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

RE: Notice of Exempt Modification
720 Quinebaug Road, Thompson, CT
Latitude: 42.0228527
Longitude: -72.297361
T-Mobile Site#: CTNL193A / L600

Dear Ms. Bachman:

T-Mobile currently maintains twelve (12) antennas at the 105-foot level of the existing 125-foot monopole tower at 720 Quinebaug Road in Thompson, CT. The 125 Monopole tower and underlying property is owned by the Quinebaug Volunteer Fire Department. T-Mobile now intends to replace four (4) of its RRUs with four (4) new RRUs and will also remove four (4) additional RRUs at the 105-foot level of the tower.

Planned Modifications:

Remove:
(4) Microdata MI-554nn diplexers
(4) Ericsson 4478 remote radio heads

Remove and Replace:
RRUs:
(4) Ericsson RRUS-11 (REMOVE) - (4) Ericsson 4449 B71 B12 RRH's (REPLACE)
.
Install New:
(1) SitePro Quad-Platform w/ handrail kit

Existing to Remain:
Antennas:
(4) Ericsson AIR32 panel antennas
(4) RFS APXVAA24_43 panel antennas
(4) RFS APX16DWV-16DWVS panel antennas
(1) 2' microwave dish
Coax Cables:
(4) 1-5/8" hybriflex fiber lines and two (2) ½" coax cables

Ground:
Install new 150 Breaker
Install (1) BB6630 for LTE

This facility was approved by The Town of Thompson Planning and Zoning Commission on March 23, 1998. A copy of the minutes and decision of the Commission's meeting is attached, 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 Ken Beausoleil, First Selectman of Thompson, and Tyra Penn-Gesek, Director of Planning and Development

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:
Ken Beausoleil, First Selectman, Town of Thompson
Quinebaug Volunteer Fire Department, tower and land owner
Tyra Penn-Gesek, Director of Planning and Development

Exhibit A

Original Facility Approval

Town of Thompson

PLANNING & ZONING COMMISSION
MUNICIPAL BUILDING
ROUTE 12
NORTH GROSVENOR DALE, CONN. 06255

TEL.: 203-923-9002

MINUTES
PLANNING & ZONING COMMISSION
MARCH 23, 1998 * 7:00 PM
MERRILL SENEY COMMUNITY ROOM

5). Discussion Regarding Proposed Telecommunications Facility
720 Thompson Road; Map 120, Block 30, Lot 14, Industrial Zone
John Kowalski, Techstar Communications
John Kowalski gave a brief presentation, they received a conceptual approval from the commission last month, he has submitted new information including the 10 ft. fence, materials stating the coverage afforded, they will be located in an industrial zone, the tower will co-host two additional users on the 140 ft. monopole. They are seeking their zoning permit at this time, there is no existing tower in town that will meet their coverage. Atty. St. Onge stated the rules are up in the air at this time, in the Town's Zoning Regulations a structure is defined as all inclusive, a building is defined with the exclusion of radio and TV antennas, and that is the only difference between a building and a structure; clearly there was an intention in the regulations but it was not spelled out. It does fit in under the industrial zone, where it accepts radio & TV towers but the regulations don't list where they're permitted. The law is the Town can regulate but it can't prohibit. The Town does need a regulation to address this issue and specify the height issue, setbacks, screening, fencing, co-location, minimum lot size, signs & lights, removal, etc. The commission may want to act on this application since he already has a conceptual approval but then either a moratorium or drafting of a new regulation must begin immediately to meet the Federal requirements. John Rice noted some approval stipulations: a letter signed by the Director of CT. operations for Techstar Communications that the commission reserves the right to require other applicant's to share their tower; also that Techstar agrees to dismantle and remove at their expense if the facility is not in use for 12 consecutive months, this removal shall occur within 90 days of the end of such 12 month period; the design and plan shall indicate how the tower will collapse without encroaching upon any adjoining property if failure occurs; a report from a licensed telecommunications system engineer indicating that the proposed wireless telecommunications facility will comply with F.C.C. radio frequency emissions standards and that the installation will not interfere with public safety communications. Discussion followed. Mr. Kowalski stated there will be no lights and no signs except for a warning sign.
A Motion was made by John Rice to approve the zoning permit for a free standing 140 ft. monopole tower and in conformity with the drawings submitted upon meeting all aforementioned stipulations and reviewed by the Zoning Enforcement Officer, seconded by Randolph Blackmer. All in favor.
VOTE: 9 YES MOTION CARRIED

Discussion followed regarding amending the regulations, it could be

Exhibit B

Property card

720 QUINEBAUG RD

Location	720 QUINEBAUG RD	**Mblu**	3/ 81/ 1/ 1/
Acct#	001697	**Owner**	QUINEBAUG VOLUNTEER FIRE DEPT
Assessment	$126,600	**Appraisal**	$180,800
PID	103800	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$180,800	$0	$180,800
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$126,600	$0	$126,600

Owner of Record

Owner	QUINEBAUG VOLUNTEER FIRE DEPT	**Sale Price**	$0
Co-Owner	C/O CINGULAR WIRELESS PROP TAX DIV	**Certificate**	
Address	5405 WINDWARD PARKWAY ALPHARETTA, GA 30004	**Book & Page**	0368/0336
		Sale Date	12/19/1997

Ownership History

Ownership History				
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Sale Date**
QUINEBAUG VOLUNTEER FIRE DEPT	$0		0368/0336	12/19/1997

Building Information

Building 1 : Section 1

Year Built:
Living Area: 0
Replacement Cost: $0
Building Percent Good:
Replacement Cost Less Depreciation: $0

Building Attributes	
Field	**Description**
Style	Vacant Land
Model	
Grade:	
Stories:	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure:	
Roof Cover	

Building Photo

(http://images.vgsi.com/photos/ThompsonCTPhotos//\00\00\45/

Building Layout

(http://images.vgsi.com/photos/ThompsonCTPhotos//Sketches/1

Building Sub-Areas (sq ft)	Legend

Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Total Bthrms:	
Total Half Baths:	
Total Xtra Fixtrs:	
Total Rooms:	
Bath Style:	
Kitchen Style:	

No Data for Building Sub-Areas

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code 390A

Land Line Valuation

Size (Acres) 0

Description	DEVEL LAND MDL-00	**Frontage**	
Zone		**Depth**	
Neighborhood		**Assessed Value**	$0
Alt Land Appr	No	**Appraised Value**	$0
Category			

Outbuildings

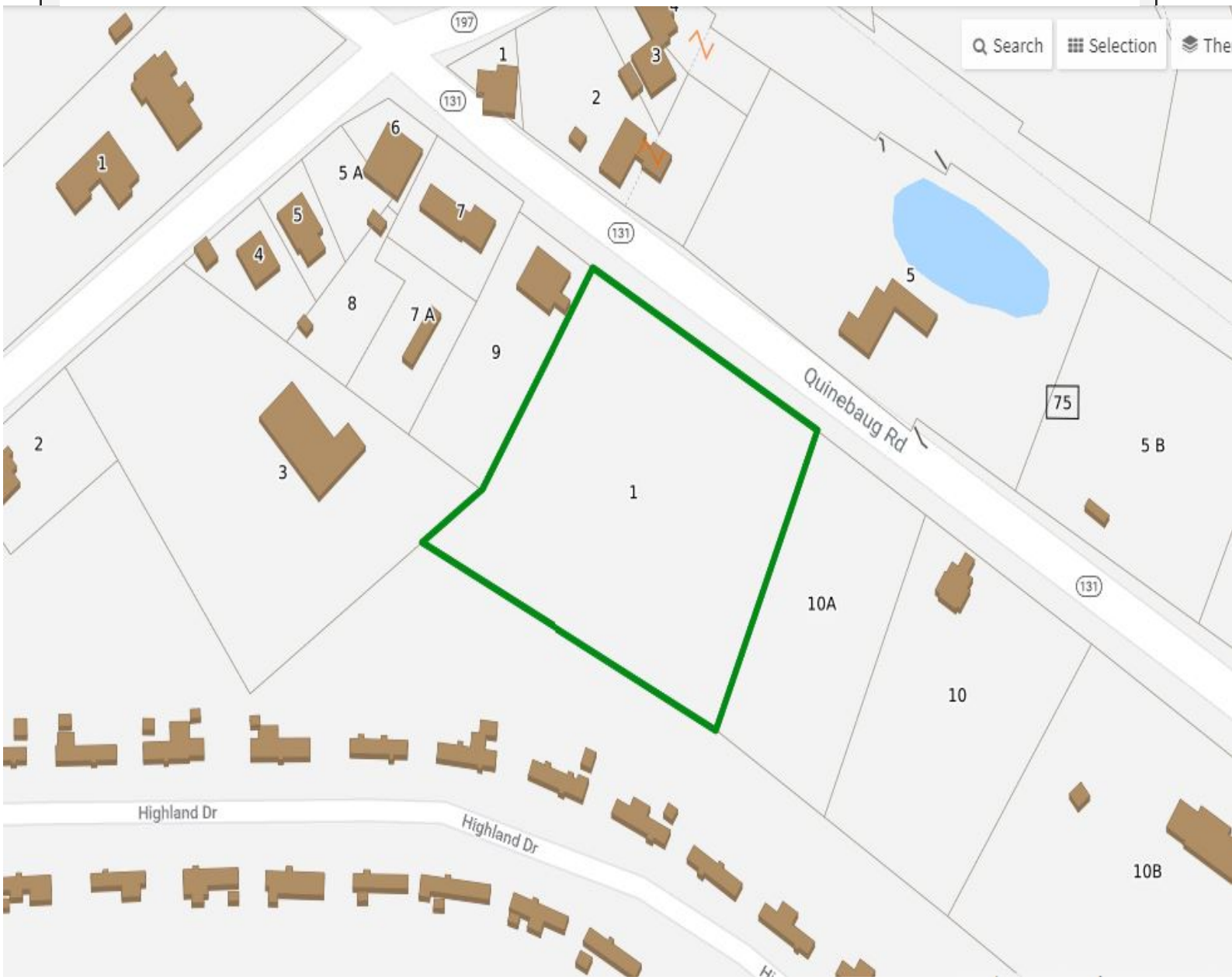
Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
TWR2	MONOPOLE			125 HEIGHT	$106,900	1
CB1	PRECAST CONC CELL			240 S.F.	$28,500	1
FN4	FENCE-8' CHAIN			94 L.F.	$2,600	1
CB1	PRECAST CONC CELL			360 S.F.	$42,800	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$180,800	$0	$180,800
2017	$180,800	$0	$180,800
2016	$180,800	$0	$180,800

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$126,600	$0	$126,600
2017	$126,600	$0	$126,600
2016	$126,600	$0	$126,600

720 Quinebaug Road Thompson CT



MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT

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

Geometry updated April 1, 2018
Data updated April 1, 2018

Exhibit C

Construction Drawings

T-Mobile

WIRELESS COMMUNICATIONS FACILITY

CTNL193A

SITE ID: CTNL193A

720 QUINEBAUG RD

QUINEBAUG, CT 06262

T-MOBILE RF CONFIGURATION

4Sec-67D97DB2_1xAIR+1OP

PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:
   - A. INSTALL (1) BB6630 FOR LTE
   - B. REMOVE (4) RRUS11 B12
   - C. REMOVE (4) RADIO 4478 B71
   - D. REMOVE (4) GENERIC 600/700 DIPLEXERS
   - E. INSTALL (4) RADIO 4449 B71+B12
   - F. INSTALL NEW 150 BREAKER

PROJECT INFORMATION

SITE NAME:	CTNL193A
SITE ID:	CTNL193A
SITE ADDRESS:	720 QUINEBAUG ROAD QUINEBAUG, CT 06262
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: 42°–01'–22.25" N LONGITUDE: 71°–56'–57.17" W GROUND ELEVATION: 368.14'± AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH

SHEET INDEX

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

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

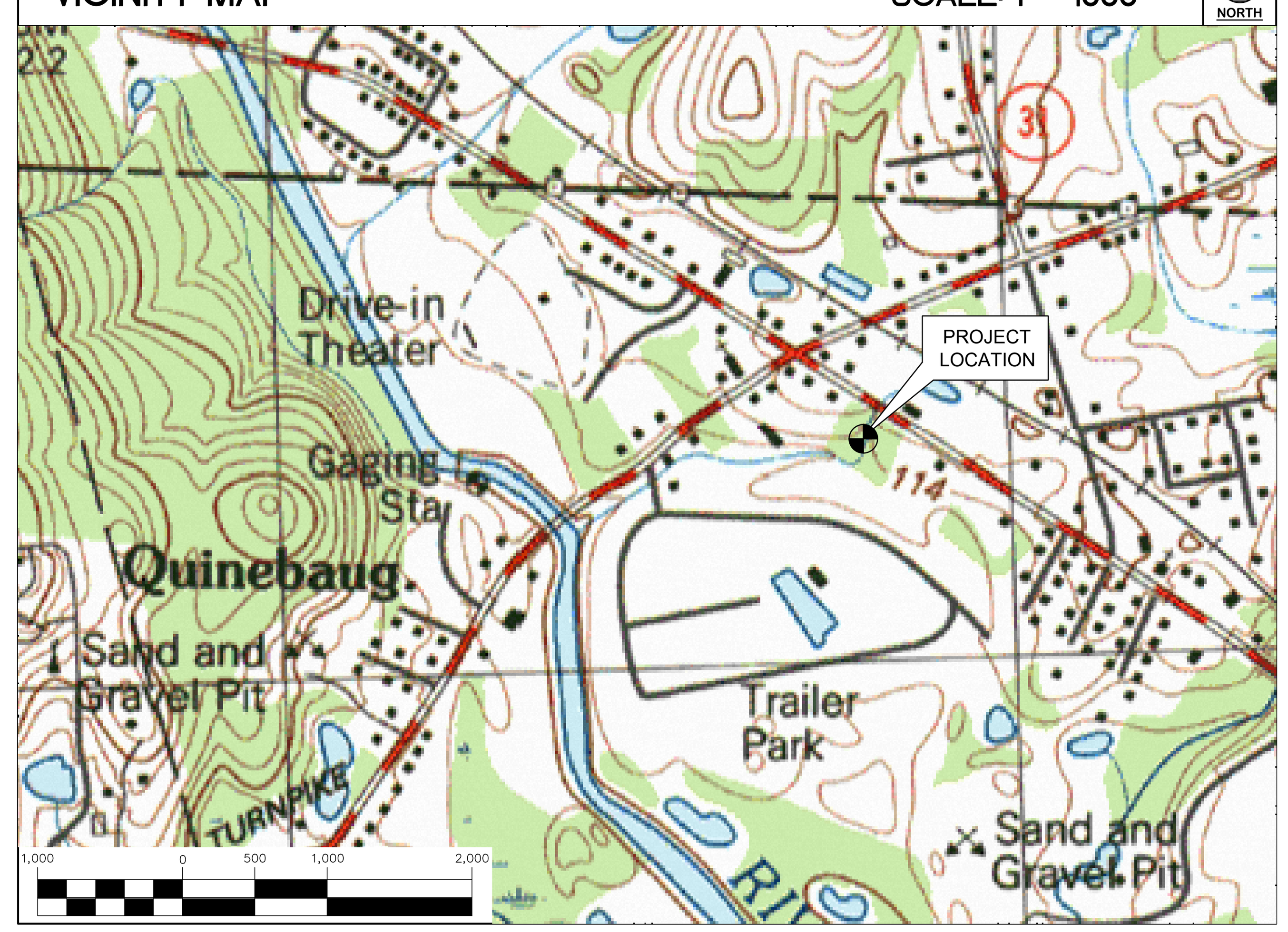
TO: 720 QUINEBAUG ROAD, QUINEBAUG, CT 06262

1.	HEAD NORTH ON GRIFFIN ROAD S. TOWARD HARTMAN RD.	0.30 MI.
2.	TAKE THE 2ND RIGHT ONTO DAY HILL RD.	3.64 MI.
3.	MERGE ONTO I–91 S TOWARD HARTFORD	3.99 MI.
4.	MERGE ONTO I–291 EAST VIA EXIT 35A TOWARD MANCHESTER	6.18 MI.
5.	MERGE ONTO I–84 E/WILBUR CROSS HWY N VIA LEFT EXIT TOWARD BOSTON	24.79 MI.
6.	TAKE THE CT–190 EXIT, EXIT 73 TOWARD UNION	0.24 MI.
7.	TURN RIGHT ONTO BUCKLEY HWY/CT–190	1.90 MI.
8.	TURN RIGHT ONTO BIGELOW HOLLOW RD/CT–171/CT–197	2.29 MI.
9.	TURN LEFT ONTO LAWSON RD/CT–197 CONTINUE TO FOLLOW CT–197	10.65 MI.
10.	TURN RIGHT ONTO QUINEBAUG RD/CT–131	0.12 MI.
11.	FINISH AT 720 QUINEBAUG ROAD, QUINEBAUG, CT 06262	

VICINITY MAP

SCALE: 1" = 1000'

NORTH



PROFESSIONAL ENGINEER SEAL

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	06/18/19	KAWJR	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
0	06/04/19	RTS	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

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
QUINEBAUG ROAD
SITE ID: CTNL193A
720 QUINEBAUG ROAD
QUINEBAUG, CT 06262

DATE:	05/14/19
SCALE:	AS NOTED
JOB NO.	19027.68

TITLE SHEET

T-1

Sheet No. 1 of 6

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 TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 101 MPH (Vasd) (EXPOSURE B/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.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	06/18/19	KAW/JR	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
0	06/04/19	RTS	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

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WIRELESS COMMUNICATIONS FACILITY

QUINEBAUG ROAD
SITE ID: CTNL193A

720 QUINEBAUG ROAD
QUINEBAUG, CT 06262

DATE: 05/14/19
SCALE: AS NOTED
JOB NO. 19027.68

DESIGN BASIS AND SITE NOTES

N-1

1
C-1

SITE LOCATION PLAN
SCALE: 1" = 50'

TRUE NORTH

GRAPHIC SCALE
50 0 25 50 100 200
(IN FEET)
1 inch = 50 ft.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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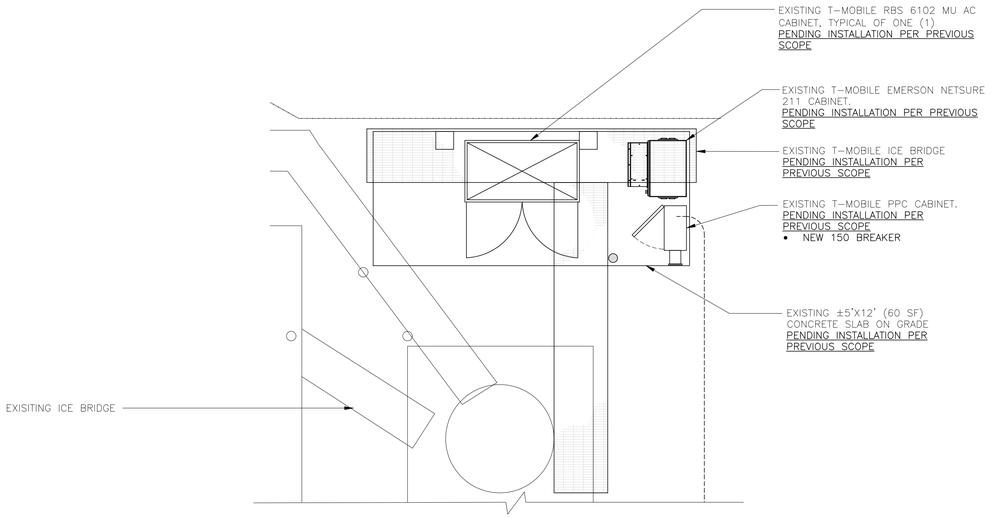
SITE LOCATION PLAN

C-1

Sheet No. 3 of 6

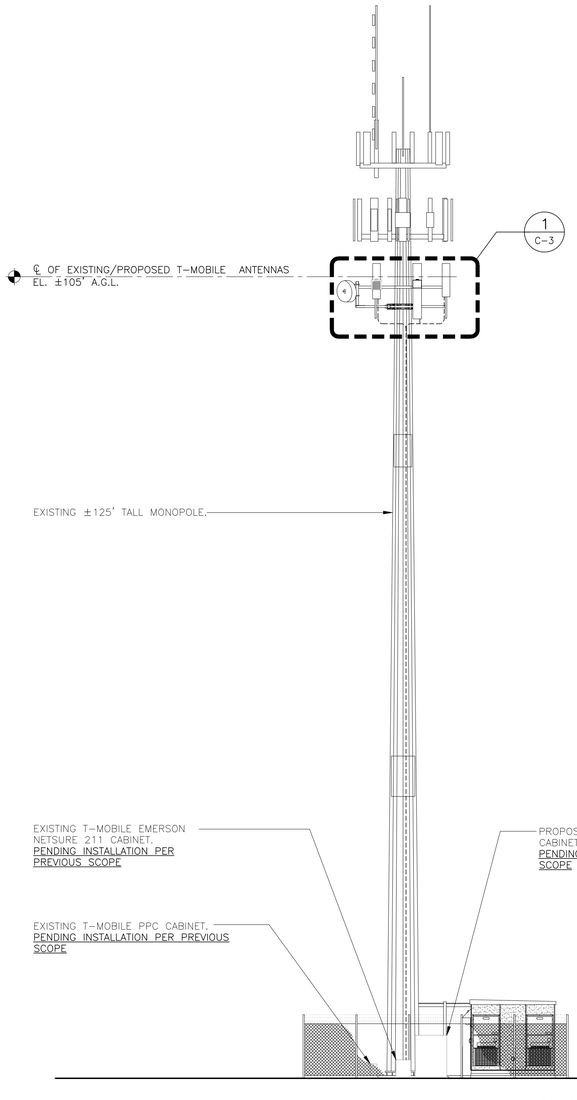
T-MOBILE RAN TEMPLATE:
4Sec-67D97DB2

T-MOBILE RF CONFIGURATION:
4Sec-67D97DB2_1xAIR+10P



3 C-2 **EQUIPMENT PLAN**
SCALE: 3/8" = 1'
TRUE NORTH

NOTE:
REFERENCE SHEET T-1 FOR
T-MOBILE EQUIPMENT SCOPE OF WORK



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

GRAPHIC SCALE
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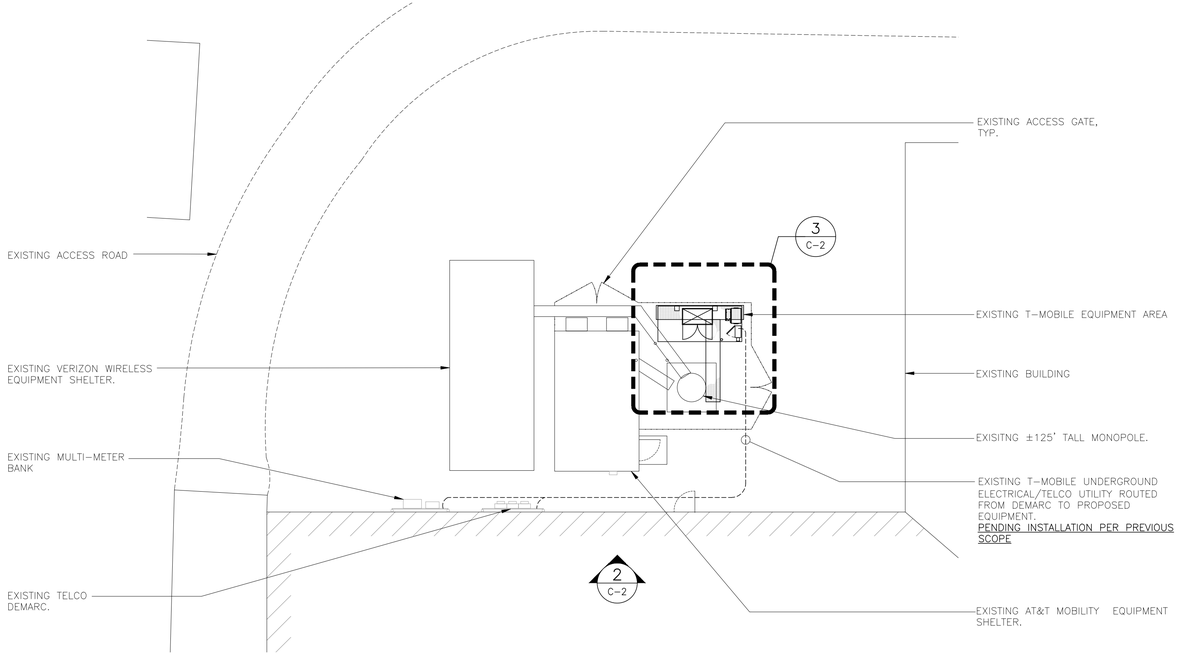
(IN FEET)
1 inch = 10 ft.



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

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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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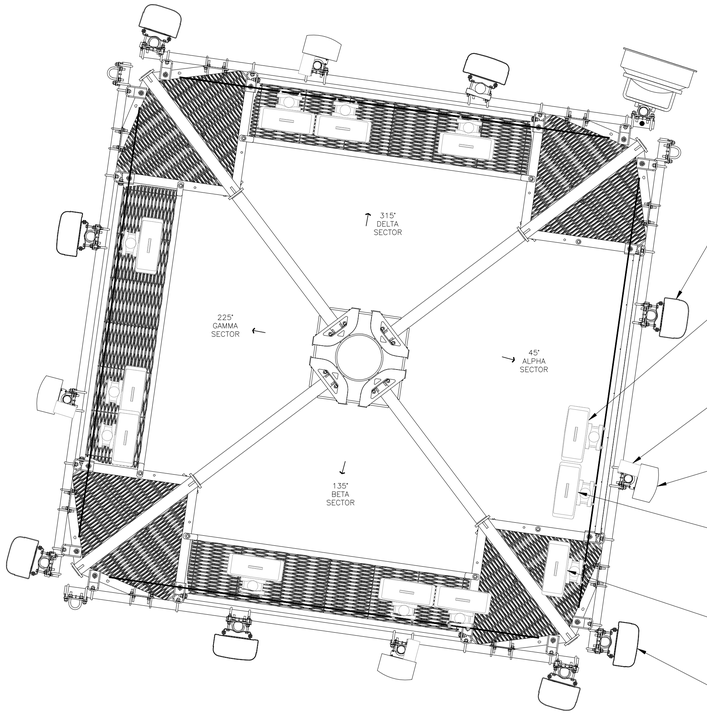
JOB NO. 19027.68

COMPOUND PLAN, AND ELEVATION

C-2

Sheet No. 4 of 6



EXISTING T-MOBILE POS 1, TYP. (1) PER SECTOR. TOTAL OF (4).
MODEL: ERICSSON-AIR32 KRD091146-1_B66A_B2A
DIMS: M56.65"H X 12.87"W X 8.6"D
(TO REMAIN)

EXISTING T-MOBILE RADIO POS 2, TYP. (1) PER SECTOR. TOTAL OF (4)
MODEL: RRUS11 B12
DIMS: 17.8"H X 17.3"W X 7.2"D
(TO BE REMOVED AND REPLACED)

EXISTING T-MOBILE DIPLEXER MOUNTED TO ANTENNA MAST POS 2, TYP. (1) PER SECTOR. TOTAL OF (4)
MODEL: GENERIC 600/700 DIPLEXER
DIMS: 11.2"H X 8"W X 4.9"D
(TO BE REMOVED)

EXISTING T-MOBILE ANTENNA POS 2, TYP. (1) PER SECTOR. TOTAL OF (4)
MOEDL: APXVAA24_43-U-NA20
DIMS: 95.9"H X 24"W X 8.7"D
(TO REMAIN)

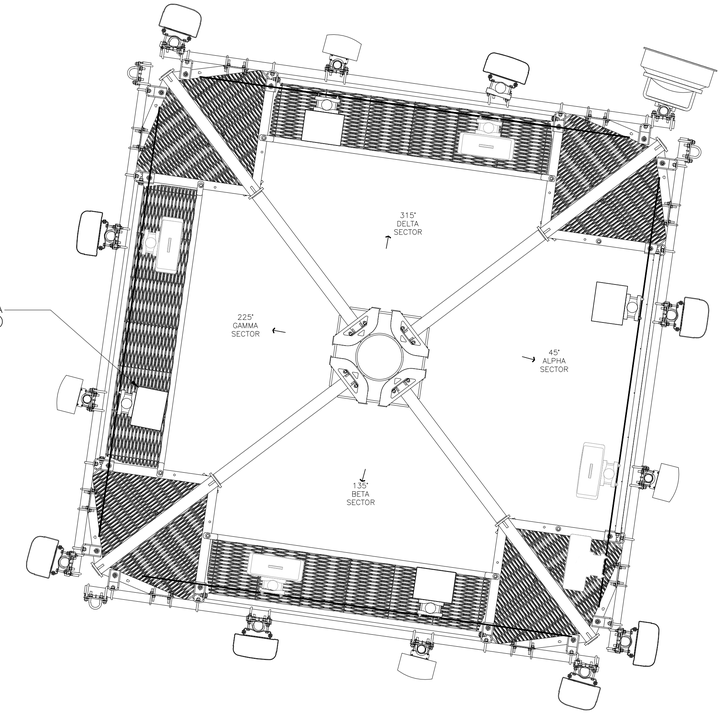
EXISTING T-MOBILE RADIO POS 2, TYP. (1) PER SECTOR. TOTAL OF (4)
MODEL: RADIO 4478 B71
DIMS: 15"H X 13.2"W X 7.4"D
(TO BE REMOVED)

EXISTING T-MOBILE RADIO POS 3, TYP. (1) PER SECTOR. TOTAL OF (4)
MODEL: RRUS11 B4
DIMS: 20"H X 17"W X 7"D
(TO REMAIN)

EXISITING T-MOBILE ANTENNA POS 3, TYP. (1) PER SECTOR. TOTAL OF (4)
MODEL: RFS-APX16DWV-16DWV-S-E-A20
DIMS: 55.9"H X 13"W X 3.15"D
(TO REMAIN)

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

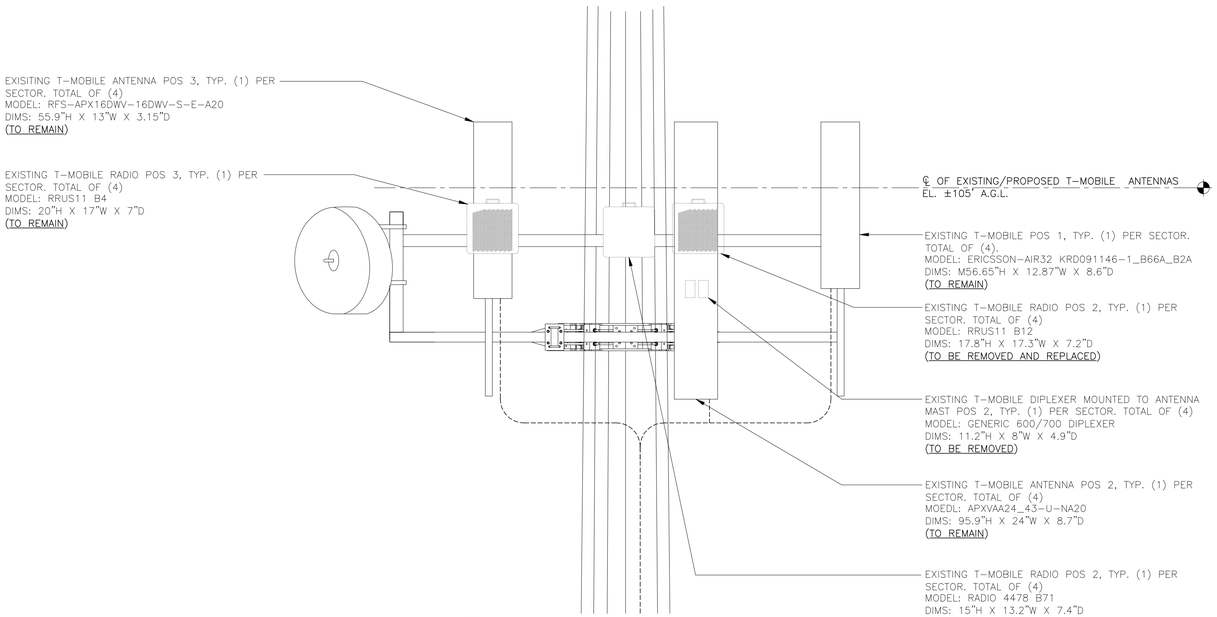
TRUE NORTH



PROPOSED T-MOBILE RADIO MOUNTED TO ANTENNA MAST POS 2, TYP. (1) PER SECTOR. TOTAL OF (4)
MODEL: RADIO 4449 B71+B12
DIMS: 14.9"H X 13.2"W X 10.4"D

1A / C-3 **PROPOSED ANTENNA CONFIGURATION**
SCALE: 1/2" = 1'

TRUE NORTH



EXISITING T-MOBILE ANTENNA POS 3, TYP. (1) PER SECTOR. TOTAL OF (4)
MODEL: RFS-APX16DWV-16DWV-S-E-A20
DIMS: 55.9"H X 13"W X 3.15"D
(TO REMAIN)

EXISTING T-MOBILE RADIO POS 3, TYP. (1) PER SECTOR. TOTAL OF (4)
MODEL: RRUS11 B4
DIMS: 20"H X 17"W X 7"D
(TO REMAIN)

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MODEL: ERICSSON-AIR32 KRD091146-1_B66A_B2A
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(TO REMAIN)

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(TO BE REMOVED)

EXISTING T-MOBILE ANTENNA POS 2, TYP. (1) PER SECTOR. TOTAL OF (4)
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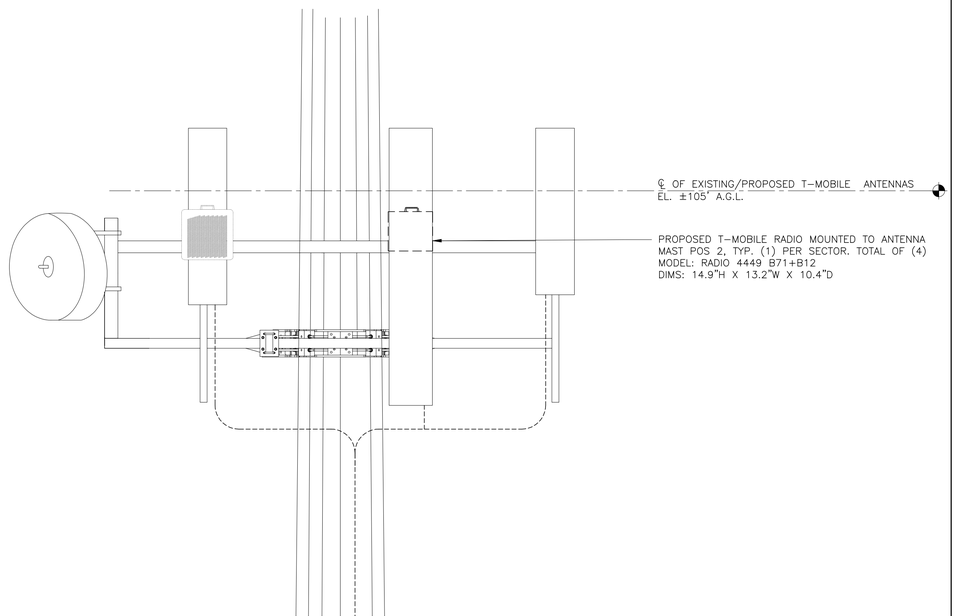
(TO REMAIN)

EXISTING T-MOBILE RADIO POS 2, TYP. (1) PER SECTOR. TOTAL OF (4)
MODEL: RADIO 4478 B71
DIMS: 15"H X 13.2"W X 7.4"D
(TO BE REMOVED)

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



PROPOSED T-MOBILE RADIO MOUNTED TO ANTENNA MAST POS 2, TYP. (1) PER SECTOR. TOTAL OF (4)
MODEL: RADIO 4449 B71+B12
DIMS: 14.9"H X 13.2"W X 10.4"D

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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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QUINEBAUG, CT 06262

DATE: 05/14/19
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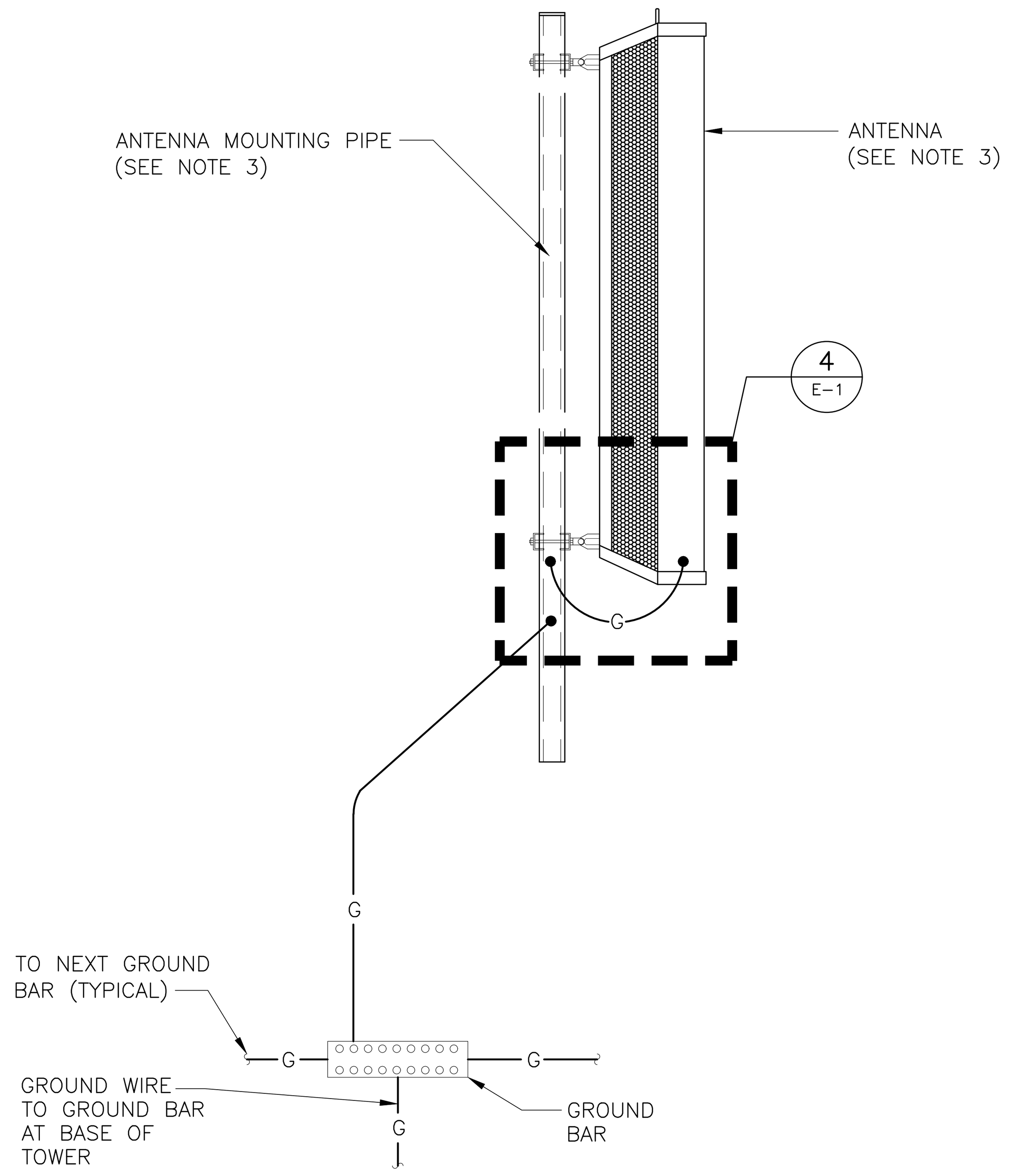
JOB NO. 19027.68

