Transcend Wireless

10 Industrial Avenue,
Suite 3
Mahwah, NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

June 25, 2019

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

Notice of Exempt Modification:

1657 Berlin Turnpike, Berlin, CT (1657 Wilbur Cross Highway)
Latitude: 41.60621666
Longitude: -72.74968611
T-Mobile Site#: CTHA231A / L600

Dear Ms. Bachman:

T-Mobile currently maintains nine (9) antennas at the 160-foot level of the existing 175-foot monopole tower at 1657 Berlin Turnpike, Berlin, CT. The 175-foot monopole tower and property is owned by the Berlin Volunteer Fire Department. T-Mobile now intends to replace six (6) of its existing antennas with six (6) new 600/700 MHz antennas. The new antennas would be installed at the 160-foot level of the tower.

Planned Modifications:

Remove:
Coax:
(6) 1-5/8" coax cables -inside of the existing tower

Remove and Replace:
Antennas:
(3) Andrew LNX-6515DS (REMOVE) - (3) RFS APXVAARR24 - 600 MHz / 700 MHz antenna (REPLACE)
(3) Ericsson AIR21 panel antennas (REMOVE) - (3) Ericsson AIR32 - 1900 MHz / 2100 MHz (REPLACE)
(3) Ericsson RRUS-11 (REMOVE) - (3) Ericsson 4449 B71 B12 RRH's (REPLACE)
.
Install New:
Coax Cables:
(3) 6x12 fiber cables - inside of the existing tower.

Existing to Remain:
Antennas:
(3) Ericsson AIR21 B2A/B4P - 1900 MHz / 1900 MHz / 2100 MHz
(3) TMAs
Coax Cables:
(6) 1-5/8" coax cables and one (1) 9x18 fiber cables running (inside of the existing tower)

Ground:
Upgrade from 100 Amp to 200 Amp
Upgrade to 125 Breaker
Replace (1) DUS41 and (1) XMU with (1) BB6630 for LTE and add (1) BB6630 for future 5G N600

This facility was originally approved by the Town of Berlin on 9/26/2002. A copy of their approval is attached along with the Councils approval of Sprint's Tower Share on 9/26/2002, with no record of conditions that would restrict exempt modifications. Therefore, this modification complies with the aforementioned approval.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies§ 16- SOj-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.SA. § 16-SOj-73, a copy of this letter is being sent to Mark H. Kaczynski, Mayor and Marek Kozikowski, Interim Town Manager/Town Planner

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

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

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

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

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

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

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

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

Sincerely,

Elizabeth Jamieson

Elizabeth Jamieson
Transcend Wireless
10 Industrial Ave., Suite 3
Mahwah, New Jersey 07430
860-605-7808
EJamieson@TranscendWireless.com

cc:
Berlin Volunteer Fire Department, tower and property owner
Mark H. Kaczynski, Mayor
Marek Kozikowski,, Interim Town Manager/Town Planner

Exhibit A

Original Facility Approval

PROP NO. 101290 PERMIT NO. B 3786

TOWN OF BERLIN

240 Kensington Road
Berlin, CT. 06037

Nicholas G. Chirico
(860) 828-7012

BUILDING PERMIT

LOCATION: 1657 WILBUR CROSS HWY
OWNER..... BERLIN VOLUNTEER FIRE DEPT
PERMIT ISSUED TO:

RED/ SPRINT PCS/ M. ROGAN
637 WILBUR CR HWY

BERLIN, CT. 06037
250-0356

TENANT:
HOME OWNER ADDRESS:

BERLIN VOLUNTEER FIRE DEPT
1657 WILBUR CR HWY

BERLIN, CT. 06037

Build (use#:	437	AAC: NonRes	EST. VALUE:	0		Issue Date:	9/26/2002
Prop Type:	COMM	Commercial	BLDG PRMT:	B	3786	Application Date:	9/19/2002
Prop Class:	PRIV	Priv Owned					
Bldg Type:	41	Comm Tower					
Bldg Frame:	3	Metal Fr					
No. Buildings:	1						
No. Res/Units:	1						

Distance E Side:
Distance W Side:
Distance S Side:
Distance N Side:

Comments.....

INSTALLATION OF COMMUNICATION TOWER, RAISED STEEL DECK & RELATED EQUIPMENT, AT BERLIN FIRE DEPT. HEADQUARTERS.

Receipt

TOTAL RECEIPTS:

TOTAL AMOUNT

Building Inspection Division

Inspector: Nicholas G. Chirico

Permission must be obtained from the Engineering Division before Building Material can be placed in the highway. Surface or subsurface drains, roof drains and sump pumps must not be connected with the sanitary sewer.

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@po.state.ct.us
Web Site: www.state.ct.us/csc/index.htm

September 26, 2002

Thomas J. Regan, Esq.
Brown Rudnick Berlack Israels LLP
185 Asylum Street, CityPlace I
Hartford, CT 06103-3402

RE: **TS-SPRINT-007-020821** - Sprint Spectrum L.P. d/b/a Sprint PCS request for an order to approve tower sharing at a proposed telecommunications facility located at 1657 Wilbur Cross Highway, Berlin, Connecticut.

Dear Attorney Regan:

At a public meeting held September 25, 2002, the Connecticut Siting Council (Council) ruled that the shared use of this tower site is technically, legally, environmentally, and economically feasible and meets public safety concerns, and therefore, in compliance with General Statutes § 16-50aa, the Council has ordered the shared use of this facility to avoid the unnecessary proliferation of tower structures. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies which will be used on this tower.

This decision is under the exclusive jurisdiction of the Council. Any additional change to this facility may require an explicit request to this agency pursuant to General Statutes § 16-50aa or notice pursuant to Regulations of Connecticut State Agencies Section 16-50j-73, as applicable. Such request or notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

This decision applies only to this request for tower sharing and is not applicable to any other request or construction.

The proposed shared use is to be implemented as specified in your letter dated August 20, 2002.

Thank you for your attention and cooperation.

Very truly yours,

Mortimer A. Gelston
Chairman

MAG/laf

c: Honorable Paul C. Argazzi, Mayor, Town of Berlin
Brian J. Miller, Town Planner, Town of Berlin
Michael J. Rogan, Assistant Chief, Berlin Fire Department

Exhibit B

Property card

Town of Berlin, CT

Property Listing Report

Map Block Lot	22-1-141-17	Building #	1	Account	1101290

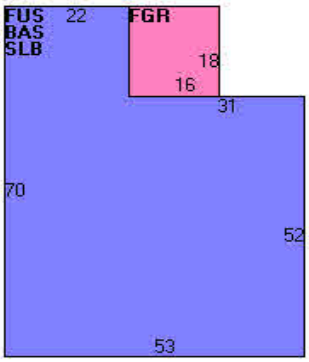
Property Information

Property Location	1657 BERLIN TPKE
Owner	BERLIN VOLUNTEER FIRE DEPT
Co-Owner	BERLIN FIREHOUSE
Mailing Address	1657 BERLIN TPKE BERLIN CT 06037
Land Use	903I Municipal MDL-96
Land Class	E
Zoning Code	BT-1
Census Tract	

Street Index	11
Acreage	0.23
Utilities	All Public
Lot Setting/Desc	Level
Additional Info	

Photo

Sketch



Primary Construction Details

Year Built	1946
Stories	2
Building Style	Other Municip
Building Use	Ind/Comm
Building Condition	A
Interior Floors 1	Hardwood
Interior Floors 2	Carpet
Whirlpool Tub	
Total Rooms	
Basement Garages	

Bedrooms	
Full Bathrooms	0
Half Bathrooms	
Extra Fixtures	
Bath Style	
Kitchen Style	
Roof Style	Mansard
Roof Cover	Rolled Compos
Fireplaces	
AC TYPE	Central

Exterior Walls	Brick Veneer
Exterior Walls 2	
Interior Walls	Plaster/Drywal
Interior Walls 2	
Heating Type	Hot Air-no Duc
Heating Fuel	Oil/Gas
Fin Basement Area	
Fin BSMT Quality	
Fin BSMT Area 2	
Fin BSMT Quality 2	

Report Created On 6/17/2019

Town of Berlin, CT

Property Listing Report

Map Block Lot	22-1-141-17	Building #	1	Account	1101290

Valuation Summary

(Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	1125100	787600
Extras	0	0
Improvements	1146600	802700
Outbuildings	21500	15100
Land	78800	55200
Total	1225400	857900

Outbuilding and Extra Features

Type	Description
Garage - Good	288 S.F.
Paving - Asphalt	5000 S.F.

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
First Floor	3152	3152
Upper Story, Finished	3152	3152
Slab	3152	0
Garage, Attached	288	0
Total Area	9744	6304

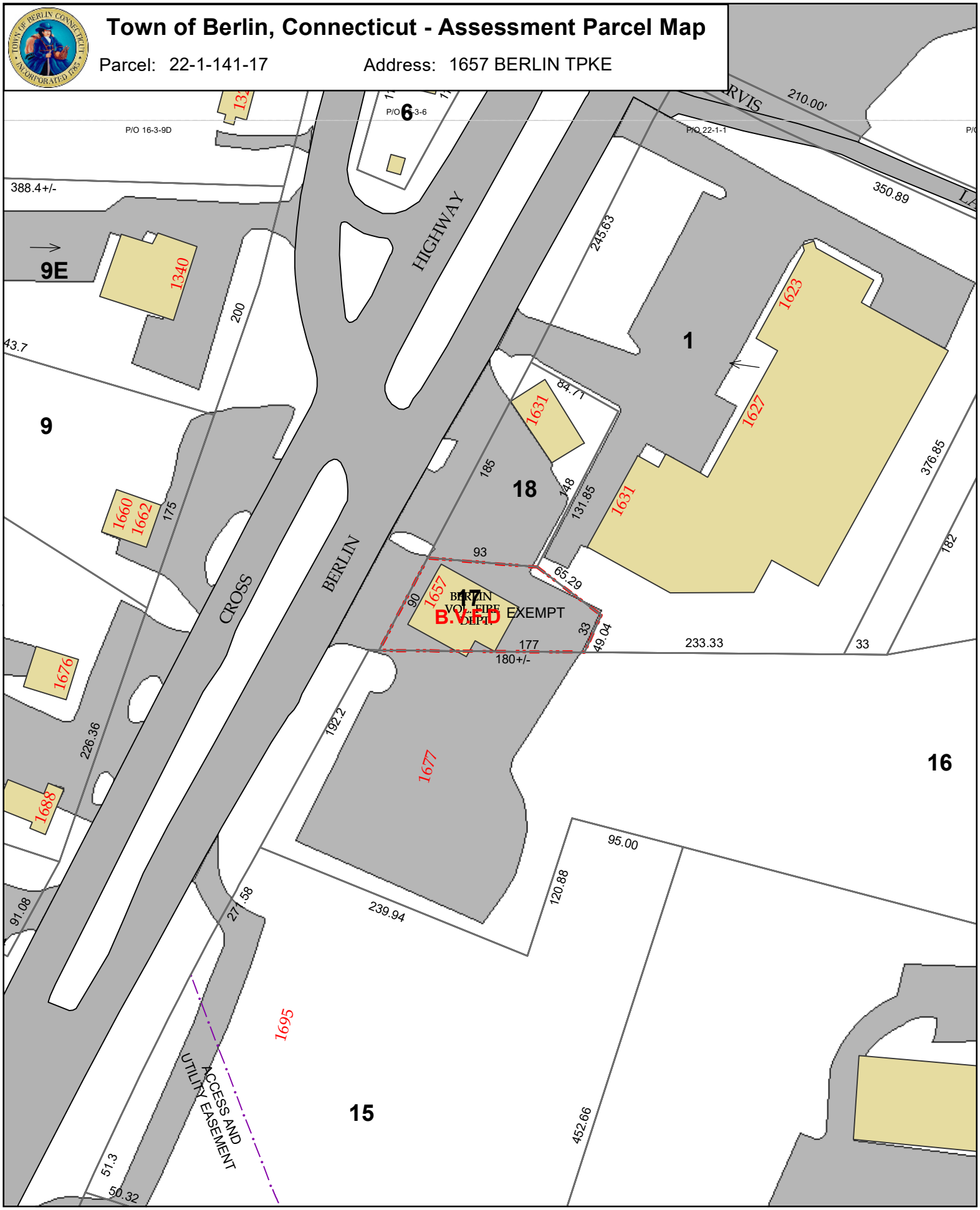
Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
BERLIN VOLUNTEER FIRE DEPT	114/ 272	6/27/1956	0

Report Created On 6/17/2019

Town of Berlin, Connecticut - Assessment Parcel Map

Parcel: 22-1-141-17 Address: 1657 BERLIN TPKE



N W E S

NEGEO
New England Geosystems
www.negeosystems.com
282 Main Street Extension - C2
Middletown, CT 06457 • (203) 404 - 7129

Approximate Scale: 1 inch = 100 feet

0 50 100 150 200 Feet

Map Produced: April 2019

Disclaimer: This map is for informational purposes only All information is subject to verification by any user. The Town of Berlin and its mapping contractors assume no legal responsibility for the information contained herein.

Exhibit C

Construction Drawings

T-Mobile

WIRELESS COMMUNICATIONS FACILITY

HA231/BERLIN FD TOWER

SITE ID: CTHA231A

1657 BERLIN TURNPIKE

BERLIN, CT 06037

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2018 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA–222 REVISION "G" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2018 CONNECTICUT FIRE SAFETY CODE, 2017 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

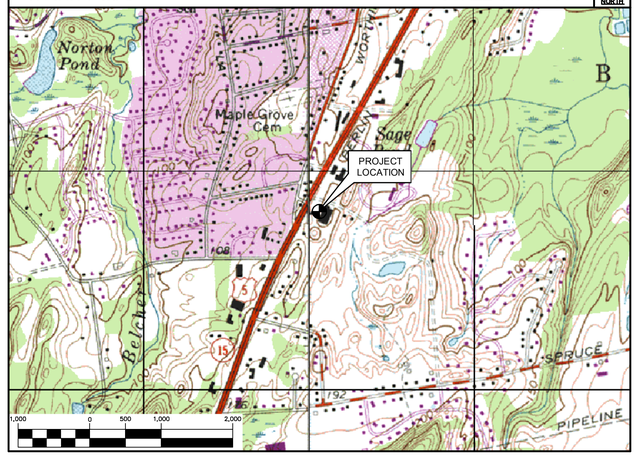
TO: 1657 BERLIN TURNPIKE
BERLIN, CT 06037

1.	START OUT GOING NORTH ON GRIFFIN RD TOWARD HARTMAN RD.	0.30 MI.
2.	TAKE THE 2ND RIGHT ONTO DAY HILL RD.	0.14 MI.
3.	TAKE THE 1ST RIGHT ONTO BLUE HILLS AVENUE EXT/CT–187. CONTINUE TO FOLLOW CT–187.	0.64 MI.
4.	STAY STRAIGHT TO GO ONTO BLUE HILLS AVE/CT–187.	1.24 MI.
5.	TURN LEFT ONTO OLD WINDSOR RD/CT–305. CONTINUE TO FOLLOW CT–305.	2.33 MI.
6.	MERGE ONTO I–91 S TOWARD HARTFORD.	8.38 MI.
7.	MERGE ONTO US–5 S/CT–15 S VIA EXIT 28 TOWARD WETHERSFIELD/NEWINGTON/BERLIN TPKE.	11.16 MI.
8.	MAKE A U–TURN AT SPRUCE BROOK RD ONTO BERLIN TURNPIKE/US–5 N/CT–15 N.	0.54 MI.
9.	1657 BERLIN TPKE, BERLIN, CT 06037–3223, 1657 BERLIN TPKE.	

VICINITY MAP

SCALE: 1" = 1000'

NORTH



T–MOBILE RF CONFIGURATION

67D92DB_2xAIR+1OP

PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:

A. REMOVE (6) EXISTING ANTENNAS, TYP. (1) PER SECTOR
B. INSTALL (3) NEW RFS ANTENNAS, TYP. (1) PER SECTOR
C. INSTALL (3) NEW AIR32 ANTENNAS, TYP. (1) PER SECTOR
D. REMOVE (3) EXISTING RRUS11 B12, TYP. (1) PER SECTOR
E. INSTALL (3) NEW RADIO 4449 B71+B12'S, TYP. (1) PER SECTOR
F. REPLACE (1) DUS41 AND (1) XMU WITH (1) BB 6630 FOR LTE CABINETS
G. UPGRADE CABINET WITH 125 BREAKER
H. INSTALL (1) ADDITIONAL BB6630 FOR FUTURE 5G N600
I. REMOVE (6) EXISTING COAX CABLES
J. INSTALL (3) 6x12 HYBRID CABLES
K. INSTALL (3) NEW HANDRAIL KITS, TYP. (1) PER SECTOR

PROJECT INFORMATION

SITE NAME:	HA231/BERLIN FD TOWER
SITE ID:	CTHA231A
SITE ADDRESS:	1657 BERLIN TURNPIKE BERLIN, CT 06037
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°–36'–22.82" N LONGITUDE: 72°–45'–00.21" W GROUND ELEVATION: 133'± AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T–1	TITLE SHEET	0
N–1	DESIGN BASIS AND SITE NOTES	0
C–1	SITE LOCATION PLAN	0
C–2	SITE PLAN AND ELEVATION	0
C–3	ANTENNA MOUNTING CONFIGURATION	0
E–1	TYPICAL ELECTRICAL DETAILS	0
E–2	TYPICAL ELECTRICAL DETAILS	0

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	05/24/19	RTS	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT · LICENSED PROFESSIONAL ENGINEER · 29117 · REGISTERED

T-Mobile

Transcend Wireless

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 NORTHEAST LLC

WIRELESS COMMUNICATIONS FACILITY

HA231/BERLIN FD TOWER
SITE ID: CTHA231A
1657 BERLIN TURNPIKE
BERLIN, CT 06037

DATE: 05/20/19
SCALE: AS NOTED
JOB NO. 19027.56

TITLE SHEET

T–1

Sheet No. 1 of 7

DESIGN BASIS:

GOVERNING CODE: 2015 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2018 CT STATE BUILDING CODE AND AMENDMENTS.

1. DESIGN CRITERIA:

- WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS): 90-105 MPH (3 SECOND GUST)
- RISK CATEGORY: II (BASED ON IBC APPENDIX N)
- NOMINAL DESIGN SPEED (TOWER): 97 MPH (Vasd) (EXPOSURE C/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-10) PER 2015 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2018 CONNECTICUT STATE BUILDING CODE.
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.
2. 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.
3. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.
4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.
5. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
6. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
7. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.
9. 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. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH NORTHEAST UTILITIES
10. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER FOUNDATION REMEDIATION WORK IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIEDOWNS, WHICH MIGHT BE NECESSARY.
11. 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.
12. SHOP DRAWINGS, CONCRETE MIX DESIGNS, TEST REPORTS, AND OTHER SUBMITTALS PERTAINING TO STRUCTURAL WORK SHALL BE FORWARDED TO THE OWNER FOR REVIEW BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL INCLUDE ERECTION DRAWINGS AND COMPLETE DETAILS OF CONNECTIONS AS WELL AS MANUFACTURER'S SPECIFICATION DATA WHERE APPROPRIATE. SHOP DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR AND BEAR THE CHECKER'S INITIALS BEFORE BEING SUBMITTED FOR REVIEW.
13. NO DRILLING WELDING OR TAPING ON EVERSOURCE OWNED EQUIPMENT.
14. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

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.

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WIRELESS COMMUNICATIONS FACILITY

HA231/BERLIN FD TOWER
SITE ID: CTHA231A

1657 BERLIN TURNPIKE
BERLIN, CT 06037

DATE:	05/20/19
SCALE:	AS NOTED
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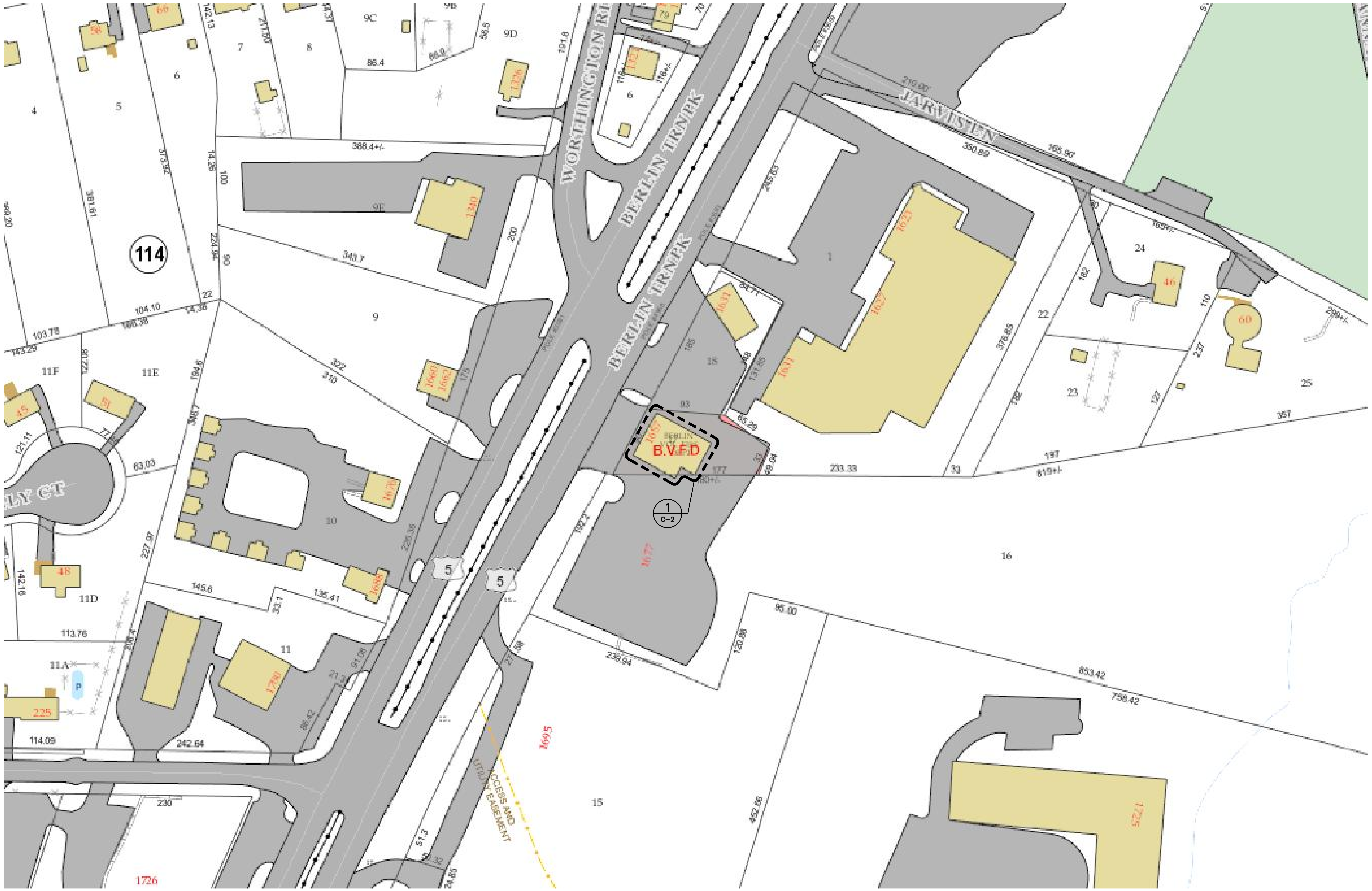
DESIGN BASIS AND SITE NOTES

N-1

Sheet No. 2 of 7



1 / C-1 **SITE LOCATION PLAN**
SCALE: 1" = 60'

APPROX. NORTH

GRAPHIC SCALE
60 0 30 60 120 240
(IN FEET)
1 inch = 60 ft.

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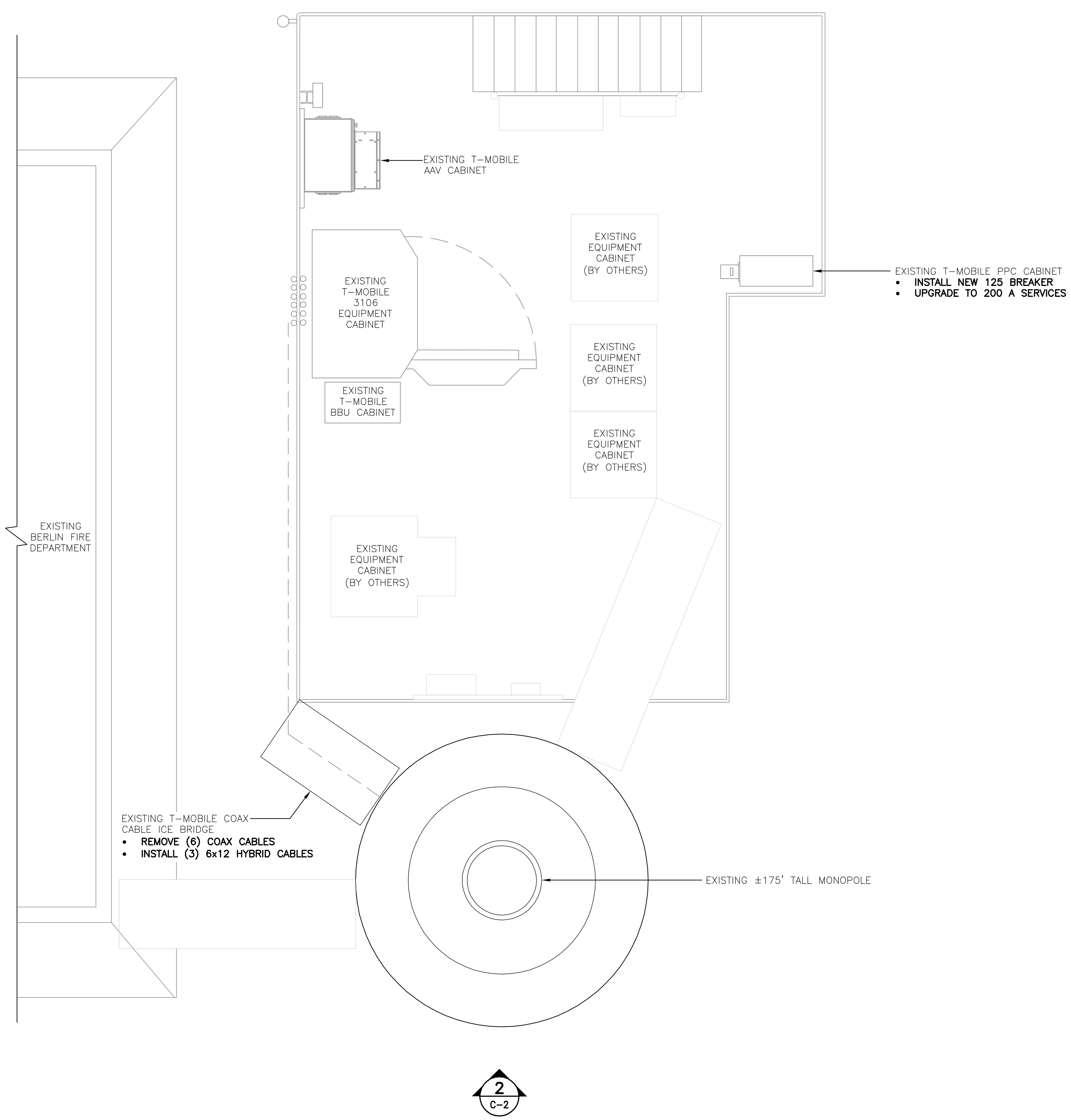
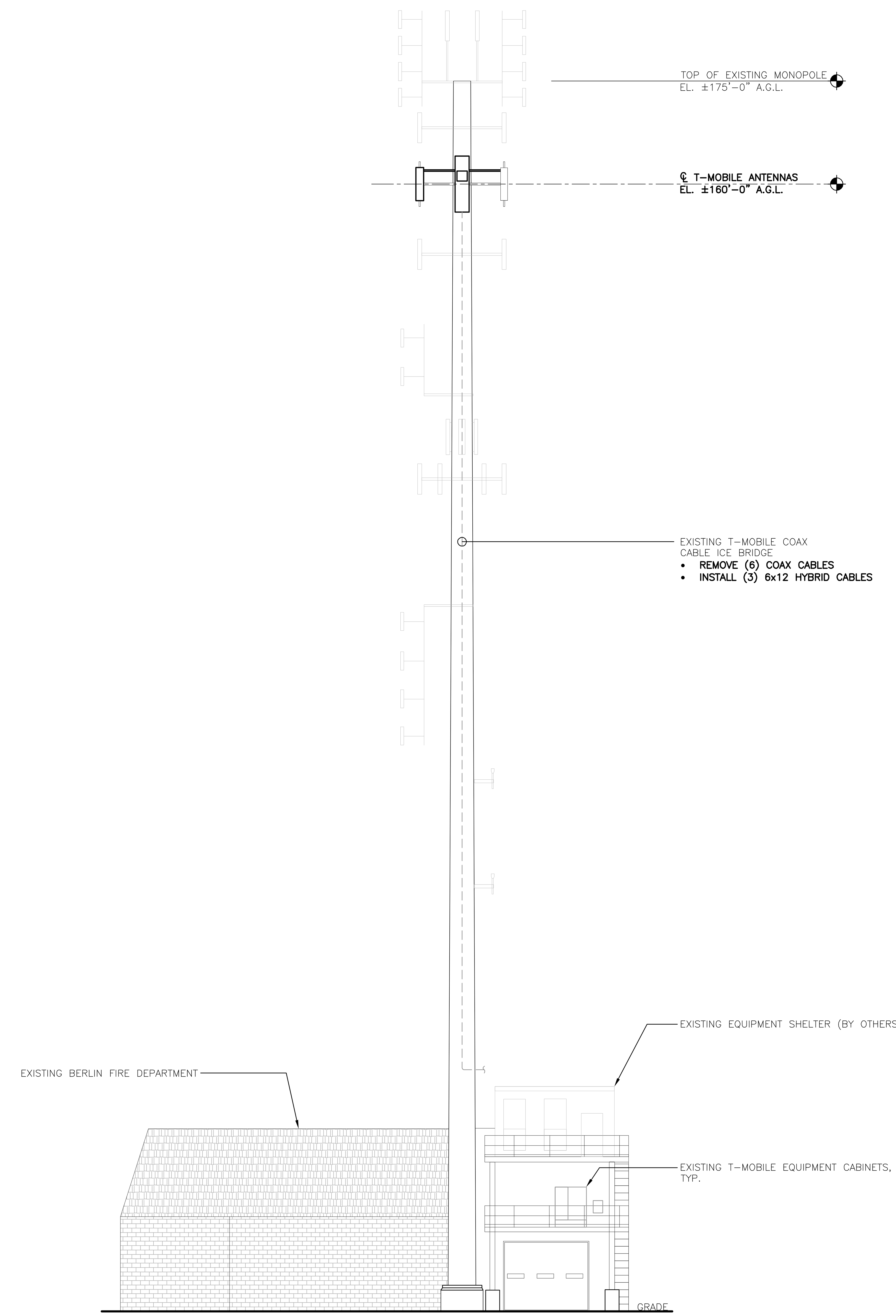
SITE LOCATION PLAN

C-1



1 C-2 **SITE PLAN - PROPOSED**
SCALE: 1/2" = 1'
TRUE NORTH



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

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

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SCALE: AS NOTED
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SITE PLAN AND ELEVATION

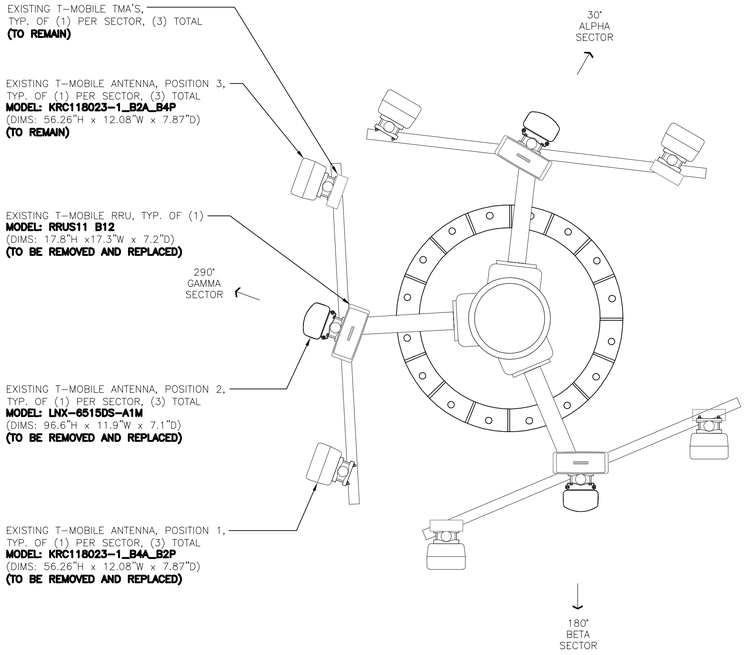
C-2

Sheet No. 4 of 7

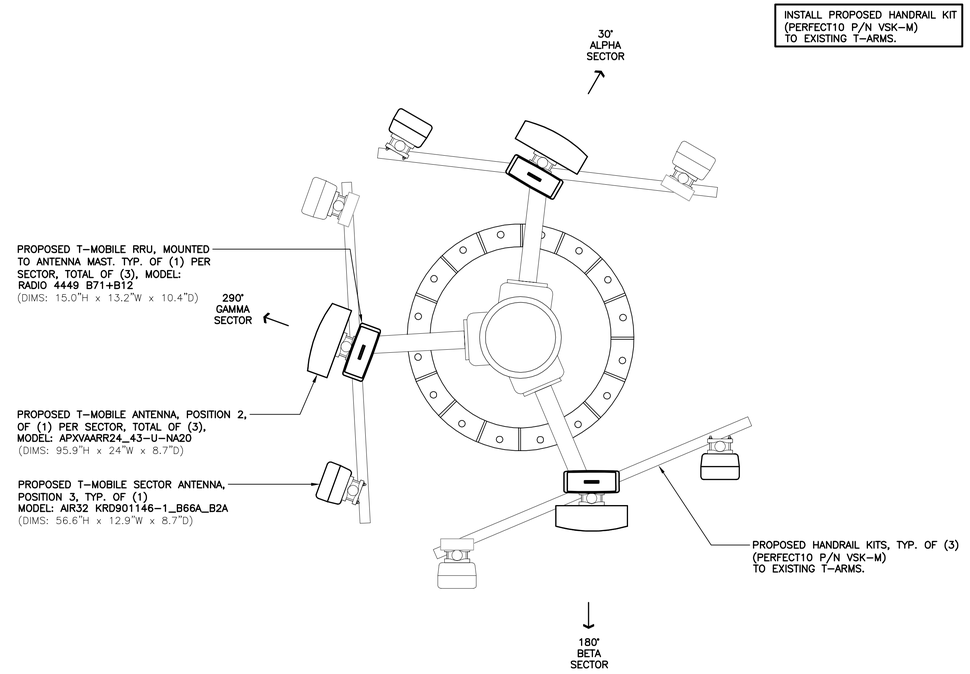
T-MOBILE RAN TEMPLATE:
67D92DB OUTDOOR

T-MOBILE RF CONFIGURATION:
67D92DB_2xAIR+1OP

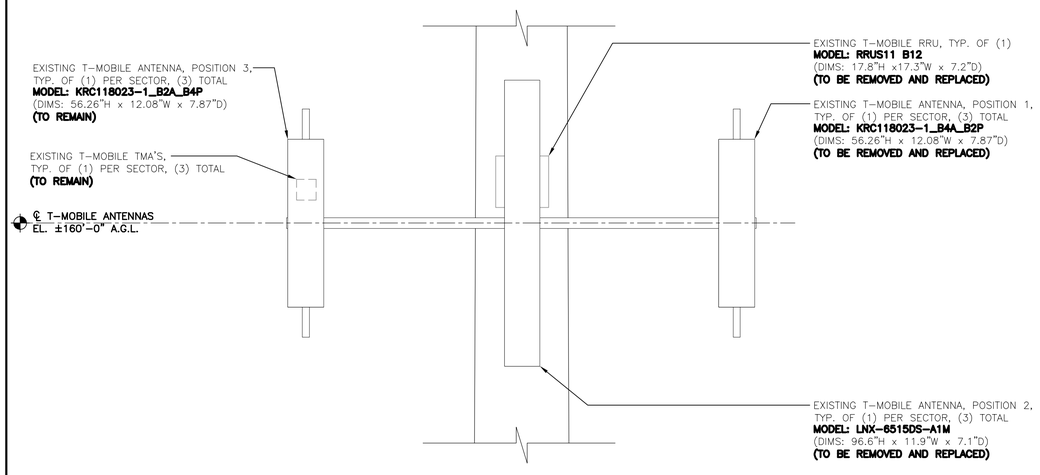
INSTALL PROPOSED HANDRAIL KIT
(PERFECT10 P/N VSK-M)
TO EXISTING T-ARMS.



