Transcend Wireless

10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

April 20, 2018

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

T-Mobile Northeast LLC – CTHA174A
Tower Share Application
33 Mitchell Drive, Manchester, CT 06040
Latitude- 41.79730280
Longitude- -72.51194400

Dear Ms. Bachman,

This letter and attachments are submitted on behalf of T-Mobile Northeast LLC ("T-Mobile"). T-Mobile plans to install antennas and related equipment at the tower site located at 33 Mitchell Drive in Manchester, Connecticut. This tower was originally approved by the Town of Manchester via Special Exception Application on November 19, 2012.

T-Mobile will install twelve (12) 600/700/1900/2100 MHz panel antennas, one (1) microwave dish antenna, four (4) tower-mounted amplifiers, and four (4) RRHs at the 140' level of the existing 170' lattice tower. Four (4) hybrid cables and nine (9) coax cables will also be installed. T-Mobile's equipment cabinets will be placed on a new concrete pad within the existing ground facility. Included are plans by Centek Engineering, dated March 28, 2018, depicting the planned changes and attached as **Exhibit A**. Also included is a structural analysis prepared by Centek Engineering, dated March 6, 2018, confirming that the existing tower is structurally capable of supporting the proposed equipment. This is attached and detailed in **Exhibit B**.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies 16-50aa, of T-Mobile's intent to share a telecommunications facility pursuant to R.C.S.A. 16-50j-88. In accordance with R.C.S.A., a copy of this letter is being sent to Jay Moran, Mayor of the Town of Manchester, as well as the tower and property owner, Mitchell Drive LLC. Please see the attached letter from Mitchell Drive LLC authorizing the proposed shared use of this facility attached as **Exhibit C**. A copy of this submission is also being sent to Gary Anderson, Director of Planning and Economic Development for the Town of Manchester.

The planned modifications of the facility fall squarely within those activities explicitly provided for in R.C.S.A. 16-50j-89.

1. The proposed modification will not result in an increase in the height of the existing structure. The top of the lattice tower is 170'; T-Mobile's proposed antennas will be located at a center line height of 140'.

2. The proposed modifications will not result in the increase of the site boundary as depicted on the attached site plan.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed local and state criteria. T-Mobile's plans include the installation of an emergency back-up generator; noise associated with this installation is exempt from State and local noise standards. The incremental effect of the proposed changes will be negligible.

4. The operation of the proposed antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard. As indicated in the attached power density calculations, the combined site operations will result in a total power density of 3.90%, as evidenced by **Exhibit D**.

Connecticut General Statutes 16-50aa indicates that the Council must approve the shared use of a telecommunications facility provided it finds the shared use is technically, legally, environmentally, and economically feasible and meets public safety concerns. As demonstrated in this letter, T-Mobile respectfully submits that the shared use of this facility satisfies these criteria.

A. Technical Feasibility. The existing lattice tower has been deemed structurally capable of supporting T-Mobile's proposed loading. The structural analysis is included as **Exhibit B**.
B. Legal Feasibility. As referenced above, C.G.S. 16-50aa has been authorized to issue orders approving the shared use of an existing tower such as this lattice tower in Manchester. Under the authority granted to the Council, an order of the Council approving the requested shared use would permit T-Mobile to obtain a building permit for the proposed installation. Further, a Letter of Authorization is included as **Exhibit C**, authorizing T-Mobile to file this application for shared use.
C. Environmental Feasibility. The proposed shared use of this facility would have minimal environmental impact. The installation of T-Mobile equipment at the 140' level of the existing 170' tower would have an insignificant visual impact on the area around the tower. T-Mobile's ground equipment would be installed on a concrete pad within the existing facility compound. T-Mobile's shared use would therefore not cause any significant alteration in the physical or environmental characteristics of the existing site. Additionally, as evidenced by **Exhibit D**, the proposed antennas would not increase radio frequency emissions to a level at or above the Federal Communications Commission safety standard.
D. Economic Feasibility. T-Mobile will be entering into an agreement with the owner of this facility to mutually agreeable terms. As previously mentioned, the Letter of Authorization has been provided by the owner to assist T-Mobile with this tower sharing application.
E. Public Safety Concerns. As discussed above, the lattice tower is structurally capable of supporting T-Mobile's proposed loading. T-Mobile is not aware of any public safety concerns relative to the proposed sharing of the existing tower. T-Mobile's intentions of providing new and improved wireless service through the shared use of this facility is expected to enhance the safety and welfare of local residents and individuals traveling through Manchester and nearby the facility.

Sincerely,

Kyle Richers

Kyle Richers
Transcend Wireless
10 Industrial Ave., Suite 3
Mahwah, New Jersey
krichers@transcendwireless.com
908-447-4716

CC: Jay Moran- First Selectmen
Mitchell Drive LLC- Owner
Gary Anderson- Zoning Official

T-Mobile

WIRELESS COMMUNICATIONS FACILITY

MANCHESTER
SITE ID: CTHA174A
33 MITCHELL DRIVE
MANCHESTER, CT 06040

PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK CONSISTS OF THE INSTALLATION OF A PROPOSED UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:
   - A. THE INSTALLATION OF TWELVE (12) NEW T–MOBILE PANEL ANTENNAS, THREE (3) PER SECTOR AND (1) MICROWAVE DISH.
   - B. THE INSTALLATION OF TWELVE (12) NEW T–MOBILE REMOTE RADIO UNITS, ONE (1) PER SECTOR.
   - C. THE INSTALLATION OF THREE (3) NEW T–MOBILE FIBER CABLES, AND (8) 1–5/8"ø COAX CABLES FROM EQUIPMENT SHELTER AT GRADE TO ANTENNA SECTORS.
   - D. THE INSTALLATION OF A NEW T–MOBILE 15kW DIESEL FUELED GENERATOR.
   - E. THE INSTALLATION OF T–MOBILE WIRELESS EQUIPMENT ON A PROPOSED ±10'x20' (200 SF.) CONCRETE SLAB ON GRADE.

PROJECT INFORMATION

SITE NAME:	MANCHESTER
SITE ID:	CTHA174A
SITE ADDRESS:	33 MITCHELL DRIVE MANCHESTER, CT 06040
APPLICANT:	T–MOBILE NORTHEAST, LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002
CONTACT PERSON:	DAN REID (PROJECT MANAGER) TRANSCEND WIRELESS, LLC (203) 592–8291
ENGINEER:	CENTEK ENGINEERING, INC. 63–2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41°–47'–50.20" N LONGITUDE: 72°–30'–42.97" W GROUND ELEVATION: 228.7'± AMSL COORDINATES AND GROUND ELEVATION BASED ON FAA 2–C SURVEY CERTIFICATION PREPARED BY CENTEK ENGINEERING, INC. DATED MARCH 13, 2018

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T–1	TITLE SHEET	C
N–1	DESIGN BASIS AND STRUCTURAL SPECIFICATIONS	C
C–1	SITE LOCATION PLAN	C
C–2	COMPOUND PLAN, EQUIPMENT LAYOUT PLAN	C
	AND ANTENNA MOUNTING CONFIG.	
C–3	ELEVATIONS	C
C–4	EQUIPMENT DETAILS	C
C–5	TYPICAL DETAILS	C
S–1	STRUCTURAL DETAILS	C
E–1	COMPOUND UTILITY PLAN	C
E–2	ELECTRICAL RISER DIAGRAM AND NOTES	C
E–3	ELECTRICAL SCHEMATIC RISER DIAGRAM	C
E–4	ELECTRICAL GROUNDING PLAN	C
E–5	ELECTRICAL DETAILS	C
E–6	ELECTRICAL DETAILS	C
E–7	ELECTRICAL SPECIFICATIONS	C

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2012 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2016 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA–222 REVISION "G" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2016 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
3. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD–OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
4. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
5. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
6. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS–BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
7. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
8. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
9. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
10. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
11. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
12. ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE T–MOBILE CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON–SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
14. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
15. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
16. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
17. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
18. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1–800–922–4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
19. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

SITE DIRECTIONS

FROM: 35 GRIFFIN ROAD SOUTH, BLOOMFIELD, CT 06002

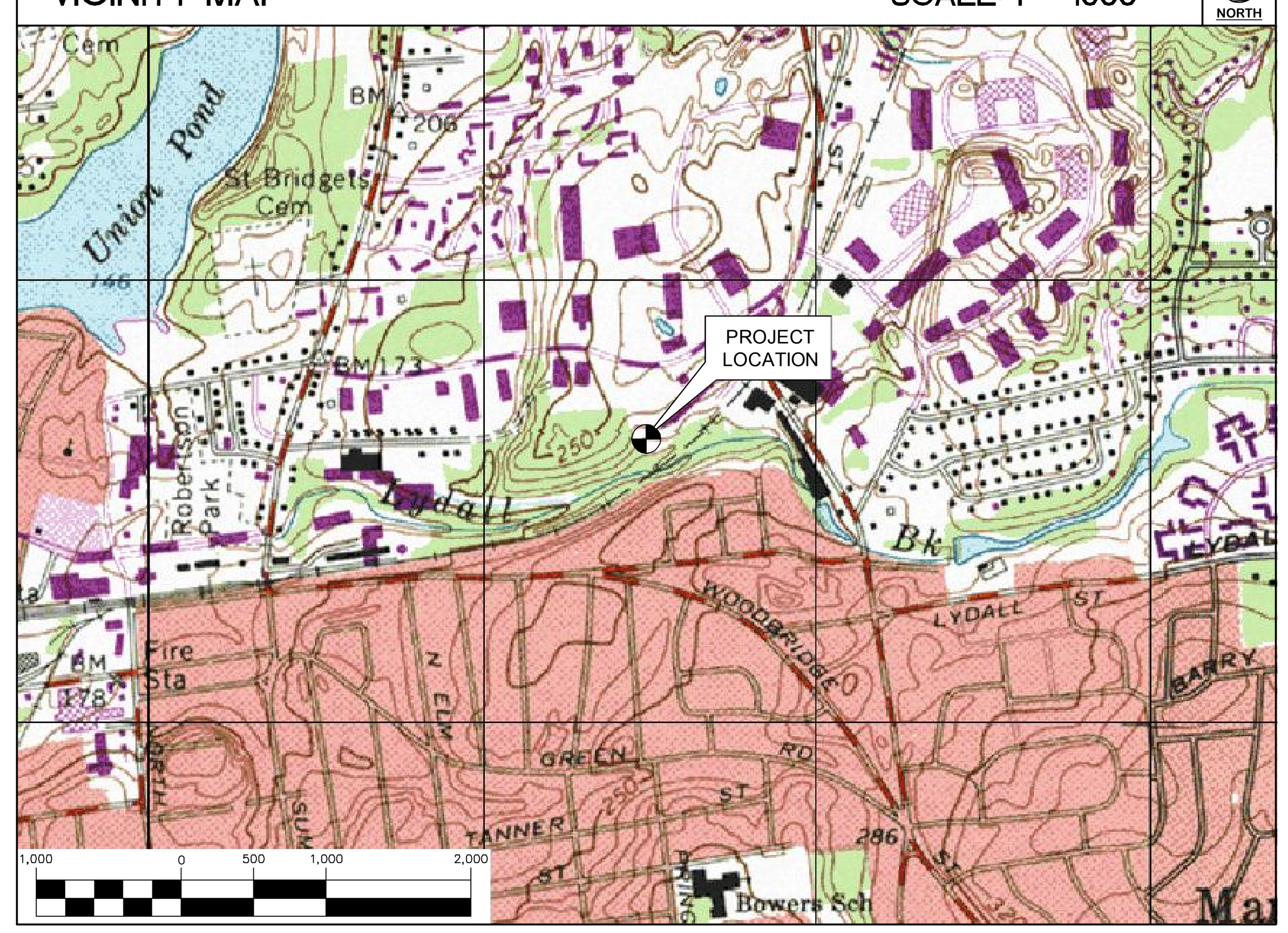
TO: 33 MITCHELL DRIVE, MANCHESTER, CT 06040

1.	HEAD SOUTHEAST ON W NEWBERRY RD TOWARD GRIFFIN RD S.	233 FT.
2.	TURN LEFT ONTO GRIFFIN RD S.	0.60 MI.
3.	TURN LEFT ONTO DAY HILL RD.	3.60 MI.
4.	USE THE RIGHT LANE TO MERGE ONTO I–91 S VIA THE RAMP TO HARTFORD.	0.40 MI.
5.	MERGE ONTO I–91 S.	3.60 MI.
6.	TAKE EXIT 35A FOR I–291 TOWARD MANCHESTER.	0.60 MI.
7.	CONTINUE ONTO I–291 E.	5.60 MI.
8.	USE THE LEFT LANE TO MERGE ONTO I–84 E TOWARD BOSTON.	3.20 MI.
9.	USE THE 2ND FROM THE RIGHT LANE TO TAKE EXIT 63 FOR CT–30 TOWARD CT–83/S WINDSOR.	0.20 MI.
10.	CONTINUE ONTO CT–83 S.	0.80 MI.
11.	TURN LEFT ONTO SHELDON RD.	0.50 MI.
12.	TURN RIGHT ONTO MITCHELL DRIVE.	171 FT.

VICINITY MAP

SCALE: 1" = 1000'

NORTH



REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
C	04/17/18	CAG	TJL	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
B	04/17/18	CDZ	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
A	04/05/18	LGL	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

T-Mobile

CENTEK engineering
Centered on Solutions
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

T-MOBILE
WIRELESS COMMUNICATIONS FACILITY
CTHA174A
33 MITCHELL DRIVE
MANCHESTER, CT 06040

DATE: 04/02/18
SCALE: AS NOTED
JOB NO. 18034.00

TITLE SHEET

T-1

Sheet No. 1 of 13

SITE AND FOUNDATION SPECIFICATIONS

DESIGN BASIS:

GOVERNING CODE: 2012 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2016 CT STATE BUILDING CODE AND AMENDMENTS.

1. DESIGN CRITERIA:

- WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS): 97 MPH (3 SECOND GUST)
- RISK CATEGORY: II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 101 MPH (Vasd) (EXPOSURE C/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-10) PER 2012 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE.
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES

1. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.
2. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST THE PRE MANUFACTURED EQUIPMENT BUILDING SHOP DRAWINGS.
3. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
4. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

CONCRETE CONSTRUCTION NOTES

1. CONCRETE CONSTRUCTION SHALL CONFORM TO THE FOLLOWING STANDARDS:

   ACI 211 – STANDARD PRACTICE FOR SELECTING PROPORTIONS FOR NORMAL AND HEAVYWEIGHT CONCRETE.

   ACI 301 – SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS.

   ACI 302 – GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION

   ACI 304 – RECOMMENDED PRACTICE FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE.

   ACI 306.1 STANDARD SPECIFICATION FOR COLD WEATHER CONCRETING

   ACI 318 – BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE.

2. CONCRETE SHALL DEVELOP COMPRESSIVE STRENGTH IN 28 DAYS AS FOLLOWS:

SLABS ON GRADE	4,000 PSI
ALL OTHER CONCRETE	3,000 PSI

   - PORTLAND CEMENT: ASTM C150, TYPE II, (540 LBS/CUBIC YARD)
   - AGGREGATE: ASTM C33, No. 67, TYPICAL
   - WATER: POTABLE WITH MAXIMUM WATER CEMENT RATIO OF .55
   - SLUMP: 3" TO 4"
   - ADMIXTURES: USE AIR ENTRAINING ADGENT CONFORMING TO ASTM C260 WITH 4 TO 6% TOTAL AIR. USE WATER REDUCING AGENT CONFORMING TO ASTM C494, TYPE A, IN ALL CONCRETE. CALCIUM CHLORIDE MAY NOT BE USED TO ACCELERATE THE CONCRETE SETTING TIME.

3. REINFORCING STEEL SHALL BE 60,000 PSI YIELD STRENGTH.
4. WELDED WIRE FABRIC SHALL CONFORM TO ASTM- A-185.
5. ALL DETAILING, FABRICATION, AND ERECTION OF REINFORCING BARS, UNLESS OTHERWISE NOTED, MUST FOLLOW THE LATEST ACI CODE AND LATEST ACI "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES".
6. CONCRETE COVER OVER REINFORCING SHALL CONFORM TO THE FOLLOWING, UNLESS OTHERWISE SHOWN:

BOTTOM OF FOOTINGS	3 INCHES
SURFACES NOT EXPOSED TO EARTH OR WEATHER	1-1/2 INCHES

7. NO STEEL WIRE, METAL FORM TIES, OR ANY OTHER METAL SHALL REMAIN WITHIN THE REQUIRED COVER OF ANY CONCRETE SURFACE.
8. ALL REINFORCEMENT SHALL BE CONTINUOUS UNLESS OTHERWISE NOTED. SPLICES SHALL BE WELL STAGGERED. ADDITIONAL BARS AND SPECIAL BENDING DETAILS ARE REQUIRED AT INTERSECTING WALLS AND AT JOINTS. SUCH DETAILS SHALL COMPLY WITH ACI 315 RECOMMENDATIONS UNLESS OTHERWISE SHOWN.
9. NO TACK WELDING OF REINFORCING WILL BE PERMITTED.
10. NO CALCIUM CHLORIDE OR ADMIXTURES CONTAINING MORE THAN 1% CHLORIDE BY WEIGHT OF ADMIXTURE SHALL BE USED IN THE CONCRETE.
11. UNLESS OTHERWISE NOTED, ALL LAP SPLICES SHALL BE 48 BAR DIAMETERS.
12. SLAB ON GRADE FINISHES:

    EXTERIOR SLAB: NON-SLIP BROOM FINISH
    INTERIOR SLAB: STEEL TROWEL FINISH

13. INSPECTION AND TESTING OF CONCRETE WORK SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY, PAID BY THE OWNER, AND APPROVED BY THE ENGINEER. THE INSPECTOR SHALL OBSERVE CONDITION OF SOILS AND FORMWORK BEFORE FOOTINGS ARE PLACED, SIZE, SPACING AND LOCATION OF REINFORCEMENT, AND PLACEMENT OF CONCRETE.
14. THE TESTING COMPANY SHALL ALSO OBTAIN A MINIMUM OF THREE (3) COMPRESSIVE STRENGTH TEST SPECIMENS FOR EACH CONCRETE MIX DESIGN. ONE SPECIMEN TESTED AT 7 DAYS, ONE AT 28 DAYS, AND ONE HELD IN RESERVE FOR FUTURE TESTING, IF NEEDED.
15. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE---ASTM A53 (FY = 35 KSI)
   F. CONNECTION BOLTS---ASTM A325-N
   G. U-BOLTS---ASTM A36
   H. ANCHOR RODS---ASTM F 1554
   I. WELDING ELECTRODE---ASTM E 70XX

2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
C	04/17/18	CAG	TJL	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
B	04/17/18	CDZ	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
A	04/05/18	LGL	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT * LICENSED PROFESSIONAL ENGINEER * TIMOTHY J. LOUCKS 21647

T-Mobile

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

T-MOBILE

WIRELESS COMMUNICATIONS FACILITY

CTHA174A

33 MITCHELL DRIVE
MANCHESTER, CT 06040

DATE: 04/02/18
SCALE: AS NOTED
JOB NO. 18034.00

DESIGN BASIS AND STRUCTURAL SPECIFICATIONS

N-1

1 / C-1 SITE LOCATION PLAN
SCALE: 1" = 100'

APPROX. NORTH

GRAPHIC SCALE
100 0 50 100 200 400
(IN FEET)
1 inch = 100 ft.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
C	04/17/18	CAG	TJL	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
B	04/17/18	CDZ	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
A	04/05/18	LGL	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL
STATE OF CONNECTICUT ★ TIMOTHY J. LEONARD ★ 27917 ★ LICENSED PROFESSIONAL ENGINEER

T-Mobile

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

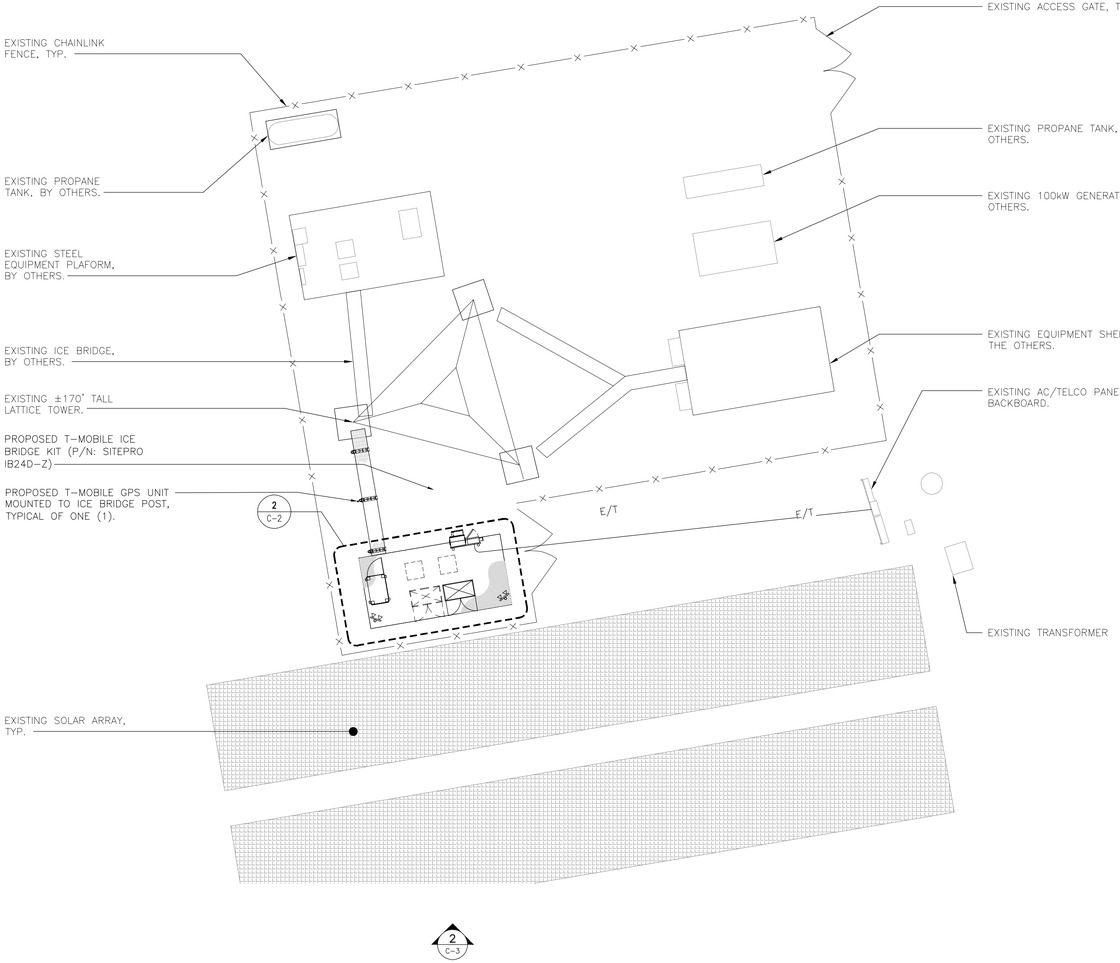
T-MOBILE
WIRELESS COMMUNICATIONS FACILITY
CTHA174A
33 MITCHELL DRIVE
MANCHESTER, CT 06040

DATE: 04/02/18
SCALE: AS NOTED
JOB NO. 18034.00

SITE LOCATION PLAN

C-1

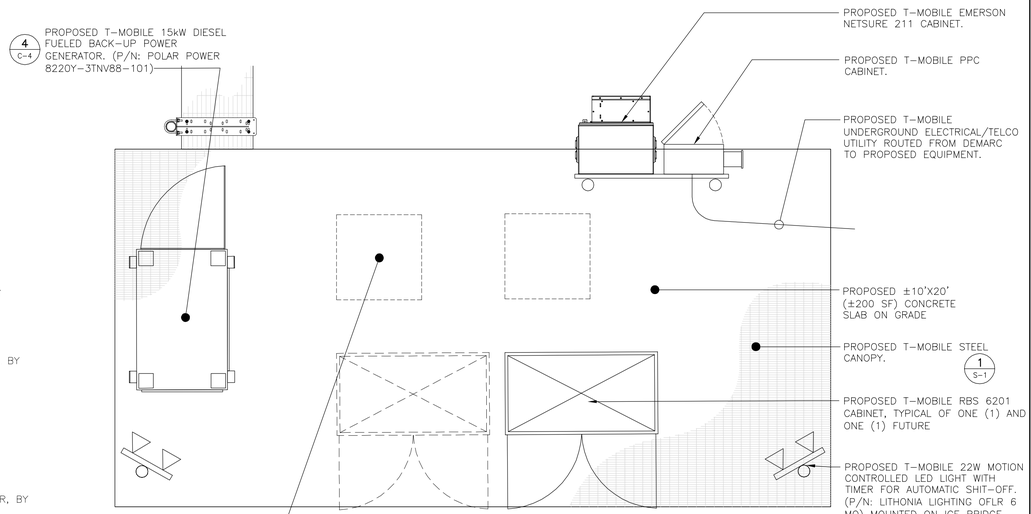
Sheet No. 3 of 13



1 C-2 **COMPOUND PLAN**
SCALE: 1" = 10'

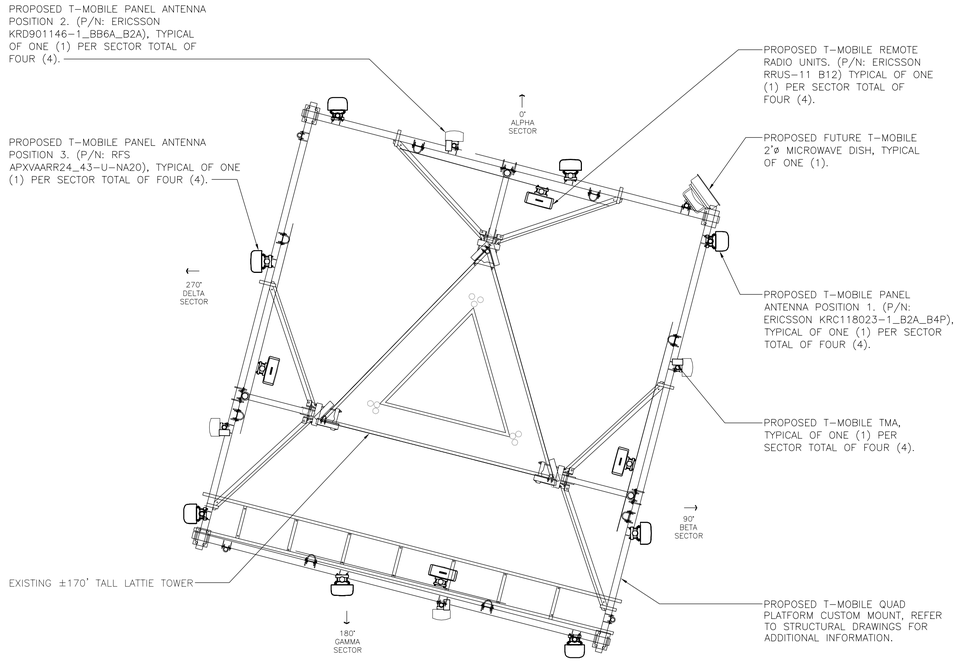
TRUE NORTH

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



3 C-2 **EQUIPMENT LAYOUT PLAN**
SCALE: 1/2" = 1'-0"

TRUE NORTH



3 C-2 **ANTENNA MOUNTING CONFIGURATION PLAN**
SCALE: 1/4" = 1'-0"

TRUE NORTH

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
C	04/17/18	CAG	TJL	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
B	04/17/18	CDZ	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
A	04/05/18	LGL	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT * LICENSED PROFESSIONAL ENGINEER * GARRIA 27917

T-Mobile

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

T-MOBILE

WIRELESS COMMUNICATIONS FACILITY

CTHA174A

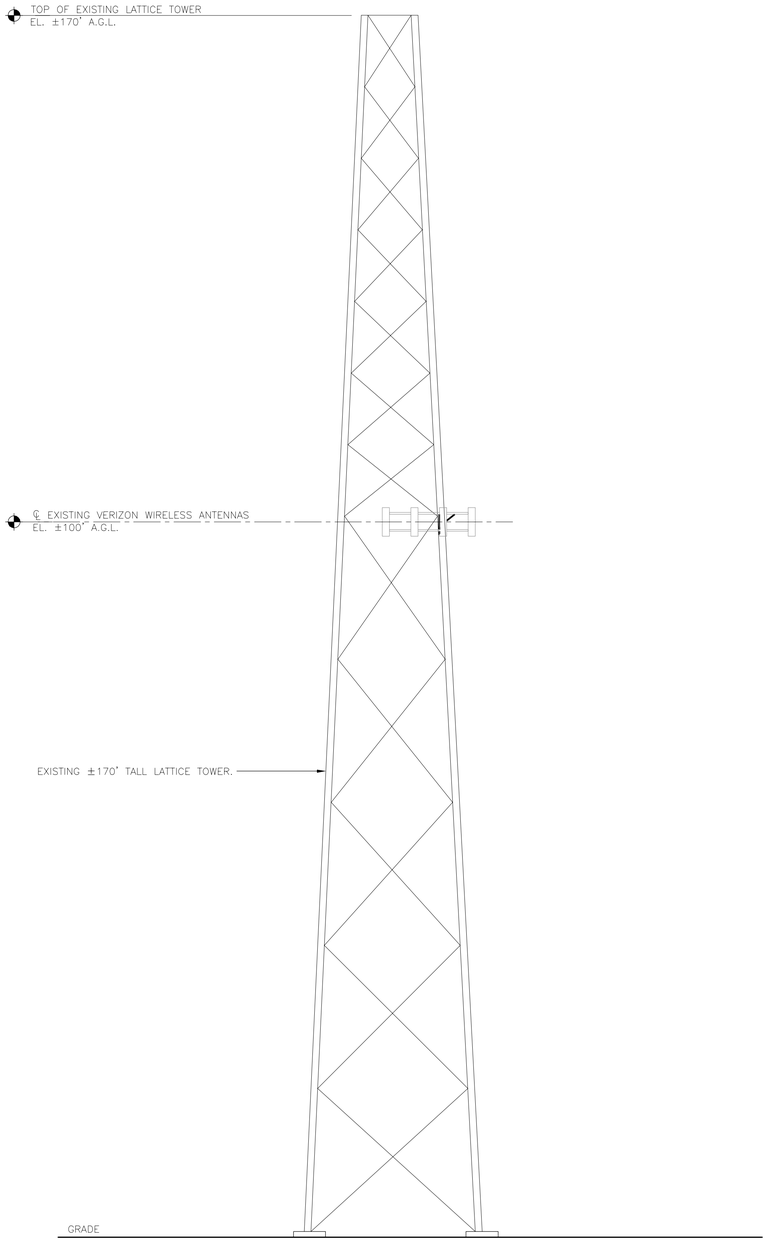
33 MITCHELL DRIVE
MANCHESTER, CT 06040

DATE: 04/02/18
SCALE: AS NOTED
JOB NO. 18034.00

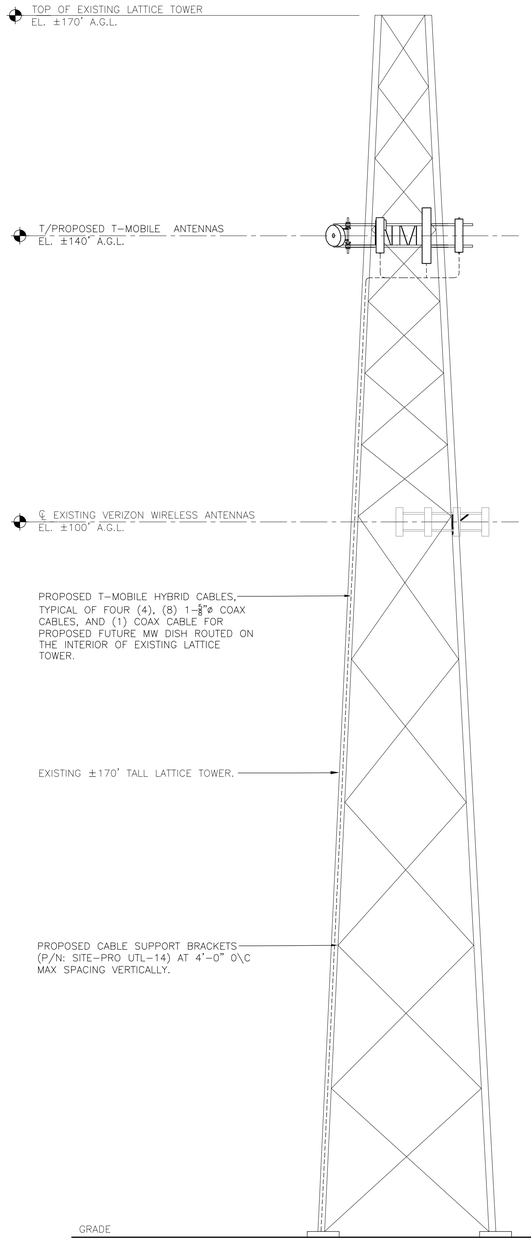
COMPOUND PLAN, EQUIP. LAYOUT AND ANTENNA MOUNTING CONFIG.