ANTENNA MOUNTING AND ELEVATION

C-3

Sheet No. 5 of 6

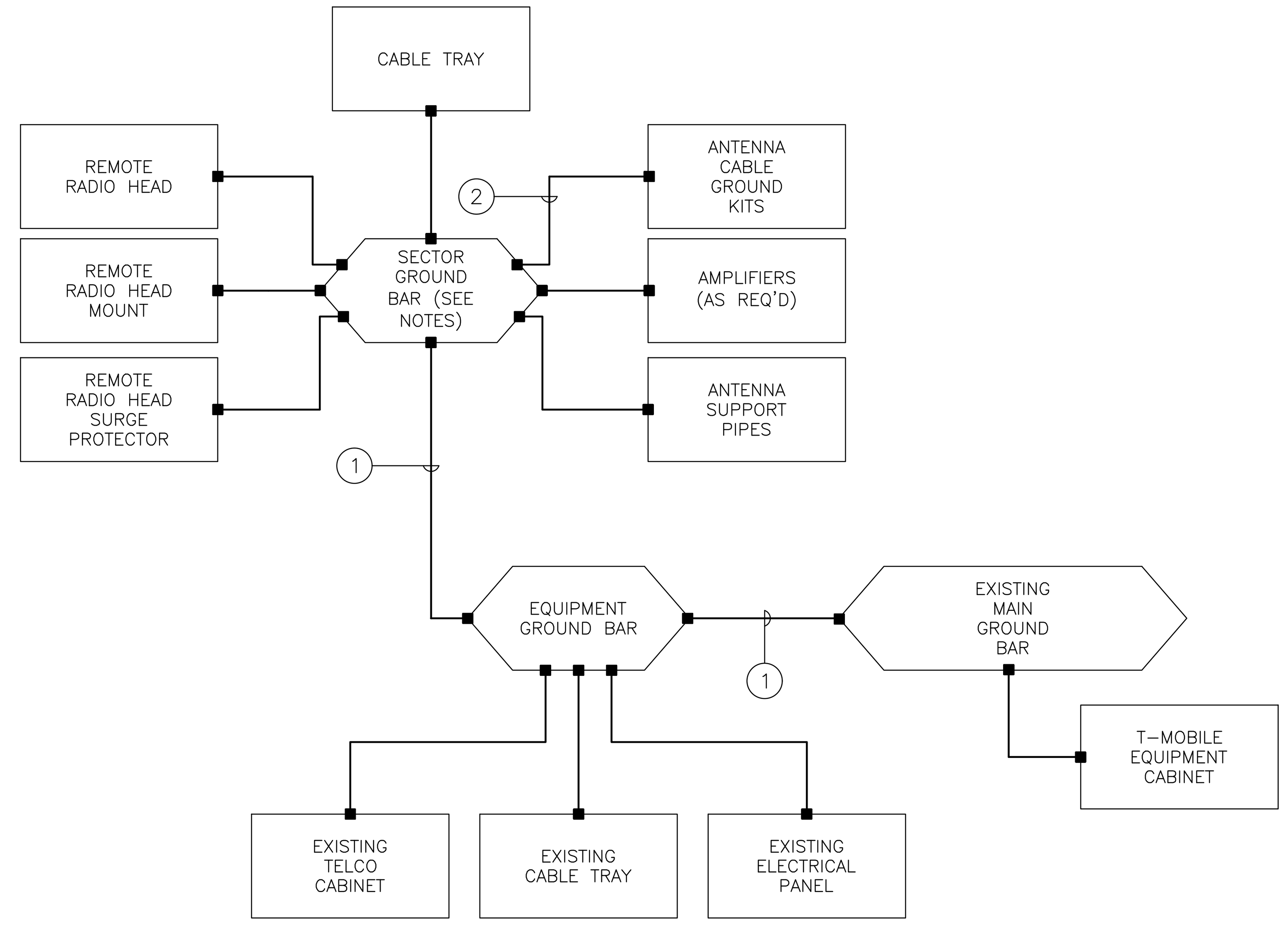


NOTES:

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: NOT TO SCALE



GROUNDING SCHEMATIC NOTES

(1) #2 AWG

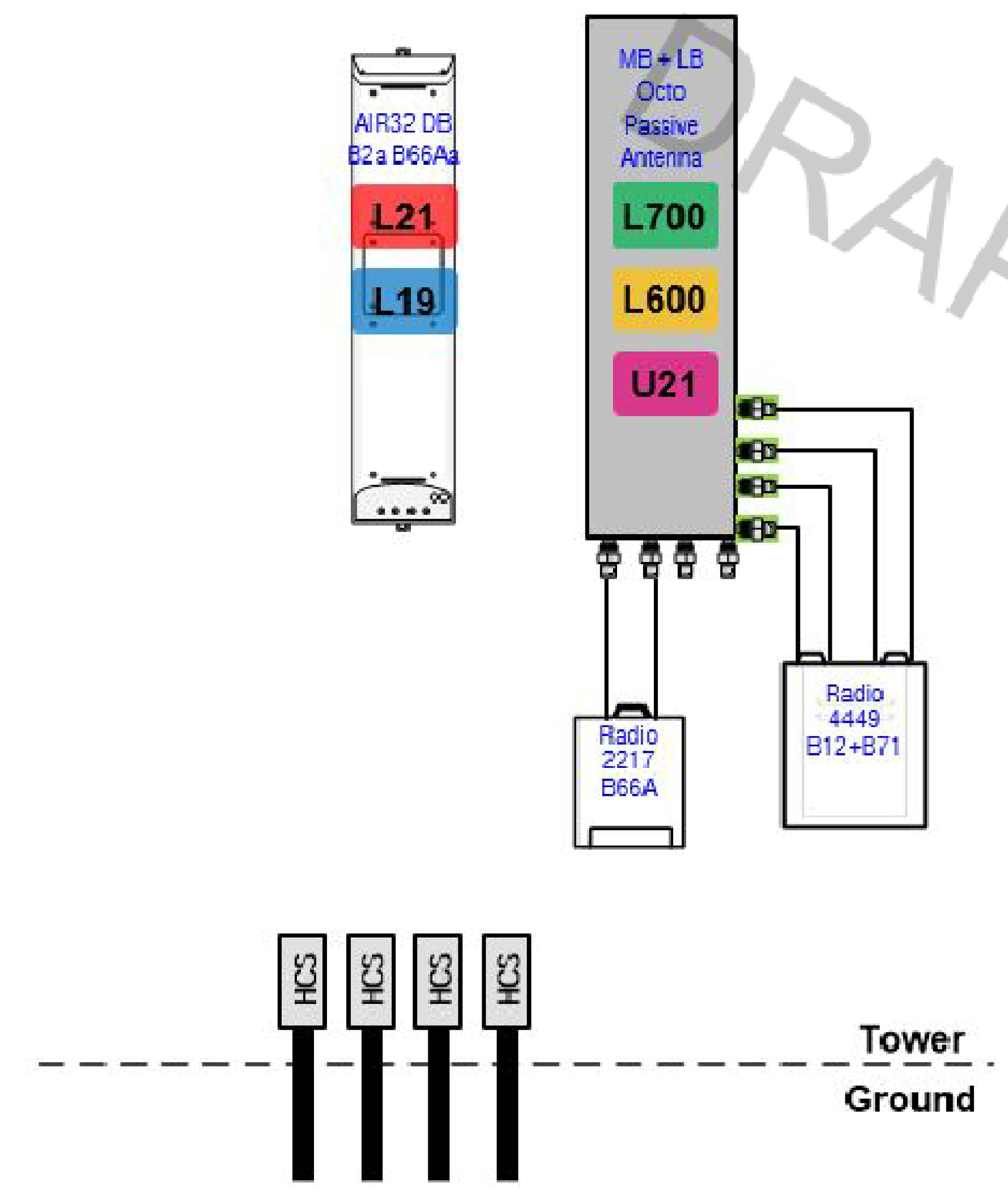
(2) #6 AWG

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-1) TYPICAL GROUNDING SCHEMATIC DETAIL

SCALE: NOT TO SCALE



3 (E-1) PROPOSED PLUMBING DIAGRAM

SCALE: NOT TO SCALE

ISOMETRIC VIEW

RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RADIO 4449 B71B12	14.9"L x 13.2"W x 10.4"D	74 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.

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

6 (E-1) PROPOSED RRU DETAIL

SCALE: NOT TO SCALE

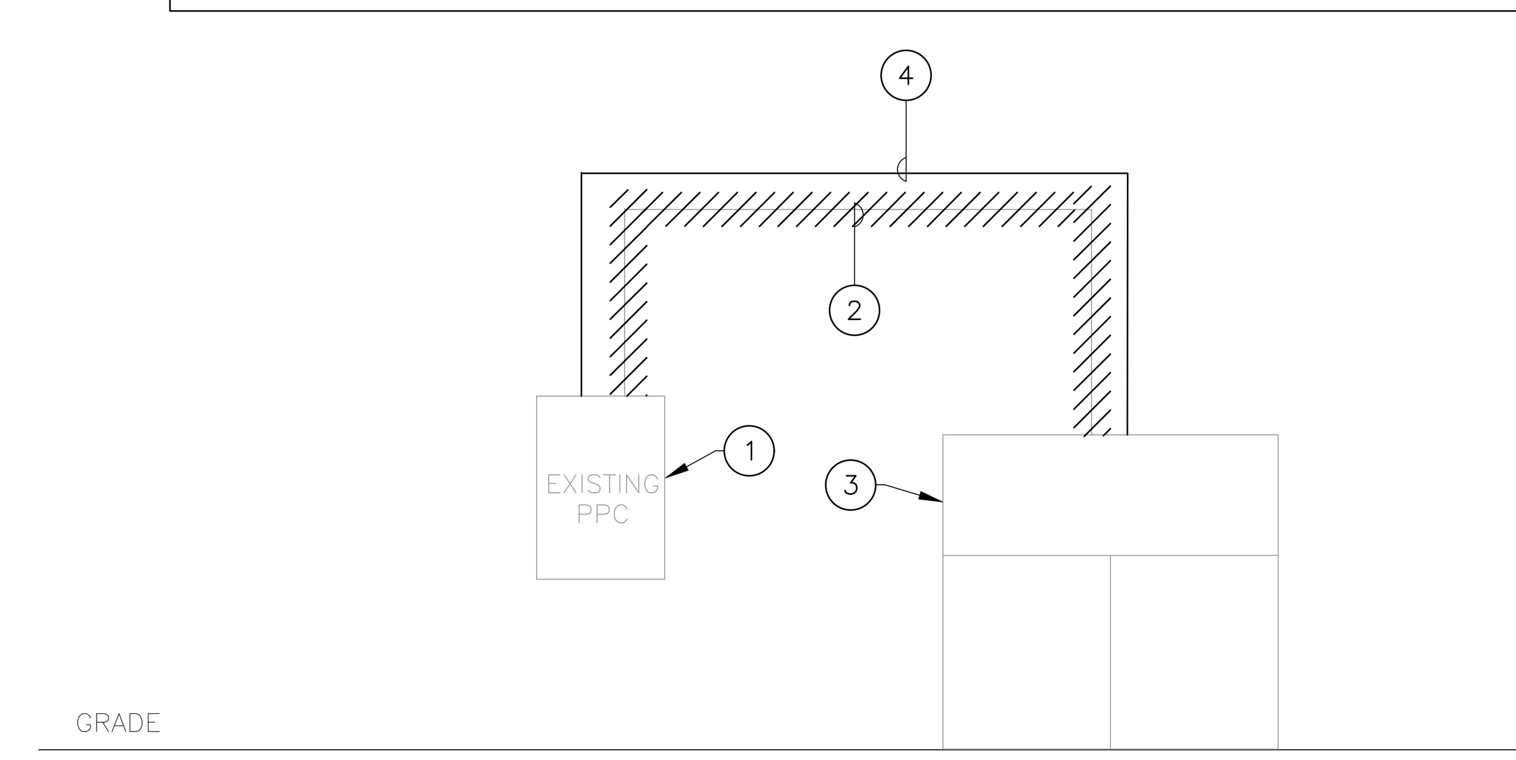
RISER DIAGRAM NOTES

(1) EXISTING PPC CABINET

(2) EXISTING CONDUITS AND CONDUCTORS TO BE REMOVED.

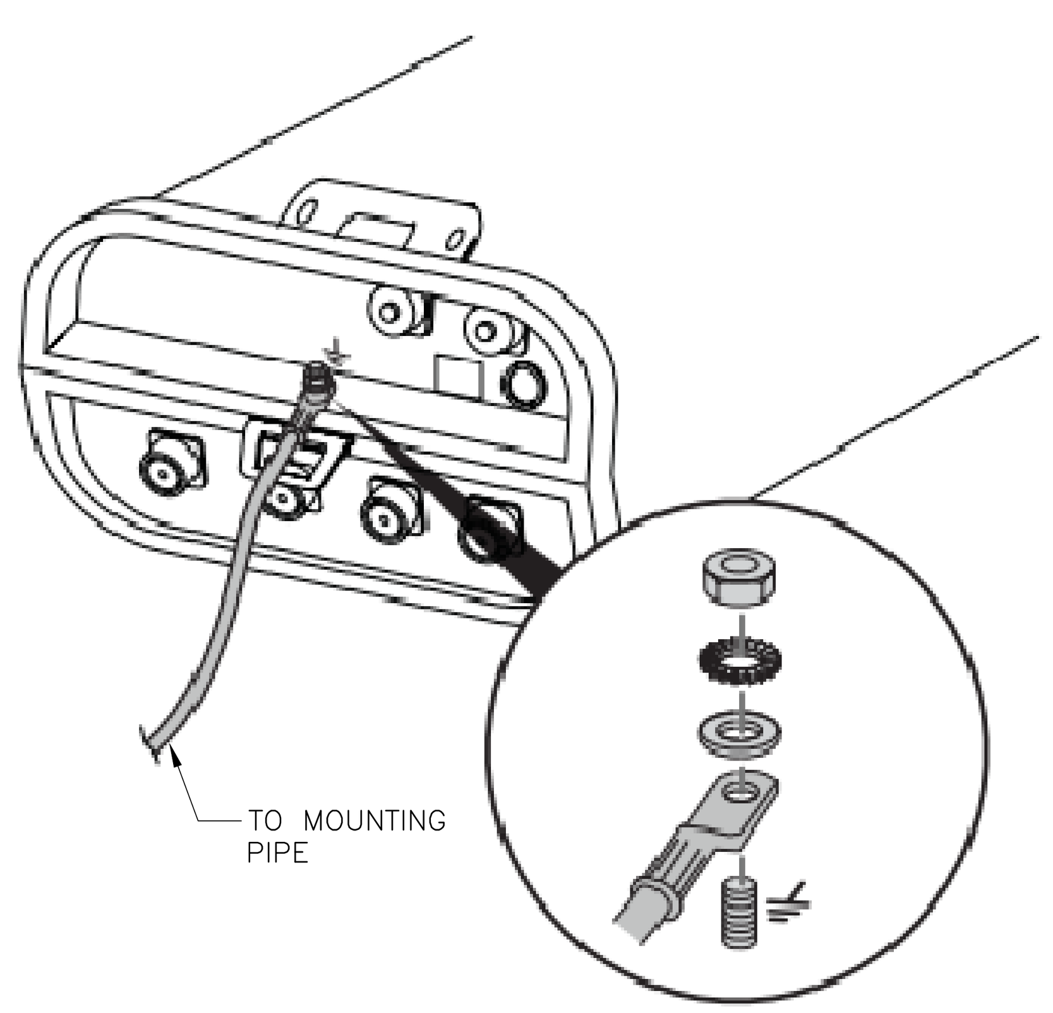
(3) EXISTING T-MOBILE EQUIPMENT CABINET

(4) (3) #1/0 AWG, (1) #6 AWG GROUND, 1-1/2" CONDUIT CONNECTED TO NEW 150A/2P CIRCUIT BREAKER IN PPC CABINET



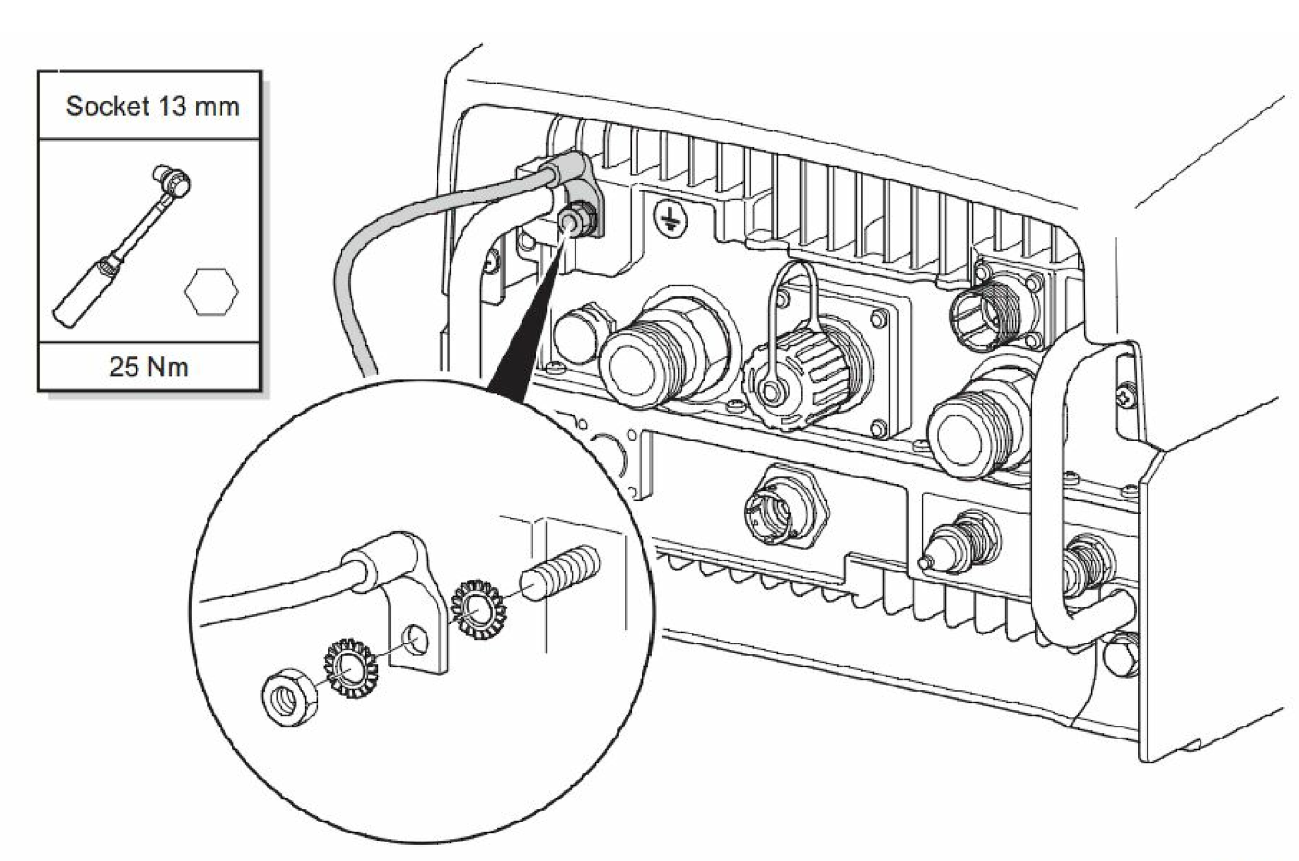
7 (E-1) ELECTRICAL POWER RISER DIAGRAM

NOT TO SCALE



4 (E-1) TYPICAL ANTENNA GROUNDING DETAIL

SCALE: NOT TO SCALE



5 (E-1) TYPICAL RRU GROUNDING DETAIL

SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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QUINEBAUG, CT 06262

DATE: 05/14/19
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JOB NO. 19027.68

TYPICAL ELECTRICAL DETAILS

E-1

Sheet No. 6 of 6

Exhibit D

Structural Analysis Report

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

125-ft Existing Valmont Monopole

Proposed T-Mobile
Antenna Installation (L600)

T-Mobile Site Ref: CTNL193A

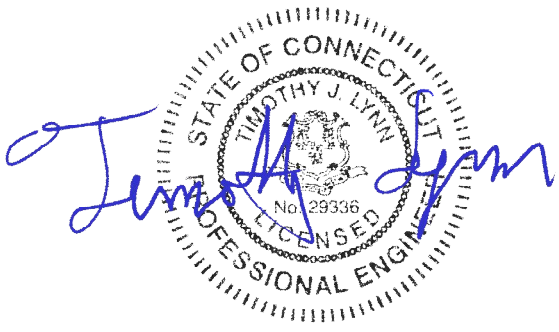
720 Quinebaug Road
Quinebaug, CT

Centek Project No. 19027.68

~~Date: May 10, 2019~~

Rev 1: May 14, 2019

Max Stress Ratio = 95.7%



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

Introduction

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

The host tower is a 125-ft tall, three-section, twelve sided, tapered monopole, originally designed and manufactured by Valmont; job no; QU12139, dated December 22, 2005. The tower geometry, structure member sizes and foundation system information were obtained from a previous structural analysis prepared by Centek project no. 17179.00 dated January 25, 2018.

Antenna and appurtenance information were obtained from the aforementioned structural report and a T-Mobile RF data sheet.

The tower is made up of three (3) 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 21.04-in at the top and 47.59-in at the base.

Antenna and Appurtenance Summary

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

- TOWN (EXISTING):
  Antennas: One (1) 4-bay dipole antenna, one (1) 20-ft Omni-directional whip antenna and one (1) 8.5-ft Omni-directional whip antenna mounted on the existing AT&T low profile platform with an elevation of 130-ft above grade.
  Coax Cables: Three (3) 7/8" ∅ coax cables running on the inside of the existing tower.
- AT&T (EXISTING):
  Antennas: Six (6) Powerwave 7770.00 panel antennas, one (1) Kathrein 800-10764 panel antenna, one (1) Kathrein 800-10766 panel antenna, one (1) KMW AM-X-CD-17-65-00T panel antenna, six (6) Powerwave LGP21401 TMA's, six (6) Powerwave LGP21901 diplexers, six (6) Ericsson RRUS-11 and one (1) Raycap DC6-48-60-18-8F surge arrestor mounted on an existing low profile platform with a RAD center elevation of 130-ft above grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables, one (1) 5/8" ∅ fiber cable and two (2) #8 DC control cables running on the inside of the existing tower.
- VERIZON (EXISTING):
  Antennas: Six (6) Antel LPA-80080-6CF panel antenna, six (6) Andrew JAHH-65B-R3B panel antennas, three (3) Alcatel-Lucent RRH2x60-700 remote radio heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads, three (3) Alcatel-Lucent RRH2x60-AWS remote radio heads and two (2) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on an existing low profile platform with a RAD center elevation of 120-ft above grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables and two (2) 1-5/8" ∅ Hybriflex fiber line running on the inside of the existing tower.

- T-MOBILE (EXISTING TO REMAIN):
  Misc. Equipment: Four (4) Ericsson AIR32 panel antennas, four (4) RFS APXVAA24_43 panel antennas, four (4) RFS APX16DWV-16DWVS panel antennas, four (4) Ericsson RRUS-11 remote radio heads, one (1) 2' microwave dish and one (1) GPS mounted on a SitePro Quad-Platform (p/n F4P-12W) w/ handrail kit (p/n F4P-HRK12) with a top of antenna elevation of 109-ft above grade.
  Coax Cables: Four (4) 1-5/8" ∅ Hybriflex fiber lines and two (2)) 1/2" ∅ coax cables running on the interior of the monopole.
- **T-MOBILE (EXISTING TO REMOVE):**
  Misc. Equipment: Four (4) Microdata MI-554nn diplexers, four (4) Ericsson RRUS-11 remote radio heads and four (4) Ericsson 4478 remote radio heads mounted on a SitePro Quad-Platform w/ handrail kit with a top of antenna elevation of 109-ft above grade.
- **T-MOBILE (PROPOSED):**
  Misc. Equipment: Four (4) Ericsson 4479 B71 B12 remote radio heads mounted on a SitePro Quad-Platform w/ handrail kit with a top of antenna elevation of 109-ft above grade.

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 existing 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 0.75" radial ice on the tower structure and its components.

Basic Wind Speed:	Windham; v = 100-110 mph	*[Annex B of TIA-222-G-2005]*
	Thompson; v = 101 mph	*[Appendix N of the 2018 CT Building Code]*
Load Cases:	Load Case 1; 101 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/ 0.75" 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. In Load Case 1, per tnxTower "Section Capacity Table", this tower was found to be at **95.7%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L1)	85.50'-125.00'	84.6%	**PASS**
Pole Shaft (L2)	39.42-85.50'	95.7%	**PASS**
Pole Shaft (L3)	0.00'-39.42'	95.7%	**PASS**

Foundation and Anchors

The existing foundation consists of a 7.0-ft square x 5-ft long reinforced concrete pier on a 20.0-ft square x 3.5-ft thick reinforced concrete pad. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned Valmont design documents; job no; 18435-65, dated August 4, 2005. The base of the tower is connected to the foundation by means of (12) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 7-ft into the concrete foundation structure.

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	33 kips
	Compression	35 kips
	Moment	3055 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	TIA-222-G Section 9.4 (FS)[1]	Proposed Loading (FS)[1]	Result
Reinforced Concrete Pad and Pier	OTM[2]	1.0	1.41	**PASS**

Note 1: FS denotes Factor of Safety.

- 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	Combined Compression and Bending	71.7%	**PASS**
Base Plate	Bending	73.2%	**PASS**

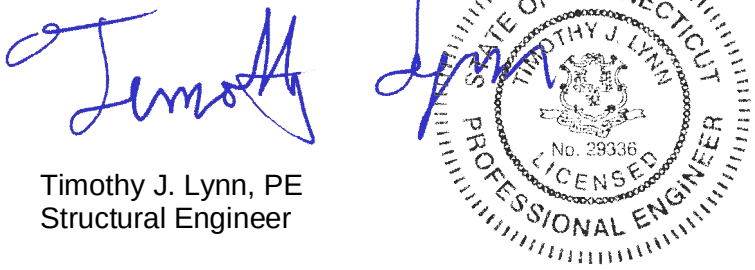
Conclusion

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

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

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

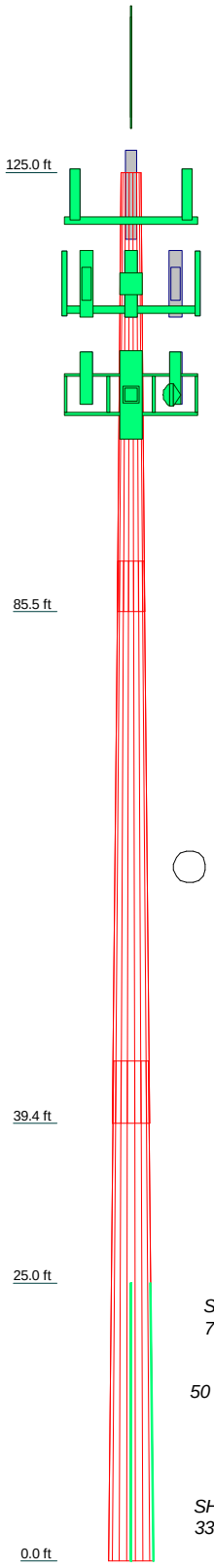
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower and RISATower, 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	Tube Length (ft)	Reinf Size	Reinf Grade	Weight (K)
1	39.500	16	0.188	4.500	21.037	29.725	A572-65				2.0
2	50.580	16	0.281	5.580	28.360	39.486	A572-65				5.2
3	45.000	16	0.313		37.696	47.593	A572-65	25.000	7x1	A572-65	6.5



ALL REACTIONS ARE FACTORED

AXIAL 69 K

SHEAR 7 K

MOMENT 736 kip-ft

TORQUE 4 kip-ft
50 mph WIND - 0.750 in ICE

AXIAL 35 K

SHEAR 33 K

MOMENT 3055 kip-ft

TORQUE 17 kip-ft
REACTIONS - 101 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
4-bay dipole	130	RRH2x60-PCS (Verizon - Existing)	115
20-ft x 3" whip	130	RRH2x60-07-U (Verizon - Existing)	115
8.5-ft x 1.5" whip	130	RRH2x60-07-U (Verizon - Existing)	115
Lightning Rod 3/4"x8'	130	RRH2x60-07-U (Verizon - Existing)	115
(2) 7770.00 (ATI - Existing)	123	DB-T1-6Z-8AB-0Z (Verizon - Existing)	115
(2) 7770.00 (ATI - Existing)	123	DB-T1-6Z-8AB-0Z (Verizon - Existing)	115
(2) 7770.00 (ATI - Existing)	123	Valmont 13' Low Profile Platform (Verizon - Existing)	113
(2) LGP21401 TMA (ATI - Existing)	123	AIR32 (T-Mobile - Existing)	106.5
(2) LGP21401 TMA (ATI - Existing)	123	APX16DWV-16DWVS-E-A20 (T-Mobile - Existing)	106.5
(2) LGP21401 TMA (ATI - Existing)	123	AIR32 (T-Mobile - Existing)	106.5
(2) LGP21901 Diplexer (ATI - Existing)	123	APX16DWV-16DWVS-E-A20 (T-Mobile - Existing)	106.5
(2) LGP21901 Diplexer (ATI - Existing)	123	AIR32 (T-Mobile - Existing)	106.5
(2) LGP21901 Diplexer (ATI - Existing)	123	APX16DWV-16DWVS-E-A20 (T-Mobile - Existing)	106.5
AM-X-CD-17-65-00T-RET (ATI - Existing)	123	AIR32 (T-Mobile - Existing)	106.5
800-10764 (ATI - Existing)	123	APX16DWV-16DWVS-E-A20 (T-Mobile - Existing)	106.5
800-10766 (ATI - Existing)	123	RRUS-11 (T-Mobile - Existing)	105
(2) RRUS-11 (ATI - Existing)	123	Radio 4449 B71 B12 (T-Mobile - Proposed)	105
(2) RRUS-11 (ATI - Existing)	123	Radio 4449 B71 B12 (T-Mobile - Proposed)	105
(2) RRUS-11 (ATI - Existing)	123	APXVAA24_43 (T-Mobile - Existing)	105
DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	123	APXVAA24_43 (T-Mobile - Existing)	105
Andrew 12'-6" Low Profile Platform (ATI - Existing)	121	RRUS-11 (T-Mobile - Existing)	105
LPA-80080-6CF (Verizon - Existing)	115	Radio 4449 B71 B12 (T-Mobile - Proposed)	105
JAHH-65B-R3B (Verizon - Existing)	115	APXVAA24_43 (T-Mobile - Existing)	105
JAHH-65B-R3B (Verizon - Existing)	115	APXVAA24_43 (T-Mobile - Existing)	105
LPA-80080-6CF (Verizon - Existing)	115	RRUS-11 (T-Mobile - Existing)	105
LPA-80080-6CF (Verizon - Existing)	115	RRUS-11 (T-Mobile - Existing)	105
JAHH-65B-R3B (Verizon - Existing)	115	Radio 4449 B71 B12 (T-Mobile - Proposed)	105
JAHH-65B-R3B (Verizon - Existing)	115	GPS (T-Mobile - Existing)	105
LPA-80080-6CF (Verizon - Existing)	115	F4P-12W Quad Platform w/ Handrail (T-Mobile - Existing)	105
RRH2x60-AWS (Verizon - Existing)	115	Andrew 2' w/Radome (T-Mobile Proposed)	105
RRH2x60-AWS (Verizon - Existing)	115		
RRH2x60-AWS (Verizon - Existing)	115		
RRH2x60-PCS (Verizon - Existing)	115		
RRH2x60-PCS (Verizon - Existing)	115		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 101 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 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 0.000 ft
7. Weld together tower sections have flange connections.
8. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
9. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
10. Welds are fabricated with ER-70S-6 electrodes.
11. TOWER RATING: 95.7%

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

Job: **19027.68 - CTNL193A**		
Project: **125ft Valmont Monopole - 720 Quinebaug Rd, Quinebaug, CT**		
Client: T-Mobile	Drawn by: TJL	App'd:
Code: TIA-222-G	Date: 05/10/19	Scale: NTS
Path:		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 101 mph.
Structure Class III.
Exposure Category C.
Topographic Category 1.
Crest Height 0.000 ft.
Nominal ice thickness of 0.750 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.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
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
L1	125.000-85.500	39.500	4.500	16	21.037	29.725	0.188	0.750	A572-65 (65 ksi)
L2	85.500-39.420	50.580	5.580	16	28.360	39.486	0.281	1.125	A572-65 (65 ksi)
L3	39.420-0.000	45.000		16	37.696	47.593	0.313	1.250	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	21.412	12.471	684.847	7.422	10.729	63.832	1380.062	6.166	3.813	20.337
	30.271	17.667	1947.276	10.515	15.160	128.450	3924.036	8.735	5.542	29.558
L2	29.870	25.192	2509.236	9.996	14.464	173.485	5056.464	12.456	5.084	18.076
	40.204	35.174	6829.889	13.957	20.138	339.157	13763.191	17.392	7.298	25.949
L3	39.625	37.267	6579.585	13.309	19.225	342.241	13258.793	18.426	6.880	22.015
	48.464	47.133	13310.880	16.832	24.273	548.393	26823.302	23.305	8.849	28.317

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 125.000-85.500				1	1	1			
L2 85.500-39.420				1	1	1			
L3 39.420-0.000				1	1	1			

Pole Reinforcing Data

Height Above Base ft	Segment Length ft	No. of Segments	Offset in	Grade	Type	Size	Unbraced Length ft	K	Bolt Hole Dia. in	Bolts per Row	Shear Lag Factor U
0.000	25.000	4	0.000	A572-65 (65 ksi)	Flat Bar	7x1	1.000	1.00	0.750	1	1.000

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 klf
7/8	C	No	Yes	Inside Pole	125.000 - 3.000	3	No Ice	0.000	0.001

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
1 5/8	C	No	Yes	Inside Pole	125.000 - 3.000	12	No Ice	0.000	0.001
(AT&T - Existing)							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
1 5/8	C	No	Yes	Inside Pole	120.000 - 3.000	12	No Ice	0.000	0.001
(Verizon - Existing)							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
HYBRIFLEX 1-5/8"	C	No	Yes	Inside Pole	120.000 - 3.000	2	No Ice	0.000	0.002
(Verizon - Existing)							1/2" Ice	0.000	0.002
							1" Ice	0.000	0.002
DC Trunk	C	No	Yes	Inside Pole	125.000 - 3.000	2	No Ice	0.000	0.000
(AT&T - Existing)							1/2" Ice	0.000	0.000
							1" Ice	0.000	0.000
Fiber Trunk	C	No	Yes	Inside Pole	125.000 - 3.000	1	No Ice	0.000	0.001
(AT&T - Existing)							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
HYBRIFLEX 1-5/8"	C	No	Yes	Inside Pole	110.000 - 3.000	4	No Ice	0.000	0.002
(T-Mobile - Existing)							1/2" Ice	0.000	0.002
							1" Ice	0.000	0.002
1/2	C	No	Yes	Inside Pole	110.000 - 3.000	2	No Ice	0.000	0.000
(T-Mobile - Existing)							1/2" Ice	0.000	0.000
							1" Ice	0.000	0.000

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	125.000-85.500	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	1.365
		D	0.000	0.000	0.000	0.000	0.000
L2	85.500-39.420	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	1.829
		D	0.000	0.000	0.000	0.000	0.000
L3	39.420-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	1.446
		D	0.000	0.000	0.000	0.000	0.000

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	125.000-85.500	A	2.104	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	1.365
		D		0.000	0.000	0.000	0.000	0.000

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
L2	85.500-39.420	A	1.996	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	1.829
		D		0.000	0.000	0.000	0.000	0.000
L3	39.420-0.000	A	1.781	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	1.446
		D		0.000	0.000	0.000	0.000	0.000

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

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
4-bay dipole	B	From Face	3.500 0.000 10.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	3.150 5.670 8.190	3.150 5.670 8.190	0.032 0.042 0.051
20-ft x 3" whip	C	From Face	3.500 0.000 10.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	0.790 0.910 1.030	0.790 0.910 1.030	0.010 0.015 0.020
8.5-ft x 1.5" whip	D	From Face	3.500 0.000 5.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	1.125 2.004 2.898	1.125 2.004 2.898	0.004 0.014 0.029
Lightning Rod 3/4"x8'	D	From Face	3.500 0.000 4.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	0.600 1.415 2.246	0.600 1.415 2.246	0.014 0.020 0.031
(2) 7770.00 (AT&T - Existing)	B	From Face	3.500 0.000 0.000	0.000	123.000	No Ice 1/2" Ice 1" Ice	5.508 5.867 6.233	2.928 3.273 3.625	0.035 0.068 0.105
(2) 7770.00 (AT&T - Existing)	C	From Face	3.500 0.000 0.000	0.000	123.000	No Ice 1/2" Ice 1" Ice	5.508 5.867 6.233	2.928 3.273 3.625	0.035 0.068 0.105
(2) 7770.00 (AT&T - Existing)	D	From Face	3.500 0.000 0.000	0.000	123.000	No Ice 1/2" Ice 1" Ice	5.508 5.867 6.233	2.928 3.273 3.625	0.035 0.068 0.105
(2) LGP21401 TMA (AT&T - Existing)	B	From Face	3.500 0.000 0.000	0.000	123.000	No Ice 1/2" Ice 1" Ice	0.817 0.937 1.065	0.346 0.440 0.540	0.018 0.023 0.031
(2) LGP21401 TMA (AT&T - Existing)	C	From Face	3.500 0.000 0.000	0.000	123.000	No Ice 1/2" Ice 1" Ice	0.817 0.937 1.065	0.346 0.440 0.540	0.018 0.023 0.031
(2) LGP21401 TMA (AT&T - Existing)	D	From Face	3.500 0.000 0.000	0.000	123.000	No Ice 1/2" Ice 1" Ice	0.817 0.937 1.065	0.346 0.440 0.540	0.018 0.023 0.031
(2) LGP21901 Diplexer	B	From Face	3.500	0.000	123.000	No Ice	0.200	0.100	0.006