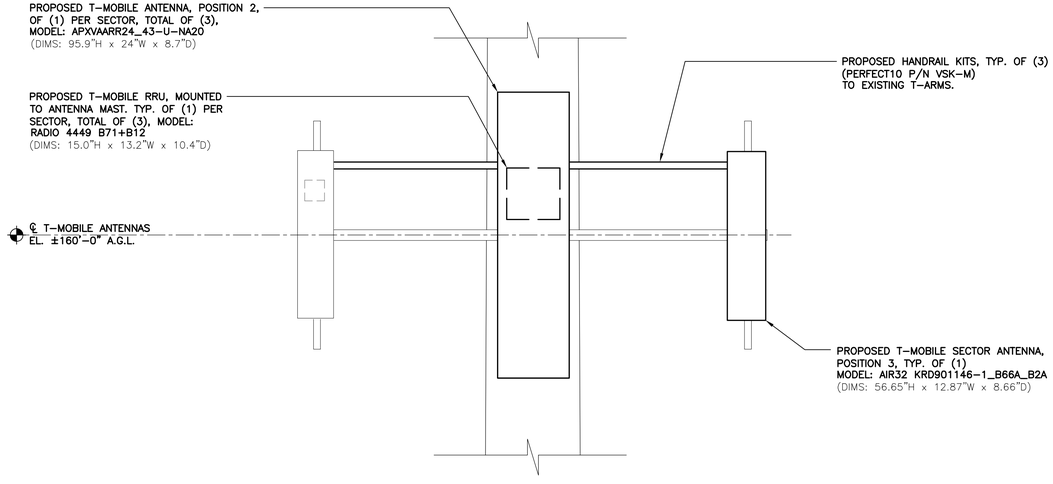
1 C-3 **EXISTING ANTENNA MOUNTING CONFIGURATION**
SCALE: 1/2" = 1' **160' ELEVATION** TRUE NORTH



2 C-3 **PROPOSED ANTENNA MOUNTING CONFIGURATION**
SCALE: 1/2" = 1' **160' ELEVATION** TRUE NORTH



3 C-3 **ANTENNA ELEVATION - EXISTING**
SCALE: 1/2" = 1'



4 C-3 **ANTENNA ELEVATION - PROPOSED**
SCALE: 1/2" = 1'

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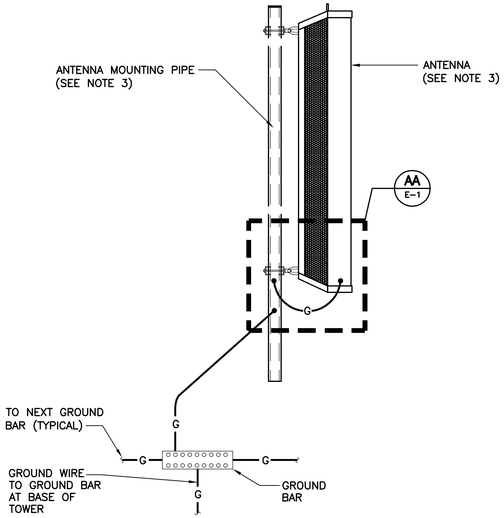
ANTENNA MOUNTING CONFIGURATION

C-3

Sheet No. 5 of 7

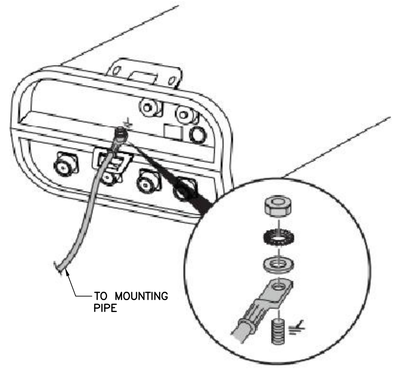


NOTES:

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.

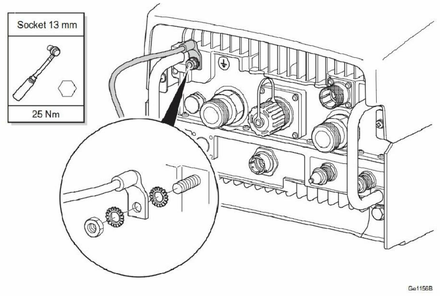
1 E-1 TYPICAL ANTENNA GROUNDING DETAIL

SCALE: NONE



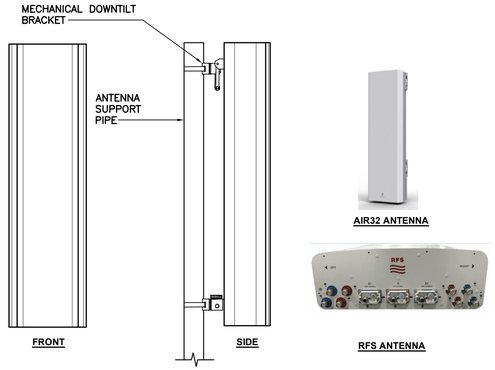
AA E-1 TYPICAL ANTENNA GROUNDING DETAIL

SCALE: NOT TO SCALE



2 E-1 TYPICAL RRU GROUNDING DETAIL

NOT TO SCALE



AIR32 ANTENNA

RFS ANTENNA

ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: RFS MODEL: APXVAARR24_43-U-NA20	95.9"H x 24"W x 8.7"D	153 LBS
MAKE: ERICSSON MODEL: AIR32 KRD901146-1	56.6"L x 12.9"W x 8.7"D	105 LBS.

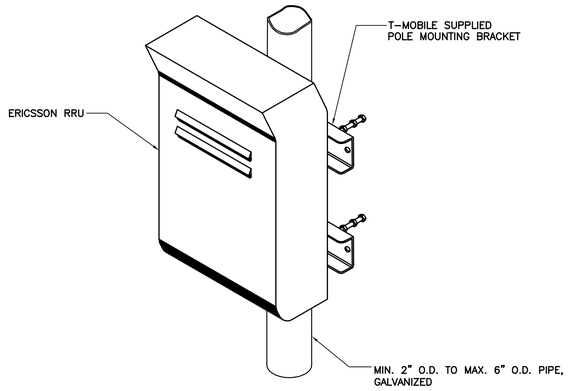
3 E-1 PROPOSED ANTENNAS DETAIL

SCALE: NOT TO SCALE

RRH (REMOTE RADIO HEAD)		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: RRU 4449 B71+B12	14.9"H x 13.2"W x 9.3"D	±74 LBS

4 E-1 REMOTE RADIO HEAD (RRH) DETAIL (TYP)

SCALE: NOT TO SCALE



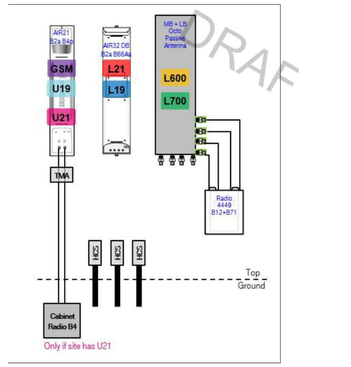
ISOMETRIC VIEW

NOTES:

1. T-MOBILE SHALL SUPPLY RRU, AND RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL SUPPLY POLE/PIPE AND INSTALL ALL MOUNTING HARDWARE INCLUDING ERICSSON RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL INSTALLS RRU AND MAKES CABLE TERMINATIONS.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

5 E-1 TYPICAL RRUS MOUNTING DETAILS

SCALE: NOT TO SCALE



6 E-1 PROPOSED PLUMBING DIAGRAM

SCALE: NONE

UNIVERSAL MOUNT STABILIZER BASE KIT		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: PERFECT10 MODEL: VSK-M	13.0"H x 10.0"W x 49.0"D	±114 LBS

7 E-1 HANDRAIL DETAIL

SCALE: NONE

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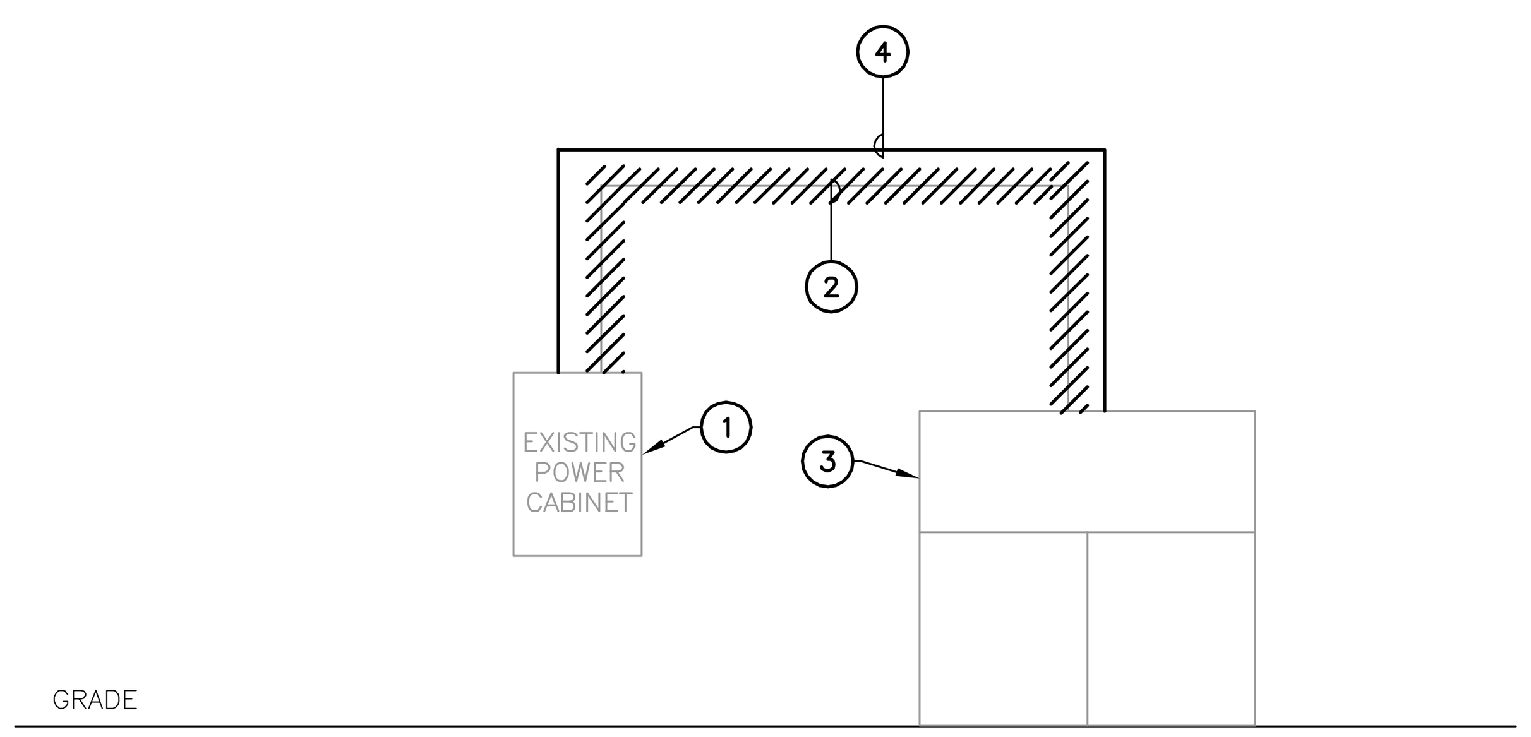
TYPICAL ELECTRICAL DETAILS

E-1

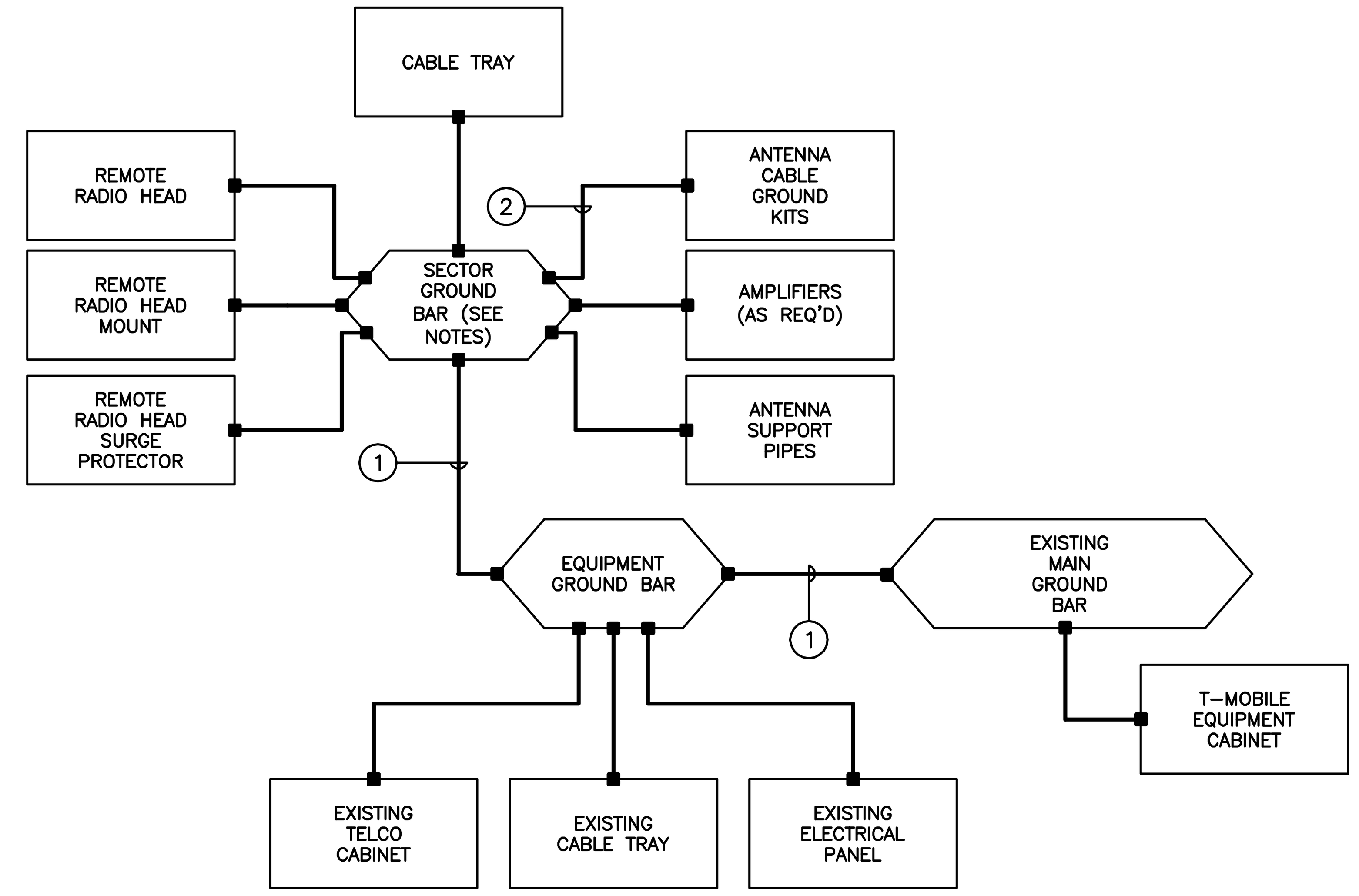
Sheet No. 6 of 7

RISER DIAGRAM NOTES

1. EXISTING POWER CABINET TO REMAIN
2. EXISTING CONDUITS, CONDUCTORS AND ASSOCIATED CIRCUIT BREAKER TO BE REMOVED.
3. EXISTING RADIO CABINET TO REMAIN
4. (3) #1 AWG, (1) #6 AWG GROUND, 1-1/2" CONDUIT CONNECTED TO NEW 125A/2P CIRCUIT BREAKER.



1 / E-2 **ELECTRICAL POWER RISER DIAGRAM**
NOT TO SCALE



GROUNDING SCHEMATIC NOTES

1. #2 AWG
2. #6 AWG

GENERAL NOTES:

1. ALL SURGE SUPPRESSION EQUIPMENT SHALL BE BONDED TO GROUND PER MANUFACTURER'S SPECIFICATIONS
2. UNLESS OTHERWISE NOTED OR REQUIRED BY CODE, GROUND CONDUCTORS SHOWN SHALL BE #2 AWG (SOLID TINNED BCW – EXTERIOR; STRANDED GREEN INSULATED – INTERIOR).
3. ALL SECTOR GROUND BARS SHALL BE BONDED TOGETHER WITH #2 AWG SOLID TINNED BCW.
4. BOND ALL EQUIPMENT CABINETS AND BATTERY CABINETS TO GROUND PER MANUFACTURER'S SPECIFICATIONS.
5. COORDINATE ALL ROOF MOUNTED EQUIPMENT WITH OWNER.
6. ALL ROOF MOUNTED AMPLIFIERS AND ASSOCIATED EQUIPMENT SHALL BE BONDED TO THE SECTOR GROUND BAR PER MANUFACTURER'S SPECIFICATIONS.
7. ALL GROUNDING SHALL BE IN ACCORDANCE WITH NEC AND OWNER'S REQUIREMENTS.

2 / E-2 **TYPICAL GROUNDING SCHEMATIC DETAIL**
SCALE: NOT TO SCALE

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TYPICAL ELECTRICAL DETAILS

E-2

Exhibit D

Structural Analysis Report

CENTEK engineering

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Structural Analysis Report

175-ft Existing EEI Monopole

Proposed T-Mobile
Antenna Upgrade (L600)

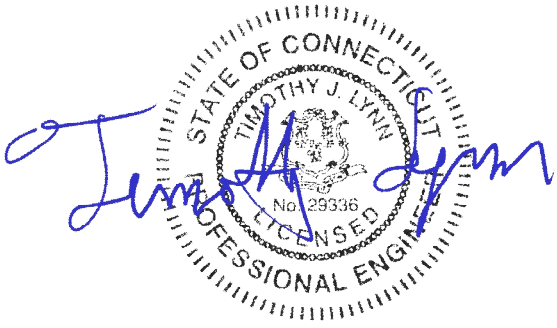
Site Ref: CTHA231A

1657 Berlin Turnpike
Berlin, CT

CENTEK Project No. 19027.56

Date: May 15, 2019

Max Stress Ratio = 79.2%



Prepared for:

T-Mobile USA
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Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by T-Mobile on the existing monopole (tower) located in Berlin, Connecticut.

The host tower is a 175-ft tall, four-section, eighteen sided, tapered monopole, originally designed and manufactured by Engineered Endeavors Incorporated (EEI); project no. 11129 dated September 16, 2002. The tower geometry, structure member sizes and foundation system information were obtained from a previous structural analysis report prepared by URS job no. VZ5-168 dated November 11, 2013.

Antenna and appurtenance information were obtained from the aforementioned URS structural report, a previous structural analysis report prepared by Raymaker dated September 11, 2017 and a T-Mobile RF sheet.

The tower is made up of four (4) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 21.0-in at the top and 60.5-in at the base.

Antenna and Appurtenance Summary

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

- TOWN (EXISTING TO REMAIN):
  Antennas: Two (2) 2'x2' panels, two (2) Kathrein paraflector antennas, one (1) 10-ft omni-directional antenna, two (2) 4-ft omni-directional antennas and two (2) 20-ft dipole antennas mounted on a 13-ft low profile platform with an elevation of 1765-ft above grade level.
  Coax Cables: Four (4) 7/8"∅, three (3) 1-1/4" ∅ and two (2) Cat5e cables running on the inside of the existing tower.
- AT&T (EXISTING):
  Antennas: Three (3) Kathrein 800-10121 panel antennas, three (3) CCI HPA-65R-BUU-H6 panel antennas, six (6) LGP21401 TMAs, three (3) Ericsson RRUS-11 remote radio heads and one (1) Raycap DC6-48-60-18-8F surge arrestor mounted on a platform w/ handrails with a RAD center elevation of 170-ft above grade level.
  Cables: Six (6) 1-5/8" ∅ coax cables, one (1) fiber cable and two (2) dc control cables running on the inside of the existing tower.
- TOWN (EXISTING TO REMAIN):
  Antennas: One (1) 4' grid dish and one (1) 3-ft dipole mounted on a 6-ft sidearm with an elevation of 164-ft above grade level.
  Coax Cables: Two (2) 7/8"∅ cables running on the inside of the existing tower.

- SPRINT (EXISTING):
  Antennas: Three (3) RFS APXVSPP18-C-A20 panel antennas, three (3) RFS APXVTM14 panel antennas, three (3) ALU 1900 MHz RRHs, three (3) ALU 800 MHz RRHs, three (3) ALU TD-RRH-8x20-25 RRHs and five (5) 2-ft microwave dishes mounted on a low profile platform with a RAD center elevation of 150-ft above grade level.
  Coax Cables: Four (4) 1-5/8" ∅ Hybriflex cables and four (4) 1/2" ∅ coax cable running on the inside of the existing tower.
- TOWN (EXISTING TO REMAIN):
  Antennas: One (1) 10-ft dipole and one (1) 2'x2' panel antenna mounted on a 6-ft sidearm with an elevation of 136-ft above grade level.
  Coax Cables: One (1) 1/2"∅ and one (1) Cat5e cables running on the inside of the existing tower.
- VERIZON (EXISTING):
  Antennas: Two (2) Antel BXA-70063-6BF panel antennas, one (1) Antel BXA-70080-4BF panel antenna, three (3) BXA-171063-12CF panel antennas, two (2) Rymsa MG D3-900Tx panel antennas, one (1) Antel BXA-185060-12CF panel antenna, three (3) Andrew LNX-6514DS panl antennas, three (3) Alcatel-Lucent RRH2x40-AWS remote radio heads and one (1) Raycap RC2DC-3315-PF-48 main distribution box mounted on a 13-ft low profile platform with a RAD center elevation of 114-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running inside the monopole. Six (6) 1-5/8" ∅ coax cables and one (1) 1-5/8" ∅ fiber cable running on the exterior of the monopole.
- TOWN (EXISTING TO REMAIN):
  Antennas: One (1) 4' grid dish, one (1) 10-ft dipole and one (1) 2'x2' panel antenna mounted on a 6-ft sidearm with an elevation of 104-ft above grade level.
  Coax Cables: One (1) 1/2"∅ and one (1) Cat5e cables running on the inside of the existing tower.
- UNKNOWN (EXISTING):
  Antennas: One (1) GPS antenna mounted on a standoff with an elevation of 78-ft above grade level.
  Coax Cables: One (1) 1/2" ∅ coax cable running on the inside of the existing tower.
- UNKNOWN (EXISTING):
  Antennas: One (1) GPS antenna mounted on a standoff with an elevation of 35.25-ft above grade level.
  Coax Cables: One (1) 1/2" ∅ coax cable running on the inside of the existing tower.
- T-MOBILE (Existing to Remain):
  Antennas: Three (3) Ericsson AIR21 panel antennas and three (3) TMAs mounted on three (3) existing T-Arms with a RAD center elevation of 160-ft above grade.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables and one (1) 9x18 fiber cable running on the inside of the existing tower.

- T-MOBILE (EXISTING TO REMOVE):
  Antennas: Three (3) Ericsson AIR21 panel antennas, three (3) Andrew LNX-6515DS panel antennas and three (3) Ericsson RRUS-11 remote radio heads mounted on three (3) existing T-Arms with a RAD center elevation of 160-ft above grade.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- **T-MOBILE (PROPOSED):**
  Antennas: Three (3) Ericsson AIR32 panel antennas, three (3) RFS APXVAARR24_43 panel antennas and three (3) Ericsson 4449 B71 B12 remote radio heads mounted on three (3) existing T-Arms with a RAD center elevation of 160-ft above grade. (Perfect10 Monopole Sector Stabilizer Kit (p/n VSK-M) to be installed on T-Arms)
  Coax Cables: Three (3) 6x12 fiber cables running on the inside 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 or reinforcement drawings.
- 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.
- All coax cables to be installed as indicated in this report.

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:	Greenwich; v = 97 mph	*[Appendix N of the 2018 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 2018 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 2015 International Building Code as amended by the 2018 Connecticut State Building Code (CSBC).

Tower Capacity

- Calculated stresses were found to be within allowable limits. This tower was found to be at **79.2%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L2)	86.12'-130.75'	79.2%	**PASS**

Foundation and Anchors

The existing foundation consists of a 7.5 ∅ x 39.0-ft long reinforced concrete caisson. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned URS structural report. The base of the tower is connected to the foundation by means of (18) 2.25"∅, ASTM A615-75 anchor bolts embedded into the concrete foundation structure.

- The tower base reactions developed from the governing Load Case were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	37 kips
	Compression	60 kips
	Moment	4706 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Result
Reinforced Concrete Caisson	Moment Capacity	58.8%	**PASS**
	Lateral Deflection	0.23 in.(1)	**PASS**

(1) Lateral deflection limited to 0.75 in under service load combination per TIA-222-G section 9.5.

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	77.0%	**PASS**
Base Plate	Bending	59.0%	**PASS**

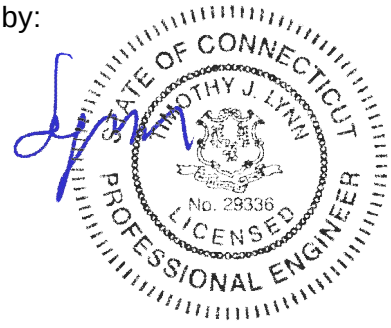
Conclusion

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

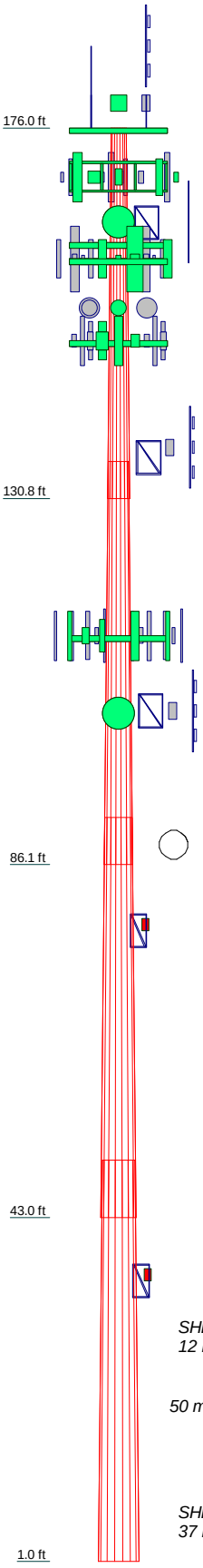
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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

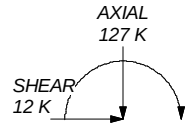
tnxTower Features:

- 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.