C-2

Sheet No. 4 of 13



1 C-3 **EXISTING ELEVATION**
SCALE: 1" = 10'



2 C-3 **PROPOSED ELEVATION**
SCALE: 1" = 10'

TOWER STRUCTURAL NOTES:

1. REFER TO STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING, INC., PROJ. NO. 18034.00, DATED MARCH 6, 2018 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
2. ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS PROVIDED BY CENTEK ENGINEERING, INC. AND FINAL T-MOBILE RF DATA SHEET.

NOTES:

1. A.G.L. = ABOVE GRADE LEVEL
2. GROUND EQUIPMENT NOT SHOWN FOR CLARITY.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
C	04/17/18	CAG	TJL	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
B	04/17/18	CDZ	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
A	04/05/18	LGL	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT · LICENSED PROFESSIONAL ENGINEER · GARRETT A. CARLSON · 27017

T-Mobile

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

T-MOBILE

WIRELESS COMMUNICATIONS FACILITY

CTHA174A

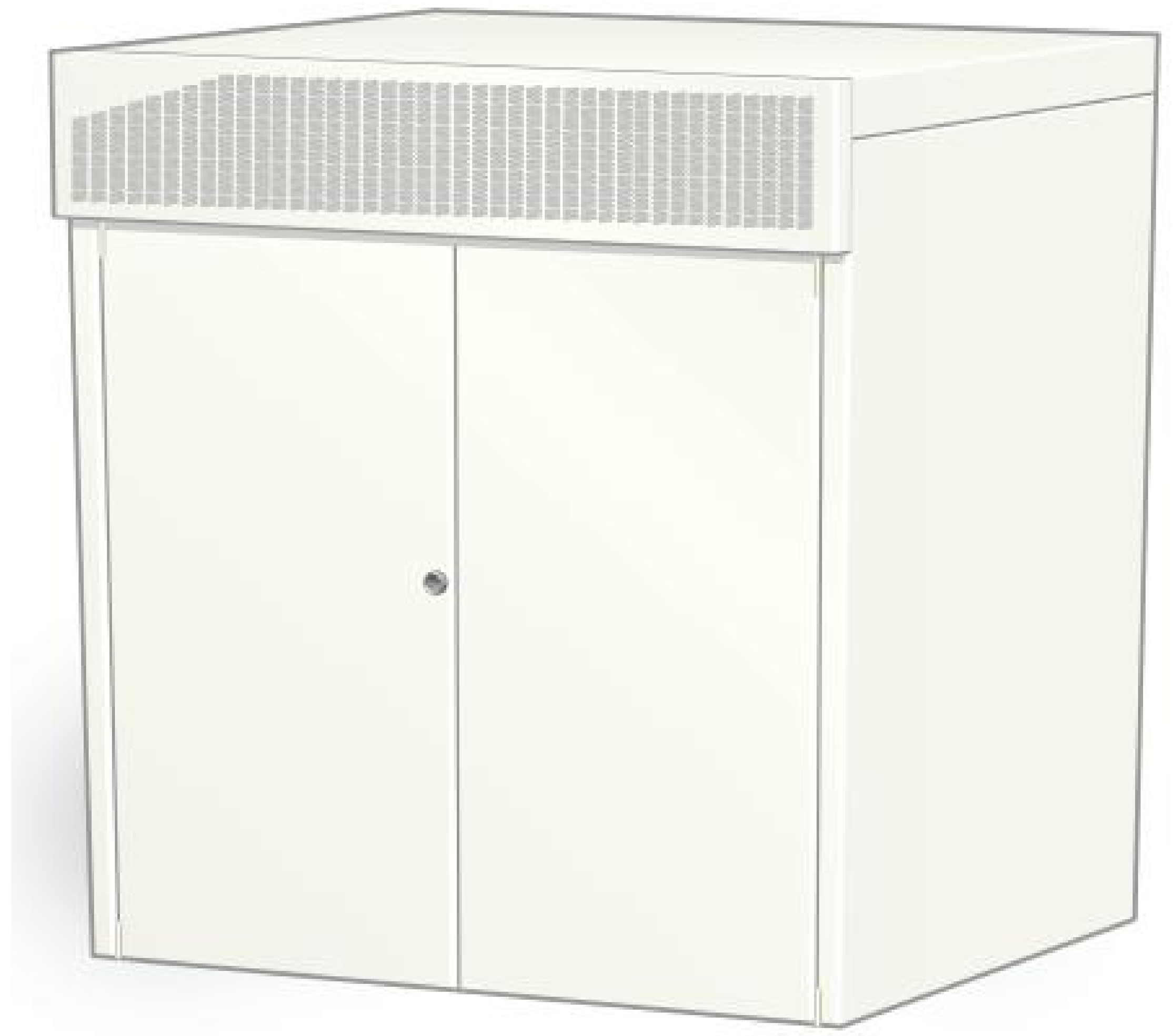
33 MITCHELL DRIVE
MANCHESTER, CT 06040

DATE: 04/02/18
SCALE: AS NOTED
JOB NO. 18034.00

ELEVATIONS

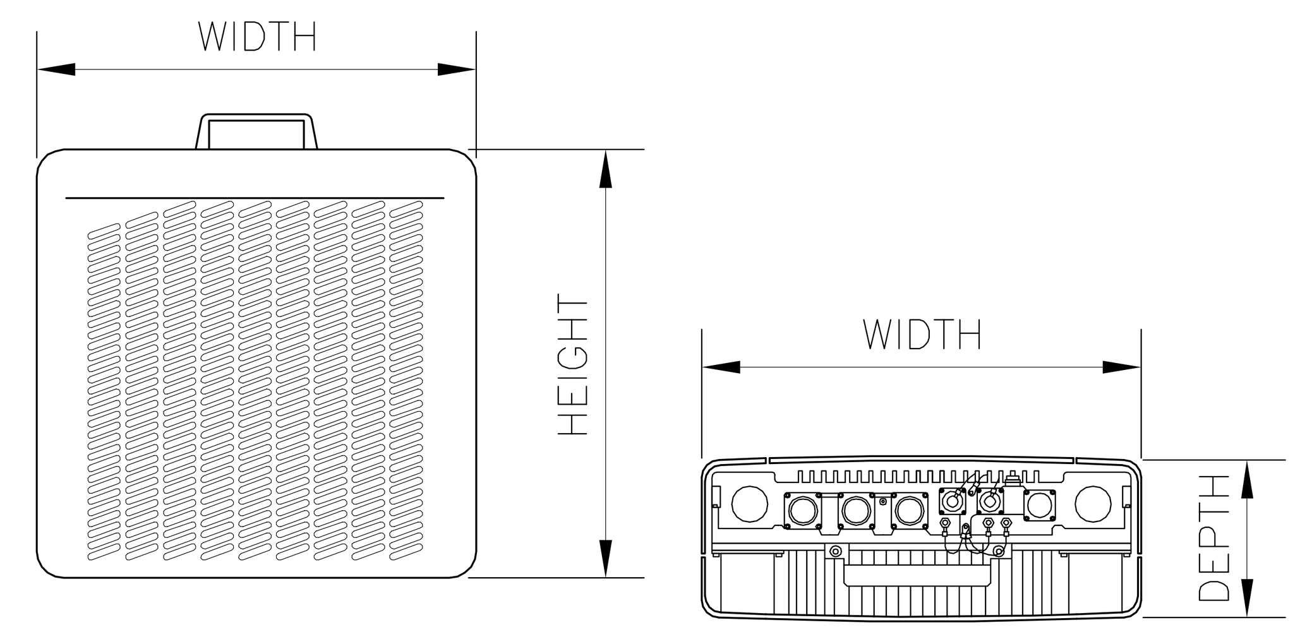
C-3

Sheet No. 5 of 13



EQUIPMENT CABINET		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: 6102	57.09"H x 51.18"W x 27.56"D	727.53–LBS

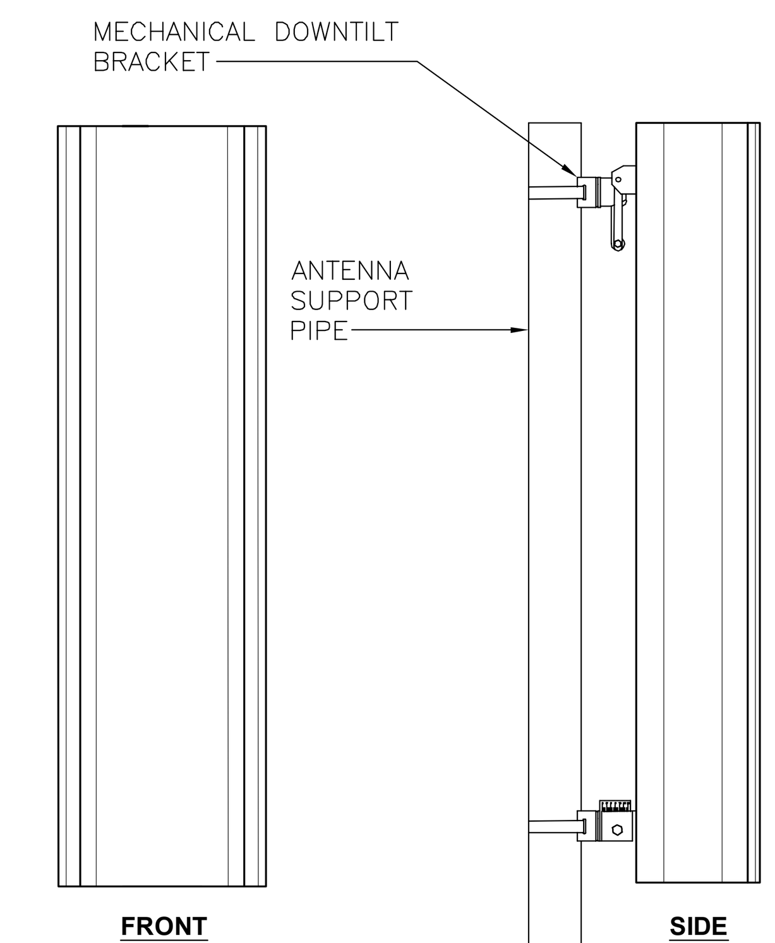
3 (C-4) ERICSSON RADIO CABINET DETAIL
SCALE: NTS



RRH (REMOTE RADIO HEAD)		
EQUIPMENT	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RRU 11 B12	50.0 LBS	ABOVE: 12" MIN. BELOW: 12" MIN. FRONT: 36" MIN.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.

2 (C-4) REMOTE RADIO HEAD (RRH) DETAIL
SCALE: NTS




AIR-21 KRC

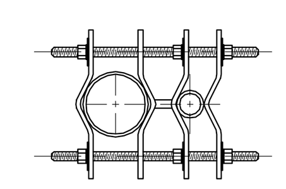

AIR-32 KRD

ALPHA/BETA/GAMMA/DELTA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: KRD901146–1_B66A_B2A	56.6"H x 12.9"W x 8.7"D	132.2–LBS
MAKE: RFS MODEL: APXVAA24_43–U–NA20	95.9"H x 24"W x 8.5"D	99–LBS
MAKE: ERICSSON MODEL: KRC118023–1_B2A_B4P	56.0"H x 12.1"W x 7.9"D	91.5–LBS

1 (C-4) PROPOSED ANTENNA DETAIL
SCALE: NTS

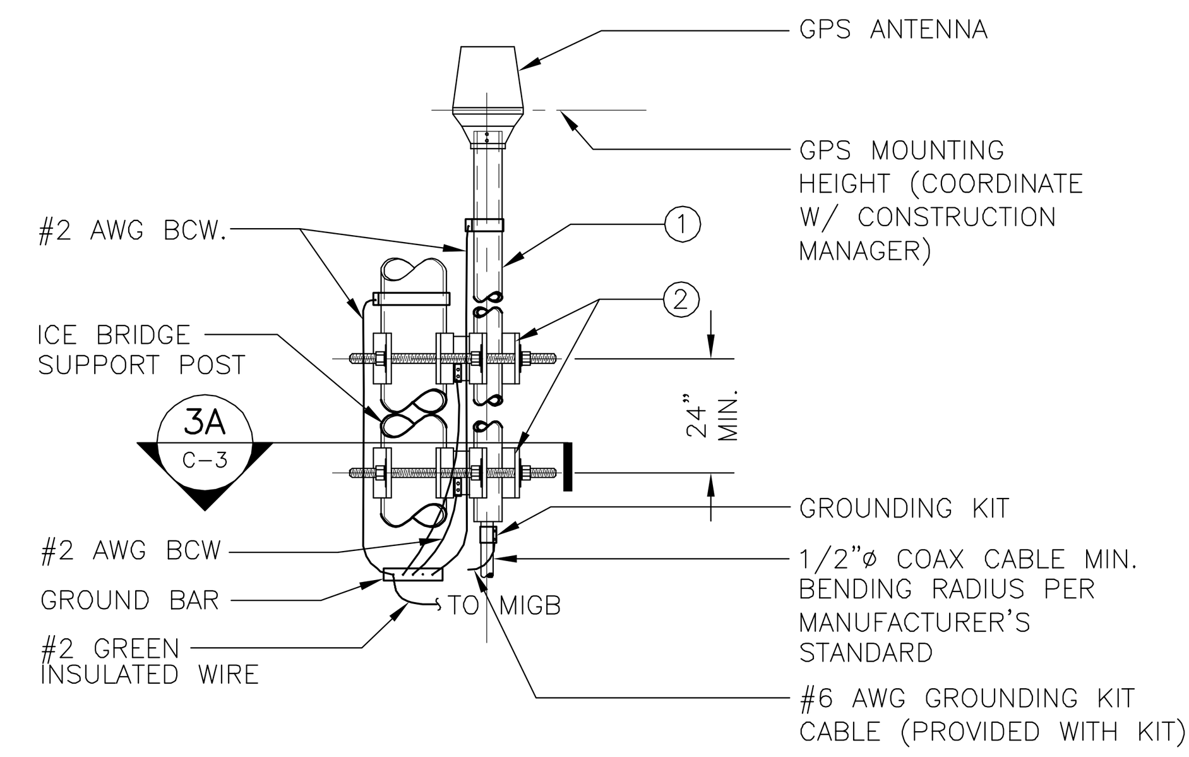
NOTES:
1. INSTALL ANTENNA TO PIPE MAST USING MANUFACTURERS SUPPLIED BRACKETS AND MOUNTING HARDWARE
2. SET MECHANICAL DOWNTILT TO VALUE SPECIFIED IN LATEST RFDS

BILL OF MATERIALS		
ITEM	DESCRIPTION	QUANTITY
①	2–1/2"ø SCH. 40 x 8'–0" LG. MAX SS OR GALV. PIPE	1
②	UNIVERSAL CLAMP SET.	2



5A (C-4) PLAN VIEW
NOT TO SCALE

NOTES:
1. THE ELEVATION AND LOCATION OF THE GPS ANTENNA SHALL BE IN ACCORDANCE WITH THE FINAL RF REPORT AND COORDINATED WITH VERIZON WIRELESS CONSTRUCTION MANAGER.
2. THE GPS ANTENNA MOUNT IS DESIGNED TO FASTEN TO A STANDARD 2–1/2" DIAMETER, SCHEDULE 40, GALVANIZED STEEL OR STAINLESS STEEL PIPE. THE PIPE MUST NOT BE THREADED AT THE ANTENNA MOUNT END. THE PIPE SHALL BE CUT TO THE REQUIRED LENGTH (MINIMUM OF 24 INCHES) USING A HAND OR ROTARY PIPE CUTTER TO ASSURE A SMOOTH AND PERPENDICULAR CUT. A HACK SAW SHALL NOT BE USED. THE CUT PIPE END SHALL BE DEBURRED AND SMOOTH IN ORDER TO SEAL AGAINST THE NEOPRENE GASKET ATTACHED TO THE ANTENNA MOUNT.
3. PRIOR TO INSTALLATION CONTRACTOR SHALL TEST GPS LOCATION WITH HAND HELD AND MOVE GPS ANTENNA TO OTHER ICE BRIDGE POSTS AS REQUIRED TO ACHIEVE ADEQUATE SIGNAL. FAILURE TO ACHIEVE ADEQUATE SIGNAL WITH A HAND HELD GPS SHALL BE REPORTED TO CONSTRUCTION MANAGER AND ENGINEER TO DETERMINE ALTERNATE INSTALLATION LOCATION FOR GPS ANTENNA.

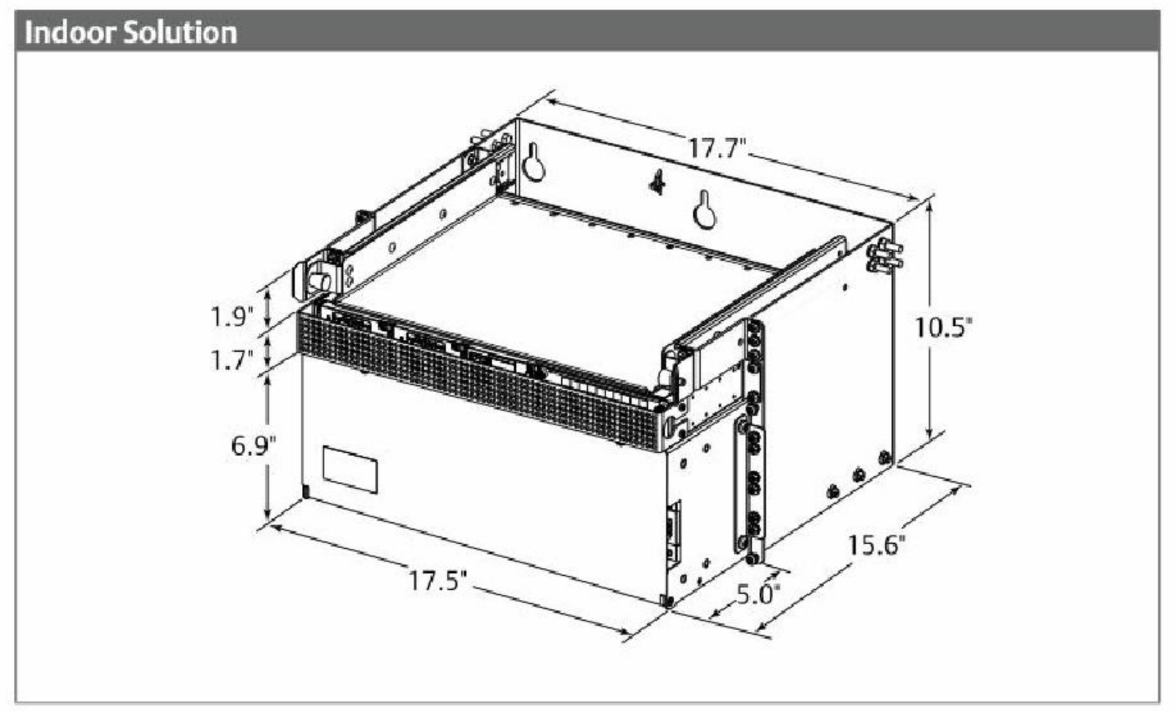


GPS ANTENNA MOUNTING BRACKET

5 (C-4) GPS GROUNDING/MOUNTING BRACKET DETAILS
NOT TO SCALE

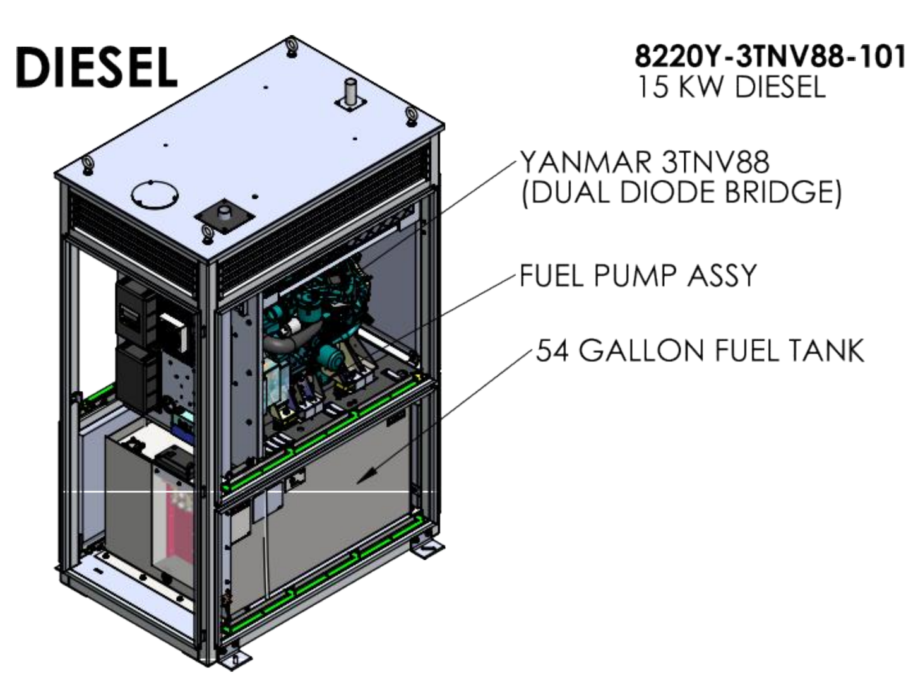
Electrical	Indoor Solution	Outdoor Solution
System Voltage, Nominal	120 VAC single phase	
Output Voltage	-42 VDC to -58 VDC	
System Capacity	19" 1 RU up to 10 A	19" 1 RU up to 8 A
Rectifier Capacity	0.5 kW @ 120 VAC	0.4 kW @ 120 VAC
DC Distribution	(1) wallmount 10 position GMT type fuse panel with (10) GMT fuses, up to 15 A	
Controller	SCU+ controller	
Physical Characteristics		
Framework Type	Relay rack	NetXtend™ Compact Enclosure
Available Space	1 RU 19" W	Up to 14 RU, 19" W
Dimensions (H x W x D)	DC power system: 1.7" x 19" x 12" Solution: 10.5" x 19" x 15.6"	Enclosure: 24" x 24" x 16" Battery tray: 22' W x 13" D
Mounting	Rack or wall mount	Wall or H-frame, pole mount (wall-mount kit included)
Weight, Equipped	System: 35.5 lb., w/out batteries Four (4) batteries: 36 lb. total	Enclosure: 64 lb., w/out batteries Four (4) batteries: 36 lb. total
Access	Front for batteries, control and distribution, rear for AC	Front
Environmental		
Climate System	Fan-cooled front to rear	Heat Exchanger
Operating Temp.	-40 °C to +75 °C *	-40 °C to +52 °C
Storage Temp.	-40 °C to +75 °C	-40 °C to +75 °C
Relative Humidity	0% to 95% non-condensing	100%
EMI/RFI	Conforms to FCC rules Part 15, Subpart B, Class B and EN55022 Class B, radiated and conducted	
Safety Compliance	cULus 60950 recognized NEBS Level 3 Compliance	cULus 60950 Recognized NEBS Level 3 Compliance Enclosure: cULus Listed GR-487

Indoor Solution



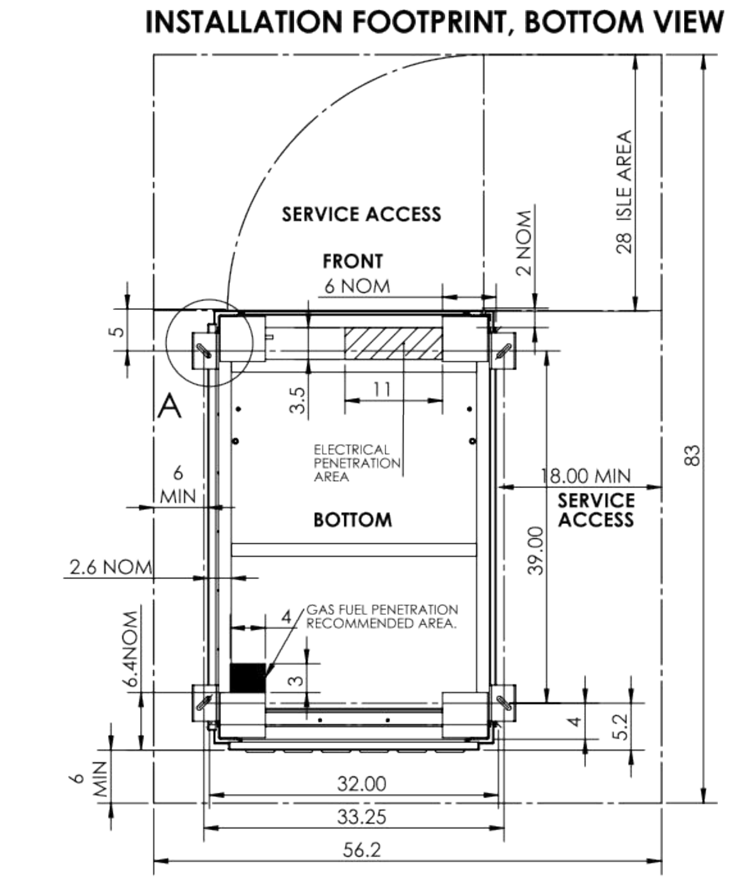
6 (C-4) EMERSON NETSURE POWER SYSTEM (582136600SK010)
SCALE: NTS

DIESEL



ISOMETRIC VIEW

INSTALLATION FOOTPRINT, BOTTOM VIEW



BOTTOM VIEW

DIESEL FUELED BACKUP POWER GENERATOR		
EQUIPMENT	FUEL TANK CAPACITY (GAL)	DIMENSIONS
MAKE: POLAR POWER MODEL: 8220Y–3TNV88–101	54	76.1"H x 31.0"W

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.

4 (C-4) BACK-UP GENERATOR DETAIL
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
C	04/17/18	CAG	TJL	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
B	04/17/18	CDZ	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
A	04/05/18	LGL	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT ★ CAMILO A. GAVIRIA 27517 LICENSED PROFESSIONAL ENGINEER ★

T-Mobile

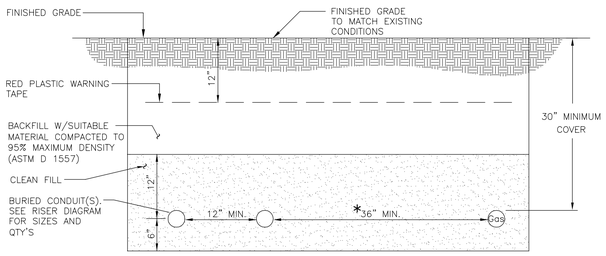
CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

T-MOBILE
WIRELESS COMMUNICATIONS FACILITY
CTHA174A
33 MITCHELL DRIVE
MANCHESTER, CT 06040

DATE: 04/02/18
SCALE: AS NOTED
JOB NO. 18034.00

EQUIPMENT DETAILS

C-4



GENERAL NOTES:

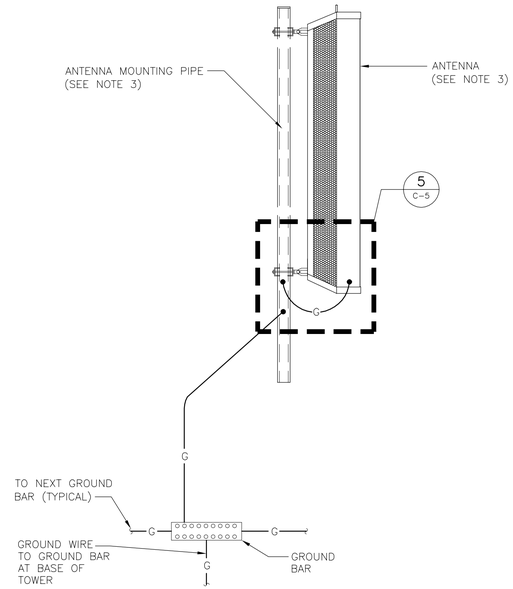
1. THE CLEAN FILL SHALL PASS THROUGH A 3/8" MESH SCREEN AND SHALL NOT CONTAIN SHARP STONES. OTHER BACKFILL SHALL NOT CONTAIN ASHES, CINDERS, SHELLS, FROZEN MATERIAL, LOOSE DEBRIS OR STONES LARGER THAN 2" IN MAXIMUM DIMENSION.
2. WHERE EXISTING UTILITIES ARE LIKELY TO BE ENCOUNTERED, CONTRACTOR SHALL HAND DIG AND PROTECT EXISTING UTILITIES.

* NATURAL GAS NOTES:

1. DPUC REGULATIONS PROHIBIT INSTALLATION OF GAS MAINS IN THE SAME TRENCH AS OTHER UTILITIES. GAS SERVICES MAY BE INSTALLED IN THE SAME TRENCH AS OTHER UTILITIES EXCEPT FOR SEWER LINES.
2. A MINIMUM 12" HORIZONTAL CLEARANCE IS REQUIRED BETWEEN GAS AND WATER SERVICES, AND 3 FEET SEPARATION BETWEEN GAS SERVICES AND ELECTRIC, TELEPHONE OR CABLE TV SERVICES.

3 C-5 TYPICAL UTILITY TRENCH DETAIL

NOT TO SCALE

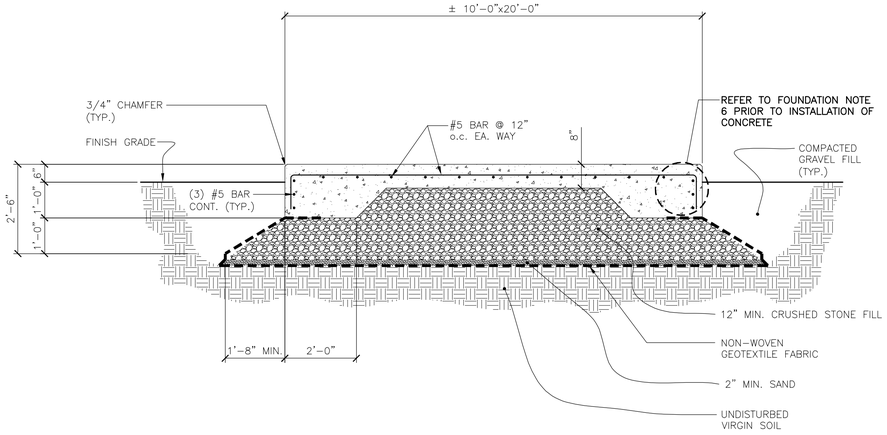


NOTES:

1. BOND COAXIAL CABLE GROUND KITS TO EACH OWNER'S GROUND BAR ALONG ENTIRE COAX RUN FROM ANTENNA TO SHELTER.
2. BOND ALL EQUIPMENT TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS.
3. DETAIL IS TYPICAL FOR ALL ANTENNA SECTORS, INCLUDING GPS ANTENNA.

