



July 16th, 2020

Melanie A. Bachman

Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Regarding: Notice of Exempt Modification – Equipment Modification
Property Address: 120 Universal Drive, North Haven CT 06473
Applicant: Empire Telecom on behalf of AT&T (“AT&T”, Site # CT5107)

Dear Ms. Bachman:

AT&T currently maintains a wireless telecommunications facility on an existing 120-foot monopole at the above-referenced address latitude 41.3441919°, longitude -72.8705989°. Said monopole is owned by Crown Castle and the underlying property owners are 120 Universal Drive, LLC.

AT&T desires to modify its existing telecommunications facility by adding: (1) DC Squid (3) CB-C23SR-43 Combiners, (3) SDARS Remote Radios, (1) Main Unit, (3) RR-FA3 Mounts, and ancillary equipment and cables. The centerline height of the existing antennas and ancillary tower-mounted equipment is and will remain at 120 feet.

Please accept this application as notification pursuant to R.C.S.A. §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. §16-50j-72 (b)(2). In accordance with R.C.S.A. §16-50j-73, a copy of this letter is being sent to the Frist Selectman, Michael J. Freda; the Zoning Enforcement Officer, Laura Magaraci; Tower Owners, Crown Castle Corporation; and property owners, 120 Universal Drive, LLC.

The planned modifications to AT&T’s facility fall squarely within those activities explicitly provided for in R.C.S.A. §16-50j-72 (b)(2). Specifically:

1. The planned modification will not result in an increase in the height of the existing structure. The modified equipment will be installed at the existing height of 120 feet on the 120 foot tower.
2. The proposed modifications will not involve any changes to AT&T’s ground-space footprint, and therefore and therefore will not require an extension of the site boundary.
3. The proposed modification will not increase the noise level at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above Federal Communications Commission (FCC) safety standard. An RF emissions calculation (enclosed) for AT&T's modified facility is herein provided.
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 AT&T's proposed modifications. Please see enclosed structural analysis completed by completed by B+T Group, dated June 5th 2020; stamped June 5th, 2020.

For the foregoing reasons, AT&T respectfully requests that the proposed installation be allowed within the exempt modifications under R.C.S.A. §16-50j-72 (b)(2).

Sincerely,

Moriah King

Moriah King
Site Acquisition Specialist
Empire Telecom USA, LLC
moking@empiretelecomm.com

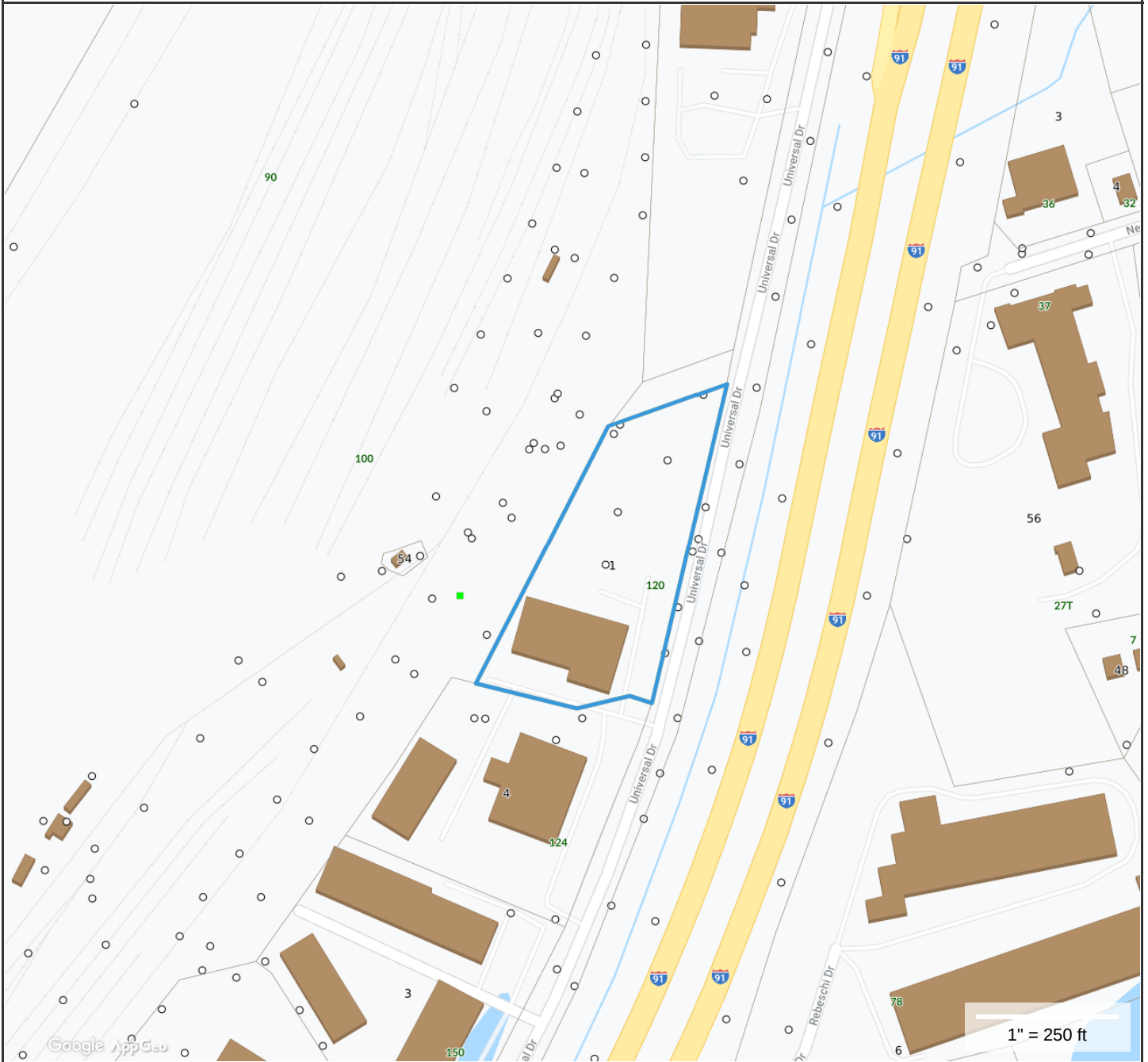
Enclosures: Exhibit 1 – Field Card and GIS Map
Exhibit 2 – Construction Drawings
Exhibit 3 – Structural Analysis
Exhibit 4 – Mount Opinion Letter
cc: Exhibit 5 – RF Emissions Analysis Report Evaluation

Michael J. Freda
First Selectman - Selectman's Office
18 Church Street North Haven, CT 06473

Laura Magaraci
Zoning Enforcement Officer
Memorial Town Hall
18 Church Street North Haven, CT 06473

120 Universal Drive Associates, LLC
120 Universal Drive North Haven, CT 06473

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



Property Information

Property ID 11/1
Location 120 UNIVERSAL DR
Owner 120 UNIVERSAL DRIVE ASSOCIATES LLC



**MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT**

Town of North Haven, CT makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

Geometry updated 07/01/2018
Data updated 11/18/2018

120 UNIVERSAL DR

Location 120 UNIVERSAL DR

Mblu 011//001//

Acct# 027540

Owner 120 UNIVERSAL DRIVE ASSOCIATES LLC

Assessment \$996,030

Appraisal \$1,422,900

PID 8457

Building Count 1

Current Value

Appraisal			
Valuation Year	Improvements	Land	Total
2014	\$1,025,400	\$397,500	\$1,422,900

Assessment			
Valuation Year	Improvements	Land	Total
2014	\$717,780	\$278,250	\$996,030

Owner of Record

Owner 120 UNIVERSAL DRIVE ASSOCIATES LLC

Sale Price \$0

Co-Owner

Certificate

Address 120 UNIVERSAL DR
NORTH HAVEN, CT 06473

Book & Page 799/ 46

Sale Date 10/28/2008

Ownership History

Ownership History				
Owner	Sale Price	Certificate	Book & Page	Sale Date
120 UNIVERSAL DRIVE ASSOCIATES LLC	\$0		799/ 46	10/28/2008
BERLUTI MARIO	\$0	1	482/ 458	07/18/1995
BERLUTI, MARIO & HELEN	\$0	3		09/01/1990
BERLUTI MARIO & HELEN & SURV	\$0	4	305/ 427	12/06/1978

Building Information

Building 1 : Section 1

Year Built: 1985
Living Area: 19,180
Replacement Cost: \$1,089,079

Building Percent Good: 78

Replacement Cost

Less Depreciation: \$849,500

Building Attributes

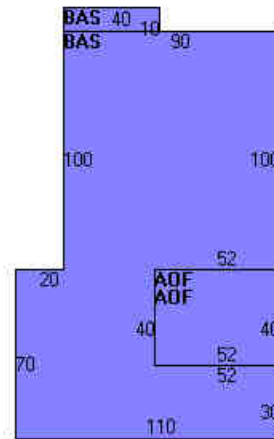
Field	Description
STYLE	Service Shop
MODEL	Comm/Ind
Grade	C +
Stories:	1
Occupancy	1
Exterior Wall 1	Metal
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Metal/Tin
Interior Wall 1	Drywall
Interior Wall 2	
Interior Floor 1	Average
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Hot Air-no Duc
AC Type	None
Bldg Use	AUTO REPAIR
Total Rooms	
Total Bedrms	
Total Baths	
1st Floor Use:	
Heat/AC	NONE
Frame Type	WOOD FRAME
Baths/Plumbing	AVERAGE
Ceiling/Wall	SUS-CEIL/MN WL
Rooms/Prtns	AVERAGE
Wall Height	20
% Comn Wall	

Building Photo



(<http://images.vgsi.com/photos/NorthHavenCTPhotos/\00\01\26\42.jpg>)

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	15,020	15,020
AOF	Office	4,160	4,160
		19,180	19,180

Extra Features

Extra Features				Legend
Code	Description	Size	Value	Bldg #
A/C	AIR CONDITION	6612 S.F.	\$10,300	1
SPR1	SPRINKLERS-WET	19220 S.F.	\$13,500	1
MEZ1	MEZZANINE-UNF	2500 S.F.	\$17,600	1

Land

Land Use

Use Code 3320
Description AUTO REPAIR
Zone IL30
Neighborhood 305
Alt Land Appr No
Category

Land Line Valuation

Size (Acres) 3
Frontage
Depth
Assessed Value \$278,250
Appraised Value \$397,500

Outbuildings

Outbuildings						<u>Legend</u>
Code	Description	Sub Code	Sub Description	Size	Value	Bldg #
FN3	FENCE-6' CHAIN			640 L.F.	\$2,900	1
PAV1	PAVING-ASPHALT			52000 S.F.	\$35,100	1
SHD7	COMM GOOD			240 S.F.	\$9,900	1
TWR1	COMMU-TOWER			1 UNITS	\$112,500	1
SHD7	COMM GOOD			240 S.F.	\$9,900	1

Valuation History

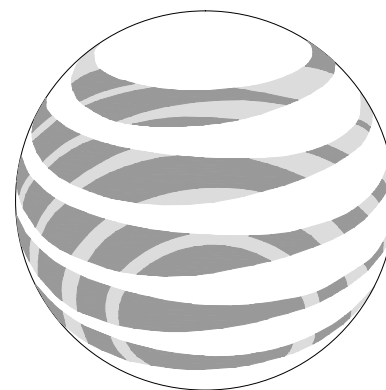
Appraisal			
Valuation Year	Improvements	Land	Total
2013	\$1,238,100	\$450,000	\$1,688,100
2008	\$733,900	\$450,000	\$1,183,900
2007		\$315,000	\$828,730

Assessment			
Valuation Year	Improvements	Land	Total
2013	\$866,670	\$315,000	\$1,181,670
2008	\$513,730	\$315,000	\$828,730
2007		\$315,000	\$828,730

PROJECT INFORMATION

SCOPE OF WORK: UNMANNED COMMUNICATIONS FACILITY MODIFICATIONS INCLUDING:
 -(P) SIRIUS-XM NEW COMMSCOPE ION-M23 SDARS REMOTE RADIO ON NEW RR-FA3 MOUNT (1/SECT., 3 TOT.)
 -(P) SIRIUS-XM NEW COMMSCOPE CBC23SR-43 COMBINER ON NEW RR-FA3 MOUNT (1/SECT., 3 TOT.)
 -(P) AT&T ALPHA/BETA/GAMMA LTEWCS RRUS-32 TxRx4 PORT TO BE CONNECTED TO NEW COMMSCOPE SXM/WCS DIPLEXER CBC23SR43 (1/SECT., 3 TOT.)
 -(P) AT&T NEW (1) DC6-48-60-18-80EV ALONG WITH EXISTING (2) DC64860188F, (1) DC6486008F (4 TOT.)
 -(P) NEW 2-DC POWER LINES, INSIDE MONOPOLE FOR A TOTAL OF 2-FIBER TRUNK + 6-DC POWER LINES IN SHELTER:
 -SIRIUS-XM EQUIPMENT NEW CommScope RACK
 -ADD 2.5A BREAKER IN AT&T POWER PLANT FOR SIRIUS-XM EQUIPMENT

SITE NUMBER: CT5107
SITE NAME: NORTH HAVEN SOUTH
SITE ADDRESS: 120 UNIVERSAL DR. NORTH HAVEN, CT 06473
TOWER OWNER: CROWN CASTLE INTERNATIONAL 500 W CUMMINGS PARK WOBURN, MA 01801
APPLICANT: AT&T 550 COCHITUATE RD SUITES 13 & 14 FRAMINGHAM, MA 01701
NOC CONTACT: TEL 866-915-5600
COORDINATES: LAT. N41° 20' 38.76" LONG. W72° 52' 14.16"
GROUND LEVEL: ±21'
DEED REFERENCE: N/A
SITE PARCEL NO.: N/A
CURRENT ZONING: N/A
HORIZONTAL DATUM: (NAD) 1983



at&t

SITE NUMBER: CT5107 FA: 10071172
SITE NAME: NORTH HAVEN SOUTH
PROJECT: RF MOD // IP REPEATER MRTCB037956
CROWN SITE ID: 881536

DRAWING INDEX

REV

LOCATION MAP

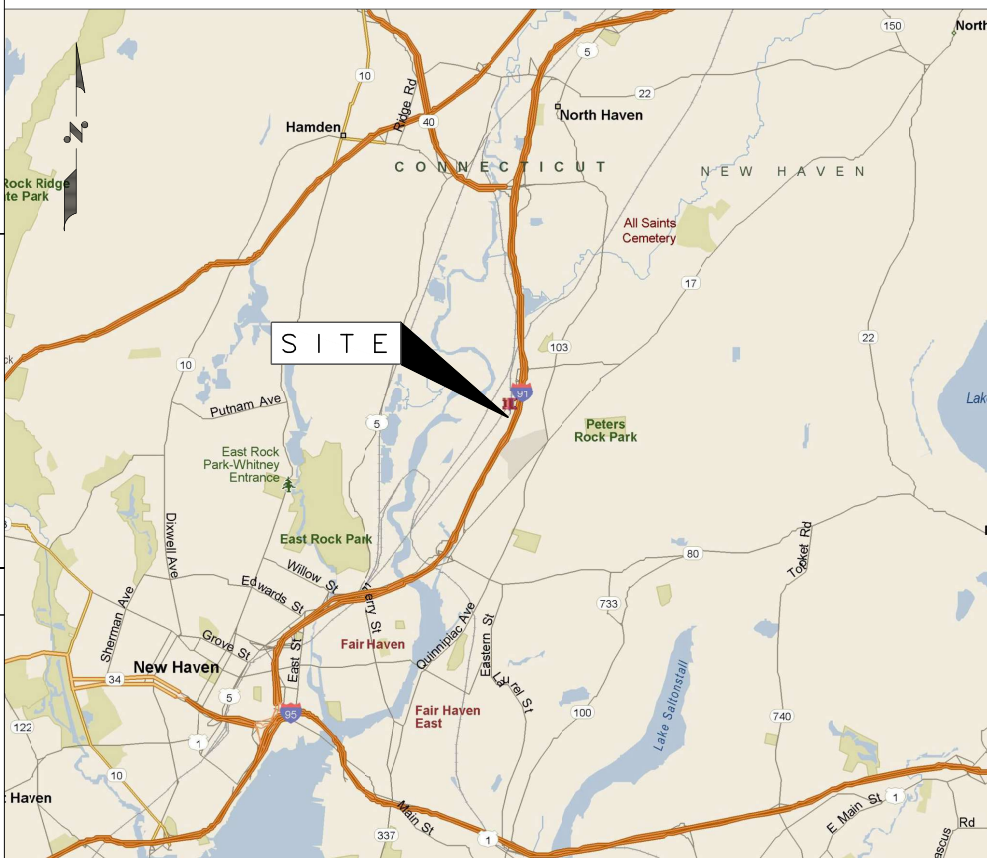
APPLICABLE BUILDING CODES AND STANDARDS

- 01 TITLE SHEET**
- 02 NOTES**
- 03 SITE PLAN & EQUIPMENT PLAN**
- 04 ELEVATION VIEW & ANTENNA LAYOUT**
- 05 GROUNDING DETAILS**

- 3**
- 3**
- 3**
- 3**
- 3**

DIRECTIONS: FROM ROCKY HILL, PROCEED SOUTH ON I-91 TOWARD NORTH HAVEN. TAKE I-91 SOUTH EXIT #9, TOWARD MONTOWESE AVE. AT END OF OFF RAMP TURN LEFT ONTO UNIVERSAL DR. SOUTH. SITE WILL BE ON YOUR RIGHT.

SITE ACCESS: LOCKED GATE



SUBCONTRACTOR'S WORK SHALL COMPLY WITH PROJECT STANDARDS AND SPECIFICATIONS. SUBCONTRACTOR WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.

BUILDING CODE:
CONNECTICUT STATE BUILDING CODE

ELECTRICAL CODE:
NATIONAL ELECTRICAL CODE LATEST EDITION
SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:
AMERICAN CONCRETE INSTITUTE (ACI) 318, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC), MANUAL OF STEEL CONSTRUCTION, ASD, NINTH EDITION
AMERICAN NATIONAL STANDARDS INSTITUTE/TELECOMMUNICATIONS INDUSTRY ASSOCIATION (ANSI/TIA) 222-F OR G AS APPLICABLE, STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES:
TIA 607, COMMERCIAL BUILDING GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS

INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) 81, GUIDE FOR MEASURING EARTH RESISTIVITY, GROUND IMPEDANCE, AND EARTH SURFACE POTENTIALS OF A GROUND SYSTEM
IEEE 1100 (1999) RECOMMENDED PRACTICE FOR POWERING AND GROUNDING OF ELECTRONIC EQUIPMENT

IEEE C62.41, RECOMMENDED PRACTICES ON SURGE VOLTAGES IN LOW VOLTAGE AC POWER CIRCUITS (FOR LOCATION CATEGORY "C3" AND "HIGH SYSTEM EXPOSURE")

TELCORDIA GR-1503, COAXIAL CABLE CONNECTIONS

ANSI T1.311, FOR TELECOM - DC POWER SYSTEMS - TELECOM, ENVIRONMENTAL PROTECTION

FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.



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

CONTACT & UTILITY INFORMATION

CONTACT	CONTACT	COMPANY	PHONE NO.
ENGINEERING:	MIGUEL NOBRE	VRG	(508) 981-9590
SITE ACQUISITION:	DAVID COOPER	EMPIRE	(617) 639-4908
CONSTRUCTION:	GREG DORMAN	EMPIRE	(484) 683-1750
UTILITIES			
POWER:	WORK REQUEST GROUP	NATIONAL GRID	(800) 375-7405
TELCO:		VERIZON	(800) 941-9900



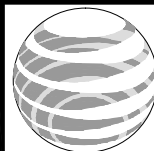
489 Washington Street
Auburn, MA 01501
Tel. (508) 981-9590
Fax (508) 519-8939
mnobre@verticalresourcesgrp.com



EMPIRE TELECOM USA, LLC
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CT5107
SITE NAME: NORTH HAVEN S
PROJECT: RF MOD // IP
CROWN ID: 881536

120 UNIVERSAL DR.
NORTH HAVEN, CT 06473
NEW HAVEN COUNTY

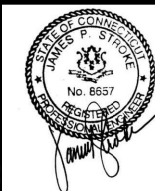


at&t

550 COCHITUATE RD
SUITES 13 & 14
FRAMINGHAM, MA 01701

NO.	DATE	REVISION	BY	CHK	APP'D
04/28/20		GENERAL REVISIONS	E.L.P.	G.A.M.	
12/10/19		GENERAL REVISIONS	E.L.P.	G.A.M.	
08/16/19		GENERAL REVISIONS	E.L.P.	G.A.M.	
06/12/19		FOR CONSTRUCTION	E.L.P.	G.A.M.	