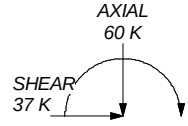
Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	45.25	18	0.2500	4.50	21.0000	31.8000		3.2
2	49.13	18	0.3125	5.75	30.2260	41.8200		5.9
3	48.87	18	0.3750	7.00	39.8381	51.3600		9.0
4	49.00	18	0.4375		48.9596	60.5000		12.6
							A572-65	30.6



ALL REACTIONS ARE FACTORED



TORQUE 3 kip-ft
50 mph WIND - 1.0000 in ICE



TORQUE 8 kip-ft
REACTIONS - 97 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
2'x2' Panel	176	VHLP800-11-DW1 (Sprint)	154
2'x2' Panel	176	VHLP800-11-DW1 (Sprint)	154
PR-900	176	VHLP2-11-DW1 (Sprint)	154
PR-900	176	VHLP2-11-DW1 (Sprint)	154
10' x 2" Dia Omni	176	VHLP2-11-DW1 (Sprint)	154
4' x 2" Dia Omni	176	FD-RRH 4x45 1900 (Sprint Existing)	150
4' x 2" Dia Omni	176	FD-RRH 2x50 800 (Sprint Existing)	150
20' 4-Bay Dipole	176	FD-RRH 2x50 800 (Sprint Existing)	150
20' 4-Bay Dipole	176	FD-RRH 2x50 800 (Sprint Existing)	150
EEI 12-ft Low Profile Platform	176	TD-RRH8x20-25 (Sprint Existing)	150
800-10121 (ATI Existing)	170	TD-RRH8x20-25 (Sprint Existing)	150
HPA-65R-BUU-H6 (ATI Existing)	170	TD-RRH8x20-25 (Sprint Existing)	150
800-10121 (ATI Existing)	170	EEI 12-ft Low Profile Platform (Sprint Existing)	150
HPA-65R-BUU-H6 (ATI Existing)	170		
800-10121 (ATI Existing)	170	APXVSPP18-C-A20 (Sprint Existing)	150
HPA-65R-BUU-H6 (ATI Existing)	170	APXVSPP18-C-A20 (Sprint Existing)	150
(2) LGP21401 TMA (ATI Existing)	170	APXVTM14 (Sprint Existing)	150
(2) LGP21401 TMA (ATI Existing)	170	APXVTM14 (Sprint Existing)	150
(2) LGP21401 TMA (ATI Existing)	170	APXVTM14 (Sprint Existing)	150
RRUS-11 (ATI Existing)	170	FD-RRH 4x45 1900 (Sprint Existing)	150
RRUS-11 (ATI Existing)	170	FD-RRH 4x45 1900 (Sprint Existing)	150
RRUS-11 (ATI Existing)	170	APXVSPP18-C-A20 (Sprint Existing)	150
DC6-48-60-18-8F Surge Arrestor (ATI Existing)	170	10' Dipole	137
		2'x2' Panel	137
Valmont 13' Platform w/Rails (ATI Existing)	170	6' Extension Arm Mount	135.75
		BXA-185060/12CF (Verizon Existing)	114
3' Whip	164.5	RRH2x40-AWS (Verizon Existing)	114
4-ft Grid Dish	164.5	RRH2x40-AWS (Verizon Existing)	114
6' Extension Arm Mount	164.42	RRH2x40-AWS (Verizon Existing)	114
Monopole Sector Stabilizer Kit VSK-M (T-Mobile Proposed)	162	RC2DC-3315-PF-48 (Verizon Existing)	114
		Valmont 13' Low Profile Platform (Verizon Existing)	114
APXVAARR24-43 (T-Mobile Existing)	160	BXA-171063-12CF (Verizon Existing)	114
AIR32 (T-Mobile Existing)	160	LNX-6514DS (Verizon Existing)	114
AIR21 B2A/B4P (T-Mobile Existing)	160	BXA-171063-12CF (Verizon Existing)	114
APXVAARR24-43 (T-Mobile Existing)	160	LNX-6514DS (Verizon Existing)	114
AIR32 (T-Mobile Existing)	160	BXA-70080-4CF (Verizon Existing)	114
TMA 10"x8"x3" (T-Mobile Existing)	160	BXA-70063-6BF (Verizon Existing)	114
TMA 10"x8"x3" (T-Mobile Existing)	160	MG D3-900Tx (Verizon Existing)	114
TMA 10"x8"x3" (T-Mobile Existing)	160	BXA-171063-12CF (Verizon Existing)	114
Radio 4449 B71 B12 (T-Mobile Existing)	160	LNX-6514DS (Verizon Existing)	114
		BXA-70063-6BF (Verizon Existing)	114
Radio 4449 B71 B12 (T-Mobile Existing)	160	MG D3-900Tx (Verizon Existing)	114
		10' Dipole	104.83
Radio 4449 B71 B12 (T-Mobile Existing)	160	2'x2' Panel	104.83
		6' Extension Arm Mount	104.83
Valmont T-Arm (1) (T-Mobile Existing)	160	4-ft Grid Dish	104.5
Valmont T-Arm (1) (T-Mobile Existing)	160	3' GPS Stand-off Mount	78
Valmont T-Arm (1) (T-Mobile Existing)	160	GPS	78
AIR21 B2A/B4P (T-Mobile Existing)	160	3' GPS Stand-off Mount	35.25
AIR21 B2A/B4P (T-Mobile Existing)	160	GPS	35.25
AIR32 (T-Mobile Existing)	160		
APXVAARR24-43 (T-Mobile Existing)	160		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for Exposure B 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 III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
8. Welds are fabricated with ER-70S-6 electrodes.
9. TOWER RATING: 79.2%

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

Job: **19027.56 - CTHA231A**			
Project: **175' EEI Monopole - 1657 Berlin Turnpike Berlin, CT**			
Client: T-Mobile	Drawn by: TJL	App'd:	
Code: TIA-222-G	Date: 05/15/19	Scale: NTS	
Path: J:\Jobs\1902700.WI\56_CTHA231A\05_Structural\Tower Analysis\Backup Documentation\ERI Files\175' EEI Monopole Berlin, CT.eri		Dwg No. E-1	

Tower Input Data

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

Basic wind speed of 97 mph.
Structure Class III.
Exposure Category B.
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.
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole 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		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	176.00-130.75	45.25	4.50	18	21.0000	31.8000	0.2500	1.0000	A572-65 (65 ksi)
L2	130.75-86.12	49.13	5.75	18	30.2260	41.8200	0.3125	1.2500	A572-65 (65 ksi)
L3	86.12-43.00	48.87	7.00	18	39.8381	51.3600	0.3750	1.5000	A572-65 (65 ksi)
L4	43.00-1.00	49.00		18	48.9596	60.5000	0.4375	1.7500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	21.2854	16.4651	895.6507	7.3663	10.6680	83.9568	1792.4800	8.2341	3.2560	13.024
	32.2520	25.0349	3148.3461	11.2003	16.1544	194.8909	6300.8349	12.5198	5.1568	20.627
L2	31.7224	29.6704	3354.2440	10.6193	15.3548	218.4493	6712.9015	14.8380	4.7698	15.263
	42.4169	41.1703	8961.3641	14.7352	21.2446	421.8192	17934.5198	20.5890	6.8103	21.793
L3	41.7714	46.9709	9241.6271	14.0094	20.2377	456.6531	18495.4146	23.4899	6.3515	16.937
	52.0945	60.6849	19929.7987	18.0997	26.0909	763.8607	39885.8215	30.3482	8.3794	22.345
L4	51.3215	67.3790	20042.0460	17.2254	24.8715	805.8240	40110.4639	33.6959	7.8469	17.936
	61.3658	83.4043	38013.0437	21.3222	30.7340	1236.8401	76076.1060	41.7101	9.8780	22.578

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 176.00-130.75				1	1	1			
L2 130.75-86.12				1	1	1			
L3 86.12-43.00				1	1	1			
L4 43.00-1.00				1	1	1			

Monopole Base Plate Data

Base Plate Data	
Base plate is square	
Base plate is grouted	
Anchor bolt grade	A615-75
Anchor bolt size	2.2500 in
Number of bolts	18
Embedment length	48.0000 in
f'_c	4 ksi
Grout space	2.0000 in
Base plate grade	A572-60
Base plate thickness	2.0000 in
Bolt circle diameter	70.0000 in
Outer diameter	76.0000 in
Inner diameter	60.7500 in
Base plate type	Stiffened Plate
Bolts per stiffener	1

Base Plate Data	
Stiffener thickness	0.5000 in
Stiffener height	12.0000 in

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (Verizon Existing)	C	No	Surface Ar (CaAa)	115.00 - 7.00	6	6	0.000 0.000	1.9800		1.04
HYBRIFLEX 1-5/8" (Verizon Existing)	C	No	Surface Ar (CaAa)	115.00 - 7.00	1	1	0.000 0.000	1.9800		1.90

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1 1/4 (Town Existing)	A	No	No	Inside Pole	176.00 - 4.00	3	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.66 0.66 0.66
7/8 (Town Existing)	A	No	No	Inside Pole	176.00 - 4.00	4	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.54 0.54 0.54
Cat5e (Town Existing)	A	No	No	Inside Pole	176.00 - 4.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.06 0.06 0.06
1 5/8 (AT&T Existing)	A	No	No	Inside Pole	171.00 - 4.00	6	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.04 1.04 1.04
RG6-Fiber (AT&T Existing)	A	No	No	Inside Pole	171.00 - 4.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.00 0.00 0.00
#8 AWG Copper WIre (AT&T Existing)	A	No	No	Inside Pole	171.00 - 4.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.00 0.00 0.00
7/8 (Town Existing)	A	No	No	Inside Pole	166.00 - 4.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.54 0.54 0.54
1 5/8 (T-Mobile Existing)	B	No	No	Inside Pole	161.00 - 4.00	6	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.04 1.04 1.04
HYBRIFLEX 1-5/8" (T-Mobile Existing)	B	No	No	Inside Pole	161.00 - 4.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.90 1.90 1.90
HYBRIFLEX 1-1/4" (T-Mobile Proposed)	B	No	No	Inside Pole	161.00 - 4.00	3	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.30 1.30 1.30
HYBRIFLEX 1-1/4" (Sprint Existing)	B	No	No	Inside Pole	151.00 - 7.00	4	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.30 1.30 1.30
1/2 (Sprint Existing)	B	No	No	Inside Pole	151.00 - 7.00	4	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.25 0.25 0.25
1/2	A	No	No	Inside Pole	136.00 - 4.00	1	No Ice	0.00	0.25

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
(Town Existing)							1/2" Ice	0.00	0.25
							1" Ice	0.00	0.25
Cat5e	A	No	No	Inside Pole	136.00 - 4.00	1	No Ice	0.00	0.06
(Town Existing)							1/2" Ice	0.00	0.06
							1" Ice	0.00	0.06
1 5/8	C	No	No	Inside Pole	115.00 - 7.00	12	No Ice	0.00	1.04
(Verizon Existing)							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
1/2	A	No	No	Inside Pole	106.00 - 4.00	1	No Ice	0.00	0.25
(Town Existing)							1/2" Ice	0.00	0.25
							1" Ice	0.00	0.25
Cat5e	A	No	No	Inside Pole	106.00 - 4.00	1	No Ice	0.00	0.06
(Town Existing)							1/2" Ice	0.00	0.06
							1" Ice	0.00	0.06
1/2	A	No	No	Inside Pole	79.00 - 4.00	1	No Ice	0.00	0.25
(Town Existing)							1/2" Ice	0.00	0.25
							1" Ice	0.00	0.25
1/2	A	No	No	Inside Pole	36.00 - 4.00	1	No Ice	0.00	0.25
(Town Existing)							1/2" Ice	0.00	0.25
							1" Ice	0.00	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
L1	176.00-130.75	A	0.000	0.000	0.000	0.000	0.48
		B	0.000	0.000	0.000	0.000	0.49
		C	0.000	0.000	0.000	0.000	0.00
L2	130.75-86.12	A	0.000	0.000	0.000	0.000	0.54
		B	0.000	0.000	0.000	0.000	0.81
		C	0.000	0.000	40.028	0.000	0.60
L3	86.12-43.00	A	0.000	0.000	0.000	0.000	0.54
		B	0.000	0.000	0.000	0.000	0.79
		C	0.000	0.000	59.764	0.000	0.89
L4	43.00-1.00	A	0.000	0.000	0.000	0.000	0.49
		B	0.000	0.000	0.000	0.000	0.69
		C	0.000	0.000	49.896	0.000	0.74

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	176.00-130.75	A	2.913	0.000	0.000	0.000	0.000	0.48
		B		0.000	0.000	0.000	0.000	0.49
		C		0.000	0.000	0.000	0.000	0.00
L2	130.75-86.12	A	2.814	0.000	0.000	0.000	0.000	0.54
		B		0.000	0.000	0.000	0.000	0.81
		C		0.000	0.000	86.458	0.000	2.30
L3	86.12-43.00	A	2.672	0.000	0.000	0.000	0.000	0.54

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		0.000	0.000	0.000	0.000	0.79
		C		0.000	0.000	127.172	0.000	3.32
L4	43.00-1.00	A	2.395	0.000	0.000	0.000	0.000	0.49
		B		0.000	0.000	0.000	0.000	0.69
		C		0.000	0.000	103.881	0.000	2.64

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	176.00-130.75	0.0000	0.0000	0.0000	0.0000
L2	130.75-86.12	0.0000	6.2357	0.0000	5.7049
L3	86.12-43.00	0.0000	8.5133	0.0000	7.7718
L4	43.00-1.00	0.0000	7.9613	0.0000	7.4549

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

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	16	1 5/8	130.75 - 115.00	1.0000	1.0000
L1	17	HYBRIFLEX 1-5/8"	130.75 - 115.00	1.0000	1.0000
L2	16	1 5/8	86.12 - 115.00	1.0000	1.0000
L2	17	HYBRIFLEX 1-5/8"	86.12 - 115.00	1.0000	1.0000
L3	16	1 5/8	43.00 - 86.12	1.0000	1.0000
L3	17	HYBRIFLEX 1-5/8"	43.00 - 86.12	1.0000	1.0000

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
2'x2' Panel	B	From Face	3.00 0.00 3.00	0.0000	176.00	No Ice 1/2" Ice 1" Ice	4.80 5.07 5.35	0.72 0.87 1.03	0.02 0.05 0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
2'x2' Panel	C	From Face	3.00 0.00 3.00	0.0000	176.00	No Ice 1/2" Ice 1" Ice	4.80 5.07 5.35	0.72 0.87 1.03	0.02 0.05 0.07
PR-900	A	From Face	3.00 0.00 0.00	0.0000	176.00	No Ice 1/2" Ice 1" Ice	6.35 11.43 16.51	6.35 11.43 16.51	0.04 0.05 0.06
PR-900	C	From Face	3.00 0.00 0.00	0.0000	176.00	No Ice 1/2" Ice 1" Ice	6.35 11.43 16.51	6.35 11.43 16.51	0.04 0.05 0.06
10' x 2" Dia Omni	A	From Face	3.00 0.00 5.00	0.0000	176.00	No Ice 1/2" Ice 1" Ice	2.00 3.02 4.07	2.00 3.02 4.07	0.02 0.03 0.05
4' x 2" Dia Omni	A	From Face	3.00 0.00 2.00	0.0000	176.00	No Ice 1/2" Ice 1" Ice	0.79 1.03 1.28	0.79 1.03 1.28	0.02 0.03 0.04
4' x 2" Dia Omni	B	From Face	3.00 0.00 2.00	0.0000	176.00	No Ice 1/2" Ice 1" Ice	0.79 1.03 1.28	0.79 1.03 1.28	0.02 0.03 0.04
20' 4-Bay Dipole	B	From Face	3.00 0.00 10.00	0.0000	176.00	No Ice 1/2" Ice 1" Ice	4.00 6.00 8.00	4.00 6.00 8.00	0.06 0.10 0.14
20' 4-Bay Dipole	C	From Face	3.00 0.00 10.00	0.0000	176.00	No Ice 1/2" Ice 1" Ice	4.00 6.00 8.00	4.00 6.00 8.00	0.06 0.10 0.14
EEI 12-ft Low Profile Platform	C	None		0.0000	176.00	No Ice 1/2" Ice 1" Ice	15.00 18.40 21.80	15.00 18.40 21.80	1.50 1.75 2.00
800-10121 (AT&T Existing)	A	From Face	3.00 -5.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	5.16 5.51 5.87	3.29 3.64 3.99	0.05 0.08 0.12
HPA-65R-BUU-H6 (AT&T Existing)	A	From Face	3.00 5.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	9.66 10.13 10.61	6.45 6.91 7.38	0.05 0.11 0.18
800-10121 (AT&T Existing)	B	From Face	3.00 -5.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	5.16 5.51 5.87	3.29 3.64 3.99	0.05 0.08 0.12
HPA-65R-BUU-H6 (AT&T Existing)	B	From Face	3.00 5.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	9.66 10.13 10.61	6.45 6.91 7.38	0.05 0.11 0.18
800-10121 (AT&T Existing)	C	From Face	3.00 -5.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	5.16 5.51 5.87	3.29 3.64 3.99	0.05 0.08 0.12
HPA-65R-BUU-H6 (AT&T Existing)	C	From Face	3.00 5.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	9.66 10.13 10.61	6.45 6.91 7.38	0.05 0.11 0.18
(2) LGP21401 TMA (AT&T Existing)	A	From Face	3.00 -2.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	0.82 0.94 1.06	0.35 0.44 0.54	0.02 0.02 0.03
(2) LGP21401 TMA (AT&T Existing)	B	From Face	3.00 -2.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	0.82 0.94 1.06	0.35 0.44 0.54	0.02 0.02 0.03
(2) LGP21401 TMA (AT&T Existing)	C	From Face	3.00 -2.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	0.82 0.94 1.06	0.35 0.44 0.54	0.02 0.02 0.03
RRUS-11 (AT&T Existing)	A	From Face	0.50 3.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	2.57 2.76 2.97	1.07 1.21 1.36	0.05 0.07 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RRUS-11	B	From Face	0.50	0.0000	170.00	No Ice	2.57	1.07	0.05
(AT&T Existing)			3.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-11	C	From Face	0.50	0.0000	170.00	No Ice	2.57	1.07	0.05
(AT&T Existing)			3.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
DC6-48-60-18-8F Surge	C	From Face	0.50	0.0000	170.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T Existing)			0.00			1" Ice	2.29	2.29	0.06
Valmont 13' Platform w/Rails	C	None		0.0000	170.00	No Ice	53.00	53.00	2.00
(AT&T Existing)						1/2" Ice	68.00	68.00	3.00
						1" Ice	83.00	83.00	4.00
AIR21 B2A/B4P	A	From Face	4.00	0.0000	160.00	No Ice	6.05	4.36	0.08
(T-Mobile Existing)			-6.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
APXVAARR24-43	A	From Face	4.00	0.0000	160.00	No Ice	20.24	8.89	0.16
(T-Mobile Existing)			-2.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR32	A	From Face	4.00	0.0000	160.00	No Ice	6.51	4.71	0.13
(T-Mobile Existing)			2.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR21 B2A/B4P	B	From Face	4.00	0.0000	160.00	No Ice	6.05	4.36	0.08
(T-Mobile Existing)			-6.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
APXVAARR24-43	B	From Face	4.00	0.0000	160.00	No Ice	20.24	8.89	0.16
(T-Mobile Existing)			-2.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR32	B	From Face	4.00	0.0000	160.00	No Ice	6.51	4.71	0.13
(T-Mobile Existing)			2.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR21 B2A/B4P	C	From Face	4.00	0.0000	160.00	No Ice	6.05	4.36	0.08
(T-Mobile Existing)			-6.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
APXVAARR24-43	C	From Face	4.00	0.0000	160.00	No Ice	20.24	8.89	0.16
(T-Mobile Existing)			-2.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR32	C	From Face	4.00	0.0000	160.00	No Ice	6.51	4.71	0.13
(T-Mobile Existing)			2.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
TMA 10"x8"x3"	A	From Face	4.00	0.0000	160.00	No Ice	0.67	0.26	0.02
(T-Mobile Existing)			0.00			1/2" Ice	0.77	0.33	0.02
			0.00			1" Ice	0.88	0.41	0.03
TMA 10"x8"x3"	B	From Face	4.00	0.0000	160.00	No Ice	0.67	0.26	0.02
(T-Mobile Existing)			0.00			1/2" Ice	0.77	0.33	0.02
			0.00			1" Ice	0.88	0.41	0.03
TMA 10"x8"x3"	C	From Face	4.00	0.0000	160.00	No Ice	0.67	0.26	0.02
(T-Mobile Existing)			0.00			1/2" Ice	0.77	0.33	0.02
			0.00			1" Ice	0.88	0.41	0.03
Radio 4449 B71 B12	A	From Face	4.00	0.0000	160.00	No Ice	1.64	1.29	0.07
(T-Mobile Existing)			-2.00			1/2" Ice	1.80	1.44	0.09
			0.00			1" Ice	1.97	1.59	0.11
Radio 4449 B71 B12	B	From Face	4.00	0.0000	160.00	No Ice	1.64	1.29	0.07
(T-Mobile Existing)			-2.00			1/2" Ice	1.80	1.44	0.09
			0.00			1" Ice	1.97	1.59	0.11
Radio 4449 B71 B12	C	From Face	4.00	0.0000	160.00	No Ice	1.64	1.29	0.07
(T-Mobile Existing)			-2.00			1/2" Ice	1.80	1.44	0.09
			0.00			1" Ice	1.97	1.59	0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Valmont T-Arm (1) (T-Mobile Existing)	A	None		0.0000	160.00	No Ice 1/2" Ice 1" Ice	10.54 14.45 18.36	10.54 14.45 18.36	0.34 0.41 0.49
Valmont T-Arm (1) (T-Mobile Existing)	B	None		0.0000	160.00	No Ice 1/2" Ice 1" Ice	10.54 14.45 18.36	10.54 14.45 18.36	0.34 0.41 0.49
Valmont T-Arm (1) (T-Mobile Existing)	C	None		0.0000	160.00	No Ice 1/2" Ice 1" Ice	10.54 14.45 18.36	10.54 14.45 18.36	0.34 0.41 0.49
Monopole Sector Stabilizer Kit VSK-M (T-Mobile Proposed)	C	None		0.0000	162.00	No Ice 1/2" Ice 1" Ice	9.00 11.50 14.00	9.00 11.50 14.00	0.35 0.42 0.50
APXVSPP18-C-A20 (Sprint Existing)	A	From Face	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	8.02 8.48 8.94	5.28 5.74 6.20	0.06 0.11 0.16
APXVSPP18-C-A20 (Sprint Existing)	B	From Face	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	8.02 8.48 8.94	5.28 5.74 6.20	0.06 0.11 0.16
APXVSPP18-C-A20 (Sprint Existing)	C	From Face	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	8.02 8.48 8.94	5.28 5.74 6.20	0.06 0.11 0.16
APXVTM14 (Sprint Existing)	A	From Face	4.00 2.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	6.34 6.72 7.10	3.61 3.97 4.33	0.06 0.10 0.14
APXVTM14 (Sprint Existing)	B	From Face	4.00 2.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	6.34 6.72 7.10	3.61 3.97 4.33	0.06 0.10 0.14
APXVTM14 (Sprint Existing)	C	From Face	4.00 2.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	6.34 6.72 7.10	3.61 3.97 4.33	0.06 0.10 0.14
FD-RRH 4x45 1900 (Sprint Existing)	A	From Face	4.00 2.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	2.32 2.52 2.74	2.38 2.59 2.80	0.06 0.08 0.11
FD-RRH 4x45 1900 (Sprint Existing)	B	From Face	4.00 2.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	2.32 2.52 2.74	2.38 2.59 2.80	0.06 0.08 0.11
FD-RRH 4x45 1900 (Sprint Existing)	C	From Face	4.00 2.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	2.32 2.52 2.74	2.38 2.59 2.80	0.06 0.08 0.11
FD-RRH 2x50 800 (Sprint Existing)	A	From Face	4.00 -2.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	2.06 2.24 2.43	1.93 2.11 2.29	0.06 0.09 0.11
FD-RRH 2x50 800 (Sprint Existing)	B	From Face	4.00 -2.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	2.06 2.24 2.43	1.93 2.11 2.29	0.06 0.09 0.11
FD-RRH 2x50 800 (Sprint Existing)	C	From Face	4.00 -2.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	2.06 2.24 2.43	1.93 2.11 2.29	0.06 0.09 0.11
TD-RRH8x20-25 (Sprint Existing)	A	From Face	4.00 2.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	4.05 4.30 4.56	1.53 1.71 1.90	0.07 0.10 0.13
TD-RRH8x20-25 (Sprint Existing)	B	From Face	4.00 2.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	4.05 4.30 4.56	1.53 1.71 1.90	0.07 0.10 0.13
TD-RRH8x20-25 (Sprint Existing)	C	From Face	4.00 2.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	4.05 4.30 4.56	1.53 1.71 1.90	0.07 0.10 0.13

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
EEI 12-ft Low Profile Platform (Sprint Existing)	C	None		0.0000	150.00	No Ice 1/2" Ice 1" Ice	15.00 18.40 21.80	15.00 18.40 21.80	1.50 1.75 2.00
BXA-171063-12CF (Verizon Existing)	A	From Face	4.00 -6.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	4.79 5.24 5.70	3.62 4.06 4.50	0.02 0.04 0.08
LNX-6514DS (Verizon Existing)	A	From Face	4.00 -2.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	8.17 8.63 9.10	5.41 5.86 6.33	0.04 0.09 0.15
BXA-70063-6BF (Verizon Existing)	A	From Face	4.00 2.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	7.57 8.02 8.47	4.16 4.60 5.04	0.02 0.06 0.11
MG D3-900Tx (Verizon Existing)	A	From Face	4.00 6.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	5.39 5.87 6.36	3.62 4.09 4.56	0.03 0.06 0.09
BXA-171063-12CF (Verizon Existing)	B	From Face	4.00 -6.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	4.79 5.24 5.70	3.62 4.06 4.50	0.02 0.04 0.08
LNX-6514DS (Verizon Existing)	B	From Face	4.00 -2.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	8.17 8.63 9.10	5.41 5.86 6.33	0.04 0.09 0.15
BXA-70063-6BF (Verizon Existing)	B	From Face	4.00 2.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	7.57 8.02 8.47	4.16 4.60 5.04	0.02 0.06 0.11
MG D3-900Tx (Verizon Existing)	B	From Face	4.00 6.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	5.39 5.87 6.36	3.62 4.09 4.56	0.03 0.06 0.09
BXA-171063-12CF (Verizon Existing)	C	From Face	4.00 -6.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	4.79 5.24 5.70	3.62 4.06 4.50	0.02 0.04 0.08
LNX-6514DS (Verizon Existing)	C	From Face	4.00 -2.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	8.17 8.63 9.10	5.41 5.86 6.33	0.04 0.09 0.15
BXA-70080-4CF (Verizon Existing)	C	From Face	4.00 2.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	3.57 3.87 4.18	2.79 3.10 3.41	0.01 0.04 0.07
BXA-185060/12CF (Verizon Existing)	C	From Face	4.00 6.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	4.79 5.24 5.70	3.62 4.06 4.50	0.02 0.04 0.08
RRH2x40-AWS (Verizon Existing)	A	From Face	4.00 4.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	2.16 2.36 2.57	1.42 1.59 1.77	0.04 0.06 0.08
RRH2x40-AWS (Verizon Existing)	B	From Face	4.00 4.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	2.16 2.36 2.57	1.42 1.59 1.77	0.04 0.06 0.08
RRH2x40-AWS (Verizon Existing)	C	From Face	4.00 4.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	2.16 2.36 2.57	1.42 1.59 1.77	0.04 0.06 0.08
RC2DC-3315-PF-48 (Verizon Existing)	B	From Face	1.00 1.00 0.00	0.0000	114.00	No Ice 1/2" Ice 1" Ice	3.01 3.23 3.46	1.96 2.15 2.35	0.03 0.05 0.08
Valmont 13' Low Profile Platform (Verizon Existing)	C	None		0.0000	114.00	No Ice 1/2" Ice 1" Ice	15.70 20.10 24.50	15.70 20.10 24.50	1.30 1.76 2.23
3' Whip	B	From Face	6.00 5.00 0.00	0.0000	164.50	No Ice 1/2" Ice 1" Ice	1.25 1.56 1.87	1.25 1.56 1.87	0.01 0.04 0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
6' Extension Arm Mount	B	From Face	3.00	0.0000	164.42	No Ice	5.01	5.01	0.13
			0.00			1/2" Ice	6.77	6.77	0.17
			0.00			1" Ice	8.53	8.53	0.20
10' Dipole	B	From Face	6.00	0.0000	137.00	No Ice	4.00	4.00	0.05
			5.00			1/2" Ice	6.00	6.00	0.07
			0.00			1" Ice	8.00	8.00	0.10
2'x2' Panel	B	From Face	6.00	0.0000	137.00	No Ice	4.80	0.72	0.02
			0.00			1/2" Ice	5.07	0.87	0.05
			0.00			1" Ice	5.35	1.03	0.07
6' Extension Arm Mount	B	From Face	3.00	0.0000	135.75	No Ice	5.01	5.01	0.13
			0.00			1/2" Ice	6.77	6.77	0.17
			0.00			1" Ice	8.53	8.53	0.20
10' Dipole	B	From Face	6.00	0.0000	104.83	No Ice	4.00	4.00	0.05
			5.00			1/2" Ice	6.00	6.00	0.07
			0.00			1" Ice	8.00	8.00	0.10
2'x2' Panel	B	From Face	6.00	0.0000	104.83	No Ice	4.80	0.72	0.02
			0.00			1/2" Ice	5.07	0.87	0.05
			0.00			1" Ice	5.35	1.03	0.07
6' Extension Arm Mount	B	From Face	3.00	0.0000	104.83	No Ice	5.01	5.01	0.13
			0.00			1/2" Ice	6.77	6.77	0.17
			0.00			1" Ice	8.53	8.53	0.20
3' GPS Stand-off Mount	B	From Face	1.00	0.0000	78.00	No Ice	2.45	2.45	0.05
			0.00			1/2" Ice	3.98	3.98	0.07
			0.00			1" Ice	5.51	5.51	0.10
GPS	B	From Face	2.00	0.0000	78.00	No Ice	1.00	1.00	0.01
			0.00			1/2" Ice	1.50	1.50	0.01
			0.00			1" Ice	2.00	2.00	0.02
3' GPS Stand-off Mount	B	From Face	1.00	0.0000	35.25	No Ice	2.45	2.45	0.05
			0.00			1/2" Ice	3.98	3.98	0.07
			0.00			1" Ice	5.51	5.51	0.10
GPS	B	From Face	2.00	0.0000	35.25	No Ice	1.00	1.00	0.01
			0.00			1/2" Ice	1.50	1.50	0.01
			0.00			1" Ice	2.00	2.00	0.02

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
VHLP800-11-DW1 (Sprint)	A	Paraboloid w/Radome	From Face	3.00	Worst		154.00	2.50	No Ice	4.91	0.05
				0.00					1/2" Ice	5.24	0.08
				0.00					1" Ice	5.57	0.10
VHLP800-11-DW1 (Sprint)	B	Paraboloid w/Radome	From Face	3.00	Worst		154.00	2.50	No Ice	4.91	0.05
				0.00					1/2" Ice	5.24	0.08
				0.00					1" Ice	5.57	0.10
VHLP2-11-DW1 (Sprint)	A	Paraboloid w/Radome	From Face	3.00	Worst		154.00	2.00	No Ice	3.14	0.04
				0.00					1/2" Ice	3.41	0.02
				0.00					1" Ice	3.68	0.00
VHLP2-11-DW1	B	Paraboloid	From	3.00	Worst		154.00	2.00	No Ice	3.14	0.04

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
(Sprint)		w/Radome	Face	0.00					1/2" Ice	3.41	0.02
				0.00					1" Ice	3.68	0.00
VHLP2-11-DW1	C	Paraboloid	From	3.00	Worst		154.00	2.00	No Ice	3.14	0.04
(Sprint)		w/Radome	Face	0.00					1/2" Ice	3.41	0.02
				0.00					1" Ice	3.68	0.00
4-ft Grid Dish		Grid	None		Worst		164.50	4.00	No Ice	7.50	0.05
									1/2" Ice	13.10	0.08
									1" Ice	18.70	0.11
4-ft Grid Dish		Grid	None		Worst		104.50	4.00	No Ice	7.50	0.05
									1/2" Ice	13.10	0.08
									1" Ice	18.70	0.11

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	152.07	1.114	29	100.940	A	0.000	100.940	100.940	100.00	0.000	0.000
176.00-130.75					B	0.000	100.940		100.00	0.000	0.000
					C	0.000	100.940		100.00	0.000	0.000
L2	107.69	1.009	27	137.868	A	0.000	137.868	137.868	100.00	0.000	0.000
130.75-86.12					B	0.000	137.868		100.00	0.000	0.000
					C	0.000	137.868		100.00	40.028	0.000
L3 86.12-43.00	64.29	0.871	23	168.646	A	0.000	168.646	168.646	100.00	0.000	0.000
					B	0.000	168.646		100.00	0.000	0.000
					C	0.000	168.646		100.00	59.764	0.000
L4 43.00-1.00	21.49	0.7	19	197.203	A	0.000	197.203	197.203	100.00	0.000	0.000
					B	0.000	197.203		100.00	0.000	0.000
					C	0.000	197.203		100.00	49.896	0.000

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	152.07	1.114	7	2.9127	122.907	A	0.000	122.907	122.907	100.00	0.000	0.000
176.00-130.75						B	0.000	122.907		100.00	0.000	0.000
						C	0.000	122.907		100.00	0.000	0.000
L2 130.75-86.12	107.69	1.009	6	2.8139	159.534	A	0.000	159.534	159.534	100.00	0.000	0.000
						B	0.000	159.534		100.00	0.000	0.000
						C	0.000	159.534		100.00	86.458	0.000
L3 86.12-43.00	64.29	0.871	5	2.6724	188.868	A	0.000	188.868	188.868	100.00	0.000	0.000
						B	0.000	188.868		100.00	0.000	0.000
						C	0.000	188.868		100.00	127.172	0.000
L4 43.00-1.00	21.49	0.7	4	2.3951	215.910	A	0.000	215.910	215.910	100.00	0.000	0.000
						B	0.000	215.910		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
						C	0.000	215.910		100.00	103.881	0.000

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	152.07	1.114	9	100.940	A	0.000	100.940	100.940	100.00	0.000	0.000
176.00-130.75					B	0.000	100.940		100.00	0.000	0.000
					C	0.000	100.940		100.00	0.000	0.000
L2	107.69	1.009	8	137.868	A	0.000	137.868	137.868	100.00	0.000	0.000
130.75-86.12					B	0.000	137.868		100.00	0.000	0.000
					C	0.000	137.868		100.00	40.028	0.000
L3 86.12-43.00	64.29	0.871	7	168.646	A	0.000	168.646	168.646	100.00	0.000	0.000
					B	0.000	168.646		100.00	0.000	0.000
					C	0.000	168.646		100.00	59.764	0.000
L4 43.00-1.00	21.49	0.7	6	197.203	A	0.000	197.203	197.203	100.00	0.000	0.000
					B	0.000	197.203		100.00	0.000	0.000
					C	0.000	197.203		100.00	49.896	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
L1	0.97	3.20	A	1	0.65	29	1	1	100.940	2.11	46.71	C
176.00-130.75			B	1	0.65		1	1	100.940			
			C	1	0.65		1	1	100.940			
L2	1.95	5.92	A	1	0.65	27	1	1	137.868	2.61	58.55	C
130.75-86.12			B	1	0.65		1	1	137.868			
			C	1	0.65		1	1	137.868			
L3	2.21	8.95	A	1	0.65	23	1	1	168.646	2.75	63.76	C
86.12-43.00			B	1	0.65		1	1	168.646			
			C	1	0.65		1	1	168.646			
L4 43.00-1.00	1.93	12.57	A	1	0.65	19	1	1	197.203	2.63	62.51	C
			B	1	0.65		1	1	197.203			
			C	1	0.65		1	1	197.203			
Sum Weight:	7.06	30.64						OTM	825.90 kip-ft	10.10		

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
L1	0.97	3.20	A	1	0.65	29	1	1	100.940	2.11	46.71	C
176.00-130.75			B	1	0.65		1	1	100.940			
			C	1	0.65		1	1	100.940			
L2	1.95	5.92	A	1	0.65	27	1	1	137.868	2.61	58.55	C
130.75-86.12			B	1	0.65		1	1	137.868			
			C	1	0.65		1	1	137.868			
L3	2.21	8.95	A	1	0.65	23	1	1	168.646	2.75	63.76	C
86.12-43.00			B	1	0.65		1	1	168.646			
			C	1	0.65		1	1	168.646			
L4 43.00-1.00	1.93	12.57	A	1	0.65	19	1	1	197.203	2.63	62.51	C
			B	1	0.65		1	1	197.203			
			C	1	0.65		1	1	197.203			
Sum Weight:	7.06	30.64						OTM	825.90 kip-ft	10.10		

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 ft^2	F K	w plf	Ctrl. Face
L1	0.97	3.20	A	1	0.65	29	1	1	100.940	2.11	46.71	C
176.00-130.75			B	1	0.65		1	1	100.940			
			C	1	0.65		1	1	100.940			
L2	1.95	5.92	A	1	0.65	27	1	1	137.868	2.61	58.55	C
130.75-86.12			B	1	0.65		1	1	137.868			
			C	1	0.65		1	1	137.868			
L3	2.21	8.95	A	1	0.65	23	1	1	168.646	2.75	63.76	C
86.12-43.00			B	1	0.65		1	1	168.646			
			C	1	0.65		1	1	168.646			
L4 43.00-1.00	1.93	12.57	A	1	0.65	19	1	1	197.203	2.63	62.51	C
			B	1	0.65		1	1	197.203			
			C	1	0.65		1	1	197.203			
Sum Weight:	7.06	30.64						OTM	825.90 kip-ft	10.10		

