Transcend Wireless

10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

August 6, 2019

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

RE: Notice of Exempt Modification
315 Spencer Plains Road, Westbrook, CT 06498
Latitude: 41.29244000000
Longitude: -72.4304540000
T-Mobile Site#: CT11033E – L600

Dear Ms. Bachman:

T-Mobile currently maintains three (3) antennas at the 130-foot level of the existing 180-foot lattice tower at 315 Spencer Plains Road, Westbrook, CT. The 180-foot lattice tower and property are owned by the State of Connecticut State Police. T-Mobile now intends to remove the three (3) existing antennas and add nine (9) new 600/700/1900/2100 MHz antennas. The new antennas will be installed at the same 130-foot level of the tower. Tower structural and foundation modifications are required as per the enclosed structural analysis. The modification also includes a mount replacement to accommodate the proposed equipment, as detailed on the enclosed mount analysis.

Planned Modifications:
Tower:
Remove
(6) 7/8" Coax

Remove and Replace:
(3) DBXNH-6565B-A2M (REMOVE) - (3) RFS APXVAARR24_43 Antenna 600/700 MHz (REPLACE)

Install New:
(3) KRC118012-1_B2A_BP4 Antenna 1900/2100 MHz
(3) AIR 32 Antenna 1900/2100 MHz
(3) Radio 4449 B71+B12 RRHs
(3) TMA
(3) 1-3/8" Hybrid Cables

Existing to Remain:
(6) 7/8" Coax

Ground:
Install New: Equipment inside existing 6102 Cabinet

This tower facility was approved by the Connecticut Siting Council on March 31, 1982 in Petition No. 61. The proposed modification complies with the original 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 First Selectman -Noel Bishop, Elected Official, and Eric Knapp, Planning, Zoning, and Development Coordinator for the Town of Westbrook.

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,

Kyle Richers
Transcend Wireless
Cell: 908-447-4716
Email: krichers@transcendwireless.com

Attachments
cc: Noel Bishop - Town of Westbrook First Selectman
Eric Knapp – Town of Westbrook Planning, Zoning, and Development Coordinator
Connecticut State Police (Brian Benito) – Tower and Property Owner

Kyle Richers

From: UPS Quantum View <pkginfo@ups.com>
Sent: Tuesday, August 6, 2019 12:13 PM
To: krichers@transcendwireless.com
Subject: UPS Ship Notification, Reference Number 1: CT11033E CSC Owner

You have a package coming.

Scheduled Delivery Date: Wednesday, 08/07/2019

This message was sent to you at the request of TRANSCEND WIRELESS to notify you that the shipment information below has been transmitted to UPS. The physical package may or may not have actually been tendered to UPS for shipment. To verify the actual transit status of your shipment, click on the tracking link below.

Shipment Details

From:	TRANSCEND WIRELESS
Tracking Number:	1ZV257424292773832
Ship To:	Brian Benito Connecticut State Police 1111 Country Club Road MIDDLETOWN, CT 064572389 US
UPS Service:	UPS GROUND
Number of Packages:	1
Scheduled Delivery:	08/07/2019
Signature Required:	A signature is required for package delivery
Weight:	1.0 LBS
Reference Number 1:	CT11033E CSC Owner

Download the UPS mobile app

Kyle Richers

From: UPS Quantum View <pkginfo@ups.com>
Sent: Tuesday, August 6, 2019 12:16 PM
To: krichers@transcendwireless.com
Subject: UPS Ship Notification, Reference Number 1: CT11033E CSC EO

You have a package coming.

Scheduled Delivery Date: Wednesday, 08/07/2019

This message was sent to you at the request of TRANSCEND WIRELESS to notify you that the shipment information below has been transmitted to UPS. The physical package may or may not have actually been tendered to UPS for shipment. To verify the actual transit status of your shipment, click on the tracking link below.

Shipment Details

From:	TRANSCEND WIRELESS
Tracking Number:	1ZV257424292311849
Ship To:	Noel Bishop Town of Westbrook 866 Boston Post Road WESTBROOK, CT 064981881 US
UPS Service:	UPS GROUND
Number of Packages:	1
Scheduled Delivery:	08/07/2019
Signature Required:	A signature is required for package delivery
Weight:	1.0 LBS
Reference Number 1:	CT11033E CSC EO

Download the UPS mobile app

Kyle Richers

From: UPS Quantum View <pkginfo@ups.com>
Sent: Tuesday, August 6, 2019 12:18 PM
To: krichers@transcendwireless.com
Subject: UPS Ship Notification, Reference Number 1: CT11033E CSC ZO

You have a package coming.

Scheduled Delivery Date: Wednesday, 08/07/2019

This message was sent to you at the request of TRANSCEND WIRELESS to notify you that the shipment information below has been transmitted to UPS. The physical package may or may not have actually been tendered to UPS for shipment. To verify the actual transit status of your shipment, click on the tracking link below.

Shipment Details

From:	TRANSCEND WIRELESS
Tracking Number:	1ZV257424292053851
Ship To:	Eric Knapp Town of Westbrook 866 Boston Post Road WESTBROOK, CT 064981881 US
UPS Service:	UPS GROUND
Number of Packages:	1
Scheduled Delivery:	08/07/2019
Signature Required:	A signature is required for package delivery
Weight:	1.0 LBS
Reference Number 1:	CT11033E CSC ZO

Download the UPS mobile app

315 SPENCER PLAINS RD

Location	315 SPENCER PLAINS RD	**Mblu**	165/ / 015/ /
Acct#	165/015	**Owner**	CONNECTICUT STATE OF
Assessment	$925,500	**Appraisal**	$1,322,140
PID	3667	**Building Count**	2

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$988,230	$333,910	$1,322,140

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$691,760	$233,740	$925,500

Owner of Record

Owner	CONNECTICUT STATE OF
Co-Owner	
Address	315 SPENCER PLAINS RD WESTBROOK, CT 06498

Sale Price	$0
Certificate	
Book & Page	46/ 350
Sale Date	01/01/1901
Instrument	25

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
CONNECTICUT STATE OF	$0		46/ 350	25	01/01/1901

Building Information

Building 1 : Section 1

Year Built:	1958
Living Area:	8,282
Replacement Cost:	$1,272,938
Building Percent Good:	62
Replacement Cost Less Depreciation:	$789,220

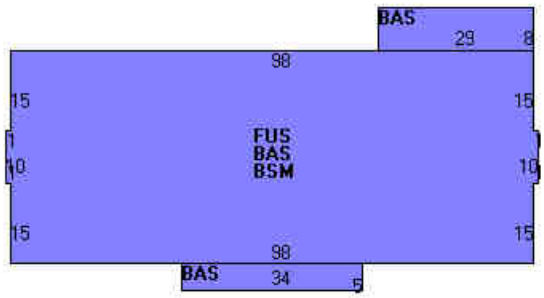
Building Attributes	
Field	**Description**

STYLE	Other State
MODEL	Comm/Ind
Grade	A
Stories:	1.0
Occupancy	1
Exterior Wall 1	Brick
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Tar & Gravel
Interior Wall 1	Drywall
Interior Wall 2	
Interior Floor 1	Linoleum
Interior Floor 2	Carpet
Heating Fuel	Oil
Heating Type	Hot Water
AC Percent	100
Foundation	Poured Conc
Bldg Use	Exempt Comm
Total Rooms	0
Total Bedrms	0
Total Fixtures	4
% Sprinklers	0
1st Floor Use:	
Heat/AC	NONE
Frame Type	MASONRY
Baths/Plumbing	AVERAGE
Ceiling/Wall	CEIL & WALLS
Rooms/Prtns	AVERAGE
Wall Height	9
% Comn Wall	

Building Photo

(http://images.vgsi.com/photos2/WestbrookCTPhotos//\00\00\07

Building Layout



(http://images.vgsi.com/photos2/WestbrookCTPhotos//Sketches/

Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	4,342	4,342
FUS	Finished Upper Story	3,940	3,940
BSM	Basement	3,940	0
		12,222	8,282

Building 2 : Section 1

Year Built: 1958
Living Area: 5,832
Replacement Cost: $290,737
Building Percent Good: 62
Replacement Cost Less Depreciation: $180,260

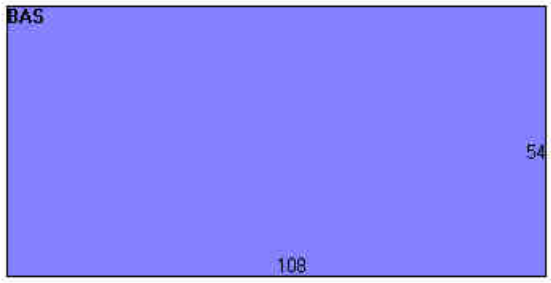
Building Attributes : Bldg 2 of 2	
Field	**Description**
STYLE	Comm Garage

MODEL	Svc Sta/Garage
Grade	C+
Stories:	1.0
Occupancy	0
Exterior Wall 1	Concr/Cinder
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Tar & Gravel
Interior Wall 1	Minimum
Interior Wall 2	
Interior Floor 1	Concrete
Interior Floor 2	
Heating Fuel	Oil
Heating Type	Forced Hot Air
AC Percent	0
Foundation	Slab
Bldg Use	Exempt Ind
Total Rooms	0
Total Bedrms	0
Total Fixtures	4
% Sprinklers	0
1st Floor Use:	
Heat/AC	NONE
Frame Type	REINF. CONCR
Baths/Plumbing	AVERAGE
Ceiling/Wall	CEIL & WALLS
Rooms/Prtns	AVERAGE
Wall Height	20
% Comn Wall	

Building Photo

(http://images.vgsi.com/photos2/WestbrookCTPhotos//\00\00\0(

Building Layout



(http://images.vgsi.com/photos2/WestbrookCTPhotos//Sketches/

Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	5,832	5,832
		5,832	5,832

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code 920
Description Exempt Comm

Land Line Valuation

Size (Acres) 3.2
Depth

Zone	LDR	**Assessed Value**	$233,740
Neighborhood	COM	**Appraised Value**	$333,910
Alt Land Appr Category	No		

Outbuildings

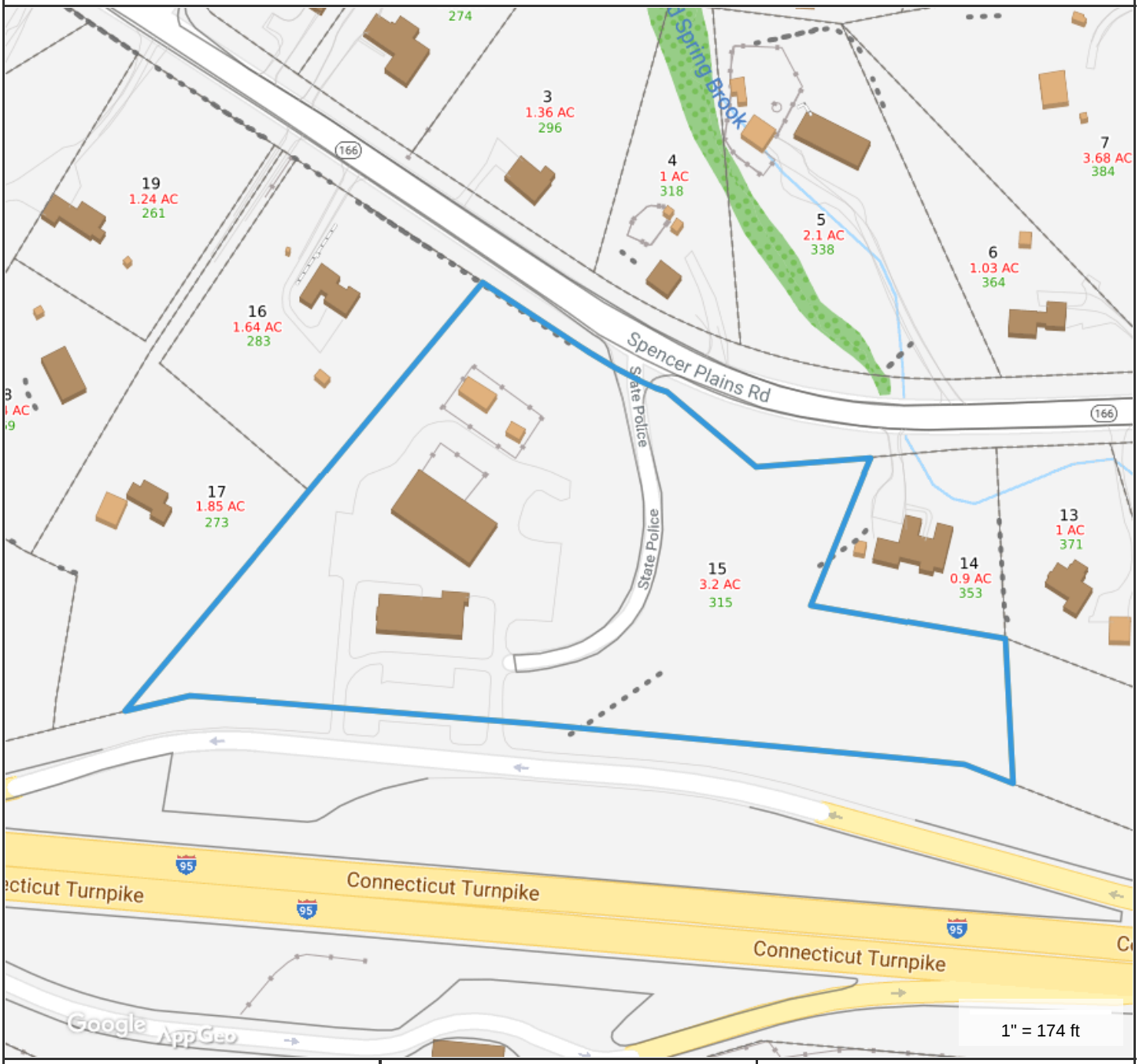
Outbuildings							Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**	**Comment**
PAV1	Paving			25000 S.F.	$18,750	1	

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$988,230	$333,910	$1,322,140
2015	$991,320	$318,010	$1,309,330
2014	$991,320	$318,010	$1,309,330

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$691,760	$233,740	$925,500
2015	$693,930	$222,610	$916,540
2014	$693,930	$222,610	$916,540

CT11033E map



Property Information

Property ID	165/015
Location	315 SPENCER PLAINS RD
Owner	CONNECTICUT STATE OF

MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT

Town of Westbrook, 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 October 2018
Data updated 11/19/2018

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

1 CENTRAL PARK PLAZA • NEW BRITAIN, CONN. 06051

PHONE: 827-2604

PETITION NO. 61
Westbrook, Connecticut
March 31, 1982

Commissioner Boucher, Dr. Horsfall, and Duncan Reid made a final field inspection of the new telecommunication tower at the State Police Barracks in Westbrook.

This petition involved replacing an existing 60 foot monotube telecommunication tower with a 180 foot self-supporting lattice tower. Valley Shore Emergency Communications, Inc. is the owner-operator and shares the facility with the Department of Transportation and the Department of Public Safety. The tower supports three microwave "dish" antennas and four "stick" antennas. There is no equipment shelter; associated equipment is housed in the nearby State Police Garage. The facility is used for State Police communications, motorist aid call box communications, and local emergency communications.

The monotube tower has been dismantled and removed from the site. The new tower extends approximately 100 feet above the treeline and is visible from selected locations on nearby Route 166 and from several locations on I-95. Otherwise, it appears to be screened by trees and ridges. No significant adverse environmental impacts resulted from construction.

Final approval is recommended.

Duncan C. Reid
Environmentalist
4/1/82

T-Mobile

WIRELESS COMMUNICATIONS FACILITY

CT STATE POLICE_1

SITE ID: CT11033E

315 SPENCER PLAINS RD

WESTBROOK, CT 06498

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.

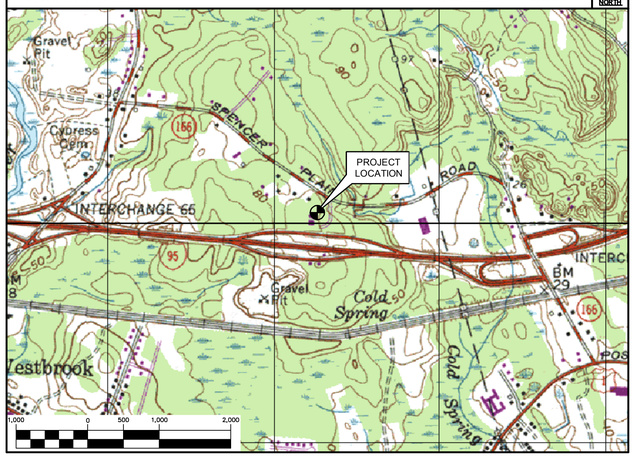
SITE DIRECTIONS

FROM: 35 GRIFFIN ROAD SOUTH, BLOOMFIELD, CT 06002 **TO:** 315 SPENCER PLAINS RD, WESTBROOK, CT 06498

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.	18.20 MI.
4.	MERGE ONTO CT-9 S VIA EXIT 22S ON THE LEFT TOWARD MIDDLETOWN/OLD SAYBROOK.	25.55 MI.
5.	TAKE THE CT-154 EXIT, EXIT 3, TOWARD WESTBROOK/ESSEX/CT-153.	0.26 MI.
6.	GO STRAIGHT TOWARD WESTBROOK.	0.12 MI.
7.	TURN RIGHT ONTO PLAINS RD/CT-153. CONTINUE TO FOLLOW CT-153.	4.28 MI.
8.	TURN LEFT ONTO SPENCER PLAINS RD/CT-166.	0.62 MI.
9.	315 SPENCER PLAINS RD, WESTBROOK, CT 06498-3509, 315 SPENCER PLAINS RD IS ON THE RIGHT.	

VICINITY MAP

SCALE: 1" = 1000'



T-MOBILE RF CONFIGURATION

67D92DB_2xAIR+1OP

PROJECT SUMMARY

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

   A. REMOVE (3) EXISTING ANTENNAS, TYP. (1) PER SECTOR
   B. INSTALL (3) NEW RFS ANTENNAS, TYP. (1) PER SECTOR
   C. INSTALL (3) NEW AIR32 ANTENNAS, TYP. (1) PER SECTOR
   D. INSTALL (3) NEW AIR 21 ANTENNAS, TYP. (1) PER SECTOR
   E. REMOVE (3) EXISTING RRUS11 B12, TYP. (1) PER SECTOR AT GRADE
   F. INSTALL (3) NEW RADIO 4449 B71+B12'S, TYP. (1) PER SECTOR AT TOWER LOCATION
   G. REMOVE EXISTING TMA'S AND DIPLEXERS AT GRADE
   H. INSTALL (1) NEW PPC CABINET
   I. INSTALL (3) NEW TMA'S, TYP. (1) PER SECTOR AT TOWER LOCATION
   J. REMOVE EXISTING ANTENNA MOUNTS AND REPLACE WITH NEW ANTENNA MOUNTING SYSTEM
   K. UPGRADE 100 AMP TO 200 AMP MAIN
   L. INSTALL NEW 125 BREAKER
   M. REPLACE (1) DUS41 WITH (1) BB 6630 FOR LTE
   K. INSTALL (1) ADDITIONAL BB6630 FOR FUTURE 5G N600

PROJECT INFORMATION

SITE NAME:	CT STATE POLICE_1
SITE ID:	CT11033E
SITE ADDRESS:	315 SPENCER PLAINS RD WESTBROOK, CT 06498
APPLICANT:	T-MOBILE NORTHEAST, LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002
CONTACT PERSON:	DAN REID (PROJECT MANAGER) TRANSCEND WIRELESS, LLC (203) 592-8291
ENGINEER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41°-17'-32.40" N LONGITUDE: 72°-25'-49.79" W GROUND ELEVATION: 95'± AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	DESIGN BASIS AND SITE NOTES	0
C-1	SITE LOCATION PLAN	0
C-2	COMPOUND PLAN AND TOWER ELEVATION	0
C-3	ANTENNA CONFIG. & ELEVATION	0
E-1	TYPICAL ELECTRICAL DETAILS	0
E-2	DETAILS	0

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	08/06/19	KAWJR	CAG	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT · MICHAEL A. GUIDOTTI · 21917 · REGISTERED PROFESSIONAL ENGINEER

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
CT STATE POLICE_1
SITE ID: CT11033E
315 SPENCER PLAINS RD
WESTBROOK, CT 06498

DATE: 04/09/19
SCALE: AS NOTED
JOB NO. 19027.01

TITLE SHEET

T-1

Sheet No. 1 of 7

DESIGN BASIS:

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

1. DESIGN CRITERIA:

- WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS): 100–120 MPH (3 SECOND GUST)
- RISK CATEGORY: II (BASED ON IBC APPENDIX N)
- NOMINAL DESIGN SPEED (TOWER): 105 MPH (Vasd) (EXPOSURE C/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7–10) PER 2015 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2018 CONNECTICUT STATE BUILDING CODE.
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7–10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

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

STRUCTURAL STEEL

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

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

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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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WIRELESS COMMUNICATIONS FACILITY
CT STATE POLICE_1
SITE ID: CT11033E
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WESTBROOK, CT 06498

DATE:	04/09/19
SCALE:	AS NOTED
JOB NO.	19027.01

DESIGN BASIS AND SITE NOTES

N–1

Sheet No. 2 of 7

1 C-1 **SITE LOCATION PLAN**
SCALE: 1" = 45'

APPROX. NORTH

GRAPHIC SCALE
45 0 22.5 45 90 180
(IN FEET)
1 inch = 45 ft.

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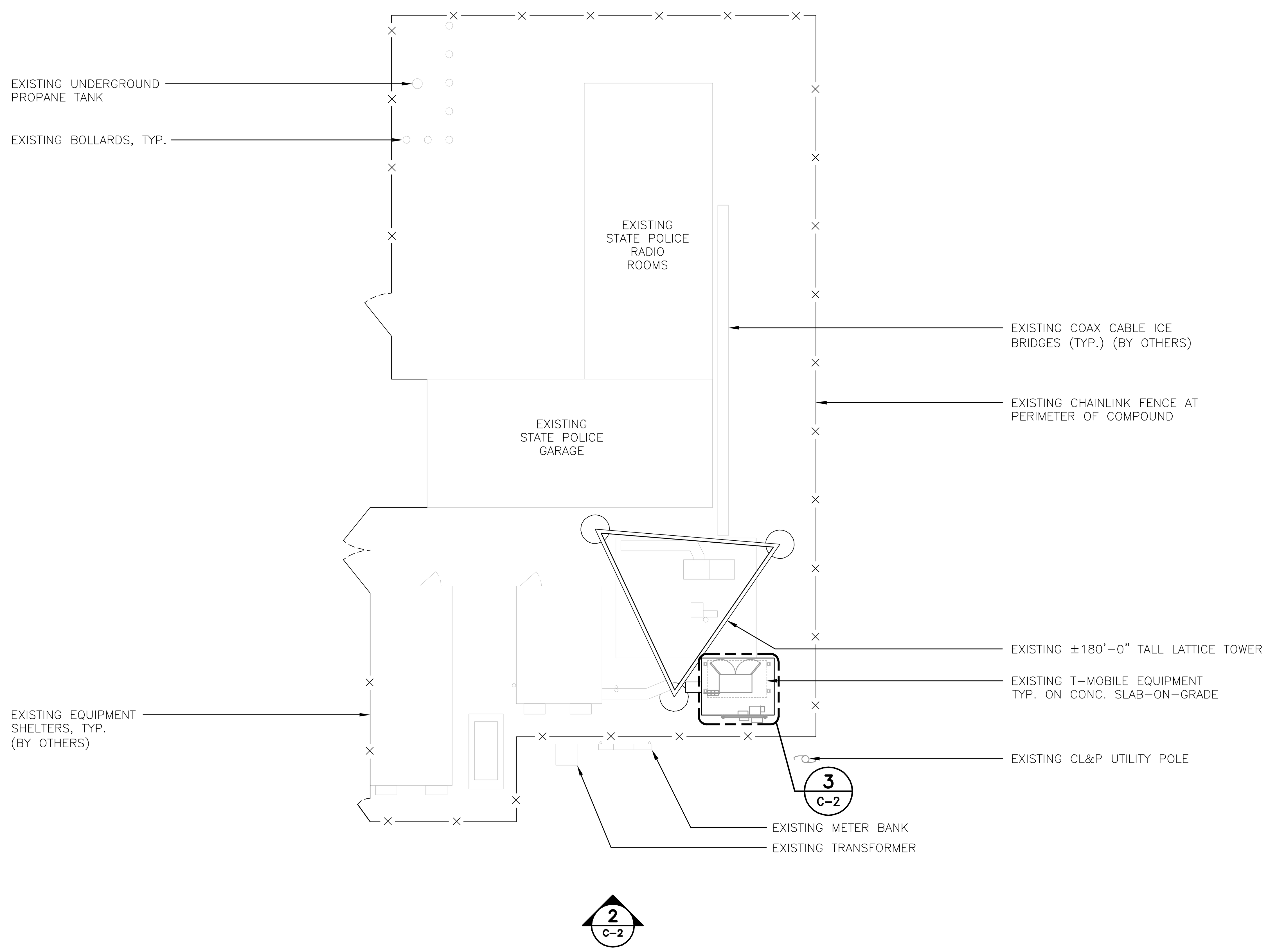
SITE LOCATION PLAN

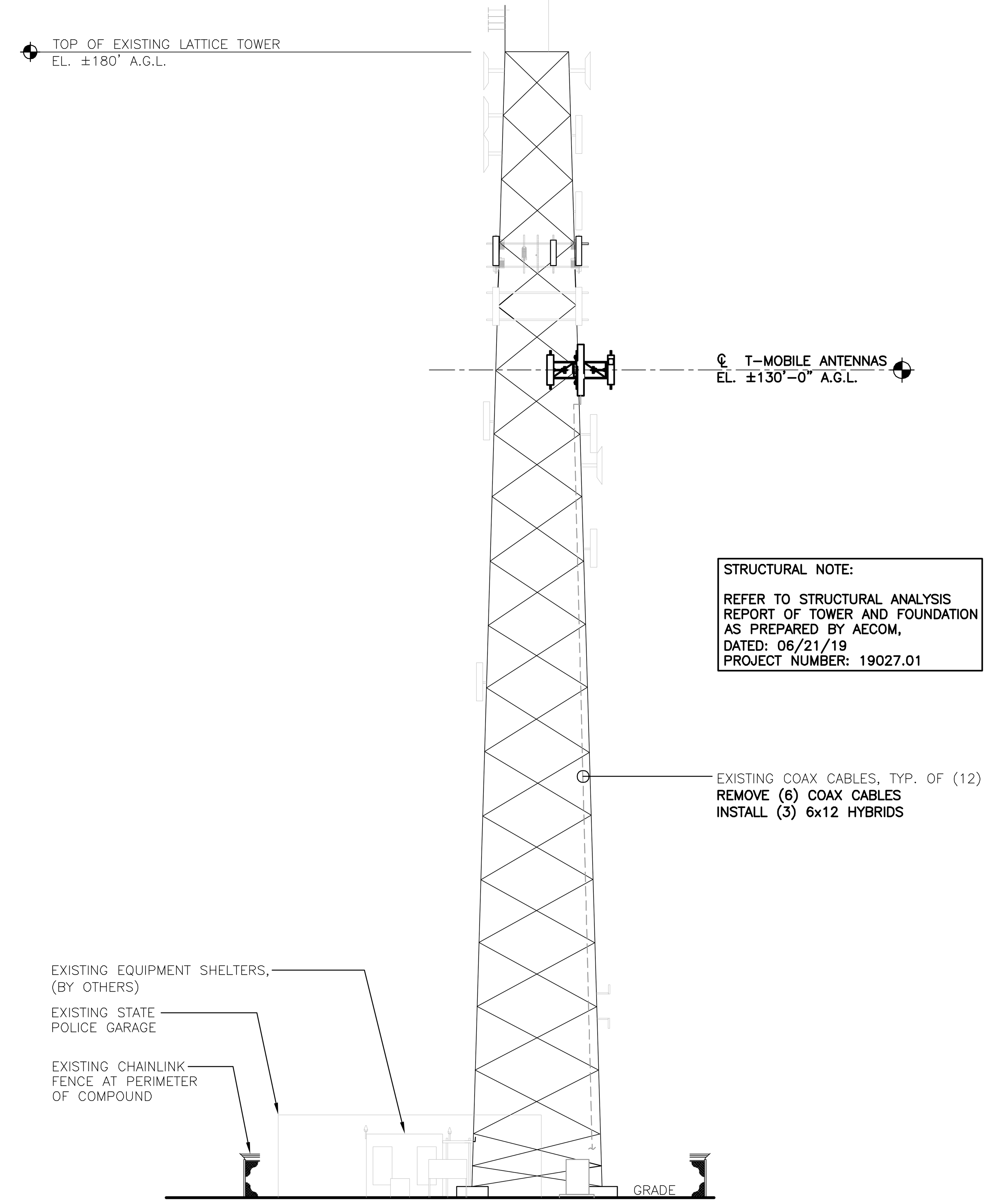
C-1

Sheet No. 3 of 7



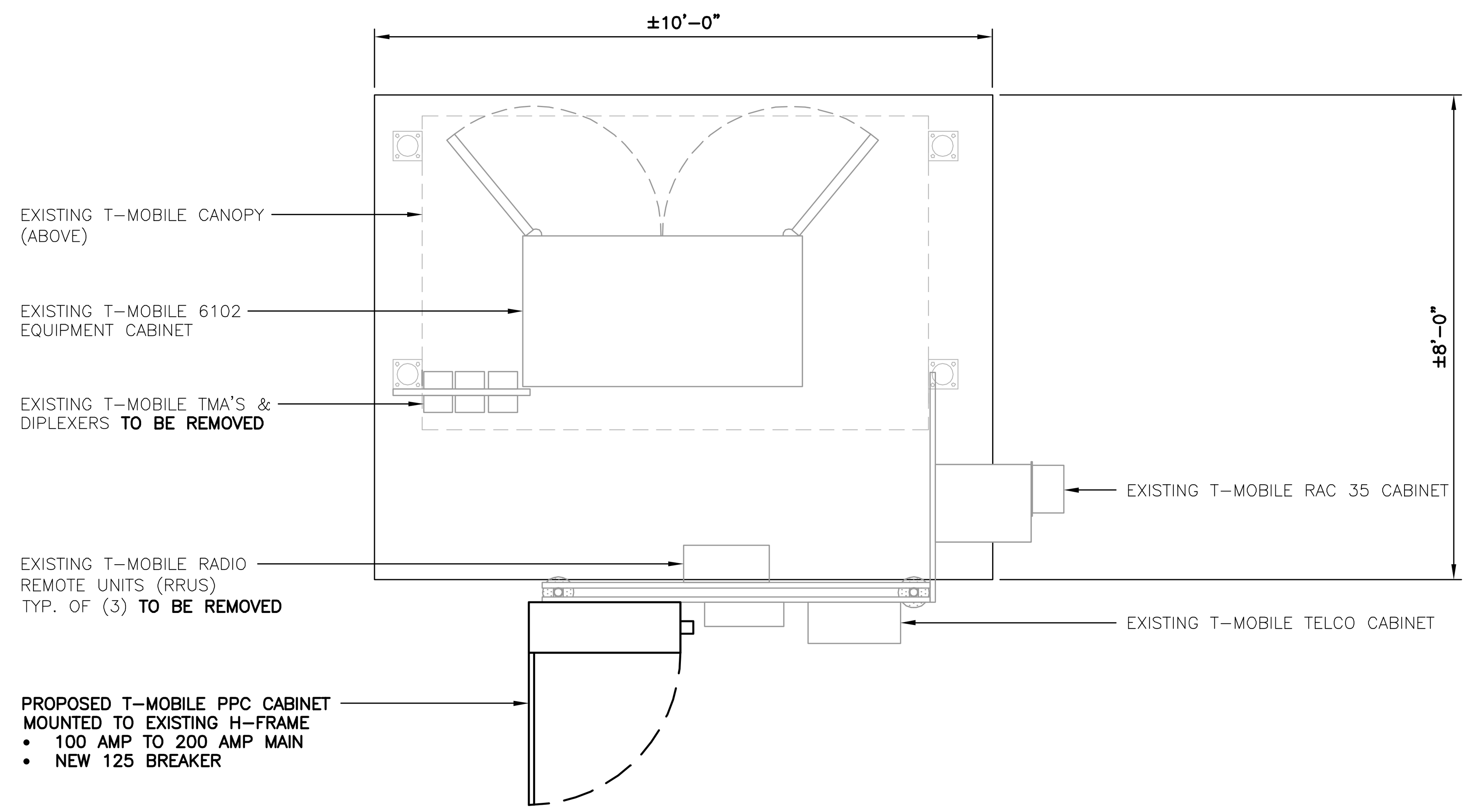
1 C-2 **COMPOUND PLAN - PROPOSED**
SCALE: 1" = 12'
TRUE NORTH

GRAPHIC SCALE
12 0 6 12 24 48
(IN FEET)
1 inch = 12 ft.



2 C-2 **TOWER ELEVATION - PROPOSED**
SCALE: 1" = 15'-0"

GRAPHIC SCALE
15 0 7.5 15 30 60
(IN FEET)
1 inch = 15 ft.



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

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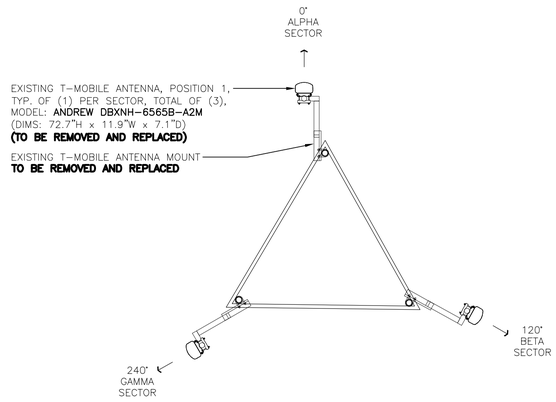
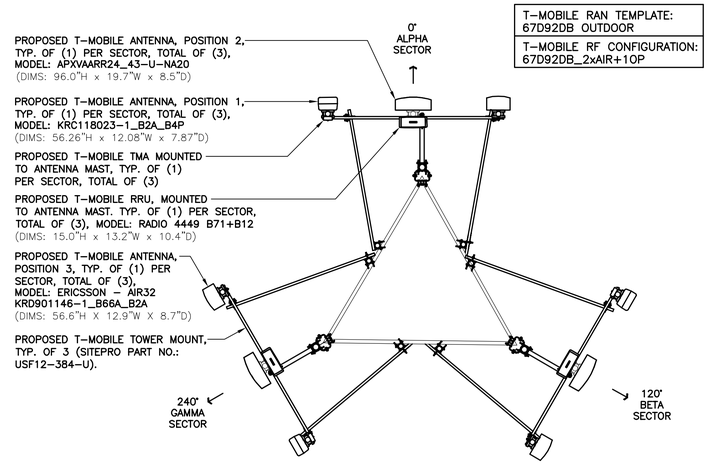
COMPOUND PLAN & TOWER ELEVATION

C-2

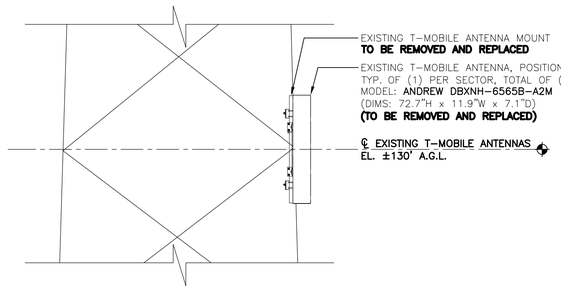
Sheet No. 4 of 7



1 C-3 **EXISTING ANTENNA MOUNTING CONFIGURATION TYP.**
SCALE: 1/4" = 1' **130'-0" ELEVATION**

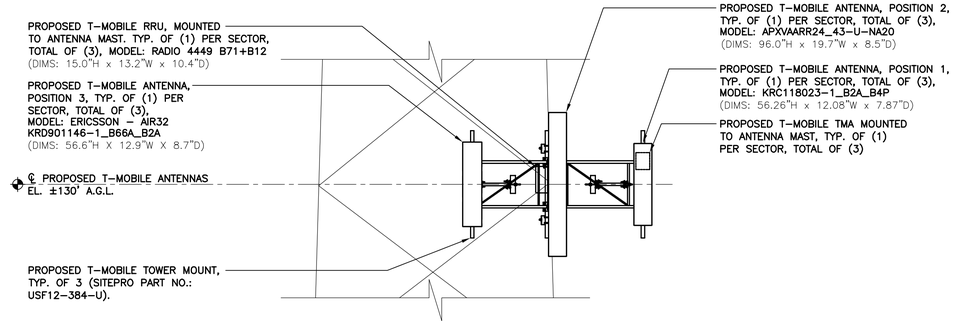


2 C-3 **PROPOSED ANTENNA MOUNTING CONFIGURATION TYP.**
SCALE: 1/4" = 1' **130'-0" ELEVATION**



TYPICAL SECTOR

3 C-3 **ANTENNA ELEVATION - EXISTING**
SCALE: NONE



TYPICAL SECTOR

4 C-3 **ANTENNA ELEVATION - PROPOSED**
SCALE: NONE

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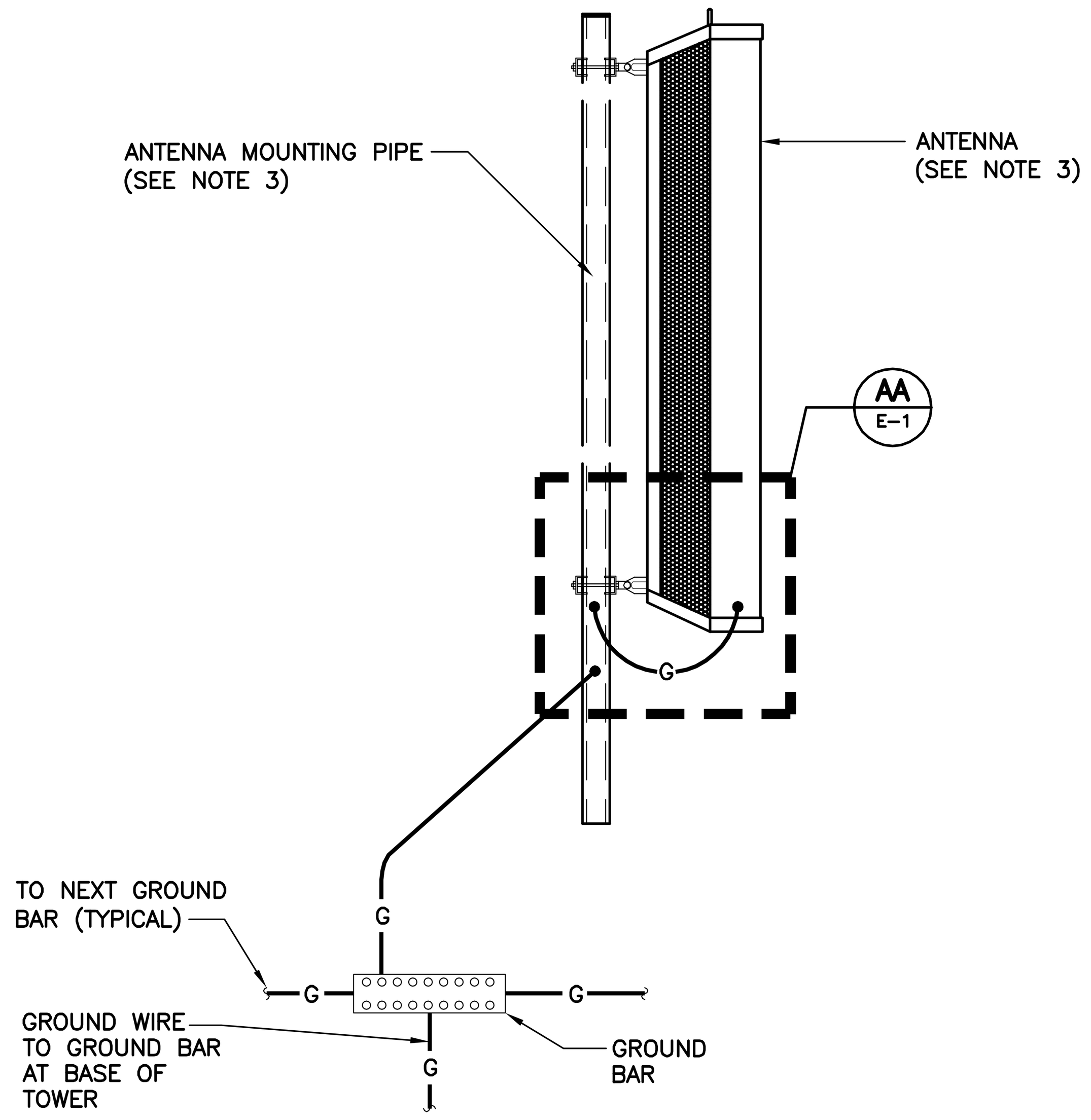
ANTENNA CONFIG.
&
ELEVATION

C-3

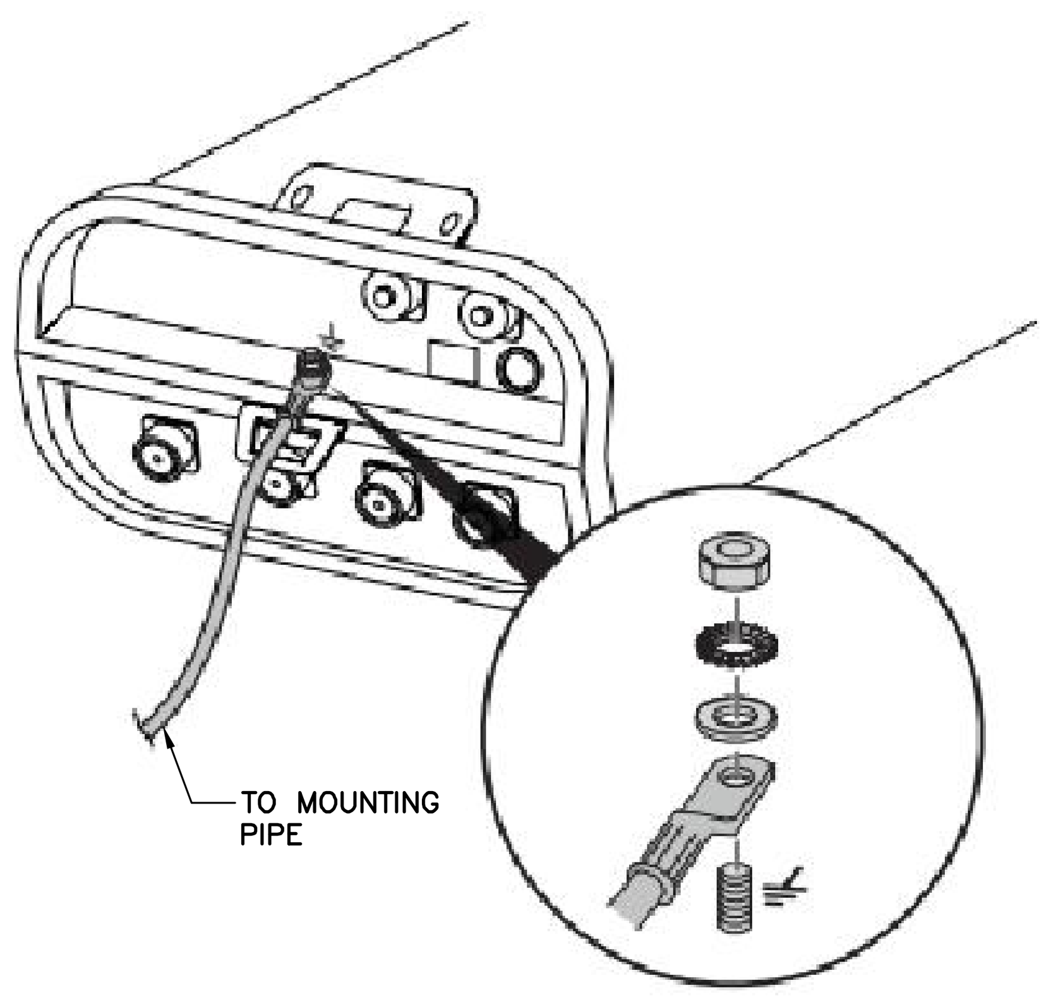
Sheet No. 5 of 7



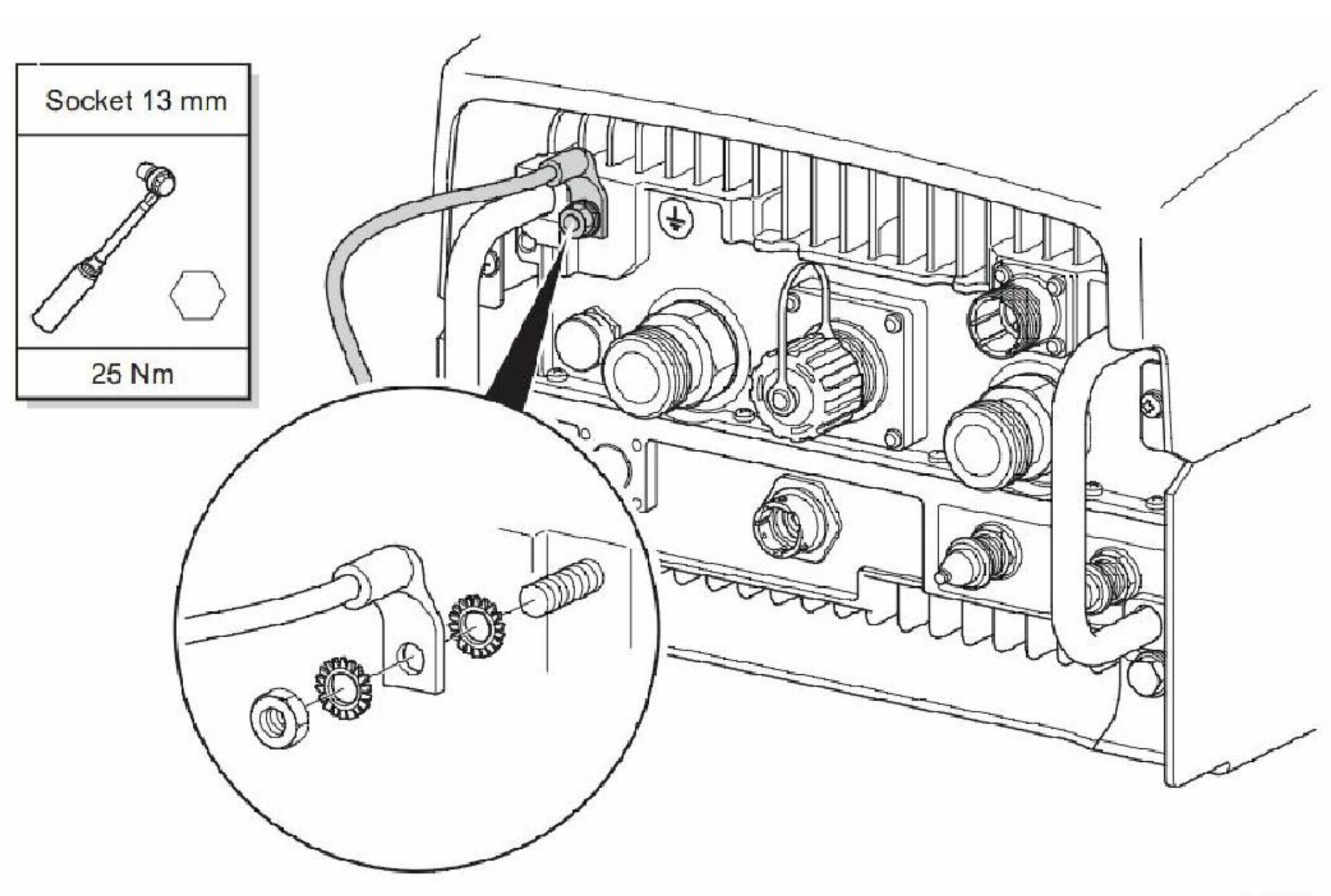
NOTES:

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

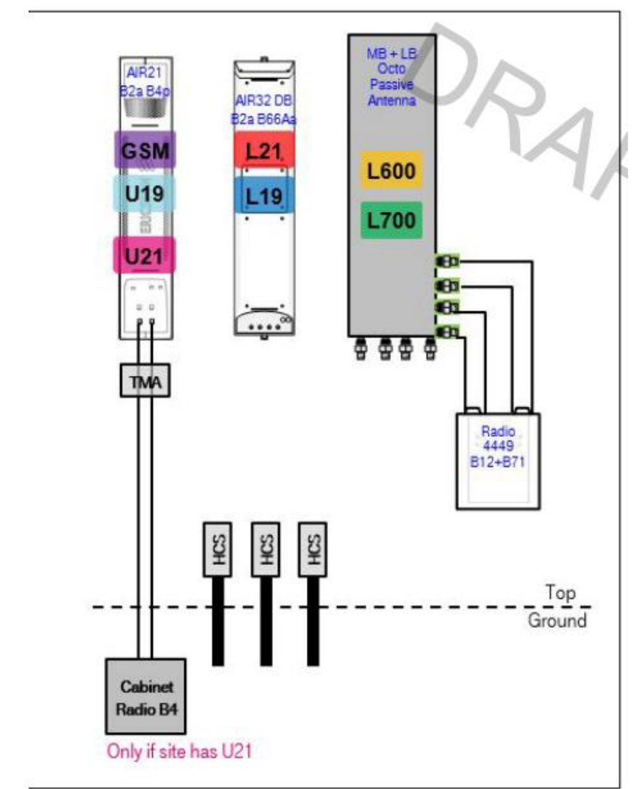
1 E-1 TYPICAL ANTENNA GROUNDING DETAIL
SCALE: NONE



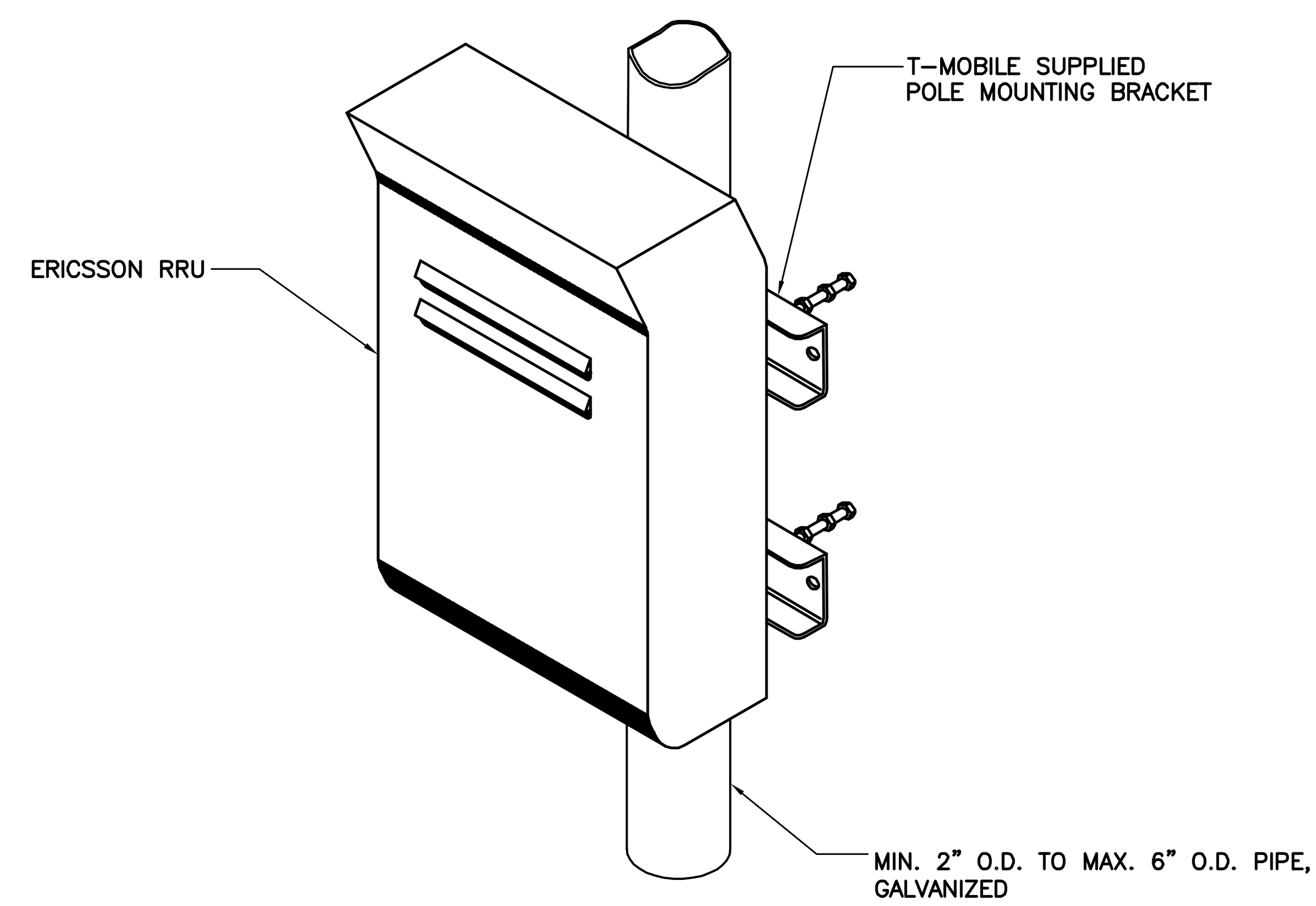
AA E-1 TYPICAL ANTENNA GROUNDING DETAIL
SCALE: NONE



2 E-1 TYPICAL RRU GROUNDING DETAIL
NOT TO SCALE



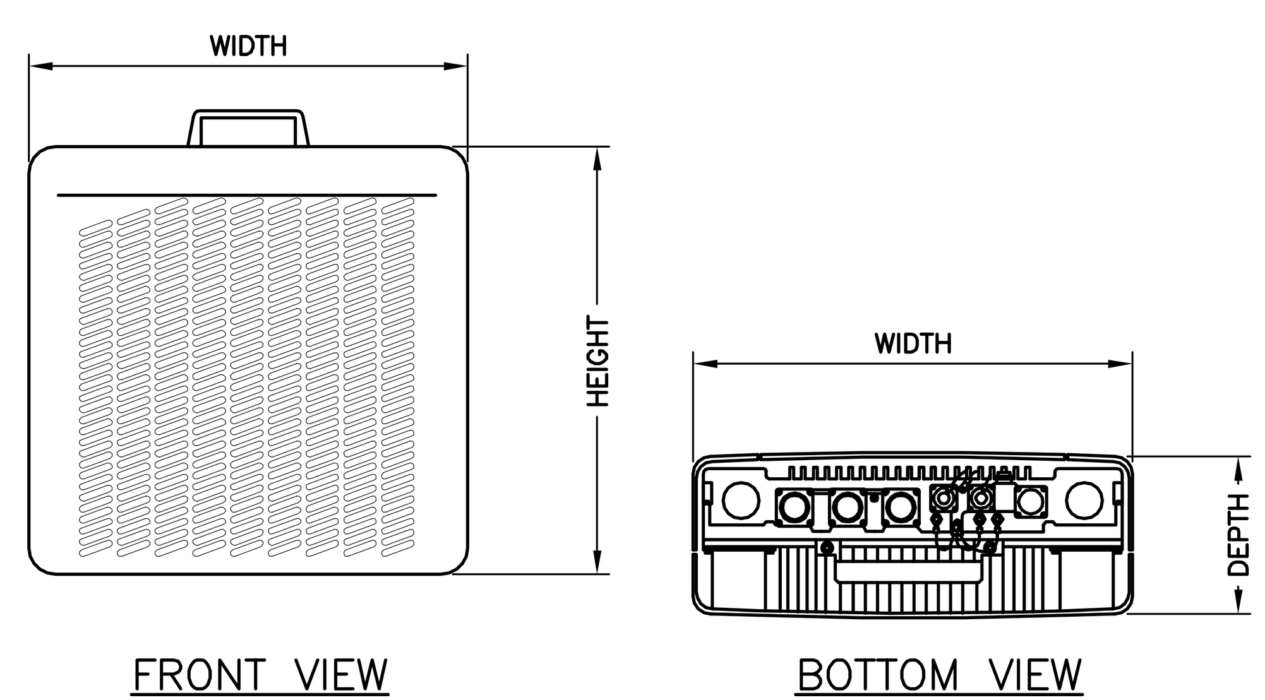
3 E-1 PROPOSED PLUMBING DIAGRAM
SCALE: NONE



NOTES:

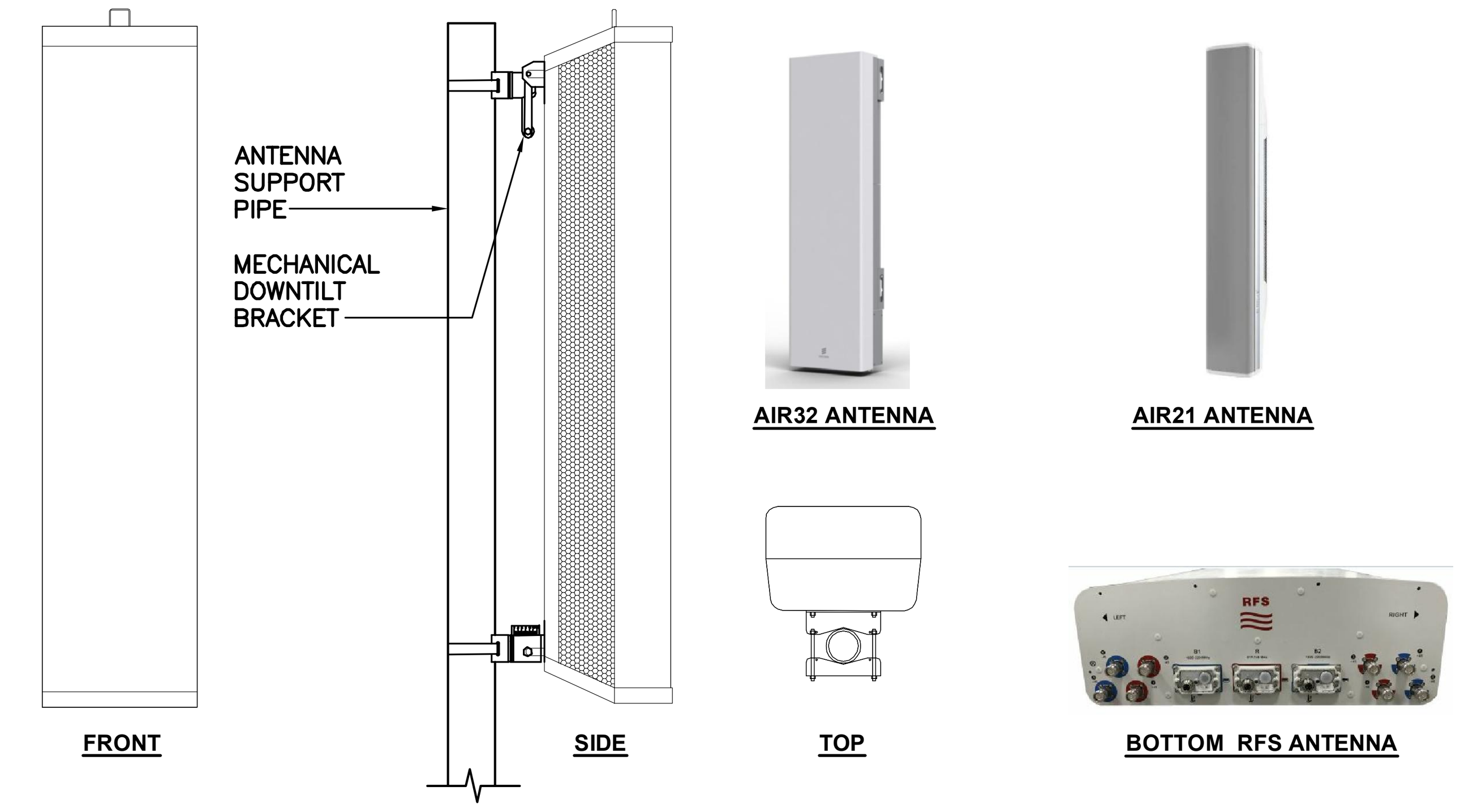
1. T-MOBILE SHALL SUPPLY RRU, AND RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL SUPPLY POLE/PIPE AND INSTALL ALL MOUNTING HARDWARE INCLUDING ERICSSON RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL INSTALLS RRU AND MAKES CABLE TERMINATIONS.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

4 E-1 TYPICAL RRUS MOUNTING DETAILS
SCALE: NOT TO SCALE



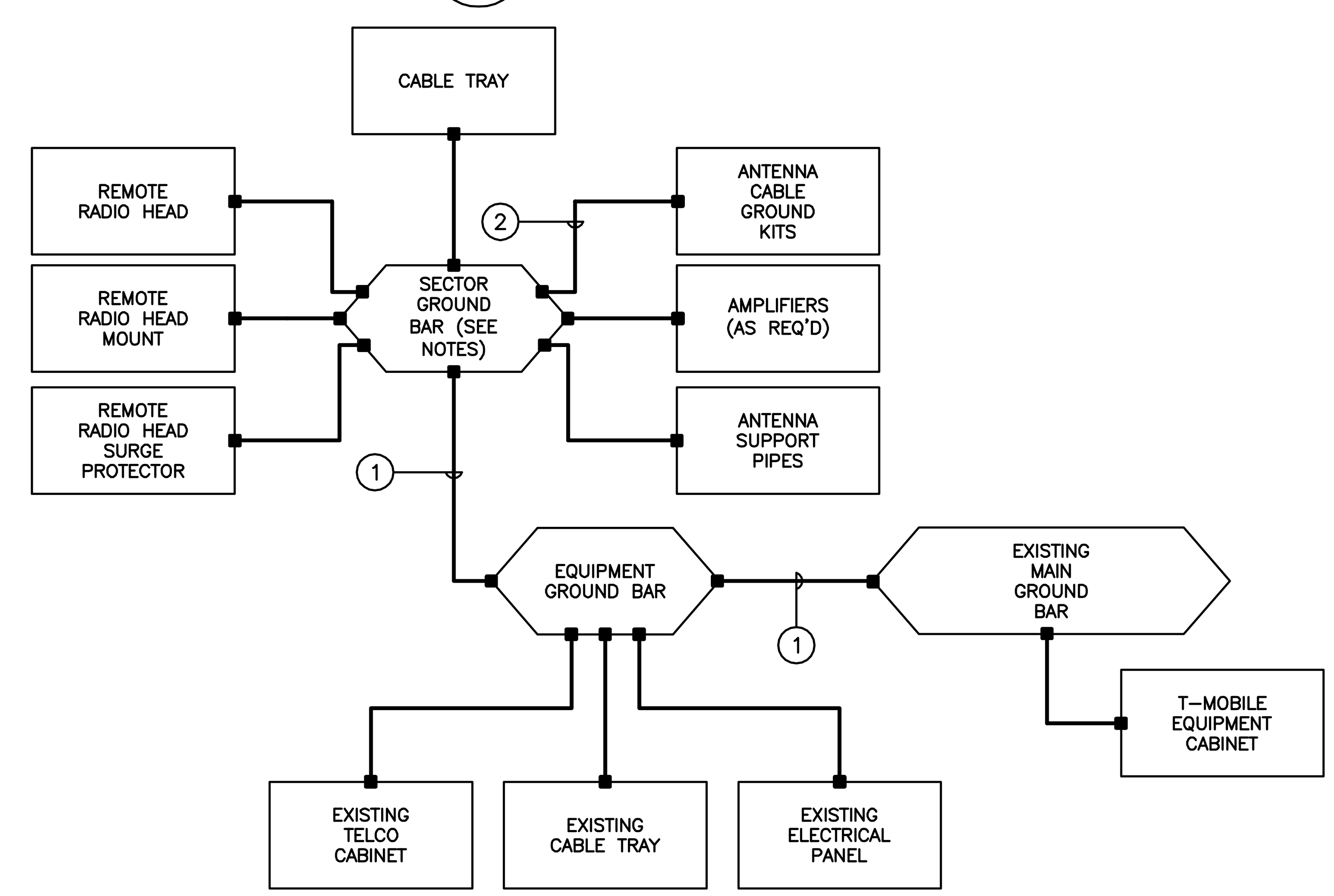
RRH (REMOTE RADIO HEAD)		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: RRU 4449 B71+B12	14.9"H x 13.2"W x 9.3"D	±74 LBS
MAKE: ERICSSON MODEL: RRU 4415 B25	16.5"H x 13.4"W x 5.9"D	±46 LBS
MAKE: ERICSSON MODEL: RRU 4415 B66A	16.5"H x 13.4"W x 5.9"D	±46 LBS

5 E-1 REMOTE RADIO HEAD (RRH) DETAIL (TYP)
SCALE: NOT TO SCALE



ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: AIR32 KRD901146-1	56.6"L x 12.9"W x 8.7"D	105 LBS.
MAKE: RFS MODEL: APXVAARR24_43-U-NA20	95.9"L x 24.0"W x 8.7"D	153 LBS.
MAKE: ERICSSON MODEL: AIR21 KRC118023-1	56.26"L x 12.08"W x 7.87"D	135 LBS.

6 E-1 PROPOSED ANTENNA DETAIL
SCALE: NONE



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.

7 E-1 TYPICAL GROUNDING SCHEMATIC DETAIL
SCALE: NOT TO SCALE

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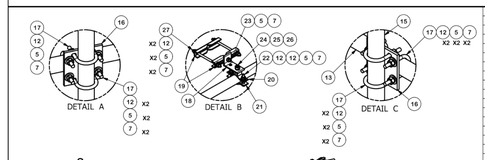
TYPICAL ELECTRICAL DETAILS

E-1

Sheet No. 6 of 7



PARTS LIST

ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	1	2PBG	24" PIPE MOUNT STANDOFF ARM		71.96	71.96
2	1	CFM	UPPER GATE FOOT WELDMENT		13.90	13.90
3	1	CFS	LOWER GATE FOOT WELDMENT		12.72	12.72
4	2	A1205	1/2" x 5" A325 HDG BOLT	5 in.	0.34	0.69
5	112	G12LW	1/2" HDG LOCKWASHER		0.01	1.56
6	2	A12NUT	1/2" HDG A325 HEX NUT		0.07	0.14
7	110	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	7.87
8	8	G12R-12	1/2" x 12" THREADED ROD (HDG.)		0.35	2.81
9	8	G12R-15	1/2" x 15" THREADED ROD (HDG.)		0.84	6.69
9	2	GBB	GATE BACKING BAR		4.53	9.06
10	2	SCX4	CROSSOVER PLATE	8.500 in	6.02	12.04
11	4	X-UB1358	1/2" X 3-5/8" X 5-1/2" X 3" U-BOLT (HDG.)		0.66	2.63
12	96	G12FW	1/2" HDG USS FLATWASHER		0.03	3.27
13	4	P2150	2-3/8" OD X 150" SCH 40 GALVANIZED PIPE	150.0000 in	48.06	192.23
14	4	X-UB1300	1/2" X 3" X 5" X 2" U-BOLT (HDG.)		0.66	2.63
15	2	A	B	C	D	
16	8	SCX1	CROSSOVER PLATE 2-3/8" X 2-3/8"		3.71	29.67
17	32	X-UB1212	1/2" X 2-1/2" X 4-1/2" X 2" U-BOLT (HDG.)		0.63	20.00
18	2	X-STA3	STIFF ARM ANGLE BRACKET	2.500 in	1.39	2.78
19	4	X-STU	STIFF ARM CHANNEL BRACKET		1.37	5.49
20	2	SAM	STIFF ARM MOUNT CLAMP		0.77	1.54
21	2	ACP	4-1/16" CLAMP HALF, 1/4" THK		0.65	1.31
22	4	G1203	1/2" x 3" HDG HEX BOLT GR5 FULL THREAD	3	0.22	0.87
23	2	G12112	1/2" x 1-1/2" HDG HEX BOLT GR5	1 1/2	0.15	0.30
24	2	G58112	5/8" x 1-1/2" HDG BOLT	1.5	0.25	0.49
25	2	G58LW	5/8" HDG LOCKWASHER		0.03	0.05
26	2	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	0.26
27	4	G12R-10	1/2" x 10" THREADED ROD (HDG.)		0.35	1.41

ANTENNA MOUNTING PIPES

"ASSEMBLY NO."	PART NO. "A"	PART DESCRIPTION "B"	LENGTH "C"	UNIT WT. "D"	TOTAL WT.
USF12-372-U	P272	2-3/8" O.D. SCH. 40 PIPE	72"	23.07	468.02
USF12-384-U	P284	2-3/8" O.D. SCH. 40 PIPE	84"	26.91	479.54
USF12-396-U	P296	2-3/8" O.D. SCH. 40 PIPE	96"	30.76	491.09

TOLERANCE NOTES

TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES *(± 0.030")*
DRILLED AND GAS CUT HOLES *(± 0.005")* - NO CONING OF HOLES
LASER CUT EDGES AND HOLES *(± 0.010")* - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING *(± 0.030")*
ALL OTHER ASSEMBLY *(± 0.060")*

PROPRIETARY NOTE:
THE DATA AND TECHNIQUES CONTAINED IN THIS DRAWING ARE PROPRIETARY INFORMATION OF VALMONT INDUSTRIES AND CONSTITUTES A TRADE SECRET. ANY USE OR DISCLOSURE WITHOUT THE CONSENT OF VALMONT INDUSTRIES IS STRICTLY PROHIBITED.

DESCRIPTION: ULTIMATE SECTOR FRAME 12'-6" FACE WIDTH

SITE PRO 1 — a valmont COMPANY — Engineering Support Team 1-888-753-7446 — Locations: New York, NY; Atlanta, GA; Los Angeles, CA; Salem, OR; Dallas, TX

CPO NO.	DRAWN BY	ENG. APPROVAL	PART NO.
5001	CEK 4/12/2011		"SEE ASSEMBLY NO."
CLASS / SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81 / 01	CUSTOMER	BMC 4/28/2011	USF12-3XX-U

SHT 1 OF 2

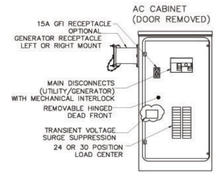
1 / E-2 **SITE PRO DETAIL**
SCALE: NONE

EMERSON Network Power

CAC-A75201090
Specifications

Cabinet Configuration
- 120/240 VAC, 1 Phase, 3 Wire & Ground
- Cabinet Dimensions: 20"W x 10"D x 40"H
- Weight: approx. 80 lbs.
- NEMA 3R Type Enclosure
- Wall or Bracket Mount
- Suitable For Use As Service Equipment
- UL Listed 891, Dead Front Switch Boards

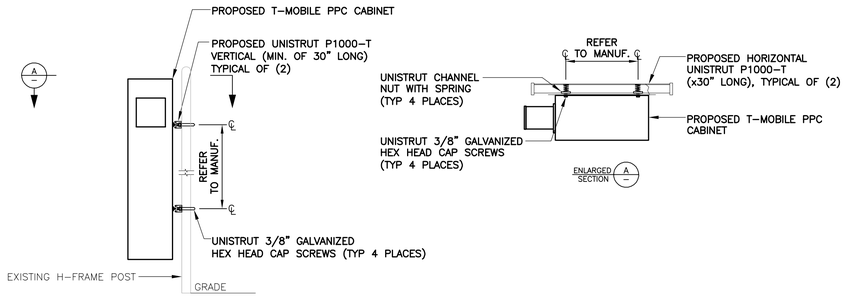
Component Configuration
- Service: 200 Amp Utility/Standby
- Slide Bar Mechanical Interlock (prevents both source from being energized simultaneously)
- 65kAIC Rated Utility Service Disconnect
- 30 Position Square-D Load Center (12 position shown)
- 15Amp, 120Vac GFI duplex receptacle
- N-G Bonding Jumper Kit (customer installed if required)
- Standby Power Receptacle Appleton AR20044RS
- Transient Voltage Surge Suppression rated 100kA



23123 E. Mission
Liberty Lake, WA 99019 USA
800-727-9119 (U.S. & Canada)
509-927-0401 • Fax 509-927-0435
www.northern-tech.com
D0315-A-0822
Rev. 0 (8/22/06)

NORTHERN TECHNOLOGIES

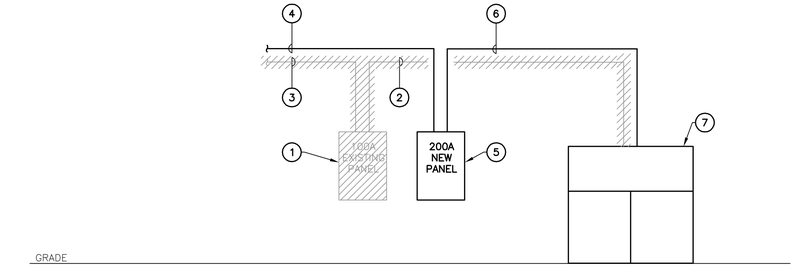
2 / E-2 **EMERSON PPC CABINET (CAC-A75201090)**
SCALE: NTS



3 / E-2 **TYPICAL APPURTENANCE MOUNTING DETAIL**
SCALE: NTS

RISER DIAGRAM NOTES

1. EXISTING T-MOBILE 100A DISTRIBUTION PANEL TO BE REMOVED AND REPLACED.
2. CONDUITS AND CONDUCTORS SERVING EXISTING RADIO EQUIPMENT CABINETS TO BE REMOVED.
3. CONDUITS AND CONDUCTORS FEEDING EXISTING 100A PANEL TO BE REMOVED.
4. (3) #3/0 AWG, (1) #6 AWG GROUND, 2 1/2" CONDUIT CONNECTED TO SOURCE PREVIOUSLY FEEDING REMOVED 100A PANEL. MAXIMUM CIRCUIT LENGTH OF 200FT. VERIFY LOCATION IN FIELD. COORDINATE ANY REQUIRED UPGRADES WITH BUILDING OWNER AND LOCAL UTILITY COMPANY.
5. NEW 200A, 240V, SINGLE PHASE, 30 POSITION, NEMA 3R PANEL WITH COPPER BUS, BOLT ON CIRCUIT BREAKERS AND 200A/2P MAIN CIRCUIT BREAKER.
6. (3) #1/0 AWG, (1) #6 AWG GROUND, 2" CONDUIT CONNECTED TO NEW 125A/2P CIRCUIT BREAKER AND ROUTED TO EXISTING T-MOBILE RADIO CABINET.
7. EXISTING T-MOBILE RADIO CABINET TO REMAIN.



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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	06/06/19	KAWJR	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

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
CT STATE POLICE_1
SITE ID: CT11033E
315 SPENCER PLAINS RD
WESTBROOK, CT 06498

DATE: 04/09/19
SCALE: AS NOTED
JOB NO. 19027.01

DETAILS

E-2

Sheet No. 7 of 7

AECOM

Submitted to
Transcend Wireless
35 Griffin Road South
Bloomfield, CT 06002

Submitted by
AECOM
500 Enterprise Drive,
Suite 3B
Rocky Hill, CT 06067
June 21, 2019

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF AN EXISTING 180' SELF SUPPORTING LATTICE TOWER AND FOUNDATION FOR PROPOSED ANTENNA ARRANGEMENT

T-Mobile Site Name: CT11033E
Site Address: 315 Spencer Plains Road
Westbrook, Connecticut

60604308
TWM-012 Revision 1

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2. INTRODUCTION
3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS
4. FINDINGS AND EVALUATION
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6. DRAWINGS AND DATA

- REINFORCEMENT DRAWINGS SK-1 THROUGH SK-8
- U-BOLTED CONNECTION CALCULATIONS
- SEISMIC BASE SHEAR ANALYSIS
- TNX TOWER INPUT / OUTPUT SUMMARY
- TNX TOWER FEEDLINE DISTRIBUTION CHART
- TNX TOWER FEEDLINE PLAN
- TNX TOWER DEFLECTION, TILT, AND TWIST
- TNX TOWER DETAILED OUTPUT
- ANCHOR BOLT ANALYSIS
- FOUNDATION ANALYSIS
- ANALYSIS UNDER TIA-222-F DESIGN CRITERIA (DESPP / CSP)
- (REFERENCE) STRUCTURAL ANALYSIS REPORT – ANTENNA MOUNT ANALYSIS OF SITEPRO1 # USF12-396-U WITH PROPOSED RFDS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis and modification of the 180' self-supporting lattice tower located at 315 Spencer Plains Road in Westbrook, Connecticut.

The structural analysis was conducted in accordance with the 2018 Connecticut State Building Code which includes the TIA-222-G[1] Standard, 2015 International Building Code, the 2018 Connecticut State Building Code Amendments, the AISC[2] Load Resistance Factor Design (LRFD), the ASCE 7[3] design Code, and the Connecticut State Police Requirements which include the TIA/EIA-222-F[4].

The antenna loading considered in the analysis consists of all the existing antennas, transmission lines and ancillary items as outlined in the Introduction Section of this report.

The proposed T-Mobile antenna installation is listed below:

Antenna and Other Appurtenances	Carrier	Antenna Center Elevation
Remove: **(3) Andrew DBXNH-6565B-A2M Panel Antennas** **(3) Smart Bias-T Units** **(6) Single TMA Units** **(6) AWS/PCS Diplexer Units** **(6) 7/8" Coaxial Cables** **(3) Existing Mount Assemblies**	**T-Mobile (existing)**	**@ 130'**
Install: **(3) Ericsson AIR21_B2A/B4A Panel Antennas** **(3) Ericsson AIR32_B66A/B2A Panel Antennas** **(3) RFS APXVAARR24_43-U-NA20 Panel Antennas** **(3) Generic Twin TMA Units (AWS)** **(3) Ericsson Radio 4449 B71+B12 RRH Units** **(3) Ericsson 6x12 HCS Hybrid Cables (analysis applied 4 Gage cables (AWG))** **(3) SitePro1 Mount Assembly (USF12-396-U) with (1) Support Stiff-Arm per Mount**	**T-Mobile (Proposed)**	**@ 130'**

1. TIA = Telecommunications Industry Association Structural Standard for Antenna Supporting Structures and Antennas (Version G)

2. AISC = American Institute of Steel Construction (14th Edition)

3. ASCE 7 = American Society of Civil Engineers Standard 7 (2010 Edition)

4. TIA/EIA = Telecommunications Industry Association Structural Standard for Antenna Supporting Structures and Antennas (Version F)

1. EXECUTIVE SUMMARY *(continued)*

The results of an initial analysis indicated the existing tower structure, existing anchor bolts and foundation did not have enough capacity for the proposed loading conditions. The tower structure and foundation requires modifications indicated on sheets SK-1 through SK-8. **Once the modifications indicated on sheets SK-1 through SK-8 are performed, the modified structure, anchor bolts and foundation are considered structurally adequate with the wind load classification specified herein with the existing and proposed loading. The controlling structural capacity for all tower and foundation components for the proposed antenna loading after modifications are installed is 98.4%**

The modified tower deflection (sway) is 0.6287 degrees, and the tower rotation (twist) is 0.1201 degrees with a wind velocity of 90 mph concurrent with 0.5" ice. **The tower deflection and rotation are within the Connecticut State Police specification of 0.75 degrees of combined deflection (sway) and rotation (twist).**

This analysis is based on:

1) The tower structure's theoretical capacity not including any assessment of the condition of the tower.
2) Tower geometry, member sizes and foundation taken from manufacturers original design documents prepared by Stainless, Inc. project number 358811 signed and sealed June 14, 1994.
3) Previous structural analysis and tower reinforcement performed by URS Corporation on behalf of T-Mobile, Northeast Utilities and AT&T, project number SAI-063 / 36924430, signed and sealed June 16, 2011.
4) Geotechnical Study for Evaluation of tower site report performed by Dr. Clarence Welti, P.E., P.C., signed on March 24, 2015.
5) Previous structural analysis and reinforcement performed by AECOM on behalf of T-Mobile, project number NSS-015 Rev. 2 / 36931360, signed and sealed May 22, 2015.
6) Tower Mapping and Inventory by D&K Nationwide Communications, Inc. performed on March 19, 2016.
7) Removal of Existing Antennas owned by Connecticut State Police confirmed via e-mail dated August 30, 2016.
8) Previous structural analysis and modification performed by AECOM on behalf of AT&T, project number SAI-092 / 60508377, signed and sealed September 9, 2017.
9) Removal of three future Connecticut State Police microwave dishes at elevation 180' per e-mail received August 18, 2017.
10) Previous structural analysis and modification performed by AECOM on behalf of Sprint, project number ASM-009 Revision 1 / 60577720, signed and sealed on September 17, 2018.
11) Proposed T-Mobile antenna inventory from Radio Frequency Data Sheet (RFDS), dated April 22, 2019, obtained via-e-mail dated May 1, 2019.
12) Antenna Mount frame capacity analysis performed by Centek Engineering, on behalf of T-Mobile, project 19027.01, signed and sealed on April 30, 2019.
13) Previous structural analysis and evaluation performed by AECOM on behalf of T-Mobile, project number 60604308 / TWM-012, signed and sealed May 4, 2019.
14) Coax cable orientation as specified in section 6 of this report.
15) Antenna inventory as specified in Sections 2 and 6 of this report

1. EXECUTIVE SUMMARY *(continued)*

This report is only valid as per the information and data provided by others for antenna inventory, mounts, tower structure, existing foundation and associated cables. The user of this report shall field verify the antenna, cabling and mount configuration used, as well as the physical condition of the tower members, connections and foundations. Notify the engineer in writing immediately if any of the information in this report is found to be other than specified.

If you should have any questions, please contact this office at (860) 529-8882.

Sincerely,

AECOM,

Richard A. Sambor, P.E.
Senior Structural Engineer
RAS/mcd

2. INTRODUCTION

The subject tower is located at 315 Spencer Plains Road in Westbrook, Connecticut. The structure is a self-supporting three-legged 180' steel tapered lattice tower manufactured by Stainless Incorporated

The structural analysis was conducted in accordance with the following:

- TIA-222-G Standard for Standard for a wind velocity of range of 100 mph to 120 mph (3-second gust) and 50 mph (3-second gust) concurrent with 0.75" ice thickness, considered to increase in thickness with height
- 2015 International Building Code with 2018 Connecticut State Building Code Amendments for a wind speed of 112 mph (3-second gust)
- 2010 AISC Load Resistance Factor Design (LRFD)
- 2010 ASCE 7 Minimum Design Loads for Buildings and Other Structures for the ice thickness referenced in the TIA-222-G Standard
- Connecticut State Police Requirements for a wind velocity of 95 mph (fastest mile) and 90 mph (fastest mile) concurrent with 0.5" ice. Twist (rotation) and sway (deflection) were determined in accordance with Connecticut State Police Requirements for a wind velocity of 90 mph (fastest mile) concurrent with 0.5" ice, analyzed under the TIA/EIA-222-F design Standard.

The inventory together with the proposed T-Mobile antenna arrangement is summarized in the table below:

Antenna Type	***Carrier***	***Mount***	***Centerline Elevation***	***Cable***
(1) 8' Omni Antenna	D&K-58 (existing)	Pipe Mounted to Leg	182'	(1) 7/8" Coax Cable
(1) 16' Omni Antenna	D&K-57 (existing)	(2) 6' Side Arm Mounts	182.5'	(1) 7/8" Coax Cable
(1) 16' Lightning Rod	D&K-56 (existing)	Mounted to Tower	181'	----------
(1) 4-Bay 20' Dipole Antenna	D&K-55 (existing)	Pipe Mounted to Leg	181'	(1) 7/8" Coax Cable
(1) 4-Bay 10' Dipole Antenna	D&K-54 (existing)	Pipe Mounted to Leg	181'	(1) 7/8" Coax Cable
(1) 12' Whip Antenna	D&K-53 (existing)	(2) 6' Side-Arm Mount (Shared with D&K 40, 41, 47, 48, 49, 50, 53)	181'	(1) 1-5/8" Coax Cables
(1) 12' Omni Antenna	D&K-52 (existing)	Pipe Mounted on Leg (Shared with D&K 51)	181'	(1) 7/8" Coax Cables
(1) 1-Bay Dipole Antenna	D&K-51 CSP-12 (existing)	Pipe Mounted on Leg (Shared with D&K 52)	180'	(1) 7/8" Coax Cables
(1) TTA Unit	D&K-50 (existing)	(2) 6' Side-Arm Mount (Shared with D&K 40, 41, 47, 48, 49, 50, 53)	180'	(2) 5/8" Coax Cables (2) 1-5/8" Coax Cables
(1) 12' Whip Antenna	D&K-49 (existing)	(2) 6' Side-Arm Mount (Shared with D&K 40, 41, 47, 48, 49, 50, 53)	180'	(2) 1/2" Coax Cables
(1) 12' Whip Antenna	D&K-48 (existing)	(2) 6' Side-Arm Mount (Shared with D&K 40, 41, 47, 48, 49, 50, 53)	180'	(2) 1/2" Coax Cables
(1) 16' Omni Antenna	D&K-59 (existing)	4' Stand-off Mount (Shared with D&K 38, 39)	179'	(1) 1-5/8" Coax Cable

Antenna Type	*Carrier*	*Mount*	*Centerline Elevation*	*Cable*
(1) TTA Control Box	D&K-47 (existing)	Pipe Mount to Face	178’	(2) 7/8” Coax Cables (1) 1/2” Coax Cable
-----	D&K-46 (existing)	1’ Side Arm Mount	172’	------
(1) 6’ Dish with Radome	D&K-45 (existing)	Pipe Mounted to Leg	176’	(1) 2” Elliptical Cable
(1) 6’ Dish with Radome	D&K-44 (existing)	Pipe Mounted to Leg	171’	(1) 2” Elliptical Cable
(1) 6’ Dish with Radome	D&K-43 (existing)	Pipe Mounted to Leg	169’	(1) 2” Elliptical Cable
(1) (Inverted) 4-Bay Dipole Antenna	D&K-41 (existing)	(2) 6’ Side-Arm Mount (Shared with D&K 40, 41, 47, 48, 49, 50, 53)	166’	(1) 7/8” Coax Cable
(1) (Inverted) 4-Bay Dipole Antenna	D&K-40 (existing)	(2) 6’ Side-Arm Mount (Shared with D&K 40, 41, 47, 48, 49, 50, 53)	166’	(1) 7/8” Coax Cable
(1) (Inverted) 12’ Whip Antenna	D&K-42 (existing)	6’ Arm Mount	164’	(1) 1-5/8” Coax Cable
(1) (Inverted) 16’ Whip Antenna	D&K-39 (existing)	4’ Stand-off Mount (Shared with D&K 38, 59)	160’	(1) 1-5/8” Coax Cable
(1) (Inverted) 16’ Whip Antenna	D&K-38 (existing)	4’ Stand-off Mount (Shared with D&K 39, 59)	160’	(1) 1-5/8” Coax Cable
(1) Parabolic Grid Dish	D&K-37 (existing)	Pipe Mounted to Leg	157’	(1) 7/8” Coax Cable
(1) 10’x4’ Dipole Antenna	D&K-36 (existing)	2’ Standoff Mount	157’	(1) 7/8” Coax Cable
(1) 8’ Whip Antenna	D&K-35 (existing)	2’ Standoff Mount	157’	(1) 7/8 Coax Cable
(1) 16’ Whip Antenna	D&K-33 (existing)	Shared with Mount @ D&K-32	153’	(1) 1-5//8” Coax Cable
(1) 1-Bay Dipole Antenna	D&K-34 (existing)	1’ Stand-off Mount	151’	(1) 1/2” Coax Cable
(6) Powerwave 7770 (3) KMW AM-X-CD-14-65 (6) TMA (3) Ericsson RRUS-11 RRH (3) Ericsson RRUS-12 RRH (1) Raycap Surge Supressor	AT&T (existing)	(3) T-frames	145’	(12) 1 1/4” coax cables (1) Fiber Cable (10mm) (2) DC Cables (0.645”)
(1) (Inverted) 10’ Whip Antenna	D&K-32 (existing)	3’ Side-arm Mount	143’	(1) 7/8” Coax Cable

Antenna Type	*Carrier*	*Mount*	*Centerline Elevation*	*Cable*
(3) RFS APXVTM14-ALU-120 Panels (3) Commscope NNVV-65B-R4 Panels (3) ALU TD-RRH-8x20-25 RRH Units (6) ALU RRH-2x50 800 MHz RRH Units (3) 1900 MHz (4x45W) RRH Units	Sprint (existing)	(3) SitePro1 Stiff Arm Kits STK-U attached to (3) 13' Lightweight T-Frames (existing)	137'	(4) Hybrid Cables (1-1/4" Outside Diameter) (6) 1-5/8 coax cables
(3) Ericsson AIR21_B2A/B4A Panels (3) Ericsson AIR32_B66A/B2A Panels (3) RFS APXVAARR24_43-U-NA20 Panels (3) Generic Twin TMA Units (AWS) (3) Ericsson Radio 4449 B71+B12 RRH Units	**T-Mobile (Proposed)**	**(3) SitePro1 Mount Assembly (USF12-396-U) with (1) Support Stiff-Arm per Mount**	**130'**	**(4) Hybrid 6x12 HCS Cables (analysis considered 4 Gage cables (AWG))**
-----	T-Mobile (Existing)	------	130'	(6) 7/8" Coaxial Cables
(1) 14"x14" Panel Antenna	D&K-10 (existing)	1' Side Arm Mount	119'	(1) 7/8" Coax Cable
(1) 12' Dipole Antenna	D&K-9 (existing)	1' Side Arm Mount	119'	(1) 7/8" Coax Cable
(1) Parabolic Grid Dish	D&K-8 VSC-31 (existing)	Pipe Mounted to Leg	109'	(1) 7/8" Coax Cable
(1) 22' Dipole Antenna	D&K-7 (existing)	Shared with Below	76'	(1) 7/8" Coax Cable
(1) 3' Yagi Antenna	D&K-6 (existing)	1' Side Arm Mount	76'	(1) 7/8" Coax Cable
(1) GPS Antenna	D&K-5 Sprint (existing)	Pipe Mounted to Leg	75'	(1) 1/2" Coax Cable
(1) (Inverted) DB803M-XC Omni Whip antenna	D&K-4 CSP-45 (existing)	Shared with Below	27'	(1) 1/2" Coax Cable
(1) DB803M-XC Omni Whip antenna	D&K-3 CSP-46 (existing)	(1) 5' Sidearm Mount	27'	(1) 1/2" Coax Cable
(1) 4' Whip Antenna	D&K-2 (existing)	Shared with Below	27'	(1) 5/8" Coax Cable

Antenna Type	*Carrier*	*Mount*	*Centerline Elevation*	*Cable*
(1) 2’ Yagi Antenna	D&K-1 (existing)	(1) 2’ Stand-off Mount	15’	(1) 5/8” Coax Cable

NOTE: Antenna ID Numbering and elevations obtained from Tower Mapping and Existing inventory via tower climb performed by D&K Nationwide Communications, Inc. on March 19, 2016.

This structural analysis of the communications tower was performed by AECOM, for T-Mobile. The purpose of this analysis was to investigate the structural integrity of the modified tower and foundation for existing and proposed antenna loads in compliance with the 2018 Connecticut State Building Code. This analysis was conducted to evaluate stress on the tower and the effect forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with, the TIA-222-G–Structural Standard for Antenna Towers and Antenna Supporting Structures and Antennas, the 2015 International Building Code with 2018 Connecticut State Building Code Amendments and the American Institute of Steel Construction (AISC) Manual of Steel Construction – Load Resistance Factor Design (LRFD)

The structural analysis was conducted using TNX Tower version 8.0.5.0 and used the following conditions for this tower review (following the TIA-222-G Standard):

- Structure Class 3 – (Essential Communications)
  - NOTE: ASCE 7 and CT State Building Code Applied Risk Category 4 for design wind loads (see below)
- Topographic Category 1 – (No Abrupt elevation changes to location of structure)
- Exposure Class C – (Open Terrain with scattered obstructions)
- Load Conditions:
  - Two load conditions were evaluated as shown which were compared to design stresses according to AISC and TIA-222-G Standard.

Basic Wind Speed:

- TIA-222-G:
  - Middlesex County (Wind Speed Range): V = 100 mph - 120 mph (3-second gust) [Annex of TIA/EIA-222-G 2006]
- IBC 2015 w/ 2018 CT State Building Code Amendment:
  - (2015) IBC Section 1609.1.1 – Determination of Wind Loads – Exception 5 "Designs using TIA-222" applies for determination of Design Wind Load obtained as "V.ult" are to be converted to "V.asd" when applying the TIA-222-G design Standard (under Section 1609.3) for Basic Wind Speed.
  - (2018) CT State Building Code Amendment to the IBC Section 1609.3 wind loads are obtained from Appendix N of the State Building Code.
    - **V.asd = 112 mph** (3-Second Gust) Wind Design Parameter for the Town of Westbrook, Connecticut for Risk Category four (IV) for essential communications (Connecticut State Police).

LOAD CONDITION 1 = 112 MPH (3-SECOND GUST) WIND LOAD (WITHOUT ICE) + TOWER DEAD LOAD
Load Condition 2 = 50 mph (3-second gust) Wind Load (with ice) + Ice Load + Tower Dead Load

Ice thickness used for this analysis is **0.75 inch** (assumed to start at the base of the tower) and is considered to increase in thickness with height. The initial ice thickness for design is referenced in the Annex of TIA-222-G and follows the same design criteria as the ASCE 7 Standard.

The load condition below implements the design requirements of the Connecticut State Police for the tower structures deflection limits with the allowable deflection limit of the combination of the tower's sway (deflection) and twist (rotation) under the TIA/EIA-222-F design Standard. This design limit required the design combined value of sway (deflection) and twist (rotation) to be under 0.75 degrees following the TIA/EIA-222-F design Standard.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS (cont.)

Load Condition 3 = 90 mph (fastest mile) Wind Load (with Ice) + Ice Load + Dead Load

Seismic event consideration factors/values for design:

- S.s = 0.167 (2018 CT State Building Code – Location Specific Value)
- S.1 = 0.059 (2018 CT State Building Code – Location Specific Value)
- Site Classification = "D"
- Seismic Design Category = "A" – (2015 International Building Code)
- F.a = 1.6 (Obtained from TIA-222-G Table 2-12 Considering above conditions)
- F.v = 2.4 (Obtained from TIA-222-G Table 2-13 Considering above conditions)

Strength Limit State Load Combinations (TIA-222-G Section 2.3.2):

The structural analysis herein has considered the following load combinations within the analysis:

1. ***1.2 Dead Load Tower structure + 1.0 Dead Load Guy Assemblies + 1.6 Wind load without ice***
2. 1.2 Dead Load Tower structure + 1.0 Dead Load Guy Assemblies + 1.0 Dead weight of ice due to factored ice thickness + 1.0 Concurrent wind load with factored ice thickness + 1.0 Load effects due to temperature
3. 1.2 Dead Load Tower structure + 1.0 Dead Load Guy Assemblies + 1.0 Earthquake Load

NOTE 1: The above **bolded** load combination is considered to create the governing design loads per the results of the analysis.

NOTE 2: The above "Dead Load Guy Assemblies" are not considered as part of the analysis and are considered as a value of zero.

NOTE 3: The "Load effects due to temperature" do not apply for structures that are self-sustaining (from the TIA-222-G Standard)

4. FINDINGS AND EVALUATION

The combined axial and bending stresses on the tower structure were evaluated to compare with the strength design in accordance with AISC (LRFD). The results of an initial analysis indicated that the existing tower structure, anchor bolts and foundation did not have enough capacity to support the proposed loading conditions. The tower structure and foundation require modifications shown on sheets SK-1 through SK-8. Once the modifications indicated on sheets SK-1 through SK-8 are performed, the modified structure, anchor bolts and foundation are considered structurally adequate with the wind load classification specified herein with the existing and proposed loading.

The modified tower deflection (sway) is 0.6287 degrees, and the tower rotation (twist) is 0.1201 degrees with a wind velocity of 90 mph concurrent with 0.5" ice. The tower deflection and rotation are within the Connecticut State Police specification of 0.75 degrees of combined deflection (sway) and rotation (twist).

Tower Base Reactions (Factored):

Description	Current (TIA-222-G)
Pier Compression (kips)	533
Pier Uplift (kips)	466
Overall Overturning (kip-ft)	11038
Overall Shear (kips)	112
Shear per Leg (kips)	63.4

Proposed Tower Component Stress vs. Capacity Summary

Component / (Section No.)	Controlling Component/ Elevation	Stress (% capacity)	Pass/Fail
Leg (T14)	1/3 HSS 7.5 OD x 0.31250 on Stainless P6.8750 O.D. x 0.5" / 0' – 12.5' / Compression	95.0	**Pass**
Diagonal (T9)	2L 3x2-1/2x1/4 / 75' – 83.333' / Compression	98.4	**Pass**
Horizontal (T5)	L3x2-1/2x1/4 / 125' – 150' / Compression	91.5	**Pass**
Top Grit (T4)	L2-1/2x2-1/2x3/16 / 150'-158.33' / Compression	49.9	**Pass**
Redundant Horizontal Bracing (T14)	L2-1/2x2-1/2x3/16 / 0' – 12.5' / Compression	79.3	**Pass**
Redundant Diagonal Bracing (T12)	L2-1/2x2-1/2x3/16 / 25' – 37.5' / Compression	86.9	**Pass**
Inner Bracing (T12)	L2-1/2x2-1/2x3/16 / 25' – 37.5' / Compression	14.2	**Pass**
Bolt Checks (T9)	(1) ¾" A325X Bolt / 83.3' / Diagonal Member Bearing on Bolt	98.4	**Pass**

4. FINDINGS AND EVALUATION (cont.)

Foundation Summary

Component	Required	Computed	% Capacity	Pass/Fail
Tower Anchor Rod Capacity (TIA-222-G – 4.9.9)	Ratio < 1.0	0.80	80.0	Pass
Adhesive Anchors (previous MODifications – Refer to Section 6)	11559.6 lbf	11316.49 lbf	97.9	Pass
Ultimate Soil Bearing Pressure	6ksf * 0.60 Reduction = 3.60 ksf	2.16 ksf	60.0	Pass
Ultimate Punching Shear (ACI Eq. 11-33)	611.27 kip	949.84	64.3	Pass
Ultimate Beam Shear (ACI Eq. 11-2)	320.42 Kip	195.64	61.1	Pass
Foundation Pad Bending Capacity	1354.22 kip*ft	598.67 kip*ft	44.2	Pass
Foundation Uplift Resistance	629.36 kips (Applying 0.750 Reduction Factor – TIA-222-G 9.4.1)	466 kips	73.0	Pass

Structure Rating (Maximum from all components) =	98.4 %	Pass

Maximum Deformations – Proposed Condition

TIA-222-G Section 2.8.2 - Limit State Deformations

1. A rotation of 4 degrees about the vertical axis (twist) or any horizontal axis (sway) of the structure
2. A horizontal displacement (in feet) of 3% of the height of the structure.

Load Case Description	Current		Allowable	
	Sway (degree)	Displacement (Feet)	Sway (degree)	Displacement (Feet)
Service Wind Load	0.1517	0.2603	4.0	5.4

Tower Twist & Sway at Top (Connecticut State Police Requirements –TIA/EIA-222-F):

Description	Current	Total	Allowable
Tower Twist (degrees)	0.1201	**0.7488**	0.750
Tower Sway (degrees)	0.6287		

5. CONCLUSIONS

The results of an initial analysis indicated the existing tower structure, existing anchor bolts and foundation did not have enough capacity for the proposed loading conditions. The tower structure and foundation requires modifications indicated on sheets SK-1 through SK-8. **Once the modifications indicated on sheets SK-1 through SK-8 are performed, the modified structure, anchor bolts and foundation are considered structurally adequate with the wind load classification specified herein with the existing and proposed loading. The controlling structural capacity for all tower and foundation components for the proposed antenna loading after modifications are installed is 98.4%**

The modified tower deflection (sway) is 0.6287 degrees, and the tower rotation (twist) is 0.1201 degrees with a wind velocity of 90 mph concurrent with 0.5" ice. **The tower deflection and rotation are within the Connecticut State Police specification of 0.75 degrees of combined deflection (sway) and rotation (twist).**

Limitations/Assumptions:

This report is based on the following:

1. Tower inventory as listed in this report.
2. Tower is properly installed and maintained.
3. All members are as specified in the original design documents and are in good condition.
4. All required members are in place.
5. All bolts are in place and are properly tightened.
6. Tower is in plumb condition.
7. All member protective coatings are in good condition.
8. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
9. Original tower base anchorage bolts are assumed to be constructed with ASTM A572 Grade 50 steel as indicated within the TIA-222 Assumed Material Standards for towers constructed after 1985 (Annex R; 2017).
10. Foundations are in good condition without defects and were properly constructed to support original design loads as specified in the original design documents.