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
(AT&T - Existing)			0.000			1/2" Ice	0.259	0.143	0.008
			0.000			1" Ice	0.326	0.193	0.011
(2) LGP21901 Diplexer	C	From Face	3.500	0.000	123.000	No Ice	0.200	0.100	0.006
(AT&T - Existing)			0.000			1/2" Ice	0.259	0.143	0.008
			0.000			1" Ice	0.326	0.193	0.011
(2) LGP21901 Diplexer	D	From Face	3.500	0.000	123.000	No Ice	0.200	0.100	0.006
(AT&T - Existing)			0.000			1/2" Ice	0.259	0.143	0.008
			0.000			1" Ice	0.326	0.193	0.011
AM-X-CD-17-65-00T-RET	B	From Face	3.500	0.000	123.000	No Ice	11.311	6.800	0.060
(AT&T - Existing)			0.000			1/2" Ice	11.927	7.384	0.121
			0.000			1" Ice	12.550	7.976	0.190
800-10764	C	From Face	3.500	0.000	123.000	No Ice	5.866	3.389	0.041
(AT&T - Existing)			0.000			1/2" Ice	6.230	3.740	0.078
			0.000			1" Ice	6.601	4.099	0.119
800-10766	D	From Face	3.500	0.000	123.000	No Ice	11.311	6.800	0.059
(AT&T - Existing)			0.000			1/2" Ice	11.927	7.384	0.120
			0.000			1" Ice	12.550	7.976	0.189
(2) RRUS-11	B	From Face	3.500	0.000	123.000	No Ice	0.000	1.246	0.050
(AT&T - Existing)			0.000			1/2" Ice	0.000	1.412	0.070
			0.000			1" Ice	0.000	1.587	0.092
(2) RRUS-11	C	From Face	3.500	0.000	123.000	No Ice	0.000	1.246	0.050
(AT&T - Existing)			0.000			1/2" Ice	0.000	1.412	0.070
			0.000			1" Ice	0.000	1.587	0.092
(2) RRUS-11	D	From Face	3.500	0.000	123.000	No Ice	0.000	1.246	0.050
(AT&T - Existing)			0.000			1/2" Ice	0.000	1.412	0.070
			0.000			1" Ice	0.000	1.587	0.092
DC6-48-60-18-8F Surge Arrestor	B	From Face	3.500	0.000	123.000	No Ice	1.909	1.909	0.020
(AT&T - Existing)			0.000			1/2" Ice	2.098	2.098	0.039
			0.000			1" Ice	2.294	2.294	0.062
Andrew 12'-6" Low Profile Platform	D	From Face	2.000	0.000	121.000	No Ice	14.450	14.450	1.300
(AT&T - Existing)			0.000			1/2" Ice	19.000	19.000	1.690
			0.000			1" Ice	23.550	23.550	2.080
LPA-80080-6CF	B	From Face	3.500	0.000	115.000	No Ice	4.326	8.619	0.021
(Verizon - Existing)			6.000			1/2" Ice	4.764	9.075	0.069
			0.000			1" Ice	5.210	9.539	0.123
JAHH-65B-R3B	B	From Face	3.500	0.000	115.000	No Ice	9.113	5.983	0.063
(Verizon - Existing)			4.000			1/2" Ice	9.579	6.442	0.121
			0.000			1" Ice	10.052	6.909	0.185
JAHH-65B-R3B	B	From Face	3.500	0.000	115.000	No Ice	9.113	5.983	0.063
(Verizon - Existing)			0.000			1/2" Ice	9.579	6.442	0.121
			0.000			1" Ice	10.052	6.909	0.185
LPA-80080-6CF	B	From Face	3.500	0.000	115.000	No Ice	4.326	8.619	0.021
(Verizon - Existing)			-6.000			1/2" Ice	4.764	9.075	0.069
			0.000			1" Ice	5.210	9.539	0.123
LPA-80080-6CF	C	From Face	3.500	0.000	115.000	No Ice	4.326	8.619	0.021
(Verizon - Existing)			6.000			1/2" Ice	4.764	9.075	0.069
			0.000			1" Ice	5.210	9.539	0.123
JAHH-65B-R3B	C	From Face	3.500	0.000	115.000	No Ice	9.113	5.983	0.063
(Verizon - Existing)			4.000			1/2" Ice	9.579	6.442	0.121
			0.000			1" Ice	10.052	6.909	0.185
JAHH-65B-R3B	C	From Face	3.500	0.000	115.000	No Ice	9.113	5.983	0.063
(Verizon - Existing)			0.000			1/2" Ice	9.579	6.442	0.121
			0.000			1" Ice	10.052	6.909	0.185
LPA-80080-6CF	C	From Face	3.500	0.000	115.000	No Ice	4.326	8.619	0.021
(Verizon - Existing)			-6.000			1/2" Ice	4.764	9.075	0.069
			0.000			1" Ice	5.210	9.539	0.123
LPA-80080-6CF	D	From Face	3.500	0.000	115.000	No Ice	4.326	8.619	0.021

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
(Verizon - Existing)			6.000			1/2" Ice	4.764	9.075	0.069
			0.000			1" Ice	5.210	9.539	0.123
JAHH-65B-R3B	D	From Face	3.500	0.000	115.000	No Ice	9.113	5.983	0.063
(Verizon - Existing)			4.000			1/2" Ice	9.579	6.442	0.121
			0.000			1" Ice	10.052	6.909	0.185
JAHH-65B-R3B	D	From Face	3.500	0.000	115.000	No Ice	9.113	5.983	0.063
(Verizon - Existing)			0.000			1/2" Ice	9.579	6.442	0.121
			0.000			1" Ice	10.052	6.909	0.185
LPA-80080-6CF	D	From Face	3.500	0.000	115.000	No Ice	4.326	8.619	0.021
(Verizon - Existing)			-6.000			1/2" Ice	4.764	9.075	0.069
			0.000			1" Ice	5.210	9.539	0.123
RRH2x60-AWS	B	From Face	3.500	0.000	115.000	No Ice	3.357	2.025	0.055
(Verizon - Existing)			4.000			1/2" Ice	3.614	2.258	0.078
			0.000			1" Ice	3.878	2.498	0.105
RRH2x60-AWS	C	From Face	3.500	0.000	115.000	No Ice	3.357	2.025	0.055
(Verizon - Existing)			4.000			1/2" Ice	3.614	2.258	0.078
			0.000			1" Ice	3.878	2.498	0.105
RRH2x60-AWS	D	From Face	3.500	0.000	115.000	No Ice	3.357	2.025	0.055
(Verizon - Existing)			4.000			1/2" Ice	3.614	2.258	0.078
			0.000			1" Ice	3.878	2.498	0.105
RRH2x60-PCS	B	From Face	3.500	0.000	115.000	No Ice	0.000	1.547	0.055
(Verizon - Existing)			-4.000			1/2" Ice	0.000	1.738	0.073
			0.000			1" Ice	0.000	1.939	0.093
RRH2x60-PCS	C	From Face	3.500	0.000	115.000	No Ice	0.000	1.547	0.055
(Verizon - Existing)			-4.000			1/2" Ice	0.000	1.738	0.073
			0.000			1" Ice	0.000	1.939	0.093
RRH2x60-PCS	D	From Face	3.500	0.000	115.000	No Ice	0.000	1.547	0.055
(Verizon - Existing)			-4.000			1/2" Ice	0.000	1.738	0.073
			0.000			1" Ice	0.000	1.939	0.093
RRH2x60-07-U	B	From Face	3.500	0.000	115.000	No Ice	0.000	1.633	0.050
(Verizon - Existing)			0.000			1/2" Ice	0.000	1.826	0.068
			0.000			1" Ice	0.000	2.027	0.089
RRH2x60-07-U	C	From Face	3.500	0.000	115.000	No Ice	0.000	1.633	0.050
(Verizon - Existing)			0.000			1/2" Ice	0.000	1.826	0.068
			0.000			1" Ice	0.000	2.027	0.089
RRH2x60-07-U	D	From Face	3.500	0.000	115.000	No Ice	0.000	1.633	0.050
(Verizon - Existing)			0.000			1/2" Ice	0.000	1.826	0.068
			0.000			1" Ice	0.000	2.027	0.089
DB-T1-6Z-8AB-0Z	D	From Face	3.500	0.000	115.000	No Ice	4.800	2.000	0.044
(Verizon - Existing)			0.000			1/2" Ice	5.070	2.193	0.080
			0.000			1" Ice	5.348	2.393	0.120
DB-T1-6Z-8AB-0Z	C	From Face	3.500	0.000	115.000	No Ice	4.800	2.000	0.044
(Verizon - Existing)			0.000			1/2" Ice	5.070	2.193	0.080
			0.000			1" Ice	5.348	2.393	0.120
Valmont 13' Low Profile Platform	D	From Face	2.000	0.000	113.000	No Ice	15.700	15.700	1.300
			0.000			1/2" Ice	20.100	20.100	1.765
(Verizon - Existing)			0.000			1" Ice	24.500	24.500	2.230
AIR32	A	From Face	3.500	0.000	106.500	No Ice	6.510	4.712	0.133
(T-Mobile - Existing)			-4.000			1/2" Ice	6.887	5.068	0.179
			0.000			1" Ice	7.271	5.431	0.230
APXVAA24_43	A	From Face	3.500	0.000	105.000	No Ice	20.243	8.733	0.125
(T-Mobile - Existing)			0.000			1/2" Ice	20.890	9.330	0.237
			0.000			1" Ice	21.544	9.935	0.357
APX16DWV-16DWVS-E-A20	A	From Face	3.500	0.000	106.500	No Ice	6.460	2.150	0.041
			4.000			1/2" Ice	6.833	2.490	0.074
(T-Mobile - Existing)			0.000			1" Ice	7.214	2.837	0.112
RRUS-11	A	From Face	3.500	0.000	105.000	No Ice	2.566	1.068	0.050

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
(T-Mobile - Existing)			0.000				1/2" Ice	2.765	1.211	0.070
			0.000				1" Ice	2.971	1.361	0.092
Radio 4449 B71 B12	A	From Face	3.500	0.000	0.000	105.000	No Ice	1.639	1.291	0.074
(T-Mobile - Proposed)			0.000				1/2" Ice	1.799	1.436	0.091
			0.000				1" Ice	1.966	1.587	0.111
AIR32	B	From Face	3.500	0.000	0.000	106.500	No Ice	6.510	4.712	0.133
(T-Mobile - Existing)			-4.000				1/2" Ice	6.887	5.068	0.179
			0.000				1" Ice	7.271	5.431	0.230
APXVAA24_43	B	From Face	3.500	0.000	0.000	105.000	No Ice	20.243	8.733	0.125
(T-Mobile - Existing)			0.000				1/2" Ice	20.890	9.330	0.237
			0.000				1" Ice	21.544	9.935	0.357
APX16DWV-16DWVS-E-A	B	From Face	3.500	0.000	0.000	106.500	No Ice	6.460	2.150	0.041
20			4.000				1/2" Ice	6.833	2.490	0.074
(T-Mobile - Existing)			0.000				1" Ice	7.214	2.837	0.112
RRUS-11	B	From Face	3.500	0.000	0.000	105.000	No Ice	2.566	1.068	0.050
(T-Mobile - Existing)			0.000				1/2" Ice	2.765	1.211	0.070
			0.000				1" Ice	2.971	1.361	0.092
Radio 4449 B71 B12	B	From Face	3.500	0.000	0.000	105.000	No Ice	1.639	1.291	0.074
(T-Mobile - Proposed)			0.000				1/2" Ice	1.799	1.436	0.091
			0.000				1" Ice	1.966	1.587	0.111
AIR32	C	From Face	3.500	0.000	0.000	106.500	No Ice	6.510	4.712	0.133
(T-Mobile - Existing)			-4.000				1/2" Ice	6.887	5.068	0.179
			0.000				1" Ice	7.271	5.431	0.230
APXVAA24_43	C	From Face	3.500	0.000	0.000	105.000	No Ice	20.243	8.733	0.125
(T-Mobile - Existing)			0.000				1/2" Ice	20.890	9.330	0.237
			0.000				1" Ice	21.544	9.935	0.357
APX16DWV-16DWVS-E-A	C	From Face	3.500	0.000	0.000	106.500	No Ice	6.460	2.150	0.041
20			4.000				1/2" Ice	6.833	2.490	0.074
(T-Mobile - Existing)			0.000				1" Ice	7.214	2.837	0.112
RRUS-11	C	From Face	3.500	0.000	0.000	105.000	No Ice	2.566	1.068	0.050
(T-Mobile - Existing)			0.000				1/2" Ice	2.765	1.211	0.070
			0.000				1" Ice	2.971	1.361	0.092
Radio 4449 B71 B12	C	From Face	3.500	0.000	0.000	105.000	No Ice	1.639	1.291	0.074
(T-Mobile - Proposed)			0.000				1/2" Ice	1.799	1.436	0.091
			0.000				1" Ice	1.966	1.587	0.111
AIR32	D	From Face	3.500	0.000	0.000	106.500	No Ice	6.510	4.712	0.133
(T-Mobile - Existing)			-4.000				1/2" Ice	6.887	5.068	0.179
			0.000				1" Ice	7.271	5.431	0.230
APXVAA24_43	D	From Face	3.500	0.000	0.000	105.000	No Ice	20.243	8.733	0.125
(T-Mobile - Existing)			0.000				1/2" Ice	20.890	9.330	0.237
			0.000				1" Ice	21.544	9.935	0.357
APX16DWV-16DWVS-E-A	D	From Face	3.500	0.000	0.000	106.500	No Ice	6.460	2.150	0.041
20			4.000				1/2" Ice	6.833	2.490	0.074
(T-Mobile - Existing)			0.000				1" Ice	7.214	2.837	0.112
RRUS-11	D	From Face	3.500	0.000	0.000	105.000	No Ice	2.566	1.068	0.050
(T-Mobile - Existing)			0.000				1/2" Ice	2.765	1.211	0.070
			0.000				1" Ice	2.971	1.361	0.092
Radio 4449 B71 B12	D	From Face	3.500	0.000	0.000	105.000	No Ice	1.639	1.291	0.074
(T-Mobile - Proposed)			0.000				1/2" Ice	1.799	1.436	0.091
			0.000				1" Ice	1.966	1.587	0.111
GPS	D	From Face	3.500	0.000	0.000	105.000	No Ice	1.000	1.000	0.010
(T-Mobile - Existing)			0.000				1/2" Ice	1.500	1.500	0.015
			0.000				1" Ice	2.000	2.000	0.020
F4P-12W Quad Platform w/	D	From Face	2.000	0.000	0.000	105.000	No Ice	35.000	35.000	2.500
Handrail			0.000				1/2" Ice	41.000	41.000	3.100
(T-Mobile - Existing)			0.000				1" Ice	47.000	47.000	3.700

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft ° °	Azimuth Adjustment	3 dB Beam Width	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
Andrew 2' w/Radome (T-Mobile Proposed)	C	Paraboloid w/Radome	From Leg	3.000 0.000 0.000	Worst		105.000	2.000	No Ice 1/2" Ice 1" Ice	3.142 3.409 3.676	0.070 0.282 0.494

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z ksf	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 125.000-85.500	104.316	1.277	0.036	85.062	A	0.000	85.062	85.062	100.00	0.000	0.000
					B	0.000	85.062		100.00	0.000	0.000
					C	0.000	85.062		100.00	0.000	0.000
					D	0.000	85.062		100.00	0.000	0.000
L2 85.500-39.420	61.779	1.144	0.032	134.543	A	0.000	134.543	134.543	100.00	0.000	0.000
					B	0.000	134.543		100.00	0.000	0.000
					C	0.000	134.543		100.00	0.000	0.000
					D	0.000	134.543		100.00	0.000	0.000
L3 39.420-0.000	19.741	0.899	0.026	144.686	A	0.000	144.686	144.686	100.00	0.000	0.000
					B	0.000	144.686		100.00	0.000	0.000
					C	0.000	144.686		100.00	0.000	0.000
					D	0.000	144.686		100.00	0.000	0.000

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z ksf	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 125.000-85.500	104.316	1.277	0.008	2.104	98.911	A	0.000	98.911	98.911	100.00	0.000	0.000
						B	0.000	98.911		100.00	0.000	0.000
						C	0.000	98.911		100.00	0.000	0.000
						D	0.000	98.911		100.00	0.000	0.000
L2 85.500-39.420	61.779	1.144	0.007	1.996	150.699	A	0.000	150.699	150.699	100.00	0.000	0.000
						B	0.000	150.699		100.00	0.000	0.000
						C	0.000	150.699		100.00	0.000	0.000
						D	0.000	150.699		100.00	0.000	0.000
L3 39.420-0.000	19.741	0.899	0.006	1.781	157.802	A	0.000	157.802	157.802	100.00	0.000	0.000
						B	0.000	157.802		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z ksf	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	157.802		100.00	0.000	0.000
						D	0.000	157.802		100.00	0.000	0.000

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z ksf	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	104.316	1.277	0.010	85.062	A	0.000	85.062	85.062	100.00	0.000	0.000
125.000-85.50					B	0.000	85.062		100.00	0.000	0.000
0					C	0.000	85.062		100.00	0.000	0.000
					D	0.000	85.062		100.00	0.000	0.000
L2	61.779	1.144	0.009	134.543	A	0.000	134.543	134.543	100.00	0.000	0.000
85.500-39.420					B	0.000	134.543		100.00	0.000	0.000
					C	0.000	134.543		100.00	0.000	0.000
					D	0.000	134.543		100.00	0.000	0.000
L3	19.741	0.899	0.007	144.686	A	0.000	144.686	144.686	100.00	0.000	0.000
39.420-0.000					B	0.000	144.686		100.00	0.000	0.000
					C	0.000	144.686		100.00	0.000	0.000
					D	0.000	144.686		100.00	0.000	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 ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	1.365	2.025	A	1	0.75	0.036	1	1	85.062	2.554	0.065	D
125.000-85.50			B	1	0.75		1	1	85.062			
0			C	1	0.75		1	1	85.062			
			D	1	0.75		1	1	85.062			
L2	1.829	5.195	A	1	0.75	0.032	1	1	134.543	3.605	0.078	D
85.500-39.420			B	1	0.75		1	1	134.543			
			C	1	0.75		1	1	134.543			
			D	1	0.75		1	1	134.543			
L3	1.446	8.844	A	1	0.75	0.026	1	1	144.686	3.102	0.079	D
39.420-0.000			B	1	0.75		1	1	144.686			
			C	1	0.75		1	1	144.686			
			D	1	0.75		1	1	144.686			
Sum Weight:	4.641	16.064						OTM	550.361 kip-ft	9.261		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	1.365	2.025	A	1	0.75	0.036	1	1	85.062	2.554	0.065	D
125.000-85.50			B	1	0.75		1	1	85.062			
0			C	1	0.75		1	1	85.062			
			D	1	0.75		1	1	85.062			
L2	1.829	5.195	A	1	0.75	0.032	1	1	134.543	3.605	0.078	D
85.500-39.420			B	1	0.75		1	1	134.543			
			C	1	0.75		1	1	134.543			
			D	1	0.75		1	1	134.543			
L3	1.446	8.844	A	1	0.75	0.026	1	1	144.686	3.102	0.079	D
39.420-0.000			B	1	0.75		1	1	144.686			
			C	1	0.75		1	1	144.686			
			D	1	0.75		1	1	144.686			
Sum Weight:	4.641	16.064						OTM	550.361 kip-ft	9.261		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	1.365	4.859	A	1	1.2	0.008	1	1	98.911	1.013	0.026	D
125.000-85.50			B	1	1.2		1	1	98.911			
0			C	1	1.2		1	1	98.911			
			D	1	1.2		1	1	98.911			
L2	1.829	9.351	A	1	1.2	0.007	1	1	150.699	1.377	0.030	D
85.500-39.420			B	1	1.2		1	1	150.699			
			C	1	1.2		1	1	150.699			
			D	1	1.2		1	1	150.699			
L3	1.446	14.693	A	1	1.2	0.006	1	1	157.802	1.153	0.029	D
39.420-0.000			B	1	1.2		1	1	157.802			
			C	1	1.2		1	1	157.802			
			D	1	1.2		1	1	157.802			
Sum Weight:	4.641	28.902						OTM	213.460 kip-ft	3.543		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	1.365	4.859	A	1	1.2	0.008	1	1	98.911	1.013	0.026	D
125.000-85.50			B	1	1.2		1	1	98.911			
0			C	1	1.2		1	1	98.911			
			D	1	1.2		1	1	98.911			
L2	1.829	9.351	A	1	1.2	0.007	1	1	150.699	1.377	0.030	D
85.500-39.420			B	1	1.2		1	1	150.699			
			C	1	1.2		1	1	150.699			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
			D	1	1.2		1	1	150.699			
L3	1.446	14.693	A	1	1.2	0.006	1	1	157.802	1.153	0.029	D
39.420-0.000			B	1	1.2		1	1	157.802			
			C	1	1.2		1	1	157.802			
			D	1	1.2		1	1	157.802			
Sum Weight:	4.641	28.902						OTM	213.460 kip-ft	3.543		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	1.365	2.025	A	1	0.75	0.010	1	1	85.062	0.701	0.018	D
125.000-85.50			B	1	0.75		1	1	85.062			
0			C	1	0.75		1	1	85.062			
			D	1	0.75		1	1	85.062			
L2	1.829	5.195	A	1	0.75	0.009	1	1	134.543	0.990	0.021	D
85.500-39.420			B	1	0.75		1	1	134.543			
			C	1	0.75		1	1	134.543			
			D	1	0.75		1	1	134.543			
L3	1.446	8.844	A	1	0.75	0.007	1	1	144.686	0.852	0.022	D
39.420-0.000			B	1	0.75		1	1	144.686			
			C	1	0.75		1	1	144.686			
			D	1	0.75		1	1	144.686			
Sum Weight:	4.641	16.064						OTM	151.114 kip-ft	2.543		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	1.365	2.025	A	1	0.75	0.010	1	1	85.062	0.701	0.018	D
125.000-85.50			B	1	0.75		1	1	85.062			
0			C	1	0.75		1	1	85.062			
			D	1	0.75		1	1	85.062			
L2	1.829	5.195	A	1	0.75	0.009	1	1	134.543	0.990	0.021	D
85.500-39.420			B	1	0.75		1	1	134.543			
			C	1	0.75		1	1	134.543			
			D	1	0.75		1	1	134.543			
L3	1.446	8.844	A	1	0.75	0.007	1	1	144.686	0.852	0.022	D
39.420-0.000			B	1	0.75		1	1	144.686			
			C	1	0.75		1	1	144.686			
			D	1	0.75		1	1	144.686			
Sum Weight:	4.641	16.064						OTM	151.114 kip-ft	2.543		

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	13.682					
Bracing Weight	2.382					
Total Member Self-Weight	16.064			15.861	-3.045	
Total Weight	29.543			15.861	-3.045	
Wind 0 deg - No Ice		0.000	-20.610	-1818.235	-3.045	7.626
Wind 30 deg - No Ice		10.202	-17.849	-1572.513	-906.809	10.503
Wind 45 deg - No Ice		14.427	-14.574	-1281.041	-1281.161	10.907
Wind 60 deg - No Ice		17.670	-10.305	-901.187	-1568.410	10.567
Wind 90 deg - No Ice		20.403	0.000	15.861	-1810.573	7.798
Wind 120 deg - No Ice		17.670	10.305	932.909	-1568.410	2.941
Wind 135 deg - No Ice		14.427	14.574	1312.762	-1281.161	0.122
Wind 150 deg - No Ice		10.202	17.849	1604.234	-906.809	-2.705
Wind 180 deg - No Ice		0.000	20.610	1849.956	-3.045	-7.626
Wind 210 deg - No Ice		-10.202	17.849	1604.234	900.719	-10.503
Wind 225 deg - No Ice		-14.427	14.574	1312.762	1275.070	-10.907
Wind 240 deg - No Ice		-17.670	10.305	932.909	1562.320	-10.567
Wind 270 deg - No Ice		-20.403	0.000	15.861	1804.483	-7.798
Wind 300 deg - No Ice		-17.670	-10.305	-901.187	1562.320	-2.941
Wind 315 deg - No Ice		-14.427	-14.574	-1281.041	1275.070	-0.122
Wind 330 deg - No Ice		-10.202	-17.849	-1572.513	900.719	2.705
Member Ice	12.838					
Total Weight Ice	61.654			38.613	-16.193	
Wind 0 deg - Ice		0.000	-7.141	-585.962	-16.193	2.261
Wind 30 deg - Ice		3.557	-6.184	-502.285	-326.689	3.406
Wind 45 deg - Ice		5.031	-5.049	-403.028	-455.300	3.646
Wind 60 deg - Ice		6.161	-3.570	-273.675	-553.987	3.637
Wind 90 deg - Ice		7.114	0.000	38.613	-637.184	2.894
Wind 120 deg - Ice		6.161	3.570	350.900	-553.987	1.376
Wind 135 deg - Ice		5.031	5.049	480.254	-455.300	0.447
Wind 150 deg - Ice		3.557	6.184	579.510	-326.689	-0.511
Wind 180 deg - Ice		0.000	7.141	663.187	-16.193	-2.261
Wind 210 deg - Ice		-3.557	6.184	579.510	294.302	-3.406
Wind 225 deg - Ice		-5.031	5.049	480.254	422.914	-3.646
Wind 240 deg - Ice		-6.161	3.570	350.900	521.601	-3.637
Wind 270 deg - Ice		-7.114	0.000	38.613	604.798	-2.894
Wind 300 deg - Ice		-6.161	-3.570	-273.675	521.601	-1.376
Wind 315 deg - Ice		-5.031	-5.049	-403.028	422.914	-0.447
Wind 330 deg - Ice		-3.557	-6.184	-502.285	294.302	0.511
Total Weight	29.543			15.861	-3.045	
Wind 0 deg - Service		0.000	-5.659	-487.732	-3.045	2.094
Wind 30 deg - Service		2.801	-4.901	-420.263	-251.194	2.884
Wind 45 deg - Service		3.961	-4.002	-340.233	-353.981	2.995
Wind 60 deg - Service		4.852	-2.830	-235.935	-432.852	2.901
Wind 90 deg - Service		5.602	0.000	15.861	-499.343	2.141
Wind 120 deg - Service		4.852	2.830	267.657	-432.852	0.807
Wind 135 deg - Service		3.961	4.002	371.954	-353.981	0.033
Wind 150 deg - Service		2.801	4.901	451.985	-251.194	-0.743
Wind 180 deg - Service		0.000	5.659	519.453	-3.045	-2.094
Wind 210 deg - Service		-2.801	4.901	451.985	245.104	-2.884
Wind 225 deg - Service		-3.961	4.002	371.954	347.890	-2.995
Wind 240 deg - Service		-4.852	2.830	267.657	426.761	-2.901
Wind 270 deg - Service		-5.602	0.000	15.861	493.253	-2.141

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 300 deg - Service		-4.852	-2.830	-235.935	426.761	-0.807
Wind 315 deg - Service		-3.961	-4.002	-340.233	347.890	-0.033
Wind 330 deg - Service		-2.801	-4.901	-420.263	245.104	0.743

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 45 deg - No Ice
7	0.9 Dead+1.6 Wind 45 deg - No Ice
8	1.2 Dead+1.6 Wind 60 deg - No Ice
9	0.9 Dead+1.6 Wind 60 deg - No Ice
10	1.2 Dead+1.6 Wind 90 deg - No Ice
11	0.9 Dead+1.6 Wind 90 deg - No Ice
12	1.2 Dead+1.6 Wind 120 deg - No Ice
13	0.9 Dead+1.6 Wind 120 deg - No Ice
14	1.2 Dead+1.6 Wind 135 deg - No Ice
15	0.9 Dead+1.6 Wind 135 deg - No Ice
16	1.2 Dead+1.6 Wind 150 deg - No Ice
17	0.9 Dead+1.6 Wind 150 deg - No Ice
18	1.2 Dead+1.6 Wind 180 deg - No Ice
19	0.9 Dead+1.6 Wind 180 deg - No Ice
20	1.2 Dead+1.6 Wind 210 deg - No Ice
21	0.9 Dead+1.6 Wind 210 deg - No Ice
22	1.2 Dead+1.6 Wind 225 deg - No Ice
23	0.9 Dead+1.6 Wind 225 deg - No Ice
24	1.2 Dead+1.6 Wind 240 deg - No Ice
25	0.9 Dead+1.6 Wind 240 deg - No Ice
26	1.2 Dead+1.6 Wind 270 deg - No Ice
27	0.9 Dead+1.6 Wind 270 deg - No Ice
28	1.2 Dead+1.6 Wind 300 deg - No Ice
29	0.9 Dead+1.6 Wind 300 deg - No Ice
30	1.2 Dead+1.6 Wind 315 deg - No Ice
31	0.9 Dead+1.6 Wind 315 deg - No Ice
32	1.2 Dead+1.6 Wind 330 deg - No Ice
33	0.9 Dead+1.6 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp

Comb. No.	Description
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service
65	Dead+Wind 315 deg - Service
66	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	125 - 85.5	Pole	Max Tension	34	0.000	0.000	0.000
			Max. Compression	34	-35.952	-18.446	-45.750
			Max. Mx	10	-12.118	-497.941	-18.961
			Max. My	18	-12.022	-3.158	-526.716
			Max. Vy	10	22.614	-497.941	-18.961
			Max. Vx	18	22.979	-3.158	-526.716
			Max. Torque	6			-17.361
L2	85.5 - 39.42	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	34	-48.213	-19.975	-49.540
			Max. Mx	10	-20.949	-1632.402	-20.160
			Max. My	18	-20.912	-3.841	-1677.285
			Max. Vy	10	27.793	-1632.402	-20.160
			Max. Vx	18	28.142	-3.841	-1677.285
			Max. Torque	6			-17.315
L3	39.42 - 0	Pole	Max Tension	42	128.118	-159.185	-282.814
			Max. Compression	34	-55.619	-20.241	-50.196
			Max. Mx	10	-26.399	-2211.194	-20.359
			Max. My	18	-26.383	-3.937	-2262.974
			Max. Vy	10	30.007	-2211.194	-20.359
			Max. Vx	18	30.347	-3.937	-2262.974
			Max. Torque	6			-17.293
	0 - 25	Reinforcing	Max Tension	18	268.712	-6.176	0.000
			Max. Compression	18	-278.018	-0.000	0.000
			Max. Mx	18	268.712	-6.176	0.000
			Max. My	10	264.266	0.042	-0.144
			Max. Vy	18	-0.254	-6.176	0.000
			Max. Vx	10	-0.012	0.042	-0.144

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	1	18.320	0.006	0.025
	Max. H_x	27	10.253	27.941	0.028
	Max. H_z	3	10.188	0.012	29.185
	Max. M_x	2	1948.483	0.014	29.182
	Max. M_z	10	1929.949	-27.908	0.036
	Max. Torsion	23	17.033	19.768	-20.593
	Min. Vert	42	-119.974	-3.162	-5.687
	Min. H_x	11	10.225	-27.930	0.028
	Min. H_z	19	10.041	0.012	-29.144
	Min. M_x	18	-1972.281	0.014	-29.127
	Min. M_z	26	-1925.391	27.922	0.036
	Min. Torsion	6	-17.287	-19.728	20.648
Reinf @ Azimuth 90 deg	Max. Vert	10	273.464	-0.066	0.016
	Max. H_x	26	-262.712	4.742	-0.018
	Max. H_z	14	194.943	-0.555	1.427
	Min. Vert	26	-262.712	4.742	-0.018
	Min. H_x	39	110.266	-0.777	0.022
	Min. H_z	6	194.912	-0.555	-1.401
Reinf @ Azimuth 0 deg	Max. Vert	2	273.799	-0.000	-0.181
	Max. H_x	6	194.450	1.226	0.385
	Max. H_z	35	103.027	0.006	0.699
	Min. Vert	18	-267.958	-0.006	-4.646
	Min. H_x	30	194.430	-1.224	0.385
	Min. H_z	18	-267.958	-0.006	-4.646
Reinf @ Azimuth 270 deg	Max. Vert	26	272.649	0.073	0.016
	Max. H_x	47	106.045	0.761	0.022
	Max. H_z	22	194.145	0.557	1.419
	Min. Vert	10	-263.508	-4.763	-0.018
	Min. H_x	10	-263.508	-4.763	-0.018
	Min. H_z	30	194.113	0.557	-1.393
Reinf @ Azimuth 180 deg	Max. Vert	18	278.018	-0.000	0.220
	Max. H_x	14	198.659	1.256	-0.367
	Max. H_z	2	-263.840	-0.006	4.542
	Min. Vert	2	-263.840	-0.006	4.542
	Min. H_x	22	198.639	-1.254	-0.368
	Min. H_z	43	113.442	0.007	-0.729

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	29.543	0.000	0.000	16.833	-3.235	0.000
1.2 Dead+1.6 Wind 0 deg - No Ice	35.451	-0.000	-32.977	-3014.647	-3.773	11.980
0.9 Dead+1.6 Wind 0 deg - No Ice	26.588	-0.000	-32.977	-2992.665	-2.777	11.986
1.2 Dead+1.6 Wind 30 deg - No Ice	35.451	16.323	-28.559	-2608.135	-1499.200	16.620
0.9 Dead+1.6 Wind 30 deg - No Ice	26.588	16.323	-28.559	-2589.801	-1484.760	16.622
1.2 Dead+1.6 Wind 45 deg - No Ice	35.451	23.084	-23.318	-2125.867	-2118.673	17.278

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
0.9 Dead+1.6 Wind 45 deg - No Ice	26.588	23.084	-23.318	-2111.873	-2098.660	17.279
1.2 Dead+1.6 Wind 60 deg - No Ice	35.451	28.272	-16.488	-1497.319	-2594.036	16.736
0.9 Dead+1.6 Wind 60 deg - No Ice	26.588	28.272	-16.488	-1488.985	-2569.747	16.735
1.2 Dead+1.6 Wind 90 deg - No Ice	35.451	32.645	-0.000	20.227	-2994.791	12.294
0.9 Dead+1.6 Wind 90 deg - No Ice	26.588	32.645	-0.000	14.892	-2966.901	12.293
1.2 Dead+1.6 Wind 120 deg - No Ice	35.451	28.272	16.488	1537.743	-2593.988	4.560
0.9 Dead+1.6 Wind 120 deg - No Ice	26.588	28.272	16.488	1518.749	-2569.716	4.556
1.2 Dead+1.6 Wind 135 deg - No Ice	35.451	23.084	23.318	2166.259	-2118.616	0.114
0.9 Dead+1.6 Wind 135 deg - No Ice	26.588	23.084	23.318	2141.616	-2098.624	0.108
1.2 Dead+1.6 Wind 150 deg - No Ice	35.451	16.323	28.559	2648.496	-1499.149	-4.315
0.9 Dead+1.6 Wind 150 deg - No Ice	26.588	16.323	28.559	2619.523	-1484.727	-4.323
1.2 Dead+1.6 Wind 180 deg - No Ice	35.451	-0.000	32.977	3054.978	-3.766	-11.958
0.9 Dead+1.6 Wind 180 deg - No Ice	26.588	-0.000	32.977	3022.366	-2.773	-11.970
1.2 Dead+1.6 Wind 210 deg - No Ice	35.451	-16.323	28.559	2648.409	1491.564	-16.404
0.9 Dead+1.6 Wind 210 deg - No Ice	26.588	-16.323	28.559	2619.458	1479.141	-16.416
1.2 Dead+1.6 Wind 225 deg - No Ice	35.451	-23.084	23.318	2166.159	2110.976	-17.038
0.9 Dead+1.6 Wind 225 deg - No Ice	26.588	-23.084	23.318	2141.542	2092.998	-17.048
1.2 Dead+1.6 Wind 240 deg - No Ice	35.451	-28.272	16.488	1537.657	2586.293	-16.533
0.9 Dead+1.6 Wind 240 deg - No Ice	26.588	-28.272	16.488	1518.685	2564.049	-16.540
1.2 Dead+1.6 Wind 270 deg - No Ice	35.451	-32.645	-0.000	20.231	2987.038	-12.298
0.9 Dead+1.6 Wind 270 deg - No Ice	26.588	-32.645	-0.000	14.894	2961.194	-12.295
1.2 Dead+1.6 Wind 300 deg - No Ice	35.451	-28.272	-16.488	-1497.228	2586.333	-4.757
0.9 Dead+1.6 Wind 300 deg - No Ice	26.588	-28.272	-16.488	-1488.918	2564.077	-4.749
1.2 Dead+1.6 Wind 315 deg - No Ice	35.451	-23.084	-23.318	-2125.763	2111.022	-0.336
0.9 Dead+1.6 Wind 315 deg - No Ice	26.588	-23.084	-23.318	-2111.797	2093.029	-0.326
1.2 Dead+1.6 Wind 330 deg - No Ice	35.451	-16.323	-28.559	-2608.045	1491.602	4.130
0.9 Dead+1.6 Wind 330 deg - No Ice	26.588	-16.323	-28.559	-2589.735	1479.167	4.140
1.2 Dead+1.0 Ice+1.0 Temp	68.523	-0.000	-0.000	50.486	-20.358	0.002
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	68.523	-0.000	-7.141	-632.294	-20.322	2.234
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	68.523	3.557	-6.184	-540.835	-359.710	3.374
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	68.523	5.031	-5.049	-432.343	-500.288	3.614

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
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	68.523	6.161	-3.570	-290.952	-608.157	3.606
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	68.523	7.114	-0.000	50.396	-699.091	2.869
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	68.523	6.161	3.570	391.743	-608.145	1.365
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	68.523	5.031	5.049	533.131	-500.272	0.447
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	68.523	3.557	6.184	641.622	-359.692	-0.500
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	68.523	-0.000	7.141	733.083	-20.308	-2.227
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	68.523	-3.557	6.184	641.623	319.072	-3.357
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	68.523	-5.031	5.049	533.133	459.647	-3.596
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	68.523	-6.161	3.570	391.747	567.514	-3.591
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	68.523	-7.114	-0.000	50.407	658.450	-2.866
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	68.523	-6.161	-3.570	-290.938	567.512	-1.372
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	68.523	-5.031	-5.049	-432.330	459.643	-0.454
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	68.523	-3.557	-6.184	-540.825	319.065	0.495
Dead+Wind 0 deg - Service	29.543	0.000	-5.659	-501.784	-3.237	2.091
Dead+Wind 30 deg - Service	29.543	2.801	-4.901	-432.301	-258.789	2.886
Dead+Wind 45 deg - Service	29.543	3.961	-4.002	-349.879	-364.643	2.998
Dead+Wind 60 deg - Service	29.543	4.852	-2.830	-242.465	-445.867	2.905
Dead+Wind 90 deg - Service	29.543	5.602	0.000	16.857	-514.342	2.144
Dead+Wind 120 deg - Service	29.543	4.852	2.830	276.178	-445.865	0.808
Dead+Wind 135 deg - Service	29.543	3.961	4.002	383.591	-364.641	0.034
Dead+Wind 150 deg - Service	29.543	2.801	4.901	466.012	-258.787	-0.742
Dead+Wind 180 deg - Service	29.543	0.000	5.659	535.495	-3.237	-2.090
Dead+Wind 210 deg - Service	29.543	-2.801	4.901	466.010	252.313	-2.879
Dead+Wind 225 deg - Service	29.543	-3.961	4.002	383.589	358.165	-2.991
Dead+Wind 240 deg - Service	29.543	-4.852	2.830	276.176	439.388	-2.899
Dead+Wind 270 deg - Service	29.543	-5.602	0.000	16.857	507.863	-2.144
Dead+Wind 300 deg - Service	29.543	-4.852	-2.830	-242.462	439.388	-0.814
Dead+Wind 315 deg - Service	29.543	-3.961	-4.002	-349.876	358.165	-0.041
Dead+Wind 330 deg - Service	29.543	-2.801	-4.901	-432.297	252.313	0.736

