Crown Castle
3530 Toringdon Way Suite 300
Charlotte NC 28277

Tel (704) 405-6600

March 10, 2015

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

RE: **T-Mobile-Exempt Modification - Crown Site BU: 871584**
T-Mobile Site ID: CT11189E
Located at: 115 Birch Mountain Road, Glastonbury, CT 06033

Dear Ms. Bachman:

This letter and exhibits are submitted on behalf of T-Mobile. T-Mobile is making modifications to certain existing sites in its Connecticut system in order to implement their 700MHz technology. Please accept this letter and exhibits as notification, pursuant to § 16-50j-73 of the Regulations of Connecticut State Agencies ("R.C.S.A."), of construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In compliance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Mr. Richard J. Johnson, Town Manager for the Town of Glastonbury, and Carolyn R. Scarrone Revocable Trust, Property Owner.

T-Mobile plans to modify the existing wireless communications facility owned by Crown Castle and located at **115 Birch Mountain Road, Glastonbury, CT 06033**. Attached are a compound plan and elevation depicting the planned changes (Exhibit-1), and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration (Exhibit-2). Also included is a power density table report reflecting the modification to T-Mobile's operations at the site (Exhibit-3).

The changes to the facility do not constitute a modification as defined in Connecticut General Statutes ("C.G.S.") § 16-50i(d) because the general physical characteristics of the facility will not be significantly changed. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for in the R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing tower. T-Mobile's replacement antennas will be located at the same elevation on the existing tower.

2. There will be no proposed modifications to the ground and no extension of boundaries.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative General Power Density table report for T-Mobile's modified facility is included as Exhibit-3.

5. A Structural Modification Report confirming that the tower and foundation can support T-Mobile's proposed modifications is included as Exhibit-2.

For the foregoing reasons, T-Mobile respectfully submits the proposed modifications to the above-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Jerry Feathers
Real Estate Specialist

Enclosure

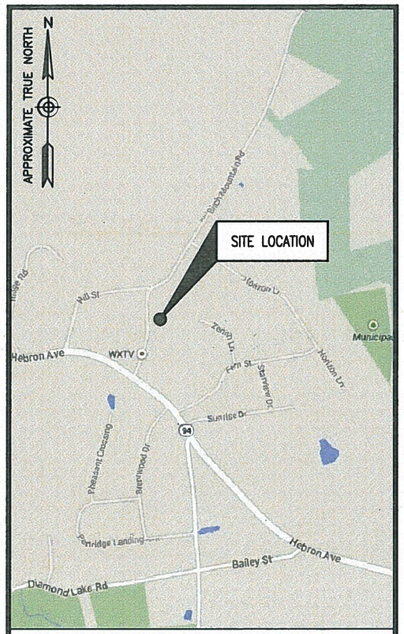
Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes
Tab 2: Exhibit-2: Structural Modification Report
Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc: Mr. Richard J. Johnson, Town Manager
Glastonbury Town Hall
2155 Main Street
Glastonbury, CT 06033

Carolyn R. Scarrone Revocable Trust
c/o Dr. Louis Scarrone
Carolyn R. Scarrone, Trustee
Glastonbury, CT 06033

T-MOBILE NORTHEAST LLC

T-MOBILE SITE #: CT11189E
CROWN CASTLE BU #: 871584
SITE NAME: JOHN TOM HILL
115 BIRCH MOUNTAIN ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY



VICINITY MAP

FROM PARSIPPANY, NJ:

DEPART SYLVAN WAY AND TAKE I-80 E TO I-95 N. TAKE EXIT 27A FOR CONNECTICUT 25/CONNECTICUT 8 TOWARD TRUMBULL/WATERBURY. CONTINUE ONTO CT-25 N/CT-8 N. KEEP RIGHT AT THE FORK TO CONTINUE ON CT-8 N, FOLLOW SIGNS FOR CONNECTICUT 8 N/CONNECTICUT 15 N/SHELTON/WATERBURY. TAKE EXIT 9 TO MERGE ONTO CT-15 N/MERRITT PKWY TOWARD CT-15. KEEP LEFT TO CONTINUE ON CT-15 N. TAKE EXIT 68 N-E TO MERGE ONTO I-91 N TOWARD CT-66 E/HARTFORD/MIDDLETOWN. TAKE EXIT 25-26 TO MERGE ONTO CT-3 N TOWARD GLASTONBURY. TAKE THE EXIT ONTO CT-2 E TOWARD NORWICH. TAKE EXIT 8 FOR CONNECTICUT 94. TURN LEFT ONTO CT-94 E/HEBRON AVE. TURN LEFT ONTO BIRCH MOUNTAIN RD. SITE WILL BE ON THE RIGHT.

ENGINEER
DEWBERRY ENGINEERS INC.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054

CONTACT: GREG NAWROTZKI
PHONE #: (973) 576-9653

CONSTRUCTION
CROWN CASTLE
500 WEST CUMMINGS PARK, SUITE 3600
WOBURN, MA 01801

CONTACT: WARREN KELLEHER
PHONE #: (781) 970-0055

CONSULTANT TEAM

SITE NAME:
JOHN TOM HILL

SITE NUMBER:
CT11189E

TOWER OWNER:
CROWN CASTLE
500 WEST CUMMINGS PARK, SUITE 3600
WOBURN, MA 01801

APPLICANT/DEVELOPER:
T-MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054

COORDINATES:
LATITUDE: 41°-42'-32.24" N (NAD83)
LONGITUDE: 72°-28'-24.41" W (NAD83)
(PER CROWN CASTLE)

CONFIGURATION
704G

PROJECT SUMMARY

SITE ADDRESS:
115 BIRCH MOUNTAIN ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

PROJECT DIRECTORY

- INSTALL (3) NEW ANTENNAS.
- INSTALL (3) NEW BIAS TEES.
- INSTALL (6) NEW LINES OF COAX.
- INSTALL (1) NEW BBU CABINET AT GRADE.

SCOPE OF WORK

THIS DOCUMENT WAS DEVELOPED TO REFLECT A SPECIFIC SITE AND ITS SITE CONDITIONS AND IS NOT TO BE USED FOR ANOTHER SITE OR WHEN OTHER CONDITIONS PERTAIN. REUSE OF THIS DOCUMENT IS AT THE SOLE RISK OF THE USER.

A.D.A. COMPLIANCE:
FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION.

SHT. NO.	DESCRIPTION
T-1	TITLE SHEET
G-1	GENERAL NOTES
C-1	COMPOUND PLAN & EQUIPMENT PLANS
C-2	ANTENNA LAYOUTS & ELEVATIONS
C-3	CONSTRUCTION DETAILS
E-1	GROUNDING NOTES & DETAILS

SHEET INDEX

T-MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054

CROWN CASTLE
500 WEST CUMMINGS PARK, SUITE 3600
WOBURN, MA 01801

CT11189E
JOHN TOM HILL

CONSTRUCTION DRAWINGS

0	03/06/15	ISSUED AS FINAL
B	03/03/15	REVISED PER COMMENTS
A	03/02/15	ISSUED FOR REVIEW

Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

STATE OF CONNECTICUT
JIANG TU
No. 23222
LICENSED PROFESSIONAL ENGINEER

CONNECTICUT LICENSE NO. 0023222

DRAWN BY:	JC
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50071487
SITE ADDRESS:	

115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

SHEET TITLE

TITLE SHEET

SHEET NUMBER

T-1

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   PROJECT MANAGEMENT – CROWN CASTLE
   CONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – T–MOBILE
   OEM – ORIGINAL EQUIPMENT MANUFACTURER
2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR 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 PROJECT MANAGEMENT.
3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. CONTRACTOR 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.
4. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
5. DRAWINGS PROVIDED HERE ARE NOT TO SCALE UNLESS OTHERWISE NOTED AND ARE INTENDED TO SHOW OUTLINE ONLY.
6. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY PROJECT MANAGEMENT.
9. CONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. CONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. CONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH PROJECT MANAGEMENT.
10. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.
11. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
12. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
13. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
14. CONTRACTOR SHALL NOTIFY DEWBERRY 48 HOURS IN ADVANCE OF POURING CONCRETE, OR BACKFILLING TRENCHES, SEALING ROOF AND WALL PENETRATIONS & POST DOWNS, FINISHING NEW WALLS OR FINAL ELECTRICAL CONNECTIONS FOR ENGINEER REVIEW.
15. CONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. CONTRACTOR SHALL NOTIFY PROJECT MANAGEMENT OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
16. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY CONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
17. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

SITE WORK GENERAL NOTES:

1. THE CONTRACTOR 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 CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR 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. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION.
7. THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE T–MOBILE 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 SOIL COMPACTION NOTES.
11. THE AREAS OF THE OWNER'S 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.

ELECTRICAL INSTALLATION NOTES:

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE LOCAL CODES.
2. CONTRACTOR SHALL MODIFY EXISTING CABLE TRAY SYSTEM AS REQUIRED TO SUPPORT RF AND TRANSPORT CABLING TO THE NEW BTS EQUIPMENT. CONTRACTOR SHALL SUBMIT MODIFICATIONS TO PROJECT MANAGEMENT FOR APPROVAL.
3. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED.
4. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC AND TELCORDIA.
5. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC AND TELCORDIA.
6. CABLES SHALL NOT BE ROUTED THROUGH LADDER–STYLE CABLE TRAY RUNGS.
7. 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, AND MATCH EXISTING INSTALLATION REQUIREMENTS.
8. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC 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).
9. PANELBOARDS (ID NUMBERS) AND INTERNAL CIRCUIT BREAKERS (CIRCUIT ID NUMBERS) SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS.
10. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.
11. 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.
12. POWER PHASE CONDUCTORS (I.E., HOTS) SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL.) PHASE CONDUCTOR COLOR CODES SHALL CONFORM WITH THE NEC & OSHA AND MATCH EXISTING INSTALLATION REQUIREMENTS.
13. 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.
14. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED OUTDOORS, OR BELOW GRADE, SHALL BE SINGLE CONDUCTOR #2 AWG SOLID TINNED COPPER CABLE, UNLESS OTHERWISE SPECIFIED.
15. 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.
16. 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).
17. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.
18. NEW RACEWAY OR CABLE TRAY WILL MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.
19. 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.
20. ELECTRICAL METALLIC TUBING (EMT), ELECTRICAL NONMETALLIC TUBING (ENT), OR RIGID NONMETALLIC CONDUIT (RIGID PVC, SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
21. GALVANIZED STEEL INTERMEDIATE METALLIC CONDUIT (IMC) SHALL BE USED FOR OUTDOOR LOCATIONS ABOVE GRADE.
22. 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.
23. LIQUID–TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID–TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
24. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION–TYPE AND APPROVED FOR THE LOCATION USED. SETSCREW FITTINGS ARE NOT ACCEPTABLE.
25. CABINETS, BOXES, AND WIREWAYS SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.
26. CABINETS, BOXES, AND WIREWAYS TO MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.
27. 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.
28. 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.
29. 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.
30. 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.
31. THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM PROJECT MANAGEMENT BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
32. THE CONTRACTOR 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.

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. ALL CONCRETING WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.
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 (UNO). SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD, UNO.
4. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:

   CONCRETE CAST AGAINST EARTH.....3 IN.
   CONCRETE EXPOSED TO EARTH OR WEATHER:
   #6 AND LARGER .....2 IN.
   #5 AND SMALLER & WWF.....1 1/2 IN.
   CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:
   SLAB AND WALL .....3/4 IN.
   BEAMS AND COLUMNS.....1 1/2 IN.

5. A CHAMFER 3/4" 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 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 CYLINDER TESTS THAT COMPRESSIVE STRENGTH HAS BEEN ATTAINED.

STRUCTURAL STEEL NOTES:

1. ALL STEEL WORK SHALL BE PAINTED OR GALVANIZED IN ACCORDANCE WITH THE DRAWINGS 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.
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 OR APPROVED EQUAL.
6. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ENGINEER REVIEW & APPROVAL ON PROJECTS REQUIRING STRUCTURAL STEEL.
7. ALL STRUCTURAL STEEL WORK SHALL BE DONE IN ACCORDANCE WITH AISC SPECIFICATIONS.

CONSTRUCTION NOTES:

1. FIELD VERIFICATION:
   CONTRACTOR SHALL FIELD VERIFY SCOPE OF WORK, T–MOBILE ANTENNA PLATFORM LOCATION AND ANTENNAS TO BE REPLACED.
2. COORDINATION OF WORK:
   CONTRACTOR SHALL COORDINATE RF WORK AND PROCEDURES WITH PROJECT MANAGEMENT.
3. CABLE LADDER RACK:
   CONTRACTOR SHALL FURNISH AND INSTALL CABLE LADDER RACK, CABLE TRAY, AND CONDUIT AS REQUIRED TO SUPPORT CABLES TO THE NEW BTS LOCATION.
4. GROUNDING OF ALL EQUIPMENT AND ANTENNAS IS NOT CONSIDERED PART OF THE SCOPE OF THIS PROJECT AND IS THE RESPONSIBILITY OF THE OWNER AND CONTRACTOR AT THE TIME OF CONSTRUCTION. ALL EQUIPMENT AND ANTENNAS TO BE INSTALLED AND GROUNDED IN ACCORDANCE WITH GOVERNING BUILDING CODE, MANUFACTURER RECOMMENDATIONS AND OWNER SPECIFICATIONS.

T-Mobile

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CROWN CASTLE

CROWN CASTLE
500 WEST CUMMINGS PARK, SUITE 3600
WOBURN, MA 01801

CT11189E
JOHN TOM HILL

CONSTRUCTION DRAWINGS		
0	03/06/15	ISSUED AS FINAL
B	03/03/15	REVISED PER COMMENTS
A	03/02/15	ISSUED FOR REVIEW

Dewberry

Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

STATE OF CONNECTICUT
JIANG YU
No. 23222
LICENSED
PROFESSIONAL ENGINEER

CONNECTICUT LICENSE NO. 0023222

DRAWN BY:	JC
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50071487
SITE ADDRESS:	

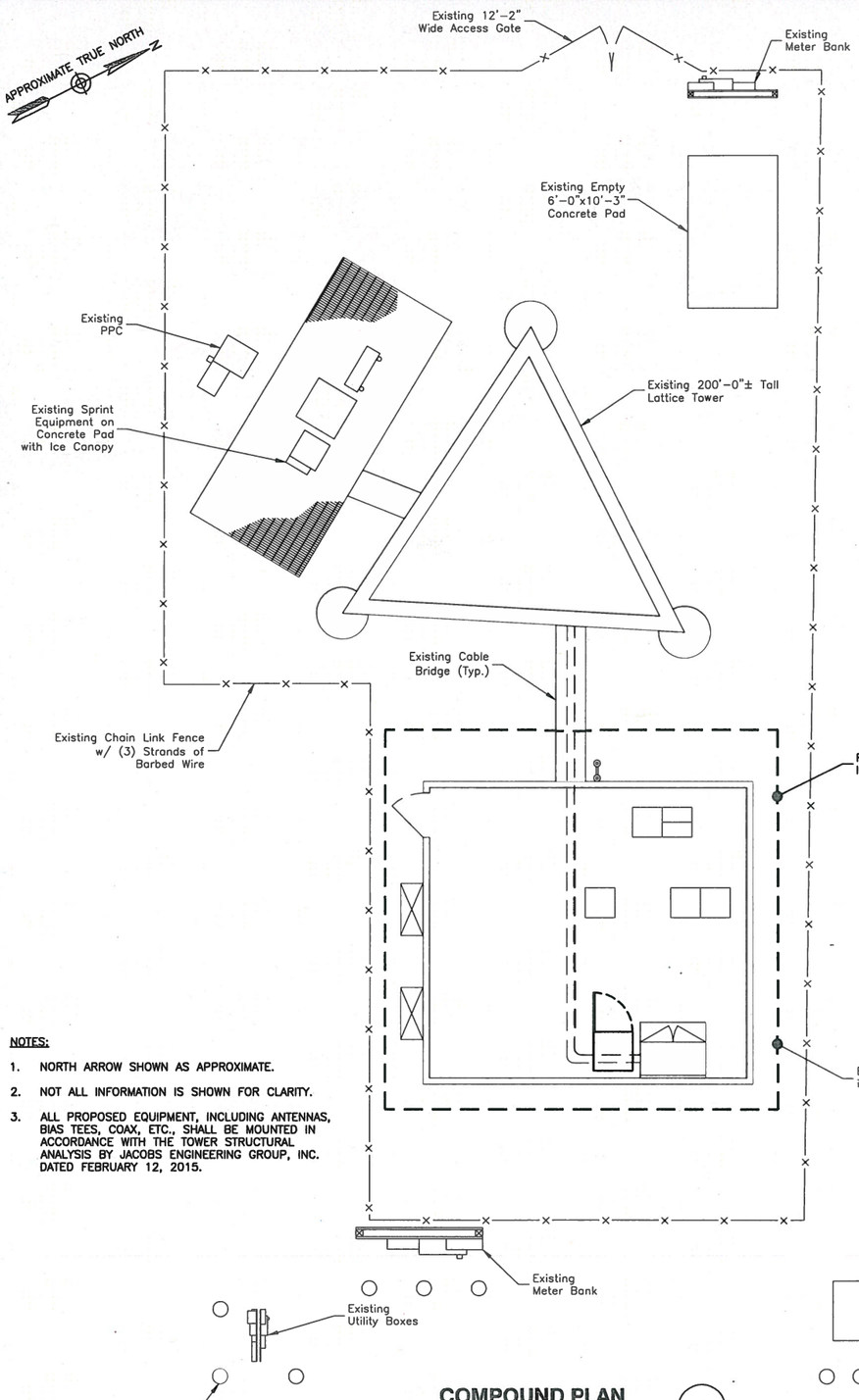
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

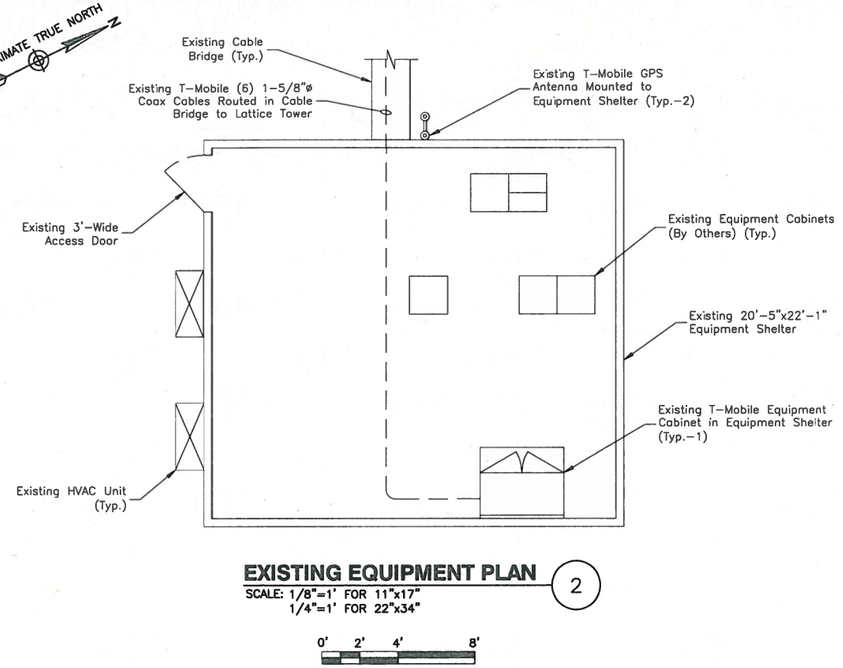
G–1



COMPOUND PLAN 1

SCALE: 1"=10' FOR 11"x17"
1"=5' FOR 22"x34"

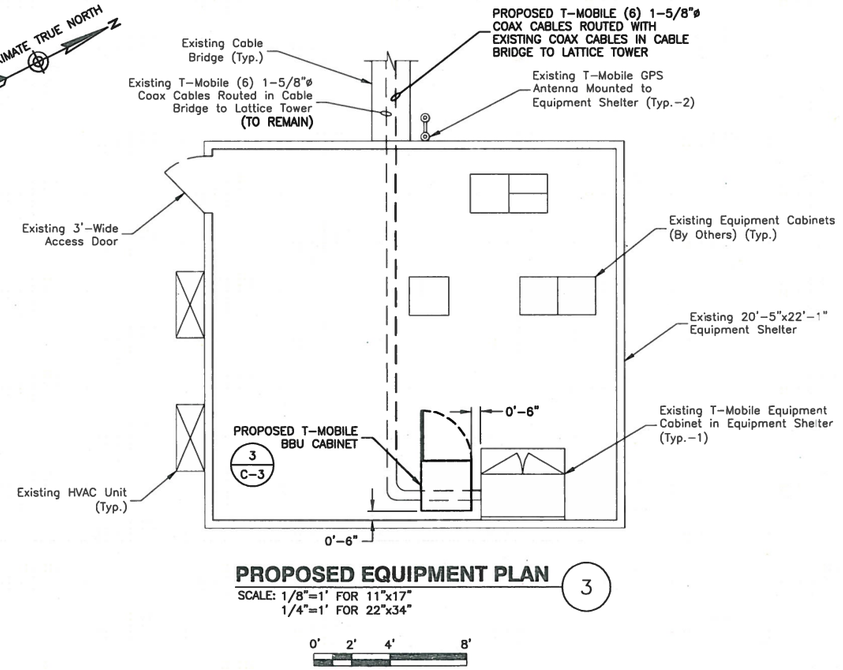
0' 5' 10'



EXISTING EQUIPMENT PLAN 2

SCALE: 1/8"=1' FOR 11"x17"
1/4"=1' FOR 22"x34"

0' 2' 4' 8'



PROPOSED EQUIPMENT PLAN 3

SCALE: 1/8"=1' FOR 11"x17"
1/4"=1' FOR 22"x34"

0' 2' 4' 8'

NOTES:

1. NORTH ARROW SHOWN AS APPROXIMATE.
2. NOT ALL INFORMATION IS SHOWN FOR CLARITY.
3. ALL PROPOSED EQUIPMENT, INCLUDING ANTENNAS, BIAS TEES, COAX, ETC., SHALL BE MOUNTED IN ACCORDANCE WITH THE TOWER STRUCTURAL ANALYSIS BY JACOBS ENGINEERING GROUP, INC. DATED FEBRUARY 12, 2015.