AECOM is not responsible for any modifications completed prior to or hereafter in which AECOM is not or was not directly involved. Modifications include but are not limited to:

A. Adding antennas
B. Removing/replacing antennas
C. Adding coaxial cables

AECOM hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations, and conclusions are based upon information contained and set forth herein. If you are aware of any information which conflicts with that which is contained herein, or you are aware of any defects arising from original design, material, fabrication, or erection deficiencies, you should disregard this report and immediately contact AECOM. AECOM disclaims all liability for any representation, recommendation, or conclusion not expressly stated herein.

Ongoing and Periodic Inspection and Maintenance:

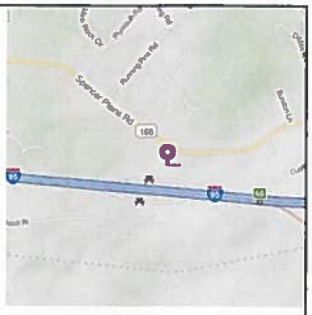
After the Contractor has successfully completed the installation and the work has been accepted, the owner will be responsible for the ongoing and periodic inspection and maintenance of the tower.

The tower owner shall refer to TIA-222-G Section 14.2 for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system be performed at least yearly and more frequently as conditions warrant. It is also recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

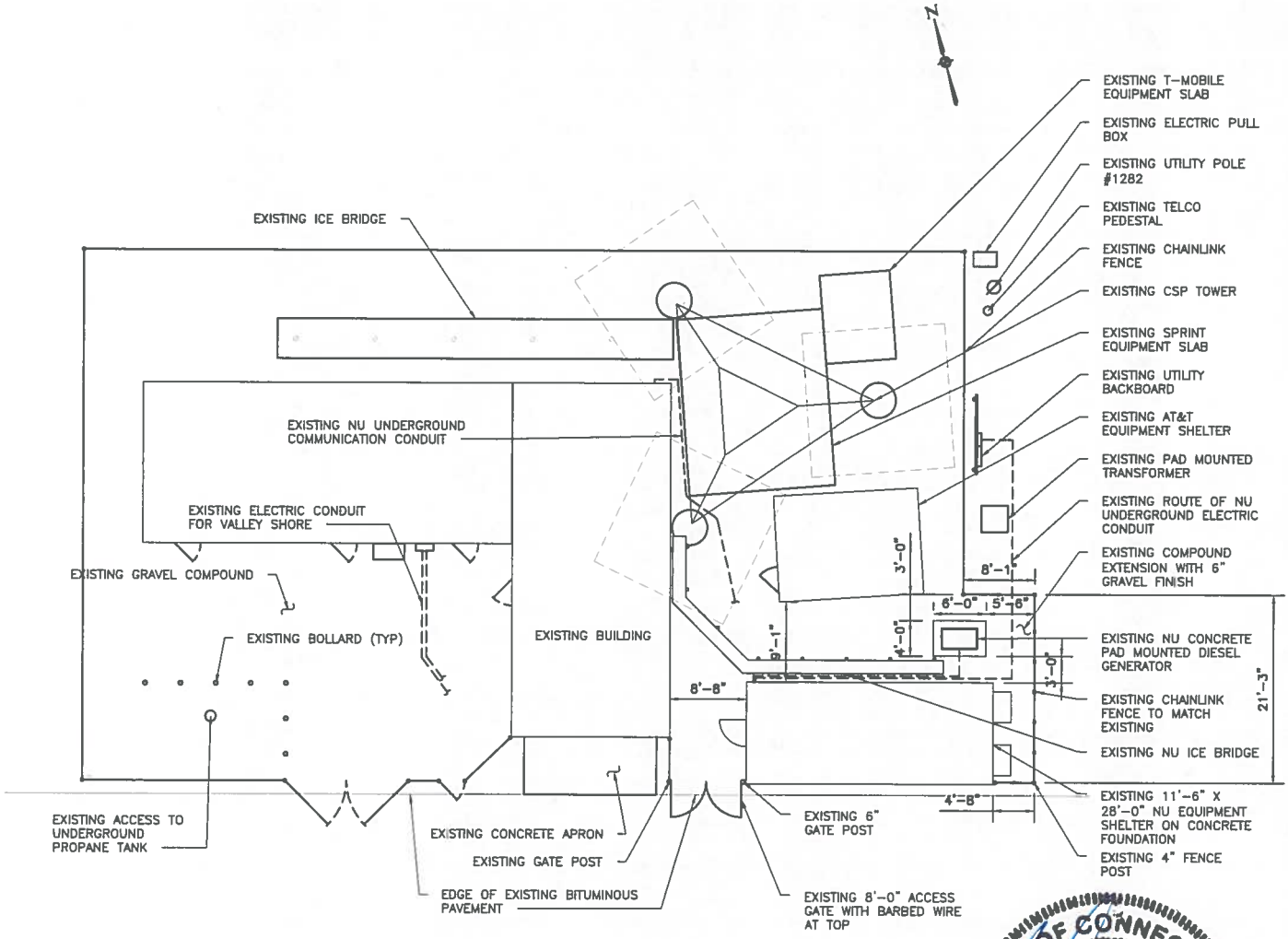
6. DRAWINGS AND DATA

REINFORCEMENT DRAWINGS SK-1 THROUGH SK-8

NOTES:
1. NO ANTENNA INSTALLATION SHALL BE PERMITTED PRIOR TO THE COMPLETION AND APPROVAL OF FOUNDATION AND TOWER REINFORCEMENT WORK.
2. CONTRACTOR SHALL VERIFY EXISTING SHELTERS SHALL NOT INTERFERE WITH INSTALLATION OF EXISTING FOUNDATION WORK. SEE SK-2 FOR FURTHER GENERAL CONSTRUCTION NOTES.



LOCATION PLAN



STATE OF CONNECTICUT
RICHARD A. SAMBOR
No. 9057
LICENSED PROFESSIONAL ENGINEER

1 / SK-1 COMPOUND PLAN
SCALE: 1" = 20'-0"

PROJECT NO.	60604308
Designed by:	MCD
Drawn by:	GAT
Checked by:	ICA
Approved by:	RAS

AECOM
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
(860)-529-8882

T-Mobile

CT11033E
SITE ADDRESS: CSP TOWER #36, 880 POST ROAD EAST
WESTBROOK, CONNECTICUT 06498

REV.	DATE:	DESCRIPTION

Dwg. No. SK-1

Scale: AS NOTED | Date: 06/21/19

Job No. TWM-012 | File No. | Dwg. 1 of 8

GENERAL CONSTRUCTION NOTES

1. ALL WORK SHALL COMPLY WITH THE CONNECTICUT STATE BUILDING AND LIFE SAFETY CODES, SUPPLEMENTS AND AMENDMENTS.
2. CONTRACTOR IS TO REVIEW ALL DRAWINGS AND NOTES 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 SUB-CONTRACTORS AND ALL RELATED PARTIES. THE SUB-CONTRACTORS 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 DRAWINGS OR WRITTEN IN 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 AND ELECTRICAL SUB-CONTRACTORS SHALL PAY FOR THEIR PERMITS.
6. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS ON SITE AT ALL TIMES AND ENSURE THE DISTRIBUTION OF NEW DRAWINGS TO SUB-CONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. CONTRACTOR SHALL FURNISH 'AS-BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
7. INSTALLATION OF THIS WIRELESS COMMUNICATIONS EQUIPMENT SITE REQUIRES WORK IN THE IMMEDIATE VICINITY OF EXISTING OPERATING TELECOMMUNICATION SYSTEMS. THE CONTRACTOR SHALL PROVIDE AND COORDINATE THE METHODS OF PROTECTION WITH THE VARIOUS TELECOMMUNICATION CARRIERS AND THE TOWER OWNER. THERE SHALL BE NO INTERRUPTION OF OPERATION WITHOUT TIMELY COORDINATION WITH AND APPROVAL BY THE VARIOUS COMMUNICATIONS OPERATORS INCLUDING THE CONNECTICUT STATE POLICE.
8. THE REINFORCEMENT OF PORTIONS OF THIS TOWER STRUCTURE WILL AFFECT CRITICAL CONNECTICUT STATE POLICE ANTENNAS. NO MOVEMENT, ALTERATION, OR DISCONNECTION OF CONNECTICUT STATE POLICE ANTENNAS MAY OCCUR WITHOUT THE NOTIFICATION AND APPROVAL OF THE CONNECTICUT STATE POLICE. CONTACT THE NETWORK CONTROL CENTER AT 860-865-8008.
9. TOWER REINFORCING WORK AFFECTING CRITICAL CONNECTICUT STATE POLICE ANTENNAS MAY BE REQUIRED TO BE CONDUCTED AT TIMES AS DETERMINED BY THE REQUIREMENTS OF THE CONNECTICUT STATE POLICE.
10. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUB-CONTRACTORS FOR ANY CONDITION PER MFR'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR ARCHITECT.
11. 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.
12. SHOP DRAWINGS ARE REQUIRED. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS ON THE TOWER AND INCLUDE THE GATHERED INFORMATION ON THE SHOP DRAWINGS. NOTE ANY DISCREPANCIES ENCOUNTERED ON THE SHOP DRAWINGS. NO FABRICATION OR INSTALLATION OF STEEL SHALL OCCUR PRIOR TO THE RECEIPT AND APPROVAL OF SHOP DRAWINGS.
13. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ARCHITECT FOR REVIEW. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTAL TO THE ARCHITECT FOR REVIEW.
14. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURE AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
15. CONTRACTOR TO CONTACT "CALL BEFORE YOU DIG" AT 1-800-922-4455 TO VERIFY AND IDENTIFY THE EXACT LOCATIONS OF ALL UNDERGROUND UTILITIES AND OBSTRUCTIONS IDENTIFIED PRIOR TO COMMENCING WORK IN THE CONTRACT AREA.
16. CONTRACTOR SHALL COMPLY WITH OWNER ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.
17. DIMENSIONS OF EXISTING TOWER ARE BASED ON ORIGINAL TOWER CONSTRUCTION DRAWINGS BY STAINLESS, INC., DATED JUNE 1994, AND ARE NOT GUARANTEED. CONTRACTOR SHALL TAKE FIELD DIMENSIONS AS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK AND SHALL ASSUME FULL RESPONSIBILITY FOR THEIR ACCURACY. SHOP DRAWINGS SHALL CONTAIN FIELD VERIFIED DIMENSIONS. WHEN SHOP DRAWINGS BASED ON FIELD MEASUREMENTS ARE SUBMITTED FOR REVIEW, DIMENSIONS ARE PROVIDED FOR THE ENGINEER'S REFERENCE ONLY.
18. TOWER INVENTORY IS BASED ON INFORMATION OBTAINED FROM CONNECTICUT STATE POLICE DATED AUGUST 2017 AND T-MOBILE DATED APRIL 2019. TOWER MAPPING AND EXISTING INVENTORY OBTAINED FROM D&K NATIONWIDE COMMUNICATIONS, INC. DATED MARCH 19, 2016.
19. CONTRACTOR TO VERIFY REQUIRED CLEARANCES INCLUDING BUT NOT LIMITED TO EXISTING BUILDINGS, EQUIPMENT PADS AND SHELTERS PRIOR TO COMMENCING WORK.
20. THE CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION. NO MEMBER OF THE TOWER SHALL BE LEFT DISCONNECTED FOR THE NEXT WORKING DAY. THE CONTRACTOR SHALL BE AWARE OF WEATHER AND WIND CONDITIONS AND NOT PERFORM MEMBER REPLACEMENT IN A WIND GUSTING MORE THAN 10 MPH.

STRUCTURAL NOTES

STRUCTURAL STEEL MATERIAL:

EXISTING PIPE/TUBE LEG ..... ASTM A500 Gr. C (50ksi) & ASTM A513 (60ksi)
1/3 HSS REINFORCING ..... ASTM 501-Gr. B (50 ksi)
EXISTING PLATES & ANGLES ..... ASTM A36
REPLACEMENT ANGLES ..... ASTM A529 Gr. 50
EXISTING TOWER BOLTS ..... ASTM A325X

STRUCTURAL STEEL SHALL CONFORM TO ALL THE REQUIREMENTS OF THE ASTM SPECIFICATION, AS REFERENCED IN THE CODE.

UNLESS OTHERWISE NOTED, ALL STEEL WILL BE GALVANIZED IN ACCORDANCE WITH ASTM 123 AFTER FABRICATION. TOUCH UP ALL DAMAGED GALVANIZED STEEL WITH APPROVED COLD ZINC, "GALVANOX", "DRY GALV", "ZINC-IT", OR APPROVED EQUIVALENT, IN ACCORDANCE WITH MANUFACTURERS GUIDELINES. TOUCH-UP DAMAGED NON GALVANIZED STEEL WITH SAME PAINT APPLIED IN SHOP OR FIELD.

SHOP AND ERECTION DRAWINGS SHALL BE SUBMITTED FOR ALL STRUCTURAL STEEL WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. SUBMIT 2 SETS OF PRINTS FOR THE ENGINEER REVIEW. REFER TO NOTE 12 ABOVE.

MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.

THE OMISSION OF ANY MATERIAL THAT WAS SHOWN ON THE CONTRACT DRAWINGS SHALL NOT RELIEVE THE CONTRACTOR OF PROVIDING THE SAME.

SOIL:

1. ALL SURFACES MUST BE FREE OF STANDING WATER PRIOR TO PLACING CONCRETE.
2. COMPACTED GRAVEL FILL SHALL COMPLY WITH CONNECTICUT DOT STANDARD SPECIFICATION SECTION M.02.01 AND ASTM D1557.
3. EXCAVATED SOIL SHALL BE PLACED IN 8" LOOSE DEPTH LAYERS AND COMPACTED TO AT LEAST 95% OF THE MAXIMUM DENSITY OBTAINED IN THE STANDARD COMPACTION TEST. BACKFILL MATERIAL SHALL BE FREE OF ORGANIC MATERIAL.

CONCRETE:

ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318 AND THE SPECIFICATION CAST-IN-PLACE CONCRETE.

CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI IN 28 DAYS AND SHALL CONTAIN 5%-7% AIR ENTRAINMENT.

REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60, DEFORMED UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 WELDED STEEL WIRE FABRIC UNLESS NOTED OTHERWISE. SPLICES SHALL BE [illegible] AND ALL HOOKS SHALL BE STANDARD, UNO.

CONCRETE (CONTINUED):

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

- CONCRETE CAST AGAINST EARTH ..... 3 IN.
- CONCRETE EXPOSED TO EARTH OR WEATHER
  - #6 AND LARGER ..... 2 IN.
  - #5 AND SMALLER & WWF ..... 1-1/2 IN.
- CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:
  - SLAB AND WALL ..... 3/4 IN.
  - BEAMS AND COLUMNS ..... 1-1/2 IN.

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

INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR ENGINEERING APPROVAL WHEN DRILLING.

COLD WEATHER PLACING SHALL BE IN ACCORDANCE WITH ACI-305.

NO CONCRETE SHALL BE PLACE ON FROZEN GROUND. UNCURED CONCRETE SHALL BE PROTECTED AGAINST FROST.

CONNECTIONS / FIELD ASSEMBLY:

BOLTED CONNECTIONS: UNLESS OTHERWISE NOTED, ALL JOINTS ARE SLIP CRITICAL TYPE, REQUIRING 5/8", 3/4", 7/8" & 1" DIA. A325N BOLTS, A563 NUTS AND F436 WASHERS, ALL GALVANIZED. BEVELED WASHERS SHALL BE USED ON BEAM FLANGES HAVING A SLOPE GREATER THAN 1:20.

STRUCTURE IS DESIGNED TO BE LEVEL AND PLUMB, SELF-SUPPORTING AND STABLE AFTER WORK IS COMPLETED.

COMMENCEMENT OF WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.

INSPECTIONS:

SPECIAL INSPECTIONS ARE REQUIRED PER THE CODE FOR STRUCTURAL STEEL WORK.

OWNER WILL SUPPLY THE SERVICES OF A SPECIAL INSPECTOR AND TESTING AGENTS AS REQUIRED. CONTRACTOR SHALL COORDINATE INSPECTIONS OF FABRICATOR'S AND ERECTOR'S WORK AND MATERIALS TO MEET THE REQUIREMENTS OF THE STATEMENT OF SPECIAL INSPECTIONS FOR THIS PROJECT.

COPIES OF TESTING AND INSPECTION REPORTS WILL BE PROVIDED TO THE OWNER, BUILDING OFFICIAL, ENGINEER OF RECORD AND CONTRACTOR.

STATE OF CONNECTICUT · RICHARD A. SAMBOR · No. 29057 · LICENSED PROFESSIONAL ENGINEER

PROJECT NO. 60604308
Designed by: MCD
Drawn by: GAT
Checked by: ICA
Approved by: RAS

AECOM
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
(860)-529-8882

T-Mobile

CT11033E
TOWER #36, 880 POST ROAD EAST
WESTBROOK, CONNECTICUT 06498

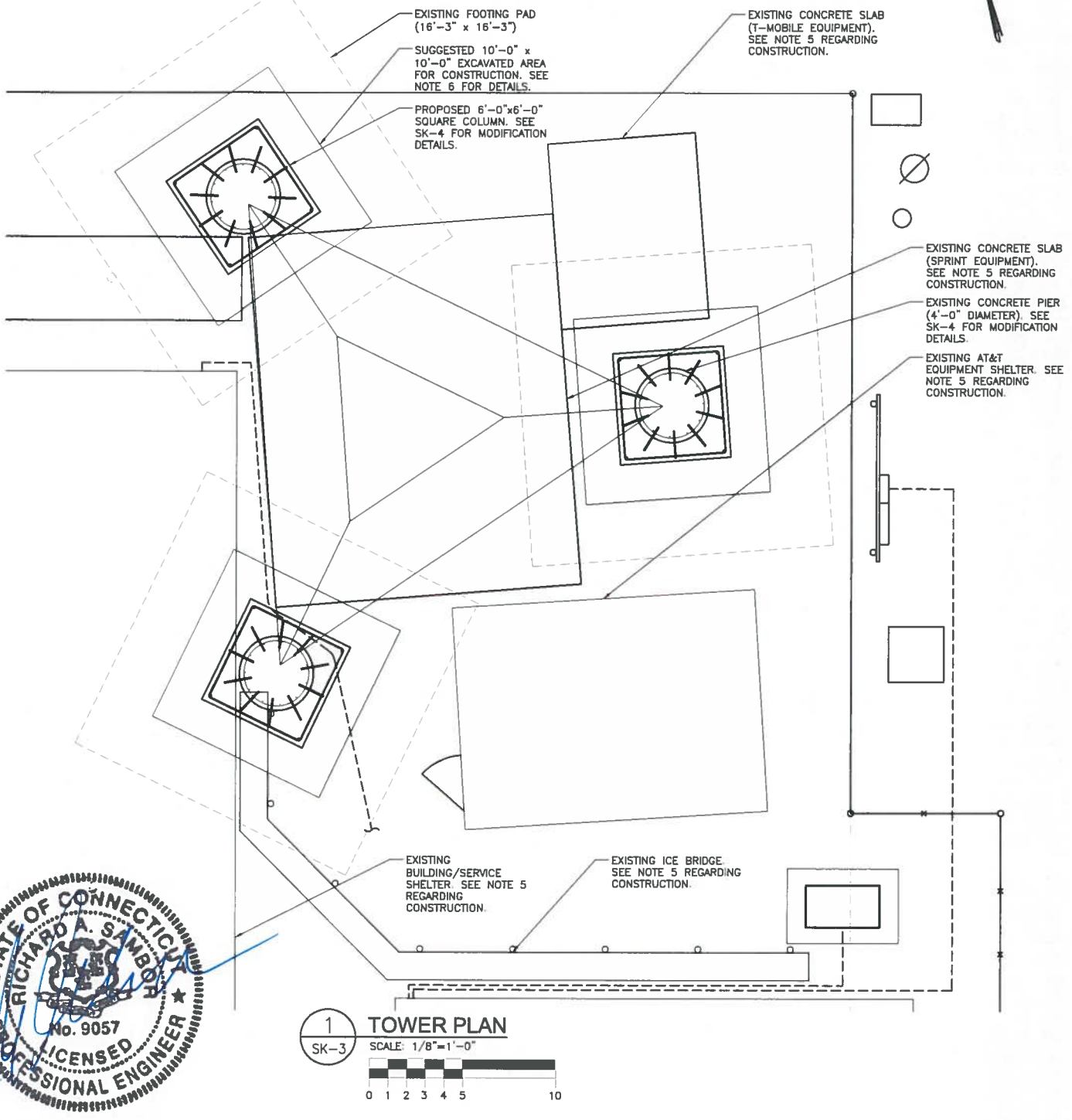
REV.	DATE:	DESCRIPTION

Scale: AS NOTED | Date: 06/21/19
Job No. TWM-012 | File No.

Dwg. No. SK-2
Dwg. 2 of 8

CONSTRUCTION NOTES

1. PRIOR TO SOIL EXCAVATION, CONTRACTOR SHALL CONFIRM THAT NO EXISTING CONDUITS, PIPES, LINES OR ANY OTHER OBJECTS ARE LOCATED WITHIN THE AREA TO BE EXCAVATED. CONTACT CALL BEFORE YOU DIG @ 1-800-922-4455.
2. SITE GROUND WATER IS NOT DOCUMENTED BY SITE SPECIFIC GEOTECHNICIAL REPORT DATED MARCH 24, 2015.
3. CONTRACTOR SHALL BE AWARE OF EXISTING STRUCTURES BEFORE INSTALLATION AND PLAN ON PROTECTING ALL EXISTING STRUCTURES AND EQUIPMENT FROM CONSTRUCTION RELATED DAMAGE.
4. EXISTING FENCES MAY BE PERMITTED TO BE REMOVED TEMPORARILY FOR CONSTRUCTION PURPOSES AND TO BE RE-INSTALLED AFTER CONSTRUCTION MODIFICATIONS ARE COMPLETE
5. EXISTING STRUCTURES (EQUIPMENT/BUILDINGS/SHELTERS/ETC.) WILL REQUIRE TEMPORARY RE-LOCATION DURING CONSTRUCTION AS NOTED. CONTRACTOR IS REQUIRED TO COORDINATE WITH THE OWNERS OF THESE STRUCTURES PRIOR TO SITE CONSTRUCTION TO DETERMINE LOCATIONS OF TEMPORARY RE-LOCATION DURING CONSTRUCTION.
6. TRENCH SHORING SHOWN IS A SUGGESTED WIDTH. CONTRACTOR SHALL DETERMINE THE REQUIRED DIMENSIONS AND MATERIALS FOR TEMPORARY SHORING OF SOIL FOR THE INDICATED REGIONS.
7. CONTRACTOR SHALL COORDINATE WITH SKEET SK-2 FOR CONSTRUCTION NOTES NOT INDICATED ON THIS SHEET.



1 / SK-3 TOWER PLAN

SCALE: 1/8"=1'-0"

0 1 2 3 4 5 10

STATE OF CONNECTICUT
RICHARD A. SAMBOR
No. 9057
LICENSED PROFESSIONAL ENGINEER

PROJECT NO.	60604308
Designed by:	MCD
Drawn by:	GAT
Checked by:	ICA
Approved by:	RAS

AECOM
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
(860)-529-8882

T-Mobile

CT11033E
SITE ADDRESS: CSP TOWER #36, 880 POST ROAD EAST
WESTBROOK, CONNECTICUT 06498

REV.	DATE:	DESCRIPTION

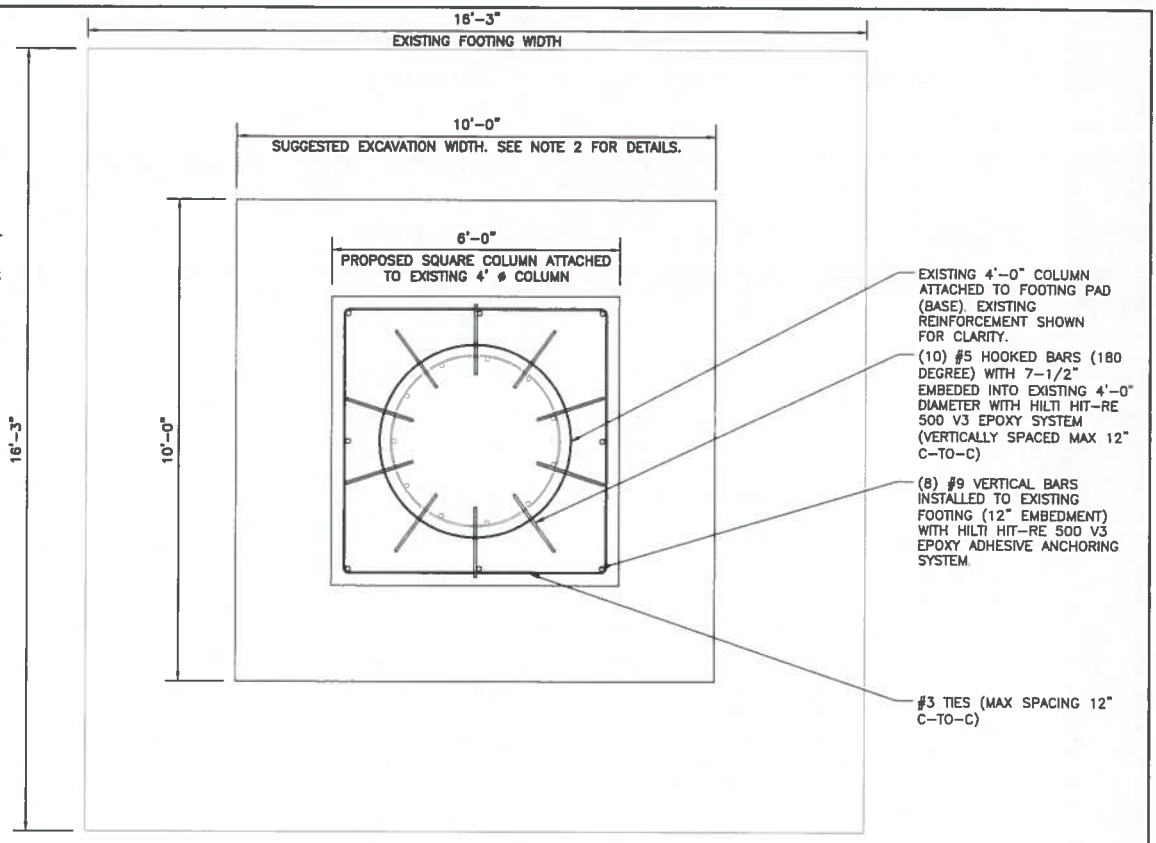
Scale: AS NOTED | Date: 06/21/19

Job No. TWM-012 | File No.

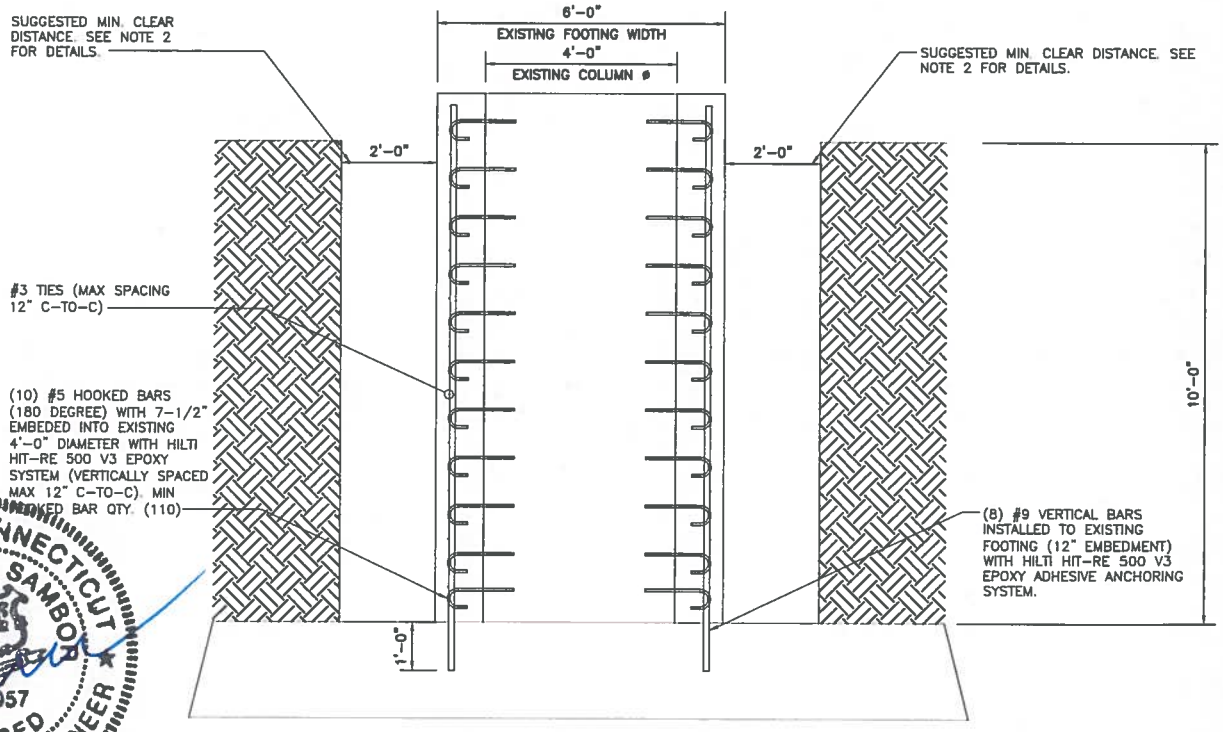
Dwg. No. SK-3

Dwg. 3 of 8

NOTES:
1. REFER TO SK-2 FOR CONSTRUCTION NOTES NOT INDICATED WITHIN THIS SHEET.
2. SUGGESTED EXCAVATION SHOWN SHALL BE DESIGNED BY CONTRACTOR AND SHALL COORDINATE WITH EXISTING SERVICE CARRIERS AND BUILDING STRUCTURES TO DETERMINE CONSTRUCTION SEQUENCING AND METHODS OF EXCAVATION AND REPLACEMENT OF EXCAVATED SOIL.
3. CONTRACTOR SHALL DESIGN AND MAINTAIN TEMPORARY SHORING OF SOIL DURING EXPANSION OF EXISTING FOOTING COLUMN.
4. CONTRACTOR SHALL USE ANY METHODS NECESSARY TO AVOID DRILLING INTO EXISTING REINFORCING STEEL WITHIN THE COLUMN AND FOOTING AS SHOWN ON THIS SHEET. CONTACT ENGINEER IF EXISTING CONDITIONS ARE DIFFERENT THAN INDICATED ON THIS SHEET.



2 / SK-4 FOUNDATION PAD WITH COLUMN - PLAN VIEW
SCALE: 1/4"=1'-0"



1 / SK-4 FOUNDATION PAD WITH COLUMN - ELEVATION VIEW
SCALE: 1/4"=1'-0"

STATE OF CONNECTICUT
RICHARD A. SAMBOR
No. 9057
LICENSED PROFESSIONAL ENGINEER

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Designed by:	MCD
Drawn by:	GAT
Checked by:	ICA
Approved by:	RAS

AECOM
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
(860)-529-8882

T-Mobile

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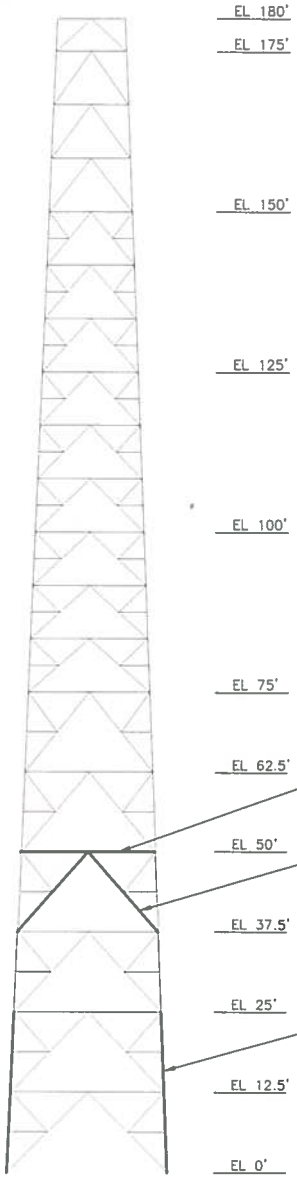
Dwg. No. SK-4

Dwg. 3 of 8

NOTES:

1. REFER TO STRUCTURAL NOTES ON SK-2 FOR STEEL GRADE REQUIREMENT MEMBERS.
2. REINFORCEMENT OF TOWER IS REQUIRED FOR ALL 3 SIDES OF EXISTING TOWER STRUCTURE.
3. CONNECTION BOLTS FOR REPLACEMENT MEMBERS SHALL BE REPLACED IN KIND, UNLESS NOTED OTHERWISE. EXISTING BOLTS SHALL NOT BE RE-USED FOR CONNECTION REPLACEMENT MEMBERS.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE CONSTRUCTION SEQUENCING AND THE STRUCTURAL INTEGRITY OF THE TOWER DURING CONSTRUCTION.
5. DIAGONAL MEMBERS INDICATED FOR ADDITIONAL STITCHING BOLTED CONNECTIONS ASSUMED BOLTS AT MID-POINTS OF MEMBER PRIOR TO PROPOSED ADDITIONAL STITCH CONNECTION BOLTS. CONTRACTOR IS TO FIELD VERIFY THE EXISTING DISTANCES OF EXISTING BOLTS INSTALLED ON EXISTING DOUBLE ANGLES WITH IN THE ELEVATION RANGE 37.5' TO 50' PRIOR TO THE PROPOSED ADDITIONAL CONNECTIONS SHOWN ON SK-6. THE ENGINEER SHALL BE CONTACTED IF FIELD CONDITIONS ARE DIFFERENT THAN THE ASSUMED CONDITIONS.



1 / SK-5 TOWER ELEVATION
SCALE: 1" = 30'-0"

STATE OF CONNECTICUT
RICHARD A. SAMBOR
No. 9057
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO.	60604308
Designed by:	MCD
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Approved by:	RAS

AECOM
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
(860)-529-8882

T-Mobile

CT11033E
SITE ADDRESS: CSP TOWER #36, 880 POST ROAD EAST
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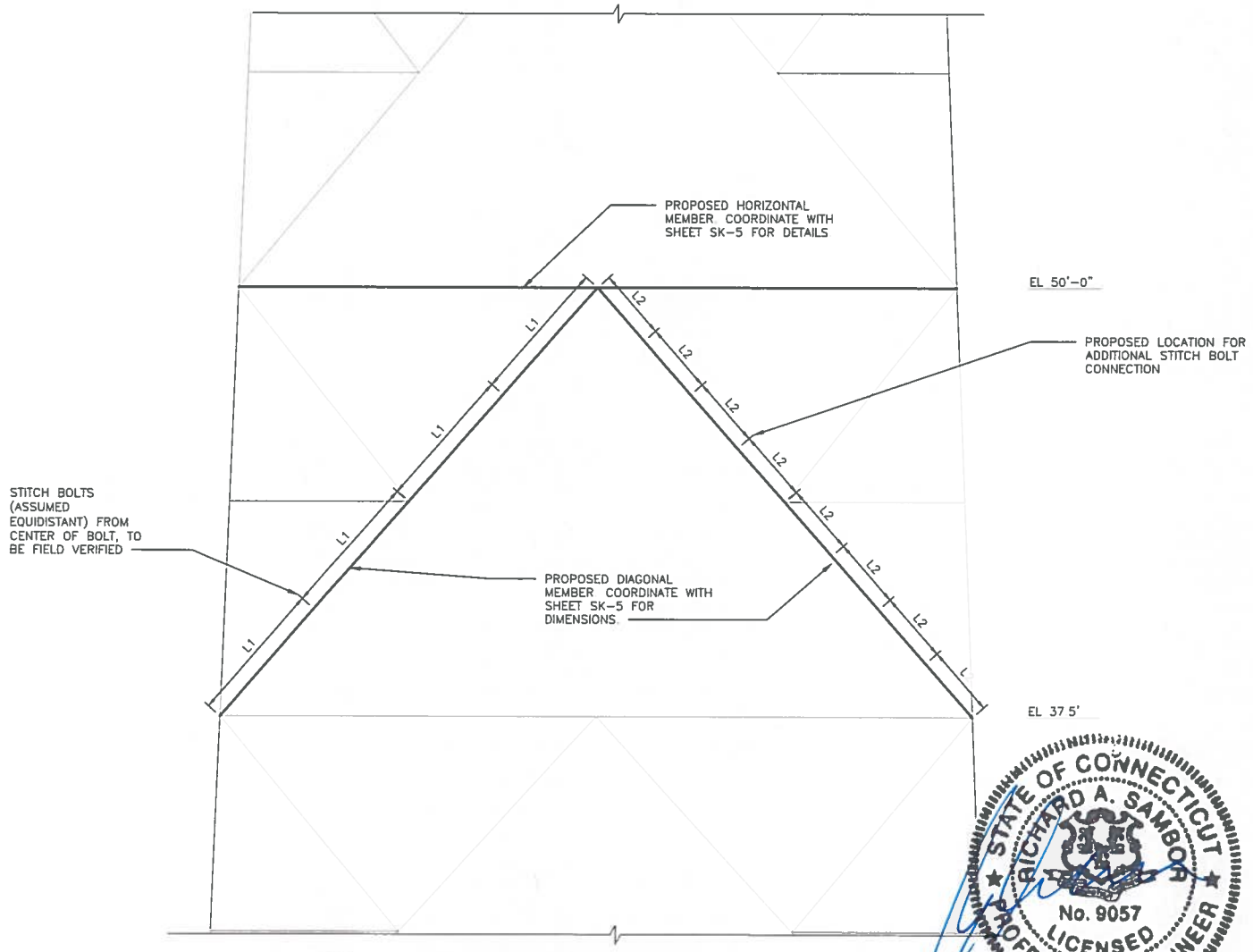
REV.	DATE:	DESCRIPTION

Scale: AS NOTED | Date: 06/21/19
Job No. TWM-012 | File No.

Dwg. No. SK-5

NOTES:
1. DIMENSIONS SHOWN ARE ASSUMED LENGTHS AND SHALL BE FIELD VERIFIED FOR LOCATIONS FROM ENDS PRIOR TO ORDERING MATERIALS FOR INSTALLATION.
2. CONNECTION PLATES BETWEEN BACK-TO-BACK ANGLES FOR PROPOSED LOCATIONS SHALL MATCH EXISTING SPACER PLATE DIMENSIONS AND APPLY 50 KSI STEEL PLATE MATERIALS, UNLESS INDICATED OTHERWISE.
3. REFER TO SK-5 FOR MATERIAL DETAILS NOT INDICATED ON THIS SHEET.
4. DETAILS FOR ADDITIONAL STITCH BOLTS APPLY TO ALL (MAIN) DIAGONAL MEMBERS WITHIN THE 37.5' TO 50' REGION.
5. LENGTH OF L2 IS INTENDED AS APPROXIMATELY HALF THE LENGTH OF L1 SHOWN BELOW. CONTRACTOR SHALL FIELD VERIFY INSTALLATION OF PROPOSED LOCATIONS INDICATED ON THIS SHEET.



1 SK-6 TOWER ELEVATION (ELEVATION 0'-25' REGION)
SCALE: 1" = 5'-0"

STATE OF CONNECTICUT
RICHARD A. SAMBOR
No. 9057
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO.	60604308
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AECOM
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
(860)-529-8882

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REV.	DATE:	DESCRIPTION

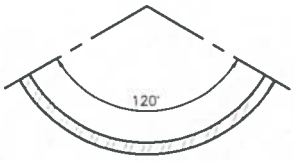
Scale: AS NOTED | Date: 06/21/19
Job No. TWM-012 | File No.

Dwg. No. SK-6
Dwg. 6 of 8

ELEVATION	TOWER LEG DIAMETER HSS TUBE EXISTING LEG SIZE (IN)	HSS TUBE REINFORCING DIMENSIONS (IN)	MINIMUM # U-BOLTS AT ENDS OF 25' SECTION SPACED AS INDICATED C-TO-C (# PER TOWER LEG)	MINIMUM U-BOLTS REMAIN PER LEG	TOTAL U-BOLTS PER LEG PER 25' SECTION	DIAMETER U-BOLTS (IN)	MINIMUM SPACING REMAINING U-BOLTS C-TO-C (IN)	MAXIMUM SPACING REMAINING U-BOLTS C-TO-C (IN)	INSTALLING PRETENSION FORCE ON U-BOLT CONNECTION (KIPS) (LRFD)
0' - 25'	6.875x0.5	7.5x0.3125	5	27	37	5/8	9	12	6.8

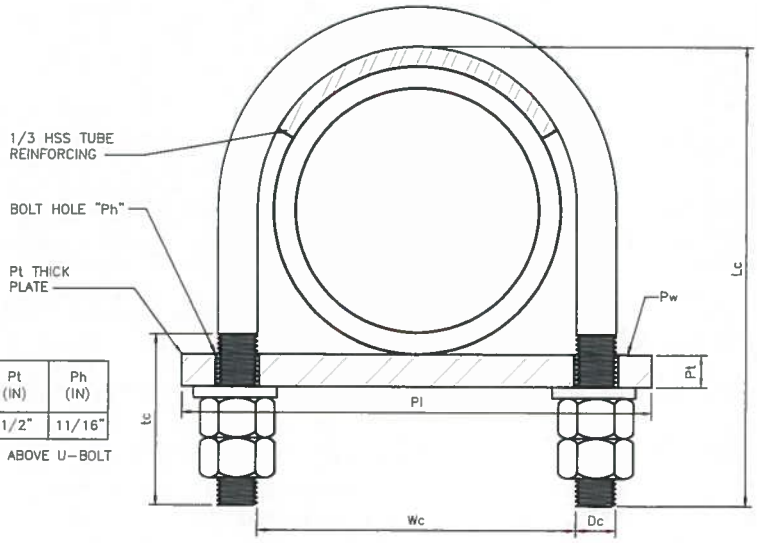
GENERAL NOTE:
SEE SK-2 FOR ADDITIONAL CONSTRUCTION NOTES.

NOTES:
- U-BOLTS SHALL MEET THE STRENGTH REQUIREMENTS OF ASTM A449. BASIS OF DESIGN IS PORTLAND BOLT OF PORTLAND, OREGON, USA. ALTERNATIVE SUPPLIER SHALL MATCH OR EXCEED QUALITY OF PORTLAND BOLT
- CONTRACTOR SHALL TAKE SPECIFIC CARE WHEN INSTALLING U-BOLTS AND NOT ALLOW ANY VISUAL DEFORMATION OF THE EXISTING TOWER LEG MEMBERS.
- THE 1/3 (ONE-THIRD) HSS TUBE REFERS TO THE REQUIRED PORTION OF HSS TUBING TO BE INSTALLED FOR REINFORCING.
- SPACING DIMENSIONS FOR U-BOLTS ARE MAXIMUM ALLOWABLE DISTANCES (CENTER-TO-CENTER). ADDITIONAL U-BOLTS MAY BE REQUIRED DUE TO INTERRUPTION CAUSED BY EXISTING TOWER CONDITIONS. SHOP DRAWINGS SHALL ILLUSTRATE ACTUAL BOLT SPACING REQUIRED BASED ON VERIFIED FIELD CONDITIONS.
- 1/3 HSS TUBES SHALL BE CONTINUOUS, SINGLE PIECE MEMBERS APPROXIMATELY 25' LENGTH (TO BE FIELD VERIFIED BEFORE ORDERING).



PLAN VIEW OF 1/3 HSS TUBE

2 / SK-7 **HSS TUBE DETAILS**
SCALE: N.T.S.



TOWER LEG DIAMETER (IN)	HSS REINFORCING O.D. (IN)	ELEVATION	Dc (IN)	Lc (IN)	Wc (IN)	tc (IN)	Pl (IN)	Pw (IN)	Pt (IN)	Ph (IN)
6.875	7.5	0'-25'	5/8"	9-3/4"	7-1/2"	3"	10-1/8"	2-1/4"	1/2"	11/16"

NOTE: U-BOLT ATTACHMENT PLATE MATERIAL SHALL BE MINIMUM 50 KSI. COORDINATE WITH ABOVE U-BOLT TABLE FOR QUANTITIES AND SPACING OF U-BOLT FOR ASSEMBLY.

1 / SK-7 **U-BOLT FOR LEG REINFORCEMENT**
SCALE: N.T.S.

PROJECT NO. 60604308
Designed by: MCD
Drawn by: GAT
Checked by: ICA
Approved by: RAS

AECOM
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
(860)-529-8882

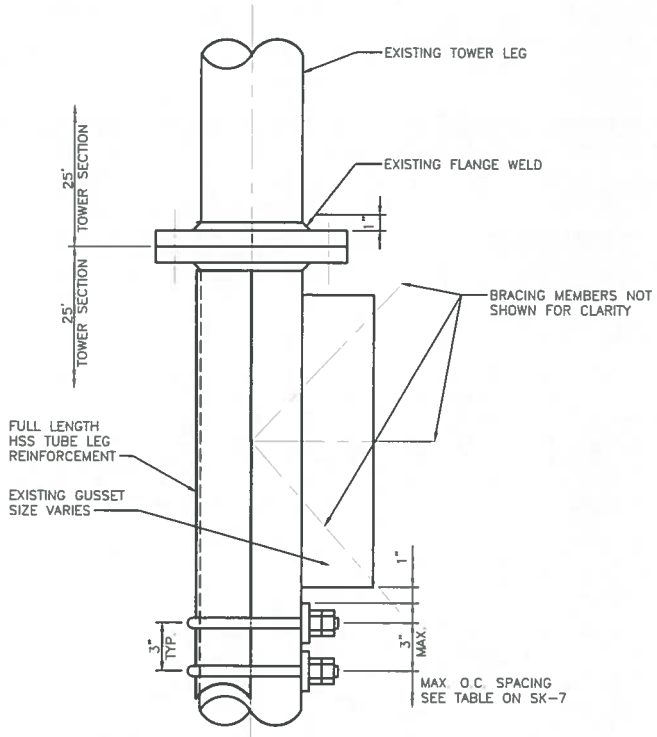
T-Mobile

CT11033E
SITE ADDRESS: CSP TOWER #36, 880 POST ROAD EAST
WESTBROOK, CONNECTICUT 06498

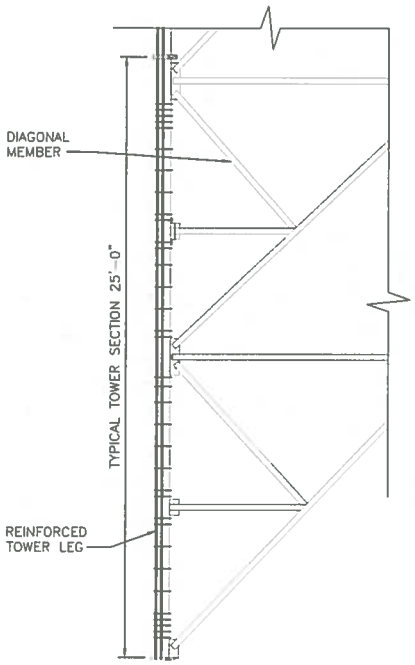
REV.	DATE:	DESCRIPTION

Scale: AS NOTED | Date: 06/21/19
Job No. TWM-012 | File No.

Dwg. No. SK-7
Dwg. 7 of 8



2 / SK-8 **REINFORCEMENT DETAIL**
SCALE: 1" = 1'-0"



1 / SK-8 **DIAGRAMATIC U-BOLT LAYOUT AT TOWER SECTIONS**
SCALE: 1/8" = 1'-0"

PROJECT NO.	60604308
Designed by:	MCD
Drawn by:	GAT
Checked by:	ICA
Approved by:	RAS

AECOM
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
(860)-529-8882

T-Mobile

CT11033E
SITE ADDRESS: CSP TOWER #36, 880 POST ROAD EAST
WESTBROOK, CONNECTICUT 06498

REV.	DATE:	DESCRIPTION

Scale: AS NOTED | Date: 06/21/19
Job No. TWM-012 | File No.

Dwg. No. SK-8

Dwg. 8 of 8

U-BOLTED CONNECTION CALCULATIONS

Leg Property - HSS 6.8750x0.5 with Built up 1/3 HSS 7.50x0.3125 (Elevations 0' - 25')

$Height_{sect} := 7.1875\,in$ $D_{Leg} := 6.8750\,in$

$Width_{sect} := 6.8750\,in$

$WindApplied := \max(Height_{sect}, Width_{sect}) = 7.1875\,in$

$Perimeter_{sect} := 41.3348\,in$

$Steel_{Modulus} := 29000\,ksi$

$Steel_{Density} := 490\,pcf$

$Section_{Area} := 12.3659\,in^2$

$I_{x.Section} := 68.7371\,in^4$

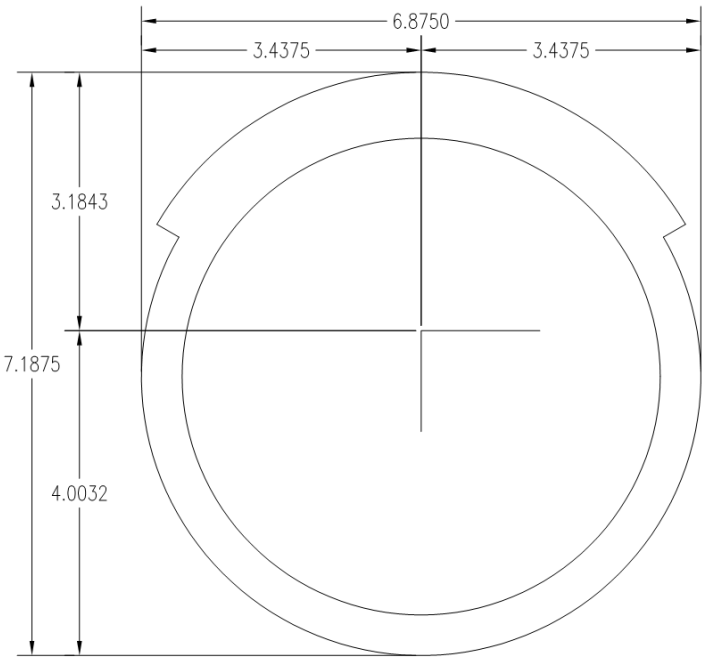
$I_{y.Section} := 60.1080\,in^4$

$d_{yT.Section} := 3.4375\,in$

$d_{yB.Section} := 3.4375\,in$

$d_{xT.Section} := 3.1843\,in$

$d_{xB.Section} := 4.0032\,in$



$$S_{y.TOP.Section} := \frac{I_{y.Section}}{d_{yT.Section}} = 17.48598982 \cdot in^3$$

$$S_{y.BOTTOM.Section} := \frac{I_{y.Section}}{d_{yB.Section}} = 17.48598982 \cdot in^3$$

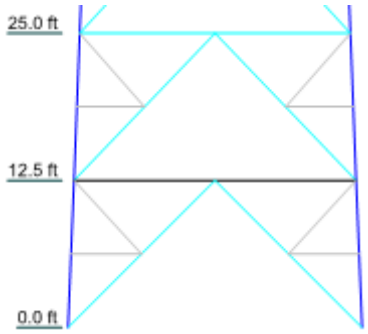
$$S_{x.TOP.Section} := \frac{I_{x.Section}}{d_{xT.Section}} = 21.5862513 \cdot in^3$$

$$S_{x.BOTTOM.Section} := \frac{I_{x.Section}}{d_{xB.Section}} = 17.17053857 \cdot in^3$$

NOTE: The intent of this additional steel identified as HSS 7.50x0.3125 is additional steel required to address the Connecticut State Police requirment for combined Twist and Sway to be below 0.75 degrees.

The following calculation is shown to determine the maximum number of clamps required for a development length at the end of the reinforcing member (similar to welds at ends of built-up sections).
Per TIA-222 Standard, the use of AISC Group "A" bolts shall be considered as design criteria for the number of bolts required for installation.

Elevation Length --> $L_{total} := 25ft$



Number of Bays within Elevation Region -->

$Num_{bays} := 4$

Maximum Length of unbraced Leg-->

$$L_{max.Unbraced} := \frac{L_{total}}{Num_{bays}} = 75 \cdot in$$

Existing Leg - Prior to MODification --> 6.8750 O.D. x 0.500" (t) (60 ksi Yield Strength) - Reference: Sheet E-4 (Stainless Inc. - Report # 358811)

$K_{unbraced} := 1.0$ (Conservative Assumption)

$r_{existing.leg} := 2.27in$

$F_{y.leg} := 60ksi$

$A_{existing.leg} := 10.0138in^2$

NOTE: Because the existing Leg is 60 ksi, the effective leg strength is to apply AISC Chapter E.

Slenderness Check [AISC B4.1a]

$$Slenderness_{CHECK} := if\left(\frac{6.8750in}{0.5in} < 0.11 \cdot \frac{Steel_{Modulus}}{F_{y.leg}}, "Not\ Slender - Compression", "Slender - Compression"\right)$$

$Slenderness_{CHECK} = "Not\ Slender - Compression"$

For Non-Slender Members, Apply AISC Equation E3-2

$$\frac{K_{unbraced} \cdot L_{max.Unbraced}}{r_{existing.leg}} = 33.04$$

$$F_e := \frac{\pi^2 \cdot 29000ksi}{\left(\frac{K_{unbraced} \cdot L_{max.Unbraced}}{r_{existing.leg}}\right)^2} = 262.2 \cdot ksi$$

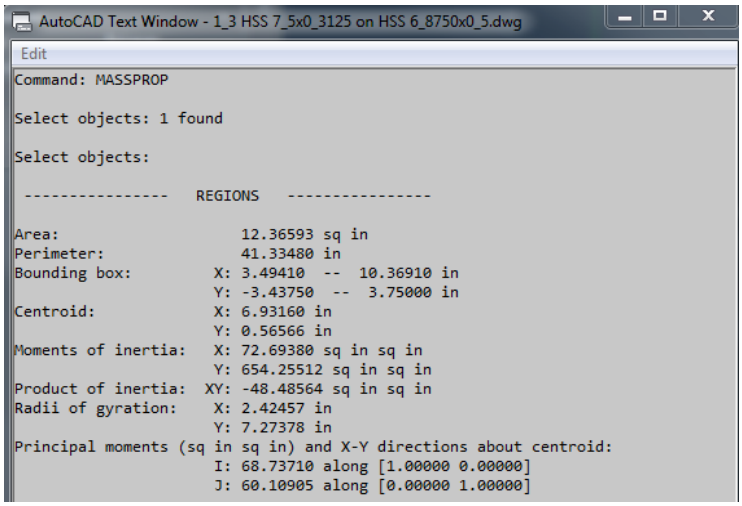
$$F_{cr} := \left[0.658^{\left(\frac{F_{y.leg}}{F_e}\right)}\right] \cdot F_{y.leg} = 54.52 \cdot ksi$$

Existing Leg Strength - Prior to MODification --> (ϕ = 0.90 - Compression - LRFD [AISC Chapter E])

$P_{Str.Leg} := 0.90 \cdot F_{cr} \cdot A_{existing.leg} = 491.36 \cdot kip$

Built-up / Reinforcement Section additional to the existing Leg member:

Determine governing radius of gyration of material:



$$A_{reinf} := 12.36593\,in^2$$

$$I_{x.reinf} := 68.73710\,in^4$$

$$I_{y.reinf} := 60.10905\,in^4$$

$$r_{design.reinf} := \min\left(\sqrt{\frac{I_{x.reinf}}{A_{reinf}}}, \sqrt{\frac{I_{y.reinf}}{A_{reinf}}}\right) = 2.2\cdot in$$

$$\frac{K_{unbraced}\cdot L_{max.Unbraced}}{r_{design.reinf}} = 34.02$$

NOTE: For ASTM A500 Grade C, Round HSS min Fy = 46 ksi. 50 ksi used for "developed end" calculations only

$$F_y := 50\,ksi$$

$$F_{e.reinf} := \frac{\pi^2\cdot 29000\,ksi}{\left(\frac{K_{unbraced}\cdot L_{max.Unbraced}}{r_{design.reinf}}\right)^2} = 247.34\cdot ksi$$

$$F_{cr.BU} := \left[0.658^{\left(\frac{F_y}{F_{e.reinf}}\right)}\right]\cdot F_y = 45.94\cdot ksi$$

Existing Leg Strength - Prior to MODification --> (ϕ = 0.90 - Compression - LRFD [AISC Chapter E])

$$P_{Str.Reinf} := 0.90\cdot F_{cr.BU}\cdot A_{reinf} = 511.32\cdot kip$$

Difference in materials required to be Developed at end points of reinforcing:

$$U_{Bolt.Design.Force} := P_{Str.Reinf} - P_{Str.Leg} = 19.96\cdot kip$$

TIA-222-G U-Bolt Strength Design Check:

$$\left(\frac{V_{us}}{\phi_u \cdot R_{ns}}\right)^2 + \left(\frac{T_{ur}}{\phi_u \cdot R_{nr}}\right)^2 \le 1.0$$

$V_{us} := U_{Bolt.Design.Force}$

$T_{ur} := 0kip$

$F_{y.UBolt} := 92ksi$ $dia_{UBolt} := \frac{5}{8}in$

$FU_{UBolt} := 120ksi$ $A_{g.UBolt} := \left(\frac{\pi}{4}\right)\cdot\left(dia_{UBolt}\right)^2$

$\phi_u := 1.00$

$N_{UBolt.Ends} := 5$ $R_{ns} := 0.30\cdot\left(2\cdot T_p - T_{ut}\right)$

$T_{ut} := 0kip$

$T_p := 6800lbf$ <-- Installation Pretension Force - **Manual Input**

$R_{ns} := 0.30\cdot\left(2\cdot T_p - T_{ut}\right)$ $R_{ns} = 4.08\cdot kip$

Maximum U-Bolt Tension Capacity, where the tensile capacity of each leg of the U-Bolt shall not exceed 0.85 Fy*Ag of bolt used.

$Check_{UBolt} := if\left(T_p < 0.85\cdot F_{y.UBolt}\cdot A_{g.UBolt}, "OK for Use", "NOT ok for Use"\right)$ $Check_{UBolt} = "OK for Use"$

$R_{nr} := 0.5\cdot D_{Leg}\cdot R_{ns}$

$$UBolt_{Str.Ratio} := \left(\frac{\frac{V_{us}}{N_{UBolt.Ends}}}{\phi_u \cdot R_{ns}}\right)^2 + \left(\frac{T_{ur}}{\phi_u \cdot R_{nr}}\right)^2$$

$UBolt_{Str.Ratio} = 0.96$

$Check_{UBolt} := if\left(UBolt_{Str.Ratio} \le 1.0, "OK for Use", "NOT ok for Use"\right)$ $Check_{UBolt} = "OK for Use"$

CHECK Existing Leg Capacity for Pipe Crushing Capacity (localized impact) to select maximum permissible U-Bolt Diameter Limit:

$$R_u := \phi\cdot\left[5.5\cdot F_y\cdot t^2\left(1 + 0.25\cdot\frac{l_b}{D}\right)\cdot Q_f\right]$$ [AISC Equation K1-2]

$F_{y.leg} = 60\cdot ksi$

$D := 6.875in$

$t := 0.5in$

$l_b := 0in$ (Conservative Assumption)

$U := 1$ Assuming @ Capacity value (Conservative Assumption)

$Q_f := 1 - 0.3\cdot U\cdot(1 + U)$ $Q_f = 0.4$ [AISC Equation K1-5]

$$R_{u.crushingHSS} := 0.9\cdot\left[5.5\cdot F_{y.leg}\cdot t^2\left(1 + 0.25\cdot\frac{l_b}{D}\right)\cdot Q_f\right]$$ $R_{u.crushingHSS} = 29.7\cdot kip$

$Check_{UBolt.Leg} := if\left(2\cdot T_p < R_{u.crushingHSS}, "OK for Use", "NOT ok for Use"\right)$ $Check_{UBolt.Leg} = "OK for Use"$

CHECK Plastic Bending Capacity of connecting Plates to hold U-Bolt and Clamped reinforcing pipe to leg:

$$\sigma := \frac{M}{Z} = \frac{\frac{P \cdot L}{4}}{\left(\frac{b \cdot d^2}{4}\right)} \quad \text{---->} \quad P := \frac{4 \cdot (0.9 \cdot \sigma) \cdot \left(\frac{b \cdot d^2}{4}\right)}{L}$$

$\sigma := 50000\text{psi}$ $d_{Plate.Thick} := 0.75\text{in}$

$b_{PlateHeight} := 2.25\text{in}$ $L_{clamp.ends} := 8.1250\text{in}$

$$P_{U\_Bolt.Plate} := \frac{4 \cdot (0.9 \cdot \sigma) \cdot \left(\frac{b_{PlateHeight} \cdot d_{Plate.Thick}^2}{4}\right)}{L_{clamp.ends}} = 7009.62 \cdot \text{lbf}$$

$\text{Check}_{UBolt.Plate} := \text{if}\left(T_p < P_{U\_Bolt.Plate}, \text{"OK for Use"}, \text{"NOT ok for Use"}\right)$ $\text{Check}_{UBolt.Plate} = \text{"OK for Use"}$

U-Bolt CHECK Summary for all parts of U-bolting to address Reinforcing Tube at ends to develop Reinforcement properties

$\text{Check}_{UBolt} = \text{"OK for Use"}$ $\dfrac{T_p}{\left(0.85 \cdot F_{y.UBolt} \cdot A_{g.UBolt}\right)} = 0.28$

$\text{Check}_{UBolt.Leg} = \text{"OK for Use"}$ $\dfrac{2 \cdot T_p}{R_{u.crushingHSS}} = 0.46$

$\text{Check}_{UBolt.Plate} = \text{"OK for Use"}$ $\dfrac{T_p}{P_{U\_Bolt.Plate}} = 0.97$

$\text{Check}_{UBolt} = \text{"OK for Use"}$

$\text{UBolt}_{Str.Ratio} = 0.96$

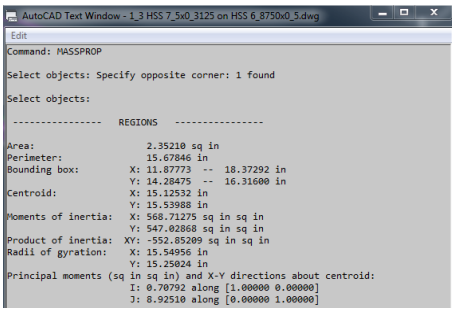
Design Required for Remainder of Clamps required for installation to keep Reinforcement attached to Leg:

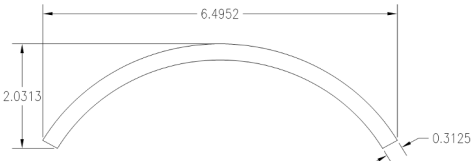
Consider --> 1/3 HSS 7.5x0.3125

$I_{x.Pipe} := 0.70792\,in^4$

$I_{y.Pipe} := 8.92510\,in^4$

$A_{pipe} := 2.35210\,in^2$





$$r_{design.Pipe} := \min\left(\sqrt{\frac{I_{x.Pipe}}{A_{pipe}}}, \sqrt{\frac{I_{y.Pipe}}{A_{pipe}}}\right) = 0.55\cdot in$$

Determine the minimum number of clamps per bay to keep the effective strength of the "bonded" bracing ends:

$$KL_{Leg} := \frac{K_{unbraced}\cdot L_{max.Unbraced}}{r_{existing.leg}} = 33.04$$

Enter Minimum # of clamps here ---> $Num_{clamps.min} := 6$

$$KL_{Reinf} := \frac{\frac{L_{max.Unbraced}}{(Num_{clamps.min}-1)}}{r_{design.Pipe}} = 27.34$$

$Min_{clamps} := if\left(KL_{Reinf} < KL_{Leg}, \text{"Number of Clamps Determined"}, \text{"Add clamp"}\right)$

$Min_{clamps} = \text{"Number of Clamps Determined"}$

Determine maximim of separation of u-bolts per bay to keep effective strength of the "bonded bracing ends:

$\frac{L_{max.Unbraced}}{Num_{clamps.min}} = 12.5\cdot in$ The figure to the left is always considered rounded down. This indicates the maximum permissible spacing of any U-bolt clamps not associated to the "bonding" ends of the reinforcement to the tower structure.

SEISMIC BASE SHEAR ANALYSIS

AECOM

Seismic (Vs) Base Shear Implementing ANSI/TIA–222-G, IBC 2015 & Connecticut State Building Code of 2018

Calculation of Seismic Base Shear Implementing ANSI/TIA-222-G, IBC 2015 & CT State Building Code 2018.

Location: Westbrook, CT -Site Class "D"

$S_{DS} = \frac{2}{3} F_A S_S$, where $S_S = 0.167$ and $F_A = 1.6$ $S_{DS} = \frac{2}{3} F_A S_S = \frac{2}{3} * 1.6 * 0.167 = 0.178$

$S_{D1} = \frac{2}{3} F_V S_1$, where $S_1 = 0.059$ and $F_V = 2.4$ $S_{D1} = \frac{2}{3} F_V S_1 = \frac{2}{3} * 2.4 * 0.059 = 0.0944$

TIA-222-G SECTION 2.7 EARTHQUAKE LOADS (PROCEDURES):

1. Importance Factor "I" (tables 2-3 TIA-222-G) = 1.5 (Structure Class 3)

ANSI/TIA-222-G 2.7.7.1 (TOTAL BASE SEISMIC SHEAR (Vs)

W=DL TOWER	= 40.092	Kips	
W=Antennas/Mounts	= 10.859	Kips	
W=Cables	= 6.934	Kips	
	57.885	Kips	= WT Total = "W"

$$V_s = \frac{S_{DS} * W * I}{R} = \frac{0.178 * 57.885 kips * 1.5}{3.0} = 5.1518 \ kips,$$ where R = 3.0 for Lattice Tower

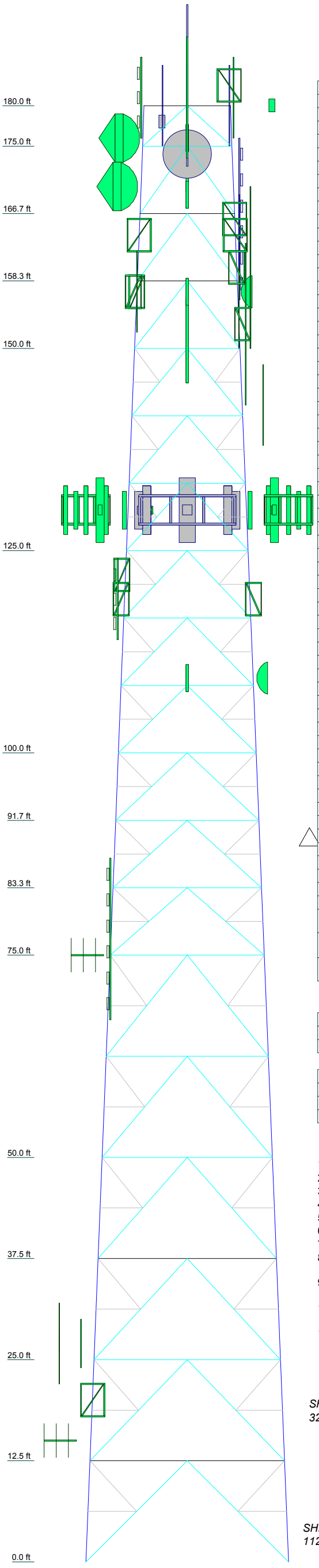
$$V_{S.min} = \frac{0.5 * S_{D1} * W * I}{R} = \frac{0.5 * 0.0944 * 57.885 kips * 1.5}{3.0} = 2.7322 \quad kips$$

*By visual inspection, the above "Base Shear" value when considering the following Load Combination is less that the base shear of wind on structure.

$1.2 * DL + 1.0\ E < 1.2\ DL + 1.6\ W$, (112 Kips), therefore seismic effect on structure Does NOT control Design.

TNX TOWER INPUT / OUPUT SUMMARY

Section	T14	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1	
Legs	B		Stainless P5x0.500		Stainless P6.875x0.400	1/3 Pipe w/ 5"x0.5 Stainless		A	Stainless P5x0.400	Stainless P5x0.300		Stainless P5x0.250			
Leg Grade	A500-50			A572-60		A500-42				A513-50					
Diagonals	2L3 1/2x3 1/2x5/16x3/8			2L3 1/2x3 1/2x5/16x3/8		2L3 1/2x3 1/2x5/16x3/8		2L3x2 1/2x1/4x3/8		2L2 1/2x2 1/2x3/16x3/8					
Diagonal Grade	A529-50			A36		A529-50									
Top Girts	2L4x4x5/16	N.A.	2L4x4x1/4	L4x4x5/16	L4x4x1/4		2L3x3x1/4		L3x3x5/16	L2 1/2x2 1/2x3/16	N.A.	C	N.A.	L3x3x1/4	
Horizontals	N.A.	L4x4x3/8	N.A.					N.A.				N.A.			
Red. Horizontals				L2 1/2x2 1/2x3/16					L2x2x3/16						
Red. Diagonals	L3x3x1/4				L2 1/2x2 1/2x3/16			N.A.	L2x2x3/16			11.6667		10.599	
Inner Bracing	L3x3x1/4				L2 1/2x2 1/2x3/16				L2 1/2x2x3/16						
Face Width (ft)	24	23	22	21	19	18.3333	17.6667	17	15	13	12.3333	11		1 @ 5	592.3
# Panels @ (ft)			6 @ 12.5						12 @ 8.33333						755.5
Weight (lb)	40791.2	4801.1	3853.2	3450.3	6256.5	2217.6	2177.7	1971.3	4822.1	3994.8	780.9	768.1			



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION
3" Dia 20' Omni (DNK-57)	182.5
6' Side-Arm(1) (DNK-57)	182.5
6' Side-Arm(1) (DNK-57)	182.5
1" Dia 8' Omni (DNK-58)	182
2" Dia 10' Omni (DNK-52)	181
2" Dia 10' Omni (DNK-53)	181
10' - 2 Bay Dipole (DNK-54)	181
20' 4-Bay Dipole (DNK-55)	181
Lightning Rod 2"x15' (DNK-56)	181
3" Dia 12' Omni (DNK-48)	180
3" Dia 12' Omni (DNK-49)	180
432E-83I-01T TTA Unit (DNK-50)	180
1 Bay Dipole ANT400D (DNK-51)	180
432E-83I-01T TTA Unit (DNK-47)	178
3'4"x4" Pipe Mount (DNK-45)	176
6' w/Radome (DNK-45)	176
6' w/Radome (DNK-44)	174
3'4"x4" Pipe Mount (DNK-44)	171
Andrew 6' w/Radome (DNK-43)	170
3'4"x4" Pipe Mount (DNK-43)	169
6' Side-Arm(1) (DNK-40,41)	166
6' Side-Arm(1) (DNK-40,41)	166
(inverted) 10' 8 Bay Di-Pole (DNK-40,41)	166
(inverted) 2" Dia 10' Omni (DNK-42)	164
6' Side-Arm(1) (DNK-42)	164
6' Side-Arm(1) (DNK-42)	164
(Inverted) 3" Dia 20' Omni (DNK-38)	160
2' Sidearm (DNK-38,39)	160
(Inverted) 3" Dia 20' Omni (DNK-39)	160
2" Dia 10' Omni (DNK-35)	157
2' Sidearm (DNK-35)	157
10'x6" Dipole Antenna (DNK-36)	157
1' Side Arm (DNK-36)	157
3'4"x4" Pipe Mount (DNK-37)	157
4' Paraflector (DNK-37)	157
3" Dia 20' Omni (DNK-33)	153
1' Side Arm (DNK-33)	153
1.5" Dia 16' Omni (DNK-33)	153
1 Bay Dipole ANT400D (DNK-34)	151
10'6"x4" Pipe Mount (DNK-34)	151
Pirod 4' Side Mount Standoff (1) (DNK-32)	143
AM-X-CD-14-65-00T-RET ((DNK 19-32)/ATT)	143
Raycap Surge Suppressor ((DNK 19-32)/ATT)	143
RRUS-12 ((DNK 19-32)/ATT)	143
RRUS-12 ((DNK 19-32)/ATT)	143
RRUS-12 ((DNK 19-32)/ATT)	143
RRUS-11 ((DNK 19-32)/ATT)	143
AM-X-CD-14-65-00T-RET ((DNK 19-32)/ATT)	143
AM-X-CD-14-65-00T-RET ((DNK 19-32)/ATT)	143
(2) 7770 w mount pipe ((DNK 19-32)/ATT)	143
(2) TMA (shielded) ((DNK 19-32)/ATT)	143
(2) TMA (shielded) ((DNK 19-32)/ATT)	143
(2) TMA (shielded) ((DNK 19-32)/ATT)	143
RRUS-11 ((DNK 19-32)/ATT)	143
RRUS-11 ((DNK 19-32)/ATT)	143
(2) 7770 w mount pipe ((DNK 19-32)/ATT)	143
13' Sector Mount (1) ((DNK 19-32)/ATT)	143
13' Sector Mount (1) ((DNK 19-32)/ATT)	143
13' Sector Mount (1) ((DNK 19-32)/ATT)	143
(2) 7770 w mount pipe ((DNK 19-32)/ATT)	143
2" Dia 10' Omni (DNK-32)	143
Pirod 12' PCS T-Frame (1) 104569 ((DNK 14-19)/Sprint)	137
Pirod 12' PCS T-Frame (1) 104569 ((DNK 14-19)/Sprint)	137
Pirod 12' PCS T-Frame (1) 104569 ((DNK 14-19)/Sprint)	137

TYPE	ELEVATION
APXVTM14-C-120 Panel Antenna ((DNK 14-19)/Sprint)	137
APXVTM14-C-120 Panel Antenna ((DNK 14-19)/Sprint)	137
APXVTM14-C-120 Panel Antenna ((DNK 14-19)/Sprint)	137
NNVV-65B-R4 Panel Antenna (Sprint)	137
NNVV-65B-R4 Panel Antenna (Sprint)	137
NNVV-65B-R4 Panel Antenna (Sprint)	137
ALU TD-RRH-8x20-25 (Sprint)	137
ALU TD-RRH-8x20-25 (Sprint)	137
ALU TD-RRH-8x20-25 (Sprint)	137
(2) ALU 800MHz 2x50W (Sprint)	137
(2) ALU 800MHz 2x50W (Sprint)	137
(2) ALU 800MHz 2x50W (Sprint)	137
ALU 4x45-1900 MHz RRH Unit (Sprint)	137
ALU 4x45-1900 MHz RRH Unit (Sprint)	137
ALU 4x45-1900 MHz RRH Unit (Sprint)	137
SitePro1 USF12-396-U Mount Assembly w/ (3) 96" Mount Pipes (T-Mobile - Proposed)	130
SitePro1 USF12-396-U Mount Assembly w/ (3) 96" Mount Pipes (T-Mobile - Proposed)	130
SitePro1 USF12-396-U Mount Assembly w/ (3) 96" Mount Pipes (T-Mobile - Proposed)	130
Ericsson AIR32 B66A/B2A Panel Antenna (T-Mobile - Proposed)	130
Ericsson AIR32 B66A/B2A Panel Antenna (T-Mobile - Proposed)	130
Ericsson AIR32 B66A/B2A Panel Antenna (T-Mobile - Proposed)	130
RFS APXVAARR24_43-U-NA20 Panel Antenna (T-Mobile - Proposed)	130
RFS APXVAARR24_43-U-NA20 Panel Antenna (T-Mobile - Proposed)	130
RFS APXVAARR24_43-U-NA20 Panel Antenna (T-Mobile - Proposed)	130
Ericsson 4449 B71 + B12 Radio Unit (T-Mobile - Proposed)	130
Ericsson 4449 B71 + B12 Radio Unit (T-Mobile - Proposed)	130
Ericsson 4449 B71 + B12 Radio Unit (T-Mobile - Proposed)	130
Ericsson AIR21 B2A|B4P Panel (T-Mobile - Proposed)	130
Ericsson AIR21 B2A|B4P Panel (T-Mobile - Proposed)	130
Ericsson AIR21 B2A|B4P Panel (T-Mobile - Proposed)	130
Generic Twin TMA unit (T-Mobile - Proposed)	130
Generic Twin TMA unit (T-Mobile - Proposed)	130
Generic Twin TMA unit (T-Mobile - Proposed)	130
1' Side Arm (DNK-6,7)	122
12' Dipole (DNK-9)	119
1' Side Arm (DNK-9)	119
1' Side Arm (DNK-10)	119
1'x1' Panel Antenna (DNK-10)	119
4' Paraflector (DNK-8)	109.25
3'4"x4" Pipe Mount (DNK-8)	109.25
3' Yagi (DNK-6)	76
20' 4-Bay Dipole (DNK-7)	76
GPS (DNK-5)	75
1" Dia Omni (DNK-4)	27
(Inverted) 1" Dia Omni (DNK-3)	27
2" Dia 8' Omni (DNK-2)	27
Rohn 6' Side-Arm(1) (DNK-3,4)	26
2' Standoff T-Arm (5' face width) (DNK 1,2)	20
2' Yagi (DNK-1)	15

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Stainless P5x0.500	C	L2 1/2x2 1/2x3/16
B	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A513-50	50 ksi	66 ksi	A572-60	60 ksi	75 ksi
A36	36 ksi	58 ksi	A529-50	50 ksi	65 ksi
A500-42	42 ksi	58 ksi	A500-50	50 ksi	62 ksi

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 105 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. P-Delta for analysis does not apply for this case - TIA-222-G Section 3.5.
8. Wind speed posted is from CT Building Code 2016 as 105 mph with a 1.15 importance factor applied (112 mph - w/o importance factor speed applied)
9. MODification Note: Tower Leg for 0'-25' is using factored (0.9) ratio of combined stress based on average of individual members (60ksi leg _46 ksi tube) to apply 50 ksi at legs at this region.
10. Previous MODification note: Top Girt Horizontals @ 12.5' _37.5' were previous MODifications from Project SAI-063 (06/2011) and considered constructed.
11. TOWER RATING: 98.4%

S AT BASE:

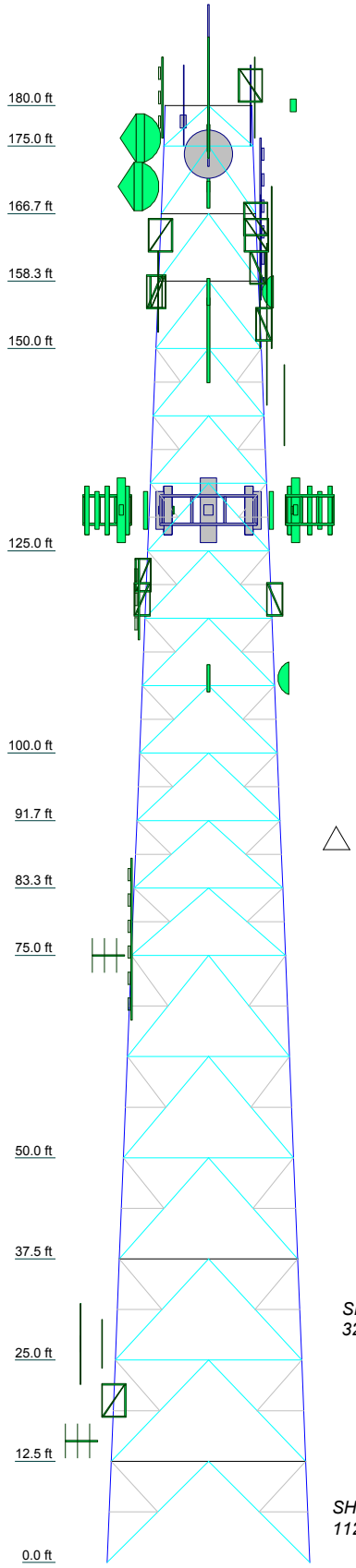
AXIAL
240226 lb
SHEAR 32293 lb
MOMENT 3365 kip-ft
TORQUE 37 kip-ft
50 mph WIND - 0.750 in ICE

AXIAL
68103 lb
SHEAR 112080 lb
MOMENT 11038 kip-ft
TORQUE 72 kip-ft
REACTIONS - 105 mph WIND

AECOM
500 Enterprise Drive, Suite 3B
Rocky Hill, CT
Phone: 860-529-8882
FAX: 860-529-3991

Job:	**Analysis - 180' Lattice Tower (CSP #36)**		
Project:	**Westbrook, Connecticut - MODification**		
Client: Transcend Wireless / T-Mobile / TWM-012		Drawn by: MCD	App'd:
Code: TIA-222-G		Date: 06/21/19	Scale: NTS
Path:			Dwg No. E-1

Section		T14	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs		C		Stainless P6.875x0.500		Stainless P6.875x0.400				Stainless P5x0.400	Stainless P5x0.300		Stainless P5x0.250		
Leg Grade		A500-50			A572-60		A500-42				A513-50				
Diagonals		2L3 1/2x3 1/2x5/16x3/8			D	2L3 1/2x3 1/2x5/16x3/8			2L3x2 1/2x1/4x3/8		2L2 1/2x2x5/16x3/8		2L2 1/2x2x3/16x3/8		
Diagonal Grade		A529-50			A36	A529-50				A36					
Top Girts		2L4x4x5/16	N.A.	2L4x4x1/4					N.A.			L2 1/2x2 1/2x3/16	N.A.	N.A.	E
Horizontals		N.A.	L4x4x3/8	N.A.	L4x4x5/16	L4x4x1/4		2L3x3x1/4		L3x3x5/16	L3x2 1/2x1/4	N.A.	N.A.	F	N.A.
Red. Horizontals				L2 1/2x2 1/2x3/16						L2x2x3/16			N.A.		
Red. Diagonals			L3x3x1/4		L2 1/2x2 1/2x3/16					L2x2x3/16			N.A.		
Inner Bracing			L3x3x1/4		L2 1/2x2 1/2x3/16					L2 1/2x2x3/16			N.A.		
Face Width (ft)	25	24		23	22	21	19	18.3333	17.6667	17	15	13	12.3333	11.6667	10.599
# Panels @ (ft)		6 @ 12.5					12 @ 8.33333								1 @ 5
Weight (lb)	40791.2	4801.1	4249.9	3953.2	3450.3	6256.5	2217.6	2177.7	1971.3	4822.1	3994.8	780.9	768.1	755.5	592.3



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Stainless P5x0.500	D	2L3 1/2x3x5/16x3/8
B	1/3 Pipe w/ 5"x0.5 Stainless	E	L3x3x1/4
C	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)	F	L2 1/2x2 1/2x3/16

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A513-50	50 ksi	66 ksi	A572-60	60 ksi	75 ksi
A36	36 ksi	58 ksi	A529-50	50 ksi	65 ksi
A500-42	42 ksi	58 ksi	A500-50	50 ksi	62 ksi

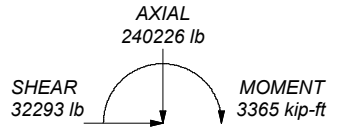
TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 105 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. P-Delta for analysis does not apply for this case - TIA-222-G Section 3.5.
8. Wind speed posted is from CT Building Code 2016 as 105 mph with a 1.15 importance factor applied (112 mph - w/o importance factor speed applied)
9. MODification Note: Tower Leg for 0'-25' is using factored (0.9) ratio of combined stress based on average of individual members (60ksi leg _46 ksi tube) to apply 50 ksi at legs at this region.
10. Previous MODification note: Top Girt Horizontals @ 12.5' _37.5' were previous MODifications from Project SAI-063 (06/2011) and considered constructed.
11. TOWER RATING: 98.4%

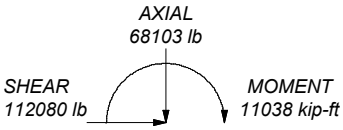
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 532535 lb
SHEAR: 63440 lb

UPLIFT: -465644 lb
SHEAR: 56535 lb



TORQUE 37 kip-ft
50 mph WIND - 0.750 in ICE



TORQUE 72 kip-ft
REACTIONS - 105 mph WIND

AECOM
500 Enterprise Drive, Suite 3B
Rocky Hill, CT
Phone: 860-529-8882
FAX: 860-529-3991

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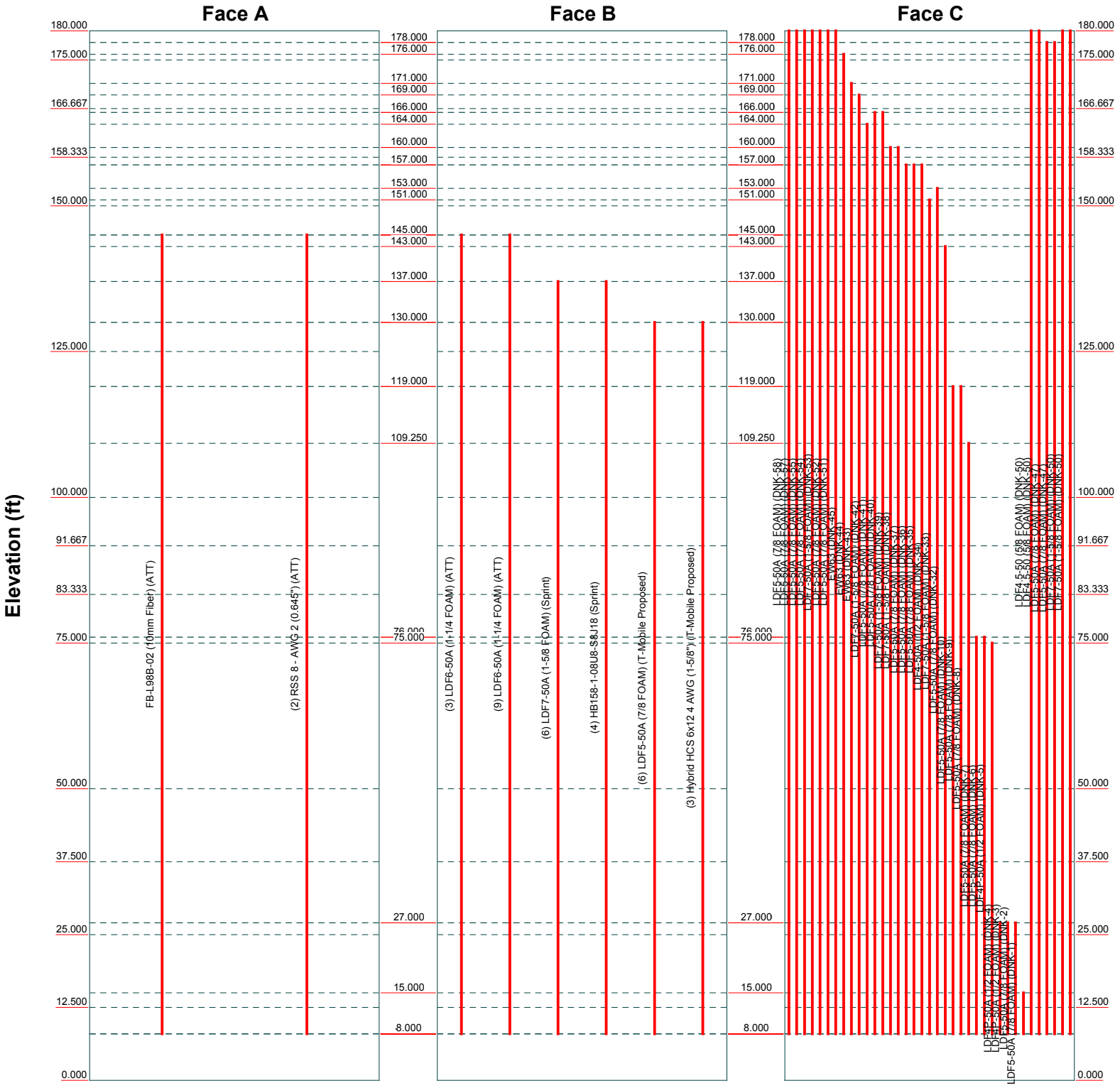
Project:	***Westbrook, Connecticut - MODification***		
Client: Transcend Wireless / T-Mobile / TWM-012		Drawn by: MCD	App'd:
Code: TIA-222-G		Date: 06/21/19	Scale: NTS
Path:			Dwg No. E-1

TNX TOWER FEEDLINE DISTRIBUTION

Feed Line Distribution Chart
0' - 180'

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



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Path:			Dwg No. E-7

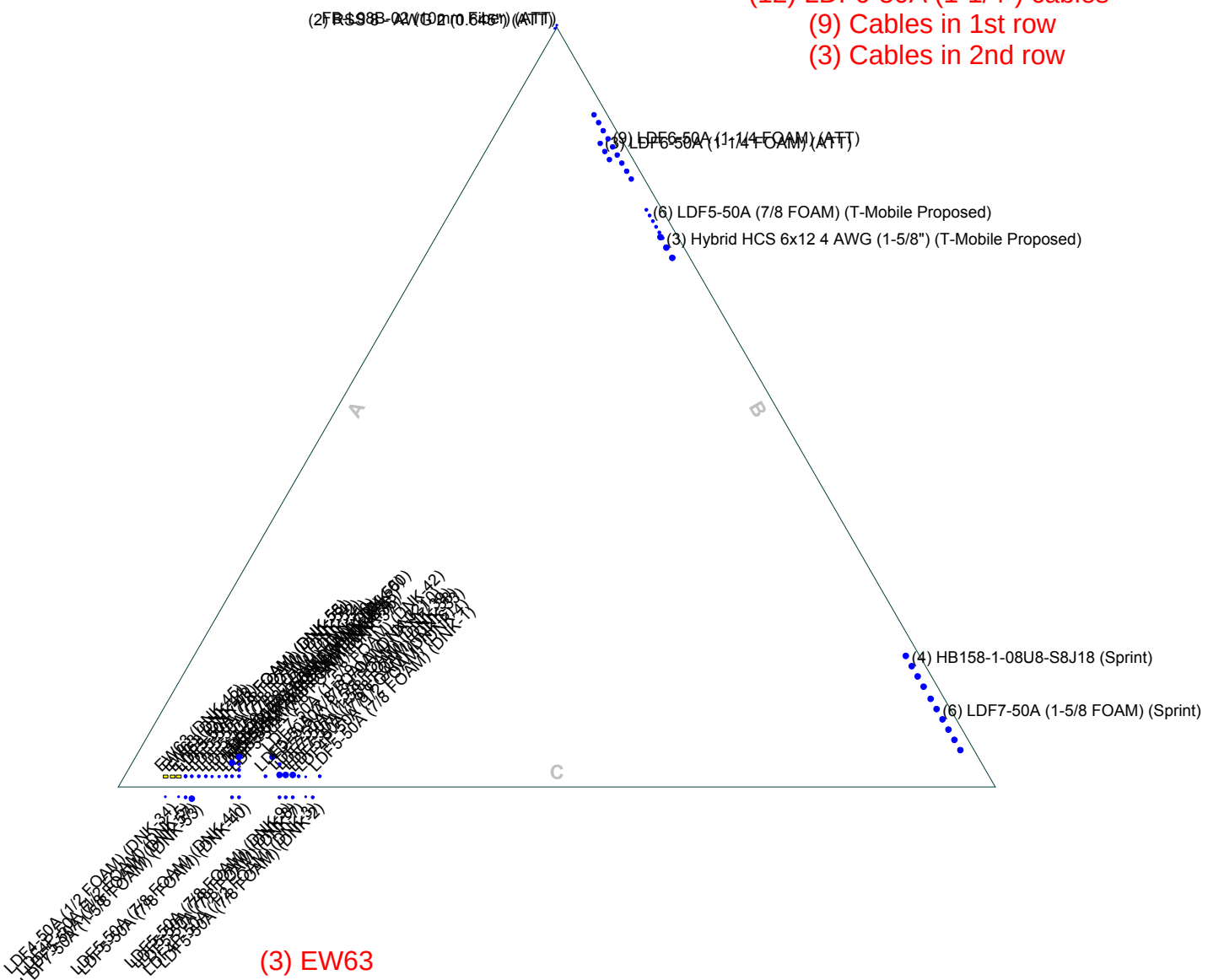
TNX TOWER FEEDLINE PLAN

Feed Line Plan

Round Flat App In Face App Out Face

(1) 10 mm Fiber Optic Cable
(2) AWG-2 Cables

(12) LDF6-50A (1-1/4") cables
(9) Cables in 1st row
(3) Cables in 2nd row



(3) EW63
(7) 1-5/8 Coax Cables
(21) 7/8" Coax Cables
(2) 5/8" Coax Cables
(4) 1/2" Coax Cables

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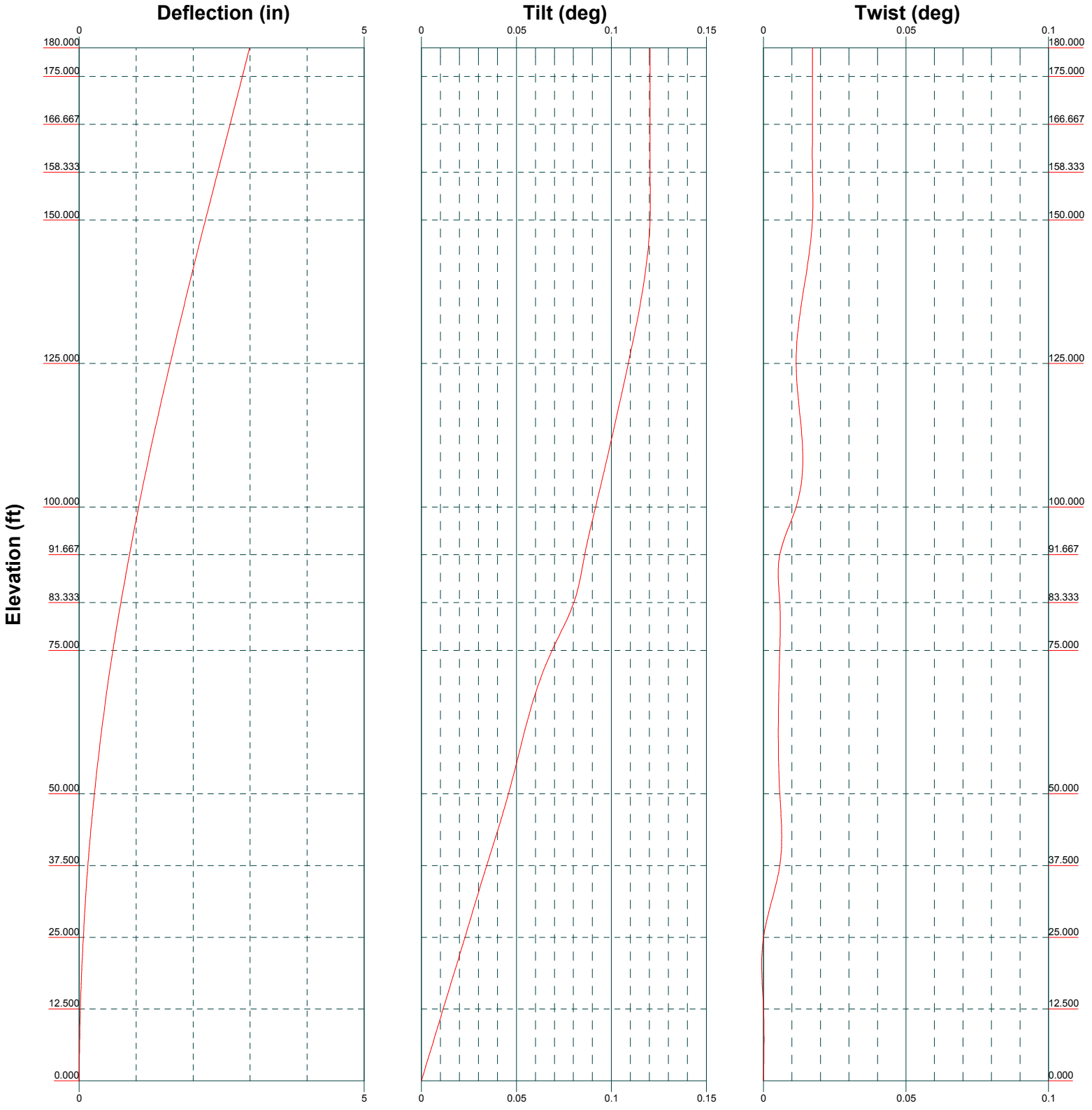
Project: ***Westbrook, Connecticut - MODification***			
Client: Transcend Wireless / T-Mobile / TWM-012	Drawn by: MCD	App'd:	
Code: TIA-222-G	Date: 06/21/19	Scale: NTS	
Path:		Dwg No. E-7	

TNX TOWER DEFLECTION, TILT, AND TWIST

TIA-222-G - Service - 60 mph

Maximum Values



AECOM
500 Enterprise Drive, Suite 3B
Rocky Hill, CT
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FAX: 860-529-3991

Job: ***Analysis - 180' Lattice Tower (CSP #36)***			
Project: ***Westbrook, Connecticut - MODification***			
Client: Transcend Wireless / T-Mobile / TWM-012	Drawn by: MCD	App'd:	
Code: TIA-222-G	Date: 06/21/19	Scale: NTS	
Path:		Dwg No. E-5	

TNX TOWER DETAILED OUTPUT

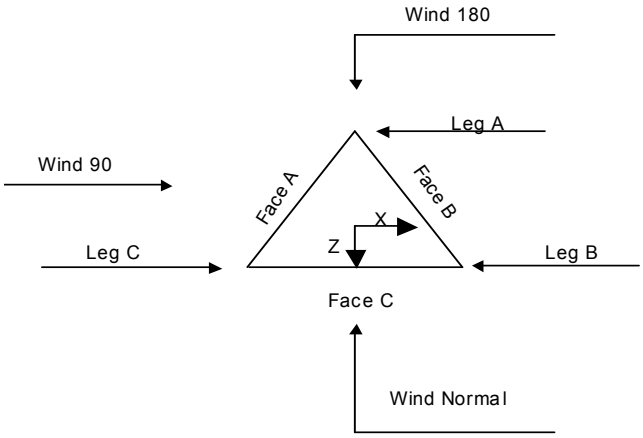
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.000 ft above the ground line.
The base of the tower is set at an elevation of 0.000 ft above the ground line.
The face width of the tower is 10.599 ft at the top and 25.000 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Basic wind speed of 105 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.
Deflections calculated using a wind speed of 60 mph.
P-Delta for analysis does not apply for this case - TIA-222-G Section 3.5..
Wind speed posted is from CT Building Code 2016 as 105 mph with a 1.15 importance factor applied (112 mph - w/o importance factor speed applied).
MODification Note: Tower Leg for 0'-25' is using factored (0.9) ratio of combined stress based on average of individual members (60ksi leg & 46 ksi tube) to apply 50 ksi at legs at this region..
Previous MODification note: Top Girt Horizontals @ 12.5' & 37.5' were previous MODifications from Project SAI-063 (06/2011) and considered constructed..
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	180.000-175.000			10.599	1	5.000
T2	175.000-166.667			11.000	1	8.333
T3	166.667-158.333			11.667	1	8.333
T4	158.333-150.000			12.333	1	8.333
T5	150.000-125.000			13.000	1	25.000
T6	125.000-100.000			15.000	1	25.000
T7	100.000-91.667			17.000	1	8.333
T8	91.667-83.333			17.667	1	8.333
T9	83.333-75.000			18.333	1	8.333
T10	75.000-50.000			19.000	1	25.000
T11	50.000-37.500			21.000	1	12.500
T12	37.500-25.000			22.000	1	12.500
T13	25.000-12.500			23.000	1	12.500
T14	12.500-0.000			24.000	1	12.500