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.000	-29.543	0.000	0.000	29.543	-0.000	0.000%
2	0.000	-35.451	-32.977	0.000	35.451	32.977	0.000%
3	0.000	-26.588	-32.977	0.000	26.588	32.977	0.000%
4	16.323	-35.451	-28.559	-16.323	35.451	28.559	0.000%
5	16.323	-26.588	-28.559	-16.323	26.588	28.559	0.000%
6	23.084	-35.451	-23.318	-23.084	35.451	23.318	0.000%
7	23.084	-26.588	-23.318	-23.084	26.588	23.318	0.000%
8	28.272	-35.451	-16.488	-28.272	35.451	16.488	0.000%
9	28.272	-26.588	-16.488	-28.272	26.588	16.488	0.000%
10	32.645	-35.451	0.000	-32.645	35.451	0.000	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
11	32.645	-26.588	0.000	-32.645	26.588	0.000	0.000%
12	28.272	-35.451	16.488	-28.272	35.451	-16.488	0.000%
13	28.272	-26.588	16.488	-28.272	26.588	-16.488	0.000%
14	23.084	-35.451	23.318	-23.084	35.451	-23.318	0.000%
15	23.084	-26.588	23.318	-23.084	26.588	-23.318	0.000%
16	16.323	-35.451	28.559	-16.323	35.451	-28.559	0.000%
17	16.323	-26.588	28.559	-16.323	26.588	-28.559	0.000%
18	0.000	-35.451	32.977	0.000	35.451	-32.977	0.000%
19	0.000	-26.588	32.977	0.000	26.588	-32.977	0.000%
20	-16.323	-35.451	28.559	16.323	35.451	-28.559	0.000%
21	-16.323	-26.588	28.559	16.323	26.588	-28.559	0.000%
22	-23.084	-35.451	23.318	23.084	35.451	-23.318	0.000%
23	-23.084	-26.588	23.318	23.084	26.588	-23.318	0.000%
24	-28.272	-35.451	16.488	28.272	35.451	-16.488	0.000%
25	-28.272	-26.588	16.488	28.272	26.588	-16.488	0.000%
26	-32.645	-35.451	0.000	32.645	35.451	0.000	0.000%
27	-32.645	-26.588	0.000	32.645	26.588	0.000	0.000%
28	-28.272	-35.451	-16.488	28.272	35.451	16.488	0.000%
29	-28.272	-26.588	-16.488	28.272	26.588	16.488	0.000%
30	-23.084	-35.451	-23.318	23.084	35.451	23.318	0.000%
31	-23.084	-26.588	-23.318	23.084	26.588	23.318	0.000%
32	-16.323	-35.451	-28.559	16.323	35.451	28.559	0.000%
33	-16.323	-26.588	-28.559	16.323	26.588	28.559	0.000%
34	0.000	-68.523	0.000	0.000	68.523	0.000	0.000%
35	0.000	-68.523	-7.141	0.000	68.523	7.141	0.000%
36	3.557	-68.523	-6.184	-3.557	68.523	6.184	0.000%
37	5.031	-68.523	-5.049	-5.031	68.523	5.049	0.000%
38	6.161	-68.523	-3.570	-6.161	68.523	3.570	0.000%
39	7.114	-68.523	0.000	-7.114	68.523	0.000	0.000%
40	6.161	-68.523	3.570	-6.161	68.523	-3.570	0.000%
41	5.031	-68.523	5.049	-5.031	68.523	-5.049	0.000%
42	3.557	-68.523	6.184	-3.557	68.523	-6.184	0.000%
43	0.000	-68.523	7.141	0.000	68.523	-7.141	0.000%
44	-3.557	-68.523	6.184	3.557	68.523	-6.184	0.000%
45	-5.031	-68.523	5.049	5.031	68.523	-5.049	0.000%
46	-6.161	-68.523	3.570	6.161	68.523	-3.570	0.000%
47	-7.114	-68.523	0.000	7.114	68.523	0.000	0.000%
48	-6.161	-68.523	-3.570	6.161	68.523	3.570	0.000%
49	-5.031	-68.523	-5.049	5.031	68.523	5.049	0.000%
50	-3.557	-68.523	-6.184	3.557	68.523	6.184	0.000%
51	0.000	-29.543	-5.659	0.000	29.543	5.659	0.000%
52	2.801	-29.543	-4.901	-2.801	29.543	4.901	0.000%
53	3.961	-29.543	-4.002	-3.961	29.543	4.002	0.000%
54	4.852	-29.543	-2.830	-4.852	29.543	2.830	0.000%
55	5.602	-29.543	0.000	-5.602	29.543	0.000	0.000%
56	4.852	-29.543	2.830	-4.852	29.543	-2.830	0.000%
57	3.961	-29.543	4.002	-3.961	29.543	-4.002	0.000%
58	2.801	-29.543	4.901	-2.801	29.543	-4.901	0.000%
59	0.000	-29.543	5.659	0.000	29.543	-5.659	0.000%
60	-2.801	-29.543	4.901	2.801	29.543	-4.901	0.000%
61	-3.961	-29.543	4.002	3.961	29.543	-4.002	0.000%
62	-4.852	-29.543	2.830	4.852	29.543	-2.830	0.000%
63	-5.602	-29.543	0.000	5.602	29.543	0.000	0.000%
64	-4.852	-29.543	-2.830	4.852	29.543	2.830	0.000%
65	-3.961	-29.543	-4.002	3.961	29.543	4.002	0.000%
66	-2.801	-29.543	-4.901	2.801	29.543	4.901	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00005904
2	Yes	5	0.00000001	0.00097161
3	Yes	5	0.00000001	0.00038887
4	Yes	6	0.00000001	0.00008147
5	Yes	5	0.00000001	0.00075920
6	Yes	6	0.00000001	0.00007054
7	Yes	5	0.00000001	0.00067195
8	Yes	6	0.00000001	0.00004884
9	Yes	5	0.00000001	0.00047515
10	Yes	6	0.00000001	0.00004415
11	Yes	5	0.00000001	0.00040636
12	Yes	6	0.00000001	0.00004440
13	Yes	5	0.00000001	0.00040893
14	Yes	5	0.00000001	0.00094399
15	Yes	5	0.00000001	0.00034508
16	Yes	6	0.00000001	0.00004409
17	Yes	5	0.00000001	0.00040635
18	Yes	5	0.00000001	0.00096418
19	Yes	5	0.00000001	0.00038374
20	Yes	6	0.00000001	0.00004611
21	Yes	5	0.00000001	0.00045106
22	Yes	6	0.00000001	0.00006810
23	Yes	5	0.00000001	0.00065087
24	Yes	6	0.00000001	0.00008077
25	Yes	5	0.00000001	0.00075413
26	Yes	6	0.00000001	0.00004434
27	Yes	5	0.00000001	0.00040739
28	Yes	5	0.00000001	0.00071724
29	Yes	5	0.00000001	0.00026604
30	Yes	5	0.00000001	0.00092709
31	Yes	5	0.00000001	0.00034371
32	Yes	5	0.00000001	0.00071987
33	Yes	5	0.00000001	0.00026417
34	Yes	5	0.00000001	0.00070559
35	Yes	6	0.00000001	0.00039366
36	Yes	6	0.00000001	0.00044285
37	Yes	6	0.00000001	0.00046511
38	Yes	6	0.00000001	0.00048088
39	Yes	6	0.00000001	0.00051410
40	Yes	6	0.00000001	0.00055450
41	Yes	6	0.00000001	0.00056436
42	Yes	6	0.00000001	0.00056378
43	Yes	6	0.00000001	0.00054817
44	Yes	6	0.00000001	0.00054118
45	Yes	6	0.00000001	0.00053336
46	Yes	6	0.00000001	0.00051393
47	Yes	6	0.00000001	0.00045032
48	Yes	6	0.00000001	0.00041059
49	Yes	6	0.00000001	0.00040085
50	Yes	6	0.00000001	0.00039114
51	Yes	5	0.00000001	0.00007329
52	Yes	5	0.00000001	0.00010569
53	Yes	5	0.00000001	0.00010629
54	Yes	5	0.00000001	0.00009960
55	Yes	5	0.00000001	0.00008171
56	Yes	5	0.00000001	0.00005131
57	Yes	5	0.00000001	0.00004126
58	Yes	5	0.00000001	0.00005115
59	Yes	5	0.00000001	0.00008367

60	Yes	5	0.00000001	0.00010637
61	Yes	5	0.00000001	0.00011456
62	Yes	5	0.00000001	0.00011437
63	Yes	5	0.00000001	0.00007956
64	Yes	4	0.00000001	0.00094843
65	Yes	4	0.00000001	0.00085623
66	Yes	4	0.00000001	0.00093316

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	125 - 85.5	17.074	59	1.279	0.036
L2	90 - 39.42	8.404	59	0.979	0.017
L3	45 - 0	1.746	59	0.400	0.005

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
130.000	4-bay dipole	59	17.074	1.279	0.036	28770
123.000	(2) 7770.00	59	16.544	1.264	0.035	28770
121.000	Andrew 12'-6" Low Profile Platform	59	16.016	1.249	0.034	28770
115.000	LPA-80080-6CF	59	14.440	1.204	0.030	14385
113.000	Valmont 13' Low Profile Platform	59	13.921	1.189	0.029	11987
106.500	AIR32	59	12.264	1.137	0.025	7775
105.000	Andrew 2' w/Radome	59	11.890	1.124	0.024	7192

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	125 - 85.5	93.890	18	6.825	0.210
L2	90 - 39.42	47.118	18	5.419	0.096
L3	45 - 0	9.906	18	2.264	0.028

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
130.000	4-bay dipole	18	93.890	6.825	0.210	5943
123.000	(2) 7770.00	18	91.050	6.761	0.203	5943
121.000	Andrew 12'-6" Low Profile Platform	18	88.213	6.697	0.196	5943

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
115.000	LPA-80080-6CF	18	79.754	6.499	0.174	2970
113.000	Valmont 13' Low Profile Platform	18	76.963	6.430	0.167	2475
106.500	AIR32	18	68.046	6.192	0.145	1603
105.000	Andrew 2' w/Radome	18	66.029	6.133	0.140	1483

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	125 - 123.158	TP29.725x21.037x0.188	39.500	0.000	0.0	12.713	-0.179	904.725	0.000
	123.158 - 121.316					12.955	-0.979	916.299	0.001
	121.316 - 119.474					13.198	-2.541	927.660	0.003
	119.474 - 117.632					13.440	-2.697	938.809	0.003
	117.632 - 115.789					13.682	-2.856	949.745	0.003
	115.789 - 113.947					13.925	-3.670	960.470	0.004
	113.947 - 112.105					14.167	-5.296	970.982	0.005
	112.105 - 110.263					14.409	-5.468	981.282	0.006
	110.263 - 108.421					14.652	-5.643	991.370	0.006
	108.421 - 106.579					14.894	-5.823	1001.250	0.006
	106.579 - 104.737					15.136	-10.243	1010.910	0.010
	104.737 - 102.895					15.379	-10.444	1020.360	0.010
	102.895 - 101.053					15.621	-10.651	1029.600	0.010
	101.053 - 99.2105					15.863	-10.865	1038.630	0.010
	99.2105 - 97.3684					16.106	-11.085	1047.440	0.011
	97.3684 - 95.5263					16.348	-11.311	1056.040	0.011
	95.5263 - 93.6842					16.590	-11.542	1064.430	0.011
	93.6842 - 91.8421					16.833	-11.780	1072.610	0.011
	91.8421 - 90					17.075	-12.023	1080.570	0.011
	90 - 85.5					17.667	-5.295	1099.140	0.005
L2	90 - 85.5	TP39.486x28.36x0.281	50.580	0.000	0.0	26.080	-7.714	1908.870	0.004
	85.5 - 83.25					26.524	-13.399	1931.920	0.007
	83.25 - 81					26.968	-13.789	1954.640	0.007
	81 - 78.75					27.412	-14.187	1977.050	0.007
	78.75 - 76.5					27.856	-14.592	1999.140	0.007

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
	76.5 - 74.25					28.300	-15.003	2020.920	0.007
	74.25 - 72					28.744	-15.421	2042.380	0.008
	72 - 69.75					29.188	-15.845	2063.520	0.008
	69.75 - 67.5					29.632	-16.276	2084.340	0.008
	67.5 - 65.25					30.076	-16.712	2104.850	0.008
	65.25 - 63					30.521	-17.155	2125.040	0.008
	63 - 60.75					30.965	-17.604	2144.920	0.008
	60.75 - 58.5					31.409	-18.059	2164.470	0.008
	58.5 - 56.25					31.853	-18.520	2183.720	0.008
	56.25 - 54					32.297	-18.987	2202.640	0.009
	54 - 51.75					32.741	-19.460	2221.250	0.009
	51.75 - 49.5					33.185	-19.938	2239.540	0.009
	49.5 - 47.25					33.629	-20.422	2257.520	0.009
	47.25 - 45					34.073	-20.912	2275.170	0.009
	45 - 39.42					35.174	-10.994	2317.600	0.005
L3	45 - 39.42	TP47.593x37.696x0.313	45.000	0.000	0.0	38.490	-11.898	2659.650	0.004
	39.42 - 37.3453					38.945	-23.393	2679.560	0.009
	37.3453 - 35.2705					39.400	-23.884	2699.200	0.009
	35.2705 - 33.1958					39.855	-24.379	2718.570	0.009
	33.1958 - 31.1211					40.310	-24.878	2737.670	0.009
	31.1211 - 29.0463					40.765	-25.383	2756.500	0.009
	29.0463 - 26.9716					41.220	-25.893	2775.060	0.009
	26.9716 - 25					41.652	-26.383	2792.450	0.009
	25 - 24.8968					41.674	-9.299	2793.350	0.003
	24.8968 - 22.8221					42.129	-9.761	2811.380	0.003
	22.8221 - 20.7474					42.584	-10.245	2829.130	0.004
	20.7474 - 18.6726					43.039	-10.734	2846.620	0.004
	18.6726 - 16.5979					43.494	-11.228	2863.840	0.004
	16.5979 - 14.5232					43.949	-11.727	2880.780	0.004
	14.5232 - 12.4484					44.404	-12.231	2897.460	0.004
	12.4484 - 10.3737					44.859	-12.740	2913.870	0.004
	10.3737 - 8.29895					45.313	-13.253	2930.010	0.005
	8.29895 - 6.22421					45.768	-13.772	2945.880	0.005
	6.22421 - 4.14947					46.223	-14.295	2961.480	0.005
	4.14947 - 2.07474					46.678	-14.823	2976.810	0.005
	2.07474 - 0					47.133	-15.355	2991.880	0.005

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	125 - 123.158	TP29.725x21.037x0.188	6.137	393.478	0.016	0.000	393.478	0.000
	123.158 - 121.316		13.759	406.174	0.034	0.000	406.174	0.000
	121.316 - 119.474		26.758	418.968	0.064	0.000	418.968	0.000
	119.474 - 117.632		36.695	431.855	0.085	0.000	431.855	0.000
	117.632 - 115.789		46.989	444.828	0.106	0.000	444.828	0.000
	115.789 - 113.947		63.922	457.884	0.140	0.000	457.884	0.000
	113.947 - 112.105		90.404	471.016	0.192	0.000	471.016	0.000
	112.105 - 110.263		113.537	484.219	0.234	0.000	484.219	0.000
	110.263 - 108.421		137.037	497.488	0.275	0.000	497.488	0.000
	108.421 - 106.579		160.907	510.818	0.315	0.000	510.818	0.000
	106.579 - 104.737		199.912	524.202	0.381	0.000	524.202	0.000
	104.737 - 102.895		239.499	537.637	0.445	0.000	537.637	0.000
	102.895 - 101.053		279.447	551.116	0.507	0.000	551.116	0.000
	101.053 - 99.2105		319.757	564.633	0.566	0.000	564.633	0.000
	99.2105 - 97.3684		360.428	578.185	0.623	0.000	578.185	0.000
	97.3684 - 95.5263		401.459	591.766	0.678	0.000	591.766	0.000
	95.5263 - 93.6842		442.853	605.369	0.732	0.000	605.369	0.000
	93.6842 - 91.8421		484.608	618.991	0.783	0.000	618.991	0.000
	91.8421 - 90		526.725	632.625	0.833	0.000	632.625	0.000
	90 - 85.5		260.082	665.950	0.391	0.000	665.950	0.000
L2	90 - 85.5	TP39.486x28.36x0.281	371.267	1134.450	0.327	0.000	1134.450	0.000
	85.5 - 83.25		684.599	1167.883	0.586	0.000	1167.883	0.000
	83.25 - 81		738.419	1201.583	0.615	0.000	1201.583	0.000
	81 - 78.75		792.812	1235.558	0.642	0.000	1235.558	0.000
	78.75 - 76.5		847.775	1269.783	0.668	0.000	1269.783	0.000
	76.5 - 74.25		903.317	1304.258	0.693	0.000	1304.258	0.000
	74.25 - 72		959.417	1338.975	0.717	0.000	1338.975	0.000
	72 - 69.75		1016.100	1373.917	0.740	0.000	1373.917	0.000
	69.75 - 67.5		1073.350	1409.075	0.762	0.000	1409.075	0.000
	67.5 - 65.25		1131.175	1444.442	0.783	0.000	1444.442	0.000
	65.25 - 63		1189.567	1480.008	0.804	0.000	1480.008	0.000
	63 - 60.75		1248.533	1515.758	0.824	0.000	1515.758	0.000
	60.75 - 58.5		1308.075	1551.692	0.843	0.000	1551.692	0.000
	58.5 - 56.25		1368.183	1587.792	0.862	0.000	1587.792	0.000
	56.25 - 54		1428.858	1624.058	0.880	0.000	1624.058	0.000
	54 - 51.75		1490.108	1660.467	0.897	0.000	1660.467	0.000
	51.75 - 49.5		1551.933	1697.025	0.915	0.000	1697.025	0.000
	49.5 - 47.25		1614.325	1733.708	0.931	0.000	1733.708	0.000
	47.25 - 45		1677.292	1770.508	0.947	0.000	1770.508	0.000
	45 - 39.42		891.283	1862.242	0.479	0.000	1862.242	0.000
L3	45 - 39.42	TP47.593x37.696x0.313	944.950	2102.792	0.449	0.000	2102.792	0.000
	39.42 - 37.3453		1896.325	2143.767	0.885	0.000	2143.767	0.000

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 $\frac{M_{uy}}{\phi M_{ny}}$
	37.3453 - 35.2705		1956.867	2184.900	0.896	0.000	2184.900	0.000
	35.2705 - 33.1958		2017.842	2226.183	0.906	0.000	2226.183	0.000
	33.1958 - 31.1211		2079.267	2267.617	0.917	0.000	2267.617	0.000
	31.1211 - 29.0463		2141.117	2309.175	0.927	0.000	2309.175	0.000
	29.0463 - 26.9716		2203.400	2350.867	0.937	0.000	2350.867	0.000
	26.9716 - 25		2262.975	2390.592	0.947	0.000	2390.592	0.000
	25 - 24.8968		1283.458	2392.667	0.536	0.000	2392.667	0.000
	24.8968 - 22.8221		1338.017	2434.592	0.550	0.000	2434.592	0.000
	22.8221 - 20.7474		1393.100	2476.608	0.563	0.000	2476.608	0.000
	20.7474 - 18.6726		1448.708	2518.733	0.575	0.000	2518.733	0.000
	18.6726 - 16.5979		1504.842	2560.942	0.588	0.000	2560.942	0.000
	16.5979 - 14.5232		1561.492	2603.225	0.600	0.000	2603.225	0.000
	14.5232 - 12.4484		1618.658	2645.592	0.612	0.000	2645.592	0.000
	12.4484 - 10.3737		1676.342	2688.017	0.624	0.000	2688.017	0.000
	10.3737 - 8.29895		1734.525	2730.500	0.635	0.000	2730.500	0.000
	8.29895 - 6.22421		1793.217	2773.042	0.647	0.000	2773.042	0.000
	6.22421 - 4.14947		1852.408	2815.617	0.658	0.000	2815.617	0.000
	4.14947 - 2.07474		1912.100	2858.233	0.669	0.000	2858.233	0.000
	2.07474 - 0		1972.283	2900.875	0.680	0.000	2900.875	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	125 - 123.158	TP29.725x21.037x0.188	0.574	452.363	0.001	0.012	794.565	0.000
	123.158 - 121.316		3.947	458.149	0.009	1.673	820.178	0.002
	121.316 - 119.474		5.303	463.830	0.011	3.252	845.992	0.004
	119.474 - 117.632		5.494	469.404	0.012	3.252	871.983	0.004
	117.632 - 115.789		5.687	474.873	0.012	3.252	898.158	0.004
	115.789 - 113.947		11.322	480.235	0.024	11.601	924.492	0.013
	113.947 - 112.105		12.464	485.491	0.026	11.601	950.983	0.012
	112.105 - 110.263		12.662	490.641	0.026	11.600	977.608	0.012

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 $\frac{T_u}{\phi T_n}$
	110.263 - 108.421		12.862	495.685	0.026	11.598	1004.375	0.012
	108.421 - 106.579		13.063	500.623	0.026	11.597	1031.267	0.011
	106.579 - 104.737		21.400	505.454	0.042	12.099	1058.258	0.011
	104.737 - 102.895		21.598	510.180	0.042	12.097	1085.358	0.011
	102.895 - 101.053		21.795	514.799	0.042	12.094	1112.542	0.011
	101.053 - 99.2105		21.992	519.313	0.042	12.091	1139.808	0.011
	99.2105 - 97.3684		22.189	523.720	0.042	12.088	1167.142	0.010
	97.3684 - 95.5263		22.386	528.021	0.042	12.084	1194.533	0.010
	95.5263 - 93.6842		22.584	532.216	0.042	12.080	1221.967	0.010
	93.6842 - 91.8421		22.781	536.305	0.042	12.076	1249.442	0.010
	91.8421 - 90		22.979	540.287	0.043	12.072	1276.942	0.009
	90 - 85.5		9.859	549.570	0.018	4.969	1344.150	0.004
L2	90 - 85.5	TP39.486x28.36x0.281	13.698	954.437	0.014	7.098	2291.217	0.003
	85.5 - 83.25		23.811	965.958	0.025	12.063	2358.658	0.005
	83.25 - 81		24.066	977.321	0.025	12.058	2426.658	0.005
	81 - 78.75		24.321	988.525	0.025	12.054	2495.192	0.005
	78.75 - 76.5		24.576	999.571	0.025	12.049	2564.250	0.005
	76.5 - 74.25		24.831	1010.460	0.025	12.044	2633.800	0.005
	74.25 - 72		25.086	1021.190	0.025	12.039	2703.825	0.004
	72 - 69.75		25.341	1031.760	0.025	12.034	2774.317	0.004
	69.75 - 67.5		25.596	1042.170	0.025	12.030	2845.233	0.004
	67.5 - 65.25		25.851	1052.430	0.025	12.025	2916.583	0.004
	65.25 - 63		26.105	1062.520	0.025	12.020	2988.325	0.004
	63 - 60.75		26.360	1072.460	0.025	12.015	3060.450	0.004
	60.75 - 58.5		26.615	1082.240	0.025	12.011	3132.933	0.004
	58.5 - 56.25		26.870	1091.860	0.025	12.006	3205.758	0.004
	56.25 - 54		27.124	1101.320	0.025	12.002	3278.900	0.004
	54 - 51.75		27.379	1110.620	0.025	11.998	3352.350	0.004
	51.75 - 49.5		27.633	1119.770	0.025	11.994	3426.075	0.004
	49.5 - 47.25		27.888	1128.760	0.025	11.990	3500.067	0.003
	47.25 - 45		28.142	1137.590	0.025	11.986	3574.300	0.003
	45 - 39.42		14.221	1158.800	0.012	5.815	3759.325	0.002
L3	45 - 39.42	TP47.593x37.696x0.313	14.677	1329.820	0.011	6.168	4245.667	0.001
	39.42 - 37.3453		29.103	1339.780	0.022	11.979	4328.325	0.003
	37.3453 - 35.2705		29.317	1349.600	0.022	11.976	4411.300	0.003
	35.2705 - 33.1958		29.530	1359.280	0.022	11.974	4494.575	0.003
	33.1958 - 31.1211		29.740	1368.830	0.022	11.971	4578.142	0.003
	31.1211 - 29.0463		29.948	1378.250	0.022	11.969	4661.975	0.003
	29.0463 - 26.9716		30.155	1387.530	0.022	11.967	4746.058	0.003
	26.9716 - 25		30.347	1396.230	0.022	11.965	4826.192	0.002
	25 - 24.8968		26.171	1396.680	0.019	11.959	4830.392	0.002
	24.8968 - 22.8221		26.431	1396.680	0.019	11.959	4914.942	0.002
	22.8221 -		26.685	1405.690	0.019	11.958	4999.700	0.002

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 $\frac{T_u}{\phi T_n}$
	20.7474							
	20.7474 - 18.6726		26.938	1414.570	0.019	11.957	5084.650	0.002
	18.6726 - 16.5979		27.189	1423.310	0.019	11.957	5169.783	0.002
	16.5979 - 14.5232		27.438	1431.920	0.019	11.956	5255.083	0.002
	14.5232 - 12.4484		27.686	1440.390	0.019	11.956	5340.525	0.002
	12.4484 - 10.3737		27.932	1448.730	0.019	11.956	5426.092	0.002
	10.3737 - 8.29895		28.177	1456.940	0.019	11.955	5511.783	0.002
	8.29895 - 6.22421		28.420	1465.000	0.019	11.955	5597.575	0.002
	6.22421 - 4.14947		28.661	1472.940	0.019	11.955	5683.458	0.002
	4.14947 - 2.07474		28.901	1480.740	0.020	11.955	5769.408	0.002
	2.07474 - 0		29.138	1488.410	0.020	11.955	5855.408	0.002

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	125 - 123.158	0.000	0.016	0.000	0.001	0.000	0.016 ✔	1.000	4.8.2 ✔
	123.158 - 121.316	0.001	0.034	0.000	0.009	0.002	0.035 ✔	1.000	4.8.2 ✔
	121.316 - 119.474	0.003	0.064	0.000	0.011	0.004	0.067 ✔	1.000	4.8.2 ✔
	119.474 - 117.632	0.003	0.085	0.000	0.012	0.004	0.088 ✔	1.000	4.8.2 ✔
	117.632 - 115.789	0.003	0.106	0.000	0.012	0.004	0.109 ✔	1.000	4.8.2 ✔
	115.789 - 113.947	0.004	0.140	0.000	0.024	0.013	0.145 ✔	1.000	4.8.2 ✔
	113.947 - 112.105	0.005	0.192	0.000	0.026	0.012	0.199 ✔	1.000	4.8.2 ✔
	112.105 - 110.263	0.006	0.234	0.000	0.026	0.012	0.241 ✔	1.000	4.8.2 ✔
	110.263 - 108.421	0.006	0.275	0.000	0.026	0.012	0.283 ✔	1.000	4.8.2 ✔
	108.421 - 106.579	0.006	0.315	0.000	0.026	0.011	0.322 ✔	1.000	4.8.2 ✔
	106.579 - 104.737	0.010	0.381	0.000	0.042	0.011	0.394 ✔	1.000	4.8.2 ✔
	104.737 - 102.895	0.010	0.445	0.000	0.042	0.011	0.459 ✔	1.000	4.8.2 ✔
	102.895 -	0.010	0.507	0.000	0.042	0.011	0.520	1.000	4.8.2 ✔

Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	101.053								
	101.053 - 99.2105	0.010	0.566	0.000	0.042	0.011	0.580	1.000	4.8.2
	99.2105 - 97.3684	0.011	0.623	0.000	0.042	0.010	0.637	1.000	4.8.2
	97.3684 - 95.5263	0.011	0.678	0.000	0.042	0.010	0.692	1.000	4.8.2
	95.5263 - 93.6842	0.011	0.732	0.000	0.042	0.010	0.745	1.000	4.8.2
	93.6842 - 91.8421	0.011	0.783	0.000	0.042	0.010	0.797	1.000	4.8.2
	91.8421 - 90	0.011	0.833	0.000	0.043	0.009	0.846	1.000	4.8.2
	90 - 85.5	0.005	0.391	0.000	0.018	0.004	0.396	1.000	4.8.2
L2	90 - 85.5	0.004	0.327	0.000	0.014	0.003	0.332	1.000	4.8.2
	85.5 - 83.25	0.007	0.586	0.000	0.025	0.005	0.594	1.000	4.8.2
	83.25 - 81	0.007	0.615	0.000	0.025	0.005	0.622	1.000	4.8.2
	81 - 78.75	0.007	0.642	0.000	0.025	0.005	0.650	1.000	4.8.2
	78.75 - 76.5	0.007	0.668	0.000	0.025	0.005	0.676	1.000	4.8.2
	76.5 - 74.25	0.007	0.693	0.000	0.025	0.005	0.701	1.000	4.8.2
	74.25 - 72	0.008	0.717	0.000	0.025	0.004	0.725	1.000	4.8.2
	72 - 69.75	0.008	0.740	0.000	0.025	0.004	0.748	1.000	4.8.2
	69.75 - 67.5	0.008	0.762	0.000	0.025	0.004	0.770	1.000	4.8.2
	67.5 - 65.25	0.008	0.783	0.000	0.025	0.004	0.792	1.000	4.8.2
	65.25 - 63	0.008	0.804	0.000	0.025	0.004	0.813	1.000	4.8.2
	63 - 60.75	0.008	0.824	0.000	0.025	0.004	0.833	1.000	4.8.2
	60.75 - 58.5	0.008	0.843	0.000	0.025	0.004	0.852	1.000	4.8.2
	58.5 - 56.25	0.008	0.862	0.000	0.025	0.004	0.871	1.000	4.8.2
	56.25 - 54	0.009	0.880	0.000	0.025	0.004	0.889	1.000	4.8.2
	54 - 51.75	0.009	0.897	0.000	0.025	0.004	0.907	1.000	4.8.2
	51.75 - 49.5	0.009	0.915	0.000	0.025	0.004	0.924	1.000	4.8.2
	49.5 - 47.25	0.009	0.931	0.000	0.025	0.003	0.941	1.000	4.8.2
	47.25 - 45	0.009	0.947	0.000	0.025	0.003	0.957	1.000	4.8.2

Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	45 - 39.42	0.005	0.479	0.000	0.012	0.002	0.484	1.000	4.8.2
L3	45 - 39.42	0.004	0.449	0.000	0.011	0.001	0.454	1.000	4.8.2
	39.42 - 37.3453	0.009	0.885	0.000	0.022	0.003	0.894	1.000	4.8.2
	37.3453 - 35.2705	0.009	0.896	0.000	0.022	0.003	0.905	1.000	4.8.2
	35.2705 - 33.1958	0.009	0.906	0.000	0.022	0.003	0.916	1.000	4.8.2
	33.1958 - 31.1211	0.009	0.917	0.000	0.022	0.003	0.927	1.000	4.8.2
	31.1211 - 29.0463	0.009	0.927	0.000	0.022	0.003	0.937	1.000	4.8.2
	29.0463 - 26.9716	0.009	0.937	0.000	0.022	0.003	0.947	1.000	4.8.2
	26.9716 - 25	0.009	0.947	0.000	0.022	0.002	0.957	1.000	4.8.2
	25 - 24.8968	0.003	0.536	0.000	0.019	0.002	0.540	1.000	4.8.2
	24.8968 - 22.8221	0.003	0.550	0.000	0.019	0.002	0.554	1.000	4.8.2
	22.8221 - 20.7474	0.004	0.563	0.000	0.019	0.002	0.567	1.000	4.8.2
	20.7474 - 18.6726	0.004	0.575	0.000	0.019	0.002	0.579	1.000	4.8.2
	18.6726 - 16.5979	0.004	0.588	0.000	0.019	0.002	0.592	1.000	4.8.2
	16.5979 - 14.5232	0.004	0.600	0.000	0.019	0.002	0.604	1.000	4.8.2
	14.5232 - 12.4484	0.004	0.612	0.000	0.019	0.002	0.617	1.000	4.8.2
	12.4484 - 10.3737	0.004	0.624	0.000	0.019	0.002	0.628	1.000	4.8.2
	10.3737 - 8.29895	0.005	0.635	0.000	0.019	0.002	0.640	1.000	4.8.2
	8.29895 - 6.22421	0.005	0.647	0.000	0.019	0.002	0.652	1.000	4.8.2
	6.22421 - 4.14947	0.005	0.658	0.000	0.019	0.002	0.663	1.000	4.8.2
	4.14947 - 2.07474	0.005	0.669	0.000	0.020	0.002	0.674	1.000	4.8.2
	2.07474 - 0	0.005	0.680	0.000	0.020	0.002	0.685	1.000	4.8.2

Reinforcing Design Data (Compression)

Section No.	Elevation (ft)	Size	L (ft)	L_u (ft)	Kl/r	A (in^2)	P_u (K)	ϕP_n (K)	Ratio $\frac{P_u}{\phi P_n}$
L3	25 - 0	7x1	25.001	1.000	41.6 K=1.00	7.000	-277.661	347.473	0.799

Reinforcing 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 $\frac{M_{uy}}{\phi M_{ny}}$
L3	25 - 0	7x1	-6.135	59.719	0.103	0.000	8.531	0.000

Reinforcing Interaction Design Data

Section No.	Elevation (ft)	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L3	25 - 0	7x1	0.799	0.103	0.000	0.802 ✔	1.000	4.8.1 ✔

Tension Checks

Reinforcing Design Data (Tension)

Section No.	Elevation (ft)	Size	L (ft)	L_u (ft)	Kl/r	A (in^2)	P_u (K)	ϕP_n (K)	Ratio $\frac{P_u}{\phi P_n}$
L3	25 - 0	7x1	25.001	1.000	41.6	6.250	268.712	375.000	0.717

Reinforcing 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 $\frac{M_{uy}}{\phi M_{ny}}$
L3	25 - 0	7x1	-6.176	59.719	0.103	0.000	8.531	0.000

Reinforcing Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L3	25 - 0	7x1	0.717	0.103	0.000	0.729 ✔	1.000	4.8.1 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	125 - 85.5	Pole	TP29.725x21.037x0.188	1	-12.023	1080.570	84.6	Pass
L2	85.5 - 39.42	Pole	TP39.486x28.36x0.281	2	-20.912	2275.170	95.7	Pass
L3	39.42 - 0	Pole	TP47.593x37.696x0.313	3	-26.383	2792.450	95.7	Pass
L3	25 - 0	Reinforcing	7x1	7	-277.661	347.473	80.2	Pass
							Summary	
						Pole (L2)	95.7	Pass
						Reinforcing (L3)	80.2	Pass
						RATING =	**95.7**	**Pass**

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Subject:	Anchor Bolt and Baseplate Analysis
Location:	125-FT Valmont Monopole Quinebaug, CT
Rev. 0: 5/10/19	Prepared by: T.J.L. Checked by: C.A.G. Job No. 19027.68

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$M_u := 3055 \cdot ft \cdot kips$	(Input From RisaTower)
Shear Force =	$Shear := 33 \cdot kips$	(Input From RisaTower)
Axial Force =	$R_u := 35 \cdot kips$	(Input From RisaTower)

Anchor Bolt Data:

ASTMA615 Grade 75

Number of Anchor Bolts =	$N := 12$	(User Input)
Diameter of Bolt Circle =	$D_{BC} := 55.0 \cdot in$	(User Input)
Bolt "Column" Distance =	$l := 3.0 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 100 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 75 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25 \cdot in$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)
Top of Concrete to Bot Leveling Nut =	$l_{ar} := 2 \cdot in$	(User Input)
Anchor Rod Force Correction Factor =	$n_c = 1.02$	Table 2-1 Addendum 3

Base Plate Data:

Use AST MA572 Grade 60

Plate Yield Strength =	$F_{yf} := 60 \cdot ksi$	(User Input)
Base Plate Thickness =	$t_{TP} := 2.25 \cdot in$	(User Input)
Base Plate Diameter =	$D_{OD} := 61.0 \cdot in$	(User Input)
Outer Pole Diameter =	$D_T := 47.60 \cdot in$	(User Input)
Pole Wall Thickness =	$t_T := 0.3125 \cdot in$	(User Input)
Pole Design Yield Strength =	$F_{yp} := 65 \cdot ksi$	(User Input)
	$\eta := 0.5$	For Ungrouted Base Plate per TIA-222-G Section 4.9.9

Anchor Bolt Analysis:

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 = 3.248 \cdot in^2$

Tensile Root Diameter = $d_{rt} := D - \frac{0.9743 \cdot in}{n} = 2.033 \cdot in$

Plastic Section Modulus = $Z := \frac{d_{rt}^3}{6} = 1.401 \cdot in^3$

Maximum Anchor Rod Force = $P_u := \frac{n_c \cdot \pi \cdot M_u}{N \cdot D_{BC}} + \frac{R_u}{N} = 180.9 \cdot kips$

Maximum Shear Force = $V_u := \frac{Shear}{N} = 2.8 \cdot kips$

Design Tensile Strength = $\Phi R_{nt} := 0.8 \cdot F_u \cdot A_n = 259.815 \cdot k$

Bolt % of Capacity = $\frac{\left(P_u + \frac{V_u}{\eta} \right)}{\Phi R_{nt}} \cdot 100 = 71.7$

Condition1 = $Condition1 := if\left[\frac{\left(P_u + \frac{V_u}{\eta} \right)}{\Phi R_{nt}} \le 1.00, "OK", "Overstressed" \right]$

Condition1 = "OK"

Design Shear Strength = $\Phi R_{nv} := 0.75 \cdot 0.45 \cdot F_u \cdot A_g = 134.193 \cdot k$

Design Flexural Strength = $\Phi R_{nm} := 0.9 \cdot F_y \cdot Z = 94.597 \cdot in \cdot k$

$M_u := \begin{cases} 0 & \text{if } l_{ar} < D \\ 0.65 \cdot l_{ar} \cdot V_u & \text{otherwise} \end{cases} = 0 \cdot in \cdot k$

Bolt % of Capacity = $\left[\left(\frac{V_u}{\Phi R_{nv}} \right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}} \right)^2 \right] \cdot 100 = 48.5$

Condition2 = $Condition2 := if\left[\left(\frac{V_u}{\Phi R_{nv}} \right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}} \right)^2 \le 1.00, "OK", "Overstressed" \right]$

Condition2 = "OK"

Base Plate Analysis:

Strength Resistance Factor for Yielding due to Bending = $\phi_b := 0.9$

Strength Resistance Factor for Yielding due to Shear = $\phi_v := 1.0$

Outside Fillet Horizontal Leg Dimension = $w_1 := 0.25 \cdot in$

Effective Pole Outside Diameter = $D_e := D_T + w_1 = 47.85 \cdot in$

Effective Base Plate Outside Diameter = $D_{oe} := \begin{cases} D_{OD} & \text{if } D_{OD} \le \left(D_{BC} + 6 \cdot t_{TP}\right) \\ \left(D_{BC} + 6 \cdot t_{TP}\right) & \text{otherwise} \end{cases} = 61 \cdot in$

Half-Angle Between Radial Lines Extending from Pole Centerline Through Midpoints Between Adjacent Anchor Rods = $\theta_1 := \frac{\pi}{N} = 0.262$

Angle Defining Limiting Effective Base Plate Width Based on Plate Thickness = $\theta_2 := \operatorname{asin}\left(\frac{12 \cdot t_{TP}}{D_{BC}}\right) = 0.513$

Angle Defining Limiting Effective Base Plate Width Based on Distance Between Anchor Rod Bolt Circle and Effective Pole Outside Diameter = $\theta_3 := \operatorname{acos}\left(\frac{D_{BC} + D_e}{2 \cdot D_{BC}}\right) = 0.363$

Governing Angle Defining Effective Base Plate Width Resisting Bending = $\theta := \min\left(\theta_1, \theta_2, \theta_3\right) = 0.262$

Effective Moment Arm of Anchor Rod Force = $x := 0.5 \cdot \left(D_{BC} - D_e\right) = 3.575 \cdot in$

Effective Base Plate Width Resisting Bending from Transverse Bend Line = $B_{et} := D_{BC} \cdot \sin(\theta) = 14.235 \cdot in$

Effective Base Plate Width Resisting Bending from Radial Bend Lines = $B_{er} := \left(D_{oe} - D_e\right) \cdot \sin(\theta) = 3.403 \cdot in$

Total Effective Base Plate Width Resisting Bending = $B_{eff} := B_{et} + B_{er} = 17.639 \cdot in$

Required Base Plate Thickness = $t_{TP.Req} := \sqrt{\frac{4 \cdot P_u \cdot x}{\phi_b \cdot F_{yf} \cdot B_{eff}}} = 1.648 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 73.2 \cdot \%$

Condition2 = $Condition3 := if\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, "Ok", "Overstressed"\right)$

Condition3 = "Ok"

Required Base Plate Thickness = $t_{TP.Req} := \frac{\phi_b \cdot t_T \cdot F_{yp}}{\phi_v \cdot 0.6 \cdot F_{yf}} = 0.508 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 22.6 \cdot \%$

Condition2 = $Condition4 := if\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, "Ok", "Overstressed"\right)$

Condition4 = "Ok"

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Subject: FOUNDATION ANALYSIS

Location: 125-ft Valmont Monopole
Quinebaug, CT

Rev. 0: 5/10/19

Prepared by: T.J.L Checked by: C.A.G.
Job no. 19027.68

Standard Monopole Foundation:

Input Data:

Tower Data

Overturning Moment =	$OM := 3055 \cdot ft \cdot kips$	(User Input)	
Shear Force =	$Shear := 33 \cdot kip$	(User Input)	
Axial Force =	$Axial := 35 \cdot kip$	(User Input)	
Tower Height =	$H_t := 125 \cdot ft$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 8 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 5.0 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 7.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 3.5 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 20.0 \cdot ft$	(User Input)	

Anchor Bolt Data:

