NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development

Northeast Site Solutions
Denise Sabo
199 Brickyard Rd Farmington, CT 06032
860-209-4690
denise@northeastsitesolutions.com

April 18, 2017

Members of the Siting Council
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RE: Notice of Exempt Modification
85 Plainfield Avenue, West Haven CT 06516
Latitude: 41.30128000
Longitude: -72.97644000
T-Mobile Site#: CTNH506A_L1900

Dear Ms. Bachman:

T-Mobile is requesting to file an exempt modification for an existing 148-foot Monopole located at 85 Plainfield Avenue, West Haven CT 06516. T-Mobile currently maintains six (6) antennas at the 144-foot and 146-foot level of the existing 148-foot tower. The monopole is owned by Crown Castle. The property is owned by Sprint. T-Mobile now intends to replace six (6) existing antenna with three (3) new 700MHz antenna and three (3) new 1900/2100 MHz antenna. The new antennas would be installed at the 144-foot and 146-foot level of the tower.

Planned Modifications:

Remove:
NONE

Remove and Replace:
(3) LNX6515DS A1M Antenna **(Remove) –** (3) AIR32DB B66Aa B2a Antenna **(Replace)**
(3) APX18-206516S-C-A20 Antenna **(Remove) –** (3) SBNH1-D65C Antenna **(Replace)**
(3) ATBT-BOTTOM-24V- Smart Bias Tee (Remove) – (3) ATSBT-TOP-MF-4G Smart Bias Tee (Replace)

Install New:
(1) Hybrid
(6) 1-5/8" Coax

Existing to Remain:
(6) 1-5/8" Coax

This facility was approved by the CT Siting Council. Petition No. 877 – Dated February 19, 2009. The petition was approved for Pocket Communications to expand the height of the tower to 151-feet. T-Mobile received approval to relocate their ACL centers to 148'-6" in April 2016. Please see attached.

NORTHEAST SITE SOLUTIONS

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Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies§ 16- SOj-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.SA. § 16-SOj-73, a copy of this letter is being sent to Mayor Edward M. O'Brien, Elected Official for the City of West Haven and Joseph A. Riccio, Jr, City Planning Commissioner as well as the property owner and the tower owner.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S;A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing structure.

2. The proposed modifications will not require the extension of the site boundary.

3. The proposed modifications 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 Communications 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 constitute an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Denise Sabo
Mobile: 860-209-4690
Fax: 413-521-0558
Office: 199 Brickyard Rd, Farmington, CT 06032
Email: denise@northeastsitesolutions.com

Attachments
cc: Edward M. O'Brien- Mayor - as elected official
Joseph A. Riccio, Jr- City Planning Commissioner
Crown Castle - as tower owner
Sprint - as property owner

Exhibit A

Petition No. 878
Pocket Communications
85 Plainfield Avenue, West Haven
February 19, 2009
Staff Report

On December 15, 2008, the Connecticut Siting Council (Council) received a Petition (Petition) from Youghiogheny Communications-Northeast, LLC d/b/a Pocket Communications (Pocket) for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the proposed modifications to an existing telecommunications facility located at 85 Plainfield Avenue, West Haven. Specifically, Pocket seeks to extend the 138-foot Crown Castle-owned monopole to 148 feet tall. Pocket would install three flush mounted panel antennas at the 146-foot level of the extended tower.

The total height with appurtenances would be approximately 151 feet tall. A Professional Engineer duly licensed in the State of Connecticut has certified that the tower is structurally adequate to support the proposed loading. The maximum worst case power density would be 32.1 percent of the applicable limit.

Pocket would also install a Nortel CDMA Micro BTS equipment cabinet on an H-frame to be located inside the existing fenced compound.

The site is in a wooded area. To the east is Plainfield Avenue and undeveloped land across the street. To the north and west is open (wooded) space. To the south is a parking lot, Maltby Avenue and a residential neighborhood. There are no wetlands at the site.

The tower is currently visible on portions of Plainfield Avenue, Maltby Street, and Timberland Drive. The tower extension is expected to visible from these areas as well. On January 9, 2009, Pocket submitted a notice to abutting property owners with a deadline for reply of January 23, 2009. To date, Pocket has received two inquiries about the project, but neither were opposed. No abutters have contacted the Council's office with any replies. No comments have been received by the City of West Haven either.

This Petition was field reviewed by Dr. Barbara Bell and Mike Perrone of the Council staff on January 12, 2009. Attorney Carrie Larson from Pullman and Comley, LLC (representing Pocket) and Eric Dahl, site acquisition specialist also attended the field review.

Exhibit B

City of West Haven, CT
Property Listing Report

Parcel ID 067-0005-0-CELL

Account 00067597

Property Information

Owner	SPRINT
Co-Owner	
Address	85 PLAINFIELD AVE
Mailing Address	PMB 331 4017 WASHINGTON RD MCMURRAY PA 15317
Land Use	431V TEL REL TW MDL-00
Land Class	I

Vision ID	102768
Census Tract	
Neighborhood	
Zoning Code	
Acreage	0
Utilities	

Photo

Sketch

Primary Construction Details

Actual Year Built	
Effective Year Built	
Stories	
Building Style	
Building Use	
Building Condition	
Total Rooms	

Bedrooms	
Full Bathrooms	
Half Bathrooms	
Bath Style	
Kitchen Style	
Roof Style	
Roof Cover	

Exterior Walls	
Interior Walls	
Heating Type	
Heating Fuel	
AC Type	
Gross Bldg Area	
Total Living Area	0

Report Created On 3/8/2017

City of West Haven, CT
Property Listing Report

Parcel ID 067-0005-0-CELL

Account 00067597

Valuation Summary (Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	0	0
Outbuildings	453600	317520
Improvements	453600	317520
Extras	0	0
Land	0	0
Total	453600	317520

Outbuilding and Extra Items

Description	Units
TOWER	2 SITES
CELL SHED	360 S.F.
FENCE-8' CHAIN	400 L.F.

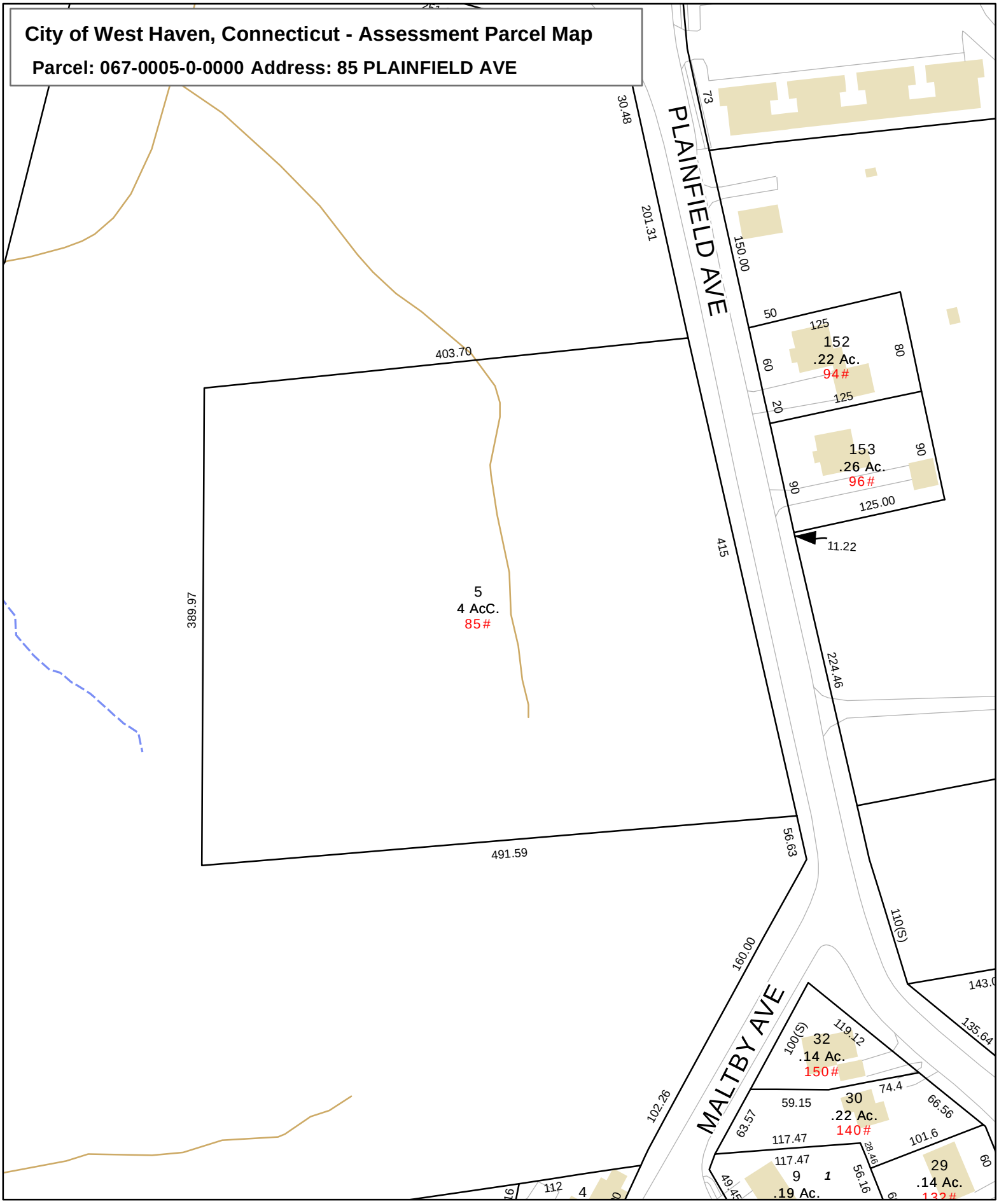
Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Total Area		

Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
SPRINT	000/ 000		
SPRINT	000/ 000		0

Report Created On 3/8/2017



N

Approximate Scale: 1 inch = 100 feet

0 30 60 120 180 240 Feet

Map Produced: January 2015

Exhibit C

T-MOBILE NORTHEAST LLC

T-MOBILE SITE NUMBER: **CTNH506A**

CROWN BU NUMBER: **876323**

SITE NAME:

CROWN WEST HAVEN MONOPOLE

SITE ADDRESS:

85 PLAINFIELD AVE.
WEST HAVEN, CT 06516

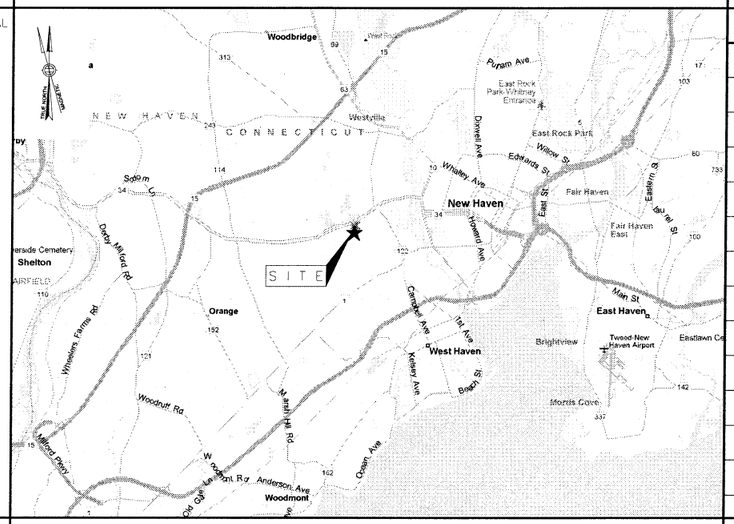
(795FDB CONFIGURATION)

SITE INFORMATION

SITE NUMBER:	CTNH506A
SITE NAME:	CROWN WEST HAVEN MONOPOLE
SITE ADDRESS:	85 PLAINFIELD AVE. WEST HAVEN, CT 06516
COUNTY:	NEW HAVEN
ZONING:	N/A
PARCEL ID:	N/A
FAA 2-C COORDINATES:	N 41° 18' 04.59" W 72° 58' 35.2"
GROUND ELEV:	214'-0" ± AMSL
STRUCTURE TYPE:	MONOPOLE
STRUCTURE HEIGHT:	149'-6"± AGL
ANTENNA RAD CENTER:	146'-0"± AGL

TOWER OWNER:	CROWN CASTLE INTERNATIONAL 500 W CUMMINGS PARK WOBURN, MA 01801
LOCAL POWER COMPANY:	UNITED ILLUMINATING
LOCAL TELCO COMPANY:	LIGHT TOWER
APPLICANT:	T-MOBILE NORTHEAST LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002 P: (860) 648-1116
SITE ACQUISITION REPRESENTATIVE:	NORTHEAST SITE SOLUTIONS 420 MAIN STREET UNIT #2 STURBRIDGE, MA 01566 P: (860) 394-7021
ARCHITECT/ENGINEER:	VERTICAL RESOURCES GROUP 489 WASHINGTON STREET AUBURN, MA 01501 TEL:508-981-9590 FAX:508-519-8939

VICINITY MAP (NOT TO SCALE)



DRAWING INDEX

SHT #	SHEET DESCRIPTION
01	TITLE SHEET
02	GENERAL NOTES
03	ROOF PLAN & ELEVATIONS
04	ANTENNA DETAILS
05	GROUNDING & RF PLUMBING DIAGRAM
06	GROUNDING DETAILS

GENERAL NOTES

1. THIS IS AN IS UNMANNED TELECOMMUNICATION FACILITY AND NOT FOR HUMAN HABITATION:
   -HANDICAP ACCESS REQUIREMENTS ARE NOT REQUIRED.
   -FACILITY HAS NO PLUMBING OR REFRIGERANTS.
   -THIS FACILITY SHALL MEET OR EXCEED ALL FAA AND FCC REGULATOR REQUIREMENTS.
2. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE PROJECT OWNER'S REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.
3. DEVELOPMENT AND USE OF THIS SITE WILL CONFORM TO ALL APPLICABLE CODES AND ORDINANCES.
   BUILDING CODE: CONNECTICUT STATE BUILDING CODE
   ELECTRICAL CODE: 2008 (OR LATEST) NATIONAL ELECTRICAL CODE
   STRUCTURAL CODE: TIA/EIA-222-G OR LATEST EDITION

DIRECTIONS:
FROM BLOOMFIELD, CT PROCEED SOUTH ON I-91. CONTINUE THROUGH HARTFORD. TAKE I-91 SOUTH EXIT 1 TOWARDS RT-34 WEST. PROCEED WEST ON RT-34. CONTINUE ONTO N FRONTAGE RD. CONTINUE ON DERBY AVE. (RT-34 WEST). TURN LEFT ONTO PLAINFIELD AVE. ACCESS ROAD WILL BE ON RIGHT BEFORE MALTBY AVE.

CONNECTICUT ONE CALL SYSTEM, INC. 1-800-922-4455 STOP-CALL BEFORE YOU DIG!

CALL BEFORE YOU DIG
CBYD.COM

CONNECTICUT LAW REQUIRES TWO WORKING DAYS NOTICE PRIOR TO ANY EARTH MOVING ACTIVITIES BY CALLING 800-922-4455 OR DIAL 811

APPROVALS

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

CONSTRUCTION: _____ DATE: _____

SITE ACQUISITION: _____ DATE: _____

LEASING/
R.F. ENGINEER: _____ DATE: _____

LANDLORD/
PROPERTY OWNER: _____ DATE: _____

T-Mobile
T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
O: 860-692-7100
F: 860-692-7159

NSS NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development
420 MAIN STREET
STURBRIDGE, MA 01566
O: 860-692-7100
F: 860-692-7159

VRG
VERTICAL RESOURCES GRP.
489 WASHINGTON STREET
AUBURN, MA 01501
TEL: 508-981-9590
FAX: 508-519-8939

STATE OF CONNECTICUT · JAMES P. STROKE · No. 8657 · REGISTERED PROFESSIONAL ENGINEER

APR 18 2017

SUBMITTALS

NO	DATE	DESCRIPTION	BY
3	04/18/17	GENERAL REVISIONS	MN
2	03/13/17	FOR PERMITTING	MN
1	03/10/17	GENERAL REVISIONS	MN
0	02/10/17	ISSUED FOR REVIEW	MN

SITE NUMBER:
CTNH506-A
SITE NAME:
CROWN WEST HAVEN MONOPOLE
SITE ADDRESS:
85 PLAINFIELD AVE.
WEST HAVEN, CT 06516

SHEET TITLE:
TITLE SHEET

SHEET NUMBER:
01

GENERAL NOTES

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   CONTRACTOR – PRIME CONTRACTOR
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – AT&T WIRELESS
   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.

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 UNLESS OTHERWISE NOTED 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. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

7. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CONTRACTOR.

8. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. ROUTING OF CONDUIT FOR POWER AND TELCO SHALL BE APPROVED BY OWNER OF SITE.

9. 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.

10. 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.

11. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.

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 & EXCAVATION.

