYSTEM.

B. BRANCH CIRCUITS FEEDING AVIATION OBSTRUCTION LIGHTING EQUIPMENT SHALL BE CLEARLY IDENTIFIED AS SUCH AT THE BRANCH CIRCUIT PANELBOARD.

SECTION 26 200 - ELECTRICAL MATERIALS AND EQUIPMENT

CONDUIT:

A. RIGID GALVANIZED STEEL (RGS) CONDUIT SHALL BE USED FOR EXTERIOR LOCATIONS ABOVE GROUND AND IN UNFINISHED INTERIOR LOCATIONS AND FOR UNDERGROUND RUNS. RIGID CONDUIT AND FITTINGS SHALL BE STEEL, COATED WITH ZINC EXTERIOR AND INTERIOR BY THE HOT DIP GALVANIZING PROCESS. CONDUIT SHALL BE PRODUCED TO ANSI SPECIFICATIONS C80.1, FEDERAL SPECIFICATION WW-C-581 AND SHALL BE LISTED WITH THE UNDERWRITERS' LABORATORIES. FITTINGS SHALL BE THREADED - SET SCREW OR COMPRESSION FITTINGS WILL NOT BE ACCEPTABLE. RGS CONDUITS SHALL BE MANUFACTURED BY ALLIED, REPUBLIC OR WHEATLAND.

B. UNDERGROUND CONDUIT IN CONCRETE SHALL BE POLYVINYLCHLORIDE (PVC) SUITABLE FOR DIRECT BURIAL AS APPLICABLE. JOINTS SHALL BE BELLED, AND FLUSH SOLVENT WELDED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. CONDUIT SHALL BE CARLON ELECTRICAL PRODUCTS OR APPROVED EQUAL.

C. TRANSITIONS BETWEEN PVC AND RIGID (RGS) SHALL BE MADE WITH PVC COATED METALLIC LONG SWEEP RADIUS ELBOWS.

D. ALL UNDERGROUND CONDUIT OR CONDUIT IN CONCRETE SHOULD BE PVC. EMT OR RIGID GALVANIZED STEEL CONDUIT MAY BE USED IN FINISHED SPACES CONCEALED IN WALLS AND CEILINGS. EMT SHALL BE MILD STEEL, ELECTRICALLY WELDED, ELECTRO-GALVANIZED OR HOT-DIPPED GALVANIZED AND PRODUCED TO ANSI SPECIFICATIONS C80.3, FEDERAL SPECIFICATION WW-C-563, AND SHALL BE UL LISTED. EMT SHALL BE MANUFACTURED BY ALLIED, REPUBLIC OR WHEATLAND, OR APPROVED EQUAL. FITTINGS SHALL BE METALLIC COMPRESSION. SET SCREW CONNECTIONS SHALL NOT BE ACCEPTABLE.

E. LIQUID TIGHT FLEXIBLE METALLIC CONDUIT SHALL BE USED FOR FINAL CONNECTION TO EQUIPMENT FITTINGS SHALL BE METALLIC GLAND TYPE COMPRESSION FITTINGS, MAINTAINING THE INTEGRITY OF CONDUIT SYSTEM. SET SCREW CONNECTIONS SHALL NOT BE ACCEPTABLE. MAXIMUM LENGTH OF FLEXIBLE CONDUIT SHALL NOT EXCEED 6- FEET. LFMC SHALL BE PROTECTED AND SUPPORTED AS REQUIRED BY NEC. MANUFACTURERS OF FLEXIBLE CONDUITS SHALL BE CAROL, ANACONDA METAL HOSE OR UNIVERSAL METAL HOSE, OR APPROVED EQUAL.

F. MINIMUM SIZE CONDUIT SHALL BE 3/4 INCH (21MM).

HUBS AND BOXES:

A. AT ENTRANCES TO CABINETS OR OTHER EQUIPMENT NOT HAVING INTEGRAL THREADED HUBS PROVIDE METALLIC THREADED HUBS OF THE SIZE AND CONFIGURATION REQUIRED HUB SHALL INCLUDE LOCK NUT AND NEOPRENE O-RING SEAL. PROVIDE IMPACT RESISTANT 105 DEGREE C PLASTIC BUSHINGS TO PROTECT CABLE INSULATION

- B. CABLE TERMINATION FITTINGS FOR CONDUIT

- 1. CABLE TERMINATORS FOR RGS CONDUITS SHALL BE TYPE CRC BY O-Z/GEDNEY OR EQUAL BY ROXTEC.

- 2. CABLE TERMINATORS FOR LFMC SHALL BE ETCO - CL2075, OR MADE FOR THE PURPOSE PRODUCTS BY ROXTEC.

C. EXTERIOR PULL BOXES AND PULL BOXES IN INTERIOR INDUSTRIAL AREAS SHALL BE PLATED CAST ALLOY, HEAVY DUTY, WEATHERPROOF, DUST PROOF, WITH GASKET, PLATED IRON ALLOY COVER AND STAINLESS STEEL COVER SCREWS, CROUSE-HINDS WAB SERIES OR EQUAL.

D. CONDUIT OUTLET BODIES SHALL BE PLATED CAST ALLOY WITH SIMILAR GASKET COVERS. OUTLET BODIES SHALL BE OF THE CONFIGURATION AND SIZE SUITABLE FOR THE APPLICATION, PROVIDE CROUSE-HINDS FORM 8 OR EQUAL.

E. MANUFACTURER FOR BOXES AND COVERS SHALL BE HOFFMAN, SQUARE "D", CROUSE-HINDS, COOPER, ADALET, APPLETON, O-Z GEDNEY, RACO, OR APPROVED EQUAL.

SUPPLEMENTAL GROUNDING SYSTEM:

A. FURNISH AND INSTALL A SUPPLEMENTAL GROUNDING SYSTEM TO THE EXTENT INDICATED ON THE DRAWINGS. SUPPORT SYSTEM WITH NON-MAGNETIC STAINLESS STEEL CLIPS WITH RUBBER GROMMET. GROUNDING CONNECTORS SHALL BE TINNED COPPER WIRE, SIZES AS INDICATED ON THE DRAWINGS. PROVIDE STRANDED OR SOLID BARE OR INSULATED CONDUCTORS EXCEPT AS OTHERWISE NOTED.

B. SUPPLEMENTAL GROUNDING SYSTEM: ALL CONNECTIONS TO BE MADE WITH CAD WELDS, EXCEPT AT EQUIPMENT USE LUGS OR OTHER AVAILABLE GROUNDING MEANS AS REQUIRED BY MANUFACTURER; AT GROUND BARS USE TWO-HOLE SPADES WITH NO-OX.

C. STOLEN GROUND-BARS: IN THE EVENT OF STOLEN GROUND BARS, CONTACT SPRINT CONSTRUCTION MANAGER FOR REPLACEMENT INSTRUCTION USING THREADED ROD KITS.

EXISTING STRUCTURE:

A. EXISTING EXPOSED WIRING AND ALL EXPOSED OUTLETS, RECEPTACLES, SWITCHES, DEVICES, BOXES, AND OTHER EQUIPMENT THAT ARE NOT TO BE UTILIZED IN THE COMPLETED PROJECT SHALL BE REMOVED OR DE-ENERGIZED AND CAPPED IN THE WALL, CEILING, OR FLOOR SO THAT THEY ARE CONCEALED AND SAFE. WALL, CEILING, OR FLOOR SHALL BE PATCHED TO MATCH THE ADJACENT CONSTRUCTION.

CONDUIT AND CONDUCTOR INSTALLATION:

A. CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON-PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER, PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.

B. CONDUCTORS SHALL BE PULLED IN ACCORDANCE WITH ACCEPTED GOOD PRACTICE.

ADDITIONAL REQUIRED NOTES:

- GC IS RESPONSIBLE FOR HIRING ALL 3RD PARTY SPECIAL INSPECTIONS AS REQUIRED PER MUNICIPALITY
- GC IS RESPONSIBLE FOR VERIFYING ALL FIELD MEASUREMENTS PRIOR TO STARTING CONSTRUCTION
- DO NOT OPEN RRU PACKAGES IN THE RAIN
- NO OPEN FLAME ON SITE
- GC TO ENSURE HYBRIDS ARE SUPPORTED EVERY 3'-0" ON HORIZONTAL AND 4'-0" ON VERTICAL RUNS



SPRINT SITE NUMBER:
CT23XC411

BU #: **876360**
PRESTON / TOWN HALL

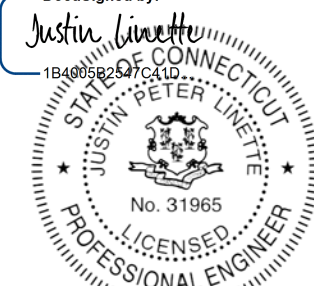
389 RT. 2
PRESTON, CT 06365

EXISTING 147'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	11/17/16	CJ	PRELIMINARY	LR
0	1/5/17	ZTK	CONSTRUCTION	JL

DocuSigned by:

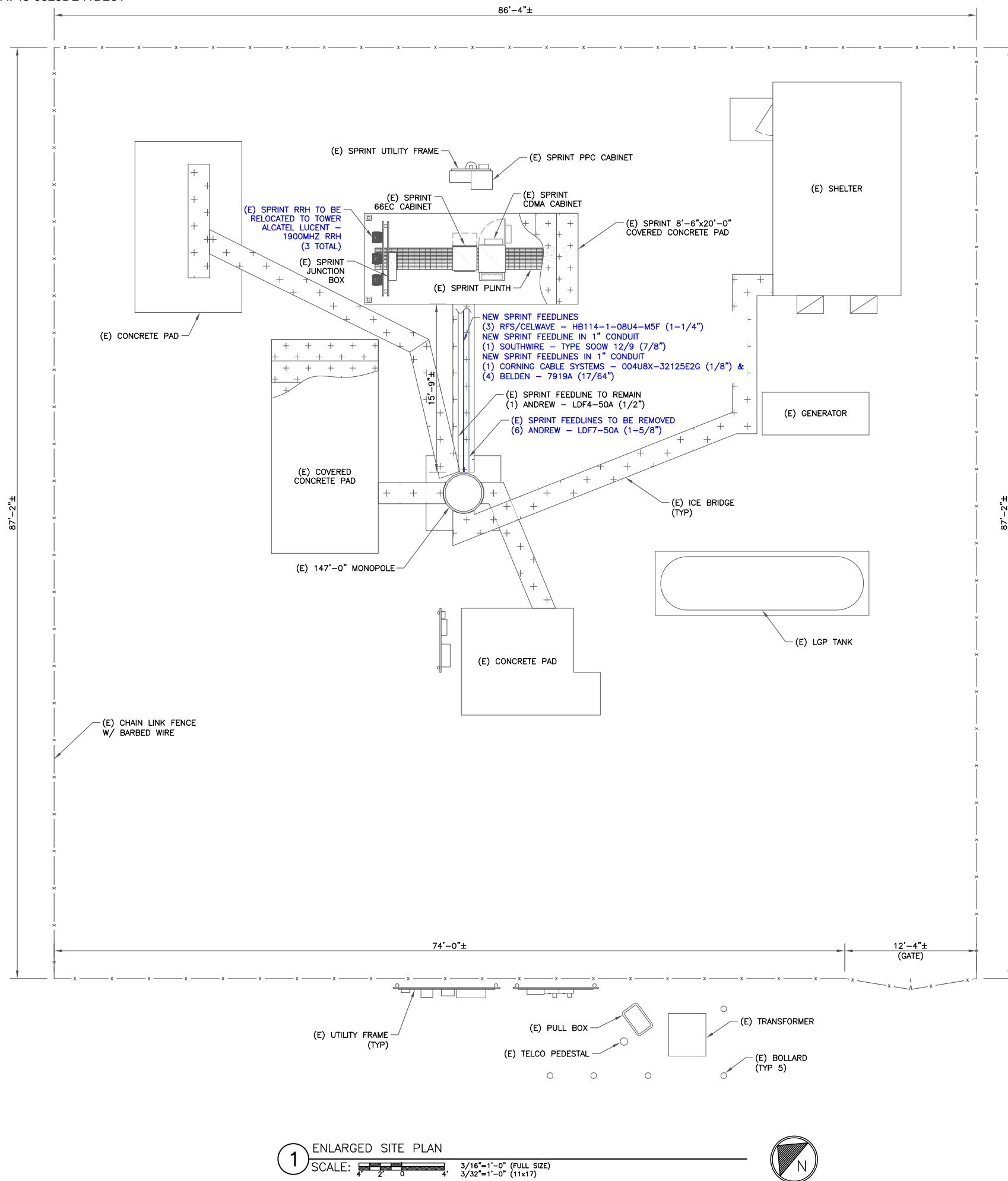


1/9/2017 | 11:41:00 AM EST

Justin Peter Linette, P.E.
Professional Engineer License: 31965
Crown Castle USA, Inc. Firm Registration #PEC.0001101

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

SHEET NUMBER: **T-3** REVISION: **0**



CROWN CASTLE
 3 CORPORATE PARK DRIVE, SUITE 101
 CLIFTON PARK, NY 12065

SPRINT SITE NUMBER:
CT23XC411

BU #: 876360
PRESTON / TOWN HALL

389 RT. 2
 PRESTON, CT 06365

EXISTING 147'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	11/17/16	CJ	PRELIMINARY	LR
0	1/5/17	ZTK	CONSTRUCTION	JL

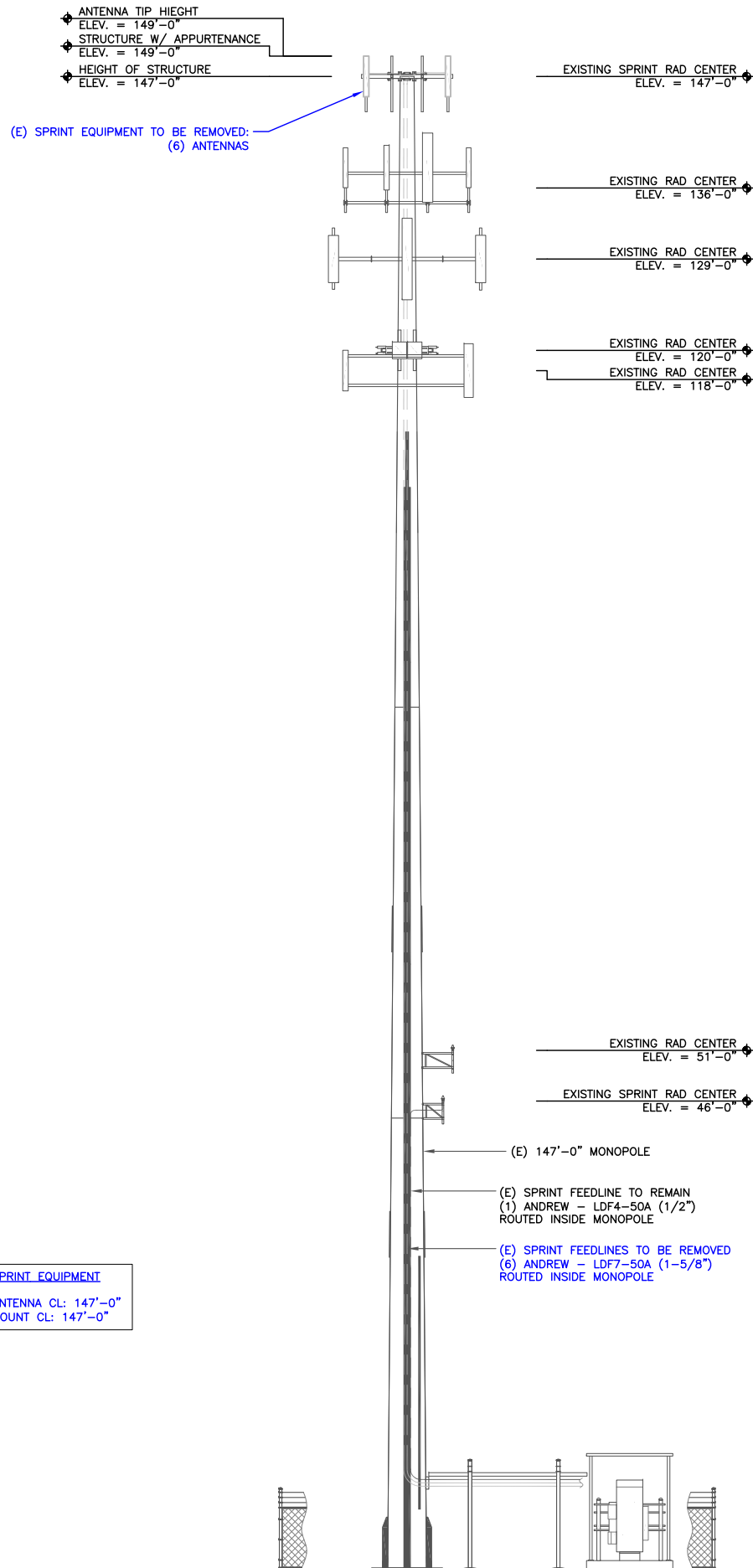
DocuSigned by:
Justin Linette
 1B405B2547C41D

1/9/2017 | 11:41:00 AM EST

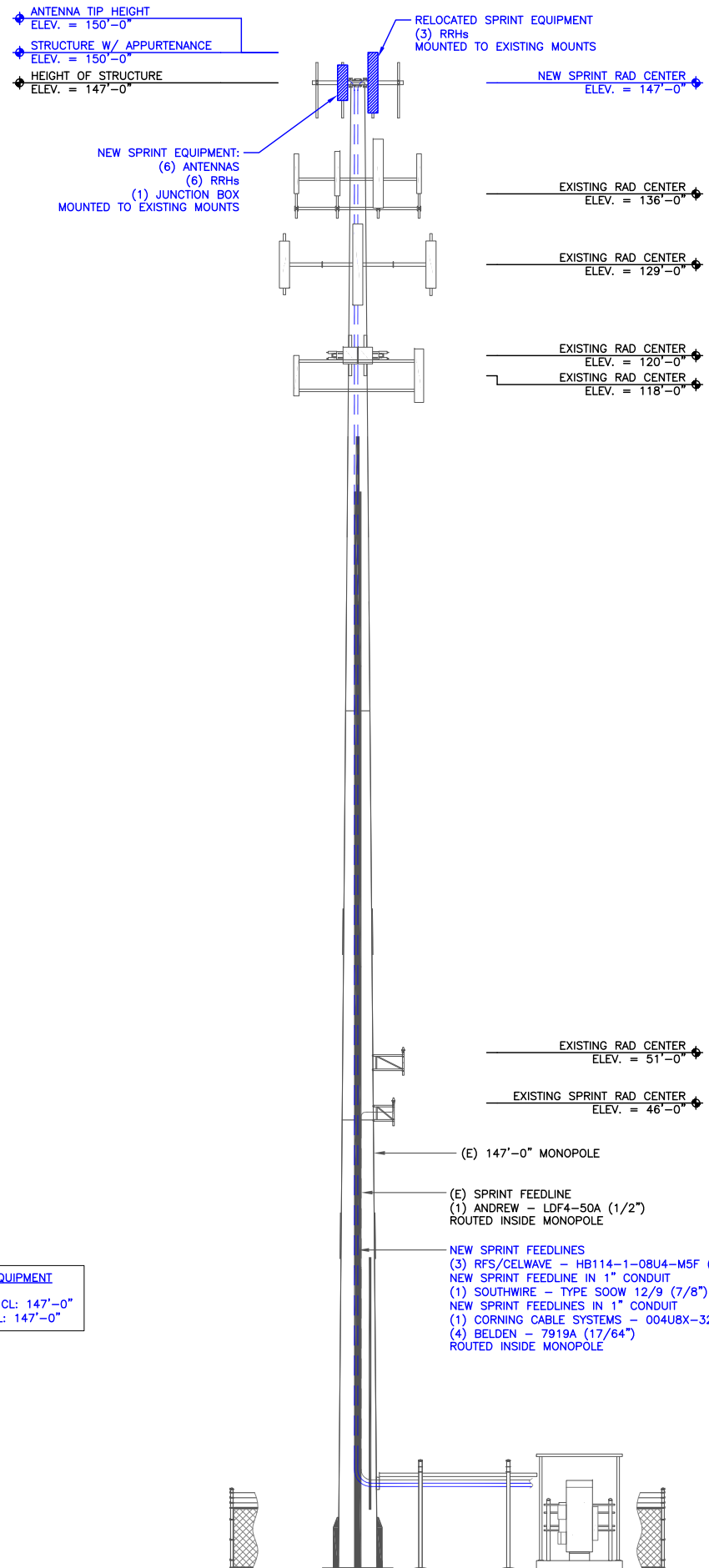
Justin Peter Linette, P.E.
 Professional Engineer License: 31965
 Crown Castle USA, Inc. Firm Registration #PEC.0001101

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

SHEET NUMBER: **C-1** REVISION: **0**



1 EXISTING ELEVATION
SCALE: NOT TO SCALE



2 FINAL ELEVATION
SCALE: NOT TO SCALE

INSTALLER NOTE:
DIRECT TOWER MOUNTED EQUIPMENT MUST NOT TRAP OR INTERFERE W/ CLIMBING PEGS/STEPS AND SAFETY CLIMB.



SPRINT SITE NUMBER:
CT23XC411

BU #: 876360
PRESTON / TOWN HALL

389 RT. 2
PRESTON, CT 06365

EXISTING 147'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	11/17/16	CJ	PRELIMINARY	LR
0	1/5/17	ZTK	CONSTRUCTION	JL

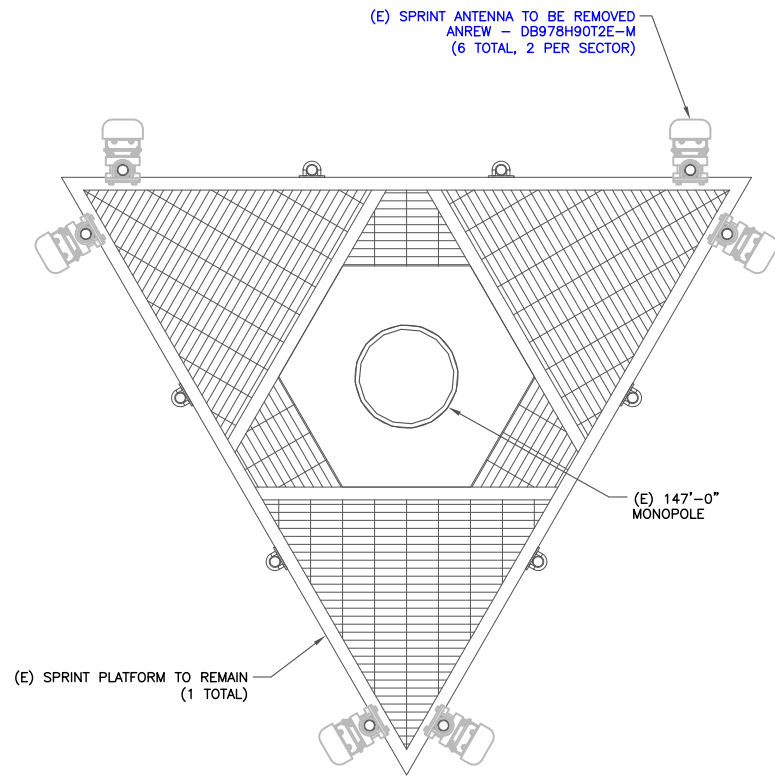
DocuSigned by:
Justin Linette
1840582347C41D

1/9/2017 | 11:41:00 AM EST

Justin Peter Linette, P.E.
Professional Engineer License: 31965
Crown Castle USA, Inc. Firm Registration #PEC.0001101

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

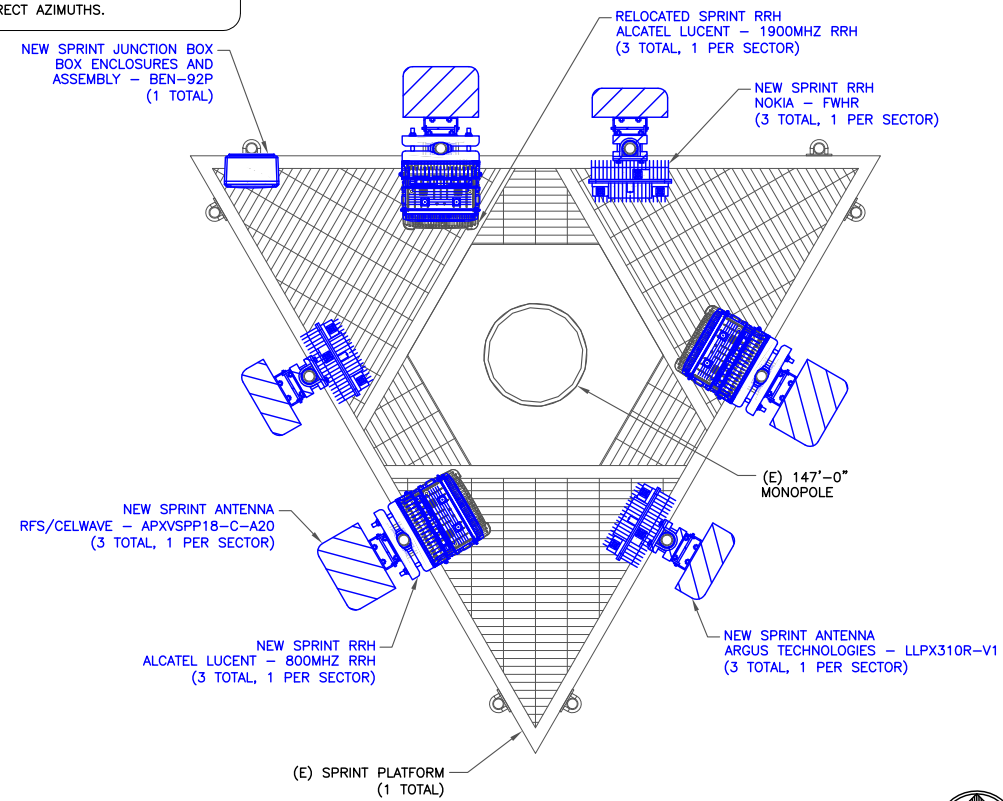
SHEET NUMBER: **C-2** REVISION: **0**



1 EXISTING ANTENNA LAYOUT
SCALE: NOT TO SCALE



INSTALLER NOTE:
CONTRACTOR TO REFERENCE LATEST RFDS FOR CORRECT AZIMUTHS.

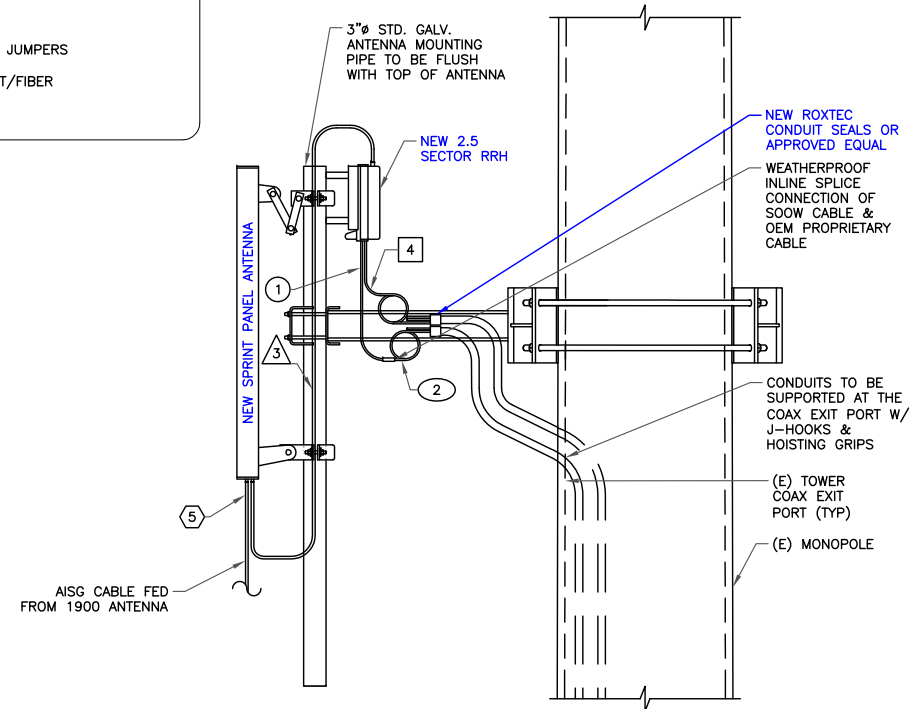


2 FINAL ANTENNA LAYOUT
SCALE: NOT TO SCALE



KEYED CABLE LEGEND

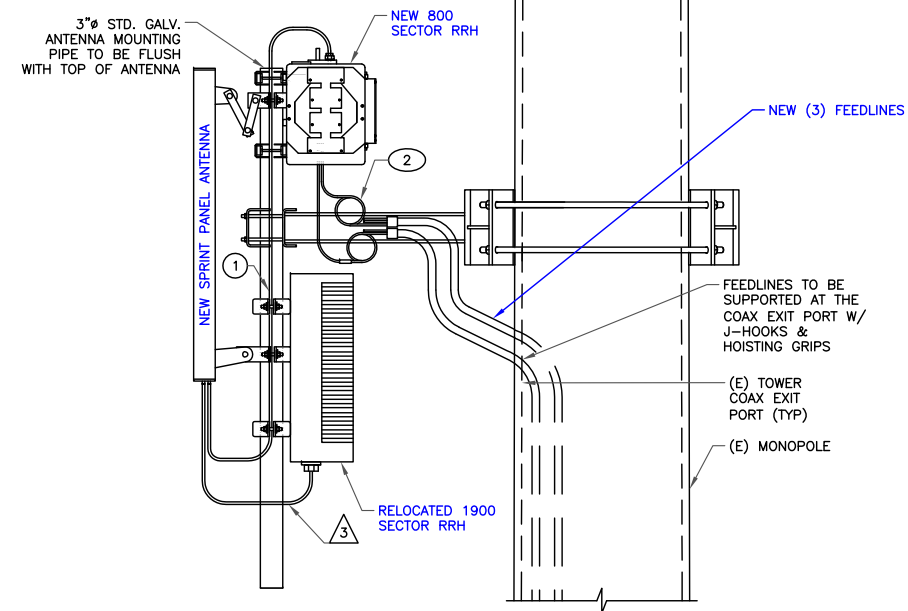
- ① OEM PROPRIETARY
- ② SOOW
- ③ 1/2" RF JUMPERS
- ④ ETHERNET/FIBER
- ⑤ RET



3 2.5 ANTENNA SCHEMATIC
SCALE: NOT TO SCALE

KEYED CABLE LEGEND

- ① 1/2" RF JUMPERS
- ② ETHERNET/FIBER
- ③ RET



4 800/1900 ANTENNA SCHEMATIC
SCALE: NOT TO SCALE



3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

SPRINT SITE NUMBER:
CT23XC411

BU #: **876360**
PRESTON / TOWN HALL

389 RT. 2
PRESTON, CT 06365

EXISTING 147'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	11/17/16	CJ	PRELIMINARY	LR
0	1/5/17	ZTK	CONSTRUCTION	JL

DocuSigned by:



1/9/2017 | 11:41:00 AM EST

Justin Peter Linette, P.E.
Professional Engineer License: 31965
Crown Castle USA, Inc. Firm Registration #PEC.0001101

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

SHEET NUMBER:

C-3

REVISION:

0



3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

SPRINT SITE NUMBER:
CT23XC411

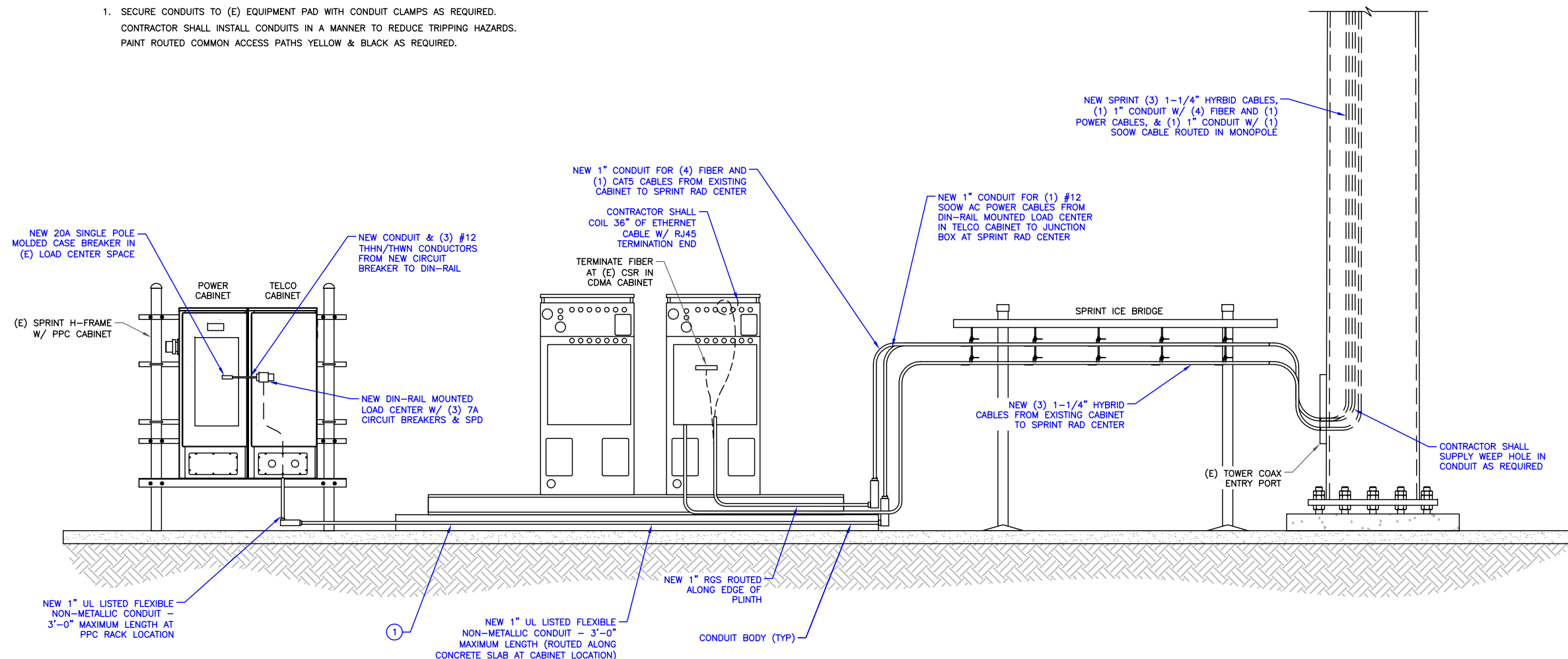
BU #: **876360**
PRESTON / TOWN HALL

389 RT. 2
PRESTON, CT 06365

EXISTING 147'-0" MONOPOLE

CONDUIT NOTES:

1. SECURE CONDUITS TO (E) EQUIPMENT PAD WITH CONDUIT CLAMPS AS REQUIRED.
CONTRACTOR SHALL INSTALL CONDUITS IN A MANNER TO REDUCE TRIPPING HAZARDS.
PAINT ROUTED COMMON ACCESS PATHS YELLOW & BLACK AS REQUIRED.



1 CONDUIT ROUTING SCHEMATIC
SCALE: NOT TO SCALE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	11/17/16	CJ	PRELIMINARY	LR
0	1/5/17	ZTK	CONSTRUCTION	JL

DocuSigned by:

Justin Linette

1B4005B257C41D



1/9/2017 | 11:41:00 AM EST

Justin Peter Linette, P.E.
Professional Engineer License: 31965
Crown Castle USA, Inc. Firm Registration #PEC.0001101

IT IS A VIOLATION OF LAW FOR ANY PERSON,
UNLESS THEY ARE ACTING UNDER THE DIRECTION
OF A LICENSED PROFESSIONAL ENGINEER,
TO ALTER THIS DOCUMENT.

SHEET NUMBER: REVISION:

C-4

0

REV. 0 7/25/16

SPRINT CONSTRUCTION SPECIFICATIONS
MINI-MACRO CELL SITES

1) BASIC REQUIREMENTS

- a) MEET ALL REQUIREMENTS OF JURISDICTIONS.
- b) IF EQUIPMENT FURNISHED BY THE COMPANY DOES NOT MATCH THE EQUIPMENT LISTED ON THE RFDS AND SHOWN ON THE PERMITTING DRAWINGS, RESOLVE DISCREPANCY THROUGH INSTALLER'S CONSTRUCTION MANAGER AND COMPANY'S POINT OF CONTACT
- c) CABLE INSTALLATIONS
 - i) ALL CABLES MUST BE OUTDOOR RATED AND HAVE UV RESISTANT OUTER JACKETS
 - ii) CABLE BENDS MUST NOT EXCEED MANUFACTURER'S ALLOWABLE CABLE BEND RADII
 - iii) AT RADIOS INSTALL SERVICE LOOPS FOR POWER, FIBER, AND ETHERNET SECURED AT LEAST TWICE 180° TO THE STRUCTURE
 - iv) SPARE FIBERS MUST BE ENCASED IN A LOW PROFILE WEATHERTIGHT ASSEMBLY
- d) FIBERS MUST BE FIELD-TERMINATED WITH LC TYPE CONNECTORS
- e) CONDUITS IN EARTH: PROVIDE PVC. CONDUITS EXPOSED IN FACILITIES: PROVIDE RGS. HAND DIG TRENCHES IN COMPOUNDS
- f) SECURE AND SUPPORT CONDUITS AND CABLES ON NO MORE THAN 48" INTERVALS
- g) ON TOWER SITES RGS CONDUITS MAY BE SURFACE MOUNTED AWAY FROM WALKWAYS AND ACCESS/EGRESS PATHS. IF INSTALLATIONS IN WALKWAYS AND ACCESS/EGRESS PATHS CANNOT BE AVOIDED, IDENTIFY THE CONDUIT ENVELOPE/TRIP HAZARD BY ALTERNATING YELLOW AND BLACK STRIPES PAINTED ON CONCRETE AND CONDUIT.

2) SPRINT - FURNISHED EQUIPMENT

- a) INSTALL THE FOLLOWING EQUIPMENT AT LOCATIONS AND AZIMUTHS SHOWN ON THE CONSTRUCTION DRAWINGS.
 - i) PANEL ANTENNAS
 - ii) RADIOS
 - iii) GPS ANTENNAS
 - iv) FILTERS
 - v) 120 VOLT DIN-RAIL CIRCUIT BREAKER ASSEMBLY

3) TOWER INSTALLATIONS

- a) MEET ALL REQUIREMENTS OF THE TOWER OWNER
- b) INSTALL CORRUGATED FLEXIBLE CONDUIT UP THE TOWER TO COMPANY'S RAD CENTER
- c) PROVIDE HANGING GRIPS OR CONDUIT CLAMPS AND ENSURE CONDUITS AS WELL AS INNER CABLES ARE SUPPORTED
- d) CONDUIT RISERS: AT THE TOP OF THE TOWER TURN CONDUIT DOWN AND PROVIDE CABLE TERMINATION FITTINGS. EXTEND CABLES TO RADIOS EXPOSED AND SECURED TO THE STRUCTURE, AT CONDUIT EXIT FROM TOWER, PROVIDE DRIP LOOPS AND WEEP HOLES.
- e) AT THE ICE BRIDGE RUN CABLES IN RGS CONDUIT. UTILIZE CONDULETS TO MAKE COMPACT 90 DEGREE TURNS

4) AC POWER TIE-IN

- a) INSTALL SPRINT'S 120 VOLT DIN-RAIL CIRCUIT BREAKER ASSEMBLY IN THE EXISTING POWER PROTECTION CABINET TELCO SECTION
- b) INSTALL A 20 AMPERE MOLDED CASE CIRCUIT BREAKER IN AVAILABLE SPACE IN THE ADJACENT PPC POWER SECTION LOAD CENTER

5) GROUNDING

- a) 120 VOLT CIRCUITS: POWER CABLES MUST BE 3-WIRE WITH EQUIPMENT GROUNDING CONDUCTOR
- b) SUPPLEMENTAL GROUNDING: ALL GROUNDING HARDWARE MUST BE UL STAMPED AS SUITABLE FOR GROUNDING HARDWARE
- c) RADIOS: BOND RADIO TO THE TOWER TOP OR SECTOR GROUND BAR WITH #6 BARE TINNED COPPER WIRE (GREEN INSULATED ON ROOFTOPS)
- d) DIN-RAIL CIRCUIT BREAKER ASSEMBLY: BOND SURGE ARRESTOR TO PPC TELCO BOARD GROUND BAR

6) MINOR MATERIALS

- a) CONDUIT
 - i) RIGID GALVANIZED STEEL CONDUIT (RGS): UL LISTED, COMPLIANT WITH ANSI STANDARD C80, HOT-DIP GALVANIZED, WITH THREADED FITTINGS. MANUFACTURERS: ALLIED, REPUBLIC, WHEATLAND, OR EQUAL.
 - ii) CORRUGATED FLEXIBLE CONDUIT: DURALINE OR EQUAL.
 - iii) LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LFMC): UL LABELED, UC RESISTANT, FLAME RETARDANT PVC JACKET, HOT-DIP GALVANIZED, GREY. MANUFACTURERS: AFC, ANACONDA, SOUTHWIRE, OR EQUAL.
 - iv) PVC CONDUIT: SCHEDULE 40. CARLON OR EQUAL
 - v) CABINET HUBS AND CABLE TERMINATION FITTINGS: OZ GEDNEY OR ROXTEC
- b) COAXIAL CABLE JUMPERS: 1/2" LDF-4 MANUFACTURERS: COMMSCOPE, RFS OR FCT.
- c) FASTENERS AND HARDWARE
 - i) TO SECURE RACEWAYS, UTILIZE NON CORRODING NON-MAGNETS METALLIC FASTENERS AND HARDWARE

SUITABLE FOR THE PURPOSE

- d) POWER CABLES - 3/C #12 SOOW BY SOUTHWIRE OR EQUAL
- e) ETHERNET CABLES AND CONNECTORS: OUTDOOR RATED, CAT 5E, BELDEN OR EQUAL
- f) FIBER CABLES: CORNING "FREEDOM FAN OUT" OUTDOOR RISER CABLE, 4F, SINGLE MODE, OR EQUAL
- g) RF TRANSPARENT PAINT FOR ANTENNA CONCEALMENT: SELECT NO/LOW CARBON PAINTS, WITH NO/LOW TITANIUM DIOXIDE, AND WITHOUT SUSPENDED METAL PARTICLES (ALUMINUM, ZINC, COPPER, ETC)

7) COLOR CODING

- a) COLOR CODE CABLES AND CONDUITS AS REQUIRED BY SPRINT STANDARD TS-0200

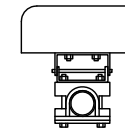
8) TESTING AND CONSTRUCTION COMPLETE

- a) SWEEP ALL COAXIAL CABLES ACCORDING TO SPRINT STANDARD TS-0200
- b) PANEL ANTENNA ALIGNMENT - USING ELECTRONIC ALIGNMENT TOOL. AZIMUTH/DOWNTILT +/- 1 DEGREE
- c) LEAVE EQUIPMENT DE-ENERGIZED UNTIL INSTRUCTED BY THE COMMISSIONING AND INTEGRATION TEAM TO ENERGIZE
- d) OTHER REQUIREMENTS AND DELIVERABLES MAY BE REQUIRED BEFORE THE CONSTRUCTION COMPLETE MILESTONE CAN BE ACTUALIZED IN SITERRA (SPRINT'S DATABASE-OF-RECORD).



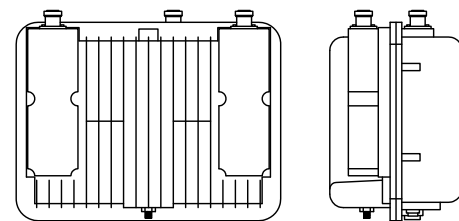
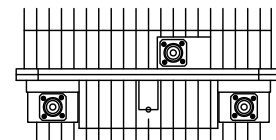
RFS/CELWAVE - APXVSP18-C-A20
WEIGHT (WITHOUT MOUNTING HARDWARE): 92.0 LBS
SIZE (HxWxD): 72.0x11.8x7.9 IN.
MOUNTING HARDWARE: APM40-2 DOWNTILT KIT
MOUNTING HARDWARE WEIGHT: 7.5 LBS

1 RFS/CELWAVE - APXVSP18-C-A20
SCALE: NOT TO SCALE



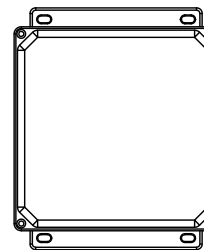
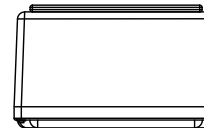
ARGUS TECHNOLOGIES - LLPX310R-V1
WEIGHT (WITHOUT MOUNTING HARDWARE): 28.66 LBS
SIZE (HxWxD): 42.13x11.81x4.53 IN.
MOUNTING HARDWARE P/N: F-042-GL-E OR T-045-GL-E
RATED WIND VELOCITY: 124.27 MPH

2 ARGUS TECHNOLOGIES - LLPX310R-V1
SCALE: NOT TO SCALE



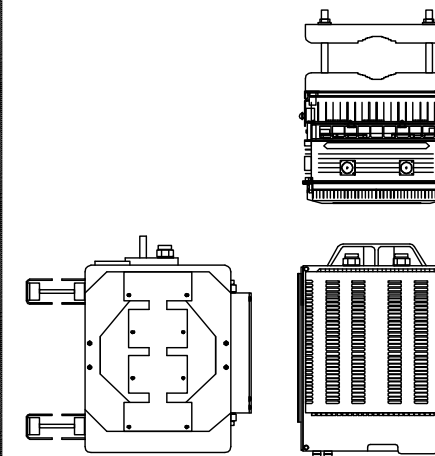
NOKIA - FWHR
WEIGHT: 24.7 LBS
SIZE (HxWxD): 9.7x12.9x6.3 IN.

3 NOKIA - FWHR
SCALE: NOT TO SCALE



BOX ENCLOSURES AND ASSEMBLY - BEN-92P
WEIGHT (WITHOUT MOUNTING HARDWARE): 2.2 LBS
SIZE (HxWxD): 9.7x12.8x6.3 IN.

4 BOX ENCLOSURES AND ASSEMBLY - BEN-92P
SCALE: NOT TO SCALE



ALCATEL LUCENT - 800MHZ RRH
WEIGHT (WITHOUT MOUNTING HARDWARE): 53.0 LBS
SIZE (HxWxD): 19.7x13.0x10.8 IN.

5 ALCATEL LUCENT - 800MHZ RRH
SCALE: NOT TO SCALE



3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

SPRINT SITE NUMBER:
CT23XC411

BU #: 876360
PRESTON / TOWN HALL

389 RT. 2
PRESTON, CT 06365

EXISTING 147'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	11/17/16	CJ	PRELIMINARY	LR
0	1/5/17	ZTK	CONSTRUCTION	JL

DocuSigned by:

Justin Linette

1849058237C41D

STATE OF CONNECTICUT

JUSTIN PETER LINETTE

No. 31965

PROFESSIONAL ENGINEER

1/9/2017 | 11:41:00 AM EST

Justin Peter Linette, P.E.

Professional Engineer License: 31965

Crown Castle USA, Inc. Firm Registration #PEC.0001101

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

SHEET NUMBER:

C-5

REVISION:

0

ALL MATERIALS ON THIS PAGE SHALL BE SUPPLIED BY THE CONTRACTOR

3-9 SOOW ROYAL® MULTI-CONDUCTOR SOOW

Royal® 90°C Rubber Cord. 600 Volts. Flexible Stranding. Flame and Ozone Resistant. Black Jacket. Rated -40°C to 90°C. RoHS Compliant. UL Listed and CSA Certified for Indoor and Outdoor Use. Provides Premium Oil Resistance, Water Resistant and High Flexibility. Excellent Abrasion Resistance. Rated Extra-Hard Usage.



VIPER RUBBER TYPE MULTI-CONDUCTOR TYPE SOOW CONTROL

CONDUCTOR SIZE (AWG)	CONDUCTOR STRANDING (#AWG)	NOMINAL INSULATION THICKNESS (mils)	NOMINAL JACKET WALL (mils)	NOMINAL OVERALL DIAMETER (mils)	WEIGHT (lbs/1000ft)	AMPACITY
12/9	65 x 30	45	95	880	510	14

1 NOT USED
SCALE: NOT TO SCALE

2 SOOW POWER CABLE
SCALE: NOT TO SCALE

Detailed Specifications & Technical Data

ENGLISH MEASUREMENT VERSION



7919A Multi-Conductor - Category 5e DataTuff® Twisted Pair Cable



For more information please call

1-800-Belden1



Description:

24 AWG solid bare copper conductors, twisted pairs, polyolefin insulation, overall Beldfoil shield (100% coverage), 24 AWG stranded TC drain wire, industrial grade sunlight- and oil-resistant PVC jacket, rip cord. Sequential marking at two foot intervals

Usage (Overall)

Subtable Applications: Industrial Ethernet Cable, Harsh Environments, 100MHz Category 5e, Gigabit Ethernet, 100Base-TX, 100Base-VG ANYLAN, 155MATM 622ATM, NTSOSPAL, Component or Composite Video, AES/EBU Digital Audio, RS-422, CMR - Outdoor, R45 Compatible, Noisy Environments

Physical Characteristics (Overall)

Conductor

AWG:

24 Pairs AWG Stranding Conductor Material

4 24 Subd BC-Bare Copper

Insulation

Insulation Material:

Insulation Material Heat Shrinkage (%)

70 - Polyolefin - 270

Outer Shield

Outer Shield Material:

Outer Shield Trade Name Type Outer Shield Material Coverage (%)

ShieldTuff Tape Aluminum Polyethylene Tape 100

Outer Shield Drain Wire AWG:

AWG Stranding Drain Wire Conductor Material

24 T432 TC-Tinned Copper

Outer Jacket

Outer Jacket Material:

Outer Jacket Material

Industrial Grade PVC-Polyvinyl Chloride

Outer Jacket Ripcord:

No

Overall Cable

Overall Nominal Diameter:

0.265 in.

Pair

Pair Color Code Chart:

Number Color

1 White/Blue Stripe & Blue

2 White/Orange Stripe & Orange

3 White/Green Stripe & Green

4 White/Brown Stripe & Brown

Mechanical Characteristics (Overall)

Installation Temperature Range:

-25°C To +75°C

Distributed By: INTERSTATE WIRE CO. Page 1 of 4

1-800-527-0010

01-06-2012

3 CAT5 CABLE
SCALE: NOT TO SCALE



3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

SPRINT SITE NUMBER:
CT23XC411

BU #: 876360
PRESTON / TOWN HALL

389 RT. 2
PRESTON, CT 06365

EXISTING 147'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	11/17/16	CJ	PRELIMINARY	LR
0	1/5/17	ZTK	CONSTRUCTION	JL

DocuSigned by:

Justin Linette

18400582547C41D

STATE OF CONNECTICUT

JUSTIN PETER LINETTE

No. 31965

PROFESSIONAL ENGINEER

1/9/2017 | 11:41:00 AM EST

Justin Peter Linette, P.E.
Professional Engineer License: 31965
Crown Castle USA, Inc. Firm Registration #PEC.0001101

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

SHEET NUMBER:

C-6

REVISION:

0

Connectors



Base Mount Double Row Terminal Blocks

Series KU

Specifications

Description: Base mount double row terminal blocks.

Ratings:

Volts: - 600V

Amps: - 60A*

Center Spacing: 0.625" (15.88mm)

Number of Poles: 2- to 12-poles

Wire Range: #6-22 AWG Cu

Screw Size: #10-32

Torque Rating: 20 lb-in.

Distance Between Barriers: 0.437" (11.09mm)

Mounting: Base mount

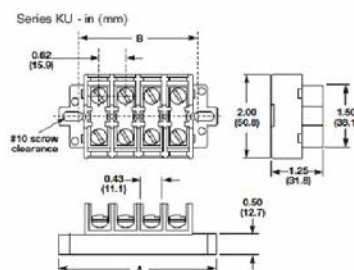
Material: Molded base: Black, UL rated 94V1 Nuclear Grade Nylon

Terminal plating: Nickel over brass

Operating Temperature: 105°C max.

Agency Information: UL File E62622, CSA File 47235

* AWG rating achieved with #10 copper wire crimped to ring terminals.