SCALE: DESIGNED BY: M.N. DRAWN BY: G.A.M.



AT&T

TITLE SHEET

JOB NUMBER	DRAWING NUMBER	REV
CT5107-IPRepeater	01	3

GENERAL NOTES

- 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
- 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.
- 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.
- DRAWINGS PROVIDED HERE ARE NOT TO SCALE UNLESS OTHERWISE NOTED AND ARE INTENDED TO SHOW OUTLINE ONLY.
- UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
- THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
- IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CONTRACTOR.
- 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.
- 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.
- 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.
- SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.

SITE WORK GENERAL NOTES

- THE SUBCONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
- 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.
- ALL SITE WORK SHALL BE AS INDICATED ON THE DRAWINGS AND PROJECT SPECIFICATIONS.
- IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES, TOP SOIL AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
- 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.
- SUBCONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION.
- THE SUBCONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE OWNER SPECIFICATION FOR SITE SIGNAGE.
- THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE TRANSMISSION EQUIPMENT AND TOWER AREAS.
- 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.
- THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION, SEE DETAIL 303.
- 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.
- EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL JURISDICTION'S GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
- ALL EARTH WORK SHALL BE PERFORMED IN ACCORDANCE WITH TECHNICAL SPECIFICATION FOR CONSTRUCTION OF RADIO ACCESS NETWORK SITES.

STRUCTURAL STEEL NOTES:

- 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".
- 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.
- BOLTED CONNECTIONS SHALL BE ASTM A325 BEARING TYPE (3/4") CONNECTIONS AND SHALL HAVE MINIMUM OF TWO BOLTS UNLESS NOTED OTHERWISE. STEEL FASTENER HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 (HOT-DIP)
- NON-STRUCTURAL CONNECTIONS FOR STEEL GRATING MAY USE 5/8" DIA. ASTM A 307 BOLTS UNLESS NOTED OTHERWISE.
- 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.
- ALL STRUCTURAL STEEL SHALL BE SUPPLIED IN ACCORDANCE WITH TECHNICAL SPECIFICATION FOR CONSTRUCTION OF RADIO ACCESS NETWORK SITES.

CONCRETE AND REINFORCING STEEL NOTES:

- 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.
- 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.
- 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.
- 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 LARGER2 INCH
 #5 AND SMALLER & WWF.....1 1/2 INCH
 CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:
 SLAB AND WALL3/4 INCH
 BEAMS AND COLUMNS.....1 1/2 INCH
- A 3/4" CHAMFER SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNO, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.
- 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.
- 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.
- 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.
- 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.
- ALL CONCRETE SHALL BE SUPPLIED IN ACCORDANCE WITH TECHNICAL SPECIFICATION FOR CONSTRUCTION OF RADIO ACCESS NETWORK SITES.

SOIL COMPACTION NOTES FOR SLAB ON GRADE:

- EXCAVATE AS REQUIRED TO REMOVE VEGETATION AND TOPSOIL, EXPOSE UNDISTURBED NATURAL SUBGRADE AND PLACE CRUSHED STONE AS REQUIRED.
- COMPACTION CERTIFICATION: AN INSPECTION AND WRITTEN CERTIFICATION BY A QUALIFIED GEOTECHNICAL TECHNICIAN OR ENGINEER IS ACCEPTABLE.
- 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.
- 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.
- 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.
- COMPACTION CRITERIA FOR OTHER FILL AREAS ON SITE SHALL MEET THE SAME REQUIREMENTS AS NOTED ABOVE.
- 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

- ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE LOCAL CODES.
- CONDUIT ROUTINGS ARE SCHEMATIC. SUBCONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED.
- WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC AND TELCORDIA.
- ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC AND TELCORDIA.
- CABLES SHALL NOT BE ROUTED THROUGH LADDER-STYLE CABLE TRAY RUNGS.
- 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.
- 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.
- PANELBOARDS (ID NUMBERS) AND INTERNAL CIRCUIT BREAKERS (CIRCUIT ID NUMBERS) SHALL BE CLEARLY LABELED. NO HAND WRITTEN LABELS ALLOWED.
- ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.
- 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.
- 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.
- 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.
- 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).
- RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.

ELECTRICAL INSTALLATION NOTES (cont.)

- 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.
- ELECTRICAL METALLIC TUBING (EMT), ELECTRICAL NONMETALLIC TUBING (ENT), OR RIGID NONMETALLIC CONDUIT (RIGID PVC, SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
- GALVANIZED STEEL INTERMEDIATE METALLIC CONDUIT (IMC) SHALL BE USED FOR OUTDOOR LOCATIONS ABOVE GRADE.
- 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.
- LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID-TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
- CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION-TYPE AND APPROVED FOR THE LOCATION USED. SETSCREW FITTINGS ARE NOT ACCEPTABLE.
- CABINETS, BOXES, AND WIREWAYS SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.
- 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.
- 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
- 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.
- 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.
- THE SUBCONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CONTRACTOR BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
- 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.

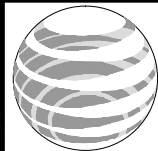


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SITE NUMBER: CT5107
SITE NAME: NORTH HAVEN S
PROJECT: RF MOD // IP
CROWN ID: 881536
 120 UNIVERSAL DR.
 NORTH HAVEN, CT 06473
 NEW HAVEN COUNTY



at&t
 550 COCHITUATE RD
 SUITES 13 & 14
 FRAMINGHAM, MA 01701

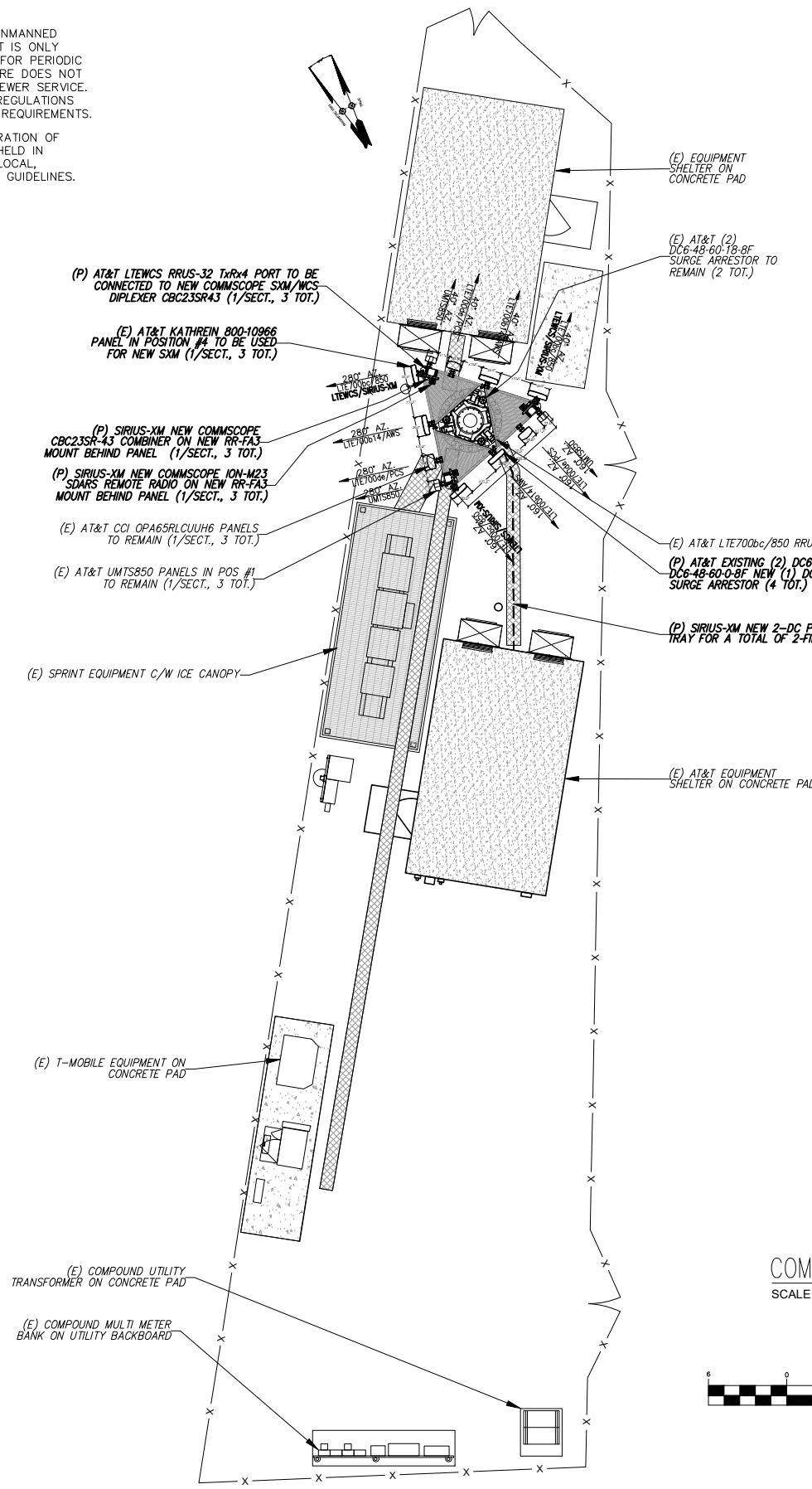
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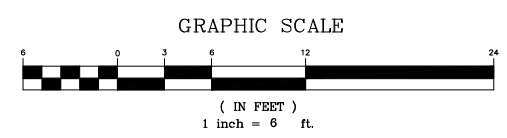
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JOB NUMBER	DRAWING NUMBER	REV
CT5107-IPRepeater	02	3

GENERAL NOTES

1. 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.
2. CONSTRUCTION, MAINTENANCE & OPERATION OF PROPOSED TOWER FACILITY WILL BE HELD IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE & FEDERAL REGULATIONS AND GUIDELINES.

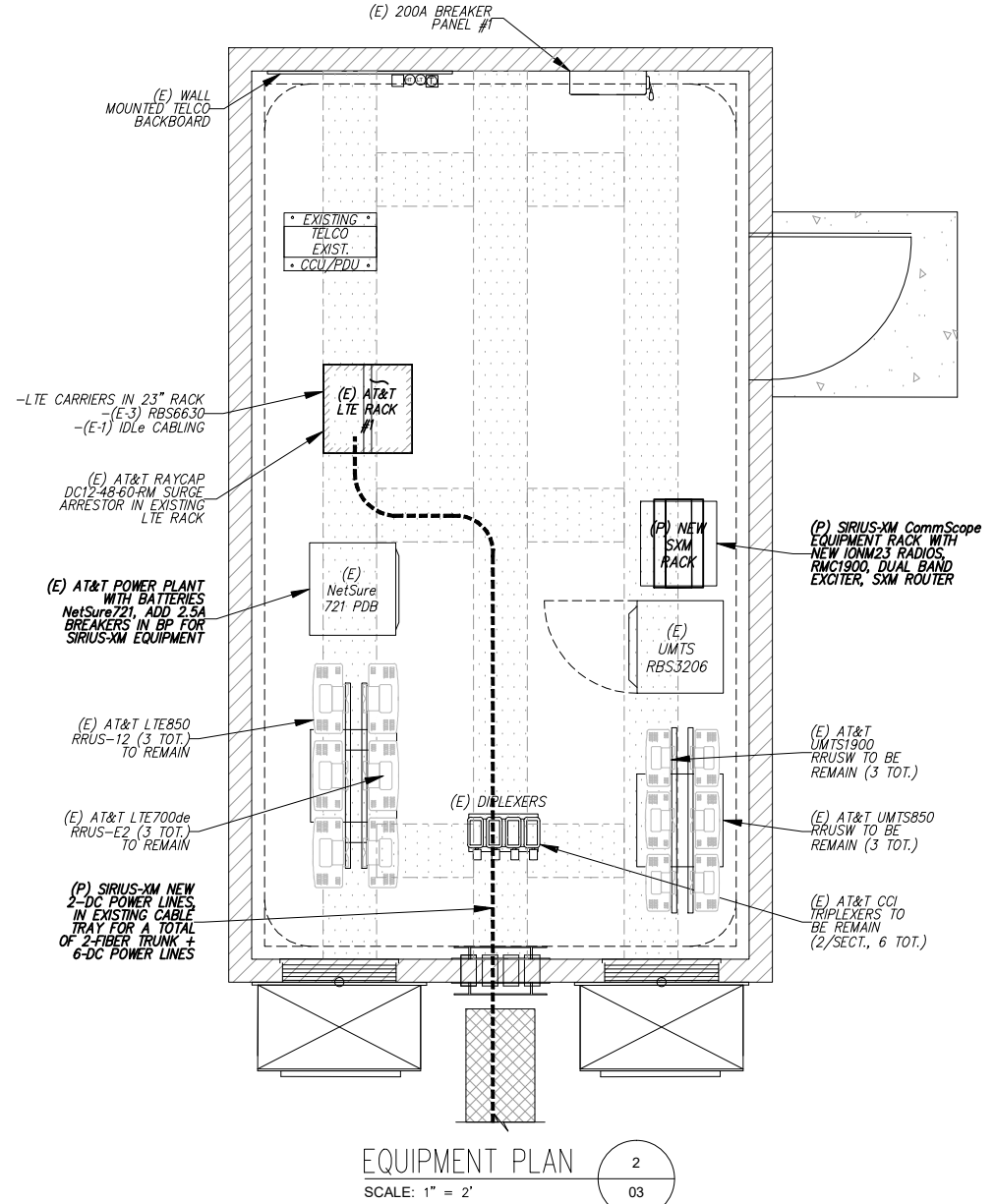


COMPOUND PLAN
SCALE: 1" = 6'



AT&T RF SYSTEM SCHEDULE

POSITION	SECTOR	STATUS	BAND	ANTENNA MAKE	ANTENNA MODEL	SIZE(INCHES) (LxWxH)	RAD CTR. FT. AGL	AZIMUTH	DIPLEXER	TMA COMBINER	REMOTE RADIOS	RADIO LOCATION	SIZE(INCHES) (LxWxH)	FEEDER TYPE	FEEDER LENGTH	RAYCAP
1	Alpha	EXISTING	UMTS850	POWERWAVE	7770	55.0x11.0x5.0	±121.0'	40°	2-PORT (CP1140) 2-PORT (CP1140)	---	RRUS-E2	SHELTER	20.4x18.5x7.5	(E2) 1-5/8" COAX	(E2) 140'	
2	Alpha	EXISTING	L7E700de/PCS	CCI	OPA65RLCUUH6	72.0x14.8x7.4	±121.0'	40°	2-PORT (CP1140) 2-PORT (CP1140)	---	RRUS-8843	TOWER	14.9x13.2x10.9	(E2) 1-5/8" COAX	(E2) 140'	
3	Alpha	EXISTING	L7E700b14de/AWS	KATHREIN	800-10966	96.0x20.0x7.4	±121.0'	40°	2-PORT (CP1140) 2-PORT (CP1140)	---	RRUS-4478	LOWER SHARED	18.1x13.4x8.3	SHARED		
4	Alpha	EXISTING	L7E700bc/850/WCS/SIRIUSXM	KATHREIN	800-10966	96.0x20.0x7.4	±121.0'	40°	1-COM CBC23SR43 T	ION23 SDARS	RRUS-4449	TOWER	17.9x13.2x9.4			
1	Beta	EXISTING	UMTS850	POWERWAVE	7770	55.0x11.0x5.0	±121.0'	160°	2-PORT (CP1140) 2-PORT (CP1140)	---	RRUS-E2	SHELTER	20.4x18.5x7.5	(E2) 1-5/8" COAX	(E2) 140'	(E2)
2	Beta	EXISTING	L7E700de/PCS	CCI	OPA65RLCUUH6	72.0x14.8x7.4	±121.0'	160°	2-PORT (CP1140) 2-PORT (CP1140)	---	RRUS-8843	TOWER	14.9x13.2x10.9	(E2) 1-5/8" COAX	(E2) 140'	(E1)
3	Beta	EXISTING	L7E700b14de/AWS	KATHREIN	800-10966	96.0x20.0x7.4	±121.0'	160°	2-PORT (CP1140) 2-PORT (CP1140)	---	RRUS-4478	LOWER SHARED	18.1x13.4x8.3	SHARED		DC6-48-60-0-8F
4	Beta	EXISTING	L7E700bc/850/WCS/SIRIUSXM	KATHREIN	800-10966	96.0x20.0x7.4	±121.0'	160°	1-COM CBC23SR43 T	ION23 SDARS	RRUS-4449	LOWER TOWER	17.9x13.2x9.4			(P1)
1	Gamma	EXISTING	UMTS850	POWERWAVE	7770	55.0x11.0x5.0	±121.0'	280°	2-PORT (CP1140) 2-PORT (CP1140)	---	RRUS-E2	SHELTER	20.4x18.5x7.5	(E2) 1-5/8" COAX	(E2) 140'	
2	Gamma	EXISTING	L7E700de/PCS	CCI	OPA65RLCUUH6	72.0x14.8x7.4	±121.0'	280°	2-PORT (CP1140) 2-PORT (CP1140)	---	RRUS-8843	TOWER	14.9x13.2x10.9	(E2) 1-5/8" COAX	(E2) 140'	
3	Gamma	EXISTING	L7E700b14de/AWS	KATHREIN	800-10966	96.0x20.0x7.4	±121.0'	280°	2-PORT (CP1140) 2-PORT (CP1140)	---	RRUS-4478	LOWER SHARED	18.1x13.4x8.3	SHARED		
4	Gamma	EXISTING	L7E700bc/850/WCS/SIRIUSXM	KATHREIN	800-10966	96.0x20.0x7.4	±121.0'	280°	1-COM CBC23SR43 T	ION23 SDARS	RRUS-4449	LOWER TOWER	17.9x13.2x9.4			DC6-48-60-18-BCEV



EQUIPMENT PLAN
SCALE: 1" = 2'