3. ALL SITE WORK SHALL BE AS INDICATED ON THE DRAWINGS AND PROJECT SPECIFICATIONS.

4. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES, TOP SOIL AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.

5. 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.

6. SUBCONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION.

7. THE SUBCONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE OWNER SPECIFICATION FOR SITE SIGNAGE.

8. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE TRANSMISSION 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, SEE DETAIL 303.

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.

12. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL JURISDICTION'S GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

13. ALL EARTH WORK SHALL BE PERFORMED IN ACCORDANCE WITH TECHNICAL SPECIFICATION FOR CONSTRUCTION OF RADIO ACCESS NETWORK SITES.

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 4000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE. A HIGHER STRENGTH (4000 PSI) MAY BE USED.

3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60, DEFORMED UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 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 INCH
   #5 AND SMALLER & WWF.....1 1/2 INCH

   CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:

   SLAB AND WALL .....3/4 INCH
   BEAMS AND COLUMNS.....1 1/2 INCH

5. A 3/4" CHAMFER SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNO, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

6. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN 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. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY RAMSET/REDHEAD HILTI OR APPROVED EQUAL.

7. CONCRETE CYLINDER TEST IS NOT REQUIRED FOR SLAB ON GRADE WHEN CONCRETE IS LESS THAN 50 CUBIC YARDS (IBC 1905.6.2.3) IN THAT EVENT THE FOLLOWING RECORDS SHALL BE PROVIDED BY THE CONCRETE SUPPLIER;
   (A) RESULTS OF CONCRETE CYLINDER TESTS PERFORMED AT THE SUPPLIER'S PLANT,

   (B) CERTIFICATION OF MINIMUM COMPRESSIVE STRENGTH FOR THE CONCRETE GRADE SUPPLIED.

   FOR GREATER THAN 50 CUBIC YARDS THE GC SHALL PERFORM THE CONCRETE CYLINDER TEST.

8. AS AN ALTERNATIVE TO ITEM 7, TEST CYLINDERS SHALL BE TAKEN INITIALLY AND THEREAFTER FOR EVERY 50 YARDS OF CONCRETE FROM EACH DIFFERENT BATCH PLANT.

9. EQUIPMENT SHALL NOT BE PLACED ON NEW PADS FOR SEVEN DAYS AFTER PAD IS POURED, UNLESS IT IS VERIFIED BY TESTS THAT COMPRESSIVE STRENGTH HAS BEEN ATTAINED.

10. ALL CONCRETE SHALL BE SUPPLIED IN ACCORDANCE WITH TECHNICAL SPECIFICATION FOR CONSTRUCTION OF RADIO ACCESS NETWORK SITES.

SOIL COMPACTION NOTES FOR SLAB ON GRADE:

1. EXCAVATE AS REQUIRED TO REMOVE VEGETATION AND TOPSOIL, EXPOSE UNDISTURBED NATURAL SUBGRADE AND PLACE CRUSHED STONE AS REQUIRED.

2. COMPACTION CERTIFICATION: AN INSPECTION AND WRITTEN CERTIFICATION BY A QUALIFIED GEOTECHNICAL TECHNICIAN OR ENGINEER IS ACCEPTABLE.

3. AS AN ALTERNATIVE TO INSPECTION AND WRITTEN CERTIFICATION, THE "UNDISTURBED SOIL" BASE SHALL BE COMPACTED WITH "COMPACTION EQUIPMENT", LISTED BELOW, TO AT LEAST 90% MODIFIED PROCTOR MAXIMUM DENSITY PER ASTM D 1557 METHOD C.

4. COMPACTED SUBBASE SHALL BE UNIFORM AND LEVELED. PROVIDE 6" MINIMUM CRUSHED STONE OR GRAVEL COMPACTED IN 3" LIFTS ABOVE COMPACTED SOIL. GRAVEL SHALL BE NATURAL OR CRUSHED WITH 100% PASSING 1" SIEVE.

5. AS AN ALTERNATIVE TO ITEMS 2 AND 3 PROOF ROLL THE SUBGRADE SOILS WITH 5 PASSES OF A MEDIUM SIZED VIBRATORY PLATE COMPACTOR (SUCH AS BOMAG BPR 30/38) OR HAND-OPERATED SINGLE DRUM VIBRATORY ROLLER (SUCH AS BOMAG BW 55E). ANY SOFT AREAS THAT ARE ENCOUNTERED SHOULD BE REMOVED AND REPLACED WITH A WELL-GRADED GRANULAR FILL, AND COMPACTED AS STATED ABOVE.

6. COMPACTION CRITERIA FOR OTHER FILL AREAS ON SITE SHALL MEET THE SAME REQUIREMENTS AS NOTED ABOVE.

7. SOIL COMPACTION SHALL BE PERFORMED IN ACCORDANCE WITH TECHNICAL SPECIFICATION FOR CONSTRUCTION OF RADIO ACCESS NETWORK SITES.

COMPACTION EQUIPMENT:

HAND OPERATED DOUBLE DRUM, VIBRATORY ROLLER, VIBRATORY PLATE COMPACTOR OR JUMPING JACK COMPACTOR.

ELECTRICAL INSTALLATION NOTES

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE LOCAL CODES.

2. CONDUIT ROUTINGS ARE SCHEMATIC. SUBCONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED.

3. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC AND TELCORDIA.

4. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC AND TELCORDIA.

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 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC & OSHA.

7. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH PERMANENT LABELS. ALL EQUIPMENT SHALL BE LABELED WITH THEIR VOLTAGE RATING, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING, AND BRANCH CIRCUIT ID NUMBERS (I.E., PANELBOARD AND CIRCUIT ID'S). NO HAND WRITTEN LABELS ALLOWED.

8. PANELBOARDS (ID NUMBERS) AND INTERNAL CIRCUIT BREAKERS (CIRCUIT ID NUMBERS) SHALL BE CLEARLY LABELED. NO HAND WRITTEN LABELS ALLOWED.

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 (SIZE 14 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN-2, 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.

11. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE CONDUCTOR (SIZE 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 (SIZE 14 AWG OR LARGER), 600V, 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 POWER GROUNDING CONNECTIONS SHALL BE CRIMP-STYLE, COMPRESSION WIRE LUGS AND WIRENUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRENUTS 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. GALVANIZED STEEL INTERMEDIATE METALLIC CONDUIT (IMC) SHALL BE USED FOR OUTDOOR LOCATIONS ABOVE GRADE.

18. RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80) SHALL BE USED UNDERGROUND; DIRECT BURIED, IN AREAS OF OCCASIONAL LIGHT VEHICLE TRAFFIC OR ENCASED IN REINFORCED CONCRETE IN AREAS OF HEAVY VEHICLE TRAFFIC.

19. LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID-TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.

20. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION-TYPE AND APPROVED FOR THE LOCATION USED. SETSCREW FITTINGS ARE NOT ACCEPTABLE.

21. CABINETS, BOXES, AND WIREWAYS SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.

22. WIREWAYS SHALL BE EPOXY-COATED (GRAY) AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARD; SHALL BE PANDUIT TYPE E (OR EQUAL); AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.

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

ELECTRICAL INSTALLATION NOTES (cont.)

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 AGAINST LIFE AND PROPERTY.

STRUCTURAL STEEL NOTES:

1. ALL STEEL WORK SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123 (HOT-DIP) UNLESS NOTED OTHERWISE. STRUCTURAL STEEL SHALL BE ASTM-A-36 UNLESS OTHERWISE NOTED ON THE SITE SPECIFIC DRAWINGS. STEEL DESIGN, INSTALLATION AND BOLTING SHALL BE PERFORMED IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) "MANUAL OF STEEL CONSTRUCTION".

2. ALL WELDING SHALL BE PERFORMED USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION". PAINTED SURFACES SHALL BE TOUCHED UP.

3. BOLTED CONNECTIONS SHALL BE ASTM A325 BEARING TYPE (3/4"ø) CONNECTIONS AND SHALL HAVE MINIMUM OF TWO BOLTS UNLESS NOTED OTHERWISE. STEEL FASTENER HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 (HOT-DIP)

4. NON-STRUCTURAL CONNECTIONS FOR STEEL GRATING MAY USE 5/8" DIA. ASTM A 307 BOLTS UNLESS NOTED OTHERWISE.

5. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN 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. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY RAMSET/REDHEAD, HILTI OR APPROVED EQUAL.

6. ALL STRUCTURAL STEEL SHALL BE SUPPLIED IN ACCORDANCE WITH TECHNICAL SPECIFICATION FOR CONSTRUCTION OF RADIO ACCESS NETWORK SITES.

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STATE OF CONNECTICUT
JAMES P. STROKE
No. 8657
REGISTERED PROFESSIONAL ENGINEER

APR 18 2017

SUBMITTALS

NO	DATE	DESCRIPTION	BY
3	04/18/17	GENERAL REVISIONS	MN
2	03/13/17	FOR PERMITTING	MN
1	03/10/17	GENERAL REVISIONS	MN
0	02/10/17	ISSUED FOR REVIEW	MN

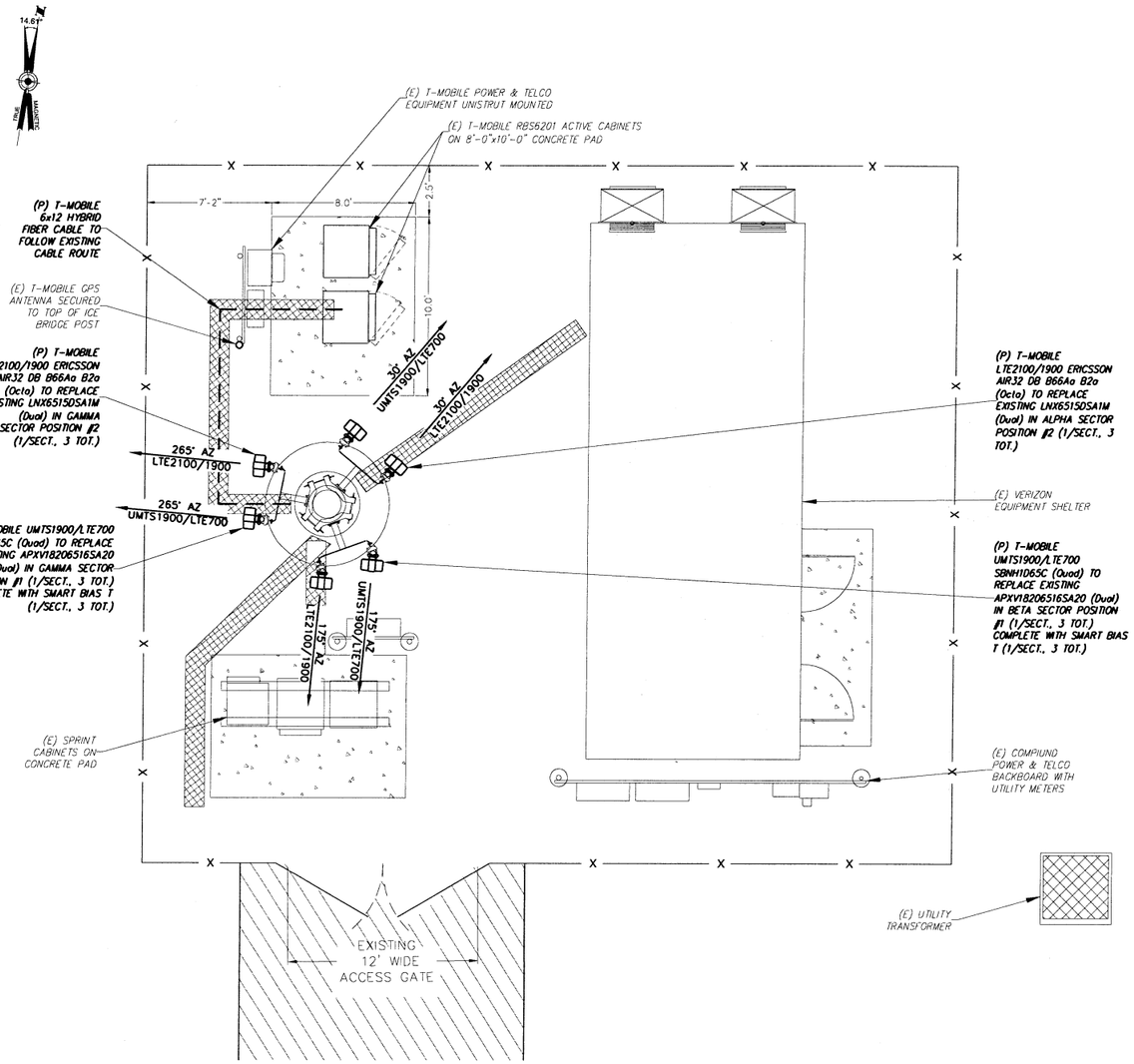
SITE NUMBER:
CTNH506-A
SITE NAME:
CROWN WEST HAVEN MONOPOLE
SITE ADDRESS:
85 PLAINFIELD AVE.
WEST HAVEN, CT 06516

SHEET TITLE:
GENERAL NOTES

SHEET NUMBER:
02

GENERAL NOTES

1. THE TYPE, DIMENSIONS, MOUNTING HARDWARE, AND THE POSITIONS OF ALL EQUIPMENT IN THE COMPOUND ARE SHOWN IN ILLUSTRATIVE FASHION. THESE DRAWINGS ARE NOT INTENDED FOR CONSTRUCTION. ACTUAL HARDWARE DETAILS AND FINAL LOCATIONS MAY DIFFER SLIGHTLY FROM WHAT IS SHOWN.
2. THE CELLULAR INSTALLATION IS AN UNMANNED PRIVATE AND SECURED COMPOUND. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.
3. CONSTRUCTION, MAINTENANCE & OPERATION OF PROPOSED TOWER FACILITY WILL BE HELD IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE & FEDERAL REGULATIONS AND GUIDELINES.

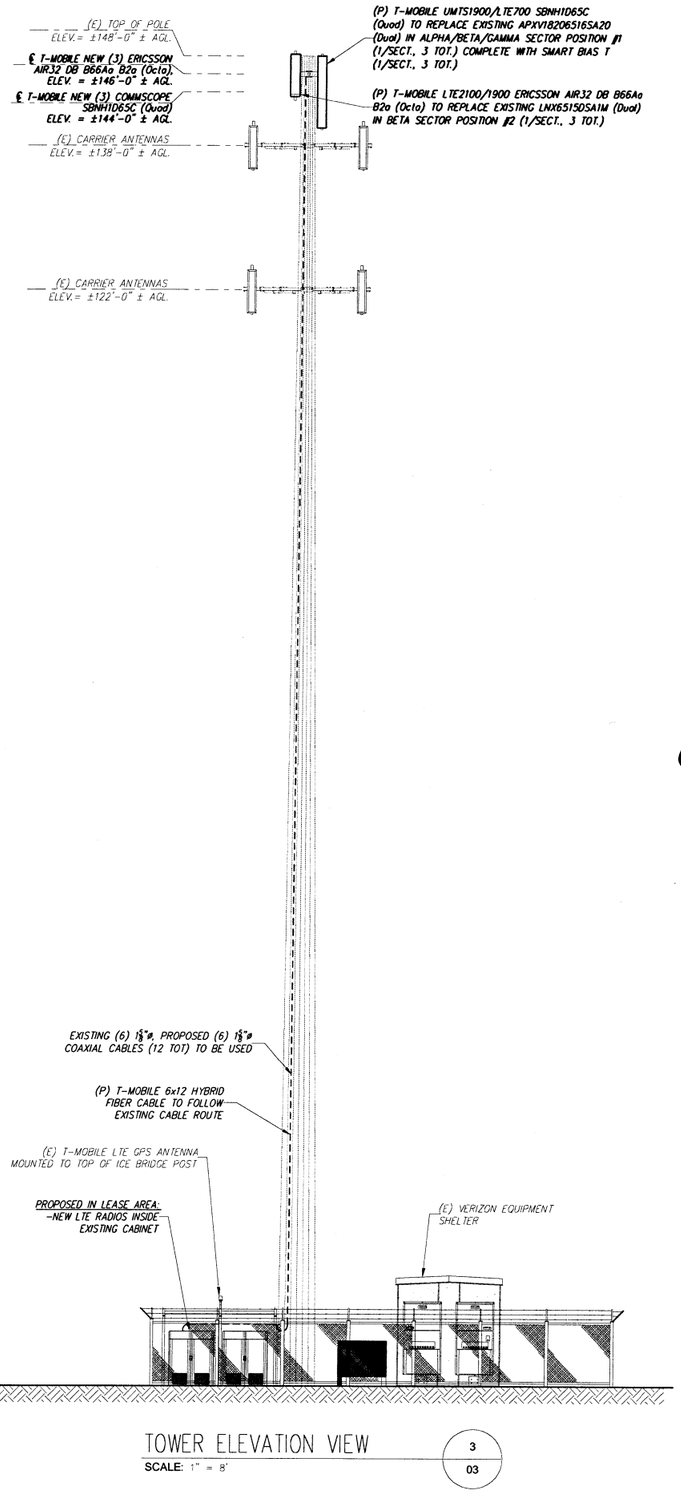


SITE PLAN 2
SCALE: 1" = 4' 03

GRAPHIC SCALE

4 0 2 4 8 16

(IN FEET)
1 inch = 4 ft.



