NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development

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

April 21, 2017

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

RE: Notice of Exempt Modification
1 Hartford Square, New Britain CT 06051
Latitude: 41.666209
Longitude: -72.811634
T-Mobile Site#: CT11351_L1900

Dear Ms. Bachman:

T-Mobile is requesting to file an exempt modification for an existing 175-foot Monopole located at 1 Hartford Square, New Britain CT 06051. T-Mobile currently maintains six (6) antennas at the 152-foot level of the existing 175-foot tower. The monopole is owned by SBA. The property is owned by Hartford Square Associates LLC. T-Mobile now intends to replace three (3) existing antenna with three (3) new 1900/2100 MHz antenna. The new antennas would be installed at the 152-foot and level of the tower.

Planned Modifications:

Remove:
NONE

Remove and Replace:
(3) KRC118023-1_B2P_B4A Antenna **(Remove) –** (3) AIR32DB B66Aa B2a Antenna **(Replace)**

Install New:
(1) 1-1/4" Hybrid

Existing to Remain:
(12) 1-5/8" Coax
(1) 1-5/8" Hybrid
(3) RRU
(3) Commscope LNX6515DS A1M Antenna
(3) AIR21 KRC118023-1_B2A_B4P Antenna
(3) TMA

This facility was approved by the City of New Britain PZC – Dated August 14, 2000. The approval is for a 175-foot communications tower. The City zoning director sent over the files they had available. Please see attached.

NORTHEAST SITE SOLUTIONS

Turnkey Wireless Development

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies§ 16- SOj-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.SA. § 16-SOj-73, a copy of this letter is being sent to Mayor Erin Stewart, Elected Official for the City of New Britain and David D. Zajac, City Planning and Building Enforcement as well as the property owner and the tower owner.

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

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

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

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The existing structure and its foundation can support the proposed loading.

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

Sincerely,

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

Attachments
cc: Erin Stewart- Mayor - as elected official
David D. Zajac- City Planning & Building
SBA - as tower owner
Hartford Square Associates LLC - as property owner

Exhibit A

CITY OF NEW BRITAIN

EST. 1871

DEPARTMENT OF
BUILDING AND HEALTH

SERGIO LUPO MPH, RS
DIRECTOR

WWW.NEWBRITAINCT.GOV

Certificate of Zoning Compliance

April 20, 2017

Denise Sabo
NSS Northeast Site Solutions
199 Brickyard Rd
Farmington, CT 06032

Subject: One Hartford Square
New Britain, CT 06053

Dear Sir or Madam:

This is to advise you that the zoning and use of the above caption Premises are governed by the law and regulations of the City of New Britain and the Premises are located in an I-2 District (general industry) under the City of New Britain Zoning Ordinances Section 200.

The use of this building/site as 200-10-31 Public Utility facility, being a 175 foot Lattice Communication Tower, Building Permit #B1414 and Certificate of Occupancy issued November7, 2003. Is a permitted use.

A file check of this property in the building department shows no violations.

I hope this letter will suffice in satisfying your needs.

If you have any questions, please call me at (860) 612 5014.

Sincerely,

David D. Zajac
Building Inspector
Zoning Enforcement Officer

CC: Director, of Licenses, Permits & Inspections

/ddz

City of New Britain
Building Department

Date Issued 11/7/03

BUILDING PERMIT — CERTIFICATE OF OCCUPANCY

Date 8/14/00 Permit No. B1414

Applicant SBA Address 80 Eastern Blvd, Glastonbury, CT

Permit To ACCESSORY (Type of Improvement) ( ) (No.) Story Tower (Proposed Use) No. of Dwelling Units

At (Location) ONE HARTFORD SQUARE (No.) (Street) Zoning District I2

Subdivision Lot Block Lot Size

Building is to be Ft. wide by Ft. long by Ft. in height and shall conform in construction

To Type Use Group Basement Walls or Foundation (Type)

Remarks: Construct 175' lattice type communication tower per plans and specifications.

Area or Volume (Cubic/Square Feet)

Owner Dixwell Assoicates

Address 1 Hartford Sq, NB, CT

(Building Inspector)

To be posted on premises — See reverse side for conditions of certificate.

LOCATION 1 HARTFORD SQUARE DATE AUG 1, 2000 ZONE I2 CODE YR 99

APPLICATION BUILDING/ZONING NEW BRITAIN, CT

B 1414 COST $ 85,000 FEE $ 1290.00 CK # 80378 CO. FEE 15.00 CK # 80378

1. OWNER DIXWELL ASSOCIATES. ADDRESS 1 HARTFORD SQ. N.B. CT.
2. APPLICANT SBA ADDRESS 80 EASTERN BLVD GLASTONBURY
3. ARCHITECT THOMAS W. SCHEPKE P.E. ADDRESS 6718 W. PLANK Rd, PEORIA, ILL.

REMODELING ☐ ACCESSORY ☑ DEMOLITION ☐ SIGNAGE ☐ SITE PLAN REVIEW ☐ OTHER ☐

NEW CONTST ☐ NO. BEDROOMS NO. BATHS NO. GARAGES FLOOD ZONE Y/N/NA

CONSTRUCT 175' LATTICE TYPE COMMUNICATION TOWER PER PLANS/SPECS.

CO 11/7/03

DIMENSIONS	NO. OF STORIES	HEIGHT	TOTAL SQ. FT. FLR AREA
LOT SIZE	TOTAL LAND AREA SQ. FT.	BUILDING TYPE	USE GROUP

I hereby agree to conform to all of the requirements of the Laws of the State of Connecticut and the Ordinance of the City of New Britain and to notify the Building Commission of any alteration in the plans or specifications of the Building for which this permit is asked.

Applicant (signature) X EDWARD G. DUPONT (print) X 860 659-9101 (telephone no.)

Owner (signature) (print) (telephone no.)

Exhibit B

CITY OF
NEW BRITAIN
CONNECTICUT
GIS & Real Property Information
27 West Main Street
New Britain, CT 06051
ph (860) 826-3323

Property Search

Name: ex. Smith

House No:

Street:
All Streets

Parcel Id: ex. C7C 34

GO

Information Updates

GIS Parcel Maps Updated
October 2015

Property Info Data Updated
Nightly

Current Parcel Count
17,434 +/-

Detailed Parcel Information

GIS ID
641-2

Parcel ID
F4A 2

Unique ID
764

Owner
HARTFORD SQUARE
ASSOCIATES LLC

Location
1 HARTFORD SQ

MAILING ADDRESS
1 HARTFORD SQ WEST
BOX #15
NEW BRITAIN CT 06052

Quick Links: Quick Map VISION Card Summary Card

Scroll Down For Complete Property Detail

PARCEL VALUATIONS

	Appraised Value	Assessed Value
Buildings	4123000	2886100
Land	2076000	1453200
TOTAL:	6542700	4579890


Map
Search
Print
Select
Legend
W MAIN ST
SLATER RD
NORTON RD
RUSSWIN RD
CORBIN AVE
WAKEFIELD CT
BRADLEY ST
EXIT 35
STATE HWY 72
HARTFORD SQ
WOOSTER ST
BLACK ROCK AVE
COLT ST
PAUL ST
MAY ST
BARNES ST
TEXAS DR
PENNSYLVANIA AVE
LELAND ST
BUNNELL ST
EXIT
7
STATE HWY 72
EXIT 7

Exhibit C

T-Mobile

T-MOBILE NORTHEAST LLC

SITE NUMBER:

CT 11351C

SITE NAME:

NEW BRITAIN/RT72 WOOSTER

SITE ADDRESS:

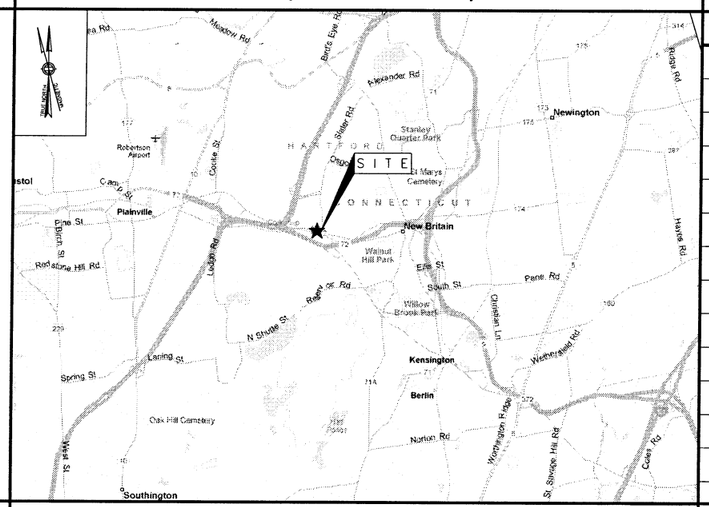
1 HARTFORD SQUARE ST
NEW BRITAIN CT 06053

(792DB CONFIGURATION)

SITE INFORMATION

SITE NUMBER:	CT11351-C
SITE NAME:	NEW BRITAIN/ RT72 WOOSTER
SITE ADDRESS:	1 HARTFORD SQUARE ST NEW BRITAIN, CT 06053
COUNTY:	HARTFORD
ZONING:	N/A
PARCEL ID:	N/A
FAA 2-C COORDINATES:	N 41° 39' 59.0" W 72° 48' 46.0"
GROUND ELEV:	228'-0" ± AMSL
STRUCTURE TYPE:	SELF SUPPORT TOWER
STRUCTURE HEIGHT:	176'-0"± AGL
ANTENNA RAD CENTER:	152'-0"± AGL
TOWER OWNER:	SBA TOWERS, LLC 33 BOSTON POST RD, 320 MARLBOROUGH, MA 01752
LOCAL POWER COMPANY:	EVERSOURCE
LOCAL TELCO COMPANY:	LIGHT TOWER
APPLICANT:	T-MOBILE NORTHEAST LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002 P: (860) 648-1116
SITE ACQUISITION REPRESENTATIVE:	NORTHEAST SITE SOLUTIONS 420 MAIN STREET UNIT #2 STURBRIDGE, MA 01566 P: (860) 394-7021
ARCHITECT/ENGINEER:	VERTICAL RESOURCES GROUP 489 WASHINGTON STREET AUBURN, MA 01501 TEL:508-981-9590 FAX:508-519-8939

VICINITY MAP (NOT TO SCALE)



DRAWING INDEX

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

GENERAL NOTES

1. THIS IS AN IS UNMANNED TELECOMMUNICATION FACILITY AND NOT FOR HUMAN HABITATION:
   -HANDICAP ACCESS REQUIREMENTS ARE NOT REQUIRED.
   -FACILITY HAS NO PLUMBING OR REFRIGERANTS.
   -THIS FACILITY SHALL MEET OR EXCEED ALL FAA AND FCC REGULATOR REQUIREMENTS.
2. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE PROJECT OWNER'S REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

   DEVELOPMENT AND USE OF THIS SITE WILL CONFORM TO ALL APPLICABLE CODES AND ORDINANCES.
3. BUILDING CODE: CONNECTICUT STATE BUILDING CODE
   ELECTRICAL CODE: 2008 (OR LATEST) NATIONAL ELECTRICAL CODE
   STRUCTURAL CODE: TIA/EIA-222-G OR LATEST EDITION

DIRECTIONS:
FROM BLOOMFIELD, CT PROCEED SOUTH ON I-91. CONTINUE THROUGH HARTFORD. TAKE I-91 SOUTH EXIT 32 TOWARDS I-84 WEST. CONTINUE ON I-84 WEST. TAKE I-84 WEST EXIT 35 TOWARDS CT RT-72 EAST. TAKE CT RT-72 EAST EXIT 7 TOWARDS CORBIN AVE. AT END OF OFF RAMP TURN LEFT ONTO CORBIN AVE NORTH. TURN LEFT ONTO W. MAIN ST. TURN LEFT ONTO WOOSTER ST. TURN LEFT ONTO HARTFORD SQUARE. SITE WILL BE ON LEFT.

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

CALL BEFORE YOU DIG
CBYD.COM

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

APPROVALS

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

CONSTRUCTION: _____ DATE: _____

SITE ACQUISITION: _____ DATE: _____

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

LANDLORD/
PROPERTY OWNER: _____ DATE: _____

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

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

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

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

MAR 29 2017

SUBMITTALS

NO	DATE	DESCRIPTION	BY
2	03/29/17	FOR CONSTRUCTION	MN
1	02/20/17	FOR PERMITTING	MN
0	02/08/17	ISSUED FOR REVIEW	MN

SITE NUMBER:
CT11351C
SITE NAME:
NEW BRITAIN/RT 72 WOOSTER
SITE ADDRESS:
1 HARTFORD SQUARE
NEW BRITAIN, CT 06052

SHEET TITLE:
TITLE SHEET

SHEET NUMBER:
01

GENERAL NOTES

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

2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.

3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK.

ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

4. DRAWINGS PROVIDED HERE ARE NOT TO SCALE UNLESS OTHERWISE NOTED AND ARE INTENDED TO SHOW OUTLINE ONLY.

5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.

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

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

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

9. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.

10. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.

11. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.

SITE WORK GENERAL NOTES

1. THE SUBCONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.

2. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE SUBCONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. SUBCONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING & EXCAVATION.

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

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

5. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF CONTRACTOR, OWNER AND/OR LOCAL UTILITIES.

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

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

8. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE TRANSMISSION EQUIPMENT AND TOWER AREAS.

9. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

10. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION, SEE DETAIL 303.

11. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION.

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

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

CONCRETE AND REINFORCING STEEL NOTES:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST-IN-PLACE CONCRETE.

2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE. A HIGHER STRENGTH (4000 PSI) MAY BE USED.

3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60, DEFORMED UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 WELDED STEEL WIRE FABRIC UNLESS NOTED OTHERWISE. SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD, UNO.

4. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:

   CONCRETE CAST AGAINST EARTH.....3 IN.
   CONCRETE EXPOSED TO EARTH OR WEATHER:

   #6 AND LARGER .....2 INCH
   #5 AND SMALLER & WWF.....1 1/2 INCH

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

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

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

6. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY RAMSET/REDHEAD HILTI OR APPROVED EQUAL.

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

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

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

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

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

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

SOIL COMPACTION NOTES FOR SLAB ON GRADE:

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

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

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

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

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

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

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

COMPACTION EQUIPMENT:

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

ELECTRICAL INSTALLATION NOTES

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

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

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

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

5. CABLES SHALL NOT BE ROUTED THROUGH LADDER-STYLE CABLE TRAY RUNGS.

6. EACH END OF EVERY POWER, POWER PHASE CONDUCTOR (I.E., HOTS), GROUNDING, AND T1 CONDUCTOR AND CABLE SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC & OSHA.

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

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

9. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.

10. POWER, CONTROL, AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE CONDUCTOR (SIZE 14 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN-2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.

11. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE CONDUCTOR (SIZE 6 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN-2 GREEN INSULATION, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.

12. POWER AND CONTROL WIRING, NOT IN TUBING OR CONDUIT, SHALL BE MULTI-CONDUCTOR, TYPE TC CABLE (SIZE 14 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN-2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; WITH OUTER JACKET; LISTED OR LABELED FOR THE LOCATION USED, UNLESS OTHERWISE SPECIFIED.

13. ALL POWER AND POWER GROUNDING CONNECTIONS SHALL BE CRIMP-STYLE, COMPRESSION WIRE LUGS AND WIRENUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRENUTS SHALL BE RATED FOR OPERATION AT NO LESS THAN 75°C (90°C IF AVAILABLE).

14. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.

15. ELECTRICAL METALLIC TUBING (EMT) OR RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40, OR RIGID PVC SCHEDULE 80 FOR LOCATIONS SUBJECT TO PHYSICAL DAMAGE) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.

16. ELECTRICAL METALLIC TUBING (EMT), ELECTRICAL NONMETALLIC TUBING (ENT), OR RIGID NONMETALLIC CONDUIT (RIGID PVC, SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.

17. GALVANIZED STEEL INTERMEDIATE METALLIC CONDUIT (IMC) SHALL BE USED FOR OUTDOOR LOCATIONS ABOVE GRADE.

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

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

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

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

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

23. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES, AND PULL BOXES SHALL BE GALVANIZED OR EPOXY-COATED SHEET STEEL, SHALL MEET OR EXCEED UL 50, AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS

ELECTRICAL INSTALLATION NOTES (cont.)

24. METAL RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY-COATED, OR NON-CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.

25. NONMETALLIC RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.

26. THE SUBCONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CONTRACTOR BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.

27. THE SUBCONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD AGAINST LIFE AND PROPERTY.

STRUCTURAL STEEL NOTES:

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

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

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

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

5. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY RAMSET/REDHEAD, HILTI OR APPROVED EQUAL.

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

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

MAR 29 2017

SUBMITTALS

NO	DATE	DESCRIPTION	BY
2	03/29/17	FOR CONSTRUCTION	MN
1	02/20/17	FOR PERMITTING	MN
0	02/08/17	ISSUED FOR REVIEW	MN

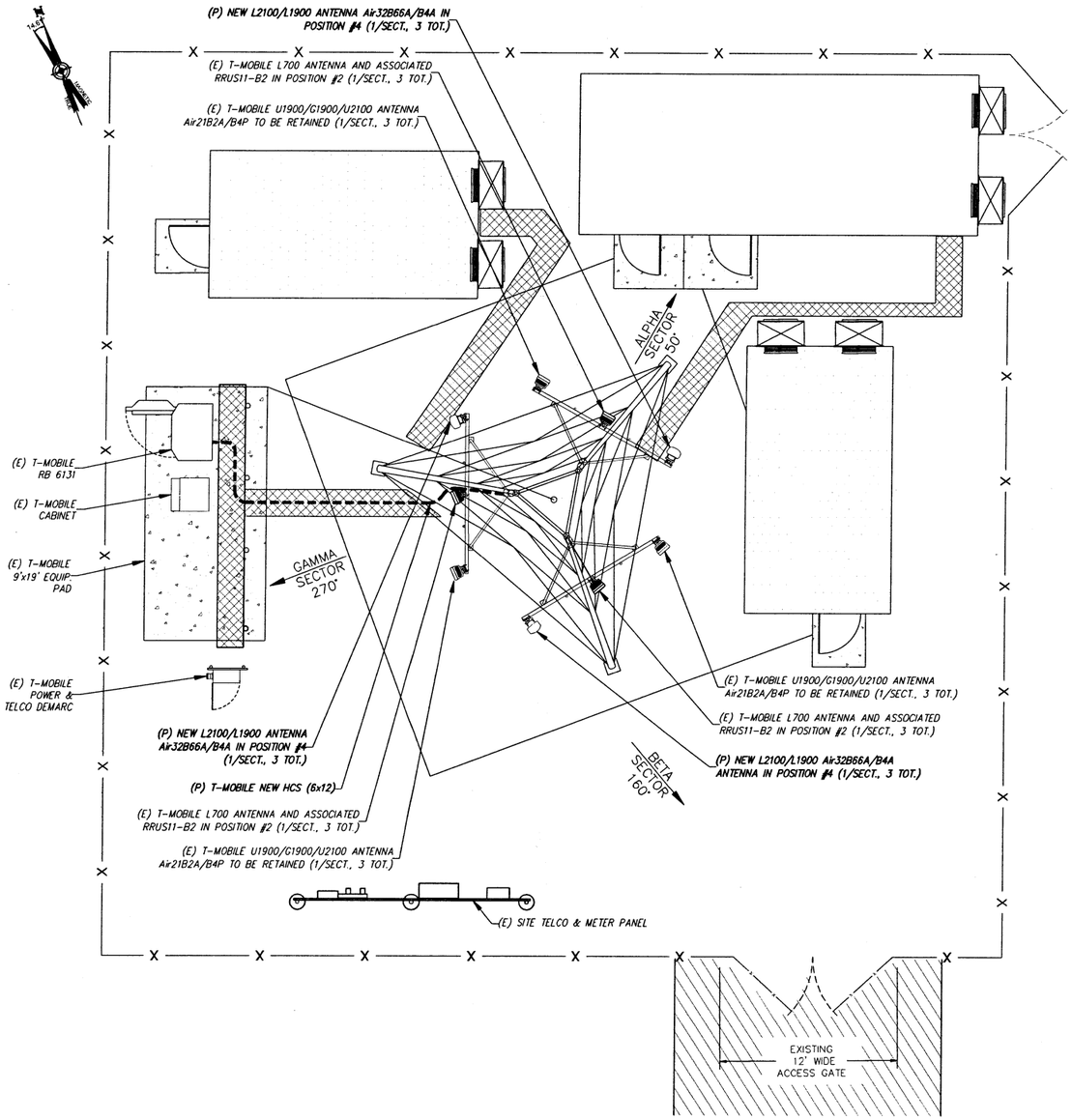
SITE NUMBER:
CT11351C
SITE NAME:
NEW BRITAIN/RT 72 WOOSTER
SITE ADDRESS:
1 HARTFORD SQUARE
NEW BRITAIN, CT 06052