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	180.000-175.000	5.000	K Brace Down	No	Yes	0.000	0.000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T2	175.000-166.667	8.333	K Brace Down	No	Yes	0.000	0.000
T3	166.667-158.333	8.333	K Brace Down	No	Yes	0.000	0.000
T4	158.333-150.000	8.333	K Brace Down	No	Yes	0.000	0.000
T5	150.000-125.000	8.333	K1 Down	No	Yes	0.000	0.000
T6	125.000-100.000	8.333	K1 Down	No	Yes	0.000	0.000
T7	100.000-91.667	8.333	K1 Down	No	Yes	0.000	0.000
T8	91.667-83.333	8.333	K1 Down	No	Yes	0.000	0.000
T9	83.333-75.000	8.333	K1 Down	No	Yes	0.000	0.000
T10	75.000-50.000	12.500	K1 Down	No	Yes	0.000	0.000
T11	50.000-37.500	12.500	K1 Down	No	Yes	0.000	0.000
T12	37.500-25.000	12.500	K1 Down	No	Yes	0.000	0.000
T13	25.000-12.500	12.500	K1 Down	No	Yes	0.000	0.000
T14	12.500-0.000	12.500	K1 Down	No	Yes	0.000	0.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.000-175.000	Pipe	Stainless P5x0.250	A513-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16x3/8	A36 (36 ksi)
T2 175.000-166.667	Pipe	Stainless P5x0.250	A513-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16x3/8	A36 (36 ksi)
T3 166.667-158.333	Pipe	Stainless P5x0.250	A513-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16x3/8	A36 (36 ksi)
T4 158.333-150.000	Pipe	Stainless P5x0.250	A513-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16x3/8	A36 (36 ksi)
T5 150.000-125.000	Pipe	Stainless P5x0.300	A513-50 (50 ksi)	Double Angle	2L2 1/2x2x5/16x3/8	A36 (36 ksi)
T6 125.000-100.000	Pipe	Stainless P5x0.400	A513-50 (50 ksi)	Double Angle	2L3x2 1/2x1/4x3/8	A36 (36 ksi)
T7 100.000-91.667	Pipe	Stainless P5x0.500	A513-50 (50 ksi)	Double Angle	2L3x2 1/2x1/4x3/8	A36 (36 ksi)
T8 91.667-83.333	Arbitrary Shape	1/3 Pipe w/ 5"x0.5 Stainless	A500-42 (42 ksi)	Double Angle	2L3x2 1/2x1/4x3/8	A36 (36 ksi)
T9 83.333-75.000	Arbitrary Shape	1/3 Pipe w/ 5"x0.5 Stainless	A500-42 (42 ksi)	Double Angle	2L3x2 1/2x1/4x3/8	A36 (36 ksi)
T10 75.000-50.000	Pipe	Stainless P6.875x0.400	A572-60 (60 ksi)	Double Equal Angle	2L3 1/2x3 1/2x5/16x3/8	A529-50 (50 ksi)
T11 50.000-37.500	Pipe	Stainless P6.875x0.500	A572-60 (60 ksi)	Double Angle	2L3 1/2x3x5/16x3/8	A36 (36 ksi)
T12 37.500-25.000	Pipe	Stainless P6.875x0.500	A572-60 (60 ksi)	Double Angle	2L3 1/2x3 1/2x5/16x3/8	A529-50 (50 ksi)
T13 25.000-12.500	Arbitrary Shape	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)	A500-50 (50 ksi)	Double Angle	2L3 1/2x3 1/2x5/16x3/8	A529-50 (50 ksi)
T14 12.500-0.000	Arbitrary Shape	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)	A500-50 (50 ksi)	Double Angle	2L3 1/2x3 1/2x5/16x3/8	A529-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 180.000-175.000	Single Angle	L3x3x1/4	A36 (36 ksi)	Pipe		A36 (36 ksi)
T3 166.667-158.333	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Pipe		A36 (36 ksi)
T4 158.333-150.000	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Pipe		A36 (36 ksi)
T12 37.500-25.000	Double Equal Angle	2L4x4x1/4	A36 (36 ksi)	Pipe		A36 (36 ksi)
T14 12.500-0.000	Double Equal Angle	2L4x4x5/16	A36 (36 ksi)	Pipe		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 180.000-175.000	None	Pipe		A36 (36 ksi)	Single Angle	L1x1x1/8	A36 (36 ksi)
T2 175.000-166.667	None	Pipe		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 166.667-158.333	None	Pipe		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 158.333-150.000	None	Pipe		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 150.000-125.000	None	Pipe		A36 (36 ksi)	Single Angle	L3x2 1/2x1/4	A36 (36 ksi)
T6 125.000-100.000	None	Pipe		A36 (36 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T7 100.000-91.667	None	Pipe		A36 (36 ksi)	Double Equal Angle	2L3x3x1/4	A36 (36 ksi)
T8 91.667-83.333	None	Pipe		A36 (36 ksi)	Double Angle	2L3x3x1/4	A36 (36 ksi)
T9 83.333-75.000	None	Pipe		A36 (36 ksi)	Double Angle	2L3x3x1/4	A36 (36 ksi)
T10 75.000-50.000	None	Pipe		A36 (36 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T11 50.000-37.500	None	Pipe		A36 (36 ksi)	Single Angle	L4x4x5/16	A529-50 (50 ksi)
T12 37.500-25.000	None	Pipe		A36 (36 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T13 25.000-12.500	None	Pipe		A36 (36 ksi)	Single Angle	L4x4x3/8	A529-50 (50 ksi)
T14 12.500-0.000	None	Pipe		A36 (36 ksi)	Single Angle	L4x4x5/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T5 150.000-125.000	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T6 125.000-100.000	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T7 100.000-91.667	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T8 91.667-83.333	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T9 83.333-75.000	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T10 75.000-50.000	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T11 50.000-37.500	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T12 37.500-25.000	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T13 25.000-12.500	Solid Round		A36 (36 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T14 12.500-0.000	Solid Round		A36 (36 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T5 150.000-125.000	A36 (36 ksi)	Horizontal (1)	Single Angle	L2x2x3/16	1
		Diagonal (1)	Single Angle	L2x2x3/16	1
T6 125.000-100.000	A36 (36 ksi)	Horizontal (1)	Single Angle	L2x2x3/16	1
		Diagonal (1)	Single Angle	L2x2x3/16	1
T7 100.000-91.667	A36 (36 ksi)	Horizontal (1)	Single Angle	L2x2x3/16	1
		Diagonal (1)	Single Angle	L2x2x3/16	1
T8 91.667-83.333	A36 (36 ksi)	Horizontal (1)	Single Angle	L2x2x3/16	1
		Diagonal (1)	Single Angle	L2x2x3/16	1
T9 83.333-75.000	A36 (36 ksi)	Horizontal (1)	Single Angle	L2x2x3/16	1
		Diagonal (1)	Single Angle	L2x2x3/16	1
T10 75.000-50.000	A36 (36 ksi)	Horizontal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
		Diagonal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
T11 50.000-37.500	A36 (36 ksi)	Horizontal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
		Diagonal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
T12 37.500-25.000	A36 (36 ksi)	Horizontal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
		Diagonal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
T13 25.000-12.500	A36 (36 ksi)	Horizontal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
		Diagonal (1)	Single Angle	L3x3x1/4	1
T14 12.500-0.000	A36 (36 ksi)	Horizontal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
		Diagonal (1)	Single Angle	L3x3x1/4	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 180.000-175.000	0.000	0.000	A36 (36 ksi)	1	1	1	29.736	Third-Pt	Third-Pt
T2 175.000-166.667	0.000	0.000	A36 (36 ksi)	1	1	1	40.696	Third-Pt	Third-Pt
T3 166.667-158.333	0.000	0.000	A36 (36 ksi)	1	1	1	41.476	Third-Pt	Third-Pt
T4 158.333-150.000	0.000	0.000	A36 (36 ksi)	1	1	1	42.280	Third-Pt	Third-Pt
T5 150.000-125.000	0.000	0.000	A36 (36 ksi)	1	1	1	33.639	Third-Pt	Third-Pt
T6 125.000-100.000	0.000	0.000	A36 (36 ksi)	1	1	1	47.620	Third-Pt	Third-Pt
T7 100.000-91.667	0.000	0.000	A36 (36 ksi)	1	1	1	48.580	Third-Pt	Third-Pt
T8 91.667-83.333	0.000	0.000	A36 (36 ksi)	1	1	1	37.170	Third-Pt	Third-Pt
T9 83.333-75.000	0.000	0.000	A36 (36 ksi)	1	1	1	37.917	Third-Pt	Third-Pt
T10 75.000-50.000	0.000	0.000	A36 (36 ksi)	1	1	1	65.308	Third-Pt	Third-Pt
T11 50.000-37.500	0.000	0.000	A36 (36 ksi)	1	1	1	24.980	Third-Pt	Third-Pt
T12 37.500-25.000	0.000	0.000	A36 (36 ksi)	1	1	1	67.952	Third-Pt	Third-Pt
T13 25.000-12.500	0.000	0.000	A36 (36 ksi)	1	1	1	51.990	Third-Pt	Third-Pt
T14 12.500-0.000	0.000	0.000	A36 (36 ksi)	1	1	1	53.040	Mid-Pt	Third-Pt

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 180.000-175.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 175.000-166.667	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 166.667-158.333	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 158.333-150.0	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
00										
T5	Yes	No	1	1	1	1	1	1	1	1
150.000-125.000				1	1	1	1	1	1	1
T6	Yes	No	1	1	1	1	1	1	1	1
125.000-100.000				1	1	1	1	1	1	1
T7	Yes	No	1	1	1	1	1	1	1	1
100.000-91.667				1	1	1	1	1	1	1
T8	Yes	No	1	1	1	1	1	1	1	1
91.667-83.333				1	1	1	1	1	1	1
T9	Yes	No	1	1	1	1	1	1	1	1
83.333-75.000				1	1	1	1	1	1	1
T10	Yes	No	1	1	1	1	1	1	1	1
75.000-50.000				1	1	1	1	1	1	1
T11	Yes	No	1	1	1	1	1	1	1	1
50.000-37.500				1	1	1	1	1	1	1
T12	Yes	No	1	1	1	1	1	1	1	1
37.500-25.000				1	1	1	1	1	1	1
T13	Yes	No	1	1	1	1	1	1	1	1
25.000-12.500				1	1	1	1	1	1	1
T14	Yes	No	1	1	1	1	1	1	1	1
12.500-0.000				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
180.000-175.000														
T2	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
175.000-166.667														
T3	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
166.667-158.333														
T4	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
158.333-150.000														
T5	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
150.000-125.000														
T6	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
125.000-100.000														

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T7 100.000-91.667	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T8 91.667-83.333	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T9 83.333-75.000	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T10 75.000-50.000	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T11 50.000-37.500	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T12 37.500-25.000	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T13 25.000-12.500	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T14 12.500-0.000	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 180.000-175.000	Flange	0.750 A325X	0	0.750 A325X	1	0.625 A325X	2	0.625 A325N	0	0.625 A325N	0	0.625 A325X	0	0.625 A325N	0
T2 175.000-166.667	Flange	0.750 A325X	6	0.750 A325X	1	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T3 166.667-158.333	Flange	0.750 A325X	0	0.750 A325X	1	0.625 A325X	2	0.000 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T4 158.333-150.000	Flange	0.750 A325X	0	0.750 A325X	1	0.625 A325X	2	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T5 150.000-125.000	Flange	0.750 A325X	6	0.750 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T6 125.000-100.000	Flange	0.750 A325X	6	0.750 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T7 100.000-91.667	Flange	1.000 A325X	6	0.750 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T8 91.667-83.333	Flange	0.750 A325X	0	0.750 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T9 83.333-75.000	Flange	0.750 A325X	0	0.750 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T10 75.000-50.000	Flange	1.000 A325X	8	0.750 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T11 50.000-37.500	Flange	1.000 A325X	8	1.000 A325X	1	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T12 37.500-25.000	Flange	1.000 A325X	0	1.000 A325X	1	0.625 A325X	2	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T13 25.000-12.500	Flange	1.000 A325X	8	1.000 A325X	1	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T14 12.500-0.000	Flange	1.000 A325X	0	1.000 A325X	1	0.625 A325X	2	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
FB-L98B-02 (10mm Fiber) (ATT)	A	No	No	Ar (CaAa)	145.000 - 8.000	0.000	0.5	1	1	0.394	0.394		0.300
RSS 8 - AWG 2 (0.645") (ATT)	A	No	No	Ar (CaAa)	145.000 - 8.000	0.000	0.5	2	2	0.645	0.645		0.300
LDF6-50A (1-1/4 FOAM) (ATT)	B	No	No	Ar (CaAa)	145.000 - 8.000	-6.000	-0.35	3	3	1.550	1.550		0.660
LDF6-50A (1-1/4 FOAM) (ATT)	B	No	No	Ar (CaAa)	145.000 - 8.000	-3.000	-0.35	9	9	1.550	1.550		0.660
LDF7-50A (1-5/8 FOAM) (Sprint)	B	No	No	Ar (CaAa)	137.000 - 8.000	-3.000	0.41	6	6	1.980	1.980		0.820
LDF5-50A (7/8 FOAM) (DNK-58)	C	No	No	Ar (CaAa)	180.000 - 8.000	-3.000	0.423	1	1	1.090	1.090		0.330
LDF5-50A (7/8 FOAM) (DNK-57)	C	No	No	Ar (CaAa)	180.000 - 8.000	3.000	0.423	1	1	1.090	1.090		0.330
LDF5-50A (7/8 FOAM) (DNK-55)	C	No	No	Ar (CaAa)	180.000 - 8.000	-3.000	0.423	1	1	1.090	1.090		0.330
LDF5-50A (7/8 FOAM) (DNK-54)	C	No	No	Ar (CaAa)	180.000 - 8.000	-3.000	0.416	1	1	1.090	1.090		0.330
LDF7-50A (1-5/8 FOAM) (DNK-53)	C	No	No	Ar (CaAa)	180.000 - 8.000	3.000	0.416	1	1	1.980	1.980		0.820
LDF5-50A (7/8 FOAM) (DNK-52)	C	No	No	Ar (CaAa)	180.000 - 8.000	-3.000	0.408	1	1	1.090	1.090		0.330
LDF5-50A (7/8 FOAM) (DNK-51)	C	No	No	Ar (CaAa)	180.000 - 8.000	-3.000	0.4	1	1	1.090	1.090		0.330
EW63 (DNK-45)	C	No	No	Af (CaAa)	176.000 - 8.000	-3.000	0.446	1	1	1.574	1.574		0.510
EW63	C	No	No	Af (CaAa)	171.000 -	-3.000	0.438	1	1	1.574	1.574		0.510

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
(DNK-44)					8.000								
EW63	C	No	No	Af (CaAa)	169.000 - 8.000	-3.000	0.431	1	1	1.574	1.574		0.510
(DNK-43)													
LDF7-50A (1-5/8 FOAM)	C	No	No	Ar (CaAa)	164.000 - 8.000	-9.000	0.324	1	1	1.980	1.980		0.820
(DNK-42)													
LDF5-50A (7/8 FOAM)	C	No	No	Ar (CaAa)	166.000 - 8.000	3.000	0.37	1	1	1.090	1.090		0.330
(DNK-41)													
LDF5-50A (7/8 FOAM)	C	No	No	Ar (CaAa)	166.000 - 8.000	3.000	0.362	1	1	1.090	1.090		0.330
(DNK-40)													
LDF7-50A (1-5/8 FOAM)	C	No	No	Ar (CaAa)	160.000 - 8.000	-3.000	0.316	1	1	1.980	1.980		0.820
(DNK-39)													
LDF7-50A (1-5/8 FOAM)	C	No	No	Ar (CaAa)	160.000 - 8.000	-3.000	0.309	1	1	1.980	1.980		0.820
(DNK-38)													
LDF5-50A (7/8 FOAM)	C	No	No	Ar (CaAa)	157.000 - 8.000	-3.000	0.362	1	1	1.090	1.090		0.330
(DNK-37)													
LDF5-50A (7/8 FOAM)	C	No	No	Ar (CaAa)	157.000 - 8.000	-5.000	0.362	1	1	1.090	1.090		0.330
(DNK-36)													
LDF5-50A (7/8 FOAM)	C	No	No	Ar (CaAa)	157.000 - 8.000	-7.000	0.362	1	1	1.090	1.090		0.330
(DNK-35)													
LDF4-50A (1/2 FOAM)	C	No	No	Ar (CaAa)	151.000 - 8.000	3.000	0.446	1	1	0.630	0.630		0.150
(DNK-34)													
LDF7-50A (1-5/8 FOAM)	C	No	No	Ar (CaAa)	153.000 - 8.000	-3.000	0.301	1	1	1.980	1.980		0.820
(DNK-33)													
LDF5-50A (7/8 FOAM)	C	No	No	Ar (CaAa)	143.000 - 8.000	-3.000	0.332	1	1	1.090	1.090		0.330
(DNK-32)													
LDF5-50A (7/8 FOAM)	C	No	No	Ar (CaAa)	119.000 - 8.000	-7.000	0.316	1	1	1.090	1.090		0.330
(DNK-10)													
LDF5-50A (7/8 FOAM)	C	No	No	Ar (CaAa)	119.000 - 8.000	3.000	0.316	1	1	1.090	1.090		0.330
(DNK-9)													
LDF5-50A (7/8 FOAM)	C	No	No	Ar (CaAa)	109.250 - 8.000	3.000	0.309	1	1	1.090	1.090		0.330
(DNK-8)													
LDF5-50A (7/8 FOAM)	C	No	No	Ar (CaAa)	76.000 - 8.000	3.000	0.301	1	1	1.090	1.090		0.330
(DNK-7)													
LDF5-50A (7/8 FOAM)	C	No	No	Ar (CaAa)	76.000 - 8.000	-3.000	0.294	1	1	1.090	1.090		0.330
(DNK-6)													
LDF4P-50A (1/2 FOAM)	C	No	No	Ar (CaAa)	75.000 - 8.000	3.000	0.431	1	1	0.630	0.630		0.150
(DNK-5)													
LDF4P-50A (1/2 FOAM)	C	No	No	Ar (CaAa)	27.000 - 8.000	-3.000	0.286	1	1	0.630	0.630		0.150
(DNK-4)													
LDF4P-50A (1/2 FOAM)	C	No	No	Ar (CaAa)	27.000 - 8.000	3.000	0.286	1	1	0.630	0.630		0.150
(DNK-3)													

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LDF5-50A (7/8 FOAM) (DNK-2)	C	No	No	Ar (CaAa)	27.000 - 8.000	3.000	0.278	1	1	1.090	1.090		0.330
LDF5-50A (7/8 FOAM) (DNK-1)	C	No	No	Ar (CaAa)	15.000 - 8.000	-3.000	0.27	1	1	1.090	1.090		0.330
LDF4.5-50 (5/8 FOAM) (DNK-50)	C	No	No	Ar (CaAa)	180.000 - 8.000	-3.000	0.393	1	1	0.870	0.870		0.150
LDF4.5-50 (5/8 FOAM) (DNK-50)	C	No	No	Ar (CaAa)	180.000 - 8.000	-3.000	0.385	1	1	0.870	0.870		0.150
LDF5-50A (7/8 FOAM) (DNK-47)	C	No	No	Ar (CaAa)	178.000 - 8.000	-3.000	0.377	1	1	1.090	1.090		0.330
LDF5-50A (7/8 FOAM) (DNK-47)	C	No	No	Ar (CaAa)	178.000 - 8.000	-3.000	0.37	1	1	1.090	1.090		0.330
LDF7-50A (1-5/8 FOAM) (DNK-50)	C	No	No	Ar (CaAa)	180.000 - 8.000	-7.000	0.37	1	1	1.980	1.980		0.820
LDF7-50A (1-5/8 FOAM) (DNK-50)	C	No	No	Ar (CaAa)	180.000 - 8.000	-9.000	0.362	1	1	1.980	1.980		0.820
HB158-1-08U8-S8J18 (Sprint) * TMW Proposed 5-1-2019	B	No	No	Ar (CaAa)	137.000 - 8.000	-3.000	0.34	4	4	1.980	1.980		1.300
LDF5-50A (7/8 FOAM) (T-Mobile Proposed)	B	No	No	Ar (CaAa)	130.000 - 8.000	-4.000	-0.25	6	6	1.090	1.090		0.330
Hybrid HCS 6x12 4 AWG (1-5/8") (T-Mobile Proposed)	B	No	No	Ar (CaAa)	130.000 - 8.000	-4.000	-0.22	3	3	1.990	1.990		1.900

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 lb
T1	180.000-175.000	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	8.026	0.000	26.190
T2	175.000-166.667	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	17.602	0.000	52.650
T3	166.667-158.333	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	23.679	0.000	70.190
T4	158.333-150.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000

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 lb
		C	0.000	0.000	29.939	0.000	93.290
T5	150.000-125.000	A	0.000	0.000	3.367	0.000	18.000
		B	0.000	0.000	67.215	0.000	318.240
		C	0.000	0.000	97.640	0.000	306.190
T6	125.000-100.000	A	0.000	0.000	4.209	0.000	22.500
		B	0.000	0.000	127.275	0.000	643.000
		C	0.000	0.000	103.553	0.000	324.092
T7	100.000-91.667	A	0.000	0.000	1.403	0.000	7.500
		B	0.000	0.000	42.425	0.000	214.333
		C	0.000	0.000	35.526	0.000	111.083
T8	91.667-83.333	A	0.000	0.000	1.403	0.000	7.500
		B	0.000	0.000	42.425	0.000	214.333
		C	0.000	0.000	35.526	0.000	111.083
T9	83.333-75.000	A	0.000	0.000	1.403	0.000	7.500
		B	0.000	0.000	42.425	0.000	214.333
		C	0.000	0.000	35.744	0.000	111.743
T10	75.000-50.000	A	0.000	0.000	4.209	0.000	22.500
		B	0.000	0.000	127.275	0.000	643.000
		C	0.000	0.000	113.603	0.000	353.500
T11	50.000-37.500	A	0.000	0.000	2.105	0.000	11.250
		B	0.000	0.000	63.637	0.000	321.500
		C	0.000	0.000	56.801	0.000	176.750
T12	37.500-25.000	A	0.000	0.000	2.105	0.000	11.250
		B	0.000	0.000	63.637	0.000	321.500
		C	0.000	0.000	57.271	0.000	178.010
T13	25.000-12.500	A	0.000	0.000	2.105	0.000	11.250
		B	0.000	0.000	63.638	0.000	321.500
		C	0.000	0.000	60.011	0.000	185.450
T14	12.500-0.000	A	0.000	0.000	0.758	0.000	4.050
		B	0.000	0.000	22.910	0.000	115.740
		C	0.000	0.000	21.996	0.000	67.950

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 lb
T1	180.000-175.000	A	2.219	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	35.536	0.000	615.061
T2	175.000-166.667	A	2.210	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	72.117	0.000	1241.318
T3	166.667-158.333	A	2.199	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	93.023	0.000	1600.244
T4	158.333-150.000	A	2.188	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	117.439	0.000	2025.059
T5	150.000-125.000	A	2.163	0.000	0.000	29.421	0.000	348.772
		B		0.000	0.000	201.309	0.000	3349.518
		C		0.000	0.000	386.566	0.000	6590.381
T6	125.000-100.000	A	2.120	0.000	0.000	36.185	0.000	422.285
		B		0.000	0.000	384.109	0.000	6301.296
		C		0.000	0.000	409.737	0.000	6858.319
T7	100.000-91.667	A	2.086	0.000	0.000	11.907	0.000	137.236
		B		0.000	0.000	127.506	0.000	2070.470
		C		0.000	0.000	139.823	0.000	2308.254

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 lb
T8	91.667-83.333	A	2.067	0.000	0.000	11.820	0.000	135.281
		B		0.000	0.000	127.209	0.000	2053.745
		C		0.000	0.000	138.878	0.000	2276.186
T9	83.333-75.000	A	2.046	0.000	0.000	11.725	0.000	133.167
		B		0.000	0.000	126.885	0.000	2035.568
		C		0.000	0.000	138.886	0.000	2257.839
T10	75.000-50.000	A	1.999	0.000	0.000	34.518	0.000	384.971
		B		0.000	0.000	378.403	0.000	5980.656
		C		0.000	0.000	443.381	0.000	7043.640
T11	50.000-37.500	A	1.929	0.000	0.000	16.777	0.000	182.096
		B		0.000	0.000	187.556	0.000	2898.766
		C		0.000	0.000	215.913	0.000	3335.278
T12	37.500-25.000	A	1.865	0.000	0.000	16.337	0.000	172.890
		B		0.000	0.000	186.059	0.000	2816.115
		C		0.000	0.000	213.356	0.000	3207.141
T13	25.000-12.500	A	1.772	0.000	0.000	15.698	0.000	159.937
		B		0.000	0.000	183.887	0.000	2697.167
		C		0.000	0.000	220.241	0.000	3167.789
T14	12.500-0.000	A	1.588	0.000	0.000	5.195	0.000	48.882
		B		0.000	0.000	64.655	0.000	887.659
		C		0.000	0.000	74.701	0.000	989.347

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	180.000-175.000	-9.991	7.222	-20.017	13.631
T2	175.000-166.667	-15.683	10.964	-26.134	17.537
T3	166.667-158.333	-19.631	14.001	-30.469	21.016
T4	158.333-150.000	-22.781	16.700	-34.144	24.118
T5	150.000-125.000	-11.361	5.201	-19.557	8.114
T6	125.000-100.000	-5.185	2.067	-12.221	3.991
T7	100.000-91.667	-5.747	2.588	-13.349	4.857
T8	91.667-83.333	-5.211	2.429	-13.104	4.850
T9	83.333-75.000	-5.382	2.580	-13.457	5.088
T10	75.000-50.000	-7.296	3.929	-16.506	7.254
T11	50.000-37.500	-7.601	4.152	-16.931	7.417
T12	37.500-25.000	-7.919	4.442	-17.292	7.737
T13	25.000-12.500	-7.534	4.774	-17.595	9.024
T14	12.500-0.000	-3.819	2.583	-10.003	5.325

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	7	LDF5-50A (7/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	8	LDF5-50A (7/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	9	LDF5-50A (7/8 FOAM)	175.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	10	LDF5-50A (7/8 FOAM)	180.00 175.00 - 180.00	0.6000	0.6000
T1	11	LDF7-50A (1-5/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	12	LDF5-50A (7/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	13	LDF5-50A (7/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	17	EW63	175.00 - 176.00	0.6000	0.6000
T1	41	LDF4.5-50 (5/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	42	LDF4.5-50 (5/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	43	LDF5-50A (7/8 FOAM)	175.00 - 178.00	0.6000	0.6000
T1	44	LDF5-50A (7/8 FOAM)	175.00 - 178.00	0.6000	0.6000
T1	45	LDF7-50A (1-5/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T1	46	LDF7-50A (1-5/8 FOAM)	175.00 - 180.00	0.6000	0.6000
T2	7	LDF5-50A (7/8 FOAM)	166.67 - 175.00	0.6000	0.6000
T2	8	LDF5-50A (7/8 FOAM)	166.67 - 175.00	0.6000	0.6000
T2	9	LDF5-50A (7/8 FOAM)	166.67 - 175.00	0.6000	0.6000
T2	10	LDF5-50A (7/8 FOAM)	166.67 - 175.00	0.6000	0.6000
T2	11	LDF7-50A (1-5/8 FOAM)	166.67 - 175.00	0.6000	0.6000
T2	12	LDF5-50A (7/8 FOAM)	166.67 - 175.00	0.6000	0.6000
T2	13	LDF5-50A (7/8 FOAM)	166.67 - 175.00	0.6000	0.6000
T2	17	EW63	166.67 - 175.00	0.6000	0.6000
T2	18	EW63	166.67 - 171.00	0.6000	0.6000
T2	19	EW63	166.67 - 169.00	0.6000	0.6000
T2	41	LDF4.5-50 (5/8 FOAM)	166.67 - 175.00	0.6000	0.6000
T2	42	LDF4.5-50 (5/8 FOAM)	166.67 - 175.00	0.6000	0.6000
T2	43	LDF5-50A (7/8 FOAM)	166.67 - 175.00	0.6000	0.6000
T2	44	LDF5-50A (7/8 FOAM)	166.67 - 175.00	0.6000	0.6000
T2	45	LDF7-50A (1-5/8 FOAM)	166.67 - 175.00	0.6000	0.6000
T2	46	LDF7-50A (1-5/8 FOAM)	166.67 - 175.00	0.6000	0.6000
T3	7	LDF5-50A (7/8 FOAM)	158.33 - 166.67	0.6000	0.6000
T3	8	LDF5-50A (7/8 FOAM)	158.33 - 166.67	0.6000	0.6000
T3	9	LDF5-50A (7/8 FOAM)	158.33 - 166.67	0.6000	0.6000
T3	10	LDF5-50A (7/8 FOAM)	158.33 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T3	11	LDF7-50A (1-5/8 FOAM)	166.67 158.33 -	0.6000	0.6000
T3	12	LDF5-50A (7/8 FOAM)	166.67 158.33 -	0.6000	0.6000
T3	13	LDF5-50A (7/8 FOAM)	166.67 158.33 -	0.6000	0.6000
T3	17	EW63	166.67 158.33 -	0.6000	0.6000
T3	18	EW63	166.67 158.33 -	0.6000	0.6000
T3	19	EW63	166.67 158.33 -	0.6000	0.6000
T3	20	LDF7-50A (1-5/8 FOAM)	166.67 158.33 -	0.6000	0.6000
T3	21	LDF5-50A (7/8 FOAM)	164.00 158.33 -	0.6000	0.6000
T3	22	LDF5-50A (7/8 FOAM)	166.00 158.33 -	0.6000	0.6000
T3	23	LDF7-50A (1-5/8 FOAM)	166.00 158.33 -	0.6000	0.6000
T3	24	LDF7-50A (1-5/8 FOAM)	160.00 158.33 -	0.6000	0.6000
T3	41	LDF4.5-50 (5/8 FOAM)	160.00 158.33 -	0.6000	0.6000
T3	42	LDF4.5-50 (5/8 FOAM)	166.67 158.33 -	0.6000	0.6000
T3	43	LDF5-50A (7/8 FOAM)	166.67 158.33 -	0.6000	0.6000
T3	44	LDF5-50A (7/8 FOAM)	166.67 158.33 -	0.6000	0.6000
T3	45	LDF7-50A (1-5/8 FOAM)	166.67 158.33 -	0.6000	0.6000
T3	46	LDF7-50A (1-5/8 FOAM)	166.67 158.33 -	0.6000	0.6000
T4	7	LDF5-50A (7/8 FOAM)	166.67 150.00 -	0.6000	0.6000
T4	8	LDF5-50A (7/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T4	9	LDF5-50A (7/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T4	10	LDF5-50A (7/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T4	11	LDF7-50A (1-5/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T4	12	LDF5-50A (7/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T4	13	LDF5-50A (7/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T4	17	EW63	158.33 150.00 -	0.6000	0.6000
T4	18	EW63	158.33 150.00 -	0.6000	0.6000
T4	19	EW63	158.33 150.00 -	0.6000	0.6000
T4	20	LDF7-50A (1-5/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T4	21	LDF5-50A (7/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T4	22	LDF5-50A (7/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T4	23	LDF7-50A (1-5/8 FOAM)	158.33 150.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T4	24	LDF7-50A (1-5/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T4	25	LDF5-50A (7/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T4	26	LDF5-50A (7/8 FOAM)	157.00 150.00 -	0.6000	0.6000
T4	27	LDF5-50A (7/8 FOAM)	157.00 150.00 -	0.6000	0.6000
T4	28	LDF4-50A (1/2 FOAM)	157.00 150.00 -	0.6000	0.6000
T4	29	LDF7-50A (1-5/8 FOAM)	151.00 150.00 -	0.6000	0.6000
T4	41	LDF4.5-50 (5/8 FOAM)	153.00 150.00 -	0.6000	0.6000
T4	42	LDF4.5-50 (5/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T4	43	LDF5-50A (7/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T4	44	LDF5-50A (7/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T4	45	LDF7-50A (1-5/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T4	46	LDF7-50A (1-5/8 FOAM)	158.33 150.00 -	0.6000	0.6000
T5	1	FB-L98B-02 (10mm Fiber)	158.33 125.00 -	0.6000	0.6000
T5	2	RSS 8 - AWG 2 (0.645")	145.00 125.00 -	0.6000	0.6000
T5	3	LDF6-50A (1-1/4 FOAM)	145.00 125.00 -	0.6000	0.6000
T5	4	LDF6-50A (1-1/4 FOAM)	145.00 125.00 -	0.6000	0.6000
T5	5	LDF7-50A (1-5/8 FOAM)	145.00 125.00 -	0.6000	0.6000
T5	7	LDF5-50A (7/8 FOAM)	137.00 125.00 -	0.6000	0.6000
T5	8	LDF5-50A (7/8 FOAM)	150.00 125.00 -	0.6000	0.6000
T5	9	LDF5-50A (7/8 FOAM)	150.00 125.00 -	0.6000	0.6000
T5	10	LDF5-50A (7/8 FOAM)	150.00 125.00 -	0.6000	0.6000
T5	11	LDF7-50A (1-5/8 FOAM)	150.00 125.00 -	0.6000	0.6000
T5	12	LDF5-50A (7/8 FOAM)	150.00 125.00 -	0.6000	0.6000
T5	13	LDF5-50A (7/8 FOAM)	150.00 125.00 -	0.6000	0.6000
T5	17	EW63	150.00 125.00 -	0.6000	0.6000
T5	18	EW63	150.00 125.00 -	0.6000	0.6000
T5	19	EW63	150.00 125.00 -	0.6000	0.6000
T5	20	LDF7-50A (1-5/8 FOAM)	150.00 125.00 -	0.6000	0.6000
T5	21	LDF5-50A (7/8 FOAM)	150.00 125.00 -	0.6000	0.6000
T5	22	LDF5-50A (7/8 FOAM)	150.00 125.00 -	0.6000	0.6000
T5	23	LDF7-50A (1-5/8 FOAM)	150.00 125.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T5	24	LDF7-50A (1-5/8 FOAM)	150.00 125.00 - 150.00	0.6000	0.6000
T5	25	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T5	26	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T5	27	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T5	28	LDF4-50A (1/2 FOAM)	125.00 - 150.00	0.6000	0.6000
T5	29	LDF7-50A (1-5/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T5	30	LDF5-50A (7/8 FOAM)	125.00 - 143.00	0.6000	0.6000
T5	41	LDF4.5-50 (5/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T5	42	LDF4.5-50 (5/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T5	43	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T5	44	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T5	45	LDF7-50A (1-5/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T5	46	LDF7-50A (1-5/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T5	47	HB158-1-08U8-S8J18	125.00 - 137.00	0.6000	0.6000
T5	49	LDF5-50A (7/8 FOAM)	125.00 - 130.00	0.6000	0.6000
T5	50	Hybrid HCS 6x12 4 AWG (1-5/8")	125.00 - 130.00	0.6000	0.6000
T6	1	FB-L98B-02 (10mm Fiber)	100.00 - 125.00	0.6000	0.6000
T6	2	RSS 8 - AWG 2 (0.645")	100.00 - 125.00	0.6000	0.6000
T6	3	LDF6-50A (1-1/4 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	4	LDF6-50A (1-1/4 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	5	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	7	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	8	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	9	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	10	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	11	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	12	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	13	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	17	EW63	100.00 - 125.00	0.6000	0.6000
T6	18	EW63	100.00 - 125.00	0.6000	0.6000
T6	19	EW63	100.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			125.00		
T6	20	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	21	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	22	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	23	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	24	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	25	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	26	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	27	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	28	LDF4-50A (1/2 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	29	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	30	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	31	LDF5-50A (7/8 FOAM)	100.00 - 119.00	0.6000	0.6000
T6	32	LDF5-50A (7/8 FOAM)	100.00 - 119.00	0.6000	0.6000
T6	33	LDF5-50A (7/8 FOAM)	100.00 - 109.25	0.6000	0.6000
T6	41	LDF4.5-50 (5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	42	LDF4.5-50 (5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	43	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	44	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	45	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	46	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	47	HB158-1-08U8-S8J18	100.00 - 125.00	0.6000	0.6000
T6	49	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T6	50	Hybrid HCS 6x12 4 AWG (1-5/8")	100.00 - 125.00	0.6000	0.6000
T7	1	FB-L98B-02 (10mm Fiber)	91.67 - 100.00	0.6000	0.6000
T7	2	RSS 8 - AWG 2 (0.645")	91.67 - 100.00	0.6000	0.6000
T7	3	LDF6-50A (1-1/4 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	4	LDF6-50A (1-1/4 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	5	LDF7-50A (1-5/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	7	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	8	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	9	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	10	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	11	LDF7-50A (1-5/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	12	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	13	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	17	EW63	91.67 - 100.00	0.6000	0.6000
T7	18	EW63	91.67 - 100.00	0.6000	0.6000
T7	19	EW63	91.67 - 100.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T7	20	LDF7-50A (1-5/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	21	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	22	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	23	LDF7-50A (1-5/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	24	LDF7-50A (1-5/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	25	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	26	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	27	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	28	LDF4-50A (1/2 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	29	LDF7-50A (1-5/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	30	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	31	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	32	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	33	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	41	LDF4.5-50 (5/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	42	LDF4.5-50 (5/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	43	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	44	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	45	LDF7-50A (1-5/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	46	LDF7-50A (1-5/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	47	HB158-1-08U8-S8J18	91.67 - 100.00	0.6000	0.6000
T7	49	LDF5-50A (7/8 FOAM)	91.67 - 100.00	0.6000	0.6000
T7	50	Hybrid HCS 6x12 4 AWG (1-5/8")	91.67 - 100.00	0.6000	0.6000
T8	1	FB-L98B-02 (10mm Fiber)	83.33 - 91.67	0.6000	0.6000
T8	2	RSS 8 - AWG 2 (0.645")	83.33 - 91.67	0.6000	0.6000
T8	3	LDF6-50A (1-1/4 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	4	LDF6-50A (1-1/4 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	5	LDF7-50A (1-5/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	7	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	8	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	9	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	10	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	11	LDF7-50A (1-5/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	12	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	13	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	17	EW63	83.33 - 91.67	0.6000	0.6000
T8	18	EW63	83.33 - 91.67	0.6000	0.6000
T8	19	EW63	83.33 - 91.67	0.6000	0.6000
T8	20	LDF7-50A (1-5/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	21	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	22	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	23	LDF7-50A (1-5/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	24	LDF7-50A (1-5/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	25	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	26	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	27	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	28	LDF4-50A (1/2 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	29	LDF7-50A (1-5/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	30	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	31	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	32	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	33	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	41	LDF4.5-50 (5/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	42	LDF4.5-50 (5/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	43	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	44	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	45	LDF7-50A (1-5/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	46	LDF7-50A (1-5/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	47	HB158-1-08U8-S8J18	83.33 - 91.67	0.6000	0.6000
T8	49	LDF5-50A (7/8 FOAM)	83.33 - 91.67	0.6000	0.6000
T8	50	Hybrid HCS 6x12 4 AWG	83.33 - 91.67	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
		(1-5/8")			
T9	1	FB-L98B-02 (10mm Fiber)	75.00 - 83.33	0.6000	0.6000
T9	2	RSS 8 - AWG 2 (0.645")	75.00 - 83.33	0.6000	0.6000
T9	3	LDF6-50A (1-1/4 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	4	LDF6-50A (1-1/4 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	5	LDF7-50A (1-5/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	7	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	8	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	9	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	10	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	11	LDF7-50A (1-5/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	12	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	13	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	17	EW63	75.00 - 83.33	0.6000	0.6000
T9	18	EW63	75.00 - 83.33	0.6000	0.6000
T9	19	EW63	75.00 - 83.33	0.6000	0.6000
T9	20	LDF7-50A (1-5/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	21	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	22	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	23	LDF7-50A (1-5/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	24	LDF7-50A (1-5/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	25	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	26	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	27	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	28	LDF4-50A (1/2 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	29	LDF7-50A (1-5/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	30	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	31	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	32	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	33	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	34	LDF5-50A (7/8 FOAM)	75.00 - 76.00	0.6000	0.6000
T9	35	LDF5-50A (7/8 FOAM)	75.00 - 76.00	0.6000	0.6000
T9	41	LDF4.5-50 (5/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	42	LDF4.5-50 (5/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	43	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	44	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	45	LDF7-50A (1-5/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	46	LDF7-50A (1-5/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	47	HB158-1-08U8-S8J18	75.00 - 83.33	0.6000	0.6000
T9	49	LDF5-50A (7/8 FOAM)	75.00 - 83.33	0.6000	0.6000
T9	50	Hybrid HCS 6x12 4 AWG (1-5/8")	75.00 - 83.33	0.6000	0.6000
T10	1	FB-L98B-02 (10mm Fiber)	50.00 - 75.00	0.6000	0.6000
T10	2	RSS 8 - AWG 2 (0.645")	50.00 - 75.00	0.6000	0.6000
T10	3	LDF6-50A (1-1/4 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	4	LDF6-50A (1-1/4 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	5	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	7	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	8	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	9	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	10	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	11	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	12	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	13	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	17	EW63	50.00 - 75.00	0.6000	0.6000
T10	18	EW63	50.00 - 75.00	0.6000	0.6000
T10	19	EW63	50.00 - 75.00	0.6000	0.6000
T10	20	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	21	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	22	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	23	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	24	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T10	25	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	26	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	27	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	28	LDF4-50A (1/2 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	29	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	30	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	31	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	32	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	33	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	34	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	35	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	36	LDF4P-50A (1/2 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	41	LDF4.5-50 (5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	42	LDF4.5-50 (5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	43	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	44	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	45	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	46	LDF7-50A (1-5/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	47	HB158-1-08U8-S8J18	50.00 - 75.00	0.6000	0.6000
T10	49	LDF5-50A (7/8 FOAM)	50.00 - 75.00	0.6000	0.6000
T10	50	Hybrid HCS 6x12 4 AWG (1-5/8")	50.00 - 75.00	0.6000	0.6000
T11	1	FB-L98B-02 (10mm Fiber)	37.50 - 50.00	0.6000	0.6000
T11	2	RSS 8 - AWG 2 (0.645")	37.50 - 50.00	0.6000	0.6000
T11	3	LDF6-50A (1-1/4 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	4	LDF6-50A (1-1/4 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	5	LDF7-50A (1-5/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	7	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	8	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	9	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	10	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	11	LDF7-50A (1-5/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	12	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	13	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	17	EW63	37.50 - 50.00	0.6000	0.6000
T11	18	EW63	37.50 - 50.00	0.6000	0.6000
T11	19	EW63	37.50 - 50.00	0.6000	0.6000
T11	20	LDF7-50A (1-5/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	21	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	22	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	23	LDF7-50A (1-5/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	24	LDF7-50A (1-5/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	25	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	26	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	27	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	28	LDF4-50A (1/2 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	29	LDF7-50A (1-5/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	30	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	31	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	32	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	33	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	34	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	35	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	36	LDF4P-50A (1/2 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	41	LDF4.5-50 (5/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	42	LDF4.5-50 (5/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	43	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	44	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	45	LDF7-50A (1-5/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	46	LDF7-50A (1-5/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T11	47	HB158-1-08U8-S8J18	37.50 - 50.00	0.6000	0.6000
T11	49	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T11	50	Hybrid HCS 6x12 4 AWG (1-5/8")	37.50 - 50.00	0.6000	0.6000
T12	1	FB-L98B-02 (10mm Fiber)	25.00 - 37.50	0.6000	0.6000
T12	2	RSS 8 - AWG 2 (0.645")	25.00 - 37.50	0.6000	0.6000
T12	3	LDF6-50A (1-1/4 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	4	LDF6-50A (1-1/4 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	5	LDF7-50A (1-5/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	7	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	8	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	9	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	10	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	11	LDF7-50A (1-5/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	12	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	13	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	17	EW63	25.00 - 37.50	0.6000	0.6000
T12	18	EW63	25.00 - 37.50	0.6000	0.6000
T12	19	EW63	25.00 - 37.50	0.6000	0.6000
T12	20	LDF7-50A (1-5/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	21	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	22	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	23	LDF7-50A (1-5/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	24	LDF7-50A (1-5/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	25	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	26	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	27	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	28	LDF4-50A (1/2 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	29	LDF7-50A (1-5/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	30	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	31	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	32	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	33	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	34	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	35	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	36	LDF4P-50A (1/2 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	37	LDF4P-50A (1/2 FOAM)	25.00 - 27.00	0.6000	0.6000
T12	38	LDF4P-50A (1/2 FOAM)	25.00 - 27.00	0.6000	0.6000
T12	39	LDF5-50A (7/8 FOAM)	25.00 - 27.00	0.6000	0.6000
T12	41	LDF4.5-50 (5/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	42	LDF4.5-50 (5/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	43	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	44	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	45	LDF7-50A (1-5/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	46	LDF7-50A (1-5/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	47	HB158-1-08U8-S8J18	25.00 - 37.50	0.6000	0.6000
T12	49	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T12	50	Hybrid HCS 6x12 4 AWG (1-5/8")	25.00 - 37.50	0.6000	0.6000
T13	1	FB-L98B-02 (10mm Fiber)	12.50 - 25.00	0.6000	0.6000
T13	2	RSS 8 - AWG 2 (0.645")	12.50 - 25.00	0.6000	0.6000
T13	3	LDF6-50A (1-1/4 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	4	LDF6-50A (1-1/4 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	5	LDF7-50A (1-5/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	7	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	8	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	9	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	10	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	11	LDF7-50A (1-5/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	12	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	13	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	17	EW63	12.50 - 25.00	0.6000	0.6000
T13	18	EW63	12.50 - 25.00	0.6000	0.6000
T13	19	EW63	12.50 - 25.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T13	20	LDF7-50A (1-5/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	21	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	22	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	23	LDF7-50A (1-5/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	24	LDF7-50A (1-5/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	25	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	26	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	27	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	28	LDF4-50A (1/2 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	29	LDF7-50A (1-5/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	30	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	31	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	32	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	33	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	34	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	35	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	36	LDF4P-50A (1/2 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	37	LDF4P-50A (1/2 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	38	LDF4P-50A (1/2 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	39	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	40	LDF5-50A (7/8 FOAM)	12.50 - 15.00	0.6000	0.6000
T13	41	LDF4.5-50 (5/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	42	LDF4.5-50 (5/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	43	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	44	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	45	LDF7-50A (1-5/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	46	LDF7-50A (1-5/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	47	HB158-1-08U8-S8J18	12.50 - 25.00	0.6000	0.6000
T13	49	LDF5-50A (7/8 FOAM)	12.50 - 25.00	0.6000	0.6000
T13	50	Hybrid HCS 6x12 4 AWG (1-5/8")	12.50 - 25.00	0.6000	0.6000
T14	1	FB-L98B-02 (10mm Fiber)	8.00 - 12.50	0.6000	0.6000
T14	2	RSS 8 - AWG 2 (0.645")	8.00 - 12.50	0.6000	0.6000
T14	3	LDF6-50A (1-1/4 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	4	LDF6-50A (1-1/4 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	5	LDF7-50A (1-5/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	7	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	8	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	9	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	10	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	11	LDF7-50A (1-5/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	12	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	13	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	17	EW63	8.00 - 12.50	0.6000	0.6000
T14	18	EW63	8.00 - 12.50	0.6000	0.6000
T14	19	EW63	8.00 - 12.50	0.6000	0.6000
T14	20	LDF7-50A (1-5/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	21	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	22	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	23	LDF7-50A (1-5/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	24	LDF7-50A (1-5/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	25	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	26	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	27	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	28	LDF4-50A (1/2 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	29	LDF7-50A (1-5/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	30	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	31	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	32	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	33	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	34	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	35	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T14	36	LDF4P-50A (1/2 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	37	LDF4P-50A (1/2 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	38	LDF4P-50A (1/2 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	39	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	40	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	41	LDF4.5-50 (5/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	42	LDF4.5-50 (5/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	43	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	44	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	45	LDF7-50A (1-5/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	46	LDF7-50A (1-5/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	47	HB158-1-08U8-S8J18	8.00 - 12.50	0.6000	0.6000
T14	49	LDF5-50A (7/8 FOAM)	8.00 - 12.50	0.6000	0.6000
T14	50	Hybrid HCS 6x12 4 AWG (1-5/8")	8.00 - 12.50	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
* D&K Inventory Climb Antennas									
2' Yagi (DNK-1)	C	From Leg	2.000 0.000 0.000	0.0000	15.000	No Ice 1/2" Ice 1" Ice	2.083 3.787 5.517	2.083 3.787 5.517	30.950 52.866 85.272
2" Dia 8' Omni (DNK-2)	C	From Leg	2.000 0.000 0.000	0.0000	27.000	No Ice 1/2" Ice 1" Ice	2.000 3.030 4.060	2.000 3.030 4.060	5.000 18.000 31.000
2' Standoff T-Arm (5' face width) (DNK 1,2)	C	From Leg	0.000 0.000 0.000	0.0000	20.000	No Ice 1/2" Ice 1" Ice	3.500 4.200 4.900	3.500 4.200 4.900	91.000 120.000 149.000
(Inverted) 1" Dia Omni (DNK-3)	C	From Leg	5.000 0.000 -2.000	0.0000	27.000	No Ice 1/2" Ice 1" Ice	2.000 3.030 4.060	2.000 3.030 4.060	5.000 18.000 31.000
1" Dia Omni (DNK-4)	C	From Leg	5.000 0.000 2.000	0.0000	27.000	No Ice 1/2" Ice 1" Ice	2.000 3.030 4.060	2.000 3.030 4.060	5.000 18.000 31.000
Rohn 6' Side-Arm(1) (DNK-3,4)	C	None		0.0000	26.000	No Ice 1/2" Ice 1" Ice	10.600 15.400 20.200	10.600 15.400 20.200	140.000 212.000 284.000
GPS (DNK-5)	A	From Leg	0.500 0.000 0.000	0.0000	75.000	No Ice 1/2" Ice 1" Ice	1.000 1.500 2.000	1.000 1.500 2.000	10.000 15.000 20.000
3' Yagi (DNK-6)	C	From Leg	1.000 0.000 -1.000	0.0000	76.000	No Ice 1/2" Ice 1" Ice	2.083 3.787 5.517	2.083 3.787 5.517	30.950 52.866 85.272
20' 4-Bay Dipole (DNK-7)	C	From Leg	0.000 0.000 1.000	0.0000	76.000	No Ice 1/2" Ice 1" Ice	4.000 6.000 8.000	4.000 6.000 8.000	55.000 100.000 145.000
1' Side Arm	C	From Leg	0.500	0.0000	122.000	No Ice	2.500	2.500	55.000

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 lb
(DNK-6,7)			0.000			1/2" Ice	3.363	3.363	73.000
			0.000			1" Ice	4.226	4.226	91.000
3'4"x4" Pipe Mount (DNK-8)	B	None		0.0000	109.250	No Ice	0.862	0.862	36.000
						1/2" Ice	1.269	1.269	46.951
						1" Ice	1.494	1.494	60.549
12' Dipole (DNK-9)	C	From Leg	1.000	0.0000	119.000	No Ice	3.169	3.169	40.000
			0.000			1/2" Ice	3.389	3.389	78.897
			0.000			1" Ice	3.617	3.617	121.780
1' Side Arm (DNK-9)	C	From Leg	0.500	0.0000	119.000	No Ice	2.500	2.500	55.000
			0.000			1/2" Ice	3.363	3.363	73.000
			0.000			1" Ice	4.226	4.226	91.000
1'x1' Panel Antenna (DNK-10)	B	From Leg	0.500	0.0000	119.000	No Ice	1.200	0.131	10.000
			0.000			1/2" Ice	1.337	0.208	16.287
			0.000			1" Ice	1.481	0.290	24.389
1' Side Arm (DNK-10)	B	From Leg	0.500	0.0000	119.000	No Ice	2.500	2.500	55.000
			0.000			1/2" Ice	3.363	3.363	73.000
			0.000			1" Ice	4.226	4.226	91.000
* AT&T Carrier Antennas @ 143'									
13' Sector Mount (1) ((DNK 19-32)/ATT)	A	From Leg	4.000	0.0000	143.000	No Ice	12.000	12.000	220.000
			0.000			1/2" Ice	16.100	16.100	420.000
			0.000			1" Ice	20.200	20.200	620.000
13' Sector Mount (1) ((DNK 19-32)/ATT)	B	From Leg	4.000	0.0000	143.000	No Ice	12.000	12.000	220.000
			0.000			1/2" Ice	16.100	16.100	420.000
			0.000			1" Ice	20.200	20.200	620.000
13' Sector Mount (1) ((DNK 19-32)/ATT)	C	From Leg	4.000	0.0000	143.000	No Ice	12.000	12.000	220.000
			0.000			1/2" Ice	16.100	16.100	420.000
			0.000			1" Ice	20.200	20.200	620.000
(2) 7770 w mount pipe ((DNK 19-32)/ATT)	A	From Leg	4.000	0.0000	143.000	No Ice	5.882	3.980	52.000
			-6.000			1/2" Ice	6.314	4.603	94.698
			0.000			1" Ice	6.755	5.243	146.494
(2) 7770 w mount pipe ((DNK 19-32)/ATT)	B	From Leg	4.000	0.0000	143.000	No Ice	5.882	3.980	52.000
			-6.000			1/2" Ice	6.314	4.603	94.698
			0.000			1" Ice	6.755	5.243	146.494
(2) 7770 w mount pipe ((DNK 19-32)/ATT)	C	From Leg	4.000	0.0000	143.000	No Ice	5.882	3.980	52.000
			-6.000			1/2" Ice	6.314	4.603	94.698
			0.000			1" Ice	6.755	5.243	146.494
(2) TMA (shielded) ((DNK 19-32)/ATT)	A	From Leg	4.000	0.0000	143.000	No Ice	0.000	0.000	7.300
			0.000			1/2" Ice	0.000	0.000	11.643
			0.000			1" Ice	0.000	0.000	17.456
(2) TMA (shielded) ((DNK 19-32)/ATT)	B	From Leg	4.000	0.0000	143.000	No Ice	0.000	0.000	7.300
			0.000			1/2" Ice	0.000	0.000	11.643
			0.000			1" Ice	0.000	0.000	17.456
(2) TMA (shielded) ((DNK 19-32)/ATT)	C	From Leg	4.000	0.0000	143.000	No Ice	0.000	0.000	7.300
			0.000			1/2" Ice	0.000	0.000	11.643
			0.000			1" Ice	0.000	0.000	17.456
RRUS-11 ((DNK 19-32)/ATT)	A	None		0.0000	143.000	No Ice	2.566	1.068	50.000
						1/2" Ice	2.765	1.211	69.573
						1" Ice	2.971	1.361	92.082
RRUS-11 ((DNK 19-32)/ATT)	B	None		0.0000	143.000	No Ice	2.566	1.068	50.000
						1/2" Ice	2.765	1.211	69.573
						1" Ice	2.971	1.361	92.082
RRUS-11 ((DNK 19-32)/ATT)	C	None		0.0000	143.000	No Ice	2.566	1.068	50.000
						1/2" Ice	2.765	1.211	69.573
						1" Ice	2.971	1.361	92.082
AM-X-CD-14-65-00T-RET ((DNK 19-32)/ATT)	A	From Leg	4.000	0.0000	143.000	No Ice	5.507	2.828	4.000
			-2.000			1/2" Ice	5.899	3.137	35.591

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 lb
			0.000			1" Ice	6.299	3.469	71.995
AM-X-CD-14-65-00T-RET	B	From Leg	4.000	0.0000	143.000	No Ice	5.507	2.828	4.000
((DNK 19-32)/ATT)			-2.000			1/2" Ice	5.899	3.137	35.591
			0.000			1" Ice	6.299	3.469	71.995
AM-X-CD-14-65-00T-RET	C	From Leg	4.000	0.0000	143.000	No Ice	5.507	2.828	4.000
((DNK 19-32)/ATT)			-2.000			1/2" Ice	5.899	3.137	35.591
			0.000			1" Ice	6.299	3.469	71.995
Raycap Surge Suppressor	A	From Leg	0.000	0.0000	143.000	No Ice	1.266	1.266	20.000
((DNK 19-32)/ATT)			0.000			1/2" Ice	1.456	1.456	35.116
			0.000			1" Ice	1.658	1.658	52.569
RRUS-12	A	None		0.0000	143.000	No Ice	3.145	1.285	58.000
((DNK 19-32)/ATT)						1/2" Ice	3.365	1.438	81.222
						1" Ice	3.592	1.600	107.645
RRUS-12	B	None		0.0000	143.000	No Ice	3.145	1.285	58.000
((DNK 19-32)/ATT)						1/2" Ice	3.365	1.438	81.222
						1" Ice	3.592	1.600	107.645
RRUS-12	C	None		0.0000	143.000	No Ice	3.145	1.285	58.000
((DNK 19-32)/ATT)						1/2" Ice	3.365	1.438	81.222
						1" Ice	3.592	1.600	107.645
* AT&T Carrier Antennas @ 143'									
2" Dia 10' Omni	B	From Leg	3.000	0.0000	143.000	No Ice	2.000	2.000	10.000
(DNK-32)			0.000			1/2" Ice	3.030	3.030	25.000
			0.000			1" Ice	4.060	4.060	40.000
Pirod 4' Side Mount Standoff	B	None		0.0000	143.000	No Ice	2.720	2.720	50.000
(1)						1/2" Ice	4.910	4.910	89.000
(DNK-32)						1" Ice	7.100	7.100	128.000
3" Dia 20' Omni	B	From Leg	1.000	0.0000	153.000	No Ice	4.000	4.000	55.000
(DNK-33)			0.000			1/2" Ice	6.000	6.000	100.000
			0.000			1" Ice	8.000	8.000	145.000
1' Side Arm	B	From Leg	0.500	0.0000	153.000	No Ice	2.500	2.500	55.000
(DNK-33)			0.000			1/2" Ice	3.363	3.363	73.000
			0.000			1" Ice	4.226	4.226	91.000
1 Bay Dipole ANT400D	A	From Leg	0.000	0.0000	151.000	No Ice	1.879	0.518	13.300
(DNK-34)			0.000			1/2" Ice	2.093	0.742	27.514
			0.000			1" Ice	2.317	0.984	44.738
10'6"x4" Pipe Mount	B	None		0.0000	151.000	No Ice	3.048	3.048	114.000
(DNK-34)						1/2" Ice	5.615	5.615	146.840
						1" Ice	6.252	6.252	186.706
1.5" Dia 16' Omni	B	From Leg	0.000	0.0000	153.000	No Ice	4.000	4.000	55.000
(DNK-33)			0.000			1/2" Ice	6.000	6.000	100.000
			2.000			1" Ice	8.000	8.000	145.000
2" Dia 10' Omni	C	From Leg	0.000	0.0000	157.000	No Ice	2.000	2.000	10.000
(DNK-35)			0.000			1/2" Ice	3.030	3.030	25.000
			0.000			1" Ice	4.060	4.060	40.000
2' Sidearm	C	From Leg	0.000	0.0000	157.000	No Ice	3.900	3.900	87.000
(DNK-35)			0.000			1/2" Ice	4.400	4.400	97.000
			0.000			1" Ice	4.900	4.900	107.000
10'x6" Dipole Antenna	C	From Leg	0.500	0.0000	157.000	No Ice	9.167	1.667	46.000
(DNK-36)			0.000			1/2" Ice	9.888	2.793	77.565
			0.000			1" Ice	10.617	3.932	117.556
1' Side Arm	C	From Leg	0.500	0.0000	157.000	No Ice	2.500	2.500	55.000
(DNK-36)			0.000			1/2" Ice	3.363	3.363	73.000
			0.000			1" Ice	4.226	4.226	91.000
3'4"x4" Pipe Mount	B	None		0.0000	157.000	No Ice	0.846	0.846	36.000
(DNK-37)						1/2" Ice	1.269	1.269	46.951
						1" Ice	1.494	1.494	60.549

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 lb
(Inverted) 3" Dia 20' Omni	B	From Leg	2.000	0.0000	160.000	No Ice	4.000	4.000	55.000
(DNK-38)			0.000			1/2" Ice	6.000	6.000	100.000
			0.000			1" Ice	8.000	8.000	145.000
2' Sidearm	B	From Leg	0.000	0.0000	160.000	No Ice	3.900	3.900	87.000
(DNK-38,39)			0.000			1/2" Ice	4.400	4.400	97.000
			0.000			1" Ice	4.900	4.900	107.000
(Inverted) 3" Dia 20' Omni	B	From Leg	2.000	0.0000	160.000	No Ice	4.000	4.000	55.000
(DNK-39)			0.000			1/2" Ice	6.000	6.000	100.000
			0.000			1" Ice	8.000	8.000	145.000
6' Side-Arm(1)	A	From Leg	0.000	-45.0000	166.000	No Ice	10.600	10.600	140.000
(DNK-40,41)			0.000			1/2" Ice	15.400	15.400	212.000
			0.000			1" Ice	20.200	20.200	284.000
6' Side-Arm(1)	B	From Leg	0.000	45.0000	166.000	No Ice	10.600	10.600	140.000
(DNK-40,41)			0.000			1/2" Ice	15.400	15.400	212.000
			0.000			1" Ice	20.200	20.200	284.000
(inverted) 10' 8 Bay Di-Pole	B	From Face	4.000	-45.0000	166.000	No Ice	4.000	4.000	55.000
(DNK-40,41)			0.000			1/2" Ice	6.000	6.000	100.000
			0.000			1" Ice	8.000	8.000	145.000
(inverted) 2" Dia 10' Omni	B	From Face	4.000	0.0000	164.000	No Ice	2.000	2.000	10.000
(DNK-42)			0.000			1/2" Ice	3.030	3.030	25.000
			0.000			1" Ice	4.060	4.060	40.000
6' Side-Arm(1)	B	From Leg	0.000	-45.0000	164.000	No Ice	10.600	10.600	140.000
(DNK-42)			0.000			1/2" Ice	15.400	15.400	212.000
			0.000			1" Ice	20.200	20.200	284.000
6' Side-Arm(1)	C	From Leg	0.000	45.0000	164.000	No Ice	10.600	10.600	140.000
(DNK-42)			0.000			1/2" Ice	15.400	15.400	212.000
			0.000			1" Ice	20.200	20.200	284.000
3'4"x4" Pipe Mount	C	None		0.0000	169.000	No Ice	0.843	0.843	36.000
(DNK-43)						1/2" Ice	1.269	1.269	46.951
						1" Ice	1.494	1.494	60.549
3'4"x4" Pipe Mount	A	None		0.0000	171.000	No Ice	0.842	0.842	36.000
(DNK-44)						1/2" Ice	1.269	1.269	46.951
						1" Ice	1.494	1.494	60.549
3'4"x4" Pipe Mount	C	None		0.0000	176.000	No Ice	0.841	0.841	36.000
(DNK-45)						1/2" Ice	1.269	1.269	46.951
						1" Ice	1.494	1.494	60.549
432E-83I-01T TTA Unit	A	From Face	0.500	0.0000	178.000	No Ice	2.850	0.973	25.000
(DNK-47)			0.000			1/2" Ice	3.059	1.111	44.704
			0.000			1" Ice	3.276	1.255	67.389
3" Dia 12' Omni	A	From Face	0.500	0.0000	180.000	No Ice	2.000	2.000	10.000
(DNK-48)			0.000			1/2" Ice	3.030	3.030	25.000
			0.000			1" Ice	4.060	4.060	40.000
3" Dia 12' Omni	B	From Face	3.000	0.0000	180.000	No Ice	2.000	2.000	10.000
(DNK-49)			0.000			1/2" Ice	3.030	3.030	25.000
			0.000			1" Ice	4.060	4.060	40.000
432E-83I-01T TTA Unit	B	From Leg	6.000	0.0000	180.000	No Ice	2.850	0.973	25.000
(DNK-50)			0.000			1/2" Ice	3.059	1.111	44.704
			0.000			1" Ice	3.276	1.255	67.389
1 Bay Dipole ANT400D	B	From Leg	1.000	0.0000	180.000	No Ice	1.879	0.518	13.300
(DNK-51)			0.000			1/2" Ice	2.093	0.742	27.514
			0.000			1" Ice	2.317	0.984	44.738
2" Dia 10' Omni	B	From Leg	0.500	0.0000	181.000	No Ice	2.000	2.000	10.000
(DNK-52)			0.000			1/2" Ice	3.030	3.030	25.000
			0.000			1" Ice	4.060	4.060	40.000
2" Dia 10' Omni	C	From Leg	0.500	0.0000	181.000	No Ice	2.000	2.000	10.000
(DNK-53)			0.000			1/2" Ice	3.030	3.030	25.000
			0.000			1" Ice	4.060	4.060	40.000

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 lb
10' - 2 Bay Dipole	C	From Leg	0.500	0.0000	181.000	No Ice	1.408	1.408	10.000
(DNK-54)			0.000			1/2" Ice	1.556	1.556	27.727
			0.000			1" Ice	1.712	1.712	48.176
20' 4-Bay Dipole	A	From Leg	0.500	0.0000	181.000	No Ice	4.000	4.000	55.000
(DNK-55)			0.000			1/2" Ice	6.000	6.000	100.000
			0.000			1" Ice	8.000	8.000	145.000
Lightning Rod 2"x15'	C	None		0.0000	181.000	No Ice	3.000	3.000	80.000
(DNK-56)						1/2" Ice	4.525	4.525	103.137
						1" Ice	6.067	6.067	135.792
3" Dia 20' Omni	A	From Leg	6.000	0.0000	182.500	No Ice	4.000	4.000	55.000
(DNK-57)			0.000			1/2" Ice	6.000	6.000	100.000
			0.000			1" Ice	8.000	8.000	145.000
1" Dia 8' Omni	A	From Leg	2.000	0.0000	182.000	No Ice	2.000	2.000	5.000
(DNK-58)			0.000			1/2" Ice	3.030	3.030	18.000
			0.000			1" Ice	4.060	4.060	31.000
6' Side-Arm(1)	A	From Leg	0.000	-45.0000	182.500	No Ice	10.600	10.600	140.000
(DNK-57)			0.000			1/2" Ice	15.400	15.400	212.000
			0.000			1" Ice	20.200	20.200	284.000
6' Side-Arm(1)	B	From Leg	0.000	45.0000	182.500	No Ice	10.600	10.600	140.000
(DNK-57)			0.000			1/2" Ice	15.400	15.400	212.000
			0.000			1" Ice	20.200	20.200	284.000
* Proposed Antenna Install ASM-003 * 02/05/2018 ASM 003 Proposed * IQ-ASM-003 Update									
Pirod 12' PCS T-Frame (1)	A	None		0.0000	137.000	No Ice	9.800	9.800	260.000
104569						1/2" Ice	14.800	14.800	360.000
((DNK 14-19)/Sprint)						1" Ice	19.800	19.800	460.000
Pirod 12' PCS T-Frame (1)	B	None		0.0000	137.000	No Ice	9.800	9.800	260.000
104569						1/2" Ice	14.800	14.800	360.000
((DNK 14-19)/Sprint)						1" Ice	19.800	19.800	460.000
Pirod 12' PCS T-Frame (1)	C	None		0.0000	137.000	No Ice	9.800	9.800	260.000
104569						1/2" Ice	14.800	14.800	360.000
((DNK 14-19)/Sprint)						1" Ice	19.800	19.800	460.000
APXVTM14-C-120 Panel	A	From Leg	3.000	0.0000	137.000	No Ice	6.342	3.607	72.000
Antenna			-3.500			1/2" Ice	6.716	3.967	111.526
((DNK 14-19)/Sprint)			0.000			1" Ice	7.097	4.333	156.120
APXVTM14-C-120 Panel	B	From Leg	3.000	0.0000	137.000	No Ice	6.342	3.607	72.000
Antenna			-3.500			1/2" Ice	6.716	3.967	111.526
((DNK 14-19)/Sprint)			0.000			1" Ice	7.097	4.333	156.120
APXVTM14-C-120 Panel	C	From Leg	3.000	0.0000	137.000	No Ice	6.342	3.607	72.000
Antenna			-3.500			1/2" Ice	6.716	3.967	111.526
((DNK 14-19)/Sprint)			0.000			1" Ice	7.097	4.333	156.120
NNVV-65B-R4 Panel	A	From Leg	3.000	0.0000	137.000	No Ice	12.271	5.750	85.000
Antenna			3.500			1/2" Ice	12.766	6.207	157.141
(Sprint)			0.000			1" Ice	13.268	6.671	235.920
NNVV-65B-R4 Panel	B	From Leg	3.000	0.0000	137.000	No Ice	12.271	5.750	85.000
Antenna			3.500			1/2" Ice	12.766	6.207	157.141
(Sprint)			0.000			1" Ice	13.268	6.671	235.920
NNVV-65B-R4 Panel	C	From Leg	3.000	0.0000	137.000	No Ice	12.271	5.750	85.000
Antenna			3.500			1/2" Ice	12.766	6.207	157.141
(Sprint)			0.000			1" Ice	13.268	6.671	235.920
ALU TD-RRH-8x20-25	A	From Leg	3.000	0.0000	137.000	No Ice	4.030	1.526	76.200
(Sprint)			3.500			1/2" Ice	4.281	1.705	103.251
			0.000			1" Ice	4.540	1.891	133.822
ALU TD-RRH-8x20-25	B	From Leg	3.000	0.0000	137.000	No Ice	4.030	1.526	76.200

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 lb
(Sprint)			3.500			1/2" Ice	4.281	1.705	103.251
			0.000			1" Ice	4.540	1.891	133.822
ALU TD-RRH-8x20-25	C	From Leg	3.000	0.0000	137.000	No Ice	4.030	1.526	76.200
(Sprint)			3.500			1/2" Ice	4.281	1.705	103.251
			0.000			1" Ice	4.540	1.891	133.822
(2) ALU 800MHz 2x50W	A	From Leg	3.000	0.0000	137.000	No Ice	2.058	1.932	64.000
(Sprint)			3.500			1/2" Ice	2.240	2.109	86.121
			0.000			1" Ice	2.429	2.293	111.302
(2) ALU 800MHz 2x50W	B	From Leg	3.000	0.0000	137.000	No Ice	2.058	1.932	64.000
(Sprint)			3.500			1/2" Ice	2.240	2.109	86.121
			0.000			1" Ice	2.429	2.293	111.302
(2) ALU 800MHz 2x50W	C	From Leg	3.000	0.0000	137.000	No Ice	2.058	1.932	64.000
(Sprint)			3.500			1/2" Ice	2.240	2.109	86.121
			0.000			1" Ice	2.429	2.293	111.302
ALU 4x45-1900 MHz RRH	A	From Leg	3.000	0.0000	137.000	No Ice	2.500	2.500	69.500
Unit			-3.500			1/2" Ice	2.709	2.709	95.231
(Sprint)			0.000			1" Ice	2.926	2.926	124.333
ALU 4x45-1900 MHz RRH	B	From Leg	3.000	0.0000	137.000	No Ice	2.500	2.500	69.500
Unit			-3.500			1/2" Ice	2.709	2.709	95.231
(Sprint)			0.000			1" Ice	2.926	2.926	124.333
ALU 4x45-1900 MHz RRH	C	From Leg	3.000	0.0000	137.000	No Ice	2.500	2.500	69.500
Unit			-3.500			1/2" Ice	2.709	2.709	95.231
(Sprint)			0.000			1" Ice	2.926	2.926	124.333
* IQ-ASM-003 Update									
* TWM Equipment Upgrade 5-1-2019									
SitePro1 USF12-396-U	A	From Leg	0.500	0.0000	130.000	No Ice	16.233	9.804	491.090
Mount Assembly w/ (3) 96"			0.000			1/2" Ice	22.183	13.272	630.090
Mount Pipes			0.000			1" Ice	28.152	16.684	815.090
(T-Mobile - Proposed)									
SitePro1 USF12-396-U	B	From Leg	0.500	0.0000	130.000	No Ice	16.233	9.804	491.090
Mount Assembly w/ (3) 96"			0.000			1/2" Ice	22.183	13.272	630.090
Mount Pipes			0.000			1" Ice	28.152	16.684	815.090
(T-Mobile - Proposed)									
SitePro1 USF12-396-U	C	From Leg	0.500	0.0000	130.000	No Ice	16.233	9.804	491.090
Mount Assembly w/ (3) 96"			0.000			1/2" Ice	22.183	13.272	630.090
Mount Pipes			0.000			1" Ice	28.152	16.684	815.090
(T-Mobile - Proposed)									
Ericsson AIR32 B66A/B2A	A	From Leg	4.000	0.0000	130.000	No Ice	6.510	4.712	132.200
Panel Antenna			6.000			1/2" Ice	6.887	5.068	178.024
(T-Mobile - Proposed)			0.000			1" Ice	7.271	5.431	229.110
Ericsson AIR32 B66A/B2A	B	From Leg	4.000	0.0000	130.000	No Ice	6.510	4.712	132.200
Panel Antenna			6.000			1/2" Ice	6.887	5.068	178.024
(T-Mobile - Proposed)			0.000			1" Ice	7.271	5.431	229.110
Ericsson AIR32 B66A/B2A	C	From Leg	4.000	0.0000	130.000	No Ice	6.510	4.712	132.200
Panel Antenna			6.000			1/2" Ice	6.887	5.068	178.024
(T-Mobile - Proposed)			0.000			1" Ice	7.271	5.431	229.110
RFS	A	From Leg	4.000	0.0000	130.000	No Ice	20.243	8.889	153.300
APXVAARR24_43-U-NA20			0.000			1/2" Ice	20.890	9.487	265.894
Panel Antenna			0.000			1" Ice	21.544	10.092	387.018
(T-Mobile - Proposed)									
RFS	B	From Leg	4.000	0.0000	130.000	No Ice	20.243	8.889	153.300
APXVAARR24_43-U-NA20			0.000			1/2" Ice	20.890	9.487	265.894
Panel Antenna			0.000			1" Ice	21.544	10.092	387.018
(T-Mobile - Proposed)									
RFS	C	From Leg	4.000	0.0000	130.000	No Ice	20.243	8.889	153.300
APXVAARR24_43-U-NA20			0.000			1/2" Ice	20.890	9.487	265.894

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 lb
Panel Antenna			0.000			1" Ice	21.544	10.092	387.018
(T-Mobile - Proposed)									
Ericsson 4449 B71 + B12	A	From Leg	4.000	0.0000	130.000	No Ice	1.656	1.156	80.000
Radio Unit			0.000			1/2" Ice	1.817	1.295	96.157
(T-Mobile - Proposed)			0.000			1" Ice	1.985	1.441	114.939
Ericsson 4449 B71 + B12	B	From Leg	4.000	0.0000	130.000	No Ice	1.656	1.156	80.000
Radio Unit			0.000			1/2" Ice	1.817	1.295	96.157
(T-Mobile - Proposed)			0.000			1" Ice	1.985	1.441	114.939
Ericsson 4449 B71 + B12	C	From Leg	4.000	0.0000	130.000	No Ice	1.656	1.156	80.000
Radio Unit			0.000			1/2" Ice	1.817	1.295	96.157
(T-Mobile - Proposed)			0.000			1" Ice	1.985	1.441	114.939
Ericsson AIR21 B2A|B4P	A	From Leg	4.000	0.0000	130.000	No Ice	6.510	4.712	105.800
Panel			-6.000			1/2" Ice	6.887	5.068	151.624
(T-Mobile - Proposed)			0.000			1" Ice	7.271	5.431	202.710
Ericsson AIR21 B2A|B4P	B	From Leg	4.000	0.0000	130.000	No Ice	6.510	4.712	105.800
Panel			-6.000			1/2" Ice	6.887	5.068	151.624
(T-Mobile - Proposed)			0.000			1" Ice	7.271	5.431	202.710
Ericsson AIR21 B2A|B4P	C	From Leg	4.000	0.0000	130.000	No Ice	6.510	4.712	105.800
Panel			-6.000			1/2" Ice	6.887	5.068	151.624
(T-Mobile - Proposed)			0.000			1" Ice	7.271	5.431	202.710
Generic Twin TMA unit	A	From Leg	0.000	0.0000	130.000	No Ice	0.373	0.964	25.000
(T-Mobile - Proposed)			-6.000			1/2" Ice	0.460	1.087	32.190
			0.000			1" Ice	0.553	1.218	41.214
Generic Twin TMA unit	B	From Leg	0.000	0.0000	130.000	No Ice	0.373	0.964	25.000
(T-Mobile - Proposed)			-6.000			1/2" Ice	0.460	1.087	32.190
			0.000			1" Ice	0.553	1.218	41.214
Generic Twin TMA unit	C	From Leg	0.000	0.0000	130.000	No Ice	0.373	0.964	25.000
(T-Mobile - Proposed)			-6.000			1/2" Ice	0.460	1.087	32.190
			0.000			1" Ice	0.553	1.218	41.214
* TWM Equipment Upgrade 5-1-2019									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
6' w/Radome	C	Paraboloid	From	0.500	Worst		176.000	6.000	No Ice	28.274	380.000
(DNK-45)		w/Radome	Leg	0.000					1/2" Ice	29.065	450.000
				0.000					1" Ice	29.856	520.000
6' w/Radome	A	Paraboloid	From	0.500	Worst		174.000	6.000	No Ice	28.274	380.000
(DNK-44)		w/Radome	Leg	0.000					1/2" Ice	29.065	450.000
				0.000					1" Ice	29.856	520.000
Andrew 6' w/Radome	C	Paraboloid	From	0.500	Worst		170.000	6.000	No Ice	28.274	380.000
(DNK-43)		w/Radome	Leg	0.000					1/2" Ice	29.065	450.000
				0.000					1" Ice	29.856	520.000
4' Paraflector	B	Grid	From	0.500	Worst		109.250	4.000	No Ice	16.000	34.000
(DNK-8)			Leg	0.000					1/2" Ice	16.674	48.000
				0.000					1" Ice	17.347	62.000

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight lb
4' Paraflector (DNK-37)	B	Grid	From Leg	0.500 0.000 0.000	Worst		157.000	4.000	No Ice 1/2" Ice 1" Ice	16.000 16.674 17.347	34.000 48.000 62.000

222-G Verification Constants

Constant	Value
Wind Importance Factor Without Ice	1.15
Wind Importance Factor With Ice Factor	1
Ice Importance Factor	1.25
K_d	0.85
Z_g	900
α	9.5
K_{zmin}	0.85
K_e	1
K_t	1
f	1

222-G Section Verification ArRr By Element

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	Face	e	e w/Ice	A_r ft²	A_r w/Ice ft²	A_rR_r ft²	A_rR_r w/Ice ft²
T1 180.000-175.000	1	Stainless P5x0.250	56.067	46.991	C	0.173	0.388	2.086	3.936	0.970	2.484
	1	Stainless P5x0.250	56.067	46.991	A	0.173	0.388	2.086	3.936	0.970	2.484
	2	Stainless P5x0.250	56.067	46.991	C	0.173	0.388	2.086	3.936	0.970	2.484
	2	Stainless P5x0.250	56.067	46.991	B	0.173	0.388	2.086	3.936	0.970	2.484
	3	Stainless P5x0.250	56.067	46.991	B	0.173	0.388	2.086	3.936	0.970	2.484
	3	Stainless P5x0.250	56.067	46.991	A	0.173	0.388	2.086	3.936	0.970	2.484
					A		Sum:	4.171	7.873	1.941	4.967
					B			4.171	7.873	1.941	4.967
					C			4.171	7.873	1.941	4.967
T2 175.000-166.667	13	Stainless P5x0.250	55.842	46.717	C	0.135	0.302	3.476	6.549	1.567	3.927
	13	Stainless P5x0.250	55.842	46.717	A	0.135	0.302	3.476	6.549	1.567	3.927
	14	Stainless P5x0.250	55.842	46.717	C	0.135	0.302	3.476	6.549	1.567	3.927
	14	Stainless P5x0.250	55.842	46.717	B	0.135	0.302	3.476	6.549	1.567	3.927
	15	Stainless P5x0.250	55.842	46.717	B	0.135	0.302	3.476	6.549	1.567	3.927
	15	Stainless P5x0.250	55.842	46.717	A	0.135	0.302	3.476	6.549	1.567	3.927
					A		Sum:	6.952	13.097	3.134	7.853
					B			6.952	13.097	3.134	7.853
					C			6.952	13.097	3.134	7.853
T3 166.667-158.333	25	Stainless P5x0.250	55.549	46.363	C	0.13	0.291	3.476	6.533	1.565	3.896
	25	Stainless P5x0.250	55.549	46.363	A	0.13	0.291	3.476	6.533	1.565	3.896
	26	Stainless P5x0.250	55.549	46.363	C	0.13	0.291	3.476	6.533	1.565	3.896
	26	Stainless P5x0.250	55.549	46.363	B	0.13	0.291	3.476	6.533	1.565	3.896
	27	Stainless P5x0.250	55.549	46.363	B	0.13	0.291	3.476	6.533	1.565	3.896

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	Face	e	e w/Ice	A_r ft^2	A_r w/Ice ft^2	A_rR_r ft^2	A_rR_r w/Ice ft^2
	27	Stainless P5x0.250	55.549	46.363	A	0.13	0.291	3.476	6.533	1.565	3.896
					A		Sum:	6.952	13.067	3.131	7.792
					B			6.952	13.067	3.131	7.792
					C			6.952	13.067	3.131	7.792
T4	37	Stainless P5x0.250	55.242	45.994	C	0.126	0.282	3.476	6.517	1.565	3.868
158.333-150.000											
	37	Stainless P5x0.250	55.242	45.994	A	0.126	0.282	3.476	6.517	1.565	3.868
	38	Stainless P5x0.250	55.242	45.994	C	0.126	0.282	3.476	6.517	1.565	3.868
	38	Stainless P5x0.250	55.242	45.994	B	0.126	0.282	3.476	6.517	1.565	3.868
	39	Stainless P5x0.250	55.242	45.994	B	0.126	0.282	3.476	6.517	1.565	3.868
	39	Stainless P5x0.250	55.242	45.994	A	0.126	0.282	3.476	6.517	1.565	3.868
					A		Sum:	6.952	13.035	3.130	7.736
					B			6.952	13.035	3.130	7.736
					C			6.952	13.035	3.130	7.736
T5	49	Stainless P5x0.300	54.58	45.202	C	0.145	0.339	10.428	19.448	4.803	11.905
150.000-125.000											
	49	Stainless P5x0.300	54.58	45.202	A	0.145	0.339	10.428	19.448	4.803	11.905
	50	Stainless P5x0.300	54.58	45.202	C	0.145	0.339	10.428	19.448	4.803	11.905
	50	Stainless P5x0.300	54.58	45.202	B	0.145	0.339	10.428	19.448	4.803	11.905
	51	Stainless P5x0.300	54.58	45.202	B	0.145	0.339	10.428	19.448	4.803	11.905
	51	Stainless P5x0.300	54.58	45.202	A	0.145	0.339	10.428	19.448	4.803	11.905
					A		Sum:	20.856	38.897	9.606	23.811
					B			20.856	38.897	9.606	23.811
					C			20.856	38.897	9.606	23.811
T6	124	Stainless P5x0.400	53.44	43.849	C	0.142	0.323	10.428	19.269	4.848	11.685
125.000-100.000											
	124	Stainless P5x0.400	53.44	43.849	A	0.142	0.323	10.428	19.269	4.848	11.685
	125	Stainless P5x0.400	53.44	43.849	C	0.142	0.323	10.428	19.269	4.848	11.685
	125	Stainless P5x0.400	53.44	43.849	B	0.142	0.323	10.428	19.269	4.848	11.685
	126	Stainless P5x0.400	53.44	43.849	B	0.142	0.323	10.428	19.269	4.848	11.685
	126	Stainless P5x0.400	53.44	43.849	A	0.142	0.323	10.428	19.269	4.848	11.685
					A		Sum:	20.856	38.538	9.697	23.369
					B			20.856	38.538	9.697	23.369
					C			20.856	38.538	9.697	23.369
T7	199	Stainless P5x0.500	52.545	42.801	C	0.137	0.31	3.476	6.376	1.624	3.838
100.000-91.667											
	199	Stainless P5x0.500	52.545	42.801	A	0.137	0.31	3.476	6.376	1.624	3.838
	200	Stainless P5x0.500	52.545	42.801	C	0.137	0.31	3.476	6.376	1.624	3.838
	200	Stainless P5x0.500	52.545	42.801	B	0.137	0.31	3.476	6.376	1.624	3.838
	201	Stainless P5x0.500	52.545	42.801	B	0.137	0.31	3.476	6.376	1.624	3.838
	201	Stainless P5x0.500	52.545	42.801	A	0.137	0.31	3.476	6.376	1.624	3.838
					A		Sum:	6.952	12.752	3.248	7.676
					B			6.952	12.752	3.248	7.676
					C			6.952	12.752	3.248	7.676
T8					A		Sum:	0.000	0.000	0.000	0.000
91.667-83.333					B			0.000	0.000	0.000	0.000
					C			0.000	0.000	0.000	0.000
T9					A		Sum:	0.000	0.000	0.000	0.000
83.333-75.000					B			0.000	0.000	0.000	0.000
					C			0.000	0.000	0.000	0.000
T10	280	Stainless P6.875x0.400	69.071	48.504	C	0.135	0.26	14.338	22.675	5.899	13.321
75.000-50.000											
	280	Stainless P6.875x0.400	69.071	48.504	A	0.135	0.26	14.338	22.675	5.899	13.321
	281	Stainless P6.875x0.400	69.071	48.504	C	0.135	0.26	14.338	22.675	5.899	13.321
	281	Stainless	69.071	48.504	B	0.135	0.26	14.338	22.675	5.899	13.321

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	Face	e	e w/Ice	A_r ft^2	A_r w/Ice ft^2	A_rR_r ft^2	A_rR_r w/Ice ft^2
		P6.875x0.400									
	282	Stainless	69.071	48.504	B	0.135	0.26	14.338	22.675	5.899	13.321
		P6.875x0.400									
	282	Stainless	69.071	48.504	A	0.135	0.26	14.338	22.675	5.899	13.321
		P6.875x0.400									
					A		Sum:	28.676	45.350	11.798	26.643
					B			28.676	45.350	11.798	26.643
					C			28.676	45.350	11.798	26.643
T11	331	Stainless	66.526	46.115	C	0.13	0.246	7.169	11.191	2.930	6.536
50.000-37.500		P6.875x0.500									
	331	Stainless	66.526	46.115	A	0.13	0.246	7.169	11.191	2.930	6.536
		P6.875x0.500									
	332	Stainless	66.526	46.115	C	0.13	0.246	7.169	11.191	2.930	6.536
		P6.875x0.500									
	332	Stainless	66.526	46.115	B	0.13	0.246	7.169	11.191	2.930	6.536
		P6.875x0.500									
	333	Stainless	66.526	46.115	B	0.13	0.246	7.169	11.191	2.930	6.536
		P6.875x0.500									
	333	Stainless	66.526	46.115	A	0.13	0.246	7.169	11.191	2.930	6.536
		P6.875x0.500									
					A		Sum:	14.338	22.383	5.860	13.073
					B			14.338	22.383	5.860	13.073
					C			14.338	22.383	5.860	13.073
T12	358	Stainless	64.211	43.981	C	0.127	0.237	7.169	11.058	2.919	6.435
37.500-25.000		P6.875x0.500									
	358	Stainless	64.211	43.981	A	0.127	0.237	7.169	11.058	2.919	6.435
		P6.875x0.500									
	359	Stainless	64.211	43.981	C	0.127	0.237	7.169	11.058	2.919	6.435
		P6.875x0.500									
	359	Stainless	64.211	43.981	B	0.127	0.237	7.169	11.058	2.919	6.435
		P6.875x0.500									
	360	Stainless	64.211	43.981	B	0.127	0.237	7.169	11.058	2.919	6.435
		P6.875x0.500									
	360	Stainless	64.211	43.981	A	0.127	0.237	7.169	11.058	2.919	6.435
		P6.875x0.500									
					A		Sum:	14.338	22.117	5.839	12.871
					B			14.338	22.117	5.839	12.871
					C			14.338	22.117	5.839	12.871
T13					A		Sum:	0.000	0.000	0.000	0.000
25.000-12.500					B			0.000	0.000	0.000	0.000
					C			0.000	0.000	0.000	0.000
T14					A		Sum:	0.000	0.000	0.000	0.000
12.500-0.000					B			0.000	0.000	0.000	0.000
					C			0.000	0.000	0.000	0.000

222-G Section Verification Tables - No Ice

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z ksf	Face	e	A_rR_r ft^2
T1 180.000-175.000	177.500		1.428	1	1		0.039	A	0.173	1.941
								B	0.173	1.941

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z ksf	Face	e	A_rR_r ft²
								C	0.173	1.941
T2 175.000-166.667	170.833		1.417	1	1		0.039	A	0.135	3.134
								B	0.135	3.134
								C	0.135	3.134
T3 166.667-158.333	162.500		1.402	1	1		0.039	A	0.13	3.131
								B	0.13	3.131
								C	0.13	3.131
T4 158.333-150.000	154.167		1.386	1	1		0.038	A	0.126	3.130
								B	0.126	3.130
								C	0.126	3.130
T5 150.000-125.000	137.500		1.353	1	1		0.037	A	0.145	9.606
								B	0.145	9.606
								C	0.145	9.606
T6 125.000-100.000	112.500		1.297	1	1		0.036	A	0.142	9.697
								B	0.142	9.697
								C	0.142	9.697
T7 100.000-91.667	95.833		1.254	1	1		0.035	A	0.137	3.248
								B	0.137	3.248
								C	0.137	3.248
T8 91.667-83.333	87.500		1.231	1	1		0.034	A	0.137	0.000
								B	0.137	0.000
								C	0.137	0.000
T9 83.333-75.000	79.167		1.205	1	1		0.033	A	0.135	0.000
								B	0.135	0.000
								C	0.135	0.000
T10 75.000-50.000	62.500		1.146	1	1		0.032	A	0.135	11.798
								B	0.135	11.798
								C	0.135	11.798
T11 50.000-37.500	43.750		1.063	1	1		0.029	A	0.13	5.860
								B	0.13	5.860
								C	0.13	5.860
T12 37.500-25.000	31.250		0.991	1	1		0.027	A	0.127	5.839
								B	0.127	5.839
								C	0.127	5.839
T13 25.000-12.500	18.750		0.89	1	1		0.025	A	0.128	0.000
								B	0.128	0.000
								C	0.128	0.000
T14 12.500-0.000	6.250		0.85	1	1		0.023	A	0.126	0.000
								B	0.126	0.000
								C	0.126	0.000

222-G Section Verification Tables - Ice

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z ksf	Face	e	A_rR_r ft²
T1 180.000-175.000	177.500	177.500	1.428	1	1	2.219	0.008	A	0.388	10.680
								B	0.388	10.680
								C	0.388	10.680
T2 175.000-166.667	170.833	170.833	1.417	1	1	2.210	0.008	A	0.302	14.524
								B	0.302	14.524
								C	0.302	14.524
T3 166.667-158.333	162.500	162.500	1.402	1	1	2.199	0.008	A	0.291	14.630
								B	0.291	14.630
								C	0.291	14.630
T4 158.333-150.000	154.167	154.167	1.386	1	1	2.188	0.008	A	0.282	14.742

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z ksf	Face	e	A_rR_r ft²
								B	0.282	14.742
								C	0.282	14.742
T5 150.000-125.000	137.500	137.500	1.353	1	1	2.163	0.007	A	0.339	57.511
								B	0.339	57.511
								C	0.339	57.511
T6 125.000-100.000	112.500	112.500	1.297	1	1	2.120	0.007	A	0.323	59.362
								B	0.323	59.362
								C	0.323	59.362
T7 100.000-91.667	95.833	95.833	1.254	1	1	2.086	0.007	A	0.31	20.120
								B	0.31	20.120
								C	0.31	20.120
T8 91.667-83.333	87.500	87.500	1.231	1	1	2.067	0.007	A	0.293	12.585
								B	0.293	12.585
								C	0.293	12.585
T9 83.333-75.000	79.167	79.167	1.205	1	1	2.046	0.007	A	0.288	12.782
								B	0.288	12.782
								C	0.288	12.782
T10 75.000-50.000	62.500	62.500	1.146	1	1	1.999	0.006	A	0.26	55.739
								B	0.26	55.739
								C	0.26	55.739
T11 50.000-37.500	43.750	43.750	1.063	1	1	1.929	0.006	A	0.246	27.695
								B	0.246	27.695
								C	0.246	27.695
T12 37.500-25.000	31.250	31.250	0.991	1	1	1.865	0.005	A	0.237	27.417
								B	0.237	27.417
								C	0.237	27.417
T13 25.000-12.500	18.750	18.750	0.89	1	1	1.772	0.005	A	0.224	14.188
								B	0.224	14.188
								C	0.224	14.188
T14 12.500-0.000	6.250	6.250	0.85	1	1	1.588	0.005	A	0.21	13.044
								B	0.21	13.044
								C	0.21	13.044

222-G Section Verification Tables - Service

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z ksf	Face	e	A_rR_r ft²
T1 180.000-175.000	177.500		1.428	1	1		0.011	A	0.173	1.941
								B	0.173	1.941
								C	0.173	1.941
T2 175.000-166.667	170.833		1.417	1	1		0.011	A	0.135	3.134
								B	0.135	3.134
								C	0.135	3.134
T3 166.667-158.333	162.500		1.402	1	1		0.011	A	0.13	3.131
								B	0.13	3.131
								C	0.13	3.131
T4 158.333-150.000	154.167		1.386	1	1		0.011	A	0.126	3.130
								B	0.126	3.130
								C	0.126	3.130
T5 150.000-125.000	137.500		1.353	1	1		0.011	A	0.145	9.606
								B	0.145	9.606
								C	0.145	9.606
T6 125.000-100.000	112.500		1.297	1	1		0.010	A	0.142	9.697
								B	0.142	9.697
								C	0.142	9.697

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z ksf	Face	e	A_rR_r ft²
T7 100.000-91.667	95.833		1.254	1	1		0.010	A	0.137	3.248
								B	0.137	3.248
								C	0.137	3.248
T8 91.667-83.333	87.500		1.231	1	1		0.010	A	0.137	0.000
								B	0.137	0.000
								C	0.137	0.000
T9 83.333-75.000	79.167		1.205	1	1		0.009	A	0.135	0.000
								B	0.135	0.000
								C	0.135	0.000
T10 75.000-50.000	62.500		1.146	1	1		0.009	A	0.135	11.798
								B	0.135	11.798
								C	0.135	11.798
T11 50.000-37.500	43.750		1.063	1	1		0.008	A	0.13	5.860
								B	0.13	5.860
								C	0.13	5.860
T12 37.500-25.000	31.250		0.991	1	1		0.008	A	0.127	5.839
								B	0.127	5.839
								C	0.127	5.839
T13 25.000-12.500	18.750		0.89	1	1		0.007	A	0.128	0.000
								B	0.128	0.000
								C	0.128	0.000
T14 12.500-0.000	6.250		0.85	1	1		0.007	A	0.126	0.000
								B	0.126	0.000
								C	0.126	0.000

Tower Pressures - No Ice

$G_H = 0.850$

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
T1	177.500	1.428	0.039	56.082	A	5.526	4.171	4.171	43.02	0.000	0.000
180.000-175.0					B	5.526	4.171		43.02	0.000	0.000
00					C	5.526	4.171		43.02	8.026	0.000
T2	170.833	1.417	0.039	97.919	A	6.293	6.952	6.952	52.49	0.000	0.000
175.000-166.6					B	6.293	6.952		52.49	0.000	0.000
67					C	6.293	6.952		52.49	17.602	0.000
T3	162.500	1.402	0.039	103.475	A	6.518	6.952	6.952	51.61	0.000	0.000
166.667-158.3					B	6.518	6.952		51.61	0.000	0.000
33					C	6.518	6.952		51.61	23.679	0.000
T4	154.167	1.386	0.038	109.031	A	6.746	6.952	6.952	50.75	0.000	0.000
158.333-150.0					B	6.746	6.952		50.75	0.000	0.000
00					C	6.746	6.952		50.75	29.939	0.000
T5	137.500	1.353	0.037	360.425	A	31.437	20.856	20.856	39.88	3.367	0.000
150.000-125.0					B	31.437	20.856		39.88	67.215	0.000
00					C	31.437	20.856		39.88	97.640	0.000
T6	112.500	1.297	0.036	410.425	A	37.501	20.856	20.856	35.74	4.209	0.000
125.000-100.0					B	37.501	20.856		35.74	127.275	0.000
00					C	37.501	20.856		35.74	103.553	0.000
T7	95.833	1.254	0.035	147.919	A	13.268	6.952	6.952	34.38	1.403	0.000
100.000-91.66					B	13.268	6.952		34.38	42.425	0.000
7					C	13.268	6.952		34.38	35.526	0.000
T8	87.500	1.231	0.034	154.157	A	21.130	0.000	7.473	35.37	1.403	0.000
91.667-83.333					B	21.130	0.000		35.37	42.425	0.000

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
					C	21.130	0.000		35.37	35.526	0.000
T9	79.167	1.205	0.033	159.712	A	21.520	0.000	7.473	34.73	1.403	0.000
83.333-75.000					B	21.520	0.000		34.73	42.425	0.000
					C	21.520	0.000		34.73	35.744	0.000
T10	62.500	1.146	0.032	514.334	A	40.966	28.676	28.676	41.18	4.209	0.000
75.000-50.000					B	40.966	28.676		41.18	127.275	0.000
					C	40.966	28.676		41.18	113.603	0.000
T11	43.750	1.063	0.029	275.917	A	21.483	14.338	14.338	40.03	2.105	0.000
50.000-37.500					B	21.483	14.338		40.03	63.637	0.000
					C	21.483	14.338		40.03	56.801	0.000
T12	31.250	0.991	0.027	288.417	A	22.193	14.338	14.338	39.25	2.105	0.000
37.500-25.000					B	22.193	14.338		39.25	63.637	0.000
					C	22.193	14.338		39.25	57.271	0.000
T13	18.750	0.89	0.025	300.389	A	38.557	0.000	14.990	38.88	2.105	0.000
25.000-12.500					B	38.557	0.000		38.88	63.638	0.000
					C	38.557	0.000		38.88	60.011	0.000
T14	6.250	0.85	0.023	312.889	A	39.292	0.000	14.990	38.15	0.758	0.000
12.500-0.000					B	39.292	0.000		38.15	22.910	0.000
					C	39.292	0.000		38.15	21.996	0.000

Tower Pressure - With Ice

$G_H = 0.850$

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
T1	177.500	1.428	0.008	2.219	57.933	A	5.526	16.927	7.873	35.06	0.000	0.000
180.000-175.000						B	5.526	16.927		35.06	0.000	0.000
						C	5.526	16.927		35.06	35.536	0.000
T2	170.833	1.417	0.008	2.210	100.991	A	6.293	24.223	13.097	42.92	0.000	0.000
175.000-166.667						B	6.293	24.223		42.92	0.000	0.000
						C	6.293	24.223		42.92	72.117	0.000
T3	162.500	1.402	0.008	2.199	106.532	A	6.518	24.534	13.067	42.08	0.000	0.000
166.667-158.333						B	6.518	24.534		42.08	0.000	0.000
						C	6.518	24.534		42.08	93.023	0.000
T4	154.167	1.386	0.008	2.188	112.071	A	6.746	24.840	13.035	41.27	0.000	0.000
158.333-150.000						B	6.746	24.840		41.27	0.000	0.000
						C	6.746	24.840		41.27	117.439	0.000
T5	137.500	1.353	0.007	2.163	369.443	A	31.437	93.947	38.897	31.02	29.421	0.000
150.000-125.000						B	31.437	93.947		31.02	201.309	0.000
						C	31.437	93.947		31.02	386.566	0.000
T6	112.500	1.297	0.007	2.120	419.264	A	37.501	97.893	38.538	28.46	36.185	0.000
125.000-100.000						B	37.501	97.893		28.46	384.109	0.000
						C	37.501	97.893		28.46	409.737	0.000
T7	95.833	1.254	0.007	2.086	150.819	A	13.268	33.424	12.752	27.31	11.907	0.000
100.000-91.667						B	13.268	33.424		27.31	127.506	0.000
						C	13.268	33.424		27.31	139.823	0.000
T8	87.500	1.231	0.007	2.067	157.030	A	24.962	21.086	11.305	24.55	11.820	0.000
91.667-83.333						B	24.962	21.086		24.55	127.209	0.000
						C	24.962	21.086		24.55	138.878	0.000
T9	79.167	1.205	0.007	2.046	162.557	A	25.314	21.475	11.267	24.08	11.725	0.000
83.333-75.000						B	25.314	21.475		24.08	126.885	0.000
						C	25.314	21.475		24.08	138.886	0.000
T10	62.500	1.146	0.006	1.999	522.669	A	40.966	94.877	45.350	33.38	34.518	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
75.000-50.000						B	40.966	94.877		33.38	378.403	0.000
						C	40.966	94.877		33.38	443.381	0.000
T11	43.750	1.063	0.006	1.929	279.938	A	21.483	47.419	22.383	32.48	16.777	0.000
50.000-37.500						B	21.483	47.419		32.48	187.556	0.000
						C	21.483	47.419		32.48	215.913	0.000
T12	31.250	0.991	0.005	1.865	292.305	A	22.193	47.111	22.117	31.91	16.337	0.000
37.500-25.000						B	22.193	47.111		31.91	186.059	0.000
						C	22.193	47.111		31.91	213.356	0.000
T13	18.750	0.89	0.005	1.772	304.084	A	43.484	24.504	19.917	29.30	15.698	0.000
25.000-12.500						B	43.484	24.504		29.30	183.887	0.000
						C	43.484	24.504		29.30	220.241	0.000
T14	6.250	0.85	0.005	1.588	316.199	A	43.707	22.635	19.405	29.25	5.195	0.000
12.500-0.000						B	43.707	22.635		29.25	64.655	0.000
						C	43.707	22.635		29.25	74.701	0.000