Dimensions - in

Poles	KU	KUX Only
02	2.60	1.60
03	3.12	2.25
04	3.75	2.87
05	4.37	3.50
06	5.00	4.12
07	5.62	4.75
08	6.25	5.37
09	6.87	6.00
10	7.50	6.62
11	8.12	7.25
12	8.75	7.87

Catalog Number Build-A-Code

Series	Poles	Screw Options	Covers	Marking Strip
KU = Standard block	02 to 12	00 = Screws shipped bulk	WC = Top cover & 2 end plates	MT = Matte finish
KUH = Black		W = Brass washer head, nickel-plated		NU = Numbered 1 to 12, horizontal
KUX = Short block		P = Steel screw w/pressure plate zinc-plated		NUV = Numbered 1 to 12, vertical
KULRL = Standard wire/removable link		B = Brass washer head, no plating		PT = Marker strip for cover
KULRLX = Short block wire/removable link		BP = Brass phislot, nickel-plated		

4 TERMINAL BLOCK
SCALE: NOT TO SCALE

CORRUGATED

www.duraline.com



Customer Service
800-847-7661



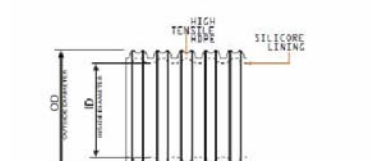
FEATURES:

- Available in 1", 1 1/4", 1 1/2", 2"
- Manufactured from flexible HDPE
- Continuous lengths on reels or in coils
- Rugged corrugated design is flexible and light weight, yet provides excellent crush resistance
- Outstanding long term cable protection from shifting ground, rock and root impingement
- Provides a permanent pathway, simplifies future cable repairs or replacement
- Available with UV protectant for above ground applications
- Plenum and Riser products available

CORRUGATED - SPECS

Customer Service 800-847-7661 www.duraline.com

Nominal Size	OD (in.)	Wall Thick. (min. in.)	Wall Thick. (max. in.)	ID (in.)	Safe Working Pull Strength	Weight (lb/ft)	Bend Radius	Brittleness Temp.
1"	1.330±0.010	0.045	0.055	1.220	500 lbs	0.121	14	-75°C
1 1/4"	1.550±0.010	0.045	0.055	1.440	500 lbs	0.141	16	-75°C
1 1/2"	1.800±0.010	0.055	0.075	1.670	500 lbs	0.165	19	-75°C
2"	2.265±0.010	0.055	0.075	2.135	500 lbs	0.196	22	-75°C



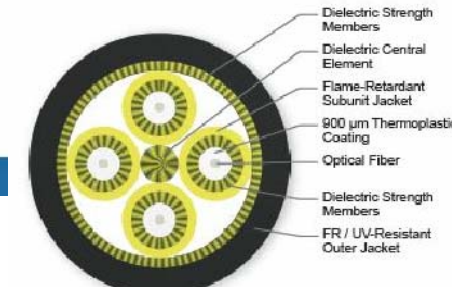
5 CORRUGATED CONDUIT
SCALE: NOT TO SCALE

FREEDM® Fan-Out Tight-Buffered Cable, Riser

4 F, Single-mode (OS2)

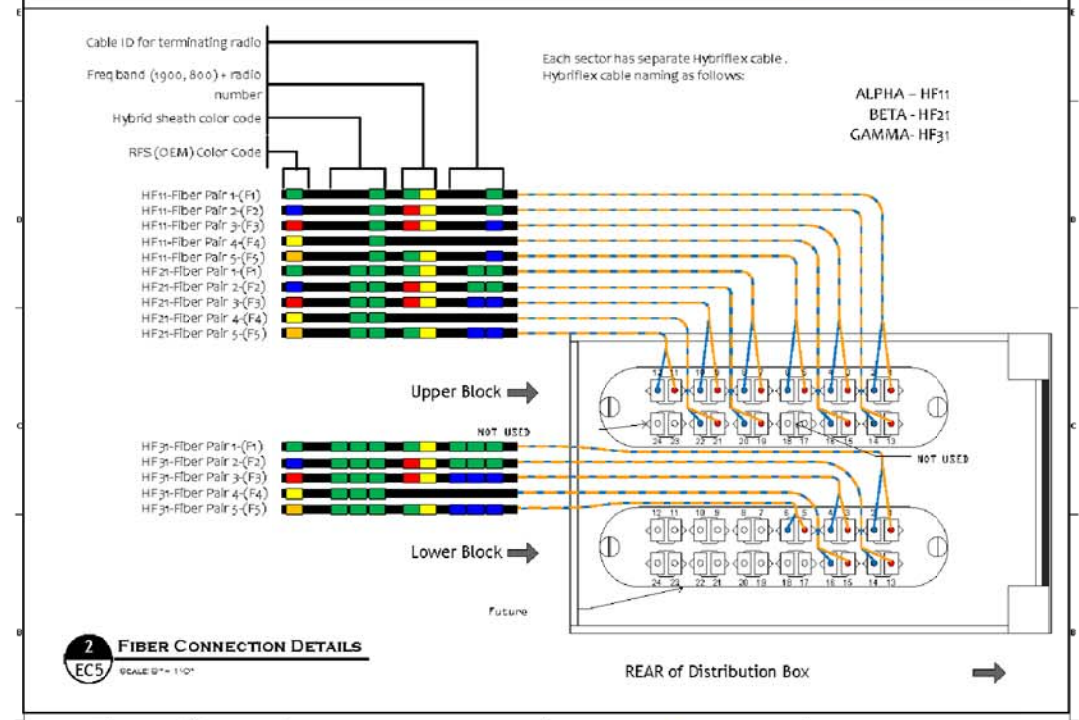
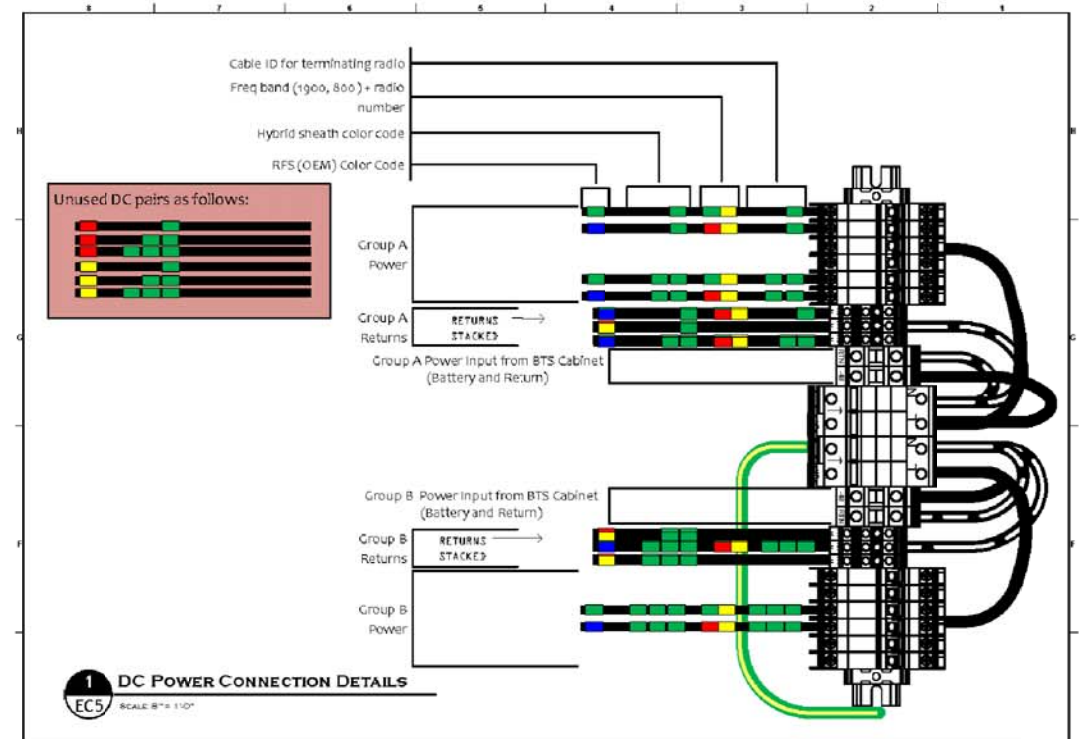
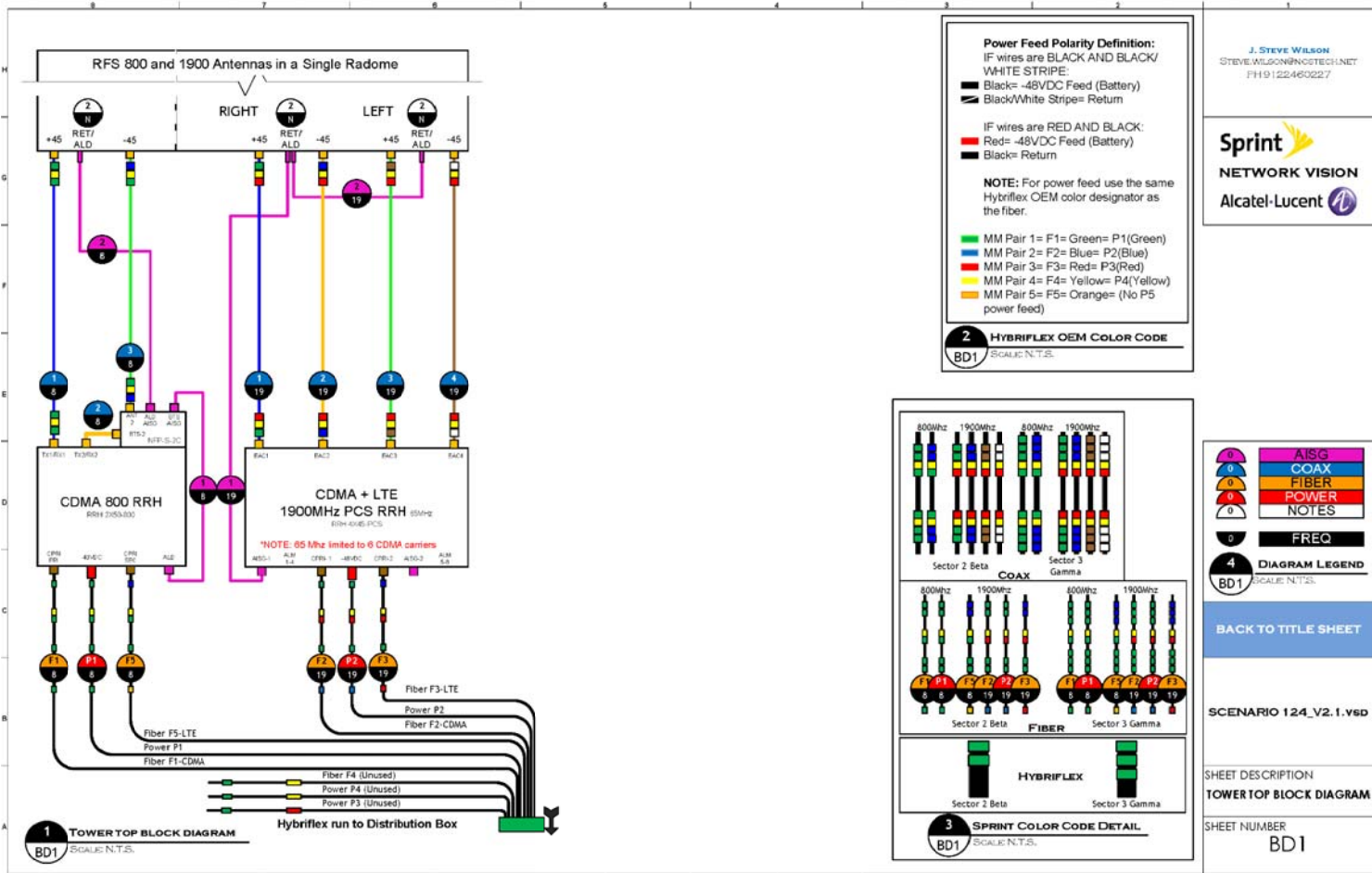


Part Number: 004E6F-31331-29



Cross Section of Part Number: 004E6F-31331-29

6 FIBER CABLE
SCALE: NOT TO SCALE



J. Steve Wilson
 STEVE.WILSON@NGSTECH-NET
 PH 9122450227

Sprint
 NETWORK VISION
 Alcatel-Lucent

4 DIAGRAM LEGEND
 BD1 SCALE: N.T.S.

SCENARIO 124_V2.1.VSD

SHEET DESCRIPTION
 TOWERTOP BLOCK DIAGRAM

SHEET NUMBER
 BD1

FILE NAME
 SCENARIO 124_V2.1.VSD

SHEET DESCRIPTION
 DISTRIBUTION BOX CONNECTION DETAILS FOR TOWER MOUNTED RRH

SHEET NUMBER
 EC5

Sprint
 NETWORK VISION
 Alcatel-Lucent

J. STEVE WILSON
 STEVE.WILSON@NGSTECH-NET
 PH 9122450227

BACK TO TITLE SHEET

Sprint

CROWN CASTLE
 3 CORPORATE PARK DRIVE, SUITE 101
 CLIFTON PARK, NY 12065

SPRINT SITE NUMBER:
CT23XC411

BU #: 876360
PRESTON / TOWN HALL

389 RT. 2
 PRESTON, CT 06365

EXISTING 147'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	11/17/16	CJ	PRELIMINARY	LR
0	1/5/17	ZTK	CONSTRUCTION	JL

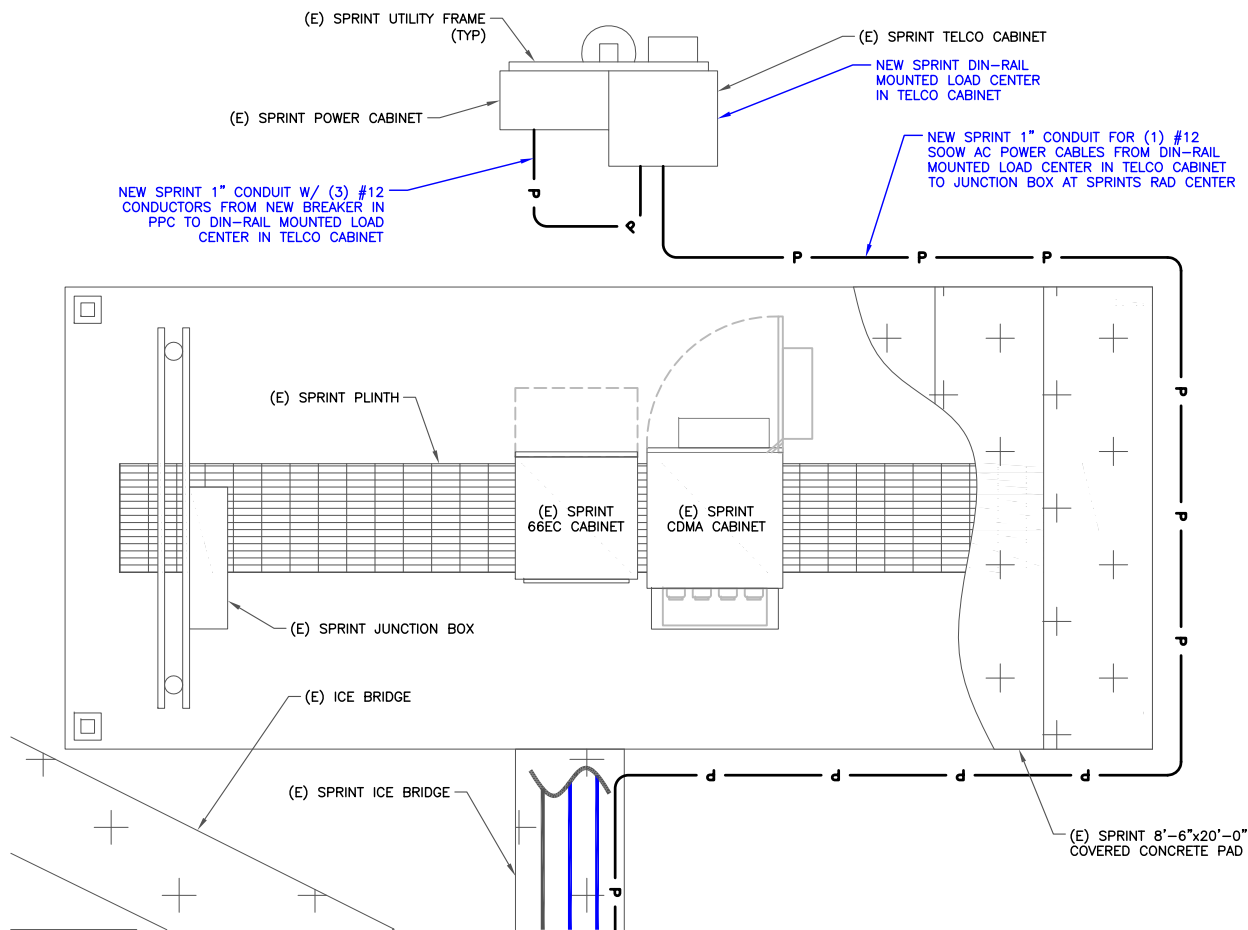
DocuSigned by:
 Justin Linette
 1B4005B2547C41D

STATE OF CONNECTICUT
 JUSTIN PETER LINETTE
 No. 31965
 LICENSED PROFESSIONAL ENGINEER

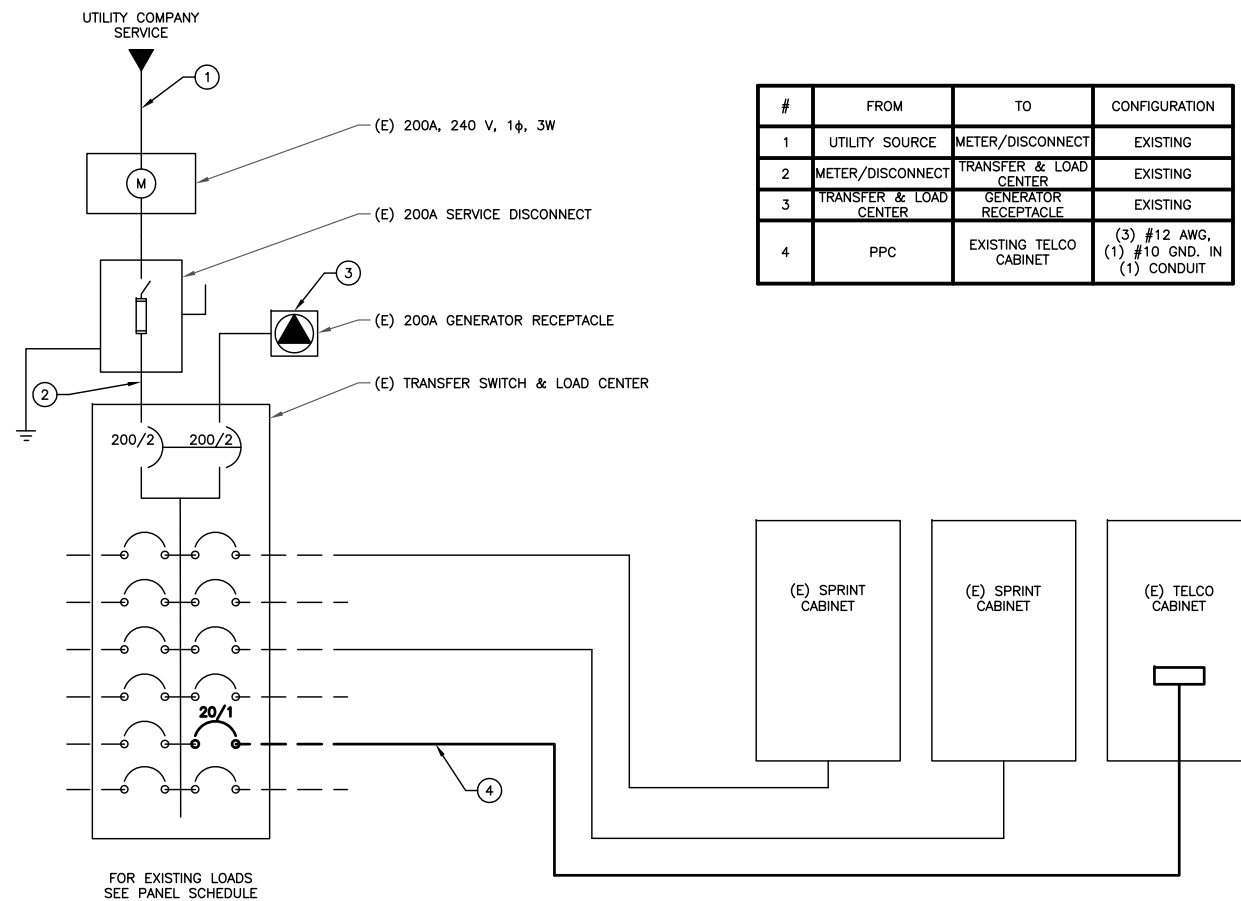
1/9/2017 | 11:41:00 AM EST

Justin Peter Linette, P.E.
 Professional Engineer License: 31965
 Crown Castle USA, Inc. Firm Registration #PEC.0001101

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.



1 ELECTRICAL AND GROUNDING PLAN
 SCALE: NOT TO SCALE



#	FROM	TO	CONFIGURATION
1	UTILITY SOURCE	METER/DISCONNECT	EXISTING
2	METER/DISCONNECT	TRANSFER & LOAD CENTER	EXISTING
3	TRANSFER & LOAD CENTER	GENERATOR RECEPTACLE	EXISTING
4	PPC	EXISTING TELCO CABINET	(3) #12 AWG, (1) #10 GND. IN (1) CONDUIT

2 ELECTRICAL ONE-LINE DIAGRAM
 SCALE: NOT TO SCALE



SPRINT SITE NUMBER:
CT23XC411
 BU #: 876360
PRESTON / TOWN HALL
 389 RT. 2
 PRESTON, CT 06365
 EXISTING 147'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	11/17/16	CJ	PRELIMINARY	LR
0	1/5/17	ZTK	CONSTRUCTION	JL

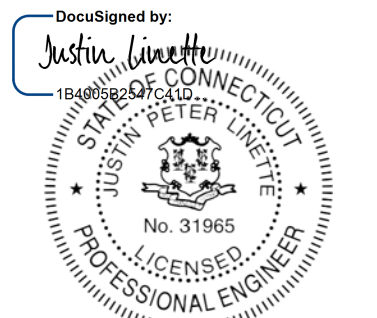
EXISTING PANEL PANEL

MAIN: 200 AMP MAIN BREAKER		VOLTAGE/PHASE: 120/240V, 1-PHASE, 3-WIRE				SHORT CIRCUIT CURRENT RATING: 22,000 AMPS					
MOUNTING: SURFACE		ENCLOSURE: NEMA 1				SURGE PROTECTION DEVICE: YES					
SERVICE FROM: N/A		MANUFACTURER: NORTHERN TECHNOLOGIES, INC (SQUARE D)				MODEL NUMBER: QO142M200					
DESCRIPTION	LOAD (VA)	C or NC	C/B	CIR No.	LOAD (VA)		CIR No.	C/B	C or NC	LOAD (VA)	DESCRIPTION
					A-PHASE	B-PHASE					
BTS CABINET	9600	C	100	1	9600		2	60	C	0	SURGE SUPPRESSOR
BTS CABINET	9600	C	-	3		9600	4	-	C	0	SURGE SUPPRESSOR
				5	240		6	15	C	240	TELCO GFCI
				7		360	8	15	C	360	LIGHTS
				9	240		10	15	C	240	GCFI
TELCO FAN	180	NC	10	11		540	12	20	NC	360	FLOOD LIGHTS
BASE LOAD (VA) =					10080	10500	"C" DESIGNATION IDENTIFIES CONTINUOUS LOADS AND MOTOR LOADS AS REQUIRED BY SECTIONS 230.42 AND 430.24 OF THE NEC				
25% OF CONTINUOUS LOAD (VA) =					2520	2490					
TOTAL LOAD (VA) =					12600	12990					
TOTAL LOAD (A) =					105	109					

PROPOSED PANEL PANEL

MAIN: 200 AMP MAIN BREAKER		VOLTAGE/PHASE: 120/240V, 1-PHASE, 3-WIRE				SHORT CIRCUIT CURRENT RATING: 22,000 AMPS					
MOUNTING: SURFACE		ENCLOSURE: NEMA 1				SURGE PROTECTION DEVICE: YES					
SERVICE FROM: N/A		MANUFACTURER: NORTHERN TECHNOLOGIES, INC (SQUARE D)				MODEL NUMBER: QO142M200					
DESCRIPTION	LOAD (VA)	C or NC	C/B	CIR No.	LOAD (VA)		CIR No.	C/B	C or NC	LOAD (VA)	DESCRIPTION
					A-PHASE	B-PHASE					
BTS CABINET	9600	C	100	1	9600		2	60	C	0	SURGE SUPPRESSOR
BTS CABINET	9600	C	-	3		9600	4	-	C	0	SURGE SUPPRESSOR
				5	240		6	15	C	240	TELCO GFCI
				7		360	8	15	C	360	LIGHTS
				9	240		10	15	C	240	GCFI
TELCO FAN	180	NC	10	11		540	12	20	NC	360	FLOOD LIGHTS
BASE LOAD (VA) =					11280	10500	"C" DESIGNATION IDENTIFIES CONTINUOUS LOADS AND MOTOR LOADS AS REQUIRED BY SECTIONS 230.42 AND 430.24 OF THE NEC				
25% OF CONTINUOUS LOAD (VA) =					2820	2490					
TOTAL LOAD (VA) =					14100	12990					
TOTAL LOAD (A) =					118	109					

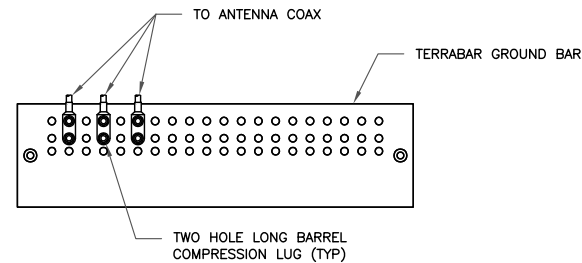
3 EXISTING/NEW PANEL SCHEDULE AND NOTES
 SCALE: NOT TO SCALE



1/9/2017 | 11:41:00 AM EST

Justin Peter Linette, P.E.
 Professional Engineer License: 31965
 Crown Castle USA, Inc. Firm Registration #PEC.0001101
 IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

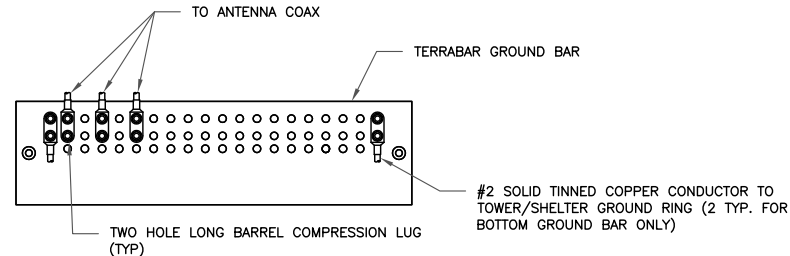
SHEET NUMBER: **E-1** REVISION: **0**



NOTES:

1. DOUBLING UP "OR STACKING" OF CONNECTIONS IS NOT PERMITTED.
2. EXTERIOR ANTIOXIDANT JOINT COMPOUND TO BE USED ON ALL EXTERIOR CONNECTIONS.
3. GROUND BAR SHALL NOT BE ISOLATED FROM TOWER. MOUNT DIRECTLY TO TOWER STEEL.

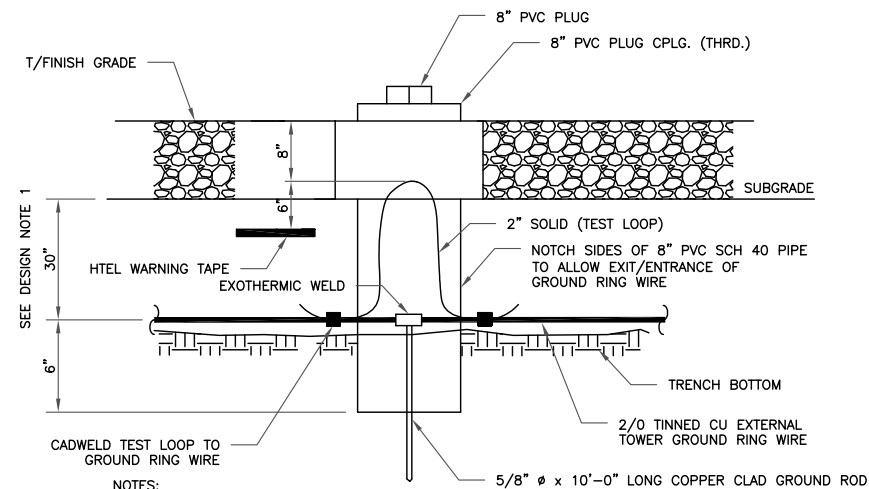
1 ANTENNA GROUND BAR DETAIL
SCALE: NOT TO SCALE



NOTES:

1. EXTERIOR ANTIOXIDANT JOINT COMPOUND TO BE USED ON ALL EXTERIOR CONNECTIONS.
2. GROUND BAR SHALL NOT BE ISOLATED FROM TOWER. MOUNT DIRECTLY TO TOWER STEEL (TOWER ONLY).
3. INSTALL GROUND BARS AT 75 FT. INTERVAL MAXIMUM.
4. GROUND BAR SHALL BE ISOLATED FROM BUILDING OR SHELTER.

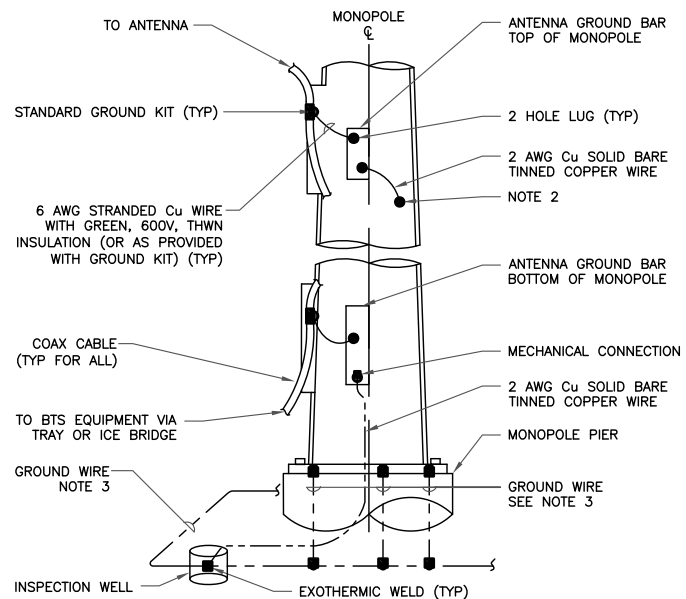
2 TOWER/SHELTER GROUND BAR DETAIL
SCALE: NOT TO SCALE



NOTES:

1. GROUND ROD SHALL BE DRIVEN VERTICALLY, NOT TO EXCEED 45 DEGREES FROM THE VERTICAL
2. GROUND WIRE SHALL BE MIN. 30" BELOW GRADE OR 6" BELOW FROST LINE. (WHICH EVER IS GREATER) AS PER N.E.C. ARTICLE 250-50(D)

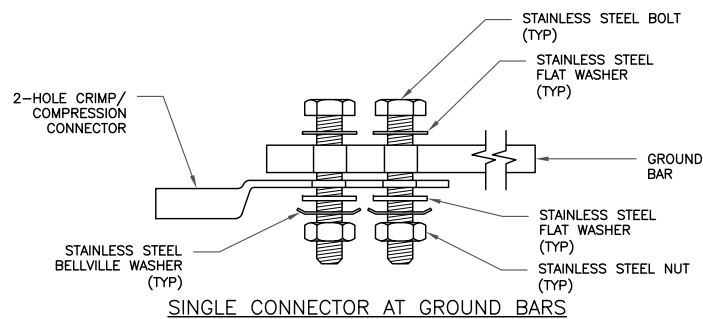
3 INSPECTION PORT DETAIL
SCALE: NOT TO SCALE



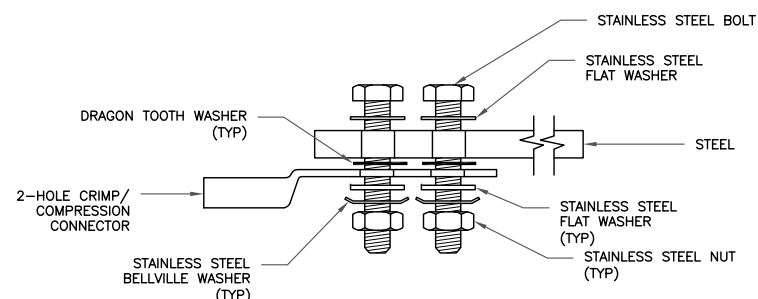
NOTES:

1. NUMBER OF GROUND BARS MAY VARY DEPENDING ON THE TYPE OF MONOPOLE, ANTENNA LOCATION AND CONNECTION ORIENTATION. COAXIAL CABLES EXCEEDING 200 FEET IN/ON THE POLE SHALL HAVE GROUND KITS AT THE MIDPOINT. PROVIDE AS REQUIRED.
2. ONLY MECHANICAL CONNECTIONS ARE ALLOWED TO BE MADE TO CROWN CASTLE TOWERS. ALL MECHANICAL CONNECTIONS SHALL BE TREATED WITH AN ANTI-OXIDANT COATING.
3. ALL TOWER GROUNDING SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF ANSI/TIA 222. FOR TOWERS BEING BUILT TO REV G OF THE STANDARD, THE WIRE SIZE OF THE BURIED GROUND RING AND CONNECTIONS BETWEEN THE TOWER AND THE BURIED GROUND RING SHALL BE 2/0 AWG. STRANDED IN ADDITION, THE MINIMUM LENGTH OF THE GROUND RODS SHALL BE INCREASED FROM 8 FEET TO 10 FEET.

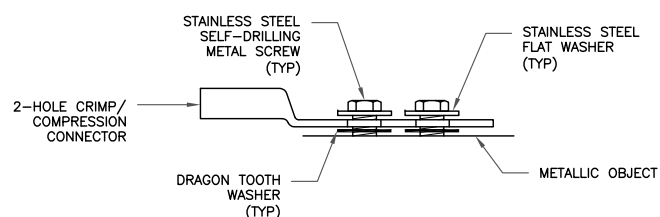
4 TYPICAL ANTENNA CABLE GROUNDING
SCALE: NOT TO SCALE



SINGLE CONNECTOR AT GROUND BARS

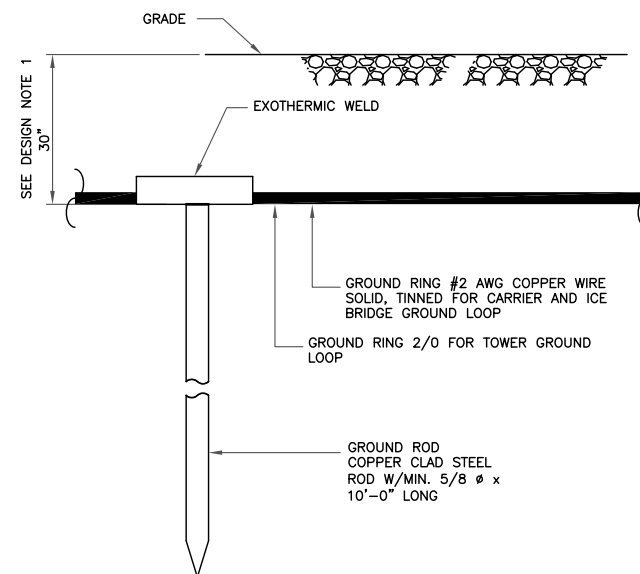


SINGLE CONNECTOR AT STEEL OBJECTS



SINGLE CONNECTOR AT METALLIC/STEEL OBJECTS

5 HARDWARE DETAIL FOR EXTERIOR CONNECTIONS
SCALE: NOT TO SCALE



NOTES:

1. GROUND ROD SHALL BE DRIVEN VERTICALLY, NOT TO EXCEED 45 DEGREES FROM THE VERTICAL
2. GROUND WIRE SHALL BE MIN. 30" BELOW GRADE OR 6" BELOW FROST LINE. (WHICH EVER IS GREATER) AS PER N.E.C. ARTICLE 250-50(D)

6 GROUND ROD DETAIL
SCALE: NOT TO SCALE



3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

SPRINT SITE NUMBER:
CT23XC411

BU #: **876360**
PRESTON / TOWN HALL

389 RT. 2
PRESTON, CT 06365

EXISTING 147'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	11/17/16	CJ	PRELIMINARY	LR
0	1/5/17	ZTK	CONSTRUCTION	JL

DocuSigned by:

Justin Linette
1840058257C41D

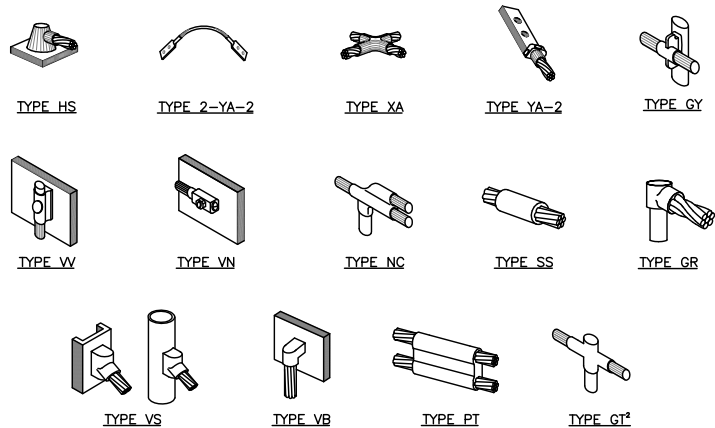


1/9/2017 | 11:41:00 AM EST

Justin Peter Linette, P.E.
Professional Engineer License: 31965
Crown Castle USA, Inc. Firm Registration #PEC.0001101

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

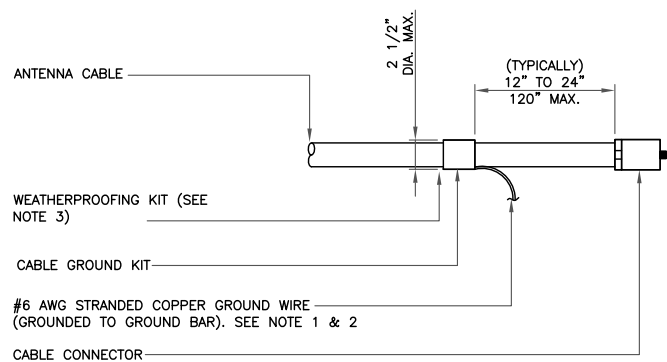
SHEET NUMBER: **G-1** REVISION: **0**



NOTE:

1. ERICO EXOTHERMIC "MOLD TYPES" SHOWN HERE ARE EXAMPLES. CONSULT WITH CONSTRUCTION MANAGER FOR SPECIFIC MOLDS TO BE USED FOR THIS PROJECT.
2. MOLD TYPE ONLY TO BE USED BELOW GRADE WHEN CONNECTING GROUND RING TO GROUND ROD.

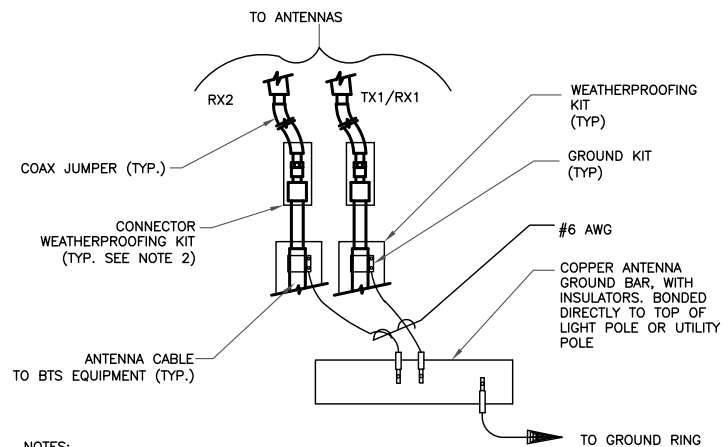
1 CADWELD GROUNDING CONNECTIONS
SCALE: NOT TO SCALE



NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.
2. GROUNDING KIT SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.
3. WEATHER PROOFING SHALL BE TWO-PART TAPE KIT. COLD SHRINK SHALL NOT BE USED.

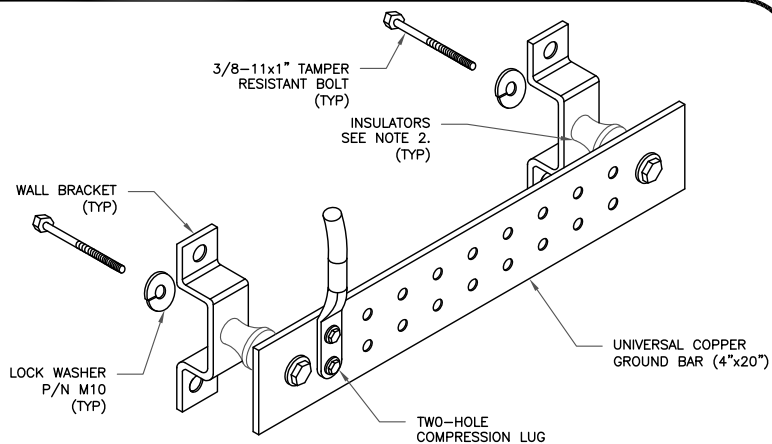
3 CABLE GROUND KIT CONNECTION
SCALE: NOT TO SCALE



NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO ANTENNA GROUND BAR.
2. WEATHER PROOFING SHALL BE TWO-PART TAPE KIT. COLD SHRINK SHALL NOT BE USED.

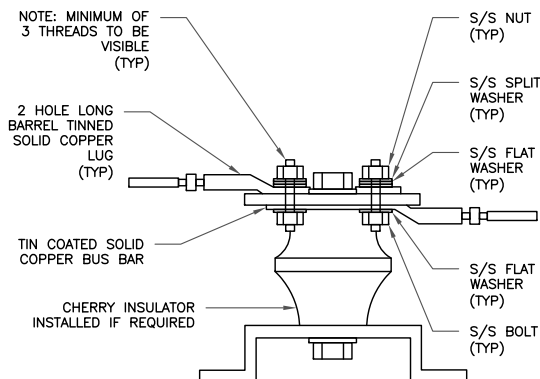
4 GROUND CABLE CONNECTION
SCALE: NOT TO SCALE



NOTES:

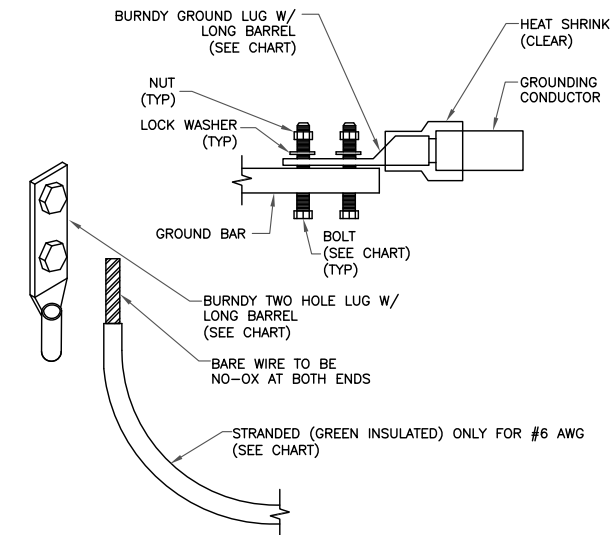
1. DOWN LEAD (HOME RUN) CONDUCTORS ARE NOT TO BE INSTALLED ON CROWN CASTLE TOWER, PER THE GROUNDING DOWN CONDUCTOR POLICY GAS-STD-10091. NO MODIFICATION OR DRILLING TO TOWER STEEL IS ALLOWED IN ANY FORM OR FASHION, CAD-WELDING ON THE TOWER AND/OR IN THE AIR ARE NOT PERMITTED.
2. OMIT INSULATOR WHEN MOUNTING TO TOWER STEEL OR PLATFORM STEEL. USE INSULATORS WHEN ATTACHING TO BUILDING OR SHELTERS.

6 GROUND BAR DETAIL
SCALE: NOT TO SCALE



7 LUG DETAIL
SCALE: NOT TO SCALE

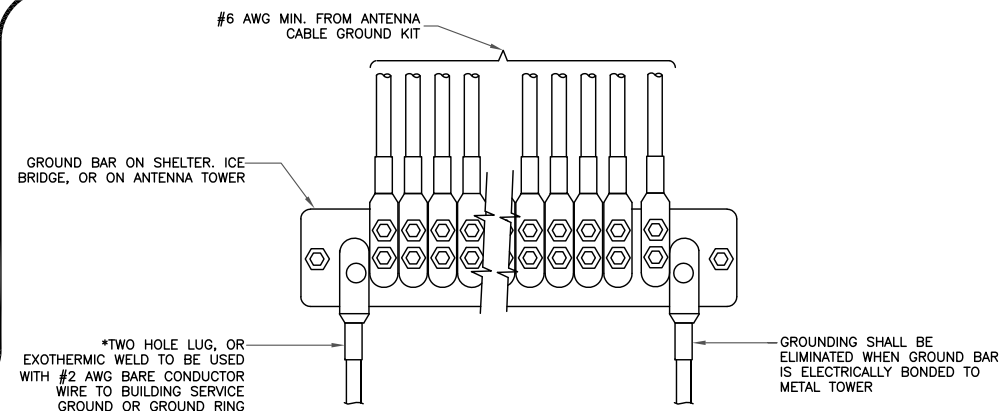
WIRE SIZE	BURNDY LUG	BOLT SIZE
#6 AWG GREEN INSULATED	YA6C-2TC38	3/8" - 16 NC S 2 BOLT
#2 AWG SOLID TINNED	YA3C-2TC38	3/8" - 16 NC S 2 BOLT
#2 AWG STRANDED	YA2C-2TC38	3/8" - 16 NC S 2 BOLT
#2/0 AWG STRANDED	YA26-2TC38	3/8" - 16 NC S 2 BOLT
#4/0 AWG STRANDED	YA28-2N	1/2" - 16 NC S 2 BOLT



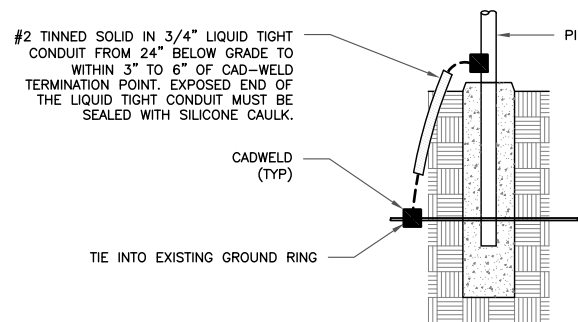
NOTES:

1. ALL GROUNDING LUGS ARE TO BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS. ALL HARDWARE BOLTS, NUTS, LOCK WASHERS SHALL BE STAINLESS STEEL. ALL HARDWARE ARE TO BE AS FOLLOWS: BOLT, FLAT WASHER, GROUND BAR, GROUND LUG, FLAT WASHER AND NUT.

2 MECHANICAL LUG CONNECTION
SCALE: NOT TO SCALE



5 GROUNDWIRE INSTALLATION
SCALE: NOT TO SCALE



8 TRANSITIONING GROUND DETAIL
SCALE: NOT TO SCALE



3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

SPRINT SITE NUMBER:
CT23XC411

BU #: 876360
PRESTON / TOWN HALL

389 RT. 2
PRESTON, CT 06365

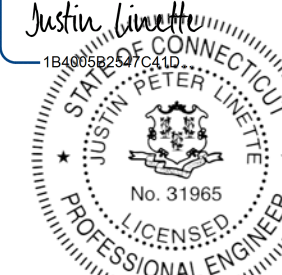
EXISTING 147'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	11/17/16	CJ	PRELIMINARY	LR
0	1/5/17	ZTK	CONSTRUCTION	JL

DocuSigned by:

Justin Linette
1840582347C41D



1/9/2017 | 11:41:00 AM EST

Justin Peter Linette, P.E.
Professional Engineer License: 31965
Crown Castle USA, Inc. Firm Registration #PEC.0001101

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

SHEET NUMBER: **G-2** REVISION: **0**

Certificate Of Completion

Envelope Id: AC0B8B4A514B4C0CA7480528DE41BE31	Status: Completed
Subject: CT23XC411_876360_PRESTON_FCD_REV_0_1.9.17.pdf	
Source Envelope:	
Document Pages: 13	Signatures: 13
Supplemental Document Pages: 0	Initials: 0
Certificate Pages: 1	
AutoNav: Enabled	Payments: 0
Envelope Stamping: Enabled	Envelope Originator:
Time Zone: (UTC-05:00) Eastern Time (US & Canada)	Jordan Stanga
	Canonsburg, PA 15317
	jordan.stanga@crowncastle.com
	IP Address: 64.213.130.241

Record Tracking

Status: Original 1/9/2017 11:29:03 AM	Holder: Jordan Stanga jordan.stanga@crowncastle.com	Location: DocuSign
--	--	--------------------

Signer Events

Justin Linette
justin.linette@crowncastle.com
Crown Castle International Corp.
Security Level: Email, Account Authentication (None)

Signature

DocuSigned by:

1B4005B2547C41D...
Using IP Address: 64.213.130.241

Timestamp

Sent: 1/9/2017 | 11:29:53 AM
Viewed: 1/9/2017 | 11:34:26 AM
Signed: 1/9/2017 | 11:41:00 AM

Electronic Record and Signature Disclosure:
Not Offered via DocuSign
ID:

In Person Signer Events	Signature	Timestamp
Editor Delivery Events	Status	Timestamp
Agent Delivery Events	Status	Timestamp
Intermediary Delivery Events	Status	Timestamp
Certified Delivery Events	Status	Timestamp
Carbon Copy Events	Status	Timestamp
Notary Events		Timestamp
Envelope Summary Events	Status	Timestamps
Envelope Sent	Hashed/Encrypted	1/9/2017 11:29:53 AM
Certified Delivered	Security Checked	1/9/2017 11:34:26 AM
Signing Complete	Security Checked	1/9/2017 11:41:00 AM
Completed	Security Checked	1/9/2017 11:41:00 AM
Payment Events	Status	Timestamps



Date: December 27, 2016

Timothy Howell
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277
980.209.8242

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

Subject: Structural Modification Report

Carrier Designation: *Sprint PCS Co-Locate*
Carrier Site Number: CT23XC411
Carrier Site Name: N/A

Crown Castle Designation:
Crown Castle BU Number: 876360
Crown Castle Site Name: PRESTON / TOWN HALL
Crown Castle JDE Job Number: 399007
Crown Castle Work Order Number: 1338804
Crown Castle Application Number: 363243 Rev. 2

Engineering Firm Designation: Paul J. Ford and Company Project Number: 37516-3879.001.7700

Site Data: 389 Rt. 2, PRESTON, New London County, CT
Latitude 41° 29' 25.25", Longitude -71° 59' 29.55"
147 Foot - Monopole Tower

Dear Timothy Howell,

Paul J. Ford and Company 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 982074, in accordance with application 363243, 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 Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

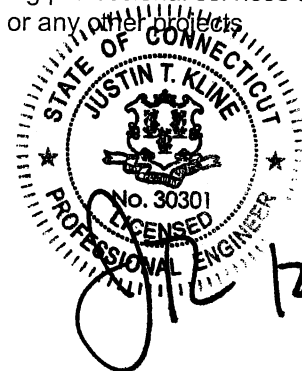
This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 135 mph converted to a nominal 3-second gust wind speed of 105 mph per Section 1609.3 and Appendix N as required for use in the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. Risk Category II and Exposure Category C were used in this analysis.

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

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

Respectfully submitted by:

Joey Meinerding, E.I. BKK
Structural Designer



12-28-16

Date: **December 27, 2016**

Timothy Howell
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277
980.209.8242

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

Subject: Structural Modification Report

Carrier Designation: **Sprint PCS Co-Locate**
Carrier Site Number: CT23XC411
Carrier Site Name: N/A

Crown Castle Designation: **Crown Castle BU Number:** 876360
Crown Castle Site Name: PRESTON / TOWN HALL
Crown Castle JDE Job Number: 399007
Crown Castle Work Order Number: 1338804
Crown Castle Application Number: 363243 Rev. 2

Engineering Firm Designation: **Paul J. Ford and Company Project Number:** 37516-3879.001.7700

Site Data: **389 Rt. 2, PRESTON, New London County, CT**
Latitude 41° 29' 25.25", Longitude -71° 59' 29.55"
147 Foot - Monopole Tower

Dear Timothy Howell,

Paul J. Ford and Company 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 982074, in accordance with application 363243, 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 Equipment
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

Sufficient Capacity

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 135 mph converted to a nominal 3-second gust wind speed of 105 mph per Section 1609.3 and Appendix N as required for use in the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. Risk Category II and Exposure Category C were used in this analysis.

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

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

Respectfully submitted by:

Joey Meinerding, E.I.
Structural Designer

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA

Table 1 - Proposed Antenna and Cable Information

Table 2 - Existing and Reserved Antenna and Cable Information

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

4) ANALYSIS RESULTS

Table 4 – Section Capacity (Summary)

Table 5 – Tower Component Stresses vs. Capacity

4.1) Recommendations

5) APPENDIX A

tnxTower Output

6) APPENDIX B

Base Level Drawing

7) APPENDIX C

Additional Calculations

1) INTRODUCTION

This tower is a 147 ft. monopole tower designed by Engineered Endeavors, Inc. in May of 2000. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 135 mph converted to a nominal 3-second gust wind speed of 105 mph per Section 1609.3 and Appendix N as required for use in the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. Risk Category II and Exposure Category C were used in this analysis.