SHEET TITLE:
GENERAL NOTES

SHEET NUMBER:
02

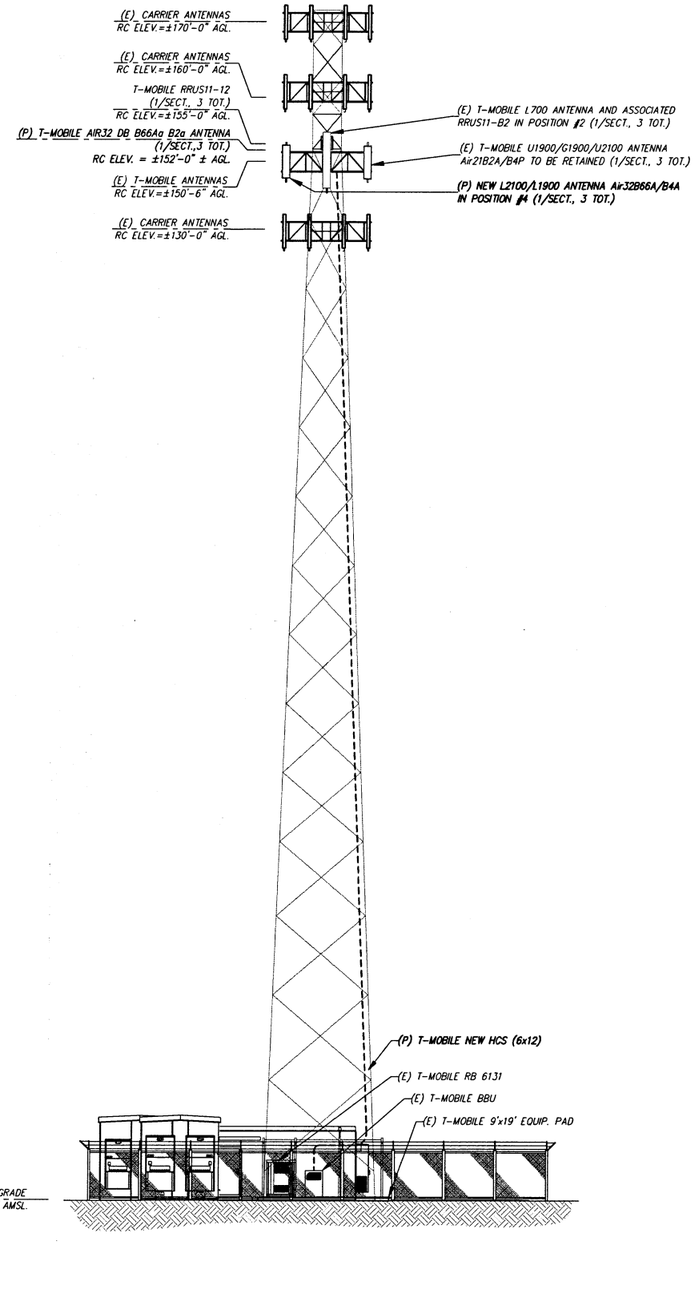
GENERAL NOTES

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



ROOF PLAN 1/03
SCALE: 1" = 5'

GRAPHIC SCALE
5 0 2.5 5 10 20
(IN FEET)
1 inch = 5 ft.



ELEVATION VIEW 2/03
SCALE: 1"=10'

GRAPHIC SCALE
10 0 5 10 20 40
(IN FEET)
1 inch = 10 ft.

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MAR 29 2017

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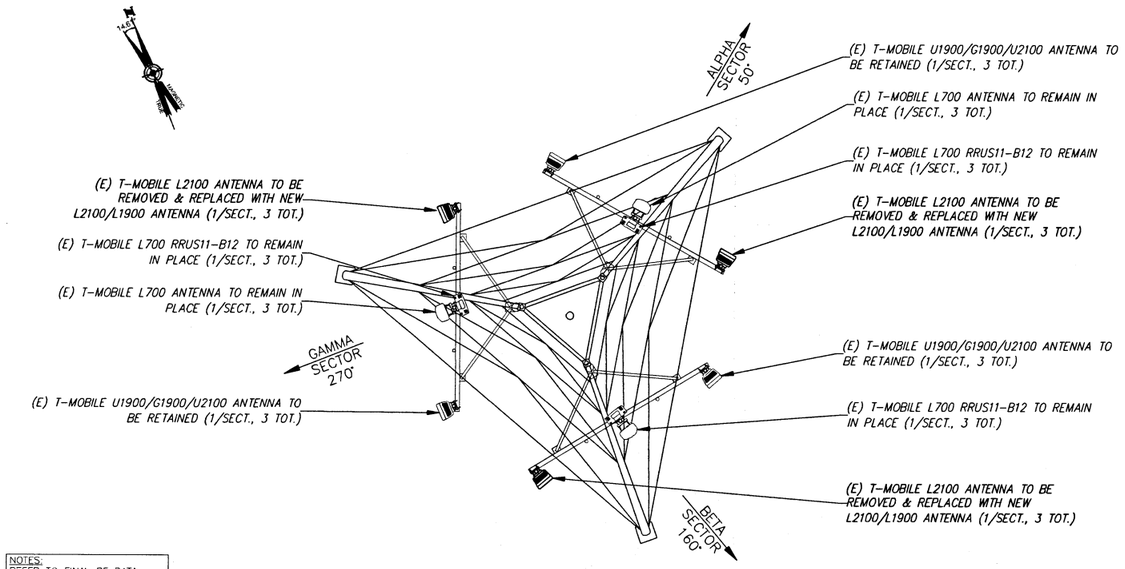
SITE ADDRESS:
1 HARTFORD SQUARE
NEW BRITAIN, CT 06052

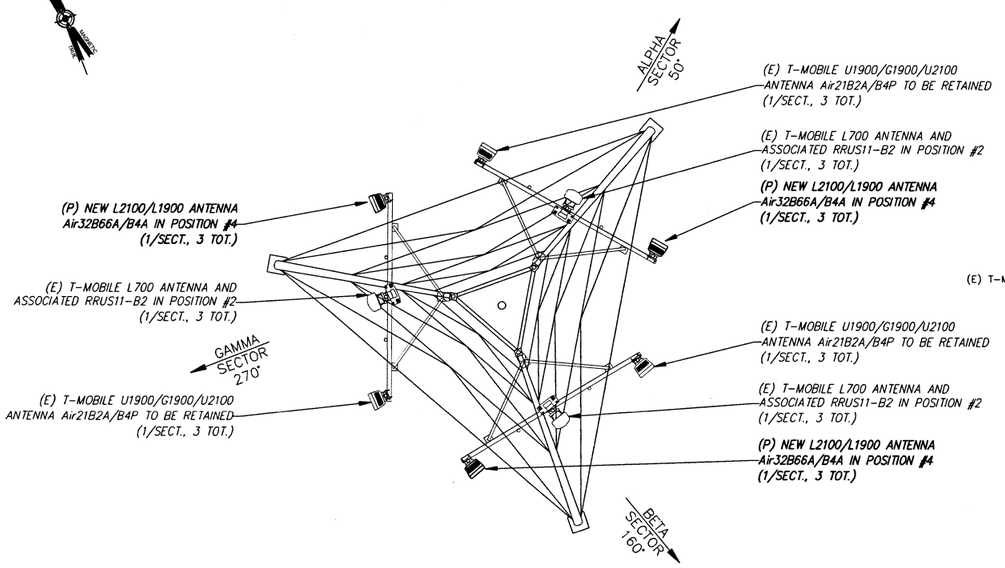
SHEET TITLE:
SITE PLAN & ELEVATIONS

SHEET NUMBER:
03

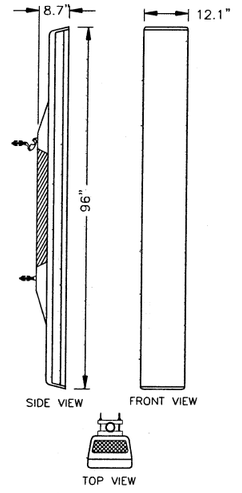


NOTES:
REFER TO FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS AND CONFIGURATIONS

EXISTING ANTENNA CONDITIONS 1/04
SCALE: N.T.S

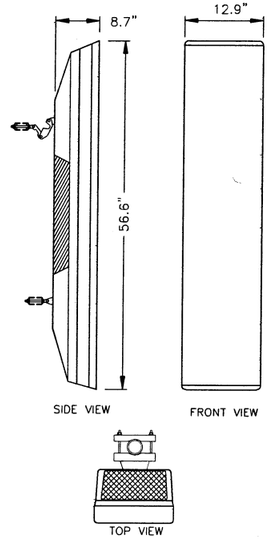


PROPOSED ANTENNA CONFIGURATION 2/04
SCALE: N.T.S



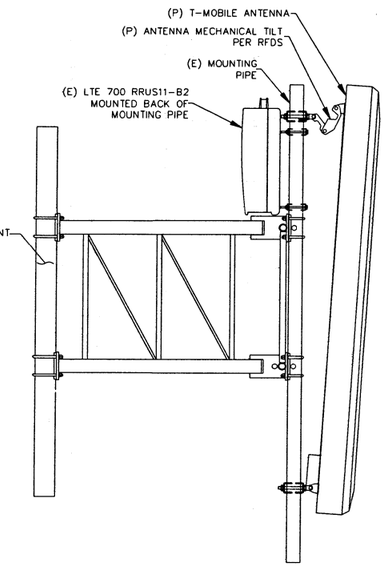
MANUFACTURER:	ERICSSON
MODEL:	KRC118023_1 B2A B4P
DIMENSIONS:	HxWxD 98"x21.1"x8.2"

ANTENNA DETAILS KRC1180023 1 B2A B4P 3/04
SCALE: N.T.S

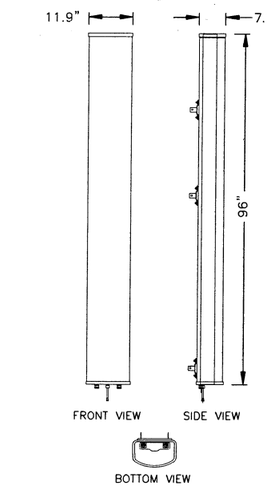


MANUFACTURER:	ERICSSON
MODEL:	AIR32 B66Aa B2A
DIMENSIONS:	HxWxD 56.6"x12.9"x8.7"

ANTENNA DETAILS AIR32 B66Aa/B2A 4/04
SCALE: N.T.S



ANTENNA MOUNTING DETAIL 5/04
SCALE: N.T.S.



MANUFACTURER:	COMSCOPE
MODEL:	LNX 6515DS A1M
DIMENSIONS:	HxWxD 96"x11.9"x7.1"

ANTENNA DETAILS LNX 6515DS A1M 6/04
SCALE: N.T.S

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MAR 29 2017

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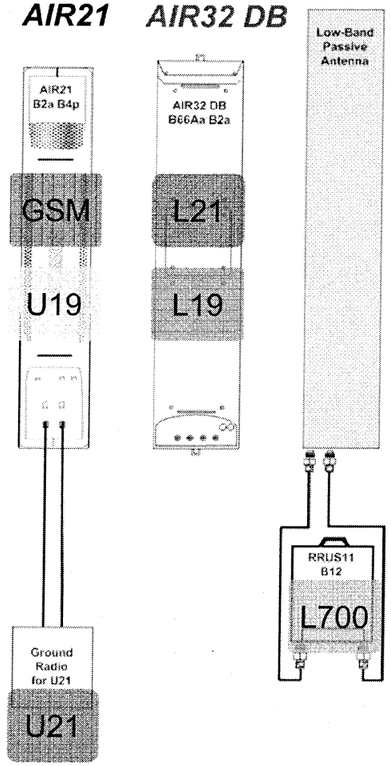
NEW BRITAIN, CT 06052

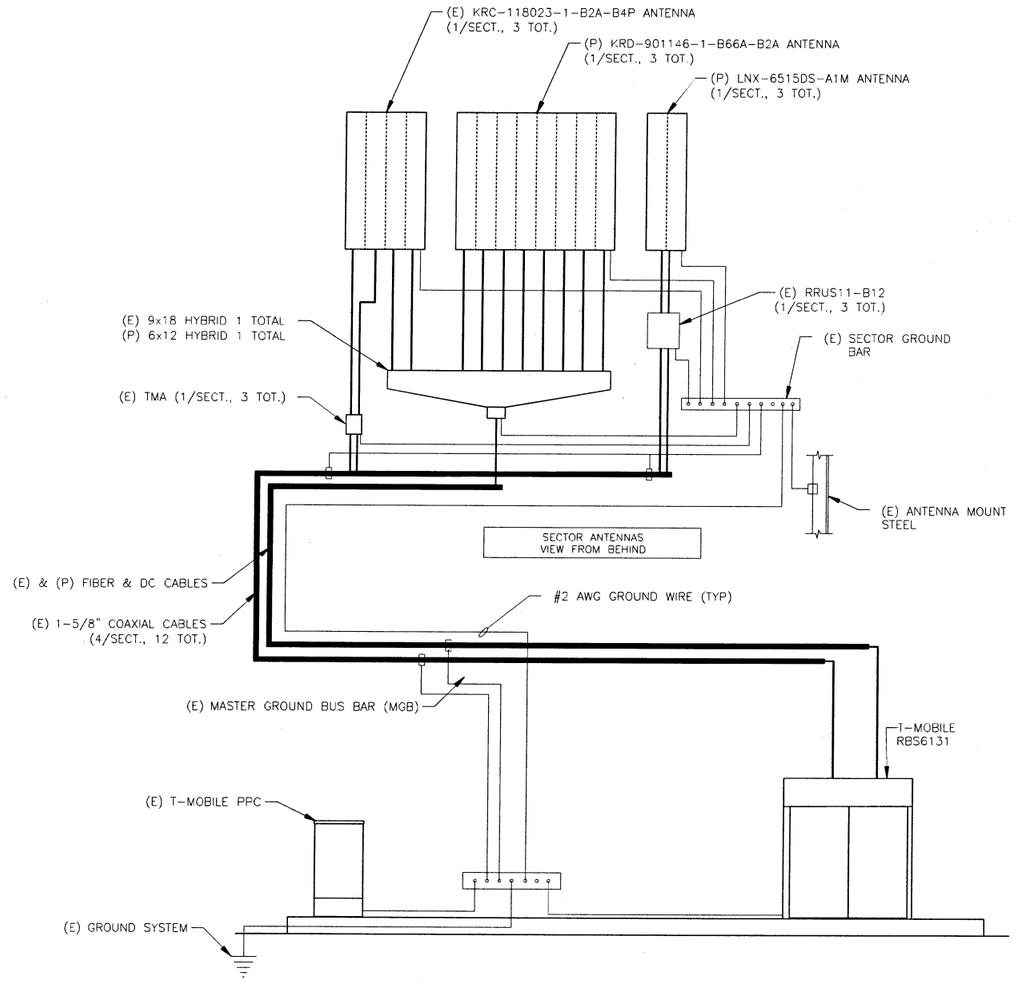
SHEET TITLE:
ANTENNA DETAILS

SHEET NUMBER:
04



COAX/FIBER
CABLE PLUMBING DIAGRAM 1/05

SCALE: N.T.S.



GROUNDING PLUMBING DIAGRAM 2/05

SCALE: N.T.S.

HYBRID FIBER/POWER JUMPER NOTES:

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

TRUNK FIBER NOTES:

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

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

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

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

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

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

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

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

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

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

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STATE OF CONNECTICUT
JAMES P. STROKE
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MAR 29 2017

SUBMITTALS

NO	DATE	DESCRIPTION	BY
2	03/29/17	FOR CONSTRUCTION	MN
1	02/20/17	FOR PERMITTING	MN
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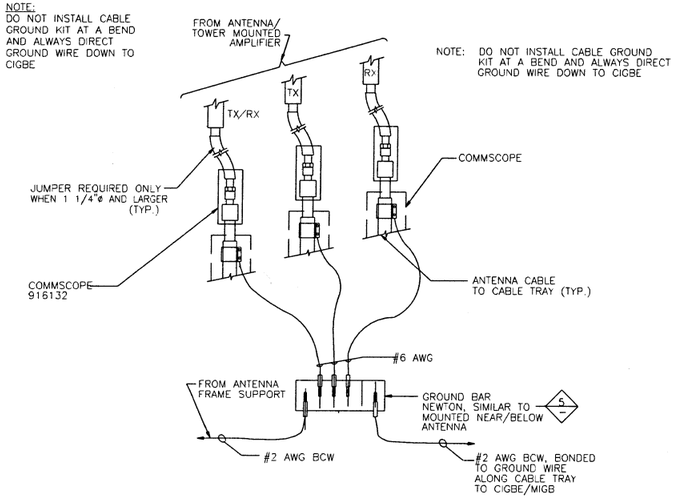
CT11351C
SITE NAME:
NEW BRITAIN/RT 72 WOOSTER
SITE ADDRESS:
1 HARTFORD SQUARE
NEW BRITAIN, CT 06052

SHEET TITLE:
GROUNDING & RF PLUMBING DIAGRAM

SHEET NUMBER:
05

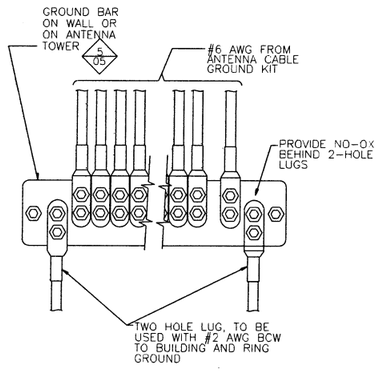
NOTE:
DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE



CONNECTION OF GROUND WIRES TO GROUNDING BAR

1 / 06

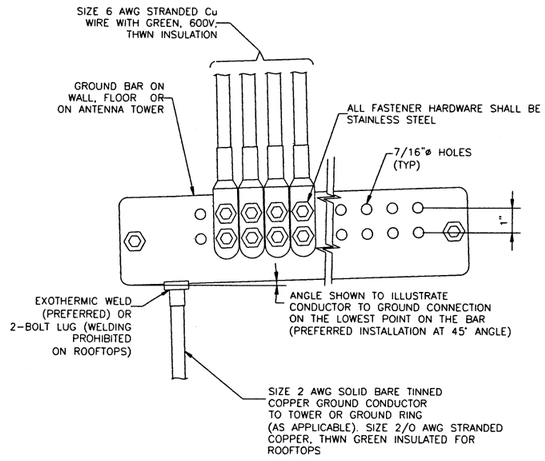
SCALE: N.T.S.



INSTALLATION OF GROUND WIRE TO GROUND BAR

2 / 06

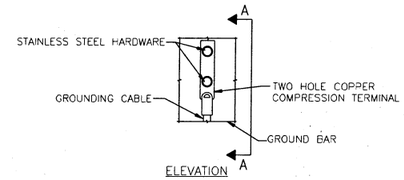
SCALE: N.T.S.

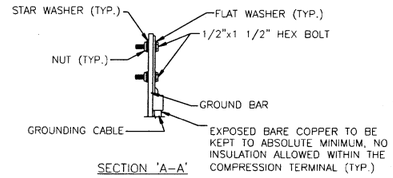


INSTALLATION OF GROUND WIRE TO ANTENNA CABLE GROUND BAR

5 / 06

SCALE: N.T.S.



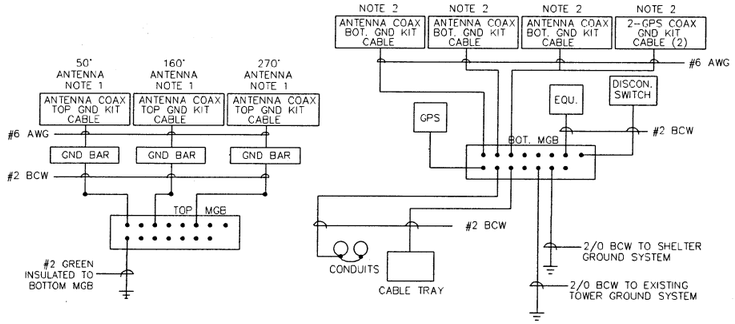


NOTES:
1. DOUBLING UP OR STACKING OF CONNECTIONS IS NOT PERMITTED
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.

TYP. MECHANICAL CONNECTION

6 / 06

SCALE: N.T.S.

