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

March 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: 876325**
T-Mobile Site ID: CT11062B
Located at: 92 Weston Street, Hartford, CT 06103
Latitude: 41° 47' 12.3"/ Longitude: -72° 39' 44.42"

Dear Ms. Bachman,

T-Mobile currently maintains three (3) antennas at the 76-foot level of the existing 110-foot monopole located at 92 Weston Street, Hartford, CT. The tower is owned by Crown Castle. The property is owned by NEPREO Inc. T-Mobile now intends to add three (3) antennas, replace three (3) antennas, add three (3) RRHs and one (1) hybrid cable, and remove six (6) lines of coaxial cable at the same 76-foot level.

The only document that the town could find for the original approval of the tower was building permit number 964785E dated November 26, 1996. No conditions were outlined on the permit. A copy of my request to the town and the permit have been included.

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 Luke Bronin, Ms. Caitlin Palmer Principle Planner for Commercial Development Planning & Zoning Commission, 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: Mayor Luke Bronin
Office of the Mayor
550 Main Street, Room 200
Hartford, CT 06103

Ms. Caitlin Palmer Principle Planner for Commercial Development
Planning & Zoning Commission
250 Constitution Plaza, 4th Floor
Hartford, CT 06103

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

NEPREO INC (Property Owner)
337 Freeport Street
Boston, MA 02122

CROWN CASTLE

eet, Suite 5800
MA 01801

Mayor Luke Bronin
office of the Mayor
550 Main St. Rm 200
Hartford, CT 06103

CROWN CASTLE

reet, Suite 5800
, MA 01801

Ms. Caitlin Palmer - Principle Planner
Planning + Zoning Commission
250 Constitution Plaza, 4th floor
Hartford, CT 06103

CROWN CASTLE

eet, Suite 5800
MA 01801

NEPREO Inc
337 Freeport Street
Boston, MA 02122

Cornwall, Amanda

From: Goodall, Amanda
Sent: Thursday, February 16, 2017 9:28 AM
To: caitlin.palmer@hartford.gov
Subject: Cell Tower-92 Weston Street
Attachments: emfilingmemo111015.pdf

Good morning Ms. Palmer,

My name is Amanda and I work for Crown Castle. I am looking for the City's original approval for the construction of the cell tower located at 92 Weston Street. The Connecticut Siting Council has made supplying them with a copy of the approval a requirement for their exempt modification packages. I have attached a copy of the CSC's filing memo for your reference. Please let me know if you have a copy of approval and if you could please send me a copy. Please do not hesitate to contact me here or at the number below if you have any questions.

Thank you for your time.

AMANDA GOODALL
Real Estate Specialist
T: (339) 205-7017 | M: (978) 790-8547 | F: (724) 416-4185
Amanda.Goodall@crowncastle.com

CROWN CASTLE
12 Gill Street, Suite 5800, Woburn, MA 01801
CrownCastle.com

Cornwall, Amanda

From: postmaster@hartfordgov.onmicrosoft.com
To: jamie.bratt@hartford.gov
Sent: Friday, March 17, 2017 10:04 AM
Subject: Delivered: 92 Weston Street-Cell Tower

Your message has been delivered to the following recipients:

jamie.bratt@hartford.gov

Subject: 92 Weston Street-Cell Tower

CT03XC064

BUILDING PERMIT

DEPARTMENT OF LICENSES & INSPECTIONS
CITY OF HARTFORD

Appl. Nbr.964013 Permit Nbr. 964785 E

THE APPLICANT NAMED BELOW IS HEREBY GRANTED PERMISSION TO PERFORM WORK AS DESCRIBED HEREIN AT:

0000 0092 WESTON ST

FLOOR: 0 0 0 CONDO:

IN ACCORDANCE WITH THE APPLICATION AND PLANS APPROVED BY THE DEPARTMENT OF LICENSES AND INSPECTIONS.

Joseph Hewes Date 11/26/96
Building Official

OWNER: WESTON SQUARE ASSOCIATES
ADDRESS: ONE HARTFORD SQUARE
NEW BRITAIN, CT 06051

APPLICANT: MIKE EVANCHICK
SPRINT SPECTRUM LP
9 BARNES INDUSTRIAL RD
WALLINGFORD, CT 06492

294-5600

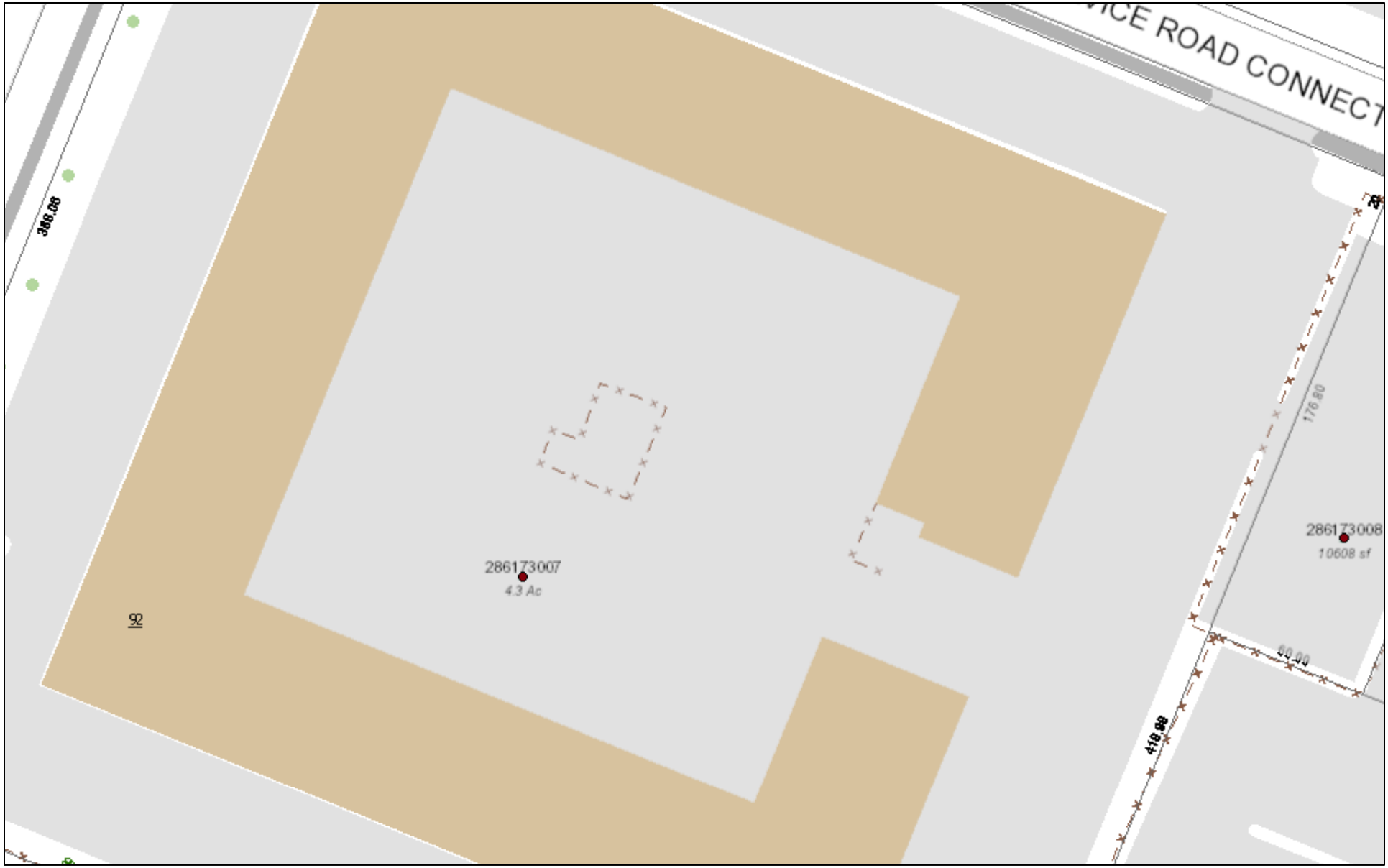
ESTIMATED COST: $ 98000.

Application Date: 10/08/96 Fee: 1568.00

DESCRIPTION OF JOB:
INSTALLATION OF 110 FT MONOPOLE WITH 6 ANTENNAS AND ASSOCIATED INFRASTRUCTURE.

PARCEL ID.: NOT FOUND

City of Hartford GIS Map



March 17, 2017

1:600

0 0.005 0.01 0.02 mi

0 0.0075 0.015 0.03 km

Address Points

Parcels

Parcel Labels

HartfordGIS
City of Hartford - GIS Services

Unofficial Property Record Card - City of Hartford, CT

General Property Data

Parcel Identification 286-173-007
Property Owner NEPREO INC
Mailing Address 337 FREEPORT ST
City BOSTON
Mailing State MA **Zip** 02122
ParcelZoning ID-1

Property Location 0092 WESTON ST HARTFORD
Property Use WAREHOUSE
Most Recent Sale Date 11/3/2016
Legal Reference 07130-0299
Grantor ALBEMARLE WESTON STREET LLC,
Sale Price 0
Land Area 4.301 acres

Current Property Assessment

Fiscal Year 2016
Land Value 886,480
Total Value 1,771,490
Building Value 825,230

Building Description

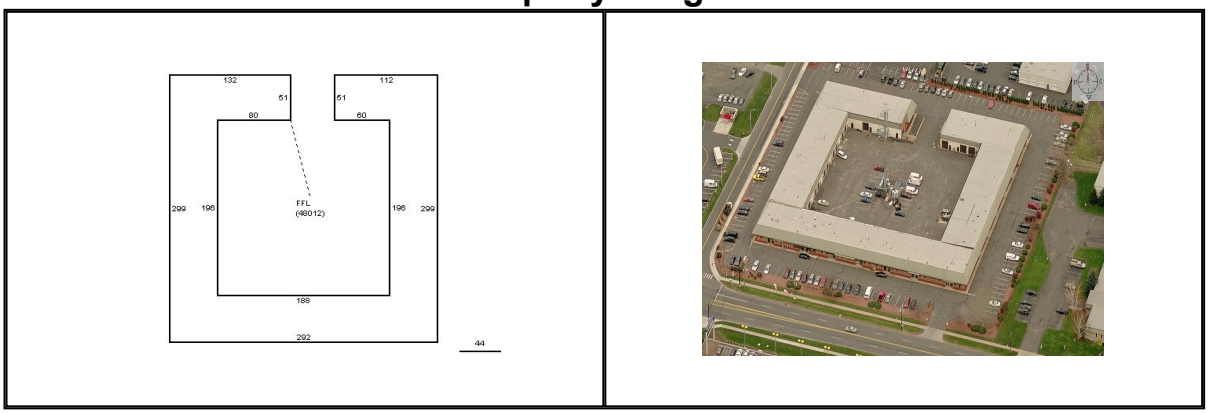
Building Style OFFICE/WHS
# of Living Units 0
Year Built 1978
Building Grade Average
Building Condition Average
Finished Area (SF) 48012
Number Rooms 0
# of 3/4 Baths 0
Foundation Type Concrete
Frame Type Steel
Roof Structure FLAT
Roof Cover Metal
Siding Brick
Interior Walls DRYWALL
Number Beds 0
# of 1/2 Baths 0
Flooring Type COMBINATION
Basement Floor N/A
Heating Type Warm Air
Heating Fuel Gas
Air Conditioning 30%
# of Bsmt Garages 0
# of Full Baths 0
# of Other Fixtures 0

Legal Description

Narrative Description of Property

This property contains 4.301 acres of land mainly classified as WAREHOUSE with a(n) OFFICE/WHS style building, built about 1978 , having Brick exterior and Metal roof cover, with 0 unit(s), 0 room(s), 0 bedroom(s), 0 bath(s), 0 half bath(s).

Property Images



Disclaimer: This information is believed to be correct but is subject to change and is not warranteed.

T · · Mobile · · ·

T-MOBILE SITE NUMBER: CT11062B
T-MOBILE SITE NAME: WINDSOR/ I91/X35
SITE TYPE: MONOPOLE
TOWER HEIGHT: 110'-0"

CROWN CASTLE BU #: 876325
SITE ADDRESS: 92 WESTON STREET HARTFORD, CT 06103
COUNTY: HARTFORD
JURISDICTION: CITY OF HARTFORD

T-MOBILE L700_792DB CONFIGURATION

SITE INFORMATION

CROWN CASTLE SITE NAME:	WESTON SQUARE
SITE ADDRESS:	92 WESTON STREET HARTFORD, CT 06103
COUNTY:	HARTFORD
MAP/PARCEL #:	HRFD-000286-000173-000007
AREA OF CONSTRUCTION:	EXISTING
LATITUDE:	41° 47' 12.30"
LONGITUDE:	-72° 39' 44.42"
LAT/LONG TYPE:	NAD83
GROUND ELEVATION:	18 FT.
CURRENT ZONING:	C1
JURISDICTION:	CITY OF HARTFORD
OCCUPANCY CLASSIFICATION:	U
TYPE OF CONSTRUCTION:	VB
A.D.A. COMPLIANCE:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION
PROPERTY OWNER:	ALBEMARLE WESTON STREET 942 MAIN STREET, SUITE 300 HARTFORD, CT 06095
TOWER OWNER:	GLOBAL SIGNAL ACQUISITIONS II LLC 2000 CORPORATE DRIVE CANONSBURG, PA 15317
CARRIER/APPLICANT:	T-MOBILE NORTHEAST 35 GRIFFIN RD SOUTH BLOOMFIELD, CT 06002
CROWN CASTLE APPLICATION ID:	366958
ELECTRIC PROVIDER:	NORTHEAST UTILITIES (800) 386-2000
TELCO PROVIDER:	LIGHTOWER (888) 583-4237

PROJECT TEAM

CROWN CASTLE A&E FIRM:	CROWN CASTLE 2000 CORPORATE DRIVE CANONSBURG, PA 15317 CROWNAE.APPROVAL@CROWNCASTLE.COM
CROWN CASTLE CONTACTS:	3 CORPORATE PARK DRIVE, SUITE 101 CLIFTON PARK, NY 12065 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	OVERALL AND ENLARGED SITE PLAN
C-2	FINAL ELEVATION AND ANTENNA PLANS
C-3	ANTENNA AND CABLE SCHEDULE
C-4	PLUMBING DIAGRAM
C-5	EQUIPMENT SPECIFICATIONS
G-1	ANTENNA GROUNDING DETAILS
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:

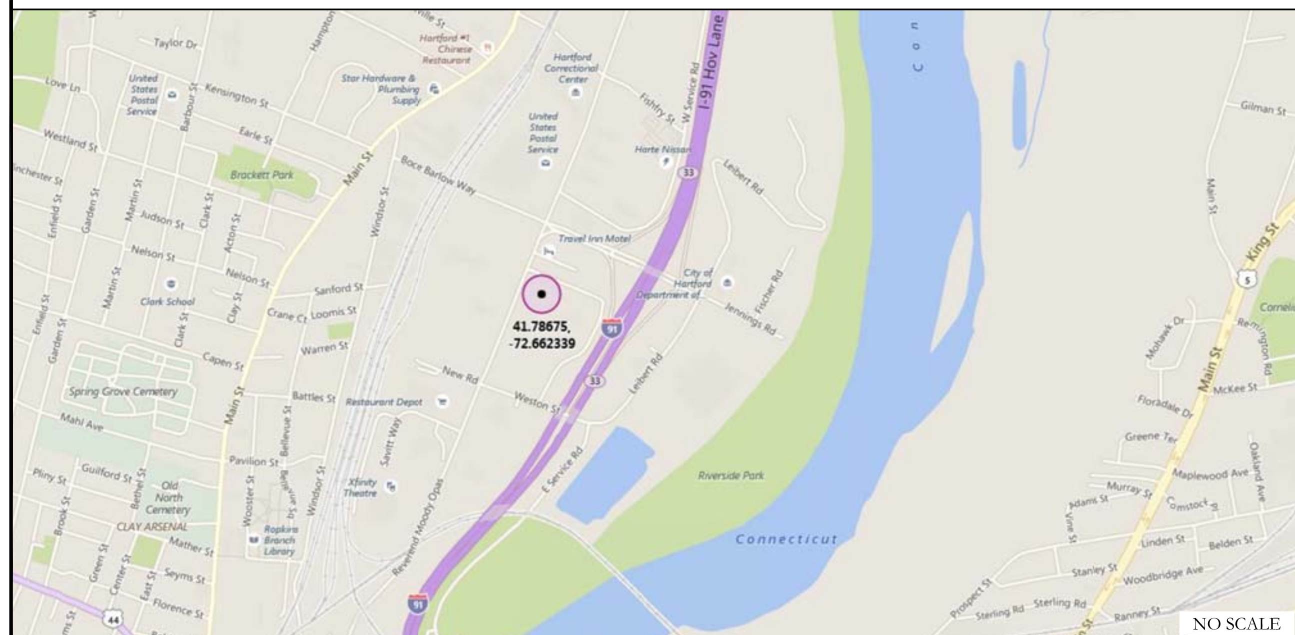
CODE TYPE	CODE
BUILDING	2016 CT STATE BUILDING CODE/2012 IBC W/ CT AMENDMENTS
MECHANICAL	2016 CT STATE BUILDING CODE/2012 IMC W/ CT AMENDMENTS
ELECTRICAL	2016 CT STATE BUILDING CODE/2014 NEC W/ CT AMENDMENTS

REFERENCE DOCUMENTS:

STRUCTURAL ANALYSIS: PAUL J. FORD & CO. DATED FEBRUARY 15, 2017

TOWER MODIFICATION DESIGN: PAUL J. FORD & CO. DATED FEBRUARY 15, 2017

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.

- REMOVE (3) ANTENNAS
- REMOVE (6) 1-1/4" COAX CABLES
- INSTALL (6) ANTENNAS
- INSTALL (1) 1-3/8" HYBRID CABLE
- INSTALL (3) RRUs

DESIGN PACKAGE BASED ON RF DATA SHEET
VERSION: 1.1
ISSUED: 01/04/17

DESIGN PACKAGE BASED ON THE APPLICATION
ID: 366958
REVISION: 6

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

CALL CONNECTICUT ONE CALL
(800) 922-4455
CALL 3 WORKING DAYS BEFORE YOU DIG!
811

T · · Mobile · · ·
35 GRIFFIN RD SOUTH
BLOOMFIELD, CT 06002

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

T-MOBILE SITE NUMBER:
CT11062B

BU #: **876325**
WESTON SQUARE

92 WESTON STREET
HARTFORD, CT 06103

EXISTING 110'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	12/19/16	CJ	PRELIMINARY	LR
B	02/16/17	CJ	PRELIMINARY	LR
C	02/21/17	CJ	PRELIMINARY	LR
D	03/08/17	CJ	PRELIMINARY	LR
0	03/20/17	CJ	CONSTRUCTION	AF

DocuSigned by:
BAD6066DD9024F4...

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

3/20/2017 | 6:49:17 PM EDT

Crown Castle USA, Inc. COA
#PEC.0001101

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

SHEET NUMBER: T-1
REVISION: 0

SITE 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:

PBS/G	SOLID GROUND BUS BAR
PBS/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-POTENTAL 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 RD SOUTH
BLOOMFIELD, CT 06002

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

T-MOBILE SITE NUMBER:
CT11062B

BU #: **876325**
WESTON SQUARE

92 WESTON STREET
HARTFORD, CT 06103

EXISTING 110'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	12/19/16	CJ	PRELIMINARY	LR
B	02/16/17	CJ	PRELIMINARY	LR
C	02/21/17	CJ	PRELIMINARY	LR
D	03/08/17	CJ	PRELIMINARY	LR
0	03/20/17	CJ	CONSTRUCTION	AF

DocuSigned by:
EAD5066DD9024F4...