Tower Pressure - Service

$G_H = 0.850$

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
T1	177.500	1.428	0.011	56.082	A	5.526	4.171	4.171	43.02	0.000	0.000
180.000-175.0					B	5.526	4.171		43.02	0.000	0.000
00					C	5.526	4.171		43.02	8.026	0.000
T2	170.833	1.417	0.011	97.919	A	6.293	6.952	6.952	52.49	0.000	0.000
175.000-166.6					B	6.293	6.952		52.49	0.000	0.000
67					C	6.293	6.952		52.49	17.602	0.000
T3	162.500	1.402	0.011	103.475	A	6.518	6.952	6.952	51.61	0.000	0.000
166.667-158.3					B	6.518	6.952		51.61	0.000	0.000
33					C	6.518	6.952		51.61	23.679	0.000
T4	154.167	1.386	0.011	109.031	A	6.746	6.952	6.952	50.75	0.000	0.000
158.333-150.0					B	6.746	6.952		50.75	0.000	0.000
00					C	6.746	6.952		50.75	29.939	0.000
T5	137.500	1.353	0.011	360.425	A	31.437	20.856	20.856	39.88	3.367	0.000
150.000-125.0					B	31.437	20.856		39.88	67.215	0.000
00					C	31.437	20.856		39.88	97.640	0.000
T6	112.500	1.297	0.010	410.425	A	37.501	20.856	20.856	35.74	4.209	0.000
125.000-100.0					B	37.501	20.856		35.74	127.275	0.000
00					C	37.501	20.856		35.74	103.553	0.000
T7	95.833	1.254	0.010	147.919	A	13.268	6.952	6.952	34.38	1.403	0.000
100.000-91.66					B	13.268	6.952		34.38	42.425	0.000
7					C	13.268	6.952		34.38	35.526	0.000
T8	87.500	1.231	0.010	154.157	A	21.130	0.000	7.473	35.37	1.403	0.000
91.667-83.333					B	21.130	0.000		35.37	42.425	0.000
					C	21.130	0.000		35.37	35.526	0.000
T9	79.167	1.205	0.009	159.712	A	21.520	0.000	7.473	34.73	1.403	0.000
83.333-75.000					B	21.520	0.000		34.73	42.425	0.000
					C	21.520	0.000		34.73	35.744	0.000
T10	62.500	1.146	0.009	514.334	A	40.966	28.676	28.676	41.18	4.209	0.000
75.000-50.000					B	40.966	28.676		41.18	127.275	0.000
					C	40.966	28.676		41.18	113.603	0.000
T11	43.750	1.063	0.008	275.917	A	21.483	14.338	14.338	40.03	2.105	0.000
50.000-37.500					B	21.483	14.338		40.03	63.637	0.000

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
					C	21.483	14.338		40.03	56.801	0.000
T12	31.250	0.991	0.008	288.417	A	22.193	14.338	14.338	39.25	2.105	0.000
37.500-25.000					B	22.193	14.338		39.25	63.637	0.000
					C	22.193	14.338		39.25	57.271	0.000
T13	18.750	0.89	0.007	300.389	A	38.557	0.000	14.990	38.88	2.105	0.000
25.000-12.500					B	38.557	0.000		38.88	63.638	0.000
					C	38.557	0.000		38.88	60.011	0.000
T14	6.250	0.85	0.007	312.889	A	39.292	0.000	14.990	38.15	0.758	0.000
12.500-0.000					B	39.292	0.000		38.15	22.910	0.000
					C	39.292	0.000		38.15	21.996	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	26.190	592.305	A	0.173	2.689	0.039	1	1	7.467	833.688	166.738	C
180.000-175.0			B	0.173	2.689		1	1	7.467			
00			C	0.173	2.689		1	1	7.467			
T2	52.650	755.494	A	0.135	2.826	0.039	1	1	9.427	1236.042	148.325	C
175.000-166.6			B	0.135	2.826		1	1	9.427			
67			C	0.135	2.826		1	1	9.427			
T3	70.190	768.073	A	0.13	2.846	0.039	1	1	9.649	1369.713	164.366	C
166.667-158.3			B	0.13	2.846		1	1	9.649			
33			C	0.13	2.846		1	1	9.649			
T4	93.290	780.881	A	0.126	2.863	0.038	1	1	9.875	1503.271	180.393	C
158.333-150.0			B	0.126	2.863		1	1	9.875			
00			C	0.126	2.863		1	1	9.875			
T5	642.430	3994.805	A	0.145	2.79	0.037	1	1	41.043	6837.228	273.489	C
150.000-125.0			B	0.145	2.79		1	1	41.043			
00			C	0.145	2.79		1	1	41.043			
T6	989.592	4822.083	A	0.142	2.8	0.036	1	1	47.198	8311.976	332.479	C
125.000-100.0			B	0.142	2.8		1	1	47.198			
00			C	0.142	2.8		1	1	47.198			
T7	332.917	1971.333	A	0.137	2.821	0.035	1	1	16.517	2771.077	332.529	C
100.000-91.66			B	0.137	2.821		1	1	16.517			
7			C	0.137	2.821		1	1	16.517			
T8	332.917	2177.704	A	0.137	2.82	0.034	1	1	21.130	3093.188	371.183	C
91.667-83.333			B	0.137	2.82		1	1	21.130			
			C	0.137	2.82		1	1	21.130			
T9	333.577	2217.593	A	0.135	2.828	0.033	1	1	21.520	3068.839	368.261	C
83.333-75.000			B	0.135	2.828		1	1	21.520			
			C	0.135	2.828		1	1	21.520			
T10	1019.000	6256.473	A	0.135	2.826	0.032	1	1	52.764	7961.791	318.472	C
75.000-50.000			B	0.135	2.826		1	1	52.764			
			C	0.135	2.826		1	1	52.764			
T11	509.500	3450.287	A	0.13	2.847	0.029	1	1	27.344	3775.134	302.011	C
50.000-37.500			B	0.13	2.847		1	1	27.344			
			C	0.13	2.847		1	1	27.344			
T12	510.760	3953.241	A	0.127	2.859	0.027	1	1	28.032	3576.955	286.156	C
37.500-25.000			B	0.127	2.859		1	1	28.032			
			C	0.127	2.859		1	1	28.032			
T13	518.200	4249.867	A	0.128	2.853	0.025	1	1	38.557	3869.175	309.534	C
25.000-12.500			B	0.128	2.853		1	1	38.557			
			C	0.128	2.853		1	1	38.557			
T14	187.740	4801.092	A	0.126	2.863	0.023	1	1	39.292	2788.772	223.102	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
12.500-0.000			B	0.126	2.863		1	1	39.292			
			C	0.126	2.863		1	1	39.292			
Sum Weight:	5618.953	40791.230						OTM	4332.382 kip-ft	50996.848		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1	26.190	592.305	A	0.173	2.689	0.039	0.825	1	6.500	746.604	149.321	C
180.000-175.0			B	0.173	2.689		0.825	1	6.500			
00			C	0.173	2.689		0.825	1	6.500			
T2	52.650	755.494	A	0.135	2.826	0.039	0.825	1	8.326	1132.637	135.916	C
175.000-166.6			B	0.135	2.826		0.825	1	8.326			
67			C	0.135	2.826		0.825	1	8.326			
T3	70.190	768.073	A	0.13	2.846	0.039	0.825	1	8.508	1263.001	151.560	C
166.667-158.3			B	0.13	2.846		0.825	1	8.508			
33			C	0.13	2.846		0.825	1	8.508			
T4	93.290	780.881	A	0.126	2.863	0.038	0.825	1	8.695	1393.381	167.206	C
158.333-150.0			B	0.126	2.863		0.825	1	8.695			
00			C	0.126	2.863		0.825	1	8.695			
T5	642.430	3994.805	A	0.145	2.79	0.037	0.825	1	35.542	6350.146	254.006	C
150.000-125.0			B	0.145	2.79		0.825	1	35.542			
00			C	0.145	2.79		0.825	1	35.542			
T6	989.592	4822.083	A	0.142	2.8	0.036	0.825	1	40.635	7752.808	310.112	C
125.000-100.0			B	0.142	2.8		0.825	1	40.635			
00			C	0.142	2.8		0.825	1	40.635			
T7	332.917	1971.333	A	0.137	2.821	0.035	0.825	1	14.195	2578.400	309.408	C
100.000-91.66			B	0.137	2.821		0.825	1	14.195			
7			C	0.137	2.821		0.825	1	14.195			
T8	332.917	2177.704	A	0.137	2.82	0.034	0.825	1	17.432	2792.319	335.078	C
91.667-83.333			B	0.137	2.82		0.825	1	17.432			
			C	0.137	2.82		0.825	1	17.432			
T9	333.577	2217.593	A	0.135	2.828	0.033	0.825	1	17.754	2767.865	332.144	C
83.333-75.000			B	0.135	2.828		0.825	1	17.754			
			C	0.135	2.828		0.825	1	17.754			
T10	1019.000	6256.473	A	0.135	2.826	0.032	0.825	1	45.595	7417.154	296.686	C
75.000-50.000			B	0.135	2.826		0.825	1	45.595			
			C	0.135	2.826		0.825	1	45.595			
T11	509.500	3450.287	A	0.13	2.847	0.029	0.825	1	23.584	3508.192	280.655	C
50.000-37.500			B	0.13	2.847		0.825	1	23.584			
			C	0.13	2.847		0.825	1	23.584			
T12	510.760	3953.241	A	0.127	2.859	0.027	0.825	1	24.148	3318.954	265.516	C
37.500-25.000			B	0.127	2.859		0.825	1	24.148			
			C	0.127	2.859		0.825	1	24.148			
T13	518.200	4249.867	A	0.128	2.853	0.025	0.825	1	31.809	3467.564	277.405	C
25.000-12.500			B	0.128	2.853		0.825	1	31.809			
			C	0.128	2.853		0.825	1	31.809			
T14	187.740	4801.092	A	0.126	2.863	0.023	0.825	1	32.416	2396.310	191.705	C
12.500-0.000			B	0.126	2.863		0.825	1	32.416			
			C	0.126	2.863		0.825	1	32.416			
Sum Weight:	5618.953	40791.230						OTM	4002.715	46885.337		

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
									kip-ft			

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1	26.190	592.305	A	0.173	2.689	0.039	0.8	1	6.361	734.163	146.833	C
180.000-175.0			B	0.173	2.689		0.8	1	6.361			
00			C	0.173	2.689		0.8	1	6.361			
T2	52.650	755.494	A	0.135	2.826	0.039	0.8	1	8.168	1117.865	134.144	C
175.000-166.6			B	0.135	2.826		0.8	1	8.168			
67			C	0.135	2.826		0.8	1	8.168			
T3	70.190	768.073	A	0.13	2.846	0.039	0.8	1	8.345	1247.757	149.731	C
166.667-158.3			B	0.13	2.846		0.8	1	8.345			
33			C	0.13	2.846		0.8	1	8.345			
T4	93.290	780.881	A	0.126	2.863	0.038	0.8	1	8.526	1377.682	165.322	C
158.333-150.0			B	0.126	2.863		0.8	1	8.526			
00			C	0.126	2.863		0.8	1	8.526			
T5	642.430	3994.805	A	0.145	2.79	0.037	0.8	1	34.756	6280.563	251.223	C
150.000-125.0			B	0.145	2.79		0.8	1	34.756			
00			C	0.145	2.79		0.8	1	34.756			
T6	989.592	4822.083	A	0.142	2.8	0.036	0.8	1	39.698	7672.927	306.917	C
125.000-100.0			B	0.142	2.8		0.8	1	39.698			
00			C	0.142	2.8		0.8	1	39.698			
T7	332.917	1971.333	A	0.137	2.821	0.035	0.8	1	13.863	2550.875	306.105	C
100.000-91.66			B	0.137	2.821		0.8	1	13.863			
7			C	0.137	2.821		0.8	1	13.863			
T8	332.917	2177.704	A	0.137	2.82	0.034	0.8	1	16.904	2749.338	329.921	C
91.667-83.333			B	0.137	2.82		0.8	1	16.904			
			C	0.137	2.82		0.8	1	16.904			
T9	333.577	2217.593	A	0.135	2.828	0.033	0.8	1	17.216	2724.869	326.984	C
83.333-75.000			B	0.135	2.828		0.8	1	17.216			
			C	0.135	2.828		0.8	1	17.216			
T10	1019.000	6256.473	A	0.135	2.826	0.032	0.8	1	44.571	7339.349	293.574	C
75.000-50.000			B	0.135	2.826		0.8	1	44.571			
			C	0.135	2.826		0.8	1	44.571			
T11	509.500	3450.287	A	0.13	2.847	0.029	0.8	1	23.047	3470.057	277.605	C
50.000-37.500			B	0.13	2.847		0.8	1	23.047			
			C	0.13	2.847		0.8	1	23.047			
T12	510.760	3953.241	A	0.127	2.859	0.027	0.8	1	23.593	3282.097	262.568	C
37.500-25.000			B	0.127	2.859		0.8	1	23.593			
			C	0.127	2.859		0.8	1	23.593			
T13	518.200	4249.867	A	0.128	2.853	0.025	0.8	1	30.845	3410.191	272.815	C
25.000-12.500			B	0.128	2.853		0.8	1	30.845			
			C	0.128	2.853		0.8	1	30.845			
T14	187.740	4801.092	A	0.126	2.863	0.023	0.8	1	31.434	2340.244	187.219	C
12.500-0.000			B	0.126	2.863		0.8	1	31.434			
			C	0.126	2.863		0.8	1	31.434			
Sum Weight:	5618.953	40791.230						OTM	3955.620 kip-ft	46297.978		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1	26.190	592.305	A	0.173	2.689	0.039	0.85	1	6.638	759.044	151.809	C
180.000-175.0			B	0.173	2.689		0.85	1	6.638			
00			C	0.173	2.689		0.85	1	6.638			
T2	52.650	755.494	A	0.135	2.826	0.039	0.85	1	8.483	1147.409	137.689	C
175.000-166.6			B	0.135	2.826		0.85	1	8.483			
67			C	0.135	2.826		0.85	1	8.483			
T3	70.190	768.073	A	0.13	2.846	0.039	0.85	1	8.671	1278.246	153.390	C
166.667-158.3			B	0.13	2.846		0.85	1	8.671			
33			C	0.13	2.846		0.85	1	8.671			
T4	93.290	780.881	A	0.126	2.863	0.038	0.85	1	8.864	1409.079	169.090	C
158.333-150.0			B	0.126	2.863		0.85	1	8.864			
00			C	0.126	2.863		0.85	1	8.864			
T5	642.430	3994.805	A	0.145	2.79	0.037	0.85	1	36.328	6419.730	256.789	C
150.000-125.0			B	0.145	2.79		0.85	1	36.328			
00			C	0.145	2.79		0.85	1	36.328			
T6	989.592	4822.083	A	0.142	2.8	0.036	0.85	1	41.573	7832.689	313.308	C
125.000-100.0			B	0.142	2.8		0.85	1	41.573			
00			C	0.142	2.8		0.85	1	41.573			
T7	332.917	1971.333	A	0.137	2.821	0.035	0.85	1	14.526	2605.926	312.711	C
100.000-91.66			B	0.137	2.821		0.85	1	14.526			
7			C	0.137	2.821		0.85	1	14.526			
T8	332.917	2177.704	A	0.137	2.82	0.034	0.85	1	17.960	2835.301	340.236	C
91.667-83.333			B	0.137	2.82		0.85	1	17.960			
			C	0.137	2.82		0.85	1	17.960			
T9	333.577	2217.593	A	0.135	2.828	0.033	0.85	1	18.292	2810.862	337.303	C
83.333-75.000			B	0.135	2.828		0.85	1	18.292			
			C	0.135	2.828		0.85	1	18.292			
T10	1019.000	6256.473	A	0.135	2.826	0.032	0.85	1	46.619	7494.960	299.798	C
75.000-50.000			B	0.135	2.826		0.85	1	46.619			
			C	0.135	2.826		0.85	1	46.619			
T11	509.500	3450.287	A	0.13	2.847	0.029	0.85	1	24.121	3546.326	283.706	C
50.000-37.500			B	0.13	2.847		0.85	1	24.121			
			C	0.13	2.847		0.85	1	24.121			
T12	510.760	3953.241	A	0.127	2.859	0.027	0.85	1	24.703	3355.811	268.465	C
37.500-25.000			B	0.127	2.859		0.85	1	24.703			
			C	0.127	2.859		0.85	1	24.703			
T13	518.200	4249.867	A	0.128	2.853	0.025	0.85	1	32.773	3524.937	281.995	C
25.000-12.500			B	0.128	2.853		0.85	1	32.773			
			C	0.128	2.853		0.85	1	32.773			
T14	187.740	4801.092	A	0.126	2.863	0.023	0.85	1	33.398	2452.376	196.190	C
12.500-0.000			B	0.126	2.863		0.85	1	33.398			
			C	0.126	2.863		0.85	1	33.398			
Sum Weight:	5618.953	40791.230						OTM	4049.810 kip-ft	47472.696		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	615.061	2360.997	A	0.388	2.089	0.008	1	1	16.206	364.376	72.875	C
180.000-175.0			B	0.388	2.089		1	1	16.206			
00			C	0.388	2.089		1	1	16.206			
T2	1241.318	3004.881	A	0.302	2.29	0.008	1	1	20.817	595.758	71.491	C
175.000-166.6			B	0.302	2.29		1	1	20.817			
67			C	0.302	2.29		1	1	20.817			
T3	1600.244	3057.299	A	0.291	2.319	0.008	1	1	21.148	679.666	81.560	C
166.667-158.3			B	0.291	2.319		1	1	21.148			
33			C	0.291	2.319		1	1	21.148			
T4	2025.059	3109.358	A	0.282	2.345	0.008	1	1	21.488	774.794	92.975	C
158.333-150.0			B	0.282	2.345		1	1	21.488			
00			C	0.282	2.345		1	1	21.488			
T5	10288.671	14266.379	A	0.339	2.197	0.007	1	1	88.948	3540.485	141.619	C
150.000-125.0			B	0.339	2.197		1	1	88.948			
00			C	0.339	2.197		1	1	88.948			
T6	13581.901	16319.052	A	0.323	2.237	0.007	1	1	96.863	4287.477	171.499	C
125.000-100.0			B	0.323	2.237		1	1	96.863			
00			C	0.323	2.237		1	1	96.863			
T7	4515.961	6146.918	A	0.31	2.271	0.007	1	1	33.388	1411.486	169.378	C
100.000-91.66			B	0.31	2.271		1	1	33.388			
7			C	0.31	2.271		1	1	33.388			
T8	4465.212	6561.250	A	0.293	2.314	0.007	1	1	37.546	1443.164	173.180	C
91.667-83.333			B	0.293	2.314		1	1	37.546			
			C	0.293	2.314		1	1	37.546			
T9	4426.574	6652.103	A	0.288	2.329	0.007	1	1	38.096	1421.920	170.630	C
83.333-75.000			B	0.288	2.329		1	1	38.096			
			C	0.288	2.329		1	1	38.096			
T10	13409.267	17353.683	A	0.26	2.408	0.006	1	1	96.705	3957.953	158.318	C
75.000-50.000			B	0.26	2.408		1	1	96.705			
			C	0.26	2.408		1	1	96.705			
T11	6416.139	8974.968	A	0.246	2.449	0.006	1	1	49.179	1832.196	146.576	C
50.000-37.500			B	0.246	2.449		1	1	49.179			
			C	0.246	2.449		1	1	49.179			
T12	6196.146	9744.431	A	0.237	2.477	0.005	1	1	49.610	1705.669	136.454	C
37.500-25.000			B	0.237	2.477		1	1	49.610			
			C	0.237	2.477		1	1	49.610			
T13	6024.893	9983.911	A	0.224	2.519	0.005	1	1	57.672	1634.010	130.721	C
25.000-12.500			B	0.224	2.519		1	1	57.672			
			C	0.224	2.519		1	1	57.672			
T14	1925.888	10283.251	A	0.21	2.564	0.005	1	1	56.751	912.696	73.016	C
12.500-0.000			B	0.21	2.564		1	1	56.751			
			C	0.21	2.564		1	1	56.751			
Sum Weight:	76732.334	117818.481						OTM	2156.791 kip-ft	24561.650		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	615.061	2360.997	A	0.388	2.089	0.008	0.825	1	15.239	351.036	70.207	C
180.000-175.0			B	0.388	2.089		0.825	1	15.239			
00			C	0.388	2.089		0.825	1	15.239			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T2	1241.318	3004.881	A	0.302	2.29	0.008	0.825	1	19.716	579.237	69.508	C
175.000-166.6			B	0.302	2.29		0.825	1	19.716			
67			C	0.302	2.29		0.825	1	19.716			
T3	1600.244	3057.299	A	0.291	2.319	0.008	0.825	1	20.007	662.520	79.502	C
166.667-158.3			B	0.291	2.319		0.825	1	20.007			
33			C	0.291	2.319		0.825	1	20.007			
T4	2025.059	3109.358	A	0.282	2.345	0.008	0.825	1	20.307	757.044	90.845	C
158.333-150.0			B	0.282	2.345		0.825	1	20.307			
00			C	0.282	2.345		0.825	1	20.307			
T5	10288.671	14266.379	A	0.339	2.197	0.007	0.825	1	83.446	3464.863	138.595	C
150.000-125.0			B	0.339	2.197		0.825	1	83.446			
00			C	0.339	2.197		0.825	1	83.446			
T6	13581.901	16319.052	A	0.323	2.237	0.007	0.825	1	90.301	4199.412	167.976	C
125.000-100.0			B	0.323	2.237		0.825	1	90.301			
00			C	0.323	2.237		0.825	1	90.301			
T7	4515.961	6146.918	A	0.31	2.271	0.007	0.825	1	31.066	1380.904	165.708	C
100.000-91.66			B	0.31	2.271		0.825	1	31.066			
7			C	0.31	2.271		0.825	1	31.066			
T8	4465.212	6561.250	A	0.293	2.314	0.007	0.825	1	33.178	1385.645	166.277	C
91.667-83.333			B	0.293	2.314		0.825	1	33.178			
			C	0.293	2.314		0.825	1	33.178			
T9	4426.574	6652.103	A	0.288	2.329	0.007	0.825	1	33.667	1364.441	163.733	C
83.333-75.000			B	0.288	2.329		0.825	1	33.667			
			C	0.288	2.329		0.825	1	33.667			
T10	13409.267	17353.683	A	0.26	2.408	0.006	0.825	1	89.536	3866.440	154.658	C
75.000-50.000			B	0.26	2.408		0.825	1	89.536			
			C	0.26	2.408		0.825	1	89.536			
T11	6416.139	8974.968	A	0.246	2.449	0.006	0.825	1	45.419	1786.918	142.953	C
50.000-37.500			B	0.246	2.449		0.825	1	45.419			
			C	0.246	2.449		0.825	1	45.419			
T12	6196.146	9744.431	A	0.237	2.477	0.005	0.825	1	45.726	1661.601	132.928	C
37.500-25.000			B	0.237	2.477		0.825	1	45.726			
			C	0.237	2.477		0.825	1	45.726			
T13	6024.893	9983.911	A	0.224	2.519	0.005	0.825	1	50.062	1555.144	124.412	C
25.000-12.500			B	0.224	2.519		0.825	1	50.062			
			C	0.224	2.519		0.825	1	50.062			
T14	1925.888	10283.251	A	0.21	2.564	0.005	0.825	1	49.102	835.630	66.850	C
12.500-0.000			B	0.21	2.564		0.825	1	49.102			
			C	0.21	2.564		0.825	1	49.102			
Sum Weight:	76732.334	117818.481						OTM	2102.221 kip-ft	23850.835		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	615.061	2360.997	A	0.388	2.089	0.008	0.8	1	15.101	349.130	69.826	C
180.000-175.0			B	0.388	2.089		0.8	1	15.101			
00			C	0.388	2.089		0.8	1	15.101			
T2	1241.318	3004.881	A	0.302	2.29	0.008	0.8	1	19.558	576.876	69.225	C
175.000-166.6			B	0.302	2.29		0.8	1	19.558			
67			C	0.302	2.29		0.8	1	19.558			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T3	1600.244	3057.299	A	0.291	2.319	0.008	0.8	1	19.844	660.071	79.209	C
166.667-158.3			B	0.291	2.319		0.8	1	19.844			
33			C	0.291	2.319		0.8	1	19.844			
T4	2025.059	3109.358	A	0.282	2.345	0.008	0.8	1	20.139	754.509	90.541	C
158.333-150.0			B	0.282	2.345		0.8	1	20.139			
00			C	0.282	2.345		0.8	1	20.139			
T5	10288.671	14266.379	A	0.339	2.197	0.007	0.8	1	82.660	3454.060	138.162	C
150.000-125.0			B	0.339	2.197		0.8	1	82.660			
00			C	0.339	2.197		0.8	1	82.660			
T6	13581.901	16319.052	A	0.323	2.237	0.007	0.8	1	89.363	4186.832	167.473	C
125.000-100.0			B	0.323	2.237		0.8	1	89.363			
00			C	0.323	2.237		0.8	1	89.363			
T7	4515.961	6146.918	A	0.31	2.271	0.007	0.8	1	30.734	1376.535	165.184	C
100.000-91.66			B	0.31	2.271		0.8	1	30.734			
7			C	0.31	2.271		0.8	1	30.734			
T8	4465.212	6561.250	A	0.293	2.314	0.007	0.8	1	32.554	1377.428	165.291	C
91.667-83.333			B	0.293	2.314		0.8	1	32.554			
			C	0.293	2.314		0.8	1	32.554			
T9	4426.574	6652.103	A	0.288	2.329	0.007	0.8	1	33.034	1356.230	162.748	C
83.333-75.000			B	0.288	2.329		0.8	1	33.034			
			C	0.288	2.329		0.8	1	33.034			
T10	13409.267	17353.683	A	0.26	2.408	0.006	0.8	1	88.512	3853.366	154.135	C
75.000-50.000			B	0.26	2.408		0.8	1	88.512			
			C	0.26	2.408		0.8	1	88.512			
T11	6416.139	8974.968	A	0.246	2.449	0.006	0.8	1	44.882	1780.450	142.436	C
50.000-37.500			B	0.246	2.449		0.8	1	44.882			
			C	0.246	2.449		0.8	1	44.882			
T12	6196.146	9744.431	A	0.237	2.477	0.005	0.8	1	45.171	1655.306	132.424	C
37.500-25.000			B	0.237	2.477		0.8	1	45.171			
			C	0.237	2.477		0.8	1	45.171			
T13	6024.893	9983.911	A	0.224	2.519	0.005	0.8	1	48.975	1543.878	123.510	C
25.000-12.500			B	0.224	2.519		0.8	1	48.975			
			C	0.224	2.519		0.8	1	48.975			
T14	1925.888	10283.251	A	0.21	2.564	0.005	0.8	1	48.009	824.620	65.970	C
12.500-0.000			B	0.21	2.564		0.8	1	48.009			
			C	0.21	2.564		0.8	1	48.009			
Sum Weight:	76732.334	117818.481						OTM	2094.425 kip-ft	23749.290		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1	615.061	2360.997	A	0.388	2.089	0.008	0.85	1	15.377	352.942	70.588	C
180.000-175.0			B	0.388	2.089		0.85	1	15.377			
00			C	0.388	2.089		0.85	1	15.377			
T2	1241.318	3004.881	A	0.302	2.29	0.008	0.85	1	19.873	581.597	69.792	C
175.000-166.6			B	0.302	2.29		0.85	1	19.873			
67			C	0.302	2.29		0.85	1	19.873			
T3	1600.244	3057.299	A	0.291	2.319	0.008	0.85	1	20.170	664.970	79.796	C
166.667-158.3			B	0.291	2.319		0.85	1	20.170			
33			C	0.291	2.319		0.85	1	20.170			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T4	2025.059	3109.358	A	0.282	2.345	0.008	0.85	1	20.476	759.580	91.150	C
158.333-150.0			B	0.282	2.345		0.85	1	20.476			
00			C	0.282	2.345		0.85	1	20.476			
T5	10288.671	14266.379	A	0.339	2.197	0.007	0.85	1	84.232	3475.666	139.027	C
150.000-125.0			B	0.339	2.197		0.85	1	84.232			
00			C	0.339	2.197		0.85	1	84.232			
T6	13581.901	16319.052	A	0.323	2.237	0.007	0.85	1	91.238	4211.993	168.480	C
125.000-100.0			B	0.323	2.237		0.85	1	91.238			
00			C	0.323	2.237		0.85	1	91.238			
T7	4515.961	6146.918	A	0.31	2.271	0.007	0.85	1	31.398	1385.273	166.233	C
100.000-91.66			B	0.31	2.271		0.85	1	31.398			
7			C	0.31	2.271		0.85	1	31.398			
T8	4465.212	6561.250	A	0.293	2.314	0.007	0.85	1	33.802	1393.862	167.263	C
91.667-83.333			B	0.293	2.314		0.85	1	33.802			
			C	0.293	2.314		0.85	1	33.802			
T9	4426.574	6652.103	A	0.288	2.329	0.007	0.85	1	34.299	1372.653	164.718	C
83.333-75.000			B	0.288	2.329		0.85	1	34.299			
			C	0.288	2.329		0.85	1	34.299			
T10	13409.267	17353.683	A	0.26	2.408	0.006	0.85	1	90.560	3879.513	155.181	C
75.000-50.000			B	0.26	2.408		0.85	1	90.560			
			C	0.26	2.408		0.85	1	90.560			
T11	6416.139	8974.968	A	0.246	2.449	0.006	0.85	1	45.956	1793.386	143.471	C
50.000-37.500			B	0.246	2.449		0.85	1	45.956			
			C	0.246	2.449		0.85	1	45.956			
T12	6196.146	9744.431	A	0.237	2.477	0.005	0.85	1	46.281	1667.896	133.432	C
37.500-25.000			B	0.237	2.477		0.85	1	46.281			
			C	0.237	2.477		0.85	1	46.281			
T13	6024.893	9983.911	A	0.224	2.519	0.005	0.85	1	51.149	1566.411	125.313	C
25.000-12.500			B	0.224	2.519		0.85	1	51.149			
			C	0.224	2.519		0.85	1	51.149			
T14	1925.888	10283.251	A	0.21	2.564	0.005	0.85	1	50.195	846.639	67.731	C
12.500-0.000			B	0.21	2.564		0.85	1	50.195			
			C	0.21	2.564		0.85	1	50.195			
Sum Weight:	76732.334	117818.481						OTM	2110.016 kip-ft	23952.380		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	26.190	592.305	A	0.173	2.689	0.011	1	1	7.467	236.717	47.343	C
180.000-175.0			B	0.173	2.689		1	1	7.467			
00			C	0.173	2.689		1	1	7.467			
T2	52.650	755.494	A	0.135	2.826	0.011	1	1	9.427	350.961	42.115	C
175.000-166.6			B	0.135	2.826		1	1	9.427			
67			C	0.135	2.826		1	1	9.427			
T3	70.190	768.073	A	0.13	2.846	0.011	1	1	9.649	388.916	46.670	C
166.667-158.3			B	0.13	2.846		1	1	9.649			
33			C	0.13	2.846		1	1	9.649			
T4	93.290	780.881	A	0.126	2.863	0.011	1	1	9.875	426.838	51.221	C
158.333-150.0			B	0.126	2.863		1	1	9.875			
00			C	0.126	2.863		1	1	9.875			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T5	642.430	3994.805	A	0.145	2.79	0.011	1	1	41.043	1941.360	77.654	C
150.000-125.0			B	0.145	2.79		1	1	41.043			
00			C	0.145	2.79		1	1	41.043			
T6	989.592	4822.083	A	0.142	2.8	0.010	1	1	47.198	2360.100	94.404	C
125.000-100.0			B	0.142	2.8		1	1	47.198			
00			C	0.142	2.8		1	1	47.198			
T7	332.917	1971.333	A	0.137	2.821	0.010	1	1	16.517	786.819	94.418	C
100.000-91.66			B	0.137	2.821		1	1	16.517			
7			C	0.137	2.821		1	1	16.517			
T8	332.917	2177.704	A	0.137	2.82	0.010	1	1	21.130	878.279	105.393	C
91.667-83.333			B	0.137	2.82		1	1	21.130			
			C	0.137	2.82		1	1	21.130			
T9	333.577	2217.593	A	0.135	2.828	0.009	1	1	21.520	871.365	104.564	C
83.333-75.000			B	0.135	2.828		1	1	21.520			
			C	0.135	2.828		1	1	21.520			
T10	1019.000	6256.473	A	0.135	2.826	0.009	1	1	52.764	2260.668	90.427	C
75.000-50.000			B	0.135	2.826		1	1	52.764			
			C	0.135	2.826		1	1	52.764			
T11	509.500	3450.287	A	0.13	2.847	0.008	1	1	27.344	1071.910	85.753	C
50.000-37.500			B	0.13	2.847		1	1	27.344			
			C	0.13	2.847		1	1	27.344			
T12	510.760	3953.241	A	0.127	2.859	0.008	1	1	28.032	1015.640	81.251	C
37.500-25.000			B	0.127	2.859		1	1	28.032			
			C	0.127	2.859		1	1	28.032			
T13	518.200	4249.867	A	0.128	2.853	0.007	1	1	38.557	1098.612	87.889	C
25.000-12.500			B	0.128	2.853		1	1	38.557			
			C	0.128	2.853		1	1	38.557			
T14	187.740	4801.092	A	0.126	2.863	0.007	1	1	39.292	791.843	63.347	C
12.500-0.000			B	0.126	2.863		1	1	39.292			
			C	0.126	2.863		1	1	39.292			
Sum Weight:	5618.953	40791.230						OTM	1230.135 kip-ft	14480.028		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	26.190	592.305	A	0.173	2.689	0.011	0.825	1	6.500	211.990	42.398	C
180.000-175.0			B	0.173	2.689		0.825	1	6.500			
00			C	0.173	2.689		0.825	1	6.500			
T2	52.650	755.494	A	0.135	2.826	0.011	0.825	1	8.326	321.601	38.592	C
175.000-166.6			B	0.135	2.826		0.825	1	8.326			
67			C	0.135	2.826		0.825	1	8.326			
T3	70.190	768.073	A	0.13	2.846	0.011	0.825	1	8.508	358.616	43.034	C
166.667-158.3			B	0.13	2.846		0.825	1	8.508			
33			C	0.13	2.846		0.825	1	8.508			
T4	93.290	780.881	A	0.126	2.863	0.011	0.825	1	8.695	395.636	47.476	C
158.333-150.0			B	0.126	2.863		0.825	1	8.695			
00			C	0.126	2.863		0.825	1	8.695			
T5	642.430	3994.805	A	0.145	2.79	0.011	0.825	1	35.542	1803.058	72.122	C
150.000-125.0			B	0.145	2.79		0.825	1	35.542			
00			C	0.145	2.79		0.825	1	35.542			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T6	989.592	4822.083	A	0.142	2.8	0.010	0.825	1	40.635	2201.330	88.053	C
125.000-100.0			B	0.142	2.8		0.825	1	40.635			
00			C	0.142	2.8		0.825	1	40.635			
T7	332.917	1971.333	A	0.137	2.821	0.010	0.825	1	14.195	732.110	87.853	C
100.000-91.66			B	0.137	2.821		0.825	1	14.195			
7			C	0.137	2.821		0.825	1	14.195			
T8	332.917	2177.704	A	0.137	2.82	0.010	0.825	1	17.432	792.850	95.142	C
91.667-83.333			B	0.137	2.82		0.825	1	17.432			
			C	0.137	2.82		0.825	1	17.432			
T9	333.577	2217.593	A	0.135	2.828	0.009	0.825	1	17.754	785.907	94.309	C
83.333-75.000			B	0.135	2.828		0.825	1	17.754			
			C	0.135	2.828		0.825	1	17.754			
T10	1019.000	6256.473	A	0.135	2.826	0.009	0.825	1	45.595	2106.024	84.241	C
75.000-50.000			B	0.135	2.826		0.825	1	45.595			
			C	0.135	2.826		0.825	1	45.595			
T11	509.500	3450.287	A	0.13	2.847	0.008	0.825	1	23.584	996.115	79.689	C
50.000-37.500			B	0.13	2.847		0.825	1	23.584			
			C	0.13	2.847		0.825	1	23.584			
T12	510.760	3953.241	A	0.127	2.859	0.008	0.825	1	24.148	942.383	75.391	C
37.500-25.000			B	0.127	2.859		0.825	1	24.148			
			C	0.127	2.859		0.825	1	24.148			
T13	518.200	4249.867	A	0.128	2.853	0.007	0.825	1	31.809	984.579	78.766	C
25.000-12.500			B	0.128	2.853		0.825	1	31.809			
			C	0.128	2.853		0.825	1	31.809			
T14	187.740	4801.092	A	0.126	2.863	0.007	0.825	1	32.416	680.407	54.433	C
12.500-0.000			B	0.126	2.863		0.825	1	32.416			
			C	0.126	2.863		0.825	1	32.416			
Sum Weight:	5618.953	40791.230						OTM	1136.530 kip-ft	13312.607		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	26.190	592.305	A	0.173	2.689	0.011	0.8	1	6.361	208.458	41.692	C
180.000-175.0			B	0.173	2.689		0.8	1	6.361			
00			C	0.173	2.689		0.8	1	6.361			
T2	52.650	755.494	A	0.135	2.826	0.011	0.8	1	8.168	317.406	38.089	C
175.000-166.6			B	0.135	2.826		0.8	1	8.168			
67			C	0.135	2.826		0.8	1	8.168			
T3	70.190	768.073	A	0.13	2.846	0.011	0.8	1	8.345	354.288	42.515	C
166.667-158.3			B	0.13	2.846		0.8	1	8.345			
33			C	0.13	2.846		0.8	1	8.345			
T4	93.290	780.881	A	0.126	2.863	0.011	0.8	1	8.526	391.179	46.941	C
158.333-150.0			B	0.126	2.863		0.8	1	8.526			
00			C	0.126	2.863		0.8	1	8.526			
T5	642.430	3994.805	A	0.145	2.79	0.011	0.8	1	34.756	1783.301	71.332	C
150.000-125.0			B	0.145	2.79		0.8	1	34.756			
00			C	0.145	2.79		0.8	1	34.756			
T6	989.592	4822.083	A	0.142	2.8	0.010	0.8	1	39.698	2178.648	87.146	C
125.000-100.0			B	0.142	2.8		0.8	1	39.698			
00			C	0.142	2.8		0.8	1	39.698			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T7	332.917	1971.333	A	0.137	2.821	0.010	0.8	1	13.863	724.295	86.915	C
100.000-91.66			B	0.137	2.821		0.8	1	13.863			
7			C	0.137	2.821		0.8	1	13.863			
T8	332.917	2177.704	A	0.137	2.82	0.010	0.8	1	16.904	780.646	93.678	C
91.667-83.333			B	0.137	2.82		0.8	1	16.904			
			C	0.137	2.82		0.8	1	16.904			
T9	333.577	2217.593	A	0.135	2.828	0.009	0.8	1	17.216	773.698	92.844	C
83.333-75.000			B	0.135	2.828		0.8	1	17.216			
			C	0.135	2.828		0.8	1	17.216			
T10	1019.000	6256.473	A	0.135	2.826	0.009	0.8	1	44.571	2083.932	83.357	C
75.000-50.000			B	0.135	2.826		0.8	1	44.571			
			C	0.135	2.826		0.8	1	44.571			
T11	509.500	3450.287	A	0.13	2.847	0.008	0.8	1	23.047	985.287	78.823	C
50.000-37.500			B	0.13	2.847		0.8	1	23.047			
			C	0.13	2.847		0.8	1	23.047			
T12	510.760	3953.241	A	0.127	2.859	0.008	0.8	1	23.593	931.917	74.553	C
37.500-25.000			B	0.127	2.859		0.8	1	23.593			
			C	0.127	2.859		0.8	1	23.593			
T13	518.200	4249.867	A	0.128	2.853	0.007	0.8	1	30.845	968.289	77.463	C
25.000-12.500			B	0.128	2.853		0.8	1	30.845			
			C	0.128	2.853		0.8	1	30.845			
T14	187.740	4801.092	A	0.126	2.863	0.007	0.8	1	31.434	664.488	53.159	C
12.500-0.000			B	0.126	2.863		0.8	1	31.434			
			C	0.126	2.863		0.8	1	31.434			
Sum Weight:	5618.953	40791.230						OTM	1123.157 kip-ft	13145.832		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	26.190	592.305	A	0.173	2.689	0.011	0.85	1	6.638	215.523	43.105	C
180.000-175.0			B	0.173	2.689		0.85	1	6.638			
00			C	0.173	2.689		0.85	1	6.638			
T2	52.650	755.494	A	0.135	2.826	0.011	0.85	1	8.483	325.795	39.095	C
175.000-166.6			B	0.135	2.826		0.85	1	8.483			
67			C	0.135	2.826		0.85	1	8.483			
T3	70.190	768.073	A	0.13	2.846	0.011	0.85	1	8.671	362.945	43.553	C
166.667-158.3			B	0.13	2.846		0.85	1	8.671			
33			C	0.13	2.846		0.85	1	8.671			
T4	93.290	780.881	A	0.126	2.863	0.011	0.85	1	8.864	400.094	48.011	C
158.333-150.0			B	0.126	2.863		0.85	1	8.864			
00			C	0.126	2.863		0.85	1	8.864			
T5	642.430	3994.805	A	0.145	2.79	0.011	0.85	1	36.328	1822.816	72.913	C
150.000-125.0			B	0.145	2.79		0.85	1	36.328			
00			C	0.145	2.79		0.85	1	36.328			
T6	989.592	4822.083	A	0.142	2.8	0.010	0.85	1	41.573	2224.011	88.960	C
125.000-100.0			B	0.142	2.8		0.85	1	41.573			
00			C	0.142	2.8		0.85	1	41.573			
T7	332.917	1971.333	A	0.137	2.821	0.010	0.85	1	14.526	739.926	88.791	C
100.000-91.66			B	0.137	2.821		0.85	1	14.526			
7			C	0.137	2.821		0.85	1	14.526			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T8	332.917	2177.704	A	0.137	2.82	0.010	0.85	1	17.960	805.054	96.607	C
91.667-83.333			B	0.137	2.82		0.85	1	17.960			
			C	0.137	2.82		0.85	1	17.960			
T9	333.577	2217.593	A	0.135	2.828	0.009	0.85	1	18.292	798.115	95.774	C
83.333-75.000			B	0.135	2.828		0.85	1	18.292			
			C	0.135	2.828		0.85	1	18.292			
T10	1019.000	6256.473	A	0.135	2.826	0.009	0.85	1	46.619	2128.116	85.125	C
75.000-50.000			B	0.135	2.826		0.85	1	46.619			
			C	0.135	2.826		0.85	1	46.619			
T11	509.500	3450.287	A	0.13	2.847	0.008	0.85	1	24.121	1006.943	80.555	C
50.000-37.500			B	0.13	2.847		0.85	1	24.121			
			C	0.13	2.847		0.85	1	24.121			
T12	510.760	3953.241	A	0.127	2.859	0.008	0.85	1	24.703	952.848	76.228	C
37.500-25.000			B	0.127	2.859		0.85	1	24.703			
			C	0.127	2.859		0.85	1	24.703			
T13	518.200	4249.867	A	0.128	2.853	0.007	0.85	1	32.773	1000.870	80.070	C
25.000-12.500			B	0.128	2.853		0.85	1	32.773			
			C	0.128	2.853		0.85	1	32.773			
T14	187.740	4801.092	A	0.126	2.863	0.007	0.85	1	33.398	696.327	55.706	C
12.500-0.000			B	0.126	2.863		0.85	1	33.398			
			C	0.126	2.863		0.85	1	33.398			
Sum Weight:	5618.953	40791.230						OTM	1149.902 kip-ft	13479.381		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	13687.988					
Bracing Weight	27103.242					
Total Member Self-Weight	40791.230			2.714	4.317	
Total Weight	56752.753			2.714	4.317	
Wind 0 deg - No Ice		17.409	-69899.193	-7069.170	2.697	-37.127
Wind 30 deg - No Ice		33292.898	-57491.176	-5877.813	-3406.695	-19.436
Wind 45 deg - No Ice		46658.931	-46531.226	-4765.899	-4785.442	-8.269
Wind 60 deg - No Ice		56630.246	-32615.238	-3346.250	-5820.537	3.462
Wind 90 deg - No Ice		66555.643	-17.409	1.095	-6814.900	25.433
Wind 120 deg - No Ice		60682.178	34934.520	3537.254	-6145.202	40.589
Wind 135 deg - No Ice		48295.612	48167.908	4902.243	-4916.356	44.236
Wind 150 deg - No Ice		33262.745	57473.767	5881.622	-3403.889	44.869
Wind 180 deg - No Ice		-17.409	65200.324	6697.837	5.937	37.127
Wind 210 deg - No Ice		-33292.898	57491.176	5883.242	3415.329	19.436
Wind 225 deg - No Ice		-46658.931	46531.226	4771.328	4794.076	8.269
Wind 240 deg - No Ice		-60699.587	34964.673	3540.060	6155.457	-3.462
Wind 270 deg - No Ice		-66555.643	17.409	4.334	6823.535	-25.433
Wind 300 deg - No Ice		-56612.838	-32585.085	-3343.444	5827.552	-40.589
Wind 315 deg - No Ice		-46634.311	-46506.606	-4763.608	4791.785	-44.236
Wind 330 deg - No Ice		-33262.745	-57473.767	-5876.193	3412.523	-44.869
Member Ice	77027.251					
Total Weight Ice	228875.670			102.653	169.186	
Wind 0 deg - Ice		-3.663	-32265.398	-3168.781	169.988	-31.594
Wind 30 deg - Ice		15841.507	-27413.180	-2689.583	-1445.214	-17.584

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 45 deg - Ice		22333.367	-22309.870	-2171.446	-2108.823	-8.514
Wind 60 deg - Ice		27266.077	-15723.348	-1501.186	-2614.336	1.137
Wind 90 deg - Ice		31689.359	3.663	103.455	-3061.003	19.553
Wind 120 deg - Ice		27973.264	16135.871	1739.065	-2669.149	32.730
Wind 135 deg - Ice		22625.759	22602.262	2399.936	-2132.007	36.166
Wind 150 deg - Ice		15847.851	27416.843	2895.691	-1446.603	37.138
Wind 180 deg - Ice		3.663	31453.039	3311.721	168.383	31.594
Wind 210 deg - Ice		-15841.507	27413.180	2894.889	1783.585	17.584
Wind 225 deg - Ice		-22333.367	22309.870	2376.751	2447.194	8.514
Wind 240 deg - Ice		-27969.601	16129.527	1737.675	3006.717	-1.137
Wind 270 deg - Ice		-31689.359	-3.663	101.850	3399.374	-19.553
Wind 300 deg - Ice		-27269.740	-15729.691	-1502.576	2953.509	-32.730
Wind 315 deg - Ice		-22338.547	-22315.050	-2172.581	2448.329	-36.166
Wind 330 deg - Ice		-15847.851	-27416.843	-2690.386	1784.975	-37.138
Total Weight	56752.753			2.714	4.317	
Wind 0 deg - Service		4.943	-19847.153	-2004.355	3.304	-10.542
Wind 30 deg - Service		9453.174	-16324.025	-1666.081	-964.758	-5.519
Wind 45 deg - Service		13248.321	-13212.061	-1350.365	-1356.239	-2.348
Wind 60 deg - Service		16079.573	-9260.760	-947.270	-1650.143	0.983
Wind 90 deg - Service		18897.787	-4.943	3.174	-1932.482	7.221
Wind 120 deg - Service		17230.077	9919.296	1007.230	-1742.329	11.525
Wind 135 deg - Service		13713.040	13676.780	1394.804	-1393.411	12.560
Wind 150 deg - Service		9444.613	16319.082	1672.889	-963.961	12.740
Wind 180 deg - Service		-4.943	18512.958	1904.645	4.224	10.542
Wind 210 deg - Service		-9453.174	16324.025	1673.349	972.285	5.519
Wind 225 deg - Service		-13248.321	13212.061	1357.632	1363.766	2.348
Wind 240 deg - Service		-17235.020	9927.857	1008.026	1750.316	-0.983
Wind 270 deg - Service		-18897.787	4.943	4.094	1940.010	-7.221
Wind 300 deg - Service		-16074.630	-9252.198	-946.474	1657.211	-11.525
Wind 315 deg - Service		-13241.331	-13205.070	-1349.714	1363.116	-12.560
Wind 330 deg - Service		-9444.613	-16319.082	-1665.622	971.489	-12.740

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

Comb. No.	Description
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
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice
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 lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 175	Leg	Max Tension	29	225.029	-0.596	0.245
			Max. Compression	46	-1802.332	0.004	-0.026
			Max. Mx	8	-160.199	-0.614	0.178
			Max. My	32	-651.761	-0.020	0.959
			Max. Vy	28	-925.704	0.000	0.000
			Max. Vx	10	1182.607	0.000	0.000
		Diagonal	Max Tension	15	1570.718	0.000	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	14	-1690.660	0.000	0.000
			Max. Mx	34	-205.003	0.139	0.000
			Max. My	34	-207.287	0.000	-0.004
			Max. Vy	34	-74.772	0.000	0.000
			Max. Vx	34	2.340	0.000	0.000
		Top Girt	Max Tension	29	1374.759	0.000	0.000
			Max. Compression	12	-1404.697	0.023	0.005
			Max. Mx	38	-305.285	0.082	0.020
			Max. My	48	-75.514	0.082	0.020
			Max. Vy	38	77.456	0.082	0.020
			Max. Vx	43	5.211	0.000	0.000
T2	175 - 166.667	Leg	Max Tension	29	1509.180	-0.596	0.245
			Max. Compression	46	-4954.880	0.149	0.041
			Max. Mx	28	1314.468	-0.881	0.292
			Max. My	16	-1427.566	-0.023	1.202
			Max. Vy	18	-662.522	-0.599	-0.423
			Max. Vx	24	-948.016	-0.312	-0.687
		Diagonal	Max Tension	21	5065.643	0.000	0.000
			Max. Compression	20	-5171.966	0.000	0.000
			Max. Mx	34	-131.081	0.201	0.000
			Max. My	34	-103.133	0.000	-0.008
			Max. Vy	34	79.008	0.000	0.000
			Max. Vx	34	3.182	0.000	0.000
		Horizontal	Max Tension	6	3056.877	0.014	0.006
			Max. Compression	23	-3014.539	0.000	0.000
			Max. Mx	48	-53.646	0.075	0.024
			Max. My	48	35.875	0.075	0.024
			Max. Vy	48	66.448	0.075	0.024
			Max. Vx	46	-5.621	0.000	0.000
T3	166.667 - 158.333	Leg	Max Tension	29	7079.411	-0.876	0.292
			Max. Compression	24	-9673.936	0.782	0.335
			Max. Mx	28	6865.764	-0.881	0.292
			Max. My	32	-1816.676	-0.024	1.196
			Max. Vy	28	-870.724	-0.881	0.292
			Max. Vx	4	-1022.732	-0.023	-0.796
		Diagonal	Max Tension	5	7528.562	0.000	0.000
			Max. Compression	4	-7640.642	0.000	0.000
			Max. Mx	34	-162.212	0.215	0.000
			Max. My	34	-102.924	0.000	-0.008
			Max. Vy	34	-83.116	0.000	0.000
			Max. Vx	34	3.227	0.000	0.000
		Top Girt	Max Tension	6	4534.145	0.016	0.006
			Max. Compression	3	-4602.286	0.015	0.005
			Max. Mx	48	-265.227	0.086	0.026
			Max. My	46	330.050	0.082	0.026
			Max. Vy	48	-70.352	0.086	0.026
			Max. Vx	46	5.799	0.000	0.000
T4	158.333 - 150	Leg	Max Tension	29	15566.434	-0.730	0.200
			Max. Compression	12	-19759.581	0.319	-0.228
			Max. Mx	25	-18633.432	0.782	0.335
			Max. My	22	2552.300	-0.223	0.956
			Max. Vy	25	644.616	0.782	0.335
			Max. Vx	24	738.081	-0.406	0.927
		Diagonal	Max Tension	11	9038.082	0.000	0.000
			Max. Compression	10	-9156.805	0.000	0.000
			Max. Mx	34	-144.102	0.230	0.000
			Max. My	34	-105.565	0.000	-0.009
			Max. Vy	34	-87.162	0.000	0.000
			Max. Vx	34	3.273	0.000	0.000
		Top Girt	Max Tension	10	5624.947	0.000	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	27	-5579.899	0.014	0.005
			Max. Mx	43	-266.229	0.097	0.029
			Max. My	48	-364.318	0.096	0.029
			Max. Vy	43	74.181	0.097	0.029
			Max. Vx	46	-5.976	0.000	0.000
T5	150 - 125	Leg	Max Tension	29	53965.634	-0.290	0.116
			Max. Compression	24	-66562.116	1.375	-0.017
			Max. Mx	24	-66562.116	1.375	-0.017
			Max. My	16	-4721.197	-0.184	-1.923
			Max. Vy	24	-1996.983	1.375	-0.017
			Max. Vx	16	1678.090	-0.133	-1.510
		Diagonal	Max Tension	11	20111.028	0.012	-0.004
			Max. Compression	10	-20455.151	0.000	0.000
			Max. Mx	14	-6184.898	-0.081	0.005
			Max. My	46	-224.451	-0.065	0.016
			Max. Vy	46	69.040	-0.065	-0.016
			Max. Vx	48	-4.799	0.000	0.000
		Horizontal	Max Tension	10	12757.507	0.000	0.000
			Max. Compression	10	-12759.238	0.000	0.000
			Max. Mx	43	-789.774	0.164	0.003
			Max. My	24	2129.046	0.010	-0.025
			Max. Vy	43	99.503	0.164	0.003
			Max. Vx	24	-3.886	0.010	-0.025
		Redund Horz 1 Bracing	Max Tension	14	1666.218	0.000	0.000
			Max. Compression	32	-1662.384	0.000	0.000
			Max. Mx	34	362.046	-0.026	0.000
			Max. My	34	480.419	0.000	0.001
			Max. Vy	34	28.850	0.000	0.000
			Max. Vx	34	0.666	0.000	0.000
		Redund Diag 1 Bracing	Max Tension	30	1244.818	0.000	0.000
			Max. Compression	14	-1252.493	0.000	0.000
			Max. Mx	34	272.254	-0.037	0.000
			Max. My	34	361.269	0.000	-0.001
			Max. Vy	34	27.508	0.000	0.000
			Max. Vx	34	1.002	0.000	0.000
		Inner Bracing	Max Tension	25	5.599	0.000	0.000
			Max. Compression	38	-11.888	0.000	0.000
			Max. Mx	34	-9.782	-0.112	0.000
			Max. Vy	34	62.624	0.000	0.000
T6	125 - 100	Leg	Max Tension	29	125453.196	0.951	0.126
			Max. Compression	24	-145807.490	-1.529	0.031
			Max. Mx	24	-145783.542	2.149	-0.032
			Max. My	16	-8677.135	-0.220	-1.785
			Max. Vy	24	943.662	2.149	-0.032
			Max. Vx	20	-843.126	-0.212	1.453
		Diagonal	Max Tension	11	22757.912	-0.035	-0.004
			Max. Compression	10	-23214.387	0.000	0.000
			Max. Mx	12	-1579.749	-0.121	0.005
			Max. My	46	-290.334	-0.087	0.019
			Max. Vy	47	84.616	-0.090	-0.019
			Max. Vx	46	-5.389	0.000	0.000
		Horizontal	Max Tension	10	16330.847	0.000	0.000
			Max. Compression	11	-16240.359	0.000	0.000
			Max. Mx	43	-565.553	0.232	0.005
			Max. My	24	1207.378	0.020	-0.037
			Max. Vy	43	-125.322	0.232	0.005
			Max. Vx	24	-5.495	0.021	-0.036

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Redund Horz 1 Bracing	Max Tension	24	2528.685	0.000	0.000
			Max. Compression	24	-2528.685	0.000	0.000
			Max. Mx	34	538.314	-0.033	0.000
			Max. My	34	676.704	0.000	0.001
			Max. Vy	34	32.114	0.000	0.000
			Max. Vx	34	0.742	0.000	0.000
		Redund Diag 1 Bracing	Max Tension	24	1853.163	0.000	0.000
			Max. Compression	24	-1853.163	0.000	0.000
			Max. Mx	34	367.413	-0.044	0.000
			Max. My	34	473.913	0.000	-0.001
			Max. Vy	34	30.803	0.000	0.000
			Max. Vx	34	1.039	0.000	0.000
		Inner Bracing	Max Tension	25	8.522	0.000	0.000
			Max. Compression	38	-14.283	0.000	0.000
			Max. Mx	34	-11.315	-0.142	0.000
			Max. Vy	34	69.758	0.000	0.000
T7	100 - 91.6667	Leg	Max Tension	29	150799.552	1.109	0.149
			Max. Compression	24	-173809.385	-1.595	0.028
			Max. Mx	24	-173766.555	2.226	-0.028
			Max. My	16	-9483.632	-0.214	-1.800
			Max. Vy	24	976.325	2.226	-0.028
			Max. Vx	16	775.914	-0.214	-1.800
		Diagonal	Max Tension	11	23394.467	-0.049	-0.004
			Max. Compression	10	-23919.509	0.000	0.000
			Max. Mx	26	9941.041	-0.117	-0.006
			Max. My	48	-476.655	-0.039	0.019
			Max. Vy	47	-87.655	-0.099	-0.019
			Max. Vx	46	5.429	0.000	0.000
		Horizontal	Max Tension	10	17118.893	0.000	0.000
			Max. Compression	11	-17021.203	0.000	0.000
			Max. Mx	43	-567.326	-0.339	-0.011
			Max. My	24	663.024	-0.044	0.068
			Max. Vy	43	-177.452	-0.339	-0.011
			Max. Vx	24	9.158	-0.044	0.068
		Redund Horz 1 Bracing	Max Tension	24	3014.156	0.000	0.000
			Max. Compression	24	-3014.156	0.000	0.000
			Max. Mx	34	585.680	-0.035	0.000
			Max. My	34	745.434	0.000	0.001
			Max. Vy	34	32.809	0.000	0.000
			Max. Vx	34	-0.758	0.000	0.000
		Redund Diag 1 Bracing	Max Tension	24	2069.031	0.000	0.000
			Max. Compression	24	-2069.031	0.000	0.000
			Max. Mx	34	402.033	-0.046	0.000
			Max. My	34	511.694	0.000	-0.002
			Max. Vy	34	31.522	0.000	0.000
			Max. Vx	34	1.040	0.000	0.000
		Inner Bracing	Max Tension	25	14.784	0.000	0.000
			Max. Compression	8	-20.942	0.000	0.000
			Max. Mx	34	-12.774	-0.152	0.000
			Max. Vy	34	71.308	0.000	0.000
T8	91.6667 - 83.3333	Leg	Max Tension	29	176418.192	1.185	0.147
			Max. Compression	24	-202397.025	-1.500	0.028
			Max. Mx	24	-202317.74	2.121	-0.029

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
					4		
			Max. My	16	-10424.850	-0.215	-2.097
			Max. Vy	24	-968.407	2.121	-0.029
			Max. Vx	16	895.480	-0.215	-2.097
		Diagonal	Max Tension	11	24006.441	0.000	0.000
			Max. Compression	10	-24520.523	0.000	0.000
			Max. Mx	46	-720.494	-0.105	-0.020
			Max. My	46	-476.426	-0.105	0.020
			Max. Vy	46	90.472	-0.105	-0.020
			Max. Vx	48	-5.501	0.000	0.000
		Horizontal	Max Tension	10	17917.641	0.000	0.000
			Max. Compression	11	-17769.808	0.000	0.000
			Max. Mx	43	-531.694	-0.351	-0.011
			Max. My	24	690.741	-0.062	0.069
			Max. Vy	43	181.607	-0.351	-0.011
			Max. Vx	24	-9.013	-0.062	0.069
		Redund Horz 1 Bracing	Max Tension	24	3509.663	0.000	0.000
			Max. Compression	24	-3509.663	0.000	0.000
			Max. Mx	34	660.327	-0.037	0.000
			Max. My	34	818.089	0.000	0.001
			Max. Vy	34	33.740	0.000	0.000
			Max. Vx	34	0.779	0.000	0.000
		Redund Diag 1 Bracing	Max Tension	24	2365.070	0.000	0.000
			Max. Compression	24	-2365.070	0.000	0.000
			Max. Mx	34	437.898	-0.048	0.000
			Max. My	34	551.289	0.000	-0.002
			Max. Vy	34	32.467	0.000	0.000
			Max. Vx	34	-1.050	0.000	0.000
		Inner Bracing	Max Tension	25	14.267	0.000	0.000
			Max. Compression	8	-20.560	0.000	0.000
			Max. Mx	34	-13.006	-0.162	0.000
			Max. Vy	34	73.355	0.000	0.000
T9	83.3333 - 75	Leg	Max Tension	29	201950.890	1.096	0.160
			Max. Compression	24	-231112.88	-2.890	0.037
					8		
			Max. Mx	24	-231112.88	-2.890	0.037
					8		
			Max. My	16	-11457.071	-0.368	-3.630
			Max. Vy	24	1406.085	2.572	-0.027
			Max. Vx	16	1432.596	-0.368	-3.630
		Diagonal	Max Tension	11	24832.358	0.000	0.000
			Max. Compression	10	-25390.693	0.000	0.000
			Max. Mx	47	2479.665	-0.112	-0.021
			Max. My	48	-2316.726	-0.077	-0.021
			Max. Vy	47	-93.203	-0.112	-0.021
			Max. Vx	46	5.569	0.000	0.000
		Horizontal	Max Tension	10	18845.338	0.000	0.000
			Max. Compression	11	-18668.940	0.000	0.000
			Max. Mx	43	-476.554	-0.374	-0.011
			Max. My	24	1046.756	-0.066	0.070
			Max. Vy	43	186.837	-0.374	-0.011
			Max. Vx	24	-8.867	-0.066	0.070
		Redund Horz 1 Bracing	Max Tension	24	4007.665	0.000	0.000
			Max. Compression	24	-4007.665	0.000	0.000
			Max. Mx	34	722.367	-0.040	0.000
			Max. My	34	896.370	0.000	0.001
			Max. Vy	34	34.613	0.000	0.000
			Max. Vx	34	-0.799	0.000	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Redund Diag 1 Bracing	Max Tension	24	2654.970	0.000	0.000
			Max. Compression	24	-2654.970	0.000	0.000
			Max. Mx	34	472.361	-0.051	0.000
			Max. My	34	478.549	0.000	0.002
			Max. Vy	34	-33.354	0.000	0.000
			Max. Vx	34	-1.059	0.000	0.000
		Inner Bracing	Max Tension	25	13.736	0.000	0.000
			Max. Compression	8	-20.140	0.000	0.000
			Max. Mx	34	-13.261	-0.173	0.000
			Max. Vy	34	-75.280	0.000	0.000
T10	75 - 50	Leg	Max Tension	29	265381.271	5.374	0.227
			Max. Compression	24	-302760.716	9.124	-0.026
			Max. Mx	24	-302531.939	9.124	-0.026
			Max. My	16	-13857.688	-0.590	-4.071
			Max. Vy	24	2733.953	9.124	-0.026
			Max. Vx	16	1121.872	-0.590	-4.071
		Diagonal	Max Tension	11	33519.830	-0.283	-0.012
			Max. Compression	10	-34314.166	0.000	0.000
			Max. Mx	6	23798.364	-0.405	-0.015
			Max. My	46	-563.414	-0.195	0.041
			Max. Vy	43	-132.346	-0.224	0.041
			Max. Vx	48	-8.808	0.000	0.000
		Horizontal	Max Tension	10	20996.726	0.000	0.000
			Max. Compression	11	-20911.556	0.000	0.000
			Max. Mx	43	-987.120	0.422	0.011
			Max. My	24	1460.184	-0.028	-0.073
			Max. Vy	43	175.215	0.422	0.011
			Max. Vx	24	-8.448	-0.031	-0.072
		Redund Horz 1 Bracing	Max Tension	24	5251.663	0.000	0.000
			Max. Compression	24	-5251.663	0.000	0.000
			Max. Mx	34	871.084	-0.054	0.000
			Max. My	34	1073.314	0.000	0.001
			Max. Vy	34	42.980	0.000	0.000
			Max. Vx	34	0.993	0.000	0.000
		Redund Diag 1 Bracing	Max Tension	24	4258.166	0.000	0.000
			Max. Compression	24	-4258.166	0.000	0.000
			Max. Mx	34	678.537	-0.080	0.000
			Max. My	34	842.711	0.000	-0.003
			Max. Vy	34	40.831	0.000	0.000
			Max. Vx	34	1.559	0.000	0.000
		Inner Bracing	Max Tension	25	12.722	0.000	0.000
			Max. Compression	38	-21.774	0.000	0.000
			Max. Mx	34	-16.929	-0.215	0.000
			Max. Vy	34	-85.983	0.000	0.000
T11	50 - 37.5	Leg	Max Tension	29	305153.397	6.017	0.243
			Max. Compression	24	-347866.015	-6.968	0.032
			Max. Mx	24	-347607.934	9.110	-0.027
			Max. My	16	-15375.551	-0.599	-4.953
			Max. Vy	24	-2724.170	9.110	-0.027
			Max. Vx	16	1297.437	-0.599	-4.953
		Diagonal	Max Tension	11	33984.384	-0.227	-0.011
			Max. Compression	10	-34800.520	0.000	0.000
			Max. Mx	26	14398.480	-0.335	-0.015
			Max. My	48	-3261.544	-0.099	-0.041

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	47	130.575	-0.224	-0.041
			Max. Vx	35	8.519	0.000	0.000
		Horizontal	Max Tension	10	21976.934	0.000	0.000
			Max. Compression	11	-21858.932	0.000	0.000
			Max. Mx	43	-946.850	0.470	0.010
			Max. My	24	1061.321	0.005	-0.072
			Max. Vy	43	-190.019	0.470	0.010
			Max. Vx	24	8.001	0.005	-0.072
		Redund Horz 1 Bracing	Max Tension	24	6033.882	0.000	0.000
			Max. Compression	24	-6033.882	0.000	0.000
			Max. Mx	34	962.658	-0.057	0.000
			Max. My	34	1177.184	0.000	0.001
			Max. Vy	34	-43.454	0.000	0.000
			Max. Vx	34	1.004	0.000	0.000
		Redund Diag 1 Bracing	Max Tension	24	4600.236	0.000	0.000
			Max. Compression	24	-4600.236	0.000	0.000
			Max. Mx	34	729.175	-0.083	0.000
			Max. My	34	897.486	0.000	-0.003
			Max. Vy	34	41.384	0.000	0.000
			Max. Vx	34	-1.530	0.000	0.000
		Inner Bracing	Max Tension	25	10.463	0.000	0.000
			Max. Compression	38	-21.545	0.000	0.000
			Max. Mx	34	-17.011	-0.228	0.000
			Max. Vy	34	86.930	0.000	0.000
T12	37.5 - 25	Leg	Max Tension	29	344432.784	5.657	0.293
			Max. Compression	24	-392812.096	-8.431	0.024
			Max. Mx	24	-392467.432	10.046	-0.023
			Max. My	16	-16468.232	-0.599	-4.953
			Max. Vy	24	3087.422	10.046	-0.023
			Max. Vx	16	1404.509	-0.650	-4.381
		Diagonal	Max Tension	11	34905.467	-0.306	-0.013
			Max. Compression	10	-35880.068	0.000	0.000
			Max. Mx	28	25427.487	-0.412	-0.017
			Max. My	48	-3466.116	-0.102	-0.042
			Max. Vy	43	139.538	-0.255	0.042
			Max. Vx	40	-8.737	0.000	0.000
		Top Girt	Max Tension	10	23081.830	0.000	0.000
			Max. Compression	11	-22956.186	0.000	0.000
			Max. Mx	43	-978.452	-0.727	-0.018
			Max. My	24	1367.636	-0.017	0.124
			Max. Vy	43	-276.763	-0.727	-0.018
			Max. Vx	24	13.277	-0.017	0.124
		Redund Horz 1 Bracing	Max Tension	24	6813.232	0.000	0.000
			Max. Compression	24	-6813.232	0.000	0.000
			Max. Mx	34	1055.072	-0.060	0.000
			Max. My	34	1285.149	0.000	0.001
			Max. Vy	34	43.952	0.000	0.000
			Max. Vx	34	1.015	0.000	0.000
		Redund Diag 1 Bracing	Max Tension	24	5056.465	0.000	0.000
			Max. Compression	24	-5056.465	0.000	0.000
			Max. Mx	34	778.793	-0.086	0.000
			Max. My	34	953.778	0.000	-0.003
			Max. Vy	34	41.954	0.000	0.000
			Max. Vx	34	1.507	0.000	0.000
		Inner Bracing	Max Tension	27	392.714	0.000	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	26	-406.190	0.000	0.000
			Max. Mx	34	-7.190	-0.242	0.000
			Max. Vy	34	87.927	0.000	0.000
T13	25 - 12.5	Leg	Max Tension	29	383919.849	6.943	0.294
			Max. Compression	24	-438509.653	-7.916	0.032
			Max. Mx	24	-438417.832	10.842	-0.024
			Max. My	16	-19052.732	-0.679	-5.520
			Max. Vy	24	-3219.619	10.842	-0.024
			Max. Vx	16	1467.985	-0.679	-5.520
		Diagonal	Max Tension	11	35611.937	-0.227	-0.014
			Max. Compression	10	-36599.322	0.000	0.000
			Max. Mx	26	17738.284	-0.346	-0.018
			Max. My	46	-617.973	-0.234	0.044
			Max. Vy	47	-139.657	-0.252	-0.044
			Max. Vx	49	-8.788	0.000	0.000
		Horizontal	Max Tension	10	24105.269	0.000	0.000
			Max. Compression	11	-23904.309	0.000	0.000
			Max. Mx	43	-947.595	0.545	0.008
			Max. My	24	1344.343	0.061	-0.072
			Max. Vy	43	206.956	0.545	0.008
			Max. Vx	24	7.772	0.061	-0.072
		Redund Horz 1 Bracing	Max Tension	24	7605.814	0.000	0.000
			Max. Compression	24	-7605.814	0.000	0.000
			Max. Mx	34	1151.827	-0.063	0.000
			Max. My	34	1399.393	0.000	0.001
			Max. Vy	34	-43.611	0.000	0.000
			Max. Vx	34	-1.007	0.000	0.000
		Redund Diag 1 Bracing	Max Tension	24	5507.049	0.000	0.000
			Max. Compression	24	-5507.049	0.000	0.000
			Max. Mx	34	829.889	-0.108	0.000
			Max. My	34	1013.241	0.000	-0.004
			Max. Vy	34	-51.963	0.000	0.000
			Max. Vx	34	1.817	0.000	0.000
		Inner Bracing	Max Tension	25	7.797	0.000	0.000
			Max. Compression	38	-22.422	0.000	0.000
			Max. Mx	34	-18.361	-0.312	0.000
			Max. Vy	34	108.678	0.000	0.000
T14	12.5 - 0	Leg	Max Tension	29	424228.409	6.418	0.334
			Max. Compression	24	-485455.866	0.000	-0.000
			Max. Mx	24	-485131.237	9.709	-0.020
			Max. My	16	-20455.001	-0.679	-5.520
			Max. Vy	24	-2923.752	9.709	-0.020
			Max. Vx	16	-1339.486	-0.679	-5.520
		Diagonal	Max Tension	11	35907.768	-0.282	-0.014
			Max. Compression	10	-36969.579	0.000	0.000
			Max. Mx	6	24746.242	-0.394	-0.019
			Max. My	38	-834.530	-0.111	-0.043
			Max. Vy	43	137.014	-0.260	0.043
			Max. Vx	35	8.346	0.000	0.000
		Top Girt	Max Tension	10	25047.995	0.000	0.000
			Max. Compression	11	-24905.386	0.000	0.000
			Max. Mx	43	-1255.845	-0.835	-0.015
			Max. My	24	1721.252	-0.126	0.131
			Max. Vy	43	-298.736	-0.835	-0.015
			Max. Vx	24	13.593	-0.126	0.131

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Redund Horz 1 Bracing	Max Tension	24	8418.326	0.000	0.000
			Max. Compression	24	-8418.326	0.000	0.000
			Max. Mx	34	1257.637	-0.061	0.000
			Max. My	34	1501.827	0.000	0.001
			Max. Vy	34	40.849	0.000	0.000
			Max. Vx	34	-0.943	0.000	0.000
		Redund Diag 1 Bracing	Max Tension	24	5958.681	0.000	0.000
			Max. Compression	24	-5958.681	0.000	0.000
			Max. Mx	34	885.767	-0.105	0.000
			Max. My	34	1063.027	0.000	-0.004
			Max. Vy	34	49.403	0.000	0.000
			Max. Vx	34	1.685	0.000	0.000
		Inner Bracing	Max Tension	27	425.287	0.000	0.000
			Max. Compression	26	-441.769	0.000	0.000
			Max. Mx	34	-7.504	-0.309	0.000
			Max. Vy	34	-103.130	0.000	0.000

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	24	532534.548	55008.585	-31602.852
	Max. H_x	24	532534.548	55008.585	-31602.852
	Max. H_z	5	-406208.728	-39582.548	30697.485
	Min. Vert	9	-465540.940	-49030.272	28151.559
	Min. H_x	9	-465540.940	-49030.272	28151.559
	Min. H_z	20	446429.934	42098.023	-32149.507
Leg B	Max. Vert	12	531912.754	-55669.952	-30393.533
	Max. H_x	29	-465644.420	49696.879	26951.315
	Max. H_z	31	-452170.557	46901.115	28780.810
	Min. Vert	29	-465644.420	49696.879	26951.315
	Min. H_x	12	531912.754	-55669.952	-30393.533
	Min. H_z	14	504596.567	-51018.189	-31302.926
Leg A	Max. Vert	2	530340.518	-1377.990	63292.435
	Max. H_x	27	16793.275	11239.377	1225.279
	Max. H_z	2	530340.518	-1377.990	63292.435
	Min. Vert	19	-464104.473	1372.751	-56398.924
	Min. H_x	10	22670.368	-11244.617	1669.692
	Min. H_z	19	-464104.473	1372.751	-56398.924

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	56752.753	0.000	-0.000	2.714	4.317	0.000
1.2 Dead+1.6 Wind 0 deg - No Ice	68103.303	27.854	-111838.711	-10990.716	2.589	-59.403
0.9 Dead+1.6 Wind 0 deg - No Ice	51077.477	27.854	-111838.711	-10991.530	1.293	-59.403

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	kip-ft	kip-ft	kip-ft
1.2 Dead+1.6 Wind 30 deg - No Ice	68103.303	53268.636	-91985.883	-9142.612	-5300.609	-31.098
0.9 Dead+1.6 Wind 30 deg - No Ice	51077.477	53268.636	-91985.883	-9143.426	-5301.904	-31.098
1.2 Dead+1.6 Wind 45 deg - No Ice	68103.303	74654.289	-74449.963	-7413.855	-7445.764	-13.230
0.9 Dead+1.6 Wind 45 deg - No Ice	51077.477	74654.289	-74449.963	-7414.669	-7447.059	-13.230
1.2 Dead+1.6 Wind 60 deg - No Ice	68103.303	90608.395	-52184.382	-5206.154	-9056.629	5.540
0.9 Dead+1.6 Wind 60 deg - No Ice	51077.477	90608.395	-52184.382	-5206.968	-9057.925	5.540
1.2 Dead+1.6 Wind 90 deg - No Ice	68103.303	106489.028	-27.854	0.665	-10601.910	40.693
0.9 Dead+1.6 Wind 90 deg - No Ice	51077.477	106489.028	-27.854	-0.149	-10603.205	40.693
1.2 Dead+1.6 Wind 120 deg - No Ice	68103.303	97091.486	55895.233	5497.999	-9556.020	64.942
0.9 Dead+1.6 Wind 120 deg - No Ice	51077.477	97091.486	55895.233	5497.185	-9557.315	64.942
1.2 Dead+1.6 Wind 135 deg - No Ice	68103.303	77272.980	77068.653	7621.637	-7647.032	70.778
0.9 Dead+1.6 Wind 135 deg - No Ice	51077.477	77272.980	77068.653	7620.823	-7648.327	70.778
1.2 Dead+1.6 Wind 150 deg - No Ice	68103.303	53220.392	91958.029	9146.534	-5296.120	71.791
0.9 Dead+1.6 Wind 150 deg - No Ice	51077.477	53220.392	91958.029	9145.720	-5297.415	71.791
1.2 Dead+1.6 Wind 180 deg - No Ice	68103.303	-27.854	104320.519	10417.591	7.772	59.403
0.9 Dead+1.6 Wind 180 deg - No Ice	51077.477	-27.854	104320.519	10416.777	6.477	59.403
1.2 Dead+1.6 Wind 210 deg - No Ice	68103.303	-53268.636	91985.883	9149.126	5310.970	31.098
0.9 Dead+1.6 Wind 210 deg - No Ice	51077.477	-53268.636	91985.883	9148.312	5309.675	31.098
1.2 Dead+1.6 Wind 225 deg - No Ice	68103.303	-74654.289	74449.963	7420.369	7456.125	13.230
0.9 Dead+1.6 Wind 225 deg - No Ice	51077.477	-74654.289	74449.963	7419.555	7454.830	13.230
1.2 Dead+1.6 Wind 240 deg - No Ice	68103.303	-97119.340	55943.478	5502.489	9568.973	-5.540
0.9 Dead+1.6 Wind 240 deg - No Ice	51077.477	-97119.340	55943.478	5501.674	9567.678	-5.540
1.2 Dead+1.6 Wind 270 deg - No Ice	68103.303	-106489.028	27.854	5.849	10612.271	-40.693
0.9 Dead+1.6 Wind 270 deg - No Ice	51077.477	-106489.028	27.854	5.035	10610.976	-40.693
1.2 Dead+1.6 Wind 300 deg - No Ice	68103.303	-90580.541	-52136.137	-5201.665	9064.399	-64.942
0.9 Dead+1.6 Wind 300 deg - No Ice	51077.477	-90580.541	-52136.137	-5202.479	9063.103	-64.942
1.2 Dead+1.6 Wind 315 deg - No Ice	68103.303	-74614.898	-74410.571	-7410.189	7452.460	-70.778
0.9 Dead+1.6 Wind 315 deg - No Ice	51077.477	-74614.898	-74410.571	-7411.004	7451.165	-70.778
1.2 Dead+1.6 Wind 330 deg - No Ice	68103.303	-53220.392	-91958.029	-9140.020	5306.481	-71.791
0.9 Dead+1.6 Wind 330 deg - No Ice	51077.477	-53220.392	-91958.029	-9140.834	5305.186	-71.791
1.2 Dead+1.0 Ice	240226.221	0.000	-0.000	103.195	170.049	-0.000

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 0 deg+1.0 Ice	240226.221	-3.663	-32265.399	-3059.115	170.852	-31.594
1.2 Dead+1.0 Wind 30 deg+1.0 Ice	240226.221	15841.507	-27413.181	-2596.415	-1390.873	-17.585
1.2 Dead+1.0 Wind 45 deg+1.0 Ice	240226.221	22333.368	-22309.871	-2095.530	-2032.586	-8.514
1.2 Dead+1.0 Wind 60 deg+1.0 Ice	240226.221	27266.077	-15723.348	-1447.528	-2521.473	1.136
1.2 Dead+1.0 Wind 90 deg+1.0 Ice	240226.221	31689.359	3.663	103.998	-2953.185	19.553
1.2 Dead+1.0 Wind 120 deg+1.0 Ice	240226.221	27973.264	16135.871	1685.046	-2573.782	32.730
1.2 Dead+1.0 Wind 135 deg+1.0 Ice	240226.221	22625.760	22602.263	2324.084	-2054.749	36.166
1.2 Dead+1.0 Wind 150 deg+1.0 Ice	240226.221	15847.851	27416.843	2803.608	-1392.263	37.138
1.2 Dead+1.0 Wind 180 deg+1.0 Ice	240226.221	3.663	31453.039	3206.032	169.246	31.594
1.2 Dead+1.0 Wind 210 deg+1.0 Ice	240226.221	-15841.507	27413.181	2802.806	1730.971	17.585
1.2 Dead+1.0 Wind 225 deg+1.0 Ice	240226.221	-22333.367	22309.871	2301.921	2372.684	8.514
1.2 Dead+1.0 Wind 240 deg+1.0 Ice	240226.221	-27969.601	16129.527	1683.656	2913.077	-1.136
1.2 Dead+1.0 Wind 270 deg+1.0 Ice	240226.221	-31689.359	-3.663	102.393	3293.283	-19.553
1.2 Dead+1.0 Wind 300 deg+1.0 Ice	240226.221	-27269.740	-15729.692	-1448.918	2862.373	-32.730
1.2 Dead+1.0 Wind 315 deg+1.0 Ice	240226.221	-22338.547	-22315.050	-2096.665	2373.819	-36.166
1.2 Dead+1.0 Wind 330 deg+1.0 Ice	240226.221	-15847.851	-27416.843	-2597.217	1732.361	-37.138
Dead+Wind 0 deg - Service	56752.753	4.943	-19847.154	-1948.301	3.857	-10.542
Dead+Wind 30 deg - Service	56752.753	9453.174	-16324.025	-1620.332	-937.260	-5.519
Dead+Wind 45 deg - Service	56752.753	13248.321	-13212.061	-1313.543	-1317.945	-2.348
Dead+Wind 60 deg - Service	56752.753	16079.573	-9260.760	-921.760	-1603.812	0.983
Dead+Wind 90 deg - Service	56752.753	18897.787	-4.943	2.254	-1878.041	7.221
Dead+Wind 120 deg - Service	56752.753	17230.077	9919.296	977.824	-1692.435	11.525
Dead+Wind 135 deg - Service	56752.753	13713.040	13676.780	1354.690	-1353.662	12.560
Dead+Wind 150 deg - Service	56752.753	9444.613	16319.082	1625.301	-936.464	12.740
Dead+Wind 180 deg - Service	56752.753	-4.943	18512.958	1850.866	4.777	10.542
Dead+Wind 210 deg - Service	56752.753	-9453.174	16324.025	1625.761	945.895	5.519
Dead+Wind 225 deg - Service	56752.753	-13248.321	13212.061	1318.972	1326.579	2.348
Dead+Wind 240 deg - Service	56752.753	-17235.020	9927.858	978.621	1701.530	-0.983
Dead+Wind 270 deg - Service	56752.753	-18897.787	4.943	3.174	1886.676	-7.221
Dead+Wind 300 deg - Service	56752.753	-16074.630	-9252.198	-920.963	1611.987	-11.525
Dead+Wind 315 deg - Service	56752.753	-13241.331	-13205.070	-1312.893	1325.928	-12.560
Dead+Wind 330 deg - Service	56752.753	-9444.613	-16319.082	-1619.872	945.098	-12.740

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	0.000	-56752.753	0.000	-0.000	56752.753	0.000	0.000%
2	27.854	-68103.303	-111838.709	-27.854	68103.303	111838.711	0.000%
3	27.854	-51077.477	-111838.709	-27.854	51077.477	111838.711	0.000%
4	53268.636	-68103.303	-91985.882	-53268.636	68103.303	91985.883	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
5	53268.636	-51077.477	-91985.882	-53268.636	51077.477	91985.883	0.000%
6	74654.289	-68103.303	-74449.962	-74654.289	68103.303	74449.963	0.000%
7	74654.289	-51077.477	-74449.962	-74654.289	51077.477	74449.963	0.000%
8	90608.394	-68103.303	-52184.381	-90608.395	68103.303	52184.382	0.000%
9	90608.394	-51077.477	-52184.381	-90608.395	51077.477	52184.382	0.000%
10	106489.028	-68103.303	-27.854	-106489.028	68103.303	27.854	0.000%
11	106489.028	-51077.477	-27.854	-106489.028	51077.477	27.854	0.000%
12	97091.485	-68103.303	55895.232	-97091.486	68103.303	-55895.233	0.000%
13	97091.485	-51077.477	55895.232	-97091.486	51077.477	-55895.233	0.000%
14	77272.980	-68103.303	77068.653	-77272.980	68103.303	-77068.653	0.000%
15	77272.980	-51077.477	77068.653	-77272.980	51077.477	-77068.653	0.000%
16	53220.392	-68103.303	91958.028	-53220.392	68103.303	-91958.029	0.000%
17	53220.392	-51077.477	91958.028	-53220.392	51077.477	-91958.029	0.000%
18	-27.854	-68103.303	104320.518	27.854	68103.303	-104320.519	0.000%
19	-27.854	-51077.477	104320.518	27.854	51077.477	-104320.519	0.000%
20	-53268.636	-68103.303	91985.882	53268.636	68103.303	-91985.883	0.000%
21	-53268.636	-51077.477	91985.882	53268.636	51077.477	-91985.883	0.000%
22	-74654.289	-68103.303	74449.962	74654.289	68103.303	-74449.963	0.000%
23	-74654.289	-51077.477	74449.962	74654.289	51077.477	-74449.963	0.000%
24	-97119.339	-68103.303	55943.477	97119.340	68103.303	-55943.478	0.000%
25	-97119.339	-51077.477	55943.477	97119.340	51077.477	-55943.478	0.000%
26	-106489.028	-68103.303	27.854	106489.028	68103.303	-27.854	0.000%
27	-106489.028	-51077.477	27.854	106489.028	51077.477	-27.854	0.000%
28	-90580.540	-68103.303	-52136.137	90580.541	68103.303	52136.137	0.000%
29	-90580.540	-51077.477	-52136.137	90580.541	51077.477	52136.137	0.000%
30	-74614.898	-68103.303	-74410.570	74614.898	68103.303	74410.571	0.000%
31	-74614.898	-51077.477	-74410.570	74614.898	51077.477	74410.571	0.000%
32	-53220.392	-68103.303	-91958.028	53220.392	68103.303	91958.029	0.000%
33	-53220.392	-51077.477	-91958.028	53220.392	51077.477	91958.029	0.000%
34	0.000	-240226.221	0.000	-0.000	240226.221	0.000	0.000%
35	-3.663	-240226.221	-32265.398	3.663	240226.221	32265.399	0.000%
36	15841.507	-240226.221	-27413.180	-15841.507	240226.221	27413.181	0.000%
37	22333.367	-240226.221	-22309.870	-22333.368	240226.221	22309.871	0.000%
38	27266.077	-240226.221	-15723.348	-27266.077	240226.221	15723.348	0.000%
39	31689.359	-240226.221	3.663	-31689.359	240226.221	-3.663	0.000%
40	27973.264	-240226.221	16135.871	-27973.264	240226.221	-16135.871	0.000%
41	22625.759	-240226.221	22602.262	-22625.760	240226.221	-22602.263	0.000%
42	15847.851	-240226.221	27416.843	-15847.851	240226.221	-27416.843	0.000%
43	3.663	-240226.221	31453.039	-3.663	240226.221	-31453.039	0.000%
44	-15841.507	-240226.221	27413.180	15841.507	240226.221	-27413.181	0.000%
45	-22333.367	-240226.221	22309.870	22333.367	240226.221	-22309.871	0.000%
46	-27969.601	-240226.221	16129.527	27969.601	240226.221	-16129.527	0.000%
47	-31689.359	-240226.221	-3.663	31689.359	240226.221	3.663	0.000%
48	-27269.740	-240226.221	-15729.691	27269.740	240226.221	15729.692	0.000%
49	-22338.547	-240226.221	-22315.050	22338.547	240226.221	22315.050	0.000%
50	-15847.851	-240226.221	-27416.843	15847.851	240226.221	27416.843	0.000%
51	4.943	-56752.753	-19847.153	-4.943	56752.753	19847.154	0.000%
52	9453.174	-56752.753	-16324.025	-9453.174	56752.753	16324.025	0.000%
53	13248.321	-56752.753	-13212.061	-13248.321	56752.753	13212.061	0.000%
54	16079.573	-56752.753	-9260.760	-16079.573	56752.753	9260.760	0.000%
55	18897.787	-56752.753	-4.943	-18897.787	56752.753	4.943	0.000%
56	17230.077	-56752.753	9919.296	-17230.077	56752.753	-9919.296	0.000%
57	13713.040	-56752.753	13676.780	-13713.040	56752.753	-13676.780	0.000%
58	9444.613	-56752.753	16319.082	-9444.613	56752.753	-16319.082	0.000%
59	-4.943	-56752.753	18512.958	4.943	56752.753	-18512.958	0.000%
60	-9453.174	-56752.753	16324.025	9453.174	56752.753	-16324.025	0.000%
61	-13248.321	-56752.753	13212.061	13248.321	56752.753	-13212.061	0.000%
62	-17235.020	-56752.753	9927.857	17235.020	56752.753	-9927.858	0.000%
63	-18897.787	-56752.753	4.943	18897.787	56752.753	-4.943	0.000%
64	-16074.630	-56752.753	-9252.198	16074.630	56752.753	9252.198	0.000%
65	-13241.331	-56752.753	-13205.070	13241.331	56752.753	13205.070	0.000%

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
66	-9444.613	-56752.753	-16319.082	9444.613	56752.753	16319.082	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 175	2.990	62	0.1209	0.0193
T2	175 - 166.667	2.863	62	0.1209	0.0197
T3	166.667 - 158.333	2.648	62	0.1207	0.0189
T4	158.333 - 150	2.431	62	0.1200	0.0177
T5	150 - 125	2.216	62	0.1182	0.0163
T6	125 - 100	1.597	62	0.1080	0.0129
T7	100 - 91.6667	1.044	62	0.0904	0.0094
T8	91.6667 - 83.3333	0.884	62	0.0837	0.0085
T9	83.3333 - 75	0.732	62	0.0779	0.0076
T10	75 - 50	0.592	62	0.0715	0.0067
T11	50 - 37.5	0.268	62	0.0467	0.0042
T12	37.5 - 25	0.153	62	0.0351	0.0030
T13	25 - 12.5	0.074	62	0.0224	0.0021
T14	12.5 - 0	0.021	56	0.0116	0.0010

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
182.500	3" Dia 20' Omni	62	2.990	0.1209	0.0193	177629
182.000	1" Dia 8' Omni	62	2.990	0.1209	0.0193	177629
181.000	2" Dia 10' Omni	62	2.990	0.1209	0.0193	177629
180.000	3" Dia 12' Omni	62	2.990	0.1209	0.0193	177629
178.000	432E-83I-01T TTA Unit	62	2.939	0.1209	0.0195	177629
176.000	6' w/Radome	62	2.888	0.1209	0.0197	177629
174.000	6' w/Radome	62	2.837	0.1209	0.0197	171116
171.000	3'4"x4" Pipe Mount	62	2.760	0.1209	0.0195	209284
170.000	Andrew 6' w/Radome	62	2.734	0.1209	0.0194	241038
169.000	3'4"x4" Pipe Mount	62	2.708	0.1208	0.0192	283268
166.000	6' Side-Arm(1)	62	2.631	0.1207	0.0188	506086
164.000	(inverted) 2" Dia 10' Omni	62	2.579	0.1206	0.0185	740157
160.000	(Inverted) 3" Dia 20' Omni	62	2.475	0.1202	0.0179	Inf
157.000	4' Paraflector	62	2.397	0.1197	0.0175	648961
153.000	3" Dia 20' Omni	62	2.293	0.1189	0.0168	268240
151.000	1 Bay Dipole ANT400D	62	2.241	0.1185	0.0164	208012
143.000	13' Sector Mount (1)	62	2.037	0.1161	0.0152	161308
137.000	Pirod 12' PCS T-Frame (1) 104569	62	1.888	0.1139	0.0144	150898
130.000	SitePro1 USF12-396-U Mount Assembly w/ (3) 96" Mount Pipes	62	1.717	0.1107	0.0135	140332
122.000	1' Side Arm	62	1.526	0.1063	0.0125	115387
119.000	12' Dipole	62	1.456	0.1044	0.0121	101867
109.250	4' Paraflector	62	1.238	0.0976	0.0107	73474
76.000	3' Yagi	62	0.608	0.0724	0.0068	47497
75.000	GPS	62	0.592	0.0715	0.0067	45838

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
27.000	2" Dia 8' Omni	62	0.085	0.0244	0.0022	86219
26.000	Rohn 6' Side-Arm(1)	62	0.079	0.0234	0.0021	90887
20.000	2' Standoff T-Arm (5' face width)	62	0.049	0.0180	0.0016	67693
15.000	2' Yagi	56	0.029	0.0137	0.0012	48984

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 175	16.774	24	0.6750	0.1089
T2	175 - 166.667	16.064	24	0.6750	0.1110
T3	166.667 - 158.333	14.862	24	0.6745	0.1063
T4	158.333 - 150	13.651	24	0.6706	0.0997
T5	150 - 125	12.443	24	0.6615	0.0917
T6	125 - 100	8.975	24	0.6057	0.0727
T7	100 - 91.6667	5.871	24	0.5075	0.0532
T8	91.6667 - 83.3333	4.969	24	0.4703	0.0479
T9	83.3333 - 75	4.119	24	0.4378	0.0427
T10	75 - 50	3.328	24	0.4018	0.0376
T11	50 - 37.5	1.509	24	0.2625	0.0236
T12	37.5 - 25	0.861	24	0.1972	0.0170
T13	25 - 12.5	0.416	24	0.1262	0.0116
T14	12.5 - 0	0.117	25	0.0652	0.0054

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
182.500	3" Dia 20' Omni	24	16.774	0.6750	0.1089	34827
182.000	1" Dia 8' Omni	24	16.774	0.6750	0.1089	34827
181.000	2" Dia 10' Omni	24	16.774	0.6750	0.1089	34827
180.000	3" Dia 12' Omni	24	16.774	0.6750	0.1089	34827
178.000	432E-83I-01T TTA Unit	24	16.491	0.6750	0.1101	34827
176.000	6' w/Radome	24	16.206	0.6750	0.1109	34827
174.000	6' w/Radome	24	15.921	0.6751	0.1110	33579
171.000	3'4"x4" Pipe Mount	24	15.489	0.6750	0.1097	41291
170.000	Andrew 6' w/Radome	24	15.345	0.6750	0.1091	47713
169.000	3'4"x4" Pipe Mount	24	15.200	0.6749	0.1083	56319
166.000	6' Side-Arm(1)	24	14.766	0.6744	0.1058	102058
164.000	(inverted) 2" Dia 10' Omni	24	14.475	0.6738	0.1041	155719
160.000	(Inverted) 3" Dia 20' Omni	24	13.894	0.6718	0.1011	209023
157.000	4' Paraflector	24	13.457	0.6695	0.0986	121419
153.000	3" Dia 20' Omni	24	12.876	0.6653	0.0947	49015
151.000	1 Bay Dipole ANT400D	24	12.587	0.6628	0.0927	38312
143.000	13' Sector Mount (1)	24	11.445	0.6502	0.0856	29465
137.000	Pirod 12' PCS T-Frame (1) 104569	24	10.606	0.6379	0.0811	27517
130.000	SitePro1 USF12-396-U Mount Assembly w/ (3) 96" Mount Pipes	24	9.646	0.6205	0.0762	25546
122.000	1' Side Arm	24	8.578	0.5960	0.0704	20888
119.000	12' Dipole	24	8.186	0.5856	0.0680	18380

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
109.250	4' Paraflector	24	6.957	0.5478	0.0601	13166
76.000	3' Yagi	24	3.418	0.4065	0.0382	8465
75.000	GPS	24	3.328	0.4018	0.0376	8169
27.000	2" Dia 8' Omni	24	0.477	0.1371	0.0125	15350
26.000	Rohn 6' Side-Arm(1)	24	0.446	0.1316	0.0120	16184
20.000	2' Standoff T-Arm (5' face width)	24	0.277	0.1010	0.0091	12047
15.000	2' Yagi	25	0.162	0.0772	0.0066	8713

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	180	Diagonal	A325X	0.750	1	1570.720	17943.801	0.088 ✔	1	Member Block Shear
		Top Girt	A325X	0.625	2	687.379	10263.300	0.067 ✔	1	Member Block Shear
T2	175	Leg	A325X	0.750	6	275.271	29820.600	0.009 ✔	1	Bolt Tension
		Diagonal	A325X	0.750	1	5065.640	17943.801	0.282 ✔	1	Member Block Shear
		Horizontal	A325X	0.625	2	1528.440	7187.700	0.213 ✔	1	Member Block Shear
T3	166.667	Diagonal	A325X	0.750	1	7528.560	17943.801	0.420 ✔	1	Member Block Shear
		Top Girt	A325X	0.625	2	2267.070	7187.700	0.315 ✔	1	Member Block Shear
T4	158.333	Diagonal	A325X	0.750	1	9038.080	17943.801	0.504 ✔	1	Member Block Shear
		Top Girt	A325X	0.625	2	2812.470	7187.700	0.391 ✔	1	Member Block Shear
T5	150	Leg	A325X	0.750	6	4307.220	29820.600	0.144 ✔	1	Bolt Tension
		Diagonal	A325X	0.750	1	20111.000	29906.301	0.672 ✔	1	Member Block Shear
		Horizontal	A325X	0.625	2	6378.750	10263.300	0.622 ✔	1	Member Block Shear
T6	125	Leg	A325X	0.750	6	12787.300	29820.600	0.429 ✔	1	Bolt Tension
		Diagonal	A325X	0.750	1	22757.900	25230.000	0.902 ✔	1	Member Bearing
		Horizontal	A325X	0.625	2	8165.420	12829.100	0.636 ✔	1	Member Block Shear
T7	100	Leg	A325X	1.000	6	25133.301	53014.398	0.474 ✔	1	Bolt Tension
		Diagonal	A325X	0.750	1	23394.500	25230.000	0.927 ✔	1	Member Bearing
		Horizontal	A325X	0.625	2	8559.450	20526.600	0.417 ✔	1	Member Block Shear
T8	91.6667	Diagonal	A325X	0.750	1	24006.400	25230.000	0.952 ✔	1	Member Bearing
		Horizontal	A325X	0.625	2	8958.820	20526.600	0.436 ✔	1	Member Block Shear
T9	83.3333	Diagonal	A325X	0.750	1	24832.400	25230.000	0.984 ✔	1	Member Bearing
		Horizontal	A325X	0.625	2	9422.670	20526.600	0.459 ✔	1	Member Block Shear
T10	75	Leg	A325X	1.000	8	28294.199	53014.398	0.534 ✔	1	Bolt Tension

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
		Diagonal	A325X	0.750	1	33519.801	35343.801	0.948 ✔	1	Member Bearing
		Horizontal	A325X	0.625	2	10498.400	11622.700	0.903 ✔	1	Member Block Shear
T11	50	Leg	A325X	1.000	8	38144.199	53014.398	0.720 ✔	1	Bolt Tension
		Diagonal	A325X	1.000	1	33984.398	40675.801	0.835 ✔	1	Member Block Shear
		Horizontal	A325X	0.625	2	10988.500	15186.400	0.724 ✔	1	Bolt Shear
T12	37.5	Diagonal	A325X	1.000	1	34905.500	45703.102	0.764 ✔	1	Member Block Shear
		Top Girt	A325X	0.625	2	11540.900	23245.301	0.496 ✔	1	Member Block Shear
T13	25	Leg	A325X	1.000	8	47990.000	53014.398	0.905 ✔	1	Bolt Tension
		Diagonal	A325X	1.000	1	35611.898	45703.102	0.779 ✔	1	Member Block Shear
		Horizontal	A325X	0.625	2	12052.600	15186.400	0.794 ✔	1	Bolt Shear
T14	12.5	Diagonal	A325X	1.000	1	35907.801	45703.102	0.786 ✔	1	Member Block Shear
		Top Girt	A325X	0.625	2	12524.000	29056.600	0.431 ✔	1	Member Block Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	Stainless P5x0.250	5.005	5.005	35.7 K=1.00	3.731	-1802.330	152928.000	0.012 [1] ✔
T2	175 - 166.667	Stainless P5x0.250	8.342	8.342	59.5 K=1.00	3.731	-4954.880	129561.000	0.038 [1] ✔
T3	166.667 - 158.333	Stainless P5x0.250	8.342	8.342	59.5 K=1.00	3.731	-9673.940	129561.000	0.075 [1] ✔
T4	158.333 - 150	Stainless P5x0.250	8.342	8.342	59.5 K=1.00	3.731	-19759.600	129561.000	0.153 [1] ✔
T5	150 - 125	Stainless P5x0.300	25.027	4.171	30.1 K=1.00	4.430	-66562.102	186589.000	0.357 [1] ✔
T6	125 - 100	Stainless P5x0.400	25.027	4.171	30.7 K=1.00	5.781	-145807.000	242845.000	0.600 [1] ✔
T7	100 - 91.6667	Stainless P5x0.500	8.342	4.171	31.3 K=1.00	7.069	-173809.000	296141.000	0.587 [1] ✔
T8	91.6667 - 83.3333	1/3 Pipe w/ 5"x0.5 Stainless	8.342	4.171	32.1 K=1.00	9.027	-202397.000	320254.000	0.632 [1] ✔
T9	83.3333 - 75	1/3 Pipe w/ 5"x0.5 Stainless	8.342	4.171	32.1 K=1.00	9.027	-231113.000	320254.000	0.722 [1] ✔
T10	75 - 50	Stainless P6.875x0.400	25.027	6.257	32.7 K=1.00	8.137	-302761.000	399956.000	0.757 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T11	50 - 37.5	Stainless P6.875x0.500	12.513	6.257	33.2 K=1.00	10.014	-347866.000	490874.000	0.709 [1]
T12	37.5 - 25	Stainless P6.875x0.500	12.513	6.257	33.2 K=1.00	10.014	-392812.000	490874.000	0.800 [1]
T13	25 - 12.5	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)	12.513	6.257	34.1 K=1.00	12.366	-438510.000	511227.000	0.858 [1]
T14	12.5 - 0	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)	12.513	6.257	34.1 K=1.00	12.366	-485456.000	511227.000	0.950 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	2L2 1/2x2x3/16x3/8	7.434	6.882	113.4 K=1.00	1.620	-1690.660	26679.199	0.063 [1]
T2	175 - 166.667	2L2 1/2x2x3/16x3/8	10.174	9.540	156.4 K=1.00	1.620	-5171.970	14958.200	0.346 [1]
T3	166.667 - 158.333	2L2 1/2x2x3/16x3/8	10.369	9.748	159.7 K=1.00	1.620	-7640.640	14354.500	0.532 [1]
T4	158.333 - 150	2L2 1/2x2x3/16x3/8	10.570	9.961	163.0 K=1.00	1.620	-9156.810	13771.600	0.665 [1]
T5	150 - 125	2L2 1/2x2x5/16x3/8	11.213	10.631	156.4 K=1.00	2.620	-20455.199	24195.801	0.845 [1]
T6	125 - 100	2L3x2 1/2x1/4x3/8	11.905	11.343	150.5 K=1.00	2.630	-23214.400	26240.100	0.885 [1]
T7	100 - 91.6667	2L3x2 1/2x1/4x3/8	12.145	11.588	153.7 K=1.00	2.630	-23919.500	25166.100	0.950 [1]
T8	91.6667 - 83.3333	2L3x2 1/2x1/4x3/8	12.390	11.838	144.1 K=1.00	2.630	-24520.500	28622.100	0.857 [1]
T9	83.3333 - 75	2L3x2 1/2x1/4x3/8	12.639	12.091	147.1 K=1.00	2.630	-25390.699	27453.000	0.925 [1]
T10	75 - 50	2L3 1/2x3 1/2x5/16x3/8	16.327	15.611	150.6 K=1.00	4.180	-34314.199	41659.801	0.824 [1]
T11	50 - 37.5	2L 'a' > 60.591 in - 287 2L3 1/2x3x5/16x3/8	16.653	15.887	146.7 K=1.00	3.870	-34800.500	40610.699	0.857 [1]
T12	37.5 - 25	2L3 1/2x3 1/2x5/16x3/8	16.988	16.231	156.6 K=1.00	4.180	-35880.102	38515.000	0.932 [1]
T13	25 - 12.5	2L 'a' > 62.998 in - 367 2L3 1/2x3 1/2x5/16x3/8	17.330	16.583	145.4 K=1.00	4.180	-36599.301	44656.398	0.820 [1]
T14	12.5 - 0	2L3 1/2x3 1/2x5/16x3/8	17.680	16.942	148.5 K=1.00	4.180	-36969.602	42818.699	0.863 [1]

