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

April 28, 2017

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

RE: **Notice of Exempt Modification for T-Mobile / L700 Crown Site BU: 841288**
T-Mobile Site ID: CTFF334A
Located at: 205 Kaechele Place, Bridgeport, CT
06610 Latitude: 41° 13' 24.04" / Longitude: -73°
13' .38"

Dear Ms. Bachman,

T-Mobile/Metro PCS currently maintains three (3) antennas at the 120-foot level of the existing 150-foot monopole at 2 Kaechele Place, Bridgeport, CT. The tower is owned by Crown Castle. The property is owned by Southern New England Telephone Company. T-Mobile now intends to remove the existing equipment and replace it with nine (9) new antennas, three (3) TMAs, three (3) RRUs, twelve (12) coaxial cables, and two (2) hybrid cables at the same 120-foot level. They also propose to add one equipment cabinet to the ground.

This facility was approved by the Connecticut Siting Council, Docket Number 45 on September 14, 1984. This approval included the condition(s) that:

1. The tower shall be no taller than necessary to provide the proposed service, and in no event shall exceed 167';
2. A fence not lower than eight feet shall surround each tower and its associated equipment
3. The applicant or its successor shall notify the Council if and when directional antennas or any other equipment is added to any of these facilities;
4. The applicant or its successor shall permit, in accordance with representations made by it during the proceeding, public or private entities to share space on the facilities, for due consideration

received, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing;

5. Unless necessary to comply with condition number six, below, no lights shall be installed on any of these towers;
6. The facilities shall be constructed in accordance with all applicable federal, state, and municipal laws and regulations;
7. The applicant shall submit a development and management plan (D&M) for the Bridgeport site pursuant to sections 16-50j-85 through 16-50j-87 of the regulations of state agencies, except that irrelevant items in section 16-50j-86 need only be identified as such. The D&M plans shall include appropriate evergreen screening of the sites, erosion control measures, reseeding plans, and tree removal plans. The applicant shall comply with the reporting requirements of section 16-50j-87 for all sites;
8. Construction activities shall take place during daylight working hours;
9. This decision and order shall be void and the towers and associated equipment approved herein shall be dismantled and removed, or reapplication for any new use shall be made to the Connecticut Siting Council before any such new use it made, if the towers do not provide or permanently cease to provide cellular service following completion of construction.
10. This decision and order shall be void if all construction authorized is not completed within three years of the issuance of this decision.

This modification complies with the aforementioned condition(s).

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 Honorable Joseph P. Ganim, Mayor for the Town of Bridgeport, the Planning & Economic Department for the Town of Bridgeport, 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, T-Mobile 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 Cornwall.

Sincerely,

Amanda Cornwall
Real Estate Specialist
12 Gill Street, Suite 5800, Woburn, MA 01801
339-205-7017
Amanda.Cornwall@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: Joseph P. Ganim, Mayor
Town of Bridgeport

999 Broad Street
Bridgeport, CT 06604

Thomas F. Gill, Director of OPED
Office of Planning and Economic Development
999 Broad Street
Bridgeport, CT 06604

Crown Castle (Tower Owner)
12 Gill Street, Suite 5800
Woburn, Ma 01801

Southern New England Telephone (Property Owner)
One SBC Center 36-M-01
St. Louis, ME 63101

11171

CROWN CASTLE - ETA PROPERTY
3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277

32-61/1110

DATE 4/28/17

PAY TO THE ORDER OF Connecticut Siting Council $ 625.00/100

Six Hundred Twenty five 00/100 DOLLARS

Security Features Included Details on Back.

CHASE
JPMorgan Chase Bank, N.A.
www.Chase.com

VALID FOR 180 DAYS

FOR 841288-CTFF334A-416902

Linda Cornwall MP

⑈011171⑈ ⑆111000614⑆ 464638118⑈

DOCKET NO. 45

AN APPLICATION SUBMITTED BY THE SOUTHERN NEW ENGLAND TELEPHONE COMPANY FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED FOR THE CONSTRUCTION, MAINTENANCE, AND OPERATION OF FACILITIES TO PROVIDE CELLULAR SERVICE IN FAIRFIELD COUNTY.	:	CONNECTICUT SITING COUNCIL
	:	September 14, 1984

DECISION AND ORDER

Pursuant to the foregoing opinion, the Council hereby directs that a certificate of environmental compatibility and public need as required by section 16-50k of the General Statutes of Connecticut, revisions of 1958, revised to 1983, as amended, be issued to the Southern New England Telephone Company for the construction, operation, and maintenance of a telecommunications tower and associated equipment to provide cellular service at each of the following sites:

Kaechele Place, Bridgeport, Connecticut;
Connecticut Avenue, Norwalk, Connecticut;
Nells Rock Road, Shelton, Connecticut;
Newfield Avenue, Stamford, Connecticut; and
Bayberry Lane, (former Nike site), Westport, Connecticut.

The facilities shall be constructed, operated, and maintained as specified in the Council's record on this matter, and subject to the following conditions:

1. The towers shall be no taller than necessary to provide the proposed service, and in no event shall exceed

   a) 167' at the Bridgeport site,
   b) 167' at the Norwalk site,
   c) 189.5' at the Shelton site,
   d) 167' at the Stamford site,
   e) 117' at the Westport site;

2. A fence not lower than eight feet shall surround each tower and its associated equipment;

3. The applicant or its successor shall notify the Council if and when directional antennas or any other equipment is added to any of these facilities;

4. The applicant or its successor shall permit, in accordance with representations made by it during the proceeding, public or private entities to share space on the facilities, for due consideration received, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing;
5. Unless necessary to comply with condition number six, below, no lights shall be installed on any of these towers;
6. The facilities shall be constructed in accordance with all applicable federal, state, and municipal laws and regulations;
7. The applicant shall submit a development and management plan (D&M) for the Bridgeport, Stamford, and Westport sites pursuant to sections 16-50j-85 through 16-50j-87 of the regulations of state agencies, except that irrelevant items in section 16-50j-86 need only be identified as such. The D&M plans shall include appropriate evergreen screening of the sites, erosion control measures, reseeding plans, and tree removal plans. The applicant shall consult with the Stamford Environmental Protection Board in the preparation of a drainage and erosion control plan for the Stamford tower. The applicant shall comply with the reporting requirements of section 16-50j-87 for all sites;
8. Construction activities shall take place during daylight working hours;
9. This decision and order shall be void and the towers and associated equipment approved herein shall be dismantled and

removed, or reapplication for any new use shall be made to the Connecticut Siting Council before any such new use is made, if the towers do not provide or permanently cease to provide cellular service following completion of construction;

10. This decision and order shall be void if all construction authorized is not completed within three years of the issuance of this decision.

Pursuant to section 16-50p of the General Statutes, we hereby direct that a copy of the opinion and decision and order be served on each person listed below. A notice of the issuance shall be published in the Bridgeport Post, the Norwalk Hour, the Stamford Advocate, and the Shelton Suburban News, and the Westport News.

The parties to this proceeding are

The Southern New England Telephone Company Room 314 227 Church Street New Haven, Connecticut 06506	(Applicant)
Attention: Mr. Peter J. Tyrrell Senior Attorney	(its attorney)
Rolnick Observatory 52 Sawyer Road Fairfield, Connecticut	represented by: Frederick H. Bump Director
Mr. Adam Norton 40 Highland Road Westport, Connecticut 06880	
Representative John Wayne Fox 13 Apple Tree Drive Stamford, Connecticut 06906	(service waived)
Mr. George C. Lenfest 4 Highland Road Westport, Connecticut	

Mr. William Seiden
First Selectman
Town of Westport
110 Myrtle Avenue
P.O. Box 549
Westport, Connecticut 06881

Mr. Arthur L. Schimel
174 Bayberry Lane
Westport, Connecticut

Mr. Seymour Bendremer
11 Apache Trail
Westport, Connecticut

Ms. Gladys Floch
32 Woody Lane
Westport, Connecticut

Ms. Helen S. Cohen (service waived)
15 Highland Road
Westport, Connecticut

Mr. Jack Braverman
226 Bayberry Lane
Westport, Connecticut

Mr. Kevin Gavin (service waived)
191 Bayberry Lane
Westport, Connecticut

Mr. A.B. Beiser
12 Highland Road
Westport, Connecticut

Mr. Edward V. Polusky (service waived)
4 Hooper Road
Westport, Connecticut

Ms. Lois Schine represented by:

Mary D. Mix, Esquire
830 Post Road - East
Suite 100
Westport, Connecticut 06880

Mr. Allen Witt
3 Apache Trail
Westport, Connecticut

Ms. Gayle Shiller (service waived)
5 Apache Trail
Westport, Connecticut

Mrs. Ronnie Hammer
3 Hooper Road
Westport, Connecticut

Mr. Paul Rosenblatt (service waived)
7 Apache Trail
Westport, Connecticut

Mr. Henry J. Wolfson (service waived)
179 Bayberry Lane
Westport, Connecticut

Mr. Melvin H. Barr (service waived)
Planning Director
Town of Westport
110 Myrtle Avenue
P.O. Box 549
Westport, Connecticut 06881

Mr. Mark Infeld (service waived)
6 Apache Trail
Westport, Connecticut

Ms. Barbara Saipe (service waived)
Representative Town
Meeting Member
District #8
Town Hall
P.O. Box 549
Westport, Connecticut 06881

Ms. Peggy Goldenberg (service waived)
201 Bayberry Lane
Westport, Connecticut

Ms. Martha Hauhuth (service waived)
Board of Selectman
Town Hall
P.O. Box 549
Westport, Connecticut 06881

Ms. Meg Coffee
32 Otter Trail
Westport, Connecticut (service waived)

CERTIFICATION

The undersigned members of the Connecticut Siting Council hereby certify that they have heard this case or read the record thereof, and that we voted as follows:

Dated at New Britain, Connecticut, this 14th day of September, 1984.

Council Members	Vote Cast
Gloria Dibble Pond Chairperson	Yes
Commissioner John Downey Designee: Commissioner Peter G. Boucher	Absent
Commissioner Stanley Pac	Absent
Owen L. Clark	Yes
Fred J. Doocy	Yes
Mortimer A. Gelston	Yes
James G. Horsfall	Yes
Janet Sitty	Yes
Colin C. Tait	Absent

STATE OF CONNECTICUT)
: ss. New Britain, September 14, 1984
COUNTY OF HARTFORD)

I hereby certify that the foregoing is a true and correct copy of the decision and order issued by the Connecticut Siting Council, State of Connecticut.

ATTEST:

Christopher S. Wood

Christopher S. Wood, Executive Director
Connecticut Siting Council

205 KAECHELE PL

Location	205 KAECHELE PL	**Mblu**	81/ 2602/ 9/ /
Acct#	R--0148640	**Owner**	SOUTHERN NEW ENGLAND TEL
Assessment	$104,120	**Appraisal**	$148,730
PID	29859	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$51,340	$97,390	$148,730
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$35,950	$68,170	$104,120

Owner of Record

Owner	SOUTHERN NEW ENGLAND TEL	**Sale Price**	$0
Co-Owner	% SBC COMMUNICATIONS INC	**Certificate**	
Address	ONE SBC CENTER 36-M-01 ST LOUIS, MO 63101	**Book & Page**	0/ 0
		Sale Date	

Ownership History

Ownership History				
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Sale Date**
SOUTHERN NEW ENGLAND TEL	$0		0/ 0	

Building Information

Building 1 : Section 1

Year Built:	
Living Area:	0
Replacement Cost:	$0
Building Percent Good:	
Replacement Cost Less Depreciation:	$0

Building Attributes	
Field	**Description**

Style	Vacant Land
Model	
Grade:	
Stories:	
Occupancy:	
Exterior Wall 1:	
Exterior Wall 2:	
Roof Structure:	
Roof Cover:	
Interior Wall 1:	
Interior Wall 2:	
Interior Flr 1:	
Interior Flr 2	
Heat Fuel:	
Heat Type:	
AC Type:	
Total Bedrooms	
Total Full Baths	
Total Half Baths	
Total Xtra Fixtrs:	
Total Rooms	
Bath Style:	
Kitchen Style:	
Fireplaces	
Fin Bsmt Area	
Fin Bsmt Quality	
Bsmt Garages	
.	

Building Photo

(http://images.vgsi.com/photos/BridgeportCTPhotos//\00\03\05

Building Layout

Building Sub-Areas (sq ft)	Legend
No Data for Building Sub-Areas	

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code	499
Description	Utility Vac Ln
Zone	RA
Neighborhood	2080

Land Line Valuation

Size (Acres)	0.15
Frontage	0
Depth	0
Assessed Value	$68,170

Alt Land Appr Category No

Appraised Value $97,390

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
SHD3	Shed w/ Lt	CM	Comm	384 SF	$6,910	1
SHD3	Shed w/ Lt	CM	Comm	384 SF	$6,910	1
SHD3	Shed w/ Lt	CM	Comm	576 SF	$10,370	1
FN1	Fence, Chain	8	8 ft	350 LF	$3,150	1
TWR	Tower			120 LF	$24,000	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$51,340	$97,390	$148,730
2014	$51,340	$106,880	$158,220
2013	$51,340	$106,880	$158,220

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$35,950	$68,170	$104,120
2014	$35,950	$74,820	$110,770
2013	$35,950	$74,820	$110,770

Google Maps 205 Kaechele Pl

Imagery ©2017 Google, Map data ©2017 Google 50 ft

T-Mobile

T-MOBILE SITE NUMBER: CTFF334A
T-MOBILE SITE NAME: ----
SITE TYPE: MONOPOLE
TOWER HEIGHT: 151'-4"

CROWN CASTLE BU #: 841288
SITE ADDRESS: 205 KAECHELE PLACE BRIDGEPORT , CT 06606
COUNTY: FAIRFIELD
JURISDICTION: CITY OF BRIDGEPORT

T-MOBILE 2017 NSD

SITE INFORMATION

CROWN CASTLE SITE NAME:	BRIDGEPORT NORTH
SITE ADDRESS:	205 KAECHELE PLACE BRIDGEPORT , CT 06606
COUNTY:	FAIRFIELD
MAP/PARCEL #:	BRID-002602-000009
AREA OF CONSTRUCTION:	EXISTING
LATITUDE:	41° 13' 24.10"
LONGITUDE:	-73° 13' 0.35"
LAT/LONG TYPE:	NAD83
GROUND ELEVATION:	241.3 FT.
CURRENT ZONING:	R-A
JURISDICTION:	CITY OF BRIDGEPORT
OCCUPANCY CLASSIFICATION:	U
TYPE OF CONSTRUCTION:	VB
A.D.A. COMPLIANCE:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION
PROPERTY OWNER:	CCATT LLC 2000 CORPORATE DRIVE CANONSBURG, PA 15317
TOWER OWNER:	CCATT LLC 2000 CORPORATE DRIVE CANONSBURG, PA 15317
CARRIER/APPLICANT:	T-MOBILE 35 GRIFFIN ROAD, BLOOMFIELD, CT 06002
CROWN CASTLE APPLICATION ID:	374828
ELECTRIC PROVIDER:	N/A N/A
TELCO PROVIDER:	AT&T (866) 620-6900

PROJECT TEAM

CROWN CASTLE A&E FIRM:	CROWN CASTLE 2000 CORPORATE DRIVE CANONSBURG, PA 15317 CROWNAE.APPROVAL@CROWNCASTLE.COM
CROWN CASTLE CONTACTS:	1200 MACARTHUR BLVD, SUITE 200 MAHWAH, NJ 07430
	TRICIA PELON - PROJECT MANAGER (518) 373-3507
	JASON D'AMICO - CONSTRUCTION MANAGER (860) 209-0104
	WILLIAM STONE - A&E PROJECT MANAGER WILLIAM.STONE@CROWNCASTLE.COM (518) 373-3543

DRAWING INDEX

SHEET #	SHEET DESCRIPTION
T-1	TITLE SHEET
T-2	GENERAL NOTES
C-1	SITE PLAN
C-2	EXISTING & FINAL EQUIPMENT PLAN
C-3	FINAL ELEVATION AND ANTENNA PLANS
C-4	ANTENNA AND CABLE SCHEDULE
C-5	EQUIPMENT SPECIFICATIONS
C-6	EQUIPMENT SPECIFICATIONS
E-1	PANEL SCHEDULE & ONE-LINE DIAGRAM
G-1	EQUIPMENT & ANTENNA GROUNDING PLAN
G-2	GROUNDING DETAILS
G-3	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.

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

INSTALLER NOTE:

TOWER DOES NOT HAVE CLIMBING FACILITIES - MANLIFT REQUIRED FOR ELEVATED WORK.

REFERENCE DOCUMENTS:

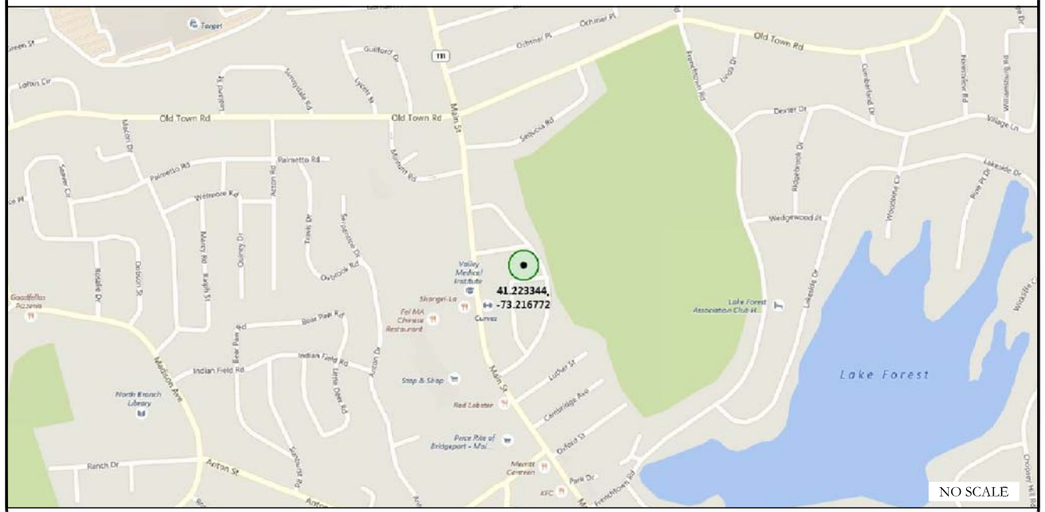
STRUCTURAL ANALYSIS: BY OTHERS

STRUCTURAL ANALYSIS: BY OTHERS

MOUNT ANALYSIS: BY OTHERS

NOTE:
PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE CROWN NOC AT (800) 788-7011 & CROWN CONSTRUCTION MANAGER

LOCATION MAP



APPROVALS

APPROVAL	SIGNATURE	DATE
PROPERTY OWNER OR REP.		
LAND USE PLANNER		
T-MOBILE		
OPERATIONS		
RF		
NETWORK		
BACKHAUL		
CONSTRUCTION MANAGER		

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.

PROJECT DESCRIPTION

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

TOWER SCOPE OF WORK:
- REMOVE ALL EQUIPMENT & FEEDLINES @ LEVEL 120'-0"
- INSTALL (9) ANTENNAS
- INSTALL (3) RRUs
- INSTALL (3) TMSs
- INSTALL (12) 1-5/8"COAX CABLES
- INSTALL (1) 1-5/8" HYBRID CABLE
- INSTALL (1) 1-1/2" HYBRID CABLE

GROUND SCOPE OF WORK:
- REMOVE ALL EQUIPMENT ON CONCRETE PAD
- INSTALL (1) AAV CABINET
- INSTALL (1) 6102 CABINET
- INSTALL (1) RAC24 CABINET
- POWER & TELCO TO BE RECOMMISSIONED

DESIGN PACKAGE BASED ON THE APPLICATION ID: 374828
REVISION: 2

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

T-Mobile
35 GRIFFIN ROAD,
BLOOMFIELD, CT 06002

CROWN CASTLE
1200 MACARTHUR BLVD, SUITE 200
MAHWAH, NJ 07430

T-MOBILE SITE NUMBER:
CTFF334A

BU #: **841288**
BRIDGEPORT NORTH

205 KAECHELE PLACE
BRIDGEPORT , CT 06606

EXISTING 151'-4" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	2/27/17	ZTK	PRELIMINARY	LR
0	3/7/17	ZTK	CONSTRUCTION	LR
1	4/4/17	ZTK	CONSTRUCTION	LR
2	4/7/17	ZTK	CONSTRUCTION	LR
3	4/19/17	ZTK	CONSTRUCTION	LR
4	4/21/17	ZTK	CONSTRUCTION	LR

DocuSigned by:
BAD8068D3024F2...

STATE OF CONNECTICUT
ANDREW JOSEPH FANDOZZI III
No. 30515
LICENSED PROFESSIONAL ENGINEER

4/26/2017 | 12:38:56 PM EDT

Andrew Joseph Fandozzi III, P.E.
Professional Engineer License: #30515
Crown Castle USA, Inc. Certificate of Registration #PEC.0001101

SHEET NUMBER: T-1
REVISION: 4

SITE WORK GENERAL NOTES:

1. THE SUBCONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
2. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE SUBCONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES, SUBCONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION.
3. ALL SITE WORK TO COMPLY WITH QAS-STD-10068 "INSTALLATION STANDARDS FOR CONSTRUCTION ACTIVITIES ON CROWN CASTLE TOWER SITE" AND LATEST VERSION OF TIA 1019 "STANDARD FOR INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS."
4. ALL SITE WORK SHALL BE AS INDICATED ON THE STAMPED CONSTRUCTION DRAWINGS AND PROJECT SPECIFICATIONS.
5. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
6. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF CONTRACTOR, OWNER AND/OR LOCAL UTILITIES.
7. THE SUBCONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE.
8. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE BTS EQUIPMENT AND TOWER AREAS.
9. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.
10. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
11. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION AS SPECIFIED ON THE PROJECT SPECIFICATIONS.
12. SUBCONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
13. NOTICE TO PROCEED– NO WORK TO COMMENCE PRIOR TO COMPANY'S WRITTEN NOTICE TO PROCEED AND THE ISSUANCE OF A PURCHASE ORDER.
14. 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/TIA 1019 (LATEST EDITION), OSHA, AND GENERAL INDUSTRY STANDARDS. ALL RIGGING PLANS SHALL ADHERE TO ANSI/TIA-1019 (LATEST EDITION) INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION.

STRUCTURAL STEEL NOTES:

1. ALL STEEL WORK SHALL BE PAINTED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS AND IN ACCORDANCE WITH ASTM A36 UNLESS OTHERWISE NOTED.
2. BOLTED CONNECTIONS SHALL BE ASTM A325 BEARING TYPE (3/4"ø) CONNECTIONS AND SHALL HAVE MINIMUM OF TWO BOLTS UNLESS NOTED OTHERWISE.
3. NON-STRUCTURAL CONNECTIONS FOR STEEL GRATING MAY USE 5/8"ø ASTM A307 BOLTS UNLESS NOTED OTHERWISE.
4. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS.

CONCRETE AND REINFORCING STEEL NOTES:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST-IN-PLACE CONCRETE.
2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE. SLAB FOUNDATION DESIGN ASSUMING ALLOWABLE SOIL BEARING PRESSURE OF 2000 PSF.
3. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60, DEFORMED UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185 WELDED STEEL WIRE FABRIC UNLESS NOTED OTHERWISE. SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD, UNO.
4. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:

   CONCRETE CAST AGAINST EARTH..................3 IN.
   CONCRETE EXPOSED TO EARTH OR WEATHER:
   #6 AND LARGER..................................2 IN.
   #5 AND SMALLER & WWF...................1 1/2 IN.
   CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:
   SLAB AND WALLS................................3/4 IN.
   BEAMS AND COLUMNS........................1 1/2 IN.
5. A CHAMFER 3/4" SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNLESS NOTED OTHERWISE. IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

MASONRY NOTES:

1. HOLLOW CONCRETE MASONRY UNITS SHALL MEET A.S.T.M. SPECIFICATION C90, GRADE N. TYPE 1. THE SPECIFIED DESIGN COMPRESSIVE STRENGTH OF CONCRETE MASONRY (F'm) SHALL BE 1500 PSI.
2. MORTAR SHALL MEET THE PROPERTY SPECIFICATION OF A.S.T.M. C270 TYP. "S" MORTAR AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2000 PSI.
3. GROUT SHALL MEET A.S.T.M. SPECIFICATION C475 AND HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 2000 PSI.
4. CONCRETE MASONRY SHALL BE LAID IN RUNNING (COMMON) BOND.
5. WALL SHALL RECEIVE TEMPORARY BRACING. TEMPORARY BRACING SHALL NOT BE REMOVED UNTIL GROUT IS FULLY CURED.

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   CONTRACTOR– __________
   SUBCONTRACTOR– GENERAL CONTRACTOR (CONSTRUCTION)
   CARRIER– T-MOBILE
   TOWER OWNER– CROWN CASTLE
   OEM– ORIGINAL EQUIPMENT MANUFACTURER
2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR AND CROWN CASTLE.
3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
4. DRAWINGS PROVIDED HERE ARE NOT TO SCALE AND ARE INTENDED TO SHOW OUTLINE ONLY.
5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
6. "KITTING LIST" SUPPLIED WITH THE BID PACKAGE IDENTIFIES ITEMS THAT WILL BE SUPPLIED BY CONTRACTOR. ITEMS NOT INCLUDED IN THE BILL OF MATERIALS AND KITTING LIST SHALL BE SUPPLIED BY THE SUBCONTRACTOR.
7. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
8. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CONTRACTOR AND CROWN CASTLE PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
9. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWINGS.
10. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
11. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.

ABBREVIATIONS AND SYMBOLS:

ABBREVIATIONS:

AGL	ABOVE GRADE LEVEL
BTS	BASE TRANSCEIVER STATION
(E)	EXISTING
MIN.	MINIMUM
REF	REFERENCE
RF	RADIO FREQUENCY
T.B.D.	TO BE DETERMINED
T.B.R.	TO BE RESOLVED
TYP	TYPICAL
REQ	REQUIRED
EGR	EQUIPMENT GROUND RING
AWG	AMERICAN WIRE GAUGE
MGB	MASTER GROUND BAR
EG	EQUIPMENT GROUND
BCW	BARE COPPER WIRE
SIAD	SMART INTEGRATED ACCESS DEVICE
GEN	GENERATOR
IGR	INTERIOR GROUND RING (HALO)
RBS	RADIO BASE STATION

SYMBOLS:

S/G	SOLID GROUND BUS BAR
S/N	SOLID NEUTRAL BUS BAR
	SUPPLEMENTAL GROUND CONDUCTOR
	2-POLE THERMAL-MAGNETIC CIRCUIT BREAKER
	SINGLE-POLE THERMAL-MAGNETIC CIRCUIT BREAKER
	CHEMICAL GROUND ROD
	TEST WELL
	DISCONNECT SWITCH
M	METER
■	EXOTHERMIC WELD (CADWELD) (UNLESS OTHERWISE NOTED)
●	MECHANICAL CONNECTION
——	GROUNDING WIRE

ELECTRICAL INSTALLATION NOTES:

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES/ORDINANCES.
2. CONDUIT ROUTINGS ARE SCHEMATIC. SUBCONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED AND TRIP HAZARDS ARE ELIMINATED.
3. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC. HILTI EPOXY ANCHORS ARE REQUIRED BY CROWN CASTLE.
4. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC.
5. CABLES SHALL NOT BE ROUTED THROUGH LADDER-STYLE CABLE TRAY RUNGS.
6. EACH END OF EVERY POWER, POWER PHASE CONDUCTOR (I.E., HOTS), GROUNDING AND T1 CONDUCTOR AND CABLE SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2" PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA.
7. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH PLASTIC TAPE PER COLOR SCHEDULE. ALL EQUIPMENT SHALL BE LABELED WITH THEIR VOLTAGE RATING, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING AND BRANCH CIRCUIT ID NUMBERS (I.E. PANEL BOARD AND CIRCUIT ID'S).
8. PANEL BOARDS (ID NUMBERS) AND INTERNAL CIRCUIT BREAKERS (CIRCUIT ID NUMBERS) SHALL BE CLEARLY LABELED WITH PLASTIC LABELS.
9. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.
10. POWER, CONTROL AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE CONDUCTOR (#14 AWG OR LARGER), 600 V, OIL RESISTANT THHN OR THWN-2, CLASS B STRANDED COPPER CABLE RATED FOR 90° C (WET & DRY) OPERATION LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED UNLESS OTHERWISE SPECIFIED.
11. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE CONDUCTOR (#6 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN-2 GREEN INSULATION CLASS B STRANDED COPPER CABLE RATED FOR 90° C (WET AND DRY) OPERATION LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED UNLESS OTHERWISE SPECIFIED.
12. POWER AND CONTROL WIRING, NOT IN TUBING OR CONDUIT, SHALL BE MULTI-CONDUCTOR, TYPE TC CABLE (#14 AWG OR LARGER), 600 V, OIL RESISTANT THHN OR THWN-2, CLASS B STRANDED COPPER CABLE RATED FOR 90° C (WET AND DRY) OPERATION WITH OUTER JACKET LISTED OR LABELED FOR THE LOCATION USED UNLESS OTHERWISE SPECIFIED.
13. ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP-STYLE, COMPRESSION WIRE LUGS AND WIRE NUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRE NUTS SHALL BE RATED FOR OPERATION AT NO LESS THAN 75° C (90° C IF AVAILABLE).
14. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.
15. ELECTRICAL METALLIC TUBING (EMT) OR RIGID NONMETALLIC CONDUIT (I.E. RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80 FOR LOCATIONS SUBJECT TO PHYSICAL DAMAGE) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.
16. ELECTRICAL METALLIC TUBING (EMT), ELECTRICAL NONMETALLIC TUBING (ENT) OR RIGID NONMETALLIC CONDUIT (RIGID PVC, SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
17. SCHEDULE 40 PVC UNDERGROUND ON STRAIGHTS AND SCHEDULE 80 PVC FOR ALL ELBOWS/90s AND ALL APPROVED ABOVE GRADE PVC CONDUIT.
18. LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID-TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
19. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION-TYPE AND APPROVED FOR THE LOCATION USED. SET SCREW FITTINGS ARE NOT ACCEPTABLE.
20. CABINETS, BOXES AND WIRE WAYS SHALL BE LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.
21. WIREWAYS SHALL BE EPOXY-COATED (GRAY) AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARDS; SHALL BE PANDUIT TYPE E (OR EQUAL); AND RATED NEMA 1 (OR BETTER).
22. 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 FLUSH TO FINISH GRADE TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHIN ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.
23. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES AND PULL BOXES SHALL BE GALVANIZED OR EPOXY-COATED SHEET STEEL; SHALL MEET OR EXCEED UL 50 AND RATED NEMA 1 (OR BETTER) INDOORS OR NEMA 3R (OR BETTER) OUTDOORS.
24. METAL RECEPTACLE, SWITCH AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY-COATED OR NON-CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1; AND RATED NEMA 1 (OR BETTER) INDOORS OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.
25. NONMETALLIC RECEPTACLE, SWITCH AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2; AND RATED NEMA 1 (OR BETTER) INDOORS OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.
26. THE SUBCONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CONTRACTOR BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
27. THE SUBCONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD LIFE AND PROPERTY.
28. INSTALL PLASTIC LABEL ON THE METER CENTER TO SHOW "T-MOBILE".
29. ALL CONDUITS THAT ARE INSTALLED ARE TO HAVE A METERED MULE TAPE PULL CORD INSTALLED.

GREENFIELD GROUNDING NOTES:

1. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION AND AC POWER GES'S) SHALL BE BONDED TOGETHER AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
2. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.
3. THE SUBCONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT AND PROVIDE TESTING RESULTS.
4. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 AWG COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
5. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
6. EACH CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS; #2 AWG SOLID TINNED COPPER FOR OUTDOOR BTS.
7. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED BACK TO BACK CONNECTIONS ON OPPOSITE SIDE OF THE GROUND BUS ARE PERMITTED.
8. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING SHALL BE #2 AWG SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED.
11. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
12. ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR AND EXTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS.
13. COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.
14. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR.
15. APPROVED ANTIOXIDANT COATINGS (I.E. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
16. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
17. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
18. BOND ALL METALLIC OBJECTS WITHIN 6 FT. OF MAIN GROUND WIRES WITH 1-#2 AWG TIN-PLATED COPPER GROUND CONDUCTOR.
19. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS, WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G., NONMETALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.
20. ALL GROUNDS THAT TRANSITION FROM BELOW GRADE TO ABOVE GRADE MUST BE #2 TINNED SOLID IN 3/4" LIQUID TIGHT CONDUIT FROM 24" BELOW GRADE TO WITHIN 3" TO 6" OF CAD-WELD TERMINATION POINT. THE EXPOSED END OF THE LIQUID TIGHT CONDUIT MUST BE SEALED WITH SILICONE CAULK. (ADD TRANSITIONING GROUND STANDARD DETAIL AS WELL).

NEC INSULATOR COLOR CODE

DESCRIPTION	PHASE/CODE LETTER	WIRE COLOR
240/120 1ø	LEG 1	BLACK
	LEG 2	RED
AC NEUTRAL	N	WHITE
GROUND (EGC)	G	GREEN
VDC POS	+	*RED-POLARITY MARK AT TERMINATION
VDC NEG	–	*BLACK-POLARITY MARK AT TERMINATION
240V OR 208V, 3ø	PHASE A	BLACK
	PHASE B	RED(ORG. IF HI LEG)
	PHASE C	BLUE
480V, 3ø	PHASE A	BROWN
	PHASE B	ORANGE
	PHASE C	YELLOW

* SEE NEC 210.5(C)(1) AND (2)

T-Mobile
35 GRIFFIN ROAD,
BLOOMFIELD, CT 06002

CROWN CASTLE
1200 MACARTHUR BLVD, SUITE 200
MAHWAH, NJ 07430

T-MOBILE SITE NUMBER:
CTFF334A

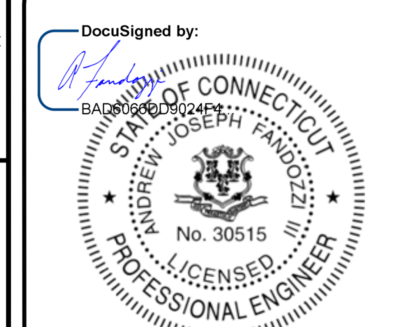
BU #: **841288**
BRIDGEPORT NORTH

205 KAECHELE PLACE
BRIDGEPORT , CT 06606

EXISTING 151'-4" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	2/27/17	ZTK	PRELIMINARY	LR
0	3/7/17	ZTK	CONSTRUCTION	LR
1	4/4/17	ZTK	CONSTRUCTION	LR
2	4/7/17	ZTK	CONSTRUCTION	LR
3	4/19/17	ZTK	CONSTRUCTION	LR
4	4/21/17	ZTK	CONSTRUCTION	LR

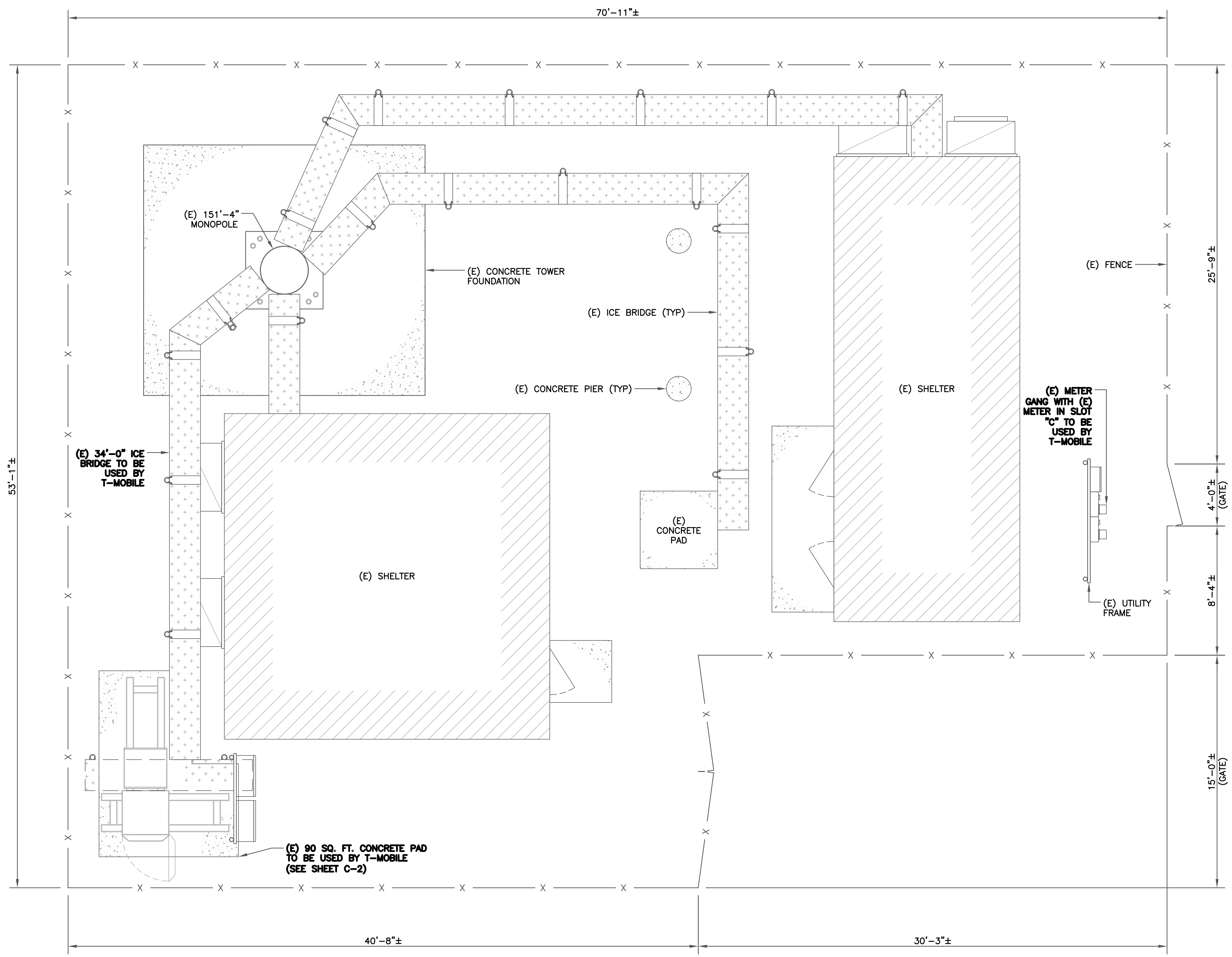


4/26/2017 | 12:38:56 PM EDT

Andrew Joseph Fandozzi III, P.E.
Professional Engineer License: #30515
Crown Castle USA, Inc. Certificate of 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-2**
REVISION: **4**



1 SITE PLAN
SCALE: 4' 3' 2' 1' 0 4' — 1/4"=1'-0" (FULL SIZE) 1/8"=1'-0" (11x17)

N

T-Mobile
35 GRIFFIN ROAD,
BLOOMFIELD, CT 06002

CROWN CASTLE
1200 MACARTHUR BLVD, SUITE 200
MAHWAH, NJ 07430

T-MOBILE SITE NUMBER:
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4	4/21/17	ZTK	CONSTRUCTION	LR

DocuSigned by:
BAD6068DD9024F4...