TOWER ELEVATION VIEW 3
SCALE: 1" = 8' 03

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STATE OF CONNECTICUT
JAMES P. STROKE
No. 18657
REGISTERED PROFESSIONAL ENGINEER
7/18/2017

SUBMITTALS

NO	DATE	DESCRIPTION	BY
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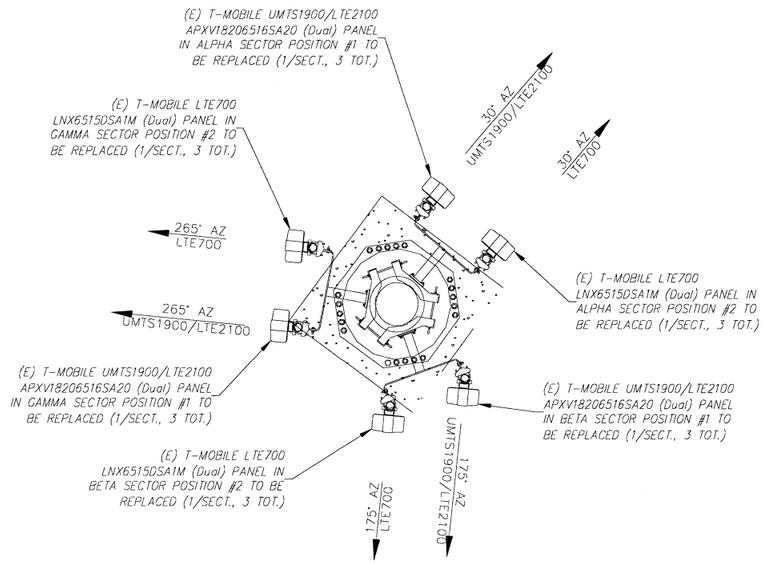
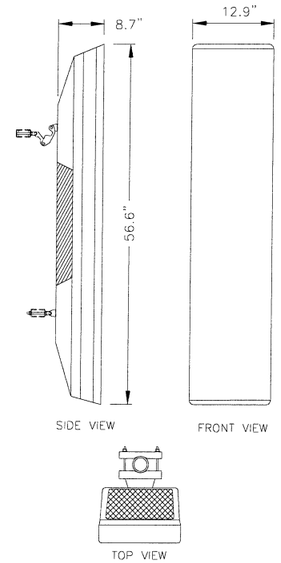
SHEET TITLE:
SITE PLAN & ELEVATIONS

SHEET NUMBER:
03



EXISTING ANTENNA CONDITIONS 1/04

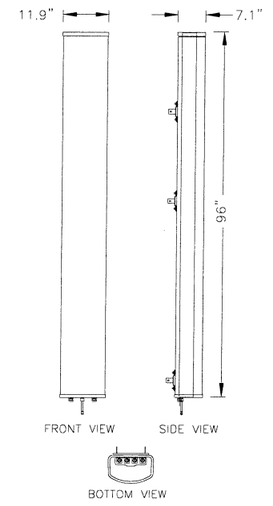
SCALE: N.T.S



MANUFACTURER:	ERICSSON
MODEL:	AIR32 B66Aa B2A
DIMENSIONS:	HxWxD 56.6"x12.9"x8.7"

ANTENNA DETAILS ERICSSON AIR32 B66Aa/B2A 4/04

SCALE: N.T.S

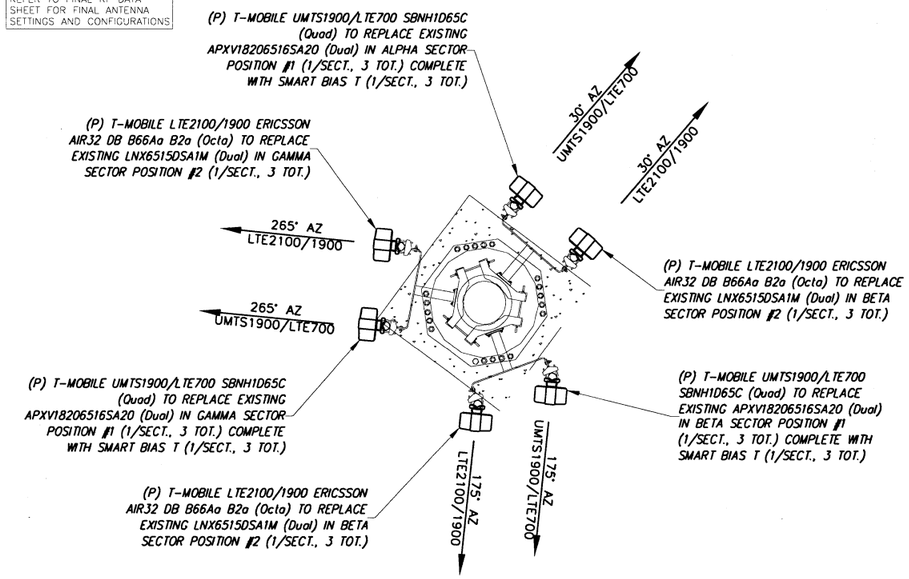


MANUFACTURER:	COMMSCOPE
MODEL:	SBNH-1D65C
DIMENSIONS:	HxWxD 96.4"x11.8"x7.1"

ANTENNA DETAILS SBNH-1D65C 5/04

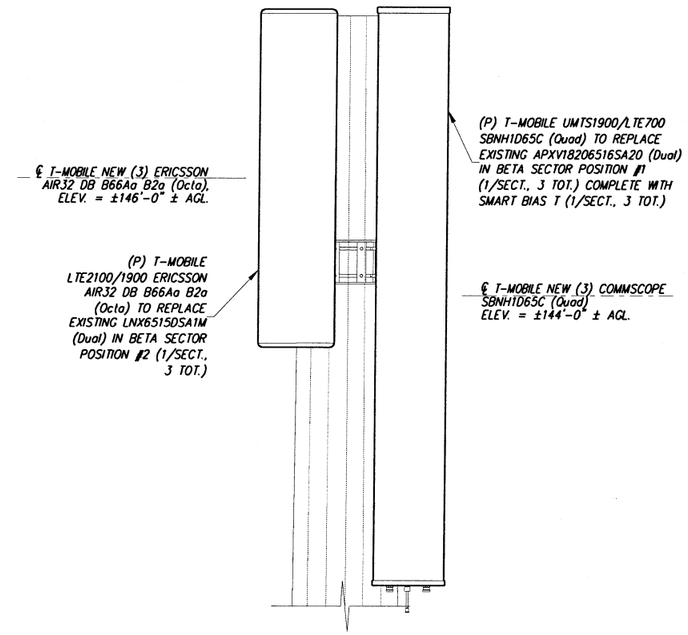
SCALE: N.T.S

NOTES:
REFER TO FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS AND CONFIGURATIONS



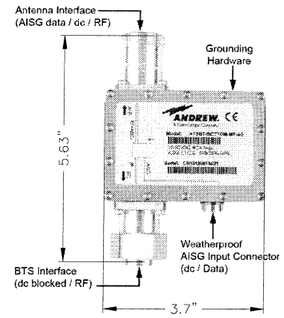
PROPOSED ANTENNA CONFIGURATION 2/04

SCALE: N.T.S



ANTENNA & PIPE MAST ATTACHMENT 3/04

SCALE: N.T.S



MANUFACTURER:	COMMSCOPE
MODEL:	ATSBT-BOTTOM-MF
DIMENSIONS:	HxWxD 3.7"x5.63"x2.0"

SMART BIAS T DETAILS 5/04

SCALE: N.T.S

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STATE OF CONNECTICUT
JAMES P. STROKE
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APR 18 201

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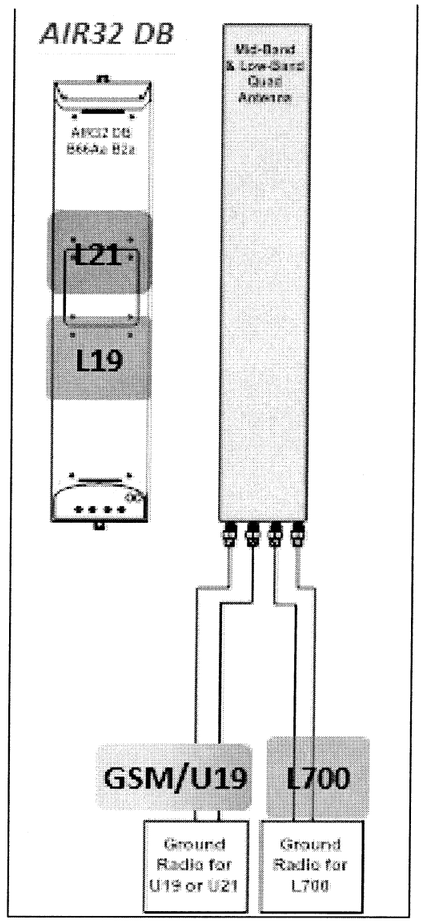
85 PLAINFIELD AVE.
WEST HAVEN, CT 06516

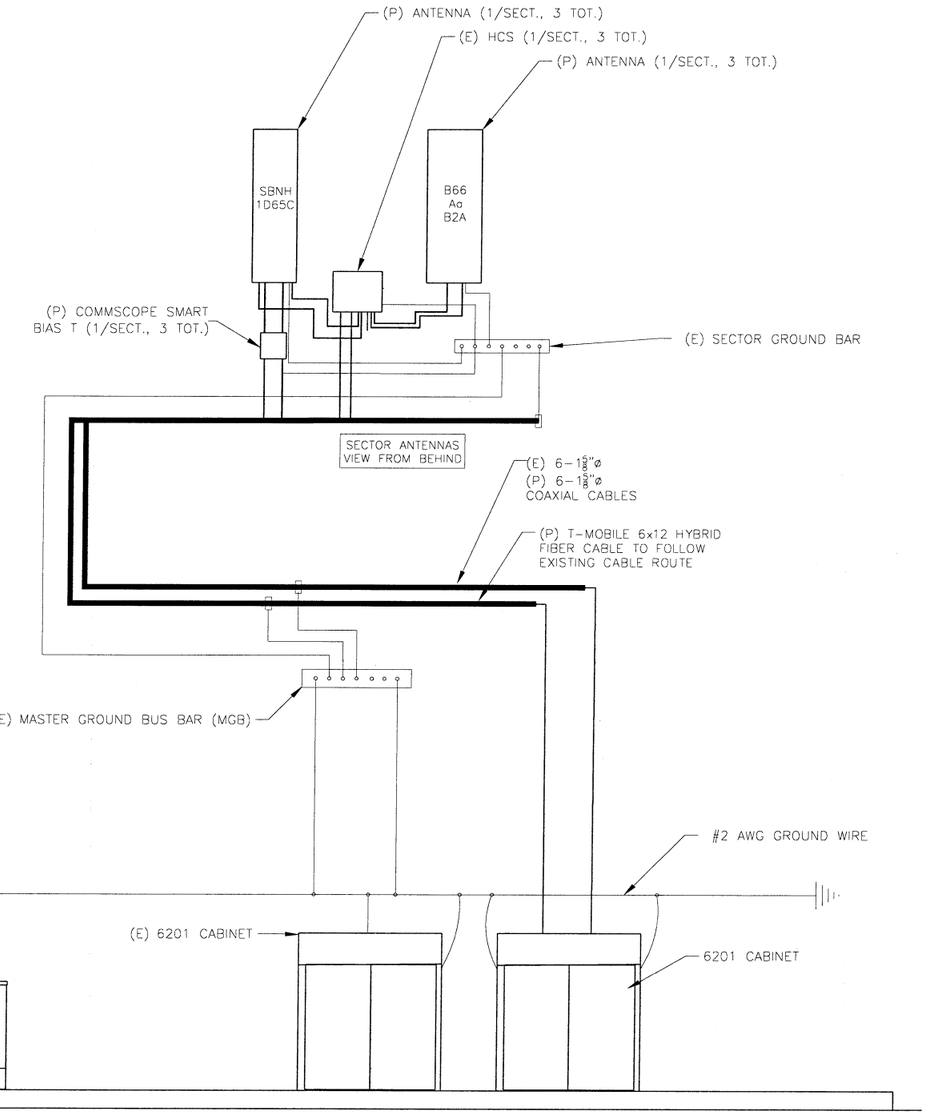
SHEET TITLE:
ANTENNA DETAILS

SHEET NUMBER:
04



COAX/FIBER
CABLE PLUMBING DIAGRAM 1/05

SCALE: N.T.S.



GROUNDING PLUMBING DIAGRAM 2/05

SCALE: N.T.S.

HYBRID FIBER/POWER JUMPER NOTES:

1. IN GENERAL THIS CABLE WILL HANDLE SIMILARLY TO A " COAXIAL CABLE. 38" COAXIAL CABLE.
2. THE TERMINATED FIBER ENDS HOWEVER ARE FRAGILE AND MUST BE PROTECTED DURING INSTALLATION. LEAVE THE PACKAGING AROUND THE FIBER ENDS IN PLACE UNTIL READY TO CONNECT THE JUMPER BETWEEN OVP AND RRU OR BBU.
3. DO NOT BEND THE FIBER BREAKOUT CABLE (BETWEEN THE MAIN CABLE AND THE FIBER CONNECTOR) TIGHTER THAN " (19MM) RADIUS, ELSE THERE IS A RISK OF BREAKING THE GLASS. 34" (19MM) RADIUS, ELSE THERE IS A RISK OF BREAKING THE GLASS.
4. ATTACH THE MAIN CABLE SECURELY TO THE STRUCTURE OR EQUIPMENT USING HANGERS AND/OR CABLE TIES TO PREVENT STRAIN ON CONNECTIONS FROM MOVEMENT IN WIND OR SNOW/ICE CONDITIONS.
5. ENSURE THE LC FIBER CONNECTORS ARE SEATED FIRMLY IN PANEL IN OVP OR IN EQUIPMENT.
6. INSTALLATION TEMPERATURE RANGE IS -22F TO 158F (-30C TO 70C).
7. MINIMUM CABLE BEND RADII ARE 10.3 INCH (265MM) LOADED (WITH TENSION ON THE CABLE) AND 5.2 INCH (130MM) UNLOADED.
8. MAXIMUM CABLE TENSILE LOAD IS 350 LB (1560N) SHORT TERM (DURING INSTALLATION) AND 105 LB (470N) LONG TERM.
9. STANDARD LENGTHS AVAILABLE ARE 6 FEET, 15 FEET AND 20 FEET

TRUNK FIBER NOTES:

1. IN GENERAL THIS CABLE WILL HANDLE SIMILARLY TO " COAXIAL CABLE, AND SIMILAR INSTALLATION TECHNIQUES APPLY. ALL 78" COAXIAL CABLE, AND SIMILAR INSTALLATION TECHNIQUES APPLY. ALL CABLES ARE INDIVIDUALLY SERIALIZED, BE SURE TO WRITE DOWN THE CABLE SERIAL NUMBER FOR FUTURE REFERENCE.

2. THE TERMINATED FIBER ENDS (THE BROKEN OUT FIBERS PLUS CONNECTORS) HOWEVER ARE FRAGILE, AND THESE MUST BE PROTECTED DURING THE INSTALLATION PROCESS.

3. LEAVE THE PROTECTIVE TUBE AND SOCK AROUND THE FIBER TAILS AND CONNECTORS IN PLACE DURING HOISTING AND SECURING THE CABLE. REMOVE THIS ONLY JUST PRIOR TO MAKING THE FINAL CONNECTIONS TO THE OVP BOX.

4. DO NOT BEND THE FIBER ENDS (IN THE ORANGE FURCATION TUBES) TIGHTER THAN " (19MM) BEND RADIUS, ELSE THERE IS 34" (19MM) BEND RADIUS, ELSE THERE IS A RISK OF BREAKING THE GLASS FIBERS.

5. BE SURE THAT THE LACE UP ENDS AND FIBER CONNECTORS ARE NOT DAMAGED BY ATTACHMENT OF A HOISTING GRIP OR DURING THE HOISTING PROCESS, ATTACH A HOISTING GRIP ON THE JACKETED CABLE NO LESS THAN 6 INCHES BELOW THE FIBER BREAKOUT POINT. IF A HOISTING GRIP IS NOT EASILY ATTACHED, USE A SIMPLE LINE ATTACHED BELOW THE FIBER BREAK-OUT POINT (I.E. AT THE CABLE OUTER JACKET). PREVENT THE FIBER TAILS (IN PROTECTIVE TUBE) AT THE CABLE END FROM UNDUE MOVEMENT DURING HOISTING BY SECURING THE PROTECTIVE TUBE (WITH OUTER SOCK) TO THE HOISTING LINE.