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
L1	0.97	7.96	A	1	1.2	7	1	1	122.907	1.10	24.26	C
176.00-130.75			B	1	1.2		1	1	122.907			
			C	1	1.2		1	1	122.907			
L2	3.65	12.02	A	1	1.2	6	1	1	159.534	1.29	28.90	C
130.75-86.12			B	1	1.2		1	1	159.534			
			C	1	1.2		1	1	159.534			
L3	4.64	15.91	A	1	1.2	5	1	1	188.868	1.31	30.46	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
86.12-43.00			B	1	1.2		1	1	188.868			
			C	1	1.2		1	1	188.868			
L4 43.00-1.00	3.82	19.77	A	1	1.2	4	1	1	215.910	1.23	29.19	C
			B	1	1.2		1	1	215.910			
			C	1	1.2		1	1	215.910			
Sum Weight:	13.08	55.67						OTM	411.69 kip-ft	4.93		

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 ft^2	F K	w plf	Ctrl. Face
L1	0.97	7.96	A	1	1.2	7	1	1	122.907	1.10	24.26	C
176.00-130.75			B	1	1.2		1	1	122.907			
			C	1	1.2		1	1	122.907			
L2	3.65	12.02	A	1	1.2	6	1	1	159.534	1.29	28.90	C
130.75-86.12			B	1	1.2		1	1	159.534			
			C	1	1.2		1	1	159.534			
L3	4.64	15.91	A	1	1.2	5	1	1	188.868	1.31	30.46	C
86.12-43.00			B	1	1.2		1	1	188.868			
			C	1	1.2		1	1	188.868			
L4 43.00-1.00	3.82	19.77	A	1	1.2	4	1	1	215.910	1.23	29.19	C
			B	1	1.2		1	1	215.910			
			C	1	1.2		1	1	215.910			
Sum Weight:	13.08	55.67						OTM	411.69 kip-ft	4.93		

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
L1	0.97	7.96	A	1	1.2	7	1	1	122.907	1.10	24.26	C
176.00-130.75			B	1	1.2		1	1	122.907			
			C	1	1.2		1	1	122.907			
L2	3.65	12.02	A	1	1.2	6	1	1	159.534	1.29	28.90	C
130.75-86.12			B	1	1.2		1	1	159.534			
			C	1	1.2		1	1	159.534			
L3	4.64	15.91	A	1	1.2	5	1	1	188.868	1.31	30.46	C
86.12-43.00			B	1	1.2		1	1	188.868			
			C	1	1.2		1	1	188.868			
L4 43.00-1.00	3.82	19.77	A	1	1.2	4	1	1	215.910	1.23	29.19	C
			B	1	1.2		1	1	215.910			
			C	1	1.2		1	1	215.910			
Sum Weight:	13.08	55.67						OTM	411.69 kip-ft	4.93		

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
L1	0.97	3.20	A	1	0.65	9	1	1	100.940	0.63	13.90	C
176.00-130.75			B	1	0.65		1	1	100.940			
			C	1	0.65		1	1	100.940			
L2	1.95	5.92	A	1	0.65	8	1	1	137.868	0.78	17.43	C
130.75-86.12			B	1	0.65		1	1	137.868			
			C	1	0.65		1	1	137.868			
L3	2.21	8.95	A	1	0.65	7	1	1	168.646	0.82	18.98	C
86.12-43.00			B	1	0.65		1	1	168.646			
			C	1	0.65		1	1	168.646			
L4 43.00-1.00	1.93	12.57	A	1	0.65	6	1	1	197.203	0.78	18.61	C
			B	1	0.65		1	1	197.203			
			C	1	0.65		1	1	197.203			
Sum Weight:	7.06	30.64						OTM	245.86 kip-ft	3.01		

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
L1	0.97	3.20	A	1	0.65	9	1	1	100.940	0.63	13.90	C
176.00-130.75			B	1	0.65		1	1	100.940			
			C	1	0.65		1	1	100.940			
L2	1.95	5.92	A	1	0.65	8	1	1	137.868	0.78	17.43	C
130.75-86.12			B	1	0.65		1	1	137.868			
			C	1	0.65		1	1	137.868			
L3	2.21	8.95	A	1	0.65	7	1	1	168.646	0.82	18.98	C
86.12-43.00			B	1	0.65		1	1	168.646			
			C	1	0.65		1	1	168.646			
L4 43.00-1.00	1.93	12.57	A	1	0.65	6	1	1	197.203	0.78	18.61	C
			B	1	0.65		1	1	197.203			
			C	1	0.65		1	1	197.203			
Sum Weight:	7.06	30.64						OTM	245.86 kip-ft	3.01		

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
L1	0.97	3.20	A	1	0.65	9	1	1	100.940	0.63	13.90	C
176.00-130.75			B	1	0.65		1	1	100.940			
			C	1	0.65		1	1	100.940			
L2	1.95	5.92	A	1	0.65	8	1	1	137.868	0.78	17.43	C
130.75-86.12			B	1	0.65		1	1	137.868			
			C	1	0.65		1	1	137.868			
L3	2.21	8.95	A	1	0.65	7	1	1	168.646	0.82	18.98	C
86.12-43.00			B	1	0.65		1	1	168.646			
			C	1	0.65		1	1	168.646			
L4 43.00-1.00	1.93	12.57	A	1	0.65	6	1	1	197.203	0.78	18.61	C
			B	1	0.65		1	1	197.203			
			C	1	0.65		1	1	197.203			
Sum Weight:	7.06	30.64						OTM	245.86 kip-ft	3.01		

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	30.64					
Bracing Weight	0.00					
Total Member Self-Weight	30.64			0.50	-3.23	
Total Weight	49.99			0.50	-3.23	
Wind 0 deg - No Ice		0.18	-22.97	-2767.82	-27.93	4.98
Wind 30 deg - No Ice		11.71	-19.98	-2409.29	-1415.10	3.60
Wind 60 deg - No Ice		20.10	-11.64	-1405.05	-2423.96	1.27
Wind 90 deg - No Ice		23.11	-0.18	-24.20	-2784.19	-1.41
Wind 120 deg - No Ice		19.93	11.33	1363.26	-2399.26	-3.71
Wind 150 deg - No Ice		11.40	19.80	2385.58	-1372.31	-5.01
Wind 180 deg - No Ice		-0.18	22.97	2768.82	21.48	-4.98
Wind 210 deg - No Ice		-11.71	19.98	2410.28	1408.65	-3.60
Wind 240 deg - No Ice		-20.10	11.64	1406.05	2417.50	-1.27
Wind 270 deg - No Ice		-23.11	0.18	25.20	2777.73	1.41
Wind 300 deg - No Ice		-19.93	-11.33	-1362.27	2392.80	3.71
Wind 330 deg - No Ice		-11.40	-19.80	-2384.58	1365.86	5.01
Member Ice	25.03					
Total Weight Ice	114.57			9.17	-15.96	
Wind 0 deg - Ice		0.05	-11.93	-1459.95	-22.64	2.80
Wind 30 deg - Ice		6.03	-10.36	-1266.47	-757.85	2.18
Wind 60 deg - Ice		10.39	-6.01	-731.18	-1294.27	0.97
Wind 90 deg - Ice		11.97	-0.05	2.49	-1488.16	-0.49
Wind 120 deg - Ice		10.34	5.92	737.95	-1287.58	-1.83
Wind 150 deg - Ice		5.94	10.31	1278.13	-746.27	-2.67
Wind 180 deg - Ice		-0.05	11.93	1478.30	-9.27	-2.80
Wind 210 deg - Ice		-6.03	10.36	1284.82	725.94	-2.18
Wind 240 deg - Ice		-10.39	6.01	749.53	1262.36	-0.97
Wind 270 deg - Ice		-11.97	0.05	15.86	1456.25	0.49
Wind 300 deg - Ice		-10.34	-5.92	-719.60	1255.67	1.83
Wind 330 deg - Ice		-5.94	-10.31	-1259.78	714.36	2.67
Total Weight	49.99			0.50	-3.23	
Wind 0 deg - Service		0.05	-6.84	-825.38	-10.58	1.48
Wind 30 deg - Service		3.49	-5.95	-718.65	-423.52	1.07

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 60 deg - Service		5.98	-3.46	-419.71	-723.84	0.38
Wind 90 deg - Service		6.88	-0.05	-8.65	-831.08	-0.42
Wind 120 deg - Service		5.93	3.37	404.38	-716.49	-1.10
Wind 150 deg - Service		3.39	5.89	708.71	-410.78	-1.49
Wind 180 deg - Service		-0.05	6.84	822.79	4.13	-1.48
Wind 210 deg - Service		-3.49	5.95	716.06	417.07	-1.07
Wind 240 deg - Service		-5.98	3.46	417.11	717.39	-0.38
Wind 270 deg - Service		-6.88	0.05	6.06	824.62	0.42
Wind 300 deg - Service		-5.93	-3.37	-406.97	710.03	1.10
Wind 330 deg - Service		-3.39	-5.89	-711.30	404.33	1.49

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service

Comb. No.	Description
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	176 - 130.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-46.64	-10.34	2.00
			Max. Mx	8	-14.50	-551.62	5.49
			Max. My	2	-14.51	-6.63	555.02
			Max. Vy	8	21.11	-551.62	5.49
			Max. Vx	2	-21.12	-6.63	555.02
			Max. Torque	3			-3.73
L2	130.75 - 86.12	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-73.22	-18.60	1.44
			Max. Mx	8	-25.94	-1640.87	15.78
			Max. My	2	-25.97	-18.39	1638.68
			Max. Vy	8	29.27	-1640.87	15.78
			Max. Vx	2	-29.04	-18.39	1638.68
			Max. Torque	2			-7.26
L3	86.12 - 43	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-95.75	-20.23	-3.69
			Max. Mx	8	-39.35	-2951.91	27.61
			Max. My	2	-39.37	-31.21	2938.98
			Max. Vy	8	33.17	-2951.91	27.61
			Max. Vx	14	32.93	23.47	-2938.41
			Max. Torque	2			-7.64
L4	43 - 1	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-127.31	-21.11	-9.69
			Max. Mx	8	-59.96	-4676.37	40.98
			Max. My	14	-59.96	37.45	-4652.09
			Max. Vy	8	37.02	-4676.37	40.98
			Max. Vx	14	36.79	37.45	-4652.09
			Max. Torque	24			-8.02

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	30	127.31	-11.97	0.05
	Max. H_x	21	44.99	36.98	-0.28
	Max. H_z	2	59.98	-0.28	36.75
	Max. M_x	2	4650.96	-0.28	36.75
	Max. M_z	8	4676.37	-36.98	0.28
	Max. Torsion	12	7.96	-18.24	-31.68

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. Vert	5	44.99	-18.73	31.97
	Min. H_x	8	59.98	-36.98	0.28
	Min. H_z	14	59.98	0.28	-36.75
	Min. M_x	14	-4652.09	0.28	-36.75
	Min. M_z	20	-4668.03	36.98	-0.28
	Min. Torsion	24	-8.02	18.24	31.68

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	49.99	0.00	0.00	0.47	-3.35	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	59.98	0.28	-36.75	-4650.96	-45.66	7.97
0.9 Dead+1.6 Wind 0 deg - No Ice	44.99	0.28	-36.75	-4590.74	-44.02	7.95
1.2 Dead+1.6 Wind 30 deg - No Ice	59.98	18.73	-31.97	-4048.45	-2376.15	5.76
0.9 Dead+1.6 Wind 30 deg - No Ice	44.99	18.73	-31.97	-3996.03	-2344.34	5.74
1.2 Dead+1.6 Wind 60 deg - No Ice	59.98	32.16	-18.62	-2361.12	-4071.06	2.01
0.9 Dead+1.6 Wind 60 deg - No Ice	44.99	32.16	-18.62	-2330.60	-4017.31	2.00
1.2 Dead+1.6 Wind 90 deg - No Ice	59.98	36.98	-0.28	-40.97	-4676.37	-2.25
0.9 Dead+1.6 Wind 90 deg - No Ice	44.99	36.98	-0.28	-40.56	-4614.79	-2.25
1.2 Dead+1.6 Wind 120 deg - No Ice	59.98	31.88	18.13	2290.45	-4029.75	-5.89
0.9 Dead+1.6 Wind 120 deg - No Ice	44.99	31.88	18.13	2260.60	-3976.54	-5.88
1.2 Dead+1.6 Wind 150 deg - No Ice	59.98	18.24	31.68	4008.28	-2304.31	-7.96
0.9 Dead+1.6 Wind 150 deg - No Ice	44.99	18.24	31.68	3956.14	-2273.45	-7.94
1.2 Dead+1.6 Wind 180 deg - No Ice	59.98	-0.28	36.75	4652.09	37.45	-7.91
0.9 Dead+1.6 Wind 180 deg - No Ice	44.99	-0.28	36.75	4591.60	37.99	-7.90
1.2 Dead+1.6 Wind 210 deg - No Ice	59.98	-18.73	31.97	4049.53	2367.89	-5.77
0.9 Dead+1.6 Wind 210 deg - No Ice	44.99	-18.73	31.97	3996.86	2338.28	-5.75
1.2 Dead+1.6 Wind 240 deg - No Ice	59.98	-32.16	18.62	2362.22	4062.74	-2.08
0.9 Dead+1.6 Wind 240 deg - No Ice	44.99	-32.16	18.62	2331.44	4011.20	-2.06
1.2 Dead+1.6 Wind 270 deg - No Ice	59.98	-36.98	0.28	42.14	4668.03	2.20
0.9 Dead+1.6 Wind 270 deg - No Ice	44.99	-36.98	0.28	41.45	4608.65	2.20
1.2 Dead+1.6 Wind 300 deg - No Ice	59.98	-31.88	-18.13	-2289.24	4021.46	5.90
0.9 Dead+1.6 Wind 300 deg - No Ice	44.99	-31.88	-18.13	-2259.68	3970.45	5.89

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.6 Wind 330 deg - No Ice	59.98	-18.24	-31.68	-4007.09	2296.08	8.02
0.9 Dead+1.6 Wind 330 deg - No Ice	44.99	-18.24	-31.68	-3955.23	2267.41	8.00
1.2 Dead+1.0 Ice+1.0 Temp	127.31	0.00	0.00	9.69	-21.11	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	127.31	0.05	-11.93	-1691.35	-29.00	2.95
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	127.31	6.03	-10.36	-1467.32	-880.13	2.30
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	127.31	10.39	-6.01	-847.51	-1501.13	1.04
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	127.31	11.97	-0.05	2.00	-1725.59	-0.50
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	127.31	10.34	5.92	853.59	-1493.38	-1.90
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	127.31	5.94	10.31	1479.07	-866.70	-2.80
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	127.31	-0.05	11.93	1710.84	-13.49	-2.94
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	127.31	-6.03	10.36	1486.81	837.63	-2.30
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	127.31	-10.39	6.01	867.01	1458.62	-1.05
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	127.31	-11.97	0.05	17.51	1683.08	0.49
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	127.31	-10.34	-5.92	-834.08	1450.87	1.90
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	127.31	-5.94	-10.31	-1459.56	824.21	2.80
Dead+Wind 0 deg - Service	49.99	0.05	-6.84	-859.07	-11.14	1.49
Dead+Wind 30 deg - Service	49.99	3.49	-5.95	-747.75	-441.80	1.08
Dead+Wind 60 deg - Service	49.99	5.98	-3.46	-435.95	-755.00	0.38
Dead+Wind 90 deg - Service	49.99	6.88	-0.05	-7.21	-866.83	-0.42
Dead+Wind 120 deg - Service	49.99	5.93	3.37	423.59	-747.33	-1.11
Dead+Wind 150 deg - Service	49.99	3.39	5.89	741.01	-428.50	-1.50
Dead+Wind 180 deg - Service	49.99	-0.05	6.84	860.00	4.22	-1.49
Dead+Wind 210 deg - Service	49.99	-3.49	5.95	748.69	434.87	-1.08
Dead+Wind 240 deg - Service	49.99	-5.98	3.46	436.88	748.08	-0.39
Dead+Wind 270 deg - Service	49.99	-6.88	0.05	8.15	859.91	0.42
Dead+Wind 300 deg - Service	49.99	-5.93	-3.37	-422.65	740.40	1.11
Dead+Wind 330 deg - Service	49.99	-3.39	-5.89	-740.08	421.58	1.50

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	-49.99	0.00	-0.00	49.99	0.00	0.000%
2	0.28	-59.98	-36.75	-0.28	59.98	36.75	0.000%
3	0.28	-44.99	-36.75	-0.28	44.99	36.75	0.000%
4	18.73	-59.98	-31.97	-18.73	59.98	31.97	0.000%
5	18.73	-44.99	-31.97	-18.73	44.99	31.97	0.000%
6	32.16	-59.98	-18.62	-32.16	59.98	18.62	0.000%
7	32.16	-44.99	-18.62	-32.16	44.99	18.62	0.000%
8	36.98	-59.98	-0.28	-36.98	59.98	0.28	0.000%
9	36.98	-44.99	-0.28	-36.98	44.99	0.28	0.000%
10	31.88	-59.98	18.13	-31.88	59.98	-18.13	0.000%
11	31.88	-44.99	18.13	-31.88	44.99	-18.13	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
12	18.24	-59.98	31.68	-18.24	59.98	-31.68	0.000%
13	18.24	-44.99	31.68	-18.24	44.99	-31.68	0.000%
14	-0.28	-59.98	36.75	0.28	59.98	-36.75	0.000%
15	-0.28	-44.99	36.75	0.28	44.99	-36.75	0.000%
16	-18.73	-59.98	31.97	18.73	59.98	-31.97	0.000%
17	-18.73	-44.99	31.97	18.73	44.99	-31.97	0.000%
18	-32.16	-59.98	18.62	32.16	59.98	-18.62	0.000%
19	-32.16	-44.99	18.62	32.16	44.99	-18.62	0.000%
20	-36.98	-59.98	0.28	36.98	59.98	-0.28	0.000%
21	-36.98	-44.99	0.28	36.98	44.99	-0.28	0.000%
22	-31.88	-59.98	-18.13	31.88	59.98	18.13	0.000%
23	-31.88	-44.99	-18.13	31.88	44.99	18.13	0.000%
24	-18.24	-59.98	-31.68	18.24	59.98	31.68	0.000%
25	-18.24	-44.99	-31.68	18.24	44.99	31.68	0.000%
26	0.00	-127.31	0.00	-0.00	127.31	-0.00	0.000%
27	0.05	-127.31	-11.93	-0.05	127.31	11.93	0.000%
28	6.03	-127.31	-10.36	-6.03	127.31	10.36	0.000%
29	10.39	-127.31	-6.01	-10.39	127.31	6.01	0.000%
30	11.97	-127.31	-0.05	-11.97	127.31	0.05	0.000%
31	10.34	-127.31	5.92	-10.34	127.31	-5.92	0.000%
32	5.94	-127.31	10.31	-5.94	127.31	-10.31	0.000%
33	-0.05	-127.31	11.93	0.05	127.31	-11.93	0.000%
34	-6.03	-127.31	10.36	6.03	127.31	-10.36	0.000%
35	-10.39	-127.31	6.01	10.39	127.31	-6.01	0.000%
36	-11.97	-127.31	0.05	11.97	127.31	-0.05	0.000%
37	-10.34	-127.31	-5.92	10.34	127.31	5.92	0.000%
38	-5.94	-127.31	-10.31	5.94	127.31	10.31	0.000%
39	0.05	-49.99	-6.84	-0.05	49.99	6.84	0.000%
40	3.49	-49.99	-5.95	-3.49	49.99	5.95	0.000%
41	5.98	-49.99	-3.46	-5.98	49.99	3.46	0.000%
42	6.88	-49.99	-0.05	-6.88	49.99	0.05	0.000%
43	5.93	-49.99	3.37	-5.93	49.99	-3.37	0.000%
44	3.39	-49.99	5.89	-3.39	49.99	-5.89	0.000%
45	-0.05	-49.99	6.84	0.05	49.99	-6.84	0.000%
46	-3.49	-49.99	5.95	3.49	49.99	-5.95	0.000%
47	-5.98	-49.99	3.46	5.98	49.99	-3.46	0.000%
48	-6.88	-49.99	0.05	6.88	49.99	-0.05	0.000%
49	-5.93	-49.99	-3.37	5.93	49.99	3.37	0.000%
50	-3.39	-49.99	-5.89	3.39	49.99	5.89	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	5	0.00000001	0.00035263
3	Yes	5	0.00000001	0.00016253
4	Yes	6	0.00000001	0.00015508
5	Yes	6	0.00000001	0.00004825
6	Yes	6	0.00000001	0.00014401
7	Yes	6	0.00000001	0.00004426
8	Yes	5	0.00000001	0.00013498
9	Yes	5	0.00000001	0.00006185
10	Yes	6	0.00000001	0.00013495
11	Yes	5	0.00000001	0.00098545
12	Yes	6	0.00000001	0.00015359

13	Yes	6	0.00000001	0.00004839
14	Yes	5	0.00000001	0.00023852
15	Yes	5	0.00000001	0.00011115
16	Yes	6	0.00000001	0.00013933
17	Yes	6	0.00000001	0.00004271
18	Yes	6	0.00000001	0.00014893
19	Yes	6	0.00000001	0.00004616
20	Yes	5	0.00000001	0.00003023
21	Yes	4	0.00000001	0.00042628
22	Yes	6	0.00000001	0.00014945
23	Yes	6	0.00000001	0.00004699
24	Yes	6	0.00000001	0.00013231
25	Yes	5	0.00000001	0.00096739
26	Yes	4	0.00000001	0.00019484
27	Yes	6	0.00000001	0.00032212
28	Yes	6	0.00000001	0.00060405
29	Yes	6	0.00000001	0.00057226
30	Yes	6	0.00000001	0.00031566
31	Yes	6	0.00000001	0.00056257
32	Yes	6	0.00000001	0.00059585
33	Yes	6	0.00000001	0.00032057
34	Yes	6	0.00000001	0.00053209
35	Yes	6	0.00000001	0.00055921
36	Yes	6	0.00000001	0.00030240
37	Yes	6	0.00000001	0.00054844
38	Yes	6	0.00000001	0.00052002
39	Yes	4	0.00000001	0.00021216
40	Yes	4	0.00000001	0.00045311
41	Yes	4	0.00000001	0.00035191
42	Yes	4	0.00000001	0.00008670
43	Yes	4	0.00000001	0.00031241
44	Yes	4	0.00000001	0.00046714
45	Yes	4	0.00000001	0.00019843
46	Yes	4	0.00000001	0.00032163
47	Yes	4	0.00000001	0.00038519
48	Yes	4	0.00000001	0.00007684
49	Yes	4	0.00000001	0.00042133
50	Yes	4	0.00000001	0.00030476

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	176 - 130.75	25.157	41	1.3227	0.0053
L2	135.25 - 86.12	14.480	41	1.1045	0.0049
L3	91.87 - 43	6.223	41	0.6831	0.0024
L4	50 - 1	1.729	41	0.3254	0.0009

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
176.00	2'x2' Panel	41	25.157	1.3227	0.0053	47382
170.00	800-10121	41	23.503	1.2976	0.0054	39485

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
164.50	4-ft Grid Dish	41	21.996	1.2737	0.0054	20601
164.42	6' Extension Arm Mount	41	21.974	1.2733	0.0054	20458
162.00	Monopole Sector Stabilizer Kit VSK-M	41	21.316	1.2624	0.0054	16922
160.00	AIR21 B2A/B4P	41	20.775	1.2531	0.0053	14807
154.00	VHLP800-11-DW1	41	19.174	1.2234	0.0053	10768
150.00	APXVSPP18-C-A20	41	18.129	1.2018	0.0053	9111
137.00	10' Dipole	41	14.892	1.1178	0.0050	6112
135.75	6' Extension Arm Mount	41	14.597	1.1084	0.0049	5981
114.00	BXA-171063-12CF	41	9.967	0.9101	0.0038	6025
104.83	10' Dipole	41	8.299	0.8156	0.0032	6115
104.50	4-ft Grid Dish	41	8.242	0.8122	0.0032	6118
78.00	3' GPS Stand-off Mount	41	4.360	0.5527	0.0018	6231
35.25	3' GPS Stand-off Mount	41	0.932	0.2210	0.0006	8869

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	176 - 130.75	135.299	6	7.1269	0.0283
L2	135.25 - 86.12	78.003	6	5.9528	0.0262
L3	91.87 - 43	33.575	6	3.6865	0.0129
L4	50 - 1	9.334	6	1.7573	0.0047

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
176.00	2'x2' Panel	6	135.299	7.1269	0.0284	9088
170.00	800-10121	6	126.426	6.9909	0.0284	7573
164.50	4-ft Grid Dish	6	118.342	6.8619	0.0285	3950
164.42	6' Extension Arm Mount	6	118.225	6.8600	0.0285	3922
162.00	Monopole Sector Stabilizer Kit VSK-M	6	114.695	6.8009	0.0285	3244
160.00	AIR21 B2A/B4P	6	111.795	6.7507	0.0284	2837
154.00	VHLP800-11-DW1	6	103.206	6.5911	0.0283	2062
150.00	APXVSPP18-C-A20	6	97.594	6.4751	0.0280	1743
137.00	10' Dipole	6	80.219	6.0240	0.0266	1166
135.75	6' Extension Arm Mount	6	78.633	5.9734	0.0264	1140
114.00	BXA-171063-12CF	6	53.738	4.9077	0.0203	1138
104.83	10' Dipole	6	44.760	4.3996	0.0171	1152
104.50	4-ft Grid Dish	6	44.454	4.3812	0.0170	1152
78.00	3' GPS Stand-off Mount	6	23.531	2.9835	0.0093	1164
35.25	3' GPS Stand-off Mount	6	5.030	1.1931	0.0030	1644

Base Plate Design Data

Plate Thickness in	Number of Anchor Bolts	Anchor Bolt Size in	Actual Allowable Ratio Bolt Tension K	Actual Allowable Ratio Bolt Compression K	Actual Allowable Ratio Plate Stress ksi	Actual Allowable Ratio Stiffener Stress ksi	Controlling Condition	Ratio
2.0000	18	2.2500	173.23 223.65 0.77	179.89 371.27 0.48	30.474 54.000 0.56	31.770 54.000 0.59	Bolt T	0.77 ✔

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	176 - 130.75 (1)	TP31.8x21x0.25	45.25	175.00	194.1	24.1827	-14.47	145.00	0.100
L2	130.75 - 86.12 (2)	TP41.82x30.226x0.3125	49.13	175.00	147.3	39.8244	-25.92	414.47	0.063
L3	86.12 - 43 (3)	TP51.36x39.8381x0.375	48.87	175.00	119.9	58.7205	-39.34	922.68	0.043
L4	43 - 1 (4)	TP60.5x48.9596x0.4375	49.00	175.00	98.5	83.4043	-59.96	1942.46	0.031

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	176 - 130.75 (1)	TP31.8x21x0.25	558.83	1063.91	0.525	0.00	1063.91	0.000
L2	130.75 - 86.12 (2)	TP41.82x30.226x0.3125	1653.76	2268.91	0.729	0.00	2268.91	0.000
L3	86.12 - 43 (3)	TP51.36x39.8381x0.375	2972.75	4077.31	0.729	0.00	4077.31	0.000
L4	43 - 1 (4)	TP60.5x48.9596x0.4375	4706.22	6942.81	0.678	0.00	6942.81	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	176 - 130.75 (1)	TP31.8x21x0.25	21.29	849.12	0.025	2.72	2133.05	0.001
L2	130.75 - 86.12 (2)	TP41.82x30.226x0.3125	29.47	1373.95	0.021	2.02	4548.70	0.000
L3	86.12 - 43 (3)	TP51.36x39.8381x0.375	33.37	2009.04	0.017	2.02	8173.96	0.000
L4	43 - 1 (4)	TP60.5x48.9596x0.4375	37.21	2809.06	0.013	2.01	13917.92	0.000

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	176 - 130.75 (1)	0.100	0.525	0.000	0.025	0.001	0.626 ✔	1.000	4.8.2 ✔
L2	130.75 - 86.12 (2)	0.063	0.729	0.000	0.021	0.000	0.792 ✔	1.000	4.8.2 ✔
L3	86.12 - 43 (3)	0.043	0.729	0.000	0.017	0.000	0.772 ✔	1.000	4.8.2 ✔
L4	43 - 1 (4)	0.031	0.678	0.000	0.013	0.000	0.709 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	176 - 130.75	Pole	TP31.8x21x0.25	1	-14.47	145.00	62.6	Pass
L2	130.75 - 86.12	Pole	TP41.82x30.226x0.3125	2	-25.92	414.47	79.2	Pass
L3	86.12 - 43	Pole	TP51.36x39.8381x0.375	3	-39.34	922.68	77.2	Pass
L4	43 - 1	Pole	TP60.5x48.9596x0.4375	4	-59.96	1942.46	70.9	Pass
							Summary	
						Pole (L2)	79.2	Pass
						Base Plate	77.5	Pass
						RATING =	**79.2**	**Pass**

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Subject:	CAISSON FOUNDATION
Location:	175-ft EEI Monopole Berlin, CT
Rev. 0: 5/15/19	Prepared by: TJL Checked by: C.A.G. Job No. 19027.56

Caisson Foundation:

Input Data:

Shear Force =	$S := 37k$	*USER INPUT-FROM tnxTower*
Overturning Moment =	$M := 4706ft \cdot k$	*USER INPUT-FROM tnxTower*
Applied Axial Load =	$A1 := 60k$	*USER INPUT-FROM tnxTower*
Bending Moment =	$Mu := 4999ft \cdot k$	*USER INPUT--FROM LPILE*
Moment Capacity =	$Mn := 9228ft \cdot k$	*USER INPUT--FROM LPILE*
Foundation Diameter =	$d := 7.5ft$	*USER INPUT*
Overall Length of Caisson =	$L_c := 39.0ft$	*USER INPUT*
Depth From Top of Caisson to Grade =	$L_{pag} := 4.0ft$	*USER INPUT*
Number of Rebar =	$n := 30$	*USER INPUT*
Area of Rebar =	$Ar := 1.560in^2$	*USER INPUT*
Rebar Yield Strength =	$fy := 60ksi$	*USER INPUT*
Concrete Comp Strength =	$f'c := 4ksi$	*USER INPUT*

Check Moment Capacity:

Factor of Safety = $FS := \frac{0.9 \cdot Mn}{Mu} = 1.7$

Factor of Safety Required = $FS_{reqd} := 1$

$FOSCheck := if(FS \geq FS_{reqd}, "OK", "NO GOOD")$

FOSCheck = "OK"

This program is licensed to:

TJL
Centek Engineering

Files Used for Analysis

Path to file locations: J:\Jobs\1902700.WI\56_CTHA231A\05_Structural\Tower Analysis\Backup Documentation\Foundation\
Name of input data file: Caisson Analysis.lpd
Name of output file: Caisson Analysis.lpo
Name of plot output file: Caisson Analysis.lpp
Name of runtime file: Caisson Analysis.lpr

Time and Date of Analysis

Date: May 15, 2019 Time: 13:40:22

Problem Title

19027.56 - CTHA231A

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 3:
- Computation of Nonlinear Bending Stiffness and Ultimate Bending Moment
  Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- Analysis includes computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-04 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 8

Pile Structural Properties and Geometry

Pile Length = 468.00 in

Depth of ground surface below top of pile = 48.00 in

Slope angle of ground surface = 0.00 deg.

Structural properties of pile defined using 2 points

Point No.	Point Depth in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	90.00000000	3220623.	6361.0000	3600000.
2	468.0000	90.00000000	3220623.	6361.0000	3600000.

Please note that because this analysis makes computations of ultimate
moment capacity and pile response using nonlinear bending stiffness
that the above values of moment of inertia and modulus of are not used
for any computations other than total stress due to combined axial
loading and bending.

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer   =   48.000 in
Distance from top of pile to bottom of layer =   60.000 in
p-y subgrade modulus k for top of soil layer =   1.000 lbs/in**3
p-y subgrade modulus k for bottom of layer   =   1.000 lbs/in**3

Layer 2 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer   =   60.000 in
Distance from top of pile to bottom of layer =   132.000 in
p-y subgrade modulus k for top of soil layer =   25.000 lbs/in**3
p-y subgrade modulus k for bottom of layer   =   25.000 lbs/in**3

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer   =   132.000 in
Distance from top of pile to bottom of layer =   192.000 in
p-y subgrade modulus k for top of soil layer =   35.000 lbs/in**3
p-y subgrade modulus k for bottom of layer   =   35.000 lbs/in**3

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer   =   192.000 in
Distance from top of pile to bottom of layer =   468.000 in
p-y subgrade modulus k for top of soil layer =   120.000 lbs/in**3
p-y subgrade modulus k for bottom of layer   =   120.000 lbs/in**3

(Depth of lowest layer extends   0.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	48.00	0.03600
2	60.00	0.03600
3	60.00	0.03600
4	132.00	0.03600
5	132.00	0.03600
6	192.00	0.03600
7	192.00	0.03600

8 468.00 0.03600

Shear Strength of Soils

Shear strength parameters with depth defined using 8 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	48.000	0.00000	30.00	------	------
2	60.000	0.00000	30.00	------	------
3	60.000	0.00000	32.00	------	------
4	132.000	0.00000	32.00	------	------
5	132.000	0.00000	34.00	------	------
6	192.000	0.00000	34.00	------	------
7	192.000	0.00000	36.00	------	------
8	468.000	0.00000	36.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 2

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 37000.000 lbs
Bending moment at pile head = 56472000.000 in-lbs

Axial load at pile head = 60000.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head
may rotate under the applied pile-head loading, but is not a free-head
(zero moment) condition.

Load Case Number 2

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 14000.000 lbs
Bending moment at pile head = 21672000.000 in-lbs
Axial load at pile head = 60000.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head
may rotate under the applied pile-head loading, but is not a free-head
(zero moment) condition.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

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Number of sections = 1

Pile Section No. 1

The sectional shape is a circular drilled shaft (bored pile).