STATE OF CONNECTICUT
ANDREW JOSEPH FANDOZZI III
No. 30515
LICENSED
PROFESSIONAL ENGINEER

4/26/2017 | 12:38:56 PM EDT

Andrew Joseph Fandozzi III, P.E.
Professional Engineer License: #30515
Crown Castle USA, Inc. Certificate of Registration
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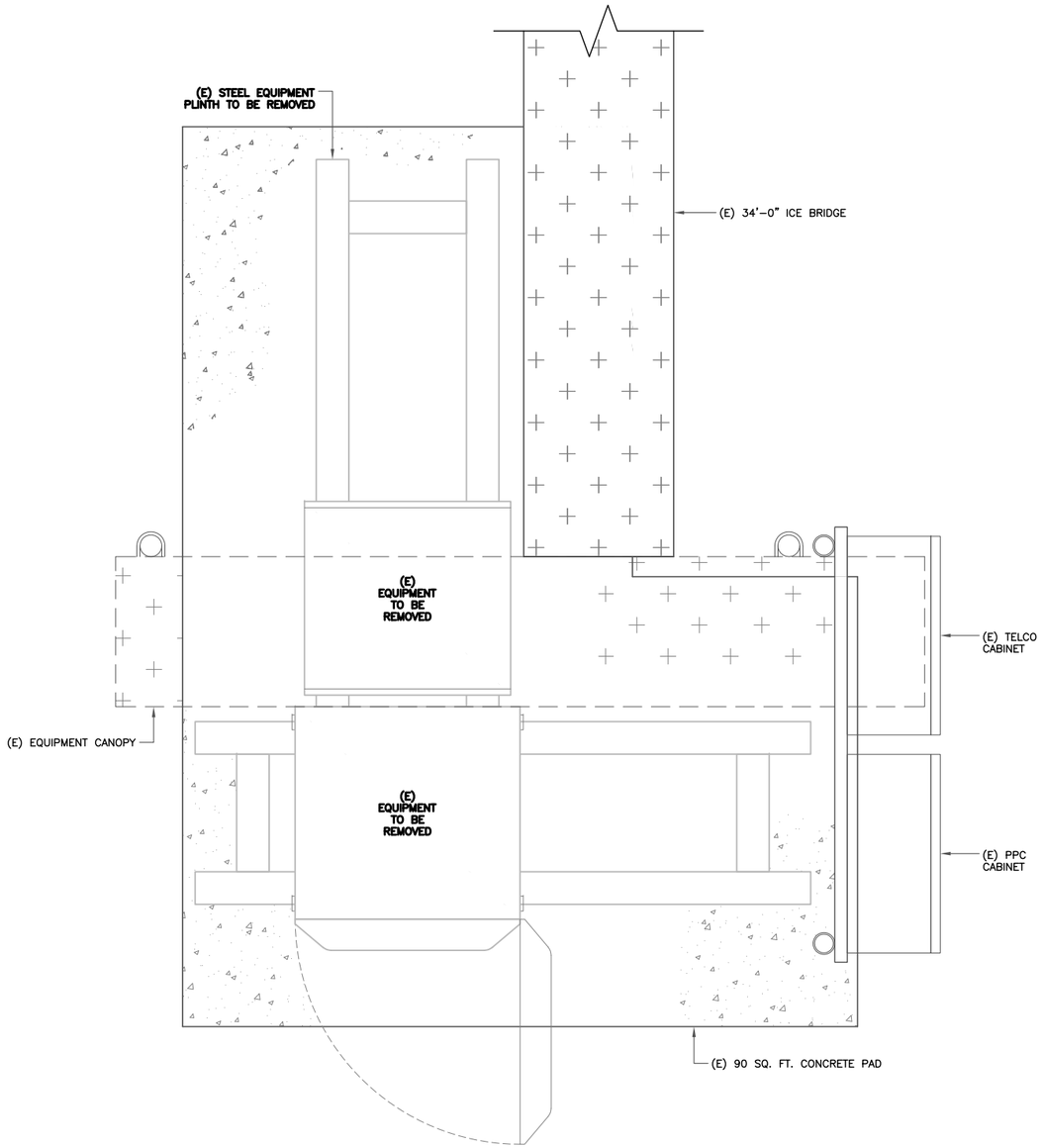
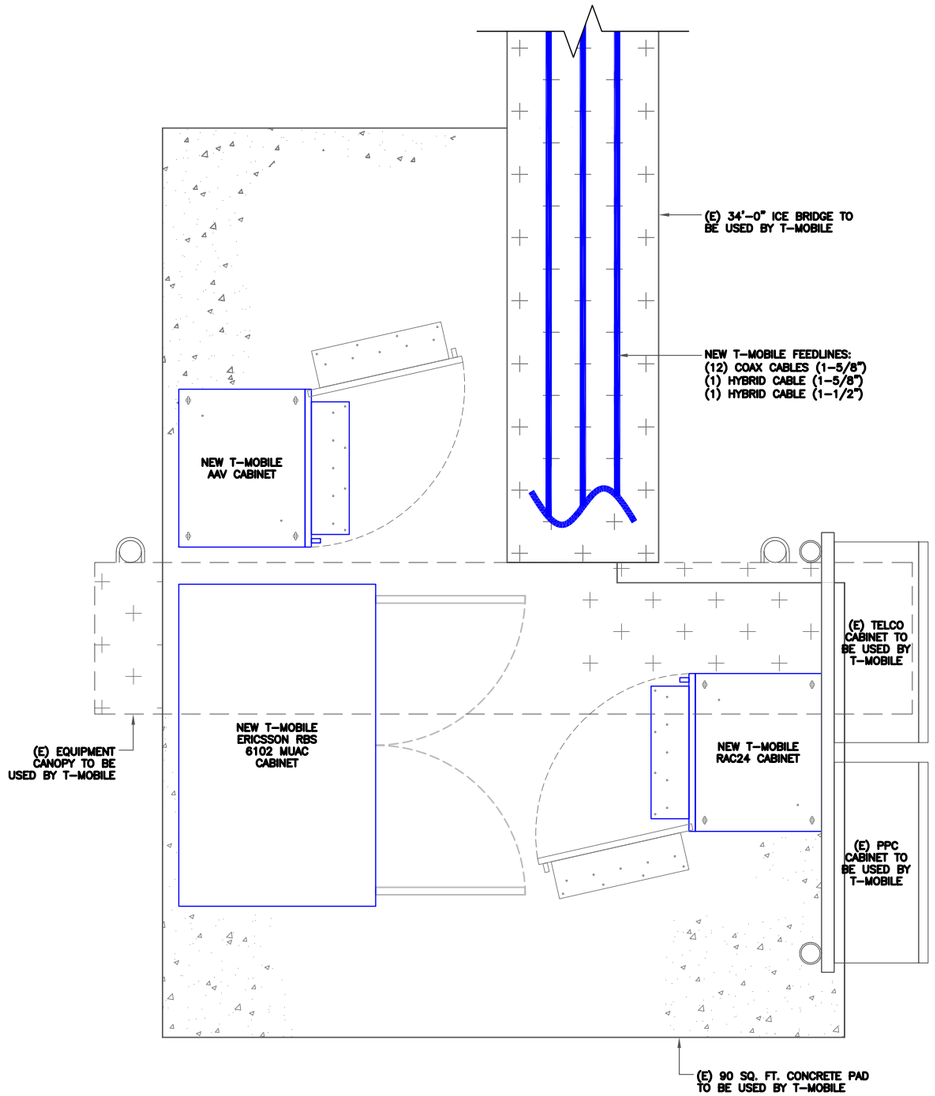
SHEET NUMBER: C-1
REVISION: 4



1 EXISTING EQUIPMENT PLAN
SCALE: 1'=1'-0" (FULL SIZE) 1/2"=1'-0" (11x17)

N



2 FINAL EQUIPMENT PLAN
SCALE: 1'=1'-0" (FULL SIZE) 1/2"=1'-0" (11x17)

N

T-Mobile
35 GRIFFIN ROAD,
BLOOMFIELD, CT 06002

CROWN CASTLE
1200 MACARTHUR BLVD, SUITE 200
MAHWAH, NJ 07430

T-MOBILE SITE NUMBER:
CTFF334A

BU #: **841288**
BRIDGEPORT NORTH

205 KAECHELE PLACE
BRIDGEPORT , CT 06606

EXISTING 151'-4" MONOPOLE

ISSUED FOR:

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3	4/19/17	ZTK	CONSTRUCTION	LR
4	4/21/17	ZTK	CONSTRUCTION	LR

DocuSigned by:
BAD5085D9024E2...

STATE OF CONNECTICUT
ANDREW JOSEPH FANDOZZI, III
No. 30515
LICENSED
PROFESSIONAL ENGINEER

4/26/2017 | 12:38:56 PM EDT

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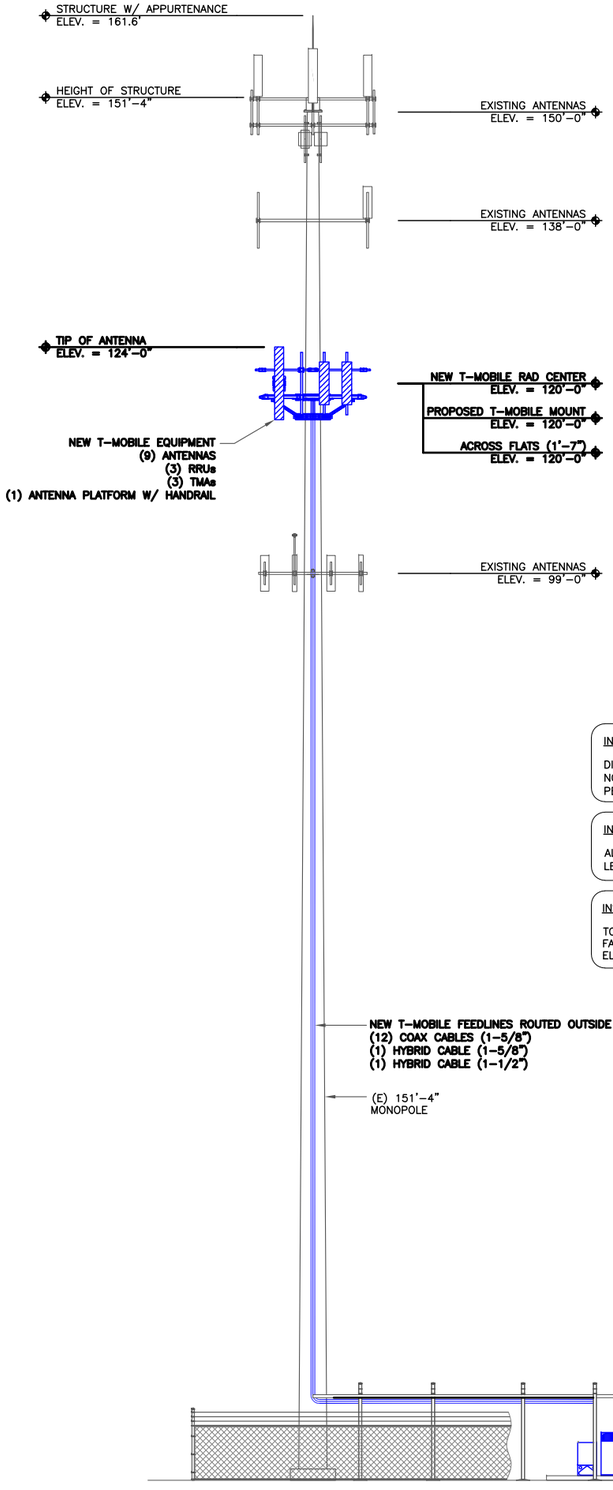
Crown Castle USA, Inc. Certificate of Registration #PEC.0001101

SHEET NUMBER: C-2

REVISION: 4



T-MOBILE EQUIPMENT

ANTENNA CL: 120'-0"
MOUNT CL: 120'-0"

INSTALLER NOTE:

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

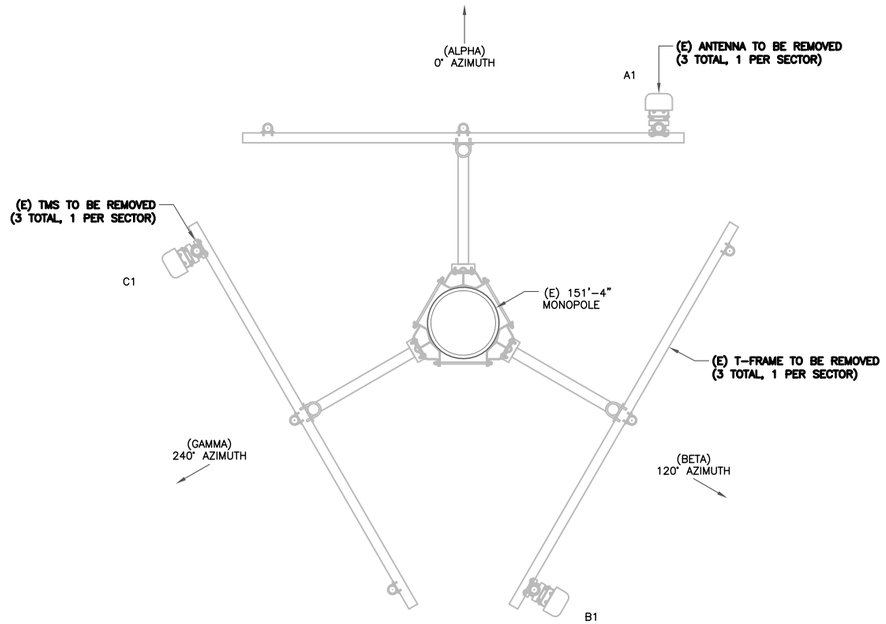
INSTALLER NOTE:

ALL EXISTING EQUIPMENT & FEEDLINES AT LEVEL 120'-0" TO BE REMOVED.

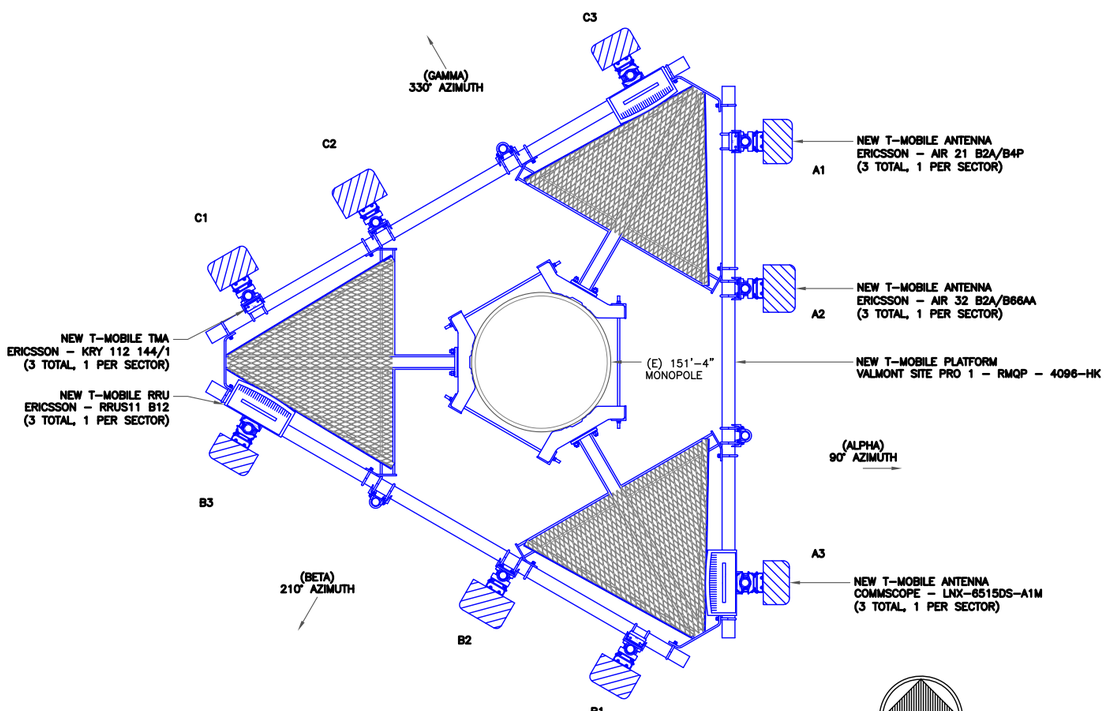
INSTALLER NOTE:

TOWER DOES NOT HAVE CLIMBING FACILITIES – MANLIFT REQUIRED FOR ELEVATED WORK.

1 FINAL ELEVATION
SCALE: NOT TO SCALE



2 EXISTING ANTENNA LAYOUT
SCALE: NOT TO SCALE



3 FINAL ANTENNA LAYOUT
SCALE: NOT TO SCALE

T-Mobile
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1200 MACARTHUR BLVD, SUITE 200
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EXISTING 151'-4" MONOPOLE

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1	4/4/17	ZTK	CONSTRUCTION	LR
2	4/7/17	ZTK	CONSTRUCTION	LR
3	4/19/17	ZTK	CONSTRUCTION	LR
4	4/21/17	ZTK	CONSTRUCTION	LR

DocuSigned by:
BAD5066D9024F2...

STATE OF CONNECTICUT
ANDREW JOSEPH FANDOZZI III
No. 30515
LICENSED PROFESSIONAL ENGINEER

4/26/2017 | 12:38:56 PM EDT

Andrew Joseph Fandozzi III, P.E.
Professional Engineer License: #30515
Crown Castle USA, Inc. Certificate of Registration #PEC.0001101

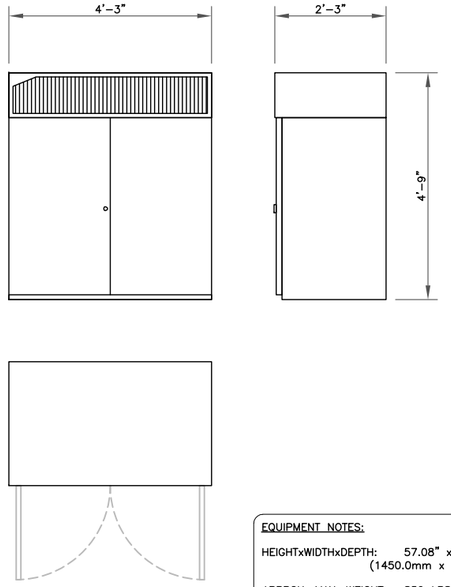
SHEET NUMBER: C-3

REVISION: 4

ANTENNA SCHEDULE									
SECTOR	POS.	TECHNOLOGY	RAD CENTER	AZIMUTH	ANTENNA MANUFACTURER	ANTENNA MODEL	MECH. TILT	ELECT. TILT	TOWER MOUNTED EQUIPMENT	FEEDLINE TYPE
ALPHA	A1	LTE	120'-0"	90°	ERICSSON	AIR 21 B2A/B4P	–	–	(1) ERICSSON – KRY 112 144/1	COAX
ALPHA	A2	LTE	120'-0"	90°	ERICSSON	AIR 32 B2A/B66AA	–	–	–	(2) HYBRID
ALPHA	A3	LTE 700	120'-0"	90°	COMMSCOPE	LNX-6515DS-A1M	–	–	(1) ERICSSON – RRUS11 B12	COAX
BETA	B1	LTE	120'-0"	210°	ERICSSON	AIR 21 B2A/B4P	–	–	(1) ERICSSON – KRY 112 144/1	COAX
BETA	B2	LTE	120'-0"	210°	ERICSSON	AIR 32 B2A/B66AA	–	–	–	(2) HYBRID
BETA	B3	LTE 700	120'-0"	210°	COMMSCOPE	LNX-6515DS-A1M	–	–	(1) ERICSSON – RRUS11 B12	COAX
GAMMA	C1	LTE	120'-0"	330°	ERICSSON	AIR 21 B2A/B4P	–	–	(1) ERICSSON – KRY 112 144/1	COAX
GAMMA	C2	LTE	120'-0"	330°	ERICSSON	AIR 32 B2A/B66AA	–	–	–	(2) HYBRID
GAMMA	C3	LTE 700	120'-0"	330°	COMMSCOPE	LNX-6515DS-A1M	–	–	(1) ERICSSON – RRUS11 B12	COAX

CABLE SCHEDULE			
STATUS	CABLE TYPE	SIZE	QUANTITY
NEW	COAX	1-5/8"	12
NEW	HYBRID	1-5/8"	1
NEW	HYBRID	1-1/2"	1
–	–	–	–
FINAL CABLE QUANTITY			14

1 ANTENNA AND CABLE SCHEDULE
SCALE: NOT TO SCALE

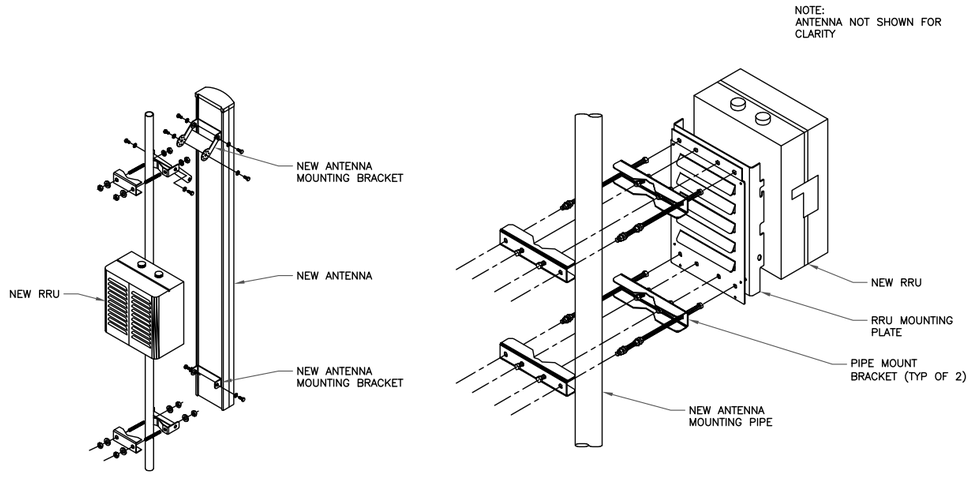


EQUIPMENT NOTES:

HEIGHTxWIDTHxDEPTH: 57.08" x 51.00" x 27.55" (1450.0mm x 1300.0mm x 700.0mm)

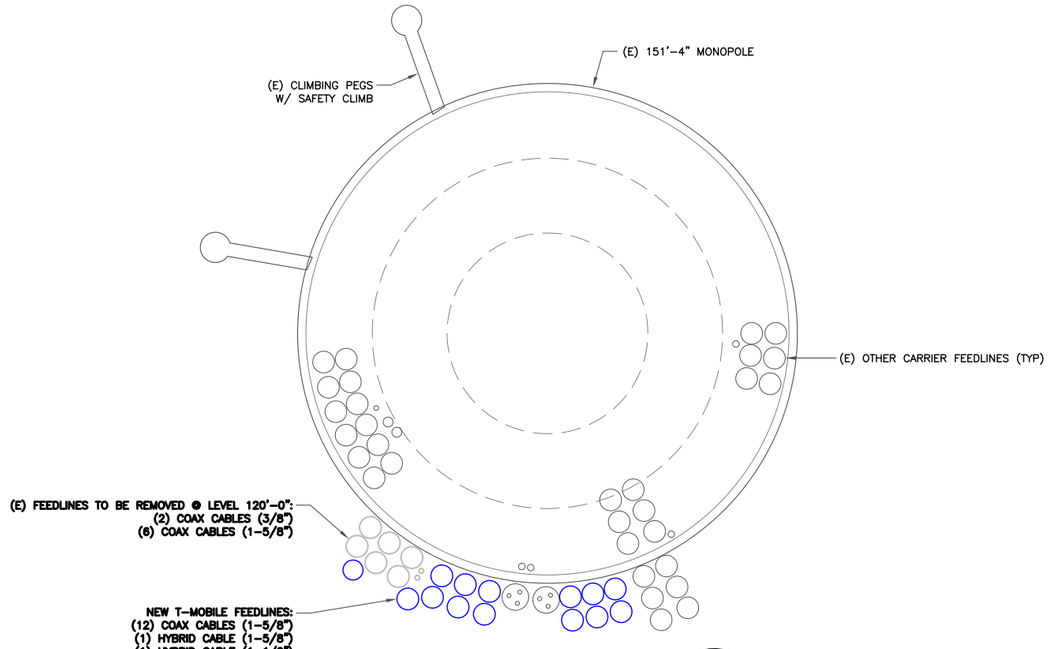
APPROX. MAX. WEIGHT: 859 LBS (390 kg)

2 ERICSSON – RBS 6102
SCALE: NOT TO SCALE



NOTE:
ALL PIPES BRACKETS AND MISCELLANEOUS HARDWARE TO BE GALVANIZED UNLESS NOTED OTHERWISE

3 ANTENNA & RRU MOUNTING DETAIL
SCALE: NOT TO SCALE



4 CABLE ROUTING DETAIL
SCALE: NOT TO SCALE

T-Mobile
35 GRIFFIN ROAD,
BLOOMFIELD, CT 06002

CROWN CASTLE
1200 MACARTHUR BLVD, SUITE 200
MAHWAH, NJ 07430

T-MOBILE SITE NUMBER:
CTFF334A

BU #: **841288**
BRIDGEPORT NORTH

205 KAECHELE PLACE
BRIDGEPORT , CT 06606

EXISTING 151'-4" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
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1	4/4/17	ZTK	CONSTRUCTION	LR
2	4/7/17	ZTK	CONSTRUCTION	LR
3	4/19/17	ZTK	CONSTRUCTION	LR
4	4/21/17	ZTK	CONSTRUCTION	LR

DocuSigned by:
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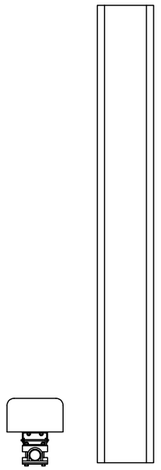
STATE OF CONNECTICUT
ANDREW JOSEPH FANDOZZI III
No. 30515
LICENSED PROFESSIONAL ENGINEER

4/26/2017 | 12:38:56 PM EDT

Andrew Joseph Fandozzi III, P.E.
Professional Engineer License: #30515
Crown Castle USA, Inc. Certificate of Registration #PEC.0001101

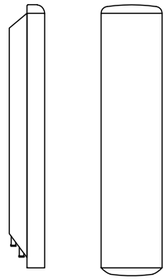
SHEET NUMBER: C-4

REVISION: 4



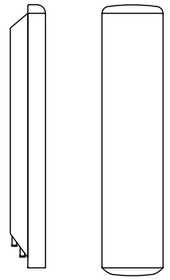
COMMSCOPE – LNX-6515DS-A1M
WEIGHT (WITHOUT MOUNTING HARDWARE): 43.7 LBS
SIZE (HxWxD): 96.60x11.90x7.10 IN.
MOUNTING HARDWARE P/N: DB380-3 & DB5083D
RATED WIND VELOCITY: 149.8 MPH

1 COMMSCOPE – LNX-6515DS-A1M
SCALE: NOT TO SCALE



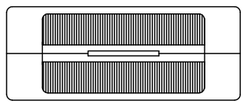
ERICSSON – AIR 21 B2A/B4P
WEIGHT (WITHOUT MOUNTING HARDWARE): 91.5 LBS
SIZE (HxWxD): 56.0x12.1x7.87 IN.

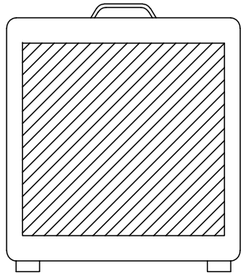
2 ERICSSON – AIR 21 B2A/B4P
SCALE: NOT TO SCALE



ERICSSON – AIR 32 B2A/B66AA
WEIGHT (WITHOUT MOUNTING HARDWARE): 132.2 LBS
SIZE (HxWxD): 56.6x12.9x8.7 IN.
RATED WIND VELOCITY: 150.0 MPH

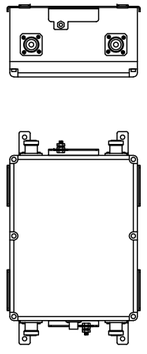
3 ERICSSON – AIR 32 B2A/B66AA
SCALE: NOT TO SCALE





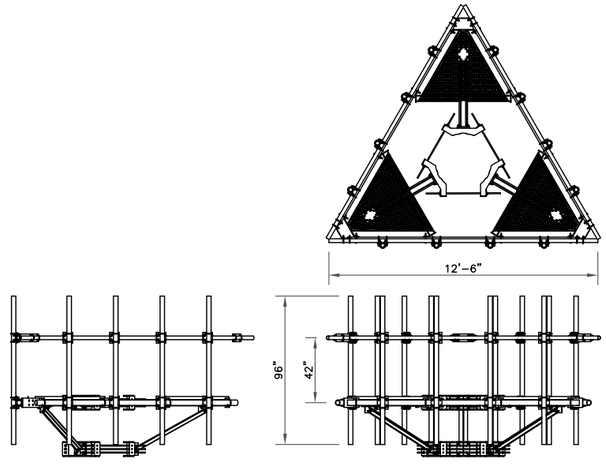
ERICSSON – RRUS 11 B12
WEIGHT (FULLY EQUIPPED): 50.7 LBS
SIZE (HxWxD): 19.7x17x7.2 IN.
OUTPUT POWER: 2x30W
TYPICAL POWER CONSUMPTION: 022kW
HIGH LOAD POWER CONSUMPTION: 0.38kW

4 ERICSSON – RRUS 11 B12
SCALE: NOT TO SCALE



ERICSSON – KRY 112 144/1
WEIGHT: 11.0 LBS
SIZE (HxWxD): 7.0x6.0x3.0 IN.

5 ERICSSON – KRY 112 144/1
SCALE: NOT TO SCALE



6 VALMONT SITE PRO 1 – RMQP – 4096-HK
SCALE: NOT TO SCALE

T-Mobile
35 GRIFFIN ROAD,
BLOOMFIELD, CT 06002

CROWN CASTLE
1200 MACARTHUR BLVD, SUITE 200
MAHWAH, NJ 07430

T-MOBILE SITE NUMBER:
CTFF334A

BU #: **841288**
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BRIDGEPORT , CT 06606

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2	4/7/17	ZTK	CONSTRUCTION	LR
3	4/19/17	ZTK	CONSTRUCTION	LR
4	4/21/17	ZTK	CONSTRUCTION	LR

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STATE OF CONNECTICUT
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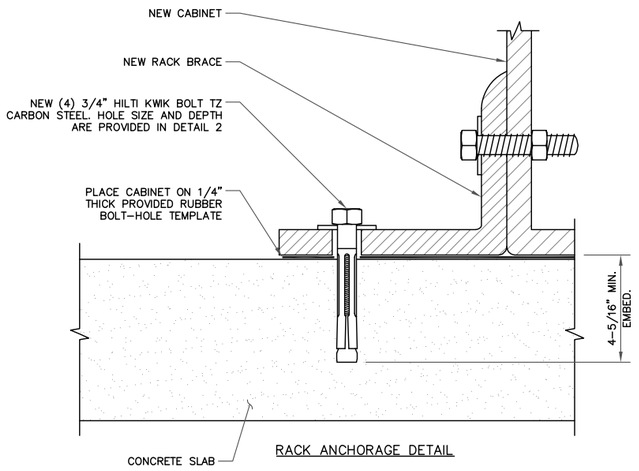
No. 30515
LICENSED
PROFESSIONAL ENGINEER

4/26/2017 | 12:38:56 PM EDT

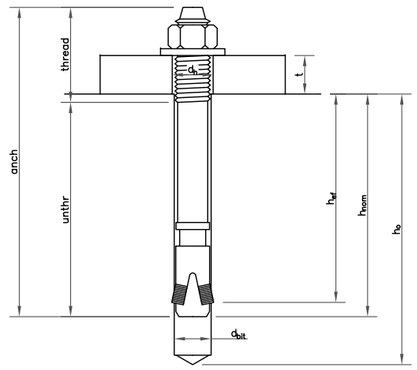
Andrew Joseph Fandozzi III, P.E.
Professional Engineer License: #30515
Crown Castle USA, Inc. Certificate of Registration #PEC.0001101

SHEET NUMBER: C-5

REVISION: 4



1 CABINET ANCHOR DETAIL
SCALE: NOT TO SCALE



Mechanical Anchoring Systems

KWIK Bolt TZ Expansion Anchor 3.3.5

Table 1 - KWIK Bolt TZ specifications

Setting information	Symbol	Units	Nominal anchor diameter d_a											
			3/8			1/2			5/8			3/4		
Nominal bit diameter	d_{bit}	in.	3/8			1/2			5/8			3/4		
Minimum nominal embedment	h_{nom}	in. (mm)	2-5/16 (59)			2-3/8 (60)	3-5/8 (91)		3-9/16 (91)	4-7/16 (113)		4-5/16 (110)	5-9/16 (142)	
Effective minimum embedment	h_{ef}	in. (mm)	2 (51)			2 (51)	3-1/4 (83)		3-1/8 (79)	4 (102)		3-3/4 (95)	4-3/4 (121)	
Min. hole depth	h_0	in. (mm)	2-5/8 (67)			2-5/8 (67)	4 (102)		3-3/4 (95)	4-3/4 (121)		4-5/8 (117)	5-3/4 (146)	
Min. thickness of fixture[1]	t_{min}	in. (mm)	1/8 (3)			1/8 (3)	n/a		1/8 (3)	n/a		1/8 (3)	n/a	
Max. thickness of fixture	t_{max}	in. (mm)	2-1/4 (57)			4 (101)	2-3/4 (70)		5-5/8 (143)	4-3/4 (121)		4-5/8 (117)	3-5/8 (92)	
Installation torque	T_{inst}	ft-lb (Nm)	25 (34)			40 (54)			60 (81)			110 (149)		
Minimum fixture hole diameter	d_h	in. (mm)	7/16 (11.1)			9/16 (14.3)			11/16 (17.5)			13/16 (20.6)		
Available anchor lengths	ℓ_{anch}	in. (mm)	3 (76)	3-3/4 (95)	5 (127)	3-3/4 (95)	4-1/2 (114)	5-1/2 (140)	7 (178)	4-3/4 (121)	6 (152)	8-1/2 (216)	10 (254)	5-1/2 (140)	8 (203)	10 (254)
Threaded length including dog point	ℓ_{thread}	in. (mm)	7/8 (22)	1-5/8 (41)	2-7/8 (73)	1-5/8 (41)	2-3/8 (60)	3-3/8 (86)	4-7/8 (178)	1-1/2 (38)	2-3/4 (70)	5-1/4 (133)	6-3/4 (171)	1-1/2 (38)	4 (102)	6 (152)
Unthreaded length	ℓ_{unthr}	in. (mm)	2-1/8 (54)			2-1/8 (54)			3-1/4 (83)			4 (102)		

1 Minimum thickness of fixture is a concern only when the anchor is installed at the minimum nominal embedment. When KWIK Bolt TZ anchors are installed at this embedment, the anchor threading ends near the surface of the concrete. If the fixture is sufficiently thin, it could be possible to run the nut to the bottom of the threading during application of the installation torque. If fixtures are thin, it is recommended that embedment be increased accordingly.

2 HILTI KWIK BOLT SPECIFICATIONS
SCALE: NOT TO SCALE

3 NOT USED
SCALE: NOT TO SCALE

4 NOT USED
SCALE: NOT TO SCALE

5 NOT USED
SCALE: NOT TO SCALE

T-Mobile
35 GRIFFIN ROAD,
BLOOMFIELD, CT 06002

CROWN CASTLE
1200 MACARTHUR BLVD, SUITE 200
MAHWAH, NJ 07430

T-MOBILE SITE NUMBER:
CTFF334A

BU #: **841288**
BRIDGEPORT NORTH

205 KAECHELE PLACE
BRIDGEPORT , CT 06606

EXISTING 151'-4" MONOPOLE

ISSUED FOR:

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3	4/19/17	ZTK	CONSTRUCTION	LR
4	4/21/17	ZTK	CONSTRUCTION	LR

DocuSigned by:
BAD3066DD9024F2...