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CT11189E
JOHN TOM HILL

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STATE OF CONNECTICUT
JIANG YU
28222
LICENSED PROFESSIONAL ENGINEER
CONNECTICUT LICENSE NO. 0023222

DRAWN BY:	JC
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50071487
SITE ADDRESS:	

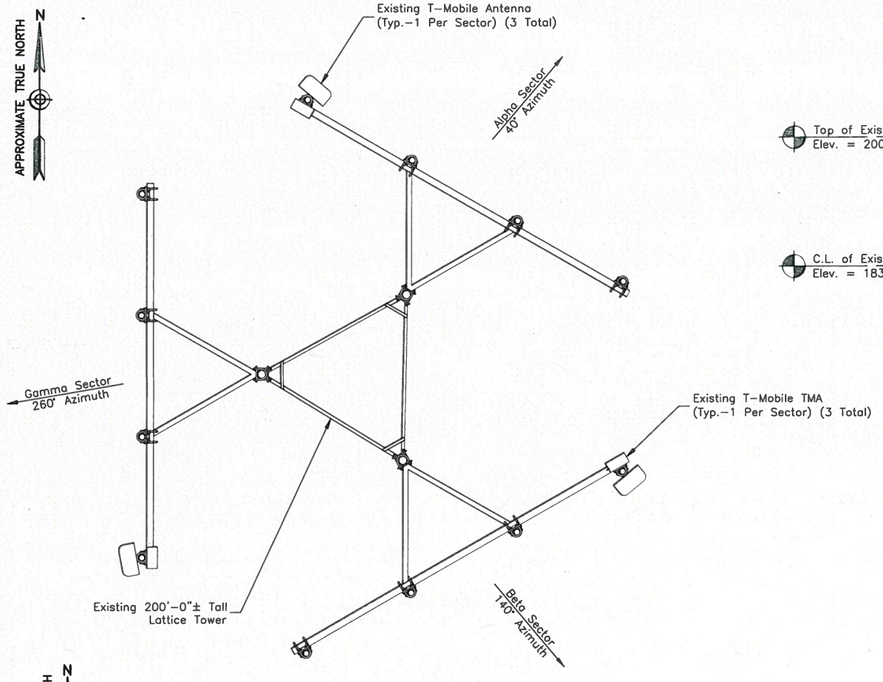
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

SHEET TITLE

COMPOUND PLAN & EQUIPMENT PLANS

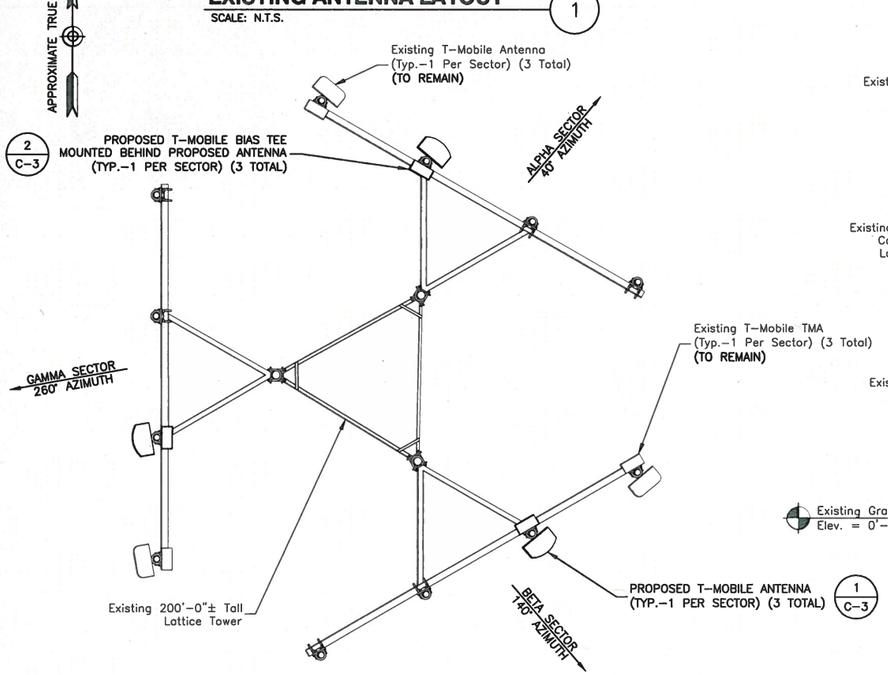
SHEET NUMBER

C-1



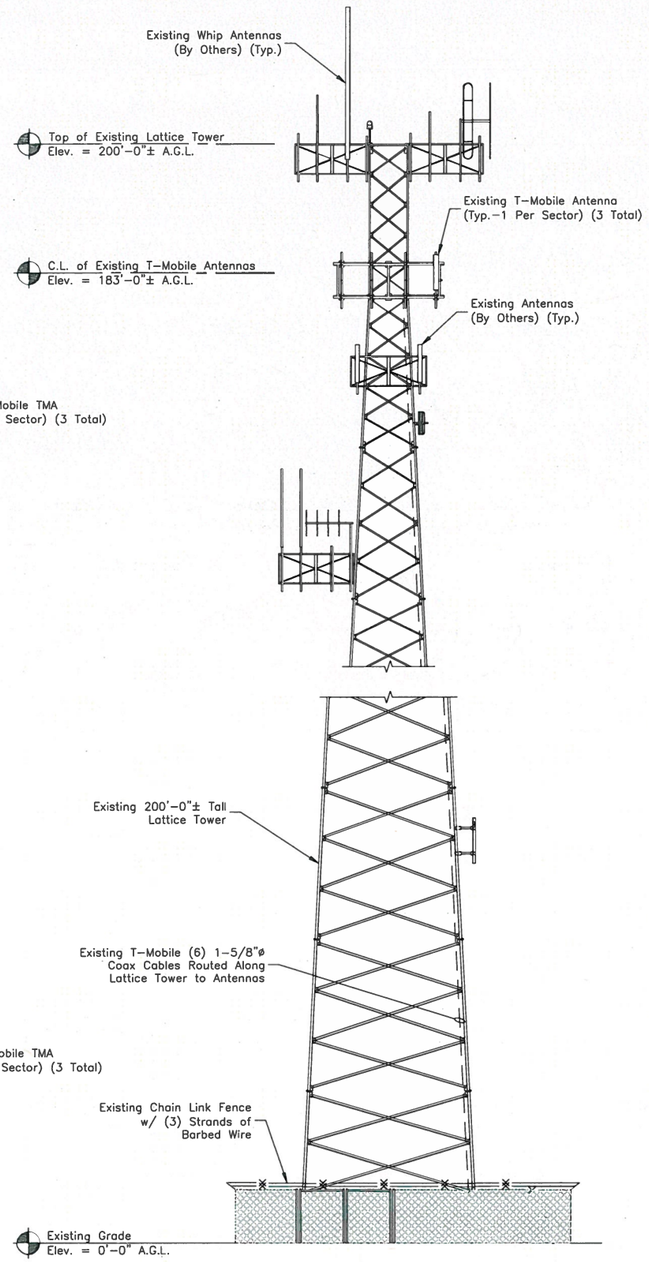
EXISTING ANTENNA LAYOUT (1)

SCALE: N.T.S.



PROPOSED ANTENNA LAYOUT (2)

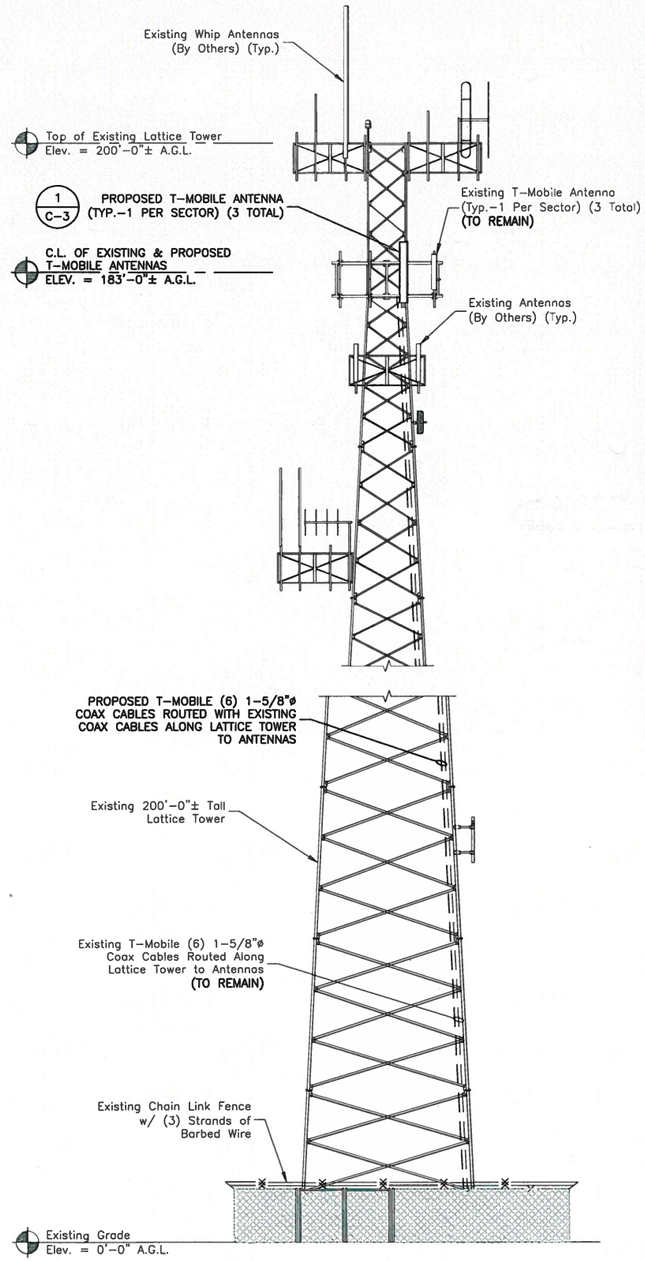
SCALE: N.T.S.



EXISTING ELEVATION (3)

SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"

0' 10' 20'



PROPOSED ELEVATION (4)

SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"

0' 10' 20'

NOTES:

1. ALL PROPOSED EQUIPMENT, INCLUDING ANTENNAS, BIAS TEES, COAX, ETC., SHALL BE MOUNTED IN ACCORDANCE WITH THE TOWER STRUCTURAL ANALYSIS BY JACOBS ENGINEERING GROUP, INC. DATED FEBRUARY 12, 2015.
2. DEWBERRY HAS NOT BEEN CONTRACTED TO PERFORM A STRUCTURAL ANALYSIS ON THE EXISTING ANTENNA MOUNT AND THEREFORE ASSUMES NO RESPONSIBILITY FOR THE STRUCTURAL CAPACITY.

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JOHN TOM HILL

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STATE OF CONNECTICUT
JIANG XU
No. 23222
LICENSED
PROFESSIONAL ENGINEER

CONNECTICUT LICENSE NUMBER 0023222

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

DRAWN BY:	JC
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50071487
SITE ADDRESS:	

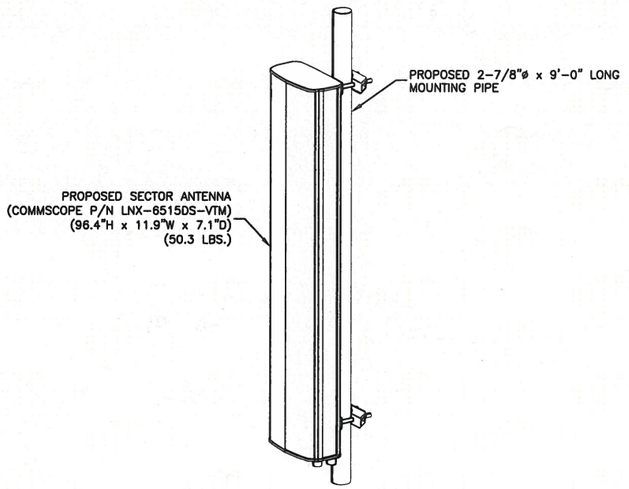
115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

SHEET TITLE

ANTENNA LAYOUTS & ELEVATIONS

SHEET NUMBER

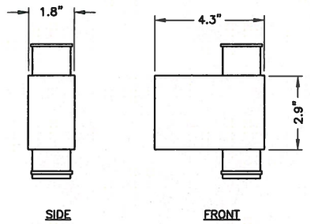
C-2



NOTES:

1. MOUNT ANTENNAS PER MANUFACTURER'S RECOMMENDATIONS.
2. GROUND ANTENNAS AND MOUNTS PER MANUFACTURER'S RECOMMENDATIONS AND T-MOBILE STANDARDS.
3. CONFIRM REQUIRED ANTENNAS WITH THE LATEST RFDS.

ISOMETRIC ANTENNA DETAIL 1
SCALE: N.T.S.

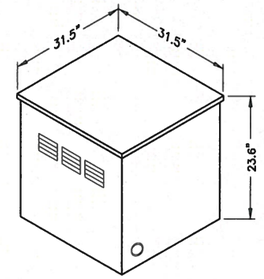


ANDREW ATBT-BOTTOM-24V

NOTES:

1. MOUNT EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS.
2. GROUND EQUIPMENT AND MOUNTS PER MANUFACTURER'S RECOMMENDATIONS AND T-MOBILE STANDARDS.
3. CONFIRM REQUIRED EQUIPMENT WITH THE LATEST RFDS.

BIAS TEE DETAIL 2
SCALE: N.T.S.



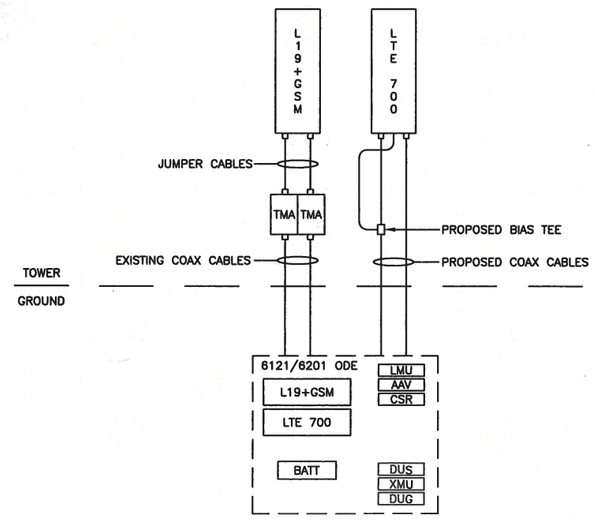
ALCATEL-LUCENT EZBFo BATTERY BACKUP SYSTEM

MATERIAL:	ANCHOR:
CONCRETE	3/8"ø HILTI KWIK BOLT 3 W/2-1/2" MIN. EMBED.
STRUCTURAL STEEL	1/2"ø STRUCTURAL BOLTS

NOTE:

1. CONTRACTOR SHALL ANCHOR CABINET IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.

BBU CABINET DETAIL 3
SCALE: N.T.S.



SITE CONFIGURATION 704G 4
SCALE: N.T.S.

DESIGN CONFIGURATION

	ANTENNAS		COAX		COAX LENGTH
	EXISTING	PROPOSED	EXISTING	PROPOSED	
ALPHA	EMS RR90-17-02DP	EXISTING TO REMAIN	(2) 1-5/8"ø	(2) 1-5/8"ø	233'-0"
	–	COMMSCOPE LNX-6515DS-VTM			
BETA	EMS RR90-17-02DP	EXISTING TO REMAIN	(2) 1-5/8"ø	(2) 1-5/8"ø	233'-0"
	–	COMMSCOPE LNX-6515DS-VTM			
GAMMA	EMS RR90-17-02DP	EXISTING TO REMAIN	(2) 1-5/8"ø	(2) 1-5/8"ø	233'-0"
	–	COMMSCOPE LNX-6515DS-VTM			

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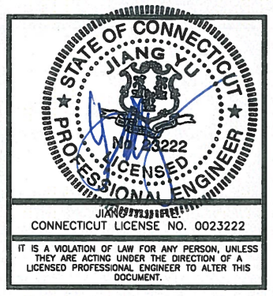


JIANG YU
CONNECTICUT LICENSE NO. 0023222

DRAWN BY:	JC
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50071487

SITE ADDRESS:

115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

SHEET TITLE

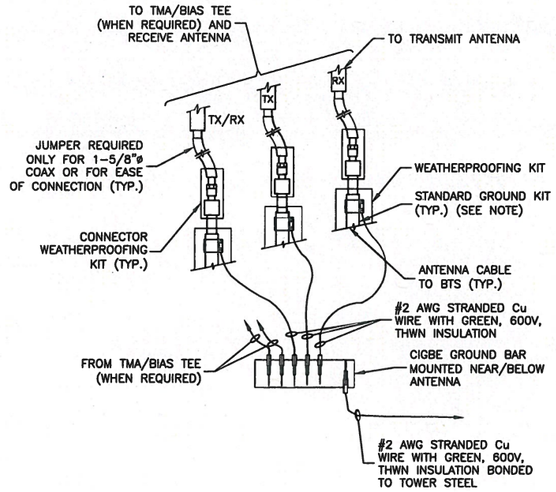
CONSTRUCTION DETAILS

SHEET NUMBER

C-3

GROUNDING NOTES:

1. THE CONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ). THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE CONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE ENGINEER FOR RESOLUTION.
2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS. ALL AVAILABLE GROUNDING ELECTRODES SHALL BE CONNECTED TOGETHER IN ACCORDANCE WITH THE NEC.
3. THE CONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS. USE OF OTHER METHODS MUST BE PRE-APPROVED BY THE ENGINEER IN WRITING.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS ON TOWER SITES AND 10 OHMS OR LESS ON ROOFTOP SITES. WHEN ADDING ELECTRODES, CONTRACTOR SHALL MAINTAIN A MINIMUM DISTANCE BETWEEN THE ADDED ELECTRODE AND ANY OTHER EXISTING ELECTRODE EQUAL TO THE BURIED LENGTH OF THE ROD. IDEALLY, CONTRACTOR SHALL STRIVE TO KEEP THE SEPARATION DISTANCE EQUAL TO TWICE THE BURIED LENGTH OF THE RODS.
5. THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT.
6. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWG COPPER WIRE AND UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
7. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO TRANSMISSION EQUIPMENT.
8. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED. BACK-TO-BACK CONNECTIONS ON OPPOSITE SIDES OF THE GROUND BUS ARE PERMITTED.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED. IN ALL CASES, BENDS SHALL BE MADE WITH A MINIMUM BEND RADIUS OF 8 INCHES.
11. EACH INTERIOR TRANSMISSION CABINET FRAME/PLINTH SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH 6 AWG STRANDED, GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRE UNLESS NOTED OTHERWISE IN THE DETAILS. EACH OUTDOOR CABINET FRAME/PLINTH SHALL BE DIRECTLY CONNECTED TO THE BURIED GROUND RING WITH 2 AWG SOLID TIN-PLATED COPPER WIRE UNLESS NOTED OTHERWISE IN THE DETAILS.
12. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING, SHALL BE 2 AWG SOLID TIN-PLATED COPPER UNLESS OTHERWISE INDICATED.
13. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE. CONNECTIONS TO ABOVE GRADE UNITS SHALL BE MADE WITH EXOTHERMIC WELDS WHERE PRACTICAL OR WITH 2 HOLE MECHANICAL TYPE BRASS CONNECTORS WITH STAINLESS STEEL HARDWARE, INCLUDING SET SCREWS. HIGH PRESSURE CRIMP CONNECTORS MAY ONLY BE USED WITH WRITTEN PERMISSION FROM T-MOBILE MARKET REPRESENTATIVE.
14. EXOTHERMIC WELDS SHALL BE PERMITTED ON TOWERS ONLY WITH THE EXPRESS APPROVAL OF THE TOWER MANUFACTURER OR THE CONTRACTORS STRUCTURAL ENGINEER.
15. ALL WIRE TO WIRE GROUND CONNECTIONS TO THE INTERIOR GROUND RING SHALL BE FORMED USING HIGH PRESS CRIMPS OR SPLIT BOLT CONNECTORS WHERE INDICATED IN THE DETAILS.
16. ON ROOFTOP SITES WHERE EXOTHERMIC WELDS ARE A FIRE HAZARD COPPER COMPRESSION CAP CONNECTORS MAY BE USED FOR WIRE TO WIRE CONNECTORS. 2 HOLE MECHANICAL TYPE BRASS CONNECTORS WITH STAINLESS STEEL HARDWARE, INCLUDING SET SCREWS SHALL BE USED FOR CONNECTION TO ALL ROOFTOP TRANSMISSION EQUIPMENT AND STRUCTURAL STEEL.
17. COAX BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR USING TWO-HOLE MECHANICAL TYPE BRASS CONNECTORS AND STAINLESS STEEL HARDWARE.
18. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
19. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
20. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
21. BOND ALL METALLIC OBJECTS WITHIN 6 FT OF THE BURIED GROUND RING WITH 2 AWG SOLID TIN-PLATED COPPER GROUND CONDUCTOR. DURING EXCAVATION FOR NEW GROUND CONDUCTORS, IF EXISTING GROUND CONDUCTORS ARE ENCOUNTERED, BOND EXISTING GROUND CONDUCTORS TO NEW CONDUCTORS.
22. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G., NON-METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT WITH LISTED BONDING FITTINGS.