2 C-5 TYPICAL ANTENNA GROUNDING DETAIL

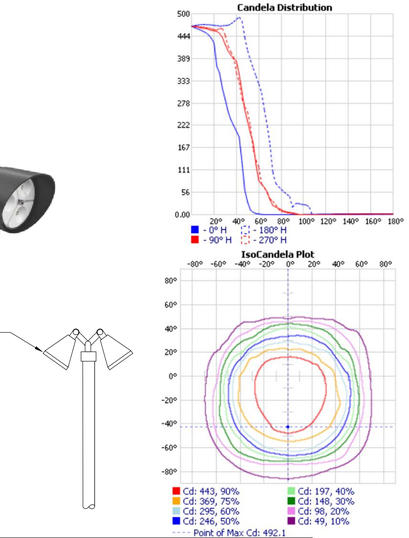
SCALE: NONE



1 C-5 CONCRETE SLAB ON GRADE DETAIL

SCALE: 1/2"=1'-0"

(1) PROPOSED T-MOBILE 22W MOTION CONTROLLED LED LIGHT WITH TIMER FOR AUTOMATIC SHUT-OFF (P/N: LITHONIA LIGHTING OFLR 6 MO) MOUNTED ON ICE BRIDGE POST.



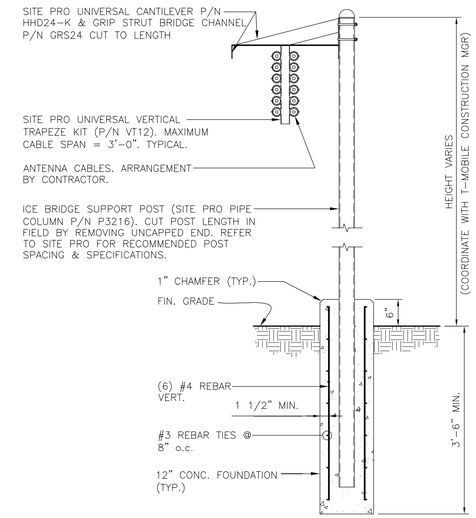
EXTERIOR LIGHT		
EQUIPMENT	WATTAGE	VOLTAGE
MAKE: LITHONIA LIGHTING MODEL: OFLR 6 MO	21.89 W	120 V

NOTES:

1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.

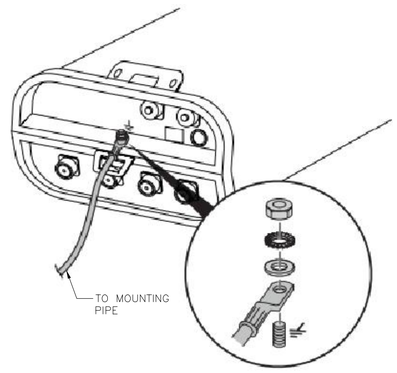
6 C-5 TYPICAL LIGHT DETAIL

NOT TO SCALE



5 C-5 ICE BRIDGE DETAIL

NOT TO SCALE



4 C-5 TYPICAL ANTENNA GROUNDING DETAIL

SCALE: NONE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
C	04/17/18	CAG	TJL	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
B	04/17/18	CDZ	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
A	04/05/18	LGL	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT * GARRIN * 27917 * LICENSED PROFESSIONAL ENGINEER

T-Mobile

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

T-MOBILE

WIRELESS COMMUNICATIONS FACILITY

CTHA174A

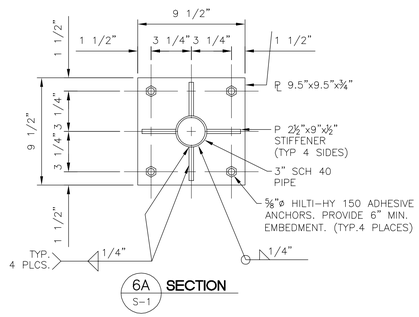
33 MITCHELL DRIVE
MANCHESTER, CT 06040

DATE: 04/02/18
SCALE: AS NOTED
JOB NO. 18034.00

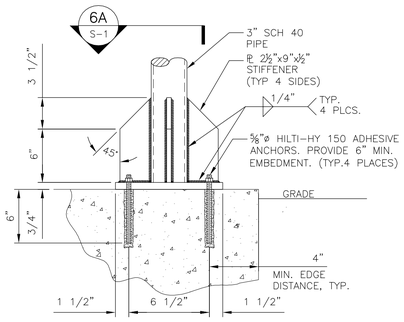
TYPICAL DETAILS

C-5

Sheet No. 7 of 13



6A S-1 SECTION



6 S-1 FRAME TO CONCRETE CONNECTION DETAIL

NOT TO SCALE

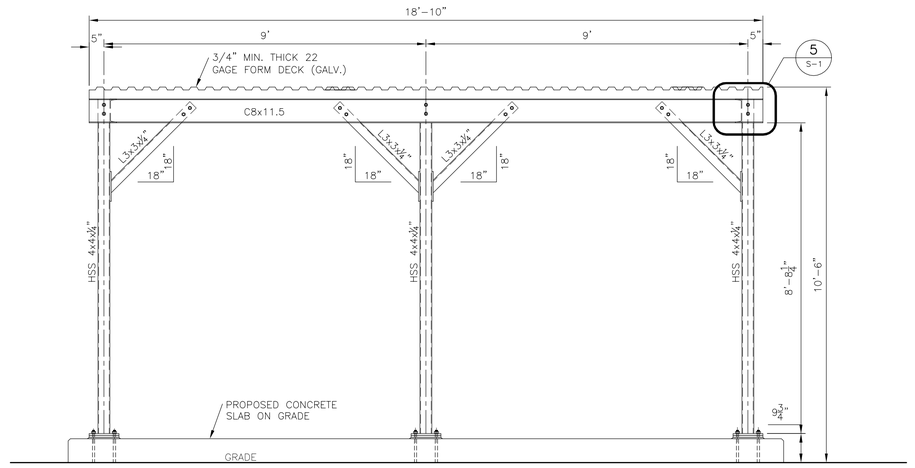
PLAN NOTES AND LEGEND

1. VERIFY ALL DIMENSIONS, ELEVATIONS, EXISTING FRAMING MEMBER SIZES AND GENERAL CONDITIONS PRIOR TO COMMENCEMENT OF WORK. NOTIFY ENGINEER OF RECORD OF ANY DISCREPANCIES BETWEEN THESE DRAWINGS AND EXISTING CONDITIONS.

P1 INDICATES HSS4x4x1/4 ASTM A500 GR. B (F_y = 46ksi) STEEL POST.

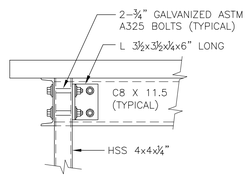
INDICATES SPAN DIRECTION.

K.B. INDICATES L3x3x1/4 ASTM A36 (Fy=36 KSI) STEEL ANGLE



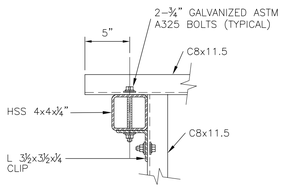
2 S-1 NORTH CANOPY ELEVATION

SCALE: 1/2" = 1'-0"



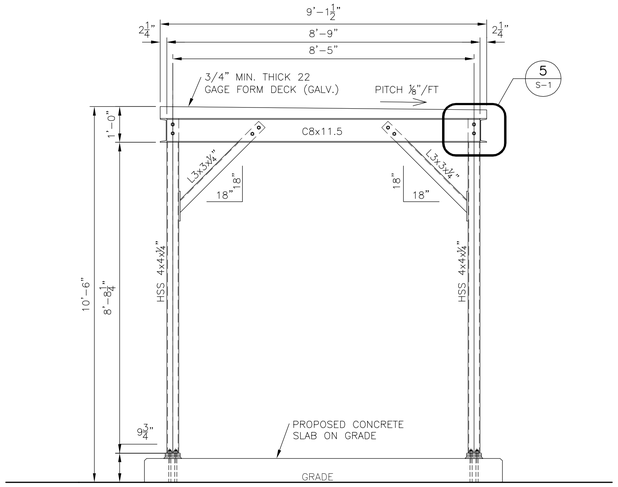
5 S-1 CANOPY FRAME CONNECTION

SCALE: 1" = 1'-0"



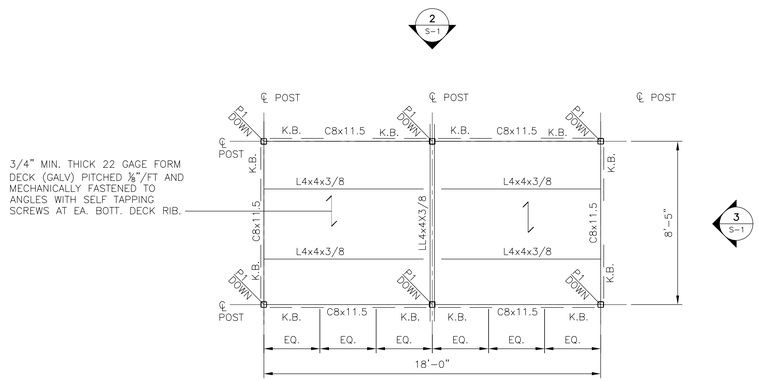
4 S-1 CANOPY FRAME CONNECTION - PLAN VIEW

SCALE: 1-1/2" = 1'-0"



3 S-1 EAST CANOPY ELEVATION

1/2" = 1'-0"



1 S-1 PLAN - ROOF FRAMING

SCALE: NOT TO SCALE

APPROXIMATE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
C	04/17/18	CAG	TJL	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
B	04/17/18	CDZ	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENTS COMMENTS
A	04/05/18	LGL	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT · GARIPAY · 27917 · LICENSED PROFESSIONAL ENGINEER

T-Mobile

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

WIRELESS COMMUNICATIONS FACILITY

CTHA174A

33 MITCHELL DRIVE
MANCHESTER, CT 06040

DATE: 04/02/18
SCALE: AS NOTED
JOB NO. 18034.00

STRUCTURAL DETAILS

S-1

Sheet No. 8 of 13

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

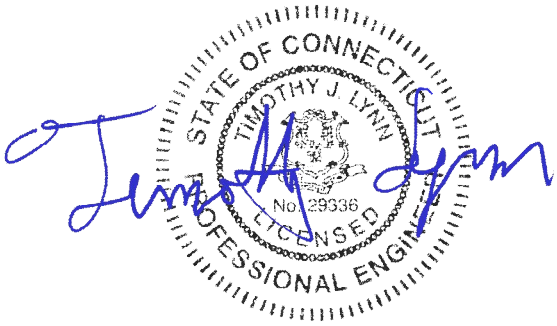
170-ft Existing Valmont Lattice Tower

Site Ref: CTHA174

33 Mitchell Drive
Manchester, CT

CENTEK Project No. 18034.00

Date: March 6, 2018



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna installation proposed by T-Mobile on the existing lattice tower located in Manchester, Connecticut.

The host tower is a 170-ft, three legged, lattice tower originally manufactured by Valmont eng file no. A-175553 dated 9/20/12. The tower geometry, structure member sizes and foundation information were taken from the aforementioned tower design documents.

Antenna and appurtenance information were obtained from the aforementioned tower design drawings, a previous structural analysis prepared by All-Points Technology project no. CT141NB9160, dated October 4, 2017 and visual verification from grade conducted by Centek personnel on February 20, 2018.

The tower consists of nine (9) vertical sections consisting of truss legs conforming to ASTM A572 GR. 50 with diagonal steel angle bracing conforming to ASTM A36. The vertical tower sections are connected by bolted flange plates with the diagonal and horizontal bracing to pipe legs consisting of bolted connections. The width of the tower face is 7-ft at the top and 24-ft at the bottom.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- Future Carrier (Reserved):
  Antennas: Twelve (12) 6'x1' panel antennas mounted on (3) 12-ft V-Frames with a RAD center elevation of ±170-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- Unknown (Reserved):
  Antennas: Three (3) 6-ft Microwave dishes leg mounted with a RAD center elevation of ±165-ft above grade level.
  Coax Cable: Three (3) 1-5/8" ∅ cables running on the leg of the existing tower as specified in Section 3 of this report.
- Unknown (Reserved):
  Antennas: One (1) Shively Labs 6812 leg mounted with a RAD center elevation of ±160-ft above grade level.
  Coax Cable: One (1) 1-5/8" ∅ cables running on the leg of the existing tower as specified in Section 3 of this report.
- Unknown (Reserved):
  Antennas: One (1) Shively Labs 6812 leg mounted with a RAD center elevation of ±155-ft above grade level.
  Coax Cable: One (1) 1-5/8" ∅ cables running on the leg of the existing tower as specified in Section 3 of this report.

- Unknown (Reserved):
  Antennas: Two (2) 4-ft Microwave dishes and one (1) 2-ft Microwave dish leg mounted with a RAD center elevation of ±150-ft above grade level.
  Coax Cable: Three (3) 1-5/8" ∅ cables running on the leg of the existing tower as specified in Section 3 of this report.
- VERIZON (Proposed):
  Antennas: Twelve (12) Andrew SBNHH-1D65B panel antennas, three (3) Alcatel-Lucent RRH2x60-LTE remote radio heads, three (3) Alcatel-Lucent RRH4x45/2x90-AWS remote radio heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads and two (2) RFS DB-T1-6Z-8AB-0Z distribution boxes mounted on (3) 12-ft V-Frames with a RAD center elevation of ±100-ft above grade level.
  Coax Cables: Two (2) 1-5/8" ∅ fiber cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **T-MOBILE (PROPOSED):**
  Antennas: Four (4) Ericsson AIR32 panel antennas, four (4) Ericcson AIR21 panel antennas, four (4) RFS APXVAARR24-43 panel antennas, four (4) Ericsson KRY 112-144 TMAs, twelve (12) Ericsson 4449 B12,B71 remote radio heads and one (1) Commscope SC2-W100AB microwave dish mounted on one (1) custom 4-sided sector frame with a RAD center elevation of 140-ft AGL.
  Coax Cables: Four (4) 1-5/8" ∅ fiber cables, eight (8) 1-5/8" ∅ coax cables and one (1) 1/2" ∅ coax cable running on a leg/face of the existing tower.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower, and the model assumes that the tower members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (3-second gust) with no ice and the applicable wind and ice combination to determine stresses in members as per guidelines of TIA-222-G-2005 entitled "Structural Standard for Antenna Support Structures and Antennas", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Load and Resistance Factor Design (LRFD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix N of the CSBC[1] and the wind speed data available in the TIA-222-G-2005 Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-G-2005, gravity loads of the tower structure and its components, and the application of 1.00" radial ice on the tower structure and its components.

Basic Wind Speed:	Manchester; v = 97 mph (3 second gust)	*[Appendix N of the 2016 CT Building Code]*
Load Cases:	Load Case 1; 97 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix N of the 2016 CT Building Code]*
	Load Case 2; = 50 mph wind speed w/ 1.00" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-G-2005]*

[1] The 2012 International Building Code as amended by the 2016 Connecticut State Building Code (CSBC).

Tower Capacity

- Calculated stresses were found to be within allowable limits. In Load Case 2, per tnxTower "Section Capacity Table", this tower was found to be at **94.5%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T8)	20'-0"- 40'-0"	63.8%	**PASS**
Diagonal (T7)	40'-0"- 60'-0"	94.5%	**PASS**

Foundation and Anchors

The existing foundation consists of three (3) 4.5' ∅ x 4.75' tall reinforced concrete piers and one (1) 32.0' square x 1.75' thick reinforced concrete mat. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned manufacturers original design documents. The tower legs are connected to the foundation by means of twelve (12) 1"∅, ASTM F1554 Grade 105 anchor bolts per leg, embedded into the concrete foundation structure.

- The tower reactions developed from the governing Load Case 1 of the proposed reinforced tower condition were used in the verification of the foundation and anchor bolts:

Leg Reactions	Vector	Proposed Tower Reactions
Leg	Shear	**38 kips**
	Compression	**326 kips**
	Uplift	**276 kips**
Base	Shear	**62 kips**
	Compression	**62 kips**
	Moment	**6355 kip-ft**

- The anchor bolts were found to be within allowable limits.

Tower Section	Component	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	39.2%	**PASS**

- The foundation was found to be within allowable limits.

Foundation Type	Design Limit	Allowable Limit/FS	Proposed Loading	Result
Reinforced Concrete Piers and Mat	Ultimate Bearing Pressure	6.00 ksf	2.22 ksf	**PASS**
	Overturning	1.00 (1)	1.61	**PASS**

Note 1: Minimum required Factor of Safety (FS) of 1.0 required per TIA-222-G section 9.4

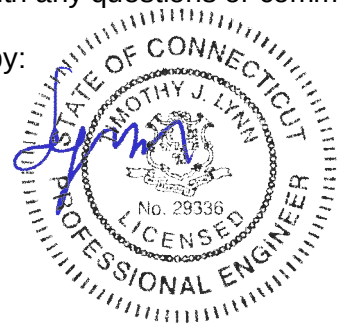
Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed antenna configuration.

The analysis is based, in part, on the information provided to this office by T-Mobile. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the “as new” condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

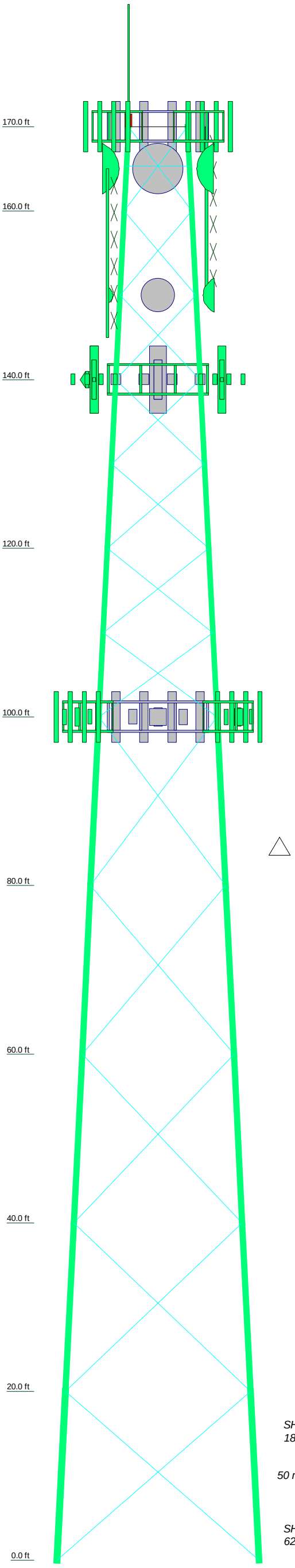
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly RISA Tower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	
Legs	A	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)		#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	B	#12ZG - 2.00" - 0.875" conn. (Pirod 208333)	#12ZG - 2.25" - 0.875" conn. (Pirod 208334)	#12ZG -2.25" - 0.875" conn. (Pirod 208335)		
Leg Grade	A572-50									
Diagonals	L2 1/2x2 1/2x3/16		L3x3x3/16	L3x3x5/16		2L3x3x3/16		2L3 1/2x3 1/2x1/4		
Diagonal Grade	A36									
Top Girts	N.A.									
Sec. Horizontals	N.A.									
Face Width (ft)	7	8	10	12	14	16	18	20	22	24
# Panels @ (ft)	1 @ 7	7 @ 10			5 @ 20					
Weight (K)	1.0	2.2	2.3	3.2	4.1	4.2	4.7	5.5	6.2	33.4



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
15' Lighting Rod	170	KRY 112-144-1 TMA (T-Mobile Proposed)	140
Beacon	170	KRY 112-144-1 TMA (T-Mobile Proposed)	140
(4) 6'x1' Panel Antenna (Future Carrier)	170	KRY 112-144-1 TMA (T-Mobile Proposed)	140
(4) 6'x1' Panel Antenna (Future Carrier)	170	KRY 112-144-1 TMA (T-Mobile Proposed)	140
(4) 6'x1' Panel Antenna (Future Carrier)	170	(4) 4449 B12,B71 (T-Mobile Proposed)	140
SitePro VFA12-HD (Future Carrier)	170	(4) 4449 B12,B71 (T-Mobile Proposed)	140
SitePro VFA12-HD (Future Carrier)	170	(4) 4449 B12,B71 (T-Mobile Proposed)	140
SitePro VFA12-HD (Future Carrier)	170	Custom 4-Sided Sector Mount (T-Mobile Proposed)	140
6-ft Dish	165	SC2-W100AB (T-Mobile Proposed)	140
6-ft Dish	165	RRH2x60-07-U (Verizon)	100
6-ft Dish	165	RRH2x60-PCS (Verizon)	100
6812	160	RRH4x45/2x90-AWS (Verizon)	100
6812	155	RRH4x45/2x90-AWS (Verizon)	100
4-ft Dish	150	RRH4x45/2x90-AWS (Verizon)	100
4-ft Dish	150	DB-T1-6Z-8AB-0Z (Verizon)	100
2-ft dish	150	DB-T1-6Z-8AB-0Z (Verizon)	100
APXVAARR24-43 (T-Mobile Proposed)	140	SitePro VFA12-HD (Verizon)	100
AIR32 (T-Mobile Proposed)	140	SitePro VFA12-HD (Verizon)	100
AIR21 B2A/B4P (T-Mobile Proposed)	140	SitePro VFA12-HD (Verizon)	100
APXVAARR24-43 (T-Mobile Proposed)	140	RRH2x60-07-U (Verizon)	100
AIR32 (T-Mobile Proposed)	140	(4) SBNHH-1D65B (Verizon)	100
AIR21 B2A/B4P (T-Mobile Proposed)	140	(4) SBNHH-1D65B (Verizon)	100
APXVAARR24-43 (T-Mobile Proposed)	140	(4) SBNHH-1D65B (Verizon)	100
AIR32 (T-Mobile Proposed)	140	RRH2x60-07-U (Verizon)	100
AIR21 B2A/B4P (T-Mobile Proposed)	140	RRH2x60-PCS (Verizon)	100
APXVAARR24-43 (T-Mobile Proposed)	140	RRH2x60-PCS (Verizon)	100
AIR32 (T-Mobile Proposed)	140		
AIR21 B2A/B4P (T-Mobile Proposed)	140		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	B	#12ZG -2.00" - 0.875" conn.-Trans (Pirod 211843)

MATERIAL STRENGTH

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

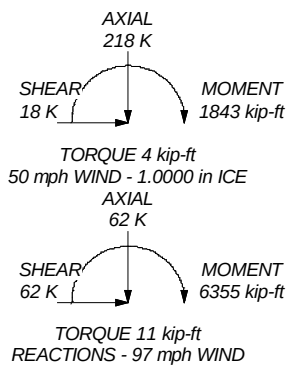
TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 94.5%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 326 K
SHEAR: 38 K

UPLIFT: -276 K
SHEAR: 34 K

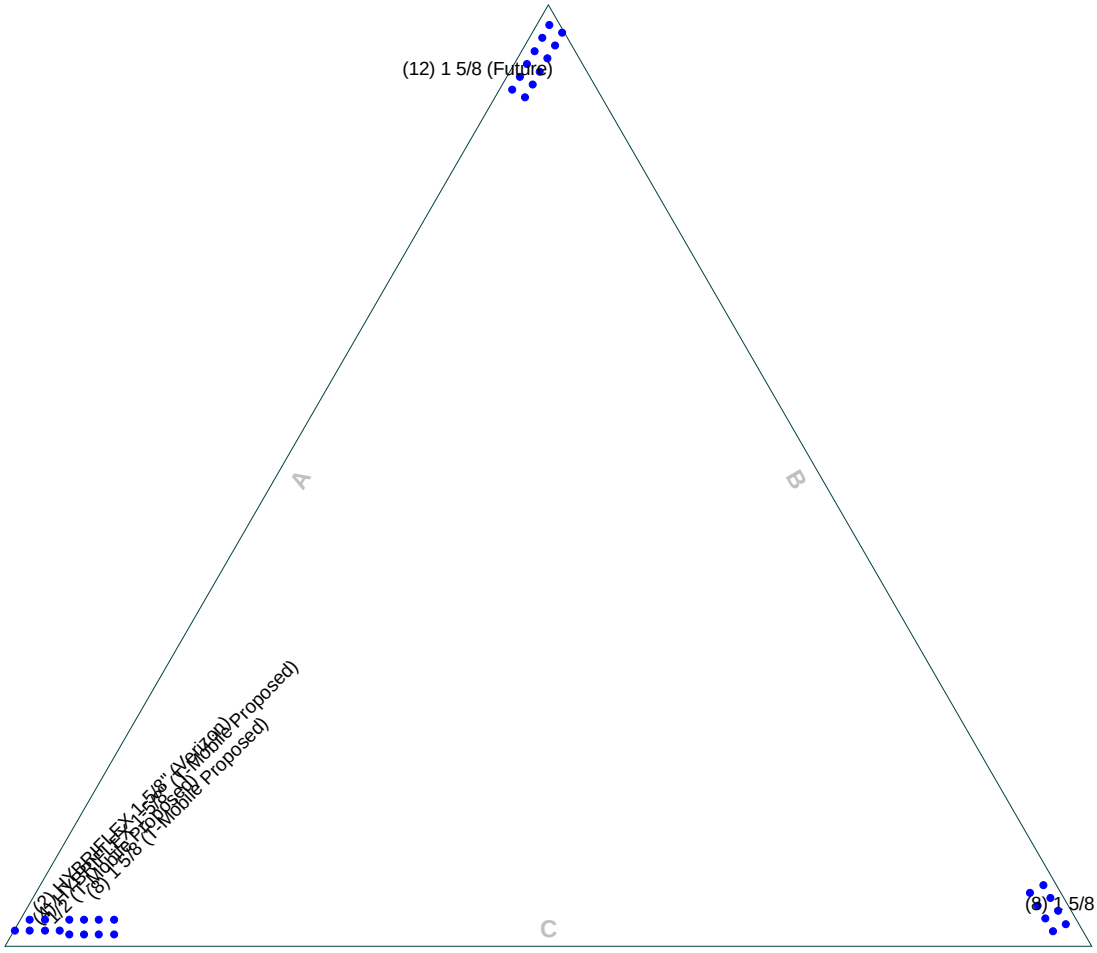


Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job:	***18034.00 - CTHA174***		
Project:	***33 Mitchell Drive Manchester, CT***		
Client: T-Mobile	Drawn by: TJL		App'd:
Code: TIA-222-G	Date: 03/06/18		Scale: NTS
Path: J:\Jobs\1803400.W\04_Structural\Backup Documentation\ERI Files\170' Valmont Lattice Tower.eri			Dwg No. E-1

Feed Line Plan

Round Flat App In Face App Out Face Truss-Leg

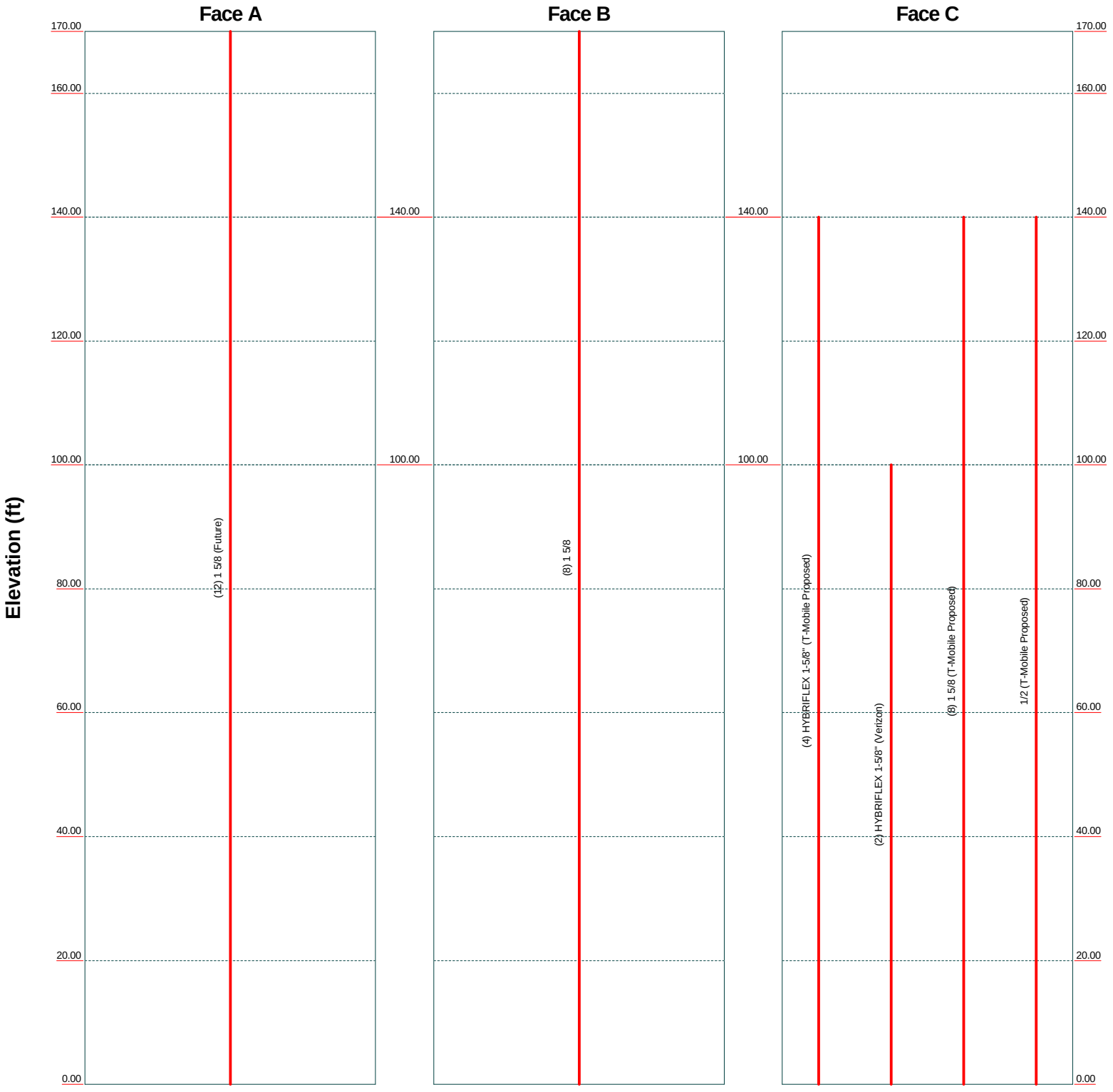


Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job:	***18034.00 - CTHA174***		
Project:	***33 Mitchell Drive Manchester, CT***		
Client: T-Mobile		Drawn by: TJL	App'd:
Code: TIA-222-G		Date: 03/06/18	Scale: NTS
Path: J:\Jobs\1803400.WI\04_Structural\Backup Documentation\ERI Files\170' Valmont Lattice Tower.eri			Dwg No. E-7

Feed Line Distribution Chart
0' - 170'

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



Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: ***18034.00 - CTHA174***			
Project: ***33 Mitchell Drive Manchester, CT***			
Client: T-Mobile	Drawn by: TJL	App'd:	
Code: TIA-222-G	Date: 03/06/18	Scale: NTS	
Path: J:\Jobs\1803400.W\04_Structural\Backup Documentation\ERI Files\170' Valmont Lattice Tower.eri		Dwg No. E-7	