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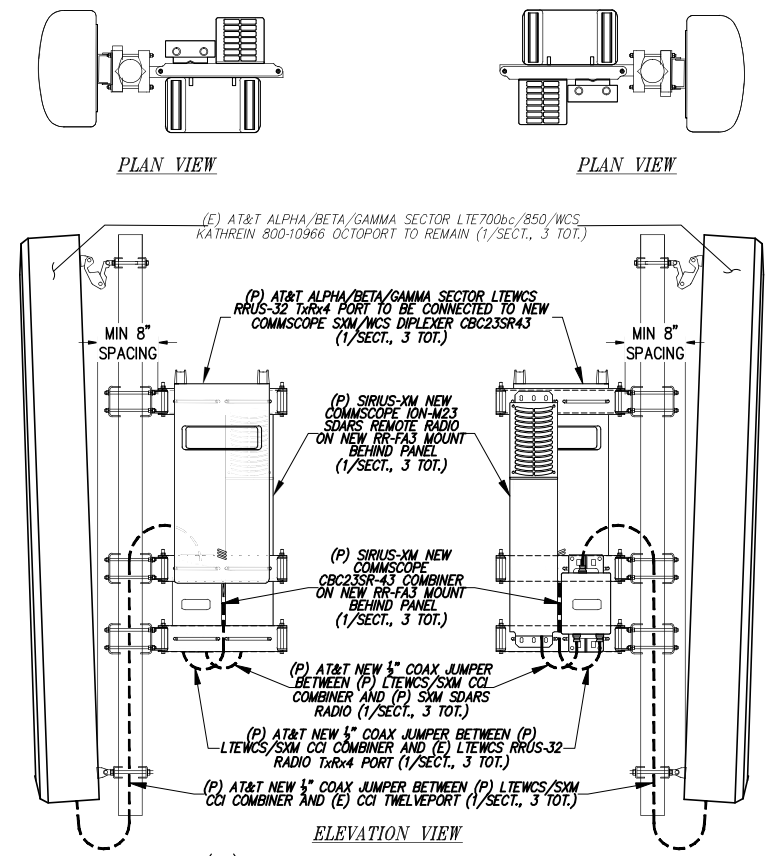
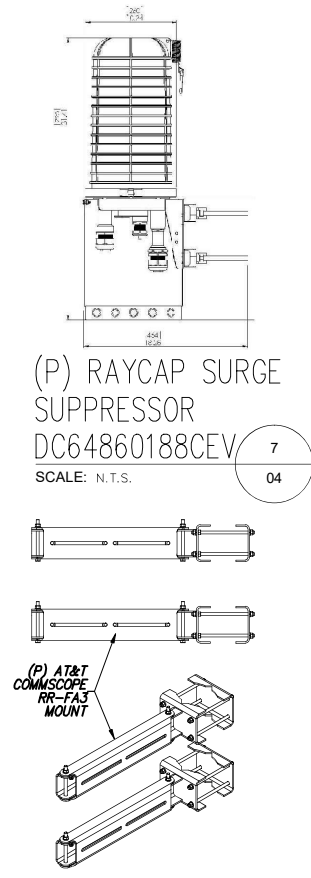
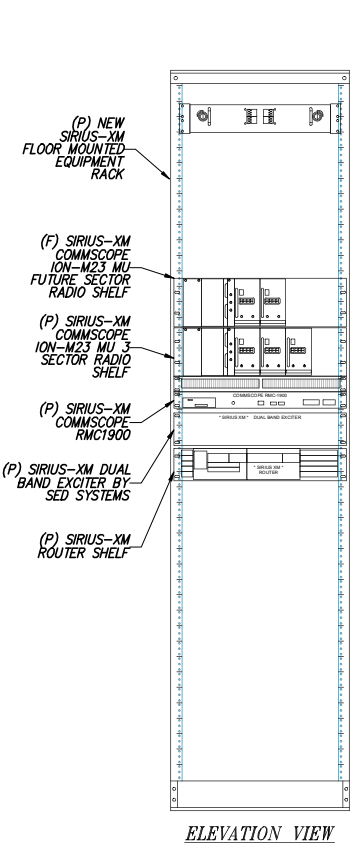
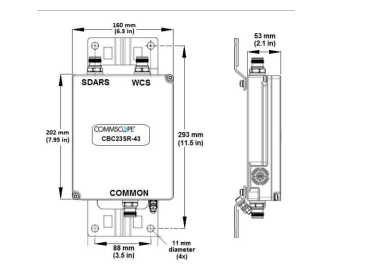
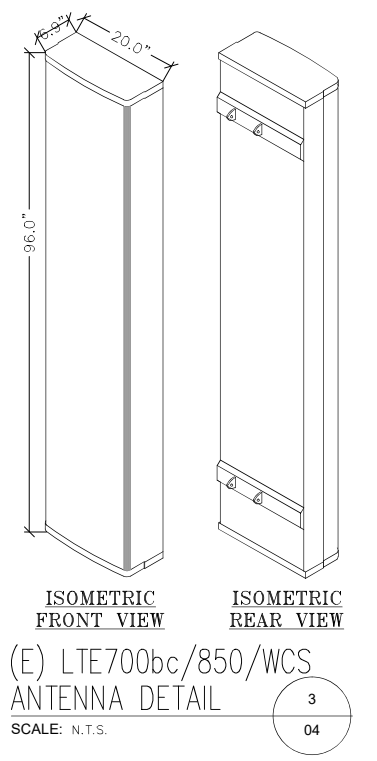
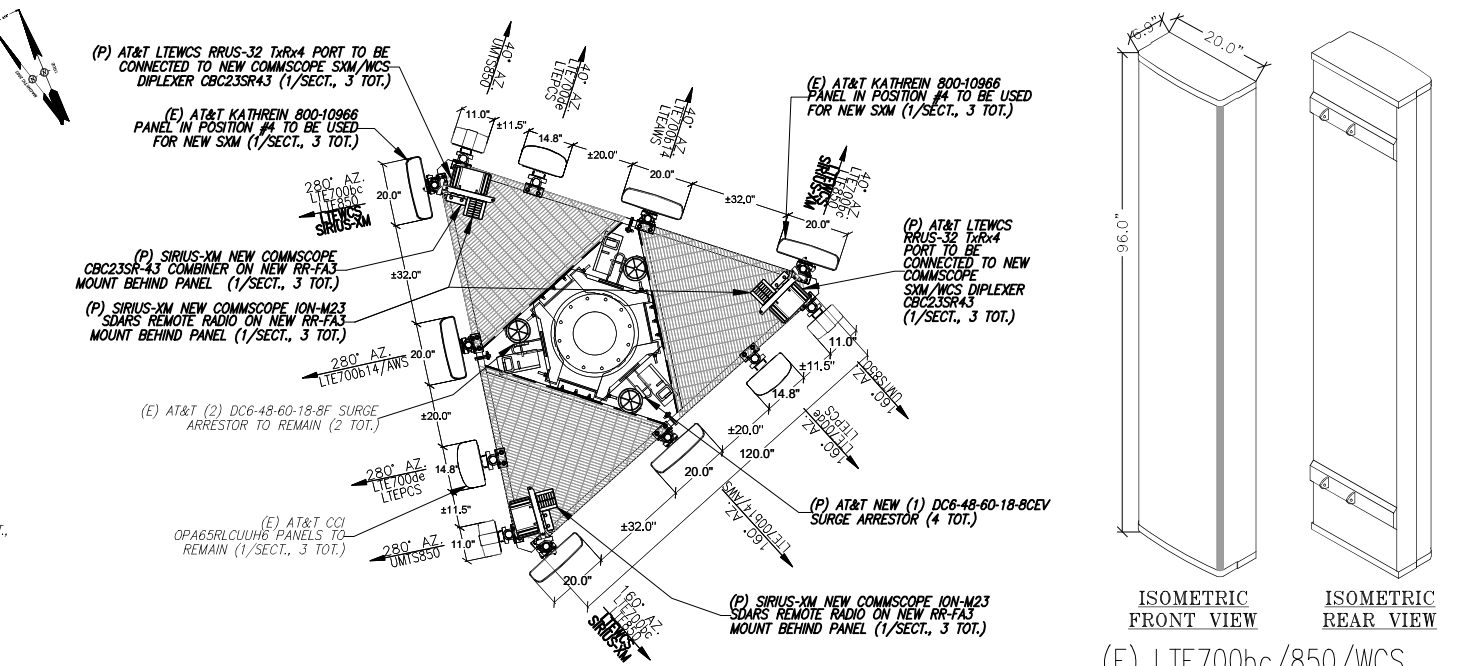
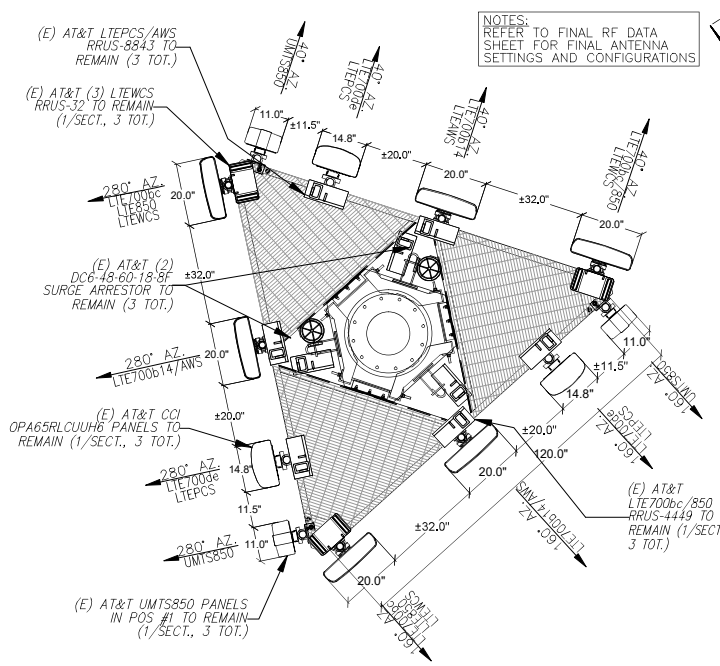
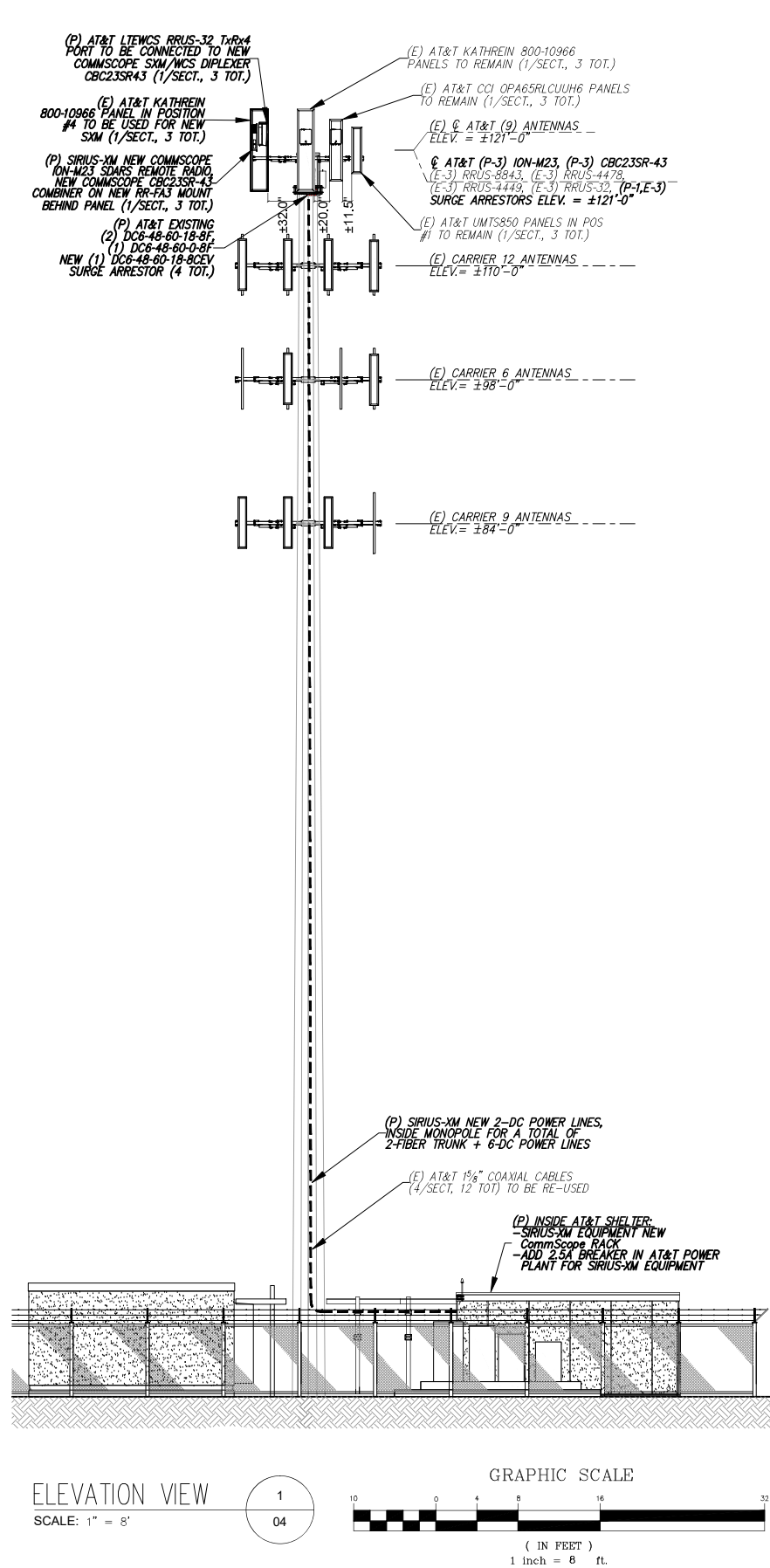
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SITE NAME: NORTH HAVEN S
PROJECT: RF MOD // IP
CROWN ID: 881536
120 UNIVERSAL DR.
NORTH HAVEN, CT 06473
NEW HAVEN COUNTY

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SITE PLAN & EQUIPMENT PLAN
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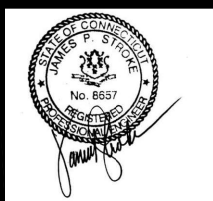
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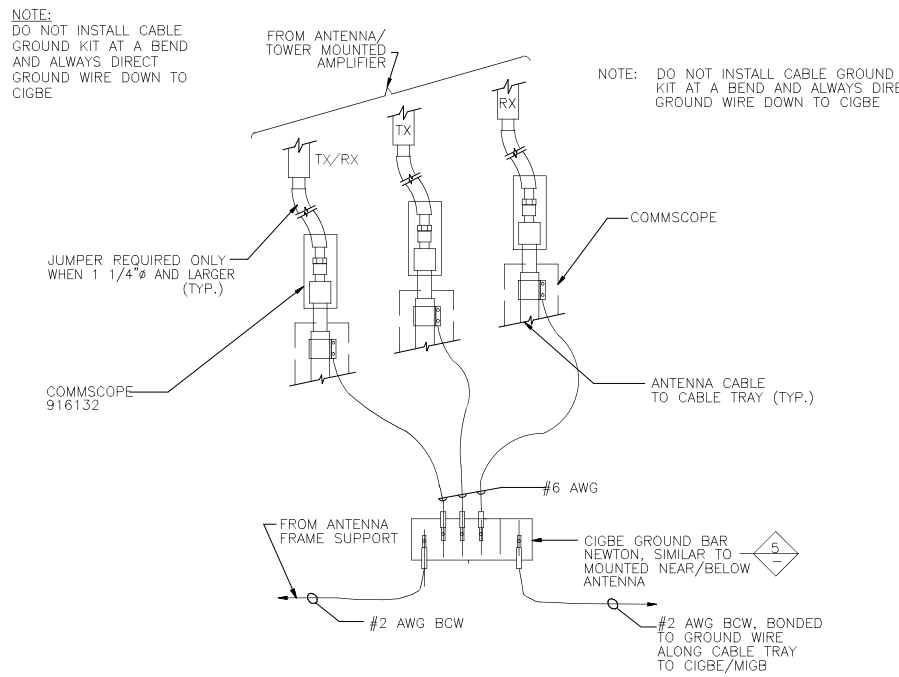
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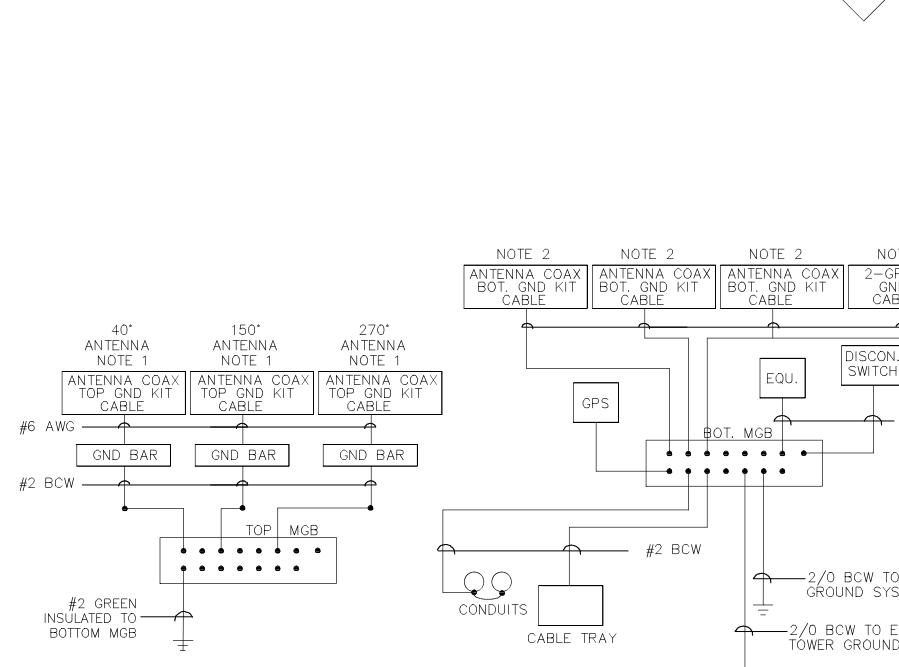
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ELEVATION VIEW & ANTENNA LAYOUT

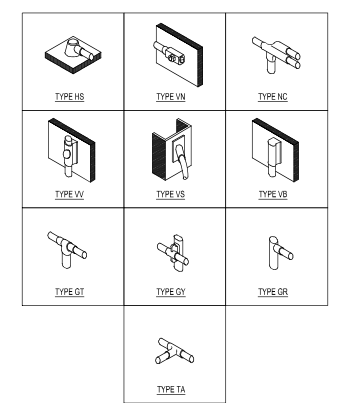
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CT5107-IPRepeater	04	3



CONNECTION OF GROUND WIRES TO GROUNDING BAR (CIGBE)
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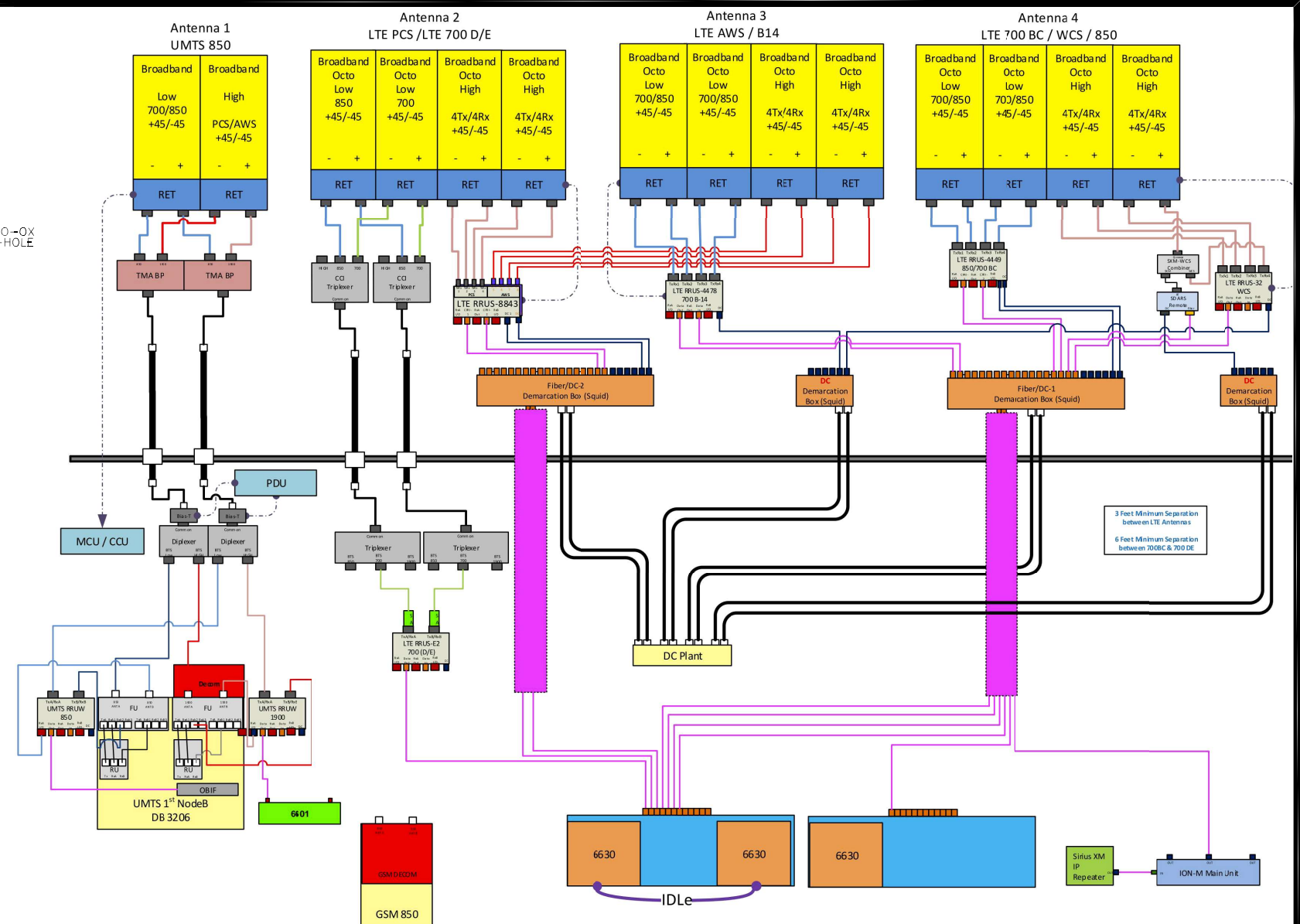
INSTALLATION OF GROUND WIRE TO GROUND BAR
SCALE: N.T.S.



GROUNDING CONNECTION DETAIL
SCALE: N.T.S.