6. DURING HOISTING ENSURE THAT THERE IS A FREE PATH AND THAT THE CABLE, AND ESPECIALLY THE FIBER ENDS, WILL NOT CATCH ON TOWER MEMBERS OR OTHER OBSTACLES.

7. INSTALLATION TEMPERATURE RANGE IS -22F TO 158F (-30C TO +70C).

8. MINIMUM CABLE BEND RADII ARE 22.2" (565MM) LOADED (WITH TENSION ON THE CABLE) AND 11.1" (280MM) UNLOADED.

9. MAXIMUM CABLE TENSILE LOAD IS 3560 N (800 LB) SHORT TERM (DURING INSTALLATION) AND 1070 N (240 LB) LONG TERM.

10. COMMSCOPE NON LACE UP GRIP RECOMMENDED FOR MONOPOLE INSTALLATIONS. 11. MAXIMUM HANGER SPACING 3FT (0.9 M).

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STATE OF CONNECTICUT
JAMES P. STROKE
No. 8657
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APR 18 2017

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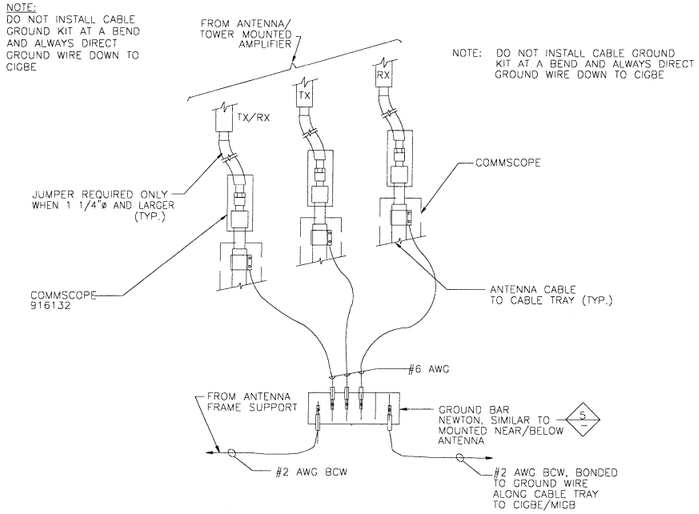
CTNH506-A
SITE NAME:
CROWN WEST HAVEN MONOPOLE
SITE ADDRESS:
85 PLAINFIELD AVE.
WEST HAVEN, CT 06516

SHEET TITLE:
GROUNDING & RF PLUMBING DIAGRAM

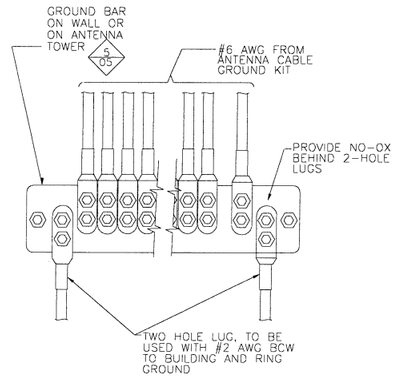
SHEET NUMBER:
05

NOTE:
DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE



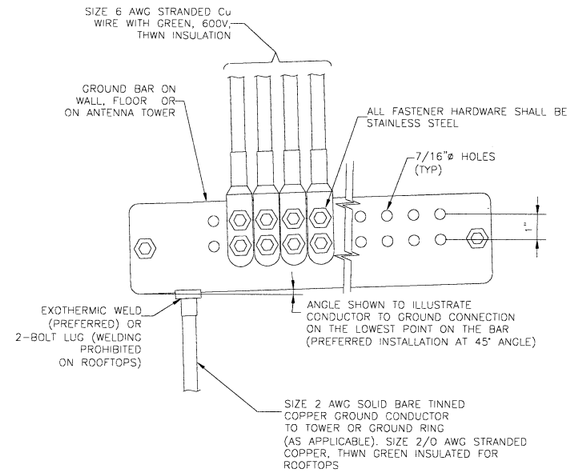
CONNECTION OF GROUND WIRES TO GROUNDING BAR — 1/06

SCALE: N.T.S.



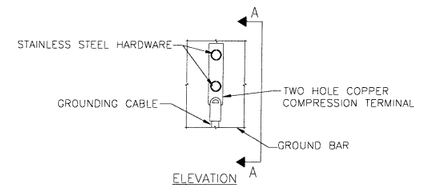
INSTALLATION OF GROUND WIRE TO GROUND BAR — 2/06

SCALE: N.T.S.

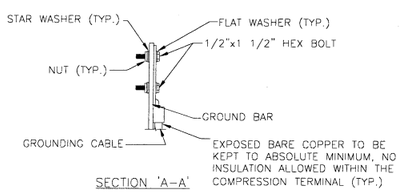


INSTALLATION OF GROUND WIRE TO ANTENNA CABLE GROUND BAR — 5/06

SCALE: N.T.S.



ELEVATION

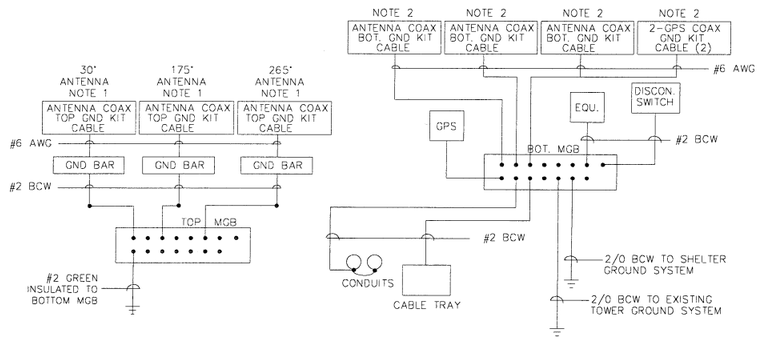


SECTION 'A-A'

NOTES:
1. DOUBLING UP OR STACKING OF CONNECTIONS IS NOT PERMITTED
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.

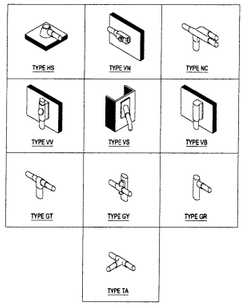
TYP. MECHANICAL CONNECTION — 6/06

SCALE: N.T.S.



GROUNDING CONNECTION DETAIL — 4/06

SCALE: N.T.S.



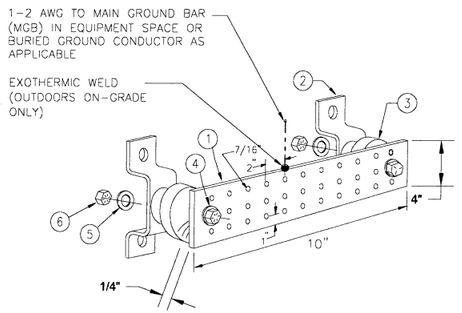
NOTE:

1. BOND ANTENNA GROUNDING KIT CABLE TO TOP CIGBE
2. BOND ANTENNA GROUNDING KIT CABLE TO BOTTOM CIGBE

GROUNDING ONE-LINE DIAGRAM — 3/06

SCALE: N.T.S.

NEWTON INSTRUMENT COMPANY, INC. BUTNER, N.C. OR APPROVED EQUAL			
ITEM	REQ.	PART NO.	DESCRIPTION
1	1	1/4"x4"x12"	PRE DRILLED GND. BAR
2	2	A-6056	WALL MTG. BRKT.
3	2	3061-4	INSULATORS
4	2	3012-13	5/8"-11x4" H.H.C.S.
5	4	3015-8	5/8 LOCKWASHER
6	2	3014-8	5/8"-11 HEX NUT



GROUND BAR DETAIL — 7/06

SCALE: N.T.S.

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JAMES P. STROKE
No. 0657
REGISTERED PROFESSIONAL ENGINEER

APR 18 2017

SUBMITTALS

NO	DATE	DESCRIPTION	BY
3	04/18/17	GENERAL REVISIONS	MN
2	03/13/17	FOR PERMITTING	MN
1	03/10/17	GENERAL REVISIONS	MN
0	02/10/17	ISSUED FOR REVIEW	MN

SITE NUMBER:
CTNH506-A
SITE NAME:
CROWN WEST HAVEN MONOPOLE
SITE ADDRESS:
85 PLAINFIELD AVE.
WEST HAVEN, CT 06516

SHEET TITLE:
GROUNDING DETAILS

SHEET NUMBER:
06

Exhibit D

PJF PAUL J. FORD & COMPANY

Date: **March 30, 2017**

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

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Metro PCS* Co-Locate**	
	Carrier Site Number:	CTNH506A
	Carrier Site Name:	Crown West Haven Monopole
Crown Castle Designation:	**Crown Castle BU Number:**	876323
	Crown Castle Site Name:	HILLSIDE
	Crown Castle JDE Job Number:	416900
	Crown Castle Work Order Number:	1383262
	Crown Castle Application Number:	374829 Rev. 10
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37517-0499.003.7805
Site Data:	**85 Plainfield Ave, WEST HAVEN, New Haven County, CT** **Latitude *41° 18' 4.59"*, Longitude *-72° 58' 35.2"*** **148 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 1019024, in accordance with application 374829, revision 10.

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:

LC7: 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 B and Topographic Category 1 with a maximum Topographic Factor, Kzt, of 1.0 were used in this analysis.

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:

Lone Gimeno
Project Designer II

STATE OF CONNECTICUT JUSTIN M. LINE No. 30301 LICENSED PROFESSIONAL ENGINEER

3-30-17

tnxTower Report - version 7.0.5.1

Date: **March 30, 2017**

Charles McGuirt
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
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Lohe Gimeno
Project Designer II

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 148 ft Monopole tower designed by SUMMIT in June of 1997. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 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 B 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
146.0	146.0	3	commscope	ATSBT-TOP-MF-4G	1 6	1-3/8 1-5/8	-
		3	ericsson	AIR -32 B2A/B66AA w/ Mount Pipe			
		1	tower mounts	Side Arm Mount [SO 102-3]			
	144.0	3	commscope	SBNHH-1D65C w/ Mount Pipe			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
146.0	149.0	3	commscope	ATBT-BOTTOM-24V	6	1-5/8	3
		3	commscope	LNX-6515DS-A1M w/ Mount Pipe			
		3	rfs celwave	APXV18-206516S-C-A20 w/ Mount Pipe			
	146.0	1	tower mounts	Pipe Mount [PM 601-3]			
		-	-	-	6	1-5/8	1
138.0	140.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER	3	1-1/4	1
		6	powerwave technologies	P40-16-XLPP-RR-A			
		18	rfs celwave	ACU-A20-N			
		3	alcatel lucent	TD-RRH8x20-25	1	1-1/4	2
		3	rfs celwave	APXVTM14-C-120			
	138.0	1	tower mounts	Platform Mount [LP 301-1]	-	-	1

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
136.0	139.0	3	alcatel lucent	TME-800MHz RRH w/ mount pipe	-	-	1
	137.0	3	alcatel lucent	TME-1900MHz RRH (65MHz) w/ Mount Pipe			
	136.0	1	tower mounts	Side Arm Mount [SO 102-3]			
	135.0	3	alcatel lucent	TME-1900MHz RRH (65MHz) w/ Mount Pipe			
122.0	122.0	1	rfs celwave	TMA-DB-T1-6Z-8AB-0Z	-	-	1
		1	tower mounts	Side Arm Mount [SO 102-1]			
120.0	126.0	1	gps	GPS_A	12 1	1-5/8 1/2	1
	122.0	3	alcatel lucent	RRH2X40-AWS			
		3	antel	BXA-171063-8BF-EDIN-0 w/ Mount Pipe			
		2	antel	BXA-80063/4CF w/ Mount Pipe			
		1	antel	BXA-80063/6CF w/ Mount Pipe			
		3	commscope	LNX-6514DS-A1M w/ Mount Pipe			
		2	rfs celwave	FD9R6004/2C-3L			
		3	rymsa wireless	MG D3-800TV w/ Mount Pipe			
	120.0	1	tower mounts	Platform Mount [LP 1201-1]			
90.0	91.0	1	lucent	KS24019-L112A	1	1/2	1
	90.0	1	tower mounts	Side Arm Mount [SO 701-1]			

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

Table 3 - Design Antenna and Cable Information

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

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH, 1205093EG1, 5/31/2012	2134228	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Summit, 29297-0288, 6/5/1997	1614608	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Summit, 29297-0288, 6/5/1997	1615021	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PSG, 0801F202-A060140, 02/06/2009	2384593	CCISITES
4-POST-MODIFICATION INSPECTION	SGS, 160788, 05/06/2016	6254609	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) Monopole has been reinforced in conformance with the referenced modification documents.
5) The existing monopole shaft has been reinforced using a Crown-approved system in accordance with the above referenced documents. However, in this analysis we found that the existing pole shaft without modifications has adequate capacity according to TIA-222-G-2 (addendum 2) and therefore, we did not consider the existing reinforcing elements in the strength calculations

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	148 - 138.5	Pole	TP24x24x0.25	1	-1.44	753.82	4.2	Pass
L2	138.5 - 138	Pole	TP24x22x0.25	2	-1.44	706.70	4.9	Pass
L3	138 - 90.75	Pole	TP31.924x22x0.25	3	-13.01	1598.87	59.6	Pass
L4	90.75 - 44.75	Pole	TP41.086x30.5839x0.3125	4	-22.66	2547.91	75.7	Pass
L5	44.75 - 0	Pole	TP49.86x39.3583x0.375	5	-37.96	3765.09	77.4	Pass
							Summary	
						Pole (L4)	77.4	Pass
						Rating =	77.4	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	82.1	Pass
1	Base Plate	0	63.7	Pass
1	Base Foundation Steel	0	52.5	Pass
1	Base Foundation Soil Interaction	0	60.2	Pass
1	Extension Flange	138	21.0	Pass

Structure Rating (max from all components) =	82.1%

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

4.1) Recommendations

The monopole and its foundation have sufficient capacity to carry the proposed loading configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

1) Tower is located in New Haven County, Connecticut.
2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3) Basic wind speed of 97.00 mph.
4) Structure Class II.
5) Exposure Category B.
6) Topographic Category 1.
7) Crest Height 0.0000 ft.
8) Nominal ice thickness of 0.7500 in.
9) Ice thickness is considered to increase with height.
10) Ice density of 56.00 pcf.
11) A wind speed of 50.00 mph is used in combination with ice.
12) Temperature drop of 50.00 °F.
13) Deflections calculated using a wind speed of 60.00 mph.
14) A non-linear (P-delta) analysis was used.
15) Pressures are calculated at each section.
16) Stress ratio used in pole design is 1.
17) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	*Elevation* ft	*Section Length* ft	*Splice Length* ft	*Number of Sides*	*Top Diameter* in	*Bottom Diameter* in	*Wall Thickness* in	*Bend Radius* in	*Pole Grade*
L1	148.0000-138.5000	9.5000	0.00	Round	24.0000	24.0000	0.2500		A500-50 (50 ksi)
L2	138.5000-138.0000	0.5000	0.00	Round	22.0000	24.0000	0.2500		A500-50 (50 ksi)
L3	138.0000-90.7500	47.2500	4.00	18	22.0000	31.9240	0.2500	1.0000	A607-60 (60 ksi)
L4	90.7500-44.7500	50.0000	5.25	18	30.5839	41.0860	0.3125	1.2500	A607-60 (60 ksi)
L5	44.7500-0.0000	50.0000		18	39.3583	49.8600	0.3750	1.5000	A607-60 (60 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	24.0000	18.6532	1315.3425	8.3974	12.0000	109.6119	2630.6850	9.3210	0.0000	0
	24.0000	18.6532	1315.3425	8.3974	12.0000	109.6119	2630.6850	9.3210	0.0000	0
L2	22.0000	17.0824	1010.2644	7.6903	11.0000	91.8422	2020.5288	8.5361	0.0000	0
	24.0000	18.6532	1315.3425	8.3974	12.0000	109.6119	2630.6850	9.3210	0.0000	0
L3	22.3394	17.2586	1031.4832	7.7212	11.1760	92.2945	2064.3237	8.6310	3.4320	13.728
	32.4165	25.1333	3185.6138	11.2443	16.2174	196.4319	6375.4192	12.5690	5.1786	20.714
L4	31.9088	30.0254	3476.0879	10.7463	15.5366	223.7353	6956.7498	15.0156	4.8328	15.465
	41.7198	40.4422	8494.3152	14.4746	20.8717	406.9779	16999.8075	20.2250	6.6811	21.38
L5	41.0851	46.3998	8908.6246	13.8391	19.9940	445.5648	17828.9715	23.2043	6.2671	16.712
	50.6292	58.8995	18222.0135	17.5672	25.3289	719.4165	36468.0040	29.4554	8.1154	21.641