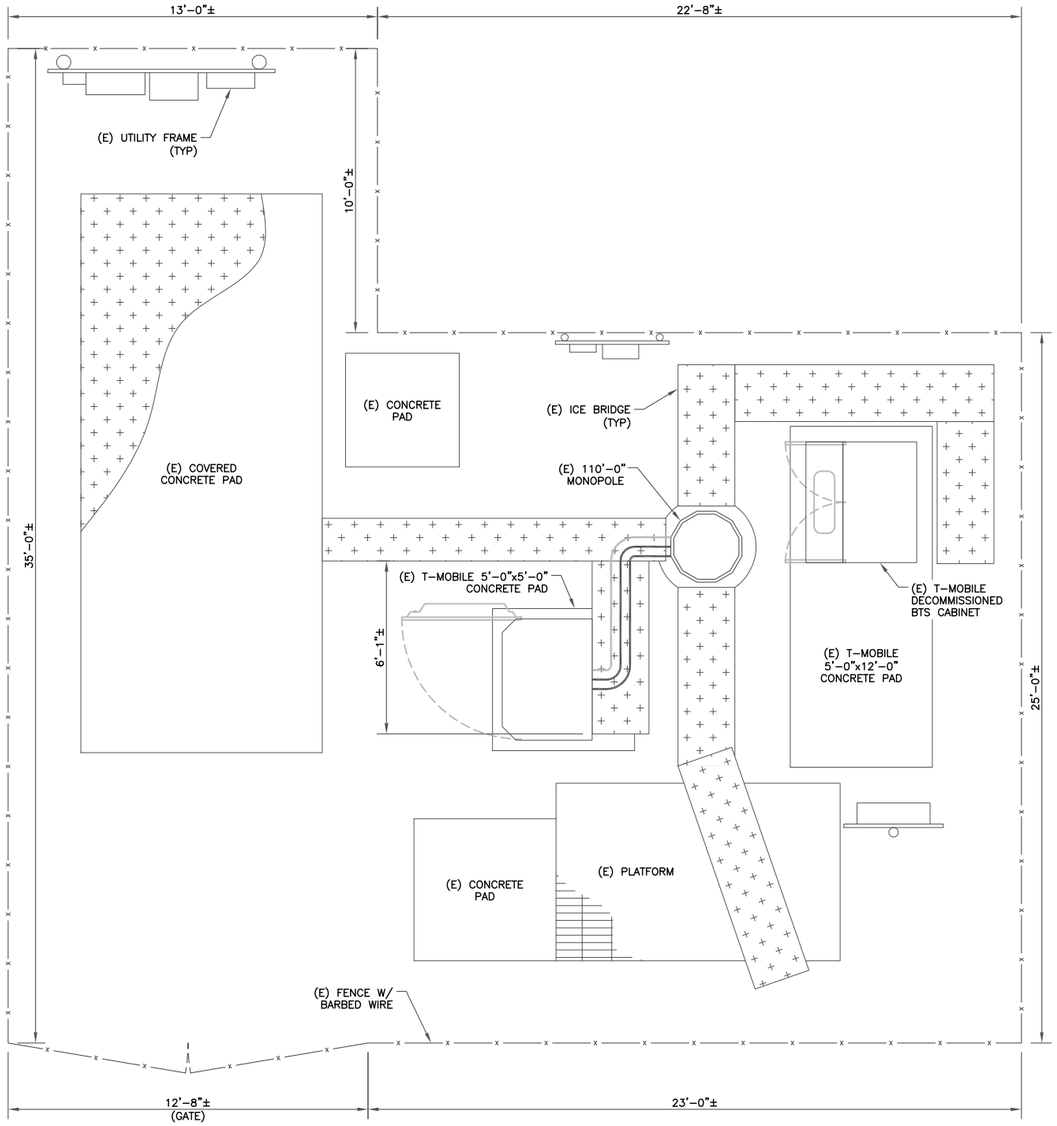
STATE OF CONNECTICUT
ANDREW JOSEPH FANDOZZI III
No. 30515
LICENSED
PROFESSIONAL ENGINEER

3/20/2017 | 6:49:17 PM EDT

Crown Castle USA, Inc. COA
#PEC.0001101

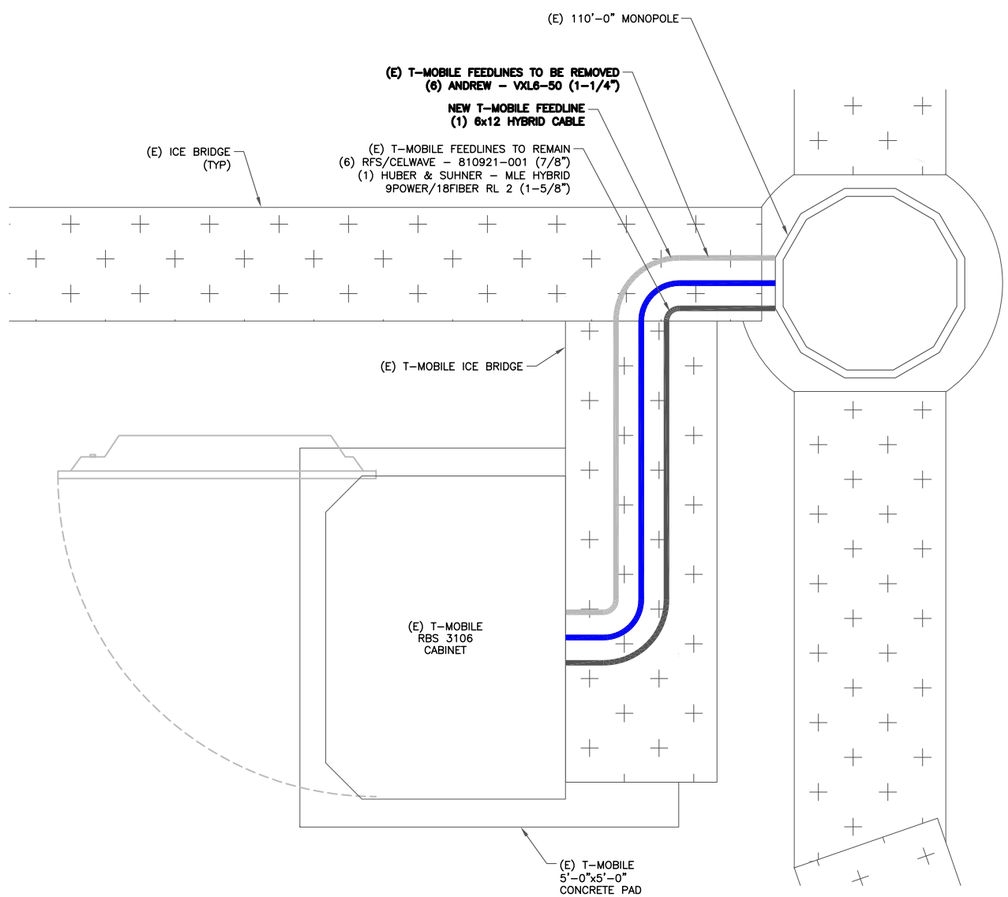
SHEET NUMBER: T-2

REVISION: 0



1 OVERALL SITE PLAN
SCALE: 2' 1' 0 2' 3/8"=1'-0" (FULL SIZE) 3/16"=1'-0" (11x17)

N



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

N

T-Mobile
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0	03/20/17	CJ	CONSTRUCTION	AF

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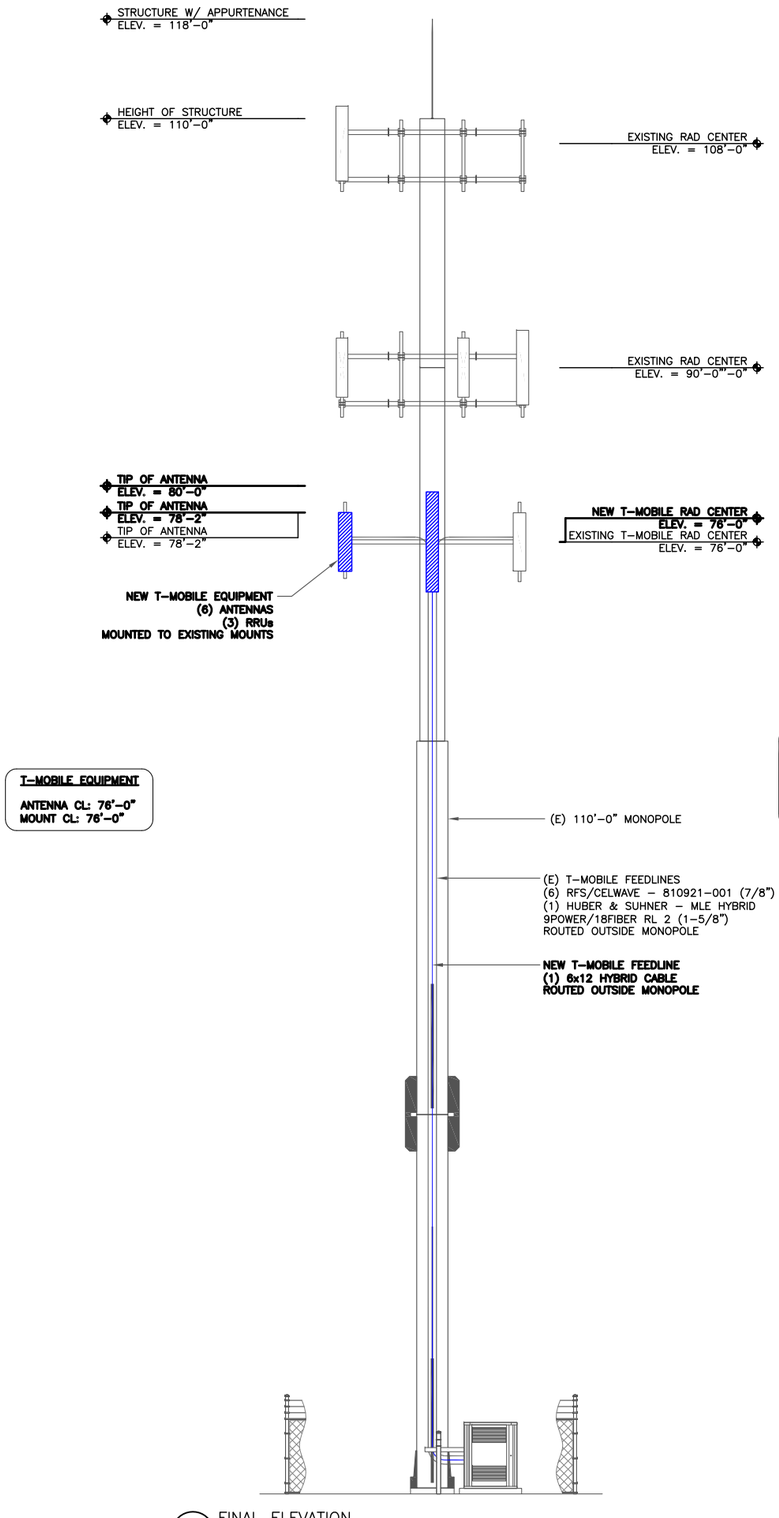
STATE OF CONNECTICUT
ANDREW JOSEPH FANDOZZI III
No. 30515
LICENSED PROFESSIONAL ENGINEER

3/20/2017 | 6:49:17 PM EDT

Crown Castle USA, Inc. COA
#PEC.0001101

SHEET NUMBER: C-1

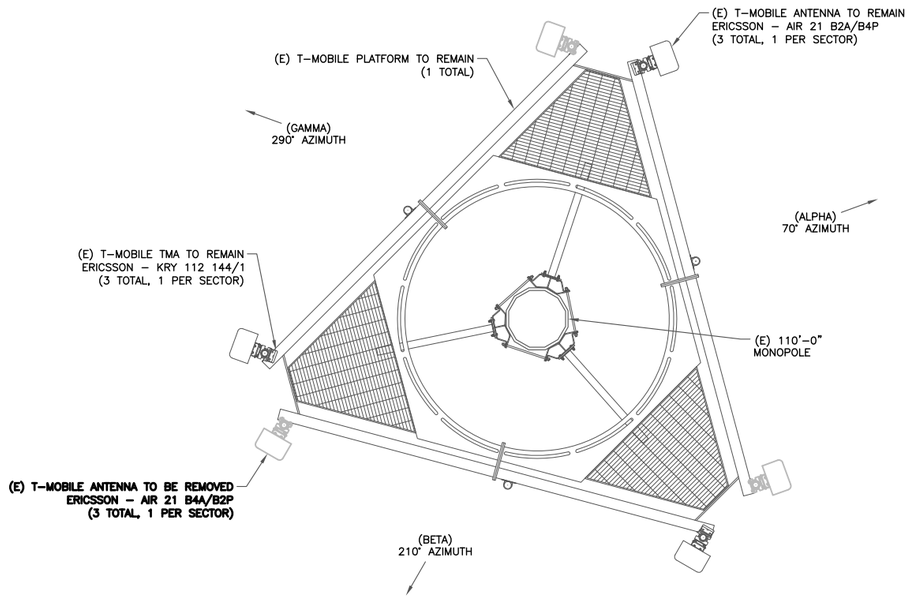
REVISION: 0



1 FINAL ELEVATION
SCALE: NOT TO SCALE

INSTALLER NOTE:

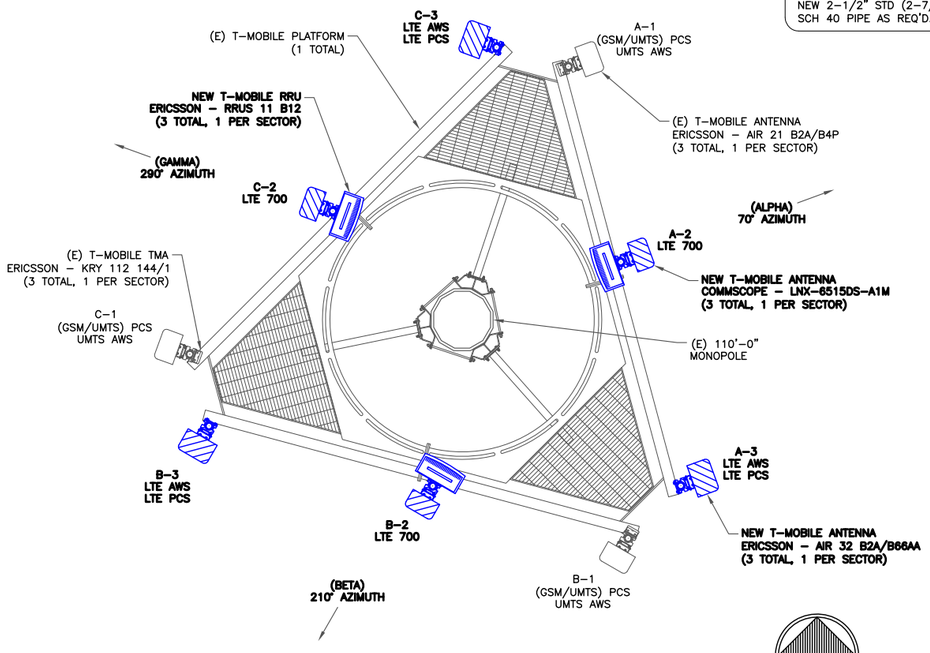
NO ADDITIONAL LOADING TO BE ADDED UNTIL TOWER MODIFICATIONS ARE INSTALLED PER TOWER MODIFICATION DESIGNED BY PAUL J. FORD & CO. DATED FEBRUARY 15, 2017.



2 EXISTING ANTENNA LAYOUT
SCALE: NOT TO SCALE

INSTALLER NOTE:

REPLACE EXISTING PIPE MOUNTS WITH NEW 2-1/2" STD (2-7/8" O.D.) GALV. SCH 40 PIPE AS REQ'D.



3 FINAL ANTENNA LAYOUT
SCALE: NOT TO SCALE

T-Mobile
35 GRIFFIN RD SOUTH
BLOOMFIELD, CT 06002

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

T-MOBILE SITE NUMBER:
CT11062B

BU #: **876325**
WESTON SQUARE

92 WESTON STREET
HARTFORD, CT 06103

EXISTING 110'-0" MONOPOLE

ISSUED FOR:

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C	02/21/17	CJ	PRELIMINARY	LR
D	03/08/17	CJ	PRELIMINARY	LR
0	03/20/17	CJ	CONSTRUCTION	AF

DocuSigned by:
BAD6066DD9024F4...

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

3/20/2017 | 6:49:17 PM EDT

Crown Castle USA, Inc. COA
#PEC.0001101

SHEET NUMBER: C-2

REVISION: 0

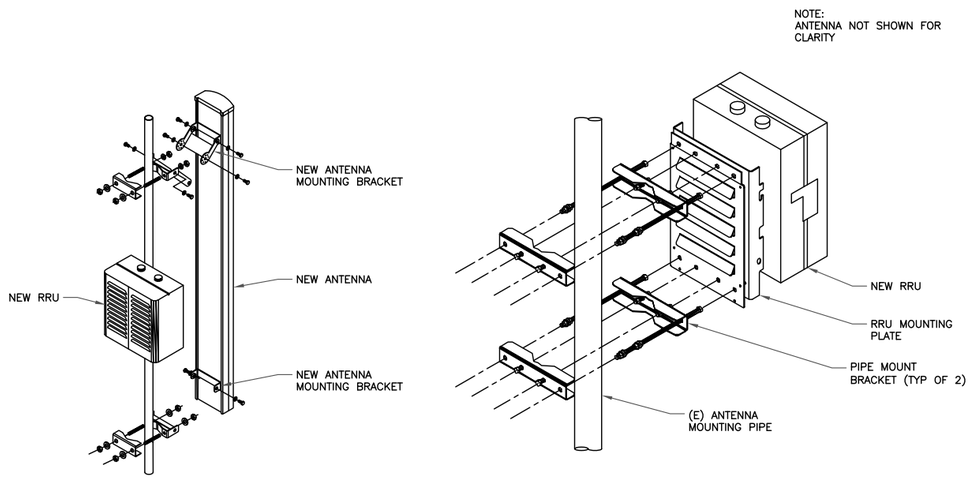
FINAL ANTENNA SCHEDULE

SECTOR	POS.	TECHNOLOGY	RAD CENTER	AZIMUTH	ANTENNA MANUFACTURER	ANTENNA MODEL	MECH. TILT	ELECT. TILT	TOWER MOUNTED EQUIPMENT	FEEDLINE TYPE
ALPHA	A-1	(GSM/UMTS) PCS UMTS AWS	76'-0"	70°	ERICSSON	AIR 21 B2A/B4P	0°	4°/4°	(1) ERICSSON - KRY 112 144/1	COAX/HYBRID
ALPHA	**A-2**	**LTE 700**	**76'-0"**	**70°**	**COMMSCOPE**	**LNX-6515DS-A1M**	**0°**	**2°**	**(1) ERICSSON - RRUS 11 B12**	**HYBRID**
ALPHA	**A-3**	**LTE AWS LTE PCS**	**76'-0"**	**70°**	**ERICSSON**	**AIR 32 B2A/B66AA**	**0°**	**4°/4°/4°/4°**	**-**	HYBRID
BETA	B-1	(GSM/UMTS) PCS UMTS AWS	76'-0"	210°	ERICSSON	AIR 21 B2A/B4P	0°	5°/5°	(1) ERICSSON - KRY 112 144/1	COAX/HYBRID
BETA	**B-2**	**LTE 700**	**76'-0"**	**210°**	**COMMSCOPE**	**LNX-6515DS-A1M**	**0°**	**2°**	**(1) ERICSSON - RRUS 11 B12**	**HYBRID**
BETA	**B-3**	**LTE AWS LTE PCS**	**76'-0"**	**210°**	**ERICSSON**	**AIR 32 B2A/B66AA**	**0°**	**5°/5°/5°/5°**	**-**	HYBRID
GAMMA	C-1	(GSM/UMTS) PCS UMTS AWS	76'-0"	290°	ERICSSON	AIR 21 B2A/B4P	0°	4°/4°	(1) ERICSSON - KRY 112 144/1	COAX/HYBRID
GAMMA	**C-2**	**LTE 700**	**76'-0"**	**290°**	**COMMSCOPE**	**LNX-6515DS-A1M**	**0°**	**2°**	**(1) ERICSSON - RRUS 11 B12**	**HYBRID**
GAMMA	**C-3**	**LTE AWS LTE PCS**	**76'-0"**	**290°**	**ERICSSON**	**AIR 32 B2A/B66AA**	**0°**	**4°/4°/4°/4°**	**-**	HYBRID

CABLE SCHEDULE

STATUS	CABLE TYPE	SIZE	QUANTITY
EXISTING	COAX	7/8"	6
EXISTING	HYBRID	1-1/4"	1
NEW	**HYBRID**	**1-3/8"**	**1**
FINAL CABLE QUANTITY			**8**

1 ANTENNA AND CABLE SCHEDULE
SCALE: NOT TO SCALE



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

2 ANTENNA & RRU MOUNTING DETAIL
SCALE: NOT TO SCALE

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T-MOBILE SITE NUMBER:
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BU #: **876325**
WESTON SQUARE