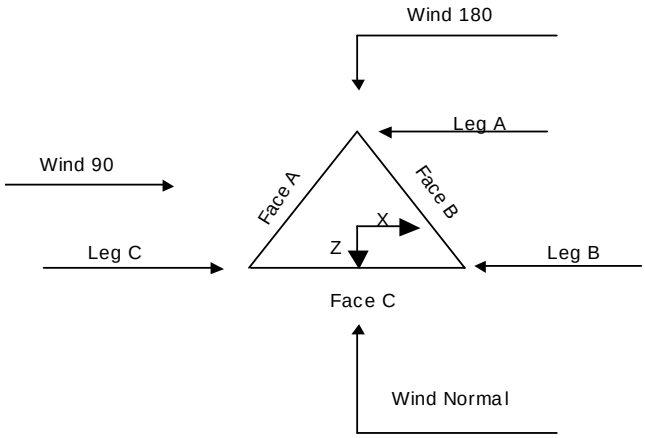
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 170.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 7.00 ft at the top and 24.00 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Basic wind speed of 97 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	170.00-160.00			7.00	1	10.00
T2	160.00-140.00			8.00	1	20.00
T3	140.00-120.00			10.00	1	20.00
T4	120.00-100.00			12.00	1	20.00
T5	100.00-80.00			14.00	1	20.00
T6	80.00-60.00			16.00	1	20.00
T7	60.00-40.00			18.00	1	20.00
T8	40.00-20.00			20.00	1	20.00
T9	20.00-0.00			22.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	170.00-160.00	10.00	X Brace	No	Yes	0.0000	0.0000
T2	160.00-140.00	10.00	X Brace	No	No	0.0000	0.0000
T3	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T4	120.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T5	100.00-80.00	20.00	X Brace	No	No	0.0000	0.0000
T6	80.00-60.00	20.00	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T7	60.00-40.00	20.00	X Brace	No	No	0.0000	0.0000
T8	40.00-20.00	20.00	X Brace	No	No	0.0000	0.0000
T9	20.00-0.00	20.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 170.00-160.00	Truss Leg	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T2 160.00-140.00	Truss Leg	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 140.00-120.00	Truss Leg	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T4 120.00-100.00	Truss Leg	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T5 100.00-80.00	Truss Leg	#12ZG -2.00" - 0.875" conn.-Trans (Pirod 211843)	A572-50 (50 ksi)	Double Equal Angle	2L3x3x3/16	A36 (36 ksi)
T6 80.00-60.00	Truss Leg	#12ZG - 2.00" - 0.875" conn. (Pirod 208333)	A572-50 (50 ksi)	Double Equal Angle	2L3x3x3/16	A36 (36 ksi)
T7 60.00-40.00	Truss Leg	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	A572-50 (50 ksi)	Double Equal Angle	2L3x3x3/16	A36 (36 ksi)
T8 40.00-20.00	Truss Leg	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	A572-50 (50 ksi)	Double Equal Angle	2L3 1/2x3 1/2x1/4	A36 (36 ksi)
T9 20.00-0.00	Truss Leg	#12ZG - 2.50" - 0.875" conn. (Pirod 208335)	A572-50 (50 ksi)	Double Equal Angle	2L3 1/2x3 1/2x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 170.00-160.00	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T1 170.00-160.00	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 170.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	0.0000	Mid-Pt	36.0000
T2 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T7 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T8 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T9 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
170.00-160.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
160.00-140.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T9 20.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

	Truss-Leg K Factors					
	Truss-Legs Used As Leg Members			Truss-Legs Used As Inner Members		
Tower Elevation ft	Leg Panels	X Brace Diagonals	Z Brace Diagonals	Leg Panels	X Brace Diagonals	Z Brace Diagonals
T1 170.00-160.00	1	0.5	0.85	1	0.5	0.85
T2 160.00-140.00	1	0.5	0.85	1	0.5	0.85
T3 140.00-120.00	1	0.5	0.85	1	0.5	0.85
T4 120.00-100.00	1	0.5	0.85	1	0.5	0.85
T5 100.00-80.00	1	0.5	0.85	1	0.5	0.85
T6 80.00-60.00	1	0.5	0.85	1	0.5	0.85
T7 60.00-40.00	1	0.5	0.85	1	0.5	0.85
T8 40.00-20.00	1	0.5	0.85	1	0.5	0.85
T9 20.00-0.00	1	0.5	0.85	1	0.5	0.85

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 170.00-160.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T2 160.00-140.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 140.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T9 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1 170.00-160.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.0000 A325N	0	1.0000 A325N	0
T2 160.00-140.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.0000 A325N	0
T3 140.00-120.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.0000 A325N	0
T4 120.00-100.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.0000 A325N	1
T5 100.00-80.00	Flange	1.0000 A325N	12	0.8750 A325N	1	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.0000 A325N	0
T6 80.00-60.00	Flange	1.0000 A325N	12	0.8750 A325N	1	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.0000 A325N	0
T7 60.00-40.00	Flange	1.0000 A325N	12	0.8750 A325N	1	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.0000 A325N	0
T8 40.00-20.00	Flange	1.0000 A325N	12	0.8750 A325N	1	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.0000 A325N	0	0.0000 A325N	0
T9 20.00-0.00	Flange	1.0000 F1554-105	12	0.8750 A325N	1	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.0000 A325N	0	0.0000 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
HYBRIFLEX 1-5/8" (T-Mobile Proposed)	C	No	Ar (CaAa)	140.00 - 0.00	-3.0000	0.47	4	4	1.9800	1.9800		1.90
HYBRIFLEX 1-5/8" (Verizon)	C	No	Ar (CaAa)	100.00 - 0.00	-6.0000	0.47	2	2	1.9800	1.9800		1.90
1 5/8 (Future)	A	No	Ar (CaAa)	170.00 - 0.00	-6.0000	0.45	12	6	1.9800	1.9800		1.04
1 5/8	B	No	Ar (CaAa)	170.00 - 0.00	-6.0000	0.45	8	4	1.9800	1.9800		1.04
1 5/8 (T-Mobile Proposed)	C	No	Ar (CaAa)	140.00 - 0.00	-6.0000	0.42	8	4	1.9800	1.9800		1.04
1/2 (T-Mobile Proposed)	C	No	Ar (CaAa)	140.00 - 0.00	-4.0000	0.45	1	1	0.5800	0.5800		0.25

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	170.00-160.00	A	0.000	0.000	23.760	0.000	0.12
		B	0.000	0.000	15.840	0.000	0.08
		C	0.000	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	0.000	0.000	47.520	0.000	0.25

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B	0.000	0.000	31.680	0.000	0.17
		C	0.000	0.000	0.000	0.000	0.00
T3	140.00-120.00	A	0.000	0.000	47.520	0.000	0.25
		B	0.000	0.000	31.680	0.000	0.17
		C	0.000	0.000	48.680	0.000	0.32
T4	120.00-100.00	A	0.000	0.000	47.520	0.000	0.25
		B	0.000	0.000	31.680	0.000	0.17
		C	0.000	0.000	48.680	0.000	0.32
T5	100.00-80.00	A	0.000	0.000	47.520	0.000	0.25
		B	0.000	0.000	31.680	0.000	0.17
		C	0.000	0.000	56.600	0.000	0.40
T6	80.00-60.00	A	0.000	0.000	47.520	0.000	0.25
		B	0.000	0.000	31.680	0.000	0.17
		C	0.000	0.000	56.600	0.000	0.40
T7	60.00-40.00	A	0.000	0.000	47.520	0.000	0.25
		B	0.000	0.000	31.680	0.000	0.17
		C	0.000	0.000	56.600	0.000	0.40
T8	40.00-20.00	A	0.000	0.000	47.520	0.000	0.25
		B	0.000	0.000	31.680	0.000	0.17
		C	0.000	0.000	56.600	0.000	0.40
T9	20.00-0.00	A	0.000	0.000	47.520	0.000	0.25
		B	0.000	0.000	31.680	0.000	0.17
		C	0.000	0.000	56.600	0.000	0.40

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	170.00-160.00	A	2.349	0.000	0.000	35.670	0.000	1.04
		B		0.000	0.000	26.739	0.000	0.72
		C		0.000	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	2.327	0.000	0.000	71.194	0.000	2.07
		B		0.000	0.000	53.327	0.000	1.43
		C		0.000	0.000	0.000	0.000	0.00
T3	140.00-120.00	A	2.294	0.000	0.000	70.979	0.000	2.05
		B		0.000	0.000	53.101	0.000	1.41
		C		0.000	0.000	112.392	0.000	2.51
T4	120.00-100.00	A	2.256	0.000	0.000	70.733	0.000	2.03
		B		0.000	0.000	52.842	0.000	1.40
		C		0.000	0.000	111.738	0.000	2.47
T5	100.00-80.00	A	2.211	0.000	0.000	70.442	0.000	2.01
		B		0.000	0.000	52.536	0.000	1.38
		C		0.000	0.000	141.418	0.000	2.91
T6	80.00-60.00	A	2.156	0.000	0.000	70.086	0.000	1.98
		B		0.000	0.000	52.162	0.000	1.36
		C		0.000	0.000	140.098	0.000	2.85
T7	60.00-40.00	A	2.085	0.000	0.000	69.624	0.000	1.94
		B		0.000	0.000	51.677	0.000	1.33
		C		0.000	0.000	138.383	0.000	2.77
T8	40.00-20.00	A	1.981	0.000	0.000	68.952	0.000	1.89
		B		0.000	0.000	50.970	0.000	1.29
		C		0.000	0.000	135.891	0.000	2.67
T9	20.00-0.00	A	1.775	0.000	0.000	67.623	0.000	1.78
		B		0.000	0.000	49.571	0.000	1.21
		C		0.000	0.000	130.956	0.000	2.46

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	170.00-160.00	2.5603	-2.6962	0.8896	-1.0407
T2	160.00-140.00	3.1303	-3.4048	1.4187	-1.7148
T3	140.00-120.00	-1.2766	-0.6979	-1.5706	0.0401
T4	120.00-100.00	-1.4948	-0.8007	-1.8917	0.0584
T5	100.00-80.00	-2.5827	-0.4159	-2.6568	0.3670
T6	80.00-60.00	-2.9247	-0.4541	-3.0098	0.4248
T7	60.00-40.00	-3.2318	-0.4873	-3.3542	0.4778
T8	40.00-20.00	-3.5115	-0.5167	-3.6834	0.5221
T9	20.00-0.00	-3.7930	-0.5468	-4.0488	0.5522

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	3	1 5/8	160.00 - 170.00	0.6000	0.3484
T1	4	1 5/8	160.00 - 170.00	0.6000	0.3484
T2	3	1 5/8	140.00 - 160.00	0.6000	0.4985
T2	4	1 5/8	140.00 - 160.00	0.6000	0.4985
T3	1	HYBRIFLEX 1-5/8"	120.00 - 140.00	0.6000	0.5569
T3	3	1 5/8	120.00 - 140.00	0.6000	0.5569
T3	4	1 5/8	120.00 - 140.00	0.6000	0.5569
T3	5	1 5/8	120.00 - 140.00	0.6000	0.5569
T3	6	1/2	120.00 - 140.00	0.6000	0.5569
T4	1	HYBRIFLEX 1-5/8"	100.00 - 120.00	0.6000	0.6000
T4	3	1 5/8	100.00 - 120.00	0.6000	0.6000
T4	4	1 5/8	100.00 - 120.00	0.6000	0.6000
T4	5	1 5/8	100.00 - 120.00	0.6000	0.6000
T4	6	1/2	100.00 - 120.00	0.6000	0.6000
T5	1	HYBRIFLEX 1-5/8"	80.00 - 100.00	0.6000	0.6000
T5	2	HYBRIFLEX 1-5/8"	80.00 - 100.00	0.6000	0.6000
T5	3	1 5/8	80.00 - 100.00	0.6000	0.6000
T5	4	1 5/8	80.00 - 100.00	0.6000	0.6000
T5	5	1 5/8	80.00 - 100.00	0.6000	0.6000
T5	6	1/2	80.00 - 100.00	0.6000	0.6000
T6	1	HYBRIFLEX 1-5/8"	60.00 - 80.00	0.6000	0.6000
T6	2	HYBRIFLEX 1-5/8"	60.00 - 80.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T6	3	1 5/8	60.00 - 80.00	0.6000	0.6000
T6	4	1 5/8	60.00 - 80.00	0.6000	0.6000
T6	5	1 5/8	60.00 - 80.00	0.6000	0.6000
T6	6	1/2	60.00 - 80.00	0.6000	0.6000
T7	1	HYBRIFLEX 1-5/8"	40.00 - 60.00	0.6000	0.6000
T7	2	HYBRIFLEX 1-5/8"	40.00 - 60.00	0.6000	0.6000
T7	3	1 5/8	40.00 - 60.00	0.6000	0.6000
T7	4	1 5/8	40.00 - 60.00	0.6000	0.6000
T7	5	1 5/8	40.00 - 60.00	0.6000	0.6000
T7	6	1/2	40.00 - 60.00	0.6000	0.6000
T8	1	HYBRIFLEX 1-5/8"	20.00 - 40.00	0.6000	0.6000
T8	2	HYBRIFLEX 1-5/8"	20.00 - 40.00	0.6000	0.6000
T8	3	1 5/8	20.00 - 40.00	0.6000	0.6000
T8	4	1 5/8	20.00 - 40.00	0.6000	0.6000
T8	5	1 5/8	20.00 - 40.00	0.6000	0.6000
T8	6	1/2	20.00 - 40.00	0.6000	0.6000
T9	1	HYBRIFLEX 1-5/8"	0.00 - 20.00	0.6000	0.6000
T9	2	HYBRIFLEX 1-5/8"	0.00 - 20.00	0.6000	0.6000
T9	3	1 5/8	0.00 - 20.00	0.6000	0.6000
T9	4	1 5/8	0.00 - 20.00	0.6000	0.6000
T9	5	1 5/8	0.00 - 20.00	0.6000	0.6000
T9	6	1/2	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
15' Lighting Rod	C	From Leg	0.00 0.00 7.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	4.50 6.03 7.58	4.50 6.03 7.58	0.05 0.08 0.12
Beacon	C	From Leg	0.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	0.18 0.31 0.39	0.18 0.31 0.39	0.01 0.01 0.02
(4) 6'x1' Panel Antenna (Future Carrier)	A	From Leg	3.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	8.13 8.59 9.05	3.53 3.97 4.41	0.04 0.08 0.13
(4) 6'x1' Panel Antenna (Future Carrier)	B	From Leg	3.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	8.13 8.59 9.05	3.53 3.97 4.41	0.04 0.08 0.13
(4) 6'x1' Panel Antenna (Future Carrier)	C	From Leg	3.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	8.13 8.59 9.05	3.53 3.97 4.41	0.04 0.08 0.13
SitePro VFA12-HD (Future Carrier)	A	From Leg	1.50 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	16.00 19.20 22.40	16.00 19.20 22.40	0.75 0.90 1.05
SitePro VFA12-HD (Future Carrier)	B	From Leg	1.50 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	16.00 19.20 22.40	16.00 19.20 22.40	0.75 0.90 1.05
SitePro VFA12-HD (Future Carrier)	C	From Leg	1.50 0.00	0.0000	170.00	No Ice 1/2" Ice	16.00 19.20	16.00 19.20	0.75 0.90

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	22.40	22.40	1.05
(4) SBNHH-1D65B	A	From Leg	3.00	0.0000	100.00	No Ice	8.08	5.34	0.04
(Verizon)			0.00			1/2" Ice	8.53	5.79	0.09
			0.00			1" Ice	9.00	6.26	0.15
(4) SBNHH-1D65B	B	From Leg	3.00	0.0000	100.00	No Ice	8.08	5.34	0.04
(Verizon)			0.00			1/2" Ice	8.53	5.79	0.09
			0.00			1" Ice	9.00	6.26	0.15
(4) SBNHH-1D65B	C	From Leg	3.00	0.0000	100.00	No Ice	8.08	5.34	0.04
(Verizon)			0.00			1/2" Ice	8.53	5.79	0.09
			0.00			1" Ice	9.00	6.26	0.15
RRH2x60-07-U	A	From Leg	3.00	0.0000	100.00	No Ice	2.10	1.41	0.05
(Verizon)			-3.00			1/2" Ice	2.29	1.56	0.07
			0.00			1" Ice	2.48	1.74	0.09
RRH2x60-07-U	B	From Leg	3.00	0.0000	100.00	No Ice	2.10	1.41	0.05
(Verizon)			-3.00			1/2" Ice	2.29	1.56	0.07
			0.00			1" Ice	2.48	1.74	0.09
RRH2x60-07-U	C	From Leg	3.00	0.0000	100.00	No Ice	2.10	1.41	0.05
(Verizon)			-3.00			1/2" Ice	2.29	1.56	0.07
			0.00			1" Ice	2.48	1.74	0.09
RRH2x60-PCS	A	From Leg	3.00	0.0000	100.00	No Ice	2.15	1.35	0.06
(Verizon)			3.00			1/2" Ice	2.34	1.50	0.07
			0.00			1" Ice	2.54	1.67	0.09
RRH2x60-PCS	B	From Leg	3.00	0.0000	100.00	No Ice	2.15	1.35	0.06
(Verizon)			3.00			1/2" Ice	2.34	1.50	0.07
			0.00			1" Ice	2.54	1.67	0.09
RRH2x60-PCS	C	From Leg	3.00	0.0000	100.00	No Ice	2.15	1.35	0.06
(Verizon)			3.00			1/2" Ice	2.34	1.50	0.07
			0.00			1" Ice	2.54	1.67	0.09
RRH4x45/2x90-AWS	A	From Leg	3.00	0.0000	100.00	No Ice	2.58	1.69	0.08
(Verizon)			0.00			1/2" Ice	2.79	1.87	0.10
			0.00			1" Ice	3.01	2.06	0.12
RRH4x45/2x90-AWS	B	From Leg	3.00	0.0000	100.00	No Ice	2.58	1.69	0.08
(Verizon)			0.00			1/2" Ice	2.79	1.87	0.10
			0.00			1" Ice	3.01	2.06	0.12
RRH4x45/2x90-AWS	C	From Leg	3.00	0.0000	100.00	No Ice	2.58	1.69	0.08
(Verizon)			0.00			1/2" Ice	2.79	1.87	0.10
			0.00			1" Ice	3.01	2.06	0.12
DB-T1-6Z-8AB-0Z	A	From Leg	3.00	0.0000	100.00	No Ice	4.80	2.00	0.04
(Verizon)			0.00			1/2" Ice	5.07	2.19	0.08
			0.00			1" Ice	5.35	2.39	0.12
DB-T1-6Z-8AB-0Z	B	From Leg	3.00	0.0000	100.00	No Ice	4.80	2.00	0.04
(Verizon)			0.00			1/2" Ice	5.07	2.19	0.08
			0.00			1" Ice	5.35	2.39	0.12
SitePro VFA12-HD	A	From Leg	1.50	0.0000	100.00	No Ice	16.00	16.00	0.75
(Verizon)			0.00			1/2" Ice	19.20	19.20	0.90
			0.00			1" Ice	22.40	22.40	1.05
SitePro VFA12-HD	B	From Leg	1.50	0.0000	100.00	No Ice	16.00	16.00	0.75
(Verizon)			0.00			1/2" Ice	19.20	19.20	0.90
			0.00			1" Ice	22.40	22.40	1.05
SitePro VFA12-HD	C	From Leg	1.50	0.0000	100.00	No Ice	16.00	16.00	0.75
(Verizon)			0.00			1/2" Ice	19.20	19.20	0.90
			0.00			1" Ice	22.40	22.40	1.05
6812	B	From Leg	2.00	0.0000	160.00	No Ice	0.20	0.20	0.00
			0.00			1/2" Ice	0.36	0.36	0.00
			0.00			1" Ice	0.52	0.52	0.00
6812	C	From Leg	2.00	0.0000	155.00	No Ice	0.20	0.20	0.00
			0.00			1/2" Ice	0.36	0.36	0.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	0.52	0.52	0.00
APXVAARR24-43	A	From Leg	3.00	0.0000	140.00	No Ice	20.24	8.89	0.16
(T-Mobile Proposed)			0.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR32	A	From Leg	3.00	0.0000	140.00	No Ice	6.51	4.71	0.13
(T-Mobile Proposed)			0.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR21 B2A/B4P	A	From Leg	3.00	0.0000	140.00	No Ice	6.05	4.36	0.08
(T-Mobile Proposed)			0.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
APXVAARR24-43	B	From Leg	3.00	0.0000	140.00	No Ice	20.24	8.89	0.16
(T-Mobile Proposed)			0.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR32	B	From Leg	3.00	0.0000	140.00	No Ice	6.51	4.71	0.13
(T-Mobile Proposed)			0.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR21 B2A/B4P	B	From Leg	3.00	0.0000	140.00	No Ice	6.05	4.36	0.08
(T-Mobile Proposed)			0.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
APXVAARR24-43	C	From Leg	3.00	0.0000	140.00	No Ice	20.24	8.89	0.16
(T-Mobile Proposed)			0.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR32	C	From Leg	3.00	0.0000	140.00	No Ice	6.51	4.71	0.13
(T-Mobile Proposed)			0.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR21 B2A/B4P	C	From Leg	3.00	0.0000	140.00	No Ice	6.05	4.36	0.08
(T-Mobile Proposed)			0.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
APXVAARR24-43	C	From Leg	3.00	0.0000	140.00	No Ice	20.24	8.89	0.16
(T-Mobile Proposed)			0.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR32	C	From Leg	3.00	0.0000	140.00	No Ice	6.51	4.71	0.13
(T-Mobile Proposed)			0.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR21 B2A/B4P	C	From Leg	3.00	0.0000	140.00	No Ice	6.05	4.36	0.08
(T-Mobile Proposed)			0.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
KRY 112-144-1 TMA	A	From Leg	3.00	0.0000	140.00	No Ice	0.35	0.14	0.02
(T-Mobile Proposed)			0.00			1/2" Ice	0.43	0.20	0.02
			0.00			1" Ice	0.51	0.26	0.02
KRY 112-144-1 TMA	A	From Leg	3.00	0.0000	140.00	No Ice	0.35	0.14	0.02
(T-Mobile Proposed)			0.00			1/2" Ice	0.43	0.20	0.02
			0.00			1" Ice	0.51	0.26	0.02
KRY 112-144-1 TMA	B	From Leg	3.00	0.0000	140.00	No Ice	0.35	0.14	0.02
(T-Mobile Proposed)			0.00			1/2" Ice	0.43	0.20	0.02
			0.00			1" Ice	0.51	0.26	0.02
KRY 112-144-1 TMA	C	From Leg	3.00	0.0000	140.00	No Ice	0.35	0.14	0.02
(T-Mobile Proposed)			0.00			1/2" Ice	0.43	0.20	0.02
			0.00			1" Ice	0.51	0.26	0.02
(4) 4449 B12,B71	A	From Leg	3.00	0.0000	140.00	No Ice	1.65	1.16	0.08
(T-Mobile Proposed)			0.00			1/2" Ice	1.81	1.29	0.10
			0.00			1" Ice	1.98	1.44	0.11
(4) 4449 B12,B71	B	From Leg	3.00	0.0000	140.00	No Ice	1.65	1.16	0.08
(T-Mobile Proposed)			0.00			1/2" Ice	1.81	1.29	0.10
			0.00			1" Ice	1.98	1.44	0.11
(4) 4449 B12,B71	C	From Leg	3.00	0.0000	140.00	No Ice	1.65	1.16	0.08
(T-Mobile Proposed)			0.00			1/2" Ice	1.81	1.29	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Custom 4-Sided Sector Mount (T-Mobile Proposed)	A	None	0.00	0.0000	140.00	1" Ice	1.98	1.44	0.11
						No Ice	36.00	36.00	3.00
						1/2" Ice	42.00	42.00	3.30
						1" Ice	48.00	48.00	3.60

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
SC2-W100AB (T-Mobile Proposed)	C	Paraboloid w/Radome	From Leg	3.00	0.0000		140.00	2.00	No Ice	3.14	0.02
				0.00					1/2" Ice	3.41	0.04
				0.00					1" Ice	3.68	0.06
6-ft Dish	A	Paraboloid w/o Radome	From Leg	1.00	0.0000		165.00	6.00	No Ice	28.27	0.05
				0.00					1/2" Ice	29.07	0.06
				0.00					1" Ice	29.87	0.35
6-ft Dish	B	Paraboloid w/o Radome	From Leg	1.00	0.0000		165.00	6.00	No Ice	28.27	0.05
				0.00					1/2" Ice	29.07	0.06
				0.00					1" Ice	29.87	0.35
6-ft Dish	C	Paraboloid w/o Radome	From Leg	1.00	0.0000		165.00	6.00	No Ice	28.27	0.05
				0.00					1/2" Ice	29.07	0.06
				0.00					1" Ice	29.87	0.35
4-ft Dish	A	Paraboloid w/o Radome	From Leg	1.00	0.0000		150.00	4.00	No Ice	12.57	0.08
				0.00					1/2" Ice	13.10	0.15
				0.00					1" Ice	13.62	0.21
4-ft Dish	B	Paraboloid w/o Radome	From Leg	1.00	0.0000		150.00	4.00	No Ice	12.57	0.08
				0.00					1/2" Ice	13.10	0.15
				0.00					1" Ice	13.62	0.21
2-ft dish	C	Paraboloid w/o Radome	From Leg	1.00	0.0000		150.00	2.00	No Ice	3.14	0.05
				0.00					1/2" Ice	3.41	0.08
				0.00					1" Ice	3.68	0.10

Truss-Leg Interaction Properties

Section Designation	Area in^2	Area Ice in^2	Self Weight K	Ice Weight K	Equiv. Diameter in	Equiv. Diameter Ice in	Section Modulus S_x in^3	Section Modulus S_y in^3	Leg Area in^2
#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	2175.9279	6580.3363	0.44	2.52	7.5553	22.8484	12.8052	14.7861	3.6816
#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	2303.0530	6636.4847	0.55	2.55	7.9967	23.0433	18.4723	21.3300	5.3014
#12ZG - 1.50" - 1.00" conn. (Pirod	2303.0530	6612.9668	0.55	2.54	7.9967	22.9617	18.4723	21.3300	5.3014

Section Designation	Area in^2	Area Ice in^2	Self Weight K	Ice Weight K	Equiv. Diameter in	Equiv. Diameter Ice in	Section Modulus S_x in^3	Section Modulus S_y in^3	Leg Area in^2
207629)									
#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	2421.2670	6657.9346	0.68	2.56	8.4072	23.1178	25.1958	29.0936	7.2158
#12ZG -2.00" - 0.875" conn.-Trans (Pirod 211843)	2550.9192	6698.0542	1.00	2.58	8.8574	23.2571	32.9885	38.0918	9.4248
#12ZG - 2.00" - 0.875" conn. (Pirod 208333)	2556.3970	6659.0197	1.00	2.55	8.8764	23.1216	32.9885	38.0918	9.4248
#12ZG -2.25" - 0.875" conn. (Pirod 208334)	2686.5516	6680.2711	1.17	2.55	9.3283	23.1954	41.8654	48.3420	11.9282
#12ZG -2.25" - 0.875" conn. (Pirod 208334)	2686.5516	6606.4167	1.17	2.49	9.3283	22.9389	41.8654	48.3420	11.9282
#12ZG - 2.50" - 0.875" conn. (Pirod 208335)	2826.7749	6531.8043	1.35	2.36	9.8152	22.6799	51.8434	59.8636	14.7262

Tower Pressures - No Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 170.00-160.00	165.00	1.406	29	86.055	A	7.113	12.613	12.613	63.94	23.760	0.000
					B	7.113	12.613		63.94	15.840	0.000
					C	7.113	12.613		63.94	0.000	0.000
T2 160.00-140.00	150.00	1.378	28	202.528	A	9.970	26.700	26.700	72.81	47.520	0.000
					B	9.970	26.700		72.81	31.680	0.000
					C	9.970	26.700		72.81	0.000	0.000
T3 140.00-120.00	130.00	1.337	27	242.528	A	13.520	26.700	26.700	66.39	47.520	0.000
					B	13.520	26.700		66.39	31.680	0.000
					C	13.520	26.700		66.39	48.680	0.000
T4 120.00-100.00	110.00	1.291	26	282.945	A	15.144	28.071	28.071	64.96	47.520	0.000
					B	15.144	28.071		64.96	31.680	0.000
					C	15.144	28.071		64.96	48.680	0.000
T5 100.00-80.00	90.00	1.238	25	323.362	A	11.670	29.574	29.574	71.70	47.520	0.000
					B	11.670	29.574		71.70	31.680	0.000
					C	11.670	29.574		71.70	56.600	0.000
T6 80.00-60.00	70.00	1.174	24	363.362	A	12.356	29.637	29.637	70.58	47.520	0.000
					B	12.356	29.637		70.58	31.680	0.000
					C	12.356	29.637		70.58	56.600	0.000
T7 60.00-40.00	50.00	1.094	22	403.780	A	13.070	31.146	31.146	70.44	47.520	0.000
					B	13.070	31.146		70.44	31.680	0.000
					C	13.070	31.146		70.44	56.600	0.000
T8 40.00-20.00	30.00	0.982	20	443.780	A	16.115	31.146	31.146	65.90	47.520	0.000
					B	16.115	31.146		65.90	31.680	0.000
					C	16.115	31.146		65.90	56.600	0.000
T9 20.00-0.00	10.00	0.85	17	484.197	A	17.010	32.772	32.772	65.83	47.520	0.000
					B	17.010	32.772		65.83	31.680	0.000
					C	17.010	32.772		65.83	56.600	0.000

Tower Pressure - With Ice

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	165.00	1.406	8	2.3492	89.976	A	7.113	51.512	38.144	65.06	35.670	0.000
170.00-160.00						B	7.113	51.512		65.06	26.739	0.000
						C	7.113	51.512		65.06	0.000	0.000
T2	150.00	1.378	7	2.3270	210.294	A	9.970	95.499	76.939	72.95	71.194	0.000
160.00-140.00						B	9.970	95.499		72.95	53.327	0.000
						C	9.970	95.499		72.95	0.000	0.000
T3	130.00	1.337	7	2.2939	250.184	A	13.520	97.342	76.666	69.16	70.979	0.000
140.00-120.00						B	13.520	97.342		69.16	53.101	0.000
						C	13.520	97.342		69.16	112.392	0.000
T4	110.00	1.291	7	2.2559	290.474	A	15.144	99.963	77.188	67.06	70.733	0.000
120.00-100.00						B	15.144	99.963		67.06	52.842	0.000
						C	15.144	99.963		67.06	111.738	0.000
T5 100.00-80.00	90.00	1.238	7	2.2111	330.742	A	11.670	94.856	77.653	72.90	70.442	0.000
						B	11.670	94.856		72.90	52.536	0.000
						C	11.670	94.856		72.90	141.418	0.000
T6 80.00-60.00	70.00	1.174	6	2.1562	370.559	A	12.356	94.961	77.200	71.94	70.086	0.000
						B	12.356	94.961		71.94	52.162	0.000
						C	12.356	94.961		71.94	140.098	0.000
T7 60.00-40.00	50.00	1.094	6	2.0849	410.738	A	13.070	95.613	77.447	71.26	69.624	0.000
						B	13.070	95.613		71.26	51.677	0.000
						C	13.070	95.613		71.26	138.383	0.000
T8 40.00-20.00	30.00	0.982	5	1.9810	450.391	A	16.115	94.832	76.590	69.03	68.952	0.000
						B	16.115	94.832		69.03	50.970	0.000
						C	16.115	94.832		69.03	135.891	0.000
T9 20.00-0.00	10.00	0.85	5	1.7749	490.121	A	17.010	92.978	75.725	68.85	67.623	0.000
						B	17.010	92.978		68.85	49.571	0.000
						C	17.010	92.978		68.85	130.956	0.000