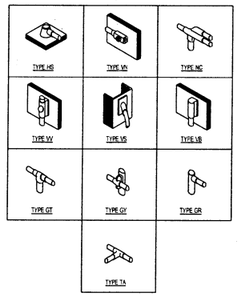


NOTE:
1. BOND ANTENNA GROUNDING KIT CABLE TO TOP CIGBE
2. BOND ANTENNA GROUNDING KIT CABLE TO BOTTOM CIGBE

GROUNDING ONE-LINE DIAGRAM

3 / 06

SCALE: N.T.S.



GROUNDING CONNECTION DETAIL

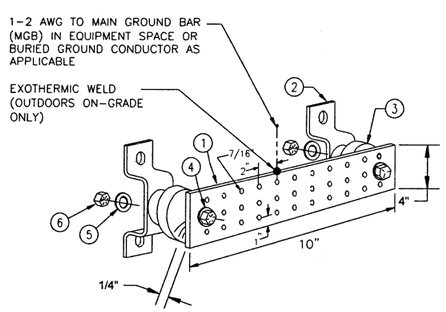
4 / 06

SCALE: N.T.S.

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

1-2 AWG TO MAIN GROUND BAR (MGB) IN EQUIPMENT SPACE OR BURIED GROUND CONDUCTOR AS APPLICABLE

EXOTHERMIC WELD (OUTDOORS ON-GRADE ONLY)



GROUND BAR DETAIL

6 / 06

SCALE: N.T.S.

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

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

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

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

MAR 29 2017

SUBMITTALS

NO	DATE	DESCRIPTION	BY
2	03/29/17	FOR CONSTRUCTION	MN
1	02/20/17	FOR PERMITTING	MN
0	02/08/17	ISSUED FOR REVIEW	MN

SITE NUMBER:
CT11351C
SITE NAME:
NEW BRITAIN/RT 72 WOOSTER
SITE ADDRESS:
1 HARTFORD SQUARE
NEW BRITAIN, CT 06052

SHEET TITLE:
GROUNDING DETAILS

SHEET NUMBER:
06

Exhibit D

ALLPRO
CONSULTING GROUP, INC.
9221 Lyndon B. Johnson Freeway, #204, Dallas, TX 75243 ★ PHONE 972-231-8893 ★ FAX 1-866-364-8375
www.allprocgi.com ★ e-mail: info@allprocgi.com

Tower Structural Analysis Report for SBA Communications Corporation

Existing 175' Self Support Tower

SBA Site Name: New Britain 2, CT
SBA Site Number: CT04382-S-03
Carrier Name: T-Mobile
Carrier Site ID/Name: CT11351C / New Britain /Rt 72 Wooster
App #: 54308, v1.

Site Location:
1 Hartford Square,
New Britain,
CT 06052-1161

Latitude: 41.666209°
Longitude: -72.811634°

ACGI Job # 17-1365
(Refer Previous Modification Design ACGI Job # 17-0378, dated 03/09/2017)

ANALYSIS RESULTS		
Tower Components	98.5 %	**Pass**
Tower Foundation Capacity	63.5 %	**Pass**
Net Change in Tower Stress	-0.1 %	**Change from previous Modification Design by ACGI Job # 17-0378, dated 03/09/2017**

Prepared By:
Snehalsinh Vansia, EIT

03/24/2017
Approved By:
Joji Geroge, P.E.
CT PE #24444

TABLE OF CONTENTS

1. ANALYSIS SUMMARY

The existing 175' Self Support Tower located in New Britain, CT was analyzed by Allpro Consulting Group, Inc (ACGI) for the existing loads and the proposed **T-Mobile** antennas and coaxes as authorized by SBA Communication Corp. Based on the results of the analysis, the existing tower with mentioned proposed and existing loading is found **to be in code compliance** with *TIA-222-G, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and IBC 2012.*

2. SCOPE & SOURCE OF INFORMATION

The purpose of this structural analysis is to determine whether the existing structure is capable of supporting additional proposed loads.

SOURCE OF INFORMATION		
Tower Data:	Rohn Industries, Inc. FDH Engineering, Inc. Allpro Consulting Group Inc.,	Original Tower Drawings by Rohn Industries, Inc. (Eng. File No. 44545AE dated 08/18/2000) Previous Structural Analysis by FDH Engineering, Inc.(FDH Project Number 16BICQ1400, dated 05/13/2016) Previous Structural Analysis by Allpro Consulting Group Inc., ACGI # 16-4300, dated 12/07/2016. Previous Modification Design by Allpro consulting Group Inc., ACGI # 17-0378, dated 03/09/2017.
Foundation Data:	Rohn Industries, Inc.	Existing MAT foundation data is as per original foundation design by Rohn Industries, Inc. (Eng. File No. 44545AE dated 07/26/2000)
Geotechnical Report:	Jaworski Geotech, Inc	Foundation design was based on geotechnical report (No. 00309G dated 07/05/2000)
Loading Data:	Allpro Consulting Group Inc., SBA Communication Corp.	Existing Loading as per previous Modification Design by Allpro consulting Group Inc., ACGI # 17-0378, dated 03/09/2017 Proposed final loading for T-Mobile as per SBA Portal, App #54308, v1.
Authorization:	SBA Communication Corp.	

3. ANALYSIS METHODS & DATA

The analysis was performed in accordance with Telecommunication Industry Association specification TIA-222-G. The tower was modeled using TNX Tower, a 3-D finite element program. TNX Tower is a general-purpose modeling, analysis, and design program created specifically for communication towers using the EIA-222-C, EIA-222-D, TIA/EIA-222-F or TIA-222-G standards. The 3-D model included the tower, with existing appurtenances and all proposed loads.

SITE DATA	
SBA Site Name:	New Britain 2, CT
SBA Site Number:	CT04382-S-03
Carrier Site ID:	T-Mobile: CT11351C / New Britain / Rt 72 Wooster
City, State:	Hartford, CT
County:	Hartford County
Code Wind Load Requirement:	TIA-222-G &International Building Code (122 mph ultimate wind speed equivalent to 95 mph basic wind speed)
Wind Load Used:	TIA-222-G Code: • Basic wind speed of 95 mph (3 second gust wind speed) • Structure Class II. • Exposure Category C. • Topographic Category 1. • Crest Height 0.00 ft. • A wind speed of 50 mph is used in combination with ice • Nominal ice thickness of 1.0 in.
Seismic Check:	S_s=0.183 < 1.0, thus seismic loading can be ignored as per 2.7.3 of the TIA-222-G Code

TOWER DATA	
Tower Type:	Self Support Tower
Height:	175'
Cross Section:	Triangular
Steel Strength:	Legs – 50 ksi , Braces – 36 ksi
Type of Foundation:	Mat Foundation with (3) Pedestals

TOWER HISTORY	
Tower Manufacturer / Model:	Rohn Industries, Inc.
Date of Original Design:	08/18/2000
Previous Modifications:	Allpro Consulting Group Inc., Job # 17-0378, dated 03/03/2017.
Original Design Code Requirements:	TIA-222-F 2005, 80 mph wind speed + 1" radical ice 38 mph wind speed

4. CONCLUSIONS

RESULT SUMMARY		
MEMBER	*% Capacity*	*Pass/Acceptable*
Legs	**66.1 %**	**Pass**
Diagonals	**98.5 %**	**Pass**
Top Girt	**3.0 %**	**Pass**
Bolt checks	**98.5 %**	**Pass**
Foundation (see attached MathCAD for details)	**Net Soil Pressure (22.2 %)**	**Pass**
	Horizontal shear (30.3 %)	**Pass**
	Safety against overturning (63.5 %)	**Pass**
OVERALL TOWER RATING = 98.5 %		

As per the results of the analysis, the existing tower **is in code compliance** for the proposed and existing antenna loads.

Maximum tower member stress **is less than allowable,** making **it in code compliance** under the TIA-222-G code and 2012 International Building Code.

5. DISCLAIMER

Installation procedures and related loading are not within the scope of this analysis. A contractor experienced in similar work should perform all installation work. The engineering services provided by Allpro Consulting Group, Inc. (ACGI) are limited to the computer analysis and calculations of the structure with the proposed and existing loads. This analysis is considered void if the loading mentioned in this report is changed or is different as installed. It is assumed that the existing structure is properly maintained and is in good condition free of any defects. Scope of this analysis does not include existing connections, except as noted in this report.

ACGI does not make any warranties, expressed or implied in connection with this engineering analysis report and disclaims any liability arising from deficiencies or any existing conditions of the original structure. ACGI will not be responsible for consequential or incidental damages sustained by any parties as a result of any data or conclusions included in this Report. The maximum liability of ACGI pursuant to this report shall be limited to the consulting fee received for the preparation of the report.

6. ASSUMPTIONS

This analysis was completed based on the following assumptions:

- Tower has been properly maintained.
- Tower erection was in accordance to manufacturer drawings and modification reports.
- Leg flanges have been properly designed by manufacturer to not be a limiting reaction.
- Welds have been properly designed and installed by manufacturer to not be a limiting reaction.
- Foundation data was not provided. It is assumed that the foundation is designed to resist the original tower reactions.
- Foundation does not have structural damage.
- Bolts have been properly tightened according to manufacturer specifications.
- Appurtenance, mount and transmission line sizes and weights are best estimates using the tnxTower database and manufacturer information.

7. APPURTENANCE LISTING

EXISTING LOAD DESCRIPTION					
ELEV (ft.)	***Qty.***	***Antenna Description***	***Mount Type & Qty.***	***TX. LINE (in)***	***TENANT***
172±	3	Kathrein 840-10054	(3) T-Frames	(6) 5/16" Fiber	Clearwire
	4	Andrew VHLP2.5			
	3	Samsung U-RAS Flexible RRH			
	3	Dragonwave Horizon Duo			
162±	3	Kathrein 800 10121	(3) T-Frames	(12) 1-5/8" Coax (2) 1/2" Fiber (4) 3/4" DC Power (1) 3" Flex Conduit	AT&T*
	3	Quintel Technology QS66512-2			
	6	KMW AM-X-CD-16-65-00T			
	3	Ericsson RRUS-32			
	3	Ericsson RRUS-11			
	3	Ericsson RRUS-32 B2s			
	6	Powerwave LGP 21401			
	6	CCI TPX-070821			
	6	Kathrein 860-10025			
	2	Raycap DC6-48-60-18-8F			
152±	3	Commscope LNX-6515DS-A1M	(3) T-Frames	(12) 1-5/8" Coax (1) 1-5/8" Fiber	T-Mobile
	3	Ericsson S11B12			
	3	Ericsson AIR 21 B2A/B4P			
	3	Ericsson AIR 21 B4A/B2P			
	3	Ericsson KRY 112 144/1			
140±	6	Andrew SBNHH-1D65B	(3) T-Frames	(12) 1-5/8" Coax (2) 1-5/8" Hybrid	Verizon
	3	Kathrein 800 10735v01			
	3	Antel BXA-80080/4CF			
	3	Alcatel Lucent RRH-2x60-AWS			
	3	Alcatel Lucent RRH-2x60-PCS			
	3	Alcatel Lucent RRH-2X60W-700U			
	1	RFS DB-T1-6Z-8AB-0Z			
130±	3	Kathrein 742 213	(3) Pipe Mounts	(6) 1-5/8" Coax	Metro PCS

*The (2) 1/2" Fiber Cable and (4) 3/4" DC Power Cable for ATT will be Installed in (1) 3" Conduit.

FINAL T-MOBILE LOAD DESCRIPTION					
ELEV (ft.)	***Qty.***	***Antenna Description***	***Mount Type & Qty.***	***TX. LINE (in)***	***TENANT***
152±	3	Ericsson Air 21 B2A/B4P Antenna	(3) T-Frames	(12) 1-5/8" Coax (1) 1-5/8" Hybrid **(1) 1-1/4" Hybrid**	T-Mobile
	3	**Ericsson Air 32 Antenna**			
	3	Commscope LNX-6515DS-A1M Antenna			
	3	Ericsson KRY 112 144/1 TMA			
	3	Ericsson RRUS 11 (Band 12)			

1. ACGI should be notified of any discrepancies found in the data listed in this report.
2. Notify ACGI if any potential physical and other interference with existing antennas for a redesign.

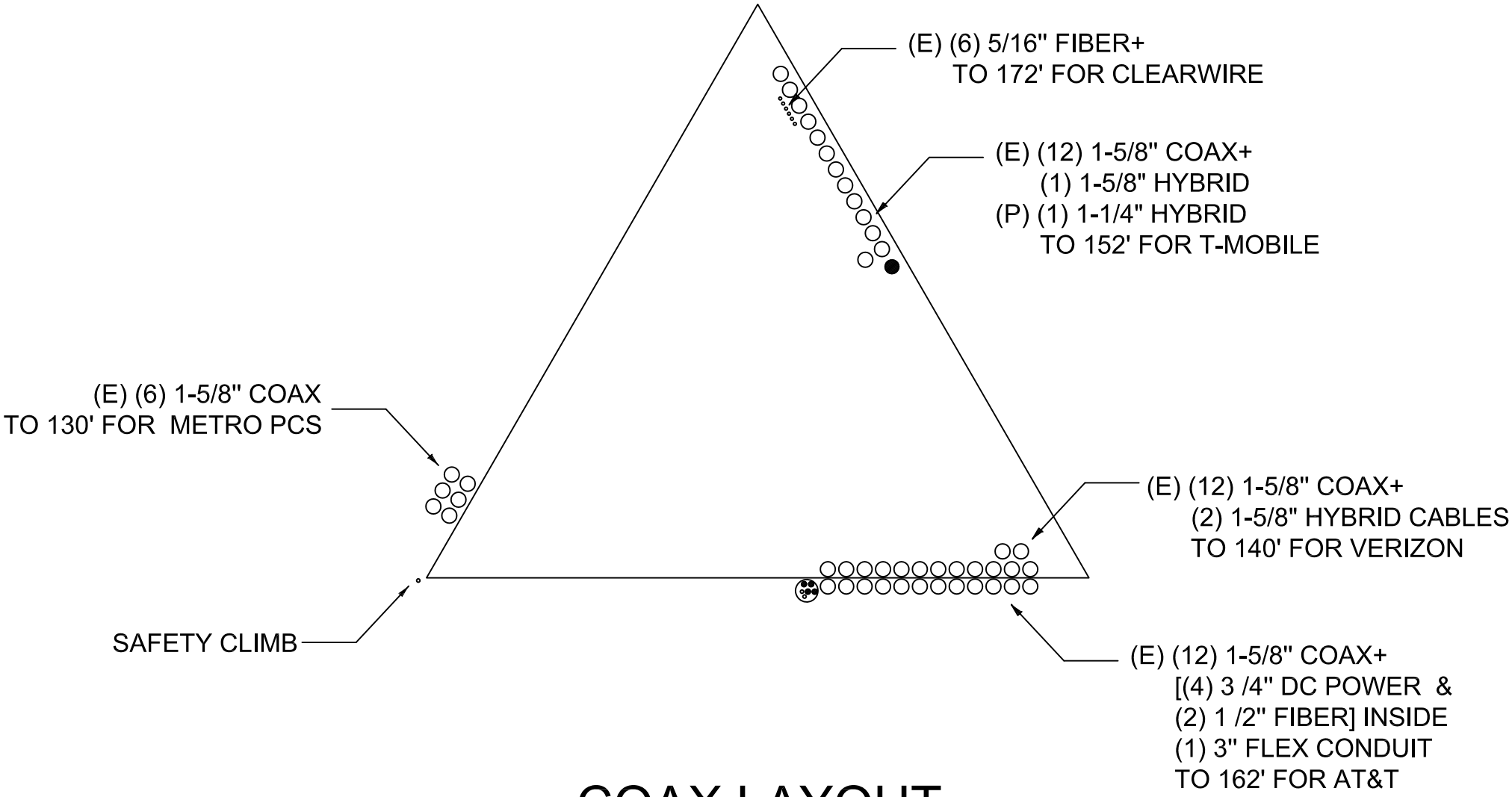
8. SUMMARY OF WORKING PERCENTAGE OF STRUCTURAL COMPONENTS

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	øP$_{allow}$ K	% Capacity	Pass Fail
T1	176 - 160	Leg	ROHN 3 EH	2	-11.58	119.12	9.7	Pass
T2	160 - 140	Leg	ROHN 4 EH	32	-53.23	183.54	29.0	Pass
T3	140 - 120	Leg	ROHN 5 EH	66	-102.22	254.38	40.2	Pass
T4	120 - 100	Leg	ROHN 6 EHS	93	-144.01	274.77	52.4	Pass
T5	100 - 93.3333	Leg	ROHN 6 EH	114	-157.85	343.10	46.0	Pass
T6	93.3333 - 86.6667	Leg	ROHN 6 EH	123	-170.92	343.10	49.8	Pass
T7	86.6667 - 80	Leg	ROHN 6 EH	132	-183.91	343.10	53.6	Pass
T8	80 - 60	Leg	ROHN 6 EH	141	-222.13	343.10	64.7	Pass
T9	60 - 40	Leg	ROHN 8 EHS	162	-255.47	386.39	66.1	Pass
T10	40 - 20	Leg	ROHN 8 X-STR	177	-291.04	505.55	57.6	Pass
							59.4 (b)	
T11	20 - 0	Leg	ROHN 8 EH	192	-325.31	505.55	64.3	Pass
T1	176 - 160	Diagonal	L2x2x1/4	9	-2.87	19.13	15.0	Pass
							29.4 (b)	
T2	160 - 140	Diagonal	L2x2x3/16	37	-4.72	11.91	39.6	Pass
							68.6 (b)	
T3	140 - 120	Diagonal	L2x2x3/16	70	-6.62	7.89	83.9	Pass
							98.5 (b)	
T4	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	97	-7.46	9.76	76.4	Pass
							94.5 (b)	
T5	100 - 93.3333	Diagonal	L2 1/2x2 1/2x3/16	118	-7.56	8.87	85.1	Pass
							96.5 (b)	
T6	93.3333 - 86.6667	Diagonal	L2 1/2x2 1/2x3/16	127	-7.53	8.09	93.0	Pass
							95.3 (b)	
T7	86.6667 - 80	Diagonal	L2.5x2.5x3/16 + L2.5x2.5x3/16 (C-shape)	136	-8.07	32.06	25.2	Pass
							64.9 (b)	
T8	80 - 60	Diagonal	L3x3x1/4	144	-8.30	13.19	62.9	Pass
T9	60 - 40	Diagonal	L3 1/2x3 1/2x1/4	165	-9.85	14.60	67.5	Pass
							69.2 (b)	
T10	40 - 20	Diagonal	L3 1/2x3 1/2x1/4	180	-10.33	12.18	84.8	Pass
T11	20 - 0	Diagonal	L4x4x1/4	195	-11.07	15.47	71.5	Pass
							76.5 (b)	
T1	176 - 160	Top Girt	L2x2x1/4	5	-0.34	12.90	2.6	Pass
							3.0 (b)	
							Summary	
						Leg (T9)	66.1	Pass
						Diagonal (T3)	98.5	Pass
						Top Girt (T1)	3.0	Pass
						Bolt Checks	98.5	Pass
						RATING =	**98.5**	**Pass**

APPENDIX

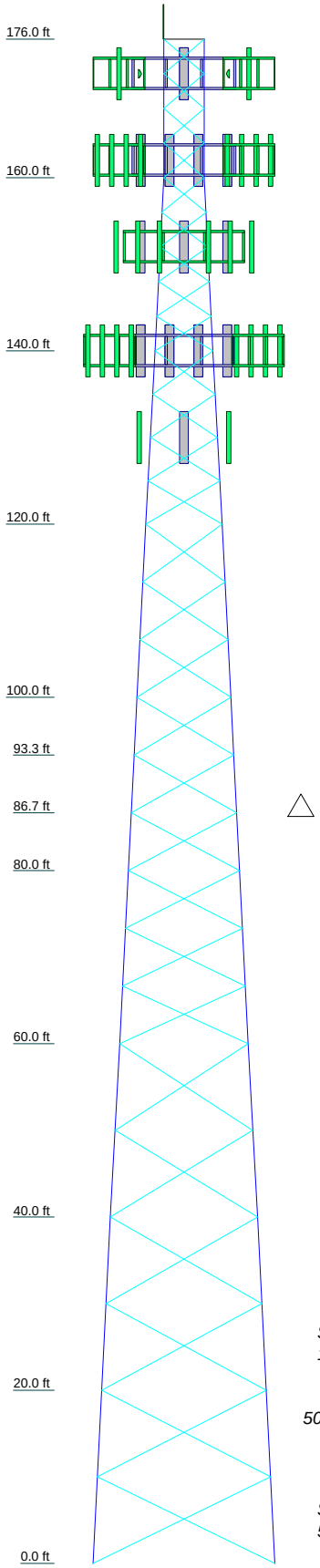
COAX LAYOUT


(E) (6) 5/16" FIBER+
TO 172' FOR CLEARWIRE
(E) (12) 1-5/8" COAX+
(1) 1-5/8" HYBRID
(P) (1) 1-1/4" HYBRID
TO 152' FOR T-MOBILE
(E) (6) 1-5/8" COAX
TO 130' FOR METRO PCS
(E) (12) 1-5/8" COAX+
(2) 1-5/8" HYBRID CABLES
TO 140' FOR VERIZON
SAFETY CLIMB
(E) (12) 1-5/8" COAX+
[(4) 3 /4" DC POWER &
(2) 1 /2" FIBER] INSIDE
(1) 3" FLEX CONDUIT
TO 162' FOR AT&T