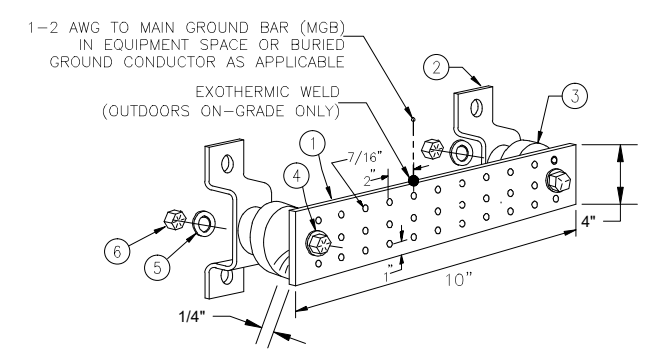
SCHEMATIC GROUNDING DIAGRAM
SCALE: N.T.S.



ALPHA/BETA/GAMMA SIRIUS-XM PLUMBING DIAGRAM
SCALE: N.T.S.

NEWTON INSTRUMENT COMPANY, INC.
BUTNER, N.C. OR APPROVED EQUAL

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



GROUND BAR DETAIL
SCALE: N.T.S.

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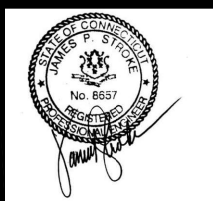
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GROUNDING DETAILS

JOB NUMBER	DRAWING NUMBER	REV
CT5107-IPRepeater	05	3



Date: **June 05, 2020**

Stephanie Lipscomb
Crown Castle
370 Mallory Station Rd
Franklin, TN 37067

B+T Group
1717 S. Boulder, Suite 300
Tulsa, OK 74119
(918) 587-4630

Subject: **Structural Analysis Report**

Carrier Designation: **AT&T Mobility Co-Locate**
Carrier Site Number: CT5107
Carrier Site Name: North Haven South

Crown Castle Designation: **Crown Castle BU Number:** 881536
Crown Castle Site Name: North Haven Tower
Crown Castle JDE Job Number: 607674
Crown Castle Work Order Number: 1847732
Crown Castle Order Number: 502381 Rev. 0

Engineering Firm Designation: **B+T Group Project Number:** 142902.001.01

Site Data: **120 Universal Drive, North Haven, New Haven County, CT**
Latitude 41° 20' 40.01", Longitude -72° 52' 14.92"
120 Foot - Monopole Tower

Dear Stephanie Lipscomb,

B+T Group is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

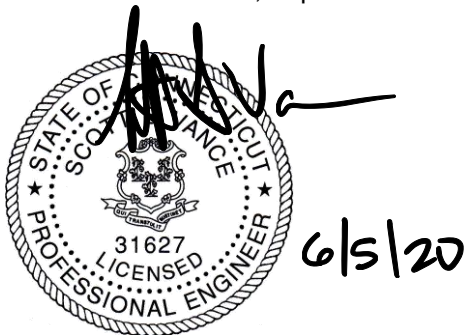
LC5: Proposed Equipment Configuration

Sufficient Capacity-50.2%

This analysis utilizes an ultimate 3-second gust wind speed of 125 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Jason Brock, E.I.

Respectfully submitted by: B+T Engineering, Inc.
COA: PEC.0001564; Expires: 02/10/2021



Scott S. Vance, P.E.

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- 3.2) Assumptions

4) ANALYSIS RESULTS

- Table 4 - Section Capacity (Summary)
- Table 5 – Tower Component Stresses vs. Capacity - LC5
- 4.1) Recommendations

5) APPENDIX A

- tnxTower Output

6) APPENDIX B

- Base Level Drawing

7) APPENDIX C

- Additional Calculations

1) INTRODUCTION

This tower is a 120 ft. Monopole tower designed By Engineered Endeavors, Inc., in February of 2001.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	125 mph
Exposure Category:	C
Topographic Factor:	1
Ice Thickness:	1.5 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
118.0	121.0	3	CCI Antennas	OPA-65R-LCUU-H6	12 2 1	1-5/8 3/4 3/8
		6	CCI Antennas	TPX-070821		
		3	Commscope	CBC23SR-43		
		3	Commscope	ION-M23 SDARS		
		3	Ericsson	RRUS 32		
		3	Ericsson	RRUS 4449 B5/B12		
		6	Kathrein	80010966		
		3	Powerwave Tech.	7770.00		
		6	Powerwave Tech.	LGP21401		
		1	Raycap	DC6-48-60-0-8C-EV		
	1	Raycap	DC6-48-60-18-8F			
	118.0	3	Commscope	MCG22HDx14 Mount		
116.0	116.0	3	Ericsson	RRUS 4478 B14	4 1	3/4 3/8
		3	Ericsson	RRUS 8843 B2/B66A		
		2	Raycap	DC6-48-60-18-8F		
		1	--	Side Arm Mount [SO 104-3]		

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
108.0	110.0	12	Decibel	844G65VTZASX	12	1-1/4
	108.0	1	--	Platform Mount [LP 303-1]		
100.0	100.0	3	Alcatel Lucent	TME-1900MHZ RRH (65MHZ)	--	--
		1	--	Pipe Mount [PM 601-3]		
		1	--	Side Arm Mount [SO 102-3]		
	99.0	3	Alcatel Lucent	TME-800MHZ RRH		
97.0	99.0	3	Alcatel Lucent	TD-RRH8X20-25	3	1-1/4
	98.0	3	Alcatel Lucent	800 EXTERNAL NOTCH	1	1-5/8

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
				FILTER		
		2	Powerwave Tech.	P40-16-XLPP-RR-A		
		9	Rfs Celwave	ACU-A20-N		
		1	Rfs Celwave	APXVSP18-C-A20		
		3	Rfs Celwave	APXVTM14-C-120		
	97.0	1	--	Platform Mount [LP 601-1]		
83.0	84.0	3	Ericsson	AIR -32 B2A/B66AA	10 1 2	1-5/8 1-3/8 1-1-4
		3	Ericsson	ERICSSON AIR 21 B2A B4P		
		3	Ericsson	RADIO 4449 B71/B85A		
		3	RFS Celwave	APXVAARR24_43-U-NA20		
	83.0	3	RFS Celwave	ATMAA1412D-1A20		
		1	--	Platform Mount [LP 303-1]		
51.0	52.0	1	Lucent	KS24019-L112A	1	1/2
	51.0	1	--	Side Arm Mount [SO 901-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
Online Order Information	AT&T Mobility Co-Locate, Rev # 0	502381	CCI Sites
Tower Manufacturer Drawing	EEI, Job No: 8821	1405788	CCI Sites
Foundation Drawing	EEI, Project No: 8821	1405795	CCI Sites
Geotech Report	Dr. Clarence Welti, P.E., P.C, Date: 01/30/2001	1405753	CCI Sites
Antenna Configuration	Crown CAD Package	Date: 04/23/2020	CCI Sites

3.1) Analysis Method

tnxTower (version 8.0.5.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 standard.

3.2) Assumptions

- 1) The tower and structures were maintained in accordance with the - TIA-222 standard.
- 2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. B+T Group should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	120 - 84.7161	Pole	TP32.531x24.094x0.375	1	-15.221	2271.118	26.8	Pass
L2	84.7161 - 41.6224	Pole	TP42.031x30.689x0.438	2	-30.240	3430.969	46.0	Pass
L3	41.6224 - 0	Pole	TP51x39.787x0.5	3	-48.549	4922.820	50.2	Pass
							Summary	
						Pole (L3)	50.2	Pass
						Rating =	50.2	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Anchor Rods	Base	45.4	Pass
1,2	Base Plate	Base	58.4	Pass
1,2	Base Foundation (Structure)	Base	47.1	Pass
1,2	Base Foundation (Soil Interaction)	Base	26.2	Pass

Structure Rating (max from all components) =	58.4%
---	--------------

Notes:

- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
- 2) Rating per TIA-222-H Section 15.5.

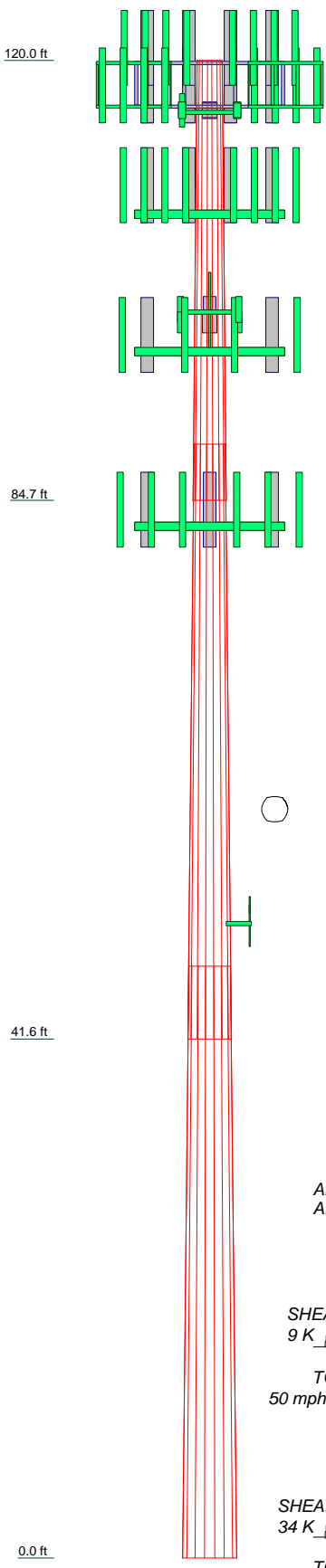
4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3
Length (ft)	35.284	47.661	47.378
Number of Sides	18	18	18
Thickness (in)	0.375	0.438	0.500
Socket Length (ft)	4.568	5.755	39.767
Top Dia (in)	24.094	30.689	51.000
Bot Dia (in)	32.531	42.031	11.5
Grade	A572-65	A572-65	A572-65
Weight (K)	4.0	8.1	11.5

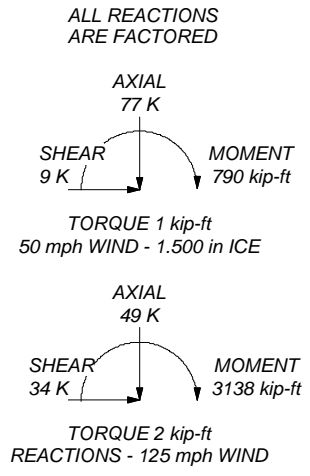



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 125 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.000 ft
8. TIA-222-H Annex S
9. TOWER RATING: 50.2%



B+T Group

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 Tulsa, OK 74119
 Phone: (918) 587-4630
 FAX: (918) 295-0265

Job:	142902.001.01 - NORTH HAVEN TOWER, CT (BU# 88153)		
Project:			
Client:	Crown Castle	Drawn by:	Chaitra
Code:	TIA-222-H	Date:	06/05/20
Path:			Scale: NTS
			Dwg No. E-1

Vx

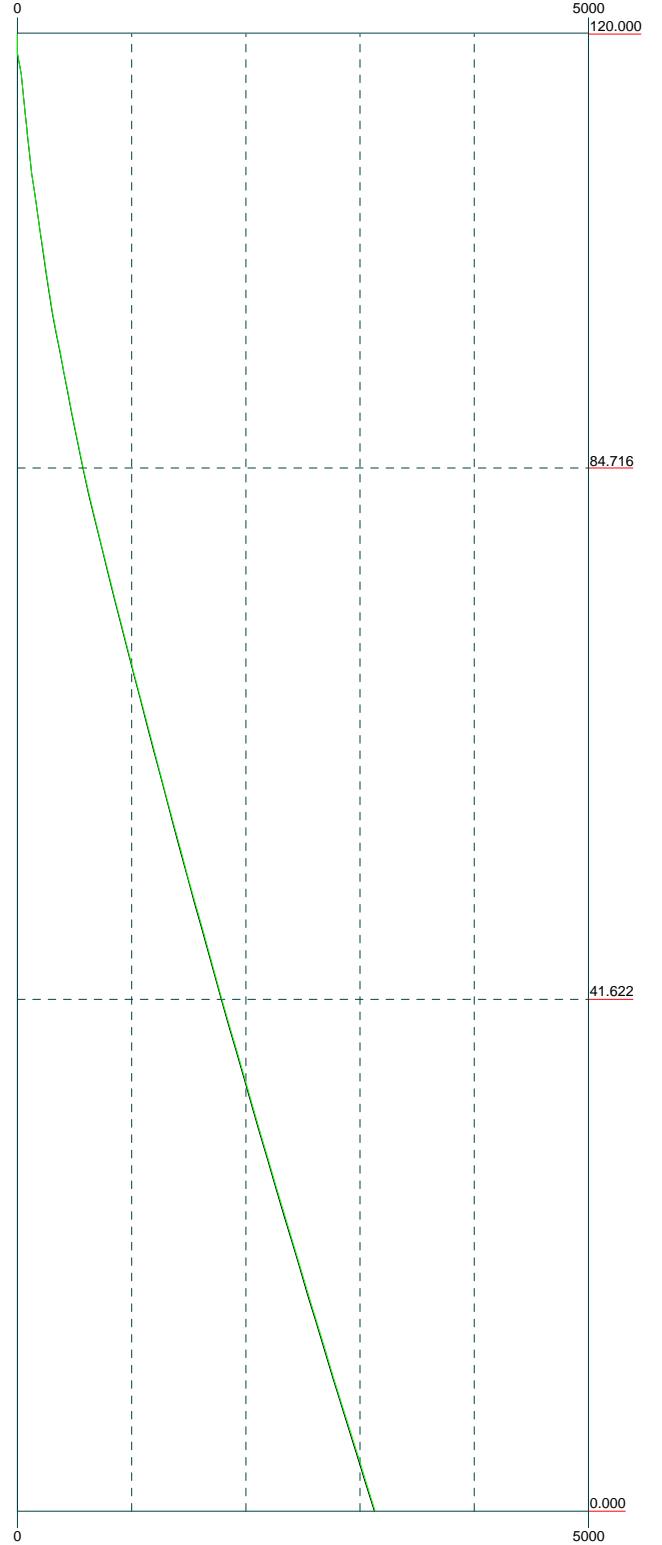
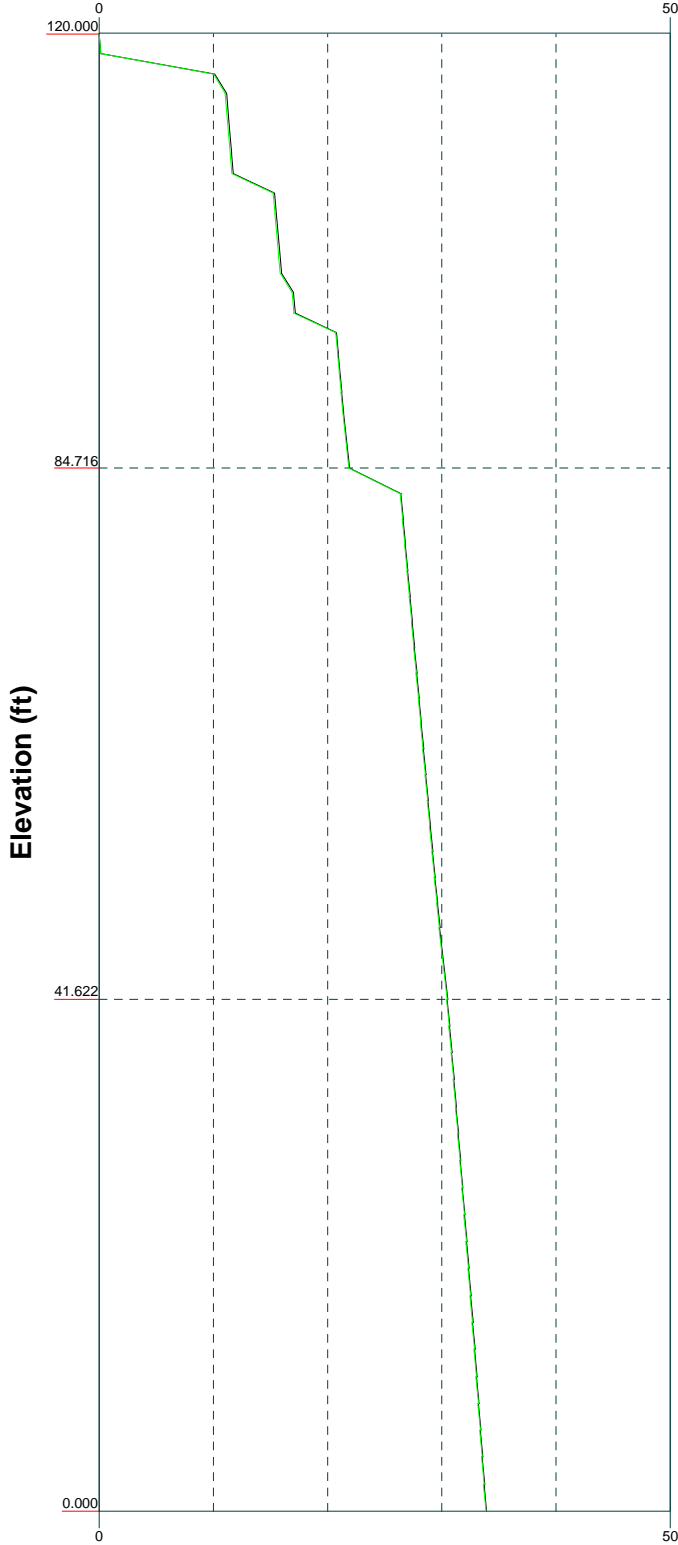
Vz


Mx

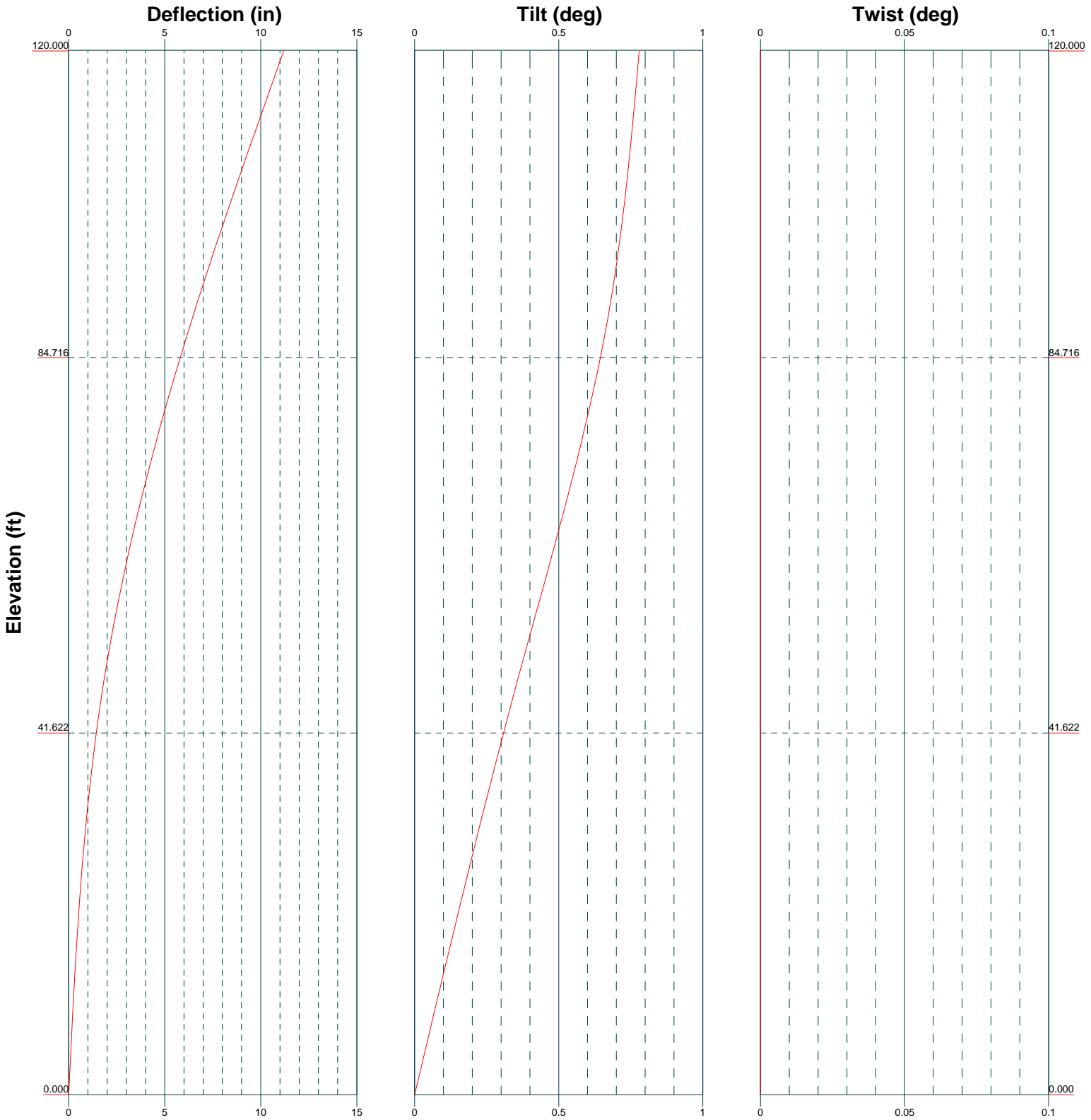
Mz


Global Mast Shear (K)