Tower Pressure - Service

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	165.00	1.406	11	86.055	A	7.113	12.613	12.613	63.94	23.760	0.000
170.00-160.00					B	7.113	12.613		63.94	15.840	0.000
					C	7.113	12.613		63.94	0.000	0.000
T2	150.00	1.378	11	202.528	A	9.970	26.700	26.700	72.81	47.520	0.000
160.00-140.00					B	9.970	26.700		72.81	31.680	0.000
					C	9.970	26.700		72.81	0.000	0.000
T3	130.00	1.337	10	242.528	A	13.520	26.700	26.700	66.39	47.520	0.000
140.00-120.00					B	13.520	26.700		66.39	31.680	0.000
					C	13.520	26.700		66.39	48.680	0.000
T4	110.00	1.291	10	282.945	A	15.144	28.071	28.071	64.96	47.520	0.000
120.00-100.00					B	15.144	28.071		64.96	31.680	0.000
					C	15.144	28.071		64.96	48.680	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T5	90.00	1.238	10	323.362	A	11.670	29.574	29.574	71.70	47.520	0.000
100.00-80.00					B	11.670	29.574		71.70	31.680	0.000
					C	11.670	29.574		71.70	56.600	0.000
T6 80.00-60.00	70.00	1.174	9	363.362	A	12.356	29.637	29.637	70.58	47.520	0.000
					B	12.356	29.637		70.58	31.680	0.000
					C	12.356	29.637		70.58	56.600	0.000
T7 60.00-40.00	50.00	1.094	9	403.780	A	13.070	31.146	31.146	70.44	47.520	0.000
					B	13.070	31.146		70.44	31.680	0.000
					C	13.070	31.146		70.44	56.600	0.000
T8 40.00-20.00	30.00	0.982	8	443.780	A	16.115	31.146	31.146	65.90	47.520	0.000
					B	16.115	31.146		65.90	31.680	0.000
					C	16.115	31.146		65.90	56.600	0.000
T9 20.00-0.00	10.00	0.85	7	484.197	A	17.010	32.772	32.772	65.83	47.520	0.000
					B	17.010	32.772		65.83	31.680	0.000
					C	17.010	32.772		65.83	56.600	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.21	1.03	A	0.229	2.501	29	1	1	14.431	1.46	146.49	C
170.00-160.00			B	0.229	2.501		1	1	14.431			
			C	0.229	2.501		1	1	14.431			
T2	0.42	2.16	A	0.181	2.66	28	1	1	25.227	2.75	137.50	C
160.00-140.00			B	0.181	2.66		1	1	25.227			
			C	0.181	2.66		1	1	25.227			
T3	0.74	2.32	A	0.166	2.714	27	1	1	28.721	3.60	180.02	C
140.00-120.00			B	0.166	2.714		1	1	28.721			
			C	0.166	2.714		1	1	28.721			
T4	0.74	3.23	A	0.153	2.761	26	1	1	31.083	3.65	182.66	C
120.00-100.00			B	0.153	2.761		1	1	31.083			
			C	0.153	2.761		1	1	31.083			
T5	0.82	4.11	A	0.128	2.856	25	1	1	28.398	3.50	175.12	C
100.00-80.00			B	0.128	2.856		1	1	28.398			
			C	0.128	2.856		1	1	28.398			
T6	0.82	4.17	A	0.116	2.902	24	1	1	29.099	3.39	169.52	C
80.00-60.00			B	0.116	2.902		1	1	29.099			
			C	0.116	2.902		1	1	29.099			
T7	0.82	4.73	A	0.11	2.926	22	1	1	30.658	3.26	162.93	C
60.00-40.00			B	0.11	2.926		1	1	30.658			
			C	0.11	2.926		1	1	30.658			
T8	0.82	5.50	A	0.106	2.938	20	1	1	33.698	3.09	154.26	C
40.00-20.00			B	0.106	2.938		1	1	33.698			
			C	0.106	2.938		1	1	33.698			
T9 20.00-0.00	0.82	6.18	A	0.103	2.953	17	1	1	35.508	2.76	137.81	C
			B	0.103	2.953		1	1	35.508			
			C	0.103	2.953		1	1	35.508			
Sum Weight:	6.18	33.43						OTM	2359.67 kip-ft	27.46		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.21	1.03	A	0.229	2.501	29	0.825	1	13.186	1.39	138.87	C
170.00-160.00			B	0.229	2.501		0.825	1	13.186			
			C	0.229	2.501		0.825	1	13.186			
T2	0.42	2.16	A	0.181	2.66	28	0.825	1	23.482	2.64	131.93	C
160.00-140.00			B	0.181	2.66		0.825	1	23.482			
			C	0.181	2.66		0.825	1	23.482			
T3	0.74	2.32	A	0.166	2.714	27	0.825	1	26.355	3.45	172.54	C
140.00-120.00			B	0.166	2.714		0.825	1	26.355			
			C	0.166	2.714		0.825	1	26.355			
T4	0.74	3.23	A	0.153	2.761	26	0.825	1	28.433	3.49	174.43	C
120.00-100.00			B	0.153	2.761		0.825	1	28.433			
			C	0.153	2.761		0.825	1	28.433			
T5	0.82	4.11	A	0.128	2.856	25	0.825	1	26.356	3.38	168.84	C
100.00-80.00			B	0.128	2.856		0.825	1	26.356			
			C	0.128	2.856		0.825	1	26.356			
T6	0.82	4.17	A	0.116	2.902	24	0.825	1	26.937	3.26	163.11	C
80.00-60.00			B	0.116	2.902		0.825	1	26.937			
			C	0.116	2.902		0.825	1	26.937			
T7	0.82	4.73	A	0.11	2.926	22	0.825	1	28.370	3.13	156.56	C
60.00-40.00			B	0.11	2.926		0.825	1	28.370			
			C	0.11	2.926		0.825	1	28.370			
T8	0.82	5.50	A	0.106	2.938	20	0.825	1	30.878	2.94	147.18	C
40.00-20.00			B	0.106	2.938		0.825	1	30.878			
			C	0.106	2.938		0.825	1	30.878			
T9 20.00-0.00	0.82	6.18	A	0.103	2.953	17	0.825	1	32.531	2.63	131.31	C
			B	0.103	2.953		0.825	1	32.531			
			C	0.103	2.953		0.825	1	32.531			
Sum Weight:	6.18	33.43						OTM	2260.67 kip-ft	26.31		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.21	1.03	A	0.229	2.501	29	0.8	1	13.008	1.38	137.79	C
170.00-160.00			B	0.229	2.501		0.8	1	13.008			
			C	0.229	2.501		0.8	1	13.008			
T2	0.42	2.16	A	0.181	2.66	28	0.8	1	23.233	2.62	131.13	C
160.00-140.00			B	0.181	2.66		0.8	1	23.233			
			C	0.181	2.66		0.8	1	23.233			
T3	0.74	2.32	A	0.166	2.714	27	0.8	1	26.017	3.43	171.48	C
140.00-120.00			B	0.166	2.714		0.8	1	26.017			
			C	0.166	2.714		0.8	1	26.017			
T4	0.74	3.23	A	0.153	2.761	26	0.8	1	28.054	3.47	173.26	C
120.00-100.00			B	0.153	2.761		0.8	1	28.054			
			C	0.153	2.761		0.8	1	28.054			
T5	0.82	4.11	A	0.128	2.856	25	0.8	1	26.064	3.36	167.94	C
100.00-80.00			B	0.128	2.856		0.8	1	26.064			
			C	0.128	2.856		0.8	1	26.064			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T6	0.82	4.17	A	0.116	2.902	24	0.8	1	26.628	3.24	162.19	C
80.00-60.00			B	0.116	2.902		0.8	1	26.628			
			C	0.116	2.902		0.8	1	26.628			
T7	0.82	4.73	A	0.11	2.926	22	0.8	1	28.043	3.11	155.65	C
60.00-40.00			B	0.11	2.926		0.8	1	28.043			
			C	0.11	2.926		0.8	1	28.043			
T8	0.82	5.50	A	0.106	2.938	20	0.8	1	30.475	2.92	146.17	C
40.00-20.00			B	0.106	2.938		0.8	1	30.475			
			C	0.106	2.938		0.8	1	30.475			
T9 20.00-0.00	0.82	6.18	A	0.103	2.953	17	0.8	1	32.106	2.61	130.38	C
			B	0.103	2.953		0.8	1	32.106			
			C	0.103	2.953		0.8	1	32.106			
Sum Weight:	6.18	33.43						OTM	2246.53 kip-ft	26.14		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.21	1.03	A	0.229	2.501	29	0.85	1	13.364	1.40	139.96	C
170.00-160.00			B	0.229	2.501		0.85	1	13.364			
			C	0.229	2.501		0.85	1	13.364			
T2	0.42	2.16	A	0.181	2.66	28	0.85	1	23.732	2.65	132.72	C
160.00-140.00			B	0.181	2.66		0.85	1	23.732			
			C	0.181	2.66		0.85	1	23.732			
T3	0.74	2.32	A	0.166	2.714	27	0.85	1	26.693	3.47	173.61	C
140.00-120.00			B	0.166	2.714		0.85	1	26.693			
			C	0.166	2.714		0.85	1	26.693			
T4	0.74	3.23	A	0.153	2.761	26	0.85	1	28.812	3.51	175.61	C
120.00-100.00			B	0.153	2.761		0.85	1	28.812			
			C	0.153	2.761		0.85	1	28.812			
T5	0.82	4.11	A	0.128	2.856	25	0.85	1	26.648	3.39	169.73	C
100.00-80.00			B	0.128	2.856		0.85	1	26.648			
			C	0.128	2.856		0.85	1	26.648			
T6	0.82	4.17	A	0.116	2.902	24	0.85	1	27.246	3.28	164.02	C
80.00-60.00			B	0.116	2.902		0.85	1	27.246			
			C	0.116	2.902		0.85	1	27.246			
T7	0.82	4.73	A	0.11	2.926	22	0.85	1	28.697	3.15	157.47	C
60.00-40.00			B	0.11	2.926		0.85	1	28.697			
			C	0.11	2.926		0.85	1	28.697			
T8	0.82	5.50	A	0.106	2.938	20	0.85	1	31.281	2.96	148.19	C
40.00-20.00			B	0.106	2.938		0.85	1	31.281			
			C	0.106	2.938		0.85	1	31.281			
T9 20.00-0.00	0.82	6.18	A	0.103	2.953	17	0.85	1	32.956	2.64	132.24	C
			B	0.103	2.953		0.85	1	32.956			
			C	0.103	2.953		0.85	1	32.956			
Sum Weight:	6.18	33.43						OTM	2274.81 kip-ft	26.47		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	1.76	6.81	A	0.652	1.781	8	1	1	47.163	0.69	68.77	C
170.00-160.00			B	0.652	1.781		1	1	47.163			
			C	0.652	1.781		1	1	47.163			
T2	3.49	12.52	A	0.502	1.898	7	1	1	75.467	1.31	65.43	C
160.00-140.00			B	0.502	1.898		1	1	75.467			
			C	0.502	1.898		1	1	75.467			
T3	5.97	13.21	A	0.443	1.985	7	1	1	77.371	1.76	88.21	C
140.00-120.00			B	0.443	1.985		1	1	77.371			
			C	0.443	1.985		1	1	77.371			
T4	5.90	14.45	A	0.396	2.071	7	1	1	78.585	1.81	90.75	C
120.00-100.00			B	0.396	2.071		1	1	78.585			
			C	0.396	2.071		1	1	78.585			
T5	6.29	15.19	A	0.322	2.239	7	1	1	69.163	1.79	89.72	C
100.00-80.00			B	0.322	2.239		1	1	69.163			
			C	0.322	2.239		1	1	69.163			
T6	6.18	15.21	A	0.29	2.324	6	1	1	68.930	1.72	86.21	C
80.00-60.00			B	0.29	2.324		1	1	68.930			
			C	0.29	2.324		1	1	68.930			
T7	6.04	15.81	A	0.265	2.394	6	1	1	69.360	1.63	81.40	C
60.00-40.00			B	0.265	2.394		1	1	69.360			
			C	0.265	2.394		1	1	69.360			
T8	5.84	16.77	A	0.246	2.449	5	1	1	71.507	1.49	74.62	C
40.00-20.00			B	0.246	2.449		1	1	71.507			
			C	0.246	2.449		1	1	71.507			
T9 20.00-0.00	5.44	16.74	A	0.224	2.516	5	1	1	70.861	1.29	64.30	C
			B	0.224	2.516		1	1	70.861			
			C	0.224	2.516		1	1	70.861			
Sum Weight:	46.93	126.72						OTM	1159.96 kip-ft	13.50		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	1.76	6.81	A	0.652	1.781	8	0.825	1	45.918	0.67	67.32	C
170.00-160.00			B	0.652	1.781		0.825	1	45.918			
			C	0.652	1.781		0.825	1	45.918			
T2	3.49	12.52	A	0.502	1.898	7	0.825	1	73.722	1.29	64.37	C
160.00-140.00			B	0.502	1.898		0.825	1	73.722			
			C	0.502	1.898		0.825	1	73.722			
T3	5.97	13.21	A	0.443	1.985	7	0.825	1	75.005	1.74	86.76	C
140.00-120.00			B	0.443	1.985		0.825	1	75.005			
			C	0.443	1.985		0.825	1	75.005			
T4	5.90	14.45	A	0.396	2.071	7	0.825	1	75.934	1.78	89.11	C
120.00-100.00			B	0.396	2.071		0.825	1	75.934			
			C	0.396	2.071		0.825	1	75.934			
T5	6.29	15.19	A	0.322	2.239	7	0.825	1	67.120	1.77	88.41	C
100.00-80.00			B	0.322	2.239		0.825	1	67.120			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.322	2.239		0.825	1	67.120			
T6	6.18	15.21	A	0.29	2.324	6	0.825	1	66.767	1.70	84.85	C
80.00-60.00			B	0.29	2.324		0.825	1	66.767			
			C	0.29	2.324		0.825	1	66.767			
T7	6.04	15.81	A	0.265	2.394	6	0.825	1	67.073	1.60	80.01	C
60.00-40.00			B	0.265	2.394		0.825	1	67.073			
			C	0.265	2.394		0.825	1	67.073			
T8	5.84	16.77	A	0.246	2.449	5	0.825	1	68.687	1.46	73.05	C
40.00-20.00			B	0.246	2.449		0.825	1	68.687			
			C	0.246	2.449		0.825	1	68.687			
T9 20.00-0.00	5.44	16.74	A	0.224	2.516	5	0.825	1	67.884	1.26	62.83	C
			B	0.224	2.516		0.825	1	67.884			
			C	0.224	2.516		0.825	1	67.884			
Sum Weight:	46.93	126.72						OTM	1140.15 kip-ft	13.26		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	1.76	6.81	A	0.652	1.781	8	0.8	1	45.740	0.67	67.12	C
170.00-160.00			B	0.652	1.781		0.8	1	45.740			
			C	0.652	1.781		0.8	1	45.740			
T2	3.49	12.52	A	0.502	1.898	7	0.8	1	73.472	1.28	64.22	C
160.00-140.00			B	0.502	1.898		0.8	1	73.472			
			C	0.502	1.898		0.8	1	73.472			
T3	5.97	13.21	A	0.443	1.985	7	0.8	1	74.667	1.73	86.55	C
140.00-120.00			B	0.443	1.985		0.8	1	74.667			
			C	0.443	1.985		0.8	1	74.667			
T4	5.90	14.45	A	0.396	2.071	7	0.8	1	75.556	1.78	88.87	C
120.00-100.00			B	0.396	2.071		0.8	1	75.556			
			C	0.396	2.071		0.8	1	75.556			
T5	6.29	15.19	A	0.322	2.239	7	0.8	1	66.829	1.76	88.22	C
100.00-80.00			B	0.322	2.239		0.8	1	66.829			
			C	0.322	2.239		0.8	1	66.829			
T6	6.18	15.21	A	0.29	2.324	6	0.8	1	66.458	1.69	84.65	C
80.00-60.00			B	0.29	2.324		0.8	1	66.458			
			C	0.29	2.324		0.8	1	66.458			
T7	6.04	15.81	A	0.265	2.394	6	0.8	1	66.746	1.60	79.82	C
60.00-40.00			B	0.265	2.394		0.8	1	66.746			
			C	0.265	2.394		0.8	1	66.746			
T8	5.84	16.77	A	0.246	2.449	5	0.8	1	68.284	1.46	72.83	C
40.00-20.00			B	0.246	2.449		0.8	1	68.284			
			C	0.246	2.449		0.8	1	68.284			
T9 20.00-0.00	5.44	16.74	A	0.224	2.516	5	0.8	1	67.459	1.25	62.62	C
			B	0.224	2.516		0.8	1	67.459			
			C	0.224	2.516		0.8	1	67.459			
Sum Weight:	46.93	126.72						OTM	1137.32 kip-ft	13.23		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	1.76	6.81	A	0.652	1.781	8	0.85	1	46.096	0.68	67.53	C
170.00-160.00			B	0.652	1.781		0.85	1	46.096			
			C	0.652	1.781		0.85	1	46.096			
T2	3.49	12.52	A	0.502	1.898	7	0.85	1	73.971	1.29	64.52	C
160.00-140.00			B	0.502	1.898		0.85	1	73.971			
			C	0.502	1.898		0.85	1	73.971			
T3	5.97	13.21	A	0.443	1.985	7	0.85	1	75.343	1.74	86.97	C
140.00-120.00			B	0.443	1.985		0.85	1	75.343			
			C	0.443	1.985		0.85	1	75.343			
T4	5.90	14.45	A	0.396	2.071	7	0.85	1	76.313	1.79	89.34	C
120.00-100.00			B	0.396	2.071		0.85	1	76.313			
			C	0.396	2.071		0.85	1	76.313			
T5	6.29	15.19	A	0.322	2.239	7	0.85	1	67.412	1.77	88.60	C
100.00-80.00			B	0.322	2.239		0.85	1	67.412			
			C	0.322	2.239		0.85	1	67.412			
T6	6.18	15.21	A	0.29	2.324	6	0.85	1	67.076	1.70	85.04	C
80.00-60.00			B	0.29	2.324		0.85	1	67.076			
			C	0.29	2.324		0.85	1	67.076			
T7	6.04	15.81	A	0.265	2.394	6	0.85	1	67.399	1.60	80.21	C
60.00-40.00			B	0.265	2.394		0.85	1	67.399			
			C	0.265	2.394		0.85	1	67.399			
T8	5.84	16.77	A	0.246	2.449	5	0.85	1	69.090	1.47	73.27	C
40.00-20.00			B	0.246	2.449		0.85	1	69.090			
			C	0.246	2.449		0.85	1	69.090			
T9 20.00-0.00	5.44	16.74	A	0.224	2.516	5	0.85	1	68.309	1.26	63.04	C
			B	0.224	2.516		0.85	1	68.309			
			C	0.224	2.516		0.85	1	68.309			
Sum Weight:	46.93	126.72						OTM	1142.98 kip-ft	13.30		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.21	1.03	A	0.229	2.501	11	1	1	14.431	0.56	56.05	C
170.00-160.00			B	0.229	2.501		1	1	14.431			
			C	0.229	2.501		1	1	14.431			
T2	0.42	2.16	A	0.181	2.66	11	1	1	25.227	1.05	52.61	C
160.00-140.00			B	0.181	2.66		1	1	25.227			
			C	0.181	2.66		1	1	25.227			
T3	0.74	2.32	A	0.166	2.714	10	1	1	28.721	1.38	68.88	C
140.00-120.00			B	0.166	2.714		1	1	28.721			
			C	0.166	2.714		1	1	28.721			
T4	0.74	3.23	A	0.153	2.761	10	1	1	31.083	1.40	69.89	C
120.00-100.00			B	0.153	2.761		1	1	31.083			
			C	0.153	2.761		1	1	31.083			
T5	0.82	4.11	A	0.128	2.856	10	1	1	28.398	1.34	67.00	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
100.00-80.00			B	0.128	2.856		1	1	28.398			
			C	0.128	2.856		1	1	28.398			
T6	0.82	4.17	A	0.116	2.902	9	1	1	29.099	1.30	64.86	C
80.00-60.00			B	0.116	2.902		1	1	29.099			
			C	0.116	2.902		1	1	29.099			
T7	0.82	4.73	A	0.11	2.926	9	1	1	30.658	1.25	62.34	C
60.00-40.00			B	0.11	2.926		1	1	30.658			
			C	0.11	2.926		1	1	30.658			
T8	0.82	5.50	A	0.106	2.938	8	1	1	33.698	1.18	59.02	C
40.00-20.00			B	0.106	2.938		1	1	33.698			
			C	0.106	2.938		1	1	33.698			
T9 20.00-0.00	0.82	6.18	A	0.103	2.953	7	1	1	35.508	1.05	52.73	C
			B	0.103	2.953		1	1	35.508			
			C	0.103	2.953		1	1	35.508			
Sum Weight:	6.18	33.43						OTM	902.84 kip-ft	10.51		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.21	1.03	A	0.229	2.501	11	0.825	1	13.186	0.53	53.13	C
170.00-160.00			B	0.229	2.501		0.825	1	13.186			
			C	0.229	2.501		0.825	1	13.186			
T2	0.42	2.16	A	0.181	2.66	11	0.825	1	23.482	1.01	50.48	C
160.00-140.00			B	0.181	2.66		0.825	1	23.482			
			C	0.181	2.66		0.825	1	23.482			
T3	0.74	2.32	A	0.166	2.714	10	0.825	1	26.355	1.32	66.02	C
140.00-120.00			B	0.166	2.714		0.825	1	26.355			
			C	0.166	2.714		0.825	1	26.355			
T4	0.74	3.23	A	0.153	2.761	10	0.825	1	28.433	1.33	66.74	C
120.00-100.00			B	0.153	2.761		0.825	1	28.433			
			C	0.153	2.761		0.825	1	28.433			
T5	0.82	4.11	A	0.128	2.856	10	0.825	1	26.356	1.29	64.60	C
100.00-80.00			B	0.128	2.856		0.825	1	26.356			
			C	0.128	2.856		0.825	1	26.356			
T6	0.82	4.17	A	0.116	2.902	9	0.825	1	26.937	1.25	62.41	C
80.00-60.00			B	0.116	2.902		0.825	1	26.937			
			C	0.116	2.902		0.825	1	26.937			
T7	0.82	4.73	A	0.11	2.926	9	0.825	1	28.370	1.20	59.90	C
60.00-40.00			B	0.11	2.926		0.825	1	28.370			
			C	0.11	2.926		0.825	1	28.370			
T8	0.82	5.50	A	0.106	2.938	8	0.825	1	30.878	1.13	56.31	C
40.00-20.00			B	0.106	2.938		0.825	1	30.878			
			C	0.106	2.938		0.825	1	30.878			
T9 20.00-0.00	0.82	6.18	A	0.103	2.953	7	0.825	1	32.531	1.00	50.24	C
			B	0.103	2.953		0.825	1	32.531			
			C	0.103	2.953		0.825	1	32.531			
Sum Weight:	6.18	33.43						OTM	864.96 kip-ft	10.07		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.21	1.03	A	0.229	2.501	11	0.8	1	13.008	0.53	52.72	C
170.00-160.00			B	0.229	2.501		0.8	1	13.008			
			C	0.229	2.501		0.8	1	13.008			
T2	0.42	2.16	A	0.181	2.66	11	0.8	1	23.233	1.00	50.17	C
160.00-140.00			B	0.181	2.66		0.8	1	23.233			
			C	0.181	2.66		0.8	1	23.233			
T3	0.74	2.32	A	0.166	2.714	10	0.8	1	26.017	1.31	65.61	C
140.00-120.00			B	0.166	2.714		0.8	1	26.017			
			C	0.166	2.714		0.8	1	26.017			
T4	0.74	3.23	A	0.153	2.761	10	0.8	1	28.054	1.33	66.29	C
120.00-100.00			B	0.153	2.761		0.8	1	28.054			
			C	0.153	2.761		0.8	1	28.054			
T5	0.82	4.11	A	0.128	2.856	10	0.8	1	26.064	1.29	64.26	C
100.00-80.00			B	0.128	2.856		0.8	1	26.064			
			C	0.128	2.856		0.8	1	26.064			
T6	0.82	4.17	A	0.116	2.902	9	0.8	1	26.628	1.24	62.06	C
80.00-60.00			B	0.116	2.902		0.8	1	26.628			
			C	0.116	2.902		0.8	1	26.628			
T7	0.82	4.73	A	0.11	2.926	9	0.8	1	28.043	1.19	59.55	C
60.00-40.00			B	0.11	2.926		0.8	1	28.043			
			C	0.11	2.926		0.8	1	28.043			
T8	0.82	5.50	A	0.106	2.938	8	0.8	1	30.475	1.12	55.93	C
40.00-20.00			B	0.106	2.938		0.8	1	30.475			
			C	0.106	2.938		0.8	1	30.475			
T9 20.00-0.00	0.82	6.18	A	0.103	2.953	7	0.8	1	32.106	1.00	49.88	C
			B	0.103	2.953		0.8	1	32.106			
			C	0.103	2.953		0.8	1	32.106			
Sum Weight:	6.18	33.43						OTM	859.55 kip-ft	10.00		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.21	1.03	A	0.229	2.501	11	0.85	1	13.364	0.54	53.55	C
170.00-160.00			B	0.229	2.501		0.85	1	13.364			
			C	0.229	2.501		0.85	1	13.364			
T2	0.42	2.16	A	0.181	2.66	11	0.85	1	23.732	1.02	50.78	C
160.00-140.00			B	0.181	2.66		0.85	1	23.732			
			C	0.181	2.66		0.85	1	23.732			
T3	0.74	2.32	A	0.166	2.714	10	0.85	1	26.693	1.33	66.43	C
140.00-120.00			B	0.166	2.714		0.85	1	26.693			
			C	0.166	2.714		0.85	1	26.693			
T4	0.74	3.23	A	0.153	2.761	10	0.85	1	28.812	1.34	67.19	C
120.00-100.00			B	0.153	2.761		0.85	1	28.812			
			C	0.153	2.761		0.85	1	28.812			
T5	0.82	4.11	A	0.128	2.856	10	0.85	1	26.648	1.30	64.94	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
100.00-80.00			B	0.128	2.856		0.85	1	26.648			
			C	0.128	2.856		0.85	1	26.648			
T6	0.82	4.17	A	0.116	2.902	9	0.85	1	27.246	1.26	62.76	C
80.00-60.00			B	0.116	2.902		0.85	1	27.246			
			C	0.116	2.902		0.85	1	27.246			
T7	0.82	4.73	A	0.11	2.926	9	0.85	1	28.697	1.20	60.25	C
60.00-40.00			B	0.11	2.926		0.85	1	28.697			
			C	0.11	2.926		0.85	1	28.697			
T8	0.82	5.50	A	0.106	2.938	8	0.85	1	31.281	1.13	56.70	C
40.00-20.00			B	0.106	2.938		0.85	1	31.281			
			C	0.106	2.938		0.85	1	31.281			
T9 20.00-0.00	0.82	6.18	A	0.103	2.953	7	0.85	1	32.956	1.01	50.60	C
			B	0.103	2.953		0.85	1	32.956			
			C	0.103	2.953		0.85	1	32.956			
Sum Weight:	6.18	33.43						OTM	870.37 kip-ft	10.13		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	23.10					
Bracing Weight	10.33					
Total Member Self-Weight	33.43			2.04	13.26	
Total Weight	51.68			2.04	13.26	
Wind 0 deg - No Ice		-0.19	-38.45	-3923.96	41.54	-6.77
Wind 30 deg - No Ice		19.06	-31.66	-3197.08	-1960.75	-6.04
Wind 45 deg - No Ice		26.57	-25.63	-2584.31	-2724.57	-5.17
Wind 60 deg - No Ice		31.94	-18.44	-1883.91	-3252.81	-3.73
Wind 90 deg - No Ice		36.94	-0.68	-108.18	-3743.85	-0.50
Wind 120 deg - No Ice		33.20	19.39	1989.53	-3372.14	2.85
Wind 135 deg - No Ice		26.62	27.06	2767.10	-2682.31	4.97
Wind 150 deg - No Ice		17.83	32.39	3319.11	-1762.33	5.31
Wind 180 deg - No Ice		-0.06	36.88	3774.59	22.14	5.96
Wind 210 deg - No Ice		-17.93	32.41	3321.89	1803.97	5.22
Wind 225 deg - No Ice		-26.18	26.36	2704.88	2687.26	3.71
Wind 240 deg - No Ice		-33.44	19.31	1977.83	3434.96	3.92
Wind 270 deg - No Ice		-37.03	-0.67	-106.85	3783.28	1.32
Wind 300 deg - No Ice		-31.97	-18.39	-1876.55	3284.35	-2.23
Wind 315 deg - No Ice		-27.26	-26.28	-2638.59	2810.51	-3.91
Wind 330 deg - No Ice		-19.13	-31.64	-3194.45	1997.72	-5.31
Member Ice	93.29					
Total Weight Ice	208.06			1.31	71.43	
Wind 0 deg - Ice		-0.06	-17.67	-1750.68	80.28	-3.61
Wind 30 deg - Ice		8.83	-14.88	-1462.12	-811.87	-2.74
Wind 45 deg - Ice		12.38	-12.10	-1186.64	-1162.48	-2.04
Wind 60 deg - Ice		14.99	-8.66	-856.76	-1414.60	-1.14
Wind 90 deg - Ice		17.30	-0.21	-32.03	-1637.42	0.75
Wind 120 deg - Ice		15.27	8.89	884.96	-1441.22	2.45
Wind 135 deg - Ice		12.33	12.47	1238.11	-1144.05	3.26
Wind 150 deg - Ice		8.46	15.11	1500.94	-751.81	3.40
Wind 180 deg - Ice		-0.01	17.32	1718.07	73.61	3.36

Load Case	*Vertical Forces K*	*Sum of Forces X K*	*Sum of Forces Z K*	*Sum of Overturning Moments, M_x kip-ft*	*Sum of Overturning Moments, M_z kip-ft*	*Sum of Torques kip-ft*
Wind 210 deg - Ice		-8.48	15.11	1501.48	898.41	2.48
Wind 225 deg - Ice		-12.26	12.32	1224.76	1285.57	1.59
Wind 240 deg - Ice		-15.34	8.86	880.76	1594.50	1.16
Wind 270 deg - Ice		-17.33	-0.21	-32.50	1783.94	-0.50
Wind 300 deg - Ice		-15.00	-8.65	-855.18	1559.09	-2.22
Wind 315 deg - Ice		-12.53	-12.23	-1197.55	1317.71	-2.93
Wind 330 deg - Ice		-8.85	-14.88	-1461.55	958.37	-3.40
Total Weight	51.68			2.04	13.26	
Wind 0 deg - Service		-0.07	-14.71	-1500.77	13.45	-2.59
Wind 30 deg - Service		7.29	-12.11	-1222.66	-752.65	-2.31
Wind 45 deg - Service		10.17	-9.81	-988.21	-1044.90	-1.98
Wind 60 deg - Service		12.22	-7.06	-720.22	-1247.01	-1.43
Wind 90 deg - Service		14.13	-0.26	-40.81	-1434.89	-0.19
Wind 120 deg - Service		12.70	7.42	761.80	-1292.67	1.09
Wind 135 deg - Service		10.18	10.35	1059.31	-1028.73	1.90
Wind 150 deg - Service		6.82	12.39	1270.51	-676.74	2.03
Wind 180 deg - Service		-0.02	14.11	1444.79	6.03	2.28
Wind 210 deg - Service		-6.86	12.40	1271.58	687.78	2.00
Wind 225 deg - Service		-10.02	10.09	1035.50	1025.73	1.42
Wind 240 deg - Service		-12.80	7.39	757.33	1311.81	1.50
Wind 270 deg - Service		-14.17	-0.26	-40.30	1445.08	0.51
Wind 300 deg - Service		-12.23	-7.04	-717.41	1254.19	-0.85
Wind 315 deg - Service		-10.43	-10.06	-1008.97	1072.89	-1.50
Wind 330 deg - Service		-7.32	-12.10	-1221.65	761.91	-2.03