STATE OF CONNECTICUT
ANDREW JOSEPH FANDOZZI III
No. 30515
LICENSED
PROFESSIONAL ENGINEER

4/26/2017 | 12:38:56 PM EDT

Andrew Joseph Fandozzi III, P.E.
Professional Engineer License: #30515
Crown Castle USA, Inc. Certificate of Registration #PEC.0001101

SHEET NUMBER: C-6

REVISION: 4

PANEL A

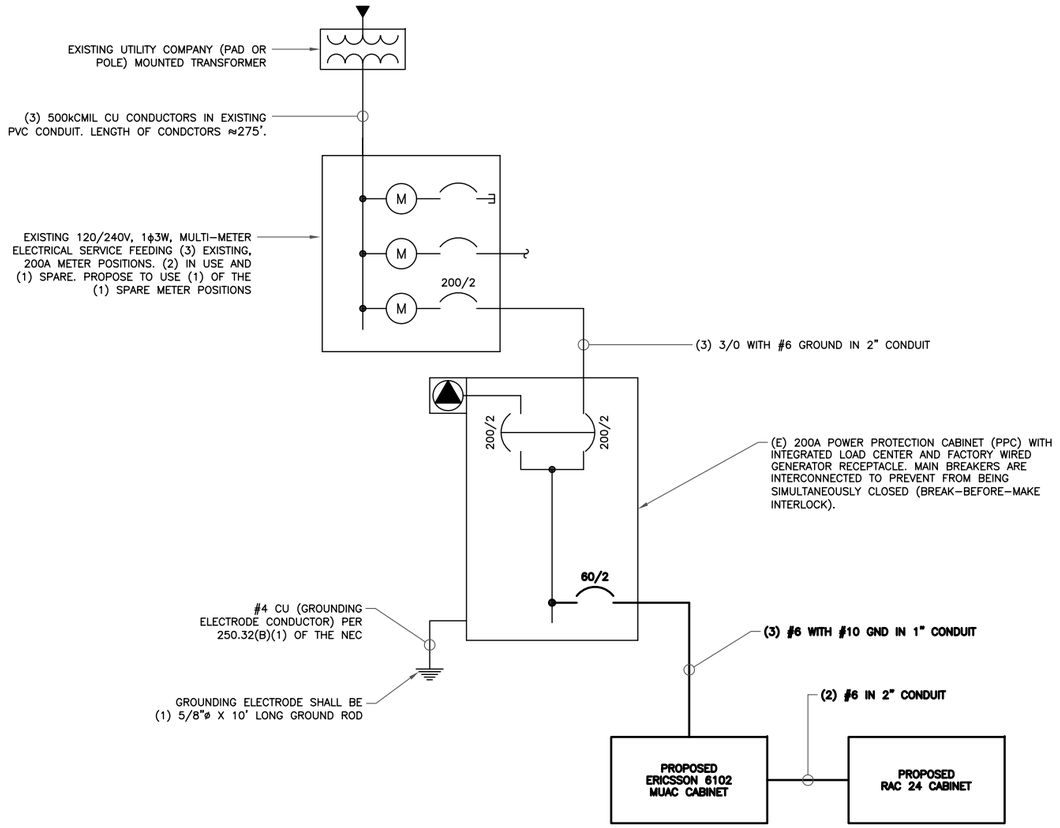
VOLTAGE/PHASE: 120/240V, 1-PHASE, 3-WIRE

MAIN: 200 AMP MAIN BREAKER

DESCRIPTION	LOAD (VA)	C or NC	C/B	CIR No.	LOAD (VA) A-PHASE	LOAD (VA) B-PHASE	CIR No.	C/B	C or NC	LOAD (VA)	DESCRIPTION
SURGE ARRESTOR	0	NC	60/2	1	435		2	20	NC	435	GFI RECEPTACLE/FLOOD LIGHT
	0	NC		3		0	4				SPACE
T-MOBILE EQUIPMENT CABINET (RBS 6102)	9600	C	100/2	5	9600		6				SPACE
	9600	C		7		9600	8				SPACE
SPACE				9	0		10				SPACE
SPACE				11		0	12				SPACE
SPACE				13	0		14				SPACE
SPACE				15		0	16				SPACE
SPACE				17	0		18				SPACE
SPACE				19		0	20				SPACE
SPACE				21	0		22	30/2	C		AAV
SPACE				23		0	24		C		
BASE LOAD (VA) =					10035	9600					
25% OF CONTINUOUS LOAD (VA) =					2400	2400					
TOTAL LOAD (VA) =					12435	12000					
TOTAL LOAD (A) =					104	100					

"C" DESIGNATION IDENTIFIES CONTINUOUS LOADS AND MOTOR LOADS AS REQUIRED BY SECTIONS 230.42 AND 430.24 OF THE NEC

1 ELECTRICAL PANEL
SCALE: NOT TO SCALE



2 ONE-LINE DIAGRAM
SCALE: NOT TO SCALE

T-Mobile
35 GRIFFIN ROAD,
BLOOMFIELD, CT 06002

CROWN CASTLE
1200 MACARTHUR BLVD, SUITE 200
MAHWAH, NJ 07430

T-MOBILE SITE NUMBER:
CTFF334A

BU #: **841288**
BRIDGEPORT NORTH

205 KAECHELE PLACE
BRIDGEPORT , CT 06606

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DocuSigned by:
BAD5095BD9024E2...

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4/26/2017 | 12:38:56 PM EDT

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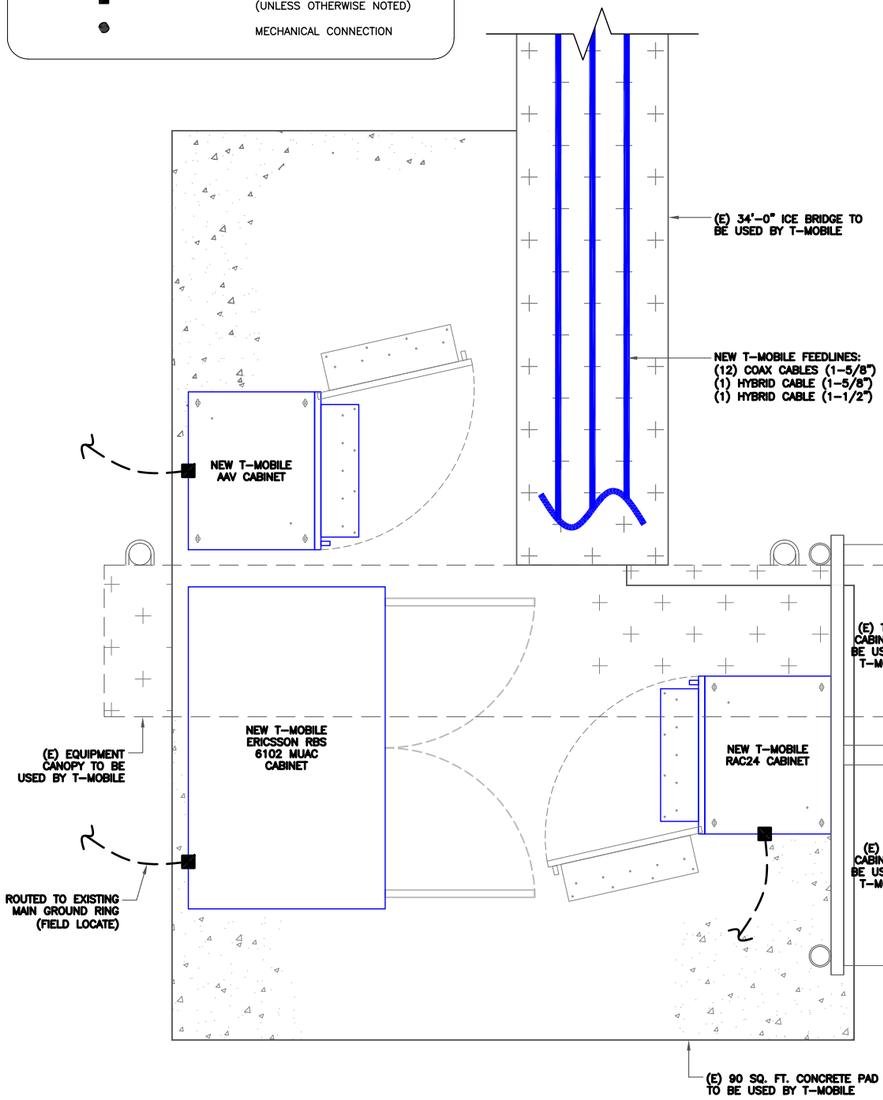
Professional Engineer License: #30515
Crown Castle USA, Inc. Certificate of Registration #PEC.0001101

SHEET NUMBER: E-1

REVISION: 4

GROUNDING LEGEND

- INSPECTION WELL VERIFY LOCATION W/ CONSTR. MGR.
- 5/8"x10'-0" COPPER CLAD GROUND ROD, 10' O.C. (TYP)
- #6 AWG STRANDED & INSULATED
- #2 AWG SOLID COPPER TINNED
- GROUND BUS BAR
- EXOTHERMIC WELD (CADWELD) (UNLESS OTHERWISE NOTED)
- MECHANICAL CONNECTION

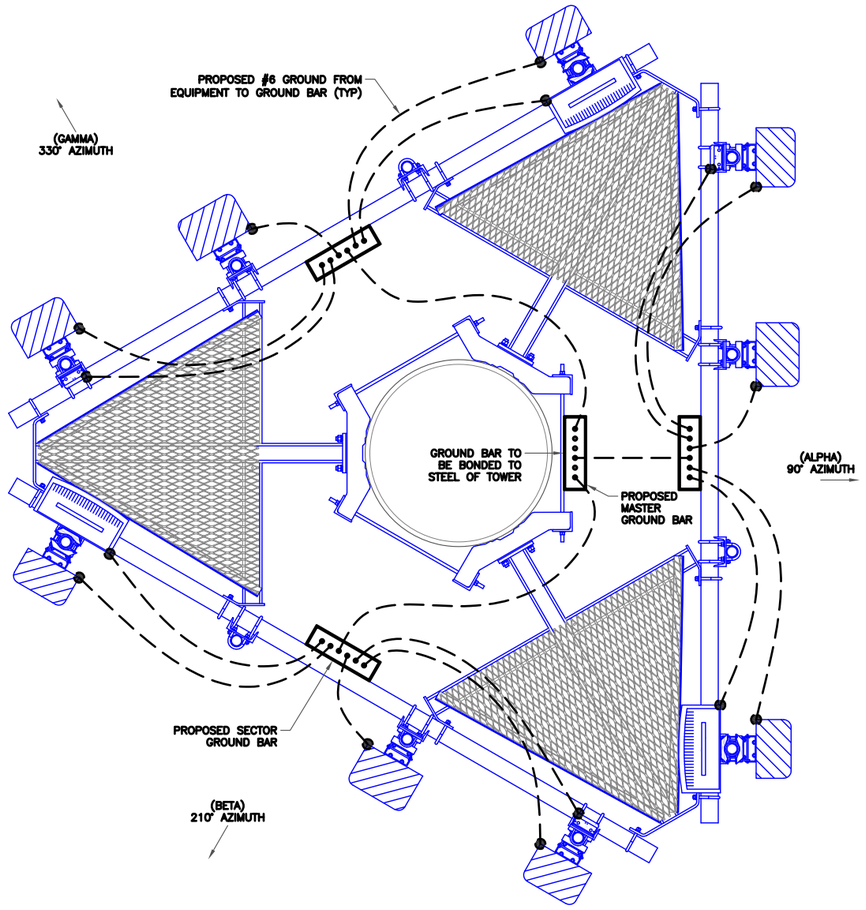


1 EQUIPMENT GROUNDING PLAN
SCALE: 1' 6" 0 1' 1"=1'-0" (FULL SIZE) 1/2"=1'-0" (11x17)

N

GROUNDING LEGEND

- MECHANICAL CONNECTION
- #6 AWG STRANDED & INSULATED
- GROUND BUS BAR



2 ANTENNA GROUNDING PLAN
SCALE: NOT TO SCALE

N

T-Mobile
35 GRIFFIN ROAD,
BLOOMFIELD, CT 06002

CROWN CASTLE
1200 MACARTHUR BLVD, SUITE 200
MAHWAH, NJ 07430

T-MOBILE SITE NUMBER:
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BU #: **841288**
BRIDGEPORT NORTH

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3	4/19/17	ZTK	CONSTRUCTION	LR
4	4/21/17	ZTK	CONSTRUCTION	LR

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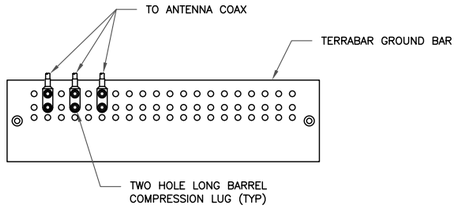
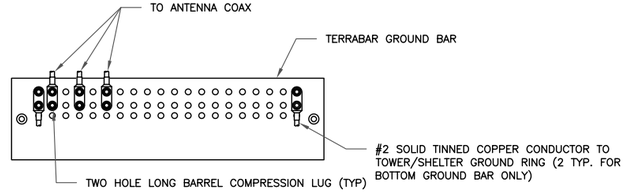
SHEET NUMBER: G-1
REVISION: 4



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.

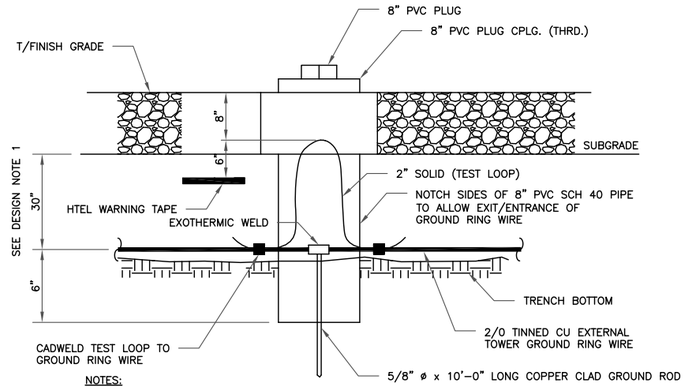
1 ANTENNA GROUND BAR DETAIL
SCALE: NOT TO SCALE



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.

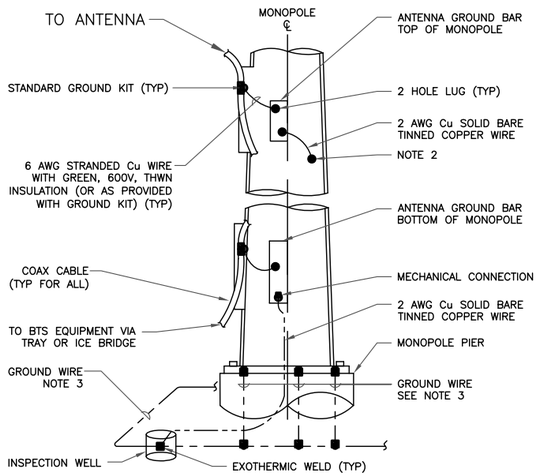
2 TOWER/SHELTER GROUND BAR DETAIL
SCALE: NOT TO SCALE



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)

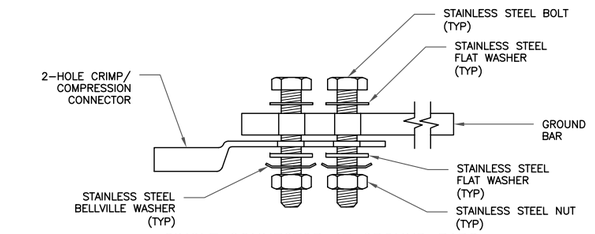
3 INSPECTION PORT DETAIL
SCALE: NOT TO SCALE



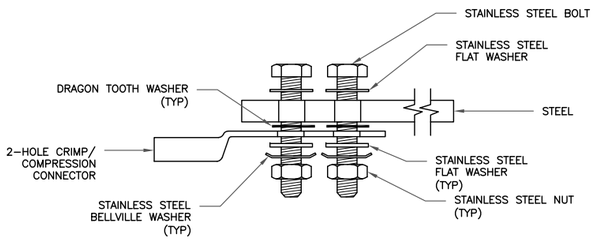
NOTES:

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.

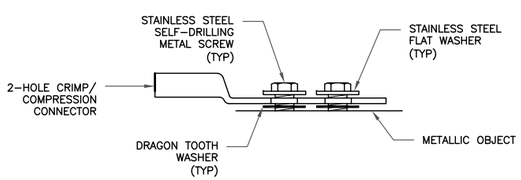
4 TYPICAL ANTENNA CABLE GROUNDING
SCALE: NOT TO SCALE



SINGLE CONNECTOR AT GROUND BARS

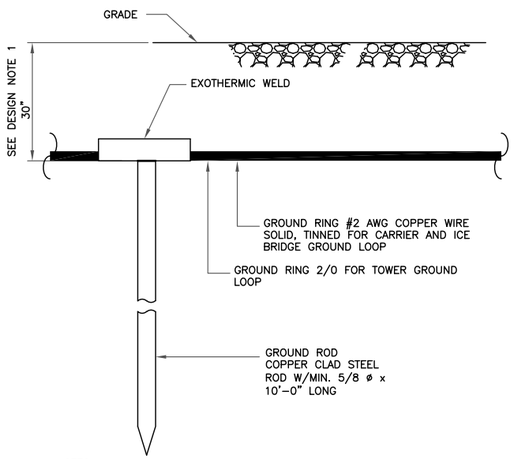


SINGLE CONNECTOR AT STEEL OBJECTS



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

T-Mobile
35 GRIFFIN ROAD,
BLOOMFIELD, CT 06002

CROWN CASTLE
1200 MACARTHUR BLVD, SUITE 200
MAHWAH, NJ 07430

T-MOBILE SITE NUMBER:
CTFF334A

BU #: **841288**
BRIDGEPORT NORTH

205 KAECHELE PLACE
BRIDGEPORT , CT 06606

EXISTING 151'-4" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	2/27/17	ZTK	PRELIMINARY	LR
0	3/7/17	ZTK	CONSTRUCTION	LR
1	4/4/17	ZTK	CONSTRUCTION	LR
2	4/7/17	ZTK	CONSTRUCTION	LR
3	4/19/17	ZTK	CONSTRUCTION	LR
4	4/21/17	ZTK	CONSTRUCTION	LR

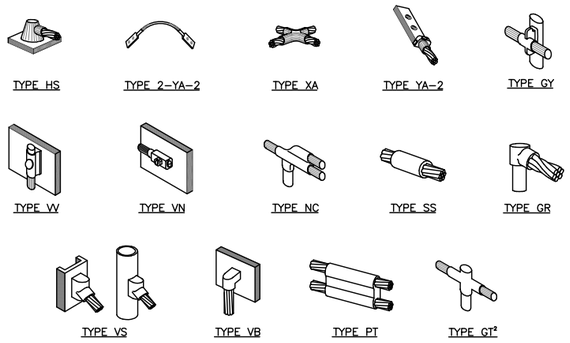
DocuSigned by:
BAD5085D3024E2...

STATE OF CONNECTICUT
ANDREW JOSEPH FANDOZZI, III
No. 30515
LICENSED PROFESSIONAL ENGINEER

4/26/2017 | 12:38:56 PM EDT

Andrew Joseph Fandozzi III, P.E.
Professional Engineer License: #30515
Crown Castle USA, Inc. Certificate of Registration #PEC.0001101

SHEET NUMBER: G-2
REVISION: 4

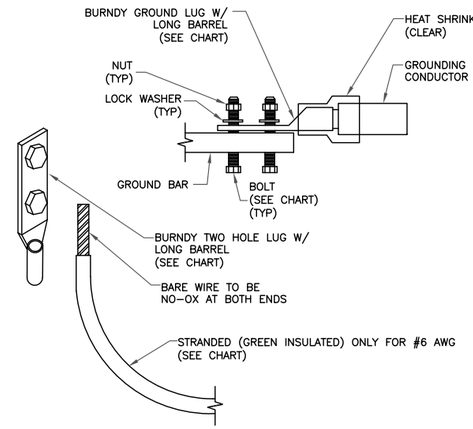


NOTE:

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

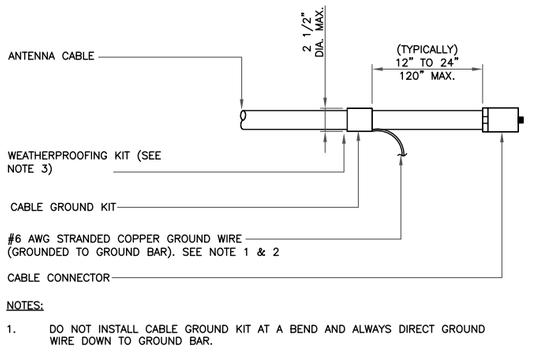
WIRE SIZE	BURNDY LUG	BOLT SIZE
#6 AWG GREEN INSULATED	YA6C-2TC38	3/8" - 16 NC S 2 BOLT
#2 AWG SOLID TINNED	YA3C-2TC38	3/8" - 16 NC S 2 BOLT
#2 AWG STRANDED	YA2C-2TC38	3/8" - 16 NC S 2 BOLT
#2/0 AWG STRANDED	YA26-2TC38	3/8" - 16 NC S 2 BOLT
#4/0 AWG STRANDED	YA28-2N	1/2" - 16 NC S 2 BOLT



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.

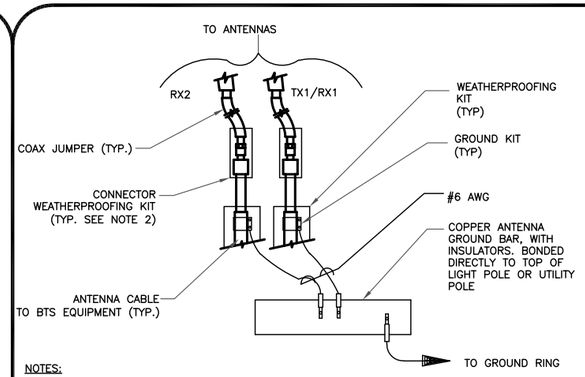
2 MECHANICAL LUG CONNECTION
SCALE: NOT TO SCALE



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.

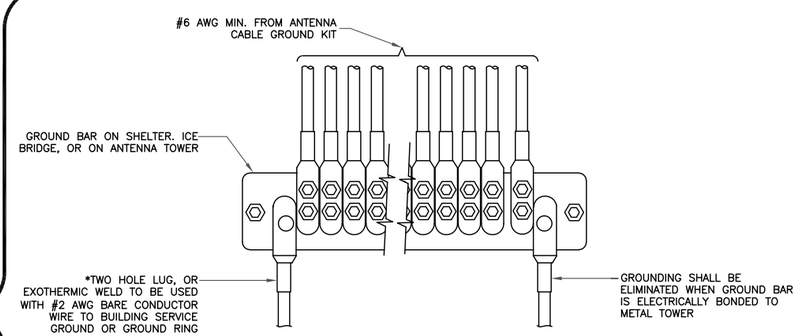
3 CABLE GROUND KIT CONNECTION
SCALE: NOT TO SCALE



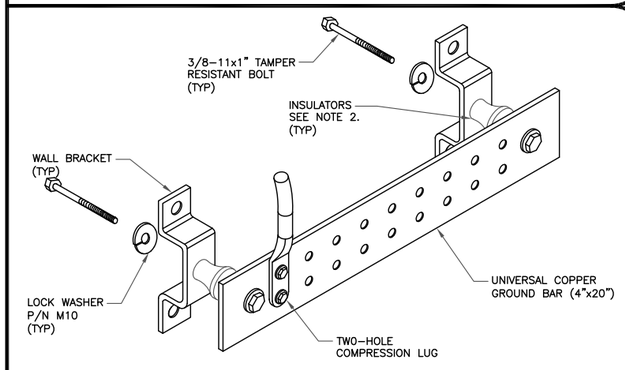
NOTES:

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



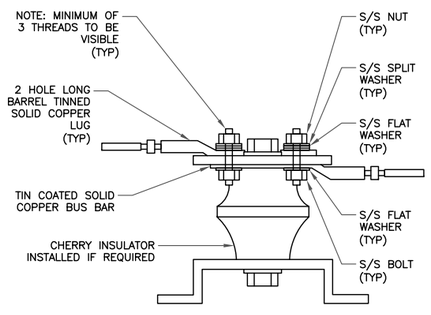
5 GROUNDWIRE INSTALLATION
SCALE: NOT TO SCALE



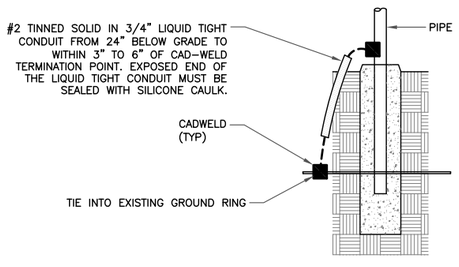
NOTES:

1. DOWN LEAD (HOME RUN) CONDUCTORS ARE NOT TO BE INSTALLED ON CROWN CASTLE TOWER, PER THE GROUNDING DOWN CONDUCTOR POLICY QAS-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



8 TRANSITIONING GROUND DETAIL
SCALE: NOT TO SCALE

T-Mobile
35 GRIFFIN ROAD,
BLOOMFIELD, CT 06002

CROWN CASTLE
1200 MACARTHUR BLVD, SUITE 200
MAHWAH, NJ 07430

T-MOBILE SITE NUMBER:
CTFF334A

BU #: **841288**
BRIDGEPORT NORTH

205 KAECHELE PLACE
BRIDGEPORT , CT 06606

EXISTING 151'-4" MONOPOLE

ISSUED FOR:

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A	2/27/17	ZTK	PRELIMINARY	LR
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DocuSigned by:
BAD8068DD9024F2...

STATE OF CONNECTICUT
ANDREW JOSEPH FANDOZZI III
No. 30515
LICENSED PROFESSIONAL ENGINEER

4/26/2017 | 12:38:56 PM EDT

Andrew Joseph Fandozzi III, P.E.
Professional Engineer License: #30515
Crown Castle USA, Inc. Certificate of Registration #PEC.0001101

SHEET NUMBER: G-3
REVISION: 4

PAUL J. FORD & COMPANY

Date: **March 31, 2017**

Steve Tuttle
Crown Castle
8 Parkmeadow Drive
Pittsford, NY 14534
585.899.3445

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

Subject: **Structural Modification Report**

Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CTFF334A
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	841288
	Crown Castle Site Name:	BRIDGEPORT NORTH
	Crown Castle JDE Job Number:	416902
	Crown Castle Work Order Number:	1368682
	Crown Castle Application Number:	374828 Rev. 2
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37517-0750.003.7700
Site Data:	**205 Kaechele Place, BRIDGEPORT, Fairfield County, CT** **Latitude *41° 13' 24.04"*, Longitude *-73° 13' 0.38"*** **150 Foot - Monopole Tower**	

Dear Steve Tuttle,

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 1006119, in accordance with application 374828, 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 125 mph converted to a nominal 3-second gust wind speed of 97 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, Exposure Category C and Topographic Category 1 were used in this analysis.

All modifications and equipment proposed in this report shall be installed in accordance with the referenced and 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:

Seth Tschanen, E.I.
Structural Designer

tnxTower Report - version 7.0.5.1

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
LICENSED
PROFESSIONAL ENGINEER

4.5.17

Date: **March 31, 2017**

Steve Tuttle
Crown Castle
8 Parkmeadow Drive
Pittsford, NY 14534
585.899.3445

Paul J Ford and Company
250 E. Broad Street, Suite 600
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Respectfully submitted by:

Seth Tschanen, E.I.
Structural Designer

tnxTower Report - version 7.0.5.1

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 150 ft Monopole tower. All information on the monopole was obtained from the mapping referenced in Table 4 of this report.

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 125 mph converted to a nominal 3-second gust wind speed of 97 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, Exposure Category C and Topographic Category 1 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
120.0	120.0	3	commscope	LNX-6515DS-A1M w/ Mount Pipe	1 13	1 1/2 1 5/8	--
		3	ericsson	AIR -32 B2A/B66AA w/ Mount Pipe			
		3	ericsson	AIR 21 B2A/B4P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
		3	ericsson	RRUS 11 B12			
		1	tower mounts	Platform Mount [LP 301-1]			

Notes:
1) Proposed Equipment

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
150.0	154.0	6	cci antennas	TPX-070821	1 2	3/8 3/4	2
		3	ericsson	RRUS 32			
		3	ericsson	RRUS 32 B2			
		3	kathrein	782 10253			
		3	quintel technology	QS66512-2 w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		3	powerwave technologies	7770.00 w/ Mount Pipe	2 1 12	3/4 3/8 1 5/8	1
		3	powerwave technologies	P65-16-XLH-RR w/ Mount Pipe			
		3	powerwave technologies	TT19-08BP111-001			
	150.0	1	tower mounts	Platform Mount (LP 101-1)			
		1	tower mounts	Side Arm Mount [SO 201-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
147.0	147.0	3	ericsson	RRUS 11	--	--	1
		1	raycap	TME-DC6-48-60-18-8F			
		1	tower mounts	Pipe Mount [PM 601-3]			
138.0	143.0	1	andrew	VHLP2-18	6 2	5/16 1/2	1
		1	andrew	VHLP2-23			
		1	clearwire	CW JUNCTION BOX			
		2	dragonwave	Horizon Compact			
	140.0	3	argus technologies	LLPX310R-V1 w/ Mount Pipe			
		3	samsung	RAS SPI-2213 RRH			
	138.0	1	tower mounts	Platform Mount [LP 713-1]			
120.0	121.0	3	kathrein	800 10504 w/ Mount Pipe	2 6	3/8 1 5/8	3
		3	kathrein	860 10025			
	120.0	1	tower mounts	T-Arm Mount [TA 601-3]			
99.0	103.0	1	gps	GPS_A	12 1	1 5/8 1/2	1
	99.0	3	antel	BXA-171063/8CF w/ Mount Pipe			
		3	antel	BXA-70063/4CF w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		1	tower mounts	T-Arm Mount [TA 602-3]			
		3	alcatel lucent	B13 RRH 4X30	2	1 1/4	2
		3	alcatel lucent	B25 RRH2x60 PCS			
		3	alcatel lucent	B66A RRH4X45			
		2	commscope	RC2DC-3315-PF-48			
		6	css	X7CQAP-465-VR0 w/ Mount Pipe			

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

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
--	--	--	--	--	--	--

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH, 08-09065E G1, 9/23/08	5110784	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	FDH, 08-09065E NA, 09/23/08	5110783	CCISITES
4-TOWER MAPPING	GPD, 2014777.841288.02, 04/11/08	4710143	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 25567.42283, 10/22/14	5401472	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 25567_26102, 06/05/15	5739992	CCISITES
PROPOSED REINFORCEMENT DESIGN/DRAWINGS/DATA	GPD, 2017777.841288.07, 10/09/16	6650617	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) At the time of the analysis, proof test information for the rock anchors was not available. We have assumed that the rock anchors were properly installed and are fully effective.
5) The monopole manufacturer drawings are not available at the time of this analysis. Therefore, we have assumed pole shaft and base plate steel yield strength(s) (Fy) as shown in the attached calculations. Anchor rods are assumed to be ASTM A615 #18J, 2.25" diam, (Fu = 100 ksi, Fy = 75 ksi).
6) Monopole was modified in conformance with the referenced modification drawings.
7) Monopole will be modified in conformance with the referenced and 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 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	150 - 128.5	Pole	TP18.1463x15x0.2188	1	-6.28	716.15	98.4	Pass
L2	128.5 - 109	Pole	TP21x18.1463x0.5837	2	-12.33	1529.92	99.5	Pass
L3	109 - 104.167	Pole	TP21.7298x21x0.661	3	-13.38	1959.85	89.0	Pass
L4	104.167 - 100.92	Pole	TP22.2201x21.7298x1.5958	4	-14.85	4632.85	44.4	Pass
L5	100.92 - 95.25	Pole	TP23.0763x22.2201x1.4985	5	-19.36	4350.86	53.6	Pass
L6	95.25 - 80.5	Pole	TP25.3035x23.0763x0.8972	6	-24.35	3126.48	94.5	Pass
L7	80.5 - 73.5833	Pole	TP26.3479x25.3035x1.1822	7	-27.43	3860.85	87.1	Pass
L8	73.5833 - 72	Pole	TP26.587x26.3479x1.1696	8	-28.14	3860.07	89.0	Pass
L9	72 - 66.75	Pole	TP26.992x26.587x1.266	9	-30.72	4228.89	89.1	Pass
L10	66.75 - 48.25	Pole	TP29.9611x26.992x1.2042	10	-40.06	4944.24	92.5	Pass
L11	48.25 - 44.25	Pole	TP30.603x29.9611x1.5876	11	-42.73	5855.07	83.1	Pass
L12	44.25 - 43.0833	Pole	TP30.7903x30.603x1.6684	12	-43.55	6182.99	80.0	Pass
L13	43.0833 - 30	Pole	TP32.89x30.7903x1.5728	13	-49.82	6195.76	85.5	Pass
L14	30 - 23.75	Pole	TP33.3525x29.1025x1.6275	14	-55.07	6130.65	96.2	Pass
L15	23.75 - 11	Pole	TP35.5039x33.3525x1.5179	15	-68.96	6743.53	93.1	Pass
L16	11 - 6	Pole	TP36.3476x35.5039x1.3615	16	-72.48	7430.47	86.2	Pass
L17	6 - 3.25	Pole	TP36.8116x36.3476x1.493	17	-74.59	8096.73	80.9	Pass
L18	3.25 - 0	Pole	TP37.36x36.8116x1.1317	18	-76.63	6573.67	99.4	Pass
							Summary	
						Pole (L2)	99.5	Pass
						Rating =	99.5	Pass

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

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	95.2	Pass
1	Base Plate	0	71.5	Pass
1	Base Foundation Steel	0	87.2	Pass
1	Base Foundation Soil Interaction	0	84.9	Pass
1	Flange Connection	109	99.6	Pass

Structure Rating (max from all components) =	**99.6%**

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

4.1) Recommendations

The monopole and its foundation will have sufficient capacity to carry the proposed loading configuration once the proposed modifications are installed.

- Install the proposed modifications per the attached drawings.
- Install the modifications as per the proposed modification drawings referenced in Table 4.