Global Mast Moment (kip-ft)



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	<p>Project:</p>		
	<p>Client: Crown Castle</p>	<p>Drawn by: Chaitra</p>	<p>App'd:</p>
	<p>Code: TIA-222-H</p>	<p>Date: 06/05/20</p>	<p>Scale: NTS</p>
<p>Path:</p>		<p>Dwg No. E-4</p>	

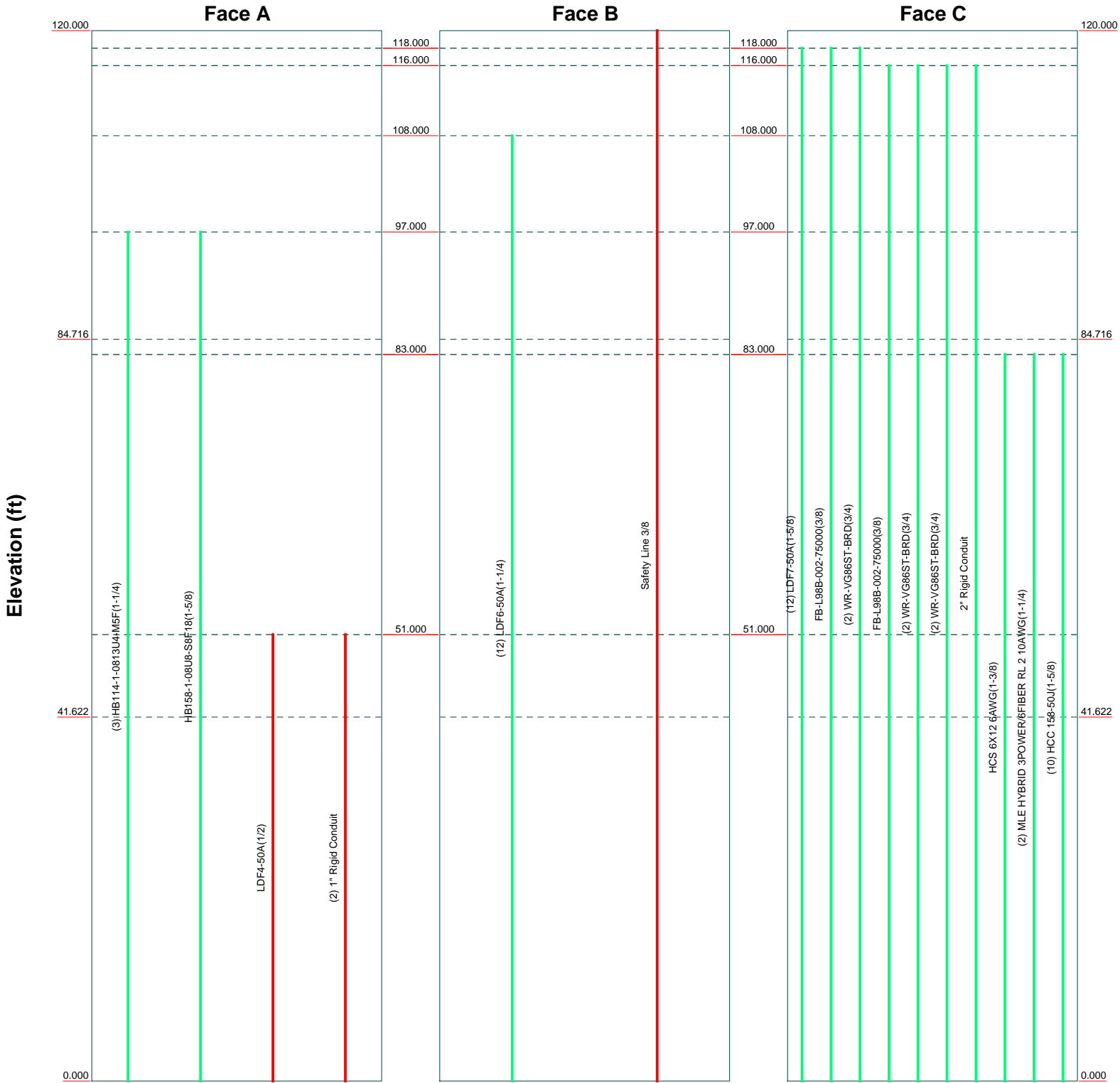


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	Project:		
	Client: Crown Castle	Drawn by: Chaitra	App'd:
	Code: TIA-222-H	Date: 06/05/20	Scale: NTS
Path:	Dwg No. E-5		

Feed Line Distribution Chart

0' - 120'

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



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Job: 142902.001.01 - NORTH HAVEN TOWER, CT (BU# 88153)		
Project:		
Client: Crown Castle	Drawn by: Chaitra	App'd:
Code: TIA-222-H	Date: 06/05/20	Scale: NTS
Path:	Dwg No. E-7	

<p>tnxTower</p> <p>B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265</p>	Job 142902.001.01 - NORTH HAVEN TOWER, CT (BU# 881536)	Page 1 of 20
	Project	Date 09:17:50 06/05/20
	Client Crown Castle	Designed by Chaitra

Tower Input Data

The tower is a monopole.

This tower is designed using the TIA-222-H standard.

The following design criteria apply:

- Tower is located in New Haven County, Connecticut.
- Tower base elevation above sea level: 18.000 ft.
- Basic wind speed of 125 mph.
- Risk Category II.
- Exposure Category C.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.000 ft.
- Nominal ice thickness of 1.500 in.
- Ice thickness is considered to increase with height.
- Ice density of 56.000 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50.000 °F.
- Deflections calculated using a wind speed of 60 mph.
- TIA-222-H Annex S.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.05.
- Tower analysis based on target reliabilities in accordance with Annex S.
- Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification Use Code Stress Ratios √ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric | <ul style="list-style-type: none"> Distribute Leg Loads As Uniform Assume Legs Pinned √ Assume Rigid Index Plate √ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension √ Bypass Mast Stability Checks √ Use Azimuth Dish Coefficients √ Project Wind Area of Appurt. Autocalc Torque Arm Areas Add IBC .6D+W Combination Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder Ignore KL/ry For 60 Deg. Angle Legs | <ul style="list-style-type: none"> Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation √ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-H Bracing Resist. Exemption Use TIA-222-H Tension Splice Exemption <li style="text-align: center;">Poles √ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets Pole Without Linear Attachments Pole With Shroud Or No Appurtenances Outside and Inside Corner Radii Are Known |
|--|---|---|

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Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	120.000-84.716	A	0.000	0.000	0.000	0.000	0.065
		B	0.000	0.000	1.323	0.000	0.175
		C	0.000	0.000	0.000	0.000	0.531
L2	84.716-41.622	A	0.000	0.000	1.876	0.000	0.241
		B	0.000	0.000	1.616	0.000	0.320
		C	0.000	0.000	0.000	0.000	1.165
L3	41.622-0.000	A	0.000	0.000	8.324	0.000	0.277
		B	0.000	0.000	1.561	0.000	0.309
		C	0.000	0.000	0.000	0.000	1.144

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 _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	120.000-84.716	A	1.427	0.000	0.000	0.000	0.000	0.065
		B		0.000	0.000	11.392	0.000	0.286
		C		0.000	0.000	0.000	0.000	0.531
L2	84.716-41.622	A	1.359	0.000	0.000	8.365	0.000	0.315
		B		0.000	0.000	13.913	0.000	0.455
		C		0.000	0.000	0.000	0.000	1.165
L3	41.622-0.000	A	1.218	0.000	0.000	35.864	0.000	0.581
		B		0.000	0.000	12.876	0.000	0.429
		C		0.000	0.000	0.000	0.000	1.144

Feed Line Center of Pressure

Section	Elevation ft	CP _X in	CP _Z in	CP _X Ice in	CP _Z Ice in
L1	120.000-84.716	0.286	0.096	1.262	0.425
L2	84.716-41.622	-0.054	-0.099	0.556	-0.109
L3	41.622-0.000	-1.056	-0.674	-1.336	-1.489

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

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	Project	Date 09:17:50 06/05/20
	Client Crown Castle	Designed by Chaitra

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
L1	22	Safety Line 3/8	84.72 - 120.00	1.0000	1.0000
L1	19	LDF4-50A(1/2)	84.72 - 51.00	1.0000	1.0000
L1	20	1" Rigid Conduit	84.72 - 51.00	1.0000	1.0000
L2	19	LDF4-50A(1/2)	41.62 - 51.00	1.0000	1.0000
L2	20	1" Rigid Conduit	41.62 - 51.00	1.0000	1.0000
L2	22	Safety Line 3/8	41.62 - 84.72	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
7770.00 w/ Mount Pipe	A	From Leg	4.000	0.000	118.000	No Ice	5.746	4.254	0.055
			0.000			1/2" Ice	6.179	5.014	0.103
			3.000			1" Ice	6.607	5.711	0.157
						2" Ice	7.488	7.155	0.287
7770.00 w/ Mount Pipe	B	From Leg	4.000	0.000	118.000	No Ice	5.746	4.254	0.055
			0.000			1/2" Ice	6.179	5.014	0.103
			3.000			1" Ice	6.607	5.711	0.157
						2" Ice	7.488	7.155	0.287
7770.00 w/ Mount Pipe	C	From Leg	4.000	0.000	118.000	No Ice	5.746	4.254	0.055
			0.000			1/2" Ice	6.179	5.014	0.103
			3.000			1" Ice	6.607	5.711	0.157
						2" Ice	7.488	7.155	0.287
OPA-65R-LCUU-H6 w/ Mount Pipe	A	From Leg	4.000	0.000	118.000	No Ice	9.190	6.210	0.106
			0.000			1/2" Ice	9.940	6.930	0.175
			3.000			1" Ice	10.710	7.660	0.256
						2" Ice	12.300	9.170	0.451
OPA-65R-LCUU-H6 w/ Mount Pipe	B	From Leg	4.000	0.000	118.000	No Ice	9.190	6.210	0.106
			0.000			1/2" Ice	9.940	6.930	0.175
			3.000			1" Ice	10.710	7.660	0.256
						2" Ice	12.300	9.170	0.451
OPA-65R-LCUU-H6 w/ Mount Pipe	C	From Leg	4.000	0.000	118.000	No Ice	9.190	6.210	0.106
			0.000			1/2" Ice	9.940	6.930	0.175
			3.000			1" Ice	10.710	7.660	0.256
						2" Ice	12.300	9.170	0.451
(2) 80010966 w/ Mount Pipe	A	From Leg	4.000	0.000	118.000	No Ice	14.610	6.840	0.159
			0.000			1/2" Ice	15.470	7.630	0.267
			3.000			1" Ice	16.350	8.420	0.389
						2" Ice	18.140	10.060	0.677
(2) 80010966 w/ Mount Pipe	B	From Leg	4.000	0.000	118.000	No Ice	14.610	6.840	0.159
			0.000			1/2" Ice	15.470	7.630	0.267
			3.000			1" Ice	16.350	8.420	0.389
						2" Ice	18.140	10.060	0.677
(2) 80010966 w/ Mount Pipe	C	From Leg	4.000	0.000	118.000	No Ice	14.610	6.840	0.159
			0.000			1/2" Ice	15.470	7.630	0.267
			3.000			1" Ice	16.350	8.420	0.389
						2" Ice	18.140	10.060	0.677
(2) LGP21401	A	From Leg	4.000	0.000	118.000	No Ice	1.104	0.207	0.014
			0.000			1/2" Ice	1.239	0.274	0.021
			3.000			1" Ice	1.381	0.348	0.030

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
(2) LGP21401	B	From Leg	4.000	0.000	118.000	2" Ice	1.688	0.521	0.055
			0.000			No Ice	1.104	0.207	0.014
			3.000			1/2" Ice	1.239	0.274	0.021
						1" Ice	1.381	0.348	0.030
(2) LGP21401	C	From Leg	4.000	0.000	118.000	2" Ice	1.688	0.521	0.055
			0.000			No Ice	1.104	0.207	0.014
			3.000			1/2" Ice	1.239	0.274	0.021
						1" Ice	1.381	0.348	0.030
RRUS 32	A	From Leg	4.000	0.000	118.000	2" Ice	1.688	0.521	0.055
			0.000			No Ice	2.857	1.777	0.055
			3.000			1/2" Ice	3.083	1.968	0.077
						1" Ice	3.316	2.166	0.103
RRUS 32	B	From Leg	4.000	0.000	118.000	2" Ice	3.805	2.583	0.165
			0.000			No Ice	2.857	1.777	0.055
			3.000			1/2" Ice	3.083	1.968	0.077
						1" Ice	3.316	2.166	0.103
RRUS 32	C	From Leg	4.000	0.000	118.000	2" Ice	3.805	2.583	0.165
			0.000			No Ice	2.857	1.777	0.055
			3.000			1/2" Ice	3.083	1.968	0.077
						1" Ice	3.316	2.166	0.103
(2) TPX-070821	A	From Leg	4.000	0.000	118.000	2" Ice	3.805	2.583	0.165
			0.000			No Ice	0.469	0.101	0.008
			3.000			1/2" Ice	0.559	0.147	0.011
						1" Ice	0.656	0.202	0.016
(2) TPX-070821	B	From Leg	4.000	0.000	118.000	2" Ice	0.872	0.334	0.030
			0.000			No Ice	0.469	0.101	0.008
			3.000			1/2" Ice	0.559	0.147	0.011
						1" Ice	0.656	0.202	0.016
(2) TPX-070821	C	From Leg	4.000	0.000	118.000	2" Ice	0.872	0.334	0.030
			0.000			No Ice	0.469	0.101	0.008
			3.000			1/2" Ice	0.559	0.147	0.011
						1" Ice	0.656	0.202	0.016
RRUS 4449 B5/B12	A	From Leg	4.000	0.000	118.000	2" Ice	0.872	0.334	0.030
			0.000			No Ice	1.968	1.408	0.071
			3.000			1/2" Ice	2.144	1.564	0.090
						1" Ice	2.328	1.727	0.111
RRUS 4449 B5/B12	B	From Leg	4.000	0.000	118.000	2" Ice	2.718	2.075	0.163
			0.000			No Ice	1.968	1.408	0.071
			3.000			1/2" Ice	2.144	1.564	0.090
						1" Ice	2.328	1.727	0.111
RRUS 4449 B5/B12	C	From Leg	4.000	0.000	118.000	2" Ice	2.718	2.075	0.163
			0.000			No Ice	1.968	1.408	0.071
			3.000			1/2" Ice	2.144	1.564	0.090
						1" Ice	2.328	1.727	0.111
DC6-48-60-18-8F	A	From Leg	4.000	0.000	118.000	2" Ice	2.718	2.075	0.163
			0.000			No Ice	1.212	1.212	0.033
			3.000			1/2" Ice	1.892	1.892	0.055
						1" Ice	2.105	2.105	0.080
CBC23SR-43	A	From Leg	4.000	0.000	118.000	2" Ice	2.570	2.570	0.138
			0.000			No Ice	0.417	0.145	0.005
			3.000			1/2" Ice	0.500	0.202	0.009
						1" Ice	0.590	0.266	0.013
CBC23SR-43	B	From Leg	4.000	0.000	118.000	2" Ice	0.792	0.420	0.026
			0.000			No Ice	0.417	0.145	0.005
			3.000			1/2" Ice	0.500	0.202	0.009
						1" Ice	0.590	0.266	0.013
					2" Ice	0.792	0.420	0.026	

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Lateral						°
CBC23SR-43	C	From Leg	4.000	0.000	0.000	118.000	No Ice	0.417	0.145	0.005
			0.000				1/2" Ice	0.500	0.202	0.009
			3.000				1" Ice	0.590	0.266	0.013
							2" Ice	0.792	0.420	0.026
ION-M23 SDARS	A	From Leg	4.000	0.000	0.000	118.000	No Ice	1.838	1.764	0.048
			0.000				1/2" Ice	2.051	1.975	0.063
			3.000				1" Ice	2.270	2.193	0.082
							2" Ice	2.731	2.650	0.128
ION-M23 SDARS	B	From Leg	4.000	0.000	0.000	118.000	No Ice	1.838	1.764	0.048
			0.000				1/2" Ice	2.051	1.975	0.063
			3.000				1" Ice	2.270	2.193	0.082
							2" Ice	2.731	2.650	0.128
ION-M23 SDARS	C	From Leg	4.000	0.000	0.000	118.000	No Ice	1.838	1.764	0.048
			0.000				1/2" Ice	2.051	1.975	0.063
			3.000				1" Ice	2.270	2.193	0.082
							2" Ice	2.731	2.650	0.128
DC6-48-60-0-8C-EV	A	From Leg	4.000	0.000	0.000	118.000	No Ice	2.736	4.783	0.026
			0.000				1/2" Ice	2.962	5.063	0.063
			3.000				1" Ice	3.195	5.350	0.104
							2" Ice	3.683	5.947	0.200
10'6"x2-3/8" Pipe Mount	A	From Leg	4.000	0.000	0.000	118.000	No Ice	2.494	2.494	0.036
			0.000				1/2" Ice	3.572	3.572	0.055
			0.000				1" Ice	4.667	4.667	0.080
							2" Ice	6.317	6.317	0.152
10'6"x2-3/8" Pipe Mount	B	From Leg	4.000	0.000	0.000	118.000	No Ice	2.494	2.494	0.036
			0.000				1/2" Ice	3.572	3.572	0.055
			0.000				1" Ice	4.667	4.667	0.080
							2" Ice	6.317	6.317	0.152
10'6"x2-3/8" Pipe Mount	C	From Leg	4.000	0.000	0.000	118.000	No Ice	2.494	2.494	0.036
			0.000				1/2" Ice	3.572	3.572	0.055
			0.000				1" Ice	4.667	4.667	0.080
							2" Ice	6.317	6.317	0.152
(2) 5' x 2" Pipe Mount	A	From Leg	4.000	0.000	0.000	118.000	No Ice	1.188	1.188	0.018
			0.000				1/2" Ice	1.496	1.496	0.027
			0.000				1" Ice	1.807	1.807	0.040
							2" Ice	2.458	2.458	0.076
Pipe Mount [PM 601-3]	C	None		0.000	0.000	118.000	No Ice	3.170	3.170	0.195
							1/2" Ice	3.790	3.790	0.232
							1" Ice	4.420	4.420	0.279
							2" Ice	5.760	5.760	0.401
(2) Side Arm Mount [SO 102-3]	C	None		0.000	0.000	118.000	No Ice	3.600	3.600	0.075
							1/2" Ice	4.180	4.180	0.105
							1" Ice	4.750	4.750	0.135
							2" Ice	5.900	5.900	0.195
Sector Mount [SM 504-3]	C	None		0.000	0.000	118.000	No Ice	31.050	31.050	1.708
							1/2" Ice	43.830	43.830	2.326
							1" Ice	56.440	56.440	3.143
							2" Ice	81.280	81.280	5.358
* RRUS 4478 B14	A	From Leg	1.500	0.000	0.000	116.000	No Ice	1.843	1.059	0.060
			0.000				1/2" Ice	2.012	1.197	0.076
			0.000				1" Ice	2.190	1.342	0.094
							2" Ice	2.566	1.656	0.140
RRUS 4478 B14	B	From Leg	1.500	0.000	0.000	116.000	No Ice	1.843	1.059	0.060
			0.000				1/2" Ice	2.012	1.197	0.076
			0.000				1" Ice	2.190	1.342	0.094
							2" Ice	2.566	1.656	0.140