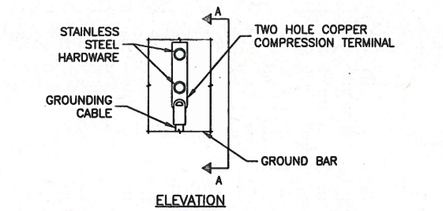


NOTE:

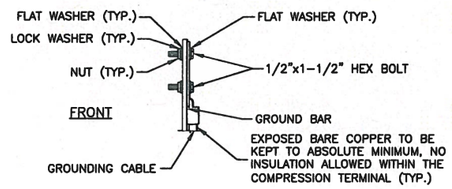
1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE.

CONNECTION OF GROUND WIRES TO GROUNDING BAR (CIGBE) — 1

SCALE: N.T.S.



ELEVATION



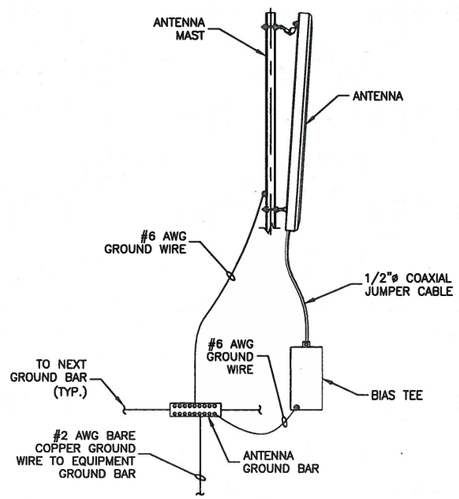
SECTION 'A-A'

NOTES:

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

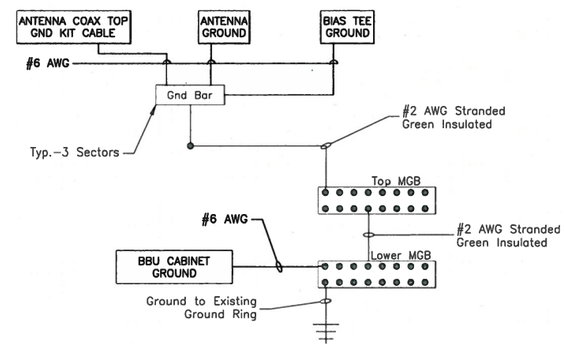
TYPICAL GROUND BAR MECHANICAL CONNECTION DETAIL — 2

SCALE: N.T.S.



TYPICAL ANTENNA GROUNDING DETAIL — 3

SCALE: N.T.S



NOTES:

1. BOND ANTENNA GROUNDING KIT CABLE TO TOP CIGBE
2. BOND ANTENNA GROUNDING KIT CABLE TO BOTTOM CIGBE.
3. SCHEMATIC GROUNDING DIAGRAM IS TYPICAL FOR EACH SECTOR.
4. VERIFY EXISTING GROUND SYSTEM IS INSTALLED PER T-MOBILE STANDARDS.

SCHEMATIC GROUNDING DIAGRAM — 4

SCALE: N.T.S.

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JOHN TOM HILL

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STATE OF CONNECTICUT
JIANG LI
No. 23222
LICENSED PROFESSIONAL ENGINEER
CONNECTICUT LICENSE NO. 0023222

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115 BIRCH MTN. ROAD
GLASTONBURY, CT 06033
HARTFORD COUNTY

SHEET TITLE

GROUNDING NOTES & DETAILS

SHEET NUMBER

E-1

Date: **February 12, 2015**

JACOBS
Jacobs Engineering Group. Inc.

Holly Haas
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3530 Toringdon Way Suite 300
Charlotte, NC 28277

5449 Bells Ferry Road
Acworth, GA 301102
(770) 701-2500

Subject:	**Structural Analysis Report**	
Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11189E
	Carrier Site Name:	Glastonbury/ Rt 94 & Fern
Crown Castle Designation:	**Crown Castle BU Number:**	871584
	Crown Castle Site Name:	John Tom Hill
	Crown Castle JDE Job Number:	322291
	Crown Castle Work Order Number:	1005912
	Crown Castle Application Number:	282547 Rev. 0
Engineering Firm Designation:	**Jacobs Engineering Group, Inc. Project Number:**	1005912
Site Data:	**115 Birch Mtn. Road, GLASTONBURY, Hartford County, CT** **Latitude *41° 42' 32.24"*, Longitude *-72° 28' 24.41"*** **200 Foot - Self Support Tower**	

Dear Holly Haas,

Jacobs Engineering Group, Inc. 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 754645, in accordance with application 282547, revision 0.

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:

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and the 2005 CT State Building Code based upon a wind speed of 80 mph fastest mile.

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

We at *Jacobs Engineering Group, Inc.* 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:

Kristi Holder

Kristi Holder, EI
Structural Engineer

Reviewed By:

Matthew Watkins, P.E.
Engineering Project Manager

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 200 ft Self Support tower designed by SABRE COMMUNICATIONS in November of 1998. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1.00 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
182.0	183.0	3	commscope	ATBT-BOTTOM-24V	6	1-5/8	-
		3	commscope	LNX-6515DS-VTM w/ Mount Pipe			

Table 2 - Existing 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
198.0	208.0	1	rfs celwave	ALR10-O	4 1	7/8 1/2	1
	205.0	1	decibel	DB225-A			
		1	rfs celwave	PD1107-1	-	-	2
		1	rfs celwave	PD201-7			
	204.0	1	scala	OGB6-928N	-	-	1
	198.0	1	crown mounts	Sector Mount [SM 602-3]			
182.0	183.0	3	ems wireless	RR90-17-02DP w/ Mount Pipe	6	1-5/8	1
	182.0	3	ericsson	KRY 112 71			
		1	crown mounts	Sector Mount [SM 602-3]			
170.0	171.0	6	decibel	DB980H90E-M w/ Mount Pipe	6 1	1-5/8 1/2	1
	170.0	1	crown mounts	Sector Mount [SM 506-3]			
163.0	163.0	1	kathrein	PR-850	1	1/2	1
		1	crown mounts	Pipe Mount [PM 601-1]			
144.0	155.0	1	sinclair	SRL480N1DT4	-	-	2
	152.0	2	rfs celwave	PD1109-1	3 1	1/2 7/8	1
	150.0	1	rfs celwave	PD156S-4			
	144.0	1	crown mounts	Sector Mount [SM 602-3]			
53.0	55.0	1	lucent	KS24019-L112A	1	1/2	1
	53.0	1	crown mounts	Side Arm Mount [SO 202-1]			

Notes:
1) Existing Equipment
2) Abandoned Equipment; Considered In This Analysis

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)
180.0	180.0	9	Dapa	DB809	9	7/8
160.0	160.0	9	Dapa	DB809	9	7/8
140.0	140.0	12	Dapa	2980	12	1-5/8
120.0	120.0	12	Dapa	2980	12	1-5/8
100.0	100.0	12	Dapa	2980	12	1-5/8
80.0	80.0	1	Generic	6' Dish	1	EW64
70.0	70.0	1	Generic	1 Meter Dish	1	7/8
60.0	60.0	1	Generic	1 Meter Dish	1	7/8
50.0	50.0	1	Generic	1 Meter Dish	1	7/8

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clarence Welti Assoc., Inc.	1404208	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Sabre Communications	1333892	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Sabre Communications	1403674	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

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

This analysis may be affected if any assumptions are not valid or have been made in error. Jacobs Engineering Group, Inc. 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
T1	200 - 180	Leg	Pipe 2.875" x 0.375" (2.5 #160)	3	-14.50	84.26	17.2	Pass
T2	180 - 160	Leg	Pipe 3.5" x 0.300" (3 XS)	33	-41.41	96.06	43.1	Pass
T3	160 - 140	Leg	Pipe 4" x 0.318" (3.5 XS)	60	-68.21	122.40	55.7	Pass
T4	140 - 120	Leg	Pipe 4.5" x 0.438" (4 #120)	87	-94.22	174.90	53.9	Pass
T5	120 - 100	Leg	Pipe 5.563" x 0.375" (5 XS)	108	-119.69	206.29	58.0	Pass
T6	100 - 80	Leg	Pipe 5.563" x 0.375" (5 XS)	129	-144.59	206.29	70.1	Pass
T7	80 - 60	Leg	Pipe 6.625" x 0.432" (6 EH)	150	-167.20	264.31	63.3	Pass
T8	60 - 40	Leg	Pipe 8.625" x 0.322" (8 STD)	165	-191.59	287.78	66.6	Pass
T9	40 - 20	Leg	Pipe 8.625" x 0.500" (8 XS)	180	-216.08	435.22	49.6	Pass
T10	20 - 0	Leg	Pipe 8.625" x 0.500" (8 XS)	195	-247.25	435.64	56.8	Pass
T1	200 - 180	Diagonal	L1 3/4x1 3/4x3/16	10	-2.77	9.23	30.1 34.2 (b)	Pass
T2	180 - 160	Diagonal	L1 3/4x1 3/4x3/16	37	-3.13	6.30	49.6	Pass
T3	160 - 140	Diagonal	L1 3/4x1 3/4x3/16	64	-3.83	4.35	88.0	Pass
T4	140 - 120	Diagonal	L2 1/2x2 1/2x3/16	91	-4.45	8.21	54.2	Pass
T5	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	112	-4.79	6.38	75.0	Pass
T6	100 - 80	Diagonal	L3x3x3/16	133	-5.15	8.76	58.8	Pass
T7	80 - 60	Diagonal	L3 1/2x3 1/2x1/4	154	-6.22	12.65	49.1	Pass
T8	60 - 40	Diagonal	L3 1/2x3 1/2x1/4	169	-6.88	10.81	63.6	Pass
T9	40 - 20	Diagonal	L3 1/2x3 1/2x1/4	184	-7.32	9.14	80.1	Pass
T10	20 - 0	Diagonal	L4x4x1/4	199	-8.27	11.79	70.2	Pass
T1	200 - 180	Top Girt	L1 3/4x1 3/4x3/16	4	-0.06	5.17	1.1	Pass
							Summary	
						Leg (T6)	70.1	Pass
						Diagonal (T3)	88.0	Pass
						Top Girt (T1)	1.1	Pass
						Bolt Checks	49.3	Pass
						RATING =	**88.0**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	49.3	Pass
1	Base Foundation Structural	0	73.9	Pass
1	Base Foundation Soil Interaction	0	68.2	Pass

Structure Rating (max from all components) =	88.0%

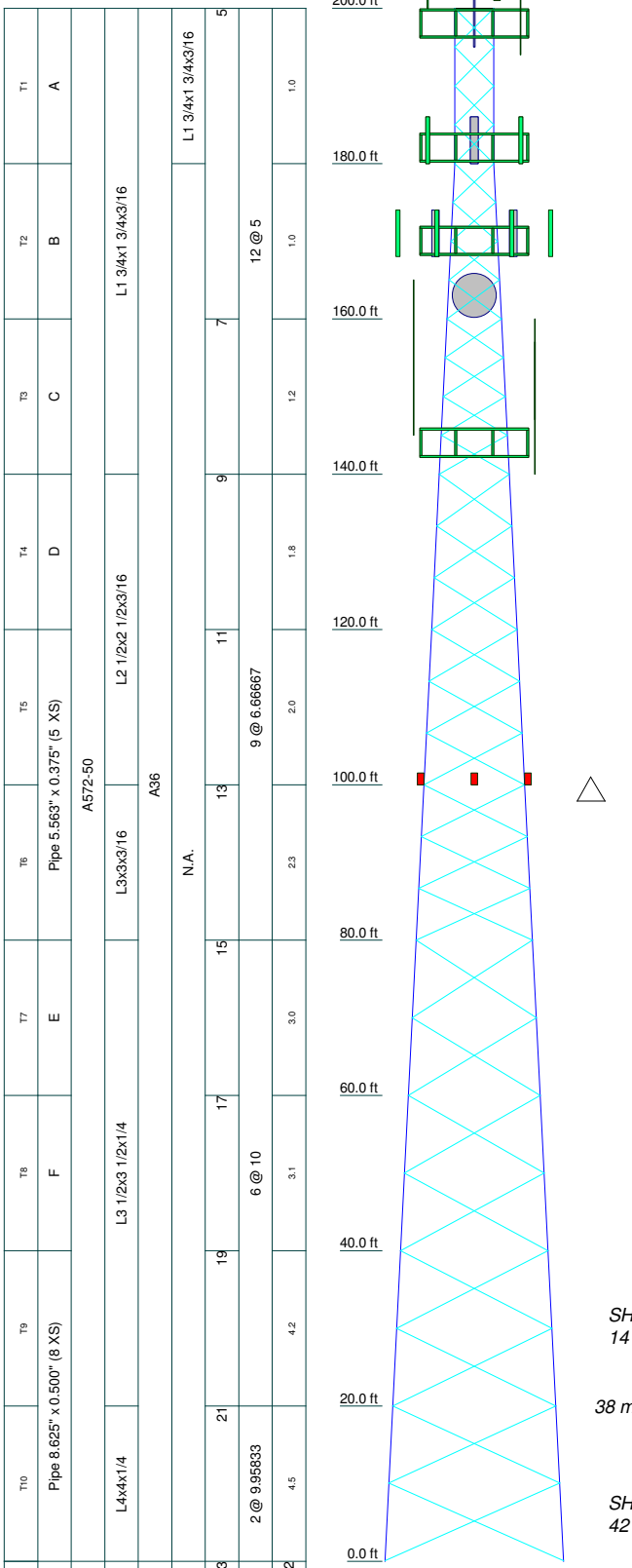
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Beacon	200	(2) 6' x 2" Mount Pipe	182
DB225-A	198	Sector Mount [SM 602-3]	182
ALR10-O	198	(2) DB980H90E-M w/ Mount Pipe	170
OGB6-928N	198	(2) DB980H90E-M w/ Mount Pipe	170
PD1107-1	198	(2) DB980H90E-M w/ Mount Pipe	170
PD201-7	198	6' x 2" Mount Pipe	170
(4) 6' x 2" Mount Pipe	198	6' x 2" Mount Pipe	170
(4) 6' x 2" Mount Pipe	198	6' x 2" Mount Pipe	170
(4) 6' x 2" Mount Pipe	198	Sector Mount [SM 506-3]	170
Sector Mount [SM 602-3]	198	Pipe Mount [PM 601-1]	163
RR90-17-02DP w/ Mount Pipe	182	PR-850	163
RR90-17-02DP w/ Mount Pipe	182	PD156S-4	144
RR90-17-02DP w/ Mount Pipe	182	SRL480N1DT4	144
KRY 112 71	182	(2) PD1109-1	144
KRY 112 71	182	(4) 6' x 2" Mount Pipe	144
KRY 112 71	182	(4) 6' x 2" Mount Pipe	144
LNX-6515DS-VTM w/ Mount Pipe	182	(4) 6' x 2" Mount Pipe	144
LNX-6515DS-VTM w/ Mount Pipe	182	Sector Mount [SM 602-3]	144
LNX-6515DS-VTM w/ Mount Pipe	182	Sidemarker	100
ATBT-BOTTOM-24V	182	Sidemarker	100
ATBT-BOTTOM-24V	182	Sidemarker	100
ATBT-BOTTOM-24V	182	Side Arm Mount [SO 202-1]	53
(2) 6' x 2" Mount Pipe	182	KS24019-L112A	53
(2) 6' x 2" Mount Pipe	182		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pipe 2.875" x 0.375" (2.5 #160)	D	Pipe 4.5" x 0.438" (4 #120)
B	Pipe 3.5" x 0.300" (3 XS)	E	Pipe 6.625" x 0.432" (6 EH)
C	Pipe 4" x 0.318" (3.5 XS)	F	Pipe 8.625" x 0.322" (8 STD)

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 88%

MAX. CORNER REACTIONS AT BASE:
DOWN: 246 K
SHEAR: 26 K

UPLIFT: -198 K
SHEAR: 22 K

AXIAL
95 K
SHEAR
14 K
MOMENT
1647 kip-ft
TORQUE 5 kip-ft
38 mph WIND - 1.0000 in ICE

AXIAL
44 K
SHEAR
42 K
MOMENT
4608 kip-ft
TORQUE 22 kip-ft
REACTIONS - 80 mph WIND

Jacobs Engineering Group, Inc.
JACOBS
5449 Bells Ferry Road
Acworth, GA 301102
Phone: (770) 701-2500
FAX: (770) 701-2501

Job: *John Tom Hill BU 871584*			
Project: *1005912*			
Client: Crown Castle	Drawn by: holderkg	App'd:	
Code: TIA/EIA-222-F	Date: 02/11/15	Scale: NTS	
Path: C:\Users\holderkg\Desktop\Project Shortcuts\871584 John Tom Hill\1005912\Analysis\LCS\Model\John Tom Hill BU 871584.eri		Dwg No. E-1	