Outside Diameter = 90.0000 in

Material Properties:

Compressive Strength of Concrete	=	4.000 kip/in**2
Yield Stress of Reinforcement	=	60. kip/in**2
Modulus of Elasticity of Reinforcement	=	29000. kip/in**2
Number of Reinforcing Bars	=	30
Area of Single Bar	=	1.56000 in**2
Number of Rows of Reinforcing Bars	=	15
Area of Steel	=	46.800 in**2
Area of Shaft	=	6361.725 in**2
Percentage of Steel Reinforcement	=	0.736 percent
Cover Thickness (edge to bar center)	=	4.000 in

Unfactored Axial Squash Load Capacity = 24278.75 kip

Distribution and Area of Steel Reinforcement

Row	Area of	Distance to

Number	Reinforcement in**2	Centroidal Axis in
1	3.120	40.775
2	3.120	38.993
3	3.120	35.507
4	3.120	30.469
5	3.120	24.099
6	3.120	16.676
7	3.120	8.524
8	3.120	0.000
9	3.120	-8.524
10	3.120	-16.676
11	3.120	-24.099
12	3.120	-30.469
13	3.120	-35.507
14	3.120	-38.993
15	3.120	-40.775

Axial Thrust Force = 60000.00 lbs

Bending Moment in-lbs	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi	Max. Steel Stress psi
8014323.	1.282292E+13	6.250000E-07	0.00003070	49.12435368	109.06055	813.80799
15953312.	1.276265E+13	0.00000125	0.00005894	47.14887455	207.64772	1556.00487
23818461.	1.270318E+13	0.00000188	0.00008719	46.49999991	304.79822	2298.72475
31607771.	1.264311E+13	0.00000250	0.00011544	46.17666498	400.45696	3041.52454
31607771.	1.011449E+13	0.00000313	0.00007564	24.20568243	261.33599	5579.75545
31607771.	8.428739E+12	0.00000375	0.00008901	23.73587742	306.24076	6746.79783
31607771.	7.224633E+12	0.00000438	0.00010217	23.35236982	350.09975	7919.92166
31607771.	6.321554E+12	0.00000500	0.00011534	23.06766674	393.69568	9092.62099
31607771.	5.619159E+12	0.00000563	0.00012852	22.84885213	437.02783	10264.89275
31607771.	5.057243E+12	0.00000625	0.00014173	22.67617419	480.09542	11436.73426
31607771.	4.597494E+12	0.00000688	0.00015494	22.53705874	522.89755	

12608.14383
   31607771. 4.214369E+12   0.00000750   0.00016858   22.47726694   566.78151
13767.34344
   31607771. 3.890187E+12   0.00000813   0.00018180   22.37523034   608.95119
14938.66444
   31607771. 3.612317E+12   0.00000875   0.00019503   22.28963032   650.85791
16109.51347
   31607771. 3.371496E+12   0.00000938   0.00020829   22.21719459   692.50091
17279.88647
   31607771. 3.160777E+12   0.00001000   0.00022155   22.15546355   733.87924
18449.78091
   31607771. 2.974849E+12   0.00001063   0.00023484   22.10255966   774.99206
19619.19323
   31607771. 2.809580E+12   0.00001125   0.00024814   22.05702111   815.83847
20788.12037
   31607771. 2.661707E+12   0.00001188   0.00026146   22.01769724   856.41767
21956.55810
   31607771. 2.528622E+12   0.00001250   0.00027480   21.98366001   896.72856
23124.50492
   32604575. 2.484158E+12   0.00001313   0.00028815   21.95416644   936.77036
24291.95615
   34069938. 2.477814E+12   0.00001375   0.00030152   21.92860499   976.54213
25458.90860
   35533776. 2.471915E+12   0.00001438   0.00031491   21.90646872   1016.04284
26625.35977
   36996091. 2.466406E+12   0.00001500   0.00032831   21.88734189   1055.27175
27791.30428
   38456871. 2.461240E+12   0.00001563   0.00034173   21.87087044   1094.22786
28956.73892
   39916100. 2.456375E+12   0.00001625   0.00035517   21.85675129   1132.91002
30121.66212
   41373779. 2.451779E+12   0.00001688   0.00036863   21.84473500   1171.31746
31286.06807
   42829894. 2.447423E+12   0.00001750   0.00038211   21.83460161   1209.44913
32449.95402
   44284436. 2.443279E+12   0.00001813   0.00039560   21.82616338   1247.30402
33613.31629
   45737395. 2.439328E+12   0.00001875   0.00040911   21.81925669   1284.88109
34776.15168
   47188764. 2.435549E+12   0.00001938   0.00042264   21.81374207   1322.17942
35938.45526
   48638538. 2.431927E+12   0.00002000   0.00043619   21.80949613   1359.19803
37100.22291
   50086702. 2.428446E+12   0.00002063   0.00044976   21.80640891   1395.93581
38261.45142
   51533245. 2.425094E+12   0.00002125   0.00046334   21.80438384   1432.39168
39422.13729
   52978163. 2.421859E+12   0.00002188   0.00047695   21.80333778   1468.56467
40582.27552
   54421445. 2.418731E+12   0.00002250   0.00049057   21.80319563   1504.45374
41741.86186

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   55863083.  2.415701E+12    0.00002313    0.00050421   21.80389032    1540.05781
42900.89215
   57303054.  2.412760E+12    0.00002375    0.00051788   21.80535749    1575.37552
44059.36520
   58741362.  2.409902E+12    0.00002438    0.00053156   21.80754885    1610.40610
45217.27316
   61612946.  2.404408E+12    0.00002563    0.00055898   21.81391373    1679.60130
47531.37778
   64477725.  2.399171E+12    0.00002688    0.00058648   21.82264432    1747.63380
49843.17717
   67335634.  2.394156E+12    0.00002813    0.00061407   21.83347508    1814.49476
52152.63064
   70186582.  2.389330E+12    0.00002938    0.00064173   21.84618071    1880.17467
54459.70173
   73030465.  2.384668E+12    0.00003063    0.00066948   21.86057076    1944.66356
56764.35569
   75867212.  2.380148E+12    0.00003188    0.00069731   21.87649503    2007.95195
59066.54816
   78418873.  2.367362E+12    0.00003313    0.00072431   21.86601833    2067.93411
60000.00000
   80379850.  2.338323E+12    0.00003438    0.00074940   21.80085942    2122.35013
60000.00000
   82132305.  2.305468E+12    0.00003563    0.00077383   21.72155991    2174.17610
60000.00000
   83593719.  2.266948E+12    0.00003688    0.00079727   21.62075713    2222.80906
60000.00000
   85051531.  2.230860E+12    0.00003813    0.00082075   21.52788833    2270.56347
60000.00000
   86197726.  2.189149E+12    0.00003938    0.00084305   21.41082332    2314.89617
60000.00000
   87275260.  2.148314E+12    0.00004063    0.00086513   21.29552320    2357.89646
60000.00000
   88349926.  2.109849E+12    0.00004188    0.00088725   21.18811682    2400.11086
60000.00000
   89414419.  2.073378E+12    0.00004313    0.00090938   21.08715847    2441.47092
60000.00000
   90377150.  2.036668E+12    0.00004438    0.00093188   21.00000009    2482.63750
60000.00000
   90984788.  1.994187E+12    0.00004563    0.00095400   20.90949968    2522.21633
60000.00000
   91733354.  1.956978E+12    0.00004688    0.00097439   20.78707829    2557.80762
60000.00000
   92479808.  1.921658E+12    0.00004813    0.00099483   20.67177817    2592.72729
60000.00000
   93224136.  1.888084E+12    0.00004938    0.00101530   20.56306556    2626.97180
60000.00000
   93891703.  1.854651E+12    0.00005063    0.00103537   20.45167342    2659.78298
60000.00000
   94391921.  1.819603E+12    0.00005188    0.00105448   20.32726452    2690.29892
60000.00000
   94890509.  1.786174E+12    0.00005313    0.00107362   20.20929560    2720.22311
```

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   95387442. 1.754252E+12   0.00005438   0.00109279   20.09732410   2749.55237
60000.00000
   95882712. 1.723734E+12   0.00005563   0.00111200   19.99095038   2778.28380
60000.00000
   96376291. 1.694528E+12   0.00005688   0.00113123   19.88980696   2806.41419
60000.00000
   96868173. 1.666549E+12   0.00005813   0.00115050   19.79356125   2833.94057
60000.00000
   97358377. 1.639720E+12   0.00005938   0.00116980   19.70191285   2860.86032
60000.00000
   97846848. 1.613969E+12   0.00006063   0.00118913   19.61457476   2887.16975
60000.00000
   98210901. 1.587247E+12   0.00006188   0.00120759   19.51655075   2911.60957
60000.00000
   98585211. 1.561746E+12   0.00006313   0.00123094   19.49999884   2942.01326
60000.00000
   98916807. 1.536572E+12   0.00006438   0.00124873   19.39769670   2964.22926
60000.00000
   99218559. 1.511902E+12   0.00006563   0.00126624   19.29508612   2985.54261
60000.00000
   99519099. 1.488136E+12   0.00006688   0.00128378   19.19671342   3006.35485
60000.00000
   99818435. 1.465225E+12   0.00006813   0.00130135   19.10235062   3026.66383
60000.00000
1.001166E+08 1.443122E+12   0.00006938   0.00131894   19.01178315   3046.46707
60000.00000
1.004134E+08 1.421783E+12   0.00007063   0.00133656   18.92480984   3065.76195
60000.00000
1.007091E+08 1.401170E+12   0.00007188   0.00135421   18.84124830   3084.54620
60000.00000
1.010035E+08 1.381245E+12   0.00007313   0.00137189   18.76092687   3102.81738
60000.00000
1.012967E+08 1.361972E+12   0.00007438   0.00138960   18.68368194   3120.57271
60000.00000
1.018792E+08 1.325258E+12   0.00007688   0.00142510   18.53783682   3154.52609
60000.00000
1.023342E+08 1.289250E+12   0.00007938   0.00145936   18.38559195   3185.15136
60000.00000
1.026844E+08 1.254160E+12   0.00008188   0.00149261   18.23033229   3212.87784
60000.00000
1.030306E+08 1.221103E+12   0.00008438   0.00152596   18.08546081   3238.76893
60000.00000
1.037583E+08 1.194341E+12   0.00008688   0.00156375   18.00000027   3265.95599
60000.00000
1.038024E+08 1.161426E+12   0.00008938   0.00160111   17.91447803   3290.35203
60000.00000
1.041185E+08 1.133263E+12   0.00009188   0.00163331   17.77754590   3309.26539
60000.00000
1.044309E+08 1.106553E+12   0.00009438   0.00166562   17.64891788   3326.44258
60000.00000

1.047396E+08 1.081183E+12 0.00009688 0.00169802 17.52797171 3341.86698
60000.00000
1.050446E+08 1.057053E+12 0.00009938 0.00173053 17.41413608 3355.52092
60000.00000
1.053458E+08 1.034069E+12 0.00010188 0.00176314 17.30690405 3367.38680
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1.056431E+08 1.012149E+12 0.00010438 0.00179586 17.20581695 3377.44655
60000.00000
1.059350E+08 9.912046E+11 0.00010688 0.00182865 17.11019352 3385.67491
60000.00000
1.060963E+08 9.700230E+11 0.00010938 0.00185920 16.99843392 3391.64445
60000.00000
1.062545E+08 9.497608E+11 0.00011188 0.00188985 16.89249739 3396.02616
60000.00000
1.064096E+08 9.303571E+11 0.00011438 0.00192059 16.79200575 3398.80450
60000.00000
1.065616E+08 9.117569E+11 0.00011688 0.00195142 16.69662639 3399.96383
60000.00000
1.067043E+08 8.938584E+11 0.00011938 0.00198235 16.60604015 3393.93710
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1.068439E+08 8.766677E+11 0.00012188 0.00201337 16.51996806 3386.23476
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1.068439E+08 8.590463E+11 0.00012438 0.00205219 16.49999902 3390.75123
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1.072234E+08 8.451108E+11 0.00012688 0.00209154 16.48508057 3396.04279
60000.00000
1.073467E+08 8.297329E+11 0.00012938 0.00212133 16.39677957 3398.47294
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1.078219E+08 7.736103E+11 0.00013938 0.00224179 16.08457848 3384.58873
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1.079374E+08 7.607922E+11 0.00014188 0.00227217 16.01527020 3383.63343
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1.080520E+08 7.484119E+11 0.00014438 0.00230262 15.94890699 3388.52048
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1.081657E+08 7.364471E+11 0.00014688 0.00233316 15.88534936 3392.55680
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1.082785E+08 7.248769E+11 0.00014938 0.00236378 15.82446590 3395.73267
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1.083904E+08 7.136816E+11 0.00015188 0.00239448 15.76612785 3398.03800
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1.085014E+08 7.028429E+11 0.00015438 0.00242527 15.71021989 3399.46263
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1.086114E+08 6.923436E+11 0.00015688 0.00245613 15.65663472 3399.99615
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1.087182E+08 6.821534E+11 0.00015938 0.00248725 15.60625747 3394.78892

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1.088741E+08 6.623518E+11 0.00016438 0.00254752 15.49819395 3383.81850
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1.089199E+08 6.527036E+11 0.00016688 0.00257650 15.43968424 3378.63781
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1.089654E+08 6.433384E+11 0.00016938 0.00260553 15.38319156 3377.06985
60000.00000
1.090106E+08 6.342436E+11 0.00017188 0.00263461 15.32863006 3381.58733
60000.00000
1.090554E+08 6.254076E+11 0.00017438 0.00266374 15.27591661 3385.62140
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1.091441E+08 6.084689E+11 0.00017938 0.00272215 15.17574415 3392.22147
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1.092314E+08 5.924412E+11 0.00018438 0.00278076 15.08211091 3396.83257
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1.093686E+08 5.775242E+11 0.00018938 0.00284063 15.00000045 3399.46480
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1.101242E+08 5.665554E+11 0.00019438 0.00291563 15.00000045 3393.31839
60000.00000
1.107360E+08 5.554155E+11 0.00019938 0.00299063 15.00000045 3380.43715
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1.107360E+08 5.418273E+11 0.00020438 0.00306160 14.98031572 3368.61892
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1.107360E+08 5.288882E+11 0.00020938 0.00312140 14.90819111 3374.55929
60000.00000
1.107360E+08 5.165526E+11 0.00021438 0.00318138 14.84024003 3382.13994
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1.107360E+08 5.047793E+11 0.00021938 0.00324153 14.77619693 3388.42090
60000.00000
1.107360E+08 4.935307E+11 0.00022438 0.00330186 14.71582040 3393.37548
60000.00000
1.107360E+08 4.827726E+11 0.00022938 0.00336238 14.65889052 3396.97591
60000.00000
1.107360E+08 4.724734E+11 0.00023438 0.00342310 14.60521147 3399.19334
60000.00000
1.107360E+08 4.626045E+11 0.00023938 0.00348401 14.55460086 3399.99747
60000.00000
1.107360E+08 4.531395E+11 0.00024438 0.00354656 14.51276109 3392.82471
60000.00000
1.107360E+08 4.440540E+11 0.00024938 0.00361179 14.48336944 3384.50560
60000.00000
1.107360E+08 4.353256E+11 0.00025438 0.00367720 14.45583925 3376.13903
60000.00000
1.107360E+08 4.269338E+11 0.00025938 0.00374280 14.43009004 3367.72315
60000.00000
1.107360E+08 4.188594E+11 0.00026438 0.00380860 14.40603599 3359.25689
60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 110735.95693

in-kip

Axial Thrust Force = 60000.00 lbs

Bending Moment in-lbs	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi	Max. Steel Stress psi
8014323.	1.282292E+13	6.250000E-07	0.00003070	49.12435368	109.06055	813.80799
15953312.	1.276265E+13	0.00000125	0.00005894	47.14887455	207.64772	1556.00487
23818461.	1.270318E+13	0.00000188	0.00008719	46.49999991	304.79822	2298.72475
31607771.	1.264311E+13	0.00000250	0.00011544	46.17666498	400.45696	3041.52454
31607771.	1.011449E+13	0.00000313	0.00007564	24.20568243	261.33599	5579.75545
31607771.	8.428739E+12	0.00000375	0.00008901	23.73587742	306.24076	6746.79783
31607771.	7.224633E+12	0.00000438	0.00010217	23.35236982	350.09975	7919.92166
31607771.	6.321554E+12	0.00000500	0.00011534	23.06766674	393.69568	9092.62099
31607771.	5.619159E+12	0.00000563	0.00012852	22.84885213	437.02783	10264.89275
31607771.	5.057243E+12	0.00000625	0.00014173	22.67617419	480.09542	11436.73426
31607771.	4.597494E+12	0.00000688	0.00015494	22.53705874	522.89755	12608.14383
31607771.	4.214369E+12	0.00000750	0.00016858	22.47726694	566.78151	13767.34344
31607771.	3.890187E+12	0.00000813	0.00018180	22.37523034	608.95119	14938.66444
31607771.	3.612317E+12	0.00000875	0.00019503	22.28963032	650.85791	16109.51347
31607771.	3.371496E+12	0.00000938	0.00020829	22.21719459	692.50091	17279.88647
31607771.	3.160777E+12	0.00001000	0.00022155	22.15546355	733.87924	18449.78091
31607771.	2.974849E+12	0.00001063	0.00023484	22.10255966	774.99206	19619.19323
31607771.	2.809580E+12	0.00001125	0.00024814	22.05702111	815.83847	20788.12037

31607771. 2.661707E+12 0.00001188 0.00026146 22.01769724 856.41767
21956.55810
31607771. 2.528622E+12 0.00001250 0.00027480 21.98366001 896.72856
23124.50492
32604575. 2.484158E+12 0.00001313 0.00028815 21.95416644 936.77036
24291.95615
34069938. 2.477814E+12 0.00001375 0.00030152 21.92860499 976.54213
25458.90860
35533776. 2.471915E+12 0.00001438 0.00031491 21.90646872 1016.04284
26625.35977
36996091. 2.466406E+12 0.00001500 0.00032831 21.88734189 1055.27175
27791.30428
38456871. 2.461240E+12 0.00001563 0.00034173 21.87087044 1094.22786
28956.73892
39916100. 2.456375E+12 0.00001625 0.00035517 21.85675129 1132.91002
30121.66212
41373779. 2.451779E+12 0.00001688 0.00036863 21.84473500 1171.31746
31286.06807
42829894. 2.447423E+12 0.00001750 0.00038211 21.83460161 1209.44913
32449.95402
44284436. 2.443279E+12 0.00001813 0.00039560 21.82616338 1247.30402
33613.31629
45737395. 2.439328E+12 0.00001875 0.00040911 21.81925669 1284.88109
34776.15168
47188764. 2.435549E+12 0.00001938 0.00042264 21.81374207 1322.17942
35938.45526
48638538. 2.431927E+12 0.00002000 0.00043619 21.80949613 1359.19803
37100.22291
50086702. 2.428446E+12 0.00002063 0.00044976 21.80640891 1395.93581
38261.45142
51533245. 2.425094E+12 0.00002125 0.00046334 21.80438384 1432.39168
39422.13729
52978163. 2.421859E+12 0.00002188 0.00047695 21.80333778 1468.56467
40582.27552
54421445. 2.418731E+12 0.00002250 0.00049057 21.80319563 1504.45374
41741.86186
55863083. 2.415701E+12 0.00002313 0.00050421 21.80389032 1540.05781
42900.89215
57303054. 2.412760E+12 0.00002375 0.00051788 21.80535749 1575.37552
44059.36520
58741362. 2.409902E+12 0.00002438 0.00053156 21.80754885 1610.40610
45217.27316
61612946. 2.404408E+12 0.00002563 0.00055898 21.81391373 1679.60130
47531.37778
64477725. 2.399171E+12 0.00002688 0.00058648 21.82264432 1747.63380
49843.17717
67335634. 2.394156E+12 0.00002813 0.00061407 21.83347508 1814.49476
52152.63064
70186582. 2.389330E+12 0.00002938 0.00064173 21.84618071 1880.17467
54459.70173
73030465. 2.384668E+12 0.00003063 0.00066948 21.86057076 1944.66356

56764.35569
   75867212. 2.380148E+12   0.00003188   0.00069731   21.87649503   2007.95195
59066.54816
   78418873. 2.367362E+12   0.00003313   0.00072431   21.86601833   2067.93411
60000.00000
   80379850. 2.338323E+12   0.00003438   0.00074940   21.80085942   2122.35013
60000.00000
   82132305. 2.305468E+12   0.00003563   0.00077383   21.72155991   2174.17610
60000.00000
   83593719. 2.266948E+12   0.00003688   0.00079727   21.62075713   2222.80906
60000.00000
   85051531. 2.230860E+12   0.00003813   0.00082075   21.52788833   2270.56347
60000.00000
   86197726. 2.189149E+12   0.00003938   0.00084305   21.41082332   2314.89617
60000.00000
   87275260. 2.148314E+12   0.00004063   0.00086513   21.29552320   2357.89646
60000.00000
   88349926. 2.109849E+12   0.00004188   0.00088725   21.18811682   2400.11086
60000.00000
   89414419. 2.073378E+12   0.00004313   0.00090938   21.08715847   2441.47092
60000.00000
   90377150. 2.036668E+12   0.00004438   0.00093188   21.00000009   2482.63750
60000.00000
   90984788. 1.994187E+12   0.00004563   0.00095400   20.90949968   2522.21633
60000.00000
   91733354. 1.956978E+12   0.00004688   0.00097439   20.78707829   2557.80762
60000.00000
   92479808. 1.921658E+12   0.00004813   0.00099483   20.67177817   2592.72729
60000.00000
   93224136. 1.888084E+12   0.00004938   0.00101530   20.56306556   2626.97180
60000.00000
   93891703. 1.854651E+12   0.00005063   0.00103537   20.45167342   2659.78298
60000.00000
   94391921. 1.819603E+12   0.00005188   0.00105448   20.32726452   2690.29892
60000.00000
   94890509. 1.786174E+12   0.00005313   0.00107362   20.20929560   2720.22311
60000.00000
   95387442. 1.754252E+12   0.00005438   0.00109279   20.09732410   2749.55237
60000.00000
   95882712. 1.723734E+12   0.00005563   0.00111200   19.99095038   2778.28380
60000.00000
   96376291. 1.694528E+12   0.00005688   0.00113123   19.88980696   2806.41419
60000.00000
   96868173. 1.666549E+12   0.00005813   0.00115050   19.79356125   2833.94057
60000.00000
   97358377. 1.639720E+12   0.00005938   0.00116980   19.70191285   2860.86032
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60000.00000
   98210901. 1.587247E+12   0.00006188   0.00120759   19.51655075   2911.60957
60000.00000

98585211.	1.561746E+12	0.00006313	0.00123094	19.49999884	2942.01326
60000.00000					
98916807.	1.536572E+12	0.00006438	0.00124873	19.39769670	2964.22926
60000.00000					
99218559.	1.511902E+12	0.00006563	0.00126624	19.29508612	2985.54261
60000.00000					
99519099.	1.488136E+12	0.00006688	0.00128378	19.19671342	3006.35485
60000.00000					
99818435.	1.465225E+12	0.00006813	0.00130135	19.10235062	3026.66383
60000.00000					
1.001166E+08	1.443122E+12	0.00006938	0.00131894	19.01178315	3046.46707
60000.00000					
1.004134E+08	1.421783E+12	0.00007063	0.00133656	18.92480984	3065.76195
60000.00000					
1.007091E+08	1.401170E+12	0.00007188	0.00135421	18.84124830	3084.54620
60000.00000					
1.010035E+08	1.381245E+12	0.00007313	0.00137189	18.76092687	3102.81738
60000.00000					
1.012967E+08	1.361972E+12	0.00007438	0.00138960	18.68368194	3120.57271
60000.00000					
1.018792E+08	1.325258E+12	0.00007688	0.00142510	18.53783682	3154.52609
60000.00000					
1.023342E+08	1.289250E+12	0.00007938	0.00145936	18.38559195	3185.15136
60000.00000					
1.026844E+08	1.254160E+12	0.00008188	0.00149261	18.23033229	3212.87784
60000.00000					
1.030306E+08	1.221103E+12	0.00008438	0.00152596	18.08546081	3238.76893
60000.00000					
1.037583E+08	1.194341E+12	0.00008688	0.00156375	18.00000027	3265.95599
60000.00000					
1.038024E+08	1.161426E+12	0.00008938	0.00160111	17.91447803	3290.35203
60000.00000					
1.041185E+08	1.133263E+12	0.00009188	0.00163331	17.77754590	3309.26539
60000.00000					
1.044309E+08	1.106553E+12	0.00009438	0.00166562	17.64891788	3326.44258
60000.00000					
1.047396E+08	1.081183E+12	0.00009688	0.00169802	17.52797171	3341.86698
60000.00000					
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60000.00000					
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1.056431E+08	1.012149E+12	0.00010438	0.00179586	17.20581695	3377.44655
60000.00000					
1.059350E+08	9.912046E+11	0.00010688	0.00182865	17.11019352	3385.67491
60000.00000					
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60000.00000					
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1.064096E+08	9.303571E+11	0.00011438	0.00192059	16.79200575	3398.80450

60000.00000
1.065616E+08 9.117569E+11 0.00011688 0.00195142 16.69662639 3399.96383
60000.00000
1.067043E+08 8.938584E+11 0.00011938 0.00198235 16.60604015 3393.93710
60000.00000
1.068439E+08 8.766677E+11 0.00012188 0.00201337 16.51996806 3386.23476
60000.00000
1.068439E+08 8.590463E+11 0.00012438 0.00205219 16.49999902 3390.75123
60000.00000
1.072234E+08 8.451108E+11 0.00012688 0.00209154 16.48508057 3396.04279
60000.00000
1.073467E+08 8.297329E+11 0.00012938 0.00212133 16.39677957 3398.47294
60000.00000
1.074687E+08 8.149285E+11 0.00013188 0.00215122 16.31257430 3399.77047
60000.00000
1.075885E+08 8.006584E+11 0.00013438 0.00218126 16.23266593 3397.60834
60000.00000
1.077056E+08 7.868905E+11 0.00013688 0.00221149 16.15699008 3391.10865
60000.00000
1.078219E+08 7.736103E+11 0.00013938 0.00224179 16.08457848 3384.58873
60000.00000
1.079374E+08 7.607922E+11 0.00014188 0.00227217 16.01527020 3383.63343
60000.00000
1.080520E+08 7.484119E+11 0.00014438 0.00230262 15.94890699 3388.52048
60000.00000
1.081657E+08 7.364471E+11 0.00014688 0.00233316 15.88534936 3392.55680
60000.00000
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60000.00000
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60000.00000
1.085014E+08 7.028429E+11 0.00015438 0.00242527 15.71021989 3399.46263
60000.00000
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60000.00000
1.087182E+08 6.821534E+11 0.00015938 0.00248725 15.60625747 3394.78892
60000.00000
1.088242E+08 6.722730E+11 0.00016188 0.00251844 15.55791602 3389.02463
60000.00000
1.088741E+08 6.623518E+11 0.00016438 0.00254752 15.49819395 3383.81850
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60000.00000
1.089654E+08 6.433384E+11 0.00016938 0.00260553 15.38319156 3377.06985
60000.00000
1.090106E+08 6.342436E+11 0.00017188 0.00263461 15.32863006 3381.58733
60000.00000
1.090554E+08 6.254076E+11 0.00017438 0.00266374 15.27591661 3385.62140
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1.091441E+08 6.084689E+11 0.00017938 0.00272215 15.17574415 3392.22147
60000.00000

```
  1.092314E+08  5.924412E+11    0.00018438    0.00278076   15.08211091    3396.83257
  60000.00000
  1.093686E+08  5.775242E+11    0.00018938    0.00284063   15.00000045    3399.46480
  60000.00000
  1.101242E+08  5.665554E+11    0.00019438    0.00291563   15.00000045    3393.31839
  60000.00000
  1.107360E+08  5.554155E+11    0.00019938    0.00299063   15.00000045    3380.43715
  60000.00000
  1.107360E+08  5.418273E+11    0.00020438    0.00306160   14.98031572    3368.61892
  60000.00000
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  60000.00000
  1.107360E+08  5.165526E+11    0.00021438    0.00318138   14.84024003    3382.13994
  60000.00000
  1.107360E+08  5.047793E+11    0.00021938    0.00324153   14.77619693    3388.42090
  60000.00000
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  60000.00000
  1.107360E+08  4.827726E+11    0.00022938    0.00336238   14.65889052    3396.97591
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  60000.00000
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  60000.00000
  1.107360E+08  4.188594E+11    0.00026438    0.00380860   14.40603599    3359.25689
  60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 =  110735.95693
in-kip



------------------------------------------------------------------------------
             Computed Values of Load Distribution and Deflection
                 for Lateral Loading for Load Case Number  1
------------------------------------------------------------------------------