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Lateral						Vert
RRUS 4478 B14	C	From Leg	1.500	0.000	0.000	116.000	No Ice	1.843	1.059	0.060
			0.000				1/2" Ice	2.012	1.197	0.076
			0.000				1" Ice	2.190	1.342	0.094
							2" Ice	2.566	1.656	0.140
RRUS 8843 B2/B66A	A	From Leg	1.500	0.000	0.000	116.000	No Ice	1.639	1.353	0.072
			0.000				1/2" Ice	1.799	1.500	0.090
			0.000				1" Ice	1.966	1.655	0.110
							2" Ice	2.323	1.986	0.159
RRUS 8843 B2/B66A	B	From Leg	1.500	0.000	0.000	116.000	No Ice	1.639	1.353	0.072
			0.000				1/2" Ice	1.799	1.500	0.090
			0.000				1" Ice	1.966	1.655	0.110
							2" Ice	2.323	1.986	0.159
RRUS 8843 B2/B66A	C	From Leg	1.500	0.000	0.000	116.000	No Ice	1.639	1.353	0.072
			0.000				1/2" Ice	1.799	1.500	0.090
			0.000				1" Ice	1.966	1.655	0.110
							2" Ice	2.323	1.986	0.159
(2) DC6-48-60-18-8F	C	From Leg	1.500	0.000	0.000	116.000	No Ice	1.212	1.212	0.033
			0.000				1/2" Ice	1.892	1.892	0.055
			0.000				1" Ice	2.105	2.105	0.080
							2" Ice	2.570	2.570	0.138
(2) 4' x 2" Pipe Mount	A	From Leg	1.000	0.000	0.000	116.000	No Ice	0.785	0.785	0.029
			0.000				1/2" Ice	1.028	1.028	0.035
			0.000				1" Ice	1.281	1.281	0.044
							2" Ice	1.814	1.814	0.072
(2) 4' x 2" Pipe Mount	B	From Leg	1.000	0.000	0.000	116.000	No Ice	0.785	0.785	0.029
			0.000				1/2" Ice	1.028	1.028	0.035
			0.000				1" Ice	1.281	1.281	0.044
							2" Ice	1.814	1.814	0.072
(2) 4' x 2" Pipe Mount	C	From Leg	1.000	0.000	0.000	116.000	No Ice	0.785	0.785	0.029
			0.000				1/2" Ice	1.028	1.028	0.035
			0.000				1" Ice	1.281	1.281	0.044
							2" Ice	1.814	1.814	0.072
4' x 2" Horizontal Face Mount Pipe	C	From Leg	1.000	0.000	0.000	116.000	No Ice	0.870	0.010	0.015
			0.000				1/2" Ice	1.110	0.050	0.022
			0.000				1" Ice	1.370	0.100	0.032
							2" Ice	1.900	0.240	0.061
Side Arm Mount [SO 104-3]	C	None			0.000	116.000	No Ice	2.620	2.620	0.288
							1/2" Ice	3.300	3.300	0.408
							1" Ice	3.980	3.980	0.528
							2" Ice	5.350	5.350	0.768
* (4) 844G65VTZASX w/ Mount Pipe	A	From Leg	4.000	0.000	2.000	108.000	No Ice	5.548	5.041	0.034
			0.000				1/2" Ice	5.941	5.667	0.087
			2.000				1" Ice	6.342	6.298	0.145
							2" Ice	7.168	7.611	0.283
(4) 844G65VTZASX w/ Mount Pipe	B	From Leg	4.000	0.000	2.000	108.000	No Ice	5.548	5.041	0.034
			0.000				1/2" Ice	5.941	5.667	0.087
			2.000				1" Ice	6.342	6.298	0.145
							2" Ice	7.168	7.611	0.283
(4) 844G65VTZASX w/ Mount Pipe	C	From Leg	4.000	0.000	2.000	108.000	No Ice	5.548	5.041	0.034
			0.000				1/2" Ice	5.941	5.667	0.087
			2.000				1" Ice	6.342	6.298	0.145
							2" Ice	7.168	7.611	0.283
Platform Mount [LP 303-1]	C	None			0.000	108.000	No Ice	14.690	14.690	1.250
							1/2" Ice	18.010	18.010	1.569
							1" Ice	21.340	21.340	1.942
							2" Ice	28.080	28.080	2.852

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
			Horz Lateral ft	Vert ft					
*									
TME-1900MHZ RRH (65MHZ)	A	From Leg	1.500	0.000	0.000	100.000	No Ice 2.313	2.375	0.060
			0.000				1/2" Ice 2.517	2.581	0.084
			0.000				1" Ice 2.728	2.794	0.111
							2" Ice 3.174	3.243	0.176
TME-1900MHZ RRH (65MHZ)	B	From Leg	1.500	0.000	0.000	100.000	No Ice 2.313	2.375	0.060
			0.000				1/2" Ice 2.517	2.581	0.084
			0.000				1" Ice 2.728	2.794	0.111
							2" Ice 3.174	3.243	0.176
TME-1900MHZ RRH (65MHZ)	C	From Leg	1.500	0.000	0.000	100.000	No Ice 2.313	2.375	0.060
			0.000				1/2" Ice 2.517	2.581	0.084
			0.000				1" Ice 2.728	2.794	0.111
							2" Ice 3.174	3.243	0.176
TME-800MHZ RRH	A	From Leg	1.500	0.000	0.000	100.000	No Ice 2.134	1.773	0.053
			0.000				1/2" Ice 2.320	1.946	0.074
			-1.000				1" Ice 2.512	2.127	0.098
							2" Ice 2.920	2.510	0.157
TME-800MHZ RRH	B	From Leg	1.500	0.000	0.000	100.000	No Ice 2.134	1.773	0.053
			0.000				1/2" Ice 2.320	1.946	0.074
			-1.000				1" Ice 2.512	2.127	0.098
							2" Ice 2.920	2.510	0.157
TME-800MHZ RRH	C	From Leg	1.500	0.000	0.000	100.000	No Ice 2.134	1.773	0.053
			0.000				1/2" Ice 2.320	1.946	0.074
			-1.000				1" Ice 2.512	2.127	0.098
							2" Ice 2.920	2.510	0.157
Pipe Mount [PM 601-3]	C	None		0.000		100.000	No Ice 3.170	3.170	0.195
							1/2" Ice 3.790	3.790	0.232
							1" Ice 4.420	4.420	0.279
							2" Ice 5.760	5.760	0.401
Side Arm Mount [SO 102-3]	C	None		0.000		100.000	No Ice 3.600	3.600	0.075
							1/2" Ice 4.180	4.180	0.105
							1" Ice 4.750	4.750	0.135
							2" Ice 5.900	5.900	0.195
*									
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.000	0.000	0.000	97.000	No Ice 4.090	2.860	0.077
			0.000				1/2" Ice 4.480	3.230	0.127
			1.000				1" Ice 4.880	3.610	0.185
							2" Ice 5.710	4.400	0.331
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.000	0.000	0.000	97.000	No Ice 4.090	2.860	0.077
			0.000				1/2" Ice 4.480	3.230	0.127
			1.000				1" Ice 4.880	3.610	0.185
							2" Ice 5.710	4.400	0.331
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.000	0.000	0.000	97.000	No Ice 4.090	2.860	0.077
			0.000				1/2" Ice 4.480	3.230	0.127
			1.000				1" Ice 4.880	3.610	0.185
							2" Ice 5.710	4.400	0.331
P40-16-XLPP-RR-A w/ Mount Pipe	A	From Leg	4.000	0.000	0.000	97.000	No Ice 7.240	3.310	0.084
			0.000				1/2" Ice 7.730	3.730	0.147
			1.000				1" Ice 8.240	4.160	0.219
							2" Ice 9.280	5.060	0.393
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.000	0.000	0.000	97.000	No Ice 4.600	4.010	0.095
			0.000				1/2" Ice 5.050	4.450	0.160
			1.000				1" Ice 5.500	4.890	0.235
							2" Ice 6.440	5.820	0.419
P40-16-XLPP-RR-A w/ Mount Pipe	C	From Leg	4.000	0.000	0.000	97.000	No Ice 7.240	3.310	0.084
			0.000				1/2" Ice 7.730	3.730	0.147
			1.000				1" Ice 8.240	4.160	0.219

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Crown Castle						Chaitra			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz Lateral	Vert						°
(3) ACU-A20-N	A	From Leg	4.000	0.000	0.000	97.000	2" Ice	9.280	5.060	0.393
			0.000				No Ice	0.067	0.117	0.001
			1.000				1/2" Ice	0.104	0.162	0.002
							1" Ice	0.148	0.215	0.004
(3) ACU-A20-N	B	From Leg	4.000	0.000	0.000	97.000	2" Ice	0.259	0.343	0.012
			0.000				No Ice	0.067	0.117	0.001
			1.000				1/2" Ice	0.104	0.162	0.002
							1" Ice	0.148	0.215	0.004
(3) ACU-A20-N	C	From Leg	4.000	0.000	0.000	97.000	2" Ice	0.259	0.343	0.012
			0.000				No Ice	0.067	0.117	0.001
			1.000				1/2" Ice	0.104	0.162	0.002
							1" Ice	0.148	0.215	0.004
800 EXTERNAL NOTCH FILTER	A	From Leg	4.000	0.000	0.000	97.000	2" Ice	0.259	0.343	0.012
			0.000				No Ice	0.660	0.321	0.011
			1.000				1/2" Ice	0.763	0.398	0.017
							1" Ice	0.873	0.483	0.024
800 EXTERNAL NOTCH FILTER	B	From Leg	4.000	0.000	0.000	97.000	2" Ice	1.115	0.674	0.045
			0.000				No Ice	0.660	0.321	0.011
			1.000				1/2" Ice	0.763	0.398	0.017
							1" Ice	0.873	0.483	0.024
800 EXTERNAL NOTCH FILTER	C	From Leg	4.000	0.000	0.000	97.000	2" Ice	1.115	0.674	0.045
			0.000				No Ice	0.660	0.321	0.011
			1.000				1/2" Ice	0.763	0.398	0.017
							1" Ice	0.873	0.483	0.024
TD-RRH8X20-25	A	From Leg	4.000	0.000	0.000	97.000	2" Ice	1.115	0.674	0.045
			0.000				No Ice	4.045	1.535	0.070
			2.000				1/2" Ice	4.298	1.714	0.097
							1" Ice	4.557	1.901	0.128
TD-RRH8X20-25	B	From Leg	4.000	0.000	0.000	97.000	2" Ice	5.098	2.295	0.201
			0.000				No Ice	4.045	1.535	0.070
			2.000				1/2" Ice	4.298	1.714	0.097
							1" Ice	4.557	1.901	0.128
TD-RRH8X20-25	C	From Leg	4.000	0.000	0.000	97.000	2" Ice	5.098	2.295	0.201
			0.000				No Ice	4.045	1.535	0.070
			2.000				1/2" Ice	4.298	1.714	0.097
							1" Ice	4.557	1.901	0.128
Climbing Ladder (Flat)	B	From Leg	3.000	0.000	0.000	97.000	2" Ice	5.098	2.295	0.201
			0.000				No Ice	5.844	5.844	0.048
			-3.000				1/2" Ice	10.300	10.300	0.071
							1" Ice	14.756	14.756	0.094
7'x2" Antenna Mount Pipe	A	From Leg	4.000	0.000	0.000	97.000	2" Ice	23.668	23.668	0.140
			0.000				No Ice	1.663	1.663	0.026
			0.000				1/2" Ice	2.391	2.391	0.039
							1" Ice	2.825	2.825	0.056
7'x2" Antenna Mount Pipe	B	From Leg	4.000	0.000	0.000	97.000	2" Ice	3.706	3.706	0.105
			0.000				No Ice	1.663	1.663	0.026
			0.000				1/2" Ice	2.391	2.391	0.039
							1" Ice	2.825	2.825	0.056
7'x2" Antenna Mount Pipe	C	From Leg	4.000	0.000	0.000	97.000	2" Ice	3.706	3.706	0.105
			0.000				No Ice	1.663	1.663	0.026
			0.000				1/2" Ice	2.391	2.391	0.039
							1" Ice	2.825	2.825	0.056
Platform Mount [LP 601-1]	C	None		0.000	0.000	97.000	2" Ice	3.706	3.706	0.105
							No Ice	28.500	28.500	1.122
							1/2" Ice	31.690	31.690	1.676
							1" Ice	34.870	34.870	2.282
						2" Ice	41.230	41.230	3.653	

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
			Horz Lateral ft	Vert ft					
*									
AIR -32 B2A/B66AA	A	From Leg	4.000 0.000 1.000		0.000	83.000	No Ice 6.510 1/2" Ice 6.887 1" Ice 7.271 2" Ice 8.060	4.712 5.068 5.431 6.178	0.132 0.178 0.229 0.348
AIR -32 B2A/B66AA	B	From Leg	4.000 0.000 1.000		0.000	83.000	No Ice 6.510 1/2" Ice 6.887 1" Ice 7.271 2" Ice 8.060	4.712 5.068 5.431 6.178	0.132 0.178 0.229 0.348
AIR -32 B2A/B66AA	C	From Leg	4.000 0.000 1.000		0.000	83.000	No Ice 6.510 1/2" Ice 6.887 1" Ice 7.271 2" Ice 8.060	4.712 5.068 5.431 6.178	0.132 0.178 0.229 0.348
ERICSSON AIR 21 B2A B4P	A	From Leg	4.000 0.000 1.000		0.000	83.000	No Ice 6.092 1/2" Ice 6.462 1" Ice 6.838 2" Ice 7.613	4.297 4.649 5.005 5.737	0.092 0.133 0.180 0.290
ERICSSON AIR 21 B2A B4P	B	From Leg	4.000 0.000 1.000		0.000	83.000	No Ice 6.092 1/2" Ice 6.462 1" Ice 6.838 2" Ice 7.613	4.297 4.649 5.005 5.737	0.092 0.133 0.180 0.290
ERICSSON AIR 21 B2A B4P	C	From Leg	4.000 0.000 1.000		0.000	83.000	No Ice 6.092 1/2" Ice 6.462 1" Ice 6.838 2" Ice 7.613	4.297 4.649 5.005 5.737	0.092 0.133 0.180 0.290
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Leg	4.000 0.000 1.000		0.000	83.000	No Ice 14.690 1/2" Ice 15.460 1" Ice 16.230 2" Ice 17.820	6.870 7.550 8.250 9.670	0.186 0.315 0.458 0.788
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Leg	4.000 0.000 1.000		0.000	83.000	No Ice 14.690 1/2" Ice 15.460 1" Ice 16.230 2" Ice 17.820	6.870 7.550 8.250 9.670	0.186 0.315 0.458 0.788
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Leg	4.000 0.000 1.000		0.000	83.000	No Ice 14.690 1/2" Ice 15.460 1" Ice 16.230 2" Ice 17.820	6.870 7.550 8.250 9.670	0.186 0.315 0.458 0.788
RADIO 4449 B71/B85A	A	From Leg	4.000 0.000 1.000		0.000	83.000	No Ice 1.644 1/2" Ice 1.804 1" Ice 1.972 2" Ice 2.329	1.310 1.455 1.608 1.936	0.075 0.092 0.112 0.161
RADIO 4449 B71/B85A	B	From Leg	4.000 0.000 1.000		0.000	83.000	No Ice 1.644 1/2" Ice 1.804 1" Ice 1.972 2" Ice 2.329	1.310 1.455 1.608 1.936	0.075 0.092 0.112 0.161
RADIO 4449 B71/B85A	C	From Leg	4.000 0.000 1.000		0.000	83.000	No Ice 1.644 1/2" Ice 1.804 1" Ice 1.972 2" Ice 2.329	1.310 1.455 1.608 1.936	0.075 0.092 0.112 0.161
ATMAA1412D-1A20	A	From Leg	4.000 0.000 0.000		0.000	83.000	No Ice 0.407 1/2" Ice 0.497 1" Ice 0.593 2" Ice 0.815	1.000 1.126 1.259 1.548	0.013 0.021 0.030 0.056
ATMAA1412D-1A20	B	From Leg	4.000 0.000 0.000		0.000	83.000	No Ice 0.407 1/2" Ice 0.497 1" Ice 0.593 2" Ice 0.815	1.000 1.126 1.259 1.548	0.013 0.021 0.030 0.056

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C _{AA}		Weight K	
			Horz Lateral ft	Vert ft			Front ft ²	Side ft ²		
ATMAA1412D-1A20	C	From Leg	4.000 0.000 0.000		0.000	83.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.407 0.497 1.259 1.548	1.000 1.126 1.259 1.548	0.013 0.021 0.030 0.056
(3) 8' x 2" Mount Pipe	A	From Leg	4.000 0.000 0.000		0.000	83.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.900 2.728 3.401 4.396	1.900 2.728 3.401 4.396	0.029 0.044 0.063 0.119
(3) 8' x 2" Mount Pipe	B	From Leg	4.000 0.000 0.000		0.000	83.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.900 2.728 3.401 4.396	1.900 2.728 3.401 4.396	0.029 0.044 0.063 0.119
(3) 8' x 2" Mount Pipe	C	From Leg	4.000 0.000 0.000		0.000	83.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.900 2.728 3.401 4.396	1.900 2.728 3.401 4.396	0.029 0.044 0.063 0.119
Platform Mount [LP 303-1]	C	None			0.000	83.000	No Ice 1/2" Ice 1" Ice 2" Ice	14.690 18.010 21.340 28.080	14.690 18.010 21.340 28.080	1.250 1.569 1.942 2.852
* KS24019-L112A	B	From Leg	2.000 0.000 1.000		0.000	51.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.141 0.198 0.262 0.415	0.141 0.198 0.262 0.415	0.005 0.007 0.009 0.018
2' x 2" Pipe Mount	B	From Leg	2.000 0.000 0.000		0.000	51.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.023 0.049 0.085 0.186	0.023 0.049 0.085 0.186	0.007 0.008 0.009 0.013
Side Arm Mount [SO 901-1]	B	From Leg	1.000 0.000 0.000		0.000	51.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.330 0.460 0.620 1.010	0.620 0.780 0.970 1.430	0.105 0.113 0.123 0.153
*										

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice

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Comb. No.	Description
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	120 - 84.7161	Pole	Max Tension	14	0.000	0.000	0.000
			Max. Compression	26	-33.873	-0.080	1.355
			Max. Mx	8	-15.225	-477.142	1.225
			Max. My	2	-15.233	-1.007	474.018
			Max. Vy	8	21.403	-477.142	1.225
			Max. Vx	2	-21.342	-1.007	474.018
			Max. Torque	9			2.127
L2	84.7161 - 41.6224	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-55.629	-0.584	1.280
			Max. Mx	8	-30.243	-1617.542	4.290
			Max. My	2	-30.247	-4.568	1611.363
			Max. Vy	8	29.849	-1617.542	4.290
			Max. Vx	2	-29.794	-4.568	1611.363
			Max. Torque	22			-1.625

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L3	41.6224 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-77.288	-0.184	1.795
			Max. M _x	8	-48.549	-3133.162	8.173
			Max. M _y	2	-48.549	-8.276	3124.631
			Max. V _y	8	33.921	-3133.162	8.173
			Max. V _x	2	-33.869	-8.276	3124.631
			Max. Torque	22			-1.622

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	28	77.288	-4.260	7.354
	Max. H _x	20	48.572	33.889	-0.079
	Max. H _z	2	48.572	-0.079	33.837
	Max. M _x	2	3124.631	-0.079	33.837
	Max. M _z	8	3133.162	-33.889	0.079
	Max. Torsion	10	1.621	-29.309	-16.850
	Min. Vert	25	36.429	16.876	29.264
	Min. H _x	8	48.572	-33.889	0.079
	Min. H _z	14	48.572	0.079	-33.837
	Min. M _x	14	-3124.194	0.079	-33.837
	Min. M _z	20	-3132.522	33.889	-0.079
	Min. Torsion	22	-1.621	29.309	16.850