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	175 - 166.667	L2 1/2x2 1/2x3/16	11.000	5.094	122.7 K=0.99	0.902	-3014.540	13230.200	0.228 [1] ✔
T5	150 - 125	L3x2 1/2x1/4	14.333	6.760	145.7 K=0.95	1.310	-12759.200	13945.100	0.915 [1] ✔
T6	125 - 100	L3x3x5/16	16.333	7.760	149.1 K=0.94	1.780	-16240.400	18094.000	0.898 [1] ✔
T7	100 - 91.6667	2L3x3x1/4	17.000	8.094	104.4 K=1.00	2.880	-17021.199	52550.199	0.324 [1] ✔
T8	91.6667 - 83.3333	2L3x3x1/4	17.667	8.427	108.7 K=1.00	2.880	-17769.801	50073.898	0.355 [1] ✔
T9	83.3333 - 75	2L3x3x1/4	18.333	8.760	113.0 K=1.00	2.880	-18668.900	47621.500	0.392 [1] ✔
T10	75 - 50	L4x4x1/4	20.000	9.516	138.0 K=0.96	1.940	-20911.600	22997.699	0.909 [1] ✔
T11	50 - 37.5	L4x4x5/16	21.000	10.016	144.4 K=0.95	2.400	-21858.900	26009.400	0.840 [1] ✔
T13	25 - 12.5	L4x4x3/8	23.000	11.016	156.4 K=0.93	2.860	-23904.301	26405.100	0.905 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	L3x3x1/4	10.599	4.893	109.6 K=1.10	1.440	-1404.700	24791.500	0.057 [1] ✔
T3	166.667 - 158.333	L2 1/2x2 1/2x3/16	11.667	5.427	128.9 K=0.98	0.902	-4602.290	12194.200	0.377 [1] ✔
T4	158.333 - 150	L2 1/2x2 1/2x3/16	12.333	5.760	135.0 K=0.97	0.902	-5579.900	11179.200	0.499 [1] ✔
T12	37.5 - 25	2L4x4x1/4	22.000	10.516	100.9 K=1.00	3.880	-22956.199	72328.898	0.317 [1] ✔
T14	12.5 - 0	2L4x4x5/16	24.000	11.516	111.4 K=1.00	4.800	-24905.400	80880.398	0.308 [1] ✔

[1] P_u / ϕP_n controls

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T5	150 - 125	L2x2x3/16	3.583	3.375	111.4 K=1.08	0.715	-1662.380	12054.300	0.138 [1] ✔
T6	125 - 100	L2x2x3/16	4.083	3.875	119.0 K=1.01	0.715	-2528.690	10990.800	0.230 [1] ✔
T7	100 - 91.6667	L2x2x3/16	4.250	4.042	123.1 K=1.00	0.715	-3014.160	10433.000	0.289 [1] ✔
T8	91.6667 - 83.3333	L2x2x3/16	4.417	4.208	128.2 K=1.00	0.715	-3509.660	9755.500	0.360 [1] ✔
T9	83.3333 - 75	L2x2x3/16	4.583	4.375	133.2 K=1.00	0.715	-4007.660	9097.250	0.441 [1] ✔
T10	75 - 50	L2 1/2x2 1/2x3/16	5.000	4.714	117.1 K=1.03	0.902	-5251.660	14192.600	0.370 [1] ✔
T11	50 - 37.5	L2 1/2x2 1/2x3/16	5.250	4.964	120.3 K=1.00	0.902	-6033.880	13637.000	0.442 [1] ✔
T12	37.5 - 25	L2 1/2x2 1/2x3/16	5.500	5.214	126.4 K=1.00	0.902	-6813.230	12604.700	0.541 [1] ✔
T13	25 - 12.5	L2 1/2x2 1/2x3/16	5.750	5.464	132.4 K=1.00	0.902	-7605.810	11605.500	0.655 [1] ✔
T14	12.5 - 0	L2 1/2x2 1/2x3/16	6.000	5.714	138.5 K=1.00	0.902	-8418.330	10621.400	0.793 [1] ✔

[1] $P_u / \phi P_n$ controls

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T5	150 - 125	L2x2x3/16	5.389	5.061	154.1 K=1.00	0.715	-1252.490	6798.980	0.184 [1] ✔
T6	125 - 100	L2x2x3/16	5.719	5.415	164.9 K=1.00	0.715	-1770.900	5938.100	0.298 [1] ✔
T7	100 - 91.6667	L2x2x3/16	5.835	5.537	168.6 K=1.00	0.715	-2069.030	5679.480	0.364 [1] ✔
T8	91.6667 - 83.3333	L2x2x3/16	5.953	5.661	172.4 K=1.00	0.715	-2365.070	5433.940	0.435 [1] ✔
T9	83.3333 - 75	L2x2x3/16	6.073	5.786	176.2 K=1.00	0.715	-2654.970	5200.860	0.510 [1] ✔
T10	75 - 50	L2 1/2x2 1/2x3/16	7.851	7.378	178.9 K=1.00	0.902	-4123.340	6369.320	0.647 [1] ✔
T11	50 - 37.5	L2 1/2x2 1/2x3/16	8.005	7.547	183.0 K=1.00	0.902	-4600.240	6087.970	0.756 [1] ✔
T12	37.5 - 25	L2 1/2x2 1/2x3/16	8.164	7.718	187.1 K=1.00	0.902	-5056.460	5820.200	0.869 [1] ✔
T13	25 - 12.5	L3x3x1/4	8.327	7.893	160.0 K=1.00	1.440	-5507.050	12708.200	0.433 [1] ✔
T14	12.5 - 0	L3x3x1/4	8.494	8.071	163.6	1.440	-5958.680	12154.700	0.490 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
					K=1.00				✔

[1] P_u / ϕP_n controls

Inner Bracing Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T5	150 - 125	L2 1/2x2x3/16	7.167	7.167	201.4 K=1.00	0.809	-11.888	4505.540	0.003 [1] ✔
T6	125 - 100	L2 1/2x2x3/16	8.167	8.167	229.5 K=1.00	0.809	-14.283	3469.700	0.004 [1] ✔
T7	100 - 91.6667	L2 1/2x2x3/16	8.500	8.500	238.9 K=1.00	0.809	-20.942	3202.900	0.007 [1] ✔
T8	91.6667 - 83.3333	L2 1/2x2x3/16	8.833	8.833	248.2 K=1.00	0.809	-20.560	2965.740	0.007 [1] ✔
T9	83.3333 - 75	L2 1/2x2x3/16	9.167	9.167	257.6 K=1.00	0.809	-20.140	2753.970	0.007 [1] ✔
T10	75 - 50	KL/R > 250 (C) - 279 L2 1/2x2 1/2x3/16	10.000	10.000	242.4 K=1.00	0.902	-21.774	3467.320	0.006 [1] ✔
T11	50 - 37.5	L2 1/2x2 1/2x3/16	10.500	10.500	254.5 K=1.00	0.902	-21.545	3144.960	0.007 [1] ✔
T12	37.5 - 25	KL/R > 250 (C) - 357 L2 1/2x2 1/2x3/16	11.000	11.000	266.7 K=1.00	0.902	-406.190	2865.560	0.142 [1] ✔
T13	25 - 12.5	KL/R > 250 (C) - 384 L3x3x1/4	11.500	11.500	233.1 K=1.00	1.440	-22.422	5986.700	0.004 [1] ✔
T14	12.5 - 0	L3x3x1/4	12.000	12.000	243.2 K=1.00	1.440	-441.769	5498.200	0.080 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	Stainless P5x0.250	5.005	5.005	35.7	3.731	225.029	167879.000	0.001 [1] ✔
T2	175 - 166.667	Stainless P5x0.250	8.342	8.342	59.5	3.731	1509.180	167879.000	0.009 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T3	166.667 - 158.333	Stainless P5x0.250	8.342	8.342	59.5	3.731	7079.410	167879.000	0.042 [1]
T4	158.333 - 150	Stainless P5x0.250	8.342	8.342	59.5	3.731	15566.400	167879.000	0.093 [1]
T5	150 - 125	Stainless P5x0.300	25.027	4.171	30.1	4.430	53965.602	199334.000	0.271 [1]
T6	125 - 100	Stainless P5x0.400	25.027	4.171	30.7	5.781	125453.000	260124.000	0.482 [1]
T7	100 - 91.6667	Stainless P5x0.500	8.342	4.171	31.3	7.069	150800.000	318086.000	0.474 [1]
T8	91.6667 - 83.3333	1/3 Pipe w/ 5"x0.5 Stainless	8.342	4.171	32.1	9.027	176418.000	341202.000	0.517 [1]
T9	83.3333 - 75	1/3 Pipe w/ 5"x0.5 Stainless	8.342	4.171	32.1	9.027	201951.000	341202.000	0.592 [1]
T10	75 - 50	Stainless P6.875x0.400	25.027	6.257	32.7	8.137	265381.000	439383.000	0.604 [1]
T11	50 - 37.5	Stainless P6.875x0.500	12.513	6.257	33.2	10.014	305153.000	540747.000	0.564 [1]
T12	37.5 - 25	Stainless P6.875x0.500	12.513	6.257	33.2	10.014	344433.000	540747.000	0.637 [1]
T13	25 - 12.5	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)	12.513	6.257	34.1	12.366	383920.000	556467.000	0.690 [1]
T14	12.5 - 0	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)	12.513	6.257	34.1	12.366	424228.000	556467.000	0.762 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	2L2 1/2x2x3/16x3/8	7.434	6.882	108.2	0.969	1570.720	42147.398	0.037 [1]
T2	175 - 166.667	2L2 1/2x2x3/16x3/8	10.174	9.540	148.5	0.969	5065.640	42147.398	0.120 [1]
T3	166.667 - 158.333	2L2 1/2x2x3/16x3/8	10.369	9.748	151.6	0.969	7528.560	42147.398	0.179 [1]
T4	158.333 - 150	2L2 1/2x2x3/16x3/8	10.570	9.961	154.8	0.969	9038.080	42147.398	0.214 [1]
T5	150 - 125	2L2 1/2x2x5/16x3/8	11.213	10.631	138.0	1.555	20111.000	67635.703	0.297 [1]
T6	125 - 100	2L3x2 1/2x1/4x3/8	11.905	11.343	123.3	1.644	22757.900	71530.297	0.318 [1]
T7	100 - 91.6667	2L3x2 1/2x1/4x3/8	12.145	11.588	125.9	1.644	23394.500	71530.297	0.327 [1]
T8	91.6667 -	2L3x2 1/2x1/4x3/8	12.390	11.838	128.6	1.644	24006.400	71530.297	0.336 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
	83.3333								✔
T9	83.3333 - 75	2L3x2 1/2x1/4x3/8	12.639	12.091	131.3	1.644	24832.400	71530.297	0.347 [1]
									✔
T10	75 - 50	2L3 1/2x3 1/2x5/16x3/8	16.327	15.611	119.1	2.725	33519.801	132836.000	0.252 [1]
									✔
T11	50 - 37.5	2L 'a' > 60.591 in - 284 2L3 1/2x3x5/16x3/8	16.653	15.887	144.2	2.375	33984.398	103319.000	0.329 [1]
									✔
T12	37.5 - 25	2L3 1/2x3 1/2x5/16x3/8	16.988	16.231	124.2	2.608	34905.500	127123.000	0.275 [1]
									✔
T13	25 - 12.5	2L 'a' > 62.998 in - 364 2L3 1/2x3 1/2x5/16x3/8	17.330	16.583	126.9	2.608	35611.898	127123.000	0.280 [1]
									✔
T14	12.5 - 0	2L3 1/2x3 1/2x5/16x3/8	17.680	16.942	129.6	2.608	35907.801	127123.000	0.282 [1]
									✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	175 - 166.667	L2 1/2x2 1/2x3/16	11.000	5.094	122.4	0.571	3056.880	24839.900	0.123 [1]
									✔
T5	150 - 125	L3x2 1/2x1/4	14.333	6.760	111.1	0.842	12757.500	36621.602	0.348 [1]
									✔
T6	125 - 100	L3x3x5/16	16.333	7.760	103.6	1.159	16330.800	50426.000	0.324 [1]
									✔
T7	100 - 91.6667	2L3x3x1/4	17.000	8.094	107.0	1.879	17118.900	81725.602	0.209 [1]
									✔
T8	91.6667 - 83.3333	2L3x3x1/4	17.667	8.427	111.3	1.879	17917.600	81725.602	0.219 [1]
									✔
T9	83.3333 - 75	2L3x3x1/4	18.333	8.760	115.6	1.879	18845.301	81725.602	0.231 [1]
									✔
T10	75 - 50	L4x4x1/4	20.000	9.516	93.3	1.314	20996.699	57175.301	0.367 [1]
									✔
T11	50 - 37.5	L4x4x5/16	21.000	10.016	98.8	1.624	21976.900	79180.703	0.278 [1]
									✔
T13	25 - 12.5	L4x4x3/8	23.000	11.016	109.4	1.934	24105.301	94285.500	0.256 [1]
									✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 175	L3x3x1/4	10.599	4.893	98.5	0.939	1374.760	40862.801	0.034 [1] ✔
T3	166.667 - 158.333	L2 1/2x2 1/2x3/16	11.667	5.427	130.1	0.571	4534.150	24839.900	0.183 [1] ✔
T4	158.333 - 150	L2 1/2x2 1/2x3/16	12.333	5.760	137.9	0.571	5624.950	24839.900	0.226 [1] ✔
T12	37.5 - 25	2L4x4x1/4	22.000	10.516	102.8	2.629	23081.801	114351.000	0.202 [1] ✔
T14	12.5 - 0	2L4x4x5/16	24.000	11.516	113.4	3.248	25048.000	141307.000	0.177 [1] ✔

[1] P_u / ϕP_n controls

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T5	150 - 125	L2x2x3/16	3.583	3.375	65.6	0.715	1666.220	23166.000	0.072 [1] ✔
T6	125 - 100	L2x2x3/16	4.083	3.875	75.4	0.715	2528.690	23166.000	0.109 [1] ✔
T7	100 - 91.6667	L2x2x3/16	4.250	4.042	78.6	0.715	3014.160	23166.000	0.130 [1] ✔
T8	91.6667 - 83.3333	L2x2x3/16	4.417	4.208	81.8	0.715	3509.660	23166.000	0.152 [1] ✔
T9	83.3333 - 75	L2x2x3/16	4.583	4.375	┼ ┼	0.715	4007.660	23166.000	0.173 [1] ✔
T10	75 - 50	L2 1/2x2 1/2x3/16	5.000	4.714	72.7	0.902	5251.660	29224.801	0.180 [1] ✔
T11	50 - 37.5	L2 1/2x2 1/2x3/16	5.250	4.964	76.6	0.902	6033.880	29224.801	0.206 [1] ✔
T12	37.5 - 25	L2 1/2x2 1/2x3/16	5.500	5.214	80.4	0.902	6813.230	29224.801	0.233 [1] ✔
T13	25 - 12.5	L2 1/2x2 1/2x3/16	5.750	5.464	84.3	0.902	7605.810	29224.801	0.260 [1] ✔
T14	12.5 - 0	L2 1/2x2 1/2x3/16	6.000	5.714	88.1	0.902	8418.330	29224.801	0.288 [1] ✔

[1] P_u / ϕP_n controls

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T5	150 - 125	L2x2x3/16	5.389	5.061	98.4	0.715	1244.820	23166.000	0.054 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T6	125 - 100	L2x2x3/16	5.496	5.192	101.0	0.715	1853.160	23166.000	0.080 [1]
T7	100 - 91.6667	L2x2x3/16	5.835	5.537	107.7	0.715	2069.030	23166.000	0.089 [1]
T8	91.6667 - 83.3333	L2x2x3/16	5.953	5.661	110.1	0.715	2365.070	23166.000	0.102 [1]
T9	83.3333 - 75	L2x2x3/16	6.073	5.786	112.5	0.715	2654.970	23166.000	0.115 [1]
T10	75 - 50	L2 1/2x2 1/2x3/16	7.703	7.230	111.5	0.902	4258.170	29224.801	0.146 [1]
T11	50 - 37.5	L2 1/2x2 1/2x3/16	8.005	7.547	116.4	0.902	4600.240	29224.801	0.157 [1]
T12	37.5 - 25	L2 1/2x2 1/2x3/16	8.164	7.718	119.1	0.902	5056.460	29224.801	0.173 [1]
T13	25 - 12.5	L3x3x1/4	8.327	7.893	101.8	1.440	5507.050	46656.000	0.118 [1]
T14	12.5 - 0	L3x3x1/4	8.494	8.071	104.1	1.440	5958.680	46656.000	0.128 [1]

[1] P_u / ϕP_n controls

Inner Bracing Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T5	150 - 125	L2 1/2x2x3/16	7.167	7.167	143.4	0.809	5.599	26211.600	0.000 [1]
T6	125 - 100	L2 1/2x2x3/16	7.500	7.500	150.1	0.809	8.522	26211.600	0.000 [1]
T7	100 - 91.6667	L2 1/2x2x3/16	8.500	8.500	170.1	0.809	14.784	26211.600	0.001 [1]
T8	91.6667 - 83.3333	L2 1/2x2x3/16	8.833	8.833	176.7	0.809	14.267	26211.600	0.001 [1]
T9	83.3333 - 75	L2 1/2x2x3/16	9.167	9.167	183.4	0.809	13.736	26211.600	0.001 [1]
T10	75 - 50	L2 1/2x2 1/2x3/16	9.500	9.500	146.5	0.902	12.722	29224.801	0.000 [1]
T11	50 - 37.5	L2 1/2x2 1/2x3/16	10.500	10.500	162.0	0.902	10.463	29224.801	0.000 [1]
T12	37.5 - 25	L2 1/2x2 1/2x3/16	11.000	11.000	169.7	0.902	392.714	29224.801	0.013 [1]
T13	25 - 12.5	L3x3x1/4	11.500	11.500	148.4	1.440	7.797	46656.000	0.000 [1]
T14	12.5 - 0	L3x3x1/4	12.000	12.000	154.8	1.440	425.287	46656.000	0.009 [1]

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	180 - 175	Leg	Stainless P5x0.250	1	-1802.330	152928.000	1.2	Pass
		Leg	Stainless P5x0.250	2	-1274.020	152928.000	1.3	Pass
		Leg	Stainless P5x0.250	3	-1769.490	152928.000	1.5	Pass
T2	175 - 166.667	Leg	Stainless P5x0.250	13	-4954.880	129561.000	3.8	Pass
		Leg	Stainless P5x0.250	14	-2648.620	129561.000	2.0	Pass
		Leg	Stainless P5x0.250	15	-3807.990	129561.000	2.9	Pass
T3	166.667 - 158.333	Leg	Stainless P5x0.250	25	-9673.940	129561.000	7.5	Pass
		Leg	Stainless P5x0.250	26	-9574.750	129561.000	7.4	Pass
		Leg	Stainless P5x0.250	27	-9462.450	129561.000	7.3	Pass
T4	158.333 - 150	Leg	Stainless P5x0.250	37	-19740.500	129561.000	15.2	Pass
		Leg	Stainless P5x0.250	38	-19759.600	129561.000	15.3	Pass
		Leg	Stainless P5x0.250	39	-19228.301	129561.000	14.8	Pass
T5	150 - 125	Leg	Stainless P5x0.300	49	-66562.102	186589.000	35.7	Pass
		Leg	Stainless P5x0.300	50	-66349.102	186589.000	35.6	Pass
		Leg	Stainless P5x0.300	51	-65591.398	186589.000	35.2	Pass
T6	125 - 100	Leg	Stainless P5x0.400	124	-145807.000	242845.000	60.0	Pass
		Leg	Stainless P5x0.400	125	-145462.000	242845.000	59.9	Pass
		Leg	Stainless P5x0.400	126	-144415.000	242845.000	59.5	Pass
T7	100 - 91.6667	Leg	Stainless P5x0.500	199	-173809.000	296141.000	58.7	Pass
		Leg	Stainless P5x0.500	200	-173464.000	296141.000	58.6	Pass
		Leg	Stainless P5x0.500	201	-172358.000	296141.000	58.2	Pass
T8	91.6667 - 83.3333	Leg	1/3 Pipe w/ 5"x0.5 Stainless	226	-202397.000	320254.000	63.2	Pass
		Leg	1/3 Pipe w/ 5"x0.5 Stainless	227	-202052.000	320254.000	63.1	Pass
		Leg	1/3 Pipe w/ 5"x0.5 Stainless	228	-200892.000	320254.000	62.7	Pass
T9	83.3333 - 75	Leg	1/3 Pipe w/ 5"x0.5 Stainless	253	-231113.000	320254.000	72.2	Pass
		Leg	1/3 Pipe w/ 5"x0.5 Stainless	254	-230662.000	320254.000	72.0	Pass
		Leg	1/3 Pipe w/ 5"x0.5 Stainless	255	-229455.000	320254.000	71.6	Pass
T10	75 - 50	Leg	Stainless P6.875x0.400	280	-302761.000	399956.000	75.7	Pass
		Leg	Stainless P6.875x0.400	281	-302312.000	399956.000	75.6	Pass
		Leg	Stainless P6.875x0.400	282	-301011.000	399956.000	75.3	Pass
T11	50 - 37.5	Leg	Stainless P6.875x0.500	331	-347866.000	490874.000	70.9 71.9 (b)	Pass
		Leg	Stainless P6.875x0.500	332	-347427.000	490874.000	70.8 72.0 (b)	Pass
		Leg	Stainless P6.875x0.500	333	-346074.000	490874.000	70.5 71.7 (b)	Pass
T12	37.5 - 25	Leg	Stainless P6.875x0.500	358	-392812.000	490874.000	80.0	Pass
		Leg	Stainless P6.875x0.500	359	-392354.000	490874.000	79.9	Pass
		Leg	Stainless P6.875x0.500	360	-390947.000	490874.000	79.6	Pass
T13	25 - 12.5	Leg	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)	385	-438510.000	511227.000	85.8 90.5 (b)	Pass
		Leg	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)	386	-437896.000	511227.000	85.7 90.5 (b)	Pass
		Leg	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)	387	-436439.000	511227.000	85.4 90.2 (b)	Pass
T14	12.5 - 0	Leg	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)	412	-485456.000	511227.000	95.0	Pass
		Leg	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT	413	-484840.000	511227.000	94.8	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
			MOD)					
		Leg	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)	414	-483326.000	511227.000	94.5	Pass
T1	180 - 175	Diagonal	2L2 1/2x2x3/16x3/8	7	-963.679	26679.199	3.6 4.7 (b)	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	8	-956.555	26679.199	3.6 4.7 (b)	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	9	-1690.660	26679.199	6.3 8.7 (b)	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	10	-1680.590	26679.199	6.3 8.8 (b)	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	11	-1280.810	26679.199	4.8 6.5 (b)	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	12	-1292.650	26679.199	4.8 6.5 (b)	Pass
T2	175 - 166.667	Diagonal	2L2 1/2x2x3/16x3/8	17	-3592.490	14958.200	24.0	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	18	-3722.460	14958.200	24.9	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	20	-3865.220	14958.200	25.8	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	21	-3779.260	14958.200	25.3	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	23	-5169.980	14958.200	34.6	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	24	-5171.970	14958.200	34.6	Pass
T3	166.667 - 158.333	Diagonal	2L2 1/2x2x3/16x3/8	31	-6522.560	14354.500	45.4	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	32	-6549.940	14354.500	45.6	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	33	-5953.030	14354.500	41.5	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	34	-5855.310	14354.500	40.8	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	35	-7640.640	14354.500	53.2	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	36	-7633.190	14354.500	53.2	Pass
T4	158.333 - 150	Diagonal	2L2 1/2x2x3/16x3/8	43	-9138.720	13771.600	66.4	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	44	-9156.810	13771.600	66.5	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	45	-7429.030	13771.600	53.9	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	46	-7429.910	13771.600	54.0	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	47	-8807.500	13771.600	64.0	Pass
		Diagonal	2L2 1/2x2x3/16x3/8	48	-8788.540	13771.600	63.8	Pass
T5	150 - 125	Diagonal	2L2 1/2x2x5/16x3/8	53	-20441.301	24195.801	84.5	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	56	-20455.199	24195.801	84.5	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	60	-18104.100	24195.801	74.8	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	63	-18098.900	24195.801	74.8	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	67	-20021.000	24195.801	82.7	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	70	-20012.301	24195.801	82.7	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	77	-16003.700	24953.000	64.1	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	80	-16018.000	24953.000	64.2	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	84	-13808.100	24953.000	55.3	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	87	-13803.700	24953.000	55.3	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	91	-15501.000	24953.000	62.1	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	94	-15491.100	24953.000	62.1	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	101	-11031.200	25720.400	42.9	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	104	-11040.400	25720.400	42.9	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	108	-8979.450	25720.400	34.9	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	111	-8978.470	25720.400	34.9	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	115	-10492.000	25720.400	40.8	Pass
		Diagonal	2L2 1/2x2x5/16x3/8	118	-10483.800	25720.400	40.8	Pass
T6	125 - 100	Diagonal	2L3x2 1/2x1/4x3/8	128	-23202.600	26240.100	88.4 90.2 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	131	-23214.400	26240.100	88.5 90.2 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	135	-20587.500	26240.100	78.5 79.8 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	138	-20584.900	26240.100	78.4 79.8 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Diagonal	2L3x2 1/2x1/4x3/8	142	-22520.100	26240.100	85.8 87.4 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	145	-22511.000	26240.100	85.8 87.5 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	152	-22196.301	26950.199	82.4 86.3 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	155	-22211.301	26950.199	82.4 86.3 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	159	-19546.600	26950.199	72.5 75.8 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	162	-19542.699	26950.199	72.5 75.7 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	166	-21720.000	26950.199	80.6 84.3 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	169	-21708.900	26950.199	80.6 84.4 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	176	-21150.100	27668.301	76.4 82.3 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	179	-21162.900	27668.301	76.5 82.2 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	183	-18577.000	27668.301	67.1 72.0 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	186	-18576.500	27668.301	67.1 72.0 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	190	-20734.000	27668.301	74.9 80.5 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	193	-20721.801	27668.301	74.9 80.6 (b)	Pass
T7	100 - 91.6667	Diagonal	2L3x2 1/2x1/4x3/8	203	-23908.801	25166.100	95.0	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	206	-23919.500	25166.100	95.0	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	210	-21307.400	25166.100	84.7	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	213	-21304.600	25166.100	84.7	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	217	-23285.900	25166.100	92.5	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	220	-23277.900	25166.100	92.5	Pass
T8	91.6667 - 83.3333	Diagonal	2L3x2 1/2x1/4x3/8	230	-24510.699	28622.100	85.6 95.2 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	233	-24520.500	28622.100	85.7 95.1 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	237	-21933.100	28622.100	76.6 84.8 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	240	-21930.500	28622.100	76.6 84.8 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	244	-23944.400	28622.100	83.7 92.7 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	247	-23937.199	28622.100	83.6 92.8 (b)	Pass
T9	83.3333 - 75	Diagonal	2L3x2 1/2x1/4x3/8	257	-25381.500	27453.000	92.5 98.4 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	260	-25390.699	27453.000	92.5 98.4 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	264	-22854.301	27453.000	83.2 88.1 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	267	-22797.301	27453.000	83.0 88.0 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	271	-24865.500	27453.000	90.6 96.2 (b)	Pass
		Diagonal	2L3x2 1/2x1/4x3/8	274	-24860.801	27453.000	90.6 96.2 (b)	Pass
T10	75 - 50	Diagonal	2L3 1/2x3 1/2x5/16x3/8	284	-34303.602	41659.801	82.3 94.8 (b)	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	287	-34314.199	41659.801	82.4	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
							94.8 (b)	
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	291	-31111.900	41659.801	74.7	Pass
							85.0 (b)	
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	294	-30831.500	41659.801	74.0	Pass
							85.0 (b)	
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	298	-33803.102	41659.801	81.1	Pass
							93.4 (b)	
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	301	-33801.801	41659.801	81.1	Pass
							93.4 (b)	
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	308	-33285.699	42697.699	78.0	Pass
							92.1 (b)	
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	311	-33298.102	42697.699	78.0	Pass
							92.1 (b)	
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	315	-30006.400	42697.699	70.3	Pass
							82.3 (b)	
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	318	-29818.699	42697.699	69.8	Pass
							82.3 (b)	
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	322	-32727.000	42697.699	76.6	Pass
							90.5 (b)	
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	325	-32722.801	42697.699	76.6	Pass
							90.6 (b)	
T11	50 - 37.5	Diagonal	2L3 1/2x3x5/16x3/8	335	-34791.199	40610.699	85.7	Pass
		Diagonal	2L3 1/2x3x5/16x3/8	338	-34800.500	40610.699	85.7	Pass
		Diagonal	2L3 1/2x3x5/16x3/8	342	-31679.000	40610.699	78.0	Pass
		Diagonal	2L3 1/2x3x5/16x3/8	345	-31353.699	40610.699	77.2	Pass
		Diagonal	2L3 1/2x3x5/16x3/8	349	-34345.398	40610.699	84.6	Pass
		Diagonal	2L3 1/2x3x5/16x3/8	352	-34345.102	40610.699	84.6	Pass
T12	37.5 - 25	Diagonal	2L3 1/2x3 1/2x5/16x3/8	364	-35871.898	38515.000	93.1	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	367	-35880.102	38515.000	93.2	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	370	-32711.900	38515.000	84.9	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	373	-32359.199	38515.000	84.0	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	376	-35463.301	38515.000	92.1	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	379	-35464.199	38515.000	92.1	Pass
T13	25 - 12.5	Diagonal	2L3 1/2x3 1/2x5/16x3/8	389	-36587.102	44656.398	81.9	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	392	-36599.301	44656.398	82.0	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	396	-33271.500	44656.398	74.5	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	399	-32864.398	44656.398	73.6	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	403	-36216.000	44656.398	81.1	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	406	-36213.000	44656.398	81.1	Pass
T14	12.5 - 0	Diagonal	2L3 1/2x3 1/2x5/16x3/8	418	-36955.898	42818.699	86.3	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	421	-36969.602	42818.699	86.3	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	424	-33423.500	42818.699	78.1	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	427	-33180.801	42818.699	77.5	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	430	-36602.602	42818.699	85.5	Pass
		Diagonal	2L3 1/2x3 1/2x5/16x3/8	433	-36594.602	42818.699	85.5	Pass
T2	175 - 166.667	Horizontal	L2 1/2x2 1/2x3/16	16	-2495.120	13230.200	18.9	Pass
		Horizontal	L2 1/2x2 1/2x3/16	19	-2534.430	13230.200	19.2	Pass
		Horizontal	L2 1/2x2 1/2x3/16	22	-3014.540	13230.200	22.8	Pass
T5	150 - 125	Horizontal	L3x2 1/2x1/4	52	-12759.200	13945.100	91.5	Pass
		Horizontal	L3x2 1/2x1/4	59	-11399.500	13945.100	81.7	Pass
		Horizontal	L3x2 1/2x1/4	66	-12477.300	13945.100	89.5	Pass
		Horizontal	L3x2 1/2x1/4	76	-9953.860	15119.700	65.8	Pass
		Horizontal	L3x2 1/2x1/4	83	-8597.000	15119.700	56.9	Pass
		Horizontal	L3x2 1/2x1/4	90	-9728.490	15119.700	64.3	Pass
		Horizontal	L3x2 1/2x1/4	100	-6696.360	16449.100	40.7	Pass
		Horizontal	L3x2 1/2x1/4	107	-5363.980	16449.100	32.6	Pass
		Horizontal	L3x2 1/2x1/4	114	-6317.360	16449.100	38.4	Pass
T6	125 - 100	Horizontal	L3x3x5/16	127	-16240.400	18094.000	89.8	Pass
		Horizontal	L3x3x5/16	134	-14293.500	18094.000	79.0	Pass
		Horizontal	L3x3x5/16	141	-15715.800	18094.000	86.9	Pass
		Horizontal	L3x3x5/16	151	-15245.500	19418.801	78.5	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Horizontal	L3x3x5/16	158	-13301.200	19418.801	68.5	Pass
		Horizontal	L3x3x5/16	165	-14905.800	19418.801	76.8	Pass
		Horizontal	L3x3x5/16	175	-14230.900	20894.600	68.1	Pass
		Horizontal	L3x3x5/16	182	-12475.100	20894.600	59.7	Pass
		Horizontal	L3x3x5/16	189	-13945.200	20894.600	66.7	Pass
T7	100 - 91.6667	Horizontal	2L3x3x1/4	202	-17021.199	52550.199	32.4	Pass
							41.7 (b)	
		Horizontal	2L3x3x1/4	209	-15041.900	52550.199	28.6	Pass
							36.9 (b)	
		Horizontal	2L3x3x1/4	216	-16539.600	52550.199	31.5	Pass
							40.5 (b)	
T8	91.6667 - 83.3333	Horizontal	2L3x3x1/4	229	-17769.801	50073.898	35.5	Pass
							43.6 (b)	
		Horizontal	2L3x3x1/4	236	-15763.600	50073.898	31.5	Pass
							38.8 (b)	
		Horizontal	2L3x3x1/4	243	-17323.000	50073.898	34.6	Pass
							42.6 (b)	
T9	83.3333 - 75	Horizontal	2L3x3x1/4	256	-18668.900	47621.500	39.2	Pass
							45.9 (b)	
		Horizontal	2L3x3x1/4	263	-16628.801	47621.500	34.9	Pass
							40.9 (b)	
		Horizontal	2L3x3x1/4	270	-18254.600	47621.500	38.3	Pass
							44.9 (b)	
T10	75 - 50	Horizontal	L4x4x1/4	283	-20911.600	22997.699	90.9	Pass
		Horizontal	L4x4x1/4	290	-18718.000	22997.699	81.4	Pass
		Horizontal	L4x4x1/4	297	-20575.600	22997.699	89.5	Pass
		Horizontal	L4x4x1/4	307	-19921.301	24933.100	79.9	Pass
							86.3 (b)	
		Horizontal	L4x4x1/4	314	-17730.400	24933.100	71.1	Pass
							76.7 (b)	
		Horizontal	L4x4x1/4	321	-19554.000	24933.100	78.4	Pass
							84.7 (b)	
T11	50 - 37.5	Horizontal	L4x4x5/16	334	-21858.900	26009.400	84.0	Pass
		Horizontal	L4x4x5/16	341	-19581.301	26009.400	75.3	Pass
		Horizontal	L4x4x5/16	348	-21550.801	26009.400	82.9	Pass
T13	25 - 12.5	Horizontal	L4x4x3/8	388	-23904.301	26405.100	90.5	Pass
		Horizontal	L4x4x3/8	395	-21339.000	26405.100	80.8	Pass
		Horizontal	L4x4x3/8	402	-23635.400	26405.100	89.5	Pass
T1	180 - 175	Top Girt	L3x3x1/4	4	-911.014	24791.500	3.7	Pass
							4.4 (b)	
		Top Girt	L3x3x1/4	5	-1404.700	24791.500	5.7	Pass
							6.7 (b)	
		Top Girt	L3x3x1/4	6	-1175.680	24791.500	4.7	Pass
							5.6 (b)	
T3	166.667 - 158.333	Top Girt	L2 1/2x2 1/2x3/16	28	-4266.340	12194.200	35.0	Pass
		Top Girt	L2 1/2x2 1/2x3/16	29	-3795.030	12194.200	31.1	Pass
		Top Girt	L2 1/2x2 1/2x3/16	30	-4602.290	12194.200	37.7	Pass
T4	158.333 - 150	Top Girt	L2 1/2x2 1/2x3/16	40	-5579.900	11179.200	49.9	Pass
		Top Girt	L2 1/2x2 1/2x3/16	41	-4609.630	11179.200	41.2	Pass
		Top Girt	L2 1/2x2 1/2x3/16	42	-5375.630	11179.200	48.1	Pass
T12	37.5 - 25	Top Girt	2L4x4x1/4	361	-22956.199	72328.898	31.7	Pass
							49.6 (b)	
		Top Girt	2L4x4x1/4	362	-20607.500	72328.898	28.5	Pass
							44.4 (b)	
		Top Girt	2L4x4x1/4	363	-22668.600	72328.898	31.3	Pass
							49.0 (b)	
T14	12.5 - 0	Top Girt	2L4x4x5/16	415	-24905.400	80880.398	30.8	Pass
							43.1 (b)	
		Top Girt	2L4x4x5/16	416	-22431.801	80880.398	27.7	Pass
							38.3 (b)	

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Top Girt	2L4x4x5/16	417	-24642.199	80880.398	30.5 42.7 (b)	Pass
T5	150 - 125	Redund Horz 1 Bracing	L2x2x3/16	54	-1599.880	12054.300	13.3	Pass
		Redund Horz 1 Bracing	L2x2x3/16	57	-1594.220	12054.300	13.2	Pass
		Redund Horz 1 Bracing	L2x2x3/16	61	-1662.380	12054.300	13.8	Pass
		Redund Horz 1 Bracing	L2x2x3/16	64	-1651.830	12054.300	13.7	Pass
		Redund Horz 1 Bracing	L2x2x3/16	68	-1622.170	12054.300	13.5	Pass
		Redund Horz 1 Bracing	L2x2x3/16	71	-1638.380	12054.300	13.6	Pass
		Redund Horz 1 Bracing	L2x2x3/16	78	-1165.880	12414.300	9.4	Pass
		Redund Horz 1 Bracing	L2x2x3/16	81	-1160.940	12414.300	9.4	Pass
		Redund Horz 1 Bracing	L2x2x3/16	85	-1214.720	12414.300	9.8	Pass
		Redund Horz 1 Bracing	L2x2x3/16	88	-1197.000	12414.300	9.6	Pass
		Redund Horz 1 Bracing	L2x2x3/16	92	-1195.710	12414.300	9.6	Pass
		Redund Horz 1 Bracing	L2x2x3/16	95	-1217.900	12414.300	9.8	Pass
		Redund Horz 1 Bracing	L2x2x3/16	102	-1155.380	12776.400	9.0	Pass
		Redund Horz 1 Bracing	L2x2x3/16	105	-1151.360	12776.400	9.0	Pass
		Redund Horz 1 Bracing	L2x2x3/16	109	-1151.360	12776.400	9.0	Pass
		Redund Horz 1 Bracing	L2x2x3/16	112	-1138.330	12776.400	8.9	Pass
		Redund Horz 1 Bracing	L2x2x3/16	116	-1138.330	12776.400	8.9	Pass
		Redund Horz 1 Bracing	L2x2x3/16	119	-1155.380	12776.400	9.0	Pass
T6	125 - 100	Redund Horz 1 Bracing	L2x2x3/16	129	-2528.690	10990.800	23.0	Pass
		Redund Horz 1 Bracing	L2x2x3/16	132	-2522.700	10990.800	23.0	Pass
		Redund Horz 1 Bracing	L2x2x3/16	136	-2522.700	10990.800	23.0	Pass
		Redund Horz 1 Bracing	L2x2x3/16	139	-2504.540	10990.800	22.8	Pass
		Redund Horz 1 Bracing	L2x2x3/16	143	-2504.540	10990.800	22.8	Pass
		Redund Horz 1 Bracing	L2x2x3/16	146	-2528.690	10990.800	23.0	Pass
		Redund Horz 1 Bracing	L2x2x3/16	153	-2528.690	11342.100	22.3	Pass
		Redund Horz 1 Bracing	L2x2x3/16	156	-2522.700	11342.100	22.2	Pass
		Redund Horz 1 Bracing	L2x2x3/16	160	-2522.700	11342.100	22.2	Pass
		Redund Horz 1 Bracing	L2x2x3/16	163	-2504.540	11342.100	22.1	Pass
		Redund Horz 1 Bracing	L2x2x3/16	167	-2504.540	11342.100	22.1	Pass
		Redund Horz 1	L2x2x3/16	170	-2528.690	11342.100	22.3	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Bracing						
		Redund Horz 1	L2x2x3/16	177	-2528.690	11696.700	21.6	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	180	-2522.700	11696.700	21.6	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	184	-2522.700	11696.700	21.6	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	187	-2504.540	11696.700	21.4	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	191	-2504.540	11696.700	21.4	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	194	-2528.690	11696.700	21.6	Pass
		Bracing						
T7	100 - 91.6667	Redund Horz 1	L2x2x3/16	204	-3014.160	10433.000	28.9	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	207	-3008.170	10433.000	28.8	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	211	-3008.170	10433.000	28.8	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	214	-2988.990	10433.000	28.6	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	218	-2988.990	10433.000	28.6	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	221	-3014.160	10433.000	28.9	Pass
		Bracing						
T8	91.6667 - 83.3333	Redund Horz 1	L2x2x3/16	231	-3509.660	9755.500	36.0	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	234	-3503.680	9755.500	35.9	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	238	-3503.680	9755.500	35.9	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	241	-3483.570	9755.500	35.7	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	245	-3483.570	9755.500	35.7	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	248	-3509.660	9755.500	36.0	Pass
		Bracing						
T9	83.3333 - 75	Redund Horz 1	L2x2x3/16	258	-4007.660	9097.250	44.1	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	261	-3999.860	9097.250	44.0	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	265	-3999.860	9097.250	44.0	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	268	-3978.910	9097.250	43.7	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	272	-3978.910	9097.250	43.7	Pass
		Bracing						
		Redund Horz 1	L2x2x3/16	275	-4007.660	9097.250	44.1	Pass
		Bracing						
T10	75 - 50	Redund Horz 1	L2 1/2x2 1/2x3/16	285	-5251.660	14192.600	37.0	Pass
		Bracing						
		Redund Horz 1	L2 1/2x2 1/2x3/16	288	-5244.010	14192.600	36.9	Pass
		Bracing						
		Redund Horz 1	L2 1/2x2 1/2x3/16	292	-5244.010	14192.600	36.9	Pass
		Bracing						
		Redund Horz 1	L2 1/2x2 1/2x3/16	295	-5221.580	14192.600	36.8	Pass
		Bracing						
		Redund Horz 1	L2 1/2x2 1/2x3/16	299	-5221.580	14192.600	36.8	Pass
		Bracing						
		Redund Horz 1	L2 1/2x2 1/2x3/16	302	-5251.660	14192.600	37.0	Pass
		Bracing						

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	309	-5251.660	14725.900	35.7	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	312	-5244.010	14725.900	35.6	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	316	-5244.010	14725.900	35.6	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	319	-5221.580	14725.900	35.5	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	323	-5221.580	14725.900	35.5	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	326	-5251.660	14725.900	35.7	Pass
T11	50 - 37.5	Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	336	-6033.880	13637.000	44.2	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	339	-6026.280	13637.000	44.2	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	343	-6026.280	13637.000	44.2	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	346	-6002.800	13637.000	44.0	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	350	-6002.800	13637.000	44.0	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	353	-6033.880	13637.000	44.2	Pass
T12	37.5 - 25	Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	365	-6813.230	12604.700	54.1	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	368	-6805.280	12604.700	54.0	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	371	-6805.280	12604.700	54.0	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	374	-6780.880	12604.700	53.8	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	377	-6780.880	12604.700	53.8	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	380	-6813.230	12604.700	54.1	Pass
T13	25 - 12.5	Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	390	-7605.810	11605.500	65.5	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	393	-7595.180	11605.500	65.4	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	397	-7595.180	11605.500	65.4	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	400	-7569.900	11605.500	65.2	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	404	-7569.900	11605.500	65.2	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	407	-7605.810	11605.500	65.5	Pass
T14	12.5 - 0	Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	419	-8418.330	10621.400	79.3	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	422	-8407.660	10621.400	79.2	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	425	-8407.660	10621.400	79.2	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	428	-8381.390	10621.400	78.9	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	431	-8381.390	10621.400	78.9	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x3/16	434	-8418.330	10621.400	79.3	Pass
T5	150 - 125	Redund Diag 1	L2x2x3/16	55	-1193.540	6798.980	17.6	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Bracing Redund Diag 1	L2x2x3/16	58	-1189.350	6798.980	17.5	Pass
		Bracing Redund Diag 1	L2x2x3/16	62	-1252.490	6798.980	18.4	Pass
		Bracing Redund Diag 1	L2x2x3/16	65	-1236.390	6798.980	18.2	Pass
		Bracing Redund Diag 1	L2x2x3/16	69	-1210.660	6798.980	17.8	Pass
		Bracing Redund Diag 1	L2x2x3/16	72	-1227.510	6798.980	18.1	Pass
		Bracing Redund Diag 1	L2x2x3/16	79	-893.616	7087.540	12.6	Pass
		Bracing Redund Diag 1	L2x2x3/16	82	-890.505	7087.540	12.6	Pass
		Bracing Redund Diag 1	L2x2x3/16	86	-945.600	7087.540	13.3	Pass
		Bracing Redund Diag 1	L2x2x3/16	89	-920.888	7087.540	13.0	Pass
		Bracing Redund Diag 1	L2x2x3/16	93	-916.765	7087.540	12.9	Pass
		Bracing Redund Diag 1	L2x2x3/16	96	-938.620	7087.540	13.2	Pass
		Bracing Redund Diag 1	L2x2x3/16	103	-921.522	7384.910	12.5	Pass
		Bracing Redund Diag 1	L2x2x3/16	106	-918.313	7384.910	12.4	Pass
		Bracing Redund Diag 1	L2x2x3/16	110	-918.313	7384.910	12.4	Pass
		Bracing Redund Diag 1	L2x2x3/16	113	-907.917	7384.910	12.3	Pass
		Bracing Redund Diag 1	L2x2x3/16	117	-907.917	7384.910	12.3	Pass
		Bracing Redund Diag 1	L2x2x3/16	120	-921.522	7384.910	12.5	Pass
T6	125 - 100	Bracing Redund Diag 1	L2x2x3/16	130	-1770.900	5938.100	29.8	Pass
		Bracing Redund Diag 1	L2x2x3/16	133	-1766.710	5938.100	29.8	Pass
		Bracing Redund Diag 1	L2x2x3/16	137	-1766.710	5938.100	29.8	Pass
		Bracing Redund Diag 1	L2x2x3/16	140	-1753.990	5938.100	29.5	Pass
		Bracing Redund Diag 1	L2x2x3/16	144	-1753.990	5938.100	29.5	Pass
		Bracing Redund Diag 1	L2x2x3/16	147	-1770.900	5938.100	29.8	Pass
		Bracing Redund Diag 1	L2x2x3/16	154	-1809.840	6193.480	29.2	Pass
		Bracing Redund Diag 1	L2x2x3/16	157	-1805.560	6193.480	29.2	Pass
		Bracing Redund Diag 1	L2x2x3/16	161	-1805.560	6193.480	29.2	Pass
		Bracing Redund Diag 1	L2x2x3/16	164	-1792.560	6193.480	28.9	Pass
		Bracing Redund Diag 1	L2x2x3/16	168	-1792.560	6193.480	28.9	Pass
		Bracing Redund Diag 1	L2x2x3/16	171	-1809.840	6193.480	29.2	Pass
		Bracing Redund Diag 1	L2x2x3/16	178	-1853.160	6458.880	28.7	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Redund Diag 1 Bracing	L2x2x3/16	181	-1848.780	6458.880	28.6	Pass
		Redund Diag 1 Bracing	L2x2x3/16	185	-1848.780	6458.880	28.6	Pass
		Redund Diag 1 Bracing	L2x2x3/16	188	-1835.470	6458.880	28.4	Pass
		Redund Diag 1 Bracing	L2x2x3/16	192	-1835.470	6458.880	28.4	Pass
		Redund Diag 1 Bracing	L2x2x3/16	195	-1853.160	6458.880	28.7	Pass
T7	100 - 91.6667	Redund Diag 1 Bracing	L2x2x3/16	205	-2069.030	5679.480	36.4	Pass
		Redund Diag 1 Bracing	L2x2x3/16	208	-2064.920	5679.480	36.4	Pass
		Redund Diag 1 Bracing	L2x2x3/16	212	-2064.920	5679.480	36.4	Pass
		Redund Diag 1 Bracing	L2x2x3/16	215	-2051.760	5679.480	36.1	Pass
		Redund Diag 1 Bracing	L2x2x3/16	219	-2051.760	5679.480	36.1	Pass
		Redund Diag 1 Bracing	L2x2x3/16	222	-2069.030	5679.480	36.4	Pass
T8	91.6667 - 83.3333	Redund Diag 1 Bracing	L2x2x3/16	232	-2365.070	5433.940	43.5	Pass
		Redund Diag 1 Bracing	L2x2x3/16	235	-2361.040	5433.940	43.4	Pass
		Redund Diag 1 Bracing	L2x2x3/16	239	-2361.040	5433.940	43.4	Pass
		Redund Diag 1 Bracing	L2x2x3/16	242	-2347.480	5433.940	43.2	Pass
		Redund Diag 1 Bracing	L2x2x3/16	246	-2347.480	5433.940	43.2	Pass
		Redund Diag 1 Bracing	L2x2x3/16	249	-2365.070	5433.940	43.5	Pass
T9	83.3333 - 75	Redund Diag 1 Bracing	L2x2x3/16	259	-2654.970	5200.860	51.0	Pass
		Redund Diag 1 Bracing	L2x2x3/16	262	-2649.800	5200.860	50.9	Pass
		Redund Diag 1 Bracing	L2x2x3/16	266	-2649.800	5200.860	50.9	Pass
		Redund Diag 1 Bracing	L2x2x3/16	269	-2635.920	5200.860	50.7	Pass
		Redund Diag 1 Bracing	L2x2x3/16	273	-2635.920	5200.860	50.7	Pass
		Redund Diag 1 Bracing	L2x2x3/16	276	-2654.970	5200.860	51.0	Pass
T10	75 - 50	Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	286	-4123.340	6369.320	64.7	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	289	-4117.330	6369.320	64.6	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	293	-4117.330	6369.320	64.6	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	296	-4099.710	6369.320	64.4	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	300	-4099.710	6369.320	64.4	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	303	-4123.340	6369.320	64.7	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	310	-4258.170	6633.980	64.2	Pass
		Redund Diag 1	L2 1/2x2 1/2x3/16	313	-4251.960	6633.980	64.1	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Bracing						
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	317	-4251.960	6633.980	64.1	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	320	-4233.770	6633.980	63.8	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	324	-4233.770	6633.980	63.8	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	327	-4258.170	6633.980	64.2	Pass
T11	50 - 37.5	Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	337	-4600.240	6087.970	75.6	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	340	-4594.440	6087.970	75.5	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	344	-4594.440	6087.970	75.5	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	347	-4576.540	6087.970	75.2	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	351	-4576.540	6087.970	75.2	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	354	-4600.240	6087.970	75.6	Pass
T12	37.5 - 25	Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	366	-5056.460	5820.200	86.9	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	369	-5050.570	5820.200	86.8	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	372	-5050.570	5820.200	86.8	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	375	-5032.460	5820.200	86.5	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	378	-5032.460	5820.200	86.5	Pass
		Redund Diag 1 Bracing	L2 1/2x2 1/2x3/16	381	-5056.460	5820.200	86.9	Pass
T13	25 - 12.5	Redund Diag 1 Bracing	L3x3x1/4	391	-5507.050	12708.200	43.3	Pass
		Redund Diag 1 Bracing	L3x3x1/4	394	-5499.350	12708.200	43.3	Pass
		Redund Diag 1 Bracing	L3x3x1/4	398	-5499.350	12708.200	43.3	Pass
		Redund Diag 1 Bracing	L3x3x1/4	401	-5481.040	12708.200	43.1	Pass
		Redund Diag 1 Bracing	L3x3x1/4	405	-5481.040	12708.200	43.1	Pass
		Redund Diag 1 Bracing	L3x3x1/4	408	-5507.050	12708.200	43.3	Pass
T14	12.5 - 0	Redund Diag 1 Bracing	L3x3x1/4	420	-5958.680	12154.700	49.0	Pass
		Redund Diag 1 Bracing	L3x3x1/4	423	-5951.130	12154.700	49.0	Pass
		Redund Diag 1 Bracing	L3x3x1/4	426	-5951.130	12154.700	49.0	Pass
		Redund Diag 1 Bracing	L3x3x1/4	429	-5932.540	12154.700	48.8	Pass
		Redund Diag 1 Bracing	L3x3x1/4	432	-5932.540	12154.700	48.8	Pass
		Redund Diag 1 Bracing	L3x3x1/4	435	-5958.680	12154.700	49.0	Pass
T5	150 - 125	Inner Bracing	L2 1/2x2x3/16	73	-11.818	4505.540	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	74	-11.804	4505.540	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	75	-11.888	4505.540	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	97	-11.305	4955.830	0.8	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Inner Bracing	L2 1/2x2x3/16	98	-11.287	4955.830	0.8	Pass
		Inner Bracing	L2 1/2x2x3/16	99	-11.365	4955.830	0.8	Pass
		Inner Bracing	L2 1/2x2x3/16	121	-10.416	5477.150	0.8	Pass
		Inner Bracing	L2 1/2x2x3/16	122	-10.397	5477.150	0.8	Pass
		Inner Bracing	L2 1/2x2x3/16	123	-10.472	5477.150	0.8	Pass
T6	125 - 100	Inner Bracing	L2 1/2x2x3/16	148	-14.165	3469.700	1.0	Pass
		Inner Bracing	L2 1/2x2x3/16	149	-14.149	3469.700	1.0	Pass
		Inner Bracing	L2 1/2x2x3/16	150	-14.283	3469.700	1.0	Pass
		Inner Bracing	L2 1/2x2x3/16	172	-13.847	3771.280	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	173	-13.829	3771.280	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	174	-13.964	3771.280	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	196	-13.568	4113.950	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	197	-13.549	4113.950	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	198	-13.684	4113.950	0.9	Pass
T7	100 - 91.6667	Inner Bracing	L2 1/2x2x3/16	223	-20.913	3202.900	1.0	Pass
		Inner Bracing	L2 1/2x2x3/16	224	-20.870	3202.900	1.0	Pass
		Inner Bracing	L2 1/2x2x3/16	225	-20.942	3202.900	1.0	Pass
T8	91.6667 - 83.3333	Inner Bracing	L2 1/2x2x3/16	250	-20.535	2965.740	1.0	Pass
		Inner Bracing	L2 1/2x2x3/16	251	-20.497	2965.740	1.0	Pass
		Inner Bracing	L2 1/2x2x3/16	252	-20.560	2965.740	1.0	Pass
T9	83.3333 - 75	Inner Bracing	L2 1/2x2x3/16	277	-20.118	2753.970	1.0	Pass
		Inner Bracing	L2 1/2x2x3/16	278	-20.085	2753.970	1.0	Pass
		Inner Bracing	L2 1/2x2x3/16	279	-20.140	2753.970	1.0	Pass
T10	75 - 50	Inner Bracing	L2 1/2x2 1/2x3/16	304	-21.570	3467.320	0.9	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	305	-21.559	3467.320	0.9	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	306	-21.774	3467.320	0.9	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	328	-21.606	3841.910	0.9	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	329	-21.575	3841.910	0.9	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	330	-21.625	3841.910	0.9	Pass
T11	50 - 37.5	Inner Bracing	L2 1/2x2 1/2x3/16	355	-21.345	3144.960	1.0	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	356	-21.336	3144.960	1.0	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	357	-21.545	3144.960	1.0	Pass
T12	37.5 - 25	Inner Bracing	L2 1/2x2 1/2x3/16	382	-406.181	2865.560	14.2	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	383	-401.189	2865.560	14.0	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	384	-406.190	2865.560	14.2	Pass
T13	25 - 12.5	Inner Bracing	L3x3x1/4	409	-22.239	5986.700	0.7	Pass
		Inner Bracing	L3x3x1/4	410	-22.232	5986.700	0.7	Pass
		Inner Bracing	L3x3x1/4	411	-22.422	5986.700	0.7	Pass
T14	12.5 - 0	Inner Bracing	L3x3x1/4	436	-441.759	5498.200	8.0	Pass
		Inner Bracing	L3x3x1/4	437	-437.225	5498.200	8.0	Pass
		Inner Bracing	L3x3x1/4	438	-441.769	5498.200	8.0	Pass
							Summary	
						Leg (T14)	95.0	Pass
						Diagonal (T9)	98.4	Pass
						Horizontal (T5)	91.5	Pass
						Top Girt (T4)	49.9	Pass
						Redund Horz 1 Bracing (T14)	79.3	Pass
						Redund Diag 1 Bracing (T12)	86.9	Pass
						Inner Bracing (T12)	14.2	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
						Bolt Checks	98.4	Pass
						RATING =	**98.4**	**Pass**

Program Version 8.0.5.0 - 11/28/2018
File:P:/Projects/Telcom/StructuralsByLocation/Connecticut/WestbrookCSP#36/13-MODification_TWM-012/TIA-G/MODification_TWM-012_G_Westbrook_CT.eri

ANCHOR BOLT EVALUATION

ANCHOR BOLT ANALYSIS

Input Data

Tower Reactions:

Uplift:	Uplift := 465.644kips	*user input*
Shear:	Shear := 63.440kips	*user input*
Compression:	Compression := 532.535kips	*user input*

Anchor Bolt Data:

NOTE: Assumed material for the anchor rods, in the absence of supporting information, based on the member shape and/or age of the structure and typical standard practices in the USA shall apply the TIA-222 Assumed Material Standard for Anchor Rods for this design pertaining to structures built after 1985 - (Westbrook, CT Original construction drawings dated November 3, 1995). Apply ASTM A572 Gr. 50 anchors for existing bolts.

(actual material strength unknown therefore refer to above Note) (TIA-222; 2018)

Use ASTM A572 Gr 42 (Fy = 42ksi; Fu = 60ksi)

Number of Anchor Bolts = N	$N := 6$	*user input*
Bolt Ultimate Strength:	$F_u := 60 \cdot ksi$	*user input*
Bolt Yield Strength:	$Fy := 42 \cdot ksi$	*user input*
Bolt Modulus:	$E := 29000\,ksi$	*user input*
Thickness of Anchor Bolts	$D := 1.75in$	*user input*
Threads per Inch:	$n := 5$	*user input*
Coefficient of Friction:	$\mu := 0.55$	*user input*

(for baseplate with grout ASCE 10-15)

Length from top of pier to bottom of leveling nut:	$L_{ar} := 0in$	*user input*
Bolt Modulus:	$E := 29000 \cdot ksi$	*user input*

Previously MODified Anchorage - Steel Bolts (Ref. SAI-063 Rev.1)

Number of Anchor Bolts = N	$N_{M1} := 0$	*user input*
Bolt Ultimate Strength:	$F_{u.M1} := 72.5 \cdot ksi$	*user input*
Bolt Yield Strength:	$Fy_{M1} := 58 \cdot ksi$	*user input*
Bolt Modulus:	$E_{M1} := 29000\,ksi$	*user input*
Thickness of Anchor Bolts	$D_{M1} := 1.25in$	*user input*
Threads per Inch:	$n_{M1} := 7$	*user input*

Previously MODified Anchorage - Steel Bolts (Ref. NSS-015 Rev.2)

Number of Anchor Bolts = N	$N_{M2} := 0$	*user input*
Bolt Ultimate Strength:	$F_{u.M2} := 72.5 \cdot ksi$	*user input*
Bolt Yield Strength:	$Fy_{M2} := 58 \cdot ksi$	*user input*
Bolt Modulus:	$E_{M2} := 29000 \cdot ksi$	*user input*
Thickness of Anchor Bolts	$D_{M2} := 1.25in$	*user input*
Threads per Inch:	$n_{M2} := 7$	*user input*

Anchor Bolt Section Properties:

Gross Area of Bolt:

$A_{ge} := N\frac{\pi}{4}\cdot D^2$ $A_{ge} = 14.43\cdot in^2$ $A_{g.pm} := 0\frac{\pi}{4}\cdot D_{M1}{}^2 + 0\frac{\pi}{4}\cdot D_{M2}{}^2$ $A_{g.pm} = 0\cdot in^2$

Net Area of Bolt:

$A_{ne} := N\cdot\left[\frac{\pi}{4}\cdot\left(D - \frac{0.9743\cdot in}{n}\right)^2\right]$ $A_{n.pm} := 0\cdot\left[\frac{\pi}{4}\cdot\left(D_{M1} - \frac{0.9743\cdot in}{n_{M1}}\right)^2\right] + 0\cdot\left[\frac{\pi}{4}\cdot\left(D_{M2} - \frac{0.9743\cdot in}{n_{M2}}\right)^2\right]$

$A_{ne} = 11.4\cdot in^2$ $A_{n.pm} = 0\cdot in^2$

Net Diameter:

$D_{ne} := N\left(D - \frac{0.9743in}{n}\right)$ $D_{ne} = 9.33\cdot in$ $D_{n.pm} := 0\cdot\left(D_{M1} - \frac{0.9743\cdot in}{n_{M1}}\right) + 0\cdot\left(D_{M2} - \frac{0.9743\cdot in}{n_{M2}}\right)$ $D_{n.pm} = 0\cdot in$

Radius of Gyration of Bolt:

$r_e := N\cdot\frac{\left(D - \frac{0.9743in}{n}\right)}{4}$ $r_e = 2.33\cdot in$ $r_{pm} := 0\cdot\frac{\left(D_{M1} - \frac{0.9743\cdot in}{n_{M1}}\right)}{4} + 0\cdot\frac{\left(D_{M2} - \frac{0.9743\cdot in}{n_{M2}}\right)}{4}$ $r_{pm} = 0\cdot in$

Plastic Section Modulus of Bolt:

$Z_{xe} := N\frac{\left(D - \frac{0.9743in}{n}\right)^3}{6}$ $Z_{xe} = 3.76\cdot in^3$ $Z_{x.pm} := 0\frac{\left(D_{M1} - \frac{0.9743\cdot in}{n_{M1}}\right)^3}{6} + 0\frac{\left(D_{M2} - \frac{0.9743\cdot in}{n_{M2}}\right)^3}{6}$ $Z_{x.pm} = 0\cdot in^3$

Forces:

Tension Force:

$T_u := \frac{Uplift}{1}$

$T_u = 465.64\cdot kip$ $T_{ub} := T_u$

Shear Force:

$V_u := \frac{Shear}{1}$

$V_u = 63.44\cdot kip$ $V_{ub} := V_u$

Resistance Factor for Flexure (ANSI/TIA-222-G 4.7):

$\phi_f := 0.9$

Resistance Factor for Anchor Bolt (ANSI/TIA-222-G 4.5.4.2):

$\phi_b := 0.80$

Resistance Factor for Tension (ANSI/TIA-222-G 4.9.6.1):

$\phi_t := 0.80$ $\phi_{t.pm} := 0.65$

Resistance Factor for Shear (ANSI/TIA-222-G 4.9.6.3):

$\phi_v := 0.75$ $\phi_{v.pm} := 0.60$

ANSI/TIA-222-G 4.7.1 Flexural Members:

Nominal Flexure Strength, Mn:

$M_n := Fy \cdot Z_{xe} + Fy \cdot Z_{x.pm}$

$M_n = 13.16 \cdot ft \cdot kip$

$\phi_f \cdot M_n = 11.85 \cdot ft \cdot kip$

Applied Moment due to Shear (worst case lever arm), Mu:

$M_u := L_{ar} \cdot V_u$

$M_u = 0 \cdot ft \cdot kip$

Flexure Check:

$FlexureCheck := if\left(M_u \le \phi_f \cdot M_n, "OK", "NO\ GOOD"\right)$

FlexureCheck = "OK"

$\frac{M_u}{\phi_f \cdot M_n} = 0 \cdot \%$

ANSI/TIA-222-G 4.9.6.1 Tensile Strength:

Design Tensile Strength, Rnt:

$R_{nt} := F_u \cdot A_{ne}$ $\quad R_{nt.pm} := F_u \cdot A_{n.pm}$

$R_{nt} = 683.8 \cdot ft \cdot kip$ $\quad R_{nt.pm} = 0 \cdot ft \cdot kip$

$\phi_t \cdot R_{nt} = 547.04 \cdot ft \cdot kip$ $\quad \phi_{t.pm} \cdot R_{nt.pm} = 0 \cdot ft \cdot kip$

Tension Check:

$TensionCheck := if\left[T_u \le \left(\phi_t \cdot R_{nt} + \phi_{t.pm} \cdot R_{nt.pm}\right), "OK", "NO\ GOOD"\right]$

TensionCheck = "OK"

$\frac{T_u}{\phi_t \cdot R_{nt} + \phi_{t.pm} \cdot R_{nt.pm}} = 85.12 \cdot \%$

ANSI/TIA-222-G 4.9.6.3 Design Shear Strength:

Design Shear Strength, Rnv:

$R_{nv} := 0.45 \cdot F_u \cdot A_{ge}$ $\quad R_{nv.pm} := 0.45 \cdot F_u \cdot A_{g.pm}$

$R_{nv} = 389.66 \cdot ft \cdot kip$ $\quad R_{nv.pm} = 0 \cdot ft \cdot kip$

$\phi_v \cdot R_{nv} = 292.24 \cdot ft \cdot kip$ $\quad \phi_{v.pm} \cdot R_{nv.pm} = 0 \cdot ft \cdot kip$

Shear Check:

$ShearCheck := if\left[V_u \le \left(\phi_v \cdot R_{nv} + \phi_{v.pm} \cdot R_{nv.pm}\right), "OK", "NO\ GOOD"\right]$

ShearCheck = "OK"

$\frac{V_u}{\phi_v \cdot R_{nv} + \phi_{v.pm} \cdot R_{nv.pm}} = 21.71 \cdot \%$

ANSI/TIA-222-G 4.9.6.4 Combined Shear and Tension:

$$\left[\frac{V_{ub}}{(\phi_v \cdot R_{nv})}\right]^2 + \left[\frac{T_{ub}}{(\phi_t \cdot R_{nt})}\right]^2 \le 1$$

$$\left[\frac{V_{ub}}{(\phi_v \cdot R_{nv} + \phi_{v.pm} \cdot R_{nv.pm})}\right]^2 + \left[\frac{T_{ub}}{(\phi_t \cdot R_{nt} + \phi_{t.pm} \cdot R_{nt.pm})}\right]^2 = 0.77$$

Combined Shear and Tension Check:

$$\text{ShearAndTensionCheck} := \text{if}\left[\left[\frac{V_{ub}}{(\phi_v \cdot R_{nv} + \phi_{v.pm} \cdot R_{nv.pm})}\right]^2 + \left[\frac{T_{ub}}{(\phi_t \cdot R_{nt} + \phi_{t.pm} \cdot R_{nt.pm})}\right]^2 \le 1, \text{"OK"}, \text{"NO GOOD"}\right]$$

ShearAndTensionCheck = "OK"

ANSI/TIA-222-G 4.9.9 Anchor Rods (Capacity):

$$\frac{\left[T_u + \left(\frac{V_u}{\eta}\right)\right]}{\phi_b \cdot P_n} \le 1$$

$\eta := 0.55$ *user input from ANSI/TIA-222-G 4.9.9*

$$\frac{\left[T_u + \left(\frac{V_u}{\eta}\right)\right]}{(\phi_b \cdot F_u \cdot A_{ne}) + (\phi_t \cdot F_u \cdot A_{g.pm})} = 1.06$$

Capacity Check:

$$\text{CapacityCheck} := \text{if}\left[\frac{\left[T_u + \left(\frac{V_u}{\eta}\right)\right]}{(\phi_b \cdot F_u \cdot A_{ne}) + (\phi_t \cdot F_u \cdot A_{g.pm})} \le 1, \text{"OK"}, \text{"NO GOOD"}\right]$$

CapacityCheck = "NO GOOD"

NOTE: Concrete Anchors have been previously modified per project SAI-0634 Revision 1 and project NSS-015 Revision 2. The following calculations shall check the strength of the additional anchors and the strength of the previously applied weld.

$$T_u + \left(\frac{V_u}{\eta}\right) = 580.99 \cdot \text{kip}$$

$$T_u + \left(\frac{V_u}{\eta}\right) - (\phi_b \cdot F_u \cdot A_{ne}) + (\phi_t \cdot F_u \cdot A_{g.pm}) = 33946.60 \cdot \text{lbf}$$

$\phi_b \cdot F_{up} \cdot A_{ne} = \blacksquare \cdot \text{kip}$

$(\phi_b \cdot F_u \cdot A_{ne}) + (\phi_t \cdot F_u \cdot A_{g.pm}) = 547.04 \cdot \text{kip}$

Above force required for additional anchorage required for uplift resistance for Strength Design (LRFD) - see prevously instlled anchors for Strength design check. (Disregard above note if value is negative)

ANCHOR BOLT ANALYSIS

Input Data

Tower Reactions:

Uplift: $Uplift := 465.644kips$ *user input*

Shear: $Shear := 63.440kips$ *user input*

Compression: $Compression := 532.535kips$ *user input*

Anchor Bolt Data:

NOTE: Assumed material for the anchor rods, in the absence of supporting information, based on the member shape and/or age of the structure and typical standard practices in the USA shall apply the TIA-222 Assumed Material Standard for Anchor Rods for this design pertaining to structures built after 1985 - (Westbrook, CT Original construction drawings dated November 3, 1995). Apply ASTM A572 Gr. 50 anchors for existing bolts.

(actual material strength unknown therefore refer to above Note) (TIA-222 2018)

Use ASTM A572 Gr 42 (Fy = 42ksi; Fu = 60ksi)

Number of Anchor Bolts = N: $N := 6$ *user input*

Bolt Ultimate Strength: $F_u := 60 \cdot ksi$ *user input*

Bolt Yield Strength: $Fy := 42 \cdot ksi$ *user input*

Bolt Modulus: $E := 29000ksi$ *user input*

Thickness of Anchor Bolts: $D := 1.75in$ *user input*

Threads per Inch: $n := 5$ *user input*

Coefficient of Friction: $\mu := 0.55$ *user input*

(for baseplate with grout ASCE 10-15)

Length from top of pier to bottom of leveling nut: $L_{ar} := 2in$ *user input*

Bolt Modulus: $E := 29000 \cdot ksi$ *user input*

Previously MODified Anchorage - Steel Bolts (Ref. SAI-063 Rev.1)

Number of Anchor Bolts = N: $N_{M1} := 1$ *user input*

Bolt Ultimate Strength: $F_{u.M1} := 72.5 \cdot ksi$ *user input*

Bolt Yield Strength: $Fy_{M1} := 58 \cdot ksi$ *user input*

Bolt Modulus: $E_{M1} := 29000ksi$ *user input*

Thickness of Anchor Bolts: $D_{M1} := 1.25in$ *user input*

Threads per Inch: $n_{M1} := 7$ *user input*

Previously MODified Anchorage - Steel Bolts (Ref. NSS-015 Rev.2)

Number of Anchor Bolts = N: $N_{M2} := 2$ *user input*

Bolt Ultimate Strength: $F_{u.M2} := 72.5 \cdot ksi$ *user input*

Bolt Yield Strength: $Fy_{M2} := 58 \cdot ksi$ *user input*

Bolt Modulus: $E_{M2} := 29000 \cdot ksi$ *user input*

Thickness of Anchor Bolts: $D_{M2} := 1.25in$ *user input*

Threads per Inch: $n_{M2} := 7$ *user input*

Anchor Bolt Section Properties:

Gross Area of Bolt:

$A_{ge} := 6\frac{\pi}{4}\cdot D^2$ $A_{ge} = 14.43\cdot in^2$ $A_{g.pm} := 1\frac{\pi}{4}\cdot D_{M1}^{\ 2} + N_{M2}\frac{\pi}{4}\cdot D_{M2}^{\ 2}$ $A_{g.pm} = 3.68\cdot in^2$

Net Area of Bolt:

$$A_{ne} := 6\cdot\left[\frac{\pi}{4}\cdot\left(D - \frac{0.9743\cdot in}{n}\right)^2\right] \qquad A_{n.pm} := 1\cdot\left[\frac{\pi}{4}\cdot\left(D_{M1} - \frac{0.9743\cdot in}{n_{M1}}\right)^2\right] + N_{M2}\cdot\left[\frac{\pi}{4}\cdot\left(D_{M2} - \frac{0.9743\cdot in}{n_{M2}}\right)^2\right]$$

$A_{ne} = 11.4\cdot in^2$ $A_{n.pm} = 2.91\cdot in^2$

Net Diameter:

$D_{ne} := 6\left(D - \frac{0.9743in}{n}\right)$ $D_{ne} = 9.33\cdot in$ $D_{n.pm} := 1\cdot\left(D_{M1} - \frac{0.9743\cdot in}{n_{M1}}\right) + N_{M2}\cdot\left(D_{M2} - \frac{0.9743\cdot in}{n_{M2}}\right)$ $D_{n.pm} = 3.33\cdot in$

Radius of Gyration of Bolt:

$$r_e := 6\cdot\frac{\left(D - \frac{0.9743in}{n}\right)}{4} \quad r_e = 2.33\cdot in \qquad r_{pm} := 1\cdot\frac{\left(D_{M1} - \frac{0.9743\cdot in}{n_{M1}}\right)}{4} + N_{M2}\cdot\frac{\left(D_{M2} - \frac{0.9743\cdot in}{n_{M2}}\right)}{4} \quad r_{pm} = 0.83\cdot in$$

Plastic Section Modulus of Bolt:

$$Z_{xe} := 6\frac{\left(D - \frac{0.9743in}{n}\right)^3}{6} \quad Z_{xe} = 3.76\cdot in^3 \qquad Z_{x.pm} := 1\frac{\left(D_{M1} - \frac{0.9743\cdot in}{n_{M1}}\right)^3}{6} + N_{M2}\frac{\left(D_{M2} - \frac{0.9743\cdot in}{n_{M2}}\right)^3}{6} \quad Z_{x.pm} = 0.69\cdot in^3$$

Forces:

Tension Force:

$T_u := \frac{Uplift}{1}$

$T_u = 465.64\cdot kip$ $T_{ub} := T_u$

Shear Force:

$V_u := \frac{Shear}{1}$

$V_u = 63.44\cdot kip$ $V_{ub} := V_u$

Resistance Factor for Flexure (ANSI/TIA-222-G 4.7):

$\phi_f := 0.9$

Resistance Factor for Anchor Bolt (ANSI/TIA-222-G 4.5.4.2):

$\phi_b := 0.80$

Resistance Factor for Tension (ANSI/TIA-222-G 4.9.6.1):

$\phi_t := 0.80$ $\phi_{t.pm} := 0.65$

Resistance Factor for Shear (ANSI/TIA-222-G 4.9.6.3):

$\phi_v := 0.75$ $\phi_{v.pm} := 0.60$

ANSI/TIA-222-G 4.7.1 Flexural Members:

Nominal Flexure Strength, Mn:

$M_n := Fy \cdot Z_{xe} + Fy \cdot Z_{x.pm}$

$M_n = 15.56 \cdot ft \cdot kip$

$\phi_f \cdot M_n = 14.01 \cdot ft \cdot kip$

Applied Moment due to Shear (worst case lever arm), Mu:

$M_u := L_{ar} \cdot V_u$

$M_u = 10.57 \cdot ft \cdot kip$

Flexure Check:

$FlexureCheck := if\left(M_u \le \phi_f \cdot M_n, "OK", "NO\ GOOD"\right)$

FlexureCheck = "OK"

$$\frac{M_u}{\phi_f \cdot M_n} = 75.49 \cdot \%$$

ANSI/TIA-222-G 4.9.6.1 Tensile Strength:

Design Tensile Strength, Rnt:

$R_{nt} := F_u \cdot A_{ne}$ $\quad R_{nt.pm} := F_u \cdot A_{n.pm}$

$R_{nt} = 683.8 \cdot ft \cdot kip$ $\quad R_{nt.pm} = 174.44 \cdot ft \cdot kip$

$\phi_t \cdot R_{nt} = 547.04 \cdot ft \cdot kip$ $\quad \phi_{t.pm} \cdot R_{nt.pm} = 113.39 \cdot ft \cdot kip$

Tension Check:

$TensionCheck := if\left[T_u \le \left(\phi_t \cdot R_{nt} + \phi_{t.pm} \cdot R_{nt.pm}\right), "OK", "NO\ GOOD"\right]$

TensionCheck = "OK"

$$\frac{T_u}{\phi_t \cdot R_{nt} + \phi_{t.pm} \cdot R_{nt.pm}} = 70.51 \cdot \%$$

ANSI/TIA-222-G 4.9.6.3 Design Shear Strength:

Design Shear Strength, Rnv:

$R_{nv} := 0.45 \cdot F_u \cdot A_{ge}$ $\quad R_{nv.pm} := 0.45 \cdot F_u \cdot A_{g.pm}$

$R_{nv} = 389.66 \cdot ft \cdot kip$ $\quad R_{nv.pm} = 99.4 \cdot ft \cdot kip$

$\phi_v \cdot R_{nv} = 292.24 \cdot ft \cdot kip$ $\quad \phi_{v.pm} \cdot R_{nv.pm} = 59.64 \cdot ft \cdot kip$

Shear Check:

$ShearCheck := if\left[V_u \le \left(\phi_v \cdot R_{nv} + \phi_{v.pm} \cdot R_{nv.pm}\right), "OK", "NO\ GOOD"\right]$

ShearCheck = "OK"

$$\frac{V_u}{\phi_v \cdot R_{nv} + \phi_{v.pm} \cdot R_{nv.pm}} = 18.03 \cdot \%$$

ANSI/TIA-222-G 4.9.6.4 Combined Shear and Tension:

$$\left[\frac{V_{ub}}{(\phi_v \cdot R_{nv})}\right]^2 + \left[\frac{T_{ub}}{(\phi_t \cdot R_{nt})}\right]^2 \le 1$$

$$\left[\frac{V_{ub}}{(\phi_v \cdot R_{nv} + \phi_{v.pm} \cdot R_{nv.pm})}\right]^2 + \left[\frac{T_{ub}}{(\phi_t \cdot R_{nt} + \phi_{t.pm} \cdot R_{nt.pm})}\right]^2 = 0.53$$

Combined Shear and Tension Check:

$$\text{ShearAndTensionCheck} := \text{if}\left[\left[\frac{V_{ub}}{(\phi_v \cdot R_{nv} + \phi_{v.pm} \cdot R_{nv.pm})}\right]^2 + \left[\frac{T_{ub}}{(\phi_t \cdot R_{nt} + \phi_{t.pm} \cdot R_{nt.pm})}\right]^2 \le 1, \text{"OK"}, \text{"NO GOOD"}\right]$$

ShearAndTensionCheck = "OK"

ANSI/TIA-222-G 4.9.9 Anchor Rods (Capacity):

$$\frac{\left[T_u + \left(\frac{V_u}{\eta}\right)\right]}{\phi_b \cdot P_n} \le 1$$

$\eta := 0.55$ *user input from ANSI/TIA-222-G 4.9.9*

$$\frac{\left[T_u + \left(\frac{V_u}{\eta}\right)\right]}{(\phi_b \cdot F_u \cdot A_{ne}) + (\phi_t \cdot F_u \cdot A_{g.pm})} = 0.80$$

Capacity Check:

$$\text{CapacityCheck} := \text{if}\left[\frac{\left[T_u + \left(\frac{V_u}{\eta}\right)\right]}{(\phi_b \cdot F_u \cdot A_{ne}) + (\phi_t \cdot F_u \cdot A_{g.pm})} \le 1, \text{"OK"}, \text{"NO GOOD"}\right]$$

CapacityCheck = "OK"

NOTE: Because the reinforcement of additional bolts are within capacity, the anchor bolts are considered to be OK for the design loads. Apply the previously calculated force that is not contained by the existing anchorage (prior to the additional anchorage modifications) with the previously installed anchorage to verify the capacity of the existing anchorage system.

$$T_u + \left(\frac{V_u}{\eta}\right) = 580.99 \cdot \text{kip}$$

$$T_u + \left(\frac{V_u}{\eta}\right) - \left[(\phi_b \cdot F_u \cdot A_{ne}) + (\phi_t \cdot F_u \cdot A_{g.pm})\right] = -142.77 \cdot \text{kip}$$

$\phi_b \cdot F_{up} \cdot A_{ne} = \blacksquare \cdot \text{kip}$

$(\phi_b \cdot F_u \cdot A_{ne}) + (\phi_t \cdot F_u \cdot A_{g.pm}) = 723.76 \cdot \text{kip}$

WELDED BEAM TO LEG ANCHOR ANALYSIS

NOTE: Welded beams were designed from a previous MODification analysis. The following calculation sheets are checking the capacity of the welded connection and adhesive anchorage for the Westbrook (CSP), CT Tower.

* From the Mathcad analysis for anchor bolts, the force required to be contained (by the additional 3 anchors) -->

$$Des_{Uplift} := \frac{\left[\left[T_u + \left(\frac{V_u}{\eta}\right)\right] - 547.04kip\right]}{3} = 11316.48 \cdot lbf$$

NOTE: **"528.81 kip"** comes from the "PRE_Group_G_Lattice_Anchor_Bolts" (non-modified bolted anchors)

"d" arm --> $d := 1ft + 2in$

* Identify Existing Conditions (Materials and Weld Length)

Yield Steel (f.y) --> $F_y := 50ksi$

Modulus Steel (E) --> $E := 29000ksi$

WT 8x25 --> $t_{w.WT8x25} := 0.380in$

$d_{WT8x25} := 8.13in$

Weld Length: $l_{weld} := 18in$

Area (WT 8x35 Stem) --> $A_{stem} := t_{w.WT8x25} \cdot l_{weld} = 6.84 \cdot in^2$

Section Modulus (x-axis) (Stem) --> $S_{stem} := \frac{t_{w.WT8x25} \cdot l_{weld}^2}{6} = 20.52 \cdot in^3$

$$\sigma_{force.M} := \frac{Des_{Uplift} \cdot d}{S_{stem}} = 7720.8 \cdot psi$$

$$\sigma_{force.P} := \frac{Des_{Uplift}}{A_{stem}} = 1654.46 \cdot psi$$

* CHECK - Flexure in WT (AISC - LRFD Method):

* Apply AISC Chapter F - Flexure, Section F9, Equation F9-10 (governs design): $\theta_f := 0.90$

$$F_{cr} := \left(2.55 - 1.84 \cdot \frac{d_{WT8x25}}{t_{w.WT8x25}} \cdot \sqrt{\frac{F_y}{E}}\right) \cdot F_y = 45.77 \cdot ksi$$

$$M_{capacity.beam} := F_{cr} \cdot \frac{t_{w.WT8x25} \cdot d_{WT8x25}^2}{6} \cdot \theta_f = 172.44 \cdot kip \cdot in$$

* CHECK - Flexure in WT (AISC - LRFD Method):

$$CHECK_1 := if\left(\frac{Des_{Uplift} \cdot d}{M_{capacity.beam}} < 1.0, "OK", "No Good"\right)$$

$$\frac{Des_{Uplift} \cdot d}{M_{capacity.beam}} = 0.92$$

$CHECK_1 = "OK"$

* CHECK - Axial Stress in WT (AISC - LRFD Method):

$$CHECK_2 := if\left(\frac{\sigma_{force.M} + \sigma_{force.P}}{F_{cr} \cdot \theta_f} < 1.0, "OK", "No Good"\right)$$

$$\frac{\sigma_{force.M} + \sigma_{force.P}}{F_{cr} \cdot \theta_f} = 0.23$$

$CHECK_2 = "OK"$

* CHECK - Shear in WT (AISC - LRFD Method):

* Apply AISC Chapter G - Shear, Section G2, Equation G2-1:

$\theta_v := 0.9$

NOTE: Shear plane intended to act along length of wt8x25, therefore the attached "length" is depth and area is determined as depth x stem thickness.

$V_{cap} := 0.6 \cdot F_y \cdot A_w \cdot C_v$ ----> $C_v := 1.0$ $A_w := t_{w.WT8x25} \cdot (l_{weld}) = 6.84 \cdot in^2$ $F_y = 50 \cdot ksi$

$V_{cap} := \theta_v \cdot 0.6 \cdot F_y \cdot A_w \cdot C_v = 184.68 \cdot kip$

* CHECK - Shear in WT (AISC - LRFD Method):

$CHECK_3 := if\left(\frac{Des_{Uplift}}{V_{cap}} < 1.0, "OK", "No\ Good"\right)$ $\frac{Des_{Uplift}}{V_{cap}} = 0.06$ $CHECK_3 = "OK"$

* CHECK - Shear Stress in WT (AISC - LRFD Method):

$CHECK_4 := if\left(\frac{\sigma_{force.P}}{F_y \cdot \theta_v \cdot 0.6} < 1.0, "OK", "No\ Good"\right)$ $\frac{\sigma_{force.P}}{F_y \cdot \theta_v \cdot 0.6} = 0.06$ $CHECK_4 = "OK"$

* CHECK - Combined Flexure - Shear Stress in WT (AISC - LRFD Method):

$CHECK_5 := if\left[\frac{\sigma_{force.M} + \sigma_{force.P}}{F_{cr} \cdot \theta_f} + \frac{\sigma_{force.P}}{(F_y \cdot \theta_v \cdot 0.6)} < 1.0, "OK", "No\ Good"\right]$ $\frac{\sigma_{force.M} + \sigma_{force.P}}{F_{cr} \cdot \theta_f} + \frac{\sigma_{force.P}}{(F_y \cdot \theta_v \cdot 0.6)} = 0.29$

$CHECK_5 = "OK"$

* CHECK - Combined Flexure - Shear Force in WT (AISC - LRFD Method):

$CHECK_6 := if\left(\frac{Des_{Uplift} \cdot d}{M_{capacity.beam}} + \frac{Des_{Uplift}}{V_{cap}} < 1.0, "OK", "No\ Good"\right)$ $\frac{Des_{Uplift} \cdot d}{M_{capacity.beam}} + \frac{Des_{Uplift}}{V_{cap}} = 0.98$

$CHECK_6 = "OK"$

* CHECK - Weld in WT (AISC - LRFD Method):

$t_{weld} := \frac{5}{16}in$ $Fy_{Electrode} := 70ksi$ $\theta_{weld} := 0.75$

$$S_{x.weld} := \frac{t_{weld}\cdot\left(l_{weld} - \frac{9}{16}in\right)^2}{6} = 15.84\cdot in^3$$

* Moment Induced into Weld (AISC - LRFD Method):

$$M_{applied} := Des_{Uplift}\cdot d = 158.43\cdot kip\cdot in$$

* Stress Caused by Moment on Weld (AISC - LRFD Method):

$$\sigma_{applied.M} := \frac{M_{applied}}{S_{x.weld}} = 10\cdot ksi$$

* Stress Capacity in Weld (AISC - LRFD Method):

$$\sigma_{weld} := Fy_{Electrode}\cdot 0.6\cdot\theta_{weld} = 31.5\cdot ksi$$

* CHECK - Stress in Weld on WT - Moment Induced (AISC - LRFD Method):

$$CHECK_7 := if\left(\frac{\sigma_{applied.M}}{\sigma_{weld}} < 1.0, "OK", "No\ Good"\right) \qquad \frac{\sigma_{applied.M}}{\sigma_{weld}} = 0.32$$

$CHECK_7 = "OK"$

* CHECK - Stress in Weld on WT - Shear Induced (AISC - LRFD Method):

$$CHECK_8 := if\left(\frac{\frac{Des_{Uplift}}{A_w}}{\sigma_{weld}} < 1.0, "OK", "No\ Good"\right) \qquad \frac{\frac{Des_{Uplift}}{A_w}}{\sigma_{weld}} = 0.05$$

$CHECK_8 = "OK"$

* CHECK - Combined Flexure - Shear Stress Force in Weld on WT (AISC - LRFD Method):

$$CHECK_9 := if\left(\frac{\frac{Des_{Uplift}}{A_w}}{\sigma_{weld}} + \frac{\sigma_{applied.M}}{\sigma_{weld}} < 1.0, "OK", "No\ Good"\right) \qquad \frac{\frac{Des_{Uplift}}{A_w}}{\sigma_{weld}} + \frac{\sigma_{applied.M}}{\sigma_{weld}} = 0.37$$

$CHECK_9 = "OK"$

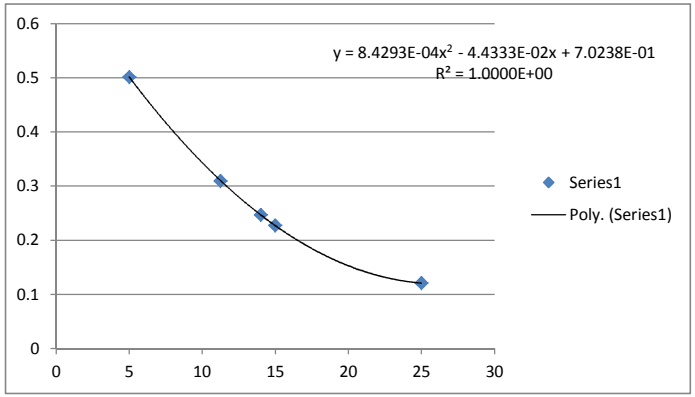
The following calculation pages address the chemical / adhesive anchors previously installed into the tower leg foundation. Data from tables were obtained by NON-LINEAR interpolation (HILTI 2016 Catalog).