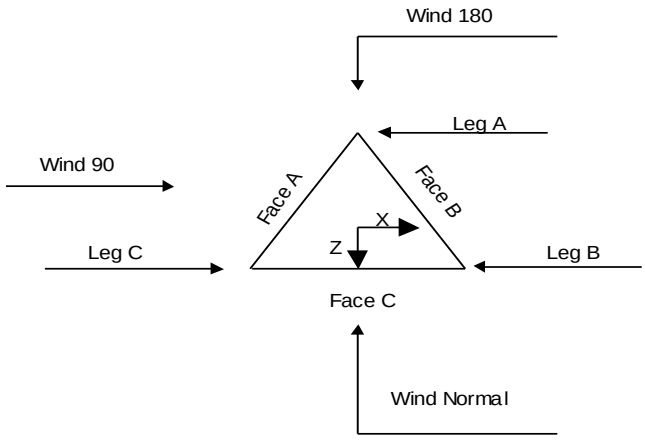
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 200.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 5.00 ft at the top and 23.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
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		Treat Feedline Bundles As Cylinder
	Consider Moments - Horizontals		Assume Legs Pinned		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Diagonals	√	Assume Rigid Index Plate	√	Calculate Redundant Bracing Forces
	Use Moment Magnification	√	Use Clear Spans For Wind Area		Ignore Redundant Members in FEA
√	Use Code Stress Ratios	√	Use Clear Spans For KL/r	√	SR Leg Bolts Resist Compression
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension	√	All Leg Panels Have Same Allowable
√	Escalate Ice	√	Bypass Mast Stability Checks	√	Offset Girt At Foundation
	Always Use Max Kz	√	Use Azimuth Dish Coefficients	√	Consider Feedline Torque
	Use Special Wind Profile	√	Project Wind Area of Appurt.	√	Include Angle Block Shear Check
√	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Poles
	Leg Bolts Are At Top Of Section		SR Members Have Cut Ends		Include Shear-Torsion Interaction
√	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Always Use Sub-Critical Flow
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Use Top Mounted Sockets
	Add IBC .6D+W Combination		Use TIA-222-G Tension Splice Capacity Exemption		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	200.00-180.00			5.00	1	20.00
T2	180.00-160.00			5.00	1	20.00
T3	160.00-140.00			7.00	1	20.00
T4	140.00-120.00			9.00	1	20.00
T5	120.00-100.00			11.00	1	20.00
T6	100.00-80.00			13.00	1	20.00
T7	80.00-60.00			15.00	1	20.00
T8	60.00-40.00			17.00	1	20.00
T9	40.00-20.00			19.00	1	20.00
T10	20.00-0.00			21.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	200.00-180.00	5.00	X Brace	No	No	0.0000	0.0000
T2	180.00-160.00	5.00	X Brace	No	No	0.0000	0.0000
T3	160.00-140.00	5.00	X Brace	No	No	0.0000	0.0000
T4	140.00-120.00	6.67	X Brace	No	No	0.0000	0.0000
T5	120.00-100.00	6.67	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T6	100.00-80.00	6.67	X Brace	No	No	0.0000	0.0000
T7	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T8	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T9	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T10	20.00-0.00	9.96	X Brace	No	No	0.0000	1.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 200.00-180.00	Pipe	Pipe 2.875" x 0.375" (2.5 #160)	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 180.00-160.00	Pipe	Pipe 3.5" x 0.300" (3 XS)	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T3 160.00-140.00	Pipe	Pipe 4" x 0.318" (3.5 XS)	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T4 140.00-120.00	Pipe	Pipe 4.5" x 0.438" (4 #120)	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 120.00-100.00	Pipe	Pipe 5.563" x 0.375" (5 XS)	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 100.00-80.00	Pipe	Pipe 5.563" x 0.375" (5 XS)	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T7 80.00-60.00	Pipe	Pipe 6.625" x 0.432" (6 EH)	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T8 60.00-40.00	Pipe	Pipe 8.625" x 0.322" (8 STD)	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T9 40.00-20.00	Pipe	Pipe 8.625" x 0.500" (8 XS)	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T10 20.00-0.00	Pipe	Pipe 8.625" x 0.500" (8 XS)	A572-50 (50 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 200.00-180.00	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

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

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
T1 200.00-180.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T8 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T9 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T10 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	No	1	1	1	1	1	1	1	1
200.00-180.00				1	1	1	1	1	1	1
T2	Yes	No	1	1	1	1	1	1	1	1
180.00-160.00				1	1	1	1	1	1	1
T3	Yes	No	1	1	1	1	1	1	1	1
160.00-140.00				1	1	1	1	1	1	1
T4	Yes	No	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T5	Yes	No	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1
T6	Yes	No	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1
T7	Yes	No	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T8	Yes	No	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T9	Yes	No	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T10	Yes	No	1	1	1	1	1	1	1	1
20.00-0.00				1	1	1	1	1	1	1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 200.00-180.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 180.00-160.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 160.00-140.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 140.00-120.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 120.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 200.00-180.00	Flange	0.7500 A325N	4	0.6250 A325X	1	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 180.00-160.00	Flange	1.0000 A325N	4	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 160.00-140.00	Flange	1.0000 A325N	4	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 140.00-120.00	Flange	1.2500 A325N	4	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 120.00-100.00	Flange	1.2500 A325N	4	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 100.00-80.00	Flange	1.2500 A325N	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 80.00-60.00	Flange	1.2500 A325N	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 60.00-40.00	Flange	1.3750 A325N	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 40.00-20.00	Flange	1.3750 A325N	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 20.00-0.00	Flange	1.5000 A572-50	8	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
** A Face ** **												
** B Face **												
AVA7-50(1-5/8)	B	Yes	Ar (CfAe)	182.00 - 0.00	0.0000	-0.4	12	6	0.5000	2.0100		0.70
Feedline Ladder (Af)	B	Yes	Af (CfAe)	182.00 - 0.00	0.0000	-0.4	1	1	3.0000	3.0000	12.0000	8.40
Feedline Ladder (Af) **	B	Yes	Af (CfAe)	200.00 - 0.00	0.0000	0	1	1	3.0000	3.0000	12.0000	8.40
FLC 12-50J(1/2")	B	Yes	Ar (CfAe)	163.00 - 0.00	0.0000	-0.2	1	1	0.5000	0.6400		0.17
Feedline Ladder (Af) **	B	Yes	Af (CfAe)	163.00 - 0.00	0.0000	-0.2	1	1	3.0000	3.0000	12.0000	8.40
LDF4-50A(1/2")	B	Yes	Ar (CfAe)	144.00 - 0.00	0.0000	0.4	4	4	0.5000	0.6300		0.15
LDF4-50A(1/2")	B	Yes	Ar (CfAe)	198.00 - 144.00	0.0000	0.4	1	1	0.5000	0.6300		0.15
LDF5-50A(7/8")	B	Yes	Ar (CfAe)	144.00 - 0.00	0.0000	0.35	5	3	0.5000	1.0900		0.33
LDF5-50A(7/8")	B	Yes	Ar (CfAe)	198.00 - 144.00	0.0000	0.35	4	2	0.5000	1.0900		0.33
Feedline Ladder (Af) **	B	Yes	Af (CfAe)	198.00 - 0.00	0.0000	0	1	1	3.0000	3.0000	12.0000	8.40
** C Face **												
LDF7-50A(1-5/8")	C	Yes	Ar (CfAe)	170.00 - 0.00	-1.5000	0	6	6	0.5000	1.9800		0.82
LDF4-50A(1/2")	C	Yes	Ar (CfAe)	53.00 - 0.00	-1.5000	0.08	1	1	0.5000	0.6300		0.15
Feedline Ladder (Af) **	C	Yes	Af (CfAe)	170.00 - 0.00	-1.5000	0	1	1	3.0000	3.0000	12.0000	8.40
Safety Line 3/8	C	Yes	Ar (CfAe)	200.00 - 0.00	0.0000	0	1	1	0.3750	0.3750		0.22
Climbing Ladder	C	Yes	Af (CfAe)	200.00 - 0.00	0.0000	0	1	1	2.5000	2.5000	10.0000	7.90

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
** A Face ** ** **							

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

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
T1	200.00-180.00	A	0.000	0.000	0.000	0.000	0.00
		B	6.225	10.000	0.000	0.000	0.38
		C	0.625	4.167	0.000	0.000	0.16
T2	180.00-160.00	A	0.000	0.000	0.000	0.000	0.00
		B	24.943	15.750	0.000	0.000	0.73
		C	10.525	6.667	0.000	0.000	0.30
T3	160.00-140.00	A	0.000	0.000	0.000	0.000	0.00
		B	26.843	20.000	0.000	0.000	0.88
		C	20.425	9.167	0.000	0.000	0.43
T4	140.00-120.00	A	0.000	0.000	0.000	0.000	0.00
		B	30.817	20.000	0.000	0.000	0.89
		C	20.425	9.167	0.000	0.000	0.43
T5	120.00-100.00	A	0.000	0.000	0.000	0.000	0.00
		B	30.817	20.000	0.000	0.000	0.89
		C	20.425	9.167	0.000	0.000	0.43
T6	100.00-80.00	A	0.000	0.000	0.000	0.000	0.00
		B	30.817	20.000	0.000	0.000	0.89
		C	20.425	9.167	0.000	0.000	0.43
T7	80.00-60.00	A	0.000	0.000	0.000	0.000	0.00
		B	30.817	20.000	0.000	0.000	0.89
		C	20.425	9.167	0.000	0.000	0.43
T8	60.00-40.00	A	0.000	0.000	0.000	0.000	0.00
		B	30.817	20.000	0.000	0.000	0.89
		C	21.108	9.167	0.000	0.000	0.43
T9	40.00-20.00	A	0.000	0.000	0.000	0.000	0.00
		B	30.817	20.000	0.000	0.000	0.89
		C	21.475	9.167	0.000	0.000	0.43
T10	20.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	30.817	20.000	0.000	0.000	0.89
		C	21.475	9.167	0.000	0.000	0.43

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
T1	200.00-180.00	A	1.234	0.000	0.000	0.000	0.000	0.00
		B		10.729	19.960	0.000	0.000	0.95
		C		4.738	6.908	0.000	0.000	0.35
T2	180.00-160.00	A	1.217	0.000	0.000	0.000	0.000	0.00
		B		19.159	47.838	0.000	0.000	2.03
		C		8.362	21.058	0.000	0.000	0.76
T3	160.00-140.00	A	1.199	0.000	0.000	0.000	0.000	0.00
		B		23.273	55.887	0.000	0.000	2.36
		C		11.920	35.163	0.000	0.000	1.16
T4	140.00-120.00	A	1.179	0.000	0.000	0.000	0.000	0.00
		B		23.001	62.345	0.000	0.000	2.42
		C		11.784	35.073	0.000	0.000	1.15
T5	120.00-100.00	A	1.155	0.000	0.000	0.000	0.000	0.00
		B		22.689	62.137	0.000	0.000	2.39
		C		11.628	34.969	0.000	0.000	1.13
T6	100.00-80.00	A	1.128	0.000	0.000	0.000	0.000	0.00
		B		22.323	61.893	0.000	0.000	2.36
		C		11.445	34.846	0.000	0.000	1.11
T7	80.00-60.00	A	1.094	0.000	0.000	0.000	0.000	0.00
		B		21.876	61.595	0.000	0.000	2.31
		C		11.221	34.697	0.000	0.000	1.09
T8	60.00-40.00	A	1.051	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		21.298	61.210	0.000	0.000	2.26
		C		13.892	34.505	0.000	0.000	1.09
T9	40.00-20.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		20.617	60.756	0.000	0.000	2.19
		C		14.975	34.278	0.000	0.000	1.07
T10	20.00-0.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		20.617	60.756	0.000	0.000	2.19
		C		14.975	34.278	0.000	0.000	1.07

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	200.00-180.00	A	0.000	0.000	0.000	0.000
		B	0.000	4.232	1.457	3.002
		C	0.000	1.648	0.430	1.169
T2	180.00-160.00	A	0.000	0.000	0.000	0.000
		B	0.000	7.563	3.104	5.436
		C	0.000	3.338	1.311	2.399
T3	160.00-140.00	A	0.000	0.000	0.000	0.000
		B	0.000	7.980	3.228	5.823
		C	0.000	4.699	2.039	3.428
T4	140.00-120.00	A	0.000	0.000	0.000	0.000
		B	0.000	6.425	3.822	6.812
		C	0.000	3.509	2.225	3.721
T5	120.00-100.00	A	0.000	0.000	0.000	0.000
		B	0.000	5.949	3.636	6.436
		C	0.000	3.251	2.117	3.517
T6	100.00-80.00	A	0.000	0.000	0.000	0.000
		B	0.000	5.576	4.223	7.415
		C	0.000	3.049	2.459	4.055
T7	80.00-60.00	A	0.000	0.000	0.000	0.000
		B	0.000	3.801	3.497	6.079
		C	0.000	2.081	2.036	3.327
T8	60.00-40.00	A	0.000	0.000	0.000	0.000
		B	0.000	3.495	3.392	5.819
		C	0.000	2.034	2.021	3.386
T9	40.00-20.00	A	0.000	0.000	0.000	0.000
		B	0.000	3.199	3.315	5.598
		C	0.000	1.919	1.999	3.358
T10	20.00-0.00	A	0.000	0.000	0.000	0.000
		B	0.000	3.140	3.719	6.281
		C	0.000	1.884	2.243	3.767

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	200.00-180.00	3.4651	-0.4625	2.0800	0.2993
T2	180.00-160.00	3.9589	-5.1825	2.7190	-2.4222

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T3	160.00-140.00	4.9408	-4.4982	3.5930	-2.6912
T4	140.00-120.00	6.4598	-4.2753	4.4918	-2.9657
T5	120.00-100.00	6.9684	-4.5573	4.9955	-3.2447
T6	100.00-80.00	7.2794	-4.7194	5.3018	-3.4309
T7	80.00-60.00	8.0650	-5.1938	6.3955	-4.0271
T8	60.00-40.00	7.9729	-4.9685	6.4325	-3.6130
T9	40.00-20.00	8.5702	-5.2387	6.9087	-3.6366
T10	20.00-0.00	8.6861	-5.2884	7.0572	-3.7110

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
Beacon	B	From Leg	0.50 0.00 1.00	0.0000	200.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.00 2.50 3.00 4.00 6.00	2.00 2.50 3.00 4.00 6.00	0.02 0.03 0.04 0.06 0.10
Sidemarker	A	From Leg	0.50 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.60 0.72 0.86 1.16 1.89	0.60 0.72 0.86 1.16 1.89	0.01 0.02 0.03 0.05 0.13
Sidemarker	B	From Leg	0.50 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.60 0.72 0.86 1.16 1.89	0.60 0.72 0.86 1.16 1.89	0.01 0.02 0.03 0.05 0.13
Sidemarker	C	From Leg	0.50 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.60 0.72 0.86 1.16 1.89	0.60 0.72 0.86 1.16 1.89	0.01 0.02 0.03 0.05 0.13
** ** 198 **									
DB225-A	A	From Leg	4.00 0.00 7.00	0.0000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.21 5.78 8.35 13.48 23.75	3.21 5.78 8.35 13.48 23.75	0.04 0.05 0.06 0.08 0.13
ALR10-O	B	From Leg	4.00 0.00 10.00	0.0000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	13.25 15.31 17.39 20.79 25.72	13.25 15.31 17.39 20.79 25.72	0.09 0.18 0.28 0.52 1.17
OGB6-928N	B	From Leg	4.00 0.00 6.00	0.0000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.97 1.33 1.63 2.26 3.67	0.97 1.33 1.63 2.26 3.67	0.01 0.02 0.03 0.06 0.17
PD1107-1	C	From Leg	4.00	0.0000	198.00	No Ice	2.18	2.18	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	3.29	3.29	0.02
			7.00			1" Ice	4.43	4.43	0.05
						2" Ice	6.42	6.42	0.12
						4" Ice	9.18	9.18	0.35
PD201-7	C	From Leg	4.00	0.0000	198.00	No Ice	1.02	1.02	0.00
			0.00			1/2" Ice	1.81	1.81	0.01
			7.00			1" Ice	2.62	2.62	0.03
						2" Ice	3.76	3.76	0.07
						4" Ice	5.78	5.78	0.22
(4) 6' x 2" Mount Pipe	A	From Leg	4.00	0.0000	198.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.57	1.57	0.04
						2" Ice	1.71	1.71	0.05
						4" Ice	1.99	1.99	0.07
(4) 6' x 2" Mount Pipe	B	From Leg	4.00	0.0000	198.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.57	1.57	0.04
						2" Ice	1.71	1.71	0.05
						4" Ice	1.99	1.99	0.07
(4) 6' x 2" Mount Pipe	C	From Leg	4.00	0.0000	198.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.57	1.57	0.04
						2" Ice	1.71	1.71	0.05
						4" Ice	1.99	1.99	0.07
Sector Mount [SM 602-3]	C	None		0.0000	198.00	No Ice	33.11	33.11	1.54
						1/2" Ice	44.90	44.90	2.16
						1" Ice	56.69	56.69	2.78
						2" Ice	80.27	80.27	4.01
						4" Ice	127.43	127.43	6.49
** ** 182 **									
RR90-17-02DP w/ Mount Pipe	A	From Leg	4.00	0.0000	182.00	No Ice	4.59	3.32	0.03
			0.00			1/2" Ice	5.09	4.09	0.07
			1.00			1" Ice	5.58	4.78	0.12
						2" Ice	6.59	6.23	0.22
						4" Ice	8.73	9.31	0.56
RR90-17-02DP w/ Mount Pipe	B	From Leg	4.00	0.0000	182.00	No Ice	4.59	3.32	0.03
			0.00			1/2" Ice	5.09	4.09	0.07
			1.00			1" Ice	5.58	4.78	0.12
						2" Ice	6.59	6.23	0.22
						4" Ice	8.73	9.31	0.56
RR90-17-02DP w/ Mount Pipe	C	From Leg	4.00	0.0000	182.00	No Ice	4.59	3.32	0.03
			0.00			1/2" Ice	5.09	4.09	0.07
			1.00			1" Ice	5.58	4.78	0.12
						2" Ice	6.59	6.23	0.22
						4" Ice	8.73	9.31	0.56
KRY 112 71	A	From Leg	4.00	0.0000	182.00	No Ice	0.68	0.45	0.01
			0.00			1/2" Ice	0.80	0.56	0.02
			0.00			1" Ice	0.93	0.68	0.03
						2" Ice	1.22	0.94	0.04
						4" Ice	1.90	1.57	0.11
KRY 112 71	B	From Leg	4.00	0.0000	182.00	No Ice	0.68	0.45	0.01
			0.00			1/2" Ice	0.80	0.56	0.02
			0.00			1" Ice	0.93	0.68	0.03
						2" Ice	1.22	0.94	0.04
						4" Ice	1.90	1.57	0.11
KRY 112 71	C	From Leg	4.00	0.0000	182.00	No Ice	0.68	0.45	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
			0.00			1/2" Ice	0.80	0.56	0.02
			0.00			1" Ice	0.93	0.68	0.03
						2" Ice	1.22	0.94	0.04
						4" Ice	1.90	1.57	0.11
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.68 12.40 13.14 14.60 17.87	9.84 11.37 12.91 15.27 20.14	0.08 0.17 0.27 0.51 1.15
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.68 12.40 13.14 14.60 17.87	9.84 11.37 12.91 15.27 20.14	0.08 0.17 0.27 0.51 1.15
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.68 12.40 13.14 14.60 17.87	9.84 11.37 12.91 15.27 20.14	0.08 0.17 0.27 0.51 1.15
ATBT-BOTTOM-24V	A	From Leg	4.00 0.00 1.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.12 0.17 0.23 0.38 0.77	0.08 0.12 0.17 0.30 0.67	0.00 0.00 0.01 0.01 0.04
ATBT-BOTTOM-24V	B	From Leg	4.00 0.00 1.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.12 0.17 0.23 0.38 0.77	0.08 0.12 0.17 0.30 0.67	0.00 0.00 0.01 0.01 0.04
ATBT-BOTTOM-24V	C	From Leg	4.00 0.00 1.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.12 0.17 0.23 0.38 0.77	0.08 0.12 0.17 0.30 0.67	0.00 0.00 0.01 0.01 0.04
(2) 6' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.50 1.57 1.71 1.99	1.43 1.50 1.57 1.71 1.99	0.02 0.03 0.04 0.05 0.07
(2) 6' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.50 1.57 1.71 1.99	1.43 1.50 1.57 1.71 1.99	0.02 0.03 0.04 0.05 0.07
(2) 6' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.50 1.57 1.71 1.99	1.43 1.50 1.57 1.71 1.99	0.02 0.03 0.04 0.05 0.07
Sector Mount [SM 602-3]	C	None		0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	33.11 44.90 56.69 80.27 127.43	33.11 44.90 56.69 80.27 127.43	1.54 2.16 2.78 4.01 6.49
** ** 170 ** (2) DB980H90E-M w/ Mount	A	From Leg	5.00	0.0000	170.00	No Ice	4.04	3.62	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Pipe			0.00			1/2" Ice	4.50	4.48	0.07
			1.00			1" Ice	4.95	5.22	0.11
						2" Ice	5.87	6.74	0.22
						4" Ice	8.05	10.00	0.55
(2) DB980H90E-M w/ Mount Pipe	B	From Leg	5.00	0.0000	170.00	No Ice	4.04	3.62	0.03
			0.00			1/2" Ice	4.50	4.48	0.07
			1.00			1" Ice	4.95	5.22	0.11
						2" Ice	5.87	6.74	0.22
						4" Ice	8.05	10.00	0.55
(2) DB980H90E-M w/ Mount Pipe	C	From Leg	5.00	0.0000	170.00	No Ice	4.04	3.62	0.03
			0.00			1/2" Ice	4.50	4.48	0.07
			1.00			1" Ice	4.95	5.22	0.11
						2" Ice	5.87	6.74	0.22
						4" Ice	8.05	10.00	0.55
6' x 2" Mount Pipe	A	From Leg	5.00	0.0000	170.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.57	1.57	0.04
						2" Ice	1.71	1.71	0.05
						4" Ice	1.99	1.99	0.07
6' x 2" Mount Pipe	B	From Leg	5.00	0.0000	170.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.57	1.57	0.04
						2" Ice	1.71	1.71	0.05
						4" Ice	1.99	1.99	0.07
6' x 2" Mount Pipe	C	From Leg	5.00	0.0000	170.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.57	1.57	0.04
						2" Ice	1.71	1.71	0.05
						4" Ice	1.99	1.99	0.07
Sector Mount [SM 506-3]	C	None		0.0000	170.00	No Ice	35.47	35.47	1.74
						1/2" Ice	50.60	50.60	2.35
						1" Ice	65.73	65.73	2.95
						2" Ice	95.99	95.99	4.16
						4" Ice	156.51	156.51	6.59
**									
** 163 **									
Pipe Mount [PM 601-1]	A	From Leg	0.50	0.0000	163.00	No Ice	3.00	0.90	0.07
			0.00			1/2" Ice	3.74	1.12	0.08
			0.00			1" Ice	4.48	1.34	0.09
						2" Ice	5.96	1.78	0.12
						4" Ice	8.92	2.66	0.18
**									
** 144 **									
PD156S-4	B	From Leg	4.00	0.0000	144.00	No Ice	0.44	0.44	0.01
			0.00			1/2" Ice	0.79	0.79	0.01
			6.00			1" Ice	1.14	1.14	0.01
						2" Ice	1.85	1.85	0.01
						4" Ice	3.26	3.26	0.02
SRL480N1DT4	C	From Leg	4.00	0.0000	144.00	No Ice	3.81	3.81	0.03
			0.00			1/2" Ice	5.37	5.37	0.06
			11.00			1" Ice	6.94	6.94	0.10
						2" Ice	10.13	10.13	0.20
						4" Ice	14.61	14.61	0.54
(2) PD1109-1	B	From Leg	4.00	0.0000	144.00	No Ice	2.83	2.83	0.02
			0.00			1/2" Ice	3.89	3.89	0.04
			8.00			1" Ice	4.97	4.97	0.07
						2" Ice	6.37	6.37	0.14