Length of Anchor Bolts=	$L_{st} := 96 \cdot in$	(User Input)	
Projection of Anchor Bolts Above Pier =	$A_{BP} := 12 \cdot in$	(User Input)	
Anchor Bolt Diameter =	$d_{anchor} := 2.25 \cdot in$	(User Input)	
Base Plate Bolt Circle =	$MP := 55.0 \cdot in$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 3000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Anchor Bolt Yield Strength =	$f_{ya} := 75000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Ultimate Soil Bearing Capacity =	$q_u := 10000 \cdot psf$	(User Input)	
Allowable Soil Bearing Capacity =	$q_a := \frac{q_u}{2} = 5000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 100 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 9$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.128 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 36$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 3 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 6$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 0.75 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 15$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 7$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 0.875 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 22$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.999 \cdot in^2$

Pad Top Reinforcement Bar Area = $A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.442 \cdot in^2$

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

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

Stability of Footing:

Adjusted Concrete Unit Weight =

$$\gamma_c := \text{if}\left(\text{Bouyancy} = 1, \gamma_{conc} - 62.4pcf, \gamma_{conc}\right) = 150 \cdot pcf$$

Adjusted Soil Unit Weight =

$$\gamma_s := \text{if}\left(\text{Bouyancy} = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}\right) = 100 \cdot pcf$$

Passive Pressure =

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

$$P_{pt} := K_p \cdot \gamma_s \cdot \left(D_f - T_f\right) + c \cdot 2 \cdot \sqrt{K_p} = 1.35 \cdot ksf$$

$$P_{top} := \text{if}\left[n < \left(D_f - T_f\right), P_{pt}, P_{pn}\right] = 1.35 \cdot ksf$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.4 \cdot ksf$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.875 \cdot ksf$$

$$T_p := \text{if}\left[n < \left(D_f - T_f\right), T_f, \left(D_f - n\right)\right] = 3.5$$

$$A_p := W_f \cdot T_p = 70$$

Ultimate Shear =

$$S_u := P_{ave} \cdot A_p = 131.25 \cdot kip$$

Weight of Concrete Pad =

$$WT_c := \left[\left(W_f^2 \cdot T_f\right) + d_p^2 L_p\right] \cdot \gamma_c = 246.75 \cdot kip$$

Weight of Soil Above Footing =

$$WT_{s1} := \left[\left(W_f^2 - d_p^2\right) \cdot \left(\left|L_p - L_{pag} - n\right|\right)\right] \cdot \gamma_s = 157.95 \cdot kip$$

Weight of Soil Wedge at Back Face =

$$WT_{s2} := \left(\frac{D_f^2 \cdot \tan\left(\Phi_s\right)}{2} \cdot W_f\right) \cdot \gamma_s = 36.95 \cdot kip$$

Weight of Soil Wedge at back face Corners =

$$WT_{s3} := 2 \cdot \left[\left(D_f\right)^3 \cdot \frac{\tan\left(\Phi_s\right)}{3}\right] \cdot \gamma_s = 19.707 \cdot kips$$

Total Weight =

$$WT_{tot} := WT_c + WT_{s1} + Axial = 439.7 \cdot kip$$

Resisting Weight =

$$WT_R := 0.9 \cdot WT_c + 0.75 \cdot WT_{s1} + 0.75 \cdot Axial = 366.788 \cdot kip$$

Resisting Moment =

$$M_r := \left(WT_R\right) \cdot \frac{W_f}{2} + 0.75 \cdot S_u \cdot \frac{T_f}{3} + 0.75 \cdot \left[\left(WT_{s2} + WT_{s3}\right) \cdot \left(W_f + \frac{D_f \cdot \tan\left(\Phi_s\right)}{3}\right)\right] = 4698 \cdot kip \cdot ft$$

Overturning Moment =

$$M_{ot} := OM + Shear \cdot \left(L_p + T_f\right) = 3336 \cdot kip \cdot ft$$

Factor of Safety Actual =

$$FS := \frac{M_r}{M_{ot}} = 1.41$$

Factor of Safety Required =

$$FS_{req} := 1$$

$$OverTurning\_Moment\_Check := \text{if}\left(FS \geq FS_{req}, \text{"Okay"}, \text{"No Good"}\right)$$

OverTurning_Moment_Check = "Okay"

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 329.115 \cdot kips$

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

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

Area of the Mat = $A_{mat} := W_f^2 = 400$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 1333.33 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 3.601 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < .75 \cdot q_u, "Okay", "No Good")$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -1.402 \cdot ksf$

$Min\_Pressure\_Check := if[(P_{min} \geq 0) \cdot (P_{min} < .75 \cdot q_u), "Okay", "No Good"]$

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 4.798$

Distance to Kern = $X_k := \frac{W_f}{6} = 3.333$

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

Eccentricity = $e := \frac{\frac{M_{ot}}{1.6}}{WT_{tot}} = 4.741$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 2.787 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 2.787 \cdot ksf$

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

Pressure_Check = "Okay"

Concrete Bearing Capacity:

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

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 9.185 \times 10^3 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if\left(P_b > Axial, "Okay", "No Good"\right)$

Bearing_Check = "Okay"

Shear Strength of Concrete:

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

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 3.177$

$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$

$d_2 := d_1 - d$

$L := \left(\frac{W_f}{2} - e\right) \cdot 3$

$Slope := if\left(L > W_f, \frac{P_{max} - P_{min}}{W_f}, \frac{q_{adj}}{L}\right)$

$V_{req} := \left[\left(q_{adj} - Slope \cdot d_1\right) + \left(\frac{Slope \cdot d_1}{2}\right)\right] \cdot W_f \cdot d_1$

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

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

Beam_Shear_Check = "Okay"

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

Critical Perimeter of Punching Shear = $b_o := \left(d_p + d\right) \cdot \pi = 32$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot \left(d_p + d\right)^2}{4} = 81.3$

Area Outside of Perimeter = $A_{out} := A_{mat} - A_{bo} = 318.7$

Guess Value = $v_u := 1ksf$

(From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given $d^2 + d_p \cdot d = \frac{WT_{tot}}{\pi \cdot v_u}$

$v_u := Find(v_u) = 4.3 \cdot ksf$

$V_u := v_u \cdot d \cdot W_f = 275.1 \cdot kips$

Required Shear Strength = $V_{req} := V_u = 275.1 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 2724 \cdot kip$ (ACI-2008 11.11.2.1)

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

$Punching\_Shear\_Check = "Okay"$

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

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

$q_b := q_{adj} - d_1 \cdot Slope = 1.639 \cdot ksf$

Maximum Bending at Face of Pier = $M_n := \frac{1}{\phi_m} \cdot \left[(q_{adj} - q_b) \cdot \frac{d_1^2}{3} + q_b \cdot \frac{d_1^2}{2} \right] \cdot W_f = 1128.7 \cdot kip \cdot ft$

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

(ACI-200810.2.7.3)

$R_n := \frac{M_n}{W_f \cdot d^2} = 38.8 \cdot psi$

$\rho := \frac{0.85 \cdot f_c}{f_y} \left(1 - \sqrt{1 - \frac{2 \cdot R_n}{0.85 \cdot f_c}} \right) = 0.0007$

$\rho_{min} := \rho = 0.00065$

Required Reinforcement for Temperature and Shrinkage:

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

Check Bottom Bars:

$$As := \begin{cases} \rho_{min} \cdot W_f \cdot d & \text{if } \rho_{min} > \frac{\rho_{sh}}{2} \\ \rho_{sh} \cdot W_f \cdot \frac{d}{2} & \text{otherwise} \end{cases} = 8.235 \cdot in^2$$

$As_{prov.bot} := A_{bbot} \cdot NB_{bot} = 13.2 \cdot in^2$

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

Pad_Reinforcement_Bot = "Okay"

Check Temp Shrinkage Reinforcement:

$As := \rho_{sh} \cdot (W_f \cdot T_f) = 18.1 \cdot in^2$

$As_{prov.top} := A_{btop} \cdot NB_{top} = 6.6 \cdot in^2$

$As_{prov.tot} := As_{prov.bot} + As_{prov.top} = 19.9 \cdot in^2$

$Pad\_Reinforcement\_Temp := if(As_{prov.tot} > As, "Okay", "No Good")$

Pad_Reinforcement_Temp = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 10.23 \cdot in$$

Spacing or Cover Dimension =

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

Transverse Reinforcement Index =

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

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 21 \cdot in$$

Minimum Development Length =

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

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

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{d_p}{2} - Cvr_{pad} = 75 \cdot in$$

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

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := d_p^2 = 7056 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 35.28 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 35.98 \cdot in^2$

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

Steel_Area_Check = "Okay"

NOTE: Anchor Bolts are not accounted for in reinforcement calculation and will provide additional reinforcement to satisfy minimum requirement of steel.

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 6.202 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 78 \cdot in$

Maximum Moment in Pier = $M_p := \left[OM + Shear \cdot \left(L_p + \frac{A_{BP}}{2}\right)\right] = 38838 \cdot in \cdot kips$

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

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

$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) = (84 \;\; 36 \;\; 9 \;\; 46.7 \;\; 38838)$

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

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

$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) = (83.4 \;\; 69438.8 \;\; -60 \;\; 0)$

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

Axial_Load_Check = "Okay"

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

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 57 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 39 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

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

Transverse Reinforcement =

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

$L_{dbt} := \frac{3 \cdot f_y \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 34.85 \cdot in$

Minimum Development Length =

$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 17.299 \cdot in$ (ACI 12.2.1)

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

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

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

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

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 24.713 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 20.304 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 24.713 \cdot in$

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

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

RAN Template:	A&L Template:	Power System Template:
4Sec-67D97DB2	4Sec-67D97DB2_1xAIR+1OP	Custom

CTNL193A_L600_1.1_draft

Section 1 - Site Information

Site ID: CTNL193A
Status: Draft
Version: 1.1
Project Type: L600
Approved: Not Approved
Approved By: Not Approved
Last Modified: 4/25/2019 9:50:05 AM
Last Modified By: GSM1900\AMurill9

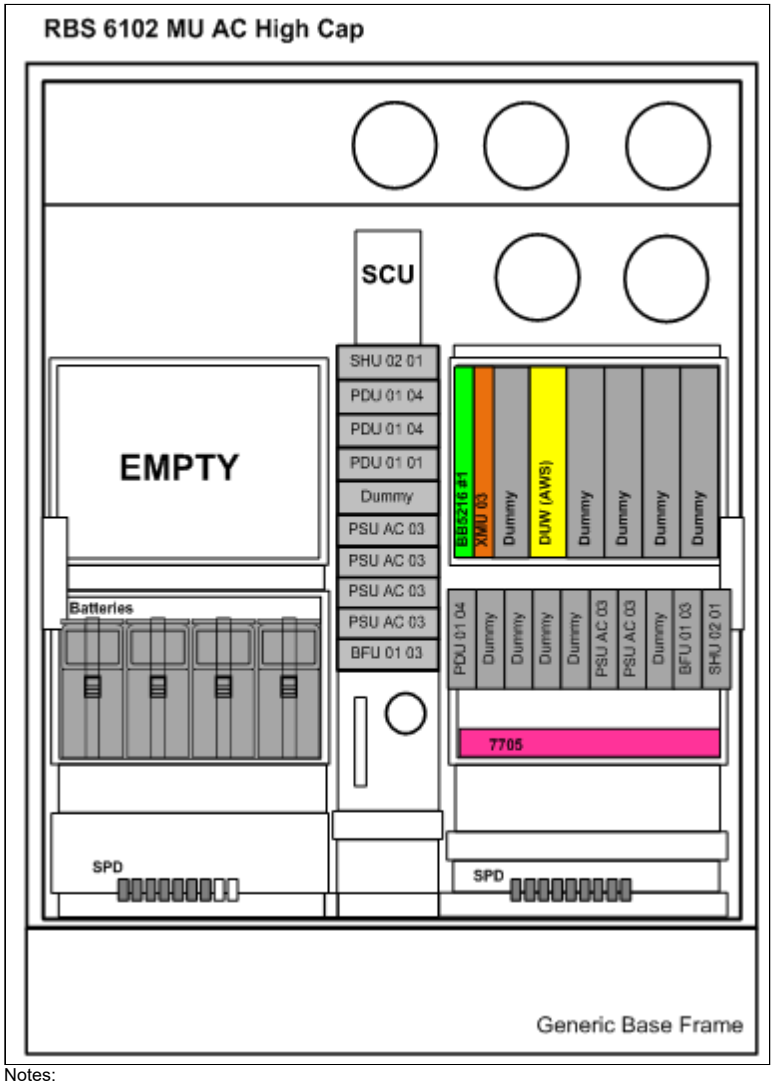
Site Name: CTNL193A
Site Class: Monopole
Site Type: Structure Non Building
Plan Year:
Market: CONNECTICUT
Vendor: Ericsson
Landlord: Quinebaug Volunteer Fire Dept

Latitude: 42.0228000000
Longitude: -71.9493000000
Address: 720 Quinebaug Rd
City, State: Quinebaug, CT
Region: NORTHEAST

RAN Template: 4Sec-67D97DB2			AL Template: 4Sec-67D97DB2_1xAIR+1OP	
Sector Count: 4	**Antenna Count:** 12	**Coax Line Count:** 0	**TMA Count:** 0	**RRU Count:** 8

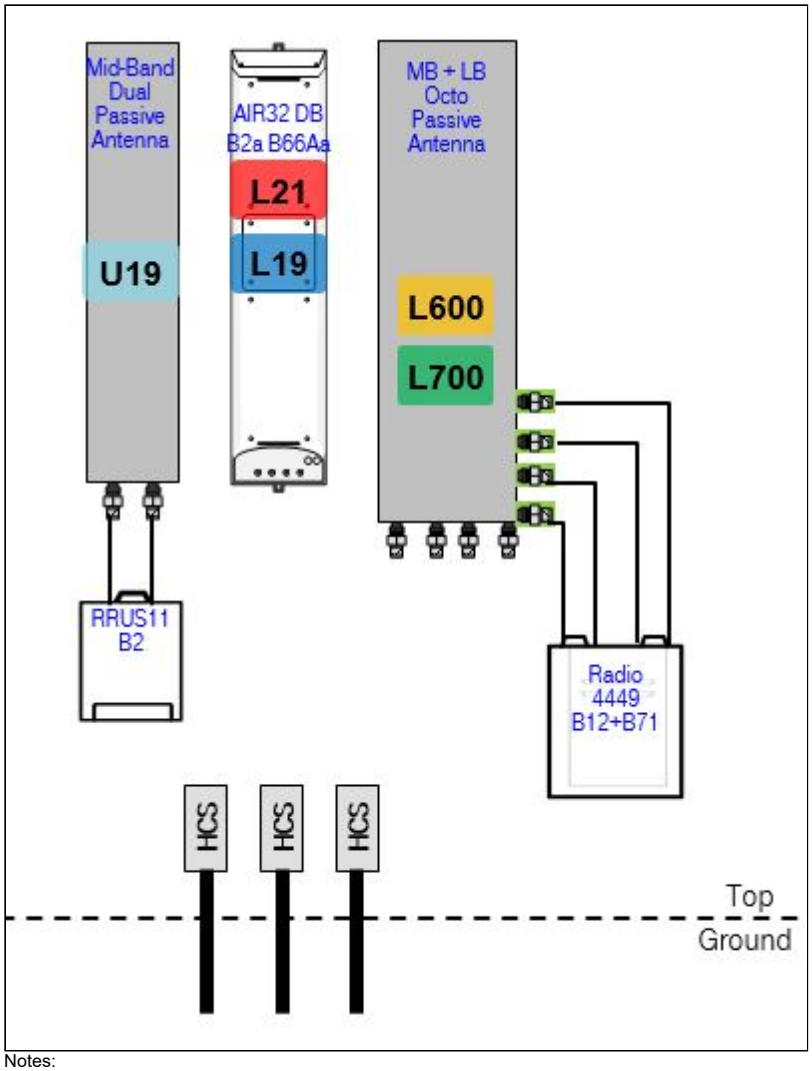
Section 2 - Existing Template Images

4Sec-797DB3_RAN.PNG



Notes:

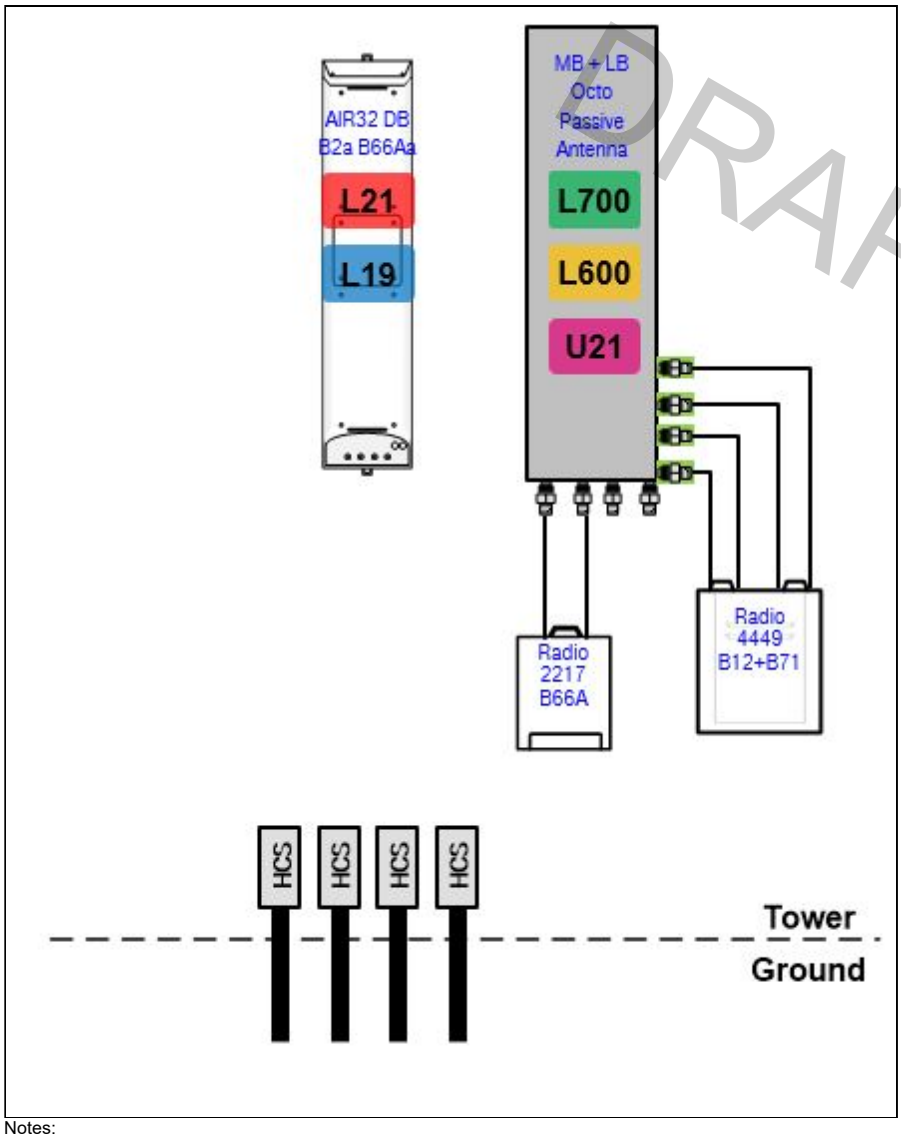
67D97DB3_AL.JPG


Mid-Band
Dual
Passive
Antenna
U19
AIR32 DB
B2a B66Aa
L21
L19
MB + LB
Octo
Passive
Antenna
L600
L700
RRUS11
B2
Radio
4449
B12+B71
HCS
HCS
HCS
Top
Ground

Notes:

Section 3 - Proposed Template Images

4Sec-67D97DB2_1xAIR+1OP.JPG



Notes:

Section 4 - Siteplan Images

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

RAN Template:	A&L Template:	Power System Template:
4Sec-67D97DB2	4Sec-67D97DB2_1xAIR+1OP	Custom

CTNL193A_L600_1.1_draft

Section 5 - RAN Equipment

Existing RAN Equipment

Template: Custom

Enclosure	1	2
Enclosure Type	RBS 6102 MU AC	Ancillary Equipment
Baseband	DUW30 (U2100); BB 5216 (L2100, L1900, L700, L600 (RESTRICTED)); BB 6630 (N600 (DARK))	
Hybrid Cable System		Ericsson 6x12 HCS *Select Length & AWG* (x4)
Multiplexer	XMU (L2100, L1900, L700, L600 (RESTRICTED))	

Proposed RAN Equipment

Template: 4Sec-67D97DB2

Enclosure	1	2
Enclosure Type	RBS 6102 MU AC	Ancillary Equipment
Baseband	DUW30 (U2100); BB 5216 (L2100, L1900, L700, L600); BB 6630 (N600 (DARK)); BB 6630 (L2100, L1900, L700, L600)	
Hybrid Cable System		Ericsson 6x12 HCS *Select Length & AWG* (x4)
Multiplexer	XMU (L2100, L1900, L700, L600 (RESTRICTED))	

RAN Scope of Work:

Add (1) BB6630 for LTE.

RAN Template:	A&L Template:	Power System Template:
4Sec-67D97DB2	4Sec-67D97DB2_1xAIR+1OP	Custom

CTNL193A_L600_1.1_draft

Section 6 - A&L Equipment

Existing Template: Custom
Proposed Template: 4Sec-67D97DB2_1xAIR+1OP

Sector 1 (Existing) view from behind

Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAA24_43-U-A20 (Quad)		RFS - APX16DWV-16DWV-S-E-A20 (Quad)	
Azimuth	45				45		45	
M. Tilt	0				0		0	
Height	105				105		105	
Ports	P1	P2	P3	P4	P5	P6	P7	P8
Active Tech.	L2100	L2100	L1900	L1900	L700		U2100	
Dark Tech.								
Restricted Tech.						L600		
Decomm. Tech.								
E. Tilt	2		2		2	2	2	
Cables								
TMAs								
Diplexers / Combiners					Generic 600/700 Diplexer (AtAntenna)	SHARED Generic 600/700 Diplexer (AtAntenna)		
Radio					RRUS11 B12 (At Antenna)	Radio 4478 B71 (At Antenna)	RRUS11 B4 (At Antenna)	
Sector Equipment								

Unconnected Equipment:

Scope of Work:

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

RAN Template:	A&L Template:	Power System Template:
4Sec-67D97DB2	4Sec-67D97DB2_1xAIR+1OP	Custom

CTNL193A_L600_1.1_draft

Sector 1 (Proposed) view from behind								
Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAA24_43-U-A20 (Quad)		RFS - APX16DWV-16DWV-S-E-A20 (Quad)	
Azimuth	45				45		45	
M. Tilt	0				0		0	
Height	105				105		105	
Ports	P1	P2	P3	P4	P5	P6	P7	P8
Active Tech.	L2100	L2100	L1900	L1900	L700 L600	L700 L600	U2100	
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt	2		2		2	2	2	
Cables								
TMAs								
Diplexers / Combiners								
Radio					Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)	RRUS11 B4 (At Antenna)	
Sector Equipment								

Unconnected Equipment:

Scope of Work:

Remove Diplexers for L600 and L700 in Position 2.
Replace (1) RRUS11 B12 and (1) Radio 4478 B71 with (1) Radio 4449 B71+B12. Connect Radio 4449 to all four ports of LB Quad in Position 2.

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

RAN Template:	A&L Template:	Power System Template:
4Sec-67D97DB2	4Sec-67D97DB2_1xAIR+1OP	Custom

CTNL193A_L600_1.1_draft

Sector 2 (Existing) view from behind								
Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAA24_43-U-A20 (Quad)		RFS - APX16DWV-16DWV-S-E-A20 (Quad)	
Azimuth	135				135		135	
M. Tilt	0				0		0	
Height	105				105		105	
Ports	P1	P2	P3	P4	P5	P6	P7	P8
Active Tech.	L2100	L2100	L1900	L1900	L700		U2100	
Dark Tech.								
Restricted Tech.						L600		
Decomm. Tech.								
E. Tilt	2		2		2	2	2	
Cables								
TMAs								
Diplexers / Combiners					Generic 600/700 Diplexer (AtAntenna)	SHARED Generic 600/700 Diplexer (AtAntenna)		
Radio					RRUS11 B12 (At Antenna)	Radio 4478 B71 (At Antenna)	RRUS11 B4 (At Antenna)	
Sector Equipment								

Unconnected Equipment:

Scope of Work:

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

RAN Template:	A&L Template:	Power System Template:
4Sec-67D97DB2	4Sec-67D97DB2_1xAIR+1OP	Custom

CTNL193A_L600_1.1_draft

Sector 2 (Proposed) view from behind								
Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAA24_43-U-A20 (Quad)		RFS - APX16DWV-16DWV-S-E-A20 (Quad)	
Azimuth	135				135		135	
M. Tilt	0				0		0	
Height	105				105		105	
Ports	P1	P2	P3	P4	P5	P6	P7	P8
Active Tech.	L2100	L2100	L1900	L1900	L700 L600	L700 L600	U2100	
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt	2		2		2	2	2	
Cables								
TMAs								
Diplexers / Combiners								
Radio					Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)	RRUS11 B4 (At Antenna)	
Sector Equipment								

Unconnected Equipment:

Scope of Work:

Remove Diplexers for L600 and L700 in Position 2.
Replace (1) RRUS11 B12 and (1) Radio 4478 B71 with (1) Radio 4449 B71+B12. Connect Radio 4449 to all four ports of LB Quad in Position 2.

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

RAN Template:	A&L Template:	Power System Template:
4Sec-67D97DB2	4Sec-67D97DB2_1xAIR+1OP	Custom

CTNL193A_L600_1.1_draft

Sector 3 (Existing) view from behind								
Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAA24_43-U-A20 (Quad)		RFS - APX16DWV-16DWV-S-E-A20 (Quad)	
Azimuth	225				225		225	
M. Tilt	0				0		0	
Height	105				105		105	
Ports	P1	P2	P3	P4	P5	P6	P7	P8
Active Tech.	L2100	L2100	L1900	L1900	L700		U2100	
Dark Tech.								
Restricted Tech.						L600		
Decomm. Tech.								
E. Tilt	2		2		2	2	2	
Cables								
TMAs								
Diplexers / Combiners					Generic 600/700 Diplexer (AtAntenna)	SHARED Generic 600/700 Diplexer (AtAntenna)		
Radio					RRUS11 B12 (At Antenna)	Radio 4478 B71 (At Antenna)	RRUS11 B4 (At Antenna)	
Sector Equipment								

Unconnected Equipment:

Scope of Work:

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

RAN Template:	A&L Template:	Power System Template:
4Sec-67D97DB2	4Sec-67D97DB2_1xAIR+1OP	Custom

CTNL193A_L600_1.1_draft

Sector 3 (Proposed) view from behind								
Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAA24_43-U-A20 (Quad)		RFS - APX16DWV-16DWV-S-E-A20 (Quad)	
Azimuth	225				225		225	
M. Tilt	0				0		0	
Height	105				105		105	
Ports	P1	P2	P3	P4	P5	P6	P7	P8
Active Tech.	L2100	L2100	L1900	L1900	L700 L600	L700 L600	U2100	
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt	2		2		2	2	2	
Cables								
TMAs								
Diplexers / Combiners								
Radio					Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)	RRUS11 B4 (At Antenna)	
Sector Equipment								

Unconnected Equipment:

Scope of Work:

Remove Diplexers for L600 and L700 in Position 2.
Replace (1) RRUS11 B12 and (1) Radio 4478 B71 with (1) Radio 4449 B71+B12. Connect Radio 4449 to all four ports of LB Quad in Position 2.

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

RAN Template:	A&L Template:	Power System Template:
4Sec-67D97DB2	4Sec-67D97DB2_1xAIR+1OP	Custom

CTNL193A_L600_1.1_draft

Sector 4 (Existing) view from behind								
Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAA24_43-U-A20 (Quad)		RFS - APX16DWV-16DWV-S-E-A20 (Quad)	
Azimuth	315				315		315	
M. Tilt	0				0		0	
Height	105				105		105	
Ports	P1	P2	P3	P4	P5	P6	P7	P8
Active Tech.	L2100	L2100	L1900	L1900	L700		U2100	
Dark Tech.								
Restricted Tech.						L600		
Decomm. Tech.								
E. Tilt	2		2		2	2	2	
Cables								
TMAs								
Diplexers / Combiners					Generic 600/700 Diplexer (AtAntenna)	SHARED Generic 600/700 Diplexer (AtAntenna)		
Radio					RRUS11 B12 (At Antenna)	Radio 4478 B71 (At Antenna)	RRUS11 B4 (At Antenna)	
Sector Equipment								

Unconnected Equipment:

Scope of Work:

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

RAN Template:	A&L Template:	Power System Template:
4Sec-67D97DB2	4Sec-67D97DB2_1xAIR+1OP	Custom

CTNL193A_L600_1.1_draft

Sector 4 (Proposed) view from behind								
Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAA24_43-U-A20 (Quad)		RFS - APX16DWV-16DWV-S-E-A20 (Quad)	
Azimuth	315				315		315	
M. Tilt	0				0		0	
Height	105				105		105	
Ports	P1	P2	P3	P4	P5	P6	P7	P8
Active Tech.	L2100	L2100	L1900	L1900	L700 L600	L700 L600	U2100	
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt	2		2		2	2	2	
Cables								
TMAs								
Diplexers / Combiners								
Radio					Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)	RRUS11 B4 (At Antenna)	
Sector Equipment								

Unconnected Equipment:

Scope of Work:

Remove Diplexers for L600 and L700 in Position 2.
Replace (1) RRUS11 B12 and (1) Radio 4478 B71 with (1) Radio 4449 B71+B12. Connect Radio 4449 to all four ports of LB Quad in Position 2.

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

RAN Template:	A&L Template:	Power System Template:
4Sec-67D97DB2	4Sec-67D97DB2_1xAIR+1OP	Custom

CTNL193A_L600_1.1_draft

Section 7 - Power Systems Equipment

Existing Power Systems Equipment

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

Proposed Power Systems Equipment

Exhibit E

Mount Analysis

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

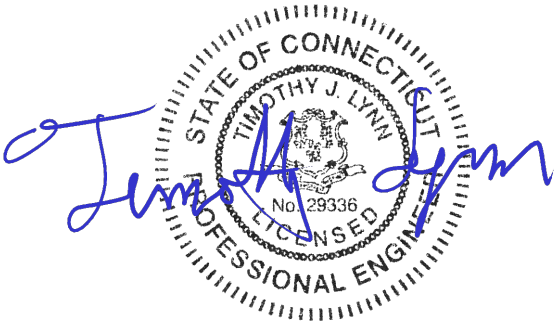
T-Mobile Site #: CTNL193A

720 Quinebaug Road
Quinebaug, CT

Centek Project No. 19027.68

Date: May 20, 2019

Max Stress Ratio = 75.4%



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

CENTEK engineering

Centered on Solutions℠

May 20, 2019

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

Re: Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CTNL193A
720 Quinebaug Road
Quinebaug, CT 06262

Centek Project No. 19027.68

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 one (1)12-ft Quad Platform (SitePro P/N F4P-12W) and handrail (P/N F4P-HRK12) to support the proposed/existing equipment configuration. 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: Four (4) Ericsson AIR32 KRD901146-1_B66A_B2A panel antennas, four (4) RFS APXVAA24_43-U-A20 panel antennas, four (4) RFS APX16DWV-16DWV-S-E-A20panel antennas, one (1) 2-ft Ø Microwave dish antenna, four (4) Ericsson RRUS-11 B4 remote radio and four (4) Ericsson 4449 B71_B12 remote radio units mounted on the quad platform with a RAD center elevation of 105-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 101mph for Quinebaug (Thompson, CT) 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 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

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL 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: TIA-222-G Loads

Location: Quinebaug, CT

Rev. 0: 5/17/19

Prepared by: T.J.L. Checked by: C.A.G.
Job No. 19027.68

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

Wind Speeds

Basic Wind Speed $V := 101$ 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 = $h := 125$ ft (User Input)

Height to Center of Antennas = $z_{Ant} := 105$ ft (User Input)

Radial Ice Thickness = $t_i := 0.75$ 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)

Importance Factors =

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

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

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

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

$$K_{iz} := \left(\frac{z_{Ant}}{33}\right)^{0.1} = 1.123$$

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.684$$

Velocity Pressure Coefficient Antennas =

$$Kz_{Ant} := 2.01\left(\left(\frac{z_{Ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.279$$

Velocity Pressure w/o Ice Antennas =

$$qz_{Ant} := 0.00256 \cdot K_d \cdot Kz_{Ant} \cdot V^2 \cdot I_{Wind} = 31.723$$

Velocity Pressure with Ice Antennas =

$$qz_{ice.Ant} := 0.00256 \cdot K_d \cdot Kz_{Ant} \cdot V_i^2 \cdot I_{Wind} = 7.774$$

CENTEK engineering
Centered on Solutions™ www.centekeng.com
63-2 North Branford Road P: (203) 488-0580
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Subject:	TIA-222-G Loads
Location:	Quinebaug, CT
Rev. 0: 5/17/19	Prepared by: T.J.L. Checked by: C.A.G. Job No. 19027.68

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS APXVAA24-43		
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 =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 706$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 5.8$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 256$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 18.9$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 204$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 8.3$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 90$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \times 10^4$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 1 \times 10^4$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 414$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 414$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFSAPX16DWV-16DWVs		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 55.9$	in	(User Input)
Antenna Width =	$W_{ant} := 13$	in	(User Input)
Antenna Thickness =	$T_{ant} := 3.15$	in	(User Input)
Antenna Weight =	$WT_{ant} := 41$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.3$		
Antenna Force Coefficient =	$Ca_{ant} = 1.28$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 5$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 225$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.2$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 55$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6.7$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 74$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 2.7$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 29$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 41$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2289$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 4034$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 131$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 131$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Ericsson AIR32		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 56.6$	in	(User Input)
Antenna Width =	$W_{ant} := 12.9$	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 =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.4$		
Antenna Force Coefficient =	$Ca_{ant} = 1.28$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 5.1$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 227$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.4$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 153$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6.8$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 74$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 5$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 55$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 6352$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 5421$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 176$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 176$	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 = $N_{RRUS} := 1$ (User Input)

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 = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 57$ lbs

Surface Area for One RRUS = $SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.1$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 45$ lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 2.1$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 22$ lbs

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.7$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 18$ 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 = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2122$

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 69$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 69$ lbs

Development of Wind & Ice Load on RRUS's

RRUS Data:

RRUS Model =	Ericsson RRUS11		
RRUS Shape =	Flat		(User Input)
RRUS Height =	$L_{RRUS} := 19.7$	in	(User Input)
RRUS Width =	$W_{RRUS} := 17$	in	(User Input)
RRUS Thickness =	$T_{RRUS} := 7.2$	in	(User Input)
RRUS Weight =	$WT_{RRUS} := 51$	lbs	(User Input)
Number of RRUS's =	$N_{RRUS} := 1$		(User Input)
RRUS Aspect Ratio =	$Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.2$		
RRUS Force Coefficient =	$Ca_{RRUS} = 1.2$		

Wind Load (without ice)

Surface Area for One RRUS =	$SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 2.3$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 97$	lbs
Surface Area for One RRUS =	$SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 41$	lbs

Wind Load (with ice)

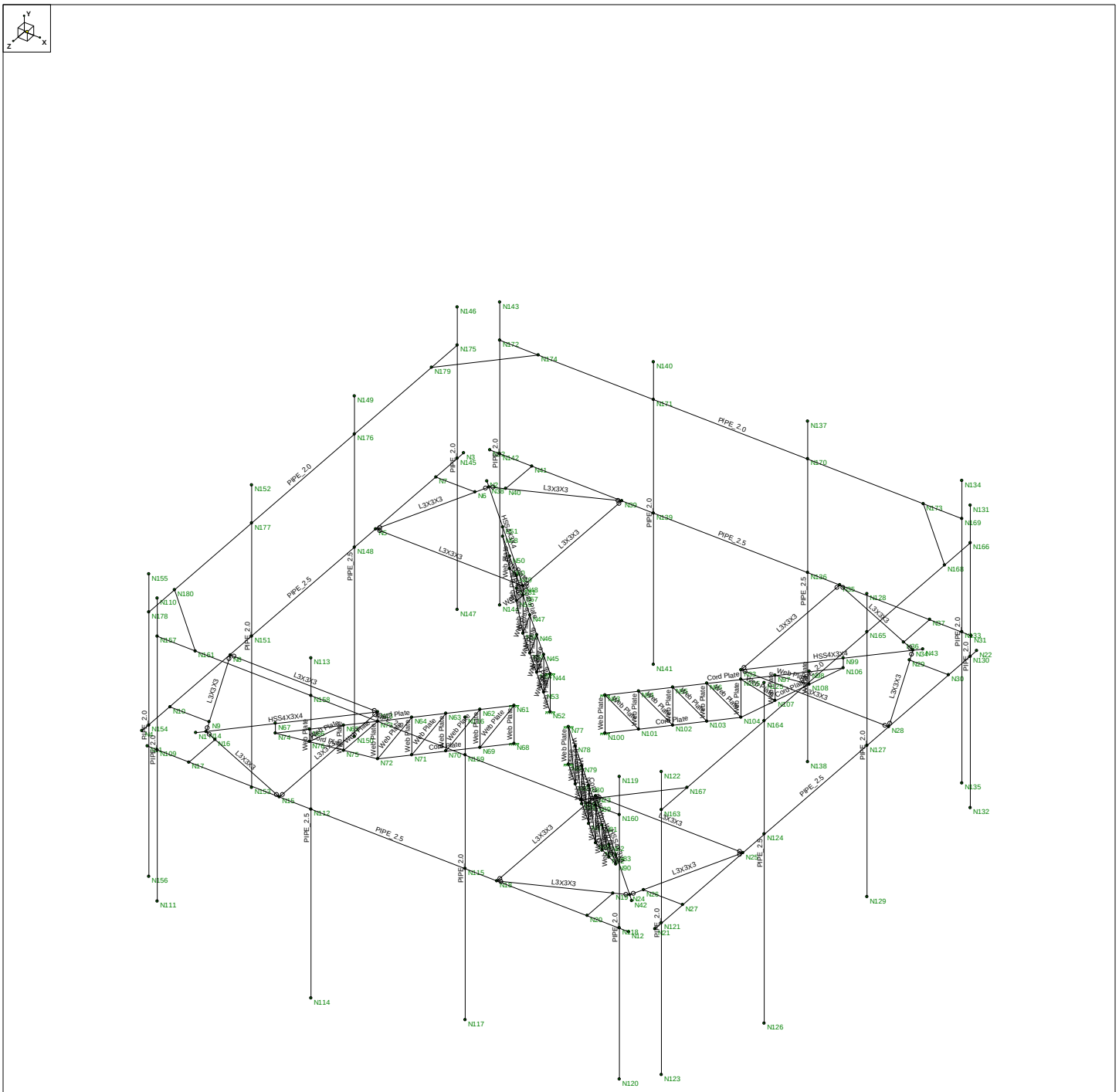
Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 3.3$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 33$	lbs
Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.7$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 17$	lbs

Gravity Load (without ice)

Weight of All RRUSs =	$WT_{RRUS} \cdot N_{RRUS} = 51$	lbs

Gravity Loads (ice only)

Volume of Each RRUS =	$V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 2411$	cu in
Volume of Ice on Each RRUS =	$V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2554$	cu in
Weight of Ice on Each RRUS =	$W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 83$	lbs
Weight of Ice on All RRUSs =	$W_{ICERRUS} \cdot N_{RRUS} = 83$	lbs



Envelope Only Solution

Centek		
FJP	CTNL193A - Mount	May 20, 2019 at 11:17 AM
19027.68	Member Framing	CTNL193A_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)	24
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-15: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-14
Masonry Code	ACI 530-13: ASD
Aluminum Code	AA ADM1-15: 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?	Yes
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	4
Cd X	4
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)	.145
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	#6
Footing Top Bar Cover (in)	1.5
Footing Bottom Bar	#6
Footing Bottom Bar Cover (in)	3
Pedestal Bar	#6
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#4

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1...	Density[k/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2
7	A1085	29000	11154	.3	.65	.49	50	1.4	65	1.3