"Uncracked" Concrete Adhesive Capacity - HILTI HIT-RE500 V3 Epoxy Adhesive Anchor

Hef	Factor
5	0.501907
11.25	0.309821
14	0.247
15	0.22739
25	0.120826

NOTE: Above reduction factors based on critical edge distance considered for anchor group (following Excel spreadsheets)

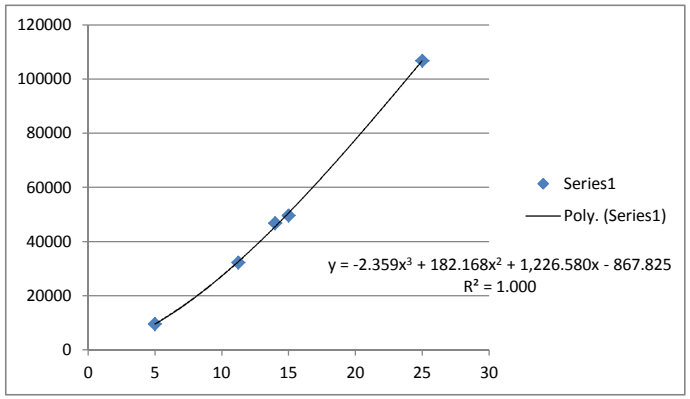
Reference:
Hilti HIT-RE 500 VE pg. 160
(Anchor Fastening Guide 2016)



"Uncracked" Concrete Adhesive Capacity - HILTI HIT-RE500 V3 Epoxy Adhesive Anchor

Hef	Strength
5	9555
11.25	32240
14	46800
15	49640
25	106805

Reference:
Hilti HIT-RE 500 VE pg. 151
(Anchor Fastening Guide 2016)



"X"	Factor	Strength	Factored Strength Adjustment	Remaining Uplift to Contain	# Anchors Proposed			
14	0.247	46800 lbf	11559.6 lbf	33949.46	3	11316.49 lbf	=	97.9%
			Capacity Load	(lbf)	(EA)	Design Load		

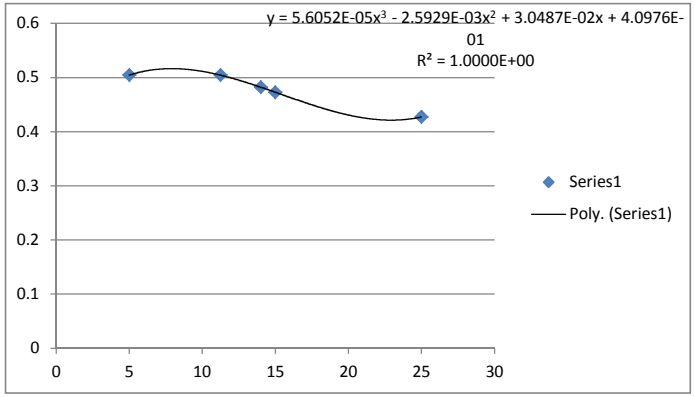
"3 x "Des.Uplift - See Mathcad Calculations"

"Cracked" Concrete Adhesive Capacity - HILTI HIT-RE500 V3 Epoxy Adhesive Anchor

Hef	Factor
5	0.504381
11.25	0.504381
14	0.482179
15	0.472831
25	0.42717

NOTE: Above reduction factors based on critical edge distance considered for anchor group (following Excel spreadsheets)

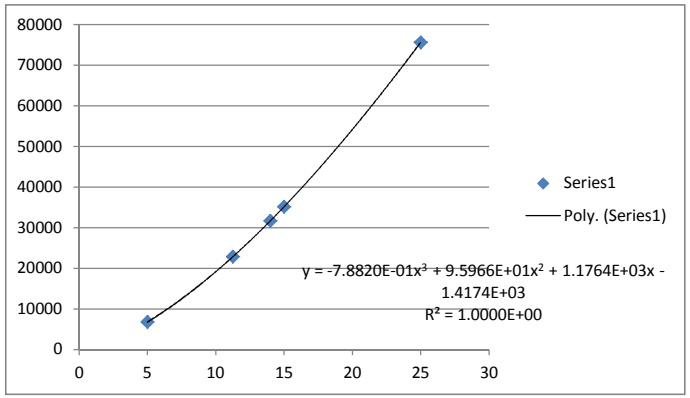
Reference:
Hilti HIT-RE 500 VE pg. 160
(Anchor Fastening Guide 2016)



"Cracked" Concrete Adhesive Capacity - HILTI HIT-RE500 V3 Epoxy Adhesive Anchor

Hef	Strength
5	6765
11.25	22840
14	31698.54
15	35160
25	75655

Reference:
Hilti HIT-RE 500 VE pg. 151
(Anchor Fastening Guide 2016)



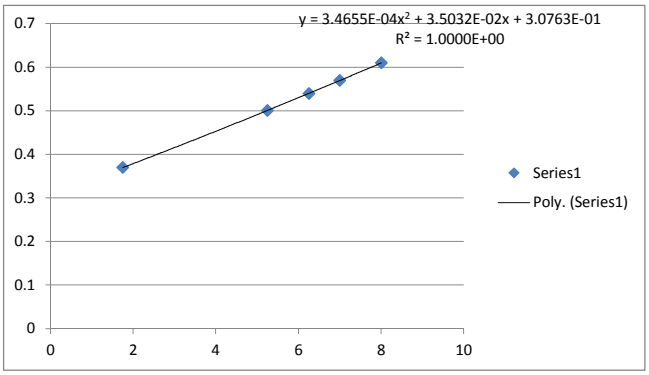
"X"	Factor	Strength	Factored Strength Adjustment	Remaining Uplift to Contain	# Anchors Proposed			
14	0.482179	31698.537 lbf	15284.36 lbf	33949.46	3	11316.49 lbf	=	74%
			Capacity Load	(lbf)	(EA)	Design Load		

"3 x "Des.Uplift - See Mathcad Calculations"

"Uncracked" Concrete Adhesive Capacity - HILTI HIT-RE500 V3 Epoxy Adhesive Anchor

Space (crit).	Factor
1.75	0.37
5.25	0.501097
6.25	0.54
7	0.57
8	0.61

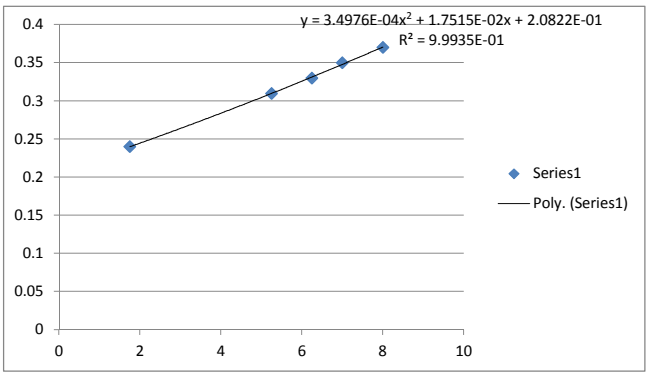
Reference:
Hilti HIT-RE 500 VE pg. 160
(Anchor Fastening Guide 2016)



"Uncracked" Concrete Adhesive Capacity - HILTI HIT-RE500 V3 Epoxy Adhesive Anchor

Space (crit).	Factor
1.75	0.24
5.25	0.309821
6.25	0.33
7	0.35
8	0.37

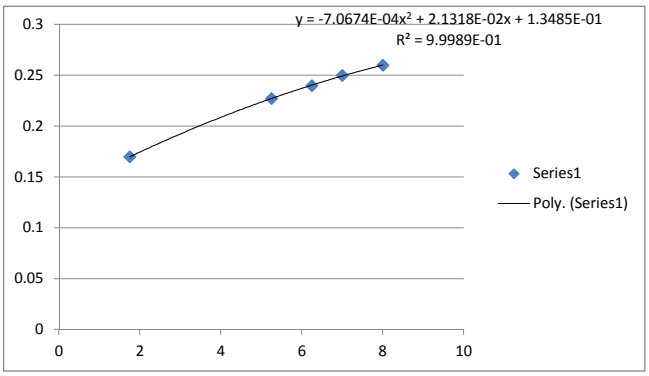
Reference:
Hilti HIT-RE 500 VE pg. 160
(Anchor Fastening Guide 2016)



"Uncracked" Concrete Adhesive Capacity - HILTI HIT-RE500 V3 Epoxy Adhesive Anchor

Space (crit).	Factor
1.75	0.17
5.25	0.22739
6.25	0.24
7	0.25
8	0.26

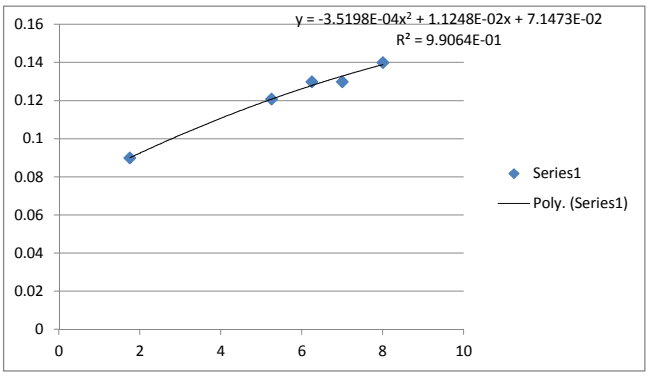
Reference:
Hilti HIT-RE 500 VE pg. 160
(Anchor Fastening Guide 2016)



"Uncracked" Concrete Adhesive Capacity - HILTI HIT-RE500 V3 Epoxy Adhesive Anchor

Space (crit).	Factor
1.75	0.09
5.25	0.120826
6.25	0.13
7	0.13
8	0.14

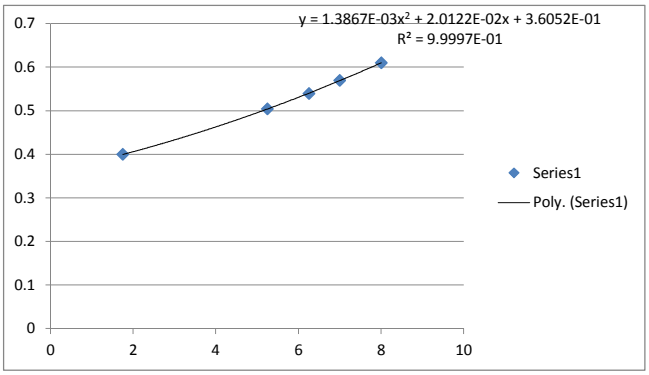
Reference:
Hilti HIT-RE 500 VE pg. 160
(Anchor Fastening Guide 2016)



"Cracked" Concrete Adhesive Capacity - HILTI HIT-RE500 V3 Epoxy Adhesive Anchor

Space (crit).	Factor
1.75	0.4
5.25	0.504381
6.25	0.54
7	0.57
8	0.61

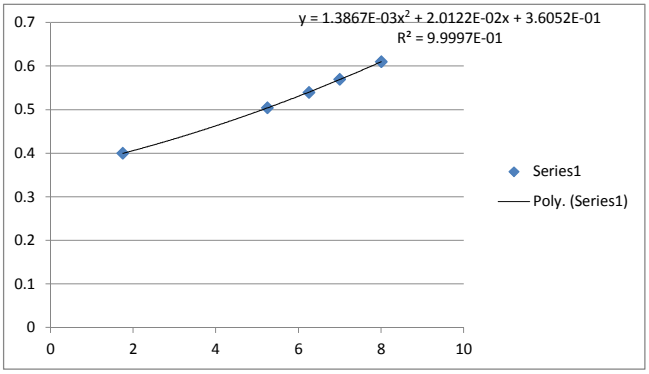
Reference:
Hilti HIT-RE 500 VE pg. 160
(Anchor Fastening Guide 2016)



"Cracked" Concrete Adhesive Capacity - HILTI HIT-RE500 V3 Epoxy Adhesive Anchor

Space (crit).	Factor
1.75	0.4
5.25	0.504381
6.25	0.54
7	0.57
8	0.61

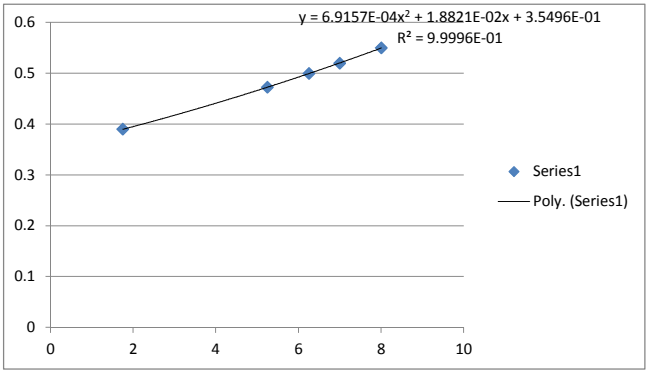
Reference:
Hilti HIT-RE 500 VE pg. 160
(Anchor Fastening Guide 2016)



"Cracked" Concrete Adhesive Capacity - HILTI HIT-RE500 V3 Epoxy Adhesive Anchor

Space (crit).	Factor
1.75	0.39
5.25	0.472831
6.25	0.5
7	0.52
8	0.55

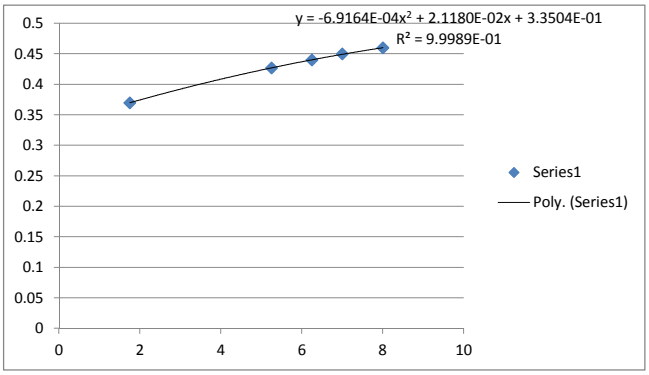
Reference:
Hilti HIT-RE 500 VE pg. 160
(Anchor Fastening Guide 2016)



"Cracked" Concrete Adhesive Capacity - HILTI HIT-RE500 V3 Epoxy Adhesive Anchor

Space (crit).	Factor
1.75	0.37
5.25	0.42717
6.25	0.44
7	0.45
8	0.46

Reference:
Hilti HIT-RE 500 VE pg. 160
(Anchor Fastening Guide 2016)



HIT-RE 500 V3 Epoxy Adhesive Anchoring System 3.2.4

Table 25 - Hilti HIT-RE 500 V3 adhesive design strength with concrete / bond failure for threaded rod in uncracked concrete[1,2,3,4,5,6,7,8,9,11]

Nominal anchor diameter in.	Effective embedment in. (mm)	Tension — ΦN_n				Shear — ΦV_n			
		f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)	f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)
3/8	2-3/8 (60)	2,855 (12.7)	3,125 (13.9)	3,610 (16.1)	4,425 (19.7)	3,075 (13.7)	3,370 (15.0)	3,890 (17.3)	4,765 (21.2)
	3-3/8 (86)	4,835 (21.5)	5,300 (23.6)	6,115 (27.2)	7,490 (33.3)	10,415 (46.3)	11,410 (50.8)	13,175 (58.6)	16,135 (71.8)
	4-1/2 (114)	7,445 (33.1)	8,155 (36.3)	9,225 (41.0)	10,210 (45.4)	16,035 (71.3)	17,570 (78.2)	19,865 (88.4)	21,985 (97.8)
	7-1/2 (191)	13,670 (60.8)	14,305 (63.6)	15,375 (68.4)	17,015 (75.7)	29,440 (131.0)	30,815 (137.1)	33,110 (147.3)	36,645 (163.0)
1/2	2-3/4 (70)	3,555 (15.8)	3,895 (17.3)	4,500 (20.0)	5,510 (24.5)	7,660 (34.1)	8,395 (37.3)	9,690 (43.1)	11,870 (52.8)
	4-1/2 (114)	7,445 (33.1)	8,155 (36.3)	9,420 (41.9)	11,535 (51.3)	16,035 (71.3)	17,570 (78.2)	20,285 (90.2)	24,845 (110.5)
	6 (152)	11,465 (51.0)	12,560 (55.9)	14,500 (64.5)	17,535 (78.0)	24,690 (109.8)	27,045 (120.3)	31,230 (138.9)	37,775 (168.0)
	10 (254)	23,485 (104.5)	24,580 (109.3)	26,410 (117.5)	29,230 (130.0)	50,580 (225.0)	52,940 (235.5)	56,885 (253.0)	62,955 (280.0)
5/8	3-1/8 (79)	4,310 (19.2)	4,720 (21.0)	5,450 (24.2)	6,675 (29.7)	9,280 (41.3)	10,165 (45.2)	11,740 (52.2)	14,380 (64.0)
	5-5/8 (143)	10,405 (46.3)	11,400 (50.7)	13,165 (58.6)	16,120 (71.7)	22,415 (99.7)	24,550 (109.2)	28,350 (126.1)	34,720 (154.4)
	7-1/2 (191)	16,020 (71.3)	17,550 (78.1)	20,265 (90.1)	24,820 (110.4)	34,505 (153.5)	37,800 (168.1)	43,650 (194.2)	53,455 (237.8)
	12-1/2 (318)	34,470 (153.3)	36,900 (164.1)	39,655 (176.4)	43,885 (195.2)	74,245 (330.3)	79,480 (353.5)	85,405 (379.9)	94,520 (420.4)
3/4[10]	3-1/2 (89)	5,105 (22.7)	5,595 (24.9)	6,460 (28.7)	7,910 (35.2)	11,000 (48.9)	12,050 (53.6)	13,915 (61.9)	17,040 (75.8)
	6-3/4 (171)	13,680 (60.9)	14,985 (66.7)	17,305 (77.0)	21,190 (94.3)	29,460 (131.0)	32,275 (143.6)	37,265 (165.8)	45,645 (203.0)
	9 (229)	21,060 (93.7)	23,070 (102.6)	26,640 (118.5)	32,625 (145.1)	45,360 (201.8)	49,690 (221.0)	57,375 (255.2)	70,270 (312.6)
	15 (381)	45,315 (201.6)	49,640 (220.8)	55,035 (244.8)	60,905 (270.9)	97,600 (434.1)	106,915 (475.6)	118,535 (527.3)	131,180 (583.5)
7/8[10]	3-1/2 (89)	5,105 (22.7)	5,595 (24.9)	6,460 (28.7)	7,910 (35.2)	11,000 (48.9)	12,050 (53.6)	13,915 (61.9)	17,040 (75.8)
	7-7/8 (200)	17,235 (76.7)	18,885 (84.0)	21,805 (97.0)	26,705 (118.8)	37,125 (165.1)	40,670 (180.9)	46,960 (208.9)	57,515 (255.8)
	10-1/2 (267)	26,540 (118.1)	29,070 (129.3)	33,570 (149.3)	41,115 (182.9)	57,160 (254.3)	62,615 (278.5)	72,300 (321.6)	88,550 (393.9)
	17-1/2 (445)	57,100 (254.0)	62,550 (278.2)	71,740 (319.1)	79,395 (353.2)	122,990 (547.1)	134,730 (599.3)	154,520 (687.3)	171,005 (760.7)
1	4 (102)	6,240 (27.8)	6,835 (30.4)	7,895 (35.1)	9,665 (43.0)	13,440 (59.8)	14,725 (65.5)	17,000 (75.6)	20,820 (92.6)
	9 (229)	21,060 (93.7)	23,070 (102.6)	26,640 (118.5)	32,625 (145.1)	45,360 (201.8)	49,690 (221.0)	57,375 (255.2)	70,270 (312.6)
	12 (305)	32,425 (144.2)	35,520 (158.0)	41,015 (182.4)	50,230 (223.4)	69,835 (310.6)	76,500 (340.3)	88,335 (392.9)	108,190 (481.3)
	20 (508)	69,765 (310.3)	76,425 (339.9)	88,245 (392.5)	99,635 (443.2)	150,265 (668.4)	164,605 (732.2)	190,070 (845.5)	214,595 (954.6)
1-1/4[10]	5 (127)	8,720 (38.8)	9,555 (42.5)	11,030 (49.1)	13,510 (60.1)	18,785 (83.6)	20,575 (91.5)	23,760 (105.7)	29,100 (129.4)
	11-1/4 (286)	29,430 (130.9)	32,240 (143.4)	37,230 (165.6)	45,595 (202.8)	63,395 (282.0)	69,445 (308.9)	80,185 (356.7)	98,205 (436.8)
	15 (381)	45,315 (201.6)	49,640 (220.8)	57,320 (255.0)	70,200 (312.3)	97,600 (434.1)	106,915 (475.6)	123,455 (549.2)	151,200 (672.6)
	25 (635)	97,500 (433.7)	106,805 (475.1)	123,330 (548.6)	142,175 (632.4)	210,000 (934.1)	230,045 (1023.3)	265,630 (1181.6)	306,220 (1362.1)

1 See Section 3.1.8 for explanation on development of load values.
2 See Section 3.1.8.6 to convert design strength (factored resistance) value to ASD value.
3 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
4 Apply spacing, edge distance, and concrete thickness factors in Tables 30-41 as necessary to the above values. Compare to the steel values in Table 29. The lesser of the values is to be used for the design.
5 Data is for temperature range A: Max. short term temperature = 130°F (55°C), max. long term temperature = 110°F (43°C).
For temperature range B: Max. short term temperature = 176°F (80°C), max. long term temperature = 110°F (43°C) multiply above values by 0.69.
Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.
6 Tabular values are for dry concrete conditions.
For water-filled drilled holes multiply design strength by 0.51.
For submerged (under water) applications multiply design strength by 0.45.
7 Tabular values are for short term loads only. For sustained loads including overhead use, see Section 3.1.8.8.
8 Tabular values are for normal-weight concrete only. For lightweight concrete multiply design strength (factored resistance) by λ_a as follows:
For sand-lightweight, λ_a = 0.51. For all-lightweight, λ_a = 0.45.
9 Tabular values are for holes drilled in concrete with carbide tipped hammer drill bit. For diamond core drilling, except as indicated in note 10, multiply above values by 0.55.
Diamond core drilling is not permitted for water-filled or underwater (submerged) applications.
10 Diamond core drilling with Hilti TE-YRT roughening tool is permitted for 3/4", 7/8", and 1 1/4" diameter anchors for dry and water-saturated concrete conditions. See Table 27.
11 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete.

3.2.4 HIT-RE 500 V3 Epoxy Adhesive Anchoring System

Table 26 - Hilti HIT-RE 500 V3 adhesive design strength with concrete / bond failure for threaded rod in cracked concrete[1,2,3,4,5,6,7,8,9,11]

Nominal anchor diameter in.	Effective embedment in. (mm)	Tension — ΦN_n				Shear — ΦV_n			
		f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)	f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)
3/8	2-3/8 (60)	2,020 (9.0)	2,215 (9.9)	2,500 (11.1)	2,655 (11.8)	2,180 (9.7)	2,385 (10.6)	2,690 (12.0)	2,860 (12.7)
	3-3/8 (86)	3,310 (14.7)	3,400 (15.1)	3,550 (15.8)	3,770 (16.8)	7,125 (31.7)	7,325 (32.6)	7,645 (34.0)	8,125 (36.1)
	4-1/2 (114)	4,410 (19.6)	4,535 (20.2)	4,735 (21.1)	5,030 (22.4)	9,500 (42.3)	9,765 (43.4)	10,195 (45.3)	10,835 (48.2)
	7-1/2 (191)	7,350 (32.7)	7,555 (33.6)	7,890 (35.1)	8,385 (37.3)	15,835 (70.4)	16,275 (72.4)	16,990 (75.6)	18,055 (80.3)
1/2	2-3/4 (70)	2,520 (11.2)	2,760 (12.3)	3,185 (14.2)	3,905 (17.4)	5,425 (24.1)	5,945 (26.4)	6,865 (30.5)	8,405 (37.4)
	4-1/2 (114)	5,275 (23.5)	5,780 (25.7)	6,260 (27.8)	6,655 (29.6)	11,360 (50.5)	12,445 (55.4)	13,485 (60.0)	14,330 (63.7)
	6 (152)	7,780 (34.6)	7,995 (35.6)	8,350 (37.1)	8,870 (39.5)	16,755 (74.5)	17,220 (76.6)	17,980 (80.0)	19,110 (85.0)
	10 (254)	12,965 (57.7)	13,325 (59.3)	13,915 (61.9)	14,785 (65.8)	27,930 (124.2)	28,705 (127.7)	29,970 (133.3)	31,850 (141.7)
5/8	3-1/8 (79)	3,050 (13.6)	3,345 (14.9)	3,860 (17.2)	4,730 (21.0)	6,575 (29.2)	7,200 (32.0)	8,315 (37.0)	10,185 (45.3)
	5-5/8 (143)	7,370 (32.8)	8,075 (35.9)	9,325 (41.5)	10,315 (45.9)	15,875 (70.6)	17,390 (77.4)	20,080 (89.3)	22,215 (98.8)
	7-1/2 (191)	11,350 (50.5)	12,395 (55.1)	12,940 (57.6)	13,755 (61.2)	24,440 (108.7)	26,695 (118.7)	27,875 (124.0)	29,620 (131.8)
	12-1/2 (318)	20,100 (89.4)	20,660 (91.9)	21,570 (95.9)	22,920 (102.0)	43,295 (192.6)	44,495 (197.9)	46,460 (206.7)	49,370 (219.6)
3/4[10]	3-1/2 (89)	3,620 (16.1)	3,965 (17.6)	4,575 (20.4)	5,605 (24.9)	7,790 (34.7)	8,535 (38.0)	9,855 (43.8)	12,070 (53.7)
	6-3/4 (171)	9,690 (43.1)	10,615 (47.2)	12,255 (54.5)	14,735 (65.5)	20,870 (92.8)	22,860 (101.7)	26,395 (117.4)	31,740 (141.2)
	9 (229)	14,920 (66.4)	16,340 (72.7)	18,490 (82.2)	19,650 (87.4)	32,130 (142.9)	35,195 (156.6)	39,820 (177.1)	42,320 (188.2)
	15 (381)	28,715 (127.7)	29,510 (131.3)	30,815 (137.1)	32,745 (145.7)	61,850 (275.1)	63,565 (282.7)	66,370 (295.2)	70,530 (313.7)
7/8[10]	3-1/2 (89)	3,620 (16.1)	3,965 (17.6)	4,575 (20.4)	5,605 (24.9)	7,790 (34.7)	8,535 (38.0)	9,855 (43.8)	12,070 (53.7)
	7-7/8 (200)	12,210 (54.3)	13,375 (59.5)	15,445 (68.7)	18,915 (84.1)	26,300 (117.0)	28,810 (128.2)	33,265 (148.0)	40,740 (181.2)
	10-1/2 (267)	18,800 (83.6)	20,590 (91.6)	23,780 (105.8)	26,530 (118.0)	40,490 (180.1)	44,355 (197.3)	51,215 (227.8)	57,140 (254.2)
	17-1/2 (445)	38,775 (172.5)	39,850 (177.3)	41,605 (185.1)	44,215 (196.7)	83,510 (371.5)	85,825 (381.8)	89,610 (398.6)	95,230 (423.6)
1	4 (102)	4,420 (19.7)	4,840 (21.5)	5,590 (24.9)	6,845 (30.4)	9,520 (42.3)	10,430 (46.4)	12,040 (53.6)	14,750 (65.6)
	9 (229)	14,920 (66.4)	16,340 (72.7)	18,870 (83.9)	23,110 (102.8)	32,130 (142.9)	35,195 (156.6)	40,640 (180.8)	49,775 (221.4)
	12 (305)	22,965 (102.2)	25,160 (111.9)	29,050 (129.2)	34,650 (154.1)	49,465 (220.0)	54,190 (241.0)	62,570 (278.3)	74,630 (332.0)
	20 (508)	49,415 (219.8)	52,045 (231.5)	54,340 (241.7)	57,750 (256.9)	106,435 (473.4)	112,100 (498.6)	117,045 (520.6)	124,385 (553.2)
1-1/4[10]	5 (127)	6,175 (27.5)	6,765 (30.1)	7,815 (34.8)	9,570 (42.6)	13,305 (59.2)	14,575 (64.8)	16,830 (74.9)	20,610 (91.7)
	11-1/4 (286)	20,850 (92.7)	22,840 (101.6)	26,370 (117.3)	32,295 (143.7)	44,905 (199.7)	49,190 (218.8)	56,800 (252.7)	69,565 (309.4)
	15 (381)	32,095 (142.8)	35,160 (156.4)	40,600 (180.6)	49,725 (221.2)	69,135 (307.5)	75,730 (336.9)	87,445 (389.0)	107,100 (476.4)
	25 (635)	69,060 (307.2)	75,655 (336.5)	80,800 (359.4)	85,865 (381.9)	148,750 (661.7)	162,945 (724.8)	174,030 (774.1)	184,945 (822.7)

1 See Section 3.1.8.8 for explanation on development of load values.
2 See Section 3.1.8.9 to convert design strength value to ASD value.
3 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
4 Apply spacing, edge distance, and concrete thickness factors in tables 30-41 as necessary to the above values. Compare to the steel values in table 29. The lesser of the values is to be used for the design.
5 Data is for temperature range A: Max. short term temperature = 130°F (55°C), max. long term temperature = 110°F (43°C).
For temperature range B: Max. short term temperature = 176°F (80°C), max. long term temperature = 110°F (43°C) multiply above values by 0.69.
Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.
6 Tabular values are for dry or water saturated concrete conditions.
For water-filled drilled holes multiply design strength by 0.51.
For submerged (under water) applications multiply design strength by 0.44.
7 Tabular values are for short term loads only. For sustained loads including overhead use, see Section 3.1.8.8.
8 Tabular values are for normal-weight concrete only. For lightweight concrete multiply design strength by λ_a as follows:
For sand-lightweight, λ_a = 0.51. For all-lightweight, λ_a = 0.45.
9 Tabular values are for holes drilled in concrete with carbide tipped hammer drill bit. Diamond core drilling is not permitted in cracked concrete conditions except as indicated in note 10.
10 Diamond core drilling with Hilti TE-YRT roughening tool is permitted for 3/4", 7/8", and 1 1/4" diameter anchors for dry and water-saturated concrete conditions. See Table 28
11 Tabular values are for static loads only. For seismic loads, multiply cracked concrete tabular values in tension and shear by α_{seis} indicated below.
See section 3.1.8.7 for additional information on seismic applications.
3/8-in. diameter - α_{seis} = 0.69
1/2-in. diameter - α_{seis} = 0.70
5/8-in. diameter - α_{seis} = 0.71
3/4-in. diameter and larger - α_{seis} = 0.75

NOTE: VALUES OBTAINED WERE THROUGH DOUBLE POLYNOMIAL INTERPOLATION (SEE ATTACHED)

HIT-RE 500 V3 Epoxy Adhesive Anchoring System 3.2.4

Table 42 - Load adjustment factors for 1-1/4-in. diameter threaded rods in uncracked concrete[1,2,3]

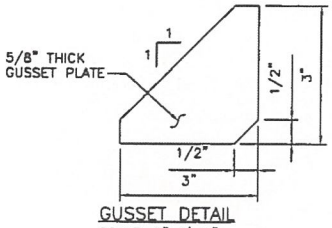
1-1/4-in. uncracked concrete		Spacing factor in tension f_{AN}				Edge distance factor in tension f_{RN}				Spacing factor in shear[4] f_{AV}				Edge distance in shear: ⊥ Toward edge f_{RV}				Edge distance in shear: ∥ To and away from edge f_{RV}				Concrete thickness factor in shear[5] f_{HV}			
Embedment h_{ef}	in. (mm)	5 (127)	11-1/4 (286)	15 (381)	25 (635)	5 (127)	11-1/4 (286)	15 (381)	25 (635)	5 (127)	11-1/4 (286)	15 (381)	25 (635)	5 (127)	11-1/4 (286)	15 (381)	25 (635)	5 (127)	11-1/4 (286)	15 (381)	25 (635)	5 (127)	11-1/4 (286)	15 (381)	25 (635)
Spacing (s) / Edge Distance (c_a) / Concrete Thickness (h), - in. (mm)	1-3/4 (44)	n/a	n/a	n/a	n/a	0.37	0.24	0.17	0.09	n/a	n/a	n/a	n/a	0.05	0.02	0.01	0.00	0.11	0.03	0.02	0.01	n/a	n/a	n/a	n/a
	6-1/4 (159)	0.59	0.59	0.57	0.54	0.54	0.33	0.24	0.13	0.59	0.54	0.53	0.52	0.37	0.11	0.07	0.03	0.67	0.22	0.14	0.07	n/a	n/a	n/a	n/a
	7 (178)	0.60	0.60	0.58	0.55	0.57	0.35	0.25	0.13	0.60	0.54	0.53	0.52	0.43	0.13	0.08	0.04	0.73	0.26	0.17	0.08	n/a	n/a	n/a	n/a
	8 (203)	0.61	0.61	0.59	0.55	0.61	0.37	0.26	0.14	0.61	0.55	0.54	0.52	0.53	0.16	0.10	0.05	0.82	0.31	0.20	0.10	0.66	n/a	n/a	n/a
	9 (229)	0.63	0.63	0.60	0.56	0.64	0.39	0.28	0.15	0.62	0.55	0.54	0.52	0.63	0.19	0.12	0.06	0.93	0.38	0.24	0.11	0.70	n/a	n/a	n/a
	10 (254)	0.64	0.64	0.61	0.57	0.68	0.41	0.29	0.16	0.64	0.56	0.55	0.53	0.74	0.22	0.14	0.07	1.00	0.41	0.29	0.13	0.74	n/a	n/a	n/a
	11 (279)	0.65	0.65	0.62	0.57	0.72	0.44	0.31	0.17	0.65	0.57	0.55	0.53	0.86	0.25	0.16	0.08		0.44	0.33	0.15	0.78	n/a	n/a	n/a
	12 (305)	0.67	0.67	0.63	0.58	0.76	0.46	0.33	0.18	0.66	0.57	0.55	0.53	0.98	0.29	0.19	0.09		0.46	0.36	0.17	0.81	n/a	n/a	n/a
	13 (330)	0.68	0.68	0.64	0.59	0.80	0.49	0.35	0.19	0.68	0.58	0.56	0.54	1.00	0.33	0.21	0.10		0.49	0.38	0.20	0.84	n/a	n/a	n/a
	14 (356)	0.70	0.70	0.66	0.59	0.84	0.52	0.36	0.20	0.69	0.59	0.56	0.54		0.36	0.24	0.11		0.52	0.40	0.22	0.87	0.58	n/a	n/a
	14-1/4 (362)	0.70	0.70	0.66	0.60	0.85	0.52	0.37	0.20	0.69	0.59	0.56	0.54		0.37	0.24	0.11		0.52	0.40	0.23	0.88	0.59	n/a	n/a
	15 (381)	0.71	0.71	0.67	0.60	0.88	0.54	0.38	0.21	0.70	0.59	0.57	0.54		0.40	0.26	0.12		0.54	0.41	0.24	0.91	0.60	n/a	n/a
	16 (406)	0.72	0.72	0.68	0.61	0.92	0.57	0.40	0.22	0.72	0.60	0.57	0.54		0.45	0.29	0.13		0.57	0.43	0.27	0.94	0.62	n/a	n/a
	17 (432)	0.74	0.74	0.69	0.61	0.96	0.60	0.42	0.23	0.73	0.60	0.58	0.55		0.49	0.32	0.15		0.60	0.45	0.29	0.96	0.64	n/a	n/a
	18 (457)	0.75	0.75	0.70	0.62	1.00	0.63	0.44	0.24	0.75	0.61	0.58	0.55		0.53	0.35	0.16		0.63	0.47	0.31	0.99	0.66	0.57	n/a
	20 (508)	0.78	0.78	0.72	0.63		0.70	0.49	0.27	0.77	0.62	0.59	0.55		0.62	0.40	0.19		0.70	0.50	0.33	1.00	0.70	0.60	n/a
	22 (559)	0.81	0.81	0.74	0.65		0.77	0.54	0.29	0.80	0.63	0.60	0.56		0.72	0.47	0.22		0.77	0.54	0.35		0.73	0.63	n/a
	24 (610)	0.84	0.84	0.77	0.66		0.84	0.59	0.32	0.83	0.65	0.61	0.57		0.82	0.53	0.25		0.84	0.59	0.36		0.76	0.66	n/a
	26 (660)	0.87	0.87	0.79	0.67		0.91	0.64	0.34	0.86	0.66	0.62	0.57		0.92	0.60	0.28		0.91	0.64	0.38		0.79	0.69	n/a
	28 (711)	0.89	0.89	0.81	0.69		0.98	0.68	0.37	0.88	0.67	0.63	0.58		1.00	0.67	0.31		0.98	0.68	0.40		0.82	0.71	0.55
	30 (762)	0.92	0.92	0.83	0.70		1.00	0.73	0.40	0.91	0.68	0.64	0.58			0.74	0.35		1.00	0.73	0.42		0.85	0.74	0.57
	36 (914)	1.00	1.00	0.90	0.74			0.88	0.48	0.99	0.72	0.66	0.60			0.98	0.45			0.88	0.48		0.94	0.81	0.63
	> 48 (1219)			1.00	0.82			1.00	0.64	1.00	0.79	0.72	0.63			1.00	0.70			1.00	0.64		1.00	0.94	0.72

3.2.4

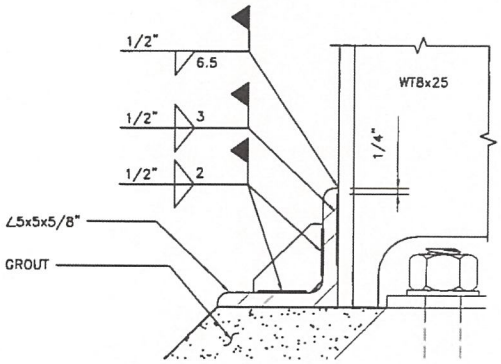
Table 43 - Load adjustment factors for 1-1/4-in. diameter threaded rods in cracked concrete[1,2,3]

1-1/4-in. cracked concrete		Spacing factor in tension f_{AN}				Edge distance factor in tension f_{RN}				Spacing factor in shear[4] f_{AV}				Edge distance in shear: ⊥ Toward edge f_{RV}				Edge distance in shear: ∥ To and away from edge f_{RV}				Concrete thickness factor in shear[5] f_{HV}			
Embedment h_{ef}	in. (mm)	5 (127)	11-1/4 (286)	15 (381)	25 (635)	5 (127)	11-1/4 (286)	15 (381)	25 (635)	5 (127)	11-1/4 (286)	15 (381)	25 (635)	5 (127)	11-1/4 (286)	15 (381)	25 (635)	5 (127)	11-1/4 (286)	15 (381)	25 (635)	5 (127)	11-1/4 (286)	15 (381)	25 (635)
Spacing (s) / Edge Distance (c_a) / Concrete Thickness (h), - in. (mm)	1-3/4 (44)	n/a	n/a	n/a	n/a	0.40	0.40	0.39	0.37	n/a	n/a	n/a	n/a	0.05	0.02	0.01	0.00	0.11	0.03	0.02	0.01	n/a	n/a	n/a	n/a
	6-1/4 (159)	0.59	0.59	0.57	0.54	0.54	0.54	0.50	0.44	0.59	0.54	0.53	0.52	0.37	0.11	0.07	0.03	0.74	0.22	0.14	0.07	n/a	n/a	n/a	n/a
	7 (178)	0.60	0.60	0.58	0.55	0.57	0.57	0.52	0.45	0.60	0.54	0.53	0.52	0.44	0.13	0.08	0.04	0.88	0.26	0.17	0.08	n/a	n/a	n/a	n/a
	8 (203)	0.61	0.61	0.59	0.55	0.61	0.61	0.55	0.46	0.61	0.55	0.54	0.52	0.54	0.16	0.10	0.05	1.00	0.32	0.21	0.10	0.66	n/a	n/a	n/a
	9 (229)	0.63	0.63	0.60	0.56	0.64	0.64	0.57	0.48	0.62	0.55	0.54	0.52	0.64	0.19	0.12	0.06		0.38	0.25	0.11	0.70	n/a	n/a	n/a
	10 (254)	0.64	0.64	0.61	0.57	0.68	0.68	0.60	0.49	0.64	0.56	0.55	0.53	0.75	0.22	0.14	0.07		0.44	0.29	0.13	0.74	n/a	n/a	n/a
	11 (279)	0.65	0.65	0.62	0.57	0.72	0.72	0.63	0.51	0.65	0.57	0.55	0.53	0.86	0.26	0.17	0.08		0.51	0.33	0.15	0.78	n/a	n/a	n/a
	12 (305)	0.67	0.67	0.63	0.58	0.76	0.76	0.66	0.53	0.66	0.57	0.55	0.53	0.98	0.29	0.19	0.09		0.58	0.38	0.18	0.81	n/a	n/a	n/a
	13 (330)	0.68	0.68	0.64	0.59	0.80	0.80	0.69	0.54	0.68	0.58	0.56	0.54	1.00	0.33	0.21	0.10		0.66	0.43	0.20	0.85	n/a	n/a	n/a
	14 (356)	0.70	0.70	0.66	0.59	0.84	0.84	0.72	0.56	0.69	0.59	0.56	0.54		0.37	0.24	0.11		0.73	0.48	0.22	0.88	0.58	n/a	n/a
	14-1/4 (362)	0.70	0.70	0.66	0.60	0.85	0.85	0.73	0.56	0.70	0.59	0.57	0.54		0.38	0.25	0.11		0.75	0.49	0.23	0.89	0.59	n/a	n/a
	15 (381)	0.71	0.71	0.67	0.60	0.88	0.88	0.75	0.57	0.71	0.59	0.57	0.54		0.41	0.26	0.12		0.82	0.53	0.25	0.91	0.61	n/a	n/a
	16 (406)	0.72	0.72	0.68	0.61	0.92	0.92	0.78	0.59	0.72	0.60	0.57	0.54		0.45	0.29	0.14		0.90	0.58	0.27	0.94	0.63	n/a	n/a
	17 (432)	0.74	0.74	0.69	0.61	0.96	0.96	0.81	0.61	0.73	0.60	0.58	0.55		0.49	0.32	0.15		0.98	0.64	0.30	0.97	0.64	n/a	n/a
	18 (457)	0.75	0.75	0.70	0.62	1.00	1.00	0.85	0.62	0.75	0.61	0.58	0.55		0.54	0.35	0.16		1.00	0.70	0.32	0.99	0.66	0.57	n/a
	20 (508)	0.78	0.78	0.72	0.63			0.91	0.66	0.77	0.62	0.59	0.55		0.63	0.41	0.19			0.82	0.38	1.00	0.70	0.61	n/a
	22 (559)	0.81	0.81	0.74	0.65			0.98	0.69	0.80	0.63	0.60	0.56		0.72	0.47	0.22			0.94	0.44		0.73	0.63	n/a
	24 (610)	0.84	0.84	0.77	0.66			1.00	0.73	0.83	0.65	0.61	0.57		0.82	0.54	0.25			1.00	0.50		0.77	0.66	n/a
	26 (660)	0.87	0.87	0.79	0.67				0.77	0.86	0.66	0.62	0.57		0.93	0.60	0.28				0.56		0.80	0.69	n/a
	28 (711)	0.89	0.89	0.81	0.69				0.81	0.88	0.67	0.63	0.58		1.00	0.68	0.31				0.63		0.83	0.72	0.55
	30 (762)	0.92	0.92	0.83	0.70				0.85	0.91	0.68	0.64	0.58			0.75	0.35				0.70		0.86	0.74	0.57
	36 (914)	1.00	1.00	0.90	0.74				0.97	0.99	0.72	0.66	0.60			0.98	0.46				0.91		0.94	0.81	0.63
	> 48 (1219)			1.00	0.82				1.00	1.00	0.79	0.72	0.63			1.00	0.70				1.00		1.00	0.94	0.73

1 Linear interpolation not permitted.
2 Shaded area with reduced edge distance is permitted provided the installation torque is reduced to 0.30 T_{max} for 5d ≤ s ≤ 16-in. and to 0.5 T_{max} for s > 16-in.
3 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with a thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using the design equations from ACI 318 Chapter 17.
4 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.
5 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

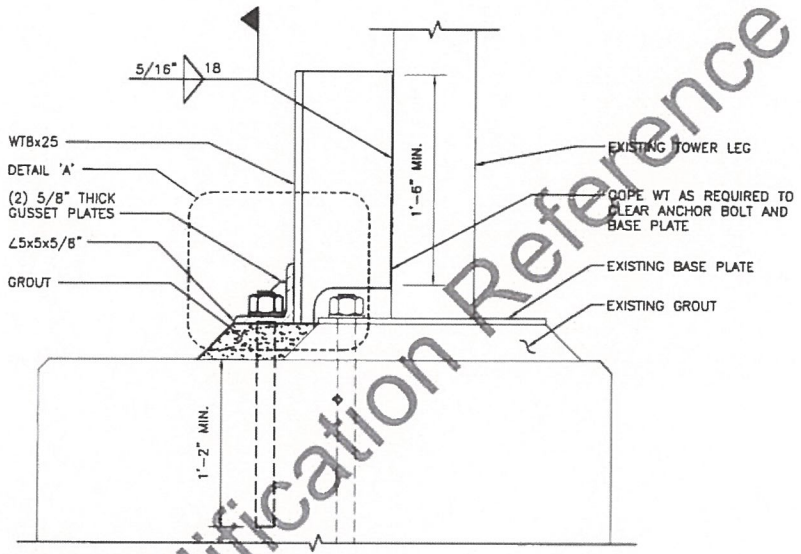


GUSSET DETAIL
SCALE: 3"=1'-0"

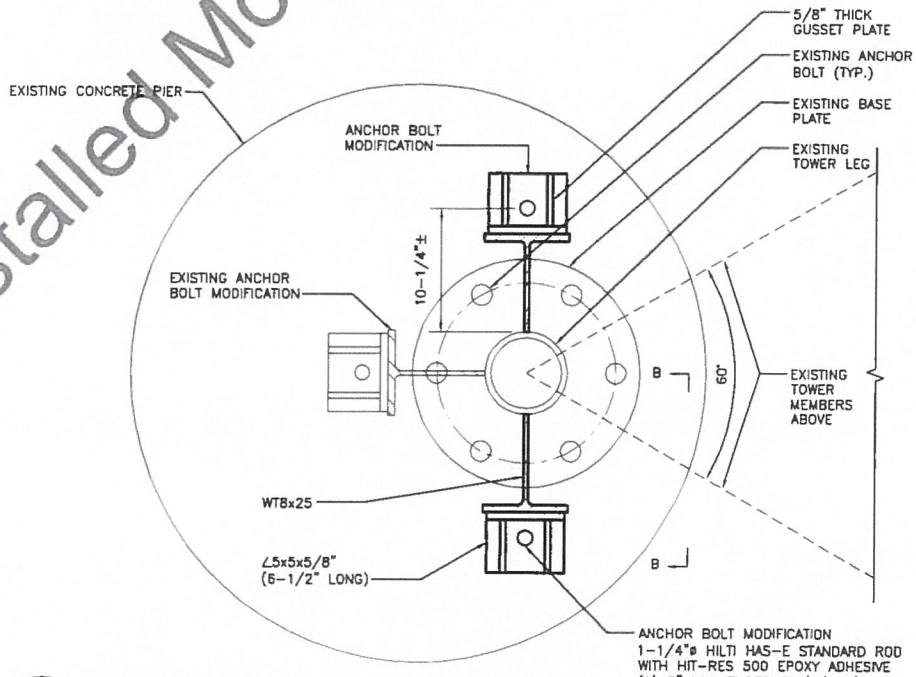


DETAIL 'A'
SCALE: 1 1/2"=1'-0"

NOTE:
ANCHOR BOLT NOT SHOWN FOR CLARITY



2 / SK-4 SECTION B-B
SCALE: 3/4" = 1'-0"



1 / SK-4 ANCHOR BOLT MODIFICATION PLAN
SCALE: 3/4" = 1'-0"

PROJECT NO.	36931389
Designed by:	MCD
Drawn by:	KAP
Checked by:	KAB
Approved by:	RAS

AECOM
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
(860)-529-8882

T-Mobile

SITE ADDRESS: T-MOBILE SITE: CT11033E
CSP #36, 315 SPENCER PLAINS ROAD
WESTBROOK, CONNECTICUT 06498

REV.	DATE:	DESCRIPTION

Scale: AS NOTED | Date: 04/08/15
Job No. NSS-015 | File No.

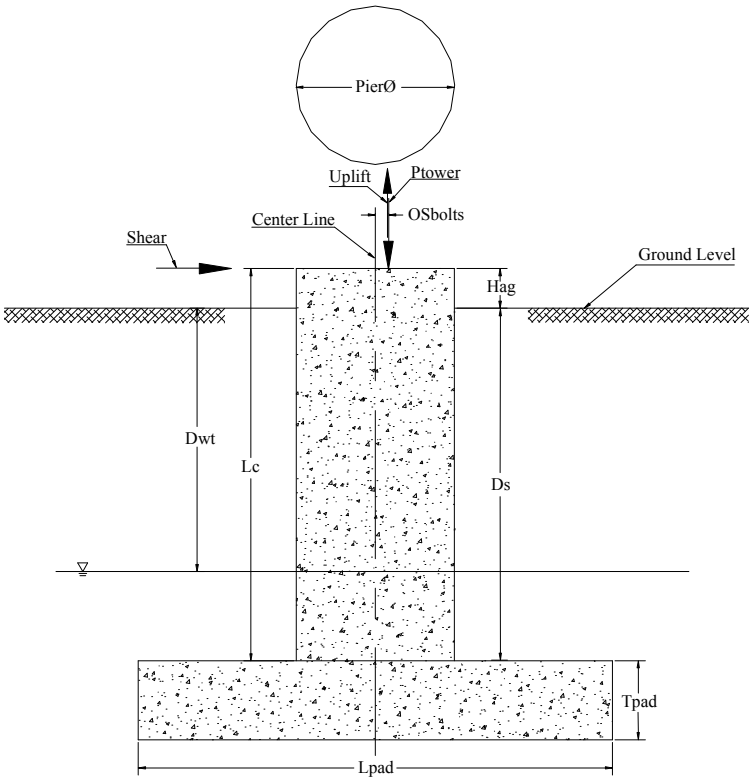
Dwg. No. SK-4

FOUNDATION ANALYSIS

AECOM

Job	180' Stainless Lattice Tower - Westbrook, CT	Project No.	TWM-012 Rev.1	Page / Sheet	1 of 4
Description	Pier and Square Mat Foundation Analysis	Computed by	MCD	Date	06/21/19
	TIA-222-G	Checked by		Date	

DEFINE VARIABLES



$f'_c := 3 \cdot ksi$

$f_y := 60 \cdot ksi$

Max Compressive Force of Tower: $P_{Tower} := 532.535 \cdot kip$

Max Uplift Force of Tower: $Uplift := 465.644 \cdot kip$

Max Shear at Base of Tower: $Shear := 63.440 \cdot kip$

Diameter of Pier: $Pier\phi := 4 \cdot ft + 2ft$

Length of Pier: $L_c := 11 \cdot ft - 0ft$

Height of Pier Above Grade: $H_{ag} := 1.0 \cdot ft$

Length of Pad: $L_{Pad} := 16.25 \cdot ft$

Thickness of Pad: $T_{Pad} := 2.0 \cdot ft + 0ft$

Distance to Water Table: $D_{wt} := 999 \cdot ft$

NOTE: SET Dwt TO A VALUE GREATER THAN TOTAL DEPTH OF PAD IF WATER TABLE DOES NOT AFFECT FOOTING

Eccentricity of Anchor Bolts from Center Line of Pier: $OS_{bolts} := 9 \cdot in$

Diameter of Reinforcing Bars in Pad: $d_{bar} := 1.00 \cdot in$

Soil Internal Friction Angle: $\phi := 34 \cdot deg$

Ultimate Soil Pressure: $q_u := 6.0 \cdot ksf$

$\gamma_s := 110 \cdot \frac{lb}{ft^3}$ $\gamma_c := 150 \cdot \frac{lb}{ft^3}$ $\gamma_w := 62.4 \cdot \frac{lb}{ft^3}$

Active Pressure of Soil Acting along Length of Pier: $K_a := \frac{1 - \sin(\phi)}{1 + \sin(\phi)}$ $P_{Active} := \frac{1}{2} \cdot (L_c + T_{Pad})^2 \cdot Pier\phi \cdot \gamma_s \cdot K_a$ $P_{Active} = 15.77 \cdot kip$

Passive Pressure of Soil Acting along Length of Pier: $K_p := \frac{1 + \sin(\phi)}{1 - \sin(\phi)}$ $P_{Passive} := \frac{1}{2} \cdot (L_c + T_{Pad})^2 \cdot Pier\phi \cdot \gamma_s \cdot K_p$ $P_{Passive} = 197.27 \cdot kip$

Distance from Grade to Bottom of Pier: $D_s := L_c - H_{ag}$ $D_s = 10\,ft$

Area and Volume of Pier: $A_c := \frac{\pi \cdot Pier\phi^2}{4}$ $V_c := A_c \cdot L_c$ $V_c = 311.02\,ft^3$

Area and Volume of Pad: $A_p := L_{Pad}^2$ $V_p := T_{Pad} \cdot A_p$ $V_p = 528.13\,ft^3$

ULTIMATE SOIL PRESSURE

Assume water table is below bottom of footing

$D_{wtp} := if\left[\left(D_s + T_{Pad}\right) > D_{wt}, T_{Pad}, 0\cdot ft\right]$ $D_{wtp} = 0\,ft$

$W_p := \left(V_p\cdot\gamma_c\right) - D_{wtp}\cdot A_p\cdot\gamma_w$ $W_p = 79.22\cdot kip$

$D_{wtc} := if\left[D_s < D_{wt}, 0\cdot ft, \left(D_s - D_{wt}\right)\right]$ $D_{wtc} = 0\,ft$

$W_c := \left(V_c\cdot\gamma_c\right) - D_{wtc}\cdot A_c\cdot\gamma_w$ $W_c = 46.65\cdot kip$

$W_s := \left[\left(D_s\right)\cdot\left(A_p - A_c\right)\cdot\gamma_s\right]$ $W_s = 259.37\cdot kip$

$P_{Total} := W_p + W_c + W_s + P_{Tower}$ $P_{Total} = 917.77\cdot kip$

$q_{gr} := \frac{P_{Total}}{A_p}$ $q_{gr} = 3.48\cdot ksf$

$q_n := q_{gr} - \left(D_s + T_{Pad}\right)\cdot\gamma_s$ $q_n = 2.16\cdot ksf$

$SoilPressure := if\left(q_n < q_u\cdot 0.60, \text{"Okay"}, \text{"No Good"}\right)$

ANSI/TIA-222-G Reduction Factor
(Section 9.4.1(c)) (0.60 - Bearing)

$SoilPressure = \text{"Okay"}$

PUNCHING SHEAR

Critical section is located at a distance d/2 from the face of Pier

$$p_u := \left(\frac{P_{Tower} + V_c\cdot\gamma_c}{L_{Pad}^{\,2}}\right) + \left[\frac{Shear\cdot\left(L_c + T_{Pad}\right) + P_{Tower}\cdot OS_{bolts} + \left(P_{Active} - P_{Passive}\right)\cdot\frac{L_c + T_{Pad}}{3}}{\frac{1}{6}\cdot L_{Pad}^{\,3}}\right]$$

$p_u = 2.81\cdot ksf$

$d := T_{Pad} - \left(3\cdot in + d_{bar}\right)$ $d = 20\cdot in$

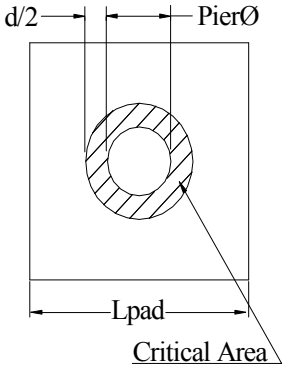
$b_o := (Pier\phi + d)\cdot\pi$ $b_o = 24.09\,ft$

$$Aout_{bo} := L_{Pad}^{\,2} - \frac{\pi\cdot(Pier\phi + d)^2}{4}$$

$Aout_{bo} = 217.9\,ft^2$

$V_u := Aout_{bo}\cdot p_u$ $V_u = 611.27\cdot kip$

$$\phi V_c := 0.75\cdot 4\cdot\sqrt{f'_c\cdot\frac{lb}{in^2}}\cdot b_o\cdot d \quad \phi V_c = 949.84\cdot kip$$



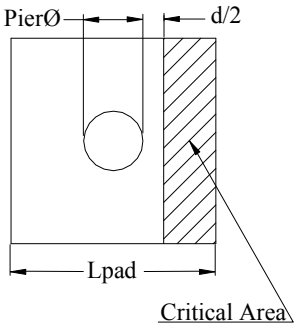
$PunchingShear := if\left(V_u < \phi V_c, \text{"Okay"}, \text{"No Good "}\right)$ $PunchingShear = \text{"Okay"}$

BEAM SHEAR

Critical section is located at a distance d/2 from the face of the Pier

$$V_u := p_u \cdot L_{Pad} \cdot \left(\frac{L_{Pad} - Pier\phi}{2} - \frac{d}{2} \right) \qquad V_u = 195.64 \cdot kip$$

$$\phi V_c := 0.75 \cdot 2 \cdot \sqrt{f'_c \cdot \frac{lb}{in^2}} \cdot L_{Pad} \cdot d \qquad \phi V_c = 320.42 \cdot kip$$



$$BeamShear := if\left(V_u < \phi V_c, "Okay", "No\ Good"\right)$$

$$BeamShear = "Okay"$$

ACI 2011 Reduction Factor (0.75) for Beam Shear and Punching Shear - Permissible by TIA-222-G Standard Section 9.4.2.

BENDING

Critical section extends across width of footing at the face of Pier

$$A_{bar} := 0.785 \cdot in^2 \qquad NoOfBar := 20$$

$$As_{provided} := NoOfBar \cdot A_{bar} \qquad As_{provided} = 15.7 \cdot in^2$$

$$M_{Req} := p_u \cdot L_{Pad} \cdot \left(\frac{L_{Pad} - Pier\phi}{2} \right)^2 \cdot \frac{1}{2}$$

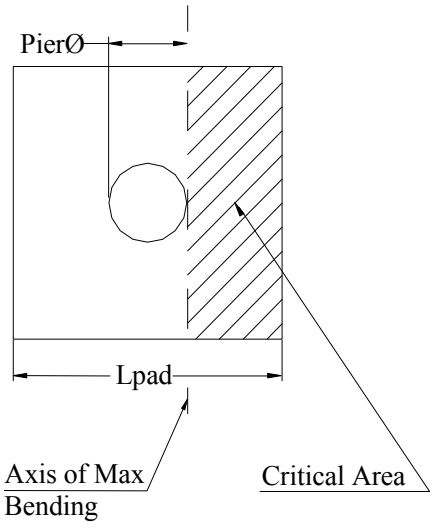
$$M_{Req} = 598.67 \cdot kip \cdot ft$$

$$a := \frac{As_{provided} \cdot f_y}{0.85 \cdot f'_c \cdot L_{Pad}}$$

$$a = 1.89 \cdot in$$

$$M_{Avail} := 0.9 \left[As_{provided} \cdot f_y \cdot \left(d - \frac{a}{2} \right) \right]$$

$$M_{Avail} = 1346.08 \cdot kip \cdot ft$$



$$Bending := if\left(M_{Avail} > M_{Req}, "Okay", "No\ Good"\right)$$

$$Bending = "Okay"$$

ACI 2011 Reduction Factor (0.90) for Concrete Bending Moment) - Permissible by TIA-222-G Standard Section 9.4.2. Considering Tension Control within concrete

UPLIFT

$$Soil_1 := \left[\left(D_s\right)\cdot\left(L_{Pad}{}^2 - A_c\right)\cdot\gamma_s\right]$$

$$Soil_2 := 4\cdot\left[\left(D_s + T_{Pad}\right)^2\cdot L_{Pad}\cdot\frac{\tan(\phi)}{2}\right]\cdot\gamma_s$$

$$Soil_3 := 4\cdot\left[\left(D_s + T_{Pad}\right)^3\cdot\frac{\tan(\phi)^2}{3}\right]\cdot\gamma_s$$

$$WT_{soil} := Soil_1 + Soil_2 + Soil_3 \qquad WT_{soil} = 721.91\cdot kip$$

$$WT_{conc} := W_p + W_c \qquad WT_{conc} = 125.87\cdot kip$$

$$Uplift_{Res} := \left(WT_{soil} + WT_{conc}\right)\cdot 0.75 \qquad Uplift_{Res} = 635.84\cdot kip$$

ANSI/TIA-222-G Reduction Factor (0.75) (Section 9.4.1(c))

$$UpLiftCapacity_{Ult} := \frac{Uplift}{Uplift_{Res}} \qquad UpLiftCapacity_{Ult} = 0.732$$

$$UpliftCheck := if\left(Uplift < Uplift_{Res}, "Okay", "No Good"\right)$$

$UpliftCheck = "Okay"$

CHECK OVERTURNING MOMENT - FACTORED LOAD CONDITIONS

$$OTM := Shear\cdot\left(L_c + T_{Pad}\right) + Uplift\cdot\left(\frac{L_{Pad}}{2} - OS_{bolts}\right) + P_{Active}\cdot\frac{L_c + T_{Pad}}{3} \qquad OTM = 4.33\times 10^3\cdot kip\cdot f$$

$$RM := P_{Tower}\cdot\left(\frac{L_{Pad}}{2} - OS_{bolts}\right) + \left(WT_{conc} + Soil_1\right)\cdot\frac{L_{Pad}}{2} + P_{Passive}\cdot\frac{L_c + T_{Pad}}{3} \qquad RM = 7.91\times 10^3\cdot kip\cdot ft$$

$$Foundation_{OT} := \frac{OTM}{RM\cdot 0.75}$$

ANSI/TIA-222-G Reduction Factor (0.75) (Section 9.4.1(c))

$Foundation_{OT} = 0.73$

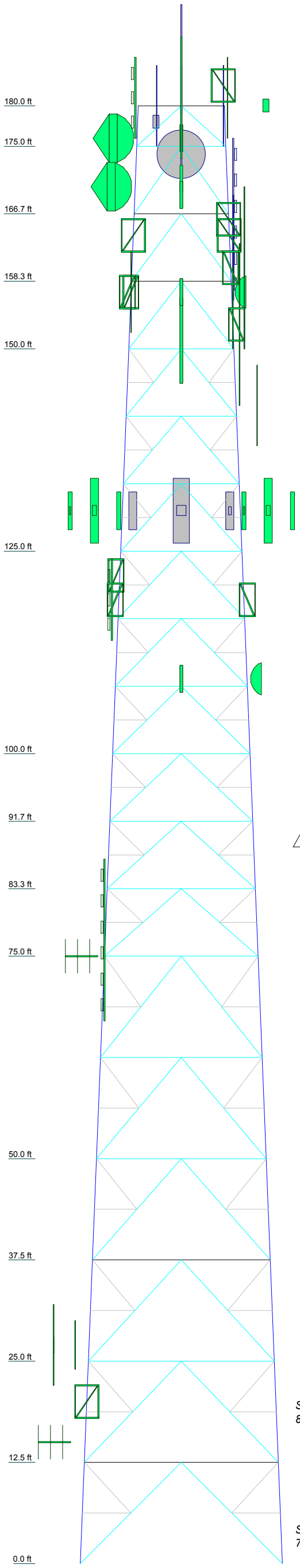
$$OTMCheck := if\left(Foundation_{OT} < 1.0, "Okay", "No Good"\right)$$

$OTMCheck = "Okay"$

ANALYSIS UNDER TIA-222-F DESIGN CRITERIA (DESPP / CSP)

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14
Section														
Legs		Stainless P5x0.250			Stainless P5x0.300	Stainless P5x0.400	A	1/3 Pipe w/ 5"x0.5 Stainless		Stainless P6.875x0.400		Stainless P6.875x0.500	B	
Leg Grade					A513-50			A500-42			A572-60		A500-46	
Diagonals		2L2 1/2x2x3/16			2L2 1/2x2x5/16	2L3x2 1/2x1/4				2L3 1/2x3 1/2x5/16		2L3 1/2x3 1/2x5/16		
Diagonal Grade					A36					A529-50		A529-50		
Top Girts	L3x3x1/4	N.A.	L2 1/2x2 1/2x3/16		L3x2 1/2x1/4			2L3x3x1/4		L4x4x1/4		L2 1/2x2 1/2x3/16		2L4x4x5/16
Horizontals	N.A.	C	N.A.			L3x3x5/16						N.A.		L4x4x3/8
Red. Horizontals	N.A.	N.A.	N.A.			L2x2x3/16						L2 1/2x2 1/2x3/16		
Red. Diagonals	N.A.	N.A.	N.A.			L2x2x3/16				L2 1/2x2 1/2x3/16			L3x3x1/4	
Inner Bracing						L2 1/2x2 1/2x3/16							L3x3x1/4	
Face Width (ft)	10.599	11	11.6667	12.3333	13		17	17.6667	18.3333	19	21	22	23	24
# Panels @ (ft)	1 @ 5					12 @ 8.33333						6 @ 12.5		
Weight (lb)	592.3	755.5	768.1	780.9	3994.8	4822.1	1971.3	2177.7	2217.6	6256.5	3450.3	3953.2	4249.9	4801.1

Total Weight (lb) 40791.2



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
3" Dia 20' Omni (DNK-57)	182.5	APXVTM14-C-120 Panel Antenna ((DNK 14-19)/Sprint)	137
6' Side-Arm(1) (DNK-57)	182.5	APXVTM14-C-120 Panel Antenna ((DNK 14-19)/Sprint)	137
6' Side-Arm(1) (DNK-57)	182.5	APXVTM14-C-120 Panel Antenna ((DNK 14-19)/Sprint)	137
1" Dia 8' Omni (DNK-58)	182	NNVV-65B-R4 Panel Antenna (Sprint)	137
2" Dia 10' Omni (DNK-52)	181	NNVV-65B-R4 Panel Antenna (Sprint)	137
2" Dia 10' Omni (DNK-53)	181	NNVV-65B-R4 Panel Antenna (Sprint)	137
10' - 2 Bay Dipole (DNK-54)	181	ALU TD-RRH-8x20-25 (Sprint)	137
20' 4-Bay Dipole (DNK-55)	181	ALU TD-RRH-8x20-25 (Sprint)	137
Lightning Rod 2"x15' (DNK-56)	181	ALU TD-RRH-8x20-25 (Sprint)	137
3" Dia 12' Omni (DNK-48)	180	(2) ALU 800MHz 2x50W (Sprint)	137
3" Dia 12' Omni (DNK-49)	180	(2) ALU 800MHz 2x50W (Sprint)	137
432E-83I-01T TTA Unit (DNK-50)	180	(2) ALU 800MHz 2x50W (Sprint)	137
1 Bay Dipole ANT400D (DNK-51)	180	ALU 4x45-1900 MHz RRH Unit (Sprint)	137
432E-83I-01T TTA Unit (DNK-47)	178	ALU 4x45-1900 MHz RRH Unit (Sprint)	137
3'4"x4" Pipe Mount (DNK-45)	176	ALU 4x45-1900 MHz RRH Unit (Sprint)	137
6' w/Radome (DNK-45)	176	SitePro1 USF12-396-U Mount Assembly w/ (3) 96" Mount Pipes (T-Mobile - Proposed)	130
6' w/Radome (DNK-44)	174	SitePro1 USF12-396-U Mount Assembly w/ (3) 96" Mount Pipes (T-Mobile - Proposed)	130
3'4"x4" Pipe Mount (DNK-44)	171	SitePro1 USF12-396-U Mount Assembly w/ (3) 96" Mount Pipes (T-Mobile - Proposed)	130
Andrew 6' w/Radome (DNK-43)	170	Ericsson AIR32 B66A/B2A Panel Antenna (T-Mobile - Proposed)	130
3'4"x4" Pipe Mount (DNK-43)	169	Ericsson AIR32 B66A/B2A Panel Antenna (T-Mobile - Proposed)	130
6' Side-Arm(1) (DNK-40,41)	166	Ericsson AIR32 B66A/B2A Panel Antenna (T-Mobile - Proposed)	130
6' Side-Arm(1) (DNK-40,41)	166	RFS APXVAARR24_43-U-NA20 Panel Antenna (T-Mobile - Proposed)	130
(inverted) 10' 8 Bay Di-Pole (DNK-40,41)	166	RFS APXVAARR24_43-U-NA20 Panel Antenna (T-Mobile - Proposed)	130
(inverted) 2" Dia 10' Omni (DNK-42)	164	RFS APXVAARR24_43-U-NA20 Panel Antenna (T-Mobile - Proposed)	130
6' Side-Arm(1) (DNK-42)	164	Ericsson 4449 B71 + B12 Radio Unit (T-Mobile - Proposed)	130
6' Side-Arm(1) (DNK-42)	164	Ericsson 4449 B71 + B12 Radio Unit (T-Mobile - Proposed)	130
(Inverted) 3" Dia 20' Omni (DNK-38)	160	Ericsson 4449 B71 + B12 Radio Unit (T-Mobile - Proposed)	130
2' Sidearm (DNK-38,39)	160	Ericsson 4449 B71 + B12 Radio Unit (T-Mobile - Proposed)	130
(Inverted) 3" Dia 20' Omni (DNK-39)	160	Ericsson AIR21 B2A|B4P Panel (T-Mobile - Proposed)	130
2" Dia 10' Omni (DNK-35)	157	Ericsson AIR21 B2A|B4P Panel (T-Mobile - Proposed)	130
2' Sidearm (DNK-35)	157	Ericsson AIR21 B2A|B4P Panel (T-Mobile - Proposed)	130
10'x6" Dipole Antenna (DNK-36)	157	Generic Twin TMA unit (T-Mobile - Proposed)	130
1' Side Arm (DNK-36)	157	Generic Twin TMA unit (T-Mobile - Proposed)	130
3'4"x4" Pipe Mount (DNK-37)	157	Generic Twin TMA unit (T-Mobile - Proposed)	130
4' Paraflector (DNK-37)	157	1' Side Arm (DNK-6,7)	122
3" Dia 20' Omni (DNK-33)	153	12' Dipole (DNK-9)	119
1' Side Arm (DNK-33)	153	1' Side Arm (DNK-9)	119
1.5" Dia 16' Omni (DNK-33)	153	1' Side Arm (DNK-10)	119
1 Bay Dipole ANT400D (DNK-34)	151	1'x1' Panel Antenna (DNK-10)	119
10'6"x4" Pipe Mount (DNK-34)	151	4' Paraflector (DNK-8)	109.25
Pirod 4' Side Mount Standoff (1) (DNK-32)	143	3'4"x4" Pipe Mount (DNK-8)	109.25
AM-X-CD-14-65-00T-RET ((DNK 19-32)/ATT)	143	3' Yagi (DNK-6)	76
Raycap Surge Suppressor ((DNK 19-32)/ATT)	143	20' 4-Bay Dipole (DNK-7)	76
RRUS-12 ((DNK 19-32)/ATT)	143	GPS (DNK-5)	75
RRUS-12 ((DNK 19-32)/ATT)	143	1" Dia Omni (DNK-4)	27
RRUS-12 ((DNK 19-32)/ATT)	143	(Inverted) 1" Dia Omni (DNK-3)	27
RRUS-11 ((DNK 19-32)/ATT)	143	2" Dia 8' Omni (DNK-2)	27
AM-X-CD-14-65-00T-RET ((DNK 19-32)/ATT)	143	Rohn 6' Side-Arm(1) (DNK-3,4)	26
AM-X-CD-14-65-00T-RET ((DNK 19-32)/ATT)	143	2' Standoff T-Arm (5' face width) (DNK 1,2)	20
(2) 7770 w mount pipe ((DNK 19-32)/ATT)	143	2' Yagi (DNK-1)	15
(2) TMA (shielded) ((DNK 19-32)/ATT)	143		
(2) TMA (shielded) ((DNK 19-32)/ATT)	143		
(2) TMA (shielded) ((DNK 19-32)/ATT)	143		
RRUS-11 ((DNK 19-32)/ATT)	143		
RRUS-11 ((DNK 19-32)/ATT)	143		
(2) 7770 w mount pipe ((DNK 19-32)/ATT)	143		
13' Sector Mount (1) ((DNK 19-32)/ATT)	143		
13' Sector Mount (1) ((DNK 19-32)/ATT)	143		
13' Sector Mount (1) ((DNK 19-32)/ATT)	143		
(2) 7770 w mount pipe ((DNK 19-32)/ATT)	143		
2" Dia 10' Omni (DNK-32)	143		
Pirod 12' PCS T-Frame (1) 104569 ((DNK 14-19)/Sprint)	137		
Pirod 12' PCS T-Frame (1) 104569 ((DNK 14-19)/Sprint)	137		
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SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Stainless P5x0.500	C	L2 1/2x2 1/2x3/16
B	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A513-50	50 ksi	66 ksi	A572-60	60 ksi	75 ksi
A36	36 ksi	58 ksi	A529-50	50 ksi	65 ksi
A500-42	42 ksi	58 ksi	A500-46	46 ksi	62 ksi

TOWER DESIGN NOTES

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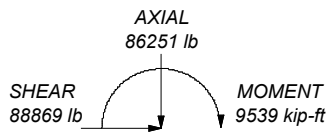
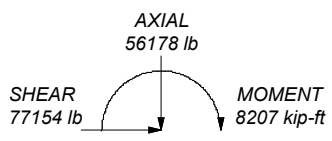
2. Tower is also designed for a 90 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 90 mph wind.
4. Inventory shown is based off of recent physical tower climb performed by D and K Nationwide Communications on March 19, 2016.

MAX. CORNER REACTIONS AT BASE:
DOWN: 469322 lb
SHEAR: 51491 lb

UPLIFT: -400136 lb
SHEAR: 46266 lb



TORQUE 89 kip-ft
90 mph WIND - 0.500 in ICE

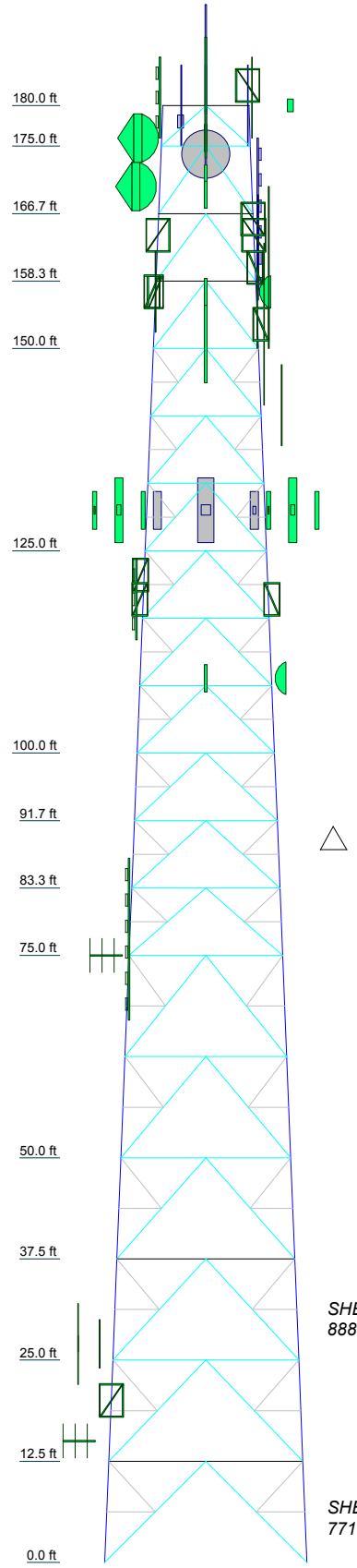


TORQUE 61 kip-ft
REACTIONS - 95 mph WIND

AECOM
500 Enterprise Drive, Suite 3B
Rocky Hill, CT
Phone: 860-529-8882
FAX: 860-529-3991

Job:	***MODification - 180' Lattice Tower (CSP #36)***		
Project:	***Westbrook, Connecticut - DESPP / CSP Load Analysis***		
Client: Transcend Wireless / T-Mobile / TWM-012R1		Drawn by: MCD	App'd:
Code: TIA/EIA-222-F		Date: 06/21/19	Scale: NTS
Path: P:\Projects\Telcom\Structurals\By Location\Connecticut\Westbrook\CSP#36\13-MODification_TWM-012\TIA-F\DESPP_CSP_Westbrook CSP.eri			Dwg No. E-1

Section		T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14
Legs		Stainless P5x0.250				Stainless P5x0.300	Stainless P5x0.400	A	B		Stainless P6.875x0.400	Stainless P6.875x0.500	Stainless P6.875x0.500	C	
Leg Grade						A513-50			A500-42		A572-60			A500-46	
Diagonals		2L2 1/2x2x3/16				2L2 1/2x2x5/16	2L3x2 1/2x1/4				2L3 1/2x3 1/2x5/16	2L3 1/2x3x5/16		2L3 1/2x3 1/2x5/16	
Diagonal Grade						A36					A529-50	A36		A529-50	
Top Girts			N.A.	N.A.	L2 1/2x2 1/2x3/16								2L4x4x1/4		2L4x5x5/16
Horizontals			E	N.A.	N.A.		L3x3x5/16		2L3x3x1/4		L4x4x1/4	L4x4x5/16	N.A.	L4x4x3/8	N.A.
Red. Horizontals			N.A.				L2x2x3/16					L2 1/2x2 1/2x3/16			
Red. Diagonals			N.A.				L2x2x3/16							L3x3x1/4	
Inner Bracing			N.A.				L2 1/2x2x3/16					L2 1/2x2 1/2x3/16		L3x3x1/4	
Face Width (ft)	25	11	11	11	13	13	15	17	17.6667	18.3333	19	21	22	23	24
# Panels @ (ft)		1 @ 5	12 @ 8.33333										6 @ 12.5		
Weight (lb)	40791.2	592.3	755.5	768.1	780.9	3994.8	4822.1	1971.3	2177.7	2217.6	6256.5	3450.3	3953.2	4249.9	4801.1



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Stainless P5x0.500	D	L3x3x1/4
B	1/3 Pipe w/ 5"x0.5 Stainless	E	L2 1/2x2 1/2x3/16
C	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook		

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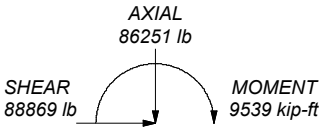
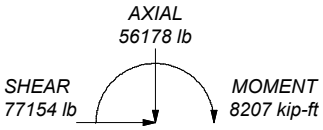


TORQUE 89 kip-ft
90 mph WIND - 0.500 in ICE



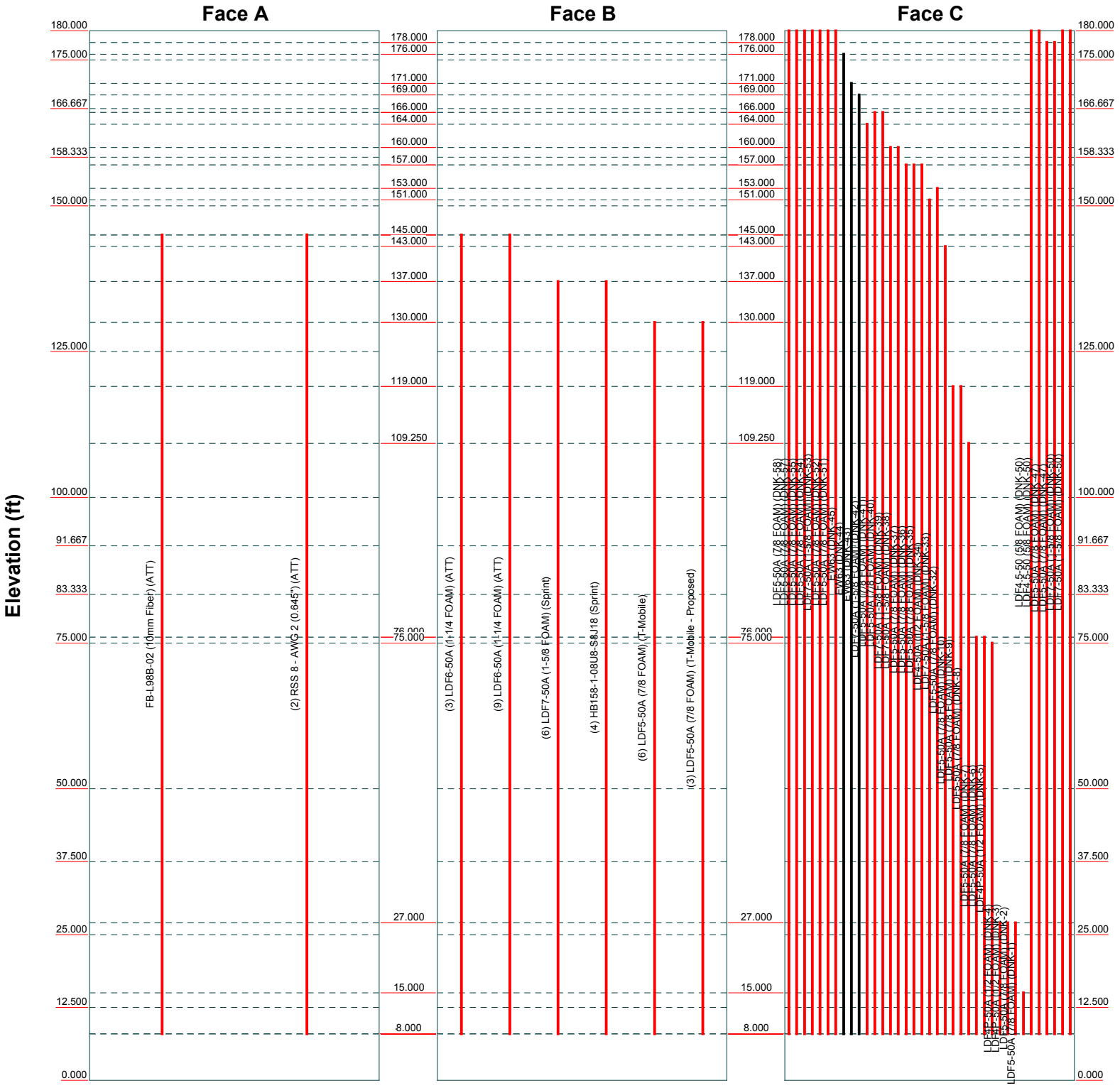
TORQUE 61 kip-ft
REACTIONS - 95 mph WIND

AECOM
500 Enterprise Drive, Suite 3B
Rocky Hill, CT
Phone: 860-529-8882
FAX: 860-529-3991

Job: ***MODification - 180' Lattice Tower (CSP #36)***			
Project: ***Westbrook, Connecticut - DESPP / CSP Load Analysis***			
Client: Transcend Wireless / T-Mobile / TWM-012R1	Drawn by: MCD	App'd:	
Code: TIA/EIA-222-F	Date: 06/21/19	Scale: NTS	
Path: P:\Projects\Telcom\StructuralsByLocation\Connecticut\Westbrook\CSP#36\13-MODification_TWM-012\TIA-F\DESPP_CSP_Westbrook CSP.eri		Dwg No. E-1	

Feed Line Distribution Chart
0' - 180'

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



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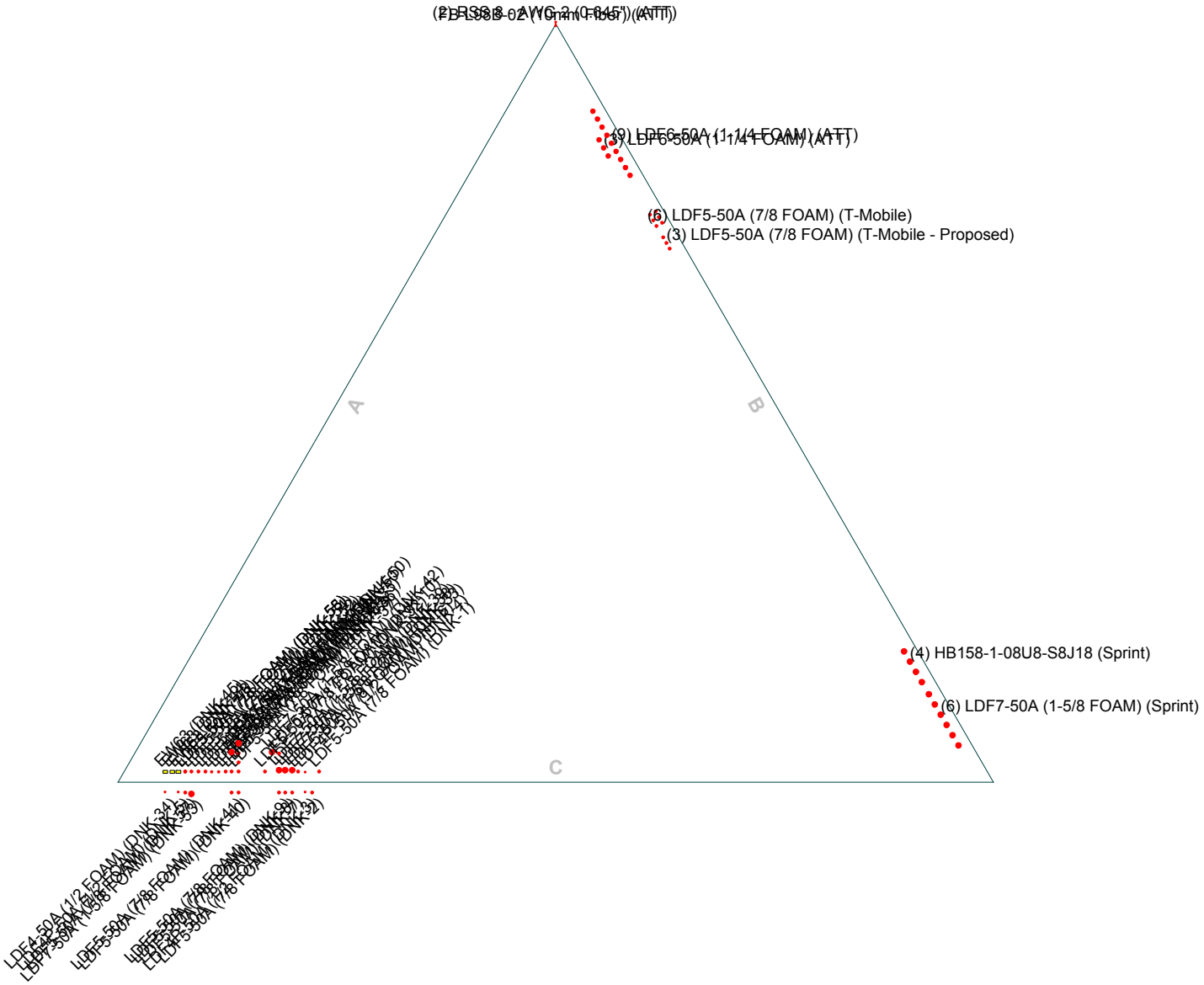
Code: TIA/EIA-222-F		Date: 06/21/19	Scale: NTS
Path: P:\Projects\Telcom\StructuralsByLocation\Connecticut\WestbrookCSP#36\13-MODification_TWM-012\TIA-F\DESPP_CSP_Westbrook CSP.eri			Dwg No. E-7

Feed Line Plan

Round Flat App In Face App Out Face



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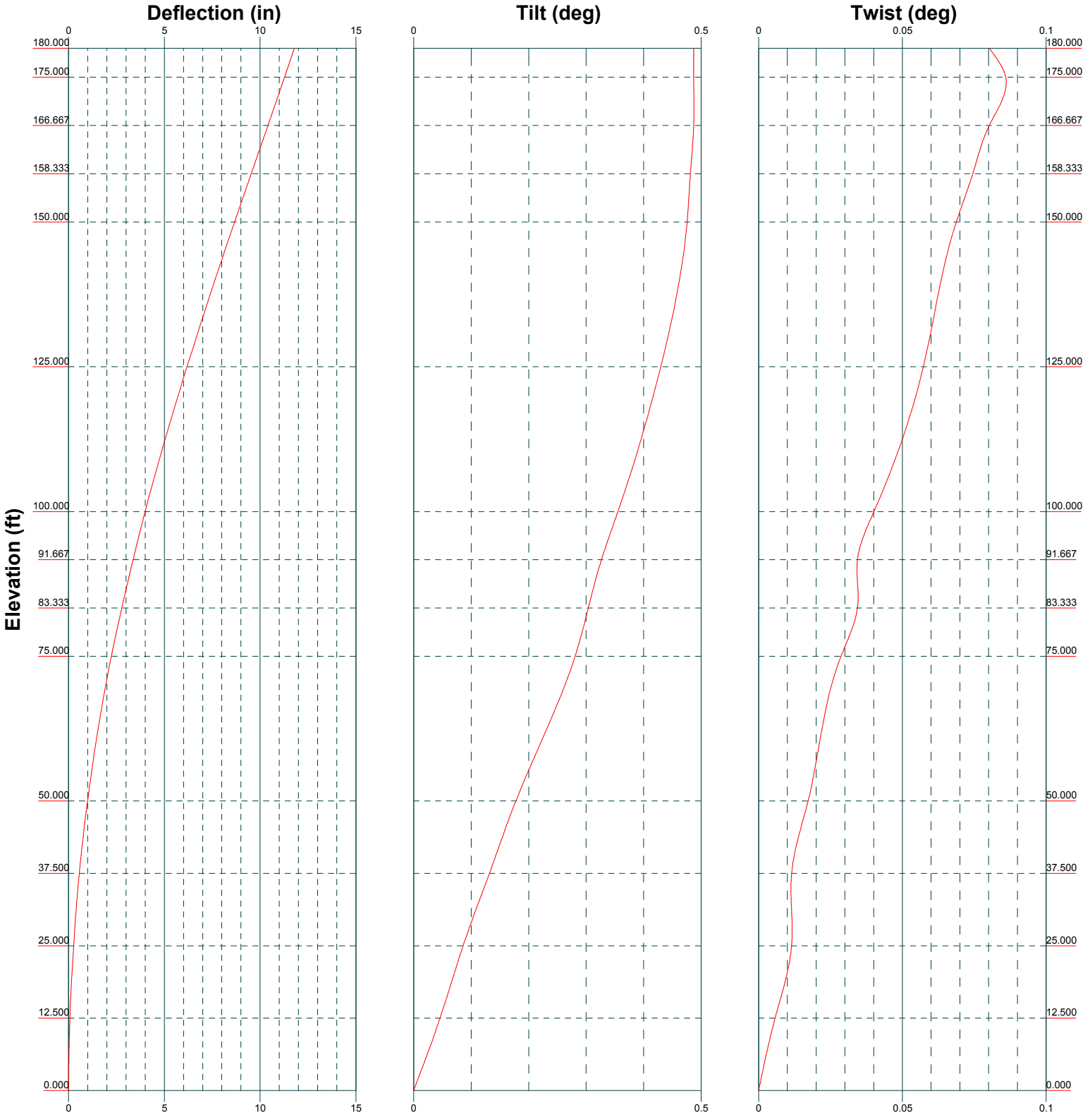
Path:	P:\Projects\Telcom\StructuralsByLocation\Connecticut\WestbrookCSP#36\13-MODification_TWM-012\TIA-F\DESPP_CSP_Westbrook CSP.eri		Dwg No. E-7

TIA/EIA-222-F - Service - 90 mph

Maximum Values



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Code: TIA/EIA-222-F	Date: 06/21/19	Scale: NTS	
Path: P:\Projects\Telcom\StructuralsByLocation\Connecticut\WestbrookCSP#36\13-MODification_TWM-012\TIA-F\DESPP_CSP_Westbrook CSP.eri		Dwg No. E-5	

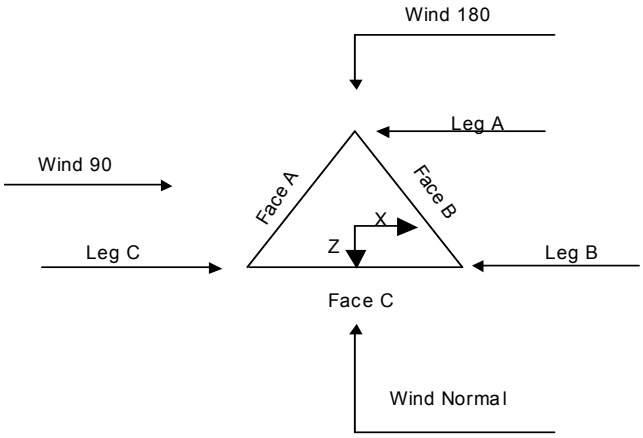
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.000 ft above the ground line.
The base of the tower is set at an elevation of 0.000 ft above the ground line.
The face width of the tower is 10.599 ft at the top and 25.000 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 95 mph.
Nominal ice thickness of 0.500 in.
Ice density of 56 pcf.
A wind speed of 90 mph is used in combination with ice.
Deflections calculated using a wind speed of 90 mph.
Inventory shown is based off of recent physical tower climb performed by D and K Nationwide Communications on March 19, 2016..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	180.000-175.000			10.599	1	5.000
T2	175.000-166.667			11.000	1	8.333
T3	166.667-158.333			11.667	1	8.333
T4	158.333-150.000			12.333	1	8.333
T5	150.000-125.000			13.000	1	25.000
T6	125.000-100.000			15.000	1	25.000
T7	100.000-91.667			17.000	1	8.333
T8	91.667-83.333			17.667	1	8.333
T9	83.333-75.000			18.333	1	8.333
T10	75.000-50.000			19.000	1	25.000
T11	50.000-37.500			21.000	1	12.500
T12	37.500-25.000			22.000	1	12.500
T13	25.000-12.500			23.000	1	12.500
T14	12.500-0.000			24.000	1	12.500

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	180.000-175.000	5.000	K Brace Down	No	Yes	0.000	0.000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T2	175.000-166.667	8.333	K Brace Down	No	Yes	0.000	0.000
T3	166.667-158.333	8.333	K Brace Down	No	Yes	0.000	0.000
T4	158.333-150.000	8.333	K Brace Down	No	Yes	0.000	0.000
T5	150.000-125.000	8.333	K1 Down	No	Yes	0.000	0.000
T6	125.000-100.000	8.333	K1 Down	No	Yes	0.000	0.000
T7	100.000-91.667	8.333	K1 Down	No	Yes	0.000	0.000
T8	91.667-83.333	8.333	K1 Down	No	Yes	0.000	0.000
T9	83.333-75.000	8.333	K1 Down	No	Yes	0.000	0.000
T10	75.000-50.000	12.500	K1 Down	No	Yes	0.000	0.000
T11	50.000-37.500	12.500	K1 Down	No	Yes	0.000	0.000
T12	37.500-25.000	12.500	K1 Down	No	Yes	0.000	0.000
T13	25.000-12.500	12.500	K1 Down	No	Yes	0.000	0.000
T14	12.500-0.000	12.500	K1 Down	No	Yes	0.000	0.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.000-175.000	Pipe	Stainless P5x0.250	A513-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16	A36 (36 ksi)
T2 175.000-166.667	Pipe	Stainless P5x0.250	A513-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16	A36 (36 ksi)
T3 166.667-158.333	Pipe	Stainless P5x0.250	A513-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16	A36 (36 ksi)
T4 158.333-150.000	Pipe	Stainless P5x0.250	A513-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16	A36 (36 ksi)
T5 150.000-125.000	Pipe	Stainless P5x0.300	A513-50 (50 ksi)	Double Angle	2L2 1/2x2x5/16	A36 (36 ksi)
T6 125.000-100.000	Pipe	Stainless P5x0.400	A513-50 (50 ksi)	Double Angle	2L3x2 1/2x1/4	A36 (36 ksi)
T7 100.000-91.667	Pipe	Stainless P5x0.500	A513-50 (50 ksi)	Double Angle	2L3x2 1/2x1/4	A36 (36 ksi)
T8 91.667-83.333	Arbitrary Shape	1/3 Pipe w/ 5"x0.5 Stainless	A500-42 (42 ksi)	Double Angle	2L3x2 1/2x1/4	A36 (36 ksi)
T9 83.333-75.000	Arbitrary Shape	1/3 Pipe w/ 5"x0.5 Stainless	A500-42 (42 ksi)	Double Angle	2L3x2 1/2x1/4	A36 (36 ksi)
T10 75.000-50.000	Pipe	Stainless P6.875x0.400	A572-60 (60 ksi)	Double Angle	2L3 1/2x3 1/2x5/16	A529-50 (50 ksi)
T11 50.000-37.500	Pipe	Stainless P6.875x0.500	A572-60 (60 ksi)	Double Angle	2L3 1/2x3x5/16	A36 (36 ksi)
T12 37.500-25.000	Pipe	Stainless P6.875x0.500	A572-60 (60 ksi)	Double Angle	2L3 1/2x3 1/2x5/16	A529-50 (50 ksi)
T13 25.000-12.500	Arbitrary Shape	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)	A500-46 (46 ksi)	Double Angle	2L3 1/2x3 1/2x5/16	A529-50 (50 ksi)
T14 12.500-0.000	Arbitrary Shape	1/3 HSS 7.5x0.3125 on HSS 6.875x0.5 (Westbrook CT MOD)	A500-46 (46 ksi)	Double Angle	2L3 1/2x3 1/2x5/16	A529-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 180.000-175.000	Single Angle	L3x3x1/4	A36 (36 ksi)	Pipe		A36 (36 ksi)
T3 166.667-158.333	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Pipe		A36 (36 ksi)
T4 158.333-150.000	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Pipe		A36 (36 ksi)
T12 37.500-25.000	Double Equal Angle	2L4x4x1/4	A36 (36 ksi)	Pipe		A36 (36 ksi)
T14 12.500-0.000	Double Equal Angle	2L4x4x5/16	A36 (36 ksi)	Pipe		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 180.000-175.000	None	Pipe		A36 (36 ksi)	Single Angle	L1x1x1/8	A36 (36 ksi)
T2 175.000-166.667	None	Pipe		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 166.667-158.333	None	Pipe		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 158.333-150.000	None	Pipe		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 150.000-125.000	None	Pipe		A36 (36 ksi)	Single Angle	L3x2 1/2x1/4	A36 (36 ksi)
T6 125.000-100.000	None	Pipe		A36 (36 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T7 100.000-91.667	None	Pipe		A36 (36 ksi)	Double Equal Angle	2L3x3x1/4	A36 (36 ksi)
T8 91.667-83.333	None	Pipe		A36 (36 ksi)	Double Angle	2L3x3x1/4	A36 (36 ksi)
T9 83.333-75.000	None	Pipe		A36 (36 ksi)	Double Angle	2L3x3x1/4	A36 (36 ksi)
T10 75.000-50.000	None	Pipe		A36 (36 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T11 50.000-37.500	None	Pipe		A36 (36 ksi)	Single Angle	L4x4x5/16	A529-50 (50 ksi)
T12 37.500-25.000	None	Pipe		A36 (36 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T13 25.000-12.500	None	Pipe		A36 (36 ksi)	Single Angle	L4x4x3/8	A529-50 (50 ksi)
T14 12.500-0.000	None	Pipe		A36 (36 ksi)	Single Angle	L4x4x5/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T5 150.000-125.000	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T6 125.000-100.000	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T7 100.000-91.667	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T8 91.667-83.333	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T9 83.333-75.000	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T10 75.000-50.000	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T11 50.000-37.500	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T12 37.500-25.000	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T13 25.000-12.500	Solid Round		A36 (36 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T14 12.500-0.000	Solid Round		A36 (36 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T5 150.000-125.000	A36 (36 ksi)	Horizontal (1)	Single Angle	L2x2x3/16	1
		Diagonal (1)	Single Angle	L2x2x3/16	1
T6 125.000-100.000	A36 (36 ksi)	Horizontal (1)	Single Angle	L2x2x3/16	1
		Diagonal (1)	Single Angle	L2x2x3/16	1
T7 100.000-91.667	A36 (36 ksi)	Horizontal (1)	Single Angle	L2x2x3/16	1
		Diagonal (1)	Single Angle	L2x2x3/16	1
T8 91.667-83.333	A36 (36 ksi)	Horizontal (1)	Single Angle	L2x2x3/16	1
		Diagonal (1)	Single Angle	L2x2x3/16	1
T9 83.333-75.000	A36 (36 ksi)	Horizontal (1)	Single Angle	L2x2x3/16	1
		Diagonal (1)	Single Angle	L2x2x3/16	1
T10 75.000-50.000	A36 (36 ksi)	Horizontal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
		Diagonal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
T11 50.000-37.500	A36 (36 ksi)	Horizontal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
		Diagonal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
T12 37.500-25.000	A36 (36 ksi)	Horizontal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
		Diagonal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
T13 25.000-12.500	A36 (36 ksi)	Horizontal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
		Diagonal (1)	Single Angle	L3x3x1/4	1
T14 12.500-0.000	A36 (36 ksi)	Horizontal (1)	Single Angle	L2 1/2x2 1/2x3/16	1
		Diagonal (1)	Single Angle	L3x3x1/4	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 180.000-175.000	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
T2 175.000-166.667	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
T3 166.667-158.333	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
T4 158.333-150.000	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
T5 150.000-125.000	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
T6 125.000-100.000	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
T7 100.000-91.667	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
T8 91.667-83.333	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
T9 83.333-75.000	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
T10 75.000-50.000	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
T11 50.000-37.500	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
T12 37.500-25.000	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
T13 25.000-12.500	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
T14 12.500-0.000	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 180.000-175.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 175.000-166.667	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 166.667-158.333	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 158.333-150.0	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
00										
T5	Yes	No	1	1	1	1	1	1	1	1
150.000-125.000				1	1	1	1	1	1	1
T6	Yes	No	1	1	1	1	1	1	1	1
125.000-100.000				1	1	1	1	1	1	1
T7	Yes	No	1	1	1	1	1	1	1	1
100.000-91.667				1	1	1	1	1	1	1
T8	Yes	No	1	1	1	1	1	1	1	1
91.667-83.333				1	1	1	1	1	1	1
T9	Yes	No	1	1	1	1	1	1	1	1
83.333-75.000				1	1	1	1	1	1	1
T10	Yes	No	1	1	1	1	1	1	1	1
75.000-50.000				1	1	1	1	1	1	1
T11	Yes	No	1	1	1	1	1	1	1	1
50.000-37.500				1	1	1	1	1	1	1
T12	Yes	No	1	1	1	1	1	1	1	1
37.500-25.000				1	1	1	1	1	1	1
T13	Yes	No	1	1	1	1	1	1	1	1
25.000-12.500				1	1	1	1	1	1	1
T14	Yes	No	1	1	1	1	1	1	1	1
12.500-0.000				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
180.000-175.000														
T2	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
175.000-166.667														
T3	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
166.667-158.333														
T4	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
158.333-150.000														
T5	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
150.000-125.000														
T6	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
125.000-100.000														

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T7 100.000-91.667	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T8 91.667-83.333	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T9 83.333-75.000	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T10 75.000-50.000	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T11 50.000-37.500	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T12 37.500-25.000	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T13 25.000-12.500	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T14 12.500-0.000	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 180.000-175.000	Flange	0.750 A325X	0	0.750 A325X	1	0.625 A325X	2	0.625 A325N	0	0.625 A325N	0	0.625 A325X	0	0.625 A325N	0
T2 175.000-166.667	Flange	0.750 A325X	6	0.750 A325X	1	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T3 166.667-158.333	Flange	0.750 A325X	0	0.750 A325X	1	0.625 A325X	2	0.000 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T4 158.333-150.000	Flange	0.750 A325X	0	0.750 A325X	1	0.625 A325X	2	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T5 150.000-125.000	Flange	0.750 A325X	6	0.750 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T6 125.000-100.000	Flange	0.750 A325X	6	0.750 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T7 100.000-91.667	Flange	1.000 A325X	6	0.750 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T8 91.667-83.333	Flange	0.750 A325X	0	0.750 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T9 83.333-75.000	Flange	0.750 A325X	0	0.750 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T10 75.000-50.000	Flange	1.000 A325X	8	0.750 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T11 50.000-37.500	Flange	1.000 A325X	8	1.000 A325X	1	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T12 37.500-25.000	Flange	1.000 A325X	0	1.000 A325X	1	0.625 A325X	2	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T13 25.000-12.500	Flange	1.000 A325X	8	1.000 A325X	1	0.625 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0
T14 12.500-0.000	Flange	1.000 A325X	0	1.000 A325X	1	0.625 A325X	2	0.625 A325N	0	0.625 A325N	0	0.625 A325X	2	0.625 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
FB-L98B-02 (10mm Fiber) (ATT)	A	No	No	Ar (Leg)	145.000 - 8.000	0.000	0	1	1	0.394	0.394		0.300
RSS 8 - AWG 2 (0.645") (ATT)	A	No	No	Ar (Leg)	145.000 - 8.000	0.000	0	2	2	0.645	0.645		0.300
LDF6-50A (1-1/4 FOAM) (ATT)	B	Yes	No	Ar (CfAe)	145.000 - 8.000	-6.000	-0.35	3	3	1.550	1.550		0.660
LDF6-50A (1-1/4 FOAM) (ATT)	B	Yes	No	Ar (CfAe)	145.000 - 8.000	-3.000	-0.35	9	9	1.550	1.550		0.660
LDF7-50A (1-5/8 FOAM) (Sprint)	B	Yes	No	Ar (CfAe)	137.000 - 8.000	-3.000	0.41	6	6	1.980	1.980		0.820
LDF5-50A (7/8 FOAM) (DNK-58)	C	Yes	No	Ar (CfAe)	180.000 - 8.000	-3.000	0.423	1	1	1.090	1.090		0.330
LDF5-50A (7/8 FOAM) (DNK-57)	C	Yes	No	Ar (CfAe)	180.000 - 8.000	3.000	0.423	1	1	1.090	1.090		0.330
LDF5-50A (7/8 FOAM) (DNK-55)	C	Yes	No	Ar (CfAe)	180.000 - 8.000	-3.000	0.423	1	1	1.090	1.090		0.330
LDF5-50A (7/8 FOAM) (DNK-54)	C	Yes	No	Ar (CfAe)	180.000 - 8.000	-3.000	0.416	1	1	1.090	1.090		0.330
LDF7-50A (1-5/8 FOAM) (DNK-53)	C	Yes	No	Ar (CfAe)	180.000 - 8.000	3.000	0.416	1	1	1.980	1.980		0.820
LDF5-50A (7/8 FOAM) (DNK-52)	C	Yes	No	Ar (CfAe)	180.000 - 8.000	-3.000	0.408	1	1	1.090	1.090		0.330
LDF5-50A (7/8 FOAM) (DNK-51)	C	Yes	No	Ar (CfAe)	180.000 - 8.000	-3.000	0.4	1	1	1.090	1.090		0.330
EW63 (DNK-45)	C	Yes	No	Af (CfAe)	176.000 - 8.000	-3.000	0.446	1	1	1.574	1.574	5.067	0.510
EW63	C	Yes	No	Af (CfAe)	171.000 -	-3.000	0.438	1	1	1.574	1.574	5.067	0.510

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
(DNK-44)					8.000								
EW63	C	Yes	No	Af (CfAe)	169.000 - 8.000	-3.000	0.431	1	1	1.574	1.574	5.067	0.510
(DNK-43)													
LDF7-50A (1-5/8 FOAM)	C	Yes	No	Ar (CfAe)	164.000 - 8.000	-9.000	0.324	1	1	1.980	1.980		0.820
(DNK-42)													
LDF5-50A (7/8 FOAM)	C	Yes	No	Ar (CfAe)	166.000 - 8.000	3.000	0.37	1	1	1.090	1.090		0.330
(DNK-41)													
LDF5-50A (7/8 FOAM)	C	Yes	No	Ar (CfAe)	166.000 - 8.000	3.000	0.362	1	1	1.090	1.090		0.330
(DNK-40)													
LDF7-50A (1-5/8 FOAM)	C	Yes	No	Ar (CfAe)	160.000 - 8.000	-3.000	0.316	1	1	1.980	1.980		0.820
(DNK-39)													
LDF7-50A (1-5/8 FOAM)	C	Yes	No	Ar (CfAe)	160.000 - 8.000	-3.000	0.309	1	1	1.980	1.980		0.820
(DNK-38)													
LDF5-50A (7/8 FOAM)	C	Yes	No	Ar (CfAe)	157.000 - 8.000	-3.000	0.362	1	1	1.090	1.090		0.330
(DNK-37)													
LDF5-50A (7/8 FOAM)	C	Yes	No	Ar (CfAe)	157.000 - 8.000	-6.000	0.362	1	1	1.090	1.090		0.330
(DNK-36)													
LDF5-50A (7/8 FOAM)	C	Yes	No	Ar (CfAe)	157.000 - 8.000	-9.000	0.362	1	1	1.090	1.090		0.330
(DNK-35)													
LDF4-50A (1/2 FOAM)	C	Yes	No	Ar (CfAe)	151.000 - 8.000	3.000	0.446	1	1	0.630	0.630		0.150
(DNK-34)													
LDF7-50A (1-5/8 FOAM)	C	Yes	No	Ar (CfAe)	153.000 - 8.000	-3.000	0.301	1	1	1.980	1.980		0.820
(DNK-33)													
LDF5-50A (7/8 FOAM)	C	Yes	No	Ar (CfAe)	143.000 - 8.000	-3.000	0.332	1	1	1.090	1.090		0.330
(DNK-32)													
LDF5-50A (7/8 FOAM)	C	Yes	No	Ar (CfAe)	119.000 - 8.000	-9.000	0.316	1	1	1.090	1.090		0.330
(DNK-10)													
LDF5-50A (7/8 FOAM)	C	Yes	No	Ar (CfAe)	119.000 - 8.000	3.000	0.316	1	1	1.090	1.090		0.330
(DNK-9)													
LDF5-50A (7/8 FOAM)	C	Yes	No	Ar (CfAe)	109.250 - 8.000	3.000	0.309	1	1	1.090	1.090		0.330
(DNK-8)													
LDF5-50A (7/8 FOAM)	C	Yes	No	Ar (CfAe)	76.000 - 8.000	3.000	0.301	1	1	1.090	1.090		0.330
(DNK-7)													
LDF5-50A (7/8 FOAM)	C	Yes	No	Ar (CfAe)	76.000 - 8.000	-3.000	0.294	1	1	1.090	1.090		0.330
(DNK-6)													
LDF4P-50A (1/2 FOAM)	C	Yes	No	Ar (CfAe)	75.000 - 8.000	3.000	0.431	1	1	0.630	0.630		0.150
(DNK-5)													
LDF4P-50A (1/2 FOAM)	C	Yes	No	Ar (CfAe)	27.000 - 8.000	-3.000	0.286	1	1	0.630	0.630		0.150
(DNK-4)													
LDF4P-50A (1/2 FOAM)	C	Yes	No	Ar (CfAe)	27.000 - 8.000	3.000	0.286	1	1	0.630	0.630		0.150
(DNK-3)													