COAX LAYOUT

TOWER ELEVATION DRAWING

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	
Legs	ROHN 3 EH	ROHN 4 EH	ROHN 5 EH	ROHN 6 EHS	ROHN 6 EH				ROHN 8 EHS	ROHN 8 X-STR	ROHN 8 EH	
Leg Grade	A572-50											
Diagonals	L2x2x1/4	L2x2x3/16		L2 1/2x2 1/2x3/16			A	L3x3x1/4	L3 1/2x3 1/2x1/4		L4x4x1/4	
Diagonal Grade	A36							A572-50				
Top Girts	L2x2x1/4	N.A.										
Face Width (ft) 21	4.6875	6.72656	8.76563	10.8047	11.4844	12.1641	12.8438	14.8828	16.9219	18.9609		
# Panels @ (ft)	9 @ 4	4 @ 5	9 @ 6.66667						6 @ 10			
Weight (K) 24.9	1.1	1.5	1.9	2.1	0.9	0.9	1.2	3.2	3.4	4.2	4.6	



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L2.5x2.5x3/16 + L2.5x2.5x3/16 (C-shape)		

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 Exposure C to the TIA-222-G Standard.
3. Tower designed for a 95 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 98.5%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 334 K
SHEAR: 35 K

UPLIFT: -287 K
SHEAR: 31 K

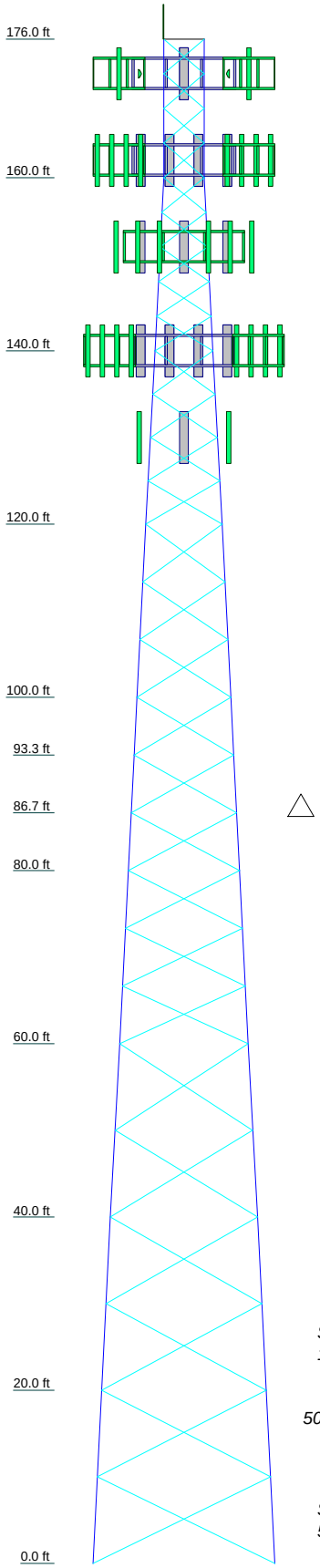
AXIAL 177 K
SHEAR 17 K *MOMENT 1942 kip-ft*
TORQUE 4 kip-ft
50 mph WIND - 1.0000 in ICE

AXIAL 61 K
SHEAR 56 K *MOMENT 5699 kip-ft*
TORQUE 16 kip-ft
REACTIONS - 95 mph WIND

Allpro Consulting Group, inc.
9221 Lyndon B. Johnson Fwy, Suite #204
Dallas, TX 75243
Phone: 972-231-8893
FAX: 866-364-8375

Job: ***17-1365***			
Project: ***CT04382-S-03 New Britain 2, CT***			
Client: SBA Network Services, Inc.	Drawn by: sVansia	App'd:	
Code: TIA-222-G	Date: 03/24/17	Scale: NTS	
Path: P:\2017\Structural\17-1365 CT04382-S-03 New Britain 2 CT Structural Analysis\Tnx\CT04382-S-03_New Britain_AT&T_03212017.eri		Dwg No. E-1	

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	
Legs	ROHN 3 EH	ROHN 4 EH	ROHN 5 EH	ROHN 6 EHS	ROHN 6 EH				ROHN 8 EHS	ROHN 8 X-STR	ROHN 8 EH	
Leg Grade	A572-50											
Diagonals	L2x2x1/4	L2x2x3/16		L2 1/2x2 1/2x3/16			A	L3x3x1/4	L3 1/2x3 1/2x1/4		L4x4x1/4	
Diagonal Grade	A36							A572-50				
Top Girts	L2x2x1/4	N.A.										
Face Width (ft)	4.6875	6.72656		8.76563	10.8047	11.4844	12.1641	12.8438	14.8828	16.9219	18.9609	21
# Panels @ (ft)	9 @ 4	4 @ 5		9 @ 6.66667						6 @ 10		
Weight (K)	1.1	1.5	1.9	2.1	0.9	0.9	1.2	3.2	3.4	4.2	4.6	24.9



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	176	(2) AM-X-CD-16-65-00T	162
840-10054 w/ Mount Pipe	172	(2) AM-X-CD-16-65-00T	162
840-10054 w/ Mount Pipe	172	AIR 21 B2A/B4P w/ Mount Pipe	152
840-10054 w/ Mount Pipe	172	AIR 21 B2A/B4P w/ Mount Pipe	152
URAS-FLEXIBLE	172	AIR 21 B2A/B4P w/ Mount Pipe	152
URAS-FLEXIBLE	172	Ericsson AIR 32	152
URAS-FLEXIBLE	172	Ericsson AIR 32	152
Horizon Duo	172	Ericsson AIR 32	152
Horizon Duo	172	Ericsson RRUS 11 (Band 12)	152
Horizon Duo	172	Ericsson RRUS 11 (Band 12)	152
(3) Empty Pipe Mount	172	Ericsson RRUS 11 (Band 12)	152
(3) Empty Pipe Mount	172	KRY 112 144/1	152
(3) Empty Pipe Mount	172	KRY 112 144/1	152
(3) T-Frames	172	KRY 112 144/1	152
(2) VHLP2.5 Dish	172	Empty Pipe Mount	152
VHLP2.5 Dish	172	Empty Pipe Mount	152
VHLP2.5 Dish	172	Empty Pipe Mount	152
Kathrein 800-10121	162	(3) T-Frames	152
Kathrein 800-10121	162	LNX-6515DS-A1M w/ Mount Pipe	152
Kathrein 800-10121	162	LNX-6515DS-A1M w/ Mount Pipe	152
QS65512-2	162	LNX-6515DS-A1M w/ Mount Pipe	152
QS65512-2	162	800 10735v01 w/ Mount Pipe	140
QS65512-2	162	800 10735v01 w/ Mount Pipe	140
(2) LGP 21401	162	800 10735v01 w/ Mount Pipe	140
(2) LGP 21401	162	BXA-80080/4CF w/ Mount Pipe	140
(2) LGP 21401	162	BXA-80080/4CF w/ Mount Pipe	140
(2) Katherin 860-10025	162	BXA-80080/4CF w/ Mount Pipe	140
(2) Katherin 860-10025	162	RRH-2x60-AWS	140
(2) Katherin 860-10025	162	RRH-2x60-AWS	140
Ericsson RRUS 11	162	RRH-2x60-AWS	140
Ericsson RRUS 11	162	RRH-2x60-PCS	140
Ericsson RRUS 11	162	RRH-2x60-PCS	140
Ericsson RRUS 32	162	RRH-2x60-PCS	140
Ericsson RRUS 32	162	RRH 2x60-700	140
Ericsson RRUS 32	162	RRH 2x60-700	140
Ericsson RRUS 32 B2s	162	RRH 2x60-700	140
Ericsson RRUS 32 B2s	162	DB-T1-6Z-8AB-0Z	140
Ericsson RRUS 32 B2s	162	(3) T-Frames	140
(2) TPX-070821	162	(2) SBNHH-1D65B w/ Mount Pipe	140
(2) TPX-070821	162	(2) SBNHH-1D65B w/ Mount Pipe	140
(2) TPX-070821	162	(2) SBNHH-1D65B w/ Mount Pipe	140
DC6-48-60-18-8F	162	(3) Pipe Mounts	130
DC6-48-60-18-8F	162	742 213 w/ Mount Pipe	130
(3) T-Frames	162	742 213 w/ Mount Pipe	130
(2) AM-X-CD-16-65-00T	162	742 213 w/ Mount Pipe	130

ALL R
ARE F
MAX.
DO
SH
UP
SH

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L2.5x2.5x3/16 + L2.5x2.5x3/16 (C-shape)		

MATERIAL STRENGTH

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

AXIAL
1

SHEAR
17 K

TORQ
50 mph WIN

61 K

SHEAR
56 K

MOMENT
5699 kip-ft

TORQUE 16 kip-ft
REACTIONS - 95 mph WIND

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 95 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 98.5%

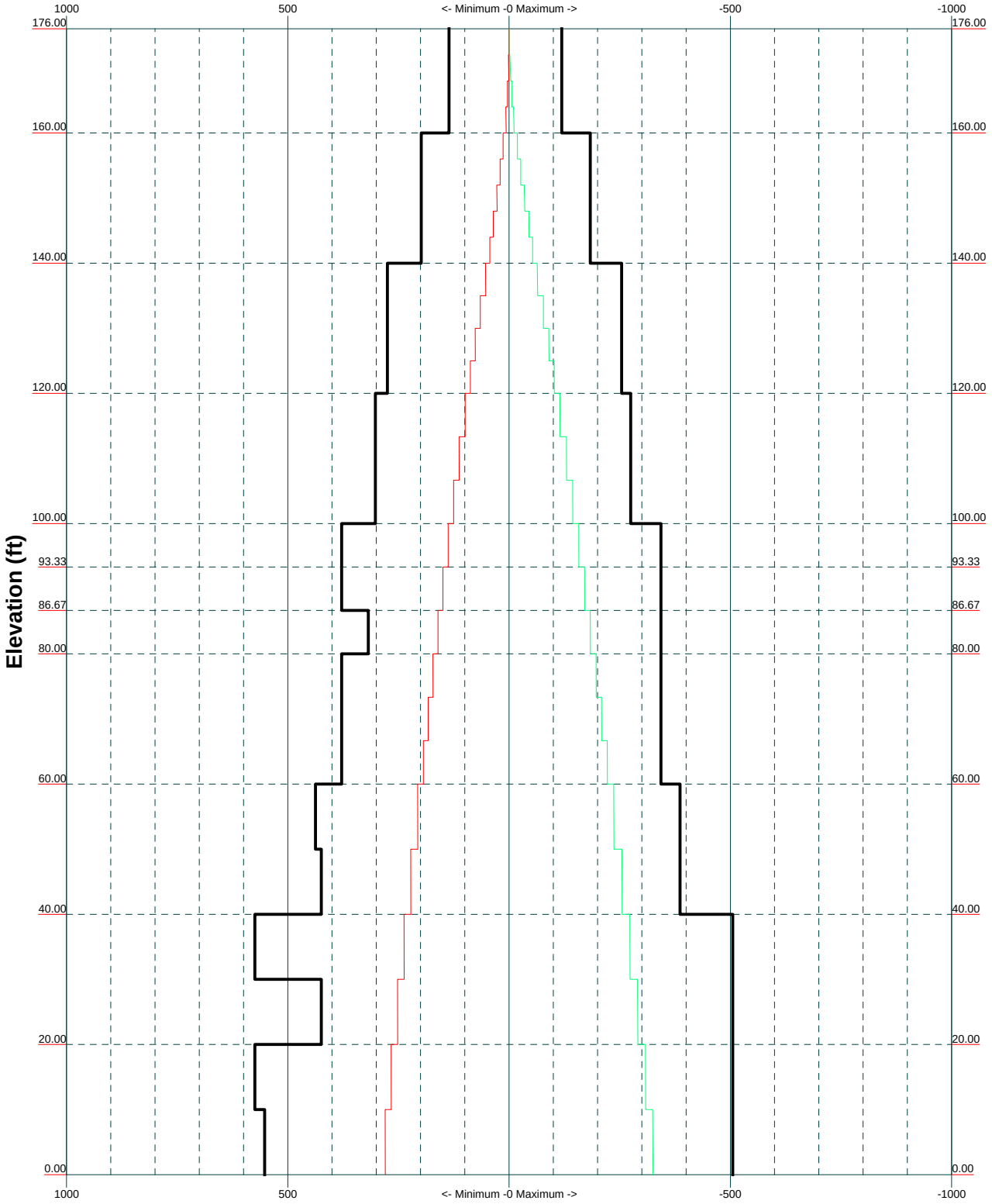
Allpro Consulting Group, inc.
9221 Lyndon B. Johnson Fwy, Suite #204
Dallas, TX 75243
Phone: 972-231-8893
FAX: 866-364-8375

Job: **17-1365**			
Project: **CT04382-S-03 New Britain 2, CT**			
Client: SBA Network Services, Inc.	Drawn by: sVansia	App'd:	
Code: TIA-222-G	Date: 03/24/17	Scale: NTS	
Path: P:\2017\Structural\17-1365 CT04382-S-03 New Britain 2 CT Structural Analysis\Tnx\CT04382-S-03_New Britain_AT&T_03212017.eri		Dwg No. E-1	

MISCELLANEOUS PLOTS

TIA-222-G - 95 mph/50 mph 1.0000 in Ice Exposure C

Leg Capacity ——— **Leg Compression (K)**



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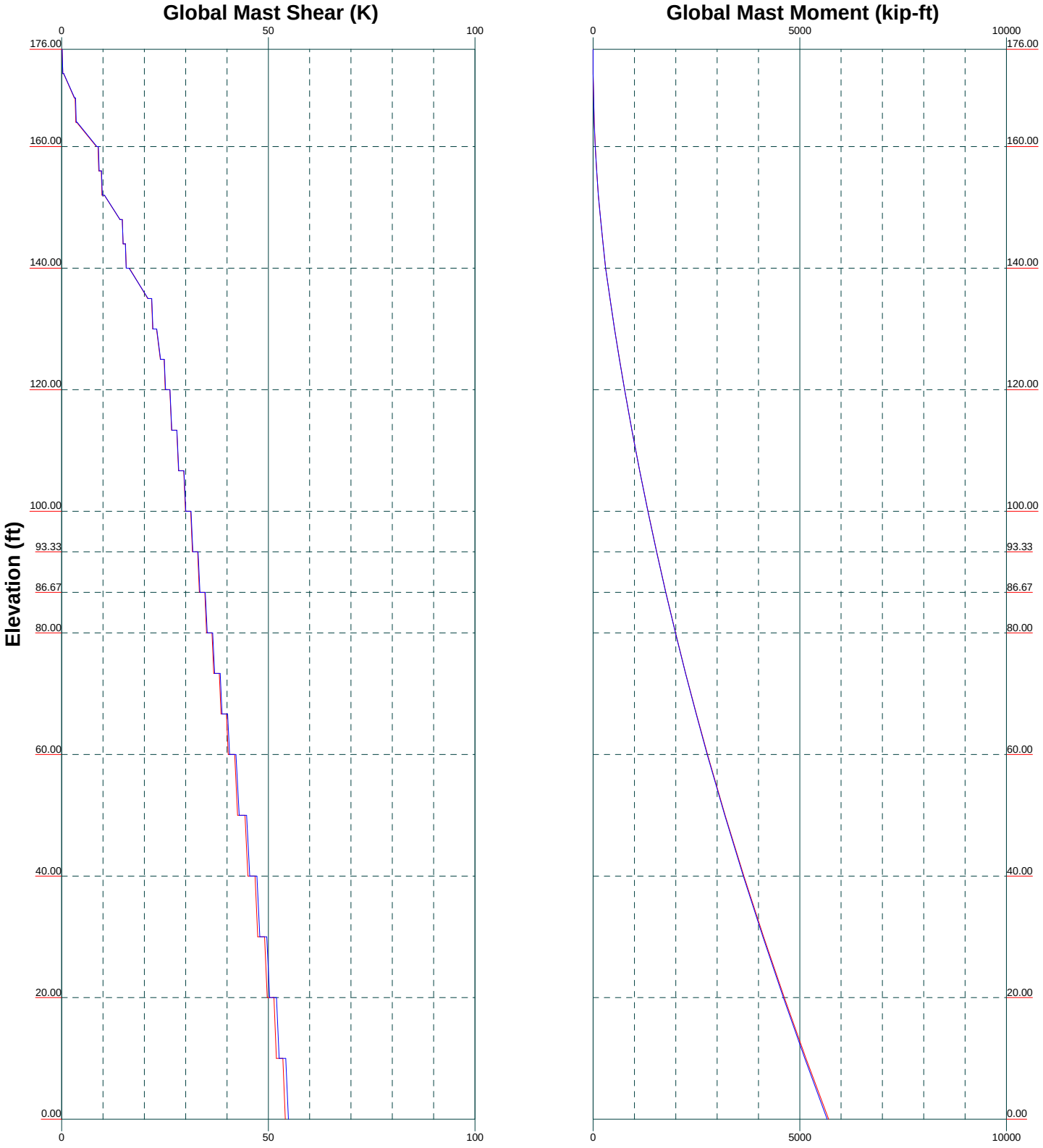
Job: ***17-1365***			
Project: ***CT04382-S-03 New Britain 2, CT***			
Client: SBA Network Services, Inc.	Drawn by: sVansia	App'd:	
Code: TIA-222-G	Date: 03/24/17	Scale: NTS	
Path: P:\2017\Structural\17-1365 CT04382-S-03 New Britain 2 CT Structural Analysis\Tnx\CT04382-S-03_New Britain_AT&T_03212017.eri		Dwg No. E-3	

TIA-222-G - 95 mph/50 mph 1.0000 in Ice Exposure C

Maximum Values

Vx Vz Mx Mz



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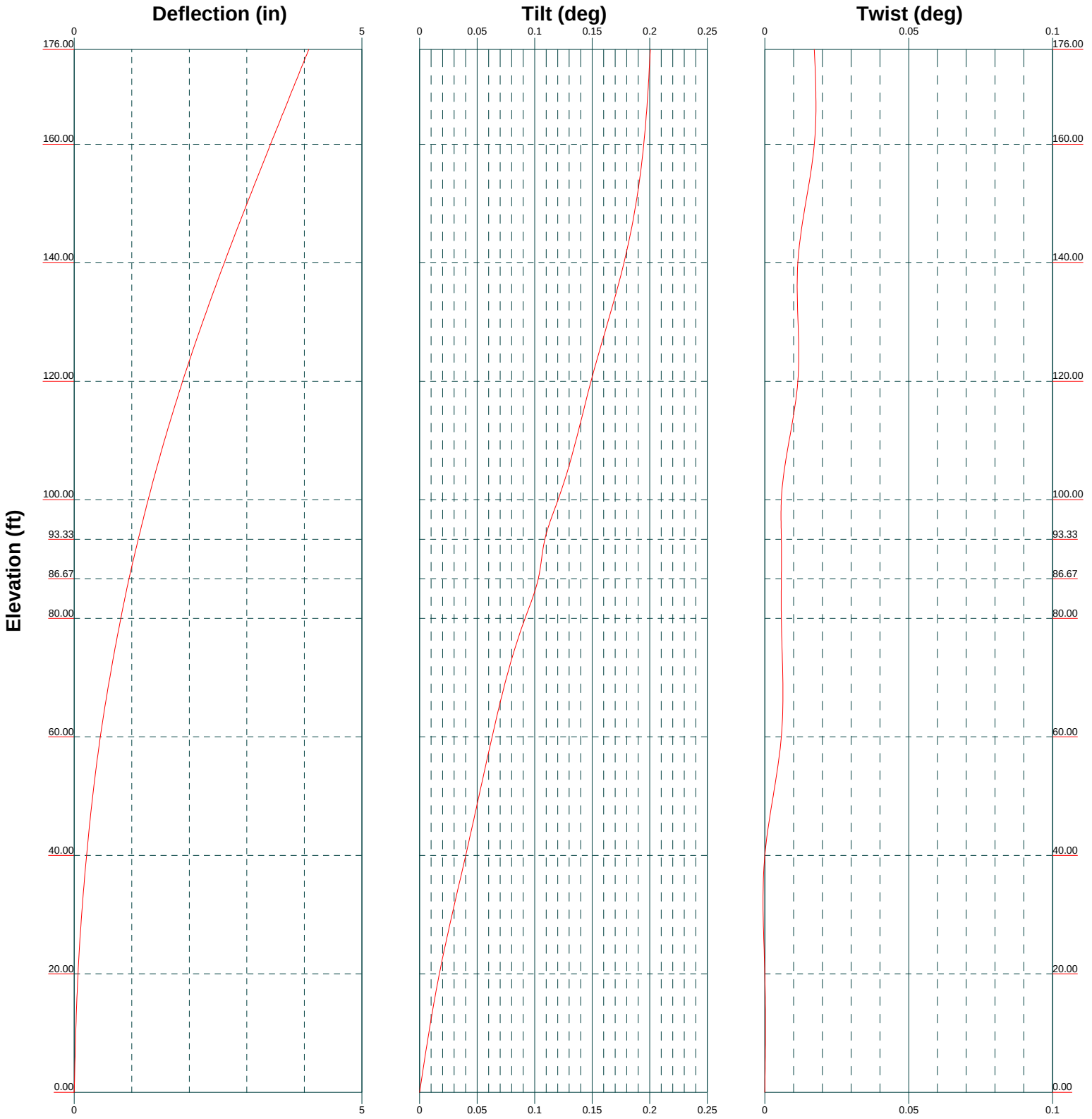
Job: ***17-1365***			
Project: ***CT04382-S-03 New Britain 2, CT***			
Client: SBA Network Services, Inc.	Drawn by: sVansia	App'd:	
Code: TIA-222-G	Date: 03/24/17	Scale: NTS	
Path: P:\2017\Structural\17-1365 CT04382-S-03 New Britain 2 CT Structural Analysis\Tnx\CT04382-S-03_New Britain_AT&T_03212017.eri		Dwg No. E-4	