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 148.0000-138.5000				1	1	1			
L2 138.5000-138.0000				1	1	1			
L3 138.0000-90.7500				1	1	1			
L4 90.7500-44.7500				1	1	1			
L5 44.7500-0.0000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
***										

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
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	76.0000 - 46.0000	1	No Ice	0.1667	0.00
						1/2" Ice	0.2778	0.00
						1" Ice	0.3889	0.00
**								
AL7-50(1-5/8)	C	No	CaAa (Out Of Face)	146.0000 - 0.0000	2	No Ice	0.1960	0.52
						1/2" Ice	0.2960	2.02
						1" Ice	0.3960	4.14
AL7-50(1-5/8)	C	No	CaAa (Out Of Face)	146.0000 - 0.0000	4	No Ice	0.0000	0.52
						1/2" Ice	0.0000	2.02
						1" Ice	0.0000	4.14
AL7-50(1-5/8)	C	No	CaAa (Out Of Face)	146.0000 - 0.0000	6	No Ice	0.0000	0.52
						1/2" Ice	0.0000	2.02
						1" Ice	0.0000	4.14
MLCH 12x6 AWG(1-3/8)	C	No	CaAa (Out Of Face)	146.0000 - 0.0000	1	No Ice	0.0000	1.72
						1/2" Ice	0.0000	2.89
						1" Ice	0.0000	4.68
**								
LDF4-50A(1/2)	C	No	Inside Pole	138.0000 - 0.0000	3	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.15
						1" Ice	0.0000	0.15

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
9207(5/16)	C	No	Inside Pole	138.0000 - 0.0000	3	No Ice	0.0000	0.06
						1/2" Ice	0.0000	0.06
						1" Ice	0.0000	0.06
2 1/2" (Nominal) Conduit	C	No	Inside Pole	138.0000 - 0.0000	2	No Ice	0.0000	7.75
						1/2" Ice	0.0000	7.75
						1" Ice	0.0000	7.75
HB114-1-0813U4-M5J(1-1/4)	C	No	Inside Pole	138.0000 - 0.0000	3	No Ice	0.0000	1.20
						1/2" Ice	0.0000	1.20
						1" Ice	0.0000	1.20
HB114-21U3M12-XXXF(1-1/4)	C	No	CaAa (Out Of Face)	138.0000 - 0.0000	1	No Ice	0.1540	1.22
						1/2" Ice	0.2540	2.47
						1" Ice	0.3540	4.32
***								
**								
HB158-1-08U8-S8J18(1-5/8)	C	No	CaAa (Out Of Face)	120.0000 - 0.0000	1	No Ice	0.1980	1.30
						1/2" Ice	0.2980	2.81
						1" Ice	0.3980	4.94
561(1-5/8)	C	No	Inside Pole	120.0000 - 0.0000	11	No Ice	0.0000	1.35
						1/2" Ice	0.0000	1.35
						1" Ice	0.0000	1.35
FSJ4-50B(1/2)	C	No	Inside Pole	120.0000 - 0.0000	1	No Ice	0.0000	0.14
						1/2" Ice	0.0000	0.14
						1" Ice	0.0000	0.14
**								
LDF4-50A(1/2)	C	No	Inside Pole	90.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.15
						1" Ice	0.0000	0.15

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	148.0000-138.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.940	0.06
L2	138.5000-138.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.196	0.00
L3	138.0000-90.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	31.590	1.84
L4	90.7500-44.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	39.224	2.09
L5	44.7500-0.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	33.294	2.03

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	148.0000-138.5000	A	1.737	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	8.152	0.84
L2	138.5000-138.0000	A	1.731	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	0.542	0.06
L3	138.0000-90.7500	A	1.697	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	89.624	7.17
L4	90.7500-44.7500	A	1.611	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	112.982	7.41

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
L5	44.7500-0.0000	A	1.439	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	90.960	6.86

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	148.0000-138.5000	-0.3481	0.2010	-0.7083	0.4089
L2	138.5000-138.0000	-0.4228	0.2441	-0.8208	0.4739
L3	138.0000-90.7500	-0.6700	0.3868	-1.2563	0.7253
L4	90.7500-44.7500	-0.8579	0.4953	-1.6694	0.9638
L5	44.7500-0.0000	-0.7967	0.4600	-1.6230	0.9371

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 ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
***									
SBNHH-1D65C w/ Mount Pipe	A	From Leg	4.0000 0.00 -2.00	0.0000	146.0000	No Ice 1/2" Ice 1" Ice	11.8639 12.6856 13.5181	10.0306 11.6489 13.2913	0.09 0.18 0.28
SBNHH-1D65C w/ Mount Pipe	B	From Leg	4.0000 0.00 -2.00	0.0000	146.0000	No Ice 1/2" Ice 1" Ice	11.8639 12.6856 13.5181	10.0306 11.6489 13.2913	0.09 0.18 0.28
SBNHH-1D65C w/ Mount Pipe	C	From Leg	4.0000 0.00 -2.00	0.0000	146.0000	No Ice 1/2" Ice 1" Ice	11.8639 12.6856 13.5181	10.0306 11.6489 13.2913	0.09 0.18 0.28
AIR -32 B2A/B66AA w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.0000	146.0000	No Ice 1/2" Ice 1" Ice	6.7474 7.2017 7.6475	6.0700 6.8671 7.5828	0.15 0.21 0.28
AIR -32 B2A/B66AA w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.0000	146.0000	No Ice 1/2" Ice 1" Ice	6.7474 7.2017 7.6475	6.0700 6.8671 7.5828	0.15 0.21 0.28
AIR -32 B2A/B66AA w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.0000	146.0000	No Ice 1/2" Ice 1" Ice	6.7474 7.2017 7.6475	6.0700 6.8671 7.5828	0.15 0.21 0.28
ATSBT-TOP-MF-4G	A	From Leg	4.0000 0.00 0.00	0.0000	146.0000	No Ice 1/2" Ice 1" Ice	0.1736 0.2291 0.2921	0.0949 0.1399 0.1934	0.00 0.00 0.01
ATSBT-TOP-MF-4G	B	From Leg	4.0000 0.00 0.00	0.0000	146.0000	No Ice 1/2" Ice	0.1736 0.2291 0.2921	0.0949 0.1399 0.1934	0.00 0.00 0.01

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
						1" Ice			
ATSBT-TOP-MF-4G	C	From Leg	4.0000 0.00 0.00	0.0000	146.0000	No Ice 1/2" Ice 1" Ice	0.1736 0.2291 0.2921	0.0949 0.1399 0.1934	0.00 0.00 0.01
Side Arm Mount [SO 102-3]	C	None		0.0000	146.0000	No Ice 1/2" Ice 1" Ice	3.0000 3.4800 3.9600	3.0000 3.4800 3.9600	0.08 0.11 0.14
**									
APXVTM14-C-120	A	From Leg	4.0000 0.00 2.00	0.0000	138.0000	No Ice 1/2" Ice 1" Ice	6.3424 6.7164 7.0974	3.6074 3.9666 4.3332	0.06 0.10 0.14
APXVTM14-C-120	B	From Leg	4.0000 0.00 2.00	0.0000	138.0000	No Ice 1/2" Ice 1" Ice	6.3424 6.7164 7.0974	3.6074 3.9666 4.3332	0.06 0.10 0.14
APXVTM14-C-120	C	From Leg	4.0000 0.00 2.00	0.0000	138.0000	No Ice 1/2" Ice 1" Ice	6.3424 6.7164 7.0974	3.6074 3.9666 4.3332	0.06 0.10 0.14
TD-RRH8x20-25	A	From Leg	4.0000 0.00 2.00	0.0000	138.0000	No Ice 1/2" Ice 1" Ice	4.0455 4.2975 4.5570	1.5345 1.7142 1.9008	0.07 0.10 0.13
TD-RRH8x20-25	B	From Leg	4.0000 0.00 2.00	0.0000	138.0000	No Ice 1/2" Ice 1" Ice	4.0455 4.2975 4.5570	1.5345 1.7142 1.9008	0.07 0.10 0.13
TD-RRH8x20-25	C	From Leg	4.0000 0.00 2.00	0.0000	138.0000	No Ice 1/2" Ice 1" Ice	4.0455 4.2975 4.5570	1.5345 1.7142 1.9008	0.07 0.10 0.13
(2) P40-16-XLPP-RR-A	A	From Leg	4.0000 0.00 2.00	0.0000	138.0000	No Ice 1/2" Ice 1" Ice	8.0050 8.3907 8.7833	3.5187 3.8659 4.2204	0.05 0.10 0.15
(2) P40-16-XLPP-RR-A	B	From Leg	4.0000 0.00 2.00	0.0000	138.0000	No Ice 1/2" Ice 1" Ice	8.0050 8.3907 8.7833	3.5187 3.8659 4.2204	0.05 0.10 0.15
(2) P40-16-XLPP-RR-A	C	From Leg	4.0000 0.00 2.00	0.0000	138.0000	No Ice 1/2" Ice 1" Ice	8.0050 8.3907 8.7833	3.5187 3.8659 4.2204	0.05 0.10 0.15
800 EXTERNAL NOTCH FILTER	A	From Leg	4.0000 0.00 2.00	0.0000	138.0000	No Ice 1/2" Ice 1" Ice	0.6601 0.7627 0.8727	0.3211 0.3983 0.4830	0.01 0.02 0.02
800 EXTERNAL NOTCH FILTER	B	From Leg	4.0000 0.00 2.00	0.0000	138.0000	No Ice 1/2" Ice 1" Ice	0.6601 0.7627 0.8727	0.3211 0.3983 0.4830	0.01 0.02 0.02
800 EXTERNAL NOTCH FILTER	C	From Leg	4.0000 0.00 2.00	0.0000	138.0000	No Ice 1/2" Ice 1" Ice	0.6601 0.7627 0.8727	0.3211 0.3983 0.4830	0.01 0.02 0.02
(6) ACU-A20-N	A	From Leg	4.0000 0.00 2.00	0.0000	138.0000	No Ice 1/2" Ice 1" Ice	0.0667 0.1037 0.1481	0.1167 0.1620 0.2148	0.00 0.00 0.00
(6) ACU-A20-N	B	From Leg	4.0000 0.00 2.00	0.0000	138.0000	No Ice 1/2" Ice Ice	0.0667 0.1037 0.1481	0.1167 0.1620 0.2148	0.00 0.00 0.00

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
						1" Ice			
(6) ACU-A20-N	C	From Leg	4.0000 0.00 2.00	0.0000	138.0000	No Ice 1/2" Ice 1" Ice	0.0667 0.1037 0.1481	0.1167 0.1620 0.2148	0.00 0.00 0.00
Platform Mount [LP 301-1]	C	None		0.0000	138.0000	No Ice 1/2" Ice 1" Ice	30.1000 40.8000 51.5000	30.1000 40.8000 51.5000	1.59 2.03 2.47
**									
TME-800MHz RRH w/ mount pipe	A	From Leg	2.0000 0.00 3.00	0.0000	136.0000	No Ice 1/2" Ice 1" Ice	3.1693 3.7178 4.1786	3.1980 3.8711 4.4206	0.07 0.11 0.15
TME-800MHz RRH w/ mount pipe	B	From Leg	2.0000 0.00 3.00	0.0000	136.0000	No Ice 1/2" Ice 1" Ice	3.1693 3.7178 4.1786	3.1980 3.8711 4.4206	0.07 0.11 0.15
TME-800MHz RRH w/ mount pipe	C	From Leg	2.0000 0.00 3.00	0.0000	136.0000	No Ice 1/2" Ice 1" Ice	3.1693 3.7178 4.1786	3.1980 3.8711 4.4206	0.07 0.11 0.15
TME-1900MHz RRH (65MHz) w/ Mount Pipe	A	From Leg	2.0000 0.00 1.00	0.0000	136.0000	No Ice 1/2" Ice 1" Ice	2.3125 2.5168 2.7284	2.3750 2.5809 2.7943	0.06 0.08 0.11
TME-1900MHz RRH (65MHz) w/ Mount Pipe	B	From Leg	2.0000 0.00 1.00	0.0000	136.0000	No Ice 1/2" Ice 1" Ice	2.3125 2.5168 2.7284	2.3750 2.5809 2.7943	0.06 0.08 0.11
TME-1900MHz RRH (65MHz) w/ Mount Pipe	C	From Leg	2.0000 0.00 1.00	0.0000	136.0000	No Ice 1/2" Ice 1" Ice	2.3125 2.5168 2.7284	2.3750 2.5809 2.7943	0.06 0.08 0.11
TME-1900MHz RRH (65MHz) w/ Mount Pipe	A	From Leg	2.0000 0.00 -1.00	0.0000	136.0000	No Ice 1/2" Ice 1" Ice	2.3125 2.5168 2.7284	2.3750 2.5809 2.7943	0.06 0.08 0.11
TME-1900MHz RRH (65MHz) w/ Mount Pipe	B	From Leg	2.0000 0.00 -1.00	0.0000	136.0000	No Ice 1/2" Ice 1" Ice	2.3125 2.5168 2.7284	2.3750 2.5809 2.7943	0.06 0.08 0.11
TME-1900MHz RRH (65MHz) w/ Mount Pipe	C	From Leg	2.0000 0.00 -1.00	0.0000	136.0000	No Ice 1/2" Ice 1" Ice	2.3125 2.5168 2.7284	2.3750 2.5809 2.7943	0.06 0.08 0.11
Side Arm Mount [SO 102-3]	C	None		0.0000	136.0000	No Ice 1/2" Ice 1" Ice	3.0000 3.4800 3.9600	3.0000 3.4800 3.9600	0.08 0.11 0.14
**									
TMA-DB-T1-6Z-8AB-0Z	C	From Leg	1.0000 0.00 0.00	0.0000	122.0000	No Ice 1/2" Ice 1" Ice	4.8000 5.0704 5.3481	2.0000 2.1926 2.3926	0.04 0.08 0.12
Side Arm Mount [SO 102-1]	C	From Leg	1.0000 0.00 0.00	0.0000	122.0000	No Ice 1/2" Ice 1" Ice	1.5000 1.7400 1.9800	1.5000 1.7500 2.0000	0.03 0.04 0.04
**									
BXA-80063/4CF w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.0000	120.0000	No Ice 1/2" Ice 1" Ice	4.9453 5.3243 5.7120	3.4238 4.0221 4.6369	0.03 0.07 0.12
BXA-80063/4CF w/ Mount	B	From Leg	4.0000	0.0000	120.0000	No Ice	4.9453	3.4238	0.03

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
Pipe			0.00				1/2" Ice	5.3243	4.0221	0.07
			2.00				1" Ice	5.7120	4.6369	0.12
BXA-80063/6CF w/ Mount Pipe	C	From Leg	4.0000		0.0000	120.0000	No Ice	7.8193	5.4071	0.04
			0.00				1/2" Ice	8.3705	6.5581	0.10
			2.00				1" Ice	8.8861	7.4216	0.17
MG D3-800TV w/ Mount Pipe	A	From Leg	4.0000		30.0000	120.0000	No Ice	3.5703	3.4178	0.04
			0.00				1/2" Ice	3.9790	4.1193	0.07
			2.00				1" Ice	4.3870	4.7842	0.11
MG D3-800TV w/ Mount Pipe	B	From Leg	4.0000		30.0000	120.0000	No Ice	3.5703	3.4178	0.04
			0.00				1/2" Ice	3.9790	4.1193	0.07
			2.00				1" Ice	4.3870	4.7842	0.11
MG D3-800TV w/ Mount Pipe	C	From Leg	4.0000		30.0000	120.0000	No Ice	3.5703	3.4178	0.04
			0.00				1/2" Ice	3.9790	4.1193	0.07
			2.00				1" Ice	4.3870	4.7842	0.11
LNX-6514DS-A1M w/ Mount Pipe	A	From Leg	4.0000		0.0000	120.0000	No Ice	8.4106	7.0817	0.06
			0.00				1/2" Ice	8.9745	8.2729	0.13
			2.00				1" Ice	9.5048	9.1847	0.21
LNX-6514DS-A1M w/ Mount Pipe	B	From Leg	4.0000		0.0000	120.0000	No Ice	8.4106	7.0817	0.06
			0.00				1/2" Ice	8.9745	8.2729	0.13
			2.00				1" Ice	9.5048	9.1847	0.21
LNX-6514DS-A1M w/ Mount Pipe	C	From Leg	4.0000		0.0000	120.0000	No Ice	8.4106	7.0817	0.06
			0.00				1/2" Ice	8.9745	8.2729	0.13
			2.00				1" Ice	9.5048	9.1847	0.21
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	A	From Leg	4.0000		0.0000	120.0000	No Ice	3.1789	3.3530	0.03
			0.00				1/2" Ice	3.5550	3.9709	0.06
			2.00				1" Ice	3.9298	4.5951	0.10
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	B	From Leg	4.0000		0.0000	120.0000	No Ice	3.1789	3.3530	0.03
			0.00				1/2" Ice	3.5550	3.9709	0.06
			2.00				1" Ice	3.9298	4.5951	0.10
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	C	From Leg	4.0000		0.0000	120.0000	No Ice	3.1789	3.3530	0.03
			0.00				1/2" Ice	3.5550	3.9709	0.06
			2.00				1" Ice	3.9298	4.5951	0.10
RRH2X40-AWS	A	From Leg	4.0000		0.0000	120.0000	No Ice	2.1614	1.4199	0.04
			0.00				1/2" Ice	2.3597	1.5903	0.06
			2.00				1" Ice	2.5655	1.7676	0.08
RRH2X40-AWS	B	From Leg	4.0000		0.0000	120.0000	No Ice	2.1614	1.4199	0.04
			0.00				1/2" Ice	2.3597	1.5903	0.06
			2.00				1" Ice	2.5655	1.7676	0.08
RRH2X40-AWS	C	From Leg	4.0000		0.0000	120.0000	No Ice	2.1614	1.4199	0.04
			0.00				1/2" Ice	2.3597	1.5903	0.06
			2.00				1" Ice	2.5655	1.7676	0.08
FD9R6004/2C-3L	A	From Leg	4.0000		0.0000	120.0000	No Ice	0.3142	0.0762	0.00
			0.00				1/2" Ice	0.3862	0.1189	0.01
			2.00				1" Ice	0.4656	0.1685	0.01
FD9R6004/2C-3L	B	From Leg	4.0000		0.0000	120.0000	No Ice	0.3142	0.0762	0.00
			0.00				1/2" Ice	0.3862	0.1189	0.01
			2.00				1" Ice	0.4656	0.1685	0.01
GPS_A	A	From Leg	4.0000		0.0000	120.0000	No Ice	0.2550	0.2550	0.00
			0.00				1/2"	0.3205	0.3205	0.00