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	40.476	0.000	0.000	-0.173	-0.257	0.000
1.2 Dead+1.0 Wind 0 deg - No Ice	48.572	0.079	-33.837	-3124.631	-8.276	1.052
0.9 Dead+1.0 Wind 0 deg - No Ice	36.429	0.079	-33.837	-3102.110	-8.137	1.051
1.2 Dead+1.0 Wind 30 deg - No Ice	48.572	17.013	-29.343	-2710.010	-1573.636	0.279
0.9 Dead+1.0 Wind 30 deg - No Ice	36.429	17.013	-29.343	-2690.468	-1562.233	0.278
1.2 Dead+1.0 Wind 60 deg - No Ice	48.572	29.388	-16.987	-1569.306	-2717.420	-0.569
0.9 Dead+1.0 Wind 60 deg - No Ice	36.429	29.388	-16.987	-1557.967	-2697.785	-0.569
1.2 Dead+1.0 Wind 90 deg - No Ice	48.572	33.889	-0.079	-8.173	-3133.162	-1.264
0.9 Dead+1.0 Wind 90 deg - No Ice	36.429	33.889	-0.079	-8.060	-3110.538	-1.264
1.2 Dead+1.0 Wind 120 deg - No Ice	48.572	29.309	16.850	1555.100	-2709.473	-1.621
0.9 Dead+1.0 Wind 120 deg - No Ice	36.429	29.309	16.850	1543.972	-2689.896	-1.620
1.2 Dead+1.0 Wind 150 deg - No Ice	48.572	16.876	29.264	2701.632	-1559.856	-1.543

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Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
No Ice						
0.9 Dead+1.0 Wind 150 deg - No Ice	36.429	16.876	29.264	2682.261	-1548.552	-1.542
1.2 Dead+1.0 Wind 180 deg - No Ice	48.572	-0.079	33.837	3124.194	7.642	-1.052
0.9 Dead+1.0 Wind 180 deg - No Ice	36.429	-0.079	33.837	3101.787	7.667	-1.051
1.2 Dead+1.0 Wind 210 deg - No Ice	48.572	-17.013	29.343	2709.572	1572.997	-0.279
0.9 Dead+1.0 Wind 210 deg - No Ice	36.429	-17.013	29.343	2690.145	1561.758	-0.278
1.2 Dead+1.0 Wind 240 deg - No Ice	48.572	-29.388	16.987	1568.873	2716.778	0.569
0.9 Dead+1.0 Wind 240 deg - No Ice	36.429	-29.388	16.987	1557.647	2697.308	0.569
1.2 Dead+1.0 Wind 270 deg - No Ice	48.572	-33.889	0.079	7.745	3132.522	1.264
0.9 Dead+1.0 Wind 270 deg - No Ice	36.429	-33.889	0.079	7.744	3110.063	1.264
1.2 Dead+1.0 Wind 300 deg - No Ice	48.572	-29.309	-16.850	-1555.527	2708.839	1.621
0.9 Dead+1.0 Wind 300 deg - No Ice	36.429	-29.309	-16.850	-1544.288	2689.425	1.620
1.2 Dead+1.0 Wind 330 deg - No Ice	48.572	-16.876	-29.264	-2702.064	1559.225	1.543
0.9 Dead+1.0 Wind 330 deg - No Ice	36.429	-16.876	-29.264	-2682.580	1548.084	1.542
1.2 Dead+1.0 Ice+1.0 Temp	77.288	0.000	0.000	-1.795	-0.184	0.000
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	77.288	0.015	-8.483	-788.287	-1.791	0.520
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	77.288	4.260	-7.354	-683.728	-395.618	0.394
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	77.288	7.363	-4.254	-396.485	-683.495	0.162
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	77.288	8.493	-0.015	-3.523	-788.287	-0.114
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	77.288	7.348	4.228	389.862	-681.914	-0.358
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	77.288	4.234	7.339	678.263	-392.878	-0.507
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	77.288	-0.015	8.483	784.404	1.373	-0.520
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	77.288	-4.260	7.354	679.844	395.199	-0.394
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	77.288	-7.363	4.254	392.600	683.076	-0.162
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	77.288	-8.493	0.015	-0.360	787.868	0.114
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	77.288	-7.348	-4.228	-393.744	681.495	0.358
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	77.288	-4.234	-7.339	-682.146	392.460	0.507
Dead+Wind 0 deg - Service	40.476	0.017	-7.343	-675.337	-1.985	0.229
Dead+Wind 30 deg - Service	40.476	3.692	-6.367	-585.743	-340.244	0.060
Dead+Wind 60 deg - Service	40.476	6.377	-3.686	-339.248	-587.406	-0.124
Dead+Wind 90 deg - Service	40.476	7.354	-0.017	-1.901	-677.244	-0.276
Dead+Wind 120 deg - Service	40.476	6.360	3.656	335.907	-585.686	-0.353
Dead+Wind 150 deg - Service	40.476	3.662	6.350	583.660	-337.265	-0.336
Dead+Wind 180 deg - Service	40.476	-0.017	7.343	674.974	1.455	-0.229
Dead+Wind 210 deg - Service	40.476	-3.692	6.367	585.380	339.713	-0.060
Dead+Wind 240 deg - Service	40.476	-6.377	3.686	338.886	586.875	0.124

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Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead+Wind 270 deg - Service	40.476	-7.354	0.017	1.539	676.713	0.276
Dead+Wind 300 deg - Service	40.476	-6.360	-3.656	-336.269	585.155	0.353
Dead+Wind 330 deg - Service	40.476	-3.662	-6.350	-584.023	336.735	0.336

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.000	-40.476	0.000	0.000	40.476	0.000	0.000%
2	0.079	-48.572	-33.837	-0.079	48.572	33.837	0.000%
3	0.079	-36.429	-33.837	-0.079	36.429	33.837	0.000%
4	17.013	-48.572	-29.343	-17.013	48.572	29.343	0.000%
5	17.013	-36.429	-29.343	-17.013	36.429	29.343	0.000%
6	29.388	-48.572	-16.987	-29.388	48.572	16.987	0.000%
7	29.388	-36.429	-16.987	-29.388	36.429	16.987	0.000%
8	33.889	-48.572	-0.079	-33.889	48.572	0.079	0.000%
9	33.889	-36.429	-0.079	-33.889	36.429	0.079	0.000%
10	29.309	-48.572	16.850	-29.309	48.572	-16.850	0.000%
11	29.309	-36.429	16.850	-29.309	36.429	-16.850	0.000%
12	16.876	-48.572	29.264	-16.876	48.572	-29.264	0.000%
13	16.876	-36.429	29.264	-16.876	36.429	-29.264	0.000%
14	-0.079	-48.572	33.837	0.079	48.572	-33.837	0.000%
15	-0.079	-36.429	33.837	0.079	36.429	-33.837	0.000%
16	-17.013	-48.572	29.343	17.013	48.572	-29.343	0.000%
17	-17.013	-36.429	29.343	17.013	36.429	-29.343	0.000%
18	-29.388	-48.572	16.987	29.388	48.572	-16.987	0.000%
19	-29.388	-36.429	16.987	29.388	36.429	-16.987	0.000%
20	-33.889	-48.572	0.079	33.889	48.572	-0.079	0.000%
21	-33.889	-36.429	0.079	33.889	36.429	-0.079	0.000%
22	-29.309	-48.572	-16.850	29.309	48.572	16.850	0.000%
23	-29.309	-36.429	-16.850	29.309	36.429	16.850	0.000%
24	-16.876	-48.572	-29.264	16.876	48.572	29.264	0.000%
25	-16.876	-36.429	-29.264	16.876	36.429	29.264	0.000%
26	0.000	-77.288	0.000	0.000	77.288	0.000	0.000%
27	0.015	-77.288	-8.483	-0.015	77.288	8.483	0.000%
28	4.260	-77.288	-7.354	-4.260	77.288	7.354	0.000%
29	7.363	-77.288	-4.254	-7.363	77.288	4.254	0.000%
30	8.493	-77.288	-0.015	-8.493	77.288	0.015	0.000%
31	7.348	-77.288	4.228	-7.348	77.288	-4.228	0.000%
32	4.234	-77.288	7.339	-4.234	77.288	-7.339	0.000%
33	-0.015	-77.288	8.483	0.015	77.288	-8.483	0.000%
34	-4.260	-77.288	7.354	4.260	77.288	-7.354	0.000%
35	-7.363	-77.288	4.254	7.363	77.288	-4.254	0.000%
36	-8.493	-77.288	0.015	8.493	77.288	-0.015	0.000%
37	-7.348	-77.288	-4.228	7.348	77.288	4.228	0.000%
38	-4.234	-77.288	-7.339	4.234	77.288	7.339	0.000%
39	0.017	-40.476	-7.343	-0.017	40.476	7.343	0.000%
40	3.692	-40.476	-6.367	-3.692	40.476	6.367	0.000%
41	6.377	-40.476	-3.686	-6.377	40.476	3.686	0.000%
42	7.354	-40.476	-0.017	-7.354	40.476	0.017	0.000%
43	6.360	-40.476	3.656	-6.360	40.476	-3.656	0.000%
44	3.662	-40.476	6.350	-3.662	40.476	-6.350	0.000%
45	-0.017	-40.476	7.343	0.017	40.476	-7.343	0.000%
46	-3.692	-40.476	6.367	3.692	40.476	-6.367	0.000%
47	-6.377	-40.476	3.686	6.377	40.476	-3.686	0.000%
48	-7.354	-40.476	0.017	7.354	40.476	-0.017	0.000%
49	-6.360	-40.476	-3.656	6.360	40.476	3.656	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
50	-3.662	-40.476	-6.350	3.662	40.476	6.350	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.0000001	0.0000001
2	Yes	4	0.0000001	0.00022759
3	Yes	4	0.0000001	0.00014262
4	Yes	5	0.0000001	0.00015795
5	Yes	5	0.0000001	0.00007095
6	Yes	5	0.0000001	0.00016164
7	Yes	5	0.0000001	0.00007271
8	Yes	4	0.0000001	0.00037043
9	Yes	4	0.0000001	0.00023458
10	Yes	5	0.0000001	0.00014988
11	Yes	5	0.0000001	0.00006723
12	Yes	5	0.0000001	0.00016205
13	Yes	5	0.0000001	0.00007311
14	Yes	4	0.0000001	0.00017127
15	Yes	4	0.0000001	0.00010666
16	Yes	5	0.0000001	0.00015767
17	Yes	5	0.0000001	0.00007086
18	Yes	5	0.0000001	0.00015476
19	Yes	5	0.0000001	0.00006943
20	Yes	4	0.0000001	0.00031372
21	Yes	4	0.0000001	0.00019882
22	Yes	5	0.0000001	0.00016345
23	Yes	5	0.0000001	0.00007376
24	Yes	5	0.0000001	0.00015052
25	Yes	5	0.0000001	0.00006755
26	Yes	4	0.0000001	0.0000001
27	Yes	5	0.0000001	0.00008003
28	Yes	5	0.0000001	0.00009362
29	Yes	5	0.0000001	0.00009331
30	Yes	5	0.0000001	0.00007985
31	Yes	5	0.0000001	0.00009185
32	Yes	5	0.0000001	0.00009261
33	Yes	5	0.0000001	0.00007934
34	Yes	5	0.0000001	0.00009216
35	Yes	5	0.0000001	0.00009257
36	Yes	5	0.0000001	0.00007974
37	Yes	5	0.0000001	0.00009326
38	Yes	5	0.0000001	0.00009239
39	Yes	4	0.0000001	0.00001514
40	Yes	4	0.0000001	0.00006628
41	Yes	4	0.0000001	0.00007167
42	Yes	4	0.0000001	0.00002168
43	Yes	4	0.0000001	0.00005883
44	Yes	4	0.0000001	0.00007473
45	Yes	4	0.0000001	0.00001463
46	Yes	4	0.0000001	0.00006585
47	Yes	4	0.0000001	0.00006216
48	Yes	4	0.0000001	0.00002107
49	Yes	4	0.0000001	0.00007691
50	Yes	4	0.0000001	0.00005933

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Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 84.7161	11.195	41	0.778	0.002
L2	89.2839 - 41.6224	6.438	41	0.668	0.001
L3	47.3776 - 0	1.821	41	0.353	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
118.000	7770.00 w/ Mount Pipe	41	10.872	0.772	0.002	59658
116.000	RRUS 4478 B14	41	10.550	0.767	0.002	59658
108.000	(4) 844G65VTZASX w/ Mount Pipe	41	9.272	0.744	0.002	24857
100.000	TME-1900MHZ RRH (65MHZ)	41	8.024	0.717	0.001	14914
97.000	APXVTM14-C-120 w/ Mount Pipe	41	7.569	0.705	0.001	12969
83.000	AIR -32 B2A/B66AA	41	5.569	0.631	0.001	8770
51.000	KS24019-L112A	41	2.096	0.383	0.000	5877

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 84.7161	51.787	6	3.599	0.010
L2	89.2839 - 41.6224	29.788	6	3.093	0.005
L3	47.3776 - 0	8.429	6	1.634	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
118.000	7770.00 w/ Mount Pipe	6	50.297	3.574	0.010	12985
116.000	RRUS 4478 B14	6	48.808	3.549	0.009	12985
108.000	(4) 844G65VTZASX w/ Mount Pipe	6	42.896	3.444	0.008	5409
100.000	TME-1900MHZ RRH (65MHZ)	6	37.127	3.318	0.006	3244
97.000	APXVTM14-C-120 w/ Mount Pipe	6	35.019	3.262	0.006	2821
83.000	AIR -32 B2A/B66AA	6	25.771	2.922	0.004	1906
51.000	KS24019-L112A	6	9.698	1.771	0.002	1272

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Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
L1	120 - 84.7161 (1)	TP32.531x24.094x0.375	35.284	0.000	0.0	36.974	-15.221	2162.970	0.007
L2	84.7161 - 41.6224 (2)	TP42.031x30.689x0.438	47.661	0.000	0.0	55.856	-30.240	3267.590	0.009
L3	41.6224 - 0 (3)	TP51x39.787x0.5	47.378	0.000	0.0	80.144	-48.549	4688.400	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{ux} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M _{uy} kip-ft	φM _{uy} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
L1	120 - 84.7161 (1)	TP32.531x24.094x0.375	477.276	1747.400	0.273	0.000	1747.400	0.000
L2	84.7161 - 41.6224 (2)	TP42.031x30.689x0.438	1619.675	3422.258	0.473	0.000	3422.258	0.000
L3	41.6224 - 0 (3)	TP51x39.787x0.5	3138.008	6078.800	0.516	0.000	6078.800	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V _u K	φV _n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T _u kip-ft	φT _n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	120 - 84.7161 (1)	TP32.531x24.094x0.375	21.454	648.892	0.033	0.654	1765.258	0.000
L2	84.7161 - 41.6224 (2)	TP42.031x30.689x0.438	29.905	980.277	0.031	0.570	3453.150	0.000
L3	41.6224 - 0 (3)	TP51x39.787x0.5	33.976	1406.520	0.024	0.569	6220.375	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	Ratio $\frac{M_{uy}}{\phi M_{uy}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 84.7161 (1)	0.007	0.273	0.000	0.033	0.000	0.281	1.050	4.8.2 ✓
L2	84.7161 - 41.6224 (2)	0.009	0.473	0.000	0.031	0.000	0.483	1.050	4.8.2 ✓

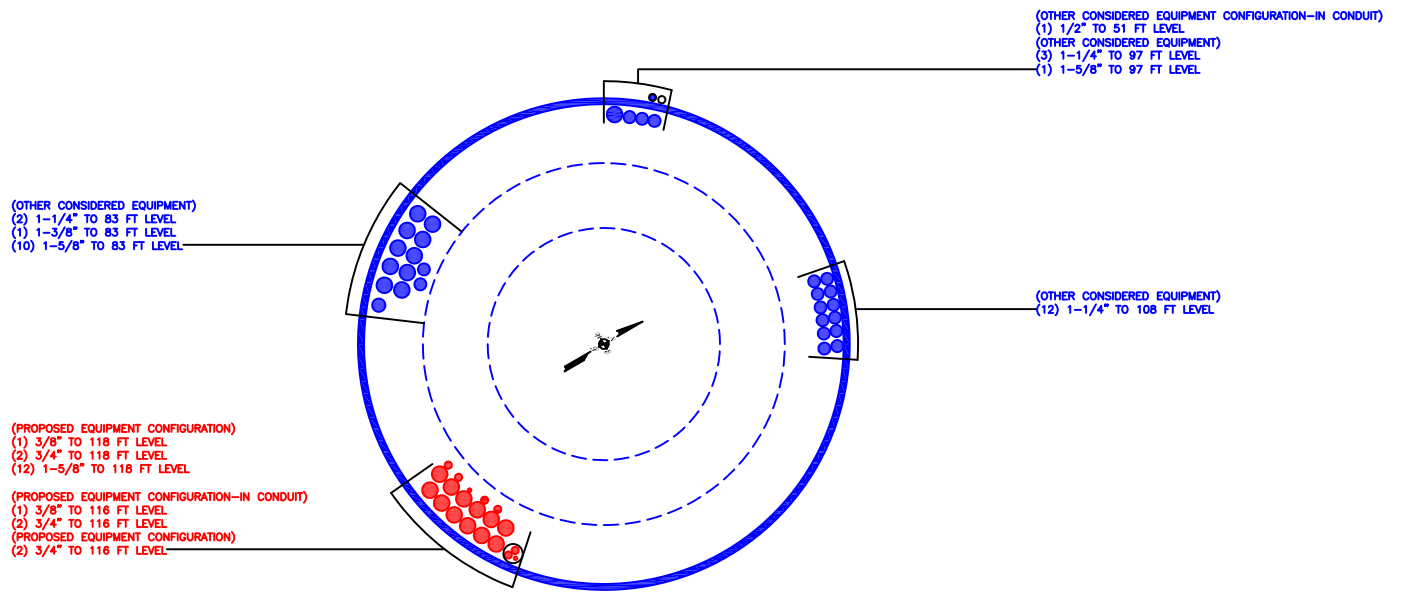
tnxTower B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265	Job 142902.001.01 - NORTH HAVEN TOWER, CT (BU# 881536)	Page 20 of 20
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Section No.	Elevation ft	Ratio P_u	Ratio M_{ux}	Ratio M_{uy}	Ratio V_u	Ratio T_u	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L3	41.6224 - 0 (3)	0.010	0.516	0.000	0.024	0.000	0.527 ✓	1.050	4.8.2 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail	
L1	120 - 84.7161	Pole	TP32.531x24.094x0.375	1	-15.221	2271.118	26.8	Pass	
L2	84.7161 - 41.6224	Pole	TP42.031x30.689x0.438	2	-30.240	3430.969	46.0	Pass	
L3	41.6224 - 0	Pole	TP51x39.787x0.5	3	-48.549	4922.820	50.2	Pass	
							Summary		
							Pole (L3)	50.2	Pass
							RATING =	50.2	Pass

APPENDIX B
BASE LEVEL DRAWING



BUSINESS UNIT:881536

APPENDIX C
ADDITIONAL CALCULATIONS

Monopole Base Plate Connection

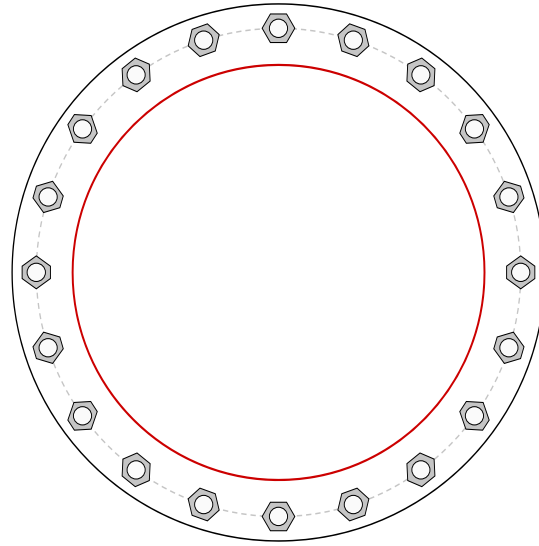


Site Info	
BU #	881536
Site Name	DRTH HAVEN TOWER,
Order #	502381 Rev.0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
I_{gr} (in)	0

Applied Loads	
Moment (kip-ft)	3138.01
Axial Force (kips)	48.55
Shear Force (kips)	33.98

*TIA-222-H Section 15.5 Applied



Connection Properties	Analysis Results
-----------------------	------------------

Anchor Rod Data
(20) 2-1/4" ϕ bolts (A615-75 N; $F_y=75$ ksi, $F_u=100$ ksi) on 60" BC
Base Plate Data
66" OD x 2.25" Plate (A871 GR60; $F_y=60$ ksi, $F_u=75$ ksi)
Stiffener Data
N/A
Pole Data
51" x 0.5" 18-sided pole (A572-65; $F_y=65$ ksi, $F_u=80$ ksi)

Anchor Rod Summary		<i>(units of kips, kip-in)</i>
$P_u_c = 127.88$	$\phi P_n_c = 268.39$	Stress Rating
$V_u = 1.7$	$\phi V_n = 120.77$	45.4%
$M_u = n/a$	$\phi M_n = n/a$	Pass
Base Plate Summary		
Max Stress (ksi):	33.11	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	58.4%	Pass