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 Fairfield County, Connecticut.
2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3) Basic wind speed of 97.00 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		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg		Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric				

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	150.0000-128.5000	21.5000	0.00	12	15.0000	18.1463	0.2188	0.8752	A572-50 (50 ksi)
L2	128.5000-109.0000	19.5000	0.00	12	18.1463	21.0000	0.5837	2.3347	Reinf 35.16 ksi (35 ksi)
L3	109.0000-104.1667	4.8333	0.00	12	21.0000	21.7298	0.6610	2.6440	Reinf 38.54 ksi (39 ksi)
L4	104.1667-100.9200	3.2467	0.00	12	21.7298	22.2201	1.5958	6.3832	Reinf 38.55 ksi (39 ksi)
L5	100.9200-95.2500	5.6700	0.00	12	22.2201	23.0763	1.4985	5.9941	Reinf 36.85 ksi (37 ksi)
L6	95.2500-80.5000	14.7500	0.00	12	23.0763	25.3035	0.8972	3.5890	Reinf 39.10 ksi (39 ksi)
L7	80.5000-	6.9167	0.00	12	25.3035	26.3479	1.1822	4.7288	Reinf 35.54 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
	73.5833								(36 ksi)
L8	73.5833-72.0000	1.5833	0.00	12	26.3479	26.5870	1.1696	4.6784	Reinf 35.56 ksi (36 ksi)
L9	72.0000-66.7500	5.2500	0.00	12	26.5870	26.9920	1.2660	5.0639	Reinf 35.56 ksi (36 ksi)
L10	66.7500-48.2500	18.5000	0.00	12	26.9920	29.9611	1.2042	4.8170	Reinf 39.10 ksi (39 ksi)
L11	48.2500-44.2500	4.0000	0.00	12	29.9611	30.6030	1.5876	6.3502	Reinf 34.81 ksi (35 ksi)
L12	44.2500-43.0833	1.1667	0.00	12	30.6030	30.7903	1.6684	6.6737	Reinf 34.85 ksi (35 ksi)
L13	43.0833-30.0000	13.0833	4.00	12	30.7903	32.8900	1.5728	6.2911	Reinf 35.17 ksi (35 ksi)
L14	30.0000-23.7500	10.2500	0.00	12	29.1025	33.3525	1.6275	6.5100	Reinf 35.41 ksi (35 ksi)
L15	23.7500-11.0000	12.7500	0.00	12	33.3525	35.5039	1.5179	6.0715	Reinf 35.80 ksi (36 ksi)
L16	11.0000-6.0000	5.0000	0.00	12	35.5039	36.3476	1.3615	5.4460	Reinf 42.72 ksi (43 ksi)
L17	6.0000-3.2500	2.7500	0.00	12	36.3476	36.8116	1.4930	5.9722	Reinf 42.05 ksi (42 ksi)
L18	3.2500-0.0000	3.2500		12	36.8116	37.3600	1.1317	4.5268	Reinf 43.91 ksi (44 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	15.5291	10.4139	290.4144	5.2917	7.7700	37.3764	588.4584	5.1254	3.4336	15.693
	18.7865	12.6306	518.1449	6.4181	9.3998	55.1229	1049.9021	6.2164	4.2768	19.547
L2	18.7865	33.0081	1299.5336	6.2874	9.3998	138.2511	2633.2074	16.2456	3.2990	5.652
	21.7408	38.3714	2041.4983	7.3090	10.8780	187.6722	4136.6291	18.8853	4.0637	6.962
L3	21.7408	43.2899	2285.7676	7.2814	10.8780	210.1276	4631.5848	21.3060	3.8565	5.834
	22.4964	44.8433	2540.7652	7.5426	11.2561	225.7244	5148.2792	22.0705	4.0521	6.13
L4	22.4964	103.4576	5353.1615	7.2080	11.2561	475.5807	10846.9564	50.9187	1.5469	0.969
	23.0039	105.9768	5753.7976	7.3835	11.5100	499.8955	11658.7539	52.1585	1.6783	1.052
L5	23.0039	99.9864	5479.8883	7.4183	11.5100	476.0980	11103.7394	49.2103	1.9389	1.294
	23.8903	104.1176	6187.5914	7.7248	11.9535	517.6386	12537.7378	51.2435	2.1684	1.447
L6	23.8903	64.0777	4023.2491	7.9401	11.9535	336.5751	8152.1934	31.5371	3.7798	4.213
	26.1961	70.5124	5361.1030	8.7374	13.1072	409.0193	10863.0481	34.7041	4.3767	4.878
L7	26.1961	91.8214	6819.1740	8.6354	13.1072	520.2612	13817.4953	45.1917	3.6131	3.056
	27.2774	95.7972	7743.8637	9.0093	13.6482	567.3899	15691.1674	47.1485	3.8930	3.293
L8	27.2774	94.8236	7672.8416	9.0138	13.6482	562.1861	15547.2573	46.6693	3.9267	3.357
	27.5249	95.7240	7893.4952	9.0994	13.7721	573.1526	15994.3614	47.1124	3.9908	3.412
L9	27.5249	103.2192	8447.1331	9.0649	13.7721	613.3526	17116.1819	50.8014	3.7325	2.948
	27.9442	104.8701	8858.9559	9.2099	13.9818	633.6042	17950.6464	51.6139	3.8411	3.034
L10	27.9442	99.9959	8487.7918	9.2320	13.9818	607.0580	17198.5674	49.2149	4.0065	3.327
	31.0180	111.5089	11770.0144	10.2949	15.5198	758.3858	23849.2402	54.8813	4.8022	3.988
L11	31.0180	145.0437	14904.2540	10.1577	15.5198	960.3365	30200.0594	71.3861	3.7749	2.378
	31.6826	148.3253	15938.9571	10.3875	15.8524	1005.4628	32296.6483	73.0012	3.9469	2.486
L12	31.6826	155.4465	16611.2135	10.3586	15.8524	1047.8701	33658.8221	76.5061	3.7302	2.236

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
	31.8764	156.4525	16935.7858	10.4256	15.9493	1061.8481	34316.4935	77.0011	3.7804	2.266
L13	31.8764	147.9667	16122.6084	10.4599	15.9493	1010.8631	32668.7756	72.8247	4.0368	2.567
	34.0502	158.6005	19854.4136	11.2116	17.0370	1165.3689	40230.4247	78.0583	4.5995	2.924
L14	31.8462	143.9833	13873.1022	9.8361	15.0751	920.2664	28110.6663	70.8642	3.4378	2.112
	34.5291	166.2557	21358.3204	11.3576	17.2766	1236.2560	43277.7476	81.8260	4.5768	2.812
L15	34.5291	155.5933	20126.9263	11.3968	17.2766	1164.9808	40782.6094	76.5783	4.8706	3.209
	36.7564	166.1082	24489.3970	12.1670	18.3910	1331.5950	49622.1578	81.7534	5.4472	3.589
L16	36.7564	149.6824	22271.2604	12.2230	18.3910	1210.9852	45127.6116	73.6691	5.8662	4.309
	37.6298	153.3812	23963.4041	12.5250	18.8281	1272.7501	48556.3536	75.4895	6.0923	4.475
L17	37.6298	167.5663	25983.1443	12.4779	18.8281	1380.0230	52648.8947	82.4711	5.7398	3.844
	38.1102	169.7972	27034.7650	12.6440	19.0684	1417.7773	54779.7634	83.5690	5.8642	3.928
L18	38.1102	130.0191	21127.1500	12.7734	19.0684	1107.9658	42809.3338	63.9915	6.8326	6.038
	38.6779	132.0175	22116.3537	12.9697	19.3525	1142.8175	44813.7286	64.9750	6.9796	6.167

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 150.0000-128.5000				1	1	1			
L2 128.5000-109.0000				1	1	1			
L3 109.0000-104.1667				1	1	1			
L4 104.1667-100.9200				1	1	1			
L5 100.9200-95.2500				1	1	1			
L6 95.2500-80.5000				1	1	1			
L7 80.5000-73.5833				1	1	1			
L8 73.5833-72.0000				1	1	1			
L9 72.0000-66.7500				1	1	1			
L10 66.7500-48.2500				1	1	1			
L11 48.2500-44.2500				1	1	1			
L12 44.2500-43.0833				1	1	1			
L13 43.0833-30.0000				1	1	1			
L14 30.0000-23.7500				1	1	1			
L15 23.7500-11.0000				1	1	1			
L16 11.0000-6.0000				1	1	1			
L17 6.0000-3.2500				1	1	1			
L18 3.2500-0.0000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
FXL-1873(1-5/8")	C	No	Inside Pole	150.0000 - 0.0000	12	No Ice	0.0000	0.67
						1/2" Ice	0.0000	0.67
						1" Ice	0.0000	0.67
FB-L98B-034-XXXXXX(3/8")	C	No	Inside Pole	150.0000 - 0.0000	1	No Ice	0.0000	0.05
						1/2" Ice	0.0000	0.05
						1" Ice	0.0000	0.05
WR-VG86ST-BRD(3/4")	C	No	Inside Pole	150.0000 - 0.0000	2	No Ice	0.0000	0.58
						1/2" Ice	0.0000	0.58
						1" Ice	0.0000	0.58
FB-L98B-034-XXXXXX(3/8")	C	No	Inside Pole	150.0000 - 0.0000	1	No Ice	0.0000	0.05
						1/2" Ice	0.0000	0.05
						1" Ice	0.0000	0.05
WR-VG86ST-BRD(3/4")	C	No	Inside Pole	150.0000 - 0.0000	2	No Ice	0.0000	0.58
						1/2" Ice	0.0000	0.58
						1" Ice	0.0000	0.58
2" (Nominal) Conduit	C	No	Inside Pole	150.0000 - 0.0000	1	No Ice	0.0000	0.72
						1/2" Ice	0.0000	0.72
						1" Ice	0.0000	0.72
***								
9207(5/16")	C	No	Inside Pole	138.0000 - 0.0000	6	No Ice	0.0000	0.06
						1/2" Ice	0.0000	0.06
						1" Ice	0.0000	0.06
EC4-50(1/2")	C	No	Inside Pole	138.0000 - 0.0000	2	No Ice	0.0000	0.16
						1/2" Ice	0.0000	0.16
						1" Ice	0.0000	0.16
2" (Nominal) Conduit	C	No	CaAa (Out Of Face)	138.0000 - 120.0000	1	No Ice	0.2375	0.72
						1/2" Ice	0.3375	2.48
						1" Ice	0.4375	4.84
2" (Nominal) Conduit	C	No	CaAa (Out Of Face)	120.0000 - 0.0000	1	No Ice	0.0000	0.72
						1/2" Ice	0.0000	2.48
						1" Ice	0.0000	4.84
2" (Nominal) Conduit	C	No	CaAa (Out Of Face)	138.0000 - 0.0000	1	No Ice	0.0000	0.72
						1/2" Ice	0.0000	2.48
						1" Ice	0.0000	4.84
***								
AL7-50(1-5/8)	C	No	CaAa (Out Of Face)	120.0000 - 0.0000	2	No Ice	0.1960	0.52
						1/2" Ice	0.2960	2.02
						1" Ice	0.3960	4.14
AL7-50(1-5/8)	C	No	CaAa (Out Of Face)	120.0000 - 0.0000	10	No Ice	0.0000	0.52
						1/2" Ice	0.0000	2.02
						1" Ice	0.0000	4.14
MLC HYBRID 6x12 6AWGx6(1-1/2)	C	No	CaAa (Out Of Face)	120.0000 - 0.0000	1	No Ice	0.0000	0.59
						1/2" Ice	0.0000	1.83
						1" Ice	0.0000	3.68
MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	C	No	CaAa (Out Of Face)	120.0000 - 0.0000	1	No Ice	0.0000	1.07
						1/2" Ice	0.0000	2.37
						1" Ice	0.0000	4.28
***								
HB114-U6S12-xxx-LI(1-1/4)	C	No	Inside Pole	99.0000 - 0.0000	2	No Ice	0.0000	1.70
						1/2" Ice	0.0000	1.70
						1" Ice	0.0000	1.70
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	99.0000 - 0.0000	1	No Ice	0.1980	0.82
						1/2" Ice	0.2980	2.33
						1" Ice	0.3980	4.46
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	99.0000 - 0.0000	5	No Ice	0.0000	0.82
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.46
LDF7-50A(1-5/8")	C	No	Inside Pole	99.0000 - 0.0000	6	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
LDF4-50A(1/2")	C	No	Inside Pole	99.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.15
						1" Ice	0.0000	0.15
***								
2.5" Solid Rod Reinforcing	C	No	CaAa (Out Of Face)	51.0000 - 0.0000	1	No Ice	0.2500	0.00
						1/2" Ice	0.3500	0.00

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						1" Ice	0.4500	0.00
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	130.0000 - 106.7500	2	No Ice	0.2083	0.00
						1/2" Ice	0.3194	0.00
						1" Ice	0.4306	0.00
2" Flat Reinforcement	C	No	CaAa (Out Of Face)	108.6700 - 0.0000	2	No Ice	0.3333	0.00
						1/2" Ice	0.4444	0.00
						1" Ice	0.5556	0.00
2" flat Climb Ladder Rail	C	No	CaAa (Out Of Face)	150.0000 - 0.0000	1	No Ice	0.3333	1.65
						1/2" Ice	0.4333	3.43
						1" Ice	0.5556	4.05

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	150.0000-128.5000	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	10.048	0.30
L2	128.5000-109.0000	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	20.956	0.38
L3	109.0000-104.1667	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	7.445	0.11
L4	104.1667-100.9200	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	4.519	0.07
L5	100.9200-95.2500	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	8.635	0.18
L6	95.2500-80.5000	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	23.453	0.54
L7	80.5000-73.5833	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	10.998	0.25
L8	73.5833-72.0000	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	2.517	0.06
L9	72.0000-66.7500	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	8.348	0.19
L10	66.7500-48.2500	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	30.103	0.67
L11	48.2500-44.2500	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	7.360	0.15
L12	44.2500-43.0833	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.147	0.04
L13	43.0833-30.0000	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	24.073	0.47
L14	30.0000-23.7500	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	11.500	0.23
L15	23.7500-11.0000	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	23.460	0.46
L16	11.0000-6.0000	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	9.200	0.18
L17	6.0000-3.2500	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	5.060	0.10

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L18	3.2500-0.0000	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	5.980	0.12

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	150.0000-128.5000	A	1.732	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	22.767	0.57
L2	128.5000-109.0000	A	1.705	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	53.513	2.01
L3	109.0000-104.1667	A	1.687	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	17.580	0.74
L4	104.1667-100.9200	A	1.680	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	10.338	0.49
L5	100.9200-95.2500	A	1.673	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	20.005	1.08
L6	95.2500-80.5000	A	1.654	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	54.357	3.07
L7	80.5000-73.5833	A	1.633	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	25.302	1.42
L8	73.5833-72.0000	A	1.623	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	5.773	0.32
L9	72.0000-66.7500	A	1.616	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	19.092	1.07
L10	66.7500-48.2500	A	1.585	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	68.121	3.68
L11	48.2500-44.2500	A	1.551	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	16.462	0.78
L12	44.2500-43.0833	A	1.543	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	4.786	0.23
L13	43.0833-30.0000	A	1.515	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	53.146	2.47
L14	30.0000-23.7500	A	1.469	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	25.388	1.18
L15	23.7500-11.0000	A	1.406	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	49.757	2.22
L16	11.0000-6.0000	A	1.310	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	18.804	0.80
L17	6.0000-3.2500	A	1.232	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	10.030	0.41
L18	3.2500-0.0000	A	1.110	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	11.270	0.43

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	150.0000-128.5000	-0.4496	0.2596	-0.6976	0.4028
L2	128.5000-109.0000	-0.8262	0.4770	-1.2367	0.7140
L3	109.0000-104.1667	-1.0522	0.6075	-1.4587	0.8422
L4	104.1667-100.9200	-1.0072	0.5815	-1.4132	0.8159
L5	100.9200-95.2500	-1.0745	0.6204	-1.5025	0.8675
L6	95.2500-80.5000	-1.1324	0.6538	-1.5957	0.9212
L7	80.5000-73.5833	-1.1643	0.6722	-1.6607	0.9588
L8	73.5833-72.0000	-1.1761	0.6790	-1.6850	0.9728
L9	72.0000-66.7500	-1.1820	0.6824	-1.6963	0.9794
L10	66.7500-48.2500	-1.2295	0.7098	-1.7745	1.0245
L11	48.2500-44.2500	-1.3547	0.7821	-1.9310	1.1149
L12	44.2500-43.0833	-1.3623	0.7865	-1.9453	1.1231
L13	43.0833-30.0000	-1.3826	0.7983	-1.9827	1.1447
L14	30.0000-23.7500	-1.3864	0.8004	-1.9910	1.1495
L15	23.7500-11.0000	-1.4256	0.8231	-2.0465	1.1815
L16	11.0000-6.0000	-1.4487	0.8364	-2.0662	1.1929
L17	6.0000-3.2500	-1.4584	0.8420	-2.0608	1.1898
L18	3.2500-0.0000	-1.4658	0.8463	-2.0317	1.1730

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft ft ft	°	ft		ft^2	ft^2	K
QS66512-2 w/ Mount Pipe	A	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	8.3708 8.9314 9.4571	8.4625 9.6573 10.5478	0.14 0.21 0.30
QS66512-2 w/ Mount Pipe	B	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	8.3708 8.9314 9.4571	8.4625 9.6573 10.5478	0.14 0.21 0.30
QS66512-2 w/ Mount Pipe	C	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	8.3708 8.9314 9.4571	8.4625 9.6573 10.5478	0.14 0.21 0.30
(2) TPX-070821	A	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	0.4688 0.5585 0.6556	0.1009 0.1471 0.2020	0.01 0.01 0.02
(2) TPX-070821	B	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	0.4688 0.5585 0.6556	0.1009 0.1471 0.2020	0.01 0.01 0.02
(2) TPX-070821	C	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	0.4688 0.5585 0.6556	0.1009 0.1471 0.2020	0.01 0.01 0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RRUS 32	A	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	2.8571 3.0830 3.3163	1.7766 1.9677 2.1658	0.06 0.08 0.10
RRUS 32	B	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	2.8571 3.0830 3.3163	1.7766 1.9677 2.1658	0.06 0.08 0.10
RRUS 32	C	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	2.8571 3.0830 3.3163	1.7766 1.9677 2.1658	0.06 0.08 0.10
RRUS 32 B2	A	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	2.7313 2.9531 3.1823	1.6681 1.8552 2.0493	0.05 0.07 0.10
RRUS 32 B2	B	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	2.7313 2.9531 3.1823	1.6681 1.8552 2.0493	0.05 0.07 0.10
RRUS 32 B2	C	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	2.7313 2.9531 3.1823	1.6681 1.8552 2.0493	0.05 0.07 0.10
782 10253	A	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	0.1075 0.1518 0.2034	0.0610 0.0980 0.1424	0.00 0.00 0.01
782 10253	B	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	0.1075 0.1518 0.2034	0.0610 0.0980 0.1424	0.00 0.00 0.01
782 10253	C	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	0.1075 0.1518 0.2034	0.0610 0.0980 0.1424	0.00 0.00 0.01
DC6-48-60-18-8F	A	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	0.9167 1.4583 1.6431	0.9167 1.4583 1.6431	0.02 0.04 0.06
P65-16-XLH-RR w/ Mount Pipe	A	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	8.3708 8.9314 9.4571	6.3625 7.5378 8.4270	0.08 0.14 0.22
P65-16-XLH-RR w/ Mount Pipe	B	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	8.3708 8.9314 9.4571	6.3625 7.5378 8.4270	0.08 0.14 0.22
P65-16-XLH-RR w/ Mount Pipe	C	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	8.3708 8.9314 9.4571	6.3625 7.5378 8.4270	0.08 0.14 0.22
7770.00 w/ Mount Pipe	A	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	5.8054 6.2677 6.6966	4.5859 5.5082 6.2127	0.09 0.14 0.21
7770.00 w/ Mount Pipe	B	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	5.8054 6.2677 6.6966	4.5859 5.5082 6.2127	0.09 0.14 0.21
7770.00 w/ Mount Pipe	C	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	5.8054 6.2677 6.6966	4.5859 5.5082 6.2127	0.09 0.14 0.21
TT19-08BP111-001	A	From Leg	4.0000	0.00	150.0000	No Ice	0.5527	0.4455	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00 4.00			1/2" Ice 1" Ice	0.6487 0.7520	0.5342 0.6303	0.02 0.03
TT19-08BP111-001	B	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	0.5527 0.6487 0.7520	0.4455 0.5342 0.6303	0.02 0.02 0.03
TT19-08BP111-001	C	From Leg	4.0000 0.00 4.00	0.00	150.0000	No Ice 1/2" Ice 1" Ice	0.5527 0.6487 0.7520	0.4455 0.5342 0.6303	0.02 0.02 0.03
Platform Mount (LP 101-1)	C	None		0.00	150.0000	No Ice 1/2" Ice 1" Ice	36.2100 42.8200 49.4300	36.2100 42.8200 49.4300	1.50 2.30 3.10
Side Arm Mount [SO 201-3]	C	None		0.00	150.0000	No Ice 1/2" Ice 1" Ice	5.7100 7.9100 10.1100	5.7100 7.9100 10.1100	0.29 0.35 0.41
Top Hat 20" Diameter x 3'-6" Tall	C	None		0.00	150.0000	No Ice 1/2" Ice 1" Ice	2.9167 4.3896 4.7056	2.9167 4.3896 4.7056	0.20 0.26 0.31
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RRUS 11	A	From Leg	4.0000 0.00 0.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice	2.7908 2.9984 3.2134	1.1923 1.3395 1.4957	0.05 0.07 0.10
RRUS 11	B	From Leg	4.0000 0.00 0.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice	2.7908 2.9984 3.2134	1.1923 1.3395 1.4957	0.05 0.07 0.10
RRUS 11	C	From Leg	4.0000 0.00 0.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice	2.7908 2.9984 3.2134	1.1923 1.3395 1.4957	0.05 0.07 0.10
TME-DC6-48-60-18-8F	B	From Leg	4.0000 0.00 0.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice	0.9167 1.4583 1.6431	0.9167 1.4583 1.6431	0.02 0.04 0.06
Pipe Mount [PM 601-3]	C	None		0.00	147.0000	No Ice 1/2" Ice 1" Ice	4.3900 5.4800 6.5700	4.3900 5.4800 6.5700	0.20 0.24 0.28
***									
LLPX310R-V1 w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.00	138.0000	No Ice 1/2" Ice 1" Ice	4.5378 4.8914 5.2539	2.9834 3.5263 4.0859	0.05 0.08 0.13
LLPX310R-V1 w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.00	138.0000	No Ice 1/2" Ice 1" Ice	4.5378 4.8914 5.2539	2.9834 3.5263 4.0859	0.05 0.08 0.13
LLPX310R-V1 w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.00	138.0000	No Ice 1/2" Ice 1" Ice	4.5378 4.8914 5.2539	2.9834 3.5263 4.0859	0.05 0.08 0.13
RAS SPI-2213 RRH	A	From Leg	4.0000 0.00 2.00	0.00	138.0000	No Ice 1/2" Ice 1" Ice	1.5617 1.7196 1.8849	0.7292 0.8475 0.9728	0.03 0.05 0.06
RAS SPI-2213 RRH	B	From Leg	4.0000 0.00 2.00	0.00	138.0000	No Ice 1/2" Ice 1" Ice	1.5617 1.7196 1.8849	0.7292 0.8475 0.9728	0.03 0.05 0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RAS SPI-2213 RRH	C	From Leg	4.0000 0.00 2.00	0.00	138.0000	No Ice 1/2" Ice 1" Ice	1.5617 1.7196 1.8849	0.7292 0.8475 0.9728	0.03 0.05 0.06
Horizon Compact	B	From Leg	4.0000 0.00 5.00	0.00	138.0000	No Ice 1/2" Ice 1" Ice	0.7208 0.8278 0.9422	0.3681 0.4499 0.5391	0.01 0.02 0.03
Horizon Compact	C	From Leg	4.0000 0.00 5.00	0.00	138.0000	No Ice 1/2" Ice 1" Ice	0.7208 0.8278 0.9422	0.3681 0.4499 0.5391	0.01 0.02 0.03
CW JUNCTION BOX	A	From Leg	4.0000 0.00 5.00	0.00	138.0000	No Ice 1/2" Ice 1" Ice	1.2000 1.3370 1.4815	0.6000 0.7037 0.8148	0.00 0.01 0.02
Platform Mount [LP 713-1]	C	None		0.00	138.0000	No Ice 1/2" Ice 1" Ice	31.2700 39.6800 48.0900	31.2700 39.6800 48.0900	1.51 1.93 2.35
***									
LNX-6515DS-A1M w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice	11.6828 12.4043 13.1351	9.8418 11.3657 12.9138	0.08 0.17 0.27
LNX-6515DS-A1M w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice	11.6828 12.4043 13.1351	9.8418 11.3657 12.9138	0.08 0.17 0.27
LNX-6515DS-A1M w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice	11.6828 12.4043 13.1351	9.8418 11.3657 12.9138	0.08 0.17 0.27
RRUS 11 B12	A	From Leg	4.0000 0.00 0.00	0.00	120.0000	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	0.00	120.0000	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	0.00	120.0000	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
AIR -32 B2A/B66AA w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice	6.7474 7.2017 7.6475	6.0700 6.8671 7.5828	0.15 0.21 0.28
AIR -32 B2A/B66AA w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice	6.7474 7.2017 7.6475	6.0700 6.8671 7.5828	0.15 0.21 0.28
AIR -32 B2A/B66AA w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice	6.7474 7.2017 7.6475	6.0700 6.8671 7.5828	0.15 0.21 0.28
AIR 21 B2A/B4P w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice	6.1619 6.6000 7.0327	5.5453 6.3031 6.9984	0.10 0.16 0.22
AIR 21 B2A/B4P w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice	6.1619 6.6000 7.0327	5.5453 6.3031 6.9984	0.10 0.16 0.22

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
AIR 21 B2A/B4P w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	120.0000	No Ice 1/2" Ice 1" Ice	6.1619 6.6000 7.0327	5.5453 6.3031 6.9984	0.10 0.16 0.22
KRY 112 144/1	A	From Leg	4.0000 0.00 0.00	0.00	120.0000	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	0.00	120.0000	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	0.00	120.0000	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
Platform Mount [LP 301-1]	C	None		0.00	120.0000	No Ice 1/2" Ice 1" Ice	30.1000 40.8000 51.5000	30.1000 40.8000 51.5000	1.59 2.03 2.47
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(2) X7CQAP-465-VR0 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	6.5999 7.0185 7.4400	4.7322 5.3944 6.0396	0.06 0.11 0.17
(2) X7CQAP-465-VR0 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	6.5999 7.0185 7.4400	4.7322 5.3944 6.0396	0.06 0.11 0.17
(2) X7CQAP-465-VR0 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	6.5999 7.0185 7.4400	4.7322 5.3944 6.0396	0.06 0.11 0.17
B13 RRH 4X30	A	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	2.0552 2.2405 2.4333	1.3201 1.4754 1.6376	0.06 0.07 0.09
B13 RRH 4X30	B	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	2.0552 2.2405 2.4333	1.3201 1.4754 1.6376	0.06 0.07 0.09
B13 RRH 4X30	C	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	2.0552 2.2405 2.4333	1.3201 1.4754 1.6376	0.06 0.07 0.09
B25 RRH2x60 PCS	A	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	2.1400 2.3293 2.5259	1.3065 1.4629 1.6264	0.05 0.07 0.09
B25 RRH2x60 PCS	B	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	2.1400 2.3293 2.5259	1.3065 1.4629 1.6264	0.05 0.07 0.09
B25 RRH2x60 PCS	C	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	2.1400 2.3293 2.5259	1.3065 1.4629 1.6264	0.05 0.07 0.09
B66A RRH4X45	A	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	2.5800 2.7937 3.0148	1.6296 1.8106 1.9986	0.07 0.09 0.11
B66A RRH4X45	B	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	2.5800 2.7937 3.0148	1.6296 1.8106 1.9986	0.07 0.09 0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
B66A RRH4X45	C	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	2.5800 2.7937 3.0148	1.6296 1.8106 1.9986	0.07 0.09 0.11
RC2DC-3315-PF-48	A	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	3.7922 4.0441 4.3033	2.5116 2.7247 2.9449	0.03 0.06 0.10
RC2DC-3315-PF-48	C	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	3.7922 4.0441 4.3033	2.5116 2.7247 2.9449	0.03 0.06 0.10
BXA-171063/8CF w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	3.1574 3.5312 3.9033	3.3303 3.9423 4.5633	0.03 0.06 0.10
BXA-171063/8CF w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	3.1574 3.5312 3.9033	3.3303 3.9423 4.5633	0.03 0.06 0.10
BXA-171063/8CF w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	3.1574 3.5312 3.9033	3.3303 3.9423 4.5633	0.03 0.06 0.10
BXA-70063/4CF w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	4.9453 5.3243 5.7120	3.6158 4.2169 4.8343	0.03 0.07 0.12
BXA-70063/4CF w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	4.9453 5.3243 5.7120	3.6158 4.2169 4.8343	0.03 0.07 0.12
BXA-70063/4CF w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	4.9453 5.3243 5.7120	3.6158 4.2169 4.8343	0.03 0.07 0.12
GPS_A	A	From Leg	4.0000 0.00 4.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	0.2550 0.3205 0.3934	0.2550 0.3205 0.3934	0.00 0.00 0.01
(2) FD9R6004/2C-3L	A	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	0.3142 0.3862 0.4656	0.0762 0.1189 0.1685	0.00 0.01 0.01
(2) FD9R6004/2C-3L	B	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	0.3142 0.3862 0.4656	0.0762 0.1189 0.1685	0.00 0.01 0.01
(2) FD9R6004/2C-3L	C	From Leg	4.0000 0.00 0.00	0.00	99.0000	No Ice 1/2" Ice 1" Ice	0.3142 0.3862 0.4656	0.0762 0.1189 0.1685	0.00 0.01 0.01
T-Arm Mount [TA 602-3]	C	None		0.00	99.0000	No Ice 1/2" Ice 1" Ice	11.5900 15.4400 19.2900	11.5900 15.4400 19.2900	0.77 0.99 1.21

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
VHLP2-23	B	Paraboloid w/o Radome	From Leg	4.0000	0.00		138.0000	2.1750	No Ice	3.7200	0.03
				0.00					1/2" Ice	4.0100	0.05
				5.00					1" Ice	4.3000	0.07
VHLP2-18	C	Paraboloid w/o Radome	From Leg	4.0000	0.00		138.0000	2.1750	No Ice	3.7200	0.03
				0.00					1/2" Ice	4.0100	0.05
				5.00					1" Ice	4.3000	0.07

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 150.0000-128.5000	138.9099	1.356	31.036	30.741	A	0.000	30.741	30.741	100.00	0.000	0.000
					B	0.000	30.741		100.00	0.000	0.000
					C	0.000	30.741		100.00	0.000	10.048
L2 128.5000-109.0000	118.5131	1.312	30.015	32.928	A	0.000	32.928	32.928	100.00	0.000	0.000
					B	0.000	32.928		100.00	0.000	0.000
					C	0.000	32.928		100.00	0.000	20.956
L3 109.0000-104.1667	106.5696	1.283	29.351	8.909	A	0.000	8.909	8.909	100.00	0.000	0.000
					B	0.000	8.909		100.00	0.000	0.000
					C	0.000	8.909		100.00	0.000	7.445
L4 104.1667-100.9200	102.5373	1.272	29.114	6.155	A	0.000	6.155	6.155	100.00	0.000	0.000
					B	0.000	6.155		100.00	0.000	0.000
					C	0.000	6.155		100.00	0.000	4.519
L5 100.9200-95.2500	98.0671	1.26	28.842	11.079	A	0.000	11.079	11.079	100.00	0.000	0.000
					B	0.000	11.079		100.00	0.000	0.000
					C	0.000	11.079		100.00	0.000	8.635
L6 95.2500-80.5000	87.7618	1.231	28.176	30.782	A	0.000	30.782	30.782	100.00	0.000	0.000
					B	0.000	30.782		100.00	0.000	0.000
					C	0.000	30.782		100.00	0.000	23.453
L7 80.5000-73.5833	77.0183	1.198	27.412	15.411	A	0.000	15.411	15.411	100.00	0.000	0.000
					B	0.000	15.411		100.00	0.000	0.000
					C	0.000	15.411		100.00	0.000	10.998
L8 73.5833-72.0000	72.7905	1.184	27.088	3.615	A	0.000	3.615	3.615	100.00	0.000	0.000
					B	0.000	3.615		100.00	0.000	0.000
					C	0.000	3.615		100.00	0.000	2.517
L9 72.0000-66.7500	69.3684	1.172	26.815	12.134	A	0.000	12.134	12.134	100.00	0.000	0.000
					B	0.000	12.134		100.00	0.000	0.000
					C	0.000	12.134		100.00	0.000	8.348
L10 66.7500-48.2500	57.3393	1.126	25.761	45.450	A	0.000	45.450	45.450	100.00	0.000	0.000
					B	0.000	45.450		100.00	0.000	0.000
					C	0.000	45.450		100.00	0.000	30.103
L11 48.2500-44.2500	46.2429	1.076	24.620	10.450	A	0.000	10.450	10.450	100.00	0.000	0.000
					B	0.000	10.450		100.00	0.000	0.000
					C	0.000	10.450		100.00	0.000	7.360
L12 44.2500-43.0833	43.6661	1.063	24.325	3.090	A	0.000	3.090	3.090	100.00	0.000	0.000
					B	0.000	3.090		100.00	0.000	0.000
					C	0.000	3.090		100.00	0.000	2.147
L13 43.0833-30.0000	36.4698	1.023	23.420	35.939	A	0.000	35.939	35.939	100.00	0.000	0.000
					B	0.000	35.939		100.00	0.000	0.000
					C	0.000	35.939		100.00	0.000	24.073
L14 30.0000-23.7500	26.8329	0.959	21.955	17.285	A	0.000	17.285	17.285	100.00	0.000	0.000
					B	0.000	17.285		100.00	0.000	0.000
					C	0.000	17.285		100.00	0.000	11.500
L15 23.7500-11.0000	17.3086	0.875	20.019	37.870	A	0.000	37.870	37.870	100.00	0.000	0.000
					B	0.000	37.870		100.00	0.000	0.000
					C	0.000	37.870		100.00	0.000	23.460
L16 11.0000-	8.4902	0.85	19.45	15.497	A	0.000	15.497	15.497	100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
6.0000			0		B	0.000	15.497		100.00	0.000	0.000
					C	0.000	15.497		100.00	0.000	9.200
L17 6.0000-3.2500	4.6221	0.85	19.450	8.679	A	0.000	8.679	8.679	100.00	0.000	0.000
					B	0.000	8.679		100.00	0.000	0.000
					C	0.000	8.679		100.00	0.000	5.060
L18 3.2500-0.0000	1.6210	0.85	19.450	10.398	A	0.000	10.398	10.398	100.00	0.000	0.000
					B	0.000	10.398		100.00	0.000	0.000
					C	0.000	10.398		100.00	0.000	5.980

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 150.0000-128.5000	138.9099	1.356	8.246	1.7319	36.947	A	0.000	36.947	36.947	100.00	0.000	0.000
						B	0.000	36.947		100.00	0.000	0.000
						C	0.000	36.947		100.00	0.000	22.767
L2 128.5000-109.0000	118.5131	1.312	7.975	1.7046	38.468	A	0.000	38.468	38.468	100.00	0.000	0.000
						B	0.000	38.468		100.00	0.000	0.000
						C	0.000	38.468		100.00	0.000	53.513
L3 109.0000-104.1667	106.5696	1.283	7.799	1.6866	10.267	A	0.000	10.267	10.267	100.00	0.000	0.000
						B	0.000	10.267		100.00	0.000	0.000
						C	0.000	10.267		100.00	0.000	17.580
L4 104.1667-100.9200	102.5373	1.272	7.736	1.6801	7.064	A	0.000	7.064	7.064	100.00	0.000	0.000
						B	0.000	7.064		100.00	0.000	0.000
						C	0.000	7.064		100.00	0.000	10.338
L5 100.9200-95.2500	98.0671	1.26	7.663	1.6726	12.659	A	0.000	12.659	12.659	100.00	0.000	0.000
						B	0.000	12.659		100.00	0.000	0.000
						C	0.000	12.659		100.00	0.000	20.005
L6 95.2500-80.5000	87.7618	1.231	7.486	1.6541	34.849	A	0.000	34.849	34.849	100.00	0.000	0.000
						B	0.000	34.849		100.00	0.000	0.000
						C	0.000	34.849		100.00	0.000	54.357
L7 80.5000-73.5833	77.0183	1.198	7.283	1.6327	17.293	A	0.000	17.293	17.293	100.00	0.000	0.000
						B	0.000	17.293		100.00	0.000	0.000
						C	0.000	17.293		100.00	0.000	25.302
L8 73.5833-72.0000	72.7905	1.184	7.197	1.6235	4.044	A	0.000	4.044	4.044	100.00	0.000	0.000
						B	0.000	4.044		100.00	0.000	0.000
						C	0.000	4.044		100.00	0.000	5.773
L9 72.0000-66.7500	69.3684	1.172	7.125	1.6157	13.548	A	0.000	13.548	13.548	100.00	0.000	0.000
						B	0.000	13.548		100.00	0.000	0.000
						C	0.000	13.548		100.00	0.000	19.092
L10 66.7500-48.2500	57.3393	1.126	6.845	1.5852	50.338	A	0.000	50.338	50.338	100.00	0.000	0.000
						B	0.000	50.338		100.00	0.000	0.000
						C	0.000	50.338		100.00	0.000	68.121
L11 48.2500-44.2500	46.2429	1.076	6.542	1.5515	11.484	A	0.000	11.484	11.484	100.00	0.000	0.000
						B	0.000	11.484		100.00	0.000	0.000
						C	0.000	11.484		100.00	0.000	16.462
L12 44.2500-43.0833	43.6661	1.063	6.463	1.5426	3.390	A	0.000	3.390	3.390	100.00	0.000	0.000
						B	0.000	3.390		100.00	0.000	0.000
						C	0.000	3.390		100.00	0.000	4.786
L13 43.0833-30.0000	36.4698	1.023	6.223	1.5151	39.243	A	0.000	39.243	39.243	100.00	0.000	0.000
						B	0.000	39.243		100.00	0.000	0.000
						C	0.000	39.243		100.00	0.000	53.146
L14 30.0000-23.7500	26.8329	0.959	5.833	1.4693	18.863	A	0.000	18.863	18.863	100.00	0.000	0.000
						B	0.000	18.863		100.00	0.000	0.000
						C	0.000	18.863		100.00	0.000	25.388
L15 23.7500-11.0000	17.3086	0.875	5.319	1.4063	40.859	A	0.000	40.859	40.859	100.00	0.000	0.000
						B	0.000	40.859		100.00	0.000	0.000
						C	0.000	40.859		100.00	0.000	49.757
L16 11.0000-6.0000	8.4902	0.85	5.168	1.3096	16.588	A	0.000	16.588	16.588	100.00	0.000	0.000
						B	0.000	16.588		100.00	0.000	0.000
						C	0.000	16.588		100.00	0.000	18.804
L17 6.0000-	4.6221	0.85	5.168	1.2323	9.243	A	0.000	9.243	9.243	100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
3.2500						B	0.000	9.243		100.00	0.000	0.000
						C	0.000	9.243		100.00	0.000	10.030
L18 3.2500-0.0000	1.6210	0.85	5.168	1.1097	10.999	A	0.000	10.999	10.999	100.00	0.000	0.000
						B	0.000	10.999		100.00	0.000	0.000
						C	0.000	10.999		100.00	0.000	11.270

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 150.0000-128.5000	138.9099	1.356	10.625	30.741	A	0.000	30.741	30.741	100.00	0.000	0.000
					B	0.000	30.741		100.00	0.000	0.000
					C	0.000	30.741		100.00	0.000	10.048
L2 128.5000-109.0000	118.5131	1.312	10.275	32.928	A	0.000	32.928	32.928	100.00	0.000	0.000
					B	0.000	32.928		100.00	0.000	0.000
					C	0.000	32.928		100.00	0.000	20.956
L3 109.0000-104.1667	106.5696	1.283	10.048	8.909	A	0.000	8.909	8.909	100.00	0.000	0.000
					B	0.000	8.909		100.00	0.000	0.000
					C	0.000	8.909		100.00	0.000	7.445
L4 104.1667-100.9200	102.5373	1.272	9.967	6.155	A	0.000	6.155	6.155	100.00	0.000	0.000
					B	0.000	6.155		100.00	0.000	0.000
					C	0.000	6.155		100.00	0.000	4.519
L5 100.9200-95.2500	98.0671	1.26	9.874	11.079	A	0.000	11.079	11.079	100.00	0.000	0.000
					B	0.000	11.079		100.00	0.000	0.000
					C	0.000	11.079		100.00	0.000	8.635
L6 95.2500-80.5000	87.7618	1.231	9.646	30.782	A	0.000	30.782	30.782	100.00	0.000	0.000
					B	0.000	30.782		100.00	0.000	0.000
					C	0.000	30.782		100.00	0.000	23.453
L7 80.5000-73.5833	77.0183	1.198	9.384	15.411	A	0.000	15.411	15.411	100.00	0.000	0.000
					B	0.000	15.411		100.00	0.000	0.000
					C	0.000	15.411		100.00	0.000	10.998
L8 73.5833-72.0000	72.7905	1.184	9.273	3.615	A	0.000	3.615	3.615	100.00	0.000	0.000
					B	0.000	3.615		100.00	0.000	0.000
					C	0.000	3.615		100.00	0.000	2.517
L9 72.0000-66.7500	69.3684	1.172	9.180	12.134	A	0.000	12.134	12.134	100.00	0.000	0.000
					B	0.000	12.134		100.00	0.000	0.000
					C	0.000	12.134		100.00	0.000	8.348
L10 66.7500-48.2500	57.3393	1.126	8.819	45.450	A	0.000	45.450	45.450	100.00	0.000	0.000
					B	0.000	45.450		100.00	0.000	0.000
					C	0.000	45.450		100.00	0.000	30.103
L11 48.2500-44.2500	46.2429	1.076	8.428	10.450	A	0.000	10.450	10.450	100.00	0.000	0.000
					B	0.000	10.450		100.00	0.000	0.000
					C	0.000	10.450		100.00	0.000	7.360
L12 44.2500-43.0833	43.6661	1.063	8.327	3.090	A	0.000	3.090	3.090	100.00	0.000	0.000
					B	0.000	3.090		100.00	0.000	0.000
					C	0.000	3.090		100.00	0.000	2.147
L13 43.0833-30.0000	36.4698	1.023	8.018	35.939	A	0.000	35.939	35.939	100.00	0.000	0.000
					B	0.000	35.939		100.00	0.000	0.000
					C	0.000	35.939		100.00	0.000	24.073
L14 30.0000-23.7500	26.8329	0.959	7.516	17.285	A	0.000	17.285	17.285	100.00	0.000	0.000
					B	0.000	17.285		100.00	0.000	0.000
					C	0.000	17.285		100.00	0.000	11.500
L15 23.7500-11.0000	17.3086	0.875	6.853	37.870	A	0.000	37.870	37.870	100.00	0.000	0.000
					B	0.000	37.870		100.00	0.000	0.000
					C	0.000	37.870		100.00	0.000	23.460
L16 11.0000-6.0000	8.4902	0.85	6.659	15.497	A	0.000	15.497	15.497	100.00	0.000	0.000
					B	0.000	15.497		100.00	0.000	0.000
					C	0.000	15.497		100.00	0.000	9.200
L17 6.0000-3.2500	4.6221	0.85	6.659	8.679	A	0.000	8.679	8.679	100.00	0.000	0.000
					B	0.000	8.679		100.00	0.000	0.000
					C	0.000	8.679		100.00	0.000	5.060
L18 3.2500-	1.6210	0.85	6.659	10.398	A	0.000	10.398	10.398	100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
0.0000					B	0.000	10.398		100.00	0.000	0.000
					C	0.000	10.398		100.00	0.000	5.980