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
						4" Ice	9.00	9.00	0.38
(4) 6' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.50 1.57 1.71 1.99	1.43 1.50 1.57 1.71 1.99	0.02 0.03 0.04 0.05 0.07
(4) 6' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.50 1.57 1.71 1.99	1.43 1.50 1.57 1.71 1.99	0.02 0.03 0.04 0.05 0.07
(4) 6' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.50 1.57 1.71 1.99	1.43 1.50 1.57 1.71 1.99	0.02 0.03 0.04 0.05 0.07
Sector Mount [SM 602-3]	C	None		0.0000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	33.11 44.90 56.69 80.27 127.43	33.11 44.90 56.69 80.27 127.43	1.54 2.16 2.78 4.01 6.49
**									
** 53 **									
KS24019-L112A	A	From Leg	1.00 0.00 2.00	0.0000	53.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.16 0.22 0.30 0.48 0.95	0.16 0.22 0.30 0.48 0.95	0.01 0.01 0.01 0.02 0.06
Side Arm Mount [SO 202-1]	A	From Leg	2.00 0.00 0.00	0.0000	53.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.96 4.10 5.24 7.52 12.08	2.53 3.51 4.49 6.45 10.37	0.11 0.13 0.16 0.20 0.30
**									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
** 163 **											
PR-850	A	Grid	From Leg	1.00 0.00 0.00	60.0000		163.00	5.67	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	25.22 25.97 26.71 28.21 31.20	0.04 0.17 0.30 0.57 1.10

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 90 deg - No Ice
4	Dead+Wind 180 deg - No Ice
5	Dead+Ice+Temp
6	Dead+Wind 0 deg+Ice+Temp
7	Dead+Wind 90 deg+Ice+Temp
8	Dead+Wind 180 deg+Ice+Temp
9	Dead+Wind 0 deg - Service
10	Dead+Wind 90 deg - Service
11	Dead+Wind 180 deg - Service

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	200 - 180	6.549	9	0.3126	0.0569
T2	180 - 160	5.241	9	0.3004	0.0443
T3	160 - 140	4.027	9	0.2611	0.0325
T4	140 - 120	2.989	9	0.2140	0.0240
T5	120 - 100	2.134	9	0.1770	0.0184
T6	100 - 80	1.430	9	0.1400	0.0132
T7	80 - 60	0.886	9	0.1007	0.0090
T8	60 - 40	0.500	9	0.0710	0.0066
T9	40 - 20	0.236	9	0.0405	0.0042
T10	20 - 0	0.075	9	0.0204	0.0020

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
200.00	Beacon	9	6.549	0.3126	0.0569	201465
198.00	DB225-A	9	6.417	0.3120	0.0557	201465
182.00	RR90-17-02DP w/ Mount Pipe	9	5.370	0.3027	0.0455	55966
170.00	(2) DB980H90E-M w/ Mount Pipe	9	4.616	0.2836	0.0381	33642
163.00	PR-850	9	4.199	0.2682	0.0341	26908
144.00	PD156S-4	9	3.181	0.2228	0.0254	24901
100.00	Sidemarker	9	1.430	0.1400	0.0132	29546
53.00	KS24019-L112A	9	0.395	0.0600	0.0058	43231

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	200 - 180	16.660	2	0.7952	0.1458

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T2	180 - 160	13.334	2	0.7639	0.1133
T3	160 - 140	10.245	2	0.6637	0.0832
T4	140 - 120	7.606	2	0.5440	0.0613
T5	120 - 100	5.433	2	0.4500	0.0472
T6	100 - 80	3.641	2	0.3559	0.0339
T7	80 - 60	2.256	2	0.2561	0.0230
T8	60 - 40	1.273	2	0.1804	0.0168
T9	40 - 20	0.603	2	0.1030	0.0109
T10	20 - 0	0.193	2	0.0519	0.0051

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
200.00	Beacon	2	16.660	0.7952	0.1458	81818
198.00	DB225-A	2	16.323	0.7937	0.1425	81818
182.00	RR90-17-02DP w/ Mount Pipe	2	13.660	0.7698	0.1165	22716
170.00	(2) DB980H90E-M w/ Mount Pipe	2	11.744	0.7209	0.0976	13230
163.00	PR-850	2	10.684	0.6817	0.0873	10602
144.00	PD156S-4	2	8.095	0.5663	0.0649	9795
100.00	Sidemarker	2	3.641	0.3559	0.0339	11624
53.00	KS24019-L112A	2	1.007	0.1525	0.0148	17023

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	200	Leg	A325N	0.7500	4	2.76	19.44	0.142 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	2.60	5.71	0.456 ✔	1.333	Member Block Shear
		Top Girt	A325X	0.6250	1	0.06	8.16	0.007 ✔	1.333	Member Bearing
T2	180	Leg	A325N	1.0000	4	8.35	34.56	0.242 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	3.18	5.71	0.557 ✔	1.333	Member Block Shear
T3	160	Leg	A325N	1.0000	4	14.01	34.56	0.406 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	3.61	5.71	0.633 ✔	1.333	Member Block Shear
T4	140	Leg	A325N	1.2500	4	19.57	54.00	0.362 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	4.26	7.75	0.550 ✔	1.333	Member Block Shear
T5	120	Leg	A325N	1.2500	4	24.91	54.00	0.461 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	4.63	7.75	0.598 ✔	1.333	Member Block Shear
T6	100	Leg	A325N	1.2500	6	20.02	54.00	0.371 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	5.14	7.88	0.652 ✔	1.333	Member Block Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T7	80	Leg	A325N	1.2500	6	23.03	54.00	0.427 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	6.09	12.69	0.480 ✔	1.333	Member Bearing
T8	60	Leg	A325N	1.3750	6	26.20	65.34	0.401 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	6.88	13.05	0.527 ✔	1.333	Member Bearing
T9	40	Leg	A325N	1.3750	6	29.34	65.34	0.449 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	7.32	13.05	0.561 ✔	1.333	Member Bearing
T10	20	Leg	A572-50	1.5000	8	24.91	37.91	0.657 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	8.27	13.05	0.634 ✔	1.333	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	200 - 180	Pipe 2.875" x 0.375" (2.5 #160)	20.00	5.00	67.1 K=1.00	21.46	2.9452	-14.50	63.21	0.229 ✔
T2	180 - 160	Pipe 3.5" x 0.300" (3 XS)	20.03	5.01	52.9 K=1.00	23.89	3.0159	-41.41	72.06	0.575 ✔
T3	160 - 140	Pipe 4" x 0.318" (3.5 XS)	20.03	5.01	46.0 K=1.00	24.96	3.6784	-68.21	91.82	0.743 ✔
T4	140 - 120	Pipe 4.5" x 0.438" (4 #120)	20.03	6.68	55.5 K=1.00	23.47	5.5894	-94.22	131.21	0.718 ✔
T5	120 - 100	Pipe 5.563" x 0.375" (5 XS)	20.03	6.68	43.6 K=1.00	25.32	6.1120	-119.69	154.76	0.773 ✔
T6	100 - 80	Pipe 5.563" x 0.375" (5 XS)	20.03	6.68	43.6 K=1.00	25.32	6.1120	-144.59	154.76	0.934 ✔
T7	80 - 60	Pipe 6.625" x 0.432" (6 EH)	20.03	10.02	54.8 K=1.00	23.59	8.4049	-167.20	198.28	0.843 ✔
T8	60 - 40	Pipe 8.625" x 0.322" (8 STD)	20.03	10.02	40.9 K=1.00	25.70	8.3993	-191.59	215.89	0.887 ✔
T9	40 - 20	Pipe 8.625" x 0.500" (8 XS)	20.03	10.02	41.8 K=1.00	25.58	12.7627	-216.08	326.50	0.662 ✔
T10	20 - 0	Pipe 8.625" x 0.500" (8 XS)	20.03	9.97	41.6 K=1.00	25.61	12.7627	-247.25	326.82	0.757 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	200 - 180	L1 3/4x1 3/4x3/16	7.07	3.20	113.8 K=1.02	11.15	0.6211	-2.77	6.92	0.401 ✔
T2	180 - 160	L1 3/4x1 3/4x3/16	8.40	4.01	140.0 K=1.00	7.61	0.6211	-3.13	4.73	0.661 ✔
T3	160 - 140	L1 3/4x1 3/4x3/16	10.08	4.82	168.6 K=1.00	5.25	0.6211	-3.83	3.26	1.174 ✔
T4	140 - 120	L2 1/2x2 1/2x3/16	12.58	6.10	147.9 K=1.00	6.83	0.9020	-4.45	6.16	0.722 ✔
T5	120 - 100	L2 1/2x2 1/2x3/16	14.32	6.92	167.7 K=1.00	5.31	0.9020	-4.79	4.79	1.000 ✔
T6	100 - 80	L3x3x3/16	16.11	7.82	157.4 K=1.00	6.03	1.0900	-5.15	6.57	0.784 ✔
T7	80 - 60	L3 1/2x3 1/2x1/4	19.30	9.43	163.1 K=1.00	5.62	1.6900	-6.22	9.49	0.655 ✔
T8	60 - 40	L3 1/2x3 1/2x1/4	21.03	10.20	176.4 K=1.00	4.80	1.6900	-6.88	8.11	0.848 ✔
T9	40 - 20	L3 1/2x3 1/2x1/4	22.81	11.10	191.9 K=1.00	4.06	1.6900	-7.32	6.86	1.068 ✔
T10	20 - 0	L4x4x1/4	24.60	11.99	181.0 K=1.00	4.56	1.9400	-8.27	8.84	0.936 ✔

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	200 - 180	L1 3/4x1 3/4x3/16	5.00	4.43	154.7 K=1.00	6.24	0.6211	-0.06	3.88	0.015 ✔

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	200 - 180	Pipe 2.875" x 0.375" (2.5 #160)	20.00	5.00	67.1	30.00	2.9452	11.04	88.36	0.125 ✔
T2	180 - 160	Pipe 3.5" x 0.300" (3 XS)	20.03	5.01	52.9	30.00	3.0159	33.40	90.48	0.369 ✔
T3	160 - 140	Pipe 4" x 0.318" (3.5 XS)	20.03	5.01	46.0	30.00	3.6784	56.06	110.35	0.508 ✔
T4	140 - 120	Pipe 4.5" x 0.438" (4 #120)	20.03	6.68	55.5	30.00	5.5894	78.26	167.68	0.467 ✔
T5	120 - 100	Pipe 5.563" x 0.375" (5 XS)	20.03	6.68	43.6	30.00	6.1120	99.65	183.36	0.543

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T6	100 - 80	Pipe 5.563" x 0.375" (5 XS)	20.03	6.68	43.6	30.00	6.1120	120.11	183.36	0.655 ✔
T7	80 - 60	Pipe 6.625" x 0.432" (6 EH)	20.03	10.02	54.8	30.00	8.4049	138.20	252.15	0.548 ✔
T8	60 - 40	Pipe 8.625" x 0.322" (8 STD)	20.03	10.02	40.9	30.00	8.3993	157.20	251.98	0.624 ✔
T9	40 - 20	Pipe 8.625" x 0.500" (8 XS)	20.03	10.02	41.8	30.00	12.7627	176.01	382.88	0.460 ✔
T10	20 - 0	Pipe 8.625" x 0.500" (8 XS)	20.03	9.97	41.6	30.00	12.7627	199.29	382.88	0.521 ✔

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	200 - 180	L1 3/4x1 3/4x3/16	7.07	3.20	75.2	29.00	0.3604	2.60	10.45	0.249 ✔
T2	180 - 160	L1 3/4x1 3/4x3/16	8.40	4.01	93.3	29.00	0.3604	3.18	10.45	0.304 ✔
T3	160 - 140	L1 3/4x1 3/4x3/16	10.08	4.82	111.6	29.00	0.3604	3.61	10.45	0.346 ✔
T4	140 - 120	L2 1/2x2 1/2x3/16	12.58	6.10	96.6	29.00	0.5710	4.26	16.56	0.258 ✔
T5	120 - 100	L2 1/2x2 1/2x3/16	14.32	6.92	109.3	29.00	0.5710	4.63	16.56	0.280 ✔
T6	100 - 80	L3x3x3/16	16.11	7.82	102.0	29.00	0.6945	5.14	20.14	0.255 ✔
T7	80 - 60	L3 1/2x3 1/2x1/4	19.30	9.43	105.9	29.00	1.1034	6.09	32.00	0.190 ✔
T8	60 - 40	L3 1/2x3 1/2x1/4	21.03	10.20	114.4	29.00	1.1034	6.45	32.00	0.201 ✔
T9	40 - 20	L3 1/2x3 1/2x1/4	21.92	10.65	119.3	29.00	1.1034	6.85	32.00	0.214 ✔
T10	20 - 0	L4x4x1/4	24.60	11.99	116.9	29.00	1.2909	7.36	37.44	0.197 ✔

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	200 - 180	L1 3/4x1 3/4x3/16	5.00	4.43	106.4	29.00	0.3604	0.03	10.45	0.003 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	200 - 180	Leg	Pipe 2.875" x 0.375" (2.5 #160)	3	-14.50	84.26	17.2	Pass
T2	180 - 160	Leg	Pipe 3.5" x 0.300" (3 XS)	33	-41.41	96.06	43.1	Pass
T3	160 - 140	Leg	Pipe 4" x 0.318" (3.5 XS)	60	-68.21	122.40	55.7	Pass
T4	140 - 120	Leg	Pipe 4.5" x 0.438" (4 #120)	87	-94.22	174.90	53.9	Pass
T5	120 - 100	Leg	Pipe 5.563" x 0.375" (5 XS)	108	-119.69	206.29	58.0	Pass
T6	100 - 80	Leg	Pipe 5.563" x 0.375" (5 XS)	129	-144.59	206.29	70.1	Pass
T7	80 - 60	Leg	Pipe 6.625" x 0.432" (6 EH)	150	-167.20	264.31	63.3	Pass
T8	60 - 40	Leg	Pipe 8.625" x 0.322" (8 STD)	165	-191.59	287.78	66.6	Pass
T9	40 - 20	Leg	Pipe 8.625" x 0.500" (8 XS)	180	-216.08	435.22	49.6	Pass
T10	20 - 0	Leg	Pipe 8.625" x 0.500" (8 XS)	195	-247.25	435.64	56.8	Pass
T1	200 - 180	Diagonal	L1 3/4x1 3/4x3/16	10	-2.77	9.23	30.1 34.2 (b)	Pass
T2	180 - 160	Diagonal	L1 3/4x1 3/4x3/16	37	-3.13	6.30	49.6	Pass
T3	160 - 140	Diagonal	L1 3/4x1 3/4x3/16	64	-3.83	4.35	88.0	Pass
T4	140 - 120	Diagonal	L2 1/2x2 1/2x3/16	91	-4.45	8.21	54.2	Pass
T5	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	112	-4.79	6.38	75.0	Pass
T6	100 - 80	Diagonal	L3x3x3/16	133	-5.15	8.76	58.8	Pass
T7	80 - 60	Diagonal	L3 1/2x3 1/2x1/4	154	-6.22	12.65	49.1	Pass
T8	60 - 40	Diagonal	L3 1/2x3 1/2x1/4	169	-6.88	10.81	63.6	Pass
T9	40 - 20	Diagonal	L3 1/2x3 1/2x1/4	184	-7.32	9.14	80.1	Pass
T10	20 - 0	Diagonal	L4x4x1/4	199	-8.27	11.79	70.2	Pass
T1	200 - 180	Top Girt	L1 3/4x1 3/4x3/16	4	-0.06	5.17	1.1	Pass
						Summary		
						Leg (T6)	70.1	Pass
						Diagonal (T3)	88.0	Pass
						Top Girt (T1)	1.1	Pass
						Bolt Checks	49.3	Pass
						RATING =	**88.0**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

Date: **February 11, 2015**

Holly Haas
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

Jacobs Engineering Group. Inc.
5449 Bells Ferry Road
Acworth, GA 301102
(770) 701-2500

Subject: **Structural Analysis Report**

Carrier Designation: ***T-Mobile* Co-Locate**
Carrier Site Number: CT11189E
Carrier Site Name: Glastonbury/ Rt 94 & Fern

Crown Castle Designation:
Crown Castle BU Number: 871584
Crown Castle Site Name: John Tom Hill
Crown Castle JDE Job Number: 322291
Crown Castle Work Order Number: 1005912
Crown Castle Application Number: 282547 Rev. 0

Engineering Firm Designation: **Jacobs Engineering Group, Inc. Project Number:** 1005912

Site Data: **115 Birch Mtn. Road, GLASTONBURY, Hartford County, CT**
Latitude *41° 42' 32.24"*, Longitude *-72° 28' 24.41"*
200 Foot - Self Support Tower

Dear Holly Haas,

Jacobs Engineering Group, Inc. 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 754645, in accordance with application 282547, revision 0.

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:

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and The 2005 CT State Building Code based upon a wind speed of 80 mph fastest mile.