Load Combinations

Comb. No.	*Description*
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 45 deg - No Ice
7	0.9 Dead+1.6 Wind 45 deg - No Ice
8	1.2 Dead+1.6 Wind 60 deg - No Ice
9	0.9 Dead+1.6 Wind 60 deg - No Ice
10	1.2 Dead+1.6 Wind 90 deg - No Ice
11	0.9 Dead+1.6 Wind 90 deg - No Ice
12	1.2 Dead+1.6 Wind 120 deg - No Ice
13	0.9 Dead+1.6 Wind 120 deg - No Ice
14	1.2 Dead+1.6 Wind 135 deg - No Ice
15	0.9 Dead+1.6 Wind 135 deg - No Ice
16	1.2 Dead+1.6 Wind 150 deg - No Ice
17	0.9 Dead+1.6 Wind 150 deg - No Ice
18	1.2 Dead+1.6 Wind 180 deg - No Ice
19	0.9 Dead+1.6 Wind 180 deg - No Ice
20	1.2 Dead+1.6 Wind 210 deg - No Ice
21	0.9 Dead+1.6 Wind 210 deg - No Ice
22	1.2 Dead+1.6 Wind 225 deg - No Ice
23	0.9 Dead+1.6 Wind 225 deg - No Ice
24	1.2 Dead+1.6 Wind 240 deg - No Ice
25	0.9 Dead+1.6 Wind 240 deg - No Ice
26	1.2 Dead+1.6 Wind 270 deg - No Ice
27	0.9 Dead+1.6 Wind 270 deg - No Ice

Comb. No.	Description
28	1.2 Dead+1.6 Wind 300 deg - No Ice
29	0.9 Dead+1.6 Wind 300 deg - No Ice
30	1.2 Dead+1.6 Wind 315 deg - No Ice
31	0.9 Dead+1.6 Wind 315 deg - No Ice
32	1.2 Dead+1.6 Wind 330 deg - No Ice
33	0.9 Dead+1.6 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service
65	Dead+Wind 315 deg - Service
66	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
T1	170 - 160	Leg	Max Tension	8	3.30	0.00	0.00
			Max. Compression	35	-6.79	-0.28	-0.00
			Max. Mx	8	2.22	0.84	0.01
			Max. My	22	-0.29	0.20	-0.95
			Max. Vy	8	-1.52	0.00	0.00
			Max. Vx	16	-1.51	0.00	0.00
		Diagonal	Max Tension	21	3.79	0.00	0.00
			Max. Compression	22	-3.99	0.00	0.00
			Max. Mx	43	-1.26	0.07	-0.00
			Max. My	41	-0.63	0.07	-0.01
			Max. Vy	42	0.05	0.07	-0.00
			Max. Vx	41	-0.00	0.00	0.00
		Secondary Horizontal	Max Tension	28	0.97	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	13	-1.03	0.01	0.00
			Max. Mx	44	0.09	0.04	0.01
			Max. My	36	0.08	0.03	0.02
			Max. Vy	44	0.05	0.04	0.01
			Max. Vx	45	-0.01	0.00	0.00
		Top Girt	Max Tension	25	0.76	0.00	0.00
			Max. Compression	18	-0.77	0.00	0.00
			Max. Mx	34	-0.05	-0.13	0.00
			Max. My	41	-0.10	0.00	0.00
			Max. Vy	34	0.07	0.00	0.00
			Max. Vx	41	-0.00	0.00	0.00
T2	160 - 140	Leg	Max Tension	29	25.79	-0.46	0.11
			Max. Compression	2	-31.58	1.44	-0.32
			Max. Mx	2	-31.58	1.44	-0.32
			Max. My	10	-4.34	0.01	1.27
			Max. Vy	18	-0.46	-0.46	-0.11
			Max. Vx	22	0.66	-0.12	1.10
		Diagonal	Max Tension	30	5.40	0.00	0.00
			Max. Compression	12	-5.54	0.00	0.00
			Max. Mx	37	1.16	0.09	-0.01
			Max. My	45	-0.41	0.09	0.02
			Max. Vy	37	0.06	0.09	-0.01
			Max. Vx	45	0.00	0.00	0.00
T3	140 - 120	Leg	Max Tension	29	57.91	-1.13	0.07
			Max. Compression	24	-71.65	2.90	-0.02
			Max. Mx	25	-69.96	2.91	-0.02
			Max. My	32	-10.68	0.13	2.60
			Max. Vy	8	-2.10	-1.18	0.01
			Max. Vx	16	-1.84	0.20	0.23
		Diagonal	Max Tension	4	8.08	0.00	0.00
			Max. Compression	4	-8.09	0.00	0.00
			Max. Mx	48	1.85	0.13	-0.02
			Max. My	35	0.11	0.12	0.02
			Max. Vy	48	0.09	0.13	-0.02
			Max. Vx	35	0.01	0.00	0.00
T4	120 - 100	Leg	Max Tension	29	92.85	-1.94	-0.01
			Max. Compression	24	-111.32	2.81	-0.02
			Max. Mx	25	-88.99	2.91	-0.02
			Max. My	32	-11.63	0.13	2.60
			Max. Vy	8	-0.25	-2.78	0.03
			Max. Vx	32	0.26	0.13	2.60
		Diagonal	Max Tension	4	8.79	0.00	0.00
			Max. Compression	4	-8.79	0.00	0.00
			Max. Mx	48	1.89	0.19	0.03
			Max. My	50	-1.12	0.16	0.03
			Max. Vy	48	0.11	0.19	0.03
			Max. Vx	50	0.01	0.00	0.00
T5	100 - 80	Leg	Max Tension	29	119.86	-2.75	0.04
			Max. Compression	24	-142.71	3.42	-0.05
			Max. Mx	8	114.95	-3.65	0.05
			Max. My	32	-17.27	-0.11	5.21
			Max. Vy	18	-1.79	-2.77	-0.07
			Max. Vx	10	1.55	0.07	1.36
		Diagonal	Max Tension	5	14.64	0.00	0.00
			Max. Compression	4	-15.16	0.00	0.00
			Max. Mx	48	3.40	-0.41	-0.07
			Max. My	36	-4.65	-0.38	-0.08
			Max. Vy	48	-0.15	-0.41	0.07
			Max. Vx	43	0.01	0.00	0.00
T6	80 - 60	Leg	Max Tension	29	158.14	-3.58	0.04
			Max. Compression	24	-187.85	3.65	-0.03

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	8	153.44	-3.79	0.04
			Max. My	32	-19.46	-0.11	5.21
			Max. Vy	38	-0.43	-3.13	0.04
			Max. Vx	32	0.40	-0.11	5.21
		Diagonal	Max Tension	4	14.94	0.00	0.00
			Max. Compression	4	-15.19	0.00	0.00
			Max. Mx	48	3.17	-0.49	0.08
			Max. My	35	-0.51	-0.48	-0.08
			Max. Vy	48	-0.17	-0.49	0.08
			Max. Vx	35	-0.01	0.00	0.00
T7	60 - 40	Leg	Max Tension	29	193.76	-3.74	0.03
			Max. Compression	24	-228.37	5.84	-0.06
			Max. Mx	24	-228.37	5.84	-0.06
			Max. My	32	-21.82	-0.06	3.77
			Max. Vy	38	0.51	-4.81	0.02
			Max. Vx	32	0.37	-0.06	3.77
		Diagonal	Max Tension	4	14.77	0.00	0.00
			Max. Compression	4	-15.31	0.00	0.00
			Max. Mx	48	4.07	-0.53	0.08
			Max. My	35	3.65	-0.52	-0.08
			Max. Vy	48	-0.18	-0.53	0.08
			Max. Vx	43	0.01	0.00	0.00
T8	40 - 20	Leg	Max Tension	29	228.62	-5.30	0.04
			Max. Compression	24	-269.34	3.41	-0.03
			Max. Mx	24	-267.77	5.84	-0.06
			Max. My	32	-26.71	-0.47	8.34
			Max. Vy	38	-0.53	-4.81	0.02
			Max. Vx	32	-0.57	-0.47	8.34
		Diagonal	Max Tension	4	14.90	0.00	0.00
			Max. Compression	4	-15.37	0.00	0.00
			Max. Mx	48	2.21	-0.78	-0.11
			Max. My	43	-4.77	-0.64	0.12
			Max. Vy	48	-0.25	-0.78	-0.11
			Max. Vx	43	0.02	0.00	0.00
T9	20 - 0	Leg	Max Tension	29	259.84	-4.14	0.05
			Max. Compression	24	-306.60	0.00	0.00
			Max. Mx	8	254.44	-4.29	0.04
			Max. My	32	-28.03	-0.47	8.34
			Max. Vy	8	-0.51	-4.29	0.04
			Max. Vx	32	0.68	-0.47	8.34
		Diagonal	Max Tension	4	15.44	0.00	0.00
			Max. Compression	4	-16.04	0.00	0.00
			Max. Mx	47	5.06	-0.75	0.11
			Max. My	35	4.19	-0.75	-0.11
			Max. Vy	47	-0.24	-0.75	0.11
			Max. Vx	35	-0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	24	326.44	32.92	-19.18
	Max. H_x	24	326.44	32.92	-19.18
	Max. H_z	7	-266.64	-27.69	17.52
	Min. Vert	9	-274.91	-29.14	16.99
	Min. H_x	9	-274.91	-29.14	16.99

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. H_z	24	326.44	32.92	-19.18
Leg B	Max. Vert	12	323.14	-32.88	-18.86
	Max. H_x	29	-275.96	29.27	16.81
	Max. H_z	31	-267.58	27.87	17.23
	Min. Vert	29	-275.96	29.27	16.81
	Min. H_x	12	323.14	-32.88	-18.86
	Min. H_z	12	323.14	-32.88	-18.86
Leg A	Max. Vert	2	323.66	-0.26	37.91
	Max. H_x	27	23.82	4.53	1.81
	Max. H_z	2	323.66	-0.26	37.91
	Min. Vert	19	-275.63	0.23	-33.75
	Min. H_x	10	29.07	-4.52	2.23
	Min. H_z	19	-275.63	0.23	-33.75

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	51.68	0.00	0.00	2.04	13.26	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	62.02	-0.30	-61.52	-6297.39	61.38	-10.89
0.9 Dead+1.6 Wind 0 deg - No Ice	46.52	-0.30	-61.52	-6293.41	57.35	-10.87
1.2 Dead+1.6 Wind 30 deg - No Ice	62.02	30.50	-50.65	-5130.91	-3151.71	-9.69
0.9 Dead+1.6 Wind 30 deg - No Ice	46.52	30.50	-50.65	-5127.81	-3153.38	-9.68
1.2 Dead+1.6 Wind 45 deg - No Ice	62.02	42.52	-41.01	-4147.65	-4377.37	-8.29
0.9 Dead+1.6 Wind 45 deg - No Ice	46.52	42.52	-41.01	-4145.26	-4378.15	-8.28
1.2 Dead+1.6 Wind 60 deg - No Ice	62.02	51.10	-29.51	-3023.85	-5224.95	-5.99
0.9 Dead+1.6 Wind 60 deg - No Ice	46.52	51.10	-29.51	-3022.26	-5225.13	-5.99
1.2 Dead+1.6 Wind 90 deg - No Ice	62.02	59.11	-1.09	-174.55	-6012.83	-0.82
0.9 Dead+1.6 Wind 90 deg - No Ice	46.52	59.11	-1.09	-175.00	-6012.44	-0.82
1.2 Dead+1.6 Wind 120 deg - No Ice	62.02	53.12	31.02	3191.70	-5416.38	4.59
0.9 Dead+1.6 Wind 120 deg - No Ice	46.52	53.12	31.02	3188.76	-5416.43	4.58
1.2 Dead+1.6 Wind 135 deg - No Ice	62.02	41.50	42.21	4346.37	-4216.34	8.01
0.9 Dead+1.6 Wind 135 deg - No Ice	46.52	41.50	42.21	4342.59	-4217.27	8.00
1.2 Dead+1.6 Wind 150 deg - No Ice	62.02	28.53	51.82	5325.22	-2833.08	8.56
0.9 Dead+1.6 Wind 150 deg - No Ice	46.52	28.53	51.82	5320.72	-2835.04	8.54
1.2 Dead+1.6 Wind 180 deg - No Ice	62.02	-0.10	59.01	6056.09	30.23	9.59
0.9 Dead+1.6 Wind 180 deg - No Ice	46.52	-0.10	59.01	6051.06	26.22	9.57
1.2 Dead+1.6 Wind 210 deg -	62.02	-28.69	51.85	5329.67	2889.30	8.39

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
No Ice						
0.9 Dead+1.6 Wind 210 deg - No Ice	46.52	-28.69	51.85	5325.17	2883.24	8.38
1.2 Dead+1.6 Wind 225 deg - No Ice	62.02	-41.89	42.17	4339.58	4306.76	5.96
0.9 Dead+1.6 Wind 225 deg - No Ice	46.52	-41.89	42.17	4335.80	4299.64	5.95
1.2 Dead+1.6 Wind 240 deg - No Ice	62.02	-53.51	30.90	3172.90	5506.59	6.30
0.9 Dead+1.6 Wind 240 deg - No Ice	46.52	-53.51	30.90	3169.98	5498.59	6.29
1.2 Dead+1.6 Wind 270 deg - No Ice	62.02	-59.24	-1.07	-172.41	6065.46	2.12
0.9 Dead+1.6 Wind 270 deg - No Ice	46.52	-59.24	-1.07	-172.86	6057.07	2.12
1.2 Dead+1.6 Wind 300 deg - No Ice	62.02	-51.15	-29.42	-3012.02	5264.93	-3.59
0.9 Dead+1.6 Wind 300 deg - No Ice	46.52	-51.15	-29.42	-3010.43	5257.10	-3.59
1.2 Dead+1.6 Wind 315 deg - No Ice	62.02	-42.53	-40.97	-4141.64	4411.57	-6.31
0.9 Dead+1.6 Wind 315 deg - No Ice	46.52	-42.53	-40.97	-4139.26	4404.35	-6.29
1.2 Dead+1.6 Wind 330 deg - No Ice	62.02	-30.61	-50.62	-5126.66	3200.42	-8.56
0.9 Dead+1.6 Wind 330 deg - No Ice	46.52	-30.61	-50.62	-5123.56	3194.08	-8.54
1.2 Dead+1.0 Ice+1.0 Temp	218.40	0.00	0.00	1.70	74.69	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	218.40	-0.06	-17.67	-1768.83	83.76	-3.68
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	218.40	8.83	-14.88	-1477.24	-817.73	-2.80
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	218.40	12.38	-12.10	-1198.72	-1172.19	-2.08
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	218.40	14.99	-8.66	-865.45	-1426.91	-1.17
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	218.40	17.30	-0.21	-31.92	-1652.08	0.75
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	218.40	15.27	8.89	894.70	-1453.84	2.48
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	218.40	12.19	12.33	1239.79	-1141.83	3.30
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	218.40	8.46	15.11	1517.11	-757.20	3.46
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	218.40	-0.01	17.32	1736.55	77.01	3.43
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	218.40	-8.48	15.11	1517.61	910.58	2.55
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	218.40	-12.26	12.32	1238.00	1301.81	1.65
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	218.40	-15.34	8.86	890.42	1613.96	1.20
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	218.40	-17.33	-0.21	-32.39	1805.35	-0.51
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	218.40	-15.00	-8.65	-863.84	1578.14	-2.25
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	218.40	-12.39	-12.09	-1198.01	1322.53	-2.97
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	218.40	-8.85	-14.88	-1476.65	971.02	-3.45
Dead+Wind 0 deg - Service	51.68	-0.07	-14.71	-1503.74	24.14	-2.60

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 30 deg - Service	51.68	7.29	-12.11	-1224.91	-743.81	-2.32
Dead+Wind 45 deg - Service	51.68	10.17	-9.81	-989.91	-1036.79	-1.98
Dead+Wind 60 deg - Service	51.68	12.22	-7.06	-721.30	-1239.38	-1.43
Dead+Wind 90 deg - Service	51.68	14.13	-0.26	-40.25	-1427.67	-0.20
Dead+Wind 120 deg - Service	51.68	12.70	7.42	764.33	-1285.14	1.10
Dead+Wind 135 deg - Service	51.68	9.92	10.10	1040.32	-998.31	1.92
Dead+Wind 150 deg - Service	51.68	6.82	12.39	1274.24	-667.69	2.05
Dead+Wind 180 deg - Service	51.68	-0.02	14.11	1448.97	16.70	2.29
Dead+Wind 210 deg - Service	51.68	-6.86	12.40	1275.31	700.07	2.00
Dead+Wind 225 deg - Service	51.68	-10.02	10.09	1038.70	1038.88	1.42
Dead+Wind 240 deg - Service	51.68	-12.80	7.39	759.84	1325.66	1.50
Dead+Wind 270 deg - Service	51.68	-14.17	-0.26	-39.73	1459.21	0.51
Dead+Wind 300 deg - Service	51.68	-12.23	-7.04	-718.47	1267.89	-0.86
Dead+Wind 315 deg - Service	51.68	-10.17	-9.80	-988.48	1063.92	-1.51
Dead+Wind 330 deg - Service	51.68	-7.32	-12.10	-1223.90	774.40	-2.05

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-51.68	0.00	0.00	51.68	0.00	0.000%
2	-0.30	-62.02	-61.52	0.30	62.02	61.52	0.000%
3	-0.30	-46.52	-61.52	0.30	46.52	61.52	0.000%
4	30.50	-62.02	-50.65	-30.50	62.02	50.65	0.000%
5	30.50	-46.52	-50.65	-30.50	46.52	50.65	0.000%
6	42.52	-62.02	-41.01	-42.52	62.02	41.01	0.000%
7	42.52	-46.52	-41.01	-42.52	46.52	41.01	0.000%
8	51.10	-62.02	-29.51	-51.10	62.02	29.51	0.000%
9	51.10	-46.52	-29.51	-51.10	46.52	29.51	0.000%
10	59.11	-62.02	-1.09	-59.11	62.02	1.09	0.000%
11	59.11	-46.52	-1.09	-59.11	46.52	1.09	0.000%
12	53.12	-62.02	31.02	-53.12	62.02	-31.02	0.000%
13	53.12	-46.52	31.02	-53.12	46.52	-31.02	0.000%
14	41.50	-62.02	42.21	-41.50	62.02	-42.21	0.000%
15	41.50	-46.52	42.21	-41.50	46.52	-42.21	0.000%
16	28.53	-62.02	51.82	-28.53	62.02	-51.82	0.000%
17	28.53	-46.52	51.82	-28.53	46.52	-51.82	0.000%
18	-0.10	-62.02	59.01	0.10	62.02	-59.01	0.000%
19	-0.10	-46.52	59.01	0.10	46.52	-59.01	0.000%
20	-28.69	-62.02	51.85	28.69	62.02	-51.85	0.000%
21	-28.69	-46.52	51.85	28.69	46.52	-51.85	0.000%
22	-41.89	-62.02	42.17	41.89	62.02	-42.17	0.000%
23	-41.89	-46.52	42.17	41.89	46.52	-42.17	0.000%
24	-53.51	-62.02	30.90	53.51	62.02	-30.90	0.000%
25	-53.51	-46.52	30.90	53.51	46.52	-30.90	0.000%
26	-59.24	-62.02	-1.07	59.24	62.02	1.07	0.000%
27	-59.24	-46.52	-1.07	59.24	46.52	1.07	0.000%
28	-51.15	-62.02	-29.42	51.15	62.02	29.42	0.000%
29	-51.15	-46.52	-29.42	51.15	46.52	29.42	0.000%
30	-42.53	-62.02	-40.97	42.53	62.02	40.97	0.000%
31	-42.53	-46.52	-40.97	42.53	46.52	40.97	0.000%
32	-30.61	-62.02	-50.62	30.61	62.02	50.62	0.000%
33	-30.61	-46.52	-50.62	30.61	46.52	50.62	0.000%
34	0.00	-218.40	0.00	-0.00	218.40	0.00	0.000%
35	-0.06	-218.40	-17.67	0.06	218.40	17.67	0.000%
36	8.83	-218.40	-14.88	-8.83	218.40	14.88	0.000%
37	12.38	-218.40	-12.10	-12.38	218.40	12.10	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
38	14.99	-218.40	-8.66	-14.99	218.40	8.66	0.000%
39	17.30	-218.40	-0.21	-17.30	218.40	0.21	0.000%
40	15.27	-218.40	8.89	-15.27	218.40	-8.89	0.000%
41	12.19	-218.40	12.33	-12.19	218.40	-12.33	0.000%
42	8.46	-218.40	15.11	-8.46	218.40	-15.11	0.000%
43	-0.01	-218.40	17.32	0.01	218.40	-17.32	0.000%
44	-8.48	-218.40	15.11	8.48	218.40	-15.11	0.000%
45	-12.26	-218.40	12.32	12.26	218.40	-12.32	0.000%
46	-15.34	-218.40	8.86	15.34	218.40	-8.86	0.000%
47	-17.33	-218.40	-0.21	17.33	218.40	0.21	0.000%
48	-15.00	-218.40	-8.65	15.00	218.40	8.65	0.000%
49	-12.39	-218.40	-12.09	12.39	218.40	12.09	0.000%
50	-8.85	-218.40	-14.88	8.85	218.40	14.88	0.000%
51	-0.07	-51.68	-14.71	0.07	51.68	14.71	0.000%
52	7.29	-51.68	-12.11	-7.29	51.68	12.11	0.000%
53	10.17	-51.68	-9.81	-10.17	51.68	9.81	0.000%
54	12.22	-51.68	-7.06	-12.22	51.68	7.06	0.000%
55	14.13	-51.68	-0.26	-14.13	51.68	0.26	0.000%
56	12.70	-51.68	7.42	-12.70	51.68	-7.42	0.000%
57	9.92	-51.68	10.09	-9.92	51.68	-10.10	0.000%
58	6.82	-51.68	12.39	-6.82	51.68	-12.39	0.000%
59	-0.02	-51.68	14.11	0.02	51.68	-14.11	0.000%
60	-6.86	-51.68	12.40	6.86	51.68	-12.40	0.000%
61	-10.02	-51.68	10.09	10.02	51.68	-10.09	0.000%
62	-12.80	-51.68	7.39	12.80	51.68	-7.39	0.000%
63	-14.17	-51.68	-0.26	14.17	51.68	0.26	0.000%
64	-12.23	-51.68	-7.04	12.23	51.68	7.04	0.000%
65	-10.17	-51.68	-9.80	10.17	51.68	9.80	0.000%
66	-7.32	-51.68	-12.10	7.32	51.68	12.10	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001

23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001
51	Yes	4	0.00000001	0.00000001
52	Yes	4	0.00000001	0.00000001
53	Yes	4	0.00000001	0.00000001
54	Yes	4	0.00000001	0.00000001
55	Yes	4	0.00000001	0.00000001
56	Yes	4	0.00000001	0.00000001
57	Yes	4	0.00000001	0.00000001
58	Yes	4	0.00000001	0.00000001
59	Yes	4	0.00000001	0.00000001
60	Yes	4	0.00000001	0.00000001
61	Yes	4	0.00000001	0.00000001
62	Yes	4	0.00000001	0.00000001
63	Yes	4	0.00000001	0.00000001
64	Yes	4	0.00000001	0.00000001
65	Yes	4	0.00000001	0.00000001
66	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
T1	170 - 160	2.460	62	0.1139	0.0051
T2	160 - 140	2.214	62	0.1133	0.0045
T3	140 - 120	1.727	62	0.1071	0.0043
T4	120 - 100	1.276	62	0.0925	0.0030
T5	100 - 80	0.900	62	0.0767	0.0023
T6	80 - 60	0.578	62	0.0619	0.0017
T7	60 - 40	0.330	62	0.0447	0.0011
T8	40 - 20	0.149	62	0.0298	0.0006
T9	20 - 0	0.038	62	0.0134	0.0003

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
170.00	15' Lighting Rod	62	2.460	0.1139	0.0051	Inf
165.00	6-ft Dish	62	2.337	0.1137	0.0048	Inf
160.00	6812	62	2.214	0.1133	0.0045	781335
155.00	6812	62	2.091	0.1125	0.0044	461609
150.00	4-ft Dish	62	1.968	0.1113	0.0044	298848
140.00	SC2-W100AB	62	1.727	0.1071	0.0043	156425
100.00	(4) SBNHH-1D65B	62	0.900	0.0767	0.0023	119967

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	170 - 160	10.223	24	0.4733	0.0214
T2	160 - 140	9.201	24	0.4708	0.0189
T3	140 - 120	7.182	24	0.4443	0.0181
T4	120 - 100	5.309	24	0.3842	0.0126
T5	100 - 80	3.746	24	0.3185	0.0096
T6	80 - 60	2.406	24	0.2572	0.0070
T7	60 - 40	1.373	24	0.1855	0.0047
T8	40 - 20	0.621	24	0.1237	0.0025
T9	20 - 0	0.159	24	0.0559	0.0012

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
170.00	15' Lighting Rod	24	10.223	0.4733	0.0214	425136
165.00	6-ft Dish	24	9.712	0.4725	0.0200	425136
160.00	6812	24	9.201	0.4708	0.0189	200421
155.00	6812	24	8.691	0.4674	0.0184	113546
150.00	4-ft Dish	24	8.183	0.4620	0.0183	72146
140.00	SC2-W100AB	24	7.182	0.4443	0.0181	37394
100.00	(4) SBNHH-1D65B	24	3.746	0.3185	0.0096	28886

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	170	Leg	A325N	1.0000	6	0.44	53.01	0.008 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	3.79	12.72	0.298 ✔	1	Member Bearing
		Top Girt	A325N	1.0000	1	0.76	12.72	0.060 ✔	1	Member Bearing
T2	160	Leg	A325N	1.0000	6	4.29	53.01	0.081 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	5.40	12.72	0.424 ✔	1	Member Bearing
T3	140	Leg	A325N	1.0000	6	9.65	53.01	0.182 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	8.08	12.72	0.635 ✔	1	Member Bearing
T4	120	Leg	A325N	1.0000	6	15.47	53.01	0.292 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	8.79	21.21	0.415 ✔	1	Member Bearing
T5	100	Leg	A325N	1.0000	12	9.99	53.01	0.188 ✔	1	Bolt Tension
		Diagonal	A325N	0.8750	1	14.64	22.18	0.660 ✔	1	Member Bearing
T6	80	Leg	A325N	1.0000	12	13.18	53.01	0.249 ✔	1	Bolt Tension
		Diagonal	A325N	0.8750	1	14.94	22.18	0.673 ✔	1	Member Bearing
T7	60	Leg	A325N	1.0000	12	16.15	53.01	0.305 ✔	1	Bolt Tension
		Diagonal	A325N	0.8750	1	14.77	22.18	0.666 ✔	1	Member Bearing
T8	40	Leg	A325N	1.0000	12	19.05	53.01	0.359 ✔	1	Bolt Tension
		Diagonal	A325N	0.8750	1	14.90	29.58	0.504 ✔	1	Member Bearing
T9	20	Leg	F1554-105	1.0000	12	21.65	55.22	0.392 ✔	1	Bolt Tension
		Diagonal	A325N	0.8750	1	15.44	29.58	0.522 ✔	1	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 160	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	10.02	5.34	45.0 K=1.00	3.6816	-6.63	142.87	0.046
T2	160 - 140	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	20.03	10.02	37.5 K=1.00	5.3014	-31.58	215.25	0.147
T3	140 - 120	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	20.03	10.02	37.5 K=1.00	5.3014	-71.65	215.25	0.333
T4	120 - 100	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	20.03	10.02	31.9 K=1.00	7.2158	-111.32	301.49	0.369
T5	100 - 80	#12ZG -2.00" - 0.875" conn.-Trans (Pirod 211843)	20.03	20.03	48.8 K=1.00	9.4248	-142.71	356.29	0.401
T6	80 - 60	#12ZG - 2.00" - 0.875" conn. (Pirod 208333)	20.03	20.03	48.8 K=1.00	9.4248	-187.85	356.29	0.527
T7	60 - 40	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	20.03	20.03	48.8 K=1.00	11.9282	-228.37	451.15	0.506
T8	40 - 20	#12ZG -2.25" - 0.875" conn.	20.03	20.03	48.8	11.9282	-267.77	451.15	0.594

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T9	20 - 0	(Pirod 208334) #12ZG - 2.50" - 0.875" conn. (Pirod 208335)	20.03	20.03	K=1.00 48.7 K=1.00	14.7262	-304.81	557.27	0.547

Leg Bending Design Data (Compression)

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	170 - 160	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	-0.32	41.41	0.008	-0.06	47.82	0.000
T2	160 - 140	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	1.44	62.50	0.023	-0.32	72.17	0.004
T3	140 - 120	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	2.90	62.50	0.046	-0.02	72.17	0.000
T4	120 - 100	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	2.81	87.73	0.032	-0.02	101.30	0.000
T5	100 - 80	#12ZG -2.00" - 0.875" conn.-Trans (Pirod 211843)	3.42	103.92	0.033	-0.05	120.00	0.000
T6	80 - 60	#12ZG - 2.00" - 0.875" conn. (Pirod 208333)	3.65	103.92	0.035	-0.03	120.00	0.000
T7	60 - 40	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	5.84	131.95	0.044	-0.06	152.37	0.000
T8	40 - 20	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	5.84	131.95	0.044	-0.06	152.37	0.000
T9	20 - 0	#12ZG - 2.50" - 0.875" conn. (Pirod 208335)	3.41	163.49	0.021	-0.03	188.78	0.000

Leg Interaction Design Data (Compression)

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	170 - 160	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	0.046	0.008	0.000	0.054 ✔	1.000	4.8.1 ✔
T2	160 - 140	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	0.147	0.023	0.004	0.174 ✔	1.000	4.8.1 ✔
T3	140 - 120	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	0.333	0.046	0.000	0.380 ✔	1.000	4.8.1 ✔
T4	120 - 100	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	0.369	0.032	0.000	0.401 ✔	1.000	4.8.1 ✔
T5	100 - 80	#12ZG -2.00" - 0.875" conn.-Trans (Pirod 211843)	0.401	0.033	0.000	0.434 ✔	1.000	4.8.1 ✔
T6	80 - 60	#12ZG - 2.00" - 0.875" conn. (Pirod 208333)	0.527	0.035	0.000	0.563 ✔	1.000	4.8.1 ✔
T7	60 - 40	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	0.506	0.044	0.000	0.551 ✔	1.000	4.8.1 ✔
T8	40 - 20	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	0.594	0.044	0.000	0.638 ✔	1.000	4.8.1 ✔

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T9	20 - 0	#12ZG - 2.50" - 0.875" conn. (Pirod 208335)	0.547	0.021	0.000	0.568 ✔	1.000	4.8.1 ✔