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	150 - 128.5	Pole	Max Tension	26	0.00	-0.00	0.00
			Max. Compression	26	-18.45	-0.01	-0.50
			Max. Mx	8	-6.28	-253.70	2.17
			Max. My	2	-6.28	-0.01	253.23
			Max. Vy	20	-13.94	253.58	2.16
			Max. Vx	2	-13.93	-0.01	253.23
			Max. Torque	23			0.55
L2	128.5 - 109	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-31.88	1.56	-1.40
			Max. Mx	20	-12.33	614.60	5.25
			Max. My	2	-12.33	0.13	613.74
			Max. Vy	20	-22.45	614.60	5.25
			Max. Vx	2	-22.44	0.13	613.74
			Max. Torque	25			1.44
L3	109 - 104.167	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-33.74	2.17	-1.75
			Max. Mx	20	-13.38	725.41	6.01
			Max. My	2	-13.38	0.18	724.40
			Max. Vy	20	-23.41	725.41	6.01
			Max. Vx	2	-23.39	0.18	724.40
			Max. Torque	25			1.77
L4	104.167 - 100.92	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-35.80	2.59	-2.00
			Max. Mx	20	-14.85	802.56	6.52
			Max. My	2	-14.85	0.21	801.45
			Max. Vy	20	-24.12	802.56	6.52
			Max. Vx	2	-24.11	0.21	801.45
			Max. Torque	25			1.98
L5	100.92 - 95.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-45.76	4.20	-2.03
			Max. Mx	20	-19.36	958.47	7.39
			Max. My	2	-19.36	0.32	957.18
			Max. Vy	20	-29.48	958.47	7.39
			Max. Vx	2	-29.49	0.32	957.18
			Max. Torque	25			2.62
L6	95.25 - 80.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-53.78	6.97	-3.62
			Max. Mx	20	-24.35	1415.21	9.36
			Max. My	2	-24.35	0.23	1413.69
			Max. Vy	20	-32.46	1415.21	9.36
			Max. Vx	2	-32.47	0.23	1413.69
			Max. Torque	25			3.77
L7	80.5 - 73.5833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-58.28	8.32	-4.39
			Max. Mx	20	-27.43	1644.72	10.27
			Max. My	2	-27.43	0.20	1643.09
			Max. Vy	20	-33.91	1644.72	10.27
			Max. Vx	2	-33.92	0.20	1643.09
			Max. Torque	25			4.34
L8	73.5833 - 72	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-59.33	8.64	-4.57
			Max. Mx	20	-28.14	1698.66	10.48
			Max. My	2	-28.14	0.19	1697.00
			Max. Vy	20	-34.24	1698.66	10.48
			Max. Vx	2	-34.25	0.19	1697.00
			Max. Torque	25			4.47
L9	72 - 66.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-62.96	9.68	-5.18
			Max. Mx	20	-30.72	1881.22	11.17
			Max. My	2	-30.72	0.17	1879.46
			Max. Vy	20	-35.31	1881.22	11.17

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	2	-35.32	0.17	1879.46
			Max. Torque	25			4.91
L10	66.75 - 48.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-75.86	13.46	-7.35
			Max. Mx	20	-40.06	2567.28	13.57
			Max. My	2	-40.06	0.11	2565.15
			Max. Vy	20	-38.88	2567.28	13.57
			Max. Vx	2	-38.89	0.11	2565.15
			Max. Torque	25			6.51
L11	48.25 - 44.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-79.31	14.29	-7.83
			Max. Mx	20	-42.73	2724.42	14.08
			Max. My	2	-42.73	0.10	2722.20
			Max. Vy	20	-39.69	2724.42	14.08
			Max. Vx	2	-39.71	0.10	2722.20
			Max. Torque	25			6.91
L12	44.25 - 43.0833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-80.36	14.54	-7.97
			Max. Mx	20	-43.55	2770.87	14.23
			Max. My	2	-43.55	0.10	2768.63
			Max. Vy	20	-39.94	2770.87	14.23
			Max. Vx	2	-39.95	0.10	2768.63
			Max. Torque	25			7.03
L13	43.0833 - 30	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-88.35	16.45	-9.07
			Max. Mx	20	-49.82	3141.52	15.39
			Max. My	2	-49.82	0.08	3139.07
			Max. Vy	20	-41.68	3141.52	15.39
			Max. Vx	2	-41.69	0.08	3139.07
			Max. Torque	25			7.93
L14	30 - 23.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-100.30	18.60	-10.31
			Max. Mx	20	-59.59	3579.39	16.68
			Max. My	2	-59.59	0.07	3576.69
			Max. Vy	20	-43.62	3579.39	16.68
			Max. Vx	2	-43.63	0.07	3576.69
			Max. Torque	25			8.93
L15	23.75 - 11	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-111.79	21.13	-11.77
			Max. Mx	20	-68.96	4147.37	18.26
			Max. My	2	-68.96	0.06	4144.34
			Max. Vy	20	-45.49	4147.37	18.26
			Max. Vx	2	-45.50	0.06	4144.34
			Max. Torque	25			10.11
L16	11 - 6	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-116.03	22.05	-12.30
			Max. Mx	20	-72.48	4376.40	18.86
			Max. My	2	-72.48	0.06	4373.24
			Max. Vy	20	-46.14	4376.40	18.86
			Max. Vx	2	-46.15	0.06	4373.24
			Max. Torque	25			10.58
L17	6 - 3.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-118.52	22.53	-12.58
			Max. Mx	20	-74.59	4503.77	19.19
			Max. My	2	-74.59	0.07	4500.54
			Max. Vy	20	-46.52	4503.77	19.19
			Max. Vx	2	-46.53	0.07	4500.54
			Max. Torque	25			10.84
L18	3.25 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-120.89	23.04	-12.87
			Max. Mx	20	-76.63	4655.52	19.58
			Max. My	2	-76.63	0.07	4652.20
			Max. Vy	20	-46.90	4655.52	19.58
			Max. Vx	2	-46.91	0.07	4652.20
			Max. Torque	25			11.16

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	120.89	-0.00	0.00
	Max. H_x	21	57.49	46.86	0.13
	Max. H_z	3	57.49	-0.02	46.87
	Max. M_x	2	4652.20	-0.02	46.87
	Max. M_z	8	4650.64	-46.86	0.18
	Max. Torsion	25	11.16	23.50	40.43
	Min. Vert	21	57.49	46.86	0.13
	Min. H_x	9	57.49	-46.86	0.18
	Min. H_z	15	57.49	0.02	-46.70
	Min. M_x	14	-4629.98	0.02	-46.70
	Min. M_z	20	-4655.52	46.86	0.13
	Min. Torsion	13	-10.72	-23.32	-40.42

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	63.88	-0.00	0.00	1.17	1.96	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	76.65	0.02	-46.87	-4652.20	0.07	-9.60
0.9 Dead+1.6 Wind 0 deg - No Ice	57.49	0.02	-46.87	-4596.22	-0.53	-9.60
1.2 Dead+1.6 Wind 30 deg - No Ice	76.65	23.54	-40.45	-4006.97	-2340.13	-5.47
0.9 Dead+1.6 Wind 30 deg - No Ice	57.49	23.54	-40.45	-3958.81	-2312.31	-5.47
1.2 Dead+1.6 Wind 60 deg - No Ice	76.65	40.60	-23.44	-2324.64	-4030.74	-0.09
0.9 Dead+1.6 Wind 60 deg - No Ice	57.49	40.60	-23.44	-2296.83	-3982.46	-0.09
1.2 Dead+1.6 Wind 90 deg - No Ice	76.65	46.86	-0.18	-24.23	-4650.64	5.25
0.9 Dead+1.6 Wind 90 deg - No Ice	57.49	46.86	-0.18	-24.23	-4594.98	5.26
1.2 Dead+1.6 Wind 120 deg - No Ice	76.65	40.68	23.19	2291.71	-4043.74	9.24
0.9 Dead+1.6 Wind 120 deg - No Ice	57.49	40.68	23.19	2263.66	-3995.25	9.25
1.2 Dead+1.6 Wind 150 deg - No Ice	76.65	23.32	40.42	4007.22	-2308.15	10.71
0.9 Dead+1.6 Wind 150 deg - No Ice	57.49	23.32	40.42	3958.33	-2280.78	10.72
1.2 Dead+1.6 Wind 180 deg - No Ice	76.65	-0.02	46.70	4629.98	4.71	9.60
0.9 Dead+1.6 Wind 180 deg - No Ice	57.49	-0.02	46.70	4573.61	4.07	9.60
1.2 Dead+1.6 Wind 210 deg - No Ice	76.65	-23.35	40.45	4009.58	2316.98	5.91
0.9 Dead+1.6 Wind 210 deg - No Ice	57.49	-23.35	40.44	3960.65	2288.32	5.91
1.2 Dead+1.6 Wind 240 deg - No Ice	76.65	-40.71	23.22	2295.78	4050.91	0.36
0.9 Dead+1.6 Wind 240 deg - No Ice	57.49	-40.71	23.22	2267.67	4001.14	0.35
1.2 Dead+1.6 Wind 270 deg - No Ice	76.65	-46.86	-0.13	-19.58	4655.52	-5.25
0.9 Dead+1.6 Wind 270 deg - No Ice	57.49	-46.86	-0.13	-19.63	4598.60	-5.26
1.2 Dead+1.6 Wind 300 deg - No Ice	76.65	-40.58	-23.40	-2320.67	4033.28	-9.50
0.9 Dead+1.6 Wind 300 deg	57.49	-40.58	-23.40	-2292.89	3983.77	-9.51

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
- No Ice 1.2 Dead+1.6 Wind 330 deg	76.65	-23.50	-40.43	-4004.71	2340.91	-11.15
- No Ice 0.9 Dead+1.6 Wind 330 deg	57.49	-23.50	-40.43	-3956.56	2311.90	-11.16
- No Ice 1.2 Dead+1.0 Ice+1.0 Temp	120.89	0.00	-0.00	12.87	23.04	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	120.89	0.00	-11.99	-1258.93	22.76	-3.54
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	120.89	6.02	-10.36	-1083.54	-616.26	-2.04
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	120.89	10.39	-6.00	-622.73	-1079.01	-0.05
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	120.89	11.99	-0.04	7.25	-1248.74	1.95
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	120.89	10.41	5.94	640.72	-1082.02	3.43
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	120.89	5.97	10.35	1108.93	-609.18	3.99
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	120.89	-0.00	11.96	1279.16	23.64	3.54
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	120.89	-5.98	10.36	1109.38	656.35	2.14
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	120.89	-10.41	5.95	641.49	1128.87	0.11
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	120.89	-11.99	-0.03	8.14	1295.16	-1.94
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	120.89	-10.39	-5.99	-621.97	1124.98	-3.49
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	120.89	-6.01	-10.35	-1083.10	661.90	-4.09
Dead+Wind 0 deg - Service	63.88	0.00	-10.03	-988.41	1.54	-0.06
Dead+Wind 30 deg - Service	63.88	5.04	-8.65	-851.16	-496.09	-0.01
Dead+Wind 60 deg - Service	63.88	8.69	-5.01	-493.43	-855.61	-0.02
Dead+Wind 90 deg - Service	63.88	10.02	-0.04	-4.24	-987.51	-0.03
Dead+Wind 120 deg - Service	63.88	8.70	4.96	488.24	-858.36	-0.02
Dead+Wind 150 deg - Service	63.88	4.99	8.65	853.01	-489.28	-0.01
Dead+Wind 180 deg - Service	63.88	-0.00	9.99	985.46	2.53	0.06
Dead+Wind 210 deg - Service	63.88	-5.00	8.65	853.50	494.20	0.11
Dead+Wind 240 deg - Service	63.88	-8.71	4.97	489.10	862.92	0.08
Dead+Wind 270 deg - Service	63.88	-10.02	-0.03	-3.25	991.57	0.03
Dead+Wind 300 deg - Service	63.88	-8.68	-5.00	-492.57	859.18	-0.04
Dead+Wind 330 deg - Service	63.88	-5.03	-8.65	-850.66	499.30	-0.09

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-63.88	0.00	0.00	63.88	-0.00	0.000%
2	0.02	-76.65	-46.87	-0.02	76.65	46.87	0.002%
3	0.02	-57.49	-46.87	-0.02	57.49	46.87	0.001%
4	23.54	-76.65	-40.45	-23.54	76.65	40.45	0.000%
5	23.54	-57.49	-40.45	-23.54	57.49	40.45	0.000%
6	40.61	-76.65	-23.44	-40.60	76.65	23.44	0.000%
7	40.61	-57.49	-23.44	-40.60	57.49	23.44	0.000%
8	46.86	-76.65	-0.18	-46.86	76.65	0.18	0.003%
9	46.86	-57.49	-0.18	-46.86	57.49	0.18	0.003%
10	40.68	-76.65	23.19	-40.68	76.65	-23.19	0.000%
11	40.68	-57.49	23.19	-40.68	57.49	-23.19	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
12	23.32	-76.65	40.42	-23.32	76.65	-40.42	0.000%
13	23.32	-57.49	40.42	-23.32	57.49	-40.42	0.000%
14	-0.02	-76.65	46.70	0.02	76.65	-46.70	0.002%
15	-0.02	-57.49	46.70	0.02	57.49	-46.70	0.001%
16	-23.35	-76.65	40.45	23.35	76.65	-40.45	0.000%
17	-23.35	-57.49	40.45	23.35	57.49	-40.44	0.000%
18	-40.71	-76.65	23.22	40.71	76.65	-23.22	0.000%
19	-40.71	-57.49	23.22	40.71	57.49	-23.22	0.000%
20	-46.86	-76.65	-0.13	46.86	76.65	0.13	0.003%
21	-46.86	-57.49	-0.13	46.86	57.49	0.13	0.003%
22	-40.58	-76.65	-23.40	40.58	76.65	23.40	0.000%
23	-40.58	-57.49	-23.40	40.58	57.49	23.40	0.000%
24	-23.50	-76.65	-40.43	23.50	76.65	40.43	0.000%
25	-23.50	-57.49	-40.43	23.50	57.49	40.43	0.000%
26	0.00	-120.89	0.00	-0.00	120.89	0.00	0.000%
27	0.00	-120.89	-11.99	-0.00	120.89	11.99	0.001%
28	6.02	-120.89	-10.36	-6.02	120.89	10.36	0.000%
29	10.39	-120.89	-6.00	-10.39	120.89	6.00	0.000%
30	11.99	-120.89	-0.04	-11.99	120.89	0.04	0.000%
31	10.41	-120.89	5.94	-10.41	120.89	-5.94	0.001%
32	5.97	-120.89	10.35	-5.97	120.89	-10.35	0.001%
33	-0.00	-120.89	11.96	0.00	120.89	-11.96	0.001%
34	-5.98	-120.89	10.36	5.98	120.89	-10.36	0.001%
35	-10.41	-120.89	5.95	10.41	120.89	-5.95	0.001%
36	-11.99	-120.89	-0.03	11.99	120.89	0.03	0.001%
37	-10.39	-120.89	-5.99	10.39	120.89	5.99	0.001%
38	-6.01	-120.89	-10.35	6.01	120.89	10.35	0.001%
39	0.00	-63.88	-10.03	-0.00	63.88	10.03	0.003%
40	5.04	-63.88	-8.65	-5.04	63.88	8.65	0.003%
41	8.69	-63.88	-5.01	-8.69	63.88	5.01	0.003%
42	10.03	-63.88	-0.04	-10.02	63.88	0.04	0.003%
43	8.70	-63.88	4.96	-8.70	63.88	-4.96	0.003%
44	4.99	-63.88	8.65	-4.99	63.88	-8.65	0.003%
45	-0.00	-63.88	9.99	0.00	63.88	-9.99	0.003%
46	-5.00	-63.88	8.65	5.00	63.88	-8.65	0.003%
47	-8.71	-63.88	4.97	8.71	63.88	-4.97	0.003%
48	-10.03	-63.88	-0.03	10.02	63.88	0.03	0.003%
49	-8.68	-63.88	-5.01	8.68	63.88	5.00	0.003%
50	-5.03	-63.88	-8.65	5.03	63.88	8.65	0.003%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	18	0.00002104	0.00013005
3	Yes	18	0.00000001	0.00010077
4	Yes	22	0.00000001	0.00009441
5	Yes	21	0.00000001	0.00013875
6	Yes	22	0.00000001	0.00009653
7	Yes	21	0.00000001	0.00014191
8	Yes	17	0.00004300	0.00009881
9	Yes	17	0.00002815	0.00007967
10	Yes	22	0.00000001	0.00009934
11	Yes	21	0.00000001	0.00014632
12	Yes	22	0.00000001	0.00009106
13	Yes	21	0.00000001	0.00013377
14	Yes	18	0.00002107	0.00013312
15	Yes	18	0.00000001	0.00010315
16	Yes	22	0.00000001	0.00009777
17	Yes	21	0.00000001	0.00014392
18	Yes	22	0.00000001	0.00009554
19	Yes	21	0.00000001	0.00014038
20	Yes	17	0.00004299	0.00010486
21	Yes	17	0.00002814	0.00008426
22	Yes	22	0.00000001	0.00009297
23	Yes	21	0.00000001	0.00013645

24	Yes	22	0.00000001	0.00010109
25	Yes	21	0.00000001	0.00014896
26	Yes	13	0.00000001	0.00004236
27	Yes	19	0.00000001	0.00008766
28	Yes	19	0.00000001	0.00011963
29	Yes	19	0.00000001	0.00012164
30	Yes	19	0.00000001	0.00008526
31	Yes	19	0.00000001	0.00012841
32	Yes	19	0.00000001	0.00012028
33	Yes	19	0.00000001	0.00008889
34	Yes	19	0.00000001	0.00013163
35	Yes	19	0.00000001	0.00012897
36	Yes	19	0.00000001	0.00008816
37	Yes	19	0.00000001	0.00012387
38	Yes	19	0.00000001	0.00013246
39	Yes	15	0.00014729	0.00004493
40	Yes	15	0.00014703	0.00012721
41	Yes	15	0.00014705	0.00012755
42	Yes	15	0.00014731	0.00004490
43	Yes	15	0.00014706	0.00012595
44	Yes	15	0.00014704	0.00012572
45	Yes	15	0.00014728	0.00004477
46	Yes	15	0.00014702	0.00012952
47	Yes	15	0.00014703	0.00012601
48	Yes	15	0.00014728	0.00004504
49	Yes	15	0.00014703	0.00012695
50	Yes	15	0.00014702	0.00013027

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load*	*Tilt*	*Twist*
	ft	*in*	*Comb.*	*°*	*°*
L1	150 - 128.5	28.30	47	1.97	0.00
L2	128.5 - 109	20.05	47	1.60	0.00
L3	109 - 104.167	14.09	47	1.30	0.00
L4	104.167 - 100.92	12.81	47	1.22	0.00
L5	100.92 - 95.25	11.98	47	1.20	0.00
L6	95.25 - 80.5	10.59	47	1.14	0.00
L7	80.5 - 73.5833	7.40	47	0.92	0.00
L8	73.5833 - 72	6.13	47	0.83	0.00
L9	72 - 66.75	5.86	47	0.81	0.00
L10	66.75 - 48.25	5.00	47	0.74	0.00
L11	48.25 - 44.25	2.60	47	0.50	0.00
L12	44.25 - 43.0833	2.20	47	0.46	0.00
L13	43.0833 - 30	2.09	47	0.45	0.00
L14	34 - 23.75	1.33	47	0.35	0.00
L15	23.75 - 11	0.66	47	0.26	0.00
L16	11 - 6	0.15	47	0.13	0.00
L17	6 - 3.25	0.05	47	0.07	0.00
L18	3.25 - 0	0.01	47	0.04	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation	*Appurtenance*	*Gov. Load*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature*
ft		*Comb.*	*in*	*°*	*°*	*ft*
150.0000	QS66512-2 w/ Mount Pipe	47	28.30	1.97	0.00	10310
147.0000	RRUS 11	47	27.09	1.92	0.00	10310
143.0000	VHLP2-23	47	25.50	1.84	0.00	7364
138.0000	LLPX310R-V1 w/ Mount Pipe	47	23.55	1.75	0.00	4295
120.0000	LNX-6515DS-A1M w/ Mount Pipe	47	17.27	1.48	0.00	2977
99.0000	(2) X7CQAP-465-VR0 w/ Mount Pipe	47	11.51	1.18	0.00	6068

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 128.5	132.69	20	9.26	0.02
L2	128.5 - 109	94.10	20	7.51	0.02
L3	109 - 104.167	66.12	20	6.13	0.02
L4	104.167 - 100.92	60.12	20	5.75	0.02
L5	100.92 - 95.25	56.26	20	5.62	0.02
L6	95.25 - 80.5	49.74	20	5.38	0.02
L7	80.5 - 73.5833	34.75	20	4.32	0.01
L8	73.5833 - 72	28.80	20	3.90	0.01
L9	72 - 66.75	27.52	20	3.81	0.01
L10	66.75 - 48.25	23.50	20	3.50	0.01
L11	48.25 - 44.25	12.20	20	2.34	0.01
L12	44.25 - 43.0833	10.32	20	2.14	0.01
L13	43.0833 - 30	9.80	20	2.09	0.01
L14	34 - 23.75	6.25	18	1.65	0.00
L15	23.75 - 11	3.10	18	1.22	0.00
L16	11 - 6	0.70	18	0.59	0.00
L17	6 - 3.25	0.22	18	0.33	0.00
L18	3.25 - 0	0.07	18	0.20	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.0000	QS66512-2 w/ Mount Pipe	20	132.69	9.26	0.03	2299
147.0000	RRUS 11	20	127.06	9.00	0.03	2299
143.0000	VHLP2-23	20	119.61	8.65	0.03	1642
138.0000	LLPX310R-V1 w/ Mount Pipe	20	110.47	8.23	0.02	956
120.0000	LNX-6515DS-A1M w/ Mount Pipe	20	81.05	6.94	0.02	653
99.0000	(2) X7CQAP-465-VR0 w/ Mount Pipe	20	54.02	5.55	0.02	1315

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	150 - 128.5 (1)	TP18.1463x15x0.2188	21.5000	0.0000	0.0	12.6306	-6.28	716.15	0.009
L2	128.5 - 109 (2)	TP21x18.1463x0.5837	19.5000	0.0000	0.0	38.3714	-12.33	1529.92	0.008
L3	109 - 104.167 (3)	TP21.7298x21x0.661	4.8333	0.0000	0.0	44.8433	-13.38	1959.85	0.007
L4	104.167 - 100.92 (4)	TP22.2201x21.7298x1.5958	3.2467	0.0000	0.0	105.9770	-14.85	4632.85	0.003
L5	100.92 - 95.25 (5)	TP23.0763x22.2201x1.4985	5.6700	0.0000	0.0	104.1180	-19.36	4350.86	0.004
L6	95.25 - 80.5 (6)	TP25.3035x23.0763x0.8972	14.7500	0.0000	0.0	70.5124	-24.35	3126.48	0.008
L7	80.5 - 73.5833 (7)	TP26.3479x25.3035x1.1822	6.9167	0.0000	0.0	95.7972	-27.43	3860.85	0.007
L8	73.5833 - 72 (8)	TP26.587x26.3479x1.1696	1.5833	0.0000	0.0	95.7240	-28.14	3860.07	0.007
L9	72 - 66.75 (9)	TP26.992x26.587x1.266	5.2500	0.0000	0.0	104.8700	-30.72	4228.89	0.007
L10	66.75 - 48.25	TP29.9611x26.992x1.204	18.500	0.0000	0.0	111.50	-40.06	4944.24	0.008

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
	(10)	2	0			90			
L11	48.25 - 44.25 (11)	TP30.603x29.9611x1.5876	4.0000	0.0000	0.0	148.3250	-42.73	5855.07	0.007
L12	44.25 - 43.0833 (12)	TP30.7903x30.603x1.6684	1.1667	0.0000	0.0	156.4520	-43.55	6182.99	0.007
L13	43.0833 - 30 (13)	TP32.89x30.7903x1.5728	13.0833	0.0000	0.0	155.3490	-49.82	6195.76	0.008
L14	30 - 23.75 (14)	TP33.3525x29.1025x1.6275	10.2500	0.0000	0.0	152.6750	-55.07	6130.65	0.009
L15	23.75 - 11 (15)	TP35.5039x33.3525x1.5179	12.7500	0.0000	0.0	166.1080	-68.96	6743.53	0.010
L16	11 - 6 (16)	TP36.3476x35.5039x1.3615	5.0000	0.0000	0.0	153.3810	-72.48	7430.47	0.010
L17	6 - 3.25 (17)	TP36.8116x36.3476x1.493	2.7500	0.0000	0.0	169.7970	-74.59	8096.73	0.009
L18	3.25 - 0 (18)	TP37.36x36.8116x1.1317	3.2500	0.0000	0.0	132.0170	-76.63	6573.67	0.012

Pole Bending Design Data

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 $\frac{M_{uy}}{\phi M_{ny}}$
L1	150 - 128.5 (1)	TP18.1463x15x0.2188	253.71	260.46	0.974	0.00	260.46	0.000
L2	128.5 - 109 (2)	TP21x18.1463x0.5837	614.62	623.56	0.986	0.00	623.56	0.000
L3	109 - 104.167 (3)	TP21.7298x21x0.661	725.43	822.10	0.882	0.00	822.10	0.000
L4	104.167 - 100.92 (4)	TP22.2201x21.7298x1.5958	802.59	1821.11	0.441	0.00	1821.11	0.000
L5	100.92 - 95.25 (5)	TP23.0763x22.2201x1.4985	958.49	1802.58	0.532	0.00	1802.58	0.000
L6	95.25 - 80.5 (6)	TP25.3035x23.0763x0.8972	1415.24	1511.31	0.936	0.00	1511.31	0.000
L7	80.5 - 73.5833 (7)	TP26.3479x25.3035x1.1822	1644.75	1905.60	0.863	0.00	1905.60	0.000
L8	73.5833 - 72 (8)	TP26.587x26.3479x1.1696	1698.69	1926.03	0.882	0.00	1926.03	0.000
L9	72 - 66.75 (9)	TP26.992x26.587x1.266	1881.25	2129.18	0.884	0.00	2129.18	0.000
L10	66.75 - 48.25 (10)	TP29.9611x26.992x1.2042	2567.31	2802.20	0.916	0.00	2802.20	0.000
L11	48.25 - 44.25 (11)	TP30.603x29.9611x1.5876	2724.50	3307.52	0.824	0.00	3307.52	0.000
L12	44.25 - 43.0833 (12)	TP30.7903x30.603x1.6684	2770.97	3497.01	0.792	0.00	3497.01	0.000
L13	43.0833 - 30 (13)	TP32.89x30.7903x1.5728	3141.75	3712.30	0.846	0.00	3712.30	0.000
L14	30 - 23.75 (14)	TP33.3525x29.1025x1.6275	3310.34	3473.50	0.953	0.00	3473.50	0.000
L15	23.75 - 11 (15)	TP35.5039x33.3525x1.5179	4147.92	4504.92	0.921	0.00	4504.92	0.000
L16	11 - 6 (16)	TP36.3476x35.5039x1.3615	4377.02	5138.14	0.852	0.00	5138.14	0.000
L17	6 - 3.25 (17)	TP36.8116x36.3476x1.493	4504.43	5633.86	0.800	0.00	5633.86	0.000
L18	3.25 - 0 (18)	TP37.36x36.8116x1.1317	4656.23	4742.12	0.982	0.00	4742.12	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	150 - 128.5 (1)	TP18.1463x15x0.2188	13.94	358.08	0.039	0.36	528.12	0.001
L2	128.5 - 109 (2)	TP21x18.1463x0.5837	22.45	764.96	0.029	0.80	1264.39	0.001
L3	109 - 104.167 (3)	TP21.7298x21x0.661	23.41	979.92	0.024	0.97	1666.95	0.001
L4	104.167 - 100.92 (4)	TP22.2201x21.7298x1.5958	24.12	2316.42	0.010	1.08	3692.63	0.000
L5	100.92 - 95.25 (5)	TP23.0763x22.2201x1.4985	29.48	2175.43	0.014	0.98	3655.08	0.000
L6	95.25 - 80.5 (6)	TP25.3035x23.0763x0.8972	32.46	1563.24	0.021	1.56	3064.46	0.001
L7	80.5 - 73.5833 (7)	TP26.3479x25.3035x1.1822	33.91	1930.43	0.018	1.84	3863.95	0.000
L8	73.5833 - 72 (8)	TP26.587x26.3479x1.1696	34.24	1930.04	0.018	1.91	3905.39	0.000
L9	72 - 66.75 (9)	TP26.992x26.587x1.266	35.31	2114.45	0.017	2.13	4317.31	0.000
L10	66.75 - 48.25 (10)	TP29.9611x26.992x1.2042	38.88	2472.12	0.016	2.93	5681.98	0.001
L11	48.25 - 44.25 (11)	TP30.603x29.9611x1.5876	39.71	2927.54	0.014	0.36	6706.61	0.000
L12	44.25 - 43.0833 (12)	TP30.7903x30.603x1.6684	39.95	3091.49	0.013	0.36	7090.85	0.000
L13	43.0833 - 30 (13)	TP32.89x30.7903x1.5728	41.69	3097.88	0.013	0.36	7527.39	0.000
L14	30 - 23.75 (14)	TP33.3525x29.1025x1.6275	42.77	3110.77	0.014	0.36	7043.18	0.000
L15	23.75 - 11 (15)	TP35.5039x33.3525x1.5179	45.50	3371.76	0.013	0.36	9134.58	0.000
L16	11 - 6 (16)	TP36.3476x35.5039x1.3615	46.15	3715.24	0.012	0.36	10418.58	0.000
L17	6 - 3.25 (17)	TP36.8116x36.3476x1.493	46.53	4048.36	0.011	0.36	11423.67	0.000
L18	3.25 - 0 (18)	TP37.36x36.8116x1.1317	46.91	3286.84	0.014	0.36	9615.50	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 128.5 (1)	0.009	0.974	0.000	0.039	0.001	0.984 ✔	1.000	4.8.2 ✔
L2	128.5 - 109 (2)	0.008	0.986	0.000	0.029	0.001	0.995 ✔	1.000	4.8.2 ✔
L3	109 - 104.167 (3)	0.007	0.882	0.000	0.024	0.001	0.890 ✔	1.000	4.8.2 ✔
L4	104.167 - 100.92 (4)	0.003	0.441	0.000	0.010	0.000	0.444 ✔	1.000	4.8.2 ✔
L5	100.92 - 95.25 (5)	0.004	0.532	0.000	0.014	0.000	0.536 ✔	1.000	4.8.2 ✔
L6	95.25 - 80.5 (6)	0.008	0.936	0.000	0.021	0.001	0.945 ✔	1.000	4.8.2 ✔
L7	80.5 - 73.5833 (7)	0.007	0.863	0.000	0.018	0.000	0.871 ✔	1.000	4.8.2 ✔
L8	73.5833 - 72 (8)	0.007	0.882	0.000	0.018	0.000	0.890 ✔	1.000	4.8.2 ✔
L9	72 - 66.75 (9)	0.007	0.884	0.000	0.017	0.000	0.891 ✔	1.000	4.8.2 ✔

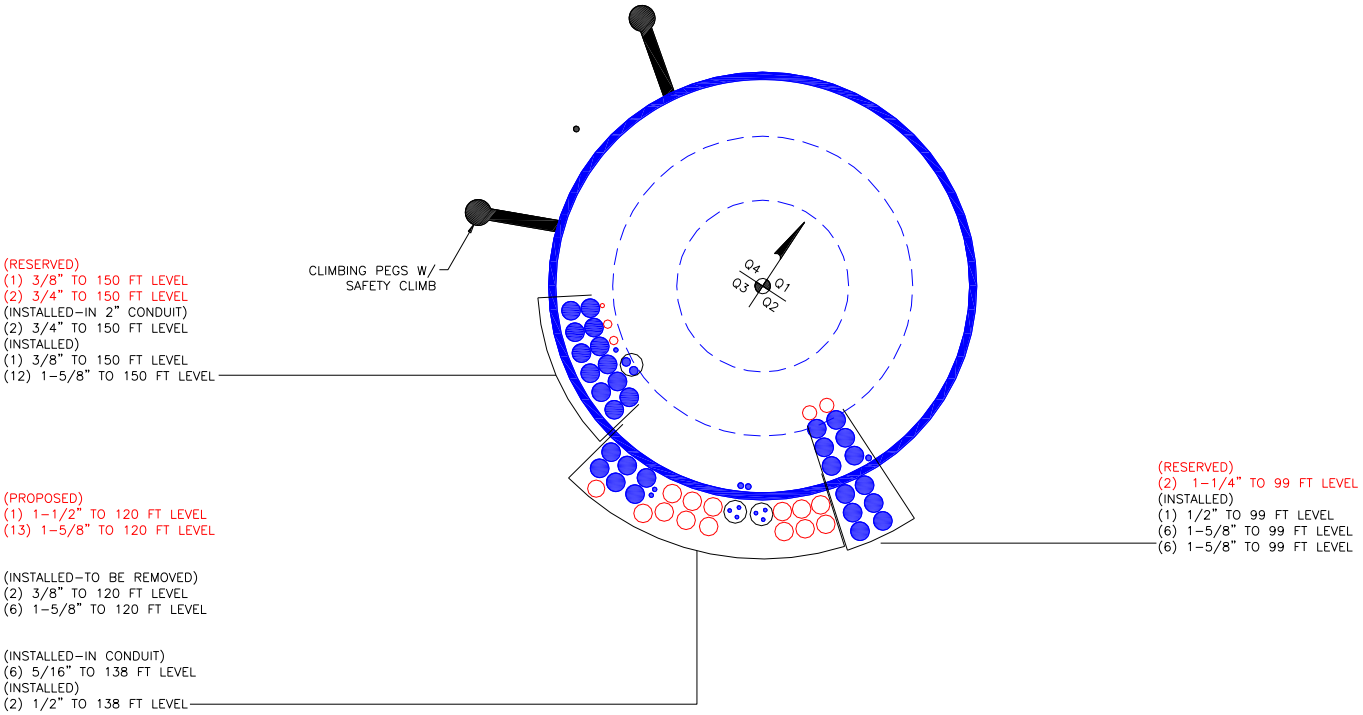
Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L10	66.75 - 48.25 (10)	0.008	0.916	0.000	0.016	0.001	0.925 ✔	1.000	4.8.2 ✔
L11	48.25 - 44.25 (11)	0.007	0.824	0.000	0.014	0.000	0.831 ✔	1.000	4.8.2 ✔
L12	44.25 - 43.0833 (12)	0.007	0.792	0.000	0.013	0.000	0.800 ✔	1.000	4.8.2 ✔
L13	43.0833 - 30 (13)	0.008	0.846	0.000	0.013	0.000	0.855 ✔	1.000	4.8.2 ✔
L14	30 - 23.75 (14)	0.009	0.953	0.000	0.014	0.000	0.962 ✔	1.000	4.8.2 ✔
L15	23.75 - 11 (15)	0.010	0.921	0.000	0.013	0.000	0.931 ✔	1.000	4.8.2 ✔
L16	11 - 6 (16)	0.010	0.852	0.000	0.012	0.000	0.862 ✔	1.000	4.8.2 ✔
L17	6 - 3.25 (17)	0.009	0.800	0.000	0.011	0.000	0.809 ✔	1.000	4.8.2 ✔
L18	3.25 - 0 (18)	0.012	0.982	0.000	0.014	0.000	0.994 ✔	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	150 - 128.5	Pole	TP18.1463x15x0.2188	1	-6.28	716.15	98.4	Pass
L2	128.5 - 109	Pole	TP21x18.1463x0.5837	2	-12.33	1529.92	99.5	Pass
L3	109 - 104.167	Pole	TP21.7298x21x0.661	3	-13.38	1959.85	89.0	Pass
L4	104.167 - 100.92	Pole	TP22.2201x21.7298x1.5958	4	-14.85	4632.85	44.4	Pass
L5	100.92 - 95.25	Pole	TP23.0763x22.2201x1.4985	5	-19.36	4350.86	53.6	Pass
L6	95.25 - 80.5	Pole	TP25.3035x23.0763x0.8972	6	-24.35	3126.48	94.5	Pass
L7	80.5 - 73.5833	Pole	TP26.3479x25.3035x1.1822	7	-27.43	3860.85	87.1	Pass
L8	73.5833 - 72	Pole	TP26.587x26.3479x1.1696	8	-28.14	3860.07	89.0	Pass
L9	72 - 66.75	Pole	TP26.992x26.587x1.266	9	-30.72	4228.89	89.1	Pass
L10	66.75 - 48.25	Pole	TP29.9611x26.992x1.2042	10	-40.06	4944.24	92.5	Pass
L11	48.25 - 44.25	Pole	TP30.603x29.9611x1.5876	11	-42.73	5855.07	83.1	Pass
L12	44.25 - 43.0833	Pole	TP30.7903x30.603x1.6684	12	-43.55	6182.99	80.0	Pass
L13	43.0833 - 30	Pole	TP32.89x30.7903x1.5728	13	-49.82	6195.76	85.5	Pass
L14	30 - 23.75	Pole	TP33.3525x29.1025x1.6275	14	-55.07	6130.65	96.2	Pass
L15	23.75 - 11	Pole	TP35.5039x33.3525x1.5179	15	-68.96	6743.53	93.1	Pass
L16	11 - 6	Pole	TP36.3476x35.5039x1.3615	16	-72.48	7430.47	86.2	Pass
L17	6 - 3.25	Pole	TP36.8116x36.3476x1.493	17	-74.59	8096.73	80.9	Pass
L18	3.25 - 0	Pole	TP37.36x36.8116x1.1317	18	-76.63	6573.67	99.4	Pass
							Summary	
						Pole (L2)	99.5	Pass
						RATING =	**99.5**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