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	2.5" Std. Pipe	PIPE_2.5	Beam	Wide Flange	A53 Gr.B	Typical	1.61	1.45	1.45	2.89
2	2.0" Std. Pipe	PIPE_2.0	Column	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25
3	HSS4x3	HSS4X3X4	Beam	None	A500 Gr.B ...	Typical	2.91	3.91	6.15	7.96
4	L3x3	L3X3X3	Beam	None	A36 Gr.36	Typical	1.09	.948	.948	.014
5	Cord Plate	Cord Plate	Beam	None	A36 Gr.36	Typical	2.25	2.668	.188	.158
6	Web Plate	Web Plate	Beam	Wide Flange	A36 Gr.36	Typical	.25	.001	.021	.004
7	Handrail	PIPE_2.0	Beam	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25
8	(P) Antenna Mast	PIPE_2.5	Column	Pipe	A53 Gr.B	Typical	1.61	1.45	1.45	2.89

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	2.5" Std. Pipe	12.5			Lbyy						Lateral
2	M2	L3x3	3.828			Lbyy						Lateral
3	M3	L3x3	2.911			Lbyy						Lateral
4	M5	L3x3	3.828			Lbyy						Lateral
5	M6	L3x3	2.911			Lbyy						Lateral
6	M8	2.5" Std. Pipe	12.5			Lbyy						Lateral
7	M9	L3x3	3.828			Lbyy						Lateral
8	M10	L3x3	2.911			Lbyy						Lateral
9	M12	L3x3	3.828			Lbyy						Lateral
10	M13	L3x3	2.911			Lbyy						Lateral
11	M15	2.5" Std. Pipe	12.5			Lbyy						Lateral
12	M16	L3x3	3.828			Lbyy						Lateral
13	M17	L3x3	2.911			Lbyy						Lateral
14	M19	L3x3	3.828			Lbyy						Lateral
15	M20	L3x3	2.911			Lbyy						Lateral
16	M22	2.5" Std. Pipe	12.5			Lbyy						Lateral
17	M23	L3x3	3.828			Lbyy						Lateral
18	M24	L3x3	2.911			Lbyy						Lateral
19	M26	L3x3	3.828			Lbyy						Lateral
20	M27	L3x3	2.911			Lbyy						Lateral
21	M29	HSS4x3	4			Lbyy						Lateral
22	M30	Cord Plate	5.25	Segment	Segment	Segment	Segment	Segme...				Lateral
23	M31	Cord Plate	2.462	Segment	Segment	Segment	Segment	Segme...				Lateral
24	M32	Cord Plate	3	Segment	Segment	Segment	Segment	Segme...				Lateral
25	M33	Web Plate	1			Lbyy						Lateral
26	M34	Web Plate	1			Lbyy						Lateral
27	M35	Web Plate	1			Lbyy						Lateral
28	M36	Web Plate	1			Lbyy						Lateral
29	M37	Web Plate	1			Lbyy						Lateral
30	M38	Web Plate	.667			Lbyy						Lateral
31	M39	Web Plate	.333			Lbyy						Lateral
32	M40	Web Plate	1.25			Lbyy						Lateral
33	M41	Web Plate	1.25			Lbyy						Lateral
34	M42	Web Plate	1.25			Lbyy						Lateral
35	M43	Web Plate	1.25			Lbyy						Lateral
36	M44	Web Plate	1.003			Lbyy						Lateral
37	M45	Web Plate	.821			Lbyy						Lateral
38	M48	HSS4x3	4			Lbyy						Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
39	M49	Cord Plate	5.25	Segment	Segment	Segment	Segment	Segme...				Lateral
40	M50	Cord Plate	2.462	Segment	Segment	Segment	Segment	Segme...				Lateral
41	M51	Cord Plate	3	Segment	Segment	Segment	Segment	Segme...				Lateral
42	M52	Web Plate	1			Lbyy						Lateral
43	M53	Web Plate	1			Lbyy						Lateral
44	M54	Web Plate	1			Lbyy						Lateral
45	M55	Web Plate	1			Lbyy						Lateral
46	M56	Web Plate	1			Lbyy						Lateral
47	M57	Web Plate	.667			Lbyy						Lateral
48	M58	Web Plate	.333			Lbyy						Lateral
49	M59	Web Plate	1.25			Lbyy						Lateral
50	M60	Web Plate	1.25			Lbyy						Lateral
51	M61	Web Plate	1.25			Lbyy						Lateral
52	M62	Web Plate	1.25			Lbyy						Lateral
53	M63	Web Plate	1.003			Lbyy						Lateral
54	M64	Web Plate	.821			Lbyy						Lateral
55	M67	HSS4x3	4			Lbyy						Lateral
56	M68	Cord Plate	5.25	Segment	Segment	Segment	Segment	Segme...				Lateral
57	M69	Cord Plate	2.462	Segment	Segment	Segment	Segment	Segme...				Lateral
58	M70	Cord Plate	3	Segment	Segment	Segment	Segment	Segme...				Lateral
59	M71	Web Plate	1			Lbyy						Lateral
60	M72	Web Plate	1			Lbyy						Lateral
61	M73	Web Plate	1			Lbyy						Lateral
62	M74	Web Plate	1			Lbyy						Lateral
63	M75	Web Plate	1			Lbyy						Lateral
64	M76	Web Plate	.667			Lbyy						Lateral
65	M77	Web Plate	.333			Lbyy						Lateral
66	M78	Web Plate	1.25			Lbyy						Lateral
67	M79	Web Plate	1.25			Lbyy						Lateral
68	M80	Web Plate	1.25			Lbyy						Lateral
69	M81	Web Plate	1.25			Lbyy						Lateral
70	M82	Web Plate	1.003			Lbyy						Lateral
71	M83	Web Plate	.821			Lbyy						Lateral
72	M86	HSS4x3	4			Lbyy						Lateral
73	M87	Cord Plate	5.25	Segment	Segment	Segment	Segment	Segme...				Lateral
74	M88	Cord Plate	2.462	Segment	Segment	Segment	Segment	Segme...				Lateral
75	M89	Cord Plate	3	Segment	Segment	Segment	Segment	Segme...				Lateral
76	M90	Web Plate	1			Lbyy						Lateral
77	M91	Web Plate	1			Lbyy						Lateral
78	M92	Web Plate	1	Segment		Lbyy						Lateral
79	M93	Web Plate	1			Lbyy						Lateral
80	M94	Web Plate	1			Lbyy						Lateral
81	M95	Web Plate	.667			Lbyy						Lateral
82	M96	Web Plate	.333			Lbyy						Lateral
83	M97	Web Plate	1.25			Lbyy						Lateral
84	M98	Web Plate	1.25			Lbyy						Lateral
85	M99	Web Plate	1.25			Lbyy						Lateral
86	M100	Web Plate	1.25			Lbyy						Lateral
87	M101	Web Plate	1.003			Lbyy						Lateral
88	M102	Web Plate	.821			Lbyy						Lateral
89	M105	2.0" Std. Pipe	8			Lbyy						Lateral
90	M106	(P) Antenna...	9			Lbyy						Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
91	M107	2.0" Std. Pipe	8			Lbyy						Lateral
92	M108	2.0" Std. Pipe	8			Lbyy						Lateral
93	M109	2.0" Std. Pipe	8			Lbyy						Lateral
94	M110	(P) Antenna...	9			Lbyy						Lateral
95	M111	2.0" Std. Pipe	8			Lbyy						Lateral
96	M112	2.0" Std. Pipe	8			Lbyy						Lateral
97	M113	2.0" Std. Pipe	8			Lbyy						Lateral
98	M114	(P) Antenna...	9			Lbyy						Lateral
99	M115	2.0" Std. Pipe	8			Lbyy						Lateral
100	M116	2.0" Std. Pipe	8			Lbyy						Lateral
101	M117	2.0" Std. Pipe	8			Lbyy						Lateral
102	M118	(P) Antenna...	9			Lbyy						Lateral
103	M119	2.0" Std. Pipe	8			Lbyy						Lateral
104	M120	2.0" Std. Pipe	8			Lbyy						Lateral
105	M121	Handrail	12			Lbyy						Lateral
106	M122	Handrail	12			Lbyy						Lateral
107	M123	Handrail	12			Lbyy						Lateral
108	M124	Handrail	12			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
1	M1	N3	N4			2.5" Std. Pipe	Beam	Wide Flange	A53 Gr.B	Typical
2	M2	N48	N5			L3x3	Beam	None	A36 Gr.36	Typical
3	M3	N38	N5			L3x3	Beam	None	A36 Gr.36	Typical
4	M4	N6	N7			RIGID	None	None	RIGID	Typical
5	M5	N13	N8			L3x3	Beam	None	A36 Gr.36	Typical
6	M6	N14	N8			L3x3	Beam	None	A36 Gr.36	Typical
7	M7	N9	N10			RIGID	None	None	RIGID	Typical
8	M8	N11	N12			2.5" Std. Pipe	Beam	Wide Flange	A53 Gr.B	Typical
9	M9	N13	N15			L3x3	Beam	None	A36 Gr.36	Typical
10	M10	N14	N15			L3x3	Beam	None	A36 Gr.36	Typical
11	M11	N16	N17			RIGID	None	None	RIGID	Typical
12	M12	N23	N18			L3x3	Beam	None	A36 Gr.36	Typical
13	M13	N24	N18			L3x3	Beam	None	A36 Gr.36	Typical
14	M14	N19	N20			RIGID	None	None	RIGID	Typical
15	M15	N21	N22			2.5" Std. Pipe	Beam	Wide Flange	A53 Gr.B	Typical
16	M16	N23	N25			L3x3	Beam	None	A36 Gr.36	Typical
17	M17	N24	N25			L3x3	Beam	None	A36 Gr.36	Typical
18	M18	N26	N27			RIGID	None	None	RIGID	Typical
19	M19	N33	N28			L3x3	Beam	None	A36 Gr.36	Typical
20	M20	N34	N28			L3x3	Beam	None	A36 Gr.36	Typical
21	M21	N29	N30			RIGID	None	None	RIGID	Typical
22	M22	N31	N32			2.5" Std. Pipe	Beam	Wide Flange	A53 Gr.B	Typical
23	M23	N33	N35			L3x3	Beam	None	A36 Gr.36	Typical
24	M24	N34	N35			L3x3	Beam	None	A36 Gr.36	Typical
25	M25	N36	N37			RIGID	None	None	RIGID	Typical
26	M26	N48	N39			L3x3	Beam	None	A36 Gr.36	Typical
27	M27	N38	N39			L3x3	Beam	None	A36 Gr.36	Typical
28	M28	N40	N41			RIGID	None	None	RIGID	Typical
29	M29	N48	N2		90	HSS4x3	Beam	None	A500 Gr....	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
30	M30	N58	N44		90	Cord Plate	Beam	None	A36 Gr.36	Typical
31	M31	N58	N56		90	Cord Plate	Beam	None	A36 Gr.36	Typical
32	M32	N56	N52		90	Cord Plate	Beam	None	A36 Gr.36	Typical
33	M33	N44	N52			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
34	M34	N45	N53			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
35	M35	N46	N54			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
36	M36	N47	N55			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
37	M37	N57	N56			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
38	M38	N49	N59			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
39	M39	N50	N60			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
40	M40	N44	N53			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
41	M41	N45	N54			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
42	M42	N46	N55			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
43	M43	N47	N56			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
44	M44	N57	N59			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
45	M45	N49	N60			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
46	M46	N51	N58			RIGID	None	None	RIGID	Typical
47	M47	N48	N57			RIGID	None	None	RIGID	Typical
48	M48	N13	N1		90	HSS4x3	Beam	None	A500 Gr....	Typical
49	M49	N74	N61		90	Cord Plate	Beam	None	A36 Gr.36	Typical
50	M50	N74	N72		90	Cord Plate	Beam	None	A36 Gr.36	Typical
51	M51	N72	N68		90	Cord Plate	Beam	None	A36 Gr.36	Typical
52	M52	N61	N68			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
53	M53	N62	N69			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
54	M54	N63	N70			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
55	M55	N64	N71			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
56	M56	N73	N72			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
57	M57	N65	N75			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
58	M58	N66	N76			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
59	M59	N61	N69			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
60	M60	N62	N70			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
61	M61	N63	N71			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
62	M62	N64	N72			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
63	M63	N73	N75			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
64	M64	N65	N76			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
65	M65	N67	N74			RIGID	None	None	RIGID	Typical
66	M66	N13	N73			RIGID	None	None	RIGID	Typical
67	M67	N23	N42		90	HSS4x3	Beam	None	A500 Gr....	Typical
68	M68	N90	N77		90	Cord Plate	Beam	None	A36 Gr.36	Typical
69	M69	N90	N88		90	Cord Plate	Beam	None	A36 Gr.36	Typical
70	M70	N88	N84		90	Cord Plate	Beam	None	A36 Gr.36	Typical
71	M71	N77	N84			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
72	M72	N78	N85			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
73	M73	N79	N86			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
74	M74	N80	N87			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
75	M75	N89	N88			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
76	M76	N81	N91			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
77	M77	N82	N92			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
78	M78	N77	N85			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
79	M79	N78	N86			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
80	M80	N79	N87			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
81	M81	N80	N88			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
82	M82	N89	N91			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
83	M83	N81	N92			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
84	M84	N83	N90			RIGID	None	None	RIGID	Typical
85	M85	N23	N89			RIGID	None	None	RIGID	Typical
86	M86	N33	N43		90	HSS4x3	Beam	None	A500 Gr....	Typical
87	M87	N106	N93		90	Cord Plate	Beam	None	A36 Gr.36	Typical
88	M88	N106	N104		90	Cord Plate	Beam	None	A36 Gr.36	Typical
89	M89	N104	N100		90	Cord Plate	Beam	None	A36 Gr.36	Typical
90	M90	N93	N100			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
91	M91	N94	N101			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
92	M92	N95	N102			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
93	M93	N96	N103			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
94	M94	N105	N104			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
95	M95	N97	N107			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
96	M96	N98	N108			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
97	M97	N93	N101			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
98	M98	N94	N102			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
99	M99	N95	N103			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
100	M100	N96	N104			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
101	M101	N105	N107			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
102	M102	N97	N108			Web Plate	Beam	Wide Flange	A36 Gr.36	Typical
103	M103	N99	N106			RIGID	None	None	RIGID	Typical
104	M104	N33	N105			RIGID	None	None	RIGID	Typical
105	M105	N110	N111			2.0" Std. Pipe	Column	Pipe	A53 Gr.B	Typical
106	M106	N113	N114			(P) Antenna Mast	Column	Pipe	A53 Gr.B	Typical
107	M107	N116	N117			2.0" Std. Pipe	Column	Pipe	A53 Gr.B	Typical
108	M108	N119	N120			2.0" Std. Pipe	Column	Pipe	A53 Gr.B	Typical
109	M109	N122	N123			2.0" Std. Pipe	Column	Pipe	A53 Gr.B	Typical
110	M110	N125	N126			(P) Antenna Mast	Column	Pipe	A53 Gr.B	Typical
111	M111	N128	N129			2.0" Std. Pipe	Column	Pipe	A53 Gr.B	Typical
112	M112	N131	N132			2.0" Std. Pipe	Column	Pipe	A53 Gr.B	Typical
113	M113	N134	N135			2.0" Std. Pipe	Column	Pipe	A53 Gr.B	Typical
114	M114	N137	N138			(P) Antenna Mast	Column	Pipe	A53 Gr.B	Typical
115	M115	N140	N141			2.0" Std. Pipe	Column	Pipe	A53 Gr.B	Typical
116	M116	N143	N144			2.0" Std. Pipe	Column	Pipe	A53 Gr.B	Typical
117	M117	N146	N147			2.0" Std. Pipe	Column	Pipe	A53 Gr.B	Typical
118	M118	N149	N150			(P) Antenna Mast	Column	Pipe	A53 Gr.B	Typical
119	M119	N152	N153			2.0" Std. Pipe	Column	Pipe	A53 Gr.B	Typical
120	M120	N155	N156			2.0" Std. Pipe	Column	Pipe	A53 Gr.B	Typical
121	M121	N157	N160			Handrail	Beam	Pipe	A53 Gr.B	Typical
122	M122	N163	N166			Handrail	Beam	Pipe	A53 Gr.B	Typical
123	M123	N169	N172			Handrail	Beam	Pipe	A53 Gr.B	Typical
124	M124	N175	N178			Handrail	Beam	Pipe	A53 Gr.B	Typical
125	M125	N180	N161			RIGID	None	None	RIGID	Typical
126	M126	N179	N174			RIGID	None	None	RIGID	Typical
127	M127	N173	N168			RIGID	None	None	RIGID	Typical
128	M128	N162	N167			RIGID	None	None	RIGID	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
1	N1	-5.656854	0	5.656854	0	
2	N2	-5.656854	0	-5.656854	0	
3	N3	-6.656854	0	-6.25	0	
4	N4	-6.656854	0	6.25	0	
5	N5	-6.656854	0	-2.828427	0	
6	N6	-5.644341	0	-5.166667	0	
7	N7	-6.656854	0	-5.166667	0	
8	N8	-6.656854	0	2.828427	0	
9	N9	-5.644341	0	5.166667	0	
10	N10	-6.656854	0	5.166667	0	
11	N11	-6.25	0	6.656854	0	
12	N12	6.25	0	6.656854	0	
13	N13	-2.828427	0	2.828427	0	
14	N14	-5.5	0	5.5	0	
15	N15	-2.828427	0	6.656854	0	
16	N16	-5.166667	0	5.644341	0	
17	N17	-5.166667	0	6.656854	0	
18	N18	2.828427	0	6.656854	0	
19	N19	5.166667	0	5.644341	0	
20	N20	5.166667	0	6.656854	0	
21	N21	6.656854	0	6.25	0	
22	N22	6.656854	0	-6.25	0	
23	N23	2.828427	0	2.828427	0	
24	N24	5.5	0	5.5	0	
25	N25	6.656854	0	2.828427	0	
26	N26	5.644341	0	5.166667	0	
27	N27	6.656854	0	5.166667	0	
28	N28	6.656854	0	-2.828427	0	
29	N29	5.644341	0	-5.166667	0	
30	N30	6.656854	0	-5.166667	0	
31	N31	6.25	0	-6.656854	0	
32	N32	-6.25	0	-6.656854	0	
33	N33	2.828427	0	-2.828427	0	
34	N34	5.5	0	-5.5	0	
35	N35	2.828427	0	-6.656854	0	
36	N36	5.166667	0	-5.644341	0	
37	N37	5.166667	0	-6.656854	0	
38	N38	-5.5	0	-5.5	0	
39	N39	-2.828427	0	-6.656854	0	
40	N40	-5.166667	0	-5.644341	0	
41	N41	-5.166667	0	-6.656854	0	
42	N42	5.656854	0	5.656854	0	
43	N43	5.656854	0	-5.656854	0	
44	N44	-0.707107	-.25	-0.707107	0	
45	N45	-1.237437	-.25	-1.237437	0	
46	N46	-1.767767	-.25	-1.767767	0	
47	N47	-2.298097	-.25	-2.298097	0	
48	N48	-2.828427	0	-2.828427	0	
49	N49	-3.358757	-.25	-3.358757	0	
50	N50	-3.889087	-.25	-3.889087	0	
51	N51	-4.419417	0	-4.419417	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
52	N52	-0.707107	-1.25	-0.707107	0	
53	N53	-1.237437	-1.25	-1.237437	0	
54	N54	-1.767767	-1.25	-1.767767	0	
55	N55	-2.298097	-1.25	-2.298097	0	
56	N56	-2.828427	-1.25	-2.828427	0	
57	N57	-2.828427	-.25	-2.828427	0	
58	N58	-4.419417	-.25	-4.419417	0	
59	N59	-3.358757	-0.916667	-3.358757	0	
60	N60	-3.889087	-0.583333	-3.889087	0	
61	N61	-0.707107	-.25	0.707107	0	
62	N62	-1.237437	-.25	1.237437	0	
63	N63	-1.767767	-.25	1.767767	0	
64	N64	-2.298097	-.25	2.298097	0	
65	N65	-3.358757	-.25	3.358757	0	
66	N66	-3.889087	-.25	3.889087	0	
67	N67	-4.419417	0	4.419417	0	
68	N68	-0.707107	-1.25	0.707107	0	
69	N69	-1.237437	-1.25	1.237437	0	
70	N70	-1.767767	-1.25	1.767767	0	
71	N71	-2.298097	-1.25	2.298097	0	
72	N72	-2.828427	-1.25	2.828427	0	
73	N73	-2.828427	-.25	2.828427	0	
74	N74	-4.419417	-.25	4.419417	0	
75	N75	-3.358757	-0.916667	3.358757	0	
76	N76	-3.889087	-0.583333	3.889087	0	
77	N77	0.707107	-.25	0.707107	0	
78	N78	1.237437	-.25	1.237437	0	
79	N79	1.767767	-.25	1.767767	0	
80	N80	2.298097	-.25	2.298097	0	
81	N81	3.358757	-.25	3.358757	0	
82	N82	3.889087	-.25	3.889087	0	
83	N83	4.419417	0	4.419417	0	
84	N84	0.707107	-1.25	0.707107	0	
85	N85	1.237437	-1.25	1.237437	0	
86	N86	1.767767	-1.25	1.767767	0	
87	N87	2.298097	-1.25	2.298097	0	
88	N88	2.828427	-1.25	2.828427	0	
89	N89	2.828427	-.25	2.828427	0	
90	N90	4.419417	-.25	4.419417	0	
91	N91	3.358757	-0.916667	3.358757	0	
92	N92	3.889087	-0.583333	3.889087	0	
93	N93	0.707107	-.25	-0.707107	0	
94	N94	1.237437	-.25	-1.237437	0	
95	N95	1.767767	-.25	-1.767767	0	
96	N96	2.298097	-.25	-2.298097	0	
97	N97	3.358757	-.25	-3.358757	0	
98	N98	3.889087	-.25	-3.889087	0	
99	N99	4.419417	0	-4.419417	0	
100	N100	0.707107	-1.25	-0.707107	0	
101	N101	1.237437	-1.25	-1.237437	0	
102	N102	1.767767	-1.25	-1.767767	0	
103	N103	2.298097	-1.25	-2.298097	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
104	N104	2.828427	-1.25	-2.828427	0	
105	N105	2.828427	-.25	-2.828427	0	
106	N106	4.419417	-.25	-4.419417	0	
107	N107	3.358757	-0.916667	-3.358757	0	
108	N108	3.889087	-0.583333	-3.889087	0	
109	N109	-6	0	6.656854	0	
110	N110	-6	4	6.656854	0	
111	N111	-6	-4	6.656854	0	
112	N112	-2	0	6.656854	0	
113	N113	-2	4	6.656854	0	
114	N114	-2	-5	6.656854	0	
115	N115	2	0	6.656854	0	
116	N116	2	4	6.656854	0	
117	N117	2	-4	6.656854	0	
118	N118	6	0	6.656854	0	
119	N119	6	4	6.656854	0	
120	N120	6	-4	6.656854	0	
121	N121	6.656854	0	6	0	
122	N122	6.656854	4	6	0	
123	N123	6.656854	-4	6	0	
124	N124	6.656854	0	2	0	
125	N125	6.656854	4	2	0	
126	N126	6.656854	-5	2	0	
127	N127	6.656854	0	-2	0	
128	N128	6.656854	4	-2	0	
129	N129	6.656854	-4	-2	0	
130	N130	6.656854	0	-6	0	
131	N131	6.656854	4	-6	0	
132	N132	6.656854	-4	-6	0	
133	N133	6	0	-6.656854	0	
134	N134	6	4	-6.656854	0	
135	N135	6	-4	-6.656854	0	
136	N136	2	0	-6.656854	0	
137	N137	2	4	-6.656854	0	
138	N138	2	-5	-6.656854	0	
139	N139	-2	0	-6.656854	0	
140	N140	-2	4	-6.656854	0	
141	N141	-2	-4	-6.656854	0	
142	N142	-6	0	-6.656854	0	
143	N143	-6	4	-6.656854	0	
144	N144	-6	-4	-6.656854	0	
145	N145	-6.656854	0	-6	0	
146	N146	-6.656854	4	-6	0	
147	N147	-6.656854	-4	-6	0	
148	N148	-6.656854	0	-2	0	
149	N149	-6.656854	4	-2	0	
150	N150	-6.656854	-5	-2	0	
151	N151	-6.656854	0	2	0	
152	N152	-6.656854	4	2	0	
153	N153	-6.656854	-4	2	0	
154	N154	-6.656854	0	6	0	
155	N155	-6.656854	4	6	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
156	N156	-6.656854	-4	6	0	
157	N157	-6	3	6.656854	0	
158	N158	-2	3	6.656854	0	
159	N159	2	3	6.656854	0	
160	N160	6	3	6.656854	0	
161	N161	-5	3	6.656854	0	
162	N162	5	3	6.656854	0	
163	N163	6.656854	3	6	0	
164	N164	6.656854	3	2	0	
165	N165	6.656854	3	-2	0	
166	N166	6.656854	3	-6	0	
167	N167	6.656854	3	5	0	
168	N168	6.656854	3	-5	0	
169	N169	6	3	-6.656854	0	
170	N170	2	3	-6.656854	0	
171	N171	-2	3	-6.656854	0	
172	N172	-6	3	-6.656854	0	
173	N173	5	3	-6.656854	0	
174	N174	-5	3	-6.656854	0	
175	N175	-6.656854	3	-6	0	
176	N176	-6.656854	3	-2	0	
177	N177	-6.656854	3	2	0	
178	N178	-6.656854	3	6	0	
179	N179	-6.656854	3	-5	0	
180	N180	-6.656854	3	5	0	
181	N181	-3.358757	-0.583333	-3.358757	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	N44	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N52	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N61	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N68	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	N77	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
6	N84	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
7	N93	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
8	N100	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M106	Y	-.077	.5
2	M110	Y	-.077	.5
3	M114	Y	-.077	.5
4	M118	Y	-.077	.5
5	M106	Y	-.077	7.5
6	M110	Y	-.077	7.5
7	M114	Y	-.077	7.5
8	M118	Y	-.077	7.5
9	M105	Y	-.021	.5

Member Point Loads (BLC 2 : Dead Load) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
10	M109	Y	-.021	.5
11	M113	Y	-.021	.5
12	M117	Y	-.021	.5
13	M105	Y	-.021	5.5
14	M109	Y	-.021	5.5
15	M113	Y	-.021	5.5
16	M117	Y	-.021	5.5
17	M107	Y	-.067	.5
18	M111	Y	-.067	.5
19	M115	Y	-.067	.5
20	M119	Y	-.067	.5
21	M107	Y	-.067	5.5
22	M111	Y	-.067	5.5
23	M115	Y	-.067	5.5
24	M119	Y	-.067	5.5
25	M106	Y	-.074	%50
26	M110	Y	-.074	%50
27	M114	Y	-.074	%50
28	M118	Y	-.074	%50
29	M105	Y	-.026	3
30	M109	Y	-.026	3
31	M113	Y	-.026	3
32	M117	Y	-.026	3

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M106	Y	-.207	.5
2	M110	Y	-.207	.5
3	M114	Y	-.207	.5
4	M118	Y	-.207	.5
5	M106	Y	-.207	7.5
6	M110	Y	-.207	7.5
7	M114	Y	-.207	7.5
8	M118	Y	-.207	7.5
9	M105	Y	-.066	.5
10	M109	Y	-.066	.5
11	M113	Y	-.066	.5
12	M117	Y	-.066	.5
13	M105	Y	-.066	5.5
14	M109	Y	-.066	5.5
15	M113	Y	-.066	5.5
16	M117	Y	-.066	5.5
17	M107	Y	-.088	.5
18	M111	Y	-.088	.5
19	M115	Y	-.088	.5
20	M119	Y	-.088	.5
21	M107	Y	-.088	5.5
22	M111	Y	-.088	5.5
23	M115	Y	-.088	5.5
24	M119	Y	-.088	5.5
25	M106	Y	-.069	%50

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
26	M110	Y	-.069	%50
27	M114	Y	-.069	%50
28	M118	Y	-.069	%50
29	M105	Y	-.042	3
30	M109	Y	-.042	3
31	M113	Y	-.042	3
32	M117	Y	-.042	3

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M106	X	.045	.5
2	M114	X	.045	.5
3	M106	X	.045	7.5
4	M114	X	.045	7.5
5	M110	X	.102	.5
6	M118	X	.102	.5
7	M110	X	.102	7.5
8	M118	X	.102	7.5
9	M105	X	.015	.5
10	M113	X	.015	.5
11	M105	X	.015	5.5
12	M113	X	.015	5.5
13	M109	X	.037	.5
14	M117	X	.037	.5
15	M109	X	.037	5.5
16	M117	X	.037	5.5
17	M107	X	.028	.5
18	M115	X	.028	.5
19	M107	X	.028	5.5
20	M115	X	.028	5.5
21	M111	X	.037	.5
22	M119	X	.037	.5
23	M111	X	.037	5.5
24	M119	X	.037	5.5
25	M106	X	.018	%50
26	M114	X	.018	%50
27	M105	X	.009	3
28	M113	X	.009	3

Member Point Loads (BLC 5 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M106	X	.128	.5
2	M114	X	.128	.5
3	M106	X	.128	7.5
4	M114	X	.128	7.5
5	M110	X	.353	.5
6	M118	X	.353	.5
7	M110	X	.353	7.5
8	M118	X	.353	7.5
9	M105	X	.028	.5
10	M113	X	.028	.5

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
11	M105	X	.028	5.5
12	M113	X	.028	5.5
13	M109	X	.113	.5
14	M117	X	.113	.5
15	M109	X	.113	5.5
16	M117	X	.113	5.5
17	M107	X	.077	.5
18	M115	X	.077	.5
19	M107	X	.077	5.5
20	M115	X	.077	5.5
21	M111	X	.114	.5
22	M119	X	.114	.5
23	M111	X	.114	5.5
24	M119	X	.114	5.5
25	M106	X	.045	%50
26	M114	X	.045	%50
27	M105	X	.021	3
28	M113	X	.021	3

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M106	Z	.102	.5
2	M114	Z	.102	.5
3	M106	Z	.102	7.5
4	M114	Z	.102	7.5
5	M110	Z	.045	.5
6	M118	Z	.045	.5
7	M110	Z	.045	7.5
8	M118	Z	.045	7.5
9	M105	Z	.037	.5
10	M113	Z	.037	.5
11	M105	Z	.037	5.5
12	M113	Z	.037	5.5
13	M109	Z	.015	.5
14	M117	Z	.015	.5
15	M109	Z	.015	5.5
16	M117	Z	.015	5.5
17	M107	Z	.037	.5
18	M115	Z	.037	.5
19	M107	Z	.037	5.5
20	M115	Z	.037	5.5
21	M111	Z	.028	.5
22	M119	Z	.028	.5
23	M111	Z	.028	5.5
24	M119	Z	.028	5.5
25	M110	Z	.018	%50
26	M118	Z	.018	%50
27	M109	Z	.009	3
28	M117	Z	.009	3

Member Point Loads (BLC 7 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M106	Z	.353	.5
2	M114	Z	.353	.5
3	M106	Z	.353	7.5
4	M114	Z	.353	7.5
5	M110	Z	.128	.5
6	M118	Z	.128	.5
7	M110	Z	.128	7.5
8	M118	Z	.128	7.5
9	M105	Z	.113	.5
10	M113	Z	.113	.5
11	M105	Z	.113	5.5
12	M113	Z	.113	5.5
13	M109	Z	.028	.5
14	M117	Z	.028	.5
15	M109	Z	.028	5.5
16	M117	Z	.028	5.5
17	M107	Z	.114	.5
18	M115	Z	.114	.5
19	M107	Z	.114	5.5
20	M115	Z	.114	5.5
21	M111	Z	.077	.5
22	M119	Z	.077	.5
23	M111	Z	.077	5.5
24	M119	Z	.077	5.5
25	M110	Z	.045	%50
26	M118	Z	.045	%50
27	M109	Z	.021	3
28	M117	Z	.021	3

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	M124	X	.003	.003	0	0
2	M1	X	.003	.003	0	0
3	M122	X	.003	.003	0	0
4	M15	X	.003	.003	0	0
5	M30	X	.003	.003	0	0
6	M31	X	.003	.003	0	0
7	M32	X	.003	.003	0	0
8	M33	X	.003	.003	0	0
9	M34	X	.003	.003	0	0
10	M35	X	.003	.003	0	0
11	M36	X	.003	.003	0	0
12	M37	X	.003	.003	0	0
13	M38	X	.003	.003	0	0
14	M39	X	.003	.003	0	0
15	M40	X	.003	.003	0	0
16	M41	X	.003	.003	0	0
17	M42	X	.003	.003	0	0
18	M43	X	.003	.003	0	0
19	M44	X	.003	.003	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
20	M45	X	.003	.003	0	0
21	M49	X	.003	.003	0	0
22	M50	X	.003	.003	0	0
23	M51	X	.003	.003	0	0
24	M52	X	.003	.003	0	0
25	M53	X	.003	.003	0	0
26	M54	X	.003	.003	0	0
27	M55	X	.003	.003	0	0
28	M56	X	.003	.003	0	0
29	M57	X	.003	.003	0	0
30	M58	X	.003	.003	0	0
31	M59	X	.003	.003	0	0
32	M60	X	.003	.003	0	0
33	M61	X	.003	.003	0	0
34	M62	X	.003	.003	0	0
35	M63	X	.003	.003	0	0
36	M64	X	.003	.003	0	0
37	M68	X	.003	.003	0	0
38	M69	X	.003	.003	0	0
39	M70	X	.003	.003	0	0
40	M71	X	.003	.003	0	0
41	M72	X	.003	.003	0	0
42	M73	X	.003	.003	0	0
43	M74	X	.003	.003	0	0
44	M75	X	.003	.003	0	0
45	M76	X	.003	.003	0	0
46	M77	X	.003	.003	0	0
47	M78	X	.003	.003	0	0
48	M79	X	.003	.003	0	0
49	M80	X	.003	.003	0	0
50	M81	X	.003	.003	0	0
51	M82	X	.003	.003	0	0
52	M83	X	.003	.003	0	0
53	M87	X	.003	.003	0	0
54	M88	X	.003	.003	0	0
55	M89	X	.003	.003	0	0
56	M90	X	.003	.003	0	0
57	M91	X	.003	.003	0	0
58	M92	X	.003	.003	0	0
59	M93	X	.003	.003	0	0
60	M94	X	.003	.003	0	0
61	M95	X	.003	.003	0	0
62	M96	X	.003	.003	0	0
63	M97	X	.003	.003	0	0
64	M98	X	.003	.003	0	0
65	M99	X	.003	.003	0	0
66	M100	X	.003	.003	0	0
67	M101	X	.003	.003	0	0
68	M102	X	.003	.003	0	0
69	M106	X	.002	.002	0	0
70	M114	X	.002	.002	0	0
71	M110	X	.002	.002	0	.5