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

We at *Jacobs Engineering Group, Inc.* 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:

Kristi Holder, EI
Structural Engineer

Reviewed By:

Matthew Watkins, P.E.
Engineering Project Manager

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 200 ft Self Support tower designed by SABRE COMMUNICATIONS in November of 1998. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1.00 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
182.0	183.0	3	commscope	ATBT-BOTTOM-24V	6	1-5/8	-
		3	commscope	LNX-6515DS-VTM w/ Mount Pipe			

Table 2 - Existing 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
198.0	208.0	1	rfs celwave	ALR10-O	4 1	7/8 1/2	1
	205.0	1	decibel	DB225-A			
		1	rfs celwave	PD1107-1	-	-	2
		1	rfs celwave	PD201-7			
	204.0	1	scala	OGB6-928N	-	-	1
	198.0	1	crown mounts	Sector Mount [SM 602-3]			
182.0	183.0	3	ems wireless	RR90-17-02DP w/ Mount Pipe	6	1-5/8	1
	182.0	3	ericsson	KRY 112 71			
		1	crown mounts	Sector Mount [SM 602-3]			
170.0	171.0	6	decibel	DB980H90E-M w/ Mount Pipe	9 1	1-5/8 1/2	1
	170.0	1	crown mounts	Sector Mount [SM 506-3]			
163.0	163.0	1	kathrein	PR-850	1	1/2	1
		1	crown mounts	Pipe Mount [PM 601-1]			
144.0	155.0	1	sinclair	SRL480N1DT4	-	-	2
	152.0	2	rfs celwave	PD1109-1	3 1	1/2 7/8	1
	150.0	1	rfs celwave	PD156S-4			
	144.0	1	crown mounts	Sector Mount [SM 602-3]			
53.0	55.0	1	lucent	KS24019-L112A	1	1/2	1
	53.0	1	crown mounts	Side Arm Mount [SO 202-1]			

Notes:
1) Existing Equipment
2) Abandoned Equipment; Considered In This Analysis

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)
180.0	180.0	9	Dapa	DB809	9	7/8
160.0	160.0	9	Dapa	DB809	9	7/8
140.0	140.0	12	Dapa	2980	12	1-5/8
120.0	120.0	12	Dapa	2980	12	1-5/8
100.0	100.0	12	Dapa	2980	12	1-5/8
80.0	80.0	1	Generic	6' Dish	1	EW64
70.0	70.0	1	Generic	1 Meter Dish	1	7/8
60.0	60.0	1	Generic	1 Meter Dish	1	7/8
50.0	50.0	1	Generic	1 Meter Dish	1	7/8

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clarence Welti Assoc., Inc.	1404208	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Sabre Communications	1333892	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Sabre Communications	1403674	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

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

This analysis may be affected if any assumptions are not valid or have been made in error. Jacobs Engineering Group, Inc. 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
T1	200 - 180	Leg	Pipe 2.875" x 0.375" (2.5 #160)	3	-14.50	84.26	17.2	Pass
T2	180 - 160	Leg	Pipe 3.5" x 0.300" (3 XS)	33	-41.41	96.06	43.1	Pass
T3	160 - 140	Leg	Pipe 4" x 0.318" (3.5 XS)	60	-68.21	122.40	55.7	Pass
T4	140 - 120	Leg	Pipe 4.5" x 0.438" (4 #120)	87	-94.22	174.90	53.9	Pass
T5	120 - 100	Leg	Pipe 5.563" x 0.375" (5 XS)	108	-119.69	206.29	58.0	Pass
T6	100 - 80	Leg	Pipe 5.563" x 0.375" (5 XS)	129	-144.59	206.29	70.1	Pass
T7	80 - 60	Leg	Pipe 6.625" x 0.432" (6 EH)	150	-167.20	264.31	63.3	Pass
T8	60 - 40	Leg	Pipe 8.625" x 0.322" (8 STD)	165	-191.59	287.78	66.6	Pass
T9	40 - 20	Leg	Pipe 8.625" x 0.500" (8 XS)	180	-216.08	435.22	49.6	Pass
T10	20 - 0	Leg	Pipe 8.625" x 0.500" (8 XS)	195	-247.25	435.64	56.8	Pass
T1	200 - 180	Diagonal	L1 3/4x1 3/4x3/16	10	-2.77	9.23	30.1 34.2 (b)	Pass
T2	180 - 160	Diagonal	L1 3/4x1 3/4x3/16	37	-3.13	6.30	49.6	Pass
T3	160 - 140	Diagonal	L1 3/4x1 3/4x3/16	64	-3.83	4.35	88.0	Pass
T4	140 - 120	Diagonal	L2 1/2x2 1/2x3/16	91	-4.45	8.21	54.2	Pass
T5	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	112	-4.79	6.38	75.0	Pass
T6	100 - 80	Diagonal	L3x3x3/16	133	-5.15	8.76	58.8	Pass
T7	80 - 60	Diagonal	L3 1/2x3 1/2x1/4	154	-6.22	12.65	49.1	Pass
T8	60 - 40	Diagonal	L3 1/2x3 1/2x1/4	169	-6.88	10.81	63.6	Pass
T9	40 - 20	Diagonal	L3 1/2x3 1/2x1/4	184	-7.32	9.14	80.1	Pass
T10	20 - 0	Diagonal	L4x4x1/4	199	-8.27	11.79	70.2	Pass
T1	200 - 180	Top Girt	L1 3/4x1 3/4x3/16	4	-0.06	5.17	1.1	Pass
							Summary	
						Leg (T6)	70.1	Pass
						Diagonal (T3)	88.0	Pass
						Top Girt (T1)	1.1	Pass
						Bolt Checks	49.3	Pass
						RATING =	**88.0**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	48.9	Pass
1	Base Foundation Structural	0	73.9	Pass
1	Base Foundation Soil Interaction	0	68.2	Pass

Structure Rating (max from all components) =	88.0%

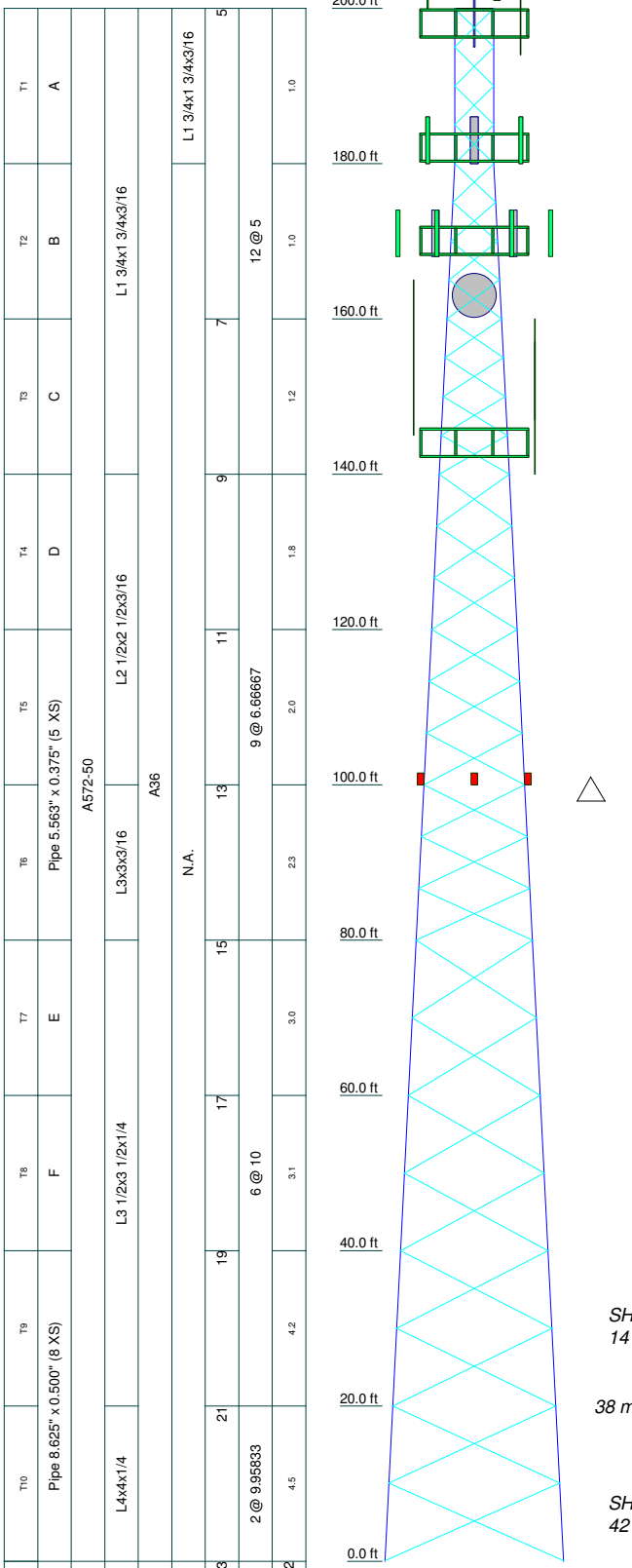
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Beacon	200	(2) 6' x 2" Mount Pipe	182
DB225-A	198	Sector Mount [SM 602-3]	182
ALR10-O	198	(2) DB980H90E-M w/ Mount Pipe	170
OGB6-928N	198	(2) DB980H90E-M w/ Mount Pipe	170
PD1107-1	198	(2) DB980H90E-M w/ Mount Pipe	170
PD201-7	198	6' x 2" Mount Pipe	170
(4) 6' x 2" Mount Pipe	198	6' x 2" Mount Pipe	170
(4) 6' x 2" Mount Pipe	198	6' x 2" Mount Pipe	170
(4) 6' x 2" Mount Pipe	198	Sector Mount [SM 506-3]	170
Sector Mount [SM 602-3]	198	Pipe Mount [PM 601-1]	163
RR90-17-02DP w/ Mount Pipe	182	PR-850	163
RR90-17-02DP w/ Mount Pipe	182	PD156S-4	144
RR90-17-02DP w/ Mount Pipe	182	SRL480N1DT4	144
KRY 112 71	182	(2) PD1109-1	144
KRY 112 71	182	(4) 6' x 2" Mount Pipe	144
KRY 112 71	182	(4) 6' x 2" Mount Pipe	144
LNX-6515DS-VTM w/ Mount Pipe	182	(4) 6' x 2" Mount Pipe	144
LNX-6515DS-VTM w/ Mount Pipe	182	Sector Mount [SM 602-3]	144
LNX-6515DS-VTM w/ Mount Pipe	182	Sidemarker	100
ATBT-BOTTOM-24V	182	Sidemarker	100
ATBT-BOTTOM-24V	182	Sidemarker	100
ATBT-BOTTOM-24V	182	Side Arm Mount [SO 202-1]	53
(2) 6' x 2" Mount Pipe	182	KS24019-L112A	53
(2) 6' x 2" Mount Pipe	182		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pipe 2.875" x 0.375" (2.5 #160)	D	Pipe 4.5" x 0.438" (4 #120)
B	Pipe 3.5" x 0.300" (3 XS)	E	Pipe 6.625" x 0.432" (6 EH)
C	Pipe 4" x 0.318" (3.5 XS)	F	Pipe 8.625" x 0.322" (8 STD)

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 88%

MAX. CORNER REACTIONS AT BASE:
DOWN: 246 K
SHEAR: 26 K

UPLIFT: -198 K
SHEAR: 22 K

AXIAL
95 K
SHEAR
14 K
MOMENT
1647 kip-ft
TORQUE 5 kip-ft
38 mph WIND - 1.0000 in ICE

AXIAL
44 K
SHEAR
42 K
MOMENT
4608 kip-ft
TORQUE 22 kip-ft
REACTIONS - 80 mph WIND

Jacobs Engineering Group, Inc.
JACOBS
5449 Bells Ferry Road
Acworth, GA 301102
Phone: (770) 701-2500
FAX: (770) 701-2501

Job: *John Tom Hill BU 871584*			
Project: *1005912*			
Client: Crown Castle	Drawn by: holderkg	App'd:	
Code: TIA/EIA-222-F	Date: 02/11/15	Scale: NTS	
Path: C:\Users\holderkg\Desktop\Project Shortcuts\871584 John Tom Hill\1005912\Analysis\LCS\Model\John Tom Hill BU 871584.eri		Dwg No. E-1	

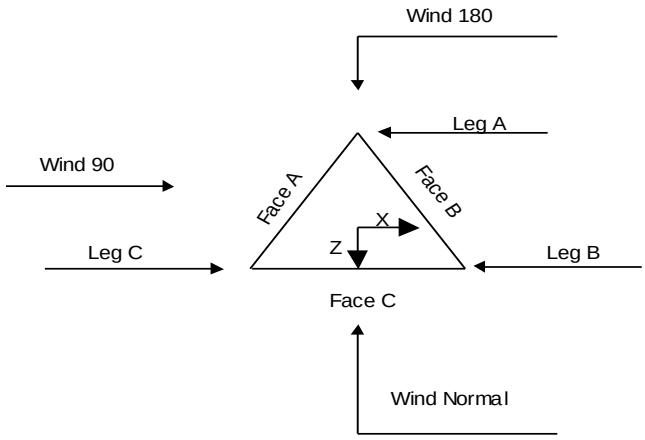
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 200.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 5.00 ft at the top and 23.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
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		Treat Feedline Bundles As Cylinder
	Consider Moments - Horizontals		Assume Legs Pinned		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Diagonals	√	Assume Rigid Index Plate	√	Calculate Redundant Bracing Forces
	Use Moment Magnification	√	Use Clear Spans For Wind Area		Ignore Redundant Members in FEA
√	Use Code Stress Ratios	√	Use Clear Spans For KL/r	√	SR Leg Bolts Resist Compression
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension	√	All Leg Panels Have Same Allowable
√	Escalate Ice	√	Bypass Mast Stability Checks	√	Offset Girt At Foundation
	Always Use Max Kz	√	Use Azimuth Dish Coefficients	√	Consider Feedline Torque
	Use Special Wind Profile	√	Project Wind Area of Appurt.	√	Include Angle Block Shear Check
√	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Poles
	Leg Bolts Are At Top Of Section		SR Members Have Cut Ends		Include Shear-Torsion Interaction
√	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Always Use Sub-Critical Flow
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Use Top Mounted Sockets
	Add IBC .6D+W Combination		Use TIA-222-G Tension Splice Capacity Exemption		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	200.00-180.00			5.00	1	20.00
T2	180.00-160.00			5.00	1	20.00
T3	160.00-140.00			7.00	1	20.00
T4	140.00-120.00			9.00	1	20.00
T5	120.00-100.00			11.00	1	20.00
T6	100.00-80.00			13.00	1	20.00
T7	80.00-60.00			15.00	1	20.00
T8	60.00-40.00			17.00	1	20.00
T9	40.00-20.00			19.00	1	20.00
T10	20.00-0.00			21.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	200.00-180.00	5.00	X Brace	No	No	0.0000	0.0000
T2	180.00-160.00	5.00	X Brace	No	No	0.0000	0.0000
T3	160.00-140.00	5.00	X Brace	No	No	0.0000	0.0000
T4	140.00-120.00	6.67	X Brace	No	No	0.0000	0.0000
T5	120.00-100.00	6.67	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T6	100.00-80.00	6.67	X Brace	No	No	0.0000	0.0000
T7	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T8	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T9	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T10	20.00-0.00	9.96	X Brace	No	No	0.0000	1.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 200.00-180.00	Pipe	Pipe 2.875" x 0.375" (2.5 #160)	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 180.00-160.00	Pipe	Pipe 3.5" x 0.300" (3 XS)	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T3 160.00-140.00	Pipe	Pipe 4" x 0.318" (3.5 XS)	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T4 140.00-120.00	Pipe	Pipe 4.5" x 0.438" (4 #120)	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 120.00-100.00	Pipe	Pipe 5.563" x 0.375" (5 XS)	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 100.00-80.00	Pipe	Pipe 5.563" x 0.375" (5 XS)	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T7 80.00-60.00	Pipe	Pipe 6.625" x 0.432" (6 EH)	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T8 60.00-40.00	Pipe	Pipe 8.625" x 0.322" (8 STD)	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T9 40.00-20.00	Pipe	Pipe 8.625" x 0.500" (8 XS)	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T10 20.00-0.00	Pipe	Pipe 8.625" x 0.500" (8 XS)	A572-50 (50 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 200.00-180.00	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

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

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
T1 200.00-180.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T8 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T9 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T10 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	No	1	1	1	1	1	1	1	1
200.00-180.00				1	1	1	1	1	1	1
T2	Yes	No	1	1	1	1	1	1	1	1
180.00-160.00				1	1	1	1	1	1	1
T3	Yes	No	1	1	1	1	1	1	1	1
160.00-140.00				1	1	1	1	1	1	1
T4	Yes	No	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T5	Yes	No	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1
T6	Yes	No	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1
T7	Yes	No	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T8	Yes	No	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T9	Yes	No	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T10	Yes	No	1	1	1	1	1	1	1	1
20.00-0.00				1	1	1	1	1	1	1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 200.00-180.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 180.00-160.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 160.00-140.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 140.00-120.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 120.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 200.00-180.00	Flange	0.7500 A325N	4	0.6250 A325X	1	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 180.00-160.00	Flange	1.0000 A325N	4	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 160.00-140.00	Flange	1.0000 A325N	4	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 140.00-120.00	Flange	1.2500 A325N	4	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 120.00-100.00	Flange	1.2500 A325N	4	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 100.00-80.00	Flange	1.2500 A325N	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 80.00-60.00	Flange	1.2500 A325N	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 60.00-40.00	Flange	1.3750 A325N	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 40.00-20.00	Flange	1.3750 A325N	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 20.00-0.00	Flange	1.5000 A572-50	8	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
** A Face ** **												
** B Face **												
AVA7-50(1-5/8)	B	Yes	Ar (CfAe)	182.00 - 0.00	0.0000	-0.4	12	6	0.5000	2.0100		0.70
Feedline Ladder (Af)	B	Yes	Af (CfAe)	182.00 - 0.00	0.0000	-0.4	1	1	3.0000	3.0000	12.0000	8.40
Feedline Ladder (Af) **	B	Yes	Af (CfAe)	200.00 - 0.00	0.0000	0	1	1	3.0000	3.0000	12.0000	8.40
FLC 12-50J(1/2")	B	Yes	Ar (CfAe)	163.00 - 0.00	0.0000	-0.2	1	1	0.5000	0.6400		0.17
Feedline Ladder (Af) **	B	Yes	Af (CfAe)	163.00 - 0.00	0.0000	-0.2	1	1	3.0000	3.0000	12.0000	8.40
LDF4-50A(1/2")	B	Yes	Ar (CfAe)	144.00 - 0.00	0.0000	0.4	4	4	0.5000	0.6300		0.15
LDF4-50A(1/2")	B	Yes	Ar (CfAe)	198.00 - 144.00	0.0000	0.4	1	1	0.5000	0.6300		0.15
LDF5-50A(7/8")	B	Yes	Ar (CfAe)	144.00 - 0.00	0.0000	0.35	5	3	0.5000	1.0900		0.33
LDF5-50A(7/8")	B	Yes	Ar (CfAe)	198.00 - 144.00	0.0000	0.35	4	2	0.5000	1.0900		0.33
Feedline Ladder (Af) **	B	Yes	Af (CfAe)	198.00 - 0.00	0.0000	0	1	1	3.0000	3.0000	12.0000	8.40
** C Face **												
LDF7-50A(1-5/8")	C	Yes	Ar (CfAe)	170.00 - 0.00	-1.5000	0	6	6	0.5000	1.9800		0.82
LDF4-50A(1/2")	C	Yes	Ar (CfAe)	53.00 - 0.00	-1.5000	0.08	1	1	0.5000	0.6300		0.15
Feedline Ladder (Af) **	C	Yes	Af (CfAe)	170.00 - 0.00	-1.5000	0	1	1	3.0000	3.0000	12.0000	8.40
Safety Line 3/8	C	Yes	Ar (CfAe)	200.00 - 0.00	0.0000	0	1	1	0.3750	0.3750		0.22
Climbing Ladder	C	Yes	Af (CfAe)	200.00 - 0.00	0.0000	0	1	1	2.5000	2.5000	10.0000	7.90

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
** A Face ** ** **							

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

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
T1	200.00-180.00	A	0.000	0.000	0.000	0.000	0.00
		B	6.225	10.000	0.000	0.000	0.38
		C	0.625	4.167	0.000	0.000	0.16
T2	180.00-160.00	A	0.000	0.000	0.000	0.000	0.00
		B	24.943	15.750	0.000	0.000	0.73
		C	10.525	6.667	0.000	0.000	0.30
T3	160.00-140.00	A	0.000	0.000	0.000	0.000	0.00
		B	26.843	20.000	0.000	0.000	0.88
		C	20.425	9.167	0.000	0.000	0.43
T4	140.00-120.00	A	0.000	0.000	0.000	0.000	0.00
		B	30.817	20.000	0.000	0.000	0.89
		C	20.425	9.167	0.000	0.000	0.43
T5	120.00-100.00	A	0.000	0.000	0.000	0.000	0.00
		B	30.817	20.000	0.000	0.000	0.89
		C	20.425	9.167	0.000	0.000	0.43
T6	100.00-80.00	A	0.000	0.000	0.000	0.000	0.00
		B	30.817	20.000	0.000	0.000	0.89
		C	20.425	9.167	0.000	0.000	0.43
T7	80.00-60.00	A	0.000	0.000	0.000	0.000	0.00
		B	30.817	20.000	0.000	0.000	0.89
		C	20.425	9.167	0.000	0.000	0.43
T8	60.00-40.00	A	0.000	0.000	0.000	0.000	0.00
		B	30.817	20.000	0.000	0.000	0.89
		C	21.108	9.167	0.000	0.000	0.43
T9	40.00-20.00	A	0.000	0.000	0.000	0.000	0.00
		B	30.817	20.000	0.000	0.000	0.89
		C	21.475	9.167	0.000	0.000	0.43
T10	20.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	30.817	20.000	0.000	0.000	0.89
		C	21.475	9.167	0.000	0.000	0.43