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LDF5-50A (7/8 FOAM) (DNK-2)	C	Yes	No	Ar (CfAe)	27.000 - 8.000	3.000	0.278	1	1	1.090	1.090		0.330
LDF5-50A (7/8 FOAM) (DNK-1)	C	Yes	No	Ar (CfAe)	15.000 - 8.000	-3.000	0.27	1	1	1.090	1.090		0.330
LDF4.5-50 (5/8 FOAM) (DNK-50)	C	Yes	No	Ar (CfAe)	180.000 - 8.000	-3.000	0.393	1	1	0.870	0.870		0.150
LDF4.5-50 (5/8 FOAM) (DNK-50)	C	Yes	No	Ar (CfAe)	180.000 - 8.000	-3.000	0.385	1	1	0.870	0.870		0.150
LDF5-50A (7/8 FOAM) (DNK-47)	C	Yes	No	Ar (CfAe)	178.000 - 8.000	-3.000	0.377	1	1	1.090	1.090		0.330
LDF5-50A (7/8 FOAM) (DNK-47)	C	Yes	No	Ar (CfAe)	178.000 - 8.000	-3.000	0.37	1	1	1.090	1.090		0.330
LDF7-50A (1-5/8 FOAM) (DNK-50)	C	Yes	No	Ar (CfAe)	180.000 - 8.000	-9.000	0.37	1	1	1.980	1.980		0.820
LDF7-50A (1-5/8 FOAM) (DNK-50)	C	Yes	No	Ar (CfAe)	180.000 - 8.000	-12.000	0.362	1	1	1.980	1.980		0.820
HB158-1-08U8-S8J18 (Sprint) * TWM Proposed 5-1-2019	B	Yes	No	Ar (CfAe)	137.000 - 8.000	-3.000	0.34	4	4	1.980	1.980		1.300
LDF5-50A (7/8 FOAM) (T-Mobile)	B	Yes	No	Ar (CfAe)	130.000 - 8.000	-4.000	-0.25	6	3	1.090	1.090		0.330
LDF5-50A (7/8 FOAM) (T-Mobile - Proposed)	B	Yes	No	Ar (CfAe)	130.000 - 8.000	-4.000	-0.22	3	3	1.090	1.090		0.330

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 lb
T1	180.000-175.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	6.470	0.131	0.000	0.000	26.190
T2	175.000-166.667	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	11.389	1.968	0.000	0.000	52.650
T3	166.667-158.333	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	14.267	3.280	0.000	0.000	70.190
T4	158.333-150.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	19.483	3.280	0.000	0.000	93.290
T5	150.000-125.000	A	2.806	0.000	0.000	0.000	18.000

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 lb
		B	56.331	0.000	0.000	0.000	294.690
		C	64.968	9.839	0.000	0.000	306.190
T6	125.000-100.000	A	3.508	0.000	0.000	0.000	22.500
		B	97.133	0.000	0.000	0.000	525.250
		C	69.896	9.839	0.000	0.000	324.092
T7	100.000-91.667	A	1.169	0.000	0.000	0.000	7.500
		B	32.378	0.000	0.000	0.000	175.083
		C	24.139	3.280	0.000	0.000	111.083
T8	91.667-83.333	A	1.169	0.000	0.000	0.000	7.500
		B	32.378	0.000	0.000	0.000	175.083
		C	24.139	3.280	0.000	0.000	111.083
T9	83.333-75.000	A	1.169	0.000	0.000	0.000	7.500
		B	32.378	0.000	0.000	0.000	175.083
		C	24.321	3.280	0.000	0.000	111.743
T10	75.000-50.000	A	3.508	0.000	0.000	0.000	22.500
		B	97.133	0.000	0.000	0.000	525.250
		C	78.271	9.839	0.000	0.000	353.500
T11	50.000-37.500	A	1.754	0.000	0.000	0.000	11.250
		B	48.566	0.000	0.000	0.000	262.625
		C	39.135	4.919	0.000	0.000	176.750
T12	37.500-25.000	A	1.754	0.000	0.000	0.000	11.250
		B	48.566	0.000	0.000	0.000	262.625
		C	39.527	4.919	0.000	0.000	178.010
T13	25.000-12.500	A	1.754	0.000	0.000	0.000	11.250
		B	48.566	0.000	0.000	0.000	262.625
		C	41.810	4.919	0.000	0.000	185.450
T14	12.500-0.000	A	0.631	0.000	0.000	0.000	4.050
		B	17.484	0.000	0.000	0.000	94.545
		C	15.379	1.771	0.000	0.000	67.950

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 lb
T1	180.000-175.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		11.553	0.187	0.000	0.000	93.602
T2	175.000-166.667	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		20.417	2.801	0.000	0.000	189.522
T3	166.667-158.333	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		25.322	4.668	0.000	0.000	249.122
T4	158.333-150.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		34.066	4.668	0.000	0.000	323.388
T5	150.000-125.000	A	0.500	5.064	2.150	0.000	0.000	56.871
		B		91.089	2.150	0.000	0.000	820.737
		C		114.385	14.005	0.000	0.000	1065.046
T6	125.000-100.000	A	0.500	6.331	2.688	0.000	0.000	71.089
		B		158.289	2.688	0.000	0.000	1498.206
		C		123.834	14.005	0.000	0.000	1135.641
T7	100.000-91.667	A	0.500	2.110	0.896	0.000	0.000	23.696
		B		52.763	0.896	0.000	0.000	499.402
		C		42.889	4.668	0.000	0.000	390.584
T8	91.667-83.333	A	0.500	2.110	0.896	0.000	0.000	23.696
		B		52.763	0.896	0.000	0.000	499.402

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 lb
		C		42.889	4.668	0.000	0.000	390.584
T9	83.333-75.000	A	0.500	2.110	0.896	0.000	0.000	23.696
		B		52.763	0.896	0.000	0.000	499.402
		C		43.237	4.668	0.000	0.000	393.186
T10	75.000-50.000	A	0.500	6.331	2.688	0.000	0.000	71.089
		B		158.289	2.688	0.000	0.000	1498.206
		C		140.771	14.005	0.000	0.000	1257.822
T11	50.000-37.500	A	0.500	3.165	1.344	0.000	0.000	35.544
		B		79.144	1.344	0.000	0.000	749.103
		C		70.385	7.003	0.000	0.000	628.911
T12	37.500-25.000	A	0.500	3.165	1.344	0.000	0.000	35.544
		B		79.144	1.344	0.000	0.000	749.103
		C		71.277	7.003	0.000	0.000	634.875
T13	25.000-12.500	A	0.500	3.165	1.344	0.000	0.000	35.544
		B		79.144	1.344	0.000	0.000	749.103
		C		76.394	7.003	0.000	0.000	669.437
T14	12.500-0.000	A	0.500	1.140	0.484	0.000	0.000	12.796
		B		28.492	0.484	0.000	0.000	269.677
		C		28.129	2.521	0.000	0.000	245.682

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	180.000-175.000	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.461	0.702	1.251
T2	175.000-166.667	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.648	0.916	1.621
T3	166.667-158.333	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.823	1.176	2.056
T4	158.333-150.000	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	1.035	1.494	2.588
T5	150.000-125.000	A	0.000	0.000	0.000	0.000
		B	0.000	4.441	6.472	10.402
		C	0.000	6.736	9.046	15.777
T6	125.000-100.000	A	0.000	0.000	0.000	0.000
		B	0.000	7.485	11.498	18.661
		C	0.000	6.892	9.792	17.183
T7	100.000-91.667	A	0.000	0.000	0.000	0.000
		B	0.000	2.433	3.739	6.069
		C	0.000	2.318	3.285	5.781
T8	91.667-83.333	A	0.000	0.000	0.000	0.000
		B	0.000	2.407	3.700	6.005
		C	0.000	2.293	3.250	5.720
T9	83.333-75.000	A	0.000	0.000	0.000	0.000
		B	0.000	2.383	3.664	5.946
		C	0.000	2.286	3.240	5.705
T10	75.000-50.000	A	0.000	0.000	0.000	0.000
		B	0.000	5.328	10.127	16.436
		C	0.000	5.499	9.530	16.967
T11	50.000-37.500	A	0.000	0.000	0.000	0.000
		B	0.000	2.590	4.930	8.002

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
		C	0.000	2.674	4.640	8.260
T12	37.500-25.000	A	0.000	0.000	0.000	0.000
		B	0.000	2.548	4.854	7.879
		C	0.000	2.661	4.609	8.225
T13	25.000-12.500	A	0.000	0.000	0.000	0.000
		B	0.000	2.511	5.022	8.152
		C	0.000	2.790	5.014	9.059
T14	12.500-0.000	A	0.000	0.000	0.000	0.000
		B	0.000	0.892	1.784	2.896
		C	0.000	1.012	1.816	3.284

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	180.000-175.000	-11.283	7.809	-15.417	10.443
T2	175.000-166.667	-15.378	10.553	-20.081	13.588
T3	166.667-158.333	-18.509	13.137	-23.464	16.454
T4	158.333-150.000	-21.968	15.963	-27.010	19.320
T5	150.000-125.000	-13.630	6.086	-17.890	7.356
T6	125.000-100.000	-6.897	4.891	-10.882	5.345
T7	100.000-91.667	-7.639	5.728	-12.052	6.471
T8	91.667-83.333	-7.059	5.503	-11.594	6.437
T9	83.333-75.000	-7.265	5.755	-11.955	6.784
T10	75.000-50.000	-9.485	7.644	-15.349	9.473
T11	50.000-37.500	-9.789	8.014	-15.996	10.005
T12	37.500-25.000	-10.159	8.452	-16.677	10.671
T13	25.000-12.500	-10.171	9.081	-17.331	12.256
T14	12.500-0.000	-4.604	4.317	-8.311	6.245

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
* D&K Inventory Climb Antennas									
2' Yagi	C	From Leg	2.000	0.0000	15.000	No Ice	2.083	2.083	30.950
(DNK-1)			0.000			1/2" Ice	3.787	3.787	52.866
			0.000						
2" Dia 8' Omni	C	From Leg	2.000	0.0000	27.000	No Ice	2.000	2.000	5.000
(DNK-2)			0.000			1/2" Ice	3.030	3.030	18.000
			0.000						
2' Standoff T-Arm (5' face width)	C	From Leg	0.000	0.0000	20.000	No Ice	3.500	3.500	91.000
			0.000			1/2" Ice	4.200	4.200	120.000
(DNK 1,2)			0.000						
(Inverted) 1" Dia Omni	C	From Leg	5.000	0.0000	27.000	No Ice	2.000	2.000	5.000

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 lb
(DNK-3)			0.000 -2.000			1/2" Ice	3.030	3.030	18.000
1" Dia Omni	C	From Leg	5.000	0.0000	27.000	No Ice	2.000	2.000	5.000
(DNK-4)			0.000 2.000			1/2" Ice	3.030	3.030	18.000
Rohn 6' Side-Arm(1)	C	None		0.0000	26.000	No Ice	10.600	10.600	140.000
(DNK-3,4)						1/2" Ice	15.400	15.400	212.000
GPS	A	From Leg	0.500	0.0000	75.000	No Ice	1.000	1.000	10.000
(DNK-5)			0.000 0.000			1/2" Ice	1.500	1.500	15.000
3' Yagi	C	From Leg	1.000	0.0000	76.000	No Ice	2.083	2.083	30.950
(DNK-6)			0.000 -1.000			1/2" Ice	3.787	3.787	52.866
20' 4-Bay Dipole	C	From Leg	0.000	0.0000	76.000	No Ice	4.000	4.000	55.000
(DNK-7)			0.000 1.000			1/2" Ice	6.000	6.000	100.000
1' Side Arm	C	From Leg	0.500	0.0000	122.000	No Ice	2.500	2.500	55.000
(DNK-6,7)			0.000 0.000			1/2" Ice	3.363	3.363	73.000
3'4"x4" Pipe Mount	B	None		0.0000	109.250	No Ice	1.052	1.052	36.000
(DNK-8)						1/2" Ice	1.269	1.269	46.951
12' Dipole	C	From Leg	1.000	0.0000	119.000	No Ice	3.697	3.697	40.000
(DNK-9)			0.000 0.000			1/2" Ice	3.954	3.954	78.897
1' Side Arm	C	From Leg	0.500	0.0000	119.000	No Ice	2.500	2.500	55.000
(DNK-9)			0.000 0.000			1/2" Ice	3.363	3.363	73.000
1'x1' Panel Antenna	B	From Leg	0.500	0.0000	119.000	No Ice	1.400	0.131	10.000
(DNK-10)			0.000 0.000			1/2" Ice	1.560	0.208	16.287
1' Side Arm	B	From Leg	0.500	0.0000	119.000	No Ice	2.500	2.500	55.000
(DNK-10)			0.000 0.000			1/2" Ice	3.363	3.363	73.000
* AT&T Carrier Antennas @ 143'									
13' Sector Mount (1)	A	From Leg	4.000	0.0000	143.000	No Ice	12.000	12.000	220.000
((DNK 19-32)/ATT)			0.000 0.000			1/2" Ice	16.100	16.100	420.000
13' Sector Mount (1)	B	From Leg	4.000	0.0000	143.000	No Ice	12.000	12.000	220.000
((DNK 19-32)/ATT)			0.000 0.000			1/2" Ice	16.100	16.100	420.000
13' Sector Mount (1)	C	From Leg	4.000	0.0000	143.000	No Ice	12.000	12.000	220.000
((DNK 19-32)/ATT)			0.000 0.000			1/2" Ice	16.100	16.100	420.000
(2) 7770 w mount pipe	A	From Leg	4.000	0.0000	143.000	No Ice	5.882	3.980	52.000
((DNK 19-32)/ATT)			-6.000 0.000			1/2" Ice	6.314	4.603	94.698
(2) 7770 w mount pipe	B	From Leg	4.000	0.0000	143.000	No Ice	5.882	3.980	52.000
((DNK 19-32)/ATT)			-6.000 0.000			1/2" Ice	6.314	4.603	94.698
(2) 7770 w mount pipe	C	From Leg	4.000	0.0000	143.000	No Ice	5.882	3.980	52.000
((DNK 19-32)/ATT)			-6.000 0.000			1/2" Ice	6.314	4.603	94.698
(2) TMA (shielded)	A	From Leg	4.000	0.0000	143.000	No Ice	0.000	0.000	7.300
((DNK 19-32)/ATT)			0.000 0.000			1/2" Ice	0.000	0.000	11.643
(2) TMA (shielded)	B	From Leg	4.000	0.0000	143.000	No Ice	0.000	0.000	7.300

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 lb
((DNK 19-32)/ATT)			0.000 0.000			1/2" Ice	0.000	0.000	11.643
(2) TMA (shielded)	C	From Leg	4.000	0.0000	143.000	No Ice	0.000	0.000	7.300
((DNK 19-32)/ATT)			0.000 0.000			1/2" Ice	0.000	0.000	11.643
RRUS-11	A	None		0.0000	143.000	No Ice	2.994	1.246	50.000
((DNK 19-32)/ATT)						1/2" Ice	3.226	1.412	69.573
RRUS-11	B	None		0.0000	143.000	No Ice	2.994	1.246	50.000
((DNK 19-32)/ATT)						1/2" Ice	3.226	1.412	69.573
RRUS-11	C	None		0.0000	143.000	No Ice	2.994	1.246	50.000
((DNK 19-32)/ATT)						1/2" Ice	3.226	1.412	69.573
AM-X-CD-14-65-00T-RET	A	From Leg	4.000	0.0000	143.000	No Ice	5.507	2.828	4.000
((DNK 19-32)/ATT)			-2.000 0.000			1/2" Ice	5.899	3.137	35.591
AM-X-CD-14-65-00T-RET	B	From Leg	4.000	0.0000	143.000	No Ice	5.507	2.828	4.000
((DNK 19-32)/ATT)			-2.000 0.000			1/2" Ice	5.899	3.137	35.591
AM-X-CD-14-65-00T-RET	C	From Leg	4.000	0.0000	143.000	No Ice	5.507	2.828	4.000
((DNK 19-32)/ATT)			-2.000 0.000			1/2" Ice	5.899	3.137	35.591
Raycap Surge Suppressor	A	From Leg	0.000	0.0000	143.000	No Ice	1.266	1.266	20.000
((DNK 19-32)/ATT)			0.000 0.000			1/2" Ice	1.456	1.456	35.116
RRUS-12	A	None		0.0000	143.000	No Ice	3.669	1.488	58.000
((DNK 19-32)/ATT)						1/2" Ice	3.926	1.673	81.222
RRUS-12	B	None		0.0000	143.000	No Ice	3.669	1.488	58.000
((DNK 19-32)/ATT)						1/2" Ice	3.926	1.673	81.222
RRUS-12	C	None		0.0000	143.000	No Ice	3.669	1.488	58.000
((DNK 19-32)/ATT)						1/2" Ice	3.926	1.673	81.222
* AT&T Carrier Antennas @ 143'									
2" Dia 10' Omni	B	From Leg	3.000	0.0000	143.000	No Ice	2.000	2.000	10.000
(DNK-32)			0.000 0.000			1/2" Ice	3.030	3.030	25.000
Pirod 4' Side Mount Standoff	B	None		0.0000	143.000	No Ice	2.720	2.720	50.000
(1)						1/2" Ice	4.910	4.910	89.000
(DNK-32)									
3" Dia 20' Omni	B	From Leg	1.000	0.0000	153.000	No Ice	4.000	4.000	55.000
(DNK-33)			0.000 0.000			1/2" Ice	6.000	6.000	100.000
1' Side Arm	B	From Leg	0.500	0.0000	153.000	No Ice	2.500	2.500	55.000
(DNK-33)			0.000 0.000			1/2" Ice	3.363	3.363	73.000
1 Bay Dipole ANT400D	A	From Leg	0.000	0.0000	151.000	No Ice	2.171	0.518	13.300
(DNK-34)			0.000 0.000			1/2" Ice	2.412	0.742	27.514
10'6"x4" Pipe Mount	B	None		0.0000	151.000	No Ice	4.725	4.725	114.000
(DNK-34)						1/2" Ice	5.615	5.615	146.840
1.5" Dia 16' Omni	B	From Leg	0.000	0.0000	153.000	No Ice	4.000	4.000	55.000
(DNK-33)			0.000 2.000			1/2" Ice	6.000	6.000	100.000
2" Dia 10' Omni	C	From Leg	0.000	0.0000	157.000	No Ice	2.000	2.000	10.000
(DNK-35)			0.000 0.000			1/2" Ice	3.030	3.030	25.000
2' Sidearm	C	From Leg	0.000	0.0000	157.000	No Ice	3.900	3.900	87.000
(DNK-35)			0.000 0.000			1/2" Ice	4.400	4.400	97.000

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 lb
10'x6" Dipole Antenna	C	From Leg	0.500	0.0000	157.000	No Ice	9.167	1.667	46.000
(DNK-36)			0.000			1/2" Ice	9.888	2.793	77.565
			0.000						
1' Side Arm	C	From Leg	0.500	0.0000	157.000	No Ice	2.500	2.500	55.000
(DNK-36)			0.000			1/2" Ice	3.363	3.363	73.000
			0.000						
3'4"x4" Pipe Mount	B	None		0.0000	157.000	No Ice	1.052	1.052	36.000
(DNK-37)						1/2" Ice	1.269	1.269	46.951
(Inverted) 3" Dia 20' Omni	B	From Leg	2.000	0.0000	160.000	No Ice	4.000	4.000	55.000
(DNK-38)			0.000			1/2" Ice	6.000	6.000	100.000
			0.000						
2' Sidearm	B	From Leg	0.000	0.0000	160.000	No Ice	3.900	3.900	87.000
(DNK-38,39)			0.000			1/2" Ice	4.400	4.400	97.000
			0.000						
(Inverted) 3" Dia 20' Omni	B	From Leg	2.000	0.0000	160.000	No Ice	4.000	4.000	55.000
(DNK-39)			0.000			1/2" Ice	6.000	6.000	100.000
			0.000						
6' Side-Arm(1)	A	From Leg	0.000	-45.0000	166.000	No Ice	10.600	10.600	140.000
(DNK-40,41)			0.000			1/2" Ice	15.400	15.400	212.000
			0.000						
6' Side-Arm(1)	B	From Leg	0.000	45.0000	166.000	No Ice	10.600	10.600	140.000
(DNK-40,41)			0.000			1/2" Ice	15.400	15.400	212.000
			0.000						
(inverted) 10' 8 Bay Di-Pole	B	From Face	4.000	-45.0000	166.000	No Ice	4.000	4.000	55.000
(DNK-40,41)			0.000			1/2" Ice	6.000	6.000	100.000
			0.000						
(inverted) 2" Dia 10' Omni	B	From Face	4.000	0.0000	164.000	No Ice	2.000	2.000	10.000
(DNK-42)			0.000			1/2" Ice	3.030	3.030	25.000
			0.000						
6' Side-Arm(1)	B	From Leg	0.000	-45.0000	164.000	No Ice	10.600	10.600	140.000
(DNK-42)			0.000			1/2" Ice	15.400	15.400	212.000
			0.000						
6' Side-Arm(1)	C	From Leg	0.000	45.0000	164.000	No Ice	10.600	10.600	140.000
(DNK-42)			0.000			1/2" Ice	15.400	15.400	212.000
			0.000						
3'4"x4" Pipe Mount	C	None		0.0000	169.000	No Ice	1.052	1.052	36.000
(DNK-43)						1/2" Ice	1.269	1.269	46.951
3'4"x4" Pipe Mount	A	None		0.0000	171.000	No Ice	1.052	1.052	36.000
(DNK-44)						1/2" Ice	1.269	1.269	46.951
3'4"x4" Pipe Mount	C	None		0.0000	176.000	No Ice	1.052	1.052	36.000
(DNK-45)						1/2" Ice	1.269	1.269	46.951
432E-83I-01T TTA Unit	A	From Face	0.500	0.0000	178.000	No Ice	3.325	1.108	25.000
(DNK-47)			0.000			1/2" Ice	3.569	1.275	44.704
			0.000						
3" Dia 12' Omni	A	From Face	0.500	0.0000	180.000	No Ice	2.000	2.000	10.000
(DNK-48)			0.000			1/2" Ice	3.030	3.030	25.000
			0.000						
3" Dia 12' Omni	B	From Face	3.000	0.0000	180.000	No Ice	2.000	2.000	10.000
(DNK-49)			0.000			1/2" Ice	3.030	3.030	25.000
			0.000						
432E-83I-01T TTA Unit	B	From Leg	6.000	0.0000	180.000	No Ice	3.325	1.108	25.000
(DNK-50)			0.000			1/2" Ice	3.569	1.275	44.704
			0.000						
1 Bay Dipole ANT400D	B	From Leg	1.000	0.0000	180.000	No Ice	2.171	0.518	13.300
(DNK-51)			0.000			1/2" Ice	2.412	0.742	27.514
			0.000						
2" Dia 10' Omni	B	From Leg	0.500	0.0000	181.000	No Ice	2.000	2.000	10.000

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 lb
(DNK-52)			0.000 0.000			1/2" Ice	3.030	3.030	25.000
2" Dia 10' Omni	C	From Leg	0.500	0.0000	181.000	No Ice	2.000	2.000	10.000
(DNK-53)			0.000 0.000			1/2" Ice	3.030	3.030	25.000
10' - 2 Bay Dipole	C	From Leg	0.500	0.0000	181.000	No Ice	1.643	1.643	10.000
(DNK-54)			0.000 0.000			1/2" Ice	1.816	1.816	27.727
20' 4-Bay Dipole	A	From Leg	0.500	0.0000	181.000	No Ice	4.000	4.000	55.000
(DNK-55)			0.000 0.000			1/2" Ice	6.000	6.000	100.000
Lightning Rod 2"x15'	C	None		0.0000	181.000	No Ice	3.000	3.000	80.000
(DNK-56)						1/2" Ice	4.525	4.525	103.137
3" Dia 20' Omni	A	From Leg	6.000	0.0000	182.500	No Ice	4.000	4.000	55.000
(DNK-57)			0.000 0.000			1/2" Ice	6.000	6.000	100.000
1" Dia 8' Omni	A	From Leg	2.000	0.0000	182.000	No Ice	2.000	2.000	5.000
(DNK-58)			0.000 0.000			1/2" Ice	3.030	3.030	18.000
6' Side-Arm(1)	A	From Leg	0.000	-45.0000	182.500	No Ice	10.600	10.600	140.000
(DNK-57)			0.000 0.000			1/2" Ice	15.400	15.400	212.000
6' Side-Arm(1)	B	From Leg	0.000	45.0000	182.500	No Ice	10.600	10.600	140.000
(DNK-57)			0.000 0.000			1/2" Ice	15.400	15.400	212.000
* Proposed Antenna Install - ASM-003 * 02/05/2018 Airosmith 003 Proposed Removal * IQ-ASM-003 Update									
Pirod 12' PCS T-Frame (1)	A	None		0.0000	137.000	No Ice	9.800	9.800	260.000
104569						1/2" Ice	14.800	14.800	360.000
((DNK 14-19)/Sprint)									
Pirod 12' PCS T-Frame (1)	B	None		0.0000	137.000	No Ice	9.800	9.800	260.000
104569						1/2" Ice	14.800	14.800	360.000
((DNK 14-19)/Sprint)									
Pirod 12' PCS T-Frame (1)	C	None		0.0000	137.000	No Ice	9.800	9.800	260.000
104569						1/2" Ice	14.800	14.800	360.000
((DNK 14-19)/Sprint)									
APXVTM14-C-120 Panel	A	From Leg	3.000	0.0000	137.000	No Ice	6.342	3.607	72.000
Antenna			-3.500			1/2" Ice	6.716	3.967	111.526
((DNK 14-19)/Sprint)			0.000						
APXVTM14-C-120 Panel	B	From Leg	3.000	0.0000	137.000	No Ice	6.342	3.607	72.000
Antenna			-3.500			1/2" Ice	6.716	3.967	111.526
((DNK 14-19)/Sprint)			0.000						
APXVTM14-C-120 Panel	C	From Leg	3.000	0.0000	137.000	No Ice	6.342	3.607	72.000
Antenna			-3.500			1/2" Ice	6.716	3.967	111.526
((DNK 14-19)/Sprint)			0.000						
NNVV-65B-R4 Panel	A	From Leg	3.000	0.0000	137.000	No Ice	12.271	5.750	85.000
Antenna			3.500			1/2" Ice	12.766	6.207	157.141
(Sprint)			0.000						
NNVV-65B-R4 Panel	B	From Leg	3.000	0.0000	137.000	No Ice	12.271	5.750	85.000
Antenna			3.500			1/2" Ice	12.766	6.207	157.141
(Sprint)			0.000						
NNVV-65B-R4 Panel	C	From Leg	3.000	0.0000	137.000	No Ice	12.271	5.750	85.000
Antenna			3.500			1/2" Ice	12.766	6.207	157.141
(Sprint)			0.000						

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 lb
ALU TD-RRH-8x20-25 (Sprint)	A	From Leg	3.000 3.500 0.000	0.0000	137.000	No Ice 1/2" Ice	4.030 4.281	1.526 1.705	76.200 103.251
ALU TD-RRH-8x20-25 (Sprint)	B	From Leg	3.000 3.500 0.000	0.0000	137.000	No Ice 1/2" Ice	4.030 4.281	1.526 1.705	76.200 103.251
ALU TD-RRH-8x20-25 (Sprint)	C	From Leg	3.000 3.500 0.000	0.0000	137.000	No Ice 1/2" Ice	4.030 4.281	1.526 1.705	76.200 103.251
(2) ALU 800MHz 2x50W (Sprint)	A	From Leg	3.000 3.500 0.000	0.0000	137.000	No Ice 1/2" Ice	2.058 2.240	1.932 2.109	64.000 86.121
(2) ALU 800MHz 2x50W (Sprint)	B	From Leg	3.000 3.500 0.000	0.0000	137.000	No Ice 1/2" Ice	2.058 2.240	1.932 2.109	64.000 86.121
(2) ALU 800MHz 2x50W (Sprint)	C	From Leg	3.000 3.500 0.000	0.0000	137.000	No Ice 1/2" Ice	2.058 2.240	1.932 2.109	64.000 86.121
ALU 4x45-1900 MHz RRH Unit (Sprint)	A	From Leg	3.000 -3.500 0.000	0.0000	137.000	No Ice 1/2" Ice	2.500 2.709	2.500 2.709	69.500 95.231
ALU 4x45-1900 MHz RRH Unit (Sprint)	B	From Leg	3.000 -3.500 0.000	0.0000	137.000	No Ice 1/2" Ice	2.500 2.709	2.500 2.709	69.500 95.231
ALU 4x45-1900 MHz RRH Unit (Sprint)	C	From Leg	3.000 -3.500 0.000	0.0000	137.000	No Ice 1/2" Ice	2.500 2.709	2.500 2.709	69.500 95.231
* TWM Equipment Upgrade 5-1-2019									
SitePro1 USF12-396-U Mount Assembly w/ (3) 96" Mount Pipes (T-Mobile - Proposed)	A	From Leg	0.500 0.000 0.000	0.0000	130.000	No Ice 1/2" Ice	16.233 22.183	9.804 13.272	491.090 630.090
SitePro1 USF12-396-U Mount Assembly w/ (3) 96" Mount Pipes (T-Mobile - Proposed)	B	From Leg	0.500 0.000 0.000	0.0000	130.000	No Ice 1/2" Ice	16.233 22.183	9.804 13.272	491.090 630.090
SitePro1 USF12-396-U Mount Assembly w/ (3) 96" Mount Pipes (T-Mobile - Proposed)	C	From Leg	0.500 0.000 0.000	0.0000	130.000	No Ice 1/2" Ice	16.233 22.183	9.804 13.272	491.090 630.090
Ericsson AIR32 B66A/B2A Panel Antenna (T-Mobile - Proposed)	A	From Leg	4.000 -6.000 0.000	0.0000	130.000	No Ice 1/2" Ice	7.099 7.553	4.787 5.215	132.200 178.024
Ericsson AIR32 B66A/B2A Panel Antenna (T-Mobile - Proposed)	B	From Leg	4.000 -6.000 0.000	0.0000	130.000	No Ice 1/2" Ice	7.099 7.553	4.787 5.215	132.200 178.024
Ericsson AIR32 B66A/B2A Panel Antenna (T-Mobile - Proposed)	C	From Leg	4.000 -6.000 0.000	0.0000	130.000	No Ice 1/2" Ice	7.099 7.553	4.787 5.215	132.200 178.024
RFS APXVAARR24_43-U-NA20 Panel Antenna (T-Mobile - Proposed)	A	From Leg	4.000 0.000 0.000	0.0000	130.000	No Ice 1/2" Ice	22.377 23.158	8.889 9.487	153.300 265.894
RFS APXVAARR24_43-U-NA20 Panel Antenna	B	From Leg	4.000 0.000 0.000	0.0000	130.000	No Ice 1/2" Ice	22.377 23.158	8.889 9.487	153.300 265.894

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 lb
(T-Mobile - Proposed)									
RFS	C	From Leg	4.000	0.0000	130.000	No Ice	22.377	8.889	153.300
APXVAARR24_43-U-NA20			0.000			1/2" Ice	23.158	9.487	265.894
Panel Antenna			0.000						
(T-Mobile - Proposed)									
Ericsson 4449 B71 + B12	A	From Leg	4.000	0.0000	130.000	No Ice	1.932	1.349	80.000
Radio Unit			0.000			1/2" Ice	2.120	1.510	96.157
(T-Mobile - Proposed)			0.000						
Ericsson 4449 B71 + B12	B	From Leg	4.000	0.0000	130.000	No Ice	1.932	1.349	80.000
Radio Unit			0.000			1/2" Ice	2.120	1.510	96.157
(T-Mobile - Proposed)			0.000						
Ericsson 4449 B71 + B12	C	From Leg	4.000	0.0000	130.000	No Ice	1.932	1.349	80.000
Radio Unit			0.000			1/2" Ice	2.120	1.510	96.157
(T-Mobile - Proposed)			0.000						
Ericsson AIR21 B2A|B4P	A	From Leg	4.000	0.0000	130.000	No Ice	7.099	4.787	105.800
Panel			6.000			1/2" Ice	7.553	5.215	151.624
(T-Mobile - Proposed)			0.000						
Ericsson AIR21 B2A|B4P	B	From Leg	4.000	0.0000	130.000	No Ice	7.099	4.787	105.800
Panel			6.000			1/2" Ice	7.553	5.215	151.624
(T-Mobile - Proposed)			0.000						
Ericsson AIR21 B2A|B4P	C	From Leg	4.000	0.0000	130.000	No Ice	7.099	4.787	105.800
Panel			6.000			1/2" Ice	7.553	5.215	151.624
(T-Mobile - Proposed)			0.000						
Generic Twin TMA unit	A	From Leg	4.000	0.0000	130.000	No Ice	0.424	1.124	25.000
(T-Mobile - Proposed)			6.000			1/2" Ice	0.529	1.269	32.190
			0.000						
Generic Twin TMA unit	B	From Leg	4.000	0.0000	130.000	No Ice	0.424	1.124	25.000
(T-Mobile - Proposed)			6.000			1/2" Ice	0.529	1.269	32.190
			0.000						
Generic Twin TMA unit	C	From Leg	4.000	0.0000	130.000	No Ice	0.424	1.124	25.000
(T-Mobile - Proposed)			6.000			1/2" Ice	0.529	1.269	32.190
			0.000						
* TWM Equipment Upgrade 5-1-2019									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
6' w/Radome	C	Paraboloid	From	0.500	Worst		176.000	6.000	No Ice	28.274	380.000
(DNK-45)		w/Radome	Leg	0.000					1/2" Ice	29.065	450.000
				0.000							
6' w/Radome	A	Paraboloid	From	0.500	Worst		174.000	6.000	No Ice	28.274	380.000
(DNK-44)		w/Radome	Leg	0.000					1/2" Ice	29.065	450.000
				0.000							
Andrew 6' w/Radome	C	Paraboloid	From	0.500	Worst		170.000	6.000	No Ice	28.274	380.000
(DNK-43)		w/Radome	Leg	0.000					1/2" Ice	29.065	450.000
				0.000							

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight lb
4' Paraflector (DNK-8)	B	Grid	From Leg	0.500 0.000 0.000	Worst		109.250	4.000	No Ice 1/2" Ice	16.000 16.674	34.000 48.000
4' Paraflector (DNK-37)	B	Grid	From Leg	0.500 0.000 0.000	Worst		157.000	4.000	No Ice 1/2" Ice	16.000 16.674	34.000 48.000

Tower Pressures - No Ice

$G_H = 1.121$

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
T1	177.500	1.617	0.037	56.082	A	5.526	4.171	4.171	43.02	0.000	0.000
180.000-175.0					B	5.526	4.171		43.02	0.000	0.000
00					C	4.955	10.641		26.74	0.000	0.000
T2	170.833	1.6	0.037	97.919	A	6.293	6.952	6.952	52.49	0.000	0.000
175.000-166.6					B	6.293	6.952		52.49	0.000	0.000
67					C	7.344	18.341		27.07	0.000	0.000
T3	162.500	1.577	0.036	103.475	A	6.518	6.952	6.952	51.61	0.000	0.000
166.667-158.3					B	6.518	6.952		51.61	0.000	0.000
33					C	8.622	21.219		23.30	0.000	0.000
T4	154.167	1.553	0.036	109.031	A	6.746	6.952	6.952	50.75	0.000	0.000
158.333-150.0					B	6.746	6.952		50.75	0.000	0.000
00					C	8.531	26.435		19.88	0.000	0.000
T5	137.500	1.503	0.035	360.425	A	31.437	23.662	20.856	37.85	0.000	0.000
150.000-125.0					B	24.964	77.187		20.42	0.000	0.000
00					C	32.230	85.824		17.67	0.000	0.000
T6	112.500	1.42	0.033	410.425	A	37.501	24.363	20.856	33.71	0.000	0.000
125.000-100.0					B	26.004	117.988		14.48	0.000	0.000
00					C	37.549	90.752		16.26	0.000	0.000
T7	95.833	1.356	0.031	147.919	A	13.268	8.121	6.952	32.50	0.000	0.000
100.000-91.66					B	9.529	39.329		14.23	0.000	0.000
7					C	13.263	31.091		15.67	0.000	0.000
T8	87.500	1.321	0.031	154.157	A	21.130	1.169	7.473	33.51	0.000	0.000
91.667-83.333					B	17.430	32.378		15.00	0.000	0.000
					C	21.159	24.139		16.50	0.000	0.000
T9	79.167	1.284	0.030	159.712	A	21.520	1.169	7.473	32.94	0.000	0.000
83.333-75.000					B	17.856	32.378		14.88	0.000	0.000
					C	21.560	24.321		16.29	0.000	0.000
T10	62.500	1.2	0.028	514.334	A	40.966	32.184	28.676	39.20	0.000	0.000
75.000-50.000					B	30.839	125.809		18.31	0.000	0.000
					C	41.274	106.947		19.35	0.000	0.000
T11	43.750	1.084	0.025	275.917	A	21.483	16.092	14.338	38.16	0.000	0.000
50.000-37.500					B	16.553	62.905		18.05	0.000	0.000
					C	21.763	53.474		19.06	0.000	0.000
T12	31.250	1	0.023	288.417	A	22.193	16.092	14.338	37.45	0.000	0.000
37.500-25.000					B	17.339	62.905		17.87	0.000	0.000
					C	22.504	53.865		18.77	0.000	0.000
T13	18.750	1	0.023	300.389	A	38.557	1.754	14.990	37.19	0.000	0.000
25.000-12.500					B	33.534	48.566		18.26	0.000	0.000
					C	38.462	41.810		18.67	0.000	0.000
T14	6.250	1	0.023	312.889	A	39.292	0.631	14.990	37.55	0.000	0.000

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
12.500-0.000					B	37.508	17.484		27.26	0.000	0.000
					C	39.248	15.379		27.44	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.121$

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
T1	177.500	1.617	0.034	0.500	56.499	A	5.526	7.046	5.005	39.81	0.000	0.000
180.000-175.000						B	5.526	7.046		39.81	0.000	0.000
						C	4.461	18.138		22.15	0.000	0.000
T2	170.833	1.6	0.033	0.500	98.614	A	6.293	10.859	8.342	48.64	0.000	0.000
175.000-166.667						B	6.293	10.859		48.64	0.000	0.000
						C	7.473	30.628		21.90	0.000	0.000
T3	162.500	1.577	0.033	0.500	104.170	A	6.518	10.949	8.342	47.76	0.000	0.000
166.667-158.333						B	6.518	10.949		47.76	0.000	0.000
						C	9.130	35.449		18.71	0.000	0.000
T4	154.167	1.553	0.032	0.500	109.726	A	6.746	11.041	8.342	46.90	0.000	0.000
158.333-150.000						B	6.746	11.041		46.90	0.000	0.000
						C	8.826	44.071		15.77	0.000	0.000
T5	137.500	1.503	0.031	0.500	362.510	A	33.587	42.819	25.027	32.75	0.000	0.000
150.000-125.000						B	23.184	124.403		16.96	0.000	0.000
						C	29.665	145.404		14.30	0.000	0.000
T6	112.500	1.42	0.029	0.500	412.510	A	40.189	45.358	25.027	29.25	0.000	0.000
125.000-100.000						B	21.528	189.832		11.84	0.000	0.000
						C	34.324	155.970		13.15	0.000	0.000
T7	95.833	1.356	0.028	0.500	148.614	A	14.164	15.407	8.342	28.21	0.000	0.000
100.000-91.667						B	8.095	63.627		11.63	0.000	0.000
						C	12.156	53.868		12.64	0.000	0.000
T8	87.500	1.321	0.027	0.500	154.852	A	22.952	7.211	8.400	27.85	0.000	0.000
91.667-83.333						B	16.948	55.457		11.60	0.000	0.000
						C	21.005	45.697		12.59	0.000	0.000
T9	79.167	1.284	0.027	0.500	160.407	A	23.343	7.357	8.400	27.36	0.000	0.000
83.333-75.000						B	17.397	55.627		11.50	0.000	0.000
						C	21.410	46.198		12.42	0.000	0.000
T10	62.500	1.2	0.025	0.500	516.419	A	43.653	51.568	32.847	34.50	0.000	0.000
75.000-50.000						B	27.217	198.199		14.57	0.000	0.000
						C	38.005	180.509		15.03	0.000	0.000
T11	43.750	1.084	0.022	0.500	276.960	A	22.827	26.080	16.424	33.58	0.000	0.000
50.000-37.500						B	14.825	99.469		14.37	0.000	0.000
						C	20.226	90.626		14.82	0.000	0.000
T12	31.250	1	0.021	0.500	289.460	A	23.537	26.291	16.424	32.96	0.000	0.000
37.500-25.000						B	15.658	99.722		14.23	0.000	0.000
						C	20.971	91.742		14.57	0.000	0.000
T13	18.750	1	0.021	0.500	301.432	A	41.291	10.080	16.380	31.89	0.000	0.000
25.000-12.500						B	33.139	83.548		14.04	0.000	0.000
						C	37.890	80.518		13.83	0.000	0.000
T14	6.250	1	0.021	0.500	313.932	A	41.166	8.268	16.380	33.14	0.000	0.000
12.500-0.000						B	38.271	34.729		22.44	0.000	0.000
						C	39.919	34.246		22.09	0.000	0.000

Tower Pressure - Service

$G_H = 1.121$

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
T1	177.500	1.617	0.034	56.082	A	5.526	4.171	4.171	43.02	0.000	0.000
180.000-175.000					B	5.526	4.171		43.02	0.000	0.000
					C	4.955	10.641		26.74	0.000	0.000
T2	170.833	1.6	0.033	97.919	A	6.293	6.952	6.952	52.49	0.000	0.000
175.000-166.667					B	6.293	6.952		52.49	0.000	0.000
					C	7.344	18.341		27.07	0.000	0.000
T3	162.500	1.577	0.033	103.475	A	6.518	6.952	6.952	51.61	0.000	0.000
166.667-158.333					B	6.518	6.952		51.61	0.000	0.000
					C	8.622	21.219		23.30	0.000	0.000
T4	154.167	1.553	0.032	109.031	A	6.746	6.952	6.952	50.75	0.000	0.000
158.333-150.000					B	6.746	6.952		50.75	0.000	0.000
					C	8.531	26.435		19.88	0.000	0.000
T5	137.500	1.503	0.031	360.425	A	31.437	23.662	20.856	37.85	0.000	0.000
150.000-125.000					B	24.964	77.187		20.42	0.000	0.000
					C	32.230	85.824		17.67	0.000	0.000
T6	112.500	1.42	0.029	410.425	A	37.501	24.363	20.856	33.71	0.000	0.000
125.000-100.000					B	26.004	117.988		14.48	0.000	0.000
					C	37.549	90.752		16.26	0.000	0.000
T7	95.833	1.356	0.028	147.919	A	13.268	8.121	6.952	32.50	0.000	0.000
100.000-91.667					B	9.529	39.329		14.23	0.000	0.000
					C	13.263	31.091		15.67	0.000	0.000
T8	87.500	1.321	0.027	154.157	A	21.130	1.169	7.473	33.51	0.000	0.000
91.667-83.333					B	17.430	32.378		15.00	0.000	0.000
					C	21.159	24.139		16.50	0.000	0.000
T9	79.167	1.284	0.027	159.712	A	21.520	1.169	7.473	32.94	0.000	0.000
83.333-75.000					B	17.856	32.378		14.88	0.000	0.000
					C	21.560	24.321		16.29	0.000	0.000
T10	62.500	1.2	0.025	514.334	A	40.966	32.184	28.676	39.20	0.000	0.000
75.000-50.000					B	30.839	125.809		18.31	0.000	0.000
					C	41.274	106.947		19.35	0.000	0.000
T11	43.750	1.084	0.022	275.917	A	21.483	16.092	14.338	38.16	0.000	0.000
50.000-37.500					B	16.553	62.905		18.05	0.000	0.000
					C	21.763	53.474		19.06	0.000	0.000
T12	31.250	1	0.021	288.417	A	22.193	16.092	14.338	37.45	0.000	0.000
37.500-25.000					B	17.339	62.905		17.87	0.000	0.000
					C	22.504	53.865		18.77	0.000	0.000
T13	18.750	1	0.021	300.389	A	38.557	1.754	14.990	37.19	0.000	0.000
25.000-12.500					B	33.534	48.566		18.26	0.000	0.000
					C	38.462	41.810		18.67	0.000	0.000
T14	6.250	1	0.021	312.889	A	39.292	0.631	14.990	37.55	0.000	0.000
12.500-0.000					B	37.508	17.484		27.26	0.000	0.000
					C	39.248	15.379		27.44	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	26.190	592.305	A	0.173	2.689	0.585	1	1	7.967	1128.766	225.753	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
180.000-175.0			B	0.173	2.689	0.585	1	1	7.967			
00			C	0.278	2.356	0.609	1	1	11.440			
T2	52.650	755.494	A	0.135	2.826	0.579	1	1	10.320	1834.347	220.122	C
175.000-166.6			B	0.135	2.826	0.579	1	1	10.320			
67			C	0.262	2.401	0.605	1	1	18.442			
T3	70.190	768.073	A	0.13	2.846	0.579	1	1	10.541	2054.473	246.537	C
166.667-158.3			B	0.13	2.846	0.579	1	1	10.541			
33			C	0.288	2.327	0.612	1	1	21.616			
T4	93.290	780.881	A	0.126	2.863	0.578	1	1	10.764	2253.848	270.462	C
158.333-150.0			B	0.126	2.863	0.578	1	1	10.764			
00			C	0.321	2.242	0.622	1	1	24.986			
T5	618.880	3994.805	A	0.153	2.761	0.582	1	1	45.206	7437.595	297.504	C
150.000-125.0			B	0.283	2.341	0.611	1	1	72.123			
00			C	0.328	2.225	0.625	1	1	85.845			
T6	871.842	4822.083	A	0.151	2.769	0.582	1	1	51.671	8029.157	321.166	B
125.000-100.0			B	0.351	2.17	0.633	1	1	100.664			
00			C	0.313	2.263	0.62	1	1	93.800			
T7	293.667	1971.333	A	0.145	2.791	0.581	1	1	17.984	2659.463	319.136	B
100.000-91.66			B	0.33	2.219	0.626	1	1	34.135			
7			C	0.3	2.296	0.616	1	1	32.410			
T8	293.667	2177.704	A	0.145	2.791	0.581	1	1	21.809	2877.911	345.349	B
91.667-83.333			B	0.323	2.236	0.623	1	1	37.609			
			C	0.294	2.313	0.614	1	1	35.981			
T9	294.327	2217.593	A	0.142	2.801	0.58	1	1	22.199	2849.160	341.899	B
83.333-75.000			B	0.315	2.258	0.62	1	1	37.945			
			C	0.287	2.33	0.612	1	1	36.446			
T10	901.250	6256.473	A	0.142	2.8	0.58	1	1	59.643	7724.678	308.987	C
75.000-50.000			B	0.305	2.284	0.617	1	1	108.502			
			C	0.288	2.328	0.612	1	1	106.764			
T11	450.625	3450.287	A	0.136	2.823	0.579	1	1	30.808	3612.155	288.972	C
50.000-37.500			B	0.288	2.328	0.612	1	1	55.069			
			C	0.273	2.371	0.608	1	1	54.270			
T12	451.885	3953.241	A	0.133	2.836	0.579	1	1	31.511	3417.886	273.431	C
37.500-25.000			B	0.278	2.356	0.609	1	1	55.678			
			C	0.265	2.394	0.606	1	1	55.133			
T13	459.325	4249.867	A	0.134	2.831	0.579	1	1	39.572	3944.564	315.565	C
25.000-12.500			B	0.273	2.369	0.608	1	1	63.067			
			C	0.267	2.387	0.606	1	1	63.817			
T14	166.545	4801.092	A	0.128	2.856	0.578	1	1	39.657	3352.702	268.216	C
12.500-0.000			B	0.176	2.679	0.586	1	1	47.749			
			C	0.175	2.683	0.586	1	1	48.253			
Sum Weight:	5044.333	40791.230						OTM	4695.782 kip-ft	53176.707		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	26.190	592.305	A	0.173	2.689	0.585	0.8	1	6.862	1030.985	206.197	C
180.000-175.0			B	0.173	2.689	0.585	0.8	1	6.862			
00			C	0.278	2.356	0.609	0.8	1	10.449			
T2	52.650	755.494	A	0.135	2.826	0.579	0.8	1	9.062	1688.244	202.589	C
175.000-166.6			B	0.135	2.826	0.579	0.8	1	9.062			
67			C	0.262	2.401	0.605	0.8	1	16.973			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T3	70.190	768.073	A	0.13	2.846	0.579	0.8	1	9.237	1890.584	226.870	C
166.667-158.3			B	0.13	2.846	0.579	0.8	1	9.237			
33			C	0.288	2.327	0.612	0.8	1	19.892			
T4	93.290	780.881	A	0.126	2.863	0.578	0.8	1	9.415	2099.932	251.992	C
158.333-150.0			B	0.126	2.863	0.578	0.8	1	9.415			
00			C	0.321	2.242	0.622	0.8	1	23.279			
T5	618.880	3994.805	A	0.153	2.761	0.582	0.8	1	38.919	6879.122	275.165	C
150.000-125.0			B	0.283	2.341	0.611	0.8	1	67.130			
00			C	0.328	2.225	0.625	0.8	1	79.399			
T6	871.842	4822.083	A	0.151	2.769	0.582	0.8	1	44.171	7614.331	304.573	B
125.000-100.0			B	0.351	2.17	0.633	0.8	1	95.463			
00			C	0.313	2.263	0.62	0.8	1	86.290			
T7	293.667	1971.333	A	0.145	2.791	0.581	0.8	1	15.330	2510.980	301.318	B
100.000-91.66			B	0.33	2.219	0.626	0.8	1	32.229			
7			C	0.3	2.296	0.616	0.8	1	29.758			
T8	293.667	2177.704	A	0.145	2.791	0.581	0.8	1	17.583	2611.155	313.339	B
91.667-83.333			B	0.323	2.236	0.623	0.8	1	34.123			
			C	0.294	2.313	0.614	0.8	1	31.749			
T9	294.327	2217.593	A	0.142	2.801	0.58	0.8	1	17.895	2581.006	309.721	B
83.333-75.000			B	0.315	2.258	0.62	0.8	1	34.374			
			C	0.287	2.33	0.612	0.8	1	32.134			
T10	901.250	6256.473	A	0.142	2.8	0.58	0.8	1	51.450	7264.268	290.571	B
75.000-50.000			B	0.305	2.284	0.617	0.8	1	102.334			
			C	0.288	2.328	0.612	0.8	1	98.509			
T11	450.625	3450.287	A	0.136	2.823	0.579	0.8	1	26.511	3382.866	270.629	B
50.000-37.500			B	0.288	2.328	0.612	0.8	1	51.758			
			C	0.273	2.371	0.608	0.8	1	49.918			
T12	451.885	3953.241	A	0.133	2.836	0.579	0.8	1	27.072	3184.848	254.788	B
37.500-25.000			B	0.278	2.356	0.609	0.8	1	52.210			
			C	0.265	2.394	0.606	0.8	1	50.632			
T13	459.325	4249.867	A	0.134	2.831	0.579	0.8	1	31.861	3469.088	277.527	C
25.000-12.500			B	0.273	2.369	0.608	0.8	1	56.360			
			C	0.267	2.387	0.606	0.8	1	56.125			
T14	166.545	4801.092	A	0.128	2.856	0.578	0.8	1	31.799	2807.299	224.584	C
12.500-0.000			B	0.176	2.679	0.586	0.8	1	40.248			
			C	0.175	2.683	0.586	0.8	1	40.403			
Sum Weight:	5044.333	40791.230						OTM	4362.435 kip-ft	49014.708		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	26.190	592.305	A	0.173	2.689	0.585	0.85	1	7.138	1055.430	211.086	C
180.000-175.0			B	0.173	2.689	0.585	0.85	1	7.138			
00			C	0.278	2.356	0.609	0.85	1	10.697			
T2	52.650	755.494	A	0.135	2.826	0.579	0.85	1	9.376	1724.770	206.972	C
175.000-166.6			B	0.135	2.826	0.579	0.85	1	9.376			
67			C	0.262	2.401	0.605	0.85	1	17.341			
T3	70.190	768.073	A	0.13	2.846	0.579	0.85	1	9.563	1931.556	231.787	C
166.667-158.3			B	0.13	2.846	0.579	0.85	1	9.563			
33			C	0.288	2.327	0.612	0.85	1	20.323			
T4	93.290	780.881	A	0.126	2.863	0.578	0.85	1	9.752	2138.411	256.609	C
158.333-150.0			B	0.126	2.863	0.578	0.85	1	9.752			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
00			C	0.321	2.242	0.622	0.85	1	23.706			
T5	618.880	3994.805	A	0.153	2.761	0.582	0.85	1	40.490	7018.740	280.750	C
150.000-125.0			B	0.283	2.341	0.611	0.85	1	68.378			
00			C	0.328	2.225	0.625	0.85	1	81.011			
T6	871.842	4822.083	A	0.151	2.769	0.582	0.85	1	46.046	7718.038	308.722	B
125.000-100.0			B	0.351	2.17	0.633	0.85	1	96.763			
00			C	0.313	2.263	0.62	0.85	1	88.168			
T7	293.667	1971.333	A	0.145	2.791	0.581	0.85	1	15.994	2548.101	305.772	B
100.000-91.66			B	0.33	2.219	0.626	0.85	1	32.706			
7			C	0.3	2.296	0.616	0.85	1	30.421			
T8	293.667	2177.704	A	0.145	2.791	0.581	0.85	1	18.639	2677.844	321.341	B
91.667-83.333			B	0.323	2.236	0.623	0.85	1	34.995			
			C	0.294	2.313	0.614	0.85	1	32.807			
T9	294.327	2217.593	A	0.142	2.801	0.58	0.85	1	18.971	2648.044	317.765	B
83.333-75.000			B	0.315	2.258	0.62	0.85	1	35.267			
			C	0.287	2.33	0.612	0.85	1	33.212			
T10	901.250	6256.473	A	0.142	2.8	0.58	0.85	1	53.498	7373.724	294.949	B
75.000-50.000			B	0.305	2.284	0.617	0.85	1	103.876			
			C	0.288	2.328	0.612	0.85	1	100.573			
T11	450.625	3450.287	A	0.136	2.823	0.579	0.85	1	27.585	3436.960	274.957	B
50.000-37.500			B	0.288	2.328	0.612	0.85	1	52.586			
			C	0.273	2.371	0.608	0.85	1	51.006			
T12	451.885	3953.241	A	0.133	2.836	0.579	0.85	1	28.181	3237.733	259.019	B
37.500-25.000			B	0.278	2.356	0.609	0.85	1	53.077			
			C	0.265	2.394	0.606	0.85	1	51.758			
T13	459.325	4249.867	A	0.134	2.831	0.579	0.85	1	33.789	3587.957	287.037	C
25.000-12.500			B	0.273	2.369	0.608	0.85	1	58.037			
			C	0.267	2.387	0.606	0.85	1	58.048			
T14	166.545	4801.092	A	0.128	2.856	0.578	0.85	1	33.763	2943.650	235.492	C
12.500-0.000			B	0.176	2.679	0.586	0.85	1	42.123			
			C	0.175	2.683	0.586	0.85	1	42.365			
Sum Weight:	5044.333	40791.230						OTM	4445.110 kip-ft	50040.958		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	93.602	862.271	A	0.223	2.523	0.595	1	1	9.720	1263.047	252.609	C
180.000-175.0			B	0.223	2.523	0.595	1	1	9.720			
00			C	0.4	2.064	0.652	1	1	16.280			
T2	189.522	1098.615	A	0.174	2.685	0.585	1	1	12.650	2120.057	254.407	C
175.000-166.6			B	0.174	2.685	0.585	1	1	12.650			
67			C	0.386	2.092	0.646	1	1	27.262			
T3	249.122	1119.335	A	0.168	2.707	0.584	1	1	12.916	2406.683	288.802	C
166.667-158.3			B	0.168	2.707	0.584	1	1	12.916			
33			C	0.428	2.011	0.663	1	1	32.647			
T4	323.388	1140.408	A	0.162	2.727	0.583	1	1	13.187	2721.514	326.582	C
158.333-150.0			B	0.162	2.727	0.583	1	1	13.187			
00			C	0.482	1.924	0.689	1	1	39.171			
T5	1942.654	5582.627	A	0.211	2.56	0.593	1	1	58.964	8725.491	349.020	C
150.000-125.0			B	0.407	2.05	0.655	1	1	104.610			
00			C	0.483	1.923	0.689	1	1	129.840			
T6	2704.935	6689.411	A	0.207	2.572	0.592	1	1	67.038	9646.979	385.879	B

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
125.000-100.000			B	0.512	1.884	0.704	1	1	155.149			
			C	0.461	1.955	0.679	1	1	140.154			
T7	913.682	2688.967	A	0.199	2.599	0.59	1	1	23.257	3147.975	377.757	B
100.000-91.667			B	0.483	1.924	0.689	1	1	51.921			
			C	0.444	1.983	0.671	1	1	48.283			
T8	913.682	2974.304	A	0.195	2.614	0.589	1	1	27.202	3270.969	392.516	B
91.667-83.333			B	0.468	1.946	0.681	1	1	54.741			
			C	0.431	2.006	0.665	1	1	51.376			
T9	916.284	3032.898	A	0.191	2.625	0.589	1	1	27.674	3224.427	386.931	B
83.333-75.000			B	0.455	1.965	0.676	1	1	54.983			
			C	0.421	2.023	0.661	1	1	51.928			
T10	2827.116	8373.824	A	0.184	2.649	0.587	1	1	73.941	8879.075	355.163	B
75.000-50.000			B	0.436	1.996	0.667	1	1	159.449			
			C	0.423	2.02	0.661	1	1	157.377			
T11	1413.558	4512.674	A	0.177	2.676	0.586	1	1	38.107	4121.711	329.737	C
50.000-37.500			B	0.413	2.039	0.657	1	1	80.161			
			C	0.4	2.064	0.652	1	1	79.287			
T12	1419.522	5190.974	A	0.172	2.692	0.585	1	1	38.920	3894.899	311.592	C
37.500-25.000			B	0.399	2.067	0.651	1	1	80.580			
			C	0.389	2.085	0.647	1	1	80.358			
T13	1454.084	5574.400	A	0.17	2.698	0.585	1	1	47.186	4353.499	348.280	C
25.000-12.500			B	0.387	2.09	0.646	1	1	87.147			
			C	0.393	2.078	0.649	1	1	90.122			
T14	528.155	6273.421	A	0.157	2.744	0.583	1	1	45.984	3481.495	278.520	C
12.500-0.000			B	0.233	2.491	0.598	1	1	59.024			
			C	0.236	2.479	0.598	1	1	60.414			
Sum Weight:	15889.304	55114.128						OTM	5485.588 kip-ft	61257.821		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1	93.602	862.271	A	0.223	2.523	0.595	0.8	1	8.615	1193.821	238.764	C
180.000-175.000			B	0.223	2.523	0.595	0.8	1	8.615			
			C	0.4	2.064	0.652	0.8	1	15.388			
T2	189.522	1098.615	A	0.174	2.685	0.585	0.8	1	11.391	2003.830	240.460	C
175.000-166.667			B	0.174	2.685	0.585	0.8	1	11.391			
			C	0.386	2.092	0.646	0.8	1	25.768			
T3	249.122	1119.335	A	0.168	2.707	0.584	0.8	1	11.613	2272.071	272.648	C
166.667-158.333			B	0.168	2.707	0.584	0.8	1	11.613			
			C	0.428	2.011	0.663	0.8	1	30.821			
T4	323.388	1140.408	A	0.162	2.727	0.583	0.8	1	11.838	2598.867	311.864	C
158.333-150.000			B	0.162	2.727	0.583	0.8	1	11.838			
			C	0.482	1.924	0.689	0.8	1	37.406			
T5	1942.654	5582.627	A	0.211	2.56	0.593	0.8	1	52.246	8326.784	333.071	C
150.000-125.000			B	0.407	2.05	0.655	0.8	1	99.973			
			C	0.483	1.923	0.689	0.8	1	123.907			
T6	2704.935	6689.411	A	0.207	2.572	0.592	0.8	1	59.000	9379.263	375.171	B
125.000-100.000			B	0.512	1.884	0.704	0.8	1	150.843			
			C	0.461	1.955	0.679	0.8	1	133.289			
T7	913.682	2688.967	A	0.199	2.599	0.59	0.8	1	20.425	3049.809	365.977	B
100.000-91.667			B	0.483	1.924	0.689	0.8	1	50.302			
			C	0.444	1.983	0.671	0.8	1	45.852			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T8	913.682	2974.304	A	0.195	2.614	0.589	0.8	1	22.611	3068.433	368.212	B
91.667-83.333			B	0.468	1.946	0.681	0.8	1	51.352			
			C	0.431	2.006	0.665	0.8	1	47.175			
T9	916.284	3032.898	A	0.191	2.625	0.589	0.8	1	23.005	3020.387	362.446	B
83.333-75.000			B	0.455	1.965	0.676	0.8	1	51.504			
			C	0.421	2.023	0.661	0.8	1	47.646			
T10	2827.116	8373.824	A	0.184	2.649	0.587	0.8	1	65.211	8575.957	343.038	B
75.000-50.000			B	0.436	1.996	0.667	0.8	1	154.006			
			C	0.423	2.02	0.661	0.8	1	149.776			
T11	1413.558	4512.674	A	0.177	2.676	0.586	0.8	1	33.542	3966.238	317.299	B
50.000-37.500			B	0.413	2.039	0.657	0.8	1	77.196			
			C	0.4	2.064	0.652	0.8	1	75.242			
T12	1419.522	5190.974	A	0.172	2.692	0.585	0.8	1	34.213	3720.362	297.629	B
37.500-25.000			B	0.399	2.067	0.651	0.8	1	77.449			
			C	0.389	2.085	0.647	0.8	1	76.164			
T13	1454.084	5574.400	A	0.17	2.698	0.585	0.8	1	38.927	3987.426	318.994	C
25.000-12.500			B	0.387	2.09	0.646	0.8	1	80.519			
			C	0.393	2.078	0.649	0.8	1	82.544			
T14	528.155	6273.421	A	0.157	2.744	0.583	0.8	1	37.750	3021.410	241.713	C
12.500-0.000			B	0.233	2.491	0.598	0.8	1	51.370			
			C	0.236	2.479	0.598	0.8	1	52.430			
Sum Weight:	15889.304	55114.128						OTM	5243.499 kip-ft	58184.658		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	93.602	862.271	A	0.223	2.523	0.595	0.85	1	8.891	1211.127	242.225	C
180.000-175.0			B	0.223	2.523	0.595	0.85	1	8.891			
00			C	0.4	2.064	0.652	0.85	1	15.611			
T2	189.522	1098.615	A	0.174	2.685	0.585	0.85	1	11.706	2032.887	243.946	C
175.000-166.6			B	0.174	2.685	0.585	0.85	1	11.706			
67			C	0.386	2.092	0.646	0.85	1	26.141			
T3	249.122	1119.335	A	0.168	2.707	0.584	0.85	1	11.939	2305.724	276.687	C
166.667-158.3			B	0.168	2.707	0.584	0.85	1	11.939			
33			C	0.428	2.011	0.663	0.85	1	31.278			
T4	323.388	1140.408	A	0.162	2.727	0.583	0.85	1	12.175	2629.529	315.544	C
158.333-150.0			B	0.162	2.727	0.583	0.85	1	12.175			
00			C	0.482	1.924	0.689	0.85	1	37.847			
T5	1942.654	5582.627	A	0.211	2.56	0.593	0.85	1	53.926	8426.461	337.058	C
150.000-125.0			B	0.407	2.05	0.655	0.85	1	101.132			
00			C	0.483	1.923	0.689	0.85	1	125.390			
T6	2704.935	6689.411	A	0.207	2.572	0.592	0.85	1	61.010	9446.192	377.848	B
125.000-100.0			B	0.512	1.884	0.704	0.85	1	151.920			
00			C	0.461	1.955	0.679	0.85	1	135.005			
T7	913.682	2688.967	A	0.199	2.599	0.59	0.85	1	21.133	3074.351	368.922	B
100.000-91.66			B	0.483	1.924	0.689	0.85	1	50.707			
7			C	0.444	1.983	0.671	0.85	1	46.460			
T8	913.682	2974.304	A	0.195	2.614	0.589	0.85	1	23.759	3119.067	374.288	B
91.667-83.333			B	0.468	1.946	0.681	0.85	1	52.199			
			C	0.431	2.006	0.665	0.85	1	48.225			
T9	916.284	3032.898	A	0.191	2.625	0.589	0.85	1	24.172	3071.397	368.568	B
83.333-75.000			B	0.455	1.965	0.676	0.85	1	52.374			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.421	2.023	0.661	0.85	1	48.717			
T10	2827.116	8373.824	A	0.184	2.649	0.587	0.85	1	67.393	8651.737	346.069	B
75.000-50.000			B	0.436	1.996	0.667	0.85	1	155.367			
			C	0.423	2.02	0.661	0.85	1	151.676			
T11	1413.558	4512.674	A	0.177	2.676	0.586	0.85	1	34.683	4004.322	320.346	B
50.000-37.500			B	0.413	2.039	0.657	0.85	1	77.937			
			C	0.4	2.064	0.652	0.85	1	76.253			
T12	1419.522	5190.974	A	0.172	2.692	0.585	0.85	1	35.390	3757.971	300.638	B
37.500-25.000			B	0.399	2.067	0.651	0.85	1	78.231			
			C	0.389	2.085	0.647	0.85	1	77.212			
T13	1454.084	5574.400	A	0.17	2.698	0.585	0.85	1	40.992	4078.944	326.316	C
25.000-12.500			B	0.387	2.09	0.646	0.85	1	82.176			
			C	0.393	2.078	0.649	0.85	1	84.438			
T14	528.155	6273.421	A	0.157	2.744	0.583	0.85	1	39.809	3136.431	250.914	C
12.500-0.000			B	0.233	2.491	0.598	0.85	1	53.283			
			C	0.236	2.479	0.598	0.85	1	54.426			
Sum Weight:	15889.304	55114.128						OTM	5303.799 kip-ft	58946.139		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	26.190	592.305	A	0.173	2.689	0.585	1	1	7.967	1013.075	202.615	C
180.000-175.0			B	0.173	2.689	0.585	1	1	7.967			
00			C	0.278	2.356	0.609	1	1	11.440			
T2	52.650	755.494	A	0.135	2.826	0.579	1	1	10.320	1646.339	197.561	C
175.000-166.6			B	0.135	2.826	0.579	1	1	10.320			
67			C	0.262	2.401	0.605	1	1	18.442			
T3	70.190	768.073	A	0.13	2.846	0.579	1	1	10.541	1843.904	221.268	C
166.667-158.3			B	0.13	2.846	0.579	1	1	10.541			
33			C	0.288	2.327	0.612	1	1	21.616			
T4	93.290	780.881	A	0.126	2.863	0.578	1	1	10.764	2022.844	242.741	C
158.333-150.0			B	0.126	2.863	0.578	1	1	10.764			
00			C	0.321	2.242	0.622	1	1	24.986			
T5	618.880	3994.805	A	0.153	2.761	0.582	1	1	45.206	6675.293	267.012	C
150.000-125.0			B	0.283	2.341	0.611	1	1	72.123			
00			C	0.328	2.225	0.625	1	1	85.845			
T6	871.842	4822.083	A	0.151	2.769	0.582	1	1	51.671	7206.224	288.249	B
125.000-100.0			B	0.351	2.17	0.633	1	1	100.664			
00			C	0.313	2.263	0.62	1	1	93.800			
T7	293.667	1971.333	A	0.145	2.791	0.581	1	1	17.984	2386.887	286.426	B
100.000-91.66			B	0.33	2.219	0.626	1	1	34.135			
7			C	0.3	2.296	0.616	1	1	32.410			
T8	293.667	2177.704	A	0.145	2.791	0.581	1	1	21.809	2582.945	309.953	B
91.667-83.333			B	0.323	2.236	0.623	1	1	37.609			
			C	0.294	2.313	0.614	1	1	35.981			
T9	294.327	2217.593	A	0.142	2.801	0.58	1	1	22.199	2557.141	306.857	B
83.333-75.000			B	0.315	2.258	0.62	1	1	37.945			
			C	0.287	2.33	0.612	1	1	36.446			
T10	901.250	6256.473	A	0.142	2.8	0.58	1	1	59.643	6932.952	277.318	C
75.000-50.000			B	0.305	2.284	0.617	1	1	108.502			
			C	0.288	2.328	0.612	1	1	106.764			
T11	450.625	3450.287	A	0.136	2.823	0.579	1	1	30.808	3241.935	259.355	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
50.000-37.500			B	0.288	2.328	0.612	1	1	55.069			
			C	0.273	2.371	0.608	1	1	54.270			
T12	451.885	3953.241	A	0.133	2.836	0.579	1	1	31.511	3067.576	245.406	C
37.500-25.000			B	0.278	2.356	0.609	1	1	55.678			
			C	0.265	2.394	0.606	1	1	55.133			
T13	459.325	4249.867	A	0.134	2.831	0.579	1	1	39.572	3540.274	283.222	C
25.000-12.500			B	0.273	2.369	0.608	1	1	63.067			
			C	0.267	2.387	0.606	1	1	63.817			
T14	166.545	4801.092	A	0.128	2.856	0.578	1	1	39.657	3009.074	240.726	C
12.500-0.000			B	0.176	2.679	0.586	1	1	47.749			
			C	0.175	2.683	0.586	1	1	48.253			
Sum Weight:	5044.333	40791.230						OTM	4214.497 kip-ft	47726.462		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	26.190	592.305	A	0.173	2.689	0.585	0.8	1	6.862	925.316	185.063	C
180.000-175.0			B	0.173	2.689	0.585	0.8	1	6.862			
00			C	0.278	2.356	0.609	0.8	1	10.449			
T2	52.650	755.494	A	0.135	2.826	0.579	0.8	1	9.062	1515.211	181.825	C
175.000-166.6			B	0.135	2.826	0.579	0.8	1	9.062			
67			C	0.262	2.401	0.605	0.8	1	16.973			
T3	70.190	768.073	A	0.13	2.846	0.579	0.8	1	9.237	1696.812	203.617	C
166.667-158.3			B	0.13	2.846	0.579	0.8	1	9.237			
33			C	0.288	2.327	0.612	0.8	1	19.892			
T4	93.290	780.881	A	0.126	2.863	0.578	0.8	1	9.415	1884.704	226.164	C
158.333-150.0			B	0.126	2.863	0.578	0.8	1	9.415			
00			C	0.321	2.242	0.622	0.8	1	23.279			
T5	618.880	3994.805	A	0.153	2.761	0.582	0.8	1	38.919	6174.059	246.962	C
150.000-125.0			B	0.283	2.341	0.611	0.8	1	67.130			
00			C	0.328	2.225	0.625	0.8	1	79.399			
T6	871.842	4822.083	A	0.151	2.769	0.582	0.8	1	44.171	6833.915	273.357	B
125.000-100.0			B	0.351	2.17	0.633	0.8	1	95.463			
00			C	0.313	2.263	0.62	0.8	1	86.290			
T7	293.667	1971.333	A	0.145	2.791	0.581	0.8	1	15.330	2253.622	270.435	B
100.000-91.66			B	0.33	2.219	0.626	0.8	1	32.229			
7			C	0.3	2.296	0.616	0.8	1	29.758			
T8	293.667	2177.704	A	0.145	2.791	0.581	0.8	1	17.583	2343.530	281.224	B
91.667-83.333			B	0.323	2.236	0.623	0.8	1	34.123			
			C	0.294	2.313	0.614	0.8	1	31.749			
T9	294.327	2217.593	A	0.142	2.801	0.58	0.8	1	17.895	2316.470	277.976	B
83.333-75.000			B	0.315	2.258	0.62	0.8	1	34.374			
			C	0.287	2.33	0.612	0.8	1	32.134			
T10	901.250	6256.473	A	0.142	2.8	0.58	0.8	1	51.450	6519.730	260.789	B
75.000-50.000			B	0.305	2.284	0.617	0.8	1	102.334			
			C	0.288	2.328	0.612	0.8	1	98.509			
T11	450.625	3450.287	A	0.136	2.823	0.579	0.8	1	26.511	3036.145	242.892	B
50.000-37.500			B	0.288	2.328	0.612	0.8	1	51.758			
			C	0.273	2.371	0.608	0.8	1	49.918			
T12	451.885	3953.241	A	0.133	2.836	0.579	0.8	1	27.072	2858.424	228.674	B
37.500-25.000			B	0.278	2.356	0.609	0.8	1	52.210			
			C	0.265	2.394	0.606	0.8	1	50.632			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T13	459.325	4249.867	A	0.134	2.831	0.579	0.8	1	31.861	3113.530	249.082	C
25.000-12.500			B	0.273	2.369	0.608	0.8	1	56.360			
			C	0.267	2.387	0.606	0.8	1	56.125			
T14	166.545	4801.092	A	0.128	2.856	0.578	0.8	1	31.799	2519.570	201.566	C
12.500-0.000			B	0.176	2.679	0.586	0.8	1	40.248			
			C	0.175	2.683	0.586	0.8	1	40.403			
Sum Weight:	5044.333	40791.230						OTM	3915.316 kip-ft	43991.040		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	26.190	592.305	A	0.173	2.689	0.585	0.85	1	7.138	947.256	189.451	C
180.000-175.0			B	0.173	2.689	0.585	0.85	1	7.138			
00			C	0.278	2.356	0.609	0.85	1	10.697			
T2	52.650	755.494	A	0.135	2.826	0.579	0.85	1	9.376	1547.993	185.759	C
175.000-166.6			B	0.135	2.826	0.579	0.85	1	9.376			
67			C	0.262	2.401	0.605	0.85	1	17.341			
T3	70.190	768.073	A	0.13	2.846	0.579	0.85	1	9.563	1733.585	208.030	C
166.667-158.3			B	0.13	2.846	0.579	0.85	1	9.563			
33			C	0.288	2.327	0.612	0.85	1	20.323			
T4	93.290	780.881	A	0.126	2.863	0.578	0.85	1	9.752	1919.239	230.309	C
158.333-150.0			B	0.126	2.863	0.578	0.85	1	9.752			
00			C	0.321	2.242	0.622	0.85	1	23.706			
T5	618.880	3994.805	A	0.153	2.761	0.582	0.85	1	40.490	6299.368	251.975	C
150.000-125.0			B	0.283	2.341	0.611	0.85	1	68.378			
00			C	0.328	2.225	0.625	0.85	1	81.011			
T6	871.842	4822.083	A	0.151	2.769	0.582	0.85	1	46.046	6926.992	277.080	B
125.000-100.0			B	0.351	2.17	0.633	0.85	1	96.763			
00			C	0.313	2.263	0.62	0.85	1	88.168			
T7	293.667	1971.333	A	0.145	2.791	0.581	0.85	1	15.994	2286.938	274.433	B
100.000-91.66			B	0.33	2.219	0.626	0.85	1	32.706			
7			C	0.3	2.296	0.616	0.85	1	30.421			
T8	293.667	2177.704	A	0.145	2.791	0.581	0.85	1	18.639	2403.384	288.406	B
91.667-83.333			B	0.323	2.236	0.623	0.85	1	34.995			
			C	0.294	2.313	0.614	0.85	1	32.807			
T9	294.327	2217.593	A	0.142	2.801	0.58	0.85	1	18.971	2376.638	285.197	B
83.333-75.000			B	0.315	2.258	0.62	0.85	1	35.267			
			C	0.287	2.33	0.612	0.85	1	33.212			
T10	901.250	6256.473	A	0.142	2.8	0.58	0.85	1	53.498	6617.968	264.719	B
75.000-50.000			B	0.305	2.284	0.617	0.85	1	103.876			
			C	0.288	2.328	0.612	0.85	1	100.573			
T11	450.625	3450.287	A	0.136	2.823	0.579	0.85	1	27.585	3084.695	246.776	B
50.000-37.500			B	0.288	2.328	0.612	0.85	1	52.586			
			C	0.273	2.371	0.608	0.85	1	51.006			
T12	451.885	3953.241	A	0.133	2.836	0.579	0.85	1	28.181	2905.888	232.471	B
37.500-25.000			B	0.278	2.356	0.609	0.85	1	53.077			
			C	0.265	2.394	0.606	0.85	1	51.758			
T13	459.325	4249.867	A	0.134	2.831	0.579	0.85	1	33.789	3220.216	257.617	C
25.000-12.500			B	0.273	2.369	0.608	0.85	1	58.037			
			C	0.267	2.387	0.606	0.85	1	58.048			
T14	166.545	4801.092	A	0.128	2.856	0.578	0.85	1	33.763	2641.946	211.356	C
12.500-0.000			B	0.176	2.679	0.586	0.85	1	42.123			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
Sum Weight:	5044.333	40791.230	C	0.175	2.683	0.586	0.85	1 OTM	42.365 3989.517 kip-ft	44912.106		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	13687.988					
Bracing Weight	27103.242					
Total Member Self-Weight	40791.230			6.254	5.652	
Total Weight	56178.133			6.254	5.652	
Wind 0 deg - No Ice		0.100	-76976.321	-8144.562	7.321	-48.815
Wind 30 deg - No Ice		37038.902	-63947.862	-6834.636	-3962.755	-19.960
Wind 60 deg - No Ice		63264.402	-36407.248	-3901.035	-6797.901	11.525
Wind 90 deg - No Ice		74077.631	-0.100	7.924	-7934.052	40.113
Wind 120 deg - No Ice		66868.699	38488.074	4083.108	-7088.257	60.790
Wind 150 deg - No Ice		37038.729	63947.762	6848.814	-3965.646	60.074
Wind 180 deg - No Ice		-0.100	72814.323	7823.723	3.982	45.354
Wind 210 deg - No Ice		-37038.902	63947.862	6847.145	3974.058	19.960
Wind 240 deg - No Ice		-66868.798	38488.247	4080.216	7097.891	-11.975
Wind 270 deg - No Ice		-74077.631	0.100	4.585	7945.356	-40.113
Wind 300 deg - No Ice		-63264.302	-36407.075	-3903.926	6810.873	-56.880
Wind 330 deg - No Ice		-37038.729	-63947.762	-6836.305	3976.949	-60.074
Member Ice	14322.898					
Total Weight Ice	86251.237			15.490	22.673	
Wind 0 deg - Ice		-10.276	-88702.980	-9436.762	25.815	-70.396
Wind 30 deg - Ice		43291.470	-74811.920	-8011.395	-4627.341	-28.214
Wind 60 deg - Ice		74333.839	-42806.008	-4586.870	-7982.308	18.609
Wind 90 deg - Ice		86600.738	10.276	18.632	-9282.797	60.494
Wind 120 deg - Ice		77005.553	44360.389	4744.337	-8195.106	89.120
Wind 150 deg - Ice		43309.269	74822.197	8045.517	-4632.783	88.708
Wind 180 deg - Ice		10.276	85629.816	9225.653	19.531	66.553
Wind 210 deg - Ice		-43291.470	74811.920	8042.375	4672.687	28.214
Wind 240 deg - Ice		-76995.277	44342.590	4738.895	8237.309	-18.724
Wind 270 deg - Ice		-86600.738	-10.276	12.348	9328.143	-60.494
Wind 300 deg - Ice		-74344.116	-42823.808	-4592.313	8030.796	-85.162
Wind 330 deg - Ice		-43309.269	-74822.197	-8014.537	4678.129	-88.708
Total Weight	56178.133			6.254	5.652	
Wind 0 deg - Service		0.090	-69086.782	-7311.780	5.262	-43.812
Wind 30 deg - Service		33242.671	-57393.649	-6136.113	-3557.908	-17.915
Wind 60 deg - Service		56780.239	-32675.757	-3503.185	-6102.471	10.344
Wind 90 deg - Service		66485.187	-0.090	5.132	-7122.175	36.002
Wind 120 deg - Service		60015.120	34543.313	3662.638	-6363.068	54.559
Wind 150 deg - Service		33242.516	57393.559	6144.878	-3560.503	53.917
Wind 180 deg - Service		-0.090	65351.359	7019.866	2.266	40.706
Wind 210 deg - Service		-33242.671	57393.649	6143.380	3565.436	17.915
Wind 240 deg - Service		-60015.210	34543.468	3660.043	6369.098	-10.747
Wind 270 deg - Service		-66485.187	0.090	2.135	7129.703	-36.002
Wind 300 deg - Service		-56780.149	-32675.602	-3505.780	6111.497	-51.050
Wind 330 deg - Service		-33242.516	-57393.559	-6137.611	3568.031	-53.917

Load Combinations

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

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 175	11.782	35	0.4847	0.0826
T2	175 - 166.667	11.272	35	0.4847	0.0841
T3	166.667 - 158.333	10.407	35	0.4843	0.0806
T4	158.333 - 150	9.535	35	0.4812	0.0768
T5	150 - 125	8.666	35	0.4740	0.0706
T6	125 - 100	6.185	35	0.4302	0.0560
T7	100 - 91.6667	3.998	35	0.3559	0.0413
T8	91.6667 - 83.3333	3.369	35	0.3284	0.0371
T9	83.3333 - 75	2.780	35	0.3047	0.0329
T10	75 - 50	2.235	35	0.2787	0.0289
T11	50 - 37.5	0.995	35	0.1799	0.0181

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T12	37.5 - 25	0.560	35	0.1344	0.0129
T13	25 - 12.5	0.266	35	0.0856	0.0088
T14	12.5 - 0	0.071	31	0.0440	0.0041

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
182.500	3" Dia 20' Omni	35	11.782	0.4847	0.0826	43271
182.000	1" Dia 8' Omni	35	11.782	0.4847	0.0826	43271
181.000	2" Dia 10' Omni	35	11.782	0.4847	0.0826	43271
180.000	3" Dia 12' Omni	35	11.782	0.4847	0.0826	43271
178.000	432E-83I-01T TTA Unit	35	11.578	0.4847	0.0834	43271
176.000	6' w/Radome	35	11.374	0.4847	0.0840	43271
174.000	6' w/Radome	35	11.169	0.4847	0.0840	41880
171.000	3'4"x4" Pipe Mount	35	10.858	0.4847	0.0831	52752
170.000	Andrew 6' w/Radome	35	10.755	0.4847	0.0826	61847
169.000	3'4"x4" Pipe Mount	35	10.650	0.4846	0.0820	74315
166.000	6' Side-Arm(1)	35	10.337	0.4842	0.0801	142835
164.000	(inverted) 2" Dia 10' Omni	35	10.128	0.4837	0.0791	215204
160.000	(Inverted) 3" Dia 20' Omni	35	9.710	0.4822	0.0776	670817
157.000	4' Paraflector	35	9.396	0.4804	0.0759	166997
153.000	3" Dia 20' Omni	35	8.977	0.4771	0.0730	60669
151.000	1 Bay Dipole ANT400D	35	8.769	0.4751	0.0714	46722
143.000	13' Sector Mount (1)	35	7.949	0.4651	0.0658	35717
137.000	Pirod 12' PCS T-Frame (1) 104569	35	7.348	0.4554	0.0624	33315
130.000	SitePro1 USF12-396-U Mount Assembly w/ (3) 96" Mount Pipes	35	6.663	0.4417	0.0587	30891
122.000	1' Side Arm	35	5.904	0.4227	0.0543	25819
119.000	12' Dipole	35	5.626	0.4147	0.0525	23106
109.250	4' Paraflector	35	4.759	0.3861	0.0466	17161
76.000	3' Yagi	35	2.297	0.2821	0.0293	11859
75.000	GPS	35	2.235	0.2787	0.0289	11481
27.000	2" Dia 8' Omni	35	0.306	0.0930	0.0094	21951
26.000	Rohn 6' Side-Arm(1)	35	0.285	0.0893	0.0091	23095
20.000	2' Standoff T-Arm (5' face width)	35	0.174	0.0683	0.0069	17567
15.000	2' Yagi	31	0.100	0.0522	0.0050	12900

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 175	15.273	23	0.6287	0.1167
T2	175 - 166.667	14.610	23	0.6288	0.1193
T3	166.667 - 158.333	13.490	23	0.6281	0.1199
T4	158.333 - 150	12.361	23	0.6241	0.1169
T5	150 - 125	11.232	23	0.6150	0.1086
T6	125 - 100	8.015	23	0.5577	0.0874
T7	100 - 91.6667	5.182	23	0.4614	0.0653
T8	91.6667 - 83.3333	4.367	23	0.4259	0.0590

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T9	83.3333 - 75	3.603	23	0.3952	0.0526
T10	75 - 50	2.896	23	0.3615	0.0463
T11	50 - 37.5	1.288	23	0.2334	0.0293
T12	37.5 - 25	0.724	23	0.1744	0.0210
T13	25 - 12.5	0.343	23	0.1110	0.0143
T14	12.5 - 0	0.091	19	0.0570	0.0066

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
182.500	3" Dia 20' Omni	23	15.273	0.6287	0.1167	38953
182.000	1" Dia 8' Omni	23	15.273	0.6287	0.1167	38953
181.000	2" Dia 10' Omni	23	15.273	0.6287	0.1167	38953
180.000	3" Dia 12' Omni	23	15.273	0.6287	0.1167	38953
178.000	432E-83I-01T TTA Unit	23	15.008	0.6287	0.1179	38953
176.000	6' w/Radome	23	14.743	0.6288	0.1189	38953
174.000	6' w/Radome	23	14.476	0.6288	0.1196	37703
171.000	3'4"x4" Pipe Mount	23	14.075	0.6287	0.1201	46944
170.000	Andrew 6' w/Radome	23	13.940	0.6286	0.1201	53801
169.000	3'4"x4" Pipe Mount	23	13.805	0.6285	0.1201	62617
166.000	6' Side-Arm(1)	23	13.400	0.6279	0.1198	99255
164.000	(inverted) 2" Dia 10' Omni	23	13.130	0.6273	0.1194	116715
160.000	(Inverted) 3" Dia 20' Omni	23	12.587	0.6253	0.1179	150193
157.000	4' Paraflector	23	12.180	0.6230	0.1158	150123
153.000	3" Dia 20' Omni	23	11.637	0.6189	0.1118	49399
151.000	1 Bay Dipole ANT400D	23	11.367	0.6164	0.1096	35207
143.000	13' Sector Mount (1)	23	10.302	0.6034	0.1018	26303
137.000	Pirod 12' PCS T-Frame (1) 104569	23	9.522	0.5907	0.0968	24872
130.000	SitePro1 USF12-396-U Mount Assembly w/ (3) 96" Mount Pipes	23	8.634	0.5726	0.0914	23387
122.000	1' Side Arm	23	7.651	0.5479	0.0848	19829
119.000	12' Dipole	23	7.291	0.5375	0.0822	17821
109.250	4' Paraflector	23	6.169	0.5004	0.0733	13359
76.000	3' Yagi	23	2.976	0.3659	0.0471	9142
75.000	GPS	23	2.896	0.3615	0.0463	8852
27.000	2" Dia 8' Omni	23	0.394	0.1207	0.0154	16907
26.000	Rohn 6' Side-Arm(1)	23	0.368	0.1158	0.0148	17785
20.000	2' Standoff T-Arm (5' face width)	19	0.224	0.0886	0.0113	13508
15.000	2' Yagi	19	0.128	0.0676	0.0082	9913

(REFERENCE) STRUCURAL ANALYSIS REPORT – ANTENNA MOUNT ANALYSIS OF SITEPRO1 # USF12-396-U WITH PROPOSED RDFS

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

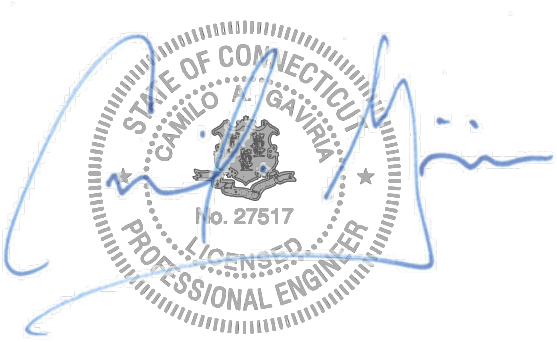
T-Mobile Site #: CT11033E

315 Spencer Plains Road
Westbrook, CT

Centek Project No. 19027.01

Date: April 30, 2019

Max Stress Ratio =86.3%



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

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- RF DATA SHEET, DATED 04/13/2019

CENTEK engineering

Centered on Solutions℠

April 30, 2019

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

Re: Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CT11033E
315 Spencer Plains Road
Westbrook, CT 06498

Centek Project No. 19027.01

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 proposed mounts, consisting of three (3) ±12-ft T frame sector mounts (SitePro P/N: USF-396-U) with stiff arms to support the proposed 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: Three (3) Ericsson AIR21 KRC118023-1_B2A_B4P panel antennas, three (3) RFS APXVAARR24_43-U-NA20 panel antennas , three (3) Ericsson AIR32 KRD901146-1_B66A_B2A panel antennas, three (3) Ericsson KRY112 TMAs and three (3) Ericsson 4449 B71_B12 remote radio units mounted on three (3) T-Arms with a RAD center elevation of 130-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 105 mph for Westbrook 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 **proposed 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:

Camilo A. Gaviria, PE
Structural Engineer

STATE OF CONNECTICUT
CAMILO A. GAVIRIA
No. 27517
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: Loads on Equipment

Location: Westbrook, CT

Rev. 0: 04/26/19

Prepared by: F.J.P Checked by: C.A.G.
Job No. 19027.01

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

Wind Speeds

Basic Wind Speed	$V := 105$	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 =	$Structure\_Type := Lattice$		(User Input)
Structure Category =	$SC := II$		(User Input)
Exposure Category =	$Exp := C$		(User Input)
Structure Height =	$h := 180$	ft	(User Input)
Height to Center of Antennas =	$z := 130$	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 =	$G_H = 1.12$		(User Input)

Output

Wind Direction Probability Factor =

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

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

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

Importance Factors =

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

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

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

$$K_{iz} := \left(\frac{z}{33}\right)^{0.1} = 1.147$$

Velocity Pressure Coefficient Antennas =

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.72$$

$$Kz := 2.01 \cdot \left(\left(\frac{z}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.337$$

Velocity Pressure w/o Ice Antennas = $qz := 0.00256 \cdot K_d \cdot Kz \cdot V^2 \cdot I_{Wind} = 32.087$ psf

Velocity Pressure with Ice Antennas = $qz_{ice} := 0.00256 \cdot K_d \cdot Kz \cdot V_i^2 \cdot I_{Wind} = 7.276$ sf

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS APXVAARR24_43		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 95.9$	in	(User Input)
Antenna Width =	$W_{ant} := 19.7$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 133.4$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.9$		
Antenna Force Coefficient =	$Ca_{ant} = 1.31$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 13.1$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 615$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 5.8$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 272$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 16$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 170$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 8.4$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 89$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \cdot 10^4$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 1 \cdot 10^4$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 372$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 372$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

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

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.7$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 218$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.1$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 143$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6.4$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 68$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 4.7$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 49$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5343$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 5115$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 166$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 166$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Ericsson KRD901146-1_B66A_B2A		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 56.7$	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 Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 234$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.4$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 158$	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 Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 71$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 5.1$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 53$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 6363$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 5568$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 180$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 180$	lbs

Development of Wind & Ice Load on RRUS's

RRUS Data:

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

Wind Load (without ice)

Surface Area for One RRUS =	$SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 1.4$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 59$	lbs
Surface Area for One RRUS =	$SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.1$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 46$	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 =	$Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 21$	lbs
Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.8$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 17$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each RRUS =	$V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 2045$	cu in
Volume of Ice on Each RRUS =	$V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2179$	cu in
Weight of Ice on Each RRUS =	$W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 71$	lbs
Weight of Ice on All RRUSs =	$W_{ICERRUS} \cdot N_{RRUS} = 71$	lbs

Development of Wind & Ice Load on TMA's

TMA Data:

TMA Model =	Ericsson KRY112 TMA		
TMA Shape =	Flat	in	(User Input)
TMA Height =	$L_{TMA} := 6.9$	in	(User Input)
TMA Width =	$W_{TMA} := 6.1$	in	(User Input)
TMA Thickness =	$T_{TMA} := 2.8$	lbs	(User Input)
TMA Weight =	$WT_{TMA} := 11$		(User Input)
Number of TMA's =	$N_{TMA} := 1$		(User Input)
TMA Aspect Ratio =	$Ar_{TMA} := \frac{L_{TMA}}{W_{TMA}} = 1.1$		
TMA Force Coefficient =	$Ca_{TMA} = 1.2$		

Wind Load (without ice)

Surface Area for One TMA =	$SA_{TMAF} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.3$	sf
Total TMA Wind Force =	$F_{TMA} := qz \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAF} = 13$	lbs
Surface Area for One TMA =	$SA_{TMAS} := \frac{L_{TMA} \cdot T_{TMA}}{144} = 0.1$	sf
Total TMA Wind Force =	$F_{TMA} := qz \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAS} = 6$	lbs

Wind Load (with ice)

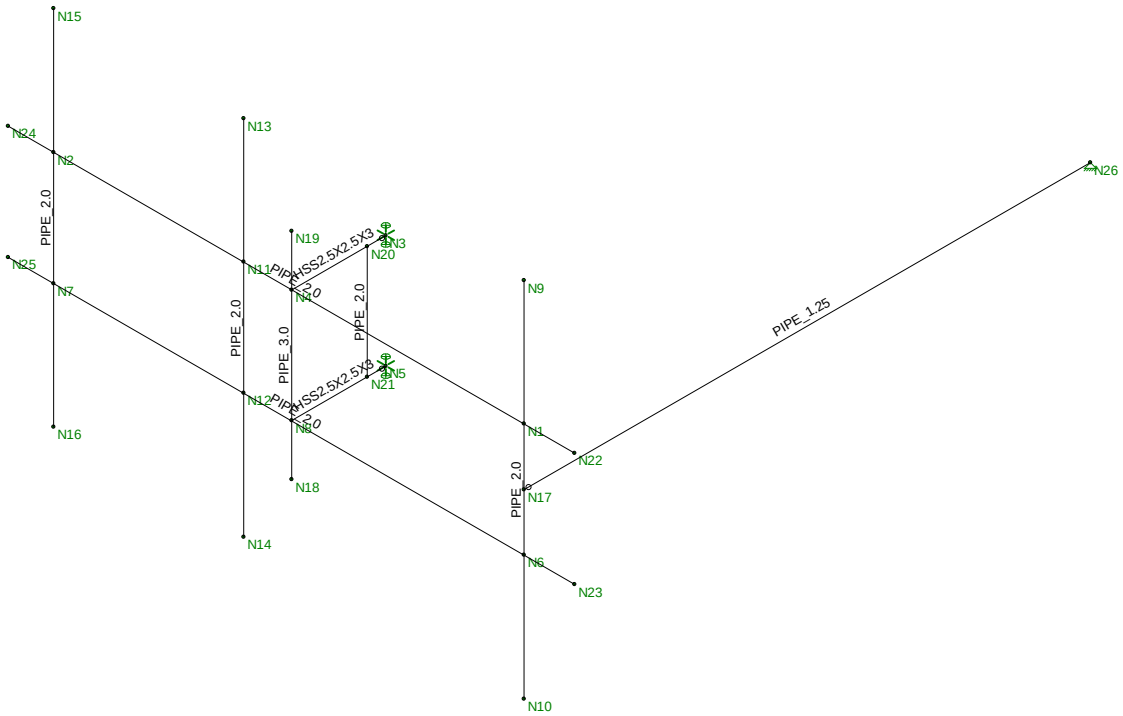
Surface Area for One TMA w/ Ice =	$SA_{ICETMAF} := \frac{(L_{TMA} + 2 \cdot t_{iz}) \cdot (W_{TMA} + 2 \cdot t_{iz})}{144} = 0.7$	sf
Total TMA Wind Force w/ Ice =	$Fi_{TMA} := qz_{ice} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{ICETMAF} = 7$	lbs
Surface Area for One TMA w/ Ice =	$SA_{ICETMAS} := \frac{(L_{TMA} + 2 \cdot t_{iz}) \cdot (T_{TMA} + 2 \cdot t_{iz})}{144} = 0.4$	sf
Total TMA Wind Force w/ Ice =	$Fi_{TMA} := qz_{ice} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{ICETMAS} = 4$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each TMA =	$V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 118$	cu in
Volume of Ice on Each TMA =	$V_{ice} := (L_{TMA} + 2 \cdot t_{iz}) \cdot (W_{TMA} + 2 \cdot t_{iz}) \cdot (T_{TMA} + 2 \cdot t_{iz}) - V_{TMA} = 498$	cu in
Weight of Ice on Each TMA =	$W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 16$	lbs
Weight of Ice on All TMAs =	$W_{ICETMA} \cdot N_{TMA} = 16$	lbs



Envelope Only Solution

Centek		
FJP	CT11033E_AMA	Apr 30, 2019 at 2:31 PM
19027.01	Member Framing	CT11033E_AMA.R3D

(Global) Model Settings

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

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

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

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	1
Cd X	1
Rho Z	1
Rho X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[k/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	58	1.2
3	A992	29000	11154	.3	.65	.49	50	1.1	58	1.2
4	A500 Gr.42	29000	11154	.3	.65	.49	42	1.3	58	1.1
5	A500 Gr.46	29000	11154	.3	.65	.49	46	1.2	58	1.1
6	A53 Grade B	29000	11154	.3	.65	.49	35	1.5	58	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Desig..	A [in2]	Iyy [i...	Izz [i...	J [in4]
1	(E)Vert	PIPE_3.0	Colu...	Pipe	A53 Grade B	Typical	2.07	2.85	2.85	5.69
2	(E) Outrigger	HSS2.5X2.5X3	Beam	Tube	A500 Gr.46	Typical	1.54	1.35	1.35	2.25
3	(E) Horz	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	(P) Stiff Arm	PIPE_1.25	Beam	Pipe	A53 Grade B	Typical	.625	.184	.184	.368
5	Antenna Mast	PIPE_2.0	Colu...	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
6	(E) Outrigger Brace	PIPE_2.0	Colu...	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[..	Lcomp bot[..	L-torq...	Kyy	Kzz	Cb	Functi...
1	M1	Antenna M...	8			Lbyy						Lateral
2	M2	Antenna M...	8			Lbyy						Lateral
3	M3	Antenna M...	8			Lbyy						Lateral
4	M4	(E) Outrigg...	2.083	Segment	Segment	Segment	Segment	Segm...				Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[..	Lcomp bot[..	L-torq...	Kyy	Kzz	Cb	Functi...
5	M5	(E) Horz	12.5	Segment	Segment	Segment	Segment	Segm...				Lateral
6	M6	(E) Outrigg...	2.083	Segment	Segment	Segment	Segment	Segm...				Lateral
7	M7	(E) Horz	12.5	Segment	Segment	Segment	Segment	Segm...				Lateral
8	M8	(E)Vert	4.75	Segment	Segment	Lbyy						Lateral
9	M9	(E) Outrigg...	2.5									Lateral
10	M10	(P) Stiff Arm	12.5			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N16	N15			Antenna Mast	Column	Pipe	A53 Grad...	Typical
2	M2	N14	N13			Antenna Mast	Column	Pipe	A53 Grad...	Typical
3	M3	N10	N9			Antenna Mast	Column	Pipe	A53 Grad...	Typical
4	M4	N5	N8			(E) Outrigger	Beam	Tube	A500 Gr.46	Typical
5	M5	N23	N25			(E) Horz	Beam	Pipe	A53 Grad...	Typical
6	M6	N3	N4			(E) Outrigger	Beam	Tube	A500 Gr.46	Typical
7	M7	N22	N24			(E) Horz	Beam	Pipe	A53 Grad...	Typical
8	M8	N19	N18			(E)Vert	Column	Pipe	A53 Grad...	Typical
9	M9	N20	N21			(E) Outrigger Brace	Column	Pipe	A53 Grad...	Typical
10	M10	N17	N26			(P) Stiff Arm	Beam	Pipe	A53 Grad...	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diaphragm
1	N1	-0.375002	0	0.	0	
2	N2	-10.750002	0	0.	0	
3	N3	-5.500002	0	-2.083333	0	
4	N4	-5.500002	0	0.	0	
5	N5	-5.500002	-2.5	-2.083333	0	
6	N6	-0.375002	-2.5	0.	0	
7	N7	-10.750002	-2.5	0.	0	
8	N8	-5.500002	-2.5	0.	0	
9	N9	-0.375002	2.75	0.	0	
10	N10	-0.375002	-5.25	0.	0	
11	N11	-6.562502	0	0.	0	
12	N12	-6.562502	-2.5	0.	0	
13	N13	-6.562502	2.75	0.	0	
14	N14	-6.562502	-5.25	0.	0	
15	N15	-10.750002	2.75	0.	0	
16	N16	-10.750002	-5.25	0.	0	
17	N17	-0.375002	-1.25	0.	0	
18	N18	-5.500002	-3.625	0.	0	
19	N19	-5.500002	1.125	0.	0	
20	N20	-5.500002	0	-1.666666	0	
21	N21	-5.500002	-2.5	-1.666666	0	
22	N22	0.749998	0	0.	0	
23	N23	0.749998	-2.5	0.	0	
24	N24	-11.750002	0	0.	0	
25	N25	-11.750002	-2.5	0.	0	
26	N26	-0.374918	-1.25	-12.5	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	N3	Reaction	Reaction	Reaction		Reaction	
2	N5	Reaction	Reaction	Reaction		Reaction	
3	N20						
4	N21						
5	N26	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Equipment Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	Y	-.046	1.167
2	M3	Y	-.046	5.833
3	M3	Y	-.011	3
4	M2	Y	-.067	7
5	M2	Y	-.067	1
6	M2	Y	-.074	3
7	M1	Y	-.067	1.167
8	M1	Y	-.067	5.833