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
			6.00			Ice 1" Ice	0.3934	0.3934	0.01
Platform Mount [LP 1201-1]	C	None		0.0000	120.0000	No Ice 1/2" Ice 1" Ice	23.1000 26.8000 30.5000	23.1000 26.8000 30.5000	2.10 2.50 2.90
**									
KS24019-L112A	A	From Leg	3.0000 0.00 1.00	0.0000	90.0000	No Ice 1/2" Ice 1" Ice	0.1407 0.1979 0.2621	0.1407 0.1979 0.2621	0.01 0.01 0.01
Side Arm Mount [SO 701-1]	C	From Leg	3.0000 0.00 0.00	0.0000	90.0000	No Ice 1/2" Ice 1" Ice	0.8500 1.1400 1.4300	1.6700 2.3400 3.0100	0.07 0.08 0.09

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 148.0000-138.5000	143.2500	1.095	25.06	19.000	A	0.000	19.000	19.000	100.00	0.000	0.000
					B	0.000	19.000		100.00	0.000	0.000
					C	0.000	19.000		100.00	0.000	2.940
L2 138.5000-138.0000	138.2464	1.084	24.81	0.958	A	0.000	0.958	0.958	100.00	0.000	0.000
					B	0.000	0.958		100.00	0.000	0.000
					C	0.000	0.958		100.00	0.000	0.196
L3 138.0000-90.7500	113.2725	1.024	23.39	107.801	A	0.000	107.801	107.801	100.00	0.000	0.000
					B	0.000	107.801		100.00	0.000	0.000
					C	0.000	107.801		100.00	0.000	31.590
L4 90.7500-44.7500	67.2910	0.882	20.08	141.122	A	0.000	141.122	141.122	100.00	0.000	0.000
					B	0.000	141.122		100.00	0.000	0.000
					C	0.000	141.122		100.00	0.000	39.224
L5 44.7500-0.0000	21.7726	0.7	16.26	171.009	A	0.000	171.009	171.009	100.00	0.000	0.000
					B	0.000	171.009		100.00	0.000	0.000
					C	0.000	171.009		100.00	0.000	33.294

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft^2	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 148.0000-138.5000	143.2500	1.095	6.66	1.7372	21.751	A	0.000	21.751	21.751	100.00	0.000	0.000
						B	0.000	21.751		100.00	0.000	0.000
						C	0.000	21.751		100.00	0.000	8.152
L2 138.5000-138.0000	138.2464	1.084	6.59	1.7310	1.103	A	0.000	1.103	1.103	100.00	0.000	0.000
						B	0.000	1.103		100.00	0.000	0.000
						C	0.000	1.103		100.00	0.000	0.542
L3 138.0000-90.7500	113.2725	1.024	6.21	1.6969	121.164	A	0.000	121.164	121.164	100.00	0.000	0.000
						B	0.000	121.164		100.00	0.000	0.000
						C	0.000	121.164		100.00	0.000	89.624
L4 90.7500-44.7500	67.2910	0.882	5.34	1.6108	154.131	A	0.000	154.131	154.131	100.00	0.000	0.000
						B	0.000	154.131		100.00	0.000	0.000
						C	0.000	154.131		100.00	0.000	112.982
L5 44.7500-	21.7726	0.7	4.32	1.4389	183.023	A	0.000	183.023	183.023	100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
0.0000						B	0.000	183.023		100.00	0.000	0.000
						C	0.000	183.023		100.00	0.000	90.960

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 148.0000-138.5000	143.2500	1.095	8.58	19.000	A	0.000	19.000	19.000	100.00	0.000	0.000
					B	0.000	19.000		100.00	0.000	0.000
					C	0.000	19.000		100.00	0.000	2.940
L2 138.5000-138.0000	138.2464	1.084	8.49	0.958	A	0.000	0.958	0.958	100.00	0.000	0.000
					B	0.000	0.958		100.00	0.000	0.000
					C	0.000	0.958		100.00	0.000	0.196
L3 138.0000-90.7500	113.2725	1.024	8.01	107.801	A	0.000	107.801	107.801	100.00	0.000	0.000
					B	0.000	107.801		100.00	0.000	0.000
					C	0.000	107.801		100.00	0.000	31.590
L4 90.7500-44.7500	67.2910	0.882	6.88	141.122	A	0.000	141.122	141.122	100.00	0.000	0.000
					B	0.000	141.122		100.00	0.000	0.000
					C	0.000	141.122		100.00	0.000	39.224
L5 44.7500-0.0000	21.7726	0.7	5.57	171.009	A	0.000	171.009	171.009	100.00	0.000	0.000
					B	0.000	171.009		100.00	0.000	0.000
					C	0.000	171.009		100.00	0.000	33.294

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

Comb. No.	Description
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	148 - 138.5	Pole	Max Tension	9	0.00	0.00	0.00
			Max. Compression	26	-5.05	0.78	-0.45
			Max. Mx	20	-1.44	18.41	-0.04
			Max. My	14	-1.44	0.06	-18.38
			Max. Vy	20	-3.07	18.41	-0.04
			Max. Vx	14	3.07	0.06	-18.38
			Max. Torque	24			0.13
L2	138.5 - 138	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-5.17	0.83	-0.48
			Max. Mx	20	-1.48	19.96	-0.04
			Max. My	14	-1.48	0.07	-19.93
			Max. Vy	20	-3.11	19.96	-0.04
			Max. Vx	14	3.11	0.07	-19.93
			Max. Torque	24			0.14
L3	138 - 90.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-34.23	8.02	-4.51
			Max. Mx	20	-13.01	594.60	-2.20
			Max. My	14	-13.02	2.54	-592.26
			Max. Vy	20	-17.84	594.60	-2.20
			Max. Vx	14	17.77	2.54	-592.26
			Max. Torque	24			2.08
L4	90.75 - 44.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-52.29	17.02	-9.62
			Max. Mx	20	-22.66	1551.74	-5.08
			Max. My	14	-22.67	5.89	-1546.32
			Max. Vy	20	-24.83	1551.74	-5.08
			Max. Vx	14	24.77	5.89	-1546.32
			Max. Torque	24			4.31
L5	44.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-76.59	27.23	-15.51
			Max. Mx	20	-37.96	2920.92	-8.07
			Max. My	14	-37.96	9.32	-2912.30
			Max. Vy	20	-29.53	2920.92	-8.07
			Max. Vx	14	29.48	9.32	-2912.30
			Max. Torque	24			6.35

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	76.59	-0.00	0.00

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. H_x	21	28.49	29.50	-0.05
	Max. H_z	2	37.98	-0.05	29.44
	Max. M_x	2	2909.03	-0.05	29.44
	Max. M_z	8	2915.15	-29.50	0.05
	Max. Torsion	24	6.35	14.71	25.47
	Min. Vert	9	28.49	-29.50	0.05
	Min. H_x	8	37.98	-29.50	0.05
	Min. H_z	14	37.98	0.05	-29.44
	Min. M_x	14	-2912.30	0.05	-29.44
	Min. M_z	20	-2920.92	29.50	-0.05
	Min. Torsion	12	-6.35	-14.71	-25.47

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	31.65	0.00	-0.00	1.30	2.29	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	37.98	0.05	-29.44	-2909.03	-3.59	-5.53
0.9 Dead+1.6 Wind 0 deg - No Ice	28.49	0.05	-29.44	-2877.61	-4.25	-5.53
1.2 Dead+1.6 Wind 30 deg - No Ice	37.98	14.79	-25.52	-2522.31	-1461.78	-3.22
0.9 Dead+1.6 Wind 30 deg - No Ice	28.49	14.79	-25.52	-2495.13	-1446.50	-3.22
1.2 Dead+1.6 Wind 60 deg - No Ice	37.98	25.57	-14.76	-1459.29	-2527.50	-0.06
0.9 Dead+1.6 Wind 60 deg - No Ice	28.49	25.57	-14.76	-1443.73	-2500.57	-0.06
1.2 Dead+1.6 Wind 90 deg - No Ice	37.98	29.50	-0.05	-4.83	-2915.15	3.12
0.9 Dead+1.6 Wind 90 deg - No Ice	28.49	29.50	-0.05	-5.17	-2883.94	3.12
1.2 Dead+1.6 Wind 120 deg - No Ice	37.98	25.52	14.68	1451.38	-2521.10	5.47
0.9 Dead+1.6 Wind 120 deg - No Ice	28.49	25.52	14.68	1435.12	-2494.24	5.47
1.2 Dead+1.6 Wind 150 deg - No Ice	37.98	14.71	25.47	2519.15	-1450.64	6.35
0.9 Dead+1.6 Wind 150 deg - No Ice	28.49	14.71	25.47	2491.21	-1435.49	6.35
1.2 Dead+1.6 Wind 180 deg - No Ice	37.98	-0.05	29.44	2912.30	9.31	5.52
0.9 Dead+1.6 Wind 180 deg - No Ice	28.49	-0.05	29.44	2880.03	8.49	5.52
1.2 Dead+1.6 Wind 210 deg - No Ice	37.98	-14.79	25.52	2525.59	1467.53	3.22
0.9 Dead+1.6 Wind 210 deg - No Ice	28.49	-14.79	25.52	2497.56	1450.75	3.22
1.2 Dead+1.6 Wind 240 deg - No Ice	37.98	-25.57	14.76	1462.55	2533.28	0.06
0.9 Dead+1.6 Wind 240 deg - No Ice	28.49	-25.57	14.76	1446.15	2504.85	0.06
1.2 Dead+1.6 Wind 270 deg - No Ice	37.98	-29.50	0.05	8.07	2920.92	-3.12
0.9 Dead+1.6 Wind 270 deg - No Ice	28.49	-29.50	0.05	7.57	2888.29	-3.12
1.2 Dead+1.6 Wind 300 deg - No Ice	37.98	-25.52	-14.68	-1448.15	2526.85	-5.47
0.9 Dead+1.6 Wind 300 deg - No Ice	28.49	-25.52	-14.68	-1432.73	2498.50	-5.47
1.2 Dead+1.6 Wind 330 deg - No Ice	37.98	-14.71	-25.47	-2515.91	1456.36	-6.35
0.9 Dead+1.6 Wind 330 deg - No Ice	28.49	-14.71	-25.47	-2488.81	1439.73	-6.35

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
1.2 Dead+1.0 Ice+1.0 Temp	76.59	0.00	-0.00	15.51	27.23	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	76.59	0.00	-7.61	-767.90	26.69	-2.47
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	76.59	3.81	-6.59	-663.32	-365.37	-1.44
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	76.59	6.59	-3.81	-376.76	-652.21	-0.02
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	76.59	7.61	-0.00	14.93	-756.89	1.40
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	76.59	6.59	3.80	406.79	-651.56	2.45
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	76.59	3.80	6.59	693.83	-364.25	2.84
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	76.59	-0.00	7.61	799.06	27.99	2.47
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	76.59	-3.81	6.59	694.48	420.06	1.44
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	76.59	-6.59	3.81	407.92	706.89	0.02
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	76.59	-7.61	0.00	16.22	811.57	-1.40
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	76.59	-6.59	-3.80	-375.64	706.25	-2.45
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	76.59	-3.80	-6.59	-662.68	418.93	-2.84
Dead+Wind 0 deg - Service	31.65	0.01	-6.30	-617.76	1.03	-0.17
Dead+Wind 30 deg - Service	31.65	3.16	-5.46	-535.50	-309.14	-0.10
Dead+Wind 60 deg - Service	31.65	5.47	-3.16	-309.39	-535.83	-0.01
Dead+Wind 90 deg - Service	31.65	6.31	-0.01	-0.01	-618.30	0.08
Dead+Wind 120 deg - Service	31.65	5.46	3.14	309.73	-534.46	0.16
Dead+Wind 150 deg - Service	31.65	3.15	5.45	536.84	-306.76	0.19
Dead+Wind 180 deg - Service	31.65	-0.01	6.30	620.47	3.77	0.17
Dead+Wind 210 deg - Service	31.65	-3.16	5.46	538.21	313.94	0.10
Dead+Wind 240 deg - Service	31.65	-5.47	3.16	312.10	540.62	0.01
Dead+Wind 270 deg - Service	31.65	-6.31	0.01	2.73	623.10	-0.08
Dead+Wind 300 deg - Service	31.65	-5.46	-3.14	-307.01	539.25	-0.16
Dead+Wind 330 deg - Service	31.65	-3.15	-5.45	-534.13	311.56	-0.19