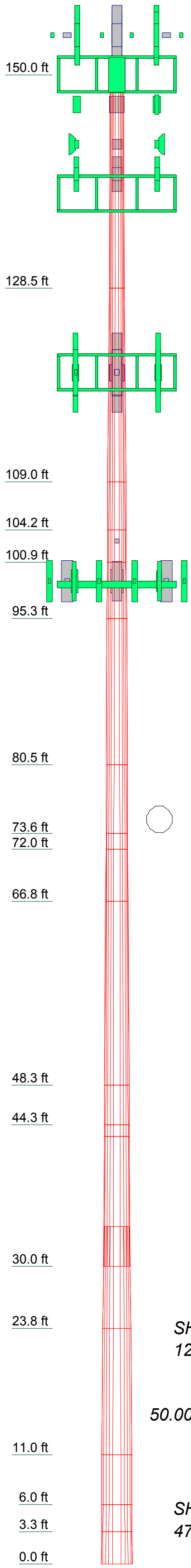


APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Length (ft)	21.5000	19.5000	4.8333	3.2467	5.6700	14.7500	6.9167	1.5833	5.2500	18.5000	4.0000	1.1667	13.0833	10.2500	12.7500	5.0000	2.7500	3.2500
Number of Sides	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Thickness (in)	0.2188	0.5837	0.6610	1.5958	1.4985	0.8972	1.1822	1.1696	1.2660	1.2042	1.5876	[illegible]	1.5728	1.6275	1.5179	1.3615	[illegible]	[illegible]
Socket Length (ft)													4.0000					
Top Dia (in)	15.0000	18.1463	21.0000	21.7298	22.2201	23.0763	25.3035	26.3479	26.5870	26.9920	[illegible]	[illegible]	30.7903	29.1025	33.3525	35.5039	[illegible]	[illegible]
Bot Dia (in)	18.1463	21.0000	21.7298	22.2201	23.0763	25.3035	26.3479	26.5870	26.9920	29.9611	[illegible]	[illegible]	32.8900	33.3525	35.5039	36.3476	[illegible]	[illegible]
Grade	A572-50	Reinf 35.16 ksi	[illegible]	[illegible]	Reinf 36.85 ksi	Reinf 39.10 ksi	Reinf 35.54 ksi	[illegible]	Reinf 35.56 ksi	Reinf 39.10 ksi	[illegible]	[illegible]	Reinf 35.17 ksi	Reinf 35.17 ksi	Reinf 35.41 ksi	Reinf 35.80 ksi	[illegible]	[illegible]
Weight (K)	0.8	2.4	0.7	1.2	2.0	3.4	2.2	0.5	1.9	6.7	2.0	0.6	6.8	5.4	7.0	2.6	1.6	1.4

Total Weight (K): 49.1



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
QS66512-2 w/ Mount Pipe	150	VHLP2-23	138
QS66512-2 w/ Mount Pipe	150	VHLP2-18	138
QS66512-2 w/ Mount Pipe	150	LNX-6515DS-A1M w/ Mount Pipe	120
(2) TPX-070821	150	RRUS 11 B12	120
(2) TPX-070821	150	RRUS 11 B12	120
(2) TPX-070821	150	RRUS 11 B12	120
RRUS 32	150	AIR -32 B2A/B66AA w/ Mount Pipe	120
RRUS 32	150	AIR -32 B2A/B66AA w/ Mount Pipe	120
RRUS 32	150	AIR -32 B2A/B66AA w/ Mount Pipe	120
RRUS 32 B2	150	AIR 21 B2A/B4P w/ Mount Pipe	120
RRUS 32 B2	150	AIR 21 B2A/B4P w/ Mount Pipe	120
RRUS 32 B2	150	AIR 21 B2A/B4P w/ Mount Pipe	120
782 10253	150	KRY 112 144/1	120
782 10253	150	KRY 112 144/1	120
782 10253	150	KRY 112 144/1	120
DC6-48-60-18-8F	150	Platform Mount [LP 301-1]	120
P65-16-XLH-RR w/ Mount Pipe	150	LNX-6515DS-A1M w/ Mount Pipe	120
P65-16-XLH-RR w/ Mount Pipe	150	LNX-6515DS-A1M w/ Mount Pipe	120
P65-16-XLH-RR w/ Mount Pipe	150	(2) X7CQAP-465-VR0 w/ Mount Pipe	99
7770.00 w/ Mount Pipe	150	B13 RRH 4X30	99
7770.00 w/ Mount Pipe	150	B13 RRH 4X30	99
7770.00 w/ Mount Pipe	150	B13 RRH 4X30	99
TT19-08BP111-001	150	B25 RRH2x60 PCS	99
TT19-08BP111-001	150	B25 RRH2x60 PCS	99
TT19-08BP111-001	150	B25 RRH2x60 PCS	99
Platform Mount (LP 101-1)	150	B66A RRH4X45	99
Side Arm Mount [SO 201-3]	150	B66A RRH4X45	99
Top Hat 20" Diameter x 3'-6" Tall	150	B66A RRH4X45	99
RRUS 11	147	RC2DC-3315-PF-48	99
RRUS 11	147	RC2DC-3315-PF-48	99
RRUS 11	147	BXA-171063/8CF w/ Mount Pipe	99
TME-DC6-48-60-18-8F	147	BXA-171063/8CF w/ Mount Pipe	99
Pipe Mount [PM 601-3]	147	BXA-171063/8CF w/ Mount Pipe	99
LLPX310R-V1 w/ Mount Pipe	138	BXA-70063/4CF w/ Mount Pipe	99
LLPX310R-V1 w/ Mount Pipe	138	BXA-70063/4CF w/ Mount Pipe	99
LLPX310R-V1 w/ Mount Pipe	138	BXA-70063/4CF w/ Mount Pipe	99
RAS SPI-2213 RRH	138	GPS_A	99
RAS SPI-2213 RRH	138	(2) FD9R6004/2C-3L	99
RAS SPI-2213 RRH	138	(2) FD9R6004/2C-3L	99
Horizon Compact	138	(2) FD9R6004/2C-3L	99
Horizon Compact	138	T-Arm Mount [TA 602-3]	99
CW JUNCTION BOX	138	(2) X7CQAP-465-VR0 w/ Mount Pipe	99
Platform Mount [LP 713-1]	138	(2) X7CQAP-465-VR0 w/ Mount Pipe	99

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	Reinf 34.81 ksi	35 ksi	44 ksi
Reinf 35.16 ksi	35 ksi	44 ksi	Reinf 34.85 ksi	35 ksi	44 ksi
Reinf 38.54 ksi	39 ksi	49 ksi	Reinf 35.17 ksi	35 ksi	44 ksi
Reinf 38.55 ksi	39 ksi	49 ksi	Reinf 35.41 ksi	35 ksi	45 ksi
Reinf 36.85 ksi	37 ksi	47 ksi	Reinf 35.80 ksi	36 ksi	45 ksi
Reinf 39.10 ksi	39 ksi	49 ksi	Reinf 42.72 ksi	43 ksi	54 ksi
Reinf 35.54 ksi	36 ksi	45 ksi	Reinf 42.05 ksi	42 ksi	53 ksi
Reinf 35.56 ksi	36 ksi	45 ksi	Reinf 43.91 ksi	44 ksi	55 ksi

ALL REACTIONS ARE FACTORED

AXIAL 121 K
SHEAR 12 K
MOMENT 1298 kip-ft
TORQUE 4 kip-ft
50.00 mph WIND - 0.7500 in ICE

AXIAL 77 K
SHEAR 47 K
MOMENT 4656 kip-ft
TORQUE 11 kip-ft
REACTIONS - 97.00 mph WIND

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97.00 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: 99.5%

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

Job: ***150' Monopole / Bridgeport, CT***		
Project: ***BU 841288 / PJF# 37517-0750***		
Client: Crown Castle	Drawn by: Seth Tschanen	App'd:
Code: TIA-222-G	Date: 04/04/17	Scale: NTS
Path:		Dwg No. E-1

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

v4.4 - Effective 7-12-13

Date: 4/4/2017
PJF Project: 37517-0750.003.7700
Client Ref. # BU 841288
Site Name: Birdgeport North
Description: 150' Monopole
Owner: Crown Castle
Engineer: SJT

Asymmetric Anchor Rod Analysis

Moment =	4656	k-ft	TIA Ref.	G	Location =	Base Plate		
Axial =	77.0	kips	ASIF =	N/A	η =	0.50	for BP, Rev. G Sect. 4.9.9	
Shear =	47.0	kips	Max Ratio =	100.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	20							

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

Item	Nominal Anchor Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	2.250	#18J A615 Gr 75	75	100	37.0	43.00	0.00	3.98	242.85	235.07	247.60	0.00	260.00	95.2%
2	2.250	#18J A615 Gr 75	75	100	53.0	43.00	0.00	3.98	242.85	235.07	247.60	0.00	260.00	95.2%
3	2.250	#18J A615 Gr 75	75	100	127.0	43.00	0.00	3.98	242.85	235.07	247.60	0.00	260.00	95.2%
4	2.250	#18J A615 Gr 75	75	100	143.0	43.00	0.00	3.98	242.85	235.07	247.60	0.00	260.00	95.2%
5	2.250	#18J A615 Gr 75	75	100	217.0	43.00	0.00	3.98	242.85	235.07	247.60	0.00	260.00	95.2%
6	2.250	#18J A615 Gr 75	75	100	233.0	43.00	0.00	3.98	242.85	235.07	247.60	0.00	260.00	95.2%
7	2.250	#18J A615 Gr 75	75	100	307.0	43.00	0.00	3.98	242.85	235.07	247.60	0.00	260.00	95.2%
8	2.250	#18J A615 Gr 75	75	100	323.0	43.00	0.00	3.98	242.85	235.07	247.60	0.00	260.00	95.2%
9	2.500	Dywidag (150 ksi)	127.7	150	75.0	42.74	0.00	5.35	324.44	313.98	330.82	392.46	392.46	84.3%
10	2.500	Dywidag (150 ksi)	127.7	150	165.0	42.74	0.00	5.35	324.44	313.98	330.82	392.46	392.46	84.3%
11	2.500	Dywidag (150 ksi)	127.7	150	255.0	42.74	0.00	5.35	324.44	313.98	330.82	392.46	392.46	84.3%
12	2.500	Dywidag (150 ksi)	127.7	150	345.0	42.74	0.00	5.35	324.44	313.98	330.82	392.46	392.46	84.3%
13	2.250	A193 Gr B7	105	125	0.0	49.00	0.00	3.98	275.92	268.14	280.66	0.00	325.00	86.4%
14	2.250	A193 Gr B7	105	125	90.0	49.00	0.00	3.98	275.92	268.14	280.66	0.00	325.00	86.4%
15	2.250	A193 Gr B7	105	125	180.0	49.00	0.00	3.98	275.92	268.14	280.66	0.00	325.00	86.4%
16	2.250	A193 Gr B7	105	125	270.0	49.00	0.00	3.98	275.92	268.14	280.66	0.00	325.00	86.4%
17	1.750	A193 Gr B7	105	125	45.0	49.86	0.00	2.41	169.80	165.10	172.67	0.00	190.00	90.9%
18	1.750	A193 Gr B7	105	125	135.0	49.86	0.00	2.41	169.80	165.10	172.67	0.00	190.00	90.9%
19	1.750	A193 Gr B7	105	125	225.0	49.86	0.00	2.41	169.80	165.10	172.67	0.00	190.00	90.9%
20	1.750	A193 Gr B7	105	125	315.0	49.86	0.00	2.41	169.80	165.10	172.67	0.00	190.00	90.9%
								78.76						

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

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

Site Data

BU#: *841288*
Site Name: *Bridgeport North*
App #:

Anchor Rod Data		
Eta Factor, η	0.5	TIA G (Fig. 4-4)
Qty:	8	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	43	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	41	in
Thick:	2.75	in
Grade:	50	ksi
Clip Distance:		in

Stiffener Data (Welding at both sides)		
Configuration:	Unstiffened	
Weld Type:		**
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	37.36	in
Thick:	0.4036	in
Grade:	50	ksi
# of Sides:	12	"0" IF Round

Base Reactions			
TIA Revision:	G		Reactions adjusted to account for additional anchor rods.
Factored Moment, Mu:	1712.5	ft-kips	
Factored Axial, Pu:	31.1	kips	
Factored Shear, Vu:	19	kips	

Anchor Rod Results

TIA G --> Max Rod (Cu+ Vu/η):	247.6	Kips
Axial Design Strength, Φ*Fu*Anet:	260.0	Kips
Anchor Rod Stress Ratio:	95.2%	**Pass**

Base Plate Results Flexural Check

Base Plate Stress:	32.2	ksi
PL Design Bending Strength, Φ*Fy:	45.0	ksi
Base Plate Stress Ratio:	71.5%	**Pass**

PL Ref. Data
Yield Line (in):
20.62
Max PL Length:
20.62

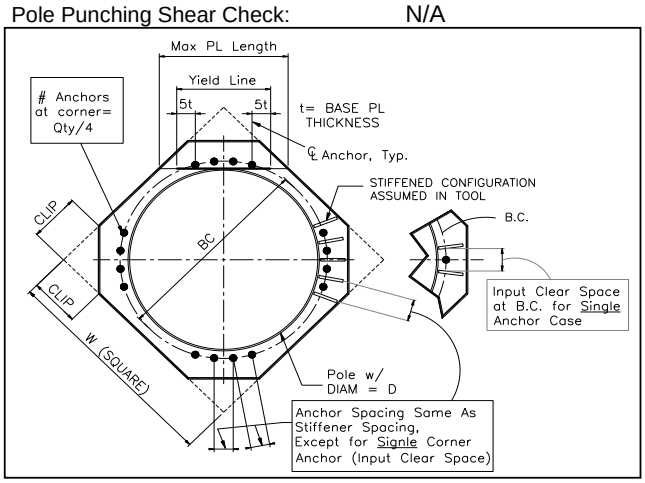
N/A - Unstiffened

Stiffener Results

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

Pole Results

Pole Punching Shear Check: N/A



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

(W) RISA-3D Plate Forces:		(L) RISA-3D Plate Forces:	
Comp (1.2)	**Tension (0.9)**	**Comp (1.2)**	**Tension (0.9)**
46.987	25.532	59.395	31.948
47.533	25.499	60.694	31.135
48.085	25.314	61.868	30.346
48.77	24.951	63.142	29.449
49.69	24.398	64.695	28.308
50.944	23.633	66.692	26.752
52.634	22.583	69.333	24.56
54.894	21.111	72.913	21.431
57.923	19.011	77.891	16.905
62.035	15.988	85.021	10.229
67.724	11.583	95.566	0.132
75.773	5.041	111.692	-15.574
87.409	-4.916	137.019	-40.553
104.503	-20.483	177.614	-80.926
129.755	-45.328	240.493	-143.782
166.279	-85.581	326.503	-230.001
215.697	-148.335	418.528	-322.388
274.301	-234.475	480.639	-384.785
329.961	-326.807	480.639	-384.785
364.733	-389.177	418.528	-322.388
364.733	-389.177	326.503	-230.001
329.961	-326.807	240.493	-143.782
274.301	-234.475	177.614	-80.926
215.697	-148.335	137.019	-40.553
166.279	-85.581	111.692	-15.574
129.755	-45.328	95.566	0.132
104.503	-20.483	85.021	10.229
87.409	-4.916	77.891	16.905
75.773	5.041	72.913	21.431
67.724	11.583	69.333	24.56
62.035	15.988	66.692	26.752
57.923	19.011	64.695	28.308
54.894	21.111	63.142	29.449
52.634	22.583	61.868	30.346
50.944	23.633	60.694	31.135
49.69	24.398	59.395	31.948
48.77	24.951		
48.085	25.314		
47.533	25.499		
46.987	25.532		
4671.26	-2020.916	5339.396	-1933.628 k-ft (per linear ft of plate)
2335.63	**-1010.458**	**2669.698**	**-966.814** k-ft (Divide by 2 for a 0.5 ft plate)

Anchor Spring Constant

Ag =	2.66	in^2
E =	29000	ksi
Lu =	21.83333	ft
k = An*E / Lu =	294.43	k/in

Soil Spring Constant

Subgrade Modulus =	3000	lb/in^3
k =	5184	k/ft^3

Soil Weight

Height Above Grade =		ft
Soil Unit Weight =		pcf
Apply Soil Weight =	Center Point	
Volume =	0.00	ft^3
Weight =	0.00	kips
Weight per Sq. Ft =	0	psf

Foundation Weight

Number Sides =	Round	
Pier Width/Diameter =		ft
Pier Height =		ft
Pad Thickness =	6.83333	ft
Pad Width =	20	ft
Pad Length =	18	ft
Concrete Density =	150	pcf
Volume =	0	ft^3
Weight =	0	kips

Applied Reactions for RISA 3D

TNX Moment =	4656	k-ft
TNX Axial =	77	kips
TNX Shear =	47	kips
Total Unfactored Axial =	**64.17**	**kips**
Side Bending Moment =	**4977.167**	**k-ft**
Corner Bending Moment (Mx) =	**3699.5**	**k-ft**
Corner Bending Moment (Mz) =	**3329.5**	**k-ft**

Tension from Anchors (Tension side only)

	Load (kips)	Distance to Center (ft)
1	38.217	7.75
2	38.537	7.75
3	38.217	7.75
4		
5		
6		

Pole/Pier Diameter =	60	inches
Bending Moment = ∑P*(D-d) =	7243.173	k-in
Bending Moment (Tension) =	603.6	k-ft

Anchor Capacity

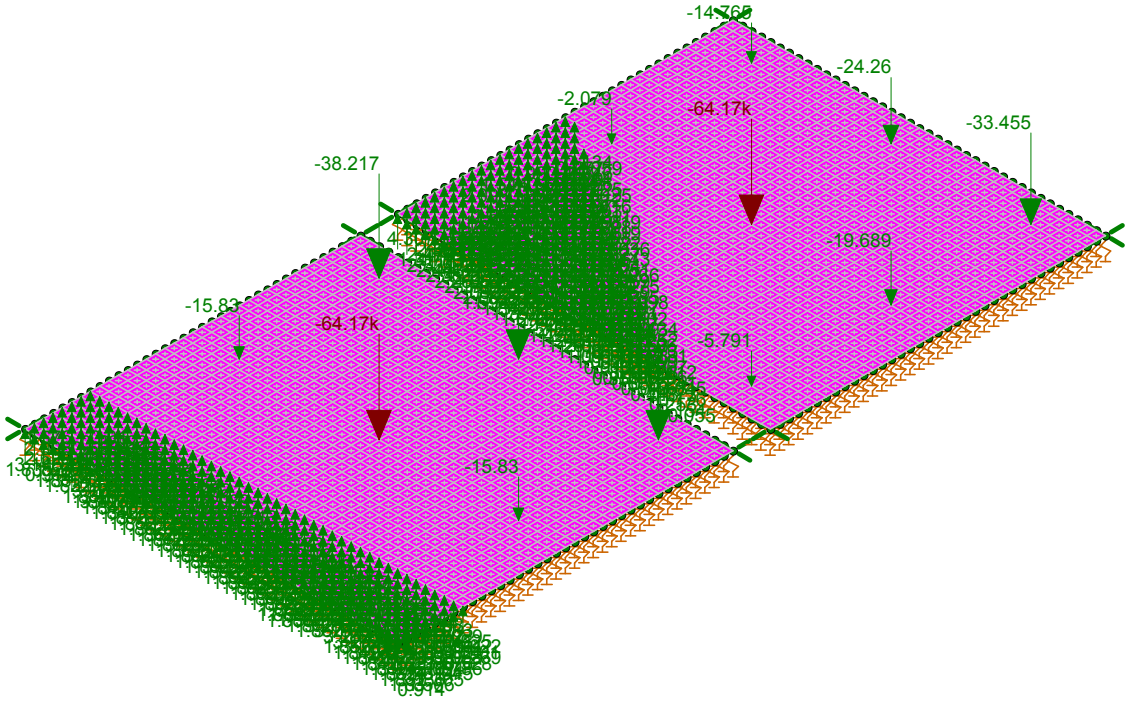
Max Tension from RISA =	38.537	kips
Anchor Type =	Rock Anchor	
Fu =	150	ksi
An =	2.6	in^2
Capacity (Kips) = 0.8*Fu*An =	312	
Ratio = 38.537 / 312 =	**12.4%**	

Pad/Mat Analysis

	Width	Length	
Thickness	4.83333	4.83333	ft
Width	20	18	ft
f'c	3	3	ksi
Top Bar Quantity	11	11	
Top Bar Size #	10	10	
Top Clear Spacing	3	3	in
Bot Bar Quantity	11	11	
Bot Bar Size #	10	10	
Bot Clear Spacing	3	3	in
As,min	25.0559827	22.55038	in^2
As, compression	13.97	13.97	in^2
d,compression	53.09496	53.09496	in
a	16.4	18.3	in
c	22.4	22.0	in
c/d	0.423	0.414	
Ø	0.825	0.837	
ØMn,compression	3020	3060	k-ft
Mu	1010.5	966.8	k-ft
Ratio =	**33.5%**	**31.6%**	
As, Tension	13.97	13.97	in^2
d,tension	53.09496	53.09496	in
a	16.4	18.3	in
c	22.4	22.0	in
c/d	0.423	0.414	
Ø	0.825	0.837	
ØMn,tension	3020	3060	k-ft
Mu	2335.6	2669.7	k-ft
Ratio =	**77.3%**	**87.2%**	

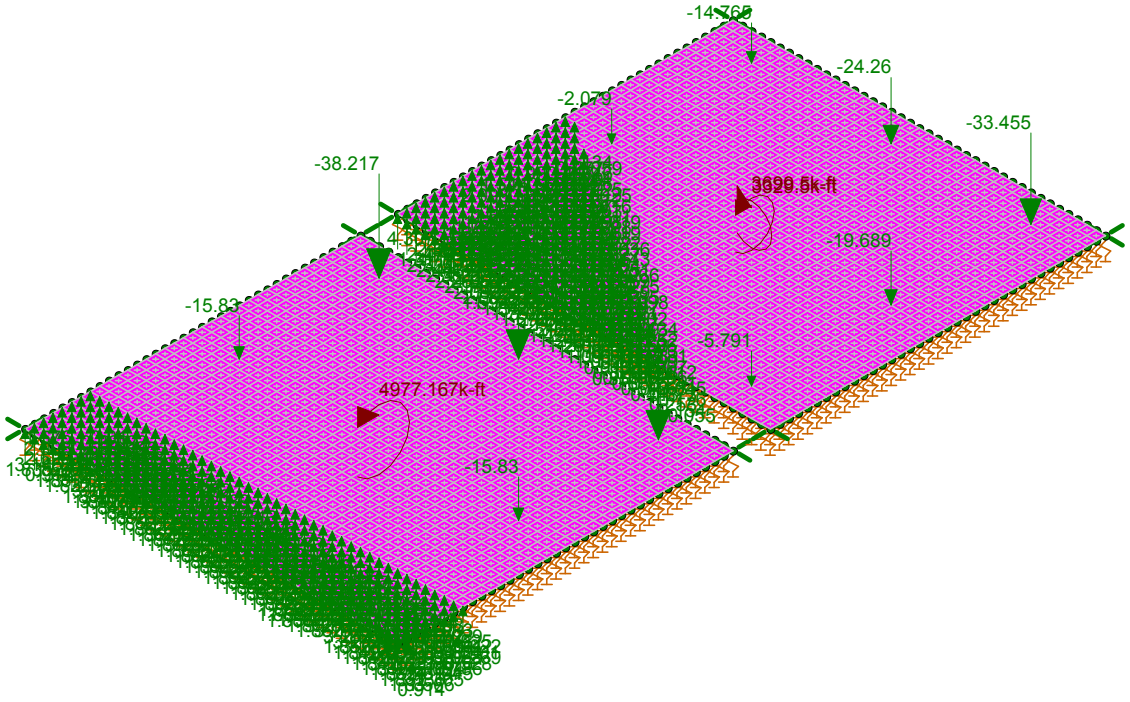
Bearing Check

Max Bearing Load =	4.773	kip
Plate Width =	0.5	ft
Plate Length =	0.5	ft
Ult. Bearing Capacity =	30	ksf
Bearing Pressure =	19.092	ksf
Ratio =	**84.9%**	



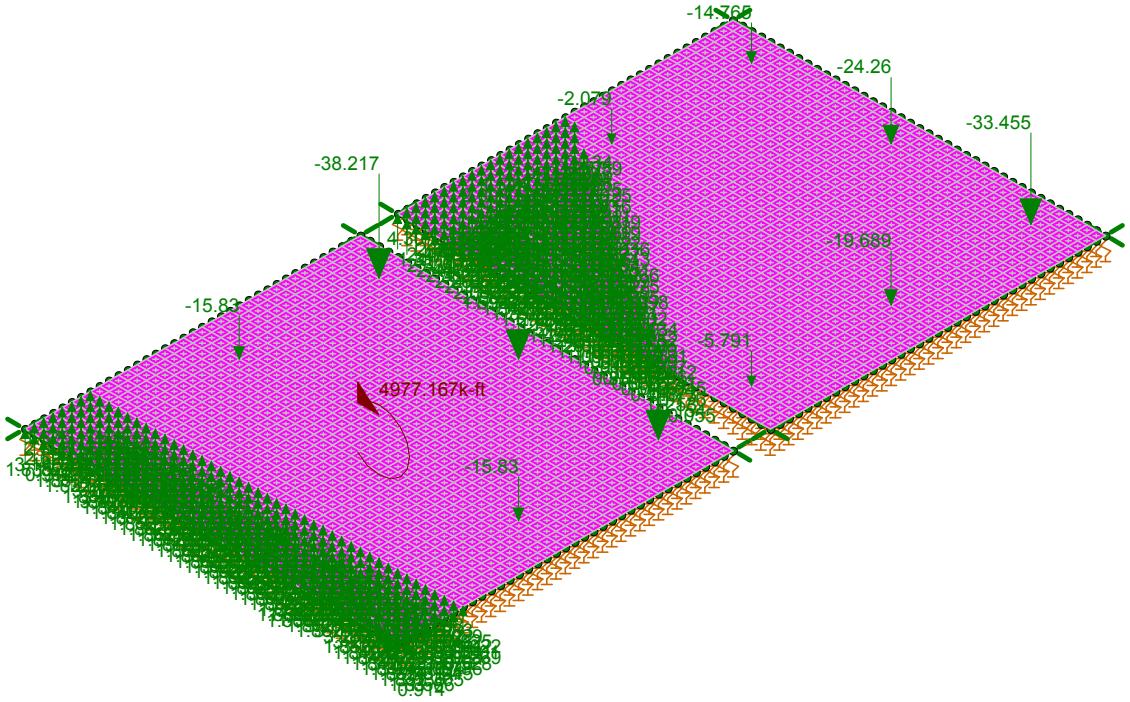
Loads: BLC 1, Dead
Y-direction Reaction Units are k and k-ft

Paul J. Ford and Company	BU 841288 / Bridgeport North	SK - 1
SJT/KAT		Apr 4, 2017 at 9:07 AM
37517-0750.003.7700		37517-0750.003.7700_Composite ...



Loads: BLC 2, Moment
Y-direction Reaction Units are k and k-ft

Paul J. Ford and Company	BU 841288 / Bridgeport North	SK - 2
SJT/KAT		Apr 4, 2017 at 9:07 AM
37517-0750.003.7700		37517-0750.003.7700_Composite ...



Loads: BLC 3, Moment side 2
Y-direction Reaction Units are k and k-ft

Paul J. Ford and Company	BU 841288 / Bridgeport North	SK - 3
SJT/KAT		Apr 4, 2017 at 9:07 AM
37517-0750.003.7700		37517-0750.003.7700_Composite ...

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	None
RISAConnection Code	None
Cold Formed Steel Code	None
Wood Code	None
Wood Temperature	< 100F
Concrete Code	ACI 318-11
Masonry Code	None
Aluminum Code	None - Building

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	1
Cd X	1
Rho Z	1
Rho X	1

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Dead	None		-1		2				
2	Moment	None				3				
3	Moment side 2	None				1				

Load Combinations

	Description	So...	P...	S...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...
1	1.2 Dead + moment	Yes	Y		1	1.2	2	1																
2	0.9 Dead+moment	Yes	Y		1	.9	2	1																
3	1.2 Dead + moment	Yes	Y		1	1.2	3	1																
4	0.9 Dead+moment	Yes	Y		1	.9	3	1																

Joint Loads and Enforced Displacements (BLC 1 : Dead)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft...
1	SIDE	L	Y	-64.17
2	CORNER	L	Y	-64.17

Joint Loads and Enforced Displacements (BLC 2 : Moment)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft...
1	SIDE	L	Mx	4977.167
2	CORNER	L	Mx	3699.5
3	CORNER	L	Mz	3329.5

Joint Loads and Enforced Displacements (BLC 3 : Moment side 2)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft...
1	SIDE	L	Mz	4977.167

Concrete Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E...	Density[k/ft...	f'c[ksi]	Lambda	Flex Steel[...	Shear Stee...
1	Conc3000NW	3156	1372	.15	.6	.145	3	1	60	60
2	Conc3500NW	3409	1482	.15	.6	.145	3.5	1	60	60
3	Conc4000NW	3644	1584	.15	.6	.145	4	1	60	60
4	Conc3000LW	2085	907	.15	.6	.11	3	.75	60	60
5	Conc3500LW	2252	979	.15	.6	.11	3.5	.75	60	60
6	Conc4000LW	2408	1047	.15	.6	.11	4	.75	60	60

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

v2.0, Effective Date: 1-12-12

Date:	4/4/2017
Project No:	37517-0750.003.7700
Site Name:	Bridgeport North
Site Number/BUN:	841288
Description:	
Owner:	
Engineer:	

Welded Bridge Stiffener Analysis per TIA-222-G & AISC 13th Ed. (Black)

General Parameters and Loading:

Flange Elevation:	109.00	ft
TIA Reference Standard:	TIA-222-G	
AISC Manual:	13th Ed. (Black)	
Method:	LRFD	
ASD Stress Increase, ASIF:	N/A	
Moment, Muf:	614.6	k-ft
Axial, Puf:	12.3	kips
Shear, Vf:	22.5	kips

Pole Parameters:

	Upper Pole	Lower Pole	
Pole Diameter, Dp:	21.00	21.00	in
Pole Thickness, tp:	0.2188	0.2500	in
Pole Fy:	50	50	ksi
Pole Fu:	65	65	ksi
Flange Diameter, Df:	28.50	28.50	in

Bridge Stiffener Parameters:

	Stiffener Type 1	Stiffener Type 2	
Qty. Stiffeners:	4	0	
Upper Weld Length, L1:	30.00	0.00	in
Lower Weld Length, L2:	30.00	0.00	in
Weld Size, w:	0.3750	0.0000	in
Electrode:	E70	E70	
Effective Stiffener Width, Ws:	4.00	0.00	in
Stiffener Thickness, ts:	1.25	0.00	in
Notch, n:	2.25	0.00	in
Stiffener Fy:	65	0	ksi
Stiffener Fu:	80	0	ksi
Unbraced Length, L:	15.00	0.00	in
K:	0.80	0.00	
Stiffener Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Stiffener Circle:	37.00	28.50	in = Df + 2 n + Ws
Upper Eccentricity, e1:	8.00	3.75	in = (Df - Dp) / 2 + n + Ws / 2
Lower Eccentricity, e2:	8.00	3.75	in = (Df - Dp) / 2 + n + Ws / 2

Flange Bolt Parameters:

Number of Bolt Circles: (1) Bolt Circle

	Bolt Circle 1	Bolt Circle 2	
Qty. Bolts:	0	0	
Bolt Diameter:	1.00	0.00	in
Bolt Circle:	26.00	0.00	in
Bolt Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0	0	degrees
Bolt Area, Ag:	0.0000	0.0000	in
Max. Tension:	0.00	0.00	kips
Max. Net Tension:	0.00	0.00	kips
Max. Net Compression:	0.00	0.00	kips
Moment to Bolt Circle:	0.00	0.00	k-ft
Axial to Bolt Circle:	0.00	0.00	kips
Shear to Bolt Circle:	0.00	0.00	kips
Equivalent Bolt Circle:	0.00	0.00	in

Weld Analysis per AISC Tables 8-4 & 8-3:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
D:	6	0	Num. of Sixteenths in Weld
a:	0.2667	0.0000	= e1 / L1
k:	0	0	
C:	3.2367	3.7100	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
Φ:	0.7500	0.7500	
Stiffener Axial, Pu:	202.7	0.0	kips
Axial Capacity, ΦPn:	437.0	0.0	kips = Φ C C1 D L
Ratio:	46.4%	0.0%	

Lower Pole	Stiffener Type 1	Stiffener Type 2	
D:	6	0	Num. of Sixteenths in Weld
a:	0.2667	0.0000	= e2 / L2
k:	0	0	
C:	3.2367	3.7100	Tabulated Cofficient
C1:	1.0000	1.0000	Coefficient for Electrode
Φ:	0.7500	0.7500	
Stiffener Axial, Pu:	202.7	0.0	kips
Axial Capacity, ΦPn:	437.0	0.0	kips = Φ C C1 D L
Ratio:	46.4%	0.0%	

Pole Analysis per AISC Table J2.5 & Sect. J4.2:

Upper Pole	Stiffener Type 1	Stiffener Type 2	
Stiffener Axial, Pu:	202.7	0.0	kips
Effective Throat, te:	0.2651	0.0000	in = 0.707 w
Shear Stress, fuv:	3.4	0.0	kips/in= Pu / (2 L1)
Section Modulus, S:	300.0	0.0	$in^2 = L1^2 / 3$
Bending Stress, fub:	5.4	0.0	kips/in = Pu e1 / S
Combined Stress, fu:	6.4	0.0	kips/in = $(fuv^2 + fub^2)^{1/2}$
Φ:	0.7500	0.0000	
Stress Capacity, ΦFn	6.4	0.0	kips/in = Φ 0.6 Fu tp
Ratio:	99.6%	0.0%	

Lower Pole	Stiffener Type 1	Stiffener Type 2	
Stiffener Axial, Pu:	202.7	0.0	kips
Effective Throat, te:	0.2651	0.0000	in = 0.707 w
Shear Stress, fuv:	3.4	0.0	ksi = Pu / (2 L2)
Section Modulus, S:	300.0	0.0	$in^2 = L2^2 / 3$
Bending Stress, fub:	5.4	0.0	ksi = Pu e2 / S
Combined Stress, fu:	6.4	0.0	kips/in = $(fuv^2 + fub^2)^{1/2}$
Φ:	0.7500	0.0000	
Stress Capacity, ΦFn	7.3	0.0	kips/in = Φ 0.6 Fu tp
Ratio:	87.1%	0.0%	

Stiffener 1 Analysis per AISC Sect. D2, E3 & E7

	Stiffener Type 1	
Gross Area, Ag:	5.0000	in^2
Effective Net Area, Aen:	4.2917	in^2 = Ag U, where U = 0.858
Stiffener Axial, Pu:	202.7	kips
Stiffener Stress, fu:	40.5	ksi = Pu / Ag
b:	10.0000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	8.0000	in
Q, Where Qa = 1.0:	1.0000	
r:	0.3608	in^3
K L / r:	33.2554	
Φ:	0.9000	
Axial Capacity, ΦFcr:	52.66	ksi = Φ [0.658$^{Fy / Fe}$] Fy
Φ:	0.9000	
Ten. Yielding Cap., ΦFnt:	58.50	ksi = Φ Fy
Φ:	0.7500	
Ten. Rupture Cap., ΦFnr:	51.50	ksi = Φ Fu (Aen / Ag)
Ratio:	78.7%	

Stiffener 2 Analysis per AISC Sect. D2, E3 & E7

	Stiffener Type 2	
Gross Area, Ag:	0.0000	in^2
Effective Net Area, Aen:	0.0000	in^2
Stiffener Axial, Pu:	0.0	kips
Stiffener Stress, fu:	0.0	ksi = Pu / Ag
b:	0.0000	in = (Df - Dp) / 2 + n + Ws, Upper Pole
b / ts:	0.0000	in
Q, Where Qa = 1.0:	0.0000	
r:	0.0000	in^3
K L / r:	0.0000	
Φ:	0.0000	
Axial Capacity, ΦFcr:	0.00	ksi = Φ Fy
Φ:	0.0000	
Ten. Yielding Cap., ΦFnt:	0.00	ksi = Φ Fy
Φ:	0.0000	
Ten. Rupture Cap., ΦFnr:	0.00	ksi = Φ Fu (Aen / Ag)
Ratio:	0.0%	

Analysis Summary:

Bridge Stiffener Type 1	Bridge Stiffener Type 2
Weld Analysis Ratio: 46.4% PASS	Weld Analysis Ratio: 0.0% PASS
Pole Analysis Ratio: 99.6% PASS	Pole Analysis Ratio: 0.0% PASS
Stiffener Analysis Ratio: 78.7% PASS	Stiffener Analysis Ratio: 0.0% PASS

MODIFICATION OF AN EXISTING 150' MONOPOLE
TOWER MAPPING CCI DOC ID #4710143
BU #841288; BRIDGEPORT NORTH

205 KAECHELE PLACE
BRIDGEPORT, CONNECTICUT 06606
FAIRFIELD COUNTY
LAT: 41° 13' 24.04"; LONG: -73° 13' 0.38"
APP: 374828 REV. 2; WO: 1368682

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CROWN CASTLE
8 PARKMEADOW DRIVE, PITTSFORD, NY 14534
PH: (585) 899-3445

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 DYWIDAG SHAFT REINFORCING
REMOVE TERMINATION BOLTS FOR EXISTING REINFORCING
SHAFT REINFORCING
INSTALL NEW CLIMBING RAIL SYSTEM
REMOVE EXISTING STIFFENERS
FIELD WELDED STIFFENERS
FIELD WELDED ANCHOR BRACKETS
POST INSTALLED ANCHOR RODS
HIGH STRENGTH GROUT
PAINT MODIFICATIONS TO MATCH EXISTING POLE

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
S-6	MISC DETAILS

WIND DESIGN DATA	
REFERENCE STANDARD	ANSI/TIA-222-G-2-2009
LOCAL CODE	2016 CONNECTICUT STATE BUILDING CODE
ULTIMATE WIND SPEED (3-SECOND GUST)	125 MPH
CONVERTED NOMINAL WIND SPEED (3-SECOND GUST)	97 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 1358541

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.