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T1	170 - 160	0.5	1.48	120.4	165.67	0.1963	1.56	3.44	0.454 ✔
T2	160 - 140	0.5	1.46	119.3	238.57	0.1963	0.30	3.50	0.086 ✔
T3	140 - 120	0.5	1.46	119.3	238.57	0.1963	2.10	3.50	0.599 ✔
T4	120 - 100	0.5	1.44	117.6	324.71	0.1963	0.30	3.62	0.082 ✔
T5	100 - 80	0.5	1.39	113.2	424.12	0.1963	1.79	3.76	0.477 ✔
T6	80 - 60	0.5	1.39	113.2	424.12	0.1963	0.43	3.76	0.113 ✔
T7	60 - 40	0.5	1.38	112.2	536.77	0.1963	0.51	3.80	0.134 ✔
T8	40 - 20	0.5	1.38	112.2	536.77	0.1963	0.58	3.80	0.152 ✔
T9	20 - 0	0.5	1.36	111.2	662.68	0.1963	0.70	3.85	0.183 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 160	L2 1/2x2 1/2x3/16	12.50	5.67	137.4 K=1.00	0.9020	-3.99	10.79	0.370 [1] ✔
T2	160 - 140	L2 1/2x2 1/2x3/16	13.80	6.37	154.4 K=1.00	0.9020	-5.54	8.55	0.648 [1] ✔
T3	140 - 120	L3x3x3/16	15.24	7.12	143.4 K=1.00	1.0900	-8.09	11.97	0.676 [1] ✔
T4	120 - 100	L3x3x5/16	16.80	7.92	161.4 K=1.00	1.7800	-8.79	15.43	0.570 [1] ✔
T5	100 - 80	2L3x3x3/16	25.01	12.35	157.9 K=1.00	2.1800	-15.16	19.76	0.767 [1] ✔
T6	80 - 60	2L3x3x3/16	26.26	12.98	165.8 K=1.00	2.1800	-15.19	17.91	0.848 [1] ✔
T7	60 - 40	2L3x3x3/16	27.59	13.65	174.4 K=1.00	2.1800	-15.31	16.20	0.945 [1] ✔
T8	40 - 20	2L3 1/2x3 1/2x1/4	29.01	14.35	158.0 K=1.00	3.3800	-15.37	30.59	0.503 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T9	20 - 0	2L3 1/2x3 1/2x1/4	30.49	15.09	166.1 K=1.00	3.3800	-16.04	27.66	0.580 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 160	L2 1/2x2 1/2x3/16	7.47	6.47	109.9 K=1.10	0.9020	-1.03	15.48	0.066 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 160	L2 1/2x2 1/2x3/16	7.00	5.67	137.4 K=1.00	0.9020	-0.77	10.80	0.071 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 160	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	10.02	5.34	45.0	3.6816	2.58	165.67	0.016
T2	160 - 140	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	20.03	10.02	37.5	5.3014	25.62	238.57	0.107
T3	140 - 120	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	20.03	10.02	37.5	5.3014	57.81	238.57	0.242
T4	120 - 100	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	20.03	10.02	31.9	7.2158	92.72	324.71	0.286
T5	100 - 80	#12ZG -2.00" - 0.875" conn.-Trans (Pirod 211843)	20.03	20.03	48.8	9.4248	118.15	424.12	0.279
T6	80 - 60	#12ZG - 2.00" - 0.875" conn.	20.03	20.03	48.8	9.4248	158.14	424.12	0.373

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T7	60 - 40	(Pirod 208333) #12ZG -2.25" - 0.875" conn.	20.03	20.03	48.8	11.9282	192.83	536.77	0.359
T8	40 - 20	(Pirod 208334) #12ZG -2.25" - 0.875" conn.	20.03	20.03	48.8	11.9282	228.62	536.77	0.426
T9	20 - 0	(Pirod 208334) #12ZG - 2.50" - 0.875" conn.	20.03	20.03	48.7	14.7262	259.84	662.68	0.392
		(Pirod 208335)							

Leg Bending Design Data (Tension)

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	170 - 160	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	0.81	48.02	0.017	-0.01	55.45	0.000
T2	160 - 140	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	-1.25	69.27	0.018	-0.26	79.99	0.003
T3	140 - 120	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	-2.78	69.27	0.040	0.03	79.99	0.000
T4	120 - 100	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	-2.75	94.48	0.029	0.04	109.10	0.000
T5	100 - 80	#12ZG -2.00" - 0.875" conn.-Trans (Pirod 211843)	-3.58	123.71	0.029	0.04	142.84	0.000
T6	80 - 60	#12ZG - 2.00" - 0.875" conn. (Pirod 208333)	-3.58	123.71	0.029	0.04	142.84	0.000
T7	60 - 40	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	-5.30	157.00	0.034	0.04	181.28	0.000
T8	40 - 20	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	-5.30	157.00	0.034	0.04	181.28	0.000
T9	20 - 0	#12ZG - 2.50" - 0.875" conn. (Pirod 208335)	-4.14	194.41	0.021	0.05	224.49	0.000

Leg Interaction Design Data (Tension)

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	170 - 160	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	0.016	0.017	0.000	0.033 ✔	1.000	4.8.1 ✔
T2	160 - 140	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	0.107	0.018	0.003	0.129 ✔	1.000	4.8.1 ✔
T3	140 - 120	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	0.242	0.040	0.000	0.283 ✔	1.000	4.8.1 ✔
T4	120 - 100	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	0.286	0.029	0.000	0.315 ✔	1.000	4.8.1 ✔
T5	100 - 80	#12ZG -2.00" - 0.875" conn.-Trans (Pirod 211843)	0.279	0.029	0.000	0.308 ✔	1.000	4.8.1 ✔
T6	80 - 60	#12ZG - 2.00" - 0.875" conn. (Pirod 208333)	0.373	0.029	0.000	0.402 ✔	1.000	4.8.1 ✔
T7	60 - 40	#12ZG -2.25" - 0.875" conn.	0.359	0.034	0.000	0.393	1.000	4.8.1 ✔

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T8	40 - 20	(Pirod 208334) #12ZG -2.25" - 0.875" conn. (Pirod 208334)	0.426	0.034	0.000	0.460	1.000	4.8.1
T9	20 - 0	#12ZG - 2.50" - 0.875" conn. (Pirod 208335)	0.392	0.021	0.000	0.414	1.000	4.8.1

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T1	170 - 160	0.5	1.48	120.4	165.67	0.1963	1.56	3.44	0.454
T2	160 - 140	0.5	1.46	119.3	238.57	0.1963	0.30	3.50	0.086
T3	140 - 120	0.5	1.46	119.3	238.57	0.1963	2.10	3.50	0.599
T4	120 - 100	0.5	1.44	117.6	324.71	0.1963	0.30	3.62	0.082
T5	100 - 80	0.5	1.39	113.2	424.12	0.1963	1.79	3.76	0.477
T6	80 - 60	0.5	1.39	113.2	424.12	0.1963	0.43	3.76	0.113
T7	60 - 40	0.5	1.38	112.2	536.77	0.1963	0.51	3.80	0.134
T8	40 - 20	0.5	1.38	112.2	536.77	0.1963	0.58	3.80	0.152
T9	20 - 0	0.5	1.36	111.2	662.68	0.1963	0.70	3.85	0.183

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 160	L2 1/2x2 1/2x3/16	12.50	5.67	90.0	0.9020	3.79	29.22	0.130 [1]
T2	160 - 140	L2 1/2x2 1/2x3/16	13.80	6.37	100.8	0.9020	5.40	29.22	0.185 [1]
T3	140 - 120	L3x3x3/16	15.24	7.12	93.2	1.0900	8.08	35.32	0.229 [1]
T4	120 - 100	L3x3x5/16	16.80	7.92	105.3	1.7800	8.79	57.67	0.152 [1]
T5	100 - 80	2L3x3x3/16	25.01	12.35	159.8	2.1800	14.64	70.63	0.207 [1]
T6	80 - 60	2L3x3x3/16	26.26	12.98	167.8	2.1800	14.94	70.63	0.212 [1]
T7	60 - 40	2L3x3x3/16	27.59	13.65	176.3	2.1800	14.77	70.63	0.209 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T8	40 - 20	2L3 1/2x3 1/2x1/4	29.01	14.35	159.7	3.3800	14.90	109.51	0.136 [1]
T9	20 - 0	2L3 1/2x3 1/2x1/4	30.49	15.09	167.8	3.3800	15.44	109.51	0.141 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 160	L2 1/2x2 1/2x3/16	7.47	6.47	99.7	0.9020	0.97	29.22	0.033 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 160	L2 1/2x2 1/2x3/16	7.00	5.67	92.5	0.9020	0.76	29.22	0.026 [1]

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	170 - 160	Leg	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	1	-4.83	142.87	45.4	Pass
T2	160 - 140	Leg	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	18	-31.58	215.25	17.4	Pass
T3	140 - 120	Leg	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	31	-51.29	215.25	59.9	Pass
T4	120 - 100	Leg	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	46	-111.32	301.49	40.1	Pass
T5	100 - 80	Leg	#12ZG -2.00" - 0.875" conn.-Trans (Pirod 211843)	63	-141.05	356.29	47.7	Pass
T6	80 - 60	Leg	#12ZG - 2.00" - 0.875" conn. (Pirod 208333)	70	-187.85	356.29	56.3	Pass
T7	60 - 40	Leg	#12ZG -2.25" - 0.875" conn.	79	-228.37	451.15	55.1	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
			(Pirod 208334)					
T8	40 - 20	Leg	#12ZG -2.25" - 0.875" conn.	88	-267.77	451.15	63.8	Pass
			(Pirod 208334)					
T9	20 - 0	Leg	#12ZG - 2.50" - 0.875" conn.	97	-304.81	557.27	56.8	Pass
			(Pirod 208335)					
T1	170 - 160	Diagonal	L2 1/2x2 1/2x3/16	12	-3.99	10.79	37.0	Pass
T2	160 - 140	Diagonal	L2 1/2x2 1/2x3/16	21	-5.54	8.55	64.8	Pass
T3	140 - 120	Diagonal	L3x3x3/16	38	-8.09	11.97	67.6	Pass
T4	120 - 100	Diagonal	L3x3x5/16	53	-8.79	15.43	57.0	Pass
T5	100 - 80	Diagonal	2L3x3x3/16	68	-15.16	19.76	76.7	Pass
T6	80 - 60	Diagonal	2L3x3x3/16	77	-15.19	17.91	84.8	Pass
T7	60 - 40	Diagonal	2L3x3x3/16	86	-15.31	16.20	94.5	Pass
T8	40 - 20	Diagonal	2L3 1/2x3 1/2x1/4	95	-15.37	30.59	50.3	Pass
							50.4 (b)	
T9	20 - 0	Diagonal	2L3 1/2x3 1/2x1/4	104	-16.04	27.66	58.0	Pass
T1	170 - 160	Secondary Horizontal	L2 1/2x2 1/2x3/16	14	-1.03	15.48	6.6	Pass
T1	170 - 160	Top Girt	L2 1/2x2 1/2x3/16	4	-0.77	10.80	7.1	Pass
							Summary	
						Leg (T8)	63.8	Pass
						Diagonal (T7)	94.5	Pass
						Secondary Horizontal (T1)	6.6	Pass
						Top Girt (T1)	7.1	Pass
						Bolt Checks	67.3	Pass
						RATING =	**94.5**	**Pass**

CENTEK engineering
Centered on Solutions℠ www.centekeng.com
63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject: FOUNDATION ANALYSIS

Location: Manchester, CT

Rev. 0: 3/6/18

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 18034.00

Pier and Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 6355 \cdot ft \cdot kips$	(User Input from tnxTower)	
Shear Force =	$S_t := 62 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$WT_t := 62 \cdot kip$	(User Input from tnxTower)	
Max Compression Force =	$C_t := 326 \cdot kip$	(User Input from tnxTower)	
Max Uplift Force =	$U_t := 276 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 170 \cdot ft$	(User Input)	
Tower Width =	$W_t := 24 \cdot ft$	(User Input)	
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 1$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 6.0 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 4.75 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 4.5 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 1.75 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 32 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 6000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 100 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 7$	(User Input)	
Bar Diameter =	$d_{bpier} := 0.875 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 24$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 4 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 7$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 0.875 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 61$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 7$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 0.875 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 61$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.601 \cdot in^2$

Pad Top Reinforcement Bar Area = $A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.601 \cdot in^2$

Pad Bottom Reinforcement Bar Area = $A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.601 \cdot in^2$

Coefficient of Lateral Soil Pressure = $K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$

Load Factor = $LF := 1$

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := if(Bouyancy = 1, \gamma_{conc} - 62.4pcf, \gamma_{conc}) = 150 \cdot pcf$

Adjusted Soil Unit Weight = $\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 100 \cdot pcf$

Passive Pressure = $P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.275 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.275 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.8 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.538 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 1.75 \cdot ft$

$A_p := W_f \cdot T_p = 56 \cdot ft^2$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 86.1 \cdot kip$

Weight of Concrete = $WT_c := \left[\left(W_f^2 \cdot T_f\right) + (3) \cdot \left(\frac{d_p^2 \cdot \pi}{4} L_p\right)\right] \cdot \gamma_c = 302.795 \cdot kip$

Weight of Soil Above Footing = $WT_{s1} := \left[\left[W_f^2 - (3) \cdot \left(\frac{d_p^2 \cdot \pi}{4}\right)\right] \cdot \left(\left|L_p - L_{pag} - n\right|\right)\right] \cdot \gamma_s = 414.92 \cdot kip$

Weight of Soil Wedge at Back Face = $WT_{s2} := \left[\frac{(D_f - n)^2 \cdot \tan(\Phi_s)}{2} \cdot W_f\right] \cdot \gamma_s = 33.255 \cdot kip$

Foundation has undercut toe per Fred A. Nudd dwg 96-4992-1

Tower Offset = $X_{t1} := \left[\frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{2}\right]$ $X_{t2} := \frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{3}$

$X_t := if(Pos_t = 1, X_{t1}, X_{t2}) = 5.608$

$X_{off1} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \cdot deg))}{3} + X_t\right] = 3.464$ $X_{off2} := 0$

$X_{off} := if(Pos_t = 1, X_{off1}, X_{off2})$ $X_{off} = 3.464 \cdot ft$

Total Weight = $WT_{tot} := 0.9WT_c + 0.75WT_{s1} = 583.7 \cdot kip$

Resisting Moment = $M_r := (WT_{tot}) \cdot \frac{W_f}{2} + 0.9WT_t \cdot \left(\frac{W_f}{2} - X_{off}\right) + 0.75\left(S_u \cdot \frac{T_p}{3}\right) + 0.75WT_{s2} \cdot \left[W_f + \frac{(D_f - n) \cdot \tan(\Phi_s)}{3}\right] = 10903 \cdot kip \cdot ft$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 6758 \cdot kip \cdot ft$

Foundation has undercut toe per Fred A. Nudd dwg 96-4992-1

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 1.61$

Factor of Safety Required = $FS_{req} := 1$ $OverTurning\_Moment\_Check := if(FS \geq FS_{req}, "Okay", "No Good")$

$OverTurning\_Moment\_Check = "Okay"$

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 348.768 \cdot kips$

$Shear\_Check := if(S_p > S_t, "Okay", "No Good")$

$Shear\_Check = "Okay"$

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 780 \cdot kip$

Area of the Mat = $A_{mat} := W_f^2 = 1.024 \times 10^3$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 5461.33 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.999 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < 0.75q_s, "Okay", "No Good")$

$Max\_Pressure\_Check = "Okay"$

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.476 \cdot ksf$

$Min\_Pressure\_Check := if[(P_{min} \geq 0) \cdot (P_{min} < 0.75q_s), "Okay", "No Good"]$

$Min\_Pressure\_Check = "No Good"$

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 8.615$

Distance to Kern = $X_k := \frac{W_f}{6} = 5.333$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 8.667$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 2.215 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 2.215 \cdot ksf$

$Pressure\_Check := if(q_{adj} < 0.75q_s, "Okay", "No Good")$

$Pressure\_Check = "Okay"$

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 5.061 \times 10^3 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if(P_b > LF \cdot C_t, "Okay", "No Good")$

Bearing_Check = "Okay"

Shear Strength of Concrete:

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 17.125 \cdot in$

$FL := LF \cdot \frac{C_t}{W_f^2} = 0.318 \cdot ksf$

$V_{req} := FL \cdot (X_t - .5 \cdot d_p - d) \cdot W_f = 19.668 \cdot kips$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 707 \cdot kip$ (ACI-2008 11.2.1.1)

$Beam\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Beam_Shear_Check = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear = $b_o := (d_p + d) \cdot \pi = 18.6$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 27.6$

Required Shear Strength = $V_{req} := FL \cdot (W_f^2 - A_{bo}) = 317 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 822.8 \cdot kip$ (ACI-2008 11.11.2.1)

$Punching\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

Maximum Moment in Pad = $M_{max} := 700 \cdot kip \cdot ft$ (User Input)

Design Moment = $M_n := \frac{LF \cdot M_{max}}{\phi_m} = 777.778 \cdot kips \cdot ft$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 & \text{if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000\right)}{1000}\right] \cdot 0.5\right] & \text{otherwise} \end{cases} = 0.85$$

(ACI-200810.2.7.3)

$b_{eff} := W_t \cdot \cos(30 \cdot deg) + d_p = 303.415 \cdot in$

$A_s := \frac{M_n}{(f_y \cdot d)} = 9.084 \cdot in^2$

$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 0.528 \cdot in$

$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2}\right)} = 9.226 \cdot in^2$

$\rho := \frac{A_s}{b_{eff} d} = 0.02131 \cdot in$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases} = 0.0018 \qquad \text{(ACI-2008 7.12.2.1)}$$

Check Bottom Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 4.7 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 36.7 \cdot in^2$$

$$Pad\_Reinforcement\_Bot := if\left(As_{prov} > As, "Okay", "No\ Good"\right)$$

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 4.7 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 36.7 \cdot in^2$$

$$Pad\_Reinforcement\_Top := if\left(As_{prov} > As, "Okay", "No\ Good"\right)$$

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 5.41 \cdot in$$

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2}\right) = 2.705 \cdot in$$

Transverse Reinforcement Index =

$$k_{tr} := 0 \qquad \text{(ACI-2008 12.2.3)}$$

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 20.1 \cdot in$$

Minimum Development Length =

$$L_{dbmin} := 12 \cdot in \qquad \text{(ACI-2008 12.2.1)}$$

$$L_{dbtCheck} := if\left(L_{dbt} \geq L_{dbmin}, "Use\ L.dbt", "Use\ L.dbmin"\right) = "Use\ L.dbt"$$

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 45 \cdot in$$

$$Lpad\_Check := if\left(L_{Pad} > L_{dbt}, "Okay", "No\ Good"\right)$$

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := \frac{\pi \cdot d_p^2}{4} = 2290.22 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 11.45 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 14.43 \cdot in^2$

$Steel\_Area\_Check := if(A_{sprov} > A_{smin}, "Okay", "No Good")$

Steel_Area_Check = "Okay"

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 6.194 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 48 \cdot in$

Maximum Moment in Pier = $M_p := S_t \cdot (L_p) \cdot LF = 3534 \cdot in \cdot kips$

Pier Check evaluated from outside program and results are listed below;

$(D \ N \ n \ P_u \ M_{xu}) := \left(d_p \cdot 12 \ \ NB_{pier} \ \ BS_{pier} \ \ \frac{C_t \cdot 1.333}{kips} \ \ \frac{M_p}{in \cdot kips}\right)$

$(D \ N \ n \ P_u \ M_{xu}) = (54 \ \ 24 \ \ 7 \ \ 434.558 \ \ 3.534 \times 10^3)$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := (0 \ \ 0 \ \ 0 \ \ 0)$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := \phi P'_n(D, N, n, P_u, M_{xu})^T$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) = (3.097 \times 10^3 \ \ 2.518 \times 10^4 \ \ -33.758 \ \ 6.288 \times 10^{-3})$

$Axial\_Load\_Check := if(\phi P_n \geq P_u, "Okay", "No Good")$

Axial_Load_Check = "Okay"

$Bending\_Check := if(\phi M_{xn} \geq M_{xu}, "Okay", "No Good")$

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 54 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 18 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

$c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 3 \cdot in$

Transverse Reinforcement =

$k_{tr} := 0$ (ACI-2008 12.2.3)

$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 18.16 \cdot in$

Minimum Development Length =

$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 11.621 \cdot in$ (ACI 12.2.1)

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right) = 18.158 \cdot in$

$L_{tension\_Check} := if\left(L_{pier} + L_{pad} > L_{dbt}, "Okay", "No Good"\right)$

$L_{tension\_Check} = "Okay"$

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 16.602 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 15.75 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 16.602 \cdot in$

$L_{compression\_Check} := if\left(L_{pier} + L_{pad} > L_{dbc}, "Okay", "No Good"\right)$

$L_{compression\_Check} = "Okay"$

RAN Template:	A&L Template:	Power System Template:
4Sec-792DB Outdoor	4Sec-792DB_2xAIR+1DP	Custom

CTHA174A_Replacement_C0.1_draft

Section 1 - Site Information

Site ID: CTHA174A
Status: Draft
Version: C0.1
Project Type: Replacement
Approved: Not Approved
Approved By: Not Approved
Last Modified: 3/6/2018 3:22:28 PM
Last Modified By: GSM1900\VJaini

Site Name: CTHA174A
Site Class: Self Support Tower
Site Type: Structure Non Building
Solution Type:
Plan Year:
Market: CONNECTICUT
Vendor: Ericsson
Landlord: Not Specified

Latitude: 41.79730280
Longitude: -72.51194400
Address: 33 Mitchell Dr
City, State: Manchester, CT
Region: NORTHEAST

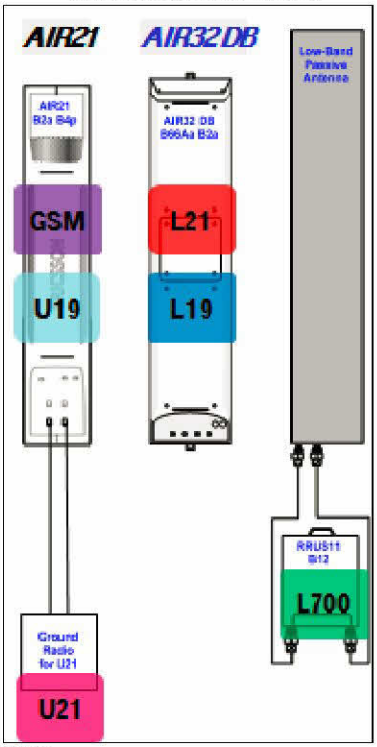
RAN Template: 4Sec-792DB Outdoor		AL Template: 4Sec-792DB_2xAIR+1DP		
Sector Count: 4	Antenna Count: 12	Coax Line Count: 8	TMA Count: 4	RRU Count: 4

Section 2 - Existing Template Images

----- This section is intentionally blank. -----

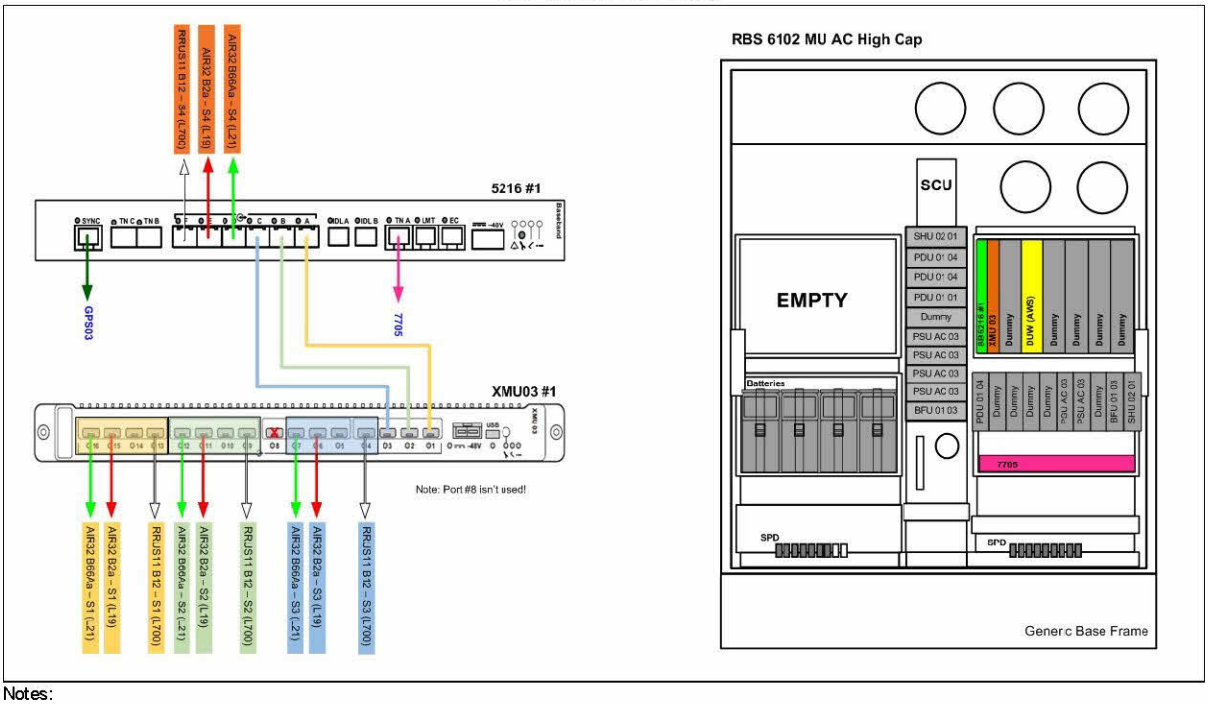
Section 3 - Proposed Template Images

4Sec-792DB_2xAIR+1DP.png



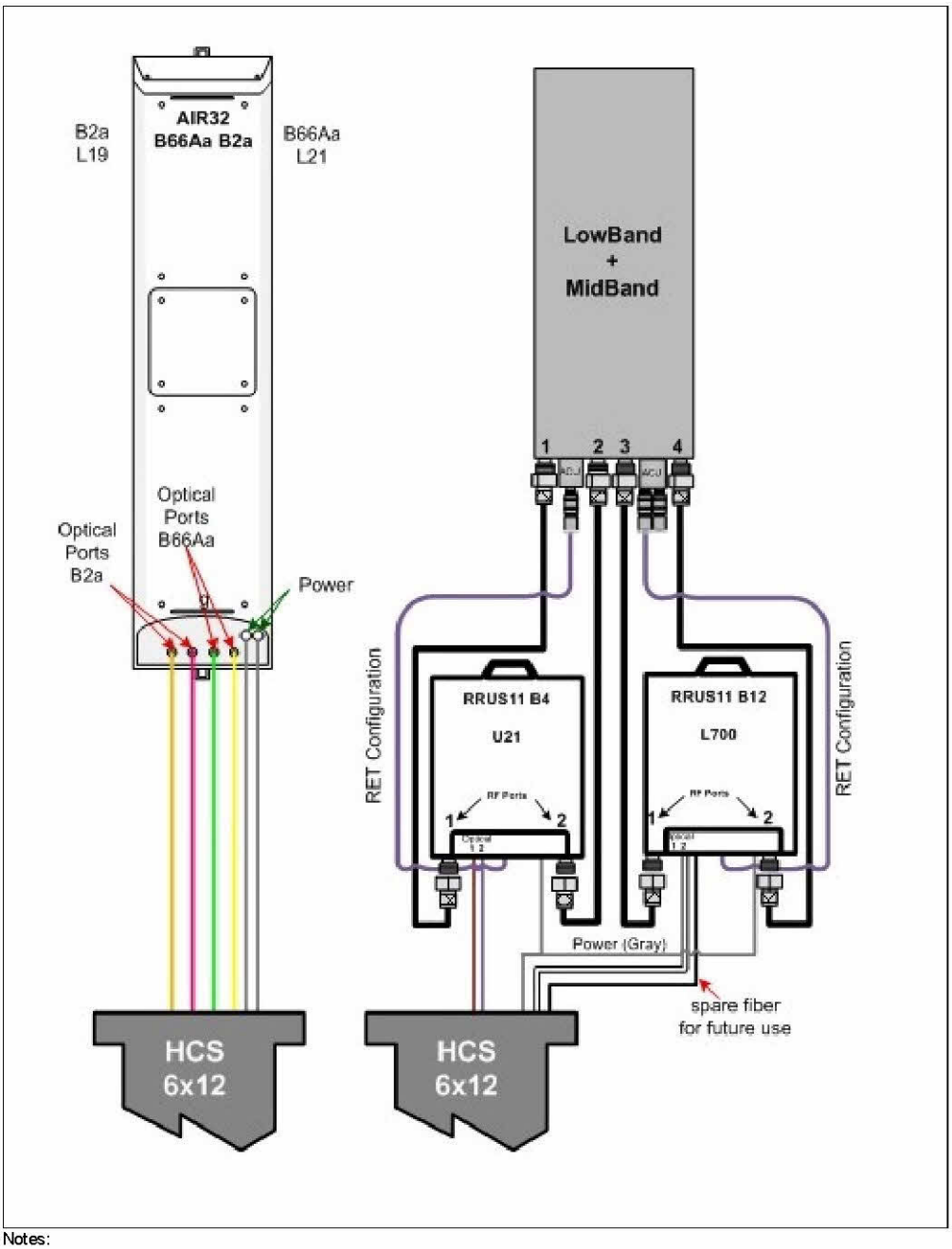
Notes:

4Sec-797DB2 Cabinet.jpg



Notes:

4Sec-797DB2 Antenna.jpg


AIR32
B66Aa B2a
B2a
L19
B66Aa
L21
LowBand
+
MidBand
1 2 3 4
Optical
Ports
B66Aa
Optical
Ports
B2a
Power
RET Configuration
RRUS11 B4
U21
RRUS11 B12
L700
RF Ports
1
2
RET Configuration
Power (Gray)
spare fiber
for future use
HCS
6x12
HCS
6x12

Notes:

Section 4 - Siteplan Images

----- This section is intentionally blank. -----

RAN Template:	A&L Template:	Power System Template:
4Sec-792DB Outdoor	4Sec-792DB_2xAIR+1DP	Custom

CTHA174A_Replacement_C0.1_draft

Section 5 - RAN Equipment

Existing RAN Equipment
----- This section is intentionally blank. -----

Proposed RAN Equipment		
Template: 4Sec-792DB Outdoor		
Enclosure	1	2
Enclosure Type	RBS 6131	Ancillary Equipment
Baseband	BB 5216, DUW30 (x2), DUG20	
Hybrid Cable System		Ericsson 6x12 HCS *Select AWG & Length* (x3) Ericsson 6x12 HCS *Select Length & AWG* (x3)
Multiplexer	XMU	
Radio	RU22 (x6)	

RAN Scope of Work:

RAN Template:	A&L Template:	Power System Template:
4Sec-792DB Outdoor	4Sec-792DB_2xAIR+1DP	Custom

CTHA174A_Replacement_C0.1_draft

Section 6 - A&L Equipment

Existing Template: Custom
Proposed Template: 4Sec-792DB_2xAIR+1DP

Sector 1 (Proposed) view from behind										
Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Ericsson - AIR32 KRD901146-1_B66A_B2A (Octa)				RFS - APXVAARR24_43-U-NA20 (Octa)			
Azimuth										
M. Tilt										
Height	140		140				140			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	U1900 G1900	U2100	L2100	L2100	L1900	L1900	L700 L600			
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables		Generic Feeder Coax (x2)								
TMAs		Generic Twin Style 1B - AWS (AtAntenna)								
Diplexers / Combiners										
Radio							Radio 4449 B71+ B12 (At Antenna)			
Sector Equipment										

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
4Sec-792DB Outdoor	4Sec-792DB_2xAIR+1DP	Custom

CTHA174A_Replacement_C0.1_draft

Sector 2 (Proposed) view from behind										
Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Ericsson - AIR32 KRD901146-1_B66A_B2A (Octa)				RFS - APXVAARR24_43-U-NA20 (Octa)			
Azimuth										
M. Tilt										
Height	140		140				140			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	U1900 G1900	U2100	L2100	L2100	L1900	L1900	L700 L600			
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables		Generic Feeder Coax (x2)								
TMAs		Generic Twin Style 1B - AWS (AtAntenna)								
Diplexers / Combiners										
Radio							Radio 4449 B71+ B12 (At Antenna)			
Sector Equipment										

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
4Sec-792DB Outdoor	4Sec-792DB_2xAIR+1DP	Custom

CTHA174A_Replacement_C0.1_draft

Sector 3 (Proposed) view from behind										
Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Ericsson - AIR32 KRD901146-1_B66A_B2A (Octa)				RFS - APXVAARR24_43-U-NA20 (Octa)			
Azimuth										
M. Tilt										
Height	140		140				140			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	U1900 G1900	U2100	L2100	L2100	L1900	L1900	L700 L600			
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables		Generic Feeder Coax (x2)								
TMAs		Generic Twin Style 1B - AWS (AtAntenna)								
Diplexers / Combiners										
Radio							Radio 4449 B71+ B12 (At Antenna)			
Sector Equipment										

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
4Sec-792DB Outdoor	4Sec-792DB_2xAIR+1DP	Custom

CTHA174A_Replacement_C0.1_draft

Sector 4 (Proposed) view from behind										
Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Ericsson - AIR32 KRD901146-1_B66A_B2A (Octa)				RFS - APXVAARR24_43-U-NA20 (Octa)			
Azimuth										
M. Tilt										
Height	140		140				140			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	U1900 G1900	U2100	L2100	L2100	L1900	L1900	L700 L600			
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables		Generic Feeder Coax (x2)								
TMAs		Generic Twin Style 1B - AWS (AtAntenna)								
Diplexers / Combiners										
Radio							Radio 4449 B71+ B12 (At Antenna)			
Sector Equipment										

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
4Sec-792DB Outdoor	4Sec-792DB_2xAIR+1DP	Custom

CTHA174A_Replacement_C0.1_draft

Section 7 - Power Systems Equipment

Existing Power Systems Equipment
----- This section is intentionally blank. -----

Proposed Power Systems Equipment

ERICSSON

AIR 21, 1.3 M
B2A B4P

The Antenna-Integrated Radio (AIR) is a single tower-mounted unit that can replace the antenna/s and radio for one sector. There is no need for additional electronics such as ASC and a RET actuator and control. A passive antenna function for an extra band is optional. (The option has to be specified when ordering, retrofit is not possible).