TIA-222-G - Service - 60 mph

Maximum Values



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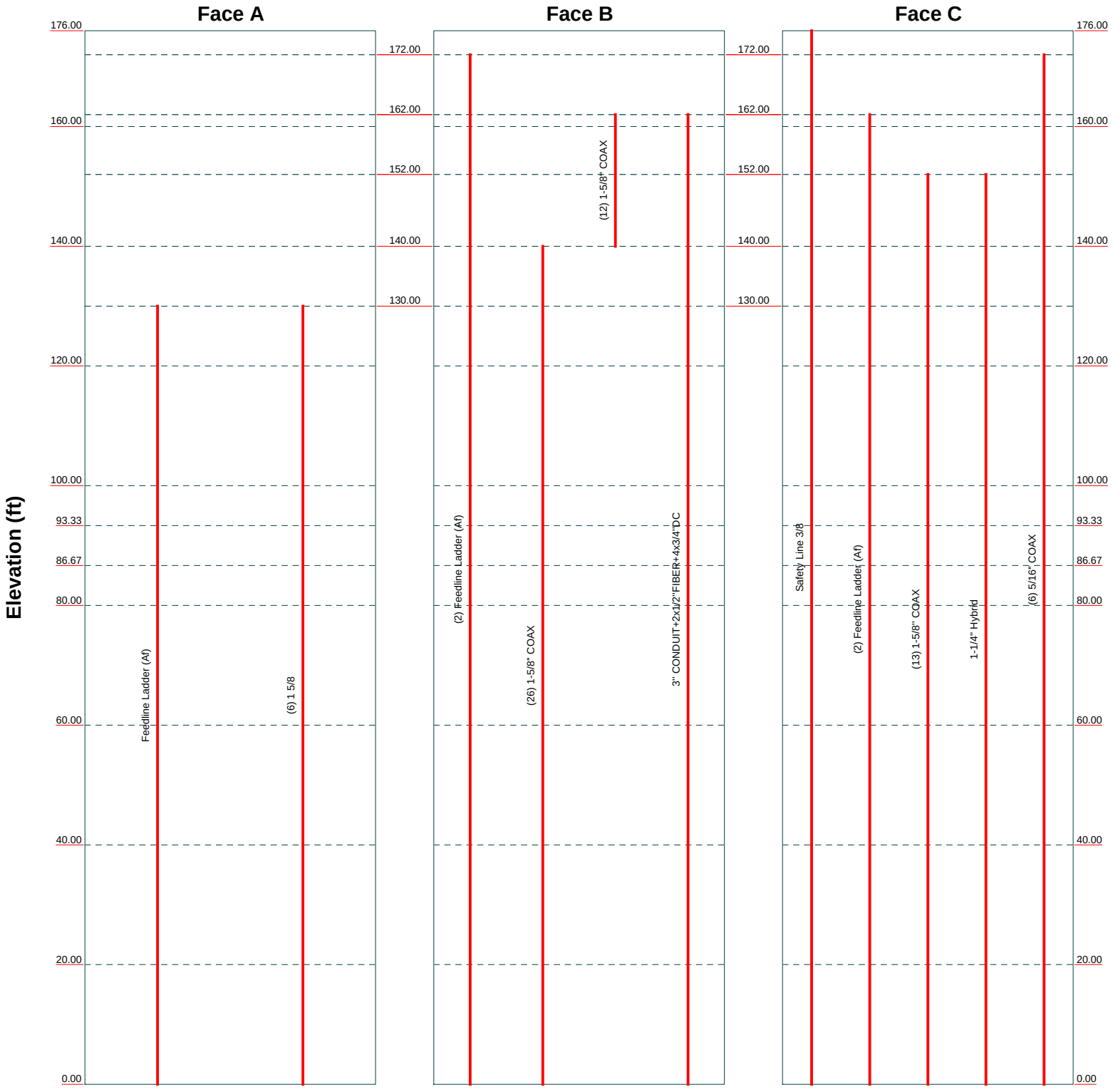
Job: ***17-1365***			
Project: ***CT04382-S-03 New Britain 2, CT***			
Client: SBA Network Services, Inc.	Drawn by: sVansia	App'd:	
Code: TIA-222-G	Date: 03/24/17	Scale: NTS	
Path: P:\2017\Structural\17-1365 CT04382-S-03 New Britain 2 CT Structural Analysis\Tnx\CT04382-S-03_New Britain_AT&T_03212017.eri		Dwg No. E-5	

Feed Line Distribution Chart
0' - 176'

Round | Flat | App In Face | App Out Face | Truss Leg



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Job: ***17-1365***			
Project: ***CT04382-S-03 New Britain 2, CT***			
Client: SBA Network Services, Inc.	Drawn by: sVansia	App'd:	
Code: TIA-222-G	Date: 03/24/17	Scale: NTS	
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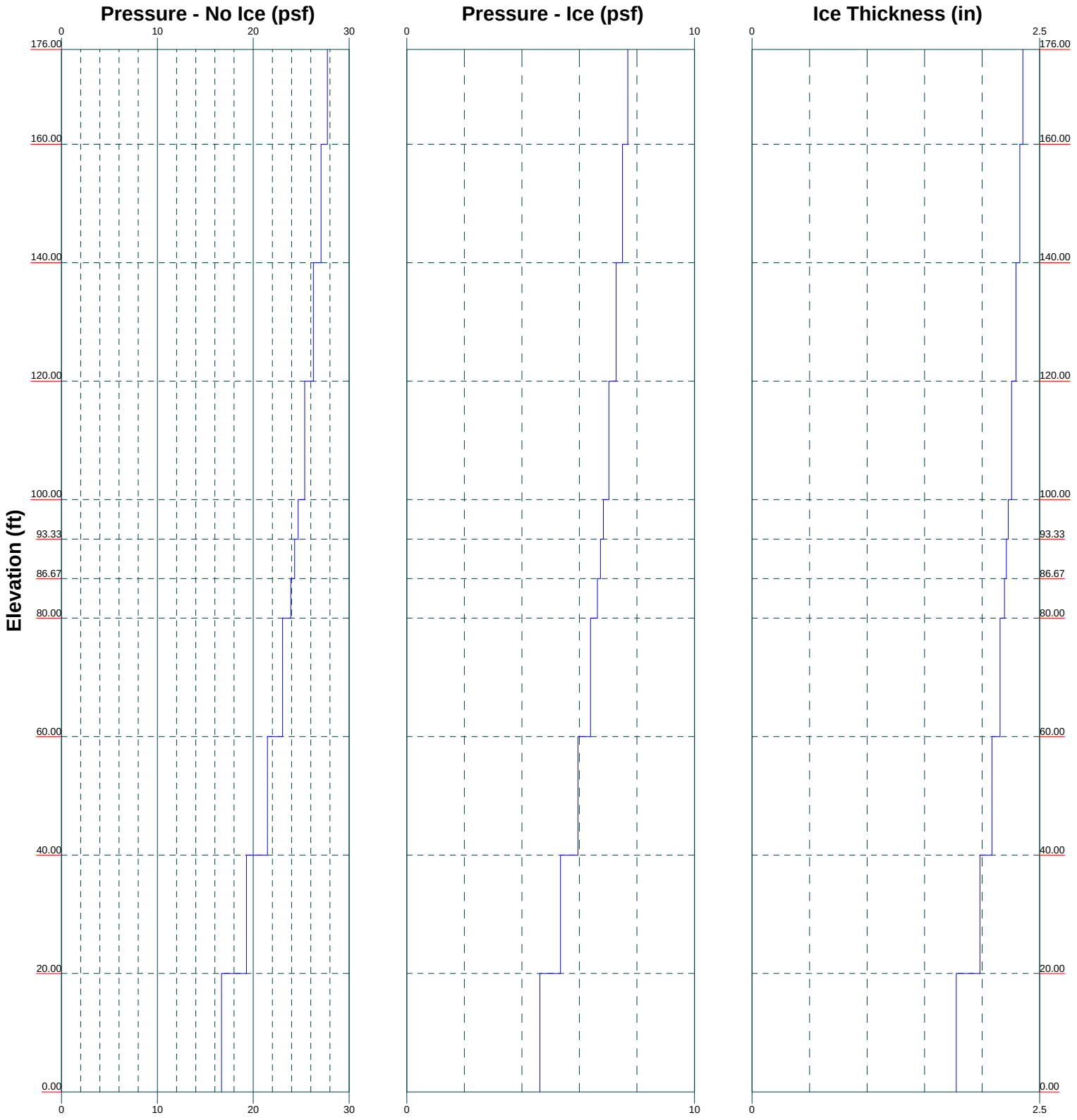
Wind Pressures and Ice Thickness

TIA-222-G - 95 mph/50 mph 1.0000 in Ice Exposure C



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Job: ***17-1365***			
Project: ***CT04382-S-03 New Britain 2, CT***			
Client: SBA Network Services, Inc.	Drawn by: sVansia	App'd:	
Code: TIA-222-G	Date: 03/24/17	Scale: NTS	
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TNX TOWER CALCULATION PRINTOUT

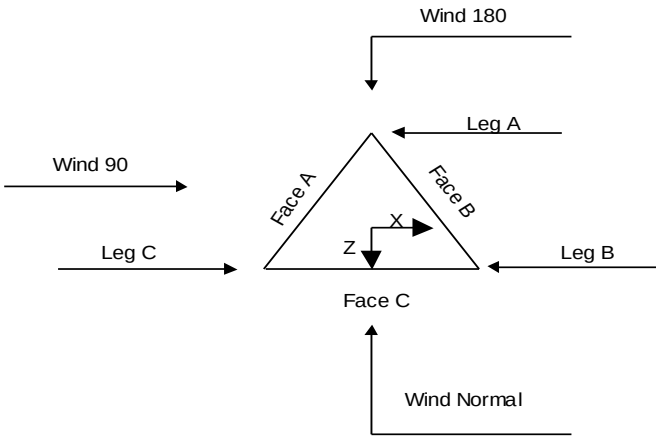
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 176.00 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 4.69 ft at the top and 21.00 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in Hartford County, Connecticut.
ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
Basic wind speed of 95 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	176.00-160.00			4.69	1	16.00
T2	160.00-140.00			4.69	1	20.00
T3	140.00-120.00			6.73	1	20.00
T4	120.00-100.00			8.77	1	20.00
T5	100.00-93.33			10.80	1	6.67
T6	93.33-86.67			11.48	1	6.67
T7	86.67-80.00			12.16	1	6.67
T8	80.00-60.00			12.84	1	20.00
T9	60.00-40.00			14.88	1	20.00
T10	40.00-20.00			16.92	1	20.00
T11	20.00-0.00			18.96	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	176.00-160.00	4.00	X Brace	No	No	0.0000	0.0000
T2	160.00-140.00	4.00	X Brace	No	No	0.0000	0.0000
T3	140.00-120.00	5.00	X Brace	No	No	0.0000	0.0000
T4	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
T5	100.00-93.33	6.67	X Brace	No	No	0.0000	0.0000
T6	93.33-86.67	6.67	X Brace	No	No	0.0000	0.0000
T7	86.67-80.00	6.67	X Brace	No	No	0.0000	0.0000
T8	80.00-60.00	6.67	X Brace	No	No	0.0000	0.0000
T9	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T10	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T11	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 176.00-160.00	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T2 160.00-140.00	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T3 140.00-120.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T4 120.00-100.00	Pipe	ROHN 6 EHS	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 100.00-93.33	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 93.33-86.67	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T7 86.67-80.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Arbitrary Shape	L2.5x2.5x3/16 + L2.5x2.5x3/16 (C-shape)	A36 (36 ksi)
T8 80.00-60.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Equal Angle	L3x3x1/4	A572-50 (50 ksi)
T9 60.00-40.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T10 40.00-20.00	Pipe	ROHN 8 X-STR	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T11 20.00-0.00	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Equal Angle	L4x4x1/4	A572-50 (50 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 176.00-160.00	Equal Angle	L2x2x1/4	A36 (36 ksi)	Flat Bar		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	Double Angle Stitch Bolt Spacing Redundants in
T1 176.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T2 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T4 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T5 100.00-93.33	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T6 93.33-86.67	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T7 86.67-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T8 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T9 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T10 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T11 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	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
176.00-160.00				1	1	1	1	1	1	1
T2	Yes	No	1	1	1	1	1	1	1	1
160.00-140.00				1	1	1	1	1	1	1
T3	Yes	No	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T4	Yes	No	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1
T5	Yes	No	1	1	1	1	1	1	1	1
100.00-93.33				1	1	1	1	1	1	1
T6	Yes	No	1	1	1	1	1	1	1	1
93.33-86.67				1	1	1	1	1	1	1
T7	Yes	No	1	1	1	1	1	1	1	1
86.67-80.00				1	1	1	1	1	1	1
T8	Yes	No	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T9	Yes	No	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T10	Yes	No	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T11	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 176.00-160.00	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
T2 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
T3 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
T4 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
T5 100.00-93.33	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 93.33-86.67	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 86.67-80.00	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
T8 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
T9 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
T10 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
T11 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 176.00-160.00	Flange	0.8750 A325N	4	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 160.00-140.00	Flange	1.0000 A325N	4	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 140.00-120.00	Flange	1.0000 A325N	6	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 120.00-100.00	Flange	1.0000 A325N	6	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 100.00-93.33	Flange	1.0000 A325N	0	0.6250 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 93.33-86.67	Flange	1.0000 A325N	0	0.6250 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 86.67-80.00	Flange	1.0000 A325N	6	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 80.00-60.00	Flange	1.0000 A325N	8	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 60.00-40.00	Flange	1.0000 A325N	8	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 40.00-20.00	Flange	1.0000 A325N	8	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

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.
T11 20.00-0.00	Flange	1.0000 A354-BC	10	0.7500 A325N	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
***												
Safety Line 3/8	C	No	Ar (CaAa)	176.00 - 0.00	0.0000	-0.5	1	1	0.5000	0.3750		0.22
Feedline Ladder (Af)	A	No	Af (CaAa)	130.00 - 0.00	0.0000	0	1	1	3.0000	2.5000		8.40
Feedline Ladder (Af)	B	No	Af (CaAa)	172.00 - 0.00	-2.0000	0	2	1	3.0000	2.5000		8.40
Feedline Ladder (Af)	C	No	Af (CaAa)	162.00 - 0.00	-2.0000	0	2	1	3.0000	2.5000		8.40
***												
1 5/8	A	No	Ar (CaAa)	130.00 - 0.00	0.0000	-0.5	6	3	0.5000	1.9800		1.04
***												
1-5/8" COAX	C	No	Ar (CaAa)	152.00 - 0.00	-0.5000	-0.5	13	12	0.5000	1.9800		1.04
1-1/4" Hybrid	C	No	Ar (CaAa)	152.00 - 0.00	-1.0000	-0.2	1	1	0.5000	1.5500		1.04
***												
5/16" COAX	C	No	Ar (CaAa)	172.00 - 0.00	-1.5000	-0.5	6	6	0.5000	0.0300		1.00
***												
1-5/8" COAX	B	No	Ar (CaAa)	140.00 - 0.00	0.0000	-0.5	26	12	0.5000	1.9800		1.04
***												
1-5/8" COAX	B	No	Ar (CaAa)	162.00 - 140.00	-0.5000	-0.5	12	12	0.5000	1.9800		1.04
3" CONDUIT+2 x1/2"FIBER+4 x3/4"DC	B	No	Ar (CaAa)	162.00 - 0.00	0.0000	0	1	1	0.5000	3.0000		2.25

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
T1	176.00-160.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	15.352	0.000	0.23
		C	0.000	0.000	2.483	0.000	0.11
T2	160.00-140.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	70.187	0.000	0.63
		C	0.000	0.000	50.525	0.000	0.64
T3	140.00-120.00	A	0.000	0.000	16.047	0.000	0.15
		B	0.000	0.000	125.627	0.000	0.92
		C	0.000	0.000	72.357	0.000	0.75
T4	120.00-100.00	A	0.000	0.000	32.093	0.000	0.29
		B	0.000	0.000	125.627	0.000	0.92
		C	0.000	0.000	72.357	0.000	0.75

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
T5	100.00-93.33	A	0.000	0.000	10.698	0.000	0.10
		B	0.000	0.000	41.876	0.000	0.31
		C	0.000	0.000	24.119	0.000	0.25
T6	93.33-86.67	A	0.000	0.000	10.698	0.000	0.10
		B	0.000	0.000	41.876	0.000	0.31
		C	0.000	0.000	24.119	0.000	0.25
T7	86.67-80.00	A	0.000	0.000	10.698	0.000	0.10
		B	0.000	0.000	41.876	0.000	0.31
		C	0.000	0.000	24.119	0.000	0.25
T8	80.00-60.00	A	0.000	0.000	32.093	0.000	0.29
		B	0.000	0.000	125.627	0.000	0.92
		C	0.000	0.000	72.357	0.000	0.75
T9	60.00-40.00	A	0.000	0.000	32.093	0.000	0.29
		B	0.000	0.000	125.627	0.000	0.92
		C	0.000	0.000	72.357	0.000	0.75
T10	40.00-20.00	A	0.000	0.000	32.093	0.000	0.29
		B	0.000	0.000	125.627	0.000	0.92
		C	0.000	0.000	72.357	0.000	0.75
T11	20.00-0.00	A	0.000	0.000	32.093	0.000	0.29
		B	0.000	0.000	125.627	0.000	0.92
		C	0.000	0.000	72.357	0.000	0.75

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	176.00-160.00	A	2.353	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	26.579	0.000	0.72
		C		0.000	0.000	24.025	0.000	0.43
T2	160.00-140.00	A	2.327	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	128.818	0.000	2.84
		C		0.000	0.000	119.052	0.000	2.55
T3	140.00-120.00	A	2.294	0.000	0.000	27.072	0.000	0.57
		B		0.000	0.000	131.453	0.000	3.57
		C		0.000	0.000	158.203	0.000	3.30
T4	120.00-100.00	A	2.256	0.000	0.000	53.726	0.000	1.12
		B		0.000	0.000	130.792	0.000	3.52
		C		0.000	0.000	157.137	0.000	3.25
T5	100.00-93.33	A	2.227	0.000	0.000	17.802	0.000	0.37
		B		0.000	0.000	43.429	0.000	1.16
		C		0.000	0.000	52.108	0.000	1.07
T6	93.33-86.67	A	2.211	0.000	0.000	17.744	0.000	0.37
		B		0.000	0.000	43.337	0.000	1.16
		C		0.000	0.000	51.960	0.000	1.06
T7	86.67-80.00	A	2.194	0.000	0.000	17.682	0.000	0.37
		B		0.000	0.000	43.239	0.000	1.15
		C		0.000	0.000	51.801	0.000	1.06
T8	80.00-60.00	A	2.156	0.000	0.000	52.628	0.000	1.08
		B		0.000	0.000	129.058	0.000	3.41
		C		0.000	0.000	154.340	0.000	3.11
T9	60.00-40.00	A	2.085	0.000	0.000	51.842	0.000	1.05
		B		0.000	0.000	127.818	0.000	3.32
		C		0.000	0.000	152.340	0.000	3.02
T10	40.00-20.00	A	1.981	0.000	0.000	50.698	0.000	1.00
		B		0.000	0.000	126.015	0.000	3.21
		C		0.000	0.000	149.432	0.000	2.88
T11	20.00-0.00	A	1.775	0.000	0.000	48.429	0.000	0.92