92 WESTON STREET
HARTFORD, CT 06103

EXISTING 110'-0" MONOPOLE

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

3/20/2017 | 6:49:17 PM EDT

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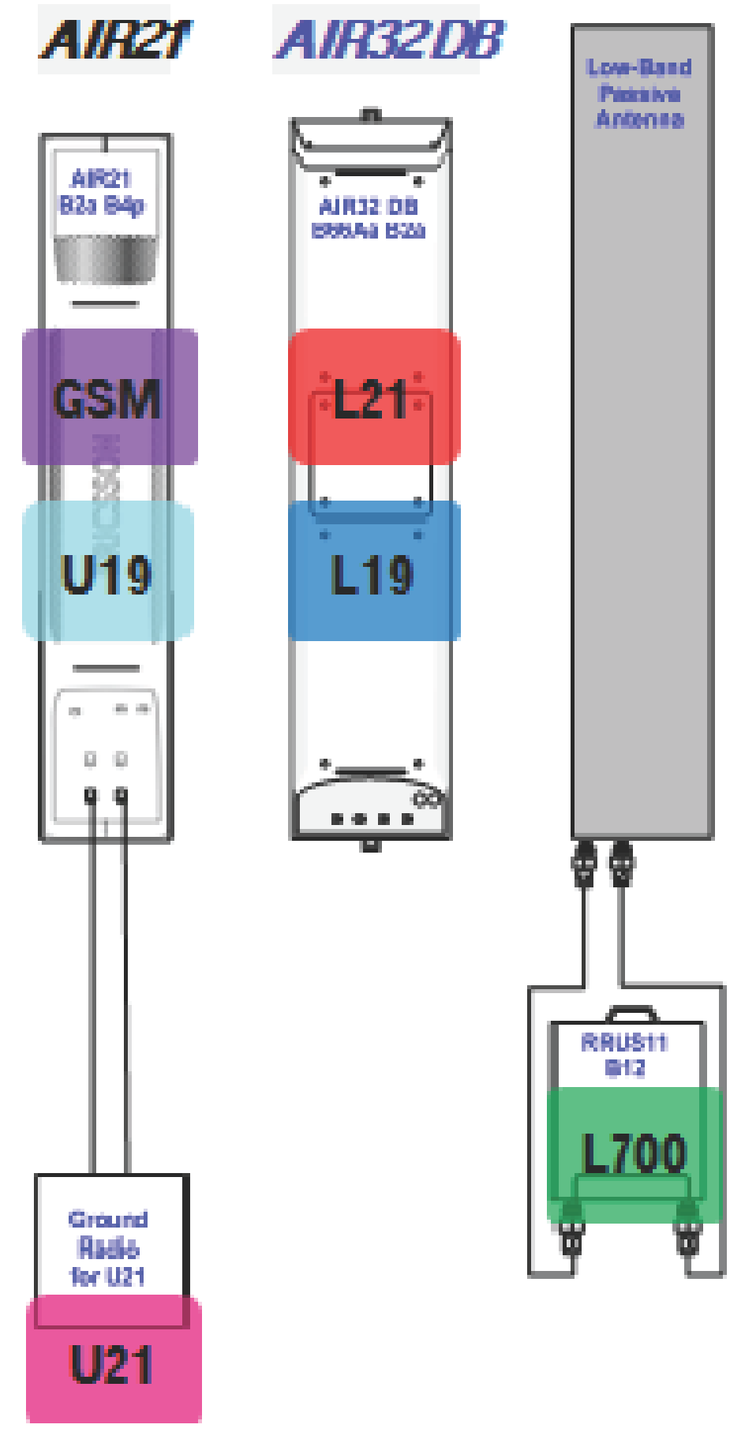
#PEC.0001101

SHEET NUMBER: C-3

REVISION: 0



1 PLUMBING DIAGRAM
SCALE: NOT TO SCALE

T-Mobile
35 GRIFFIN RD SOUTH
BLOOMFIELD, CT 06002

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3 CORPORATE PARK DRIVE, SUITE 101
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WESTON SQUARE

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EXISTING 110'-0" MONOPOLE

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Crown Castle USA, Inc. COA
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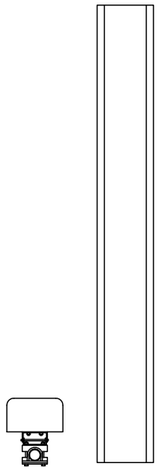
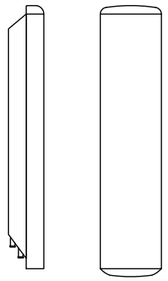
SHEET NUMBER: C-4

REVISION: 0



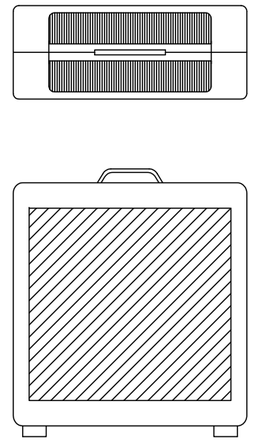
ANDREW – LNX-6515DS-A1M
WEIGHT (WITHOUT MOUNTING HARDWARE): 43.7 LBS
SIZE (HxWxD): 96.60x11.90x7.10 IN.
MOUNTING HARDWARE P/N: DB380-3 & DB5083D
RATED WIND VELOCITY: 149.8 MPH

1 ANDREW – LNX-6515DS-A1M
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

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



ERICSSON – RRUS 11
WEIGHT (FULLY EQUIPPED): 50.7 LBS
SIZE (HxWxD): 19.7x17x7.2 IN.

3 ERICSSON – RRUS 11
SCALE: NOT TO SCALE

4 NOT USED
SCALE: NOT TO SCALE

5 NOT USED
SCALE: NOT TO SCALE

6 NOT USED
SCALE: NOT TO SCALE

T-Mobile
35 GRIFFIN RD SOUTH
BLOOMFIELD, CT 06002

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

T-MOBILE SITE NUMBER:
CT11062B

BU #: **876325**
WESTON SQUARE

92 WESTON STREET
HARTFORD, CT 06103

EXISTING 110'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	12/19/16	CJ	PRELIMINARY	LR
B	02/16/17	CJ	PRELIMINARY	LR
C	02/21/17	CJ	PRELIMINARY	LR
D	03/08/17	CJ	PRELIMINARY	LR
0	03/20/17	CJ	CONSTRUCTION	AF

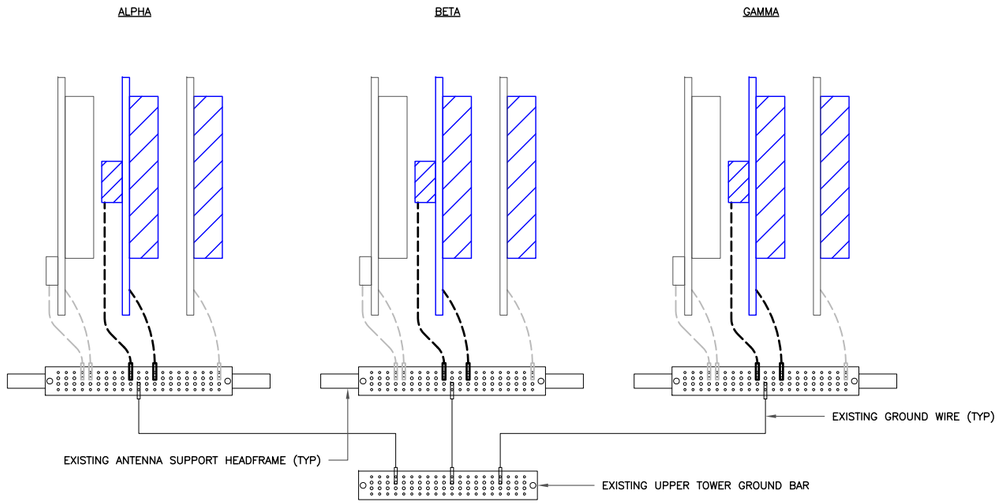
DocuSigned by:
BAD6066DD9024F4...

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

3/20/2017 | 6:49:17 PM EDT

Crown Castle USA, Inc. COA
#PEC.0001101

SHEET NUMBER: C-5
REVISION: 0



1 ANTENNA GROUNDING DIAGRAM
SCALE: NOT TO SCALE

T-Mobile
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BLOOMFIELD, CT 06002

CROWN CASTLE
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0	03/20/17	CJ	CONSTRUCTION	AF

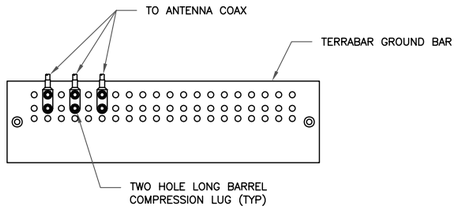
DocuSigned by:
BAC6066DD9024F4...

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

3/20/2017 | 6:49:17 PM EDT

Crown Castle USA, Inc. COA
#PEC.0001101

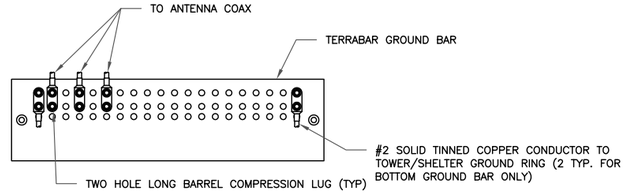
SHEET NUMBER: G-1
REVISION: 0



NOTES:

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

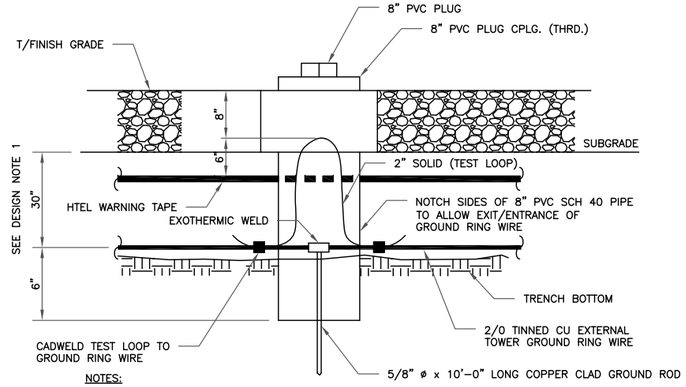
1 ANTENNA GROUND BAR DETAIL
SCALE: NOT TO SCALE



NOTES:

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

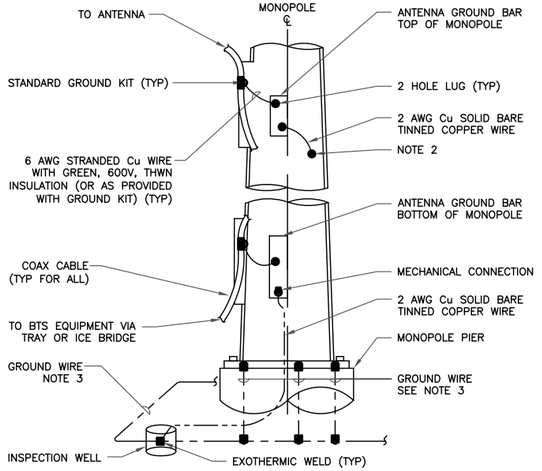
2 TOWER/SHELTER GROUND BAR DETAIL
SCALE: NOT TO SCALE



NOTES:

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

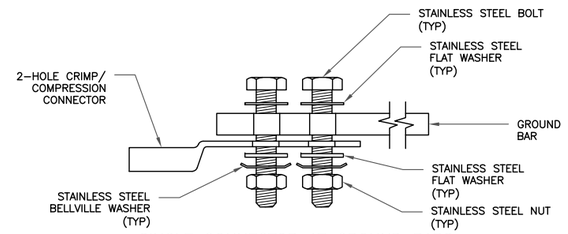
3 INSPECTION PORT DETAIL
SCALE: NOT TO SCALE



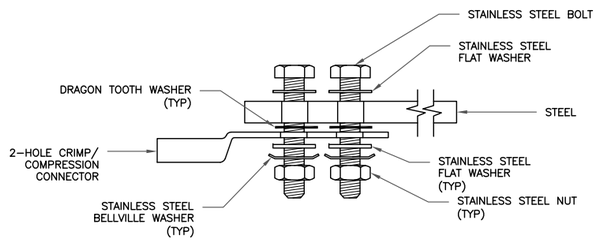
NOTES:

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

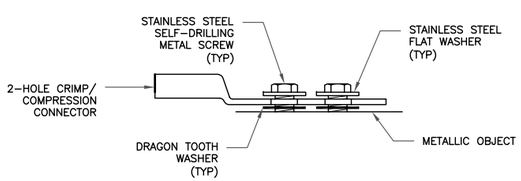
4 TYPICAL ANTENNA CABLE GROUNDING
SCALE: NOT TO SCALE



SINGLE CONNECTOR AT GROUND BARS

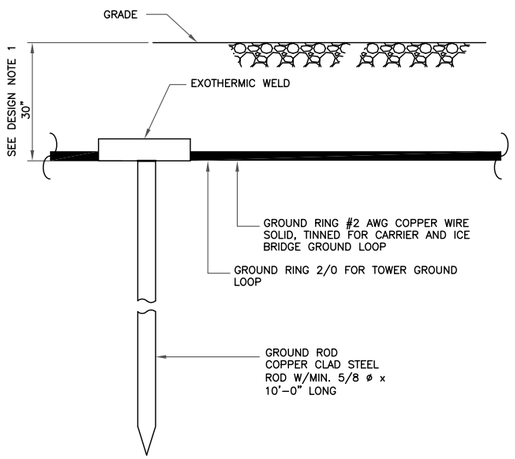


SINGLE CONNECTOR AT STEEL OBJECTS



SINGLE CONNECTOR AT METALLIC/STEEL OBJECTS

5 HARDWARE DETAIL FOR EXTERIOR CONNECTIONS
SCALE: NOT TO SCALE



NOTES:

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

6 GROUND ROD DETAIL
SCALE: NOT TO SCALE

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Crown Castle USA, Inc. COA
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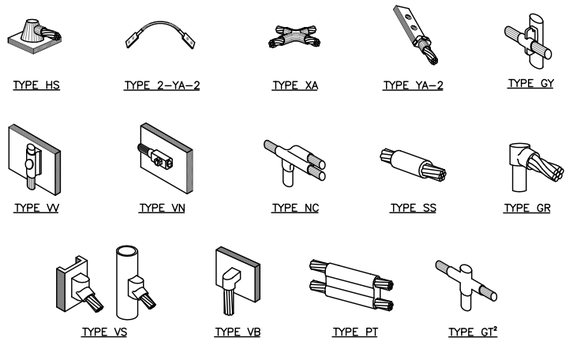
SHEET NUMBER: G-2

REVISION: 0

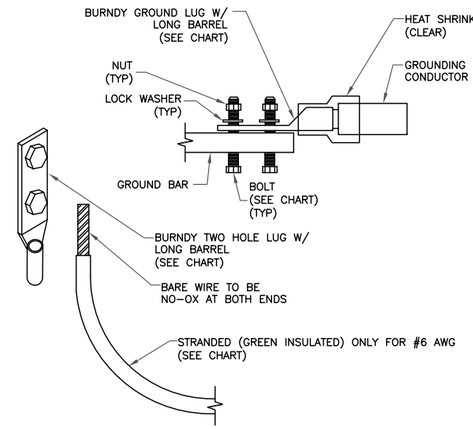


NOTE:

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

1 CADWELD GROUNDING CONNECTIONS
SCALE: NOT TO SCALE

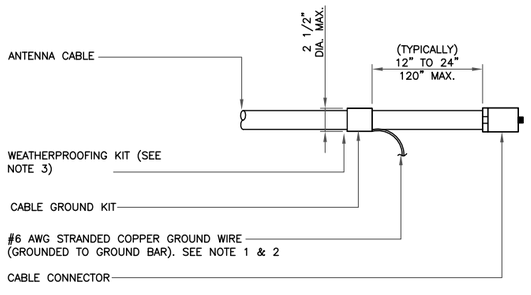
WIRE SIZE	BURNDY LUG	BOLT SIZE
#6 AWG GREEN INSULATED	YA6C-2TC38	3/8" - 16 NC S 2 BOLT
#2 AWG SOLID TINNED	YA3C-2TC38	3/8" - 16 NC S 2 BOLT
#2 AWG STRANDED	YA2C-2TC38	3/8" - 16 NC S 2 BOLT
#2/0 AWG STRANDED	YA26-2TC38	3/8" - 16 NC S 2 BOLT
#4/0 AWG STRANDED	YA28-2N	1/2" - 16 NC S 2 BOLT



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.

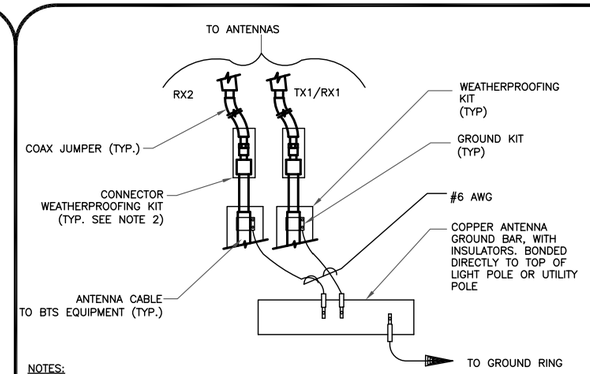
2 MECHANICAL LUG CONNECTION
SCALE: NOT TO SCALE



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.

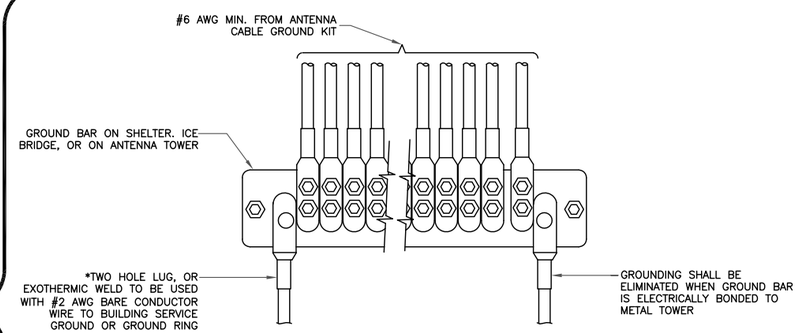
3 CABLE GROUND KIT CONNECTION
SCALE: NOT TO SCALE



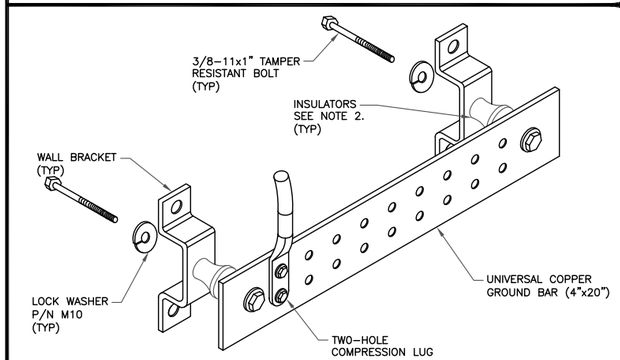
NOTES:

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



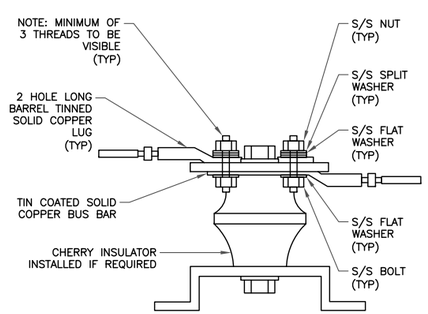
5 GROUNDWIRE INSTALLATION
SCALE: NOT TO SCALE



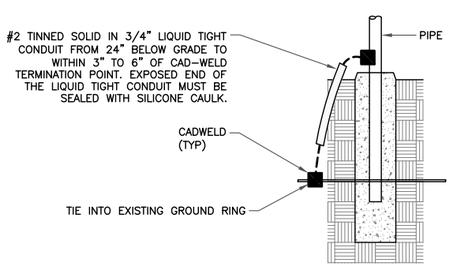
NOTES:

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 RD SOUTH
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CROWN CASTLE
3 CORPORATE PARK DRIVE, SUITE 101
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T-MOBILE SITE NUMBER:
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STATE OF CONNECTICUT
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PROFESSIONAL ENGINEER

3/20/2017 | 6:49:17 PM EDT

Crown Castle USA, Inc. COA #PEC.0001101

SHEET NUMBER: G-3

REVISION: 0

PJF PAUL J. FORD & COMPANY

Date: **March 22, 2017**

Charles McGuirt
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277
704.405.6607

Paul J. Ford and Company
250 E Broad St, Suite 600
Columbus, OH 43215
(614) 221-6679
mherbert@pjfweb.com

Subject: **Structural Analysis Report**

Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11062B
	Carrier Site Name:	CT11062B
Crown Castle Designation:	**Crown Castle BU Number:**	876325
	Crown Castle Site Name:	WESTON SQUARE
	Crown Castle JDE Job Number:	408010
	Crown Castle Work Order Number:	1378377
	Crown Castle Application Number:	366958 Rev. 6
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37517-0431.002.7805
Site Data:	**92 Weston Street, Hartford, Hartford County, CT** **Latitude *41° 47' 12.3"*, Longitude *-72° 39' 44.42"*** **110 Foot - Monopole Tower**	

Dear Charles McGuirt,

Paul J. Ford and Company is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 1014984, in accordance with application 366958, revision 6.