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
72	M118	X	.002	.002	0	.5
73	M110	X	.002	.002	6.75	0
74	M118	X	.002	.002	6.75	0
75	M105	X	.002	.002	0	0
76	M113	X	.002	.002	0	0
77	M109	X	.002	.002	0	.5
78	M117	X	.002	.002	0	.5
79	M109	X	.002	.002	4.25	0
80	M117	X	.002	.002	4.25	0
81	M107	X	.002	.002	0	0
82	M115	X	.002	.002	0	0
83	M111	X	.002	.002	0	.5
84	M119	X	.002	.002	0	.5
85	M111	X	.002	.002	4.667	0
86	M119	X	.002	.002	4.667	0
87	M108	X	.002	.002	0	0
88	M112	X	.002	.002	0	0
89	M116	X	.002	.002	0	0
90	M120	X	.002	.002	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	M124	X	.013	.013	0	0
2	M1	X	.013	.013	0	0
3	M122	X	.013	.013	0	0
4	M15	X	.013	.013	0	0
5	M30	X	.013	.013	0	0
6	M31	X	.013	.013	0	0
7	M32	X	.013	.013	0	0
8	M33	X	.013	.013	0	0
9	M34	X	.013	.013	0	0
10	M35	X	.013	.013	0	0
11	M36	X	.013	.013	0	0
12	M37	X	.013	.013	0	0
13	M38	X	.013	.013	0	0
14	M39	X	.013	.013	0	0
15	M40	X	.013	.013	0	0
16	M41	X	.013	.013	0	0
17	M42	X	.013	.013	0	0
18	M43	X	.013	.013	0	0
19	M44	X	.013	.013	0	0
20	M45	X	.013	.013	0	0
21	M49	X	.013	.013	0	0
22	M50	X	.013	.013	0	0
23	M51	X	.013	.013	0	0
24	M52	X	.013	.013	0	0
25	M53	X	.013	.013	0	0
26	M54	X	.013	.013	0	0
27	M55	X	.013	.013	0	0
28	M56	X	.013	.013	0	0
29	M57	X	.013	.013	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
30	M58	X	.013	.013	0	0
31	M59	X	.013	.013	0	0
32	M60	X	.013	.013	0	0
33	M61	X	.013	.013	0	0
34	M62	X	.013	.013	0	0
35	M63	X	.013	.013	0	0
36	M64	X	.013	.013	0	0
37	M68	X	.013	.013	0	0
38	M69	X	.013	.013	0	0
39	M70	X	.013	.013	0	0
40	M71	X	.013	.013	0	0
41	M72	X	.013	.013	0	0
42	M73	X	.013	.013	0	0
43	M74	X	.013	.013	0	0
44	M75	X	.013	.013	0	0
45	M76	X	.013	.013	0	0
46	M77	X	.013	.013	0	0
47	M78	X	.013	.013	0	0
48	M79	X	.013	.013	0	0
49	M80	X	.013	.013	0	0
50	M81	X	.013	.013	0	0
51	M82	X	.013	.013	0	0
52	M83	X	.013	.013	0	0
53	M87	X	.013	.013	0	0
54	M88	X	.013	.013	0	0
55	M89	X	.013	.013	0	0
56	M90	X	.013	.013	0	0
57	M91	X	.013	.013	0	0
58	M92	X	.013	.013	0	0
59	M93	X	.013	.013	0	0
60	M94	X	.013	.013	0	0
61	M95	X	.013	.013	0	0
62	M96	X	.013	.013	0	0
63	M97	X	.013	.013	0	0
64	M98	X	.013	.013	0	0
65	M99	X	.013	.013	0	0
66	M100	X	.013	.013	0	0
67	M101	X	.013	.013	0	0
68	M102	X	.013	.013	0	0
69	M106	X	.01	.01	0	0
70	M114	X	.01	.01	0	0
71	M110	X	.01	.01	0	.5
72	M118	X	.01	.01	0	.5
73	M110	X	.01	.01	6.75	0
74	M118	X	.01	.01	6.75	0
75	M113	X	.009	.009	0	0
76	M109	X	.009	.009	0	.5
77	M117	X	.009	.009	0	.5
78	M109	X	.009	.009	4.25	0
79	M117	X	.009	.009	4.25	0
80	M107	X	.009	.009	0	0
81	M115	X	.009	.009	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
82	M111	X	.009	.009	0	.5
83	M119	X	.009	.009	0	.5
84	M111	X	.009	.009	4.667	0
85	M119	X	.009	.009	4.667	0
86	M108	X	.009	.009	0	0
87	M112	X	.009	.009	0	0
88	M116	X	.009	.009	0	0
89	M120	X	.009	.009	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	M30	Z	.003	.003	0	0
2	M31	Z	.003	.003	0	0
3	M32	Z	.003	.003	0	0
4	M33	Z	.003	.003	0	0
5	M34	Z	.003	.003	0	0
6	M35	Z	.003	.003	0	0
7	M36	Z	.003	.003	0	0
8	M37	Z	.003	.003	0	0
9	M38	Z	.003	.003	0	0
10	M39	Z	.003	.003	0	0
11	M40	Z	.003	.003	0	0
12	M41	Z	.003	.003	0	0
13	M42	Z	.003	.003	0	0
14	M43	Z	.003	.003	0	0
15	M44	Z	.003	.003	0	0
16	M45	Z	.003	.003	0	0
17	M49	Z	.003	.003	0	0
18	M50	Z	.003	.003	0	0
19	M51	Z	.003	.003	0	0
20	M52	Z	.003	.003	0	0
21	M53	Z	.003	.003	0	0
22	M54	Z	.003	.003	0	0
23	M55	Z	.003	.003	0	0
24	M56	Z	.003	.003	0	0
25	M57	Z	.003	.003	0	0
26	M58	Z	.003	.003	0	0
27	M59	Z	.003	.003	0	0
28	M60	Z	.003	.003	0	0
29	M61	Z	.003	.003	0	0
30	M62	Z	.003	.003	0	0
31	M63	Z	.003	.003	0	0
32	M64	Z	.003	.003	0	0
33	M68	Z	.003	.003	0	0
34	M69	Z	.003	.003	0	0
35	M70	Z	.003	.003	0	0
36	M71	Z	.003	.003	0	0
37	M72	Z	.003	.003	0	0
38	M73	Z	.003	.003	0	0
39	M74	Z	.003	.003	0	0
40	M75	Z	.003	.003	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,%]
41	M76	Z	.003	.003	0	0
42	M77	Z	.003	.003	0	0
43	M78	Z	.003	.003	0	0
44	M79	Z	.003	.003	0	0
45	M80	Z	.003	.003	0	0
46	M81	Z	.003	.003	0	0
47	M82	Z	.003	.003	0	0
48	M83	Z	.003	.003	0	0
49	M87	Z	.003	.003	0	0
50	M88	Z	.003	.003	0	0
51	M89	Z	.003	.003	0	0
52	M90	Z	.003	.003	0	0
53	M91	Z	.003	.003	0	0
54	M92	Z	.003	.003	0	0
55	M93	Z	.003	.003	0	0
56	M94	Z	.003	.003	0	0
57	M95	Z	.003	.003	0	0
58	M96	Z	.003	.003	0	0
59	M97	Z	.003	.003	0	0
60	M98	Z	.003	.003	0	0
61	M99	Z	.003	.003	0	0
62	M100	Z	.003	.003	0	0
63	M101	Z	.003	.003	0	0
64	M102	Z	.003	.003	0	0
65	M123	Z	.003	.003	0	0
66	M22	Z	.003	.003	0	0
67	M121	Z	.003	.003	0	0
68	M8	Z	.003	.003	0	0
69	M110	Z	.002	.002	0	0
70	M118	Z	.002	.002	0	0
71	M106	Z	.002	.002	0	.5
72	M114	Z	.002	.002	0	.5
73	M106	Z	.002	.002	6.75	0
74	M114	Z	.002	.002	6.75	0
75	M109	Z	.002	.002	0	0
76	M117	Z	.002	.002	0	0
77	M105	Z	.002	.002	0	.5
78	M113	Z	.002	.002	0	.5
79	M105	Z	.002	.002	4.25	0
80	M113	Z	.002	.002	4.25	0
81	M111	Z	.002	.002	0	0
82	M119	Z	.002	.002	0	0
83	M107	Z	.002	.002	0	.5
84	M115	Z	.002	.002	0	.5
85	M107	Z	.002	.002	4.667	0
86	M115	Z	.002	.002	4.667	0
87	M108	Z	.002	.002	0	0
88	M112	Z	.002	.002	0	0
89	M116	Z	.002	.002	0	0
90	M120	Z	.002	.002	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	M30	Z	.013	.013	0	0
2	M31	Z	.013	.013	0	0
3	M32	Z	.013	.013	0	0
4	M33	Z	.013	.013	0	0
5	M34	Z	.013	.013	0	0
6	M35	Z	.013	.013	0	0
7	M36	Z	.013	.013	0	0
8	M37	Z	.013	.013	0	0
9	M38	Z	.013	.013	0	0
10	M39	Z	.013	.013	0	0
11	M40	Z	.013	.013	0	0
12	M41	Z	.013	.013	0	0
13	M42	Z	.013	.013	0	0
14	M43	Z	.013	.013	0	0
15	M44	Z	.013	.013	0	0
16	M45	Z	.013	.013	0	0
17	M49	Z	.013	.013	0	0
18	M50	Z	.013	.013	0	0
19	M51	Z	.013	.013	0	0
20	M52	Z	.013	.013	0	0
21	M53	Z	.013	.013	0	0
22	M54	Z	.013	.013	0	0
23	M55	Z	.013	.013	0	0
24	M56	Z	.013	.013	0	0
25	M57	Z	.013	.013	0	0
26	M58	Z	.013	.013	0	0
27	M59	Z	.013	.013	0	0
28	M60	Z	.013	.013	0	0
29	M61	Z	.013	.013	0	0
30	M62	Z	.013	.013	0	0
31	M63	Z	.013	.013	0	0
32	M64	Z	.013	.013	0	0
33	M68	Z	.013	.013	0	0
34	M69	Z	.013	.013	0	0
35	M70	Z	.013	.013	0	0
36	M71	Z	.013	.013	0	0
37	M72	Z	.013	.013	0	0
38	M73	Z	.013	.013	0	0
39	M74	Z	.013	.013	0	0
40	M75	Z	.013	.013	0	0
41	M76	Z	.013	.013	0	0
42	M77	Z	.013	.013	0	0
43	M78	Z	.013	.013	0	0
44	M79	Z	.013	.013	0	0
45	M80	Z	.013	.013	0	0
46	M81	Z	.013	.013	0	0
47	M82	Z	.013	.013	0	0
48	M83	Z	.013	.013	0	0
49	M87	Z	.013	.013	0	0
50	M88	Z	.013	.013	0	0
51	M89	Z	.013	.013	0	0
52	M90	Z	.013	.013	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
53	M91	Z	.013	.013	0	0
54	M92	Z	.013	.013	0	0
55	M93	Z	.013	.013	0	0
56	M94	Z	.013	.013	0	0
57	M95	Z	.013	.013	0	0
58	M96	Z	.013	.013	0	0
59	M97	Z	.013	.013	0	0
60	M98	Z	.013	.013	0	0
61	M99	Z	.013	.013	0	0
62	M100	Z	.013	.013	0	0
63	M101	Z	.013	.013	0	0
64	M102	Z	.013	.013	0	0
65	M123	Z	.013	.013	0	0
66	M22	Z	.013	.013	0	0
67	M121	Z	.013	.013	0	0
68	M8	Z	.013	.013	0	0
69	M110	Z	.01	.01	0	0
70	M118	Z	.01	.01	0	0
71	M106	Z	.01	.01	0	.5
72	M114	Z	.01	.01	0	.5
73	M106	Z	.01	.01	6.75	0
74	M114	Z	.01	.01	6.75	0
75	M109	Z	.009	.009	0	0
76	M117	Z	.009	.009	0	0
77	M105	Z	.009	.009	0	.5
78	M113	Z	.009	.009	0	.5
79	M105	Z	.009	.009	4.25	0
80	M113	Z	.009	.009	4.25	0
81	M111	Z	.009	.009	0	0
82	M119	Z	.009	.009	0	0
83	M107	Z	.009	.009	0	.5
84	M115	Z	.009	.009	0	.5
85	M107	Z	.009	.009	4.667	0
86	M115	Z	.009	.009	4.667	0
87	M108	Z	.009	.009	0	0
88	M112	Z	.009	.009	0	0
89	M116	Z	.009	.009	0	0
90	M120	Z	.009	.009	0	0

Member Distributed Loads (BLC 8 : BLC 2 Transient Area Loads)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M2	Y	-.004	-.004	0	3.063
2	M3	Y	-.007	-.007	.174	2.721
3	M29	Y	-.012	-.012	.989	2.609
4	M26	Y	-.003	-.006	0	3.063
5	M27	Y	-.007	-.007	.174	2.721
6	M23	Y	-.003	-.006	0	3.063
7	M24	Y	-.007	-.007	.174	2.721
8	M86	Y	-.012	-.012	.989	2.609
9	M19	Y	-.003	-.006	0	3.063
10	M20	Y	-.007	-.007	.174	2.721

Member Distributed Loads (BLC 8 : BLC 2 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
11	M12	Y	-.003	-.006	0	3.063
12	M13	Y	-.007	-.007	.174	2.721
13	M67	Y	-.012	-.012	.989	2.609
14	M16	Y	-.003	-.006	0	3.063
15	M17	Y	-.007	-.007	.174	2.721
16	M9	Y	-.003	-.006	0	3.063
17	M10	Y	-.007	-.007	.174	2.721
18	M48	Y	-.012	-.012	.989	2.609
19	M5	Y	-.003	-.006	0	3.063
20	M6	Y	-.007	-.007	.174	2.721

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					32		8	
3	Ice Load	None					32			
4	Wind with Ice X	None					28	90		
5	Wind X	None					28	89		
6	Wind with Ice Z	None					28	90		
7	Wind Z	None					28	90		
8	BLC 2 Transient Area Loads	None						20		

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	N44	max	4.67	6	1.615	6	4.651	3	.668	3	.564	2	-.189	2
2		min	-1.191	2	.57	2	-.982	5	.22	5	-.301	4	-.66	6
3	N52	max	-2.016	5	.321	3	-1.986	2	.443	3	.264	1	-.11	2
4		min	-7.146	3	.142	5	-7.131	6	.135	5	-.194	4	-.434	6
5	N61	max	5.668	6	1.667	6	.619	2	-.222	2	-.04	3	-.223	2
6		min	-.89	2	.57	2	-6.161	4	-.694	6	-.437	5	-.678	6
7	N68	max	-2.24	2	.32	3	7.44	6	-.15	2	-.034	3	-.138	2
8		min	-7.478	6	.14	5	2.025	2	-.46	6	-.222	4	-.445	6
9	N77	max	-4.875	5	1.667	3	-4.887	2	-.341	2	.265	5	.687	3
10		min	-6.071	1	.837	5	-5.933	4	-.69	6	-.347	2	.344	5
11	N84	max	7.478	6	.321	6	7.465	3	-.219	2	.197	4	.454	3
12		min	3.745	2	.138	2	3.741	5	-.457	6	-.187	1	.222	5
13	N93	max	.667	5	1.667	3	5.651	3	.689	3	.475	5	.683	3
14		min	-5.976	1	.57	5	-1.192	5	.2	5	.049	3	.246	5

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
15	N100	max	7.449	3	.32	6	-2.219	5	.455	3	.223	4	.45	3
16		min	1.986	5	.139	2	-7.463	3	.118	5	.022	3	.17	5
17	Totals:	max	0	4	7.844	6	0	3						
18		min	-9.696	2	3.384	2	-9.807	5						

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	.046	4	-.035	2	.06	4	7.176e-03	4	-8.865e-05	3	2.911e-03	3
2		min	-.114	1	-.168	6	-.114	1	4.556e-05	2	-4.75e-03	2	-3.151e-03	5
3	N2	max	.199	1	-.034	2	.037	4	1.791e-04	5	1.954e-03	2	3.593e-03	6
4		min	-.037	4	-.157	6	-.199	1	-8.941e-03	1	-2.389e-03	5	-6.722e-03	2
5	N3	max	.196	1	-.044	5	.016	4	3.136e-03	6	1.123e-03	2	7.344e-03	3
6		min	-.024	4	-.256	3	-.178	1	1.34e-03	2	-2.04e-03	5	1.805e-03	5
7	N4	max	.024	4	-.043	2	.021	6	2.991e-04	5	-1.458e-04	3	5.559e-03	6
8		min	-.145	1	-.248	6	-.172	1	-2.021e-03	3	-4.528e-03	1	6.297e-04	2
9	N5	max	.254	2	-.16	5	.017	4	4.368e-03	6	1.869e-03	2	5.732e-03	1
10		min	-.105	4	-.461	3	-.177	1	1.531e-03	2	2.965e-04	6	8.47e-04	5
11	N6	max	.211	1	-.048	2	.039	4	5.34e-03	6	1.723e-03	2	9.792e-03	3
12		min	-.049	4	-.185	6	-.198	1	2.147e-03	2	-1.911e-03	5	2.43e-03	5
13	N7	max	.211	1	-.078	5	.016	4	5.34e-03	6	1.723e-03	2	9.792e-03	3
14		min	-.049	4	-.304	3	-.177	1	2.147e-03	2	-1.911e-03	5	2.43e-03	5
15	N8	max	.162	5	-.13	2	.02	6	-9.657e-04	5	6.6e-05	6	4.749e-03	6
16		min	.017	3	-.406	6	-.172	1	-4.293e-03	3	-5.547e-03	1	1.645e-03	2
17	N9	max	.068	4	-.044	2	.06	4	-6.817e-04	5	-3.267e-04	3	7.694e-03	6
18		min	-.086	1	-.185	6	-.114	1	-4.054e-03	3	-4.782e-03	1	1.653e-03	2
19	N10	max	.068	4	-.064	2	.021	6	-6.817e-04	5	-3.267e-04	3	7.694e-03	6
20		min	-.086	1	-.279	6	-.172	1	-4.054e-03	3	-4.782e-03	1	1.653e-03	2
21	N11	max	.016	3	-.042	2	.041	4	7.096e-03	6	-8.406e-05	3	-8.234e-04	5
22		min	-.164	1	-.264	6	-.145	1	1.79e-03	5	-4.434e-03	1	-3.141e-03	3
23	N12	max	.021	3	-.126	2	.144	1	6.029e-03	6	1.917e-03	4	1.83e-03	6
24		min	-.161	1	-.252	6	-.012	3	1.633e-03	2	-5.859e-03	1	-2.612e-04	2
25	N13	max	.163	5	-.01	2	.174	4	5.947e-03	5	3.038e-05	3	1.121e-03	1
26		min	.015	3	-.044	6	.024	3	-8.412e-04	1	-4.056e-03	2	-4.456e-03	5
27	N14	max	.054	4	-.032	2	.067	4	7.176e-03	4	-8.865e-05	3	2.911e-03	3
28		min	-.105	1	-.155	6	-.105	1	4.554e-05	2	-4.75e-03	2	-3.151e-03	5
29	N15	max	.016	3	-.164	2	.176	5	5.001e-03	3	3.153e-04	3	-1.671e-03	5
30		min	-.164	1	-.467	6	.022	3	-1.247e-03	5	-3.745e-03	5	-4.372e-03	3
31	N16	max	.048	4	-.05	2	.081	4	9.539e-03	6	1.568e-04	3	-1.686e-03	5
32		min	-.112	1	-.195	6	-.087	1	2.49e-03	2	-4.307e-03	2	-5.346e-03	3
33	N17	max	.016	3	-.08	2	.081	4	9.539e-03	6	1.568e-04	3	-1.686e-03	5
34		min	-.164	1	-.311	6	-.087	1	2.49e-03	2	-4.307e-03	2	-5.346e-03	3
35	N18	max	.02	3	-.158	2	.099	5	4.894e-03	6	3.168e-03	4	4.137e-03	6
36		min	-.161	1	-.414	6	-.096	2	1.738e-03	2	-2.839e-03	1	1.002e-03	2
37	N19	max	.028	3	-.097	2	.068	1	8.124e-03	6	2.001e-03	5	3.872e-03	6
38		min	-.09	1	-.186	6	-.017	3	2.479e-03	2	-5.909e-03	1	7.19e-04	2
39	N20	max	.021	3	-.127	2	.068	1	8.124e-03	6	2.001e-03	5	3.872e-03	6
40		min	-.162	1	-.285	6	-.017	3	2.479e-03	2	-5.909e-03	1	7.19e-04	2
41	N21	max	.024	3	-.119	2	.174	1	2.535e-04	5	1.872e-03	4	-1.726e-03	2
42		min	-.127	1	-.271	6	-.014	3	-2.838e-03	3	-5.462e-03	1	-7.41e-03	6
43	N22	max	.186	1	-.069	5	.174	1	2.165e-03	6	3.872e-03	5	-2.911e-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
44		min	-.004	3	-.252	3	-.018	3	2.347e-04	2	-5.088e-04	1	-6.028e-03	3
45	N23	max	.108	2	-.025	5	.097	5	1.287e-03	5	1.496e-03	4	-1.782e-04	5
46		min	-.087	5	-.044	3	-.097	2	-1.886e-03	2	-5.135e-03	2	-3.384e-03	2
47	N24	max	.029	3	-.088	5	.092	1	3.886e-03	6	2.236e-03	4	-1.442e-03	5
48		min	-.079	1	-.155	3	-.016	3	-6.055e-04	2	-6.219e-03	2	-4.514e-03	3
49	N25	max	.11	2	-.189	2	.174	1	-1.242e-03	5	1.189e-04	6	1.352e-03	2
50		min	-.086	5	-.467	6	-.014	3	-4.324e-03	3	-5.987e-03	1	-5.409e-03	6
51	N26	max	.028	3	-.102	5	.103	1	-7.732e-04	5	1.938e-03	4	-2.586e-03	2
52		min	-.055	1	-.195	3	-.016	3	-5.085e-03	3	-5.907e-03	2	-9.915e-03	6
53	N27	max	.028	3	-.133	2	.174	1	-7.732e-04	5	1.938e-03	4	-2.586e-03	2
54		min	-.055	1	-.315	6	-.014	3	-5.085e-03	3	-5.907e-03	2	-9.915e-03	6
55	N28	max	.18	5	-.169	5	.174	1	4.338e-03	6	9.531e-04	4	-2.107e-03	5
56		min	.018	3	-.414	3	-.018	3	1.139e-03	2	3.229e-04	6	-4.89e-03	3
57	N29	max	.18	1	-.049	5	.169	1	4.155e-03	6	3.753e-03	5	-3.788e-03	5
58		min	.002	3	-.186	3	-.013	3	1.061e-03	2	-4.468e-04	1	-8.122e-03	3
59	N30	max	.18	1	-.095	5	.174	1	4.155e-03	6	3.753e-03	5	-3.788e-03	5
60		min	.002	3	-.285	3	-.018	3	1.061e-03	2	-4.468e-04	1	-8.122e-03	3
61	N31	max	.188	1	-.083	5	.176	1	-3.565e-03	2	3.539e-03	4	2.928e-03	6
62		min	-.013	6	-.271	3	-.015	3	-7.413e-03	3	-5.509e-04	1	-2.564e-04	2
63	N32	max	.185	1	-.043	5	.023	4	-6.316e-04	5	1.465e-03	2	-1.328e-03	5
64		min	-.019	6	-.236	3	-.191	1	-5.784e-03	3	-2.135e-03	5	-2.169e-03	3
65	N33	max	.182	5	-.011	5	.184	5	5.727e-03	5	3.135e-03	4	-8.228e-04	3
66		min	.019	3	-.044	3	.007	3	-1.145e-03	3	-9.769e-04	1	-5.734e-03	5
67	N34	max	.181	1	-.032	5	.168	1	4.619e-03	5	4.354e-03	4	-3.448e-03	3
68		min	0	3	-.155	3	-.013	3	-3.812e-03	3	-1.727e-04	1	-6.698e-03	4
69	N35	max	.188	1	-.166	5	.188	5	-2.958e-03	2	4.111e-03	4	4.292e-03	6
70		min	-.014	6	-.467	3	.009	3	-5.819e-03	4	-2.823e-03	1	1.24e-03	2
71	N36	max	.182	1	-.049	5	.168	1	-4.572e-03	5	4.174e-03	4	5.164e-03	6
72		min	-.002	3	-.195	3	-.008	3	-9.918e-03	3	-4.978e-04	2	7.705e-04	2
73	N37	max	.187	1	-.105	5	.168	1	-4.572e-03	5	4.174e-03	4	5.164e-03	6
74		min	-.013	6	-.315	3	-.008	3	-9.918e-03	3	-4.978e-04	2	7.705e-04	2
75	N38	max	.203	1	-.031	2	.042	4	1.792e-04	5	1.954e-03	2	3.593e-03	6
76		min	-.041	4	-.144	6	-.202	1	-8.941e-03	1	-2.389e-03	5	-6.722e-03	2
77	N39	max	.185	1	-.13	5	.112	5	-1.633e-03	5	3.045e-04	3	-2.043e-03	5
78		min	-.018	6	-.409	3	-.246	1	-4.846e-03	3	-3.33e-03	5	-4.341e-03	3
79	N40	max	.2	1	-.044	5	.051	4	-1.674e-03	5	1.339e-03	2	-2.107e-03	5
80		min	-.037	4	-.177	3	-.209	1	-7.922e-03	3	-2.366e-03	5	-4.158e-03	3
81	N41	max	.185	1	-.064	5	.051	4	-1.674e-03	5	1.339e-03	2	-2.107e-03	5
82		min	-.019	6	-.273	3	-.209	1	-7.922e-03	3	-2.366e-03	5	-4.158e-03	3
83	N42	max	.028	3	-.095	5	.104	1	3.886e-03	6	2.236e-03	4	-1.442e-03	5
84		min	-.091	1	-.169	3	-.015	3	-6.055e-04	2	-6.219e-03	2	-4.514e-03	3
85	N43	max	.182	1	-.035	5	.169	1	4.619e-03	5	4.354e-03	4	-3.448e-03	3
86		min	0	3	-.168	3	-.014	3	-3.812e-03	3	-1.727e-04	1	-6.698e-03	4
87	N44	max	0	6	0	6	0	6	0	6	0	6	0	6
88		min	0	1	0	1	0	1	0	1	0	1	0	1
89	N45	max	.037	2	-.002	2	.019	5	1.579e-04	5	5.26e-03	4	6.842e-04	4
90		min	-.019	4	-.006	6	-.036	1	-2.495e-03	1	-1.023e-02	2	-1.908e-03	2
91	N46	max	.116	2	-.005	2	.059	5	6.704e-04	5	6.511e-03	4	1.264e-03	4
92		min	-.058	4	-.018	6	-.115	2	-5.011e-03	1	-1.339e-02	2	-4.352e-03	2
93	N47	max	.194	2	-.008	2	.095	5	1.113e-03	5	4.174e-03	4	1.572e-03	5
94		min	-.094	4	-.03	6	-.192	1	-7.027e-03	1	-9.819e-03	1	-6.55e-03	2
95	N48	max	.25	2	-.01	2	.109	5	1.2e-03	5	7.31e-04	3	1.23e-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
96		min	-.108	4	-.042	6	-.249	1	-7.871e-03	1	-1.617e-03	5	-7.851e-03	2
97	N49	max	.222	2	-.01	2	.095	4	9.964e-04	5	9.434e-04	2	1.121e-03	5
98		min	-.094	4	-.051	6	-.221	1	-7.674e-03	2	-1.724e-03	5	-7.566e-03	2
99	N50	max	.215	1	-.011	2	.083	4	8.656e-04	5	1.448e-03	2	1.044e-03	5
100		min	-.082	4	-.06	6	-.213	1	-7.563e-03	1	-2.104e-03	5	-7.387e-03	2
101	N51	max	.227	2	-.013	2	.071	5	9.209e-04	5	1.703e-03	2	1.285e-03	6
102		min	-.072	4	-.072	6	-.227	1	-7.889e-03	1	-2.232e-03	5	-7.498e-03	2
103	N52	max	0	6	0	6	0	6	0	6	0	6	0	6
104		min	0	1	0	1	0	1	0	1	0	1	0	1
105	N53	max	.018	1	-.001	2	.013	4	3.864e-04	5	3.511e-03	4	7.898e-04	4
106		min	-.012	4	-.004	6	-.017	2	-2.349e-03	1	-4.971e-03	1	-1.882e-03	2
107	N54	max	.058	1	-.004	2	.041	4	8.789e-04	5	4.574e-03	4	1.442e-03	4
108		min	-.039	4	-.015	6	-.056	1	-4.699e-03	1	-6.795e-03	1	-4.063e-03	2
109	N55	max	.1	1	-.008	2	.068	4	1.136e-03	5	3.635e-03	4	1.671e-03	5
110		min	-.065	4	-.028	6	-.097	1	-6.354e-03	1	-5.838e-03	1	-5.781e-03	2
111	N56	max	.13	1	-.01	2	.085	4	8.087e-04	5	1.588e-03	4	1.071e-03	5
112		min	-.082	4	-.042	6	-.126	1	-6.439e-03	1	-3.342e-03	1	-6.209e-03	2
113	N57	max	.227	2	-.01	2	.105	4	1.2e-03	5	7.31e-04	3	1.23e-03	5
114		min	-.104	4	-.042	6	-.225	1	-7.871e-03	1	-1.617e-03	5	-7.851e-03	2
115	N58	max	.205	1	-.013	2	.069	4	9.209e-04	5	1.703e-03	2	1.285e-03	6
116		min	-.068	4	-.072	6	-.203	1	-7.889e-03	1	-2.232e-03	5	-7.498e-03	2
117	N59	max	.166	1	-.011	2	.09	4	7.576e-04	5	7.364e-04	3	8.062e-04	5
118		min	-.087	4	-.051	6	-.163	1	-6.662e-03	2	-8.572e-04	5	-6.634e-03	2
119	N60	max	.187	1	-.011	2	.082	4	6.549e-04	5	1.491e-03	2	8.54e-04	6
120		min	-.079	4	-.06	6	-.185	1	-7.004e-03	2	-2.152e-03	5	-6.877e-03	2
121	N61	max	0	6	0	6	0	6	0	6	0	6	0	6
122		min	0	1	0	1	0	1	0	1	0	1	0	1
123	N62	max	.027	5	-.002	2	.029	4	2.008e-03	4	7.614e-03	5	4.427e-04	3
124		min	.002	3	-.006	6	.003	3	3.183e-04	2	7.5e-04	3	-1.078e-03	5
125	N63	max	.083	5	-.005	2	.087	5	3.837e-03	4	9.492e-03	5	4.612e-04	3
126		min	.007	3	-.018	6	.01	3	4.097e-04	2	1.023e-03	3	-2.615e-03	5
127	N64	max	.135	5	-.009	2	.14	5	5.216e-03	4	6.264e-03	4	5.801e-04	1
128		min	.013	3	-.032	6	.016	3	1.233e-04	1	8.106e-04	3	-3.977e-03	5
129	N65	max	.132	5	-.011	2	.139	4	5.434e-03	5	1.85e-05	3	1.353e-03	1
130		min	.016	3	-.055	6	.016	1	-1.022e-03	1	-4.121e-03	2	-4.36e-03	5
131	N66	max	.112	4	-.012	2	.12	4	5.385e-03	5	-5.036e-05	3	1.484e-03	1
132		min	-.011	1	-.065	6	-.012	1	-1.059e-03	1	-4.508e-03	1	-4.174e-03	5
133	N67	max	.102	5	-.014	2	.115	4	5.822e-03	4	-6.547e-05	3	1.44e-03	1
134		min	-.044	1	-.079	6	-.044	1	-7.617e-04	1	-4.607e-03	2	-4.222e-03	5
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
137	N69	max	.015	4	-.001	2	.014	4	1.891e-03	4	4.013e-03	4	2.92e-04	3
138		min	.003	3	-.005	6	0	3	5.036e-04	2	5.869e-04	3	-1.132e-03	5
139	N70	max	.047	4	-.004	2	.043	4	3.633e-03	4	5.128e-03	4	4.342e-04	3
140		min	.009	3	-.015	6	.004	3	7.216e-04	2	7.176e-04	3	-2.419e-03	5
141	N71	max	.077	4	-.008	2	.072	4	4.745e-03	4	3.76e-03	4	5.161e-04	3
142		min	.014	3	-.03	6	.007	3	4.518e-04	2	5.232e-04	3	-3.283e-03	5
143	N72	max	.093	4	-.011	2	.087	4	4.481e-03	5	1.093e-03	4	1.189e-03	1
144		min	.017	3	-.045	6	.009	3	-6.924e-04	1	-1.009e-03	2	-3.215e-03	5
145	N73	max	.15	5	-.01	2	.156	4	5.947e-03	5	3.038e-05	3	1.121e-03	1
146		min	.016	3	-.044	6	.02	3	-8.412e-04	1	-4.056e-03	2	-4.456e-03	5
147	N74	max	.09	4	-.014	2	.098	4	5.822e-03	4	-6.547e-05	3	1.44e-03	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
148		min	-.04	1	-.079	6	-.041	1	-7.617e-04	1	-4.607e-03	2	-4.222e-03	5
149	N75	max	.103	4	-.011	2	.101	4	4.508e-03	5	-4.443e-05	3	1.478e-03	1
150		min	.018	3	-.055	6	.013	3	-1.242e-03	1	-3.383e-03	1	-3.475e-03	5
151	N76	max	.098	4	-.012	2	.1	4	4.865e-03	5	-1.387e-04	3	1.671e-03	1
152		min	-.004	2	-.065	6	-.007	2	-1.298e-03	1	-4.632e-03	1	-3.672e-03	5
153	N77	max	0	6	0	6	0	6	0	6	0	6	0	6
154		min	0	1	0	1	0	1	0	1	0	1	0	1
155	N78	max	.022	1	-.003	5	.018	4	1.055e-03	6	5.823e-03	2	-4.922e-05	5
156		min	-.016	5	-.006	3	-.021	2	-3.428e-04	2	-4.575e-03	5	-1.197e-03	1
157	N79	max	.065	2	-.01	5	.052	4	1.444e-03	6	6.713e-03	2	1.702e-04	5
158		min	-.049	5	-.018	3	-.062	2	-1.164e-03	2	-5.632e-03	5	-2.324e-03	2
159	N80	max	.1	2	-.017	5	.084	5	1.506e-03	4	3.202e-03	2	2.747e-04	5
160		min	-.08	5	-.032	3	-.095	2	-1.893e-03	2	-3.65e-03	5	-3.14e-03	2
161	N81	max	.065	2	-.033	5	.084	5	9.817e-04	6	1.573e-03	4	-1.916e-04	5
162		min	-.078	5	-.055	3	-.058	2	-1.828e-03	2	-5.315e-03	2	-2.895e-03	2
163	N82	max	.03	3	-.04	5	.073	5	1.113e-03	6	1.975e-03	4	-3.384e-04	5
164		min	-.067	5	-.065	3	-.024	3	-1.628e-03	2	-5.812e-03	2	-2.822e-03	2
165	N83	max	.034	3	-.048	5	.064	5	1.52e-03	6	2.086e-03	4	-3.614e-04	5
166		min	-.053	5	-.079	3	-.02	3	-1.673e-03	2	-6.003e-03	2	-3.258e-03	2
167	N84	max	0	6	0	6	0	6	0	6	0	6	0	6
168		min	0	1	0	1	0	1	0	1	0	1	0	1
169	N85	max	.011	1	-.002	5	.012	4	9.627e-04	4	3.234e-03	1	2.088e-04	5
170		min	-.014	4	-.005	3	-.013	1	-4.776e-04	2	-3.515e-03	4	-1.161e-03	2
171	N86	max	.034	1	-.008	5	.038	4	1.607e-03	4	3.755e-03	1	3.948e-04	5
172		min	-.041	4	-.015	3	-.037	1	-1.103e-03	2	-4.488e-03	4	-2.253e-03	2
173	N87	max	.053	1	-.016	5	.063	4	1.738e-03	4	2.001e-03	1	2.792e-04	5
174		min	-.068	4	-.03	3	-.057	1	-1.397e-03	2	-3.44e-03	4	-2.848e-03	2
175	N88	max	.056	1	-.025	5	.078	4	1.197e-03	6	5.493e-04	3	-3.054e-04	5
176		min	-.084	4	-.045	3	-.062	1	-9.7e-04	2	-1.333e-03	4	-2.269e-03	2
177	N89	max	.097	2	-.025	5	.094	5	1.287e-03	5	1.496e-03	4	-1.782e-04	5
178		min	-.088	5	-.044	3	-.092	2	-1.886e-03	2	-5.135e-03	2	-3.384e-03	2
179	N90	max	.028	3	-.048	5	.06	5	1.52e-03	6	2.086e-03	4	-3.614e-04	5
180		min	-.054	5	-.079	3	-.021	3	-1.673e-03	2	-6.003e-03	2	-3.258e-03	2
181	N91	max	.046	1	-.032	5	.081	4	8.17e-04	6	9.476e-04	4	-4.546e-04	5
182		min	-.083	4	-.055	3	-.048	1	-1.112e-03	2	-4.185e-03	2	-2.141e-03	2
183	N92	max	.023	3	-.04	5	.072	4	1.008e-03	6	2.143e-03	4	-5.719e-04	5
184		min	-.07	4	-.065	3	-.024	3	-1.187e-03	2	-5.888e-03	1	-2.368e-03	2
185	N93	max	0	6	0	6	0	6	0	6	0	6	0	6
186		min	0	1	0	1	0	1	0	1	0	1	0	1
187	N94	max	.03	4	-.002	5	.031	5	1.292e-03	5	-8.092e-04	3	-6.25e-04	3
188		min	.004	3	-.006	3	.002	3	-9.572e-04	3	-8.412e-03	5	-1.804e-03	4
189	N95	max	.093	5	-.005	5	.094	5	3.12e-03	5	-9.145e-04	3	-8.417e-04	3
190		min	.011	3	-.018	3	.007	3	-1.236e-03	3	-1.05e-02	5	-3.693e-03	5
191	N96	max	.151	5	-.009	5	.152	5	4.785e-03	5	-4.617e-04	3	-8.568e-04	3
192		min	.016	3	-.032	3	.011	3	-1.194e-03	3	-6.773e-03	1	-5.242e-03	5
193	N97	max	.162	1	-.011	5	.155	1	5.45e-03	5	3.378e-03	4	-6.016e-04	3
194		min	.013	3	-.055	3	.007	3	-9.338e-04	3	-8.577e-04	1	-5.558e-03	5
195	N98	max	.166	1	-.012	5	.159	1	5.274e-03	5	3.879e-03	4	-6.919e-04	3
196		min	.01	3	-.065	3	.004	3	-1.099e-03	3	-4.716e-04	1	-5.432e-03	5
197	N99	max	.179	1	-.013	5	.166	1	5.392e-03	5	4.114e-03	4	-1.082e-03	3
198		min	.009	3	-.079	3	-.005	3	-1.442e-03	3	-3.361e-04	1	-5.716e-03	5
199	N100	max	0	6	0	6	0	6	0	6	0	6	0	6

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
200		min	0	1	0	1	0	1	0	1	0	1	0	1
201	N101	max	.014	5	-.001	5	.015	1	1.332e-03	5	-4.466e-04	3	-4.97e-04	3
202		min	0	3	-.005	3	.003	3	-7.829e-04	3	-4.129e-03	1	-1.721e-03	4
203	N102	max	.046	1	-.004	5	.049	1	2.943e-03	5	-6.462e-04	3	-8.296e-04	3
204		min	.003	3	-.015	3	.008	3	-1.216e-03	3	-5.877e-03	1	-3.49e-03	5
205	N103	max	.083	1	-.008	5	.087	1	4.173e-03	5	-5.532e-04	3	-9.936e-04	3
206		min	.006	3	-.03	3	.013	3	-1.416e-03	3	-5.509e-03	1	-4.706e-03	5
207	N104	max	.112	1	-.011	5	.118	1	4.315e-03	5	-1.633e-04	6	-7.062e-04	3
208		min	.007	3	-.045	3	.016	3	-1.222e-03	3	-3.876e-03	1	-4.568e-03	5
209	N105	max	.165	5	-.011	5	.167	5	5.727e-03	5	3.135e-03	4	-8.228e-04	3
210		min	.016	3	-.044	3	.011	3	-1.145e-03	3	-9.769e-04	1	-5.734e-03	5
211	N106	max	.169	1	-.013	5	.161	1	5.392e-03	5	4.114e-03	4	-1.082e-03	3
212		min	.006	3	-.079	3	0	3	-1.442e-03	3	-3.361e-04	1	-5.716e-03	5
213	N107	max	.139	1	-.011	5	.141	1	4.636e-03	5	2.147e-03	5	-4.744e-04	3
214		min	.008	3	-.055	3	.013	3	-9.114e-04	3	-1.729e-03	1	-4.667e-03	5
215	N108	max	.155	1	-.012	5	.153	1	4.807e-03	5	3.93e-03	4	-6.223e-04	3
216		min	.007	3	-.065	3	.007	3	-1.097e-03	3	-4.672e-04	1	-4.925e-03	5
217	N109	max	.016	3	-.05	2	.05	4	7.096e-03	6	-8.406e-05	3	-8.234e-04	5
218		min	-.164	1	-.273	6	-.131	1	1.79e-03	5	-4.434e-03	1	-3.141e-03	3
219	N110	max	.08	3	-.05	2	.177	5	2.586e-03	5	4.004e-04	3	-1.236e-03	5
220		min	-.036	2	-.273	6	-.156	1	-3.092e-03	3	-5.034e-03	2	-3.141e-03	1
221	N111	max	-.035	5	-.05	2	.1	5	7.007e-03	3	-8.406e-05	3	-8.224e-04	5
222		min	-.292	1	-.273	6	-.316	3	-1.692e-03	5	-4.434e-03	1	-2.828e-03	6
223	N112	max	.017	3	-.176	2	.212	5	3.428e-03	3	1.204e-03	2	-4.839e-04	2
224		min	-.163	1	-.498	6	.017	3	-2.635e-03	5	-2.768e-03	5	-1.721e-03	6
225	N113	max	.066	3	-.176	2	.452	4	7.584e-03	5	6.442e-04	2	-6.767e-04	5
226		min	-.038	2	-.498	6	-.001	2	-1.178e-03	1	-3.019e-03	4	-2.881e-03	1
227	N114	max	.126	2	-.176	2	1.105	5	3.383e-03	3	1.204e-03	2	6.388e-03	2
228		min	-.088	6	-.499	6	-.187	3	-1.862e-02	5	-2.768e-03	5	-1.698e-03	6
229	N115	max	.02	3	-.166	2	.137	5	3.745e-03	6	3.956e-03	4	2.577e-03	6
230		min	-.161	1	-.449	6	-.106	2	1.367e-03	5	4.849e-04	1	4.409e-04	2
231	N116	max	.03	3	-.166	2	.381	4	6.083e-03	5	4.511e-03	4	1.684e-03	6
232		min	-.067	1	-.449	6	-.065	2	-1.47e-03	3	5.827e-04	2	-5.002e-04	2
233	N117	max	.162	3	-.166	2	.21	5	3.685e-03	3	3.956e-03	4	3.586e-03	1
234		min	-.028	2	-.449	6	-.203	3	-2.123e-03	5	4.849e-04	1	5.406e-04	5
235	N118	max	.021	3	-.125	2	.126	1	6.029e-03	6	1.917e-03	4	1.83e-03	6
236		min	-.161	1	-.258	6	-.013	3	1.633e-03	2	-5.859e-03	1	-2.612e-04	2
237	N119	max	.037	3	-.125	2	.122	5	7.522e-04	5	2.485e-03	5	1.384e-03	6
238		min	-.05	1	-.258	6	-.082	3	-4.141e-03	3	-6.804e-03	1	-1.937e-03	2
239	N120	max	.109	3	-.125	2	.046	2	5.824e-03	6	1.917e-03	4	1.886e-03	3
240		min	-.12	2	-.258	6	-.285	6	1.632e-03	2	-5.859e-03	1	2.409e-04	5
241	N121	max	.025	3	-.122	2	.174	1	2.534e-04	5	1.872e-03	4	-1.726e-03	2
242		min	-.111	1	-.279	6	-.014	3	-2.838e-03	3	-5.462e-03	1	-7.41e-03	6
243	N122	max	.034	3	-.122	2	.14	2	1.281e-03	5	3.087e-03	4	2.998e-03	6
244		min	-.009	4	-.28	6	-.059	3	-2.236e-03	3	-5.891e-03	2	-2.534e-03	2
245	N123	max	-.055	2	-.122	2	.231	1	-8.255e-04	2	1.872e-03	4	1.755e-03	2
246		min	-.341	6	-.279	6	.071	5	-2.984e-03	6	-5.462e-03	1	-7.378e-03	6
247	N124	max	.167	2	-.202	2	.174	1	-8.031e-04	5	-3.526e-04	3	2.752e-03	2
248		min	-.065	5	-.498	3	-.015	3	-1.72e-03	3	-4.829e-03	1	-3.807e-03	6
249	N125	max	.399	1	-.202	2	.147	2	1.931e-03	5	-8.591e-04	3	-9.545e-05	6
250		min	.006	5	-.498	3	-.045	3	-1.037e-03	3	-5.179e-03	1	-7.442e-03	2
251	N126	max	1.067	2	-.202	2	.385	4	-8.901e-04	2	-3.526e-04	3	1.873e-02	2