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
147.0	147.0	3	alcatel lucent	1900MHZ RRH	1 4 1 3	1/8 17/64 7/8 1-1/4	--
		3	alcatel lucent	800MHZ RRH			
		3	argus technologies	LLPX310R-V1 w/ Mount Pipe			
		1	box enclosures and assembly	BEN-92P			
		3	nokia	FWHR			
		3	rfs celwave	APXVSP18-C-A20 w/ Mount Pipe			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
147.0	147.0	6	decibel	DB978H90T2E-M w/ Mount Pipe	6	1-5/8	3
		1	tower mounts	Platform Mount [LP 601-1]	--	--	1
136.0	138.0	3	alcatel lucent	RRH2x60-700	2	1-5/8	2
		3	alcatel lucent	RRH4X45-AWS4 B66			
		6	andrew	SBNHH-1D65A w/ Mount Pipe			
		6	antel	LPA-80080/4CF w/ Mount Pipe			
	1	rfs celwave	DB-B1-6C-12AB-0Z				
	136.0	1	tower mounts	Platform Mount [LP 601-1]	12	1-5/8	1
129.0	129.0	3	andrew	LNx-6515DS-VTM w/ Mount Pipe	6	1-5/8	1
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe			
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
		3	ericsson	RRUS 11 B12			
		1	tower mounts	Platform Mount [LP 1201-1]			
120.0	120.0	6	ericsson	TME-RRUS-11	--	--	1
		1	tower mounts	Side Arm Mount [SO 102-3]			
118.0	118.0	3	kmw communications	AM-X-WM-17-65-00T w/ Mount Pipe	3 6	3/8 1-1/4	1
		6	powerwave technologies	LGP21401			
		3	powerwave technologies	RA21.7770.00 w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 303-1]			
50.0	51.0	1	lucent	KS24019-L112A	1	1/2	1
	50.0	1	tower mounts	Side Arm Mount [SO 701-1]			
45.0	46.0	1	lucent	KS24019-L112A	1	1/2	1
	45.0	1	tower mounts	Pipe Mount [PM 601-1]			

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

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH, 08-01210G, 01/24/2008	2192501	CCISITES
4-POST-MODIFICATION INSPECTION	Vertical Solutions, 080609.05, 09/26/2008	2331610	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 131001.876360, 04/04/2013	3846952	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	EEl, 6938, 05/03/2000	1615411	CCISITES
4-TOWER MANUFACTURER DRAWINGS	EEl, 6938, 05/02/2000	1615372	CCISITES
4-POST-MODIFICATION INSPECTION	FDH Velocitel, 15BIUM1500, 11/30/2015	5995667	CCISITES
4-POST-MODIFICATION INSPECTION	ETS, 151886, 01/26/2016	6072770	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.5.1), 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) For existing modifications: monopole was modified in conformance with the referenced modification drawings.
- 5) For proposed modifications: monopole will be modified in conformance with the attached proposed modification drawings.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	147 - 120.37	Pole	TP21.98x16.25x0.1875	1	-8.12	903.55	69.0	Pass
L2	120.37 - 115	Pole	TP22.7327x20.9057x0.25	2	-11.32	1325.42	74.0	Pass
L3	115 - 110.5	Pole	TP23.6864x22.7327x0.4615	3	-12.13	1438.08	82.3	Pass
L4	110.5 - 106.417	Pole	TP24.5518x23.6864x0.6662	4	-13.10	2136.55	63.9	Pass
L5	106.417 - 105	Pole	TP24.8521x24.5518x0.6599	5	-13.43	2143.48	66.2	Pass
L6	105 - 103.5	Pole	TP25.17x24.8521x0.9173	6	-13.90	2862.88	52.6	Pass
L7	103.5 - 94.1667	Pole	TP27.1481x25.17x0.6563	7	-16.25	2245.42	81.0	Pass
L8	94.1667 - 84.91	Pole	TP29.11x27.1481x0.7592	8	-17.78	2697.13	74.6	Pass
L9	84.91 - 71.3333	Pole	TP31.486x26.7077x0.7868	9	-24.74	3138.13	84.4	Pass
L10	71.3333 - 59.5	Pole	TP33.993x31.486x0.7446	10	-28.95	3220.88	93.2	Pass
L11	59.5 - 58.5833	Pole	TP34.1872x33.993x0.7522	11	-29.29	3271.89	92.6	Pass
L12	58.5833 - 44.41	Pole	TP37.19x34.1872x0.7724	12	-32.91	3707.95	88.7	Pass
L13	44.41 - 34.25	Pole	TP38.7256x34.5498x0.8025	13	-36.91	3841.00	92.8	Pass
L14	34.25 - 33.5	Pole	TP38.8849x38.7256x0.8004	14	-41.61	4153.54	91.4	Pass
L15	33.5 - 30.5	Pole	TP39.5221x38.8849x0.8547	15	-43.03	4599.50	84.4	Pass
L16	30.5 - 29.75	Pole	TP39.6814x39.5221x0.8525	16	-43.39	4609.95	84.6	Pass
L17	29.75 - 29	Pole	TP39.8407x39.6814x0.8768	17	-43.76	4740.81	82.8	Pass
L18	29 - 27.5833	Pole	TP40.1416x39.8407x0.9138	18	-44.48	4880.38	81.3	Pass
L19	27.5833 - 19.75	Pole	TP41.8053x40.1416x0.8183	19	-48.23	4821.87	86.0	Pass
L20	19.75 - 13.75	Pole	TP43.0796x41.8053x0.9253	20	-51.52	5479.21	78.7	Pass
L21	13.75 - 6.75	Pole	TP44.5664x43.0796x0.8192	21	-55.08	4906.64	90.8	Pass
L22	6.75 - 4	Pole	TP45.1504x44.5664x0.7505	22	-56.41	4785.99	94.1	Pass
L23	4 - 2.5	Pole	TP45.469x45.1504x0.7433	23	-57.14	4952.02	91.6	Pass
L24	2.5 - 0	Pole	TP46x45.469x0.7887	24	-58.43	5476.98	84.0	Pass
							Summary	
						Pole (L22)	94.1	Pass
						RATING =	94.1	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	91.1	Pass
1	Base Plate	0	95.4	Pass
1	Base Foundation Structural Steel	0	92.6	Pass
1	Base Foundation Soil Interaction	0	22.4	Pass

Structure Rating (max from all components) =	95.4%
---	--------------

Notes:

- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

Install the proposed modifications per the attached drawings.

APPENDIX A
TNXTOWER OUTPUT

Tower Input Data

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

- 1) Tower is located in New London County, Connecticut.
- 2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
- 3) Basic wind speed of 105.00 mph.
- 4) Structure Class II.
- 5) Exposure Category C.
- 6) Topographic Category 1.
- 7) Crest Height 0.0000 ft.
- 8) Nominal ice thickness of 0.7500 in.
- 9) Ice thickness is considered to increase with height.
- 10) Ice density of 56.00 pcf.
- 11) A wind speed of 50.00 mph is used in combination with ice.
- 12) Temperature drop of 50.00 °F.
- 13) Deflections calculated using a wind speed of 60.00 mph.
- 14) A non-linear (P-delta) analysis was used.
- 15) Pressures are calculated at each section.
- 16) Stress ratio used in pole design is 1.
- 17) 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) SR Members Have Cut Ends SR Members Are Concentric	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 Add IBC .6D+W Combination Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line 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 Feed Line Torque Include Angle Block Shear Check Use TIA-222-G Bracing Resist. Exemption Use TIA-222-G Tension Splice Exemption <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
--	--	---

Tapered Pole Section Geometry

Section	Elevation <i>ft</i>	Section Length <i>ft</i>	Splice Length <i>ft</i>	Number of Sides	Top Diameter <i>in</i>	Bottom Diameter <i>in</i>	Wall Thickness <i>in</i>	Bend Radius <i>in</i>	Pole Grade
L1	147.0000- 120.3700	26.6300	3.25	18	16.2500	21.9800	0.1875	0.7500	A572-65 (65 ksi)
L2	120.3700- 115.0000	8.6200	0.00	18	20.9057	22.7327	0.2500	1.0000	A572-65 (65 ksi)
L3	115.0000- 110.5000	4.5000	0.00	18	22.7327	23.6864	0.4615	1.8462	Reinf 36.98 ksi (37 ksi)
L4	110.5000- 106.4167	4.0833	0.00	18	23.6864	24.5518	0.6662	2.6648	Reinf 37.01 ksi (37 ksi)
L5	106.4167-	1.4167	0.00	18	24.5518	24.8521	0.6599	2.6396	Reinf 37.01 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
L6	105.0000 105.0000- 103.5000	1.5000	0.00	18	24.8521	25.1700	0.9173	3.6694	(37 ksi) Reinf 35.47 ksi (35 ksi)
L7	103.5000- 94.1667	9.3333	0.00	18	25.1700	27.1481	0.6563	2.6251	Reinf 35.60 ksi (36 ksi)
L8	94.1667- 84.9100	9.2567	4.17	18	27.1481	29.1100	0.7592	3.0370	Reinf 35.65 ksi (36 ksi)
L9	84.9100- 71.3333	17.7467	0.00	18	26.7077	31.4860	0.7868	3.1474	Reinf 35.81 ksi (36 ksi)
L10	71.3333- 59.5000	11.8333	0.00	18	31.4860	33.9930	0.7446	2.9785	Reinf 35.86 ksi (36 ksi)
L11	59.5000- 58.5833	0.9167	0.00	18	33.9930	34.1872	0.7522	3.0088	Reinf 35.86 ksi (36 ksi)
L12	58.5833- 44.4100	14.1733	5.17	18	34.1872	37.1900	0.7724	3.0898	Reinf 37.46 ksi (37 ksi)
L13	44.4100- 34.2500	15.3300	0.00	18	34.5498	38.7256	0.8025	3.2098	Reinf 37.53 ksi (38 ksi)
L14	34.2500- 33.5000	0.7500	0.00	18	38.7256	38.8849	0.8004	3.2015	Reinf 37.56 ksi (38 ksi)
L15	33.5000- 30.5000	3.0000	0.00	18	38.8849	39.5221	0.8547	3.4190	Reinf 38.36 ksi (38 ksi)
L16	30.5000- 29.7500	0.7500	0.00	18	39.5221	39.6814	0.8525	3.4098	Reinf 38.39 ksi (38 ksi)
L17	29.7500- 29.0000	0.7500	0.00	18	39.6814	39.8407	0.8768	3.5072	Reinf 38.25 ksi (38 ksi)
L18	29.0000- 27.5833	1.4167	0.00	18	39.8407	40.1416	0.9137	3.6550	Reinf 37.53 ksi (38 ksi)
L19	27.5833- 19.7500	7.8333	0.00	18	40.1416	41.8053	0.8183	3.2730	Reinf 39.63 ksi (40 ksi)
L20	19.7500- 13.7500	6.0000	0.00	18	41.8053	43.0796	0.9253	3.7012	Reinf 38.72 ksi (39 ksi)
L21	13.7500- 6.7500	7.0000	0.00	18	43.0796	44.5664	0.8192	3.2767	Reinf 37.74 ksi (38 ksi)
L22	6.7500-4.0000	2.7500	0.00	18	44.5664	45.1504	0.7505	3.0020	Reinf 39.59 ksi (40 ksi)
L23	4.0000-2.5000	1.5000	0.00	18	45.1504	45.4690	0.7433	2.9731	Reinf 41.06 ksi (41 ksi)
L24	2.5000-0.0000	2.5000		18	45.4690	46.0000	0.7887	3.1546	Reinf 42.34 ksi (42 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	16.5007	9.5592	311.5911	5.7022	8.2550	37.7457	623.5922	4.7805	2.5300	13.493
	22.3191	12.9693	778.1562	7.7363	11.1658	69.6908	1557.3364	6.4859	3.5385	18.872
L2	21.9276	16.3903	883.4938	7.3328	10.6201	83.1908	1768.1501	8.1967	3.2394	12.958
	23.0833	17.8400	1139.2706	7.9813	11.5482	98.6536	2280.0402	8.9217	3.5609	14.244
L3	23.0833	32.6256	2044.4632	7.9062	11.5482	177.0376	4091.6166	16.3159	3.1886	6.909
	24.0518	34.0227	2318.5287	8.2448	12.0327	192.6859	4640.1081	17.0146	3.3565	7.272
L4	24.0518	48.6766	3258.9351	8.1722	12.0327	270.8402	6522.1584	24.3429	2.9963	4.498
	24.9306	50.5066	3640.4747	8.4794	12.4723	291.8843	7285.7395	25.2581	3.1486	4.726
L5	24.9306	50.0414	3608.8520	8.4816	12.4723	289.3489	7222.4527	25.0255	3.1597	4.788
	25.2355	50.6703	3746.6311	8.5882	12.6249	296.7663	7498.1921	25.3400	3.2126	4.868
L6	25.2355	69.6892	5043.8284	8.4968	12.6249	399.5159	10094.293	34.8512	2.7594	3.008
	25.5583	70.6149	5247.4982	8.6097	12.7864	410.3983	10501.901	35.3142	2.8154	3.069
							6 3			
L7	25.5583	51.0621	3876.6321	8.7024	12.7864	303.1851	7758.3652	25.5359	3.2749	4.99
	27.5669	55.1825	4892.8657	9.4046	13.7912	354.7807	9792.1695	27.5965	3.6230	5.521
L8	27.5669	63.5926	5594.8163	9.3680	13.7912	405.6790	11196.994	31.8024	3.4418	4.533
							5			
	29.5591	68.3204	6937.7328	10.0645	14.7879	469.1499	13884.594	34.1667	3.7871	4.988
							5			
L9	28.2598	64.7356	5495.1560	9.2019	13.5675	405.0228	10997.542	32.3739	3.3157	4.214

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
	31.9717	76.6691	9128.7461	10.8982	15.9949	570.7286	18269.504	38.3418	4.1567	5.283
L10	31.9717	72.6559	8674.7188	10.9132	15.9949	542.3429	17360.851	36.3349	4.2310	5.682
	34.5174	78.5811	10974.813	11.8032	17.2685	635.5410	21964.068	39.2980	4.6722	6.275
L11	34.5174	79.3619	11078.814	11.8005	17.2685	641.5636	22172.206	39.6885	4.6589	6.194
	34.7146	79.8256	11274.135	11.8694	17.3671	649.1656	22563.105	39.9204	4.6931	6.239
L12	34.7146	81.9239	11556.484	11.8623	17.3671	665.4233	23128.174	40.9697	4.6575	6.03
	37.7637	89.2858	14960.346	12.9282	18.8925	791.8661	29940.378	44.6514	5.1859	6.714
L13	36.5128	85.9537	12367.484	11.9803	17.5513	704.6478	24751.242	42.9850	4.6685	5.818
	39.3230	96.5895	17549.992	13.4627	19.6726	892.1022	35123.078	48.3039	5.4034	6.734
L14	39.3230	96.3444	17507.382	13.4635	19.6726	889.9363	35037.801	48.1813	5.4071	6.756
	39.4848	96.7490	17728.908	13.5200	19.7535	897.5052	35481.145	48.3837	5.4351	6.791
L15	39.4848	103.1738	18852.280	13.5007	19.7535	954.3746	37729.366	51.5967	5.3394	6.247
	40.1318	104.9024	19815.816	13.7269	20.0772	986.9797	39657.706	52.4612	5.4515	6.378
L16	40.1318	104.6276	19766.237	13.7277	20.0772	984.5104	39558.484	52.3237	5.4556	6.4
	40.2935	105.0586	20011.526	13.7843	20.1582	992.7263	40049.385	52.5393	5.4836	6.433
L17	40.2935	107.9930	20544.669	13.7756	20.1582	1019.1743	41116.372	54.0068	5.4407	6.205
	40.4553	108.4363	20798.712	13.8322	20.2391	1027.6516	41624.793	54.2284	5.4688	6.237
L18	40.4553	112.8976	21613.373	13.8191	20.2391	1067.9035	43255.186	56.4595	5.4038	5.914
	40.7608	113.7702	22118.446	13.9259	20.3919	1084.6670	44265.996	56.8959	5.4567	5.972
L19	40.7608	102.1288	19951.990	13.9598	20.3919	978.4262	39930.234	51.0741	5.6248	6.874
	42.4502	106.4498	22593.075	14.5504	21.2371	1063.8498	45215.880	53.2350	5.9176	7.232
L20	42.4502	120.0618	25349.183	14.5124	21.2371	1193.6278	50731.721	60.0423	5.7292	6.192
	43.7442	123.8045	27794.457	14.9648	21.8845	1270.0547	55625.487	61.9140	5.9535	6.434
L21	43.7442	109.8805	24792.845	15.0025	21.8845	1132.8974	49618.314	54.9507	6.1403	7.496
	45.2539	113.7461	27502.628	15.5303	22.6397	1214.7956	55041.445	56.8838	6.4019	7.815
L22	45.2539	104.3732	25315.667	15.5546	22.6397	1118.1972	50664.646	52.1965	6.5228	8.691
	45.8470	105.7645	26341.604	15.7620	22.9364	1148.4617	52717.869	52.8923	6.6256	8.828
L23	45.8470	104.7641	26100.920	15.7645	22.9364	1137.9682	52236.184	52.3920	6.6383	8.931
	46.1705	105.5157	26666.709	15.8776	23.0983	1154.4898	53368.507	52.7679	6.6944	9.007
L24	46.1705	111.8442	28208.771	15.8615	23.0983	1221.2508	56454.661	55.9327	6.6145	8.387
	46.7096	113.1733	29226.467	16.0500	23.3680	1250.7047	58491.391	56.5974	6.7080	8.506

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	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft ²	in					in	in	in

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	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft ²	in					in	in	in
L1 147.0000-120.3700				1	1	1			
L2 120.3700-115.0000				1	1	1			
L3 115.0000-110.5000				1	1	1			
L4 110.5000-106.4167				1	1	1			
L5 106.4167-105.0000				1	1	1			
L6 105.0000-103.5000				1	1	1			
L7 103.5000-94.1667				1	1	1			
L8 94.1667-84.9100				1	1	1			
L9 84.9100-71.3333				1	1	1			
L10 71.3333-59.5000				1	1	1			
L11 59.5000-58.5833				1	1	1			
L12 58.5833-44.4100				1	1	1			
L13 44.4100-34.2500				1	1	1			
L14 34.2500-33.5000				1	1	1			
L15 33.5000-30.5000				1	1	1			
L16 30.5000-29.7500				1	1	1			
L17 29.7500-29.0000				1	1	1			
L18 29.0000-27.5833				1	1	1			
L19 27.5833-19.7500				1	1	1			
L20 19.7500-13.7500				1	1	1			
L21 13.7500-6.7500				1	1	1			
L22 6.7500-4.0000				1	1	1			
L23 4.0000-2.5000				1	1	1			
L24 2.5000-0.0000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number		$C_A A_A$	Weight
				ft			ft ² /ft	plf
004U8X-32125E2G(1/8)	C	No	Inside Pole	147.0000 - 0.0000	1	No Ice	0.0000	0.01
						1/2" Ice	0.0000	0.01
						1" Ice	0.0000	0.01
7919A(17/64)	C	No	Inside Pole	147.0000 - 0.0000	4	No Ice	0.0000	0.03
						1/2" Ice	0.0000	0.03
						1" Ice	0.0000	0.03
TYPE SOOW 12/9(7/8")	C	No	Inside Pole	147.0000 - 0.0000	1	No Ice	0.0000	0.51
						1/2" Ice	0.0000	0.51
						1" Ice	0.0000	0.51

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _A A _A		Weight
							ft ² /ft	plf
HB114-1-08U4-M5F(1-1/4)	C	No	Inside Pole	147.0000 - 129.0000	3	No Ice	0.0000	1.08
						1/2" Ice	0.0000	1.08
						1" Ice	0.0000	1.08

LDF7-50A(1-5/8")	C	No	Inside Pole	136.0000 - 0.0000	12	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	136.0000 - 0.0000	2	No Ice	0.0000	1.30
						1/2" Ice	0.0000	1.30
						1" Ice	0.0000	1.30

LDF7-50A(1-5/8")	C	No	Inside Pole	129.0000 - 0.0000	5	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	129.0000 - 0.0000	1	No Ice	0.1980	0.82
						1/2" Ice	0.2980	2.33
						1" Ice	0.3980	4.46

AVA6-50(1-1/4")	C	No	Inside Pole	118.0000 - 0.0000	6	No Ice	0.0000	0.45
						1/2" Ice	0.0000	0.45
						1" Ice	0.0000	0.45
FB-L98B-002-75000(3/8")	C	No	Inside Pole	118.0000 - 0.0000	3	No Ice	0.0000	0.06
						1/2" Ice	0.0000	0.06
						1" Ice	0.0000	0.06
2" (Nominal) Conduit	C	No	Inside Pole	118.0000 - 0.0000	1	No Ice	0.0000	0.72
						1/2" Ice	0.0000	0.72
						1" Ice	0.0000	0.72

LDF4-50A(1/2")	C	No	Inside Pole	50.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.15
						1" Ice	0.0000	0.15

LDF4-50A(1/2")	C	No	Inside Pole	45.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.15
						1" Ice	0.0000	0.15

1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	108.6700 - 0.0000	1	No Ice	0.2083	0.00
						1/2" Ice	0.3194	0.00
						1" Ice	0.4306	0.00

1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	36.2500 - 0.0000	1	No Ice	0.2083	0.00
						1/2" Ice	0.3194	0.00
						1" Ice	0.4306	0.00
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	116.5000 - 36.2500	1	No Ice	0.1667	0.00
						1/2" Ice	0.2778	0.00
						1" Ice	0.3889	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Sectio n	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	147.0000-120.3700	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.709	0.31
L2	120.3700-115.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.313	0.11
L3	115.0000-110.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.641	0.10
L4	110.5000-106.4167	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.958	0.09
L5	106.4167-	A	0.000	0.000	0.000	0.000	0.00

Tower Sectio n	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
	105.0000	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.812	0.03
L6	105.0000- 103.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.860	0.03
L7	103.5000- 94.1667	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	5.348	0.20
L8	94.1667-84.9100	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	5.304	0.20
L9	84.9100-71.3333	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	7.779	0.29
L10	71.3333-59.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.780	0.26
L11	59.5000-58.5833	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.525	0.02
L12	58.5833-44.4100	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	8.121	0.31
L13	44.4100-34.2500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	5.905	0.22
L14	34.2500-33.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.461	0.02
L15	33.5000-30.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.844	0.07
L16	30.5000-29.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.461	0.02
L17	29.7500-29.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.461	0.02
L18	29.0000-27.5833	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.871	0.03
L19	27.5833-19.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	4.815	0.17
L20	19.7500-13.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	3.688	0.13
L21	13.7500-6.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	4.303	0.15
L22	6.7500-4.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.690	0.06
L23	4.0000-2.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.922	0.03
L24	2.5000-0.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.537	0.05

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Sectio n	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L1	147.0000-	A	1.724	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
	120.3700	B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	4.685	0.38
L2	120.3700-115.0000	A	1.703	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.740	0.15
L3	115.0000-110.5000	A	1.696	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	4.864	0.13
L4	110.5000-106.4167	A	1.690	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	5.717	0.12
L5	106.4167-105.0000	A	1.685	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.350	0.04
L6	105.0000-103.5000	A	1.683	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.486	0.04
L7	103.5000-94.1667	A	1.674	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	15.416	0.27
L8	94.1667-84.9100	A	1.657	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	15.191	0.27
L9	84.9100-71.3333	A	1.635	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	22.280	0.40
L10	71.3333-59.5000	A	1.606	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	19.028	0.34
L11	59.5000-58.5833	A	1.590	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.464	0.03
L12	58.5833-44.4100	A	1.568	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	22.443	0.41
L13	44.4100-34.2500	A	1.526	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	16.171	0.29
L14	34.2500-33.5000	A	1.504	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.188	0.02
L15	33.5000-30.5000	A	1.495	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	4.735	0.09
L16	30.5000-29.7500	A	1.486	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.179	0.02
L17	29.7500-29.0000	A	1.483	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.178	0.02
L18	29.0000-27.5833	A	1.477	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.219	0.04
L19	27.5833-19.7500	A	1.451	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	12.139	0.22
L20	19.7500-13.7500	A	1.402	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	9.107	0.17
L21	13.7500-6.7500	A	1.334	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	10.322	0.19
L22	6.7500-4.0000	A	1.251	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.907	0.07
L23	4.0000-2.5000	A	1.190	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.072	0.04
L24	2.5000-0.0000	A	1.081	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.278	0.07

Feed Line Center of Pressure

Section	Elevation ft	CP _x in	CP _z in	CP _x Ice in	CP _z Ice in
L1	147.0000-120.3700	-0.0870	0.0502	-0.1927	0.1112
L2	120.3700-115.0000	-0.2777	0.1604	-0.5868	0.3388
L3	115.0000-110.5000	-0.3935	0.2272	-0.8161	0.4712
L4	110.5000-106.4167	-0.4978	0.2874	-0.9838	0.5680
L5	106.4167-105.0000	-0.5753	0.3322	-1.1008	0.6355
L6	105.0000-103.5000	-0.5769	0.3331	-1.1069	0.6391
L7	103.5000-94.1667	-0.5823	0.3362	-1.1286	0.6516
L8	94.1667-84.9100	-0.5908	0.3411	-1.1628	0.6713
L9	84.9100-71.3333	-0.5968	0.3446	-1.1902	0.6871
L10	71.3333-59.5000	-0.6074	0.3507	-1.2266	0.7082
L11	59.5000-58.5833	-0.6116	0.3531	-1.2419	0.7170
L12	58.5833-44.4100	-0.6161	0.3557	-1.2575	0.7260
L13	44.4100-34.2500	-0.6283	0.3627	-1.2837	0.7412
L14	34.2500-33.5000	-0.6624	0.3824	-1.3000	0.7505
L15	33.5000-30.5000	-0.6634	0.3830	-1.3019	0.7517
L16	30.5000-29.7500	-0.6645	0.3836	-1.3036	0.7527
L17	29.7500-29.0000	-0.6649	0.3839	-1.3042	0.7530
L18	29.0000-27.5833	-0.6655	0.3842	-1.3050	0.7535
L19	27.5833-19.7500	-0.6679	0.3856	-1.3071	0.7546
L20	19.7500-13.7500	-0.6714	0.3876	-1.3053	0.7536
L21	13.7500-6.7500	-0.6745	0.3894	-1.2941	0.7472
L22	6.7500-4.0000	-0.6768	0.3907	-1.2718	0.7343
L23	4.0000-2.5000	-0.6777	0.3913	-1.2515	0.7226
L24	2.5000-0.0000	-0.6786	0.3918	-1.2109	0.6991

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K ₀ No Ice	K ₀ Ice

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K	
APXVSP18-C-A20 w/ Mount Pipe	A	From Leg	4.0000	0.0000	147.0000	No Ice	8.2619	6.9458	0.08
			0.00			1/2"	8.8215	8.1266	0.15
			0.00			Ice	9.3462	9.0212	0.23
						1" Ice			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
			ft	ft	°	ft	ft ²	ft ²	K
APXVSP18-C-A20 w/ Mount Pipe	B	From Leg	4.0000	0.0000	147.0000	No Ice	8.2619	6.9458	0.08
			0.00			1/2"	8.8215	8.1266	0.15
			0.00			Ice	9.3462	9.0212	0.23
APXVSP18-C-A20 w/ Mount Pipe	C	From Leg	4.0000	0.0000	147.0000	No Ice	8.2619	6.9458	0.08
			0.00			1/2"	8.8215	8.1266	0.15
			0.00			Ice	9.3462	9.0212	0.23
LLPX310R-V1 w/ Mount Pipe	A	From Leg	4.0000	0.0000	147.0000	No Ice	4.5378	2.9834	0.05
			0.00			1/2"	4.8914	3.5263	0.08
			0.00			Ice	5.2539	4.0859	0.13
LLPX310R-V1 w/ Mount Pipe	B	From Leg	4.0000	0.0000	147.0000	No Ice	4.5378	2.9834	0.05
			0.00			1/2"	4.8914	3.5263	0.08
			0.00			Ice	5.2539	4.0859	0.13
LLPX310R-V1 w/ Mount Pipe	C	From Leg	4.0000	0.0000	147.0000	No Ice	4.5378	2.9834	0.05
			0.00			1/2"	4.8914	3.5263	0.08
			0.00			Ice	5.2539	4.0859	0.13
1900MHz RRH	A	From Leg	4.0000	0.0000	147.0000	No Ice	2.4917	3.2583	0.04
			0.00			1/2"	2.6954	3.4843	0.08
			0.00			Ice	2.9065	3.7176	0.11
1900MHz RRH	B	From Leg	4.0000	0.0000	147.0000	No Ice	2.4917	3.2583	0.04
			0.00			1/2"	2.6954	3.4843	0.08
			0.00			Ice	2.9065	3.7176	0.11
1900MHz RRH	C	From Leg	4.0000	0.0000	147.0000	No Ice	2.4917	3.2583	0.04
			0.00			1/2"	2.6954	3.4843	0.08
			0.00			Ice	2.9065	3.7176	0.11
800MHZ RRH	A	From Leg	4.0000	0.0000	147.0000	No Ice	2.1342	1.7730	0.05
			0.00			1/2"	2.3195	1.9461	0.07
			0.00			Ice	2.5123	2.1267	0.10
800MHZ RRH	B	From Leg	4.0000	0.0000	147.0000	No Ice	2.1342	1.7730	0.05
			0.00			1/2"	2.3195	1.9461	0.07
			0.00			Ice	2.5123	2.1267	0.10
800MHZ RRH	C	From Leg	4.0000	0.0000	147.0000	No Ice	2.1342	1.7730	0.05
			0.00			1/2"	2.3195	1.9461	0.07
			0.00			Ice	2.5123	2.1267	0.10
FWHR	A	From Leg	4.0000	0.0000	147.0000	No Ice	1.0350	0.5082	0.03
			0.00			1/2"	1.1637	0.6007	0.04
			0.00			Ice	1.2999	0.7006	0.05
FWHR	B	From Leg	4.0000	0.0000	147.0000	No Ice	1.0350	0.5082	0.03
			0.00			1/2"	1.1637	0.6007	0.04
			0.00			Ice	1.2999	0.7006	0.05
FWHR	C	From Leg	4.0000	0.0000	147.0000	No Ice	1.0350	0.5082	0.03
			0.00			1/2"	1.1637	0.6007	0.04
			0.00			Ice	1.2999	0.7006	0.05
BEN-92P	A	From Leg	4.0000	0.0000	147.0000	No Ice	0.6453	0.4198	0.00
			0.00			1/2"	0.7474	0.5067	0.01
			0.00			Ice	0.8569	0.6009	0.02
(2) 2.375" OD x 6' Mount Pipe	A	From Leg	4.0000	0.0000	147.0000	No Ice	1.4250	1.4250	0.03
			0.00			1/2"	1.9250	1.9250	0.04
			0.00			Ice	2.2939	2.2939	0.05
(2) 2.375" OD x 6' Mount Pipe	B	From Leg	4.0000	0.0000	147.0000	No Ice	1.4250	1.4250	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
Pipe			0.00 0.00			1/2" Ice 2.2939	1.9250 2.2939	0.04 0.05
(2) 2.375" OD x 6' Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.0000	147.0000	1" Ice No Ice 1/2" Ice 2.2939	1.4250 1.4250 1.9250 2.2939	0.03 0.04 0.05
Platform Mount [LP 601-1]	C	None		0.0000	147.0000	1" Ice No Ice 1/2" Ice 38.7100	28.4700 28.4700 33.5900 38.7100	1.12 1.51 1.91

(2) LPA-80080/4CF w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.0000	136.0000	No Ice 1/2" Ice 3.5922	2.8561 3.2195 7.1948 7.8369	0.03 0.08 0.13
(2) LPA-80080/4CF w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.0000	136.0000	No Ice 1/2" Ice 3.5922	2.8561 3.2195 7.1948 7.8369	0.03 0.08 0.13
(2) LPA-80080/4CF w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.0000	136.0000	1" Ice No Ice 1/2" Ice 3.5922	2.8561 2.8561 3.2195 7.1948 7.8369	0.03 0.08 0.13
(2) SBNHH-1D65A w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.0000	136.0000	1" Ice No Ice 1/2" Ice 6.5968	5.8154 5.0515 6.2024 5.7157 6.3790	0.06 0.11 0.17
(2) SBNHH-1D65A w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.0000	136.0000	1" Ice No Ice 1/2" Ice 6.5968	5.8154 5.0515 6.2024 5.7157 6.3790	0.06 0.11 0.17
(2) SBNHH-1D65A w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.0000	136.0000	1" Ice No Ice 1/2" Ice 6.5968	5.8154 5.0515 6.2024 5.7157 6.3790	0.06 0.11 0.17
RRH4X45-AWS4 B66	A	From Leg	4.0000 0.00 2.00	0.0000	136.0000	1" Ice No Ice 1/2" Ice 3.1037	2.6600 1.5861 2.8781 1.7690 1.9588	0.06 0.08 0.11
RRH4X45-AWS4 B66	B	From Leg	4.0000 0.00 2.00	0.0000	136.0000	1" Ice No Ice 1/2" Ice 3.1037	2.6600 1.5861 2.8781 1.7690 1.9588	0.06 0.08 0.11
RRH4X45-AWS4 B66	C	From Leg	4.0000 0.00 2.00	0.0000	136.0000	1" Ice No Ice 1/2" Ice 3.1037	2.6600 1.5861 2.8781 1.7690 1.9588	0.06 0.08 0.11
RRH2x60-700	A	From Leg	4.0000 0.00 2.00	0.0000	136.0000	1" Ice No Ice 1/2" Ice 4.0285	3.5002 1.8157 3.7609 2.0519 2.2894	0.06 0.08 0.11
RRH2x60-700	B	From Leg	4.0000 0.00 2.00	0.0000	136.0000	1" Ice No Ice 1/2" Ice 4.0285	3.5002 1.8157 3.7609 2.0519 2.2894	0.06 0.08 0.11
RRH2x60-700	C	From Leg	4.0000 0.00 2.00	0.0000	136.0000	1" Ice No Ice 1/2" Ice 4.0285	3.5002 1.8157 3.7609 2.0519 2.2894	0.06 0.08 0.11
DB-B1-6C-12AB-0Z	A	From Leg	4.0000 0.00 2.00	0.0000	136.0000	1" Ice No Ice 1/2" Ice 3.8383	3.3636 2.1921 3.5972 2.3950 2.6056	0.03 0.06 0.09
Platform Mount [LP 601-1]	C	None		0.0000	136.0000	1" Ice No Ice	28.4700 28.4700	1.12

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
						1/2"	33.5900	33.5900	1.51
						Ice	38.7100	38.7100	1.91
						1" Ice			

ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.0000	129.0000	No Ice 1/2" Ice 1" Ice	6.3292 6.7751 7.2137	5.6424 6.4259 7.1313	0.11 0.17 0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.0000	129.0000	No Ice 1/2" Ice 1" Ice	6.3292 6.7751 7.2137	5.6424 6.4259 7.1313	0.11 0.17 0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.0000	129.0000	No Ice 1/2" Ice 1" Ice	6.3292 6.7751 7.2137	5.6424 6.4259 7.1313	0.11 0.17 0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.0000	129.0000	No Ice 1/2" Ice 1" Ice	6.3186 6.7646 7.2032	5.6334 6.4160 7.1208	0.11 0.17 0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.0000	129.0000	No Ice 1/2" Ice 1" Ice	6.3186 6.7646 7.2032	5.6334 6.4160 7.1208	0.11 0.17 0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.0000	129.0000	No Ice 1/2" Ice 1" Ice	6.3186 6.7646 7.2032	5.6334 6.4160 7.1208	0.11 0.17 0.23
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.0000	129.0000	No Ice 1/2" Ice 1" Ice	11.6382 12.3560 13.0830	9.8359 11.3566 12.9014	0.08 0.17 0.27
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.0000	129.0000	No Ice 1/2" Ice 1" Ice	11.6382 12.3560 13.0830	9.8359 11.3566 12.9014	0.08 0.17 0.27
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.0000	129.0000	No Ice 1/2" Ice 1" Ice	11.6382 12.3560 13.0830	9.8359 11.3566 12.9014	0.08 0.17 0.27
KRY 112 144/1	A	From Leg	4.0000 0.00 0.00	0.0000	129.0000	No Ice 1/2" Ice 1" Ice	0.3500 0.4259 0.5093	0.1750 0.2343 0.3009	0.01 0.01 0.02
KRY 112 144/1	B	From Leg	4.0000 0.00 0.00	0.0000	129.0000	No Ice 1/2" Ice 1" Ice	0.3500 0.4259 0.5093	0.1750 0.2343 0.3009	0.01 0.01 0.02
KRY 112 144/1	C	From Leg	4.0000 0.00 0.00	0.0000	129.0000	No Ice 1/2" Ice 1" Ice	0.3500 0.4259 0.5093	0.1750 0.2343 0.3009	0.01 0.01 0.02
RRUS 11 B12	A	From Leg	4.0000 0.00 0.00	0.0000	129.0000	No Ice 1/2" Ice 1" Ice	2.8333 3.0426 3.2593	1.1821 1.3299 1.4848	0.05 0.07 0.10
RRUS 11 B12	B	From Leg	4.0000 0.00 0.00	0.0000	129.0000	No Ice 1/2" Ice 1" Ice	2.8333 3.0426 3.2593	1.1821 1.3299 1.4848	0.05 0.07 0.10
RRUS 11 B12	C	From Leg	4.0000 0.00 0.00	0.0000	129.0000	No Ice 1/2" Ice 1" Ice	2.8333 3.0426 3.2593	1.1821 1.3299 1.4848	0.05 0.07 0.10
Platform Mount [LP 1201-	C	None		0.0000	129.0000	No Ice	23.1000	23.1000	2.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
1]						1/2" Ice 30.5000	26.8000 30.5000	2.50 2.90
***						1" Ice		
(2) TME-RRUS-11	A	From Leg	2.0000 0.00 0.00	0.0000	120.0000	No Ice 1/2" Ice 3.2066	2.7845 1.1872 1.3342 1.4897	0.05 0.07 0.09
(2) TME-RRUS-11	B	From Leg	2.0000 0.00 0.00	0.0000	120.0000	No Ice 1/2" Ice 3.2066	2.7845 1.1872 1.3342 1.4897	0.05 0.07 0.09
(2) TME-RRUS-11	C	From Leg	2.0000 0.00 0.00	0.0000	120.0000	No Ice 1/2" Ice 3.2066	2.7845 1.1872 1.3342 1.4897	0.05 0.07 0.09
Side Arm Mount [SO 102-3]	C	None		0.0000	120.0000	No Ice 1/2" Ice 3.9600	3.0000 3.4800 3.9600	0.08 0.11 0.14
***						1" Ice		
AM-X-WM-17-65-00T w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.0000	118.0000	No Ice 1/2" Ice 4.8991	3.7892 3.2069 4.2269 4.9607	0.04 0.08 0.12
AM-X-WM-17-65-00T w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.0000	118.0000	No Ice 1/2" Ice 4.8991	3.7892 3.2069 4.2269 4.9607	0.04 0.08 0.12
AM-X-WM-17-65-00T w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.0000	118.0000	No Ice 1/2" Ice 4.8991	3.7892 3.2069 4.2269 4.9607	0.04 0.08 0.12
RA21.7770.00 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.0000	118.0000	No Ice 1/2" Ice 7.7350	6.7663 5.0018 5.9599 6.7465	0.06 0.11 0.18
RA21.7770.00 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.0000	118.0000	No Ice 1/2" Ice 7.7350	6.7663 5.0018 5.9599 6.7465	0.06 0.11 0.18
RA21.7770.00 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.0000	118.0000	No Ice 1/2" Ice 7.7350	6.7663 5.0018 5.9599 6.7465	0.06 0.11 0.18
(2) LGP21401	A	From Leg	4.0000 0.00 0.00	0.0000	118.0000	No Ice 1/2" Ice 1.3810	1.1040 0.3471 0.4422 0.5444	0.01 0.02 0.03
(2) LGP21401	B	From Leg	4.0000 0.00 0.00	0.0000	118.0000	No Ice 1/2" Ice 1.3810	1.1040 0.3471 0.4422 0.5444	0.01 0.02 0.03
(2) LGP21401	C	From Leg	4.0000 0.00 0.00	0.0000	118.0000	No Ice 1/2" Ice 1.3810	1.1040 0.3471 0.4422 0.5444	0.01 0.02 0.03
DC6-48-60-18-8F	A	From Leg	4.0000 0.00 0.00	0.0000	118.0000	No Ice 1/2" Ice 1.6431	0.9167 0.9167 1.4583 1.6431	0.02 0.04 0.06
Platform Mount [LP 303-1]	C	None		0.0000	118.0000	No Ice 1/2" Ice 23.0800	14.6600 14.6600 18.8700 23.0800	1.25 1.48 1.71
						1" Ice		

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K

KS24019-L112A	C	From Leg	3.0000	0.0000	50.0000	No Ice	0.1407	0.1407	0.01
			0.00			1/2"	0.1979	0.1979	0.01
			1.00			Ice	0.2621	0.2621	0.01
Side Arm Mount [SO 701-1]	C	None		0.0000	50.0000	1" Ice			
						No Ice	0.8500	1.6700	0.07
						1/2"	1.1400	2.3400	0.08
						Ice	1.4300	3.0100	0.09

KS24019-L112A	A	From Leg	1.0000	0.0000	45.0000	No Ice	0.1407	0.1407	0.01
			0.00			1/2"	0.1979	0.1979	0.01
			1.00			Ice	0.2621	0.2621	0.01
Pipe Mount [PM 601-1]	A	None		0.0000	45.0000	1" Ice			
						No Ice	3.0000	0.9000	0.07
						1/2"	3.7400	1.1200	0.08
						Ice	4.4800	1.3400	0.09

						1" Ice			

Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation ft	z ft	K _Z	q _Z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
L1 147.0000-120.3700	133.0198	1.344	36	43.074	A	0.000	43.074	43.074	100.00	0.000	0.000
					B	0.000	43.074	100.00	0.000	0.000	
					C	0.000	43.074	100.00	0.000	1.709	
L2 120.3700-115.0000	117.6620	1.31	35	10.071	A	0.000	10.071	10.071	100.00	0.000	0.000
					B	0.000	10.071	100.00	0.000	0.000	
					C	0.000	10.071	100.00	0.000	1.313	
L3 115.0000-110.5000	112.7346	1.298	35	8.838	A	0.000	8.838	8.838	100.00	0.000	0.000
					B	0.000	8.838	100.00	0.000	0.000	
					C	0.000	8.838	100.00	0.000	1.641	
L4 110.5000-106.4167	108.4461	1.287	35	8.334	A	0.000	8.334	8.334	100.00	0.000	0.000
					B	0.000	8.334	100.00	0.000	0.000	
					C	0.000	8.334	100.00	0.000	1.958	
L5 106.4167-105.0000	105.7069	1.28	34	2.961	A	0.000	2.961	2.961	100.00	0.000	0.000
					B	0.000	2.961	100.00	0.000	0.000	
					C	0.000	2.961	100.00	0.000	0.812	
L6 105.0000-103.5000	104.2484	1.277	34	3.175	A	0.000	3.175	3.175	100.00	0.000	0.000
					B	0.000	3.175	100.00	0.000	0.000	
					C	0.000	3.175	100.00	0.000	0.860	
L7 103.5000-94.1667	98.7745	1.262	34	20.660	A	0.000	20.660	20.660	100.00	0.000	0.000
					B	0.000	20.660	100.00	0.000	0.000	
					C	0.000	20.660	100.00	0.000	5.348	
L8 94.1667-84.9100	89.4845	1.236	33	22.033	A	0.000	22.033	22.033	100.00	0.000	0.000
					B	0.000	22.033	100.00	0.000	0.000	
					C	0.000	22.033	100.00	0.000	5.304	
L9 84.9100-71.3333	77.9822	1.201	32	34.073	A	0.000	34.073	34.073	100.00	0.000	0.000
					B	0.000	34.073	100.00	0.000	0.000	
					C	0.000	34.073	100.00	0.000	7.779	
L10 71.3333-59.5000	65.3411	1.157	31	32.783	A	0.000	32.783	32.783	100.00	0.000	0.000
					B	0.000	32.783	100.00	0.000	0.000	
					C	0.000	32.783	100.00	0.000	6.780	
L11 59.5000-58.5833	59.0412	1.133	30	2.644	A	0.000	2.644	2.644	100.00	0.000	0.000
					B	0.000	2.644	100.00	0.000	0.000	
					C	0.000	2.644	100.00	0.000	0.000	

Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L12 58.5833-44.4100	51.3973	1.1	29	42.802	C	0.000	2.644		100.00	0.000	0.525
					A	0.000	42.802	42.802	100.00	0.000	0.000
					B	0.000	42.802		100.00	0.000	0.000
					C	0.000	42.802		100.00	0.000	8.121
L13 44.4100-34.2500	39.2673	1.04	28	32.104	A	0.000	32.104	32.104	100.00	0.000	0.000
					B	0.000	32.104		100.00	0.000	0.000
					C	0.000	32.104		100.00	0.000	5.905
L14 34.2500-33.5000	33.8747	1.008	27	2.463	A	0.000	2.463	2.463	100.00	0.000	0.000
					B	0.000	2.463		100.00	0.000	0.000
					C	0.000	2.463		100.00	0.000	0.461
L15 33.5000-30.5000	31.9959	0.996	27	9.952	A	0.000	9.952	9.952	100.00	0.000	0.000
					B	0.000	9.952		100.00	0.000	0.000
					C	0.000	9.952		100.00	0.000	1.844
L16 30.5000-29.7500	30.1247	0.983	26	2.513	A	0.000	2.513	2.513	100.00	0.000	0.000
					B	0.000	2.513		100.00	0.000	0.000
					C	0.000	2.513		100.00	0.000	0.461
L17 29.7500-29.0000	29.3747	0.978	26	2.523	A	0.000	2.523	2.523	100.00	0.000	0.000
					B	0.000	2.523		100.00	0.000	0.000
					C	0.000	2.523		100.00	0.000	0.461
L18 29.0000-27.5833	28.2908	0.97	26	4.794	A	0.000	4.794	4.794	100.00	0.000	0.000
					B	0.000	4.794		100.00	0.000	0.000
					C	0.000	4.794		100.00	0.000	0.871
L19 27.5833-19.7500	23.6401	0.934	25	27.159	A	0.000	27.159	27.159	100.00	0.000	0.000
					B	0.000	27.159		100.00	0.000	0.000
					C	0.000	27.159		100.00	0.000	4.815
L20 19.7500-13.7500	16.7350	0.869	23	21.549	A	0.000	21.549	21.549	100.00	0.000	0.000
					B	0.000	21.549		100.00	0.000	0.000
					C	0.000	21.549		100.00	0.000	3.688
L21 13.7500-6.7500	10.2302	0.85	23	25.958	A	0.000	25.958	25.958	100.00	0.000	0.000
					B	0.000	25.958		100.00	0.000	0.000
					C	0.000	25.958		100.00	0.000	4.303
L22 6.7500-4.0000	5.3720	0.85	23	10.439	A	0.000	10.439	10.439	100.00	0.000	0.000
					B	0.000	10.439		100.00	0.000	0.000
					C	0.000	10.439		100.00	0.000	1.690
L23 4.0000-2.5000	3.2491	0.85	23	5.751	A	0.000	5.751	5.751	100.00	0.000	0.000
					B	0.000	5.751		100.00	0.000	0.000
					C	0.000	5.751		100.00	0.000	0.922
L24 2.5000-0.0000	1.2476	0.85	23	9.675	A	0.000	9.675	9.675	100.00	0.000	0.000
					B	0.000	9.675		100.00	0.000	0.000
					C	0.000	9.675		100.00	0.000	1.537

Tower Pressure - With Ice

$G_H = 1.100$

Section Elevation ft	z ft	K _Z	q _z psf	t _z in	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L1 147.0000-120.3700	133.0198	1.344	8	1.7244	50.727	A	0.000	50.727	50.727	100.00	0.000	0.000
						B	0.000	50.727		100.00	0.000	0.000
						C	0.000	50.727		100.00	0.000	4.685
L2 120.3700-115.0000	117.6620	1.31	8	1.7033	11.615	A	0.000	11.615	11.615	100.00	0.000	0.000
						B	0.000	11.615		100.00	0.000	0.000
						C	0.000	11.615		100.00	0.000	3.740
L3 115.0000-110.5000	112.7346	1.298	8	1.6961	10.110	A	0.000	10.110	10.110	100.00	0.000	0.000
						B	0.000	10.110		100.00	0.000	0.000
						C	0.000	10.110		100.00	0.000	4.864
L4 110.5000-106.4167	108.4461	1.287	8	1.6895	9.484	A	0.000	9.484	9.484	100.00	0.000	0.000
						B	0.000	9.484		100.00	0.000	0.000
						C	0.000	9.484		100.00	0.000	5.717
L5 106.4167-105.0000	105.7069	1.28	8	1.6852	3.359	A	0.000	3.359	3.359	100.00	0.000	0.000
						B	0.000	3.359		100.00	0.000	0.000
						C	0.000	3.359		100.00	0.000	2.350
L6 105.0000-	104.2484	1.277	8	1.6829	3.595	A	0.000	3.595	3.595	100.00	0.000	0.000

Section Elevation	z	K _z	q _z	t _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		psf	in	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
103.5000						B	0.000	3.595		100.00	0.000	0.000
						C	0.000	3.595		100.00	0.000	2.486
L7 103.5000- 94.1667	98.7745	1.262	8	1.6738	23.263	A	0.000	23.263	23.263	100.00	0.000	0.000
						B	0.000	23.263		100.00	0.000	0.000
						C	0.000	23.263		100.00	0.000	15.416
L8 94.1667- 84.9100	89.4845	1.236	8	1.6574	24.590	A	0.000	24.590	24.590	100.00	0.000	0.000
						B	0.000	24.590		100.00	0.000	0.000
						C	0.000	24.590		100.00	0.000	15.191
L9 84.9100- 71.3333	77.9822	1.201	7	1.6347	37.823	A	0.000	37.823	37.823	100.00	0.000	0.000
						B	0.000	37.823		100.00	0.000	0.000
						C	0.000	37.823		100.00	0.000	22.280
L10 71.3333- 59.5000	65.3411	1.157	7	1.6060	35.950	A	0.000	35.950	35.950	100.00	0.000	0.000
						B	0.000	35.950		100.00	0.000	0.000
						C	0.000	35.950		100.00	0.000	19.028
L11 59.5000- 58.5833	59.0412	1.133	7	1.5898	2.887	A	0.000	2.887	2.887	100.00	0.000	0.000
						B	0.000	2.887		100.00	0.000	0.000
						C	0.000	2.887		100.00	0.000	1.464
L12 58.5833- 44.4100	51.3973	1.1	7	1.5680	46.506	A	0.000	46.506	46.506	100.00	0.000	0.000
						B	0.000	46.506		100.00	0.000	0.000
						C	0.000	46.506		100.00	0.000	22.443
L13 44.4100- 34.2500	39.2673	1.04	6	1.5263	34.759	A	0.000	34.759	34.759	100.00	0.000	0.000
						B	0.000	34.759		100.00	0.000	0.000
						C	0.000	34.759		100.00	0.000	16.171
L14 34.2500- 33.5000	33.8747	1.008	6	1.5039	2.651	A	0.000	2.651	2.651	100.00	0.000	0.000
						B	0.000	2.651		100.00	0.000	0.000
						C	0.000	2.651		100.00	0.000	1.188
L15 33.5000- 30.5000	31.9959	0.996	6	1.4954	10.700	A	0.000	10.700	10.700	100.00	0.000	0.000
						B	0.000	10.700		100.00	0.000	0.000
						C	0.000	10.700		100.00	0.000	4.735
L16 30.5000- 29.7500	30.1247	0.983	6	1.4864	2.699	A	0.000	2.699	2.699	100.00	0.000	0.000
						B	0.000	2.699		100.00	0.000	0.000
						C	0.000	2.699		100.00	0.000	1.179
L17 29.7500- 29.0000	29.3747	0.978	6	1.4826	2.709	A	0.000	2.709	2.709	100.00	0.000	0.000
						B	0.000	2.709		100.00	0.000	0.000
						C	0.000	2.709		100.00	0.000	1.178
L18 29.0000- 27.5833	28.2908	0.97	6	1.4771	5.143	A	0.000	5.143	5.143	100.00	0.000	0.000
						B	0.000	5.143		100.00	0.000	0.000
						C	0.000	5.143		100.00	0.000	2.219
L19 27.5833- 19.7500	23.6401	0.934	6	1.4508	29.053	A	0.000	29.053	29.053	100.00	0.000	0.000
						B	0.000	29.053		100.00	0.000	0.000
						C	0.000	29.053		100.00	0.000	12.139
L20 19.7500- 13.7500	16.7350	0.869	5	1.4015	22.950	A	0.000	22.950	22.950	100.00	0.000	0.000
						B	0.000	22.950		100.00	0.000	0.000
						C	0.000	22.950		100.00	0.000	9.107
L21 13.7500- 6.7500	10.2302	0.85	5	1.3342	27.514	A	0.000	27.514	27.514	100.00	0.000	0.000
						B	0.000	27.514		100.00	0.000	0.000
						C	0.000	27.514		100.00	0.000	10.322
L22 6.7500- 4.0000	5.3720	0.85	5	1.2510	11.012	A	0.000	11.012	11.012	100.00	0.000	0.000
						B	0.000	11.012		100.00	0.000	0.000
						C	0.000	11.012		100.00	0.000	3.907
L23 4.0000- 2.5000	3.2491	0.85	5	1.1896	6.048	A	0.000	6.048	6.048	100.00	0.000	0.000
						B	0.000	6.048		100.00	0.000	0.000
						C	0.000	6.048		100.00	0.000	2.072
L24 2.5000- 0.0000	1.2476	0.85	5	1.0811	10.125	A	0.000	10.125	10.125	100.00	0.000	0.000
						B	0.000	10.125		100.00	0.000	0.000
						C	0.000	10.125		100.00	0.000	3.278