The height and width are the same as for a passive antenna with similar characteristics. The depth is increased to house the radios' electronics. Digital Units (DUs) from Ericsson's RBS 6000 family provide the baseband function and support GSM, WCDMA and LTE.

One or two DUs, depending on capacity and the standards to be supported, are needed for a three-sector site with AIR units.

TECHNICAL SPECIFICATIONS AIR 21, 1.3M, B2A B4P

RADIO	
Active frequency band:	Band 2 (1850-1910 / 1930-1990 MHz)
Passive frequency band (optional):	Band 4 (1710-1755 / 2110-2155 MHz)
Downlink EIRP in bore-sight direction for the active band:	2 x 62,5 dBm
Uplink sensitivity:	TBD*
Remote electrical tilt:	-2° to -12°, independently controlled per frequency band
MIMO:	2 x 2 for DL 4 RX branches to be used for diversity/ beam-steering /MIMO
Instantaneous bandwidth:	20 MHz
Capacity (single standard per sector):	Up to 8 carriers GSM Up to 4 carriers WCDMA with 2 x 2 DL MIMO Up to 20 MHz LTE with 2 x 2 DL MIMO
Multi-RAT capability:	Single standard or two simultaneous standards (Capacity above is reduced for multi-RAT)
Bore-sight antenna gain for passive antenna option:	17.5 dBi
Nominal beam-width, azimuth:	65°
Nominal beam-width, elevation:	7°
Additional antenna parameters:	See Antenna characteristics, page 3
MECHANICAL SPECIFICATION	
Weight (excl. mounting brackets):	37,5 kg for active only 41,5 kg for active and passive
Size (H x W x D)	1422 mm x 307 mm x 200 mm
Wind load:	580 N / 300 N / 720 N (frontal/lateral/rear-side) @ 42 m/s wind speed
INTERFACES	
AIR – DU:	DATA 1, Data 2: CPRI links (SFP modules with LC socket + flanges that match protective cover TYCO C20611458)
Power:	- 48 V DC (TYCO/Ericsson RPT 447 04)
Passive antenna (option).	TX/RX 1, TX/RX 2: RF connectors (7-16 female)
LMU RX sharing	RX1, RX2:, RF connectors (N female)
SUPPORTING BASE-BAND	
RBS 6601:	One or two units depending on configuration.

* 1 dB better than best-in-class RRU connected to same size best-in-class antenna

** Other base-band configurations are available

Telefonaktiebolaget LM Ericsson
SE-126 25 Stockholm, Sweden
Telephone +46 8 719 0000
Fax +46 8 18 40 85
www.ericsson.com

12/287 01-FGB 101 558 RevB1

AIR-32 B4A/B2P & B2A/B66AA

ERICSSON ANTENNA INTEGRATED RADIO AIR-32

Radio		
	Single Band (B4a/B2p)	**Dual Band (B2a/B66Aa)**
Band 2 (1850-1910 / 1930-1990 MHz)	Passive frequency band	Active frequency band
Band 4 (1710-1755 / 2110-2155 MHz)	Active frequency band	Subset of Band 66A (AWS 1+3)
Band 66A (1710-1780 / 2110-2180 MHz)	N/A	Active frequency band
PA Output Power	4 x 30W	2 x (4 x 30) W
Downlink EIRP in bore-sight direction for each active band	4 x 62.5 dBmi	4 x 62.5 dBmi
Instantaneous bandwidth	45 MHz (W, L)	B2: 40 MHz (W, L) B2: 20 MHz (G) B66A: 70 MHz (W, L)
Capacity (single standard per unit)	6 GSM 6 WCDMA 2 x 20 MHz LTE	6 GSM (B2 only) 6 WCDMA per Active frequency band 2 x 20 MHz LTE per band
Multi-RAT capability	WCDMA and LTE on both PAs	WCDMA and GSM on both PAs (B2 only) WCDMA and LTE on both PAs (B2 and B4) GSM and LTE (B2 only)

Interfaces		
Optical CPRI	2 x 10 Gbps	2 x 10 Gbps per Active frequency band
DC Power	-48 VDC 3-wire or 2-wire	-48 VDC 3-wire or 2-wire (separate input for both radios)
AC power (Optional)	PSU-AC 08	PSU-AC 08
Passive antenna	4 RF connectors (7/16 female)	N/A
Environmental		
Operating Temperature Range	-40 to +55 °C	-40 to +55 °C
Solar Radiation	≤ 1,120 W/m²	≤ 1,120 W/m²
Relative Humidity	5 to 100%	5 to 100%
Absolute Humidity	0.26 to 40 g/m^3	0.26 to 40 g/m^3
Maximum temperature change	1.0°C/min	1.0°C/min
Antenna		
Electrical Tilt	2º – 12º (B4) 2º – 12º (B2)	2º – 12º (B66A) 2º – 12º (B2)
Bore-sight antenna gain	18 dBi (B4) 17.5 dBi (B2)	18 dBi (B66A) 17.5 dBi (B2)
Nominal beam-width, azimuth	65º (B4) 63º (B2)	65º (B66A) 63º (B2)
Nominal beam-width, elevation	6º (B4) 6º (B2)	6º (B66A) 6º (B2)
Mechanical		
Weight	48 Kg (105.8 lbs)	60 Kg (132.2 lbs)
Dimensions (H x W x D)	1439 x 327 x 220 mm (56.6” x 12.9” x 8.7”)	1439 x 327 x 220 mm (56.6” x 12.9” x 8.7”)
Wind load at 42 m/s (150 km/h) Front / Lateral / Rear	640N / 300N / 660N	640N / 300N / 660N

RADIO FREQUENCY SYSTEMS
The Clear Choice®

Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

FEATURES / BENEFITS

This antenna provides a 8 Port multi-band flexible platform for advanced use for flexible use in deployment scenarios for encompassing 600MHz, 700MHz, AWS & PCS applications.

- **24 Inch Width For Easier Zoning**
- **Field Replaceable (Integrated) AISG RET platform for reduced environmental exposure and long lasting quality**
- **Superior elevation pattern performance across the entire electrical down tilt range**
- **Includes three AISG RET motors - Includes 0.5m AISG jumper for optional diasy chain of two high band RET motors for one single AISG point of high band tilt control.**
- **Low band arrays driven by a single RET motor**

Technical Features

LOW BAND LEFT ARRAY (617-746 MHZ) [R1]

Frequency Band	MHz	617-698	698-746
Gain	dBi	15.1	15.5
Horizontal Beamwidth @3dB	Deg	65	62
Vertical Beamwidth @3dB	Deg	11.4	10.4
Electrical Downtilt Range	Deg	0-12	0-12
Upper Side Lobe Suppression 0 to +20	dB	19	20
Front-to-Back, at +/-30°, Copolar	dB	25	24
Cross Polar Discrimination (XPD) @ Boresight	dB	19	19
Cross Polar Discrimination (XPD) @ +/-60	dB	5	3
3rd Order PIM 2 x 43dBm	dBc		-153
VSWR	-	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25
Maximum Effective Power per Port	Watt	250	250

LOW BAND RIGHT ARRAY (617-746 MHZ) [R2]

Frequency Band	MHz	617-698	698-746
Gain	dBi	14.8	15.1
Horizontal Beamwidth @3dB	Deg	65	62
Vertical Beamwidth @3dB	Deg	11.4	10.3
Electrical Downtilt Range	Deg	0-12	0-12
Upper Side Lobe Suppression 0 to +20	dB	19	20
Front-to-Back, at +/-30°, Copolar	dB	25	23
Cross Polar Discrimination (XPD) @ Boresight	dB	19	19
Cross Polar Discrimination (XPD) @ +/-60	dB	5	3
3rd Order PIM 2 x 43dBm	dBc		-153
VSWR	-	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25
Maximum Effective Power per Port	Watt	250	250

RADIO FREQUENCY SYSTEMS
The Clear Choice®

Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

ELECTRICAL SPECIFICATIONS

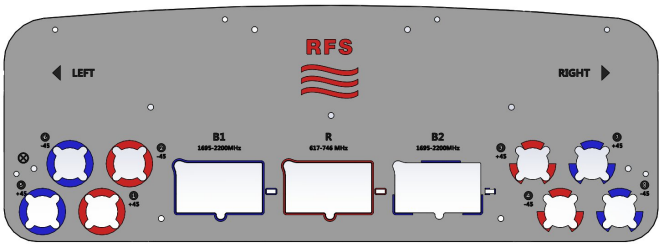
Impedance	Ohm	50.0
Polarization	Deg	±45°

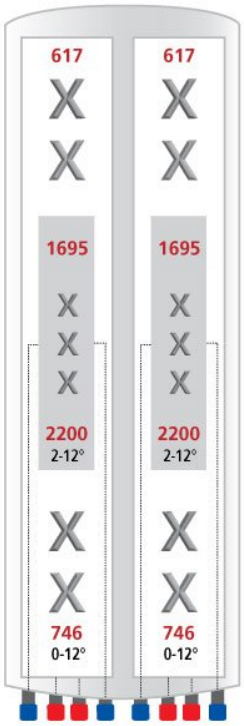
MECHANICAL SPECIFICATIONS

Dimensions - H x W x D	mm (in)	2436 x 609 x 222 (95.9 x 24 x 8.7)
Weight (Antenna Only)	kg (lb)	58 (128)
Weight (Mounting Hardware only)	kg (lb)	11.5 (25.3)
Shipping Weight	kg (lb)	80 (176)
Connector type		8 x 4.3-10 female at bottom + 6 AISG connectors (3 male, 3 female)
Adjustment mechanism		Integrated RET solution AISG compliant (Field Replaceable) + Manual Override + External Tilt Indicator
Mounting Hardware Material		Galvanized steel
Radome Material / Color		Fiber Glass / Light Grey RAL7035

TESTING AND ENVIRONMENTAL

Temperature Range	°C (°F)	-40 to 60 (-40 to 140)
Lightning protection		IEC 61000-4-5
Survival/Rated Wind Velocity	km/h	241 (150)
Environmental		ETSI 300-019-2-4 Class 4.1E





ORDERING INFORMATION

Order No.	Configuration	Mounting Hardware	Mounting pipe Diameter	Shipping Weight
APXVAARR24_43-U-NA20	Field Replace RET included (3)	APM40-5E Beam tilt kit (included)	60-120mm	80 Kg

DOUBLE TMA 17/21, PREMIUM

3GPP/AISG compatible with RET interface

Improving a radio uplink by using tower mounted amplifiers is perceived as a key method of optimizing radio networks. By ensuring maximum coverage including in-door penetration, a TMA supports the design of cost-efficient networks and extended talk-time handsets, low dropped call rates and high traffic billing.

TMA design
This Double Premium TMA for 17/2100 MHz has 12dB gain and is 3GPP/AISG 2.0 compatible, with a RET interface. It has superior RF performance, small size and low weight. There is a corresponding TMA version called ASC that has a higher gain and a VSWR measuring coupler.

System integration
The Double TMA 17/2100 is a part of Ericsson's TMA family. Power, control and supervision are provided by the RBS 3000. If sold to other RBS brand installations, it can be controlled and supervised from the "Antenna System & TMA Control Module", AST-CM, via the RF feeder.

3GPP/AISG
TMA communication is based on the 3GPP/AISG protocol standard and has a RET port for controlling antenna RET units. The communication port allows multiple RETs or Antenna Line Devices to be supervised and controlled via the TMA.

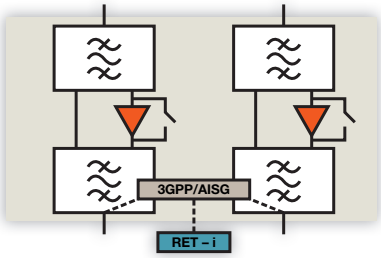
Future-proof
The Double TMA 17/21 Premium is designed for co-existence with future complementary, mast-mounted devices.

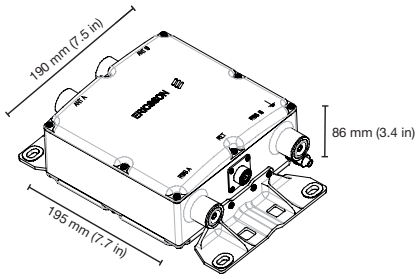
Excellent reliability
As the world's largest supplier of TMAs, Ericsson has a well-proven track record of reliable TMA designs. Reliability enhancing features include dual LNAs, weatherproof design, integrated alarm and lightning protection.

ERICSSON

Features

- Specified and verified as an integrated system solution for Ericsson RBSs
- Possible to power both TMAs from one feeder, or from both feeders
- High power capacity
- Automatic LNA by-pass function
- Built in lightning protection
- Excellent RF performance
- Connectors “in line”
- Distance between connectors simplifies sealing work
- A range of accessories for flexible site configurations





Technical Specifications for Double TMA 1700/2100, MHz Premium

Product name Double TMA 17/21, Premium 3GPP/ASIG compatible with RET interface	**Product number** KRY 112 144/1
Radio performance	
Bandwidth:	45 MHz
Receiving pass band:	1710 - 1755 MHz
Transmitting pass band:	2110 - 2155 MHz
RX Gain:	12± 1 dB
Input IP3:	16 dBm*
IM3 at antenna port (2x43dBM):	-128 dBm
Noise figure midband:	1.0 dB*
TX max input power (Max Peak):	57 dBm
TX insertion loss:	0.25 dB*
RX return loss:	22 dB*
TX return loss:	22 dB*
Electrical specifications	
Input power:	+12 - 32 VDC
Power consumption:	< 4.5 W
Mechanical specifications	
Dimensions (W x H x D):	155 x 176 x 71 mm
Weight:	5 kg
RF connectors:	7-16 DIN female
Ground connectors:	M8
DC/Alarm:	Superimposed on the RF signal
Mounting:	Pole or wall mounting
RET connectors:	Din con. IEC 60130-9 - Ed. 3.0 female
Environmental specifications	
Temperature range, full performance:	-40°C - +55°C
MTBF:	80 years
Sealing:	IP67
Lightning protection:	IEC 62305-1, IEC 61000-6
Safety approval:	International: CB certified, IEC 60 529 Europe: EN 60 529 North America: NRTL, NEMA 3R
Safety standard:	UL 60950-1, IEC 60950-1

* Typical values

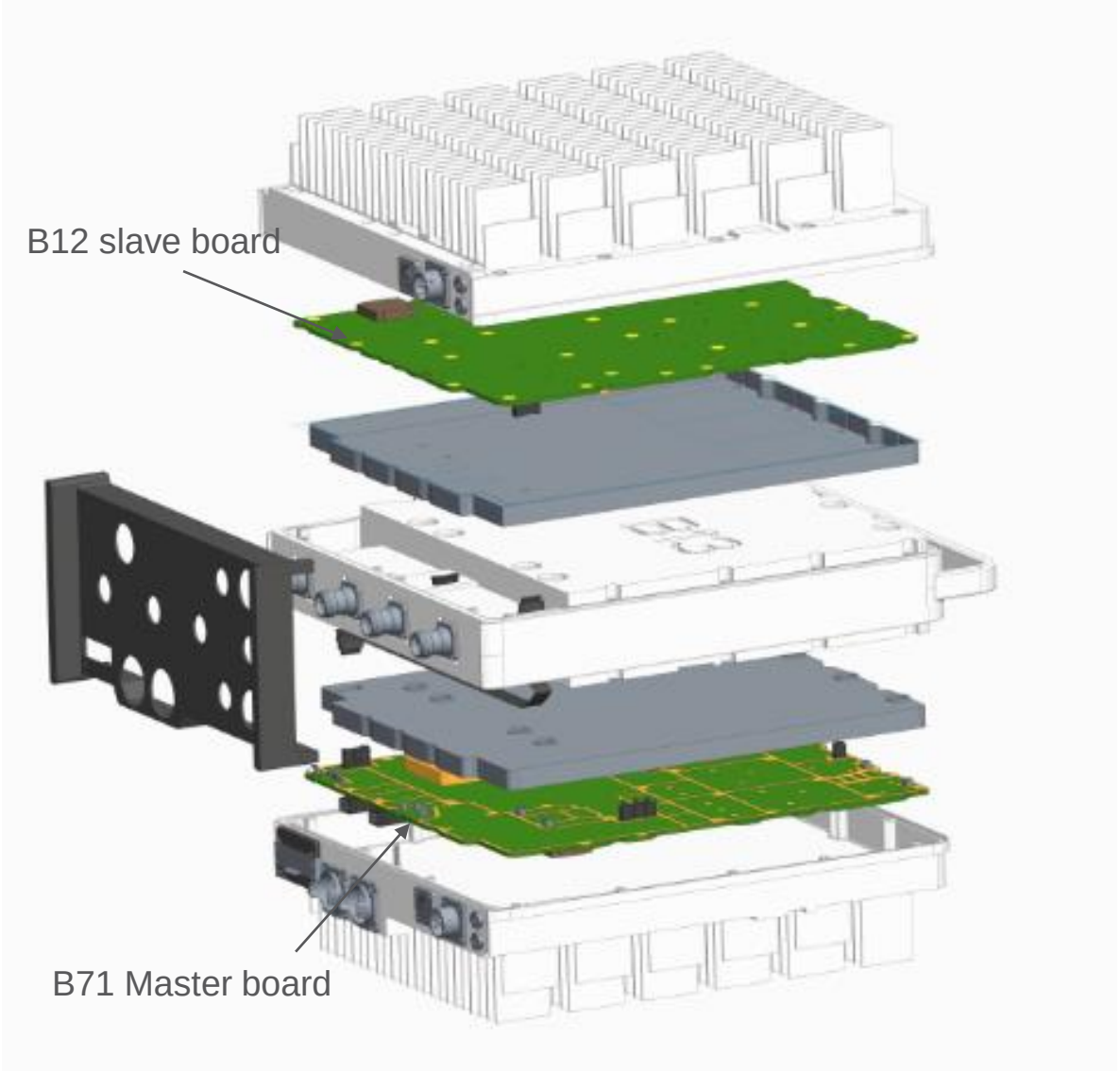
Dual Band Radio 4449 B12,B71

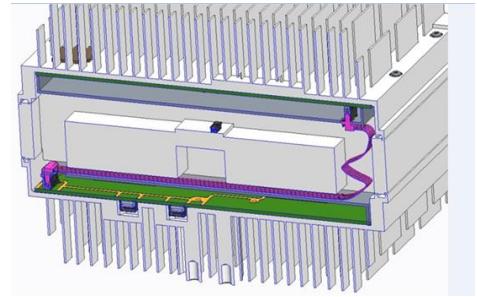
T-Mobile

Jadran Lokas

Sep. 29, 2017

BUILDING PRACTICE CONCEPT



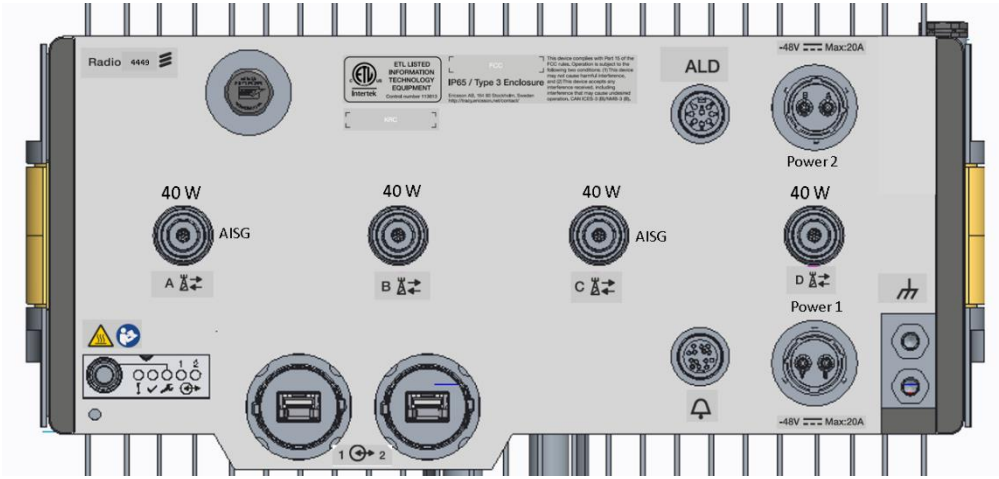


Optimized for dual band

Target size:

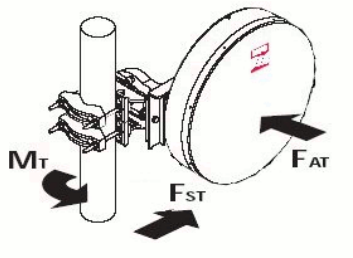
- Volume: 30+L
- 335mm width; 379.7mm height; 235+mm depth
- Weight: 74 lb +/- 4lb (33.6Kg +/- 1.8kg)
- 58+mm fin height

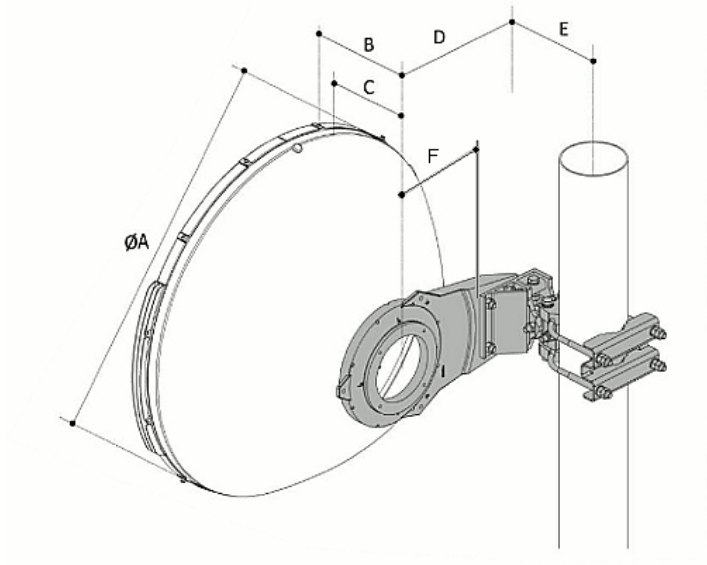
Filter double-sided chassis in-between B12 and B71 Radio boards



CompactLine Easy Antenna, Single Polarized, 2 ft
10.0 - 11.7 GHz

F_{ST} Side force max. at 110 km/h (68 mph), N (lb)	136 (31)
F_{AT} Axial force max. at 110 km/h (68 mph), N (lb)	274 (62)
M Torque max. at 110 km/h (68 mph), Nm (ft lb)	79 (58)
F_{ST} Side force max. at 200 km/h (125 mph), N (lb)	448 (101)
F_{AT} Axial force max. at 200 km/h (125 mph), N (lb)	905 (203)
M Torque max. at 200 km/h (125 mph), Nm (ft lb)	262 (193)





All dimensions in mm (in)

ØA	B	C	ØD for mounting pipe diam. 219 (8.5)	114 (4.5)	89 (3.5)	51 (2.0)	E	F
670 (26.4)	293 (11.5)	254 (10)		293 (11.4)	293 (11.4)	293 (11.4)	123 (4.8)	100 (3.9)

Notes

no notes

Documentation

RPE (10.55-10.68 GHz) (NSMA format)
SC2-W100A (10.55-10.68 GHz), 110805.txt
RPE (10.55-10.68 GHz) (PDF format)
SC2-W100A (10.55-10.68 GHz), 110805.pdf

Radiation pattern: (NSMA format)
SC2-W100A (10.0-11.7 GHz), 110803.txt
Radiation pattern: (PDF Format)
SC2-W100A (10.0-11.7 GHz), 110803.pdf

Transcend Wireless

10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

Letter of Authorization

Site: Tower at 33 Mitchell Drive, Manchester, CT 06040

Owner: Mitchell Drive LLC

Lessee: T-Mobile Northeast LLC

Mitchell Drive LLC, owner of the tower facility located at the address identified above (the "Tower Facility"), do hereby authorize T-Mobile Northeast LLC, its successors and assigns, and/or its agent, (collectively, the "Lessee") to act as our non-exclusive agent for the sole purpose of filing and consummating any land-use, zoning, or building permit application(s) as may be required by the applicable permitting authorities for Lessee's telecommunications' installations.

We understand that this application may be denied, modified or approved with conditions. The above authorization is limited to the acceptance by Lessee only of conditions related to Lessee's installation and any such conditions of approval or modifications will be Lessee's sole responsibility.

Signature:

Print Name: Michael Bula

Date: 4/11/18

EBI Consulting
environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CTHA174A

33 Mitchell Drive_Manchester CT
33 Mitchell Drive
Manchester, CT 06042

March 15, 2018

EBI Project Number: 6218001985

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	3.90 %

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

EBI Consulting
environmental | engineering | due diligence

March 15, 2018

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

Emissions Analysis for Site: **CTHA174A – 33 Mitchell Drive_Manchester CT**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **33 Mitchell Drive, Manchester, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

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

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 600 MHz and 700 MHz Band are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 10 GHz Microwave bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **33 Mitchell Drive, Manchester, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

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

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

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

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

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

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

6) 1 LTE channel (600 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

7) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

8) 1 microwave backhaul channel (10GHz) was considered for the proposed facility. This channel has a transmit power of 1 Watt.

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

10) For the following calculations the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

11) The antennas used in this modeling are the **Ericsson AIR32 B66A/B2A** & **Ericsson AIR21 B2A/B4P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels, the **RFS APXVAA24-43-U-A20** for 600 MHz and 700 MHz channels and the **Commscope SC2-W100AB** for the proposed 10 GHz microwave backhaul. This is based on feedback from the carrier with regard to anticipated antenna selection. The **Ericsson AIR32 B66A/B2A** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Ericsson AIR21 B2A/B4P** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **RFS APXVAA24-43-U-A20** has a maximum gain of **13.15 and 13.55 dBd** at its main lobe at 600 MHz and 700 MHz respectively. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

12) The antenna mounting height centerline of the proposed antennas (both panel antennas and microwave dish) is **140 feet** above ground level (AGL).

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

14) All calculations were done with respect to uncontrolled / general population threshold limits.

EBI Consulting

environmental | engineering | due diligence

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C	Sector:	D
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR32 B66A/B2A	Make / Model:	Ericsson AIR32 B66A/B2A	Make / Model:	Ericsson AIR32 B66A/B2A	Make / Model:	Ericsson AIR32 B66A/B2A
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	140	Height (AGL):	140	Height (AGL):	140	Height (AGL):	140
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	240	Total TX Power(W):	240	Total TX Power(W):	240	Total TX Power(W):	240
ERP (W):	9,337.08	ERP (W):	9,337.08	ERP (W):	9,337.08	ERP (W):	9,337.08
Antenna A1 MPE%	**1.87**	Antenna B1 MPE%	**1.87**	Antenna C1 MPE%	**1.87**	Antenna D1 MPE%	**1.87**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	140	Height (AGL):	140	Height (AGL):	140	Height (AGL):	140
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	6	Channel Count	6	Channel Count	6	Channel Count	6
Total TX Power(W):	180	Total TX Power(W):	180	Total TX Power(W):	180	Total TX Power(W):	180
ERP (W):	7,002.81	ERP (W):	7,002.81	ERP (W):	7,002.81	ERP (W):	7,002.81
Antenna A2 MPE%	**1.40**	Antenna B2 MPE%	**1.40**	Antenna C2 MPE%	**1.40**	Antenna D2 MPE%	**1.40**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	RFS APXVAA24-43-U-A20	Make / Model:	RFS APXVAA24-43-U-A20	Make / Model:	RFS APXVAA24-43-U-A20	Make / Model:	RFS APXVAA24-43-U-A20
Gain:	13.15/ 13.55 dBd	Gain:	13.15/ 13.55 dBd	Gain:	13.15/ 13.55 dBd	Gain:	13.15/ 13.55 dBd
Height (AGL):	140	Height (AGL):	140	Height (AGL):	140	Height (AGL):	140
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power(W):	30	Total TX Power(W):	30	Total TX Power(W):	30	Total TX Power(W):	30
ERP (W):	679.39	ERP (W):	679.39	ERP (W):	679.39	ERP (W):	679.39
Antenna A3 MPE%	**0.60**	Antenna B3 MPE%	**0.60**	Antenna C3 MPE%	**0.60**	Antenna D3 MPE%	**0.60**

Microwave Backhaul Data

Make / Model:	Gain	Height (AGL):	Frequency Bands	Channel Count	Total TX Power(W)	ERP (W)	MPE %	Sector
Commscope SC2-100AB	32.85 dBd	140	10 GHz	1	1	1717.91	**0.03**	A

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Sector A)	**3.90 %**
No Additional Carriers Listed in the CSC Active MPE database	**NA**
Site Total MPE %:	**3.90 %**

T-Mobile Sector A Total:	3.90%
T-Mobile Sector B Total:	3.87 %
T-Mobile Sector C Total:	3.87%
Site Total:	3.90 %

T-Mobile Max Power Values (Sector A)

T-Mobile _Max Power Values (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile AWS - 2100 MHz LTE	2	2,334.27	140	9.35	AWS - 2100 MHz	1000	0.93%
T-Mobile PCS - 1900 MHz LTE	2	2,334.27	140	9.35	PCS - 1900 MHz	1000	0.93%
T-Mobile AWS - 2100 MHz UMTS	2	1,167.14	140	4.67	AWS - 2100 MHz	1000	0.47%
T-Mobile PCS - 1900 MHz UMTS	2	1,167.14	140	4.67	PCS - 1900 MHz	1000	0.47%
T-Mobile PCS - 1900 MHz GSM	2	1,167.14	140	4.67	PCS - 1900 MHz	1000	0.47%
T-Mobile 600 MHz LTE	1	619.61	140	1.24	600 MHz	400	0.31%
T-Mobile 700 MHz LTE	1	679.39	140	1.36	700 MHz	467	0.29%
T-Mobile 10 GHz Microwave	1	1717.91	140	0.34	10 GHz	1000	0.03%
						Total:	**3.90%**

Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector A:	3.90%
Sector B:	3.87 %
Sector C:	3.83 %
T-Mobile Per Sector Maximum (Sector A):	3.90 %
Site Total:	3.90 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **3.90%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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