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
T1	200.00-180.00	A	1.234	0.000	0.000	0.000	0.000	0.00
		B		10.729	19.960	0.000	0.000	0.95
		C		4.738	6.908	0.000	0.000	0.35
T2	180.00-160.00	A	1.217	0.000	0.000	0.000	0.000	0.00
		B		19.159	47.838	0.000	0.000	2.03
		C		8.362	21.058	0.000	0.000	0.76
T3	160.00-140.00	A	1.199	0.000	0.000	0.000	0.000	0.00
		B		23.273	55.887	0.000	0.000	2.36
		C		11.920	35.163	0.000	0.000	1.16
T4	140.00-120.00	A	1.179	0.000	0.000	0.000	0.000	0.00
		B		23.001	62.345	0.000	0.000	2.42
		C		11.784	35.073	0.000	0.000	1.15
T5	120.00-100.00	A	1.155	0.000	0.000	0.000	0.000	0.00
		B		22.689	62.137	0.000	0.000	2.39
		C		11.628	34.969	0.000	0.000	1.13
T6	100.00-80.00	A	1.128	0.000	0.000	0.000	0.000	0.00
		B		22.323	61.893	0.000	0.000	2.36
		C		11.445	34.846	0.000	0.000	1.11
T7	80.00-60.00	A	1.094	0.000	0.000	0.000	0.000	0.00
		B		21.876	61.595	0.000	0.000	2.31
		C		11.221	34.697	0.000	0.000	1.09
T8	60.00-40.00	A	1.051	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		21.298	61.210	0.000	0.000	2.26
		C		13.892	34.505	0.000	0.000	1.09
T9	40.00-20.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		20.617	60.756	0.000	0.000	2.19
		C		14.975	34.278	0.000	0.000	1.07
T10	20.00-0.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		20.617	60.756	0.000	0.000	2.19
		C		14.975	34.278	0.000	0.000	1.07

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	200.00-180.00	A	0.000	0.000	0.000	0.000
		B	0.000	4.232	1.457	3.002
		C	0.000	1.648	0.430	1.169
T2	180.00-160.00	A	0.000	0.000	0.000	0.000
		B	0.000	7.563	3.104	5.436
		C	0.000	3.338	1.311	2.399
T3	160.00-140.00	A	0.000	0.000	0.000	0.000
		B	0.000	7.980	3.228	5.823
		C	0.000	4.699	2.039	3.428
T4	140.00-120.00	A	0.000	0.000	0.000	0.000
		B	0.000	6.425	3.822	6.812
		C	0.000	3.509	2.225	3.721
T5	120.00-100.00	A	0.000	0.000	0.000	0.000
		B	0.000	5.949	3.636	6.436
		C	0.000	3.251	2.117	3.517
T6	100.00-80.00	A	0.000	0.000	0.000	0.000
		B	0.000	5.576	4.223	7.415
		C	0.000	3.049	2.459	4.055
T7	80.00-60.00	A	0.000	0.000	0.000	0.000
		B	0.000	3.801	3.497	6.079
		C	0.000	2.081	2.036	3.327
T8	60.00-40.00	A	0.000	0.000	0.000	0.000
		B	0.000	3.495	3.392	5.819
		C	0.000	2.034	2.021	3.386
T9	40.00-20.00	A	0.000	0.000	0.000	0.000
		B	0.000	3.199	3.315	5.598
		C	0.000	1.919	1.999	3.358
T10	20.00-0.00	A	0.000	0.000	0.000	0.000
		B	0.000	3.140	3.719	6.281
		C	0.000	1.884	2.243	3.767

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	200.00-180.00	3.4651	-0.4625	2.0800	0.2993
T2	180.00-160.00	3.9589	-5.1825	2.7190	-2.4222

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T3	160.00-140.00	4.9408	-4.4982	3.5930	-2.6912
T4	140.00-120.00	6.4598	-4.2753	4.4918	-2.9657
T5	120.00-100.00	6.9684	-4.5573	4.9955	-3.2447
T6	100.00-80.00	7.2794	-4.7194	5.3018	-3.4309
T7	80.00-60.00	8.0650	-5.1938	6.3955	-4.0271
T8	60.00-40.00	7.9729	-4.9685	6.4325	-3.6130
T9	40.00-20.00	8.5702	-5.2387	6.9087	-3.6366
T10	20.00-0.00	8.6861	-5.2884	7.0572	-3.7110

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
Beacon	B	From Leg	0.50 0.00 1.00	0.0000	200.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.00 2.50 3.00 4.00 6.00	2.00 2.50 3.00 4.00 6.00	0.02 0.03 0.04 0.06 0.10
Sidemarker	A	From Leg	0.50 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.60 0.72 0.86 1.16 1.89	0.60 0.72 0.86 1.16 1.89	0.01 0.02 0.03 0.05 0.13
Sidemarker	B	From Leg	0.50 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.60 0.72 0.86 1.16 1.89	0.60 0.72 0.86 1.16 1.89	0.01 0.02 0.03 0.05 0.13
Sidemarker	C	From Leg	0.50 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.60 0.72 0.86 1.16 1.89	0.60 0.72 0.86 1.16 1.89	0.01 0.02 0.03 0.05 0.13
** ** 198 **									
DB225-A	A	From Leg	4.00 0.00 7.00	0.0000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.21 5.78 8.35 13.48 23.75	3.21 5.78 8.35 13.48 23.75	0.04 0.05 0.06 0.08 0.13
ALR10-O	B	From Leg	4.00 0.00 10.00	0.0000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	13.25 15.31 17.39 20.79 25.72	13.25 15.31 17.39 20.79 25.72	0.09 0.18 0.28 0.52 1.17
OGB6-928N	B	From Leg	4.00 0.00 6.00	0.0000	198.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.97 1.33 1.63 2.26 3.67	0.97 1.33 1.63 2.26 3.67	0.01 0.02 0.03 0.06 0.17
PD1107-1	C	From Leg	4.00	0.0000	198.00	No Ice	2.18	2.18	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	3.29	3.29	0.02
			7.00			1" Ice	4.43	4.43	0.05
						2" Ice	6.42	6.42	0.12
						4" Ice	9.18	9.18	0.35
PD201-7	C	From Leg	4.00	0.0000	198.00	No Ice	1.02	1.02	0.00
			0.00			1/2" Ice	1.81	1.81	0.01
			7.00			1" Ice	2.62	2.62	0.03
						2" Ice	3.76	3.76	0.07
						4" Ice	5.78	5.78	0.22
(4) 6' x 2" Mount Pipe	A	From Leg	4.00	0.0000	198.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.57	1.57	0.04
						2" Ice	1.71	1.71	0.05
						4" Ice	1.99	1.99	0.07
(4) 6' x 2" Mount Pipe	B	From Leg	4.00	0.0000	198.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.57	1.57	0.04
						2" Ice	1.71	1.71	0.05
						4" Ice	1.99	1.99	0.07
(4) 6' x 2" Mount Pipe	C	From Leg	4.00	0.0000	198.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.57	1.57	0.04
						2" Ice	1.71	1.71	0.05
						4" Ice	1.99	1.99	0.07
Sector Mount [SM 602-3]	C	None		0.0000	198.00	No Ice	33.11	33.11	1.54
						1/2" Ice	44.90	44.90	2.16
						1" Ice	56.69	56.69	2.78
						2" Ice	80.27	80.27	4.01
						4" Ice	127.43	127.43	6.49
** ** 182 **									
RR90-17-02DP w/ Mount Pipe	A	From Leg	4.00	0.0000	182.00	No Ice	4.59	3.32	0.03
			0.00			1/2" Ice	5.09	4.09	0.07
			1.00			1" Ice	5.58	4.78	0.12
						2" Ice	6.59	6.23	0.22
						4" Ice	8.73	9.31	0.56
RR90-17-02DP w/ Mount Pipe	B	From Leg	4.00	0.0000	182.00	No Ice	4.59	3.32	0.03
			0.00			1/2" Ice	5.09	4.09	0.07
			1.00			1" Ice	5.58	4.78	0.12
						2" Ice	6.59	6.23	0.22
						4" Ice	8.73	9.31	0.56
RR90-17-02DP w/ Mount Pipe	C	From Leg	4.00	0.0000	182.00	No Ice	4.59	3.32	0.03
			0.00			1/2" Ice	5.09	4.09	0.07
			1.00			1" Ice	5.58	4.78	0.12
						2" Ice	6.59	6.23	0.22
						4" Ice	8.73	9.31	0.56
KRY 112 71	A	From Leg	4.00	0.0000	182.00	No Ice	0.68	0.45	0.01
			0.00			1/2" Ice	0.80	0.56	0.02
			0.00			1" Ice	0.93	0.68	0.03
						2" Ice	1.22	0.94	0.04
						4" Ice	1.90	1.57	0.11
KRY 112 71	B	From Leg	4.00	0.0000	182.00	No Ice	0.68	0.45	0.01
			0.00			1/2" Ice	0.80	0.56	0.02
			0.00			1" Ice	0.93	0.68	0.03
						2" Ice	1.22	0.94	0.04
						4" Ice	1.90	1.57	0.11
KRY 112 71	C	From Leg	4.00	0.0000	182.00	No Ice	0.68	0.45	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
			0.00			1/2" Ice	0.80	0.56	0.02
			0.00			1" Ice	0.93	0.68	0.03
						2" Ice	1.22	0.94	0.04
						4" Ice	1.90	1.57	0.11
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.68 12.40 13.14 14.60 17.87	9.84 11.37 12.91 15.27 20.14	0.08 0.17 0.27 0.51 1.15
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.68 12.40 13.14 14.60 17.87	9.84 11.37 12.91 15.27 20.14	0.08 0.17 0.27 0.51 1.15
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.68 12.40 13.14 14.60 17.87	9.84 11.37 12.91 15.27 20.14	0.08 0.17 0.27 0.51 1.15
ATBT-BOTTOM-24V	A	From Leg	4.00 0.00 1.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.12 0.17 0.23 0.38 0.77	0.08 0.12 0.17 0.30 0.67	0.00 0.00 0.01 0.01 0.04
ATBT-BOTTOM-24V	B	From Leg	4.00 0.00 1.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.12 0.17 0.23 0.38 0.77	0.08 0.12 0.17 0.30 0.67	0.00 0.00 0.01 0.01 0.04
ATBT-BOTTOM-24V	C	From Leg	4.00 0.00 1.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.12 0.17 0.23 0.38 0.77	0.08 0.12 0.17 0.30 0.67	0.00 0.00 0.01 0.01 0.04
(2) 6' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.50 1.57 1.71 1.99	1.43 1.50 1.57 1.71 1.99	0.02 0.03 0.04 0.05 0.07
(2) 6' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.50 1.57 1.71 1.99	1.43 1.50 1.57 1.71 1.99	0.02 0.03 0.04 0.05 0.07
(2) 6' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.50 1.57 1.71 1.99	1.43 1.50 1.57 1.71 1.99	0.02 0.03 0.04 0.05 0.07
Sector Mount [SM 602-3]	C	None		0.0000	182.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	33.11 44.90 56.69 80.27 127.43	33.11 44.90 56.69 80.27 127.43	1.54 2.16 2.78 4.01 6.49
** ** 170 ** (2) DB980H90E-M w/ Mount	A	From Leg	5.00	0.0000	170.00	No Ice	4.04	3.62	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Pipe			0.00			1/2" Ice	4.50	4.48	0.07
			1.00			1" Ice	4.95	5.22	0.11
						2" Ice	5.87	6.74	0.22
						4" Ice	8.05	10.00	0.55
(2) DB980H90E-M w/ Mount Pipe	B	From Leg	5.00	0.0000	170.00	No Ice	4.04	3.62	0.03
			0.00			1/2" Ice	4.50	4.48	0.07
			1.00			1" Ice	4.95	5.22	0.11
						2" Ice	5.87	6.74	0.22
						4" Ice	8.05	10.00	0.55
(2) DB980H90E-M w/ Mount Pipe	C	From Leg	5.00	0.0000	170.00	No Ice	4.04	3.62	0.03
			0.00			1/2" Ice	4.50	4.48	0.07
			1.00			1" Ice	4.95	5.22	0.11
						2" Ice	5.87	6.74	0.22
						4" Ice	8.05	10.00	0.55
6' x 2" Mount Pipe	A	From Leg	5.00	0.0000	170.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.57	1.57	0.04
						2" Ice	1.71	1.71	0.05
						4" Ice	1.99	1.99	0.07
6' x 2" Mount Pipe	B	From Leg	5.00	0.0000	170.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.57	1.57	0.04
						2" Ice	1.71	1.71	0.05
						4" Ice	1.99	1.99	0.07
6' x 2" Mount Pipe	C	From Leg	5.00	0.0000	170.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.57	1.57	0.04
						2" Ice	1.71	1.71	0.05
						4" Ice	1.99	1.99	0.07
Sector Mount [SM 506-3]	C	None		0.0000	170.00	No Ice	35.47	35.47	1.74
						1/2" Ice	50.60	50.60	2.35
						1" Ice	65.73	65.73	2.95
						2" Ice	95.99	95.99	4.16
						4" Ice	156.51	156.51	6.59
**									
** 163 **									
Pipe Mount [PM 601-1]	A	From Leg	0.50	0.0000	163.00	No Ice	3.00	0.90	0.07
			0.00			1/2" Ice	3.74	1.12	0.08
			0.00			1" Ice	4.48	1.34	0.09
						2" Ice	5.96	1.78	0.12
						4" Ice	8.92	2.66	0.18
**									
** 144 **									
PD156S-4	B	From Leg	4.00	0.0000	144.00	No Ice	0.44	0.44	0.01
			0.00			1/2" Ice	0.79	0.79	0.01
			6.00			1" Ice	1.14	1.14	0.01
						2" Ice	1.85	1.85	0.01
						4" Ice	3.26	3.26	0.02
SRL480N1DT4	C	From Leg	4.00	0.0000	144.00	No Ice	3.81	3.81	0.03
			0.00			1/2" Ice	5.37	5.37	0.06
			11.00			1" Ice	6.94	6.94	0.10
						2" Ice	10.13	10.13	0.20
						4" Ice	14.61	14.61	0.54
(2) PD1109-1	B	From Leg	4.00	0.0000	144.00	No Ice	2.83	2.83	0.02
			0.00			1/2" Ice	3.89	3.89	0.04
			8.00			1" Ice	4.97	4.97	0.07
						2" Ice	6.37	6.37	0.14

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
						4" Ice	9.00	9.00	0.38
(4) 6' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.50 1.57 1.71 1.99	1.43 1.50 1.57 1.71 1.99	0.02 0.03 0.04 0.05 0.07
(4) 6' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.50 1.57 1.71 1.99	1.43 1.50 1.57 1.71 1.99	0.02 0.03 0.04 0.05 0.07
(4) 6' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.50 1.57 1.71 1.99	1.43 1.50 1.57 1.71 1.99	0.02 0.03 0.04 0.05 0.07
Sector Mount [SM 602-3]	C	None		0.0000	144.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	33.11 44.90 56.69 80.27 127.43	33.11 44.90 56.69 80.27 127.43	1.54 2.16 2.78 4.01 6.49
**									
** 53 **									
KS24019-L112A	A	From Leg	1.00 0.00 2.00	0.0000	53.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.16 0.22 0.30 0.48 0.95	0.16 0.22 0.30 0.48 0.95	0.01 0.01 0.01 0.02 0.06
Side Arm Mount [SO 202-1]	A	From Leg	2.00 0.00 0.00	0.0000	53.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.96 4.10 5.24 7.52 12.08	2.53 3.51 4.49 6.45 10.37	0.11 0.13 0.16 0.20 0.30
**									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
** 163 **											
PR-850	A	Grid	From Leg	1.00 0.00 0.00	60.0000		163.00	5.67	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	25.22 25.97 26.71 28.21 31.20	0.04 0.17 0.30 0.57 1.10

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 90 deg - No Ice
4	Dead+Wind 180 deg - No Ice
5	Dead+Ice+Temp
6	Dead+Wind 0 deg+Ice+Temp
7	Dead+Wind 90 deg+Ice+Temp
8	Dead+Wind 180 deg+Ice+Temp
9	Dead+Wind 0 deg - Service
10	Dead+Wind 90 deg - Service
11	Dead+Wind 180 deg - Service

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	200 - 180	6.549	9	0.3126	0.0569
T2	180 - 160	5.241	9	0.3004	0.0443
T3	160 - 140	4.027	9	0.2611	0.0325
T4	140 - 120	2.989	9	0.2140	0.0240
T5	120 - 100	2.134	9	0.1770	0.0184
T6	100 - 80	1.430	9	0.1400	0.0132
T7	80 - 60	0.886	9	0.1007	0.0090
T8	60 - 40	0.500	9	0.0710	0.0066
T9	40 - 20	0.236	9	0.0405	0.0042
T10	20 - 0	0.075	9	0.0204	0.0020

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
200.00	Beacon	9	6.549	0.3126	0.0569	201465
198.00	DB225-A	9	6.417	0.3120	0.0557	201465
182.00	RR90-17-02DP w/ Mount Pipe	9	5.370	0.3027	0.0455	55966
170.00	(2) DB980H90E-M w/ Mount Pipe	9	4.616	0.2836	0.0381	33642
163.00	PR-850	9	4.199	0.2682	0.0341	26908
144.00	PD156S-4	9	3.181	0.2228	0.0254	24901
100.00	Sidemarker	9	1.430	0.1400	0.0132	29546
53.00	KS24019-L112A	9	0.395	0.0600	0.0058	43231

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	200 - 180	16.660	2	0.7952	0.1458

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T2	180 - 160	13.334	2	0.7639	0.1133
T3	160 - 140	10.245	2	0.6637	0.0832
T4	140 - 120	7.606	2	0.5440	0.0613
T5	120 - 100	5.433	2	0.4500	0.0472
T6	100 - 80	3.641	2	0.3559	0.0339
T7	80 - 60	2.256	2	0.2561	0.0230
T8	60 - 40	1.273	2	0.1804	0.0168
T9	40 - 20	0.603	2	0.1030	0.0109
T10	20 - 0	0.193	2	0.0519	0.0051

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
200.00	Beacon	2	16.660	0.7952	0.1458	81818
198.00	DB225-A	2	16.323	0.7937	0.1425	81818
182.00	RR90-17-02DP w/ Mount Pipe	2	13.660	0.7698	0.1165	22716
170.00	(2) DB980H90E-M w/ Mount Pipe	2	11.744	0.7209	0.0976	13230
163.00	PR-850	2	10.684	0.6817	0.0873	10602
144.00	PD156S-4	2	8.095	0.5663	0.0649	9795
100.00	Sidemarker	2	3.641	0.3559	0.0339	11624
53.00	KS24019-L112A	2	1.007	0.1525	0.0148	17023