Tower Pressure - Service

$G_H = 1.100$

Section Elevation	z	K _Z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		psf	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
L1 147.0000- 120.3700	133.0198	1.344	11	43.074	A	0.000	43.074	43.074	100.00	0.000	0.000
					B	0.000	43.074		100.00	0.000	0.000
					C	0.000	43.074		100.00	0.000	1.709
L2 120.3700- 115.0000	117.6620	1.31	10	10.071	A	0.000	10.071	10.071	100.00	0.000	0.000
					B	0.000	10.071		100.00	0.000	0.000
					C	0.000	10.071		100.00	0.000	1.313
L3 115.0000- 110.5000	112.7346	1.298	10	8.838	A	0.000	8.838	8.838	100.00	0.000	0.000
					B	0.000	8.838		100.00	0.000	0.000
					C	0.000	8.838		100.00	0.000	1.641
L4 110.5000- 106.4167	108.4461	1.287	10	8.334	A	0.000	8.334	8.334	100.00	0.000	0.000
					B	0.000	8.334		100.00	0.000	0.000
					C	0.000	8.334		100.00	0.000	1.958
L5 106.4167- 105.0000	105.7069	1.28	10	2.961	A	0.000	2.961	2.961	100.00	0.000	0.000
					B	0.000	2.961		100.00	0.000	0.000
					C	0.000	2.961		100.00	0.000	0.812
L6 105.0000- 103.5000	104.2484	1.277	10	3.175	A	0.000	3.175	3.175	100.00	0.000	0.000
					B	0.000	3.175		100.00	0.000	0.000
					C	0.000	3.175		100.00	0.000	0.860
L7 103.5000- 94.1667	98.7745	1.262	10	20.660	A	0.000	20.660	20.660	100.00	0.000	0.000
					B	0.000	20.660		100.00	0.000	0.000
					C	0.000	20.660		100.00	0.000	5.348
L8 94.1667- 84.9100	89.4845	1.236	10	22.033	A	0.000	22.033	22.033	100.00	0.000	0.000
					B	0.000	22.033		100.00	0.000	0.000
					C	0.000	22.033		100.00	0.000	5.304
L9 84.9100- 71.3333	77.9822	1.201	9	34.073	A	0.000	34.073	34.073	100.00	0.000	0.000
					B	0.000	34.073		100.00	0.000	0.000
					C	0.000	34.073		100.00	0.000	7.779
L10 71.3333- 59.5000	65.3411	1.157	9	32.783	A	0.000	32.783	32.783	100.00	0.000	0.000
					B	0.000	32.783		100.00	0.000	0.000
					C	0.000	32.783		100.00	0.000	6.780
L11 59.5000- 58.5833	59.0412	1.133	9	2.644	A	0.000	2.644	2.644	100.00	0.000	0.000
					B	0.000	2.644		100.00	0.000	0.000
					C	0.000	2.644		100.00	0.000	0.525
L12 58.5833- 44.4100	51.3973	1.1	9	42.802	A	0.000	42.802	42.802	100.00	0.000	0.000
					B	0.000	42.802		100.00	0.000	0.000
					C	0.000	42.802		100.00	0.000	8.121
L13 44.4100- 34.2500	39.2673	1.04	8	32.104	A	0.000	32.104	32.104	100.00	0.000	0.000
					B	0.000	32.104		100.00	0.000	0.000
					C	0.000	32.104		100.00	0.000	5.905
L14 34.2500- 33.5000	33.8747	1.008	8	2.463	A	0.000	2.463	2.463	100.00	0.000	0.000
					B	0.000	2.463		100.00	0.000	0.000
					C	0.000	2.463		100.00	0.000	0.461
L15 33.5000- 30.5000	31.9959	0.996	8	9.952	A	0.000	9.952	9.952	100.00	0.000	0.000
					B	0.000	9.952		100.00	0.000	0.000
					C	0.000	9.952		100.00	0.000	1.844
L16 30.5000- 29.7500	30.1247	0.983	8	2.513	A	0.000	2.513	2.513	100.00	0.000	0.000
					B	0.000	2.513		100.00	0.000	0.000
					C	0.000	2.513		100.00	0.000	0.461
L17 29.7500- 29.0000	29.3747	0.978	8	2.523	A	0.000	2.523	2.523	100.00	0.000	0.000
					B	0.000	2.523		100.00	0.000	0.000
					C	0.000	2.523		100.00	0.000	0.461
L18 29.0000- 27.5833	28.2908	0.97	8	4.794	A	0.000	4.794	4.794	100.00	0.000	0.000
					B	0.000	4.794		100.00	0.000	0.000
					C	0.000	4.794		100.00	0.000	0.871
L19 27.5833- 19.7500	23.6401	0.934	7	27.159	A	0.000	27.159	27.159	100.00	0.000	0.000
					B	0.000	27.159		100.00	0.000	0.000
					C	0.000	27.159		100.00	0.000	4.815
L20 19.7500- 13.7500	16.7350	0.869	7	21.549	A	0.000	21.549	21.549	100.00	0.000	0.000
					B	0.000	21.549		100.00	0.000	0.000
					C	0.000	21.549		100.00	0.000	3.688
L21 13.7500- 6.7500	10.2302	0.85	7	25.958	A	0.000	25.958	25.958	100.00	0.000	0.000
					B	0.000	25.958		100.00	0.000	0.000
					C	0.000	25.958		100.00	0.000	4.303
L22 6.7500- 4.0000	5.3720	0.85	7	10.439	A	0.000	10.439	10.439	100.00	0.000	0.000
					B	0.000	10.439		100.00	0.000	0.000
					C	0.000	10.439		100.00	0.000	1.690
L23 4.0000- 2.5000	3.2491	0.85	7	5.751	A	0.000	5.751	5.751	100.00	0.000	0.000
					B	0.000	5.751		100.00	0.000	0.000

Section Elevation	z	K _z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		psf	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
L24 2.5000- 0.0000	1.2476	0.85	7	9.675	C	0.000	5.751		100.00	0.000	0.922
					A	0.000	9.675	9.675	100.00	0.000	0.000
					B	0.000	9.675		100.00	0.000	0.000
					C	0.000	9.675		100.00	0.000	1.537

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	147 - 120.37	Pole	Max Tension	26	0.00	-0.00	-0.00
			Max. Compression	26	-23.60	0.06	0.90
			Max. Mx	20	-8.14	264.46	0.13
			Max. My	2	-8.12	0.03	265.85
			Max. Vy	20	-19.00	264.46	0.13
			Max. Vx	2	-19.07	0.03	265.85
L2	120.37 - 115	Pole	Max. Torque	20			-0.64
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-30.38	0.11	1.36
			Max. Mx	20	-11.33	443.62	0.23
			Max. My	2	-11.32	0.04	445.79
			Max. Vy	20	-23.29	443.62	0.23
L3	115 - 110.5	Pole	Max. Vx	2	-23.36	0.04	445.79
			Max. Torque	20			-0.81
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-31.38	0.14	1.33
			Max. Mx	20	-12.14	549.52	0.24
			Max. My	2	-12.13	0.05	552.03
L4	110.5 - 106.417	Pole	Max. Vy	20	-23.80	549.52	0.24
			Max. Vx	2	-23.88	0.05	552.03
			Max. Torque	20			-0.80
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-32.56	0.17	1.31
			Max. Mx	20	-13.11	647.83	0.24
L5	106.417 - 105	Pole	Max. My	2	-13.10	0.05	650.66
			Max. Vy	20	-24.37	647.83	0.24
			Max. Vx	2	-24.45	0.05	650.66
			Max. Torque	6			0.76
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-32.98	0.19	1.31
L6	105 - 103.5	Pole	Max. Mx	20	-13.44	682.54	0.24
			Max. My	2	-13.43	0.05	685.48
			Max. Vy	20	-24.65	682.54	0.24
			Max. Vx	2	-24.73	0.05	685.48
			Max. Torque	6			0.76
			Max Tension	1	0.00	0.00	0.00
L7	103.5 - 94.1667	Pole	Max. Compression	26	-33.54	0.20	1.30
			Max. Mx	20	-13.92	719.73	0.24
			Max. My	2	-13.90	0.06	722.78
			Max. Vy	20	-24.95	719.73	0.24
			Max. Vx	2	-25.03	0.06	722.78
			Max. Torque	6			0.76
L8	94.1667 - 84.91	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-36.42	0.27	1.25
			Max. Mx	20	-16.26	961.04	0.25
			Max. My	2	-16.25	0.06	964.81
			Max. Vy	20	-26.79	961.04	0.25
			Max. Vx	2	-26.87	0.06	964.81
L9	84.91 - 71.3333	Pole	Max. Torque	4			0.86
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-38.24	0.32	1.22
			Max. Mx	20	-17.79	1099.86	0.25
			Max. My	2	-17.78	0.07	1104.03
			Max. Vy	20	-27.82	1099.86	0.25
L10	71.3333 -	Pole	Max. Vx	2	-27.90	0.07	1104.03
			Max. Torque	4			0.96
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-46.48	0.48	1.12
			Max. Mx	20	-24.75	1622.12	0.26
			Max. My	2	-24.74	0.08	1627.67
L10	71.3333 -	Pole	Max. Vy	20	-30.81	1622.12	0.26
			Max. Vx	2	-30.89	0.08	1627.67
			Max. Torque	15			-1.50
			Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
	59.5		Max. Compression	26	-51.34	0.59	1.04
			Max. Mx	20	-28.95	1996.53	0.26
			Max. My	2	-28.95	0.09	2003.00
			Max. Vy	20	-32.51	1996.53	0.26
			Max. Vx	2	-32.58	0.09	2003.00
			Max. Torque	15			-1.94
L11	59.5 - 58.5833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-51.73	0.60	1.04
			Max. Mx	20	-29.30	2026.38	0.26
			Max. My	2	-29.29	0.09	2032.91
			Max. Vy	20	-32.63	2026.38	0.26
			Max. Vx	2	-32.71	0.09	2032.91
			Max. Torque	15			-1.97
L12	58.5833 - 44.41	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-55.91	0.75	0.94
			Max. Mx	20	-32.91	2325.57	0.24
			Max. My	2	-32.91	0.12	2332.77
			Max. Vy	20	-33.95	2325.57	0.24
			Max. Vx	2	-34.02	0.12	2332.77
			Max. Torque	15			-2.33
L13	44.41 - 34.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-65.62	0.91	0.87
			Max. Mx	20	-41.27	2864.57	0.25
			Max. My	2	-41.27	0.14	2872.96
			Max. Vy	20	-36.21	2864.57	0.25
			Max. Vx	2	-36.29	0.14	2872.96
			Max. Torque	13			-2.93
L14	34.25 - 33.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-66.00	0.92	0.87
			Max. Mx	20	-41.61	2891.75	0.25
			Max. My	2	-41.61	0.14	2900.20
			Max. Vy	20	-36.31	2891.75	0.25
			Max. Vx	2	-36.38	0.14	2900.20
			Max. Torque	13			-2.97
L15	33.5 - 30.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-67.60	0.95	0.85
			Max. Mx	20	-43.03	3001.18	0.25
			Max. My	2	-43.03	0.14	3009.86
			Max. Vy	20	-36.68	3001.18	0.25
			Max. Vx	2	-36.76	0.14	3009.86
			Max. Torque	13			-3.11
L16	30.5 - 29.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-68.00	0.96	0.84
			Max. Mx	20	-43.40	3028.72	0.25
			Max. My	2	-43.39	0.14	3037.45
			Max. Vy	20	-36.77	3028.72	0.25
			Max. Vx	2	-36.85	0.14	3037.45
			Max. Torque	13			-3.15
L17	29.75 - 29	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-68.41	0.97	0.84
			Max. Mx	20	-43.76	3056.32	0.25
			Max. My	2	-43.76	0.14	3065.11
			Max. Vy	20	-36.87	3056.32	0.25
			Max. Vx	2	-36.94	0.14	3065.11
			Max. Torque	13			-3.18
L18	29 - 27.5833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-69.22	0.98	0.83
			Max. Mx	20	-44.48	3108.65	0.25
			Max. My	2	-44.48	0.14	3117.55
			Max. Vy	20	-37.05	3108.65	0.25
			Max. Vx	2	-37.12	0.14	3117.55
			Max. Torque	13			-3.25
L19	27.5833 - 19.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-73.41	1.07	0.77

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L20	19.75 - 13.75	Pole	Max. Mx	20	-48.23	3402.14	0.25
			Max. My	2	-48.23	0.15	3411.63
			Max. Vy	20	-37.93	3402.14	0.25
			Max. Vx	2	-38.01	0.15	3411.63
			Max. Torque	13			-3.61
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-77.05	1.13	0.73
			Max. Mx	20	-51.52	3631.52	0.24
			Max. My	2	-51.52	0.15	3641.46
			Max. Vy	20	-38.57	3631.52	0.24
L21	13.75 - 6.75	Pole	Max. Vx	2	-38.64	0.15	3641.46
			Max. Torque	13			-3.88
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-80.99	1.20	0.68
			Max. Mx	20	-55.08	3903.77	0.24
			Max. My	2	-55.08	0.16	3914.23
			Max. Vy	20	-39.25	3903.77	0.24
			Max. Vx	2	-39.33	0.16	3914.23
			Max. Torque	13			-4.19
			Max Tension	1	0.00	0.00	0.00
L22	6.75 - 4	Pole	Max. Compression	26	-82.45	1.23	0.66
			Max. Mx	20	-56.41	4012.02	0.24
			Max. My	2	-56.41	0.16	4022.68
			Max. Vy	20	-39.52	4012.02	0.24
			Max. Vx	2	-39.60	0.16	4022.68
			Max. Torque	13			-4.32
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-83.24	1.25	0.65
			Max. Mx	20	-57.14	4071.36	0.24
			Max. My	2	-57.14	0.16	4082.14
L23	4 - 2.5	Pole	Max. Vy	20	-39.66	4071.36	0.24
			Max. Vx	2	-39.74	0.16	4082.14
			Max. Torque	13			-4.39
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-84.62	1.27	0.64
			Max. Mx	20	-58.43	4170.74	0.24
			Max. My	2	-58.43	0.16	4181.70
			Max. Vy	20	-39.89	4170.74	0.24
			Max. Vx	2	-39.97	0.16	4181.70
			Max. Torque	13			-4.50

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	84.62	-0.00	-0.00
	Max. H _x	21	43.83	39.87	-0.00
	Max. H _z	3	43.83	0.00	39.94
	Max. M _x	2	4181.70	0.00	39.94
	Max. M _z	8	4170.38	-39.87	-0.00
	Max. Torsion	25	4.50	19.94	34.59
	Min. Vert	21	43.83	39.87	-0.00
	Min. H _x	9	43.83	-39.87	-0.00
	Min. H _z	15	43.83	0.00	-39.94
	Min. M _x	14	-4181.23	0.00	-39.94
	Min. M _z	20	-4170.74	39.87	-0.00
	Min. Torsion	13	-4.50	-19.94	-34.59

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	48.70	0.00	-0.00	-0.18	0.14	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	58.44	-0.00	-39.94	-4181.70	0.16	-4.28
0.9 Dead+1.6 Wind 0 deg - No Ice	43.83	-0.00	-39.94	-4142.31	0.12	-4.28
1.2 Dead+1.6 Wind 30 deg - No Ice	58.44	19.94	-34.59	-3621.69	-2085.37	-2.92
0.9 Dead+1.6 Wind 30 deg - No Ice	43.83	19.94	-34.59	-3587.50	-2065.77	-2.92
1.2 Dead+1.6 Wind 60 deg - No Ice	58.44	34.53	-19.97	-2091.09	-3612.10	-0.77
0.9 Dead+1.6 Wind 60 deg - No Ice	43.83	34.53	-19.97	-2071.33	-3578.12	-0.77
1.2 Dead+1.6 Wind 90 deg - No Ice	58.44	39.87	0.00	-0.24	-4170.38	1.58
0.9 Dead+1.6 Wind 90 deg - No Ice	43.83	39.87	0.00	-0.17	-4131.32	1.59
1.2 Dead+1.6 Wind 120 deg - No Ice	58.44	34.53	19.97	2090.62	-3612.10	3.51
0.9 Dead+1.6 Wind 120 deg - No Ice	43.83	34.53	19.97	2070.98	-3578.12	3.52
1.2 Dead+1.6 Wind 150 deg - No Ice	58.44	19.94	34.59	3621.22	-2085.37	4.50
0.9 Dead+1.6 Wind 150 deg - No Ice	43.83	19.94	34.59	3587.15	-2065.77	4.50
1.2 Dead+1.6 Wind 180 deg - No Ice	58.44	-0.00	39.94	4181.23	0.16	4.28
0.9 Dead+1.6 Wind 180 deg - No Ice	43.83	-0.00	39.94	4141.96	0.12	4.28
1.2 Dead+1.6 Wind 210 deg - No Ice	58.44	-19.94	34.59	3621.23	2085.71	2.91
0.9 Dead+1.6 Wind 210 deg - No Ice	43.83	-19.94	34.59	3587.17	2066.02	2.91
1.2 Dead+1.6 Wind 240 deg - No Ice	58.44	-34.53	19.97	2090.63	3612.46	0.77
0.9 Dead+1.6 Wind 240 deg - No Ice	43.83	-34.53	19.97	2070.99	3578.38	0.76
1.2 Dead+1.6 Wind 270 deg - No Ice	58.44	-39.87	0.00	-0.24	4170.74	-1.58
0.9 Dead+1.6 Wind 270 deg - No Ice	43.83	-39.87	0.00	-0.17	4131.58	-1.59
1.2 Dead+1.6 Wind 300 deg - No Ice	58.44	-34.53	-19.97	-2091.11	3612.45	-3.51
0.9 Dead+1.6 Wind 300 deg - No Ice	43.83	-34.53	-19.97	-2071.34	3578.38	-3.51
1.2 Dead+1.6 Wind 330 deg - No Ice	58.44	-19.94	-34.59	-3621.70	2085.71	-4.49
0.9 Dead+1.6 Wind 330 deg - No Ice	43.83	-19.94	-34.59	-3587.51	2066.02	-4.50
1.2 Dead+1.0 Ice+1.0 Temp	84.62	0.00	0.00	-0.64	1.27	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	84.62	0.00	-9.95	-1062.16	1.36	-1.65
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	84.62	4.97	-8.62	-919.97	-528.23	-1.09
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	84.62	8.60	-4.97	-531.50	-915.91	-0.23
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	84.62	9.93	0.00	-0.84	-1057.81	0.68
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	84.62	8.60	4.97	529.82	-915.91	1.41
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	84.62	4.97	8.62	918.29	-528.23	1.77
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	84.62	0.00	9.95	1060.48	1.36	1.65
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	84.62	-4.97	8.62	918.29	530.95	1.09
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	84.62	-8.60	4.97	529.82	918.64	0.23
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	84.62	-9.93	0.00	-0.84	1060.54	-0.68

Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 300	84.62	-8.60	-4.97	-531.50	918.64	-1.41
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 330	84.62	-4.97	-8.62	-919.97	530.95	-1.77
deg+1.0 Ice+1.0 Temp						
Dead+Wind 0 deg - Service	48.70	0.00	-7.29	-760.12	0.15	-0.00
Dead+Wind 30 deg - Service	48.70	3.64	-6.32	-658.31	-378.85	-0.08
Dead+Wind 60 deg - Service	48.70	6.30	-3.65	-380.16	-656.29	-0.14
Dead+Wind 90 deg - Service	48.70	7.28	0.00	-0.20	-757.84	-0.16
Dead+Wind 120 deg - Service	48.70	6.30	3.65	379.76	-656.29	-0.14
Dead+Wind 150 deg - Service	48.70	3.64	6.32	657.91	-378.85	-0.08
Dead+Wind 180 deg - Service	48.70	0.00	7.29	759.72	0.15	0.00
Dead+Wind 210 deg - Service	48.70	-3.64	6.32	657.91	379.14	0.08
Dead+Wind 240 deg - Service	48.70	-6.30	3.65	379.76	656.59	0.14
Dead+Wind 270 deg - Service	48.70	-7.28	0.00	-0.20	758.14	0.16
Dead+Wind 300 deg - Service	48.70	-6.30	-3.65	-380.16	656.59	0.14
Dead+Wind 330 deg - Service	48.70	-3.64	-6.32	-658.31	379.14	0.08

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-48.70	0.00	0.00	48.70	0.00	0.000%
2	0.00	-58.44	-39.94	0.00	58.44	39.94	0.003%
3	0.00	-43.83	-39.94	0.00	43.83	39.94	0.002%
4	19.94	-58.44	-34.59	-19.94	58.44	34.59	0.000%
5	19.94	-43.83	-34.59	-19.94	43.83	34.59	0.000%
6	34.53	-58.44	-19.97	-34.53	58.44	19.97	0.000%
7	34.53	-43.83	-19.97	-34.53	43.83	19.97	0.000%
8	39.87	-58.44	0.00	-39.87	58.44	-0.00	0.007%
9	39.87	-43.83	0.00	-39.87	43.83	-0.00	0.005%
10	34.53	-58.44	19.97	-34.53	58.44	-19.97	0.000%
11	34.53	-43.83	19.97	-34.53	43.83	-19.97	0.000%
12	19.94	-58.44	34.59	-19.94	58.44	-34.59	0.000%
13	19.94	-43.83	34.59	-19.94	43.83	-34.59	0.000%
14	0.00	-58.44	39.94	0.00	58.44	-39.94	0.003%
15	0.00	-43.83	39.94	0.00	43.83	-39.94	0.002%
16	-19.94	-58.44	34.59	19.94	58.44	-34.59	0.000%
17	-19.94	-43.83	34.59	19.94	43.83	-34.59	0.000%
18	-34.53	-58.44	19.97	34.53	58.44	-19.97	0.000%
19	-34.53	-43.83	19.97	34.53	43.83	-19.97	0.000%
20	-39.87	-58.44	0.00	39.87	58.44	-0.00	0.007%
21	-39.87	-43.83	0.00	39.87	43.83	-0.00	0.005%
22	-34.53	-58.44	-19.97	34.53	58.44	19.97	0.000%
23	-34.53	-43.83	-19.97	34.53	43.83	19.97	0.000%
24	-19.94	-58.44	-34.59	19.94	58.44	34.59	0.000%
25	-19.94	-43.83	-34.59	19.94	43.83	34.59	0.000%
26	0.00	-84.62	0.00	-0.00	84.62	-0.00	0.001%
27	0.00	-84.62	-9.95	-0.00	84.62	9.95	0.000%
28	4.97	-84.62	-8.62	-4.97	84.62	8.62	0.000%
29	8.60	-84.62	-4.97	-8.60	84.62	4.97	0.000%
30	9.93	-84.62	0.00	-9.93	84.62	-0.00	0.000%
31	8.60	-84.62	4.97	-8.60	84.62	-4.97	0.000%
32	4.97	-84.62	8.62	-4.97	84.62	-8.62	0.000%
33	0.00	-84.62	9.95	-0.00	84.62	-9.95	0.000%
34	-4.97	-84.62	8.62	4.97	84.62	-8.62	0.000%
35	-8.60	-84.62	4.97	8.60	84.62	-4.97	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
36	-9.93	-84.62	0.00	9.93	84.62	-0.00	0.000%
37	-8.60	-84.62	-4.97	8.60	84.62	4.97	0.000%
38	-4.97	-84.62	-8.62	4.97	84.62	8.62	0.000%
39	0.00	-48.70	-7.29	-0.00	48.70	7.29	0.001%
40	3.64	-48.70	-6.32	-3.64	48.70	6.32	0.001%
41	6.31	-48.70	-3.65	-6.30	48.70	3.65	0.001%
42	7.28	-48.70	0.00	-7.28	48.70	-0.00	0.001%
43	6.31	-48.70	3.65	-6.30	48.70	-3.65	0.001%
44	3.64	-48.70	6.32	-3.64	48.70	-6.32	0.001%
45	0.00	-48.70	7.29	-0.00	48.70	-7.29	0.001%
46	-3.64	-48.70	6.32	3.64	48.70	-6.32	0.001%
47	-6.31	-48.70	3.65	6.30	48.70	-3.65	0.001%
48	-7.28	-48.70	0.00	7.28	48.70	-0.00	0.001%
49	-6.31	-48.70	-3.65	6.30	48.70	3.65	0.001%
50	-3.64	-48.70	-6.32	3.64	48.70	6.32	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00003283	0.00012407
3	Yes	15	0.00002196	0.00011656
4	Yes	19	0.00000001	0.00008264
5	Yes	18	0.00000001	0.00014704
6	Yes	19	0.00000001	0.00008483
7	Yes	19	0.00000001	0.00006099
8	Yes	14	0.00007742	0.00009739
9	Yes	14	0.00005266	0.00008487
10	Yes	19	0.00000001	0.00008528
11	Yes	19	0.00000001	0.00006133
12	Yes	19	0.00000001	0.00008235
13	Yes	18	0.00000001	0.00014651
14	Yes	15	0.00003283	0.00012404
15	Yes	15	0.00002196	0.00012169
16	Yes	19	0.00000001	0.00008573
17	Yes	19	0.00000001	0.00006166
18	Yes	19	0.00000001	0.00008332
19	Yes	18	0.00000001	0.00014833
20	Yes	14	0.00007742	0.00009739
21	Yes	14	0.00005266	0.00008487
22	Yes	19	0.00000001	0.00008293
23	Yes	18	0.00000001	0.00014757
24	Yes	19	0.00000001	0.00008608
25	Yes	19	0.00000001	0.00006191
26	Yes	6	0.00000001	0.00002641
27	Yes	17	0.00000001	0.00007968
28	Yes	17	0.00000001	0.00009473
29	Yes	17	0.00000001	0.00009523
30	Yes	17	0.00000001	0.00007893
31	Yes	17	0.00000001	0.00009511
32	Yes	17	0.00000001	0.00009413
33	Yes	17	0.00000001	0.00007919
34	Yes	17	0.00000001	0.00009542
35	Yes	17	0.00000001	0.00009459
36	Yes	17	0.00000001	0.00007913
37	Yes	17	0.00000001	0.00009490
38	Yes	17	0.00000001	0.00009624
39	Yes	14	0.00000001	0.00002043
40	Yes	14	0.00000001	0.00003626
41	Yes	14	0.00000001	0.00004025
42	Yes	14	0.00000001	0.00002093
43	Yes	14	0.00000001	0.00003513
44	Yes	14	0.00000001	0.00003905
45	Yes	14	0.00000001	0.00002040

46	Yes	14	0.00000001	0.00003914
47	Yes	14	0.00000001	0.00003513
48	Yes	14	0.00000001	0.00002094
49	Yes	14	0.00000001	0.00004025
50	Yes	14	0.00000001	0.00003634

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147 - 120.37	19.245	39	1.3296	0.0023
L2	123.62 - 115	13.083	39	1.1112	0.0011
L3	115 - 110.5	11.176	39	0.9798	0.0008
L4	110.5 - 106.417	10.278	39	0.9264	0.0007
L5	106.417 - 105	9.501	39	0.8896	0.0006
L6	105 - 103.5	9.239	39	0.8765	0.0006
L7	103.5 - 94.1667	8.966	39	0.8660	0.0006
L8	94.1667 - 84.91	7.363	39	0.7730	0.0004
L9	89.08 - 71.3333	6.563	39	0.7273	0.0004
L10	71.3333 - 59.5	4.116	39	0.5758	0.0003
L11	59.5 - 58.5833	2.830	39	0.4625	0.0002
L12	58.5833 - 44.41	2.742	39	0.4540	0.0002
L13	49.58 - 34.25	1.962	39	0.3733	0.0001
L14	34.25 - 33.5	0.924	39	0.2597	0.0001
L15	33.5 - 30.5	0.883	39	0.2534	0.0001
L16	30.5 - 29.75	0.732	39	0.2297	0.0001
L17	29.75 - 29	0.696	39	0.2239	0.0001
L18	29 - 27.5833	0.661	39	0.2182	0.0001
L19	27.5833 - 19.75	0.598	39	0.2079	0.0001
L20	19.75 - 13.75	0.308	39	0.1458	0.0000
L21	13.75 - 6.75	0.151	39	0.1046	0.0000
L22	6.75 - 4	0.036	39	0.0522	0.0000
L23	4 - 2.5	0.013	39	0.0304	0.0000
L24	2.5 - 0	0.005	39	0.0186	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.0000	APXVSP18-C-A20 w/ Mount Pipe	39	19.245	1.3296	0.0023	16023
136.0000	(2) LPA-80080/4CF w/ Mount Pipe	39	16.229	1.2490	0.0017	7283
129.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	39	14.401	1.1804	0.0014	4450
120.0000	(2) TME-RRUS-11	39	12.251	1.0556	0.0010	3458
118.0000	AM-X-WM-17-65-00T w/ Mount Pipe	39	11.811	1.0242	0.0009	3489
50.0000	KS24019-L112A	39	1.996	0.3767	0.0001	8356
45.0000	KS24019-L112A	39	1.613	0.3387	0.0001	7992

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147 - 120.37	105.719	2	7.3052	0.0109
L2	123.62 - 115	71.940	2	6.1102	0.0068

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L3	115 - 110.5	61.470	2	5.3899	0.0061
L4	110.5 - 106.417	56.533	2	5.0972	0.0059
L5	106.417 - 105	52.265	2	4.8947	0.0058
L6	105 - 103.5	50.825	2	4.8229	0.0058
L7	103.5 - 94.1667	49.320	2	4.7656	0.0057
L8	94.1667 - 84.91	40.509	2	4.2545	0.0053
L9	89.08 - 71.3333	36.114	2	4.0029	0.0050
L10	71.3333 - 59.5	22.650	2	3.1695	0.0041
L11	59.5 - 58.5833	15.574	2	2.5458	0.0033
L12	58.5833 - 44.41	15.090	2	2.4991	0.0033
L13	49.58 - 34.25	10.799	2	2.0548	0.0028
L14	34.25 - 33.5	5.084	2	1.4295	0.0020
L15	33.5 - 30.5	4.862	2	1.3948	0.0019
L16	30.5 - 29.75	4.027	2	1.2643	0.0017
L17	29.75 - 29	3.830	2	1.2321	0.0017
L18	29 - 27.5833	3.639	2	1.2008	0.0016
L19	27.5833 - 19.75	3.291	2	1.1444	0.0016
L20	19.75 - 13.75	1.696	2	0.8021	0.0011
L21	13.75 - 6.75	0.831	2	0.5754	0.0008
L22	6.75 - 4	0.200	2	0.2874	0.0004
L23	4 - 2.5	0.069	2	0.1672	0.0002
L24	2.5 - 0	0.027	2	0.1023	0.0001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.0000	APXVSP18-C-A20 w/ Mount Pipe	2	105.719	7.3052	0.0109	3015
136.0000	(2) LPA-80080/4CF w/ Mount Pipe	2	89.190	6.8648	0.0086	1369
129.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	2	79.168	6.4894	0.0076	834
120.0000	(2) TME-RRUS-11	2	67.372	5.8057	0.0063	644
118.0000	AM-X-WM-17-65-00T w/ Mount Pipe	2	64.955	5.6334	0.0062	649
50.0000	KS24019-L112A	2	10.984	2.0737	0.0028	1522
45.0000	KS24019-L112A	2	8.877	1.8644	0.0025	1455

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio P _u / φP _n
L1	147 - 120.37 (1)	TP21.98x16.25x0.1875	26.630	0.0000	0.0	12.553	-8.12	903.55	0.009
L2	120.37 - 115 (2)	TP22.7327x20.9057x0.25	8.6200	0.0000	0.0	17.840	-11.32	1325.42	0.009
L3	115 - 110.5 (3)	TP23.6864x22.7327x0.46	4.5000	0.0000	0.0	34.022	-12.13	1438.08	0.008
L4	110.5 - 106.417 (4)	TP24.5518x23.6864x0.66	4.0833	0.0000	0.0	50.506	-13.10	2136.55	0.006
L5	106.417 - 105 (5)	TP24.8521x24.5518x0.65	1.4167	0.0000	0.0	50.670	-13.43	2143.48	0.006
L6	105 - 103.5	TP25.17x24.8521x0.9173	1.5000	0.0000	0.0	70.614	-13.90	2862.88	0.005

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio P _u / φP _n
L7	(6) 103.5 - 94.1667 (7)	TP27.1481x25.17x0.6563	9.3333	0.0000	0.0	55.182	-16.25	2245.42	0.007
L8	94.1667 - 84.91 (8)	TP29.11x27.1481x0.7592	9.2567	0.0000	0.0	66.190	-17.78	2697.13	0.007
L9	84.91 - 71.3333 (9)	TP31.486x26.7077x0.786	17.746	0.0000	0.0	76.669	-24.74	3138.13	0.008
L10	71.3333 - 59.5 (10)	TP33.993x31.486x0.7446	11.833	0.0000	0.0	78.581	-28.95	3220.88	0.009
L11	59.5 - 58.5833 (11)	TP34.1872x33.993x0.752	0.9167	0.0000	0.0	79.825	-29.29	3271.89	0.009
L12	58.5833 - 44.41 (12)	TP37.19x34.1872x0.7724	14.173	0.0000	0.0	86.600	-32.91	3707.95	0.009
L13	44.41 - 34.25 (13)	TP38.7256x34.5498x0.80	15.330	0.0000	0.0	89.540	-36.91	3841.00	0.010
L14	34.25 - 33.5 (14)	TP38.8849x38.7256x0.80	0.7500	0.0000	0.0	96.749	-41.61	4153.54	0.010
L15	33.5 - 30.5 (15)	TP39.5221x38.8849x0.85	3.0000	0.0000	0.0	104.90	-43.03	4599.50	0.009
L16	30.5 - 29.75 (16)	TP39.6814x39.5221x0.85	0.7500	0.0000	0.0	105.05	-43.39	4609.95	0.009
L17	29.75 - 29 (17)	TP39.8407x39.6814x0.87	0.7500	0.0000	0.0	108.43	-43.76	4740.81	0.009
L18	29 - 27.5833 (18)	TP40.1416x39.8407x0.91	1.4167	0.0000	0.0	113.77	-44.48	4880.38	0.009
L19	27.5833 - 19.75 (19)	TP41.8053x40.1416x0.81	7.8333	0.0000	0.0	106.45	-48.23	4821.87	0.010
L20	19.75 - 13.75 (20)	TP43.0796x41.8053x0.92	6.0000	0.0000	0.0	123.80	-51.52	5479.21	0.009
L21	13.75 - 6.75 (21)	TP44.5664x43.0796x0.81	7.0000	0.0000	0.0	113.74	-55.08	4906.64	0.011
L22	6.75 - 4 (22)	TP45.1504x44.5664x0.75	2.7500	0.0000	0.0	105.76	-56.41	4785.99	0.012
L23	4 - 2.5 (23)	TP45.469x45.1504x0.743	1.5000	0.0000	0.0	105.51	-57.14	4952.02	0.012
L24	2.5 - 0 (24)	TP46x45.469x0.7887	2.5000	0.0000	0.0	113.17	-58.43	5476.98	0.011

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{rx} kip-ft	Ratio M _{ux} / φM _{rx}	M _{uy} kip-ft	φM _{ry} kip-ft	Ratio M _{uy} / φM _{ry}
L1	147 - 120.37 (1)	TP21.98x16.25x0.1875	265.85	391.51	0.679	0.00	391.51	0.000
L2	120.37 - 115 (2)	TP22.7327x20.9057x0.25	445.79	610.79	0.730	0.00	610.79	0.000
L3	115 - 110.5 (3)	TP23.6864x22.7327x0.46	552.03	678.71	0.813	0.00	678.71	0.000
L4	110.5 - 106.417 (4)	TP24.5518x23.6864x0.66	650.66	1028.95	0.632	0.00	1028.95	0.000
L5	106.417 - 105 (5)	TP24.8521x24.5518x0.65	685.48	1046.16	0.655	0.00	1046.16	0.000
L6	105 - 103.5 (6)	TP25.17x24.8521x0.9173	722.78	1386.54	0.521	0.00	1386.54	0.000
L7	103.5 - 94.1667 (7)	TP27.1481x25.17x0.6563	964.81	1203.03	0.802	0.00	1203.03	0.000
L8	94.1667 - 84.91 (8)	TP29.11x27.1481x0.7592	1104.03	1494.04	0.739	0.00	1494.04	0.000
L9	84.91 - 71.3333 (9)	TP31.486x26.7077x0.786	1627.67	1946.70	0.836	0.00	1946.70	0.000
L10	71.3333 - 59.5 (10)	TP33.993x31.486x0.7446	2003.00	2170.79	0.923	0.00	2170.79	0.000
L11	59.5 - 58.5833 (11)	TP34.1872x33.993x0.752	2032.91	2217.33	0.917	0.00	2217.33	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L12	58.5833 - 44.41 (12)	TP37.19x34.1872x0.7724	2332.77	2656.32	0.878	0.00	2656.32	0.000
L13	44.41 - 34.25 (13)	TP38.7256x34.5498x0.8025	2510.88	2736.09	0.918	0.00	2736.09	0.000
L14	34.25 - 33.5 (14)	TP38.8849x38.7256x0.8004	2900.20	3210.91	0.903	0.00	3210.91	0.000
L15	33.5 - 30.5 (15)	TP39.5221x38.8849x0.8547	3009.86	3606.22	0.835	0.00	3606.22	0.000
L16	30.5 - 29.75 (16)	TP39.6814x39.5221x0.8525	3037.45	3630.05	0.837	0.00	3630.05	0.000
L17	29.75 - 29 (17)	TP39.8407x39.6814x0.8768	3065.11	3744.06	0.819	0.00	3744.06	0.000
L18	29 - 27.5833 (18)	TP40.1416x39.8407x0.9138	3117.55	3877.39	0.804	0.00	3877.39	0.000
L19	27.5833 - 19.75 (19)	TP41.8053x40.1416x0.8183	3411.63	4015.78	0.850	0.00	4015.78	0.000
L20	19.75 - 13.75 (20)	TP43.0796x41.8053x0.9253	3641.46	4684.07	0.777	0.00	4684.07	0.000
L21	13.75 - 6.75 (21)	TP44.5664x43.0796x0.8192	3914.23	4366.87	0.896	0.00	4366.87	0.000
L22	6.75 - 4 (22)	TP45.1504x44.5664x0.7505	4022.68	4330.79	0.929	0.00	4330.79	0.000
L23	4 - 2.5 (23)	TP45.469x45.1504x0.7433	4082.14	4515.17	0.904	0.00	4515.17	0.000
L24	2.5 - 0 (24)	TP46x45.469x0.7887	4181.70	5043.95	0.829	0.00	5043.95	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	147 - 120.37 (1)	TP21.98x16.25x0.1875	19.07	451.77	0.042	0.07	783.98	0.000
L2	120.37 - 115 (2)	TP22.7327x20.9057x0.25	23.36	662.71	0.035	0.15	1223.08	0.000
L3	115 - 110.5 (3)	TP23.6864x22.7327x0.4615	23.88	719.04	0.033	0.23	1359.08	0.000
L4	110.5 - 106.417 (4)	TP24.5518x23.6864x0.6662	24.45	1068.28	0.023	0.33	2060.42	0.000
L5	106.417 - 105 (5)	TP24.8521x24.5518x0.6599	24.73	1071.74	0.023	0.38	2094.88	0.000
L6	105 - 103.5 (6)	TP25.17x24.8521x0.9173	25.03	1431.44	0.017	0.42	2776.47	0.000
L7	103.5 - 94.1667 (7)	TP27.1481x25.17x0.6563	26.87	1122.71	0.024	0.72	2408.99	0.000
L8	94.1667 - 84.91 (8)	TP29.11x27.1481x0.7592	27.90	1348.57	0.021	0.89	2991.74	0.000
L9	84.91 - 71.3333 (9)	TP31.486x26.7077x0.7868	30.89	1569.06	0.020	1.50	3898.16	0.000
L10	71.3333 - 59.5 (10)	TP33.993x31.486x0.7446	32.58	1610.44	0.020	1.93	4346.90	0.000
L11	59.5 - 58.5833 (11)	TP34.1872x33.993x0.7522	32.71	1635.94	0.020	1.97	4440.09	0.000
L12	58.5833 - 44.41 (12)	TP37.19x34.1872x0.7724	34.02	1853.98	0.018	2.33	5319.13	0.000
L13	44.41 - 34.25 (13)	TP38.7256x34.5498x0.8025	35.16	1935.62	0.018	2.57	5478.88	0.000
L14	34.25 - 33.5 (14)	TP38.8849x38.7256x0.8004	36.38	2076.77	0.018	2.95	6429.67	0.000
L15	33.5 - 30.5 (15)	TP39.5221x38.8849x0.8547	36.76	2299.75	0.016	3.07	7221.25	0.000
L16	30.5 - 29.75 (16)	TP39.6814x39.5221x0.8525	36.85	2304.97	0.016	3.10	7268.98	0.000
L17	29.75 - 29 (17)	TP39.8407x39.6814x0.8768	36.94	2370.40	0.016	3.13	7497.27	0.000

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L18	29 - 27.5833 (18)	TP40.1416x39.8407x0.9138	37.12	2440.19	0.015	3.19	7764.27	0.000
L19	27.5833 - 19.75 (19)	TP41.8053x40.1416x0.8183	38.01	2410.93	0.016	3.50	8041.37	0.000
L20	19.75 - 13.75 (20)	TP43.0796x41.8053x0.9253	38.64	2739.61	0.014	3.74	9379.58	0.000
L21	13.75 - 6.75 (21)	TP44.5664x43.0796x0.8192	39.33	2453.32	0.016	4.01	8744.42	0.000
L22	6.75 - 4 (22)	TP45.1504x44.5664x0.7505	39.60	2392.99	0.017	4.12	8672.17	0.000
L23	4 - 2.5 (23)	TP45.469x45.1504x0.7433	39.74	2476.01	0.016	4.18	9041.42	0.000
L24	2.5 - 0 (24)	TP46x45.469x0.7887	39.97	2738.49	0.015	4.28	10100.25	0.000

Pole Interaction Design Data

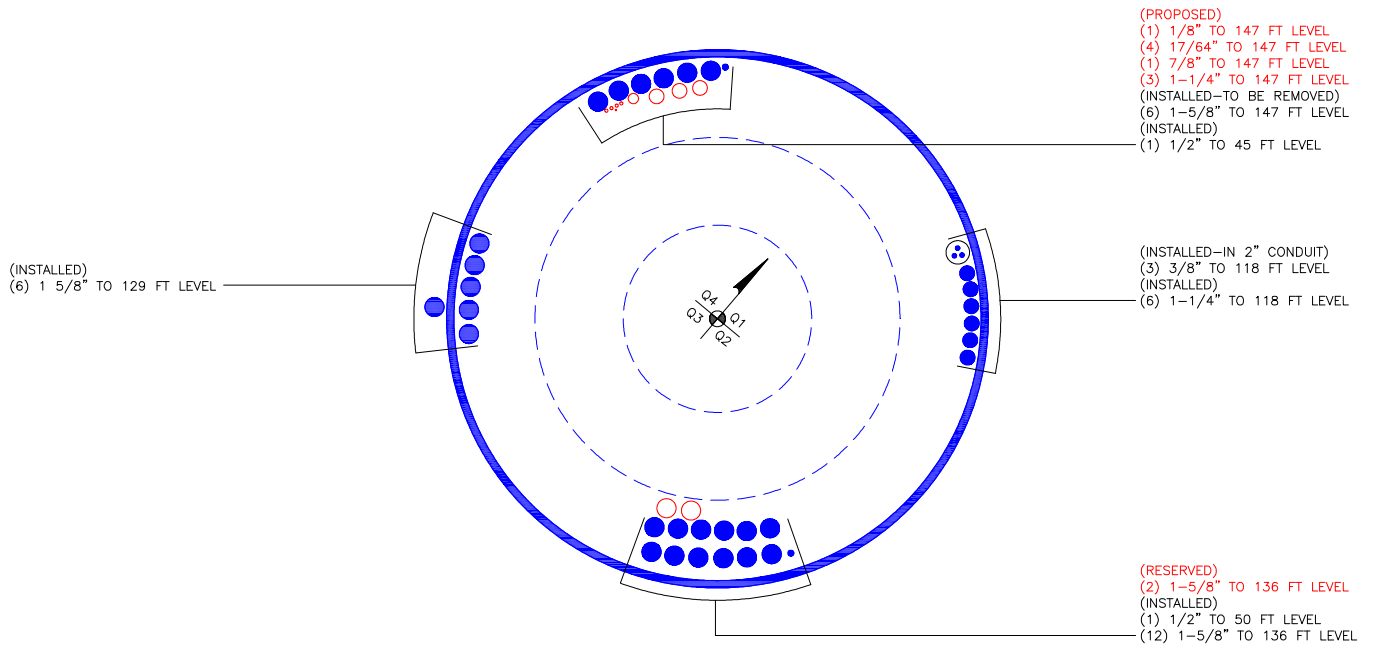
Section No.	Elevation ft	Ratio P_u ϕP_n	Ratio M_{ux} ϕM_{nx}	Ratio M_{uy} ϕM_{ny}	Ratio V_u ϕV_n	Ratio T_u ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	147 - 120.37 (1)	0.009	0.679	0.000	0.042	0.000	0.690	1.000	4.8.2 ✓
L2	120.37 - 115 (2)	0.009	0.730	0.000	0.035	0.000	0.740	1.000	4.8.2 ✓
L3	115 - 110.5 (3)	0.008	0.813	0.000	0.033	0.000	0.823	1.000	4.8.2 ✓
L4	110.5 - 106.417 (4)	0.006	0.632	0.000	0.023	0.000	0.639	1.000	4.8.2 ✓
L5	106.417 - 105 (5)	0.006	0.655	0.000	0.023	0.000	0.662	1.000	4.8.2 ✓
L6	105 - 103.5 (6)	0.005	0.521	0.000	0.017	0.000	0.526	1.000	4.8.2 ✓
L7	103.5 - 94.1667 (7)	0.007	0.802	0.000	0.024	0.000	0.810	1.000	4.8.2 ✓
L8	94.1667 - 84.91 (8)	0.007	0.739	0.000	0.021	0.000	0.746	1.000	4.8.2 ✓
L9	84.91 - 71.3333 (9)	0.008	0.836	0.000	0.020	0.000	0.844	1.000	4.8.2 ✓
L10	71.3333 - 59.5 (10)	0.009	0.923	0.000	0.020	0.000	0.932	1.000	4.8.2 ✓
L11	59.5 - 58.5833 (11)	0.009	0.917	0.000	0.020	0.000	0.926	1.000	4.8.2 ✓
L12	58.5833 - 44.41 (12)	0.009	0.878	0.000	0.018	0.000	0.887	1.000	4.8.2 ✓
L13	44.41 - 34.25 (13)	0.010	0.918	0.000	0.018	0.000	0.928	1.000	4.8.2 ✓
L14	34.25 - 33.5 (14)	0.010	0.903	0.000	0.018	0.000	0.914	1.000	4.8.2 ✓
L15	33.5 - 30.5 (15)	0.009	0.835	0.000	0.016	0.000	0.844	1.000	4.8.2 ✓
L16	30.5 - 29.75 (16)	0.009	0.837	0.000	0.016	0.000	0.846	1.000	4.8.2 ✓
L17	29.75 - 29 (17)	0.009	0.819	0.000	0.016	0.000	0.828	1.000	4.8.2 ✓
L18	29 - 27.5833 (18)	0.009	0.804	0.000	0.015	0.000	0.813	1.000	4.8.2 ✓
L19	27.5833 - 19.75 (19)	0.010	0.850	0.000	0.016	0.000	0.860	1.000	4.8.2 ✓

Section No.	Elevation ft	Ratio P_u	Ratio M_{ux}	Ratio M_{uy}	Ratio V_u	Ratio T_u	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L20	19.75 - 13.75 (20)	0.009	0.777	0.000	0.014	0.000	0.787	1.000	4.8.2 ✓
L21	13.75 - 6.75 (21)	0.011	0.896	0.000	0.016	0.000	0.908	1.000	4.8.2 ✓
L22	6.75 - 4 (22)	0.012	0.929	0.000	0.017	0.000	0.941	1.000	4.8.2 ✓
L23	4 - 2.5 (23)	0.012	0.904	0.000	0.016	0.000	0.916	1.000	4.8.2 ✓
L24	2.5 - 0 (24)	0.011	0.829	0.000	0.015	0.000	0.840	1.000	4.8.2 ✓

Section Capacity Table

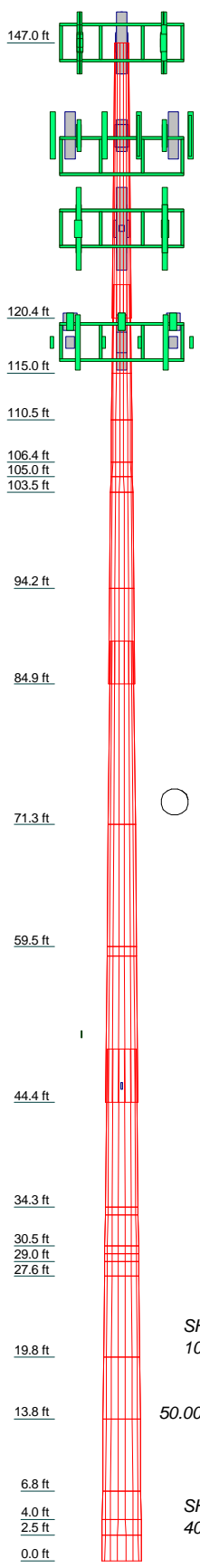
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail	
L1	147 - 120.37	Pole	TP21.98x16.25x0.1875	1	-8.12	903.55	69.0	Pass	
L2	120.37 - 115	Pole	TP22.7327x20.9057x0.25	2	-11.32	1325.42	74.0	Pass	
L3	115 - 110.5	Pole	TP23.6864x22.7327x0.4615	3	-12.13	1438.08	82.3	Pass	
L4	110.5 - 106.417	Pole	TP24.5518x23.6864x0.6662	4	-13.10	2136.55	63.9	Pass	
L5	106.417 - 105	Pole	TP24.8521x24.5518x0.6599	5	-13.43	2143.48	66.2	Pass	
L6	105 - 103.5	Pole	TP25.17x24.8521x0.9173	6	-13.90	2862.88	52.6	Pass	
L7	103.5 - 94.1667	Pole	TP27.1481x25.17x0.6563	7	-16.25	2245.42	81.0	Pass	
L8	94.1667 - 84.91	Pole	TP29.11x27.1481x0.7592	8	-17.78	2697.13	74.6	Pass	
L9	84.91 - 71.3333	Pole	TP31.486x26.7077x0.7868	9	-24.74	3138.13	84.4	Pass	
L10	71.3333 - 59.5	Pole	TP33.993x31.486x0.7446	10	-28.95	3220.88	93.2	Pass	
L11	59.5 - 58.5833	Pole	TP34.1872x33.993x0.7522	11	-29.29	3271.89	92.6	Pass	
L12	58.5833 - 44.41	Pole	TP37.19x34.1872x0.7724	12	-32.91	3707.95	88.7	Pass	
L13	44.41 - 34.25	Pole	TP38.7256x34.5498x0.8025	13	-36.91	3841.00	92.8	Pass	
L14	34.25 - 33.5	Pole	TP38.8849x38.7256x0.8004	14	-41.61	4153.54	91.4	Pass	
L15	33.5 - 30.5	Pole	TP39.5221x38.8849x0.8547	15	-43.03	4599.50	84.4	Pass	
L16	30.5 - 29.75	Pole	TP39.6814x39.5221x0.8525	16	-43.39	4609.95	84.6	Pass	
L17	29.75 - 29	Pole	TP39.8407x39.6814x0.8768	17	-43.76	4740.81	82.8	Pass	
L18	29 - 27.5833	Pole	TP40.1416x39.8407x0.9138	18	-44.48	4880.38	81.3	Pass	
L19	27.5833 - 19.75	Pole	TP41.8053x40.1416x0.8183	19	-48.23	4821.87	86.0	Pass	
L20	19.75 - 13.75	Pole	TP43.0796x41.8053x0.9253	20	-51.52	5479.21	78.7	Pass	
L21	13.75 - 6.75	Pole	TP44.5664x43.0796x0.8192	21	-55.08	4906.64	90.8	Pass	
L22	6.75 - 4	Pole	TP45.1504x44.5664x0.7505	22	-56.41	4785.99	94.1	Pass	
L23	4 - 2.5	Pole	TP45.469x45.1504x0.7433	23	-57.14	4952.02	91.6	Pass	
L24	2.5 - 0	Pole	TP46x45.469x0.7887	24	-58.43	5476.98	84.0	Pass	
							Summary		
							Pole (L22)	94.1	Pass
							RATING =	94.1	Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	26.6300	18	0.1875	3.2500	16.2500	21.9800	A572-65	1.0
2	8.6200	18	0.2500	4.1700	20.9057	22.7327	A572-65	0.5
3	4.5000	18	0.2500	4.1700	20.9057	22.7327	A572-65	0.5
4	1.5000	18	0.2500	4.1700	20.9057	22.7327	A572-65	0.5
5	1.5000	18	0.2500	4.1700	20.9057	22.7327	A572-65	0.5
6	1.5000	18	0.2500	4.1700	20.9057	22.7327	A572-65	0.5
7	9.3333	18	0.6563	25.1700	24.2653	25.6864	A572-65	1.7
8	9.2567	18	0.7592	27.1481	26.7077	28.1100	A572-65	2.1
9	17.7467	18	0.7868	31.4860	31.4860	31.4860	A572-65	4.3
10	11.8333	18	0.7446	31.4860	31.4860	33.9930	A572-65	3.0
11	0.9187	18	0.7522	33.9930	34.1872	33.9930	A572-65	0.2
12	14.1733	18	0.7724	34.1872	37.1900	34.1872	A572-65	4.1
13	15.3300	18	0.8025	34.5498	38.7256	34.5498	A572-65	4.8
14	1.0000	18	0.8000	34.5498	38.7256	34.5498	A572-65	1.0
15	1.0000	18	0.8000	34.5498	38.7256	34.5498	A572-65	1.0
16	1.0000	18	0.8000	34.5498	38.7256	34.5498	A572-65	1.0
17	1.0000	18	0.8000	34.5498	38.7256	34.5498	A572-65	1.0
18	1.0000	18	0.8000	34.5498	38.7256	34.5498	A572-65	1.0
19	7.8333	18	0.8183	40.1416	41.8053	41.8053	A572-65	2.8
20	6.0000	18	0.9253	43.0796	43.0796	43.0796	A572-65	2.5
21	7.0000	18	0.8192	43.0796	44.5664	43.0796	A572-65	2.7
22	7.0000	18	0.8192	43.0796	44.5664	43.0796	A572-65	2.7
23	7.0000	18	0.8192	43.0796	44.5664	43.0796	A572-65	2.7
24	7.0000	18	0.8192	43.0796	44.5664	43.0796	A572-65	2.7