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-31.65	0.00	-0.00	31.65	0.00	0.001%
2	0.05	-37.98	-29.44	-0.05	37.98	29.44	0.001%
3	0.05	-28.49	-29.44	-0.05	28.49	29.44	0.001%
4	14.79	-37.98	-25.52	-14.79	37.98	25.52	0.000%
5	14.79	-28.49	-25.52	-14.79	28.49	25.52	0.000%
6	25.57	-37.98	-14.76	-25.57	37.98	14.76	0.000%
7	25.57	-28.49	-14.76	-25.57	28.49	14.76	0.000%
8	29.50	-37.98	-0.05	-29.50	37.98	0.05	0.002%
9	29.50	-28.49	-0.05	-29.50	28.49	0.05	0.003%
10	25.52	-37.98	14.68	-25.52	37.98	-14.68	0.000%
11	25.52	-28.49	14.68	-25.52	28.49	-14.68	0.000%
12	14.71	-37.98	25.47	-14.71	37.98	-25.47	0.000%
13	14.71	-28.49	25.47	-14.71	28.49	-25.47	0.000%
14	-0.05	-37.98	29.44	0.05	37.98	-29.44	0.001%
15	-0.05	-28.49	29.44	0.05	28.49	-29.44	0.001%
16	-14.79	-37.98	25.52	14.79	37.98	-25.52	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
17	-14.79	-28.49	25.52	14.79	28.49	-25.52	0.000%
18	-25.57	-37.98	14.76	25.57	37.98	-14.76	0.000%
19	-25.57	-28.49	14.76	25.57	28.49	-14.76	0.000%
20	-29.50	-37.98	0.05	29.50	37.98	-0.05	0.002%
21	-29.50	-28.49	0.05	29.50	28.49	-0.05	0.001%
22	-25.52	-37.98	-14.68	25.52	37.98	14.68	0.000%
23	-25.52	-28.49	-14.68	25.52	28.49	14.68	0.000%
24	-14.71	-37.98	-25.47	14.71	37.98	25.47	0.000%
25	-14.71	-28.49	-25.47	14.71	28.49	25.47	0.000%
26	0.00	-76.59	0.00	-0.00	76.59	0.00	0.001%
27	0.00	-76.59	-7.61	-0.00	76.59	7.61	0.001%
28	3.81	-76.59	-6.59	-3.81	76.59	6.59	0.001%
29	6.59	-76.59	-3.81	-6.59	76.59	3.81	0.001%
30	7.61	-76.59	-0.00	-7.61	76.59	0.00	0.001%
31	6.59	-76.59	3.80	-6.59	76.59	-3.80	0.001%
32	3.80	-76.59	6.59	-3.80	76.59	-6.59	0.001%
33	-0.00	-76.59	7.61	0.00	76.59	-7.61	0.001%
34	-3.81	-76.59	6.59	3.81	76.59	-6.59	0.001%
35	-6.59	-76.59	3.81	6.59	76.59	-3.81	0.001%
36	-7.61	-76.59	0.00	7.61	76.59	-0.00	0.001%
37	-6.59	-76.59	-3.80	6.59	76.59	3.80	0.001%
38	-3.80	-76.59	-6.59	3.80	76.59	6.59	0.001%
39	0.01	-31.65	-6.30	-0.01	31.65	6.30	0.002%
40	3.16	-31.65	-5.46	-3.16	31.65	5.46	0.002%
41	5.47	-31.65	-3.16	-5.47	31.65	3.16	0.002%
42	6.31	-31.65	-0.01	-6.31	31.65	0.01	0.002%
43	5.46	-31.65	3.14	-5.46	31.65	-3.14	0.002%
44	3.15	-31.65	5.45	-3.15	31.65	-5.45	0.002%
45	-0.01	-31.65	6.30	0.01	31.65	-6.30	0.002%
46	-3.16	-31.65	5.46	3.16	31.65	-5.46	0.002%
47	-5.47	-31.65	3.16	5.47	31.65	-3.16	0.002%
48	-6.31	-31.65	0.01	6.31	31.65	-0.01	0.002%
49	-5.46	-31.65	-3.14	5.46	31.65	3.14	0.002%
50	-3.15	-31.65	-5.45	3.15	31.65	5.45	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	18	0.00000001	0.00007207
3	Yes	17	0.00000001	0.00011569
4	Yes	21	0.00000001	0.00008616
5	Yes	20	0.00000001	0.00013352
6	Yes	21	0.00000001	0.00008840
7	Yes	20	0.00000001	0.00013708
8	Yes	17	0.00000001	0.00008230
9	Yes	16	0.00003032	0.00013184
10	Yes	21	0.00000001	0.00009149
11	Yes	20	0.00000001	0.00014208
12	Yes	21	0.00000001	0.00008347
13	Yes	20	0.00000001	0.00012926
14	Yes	18	0.00000001	0.00008296
15	Yes	17	0.00000001	0.00013268
16	Yes	21	0.00000001	0.00009131
17	Yes	20	0.00000001	0.00014145
18	Yes	21	0.00000001	0.00008899
19	Yes	20	0.00000001	0.00013771
20	Yes	17	0.00000001	0.00010472
21	Yes	17	0.00000001	0.00007941
22	Yes	21	0.00000001	0.00008421
23	Yes	20	0.00000001	0.00013032
24	Yes	21	0.00000001	0.00009231
25	Yes	20	0.00000001	0.00014333
26	Yes	13	0.00000001	0.00004177
27	Yes	17	0.00011068	0.00010588
28	Yes	18	0.00000001	0.00008771

29	Yes	18	0.00000001	0.00009157
30	Yes	17	0.00011066	0.00009356
31	Yes	18	0.00000001	0.00010711
32	Yes	18	0.00000001	0.00009134
33	Yes	17	0.00011070	0.00011154
34	Yes	18	0.00000001	0.00011794
35	Yes	18	0.00000001	0.00011224
36	Yes	17	0.00011072	0.00010192
37	Yes	18	0.00000001	0.00009728
38	Yes	18	0.00000001	0.00011491
39	Yes	15	0.00000001	0.00003398
40	Yes	15	0.00000001	0.00009952
41	Yes	15	0.00000001	0.00010309
42	Yes	15	0.00000001	0.00003269
43	Yes	15	0.00000001	0.00010757
44	Yes	15	0.00000001	0.00009692
45	Yes	15	0.00000001	0.00003456
46	Yes	15	0.00000001	0.00010948
47	Yes	15	0.00000001	0.00010596
48	Yes	15	0.00000001	0.00003321
49	Yes	15	0.00000001	0.00009884
50	Yes	15	0.00000001	0.00010943

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	148 - 138.5	23.245	47	1.3236	0.0014
L2	138.5 - 138	20.613	47	1.3210	0.0014
L3	138 - 90.75	20.475	47	1.3205	0.0014
L4	94.75 - 44.75	9.673	47	0.9854	0.0008
L5	50 - 0	2.635	47	0.4872	0.0003

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
146.0000	SBNHH-1D65C w/ Mount Pipe	47	22.691	1.3236	0.0014	176145
138.0000	APXVTM14-C-120	47	20.475	1.3205	0.0014	25465
136.0000	TME-800MHz RRH w/ mount pipe	47	19.924	1.3176	0.0014	17082
122.0000	TMA-DB-T1-6Z-8AB-0Z	47	16.168	1.2527	0.0013	9302
120.0000	BXA-80063/4CF w/ Mount Pipe	47	15.650	1.2380	0.0012	8810
90.0000	KS24019-L112A	47	8.693	0.9317	0.0007	5163

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	148 - 138.5	108.784	18	6.2054	0.0255
L2	138.5 - 138	96.485	18	6.1930	0.0254
L3	138 - 90.75	95.839	18	6.1909	0.0254
L4	94.75 - 44.75	45.322	18	4.6215	0.0166
L5	50 - 0	12.353	18	2.2848	0.0071

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
146.0000	SBNHH-1D65C w/ Mount Pipe	18	106.193	6.2052	0.0255	38901

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
138.0000	APXVTM14-C-120	18	95.839	6.1909	0.0254	5583
136.0000	TME-800MHz RRH w/ mount pipe	18	93.262	6.1775	0.0253	3742
122.0000	TMA-DB-T1-6Z-8AB-0Z	18	75.706	5.8736	0.0234	2028
120.0000	BXA-80063/4CF w/ Mount Pipe	18	73.283	5.8048	0.0230	1920
90.0000	KS24019-L112A	18	40.732	4.3698	0.0154	1116

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	148 - 138.5 (1)	TP24x24x0.25	9.5000	0.0000	0.0	18.6532	-1.44	753.82	0.002
L2	138.5 - 138 (2)	TP24x22x0.25	0.5000	0.0000	0.0	17.0824	-1.44	706.70	0.002
L3	138 - 90.75 (3)	TP31.924x22x0.25	47.2500	0.0000	0.0	24.4667	-13.01	1598.87	0.008
L4	90.75 - 44.75 (4)	TP41.086x30.5839x0.3125	50.0000	0.0000	0.0	39.3484	-22.66	2547.91	0.009
L5	44.75 - 0 (5)	TP49.86x39.3583x0.375	50.0000	0.0000	0.0	58.8995	-37.96	3765.09	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	148 - 138.5 (1)	TP24x24x0.25	18.42	462.45	0.040	0.00	462.45	0.000
L2	138.5 - 138 (2)	TP24x22x0.25	18.42	391.40	0.047	0.00	391.40	0.000
L3	138 - 90.75 (3)	TP31.924x22x0.25	595.75	1013.51	0.588	0.00	1013.51	0.000
L4	90.75 - 44.75 (4)	TP41.086x30.5839x0.3125	1554.38	2078.45	0.748	0.00	2078.45	0.000
L5	44.75 - 0 (5)	TP49.86x39.3583x0.375	2925.16	3832.33	0.763	0.00	3832.33	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	148 - 138.5 (1)	TP24x24x0.25	3.07	375.90	0.008	0.00	736.30	0.000
L2	138.5 - 138 (2)	TP24x22x0.25	3.13	375.90	0.008	0.00	631.27	0.000
L3	138 - 90.75 (3)	TP31.924x22x0.25	17.88	799.44	0.022	0.04	2029.50	0.000
L4	90.75 - 44.75 (4)	TP41.086x30.5839x0.3125	24.86	1273.95	0.020	0.06	4161.98	0.000
L5	44.75 - 0 (5)	TP49.86x39.3583x0.375	29.56	1882.55	0.016	0.06	7674.04	0.000

Pole Interaction Design Data

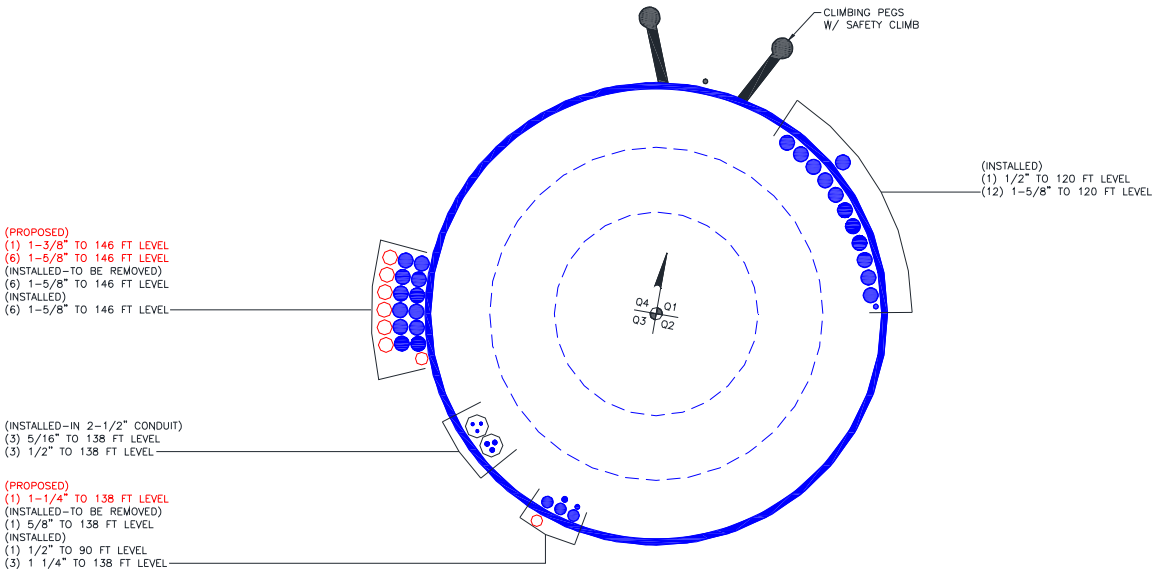
Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	148 - 138.5 (1)	0.002	0.040	0.000	0.008	0.000	0.042 ✔	1.000	4.8.2 ✔
L2	138.5 - 138 (2)	0.002	0.047	0.000	0.008	0.000	0.049 ✔	1.000	4.8.2 ✔
L3	138 - 90.75 (3)	0.008	0.588	0.000	0.022	0.000	0.596 ✔	1.000	4.8.2 ✔
L4	90.75 - 44.75 (4)	0.009	0.748	0.000	0.020	0.000	0.757 ✔	1.000	4.8.2 ✔
L5	44.75 - 0 (5)	0.010	0.763	0.000	0.016	0.000	0.774 ✔	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	148 - 138.5	Pole	TP24x24x0.25	1	-1.44	753.82	4.2	Pass
L2	138.5 - 138	Pole	TP24x22x0.25	2	-1.44	706.70	4.9	Pass
L3	138 - 90.75	Pole	TP31.924x22x0.25	3	-13.01	1598.87	59.6	Pass
L4	90.75 - 44.75	Pole	TP41.086x30.5839x0.3125	4	-22.66	2547.91	75.7	Pass
L5	44.75 - 0	Pole	TP49.86x39.3583x0.375	5	-37.96	3765.09	77.4	Pass
							Summary	
						Pole (L5)	77.4	Pass
						RATING =	**77.4**	**Pass**

APPENDIX B

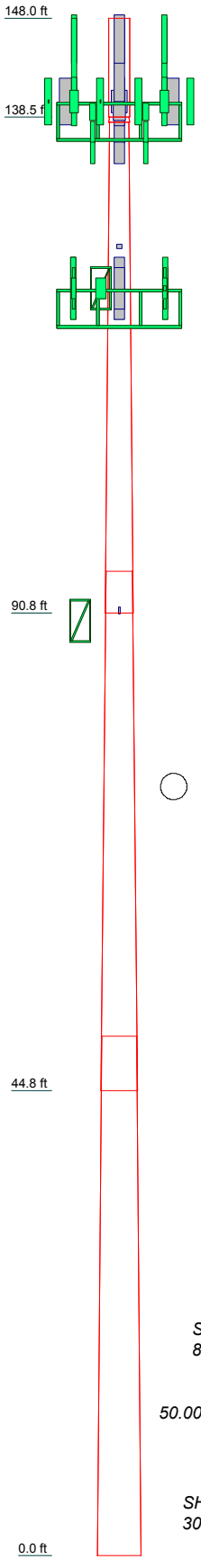
BASE LEVEL DRAWING



APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5
Length (ft)	9.5000	0.5000	47.2500	50.0000	50.0000
Number of Sides	1	1	18	18	18
Thickness (in)	0.2500	0.2500	0.2500	0.3125	0.3750
Socket Length (ft)			4.0000	5.2500	
Top Dia (in)	24.0000	22.0000	22.0000	30.5839	39.3583
Bot Dia (in)	24.0000	24.0000	31.9240	41.0860	49.8600
Grade	A500-50			A607-60	
Weight (K)	0.6	0.0	3.4	6.0	9.0



ALL REACTIONS ARE FACTORED

AXIAL 77 K

SHEAR 8 K *MOMENT 816 kip-ft*

TORQUE 3 kip-ft

50.00 mph WIND - 0.7500 in ICE

AXIAL 38 K

SHEAR 30 K *MOMENT 2925 kip-ft*

TORQUE 6 kip-ft

REACTIONS - 97.00 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
SBNHH-1D65C w/ Mount Pipe	146	TME-1900MHz RRH (65MHz) w/ Mount Pipe	136
SBNHH-1D65C w/ Mount Pipe	146	TME-1900MHz RRH (65MHz) w/ Mount Pipe	136
SBNHH-1D65C w/ Mount Pipe	146	TME-1900MHz RRH (65MHz) w/ Mount Pipe	136
AIR -32 B2A/B66AA w/ Mount Pipe	146	Side Arm Mount [SO 102-3]	136
AIR -32 B2A/B66AA w/ Mount Pipe	146	TMA-DB-T1-6Z-8AB-0Z	122
AIR -32 B2A/B66AA w/ Mount Pipe	146	Side Arm Mount [SO 102-1]	122
ATSBT-TOP-MF-4G	146	BXA-80063/4CF w/ Mount Pipe	120
ATSBT-TOP-MF-4G	146	BXA-80063/4CF w/ Mount Pipe	120
ATSBT-TOP-MF-4G	146	BXA-80063/6CF w/ Mount Pipe	120
Side Arm Mount [SO 102-3]	146	MG D3-800TV w/ Mount Pipe	120
APXVTM14-C-120	138	MG D3-800TV w/ Mount Pipe	120
APXVTM14-C-120	138	MG D3-800TV w/ Mount Pipe	120
APXVTM14-C-120	138	LNX-6514DS-A1M w/ Mount Pipe	120
TD-RRH8x20-25	138	LNX-6514DS-A1M w/ Mount Pipe	120
TD-RRH8x20-25	138	LNX-6514DS-A1M w/ Mount Pipe	120
TD-RRH8x20-25	138	BXA-171063-8BF-EDIN-0 w/ Mount Pipe	120
(2) P40-16-XLPP-RR-A	138	BXA-171063-8BF-EDIN-0 w/ Mount Pipe	120
(2) P40-16-XLPP-RR-A	138	BXA-171063-8BF-EDIN-0 w/ Mount Pipe	120
(2) P40-16-XLPP-RR-A	138	RRH2X40-AWS	120
800 EXTERNAL NOTCH FILTER	138	RRH2X40-AWS	120
800 EXTERNAL NOTCH FILTER	138	RRH2X40-AWS	120
800 EXTERNAL NOTCH FILTER	138	FD9R6004/2C-3L	120
(6) ACU-A20-N	138	FD9R6004/2C-3L	120
(6) ACU-A20-N	138	GPS_A	120
(6) ACU-A20-N	138	Platform Mount [LP 1201-1]	120
Platform Mount [LP 301-1]	138	KS24019-L112A	90
TME-800MHz RRH w/ mount pipe	136	Side Arm Mount [SO 701-1]	90
TME-800MHz RRH w/ mount pipe	136		
TME-800MHz RRH w/ mount pipe	136		
TME-1900MHz RRH (65MHz) w/ Mount Pipe	136		
TME-1900MHz RRH (65MHz) w/ Mount Pipe	136		
TME-1900MHz RRH (65MHz) w/ Mount Pipe	136		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	A607-60	60 ksi	75 ksi

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 97.00 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50.00 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.00 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.0000 ft
8. TOWER RATING: 77.4%

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

Job: **Hillside / West Javen, CT**		
Project: ***PJF 37517-0499.003.7805 / BU 876323***		
Client: CCI	Drawn by: Lohe Gimeno	App'd:
Code: TIA-222-G	Date: 03/30/17	Scale: NTS
Path: G:\TOWER\375_Crown_Castle\2017\37517-0499_876323_HILLSIDE\37517-0499.003.7805_SA_138326\37517-0499.003.7805.eri		Dwg No. E-1