MODIFICATION OF AN EXISTING 150' MONOPOLE
BU #841288; BRIDGEPORT NORTH
BRIDGEPORT, CONNECTICUT

PROJECT No:	37517-0750.003.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	S.J.T.
CHECKED BY:	
DATE:	3-31-2017

TITLE SHEET

T-1

37517-0750.003.DWG

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
X	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
X	POST INSTALLED ANCHOR ROD VERIFICATION
X	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)
X	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

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CROWN CASTLE
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PH: (585) 899-3445

MODIFICATION OF AN EXISTING 150' MONOPOLE
BU #841288; BRIDGEPORT NORTH
BRIDGEPORT, CONNECTICUT

PROJECT No:	37517-0750.003.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	S.J.T.
CHECKED BY:	
DATE:	3-31-2017

MI CHECKLIST

T-2

37517-0750.003.DWG

MONOPOLE RETROFIT PROJECT MASTER NOTES DOCUMENT (REV. 3, 02/05/2015)

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/TIA-1019 (LATEST EDITION), OSHA AND GENERAL INDUSTRY STANDARDS. ALL RIGGING PLANS SHALL ADHERE TO ANSI/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 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: TUFTUG@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

3.1. NEW GROUT FOR THE POLE BASE SHALL BE NON-SHRINK, NON-METALLIC, GROUT (NS GROUT BY EUCLID, OR APPROVED EQUAL) WITH A 7500 PSI MINIMUM COMPRESSIVE STRENGTH. CONTRACTOR SHALL SUBMIT PROPOSED GROUT SPECIFICATION INFORMATION TO CROWN CASTLE FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION. CONTRACTOR SHALL FOLLOW GROUT MANUFACTURER'S SPECIFICATIONS FOR COLD WEATHER GROUTING PROCEDURES (IF NECESSARY) AND THE TESTING AGENCY SHALL PREPARE GROUT SAMPLE SPECIMENS FOR COMPRESSIVE STRENGTH TESTING AND VERIFICATION.

3.2. GROUT SHALL BE INSTALLED TIGHT UNDER THE BASE PLATE AND BEARING PLATE REGION WITH NO VOIDS REMAINING BETWEEN THE TOP OF THE EXISTING CONCRETE AND THE UNDERSIDE OF THE EXISTING BASE PLATE AND BEARING PLATE.

3.3. CAULK AROUND ANCHOR RODS WHEN GROUTING.

4. FOUNDATION WORK - (NOT REQUIRED)

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

6. EPOXY GROUTED REINFORCING ANCHOR RODS

6.1. UNLESS OTHERWISE NOTED, REINFORCING ANCHOR RODS SHALL BE 150 KSI ALL-THREAD BARS CONFORMING TO ASTM A722. RECOMMENDED MANUFACTURERS/SUPPLIERS OF 150 KSI ALL-THREAD BARS ARE WILLIAMS FORM ENGINEERING CORPORATION AND DYWIDAG SYSTEMS INTERNATIONAL.

6.2. ALL REINFORCING ANCHOR RODS SHALL BE HOT DIP GALVANIZED PER ASTM A123.

6.3. THE CORE-DRILLED HOLES IN THE CONCRETE FOR THE ANCHOR RODS SHALL BE CLEAN AND DRY, AND OTHERWISE PROPERLY PREPARED ACCORDING TO THE ANCHOR ROD AND EPOXY MANUFACTURERS' INSTRUCTIONS, PRIOR TO PLACEMENT OF ANCHOR RODS AND EPOXY. CONTRACTOR SHALL FOLLOW ALL ANCHOR ROD AND EPOXY MANUFACTURER RECOMMENDATIONS REGARDING HANDLING OF RODS, EPOXY, ACCEPTABLE AMBIENT TEMPERATURE RANGE DURING INSTALLATION AND POST-INSTALLATION CURING, THE EFFECT OF TEMPERATURE ON EPOXY CURING TIME, PREPARATION OF HOLE, ETC.

6.4. HILTI HIT RE-500 SD OR ITW RED HEAD EPCON G5 EPOXY SHALL BE USED TO ANCHOR THE BAR IN THE DRILL HOLES. IF THE DESIGNED EMBEDMENT IS GREATER THAN 12 FT, CONTRACTOR HAS THE OPTION TO USE PILE ANCHOR GROUT BY E-CHEM AS AN ALTERNATE. IF CONTRACTOR WISHES TO USE A DIFFERENT EPOXY, A REQUEST INCLUDING THE EPOXY TECHNICAL DATA SHEET(S) SHALL BE SUBMITTED TO THE EOR FOR REVIEW PRIOR TO CONSTRUCTION.

6.5. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN INSTALLED AND ALL EPOXY AND GROUT HAVE CURED (IF BASE PLATE AND/OR BEARING PLATES HAVE BEEN GROUTED PRIOR TO TESTING), ALL REINFORCING ANCHORS SHALL BE LOAD TESTED PER CROWN CASTLE ENGINEERING DOCUMENT #ENG-PRC-10119. REFER TO THE NEW ANCHOR & BRACKET DETAIL ON FOLLOWING SHEETS FOR SPECIFIED ANCHOR ROD TARGET TENSION LOAD.

6.6. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN SUCCESSFULLY LOAD TESTED AND APPROVED THE CONTRACTOR SHALL TIGHTEN ALL HEAVY HEX ANCHOR NUTS TO SNUG TIGHT PLUS 1/8 TURN OF NUT.

6.7. TAKE ALL MEASUREMENTS NECESSARY TO AVOID DAMAGING EXISTING REINFORCING BARS DURING CORING OPERATIONS. NOTIFY ENGINEER OF RECORD IMMEDIATELY IF EXISTING REINFORCING BARS ARE ENCOUNTERED AND INTERFERE WITH PLACEMENT OF NEW ANCHORS. MINOR ADJUSTMENT TO PROPOSED LOCATION OF NEW ANCHORS MAY BE REQUIRED.

6.8. IF BASE PLATE GROUT REMOVAL IS REQUIRED FOR ANCHOR ROD INSTALLATION SEE ENG-PRC-10012; "BASE PLATE GROUT REPAIR' FOR PROCEDURES AND RECOMMENDED MANUFACTURERS. CONTRACTOR TO DETERMINE THE QUANTITY 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 ANSI/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 ANSI/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 (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.

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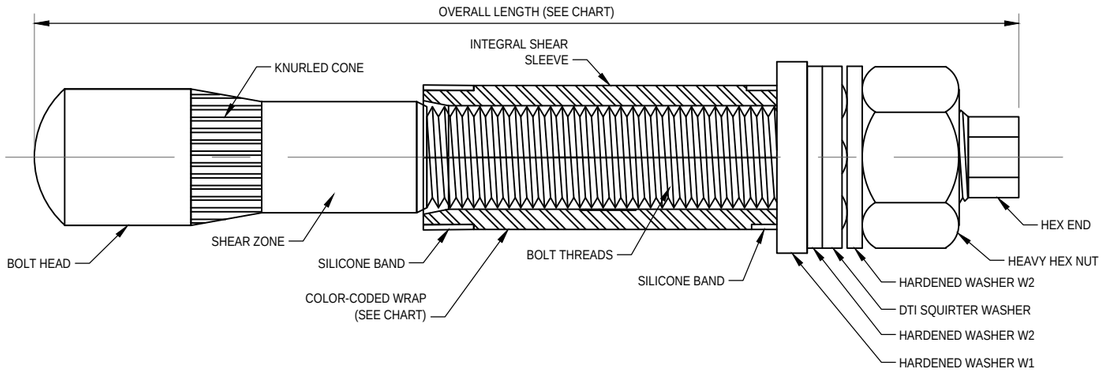
BU #841288; BRIDGEPORT NORTH
BRIDGEPORT, CONNECTICUT

PROJECT No:	37517-0750.003.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	S.J.T.
CHECKED BY:	
DATE:	3-31-2017

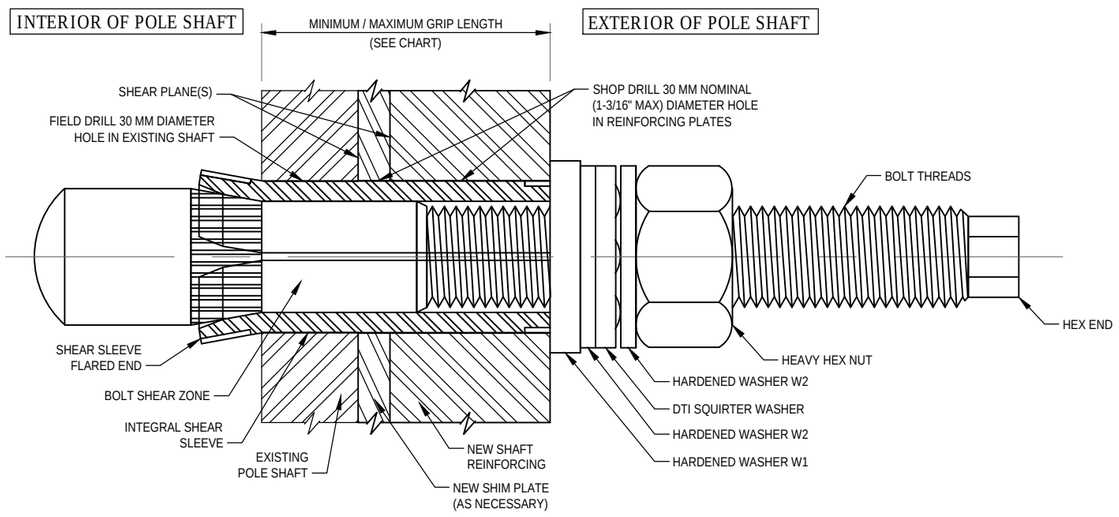
GENERAL NOTES

S-1

37517-0750.003.DWG



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

DISTRIBUTOR CONTACT:
PRECISION TOWER PRODUCTS
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WEB: www.precisiontowerproducts.com

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CROWN CASTLE
8 PARKMEADOW DRIVE, PITTSFORD, NY 14534
PH: (585) 899-3445

MODIFICATION OF AN EXISTING 150' MONOPOLE
BU #841288; BRIDGEPORT NORTH
BRIDGEPORT, CONNECTICUT

PROJECT No:	37517-0750.003.7700
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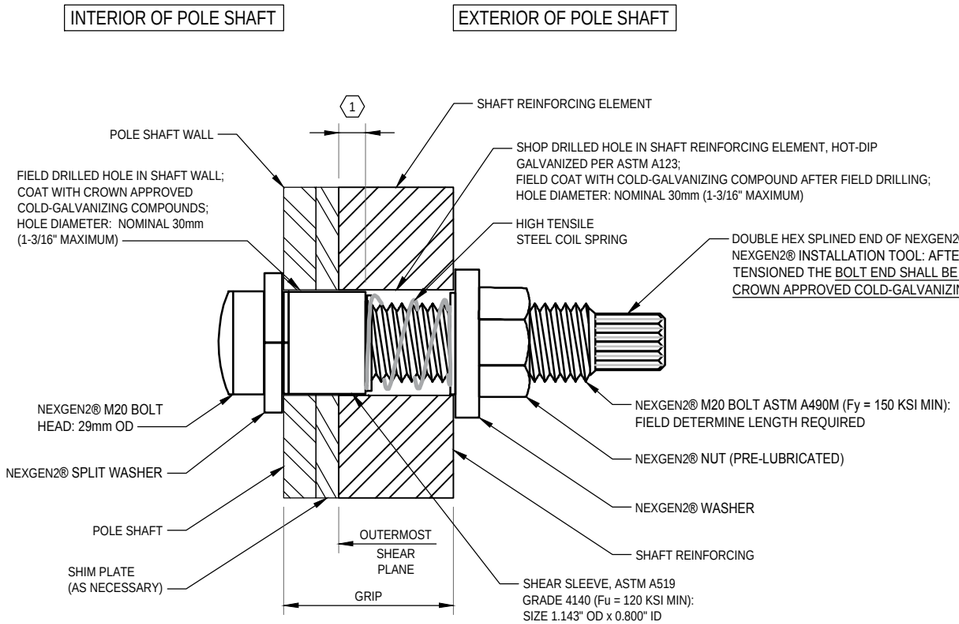
FORGBOLT™ DETAILS

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	11/16"	15/16"	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:
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BROOKPARK, OHIO 44142
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E-MAIL: SALES@ALLFASTENERS.COM

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250 E Broad St. Ste 600- Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com
CROWN CASTLE
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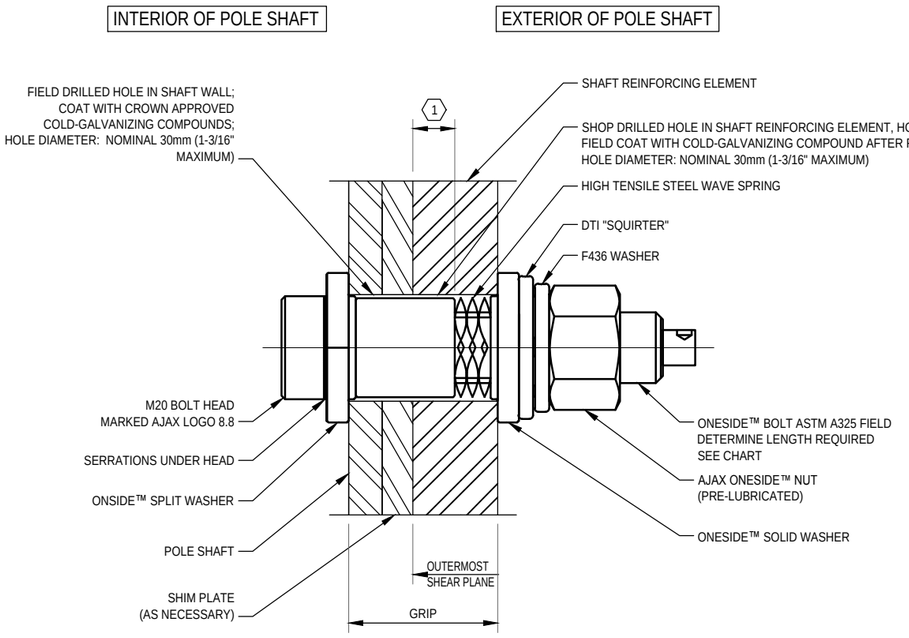
NEXGEN2™ BOLT DETAIL

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"

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CROWN CASTLE
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MODIFICATION OF AN EXISTING 150' MONOPOLE
BU #841288; BRIDGEPORT NORTH
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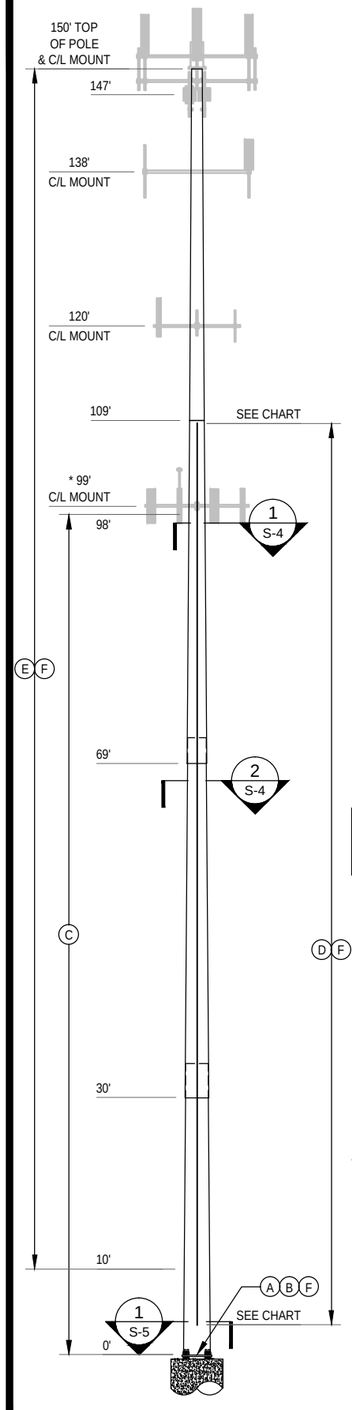
AJAX ONESIDE™ BOLT DETAIL

S-2C

37517-0750.003.DWG



POLE ELEVATION 1 / S-3

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

NEW STACKED FLAT PLATE (65 KSI) REINFORCING SCHEDULE

BOTTOM ELEVATION	TOP ELEVATION	FLAT # / DEGREE SEPARATION	ELEMENT	ELEMENT LENGTH	ELEMENT QUANTITY	APPROXIMATE BOLTS PER STACKED PLATE	APPROXIMATE TOTAL BOLT QUANTITY	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAXIMUM INTERMEDIATE BOLT SPACING	ESTIMATED TOTAL STEEL WEIGHT
3' - 6" (OUTER PLATE)	38' - 6" (OUTER PLATE)	F1 & F7	CCI-WFP-06010035 #1	35' - 0"	2	35	70	0	18	20"	1429 LBS.
3' - 6" (INNER PLATE)	38' - 6" (INNER PLATE)	F1 & F7	CCI-WFP-04510035 #2	35' - 0"	2						1072 LBS.
8' - 6" (OUTER PLATE)	38' - 6" (OUTER PLATE)	F4 & F10	CCI-WFP-06010030 #3	30' - 0"	2	33	66	0	18	20"	1225 LBS.
8' - 6" (INNER PLATE)	38' - 6" (INNER PLATE)	F4 & F10	CCI-WFP-04510030 #4	30' - 0"	2						919 LBS.
38' - 7" (OUTER PLATE)	73' - 7" (OUTER PLATE)	F1, F4, F7 & F10	CCI-CFP-06010035 #5	35' - 0"	4	51	204	18	18	20"	2858 LBS.
38' - 7" (INNER PLATE)	73' - 7" (INNER PLATE)	F1, F4, F7 & F10	CCI-CFP-04510035 #6	35' - 0"	4						2144 LBS.
73' - 8" (OUTER PLATE)	108' - 8" (OUTER PLATE)	F1, F4, F7 & F10	CCI-CFP-06010035 #7	35' - 0"	4	51	204	18	18	20"	2858 LBS.
73' - 8" (INNER PLATE)	108' - 8" (INNER PLATE)	F1, F4, F7 & F10	CCI-CFP-04510035 #8	35' - 0"	4						2144 LBS.
							544				14649 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 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

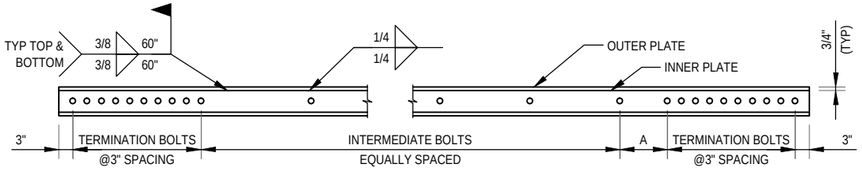
ELEVATION	FLAT PLATE THICKNESS	FLAT PLATE WIDTH	FLAT PLATE LENGTH	FLAT PLATE QUANTITY	WELD LENGTH PER SIDE	TOTAL WELD LENGTH	BOLTS PER SPLICE*	TOTAL STEEL WEIGHT
38' - 7"	1-1/4"	8-1/2"	8' - 10"	4	0"	0"	33	1277 LBS.
73' - 8"	1-1/4"	8-1/2"	9' - 7"	4	0"	0"	36	1386 LBS.
						0		2663 LBS.

*** 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
108	4	4-1/2"	4-1/2"	1-1/4"

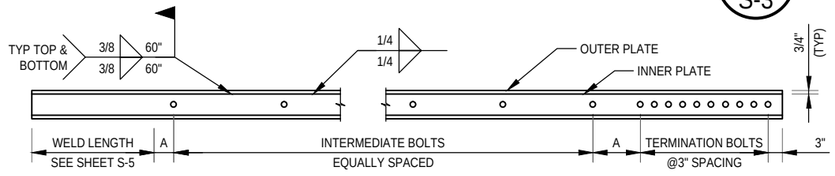
SHIMS ARE FOR BIDDING PURPOSES ONLY, FINAL SHIM REQUIREMENTS TO BE DETERMINED BY CONTRACTOR DURING FABRICATION.



BOTTOM TOP

STACKED BOLTED FLAT PLATE BAR DETAIL

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



BOTTOM TOP

STACKED WELDED FLAT PLATE BAR DETAIL

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

CROWN CASTLE US PATENT NOS 8,046,972; 8,156,712; 7,849,659; 8,424,269 AND PATENT PENDING

SHAFT SECTION DATA

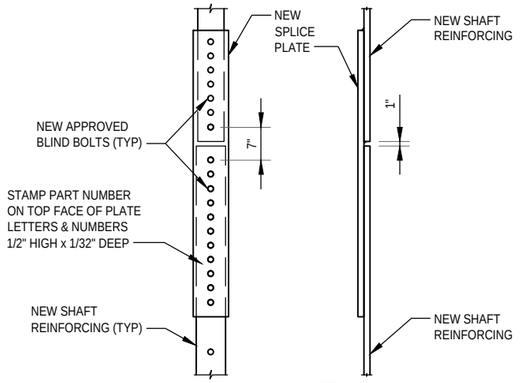
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN) @ TOP	DIAMETER ACROSS FLATS (IN) @ BOTTOM	POLE GRADE (ksi)	POLE SHAPE
1	41.00	0.2188	36.00 48.00	15.000	21.000	50	12-SIDED
2	40.00	0.2188		21.000	27.040	50	12-SIDED
3	42.00	0.3125		26.149	32.890	50	12-SIDED
4	34.00	0.4063		31.623	37.360	50	12-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'	INSTALL NEW ANCHOR RODS AND BRACKETS AT BASE PLATE	S-5
B	0'	INSTALL NEW TRANSITION STIFFENERS AT BASE PLATE	S-5
C	0' TO 98'	REMOVE EXISTING DYWIDAG SHAFT REINFORCING ON FLATS #1, 4, 7 & 10	S-3
D	3'-6" TO 108'-8"	INSTALL NEW SHAFT REINFORCING	S-3 & S-4
E	10' TO 150'	INSTALL NEW TUF-TUG STEP BOLT CLIMBER RAIL SYSTEM ON FLAT #1. CONTRACTOR SHALL COORDINATE INSTALLATION DETAILS WITH TUF-TUG PRIOR TO FABRICATION OF SHAFT REINFORCING	S-3
F	0' TO 150'	PAINT MODIFICATIONS TO MATCH EXISTING POLE	S-3



DETAIL 2 / S-3
SCALE: NTS

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MODIFICATION OF AN EXISTING 150' MONOPOLE

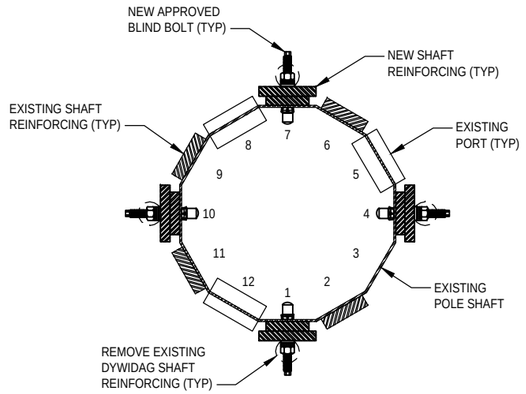
BU #841288; BRIDGEPORT NORTH
BRIDGEPORT, CONNECTICUT

PROJECT No:	37517-0750.003.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	S.J.T.
CHECKED BY:	
DATE:	3-31-2017

MONOPOLE PROFILE

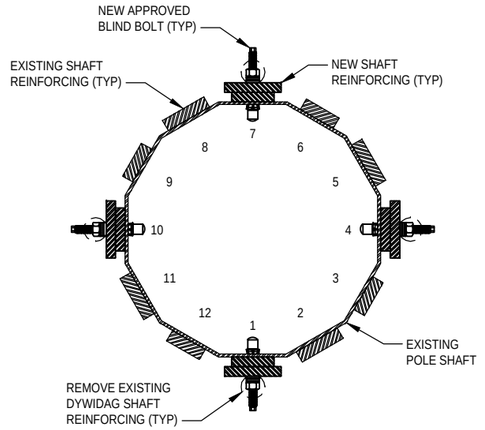
S-3

37517-0750.003.DWG

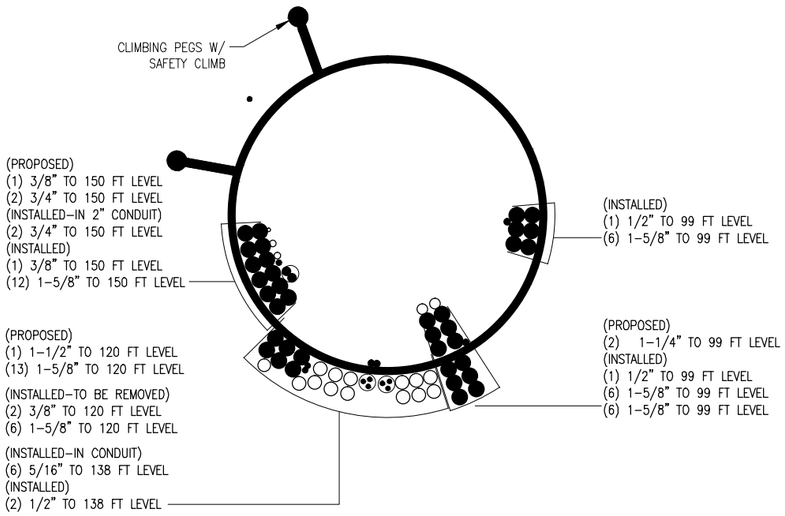


SECTION 1 / S-4
EL 97'

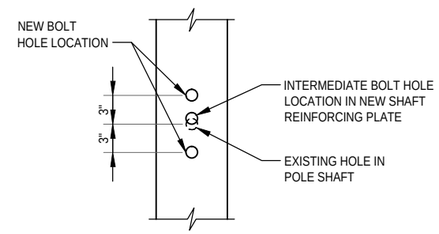
* CONTRACTOR SHALL COORDINATE INSTALLATION OF NEW STEP RAIL SYSTEM WITH TUF-TUG



SECTION 2 / S-4
EL 67'



BASE LEVEL DRAWING



INTERMEDIATE BOLT HOLE FIX 3 / S-4
SCALE: NTS

PJF PAUL J. FORD & COMPANY
250 E Broad St. Ste 600- Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com
8 PARKMEADOW DRIVE, PITTSFORD, NY 14534
PH: (585) 899-3445

CROWN CASTLE

MODIFICATION OF AN EXISTING 150' MONOPOLE
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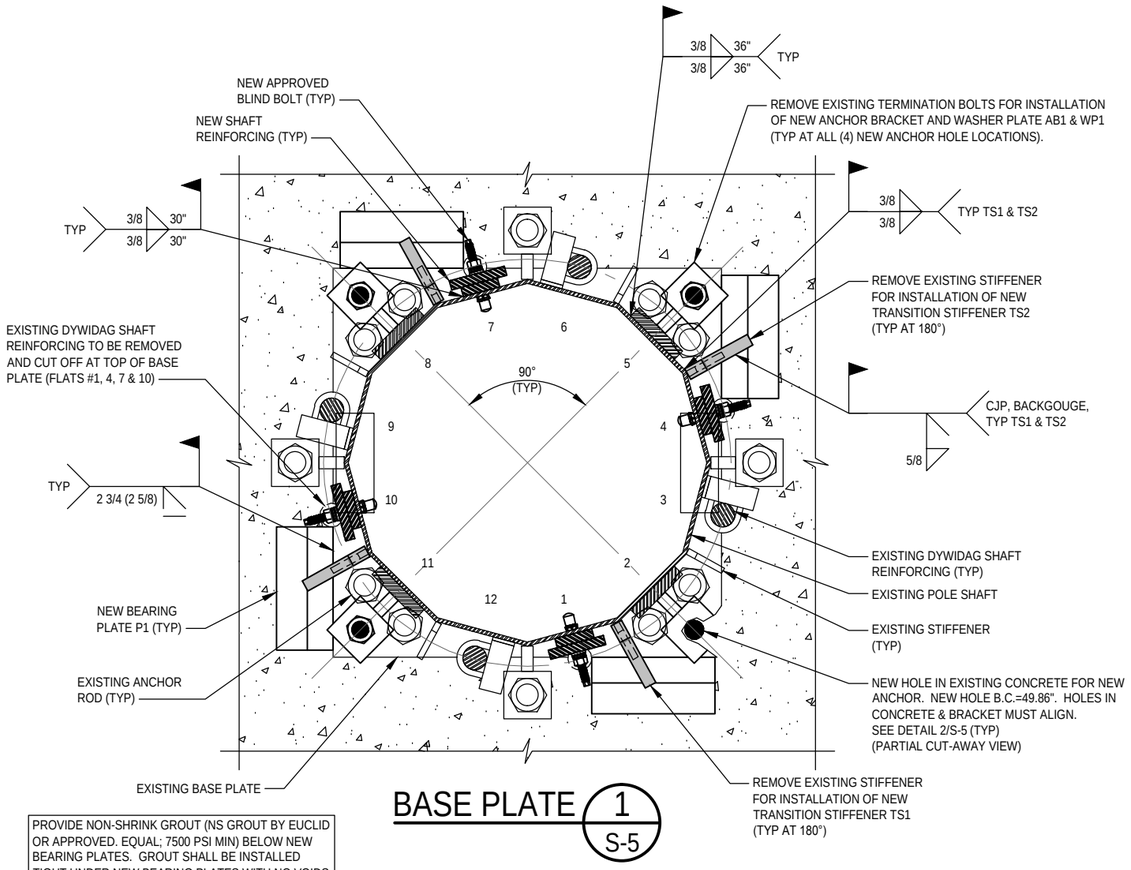
SHAFT REINFORCING SECTIONS

S-4

37517-0750.003.DWG

BASE SPECIFICATIONS	
BASE PLATE:	41" SQUARE; 2 3/4" THK.; Fy=50 KSI
ANCHOR RODS:	(8) 2 1/4"ø; A615 GRADE 75; 43" B.C.



BASE PLATE 1 / S-5

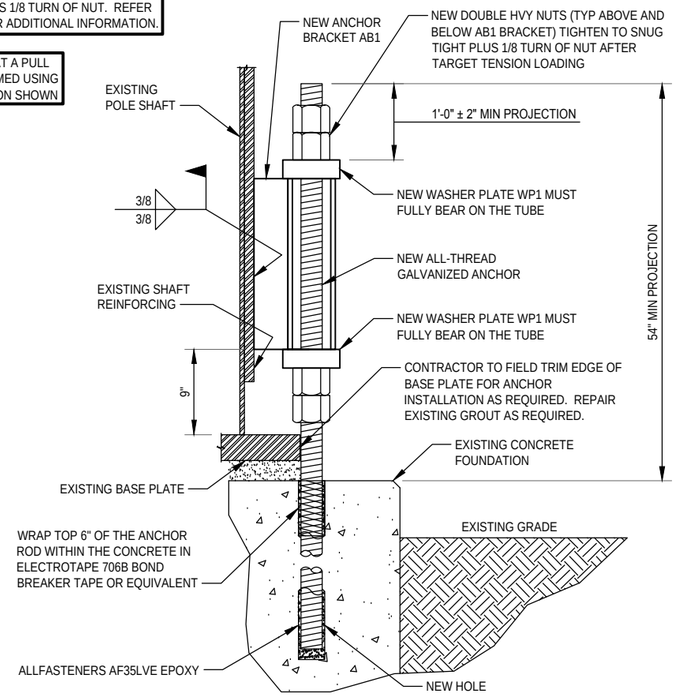
PROVIDE NON-SHRINK GROUT (NS GROUT BY EUCLID OR APPROVED. EQUAL; 7500 PSI MIN) BELOW NEW BEARING PLATES. GROUT SHALL BE INSTALLED TIGHT UNDER NEW BEARING PLATES WITH NO VOIDS REMAINING BETWEEN TOP OF EXISTING CONCRETE AND UNDERSIDE OF NEW BEARING PLATES.

NEW ANCHOR ROD REINFORCING SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS AND HOLE TO BE MECHANICALLY ROUGHENED. ONCE ALL RESIN HAS CURED, ALL NEW ANCHOR ROD REINFORCING SHALL BE TESTED TO THE TARGET TENSION LOAD. ONCE THE TENSION LOAD HAS BEEN RELEASED, TIGHTEN HEAVY HEX NUT TO SNUG TIGHT PLUS 1/8 TURN OF NUT. REFER TO SHEET S-1, SECTION 6 FOR ADDITIONAL INFORMATION.

CONTRACTOR TO VERIFY THAT A PULL TEST IS ABLE TO BE PERFORMED USING THE ANCHOR ROD PROJECTION SHOWN

NEW ANCHOR RODS

PART #	DIAMETER (IN)	LENGTH (IN)	MATERIAL	EMBEDMENT DEPTH (IN)	TARGET TENSION LOAD (KIPS)	HOLE DIAMETER (IN)
CCI-AR-0175	1 3/4	120	A193 GR B7	60	111	2



NEW ANCHOR & BRACKET DETAIL 2 / S-5

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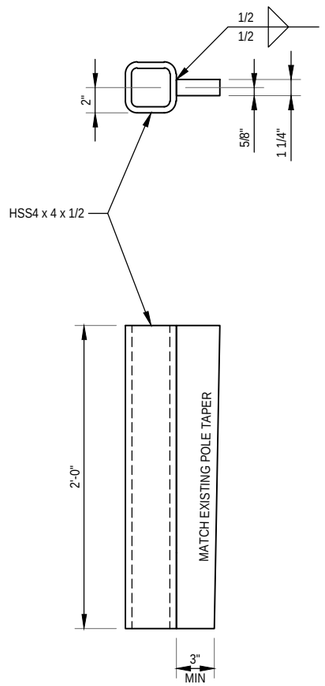
BASE PLATE DETAILS

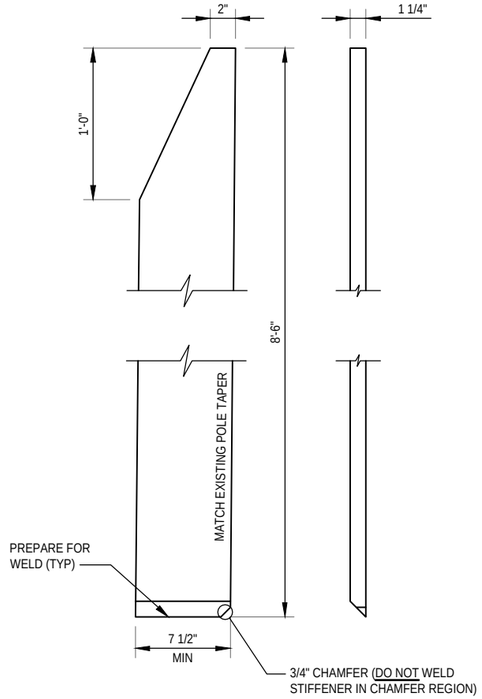
S-5

37517-0750.003.DWG



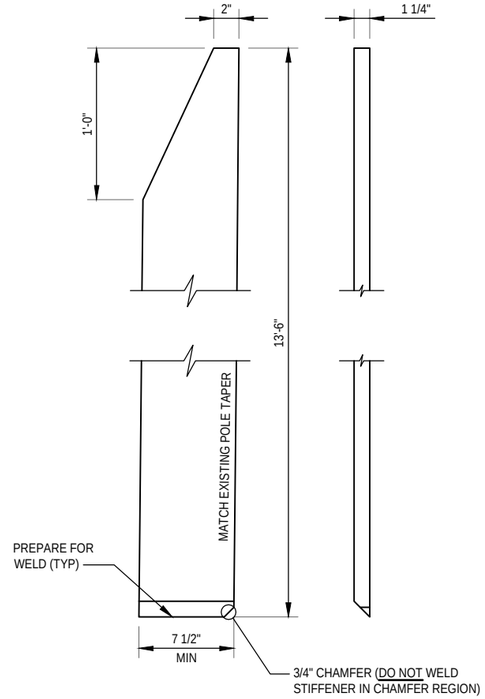
ANCHOR BRACKET MK~AB1

(4 REQUIRED) (TUBE Fy = 50 KSI) (STIFFENER Fy = 65 KSI)



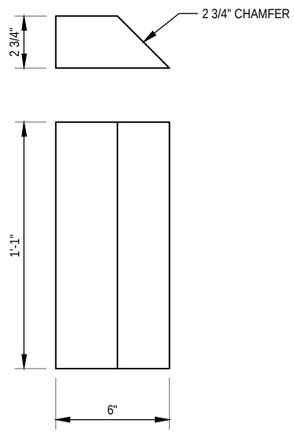
TRANSITION STIFFENER MK~TS1

(2 REQUIRED) (Fy = 65 KSI)



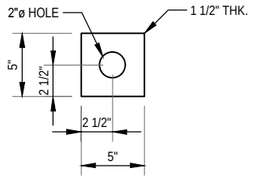
TRANSITION STIFFENER MK~TS2

(2 REQUIRED) (Fy = 65 KSI)



BEARING PLATE MK~P1

(4 REQUIRED) (Fy = 50 KSI)



WASHER PLATE MK~WP1

(8 REQUIRED) (Fy = 50 KSI)

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MISC DETAILS

S-6

37517-0750.003.DWG

MODIFICATION OF AN EXISTING 150' MONOPOLE
TOWER MAPPING CCI DOC ID #4710143
BU #841288; BRIDGEPORT NORTH

205 KAECHELE PLACE
BRIDGEPORT, CONNECTICUT 06606
FAIRFIELD COUNTY
LAT: 41° 13' 24.04"; LONG: -73° 13' 0.38"
APP: 374828 REV. 2; WO: 1368682

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

WIND DESIGN DATA	
REFERENCE STANDARD	ANSI/TIA-222-G-2-2009
LOCAL CODE	2016 CONNECTICUT STATE BUILDING CODE
ULTIMATE WIND SPEED (3-SECOND GUST)	125 MPH
CONVERTED NOMINAL WIND SPEED (3-SECOND GUST)	97 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

THIS PROJECT INCLUDES THE FOLLOWING ITEMS
REMOVE EXISTING DYWIDAG SHAFT REINFORCING
REMOVE TERMINATION BOLTS FOR EXISTING REINFORCING
SHAFT REINFORCING
INSTALL NEW CLIMBING RAIL SYSTEM
REMOVE EXISTING STIFFENERS
FIELD WELDED STIFFENERS
FIELD WELDED ANCHOR BRACKETS
POST INSTALLED ANCHOR RODS
HIGH STRENGTH GROUT
PAINT MODIFICATIONS TO MATCH EXISTING POLE

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 1358541

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.