DESIGNED APPURTENANCE LOADING

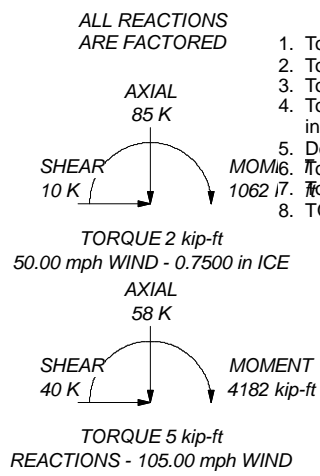
TYPE	ELEVATION	TYPE	ELEVATION
APXVSP18-C-A20 w/ Mount Pipe	147	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	129
APXVSP18-C-A20 w/ Mount Pipe	147	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	129
APXVSP18-C-A20 w/ Mount Pipe	147	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	129
LLPX310R-V1 w/ Mount Pipe	147	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	129
LLPX310R-V1 w/ Mount Pipe	147	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	129
1900MHz RRH	147	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	129
1900MHz RRH	147	LNX-6515DS-VTM w/ Mount Pipe	129
1900MHz RRH	147	LNX-6515DS-VTM w/ Mount Pipe	129
800MHz RRH	147	LNX-6515DS-VTM w/ Mount Pipe	129
800MHz RRH	147	LNX-6515DS-VTM w/ Mount Pipe	129
800MHz RRH	147	KRY 112 144/1	129
800MHz RRH	147	KRY 112 144/1	129
FWHR	147	KRY 112 144/1	129
FWHR	147	RRUS 11 B12	129
FWHR	147	RRUS 11 B12	129
BEN-92P	147	RRUS 11 B12	129
(2) 2.375" OD x 6' Mount Pipe	147	Platform Mount [LP 1201-1]	129
(2) 2.375" OD x 6' Mount Pipe	147	(2) TME-RRUS-11	120
(2) 2.375" OD x 6' Mount Pipe	147	(2) TME-RRUS-11	120
Platform Mount [LP 601-1]	147	(2) TME-RRUS-11	120
(2) LPA-80080/4CF w/ Mount Pipe	136	Side Arm Mount [SO 102-3]	120
(2) LPA-80080/4CF w/ Mount Pipe	136	AM-X-WM-17-65-00T w/ Mount Pipe	118
(2) LPA-80080/4CF w/ Mount Pipe	136	AM-X-WM-17-65-00T w/ Mount Pipe	118
(2) SBNHH-1D65A w/ Mount Pipe	136	AM-X-WM-17-65-00T w/ Mount Pipe	118
(2) SBNHH-1D65A w/ Mount Pipe	136	RA21.7770.00 w/ Mount Pipe	118
(2) SBNHH-1D65A w/ Mount Pipe	136	RA21.7770.00 w/ Mount Pipe	118
RRH4X45-AWS4 B66	136	RA21.7770.00 w/ Mount Pipe	118
RRH4X45-AWS4 B66	136	(2) LGP21401	118
RRH4X45-AWS4 B66	136	(2) LGP21401	118
RRH2x60-700	136	(2) LGP21401	118
RRH2x60-700	136	DC6-48-60-18-8F	118
RRH2x60-700	136	Platform Mount [LP 303-1]	118
DB-B1-6C-12AB-0Z	136	KS24019-L112A	50
Platform Mount [LP 601-1]	136	Side Arm Mount [SO 701-1]	50
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	129	KS24019-L112A	45
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	129	Pipe Mount [PM 601-1]	45

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi	Reinf 37.56 ksi	38 ksi	47 ksi
Reinf 36.98 ksi	37 ksi	47 ksi	Reinf 38.36 ksi	38 ksi	48 ksi
Reinf 37.01 ksi	37 ksi	47 ksi	Reinf 38.39 ksi	38 ksi	48 ksi
Reinf 35.47 ksi	35 ksi	45 ksi	Reinf 38.25 ksi	38 ksi	48 ksi
Reinf 35.60 ksi	36 ksi	45 ksi	Reinf 39.63 ksi	40 ksi	50 ksi
Reinf 35.65 ksi	36 ksi	45 ksi	Reinf 38.72 ksi	39 ksi	49 ksi
Reinf 35.81 ksi	36 ksi	45 ksi	Reinf 37.74 ksi	38 ksi	48 ksi
Reinf 35.86 ksi	36 ksi	45 ksi	Reinf 39.59 ksi	40 ksi	50 ksi
Reinf 37.46 ksi	37 ksi	47 ksi	Reinf 41.06 ksi	41 ksi	52 ksi
Reinf 37.53 ksi	38 ksi	47 ksi	Reinf 42.34 ksi	42 ksi	53 ksi

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 105.00 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50.00 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.00 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.0000 ft
8. TOWER RATING: 94.1%



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

Job: **147 ft Monopole / Preston/Town Hall**
 Project: **PJF 37516-3879 / BU 876360**
 Client: **Crown Castle** Drawn by: **Joey Meinerding** App'd:
 Code: **TIA-222-G** Date: **12/28/16** Scale: **NTS**
 Path: Dwg No. **E-1**

v4.4 - Effective 7-12-13

Asymmetric Anchor Rod Analysis

Moment = 4182 k-ft
 Axial = 58.0 kips
 Shear = 40.0 kips
 Anchor Qty = 16

TIA Ref. = G
 ASIF = 1.0000
 Max Ratio = 100.0%

Location = Base Plate
 η = 0.50 for BP, Rev. G Sect. 4.9.9
 Threads = N/A for FP, Rev. G

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

Item	Nominal Anchor Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in ²	Area, in ²	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	2.250	#18J A615 Gr 75	75	100	15.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%
2	2.250	#18J A615 Gr 75	75	100	45.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%
3	2.250	#18J A615 Gr 75	75	100	75.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%
4	2.250	#18J A615 Gr 75	75	100	105.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%
5	2.250	#18J A615 Gr 75	75	100	135.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%
6	2.250	#18J A615 Gr 75	75	100	165.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%
7	2.250	#18J A615 Gr 75	75	100	195.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%
8	2.250	#18J A615 Gr 75	75	100	225.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%
9	2.250	#18J A615 Gr 75	75	100	255.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%
10	2.250	#18J A615 Gr 75	75	100	285.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%
11	2.250	#18J A615 Gr 75	75	100	315.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%
12	2.250	#18J A615 Gr 75	75	100	345.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%
13	2.250	#18J A615 Gr 75	75	100	0.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%
14	2.250	#18J A615 Gr 75	75	100	90.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%
15	2.250	#18J A615 Gr 75	75	100	180.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%
16	2.250	#18J A615 Gr 75	75	100	270.0	55.00	0.00	3.98	231.73	224.48	236.73	0.00	260.00	91.1%

63.68

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

TIA Rev G

Assumption: Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: 876360
Site Name: Preston/Town Hall
App #:
Pole Manufacturer: <i>Other</i>

Anchor Rod Data

Qty:	24	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	55	in

Plate Data

Diam:	61	in
Thick:	1.75	in
Grade:	60	ksi
Single-Rod B-eff:	6.08	in

Stiffener Data (Welding at both sides)

Config:	1	*
Weld Type:	Both	
Groove Depth:	0.5	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.5	in
Fillet V. Weld:	0.375	in
Width:	6	in
Height:	14	in
Thick:	1	in
Notch:	0.75	in
Grade:	65	ksi
Weld str.:	80	ksi

Pole Data

Diam:	46	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Reactions

Mu:	6351.95	ft-kips
Axial, Pu:	58	kips
Shear, Vu:	40	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

Reactions adjusted to account for additional anchor rods.

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

Anchor Rod Results

Max Rod (Cu+ Vu/r): 236.7 Kips

Stiffened
AISC LRFD
φ*Tn

Base Plate Results

Base Plate Stress: 49.3 ksi
 Allowable Plate Stress: 54.0 ksi
 Base Plate Stress Ratio: 91.2% **Pass**

Flexural Check

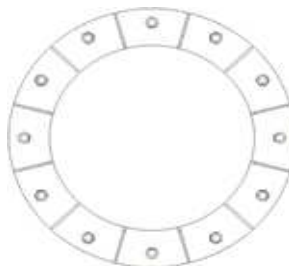
Stiffened
AISC LRFD
φ*Fy
Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld : 71.7% **Pass**
 Vertical Weld: 87.6% **Pass**
 Plate Flex+Shear, fb/Fb+(fv/Fv)^2: 31.6% **Pass**
 Plate Tension+Shear, ft/Ft+(fv/Fv)^2: 72.4% **Pass**
 Plate Comp. (AISC Bracket): 78.9% **Pass**

Pole Results

Pole Punching Shear Check: 35.9% **Pass**



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

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

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

TIA Rev G

Assumption: Clear space between bottom of leveling nut and top of concrete **not** exceeding $(1) \times (\text{Rod Diameter})$

Site Data	
BU#:	876360
Site Name:	Preston/Town Hall
App #:	
Pole Manufacturer:	Other

Anchor Rod Data	
Qty:	12
Diam:	2.25 in
Rod Material:	A615-J
Strength (Fu):	100 ksi
Yield (Fy):	75 ksi
Bolt Circle:	55 in

Plate Data	
Diam:	61 in
Thick:	1.75 in
Grade:	60 ksi
Single-Rod B-eff:	12.17 in

Stiffener Data (Welding at both sides)	
Config:	3 *
Weld Type:	Groove
Groove Depth:	0.25 in **
Groove Angle:	45 degrees
Fillet H. Weld:	<-- Disregard
Fillet V. Weld:	0.4375 in
Width:	6 in
Height:	14 in
Thick:	0.5 in
Notch:	0.75 in
Grade:	50 ksi
Weld str.:	80 ksi
Clear Space between Stiffeners (b):	7 in

Pole Data	
Diam:	46 in
Thick:	0.375 in
Grade:	65 ksi
# of Sides:	18 "0" IF Round
Fu	80 ksi
Reinf. Fillet Weld	0 "0" if None

Reactions	
Mu:	3096.9125 ft-kips
Axial, Pu:	58 kips
Shear, Vu:	40 kips
Eta Factor, η	0.5 TIA G (Fig. 4-4)

Moment adjusted to account for additional anchor rods.

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

Anchor Rod Results

Max Rod $(C_u + V_u/r)$: 236.7 Kips

Stiffened
AISC LRFD
$\phi \cdot T_n$

Base Plate Results

Base Plate Stress: 51.5 ksi
 Allowable Plate Stress: 54.0 ksi
 Base Plate Stress Ratio: 95.4% **Pass**

Flexural Check

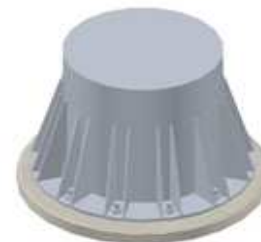
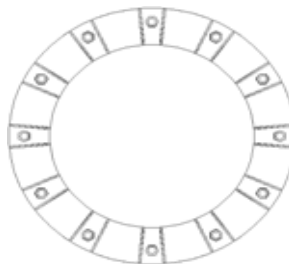
Stiffened
AISC LRFD
$\phi \cdot F_y$
Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld : 68.8% **Pass**
 Vertical Weld: 29.7% **Pass**
 Plate Flex+Shear, $f_b/F_b + (f_v/F_v)^2$: 32.9% **Pass**
 Plate Tension+Shear, $f_t/F_t + (f_v/F_v)^2$: 74.7% **Pass**
 Plate Comp. (AISC Bracket): 81.0% **Pass**

Pole Results

Pole Punching Shear Check: 14.2% **Pass**



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

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

Factored Foundation Loads:

	LC1	LC2	
Factored Axial Load (+Comp, -Ten) =	58	43.5	kips
Factored Horiz. Load at Top of Pier =	40	40	kips
Factored OTM at Top of Pier =	4182	4182	kips

LRFD Resistance and Load Factors:

	Φ	Dead Load Factors	
Soil Bearing =	0.75		
Soil Weight =	0.75	1.2	0.9
Concrete Weight =	0.75	1.2	0.9

Soil Properties:

Depth to Water Table = **99** ft
 Uplift Cone from **Top** of footing

Layer Thk ft	Soil Density pcf	Cohesion ksf	Friction Angle degrees	Ult Bearing ksf	Depth ft
6	120	0	40	10	6.00

Dimensions:

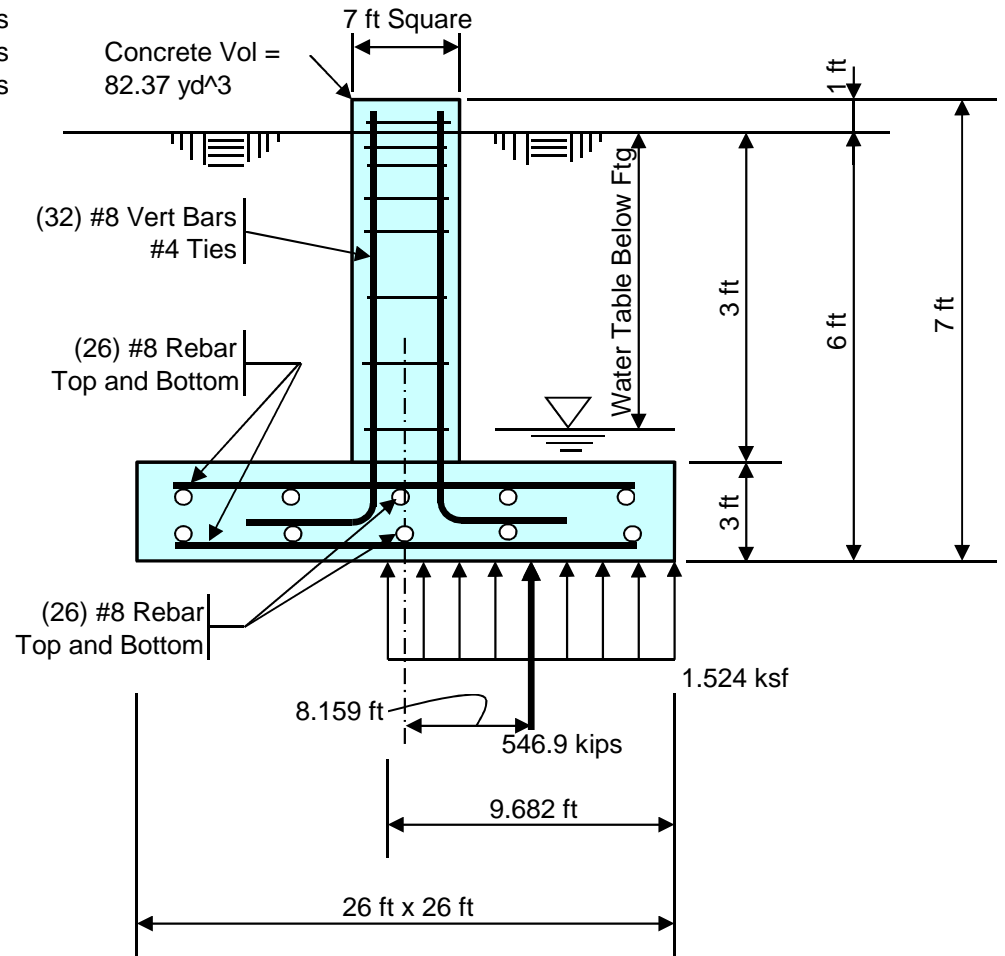
Pier Shape = **Square**
 Pier Width = **7** ft Square
 Pier Height above Grade = **1** ft
 Depth to Bottom of Footing = **6** ft
 Footing Thickness = **3** ft
 Footing Width, B = **26** ft
 Footing Length, L = **26** ft

Concrete:

Concrete Strength = **4** ksi
 Rebar Strength = **60** ksi

Summary Results:

	Required	Available
Maximum Net Soil Bearing =	1.676 ksf	7.500 ksf
Uplift =	0.0 kips	457.1 kips
Punching Shear Stress =	0.042 ksi	0.190 ksi
Bending Shear Stress =	264.9 kips	932.4 kips
Bending Moment =	1802.1 k-ft	2857.9 k-ft
Conc Pier Reinforcing Steel =	4342.0 k-ft	4688.9 k-ft



Total Pad Reinf Stl = **41.08** in² >= 20.22 in² = Min Stl, OK
 Total Pier Reinf Stl = **25.28** in² < **35.28** in² = **Min Stl**
 Footing Thickness = **3.00** ft >= 1.36 ft = Min Ftg Thk, OK

Stress Ratio =	22.4%	in Soil Bearing
Stress Ratio =	0.0%	in Uplift
Stress Ratio =	22.3%	in Punching Shear
Stress Ratio =	28.4%	in Bending Shear
Stress Ratio =	63.1%	in Bending Moment
Stress Ratio =	92.6%	in Pier Rebar

MODIFICATION OF AN EXISTING 147' MONOPOLE ENGINEERED ENDEAVORS #6938 BU #876360; PRESTON / TOWN HALL

389 RT. 2
PRESTON, CONNECTICUT 06365
NEW LONDON COUNTY
LAT: 41° 29' 25.25"; LONG: -71° 59' 29.55"
APP: 363243 REV. 2; WO: 1338804

PROJECT CONTACTS

STRUCTURE OWNER:
CROWN CASTLE
MOD PM: DAN VADNEY AT DAN.VADNEY@CROWNCastle.COM
PH: (518) 373-3510
MOD CM: JASON D'AMICO AT JASON.D'AMICO@CROWNCastle.COM
PH: (860) 209-0104

ENGINEER OF RECORD:
PJFMOD@PJFWEB.COM

THIS PROJECT INCLUDES THE FOLLOWING ITEMS

REMOVE EXISTING SHAFT REINFORCING
SHAFT REINFORCING
REMOVE EXISTING STIFFENERS
FIELD WELDED STIFFENERS
REMOVE AND REPLACE EXISTING STEP BOLTS

SHEET INDEX

SHEET NUMBER	DESCRIPTION
T-1	TITLE SHEET
T-2	MI CHECKLIST
S-1	GENERAL NOTES
S-2A	FORGBOLT™ DETAILS
S-2B	NEXGEN2™ BOLT DETAIL
S-2C	AJAX ONESIDE™ BOLT DETAIL
S-3	MONOPOLE PROFILE
S-4	SHAFT REINFORCING SECTIONS
S-5	BASE PLATE DETAILS

WIND DESIGN DATA

REFERENCE STANDARD	ANSI/TIA-222-G-2-2009
LOCAL CODE	2016 CONNECTICUT BUILDING CODE
ULTIMATE WIND SPEED (3-SECOND GUST)	135 MPH
CONVERTED NOMINAL WIND SPEED (3-SECOND GUST)	105 MPH
ICE THICKNESS	0.75 IN
ICE WIND SPEED	50 MPH
SERVICE WIND SPEED	60 MPH
RISK CATEGORY	II
EXPOSURE CATEGORY	C
Kzt	1.0

QUALIFIED ENGINEERING SERVICES ARE AVAILABLE FROM PAUL J. FORD & COMPANY TO ASSIST CONTRACTORS IN CLASS IV RIGGING PLAN REVIEWS. FOR REQUESTED QUALIFIED ENGINEERING SERVICES, PLEASE CONTACT RIGGING@PJFWEB.COM.

THE ASSOCIATED FAILING SA WO NUMBER FOR THIS PROJECT IS 1325584

ATTENTION ALL CONTRACTORS, ANYTIME YOU ACCESS A CROWN SITE FOR ANY REASON YOU ARE TO CALL THE CROWN NOC UPON ARRIVAL AND DEPARTURE, DAILY AT (800) 788-7011.

© Copyright 2016, by Paul J. Ford and Company, All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 147'
MONOPOLE
BU #876360; PRESTON / TOWN HALL
PRESTON, CONNECTICUT

PROJECT No: 37516-3879.001.7700
DRAWN BY: B.M.S.
DESIGNED BY: J.W.M.
CHECKED BY: BKK
DATE: 12-27-2016

TITLE SHEET

T-1

MODIFICATION INSPECTION NOTES:

1. GENERAL

- 1.1. 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 EOR.
- 1.2. 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.
- 1.3. ALL MI'S SHALL BE CONDUCTED BY A CROWN CASTLE ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN CASTLE.
- 1.4. 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 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 CASTLE POINT OF CONTACT (POC).
- 1.5. REFER TO ENG-SOW-10007: MODIFICATION INSPECTION SOW FOR FURTHER DETAILS AND REQUIREMENTS.

2. MI INSPECTOR

- 2.1. THE MI INSPECTOR IS REQUIRED TO CONTACT THE GC AS SOON AS RECEIVING A PO FOR THE MI TO, AT A MINIMUM:
 - 2.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.
 - 2.1.2. WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
 - 2.1.3. 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 CASTLE.

3. GENERAL CONTRACTOR

- 3.1. 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:
 - 3.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.
 - 3.1.2. WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
 - 3.1.3. BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS.
 - 3.1.4. THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE MI CHECKLIST AND ENG-SOW-10007.

4. RECOMMENDATIONS

- 4.1. THE FOLLOWING RECOMMENDATIONS AND SUGGESTIONS ARE OFFERED TO ENHANCE THE EFFICIENCY AND EFFECTIVENESS OF DELIVERING AN MI REPORT:
 - 4.1.1. IT IS SUGGESTED THAT THE GC PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, PREFERABLE 10, TO THE MI INSPECTOR AS TO WHEN THE SITE WILL BE READY FOR THE MI TO BE CONDUCTED.
 - 4.1.2. THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
 - 4.1.3. WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS.
 - 4.1.4. IT MAY BE BENEFICIAL TO INSTALL ALL TOWER MODIFICATIONS PRIOR TO CONDUCTING THE FOUNDATION INSPECTIONS TO ALLOW FOUNDATION AND MI INSPECTION(S) TO COMMENCE WITH ONE SITE VISIT.
 - 4.1.5. 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.

5. CANCELLATION OR DELAYS IN SCHEDULED MI

- 5.1. IF THE GC AND MI INSPECTOR AGREE TO A DATE ON WHICH THE MI WILL BE CONDUCTED, AND EITHER PARTY CANCELS OR DELAYS, CROWN CASTLE 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 FOR ANY TIME (E.G. TRAVEL AND LODGING, COSTS OF KEEPING EQUIPMENT ON-SITE, ETC.). IF CROWN CASTLE 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.

6. CORRECTION OF FAILING MI'S

- 6.1. IF THE MODIFICATION INSTALLATION WOULD FAIL THE MI ("FAILED MI"), THE GC SHALL WORK WITH CROWN CASTLE TO COORDINATE A REMEDIATION PLAN IN ONE OF TWO WAYS:
 - 6.1.1. CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENT MI.
 - 6.1.2. OR, WITH CROWN CASTLE'S APPROVAL, THE GC MAY WORK WITH THE EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION.

7. MI VERIFICATION INSPECTIONS

- 7.1. CROWN CASTLE RESERVES THE RIGHT TO CONDUCT A MI VERIFICATION INSPECTION TO VERIFY THE ACCURACY AND COMPLETENESS OF PREVIOUSLY COMPLETED MI INSPECTION(S) ON TOWER MODIFICATION PROJECTS.
- 7.2. ALL VERIFICATION INSPECTIONS SHALL BE HELD TO THE SAME SPECIFICATIONS AND REQUIREMENTS IN THE CONTRACT DOCUMENTS AND IN ACCORDANCE WITH ENG-SOW-10007.
- 7.3. 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.

8. PHOTOGRAPHS

- 8.1. BETWEEN THE GC AND THE MI INSPECTOR THE FOLLOWING PHOTOGRAPHS, AT A MINIMUM, ARE TO BE TAKEN AND INCLUDED IN THE MI REPORT:
 - 8.1.1. PRECONSTRUCTION GENERAL SITE CONDITION
 - 8.1.2. PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION
 - 8.1.3. RAW MATERIALS
 - 8.1.4. PHOTOS OF ALL CRITICAL DETAILS
 - 8.1.5. FOUNDATION MODIFICATIONS
 - 8.1.6. WELD PREPARATION
 - 8.1.7. BOLT INSTALLATION AND TORQUE
 - 8.1.8. FINAL INSTALLED CONDITION
 - 8.1.9. SURFACE COATING REPAIR
 - 8.1.10. POST CONSTRUCTION PHOTOGRAPHS
 - 8.1.11. FINAL INFIELD CONDITION
 - 8.1.12. PHOTOS OF ELEVATED MODIFICATIONS TAKEN FROM THE GROUND SHALL BE CONSIDERED INADEQUATE.
 - 8.1.13. THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, PLEASE REFER TO ENG-SOW-10007.

9. INSPECTION AND TESTING

- 9.1. ALL WORK SHALL BE SUBJECT TO REVIEW AND OBSERVATION BY CROWN CASTLE'S REPRESENTATIVE AND CROWN CASTLE'S AUTHORIZED INDEPENDENT INSPECTION AND TESTING AGENCY.
- 9.2. INSPECTION SERVICES WHICH ARE FURNISHED BY OTHERS ARE STILL REQUIRED WHEN THE EOR PERFORMS SUPPORT SERVICES DURING CONSTRUCTION.
- 9.3. OBSERVED DISCREPANCIES BETWEEN THE WORK AND THE CONTRACT DOCUMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST.
- 9.4. AN INDEPENDENT QUALIFIED INSPECTION/TESTING AGENCY SHALL BE SELECTED AND RETAINED FOR THE SOLE PURPOSE OF INSPECTING, TESTING, DOCUMENTING, AND APPROVING ALL WELDING AND FIELD WORK PERFORMED BY THE CONTRACTOR.
 - 9.4.1. ACCESS TO ANY PLACE WHERE WORK IS BEING DONE SHALL BE PERMITTED AT ALL TIMES.
 - 9.4.2. THE INSPECTION AGENCY SHALL SO SCHEDULE THIS WORK AS TO CAUSE A MINIMUM OF INTERRUPTION TO, AND COORDINATE WITH, THE WORK IN PROGRESS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE THE WORK SCHEDULE WITH THE TESTING AGENCY. THE CONTRACTOR SHALL ALLOW FOR ADEQUATE TIME AND ACCESS FOR THE TESTING AGENCY TO PERFORM THEIR DUTIES.
- 9.5. THE INSPECTION AND TESTING AGENCY SHALL BE RESPONSIBLE TO PERFORM THE FOLLOWING SERVICES AND INSPECT THE FOLLOWING ITEMS IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS. THE TESTING AGENCY SHALL INSPECT ITEMS ON THIS LIST AND OTHER ITEMS AS NECESSARY TO FULFILL THEIR RESPONSIBILITY. THE TESTING AGENCY SHALL UTILIZE EXPERIENCED, TRAINED INSPECTORS INCLUDING AWS CERTIFIED WELDING INSPECTORS (CWI). INSPECTORS SHALL HAVE THE TRAINING, CREDENTIALS, AND EXPERIENCE APPROPRIATE FOR AND COMMENSURATE WITH THE SCOPE AND TYPE OF INSPECTION WORK TO BE PERFORMED.
- 9.6. **GENERAL**
 - 9.6.1. PERFORM PERIODIC ON-SITE OBSERVATION, INSPECTION, VERIFICATION, AND TESTING DURING THE TIME THE CONTRACTOR IS WORKING ON-SITE. AGENCY SHALL NOTIFY CROWN CASTLE AND THE EOR IMMEDIATELY WHEN FIELD PROBLEMS OR DISCREPANCIES OCCUR.
- 9.7. **FOUNDATIONS AND SOIL PREPARATION - (NOT REQUIRED)**
- 9.8. **CONCRETE TESTING PER ACI - (NOT REQUIRED)**
- 9.9. **STRUCTURAL STEEL**
 - 9.9.1. CHECK STEEL ON THE JOB WITH THE PLANS.
 - 9.9.2. CHECK MILL CERTIFICATIONS. CALL FOR LABORATORY TEST REPORTS WHEN MILL CERTIFICATION IS IN QUESTION.
 - 9.9.3. CHECK GRADE OF STEEL MEMBERS, AND BOLTS FOR CONFORMANCE WITH DRAWINGS.
 - 9.9.4. INSPECT ALL STRUCTURAL BOLTS SHALL BE FIELD INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
 - 9.9.5. INSPECT STEEL MEMBERS FOR DISTORTION, EXCESSIVE RUST, FLAWS AND BURNED HOLES.
 - 9.9.6. CHECK STEEL MEMBERS FOR SIZES, SWEEP AND DIMENSIONAL TOLERANCES.
 - 9.9.7. CHECK FOR SURFACE FINISH SPECIFIED, GALVANIZED.
 - 9.9.8. CHECK THAT BOLTS HAVE BEEN TIGHTENED PROPERLY.
 - 9.9.9. PRIOR TO ANY FIELD CUTTING THE CONTRACTOR SHALL MARK THE CUTOUT LINES ON THE STEEL AND THE INSPECTION/TESTING AGENCY SHALL VERIFY PROPOSED LAYOUT, LOCATION, AND DIMENSIONS. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.
- 9.10. **WELDING:**
 - 9.10.1. VERIFY FIELD WELDING PROCEDURES, WELDERS, AND WELDING OPERATORS, NOT DEEMED PREQUALIFIED, IN ACCORDANCE WITH AWS D1.1.
 - 9.10.2. INSPECT FIELD WELDED CONNECTIONS IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED AND WITH AWS D1.1.
 - 9.10.3. APPROVE FIELD WELDING SEQUENCE.
 - 9.10.4. A PROGRAM OF THE APPROVED SEQUENCES SHALL BE SUBMITTED TO CROWN CASTLE BEFORE WELDING BEGINS. NO CHANGE IN APPROVED SEQUENCES MAY BE MADE WITHOUT PERMISSION FROM CROWN CASTLE.
 - 9.10.5. INSPECT WELDED CONNECTIONS AS FOLLOWS AND IN ACCORDANCE WITH AWS D1.1:
 - 9.10.5.1. INSPECT WELDING EQUIPMENT FOR CAPACITY, MAINTENANCE, AND WORKING CONDITIONS.
 - 9.10.5.2. VERIFY SPECIFIED ELECTRODES AND HANDLING AND STORAGE OF ELECTRODES FOR CONFORMANCE TO SPECIFICATIONS.
 - 9.10.5.3. INSPECT PREHEATING AND INTERPASS TEMPERATURES FOR CONFORMANCE WITH AWS D1.1.
 - 9.10.5.4. VISUALLY INSPECT ALL WELDS AND VERIFY THAT QUALITY OF WELDS MEETS THE REQUIREMENTS OF AWS D1.1. OTHER TESTS MAY ALSO BE PERFORMED ON THE WELDS BY THE TESTING AGENCY IN ORDER FOR THEM TO PERFORM THEIR DUTIES FOR THIS PROJECT.
 - 9.10.5.5. SPOT TEST AT LEAST ONE FILLET WELD OF EACH MEMBER USING MAGNETIC PARTICLE.
 - 9.10.5.6. INSPECT FOR SIZE, SPACING, TYPE AND LOCATION AS PER APPROVED DRAWINGS.
 - 9.10.5.7. VERIFY THAT THE BASE METAL CONFORMS TO THE DRAWINGS.
 - 9.10.5.8. REVIEW THE REPORTS BY TESTING LABS.
 - 9.10.5.9. CHECK TO SEE THAT WELDS ARE CLEAN AND FREE FROM SLAG.
 - 9.10.5.10. INSPECT RUST PROTECTION OF WELDS AS PER SPECIFICATIONS.
 - 9.10.5.11. CHECK THAT DEFECTIVE WELDS ARE CLEARLY MARKED AND HAVE BEEN ADEQUATELY REPAIRED.
- 9.11. **REPORTS:**
 - 9.11.1. COMPILE AND PERIODICALLY SUBMIT DAILY INSPECTION REPORTS TO CROWN CASTLE.
 - 9.11.2. THE INSPECTION PLAN OUTLINED HEREIN IS INTENDED AS A DESCRIPTION OF GENERAL AND SPECIFIC ITEMS OF CONCERN. IT IS NOT INTENDED TO BE ALL-INCLUSIVE. IT DOES NOT LIMIT THE TESTING AND INSPECTION AGENCY TO THE ITEMS LISTED. ADDITIONAL TESTING, INSPECTION, AND CHECKING MAY BE REQUIRED AND SHOULD BE ANTICIPATED. THE TESTING AGENCY SHALL USE THEIR PROFESSIONAL JUDGMENT AND KNOWLEDGE OF THE JOB SITE CONDITIONS AND THE CONTRACTOR'S PERFORMANCE TO DECIDE WHAT OTHER ITEMS REQUIRE ADDITIONAL ATTENTION. THE TESTING AGENCY'S JUDGMENT MUST PREVAIL ON ITEMS NOT SPECIFICALLY COVERED. ANY DISCREPANCIES OR PROBLEMS SHALL BE BROUGHT IMMEDIATELY TO CROWN CASTLE'S ATTENTION. RESOLUTIONS ARE NOT TO BE MADE WITHOUT CROWN CASTLE'S REVIEW AND SPECIFIC WRITTEN CONSENT. CROWN CASTLE RESERVES THE RIGHT TO DETERMINE WHETHER OR NOT A RESOLUTION IS ACCEPTABLE.
 - 9.11.3. AFTER EACH INSPECTION, THE TESTING AGENCY WILL PREPARE A WRITTEN ACCEPTANCE OR REJECTION WHICH WILL BE GIVEN TO THE CONTRACTOR AND FILED AS DAILY REPORTS TO CROWN CASTLE. THIS WRITTEN ACTION WILL GIVE THE CONTRACTOR A LIST OF ITEMS TO BE CORRECTED, PRIOR TO CONTINUING CONSTRUCTION, AND/OR LOADING OF STRUCTURAL ITEMS.
 - 9.11.4. THE TESTING AGENCY DOES NOT RELIEVE THE CONTRACTOR'S CONTRACTUAL OR STATUTORY OBLIGATIONS. THE CONTRACTOR HAS THE SOLE RESPONSIBILITY FOR ANY DEVIATIONS FROM THE OFFICIAL CONTRACT DOCUMENTS. THE TESTING AGENCY WILL NOT REPLACE THE CONTRACTOR'S QUALITY CONTROL PERSONNEL.

MI CHECKLIST	
CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
PRE-CONSTRUCTION	
X	MI CHECKLIST DRAWINGS
X	EOR REVIEW
X	FABRICATION INSPECTION
NA	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
NA	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS: _____	
CONSTRUCTION	
X	CONSTRUCTION INSPECTIONS
NA	FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
NA	POST INSTALLED ANCHOR ROD VERIFICATION
NA	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION
NA	EARTHWORK: PROVIDE PHOTO DOCUMENTATION OF EXCAVATION QUALITY AND COMPACTION
X	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
NA	MICROPILE/ROCK ANCHOR INSTALLER'S DRILLING AND INSTALLATION LOGS AND QA/QC DOCUMENTS
ADDITIONAL TESTING AND INSPECTIONS: _____	
POST-CONSTRUCTION	
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
NA	POST INSTALLED ANCHOR ROD TARGET TENSION LOAD TESTING
NA	REFER TO MICROPILE/ROCK ANCHOR NOTES FOR SPECIAL INSPECTION AND TESTING REQUIREMENTS.
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS: _____	

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

© Copyright 2016, by Paul J. Ford and Company, All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 147' MONOPOLE
BU #876360; PRESTON / TOWN HALL PRESTON, CONNECTICUT

PROJECT No:	37516-3879.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.W.M.
CHECKED BY:	BKK
DATE:	12-27-2016

MI CHECKLIST

T-2

1. GENERAL NOTES

- 1.1. THE MONOPOLE STRUCTURE IN ITS EXISTING CONDITION DOES NOT HAVE THE STRUCTURAL CAPACITY TO CARRY ALL OF THE PROPOSED AND EXISTING LOADS FROM THE ATTACHED STRUCTURAL MODIFICATION REPORT AT THE REQUIRED MINIMUM WIND SPEEDS. DO NOT INSTALL ANY NEW LOADS UNTIL THE MONOPOLE REINFORCING SYSTEM IS COMPLETELY AND SUCCESSFULLY INSTALLED.
- 1.2. THESE DRAWINGS WERE PREPARED FROM INFORMATION PROVIDED BY CROWN CASTLE. THE INFORMATION PROVIDED HAS NOT BEEN FIELD VERIFIED BY THE ENGINEER OF RECORD (EOR) FOR ACCURACY AND THEREFORE DISCREPANCIES BETWEEN THESE DRAWINGS AND ACTUAL SITE CONDITIONS SHOULD BE ANTICIPATED. PRIOR TO FABRICATION AND INSTALLATION CONTRACTOR SHALL VERIFY ALL LENGTHS AND QUANTITIES GIVEN. LENGTH AND QUANTITIES PROVIDED ARE FOR QUOTING PURPOSES ONLY AND SHALL NOT BE USED FOR FABRICATION. THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT DRAWINGS AND THEIR FIELD VERIFIED CONDITIONS AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. THE CONTRACTOR SHALL IMMEDIATELY REPORT ANY AND ALL DISCREPANCIES TO THE EOR AND CROWN CASTLE BEFORE PROCEEDING WITH THE WORK. ANY WORK PERFORMED WITHOUT A PREFABRICATION MAPPING IS DONE AT THE RISK OF THE GENERAL CONTRACTOR AND/OR THE FABRICATOR
- 1.3. IF MATERIALS, QUANTITIES, STRENGTHS OR SIZES INDICATED BY THE DRAWINGS OR SPECIFICATIONS ARE NOT IN AGREEMENT WITH THESE NOTES, THE BETTER QUALITY AND/OR GREATER QUANTITY, STRENGTH OR SIZE INDICATED, SPECIFIED OR NOTED SHALL BE PROVIDED.
- 1.4. THIS STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE INSTALLATION OF THE REINFORCING REPAIR SYSTEM HAS BEEN SUCCESSFULLY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO ENSURE THE SAFETY AND STABILITY OF THE MONOPOLE AND ITS COMPONENT PARTS DURING FIELD MODIFICATIONS. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF WHATEVER TEMPORARY BRACING, GUYS OR TIE DOWNS THAT MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER THE COMPLETION OF THE PROJECT.
- 1.5. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN AND SHALL MEET ANSII/TIA-1019 (LATEST EDITION), OSHA AND GENERAL INDUSTRY STANDARDS. ALL RIGGING PLANS SHALL ADHERE TO ANSII/TIA-1019 (LATEST EDITION) INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION.
- 1.6. OBSERVATION VISITS TO THE SITE BY CROWN CASTLE AND/OR THE EOR SHALL NOT INCLUDE INSPECTIONS OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES. ANY SUPPORT SERVICES PERFORMED BY THE EOR DURING CONSTRUCTION ARE SOLELY FOR THE PURPOSE OF ACHIEVING GENERAL CONFORMANCE WITH THE CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE THE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.
- 1.7. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANY AND ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED IN WRITING BY CROWN CASTLE AND EOR PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF MATERIALS AND EQUIPMENT BEING SUBSTITUTED.
- 1.8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT THIS PROJECT AND RELATED WORK COMPLIES WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY CODES AND REGULATIONS GOVERNING THIS WORK AS WELL AS CROWN CASTLE SAFETY GUIDELINES.
- 1.9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING AND NEW COAXIAL CABLES AND OTHER EQUIPMENT DURING CONSTRUCTION.
- 1.10. ANY EXISTING ATTACHMENTS AND/OR PROJECTIONS ON THE POLE THAT MAY INTERFERE WITH THE INSTALLATION OF THE REINFORCING SYSTEM WILL HAVE TO BE REMOVED AND RELOCATED, REPLACED, OR RE-INSTALLED AS REQUIRED AFTER THE REINFORCING IS SUCCESSFULLY COMPLETED. THE CONTRACTOR SHALL IDENTIFY AND COORDINATE THESE ITEMS PRIOR TO CONSTRUCTION WITH CROWN CASTLE, TESTING AGENCY, AND EOR.
- 1.11. ANY AND ALL EXISTING PLATFORMS THAT ARE LOCATED IN AREAS OF THE POLE SHAFT WHERE SHAFT REINFORCING MUST BE APPLIED SHALL BE TEMPORARILY REMOVED OR OTHERWISE SUPPORTED TO PERMIT NEW CONTINUOUS REINFORCEMENT TO BE ATTACHED. AFTER THE CONTRACTOR HAS SUCCESSFULLY INSTALLED THE MONOPOLE REINFORCEMENT SYSTEM, THE CONTRACTOR SHALL RE-INSTALL THE PLATFORMS.
- 1.12. THE CLIMBING FACILITIES, SAFETY CLIMB AND ALL PARTS THEREOF SHALL NOT BE IMPEDDED, MODIFIED OR ALTERED WITHOUT THE EXPRESS APPROVAL OF THE EOR.
- 1.13. FOR STANDARD CROWN PARTS SEE THE MOST RECENT VERSION OF THE "CCI APPROVED REINFORCEMENT COMPONENTS" CATALOG.
- 1.14. ALL SOLUTIONS FOR THE REPLACEMENT, RELOCATION OR MODIFICATION OF THE SAFETY CLIMB AND/OR ANY OF THE MONOPOLE CLIMBING FACILITIES SHALL BE COORDINATED WITH TUF-TUG PRODUCTS. CONTACT DETAILS:
3434 ENCRETE LANE, MORAIN, OHIO 45439
PHONE: 937-299-1213 EMAIL: TUFUG@AOL.COM

2. STRUCTURAL STEEL

- 2.1. STRUCTURAL STEEL MATERIALS, FABRICATION, DETAILING, AND WORKMANSHIP SHALL CONFORM TO THE LATEST EDITION OF THE FOLLOWING REFERENCE STANDARDS:
 - 2.1.1. BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC):
 - 2.1.1.1. "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS."
 - 2.1.1.2. "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM HIGH STRENGTH BOLTS," AS APPROVED BY THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS.
 - 2.1.1.3. "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"
 - 2.1.2. BY THE AMERICAN WELDING SOCIETY (AWS):
 - 2.1.2.1. "STRUCTURAL WELDING CODE - STEEL D1.1."
 - 2.1.2.2. "STANDARD SYMBOLS FOR WELDING, BRAZING, AND NONDESTRUCTIVE EXAMINATION"
- 2.2. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM HIGH STRENGTH BOLTS', DEC. 31, 2009.
- 2.3. ANY MATERIAL OR WORKMANSHIP WHICH IS OBSERVED TO BE DEFECTIVE OR INCONSISTENT WITH THE CONTRACT DOCUMENTS SHALL BE CORRECTED, MODIFIED, OR REPLACED AT THE CONTRACTOR'S EXPENSE.
- 2.4. WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY, AWS D1.1. ALL WELD ELECTRODES SHALL BE E80XX UNLESS NOTED OTHERWISE ON THE DRAWINGS.
- 2.5. ALL WELDED CONNECTIONS SHALL BE MADE BY WELDERS CERTIFIED BY AWS. CONTRACTOR SHALL SUBMIT WELDERS' CERTIFICATION AND QUALIFICATION DOCUMENTATION TO CROWN CASTLE'S TESTING AGENCY FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
- 2.6. STRUCTURAL STEEL PLATES SHALL CONFORM TO ASTM A572 GRADE 65(FY = 65 KSI MIN.) UNLESS NOTED OTHERWISE ON THE DRAWINGS.
- 2.7. SURFACES OF EXISTING STEEL SHALL BE PREPARED AS REQUIRED FOR FIELD WELDING PER AWS. SEE SECTION I NOTES REGARDING TOUCH UP OF GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS FIELD WELDING.
- 2.8. NO WELDING SHALL BE DONE TO THE EXISTING STRUCTURE WITHOUT THE PRIOR APPROVAL AND SUPERVISION OF THE TESTING AGENCY.
- 2.9. FIELD CUTTING OF STEEL:
 - 2.9.1. IMPORTANT CUTTING AND WELDING SAFETY GUIDELINES: THE CONTRACTOR SHALL FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE PREVENTION AND SAFETY GUIDELINES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A COPY OF THE CURRENT CROWN CASTLE GUIDELINES. PER THE 12-01-2005 CROWN CASTLE DIRECTIVE: "ALL CUTTING AND WELDING ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH CROWN CASTLE POLICY 'CUTTING AND WELDING SAFETY PLAN' (DOC # ENG-PLN-10015) ON AN ONGOING BASIS THROUGHOUT THE ENTIRE LIFE OF THE PROJECT". ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, RESULTING FROM THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.
 - 2.9.2. ALL REQUIRED CUTS SHALL BE CUT WITHIN THE DIMENSIONS SHOWN ON THE DRAWINGS. NO CUTS SHALL EXTEND BEYOND THE OUTLINE OF THE DIMENSIONS SHOWN ON THE DRAWINGS. ALL CUT EDGES SHALL BE GROUND SMOOTH AND DE-BURRED. CUT EDGES THAT ARE TO BE FIELD WELDED SHALL BE PREPARED FOR FIELD WELDING PER AWS D1.1 AND AS SHOWN ON THE DRAWINGS. CONTRACTOR TO AVOID 90 DEGREE CORNERS. IT MAY BE NECESSARY TO DRILL STARTER HOLES AS REQUIRED TO MAKE THE CUTS.

3. BASE PLATE GROUT - (NOT REQUIRED)

4. FOUNDATION WORK - (NOT REQUIRED)

5. CAST-IN-PLACE CONCRETE - (NOT REQUIRED)

6. EPOXY GROUTED REINFORCING ANCHOR RODS - (NOT REQUIRED)

7. TOUCH UP OF GALVANIZING

- 7.1. THE CONTRACTOR SHALL TOUCH UP ANY AND ALL AREAS OF GALVANIZING ON THE EXISTING STRUCTURE OR NEW COMPONENTS THAT ARE DAMAGED OR ABRADED DURING CONSTRUCTION. GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS ANY AND ALL ABRASIONS, CUTS, FIELD DRILLING, AND ALL FIELD WELDING SHALL BE TOUCHED UP WITH TWO (2) COATS OF ZRC COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.
- 7.2. CONTRACTOR SHALL CLEAN AND PREPARE ALL FIELD WELDS ON GALVANIZED AND PRIME PAINTED SURFACES FOR TOUCH-UP COATING IN ACCORDANCE WITH AWS D1.1. CROWN CASTLE'S TESTING AGENCY SHALL VERIFY THE PREPARED SURFACE PRIOR TO APPLICATION OF THE TOUCH-UP COATING.
- 7.3. CROWN CASTLE'S TESTING AGENCY SHALL TEST AND VERIFY THE COATING THICKNESS AFTER THE CONTRACTOR HAS APPLIED THE ZRC COLD GALVANIZING COMPOUND AND IT HAS SUFFICIENTLY DRIED. AREAS FOUND TO BE ADEQUATELY COATED, SHALL BE RE-COATED BY THE CONTRACTOR AND RE-TESTED BY THE TESTING AGENCY.

8. HOT-DIP GALVANIZING

- 8.1. HOT-DIP GALVANIZE ALL STRUCTURAL STEEL MEMBERS AND ALL STEEL ACCESSORIES, BOLTS, WASHERS, ETC. PER ASTM A123 OR PER ASTM A153, AS APPROPRIATE.
- 8.2. PROPERLY PREPARE STEEL ITEMS FOR GALVANIZING. DRILL OR PUNCH WEEP AND/OR DRAINAGE HOLES WITH EOR APPROVAL OF LOCATIONS.
- 8.3. ALL GALVANIZING SHALL BE DONE AFTER FABRICATION IS COMPLETED AND PRIOR TO FIELD INSTALLATION.

9. PERPETUAL INSPECTION AND MAINTENANCE BY THE OWNER

- 9.1. AFTER THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF THE MONOPOLE REINFORCING SYSTEM AND THE WORK HAS BEEN ACCEPTED BY CROWN CASTLE, CROWN CASTLE WILL BE RESPONSIBLE FOR THE LONG TERM AND PERPETUAL INSPECTION AND MAINTENANCE OF THE POLE AND REINFORCING SYSTEM.
- 9.2. ANY FIELD WELDED CONNECTIONS ARE SUBJECT TO CORROSION DAMAGE AND DETERIORATION IF THEY ARE NOT PROPERLY MAINTAINED AND COVERED WITH CORROSION PREVENTIVE COATING SUCH AS THE ZRC GALVANIZING COMPOUND SPECIFIED PREVIOUSLY. THE STRUCTURAL LOAD CARRYING CAPACITY OF THE REINFORCED POLE SYSTEM IS DEPENDENT UPON THE INSTALLED SIZE AND QUALITY, MAINTAINED SOUND CONDITION AND STRENGTH OF THESE FIELD WELDED CONNECTIONS. ANY CORROSION OF, DAMAGE TO, FATIGUE, FRACTURE, AND/OR DETERIORATION OF THESE WELDS AND/OR THE EXISTING GALVANIZED STEEL POLE STRUCTURE AND THE WELDED COMPONENTS WILL RESULT IN THE LOSS OF STRUCTURAL LOAD CARRYING CAPACITY AND MAY LEAD TO FAILURE OF THE STRUCTURAL SYSTEM. THEREFORE, IT IS IMPERATIVE THAT CROWN CASTLE REGULARLY INSPECTS, MAINTAINS, AND REPAIRS AS NECESSARY, ALL OF THESE WELDS, CONNECTIONS, AND COMPONENTS FOR THE LIFE OF THE STRUCTURE.
- 9.3. CROWN CASTLE SHALL REFER TO ANSII/TIA-222-G-2-2009, SECTION 14 AND ANNEX J FOR RECOMMENDATIONS FOR MAINTENANCE AND INSPECTION. THE FREQUENCY OF THE INSPECTION AND MAINTENANCE INTERVALS IS TO BE DETERMINED BY CROWN CASTLE BASED UPON ACTUAL SITE AND ENVIRONMENTAL CONDITIONS. THE EOR RECOMMENDS THAT A COMPLETE AND THOROUGH INSPECTION OF THE ENTIRE REINFORCED MONOPOLE STRUCTURAL SYSTEM BE PERFORMED YEARLY AND/OR AS FREQUENTLY AS CONDITIONS WARRANT. ACCORDING TO ANSII/TIA-222-G-2-2009 SECTION 14.2: "IT IS RECOMMENDED THAT THE STRUCTURE BE INSPECTED AFTER SEVERE WIND AND/OR ICE STORMS OR OTHER EXTREME LOADING CONDITIONS".

10. FIELD NDE MINIMUM REQUIREMENTS

- 10.1. ALL NDE SHALL BE IN ACCORDANCE WITH AWS D1.1.
- 10.2. FOR NEW BASE STIFFENERS (INCLUDING OF TRANSITION STIFFENERS) AND ANCHOR ROD BRACKETS, COMPLETE JOINT PENETRATION WELDS SHALL BE 100% INSPECTED BY UT. ALL PARTIAL JOINT PENETRATION AND FILLET WELDS SHALL BE 100% INSPECTED BY MT.
- 10.3. FOR NEW FLAT PLATE REINFORCEMENT AT THE BASE OF THE TOWER, COMPLETE JOINT PENETRATION WELDS SHALL BE 100% INSPECTED BY UT. ALL PARTIAL JOINT PENETRATION AND FILLET WELDS SHALL BE 100% INSPECTED BY MT, BUT MAY BE LIMITED TO A HEIGHT OF 10'-0".
- 10.4. FOR NDE OF THE EXISTING BASE PLATE CIRCUMFERENTIAL WELD, GC SHALL REFERENCE THE MI CHECKLIST FOR APPLICABILITY. PLEASE SEE ENG-SOW-10033: TOWER BASE PLATE NDE, AND ENG-BUL-10051: NDE REQUIREMENTS FOR MONOPOLE BASE PLATE TO PREVENT CONNECTION FAILURE. NOTIFY THE EOR AND CROWN ENGINEERING IMMEDIATELY IF ANY CRACKS ARE SUSPECTED OR HAVE BEEN IDENTIFIED. THE NDE SHALL INCLUDE ALL EXISTING MODIFICATIONS THAT HAVE BEEN WELDED TO THE BASE PLATE.
- 10.5. ALL TESTING LIMITATIONS SHALL BE DETAILED IN THE NDE REPORT.