Drilled Pier Foundation



BU #: 881536
 Site Name: NORTH HAVEN TOWER
 Order Number: 502381 Rev.0

TIA-222 Revision: H
 Tower Type: Monopole

Applied Loads		
	Comp.	Uplift
Moment (kip-ft)	3138	
Axial Force (kips)	49	
Shear Force (kips)	34	

Material Properties	
Concrete Strength, f _c :	4 ksi
Rebar Strength, F _y :	60 ksi

Pier Design Data	
Depth	39 ft
Ext. Above Grade	1 ft
Pier Section 1	
<i>From 1' above grade to 39' below grade</i>	
Pier Diameter	7.5 ft
Rebar Quantity	25
Rebar Size	11
Rebar Cage Diameter	79 in
Tie Size	5

Rebar & Pier Options

Embedded Pole Inputs

Belled Pier Inputs

Analysis Results		
Soil Lateral Check		
	Compression	Uplift
D _{v=0} (ft from TOC)	8.18	-
Soil Safety Factor	4.83	-
Max Moment (kip-ft)	3363.90	-
Rating*	26.2%	-
Soil Vertical Check		
	Compression	Uplift
Skin Friction (kips)	565.51	-
End Bearing (kips)	530.14	-
Weight of Concrete (kips)	212.23	-
Total Capacity (kips)	1095.65	-
Axial (kips)	261.23	-
Rating*	22.7%	-
Reinforced Concrete Check		
	Compression	Uplift
Critical Depth (ft from TOC)	8.40	-
Critical Moment (kip-ft)	3363.57	-
Critical Moment Capacity	6804.98	-
Rating*	47.1%	-

Soil Interaction Rating*	26.2%
Structural Foundation Rating*	47.1%

*Rating per TIA-222-H Section 15.5

Check Limitation	
Apply TIA-222-H Section 15.5:	<input checked="" type="checkbox"/>
N/A	<input type="checkbox"/>

Soil Profile			
Groundwater Depth	7	# of Layers	8

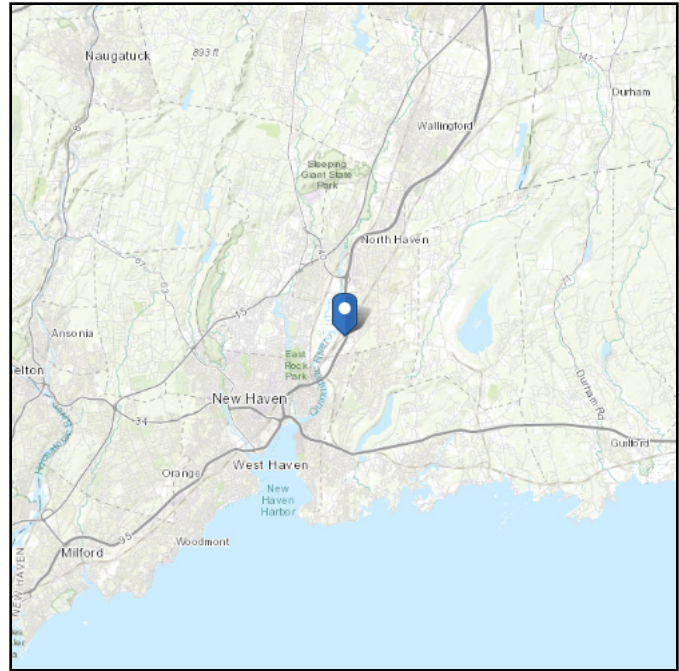
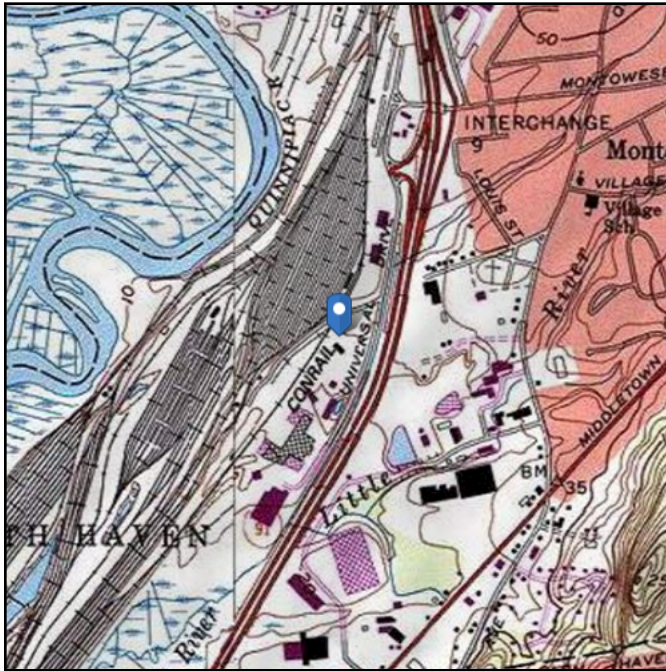
Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ _{soil} (pcf)	γ _{concrete} (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	3.75	3.75	120	150	0	0	0.000	0.000	0.00	0.00			Cohesionless
2	3.75	5	1.25	120	150	0	32	0.000	0.000	0.00	0.00			Cohesionless
3	5	7	2	120	150	0	32	0.000	0.000	1.40	1.40			Cohesionless
4	7	20	13	60	87.6	0	32	0.000	0.000	1.40	1.40			Cohesionless
5	20	25	5	60	87.6	0	30	1.014	1.014				10	Cohesionless
6	25	28	3	60	87.6	0	29	0.647	0.647				6	Cohesionless
7	28	35	7	60	87.6	0.75	0	0.41	0.41					Cohesive
8	35	39	4	60	87.6	0.5	0	0.28	0.28			16		Cohesive

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 18.13 ft (NAVD 88)
Latitude: 41.344447
Longitude: -72.870811



Wind

Results:

Wind Speed:	125 Vmph
10-year MRI	77 Vmph
25-year MRI	87 Vmph
50-year MRI	94 Vmph
100-year MRI	102 Vmph

Data Source: ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014

Date Accessed: Wed May 20 2020

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

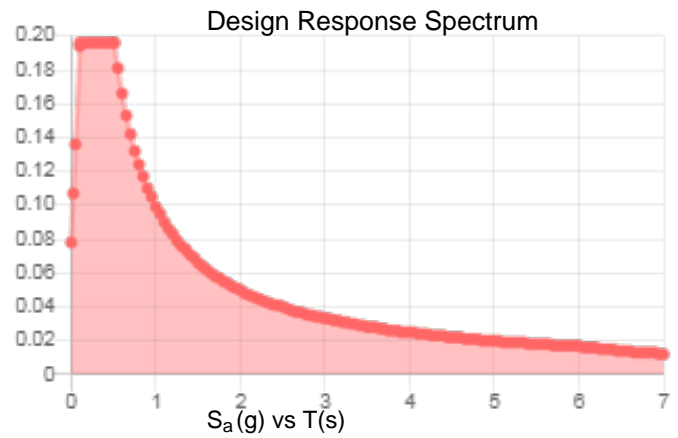
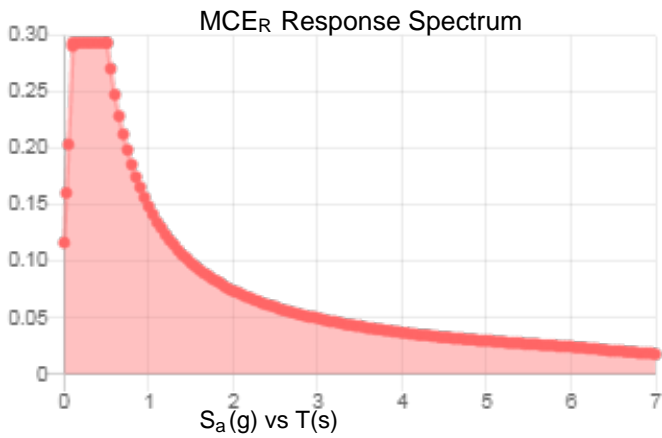
Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

Site Soil Class: D - Stiff Soil

Results:

S_S :	0.184	S_{DS} :	0.196
S_1 :	0.062	S_{D1} :	0.099
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.095
S_{MS} :	0.294	PGA _M :	0.152
S_{M1} :	0.149	F _{PGA} :	1.6
		I_e :	1

Seismic Design Category B



Data Accessed:

Wed May 20 2020

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness: 0.75 in.

Concurrent Temperature: 15 F

Gust Speed: 50 mph

Data Source: Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8

Date Accessed: Wed May 20 2020

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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Vertical Resources Group, Inc.

July 7, 2020

David P. Cooper
Director of Program Management
Empire Telecom
16 Esquire Street
Billerica, MA 01862

Object: RF Mod/IP Repeater Engineering Mount Opinion Letter
Existing ±120' Tall Tower installed AT&T LTE Antenna Platform
Site ID: CT5107 North Haven S
120 Universal Dr., North Haven, CT 06473
Our File : CT5107-IPRepeater

Mr Cooper,

The following are the calculations for the proposed installation of AT&T Mobility's Sirius-XM IP Repeater equipment on a new Commscope 14' platform top frame. Tower in question has been designed and manufactured by Engineered Endeavors in February of 2001.

Code: Connecticut State Building Code 2018, I.B.C. 2018, ASCE7-16, EIA-222-G.
Risk Category: II Exposure Category: 'C' Topographic Category: '1'
Wind Speed: 125 Mph (CT BC ultimate gust), 97 Mph (nominal 3 sec gust CT BC, IBC 1609.3.1)
Ice: ¾" ø radial Snow: P_G = ground snow load = 30 Psf (CT B.C. 2018)
F_A=q_Z*G_H*(EPA) EPA = Effective Projected Area = C_A*A_A

Commscope MCG22HDX14 Top Mount Platform Capacity Chart per pipe mount @ elevation 120':

Maximum (EPA)_A per pipe mount EPA= C_A*A_A=(1)*(17.5'²) = 17.5 Sq.Ft.
Maximum (EPA)_A per sector frame EPA= C_A*A_A=(12)*(17.5'²) = 210 Sq.Ft.

Total Commscope design (EPA)_A = 210 Sq.Ft.

Existing & Proposed AT&T Commscope MCG22HDX14 Top Platform equipment @ elevation 120':

(e) 3-Powerwave 7770	EPA= C _A *A _A =(3)*(1.31)*(4.2' ²) = 16.5 Sq.Ft.
(e) 3-CCI OP65RLCUH6	EPA= C _A *A _A =(3)*(1.30)*(7.4' ²) = 28.9 Sq.Ft.
(e) 6-Kathrein 800-10966	EPA= C _A *A _A =(6)*(1.30)*(13.3' ²)= 103.7 Sq.Ft.
(e) 6-Powerwave LGP21401 (UMTS850)	EPA= C _A *A _A =(6)*(1.20)*(0.9' ²) = 6.4 Sq.Ft.
(e) 6-CCI TPX070821 (LTE850/700de)	EPA= C _A *A _A =(6)*(1.20)*(0.4' ²) = 2.9 Sq.Ft.
(e) 3-Ericsson RRUS-32b30 (LTEWCS)	EPA= C _A *A _A =(3)*(1.20)*(2.28' ²) = 8.2 Sq.Ft.
(e) 3-Ericsson RRUS-4449 (LTE700bc/850 behind panel)	EPA= C _A *A _A =(0)*(1.20)*(1.64' ²) = 0.0 Sq.Ft.
(e) 3-Ericsson RRUS-8843 (LTEPCS/AWS behind panel)	EPA= C _A *A _A =(0)*(1.20)*(1.37' ²) = 0.0 Sq.Ft.
(e) 3-Ericsson RRUS-4478 (LTE700b14 behind panel)	EPA= C _A *A _A =(0)*(1.20)*(1.53' ²) = 0.0 Sq.Ft.
(P) 3- Commscope IONM23SDARS	EPA= C_A*A_A=(3)*(1.2)*(1.36'²)= 1.6 Sq.Ft.
(P) 3- Commscope CBC23SR43	EPA= C_A*A_A=(3)*(1.2)*(0.52'²)= 0.6 Sq.Ft.
(e) 2-DC64860188F, 2-DC6486008F (Mounted to platform)	EPA= C _A *A _A =(4)*(1.2)*(2.0' ²) = 9.6 Sq.Ft.

Total AT&T Mobility per Platform proposed install EPA = 178.4 Sq.Ft.

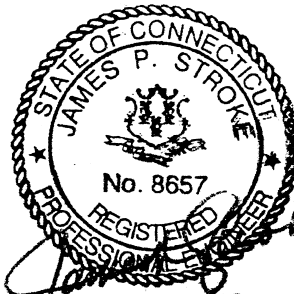
Total Commscope Design (EPA)_A = 210 Sq.Ft. > Total AT&T Install equipment (EPA)_A = 178.4 Sq.Ft. **OK!**

The aforementioned existing & proposed AT&T equipment at tower elevation 120' has a smaller exposed surface area than what the Commscope MCG22HDX14 Top Mount Platform frame was originally designed for (approx. 84%) and therefore can safely support the proposed AT&T loads.

We trust the information presented in this offer will meet your requirements. However, please do not hesitate to contact us if you have any queries, or require any further information regarding this proposal.

Yours very truly


Miguel Nobre



JUL 07 2020

Did you know you can request a refund online for unused Click-N-Ship® labels in your Shipping History? Click [here](#) to learn more.

- Create Label
- Preferences
- Shipping History
- Address Book

Account # 161958927

Label Details

Label Number:
[9405503699300456164416](#)

SCAN® Form: [9475703699300363789200](#)

Terms

Acceptance Cutoff: [07/15/2020 4:30 PM](#)

Acceptance Time: [07/16/2020 2:34 PM](#)

Expected Date: [07/18/2020 11:59 PM](#)

Delivery Status: [Delivered, In/At Mailbox](#)

Label Actions: [2020-07-20 10:12:00.0](#)

[USPS Tracking®](#)
[Ship Again](#)

Need help

[File an insurance claim](#)
[Request A Service Refund](#)

Return Address:
 MORIAH KING
 EMPIRE TELECOM
 16 ESQUIRE RD
 N BILLERICA, MA 01862-2527
 moking@empiretelecomm.com

Package:
 Ship Date: 07/15/20
 Value: \$50.00
 Weight: 1 lbs 0 oz
 From: 01862
 Label Type: Batch

Delivery Address:
 120 UNIVERSAL DRIVE ASSOCIATES, LLC
 120 UNIVERSAL DR
 NORTH HAVEN, CT 06473-3630

Service:
 Priority Mail® 2-Day
 USPS Tracking®

Transaction Number: [499874194](#)
Transaction Type: Label
Payment Method: VISA-4325
Payment Status: Account Charged

Postage Cost: \$7.50
 USPS Tracking®: Free
Label Total: \$7.50
Order Total: \$22.50

Timestamp	Message
07-15-2020 10:51:28	LABEL PRINTED
07-15-2020 10:51:19	Getting Payment
07-15-2020 10:51:06	Setting Payment

Tracking for this label is available until November 12, 2020. Need to keep Tracking history longer? Find out if your label is eligible for [Premium Tracking today!](#)

[Back to Shipping History](#)

Feedback

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- Create Label
- Preferences
- Shipping History
- Address Book

Account # 161958927

Label Details

Label Number:

[9405503699300457728730](#)

SCAN® Form: [9475703699300363976594](#)

Terms

Acceptance Cutoff: **07/16/2020 4:30 PM**

Acceptance Time: **07/16/2020 2:34 PM**

Expected Date: **07/17/2020 11:59 PM**

Delivery Status: **Delivered, Front Desk/Reception/Mail Room**

Label Actions
2020-07-17 09:06:00.0

[USPS Tracking®](#)
[Ship Again](#)

Need help

[File an insurance claim](#)
[Request A Service Refund](#)

Return Address:

MORIAH KING
EMPIRE TELECOM
16 ESQUIRE RD
N BILLERICA, MA 01862-2527
moking@empiretelecomm.com

Delivery Address:

CROWN CASTLE
12 GILL ST STE 5800
WOBURN, MA 01801-1765

Package:

Ship Date: 07/16/20
Value: \$50.00
Weight: 1 lbs 0 oz
From: 01862

Service:

Priority Mail® 1-Day
USPS Tracking®

Feedback

Transaction Number: [499999417](#)

Transaction Type: Label

Payment Method: VISA-4325

Payment Status: Account Charged

Postage Cost **\$7.50**
USPS Tracking® **Free**

Label Total: \$7.50

Order Total: \$7.50

Timestamp	Message
07-16-2020 10:39:12	LABEL PRINTED
07-16-2020 10:38:30	Getting Payment
07-16-2020 10:38:13	Setting Payment

Tracking for this label is available until November 13, 2020. Need to keep Tracking history longer? Find out if your label is eligible for [Premium Tracking today!](#)

[Back to Shipping History](#)

Account # 161958927

Label Details

Label Number:
[9405503699300456164386](#)

SCAN® Form: 9475703699300363789200

Terms
Acceptance Cutoff: 07/15/2020 4:30 PM
Acceptance Time: 07/16/2020 2:34 PM
Expected Date: 07/18/2020 11:59 PM
Delivery Status: Delivered, Left with Individual
Label Actions 2020-07-20 10:27:00.0

[USPS Tracking®](#)
[Ship Again](#)

Need help

[File an insurance claim](#)
[Request A Service Refund](#)

Return Address:
 MORIAH KING
 EMPIRE TELECOM
 16 ESQUIRE RD
 N BILLERICA, MA 01862-2527
 moking@empiretelecomm.com

Delivery Address:
 MICHAEL J FREDA
 TOWN OF NORTH HAVEN SELECTMAN'S OFFICE
 18 CHURCH ST
 NORTH HAVEN, CT 06473-2503

Package:
 Ship Date: 07/15/20
 Value: \$50.00
 Weight: 1 lbs 0 oz
 From: 01862
 Label Type: Batch

Service:
 Priority Mail® 2-Day
 USPS Tracking®

Transaction Number: 499874194
Transaction Type: Label
Payment Method: VISA-4325
Payment Status: Account Charged

Postage Cost \$7.50
 USPS Tracking® Free
Label Total: \$7.50
Order Total: \$22.50

Timestamp	Message
07-15-2020 10:51:26	LABEL PRINTED
07-15-2020 10:51:19	Getting Payment
07-15-2020 10:51:06	Setting Payment

Tracking for this label is available until November 12, 2020. Need to keep Tracking history longer? Find out if your label is eligible for [Premium Tracking today!](#)

[Back to Shipping History](#)

Feedback

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- Create Label
- Preferences
- Shipping History
- Address Book

Account # 161958927

Label Details

Label Number:

[9405503699300456164393](#)

SCAN® Form: [9475703699300363789200](#)

Terms

Acceptance Cutoff: [07/15/2020 4:30 PM](#)

Acceptance Time: [07/16/2020 2:34 PM](#)

Expected Date: [07/18/2020 11:59 PM](#)

Delivery Status: [Delivered, Left with Individual](#)

Label Actions [2020-07-20 10:27:00.0](#)

[USPS Tracking®](#)
[Ship Again](#)

Need help

[File an insurance claim](#)
[Request A Service Refund](#)

Return Address:

MORIAH KING
EMPIRE TELECOM
16 ESQUIRE RD
N BILLERICA, MA 01862-2527
moking@empiretelecomm.com

Package:

Ship Date: 07/15/20
Value: \$50.00
Weight: 1 lbs 0 oz
From: 01862
Label Type: Batch

Delivery Address:

LAURA MAGARACI
TOWN OF NORTH HAVEN ZONING
ENFORCEMENT
18 CHURCH ST
NORTH HAVEN, CT 06473-2503

Service:

Priority Mail® 2-Day
USPS Tracking®

Transaction Number: [499874194](#)

Transaction Type: Label

Payment Method: VISA-4325

Payment Status: Account Charged

Postage Cost \$7.50
USPS Tracking® Free

Label Total: **\$7.50**

Order Total: **\$22.50**

Timestamp	Message
07-15-2020 10:51:27	LABEL PRINTED
07-15-2020 10:51:19	Getting Payment
07-15-2020 10:51:06	Setting Payment

Tracking for this label is available until November 12, 2020. Need to keep Tracking history longer? Find out if your label is eligible for [Premium Tracking today!](#)

[Back to Shipping History](#)

Feedback