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		0.000	0.000	122.439	0.000	2.98
		C		0.000	0.000	143.670	0.000	2.62

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	176.00-160.00	0.7935	-1.2317	1.6066	-0.4404
T2	160.00-140.00	2.5257	-1.9458	2.4059	-0.6837
T3	140.00-120.00	3.0298	-2.8550	3.2030	-0.5718
T4	120.00-100.00	2.7117	-2.9885	3.2790	-0.6770
T5	100.00-93.33	3.0361	-3.3508	3.6828	-0.7543
T6	93.33-86.67	3.1959	-3.5293	3.8814	-0.7933
T7	86.67-80.00	3.2946	-3.6402	4.1575	-0.8491
T8	80.00-60.00	3.5963	-3.9773	4.4191	-0.9044
T9	60.00-40.00	3.9821	-4.4088	5.0827	-1.0531
T10	40.00-20.00	4.4229	-4.9011	5.6846	-1.2105
T11	20.00-0.00	4.7674	-5.2866	6.2539	-1.4232

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	2	Safety Line 3/8	160.00 - 176.00	0.6000	0.4161
T1	4	Feedline Ladder (Af)	160.00 - 172.00	0.6000	0.4161
T1	5	Feedline Ladder (Af)	160.00 - 162.00	0.6000	0.4161
T1	12	5/16" COAX	160.00 - 172.00	0.6000	0.4161
T1	16	1-5/8" COAX	160.00 - 162.00	0.6000	0.4161
T1	17	3" CONDUIT+2x1/2"FIBER+4x 3/4"DC	160.00 - 162.00	0.6000	0.4161
T2	2	Safety Line 3/8	140.00 - 160.00	0.6000	0.4841
T2	4	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.4841
T2	5	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.4841
T2	9	1-5/8" COAX	140.00 - 152.00	0.6000	0.4841
T2	10	1-1/4" Hybrid	140.00 - 152.00	0.6000	0.4841
T2	12	5/16" COAX	140.00 - 160.00	0.6000	0.4841
T2	16	1-5/8" COAX	140.00 - 160.00	0.6000	0.4841

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T2	17	3" CONDUIT+2x1/2"FIBER+4x 3/4"DC	140.00 - 160.00	0.6000	0.4841
T3	2	Safety Line 3/8	120.00 - 140.00	0.6000	0.5808
T3	3	Feedline Ladder (Af)	120.00 - 130.00	0.6000	0.5808
T3	4	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.5808
T3	5	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.5808
T3	7	1 5/8	120.00 - 130.00	0.6000	0.5808
T3	9	1-5/8" COAX	120.00 - 140.00	0.6000	0.5808
T3	10	1-1/4" Hybrid	120.00 - 140.00	0.6000	0.5808
T3	12	5/16" COAX	120.00 - 140.00	0.6000	0.5808
T3	14	1-5/8" COAX	120.00 - 140.00	0.6000	0.5808
T3	17	3" CONDUIT+2x1/2"FIBER+4x 3/4"DC	120.00 - 140.00	0.6000	0.5808
T4	2	Safety Line 3/8	100.00 - 120.00	0.6000	0.6000
T4	3	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T4	4	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T4	5	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T4	7	1 5/8	100.00 - 120.00	0.6000	0.6000
T4	9	1-5/8" COAX	100.00 - 120.00	0.6000	0.6000
T4	10	1-1/4" Hybrid	100.00 - 120.00	0.6000	0.6000
T4	12	5/16" COAX	100.00 - 120.00	0.6000	0.6000
T4	14	1-5/8" COAX	100.00 - 120.00	0.6000	0.6000
T4	17	3" CONDUIT+2x1/2"FIBER+4x 3/4"DC	100.00 - 120.00	0.6000	0.6000
T5	2	Safety Line 3/8	93.33 - 100.00	0.6000	0.6000
T5	3	Feedline Ladder (Af)	93.33 - 100.00	0.6000	0.6000
T5	4	Feedline Ladder (Af)	93.33 - 100.00	0.6000	0.6000
T5	5	Feedline Ladder (Af)	93.33 - 100.00	0.6000	0.6000
T5	7	1 5/8	93.33 - 100.00	0.6000	0.6000
T5	9	1-5/8" COAX	93.33 - 100.00	0.6000	0.6000
T5	10	1-1/4" Hybrid	93.33 - 100.00	0.6000	0.6000
T5	12	5/16" COAX	93.33 - 100.00	0.6000	0.6000
T5	14	1-5/8" COAX	93.33 - 100.00	0.6000	0.6000
T5	17	3" CONDUIT+2x1/2"FIBER+4x 3/4"DC	93.33 - 100.00	0.6000	0.6000
T6	2	Safety Line 3/8	86.67 - 93.33	0.6000	0.6000
T6	3	Feedline Ladder (Af)	86.67 - 93.33	0.6000	0.6000
T6	4	Feedline Ladder (Af)	86.67 - 93.33	0.6000	0.6000
T6	5	Feedline Ladder (Af)	86.67 - 93.33	0.6000	0.6000
T6	7	1 5/8	86.67 - 93.33	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T6	9	1-5/8" COAX	86.67 - 93.33	0.6000	0.6000
T6	10	1-1/4" Hybrid	86.67 - 93.33	0.6000	0.6000
T6	12	5/16" COAX	86.67 - 93.33	0.6000	0.6000
T6	14	1-5/8" COAX	86.67 - 93.33	0.6000	0.6000
T6	17	3" CONDUIT+2x1/2"FIBER+4x 3/4"DC	86.67 - 93.33	0.6000	0.6000
T7	2	Safety Line 3/8	80.00 - 86.67	0.6000	0.6000
T7	3	Feedline Ladder (Af)	80.00 - 86.67	0.6000	0.6000
T7	4	Feedline Ladder (Af)	80.00 - 86.67	0.6000	0.6000
T7	5	Feedline Ladder (Af)	80.00 - 86.67	0.6000	0.6000
T7	7	1 5/8	80.00 - 86.67	0.6000	0.6000
T7	9	1-5/8" COAX	80.00 - 86.67	0.6000	0.6000
T7	10	1-1/4" Hybrid	80.00 - 86.67	0.6000	0.6000
T7	12	5/16" COAX	80.00 - 86.67	0.6000	0.6000
T7	14	1-5/8" COAX	80.00 - 86.67	0.6000	0.6000
T7	17	3" CONDUIT+2x1/2"FIBER+4x 3/4"DC	80.00 - 86.67	0.6000	0.6000
T8	2	Safety Line 3/8	60.00 - 80.00	0.6000	0.6000
T8	3	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T8	4	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T8	5	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T8	7	1 5/8	60.00 - 80.00	0.6000	0.6000
T8	9	1-5/8" COAX	60.00 - 80.00	0.6000	0.6000
T8	10	1-1/4" Hybrid	60.00 - 80.00	0.6000	0.6000
T8	12	5/16" COAX	60.00 - 80.00	0.6000	0.6000
T8	14	1-5/8" COAX	60.00 - 80.00	0.6000	0.6000
T8	17	3" CONDUIT+2x1/2"FIBER+4x 3/4"DC	60.00 - 80.00	0.6000	0.6000
T9	2	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T9	3	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T9	4	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T9	5	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T9	7	1 5/8	40.00 - 60.00	0.6000	0.6000
T9	9	1-5/8" COAX	40.00 - 60.00	0.6000	0.6000
T9	10	1-1/4" Hybrid	40.00 - 60.00	0.6000	0.6000
T9	12	5/16" COAX	40.00 - 60.00	0.6000	0.6000
T9	14	1-5/8" COAX	40.00 - 60.00	0.6000	0.6000
T9	17	3" CONDUIT+2x1/2"FIBER+4x 3/4"DC	40.00 - 60.00	0.6000	0.6000
T10	2	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T10	3	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T10	4	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T10	5	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T10	7	1 5/8	20.00 - 40.00	0.6000	0.6000
T10	9	1-5/8" COAX	20.00 - 40.00	0.6000	0.6000
T10	10	1-1/4" Hybrid	20.00 - 40.00	0.6000	0.6000
T10	12	5/16" COAX	20.00 - 40.00	0.6000	0.6000
T10	14	1-5/8" COAX	20.00 - 40.00	0.6000	0.6000
T10	17	3" CONDUIT+2x1/2"FIBER+4x 3/4"DC	20.00 - 40.00	0.6000	0.6000
T11	2	Safety Line 3/8	0.00 - 20.00	0.6000	0.6000
T11	3	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T11	4	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T11	5	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T11	7	1 5/8	0.00 - 20.00	0.6000	0.6000
T11	9	1-5/8" COAX	0.00 - 20.00	0.6000	0.6000
T11	10	1-1/4" Hybrid	0.00 - 20.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T11	12	5/16" COAX	0.00 - 20.00	0.6000	0.6000
T11	14	1-5/8" COAX	0.00 - 20.00	0.6000	0.6000
T11	17	3" CONDUIT+2x1/2"FIBER+4x 3/4"DC	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Lightning Rod	C	From Leg	0.00 0.00 2.00	0.0000	176.00	No Ice 1/2" Ice 1" Ice	0.25 0.66 0.97	0.25 0.66 0.97	0.03 0.03 0.04
***									
840-10054 w/ Mount Pipe	A	From Leg	3.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice	5.58 6.03 6.50	2.69 3.25 3.83	0.06 0.10 0.14
840-10054 w/ Mount Pipe	B	From Leg	3.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice	5.58 6.03 6.50	2.69 3.25 3.83	0.06 0.10 0.14
840-10054 w/ Mount Pipe	C	From Leg	3.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice	5.58 6.03 6.50	2.69 3.25 3.83	0.06 0.10 0.14
URAS-FLEXIBLE	A	From Leg	3.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
URAS-FLEXIBLE	B	From Leg	3.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
URAS-FLEXIBLE	C	From Leg	3.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
Horizon Duo	A	From Leg	3.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice	0.55 0.65 0.76	0.34 0.43 0.52	0.01 0.01 0.02
Horizon Duo	B	From Leg	3.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice	0.55 0.65 0.76	0.34 0.43 0.52	0.01 0.01 0.02
Horizon Duo	C	From Leg	3.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice	0.55 0.65 0.76	0.34 0.43 0.52	0.01 0.01 0.02
(3) Empty Pipe Mount	A	From Leg	3.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice	2.00 3.00 4.00	0.90 1.12 1.34	0.07 0.08 0.09
(3) Empty Pipe Mount	B	From Leg	3.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice	2.00 3.00 4.00	0.90 1.12 1.34	0.07 0.08 0.09
(3) Empty Pipe Mount	C	From Leg	3.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice	2.00 3.00 4.00	0.90 1.12 1.34	0.07 0.08 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(3) T-Frames	A	None			0.0000	172.00	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) AM-X-CD-16-65-00T	A	From Leg	3.00	0.00	0.0000	162.00	No Ice	8.26	4.64	0.05
							1/2" Ice	8.97	5.14	0.10
							1" Ice	9.60	5.69	0.14
(2) AM-X-CD-16-65-00T	B	From Leg	3.00	0.00	0.0000	162.00	No Ice	8.26	4.64	0.05
							1/2" Ice	8.97	5.14	0.10
							1" Ice	9.60	5.69	0.14
(2) AM-X-CD-16-65-00T	C	From Leg	3.00	0.00	0.0000	162.00	No Ice	8.26	4.64	0.05
							1/2" Ice	8.97	5.14	0.10
							1" Ice	9.60	5.69	0.14
Kathrein 800-10121	A	From Leg	3.00	0.00	0.0000	162.00	No Ice	5.46	3.29	0.04
							1/2" Ice	6.01	3.72	0.08
							1" Ice	6.57	4.18	0.11
Kathrein 800-10121	B	From Leg	3.00	0.00	0.0000	162.00	No Ice	5.46	3.29	0.04
							1/2" Ice	6.01	3.72	0.08
							1" Ice	6.57	4.18	0.11
Kathrein 800-10121	C	From Leg	3.00	0.00	0.0000	162.00	No Ice	5.46	3.29	0.04
							1/2" Ice	6.01	3.72	0.08
							1" Ice	6.57	4.18	0.11
QS65512-2	A	From Leg	3.00	0.00	0.0000	162.00	No Ice	8.40	6.80	0.11
							1/2" Ice	9.11	7.41	0.17
							1" Ice	9.83	8.11	0.23
QS65512-2	B	From Leg	3.00	0.00	0.0000	162.00	No Ice	8.40	6.80	0.11
							1/2" Ice	9.11	7.41	0.17
							1" Ice	9.83	8.11	0.23
QS65512-2	C	From Leg	3.00	0.00	0.0000	162.00	No Ice	8.40	6.80	0.11
							1/2" Ice	9.11	7.41	0.17
							1" Ice	9.83	8.11	0.23
(2) LGP 21401	A	From Leg	3.00	0.00	0.0000	162.00	No Ice	1.95	0.53	0.03
							1/2" Ice	2.19	0.69	0.04
							1" Ice	2.45	0.86	0.05
(2) LGP 21401	B	From Leg	3.00	0.00	0.0000	162.00	No Ice	1.95	0.53	0.03
							1/2" Ice	2.19	0.69	0.04
							1" Ice	2.45	0.86	0.05
(2) LGP 21401	C	From Leg	3.00	0.00	0.0000	162.00	No Ice	1.95	0.53	0.03
							1/2" Ice	2.19	0.69	0.04
							1" Ice	2.45	0.86	0.05
(2) Katherin 860-10025	A	From Leg	3.00	0.00	0.0000	162.00	No Ice	0.14	0.12	0.00
							1/2" Ice	0.22	0.19	0.00
							1" Ice	0.31	0.28	0.00
(2) Katherin 860-10025	B	From Leg	3.00	0.00	0.0000	162.00	No Ice	0.14	0.12	0.00
							1/2" Ice	0.22	0.19	0.00
							1" Ice	0.31	0.28	0.00
(2) Katherin 860-10025	C	From Leg	3.00	0.00	0.0000	162.00	No Ice	0.14	0.12	0.00
							1/2" Ice	0.22	0.19	0.00
							1" Ice	0.31	0.28	0.00
Ericsson RRUS 11	A	From Leg	3.00	0.00	0.0000	162.00	No Ice	2.94	1.19	0.06
							1/2" Ice	3.42	1.40	0.07
							1" Ice	3.56	1.63	0.09
Ericsson RRUS 11	B	From Leg	3.00	0.00	0.0000	162.00	No Ice	2.94	1.19	0.06
							1/2" Ice	3.42	1.40	0.07
							1" Ice	3.56	1.63	0.09
Ericsson RRUS 11	C	From Leg	3.00	0.00	0.0000	162.00	No Ice	2.94	1.19	0.06
							1/2" Ice	3.42	1.40	0.07

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" Ice	3.56	1.63	0.09
Ericsson RRUS 32	A	From Leg	3.00	0.0000	162.00	No Ice	1.93	0.67	0.08
			0.00			1/2" Ice	2.19	0.88	0.09
			0.00			1" Ice	2.47	1.11	0.10
Ericsson RRUS 32	B	From Leg	3.00	0.0000	162.00	No Ice	1.93	0.67	0.08
			0.00			1/2" Ice	2.19	0.88	0.09
			0.00			1" Ice	2.47	1.11	0.10
Ericsson RRUS 32	C	From Leg	3.00	0.0000	162.00	No Ice	1.93	0.67	0.08
			0.00			1/2" Ice	2.19	0.88	0.09
			0.00			1" Ice	2.47	1.11	0.10
Ericsson RRUS 32 B2s	A	From Leg	3.00	0.0000	162.00	No Ice	3.52	2.51	0.05
			0.00			1/2" Ice	3.86	2.83	0.08
			0.00			1" Ice	4.22	3.16	0.11
Ericsson RRUS 32 B2s	B	From Leg	3.00	0.0000	162.00	No Ice	3.52	2.51	0.05
			0.00			1/2" Ice	3.86	2.83	0.08
			0.00			1" Ice	4.22	3.16	0.11
Ericsson RRUS 32 B2s	C	From Leg	3.00	0.0000	162.00	No Ice	3.52	2.51	0.05
			0.00			1/2" Ice	3.86	2.83	0.08
			0.00			1" Ice	4.22	3.16	0.11
(2) TPX-070821	A	From Leg	3.00	0.0000	162.00	No Ice	0.55	0.12	0.01
			0.00			1/2" Ice	0.68	0.19	0.01
			0.00			1" Ice	0.84	0.28	0.01
(2) TPX-070821	B	From Leg	3.00	0.0000	162.00	No Ice	0.55	0.12	0.01
			0.00			1/2" Ice	0.68	0.19	0.01
			0.00			1" Ice	0.84	0.28	0.01
(2) TPX-070821	C	From Leg	3.00	0.0000	162.00	No Ice	0.55	0.12	0.01
			0.00			1/2" Ice	0.68	0.19	0.01
			0.00			1" Ice	0.84	0.28	0.01
DC6-48-60-18-8F	A	From Leg	3.00	0.0000	162.00	No Ice	2.57	4.32	0.03
			0.00			1/2" Ice	2.87	4.68	0.06
			0.00			1" Ice	3.18	5.06	0.10
DC6-48-60-18-8F	B	From Leg	3.00	0.0000	162.00	No Ice	2.57	4.32	0.03
			0.00			1/2" Ice	2.87	4.68	0.06
			0.00			1" Ice	3.18	5.06	0.10
(3) T-Frames	C	None		0.0000	162.00	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
***									
LNX-6515DS-A1M w/ Mount Pipe	A	From Leg	3.00	0.0000	152.00	No Ice	11.45	9.36	0.08
			0.00			1/2" Ice	12.06	10.68	0.16
			0.00			1" Ice	12.69	11.71	0.25
LNX-6515DS-A1M w/ Mount Pipe	B	From Leg	3.00	0.0000	152.00	No Ice	11.45	9.36	0.08
			0.00			1/2" Ice	12.06	10.68	0.16
			0.00			1" Ice	12.69	11.71	0.25
LNX-6515DS-A1M w/ Mount Pipe	C	From Leg	3.00	0.0000	152.00	No Ice	11.45	9.36	0.08
			0.00			1/2" Ice	12.06	10.68	0.16
			0.00			1" Ice	12.69	11.71	0.25
AIR 21 B2A/B4P w/ Mount Pipe	A	From Leg	3.00	0.0000	152.00	No Ice	7.09	6.02	0.12
			0.00			1/2" Ice	7.78	7.17	0.18
			0.00			1" Ice	8.37	8.03	0.25
AIR 21 B2A/B4P w/ Mount Pipe	B	From Leg	3.00	0.0000	152.00	No Ice	7.09	6.02	0.12
			0.00			1/2" Ice	7.78	7.17	0.18
			0.00			1" Ice	8.37	8.03	0.25
AIR 21 B2A/B4P w/ Mount Pipe	C	From Leg	3.00	0.0000	152.00	No Ice	7.09	6.02	0.12
			0.00			1/2" Ice	7.78	7.17	0.18
			0.00			1" Ice	8.37	8.03	0.25
Ericsson AIR 32	A	From Leg	3.00	0.0000	152.00	No Ice	6.51	4.71	0.13