© Copyright 2016, by Paul J. Ford and Company, All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

CROWN CASTLE

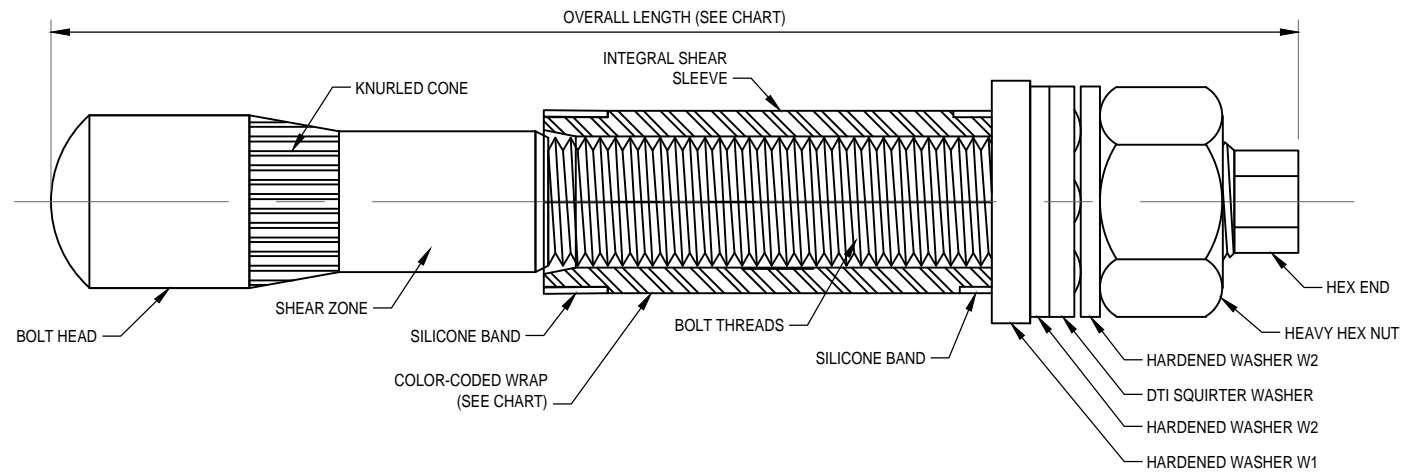
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 147' MONOPOLE
BU #876360; PRESTON / TOWN HALL PRESTON, CONNECTICUT

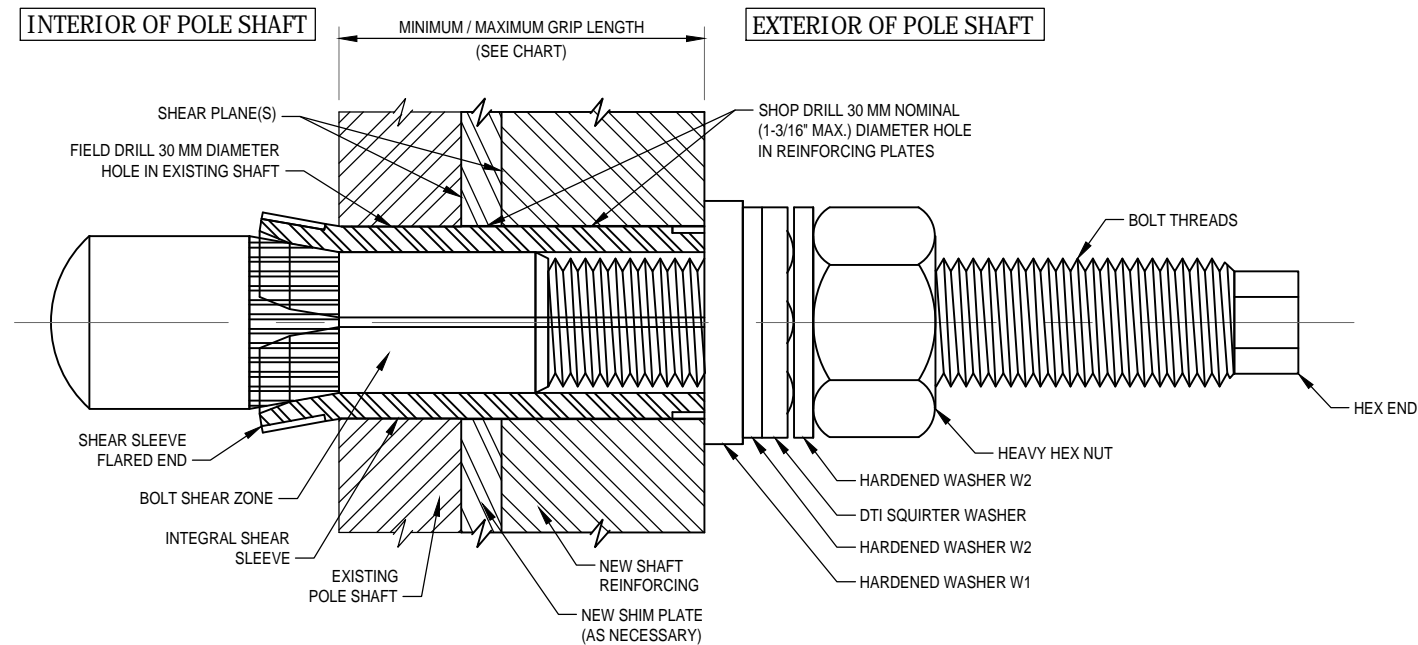
PROJECT No:	37516-3879.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.W.M.
CHECKED BY:	BKK
DATE:	12-27-2016

GENERAL NOTES

S-1



PRE-INSTALLED FORGBolt™ ASSEMBLY DETAIL 1
S-2A



INSTALLED FORGBolt™ ASSEMBLY DETAIL 2
S-2A

FORGBolt™		AISC Group A Material: ASTM A325 and PC8.8 (Tensile Stress, Fu = 120 ksi minimum)					
GROUP A	FORGBolt™ Size (mm)	Overall Length (inches)	Estimated Weight Each (lbs)	Grip Range (inch)	Comment	Color Code	
FORGBolt™ A325 - PC8.8	1	135	5.31	1.3	3/8" to 1"	--	RED
	2	160	6.30	1.6	3/4" to 1-1/2"	--	GREEN
	3	195	7.68	1.9	1-1/4" to 2-1/4"	--	BLUE
	4	260	10.24	2.6	2" to 3-1/2"	Splice Bolt	YELLOW
	5	365	14.37	3.6	3-1/2" to 5-1/2"	Flange Jump Bolt	ORANGE
	6	440	17.32	4.3	5-1/2" to 8-1/2"	Flange Jump Bolt	BLACK
DTI Note	Each Group A (A325/PC8.8) FORGBolt™ assembly shall have a 'Squirtter' DTI that is compatible with a M20-PC8.8 bolt.						

FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

- INSTALLATION NOTES:**
1. FIELD DRILL HOLES TO 30 MM DIAMETER.
 2. SELECT CORRECT BOLT SIZE FOR INSTALLATION GRIP (REFER TO PLANS).
 3. INSERT BOLT ASSEMBLY THROUGH HOLES IN SHAFT REINFORCING PLATES AND SEAT THE HARDENED WASHER W1 FLUSH AGAINST OUTSIDE OF PLATE.
 4. HAND TIGHTEN NUT TO FINGER TIGHT.
 5. TIGHTEN NUT TO PRETENSIONED CONDITION AND UNTIL DTI SHOWS PROPER INDICATION.
 6. PROPERLY DOCUMENT AND INSPECT BOLT TIGHTENING PER PLAN REQUIREMENTS.

- BOLT HOLE NOTES:**
1. ALL SHOP-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM SHOP-DRILLED HOLE DIAMETER PERMITTED IS 1-3/16".
 2. ALL FIELD-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM FIELD-DRILLED HOLE DIAMETER PERMITTED IS 30 MM.

- BOLT TIGHTENING AND INSPECTION NOTES:**
1. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
 2. ALL STRUCTURAL BOLTS SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.

**AISC GROUP A MATERIAL: ASTM A325 AND PC8.8
(Fu = 120 KSI MIN. TENSILE STRESS)**

CONTAINS PROPRIETARY INFORMATION PATENT PENDING
© Copyright 2013 to 2015 by PTP, all rights reserved.

DISTRIBUTOR CONTACT:
PRECISION TOWER PRODUCTS
PHONE: 888-926-4857
EMAIL: info@precisiontowerproducts.com
WEB: www.precisiontowerproducts.com

© Copyright 2016, by Paul J. Ford and Company, All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

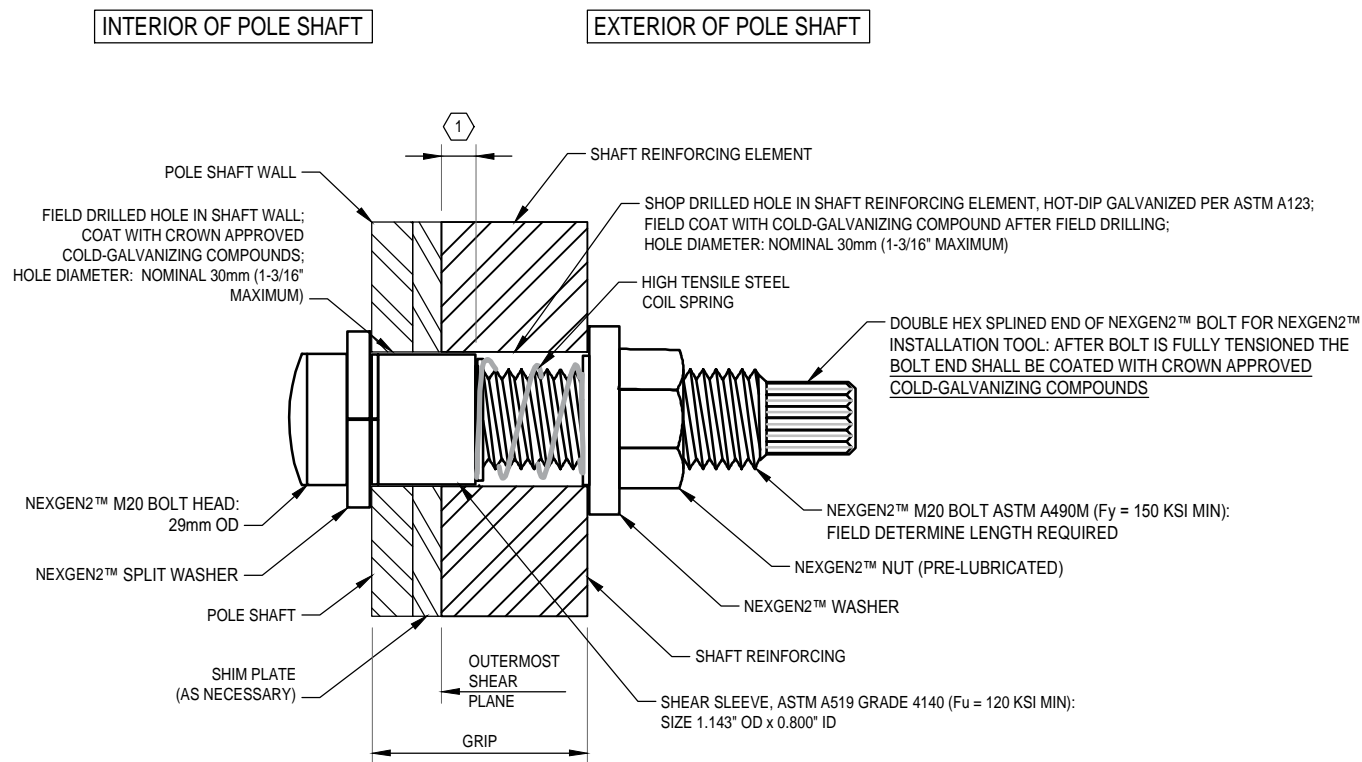
MODIFICATION OF AN EXISTING 147' MONOPOLE
BU #876360; PRESTON / TOWN HALL
PRESTON, CONNECTICUT

PROJECT No:	37516-3879.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.W.M.
CHECKED BY:	BKK
DATE:	12-27-2016

FORGBolt™
DETAILS

S-2A

1 NOTE: SHEAR SLEEVE LENGTH: THE SHEAR SLEEVE SHALL PROJECT A MINIMUM OF 3/8" BEYOND THE OUTERMOST SHEAR PLANE. THE CONTRACTOR SHALL SUBMIT FABRICATION DRAWINGS SHOWING NEXGEN2™ BOLT LENGTHS AND SHEAR SLEEVE LENGTHS TO THE EOR FOR REVIEW AND APPROVAL.



TYPICAL NEXGEN2™ BOLT DETAIL 1 S-2B

FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

BOLT HOLE NOTES:

1. ALL SHOP-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM SHOP-DRILLED HOLE DIAMETER PERMITTED IS 1-3/16".
2. ALL FIELD-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM FIELD-DRILLED HOLE DIAMETER PERMITTED IS 30 MM.

BOLT TIGHTENING AND INSPECTION NOTES:

1. ALL NEXGEN2™ BOLT ASSEMBLIES SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF SECTION 8.2.3 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. PER SECTION 8.2.3: ALL FASTENER ASSEMBLIES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS IN AISC SECTION 8.1 WITHOUT SEVERING THE SPLINED END AND WITH WASHERS POSITIONED AS REQUIRED IN AISC SECTION 6.2. PER REQUIREMENTS IN SECTION 8.1: PRIOR TO BOLT PRETENSIONING, THE JOINT SHALL FIRST BE COMPACTED TO THE SNUG-TIGHT CONDITION. SNUG TIGHT IS THE CONDITION THAT EXISTS WHEN ALL OF THE PLIES IN THE CONNECTION HAVE BEEN PULLED INTO FIRM CONTACT BY THE BOLTS AND THE BOLTS HAVE BEEN TIGHTENED SUFFICIENTLY TO PREVENT THE REMOVAL OF THE NUTS WITHOUT THE USE OF A WRENCH. ONCE THE SNUG TIGHT CONDITION IS ACHIEVED, THEN THE BOLT ASSEMBLY CAN BE TIGHTENED TO THE PRETENSIONED CONDITION.
2. ALL NEXGEN2™ BOLT ASSEMBLIES SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF SECTION 9.2.3 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. NOTE THAT COMPLETE INSPECTION OF ALL NEXGEN2™ BOLT ASSEMBLIES IS REQUIRED IN ADDITION TO ROUTINE OBSERVATION.
3. ALL NEXGEN2™ BOLTS SHALL BE INSPECTED BY A QUALIFIED BOLT INSPECTOR PER NOTES 1 AND 2, ABOVE. DURING INSTALLATION, THE BOLT INSPECTOR SHALL VERIFY AND DOCUMENT: THE SHOP-DRILLED AND FIELD-DRILLED HOLE SIZES; THE INSTALLATION OF THE NEXGEN2™ BOLT ASSEMBLY, INCLUDING THE SHEAR SLEEVE PLACEMENT AND NUT LUBRICATION; AND THE CONTRACTOR'S TENSIONING PROCEDURE. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THAT THE DOUBLE HEX SPLINED END OF THE BOLTS HAVE BEEN TWISTED OFF AND COATED WITH CROWN APPROVED COLD-GALVANIZING COMPOUND..

PART NUMBER	BOLT LENGTH	SLEEVE LENGTH	MIN GRIP RANGE	MAX GRIP RANGE
M20x36	M20x95	1 1/16"	1 5/16"	1 7/16"
M20x48	M20x95	1 3/16"	1 7/16"	1 7/8"
M20x57	M20x95	1 5/8"	1 7/8"	2 1/4"
M20x68	M20x135	2"	2 1/4"	2 11/16"
M20x96	M20x135	2 7/16"	2 11/16"	3 3/4"
M20x127	M20x165	3"	3 3/4"	5"
M20x212	M20x250	4"	5"	8 5/16"

NOTE: NEXGEN2™ BOLT ASSEMBLY SHALL BE MAGNI 565 COATED PER ASTM F2833 AND MANUFACTURER SPECIFICATIONS.

NOTE: INSTALL NEXGEN2™ BOLT ASSEMBLY PER MANUFACTURER'S INSTRUCTIONS.

DISTRIBUTOR CONTACT DETAILS:

ALLFASTENERS
 15401 COMMERCE PARK DR.
 BROOKPARK, OHIO 44142
 PHONE: 440-232-6060
 E-MAIL: SALES@ALLFASTENERS.COM

© Copyright 2016, by Paul J. Ford and Company, All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

CROWN CASTLE
 3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
 PH: (724) 416-2000

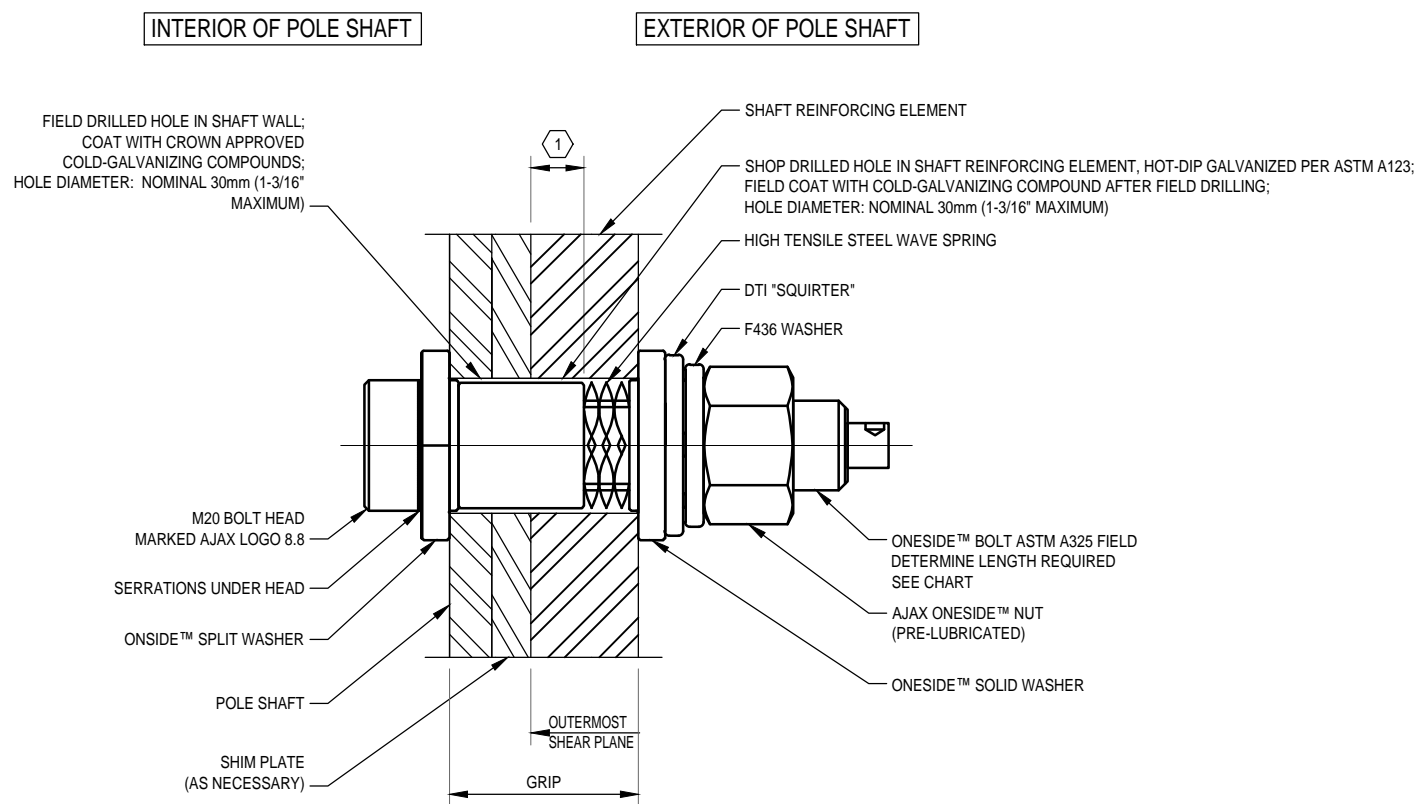
MODIFICATION OF AN EXISTING 147' MONOPOLE
 BU #876360; PRESTON / TOWN HALL PRESTON, CONNECTICUT

PROJECT No:	37516-3879.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.W.M.
CHECKED BY:	BKK
DATE:	12-27-2016

NEXGEN2™ BOLT DETAIL

S-2B

1 NOTE: SHEAR SLEEVE LENGTH: THE SHEAR SLEEVE SHALL PROJECT A MINIMUM OF 3/8" BEYOND THE OUTERMOST SHEAR PLANE. THE CONTRACTOR SHALL SUBMIT FABRICATION DRAWINGS SHOWING AJAX ONESIDE™ BOLT LENGTHS AND SHEAR SLEEVE LENGTHS TO THE EOR FOR REVIEW AND APPROVAL.



TYPICAL AJAX ONESIDE™ BOLT DETAIL 1 S-2C

FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

BOLT HOLE NOTES:

1. ALL SHOP-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM SHOP-DRILLED HOLE DIAMETER PERMITTED IS 1-3/16".
2. ALL FIELD-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM FIELD-DRILLED HOLE DIAMETER PERMITTED IS 30 MM.

BOLT TIGHTENING AND INSPECTION NOTES:

1. ALL AJAX ONESIDE™ BOLT ASSEMBLIES SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF SECTION 8.2.4 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. PER SECTION 8.2.4: ALL FASTENER ASSEMBLIES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS IN AISC SECTION 8.1 WITH WASHERS POSITIONED AS REQUIRED IN AISC SECTION 6.2. PER REQUIREMENTS IN SECTION 8.1: PRIOR TO BOLT PRETENSIONING, THE JOINT SHALL FIRST BE COMPACTED TO THE SNUG-TIGHT CONDITION. SNUG TIGHT IS THE CONDITION THAT EXISTS WHEN ALL OF THE PLIES IN THE CONNECTION HAVE BEEN PULLED INTO FIRM CONTACT BY THE BOLTS AND THE BOLTS HAVE BEEN TIGHTENED SUFFICIENTLY TO PREVENT THE REMOVAL OF THE NUTS WITHOUT THE USE OF A WRENCH. ONCE THE SNUG TIGHT CONDITION IS ACHIEVED, THEN THE BOLT ASSEMBLY CAN BE TIGHTENED TO THE PRETENSIONED CONDITION.
2. ALL AJAX ONESIDE™ BOLT ASSEMBLIES SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF SECTION 9.2.4 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. NOTE THAT COMPLETE INSPECTION OF ALL AJAX ONESIDE™ BOLT ASSEMBLIES IS REQUIRED IN ADDITION TO ROUTINE OBSERVATION.
3. ALL AJAX ONESIDE™ BOLTS SHALL BE INSPECTED BY A QUALIFIED BOLT INSPECTOR PER NOTES 1 AND 2, ABOVE. DURING INSTALLATION, THE BOLT INSPECTOR SHALL VERIFY AND DOCUMENT: THE SHOP-DRILLED AND FIELD-DRILLED HOLE SIZES; THE INSTALLATION OF THE AJAX ONESIDE™ BOLT ASSEMBLY, INCLUDING THE SHEAR SLEEVE PLACEMENT AND NUT LUBRICATION; AND THE CONTRACTOR'S TENSIONING PROCEDURE. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THAT THE DIRECT TENSION INDICATOR WASHERS SHOW THAT THE PROPER BOLT TENSION HAS BEEN REACHED.
4. A MINIMUM OF 4 OUT OF 5 SQUIRTER® DTI PROTRUSIONS SHALL BE ENGAGED IN ANY AJAX ONESIDE™/DTI BOLT ASSEMBLY IN THE REINFORCING MEMBERS. A FEELER GAGE MAY BE USED TO VERIFY PROTRUSION COMPRESSION.
5. INSPECTIONS SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS AND CROWN DOCUMENT ENG-SOW-10007: *MODIFICATION INSPECTION SOW*.

BOLT ASSEMBLY AND INSTALLATION:

1. BOLT MUST BE PURCHASED PRE-ASSEMBLED.
2. FOLLOW BOLT AND DTI MANUFACTURERS INSTRUCTIONS FOR INSTALLATION.

AJAX ONESIDE™ BOLT DETAIL

CODE	SIZE	COLOR	SLEEVE LENGTH	GRIP	GRIP IMP
OSBA20.65-6	M20 x 65	ORANGE	6.0 (0.236")	12.5 / 20.0	0.500" / 0.787"
OSBA20.95-14	M20 x 95	BLACK	14.0 (0.551")	20.0 / 32.0	0.787" / 1.259"
OSBA20.95-22	M20 x 95	GREEN	22.0 (0.866")	30.0 / 50.0	1.181" / 1.968"
OSBA20.95-30	M20 x 95	YELLOW	30.0 (1.181")	40.5 / 50.0	1.595" / 1.968"
OSBA20.135-39	M20 x 135	BLUE	39.0 (1.535")	49.0 / 77.0	1.929" / 3.031"
OSBA20.135-48	M20 x 135	BROWN	48.0 (1.889")	60.5 / 77.0	2.375" / 3.031"
OSBA20.135-57	M20 x 135	PURPLE	57.0 (2.244")	67.0 / 90.0	2.637" / 3.543"
OSBA20.165-76	M20 x 165	RED	76.0 (3.000")	87.0 / 120.0	3.425" / 4.724"
OSBA20.250	M20 x 250	SILVER	MTO	121.0 / 211.0	4.724" / 8.310"

DISTRIBUTOR

IRA SVENSGAARD AND ASSOCIATES
 PETER SVENDSGAARD - PETERS@IRASVENS.COM
 JOHN KILLAM - JOHN@IRASVENS.COM
 PHONE: (530) 647-8225
 FAX: (530) 647-8229

MANUFACTURER

AJAX FASTENERS
 SALES + TECH: ONESIDE@AJAXFAST.COM.AU

© Copyright 2016, by Paul J. Ford and Company, All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

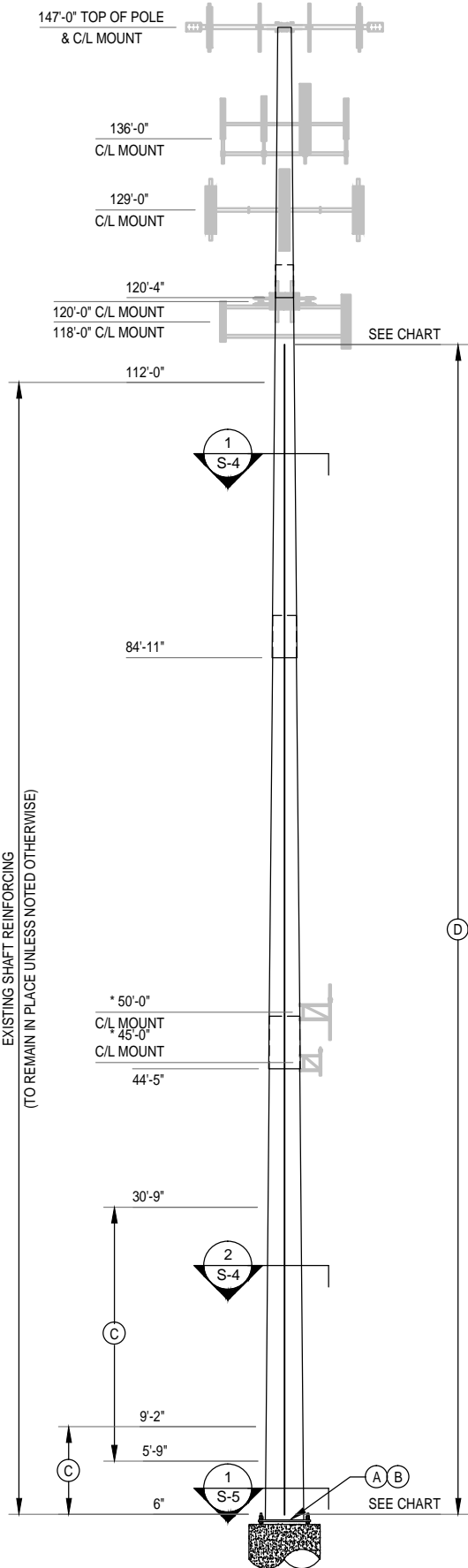
CROWN CASTLE
 3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
 PH: (724) 416-2000

MODIFICATION OF AN EXISTING 147'
 MONOPOLE
 BU #876360; PRESTON / TOWN HALL
 PRESTON, CONNECTICUT

PROJECT No: 37516-3879.001.7700
 DRAWN BY: B.M.S.
 DESIGNED BY: J.W.M.
 CHECKED BY: BKK
 DATE: 12-27-2016

AJAX ONESIDE™
 BOLT DETAIL

S-2C



POLE ELEVATION 1
S-3

NOTE: SHAFT REINFORCING MAY NEED TO BE INSTALLED OFF-CENTER OF FLAT FOR FIT UP. OFFSETS THAT RESULT IN THE FASTENER BEING LOCATED LESS THAN 1 1/2" FROM THE APEX OF THE FLAT MUST BE APPROVED BY THE ENGINEER OF RECORD.

NEW CCI FLAT PLATE (65 KSI) REINFORCING SCHEDULE											
BOTTOM ELEVATION	TOP ELEVATION	FLAT # / DEGREE SEPARATION	ELEMENT	ELEMENT LENGTH	ELEMENT QUANTITY	APPROXIMATE BOLTS PER ELEMENT	APPROXIMATE TOTAL BOLT QUANTITY	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAXIMUM INTERMEDIATE BOLT SPACING	ESTIMATED TOTAL STEEL WEIGHT
1'-3"	21'-3"	F3	CCI-SFP-04510020	20'-0"	1	22	22	6	6	20"	306 LBS.
1'-3"	21'-3"	F5	CCI-CFP-04510020 #1	20'-0"	1	22	22	6	6	20"	306 LBS.
1'-3"	36'-3"	F16	CCI-SFP-06512535	35'-0"	1	40	40	11	11	19"	968 LBS.
1'-3"	36'-3"	F10	CCI-CFP-06512535 #2	35'-0"	1	40	40	11	11	19"	968 LBS.
11'-9"	36'-3"	F4	CCI-CFP-06010024.5 #3	24'-6"	1	31	31	8	8	16"	500 LBS.
36'-4"	71'-4"	F4, F10 & F16	CCI-SFP-04510035	35'-0"	3	31	93	6	6	20"	1608 LBS.
71'-5"	106'-5"	F4, F10 & F16	CCI-SFP-04510035	35'-0"	3	31	93	6	6	20"	1608 LBS.
106'-6"	116'-6"	F4, F10 & F16	CCI-SFP-04510010	10'-0"	3	16	48	6	6	20"	459 LBS.
						389	6723 LBS.				

NOTES:

- ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. ALTERNATIVELY, ALL NEW STIFFENER PLATE STEEL REINFORCING MAY BE COLD GALVANIZED AS FOLLOWS: APPLY A MINIMUM OF TWO COATS OF ZRC-BRAND ZINC-RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.
- ALL REINFORCING SHALL BE ASTM A572 GR. 65.
- WELDS SHALL BE E80XX OR GREATER. TERMINATION WELDS SHALL BE 3/8" FILLET WELDS.
- HOLES FOR BOLTS ARE 30mm UNLESS NOTED OTHERWISE.
- ALL SHIMS SHALL BE ASTM A-36.
- ALL HOLES ARE TO BE DRILLED, DO NOT BURN OR PUNCH.
- FOR PLATES STARTING AT 6", THE BOTTOM OF THE FLAT PLATE SHALL BEGIN AT 6" ± 1". FOR SINGLE PLATES OR MULTIPLE PLATES SPLICED TOGETHER, THE BOTTOM OF THE FLAT PLATE SHALL BEGIN AT THE PROPOSED ELEVATION ± 3". FOR MULTIPLE PLATES SPLICED TOGETHER, THE TOP OF THE FLAT PLATE IS TO BE PLACED SUCH THAT THERE IS NO MORE THAN 3" DIFFERENCE BETWEEN THE ACTUAL OVERALL LENGTH OF THE SPAN AND THE PROPOSED OVERALL LENGTH OF THE SPAN, FROM THE BOTTOM OF THE PLATE TO THE TOP OF THE PLATE.

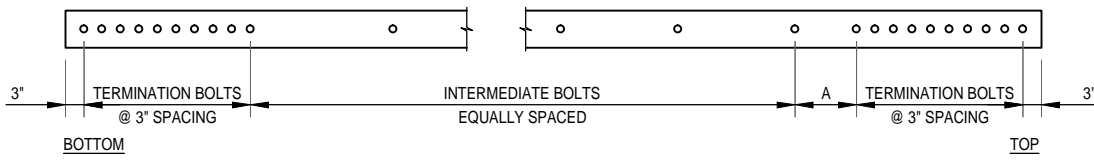
SPLICE PLATE INSTALLATION CHART								
ELEVATION	FLAT PLATE THICKNESS	FLAT PLATE WIDTH	FLAT PLATE LENGTH	FLAT PLATE QUANTITY	WELD LENGTH PER SIDE	TOTAL WELD LENGTH	BOLTS PER SPLICE*	TOTAL STEEL WEIGHT
36'-4"	1"	4-1/2"	4'-1"	1	0"	0"	14	63 LBS.
36'-4"	1"	4-1/2"	4'-10"	2	0"	0"	17	148 LBS.
71'-5"	1"	4-1/2"	3'-7"	3	0"	0"	12	165 LBS.
106'-6"	1"	4-1/2"	3'-7"	3	0"	0"	12	165 LBS.
						0"		541 LBS.

* BOLTS INCLUDED IN THE TOTAL QUANTITY LISTED IN THE FLAT PLATE INSTALLATION CHART.

NEW SHIM CHART				
1/16" SHIM QUANTITY	1/4" SHIM QUANTITY	SHIM WIDTH	SHIM LENGTH	HOLE DIAMETER
24	3	4-1/2"	4-1/2"	1-1/4"

SHIMS ARE FOR BIDDING PURPOSES ONLY, FINAL SHIM REQUIREMENTS TO BE DETERMINED BY CONTRACTOR DURING FABRICATION.

* EXISTING MOUNTS MAY NEED TO BE ADJUSTED, MOVED AND/OR TEMPORARILY SUPPORTED DURING THE INSTALLATION OF SHAFT REINFORCING



CUSTOM BOLTED BAR DETAIL

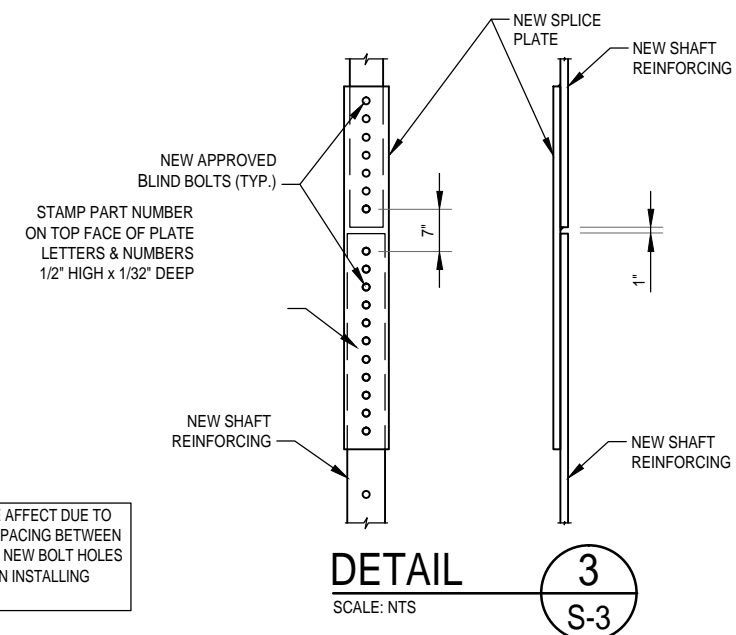
NOTE: 'A' DIMENSION MAY VARY, NOT TO EXCEED MAXIMUM INTERMEDIATE BOLT SPACING

SHAFT SECTION DATA							
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN)		POLE GRADE (ksi)	POLE SHAPE
				@ TOP	@ BOTTOM		
1	26.63	0.1875	39.00	16.250	21.980	65	18-SIDED
2	38.71	0.2500	50.00	20.905	29.110	65	18-SIDED
3	44.67	0.3125	62.00	27.726	37.190	65	18-SIDED
4	49.58	0.3750		35.469	46.000	65	18-SIDED

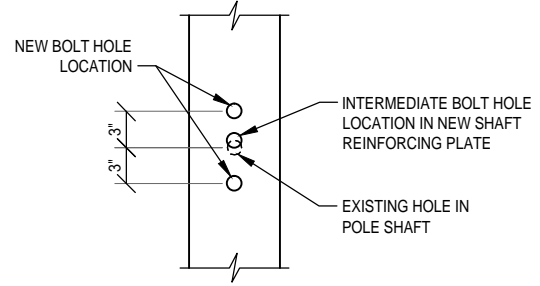
NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

ASTM A36 SHIMS FOR MONOPOLE REINFORCEMENT MEMBERS SHALL BE REQUIRED WHERE GAPS BETWEEN THE POLE SHAFT AND REINFORCING MEMBER EXIST AT FASTENER LOCATIONS. FOR INTERMEDIATE CONNECTIONS, THE MINIMUM SHIM LENGTH AND WIDTH SHALL BE THE WIDTH OF THE REINFORCING MEMBER. FOR TERMINATION CONNECTIONS, A CONTINUOUS SHIM PLATE (PREFERRED) OR EQUIVALENT INDIVIDUAL SHIM PLATES THE WIDTH OF THE REINFORCING MEMBER MAY BE USED. SHIM THICKNESSES SHALL BE NO LESS THAN 1/16". STACKING OF SHIMS IS PERMITTED. FINGER SHIMS AND HORSESHOE SHIMS ARE PERMITTED. STACKED SHIMS SHALL BE NO GREATER THAN 1/4" WITHOUT ENGINEER OF RECORD APPROVAL.

TOWER MODIFICATION SCHEDULE			
	ELEVATION	TOWER MODIFICATION DESCRIPTION	REFERENCE SHEETS
(A)	0'	REMOVE EXISTING STIFFENERS AT BASE PLATE	S-5
(B)	0'	INSTALL NEW TRANSITION STIFFENERS AT BASE PLATE	S-5
(C)	6' TO 9'-2" & 5'-9" TO 30'-9"	REMOVE EXISTING SHAFT REINFORCING FROM 6" TO 9'-2" ON FLAT 10 AND FROM 5'-9" TO 30'-9" ON FLAT 5	S-3
(D)	1'-3" TO 116'-6"	INSTALL NEW SHAFT REINFORCING	S-3 & S-4
(E)	1'-3" TO 116'-6"	REMOVE AND REPLACE SAFETY CLIMB BRACKETS AS REQUIRED FOR REINFORCING INSTALLATION. INSTALL NEW SAFETY CLIMB. COORDINATE WITH TUF-TUG.	S-3



NOTE: TRANSITION MAY BE AFFECT DUE TO EXISTING BOLT HOLES. 3" SPACING BETWEEN EXISTING BOLT HOLES AND NEW BOLT HOLES MUST BE MAINTAINED WHEN INSTALLING NEW SHAFT REINFORCING.



INTERMEDIATE BOLT HOLE FIX

SCALE: NTS

2
S-3

© Copyright 2016, by Paul J. Ford and Company, All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 147' MONOPOLE
BU #876360; PRESTON / TOWN HALL PRESTON, CONNECTICUT

PROJECT No:	37516-3879.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.W.M.
CHECKED BY:	BKK
DATE:	12-27-2016

MONOPOLE PROFILE

S-3

© Copyright 2016, by Paul J. Ford and Company, All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

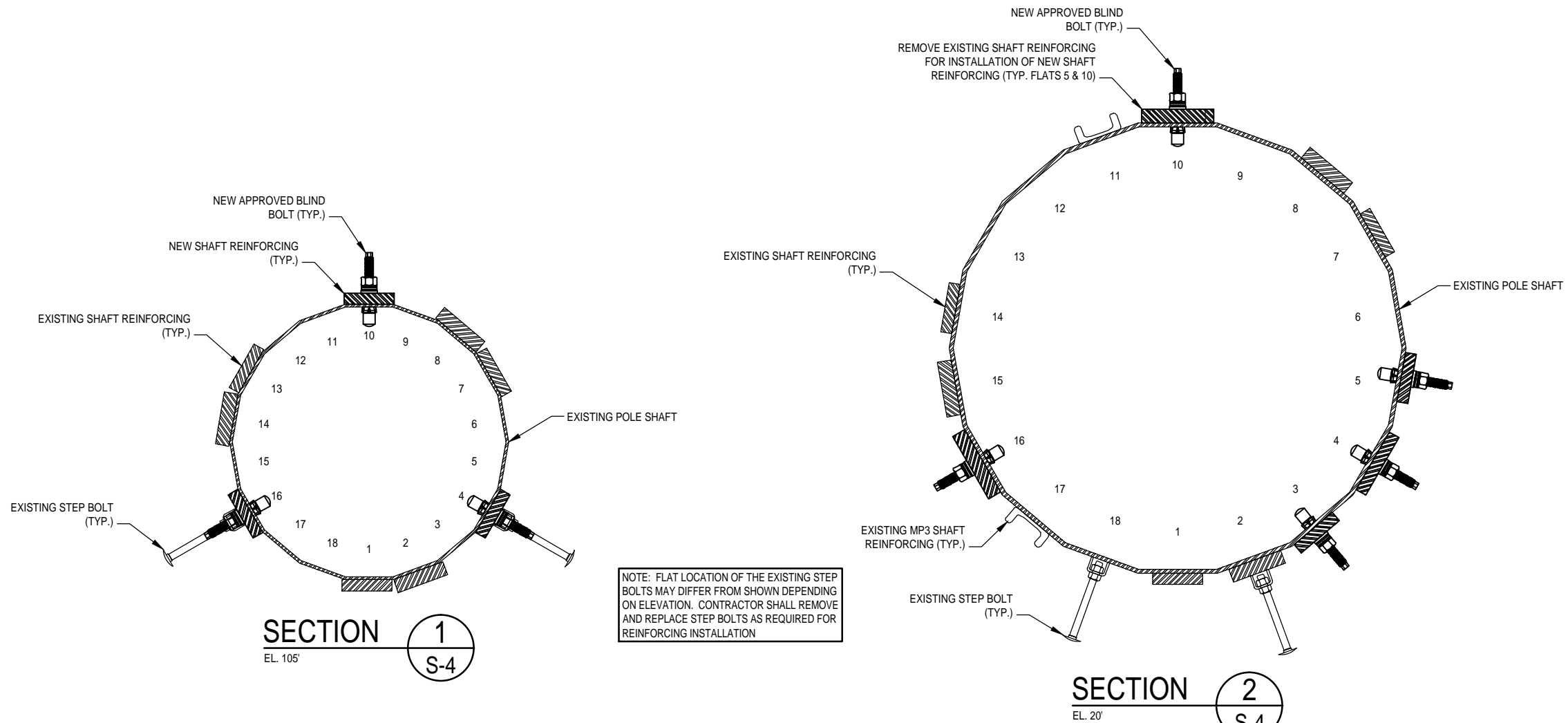
CROWN CASTLE
 3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
 PH: (724) 416-2000

MODIFICATION OF AN EXISTING 147' MONOPOLE
 BU #876360; PRESTON / TOWN HALL PRESTON, CONNECTICUT

PROJECT No: 37516-3879.001.7700
 DRAWN BY: B.M.S.
 DESIGNED BY: J.W.M.
 CHECKED BY: BKK
 DATE: 12-27-2016

SHAFT REINFORCING SECTIONS

S-4



NOTE: FLAT LOCATION OF THE EXISTING STEP BOLTS MAY DIFFER FROM SHOWN DEPENDING ON ELEVATION. CONTRACTOR SHALL REMOVE AND REPLACE STEP BOLTS AS REQUIRED FOR REINFORCING INSTALLATION

(NOT INSTALLED)
 (6) 1-5/8" TO 110 FT LEVEL

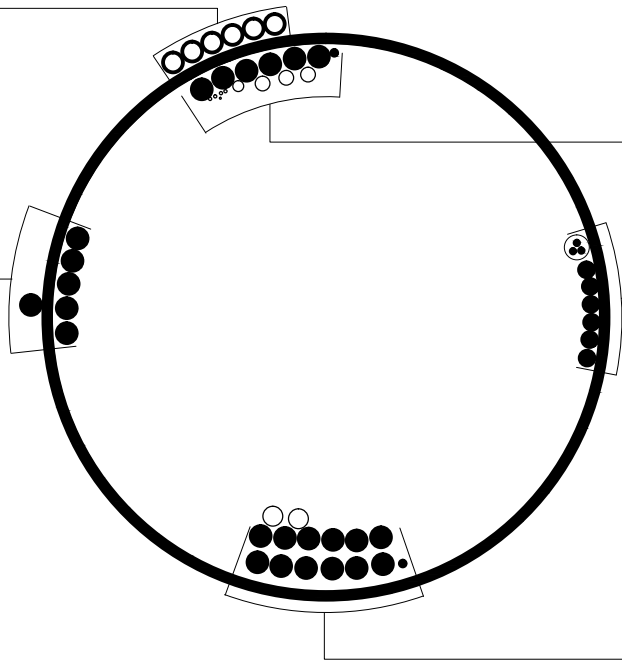
(NOT INSTALLED)
 (1) 1-5/8" TO 129 FT LEVEL
 (INSTALLED)
 (6) 1 5/8" TO 129 FT LEVEL

(MLA)
 (3) 1-5/8" TO 147 FT LEVEL
 (PROPOSED)
 (1) 1/8" TO 147 FT LEVEL
 (4) 17/64" TO 147 FT LEVEL
 (1) 7/8" TO 147 FT LEVEL
 (3) 1-1/4" TO 147 FT LEVEL
 (INSTALLED-TO BE REMOVED)
 (6) 1-5/8" TO 147 FT LEVEL
 (INSTALLED)
 (1) 1/2" TO 45 FT LEVEL

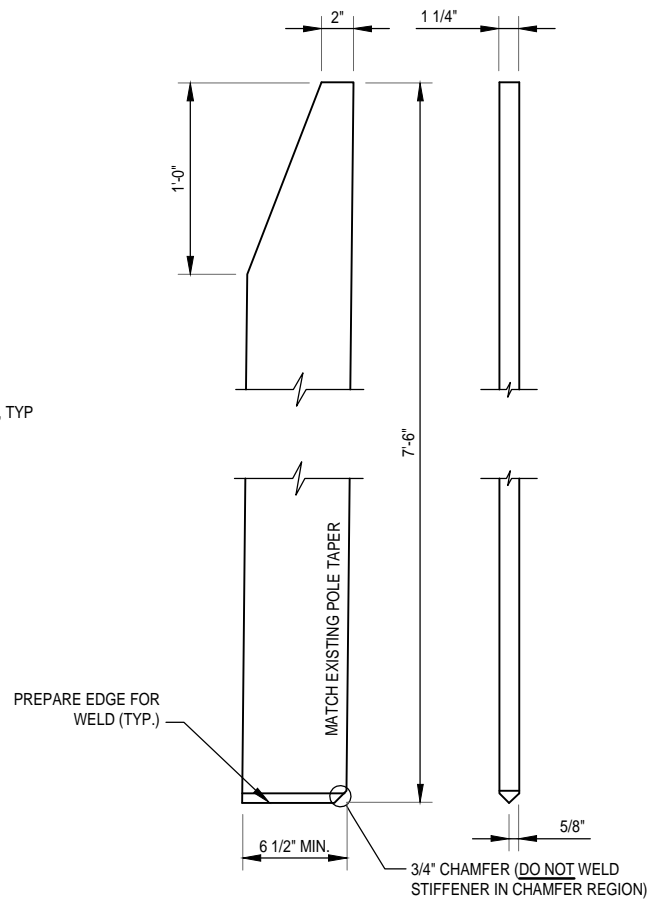
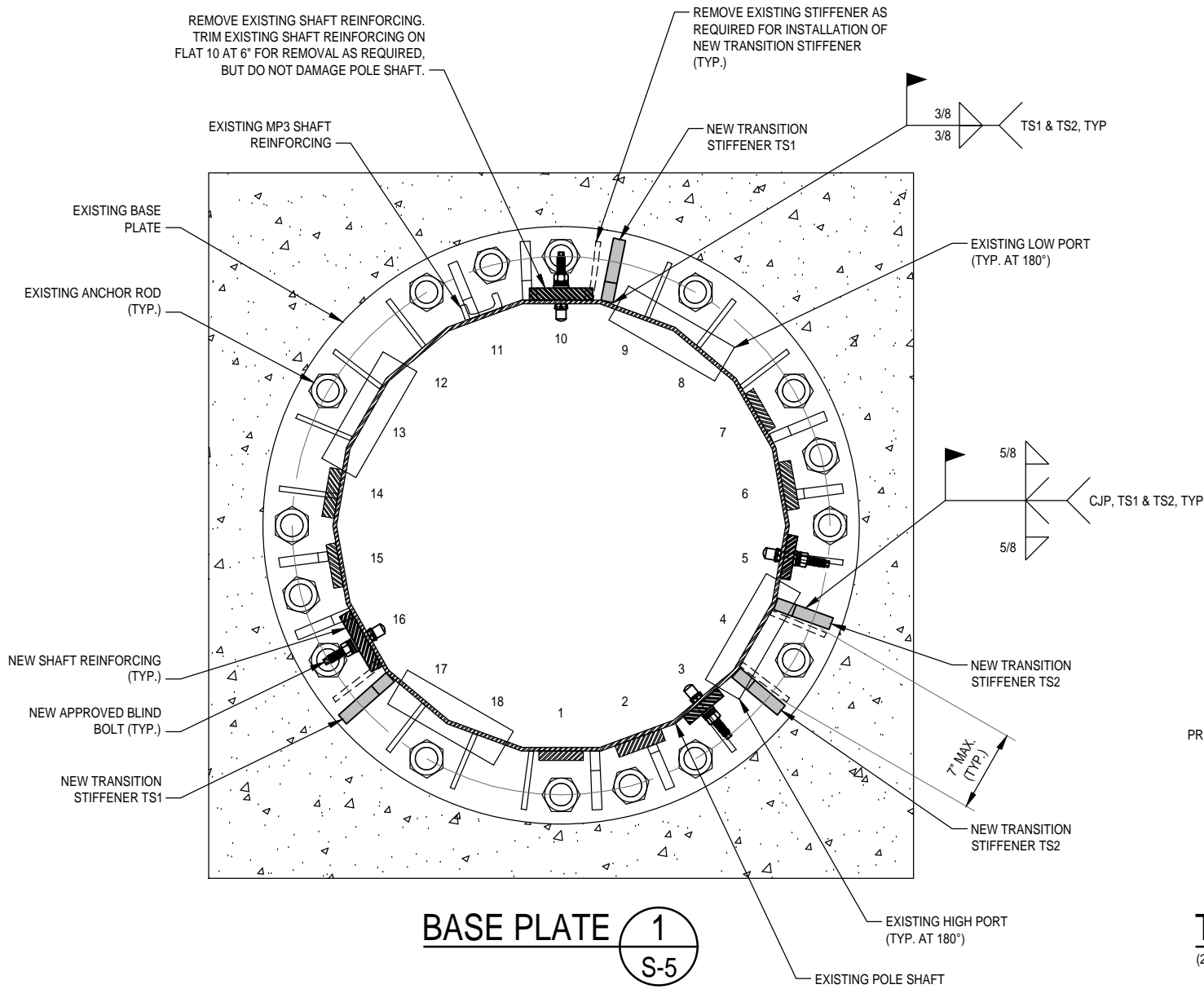
(INSTALLED-IN 2" CONDUIT)
 (3) 3/8" TO 118 FT LEVEL
 (INSTALLED)
 (6) 1-1/4" TO 118 FT LEVEL

(PROPOSED)
 (2) 1-5/8" TO 136 FT LEVEL
 (INSTALLED)
 (1) 1/2" TO 50 FT LEVEL
 (12) 1-5/8" TO 136 FT LEVEL

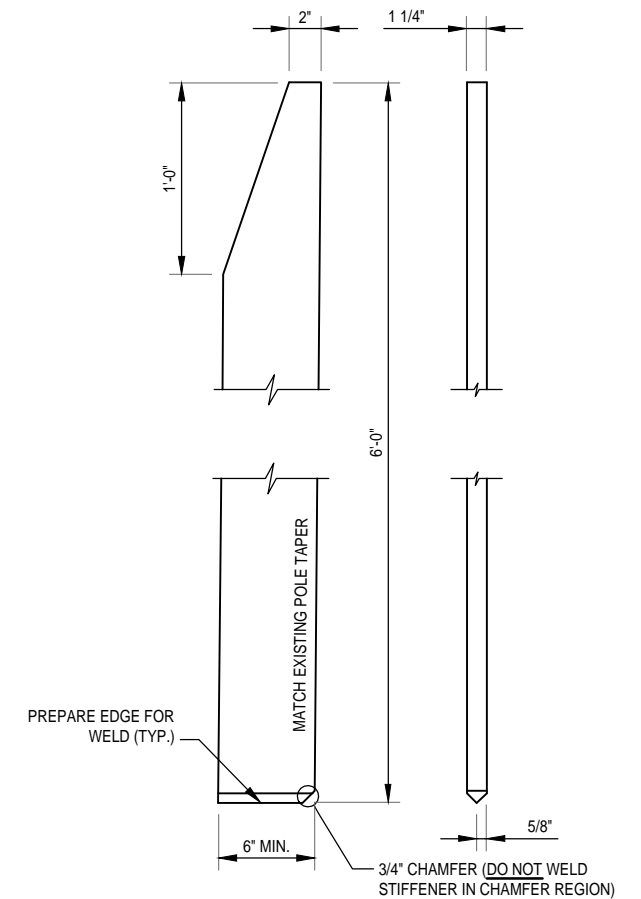
BASE LEVEL DRAWING



BASE SPECIFICATIONS	
BASE PLATE:	61"Ø; 1 3/4" THK.; Fy=60 KSI
ANCHOR RODS:	(12) 2 1/4"Ø; A615 GRADE 75; 55" B.C.