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 with a maximum Topographic Factor, Kzt, of 1.0 were used in this analysis.

All modifications and equipment proposed in this report shall be installed in accordance with the proposed modifications drawings, referenced in Table 3 of this report, 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:

Michelle Herbert
Structural Designer

STATE OF CONNECTICUT
JUSTIN P. KLINE
No. 30301
LICENSED
PROFESSIONAL ENGINEER
3-22-17

Date: **March 22, 2017**

Charles McGuirt
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277
704.405.6607

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250 E Broad St, Suite 600
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Subject: **Structural Analysis Report**

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Respectfully submitted by:

Michelle Herbert
Structural Designer

TABLE OF CONTENTS

1) INTRODUCTION

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

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

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

5) APPENDIX A
tnxTower Output

6) APPENDIX B
Base Level Drawing

7) APPENDIX C
Additional Calculations

1) INTRODUCTION

This tower is a 110 ft Monopole tower designed by ROHN in October of 1996. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-E.

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 with a maximum Topographic Factor, Kzt, of 1.0 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
76.0	76.0	3	andrew	LNX-6515DS-A1M w/ MP	1	1-5/8	
		3	ericsson	AIR 32 B2a/B66Aa w/ MP			
		3	ericsson	RRUS 11 B12			

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
107.0	108.0	3	rfs celwave	APXVSPP18-C-A20 w/ MP	3	1-1/4	1
		3	rfs celwave	IBC1900BB-1			
		3	rfs celwave	IBC1900HG-2A			
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe	1	5/8	2
	107.0	1	tower mounts	T-Arm Mount [TA 702-3]			
105.0	106.0	3	alcatel lucent	TD-RRH8x20-25	--	--	2
		3	alcatel lucent	800MHz 2X50W RRH W/FILTER	--	--	1
	105.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
		1	tower mounts	Side Arm Mount [SO 102-3]			
89.0	90.0	3	ericsson	RRUS 32 B2	2 1 1	3/4 3/8 Conduit	2
		3	ericsson	WCS RRUS-32-B30			
		3	quintel	QS66512-2 w/ MP			
		1	raycap	DC6-48-60-18-8F			
		3	kmw	AM-X-CD-16-65-00T-RET w/ MP	2 1 6	3/4 3/8 1-5/8	1
		3	powerwave	7750.00 w/ MP			
		6	powerwave	LGP21401			
		3	ericsson	RRUS-11			
		1	raycap	DC6-48-60-18-8F			
	89.0	1	tower mounts	Platform Mount [LP 502-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
80.0	81.0	3	ericsson	ERICSSON AIR 21 B4A B2P w/ MP	7 1	1-1/4 1-5/8	3
76.0	76.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ MP	6 1	7/8 1-5/8	4
		3	ericsson	KRY 112 144/1			
		1	tower mounts	Platform Mount [LP 305-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed
4) Equipment to be relocated from 80' level

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH, 07-11432G, 01/24/2008	2192540	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Rohn, 34738SW, 10/18/1996	1615433	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Rohn, 34738SW, 10/17/1996	1615400	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 060671, 06/28/2006	1956491	CCISITES
4-POST-MODIFICATION INSPECTION	B&T, 79760, 11/24/2009	2561266	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 126558, 10/22/2012	3355603	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 131001.876325, 08/06/2013	4075332	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	B&T, 79760, 11/24/2009	2356066	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	TEP, 126558, 10/22/2012	3187227	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF, 37517-0431.001.7700, 02/10/2017	6702634	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	PJF, 375176-1244.003.7805, 12/21/2016	3361707	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) In accordance with discussions with CCI Corporate Engineering: Based on the assumption that the monopole manufacturer (ROHN/PiRod) has designed the flange plates at splices to adequately develop the full capacity of the unreinforced shaft section using unpublished and/or proprietary methodologies, we are assuming that if our analysis shows that both the existing shaft and the existing flange bolts are at a usage capacity of 100% or less, then the existing flange plates are at a usage capacity of 100% or less and no additional analysis of the flange plate is required.
5) Monopole was reinforced in conformance with the referenced modification drawing.
6) Monopole will be reinforced in conformance with the proposed modification drawing referenced (Doc# 6702634).

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	110 - 90	Pole	P24x0.25	1	-3.14	662.26	19.6	Pass
L2	90 - 60	Pole	P24x0.375	2	-12.35	1052.07	79.5	Pass
L3	60 - 39.5	Pole	30" x 0.375"	3	-16.08	1311.06	90.6	Pass
L4	39.5 - 30	Pole	RPS 30" x 0.483"	4	-18.22	1606.35	86.0	Pass
L5	30 - 25	Pole	P30x0.5	5	-19.81	1751.60	86.7	Pass
L6	25 - 18.75	Pole	RPS 30" x 0.55311"	6	-21.41	1891.79	87.3	Pass
L7	18.75 - 8.25	Pole	RPS 30" x 0.69241"	7	-24.64	2142.45	89.0	Pass
L8	8.25 - 6	Pole	RPS 30" x 0.85759"	8	-25.47	2809.60	70.4	Pass
L9	6 - 0	Pole	RPS 30" x 0.801"	9	-27.56	2627.97	81.6	Pass
							Summary	
						Pole (L3)	90.6	Pass
						RATING =	90.6	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	85.1	Pass
1	Base Plate	0	78.3	Pass
1	Base Foundation Structural Steel	0	82.5	Pass
1	Base Foundation Soil Interaction	0	21.4	Pass
1	Flange Connection	30.0	82.7	Pass
1,3	Flange Connection	60.0	79.5	Pass
1,3	Flange Connection	90.0	19.6	Pass

Structure Rating (max from all components) =	**90.6%**

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) Worst case scenario between existing and post installed anchors.
3) See assumption #4.

4.1) Recommendations

The monopole and its foundation will have sufficient capacity to carry the proposed loading configuration once the following load changes are met.

- Install the proposed modifications per the referenced drawings.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

1) Tower is located in Hartford County, Connecticut.
2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3) Basic wind speed of 97 mph.
4) Structure Class II.
5) Exposure Category C.
6) Topographic Category 1.
7) Crest Height 0.00 ft.
8) Nominal ice thickness of 1.0000 in.
9) Ice thickness is considered to increase with height.
10) Ice density of 56 pcf.
11) A wind speed of 50 mph is used in combination with ice.
12) Temperature drop of 50 °F.
13) Deflections calculated using a wind speed of 60 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				

Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Pole Size*	*Pole Grade*	*Socket Length* *ft*
L1	110.00-90.00	20.00	P24x0.25	A53-B-42 (42 ksi)	
L2	90.00-60.00	30.00	P24x0.375	A53-B-42 (42 ksi)	
L3	60.00-39.50	20.50	30" x 0.375"	A53-B-42 (42 ksi)	
L4	39.50-30.00	9.50	RPS 30" x 0.483"	Reinf 39.85 ksi (40 ksi)	

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L5	30.00-25.00	5.00	P30x0.5	A53-B-42 (42 ksi)	
L6	25.00-18.75	6.25	RPS 30" x 0.55311"	Reinf 41.08 ksi (41 ksi)	
L7	18.75-8.25	10.50	RPS 30" x 0.69241"	Reinf 37.34 ksi (37 ksi)	
L8	8.25-6.00	2.25	RPS 30" x 0.85759"	Reinf 39.76 ksi (40 ksi)	
L9	6.00-0.00	6.00	RPS 30" x 0.801"	Reinf 39.74 ksi (40 ksi)	

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 110.00-90.00				1	1	1			
L2 90.00-60.00				1	1	1			
L3 60.00-39.50				1	1	1			
L4 39.50-30.00				1	1	1			
L5 30.00-25.00				1	1	1			
L6 25.00-18.75				1	1	1			
L7 18.75-8.25				1	1	1			
L8 8.25-6.00				1	1	1			
L9 6.00-0.00				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
***								
HB058-M12-XXXF(5/8)	C	No	Inside Pole	107.00 - 0.00	1	No Ice	0.00	0.24
						1/2" Ice	0.00	0.24
						1" Ice	0.00	0.24
HB114-1-08U4-M5J(1-1/4)	C	No	Inside Pole	107.00 - 0.00	3	No Ice	0.00	1.08
						1/2" Ice	0.00	1.08
						1" Ice	0.00	1.08
***								
FB-L98B-002-50000(3/8)	C	No	Inside Pole	89.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	89.00 - 0.00	2	No Ice	0.00	0.58
						1/2" Ice	0.00	0.58
						1" Ice	0.00	0.58
2" (Nominal) Conduit	C	No	CaAa (Out Of Face)	89.00 - 0.00	1	No Ice	0.24	0.72
						1/2" Ice	0.34	2.48
						1" Ice	0.44	4.84
FB-L98B-002-50000(3/8)	C	No	Inside Pole	89.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	89.00 - 0.00	2	No Ice	0.00	0.58
						1/2" Ice	0.00	0.58

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						1" Ice	0.00	0.58
2" (Nominal) Conduit	C	No	Inside Pole	89.00 - 0.00	1	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
LDF7-50A(1-5/8)	C	No	CaAa (Out Of Face)	89.00 - 0.00	4	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.46
LDF7-50A(1-5/8)	C	No	Inside Pole	89.00 - 0.00	2	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
***								
MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	C	No	Inside Pole	80.00 - 0.00	1	No Ice	0.00	1.07
						1/2" Ice	0.00	1.07
						1" Ice	0.00	1.07
VXL6-50(1-1/4)	C	No	Inside Pole	80.00 - 0.00	1	No Ice	0.00	0.50
						1/2" Ice	0.00	0.50
						1" Ice	0.00	0.50
***								
MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	C	No	CaAa (Out Of Face)	76.00 - 0.00	1	No Ice	0.00	1.07
						1/2" Ice	0.00	2.37
						1" Ice	0.00	4.28
810921-001(7/8)	C	No	CaAa (Out Of Face)	76.00 - 0.00	6	No Ice	0.00	1.26
						1/2" Ice	0.00	1.38
						1" Ice	0.00	2.98
MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	C	No	Inside Pole	76.00 - 0.00	1	No Ice	0.00	1.07
						1/2" Ice	0.00	1.07
						1" Ice	0.00	1.07
***								
Aero MP3-05	C	No	CaAa (Out Of Face)	10.50 - 0.00	1	No Ice	0.35	0.00
						1/2" Ice	0.40	0.00
						1" Ice	0.66	0.00
Aero MP3-05	C	No	CaAa (Out Of Face)	21.00 - 6.00	1	No Ice	0.35	0.00
						1/2" Ice	0.40	0.00
						1" Ice	0.66	0.00
Aero MP3-05	C	No	CaAa (Out Of Face)	40.50 - 30.00	1	No Ice	0.35	0.00
						1/2" Ice	0.40	0.00
						1" Ice	0.66	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	110.00-90.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.06
L2	90.00-60.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.888	0.55
L3	60.00-39.50	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	5.217	0.48
L4	39.50-30.00	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	5.560	0.22
L5	30.00-25.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.188	0.12
L6	25.00-18.75	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	2.267	0.15
L7	18.75-8.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.928	0.25
L8	8.25-6.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C	0.000	0.000	0.000	2.099	0.05
L9	6.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	3.512	0.14

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	110.00-90.00	A	2.234	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.06
L2	90.00-60.00	A	2.171	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	19.480	3.19
L3	60.00-39.50	A	2.084	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	14.310	2.70
L4	39.50-30.00	A	2.010	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	14.446	1.17
L5	30.00-25.00	A	1.964	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.151	0.60
L6	25.00-18.75	A	1.919	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	5.821	0.73
L7	18.75-8.25	A	1.829	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	17.054	1.17
L8	8.25-6.00	A	1.716	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	4.977	0.23
L9	6.00-0.00	A	1.574	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	8.017	0.56

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	110.00-90.00	0.0000	0.0000	0.0000	0.0000
L2	90.00-60.00	-0.2675	0.1545	-0.5603	0.3235
L3	60.00-39.50	-0.3000	0.1732	-0.6394	0.3692
L4	39.50-30.00	-0.6161	0.3557	-1.1338	0.6546
L5	30.00-25.00	-0.2818	0.1627	-0.5920	0.3418
L6	25.00-18.75	-0.4115	0.2376	-0.8063	0.4655
L7	18.75-8.25	-0.6782	0.3915	-1.1910	0.6876
L8	8.25-6.00	-0.8827	0.5096	-1.4373	0.8298
L9	6.00-0.00	-0.6161	0.3557	-1.0588	0.6113

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* *ft* *ft* *ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* *K*
***									
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	6.95 8.13 9.02	0.08 0.15 0.23
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	6.95 8.13 9.02	0.08 0.15 0.23
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	6.95 8.13 9.02	0.08 0.15 0.23
IBC1900BB-1	A	From Leg	4.00 0.00 1.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice	0.97 1.09 1.22	0.46 0.56 0.66	0.02 0.03 0.04
IBC1900BB-1	B	From Leg	4.00 0.00 1.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice	0.97 1.09 1.22	0.46 0.56 0.66	0.02 0.03 0.04
IBC1900BB-1	C	From Leg	4.00 0.00 1.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice	0.97 1.09 1.22	0.46 0.56 0.66	0.02 0.03 0.04
IBC1900HG-2A	A	From Leg	4.00 0.00 1.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice	0.97 1.09 1.22	0.46 0.56 0.66	0.02 0.03 0.04
IBC1900HG-2A	B	From Leg	4.00 0.00 1.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice	0.97 1.09 1.22	0.46 0.56 0.66	0.02 0.03 0.04
IBC1900HG-2A	C	From Leg	4.00 0.00 1.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice	0.97 1.09 1.22	0.46 0.56 0.66	0.02 0.03 0.04
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice	6.58 7.03 7.47	4.96 5.75 6.47	0.08 0.13 0.19
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice	6.58 7.03 7.47	4.96 5.75 6.47	0.08 0.13 0.19
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice	6.58 7.03 7.47	4.96 5.75 6.47	0.08 0.13 0.19
T-Arm Mount [TA 702-3]	C	None		0.0000	107.00	No Ice 1/2" Ice 1" Ice	5.64 6.55 7.46	5.64 6.55 7.46	0.34 0.43 0.52
(2) 2 3/8" OD x 6 ft mount pipe	A	From Leg	4.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.00 0.01 0.03
(2) 2 3/8" OD x 6 ft mount	B	From Leg	4.00	0.0000	107.00	No Ice	1.43	1.43	0.00

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral ft* *Vert ft* *ft*	*Azimuth Adjustment °*	*Placement ft*		*C_AA_A Front ft^2*	*C_AA_A Side ft^2*	*Weight K*
pipe			0.00			1/2" Ice	1.92	1.92	0.01
			0.00			1" Ice	2.29	2.29	0.03
(2) 2 3/8" OD x 6 ft mount pipe	C	From Leg	4.00	0.0000	107.00	No Ice	1.43	1.43	0.00
			0.00			1/2" Ice	1.92	1.92	0.01
			0.00			1" Ice	2.29	2.29	0.03
***									
PCS 1900MHz 4x45W-65MHz	A	From Leg	4.00	0.0000	105.00	No Ice	2.32	2.24	0.06
			0.00			1/2" Ice	2.53	2.44	0.08
			0.00			1" Ice	2.74	2.65	0.11
PCS 1900MHz 4x45W-65MHz	B	From Leg	4.00	0.0000	105.00	No Ice	2.32	2.24	0.06
			0.00			1/2" Ice	2.53	2.44	0.08
			0.00			1" Ice	2.74	2.65	0.11
PCS 1900MHz 4x45W-65MHz	C	From Leg	4.00	0.0000	105.00	No Ice	2.32	2.24	0.06
			0.00			1/2" Ice	2.53	2.44	0.08
			0.00			1" Ice	2.74	2.65	0.11
800MHz 2X50W RRH W/FILTER	A	From Leg	4.00	0.0000	105.00	No Ice	2.06	1.93	0.06
			0.00			1/2" Ice	2.24	2.11	0.09
			1.00			1" Ice	2.43	2.29	0.11
800MHz 2X50W RRH W/FILTER	B	From Leg	4.00	0.0000	105.00	No Ice	2.06	1.93	0.06
			0.00			1/2" Ice	2.24	2.11	0.09
			1.00			1" Ice	2.43	2.29	0.11
800MHz 2X50W RRH W/FILTER	C	From Leg	4.00	0.0000	105.00	No Ice	2.06	1.93	0.06
			0.00			1/2" Ice	2.24	2.11	0.09
			1.00			1" Ice	2.43	2.29	0.11
TD-RRH8x20-25	A	From Leg	4.00	0.0000	105.00	No Ice	4.05	1.53	0.07
			0.00			1/2" Ice	4.30	1.71	0.10
			1.00			1" Ice	4.56	1.90	0.13
TD-RRH8x20-25	B	From Leg	4.00	0.0000	105.00	No Ice	4.05	1.53	0.07
			0.00			1/2" Ice	4.30	1.71	0.10
			1.00			1" Ice	4.56	1.90	0.13
TD-RRH8x20-25	C	From Leg	4.00	0.0000	105.00	No Ice	4.05	1.53	0.07
			0.00			1/2" Ice	4.30	1.71	0.10
			1.00			1" Ice	4.56	1.90	0.13
Side Arm Mount [SO 102-3]	C	None		0.0000	105.00	No Ice	3.00	3.00	0.08
						1/2" Ice	3.48	3.48	0.11
						1" Ice	3.96	3.96	0.14
***									
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00	0.0000	89.00	No Ice	8.26	6.30	0.07
			0.00			1/2" Ice	8.82	7.48	0.14
			1.00			1" Ice	9.35	8.37	0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	0.0000	89.00	No Ice	8.26	6.30	0.07
			0.00			1/2" Ice	8.82	7.48	0.14
			1.00			1" Ice	9.35	8.37	0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00	0.0000	89.00	No Ice	8.26	6.30	0.07
			0.00			1/2" Ice	8.82	7.48	0.14
			1.00			1" Ice	9.35	8.37	0.21
7750.00 w/ Mount Pipe	A	From Leg	4.00	0.0000	89.00	No Ice	5.75	4.25	0.06
			0.00			1/2" Ice	6.18	5.01	0.10
			1.00			1" Ice	6.61	5.71	0.16

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
7750.00 w/ Mount Pipe	B	From Leg	4.00	0.0000	89.00	No Ice	5.75	4.25	0.06
			0.00			1/2" Ice	6.18	5.01	0.10
			1.00			1" Ice	6.61	5.71	0.16
7750.00 w/ Mount Pipe	C	From Leg	4.00	0.0000	89.00	No Ice	5.75	4.25	0.06
			0.00			1/2" Ice	6.18	5.01	0.10
			1.00			1" Ice	6.61	5.71	0.16
DC6-48-60-18-8F	A	From Leg	4.00	0.0000	89.00	No Ice	0.92	0.92	0.02
			0.00			1/2" Ice	1.46	1.46	0.04
			1.00			1" Ice	1.64	1.64	0.06
RRUS-11	A	From Leg	4.00	0.0000	89.00	No Ice	2.79	1.19	0.05
			0.00			1/2" Ice	3.00	1.34	0.07
			1.00			1" Ice	3.21	1.50	0.09
RRUS-11	B	From Leg	4.00	0.0000	89.00	No Ice	2.79	1.19	0.05
			0.00			1/2" Ice	3.00	1.34	0.07
			1.00			1" Ice	3.21	1.50	0.09
RRUS-11	C	From Leg	4.00	0.0000	89.00	No Ice	2.79	1.19	0.05
			0.00			1/2" Ice	3.00	1.34	0.07
			1.00			1" Ice	3.21	1.50	0.09
(2) LGP21401	A	From Leg	4.00	0.0000	89.00	No Ice	1.10	0.35	0.01
			0.00			1/2" Ice	1.24	0.44	0.02
			1.00			1" Ice	1.38	0.54	0.03
(2) LGP21401	B	From Leg	4.00	0.0000	89.00	No Ice	1.10	0.35	0.01
			0.00			1/2" Ice	1.24	0.44	0.02
			1.00			1" Ice	1.38	0.54	0.03
(2) LGP21401	C	From Leg	4.00	0.0000	89.00	No Ice	1.10	0.35	0.01
			0.00			1/2" Ice	1.24	0.44	0.02
			1.00			1" Ice	1.38	0.54	0.03
QS66512-2 w/ Mount Pipe	A	From Leg	4.00	0.0000	89.00	No Ice	8.37	8.46	0.14
			0.00			1/2" Ice	8.93	9.66	0.21
			1.00			1" Ice	9.46	10.55	0.30
QS66512-2 w/ Mount Pipe	B	From Leg	4.00	0.0000	89.00	No Ice	8.37	8.46	0.14
			0.00			1/2" Ice	8.93	9.66	0.21
			1.00			1" Ice	9.46	10.55	0.30
QS66512-2 w/ Mount Pipe	C	From Leg	4.00	0.0000	89.00	No Ice	8.37	8.46	0.14
			0.00			1/2" Ice	8.93	9.66	0.21
			1.00			1" Ice	9.46	10.55	0.30
DC6-48-60-18-8F	A	From Leg	4.00	0.0000	89.00	No Ice	0.92	0.92	0.02
			0.00			1/2" Ice	1.46	1.46	0.04
			1.00			1" Ice	1.64	1.64	0.06
WCS RRUS-32-B30	A	From Leg	4.00	0.0000	89.00	No Ice	3.31	2.42	0.08
			0.00			1/2" Ice	3.56	2.64	0.10
			1.00			1" Ice	3.81	2.86	0.14
WCS RRUS-32-B30	B	From Leg	4.00	0.0000	89.00	No Ice	3.31	2.42	0.08
			0.00			1/2" Ice	3.56	2.64	0.10
			1.00			1" Ice	3.81	2.86	0.14
WCS RRUS-32-B30	C	From Leg	4.00	0.0000	89.00	No Ice	3.31	2.42	0.08
			0.00			1/2" Ice	3.56	2.64	0.10
			1.00			1" Ice	3.81	2.86	0.14
RRUS 32 B2	A	From Leg	4.00	0.0000	89.00	No Ice	2.73	1.67	0.05