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00				1/2" Ice	6.89	5.07	0.18
			0.00				1" Ice	7.27	5.43	0.23
Ericsson AIR 32	B	From Leg	3.00		0.0000	152.00	No Ice	6.51	4.71	0.13
			0.00				1/2" Ice	6.89	5.07	0.18
			0.00				1" Ice	7.27	5.43	0.23
Ericsson AIR 32	C	From Leg	3.00		0.0000	152.00	No Ice	6.51	4.71	0.13
			0.00				1/2" Ice	6.89	5.07	0.18
			0.00				1" Ice	7.27	5.43	0.23
Ericsson RRUS 11 (Band 12)	A	From Leg	3.00		0.0000	152.00	No Ice	2.52	1.07	0.06
			0.00				1/2" Ice	2.72	1.21	0.07
			0.00				1" Ice	2.92	1.36	0.10
Ericsson RRUS 11 (Band 12)	B	From Leg	3.00		0.0000	152.00	No Ice	2.52	1.07	0.06
			0.00				1/2" Ice	2.72	1.21	0.07
			0.00				1" Ice	2.92	1.36	0.10
Ericsson RRUS 11 (Band 12)	C	From Leg	3.00		0.0000	152.00	No Ice	2.52	1.07	0.06
			0.00				1/2" Ice	2.72	1.21	0.07
			0.00				1" Ice	2.92	1.36	0.10
KRY 112 144/1	A	From Leg	3.00		0.0000	152.00	No Ice	0.41	0.19	0.01
			0.00				1/2" Ice	0.50	0.26	0.01
			0.00				1" Ice	0.60	0.33	0.02
KRY 112 144/1	B	From Leg	3.00		0.0000	152.00	No Ice	0.41	0.19	0.01
			0.00				1/2" Ice	0.50	0.26	0.01
			0.00				1" Ice	0.60	0.33	0.02
KRY 112 144/1	C	From Leg	3.00		0.0000	152.00	No Ice	0.41	0.19	0.01
			0.00				1/2" Ice	0.50	0.26	0.01
			0.00				1" Ice	0.60	0.33	0.02
Empty Pipe Mount	A	From Leg	3.00		0.0000	152.00	No Ice	2.00	0.90	0.07
			0.00				1/2" Ice	3.00	1.12	0.08
			0.00				1" Ice	4.00	1.34	0.09
Empty Pipe Mount	B	From Leg	3.00		0.0000	152.00	No Ice	2.00	0.90	0.07
			0.00				1/2" Ice	3.00	1.12	0.08
			0.00				1" Ice	4.00	1.34	0.09
Empty Pipe Mount	C	From Leg	3.00		0.0000	152.00	No Ice	2.00	0.90	0.07
			0.00				1/2" Ice	3.00	1.12	0.08
			0.00				1" Ice	4.00	1.34	0.09
(3) T-Frames	A	None			0.0000	152.00	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) SBNHH-1D65B w/ Mount Pipe	A	From Leg	3.00		0.0000	140.00	No Ice	8.86	7.30	0.07
			0.00				1/2" Ice	9.62	8.58	0.14
			0.00				1" Ice	10.34	9.72	0.22
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	3.00		0.0000	140.00	No Ice	8.86	7.30	0.07
			0.00				1/2" Ice	9.62	8.58	0.14
			0.00				1" Ice	10.34	9.72	0.22
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	3.00		0.0000	140.00	No Ice	8.86	7.30	0.07
			0.00				1/2" Ice	9.62	8.58	0.14
			0.00				1" Ice	10.34	9.72	0.22
800 10735v01 w/ Mount Pipe	A	From Leg	3.00		0.0000	140.00	No Ice	8.96	5.41	0.06
			0.00				1/2" Ice	9.60	6.60	0.12
			0.00				1" Ice	10.23	7.50	0.19
800 10735v01 w/ Mount Pipe	B	From Leg	3.00		0.0000	140.00	No Ice	8.96	5.41	0.06
			0.00				1/2" Ice	9.60	6.60	0.12
			0.00				1" Ice	10.23	7.50	0.19
800 10735v01 w/ Mount Pipe	C	From Leg	3.00		0.0000	140.00	No Ice	8.96	5.41	0.06
			0.00				1/2" Ice	9.60	6.60	0.12
			0.00				1" Ice	10.23	7.50	0.19

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-80080/4CF w/ Mount Pipe	A	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	5.49 5.94 6.40	4.03 4.65 5.30	0.03 0.08 0.13
BXA-80080/4CF w/ Mount Pipe	B	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	5.49 5.94 6.40	4.03 4.65 5.30	0.03 0.08 0.13
BXA-80080/4CF w/ Mount Pipe	C	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	5.49 5.94 6.40	4.03 4.65 5.30	0.03 0.08 0.13
RRH-2x60-AWS	A	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	2.35 2.56 2.79	1.53 1.72 1.92	0.04 0.06 0.08
RRH-2x60-AWS	B	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	2.35 2.56 2.79	1.53 1.72 1.92	0.04 0.06 0.08
RRH-2x60-AWS	C	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	2.35 2.56 2.79	1.53 1.72 1.92	0.04 0.06 0.08
RRH-2x60-PCS	A	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	2.45 2.67 2.90	1.43 1.61 1.81	0.06 0.07 0.09
RRH-2x60-PCS	B	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	2.45 2.67 2.90	1.43 1.61 1.81	0.06 0.07 0.09
RRH-2x60-PCS	C	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	2.45 2.67 2.90	1.43 1.61 1.81	0.06 0.07 0.09
RRH 2x60-700	A	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	2.57 2.79 3.02	1.93 2.13 2.34	0.03 0.05 0.07
RRH 2x60-700	B	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	2.57 2.79 3.02	1.93 2.13 2.34	0.03 0.05 0.07
RRH 2x60-700	C	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	2.57 2.79 3.02	1.93 2.13 2.34	0.03 0.05 0.07
DB-T1-6Z-8AB-0Z	A	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	5.60 5.92 6.24	2.33 2.56 2.79	0.04 0.08 0.12
(3) T-Frames	C	None		0.0000	140.00	No Ice 1/2" Ice 1" Ice	30.02 40.48 50.94	30.02 40.48 50.94	0.95 1.40 1.86
***									
742 213 w/ Mount Pipe	A	From Leg	1.50 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice	5.37 5.95 6.50	4.62 6.00 6.98	0.05 0.09 0.15
742 213 w/ Mount Pipe	B	From Leg	1.50 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice	5.37 5.95 6.50	4.62 6.00 6.98	0.05 0.09 0.15
742 213 w/ Mount Pipe	C	From Leg	1.50 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice	5.37 5.95 6.50	4.62 6.00 6.98	0.05 0.09 0.15
(3) Pipe Mounts	C	None		0.0000	130.00	No Ice 1/2" Ice 1" Ice	5.78 7.37 8.96	5.78 7.37 8.96	0.16 0.18 0.20

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
(2) VHLP2.5 Dish	A	Paraboloid w/o Radome	From Leg	3.00 0.00 0.00	0.0000		172.00	0.96	No Ice 1/2" Ice 1" Ice	0.72 0.85 0.98	0.02 0.02 0.03
VHLP2.5 Dish	B	Paraboloid w/o Radome	From Leg	3.00 0.00 0.00	0.0000		172.00	0.96	No Ice 1/2" Ice 1" Ice	0.72 0.85 0.98	0.02 0.02 0.03
VHLP2.5 Dish	C	Paraboloid w/o Radome	From Leg	3.00 0.00 0.00	0.0000		172.00	0.96	No Ice 1/2" Ice 1" Ice	0.72 0.85 0.98	0.02 0.02 0.03

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp

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

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	176 - 160	4.076	40	0.1977	0.0164
T2	160 - 140	3.412	40	0.1941	0.0161
T3	140 - 120	2.608	40	0.1750	0.0130
T4	120 - 100	1.884	40	0.1495	0.0096
T5	100 - 93.3333	1.285	40	0.1192	0.0071
T6	93.3333 - 86.6667	1.113	40	0.1106	0.0062
T7	86.6667 - 80	0.952	40	0.1017	0.0054
T8	80 - 60	0.810	40	0.0925	0.0050
T9	60 - 40	0.454	39	0.0641	0.0034
T10	40 - 20	0.215	39	0.0388	0.0022
T11	20 - 0	0.066	39	0.0195	0.0010

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
176.00	Lightning Rod	40	4.076	0.1977	0.0164	733930
172.00	(2) VHLP2.5 Dish	40	3.910	0.1974	0.0164	733930
162.00	(2) AM-X-CD-16-65-00T	40	3.495	0.1950	0.0162	257650
152.00	LNX-6515DS-A1M w/ Mount Pipe	40	3.085	0.1880	0.0151	105492
140.00	(2) SBNHH-1D65B w/ Mount Pipe	40	2.608	0.1750	0.0130	58486
130.00	742 213 w/ Mount Pipe	40	2.232	0.1630	0.0112	43635

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	176 - 160	16.162	2	0.7824	0.0658

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T2	160 - 140	13.534	2	0.7679	0.0645
T3	140 - 120	10.350	2	0.6929	0.0523
T4	120 - 100	7.483	2	0.5922	0.0385
T5	100 - 93.3333	5.113	2	0.4721	0.0283
T6	93.3333 - 86.6667	4.428	2	0.4380	0.0250
T7	86.6667 - 80	3.791	2	0.4030	0.0218
T8	80 - 60	3.226	2	0.3662	0.0201
T9	60 - 40	1.811	2	0.2540	0.0138
T10	40 - 20	0.857	2	0.1540	0.0090
T11	20 - 0	0.264	2	0.0774	0.0042

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
176.00	Lightning Rod	2	16.162	0.7824	0.0658	192930
172.00	(2) VHLP2.5 Dish	2	15.503	0.7811	0.0659	192930
162.00	(2) AM-X-CD-16-65-00T	2	13.861	0.7717	0.0650	67640
152.00	LNX-6515DS-A1M w/ Mount Pipe	2	12.237	0.7441	0.0607	27078
140.00	(2) SBNHH-1D65B w/ Mount Pipe	2	10.350	0.6929	0.0523	14871
130.00	742 213 w/ Mount Pipe	2	8.862	0.6455	0.0450	11058

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	176	Leg	A325N	0.8750	4	1.85	40.59	0.045	1	Bolt Tension
		Diagonal	A325N	0.6250	1	2.68	9.11	0.294	1	Member Block Shear
		Top Girt	A325N	0.6250	1	0.27	9.11	0.030	1	Member Block Shear
T2	160	Leg	A325N	1.0000	4	10.86	53.01	0.205	1	Bolt Tension
		Diagonal	A325N	0.6250	1	4.69	6.83	0.686	1	Member Block Shear
T3	140	Leg	A325N	1.0000	6	14.57	53.01	0.275	1	Bolt Tension
		Diagonal	A325N	0.6250	1	6.73	6.83	0.985	1	Member Block Shear
T4	120	Leg	A325N	1.0000	6	20.89	53.01	0.394	1	Bolt Tension
		Diagonal	A325N	0.6250	1	7.40	7.83	0.945	1	Member Bearing
T5	100	Diagonal	A325N	0.6250	1	7.55	7.83	0.965	1	Member Bearing
T6	93.3333	Diagonal	A325N	0.6250	1	7.46	7.83	0.953	1	Member Bearing
T7	86.6667	Leg	A325N	1.0000	6	26.79	53.01	0.505	1	Bolt Tension
		Diagonal	A325N	0.6250	1	8.07	12.43	0.649	1	Bolt Shear
T8	80	Leg	A325N	1.0000	8	24.21	53.01	0.457	1	Bolt Tension
		Diagonal	A325N	0.7500	1	8.32	14.14	0.588	1	Member Bearing
T9	60	Leg	A325N	1.0000	8	27.77	53.01	0.524	1	Bolt Tension
		Diagonal	A325N	0.7500	1	9.78	14.14	0.692	1	Member Bearing
T10	40	Leg	A325N	1.0000	8	31.49	53.01	0.594	1	Bolt Tension
		Diagonal	A325N	0.7500	1	10.17	14.14	0.719	1	Member Bearing

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
T11	20	Leg	A354-BC	1.0000	10	28.00	55.22	0.507	1	Bolt Tension
		Diagonal	A325N	0.7500	1	10.81	14.14	0.765	1	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	176 - 160	ROHN 3 EH	16.00	4.00	42.2 K=1.00	3.0159	-11.58	119.12	0.097 [1]
T2	160 - 140	ROHN 4 EH	20.03	4.01	32.6 K=1.00	4.4074	-53.23	183.54	0.290 [1]
T3	140 - 120	ROHN 5 EH	20.03	5.01	32.7 K=1.00	6.1120	-102.22	254.38	0.402 [1]
T4	120 - 100	ROHN 6 EHS	20.03	6.68	36.0 K=1.00	6.7133	-144.01	274.77	0.524 [1]
T5	100 - 93.3333	ROHN 6 EH	6.68	6.68	36.5 K=1.00	8.4049	-157.85	343.10	0.460 [1]
T6	93.3333 - 86.6667	ROHN 6 EH	6.68	6.68	36.5 K=1.00	8.4049	-170.92	343.10	0.498 [1]
T7	86.6667 - 80	ROHN 6 EH	6.68	6.68	36.5 K=1.00	8.4049	-183.91	343.10	0.536 [1]
T8	80 - 60	ROHN 6 EH	20.03	6.68	36.5 K=1.00	8.4049	-222.13	343.10	0.647 [1]
T9	60 - 40	ROHN 8 EHS	20.03	10.02	41.2 K=1.00	9.7193	-255.47	386.39	0.661 [1]
T10	40 - 20	ROHN 8 X-STR	20.03	10.02	41.8 K=1.00	12.7627	-291.04	505.55	0.576 [1]
T11	20 - 0	ROHN 8 EH	20.03	10.02	41.8 K=1.00	12.7627	-325.31	505.55	0.643 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	176 - 160	L2x2x1/4	6.16	2.77	93.8 K=1.10	0.9380	-2.87	19.13	0.150 [1]
T2	160 - 140	L2x2x3/16	7.65	3.61	112.4 K=1.02	0.7148	-4.72	11.91	0.396 [1]
T3	140 - 120	L2x2x3/16	9.87	4.70	143.1 K=1.00	0.7148	-6.62	7.89	0.839 [1]
T4	120 - 100	L2 1/2x2 1/2x3/16	12.41	5.96	144.5	0.9023	-7.46	9.76	0.764 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T5	100 - 93.3333	L2 1/2x2 1/2x3/16	12.99	6.25	151.6 K=1.00	0.9023	-7.56	8.87	0.851 [1]
T6	93.3333 - 86.6667	L2 1/2x2 1/2x3/16	13.58	6.55	158.7 K=1.00	0.9023	-7.53	8.09	0.930 [1]
T7	86.6667 - 80	L2.5x2.5x3/16 + L2.5x2.5x3/16 (C-shape)	14.17	6.97	108.2 K=1.00	1.8331	-8.07	32.06	0.252 [1]
T8	80 - 60	L3x3x1/4	16.00	7.75	157.0 K=1.00	1.4400	-8.30	13.19	0.629 [1]
T9	60 - 40	L3 1/2x3 1/2x1/4	19.22	9.35	161.7 K=1.00	1.6900	-9.85	14.60	0.675 [1]
T10	40 - 20	L3 1/2x3 1/2x1/4	20.99	10.24	177.1 K=1.00	1.6900	-10.33	12.18	0.848 [1]
T11	20 - 0	L4x4x1/4	22.80	11.15	168.3 K=1.00	1.9400	-11.07	15.47	0.715 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	176 - 160	L2x2x1/4	4.69	4.16	127.6 K=1.00	0.9380	-0.34	12.90	0.026 [1]

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	176 - 160	ROHN 3 EH	16.00	4.00	42.2	3.0159	7.39	135.72	0.054 [1]
T2	160 - 140	ROHN 4 EH	20.03	4.01	32.6	4.4074	43.46	198.34	0.219 [1]
T3	140 - 120	ROHN 5 EH	20.03	5.01	32.7	6.1120	87.40	275.04	0.318 [1]
T4	120 - 100	ROHN 6 EHS	20.03	6.68	36.0	6.7133	125.37	302.10	0.415 [1]
T5	100 - 93.3333	ROHN 6 EH	6.68	6.68	36.5	8.4049	137.71	378.22	0.364 [1]
T6	93.3333 - 86.6667	ROHN 6 EH	6.68	6.68	36.5	8.4049	149.35	378.22	0.395 [1]
T7	86.6667 - 80	ROHN 6 EH	6.68	6.68	36.5	8.4049	160.73	378.22	0.425 [1]
T8	80 - 60	ROHN 6 EH	20.03	6.68	36.5	8.4049	193.72	378.22	0.512 [1]
T9	60 - 40	ROHN 8 EHS	20.03	10.02	41.2	9.7193	222.14	437.37	0.508 [1]
T10	40 - 20	ROHN 8 X-STR	20.03	10.02	41.8	12.7627	251.88	574.32	0.439 [1]
T11	20 - 0	ROHN 8 EH	20.03	10.02	41.8	12.7627	279.95	574.32	0.487 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	176 - 160	L2x2x1/4	6.16	2.77	56.9	0.5629	2.68	24.49	0.109 [1]
T2	160 - 140	L2x2x3/16	7.31	3.44	69.1	0.4307	4.69	18.73	0.250 [1]
T3	140 - 120	L2x2x3/16	9.44	4.48	89.4	0.4307	6.73	18.73	0.359 [1]
T4	120 - 100	L2 1/2x2 1/2x3/16	12.41	5.96	93.7	0.5713	7.40	24.85	0.298 [1]
T5	100 - 93.3333	L2 1/2x2 1/2x3/16	12.99	6.25	98.2	0.5713	7.55	24.85	0.304 [1]
T6	93.3333 - 86.6667	L2 1/2x2 1/2x3/16	13.58	6.55	102.8	0.5713	7.46	24.85	0.300 [1]
T7	86.6667 - 80	L2.5x2.5x3/16 + L2.5x2.5x3/16 (C-shape)	14.17	6.97	108.2	1.8331	7.99	59.39	0.135 [1]
T8	80 - 60	L3x3x1/4	16.00	7.75	101.7	0.9159	8.32	44.65	0.186 [1]
T9	60 - 40	L3 1/2x3 1/2x1/4	19.22	9.35	104.5	1.1034	9.78	53.79	0.182 [1]
T10	40 - 20	L3 1/2x3 1/2x1/4	20.99	10.24	114.2	1.1034	10.17	53.79	0.189 [1]
T11	20 - 0	L4x4x1/4	22.80	11.15	108.3	1.2909	10.81	62.93	0.172 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	176 - 160	L2x2x1/4	4.69	4.16	86.6	0.5629	0.27	24.49	0.011 [1]

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	176 - 160	Leg	ROHN 3 EH	2	-11.58	119.12	9.7	Pass
T2	160 - 140	Leg	ROHN 4 EH	32	-53.23	183.54	29.0	Pass
T3	140 - 120	Leg	ROHN 5 EH	66	-102.22	254.38	40.2	Pass
T4	120 - 100	Leg	ROHN 6 EHS	93	-144.01	274.77	52.4	Pass
T5	100 - 93.3333	Leg	ROHN 6 EH	114	-157.85	343.10	46.0	Pass
T6	93.3333 - 86.6667	Leg	ROHN 6 EH	123	-170.92	343.10	49.8	Pass
T7	86.6667 - 80	Leg	ROHN 6 EH	132	-183.91	343.10	53.6	Pass
T8	80 - 60	Leg	ROHN 6 EH	141	-222.13	343.10	64.7	Pass
T9	60 - 40	Leg	ROHN 8 EHS	162	-255.47	386.39	66.1	Pass
T10	40 - 20	Leg	ROHN 8 X-STR	177	-291.04	505.55	57.6 59.4 (b)	Pass
T11	20 - 0	Leg	ROHN 8 EH	192	-325.31	505.55	64.3	Pass
T1	176 - 160	Diagonal	L2x2x1/4	9	-2.87	19.13	15.0 29.4 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T2	160 - 140	Diagonal	L2x2x3/16	37	-4.72	11.91	39.6 68.6 (b)	Pass
T3	140 - 120	Diagonal	L2x2x3/16	70	-6.62	7.89	83.9 98.5 (b)	Pass
T4	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	97	-7.46	9.76	76.4 94.5 (b)	Pass
T5	100 - 93.3333	Diagonal	L2 1/2x2 1/2x3/16	118	-7.56	8.87	85.1 96.5 (b)	Pass
T6	93.3333 - 86.6667	Diagonal	L2 1/2x2 1/2x3/16	127	-7.53	8.09	93.0 95.3 (b)	Pass
T7	86.6667 - 80	Diagonal	L2.5x2.5x3/16 + L2.5x2.5x3/16 (C-shape)	136	-8.07	32.06	25.2 64.9 (b)	Pass
T8	80 - 60	Diagonal	L3x3x1/4	144	-8.30	13.19	62.9	Pass
T9	60 - 40	Diagonal	L3 1/2x3 1/2x1/4	165	-9.85	14.60	67.5 69.2 (b)	Pass
T10	40 - 20	Diagonal	L3 1/2x3 1/2x1/4	180	-10.33	12.18	84.8	Pass
T11	20 - 0	Diagonal	L4x4x1/4	195	-11.07	15.47	71.5 76.5 (b)	Pass
T1	176 - 160	Top Girt	L2x2x1/4	5	-0.34	12.90	2.6 3.0 (b)	Pass
							Summary	
						Leg (T9)	66.1	Pass
						Diagonal (T3)	98.5	Pass
						Top Girt (T1)	3.0	Pass
						Bolt Checks	98.5	Pass
						RATING =	**98.5**	**Pass**