TRANSITION STIFFENER MK~TS1
(2 REQUIRED) (Fy = 65 KSI)



TRANSITION STIFFENER MK~TS2
(2 REQUIRED) (Fy = 65 KSI)

© Copyright 2016, by Paul J. Ford and Company. All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 147' MONOPOLE
BU #876360; PRESTON / TOWN HALL
PRESTON, CONNECTICUT

PROJECT No:	37516-3879.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.W.M.
CHECKED BY:	BKK
DATE:	12-27-2016

BASE PLATE
DETAILS

S-5

MODIFICATION OF AN EXISTING 147' MONOPOLE ENGINEERED ENDEAVORS #6938 BU #876360; PRESTON / TOWN HALL

389 RT. 2
PRESTON, CONNECTICUT 06365
NEW LONDON COUNTY
LAT: 41° 29' 25.25"; LONG: -71° 59' 29.55"
APP: 363243 REV. 2; WO: 1338804

© Copyright 2016, by Paul J. Ford and Company, All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

PROJECT CONTACTS

STRUCTURE OWNER:
CROWN CASTLE
MOD PM: DAN VADNEY AT DAN.VADNEY@CROWNCastle.COM
PH: (518) 373-3510
MOD CM: JASON D'AMICO AT JASON.D'AMICO@CROWNCastle.COM
PH: (860) 209-0104

ENGINEER OF RECORD:
PJFMOD@PJFWEB.COM

THIS PROJECT INCLUDES THE FOLLOWING ITEMS

REMOVE EXISTING SHAFT REINFORCING
SHAFT REINFORCING
REMOVE EXISTING STIFFENERS
FIELD WELDED STIFFENERS
REMOVE AND REPLACE EXISTING STEP BOLTS

SHEET INDEX

SHEET NUMBER	DESCRIPTION
T-1	TITLE SHEET
T-2	MI CHECKLIST
S-1	GENERAL NOTES
S-2A	FORGBOLT™ DETAILS
S-2B	NEXGEN2™ BOLT DETAIL
S-2C	AJAX ONESIDE™ BOLT DETAIL
S-3	MONOPOLE PROFILE
S-4	SHAFT REINFORCING SECTIONS
S-5	BASE PLATE DETAILS

WIND DESIGN DATA

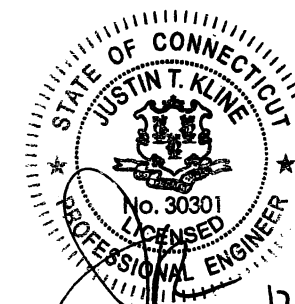
REFERENCE STANDARD	ANSI/TIA-222-G-2-2009
LOCAL CODE	2016 CONNECTICUT BUILDING CODE
ULTIMATE WIND SPEED (3-SECOND GUST)	135 MPH
CONVERTED NOMINAL WIND SPEED (3-SECOND GUST)	105 MPH
ICE THICKNESS	0.75 IN
ICE WIND SPEED	50 MPH
SERVICE WIND SPEED	60 MPH
RISK CATEGORY	II
EXPOSURE CATEGORY	C
Kzt	1.0

**MODIFICATION OF AN EXISTING 147'
MONOPOLE**
 BU #876360; PRESTON / TOWN HALL
 PRESTON, CONNECTICUT

QUALIFIED ENGINEERING SERVICES ARE AVAILABLE FROM PAUL J. FORD & COMPANY TO ASSIST CONTRACTORS IN CLASS IV RIGGING PLAN REVIEWS. FOR REQUESTED QUALIFIED ENGINEERING SERVICES, PLEASE CONTACT RIGGING@PJFWEB.COM.

THE ASSOCIATED FAILING SA WO NUMBER FOR THIS PROJECT IS 1325584

ATTENTION ALL CONTRACTORS, ANYTIME YOU ACCESS A CROWN SITE FOR ANY REASON YOU ARE TO CALL THE CROWN NOC UPON ARRIVAL AND DEPARTURE, DAILY AT (800) 788-7011.



PROJECT No: 37516-3879.001.7700
DRAWN BY: B.M.S.
DESIGNED BY: J.W.M.
CHECKED BY: B.K.K.
DATE: 12-27-2016

TITLE SHEET

T-1

MODIFICATION INSPECTION NOTES:

1. **GENERAL**
 - 1.1. 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 EOR.
 - 1.2. 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.
 - 1.3. ALL MI'S SHALL BE CONDUCTED BY A CROWN CASTLE ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN CASTLE.
 - 1.4. 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 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 CASTLE POINT OF CONTACT (POC).
 - 1.5. REFER TO ENG-SOW-10007: MODIFICATION INSPECTION SOW FOR FURTHER DETAILS AND REQUIREMENTS.
2. **MI INSPECTOR**
 - 2.1. THE MI INSPECTOR IS REQUIRED TO CONTACT THE GC AS SOON AS RECEIVING A PO FOR THE MI TO, AT A MINIMUM:
 - 2.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.
 - 2.1.2. WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
 - 2.1.3. 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 CASTLE.
3. **GENERAL CONTRACTOR**
 - 3.1. 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:
 - 3.1.1. REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.
 - 3.1.2. WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
 - 3.1.3. BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS.
 - 3.1.4. THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE MI CHECKLIST AND ENG-SOW-10007.
4. **RECOMMENDATIONS**
 - 4.1. THE FOLLOWING RECOMMENDATIONS AND SUGGESTIONS ARE OFFERED TO ENHANCE THE EFFICIENCY AND EFFECTIVENESS OF DELIVERING AN MI REPORT:
 - 4.1.1. IT IS SUGGESTED THAT THE GC PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, PREFERABLE 10, TO THE MI INSPECTOR AS TO WHEN THE SITE WILL BE READY FOR THE MI TO BE CONDUCTED.
 - 4.1.2. THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
 - 4.1.3. WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS.
 - 4.1.4. IT MAY BE BENEFICIAL TO INSTALL ALL TOWER MODIFICATIONS PRIOR TO CONDUCTING THE FOUNDATION INSPECTIONS TO ALLOW FOUNDATION AND MI INSPECTION(S) TO COMMENCE WITH ONE SITE VISIT.
 - 4.1.5. 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.
5. **CANCELLATION OR DELAYS IN SCHEDULED MI**
 - 5.1. IF THE GC AND MI INSPECTOR AGREE TO A DATE ON WHICH THE MI WILL BE CONDUCTED, AND EITHER PARTY CANCELS OR DELAYS, CROWN CASTLE 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 FOR ANY TIME (E.G. TRAVEL AND LODGING, COSTS OF KEEPING EQUIPMENT ON-SITE, ETC.). IF CROWN CASTLE 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.
6. **CORRECTION OF FAILING MI'S**
 - 6.1. IF THE MODIFICATION INSTALLATION WOULD FAIL THE MI ("FAILED MI"), THE GC SHALL WORK WITH CROWN CASTLE TO COORDINATE A REMEDIATION PLAN IN ONE OF TWO WAYS:
 - 6.1.1. CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENT MI.
 - 6.1.2. OR, WITH CROWN CASTLE'S APPROVAL, THE GC MAY WORK WITH THE EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION.
7. **MI VERIFICATION INSPECTIONS**
 - 7.1. CROWN CASTLE RESERVES THE RIGHT TO CONDUCT A MI VERIFICATION INSPECTION TO VERIFY THE ACCURACY AND COMPLETENESS OF PREVIOUSLY COMPLETED MI INSPECTION(S) ON TOWER MODIFICATION PROJECTS.
 - 7.2. ALL VERIFICATION INSPECTIONS SHALL BE HELD TO THE SAME SPECIFICATIONS AND REQUIREMENTS IN THE CONTRACT DOCUMENTS AND IN ACCORDANCE WITH ENG-SOW-10007.
 - 7.3. 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.
8. **PHOTOGRAPHS**
 - 8.1. BETWEEN THE GC AND THE MI INSPECTOR THE FOLLOWING PHOTOGRAPHS, AT A MINIMUM, ARE TO BE TAKEN AND INCLUDED IN THE MI REPORT:
 - 8.1.1. PRECONSTRUCTION GENERAL SITE CONDITION
 - 8.1.2. PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION
 - 8.1.3. RAW MATERIALS
 - 8.1.4. PHOTOS OF ALL CRITICAL DETAILS
 - 8.1.5. FOUNDATION MODIFICATIONS
 - 8.1.6. WELD PREPARATION
 - 8.1.7. BOLT INSTALLATION AND TORQUE
 - 8.1.8. FINAL INSTALLED CONDITION
 - 8.1.9. SURFACE COATING REPAIR
 - 8.1.10. POST CONSTRUCTION PHOTOGRAPHS
 - 8.1.11. FINAL INFIELD CONDITION
 - 8.1.12. PHOTOS OF ELEVATED MODIFICATIONS TAKEN FROM THE GROUND SHALL BE CONSIDERED INADEQUATE.
 - 8.1.13. THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, PLEASE REFER TO ENG-SOW-10007.

9. INSPECTION AND TESTING

- 9.1. ALL WORK SHALL BE SUBJECT TO REVIEW AND OBSERVATION BY CROWN CASTLE'S REPRESENTATIVE AND CROWN CASTLE'S AUTHORIZED INDEPENDENT INSPECTION AND TESTING AGENCY.
- 9.2. INSPECTION SERVICES WHICH ARE FURNISHED BY OTHERS ARE STILL REQUIRED WHEN THE EOR PERFORMS SUPPORT SERVICES DURING CONSTRUCTION.
- 9.3. OBSERVED DISCREPANCIES BETWEEN THE WORK AND THE CONTRACT DOCUMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST.
- 9.4. AN INDEPENDENT QUALIFIED INSPECTION/TESTING AGENCY SHALL BE SELECTED AND RETAINED FOR THE SOLE PURPOSE OF INSPECTING, TESTING, DOCUMENTING, AND APPROVING ALL WELDING AND FIELD WORK PERFORMED BY THE CONTRACTOR.
 - 9.4.1. ACCESS TO ANY PLACE WHERE WORK IS BEING DONE SHALL BE PERMITTED AT ALL TIMES.
 - 9.4.2. THE INSPECTION AGENCY SHALL SO SCHEDULE THIS WORK AS TO CAUSE A MINIMUM OF INTERRUPTION TO, AND COORDINATE WITH, THE WORK IN PROGRESS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE THE WORK SCHEDULE WITH THE TESTING AGENCY. THE CONTRACTOR SHALL ALLOW FOR ADEQUATE TIME AND ACCESS FOR THE TESTING AGENCY TO PERFORM THEIR DUTIES.
- 9.5. THE INSPECTION AND TESTING AGENCY SHALL BE RESPONSIBLE TO PERFORM THE FOLLOWING SERVICES AND INSPECT THE FOLLOWING ITEMS IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS. THE TESTING AGENCY SHALL INSPECT ITEMS ON THIS LIST AND OTHER ITEMS AS NECESSARY TO FULFILL THEIR RESPONSIBILITY. THE TESTING AGENCY SHALL UTILIZE EXPERIENCED, TRAINED INSPECTORS INCLUDING AWS CERTIFIED WELDING INSPECTORS (CW). INSPECTORS SHALL HAVE THE TRAINING, CREDENTIALS, AND EXPERIENCE APPROPRIATE FOR AND COMMENSURATE WITH THE SCOPE AND TYPE OF INSPECTION WORK TO BE PERFORMED.
- 9.6. **GENERAL**
 - 9.6.1. PERFORM PERIODIC ON-SITE OBSERVATION, INSPECTION, VERIFICATION, AND TESTING DURING THE TIME THE CONTRACTOR IS WORKING ON-SITE. AGENCY SHALL NOTIFY CROWN CASTLE AND THE EOR IMMEDIATELY WHEN FIELD PROBLEMS OR DISCREPANCIES OCCUR.
- 9.7. **FOUNDATIONS AND SOIL PREPARATION - (NOT REQUIRED)**
- 9.8. **CONCRETE TESTING PER ACI - (NOT REQUIRED)**
- 9.9. **STRUCTURAL STEEL**
 - 9.9.1. CHECK STEEL ON THE JOB WITH THE PLANS.
 - 9.9.2. CHECK MILL CERTIFICATIONS. CALL FOR LABORATORY TEST REPORTS WHEN MILL CERTIFICATION IS IN QUESTION.
 - 9.9.3. CHECK GRADE OF STEEL MEMBERS, AND BOLTS FOR CONFORMANCE WITH DRAWINGS.
 - 9.9.4. INSPECT ALL STRUCTURAL BOLTS SHALL BE FIELD INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
 - 9.9.5. INSPECT STEEL MEMBERS FOR DISTORTION, EXCESSIVE RUST, FLAWS AND BURNED HOLES.
 - 9.9.6. CHECK STEEL MEMBERS FOR SIZES, SWEEP AND DIMENSIONAL TOLERANCES.
 - 9.9.7. CHECK FOR SURFACE FINISH SPECIFIED, GALVANIZED.
 - 9.9.8. CHECK THAT BOLTS HAVE BEEN TIGHTENED PROPERLY.
 - 9.9.9. PRIOR TO ANY FIELD CUTTING THE CONTRACTOR SHALL MARK THE CUTOUT LINES ON THE STEEL AND THE INSPECTION/TESTING AGENCY SHALL VERIFY PROPOSED LAYOUT, LOCATION, AND DIMENSIONS. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.
- 9.10. **WELDING:**
 - 9.10.1. VERIFY FIELD WELDING PROCEDURES, WELDERS, AND WELDING OPERATORS, NOT DEEMED PREQUALIFIED, IN ACCORDANCE WITH AWS D1.1.
 - 9.10.2. INSPECT FIELD WELDED CONNECTIONS IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED AND WITH AWS D1.1.
 - 9.10.3. APPROVE FIELD WELDING SEQUENCE.
 - 9.10.4. A PROGRAM OF THE APPROVED SEQUENCES SHALL BE SUBMITTED TO CROWN CASTLE BEFORE WELDING BEGINS. NO CHANGE IN APPROVED SEQUENCES MAY BE MADE WITHOUT PERMISSION FROM CROWN CASTLE.
 - 9.10.5. INSPECT WELDED CONNECTIONS AS FOLLOWS AND IN ACCORDANCE WITH AWS D1.1:
 - 9.10.5.1. INSPECT WELDING EQUIPMENT FOR CAPACITY, MAINTENANCE, AND WORKING CONDITIONS.
 - 9.10.5.2. VERIFY SPECIFIED ELECTRODES AND HANDLING AND STORAGE OF ELECTRODES FOR CONFORMANCE TO SPECIFICATIONS.
 - 9.10.5.3. INSPECT PREHEATING AND INTERPASS TEMPERATURES FOR CONFORMANCE WITH AWS D1.1.
 - 9.10.5.4. VISUALLY INSPECT ALL WELDS AND VERIFY THAT QUALITY OF WELDS MEETS THE REQUIREMENTS OF AWS D1.1. OTHER TESTS MAY ALSO BE PERFORMED ON THE WELDS BY THE TESTING AGENCY IN ORDER FOR THEM TO PERFORM THEIR DUTIES FOR THIS PROJECT.
 - 9.10.5.5. SPOT TEST AT LEAST ONE FILLET WELD OF EACH MEMBER USING MAGNETIC PARTICLE.
 - 9.10.5.6. INSPECT FOR SIZE, SPACING, TYPE AND LOCATION AS PER APPROVED DRAWINGS.
 - 9.10.5.7. VERIFY THAT THE BASE METAL CONFORMS TO THE DRAWINGS.
 - 9.10.5.8. REVIEW THE REPORTS BY TESTING LABS.
 - 9.10.5.9. CHECK TO SEE THAT WELDS ARE CLEAN AND FREE FROM SLAG.
 - 9.10.5.10. INSPECT RUST PROTECTION OF WELDS AS PER SPECIFICATIONS.
 - 9.10.5.11. CHECK THAT DEFECTIVE WELDS ARE CLEARLY MARKED AND HAVE BEEN ADEQUATELY REPAIRED.
- 9.11. **REPORTS:**
 - 9.11.1. COMPILER AND PERIODICALLY SUBMIT DAILY INSPECTION REPORTS TO CROWN CASTLE.
 - 9.11.2. THE INSPECTION PLAN OUTLINED HEREIN IS INTENDED AS A DESCRIPTION OF GENERAL AND SPECIFIC ITEMS OF CONCERN. IT IS NOT INTENDED TO BE ALL-INCLUSIVE. IT DOES NOT LIMIT THE TESTING AND INSPECTION AGENCY TO THE ITEMS LISTED. ADDITIONAL TESTING, INSPECTION, AND CHECKING MAY BE REQUIRED AND SHOULD BE ANTICIPATED. THE TESTING AGENCY SHALL USE THEIR PROFESSIONAL JUDGMENT AND KNOWLEDGE OF THE JOB SITE CONDITIONS AND THE CONTRACTOR'S PERFORMANCE TO DECIDE WHAT OTHER ITEMS REQUIRE ADDITIONAL ATTENTION. THE TESTING AGENCY'S JUDGMENT MUST PREVAIL ON ITEMS NOT SPECIFICALLY COVERED. ANY DISCREPANCIES OR PROBLEMS SHALL BE BROUGHT IMMEDIATELY TO CROWN CASTLE'S ATTENTION. RESOLUTIONS ARE NOT TO BE MADE WITHOUT CROWN CASTLE'S REVIEW AND SPECIFIC WRITTEN CONSENT. CROWN CASTLE RESERVES THE RIGHT TO DETERMINE WHETHER OR NOT A RESOLUTION IS ACCEPTABLE.
 - 9.11.3. AFTER EACH INSPECTION, THE TESTING AGENCY WILL PREPARE A WRITTEN ACCEPTANCE OR REJECTION WHICH WILL BE GIVEN TO THE CONTRACTOR AND FILED AS DAILY REPORTS TO CROWN CASTLE. THIS WRITTEN ACTION WILL GIVE THE CONTRACTOR A LIST OF ITEMS TO BE CORRECTED, PRIOR TO CONTINUING CONSTRUCTION, AND/OR LOADING OF STRUCTURAL ITEMS.
 - 9.11.4. THE TESTING AGENCY DOES NOT RELIEVE THE CONTRACTOR'S CONTRACTUAL OR STATUTORY OBLIGATIONS. THE CONTRACTOR HAS THE SOLE RESPONSIBILITY FOR ANY DEVIATIONS FROM THE OFFICIAL CONTRACT DOCUMENTS. THE TESTING AGENCY WILL NOT REPLACE THE CONTRACTOR'S QUALITY CONTROL PERSONNEL.

MI CHECKLIST	
CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
PRE-CONSTRUCTION	
X	MI CHECKLIST DRAWINGS
X	EOR REVIEW
X	FABRICATION INSPECTION
NA	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
NA	NDE REPORT OF MONOPOLE BASE PLATE (AS REQUIRED)
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS: _____	
CONSTRUCTION	
X	CONSTRUCTION INSPECTIONS
NA	FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
NA	POST INSTALLED ANCHOR ROD VERIFICATION
NA	BASE PLATE GROUT VERIFICATION
X	CONTRACTOR'S CERTIFIED WELD INSPECTION
NA	EARTHWORK: PROVIDE PHOTO DOCUMENTATION OF EXCAVATION QUALITY AND COMPACTION
X	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
NA	MICROPILE/ROCK ANCHOR INSTALLER'S DRILLING AND INSTALLATION LOGS AND QA/QC DOCUMENTS
ADDITIONAL TESTING AND INSPECTIONS: _____	
POST-CONSTRUCTION	
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
NA	POST INSTALLED ANCHOR ROD TARGET TENSION LOAD TESTING
NA	REFER TO MICROPILE/ROCK ANCHOR NOTES FOR SPECIAL INSPECTION AND TESTING REQUIREMENTS.
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS: _____	

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

© Copyright 2016, by Paul J. Ford and Company, All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

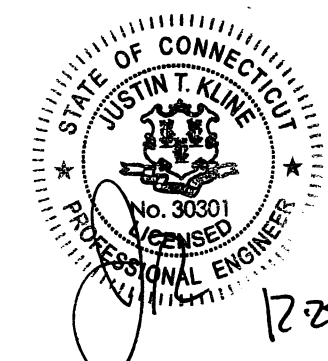
CROWN CASTLE
 3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
 PH: (724) 416-2000

MODIFICATION OF AN EXISTING 147' MONOPOLE
 BU #876360; PRESTON / TOWN HALL
 PRESTON, CONNECTICUT

PROJECT No:	37516-3879.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.W.M.
CHECKED BY:	BKK
DATE:	12-27-2016

MI CHECKLIST

T-2



12-28-16

1. GENERAL NOTES

- 1.1. THE MONOPOLE STRUCTURE IN ITS EXISTING CONDITION DOES NOT HAVE THE STRUCTURAL CAPACITY TO CARRY ALL OF THE PROPOSED AND EXISTING LOADS FROM THE ATTACHED STRUCTURAL MODIFICATION REPORT AT THE REQUIRED MINIMUM WIND SPEEDS. DO NOT INSTALL ANY NEW LOADS UNTIL THE MONOPOLE REINFORCING SYSTEM IS COMPLETELY AND SUCCESSFULLY INSTALLED.
- 1.2. THESE DRAWINGS WERE PREPARED FROM INFORMATION PROVIDED BY CROWN CASTLE. THE INFORMATION PROVIDED HAS NOT BEEN FIELD VERIFIED BY THE ENGINEER OF RECORD (EOR) FOR ACCURACY AND THEREFORE DISCREPANCIES BETWEEN THESE DRAWINGS AND ACTUAL SITE CONDITIONS SHOULD BE ANTICIPATED. PRIOR TO FABRICATION AND INSTALLATION CONTRACTOR SHALL VERIFY ALL LENGTHS AND QUANTITIES GIVEN. LENGTH AND QUANTITIES PROVIDED ARE FOR QUOTING PURPOSES ONLY AND SHALL NOT BE USED FOR FABRICATION. THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT DRAWINGS AND THEIR FIELD VERIFIED CONDITIONS AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. THE CONTRACTOR SHALL IMMEDIATELY REPORT ANY AND ALL DISCREPANCIES TO THE EOR AND CROWN CASTLE BEFORE PROCEEDING WITH THE WORK. ANY WORK PERFORMED WITHOUT A PREFABRICATION MAPPING IS DONE AT THE RISK OF THE GENERAL CONTRACTOR AND/OR THE FABRICATOR
- 1.3. IF MATERIALS, QUANTITIES, STRENGTHS OR SIZES INDICATED BY THE DRAWINGS OR SPECIFICATIONS ARE NOT IN AGREEMENT WITH THESE NOTES, THE BETTER QUALITY AND/OR GREATER QUANTITY, STRENGTH OR SIZE INDICATED, SPECIFIED OR NOTED SHALL BE PROVIDED.
- 1.4. THIS STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE INSTALLATION OF THE REINFORCING REPAIR SYSTEM HAS BEEN SUCCESSFULLY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO ENSURE THE SAFETY AND STABILITY OF THE MONOPOLE AND ITS COMPONENT PARTS DURING FIELD MODIFICATIONS. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF WHATEVER TEMPORARY BRACING, GUYS OR TIE DOWNS THAT MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER THE COMPLETION OF THE PROJECT.
- 1.5. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN AND SHALL MEET ANSI/ITIA-1019 (LATEST EDITION), OSHA AND GENERAL INDUSTRY STANDARDS. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ITIA-1019 (LATEST EDITION) INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION.
- 1.6. OBSERVATION VISITS TO THE SITE BY CROWN CASTLE AND/OR THE EOR SHALL NOT INCLUDE INSPECTIONS OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES. ANY SUPPORT SERVICES PERFORMED BY THE EOR DURING CONSTRUCTION ARE SOLELY FOR THE PURPOSE OF ACHIEVING GENERAL CONFORMANCE WITH THE CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE THE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.
- 1.7. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANY AND ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED IN WRITING BY CROWN CASTLE AND EOR PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF MATERIALS AND EQUIPMENT BEING SUBSTITUTED.
- 1.8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT THIS PROJECT AND RELATED WORK COMPLIES WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY CODES AND REGULATIONS GOVERNING THIS WORK AS WELL AS CROWN CASTLE SAFETY GUIDELINES.
- 1.9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING AND NEW COAXIAL CABLES AND OTHER EQUIPMENT DURING CONSTRUCTION.
- 1.10. ANY EXISTING ATTACHMENTS AND/OR PROJECTIONS ON THE POLE THAT MAY INTERFERE WITH THE INSTALLATION OF THE REINFORCING SYSTEM WILL HAVE TO BE REMOVED AND RELOCATED, REPLACED, OR RE-INSTALLED AS REQUIRED AFTER THE REINFORCING IS SUCCESSFULLY COMPLETED. THE CONTRACTOR SHALL IDENTIFY AND COORDINATE THESE ITEMS PRIOR TO CONSTRUCTION WITH CROWN CASTLE, TESTING AGENCY, AND EOR.
- 1.11. ANY AND ALL EXISTING PLATFORMS THAT ARE LOCATED IN AREAS OF THE POLE SHAFT WHERE SHAFT REINFORCING MUST BE APPLIED SHALL BE TEMPORARILY REMOVED OR OTHERWISE SUPPORTED TO PERMIT NEW CONTINUOUS REINFORCEMENT TO BE ATTACHED. AFTER THE CONTRACTOR HAS SUCCESSFULLY INSTALLED THE MONOPOLE REINFORCEMENT SYSTEM, THE CONTRACTOR SHALL RE-INSTALL THE PLATFORMS.
- 1.12. THE CLIMBING FACILITIES, SAFETY CLIMB AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED OR ALTERED WITHOUT THE EXPRESS APPROVAL OF THE EOR.
- 1.13. FOR STANDARD CROWN PARTS SEE THE MOST RECENT VERSION OF THE "CCI APPROVED REINFORCEMENT COMPONENTS" CATALOG.
- 1.14. ALL SOLUTIONS FOR THE REPLACEMENT, RELOCATION OR MODIFICATION OF THE SAFETY CLIMB AND/OR ANY OF THE MONOPOLE CLIMBING FACILITIES SHALL BE COORDINATED WITH TUF-TUG PRODUCTS. CONTACT DETAILS:
3434 ENCRETE LANE, MORaine, OHIO 45439
PHONE: 937-299-1213 EMAIL: TUFUG@AOL.COM

2. STRUCTURAL STEEL

- 2.1. STRUCTURAL STEEL MATERIALS, FABRICATION, DETAILING, AND WORKMANSHIP SHALL CONFORM TO THE LATEST EDITION OF THE FOLLOWING REFERENCE STANDARDS:
 - 2.1.1. BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC):
 - 2.1.1.1. "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS."
 - 2.1.1.2. "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM HIGH STRENGTH BOLTS," AS APPROVED BY THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS.
 - 2.1.1.3. "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"
 - 2.1.2. BY THE AMERICAN WELDING SOCIETY (AWS):
 - 2.1.2.1. "STRUCTURAL WELDING CODE - STEEL D1.1."
 - 2.1.2.2. "STANDARD SYMBOLS FOR WELDING, BRAZING, AND NONDESTRUCTIVE EXAMINATION"
- 2.2. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM HIGH STRENGTH BOLTS', DEC. 31, 2009.
- 2.3. ANY MATERIAL OR WORKMANSHIP WHICH IS OBSERVED TO BE DEFECTIVE OR INCONSISTENT WITH THE CONTRACT DOCUMENTS SHALL BE CORRECTED, MODIFIED, OR REPLACED AT THE CONTRACTOR'S EXPENSE.
- 2.4. WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY, AWS D1.1. ALL WELD ELECTRODES SHALL BE E80XX UNLESS NOTED OTHERWISE ON THE DRAWINGS.
- 2.5. ALL WELDED CONNECTIONS SHALL BE MADE BY WELDERS CERTIFIED BY AWS. CONTRACTOR SHALL SUBMIT WELDERS' CERTIFICATION AND QUALIFICATION DOCUMENTATION TO CROWN CASTLE'S TESTING AGENCY FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
- 2.6. STRUCTURAL STEEL PLATES SHALL CONFORM TO ASTM A572 GRADE 65(FY = 65 KSI MIN.) UNLESS NOTED OTHERWISE ON THE DRAWINGS.
- 2.7. SURFACES OF EXISTING STEEL SHALL BE PREPARED AS REQUIRED FOR FIELD WELDING PER AWS. SEE SECTION I NOTES REGARDING TOUCH UP OF GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS FIELD WELDING.
- 2.8. NO WELDING SHALL BE DONE TO THE EXISTING STRUCTURE WITHOUT THE PRIOR APPROVAL AND SUPERVISION OF THE TESTING AGENCY.
- 2.9. FIELD CUTTING OF STEEL:
 - 2.9.1. IMPORTANT CUTTING AND WELDING SAFETY GUIDELINES: THE CONTRACTOR SHALL FOLLOW ALL CROWN CASTLE CUTTING, WELDING, FIRE PREVENTION AND SAFETY GUIDELINES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A COPY OF THE CURRENT CROWN CASTLE GUIDELINES. PER THE 12-01-2005 CROWN CASTLE DIRECTIVE: "ALL CUTTING AND WELDING ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH CROWN CASTLE POLICY 'CUTTING AND WELDING SAFETY PLAN' (DOC # ENG-PLN-10015) ON AN ONGOING BASIS THROUGHOUT THE ENTIRE LIFE OF THE PROJECT". ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, RESULTING FROM THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.
 - 2.9.2. ALL REQUIRED CUTS SHALL BE CUT WITHIN THE DIMENSIONS SHOWN ON THE DRAWINGS. NO CUTS SHALL EXTEND BEYOND THE OUTLINE OF THE DIMENSIONS SHOWN ON THE DRAWINGS. ALL CUT EDGES SHALL BE GROUND SMOOTH AND DE-BURRED. CUT EDGES THAT ARE TO BE FIELD WELDED SHALL BE PREPARED FOR FIELD WELDING PER AWS D1.1 AND AS SHOWN ON THE DRAWINGS. CONTRACTOR TO AVOID 90 DEGREE CORNERS. IT MAY BE NECESSARY TO DRILL STARTER HOLES AS REQUIRED TO MAKE THE CUTS.

3. BASE PLATE GROUT - (NOT REQUIRED)

4. FOUNDATION WORK - (NOT REQUIRED)

5. CAST-IN-PLACE CONCRETE - (NOT REQUIRED)

6. EPOXY GROUTED REINFORCING ANCHOR RODS - (NOT REQUIRED)

7. TOUCH UP OF GALVANIZING

- 7.1. THE CONTRACTOR SHALL TOUCH UP ANY AND ALL AREAS OF GALVANIZING ON THE EXISTING STRUCTURE OR NEW COMPONENTS THAT ARE DAMAGED OR ABRADED DURING CONSTRUCTION. GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS ANY AND ALL ABRASIONS, CUTS, FIELD DRILLING, AND ALL FIELD WELDING SHALL BE TOUCHED UP WITH TWO (2) COATS OF ZRC COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.
- 7.2. CONTRACTOR SHALL CLEAN AND PREPARE ALL FIELD WELDS ON GALVANIZED AND PRIME PAINTED SURFACES FOR TOUCH-UP COATING IN ACCORDANCE WITH AWS D1.1. CROWN CASTLE'S TESTING AGENCY SHALL VERIFY THE PREPARED SURFACE PRIOR TO APPLICATION OF THE TOUCH-UP COATING.
- 7.3. CROWN CASTLE'S TESTING AGENCY SHALL TEST AND VERIFY THE COATING THICKNESS AFTER THE CONTRACTOR HAS APPLIED THE ZRC COLD GALVANIZING COMPOUND AND IT HAS SUFFICIENTLY DRIED. AREAS FOUND TO BE ADEQUATELY COATED, SHALL BE RE-COATED BY THE CONTRACTOR AND RE-TESTED BY THE TESTING AGENCY.

8. HOT-DIP GALVANIZING

- 8.1. HOT-DIP GALVANIZE ALL STRUCTURAL STEEL MEMBERS AND ALL STEEL ACCESSORIES, BOLTS, WASHERS, ETC. PER ASTM A123 OR PER ASTM A153, AS APPROPRIATE.
- 8.2. PROPERLY PREPARE STEEL ITEMS FOR GALVANIZING. DRILL OR PUNCH WEEP AND/OR DRAINAGE HOLES WITH EOR APPROVAL OF LOCATIONS.
- 8.3. ALL GALVANIZING SHALL BE DONE AFTER FABRICATION IS COMPLETED AND PRIOR TO FIELD INSTALLATION.

9. PERPETUAL INSPECTION AND MAINTENANCE BY THE OWNER

- 9.1. AFTER THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF THE MONOPOLE REINFORCING SYSTEM AND THE WORK HAS BEEN ACCEPTED BY CROWN CASTLE, CROWN CASTLE WILL BE RESPONSIBLE FOR THE LONG TERM AND PERPETUAL INSPECTION AND MAINTENANCE OF THE POLE AND REINFORCING SYSTEM.
- 9.2. ANY FIELD WELDED CONNECTIONS ARE SUBJECT TO CORROSION DAMAGE AND DETERIORATION IF THEY ARE NOT PROPERLY MAINTAINED AND COVERED WITH CORROSION PREVENTIVE COATING SUCH AS THE ZRC GALVANIZING COMPOUND SPECIFIED PREVIOUSLY. THE STRUCTURAL LOAD CARRYING CAPACITY OF THE REINFORCED POLE SYSTEM IS DEPENDENT UPON THE INSTALLED SIZE AND QUALITY, MAINTAINED SOUND CONDITION AND STRENGTH OF THESE FIELD WELDED CONNECTIONS. ANY CORROSION OF, DAMAGE TO, FATIGUE, FRACTURE, AND/OR DETERIORATION OF THESE WELDS AND/OR THE EXISTING GALVANIZED STEEL POLE STRUCTURE AND THE WELDED COMPONENTS WILL RESULT IN THE LOSS OF STRUCTURAL LOAD CARRYING CAPACITY AND MAY LEAD TO FAILURE OF THE STRUCTURAL SYSTEM. THEREFORE, IT IS IMPERATIVE THAT CROWN CASTLE REGULARLY INSPECTS, MAINTAINS, AND REPAIRS AS NECESSARY, ALL OF THESE WELDS, CONNECTIONS, AND COMPONENTS FOR THE LIFE OF THE STRUCTURE.
- 9.3. CROWN CASTLE SHALL REFER TO ANSII/ITIA-222-G-2-2009, SECTION 14 AND ANNEX J FOR RECOMMENDATIONS FOR MAINTENANCE AND INSPECTION. THE FREQUENCY OF THE INSPECTION AND MAINTENANCE INTERVALS IS TO BE DETERMINED BY CROWN CASTLE BASED UPON ACTUAL SITE AND ENVIRONMENTAL CONDITIONS. THE EOR RECOMMENDS THAT A COMPLETE AND THOROUGH INSPECTION OF THE ENTIRE REINFORCED MONOPOLE STRUCTURAL SYSTEM BE PERFORMED YEARLY AND/OR AS FREQUENTLY AS CONDITIONS WARRANT, ACCORDING TO ANSII/ITIA-222-G-2-2009 SECTION 14.2: "IT IS RECOMMENDED THAT THE STRUCTURE BE INSPECTED AFTER SEVERE WIND AND/OR ICE STORMS OR OTHER EXTREME LOADING CONDITIONS".

10. FIELD NDE MINIMUM REQUIREMENTS

- 10.1. ALL NDE SHALL BE IN ACCORDANCE WITH AWS D1.1.
- 10.2. FOR NEW BASE STIFFENERS (INCLUSIVE OF TRANSITION STIFFENERS) AND ANCHOR ROD BRACKETS, COMPLETE JOINT PENETRATION WELDS SHALL BE 100% INSPECTED BY UT. ALL PARTIAL JOINT PENETRATION AND FILLET WELDS SHALL BE 100% INSPECTED BY MT.
- 10.3. FOR NEW FLAT PLATE REINFORCEMENT AT THE BASE OF THE TOWER, COMPLETE JOINT PENETRATION WELDS SHALL BE 100% INSPECTED BY UT. ALL PARTIAL JOINT PENETRATION AND FILLET WELDS SHALL BE 100% INSPECTED BY MT, BUT MAY BE LIMITED TO A HEIGHT OF 10'-0".
- 10.4. FOR NDE OF THE EXISTING BASE PLATE CIRCUMFERENTIAL WELD, GC SHALL REFERENCE THE MI CHECKLIST FOR APPLICABILITY. PLEASE SEE ENG-SOW-10033: 'TOWER BASE PLATE NDE, AND ENG-BUL-10051: 'NDE REQUIREMENTS FOR MONOPOLE BASE PLATE TO PREVENT CONNECTION FAILURE'. NOTIFY THE EOR AND CROWN ENGINEERING IMMEDIATELY IF ANY CRACKS ARE SUSPECTED OR HAVE BEEN IDENTIFIED. THE NDE SHALL INCLUDE ALL EXISTING MODIFICATIONS THAT HAVE BEEN WELDED TO THE BASE PLATE.
- 10.5. ALL TESTING LIMITATIONS SHALL BE DETAILED IN THE NDE REPORT.

© Copyright 2016, by Paul J. Ford and Company, All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

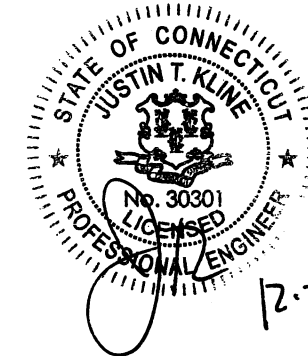
RJF PAUL J. FORD & COMPANY
250 E Broad St, Ste 600- Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 147'
MONOPOLE
BU #876360; PRESTON / TOWN HALL
PRESTON, CONNECTICUT

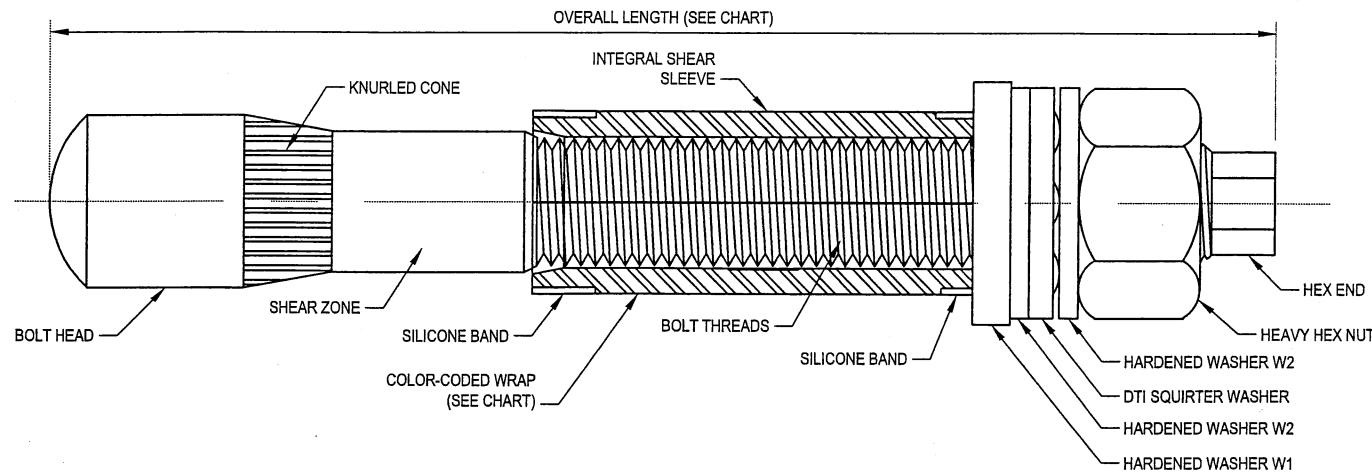
PROJECT No:	37516-3879.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.W.M.
CHECKED BY:	BKK
DATE:	12-27-2016



12-28-16

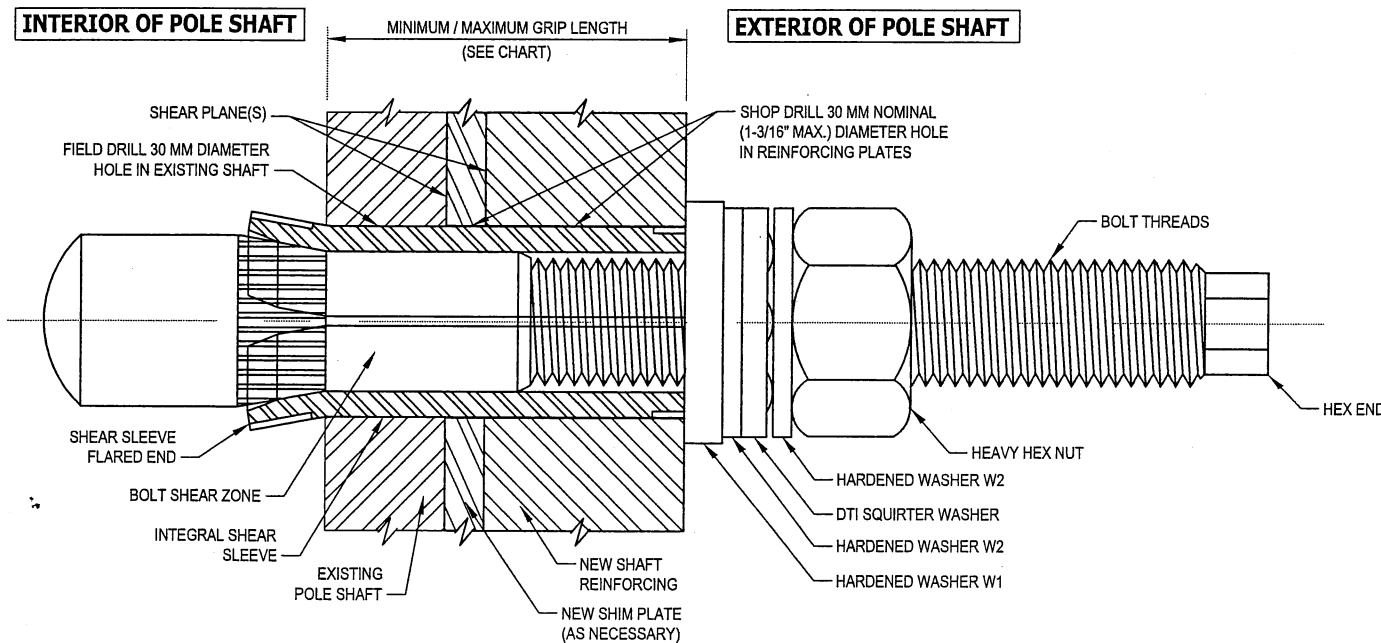
GENERAL NOTES

S-1



PRE-INSTALLED FORGBolt™ ASSEMBLY DETAIL

1
S-2A



INSTALLED FORGBolt™ ASSEMBLY DETAIL

2
S-2A

FORGBolt™		AISC Group A Material: ASTM A325 and PC8.8 (Tensile Stress, Fu = 120 ksi minimum)					
GROUP A	FORGBolt™ Size (mm)	Overall Length (inches)	Estimated Weight Each (lbs)	Grip Range (inch)	Comment	Color Code	
FORGBolt™ A325 - PC8.8	1	135	5.31	1.3	3/8" to 1"	--	RED
	2	160	6.30	1.6	3/4" to 1-1/2"	--	GREEN
	3	195	7.68	1.9	1-1/4" to 2-1/4"	--	BLUE
	4	260	10.24	2.6	2" to 3-1/2"	Splice Bolt	YELLOW
	5	365	14.37	3.6	3-1/2" to 5-1/2"	Flange Jump Bolt	ORANGE
	6	440	17.32	4.3	5-1/2" to 8-1/2"	Flange Jump Bolt	BLACK
DTI Note	Each Group A (A325/PC8.8) FORGBolt™ assembly shall have a 'Squirter' DTI that is compatible with a M20-PC8.8 bolt.						

FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

INSTALLATION NOTES:

1. FIELD DRILL HOLES TO 30 MM DIAMETER.
2. SELECT CORRECT BOLT SIZE FOR INSTALLATION GRIP (REFER TO PLANS).
3. INSERT BOLT ASSEMBLY THROUGH HOLES IN SHAFT REINFORCING PLATES AND SEAT THE HARDENED WASHER W1 FLUSH AGAINST OUTSIDE OF PLATE.
4. HAND TIGHTEN NUT TO FINGER TIGHT.
5. TIGHTEN NUT TO PRETENSIONED CONDITION AND UNTIL DTI SHOWS PROPER INDICATION.
6. PROPERLY DOCUMENT AND INSPECT BOLT TIGHTENING PER PLAN REQUIREMENTS.

BOLT HOLE NOTES:

1. ALL SHOP-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM SHOP-DRILLED HOLE DIAMETER PERMITTED IS 1-3/16".
2. ALL FIELD-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM FIELD-DRILLED HOLE DIAMETER PERMITTED IS 30 MM.

BOLT TIGHTENING AND INSPECTION NOTES:

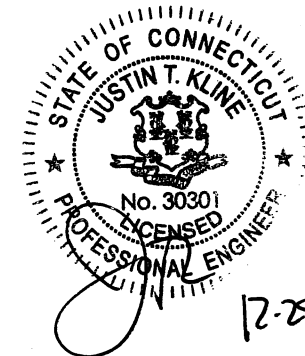
1. ALL STRUCTURAL BOLTS SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.
2. ALL STRUCTURAL BOLTS SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009.

**AISC GROUP A MATERIAL: ASTM A325 AND PC8.8
(Fu = 120 KSI MIN. TENSILE STRESS)**

CONTAINS PROPRIETARY INFORMATION PATENT PENDING

© Copyright 2013 to 2015 by PTP, all rights reserved.

DISTRIBUTOR CONTACT:
PRECISION TOWER PRODUCTS
PHONE: 888-926-4857
EMAIL: info@precisiontowerproducts.com
WEB: www.precisiontowerproducts.com



© Copyright 2016, by Paul J. Ford and Company, All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 147' MONOPOLE
BU #876360; PRESTON / TOWN HALL
PRESTON, CONNECTICUT

PROJECT No: 37516-3879.001.7700
DRAWN BY: B.M.S.
DESIGNED BY: J.W.M.
CHECKED BY: BKK
DATE: 12-27-2016

FORGBolt™
DETAILS

S-2A

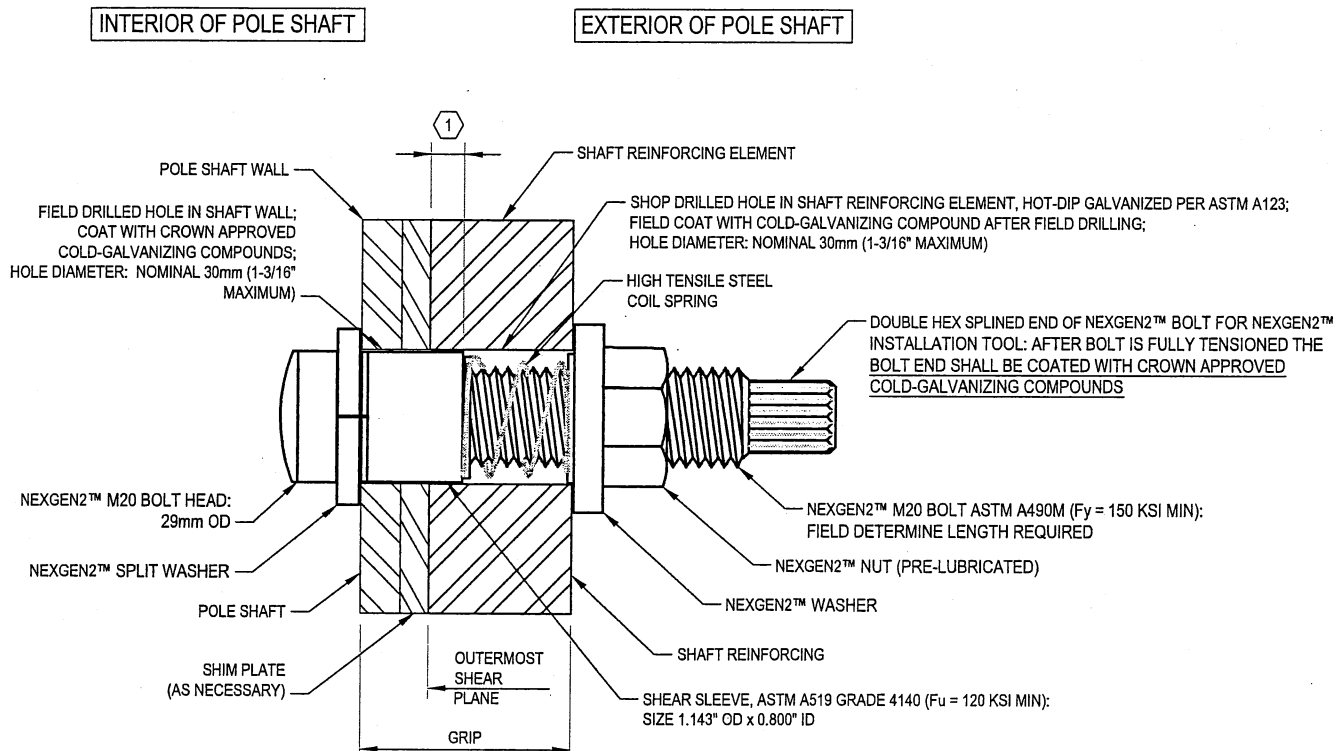
© Copyright 2016, by Paul J. Ford and Company, All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

1 NOTE: SHEAR SLEEVE LENGTH: THE SHEAR SLEEVE SHALL PROJECT A MINIMUM OF 3/8" BEYOND THE OUTERMOST SHEAR PLANE. THE CONTRACTOR SHALL SUBMIT FABRICATION DRAWINGS SHOWING NEXGEN2™ BOLT LENGTHS AND SHEAR SLEEVE LENGTHS TO THE EOR FOR REVIEW AND APPROVAL.

FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

- BOLT HOLE NOTES:**
1. ALL SHOP-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM SHOP-DRILLED HOLE DIAMETER PERMITTED IS 1-3/16".
 2. ALL FIELD-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM FIELD-DRILLED HOLE DIAMETER PERMITTED IS 30 MM.

- BOLT TIGHTENING AND INSPECTION NOTES:**
1. ALL NEXGEN2™ BOLT ASSEMBLIES SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF SECTION 8.2.3 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. PER SECTION 8.2.3: ALL FASTENER ASSEMBLIES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS IN AISC SECTION 8.1 WITHOUT SEVERING THE SPLINED END AND WITH WASHERS POSITIONED AS REQUIRED IN AISC SECTION 6.2. PER REQUIREMENTS IN SECTION 8.1: PRIOR TO BOLT PRETENSIONING, THE JOINT SHALL FIRST BE COMPACTED TO THE SNUG-TIGHT CONDITION. SNUG TIGHT IS THE CONDITION THAT EXISTS WHEN ALL OF THE PLIES IN THE CONNECTION HAVE BEEN PULLED INTO FIRM CONTACT BY THE BOLTS AND THE BOLTS HAVE BEEN TIGHTENED SUFFICIENTLY TO PREVENT THE REMOVAL OF THE NUTS WITHOUT THE USE OF A WRENCH. ONCE THE SNUG TIGHT CONDITION IS ACHIEVED, THEN THE BOLT ASSEMBLY CAN BE TIGHTENED TO THE PRETENSIONED CONDITION.
 2. ALL NEXGEN2™ BOLT ASSEMBLIES SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF SECTION 9.2.3 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. NOTE THAT COMPLETE INSPECTION OF ALL NEXGEN2™ BOLT ASSEMBLIES IS REQUIRED IN ADDITION TO ROUTINE OBSERVATION.
 3. ALL NEXGEN2™ BOLTS SHALL BE INSPECTED BY A QUALIFIED BOLT INSPECTOR PER NOTES 1 AND 2, ABOVE. DURING INSTALLATION, THE BOLT INSPECTOR SHALL VERIFY AND DOCUMENT: THE SHOP-DRILLED AND FIELD-DRILLED HOLE SIZES; THE INSTALLATION OF THE NEXGEN2™ BOLT ASSEMBLY, INCLUDING THE SHEAR SLEEVE PLACEMENT AND NUT LUBRICATION; AND THE CONTRACTOR'S TENSIONING PROCEDURE. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THAT THE DOUBLE HEX SPLINED END OF THE BOLTS HAVE BEEN TWISTED OFF AND COATED WITH CROWN APPROVED COLD-GALVANIZING COMPOUND..



TYPICAL NEXGEN2™ BOLT DETAIL 1 S-2B

PART NUMBER	BOLT LENGTH	SLEEVE LENGTH	MIN GRIP RANGE	MAX GRIP RANGE
M20x36	M20x95	1 1/16"	1 5/16"	1 7/16"
M20x48	M20x95	1 3/16"	1 7/16"	1 7/8"
M20x57	M20x95	1 5/8"	1 7/8"	2 1/4"
M20x68	M20x135	2"	2 1/4"	2 11/16"
M20x96	M20x135	2 7/16"	2 11/16"	3 3/4"
M20x127	M20x165	3"	3 3/4"	5"
M20x212	M20x250	4"	5"	8 5/16"

NOTE: NEXGEN2™ BOLT ASSEMBLY SHALL BE MAGNI 565 COATED PER ASTM F2833 AND MANUFACTURER SPECIFICATIONS.