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral ft* / *Vert ft* / *ft*	*Azimuth Adjustment °*	*Placement ft*		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight K*
			0.00			1/2" Ice	2.95	1.86	0.07
			1.00			1" Ice	3.18	2.05	0.10
RRUS 32 B2	B	From Leg	4.00	0.0000	89.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			1.00			1" Ice	3.18	2.05	0.10
RRUS 32 B2	C	From Leg	4.00	0.0000	89.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			1.00			1" Ice	3.18	2.05	0.10
Platform Mount [LP 502-1]	C	None		0.0000	89.00	No Ice	32.35	32.35	0.93
						1/2" Ice	45.67	45.67	1.19
						1" Ice	58.99	58.99	1.46
2 3/8" OD x 6 ft mount pipe	A	From Leg	4.00	0.0000	89.00	No Ice	1.43	1.43	0.00
			0.00			1/2" Ice	1.92	1.92	0.01
			0.00			1" Ice	2.29	2.29	0.03
2 3/8" OD x 6 ft mount pipe	B	From Leg	4.00	0.0000	89.00	No Ice	1.43	1.43	0.00
			0.00			1/2" Ice	1.92	1.92	0.01
			0.00			1" Ice	2.29	2.29	0.03
2 3/8" OD x 6 ft mount pipe	C	From Leg	4.00	0.0000	89.00	No Ice	1.43	1.43	0.00
			0.00			1/2" Ice	1.92	1.92	0.01
			0.00			1" Ice	2.29	2.29	0.03
***									
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00	0.0000	76.00	No Ice	6.33	5.64	0.11
			0.00			1/2" Ice	6.78	6.43	0.17
			0.00			1" Ice	7.21	7.13	0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00	0.0000	76.00	No Ice	6.33	5.64	0.11
			0.00			1/2" Ice	6.78	6.43	0.17
			0.00			1" Ice	7.21	7.13	0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00	0.0000	76.00	No Ice	6.33	5.64	0.11
			0.00			1/2" Ice	6.78	6.43	0.17
			0.00			1" Ice	7.21	7.13	0.23
KRY 112 144/1	A	From Leg	4.00	0.0000	76.00	No Ice	0.35	0.17	0.01
			0.00			1/2" Ice	0.43	0.23	0.01
			0.00			1" Ice	0.51	0.30	0.02
KRY 112 144/1	B	From Leg	4.00	0.0000	76.00	No Ice	0.35	0.17	0.01
			0.00			1/2" Ice	0.43	0.23	0.01
			0.00			1" Ice	0.51	0.30	0.02
KRY 112 144/1	C	From Leg	4.00	0.0000	76.00	No Ice	0.35	0.17	0.01
			0.00			1/2" Ice	0.43	0.23	0.01
			0.00			1" Ice	0.51	0.30	0.02
LNX-6515DS-A1M w/ Mount Pipe	A	From Leg	4.00	0.0000	76.00	No Ice	11.69	10.29	0.10
			0.00			1/2" Ice	12.40	11.81	0.20
			0.00			1" Ice	13.11	13.16	0.30
LNX-6515DS-A1M w/ Mount Pipe	B	From Leg	4.00	0.0000	76.00	No Ice	11.69	10.29	0.10
			0.00			1/2" Ice	12.40	11.81	0.20
			0.00			1" Ice	13.11	13.16	0.30
LNX-6515DS-A1M w/ Mount Pipe	C	From Leg	4.00	0.0000	76.00	No Ice	11.69	10.29	0.10
			0.00			1/2" Ice	12.40	11.81	0.20
			0.00			1" Ice	13.11	13.16	0.30
AIR 32 B2a/B66Aa w/	A	From Leg	4.00	0.0000	76.00	No Ice	6.75	6.07	0.15

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Mount Pipe			0.00				1/2" Ice	7.20	6.87	0.21
			0.00				1" Ice	7.65	7.58	0.28
AIR 32 B2a/B66Aa w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	76.00	No Ice	6.75	6.07	0.15
			0.00				1/2" Ice	7.20	6.87	0.21
			0.00				1" Ice	7.65	7.58	0.28
AIR 32 B2a/B66Aa w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	76.00	No Ice	6.75	6.07	0.15
			0.00				1/2" Ice	7.20	6.87	0.21
			0.00				1" Ice	7.65	7.58	0.28
RRUS 11 B12	A	From Leg	4.00	0.00	0.0000	76.00	No Ice	2.83	1.18	0.05
			0.00				1/2" Ice	3.04	1.33	0.07
			0.00				1" Ice	3.26	1.48	0.10
RRUS 11 B12	B	From Leg	4.00	0.00	0.0000	76.00	No Ice	2.83	1.18	0.05
			0.00				1/2" Ice	3.04	1.33	0.07
			0.00				1" Ice	3.26	1.48	0.10
RRUS 11 B12	C	From Leg	4.00	0.00	0.0000	76.00	No Ice	2.83	1.18	0.05
			0.00				1/2" Ice	3.04	1.33	0.07
			0.00				1" Ice	3.26	1.48	0.10
Platform Mount [LP 305-1]	C	None			0.0000	76.00	No Ice	18.01	18.01	1.12
							1/2" Ice	23.33	23.33	1.35
							1" Ice	28.65	28.65	1.58
***										
Bridge Stiffener (72" x 11" x 1.25")	C	None			0.0000	30.00	No Ice	1.25	7.70	0.35
							1/2" Ice	1.93	8.24	0.38
							1" Ice	2.63	8.79	0.42

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 110.00-90.00	100.00	1.266	28.96	40.000	A	0.000	40.000	40.000	100.00	0.000	0.000
					B	0.000	40.000		100.00	0.000	0.000
					C	0.000	40.000		100.00	0.000	0.000
L2 90.00-60.00	75.00	1.191	27.26	60.000	A	0.000	60.000	60.000	100.00	0.000	0.000
					B	0.000	60.000		100.00	0.000	0.000
					C	0.000	60.000		100.00	0.000	6.888
L3 60.00-39.50	49.75	1.093	25.00	51.250	A	0.000	51.250	51.250	100.00	0.000	0.000
					B	0.000	51.250		100.00	0.000	0.000
					C	0.000	51.250		100.00	0.000	5.217
L4 39.50-30.00	34.75	1.013	23.18	23.750	A	0.000	23.750	23.750	100.00	0.000	0.000
					B	0.000	23.750		100.00	0.000	0.000
					C	0.000	23.750		100.00	0.000	5.560
L5 30.00-25.00	27.50	0.964	22.07	12.500	A	0.000	12.500	12.500	100.00	0.000	0.000
					B	0.000	12.500		100.00	0.000	0.000
					C	0.000	12.500		100.00	0.000	1.188
L6 25.00-18.75	21.88	0.919	21.03	15.625	A	0.000	15.625	15.625	100.00	0.000	0.000
					B	0.000	15.625		100.00	0.000	0.000
					C	0.000	15.625		100.00	0.000	2.267

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
L7 18.75-8.25	13.50	0.85	19.45	26.250	A	0.000	26.250	26.250	100.00	0.000	0.000
					B	0.000	26.250		100.00	0.000	0.000
					C	0.000	26.250		100.00	0.000	6.928
L8 8.25-6.00	7.13	0.85	19.45	5.625	A	0.000	5.625	5.625	100.00	0.000	0.000
					B	0.000	5.625		100.00	0.000	0.000
					C	0.000	5.625		100.00	0.000	2.099
L9 6.00-0.00	3.00	0.85	19.45	15.000	A	0.000	15.000	15.000	100.00	0.000	0.000
					B	0.000	15.000		100.00	0.000	0.000
					C	0.000	15.000		100.00	0.000	3.512

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 110.00-90.00	100.00	1.266	7.69	2.2345	47.448	A	0.000	47.448	47.448	100.00	0.000	0.000
						B	0.000	47.448		100.00	0.000	0.000
						C	0.000	47.448		100.00	0.000	0.000
L2 90.00-60.00	75.00	1.191	7.24	2.1711	70.856	A	0.000	70.856	70.856	100.00	0.000	0.000
						B	0.000	70.856		100.00	0.000	0.000
						C	0.000	70.856		100.00	0.000	19.480
L3 60.00-39.50	49.75	1.093	6.64	2.0838	58.370	A	0.000	58.370	58.370	100.00	0.000	0.000
						B	0.000	58.370		100.00	0.000	0.000
						C	0.000	58.370		100.00	0.000	14.310
L4 39.50-30.00	34.75	1.013	6.16	2.0104	26.933	A	0.000	26.933	26.933	100.00	0.000	0.000
						B	0.000	26.933		100.00	0.000	0.000
						C	0.000	26.933		100.00	0.000	14.446
L5 30.00-25.00	27.50	0.964	5.86	1.9639	14.137	A	0.000	14.137	14.137	100.00	0.000	0.000
						B	0.000	14.137		100.00	0.000	0.000
						C	0.000	14.137		100.00	0.000	3.151
L6 25.00-18.75	21.88	0.919	5.59	1.9194	17.624	A	0.000	17.624	17.624	100.00	0.000	0.000
						B	0.000	17.624		100.00	0.000	0.000
						C	0.000	17.624		100.00	0.000	5.821
L7 18.75-8.25	13.50	0.85	5.17	1.8290	29.451	A	0.000	29.451	29.451	100.00	0.000	0.000
						B	0.000	29.451		100.00	0.000	0.000
						C	0.000	29.451		100.00	0.000	17.054
L8 8.25-6.00	7.13	0.85	5.17	1.7158	6.268	A	0.000	6.268	6.268	100.00	0.000	0.000
						B	0.000	6.268		100.00	0.000	0.000
						C	0.000	6.268		100.00	0.000	4.977
L9 6.00-0.00	3.00	0.85	5.17	1.5736	16.574	A	0.000	16.574	16.574	100.00	0.000	0.000
						B	0.000	16.574		100.00	0.000	0.000
						C	0.000	16.574		100.00	0.000	8.017

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 110.00-90.00	100.00	1.266	9.91	40.000	A	0.000	40.000	40.000	100.00	0.000	0.000
					B	0.000	40.000		100.00	0.000	0.000
					C	0.000	40.000		100.00	0.000	0.000
L2 90.00-60.00	75.00	1.191	9.33	60.000	A	0.000	60.000	60.000	100.00	0.000	0.000
					B	0.000	60.000		100.00	0.000	0.000
					C	0.000	60.000		100.00	0.000	6.888

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
L3 60.00-39.50	49.75	1.093	8.56	51.250	A	0.000	51.250	51.250	100.00	0.000	0.000
					B	0.000	51.250		100.00	0.000	0.000
					C	0.000	51.250		100.00	0.000	5.217
L4 39.50-30.00	34.75	1.013	7.94	23.750	A	0.000	23.750	23.750	100.00	0.000	0.000
					B	0.000	23.750		100.00	0.000	0.000
					C	0.000	23.750		100.00	0.000	5.560
L5 30.00-25.00	27.50	0.964	7.55	12.500	A	0.000	12.500	12.500	100.00	0.000	0.000
					B	0.000	12.500		100.00	0.000	0.000
					C	0.000	12.500		100.00	0.000	1.188
L6 25.00-18.75	21.88	0.919	7.20	15.625	A	0.000	15.625	15.625	100.00	0.000	0.000
					B	0.000	15.625		100.00	0.000	0.000
					C	0.000	15.625		100.00	0.000	2.267
L7 18.75-8.25	13.50	0.85	6.66	26.250	A	0.000	26.250	26.250	100.00	0.000	0.000
					B	0.000	26.250		100.00	0.000	0.000
					C	0.000	26.250		100.00	0.000	6.928
L8 8.25-6.00	7.13	0.85	6.66	5.625	A	0.000	5.625	5.625	100.00	0.000	0.000
					B	0.000	5.625		100.00	0.000	0.000
					C	0.000	5.625		100.00	0.000	2.099
L9 6.00-0.00	3.00	0.85	6.66	15.000	A	0.000	15.000	15.000	100.00	0.000	0.000
					B	0.000	15.000		100.00	0.000	0.000
					C	0.000	15.000		100.00	0.000	3.512

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

Comb. No.	Description
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	110 - 90	Pole	Max Tension	20	0.00	-0.00	-0.00
			Max. Compression	26	-9.69	0.07	-0.01
			Max. Mx	20	-3.14	75.80	0.00
			Max. My	2	-3.14	0.01	75.81
			Max. Vy	20	-4.99	75.80	0.00
			Max. Vx	2	-4.99	0.01	75.81
			Max. Torque	27			-0.00
L2	90 - 60	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-35.30	2.97	-0.36
			Max. Mx	20	-12.35	488.01	0.07
			Max. My	2	-12.35	0.29	487.87
			Max. Vy	20	-16.71	488.01	0.07
			Max. Vx	14	16.71	0.29	-487.69
			Max. Torque	9			0.35
L3	60 - 39.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-42.69	5.97	-2.04
			Max. Mx	20	-16.08	846.44	-0.12
			Max. My	14	-16.08	0.64	-846.01
			Max. Vy	20	-18.21	846.44	-0.12
			Max. Vx	14	18.21	0.64	-846.01
			Max. Torque	3			0.53
L4	39.5 - 30	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-46.39	7.25	-2.76
			Max. Mx	20	-18.22	1023.72	-0.21
			Max. My	14	-18.22	0.79	-1023.24
			Max. Vy	20	-19.09	1023.72	-0.21
			Max. Vx	14	19.09	0.79	-1023.24
			Max. Torque	3			0.78
L5	30 - 25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-48.93	7.89	-3.13
			Max. Mx	20	-19.81	1121.48	-0.25
			Max. My	14	-19.81	0.88	-1120.97
			Max. Vy	20	-19.68	1121.48	-0.25
			Max. Vx	14	19.68	0.88	-1120.97
			Max. Torque	3			0.83
L6	25 - 18.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-51.46	8.67	-3.57
			Max. Mx	20	-21.41	1245.60	-0.31
			Max. My	14	-21.41	0.98	-1245.05
			Max. Vy	20	-20.03	1245.60	-0.31
			Max. Vx	14	20.03	0.98	-1245.05
			Max. Torque	3			0.92
L7	18.75 - 8.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-56.16	9.86	-4.26
			Max. Mx	20	-24.64	1461.88	-0.41
			Max. My	14	-24.64	1.15	-1461.28
			Max. Vy	20	-21.15	1461.88	-0.41
			Max. Vx	14	21.15	1.15	-1461.28
			Max. Torque	24			1.18
L8	8.25 - 6	Pole	Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	26	-57.27	10.09	-4.39
			Max. Mx	20	-25.46	1509.75	-0.43
			Max. My	14	-25.47	1.19	-1509.14
			Max. Vy	20	-21.40	1509.75	-0.43
			Max. Vx	14	21.40	1.19	-1509.14
			Max. Torque	24			1.27
L9	6 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-60.03	10.64	-4.71
			Max. Mx	20	-27.56	1639.30	-0.49
			Max. My	14	-27.56	1.28	-1638.66
			Max. Vy	20	-21.77	1639.30	-0.49
			Max. Vx	14	21.77	1.28	-1638.66
			Max. Torque	24			1.42

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	60.03	-0.00	0.00
	Max. H_x	21	20.68	21.75	0.00
	Max. H_z	3	20.68	0.00	21.76
	Max. M_x	2	1637.68	0.00	21.76
	Max. M_z	8	1636.73	-21.75	0.00
	Max. Torsion	24	1.42	10.88	18.84
	Min. Vert	21	20.68	21.75	0.00
	Min. H_x	9	20.68	-21.75	0.00
	Min. H_z	15	20.68	0.00	-21.76
	Min. M_x	14	-1638.66	0.00	-21.76
	Min. M_z	20	-1639.30	21.75	0.00
	Min. Torsion	12	-1.42	-10.88	-18.84

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	22.98	-0.00	0.00	0.40	1.04	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	27.57	-0.00	-21.76	-1637.68	1.28	-1.38
0.9 Dead+1.6 Wind 0 deg - No Ice	20.68	-0.00	-21.76	-1623.90	0.96	-1.38
1.2 Dead+1.6 Wind 30 deg - No Ice	27.57	10.88	-18.84	-1418.30	-817.86	-0.98
0.9 Dead+1.6 Wind 30 deg - No Ice	20.68	10.88	-18.84	-1406.35	-811.21	-0.98
1.2 Dead+1.6 Wind 60 deg - No Ice	27.57	18.84	-10.88	-818.65	-1417.51	-0.31
0.9 Dead+1.6 Wind 60 deg - No Ice	20.68	18.84	-10.88	-811.80	-1405.76	-0.31
1.2 Dead+1.6 Wind 90 deg - No Ice	27.57	21.75	-0.00	0.49	-1636.73	0.44
0.9 Dead+1.6 Wind 90 deg - No Ice	20.68	21.75	-0.00	0.37	-1623.21	0.44
1.2 Dead+1.6 Wind 120 deg - No Ice	27.57	18.84	10.88	819.63	-1417.51	1.07
0.9 Dead+1.6 Wind 120 deg - No Ice	20.68	18.84	10.88	812.54	-1405.76	1.07
1.2 Dead+1.6 Wind 150 deg - No Ice	27.57	10.88	18.84	1419.28	-817.86	1.42
0.9 Dead+1.6 Wind 150 deg	20.68	10.88	18.84	1407.08	-811.21	1.42

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
- No Ice						
1.2 Dead+1.6 Wind 180 deg - No Ice	27.57	-0.00	21.76	1638.66	1.28	1.38
0.9 Dead+1.6 Wind 180 deg - No Ice	20.68	-0.00	21.76	1624.63	0.96	1.38
1.2 Dead+1.6 Wind 210 deg - No Ice	27.57	-10.88	18.84	1419.28	820.43	0.98
0.9 Dead+1.6 Wind 210 deg - No Ice	20.68	-10.88	18.84	1407.09	813.13	0.98
1.2 Dead+1.6 Wind 240 deg - No Ice	27.57	-18.84	10.88	819.63	1420.08	0.31
0.9 Dead+1.6 Wind 240 deg - No Ice	20.68	-18.84	10.88	812.54	1407.68	0.31
1.2 Dead+1.6 Wind 270 deg - No Ice	27.57	-21.75	-0.00	0.49	1639.30	-0.44
0.9 Dead+1.6 Wind 270 deg - No Ice	20.68	-21.75	-0.00	0.37	1625.12	-0.44
1.2 Dead+1.6 Wind 300 deg - No Ice	27.57	-18.84	-10.88	-818.65	1420.08	-1.07
0.9 Dead+1.6 Wind 300 deg - No Ice	20.68	-18.84	-10.88	-811.80	1407.68	-1.07
1.2 Dead+1.6 Wind 330 deg - No Ice	27.57	-10.88	-18.84	-1418.30	820.43	-1.42
0.9 Dead+1.6 Wind 330 deg - No Ice	20.68	-10.88	-18.84	-1406.35	813.13	-1.42
1.2 Dead+1.0 Ice+1.0 Temp	60.03	0.00	-0.00	4.71	10.64	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	60.03	0.00	-7.38	-598.60	10.73	-0.60
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	60.03	3.69	-6.39	-517.77	-290.94	-0.43
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	60.03	6.39	-3.69	-296.93	-511.78	-0.14
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	60.03	7.38	-0.00	4.74	-592.61	0.18
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	60.03	6.39	3.69	306.42	-511.78	0.46
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	60.03	3.69	6.39	527.25	-290.94	0.61
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	60.03	0.00	7.38	608.08	10.73	0.60
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	60.03	-3.69	6.39	527.27	312.42	0.43
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	60.03	-6.39	3.69	306.41	533.24	0.14
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	60.03	-7.38	-0.00	4.74	614.07	-0.18
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	60.03	-6.39	-3.69	-296.93	533.24	-0.46
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	60.03	-3.69	-6.39	-517.76	312.40	-0.61
Dead+Wind 0 deg - Service	22.98	0.00	-4.65	-348.45	1.07	0.00
Dead+Wind 30 deg - Service	22.98	2.33	-4.03	-301.71	-173.36	-0.04
Dead+Wind 60 deg - Service	22.98	4.03	-2.33	-174.02	-301.05	-0.07
Dead+Wind 90 deg - Service	22.98	4.65	-0.00	0.41	-347.79	-0.08
Dead+Wind 120 deg - Service	22.98	4.03	2.33	174.84	-301.05	-0.07
Dead+Wind 150 deg - Service	22.98	2.33	4.03	302.53	-173.36	-0.04
Dead+Wind 180 deg - Service	22.98	0.00	4.65	349.26	1.07	-0.00
Dead+Wind 210 deg - Service	22.98	-2.33	4.03	302.53	175.50	0.04
Dead+Wind 240 deg - Service	22.98	-4.03	2.33	174.84	303.19	0.07
Dead+Wind 270 deg - Service	22.98	-4.65	-0.00	0.41	349.93	0.08
Dead+Wind 300 deg - Service	22.98	-4.03	-2.33	-174.02	303.19	0.07
Dead+Wind 330 deg -	22.98	-2.33	-4.03	-301.71	175.50	0.04