Pile-head boundary conditions are Shear and Moment (Pile-head Condition Type 1)
Specified shear force at pile head  =       37000.000 lbs
Specified moment at pile head       =    56472000.000 in-lbs
Specified axial load at pile head   =       60000.000 lbs
```

Depth	Deflect.	Moment	Shear	Slope	Total	Flx. Rig.	Soil Res. Es*h
X	y	M	V	S	Stress	EI	p F/L
in	in	lbs-in	lbs	Rad.	lbs/in**2	lbs-in**2	lbs/in
0.000	1.321	5.65E+07	37000.	-0.007928	798.485	2.41E+12	0.000 0.000
37.440	1.040	5.79E+07	37000.	-0.007041	818.076	2.41E+12	0.000 0.000
74.880	0.793651	5.92E+07	31677.	-0.006131	837.137	2.41E+12	-479.250 2826.039
112.320	0.581423	6.00E+07	4364.386	-0.005203	847.442	2.41E+12	-906.932 7300.095
149.760	0.404052	5.94E+07	-37699.	-0.004273	839.854	2.41E+12	-1345.203 15581.
187.200	0.261178	5.71E+07	-86300.	-0.003366	807.312	2.41E+12	-1211.784 21714.
224.640	0.151369	5.24E+07	-1.75E+05	-0.002513	741.405	2.42E+12	-2678.281 82806.
262.080	0.071683	4.41E+07	-2.60E+05	-0.001766	625.761	2.44E+12	-1694.869 1.11E+05
299.520	0.017185	3.35E+07	-3.01E+05	-0.001174	476.927	2.48E+12	-483.521 1.32E+05
336.960	-0.023723	2.21E+07	-2.96E+05	-0.001053	318.622	1.27E+13	774.081 1.53E+05
374.400	-0.062115	1.19E+07	-2.40E+05	-0.001003	175.918	1.28E+13	2193.172 1.65E+05
411.840	-0.099172	4.54E+06	-1.53E+05	-0.000980	72.882	1.28E+13	2398.713 1.13E+05
449.280	-0.135703	5.47E+05	-57243.	-0.000973	17.075	1.28E+13	2871.883 99043.

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = 1.32062309 in
Computed slope at pile head = -0.00792838
Maximum bending moment = 59987804. lbs-in
Maximum shear force = -304676.90001 lbs

Depth of maximum bending moment = 117.00000 in
Depth of maximum shear force = 313.56000 in
Number of iterations = 25
Number of zero deflection points = 1

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 2

Pile-head boundary conditions are Shear and Moment (Pile-head Condition Type 1)
Specified shear force at pile head = 14000.000 lbs
Specified moment at pile head = 21672000.000 in-lbs
Specified axial load at pile head = 60000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Flx. Rig. EI lbs-in**2	Soil Res. Es*h p F/L lbs/in
0.000	0.229295	2.17E+07	14000.	-0.000973	312.243	1.27E+13	0.000
0.000							
37.440	0.194078	2.22E+07	14000.	-0.000908	319.597	1.27E+13	0.000
0.000							
74.880	0.161308	2.27E+07	12833.	-0.000842	326.836	1.27E+13	-100.632
2919.615							
112.320	0.131043	2.31E+07	6956.794	-0.000775	332.212	1.27E+13	-204.407
7300.095							
149.760	0.103323	2.32E+07	-3183.507	-0.000706	333.516	1.27E+13	-343.991
15581.							
187.200	0.078158	2.28E+07	-16583.	-0.000638	328.398	1.27E+13	-362.626
21714.							
224.640	0.055504	2.16E+07	-52927.	-0.000572	311.294	1.27E+13	-1062.955
89627.							
262.080	0.035218	1.89E+07	-88826.	-0.000513	273.845	1.27E+13	-832.682
1.11E+05							
299.520	0.017004	1.51E+07	-1.14E+05	-0.000462	220.284	1.28E+13	-478.441
1.32E+05							
336.960	0.000442	1.06E+07	-1.23E+05	-0.000425	157.526	1.28E+13	-14.421
1.53E+05							
374.400	-0.014959	6.10E+06	-1.13E+05	-0.000400	94.654	1.28E+13	555.311
1.74E+05							
411.840	-0.029686	2.39E+06	-80308.	-0.000388	42.835	1.28E+13	1235.386
1.95E+05							
449.280	-0.044137	2.89E+05	-30201.	-0.000385	13.469	1.28E+13	1512.233
1.60E+05							

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

Pile-head deflection	=	0.22929527 in
Computed slope at pile head	=	-0.00097280
Maximum bending moment	=	23208900. lbs-in
Maximum shear force	=	-123275.13598 lbs
Depth of maximum bending moment	=	140.40000 in
Depth of maximum shear force	=	336.96000 in
Number of iterations	=	7
Number of zero deflection points	=	1

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in
Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 37000.	M= 5.65E+07	60000.0000	1.3206	5.9988E+07	-304677.
1	V= 14000.	M= 2.17E+07	60000.0000	0.2292953	2.3209E+07	-123275.

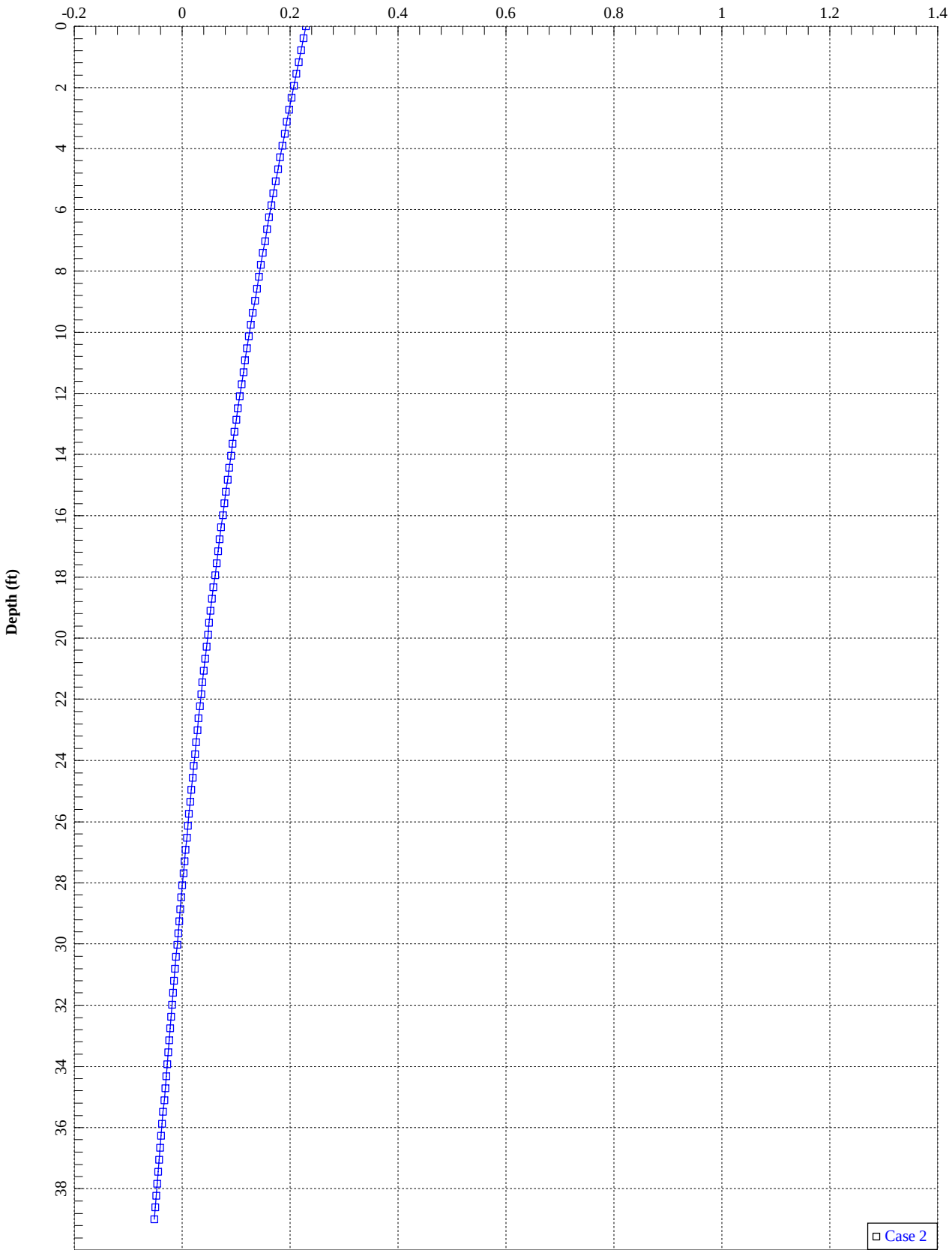
Computed Pile-head Stiffness Matrix Members
K22, K23, K32, K33 for Superstructure

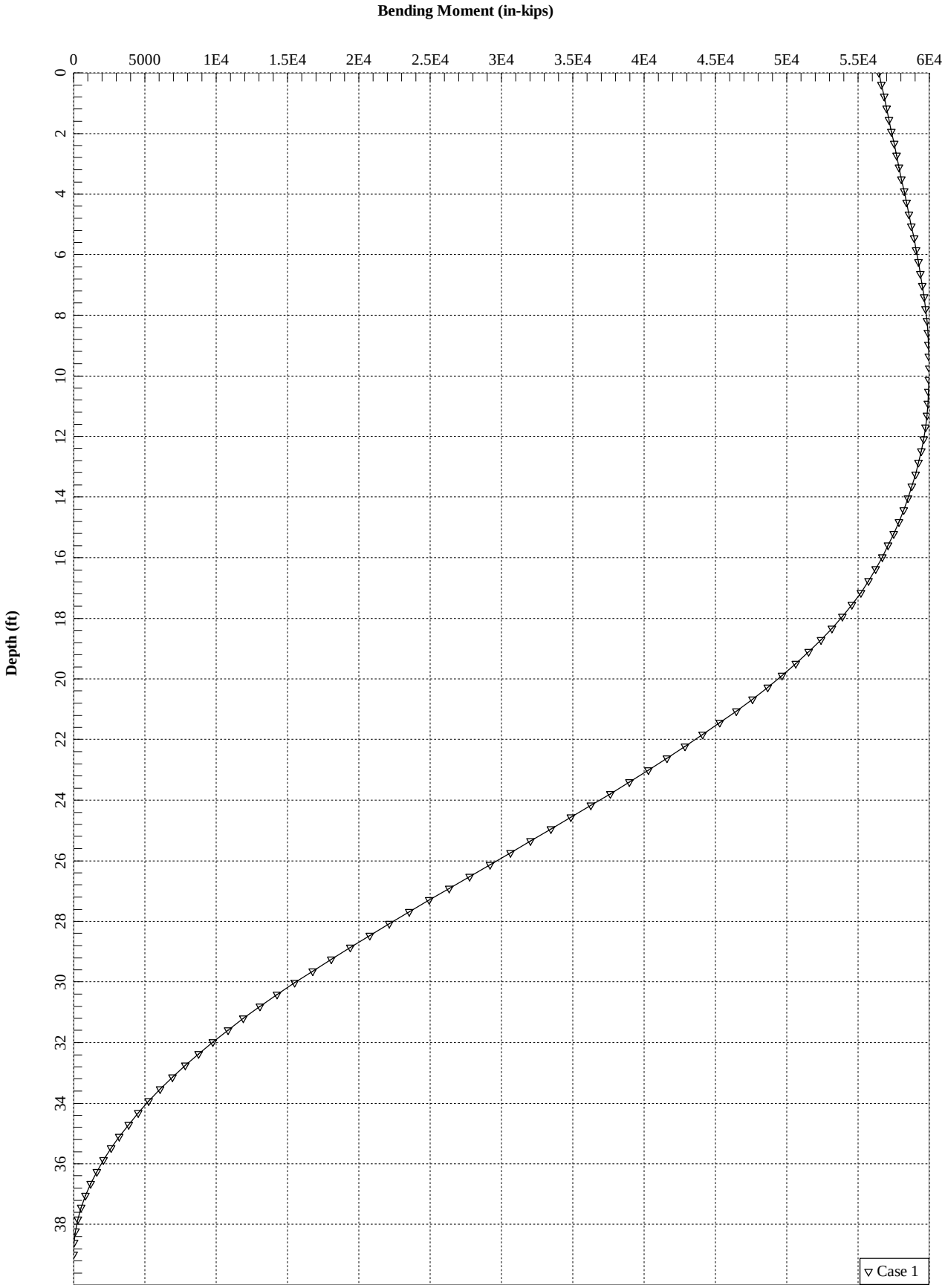
Top y in	Shear React. lbs	Mom. React. in-lbs	K22 lbs/in	K32 in-lbs/in
0.00240601	3700.00006	831703.76219	1537817.	3.456778E+08
0.00724281	11138.10984	2503678.	1537817.	3.456778E+08
0.01147958	17653.48642	3968235.	1537817.	3.456778E+08
0.01448562	22276.21968	5007356.	1537817.	3.456778E+08
0.01681728	25861.89016	5813360.	1537817.	3.456778E+08
0.01872239	28791.59626	6471913.	1537817.	3.456778E+08
0.02033313	31268.62748	7028712.	1537817.	3.456778E+08
0.02172842	33414.32952	7511033.	1537817.	3.456778E+08
0.02295916	35306.97285	7936471.	1537817.	3.456778E+08
0.02406033	37000.00000	8317008.	1537801.	3.456730E+08

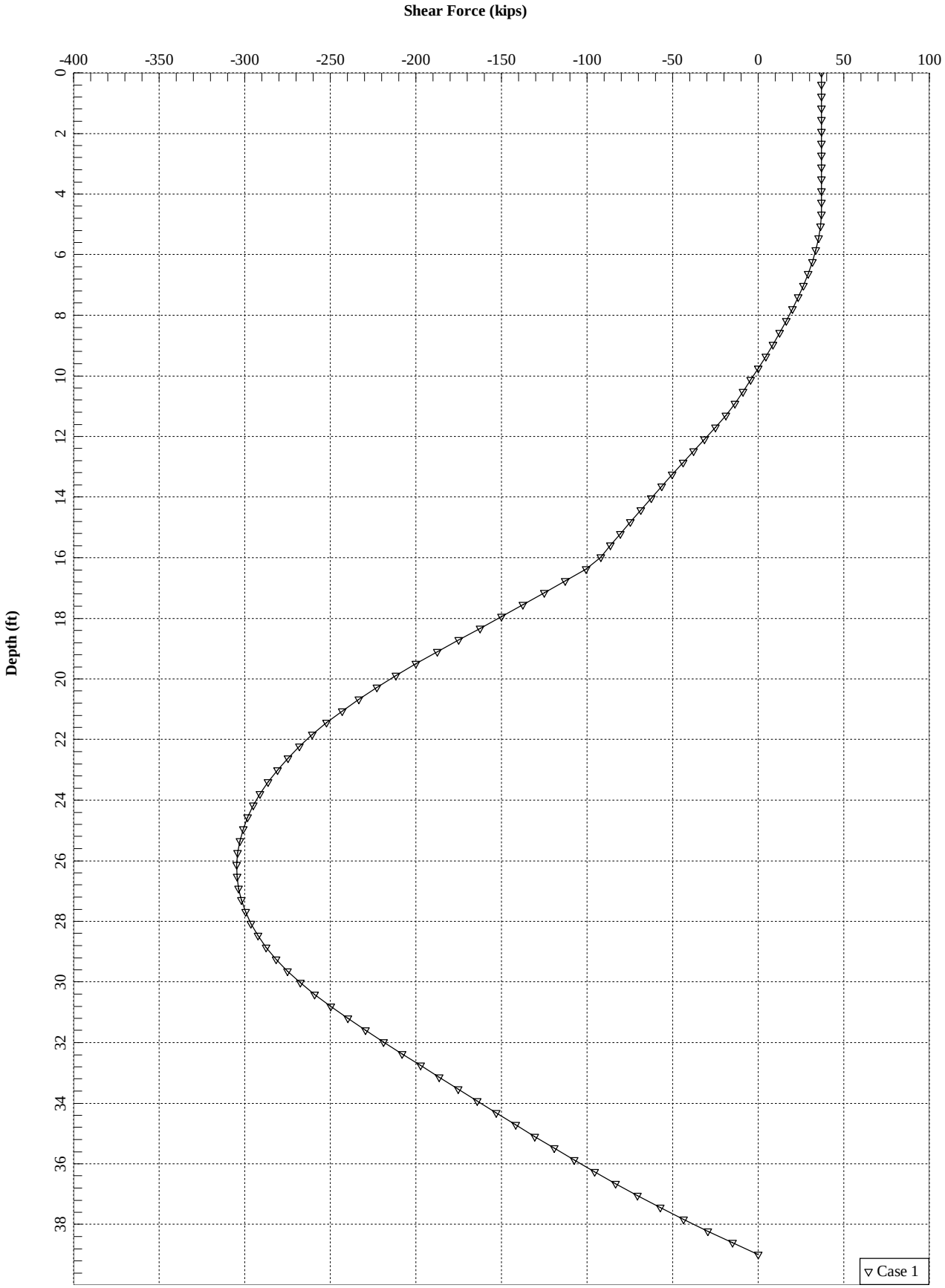
Top Rota. rad	Shear React. lbs	Mom. React. in-lbs	K23 lbs/rad	K33 in-lbs/rad
0.00005418	18727.42945	5647200.	3.456778E+08	1.042381E+11
0.00016353	56386.18665	16999766.	3.448045E+08	1.039545E+11
0.00026010	89401.41480	26943991.	3.437187E+08	1.035907E+11
0.00033712	112865.47847	33999532.	3.347895E+08	1.008518E+11
0.00093610	136907.74646	39472234.	1.462533E+08	4.216667E+10
0.00122254	157830.17443	43943757.	1.291004E+08	3.594469E+10
0.00145882	176885.60039	47724377.	1.212521E+08	3.271427E+10
0.00163136	192746.71853	50999298.	1.181509E+08	3.126182E+10
0.00176942	206294.85243	53887983.	1.165890E+08	3.045518E+10
0.00190488	219411.79392	56472000.	1.151841E+08	2.964598E+10

K22 = abs(Shear Reaction/Top y)
K23 = abs(Shear Reaction/Top Rotation)
K32 = abs(Moment Reaction/Top y)
K33 = abs(Moment Reaction/Top Rotation)

The analysis ended normally.


Lateral Deflection (in)
-0.2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
Case 2


Bending Moment (in-kips)
0
5000
1E4
1.5E4
2E4
2.5E4
3E4
3.5E4
4E4
4.5E4
5E4
5.5E4
6E4
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
Case 1


Shear Force (kips)
-400
-350
-300
-250
-200
-150
-100
-50
0
50
100
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
Case 1

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CTHA231A_L600_4.1_draft

Section 1 - Site Information

Site ID: CTHA231A
Status: Draft
Version: 4.1
Project Type: L600
Approved: Not Approved
Approved By: Not Approved
Last Modified: 4/25/2019 4:12:56 PM
Last Modified By: GSM1900\AMurill9

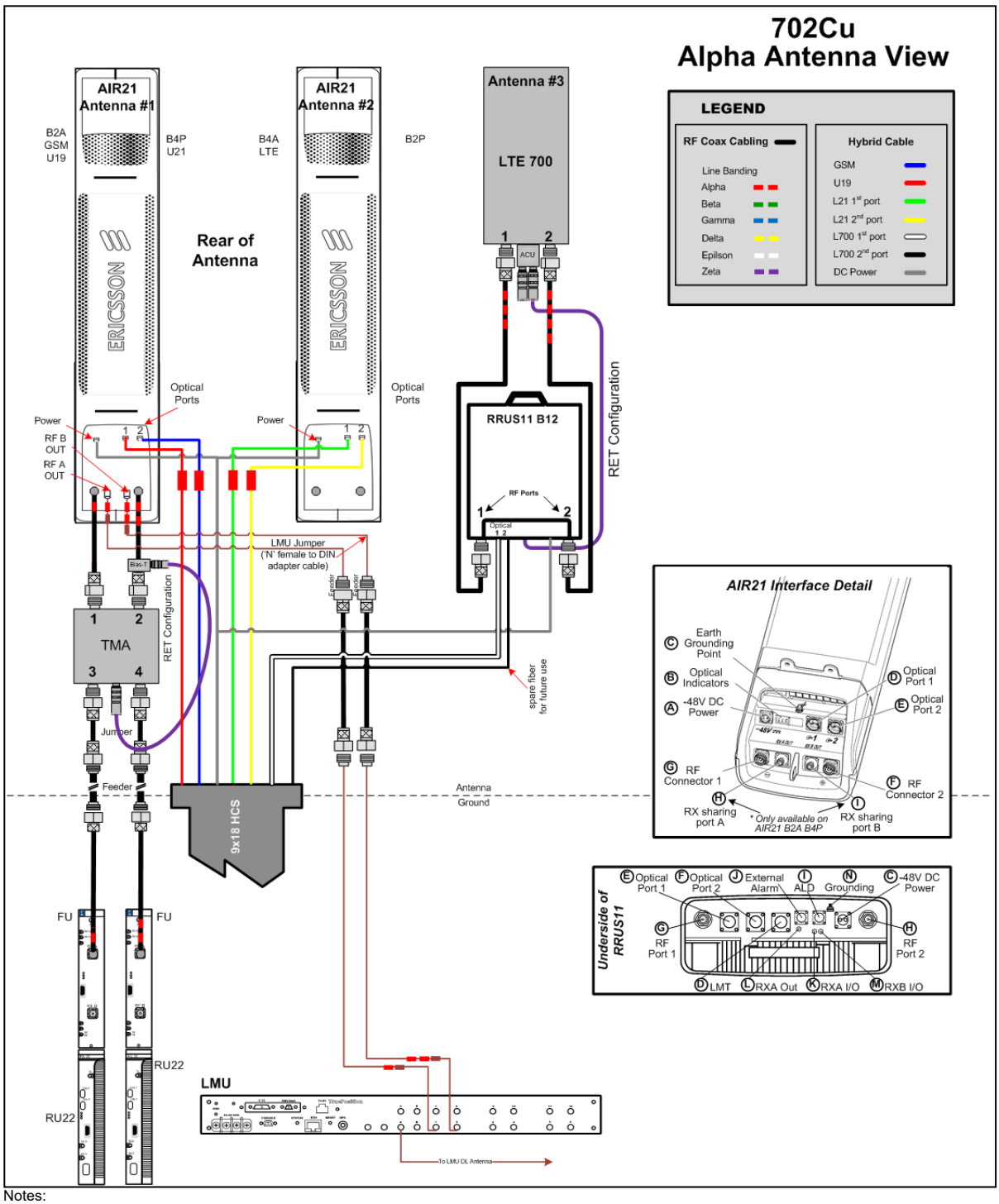
Site Name: HA231/Berlin FD Tower
Site Class: Monopole
Site Type: Structure Non Building
Plan Year:
Market: CONNECTICUT
Vendor: Ericsson
Landlord: Berlin FD

Latitude: 41.6065399500
Longitude: -72.7505955700
Address: 1657 Berlin Turnpike
City, State: Berlin, CT
Region: NORTHEAST

RAN Template: 67D92DB Outdoor			AL Template: 67D92DB_2xAIR+1OP	
Sector Count: 3	**Antenna Count:** 9	**Coax Line Count:** 6	**TMA Count:** 3	**RRU Count:** 3

Section 2 - Existing Template Images

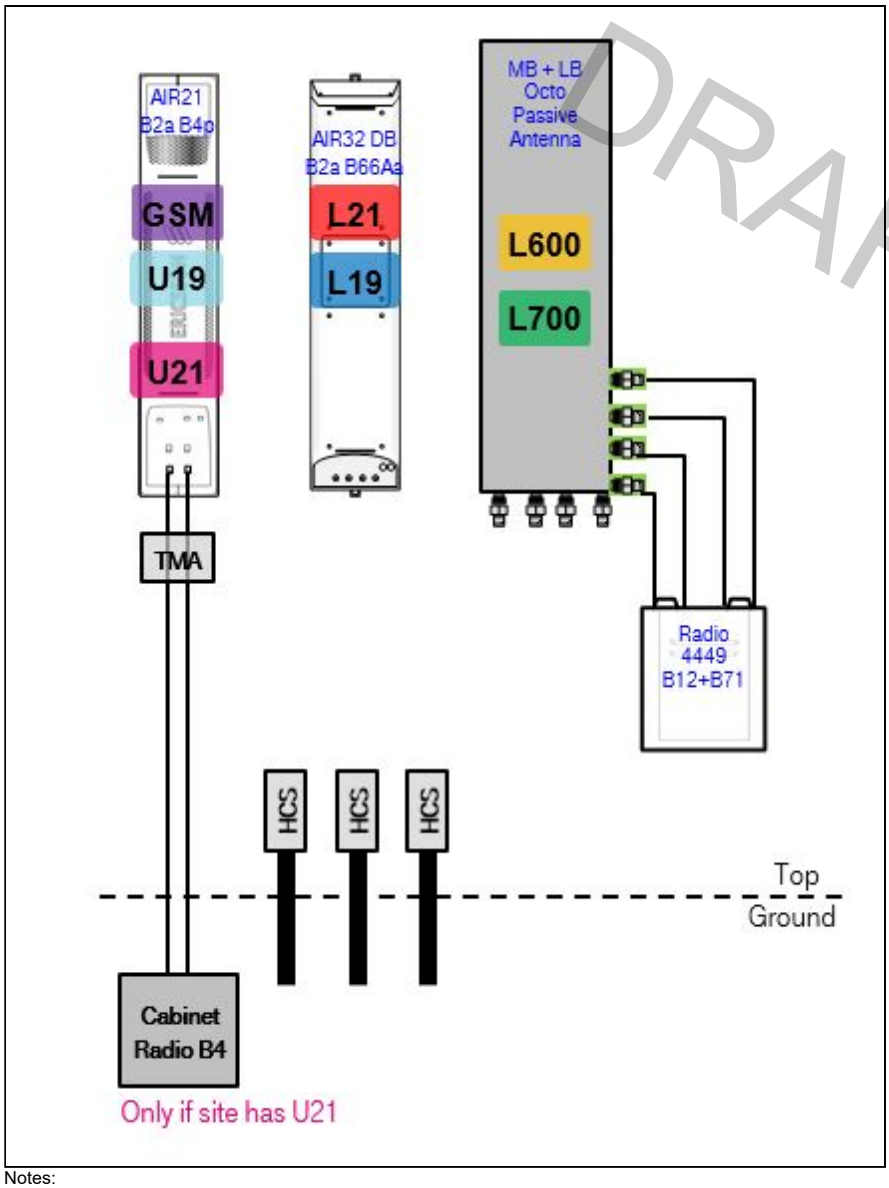
AL_702Cu.png


702Cu
Alpha Antenna View
LEGEND
RF Coax Cabling
Line Banding
Alpha
Beta
Gamma
Delta
Epilson
Zeta
Hybrid Cable
GSM
U19
L21 1st port
L21 2nd port
L700 1st port
L700 2nd port
DC Power
AIR21
Antenna #1
B2A
GSM
U19
B4P
U21
AIR21
Antenna #2
B4A
LTE
B2P
Antenna #3
LTE 700
Rear of
Antenna
ERICSSON
Optical
Ports
Power
RF B
OUT
RF A
OUT
RRUS11 B12
RF Ports
Optical
RET Configuration
LMU Jumper
('N' female to DIN
adapter cable)
Bias-T
TMA
RET Configuration
Jumper
Feeder
spare fiber
for future use
Antenna
Ground
9x18 HCS
FU
RU22
LMU
To LMU DL Antenna
AIR21 Interface Detail
Earth
Grounding
Point
Optical
Indicators
-48V DC
Power
Optical
Port 1
Optical
Port 2
RF
Connector 1
RF
Connector 2
RX sharing
port A
* Only available on
AIR21 B2A B4P
RX sharing
port B
Underside of
RRUS11
Optical
Port 1
Optical
Port 2
External
Alarm
ALD
Grounding
-48V DC
Power
RF
Port 1
RF
Port 2
LMT
RXA Out
RXA I/O
RXB I/O

Notes:

Section 3 - Proposed Template Images

67D92DB_2xAIR+1OP.JPG



Notes:

Section 4 - Siteplan Images

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RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CTHA231A_L600_4.1_draft

Section 5 - RAN Equipment

Existing RAN Equipment

Template: 792DB Outdoor

Enclosure	1
Enclosure Type	RBS 6131
Baseband	DUW30 (U2100); DUG20 (G1900); DUS41 (L2100, L1900, L700)
Hybrid Cable System	Ericsson 9x18 HCS *Select Length*
Multiplexer	XMU
Radio	RUS01 B4 (x6)

Proposed RAN Equipment

Template: 67D92DB Outdoor

Enclosure	1
Enclosure Type	RBS 6131
Baseband	DUW30 (U2100); DUG20 (G1900); BB 6630 (L2100, L1900, L700, L600); BB 6630 (N600 (DARK))
Hybrid Cable System	Ericsson 9x18 HCS *Select Length*; Ericsson 6x12 HCS *Select Length & AWG* (x3)
Radio	RUS01 B4 (x6) U2100

RAN Scope of Work:

*** Existing Cabinet is RBS6131 ***

Replace (1) DUS41 with (1) BB6630 for LTE.
Add (1) BB6630 for future 5G N600.
Remove (1) XMU.

Add (3) 6X12 HCS
Existing: (12) Coaxial lines; (1) 9X18 HCS
Remove (6) Coaxial Lines

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CTHA231A_L600_4.1_draft

Section 6 - A&L Equipment

Existing Template: 702Cu
Proposed Template: 67D92DB_2xAIR+1OP

Sector 1 (Existing) view from behind					
Coverage Type	A - Outdoor Macro				
Antenna	1		2	3	
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Andrew - LNX-6515DS-A1M (Dual)	Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)	
Azimuth	30		30	30	
M. Tilt	2		0	2	
Height	160		160	160	
Ports	P1	P2	P3	P4	P5
Active Tech.	U2100	L1900 G1900	L700	L2100	
Dark Tech.					
Restricted Tech.					
Decomm. Tech.					
E. Tilt	5	5	2	5	
Cables	1-5/8" Coax - 170 ft. **(x4)**	Fiber Jumper - 15 ft. **(x2)**	Fiber Jumper - 15 ft. **(x2)**	Fiber Jumper - 15 ft. **(x2)**	
TMAs	Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners					
Radio			RRUS11 B12 (At Antenna)		
Sector Equipment					

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CTHA231A_L600_4.1_draft

Sector 1 (Proposed) view from behind										
Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	30		30				30			
M. Tilt	2		0				2			
Height	160		160				160			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	U2100	G1900	L700 L600	L700 L600			L2100	L2100	L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	5	5	2	2			5	5	5	5
Cables	1-5/8" Coax - 170 ft. **(x2)**	Fiber Jumper - 15 ft. **(x2)**	Fiber Jumper - 15 ft.				Fiber Jumper - 15 ft.		Fiber Jumper - 15 ft.	
TMAs	Generic Twin Style 1B - AWS (AtAntenna)									
Diplexers / Combiners										
Radio			Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)						
Sector Equipment										

Unconnected Equipment:

Scope of Work:

Add handrail kit.

Replace LB Dual in Position 2 with (1) LB/MB Octo.
Replace RRUS11 B12 with (1) Radio 4449 B71+B12 for L600 and L700.
Replace AIR21 B2P/B4A in Position 3 with (1) AIR32 DB for L1900 and L2100.

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CTHA231A_L600_4.1_draft

Sector 2 (Existing) view from behind					
Coverage Type	A - Outdoor Macro				
Antenna	1		2	3	
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Andrew - LNX-6515DS-A1M (Dual)	Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)	
Azimuth	180		180	180	
M. Tilt	0		0	0	
Height	160		160	160	
Ports	P1	P2	P3	P4	P5
Active Tech.	U2100	L1900 G1900	L700		L2100
Dark Tech.					
Restricted Tech.					
Decomm. Tech.					
E. Tilt	2	2	2		2
Cables	1-5/8" Coax - 170 ft. **(x4)**	Fiber Jumper - 15 ft. **(x2)**	Fiber Jumper - 15 ft. **(x2)**	Fiber Jumper - 15 ft. **(x2)**	Fiber Jumper - 15 ft. **(x2)**
TMAs	Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners					
Radio			RRUS11 B12 (At Antenna)		
Sector Equipment					

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CTHA231A_L600_4.1_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)		RFS - APXVAARR24_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	180		180				180			
M. Tilt	2		0				2			
Height	160		160				160			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	U2100	G1900	L700 L600	L700 L600			L2100	L2100	L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	2	2	2	2			2	2	2	2
Cables	1-5/8" Coax - 170 ft. **(x2)**	Fiber Jumper - 15 ft. **(x2)**	Fiber Jumper - 15 ft.				Fiber Jumper - 15 ft.		Fiber Jumper - 15 ft.	
TMAs	Generic Twin Style 1B - AWS (AtAntenna)									
Diplexers / Combiners										
Radio			Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)						
Sector Equipment										

Unconnected Equipment:

Scope of Work:

Add handrail kit.

Replace LB Dual in Position 2 with (1) LB/MB Octo.
Replace RRUS11 B12 with (1) Radio 4449 B71+B12 for L600 and L700.
Replace AIR21 B2P/B4A in Position 3 with (1) AIR32 DB for L1900 and L2100.

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CTHA231A_L600_4.1_draft

Sector 3 (Existing) view from behind					
Coverage Type	A - Outdoor Macro				
Antenna	**1**		**2**	**3**	
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Andrew - LNX-6515DS-A1M (Dual)	Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)	
Azimuth	290		290	290	
M. Tilt	0		0	0	
Height	160		160	160	
Ports	**P1**	**P2**	**P3**	**P4**	**P5**
Active Tech.	L1900 G1900	U2100	L700	L2100	
Dark Tech.					
Restricted Tech.					
Decomm. Tech.					
E. Tilt	5	5	2	5	
Cables	Fiber Jumper - 15 ft. **(x2)**	1-5/8" Coax - 170 ft. **(x4)**	Fiber Jumper - 15 ft. **(x2)**	Fiber Jumper - 15 ft. **(x2)**	
TMAs		Generic Twin Style 1B - AWS (AtAntenna)			
Diplexers / Combiners					
Radio			RRUS11 B12 (At Antenna)		
Sector Equipment					

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CTHA231A_L600_4.1_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)		RFS - APXVAARR24_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	290		290				290			
M. Tilt	2		0				2			
Height	160		160				160			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	U2100	G1900	L700 L600	L700 L600			L2100	L2100	L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	5	5	2	2			5	5	5	5
Cables	1-5/8" Coax - 170 ft. **(x2)**	Fiber Jumper - 15 ft. **(x2)**	Fiber Jumper - 15 ft.				Fiber Jumper - 15 ft.		Fiber Jumper - 15 ft.	
TMAs	Generic Twin Style 1B - AWS (AtAntenna)									
Diplexers / Combiners										
Radio			Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)						
Sector Equipment										

Unconnected Equipment:

Scope of Work:

Add handrail kit.

Replace LB Dual in Position 2 with (1) LB/MB Octo.
Replace RRUS11 B12 with (1) Radio 4449 B71+B12 for L600 and L700.
Replace AIR21 B2P/B4A in Position 3 with (1) AIR32 DB for L1900 and L2100.

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CTHA231A_L600_4.1_draft

Section 7 - Power Systems Equipment

Existing Power Systems Equipment

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

Proposed Power Systems Equipment

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

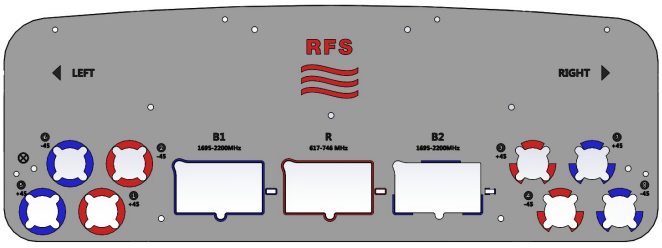
Impedance	Ohm	50.0
Polarization	Deg	±45°

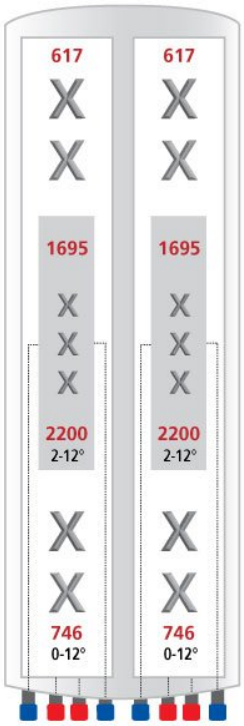
MECHANICAL SPECIFICATIONS

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

Exhibit E

Mount Analysis

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

T-Mobile Site #: CTHA231A

1657 Berlin Turnpike
Berlin, CT

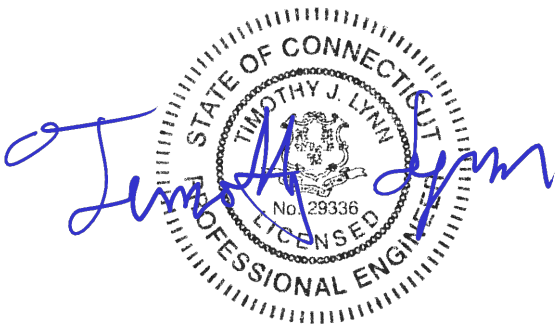
Centek Project No. 19027.56

Date: May 15, 2019

Max Stress Ratio = 97.2%

Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002



63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

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- ANTENNA AND APPURTENANCE SUMMARY
- STRUCTURE LOADING
- CONCLUSION

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- WIND LOAD ON APPURTENANCES
- RISA3D OUTPUT REPORT

SECTION 3 – REFERENCE MATERIALS (NOT INCLUDED WITHIN REPORT)

- RF DATA SHEET, DATED 04/25/2019

CENTEK engineering

Centered on Solutions℠

May 15, 2019

Mr. Dan Reid
Transcend Wireless
10 Industrial Ave
Mahwah, NJ 07430

Re: Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CTHA231A
1657 Berlin Turnpike
Berlin, CT 06037

Centek Project No. 19027.56

Dear Mr. Reid,

Centek Engineering, Inc. has reviewed the T-Mobile antenna installation at the above referenced site. The purpose of the review is to determine the structural adequacy of the existing mount, consisting of three (3) 12-ft T-Arms. The review considered the effects of wind load, dead load and ice load in accordance with the 2015 International Building Code as modified by the 2018 Connecticut State Building Code (CTBC) including ASCE 7-10 and ANSI/TIA-222-G *Structural Standards for Steel Antenna Towers and Supporting Structures*.

The loads considered in this analysis consist of the following:

- T-Mobile:
  T-Arms: Three (3) Ericsson AIR21 KRC118023-1_B2A_B4P panel antennas, three (3) RFS APXVAARR24_43-U-NA20 panel antennas, three (3) Ericsson AIR32 KRD901146-1_B66A_B2A panel antennas, three (3) KRY112 TMAs and three (3) Ericsson 4449 B71_B12 remote radio units mounted on three (3) T-Arms with a RAD center elevation of 160-ft +/- AGL.

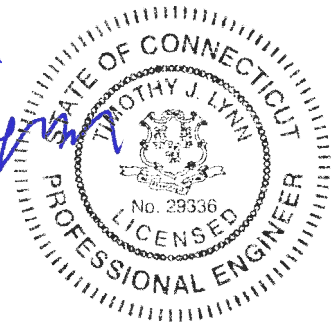
The antenna mount was analyzed per the requirements of the 2015 International Building Code as modified by the 2018 Connecticut State Building Code considering a nominal design wind speed of 97 mph for Berlin as required in Appendix N of the 2018 Connecticut State Building Code.

A structural analysis of tower and foundation needs to be completed prior to any work.

Based on our review of the installation, it is our opinion that the subject antenna mount with the installation of one (1) stabilizer kit (Perfect10 p/n: VSK-M) has sufficient capacity to support the aforementioned antenna configuration. If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer



Prepared by:

Fernando J. Palacios
Engineer

Section 2 - Calculations

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: Loads on Equipment

Location: Berlin,CT

Rev. 0: 05/13/19

Prepared by: F.J.P Checked by: T.J.L.
Job No. 19027.56

Development of Design Heights, Exposure Coefficients, and Velocity Pressures Per TIA-222-G

Wind Speeds

Basic Wind Speed	$V := 97$	mph	(User Input - 2018 CSBC Appendix N)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input per Annex B of TIA-222-G)

Input

Structure Type =	$Structure\_Type := Pole$		(User Input)
Structure Category =	$SC := II$		(User Input)
Exposure Category =	$Exp := C$		(User Input)
Structure Height =	$h := 176$	ft	(User Input)
Height to Center of Antennas =	$z := 160$	ft	(User Input)
Radial Ice Thickness =	$t_i := 1.00$	in	(User Input per Annex B of TIA-222-G)
Radial Ice Density =	$Id := 56.00$	pcf	(User Input)
Topograpic Factor =	$K_{zt} := 1.0$		(User Input)
	$K_a := 1.0$		(User Input)
Gust Response Factor =	$G_H = 1.1$		(User Input)

Output

Wind Direction Probability Factor =

$$K_d := \begin{cases} 0.95 & \text{if } Structure\_Type = Pole \\ 0.85 & \text{if } Structure\_Type = Lattice \end{cases} = 0.95$$

(Per Table 2-2 of TIA-222-G)

(Per Table 2-3 of TIA-222-G)

Importance Factors =

$$I_{Wind} := \begin{cases} 0.87 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.15 & \text{if } SC = 3 \end{cases} = 1$$

$$I_{Wind\_w\_Ice} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.00 & \text{if } SC = 3 \end{cases} = 1$$

$$I_{ice} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.25 & \text{if } SC = 3 \end{cases} = 1$$

$$K_{iz} := \left(\frac{z}{33}\right)^{0.1} = 1.171$$

Velocity Pressure Coefficient Antennas =

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 2.342$$

$$Kz := 2.01 \cdot \left(\left(\frac{z}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.397$$

Velocity Pressure w/o Ice Antennas = $qz := 0.00256 \cdot K_d \cdot Kz \cdot V^2 \cdot I_{Wind} = 31.973\,psf$