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

Site Data

BU#: *876323*
Site Name: *Hillside*
App #:

Extension Bottom Flange

Reactions		
Mu	18.42	ft-kips
Axial, Pu:	1.44	kips
Shear, Vu:	3.13	kips
Elevation:	138	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
38.88

Pole Manufacturer:	Other

If No stiffeners, Criteria:	TIA G

<-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	8		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	
N/A:		<-- Disregard	
Circle (in.):	28		

Plate Data		
Diam:	32	in
Thick, t:	0.75	in
Grade (Fy):	50	ksi
Strength, Fu:	65	ksi
Single-Rod B-eff:	9.00	in

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

Pole Data		
Diam:	24	in
Thick:	0.25	in
Grade:	50	ksi
# of Sides:	0	"0" IF Round
Fu	65	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results — Non-Rigid

Bolt Tension Capacity, φ*Tn, **B1**:	54.54	kips	φ*Tn
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	54.54	kips	φTn[(1-(Vu/φVn)^2]^0.5
Max Bolt directly applied Tu:	3.77	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	0.788	in	
Min PL "treq" for actual **T w/ Pry**:	0.151	in	
Min PL "t1" for actual **T w/o Pry**:	0.207	in	
T allowable with Prying:	52.61	kips	0≤α'≤1 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	3.77	kips	
Prying Bolt Stress Ratio=(Tu+q)/(B):	6.9%	**Pass**	

Exterior Flange Plate Results — Flexural Check — Non-Rigid

Compression Side Plate Stress:	7.8	ksi	TIA G
Allowable Plate Stress:	45.0	ksi	φ*Fy
Compression Plate Stress Ratio:	17.4%	**Pass**	Comp. Y.L. Length:
No Prying			7.50
Tension Side Stress Ratio, (treq/t)^2:	4.1%	**Pass**	

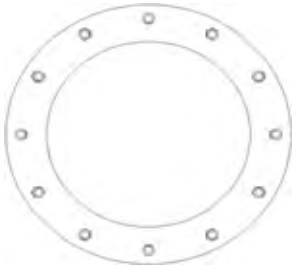
n/a

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

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

Site Data

BU#: *876323*
Site Name: *Hillside*
App #:

Original Top Plate

Reactions		
Moment:	18.42	ft-kips
Axial:	1.44	kips
Shear:	3.13	kips
Exterior Flange Run, T+q:		kips

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
21.87

Manufacturer: Other

Elevation: 138 feet

Bolt Data

Qty:	18		
Diam:	0.75	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	
N/A:		<-- Disregard	
Circle:	19	in	

Interior Flange Bolt Results

Maximum Bolt Tension, Tu:	2.5	Kips, Ext. Tu=Interior Tu
Adjusted φ*Tn (due to Vu=Vu/Qty), I	30.1	Kips
Bolt Stress Ratio:	8.3%	**Pass**

Plate Data

Plate Outer Diam:	21.5	in
Plate Inner Diam:	15	in (Hole @ Ctr)
Thick:	0.75	in
Grade:	50	ksi
Effective Width:	3.79	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	2.7	Kips, Ext. Cu=Interior Cu
Plate Stress:	6.2	ksi
Allowable Plate Stress, φ*Fy:	45.0	ksi
Plate Stress Ratio:	13.9%	**Pass**

Stiffener Data (Welding at Both Sides)

Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

Stiffener Results

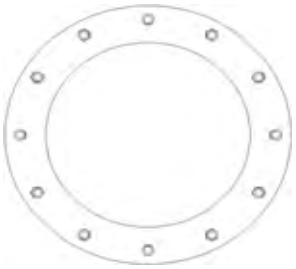
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

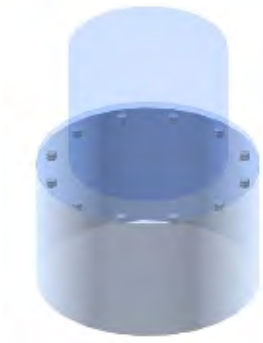
Pole Results

Pole Punching Shear Check: n/a

Pole Data

Pole OuterDiam:	22	in
Thick:	0.25	in
Pole Inner Diam:	21.5	in
Grade:	60	ksi
# of Sides:	18	"0" IF Round
Fu	75	ksi





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

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

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

Site Data

BU#: *876323*
Site Name: *Hillside*
App #:

Flange Spacer Plate

Reactions		
Moment:	18.42	ft-kips
Axial:	1.44	kips
Shear:	3.13	kips
Exterior Flange Run, T+q:		kips

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
21.87

Manufacturer:	Other

Elevation: 138 feet

Bolt Data			
Qty:	18		
Diam:	0.75	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	
N/A:		<-- Disregard	
Circle:	19	in	

Interior Flange Bolt Results

Maximum Bolt Tension, Tu:	2.5	Kips, Ext. Tu=Interior Tu
Adjusted φ*Tn (due to Vu=Vu/Qty), I	30.1	Kips
Bolt Stress Ratio:	8.3%	**Pass**

Plate Data		
Plate Outer Diam:	27.5	in
Plate Inner Diam:	15	in (Hole @ Ctr)
Thick:	1	in
Grade:	50	ksi
Effective Width:	4.80	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	2.7	Kips, Ext. Cu=Interior Cu
Plate Stress:	9.4	ksi
Allowable Plate Stress, φ*Fy:	45.0	ksi
Plate Stress Ratio:	21.0%	**Pass**

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

n/a

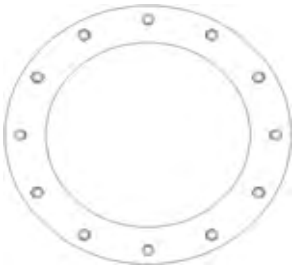
Stiffener Results

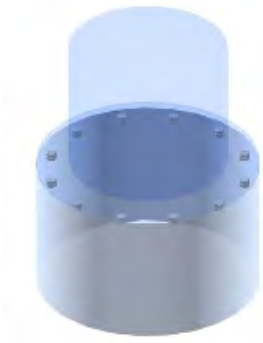
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Pole OuterDiam:	28	in
Thick:	0.25	in
Pole Inner Diam:	27.5	in
Grade:	50	ksi
# of Sides:	0	"0" IF Round
Fu	65	ksi





* 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

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

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

Site Data

BU#: *876323*
Site Name: *Hillside*
App #:

Anchor Rod Data		
Eta Factor, η	0.5	TIA G (Fig. 4-4)
Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	57	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	53	in
Thick:	3	in
Grade:	60	ksi
Clip Distance:	6	in

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

Pole Data		
Diam:	49.86	in
Thick:	0.375	in
Grade:	60	ksi
# of Sides:	18	"0" IF Round

Base Reactions		
TIA Revision:	G	
Factored Moment, Mu:	2925	ft-kips
Factored Axial, Pu:	38	kips
Factored Shear, Vu:	30	kips

Anchor Rod Results

TIA G --> Max Rod (Cu+ Vu/η):	213.4	Kips
Axial Design Strength, Φ*Fu*Anet:	260.0	Kips
Anchor Rod Stress Ratio:	82.1%	**Pass**

Base Plate Results Flexural Check

Base Plate Stress:	34.4	ksi
PL Design Bending Strength, Φ*Fy:	54.0	ksi
Base Plate Stress Ratio:	63.7%	**Pass**

PL Ref. Data
Yield Line (in): 25.09
Max PL Length: 25.09

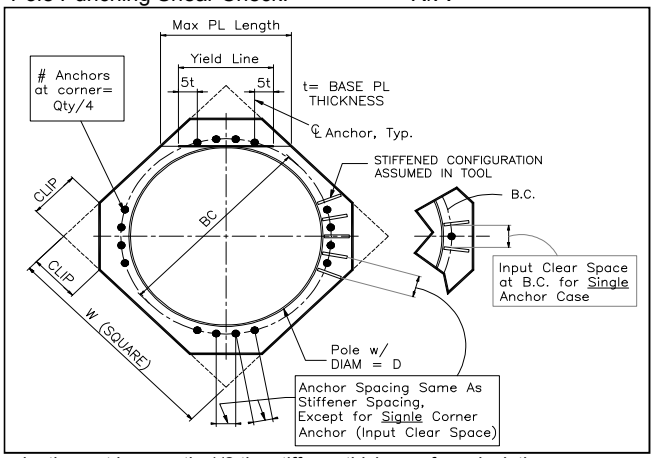
N/A - Unstiffened

Stiffener Results

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

Pole Results

Pole Punching Shear Check: N/A



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

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Job Number: 37517-0499.003.7805
Site Number: 876323
Site Name: Hillside

Page: 1
By: lgr
Date: 3/30/2017

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

Factored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, Mu =	2925.0		k-ft
Shear, Vu =	30.0		kips
Axial Load, Pu1 =	38.0		kips (from 1.2D + 1.6W)*
Axial Load, Pu2 =	28.5	0.0	kips (from 0.9D + 1.6W)**
OTMu =	2940.0	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 =	7	ft
Height Above Grade =	0.5	ft
Depth Below Grade =	21.5	ft
fc' =	3	ksi
εc =	0.003	in/in
L / D Ratio =	3.14	
Mat Ftdn. Cap Width =		ft
Mat Ftdn. Cap Length =		ft
Depth Below Grade =		ft

	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	

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 =	38	
Rebar Size =	#9	
Rebar Fy =	60	ksi
Rebar MOE =	29000	ksi
Tie Size =	#5	
Side Clear Cover to Ties =	4	in

Soil Parameters

Water Table Depth =	5.00	ft
Depth to Ignore Soil =	5.00	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 =	100.0%
Maximum Steel Ratio =	100.0%

*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	5	115		31	Sand				5
2	3	130		40	Sand				8
3	17	130		42	Sand	11700			25
4									
5									
6									
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	15.49	ft, from Grade
Bending Moment, Mu =	3404.62	k-ft, from COR
Resisting Moment, ΦMn =	5651.12	k-ft, from COR

MOMENT RATIO = 60.2% OK

Shear, Vu =	30.00	kips
Resisting Shear, ΦVn =	49.80	kips

SHEAR RATIO = 60.2% OK

Soil Results: Uplift

Uplift, Tu =	0.00	kips
Uplift Capacity, ΦTn =	78.64	kips

UPLIFT RATIO = 0.0% OK

Soil Results: Compression

Compression, Cu =	38.00	kips
Comp. Capacity, ΦCn =	310.92	kips

COMPRESSION RATIO = 12.2% OK

Steel Results (ACI 318-08):

Minimum Steel Area =	18.47	sq in
Actual Steel Area =	38.00	sq in
Axial, ΦPn (min) =	-2052.00	kips, Where ΦMn = 0 k-ft
Axial, ΦPn (max) =	8483.60	kips, Where ΦMn = 0 k-ft

Axial Load, Pu =	60.11	kips @ 6.00 ft Below Grade
Moment, Mu =	3106.96	k-ft @ 6.00 ft Below Grade
Moment, ΦMn =	5922.47	k-ft

MOMENT RATIO = 52.5% OK

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

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

Site Data

BU#: *876323*
Site Name: *Hillside*
App #:

Loads Already Factored		
For M (WL)	1	<----Disregard
For P (DL)	1	<----Disregard

Pier Properties

Concrete:

Pier Diameter =	7.0	ft
Concrete Area =	5541.8	in^2

Reinforcement:

Clear Cover to **Tie**=	4.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	6.14	ft
Vert. Cage Diameter =	73.62	in
Vertical Bar Size =	9	
Bar Diameter =	1.13	in
Bar Area =	1	in^2
Number of Bars =	38	
As Total=	38	in^2
A s/ Aconc, Rho:	0.0069	0.69%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:
(3)*(Sqrt(f'c)/Fy: 0.0027
200 / Fy: 0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.69%	**OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	8483.60	kips
at Mu=(ϕ=0.65)Mn=	5130.87	ft-kips
Max Tu, (φ=0.9) Tn =	2052	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	G	
Max. Factored Shaft Mu:	3106.96	ft-kips **(* Note)**
Max. Factored Shaft Pu:	60.11	kips
Max Axial Force Type:	Comp.	

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

Load Factor	Shaft Factored Loads		
1.00	Mu:	3106.96	ft-kips
1.00	Pu:	60.11	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code=	2008

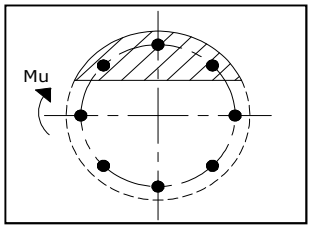
Seismic Properties

Seismic Design Category =	D
Seismic Risk =	**High**

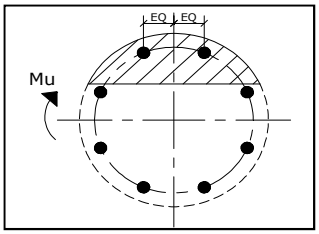
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **1**



Case 1



Case 2

Dist. From Edge to Neutral Axis:	**14.97**	in
Extreme Steel Strain, εt:	**0.0128**	
	εt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	60.11	kips
Drilled Shaft Moment Capacity, φMn:	**5922.47**	ft-kips
Drilled Shaft Superimposed Mu:	**3106.96**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**52.5%**

Exhibit E

EBI Consulting
environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CTNH506A

Crown West Haven Monopole
169 Plainfield Avenue
West Haven, CT 06516

February 16, 2017

EBI Project Number: 6217000580

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	7.13 %

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

EBI Consulting
environmental | engineering | due diligence

February 16, 2017

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

Emissions Analysis for Site: **CTNH506A – Crown West Haven Monopole**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **169 Plainfield Avenue, West Haven, 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 **169 Plainfield Avenue, West Haven, 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 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.

4) 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

5) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

6) Since some radios are ground mounted there are additional cabling losses accounted for. For each ground mounted RF path the following losses were calculated. 1.19 dB of additional cable loss for all ground mounted 700 MHz Channels and 2.07 dB of additional cable loss for all ground mounted 2100 MHz channels were factored into the calculations used for this analysis. This is based on manufacturers Specifications for 170 feet of 1-1/4" coax cable on each path. All ground mounted radios are transmitting from the Commscope SBNH-1D65C antenna.

7) 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.

8) 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.

9) The antennas used in this modeling are the **Ericsson AIR32 B66Aa/B2A** & **Commscope SBNH-1D65C** for 700 MHz, 1900 MHz (PCS) and 2100 MHz (AWS) channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR32 B66Aa/B2A** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Commscope SBNH-1D65C** has a maximum gain of **16.15 dBd** at its main lobe at 1900 MHz and a maximum gain of 13.95 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.

10) The antenna mounting height centerlines of the proposed antennas are **144 & 146 feet** above ground level (AGL).

11) 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.

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR32 B66Aa/B2A	Make / Model:	Ericsson AIR32 B66Aa/B2A	Make / Model:	Ericsson AIR32 B66Aa/B2A
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	146	Height (AGL):	146	Height (AGL):	146
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%	1.71	Antenna B1 MPE%	1.71	Antenna C1 MPE%	1.71
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Commscope SBNH-1D65C	Make / Model:	Commscope SBNH-1D65C	Make / Model:	Commscope SBNH-1D65C
Gain:	16.15 dBd / 13.95 dBd	Gain:	16.15 dBd / 13.95 dBd	Gain:	16.15 dBd / 13.95 dBd
Height (AGL):	144	Height (AGL):	144	Height (AGL):	144
Frequency Bands	1900 MHz (PCS) / 700 MHz	Frequency Bands	1900 MHz (PCS) / 700 MHz	Frequency Bands	1900 MHz (PCS) / 700 MHz
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):	4,203.10	ERP (W):	4,203.10	ERP (W):	4,203.10
Antenna A2 MPE%	1.04	Antenna B2 MPE%	1.04	Antenna C2 MPE%	1.04

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**2.75 %**
Verizon Wireless	3.16 %
Clearwire	0.11 %
Sprint	1.11 %
Site Total MPE %:	**7.13 %**

T-Mobile Sector A Total:	2.75 %
T-Mobile Sector B Total:	2.75 %
T-Mobile Sector C Total:	2.75 %
Site Total:	7.13 %

T-Mobile _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	146	8.56	AWS - 2100 MHz	1000	0.86%
T-Mobile PCS - 1900 MHz LTE	2	2,334.27	146	8.56	PCS - 1900 MHz	1000	0.86%
T-Mobile PCS - 1950 MHz UMTS	2	767.58	144	2.90	PCS - 1950 MHz	1000	0.29%
T-Mobile PCS - 1950 MHz GSM	2	767.58	144	2.90	PCS - 1950 MHz	1000	0.29%
T-Mobile 700 MHz LTE	2	566.40	144	2.14	700 MHz	467	0.46%
						Total:	**2.75%**

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:	2.75 %
Sector B:	2.75 %
Sector C:	2.75 %
T-Mobile Per Sector Maximum:	2.75 %
Site Total:	7.13 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **7.13%** 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.