SHEET INDEX	
SHEET NUMBER	DESCRIPTION
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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
S-6	MISC DETAILS

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
LICENSED
PROFESSIONAL ENGINEER

15-17

PJF PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 Columbus, OH 43215
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TITLE SHEET

T-1

37517-0750.003.DWG

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
X	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
X	POST INSTALLED ANCHOR ROD VERIFICATION
X	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)
X	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

STATE OF CONNECTICUT
JUSTIN T. KLINE
NO. 30301
LICENSED
PROFESSIONAL ENGINEER
4.5.17

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CROWN CASTLE
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PH: (585) 899-3445

MODIFICATION OF AN EXISTING MONOPOLE
BU #841288; BRIDGEPORT NORTH
BRIDGEPORT, CONNECTICUT

PROJECT No:	37517-0750.003.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	S.J.T.
CHECKED BY:	JTK
DATE:	3-31-2017

MI CHECKLIST

T-2

37517-0750.003.DWG

MONOPOLE RETROFIT PROJECT MASTER NOTES DOCUMENT (REV. 3, 02/05/2015)

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/TIA-1019 (LATEST EDITION), OSHA AND GENERAL INDUSTRY STANDARDS. ALL RIGGING PLANS SHALL ADHERE TO ANSI/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 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: TUFTUG@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

3.1. NEW GROUT FOR THE POLE BASE SHALL BE NON-SHRINK, NON-METALLIC, GROUT (NS GROUT BY EUCLID, OR APPROVED EQUAL) WITH A 7500 PSI MINIMUM COMPRESSIVE STRENGTH. CONTRACTOR SHALL SUBMIT PROPOSED GROUT SPECIFICATION INFORMATION TO CROWN CASTLE FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION. CONTRACTOR SHALL FOLLOW GROUT MANUFACTURER'S SPECIFICATIONS FOR COLD WEATHER GROUTING PROCEDURES (IF NECESSARY) AND THE TESTING AGENCY SHALL PREPARE GROUT SAMPLE SPECIMENS FOR COMPRESSIVE STRENGTH TESTING AND VERIFICATION.

3.2. GROUT SHALL BE INSTALLED TIGHT UNDER THE BASE PLATE AND BEARING PLATE REGION WITH NO VOIDS REMAINING BETWEEN THE TOP OF THE EXISTING CONCRETE AND THE UNDERSIDE OF THE EXISTING BASE PLATE AND BEARING PLATE.

3.3. CAULK AROUND ANCHOR RODS WHEN GROUTING.

4. FOUNDATION WORK - (NOT REQUIRED)

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

6. EPOXY GROUTED REINFORCING ANCHOR RODS

6.1. UNLESS OTHERWISE NOTED, REINFORCING ANCHOR RODS SHALL BE 150 KSI ALL-THREAD BARS CONFORMING TO ASTM A722. RECOMMENDED MANUFACTURERS/SUPPLIERS OF 150 KSI ALL-THREAD BARS ARE WILLIAMS FORM ENGINEERING CORPORATION AND DYWIDAG SYSTEMS INTERNATIONAL.

6.2. ALL REINFORCING ANCHOR RODS SHALL BE HOT DIP GALVANIZED PER ASTM A123.

6.3. THE CORE-DRILLED HOLES IN THE CONCRETE FOR THE ANCHOR RODS SHALL BE CLEAN AND DRY, AND OTHERWISE PROPERLY PREPARED ACCORDING TO THE ANCHOR ROD AND EPOXY MANUFACTURERS' INSTRUCTIONS, PRIOR TO PLACEMENT OF ANCHOR RODS AND EPOXY. CONTRACTOR SHALL FOLLOW ALL ANCHOR ROD AND EPOXY MANUFACTURER RECOMMENDATIONS REGARDING HANDLING OF RODS, EPOXY, ACCEPTABLE AMBIENT TEMPERATURE RANGE DURING INSTALLATION AND POST-INSTALLATION CURING, THE EFFECT OF TEMPERATURE ON EPOXY CURING TIME, PREPARATION OF HOLE, ETC.

6.4. HILTI HIT RE-500 SD OR ITW RED HEAD EPCON G5 EPOXY SHALL BE USED TO ANCHOR THE BAR IN THE DRILL HOLES. IF THE DESIGNED EMBEDMENT IS GREATER THAN 12 FT, CONTRACTOR HAS THE OPTION TO USE PILE ANCHOR GROUT BY E-CHEM AS AN ALTERNATE. IF CONTRACTOR WISHES TO USE A DIFFERENT EPOXY, A REQUEST INCLUDING THE EPOXY TECHNICAL DATA SHEET(S) SHALL BE SUBMITTED TO THE EOR FOR REVIEW PRIOR TO CONSTRUCTION.

6.5. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN INSTALLED AND ALL EPOXY AND GROUT HAVE CURED (IF BASE PLATE AND/OR BEARING PLATES HAVE BEEN GROUTED PRIOR TO TESTING), ALL REINFORCING ANCHORS SHALL BE LOAD TESTED PER CROWN CASTLE ENGINEERING DOCUMENT #ENG-PRC-10119. REFER TO THE NEW ANCHOR & BRACKET DETAIL ON FOLLOWING SHEETS FOR SPECIFIED ANCHOR ROD TARGET TENSION LOAD.

6.6. ONCE THE REINFORCING ANCHOR RODS HAVE BEEN SUCCESSFULLY LOAD TESTED AND APPROVED THE CONTRACTOR SHALL TIGHTEN ALL HEAVY HEX ANCHOR NUTS TO SNUG TIGHT PLUS 1/8 TURN OF NUT.

6.7. TAKE ALL MEASUREMENTS NECESSARY TO AVOID DAMAGING EXISTING REINFORCING BARS DURING CORING OPERATIONS. NOTIFY ENGINEER OF RECORD IMMEDIATELY IF EXISTING REINFORCING BARS ARE ENCOUNTERED AND INTERFERE WITH PLACEMENT OF NEW ANCHORS. MINOR ADJUSTMENT TO PROPOSED LOCATION OF NEW ANCHORS MAY BE REQUIRED.

6.8. IF BASE PLATE GROUT REMOVAL IS REQUIRED FOR ANCHOR ROD INSTALLATION SEE ENG-PRC-10012; "BASE PLATE GROUT REPAIR' FOR PROCEDURES AND RECOMMENDED MANUFACTURERS. CONTRACTOR TO DETERMINE THE QUANTITY 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 ANSI/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 ANSI/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 (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.

STATE OF CONNECTICUT
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CROWN CASTLE
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PH: (585) 899-3445

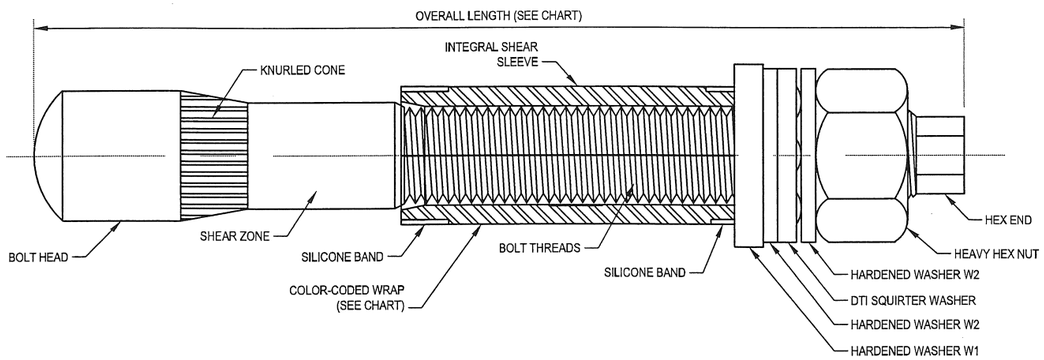
MODIFICATION OF AN EXISTING 150' MONOPOLE
BU #841288; BRIDGEPORT NORTH
BRIDGEPORT, CONNECTICUT

PROJECT No:	37517-0750.003.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	S.J.T.
CHECKED BY:	
DATE:	3-31-2017

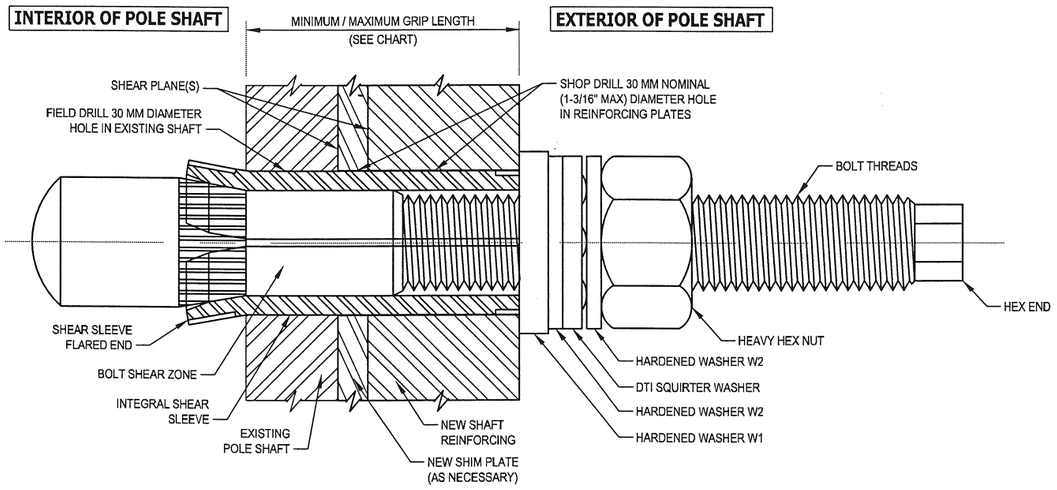
GENERAL NOTES

S-1

37517-0750.003.DWG



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

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

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
LICENSED PROFESSIONAL ENGINEER
4-5-17

PJF PAUL J. FORD & COMPANY
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8 PARKMEADOW DRIVE, PITTSFORD, NY 14534
PH: (585) 899-3445

CROWN CASTLE

MODIFICATION OF AN EXISTING 150' MONOPOLE
BU #841288; BRIDGEPORT NORTH
BRIDGEPORT, CONNECTICUT

PROJECT No:	37517-0750.003.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	S.J.T.
CHECKED BY:	
DATE:	3-31-2017

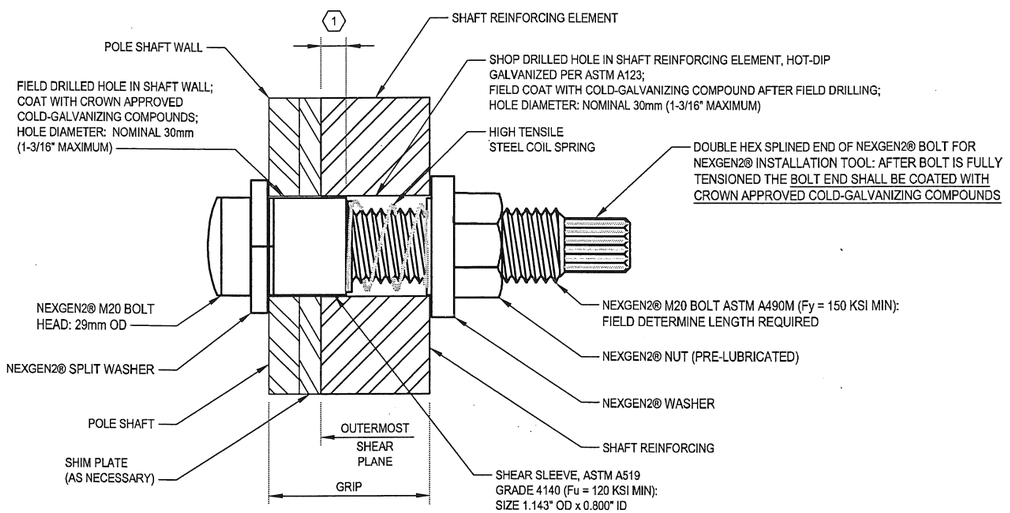
FORGBOLT™ DETAILS

S-2A

37517-0750.003.DWG

NEXGEN2® BOLT NOTE SHEET: REV. 1.01, 04-15-2015

(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	11/16"	15/16"	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

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
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BU #841288; BRIDGEPORT NORTH
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DESIGNED BY:	S.J.T.
CHECKED BY:	JTK
DATE:	3-31-2017

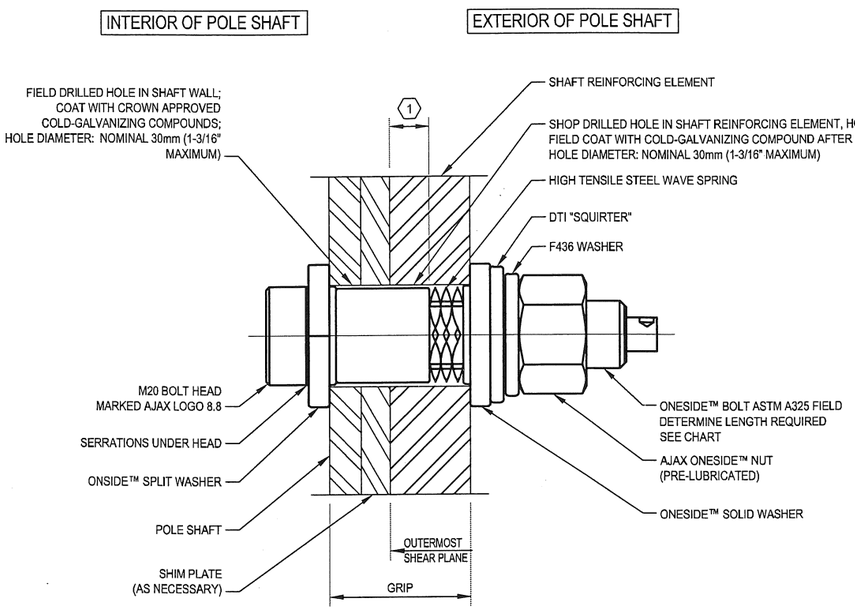
NEXGEN2™ BOLT DETAIL

S-2B

37517-0750.003.DWG

AJAX ONESIDE™ BOLT NOTE SHEET: REV. 1.01, 06-08-2016

(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
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JOHN KILLAM - JOHN@IRASVENS.COM
PHONE: (530) 647-8225
FAX: (530) 647-8229

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

STATE OF CONNECTICUT JUSTIN T. KLINE No. 30301 LICENSED PROFESSIONAL ENGINEER
4-5-17

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CROWN CASTLE

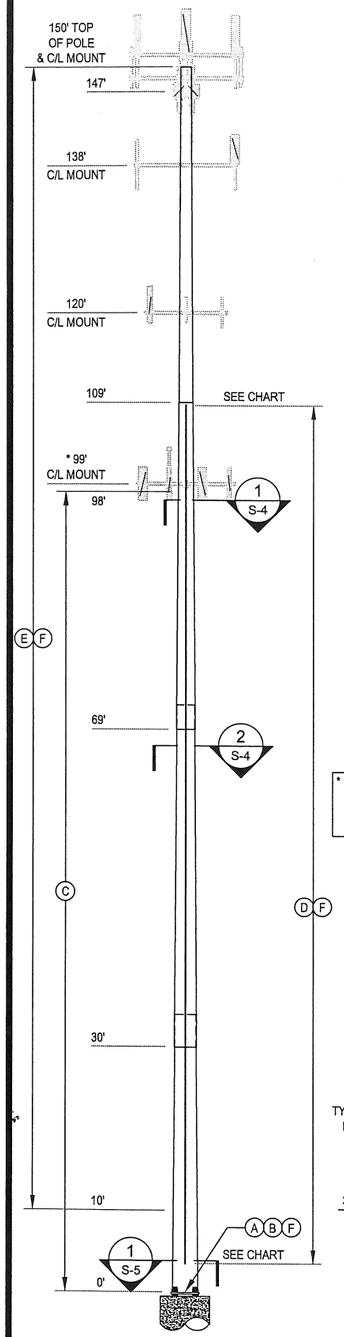
MODIFICATION OF AN EXISTING 150' MONOPOLE
BU #841288; BRIDGEPORT NORTH
BRIDGEPORT, CONNECTICUT

PROJECT No:	37517-0750.003.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	S.J.T.
CHECKED BY:	JK
DATE:	3-31-2017

AJAX ONESIDE™ BOLT DETAIL

S-2C

37517-0750.003.DWG



POLE ELEVATION 1 / S-3

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

NEW STACKED FLAT PLATE (65 KSI) REINFORCING SCHEDULE

BOTTOM ELEVATION	TOP ELEVATION	FLAT # / DEGREE SEPARATION	ELEMENT	ELEMENT LENGTH	ELEMENT QUANTITY	APPROXIMATE BOLTS PER STACKED PLATE	APPROXIMATE TOTAL BOLT QUANTITY	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAXIMUM INTERMEDIATE BOLT SPACING	ESTIMATED TOTAL STEEL WEIGHT
3'-6" (OUTER PLATE)	38'-6" (OUTER PLATE)	F1 & F7	CCI-WFP-06010035 #1	35'-0"	2	35	70	0	18	20"	1429 LBS.
3'-6" (INNER PLATE)	38'-6" (INNER PLATE)	F1 & F7	CCI-WFP-04510035 #2	35'-0"	2						1072 LBS.
8'-6" (OUTER PLATE)	38'-6" (OUTER PLATE)	F4 & F10	CCI-WFP-06010030 #3	30'-0"	2	33	66	0	18	20"	1225 LBS.
8'-6" (INNER PLATE)	38'-6" (INNER PLATE)	F4 & F10	CCI-WFP-04510030 #4	30'-0"	2						919 LBS.
38'-7" (OUTER PLATE)	73'-7" (OUTER PLATE)	F1, F4, F7 & F10	CCI-CFP-06010035 #5	35'-0"	4	51	204	18	18	20"	2858 LBS.
38'-7" (INNER PLATE)	73'-7" (INNER PLATE)	F1, F4, F7 & F10	CCI-CFP-04510035 #6	35'-0"	4						2144 LBS.
73'-8" (OUTER PLATE)	108'-8" (OUTER PLATE)	F1, F4, F7 & F10	CCI-CFP-06010035 #7	35'-0"	4	51	204	18	18	20"	2858 LBS.
73'-8" (INNER PLATE)	108'-8" (INNER PLATE)	F1, F4, F7 & F10	CCI-CFP-04510035 #8	35'-0"	4						2144 LBS.
							544				14649 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 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

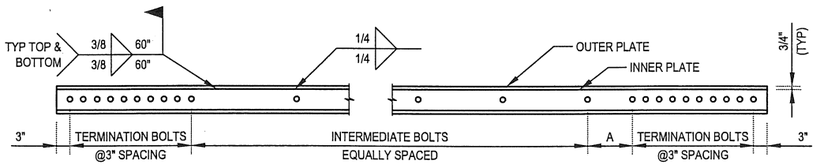
ELEVATION	FLAT PLATE THICKNESS	FLAT PLATE WIDTH	FLAT PLATE LENGTH	FLAT PLATE QUANTITY	WELD LENGTH PER SIDE	TOTAL WELD LENGTH	BOLTS PER SPLICE*	TOTAL STEEL WEIGHT
38'-7"	1-1/4"	8-1/2"	8'-10"	4	0"	0"	33	1277 LBS.
73'-8"	1-1/4"	8-1/2"	9'-7"	4	0"	0"	36	1386 LBS.
						0		2663 LBS.

* 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
108	4	4-1/2"	4-1/2"	1-1/4"

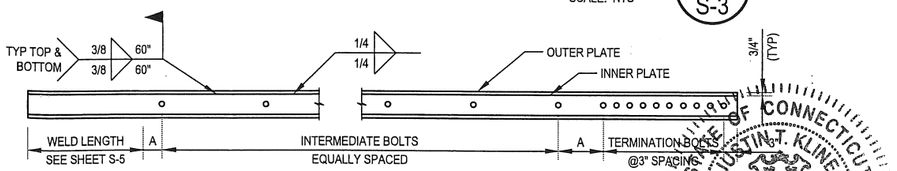
SHIMS ARE FOR BIDDING PURPOSES ONLY, FINAL SHIM REQUIREMENTS TO BE DETERMINED BY CONTRACTOR DURING FABRICATION.



BOTTOM TOP

STACKED BOLTED FLAT PLATE BAR DETAIL

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



BOTTOM TOP

STACKED WELDED FLAT PLATE BAR DETAIL

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

SHAFT SECTION DATA

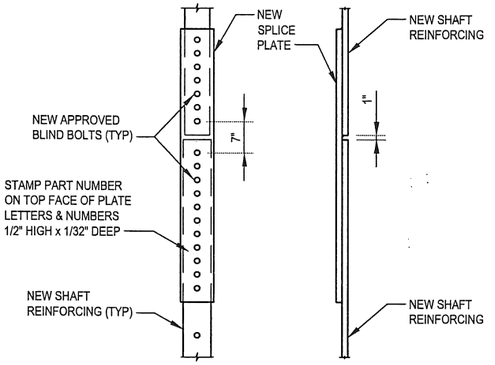
SHAFT SECTION	SECTION LENGTH (FT)	PLATE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER ACROSS FLATS (IN) @ TOP	DIAMETER ACROSS FLATS (IN) @ BOTTOM	POLE GRADE (ksi)	POLE SHAPE
1	41.00	0.2188	36.00	15.000	21.000	50	12-SIDED
2	40.00	0.2188		21.000	27.040	50	12-SIDED
3	42.00	0.3125		26.149	32.890	50	12-SIDED
4	34.00	0.4063	48.00	31.623	37.360	50	12-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'	INSTALL NEW ANCHOR RODS AND BRACKETS AT BASE PLATE	S-5
B	0'	INSTALL NEW TRANSITION STIFFENERS AT BASE PLATE	S-5
C	0' TO 98'	REMOVE EXISTING DYWIDAG SHAFT REINFORCING ON FLATS #1, 4, 7 & 10	S-3
D	3'-6" TO 108'-8"	INSTALL NEW SHAFT REINFORCING	S-3 & S-4
E	10' TO 150'	INSTALL NEW TUF-TUG STEP BOLT CLIMBER RAIL SYSTEM ON FLAT #1. CONTRACTOR SHALL COORDINATE INSTALLATION DETAILS WITH TUF-TUG PRIOR TO FABRICATION OF SHAFT REINFORCING	S-3
F	0' TO 150'	PAINT MODIFICATIONS TO MATCH EXISTING POLE	S-3



DETAIL 2 / S-3

SCALE: NTS

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MONOPOLE PROFILE

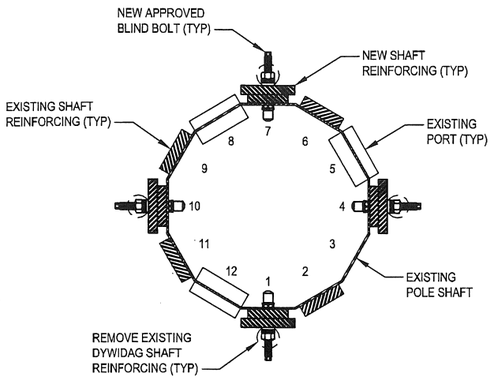
S-3

STATE OF CONNECTICUT JUSTIN T. KLINE No. 30301 LICENSED PROFESSIONAL ENGINEER

4.5.17

CROWN CASTLE US PATENT NOS 8,046,972; 8,156,712; 7,849,659; 8,424,269 AND PATENT PENDING

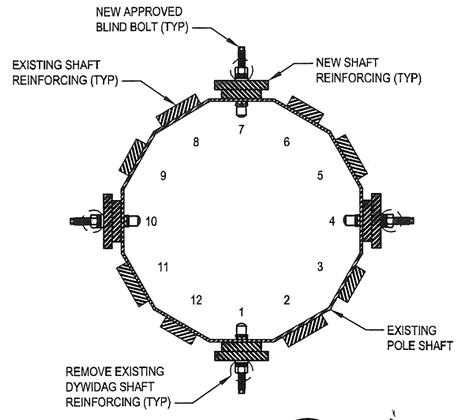
37517-0750.003.DWG



SECTION 1 / S-4

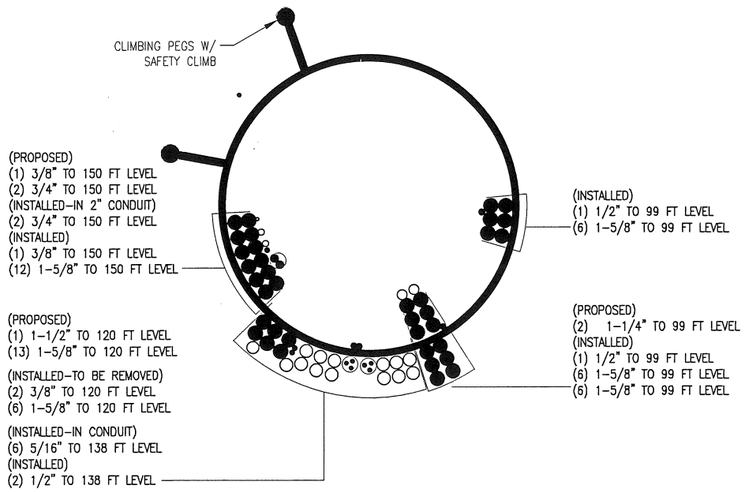
EL 97'

* CONTRACTOR SHALL COORDINATE INSTALLATION OF NEW STEP RAIL SYSTEM WITH TUF-TUG

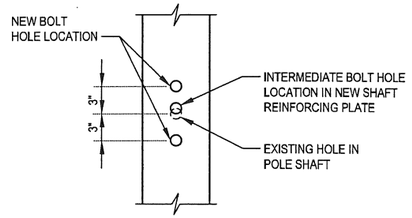


SECTION 2 / S-4

EL 67'



BASE LEVEL DRAWING



INTERMEDIATE BOLT HOLE FIX / 3 / S-4

SCALE: NTS

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CROWN CASTLE
8 PARKMEADOW DRIVE, PITTSFORD, NY 14534
PH: (585) 869-3445

MODIFICATION OF AN EXISTING 150' MONOPOLE
BU #841288; BRIDGEPORT NORTH
BRIDGEPORT, CONNECTICUT

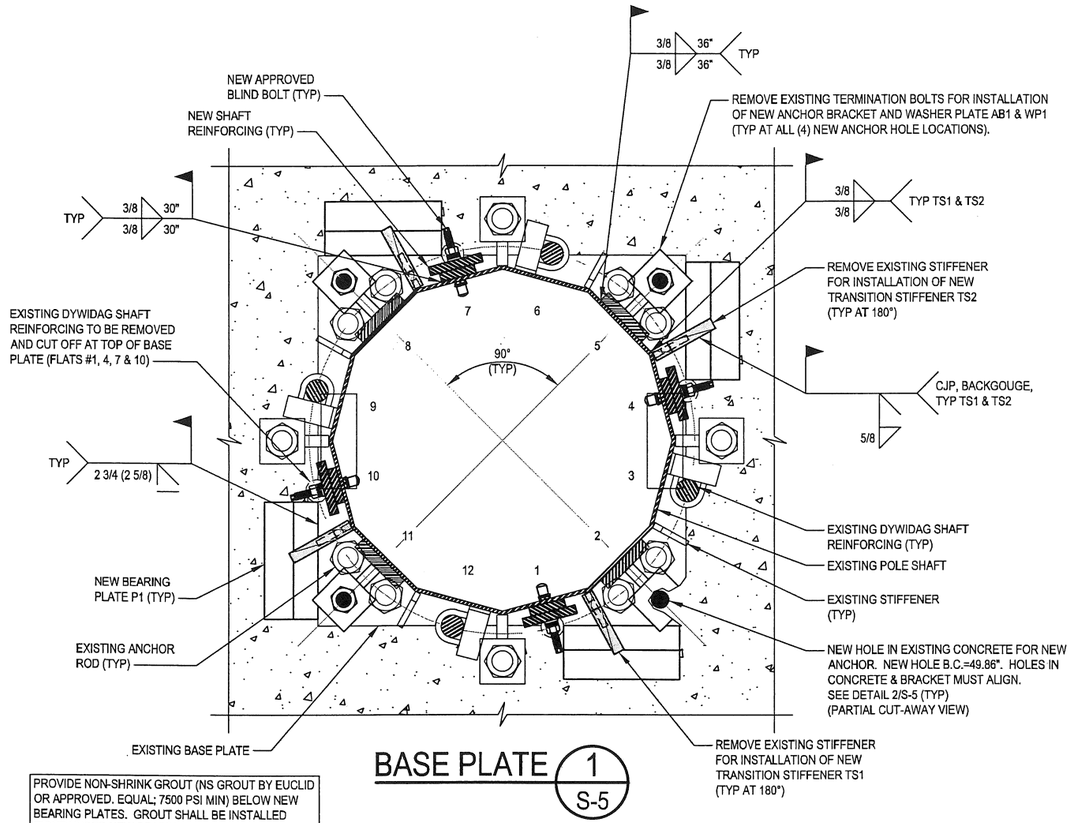
PROJECT No:	37517-0750.003.7700
DRAWN BY:	B.M.S.
DESIGNED BY:	S.J.T.
CHECKED BY:	JTK
DATE:	3-31-2017

SHAFT REINFORCING SECTIONS

S-4

37517-0750.003.DWG

BASE SPECIFICATIONS	
BASE PLATE:	41" SQUARE; 2 3/4" THK.; Fy=50 KSI
ANCHOR RODS:	(8) 2 1/4"ø; A615 GRADE 75; 43" B.C.



BASE PLATE 1 / S-5

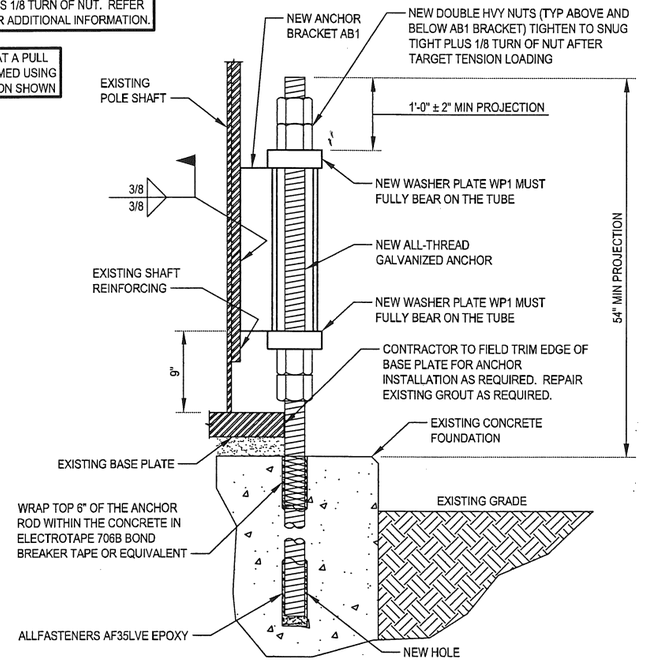
PROVIDE NON-SHRINK GROUT (NS GROUT BY EUCLID OR APPROVED. EQUAL; 7500 PSI MIN) BELOW NEW BEARING PLATES. GROUT SHALL BE INSTALLED TIGHT UNDER NEW BEARING PLATES WITH NO VOIDS REMAINING BETWEEN TOP OF EXISTING CONCRETE AND UNDERSIDE OF NEW BEARING PLATES.

NEW ANCHOR ROD REINFORCING SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS AND HOLE TO BE MECHANICALLY ROUGHENED. ONCE ALL RESIN HAS CURED, ALL NEW ANCHOR ROD REINFORCING SHALL BE TESTED TO THE TARGET TENSION LOAD. ONCE THE TENSION LOAD HAS BEEN RELEASED, TIGHTEN HEAVY HEX NUT TO SNUG TIGHT PLUS 1/8 TURN OF NUT. REFER TO SHEET S-1, SECTION 6 FOR ADDITIONAL INFORMATION.

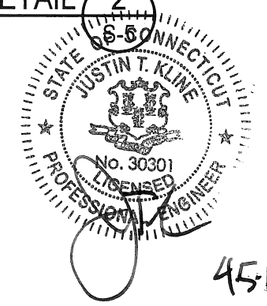
CONTRACTOR TO VERIFY THAT A PULL TEST IS ABLE TO BE PERFORMED USING THE ANCHOR ROD PROJECTION SHOWN

NEW ANCHOR RODS

PART #	DIAMETER (IN)	LENGTH (IN)	MATERIAL	EMBEDMENT DEPTH (IN)	TARGET TENSION LOAD (KIPS)	HOLE DIAMETER (IN)
CCI-AR-0175	1 3/4	120	A193 GR B7	60	111	2



NEW ANCHOR & BRACKET DETAIL 2 / S-5



4517

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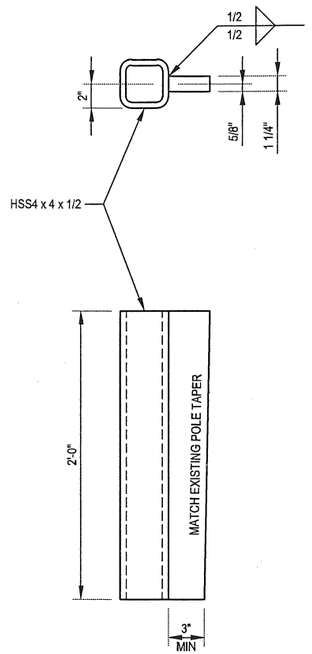
BASE PLATE DETAILS

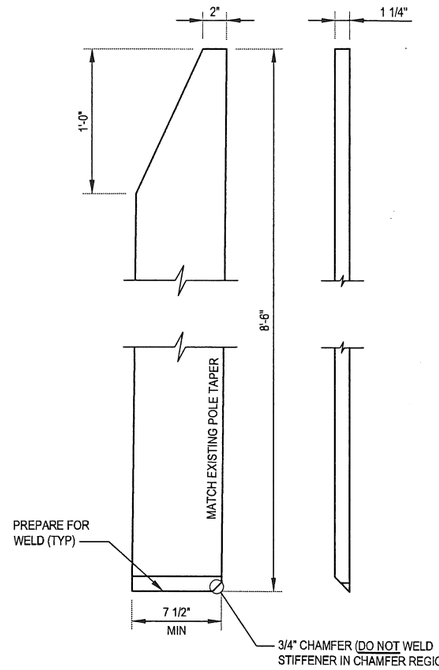
S-5

37517-0750.003.DWG



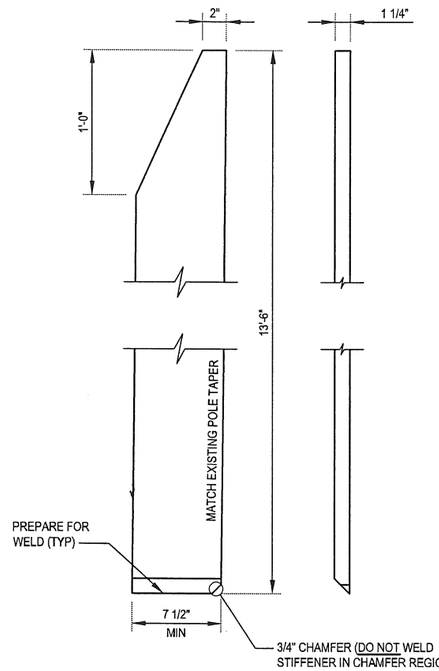
ANCHOR BRACKET MK~AB1

(4 REQUIRED) (TUBE Fy = 50 KSI) (STIFFENER Fy = 65 KSI)



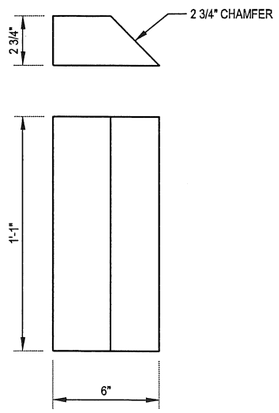
TRANSITION STIFFENER MK~TS1

(2 REQUIRED) (Fy = 65 KSI)



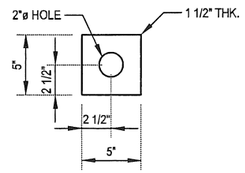
TRANSITION STIFFENER MK~TS2

(2 REQUIRED) (Fy = 65 KSI)



BEARING PLATE MK~P1

(4 REQUIRED) (Fy = 50 KSI)



WASHER PLATE MK~WP1

(8 REQUIRED) (Fy = 50 KSI)

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MISC DETAILS

S-6

37517-0750.003.DWG