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
Service						

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-22.98	0.00	0.00	22.98	-0.00	0.000%
2	0.00	-27.57	-21.76	0.00	27.57	21.76	0.004%
3	0.00	-20.68	-21.76	0.00	20.68	21.76	0.003%
4	10.88	-27.57	-18.84	-10.88	27.57	18.84	0.000%
5	10.88	-20.68	-18.84	-10.88	20.68	18.84	0.000%
6	18.84	-27.57	-10.88	-18.84	27.57	10.88	0.000%
7	18.84	-20.68	-10.88	-18.84	20.68	10.88	0.000%
8	21.76	-27.57	0.00	-21.75	27.57	0.00	0.008%
9	21.76	-20.68	0.00	-21.75	20.68	0.00	0.007%
10	18.84	-27.57	10.88	-18.84	27.57	-10.88	0.000%
11	18.84	-20.68	10.88	-18.84	20.68	-10.88	0.000%
12	10.88	-27.57	18.84	-10.88	27.57	-18.84	0.000%
13	10.88	-20.68	18.84	-10.88	20.68	-18.84	0.000%
14	0.00	-27.57	21.76	0.00	27.57	-21.76	0.004%
15	0.00	-20.68	21.76	0.00	20.68	-21.76	0.003%
16	-10.88	-27.57	18.84	10.88	27.57	-18.84	0.000%
17	-10.88	-20.68	18.84	10.88	20.68	-18.84	0.000%
18	-18.84	-27.57	10.88	18.84	27.57	-10.88	0.000%
19	-18.84	-20.68	10.88	18.84	20.68	-10.88	0.000%
20	-21.76	-27.57	0.00	21.75	27.57	0.00	0.008%
21	-21.76	-20.68	0.00	21.75	20.68	0.00	0.007%
22	-18.84	-27.57	-10.88	18.84	27.57	10.88	0.000%
23	-18.84	-20.68	-10.88	18.84	20.68	10.88	0.000%
24	-10.88	-27.57	-18.84	10.88	27.57	18.84	0.000%
25	-10.88	-20.68	-18.84	10.88	20.68	18.84	0.000%
26	0.00	-60.03	0.00	-0.00	60.03	0.00	0.001%
27	0.00	-60.03	-7.38	-0.00	60.03	7.38	0.001%
28	3.69	-60.03	-6.39	-3.69	60.03	6.39	0.001%
29	6.39	-60.03	-3.69	-6.39	60.03	3.69	0.001%
30	7.38	-60.03	0.00	-7.38	60.03	0.00	0.001%
31	6.39	-60.03	3.69	-6.39	60.03	-3.69	0.001%
32	3.69	-60.03	6.39	-3.69	60.03	-6.39	0.001%
33	0.00	-60.03	7.38	-0.00	60.03	-7.38	0.001%
34	-3.69	-60.03	6.39	3.69	60.03	-6.39	0.000%
35	-6.39	-60.03	3.69	6.39	60.03	-3.69	0.001%
36	-7.38	-60.03	0.00	7.38	60.03	0.00	0.001%
37	-6.39	-60.03	-3.69	6.39	60.03	3.69	0.001%
38	-3.69	-60.03	-6.39	3.69	60.03	6.39	0.001%
39	0.00	-22.98	-4.66	-0.00	22.98	4.65	0.002%
40	2.33	-22.98	-4.03	-2.33	22.98	4.03	0.002%
41	4.03	-22.98	-2.33	-4.03	22.98	2.33	0.002%
42	4.66	-22.98	0.00	-4.65	22.98	0.00	0.002%
43	4.03	-22.98	2.33	-4.03	22.98	-2.33	0.002%
44	2.33	-22.98	4.03	-2.33	22.98	-4.03	0.002%
45	0.00	-22.98	4.66	-0.00	22.98	-4.65	0.002%
46	-2.33	-22.98	4.03	2.33	22.98	-4.03	0.002%
47	-4.03	-22.98	2.33	4.03	22.98	-2.33	0.002%
48	-4.66	-22.98	0.00	4.65	22.98	0.00	0.002%
49	-4.03	-22.98	-2.33	4.03	22.98	2.33	0.002%
50	-2.33	-22.98	-4.03	2.33	22.98	4.03	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance

1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00004284	0.00008769
3	Yes	15	0.00000001	0.00007068
4	Yes	19	0.00000001	0.00007985
5	Yes	18	0.00000001	0.00013787
6	Yes	19	0.00000001	0.00008195
7	Yes	18	0.00000001	0.00014160
8	Yes	14	0.00009640	0.00011500
9	Yes	14	0.00006691	0.00009745
10	Yes	19	0.00000001	0.00008169
11	Yes	18	0.00000001	0.00014110
12	Yes	19	0.00000001	0.00008004
13	Yes	18	0.00000001	0.00013821
14	Yes	15	0.00004284	0.00008772
15	Yes	15	0.00000001	0.00007070
16	Yes	19	0.00000001	0.00008269
17	Yes	18	0.00000001	0.00014278
18	Yes	19	0.00000001	0.00008055
19	Yes	18	0.00000001	0.00013897
20	Yes	14	0.00009639	0.00011516
21	Yes	14	0.00006690	0.00009755
22	Yes	19	0.00000001	0.00008081
23	Yes	18	0.00000001	0.00013946
24	Yes	19	0.00000001	0.00008249
25	Yes	18	0.00000001	0.00014242
26	Yes	11	0.00000001	0.00005261
27	Yes	17	0.00000001	0.00009431
28	Yes	17	0.00000001	0.00013846
29	Yes	17	0.00000001	0.00014078
30	Yes	17	0.00000001	0.00009268
31	Yes	17	0.00000001	0.00014282
32	Yes	17	0.00000001	0.00014042
33	Yes	17	0.00000001	0.00009542
34	Yes	18	0.00000001	0.00007313
35	Yes	17	0.00000001	0.00014767
36	Yes	17	0.00000001	0.00009606
37	Yes	17	0.00000001	0.00014552
38	Yes	17	0.00000001	0.00014807
39	Yes	14	0.00000001	0.00003281
40	Yes	14	0.00000001	0.00004803
41	Yes	14	0.00000001	0.00005268
42	Yes	14	0.00000001	0.00003326
43	Yes	14	0.00000001	0.00004700
44	Yes	14	0.00000001	0.00005143
45	Yes	14	0.00000001	0.00003284
46	Yes	14	0.00000001	0.00005198
47	Yes	14	0.00000001	0.00004754
48	Yes	14	0.00000001	0.00003345
49	Yes	14	0.00000001	0.00005330
50	Yes	14	0.00000001	0.00004861

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load*	*Tilt*	*Twist*
	ft	*in*	*Comb.*	°	°
L1	110 - 90	13.906	48	0.9675	0.0008
L2	90 - 60	9.888	48	0.9388	0.0008
L3	60 - 39.5	4.552	47	0.6949	0.0003
L4	39.5 - 30	1.990	47	0.4792	0.0002
L5	30 - 25	1.143	47	0.3688	0.0001
L6	25 - 18.75	0.790	47	0.3043	0.0001
L7	18.75 - 8.25	0.444	47	0.2234	0.0001
L8	8.25 - 6	0.087	47	0.0975	0.0000
L9	6 - 0	0.047	47	0.0732	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
107.00	APXVSPP18-C-A20 w/ Mount Pipe	48	13.297	0.9671	0.0008	74855
105.00	PCS 1900MHz 4x45W-65MHz	48	12.892	0.9665	0.0008	74855
89.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	48	9.691	0.9345	0.0007	16785
76.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	48	7.225	0.8483	0.0006	8003
30.00	Bridge Stiffener (72" x 11" x 1.25")	47	1.143	0.3688	0.0001	4603

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	110 - 90	65.181	20	4.5387	0.0040
L2	90 - 60	46.347	20	4.4039	0.0040
L3	60 - 39.5	21.336	20	3.2592	0.0030
L4	39.5 - 30	9.326	18	2.2468	0.0022
L5	30 - 25	5.356	18	1.7292	0.0017
L6	25 - 18.75	3.701	18	1.4265	0.0014
L7	18.75 - 8.25	2.078	18	1.0472	0.0011
L8	8.25 - 6	0.407	18	0.4570	0.0005
L9	6 - 0	0.218	18	0.3430	0.0004

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
107.00	APXVSPP18-C-A20 w/ Mount Pipe	20	62.327	4.5368	0.0040	16190
105.00	PCS 1900MHz 4x45W-65MHz	20	60.426	4.5342	0.0040	16190
89.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	20	45.427	4.3838	0.0039	3625
76.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	20	33.867	3.9794	0.0035	1722
30.00	Bridge Stiffener (72" x 11" x 1.25")	18	5.356	1.7292	0.0017	983

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	110 - 90 (1)	P24x0.25	20.00	0.00	0.0	18.6532	-3.14	662.26	0.005
L2	90 - 60 (2)	P24x0.375	30.00	0.00	0.0	27.832	-12.35	1052.07	0.012

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L3	60 - 39.5 (3)	30" x 0.375"	20.50	0.00	0.0	34.9015	-16.08	1311.06	0.012
L4	39.5 - 30 (4)	RPS 30" x 0.483"	9.50	0.00	0.0	44.7888	-18.22	1606.35	0.011
L5	30 - 25 (5)	P30x0.5	5.00	0.00	0.0	46.3385	-19.81	1751.60	0.011
L6	25 - 18.75 (6)	RPS 30" x 0.55311"	6.25	0.00	0.0	51.1683	-21.41	1891.79	0.011
L7	18.75 - 8.25 (7)	RPS 30" x 0.69241"	10.50	0.00	0.0	63.7519	-24.64	2142.45	0.012
L8	8.25 - 6 (8)	RPS 30" x 0.85759"	2.25	0.00	0.0	78.5154	-25.47	2809.60	0.009
L9	6 - 0 (9)	RPS 30" x 0.801"	6.00	0.00	0.0	73.4768	-27.56	2627.97	0.010

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	110 - 90 (1)	P24x0.25	75.82	396.68	0.191	0.00	396.68	0.000
L2	90 - 60 (2)	P24x0.375	488.10	623.72	0.783	0.00	623.72	0.000
L3	60 - 39.5 (3)	30" x 0.375"	846.56	947.86	0.893	0.00	947.86	0.000
L4	39.5 - 30 (4)	RPS 30" x 0.483"	1023.89	1207.94	0.848	0.00	1207.94	0.000
L5	30 - 25 (5)	P30x0.5	1121.68	1311.10	0.856	0.00	1311.10	0.000
L6	25 - 18.75 (6)	RPS 30" x 0.55311"	1245.83	1446.60	0.861	0.00	1446.60	0.000
L7	18.75 - 8.25 (7)	RPS 30" x 0.69241"	1462.17	1665.87	0.878	0.00	1665.87	0.000
L8	8.25 - 6 (8)	RPS 30" x 0.85759"	1510.06	2172.52	0.695	0.00	2172.52	0.000
L9	6 - 0 (9)	RPS 30" x 0.801"	1639.64	2035.95	0.805	0.00	2035.95	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	110 - 90 (1)	P24x0.25	5.00	331.13	0.015	0.00	648.61	0.000
L2	90 - 60 (2)	P24x0.375	16.71	526.03	0.032	0.04	1019.71	0.000
L3	60 - 39.5 (3)	30" x 0.375"	18.21	655.53	0.028	0.31	1598.37	0.000
L4	39.5 - 30 (4)	RPS 30" x 0.483"	19.10	803.17	0.024	0.31	1944.33	0.000
L5	30 - 25 (5)	P30x0.5	19.68	875.80	0.022	0.31	2117.72	0.000
L6	25 - 18.75 (6)	RPS 30" x 0.55311"	20.03	945.90	0.021	0.31	2279.15	0.000
L7	18.75 - 8.25 (7)	RPS 30" x 0.69241"	21.15	1071.22	0.020	0.31	2557.29	0.000
L8	8.25 - 6 (8)	RPS 30" x 0.85759"	21.41	1404.80	0.015	0.31	3316.94	0.000
L9	6 - 0 (9)	RPS 30" x 0.801"	21.77	1313.99	0.017	0.31	3114.23	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	110 - 90 (1)	0.005	0.191	0.000	0.015	0.000	0.196 ✔	1.000	4.8.2 ✔

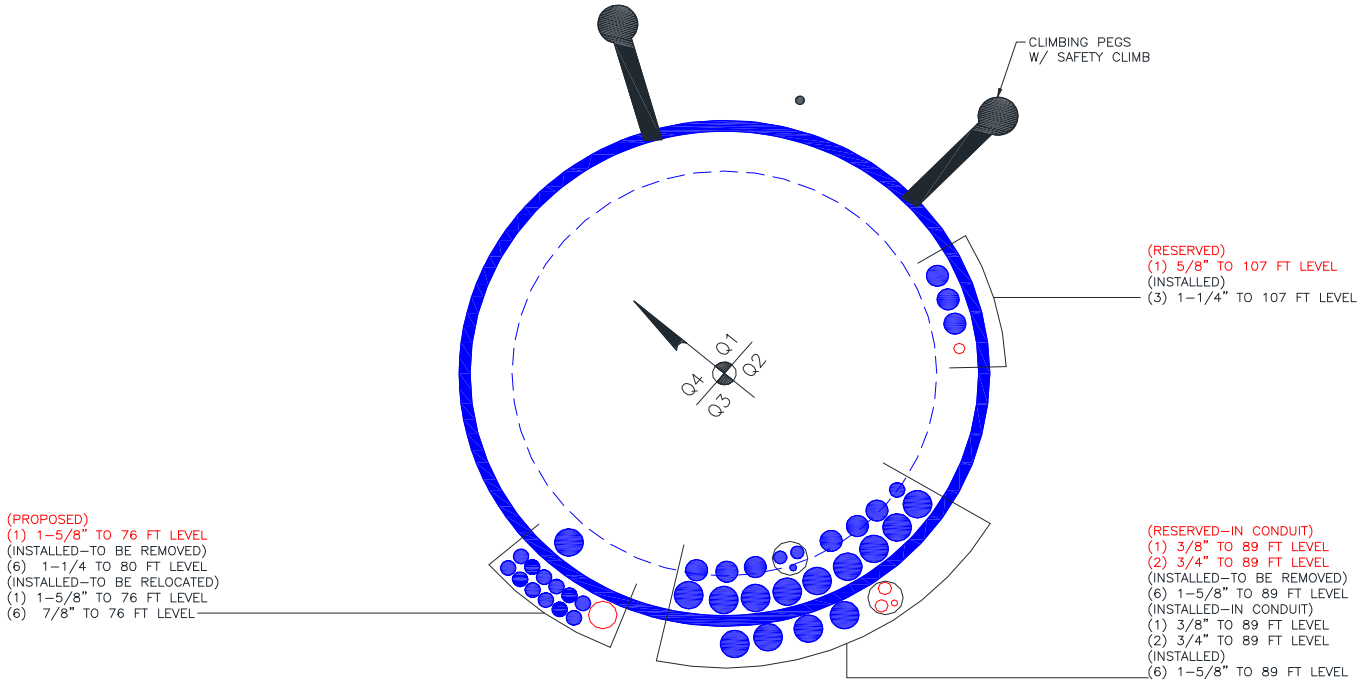
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L2	90 - 60 (2)	0.012	0.783	0.000	0.032	0.000	0.795 ✔	1.000	4.8.2 ✔
L3	60 - 39.5 (3)	0.012	0.893	0.000	0.028	0.000	0.906 ✔	1.000	4.8.2 ✔
L4	39.5 - 30 (4)	0.011	0.848	0.000	0.024	0.000	0.860 ✔	1.000	4.8.2 ✔
L5	30 - 25 (5)	0.011	0.856	0.000	0.022	0.000	0.867 ✔	1.000	4.8.2 ✔
L6	25 - 18.75 (6)	0.011	0.861	0.000	0.021	0.000	0.873 ✔	1.000	4.8.2 ✔
L7	18.75 - 8.25 (7)	0.012	0.878	0.000	0.020	0.000	0.890 ✔	1.000	4.8.2 ✔
L8	8.25 - 6 (8)	0.009	0.695	0.000	0.015	0.000	0.704 ✔	1.000	4.8.2 ✔
L9	6 - 0 (9)	0.010	0.805	0.000	0.017	0.000	0.816 ✔	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	110 - 90	Pole	P24x0.25	1	-3.14	662.26	19.6	Pass
L2	90 - 60	Pole	P24x0.375	2	-12.35	1052.07	79.5	Pass
L3	60 - 39.5	Pole	30" x 0.375"	3	-16.08	1311.06	90.6	Pass
L4	39.5 - 30	Pole	RPS 30" x 0.483"	4	-18.22	1606.35	86.0	Pass
L5	30 - 25	Pole	P30x0.5	5	-19.81	1751.60	86.7	Pass
L6	25 - 18.75	Pole	RPS 30" x 0.55311"	6	-21.41	1891.79	87.3	Pass
L7	18.75 - 8.25	Pole	RPS 30" x 0.69241"	7	-24.64	2142.45	89.0	Pass
L8	8.25 - 6	Pole	RPS 30" x 0.85759"	8	-25.47	2809.60	70.4	Pass
L9	6 - 0	Pole	RPS 30" x 0.801"	9	-27.56	2627.97	81.6	Pass
							Summary	
						Pole (L3)	90.6	Pass
						RATING =	**90.6**	**Pass**

APPENDIX B

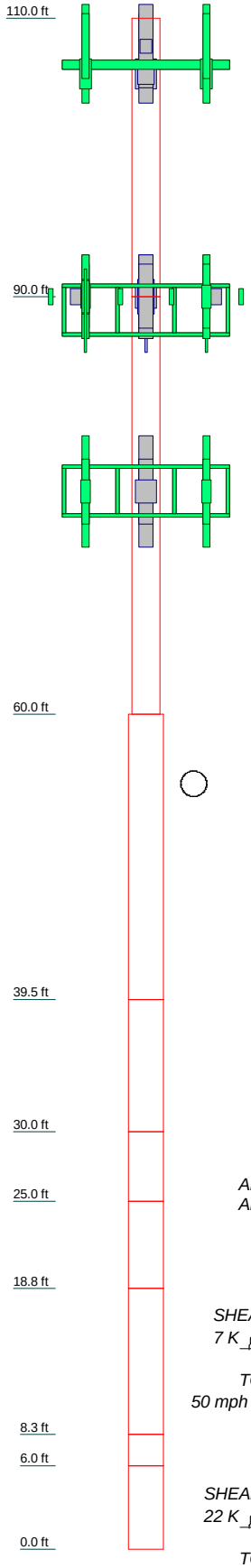
BASE LEVEL DRAWING


CLIMBING PEGS
W/ SAFETY CLIMB
(RESERVED)
(1) 5/8" TO 107 FT LEVEL
(INSTALLED)
(3) 1-1/4" TO 107 FT LEVEL
Q1
Q2
Q3
Q4
(PROPOSED)
(1) 1-5/8" TO 76 FT LEVEL
(INSTALLED-TO BE REMOVED)
(6) 1-1/4 TO 80 FT LEVEL
(INSTALLED-TO BE RELOCATED)
(1) 1-5/8" TO 76 FT LEVEL
(6) 7/8" TO 76 FT LEVEL
(RESERVED-IN CONDUIT)
(1) 3/8" TO 89 FT LEVEL
(2) 3/4" TO 89 FT LEVEL
(INSTALLED-TO BE REMOVED)
(6) 1-5/8" TO 89 FT LEVEL
(INSTALLED-IN CONDUIT)
(1) 3/8" TO 89 FT LEVEL
(2) 3/4" TO 89 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 89 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Section	Size	Length (ft)	Grade	Weight (K)
1	P24x0.25	20.00	A53-B-42	1.3
2	P24x0.375	30.00		2.8
3	30" x 0.375"	20.50		2.4
4	RPS 30" x 0.483"	9.50	Reinf 39.85 ksi	1.4
5	P30x0.5	5.00	A53-B-42	0.8
6	RPS 30" x 0.55311"	6.25	Reinf 41.08 ksi	1.1
7	RPS 30" x 0.69241"	10.50	Reinf 37.34 ksi	2.3
8	RPS 30" x 0.85736"	2.25	Reinf 39.76 ksi	0.6
9	RPS 30" x 0.9330"	6.00	Reinf 39.76 ksi	1.5
				14.2