Velocity Pressure with Ice Antennas = $qz_{ice} := 0.00256 \cdot K_d \cdot Kz \cdot V_i^2 \cdot I_{Wind} = 8.495\ psf$

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Ericsson AIR21 KRC118023-1_B2A_B4P		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 55.9$	in	(User Input)
Antenna Width =	$W_{ant} := 12.1$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7.9$	in	(User Input)
Antenna Weight =	$WT_{ant} := 91.5$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.6$		
Antenna Force Coefficient =	$Ca_{ant} = 1.29$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.7$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 214$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.1$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 140$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 7.1$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 85$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 5.3$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 64$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 92$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5343$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 7453$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 242$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 242$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS APXVAARR24_43-U-NA20		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 95.9$	in	(User Input)
Antenna Width =	$W_{ant} := 24$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 153$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.0$		
Antenna Force Coefficient =	$Ca_{ant} = 1.27$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 16$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 712$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 5.8$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 258$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 20$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 237$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 9.3$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 111$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 153$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \cdot 10^4$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 2 \cdot 10^4$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 602$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 602$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Ericsson - AIR32 KRD901146-1_B66A_B2A		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 56.6$	in	(User Input)
Antenna Width =	$W_{ant} := 12.6$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 133$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.5$		
Antenna Force Coefficient =	$Ca_{ant} = 1.29$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 5$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 224$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.4$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 155$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 7.4$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 89$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 5.7$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 69$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 133$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 6204$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 7972$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 258$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 258$	lbs

Development of Wind & Ice Load on RRUS's

RRUS Data:

RRUS Model =	Ericsson 4449 B71B12		
RRUS Shape =	Flat		(User Input)
RRUS Height =	$L_{RRUS} := 14.9$	in	(User Input)
RRUS Width =	$W_{RRUS} := 13.2$	in	(User Input)
RRUS Thickness =	$T_{RRUS} := 10.4$	in	(User Input)
RRUS Weight =	$WT_{RRUS} := 74$	lbs	(User Input)
Number of RRUS's =	$N_{RRUS} := 1$		
RRUS Aspect Ratio =	$Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.1$		
RRUS Force Coefficient =	$Ca_{RRUS} = 1.2$		

Wind Load (without ice)

Surface Area for One RRUS =	$SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 1.4$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 58$	lbs
Surface Area for One RRUS =	$SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.1$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 45$	lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 2.4$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 27$	lbs
Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 2.1$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 23$	lbs

Gravity Load (without ice)

Weight of All RRUSs =	$WT_{RRUS} \cdot N_{RRUS} = 74$	lbs

Gravity Loads (ice only)

Volume of Each RRUS =	$V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 2045$	cu in
Volume of Ice on Each RRUS =	$V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 3238$	cu in
Weight of Ice on Each RRUS =	$W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 105$	lbs
Weight of Ice on All RRUSs =	$W_{ICERRUS} \cdot N_{RRUS} = 105$	lbs

Development of Wind & Ice Load on TMA's

TMA Data:

TMA Model =	Ericsson KRY112 TMA		
TMA Shape =	Flat	in	(User Input)
TMA Height =	$L_{TMA} := 7.7$	in	(User Input)
TMA Width =	$W_{TMA} := 7.5$	in	(User Input)
TMA Thickness =	$T_{TMA} := 3.4$	lbs	(User Input)
TMA Weight =	$WT_{TMA} := 11$		(User Input)
Number of TMA's =	$N_{TMA} := 1$		(User Input)
TMA Aspect Ratio =	$Ar_{TMA} := \frac{L_{TMA}}{W_{TMA}} = 1$		
TMA Force Coefficient =	$Ca_{TMA} = 1.2$		

Wind Load (without ice)

Surface Area for One TMA =	$SA_{TMAF} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.4$	sf
Total TMA Wind Force =	$F_{TMA} := qz \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAF} = 17$	lbs
Surface Area for One TMA =	$SA_{TMAS} := \frac{L_{TMA} \cdot T_{TMA}}{144} = 0.2$	sf
Total TMA Wind Force =	$F_{TMA} := qz \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAS} = 8$	lbs

Wind Load (with ice)

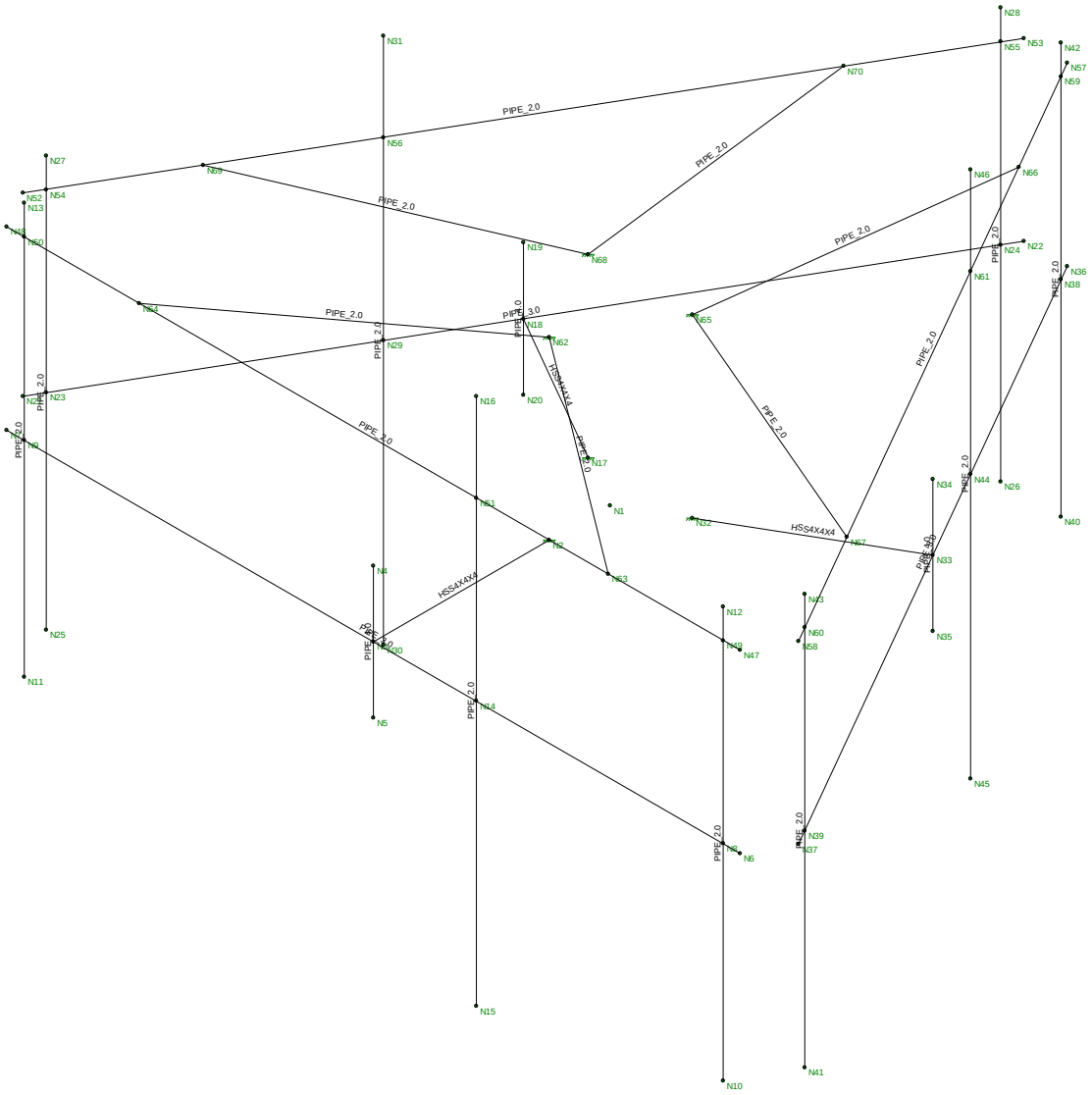
Surface Area for One TMA w/ Ice =	$SA_{ICETMAF} := \frac{(L_{TMA} + 2 \cdot t_{iz}) \cdot (W_{TMA} + 2 \cdot t_{iz})}{144} = 1$	sf
Total TMA Wind Force w/ Ice =	$Fi_{TMA} := qz_{ice} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{ICETMAF} = 12$	lbs
Surface Area for One TMA w/ Ice =	$SA_{ICETMAS} := \frac{(L_{TMA} + 2 \cdot t_{iz}) \cdot (T_{TMA} + 2 \cdot t_{iz})}{144} = 0.7$	sf
Total TMA Wind Force w/ Ice =	$Fi_{TMA} := qz_{ice} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{ICETMAS} = 8$	lbs

Gravity Load (without ice)

Weight of All TMAs =	$WT_{TMA} \cdot N_{TMA} = 11$	lbs

Gravity Loads (ice only)

Volume of Each TMA =	$V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 196$	cu in
Volume of Ice on Each TMA =	$V_{ice} := (L_{TMA} + 2 \cdot t_{iz}) \cdot (W_{TMA} + 2 \cdot t_{iz}) \cdot (T_{TMA} + 2 \cdot t_{iz}) - V_{TMA} = 1023$	cu in
Weight of Ice on Each TMA =	$W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 33$	lbs
Weight of Ice on All TMAs =	$W_{ICETMA} \cdot N_{TMA} = 33$	lbs



Envelope Only Solution

Centek		
FJP	CTHA231A_AMA	May 15, 2019 at 2:28 PM
19027.56	Member Framing	CTHA231A_AMA.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI S100-12: ASD
Wood Code	AWC NDS-12: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-14
Masonry Code	ACI 530-11: ASD
Aluminum Code	AA ADM1-10: ASD - Building
Stainless Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	No
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	1
Cd X	1
Rho Z	1
Rho X	1
Footing Overturning Safety Factor	1
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	150.001
Footing Concrete f'c (ksi)	4
Footing Concrete Ec (ksi)	3644
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	2
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1...	Density[k/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	58	1.2
3	A992	29000	11154	.3	.65	.49	50	1.1	58	1.2
4	A500 Gr.42	29000	11154	.3	.65	.49	42	1.3	58	1.1
5	A500 Gr.46	29000	11154	.3	.65	.49	46	1.2	58	1.1
6	A53 Grade B	29000	11154	.3	.65	.49	35	1.5	58	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	(E)Outrigger	HSS4X4X4	Beam	Tube	A500 Gr.46	Typical	3.37	7.8	7.8	12.8
2	(E) Horz	PIPE_3.0	Beam	Pipe	A53 Grade B	Typical	2.07	2.85	2.85	5.69
3	(E)Antenna Mast	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	Vert	PIPE_4.0	Column	Pipe	A53 Grade B	Typical	2.96	6.82	6.82	13.6
5	(P) Antenna Mast	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
6	(P) Stabilizer	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	(E)Outrigger	3			Lbyy						Lateral
2	M2	Vert	2.25			Lbyy						Lateral
3	M3	(E) Horz	12.5	Segment	Segment	Segment	Segment	Segme...				Lateral
4	M4	(E)Antenna ...	7			Lbyy						Lateral
5	M5	(E)Antenna ...	7			Lbyy						Lateral
6	M6	(P) Antenna...	9			Lbyy						Lateral
7	M7	(E)Outrigger	3			Lbyy						Lateral
8	M8	Vert	2.25			Lbyy						Lateral
9	M9	(E) Horz	12.5	Segment	Segment	Segment	Segment	Segme...				Lateral
10	M10	(E)Antenna ...	7			Lbyy						Lateral
11	M11	(E)Antenna ...	7			Lbyy						Lateral
12	M12	(P) Antenna...	9			Lbyy						Lateral
13	M13	(E)Outrigger	3			Lbyy						Lateral
14	M14	Vert	2.25			Lbyy						Lateral
15	M15	(E) Horz	12.5	Segment	Segment	Segment	Segment	Segme...				Lateral
16	M16	(E)Antenna ...	7			Lbyy						Lateral
17	M17	(E)Antenna ...	7			Lbyy						Lateral
18	M18	(P) Antenna...	9			Lbyy						Lateral
19	M19	(P) Stabilizer	12.5	Segment	Segment	Segment	Segment	Segme...				Lateral
20	M20	(P) Stabilizer	12.5	Segment	Segment	Segment	Segment	Segme...				Lateral
21	M21	(P) Stabilizer	12.5	Segment	Segment	Segment	Segment	Segme...				Lateral
22	M22	(P) Stabilizer	5			Lbyy						Lateral
23	M23	(P) Stabilizer	5			Lbyy						Lateral
24	M24	(P) Stabilizer	5			Lbyy						Lateral
25	M25	(P) Stabilizer	5			Lbyy						Lateral
26	M26	(P) Stabilizer	5			Lbyy						Lateral
27	M27	(P) Stabilizer	5			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
1	M1	N2	N3			(E)Outrigger	Beam	Tube	A500 Gr...	Typical
2	M2	N4	N5			Vert	Column	Pipe	A53 Gra...	Typical
3	M3	N7	N6			(E) Horz	Beam	Pipe	A53 Gra...	Typical
4	M4	N11	N13			(E)Antenna Mast	Column	Pipe	A53 Gra...	Typical
5	M5	N10	N12			(E)Antenna Mast	Column	Pipe	A53 Gra...	Typical
6	M6	N15	N16			(P) Antenna Mast	Column	Pipe	A53 Gra...	Typical
7	M7	N17	N18			(E)Outrigger	Beam	Tube	A500 Gr...	Typical
8	M8	N19	N20			Vert	Column	Pipe	A53 Gra...	Typical
9	M9	N22	N21			(E) Horz	Beam	Pipe	A53 Gra...	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
10	M10	N26	N28			(E)Antenna Mast	Column	Pipe	A53 Gra...	Typical
11	M11	N25	N27			(E)Antenna Mast	Column	Pipe	A53 Gra...	Typical
12	M12	N30	N31			(P) Antenna Mast	Column	Pipe	A53 Gra...	Typical
13	M13	N32	N33			(E)Outrigger	Beam	Tube	A500 Gr...	Typical
14	M14	N34	N35			Vert	Column	Pipe	A53 Gra...	Typical
15	M15	N37	N36			(E) Horz	Beam	Pipe	A53 Gra...	Typical
16	M16	N41	N43			(E)Antenna Mast	Column	Pipe	A53 Gra...	Typical
17	M17	N40	N42			(E)Antenna Mast	Column	Pipe	A53 Gra...	Typical
18	M18	N45	N46			(P) Antenna Mast	Column	Pipe	A53 Gra...	Typical
19	M19	N48	N47			(P) Stabilizer	Beam	Pipe	A53 Gra...	Typical
20	M20	N53	N52			(P) Stabilizer	Beam	Pipe	A53 Gra...	Typical
21	M21	N58	N57			(P) Stabilizer	Beam	Pipe	A53 Gra...	Typical
22	M22	N64	N62			(P) Stabilizer	Beam	Pipe	A53 Gra...	Typical
23	M23	N62	N63			(P) Stabilizer	Beam	Pipe	A53 Gra...	Typical
24	M24	N67	N65			(P) Stabilizer	Beam	Pipe	A53 Gra...	Typical
25	M25	N65	N66			(P) Stabilizer	Beam	Pipe	A53 Gra...	Typical
26	M26	N70	N68			(P) Stabilizer	Beam	Pipe	A53 Gra...	Typical
27	M27	N68	N69			(P) Stabilizer	Beam	Pipe	A53 Gra...	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
1	N1	0	0	0	0	
2	N2	0	0	1.03125	0	
3	N3	0	0	4.03125	0	
4	N4	0	1.125	4.03125	0	
5	N5	0	-1.125	4.03125	0	
6	N6	6.25	0	4.03125	0	
7	N7	-6.25	0	4.03125	0	
8	N8	5.958333	0	4.03125	0	
9	N9	-5.958333	0	4.03125	0	
10	N10	5.958333	-3.5	4.03125	0	
11	N11	-5.958333	-3.5	4.03125	0	
12	N12	5.958333	3.5	4.03125	0	
13	N13	-5.958333	3.5	4.03125	0	
14	N14	1.75	0	4.03125	0	
15	N15	1.75	-4.5	4.03125	0	
16	N16	1.75	4.5	4.03125	0	
17	N17	-0.893089	0	-0.515625	0	
18	N18	-3.491165	0	-2.015625	0	
19	N19	-3.491165	1.125	-2.015625	0	
20	N20	-3.491165	-1.125	-2.015625	0	
21	N21	-6.616165	0	3.397034	0	
22	N22	-0.366165	0	-7.428284	0	
23	N23	-6.470332	0	3.144443	0	
24	N24	-0.511998	0	-7.175693	0	
25	N25	-6.470332	-3.5	3.144443	0	
26	N26	-0.511998	-3.5	-7.175693	0	
27	N27	-6.470332	3.5	3.144443	0	
28	N28	-0.511998	3.5	-7.175693	0	
29	N29	-4.366165	0	-0.500081	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
30	N30	-4.366165	-4.5	-0.500081	0	
31	N31	-4.366165	4.5	-0.500081	0	
32	N32	0.893089	0	-0.515625	0	
33	N33	3.491165	0	-2.015625	0	
34	N34	3.491165	1.125	-2.015625	0	
35	N35	3.491165	-1.125	-2.015625	0	
36	N36	0.366165	0	-7.428284	0	
37	N37	6.616165	0	3.397034	0	
38	N38	0.511998	0	-7.175693	0	
39	N39	6.470332	0	3.144443	0	
40	N40	0.511998	-3.5	-7.175693	0	
41	N41	6.470332	-3.5	3.144443	0	
42	N42	0.511998	3.5	-7.175693	0	
43	N43	6.470332	3.5	3.144443	0	
44	N44	2.616165	0	-3.531169	0	
45	N45	2.616165	-4.5	-3.531169	0	
46	N46	2.616165	4.5	-3.531169	0	
47	N47	6.25	3	4.03125	0	
48	N48	-6.25	3	4.03125	0	
49	N49	5.958333	3	4.03125	0	
50	N50	-5.958333	3	4.03125	0	
51	N51	1.75	3	4.03125	0	
52	N52	-6.616165	3	3.397034	0	
53	N53	-0.366165	3	-7.428284	0	
54	N54	-6.470332	3	3.144443	0	
55	N55	-0.511998	3	-7.175693	0	
56	N56	-4.366165	3	-0.500081	0	
57	N57	0.366165	3	-7.428284	0	
58	N58	6.616165	3	3.397034	0	
59	N59	0.511998	3	-7.175693	0	
60	N60	6.470332	3	3.144443	0	
61	N61	2.616165	3	-3.531169	0	
62	N62	0	3	1.03125	0	
63	N63	4	3	4.03125	0	
64	N64	-4	3	4.03125	0	
65	N65	0.893089	3	-0.515625	0	
66	N66	1.491165	3	-5.479727	0	
67	N67	5.491165	3	1.448477	0	
68	N68	-0.893089	3	-0.515625	0	
69	N69	-5.491165	3	1.448477	0	
70	N70	-1.491165	3	-5.479727	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N2	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N17	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N32	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N62	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	N65	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
6	N68	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Y	-.046	1.833
2	M5	Y	-.046	5.333
3	M6	Y	-.076	1.375
4	M6	Y	-.076	7.625
5	M4	Y	-.067	1.833
6	M4	Y	-.067	5.333
7	M11	Y	-.046	1.833
8	M11	Y	-.046	5.333
9	M12	Y	-.076	1.375
10	M12	Y	-.076	7.625
11	M10	Y	-.067	1.833
12	M10	Y	-.067	5.333
13	M17	Y	-.046	1.833
14	M17	Y	-.046	5.333
15	M18	Y	-.076	1.375
16	M18	Y	-.076	7.625
17	M16	Y	-.067	1.833
18	M16	Y	-.067	5.333
19	M6	Y	-.074	6
20	M12	Y	-.074	6
21	M18	Y	-.074	6
22	M5	Y	-.011	6
23	M11	Y	-.011	6
24	M17	Y	-.011	6

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Y	-.121	1.833
2	M5	Y	-.121	5.333
3	M6	Y	-.301	1.375
4	M6	Y	-.301	7.625
5	M4	Y	-.129	1.833
6	M4	Y	-.129	5.333
7	M11	Y	-.121	1.833
8	M11	Y	-.121	5.333
9	M12	Y	-.301	1.375
10	M12	Y	-.301	7.625
11	M10	Y	-.129	1.833
12	M10	Y	-.129	5.333
13	M17	Y	-.121	1.833
14	M17	Y	-.121	5.333
15	M18	Y	-.301	1.375
16	M18	Y	-.301	7.625
17	M16	Y	-.129	1.833
18	M16	Y	-.129	5.333
19	M6	Y	-.105	6
20	M12	Y	-.105	6
21	M18	Y	-.105	6
22	M5	Y	-.033	6
23	M11	Y	-.033	6

Member Point Loads (BLC 3 : Ice Load) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
24	M17	Y	-.033	6

Member Point Loads (BLC 4 : Wind with Ice X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	X	.032	1.833
2	M5	X	.032	5.333
3	M6	X	.056	1.375
4	M6	X	.056	7.625
5	M4	X	.035	1.833
6	M4	X	.035	5.333
7	M11	X	.043	1.833
8	M11	X	.043	5.333
9	M12	X	.118	1.375
10	M12	X	.118	7.625
11	M10	X	.044	1.833
12	M10	X	.044	5.333
13	M17	X	.043	1.833
14	M17	X	.043	5.333
15	M18	X	.118	1.375
16	M18	X	.118	7.625
17	M16	X	.044	1.833
18	M16	X	.044	5.333
19	M6	X	.023	6
20	M12	X	.027	6
21	M18	X	.027	6
22	M5	X	.008	6
23	M11	X	.012	6
24	M17	X	.012	6

Member Point Loads (BLC 5 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	X	.07	1.833
2	M5	X	.07	5.333
3	M6	X	.129	1.375
4	M6	X	.129	7.625
5	M4	X	.077	1.833
6	M4	X	.077	5.333
7	M11	X	.107	1.833
8	M11	X	.107	5.333
9	M12	X	.356	1.375
10	M12	X	.356	7.625
11	M10	X	.112	1.833
12	M10	X	.112	5.333
13	M17	X	.107	1.833
14	M17	X	.107	5.333
15	M18	X	.356	1.375
16	M18	X	.356	7.625
17	M16	X	.112	1.833
18	M16	X	.112	5.333
19	M12	X	.058	6
20	M18	X	.058	6

Member Point Loads (BLC 5 : Wind X) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
21	M6	X	.045	6
22	M5	X	.008	6
23	M11	X	.017	6
24	M17	X	.017	6

Member Point Loads (BLC 6 : Wind with Ice Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Z	.043	1.833
2	M5	Z	.043	5.333
3	M6	Z	.118	1.375
4	M6	Z	.118	7.625
5	M4	Z	.044	1.833
6	M4	Z	.044	5.333
7	M11	Z	.032	1.833
8	M11	Z	.032	5.333
9	M12	Z	.056	1.375
10	M12	Z	.056	7.625
11	M10	Z	.035	1.833
12	M10	Z	.035	5.333
13	M17	Z	.032	1.833
14	M17	Z	.032	5.333
15	M18	Z	.056	1.375
16	M18	Z	.056	7.625
17	M16	Z	.035	1.833
18	M16	Z	.035	5.333
19	M6	Z	.027	6
20	M12	Z	.023	6
21	M18	Z	.023	6
22	M5	Z	.012	6
23	M11	Z	.008	6
24	M17	Z	.008	6

Member Point Loads (BLC 7 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Z	.107	1.833
2	M5	Z	.107	5.333
3	M6	Z	.356	1.375
4	M6	Z	.356	7.625
5	M4	Z	.112	1.833
6	M4	Z	.112	5.333
7	M11	Z	.07	1.833
8	M11	Z	.07	5.333
9	M12	Z	.129	1.375
10	M12	Z	.129	7.625
11	M10	Z	.077	1.833
12	M10	Z	.077	5.333
13	M17	Z	.07	1.833
14	M17	Z	.07	5.333
15	M18	Z	.129	1.375
16	M18	Z	.129	7.625
17	M16	Z	.077	1.833

Member Point Loads (BLC 7 : Wind Z) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
18	M16	Z	.077	5.333
19	M12	Z	.045	6
20	M18	Z	.045	6
21	M6	Z	.058	6
22	M5	Z	.017	6
23	M11	Z	.008	6
24	M17	Z	.008	6

Member Distributed Loads (BLC 4 : Wind with Ice X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M4	X	.002	.002	0	0
2	M5	X	.002	.002	0	0
3	M6	X	.002	.002	0	0
4	M9	X	.003	.003	0	0
5	M15	X	.003	.003	0	0
6	M20	X	.002	.002	0	0
7	M21	X	.002	.002	0	0
8	M1	X	.003	.003	0	0
9	M2	X	.003	.003	0	0
10	M7	X	.003	.003	0	0
11	M8	X	.003	.003	0	0
12	M13	X	.003	.003	0	0
13	M14	X	.003	.003	0	0

Member Distributed Loads (BLC 5 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M4	X	.007	.007	0	0
2	M5	X	.007	.007	0	0
3	M6	X	.008	.008	0	0
4	M9	X	.008	.008	0	0
5	M15	X	.008	.008	0	0
6	M20	X	.007	.007	0	0
7	M21	X	.007	.007	0	0
8	M1	X	.011	.011	0	0
9	M2	X	.012	.012	0	0
10	M7	X	.011	.011	0	0
11	M8	X	.012	.012	0	0
12	M13	X	.011	.011	0	0
13	M14	X	.012	.012	0	0

Member Distributed Loads (BLC 6 : Wind with Ice Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M3	Z	.003	.003	0	0
2	M9	Z	.003	.003	0	0
3	M11	Z	.002	.002	0	0
4	M12	Z	.002	.002	0	0
5	M15	Z	.002	.002	0	0
6	M16	Z	.002	.002	0	0
7	M17	Z	.002	.002	0	0

Member Distributed Loads (BLC 6 : Wind with Ice Z) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
8	M18	Z	.002	.002	0	0
9	M19	Z	.002	.002	0	0
10	M20	Z	.002	.002	0	0
11	M21	Z	.002	.002	0	0
12	M2	Z	.003	.003	0	0
13	M7	Z	.003	.003	0	0
14	M8	Z	.003	.003	0	0
15	M13	Z	.003	.003	0	0
16	M14	Z	.003	.003	0	0

Member Distributed Loads (BLC 7 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M3	Z	.009	.009	0	0
2	M9	Z	.009	.009	0	0
3	M15	Z	.007	.007	0	0
4	M19	Z	.007	.007	0	0
5	M20	Z	.007	.007	0	0
6	M21	Z	.007	.007	0	0
7	M16	Z	.007	.007	0	0
8	M17	Z	.007	.007	0	0
9	M18	Z	.003	.003	0	0
10	M11	Z	.007	.007	0	0
11	M12	Z	.003	.003	0	0
12	M2	Z	.012	.012	0	0
13	M7	Z	.012	.012	0	0
14	M8	Z	.012	.012	0	0
15	M13	Z	.012	.012	0	0
16	M14	Z	.012	.012	0	0

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribu...	Area(M...	Surface...
1	Self Weight	None		-1						
2	Dead Load	None					24			
3	Ice Load	None					24			
4	Wind with Ice X	None					24	13		
5	Wind X	None					24	13		
6	Wind with Ice Z	None					24	16		