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	200	Leg	A325N	0.7500	4	2.76	19.44	0.142 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	2.60	5.71	0.456 ✔	1.333	Member Block Shear
		Top Girt	A325X	0.6250	1	0.06	8.16	0.007 ✔	1.333	Member Bearing
T2	180	Leg	A325N	1.0000	4	8.35	34.56	0.242 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	3.18	5.71	0.557 ✔	1.333	Member Block Shear
T3	160	Leg	A325N	1.0000	4	14.01	34.56	0.406 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	3.61	5.71	0.633 ✔	1.333	Member Block Shear
T4	140	Leg	A325N	1.2500	4	19.57	54.00	0.362 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	4.26	7.75	0.550 ✔	1.333	Member Block Shear
T5	120	Leg	A325N	1.2500	4	24.91	54.00	0.461 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	4.63	7.75	0.598 ✔	1.333	Member Block Shear
T6	100	Leg	A325N	1.2500	6	20.02	54.00	0.371 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	5.14	7.88	0.652 ✔	1.333	Member Block Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T7	80	Leg	A325N	1.2500	6	23.03	54.00	0.427 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	6.09	12.69	0.480 ✔	1.333	Member Bearing
T8	60	Leg	A325N	1.3750	6	26.20	65.34	0.401 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	6.88	13.05	0.527 ✔	1.333	Member Bearing
T9	40	Leg	A325N	1.3750	6	29.34	65.34	0.449 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	7.32	13.05	0.561 ✔	1.333	Member Bearing
T10	20	Leg	A572-50	1.5000	8	24.91	37.91	0.657 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	8.27	13.05	0.634 ✔	1.333	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	200 - 180	Pipe 2.875" x 0.375" (2.5 #160)	20.00	5.00	67.1 K=1.00	21.46	2.9452	-14.50	63.21	0.229 ✔
T2	180 - 160	Pipe 3.5" x 0.300" (3 XS)	20.03	5.01	52.9 K=1.00	23.89	3.0159	-41.41	72.06	0.575 ✔
T3	160 - 140	Pipe 4" x 0.318" (3.5 XS)	20.03	5.01	46.0 K=1.00	24.96	3.6784	-68.21	91.82	0.743 ✔
T4	140 - 120	Pipe 4.5" x 0.438" (4 #120)	20.03	6.68	55.5 K=1.00	23.47	5.5894	-94.22	131.21	0.718 ✔
T5	120 - 100	Pipe 5.563" x 0.375" (5 XS)	20.03	6.68	43.6 K=1.00	25.32	6.1120	-119.69	154.76	0.773 ✔
T6	100 - 80	Pipe 5.563" x 0.375" (5 XS)	20.03	6.68	43.6 K=1.00	25.32	6.1120	-144.59	154.76	0.934 ✔
T7	80 - 60	Pipe 6.625" x 0.432" (6 EH)	20.03	10.02	54.8 K=1.00	23.59	8.4049	-167.20	198.28	0.843 ✔
T8	60 - 40	Pipe 8.625" x 0.322" (8 STD)	20.03	10.02	40.9 K=1.00	25.70	8.3993	-191.59	215.89	0.887 ✔
T9	40 - 20	Pipe 8.625" x 0.500" (8 XS)	20.03	10.02	41.8 K=1.00	25.58	12.7627	-216.08	326.50	0.662 ✔
T10	20 - 0	Pipe 8.625" x 0.500" (8 XS)	20.03	9.97	41.6 K=1.00	25.61	12.7627	-247.25	326.82	0.757 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	200 - 180	L1 3/4x1 3/4x3/16	7.07	3.20	113.8 K=1.02	11.15	0.6211	-2.77	6.92	0.401 ✔
T2	180 - 160	L1 3/4x1 3/4x3/16	8.40	4.01	140.0 K=1.00	7.61	0.6211	-3.13	4.73	0.661 ✔
T3	160 - 140	L1 3/4x1 3/4x3/16	10.08	4.82	168.6 K=1.00	5.25	0.6211	-3.83	3.26	1.174 ✔
T4	140 - 120	L2 1/2x2 1/2x3/16	12.58	6.10	147.9 K=1.00	6.83	0.9020	-4.45	6.16	0.722 ✔
T5	120 - 100	L2 1/2x2 1/2x3/16	14.32	6.92	167.7 K=1.00	5.31	0.9020	-4.79	4.79	1.000 ✔
T6	100 - 80	L3x3x3/16	16.11	7.82	157.4 K=1.00	6.03	1.0900	-5.15	6.57	0.784 ✔
T7	80 - 60	L3 1/2x3 1/2x1/4	19.30	9.43	163.1 K=1.00	5.62	1.6900	-6.22	9.49	0.655 ✔
T8	60 - 40	L3 1/2x3 1/2x1/4	21.03	10.20	176.4 K=1.00	4.80	1.6900	-6.88	8.11	0.848 ✔
T9	40 - 20	L3 1/2x3 1/2x1/4	22.81	11.10	191.9 K=1.00	4.06	1.6900	-7.32	6.86	1.068 ✔
T10	20 - 0	L4x4x1/4	24.60	11.99	181.0 K=1.00	4.56	1.9400	-8.27	8.84	0.936 ✔

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	200 - 180	L1 3/4x1 3/4x3/16	5.00	4.43	154.7 K=1.00	6.24	0.6211	-0.06	3.88	0.015 ✔

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	200 - 180	Pipe 2.875" x 0.375" (2.5 #160)	20.00	5.00	67.1	30.00	2.9452	11.04	88.36	0.125 ✔
T2	180 - 160	Pipe 3.5" x 0.300" (3 XS)	20.03	5.01	52.9	30.00	3.0159	33.40	90.48	0.369 ✔
T3	160 - 140	Pipe 4" x 0.318" (3.5 XS)	20.03	5.01	46.0	30.00	3.6784	56.06	110.35	0.508 ✔
T4	140 - 120	Pipe 4.5" x 0.438" (4 #120)	20.03	6.68	55.5	30.00	5.5894	78.26	167.68	0.467 ✔
T5	120 - 100	Pipe 5.563" x 0.375" (5 XS)	20.03	6.68	43.6	30.00	6.1120	99.65	183.36	0.543

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T6	100 - 80	Pipe 5.563" x 0.375" (5 XS)	20.03	6.68	43.6	30.00	6.1120	120.11	183.36	0.655 ✔
T7	80 - 60	Pipe 6.625" x 0.432" (6 EH)	20.03	10.02	54.8	30.00	8.4049	138.20	252.15	0.548 ✔
T8	60 - 40	Pipe 8.625" x 0.322" (8 STD)	20.03	10.02	40.9	30.00	8.3993	157.20	251.98	0.624 ✔
T9	40 - 20	Pipe 8.625" x 0.500" (8 XS)	20.03	10.02	41.8	30.00	12.7627	176.01	382.88	0.460 ✔
T10	20 - 0	Pipe 8.625" x 0.500" (8 XS)	20.03	9.97	41.6	30.00	12.7627	199.29	382.88	0.521 ✔

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	200 - 180	L1 3/4x1 3/4x3/16	7.07	3.20	75.2	29.00	0.3604	2.60	10.45	0.249 ✔
T2	180 - 160	L1 3/4x1 3/4x3/16	8.40	4.01	93.3	29.00	0.3604	3.18	10.45	0.304 ✔
T3	160 - 140	L1 3/4x1 3/4x3/16	10.08	4.82	111.6	29.00	0.3604	3.61	10.45	0.346 ✔
T4	140 - 120	L2 1/2x2 1/2x3/16	12.58	6.10	96.6	29.00	0.5710	4.26	16.56	0.258 ✔
T5	120 - 100	L2 1/2x2 1/2x3/16	14.32	6.92	109.3	29.00	0.5710	4.63	16.56	0.280 ✔
T6	100 - 80	L3x3x3/16	16.11	7.82	102.0	29.00	0.6945	5.14	20.14	0.255 ✔
T7	80 - 60	L3 1/2x3 1/2x1/4	19.30	9.43	105.9	29.00	1.1034	6.09	32.00	0.190 ✔
T8	60 - 40	L3 1/2x3 1/2x1/4	21.03	10.20	114.4	29.00	1.1034	6.45	32.00	0.201 ✔
T9	40 - 20	L3 1/2x3 1/2x1/4	21.92	10.65	119.3	29.00	1.1034	6.85	32.00	0.214 ✔
T10	20 - 0	L4x4x1/4	24.60	11.99	116.9	29.00	1.2909	7.36	37.44	0.197 ✔

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	200 - 180	L1 3/4x1 3/4x3/16	5.00	4.43	106.4	29.00	0.3604	0.03	10.45	0.003 ✔

Section Capacity Table

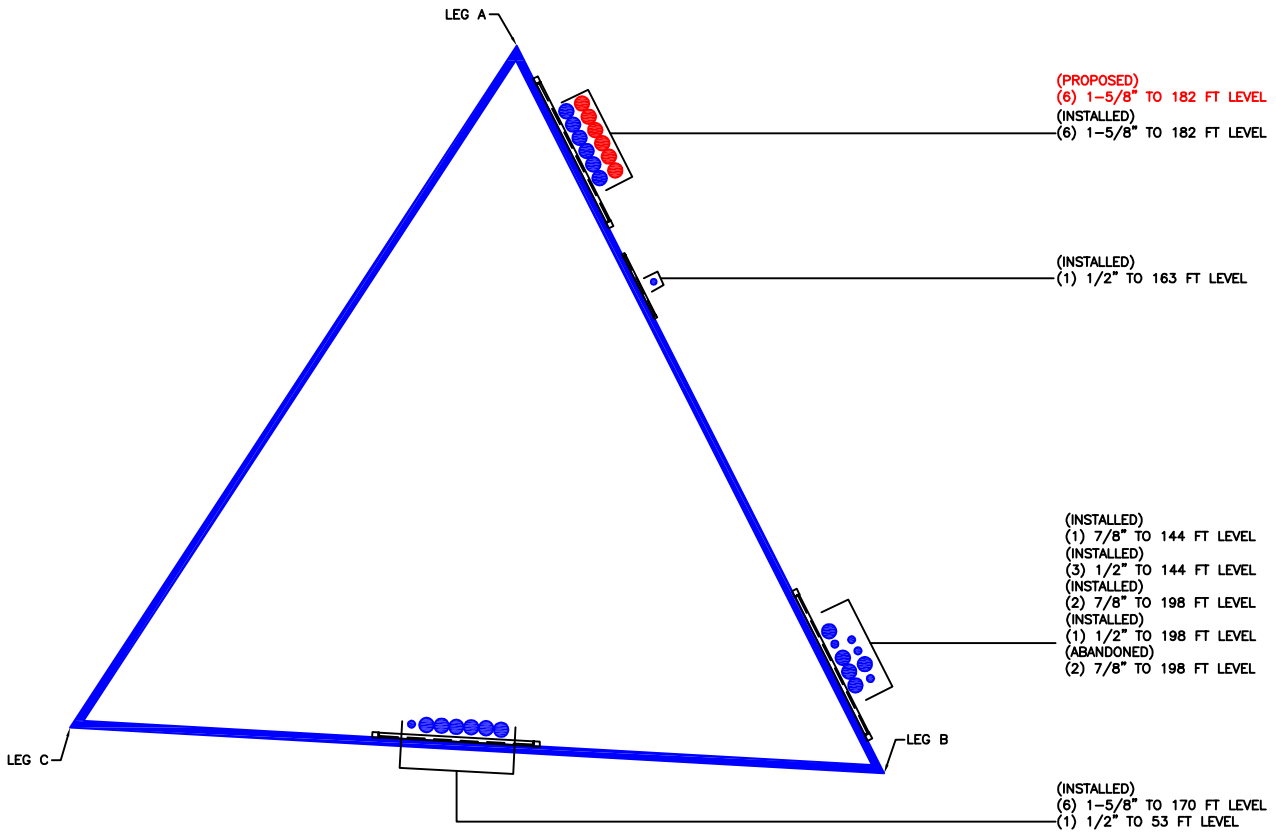
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	200 - 180	Leg	Pipe 2.875" x 0.375" (2.5 #160)	3	-14.50	84.26	17.2	Pass
T2	180 - 160	Leg	Pipe 3.5" x 0.300" (3 XS)	33	-41.41	96.06	43.1	Pass
T3	160 - 140	Leg	Pipe 4" x 0.318" (3.5 XS)	60	-68.21	122.40	55.7	Pass
T4	140 - 120	Leg	Pipe 4.5" x 0.438" (4 #120)	87	-94.22	174.90	53.9	Pass
T5	120 - 100	Leg	Pipe 5.563" x 0.375" (5 XS)	108	-119.69	206.29	58.0	Pass
T6	100 - 80	Leg	Pipe 5.563" x 0.375" (5 XS)	129	-144.59	206.29	70.1	Pass
T7	80 - 60	Leg	Pipe 6.625" x 0.432" (6 EH)	150	-167.20	264.31	63.3	Pass
T8	60 - 40	Leg	Pipe 8.625" x 0.322" (8 STD)	165	-191.59	287.78	66.6	Pass
T9	40 - 20	Leg	Pipe 8.625" x 0.500" (8 XS)	180	-216.08	435.22	49.6	Pass
T10	20 - 0	Leg	Pipe 8.625" x 0.500" (8 XS)	195	-247.25	435.64	56.8	Pass
T1	200 - 180	Diagonal	L1 3/4x1 3/4x3/16	10	-2.77	9.23	30.1 34.2 (b)	Pass
T2	180 - 160	Diagonal	L1 3/4x1 3/4x3/16	37	-3.13	6.30	49.6	Pass
T3	160 - 140	Diagonal	L1 3/4x1 3/4x3/16	64	-3.83	4.35	88.0	Pass
T4	140 - 120	Diagonal	L2 1/2x2 1/2x3/16	91	-4.45	8.21	54.2	Pass
T5	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	112	-4.79	6.38	75.0	Pass
T6	100 - 80	Diagonal	L3x3x3/16	133	-5.15	8.76	58.8	Pass
T7	80 - 60	Diagonal	L3 1/2x3 1/2x1/4	154	-6.22	12.65	49.1	Pass
T8	60 - 40	Diagonal	L3 1/2x3 1/2x1/4	169	-6.88	10.81	63.6	Pass
T9	40 - 20	Diagonal	L3 1/2x3 1/2x1/4	184	-7.32	9.14	80.1	Pass
T10	20 - 0	Diagonal	L4x4x1/4	199	-8.27	11.79	70.2	Pass
T1	200 - 180	Top Girt	L1 3/4x1 3/4x3/16	4	-0.06	5.17	1.1	Pass
						Summary		
						Leg (T6)	70.1	Pass
						Diagonal (T3)	88.0	Pass
						Top Girt (T1)	1.1	Pass
						Bolt Checks	49.3	Pass
						RATING =	**88.0**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

APPENDIX C

ADDITIONAL CALCULATIONS



BUSINESS UNIT: 871584 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Project Name:	John Tom Hill	Created On:	6/3/2014
Project Number:	871584	Checked By:	SMR / DW
Job Number:	1005912	Revised On:	9/26/2014
Date:	2/12/2015	Revision No.:	5.4

JACOBS
Jacobs Engineering Group. Inc.

Self Support Tower Pad-Pier Foundation

Load		
Code	F	
Compression	246	kips
Shear (comp)	26	kips
Uplift	198	kips
Shear (uplift)	22	kips
Soil Unit Weight	135	pcf
Friction Angle	36	
Cohesion	0	psf

Pad		
Thickness	1.75	ft
Bearing Depth	10	ft
Width	15	ft
Top Rebar Size	7	
Top Rebar Quantity	20	
Bottom Rebar Size	7	
Bottom Rebar Quantity	20	

Pier		
Pier type	Circle	
Diameter	3.5	ft
Height above Grade	0.5	ft
Rebar Size	7	
Rebar Quantity	14	
Tie Size	3	
Tie C/C Spacing	12	in

Material		
Concrete Strength (F'c)	3000	psi
Concrete Density	150	pcf
Rebar Tensile (Fy)	60	ksi
Clear Cover	3	in

Soil		
Ult. Bearing Capacity	8	ksf
Frost Depth	40	in
Water Table Depth	99	ft

Structural Capacity	73.9%	Pass
Soil Interaction Capacity	68.2%	Pass
Overall Foundation Capacity	73.9%	Pass

Compression		
Pad Beam Shear Capacity	246.8	kips
Pad Beam Shear	182.3	kips
Pad Beam Shear Check	73.9%	Pass
Steel Punching Resistance	648.0	kips
Punching Shear	326.1	kips
Punching Shear Check	50.3%	Pass
Pad Bending Moment Capacity	858.8	k-ft
Pad Bending Moment	542.2	k-ft
Pad Bending Moment Check	63.1%	Pass
Pier Beam Shear Capacity	92.2	kips
Pier Beam Shear	35.1	kips
Pier Beam Shear Check	38.1%	Pass
Peir Bending Moment Capacity	952.2	k-ft
Peir Bending Moment	191.5	k-ft
Pier Bending Moment Check	20.1%	Pass
Pad-Pier Bearing Capacity	4592.7	kips
Pad-Pier Bearing	643.7	kips
Pad-Pier Bearing Check	14.0%	Pass

Uplift		
Steel Rupture Capacity	453.6	kips
Steel Rupture Force	257.2	kips
Steel Rupture Check	56.7%	Pass
Pad Bending Moment Capacity	858.8	k-ft
Pad Bending Moment	58.9	k-ft
Pad Bending Moment Check	6.9%	Pass
Pier Beam Shear Capacity	92.2	kips
Pier Beam Shear	29.7	kips
Pier Beam Shear Check	32.2%	Pass
Peir Bending Moment Capacity	309.0	k-ft
Peir Bending Moment	153.9	k-ft
Pier Bending Moment Check	49.8%	Pass

Soil Interaction		
Compression Capacity	911.87	kips
Compression Force	253.82	kips
Compression Check	27.8%	Pass
Uplift Capacity	290.13	kips
Uplift Force	198	kips
Uplift Check	68.2%	Pass
Lateral Capacity	124.56	kips
Lateral Force	26	kips
Lateral Check	20.9%	Pass

Project Name:	John Tom Hill
Project Number:	871584
Job Number:	1005912
Date:	2/12/2015
Leg:	
Boring Number:	

JACOBS®
Jacobs Engineering Group. Inc.

Created On:	5/28/2014
Checked By:	
Revised On:	
Revision No.:	0

Self Support Tower Pad - Pier Foundation

Code :	F

UPLIFT CHECK		
Uplift Force (k)	198	
	(Ultimate)	(Allowable)
Wt. Concrete (k):	71.69	57.35
Wt. Soil (k):	441.82	220.91
Friction (k):	23.74	11.87
Total (k)		290.13
% Capacity		
68.2%	PASS	

COMPRESSION CHECK		
Comp. Force (k)	246	
	(Ultimate)	(Allowable)
Friction (k):	23.74	11.87
Bearing Cap. (ksf):	8.00	4.00
Gross/Net Bearing?:	N	
	Weights	Factored Wt.
Gross Concrete (k):	N/A	7.82
Net Concrete (k):	7.82	
Soil (k):	N/A	0.00
% Capacity		
27.8%	PASS	

FOUNDATION INFORMATION	
Density Concrete (pcf):	150
Pier Shape (R or S):	R
Pier Diameter/Width (ft):	3.5
Pier Area (ft^2):	9.62
Pier Height Above Grade (ft):	0.50
Pad Width/Length (ft):	15.00
Pad Thickness (ft):	1.75
Pad Bearing Depth (ft):	10.00
Frost Depth (ft):	3.33
Water Table Depth (ft):	99.00

SOIL INFORMATION	
Number of Layers Above Pad:	2
Number of Layers Adjacent Pad:	1
Total Number of Layers:	3
Number of Layers Check	OK
Pad Check	OK
Frost Depth Check	OK
Water Table Check	OK

Soil Profile

Soil Layer Number.	Layer Thickness (ft)	Depth at Bot. (ft)	Soil Type (C/S)	Unit Weight. (pcf)	Frict. Angle (°)	Cohesion (psf)
1	3.33	3.33	S	135	0	0
2	4.92	8.25	S	135	36	0
3	1.75	10.00	S	135	36	0
4	N/A	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A	N/A

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: CT11189E

Glastonbury / Rt-94 & Fern
115 Birch Mountain Road
Glastonbury, CT 06033

March 4, 2015

EBI Project Number: 6215001321

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	34.45 %

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

EBI Consulting
environmental | engineering | due diligence

March 4, 2015

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

Emissions Analysis for Site: **CT11189E – Glastonbury / Rt-94 & Fern**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **115 Birch Mountain Road, Glastonbury, 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 467 $\mu W/cm^2$, and the general population exposure limit for the PCS and 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 **115 Birch Mountain Road, Glastonbury, 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) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

5) 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.

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

7) The antennas used in this modeling are the **EMS RR90_17_02DP** for 1900 MHz (PCS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **EMS RR90_17_02DP** has a maximum gain of **14.4 dBd** at its main lobe. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe. 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.

8) The antenna mounting height centerline of the proposed antennas is **183 feet** above ground level (AGL).

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

All 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:	EMS RR90_17_02DP	Make / Model:	EMS RR90_17_02DP	Make / Model:	EMS RR90_17_02DP
Gain:	14.4 dBd	Gain:	14.4 dBd	Gain:	14.4 dBd
Height (AGL):	183	Height (AGL):	183	Height (AGL):	183
Frequency Bands	1900 MHz(PCS)	Frequency Bands	1900 MHz(PCS)	Frequency Bands	1900 MHz(PCS)
Channel Count	6	Channel Count	6	# PCS Channels:	6
Total TX Power:	240	Total TX Power:	240	# AWS Channels:	240
ERP (W):	6,610.15	ERP (W):	6,610.15	ERP (W):	6,610.15
Antenna A1 MPE%	0.76	Antenna B1 MPE%	0.76	Antenna C1 MPE%	0.76
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	183	Height (AGL):	183	Height (AGL):	183
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power:	30	Total TX Power:	30	Total TX Power:	30
ERP (W):	865.21	ERP (W):	865.21	ERP (W):	865.21
Antenna A2 MPE%	0.21	Antenna B2 MPE%	0.21	Antenna C2 MPE%	0.21

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**2.91**
Sprint	1.50 %
Tilcon Tomasso	1.12 %
Arch Cmcns	0.82 %
SkyTel	0.75 %
Arch Cmcns	1.48 %
US Drug	0.78 %
Internal Revenue	0.77 %
Connecticut Radio	1.08 %
Federal Express	0.72 %
Northeast Paging	4.16 %
Stamm Const.	1.38 %
Unknown	1.40 %
Unknown	1.12 %
Unknown	7.64 %
Unknown	6.79 %
Site Total MPE %:	**34.45 %**

T-Mobile Sector 1 Total:	0.97 %
T-Mobile Sector 2 Total:	0.97 %
T-Mobile Sector 3 Total:	0.97 %
Site Total:	34.45 %

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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 1:	0.97 %
Sector 2:	0.97 %
Sector 3 :	0.97 %
T-Mobile Total:	2.91 %
Site Total:	34.45 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **34.45%** 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.

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