NOTE: INSTALL NEXGEN2™ BOLT ASSEMBLY PER MANUFACTURER'S INSTRUCTIONS.

DISTRIBUTOR CONTACT DETAILS:
 ALLFASTENERS
 15401 COMMERCE PARK DR.
 BROOKPARK, OHIO 44142
 PHONE: 440-232-6060
 E-MAIL: SALES@ALLFASTENERS.COM



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

CROWN CASTLE
 3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
 PH: (724) 416-2000

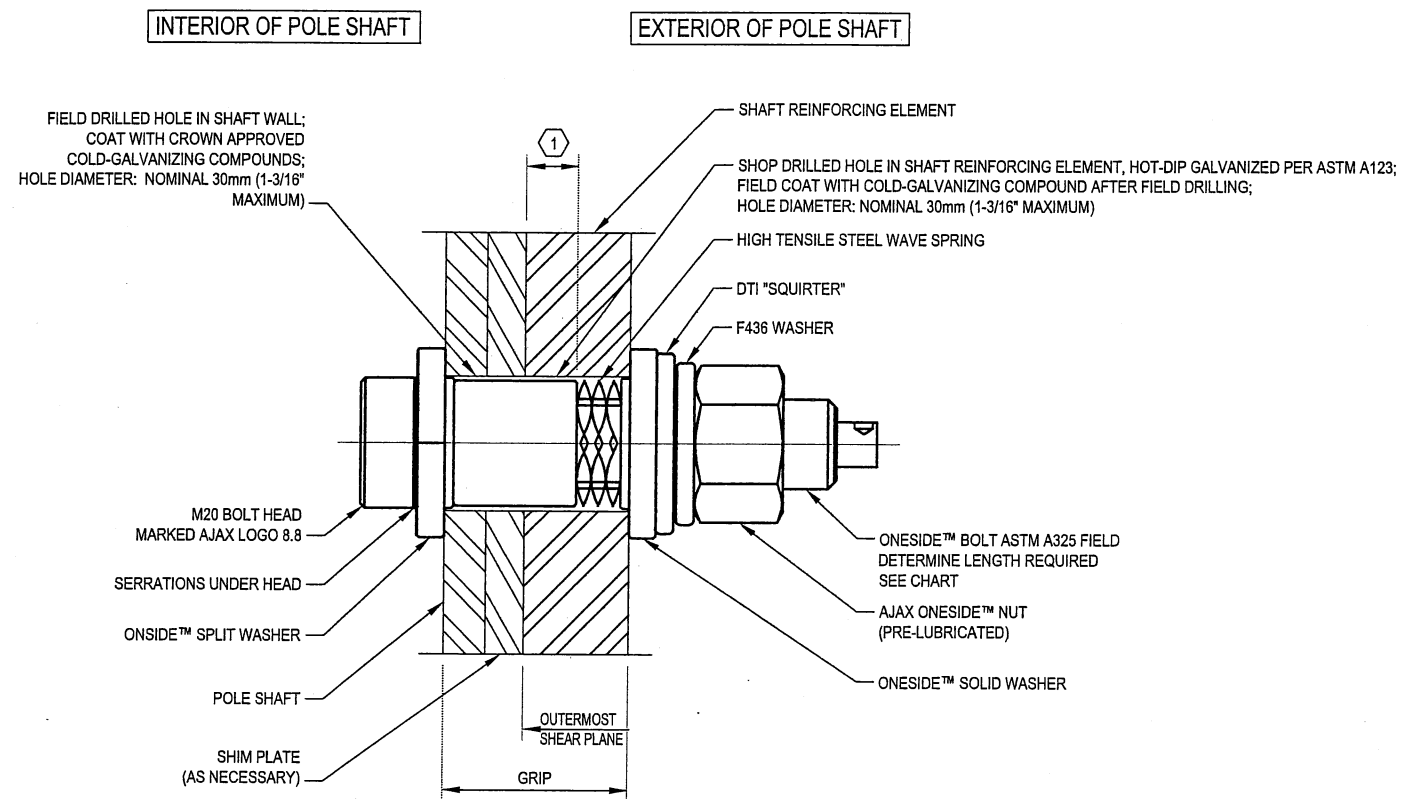
MODIFICATION OF AN EXISTING 147' MONOPOLE
 BU #876360; PRESTON / TOWN HALL
 PRESTON, CONNECTICUT

PROJECT No: 37516-3879.001.7700
 DRAWN BY: B.M.S.
 DESIGNED BY: J.W.M.
 CHECKED BY: BKK
 DATE: 12-27-2016

NEXGEN2™ BOLT DETAIL

S-2B

① NOTE: SHEAR SLEEVE LENGTH: THE SHEAR SLEEVE SHALL PROJECT A MINIMUM OF 3/8" BEYOND THE OUTERMOST SHEAR PLANE. THE CONTRACTOR SHALL SUBMIT FABRICATION DRAWINGS SHOWING AJAX ONESIDE™ BOLT LENGTHS AND SHEAR SLEEVE LENGTHS TO THE EOR FOR REVIEW AND APPROVAL.



TYPICAL AJAX ONESIDE™ BOLT DETAIL ①
S-2C

FOLLOW ALL MANUFACTURER / DISTRIBUTOR RECOMMENDATIONS FOR INSTALLATION, TIGHTENING, AND INSPECTION

BOLT HOLE NOTES:

1. ALL SHOP-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM SHOP-DRILLED HOLE DIAMETER PERMITTED IS 1-3/16".
2. ALL FIELD-DRILLED HOLES SHALL BE NOMINAL 30 MM DIAMETER. THE MAXIMUM FIELD-DRILLED HOLE DIAMETER PERMITTED IS 30 MM.

BOLT TIGHTENING AND INSPECTION NOTES:

1. ALL AJAX ONESIDE™ BOLT ASSEMBLIES SHALL BE INSTALLED AND TIGHTENED TO THE PRETENSIONED CONDITION ACCORDING TO THE REQUIREMENTS OF SECTION 8.2.4 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. PER SECTION 8.2.4: ALL FASTENER ASSEMBLIES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS IN AISC SECTION 8.1 WITH WASHERS POSITIONED AS REQUIRED IN AISC SECTION 6.2. PER REQUIREMENTS IN SECTION 8.1: PRIOR TO BOLT PRETENSIONING, THE JOINT SHALL FIRST BE COMPACTED TO THE SNUG-TIGHT CONDITION. SNUG TIGHT IS THE CONDITION THAT EXISTS WHEN ALL OF THE PLIES IN THE CONNECTION HAVE BEEN PULLED INTO FIRM CONTACT BY THE BOLTS AND THE BOLTS HAVE BEEN TIGHTENED SUFFICIENTLY TO PREVENT THE REMOVAL OF THE NUTS WITHOUT THE USE OF A WRENCH. ONCE THE SNUG TIGHT CONDITION IS ACHIEVED, THEN THE BOLT ASSEMBLY CAN BE TIGHTENED TO THE PRETENSIONED CONDITION.
2. ALL AJAX ONESIDE™ BOLT ASSEMBLIES SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF SECTION 9.2.4 OF THE AISC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS', DEC. 31, 2009. NOTE THAT COMPLETE INSPECTION OF ALL AJAX ONESIDE™ BOLT ASSEMBLIES IS REQUIRED IN ADDITION TO ROUTINE OBSERVATION.
3. ALL AJAX ONESIDE™ BOLTS SHALL BE INSPECTED BY A QUALIFIED BOLT INSPECTOR PER NOTES 1 AND 2, ABOVE. DURING INSTALLATION, THE BOLT INSPECTOR SHALL VERIFY AND DOCUMENT: THE SHOP-DRILLED AND FIELD-DRILLED HOLE SIZES; THE INSTALLATION OF THE AJAX ONESIDE™ BOLT ASSEMBLY, INCLUDING THE SHEAR SLEEVE PLACEMENT AND NUT LUBRICATION; AND THE CONTRACTOR'S TENSIONING PROCEDURE. THE BOLT INSPECTOR SHALL PROVIDE COMPLETE DOCUMENTATION OF ALL BOLTS AFTER TIGHTENING CLEARLY SHOWING THAT THE DIRECT TENSION INDICATOR WASHERS SHOW THAT THE PROPER BOLT TENSION HAS BEEN REACHED.
4. A MINIMUM OF 4 OUT OF 5 SQUIRTER® DTI PROTRUSIONS SHALL BE ENGAGED IN ANY AJAX ONESIDE™/DTI BOLT ASSEMBLY IN THE REINFORCING MEMBERS. A FEELER GAGE MAY BE USED TO VERIFY PROTRUSION COMPRESSION.
5. INSPECTIONS SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS AND CROWN DOCUMENT ENG-SOW-10007: MODIFICATION INSPECTION SOW.

BOLT ASSEMBLY AND INSTALLATION:

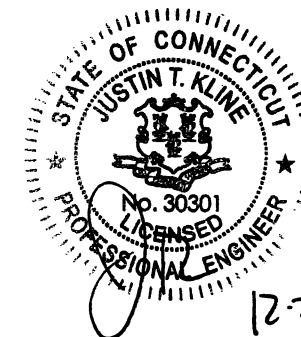
1. BOLT MUST BE PURCHASED PRE-ASSEMBLED.
2. FOLLOW BOLT AND DTI MANUFACTURERS INSTRUCTIONS FOR INSTALLATION.

AJAX ONESIDE™ BOLT DETAIL

CODE	SIZE	COLOR	SLEEVE LENGTH	GRIP	GRIP IMP
OSBA20.65-6	M20 x 65	ORANGE	6.0 (0.236")	12.5 / 20.0	0.500" / 0.787"
OSBA20.95-14	M20 x 95	BLACK	14.0 (0.551")	20.0 / 32.0	0.787" / 1.259"
OSBA20.95-22	M20 x 95	GREEN	22.0 (0.866")	30.0 / 50.0	1.181" / 1.968"
OSBA20.95-30	M20 x 95	YELLOW	30.0 (1.181")	40.5 / 50.0	1.595" / 1.968"
OSBA20.135-39	M20 x 135	BLUE	39.0 (1.535")	49.0 / 77.0	1.929" / 3.031"
OSBA20.135-48	M20 x 135	BROWN	48.0 (1.889")	60.5 / 77.0	2.375" / 3.031"
OSBA20.135-57	M20 x 135	PURPLE	57.0 (2.244")	67.0 / 90.0	2.637" / 3.543"
OSBA20.165-76	M20 x 165	RED	76.0 (3.000")	87.0 / 120.0	3.425" / 4.724"
OSBA20.250	M20 x 250	SILVER	MTO	121.0 / 211.0	4.724" / 8.310"

DISTRIBUTOR
 IRA SVENSGAARD AND ASSOCIATES
 PETER SVENSGAARD - PETERS@IRASVENS.COM
 JOHN KILLAM - JOHN@IRASVENS.COM
 PHONE: (530) 647-8225
 FAX: (530) 647-8229

MANUFACTURER
 AJAX FASTENERS
 SALES + TECH: ONESIDE@AJAXFAST.COM.AU



© Copyright 2016, by Paul J. Ford and Company. All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

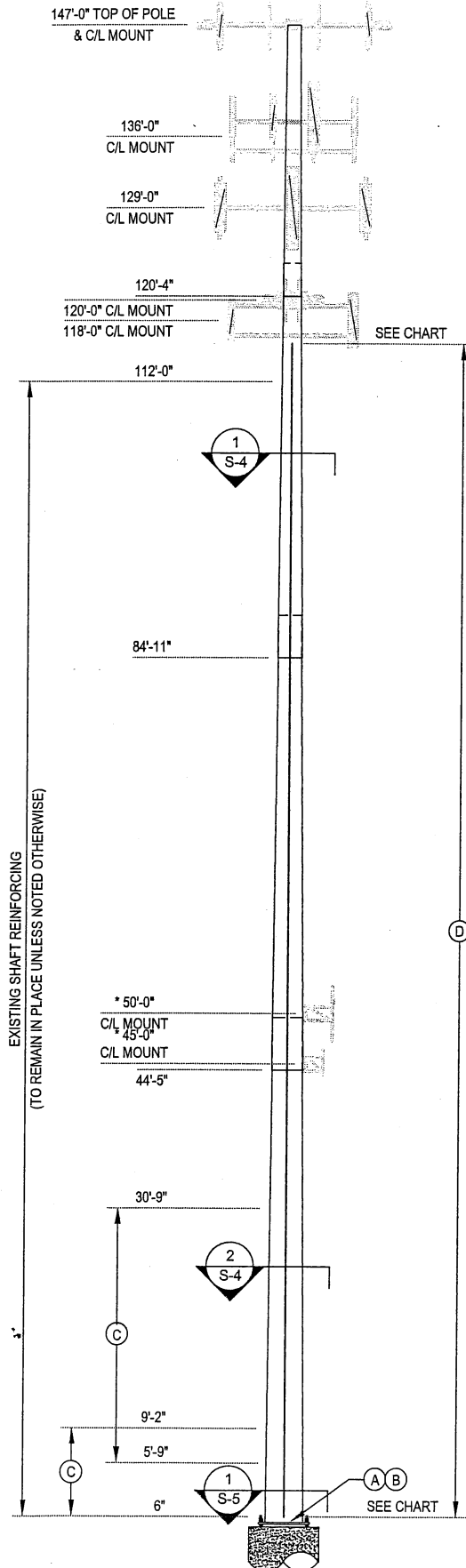
CROWN CASTLE
 3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
 PH: (724) 416-2000

MODIFICATION OF AN EXISTING 147' MONOPOLE
 BU #876360; PRESTON / TOWN HALL
 PRESTON, CONNECTICUT

PROJECT No: 37516-3879.001.7700
 DRAWN BY: B.M.S.
 DESIGNED BY: J.W.M.
 CHECKED BY: BKK
 DATE: 12-27-2016

AJAX ONESIDE™ BOLT DETAIL

S-2C



POLE ELEVATION 1 S-3

NOTE: SHAFT REINFORCING MAY NEED TO BE INSTALLED OFF-CENTER OF FLAT FOR FIT UP. OFFSETS THAT RESULT IN THE FASTENER BEING LOCATED LESS THAN 1 1/2" FROM THE APEX OF THE FLAT MUST BE APPROVED BY THE ENGINEER OF RECORD.

NEW CCI FLAT PLATE (65 KSI) REINFORCING SCHEDULE											
BOTTOM ELEVATION	TOP ELEVATION	FLAT #/ DEGREE SEPARATION	ELEMENT	ELEMENT LENGTH	ELEMENT QUANTITY	APPROXIMATE BOLTS PER ELEMENT	APPROXIMATE TOTAL BOLT QUANTITY	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAXIMUM INTERMEDIATE BOLT SPACING	ESTIMATED TOTAL STEEL WEIGHT
1'-3"	21'-3"	F3	CCI-SFP-04510020	20'-0"	1	22	22	6	6	20"	306 LBS.
1'-3"	21'-3"	F5	CCI-CFP-04510020 #1	20'-0"	1	22	22	6	6	20"	306 LBS.
1'-3"	36'-3"	F16	CCI-SFP-06512535	35'-0"	1	40	40	11	11	19"	968 LBS.
1'-3"	36'-3"	F10	CCI-CFP-06512535 #2	35'-0"	1	40	40	11	11	19"	968 LBS.
11'-9"	36'-3"	F4	CCI-CFP-06010024.5 #3	24'-6"	1	31	31	8	8	16"	500 LBS.
36'-4"	71'-4"	F4, F10 & F16	CCI-SFP-04510035	35'-0"	3	31	93	6	6	20"	1608 LBS.
71'-5"	106'-5"	F4, F10 & F16	CCI-SFP-04510035	35'-0"	3	31	93	6	6	20"	1608 LBS.
106'-6"	116'-6"	F4, F10 & F16	CCI-SFP-04510010	10'-0"	3	16	48	6	6	20"	459 LBS.
						389	6723 LBS.				

- NOTES:**
- 1.) ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. ALTERNATIVELY, ALL NEW STIFFENER PLATE STEEL REINFORCING MAY BE COLD GALVANIZED AS FOLLOWS: APPLY A MINIMUM OF TWO COATS OF ZRC-BRAND ZINC-RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.
 - 2.) ALL REINFORCING SHALL BE ASTM A572 GR. 65.
 - 3.) WELDS SHALL BE E80XX OR GREATER. TERMINATION WELDS SHALL BE 3/8" FILLET WELDS.
 - 4.) HOLES FOR BOLTS ARE 30mm UNLESS NOTED OTHERWISE.
 - 5.) ALL SHIMS SHALL BE ASTM A-36.
 - 6.) ALL HOLES ARE TO BE DRILLED, DO NOT BURN OR PUNCH.
 - 7.) FOR PLATES STARTING AT 6", THE BOTTOM OF THE FLAT PLATE SHALL BEGIN AT 6" ± 1". FOR SINGLE PLATES OR MULTIPLE PLATES SPICED TOGETHER, THE BOTTOM OF THE FLAT PLATE SHALL BEGIN AT THE PROPOSED ELEVATION ± 3". FOR MULTIPLE PLATES SPICED TOGETHER, THE TOP OF THE FLAT PLATE IS TO BE PLACED SUCH THAT THERE IS NO MORE THAN 3" DIFFERENCE BETWEEN THE ACTUAL OVERALL LENGTH OF THE SPAN AND THE PROPOSED OVERALL LENGTH OF THE SPAN, FROM THE BOTTOM OF THE PLATE TO THE TOP OF THE PLATE.

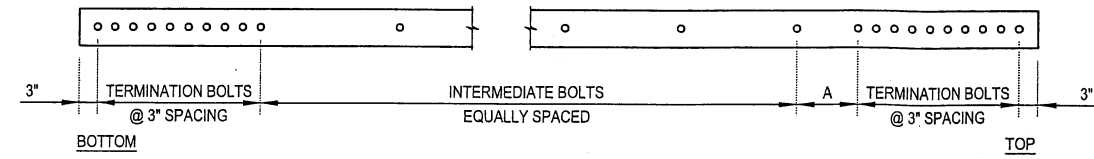
SPLICE PLATE INSTALLATION CHART								
ELEVATION	FLAT PLATE THICKNESS	FLAT PLATE WIDTH	FLAT PLATE LENGTH	FLAT PLATE QUANTITY	WELD LENGTH PER SIDE	TOTAL WELD LENGTH	BOLTS PER SPLICE*	TOTAL STEEL WEIGHT
36'-4"	1"	4-1/2"	4'-1"	1	0"	0"	14	63 LBS.
36'-4"	1"	4-1/2"	4'-10"	2	0"	0"	17	148 LBS.
71'-5"	1"	4-1/2"	3'-7"	3	0"	0"	12	165 LBS.
106'-6"	1"	4-1/2"	3'-7"	3	0"	0"	12	165 LBS.
						0"	12	541 LBS.

* BOLTS INCLUDED IN THE TOTAL QUANTITY LISTED IN THE FLAT PLATE INSTALLATION CHART.

NEW SHIM CHART				
1/16" SHIM QUANTITY	1/4" SHIM QUANTITY	SHIM WIDTH	SHIM LENGTH	HOLE DIAMETER
24	3	4-1/2"	4-1/2"	1-1/4"

SHIMS ARE FOR BIDDING PURPOSES ONLY, FINAL SHIM REQUIREMENTS TO BE DETERMINED BY CONTRACTOR DURING FABRICATION.

* EXISTING MOUNTS MAY NEED TO BE ADJUSTED, MOVED AND/OR TEMPORARILY SUPPORTED DURING THE INSTALLATION OF SHAFT REINFORCING



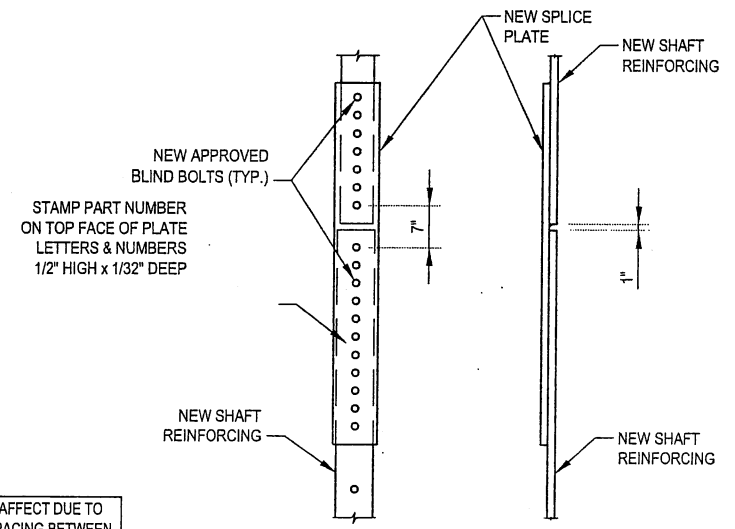
CUSTOM BOLTED BAR DETAIL
NOTE: "A" DIMENSION MAY VARY, NOT TO EXCEED MAXIMUM INTERMEDIATE BOLT SPACING

SHAFT SECTION DATA							
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN)		POLE GRADE (ksi)	POLE SHAPE
				@ TOP	@ BOTTOM		
1	26.63	0.1875	39.00	16.250	21.980	65	18-SIDED
2	38.71	0.2500	50.00	20.905	29.110	65	18-SIDED
3	44.67	0.3125	62.00	27.726	37.190	65	18-SIDED
4	49.58	0.3750		35.469	46.000	65	18-SIDED

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

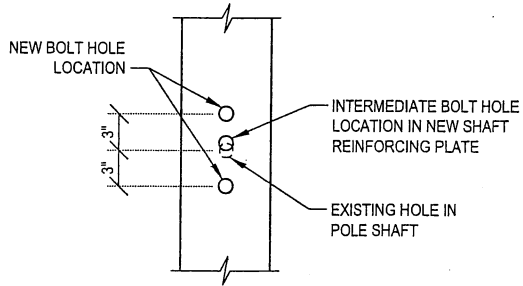
ASTM A36 SHIMS FOR MONOPOLE REINFORCEMENT MEMBERS SHALL BE REQUIRED WHERE GAPS BETWEEN THE POLE SHAFT AND REINFORCING MEMBER EXIST AT FASTENER LOCATIONS. FOR INTERMEDIATE CONNECTIONS, THE MINIMUM SHIM LENGTH AND WIDTH SHALL BE THE WIDTH OF THE REINFORCING MEMBER. FOR TERMINATION CONNECTIONS, A CONTINUOUS SHIM PLATE (PREFERRED) OR EQUIVALENT INDIVIDUAL SHIM PLATES THE WIDTH OF THE REINFORCING MEMBER MAY BE USED. SHIM THICKNESSES SHALL BE NO LESS THAN 1/16". STACKING OF SHIMS IS PERMITTED. FINGER SHIMS AND HORSESHOE SHIMS ARE PERMITTED. STACKED SHIMS SHALL BE NO GREATER THAN 1/4" WITHOUT ENGINEER OF RECORD APPROVAL.

TOWER MODIFICATION SCHEDULE			
	ELEVATION	TOWER MODIFICATION DESCRIPTION	REFERENCE SHEETS
(A)	0'	REMOVE EXISTING STIFFENERS AT BASE PLATE	S-5
(B)	0'	INSTALL NEW TRANSITION STIFFENERS AT BASE PLATE	S-5
(C)	6" TO 9'-2" & 5'-9" TO 30'-9"	REMOVE EXISTING SHAFT REINFORCING FROM 6" TO 9'-2" ON FLAT 10 AND FROM 5'-9" TO 30'-9" ON FLAT 5	S-3
(D)	1'-3" TO 116'-6"	INSTALL NEW SHAFT REINFORCING	S-3 & S-4
(E)	1'-3" TO 116'-6"	REMOVE AND REPLACE SAFETY CLIMB BRACKETS AS REQUIRED FOR REINFORCING INSTALLATION. INSTALL NEW SAFETY CLIMB. COORDINATE WITH TUF-TUG.	S-3



DETAIL 3 S-3
SCALE: NTS

NOTE: TRANSITION MAY BE AFFECT DUE TO EXISTING BOLT HOLES. 3" SPACING BETWEEN EXISTING BOLT HOLES AND NEW BOLT HOLES MUST BE MAINTAINED WHEN INSTALLING NEW SHAFT REINFORCING.



INTERMEDIATE BOLT HOLE FIX 2 S-3
SCALE: NTS

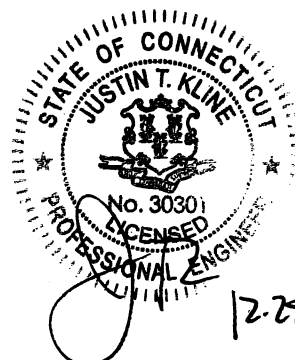
© Copyright 2016, by Paul J. Ford and Company, All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

CROWN CASTLE
3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
PH: (724) 416-2000

MODIFICATION OF AN EXISTING 147' MONOPOLE
BU #876360; PRESTON / TOWN HALL PRESTON, CONNECTICUT

PROJECT No:	37516-3879.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.W.M.
CHECKED BY:	BKK
DATE:	12-27-2016



MONOPOLE PROFILE

S-3

© Copyright 2016, by Paul J. Ford and Company. All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

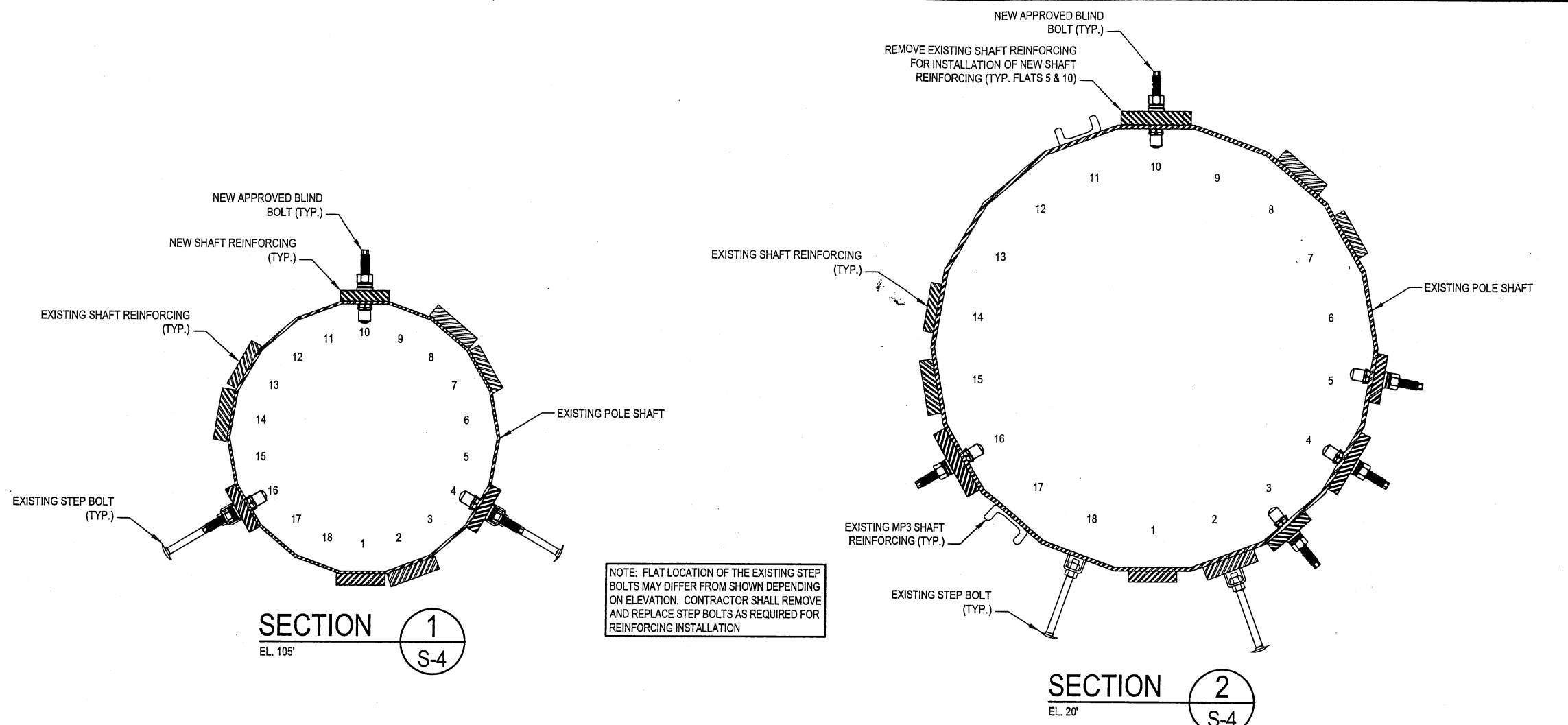
CROWN CASTLE
 3530 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
 PH: (724) 416-2000

MODIFICATION OF AN EXISTING 147' MONOPOLE
 BU #876360; PRESTON / TOWN HALL
 PRESTON, CONNECTICUT

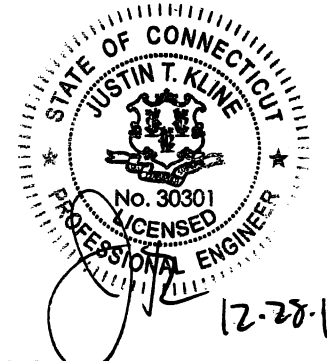
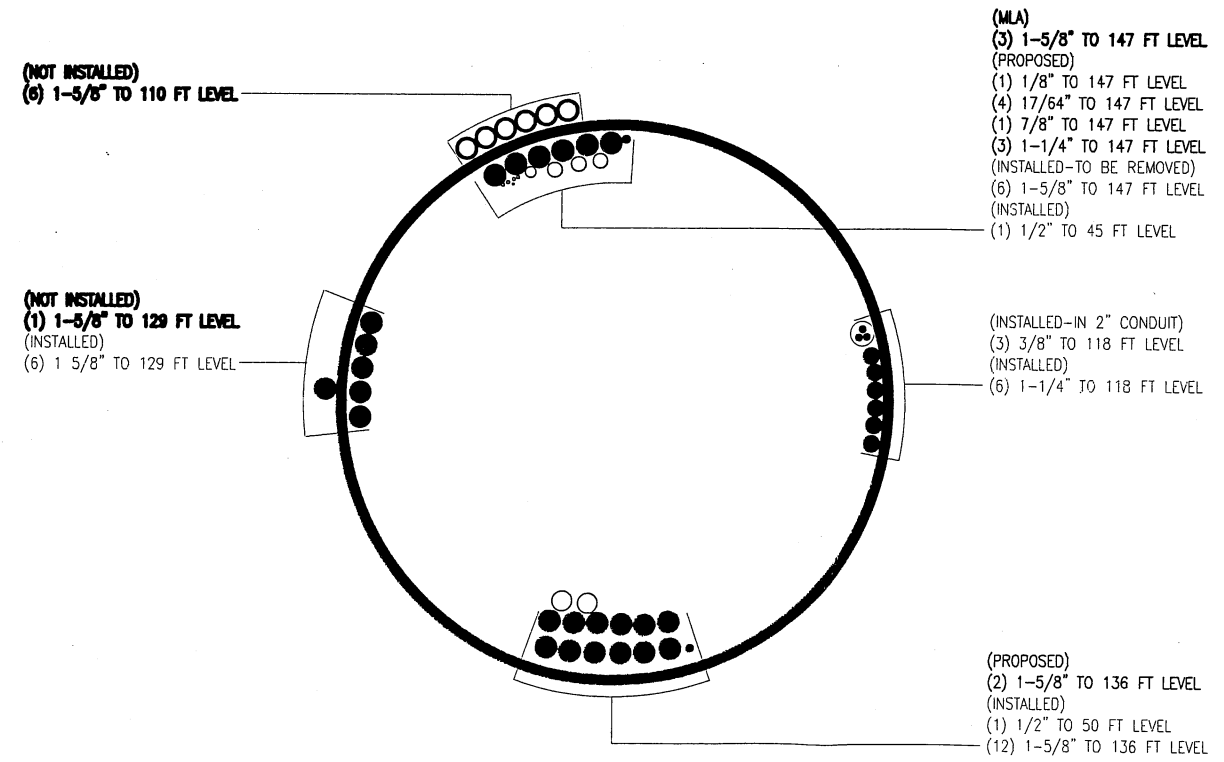
PROJECT No: 37516-3879.001.7700
 DRAWN BY: B.M.S.
 DESIGNED BY: J.W.M.
 CHECKED BY: B.K.K.
 DATE: 12-27-2016

SHAFT REINFORCING SECTIONS

S-4



NOTE: FLAT LOCATION OF THE EXISTING STEP BOLTS MAY DIFFER FROM SHOWN DEPENDING ON ELEVATION. CONTRACTOR SHALL REMOVE AND REPLACE STEP BOLTS AS REQUIRED FOR REINFORCING INSTALLATION



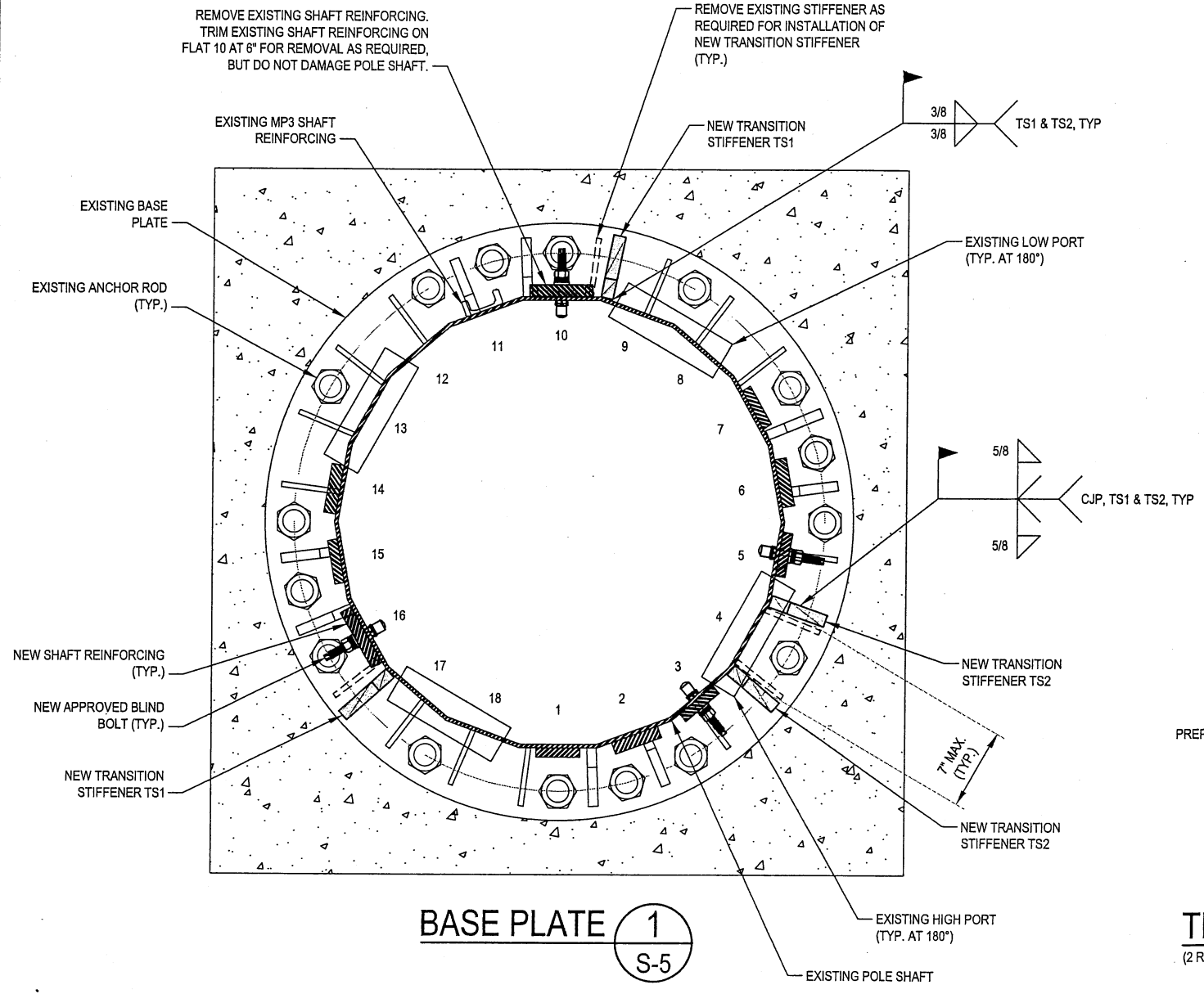
37516-3879.001.DWG

BASE SPECIFICATIONS	
BASE PLATE:	61"Ø; 1 3/4" THK.; Fy=60 KSI
ANCHOR RODS:	(12) 2 1/4"Ø; A615 GRADE 75; 55" B.C.

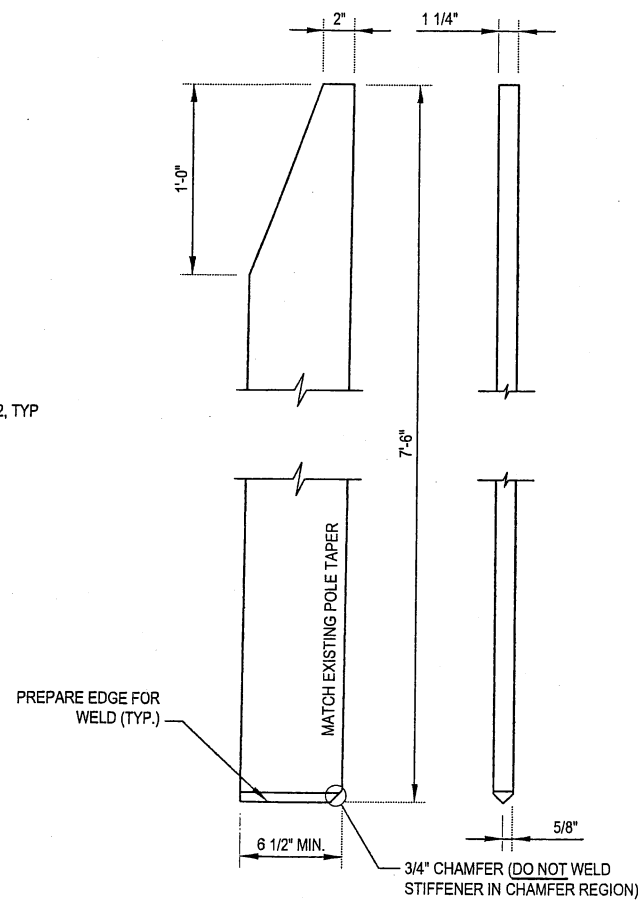
© Copyright 2016, by Paul J. Ford and Company, All Rights Reserved. This document and the data contained herein, is proprietary to Paul J. Ford and Company, issued in strict confidence and shall not, without the prior written permission of Paul J. Ford and Company, be reproduced, copied or used for any purpose other than the intended use for this specific project.

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

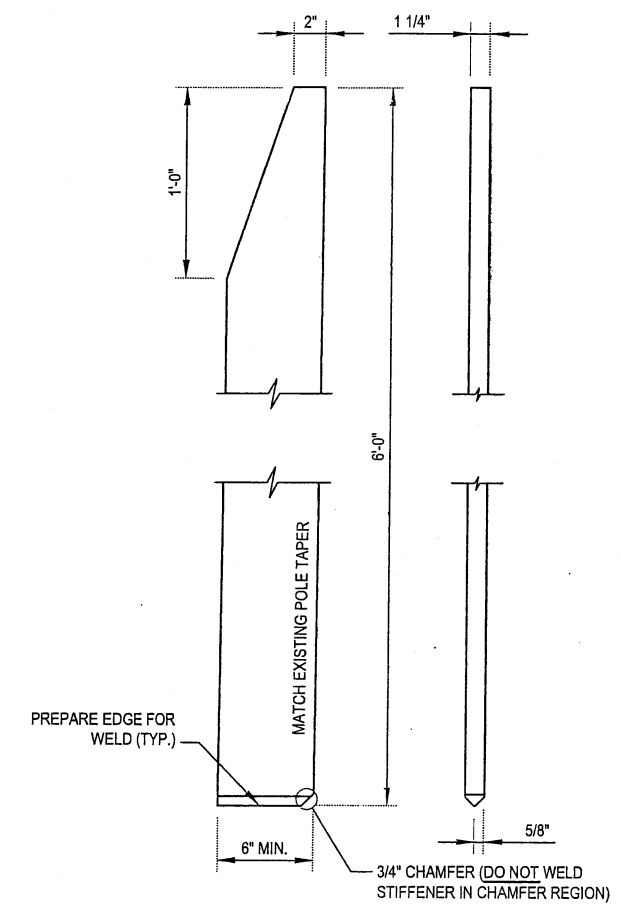
CROWN CASTLE
 3550 TORINGDON WAY, SUITE 300, CHARLOTTE, NC 28277
 PH: (724) 416-2000



BASE PLATE 1
 S-5



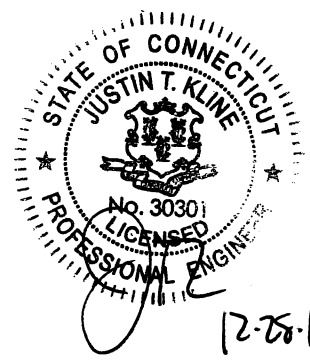
TRANSITION STIFFENER MK~TS1
 (2 REQUIRED) (Fy = 65 KSI)



TRANSITION STIFFENER MK~TS2
 (2 REQUIRED) (Fy = 65 KSI)

MODIFICATION OF AN EXISTING 147' MONOPOLE
 BU #876360; PRESTON / TOWN HALL
 PRESTON, CONNECTICUT

PROJECT No:	37516-3879.001.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	J.W.M.
CHECKED BY:	BKK
DATE:	12-27-2016



BASE PLATE
 DETAILS

S-5

37516-3879.001.DWG



RF EMISSIONS COMPLIANCE REPORT

Crown Castle on behalf of Sprint

BU: 876360
Site Name: Preston/Town Hall
389 Rt. 2
Sprint Application ID: 363243
Preston, CT
1/16/2017

Report Status:

The Site is Compliant

Prepared By:

Sitesafe, Inc.

Engineering Statement in Re:
Electromagnetic Energy Analysis
Sprint
Preston, CT

My signature below indicates:

That I am an employee of Sitesafe, Inc. in Arlington, Virginia; and

That I am thoroughly familiar with the Rules and Regulations of the Federal Communications Commission ("the FCC" and "the FCC Rules") both in general and specifically as they apply to the FCC's Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; and

That the technical information serving as the basis for this report was supplied by Crown Castle (See attached Site Summary and Carrier documents), and that Sprint's installations involve communications equipment, antennas and associated technical equipment at a location referred to as the "Preston/Town Hall" ("the site"); and

That Sprint proposes to operate at the site with transmit antennas listed in the carrier summary and with a maximum effective radiated power as specified by Sprint and shown on the worksheet, and that worst-case 100% duty cycle have been assumed; and

That this analysis has been performed with the assumption that the ground immediately surrounding the tower is primarily flat or falling; and

That at this time, the FCC requires that certain licensees address specific levels of radio-frequency energy to which workers or members of the public might possibly be exposed (at §1.1307(b) of the FCC Rules); and

That such consideration of possible exposure of humans to radio-frequency radiation must utilize the standards set by the FCC, which is the Federal Agency having jurisdiction over communications facilities; and

That the FCC rules define two tiers of permissible exposure guidelines: 1) "uncontrolled environments," defined as situations in which persons may not be aware of (the "general public"), or may not be able to control their exposure to a transmission facility; and (2) "controlled environments," which defines situations in which persons are aware of their potential for exposure (industry personnel); and

That this statement specifically addresses the uncontrolled environment (which is more conservative than the controlled environment) and the limit set forth in the FCC rules for licensees of Sprint's operating frequency as shown on the attached antenna worksheet; and

That when applying the uncontrolled environment standards, the predicted Maximum Power Density at two meters above ground level from the proposed Sprint operation is no more than 0.278% of the maximum in any accessible area on the ground and

That it is understood per FCC Guidelines and OET65 Appendix A, that regardless of the existent radio-frequency environment, only those licenses whose contributions exceed five percent of the exposure limit pertinent to their operation(s) bear any responsibility for bringing any non-compliant area(s) into compliance; and

That when applying the uncontrolled environment standards, the cumulative predicted energy density from the proposed operation is no more than 3.293% of the maximum in any accessible area up to two meters above the ground per OET-65; and

That the calculations provided in this report are based on data provided by the client and antenna pattern data supplied by the antenna manufacturer, in accordance with FCC guidelines listed in OET-65. Horizontal and vertical antenna patterns are combined for modeling purposes to accurately reflect the energy two meters above ground level where on-axis energy refers to maximum energy two meters above the ground along the azimuth of the antenna and where area energy refers to the maximum energy anywhere two meters above the ground regardless of the antenna azimuth, accounting for cumulative energy from multiple antennas for the carrier and frequency range indicated; and

That the Occupational Safety and Health Administration has policies in place which address worker safety in and around communications sites, thus individual companies will be responsible for their employees' training regarding Radio Frequency Safety.

In summary, it is stated here that the proposed operation at the site would not result in exposure of the Public to excessive levels of radio-frequency energy as defined in the FCC Rules and Regulations, specifically 47 CFR 1.1307 and that Sprint's proposed operation is completely compliant.

Finally, it is stated that access to the tower should be restricted to communication industry professionals, and approved contractor personnel trained in radio-frequency safety; and that the instant analysis addresses exposure levels at two meters above ground level and does not address exposure levels on the tower, or in the immediate proximity of the antennas.

**Sprint
Preston/Town Hall
Site Summary**

Carrier	Area Maximum Percentage MPE
AT&T Mobility	0.408 %
AT&T Mobility	0.456 %
AT&T Mobility	0.289 %
Sprint	0.112 %
Sprint	0.114 %
Sprint	0.052 %
T-Mobile	0.291 %
T-Mobile	0.295 %
T-Mobile	0.295 %
Verizon Wireless	0.307 %
Verizon Wireless	0.245 %
Verizon Wireless	0.196 %
Verizon Wireless	0.235 %
 Composite Site MPE:	 3.293 %

AT&T Mobility Preston/Town Hall Carrier Summary

Frequency: 737 MHz
Maximum Permissible Exposure (MPE): 491.33 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 2.00264 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.40759 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Powerwave	P65-17-XLH-RR	118	35	1615	1.292444	0.263048	1.766835	0.3596
ANDREW	SBNH-1D6565C	118	155	1375	0.571828	0.116383	1.093166	0.22249
Powerwave	P65-17-XLH-RR	118	265	1615	1.28544	0.261623	1.766835	0.3596

AT&T Mobility Preston/Town Hall Carrier Summary

Frequency: 1900 MHz
Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 4.55837 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.45584 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Powerwave	RA21.7770.00	118	35	2339	0.924461	0.092446	1.917673	0.191767
Powerwave	P65-17-XLH-RR	118	35	1578	1.344293	0.134429	1.932135	0.193213
Powerwave	RA21.7770.00	118	155	2339	0.924461	0.092446	1.917673	0.191767
ANDREW	SBNH-1D6565C	118	155	2334	1.73084	0.173084	2.532974	0.253297
Powerwave	RA21.7770.00	118	265	2339	0.924461	0.092446	1.917673	0.191767
Powerwave	P65-17-XLH-RR	118	265	1578	1.344293	0.134429	1.932135	0.193213

AT&T Mobility Preston/Town Hall Carrier Summary

Frequency: 850 MHz
Maximum Permissible Exposure (MPE): 566.67 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 1.63772 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.28901 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Powerwave	RA21.7770.00	118	35	1094	0.764717	0.13495	1.196629	0.21117
Powerwave	RA21.7770.00	118	155	1094	0.765692	0.135122	1.196628	0.21117
Powerwave	RA21.7770.00	118	265	1094	0.764717	0.13495	1.196629	0.21117

Sprint Preston/Town Hall Carrier Summary

Frequency: 2500 MHz
Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 1.11743 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.11174 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
ARGUS	LLPX310R-V1	147	0	1600	0.579577	0.057958	1.051977	0.105198
ARGUS	LLPX310R-V1	147	120	1600	0.579577	0.057958	1.051977	0.105198
ARGUS	LLPX310R-V1	147	240	1600	0.584026	0.058403	1.051976	0.105198

Sprint Preston/Town Hall Carrier Summary

Frequency: 1990 MHz
Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 1.1387 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.11387 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
RFS	APXVSP18-C-A20	147	0	2536	0.555847	0.055585	1.05137	0.105137
RFS	APXVSP18-C-A20	147	120	2536	0.558616	0.055862	1.05137	0.105137
RFS	APXVSP18-C-A20	147	240	2536	0.555847	0.055585	1.05137	0.105137

Sprint Preston/Town Hall Carrier Summary

Frequency: 862 MHz
Maximum Permissible Exposure (MPE): 574.67 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 0.29685 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.05166 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
RFS	APXVSP18-C-A20	147	0	867	0.286834	0.049913	0.294065	0.051171
RFS	APXVSP18-C-A20	147	120	867	0.286834	0.049913	0.294065	0.051171
RFS	APXVSP18-C-A20	147	240	867	0.287786	0.050079	0.294065	0.051171

T-Mobile Preston/Town Hall Carrier Summary

Frequency: 731 MHz
Maximum Permissible Exposure (MPE): 487.33 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 1.41641 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.29065 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
ANDREW	LNx-6515DS-VTM	118	30	1715	0.697068	0.143037	0.736848	0.1512
ANDREW	LNx-6515DS-VTM	118	120	1715	0.697068	0.143037	0.736848	0.1512
ANDREW	LNx-6515DS-VTM	118	270	1715	0.697068	0.143037	0.736848	0.1512

T-Mobile Preston/Town Hall Carrier Summary

Frequency: 2100 MHz
Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 2.94993 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.29499 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Ericsson	AIR 21 B2A B4P	118	30	2061	0.73319	0.073319	0.837759	0.083776
Ericsson	AIR 21 B4A B2P	118	30	2061	0.73319	0.073319	0.837759	0.083776
Ericsson	AIR 21 B2A B4P	118	120	2061	0.73319	0.073319	0.837759	0.083776
Ericsson	AIR 21 B4A B2P	118	120	2061	0.73319	0.073319	0.837759	0.083776
Ericsson	AIR 21 B2A B4P	118	270	2061	0.73319	0.073319	0.837759	0.083776
Ericsson	AIR 21 B4A B2P	118	270	2061	0.73319	0.073319	0.837759	0.083776

T-Mobile Preston/Town Hall Carrier Summary

Frequency: 1900 MHz
Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 2.94993 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.29499 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Ericsson	AIR 21 B2A B4P	118	30	2061	0.73319	0.073319	0.837759	0.083776
Ericsson	AIR 21 B4A B2P	118	30	2061	0.73319	0.073319	0.837759	0.083776
Ericsson	AIR 21 B2A B4P	118	120	2061	0.73319	0.073319	0.837759	0.083776
Ericsson	AIR 21 B4A B2P	118	120	2061	0.73319	0.073319	0.837759	0.083776
Ericsson	AIR 21 B2A B4P	118	270	2061	0.73319	0.073319	0.837759	0.083776
Ericsson	AIR 21 B4A B2P	118	270	2061	0.73319	0.073319	0.837759	0.083776

Verizon Wireless Preston/Town Hall Carrier Summary

Frequency: 850 MHz
Maximum Permissible Exposure (MPE): 566.67 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 1.73771 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.30665 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Antel	LPA-80080/4CF	138	0	1423	0.764812	0.134967	0.797145	0.140673
Antel	LPA-80080/4CF	138	0	1423	0.764812	0.134967	0.797145	0.140673
Antel	LPA-80080/4CF	138	120	1423	0.764812	0.134967	0.797145	0.140673
Antel	LPA-80080/4CF	138	120	1423	0.764812	0.134967	0.797145	0.140673
Antel	LPA-80080/4CF	138	240	1423	0.765787	0.135139	0.797145	0.140673
Antel	LPA-80080/4CF	138	240	1423	0.765787	0.135139	0.797145	0.140673

Verizon Wireless Preston/Town Hall Carrier Summary

Frequency: 2100 MHz
Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 2.45052 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.24505 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
ANDREW	SBNHH-1D65A	138	0	3453	1.397773	0.139777	2.412515	0.241252
ANDREW	SBNHH-1D65A	138	120	3453	1.397773	0.139777	2.412515	0.241252
ANDREW	SBNHH-1D65A	138	240	3453	1.431063	0.143106	2.412516	0.241252

Verizon Wireless Preston/Town Hall Carrier Summary

Frequency: 1900 MHz
Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 1.96462 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.19646 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
ANDREW	SBNHH-1D65A	138	0	3493	0.881879	0.088188	1.58129	0.158129
ANDREW	SBNHH-1D65A	138	120	3493	0.878126	0.087813	1.58129	0.158129
ANDREW	SBNHH-1D65A	138	240	3493	0.881879	0.088188	1.58129	0.158129

Verizon Wireless Preston/Town Hall Carrier Summary

Frequency: 751 MHz
Maximum Permissible Exposure (MPE): 500.67 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 1.17528 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.23474 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
ANDREW	SBNHH-1D65A	138	0	1074	0.830344	0.165848	1.118088	0.22332
ANDREW	SBNHH-1D65A	138	120	1074	0.805352	0.160856	1.118088	0.22332
ANDREW	SBNHH-1D65A	138	240	1074	0.830344	0.165848	1.118088	0.22332