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
252		min	-.234	4	-.499	3	.088	3	-7.879e-03	4	-4.829e-03	1	-3.758e-03	6
253	N127	max	.184	1	-.187	5	.174	1	2.749e-03	6	1.935e-03	2	-1.4e-03	2
254		min	.026	3	-.449	3	-.017	3	5.32e-04	2	-2.331e-03	5	-3.748e-03	6
255	N128	max	.433	1	-.187	5	.16	1	2.007e-03	4	2.349e-03	1	1.705e-03	6
256		min	.025	6	-.449	3	-.011	3	2.36e-04	2	-1.437e-03	5	-6.157e-03	2
257	N129	max	.254	2	-.187	5	.148	2	2.557e-03	3	1.935e-03	2	2.09e-03	2
258		min	-.15	6	-.449	3	-.14	3	-1.372e-03	5	-2.331e-03	5	-3.72e-03	6
259	N130	max	.185	1	-.074	5	.174	1	2.165e-03	6	3.872e-03	5	-2.911e-03	5
260		min	-.003	3	-.258	3	-.018	3	2.348e-04	2	-5.086e-04	1	-6.028e-03	3
261	N131	max	.281	2	-.075	5	.159	1	3.258e-03	4	4.22e-03	5	4.189e-03	6
262		min	-.066	6	-.259	3	-.015	3	2.053e-04	2	-5.576e-05	3	-7.683e-04	2
263	N132	max	.048	2	-.074	5	.162	2	1.963e-03	6	3.872e-03	5	-2.447e-03	2
264		min	-.285	3	-.258	3	-.113	6	2.347e-04	2	-5.086e-04	1	-5.824e-03	3
265	N133	max	.188	1	-.087	5	.174	1	-3.565e-03	2	3.539e-03	4	2.928e-03	6
266		min	-.013	6	-.279	3	-.014	3	-7.413e-03	3	-5.509e-04	1	-2.563e-04	2
267	N134	max	.281	2	-.087	5	.186	4	5.382e-03	4	4.595e-03	4	2.08e-03	6
268		min	-.053	6	-.28	3	.001	3	9.212e-04	2	6.403e-04	2	-1.275e-03	2
269	N135	max	.267	1	-.087	5	.393	4	-3.561e-03	2	3.539e-03	4	2.982e-03	3
270		min	.063	5	-.279	3	.341	3	-7.982e-03	4	-5.509e-04	1	1.335e-03	5
271	N136	max	.187	1	-.176	5	.227	5	-2.321e-03	2	2.961e-03	4	1.715e-03	3
272		min	-.014	6	-.498	3	.007	3	-5.837e-03	4	-5.426e-03	1	4.363e-04	5
273	N137	max	.288	2	-.176	5	.421	5	7.674e-03	4	2.722e-03	5	9.321e-04	6
274		min	-.039	6	-.498	3	-.054	3	-8.373e-04	2	-5.484e-03	1	-1.925e-03	2
275	N138	max	.565	1	-.176	5	1.309	4	-2.311e-03	2	2.961e-03	4	7.882e-03	1
276		min	.024	5	-.499	3	.234	3	-2.178e-02	4	-5.426e-03	1	4.345e-04	5
277	N139	max	.186	1	-.147	5	.151	5	-1.56e-03	2	-2.586e-04	3	-1.341e-03	5
278		min	-.018	6	-.445	3	-.217	2	-3.753e-03	3	-4.374e-03	1	-2.752e-03	3
279	N140	max	.289	1	-.147	5	.39	5	7.408e-03	4	1.212e-03	3	-1.014e-03	5
280		min	-.005	6	-.445	3	-.188	1	1.268e-03	2	-3.561e-03	2	-2.002e-03	1
281	N141	max	.225	2	-.147	5	.389	4	-1.556e-03	2	-2.586e-04	3	1.371e-03	2
282		min	-.148	6	-.446	3	-.142	2	-5.575e-03	4	-4.374e-03	1	-2.701e-03	6
283	N142	max	.185	1	-.047	5	.029	4	-6.316e-04	5	1.465e-03	2	-1.328e-03	5
284		min	-.019	6	-.243	3	-.195	1	-5.784e-03	3	-2.135e-03	5	-2.169e-03	3
285	N143	max	.305	1	-.048	5	.184	4	4.601e-03	6	1.862e-03	2	-8.955e-04	5
286		min	-.008	6	-.243	3	-.18	2	1.713e-03	2	-3.314e-03	4	-3.253e-03	1
287	N144	max	.147	2	-.047	5	.279	3	-2.101e-03	5	1.465e-03	2	-3.989e-04	2
288		min	-.116	6	-.243	3	-.053	2	-5.78e-03	3	-2.135e-03	5	-2.024e-03	6
289	N145	max	.199	1	-.051	5	.016	4	3.136e-03	6	1.123e-03	2	7.344e-03	3
290		min	-.03	4	-.265	3	-.178	1	1.34e-03	2	-2.04e-03	5	1.805e-03	5
291	N146	max	.347	1	-.051	5	.149	4	3.204e-03	4	2.19e-03	1	-1.491e-03	5
292		min	-.005	5	-.265	3	-.174	2	4.288e-04	2	-2.668e-03	5	-5.398e-03	1
293	N147	max	.551	1	-.051	5	-.027	5	2.914e-03	3	1.123e-03	2	7.944e-03	1
294		min	.059	5	-.265	3	-.259	1	4.401e-04	5	-2.04e-03	5	1.803e-03	5
295	N148	max	.272	2	-.173	5	.017	4	1.638e-03	6	3.229e-03	5	5.736e-03	1
296		min	-.085	4	-.491	6	-.176	1	4.485e-04	2	6.09e-04	3	2.846e-04	5
297	N149	max	.471	2	-.173	5	.145	4	2.854e-03	4	2.735e-03	5	-2.567e-04	6
298		min	-.06	6	-.492	6	-.178	2	1.309e-04	2	9.608e-05	3	-7.796e-03	1
299	N150	max	1.349	1	-.173	5	.301	5	1.614e-03	3	3.229e-03	5	2.168e-02	1
300		min	-.068	5	-.492	6	-.216	1	-6.357e-03	5	6.09e-04	3	2.833e-04	5
301	N151	max	.151	5	-.147	2	.02	6	-4.136e-04	5	2.563e-03	4	3.712e-03	3
302		min	.022	3	-.44	6	-.173	1	-2.717e-03	3	-6.113e-03	1	1.397e-03	5
303	N152	max	.339	2	-.147	2	.114	4	5.311e-04	5	2.869e-03	4	1.352e-04	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
304		min	.019	6	-.44	6	-.194	1	-1.824e-03	3	-5.535e-03	2	-7.342e-03	1
305	N153	max	.342	1	-.147	2	.164	4	-1.328e-03	2	2.563e-03	4	5.599e-03	1
306		min	.201	6	-.44	6	-.108	2	-3.559e-03	4	-6.113e-03	1	1.393e-03	5
307	N154	max	.034	4	-.047	2	.021	6	2.991e-04	5	-1.458e-04	3	5.559e-03	6
308		min	-.132	1	-.253	6	-.172	1	-2.021e-03	3	-4.529e-03	1	6.297e-04	2
309	N155	max	.102	3	-.047	2	.132	4	1.962e-03	5	-1.004e-03	3	-1.423e-03	5
310		min	.016	2	-.253	6	-.193	1	-1.51e-03	3	-5.704e-03	1	-4.605e-03	3
311	N156	max	.279	6	-.047	2	.116	3	-1.17e-03	5	-1.458e-04	3	5.555e-03	6
312		min	-.046	2	-.253	6	-.107	2	-2.02e-03	3	-4.529e-03	1	1.607e-03	5
313	N157	max	.049	3	-.05	2	.15	4	2.342e-03	5	4.004e-04	3	-1.236e-03	5
314		min	-.071	2	-.273	6	-.135	2	-3.091e-03	3	-5.034e-03	2	-3.085e-03	1
315	N158	max	.049	3	-.176	2	.361	4	7.271e-03	5	6.442e-04	2	-6.766e-04	5
316		min	-.071	2	-.498	6	.013	2	-1.178e-03	1	-3.019e-03	4	-2.759e-03	1
317	N159	max	.048	3	-.166	2	.311	4	5.836e-03	5	4.511e-03	4	1.684e-03	6
318		min	-.071	2	-.449	6	-.068	2	-1.469e-03	3	5.827e-04	2	-3.247e-04	2
319	N160	max	.048	3	-.125	2	.113	5	7.292e-04	5	2.485e-03	5	1.384e-03	6
320		min	-.071	2	-.258	6	-.032	3	-4.141e-03	3	-6.804e-03	1	-1.914e-03	2
321	N161	max	.049	3	-.086	2	.194	4	1.924e-04	5	-4.328e-04	3	-1.206e-03	5
322		min	-.071	2	-.319	6	-.073	2	-3.523e-03	3	-5.43e-03	1	-5.322e-03	3
323	N162	max	.048	3	-.114	2	.144	5	-6.098e-04	5	2.793e-03	4	3.303e-03	6
324		min	-.071	2	-.291	6	-.046	3	-4.966e-03	3	-6.577e-03	1	-1.324e-04	2
325	N163	max	.062	3	-.122	2	.155	2	1.202e-03	5	3.087e-03	4	2.998e-03	6
326		min	-.014	2	-.28	6	-.032	3	-2.236e-03	3	-5.891e-03	2	-2.29e-03	2
327	N164	max	.31	1	-.202	2	.155	2	1.81e-03	5	-8.591e-04	3	-9.542e-05	6
328		min	-.005	5	-.498	3	-.032	3	-1.037e-03	3	-5.179e-03	1	-7.129e-03	2
329	N165	max	.361	1	-.187	5	.155	2	1.96e-03	6	2.349e-03	1	1.704e-03	6
330		min	.045	6	-.449	3	-.031	3	2.36e-04	2	-1.437e-03	5	-5.911e-03	2
331	N166	max	.272	1	-.075	5	.155	2	3.235e-03	4	4.22e-03	5	4.189e-03	6
332		min	-.016	6	-.259	3	-.031	3	2.053e-04	2	-5.576e-05	3	-7.454e-04	2
333	N167	max	.062	3	-.14	2	.155	2	-6.098e-04	5	2.793e-03	4	3.303e-03	6
334		min	-.034	5	-.322	6	-.032	3	-4.966e-03	3	-6.577e-03	1	-1.324e-04	2
335	N168	max	.275	2	-.113	5	.155	2	3.72e-03	6	4.592e-03	5	5.199e-03	6
336		min	-.012	6	-.291	3	-.032	3	7.58e-04	2	4.293e-04	1	5.895e-04	2
337	N169	max	.266	2	-.087	5	.156	2	5.138e-03	4	4.595e-03	4	2.079e-03	6
338		min	-.028	6	-.28	3	-.035	3	9.211e-04	2	6.403e-04	2	-1.197e-03	2
339	N170	max	.266	2	-.176	5	.329	5	7.361e-03	4	2.722e-03	5	9.318e-04	6
340		min	-.027	6	-.498	3	-.052	3	-8.373e-04	2	-5.484e-03	1	-1.803e-03	2
341	N171	max	.266	2	-.147	5	.303	5	7.161e-03	4	1.212e-03	3	-1.014e-03	5
342		min	-.027	6	-.445	3	-.206	1	1.268e-03	2	-3.561e-03	2	-1.962e-03	3
343	N172	max	.266	2	-.048	5	.131	4	4.597e-03	6	1.862e-03	2	-8.955e-04	5
344		min	-.027	6	-.243	3	-.2	1	1.713e-03	2	-3.314e-03	4	-3.23e-03	1
345	N173	max	.266	2	-.104	5	.181	5	3.72e-03	6	4.592e-03	5	5.199e-03	6
346		min	-.027	6	-.322	3	-.021	3	7.58e-04	2	4.293e-04	1	5.895e-04	2
347	N174	max	.266	2	-.066	5	.171	4	5.314e-03	6	2.253e-03	2	-2.049e-03	5
348		min	-.027	6	-.281	3	-.224	2	2.498e-03	2	-3.055e-03	5	-3.726e-03	3
349	N175	max	.284	2	-.051	5	.111	4	3.125e-03	4	2.19e-03	1	-1.491e-03	5
350		min	-.038	6	-.265	3	-.179	2	4.288e-04	2	-2.668e-03	5	-5.154e-03	1
351	N176	max	.379	2	-.173	5	.111	4	2.732e-03	4	2.735e-03	5	-2.566e-04	6
352		min	-.068	4	-.492	6	-.18	2	1.309e-04	2	9.608e-05	3	-7.483e-03	1
353	N177	max	.253	2	-.147	2	.11	4	3.556e-04	5	2.869e-03	4	1.352e-04	5
354		min	0	6	-.44	6	-.18	2	-1.823e-03	3	-5.535e-03	2	-7.095e-03	1
355	N178	max	.055	4	-.047	2	.111	4	1.939e-03	5	-1.004e-03	3	-1.423e-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
356		min	-.031	1	-.253	6	-.18	2	-1.51e-03	3	-5.704e-03	1	-4.602e-03	3
357	N179	max	.311	2	-.087	5	.111	4	5.314e-03	6	2.253e-03	2	-2.049e-03	5
358		min	-.06	4	-.311	3	-.18	2	2.498e-03	2	-3.055e-03	5	-3.726e-03	3
359	N180	max	.108	4	-.065	2	.111	4	1.924e-04	5	-4.328e-04	3	-1.206e-03	5
360		min	.037	2	-.282	6	-.18	2	-3.523e-03	3	-5.43e-03	1	-5.322e-03	3
361	N181	max	.193	1	-.011	2	.093	4	9.625e-04	5	7.521e-04	3	1.035e-03	5
362		min	-.09	4	-.051	6	-.191	1	-7.383e-03	2	-1.291e-03	5	-7.301e-03	2

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

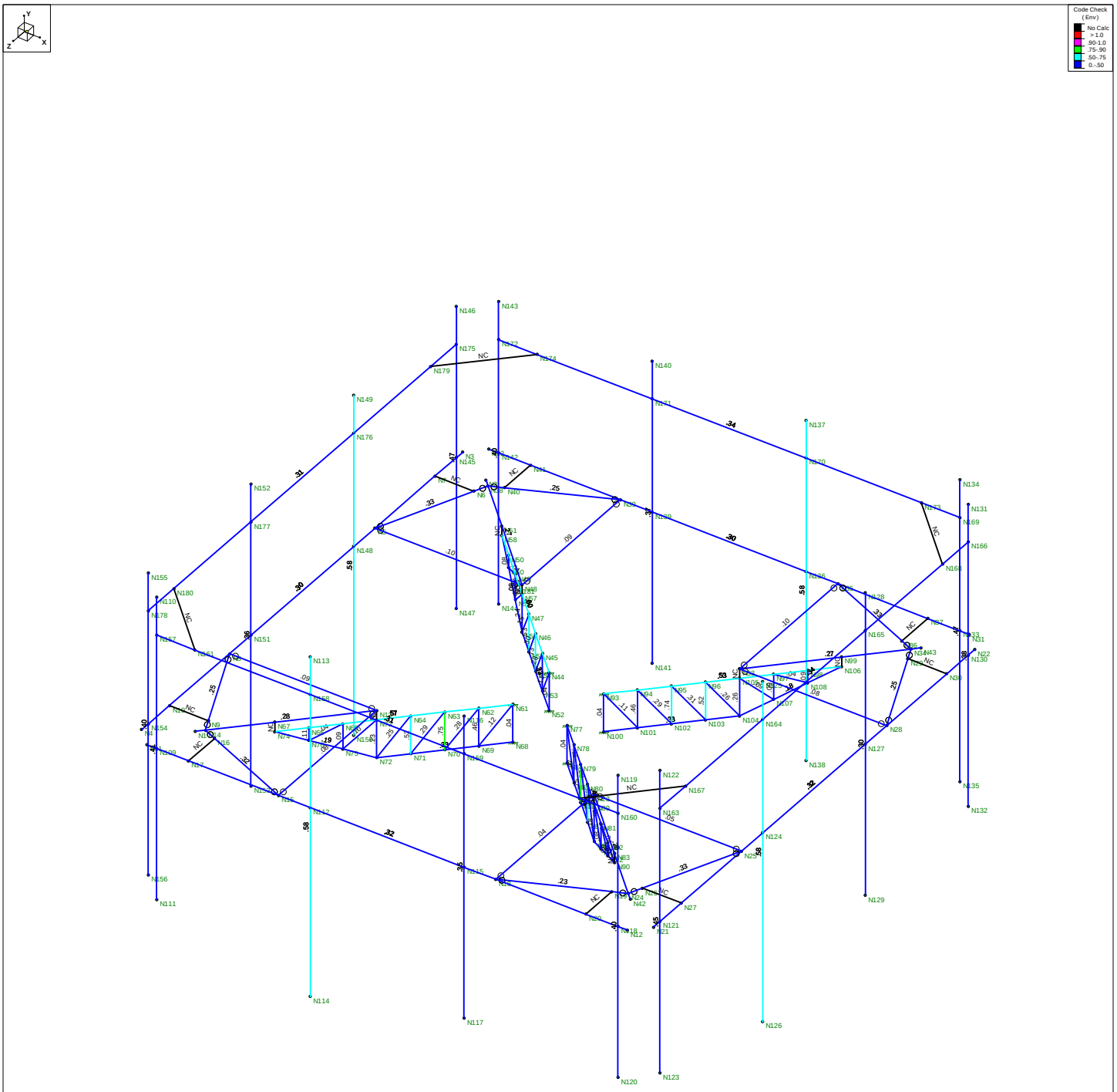
	Member	Shape	Code Check	Lo...	LC	She...	Lo...	...	...	phi*P...	phi*P...	phi*...	phi*...	...	Eqn
1	M73	Web Plate	.754	0	6	.045	1	y	2	2.043	8.1	.042	.169	...	H1-...
2	M54	Web Plate	.753	0	6	.061	0	y	5	2.043	8.1	.042	.169	...	H1-...
3	M92	Web Plate	.741	0	3	.070	0	y	5	2.043	8.1	.042	.169	...	H1-...
4	M35	Web Plate	.728	1	3	.091	1	y	2	2.043	8.1	.042	.169	...	H1-...
5	M30	Cord Plate	.604	5.25	1	.028	4.4...	y	2	69.264	72.9	5.442	1.08	...	H1-...
6	M106	PIPE_2.5	.585	4.0...	4	.040	4.0...		5	26.137	50.715	3.596	3.596	...	H1-...
7	M110	PIPE_2.5	.585	4.0...	1	.041	1.0...		1	26.137	50.715	3.596	3.596	...	H1-...
8	M118	PIPE_2.5	.584	4.0...	2	.049	1.0...		1	26.137	50.715	3.596	3.596	...	H1-...
9	M114	PIPE_2.5	.584	4.0...	5	.047	1.0...		4	26.137	50.715	3.596	3.596	...	H1-...
10	M49	Cord Plate	.571	5.25	4	.022	5.25	z	6	69.264	72.9	5.442	1.08	...	H1-...
11	M87	Cord Plate	.526	2.2...	5	.023	4.4...	y	5	69.264	72.9	5.442	1.08	...	H1-...
12	M36	Web Plate	.526	1	3	.073	1	y	2	2.043	8.1	.042	.169	...	H1-...
13	M55	Web Plate	.525	1	6	.049	0	y	5	2.043	8.1	.042	.169	...	H1-...
14	M93	Web Plate	.524	1	4	.053	0	y	5	2.043	8.1	.042	.169	...	H1-...
15	M74	Web Plate	.518	0	6	.033	1	y	2	2.043	8.1	.042	.169	...	H1-...
16	M68	Cord Plate	.488	5.25	1	.021	5.25	z	6	69.264	72.9	5.442	1.08	...	H1-...
17	M72	Web Plate	.470	0	3	.038	0	y	2	2.043	8.1	.042	.169	...	H1-...
18	M113	PIPE_2.0	.466	4	6	.056	4		1	14.916	32.13	1.872	1.872	...	H1-...
19	M117	PIPE_2.0	.466	4	3	.053	1		1	14.916	32.13	1.872	1.872	...	H1-...
20	M91	Web Plate	.464	0	3	.057	0	y	5	2.043	8.1	.042	.169	...	H1-...
21	M53	Web Plate	.463	0	6	.045	0	y	5	2.043	8.1	.042	.169	...	H1-...
22	M109	PIPE_2.0	.451	4	6	.056	4		4	14.916	32.13	1.872	1.872	...	H1-...
23	M34	Web Plate	.448	1	6	.070	0	y	2	2.043	8.1	.042	.169	...	H1-...
24	M105	PIPE_2.0	.413	4	3	.043	1		6	14.916	32.13	1.872	1.872	...	H1-...
25	M116	PIPE_2.0	.401	4	6	.050	4		6	14.916	32.13	1.872	1.872	...	H1-...
26	M120	PIPE_2.0	.400	4	3	.050	4		6	14.916	32.13	1.872	1.872	...	H1-...
27	M108	PIPE_2.0	.398	4	3	.050	4		3	14.916	32.13	1.872	1.872	...	H1-...
28	M112	PIPE_2.0	.379	4	6	.042	1		6	14.916	32.13	1.872	1.872	...	H1-...
29	M115	PIPE_2.0	.367	4	4	.064	1		6	14.916	32.13	1.872	1.872	...	H1-...
30	M119	PIPE_2.0	.362	4	1	.066	4		6	14.916	32.13	1.872	1.872	...	H1-...
31	M107	PIPE_2.0	.352	4	3	.066	4		3	14.916	32.13	1.872	1.872	...	H1-...
32	M123	PIPE_2.0	.336	4	3	.117	1		5	6.831	32.13	1.872	1.872	...	H1-...
33	M122	PIPE_2.0	.336	4	6	.178	1		1	6.831	32.13	1.872	1.872	...	H1-...
34	M24	L3X3X3	.333	.334	6	.154	.061	z	4	27.173	35.316	1.32	2.833	...	H2-1
35	M3	L3X3X3	.333	.334	3	.175	0	z	1	27.173	35.316	1.32	2.833	...	H2-1
36	M51	Cord Plate	.332	3	4	.018	.75	z	6	69.264	72.9	5.442	1.08	...	H1-...
37	M32	Cord Plate	.331	3	1	.020	2.2...	y	2	69.264	72.9	5.442	1.08	...	H1-...
38	M17	L3X3X3	.330	.334	6	.141	0	y	6	27.173	35.316	1.32	2.833	...	H2-1
39	M89	Cord Plate	.325	3	1	.017	.75	z	3	69.264	72.9	5.442	1.08	...	H1-...
40	M10	L3X3X3	.323	.334	3	.121	0	y	3	27.173	35.316	1.32	2.833	...	H2-1

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

	Member	Shape	Code Check	Lo...	LC	She...	Lo...	...	...	phi*P...	phi*P...	phi*...	phi*...	...	Eqn
41	M8	PIPE 2.5	.318	3.5...	1	.241	1.0...		6	14.559	50.715	3.596	3.596	...	H1-...
42	M15	PIPE 2.5	.317	8.9...	4	.248	1.0...		6	14.559	50.715	3.596	3.596	...	H1-...
43	M80	Web Plate	.310	1.25	3	.039	0	y	2	1.307	8.1	.042	.169	...	H1-...
44	M99	Web Plate	.310	1.25	3	.047	1.25	y	4	1.307	8.1	.042	.169	...	H1-...
45	M121	PIPE 2.0	.309	4	6	.179	1		4	6.831	32.13	1.872	1.872	...	H1-...
46	M124	PIPE 2.0	.309	4	3	.116	1		2	6.831	32.13	1.872	1.872	...	H1-...
47	M70	Cord Plate	.308	3	4	.018	.75	z	6	69.264	72.9	5.442	1.08	...	H1-...
48	M111	PIPE 2.0	.304	4	3	.062	1		3	14.916	32.13	1.872	1.872	...	H1-...
49	M1	PIPE 2.5	.300	3.5...	4	.242	1.0...		3	14.559	50.715	3.596	3.596	...	H1-...
50	M22	PIPE 2.5	.299	8.9...	1	.248	1.0...		3	14.559	50.715	3.596	3.596	...	H1-...
51	M42	Web Plate	.299	1.25	6	.051	1.25	y	1	1.307	8.1	.042	.169	...	H1-...
52	M61	Web Plate	.295	1.25	6	.043	0	y	4	1.307	8.1	.042	.169	...	H1-...
53	M98	Web Plate	.287	1.25	3	.016	1.25	y	4	1.307	8.1	.042	.169	...	H1-...
54	M79	Web Plate	.284	1.25	3	.014	0	y	1	1.307	8.1	.042	.169	...	H1-...
55	M41	Web Plate	.279	1.25	6	.013	1.25	y	1	1.307	8.1	.042	.169	...	H1-...
56	M60	Web Plate	.279	1.25	6	.013	0	y	5	1.307	8.1	.042	.169	...	H1-...
57	M48	HSS4X3X4	.276	2.25	6	.069	2.25	z	6	107....	120....	10.764	13.144	...	H1-...
58	M67	HSS4X3X4	.276	2.25	3	.069	2.25	z	6	107....	120....	10.764	13.144	...	H1-...
59	M86	HSS4X3X4	.275	2.25	3	.069	2.25	z	3	107....	120....	10.764	13.144	...	H1-...
60	M29	HSS4X3X4	.270	2.25	3	.068	2.25	z	3	107....	120....	10.764	13.144	...	H1-...
61	M81	Web Plate	.264	1.25	3	.043	0	y	2	1.307	8.1	.042	.169	...	H1-...
62	M100	Web Plate	.262	1.25	3	.051	1.25	y	4	1.307	8.1	.042	.169	...	H1-...
63	M94	Web Plate	.257	1	4	.065	0	y	4	2.043	8.1	.042	.169	...	H1-...
64	M20	L3X3X3	.252	.334	6	.096	0	y	3	27.173	35.316	1.32	2.833	...	H2-1
65	M27	L3X3X3	.252	.334	3	.093	0	y	1	27.173	35.316	1.32	2.833	...	H2-1
66	M62	Web Plate	.250	0	6	.050	0	y	4	1.307	8.1	.042	.169	...	H1-...
67	M6	L3X3X3	.246	.334	3	.100	0	y	6	27.173	35.316	1.32	2.833	...	H2-1
68	M37	Web Plate	.239	1	2	.066	1	y	1	2.043	8.1	.042	.169	...	H1-...
69	M13	L3X3X3	.235	.334	6	.095	0	y	3	27.173	35.316	1.32	2.833	...	H2-1
70	M56	Web Plate	.225	1	5	.058	0	y	4	2.043	8.1	.042	.169	...	H1-...
71	M69	Cord Plate	.204	2.4...	1	.016	1.6...	z	3	68.567	72.9	5.442	1.08	...	H1-...
72	M50	Cord Plate	.189	2.4...	4	.015	1.6...	z	6	68.567	72.9	5.442	1.08	...	H1-...
73	M75	Web Plate	.181	1	2	.063	1	y	1	2.043	8.1	.042	.169	...	H1-...
74	M88	Cord Plate	.178	2.4...	4	.016	1.6...	z	6	68.567	72.9	5.442	1.08	...	H1-...
75	M31	Cord Plate	.162	2.4...	1	.015	1.6...	z	6	68.567	72.9	5.442	1.08	...	H1-...
76	M43	Web Plate	.153	1.25	1	.057	1.25	y	1	1.307	8.1	.042	.169	...	H1-...
77	M59	Web Plate	.121	0	4	.045	0	y	4	1.307	8.1	.042	.169	...	H1-...
78	M40	Web Plate	.114	0	1	.058	1.25	y	1	1.307	8.1	.042	.169	...	H1-...
79	M97	Web Plate	.114	0	1	.046	1.25	y	4	1.307	8.1	.042	.169	...	H1-...
80	M78	Web Plate	.112	0	1	.034	0	y	4	1.307	8.1	.042	.169	...	H1-...
81	M58	Web Plate	.107	0	4	.017	0	y	4	6.89	8.1	.042	.169	...	H1-...
82	M2	L3X3X3	.102	1.8...	1	.021	0	y	1	23.991	35.316	1.32	2.598	...	H2-1
83	M23	L3X3X3	.101	1.9...	4	.017	0	y	4	23.991	35.316	1.32	2.6	...	H2-1
84	M63	Web Plate	.101	0	4	.014	0	y	4	2.029	8.1	.042	.169	...	H1-...
85	M82	Web Plate	.100	0	4	.009	0	y	1	2.029	8.1	.042	.169	...	H1-...
86	M26	L3X3X3	.094	1.9...	4	.012	0	y	2	23.991	35.316	1.32	2.6	...	H2-1
87	M77	Web Plate	.093	0	1	.018	0	y	1	6.89	8.1	.042	.169	...	H1-...
88	M101	Web Plate	.092	0	1	.008	0	y	5	2.029	8.1	.042	.169	...	H1-...
89	M5	L3X3X3	.091	1.9...	1	.016	0	y	4	23.991	35.316	1.32	2.6	...	H2-1
90	M95	Web Plate	.090	.667	5	.026	0	y	4	4.242	8.1	.042	.169	...	H1-...
91	M96	Web Plate	.086	0	4	.013	0	y	4	6.89	8.1	.042	.169	...	H1-...
92	M57	Web Plate	.086	0	4	.017	0	y	5	4.242	8.1	.042	.169	...	H1-...

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

	Member	Shape	Code Check	Lo...	LC	She...	Lo...	...	...	phi*P...	phi*P...	phi*...	phi*...	...	Eqn
93	M9	L3X3X3	.084	1.9...	1	.011	0	y	3	23.991	35.316	1.32	2.6	...	H2-1
94	M39	Web Plate	.082	0	1	.013	0	y	1	6.89	8.1	.042	.169	...	H1-...
95	M38	Web Plate	.081	.667	2	.027	.667	y	2	4.242	8.1	.042	.169	...	H1-...
96	M19	L3X3X3	.078	1.9...	4	.012	0	y	3	23.991	35.316	1.32	2.6	...	H2-1
97	M76	Web Plate	.075	.667	1	.023	.667	y	1	4.242	8.1	.042	.169	...	H1-...
98	M44	Web Plate	.061	0	3	.011	0	y	1	2.029	8.1	.042	.169	...	H1-...
99	M16	L3X3X3	.045	1.9...	1	.012	0	y	6	23.991	35.316	1.32	2.6	...	H2-1
100	M12	L3X3X3	.043	1.9...	3	.013	0	y	3	23.991	35.316	1.32	2.6	...	H2-1
101	M45	Web Plate	.041	0	2	.017	0	y	1	3.033	8.1	.042	.169	...	H1-...
102	M33	Web Plate	.040	1	4	.003	0	y	2	2.043	8.1	.042	.164	1	H1-...
103	M52	Web Plate	.040	1	4	.003	0	y	2	2.043	8.1	.042	.164	1	H1-...
104	M71	Web Plate	.040	1	4	.003	0	y	2	2.043	8.1	.042	.164	1	H1-...
105	M90	Web Plate	.040	1	4	.003	0	y	2	2.043	8.1	.042	.164	1	H1-...
106	M102	Web Plate	.040	0	5	.016	0	y	4	3.033	8.1	.042	.169	...	H1-...
107	M64	Web Plate	.039	0	4	.018	0	y	4	3.033	8.1	.042	.169	...	H1-...
108	M83	Web Plate	.037	0	4	.016	0	y	1	3.033	8.1	.042	.169	...	H1-...



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek		
FJP	CTNL193A - Mount	May 20, 2019 at 11:17 AM
19027.68	Unity Check	CTNL193A_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: CTNL193A

720 Quinebaug Road
Quinebaug, Connecticut 06262

May 21, 2019

EBI Project Number: 6219001699

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**16.50%**

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

May 21, 2019

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

Emissions Analysis for Site: CTNL193A

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **720 Quinebaug Road** in **Quinebaug, 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 720 Quinebaug Road in Quinebaug, 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) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

4) 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.

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

6) 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.

7) 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.

8) The antennas used in this modeling are the Ericsson AIR 32 for the 1900 MHz / 2100 MHz channel(s), the RFS APXVAA24_43-U-A20 for the 600 MHz / 700 MHz channel(s), the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s) in Sector A, the Ericsson AIR 32 for the 1900 MHz / 2100 MHz channel(s), the RFS APXVAA24_43-U-A20 for the 600 MHz / 700 MHz channel(s), the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s) in Sector B, the Ericsson AIR 32 for the 1900 MHz / 2100 MHz channel(s), the RFS APXVAA24_43-U-A20 for the 600 MHz / 700 MHz channel(s), the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s) in Sector C, the Ericsson AIR 32 for the 1900 MHz / 2100 MHz channel(s), the RFS APXVAA24_43-U-A20 for the 600 MHz / 700 MHz channel(s), the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s) in Sector D. 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.

9) The antenna mounting height centerline of the proposed antennas is 105 feet above ground level (AGL).

10) 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.

11) 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	Sector:	D
Antenna #:	1	Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson AIR 32	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	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	Gain:	15.35 dBd / 15.85 dBd
Height (AGL):	105 feet	Height (AGL):	105 feet	Height (AGL):	105 feet	Height (AGL):	105 feet
Channel Count:	4	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	Total TX Power (W):	240 Watts
ERP (W):	8,728.31	ERP (W):	8,728.31	ERP (W):	8,728.31	ERP (W):	8,728.31
Antenna A1 MPE %:	**2.85%**	Antenna B1 MPE %:	**2.85%**	Antenna C1 MPE %:	**2.85%**	Antenna A1 MPE %:	**2.85%**
Antenna #:	2	Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	RFS APXVAA24_43-U-A20	Make / Model:	RFS APXVAA24_43-U-A20	Make / Model:	RFS APXVAA24_43-U-A20	Make / Model:	RFS APXVAA24_43-U-A20
Frequency Bands:	600 MHz / 700 MHz	Frequency Bands:	600 MHz / 700 MHz	Frequency Bands:	600 MHz / 700 MHz	Frequency Bands:	600 MHz / 700 MHz
Gain:	13.15 dBd / 13.55 dBd	Gain:	13.15 dBd / 13.55 dBd	Gain:	13.15 dBd / 13.55 dBd	Gain:	13.15 dBd / 13.55 dBd
Height (AGL):	105 feet	Height (AGL):	105 feet	Height (AGL):	105 feet	Height (AGL):	105 feet
Channel Count:	4	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	Total TX Power (W):	120 Watts
ERP (W):	2,598.01	ERP (W):	2,598.01	ERP (W):	2,598.01	ERP (W):	2,598.01
Antenna A2 MPE %:	**1.96%**	Antenna B2 MPE %:	**1.96%**	Antenna C2 MPE %:	**1.96%**	Antenna A2 MPE %:	**1.96%**
Antenna #:	3	Antenna #:	3	Antenna #:	3	Antenna #:	3
Make / Model:	RFS APX16DWV-16DWV-S-E-A20	Make / Model:	RFS APX16DWV-16DWV-S-E-A20	Make / Model:	RFS APX16DWV-16DWV-S-E-A20	Make / Model:	RFS APX16DWV-16DWV-S-E-A20
Frequency Bands:	2100 MHz	Frequency Bands:	2100 MHz	Frequency Bands:	2100 MHz	Frequency Bands:	2100 MHz
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	105 feet	Height (AGL):	105 feet	Height (AGL):	105 feet	Height (AGL):	105 feet
Channel Count:	2	Channel Count:	2	Channel Count:	2	Channel Count:	2
Total TX Power (W):	60 Watts	Total TX Power (W):	60 Watts	Total TX Power (W):	60 Watts	Total TX Power (W):	60 Watts
ERP (W):	2,334.27	ERP (W):	2,334.27	ERP (W):	2,334.27	ERP (W):	2,334.27
Antenna A3 MPE %:	**0.76%**	Antenna B3 MPE %:	**0.76%**	Antenna C3 MPE %:	**0.76%**	Antenna A3 MPE %:	**0.76%**

Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	5.57%
Town	0.71%
AT&T	2.31%
Verizon	7.91%
Site Total MPE % :	16.50%

T-Mobile Sector A Total:	5.57%
T-Mobile Sector B Total:	5.57%
T-Mobile Sector C Total:	5.57%
T-Mobile Sector D Total:	5.57%
Site Total:	16.50%

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 LTE	2	2056.61	105.0	13.41	1900 MHz LTE	1000	1.34%
T-Mobile 2100 MHz LTE	2	2307.55	105.0	15.05	2100 MHz LTE	1000	1.50%
T-Mobile 600 MHz LTE	2	619.61	105.0	4.04	600 MHz LTE	400	1.01%
T-Mobile 700 MHz LTE	2	679.39	105.0	4.43	700 MHz LTE	467	0.95%
T-Mobile 2100 MHz UMTS	2	1167.14	105.0	7.61	2100 MHz UMTS	1000	0.76%
						Total:	**5.57%**

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:	5.57%
Sector B:	5.57%
Sector C:	5.57%
Sector D:	5.57%
T-Mobile Maximum MPE % (Sector A):	5.57%
Site Total:	16.50%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **16.50%** 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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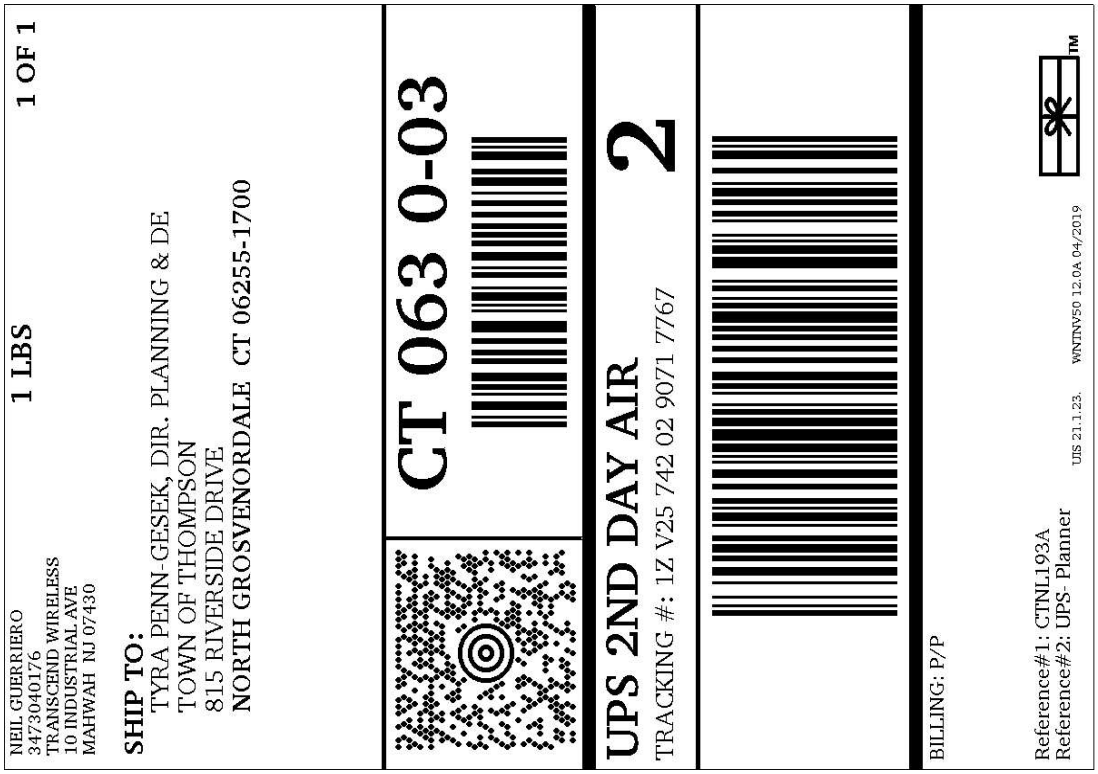

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