MATHCAD CALCULATION PRINTOUT

Foundation Check for 175' Self Supporting Tower

Customer Name: SBA
Customer Site Number: CT04382-S-03 New Britain 2, CT

CarrierName: T-Mobile
ACGI JOB # 17-1365

By:

Allpro Consulting Group, Inc.
9221 Lyndon B. Johnson Freeway, Suite 204
Dallas, TX 75243
Tel: 972-231-8893, Fax: 866-364-8375

March 24, 2017

Foundation check

-Foundation Reactions-

((As per TNX output results from the Tower Structural Analysis by Allpro Consulting Group Inc.,)

Total Shear	$S := 56 \cdot kips$	Compression on Pedestal:	$P_c := 334 \cdot kips$
Moment	$M := 5699 \cdot ft\_K$	Uplift on Pedestal:	$P_{up} := 287 \cdot kips$
Down load, Tower weight	$Pv := 61 \cdot kips$	Shear on Pedestal:	$Sh := 35 \cdot kips$

-Soil Properties- **Soil data as per Geotechnical Evaluation of Subsurface Conditions report by Jaworski Geotech, Inc., Project # 16BICQ1400, dated 07/05/2000**

Allowable Bearing Capacity $Brg_{allw} := 5 \cdot ksf$ Safety Factor $SF := 2$ (Estimated)

Umtimate Bearing Capacity $Brg_{ultimate} := Brg_{allw} \cdot SF$ $Brg_{ultimate} = 10 \cdot ksf$

Internal angle of friction for soil, $\phi := 30 \cdot deg$

Unit wt. of soil, $\gamma_s := 0.115 \cdot kcf$

Alowable Passive Pressure see next page

Cohesion of soil, $c_u := 0.0 \cdot ksf$

Friction Factor $FF := .50$

Depth to be neglected $L_{neg} := 1.0 \cdot ft$

-Reinforcement Data-

Typical concrete cover $cc := 3in$

Rebar yield strength, $f_y := 60000 \cdot psi$

-Material Parameters-

Conforming to the design requirements as in ACI 318-10

Unit wt. of concrete, $\gamma_c := 0.150 \cdot kcf$

Concrete compressive strength, $f_c := 3000 \cdot psi$

-Factor of Safety for soil strength-

$\phi_{s\_Bear} := 0.75$ as per TIA-222-G code for bearing, 9.4.1

$\phi_{s\_friction} := 0.75$ as per TIA-222-G code for skin friction resistance, 9.4.1

$\phi_{s\_lateral} := 0.75$ as per TIA-222-G code for lateral resistance, 9.4.1

$\phi_{s\_uplift} := 0.75$ as per TIA-222-G code for lateral resistance, 9.4.1

DIMENSIONS

Tower face width $TWFW := 21 \cdot ft$ Tower ht. $Tw_{ht} := 175 \cdot ft$

The tower location is eccentric by $L_{pe} := 0 \cdot ft$ with respect to the mat foundation center towards the base

Type of column, col.t=0 for circular,=1 for rectangular/square $col_t := 0$

Depth of mat, $D_f := 3.5 \cdot ft$

Thickness of mat, $T_f := 4 \cdot ft$

Pedestal size, $Ped_s := 0 \cdot ft$ No. of pedestals $Nped := 3$

Extension above the grade, $E_g := 0.5 \cdot ft$

-Foundation Data as per original foundation drawing by Rohn Industries, Inc., Eng. File No. 44545AE, dated 7/26/2000

Mat Dimensions, LxB $L := 31.5 \cdot ft$ x $B := L$ $B = 31.5\,ft$

$Brg_{ultimate} = 10 \cdot ksf$ (From Geotech Report)

MAT CALCULATIONS

$$K_p := \tan\left(45deg + \frac{\phi}{2}\right)^2 \qquad K_p = 3$$

$$P_{pave} := \frac{\left(D_f - T_f - L_{neg}\right)\cdot K_p \cdot \gamma_s + \left(D_f - L_{neg}\right)\cdot K_p \cdot \gamma_s}{2} \qquad P_{pave} = 0.172 \cdot ksf$$

Calculate safety against overturning and location of resultant on the base

Resisting Moments about mid axis parallel to base

$Area_{ped} := if\left(col_t = 1, Ped_s^2, \frac{\pi}{4}\cdot Ped_s^2\right)$ $Area_{ped} = 0$

component	value, kips	lever arm, ft	resisting moment, ft-kips
1) Concrete wt.	$C_w := L\cdot B\cdot T_f\cdot(\gamma_c) + Area_{ped}\cdot\gamma_c\cdot(D_f + E_g - T_f)\cdot Nped$	$L_c := \frac{L}{2}$	$R_c := C_w \cdot L_c$
	$C_w = 595.35 \cdot kips$	$L_c = 15.75\,ft$	$R_c = 9376.763 \cdot ft\_K$
2) Soil wt.	$S_w := 0 \cdot kips$	$L_s := \frac{L}{2}$	$R_s := S_w \cdot L_s$
	$S_w = 0 \cdot kips$	$L_s = 15.75\,ft$	$R_s = 0 \cdot ft\_K$
3) Wt. of soil wedge	$W_w := 0kips$	$L_w := \left[L + \left[\left(D_f - T_f\right)\cdot\frac{\tan(\phi)}{3}\right]\right]$	$R_w := W_w \cdot L_w$
	$W_w = 0 \cdot kips$	$L_w = 31.404\,ft$	$R_w = 0 \cdot ft\_K$

4) Passive pressure $Pe_p := (D_f - E_g)\cdot B\cdot P_{pave}$ $Pe_p = 16.301\cdot kips$ $L_p := \frac{T_f}{3}$ $L_p = 1.333\,ft$ $R_p := Pe_p\cdot L_p$ $R_p = 21.735\cdot ft\_K$

5) Vertical $Pv = 61\cdot kips$

$S_{w1} := L\cdot B\cdot D_f\cdot\gamma_s$ $S_{w1} = 399.381\cdot kips$ <--- for net calcs $L_v := \frac{L}{2}$ $R_v := Pv\cdot L_v$ $R_v = 960750\,ft\cdot lb$

Total weight $T_w := C_w + S_w + W_w + Pv$ $T_w = 656.35\cdot kips$ $L_v = 15.75\,ft$ $R_v = 960.75\cdot ft\_K$

Total resisting Moment= $M_r := R_c + R_s + R_w + R_p + R_v$ $M_r = 10359.248\cdot ft\_K$

Overturning Moments component	value, kips	lever arm, ft	Overturning Moment ft-kips
1) Moment on foundation due to eccentric location of tower	$Pv = 61\cdot kips$	$L_{pe} = 0$	$M_{pe} := L_{pe}\cdot Pv$ $M_{pe} = 0\cdot ft\_K$
2) Moment on foundation	-	-	$M = 5699\cdot ft\_K$
3) Moment due to horizontal shear	$S_t := S$	$L_{hs} := D_f + E_g$ $L_{hs} = 4\,ft$	$O_{hs} := L_{hs}\cdot S_t$ $O_{hs} = 224\cdot ft\_K$

Total Overturning Moment= $M_o := M + O_{hs} + M_{pe}$ $M_o = 5923\cdot ft\_K$

Check Safety Factor against Overturning about mid axis parallel to base

$SF := \frac{0.9M_r}{M_o}$ $SF = 1.574$ > 1.0 $\frac{1.0}{SF} = 63.529\cdot\%$ **O.K!**

Calculate eccentricity, e

$e := \frac{M_o}{T_w}$ $e = 9.024\,ft$

Check location of eccentricity and determine pressure distribution under the mat

$L_{loc} := \frac{L}{6}$ $L_{loc} = 5.25\,ft$ For net bearing calcs $T_{w1} := S_{w1} + W_w$ $T_{w1} = 399.381\cdot kips$

$P_{max1} := \text{if}\left[e \le L_{loc}, \frac{T_w}{L\cdot B}\cdot\left[1 + \left(6\cdot\frac{e}{L}\right)\right], 4\cdot\frac{T_w}{3\cdot B\cdot(L - 2\cdot e)}\right]$ $P_{max1} = 2.065\cdot ksf$

$P_{max2} := \left(\frac{T_{w1}}{L\cdot B}\right)$ $P_{max2} = 0.402\cdot ksf$ $P_{net} := P_{max1} - P_{max2}$ $P_{max} := P_{net}$

Net soil pressure, $P_{net} = 1.663 \cdot ksf$ < $\phi_{s\_Bear} \cdot Brg_{ultimate} = 7.5 \cdot ksf$ $\frac{P_{net}}{(\phi_{s\_Bear} \cdot Brg_{ultimate})} = 22.171 \cdot \%$

$P_{min} := if\left[e \le L_{loc}, \frac{T_w}{L \cdot B} \cdot \left[1 - \left(6 \cdot \frac{e}{L}\right)\right], 0 \cdot ksf\right]$ $P_{min} = 0 \cdot ksf$ **O.K.!**

Check for horizontal shear $P_{hor} := \phi_{s\_lateral} \cdot \left[Pe_p + (Pv + C_w + S_w) \cdot 0.35\right]$

$P_{hor} = 184.518 \cdot kips$ > $S = 56 \cdot kips$ $\frac{S}{P_{hor}} = 30.349 \cdot \%$ **O.K!**

Since P.hor > S it is safe!

REINFORCED CONCRETE CHECK CALCULATIONS

General Input parameters

Concrete Cover, $cc := 3.0 \cdot in$

Reduction factors as per respective ACI sections

$\phi_{shear} := 0.85$ as per ACI 9.3.2.3

$\phi_{compr} := 0.75$ as per ACI 9.3.2.2

$\phi_{axten} := 0.9$ as per ACI 9.3.2.2 a

Reinforced concrete load factor as per EIA 3.1.16 $RC_{fac} := 1.0$

(Loads already factored under TIA/EIA-222-G Code)

Check for wide beam or single shear in mat

Allowable shear stress in concrete for wide beam shear criteria=

$\nu_{wide} := 2 \cdot \phi_{shear} \cdot \sqrt{f_c \cdot psi}$ $\nu_{wide} = 93.113 \cdot psi$

Effective depth of stee $d := T_f - cc$ $d = 45 \cdot in$ $L_{eff} := if(e \le L_{loc}, L, L - 2 \cdot e)$ $L_{eff} = 13.452\,ft$

$dist := if\left[Nped = 3, \left(\frac{L}{2} - \frac{1}{3} \cdot \sin(60 \cdot deg) \cdot TWFW - \frac{1}{2} \cdot Ped_s - d\right), \left(\frac{L}{2} - \frac{TWFW}{2} - \frac{1}{2} \cdot Ped_s - d\right)\right]$

Factor load by RC $P_{maxf} := P_{max} \cdot RC_{fac}$ $P_{minf} := P_{min} \cdot RC_{fac}$

shear on the face of concrete=

$Shear_{wide} := (dist) \cdot B \cdot \left[\frac{P_{maxf} + \left[P_{maxf} - \frac{P_{maxf} - P_{minf}}{L_{eff}} \cdot (dist)\right]}{2}\right]$ $Shear_{wide} = 242.371 \cdot kips$

Area of concrete in shear= $A_{shear} := B \cdot d$ $A_{shear} = 17010 \cdot in^2$

Shear stress acting on concrete face= $\nu_{act} := \frac{Shear_{wide}}{A_{shear}}$ $\nu_{act} = 14.249 \cdot psi$

$\nu_{act} = 14.249 \cdot psi$ < $\nu_{wide} = 93.113 \cdot psi$ **O.K!**

Check for punching or two-way shear in mat

Calculate allowable shear stress in concrete for punching/two-way shear

$\beta := \frac{L}{B}$ $\beta = 1$

$\nu_{punch} := if\left[\left(2 + \frac{4}{\beta}\right)\cdot\phi_{shear}\cdot\sqrt{f_c\cdot psi} \le 4\cdot\phi_{shear}\cdot\sqrt{f_c\cdot psi}\,,\left(2 + \frac{4}{\beta}\right)\cdot\phi_{shear}\cdot\sqrt{f_c\cdot psi}\,,4\cdot\phi_{shear}\cdot\sqrt{f_c\cdot psi}\right]$

$\nu_{punch} = 186.226\cdot psi$ $Area_{col} := if\left[col_t = 0\,,\frac{\pi}{4}\cdot\left(Ped_s + d\right)^2\,,\left(Ped_s + d\right)^2\right]$

$P_{avg} := \frac{P_{maxf} + P_{minf}}{2}$ $Peri_{col} := if\left[col_t = 0\,,2\cdot\pi\cdot\frac{Ped_s + d}{2}\,,4\cdot\left(Ped_s + d\right)\right]$

Factor vertical load $Pvf := RC_{fac}\cdot Pv$

Shear stress acting on the concrete face= $\nu_{act} := \frac{P_c - Area_{col}\cdot P_{avg}}{Peri_{col}\cdot d\cdot 4}$

$\nu_{act} = 12.765\cdot psi$ < $\nu_{punch} = 186.226\cdot psi$ **O.K!**

Check of mat footing

$C_{wped} := Area_{ped}\cdot\gamma_c\cdot\left(D_f + E_g - T_f\right)\cdot Nped$ Wt. of concrete pedestals

$P_{upnet} := P_{up} - \frac{C_{wped} + S_w\cdot 0.95}{Nped}$ $P_{upnet} = 287\cdot kips$

Net uplift acting at mat level creating bending moment in the slab. Soil wt. reduced by 5 % to account for variation in compaction . ACI 9.3.2.2

Calculate bending moment for mat design:

$\phi_{bend} := 0.9$ $Langle := if(Nped = 3\,,\sin(60\cdot deg)\,,1)$

$\beta_1 := if\left[f_c \le 4000\cdot psi\,,0.85\,,if\left[f_c \ge 8000\cdot psi\,,0.65\,,0.85 - \left(\frac{f_c}{psi} - 4000\right)\cdot 0.05\right]\right]$ ACI 10.2.7.3

$B_{mo} := RC_{fac}\cdot\left[\left(TWFW\cdot P_{upnet}\right)\cdot Langle + S_t\cdot\left(D_f + E_g\right)\right]$ $B_{mo} = 5443.535\cdot ft\_K$

$B_{mo1} := \frac{P_{max} - P_{min}}{(L - 2\cdot e)\cdot 2}\cdot\left(TWFW\cdot Langle\cdot\frac{1}{3} + \frac{Ped_s}{2}\right)\cdot\left[\left[(L - 2\cdot e) - \left(TWFW\cdot Langle\cdot\frac{1}{3} + \frac{Ped_s}{2}\right)\right]^2\cdot 0.5\right]\cdot B$

$W_e := TWFW\cdot Langle + Ped_s$ $W_e = 18.187\,ft$ Reinforcement middle bandwidth. $B_{mo1} = 322239.722\,ft\cdot lb$

required R_u $R_u := \frac{B_{mo}}{\phi_{bend}\cdot B\cdot d^2}$ $R_u = 94.821\cdot psi$ $m := \frac{f_y}{\beta_1\cdot f_c}$ $m = 23.529$

required

$\rho := \frac{1}{m}\cdot\left[1-\sqrt{1-\left(\frac{2\cdot m\cdot R_u}{f_y}\right)}\right]$ $\rho = 0.002$

required area of steel for mat=

$Ast_f := \rho\cdot B\cdot d$ $Ast_f = 27.401\cdot in^2$

bar size provided $f_{bar} := 9$ $f_{dia} := \frac{f_{bar}}{8}\cdot in$ $f_{dia} = 1.125\cdot in$

Bar area= $f_{abar} := \pi\cdot\frac{f_{dia}^2}{4}$ $f_{abar} = 0.994\cdot in^2$

Number of bars required= $Nf_{bars} := \frac{Ast_f}{f_{abar}}$ $Nf_{bars} = 27.566$

Used $Nf_{bars} := 32$ > 27 OK!

Foundation Check Summary

-Foundation Reactions-

$S = 56\cdot kips$

Down load $Pv = 61\cdot kips$ (Weight)

Uplift load $P_{up} = 287\cdot kips$

$M = 5699\cdot ft\_K$

Stability Calculations

Safety Factor against Overturning $SF = 1.574$ > 1.0 OK! $\frac{1.0}{SF} = 63.529\cdot\%$ **OK!**

Net soil pressure, $P_{net} = 1.663\cdot ksf$ < $0.75Brg_{ultimate} = 7.5\cdot ksf$ $\frac{P_{net}}{0.75Brg_{ultimate}} = 22.171\cdot\%$ **OK!**

Check for horizontal shear $P_{hor} = 184.518\cdot kips$ > $S = 56\cdot kips$ $\frac{S}{P_{hor}} = 30.349\cdot\%$ **OK!**

Exhibit E

EBI Consulting
environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CT11351C

New Britain/Rt72 Wooster
1 Hartford Square Street
New Britain, CT 06053

February 14, 2017

EBI Project Number: 6217000548

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	11.41 %

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

EBI Consulting
environmental | engineering | due diligence

February 14, 2017

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

Emissions Analysis for Site: **CT11351C – New Britain/Rt72 Wooster**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **1 Hartford Square Street, New Britain, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

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

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

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

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

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **1 Hartford Square Street, New Britain, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

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

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

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

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

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

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

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

7) Since the 2100 MHz UMTS radios are ground mounted there are additional cabling losses accounted for. For each ground mounted 2100 MHz UMTS RF path an additional 1.61 dB of cable loss was factored into the calculations used for this analysis. This is based on manufacturers Specifications for 152 feet of 1-5/8" coax cable on each path.

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

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

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

11) The antenna mounting height centerlines of the proposed antennas are **150.5 feet & 152 feet** above ground level (AGL).

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

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR32 B66Aa/B2A	Make / Model:	Ericsson AIR32 B66Aa/B2A	Make / Model:	Ericsson AIR32 B66Aa/B2A
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	152	Height (AGL):	152	Height (AGL):	152
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	240	Total TX Power(W):	240	Total TX Power(W):	240
ERP (W):	9,337.08	ERP (W):	9,337.08	ERP (W):	9,337.08
Antenna A1 MPE%	1.57	Antenna B1 MPE%	1.57	Antenna C1 MPE%	1.57
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	150.5	Height (AGL):	150.5	Height (AGL):	150.5
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	6	Channel Count	6	Channel Count	6
Total TX Power(W):	180	Total TX Power(W):	180	Total TX Power(W):	180
ERP (W):	6,279.75	ERP (W):	6,279.75	ERP (W):	6,279.75
Antenna A2 MPE%	1.08	Antenna B2 MPE%	1.08	Antenna C2 MPE%	1.08
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Commscope LNX-6515DS-A1M	Make / Model:	Commscope LNX-6515DS-A1M	Make / Model:	Commscope LNX-6515DS-A1M
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	150.5	Height (AGL):	150.5	Height (AGL):	150.5
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power(W):	30	Total TX Power(W):	30	Total TX Power(W):	30
ERP (W):	865.21	ERP (W):	865.21	ERP (W):	865.21
Antenna A3 MPE%	0.32	Antenna B3 MPE%	0.32	Antenna C3 MPE%	0.32

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**2.97 %**
Nextel	0.21 %
Clearwire	0.07 %
MetroPCS	0.79 %
Verizon Wireless	3.69 %
AT&T	3.68 %
Site Total MPE %:	**11.41 %**

T-Mobile Sector A Total:	2.97 %
T-Mobile Sector B Total:	2.97 %
T-Mobile Sector C Total:	2.97 %
Site Total:	11.41 %

T-Mobile _Max Values per sector	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm²)	Frequency (MHz)	Allowable MPE (μW/cm²)	Calculated % MPE
T-Mobile AWS - 2100 MHz LTE	2	2,334.27	152	7.87	AWS - 2100 MHz	1000	0.79%
T-Mobile PCS - 1900 MHz LTE	2	2,334.27	152	7.87	PCS - 1900 MHz	1000	0.79%
T-Mobile AWS - 2100 MHz UMTS	2	805.60	150.5	2.77	AWS - 2100 MHz	1000	0.28%
T-Mobile PCS - 1950 MHz UMTS	2	1,167.14	150.5	4.02	PCS - 1950 MHz	1000	0.40%
T-Mobile PCS - 1950 MHz GSM	2	1,167.14	150.5	4.02	PCS - 1950 MHz	1000	0.40%
T-Mobile 700 MHz LTE	1	865.21	150.5	1.49	700 MHz	467	0.32%
						Total*:	**2.97%**

*NOTE: Totals may vary by 0.01% due to summing of remainders

Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector A:	2.97 %
Sector B:	2.97 %
Sector C:	2.97 %
T-Mobile Per Sector Maximum:	2.97 %
Site Total:	11.41 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **11.41%** 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.