ALL REACTIONS ARE FACTORED

AXIAL 60 K

SHEAR 7 K

MOMENT 615 kip-ft

TORQUE 1 kip-ft

50 mph WIND - 1.0000 in ICE

AXIAL 28 K

SHEAR 22 K

MOMENT 1640 kip-ft

TORQUE 1 kip-ft

REACTIONS - 97 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
APXVSPP18-C-A20 w/ Mount Pipe	107	RRUS-11	89
APXVSPP18-C-A20 w/ Mount Pipe	107	(2) LGP21401	89
APXVSPP18-C-A20 w/ Mount Pipe	107	(2) LGP21401	89
IBC1900BB-1	107	(2) LGP21401	89
IBC1900BB-1	107	QS66512-2 w/ Mount Pipe	89
IBC1900BB-1	107	QS66512-2 w/ Mount Pipe	89
IBC1900HG-2A	107	QS66512-2 w/ Mount Pipe	89
IBC1900HG-2A	107	DC6-48-60-18-8F	89
IBC1900HG-2A	107	WCS RRUS-32-B30	89
APXVTM14-C-120 w/ Mount Pipe	107	WCS RRUS-32-B30	89
APXVTM14-C-120 w/ Mount Pipe	107	WCS RRUS-32-B30	89
APXVTM14-C-120 w/ Mount Pipe	107	RRUS 32 B2	89
T-Arm Mount [TA 702-3]	107	RRUS 32 B2	89
(2) 2 3/8" OD x 6 ft mount pipe	107	RRUS 32 B2	89
(2) 2 3/8" OD x 6 ft mount pipe	107	Platform Mount [LP 502-1]	89
(2) 2 3/8" OD x 6 ft mount pipe	107	2 3/8" OD x 6 ft mount pipe	89
PCS 1900MHz 4x45W-65MHz	105	2 3/8" OD x 6 ft mount pipe	89
PCS 1900MHz 4x45W-65MHz	105	2 3/8" OD x 6 ft mount pipe	89
PCS 1900MHz 4x45W-65MHz	105	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	76
800MHz 2X50W RRH W/FILTER	105		
800MHz 2X50W RRH W/FILTER	105	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	76
800MHz 2X50W RRH W/FILTER	105		
TD-RRH8x20-25	105	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	76
TD-RRH8x20-25	105		
TD-RRH8x20-25	105	KRY 112 144/1	76
Side Arm Mount [SO 102-3]	105	KRY 112 144/1	76
AM-X-CD-16-65-00T-RET w/ Mount Pipe	89	KRY 112 144/1	76
		LNX-6515DS-A1M w/ Mount Pipe	76
AM-X-CD-16-65-00T-RET w/ Mount Pipe	89	LNX-6515DS-A1M w/ Mount Pipe	76
		LNX-6515DS-A1M w/ Mount Pipe	76
AM-X-CD-16-65-00T-RET w/ Mount Pipe	89	AIR 32 B2a/B66Aa w/ Mount Pipe	76
		AIR 32 B2a/B66Aa w/ Mount Pipe	76
7750.00 w/ Mount Pipe	89	AIR 32 B2a/B66Aa w/ Mount Pipe	76
7750.00 w/ Mount Pipe	89	RRUS 11 B12	76
7750.00 w/ Mount Pipe	89	RRUS 11 B12	76
DC6-48-60-18-8F	89	RRUS 11 B12	76
RRUS-11	89	Platform Mount [LP 305-1]	76
RRUS-11	89	Bridge Stiffener (72" x 11" x 1.25")	30

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-42	42 ksi	63 ksi	Reinf 37.34 ksi	37 ksi	47 ksi
Reinf 39.85 ksi	40 ksi	50 ksi	Reinf 39.76 ksi	40 ksi	50 ksi
Reinf 41.08 ksi	41 ksi	52 ksi	Reinf 39.74 ksi	40 ksi	50 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 90.6%

Paul J. Ford and Company
250 E Broad St, Suite 600
Columbus, OH 43215
Phone: (614) 221-6679
FAX: (555) 555-1235

Job:	***110-Ft. Monopole / Weston Square***		
Project:	***37517-0431.002 / BU 876325***		
Client: Crown Castle	Drawn by: mherbert		App'd:
Code: TIA-222-G	Date: 03/22/17		Scale: NTS
Path:			Dwg No. E-1

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

Site Data

BU#: *876325*
Site Name: *Weston Square*
App #:

Reactions		
Mu	75.82	ft-kips
Axial, Pu:	3.14	kips
Shear, Vu:	5	kips
Elevation:	90	feet

Bolt Threads:
N-Included
Vn=φ(0.45*Ab*Fu)
φ=0.75, φ*Vn (kips):
31.81

Pole Manufacturer:	Rohn

If No stiffeners, Criteria:	TIA G	<-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	20		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle (in.):	29		

Plate Data		
Diam:	32	in
Thick, t:	1.5	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.77	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	ksi

Pole Data		
Diam:	24	in
Thick:	0.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

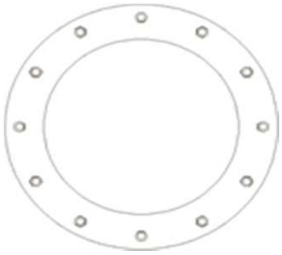
Bolt Tension Capacity, φ*Tn,**B1**:	54.54	kips	Rigid
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	54.54	kips	φ*Tn
Max Bolt directly applied Tu:	6.12	Kips	φTn[(1-(Vu/φVn)^2]^0.5
Min. PL "tc" for **B** cap. **w/o** Pry:	1.488	in	
Min PL "treq" for actual **T w/ Pry**:	0.380	in	
Min PL "t1" for actual **T w/o Pry**:	0.498	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	6.12	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	11.2%	**Pass**	

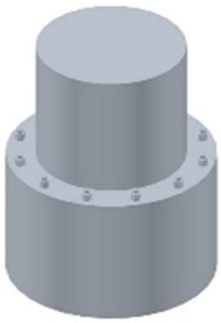
Exterior Flange Plate Results — Flexural Check — Rigid

Compression Side Plate Stress:	Rohn/Pirod, OK	TIA G
Allowable Plate Stress:	32.4 ksi	φ*Fy
Compression Plate Stress Ratio:	Rohn/Pirod, OK	Comp. Y.L. Length:
No Prying		16.28
Tension Side Stress Ratio, (treq/t)^2:	6.4%	**Pass**

n/a

Stiffener Results	N/A for Rohn / Pirod
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





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt
** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

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

Site Data

BU#: *876325*
Site Name: *Weston Square*
App #:

Reactions		
Mu	75.82	ft-kips
Axial, Pu:	3.14	kips
Shear, Vu:	5	kips
Elevation:	90	feet

Bolt Threads:
N-Included
Vn=φ(0.45*Ab*Fu)
φ=0.75, φ*Vn (kips):
31.81

Pole Manufacturer:	Rohn

If No stiffeners, Criteria:	TIA G	<-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	20		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle (in.):	29		

Plate Data		
Diam:	32	in
Thick, t:	1.5	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.77	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	ksi

Pole Data		
Diam:	24	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

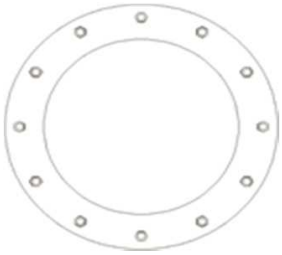
Bolt Tension Capacity, φ*Tn,**B1**:	54.54	kips	Rigid
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	54.54	kips	φ*Tn
Max Bolt directly applied Tu:	6.12	Kips	φTn[(1-(Vu/φVn)^2]^0.5
Min. PL "tc" for **B** cap. **w/o** Pry:	1.488	in	
Min PL "treq" for actual **T w/ Pry**:	0.380	in	
Min PL "t1" for actual **T w/o Pry**:	0.498	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	6.12	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	11.2%	**Pass**	

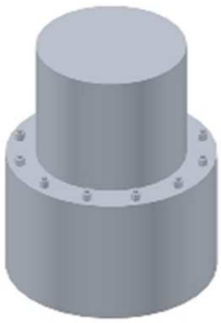
Exterior Flange Plate Results — Flexural Check — Rigid

Compression Side Plate Stress:	Rohn/Pirod, OK	TIA G
Allowable Plate Stress:	32.4 ksi	φ*Fy
Compression Plate Stress Ratio:	Rohn/Pirod, OK	Comp. Y.L. Length:
No Prying		16.28
Tension Side Stress Ratio, (treq/t)^2:	6.4%	**Pass**

n/a

Stiffener Results	N/A for Rohn / Pirod
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





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt
** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

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

Site Data

BU#: *876325*
Site Name: *Weston Square*
App #:

Reactions		
Mu	488.1	ft-kips
Axial, Pu:	12.35	kips
Shear, Vu:	16.71	kips
Elevation:	60	feet

Bolt Threads:
N-Included
Vn=φ(0.45*Ab*Fu)
φ=0.75, φ*Vn (kips):
62.62

Pole Manufacturer:	Rohn

If No stiffeners, Criteria:	TIA G	<-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	12		
Diameter (in.):	1.5	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle (in.):	35		

Plate Data		
Diam:	41	in
Thick, t:	2	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	6.28	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	ksi

Pole Data		
Diam:	24	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

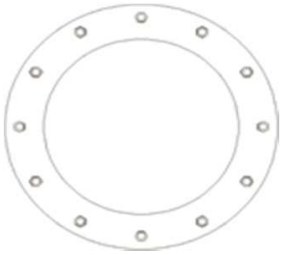
Bolt Tension Capacity, φ*Tn,**B1**:	111.04	kips	Rigid
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	111.01	kips	φ*Tn
Max Bolt directly applied Tu:	54.75	Kips	φTn[(1-(Vu/φVn)^2]^0.5
Min. PL "tc" for **B** cap. **w/o** Pry:	2.535	in	
Min PL "treq" for actual **T w/ Pry**:	1.345	in	
Min PL "t1" for actual **T w/o Pry**:	1.780	in	
T allowable with Prying:	87.60	kips	0≤α'≤1 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	54.75	kips	
Prying Bolt Stress Ratio=(Tu+q)/(B):	49.3%	**Pass**	

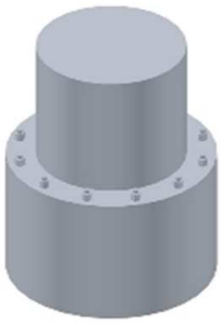
Exterior Flange Plate Results — Flexural Check — Rigid

Compression Side Plate Stress:	Rohn/Pirod, OK	TIA G
Allowable Plate Stress:	32.4 ksi	φ*Fy
Compression Plate Stress Ratio:	Rohn/Pirod, OK	Comp. Y.L. Length:
No Prying		25.48
Tension Side Stress Ratio, (treq/t)^2:	45.2% **Pass**	

n/a

Stiffener Results	N/A for Rohn / Pirod
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





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt
** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

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

Site Data

BU#: *876325*
Site Name: *Weston Square*
App #:

Reactions		
Mu	488.1	ft-kips
Axial, Pu:	12.35	kips
Shear, Vu:	16.71	kips
Elevation:	60	feet

Bolt Threads:
N-Included
Vn=φ(0.45*Ab*Fu)
φ=0.75, φ*Vn (kips):
62.62

Pole Manufacturer:	Rohn

If No stiffeners, Criteria:	TIA G	<-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	12		
Diameter (in.):	1.5	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle (in.):	35		

Plate Data		
Diam:	41	in
Thick, t:	2	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	7.85	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	ksi

Pole Data		
Diam:	30	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

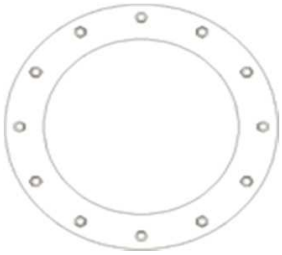
Bolt Tension Capacity, φ*Tn,**B1**:	111.04	kips	Rigid
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	111.01	kips	φ*Tn
Max Bolt directly applied Tu:	54.75	Kips	φTn[(1-(Vu/φVn)^2]^0.5
Min. PL "tc" for **B** cap. **w/o** Pry:	1.376	in	
Min PL "treq" for actual **T w/ Pry**:	0.720	in	
Min PL "t1" for actual **T w/o Pry**:	0.966	in	
T allowable w/o Prying:	111.04	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	54.75	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	49.3%	**Pass**	

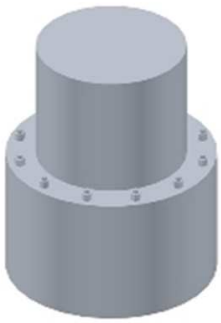
Exterior Flange Plate Results — Flexural Check — Rigid

Compression Side Plate Stress:	Rohn/Pirod, OK	TIA G
Allowable Plate Stress:	32.4 ksi	φ*Fy
Compression Plate Stress Ratio:	Rohn/Pirod, OK	Comp. Y.L. Length:
No Prying		18.03
Tension Side Stress Ratio, (treq/t)^2:	13.0% **Pass**	

n/a

Stiffener Results	N/A for Rohn / Pirod
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





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt
** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

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

Site Data

BU#: *876325*
Site Name: *Weston Square*
App #:

Reactions		
Mu	448.84	ft-kips
Axial, Pu:	9.85	kips
Shear, Vu:	19.1	kips
Elevation:	30	feet

Bolt Threads:
N-Included
Vn=φ(0.45*Ab*Fu)
φ=0.75, φ*Vn (kips):
62.62

Pole Manufacturer:	Other

If No stiffeners, Criteria:	TIA G	<-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	12		
Diameter (in.):	1.5	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle (in.):	35		

Plate Data		
Diam:	41	in
Thick, t:	2	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	7.85	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	ksi

Pole Data		
Diam:	30	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

Bolt Tension Capacity, φ*Tn,**B1**:	111.04	kips	Rigid
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	111.00	kips	φ*Tn
Max Bolt directly applied Tu:	50.48	Kips	φTn[(1-(Vu/φVn)^2]^0.5
Min. PL "tc" for **B** cap. **w/o** Pry:	1.376	in	
Min PL "treq" for actual **T w/ Pry**:	0.691	in	
Min PL "t1" for actual **T w/o Pry**:	0.928	in	
T allowable w/o Prying:	111.04	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	50.48	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	45.5%	**Pass**	

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	10.6	ksi	Rigid
Allowable Plate Stress:	32.4	ksi	TIA G
Compression Plate Stress Ratio:	32.8%	**Pass**	φ*Fy
No Prying			Comp. Y.L. Length:
Tension Side Stress Ratio, (treq/t)^2:	12.0%	**Pass**	18.03

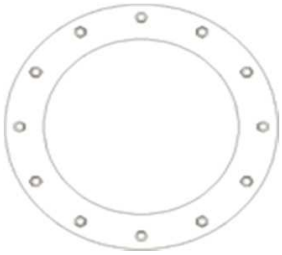
n/a

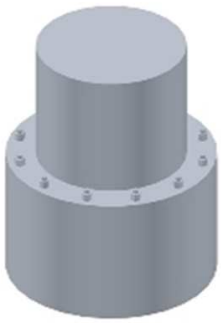
Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt
** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

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

Site Data

BU#: *876325*
Site Name: *Weston Square*
App #:

Reactions		
Mu	448.84	ft-kips
Axial, Pu:	9.85	kips
Shear, Vu:	19.1	kips
Elevation:	30	feet

Bolt Threads:
N-Included
Vn=φ(0.45*Ab*Fu)
φ=0.75, φ*Vn (kips):
62.62

Pole Manufacturer:	Other

If No stiffeners, Criteria:	TIA G	<-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	12		
Diameter (in.):	1.5	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle (in.):	35		

Plate Data		
Diam:	41	in
Thick, t:	2	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	7.85	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	ksi

Pole Data		
Diam:	30	in
Thick:	0.5	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

Bolt Tension Capacity, φ*Tn,**B1**:	111.04	kips	Rigid
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	111.00	kips	φ*Tn
Max Bolt directly applied Tu:	50.48	Kips	φTn[(1-(Vu/φVn)^2]^0.5
Min. PL "tc" for **B** cap. **w/o** Pry:	1.376	in	
Min PL "treq" for actual **T w/ Pry**:	0.691	in	
Min PL "t1" for actual **T w/o Pry**:	0.928	in	
T allowable w/o Prying:	111.04	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	50.48	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	45.5%	**Pass**	

Exterior Flange Plate Results

	Flexural Check		Rigid
Compression Side Plate Stress:	10.6	ksi	TIA G
Allowable Plate Stress:	32.4	ksi	φ*Fy
Compression Plate Stress Ratio:	32.8%	**Pass**	Comp. Y.L. Length:
No Prying			18.03
Tension Side Stress Ratio, (treq/t)^2:	12.0%	**Pass**	

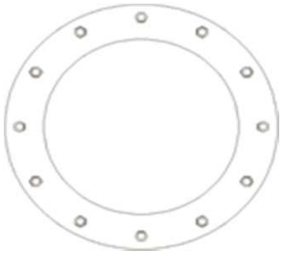
n/a

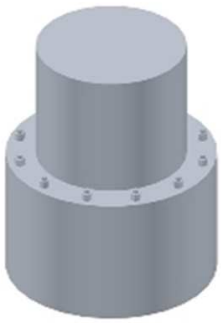
Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a





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

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

PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 • Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com
Effective Date: 3/21/2016 Verison 1.3

DATE:	3/22/2017
PROJECT NO:	37517-0431.002.7805
SITE NAME:	WESTON SQUARE
SITE NUMBER/BUN:	876325.00
DESCRIPTION:	110' MP
OWNER:	Crown Castle
ENGINEER:	MEH

BOLTED FLANGE JUMP ANALYSIS PER TIA-222-G & AISC 13TH ED. (BLACK)

General Parameters & Loading

Flange Elevation:	30.00	ft
TIA Reference Standard:	TIA-222-G	
AISC Manual:	13th Ed. (Black)	
Method:	LRFD	
ASD Stress Increase, ASIF:	1.00	
Moment, Muf:	1023.89	k-ft
Axial, Puf:	18.22	kips
Shear, Vf:	19.10	kips

Pole Parameters

	Upper Pole	Lower Pole	
Number of Sides	Round	Round	
Pole Diameter, Dp:	30.00	30.00	in
Pole Thickness, tp:	0.3750	0.5000	in
Pole Fy:	42	42	ksi
Pole Fu:	63	63	ksi
Flange Diameter, Df:	41.00	41.00	in
Flange Thickness, tf:	2.00	2.00	in

Flange Parameters

Number of Bolt Circles: (1) Bolt Circle

	Bolt Circle 1	Bolt Circle 2	
Qty. Bolts:	12		
Bolt Diameter:	1.50		in
Bolt Circle:	35.00		in
Bolt Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:			degrees
Bolt Area, Ag:	1.7671	0.0000	in^2

	Bolt Circle 1	Bolt Circle 2	
Max. Tension:	51.30	0.00	kips
Max. Net Tension:	50.47	0.00	kips
Max. Net Compression:	52.12	0.00	kips
Moment to Bolt Circle:	448.84	0.00	k-ft
Axial to Bolt Circle:	9.85	0.00	kips
Shear to Bolt Circle:	19.10	0.00	kips
Equivalent Bolt Circle:	35.00	0.00	in