7	Wind Z	None					24	16		

Load Combinations

	Description	Solve	PDel...	S...	B...	Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.2D + 1.6W (X-dire...	Yes	Y		1	1.2	2	1.2	5	1.6														
2	0.9D + 1.6W (X-dire...	Yes	Y		1	.9	2	.9	5	1.6														
3	1.2D + 1.0Di + 1.0Wi...	Yes	Y		1	1.2	2	1.2	3	1	4	1												
4	1.2D + 1.6W (Z-direc...	Yes	Y		1	1.2	2	1.2	7	1.6														
5	0.9D + 1.6W (Z-direc...	Yes	Y		1	.9	2	.9	7	1.6														
6	1.2D + 1.0Di + 1.0Wi...	Yes	Y		1	1.2	2	1.2	3	1	6	1												

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N2	max	.299	6	1.88	3	.256	3	-.009	5	1.707	4	.701	3
2		min	-1.152	2	.586	5	-1.45	5	-5.043	3	-3.384	2	-.103	5
3	N17	max	.067	5	1.883	6	.134	3	1.968	3	1.611	1	-1.836	5
4		min	-1.759	1	.589	2	-1.231	5	.902	5	-3.723	5	-5.026	3
5	N32	max	.055	6	1.882	6	-.369	2	3.247	6	4.492	1	4.084	6
6		min	-1.67	2	.579	2	-1.321	4	.141	2	1.001	6	.136	2
7	N62	max	-.156	5	.284	6	-.07	2	-.021	5	.516	5	.096	3
8		min	-.309	3	.096	2	-.9	4	-.534	3	-.535	1	-.124	4
9	N65	max	.088	5	.285	3	.433	3	.379	6	.928	2	.414	6
10		min	-.694	1	.088	5	-.232	5	-.043	2	-.165	6	.086	2
11	N68	max	.318	6	.278	3	-.122	2	.176	6	-.052	2	-.2	5
12		min	-.621	2	.086	5	-.272	4	.076	2	-.755	4	-.561	3
13	Totals:	max	0	6	6.478	6	0	3						
14		min	-6.027	1	2.068	2	-5.349	4						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
1	N1	max	0	6	0	6	0	6	0	6	0	6	0	6
2		min	0	1	0	1	0	1	0	1	0	1	0	1
3	N2	max	0	6	0	6	0	6	0	6	0	6	0	6
4		min	0	1	0	1	0	1	0	1	0	1	0	1
5	N3	max	.099	1	.023	5	0	5	5.353e-03	3	4.041e-03	1	3.127e-04	5
6		min	-.066	5	-.14	3	0	3	-2.042e-03	5	-3.491e-03	5	-2.121e-03	3
7	N4	max	.099	1	.023	5	.072	3	5.353e-03	3	4.041e-03	1	3.127e-04	5
8		min	-.071	5	-.14	3	-.027	5	-2.038e-03	5	-3.491e-03	5	-2.121e-03	3
9	N5	max	.1	2	.023	5	.028	5	5.352e-03	3	4.041e-03	1	3.127e-04	5
10		min	-.064	4	-.14	3	-.072	3	-2.046e-03	5	-3.491e-03	5	-2.12e-03	3
11	N6	max	.099	2	.012	5	.771	5	2.111e-03	3	4.811e-03	1	3.605e-04	5
12		min	-.067	4	-.565	3	-.345	1	-1.028e-02	5	-1.231e-02	5	-4.931e-03	3
13	N7	max	.1	1	-.156	5	.271	2	4.401e-03	3	4.035e-03	5	3.316e-03	6
14		min	-.066	5	-.353	3	.028	6	-6.591e-03	5	7.771e-04	3	1.848e-03	2
15	N8	max	.099	2	.011	5	.728	5	2.111e-03	3	4.811e-03	1	3.606e-04	5
16		min	-.067	4	-.548	3	-.328	1	-1.028e-02	5	-1.231e-02	5	-4.931e-03	3
17	N9	max	.1	1	-.146	5	.259	2	4.401e-03	3	4.035e-03	5	3.316e-03	6
18		min	-.066	5	-.343	3	.025	6	-6.591e-03	5	7.771e-04	3	1.848e-03	2
19	N10	max	.143	2	.011	5	1.243	5	2.099e-03	3	4.811e-03	1	1.464e-03	2
20		min	-.209	6	-.548	3	-.38	1	-1.261e-02	5	-1.231e-02	5	-4.582e-03	6
21	N11	max	.281	1	-.146	5	.488	5	4.371e-03	3	4.035e-03	5	4.761e-03	1
22		min	.049	5	-.343	3	-.124	3	-9.036e-03	5	7.771e-04	3	2.74e-03	5
23	N12	max	.146	1	.011	5	.315	5	9.845e-04	3	4.699e-03	1	8.415e-04	5
24		min	-.124	5	-.548	3	-.292	1	-8.642e-03	5	-1.059e-02	5	-3.89e-03	3
25	N13	max	.142	1	-.146	5	.304	1	3.856e-03	3	4.58e-03	1	1.467e-03	5
26		min	-.126	5	-.343	3	-.164	5	-6.308e-03	5	2.063e-03	6	-1.694e-03	3
27	N14	max	.099	1	.019	5	.15	5	3.496e-03	3	4.485e-03	1	-2.034e-04	2
28		min	-.067	5	-.242	3	-.09	1	-7.472e-03	5	-9.323e-03	5	-5.759e-03	3
29	N15	max	.58	2	.019	5	1.696	5	3.425e-03	3	4.485e-03	1	1.166e-02	2
30		min	-.322	6	-.242	3	-.237	3	-3.489e-02	5	-9.323e-03	5	-5.636e-03	6
31	N16	max	.154	1	.018	5	.096	4	7.413e-04	3	4.045e-03	1	1.166e-03	5
32		min	-.14	5	-.243	3	-.051	2	7.958e-05	5	-3.009e-03	5	-2.145e-03	3

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
33	N17	max	0	6	0	6	0	6	0	6	0	6	0	6
34		min	0	1	0	1	0	1	0	1	0	1	0	1
35	N18	max	.015	2	-.063	5	.1	4	-8.844e-04	6	5.027e-03	4	6.459e-03	3
36		min	-.057	4	-.153	3	-.025	2	-1.444e-03	1	-3.661e-04	2	2.586e-03	5
37	N19	max	-.05	2	-.063	5	.086	5	-8.837e-04	6	5.027e-03	4	6.458e-03	3
38		min	-.1	4	-.153	3	-.044	1	-1.444e-03	1	-3.661e-04	2	2.586e-03	5
39	N20	max	.091	3	-.063	5	.116	4	-8.851e-04	6	5.027e-03	4	6.46e-03	3
40		min	-.023	5	-.153	3	-.008	2	-1.444e-03	1	-3.661e-04	2	2.586e-03	5
41	N21	max	.503	4	-.193	5	.424	4	2.986e-03	6	9.939e-03	4	1.049e-02	1
42		min	.264	3	-.619	3	.144	3	-2.904e-03	2	5.235e-03	3	4.697e-03	5
43	N22	max	.375	1	-.132	5	.183	1	-2.636e-03	5	1.994e-03	5	6.895e-03	1
44		min	-.24	5	-.346	6	-.005	5	-5.385e-03	3	-7.657e-03	1	3.036e-03	6
45	N23	max	.472	4	-.186	5	.406	4	2.986e-03	6	9.939e-03	4	1.049e-02	1
46		min	.249	3	-.6	3	.135	3	-2.904e-03	2	5.235e-03	3	4.697e-03	5
47	N24	max	.352	1	-.129	5	.17	1	-2.636e-03	5	1.994e-03	5	6.895e-03	1
48		min	-.234	5	-.336	6	-.001	5	-5.385e-03	3	-7.657e-03	1	3.036e-03	6
49	N25	max	.946	1	-.186	5	.5	5	2.522e-03	3	9.939e-03	4	1.281e-02	1
50		min	.483	6	-.6	3	.029	3	-2.899e-03	2	5.235e-03	3	4.689e-03	5
51	N26	max	.729	1	-.129	5	.377	1	-4.32e-03	2	1.994e-03	5	9.333e-03	1
52		min	-.105	5	-.336	6	.17	5	-5.468e-03	6	-7.657e-03	1	3.016e-03	6
53	N27	max	.277	4	-.186	5	.398	4	2.692e-03	6	9.267e-03	4	8.431e-03	1
54		min	.05	2	-.6	3	.052	2	-2.122e-03	2	3.819e-03	3	3.619e-03	6
55	N28	max	.04	2	-.129	5	.036	2	-5.943e-04	5	3.49e-03	4	7.471e-03	1
56		min	-.43	4	-.336	6	-.016	4	-2.865e-03	1	-5.767e-03	2	4.159e-03	5
57	N29	max	.077	1	-.087	5	.171	4	3.197e-03	3	7.918e-03	4	9.815e-03	1
58		min	.041	6	-.267	3	.009	2	-8.245e-04	2	3.414e-03	3	3.658e-03	5
59	N30	max	1.748	1	-.087	5	.641	5	3.132e-03	3	7.918e-03	4	3.718e-02	1
60		min	.26	5	-.267	3	-.154	3	-1.116e-02	5	3.414e-03	3	3.642e-03	5
61	N31	max	-.01	2	-.087	5	.22	4	1.577e-03	6	5.785e-03	4	2.002e-03	4
62		min	-.075	6	-.268	3	.02	2	7.085e-04	2	5.87e-04	2	6.229e-04	2
63	N32	max	0	6	0	6	0	6	0	6	0	6	0	6
64		min	0	1	0	1	0	1	0	1	0	1	0	1
65	N33	max	.073	2	.015	2	.126	2	6.532e-04	2	-4.31e-04	6	1.458e-03	2
66		min	.01	6	-.145	6	.018	6	-4.828e-03	6	-6.604e-03	2	-3.705e-03	6
67	N34	max	.076	4	.015	2	.135	2	6.532e-04	2	-4.31e-04	6	1.454e-03	2
68		min	.054	2	-.145	6	-.047	6	-4.828e-03	6	-6.604e-03	2	-3.705e-03	6
69	N35	max	.093	2	.015	2	.122	1	6.532e-04	2	-4.31e-04	6	1.462e-03	2
70		min	-.04	6	-.145	6	.083	6	-4.829e-03	6	-6.604e-03	2	-3.705e-03	6
71	N36	max	.881	2	-.044	2	.112	6	4.697e-03	2	3.482e-03	6	7.491e-03	2
72		min	-.152	6	-.595	6	-.34	2	-5.907e-03	6	-1.423e-02	2	-2.989e-03	4
73	N37	max	-.016	3	-.155	5	.304	4	5.338e-03	1	-1.019e-04	3	3.381e-03	2
74		min	-.356	4	-.351	3	.047	3	-1.186e-03	5	-7.35e-03	4	-5.971e-03	6
75	N38	max	.838	2	-.046	2	.106	6	4.697e-03	2	3.482e-03	6	7.491e-03	2
76		min	-.142	6	-.577	6	-.315	2	-5.907e-03	6	-1.423e-02	2	-2.989e-03	4
77	N39	max	-.016	3	-.146	2	.291	4	5.338e-03	1	-1.019e-04	3	3.381e-03	2
78		min	-.334	4	-.339	3	.047	3	-1.186e-03	5	-7.35e-03	4	-5.971e-03	6
79	N40	max	1.236	2	-.046	2	.373	6	4.69e-03	2	3.482e-03	6	9.83e-03	2
80		min	-.142	6	-.577	6	-.512	2	-6.437e-03	6	-1.423e-02	2	-2.983e-03	5
81	N41	max	.164	2	-.146	2	.423	5	5.322e-03	1	-1.019e-04	3	5.833e-03	2
82		min	-.543	4	-.339	3	-.015	1	-3.643e-03	5	-7.35e-03	4	-5.93e-03	6
83	N42	max	.572	2	-.045	2	-.004	5	4.406e-03	2	2.267e-03	6	6.049e-03	1
84		min	-.119	6	-.577	6	-.066	1	-4.288e-03	6	-1.302e-02	2	-2.762e-03	5

Envelope Joint Displacements (Continued)

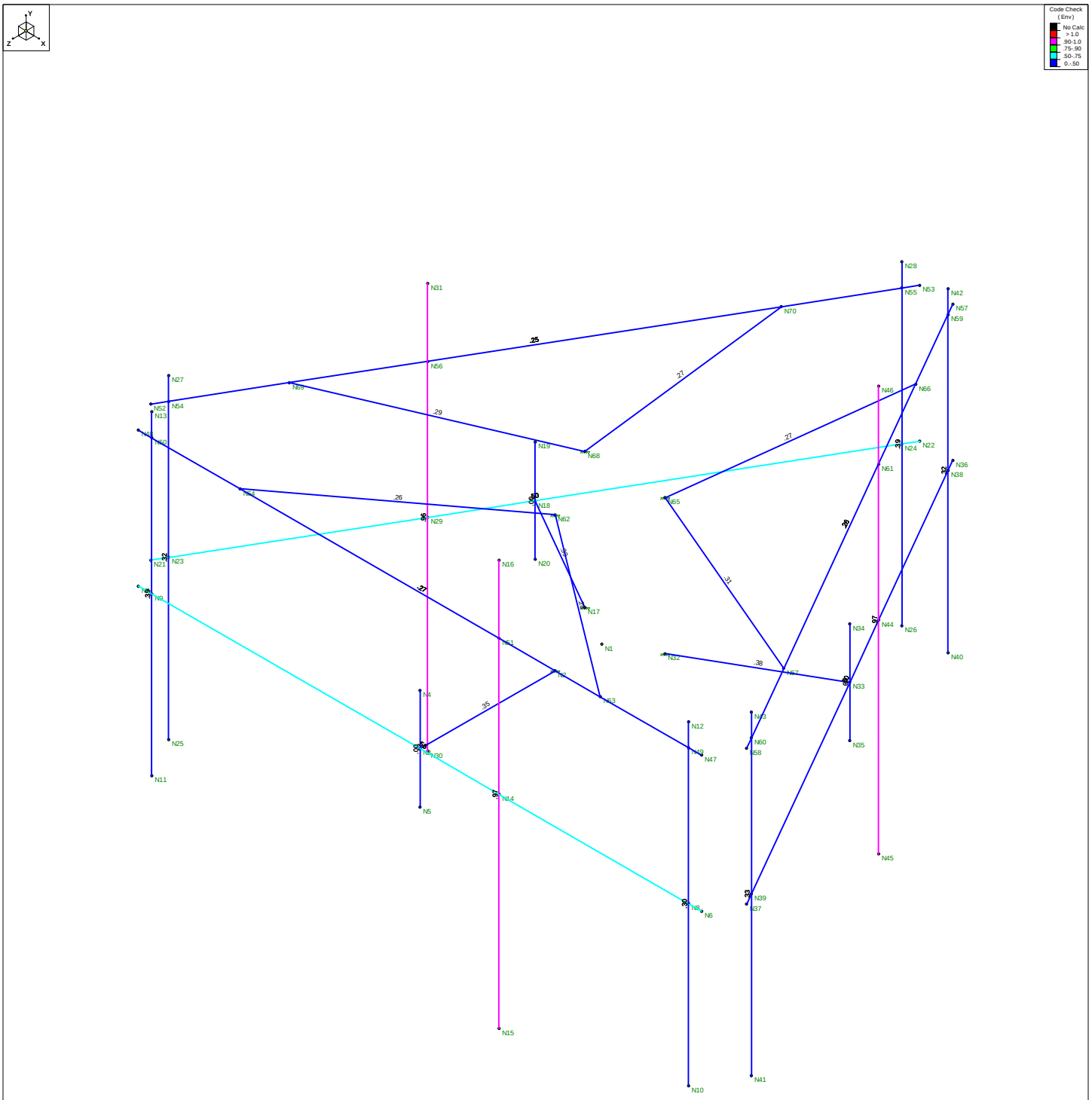
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
85	N43	max	.053	6	-.146	2	.403	2	4.197e-03	2	1.086e-03	3	3.612e-03	2
86		min	-.229	2	-.339	3	-.09	6	-3.707e-03	6	-6.512e-03	5	-4.04e-03	4
87	N44	max	.25	2	-.01	2	.058	4	1.693e-03	2	2.018e-03	6	6.424e-03	2
88		min	-.008	6	-.255	6	.02	3	-7.524e-03	6	-1.156e-02	2	-1.783e-03	4
89	N45	max	1.739	2	-.01	2	.729	4	1.686e-03	2	2.018e-03	6	3.384e-02	2
90		min	-.026	4	-.256	6	-.067	2	-1.484e-02	4	-1.156e-02	2	-1.773e-03	4
91	N46	max	.255	2	-.01	2	.148	2	1.514e-03	2	2.23e-03	6	3.983e-04	3
92		min	-.012	6	-.256	6	-.085	6	-2.095e-03	6	-5.752e-03	2	-8.113e-04	1
93	N47	max	.139	1	.014	5	.404	5	9.845e-04	3	4.699e-03	1	8.414e-04	5
94		min	-.119	5	-.562	3	-.313	1	-8.642e-03	5	-1.059e-02	5	-3.889e-03	3
95	N48	max	.138	1	-.151	5	.312	1	3.856e-03	3	4.58e-03	1	1.467e-03	5
96		min	-.118	5	-.337	3	-.116	5	-6.308e-03	5	2.063e-03	6	-1.693e-03	3
97	N49	max	.139	1	.011	5	.367	5	9.845e-04	3	4.699e-03	1	8.415e-04	5
98		min	-.119	5	-.548	3	-.297	1	-8.642e-03	5	-1.059e-02	5	-3.889e-03	3
99	N50	max	.138	1	-.146	5	.296	1	3.856e-03	3	4.58e-03	1	1.467e-03	5
100		min	-.118	5	-.343	3	-.126	5	-6.308e-03	5	2.063e-03	6	-1.693e-03	3
101	N51	max	.139	1	.018	5	.093	4	7.396e-04	3	4.045e-03	1	1.166e-03	5
102		min	-.119	5	-.243	3	-.062	2	3.55e-05	5	-3.009e-03	5	-2.124e-03	3
103	N52	max	.332	4	-.193	5	.414	4	2.691e-03	6	9.267e-03	4	8.431e-03	1
104		min	.118	2	-.615	3	.076	2	-2.121e-03	2	3.819e-03	3	3.619e-03	6
105	N53	max	.1	2	-.124	5	.063	2	-5.944e-04	5	3.489e-03	4	7.471e-03	1
106		min	-.413	4	-.329	6	-.018	4	-2.865e-03	1	-5.767e-03	2	4.159e-03	5
107	N54	max	.304	4	-.186	5	.398	4	2.691e-03	6	9.267e-03	4	8.431e-03	1
108		min	.099	2	-.6	3	.065	2	-2.122e-03	2	3.819e-03	3	3.619e-03	6
109	N55	max	.083	2	-.129	5	.053	2	-5.943e-04	5	3.49e-03	4	7.471e-03	1
110		min	-.402	4	-.336	6	-.012	4	-2.865e-03	1	-5.767e-03	2	4.159e-03	5
111	N56	max	.001	2	-.087	5	.207	4	1.557e-03	6	5.785e-03	4	2.001e-03	4
112		min	-.039	6	-.268	3	.008	2	6.827e-04	5	5.87e-04	2	6.667e-04	2
113	N57	max	.648	2	-.043	2	.02	6	4.406e-03	2	2.267e-03	6	6.049e-03	1
114		min	-.123	6	-.591	6	-.114	2	-4.289e-03	6	-1.302e-02	2	-2.762e-03	5
115	N58	max	.034	3	-.151	5	.381	2	4.197e-03	2	1.086e-03	3	3.612e-03	2
116		min	-.213	2	-.335	3	-.068	6	-3.707e-03	6	-6.512e-03	5	-4.04e-03	4
117	N59	max	.608	2	-.045	2	.016	6	4.406e-03	2	2.267e-03	6	6.049e-03	1
118		min	-.116	6	-.577	6	-.091	2	-4.288e-03	6	-1.302e-02	2	-2.762e-03	5
119	N60	max	.033	6	-.146	2	.378	2	4.197e-03	2	1.086e-03	3	3.612e-03	2
120		min	-.208	2	-.339	3	-.068	6	-3.707e-03	6	-6.512e-03	5	-4.04e-03	4
121	N61	max	.24	2	-.01	2	.121	2	1.513e-03	2	2.23e-03	6	4.066e-04	3
122		min	-.006	6	-.256	6	-.047	6	-2.106e-03	6	-5.752e-03	2	-7.92e-04	4
123	N62	max	0	6	0	6	0	6	0	6	0	6	0	6
124		min	0	1	0	1	0	1	0	1	0	1	0	1
125	N63	max	.139	1	.016	5	.163	5	2.369e-03	3	5.011e-03	1	-7.815e-04	5
126		min	-.12	5	-.392	3	-.185	1	-3.526e-03	5	-5.242e-03	5	-7.848e-03	3
127	N64	max	.138	1	-.096	5	.184	1	4.503e-03	3	4.745e-03	1	3.336e-03	6
128		min	-.117	5	-.316	3	-.154	5	-2.553e-03	5	-1.712e-03	5	2.026e-03	2
129	N65	max	0	6	0	6	0	6	0	6	0	6	0	6
130		min	0	1	0	1	0	1	0	1	0	1	0	1
131	N66	max	.375	2	-.024	2	.043	2	-1.162e-05	2	2.443e-03	6	3.58e-03	1
132		min	-.072	6	-.412	6	-.009	6	-8.576e-03	6	-8.572e-03	2	-6.246e-04	5
133	N67	max	.028	6	-.097	2	.341	2	3.015e-03	1	6.277e-04	6	6.128e-04	2
134		min	-.144	2	-.313	6	-.065	6	-7.403e-04	5	-5.721e-03	2	-5.735e-03	6
135	N68	max	0	6	0	6	0	6	0	6	0	6	0	6
136		min	0	1	0	1	0	1	0	1	0	1	0	1

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
137	N69	max	.126	4	-.137	5	.295	4	5.787e-03	3	7.783e-03	4	7.058e-03	3
138		min	.007	2	-.43	3	.012	2	6.052e-04	5	1.712e-03	2	3.234e-03	5
139	N70	max	-.006	2	-.131	5	.039	4	-2.499e-03	5	5.39e-03	4	4.414e-03	1
140		min	-.315	4	-.315	3	.002	2	-5.063e-03	3	-2.017e-03	2	2.166e-03	5

Envelope AISC 14th(360-10): LRFD Steel Code Checks

	Member	Shape	Code Check	Lo...	LC	She...	Lo...	...	...	phi*P...	phi*P...	phi*...	phi*...	...	Eqn
1	M6	PIPE_2.0	.972	4.5	4	.182	7.5		4	12.144	32.13	1.872	1.872	...	H1-...
2	M18	PIPE_2.0	.971	4.5	1	.172	7.5		1	12.144	32.13	1.872	1.872	...	H1-...
3	M12	PIPE_2.0	.961	4.5	1	.155	7.5		2	12.144	32.13	1.872	1.872	...	H1-...
4	M3	PIPE_3.0	.559	6.25	4	.339	6.25		4	53.919	65.205	5.749	5.749	...	H3-6
5	M9	PIPE_3.0	.503	6.25	1	.238	6.25		2	53.919	65.205	5.749	5.749	...	H1-...
6	M15	PIPE_3.0	.499	6.25	1	.300	6.25		1	53.919	65.205	5.749	5.749	...	H3-6
7	M7	HSS4X4X4	.390	0	4	.108	0	y	3	134....	139....	16.181	16.181	...	H1-...
8	M4	PIPE_2.0	.388	3.5	3	.073	3.5		3	17.855	32.13	1.872	1.872	...	H1-...
9	M10	PIPE_2.0	.385	3.5	6	.074	3.5		6	17.855	32.13	1.872	1.872	...	H1-...
10	M13	HSS4X4X4	.382	0	6	.106	0	y	6	134....	139....	16.181	16.181	...	H1-...
11	M1	HSS4X4X4	.349	0	3	.100	0	y	3	134....	139....	16.181	16.181	...	H1-...
12	M16	PIPE_2.0	.333	3.5	6	.068	6.49		6	17.855	32.13	1.872	1.872	...	H1-...
13	M17	PIPE_2.0	.324	3.5	6	.063	3.5		6	17.855	32.13	1.872	1.872	...	H1-...
14	M11	PIPE_2.0	.316	3.5	3	.071	3.5		1	17.855	32.13	1.872	1.872	...	H1-...
15	M24	PIPE_2.0	.306	5	1	.051	5		2	23.809	32.13	1.872	1.872	...	H1-...
16	M5	PIPE_2.0	.301	3.5	6	.059	6.0...		4	17.855	32.13	1.872	1.872	...	H1-...
17	M27	PIPE_2.0	.289	0	6	.045	0		6	23.809	32.13	1.872	1.872	...	H1-...
18	M23	PIPE_2.0	.281	0	3	.056	0		6	23.809	32.13	1.872	1.872	...	H1-...
19	M25	PIPE_2.0	.274	0	6	.057	0		3	23.809	32.13	1.872	1.872	...	H1-...
20	M19	PIPE_2.0	.270	10....	4	.182	10....		4	30.686	32.13	1.872	1.872	...	H1-...
21	M26	PIPE_2.0	.265	5	6	.055	5		1	23.809	32.13	1.872	1.872	...	H1-...
22	M21	PIPE_2.0	.261	10....	1	.163	10....		1	30.238	32.13	1.872	1.872	...	H1-...
23	M22	PIPE_2.0	.259	5	3	.056	5		5	23.809	32.13	1.872	1.872	...	H1-...
24	M20	PIPE_2.0	.246	12....	3	.136	10....		2	30.686	32.13	1.872	1.872	...	H1-...
25	M2	PIPE_4.0	.001	1.1...	1	.001	1.1...		1	91.742	93.24	10.631	10.631	...	H1-...
26	M14	PIPE_4.0	.001	1.1...	1	.001	1.1...		1	91.742	93.24	10.631	10.631	...	H1-...
27	M8	PIPE_4.0	.001	1.1...	4	.001	1.1...		5	91.742	93.24	10.631	10.631	...	H1-...



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek		
FJP	CTHA231A_AMA	May 15, 2019 at 2:27 PM
19027.56	Unity Check	CTHA231A_AMA.r3d

Exhibit F

Power Density/RF Emissions Report

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: CTHA231A

HA231/Berlin FD Tower
1657 Berlin Turnpike
Berlin, Connecticut 06037

May 21, 2019

EBI Project Number: 6219001698

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**12.49%**

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

EBI Consulting

environmental | engineering | due diligence

May 21, 2019

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

Emissions Analysis for Site: CTHA231A - HA231/Berlin FD Tower

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **1657 Berlin Turnpike** in **Berlin, Connecticut** 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 ($\mu W/cm^2$). 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 frequency bands 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 11 GHz frequency 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 1657 Berlin Turnpike in Berlin, Connecticut 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 manufacturer's 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 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 4 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.

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 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.

6) 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.

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

8) For the following calculations, the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufacturer's 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.

9) The antennas used in this modeling are the Ericsson AIR 21 for the 1900 MHz / 2100 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 700 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 2100 MHz channel(s) in Sector A, the Ericsson AIR 21 for the 1900 MHz / 2100 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 700 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 2100 MHz channel(s) in Sector B, the Ericsson AIR 21 for the 1900 MHz / 2100 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 700 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 2100 MHz channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's 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.

10) The antenna mounting height centerline of the proposed antennas is 160 feet above ground level (AGL).

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

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson AIR 21	Make / Model:	Ericsson AIR 21	Make / Model:	Ericsson AIR 21
Frequency Bands:	1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 2100 MHz
Gain:	15.35 dBd / 15.35 dBd	Gain:	15.35 dBd / 15.35 dBd	Gain:	15.35 dBd / 15.35 dBd
Height (AGL):	160 feet	Height (AGL):	160 feet	Height (AGL):	160 feet
Channel Count:	6	Channel Count:	6	Channel Count:	6
Total TX Power (W):	180 Watts	Total TX Power (W):	180 Watts	Total TX Power (W):	180 Watts
ERP (W):	6,169.82	ERP (W):	6,169.82	ERP (W):	6,169.82
Antenna A1 MPE %:	**0.87%**	Antenna B1 MPE %:	**0.87%**	Antenna C1 MPE %:	**0.87%**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Frequency Bands:	600 MHz / 700 MHz	Frequency Bands:	600 MHz / 700 MHz	Frequency Bands:	600 MHz / 700 MHz
Gain:	12.95 dBd / 13.35 dBd	Gain:	12.95 dBd / 13.35 dBd	Gain:	12.95 dBd / 13.35 dBd
Height (AGL):	160 feet	Height (AGL):	160 feet	Height (AGL):	160 feet
Channel Count:	4	Channel Count:	4	Channel Count:	4
Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts
ERP (W):	2,481.08	ERP (W):	2,481.08	ERP (W):	2,481.08
Antenna A2 MPE %:	**0.81%**	Antenna B2 MPE %:	**0.81%**	Antenna C2 MPE %:	**0.81%**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32
Frequency Bands:	1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 2100 MHz
Gain:	15.35 dBd / 15.85 dBd	Gain:	15.35 dBd / 15.85 dBd	Gain:	15.35 dBd / 15.85 dBd
Height (AGL):	160 feet	Height (AGL):	160 feet	Height (AGL):	160 feet
Channel Count:	4	Channel Count:	4	Channel Count:	4
Total TX Power (W):	240 Watts	Total TX Power (W):	240 Watts	Total TX Power (W):	240 Watts
ERP (W):	8,728.31	ERP (W):	8,728.31	ERP (W):	8,728.31
Antenna A3 MPE %:	**1.23%**	Antenna B3 MPE %:	**1.23%**	Antenna C3 MPE %:	**1.23%**

Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	2.90%
Town	0.24%
Sprint	2.56%
Clearwire	0.09%
AT&T	1.65%
Verizon	5.05%
Site Total MPE % :	12.49%

T-Mobile Sector A Total:	2.90%
T-Mobile Sector B Total:	2.90%
T-Mobile Sector C Total:	2.90%
Site Total:	12.49%

T-Mobile Maximum MPE Power Values (Sector A)

T-Mobile Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm²)	Frequency (MHz)	Allowable MPE (μW/cm²)	Calculated % MPE
T-Mobile 1900 MHz GSM	4	1028.30	160.0	5.78	1900 MHz GSM	1000	0.58%
T-Mobile 2100 MHz UMTS	2	1028.30	160.0	2.89	2100 MHz UMTS	1000	0.29%
T-Mobile 600 MHz LTE	2	591.73	160.0	1.66	600 MHz LTE	400	0.42%
T-Mobile 700 MHz LTE	2	648.82	160.0	1.82	700 MHz LTE	467	0.39%
T-Mobile 1900 MHz LTE	2	2056.61	160.0	5.78	1900 MHz LTE	1000	0.58%
T-Mobile 2100 MHz LTE	2	2307.55	160.0	6.48	2100 MHz LTE	1000	0.65%
						Total:	**2.90%**

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:	2.90%
Sector B:	2.90%
Sector C:	2.90%
T-Mobile Maximum MPE % (Sector A):	2.90%
Site Total:	12.49%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **12.49%** 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.

Exhibit G

Mailing Receipts/Proof of Notice

UPS Internet Shipping: View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. **GETTING YOUR SHIPMENT TO UPS**
   Customers with a Daily Pickup
   Your driver will pickup your shipment(s) as usual.

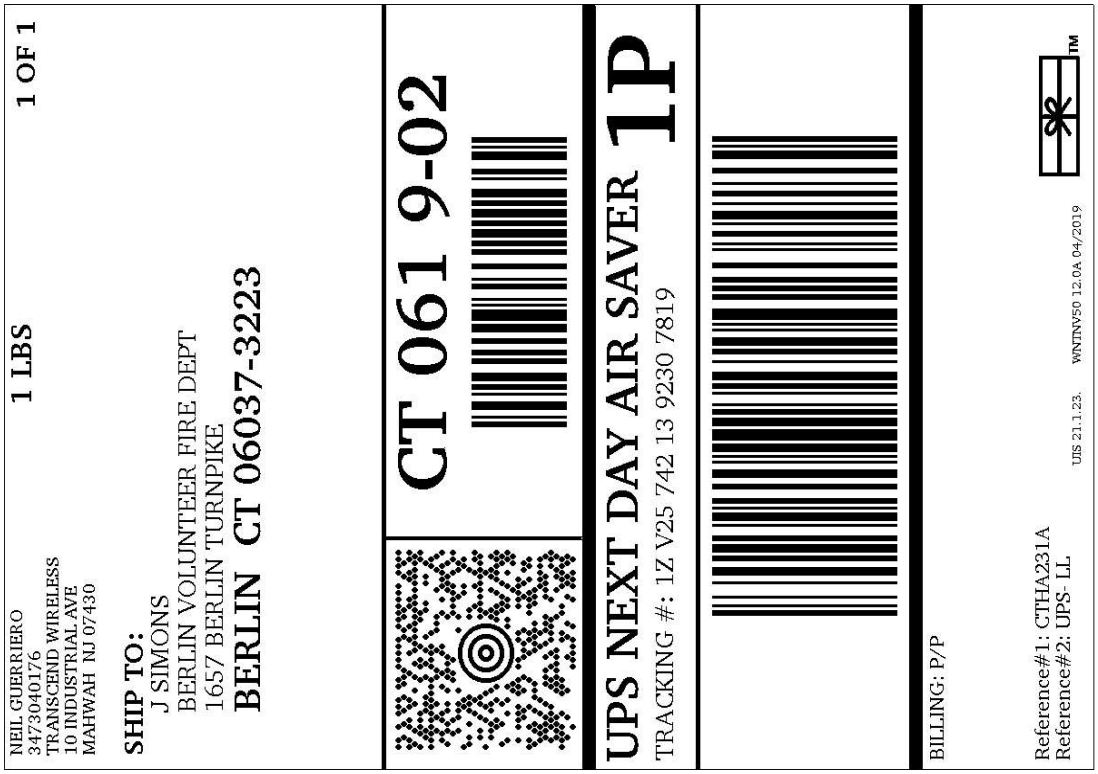
   Customers without a Daily Pickup
   Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the 'Find Locations' Quick link at ups.com.
   Schedule a same day or future day Pickup to have a UPS driver pickup all of your Internet Shipping packages.
   Hand the package to any UPS driver in your area.

UPS Access Point™
THE UPS STORE
115 FRANKLIN TPKE
MAHWAH ,NJ 07430

UPS Access Point™
THE UPS STORE
120 E MAIN ST
RAMSEY ,NJ 07446

UPS Access Point™
POSTNET 74
74 LAFAYETTE AVE
SUFFERN ,NY 10901

FOLD HERE



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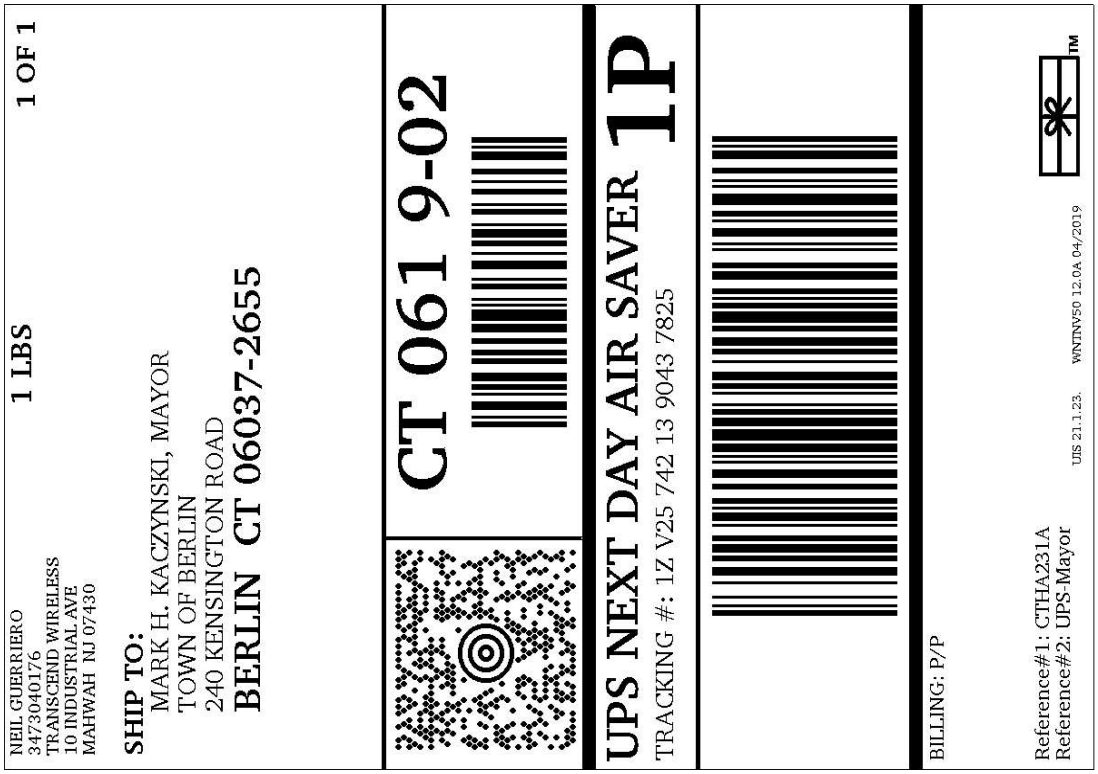

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