	Thickness	Width	Height
Top Flange Stiffener Parameters			
Bot. Flange Stiffener Parameters			

Shaft Reinforcing Parameters

	Generation 1	Generation 2	Generation 3	Generation 4	
Top Condition					
Top Shaft Reinf. Designation					
Top Shaft Reinf. Thickness					in
Top Shaft Reinf. Width					in
Top Shaft Reinf. Term. Bolts					
Top Shaft Reinf. Bolt Spacing					in
Top Shaft Reinf. End Spacing					in
Bottom Condition					
Bottom Shaft Reinf. Designation					
Bottom Shaft Reinf. Thickness					in
Bottom Shaft Reinf. Width					in
Bottom Shaft Reinf. Term. Bolts					
Bottom Shaft Reinf. Bolt Spacing					in
Bottom Shaft Reinf. End Spacing					in

Bridge Stiffener Parameters

	Generation 1	Generation 2	Generation 3	Generation 4	
Reference Document					
Analysis, Design, New, Ignore	Analysis				
Jump Plate Designation	CCI-060100				
Jump Plate Width Override					in
Jump Plate Thickness Override					in
Clear Distance from Flange	0.50				in
Jump Plate Fy	65				ksi
Jump Plate Fu	80				ksi
Bolt Type	APPROVED BLIND BOLT				
Bolt Tension Method	Case 2				
Top Bolt Quantity	18				
Top Bolt Spacing	3.00				in
Top Bolt Edge Distance	3.00				in
Bottom Bolt Quantity	14				
Bottom Bolt Spacing	3.00				in
Bottom Bolt Edge Distance	3.00				in
Unbraced Length	20.00	18.00			in
Unbraced Length Override	20.00				in
K	0.80				
Stiffener Circle	43.00				in
Clearance Check	OK				
Qty. Jump Plates	3				in
Location 1	30				deg
Location 2	150				deg
Location 3	270				deg
Location 4					deg
Location 5					deg
Location 6					deg

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Effective Date: 3/21/2016 Verison 1.3

DATE:	3/22/2017
PROJECT NO:	37517-0431.002.7805
SITE NAME:	WESTON SQUARE
SITE NUMBER/BUN:	876325.00
DESCRIPTION:	110' MP
OWNER:	Crown Castle
ENGINEER:	MEH

BOLTED FLANGE JUMP ANALYSIS PER TIA-222-G & AISC 13TH ED. (BLACK)

Jump Plate Analysis

	Generation 1	Generation 2	Generation 3	Generation 4	
Applied Axial Load (Pu)	**216.76**				kips
Hole Diameter	**1.19**				in
Gross Area (Ag)	**6.00**				in^2
Net Area (An)	**4.81**				in^2
b/t Ratio	**6.00**				
Radius of Gyration (r)	**0.29**				in
K L / r	**55.43**				
Q (Where Qa = 1.0)	**1.00**				
ASIF Value	**1.00**				
Critical Stress (Fa or Fcr)	**48.54**				ksi
Nominal Compressive Capacity	**262.12**				kips
Nominal Tensile Capacity	**288.75**				kips
Controlling Stress Ratio	**82.7%**				

Bolt Analysis

	Generation 1	Generation 2	Generation 3	Generation 4	
Top Bolt Shear Load (Vu)	**12.042**				kips
Top Bolt Tension Load (Tu)	**5.798**				kips
Top Eccentricity (e)	**6.500**				in
Top Bolt Bearing Capacity (Rn)	**47.581**				kips
Top Bolt Shear Capacity (Vn)	**37.000**				kips
Top Bolt Tension Capacity (Tn)	**14.175**				kips
Top Connection Length Reduction	**20%**				
Top Bolt Combined Stress Ratio	**33.3%**				

Bottom Bolt Shear Load (Vu)	**15.483**				kips
Bottom Bolt Tension Load (Tu)	**9.585**				kips
Bottom Eccentricity (e)	**6.500**				in
Bottom Bolt Bearing Capacity (Rn)	**63.441**				kips
Bottom Bolt Shear Capacity (Vn)	**37.000**				kips
Bottom Bolt Tension Capacity (Tn)	**18.900**				kips
Bottom Connection Length Reduction	**N/a**				
Bottom Bolt Combined Stress Ratio	**43.2%**				

Analysis Summary

	Generation 1	Generation 2	Generation 3	Generation 4
JUMP PLATE COMBINED STRESS RATIO	**82.7%**			
TOP BOLT COMBINED STRESS RATIO	**33.3%**			
BOTTOM BOLT COMBINED STRESS RATIO	**43.2%**			

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v4.4 - Effective 7-12-13

Date: 3/22/2017
PJF Project: 37517-0431.002.7805
Client Ref. # BU 876325
Site Name: Weston Square
Description: 110' MP
Owner: Crown Castle
Engineer: MEH

Asymmetric Anchor Rod Analysis

Moment =	1640	k-ft	TIA Ref.	G	Location =	Base Plate		
Axial =	28.0	kips	ASIF =	1.0000	η =	0.50	for BP, Rev. G Sect. 4.9.9	
Shear =	22.0	kips	Max Ratio =	105.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	15							

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

Item	Nominal Anchor Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	1.500	A354 Gr BC	109	125	0.0	35.00	0.00	1.77	117.37	114.00	120.02	0.00	141.00	85.1%
2	1.500	A354 Gr BC	109	125	30.0	35.00	0.00	1.77	117.37	114.00	120.02	0.00	141.00	85.1%
3	1.500	A354 Gr BC	109	125	60.0	35.00	0.00	1.77	117.37	114.00	120.02	0.00	141.00	85.1%
4	1.500	A354 Gr BC	109	125	90.0	35.00	0.00	1.77	117.37	114.00	120.02	0.00	141.00	85.1%
5	1.500	A354 Gr BC	109	125	120.0	35.00	0.00	1.77	117.37	114.00	120.02	0.00	141.00	85.1%
6	1.500	A354 Gr BC	109	125	150.0	35.00	0.00	1.77	117.37	114.00	120.02	0.00	141.00	85.1%
7	1.500	A354 Gr BC	109	125	180.0	35.00	0.00	1.77	117.37	114.00	120.02	0.00	141.00	85.1%
8	1.500	A354 Gr BC	109	125	210.0	35.00	0.00	1.77	117.37	114.00	120.02	0.00	141.00	85.1%
9	1.500	A354 Gr BC	109	125	240.0	35.00	0.00	1.77	117.37	114.00	120.02	0.00	141.00	85.1%
10	1.500	A354 Gr BC	109	125	270.0	35.00	0.00	1.77	117.37	114.00	120.02	0.00	141.00	85.1%
11	1.500	A354 Gr BC	109	125	300.0	35.00	0.00	1.77	117.37	114.00	120.02	0.00	141.00	85.1%
12	1.500	A354 Gr BC	109	125	330.0	35.00	0.00	1.77	117.37	114.00	120.02	0.00	141.00	85.1%
13	1.750	Dywidag (150 ksi)	127.7	150	15.0	44.50	0.00	2.71	228.31	223.13	232.38	0.00	314.40	73.9%
14	1.750	Dywidag (150 ksi)	127.7	150	135.0	44.50	0.00	2.71	228.31	223.13	232.38	0.00	314.40	73.9%
15	1.750	Dywidag (150 ksi)	127.7	150	255.0	44.50	0.00	2.71	228.31	223.13	232.38	0.00	314.40	73.9%
								29.34						

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

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

Site Data

BU#:	*876325*
Site Name:	*Weston Square*
App #:	
Pole Manufacturer:	*Other*

Reactions		
Mu:	1012.2	ft-kips
Axial, Pu:	20.2	kips
Shear, Vu:	15.9	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

Moment adjusted to account for additional anchor rods.

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

Anchor Rod Data		
Qty:	12	
Diam:	1.5	in
Rod Material:	Other	
Strength (Fu):	125	ksi
Yield (Fy):	109	ksi
Bolt Circle:	35	in

Anchor Rod Results

		Stiffened
Max Rod (Cu+ Vu/ή):	120.0 Kips	AISC LRFD
Allowable Axial, Φ*Fu*Anet:	141.0 Kips	φ*Tn
Anchor Rod Stress Ratio:	85.1% **Pass**	

Plate Data		
Diam:	41	in
Thick:	2	in
Grade:	36	ksi
Single-Rod B-eff:	7.85	in

Base Plate Results Flexural Check

		Stiffened
Base Plate Stress:	22.4 ksi	AISC LRFD
Allowable Plate Stress:	32.4 ksi	φ*Fy
Base Plate Stress Ratio:	69.0% **Pass**	Y.L. Length:
		N/A, Roark

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.375	in
Fillet V. Weld:	0.375	in
Width:	5	in
Height:	10	in
Thick:	0.5	in
Notch:	0.75	in
Grade:	65	ksi
Weld str.:	70	ksi

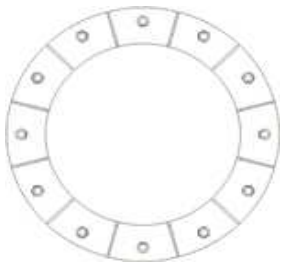
Stiffener Results

Horizontal Weld :	78.3% **Pass**
Vertical Weld:	42.3% **Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	25.0% **Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	49.7% **Pass**
Plate Comp. (AISC Bracket):	60.6% **Pass**

Pole Results

Pole Punching Shear Check:	19.4% **Pass**

Pole Data		
Diam:	30	in
Thick:	0.5	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None



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

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

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Job Number: 37517-0431.002.7805
Site Number: 876325
Site Name: Weston Square

By: MEH
Date: 3/22/2017

DRILLED PIER SOIL AND STEEL ANALYSIS - TIA-222-G

Factored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, Mu =	1640.0		k-ft
Shear, Vu =	22.0		kips
Axial Load, Pu1 =	28.0		kips (from 1.2D + 1.6W)*
Axial Load, Pu2 =	21.0	0.0	kips (from 0.9D + 1.6W)**
OTMu =	1651.0	0.0	k-ft @ Ground

***Axial Load, Pu1 will be used for Soil Compression Analysis.**
****Axial Load, Pu2 will be used for Steel Analysis.**

Safety Factors / Load Factors / Φ Factors

Tower Type =	Monopole DP
ACI Code =	ACI 318-08
Seismic Design Category =	D
Reference Standard =	TIA-222-G
Use 1.3 Load Factor?	No
Load Factor =	1.00

Drilled Pier Parameters

Diameter =	5	ft
Height Above Grade =	0.5	ft
Depth Below Grade =	37	ft
fc' =	3	ksi
εc =	0.003	in/in
L / D Ratio =	7.50	> 6

	Safety Factor	Φ Factor
Soil Lateral Resistance =	2.00	0.75
Skin Friction =	2.00	0.75
End Bearing =	2.00	0.75
Concrete Wt. Resist Uplift =	1.25	

Mat Ftdn. Cap Width =		ft
Mat Ftdn. Cap Length =		ft
Depth Below Grade =		ft

Load Combinations Checked per TIA-222-G

1. (0.75) Ult. Skin Friction + (0.75) Ult. End Bearing + (1.2) Effective Soil Wt. - (1.2) Buoyant Conc. Wt. ≥ Comp.
2. (0.75) Ult. Skin Friction + (0.9) Buoyant Conc. Wt. ≥ Uplift

Steel Parameters

Number of Bars =	16	
Rebar Size =	#9	
Rebar Fy =	60	ksi
Rebar MOE =	29000	ksi
Tie Size =	#4	
Side Clear Cover to Ties =	3	in

Soil Parameters

Water Table Depth =	15.00	ft
Depth to Ignore Soil =	3.33	ft
Depth to Full Cohesion =	0	ft
Full Cohesion Starts at?*	Ground	

Above Full Cohesion Lateral Resistance = 4(Cohesion)(Dia)(H)
Below Full Cohesion Lateral Resistance = 8(Cohesion)(Dia)(H)

Direct Embed Pole Shaft Parameters

Dia @ Grade =		in
Dia @ Depth Below Grade =		in
Number of Sides =		
Thickness =		in
Fy =		ksi
Backfill Condition =		

Maximum Capacity Ratios

Maximum Soil Ratio =	110.0%
Maximum Steel Ratio =	105.0%

*Note: The drilled pier foundation was analyzed using the methodology in the software 'PLS-Caisson' (Version 8.10, or newer, by Power Line Systems, Inc.). Per the methods in PLS-Caisson, the soil reactions of cohesive soils are calculated using 8CD independent of the depth of the soil layer. The depth of soil to be ignored at the top of the drilled pier is based the recommendations of the site specific geotechnical report. In the absence of any recommendations, the frost depth at the site or one half of the drilled pier diameter (whichever is greater) shall be ignored.

Define Soil Layers

Note: Cohesion = Undrained Shear Strengh = Unconfined Compressive Strength / 2

Layer	Thickness ft	Unit Weight pcf	Cohesion psf	Friction Angle degrees	Soil Type	Ultimate End Bearing psf	Comp. Ult. Skin Friction psf	Tension Ult. Skin Friction psf	Depth ft
1	2	120	1000	0	Clay				2
2	4	110	0	30	Sand				6
3	7	110	750	0	Clay				13
4	2	105	0	30	Sand				15
5	13	115	0	32	Sand				28
6	5	100	750	0	Clay				33
7	7	120	1500	0	Clay	9100			40
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	22.62	ft, from Grade	Shear, Vu =	22.00	kips
Bending Moment, Mu =	2148.57	k-ft, from COR	Resisting Shear, ΦVn =	102.79	kips
Resisting Moment, ΦMn =	10038.68	k-ft, from COR			

MOMENT RATIO = 21.4% OK **SHEAR RATIO = 21.4% OK**

Soil Results: Uplift

Uplift, Tu =	0.00	kips
Uplift Capacity, ΦTn =	75.14	kips

UPLIFT RATIO = 0.0% OK

Soil Results: Compression

Compression, Cu =	28.00	kips
Comp. Capacity, ΦCn =	98.90	kips

COMPRESSION RATIO = 28.3% OK

Steel Results (ACI 318-08):

Minimum Steel Area =	9.42	sq in	Axial Load, Pu =	42.21	kips @ 7.50 ft Below Grade
Actual Steel Area =	16.00	sq in	Moment, Mu =	1782.69	k-ft @ 7.50 ft Below Grade

SEE DRILLED PIER STEEL ANALYSIS

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Job Number: 37517-0431.002.7805
Site Number: 876325
Site Name: Weston Square
By: MEH
Date: 3/22/2017

DRILLED PIER STEEL ANALYSIS - STEEL CALCULATIONS - TIA-222-G

BASED ON ACI 318-08, SECTIONS 9 & 10 (ASSUMING TIE REINFORCEMENT)

Factored Internal Loads from Analysis

Reference Standard =	TIA-222-G	
ACI Code =	ACI 318-08	
Maximum Ratio =	105.0%	
Axial Load, Pu =	42.2	kips, (+Comp, -Tension)
Moment, Mu =	1782.7	k-ft (Must be Positive)
Depth to Analysis Section =	7.50	ft, from Grade

Factored Internal Loads

Load Factor =	1.0	
Axial Load, Pu = ΦPn =	42.2	kips
Moment, Mu =	1782.7	k-ft

Drilled Pier Geometry and Concrete Specifications

Diameter =	60	in
fc' =	3	ksi
εc =	0.003	in/in
β1 =	0.85	
Ag =	2827.4	in^2
Height Above Grade =	0.5	ft
Depth Below Grade =	37	ft

Nominal Axial Load and Moment

ΦPn(max) =	4341.0	kips
ΦPn(min) =	-1069.7	kips
ΦPn =	42.2	kips
Φ =	0.900	
ΦMn (Resultant) =	2160.7	k-ft
at θ =	180	degrees
NA Depth =	11.42	in

Rebar Size and Specifications

	Existing	New	
Bar Size =	#9	#10	
Override Bar Diameter =			in
Bar Diameter =	1.1280	1.2700	in
Bar Area =	1.0000	1.2700	in^2
Effective Bar Area =	1.0000	1.2700	in^2
Number Bars =	16	3	
Spacing =	Symmetric	Symmetric	
fy =	60	60	ksi
Es =	29000	29000	ksi
εy =	0.00207	0.00207	in/in
Tie Size =	#4		
Clear Cover to Ties =	3		in
Bar Circle =	51.872	44.5	in
Adjust =	11.2500	135.0000	degrees
% of Area Effective =	100.0%	100.0%	

AXIAL RATIO = 1.0% OK

MOMENT RATIO = 82.5% OK

Minimum Required Steel

Seismic Design Category =	D		
As(min) =	9.42	sq in	ACI Section 10.5
As =	19.81	sq in	
Stl Area Reduction Factor =	1.00		

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RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CT11062B

Windsor/ I91/ X35
92 Weston Street
Hartford, CT 06103

March 23, 2017

EBI Project Number: 6217001068

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	14.05 %

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

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March 23, 2017

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CT11062B – Windsor/ I91/ X35**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **92 Weston Street, Hartford, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for the 700 MHz Band is approximately 467 $\mu W/cm^2$, and the general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS) bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **92 Weston Street, Hartford, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 2 UMTS channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

5) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel

6) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

7) Since all 2100 MHz UMTS radios are ground mounted there are additional cabling losses accounted for. For each ground mounted 2100 MHz UMTS RF path an additional 1.73 dB of cable loss was factored into the calculations used for this analysis. This is based on manufacturers Specifications for 100 feet of 7/8" coax cable on each path.

8) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

9) For the following calculations the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

10) The antennas used in this modeling are the **Ericsson AIR32 B2A/B66Aa** & **Ericsson AIR21 B2A/B4P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-A1M** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR32 B2A/B66Aa** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Ericsson AIR21 B2A/B4P** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Commscope LNX-6515DS-A1M** has a maximum gain of **14.6 dBd** at its main lobe at 700 MHz. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

11) The antenna mounting height centerline of the proposed antennas is **76 feet** above ground level (AGL).

12) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

13) All calculations were done with respect to uncontrolled / general public threshold limits.

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T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR32 B2A/B66Aa	Make / Model:	Ericsson AIR32 B2A/B66Aa	Make / Model:	Ericsson AIR32 B2A/B66Aa
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	76	Height (AGL):	76	Height (AGL):	76
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	240	Total TX Power(W):	240	Total TX Power(W):	240
ERP (W):	9,337.08	ERP (W):	9,337.08	ERP (W):	9,337.08
Antenna A1 MPE%	6.85	Antenna B1 MPE%	6.85	Antenna C1 MPE%	6.85
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	76	Height (AGL):	76	Height (AGL):	76
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	6	Channel Count	6	Channel Count	6
Total TX Power(W):	180	Total TX Power(W):	180	Total TX Power(W):	180
ERP (W):	6,235.84	ERP (W):	6,235.84	ERP (W):	6,235.84
Antenna A2 MPE%	4.58	Antenna B2 MPE%	4.58	Antenna C2 MPE%	4.58
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Commscope LNX-6515DS-A1M	Make / Model:	Commscope LNX-6515DS-A1M	Make / Model:	Commscope LNX-6515DS-A1M
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	76	Height (AGL):	76	Height (AGL):	76
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power(W):	30	Total TX Power(W):	30	Total TX Power(W):	30
ERP (W):	865.21	ERP (W):	865.21	ERP (W):	865.21
Antenna A3 MPE%	1.36	Antenna B3 MPE%	1.36	Antenna C3 MPE%	1.36

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**12.78 %**
AT&T	0.63 %
WinStar Wireless	0.07 %
PageNet	0.14 %
Broadcast Video	0.43 %
Site Total MPE %:	**14.05 %**

T-Mobile Sector A Total:	12.78 %
T-Mobile Sector B Total:	12.78 %
T-Mobile Sector C Total:	12.78 %
Site Total:	14.05 %

T-Mobile _Max Values per sector	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile AWS - 2100 MHz LTE	2	2,334.27	76	34.25	AWS - 2100 MHz	1000	3.43%
T-Mobile PCS - 1900 MHz LTE	2	2,334.27	76	34.25	PCS - 1900 MHz	1000	3.43%
T-Mobile AWS - 2100 MHz UMTS	2	783.65	76	11.50	AWS - 2100 MHz	1000	1.15%
T-Mobile PCS - 1950 MHz UMTS	2	1,167.14	76	17.13	PCS - 1950 MHz	1000	1.71%
T-Mobile PCS - 1950 MHz GSM	2	1,167.14	76	17.13	PCS - 1950 MHz	1000	1.71%
T-Mobile 700 MHz LTE	1	865.21	76	6.35	700 MHz	467	1.36%
						Total:	**12.78%**

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general public exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector A:	12.78 %
Sector B:	12.78 %
Sector C:	12.78 %
T-Mobile Per Sector Maximum:	12.78 %
Site Total:	14.05 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **14.05%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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