Member Point Loads (BLC 3 : Ice Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	Y	-.083	1.167
2	M3	Y	-.083	5.833
3	M3	Y	-.016	3
4	M2	Y	-.186	7
5	M2	Y	-.186	1
6	M2	Y	-.071	3
7	M1	Y	-.09	1.167
8	M1	Y	-.09	5.833

Member Point Loads (BLC 4 : Wind w/ Ice X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	X	.025	1.167
2	M3	X	.025	5.833
3	M3	X	.004	3
4	M2	X	.044	7
5	M2	X	.044	1
6	M2	X	.017	3
7	M1	X	.026	1.167
8	M1	X	.026	5.833

Member Point Loads (BLC 5 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	X	.071	1.167
2	M3	X	.071	5.833
3	M3	X	.006	3
4	M2	X	.136	7
5	M2	X	.136	1
6	M2	X	.046	3
7	M1	X	.079	1.167

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
8	M1	X	.079	5.833

Member Point Loads (BLC 6 : Wind w/ Ice Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	Z	.034	1.167
2	M3	Z	.034	5.833
3	M3	Z	.007	3
4	M2	Z	.085	7
5	M2	Z	.085	1
6	M2	Z	.021	3
7	M1	Z	.035	1.167
8	M1	Z	.035	5.833

Member Point Loads (BLC 7 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	Z	.109	1.167
2	M3	Z	.109	5.833
3	M3	Z	.013	3
4	M2	Z	.307	7
5	M2	Z	.307	1
6	M2	Z	.059	3
7	M1	Z	.117	1.167
8	M1	Z	.117	5.833

Member Distributed Loads (BLC 4 : Wind w/ Ice X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M9	X	-.002	-.002	0	0
2	M10	X	-.001	-.001	0	0
3	M2	X	-.002	-.002	0	0
4	M6	X	-.002	-.002	0	0
5	M4	X	-.002	-.002	0	0
6	M8	X	-.002	-.002	0	0

Member Distributed Loads (BLC 5 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M9	X	-.007	-.007	0	0
2	M10	X	-.005	-.005	0	0
3	M2	X	-.007	-.007	0	0
4	M6	X	-.007	-.007	0	0
5	M4	X	-.007	-.007	0	0
6	M8	X	-.009	-.009	0	0

Member Distributed Loads (BLC 6 : Wind w/ Ice Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M5	Z	-.002	-.002	0	0
2	M7	Z	-.002	-.002	0	0
3	M9	Z	-.002	-.002	0	0
4	M2	Z	-.002	-.002	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
5	M8	Z	-.002	-.002	0	0

Member Distributed Loads (BLC 7 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M5	Z	-.007	-.007	0	0
2	M7	Z	-.007	-.007	0	0
3	M9	Z	-.007	-.007	0	0
4	M2	Z	-.007	-.007	0	0
5	M8	Z	-.009	-.009	0	0

Basic Load Cases

	BLC Description	Category	X Gr...	Y Gr...	Z Gr...	Joint	Point	Distri...	Area(...	Surface(Plate/Wall)
1	Self Weight	None		-1						
2	Equipment Weight	None					8			
3	Ice Weight	None					8			
4	Wind w/ Ice X	None					8	6		
5	Wind X	None					8	6		
6	Wind w/ Ice Z	None					8	5		
7	Wind Z	None					8	5		

Load Combinations

	Description	Solve	P...	SR...	BLC	F...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.2D + 1.6W (X-direction)	Yes	Y		1	1...	2	1.2	5	1.6																
2	0.9D + 1.6W (X-direction)	Yes	Y		1	.9	2	.9	5	1.6																
3	1.2D + 1.0Di + 1.0Wi (X...	Yes	Y		1	1...	2	1.2	3	1	4	1														
4	1.2D + 1.6W (X-direction)	Yes	Y		1	1...	2	1.2	7	1.6																
5	0.9D + 1.6W (X-direction)	Yes	Y		1	.9	2	.9	7	1.6																
6	1.2D + 1.0Di + 1.0Wi (X...	Yes	Y		1	1...	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	N3	max	.364	6	.842	6	-.661	2	0	6	0	6	0	6
2		min	-.1	2	.303	2	-1.45	6	0	1	0	1	0	1
3	N5	max	-.128	5	.814	3	1.307	3	0	6	0	6	0	6
4		min	-.662	1	.189	5	-.467	5	0	1	0	1	0	1
5	N26	max	.051	1	.016	6	.314	1	0	6	0	6	0	6
6		min	0	6	.012	5	.035	6	0	1	0	1	0	1
7	Totals:	max	0	6	1.649	6	0	3						
8		min	-.667	1	.633	2	-1.356	4						

Envelope Joint Displacements

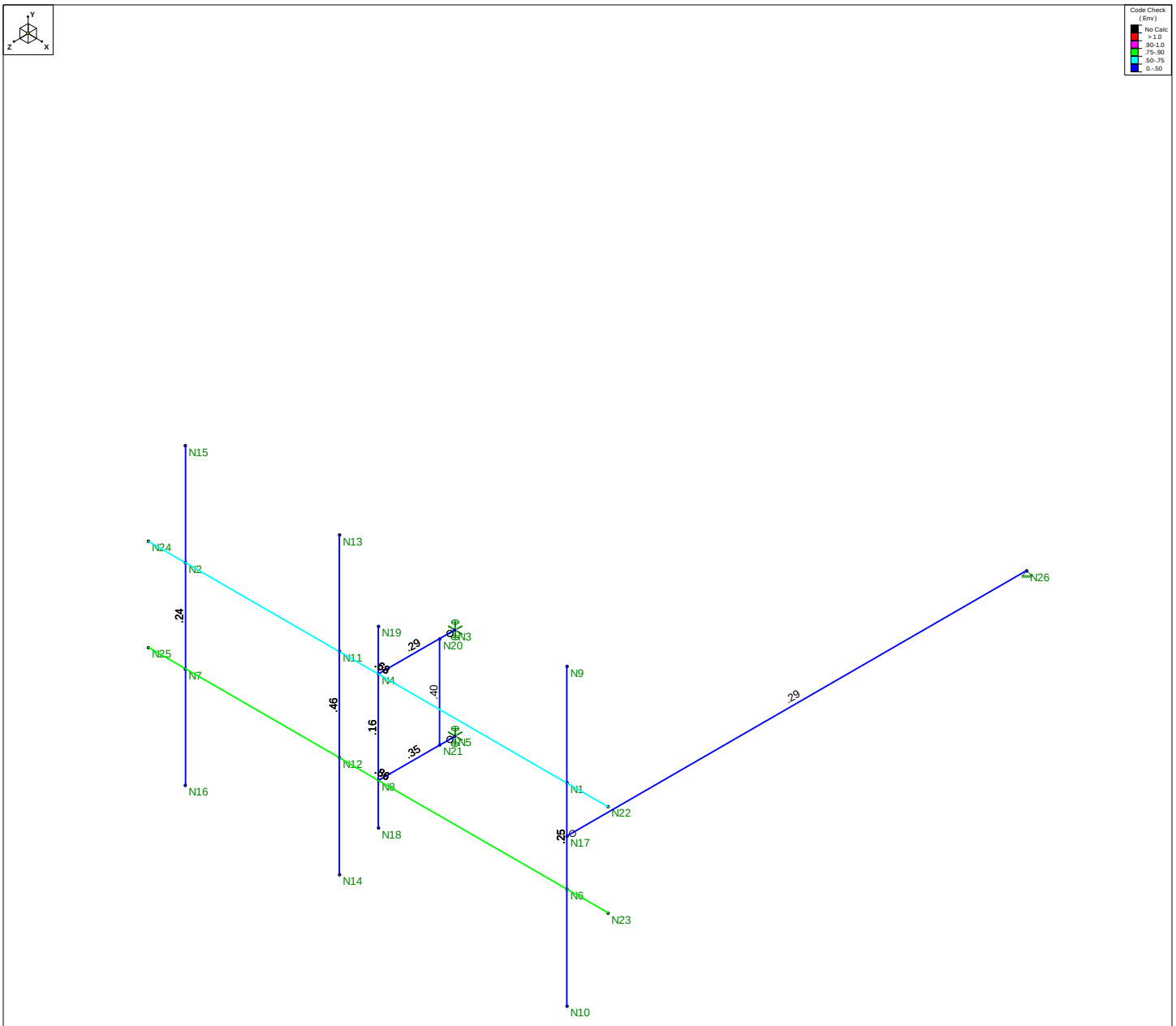
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
1	N1	max	.524	5	-.012	2	.016	3	1.03e-03	3	-1.544e-03	3	1.25e-03	3
2		min	.046	3	-.209	6	-.04	5	-1.827e-03	5	-1.052e-02	4	3.862e-04	5
3	N2	max	.523	5	-.208	5	2.356	5	-3.008e-04	3	4.5e-02	4	5.168e-03	3

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
4		min	.044	3	-.558	3	.199	3	-7.398e-04	4	3.282e-03	3	1.92e-03	5
5	N3	max	0	6	0	6	0	6	0	6	0	6	1.573e-03	3
6		min	0	1	0	1	0	1	0	1	0	1	5.284e-04	5
7	N4	max	.524	5	-.027	5	0	4	9.656e-04	6	2.143e-02	5	3.22e-03	3
8		min	.045	3	-.076	3	0	2	3.099e-04	2	2.395e-03	3	1.079e-03	5
9	N5	max	0	6	0	6	0	6	0	6	0	6	1.552e-03	3
10		min	0	1	0	1	0	1	0	1	0	1	5.311e-04	5
11	N6	max	.564	4	-.012	2	.051	5	1.799e-03	1	-1.498e-03	3	2.743e-03	1
12		min	.145	3	-.209	6	-.027	1	-4.469e-03	5	-1.18e-02	4	3.806e-04	5
13	N7	max	.565	4	-.208	5	2.465	4	-2.984e-04	3	4.619e-02	4	5.405e-03	3
14		min	.147	3	-.558	3	.208	3	-6.751e-03	4	3.187e-03	3	1.915e-03	5
15	N8	max	.564	4	-.027	5	0	5	9.009e-04	3	2.218e-02	4	3.164e-03	3
16		min	.146	3	-.076	3	0	3	-2.675e-04	5	4.046e-03	3	1.083e-03	5
17	N9	max	.511	5	-.012	2	.05	3	1.033e-03	3	-1.544e-03	3	1.212e-03	3
18		min	.006	3	-.209	6	-.092	5	-1.535e-03	5	-1.052e-02	4	3.865e-04	5
19	N10	max	.581	4	-.012	2	.257	5	1.797e-03	1	-1.498e-03	3	4.158e-03	1
20		min	.189	6	-.209	6	-.086	1	-6.627e-03	5	-1.18e-02	4	3.802e-04	5
21	N11	max	.523	5	-.049	5	.344	5	4.301e-03	5	3.124e-02	5	5.387e-03	3
22		min	.045	3	-.139	3	.036	3	-1.334e-04	1	3.051e-03	3	1.985e-03	5
23	N12	max	.565	4	-.049	5	.359	4	-2.739e-06	3	3.256e-02	4	5.654e-03	3
24		min	.147	3	-.14	3	.046	3	-5.233e-03	4	3.403e-03	3	1.993e-03	5
25	N13	max	.458	5	-.049	5	.673	5	1.139e-02	5	3.124e-02	5	5.305e-03	6
26		min	-.118	3	-.14	3	.036	3	-1.336e-04	1	3.051e-03	3	-4.794e-04	2
27	N14	max	.673	1	-.049	5	.717	4	-2.725e-06	3	3.256e-02	4	7.307e-03	1
28		min	.326	6	-.14	3	.046	3	-1.229e-02	4	3.403e-03	3	1.991e-03	5
29	N15	max	.46	5	-.208	5	2.345	5	-3.019e-04	3	4.5e-02	4	5.141e-03	3
30		min	-.126	3	-.558	3	.189	3	-4.519e-04	1	3.282e-03	3	1.922e-03	5
31	N16	max	.649	4	-.208	5	2.75	4	-2.974e-04	3	4.619e-02	4	6.072e-03	1
32		min	.317	6	-.558	3	.218	3	-9.059e-03	4	3.187e-03	3	1.912e-03	5
33	N17	max	.541	4	-.012	2	0	6	1.301e-03	3	-1.521e-03	3	4.16e-03	3
34		min	.094	3	-.209	6	-.003	1	-3.018e-03	5	-1.116e-02	4	1.48e-03	5
35	N18	max	.584	4	-.027	5	.004	5	9.009e-04	3	2.218e-02	4	3.162e-03	3
36		min	.189	3	-.076	3	-.013	3	-2.6e-04	5	4.046e-03	3	1.083e-03	5
37	N19	max	.509	5	-.027	5	.014	6	9.646e-04	6	2.143e-02	5	3.221e-03	3
38		min	.002	3	-.076	3	.005	2	3.099e-04	2	2.395e-03	3	1.079e-03	5
39	N20	max	.104	5	-.006	5	0	6	3.095e-03	3	2.079e-02	5	1.573e-03	3
40		min	.008	3	-.017	3	0	2	1.042e-03	5	1.711e-03	3	5.284e-04	5
41	N21	max	.114	4	-.006	2	0	5	3.101e-03	6	2.268e-02	4	1.552e-03	3
42		min	.033	6	-.017	3	0	3	1.157e-03	2	6.395e-03	6	5.311e-04	5
43	N22	max	.524	5	-.002	2	.104	4	1.03e-03	3	-1.544e-03	3	1.24e-03	3
44		min	.046	3	-.193	6	.036	6	-1.827e-03	5	-1.05e-02	4	3.788e-04	5
45	N23	max	.564	4	.023	2	.21	5	1.799e-03	1	-1.498e-03	3	2.734e-03	1
46		min	.145	3	-.193	6	-.002	3	-4.469e-03	5	-1.177e-02	4	3.732e-04	5
47	N24	max	.523	5	-.231	5	2.896	5	-3.008e-04	3	4.498e-02	4	5.175e-03	3
48		min	.044	3	-.62	3	.238	3	-7.398e-04	4	3.282e-03	3	1.925e-03	5
49	N25	max	.565	4	-.231	5	3.02	4	-2.984e-04	3	4.617e-02	4	5.412e-03	3
50		min	.147	3	-.623	3	.247	3	-6.751e-03	4	3.187e-03	3	1.92e-03	5
51	N26	max	0	6	0	6	0	6	8.398e-03	6	3.609e-03	4	4.16e-03	3
52		min	0	1	0	1	0	1	5.338e-03	2	-1.928e-02	2	1.48e-03	5

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

	Me...	Shape	Code C...	Loc...	LC	Shear C...	Loc[ft]	Dir	LC	phi*Pn...	phi*P...	phi*Mn...	phi*...	Cb	Eqn
1	M5	PIPE_2.0	.863	6.25	4	.354	7.292		4	31.698	32.13	1.872	1.872	1.898	H3-6
2	M7	PIPE_2.0	.683	6.25	4	.256	7.292		5	31.698	32.13	1.872	1.872	1.9	H1-1b
3	M2	PIPE_2.0	.462	5.25	4	.079	5.25		4	14.916	32.13	1.872	1.872	4.978	H1-1b
4	M9	PIPE_2.0	.398	0	3	.172	0		3	29.81	32.13	1.872	1.872	2.283	H1-1b
5	M4	HSS2.5X2.5...	.349	2.0...	1	.090	.434	y	3	61.829	63.756	4.554	4.554	2.146	H1-1b
6	M6	HSS2.5X2.5...	.293	2.0...	6	.092	.434	y	3	61.829	63.756	4.554	4.554	2.15	H1-1b
7	M10	PIPE_1.25	.290	6.25	1	.009	0		1	1.847	19.688	.801	.801	1.136	H1-1b
8	M3	PIPE_2.0	.247	5.25	3	.054	2.75		4	14.916	32.13	1.872	1.872	4.496	H1-1b
9	M1	PIPE_2.0	.239	2.75	3	.047	5.25		4	14.916	32.13	1.872	1.872	4.569	H1-1b
10	M8	PIPE_3.0	.157	1.1...	6	.094	3.612		3	63.06	65.205	5.749	5.749	1.515	H1-1b



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek		
FJP	CT11033E_AMA	Apr 30, 2019 at 2:32 PM
19027.01	Member Unity Check	CT11033E_AMA.R3D

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

CT11033E_L600_3.1_draft

Section 1 - Site Information

Site ID: CT11033E
Status: Draft
Version: 3.1
Project Type: L600
Approved: Not Approved
Approved By: Not Approved
Last Modified: 4/13/2019 5:23:11 PM
Last Modified By: GSM1900\MSaklay

Site Name: CT State Police_1
Site Class: Self Support Tower
Site Type: Structure Non Building
Plan Year: 2019
Market: CONNECTICUT
Vendor: Ericsson
Landlord: <undefined>

Latitude: 41.2924400000
Longitude: -72.4304540000
Address: 315 Spencer Plains Rd.
City, State: Westbrook, CT
Region: NORTHEAST

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

Section 2 - Existing Template Images

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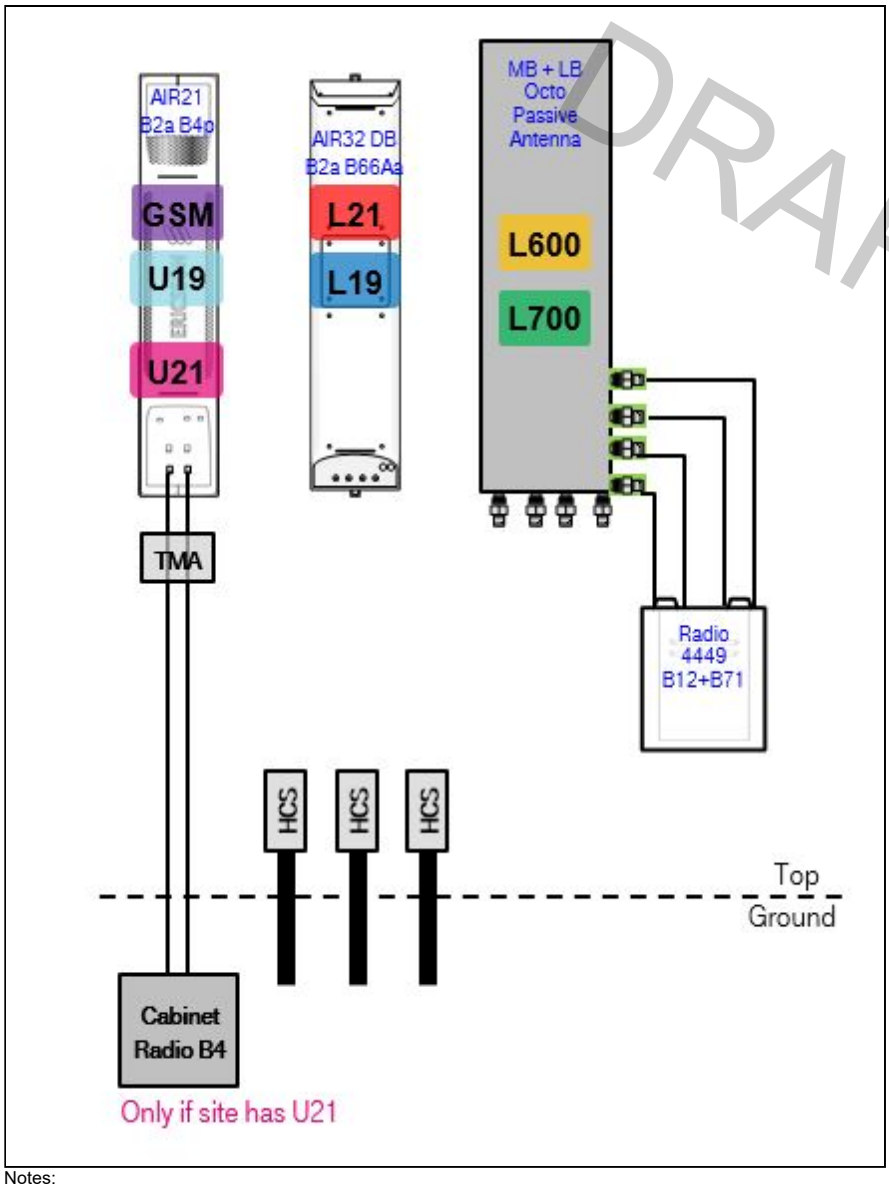
Section 3 - Proposed Template Images

67D92DB_2xAIR+1OP.JPG



Notes:

Section 4 - Siteplan Images

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

CT11033E_L600_3.1_draft

Section 5 - RAN Equipment

Existing RAN Equipment

Template: 794A U19 shutdown Outdoor

Enclosure	1	2
Enclosure Type	RBS 6102	Ground Mount
Baseband	DUW30 (U2100); DUG20 (G1900); DUS41 (L2100, L1900, L700)	
Multiplexer	XMU	
Radio	RUS01 B2 (x3) (L1900, G1900); RUS01 B2 (x3) (L1900); RUS01 B4 (x3) (U2100); RUS01 B4 (x3) (L2100)	RRUS11 B12 (x3) (L700)

Proposed RAN Equipment

Template: 67D92DB Outdoor

Enclosure	1
Enclosure Type	RBS 6102
Baseband	DUW30 (U2100); DUG20 (G1900); BB 6630 (L2100, L1900, L700, L600); BB 6630 (N600 (DARK))
Hybrid Cable System	Ericsson 6x12 HCS *Select Length & AWG* (x3)
Radio	RUS01 B4 (x3) (U2100)

RAN Scope of Work:

Ground SOW; Add PPC to the site.
Replace (1) DUS41 and (1) XMU with (1) BB 6630 for LTE. Add (1) additional BB 6630 for future 5G (N600 Dark).
Remove existing (6) Single AWS/PCS Diplex TMAs, (6) AWS/PCS Diplexers and (3) RRUS11 B12s (L700) that are mounted on H-Frames ground.
Replace (6) RUS01 B2s (GSM/L1900) and (3) RUS01 B4s (L2100) with Dummy Plates in the existing cabinet.
Add (3) 6x12 HCS (type, length and AWG requirement will be decided by Construction).

A&L SOW (per site);
Remove existing (3) DBXNH-6565B Antennas and Install New Mounts.
Remove (6) of existing (12) 7/8" Coax Lines and (3) Smart Bias-Ts.
Install (3) AIR21 B2A/B4P Antennas. Add (3) new Twin AWS TMAs and use existing (6) 7/8" Coax Lines for U2100, connect to passive ports.
Install (3) LB+MB Octa 8' Antennas. Add (3) Radio 4449 B71+B12s (L600/L700), connect to LB ports.
Install (3) AIR32 DB antennas, connect L2100 and L1900 fibers.

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

CT11033E_L600_3.1_draft

Section 6 - A&L Equipment

Existing Template: Custom
Proposed Template: 67D92DB_2xAIR+1OP

Sector 1 (Existing) view from behind		
Coverage Type	A - Outdoor Macro	
Antenna	1	
Antenna Model	Andrew - DBXNH-6565B-A2M (Quad)	
Azimuth	0	
M. Tilt	0	
Height	130	
Ports	**P1**	**P2**
Active Tech.	U2100 L2100 L1900 G1900	L700
Dark Tech.		
Restricted Tech.		
Decomm. Tech.		
E. Tilt	2	2
Cables	7/8" Coax - 160 ft. **(x2)**	7/8" Coax - 160 ft. **(x2)**
TMAs	Generic Twin Style 3B - PCS+AWS (AtCabinet) **(x2)**	
Diplexers / Combiners	Generic AWS/PCS Diplexer (AtCabinet) **(x2)**	
Radio		
Sector Equipment		Andrew Smart Bias T (At Antenna)

Unconnected Equipment:

Scope of Work:

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

CT11033E_L600_3.1_draft

Sector 1 (Proposed) view from behind										
Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	0		0				0			
M. Tilt	0		0				0			
Height	130		130				130			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	G1900	U2100	L700 L600	L700 L600			L2100	L2100	L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	2	2	2	2			2	2	2	2
Cables		7/8" Coax - 160 ft. **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**						
TMAs		Generic Twin Style 1B - AWS (AtAntenna)								
Diplexers / Combiners										
Radio			Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)						
Sector Equipment										

Unconnected Equipment:

Scope of Work:

Remove existing (1) DBXNH-6565B Antenna and Install New Mounts.
Remove existing (2) Single AWS/PCS Diplex TMAs, (2) AWS/PCS Diplexers and (1) RRUS11 B12 (L700) that are mounted on H-Frames ground, and Remove (2) 7/8" Coax Lines and (1) Smart Bias-T.
Install (1) AIR21 B2A/B4P at Position #1. Add (1) new Twin AWS TMA and use existing (2) 7/8" Coax Lines for U2100, connect to passive ports.
Install (1) LB+MB Octa 8' Antenna at Position 2. Add (1) Radio 4449 B71+B12 (L600/L700), connect to LB ports.
Install (1) AIR32 DB antenna at Position #3, connect L2100 and L1900 fibers.

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

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

CT11033E_L600_3.1_draft

Sector 2 (Existing) view from behind		
Coverage Type	A - Outdoor Macro	
Antenna	1	
Antenna Model	Andrew - DBXNH-6565B-A2M (Quad)	
Azimuth	120	
M. Tilt	0	
Height	130	
Ports	P1	P2
Active Tech.	U2100 L2100 L1900 G1900	L700
Dark Tech.		
Restricted Tech.		
Decomm. Tech.		
E. Tilt	2	2
Cables	7/8" Coax - 160 ft. **(x2)**	7/8" Coax - 160 ft. **(x2)**
TMAs	Generic Twin Style 3B - PCS+AWS (AtCabinet) **(x2)**	
Diplexers / Combiners	Generic AWS/PCS Diplexer (AtCabinet) **(x2)**	
Radio		
Sector Equipment		Andrew Smart Bias T (At Antenna)

Unconnected Equipment:

Scope of Work:

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

CT11033E_L600_3.1_draft

Sector 2 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	120		120				120			
M. Tilt	0		0				0			
Height	130		130				130			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	G1900	U2100	L700 L600	L700 L600			L2100	L2100	L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	2	2	2	2			2	2	2	2
Cables		7/8" Coax - 160 ft. **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**						
TMAs		Generic Twin Style 1B - AWS (AtAntenna)								
Diplexers / Combiners										
Radio			Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)						
Sector Equipment										

Unconnected Equipment:

Scope of Work:

Remove existing (1) DBXNH-6565B Antenna and Install New Mounts.
Remove existing (2) Single AWS/PCS Diplex TMAs, (2) AWS/PCS Diplexers and (1) RRUS11 B12 (L700) that are mounted on H-Frames ground, and Remove (2) 7/8" Coax Lines and (1) Smart Bias-T.
Install (1) AIR21 B2A/B4P at Position #1. Add (1) new Twin AWS TMA and use existing (2) 7/8" Coax Lines for U2100, connect to passive ports.
Install (1) LB+MB Octa 8' Antenna at Position 2. Add (1) Radio 4449 B71+B12 (L600/L700), connect to LB ports.
Install (1) AIR32 DB antenna at Position #3, connect L2100 and L1900 fibers.

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

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

CT11033E_L600_3.1_draft

Sector 3 (Existing) view from behind		
Coverage Type	A - Outdoor Macro	
Antenna	1	
Antenna Model	Andrew - DBXNH-6565B-A2M (Quad)	
Azimuth	240	
M. Tilt	0	
Height	130	
Ports	P1	P2
Active Tech.	U2100 L2100 L1900 G1900	L700
Dark Tech.		
Restricted Tech.		
Decomm. Tech.		
E. Tilt	2	2
Cables	7/8" Coax - 160 ft. **(x2)**	7/8" Coax - 160 ft. **(x2)**
TMAs	Generic Twin Style 3B - PCS+AWS (AtCabinet) **(x2)**	
Diplexers / Combiners	Generic AWS/PCS Diplexer (AtCabinet) **(x2)**	
Radio		
Sector Equipment		Andrew Smart Bias T (At Antenna)

Unconnected Equipment:

Scope of Work:

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

CT11033E_L600_3.1_draft

Sector 3 (Proposed) view from behind										
Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	240		240				240			
M. Tilt	0		0				0			
Height	130		130				130			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	G1900	U2100	L700 L600	L700 L600			L2100	L2100	L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	2	2	2	2			2	2	2	2
Cables		7/8" Coax - 160 ft. **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**						
TMAs		Generic Twin Style 1B - AWS (AtAntenna)								
Diplexers / Combiners										
Radio			Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)						
Sector Equipment										

Unconnected Equipment:

Scope of Work:

Remove existing (1) DBXNH-6565B Antenna and Install New Mounts.
Remove existing (2) Single AWS/PCS Diplex TMAs, (2) AWS/PCS Diplexers and (1) RRUS11 B12 (L700) that are mounted on H-Frames ground, and Remove (2) 7/8" Coax Lines and (1) Smart Bias-T.
Install (1) AIR21 B2A/B4P at Position #1. Add (1) new Twin AWS TMA and use existing (2) 7/8" Coax Lines for U2100, connect to passive ports.
Install (1) LB+MB Octa 8' Antenna at Position 2. Add (1) Radio 4449 B71+B12 (L600/L700), connect to LB ports.
Install (1) AIR32 DB antenna at Position #3, connect L2100 and L1900 fibers.

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

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

CT11033E_L600_3.1_draft

Section 7 - Power Systems Equipment

Existing Power Systems Equipment

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

Proposed Power Systems Equipment

3.2.4 HIT-RE 500 V3 Epoxy Adhesive Anchoring System

Hilti HIT-RE 500 V3 injection system

REV³OLUTIONARY.

How do we take the best and make it better? By listening to our customers!

Fifteen years ago, Hilti set legendary standards for designers and contractors alike with HIT-RE 500 – our first injectable epoxy anchors for post-installed rebar and anchoring applications. And because our customers needed the same high performance and maximum reliability for cracked concrete and seismic applications, Hilti introduced the first approved chemical anchor to do exactly that with HIT-RE 500-SD.

The new HIT-RE 500 V3 delivers ultimate performance and safety in design while making installation even easier and faster than ever before. Teamed up with SafeSet and PROFIS software, HIT-RE 500 V3 is nothing short of revolutionary.

Highlights

- Ultimate bond strength 60% higher than the current market leader HIT-RE 500-SD.
- Fastest cure time among epoxy anchors - Extremely versatile and less sensitive to low or high temperatures.
- Unique SafeSet system simplifies installation process and reduces the risk of human error.
- Pioneer in ICC approval for post-installed rebar connections.
- Along with HIT-HY 200 with the HIT-Z anchor rod, HIT-RE 500 V3 is the only product approved for diamond coring in cracked concrete with the TE-YRT roughening tool.

Applications

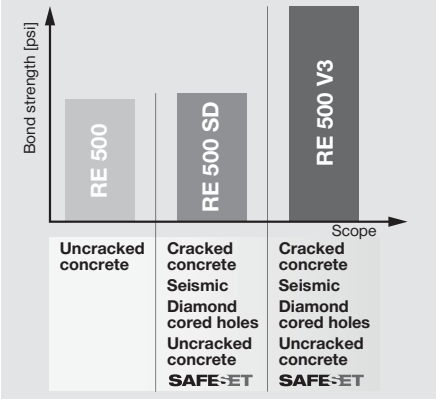
- Structural post-installed rebar connections, e.g. starter bars, beam to column connection, wall extension, etc.
- Heavy-duty fastenings in cracked and uncracked concrete, e.g. for structural beams, columns, silos, machinery, crash barriers, etc.
- Fastenings in diamond cored holes
- Post-installed anchoring in dry, wet, waterfilled or underwater.
- Seismic retrofits

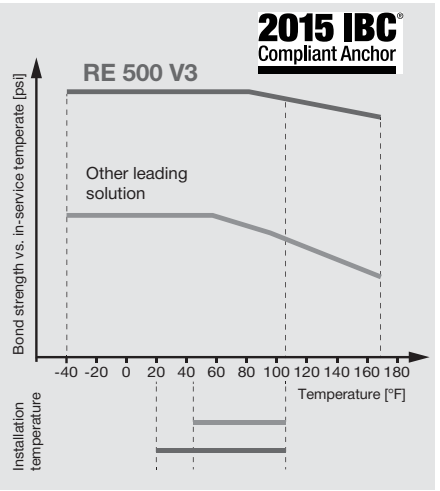
Advantages

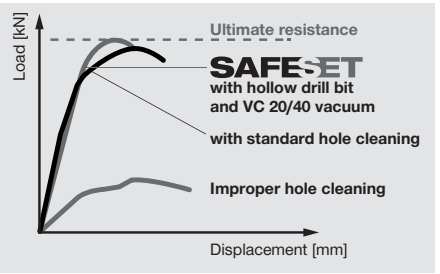
- Higher performance in shorter embedment depths leads to cost savings while maintaining the same loads.
- Fastest curing time and lower sensitivity to temperature conditions allows for unmatched productivity.
- More reliable and safer installation due to simplified cleaning process with SafeSet in hammer drilled and core drilled holes.
- The truly versatile HIT-RE 500 V3 delivers proven performance in applications where others can't.

Next generation performance...

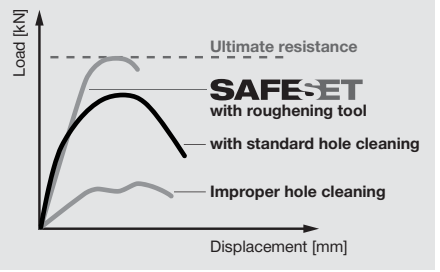
The world's most trusted epoxy injectable mortar for post-installed anchors and rebar is now more advanced than ever. HIT-RE 500 V3 delivers higher bond strength and an even wider range of approved applications.







Anchor Performance with Hammer Drilled Holes



Anchor Performance with Diamond Core drilled holes

HIT-RE 500 V3 Epoxy Adhesive Anchoring System 3.2.4

...that goes to extremes!

Meet the epoxy anchor that is the least sensitive to temperature. HIT-RE 500 V3's endurance in extreme temperature ranges makes it suitable in blistering hot temperatures up to 172° F, to installation in frigidly cold temperatures- even down to 23° F! (77°C to -5°C). In addition, it is the fastest curing epoxy mortar in the market and cures in half the time of its predecessor, HIT-RE 500-SD.

Systematically better.

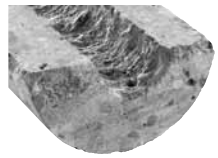
SafeSet eliminates the most load-affecting steps to make installation safe, simple and reliable. Hilti's hollow drill bit and VC 20/40 vacuum takes borehole cleaning out of the equation to provide maximum loads in all hammer drilled applications, while the new diamond roughening tool prepares diamond-cored holes for reliable anchor installations

In a class of its own.

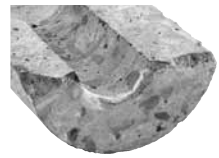
Post-installed rebar connections. HIT-RE 500 V3 continues where HIT-RE 500-SD started as the first ICC-ES approved solution for post-installed rebar connections. Design is easy because this revolutionary epoxy works like cast-in rebar.

Diamond-cored anchoring in cracked concrete.

Hilti takes a revolutionary step forward with HIT-RE 500 V3 and the new TE-YRT roughening tool. This solution as well as the HIT-HY 200 adhesive with the HIT-Z Rod are the only ICC-ES approved systems in the industry and make installation in core drilled holes easy, productive and reliable.



Diamond cored hole with roughening

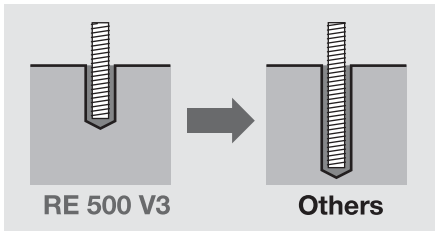


Diamond cored hole

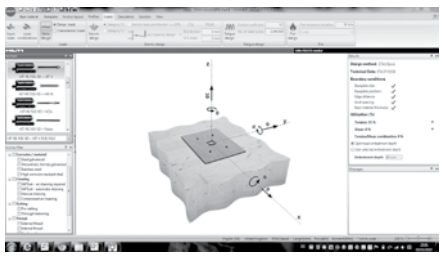
3.2.4

Anchoring applications

HIT-RE 500 V3 delivers high performance in shorter embedment depths...



...and is backed by PROFIS Anchor software for easy design.

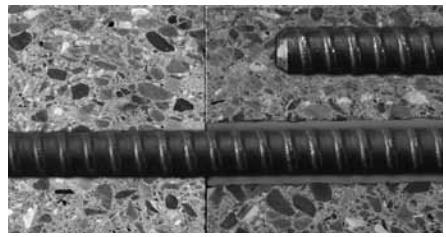


REV³OLUTIONARY

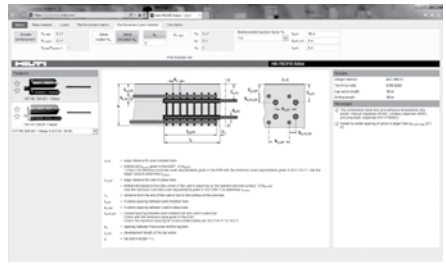
SYSTEM

Rebar applications

HIT-RE 500 V3 works like cast-in rebar...



...and is backed by PROFIS Rebar software for easy design.



3.2.4 HIT-RE 500 V3 Epoxy Adhesive Anchoring System

3.2.4.1 Product description

3.2.4.2 Material specifications

3.2.4.3 Technical data

3.2.4.4 Installation instructions

3.2.4.5 Ordering information

Listings/Approvals

ICC-ES (International Code Council)
ESR-3814

NSF/ANSI Std 61
certification for use of HIT-RE 500 V3 in potable water

City of Los Angeles
Research Report No. 26028

Independent Code Evaluation

IBC®/IRC® 2015 (ICC-ES AC308/ACI 355.4)

IBC®/IRC® 2012 (ICC-ES AC308/ACI 355.4)

IBC®/IRC® 2009 (ICC-ES AC308)

IBC®/IRC® 2006 (ICC-ES AC308)

FBC 2014 w/ HVHZ

The Leadership in Energy and Environmental Design (LEED) Green

Building Rating system™ is the nationally accepted benchmark for the design, construction, and operation of high performance green buildings.

Department of Transportation

Contact Hilti to get a current list of State Departments of Transportation that have added HIT-RE 500 V3 to their qualified product listing.

3.2.4.1 Product description

The new HIT-RE 500 V3 adhesive anchoring system is an injectable two-component epoxy adhesive. The two components are kept separate by means of a dual-cylinder foil pack attached to a manifold.

The two components combine and react when dispensed through a static mixing nozzle attached to the manifold.

HIT-RE 500 V3 adhesive anchoring system may be used with continuously threaded rod, HIS-N and HIS-RN internally-threaded inserts or deformed reinforcing bar installed in cracked or uncracked concrete. The primary components of the Hilti adhesive anchoring system are:

- HIT-RE 500 V3 adhesive packaged in foil packs
- Adhesive mixing and dispensing equipment
- Equipment for hole cleaning and adhesive injection

Product Features

- Superior bond performance in both cracked and uncracked concrete
- Seismic qualified in accordance with ICC-ES Acceptance Criteria AC308 and ACI 355.4
- Use in diamond cored holes with roughening tool for cracked and uncracked concrete in all seismic zones
- Use underwater up to 165 ft (50 m)
- Meets requirements of ASTM C881-14, Type I, II, IV, and V, Grade 3, Class A, B, and C except linear shrinkage
- Meets requirements of AASHTO specification M235, Type I, II, IV, and V, Grade 3, Class A, B, and C except linear shrinkage
- Mixing tube provides proper mixing, eliminates measuring errors and minimizes waste
- Contains no styrene and virtually odorless
- Extended installation temperature range from 23°F to 104°F (-5°C to 40°C)
- Excellent weathering resistance and resistant to elevated temperature.
- Hilti technical data available for larger diameters, oversized holes, and deeper embedments. Contact Hilti Technical Services for additional information.

HIT-RE 500 V3 adhesive can be installed using two cleaning options:

1. Traditional cleaning methods comprised of steel wire brushes and air nozzles,
2. Self-cleaning methods using the Hilti TE-CD or TE-YD hollow carbide drill bits used in conjunction of a Hilti vacuum cleaner that will remove drilling dust, automatically cleaning the hole.

Elements that are suitable for use with this system are as follows: threaded steel rods, Hilti HIS-(R)N steel internally threaded inserts, and steel reinforcing bars.

HIT-RE 500 V3 is approved for use with the TE-YRT roughening tool. The tool is used for hole preparation in conjunction with holes core drilled with a diamond core bit to allow diamond coring in cracked and uncracked concrete in all seismic zones.

HIT-RE 500 V3 Epoxy Adhesive Anchoring System 3.2.4

Guide Specifications

Master Format Section:

Previous	**2004 Format**	
03250	**03 16 00**	Concrete Anchors

Related Sections:

03200	**03 20 00**	Concrete Reinforcing
05050	**05 50 00**	Metal Fabrications
05120	**05 10 00**	Structural Metal Framing

Injectable adhesive shall be used for installation of all reinforcing steel dowels or threaded anchor rods and inserts into existing concrete. Adhesive shall be furnished in side-by-side refill packs which keep component A and component B separate. Side-by-side packs shall be designed to compress during use to minimize waste volume. Side-by-side packs shall also be designed to accept static mixing nozzle which thoroughly blends component A and component B and allows injection directly into drilled hole. Only injection tools and static mixing nozzles as recommended by manufacturer shall be used. Manufacturer's instructions shall be followed. Injection adhesive shall be formulated to include resin and hardener to provide optimal curing speed as well as high strength and stiffness. Typical curing time at 68°F (20°C) shall be approximately 6.5 hours.

Injection adhesive shall be HIT-RE 500 V3, as furnished by Hilti.

Anchor rods shall be end stamped to show the grade of steel and overall rod length. Anchor rods shall be manufactured to meet the following requirements:

1. HAS-E carbon steel
2. ASTM A193, Grade B7 high strength carbon steel anchor
3. AISI Type 304 or AISI Type 316 stainless steel meeting the requirements of ASTM F593 condition CW

Special order HAS rods may vary from standard product.

Nuts and washers of other grades and styles having specified proof load strength greater than the specified grade and style are also suitable. Nuts must have specified proof load strength equal to or greater than the minimum tensile strength of the specified threaded rod.

3.2.4.2 Material specifications

Table 1 - Material properties of fully cured Hilti HIT-RE 500 V3

Bond Strength ASTM C882-13A[1] 2 day cure 14 day cure	 10.8 MPa 11.7 MPa	 1,560 psi 1,690 psi
Compressive Strength ASTM D695-10[1]	82.7 MPa	12,000 psi
Compressive Modulus ASTM D695-10[1]	2,600 MPa	0.38 x 10^6 psi
Tensile Strength 7 day ASTM D638-14	49.3 MPa	7,150 psi
Elongation at break ASTM D638-14	1.1%	1.1%
Heat Deflection Temperature ASTM D648-07	50°C	122°F
Absorption ASTM D570-98	0.18%	0.18%
Linear Coefficient of Shrinkage on Cure ASTM D2566-86	0.008	0.008

1 Minimum values obtained as the result of tests at 35°F, 50°F, 75°F and 110°F.

Material specifications for Hilti HIT-V threaded rods, Hilti HAS threaded rods, and Hilti HIS-N inserts are listed in section 3.2.8.

3.2.4.3 Technical data

3.2.4.3.1 ACI 318-14 Chapter 17 design

The load values contained in this section are Hilti Simplified Design Tables. The load tables in this section were developed using the strength design parameters and variables of ESR-3814 and the equations within ACI 318-14 Chapter 17. For a detailed explanation of the Hilti Simplified Design Tables, refer to Section 3.1.8. Data tables from ESR-3814 are not contained in this section, but can be found at www.icc-es.org or at www.hilti.com.

3.2.4 HIT-RE 500 V3 Epoxy Adhesive Anchoring System

3.2.4.3.1 HIT-RE 500 V3 adhesive with deformed reinforcing bars (rebar)

Figure 1 - Rebar installed with Hilti HIT-RE 500 V3 adhesive

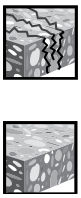
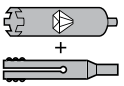
Cracked or uncracked concrete	Permissible drilling methods	Permissible concrete conditions
 Cracked and uncracked concrete	 Hammer drilling with carbide-tipped drill bit	 Dry concrete  Water-saturated concrete  Water-filled holes  Submerged (underwater)
	 Hilti TE-CD or TE-YD hollow drill bit and VC 20/40 vacuum  Diamond core drill bit with Hilti TE-YRT roughening tool	 Dry concrete  Water-saturated concrete
 Uncracked concrete	 Diamond core drill bit	 Dry concrete  Water-saturated concrete

Figure 2 - Rebar installed with Hilti HIT-RE 500 V3 adhesive

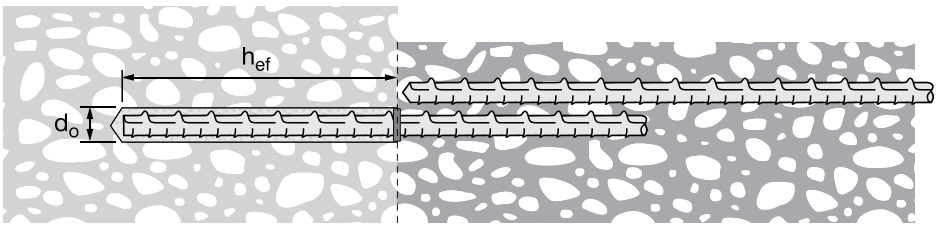


Table 2 - Specifications for rebar installed with Hilti HIT-RE 500 V3 adhesive

Setting information		Symbol	Units	Rebar size							
				#3	#4	#5	#6	#7	#8	#9	#10
Nominal bit diameter		d_o	in.	1/2	5/8	3/4	7/8	1	1-1/8	1-3/8	1-1/2
Effective embedment	minimum	$h_{ef,min}$	in.	2-3/8	2-3/8	3	3	3-3/8	4	4-1/2	5
			(mm)	(60)	(60)	(76)	(76)	(85)	(102)	(114)	(127)
	maximum	$h_{ef,max}$	in.	7-1/2	10	12-1/2	15	17-1/2	20	22-1/2	25
			(mm)	(191)	(254)	(318)	(381)	(445)	(508)	(572)	(635)
Minimum concrete member thickness		h_{min}	in.	h_{ef} + 1-1/4		$(h_{ef} + 2d_o)$					
			(mm)	(h_{ef} + 30)							
Minimum edge distance[1]		c_{min}	in.	1-7/8	2-1/2	3-1/8	3-3/4	4-3/8	5	5-5/8	6-1/4
			(mm)	(48)	(64)	(79)	(95)	(111)	(127)	(143)	(159)
Minimum anchor spacing		s_{min}	in.	1-7/8	2-1/2	3-1/8	3-3/4	4-3/8	5	5-5/8	6-1/4
			(mm)	(48)	(64)	(79)	(95)	(111)	(127)	(143)	(159)

1 Edge distance of 1-3/4-inch (44mm) is permitted provided the rebar remains un-torqued.

Note: The installation specifications in table 2 above and the data in tables 3 through 23 pertain to the use of Hilti HIT-RE 500 V3 with rebar designed as a post-installed anchor using the provisions of ACI 318-14 Chapter 17. For the use of Hilti HIT-RE 500 V3 with rebar for typical development calculations according to ACI 318-14 Chapter 25 (formerly ACI 318-11 Chapter 12), refer to section 3.1.14 for the design method and tables 83 through 87 in section 3.2.4.3.8.

HIT-RE 500 V3 Epoxy Adhesive Anchoring System 3.2.4

Table 3 - Hilti HIT-RE 500 V3 adhesive design strength with concrete / bond failure for US rebar in uncracked concrete [1,2,3,4,5,6,7,8,9,11]

Rebar size	Effective embedment in. (mm)	Tension — ϕN_n				Shear — ϕV_n			
		f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)	f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)
#3	3-3/8 (86)	4,575 (20.4)	4,790 (21.3)	5,145 (22.9)	5,695 (25.3)	9,855 (43.8)	10,310 (45.9)	11,080 (49.3)	12,265 (54.6)
	4-1/2 (114)	6,100 (27.1)	6,385 (28.4)	6,860 (30.5)	7,590 (33.8)	13,135 (58.4)	13,750 (61.2)	14,775 (65.7)	16,350 (72.7)
	7-1/2 (191)	10,165 (45.2)	10,640 (47.3)	11,435 (50.9)	12,655 (56.3)	21,895 (97.4)	22,915 (101.9)	24,625 (109.5)	27,250 (121.2)
#4	4-1/2 (114)	7,445 (33.1)	8,155 (36.3)	8,990 (40.0)	9,950 (44.3)	16,035 (71.3)	17,570 (78.2)	19,365 (86.1)	21,430 (95.3)
	6 (152)	10,660 (47.4)	11,155 (49.6)	11,990 (53.3)	13,265 (59.0)	22,960 (102.1)	24,030 (106.9)	25,820 (114.9)	28,575 (127.1)
	10 (254)	17,765 (79.0)	18,595 (82.7)	19,980 (88.9)	22,110 (98.3)	38,265 (170.2)	40,050 (178.2)	43,035 (191.4)	47,625 (211.8)
#5[10]	5-5/8 (143)	10,405 (46.3)	11,400 (50.7)	13,165 (58.6)	15,370 (68.4)	22,415 (99.7)	24,550 (109.2)	28,350 (126.1)	33,105 (147.3)
	7-1/2 (191)	16,020 (71.3)	17,230 (76.6)	18,515 (82.4)	20,490 (91.1)	34,505 (153.5)	37,115 (165.1)	39,880 (177.4)	44,135 (196.3)
	12-1/2 (318)	27,440 (122.1)	28,720 (127.8)	30,860 (137.3)	34,155 (151.9)	59,100 (262.9)	61,855 (275.1)	66,470 (295.7)	73,560 (327.2)
#6[10]	6-3/4 (171)	13,680 (60.9)	14,985 (66.7)	17,305 (77.0)	21,190 (94.3)	29,460 (131.0)	32,275 (143.6)	37,265 (165.8)	45,645 (203.0)
	9 (229)	21,060 (93.7)	23,070 (102.6)	26,200 (116.5)	28,995 (129.0)	45,360 (201.8)	49,690 (221.0)	56,430 (251.0)	62,450 (277.8)
	15 (381)	38,825 (172.7)	40,635 (180.8)	43,665 (194.2)	48,325 (215.0)	83,620 (372.0)	87,520 (389.3)	94,045 (418.3)	104,080 (463.0)
#7[10]	7-7/8 (200)	17,235 (76.7)	18,885 (84.0)	21,805 (97.0)	26,705 (118.8)	37,125 (165.1)	40,670 (180.9)	46,960 (208.9)	57,515 (255.8)
	10-1/2 (267)	26,540 (118.1)	29,070 (129.3)	33,570 (149.3)	38,995 (173.5)	57,160 (254.3)	62,615 (278.5)	72,300 (321.6)	83,995 (373.6)
	17-1/2 (445)	52,220 (232.3)	54,655 (243.1)	58,730 (261.2)	64,995 (289.1)	112,470 (500.3)	117,715 (523.6)	126,495 (562.7)	139,990 (622.7)
#8[10]	9 (229)	21,060 (93.7)	23,070 (102.6)	26,640 (118.5)	32,625 (145.1)	45,360 (201.8)	49,690 (221.0)	57,375 (255.2)	70,270 (312.6)
	12 (305)	32,425 (144.2)	35,520 (158.0)	41,015 (182.4)	50,020 (222.5)	69,835 (310.6)	76,500 (340.3)	88,335 (392.9)	107,735 (479.2)
	20 (508)	66,980 (297.9)	70,100 (311.8)	75,330 (335.1)	83,365 (370.8)	144,260 (641.7)	150,990 (671.6)	162,250 (721.7)	179,560 (798.7)
#9[10]	10-1/8 (257)	25,130 (111.8)	27,530 (122.5)	31,785 (141.4)	38,930 (173.2)	54,125 (240.8)	59,290 (263.7)	68,465 (304.5)	83,850 (373.0)
	13-1/2 (343)	38,690 (172.1)	42,380 (188.5)	48,940 (217.7)	59,940 (266.6)	83,330 (370.7)	91,285 (406.1)	105,405 (468.9)	129,095 (574.2)
	22-1/2 (572)	83,245 (370.3)	87,640 (389.8)	94,175 (418.9)	104,225 (463.6)	179,300 (797.6)	188,765 (839.7)	202,840 (902.3)	224,480 (998.5)
#10	11-1/4 (286)	29,430 (130.9)	32,240 (143.4)	37,230 (165.6)	45,595 (202.8)	63,395 (282.0)	69,445 (308.9)	80,185 (356.7)	98,205 (436.8)
	15 (381)	45,315 (201.6)	49,640 (220.8)	57,320 (255.0)	70,200 (312.3)	97,600 (434.1)	106,915 (475.6)	123,455 (549.2)	151,200 (672.6)
	25 (635)	97,500 (433.7)	106,195 (472.4)	114,115 (507.6)	126,290 (561.8)	210,000 (934.1)	228,730 (1017.4)	245,785 (1093.3)	272,005 (1209.9)

1 See Section 3.1.8 for explanation on development of load values.
2 See Section 3.1.8.6 to convert design strength value to ASD value.
3 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
4 Apply spacing, edge distance, and concrete thickness factors in tables 8-23 as necessary to the above values. Compare to the steel values in table 7. The lesser of the values is to be used for the design.
5 Data is for temperature range A: Max. short term temperature = 130°F (55°C), max. long term temperature = 110°F (43°C).
For temperature range B: Max. short term temperature = 176°F (80°C), max. long term temperature = 110°F (43°C) multiply above values by 0.69.
Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.
6 Tabular values are for dry concrete and water-saturated concrete conditions.
For water-filled drilled holes multiply design strength by 0.51.
For submerged (under water) applications multiply design strength by 0.45.
7 Tabular values are for short term loads only. For sustained loads including overhead use, see Section 3.1.8.8.
8 Tabular values are for normal-weight concrete only. For lightweight concrete multiply design strength by λa as follows:
For sand-lightweight, λa = 0.51. For all-lightweight, λa = 0.45.
9 Tabular values are for holes drilled in concrete with carbide tipped hammer drill bit. For diamond core drilling, except as indicated in note 10, multiply above values by 0.55.
Diamond core drilling is not permitted for the water-filled or under-water (submerged) applications.
10 Diamond core drilling with the Hilti TE-YRT roughening tool is permitted for #5, #6, #7, #8, and #9 rebar in dry and water-saturated concrete. See Table 5
11 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete.

3.2.4 HIT-RE 500 V3 Epoxy Adhesive Anchoring System

Table 4 - Hilti HIT-RE 500 V3 adhesive design strength with concrete / bond failure for US rebar in cracked concrete[1,2,3,4,5,6,7,8,9,11]

Rebar size	Effective embedment in. (mm)	Tension — ϕN_n				Shear — ϕV_n			
		f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)	f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)
#3	3-3/8 (86)	3,425 (15.2)	3,585 (15.9)	3,745 (16.7)	3,980 (17.7)	7,380 (32.8)	7,725 (34.4)	8,065 (35.9)	8,570 (38.1)
	4-1/2 (114)	4,650 (20.7)	4,780 (21.3)	4,990 (22.2)	5,305 (23.6)	10,020 (44.6)	10,300 (45.8)	10,750 (47.8)	11,425 (50.8)
	7-1/2 (191)	7,755 (34.5)	7,970 (35.5)	8,320 (37.0)	8,840 (39.3)	16,700 (74.3)	17,165 (76.4)	17,920 (79.7)	19,045 (84.7)
#4	4-1/2 (114)	5,275 (23.5)	5,780 (25.7)	6,670 (29.7)	7,125 (31.7)	11,360 (50.5)	12,445 (55.4)	14,370 (63.9)	15,345 (68.3)
	6 (152)	8,120 (36.1)	8,560 (38.1)	8,940 (39.8)	9,500 (42.3)	17,490 (77.8)	18,440 (82.0)	19,255 (85.7)	20,465 (91.0)
	10 (254)	13,885 (61.8)	14,270 (63.5)	14,900 (66.3)	15,835 (70.4)	29,910 (133.0)	30,735 (136.7)	32,095 (142.8)	34,105 (151.7)
#5[10]	5-5/8 (143)	7,370 (32.8)	8,075 (35.9)	9,325 (41.5)	11,380 (50.6)	15,875 (70.6)	17,390 (77.4)	20,080 (89.3)	24,510 (109.0)
	7-1/2 (191)	11,350 (50.5)	12,430 (55.3)	14,275 (63.5)	15,170 (67.5)	24,440 (108.7)	26,775 (119.1)	30,750 (136.8)	32,680 (145.4)
	12-1/2 (318)	22,175 (98.6)	22,790 (101.4)	23,795 (105.8)	25,285 (112.5)	47,760 (212.4)	49,085 (218.3)	51,250 (228.0)	54,465 (242.3)
#6[10]	6-3/4 (171)	9,690 (43.1)	10,615 (47.2)	12,255 (54.5)	15,010 (66.8)	20,870 (92.8)	22,860 (101.7)	26,395 (117.4)	32,330 (143.8)
	9 (229)	14,920 (66.4)	16,340 (72.7)	18,870 (83.9)	22,160 (98.6)	32,130 (142.9)	35,195 (156.6)	40,640 (180.8)	47,735 (212.3)
	15 (381)	32,095 (142.8)	33,290 (148.1)	34,760 (154.6)	36,935 (164.3)	69,135 (307.5)	71,700 (318.9)	74,865 (333.0)	79,560 (353.9)
#7[10]	7-7/8 (200)	12,210 (54.3)	13,375 (59.5)	15,445 (68.7)	18,915 (84.1)	26,300 (117.0)	28,810 (128.2)	33,265 (148.0)	40,740 (181.2)
	10-1/2 (267)	18,800 (83.6)	20,590 (91.6)	23,780 (105.8)	29,120 (129.5)	40,490 (180.1)	44,355 (197.3)	51,215 (227.8)	62,725 (279.0)
	17-1/2 (445)	40,445 (179.9)	44,310 (197.1)	47,310 (210.4)	50,275 (223.6)	87,115 (387.5)	95,430 (424.5)	101,895 (453.2)	108,285 (481.7)
#8[10]	9 (229)	14,920 (66.4)	16,340 (72.7)	18,870 (83.9)	23,110 (102.8)	32,130 (142.9)	35,195 (156.6)	40,640 (180.8)	49,775 (221.4)
	12 (305)	22,965 (102.2)	25,160 (111.9)	29,050 (129.2)	35,580 (158.3)	49,465 (220.0)	54,190 (241.0)	62,570 (278.3)	76,635 (340.9)
	20 (508)	49,415 (219.8)	54,135 (240.8)	62,230 (276.8)	66,130 (294.2)	106,435 (473.4)	116,595 (518.6)	134,035 (596.2)	142,440 (633.6)
#9[10]	10-1/8 (257)	17,800 (79.2)	19,500 (86.7)	22,515 (100.2)	27,575 (122.7)	38,340 (170.5)	42,000 (186.8)	48,495 (215.7)	59,395 (264.2)
	13-1/2 (343)	27,405 (121.9)	30,020 (133.5)	34,665 (154.2)	42,455 (188.8)	59,025 (262.6)	64,660 (287.6)	74,665 (332.1)	91,445 (406.8)
	22-1/2 (572)	58,965 (262.3)	64,595 (287.3)	74,585 (331.8)	81,930 (364.4)	127,005 (564.9)	139,125 (618.9)	160,650 (714.6)	176,465 (785.0)
#10	11-1/4 (286)	20,850 (92.7)	22,840 (101.6)	26,370 (117.3)	32,295 (143.7)	44,905 (199.7)	49,190 (218.8)	56,800 (252.7)	69,565 (309.4)
	15 (381)	32,095 (142.8)	35,160 (156.4)	40,600 (180.6)	49,725 (221.2)	69,135 (307.5)	75,730 (336.9)	87,445 (389.0)	107,100 (476.4)
	25 (635)	69,060 (307.2)	75,655 (336.5)	87,360 (388.6)	97,510 (433.7)	148,750 (661.7)	162,945 (724.8)	188,155 (837.0)	210,020 (934.2)

1 See Section 3.1.8 for explanation on development of load values.
2 See Section 3.1.8.6 to convert design strength value to ASD value.
3 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
4 Apply spacing, edge distance, and concrete thickness factors in tables 8-23 as necessary to the above values. Compare to the steel values in table 7. The lesser of the values is to be used for the design.
5 Data is for temperature range A: Max. short term temperature = 130°F (55°C), max. long term temperature = 110°F (43°C).
For temperature range B: Max. short term temperature = 176°F (80°C), max. long term temperature = 110°F (43°C) multiply above values by 0.69.
Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.
6 Tabular values are for dry concrete and water-saturated concrete conditions.
For water-filled drilled holes multiply design strength by 0.51.
For submerged (under water) applications multiply design strength by 0.45.
7 Tabular values are for short term loads only. For sustained loads including overhead use, see Section 3.1.8.8.
8 Tabular values are for normal-weight concrete only. For lightweight concrete multiply design strength by λ_a as follows:
For sand-lightweight, λ_a = 0.51. For all-lightweight, λ_a = 0.45.
9 Tabular values are for holes drilled in concrete with carbide tipped hammer drill bit. Diamond core drilling is not permitted in cracked concrete except as indicated in note 10.
10 Diamond core drilling with the Hilti TE-YRT roughening tool is permitted for #5, #6, #7, #8, and #9 rebar in dry and water-saturated concrete. See Table 6
11 Tabular values are for static loads only. For seismic loads, multiply cracked concrete tabular values in tension and shear by α_{seis} = 0.68. See section 3.1.8.7 for additional information on seismic applications.

HIT-RE 500 V3 Epoxy Adhesive Anchoring System 3.2.4

Table 5 - Hilti HIT-RE 500 V3 for Core Drilled Holes with TE-YRT Roughening Tool adhesive design strength with concrete / bond failure for US rebar in uncracked concrete[1,2,3,4,5,6,7,8,9]

Rebar size	Effective embedment in. (mm)	Tension — ϕN_n				Shear — ϕV_n			
		f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)	f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)
#5	5-5/8 (143)	10,405 (46.3)	11,400 (50.7)	12,350 (54.9)	12,350 (54.9)	22,415 (99.7)	24,550 (109.2)	26,595 (118.3)	26,595 (118.3)
	7-1/2 (191)	16,020 (71.3)	16,465 (73.2)	16,465 (73.2)	16,465 (73.2)	34,505 (153.5)	35,460 (157.7)	35,460 (157.7)	35,460 (157.7)
	12-1/2 (318)	27,440 (122.1)	27,440 (122.1)	27,440 (122.1)	27,440 (122.1)	59,100 (262.9)	59,100 (262.9)	59,100 (262.9)	59,100 (262.9)
#6	6-3/4 (171)	13,680 (60.9)	14,985 (66.7)	17,305 (77.0)	17,470 (77.7)	29,460 (131.0)	32,275 (143.6)	37,265 (165.8)	37,630 (167.4)
	9 (229)	21,060 (93.7)	23,070 (102.6)	23,295 (103.6)	23,295 (103.6)	45,360 (201.8)	49,690 (221.0)	50,175 (223.2)	50,175 (223.2)
	11-1/4 (286)	29,120 (129.5)	29,120 (129.5)	29,120 (129.5)	29,120 (129.5)	62,715 (279.0)	62,715 (279.0)	62,715 (279.0)	62,715 (279.0)
#7	7-7/8 (200)	17,235 (76.7)	18,885 (84.0)	21,805 (97.0)	23,500 (104.5)	37,125 (165.1)	40,670 (180.9)	46,960 (208.9)	50,610 (225.1)
	10-1/2 (267)	26,540 (118.1)	29,070 (129.3)	31,330 (139.4)	31,330 (139.4)	57,160 (254.3)	62,615 (278.5)	67,485 (300.2)	67,485 (300.2)
	17-1/2 (445)	52,220 (232.3)	52,220 (232.3)	52,220 (232.3)	52,220 (232.3)	112,470 (500.3)	112,470 (500.3)	112,470 (500.3)	112,470 (500.3)
#8	9 (229)	21,060 (93.7)	23,070 (102.6)	26,640 (118.5)	30,140 (134.1)	45,360 (201.8)	49,690 (221.0)	57,375 (255.2)	64,920 (288.8)
	12 (305)	32,425 (144.2)	35,520 (158.0)	40,185 (178.8)	40,185 (178.8)	69,835 (310.6)	76,500 (340.3)	86,555 (385.0)	86,555 (385.0)
	20 (508)	66,980 (297.9)	66,980 (297.9)	66,980 (297.9)	66,980 (297.9)	144,260 (641.7)	144,260 (641.7)	144,260 (641.7)	144,260 (641.7)
#9	10-1/8 (257)	25,130 (111.8)	27,530 (122.5)	31,785 (141.4)	37,680 (167.6)	54,125 (240.8)	59,290 (263.7)	68,465 (304.5)	81,160 (361.0)
	13-1/2 (343)	38,690 (172.1)	42,380 (188.5)	48,940 (217.7)	50,240 (223.5)	83,330 (370.7)	91,285 (406.1)	105,405 (468.9)	108,215 (481.4)
	22-1/2 (572)	83,245 (370.3)	83,735 (372.5)	83,735 (372.5)	83,735 (372.5)	179,300 (797.6)	180,355 (802.3)	180,355 (802.3)	180,355 (802.3)

1 See Section 3.1.8 for explanation on development of load values.
2 See Section 3.1.8.6 to convert design strength value to ASD value.
3 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
4 Apply spacing, edge distance, and concrete thickness factors in tables 8 - 23 as necessary to the above values. Compare to the steel values in table 7. The lesser of the values is to be used for the design.
5 Data is for temperature range A: Max. short term temperature = 130°F (55°C), max. long term temperature = 110°F (43°C). For temperature range B: Max. short term temperature = 176°F (80°C), max. long term temperature = 110°F (43°C) multiply above values by 0.69. Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.
6 Tabular values are for dry concrete and water-saturated concrete conditions. Water-filled and submerged (under water) applications are not permitted for this hole preparation method.
7 Tabular values are for short term loads only. For sustained loads including overhead use, see Section 3.1.8.8.
8 Tabular values are for normal-weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: For sand-lightweight, λ_a = 0.51. For all-lightweight, λ_a = 0.45.
9 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic loads, multiply cracked concrete tabular values in tension by α_{seis} = 0.68. See section 3.1.8.7 for additional information on seismic applications.

3.2.4 HIT-RE 500 V3 Epoxy Adhesive Anchoring System

Table 6 - Hilti HIT-RE 500 V3 for Core Drilled Holes with TE-YRT Roughening Tool adhesive design strength with concrete / bond failure for US rebar in cracked concrete[1,2,3,4,5,6,7,8,9]

Rebar size	Effective embedment in. (mm)	Tension — ϕN_n				Shear — ϕV_n			
		f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)	f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)
#5	5-5/8 (143)	6,965 (31.0)	6,965 (31.0)	6,965 (31.0)	6,965 (31.0)	15,000 (66.7)	15,000 (66.7)	15,000 (66.7)	15,000 (66.7)
	7-1/2 (191)	9,285 (41.3)	9,285 (41.3)	9,285 (41.3)	9,285 (41.3)	20,000 (89.0)	20,000 (89.0)	20,000 (89.0)	20,000 (89.0)
	12-1/2 (318)	15,475 (68.8)	15,475 (68.8)	15,475 (68.8)	15,475 (68.8)	33,330 (148.3)	33,330 (148.3)	33,330 (148.3)	33,330 (148.3)
#6	6-3/4 (171)	9,690 (43.1)	10,235 (45.5)	10,235 (45.5)	10,235 (45.5)	20,870 (92.8)	22,045 (98.1)	22,045 (98.1)	22,045 (98.1)
	9 (229)	13,645 (60.7)	13,645 (60.7)	13,645 (60.7)	13,645 (60.7)	29,390 (130.7)	29,390 (130.7)	29,390 (130.7)	29,390 (130.7)
	11-1/4 (286)	17,055 (75.9)	17,055 (75.9)	17,055 (75.9)	17,055 (75.9)	36,740 (163.4)	36,740 (163.4)	36,740 (163.4)	36,740 (163.4)
#7	7-7/8 (200)	12,210 (54.3)	13,375 (59.5)	13,930 (62.0)	13,930 (62.0)	26,300 (117.0)	28,810 (128.2)	30,005 (133.5)	30,005 (133.5)
	10-1/2 (267)	18,575 (82.6)	18,575 (82.6)	18,575 (82.6)	18,575 (82.6)	40,005 (178.0)	40,005 (178.0)	40,005 (178.0)	40,005 (178.0)
	17-1/2 (445)	30,955 (137.7)	30,955 (137.7)	30,955 (137.7)	30,955 (137.7)	66,675 (296.6)	66,675 (296.6)	66,675 (296.6)	66,675 (296.6)
#8	9 (229)	14,920 (66.4)	16,340 (72.7)	18,285 (81.3)	18,285 (81.3)	32,130 (142.9)	35,195 (156.6)	39,385 (175.2)	39,385 (175.2)
	12 (305)	22,965 (102.2)	24,380 (108.4)	24,380 (108.4)	24,380 (108.4)	49,465 (220.0)	52,515 (233.6)	52,515 (233.6)	52,515 (233.6)
	20 (508)	40,635 (180.8)	40,635 (180.8)	40,635 (180.8)	40,635 (180.8)	87,525 (389.3)	87,525 (389.3)	87,525 (389.3)	87,525 (389.3)
#9	10-1/8 (257)	17,800 (79.2)	19,500 (86.7)	22,515 (100.2)	22,560 (100.4)	38,340 (170.5)	42,000 (186.8)	48,495 (215.7)	48,595 (216.2)
	13-1/2 (343)	27,405 (121.9)	30,020 (133.5)	30,085 (133.8)	30,085 (133.8)	59,025 (262.6)	64,660 (287.6)	64,795 (288.2)	64,795 (288.2)
	22-1/2 (572)	50,140 (223.0)	50,140 (223.0)	50,140 (223.0)	50,140 (223.0)	107,990 (480.4)	107,990 (480.4)	107,990 (480.4)	107,990 (480.4)

1 See Section 3.1.8 for explanation on development of load values.
2 See Section 3.1.8.6 to convert design strength value to ASD value.
3 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
4 Apply spacing, edge distance, and concrete thickness factors in tables 8 - 23 as necessary to the above values. Compare to the steel values in table 7. The lesser of the values is to be used for the design.
5 Data is for temperature range A: Max. short term temperature = 130°F (55°C), max. long term temperature = 110°F (43°C). For temperature range B: Max. short term temperature = 176°F (80°C), max. long term temperature = 110°F (43°C) multiply above values by 0.69. Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.
6 Tabular values are for dry concrete and water-saturated concrete conditions. Water-filled and submerged (under water) applications are not permitted for this hole preparation method.
7 Tabular values are for short term loads only. For sustained loads including overhead use, see Section 3.1.8.8.
8 Tabular values are for normal-weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: For sand-lightweight, λ_a = 0.51. For all-lightweight, λ_a = 0.45.
9 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic loads, multiply cracked concrete tabular values in tension by α_{seis} = 0.68. See section 3.1.8.7 for additional information on seismic applications.

Table 7 - Steel design strength for US rebar[1]

Rebar size	ASTM A 615 Grade 40[2]			ASTM A 615 Grade 60[2]			ASTM A 706 Grade 60[2]		
	Tensile[3] ϕN_{sa} lb (kN)	Shear[4] ϕV_{sa} lb (kN)	Seismic Shear[5] $\phi V_{sa,eq}$ lb (kN)	Tensile[3] ϕN_{sa} lb (kN)	Shear[4] ϕV_{sa} lb (kN)	Seismic Shear[5] $\phi V_{sa,eq}$ lb (kN)	Tensile[3] ϕN_{sa} lb (kN)	Shear[4] ϕV_{sa} lb (kN)	Seismic Shear[5] $\phi V_{sa,eq}$ lb (kN)
#3	4,290 (19.1)	2,375 (10.6)	1,665 (7.4)	6,435 (28.6)	3,565 (15.9)	2,495 (11.1)	6,600 (29.4)	3,430 (15.3)	2,400 (10.7)
#4	7,800 (34.7)	4,320 (19.2)	3,025 (13.5)	11,700 (52.0)	6,480 (28.8)	4,535 (20.2)	12,000 (53.4)	6,240 (27.8)	4,370 (19.4)
#5	12,090 (53.8)	6,695 (29.8)	4,685 (20.8)	18,135 (80.7)	10,045 (44.7)	7,030 (31.3)	18,600 (82.7)	9,670 (43.0)	6,770 (30.1)
#6	17,160 (76.3)	9,505 (42.3)	6,655 (29.6)	25,740 (114.5)	14,255 (63.4)	9,980 (44.4)	26,400 (117.4)	13,730 (61.1)	9,610 (42.7)
#7	23,400 (104.1)	12,960 (57.6)	9,070 (40.3)	35,100 (156.1)	19,440 (86.5)	13,610 (60.5)	36,000 (160.1)	18,720 (83.3)	13,105 (58.3)
#8	30,810 (137.0)	17,065 (75.9)	11,945 (53.1)	46,215 (205.6)	25,595 (113.9)	17,915 (79.7)	47,400 (210.8)	24,650 (109.6)	17,255 (76.8)
#9	39,000 (173.5)	21,600 (96.1)	15,120 (67.3)	58,500 (260.2)	32,400 (144.1)	22,680 (100.9)	60,000 (266.9)	31,200 (138.8)	21,840 (97.1)
#10	49,530 (220.3)	27,430 (122.0)	19,200 (85.4)	74,295 (330.5)	41,150 (183.0)	28,805 (128.1)	76,200 (339.0)	39,625 (176.3)	27,740 (123.4)

1 See Section 3.1.8.6 to convert design strength value to ASD value.
2 ASTM A706 Grade 60 rebar are considered ductile steel elements. ASTM A 615 Grade 40 and 60 rebar are considered brittle steel elements.
3 Tensile = $\phi A_{se,N} f_{uta}$ as noted in ACI 318-14 Chapter 17
4 Shear = ϕ 0.60 $A_{se,N} f_{uta}$ as noted in ACI 318-14 Chapter 17
5 Seismic Shear = $\alpha_{V,seis} \phi V_{sa}$: Reduction for seismic shear only. See section 3.1.8.7 for additional information on seismic applications.

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ASTM A449

ASTM A449 covers headed bolts, rods, and anchor bolts in diameters ranging from 1/4″ through 3″ inclusive. It is a medium strength bolt manufactured from a medium carbon or alloy steel that develops its mechanical values through a heat treating process. It is intended for general engineering applications.

ASTM A449 is virtually identical in chemistry and strength to ASTM A325 and SAE J429 grade 5. However, A449 is more flexible in the sense that it covers a larger diameter range and is not restricted by a specific configuration.

A449 Types

TYPE 1	Plain carbon steel, carbon boron steel, alloy steel, or alloy boron steel.
TYPE 2	Withdrawn 2003
TYPE 3	Weathering steel.

A449 Mechanical Properties

Size	Tensile, ksi	Yield, ksi	Elong. %, min	RA %, min
1/4 - 1	120 min	92 min	14	35
1 1/8 - 1 1/2	105 min	81 min	14	35
1 5/8 - 3	90 min	58 min	14	35

A449 Chemical Properties

Type 1 Bolts				
Element	**Carbon Steel**	**Carbon Boron Steel**	**Alloy Steel**	**Alloy Boron Steel**
Carbon	0.30 - 0.52%	0.30 - 0.52%	0.30 - 0.52%	0.30 - 0.52%
Manganese, min	0.60%	0.60%	0.60%	0.60%
Phosphorus, max	0.040%	0.040%	0.035%	0.035%
Sulfur, max	0.050%	0.050%	0.040%	0.040%

* Steel, as defined by the American Iron and Steel Institute, shall be considered to be alloy when the maximum range given for the content of alloying elements exceeds one of more of the following limits: Manganese, 1.65%, silicon, 0.60%, copper, 0.60%, or in which a definite range or a minimum quantity of any of the following elements is specified or required within the limits of the recognized field of constructional alloy steels: aluminum, chromium up to 3.99%, cobalt, columbium, molybdenum, nickel, titanium, tungsten, vanadium, zirconium or any other alloying elements added to obtain a desired alloying effect.

Silicon	0.15-0.30%	0.10 - 0.30%	0.15 - 0.35%	0.15 - 0.35%
Boron		0.0005 - 0.003%		0.0005 - 0.003%
Alloying Elements			*	*

* Steel, as defined by the American Iron and Steel Institute, shall be considered to be alloy when the maximum range given for the content of alloying elements exceeds one of more of the following limits: Manganese, 1.65%, silicon, 0.60%, copper, 0.60%, or in which a definite range or a minimum quantity of any of the following elements is specified or required within the limits of the recognized field of constructional alloy steels: aluminum, chromium up to 3.99%, cobalt, columbium, molybdenum, nickel, titanium, tungsten, vanadium, zirconium or any other alloying elements added to obtain a desired alloying effect.

Type 3 Bolts, Class *						
Element	**A**	**B**	**C**	**D**	**E**	**F**
Carbon	0.33 - 0.40%	0.38 - 0.48%	0.15 - 0.25%	0.15 - 0.25%	0.20 - 0.25%	0.20 - 0.25%
Manganese	0.90 - 1.20%	0.70 - 0.90%	0.80 - 1.35%	0.40 - 1.20%	0.60 - 1.00%	0.90 - 1.20%
Phosphorus	0.035% max	0.06 - 0.12%	0.035% max	0.035% max	0.035%	0.035%
Sulfur, max	0.040%	0.040%	0.040%	0.040%	0.040%	0.040%
Silicon	0.15 - 0.35%	0.30 - 0.50%	0.15 - 0.35%	0.25 - 0.50%	0.15 - 0.35%	0.15 - 0.35%
Copper	0.25 - 0.45%	0.20 - 0.40%	0.20 - 0.50%	0.30 - 0.50%	0.30 - 0.60%	0.20 - 0.40%
Nickel	0.25 - 0.45%	0.50 - 0.80%	0.25 - 0.50%	0.50 - 0.80%	0.30 - 0.60%	0.20 - 0.40%
Chromium	0.45 - 0.65%	0.50 - 0.75%	0.30 - 0.50%	0.50 - 1.00%	0.60 - 0.90%	0.45 - 0.65%
Vanadium			0.020% min			
Molybdenum		0.06% max		0.10% max		
Titanium				0.05% max		

* Selection of a class shall be at the option of the manufacturer

A449 Recommended Hardware

Nuts			Washers
Plain		Galvanized	
1/4 - 1-1/2	**1-5/8 - 3**	**1/4 - 3**	
A563B Hex	A563A Heavy Hex	A563DH Heavy Hex	F436

Note: Nuts of other grades having proof load stresses greater than the specified grade are suitable. The ASTM A563 Nut Compatibility Chart has a complete list of specifications.

Portland Bolt & MANUFACTURING COMPANY Established 1912

(800) 547-6758
sales@portlandbolt.com

ASTM A572

ASTM A572 covers five grades of high strength, low-alloy structural steel shapes, plates, and bars. All grades are intended for riveted, bolted, or welded structures, with the exception that grades 60 and 65 are not intended for welded bridge applications.

A572 Mechanical Requirements

Grade	Yield, min ksi	Tensile, min ksi	Elongation, min % in 8”	Elongation, min % in 2”
42	42	60	20	24
50	50	65	18	21
55	55	70	17	20
60	60	75	16	18
65	65	80	15	17

A572 Chemical Requirements

Grade	Maximum Diameter, inches	Carbon, max%	Manganese, max%	Phosphorus, max%	Sulfur, max%	Silicon, max%
42	6	0.21	1.35	0.04	0.05	0.40
50	4	0.23	1.35	0.04	0.05	0.40
55	2	0.25	1.35	0.04	0.05	0.40
60	1-1/4	0.26	1.35	0.04	0.05	0.40
65	½ to 1-1/4	0.23	1.65	0.04	0.05	0.40
65	Below ½	0.26	1.35	0.04	0.05	0.40

This abridged table shows only the chemical requirements for bars. The complete table including shapes and plates can be found in the ASTM standard at www.astm.org

Alloy Content

In addition to the chemical requirements above, the material shall also contain enough alloying elements to meet the requirements of one of the below alloy types.

Type	Elements	Heat Analysis, %
1	Columbium	0.005 – 0.05
2	Vanadium	0.01 – 0.15
3	Columbium	0.005 – 0.05
	Vanadium	0.01 – 0.15
	Columbium plus Vanadium	0.02 – 0.15

Type	Elements	Heat Analysis, %
5	Titanium	0.006 – 0.04
	Nitrogen	0.003 – 0.015
	Vanadium	0.06 max

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500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
860-529-8882
Fax: 860-529-3991

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

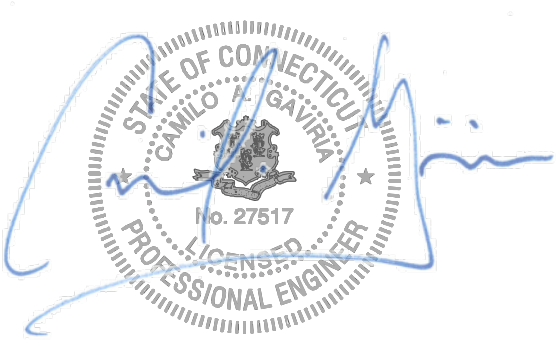
T-Mobile Site #: CT11033E

315 Spencer Plains Road
Westbrook, CT

Centek Project No. 19027.01

Date: April 30, 2019

Max Stress Ratio =86.3%



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

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- RF DATA SHEET, DATED 04/13/2019

CENTEK engineering

Centered on Solutions℠

April 30, 2019

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

Re: Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CT11033E
315 Spencer Plains Road
Westbrook, CT 06498

Centek Project No. 19027.01

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 proposed mounts, consisting of three (3) ±12-ft T frame sector mounts (SitePro P/N: USF-396-U) with stiff arms to support the proposed 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: Three (3) Ericsson AIR21 KRC118023-1_B2A_B4P panel antennas, three (3) RFS APXVAARR24_43-U-NA20 panel antennas , three (3) Ericsson AIR32 KRD901146-1_B66A_B2A panel antennas, three (3) Ericsson KRY112 TMAs and three (3) Ericsson 4449 B71_B12 remote radio units mounted on three (3) T-Arms with a RAD center elevation of 130-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 105 mph for Westbrook 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 **proposed 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:

Camilo A. Gaviria, PE
Structural Engineer

STATE OF CONNECTICUT
CAMILO A. GAVIRIA
No. 27517
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: Loads on Equipment

Location: Westbrook, CT

Rev. 0: 04/26/19

Prepared by: F.J.P Checked by: C.A.G.
Job No. 19027.01

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

Wind Speeds

Basic Wind Speed	$V := 105$	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 =	$Structure\_Type := Lattice$		(User Input)
Structure Category =	$SC := II$		(User Input)
Exposure Category =	$Exp := C$		(User Input)
Structure Height =	$h := 180$	ft	(User Input)
Height to Center of Antennas =	$z := 130$	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 =	$G_H = 1.12$		(User Input)

Output

Wind Direction Probability Factor =

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

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

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

Importance Factors =

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

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

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

$$K_{iz} := \left(\frac{z}{33}\right)^{0.1} = 1.147$$

Velocity Pressure Coefficient Antennas =

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.72$$

$$Kz := 2.01 \cdot \left(\left(\frac{z}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.337$$

Velocity Pressure w/o Ice Antennas = $qz := 0.00256 \cdot K_d \cdot Kz \cdot V^2 \cdot I_{Wind} = 32.087$ psf

Velocity Pressure with Ice Antennas = $qz_{ice} := 0.00256 \cdot K_d \cdot Kz \cdot V_i^2 \cdot I_{Wind} = 7.276$ sf

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS APXVAARR24_43		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 95.9$	in	(User Input)
Antenna Width =	$W_{ant} := 19.7$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 133.4$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.9$		
Antenna Force Coefficient =	$Ca_{ant} = 1.31$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 13.1$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 615$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 5.8$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 272$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 16$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 170$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 8.4$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 89$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \cdot 10^4$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 1 \cdot 10^4$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 372$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 372$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

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

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.7$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 218$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.1$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 143$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6.4$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 68$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 4.7$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 49$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5343$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 5115$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 166$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 166$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Ericsson KRD901146-1_B66A_B2A		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 56.7$	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 Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 234$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.4$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 158$	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 Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 71$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 5.1$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 53$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 6363$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 5568$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 180$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 180$	lbs

Development of Wind & Ice Load on RRUS's

RRUS Data:

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

Wind Load (without ice)

Surface Area for One RRUS =	$SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 1.4$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 59$	lbs
Surface Area for One RRUS =	$SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.1$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 46$	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 =	$Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 21$	lbs
Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.8$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 17$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each RRUS =	$V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 2045$	cu in
Volume of Ice on Each RRUS =	$V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2179$	cu in
Weight of Ice on Each RRUS =	$W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 71$	lbs
Weight of Ice on All RRUSs =	$W_{ICERRUS} \cdot N_{RRUS} = 71$	lbs

Development of Wind & Ice Load on TMA's

TMA Data:

TMA Model =	Ericsson KRY112 TMA		
TMA Shape =	Flat	in	(User Input)
TMA Height =	$L_{TMA} := 6.9$	in	(User Input)
TMA Width =	$W_{TMA} := 6.1$	in	(User Input)
TMA Thickness =	$T_{TMA} := 2.8$	lbs	(User Input)
TMA Weight =	$WT_{TMA} := 11$		(User Input)
Number of TMA's =	$N_{TMA} := 1$		(User Input)
TMA Aspect Ratio =	$Ar_{TMA} := \frac{L_{TMA}}{W_{TMA}} = 1.1$		
TMA Force Coefficient =	$Ca_{TMA} = 1.2$		

Wind Load (without ice)

Surface Area for One TMA =	$SA_{TMAF} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.3$	sf
Total TMA Wind Force =	$F_{TMA} := qz \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAF} = 13$	lbs
Surface Area for One TMA =	$SA_{TMAS} := \frac{L_{TMA} \cdot T_{TMA}}{144} = 0.1$	sf
Total TMA Wind Force =	$F_{TMA} := qz \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAS} = 6$	lbs

Wind Load (with ice)

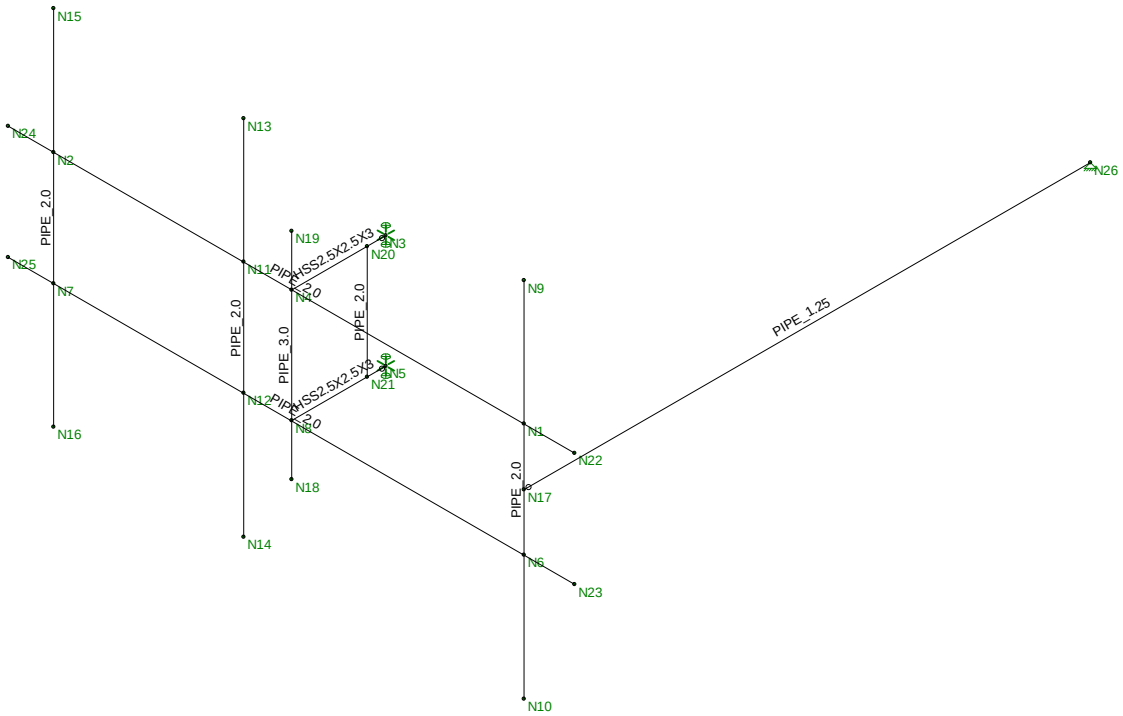
Surface Area for One TMA w/ Ice =	$SA_{ICETMAF} := \frac{(L_{TMA} + 2 \cdot t_{iz}) \cdot (W_{TMA} + 2 \cdot t_{iz})}{144} = 0.7$	sf
Total TMA Wind Force w/ Ice =	$Fi_{TMA} := qz_{ice} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{ICETMAF} = 7$	lbs
Surface Area for One TMA w/ Ice =	$SA_{ICETMAS} := \frac{(L_{TMA} + 2 \cdot t_{iz}) \cdot (T_{TMA} + 2 \cdot t_{iz})}{144} = 0.4$	sf
Total TMA Wind Force w/ Ice =	$Fi_{TMA} := qz_{ice} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{ICETMAS} = 4$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each TMA =	$V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 118$	cu in
Volume of Ice on Each TMA =	$V_{ice} := (L_{TMA} + 2 \cdot t_{iz}) \cdot (W_{TMA} + 2 \cdot t_{iz}) \cdot (T_{TMA} + 2 \cdot t_{iz}) - V_{TMA} = 498$	cu in
Weight of Ice on Each TMA =	$W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 16$	lbs
Weight of Ice on All TMAs =	$W_{ICETMA} \cdot N_{TMA} = 16$	lbs



Envelope Only Solution

Centek		
FJP	CT11033E_AMA	Apr 30, 2019 at 2:31 PM
19027.01	Member Framing	CT11033E_AMA.R3D

(Global) Model Settings

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

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

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

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	1
Cd X	1
Rho Z	1
Rho X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[k/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	58	1.2
3	A992	29000	11154	.3	.65	.49	50	1.1	58	1.2
4	A500 Gr.42	29000	11154	.3	.65	.49	42	1.3	58	1.1
5	A500 Gr.46	29000	11154	.3	.65	.49	46	1.2	58	1.1
6	A53 Grade B	29000	11154	.3	.65	.49	35	1.5	58	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Desig..	A [in2]	Iyy [i...	Izz [i...	J [in4]
1	(E)Vert	PIPE_3.0	Colu...	Pipe	A53 Grade B	Typical	2.07	2.85	2.85	5.69
2	(E) Outrigger	HSS2.5X2.5X3	Beam	Tube	A500 Gr.46	Typical	1.54	1.35	1.35	2.25
3	(E) Horz	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	(P) Stiff Arm	PIPE_1.25	Beam	Pipe	A53 Grade B	Typical	.625	.184	.184	.368
5	Antenna Mast	PIPE_2.0	Colu...	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
6	(E) Outrigger Brace	PIPE_2.0	Colu...	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[..	Lcomp bot[..	L-torq...	Kyy	Kzz	Cb	Functi...
1	M1	Antenna M...	8			Lbyy						Lateral
2	M2	Antenna M...	8			Lbyy						Lateral
3	M3	Antenna M...	8			Lbyy						Lateral
4	M4	(E) Outrigg...	2.083	Segment	Segment	Segment	Segment	Segm...				Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[..	Lcomp bot[..	L-torq...	Kyy	Kzz	Cb	Functi...
5	M5	(E) Horz	12.5	Segment	Segment	Segment	Segment	Segm...				Lateral
6	M6	(E) Outrigg...	2.083	Segment	Segment	Segment	Segment	Segm...				Lateral
7	M7	(E) Horz	12.5	Segment	Segment	Segment	Segment	Segm...				Lateral
8	M8	(E)Vert	4.75	Segment	Segment	Lbyy						Lateral
9	M9	(E) Outrigg...	2.5									Lateral
10	M10	(P) Stiff Arm	12.5			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N16	N15			Antenna Mast	Column	Pipe	A53 Grad...	Typical
2	M2	N14	N13			Antenna Mast	Column	Pipe	A53 Grad...	Typical
3	M3	N10	N9			Antenna Mast	Column	Pipe	A53 Grad...	Typical
4	M4	N5	N8			(E) Outrigger	Beam	Tube	A500 Gr.46	Typical
5	M5	N23	N25			(E) Horz	Beam	Pipe	A53 Grad...	Typical
6	M6	N3	N4			(E) Outrigger	Beam	Tube	A500 Gr.46	Typical
7	M7	N22	N24			(E) Horz	Beam	Pipe	A53 Grad...	Typical
8	M8	N19	N18			(E)Vert	Column	Pipe	A53 Grad...	Typical
9	M9	N20	N21			(E) Outrigger Brace	Column	Pipe	A53 Grad...	Typical
10	M10	N17	N26			(P) Stiff Arm	Beam	Pipe	A53 Grad...	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diaphragm
1	N1	-0.375002	0	0.	0	
2	N2	-10.750002	0	0.	0	
3	N3	-5.500002	0	-2.083333	0	
4	N4	-5.500002	0	0.	0	
5	N5	-5.500002	-2.5	-2.083333	0	
6	N6	-0.375002	-2.5	0.	0	
7	N7	-10.750002	-2.5	0.	0	
8	N8	-5.500002	-2.5	0.	0	
9	N9	-0.375002	2.75	0.	0	
10	N10	-0.375002	-5.25	0.	0	
11	N11	-6.562502	0	0.	0	
12	N12	-6.562502	-2.5	0.	0	
13	N13	-6.562502	2.75	0.	0	
14	N14	-6.562502	-5.25	0.	0	
15	N15	-10.750002	2.75	0.	0	
16	N16	-10.750002	-5.25	0.	0	
17	N17	-0.375002	-1.25	0.	0	
18	N18	-5.500002	-3.625	0.	0	
19	N19	-5.500002	1.125	0.	0	
20	N20	-5.500002	0	-1.666666	0	
21	N21	-5.500002	-2.5	-1.666666	0	
22	N22	0.749998	0	0.	0	
23	N23	0.749998	-2.5	0.	0	
24	N24	-11.750002	0	0.	0	
25	N25	-11.750002	-2.5	0.	0	
26	N26	-0.374918	-1.25	-12.5	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	N3	Reaction	Reaction	Reaction		Reaction	
2	N5	Reaction	Reaction	Reaction		Reaction	
3	N20						
4	N21						
5	N26	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Equipment Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	Y	-.046	1.167
2	M3	Y	-.046	5.833
3	M3	Y	-.011	3
4	M2	Y	-.067	7
5	M2	Y	-.067	1
6	M2	Y	-.074	3
7	M1	Y	-.067	1.167
8	M1	Y	-.067	5.833

Member Point Loads (BLC 3 : Ice Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	Y	-.083	1.167
2	M3	Y	-.083	5.833
3	M3	Y	-.016	3
4	M2	Y	-.186	7
5	M2	Y	-.186	1
6	M2	Y	-.071	3
7	M1	Y	-.09	1.167
8	M1	Y	-.09	5.833

Member Point Loads (BLC 4 : Wind w/ Ice X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	X	.025	1.167
2	M3	X	.025	5.833
3	M3	X	.004	3
4	M2	X	.044	7
5	M2	X	.044	1
6	M2	X	.017	3
7	M1	X	.026	1.167
8	M1	X	.026	5.833

Member Point Loads (BLC 5 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	X	.071	1.167
2	M3	X	.071	5.833
3	M3	X	.006	3
4	M2	X	.136	7
5	M2	X	.136	1
6	M2	X	.046	3
7	M1	X	.079	1.167

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
8	M1	X	.079	5.833

Member Point Loads (BLC 6 : Wind w/ Ice Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	Z	.034	1.167
2	M3	Z	.034	5.833
3	M3	Z	.007	3
4	M2	Z	.085	7
5	M2	Z	.085	1
6	M2	Z	.021	3
7	M1	Z	.035	1.167
8	M1	Z	.035	5.833

Member Point Loads (BLC 7 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	Z	.109	1.167
2	M3	Z	.109	5.833
3	M3	Z	.013	3
4	M2	Z	.307	7
5	M2	Z	.307	1
6	M2	Z	.059	3
7	M1	Z	.117	1.167
8	M1	Z	.117	5.833

Member Distributed Loads (BLC 4 : Wind w/ Ice X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M9	X	-.002	-.002	0	0
2	M10	X	-.001	-.001	0	0
3	M2	X	-.002	-.002	0	0
4	M6	X	-.002	-.002	0	0
5	M4	X	-.002	-.002	0	0
6	M8	X	-.002	-.002	0	0

Member Distributed Loads (BLC 5 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M9	X	-.007	-.007	0	0
2	M10	X	-.005	-.005	0	0
3	M2	X	-.007	-.007	0	0
4	M6	X	-.007	-.007	0	0
5	M4	X	-.007	-.007	0	0
6	M8	X	-.009	-.009	0	0

Member Distributed Loads (BLC 6 : Wind w/ Ice Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M5	Z	-.002	-.002	0	0
2	M7	Z	-.002	-.002	0	0
3	M9	Z	-.002	-.002	0	0
4	M2	Z	-.002	-.002	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
5	M8	Z	-.002	-.002	0	0

Member Distributed Loads (BLC 7 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M5	Z	-.007	-.007	0	0
2	M7	Z	-.007	-.007	0	0
3	M9	Z	-.007	-.007	0	0
4	M2	Z	-.007	-.007	0	0
5	M8	Z	-.009	-.009	0	0

Basic Load Cases

	BLC Description	Category	X Gr...	Y Gr...	Z Gr...	Joint	Point	Distri...	Area(...	Surface(Plate/Wall)
1	Self Weight	None		-1						
2	Equipment Weight	None					8			
3	Ice Weight	None					8			
4	Wind w/ Ice X	None					8	6		
5	Wind X	None					8	6		
6	Wind w/ Ice Z	None					8	5		
7	Wind Z	None					8	5		

Load Combinations

	Description	Solve	P...	SR...	BLC	F...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.2D + 1.6W (X-direction)	Yes	Y		1	1...	2	1.2	5	1.6																
2	0.9D + 1.6W (X-direction)	Yes	Y		1	.9	2	.9	5	1.6																
3	1.2D + 1.0Di + 1.0Wi (X...	Yes	Y		1	1...	2	1.2	3	1	4	1														
4	1.2D + 1.6W (X-direction)	Yes	Y		1	1...	2	1.2	7	1.6																
5	0.9D + 1.6W (X-direction)	Yes	Y		1	.9	2	.9	7	1.6																
6	1.2D + 1.0Di + 1.0Wi (X...	Yes	Y		1	1...	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	N3	max	.364	6	.842	6	-.661	2	0	6	0	6	0	6
2		min	-.1	2	.303	2	-1.45	6	0	1	0	1	0	1
3	N5	max	-.128	5	.814	3	1.307	3	0	6	0	6	0	6
4		min	-.662	1	.189	5	-.467	5	0	1	0	1	0	1
5	N26	max	.051	1	.016	6	.314	1	0	6	0	6	0	6
6		min	0	6	.012	5	.035	6	0	1	0	1	0	1
7	Totals:	max	0	6	1.649	6	0	3						
8		min	-.667	1	.633	2	-1.356	4						

Envelope Joint Displacements

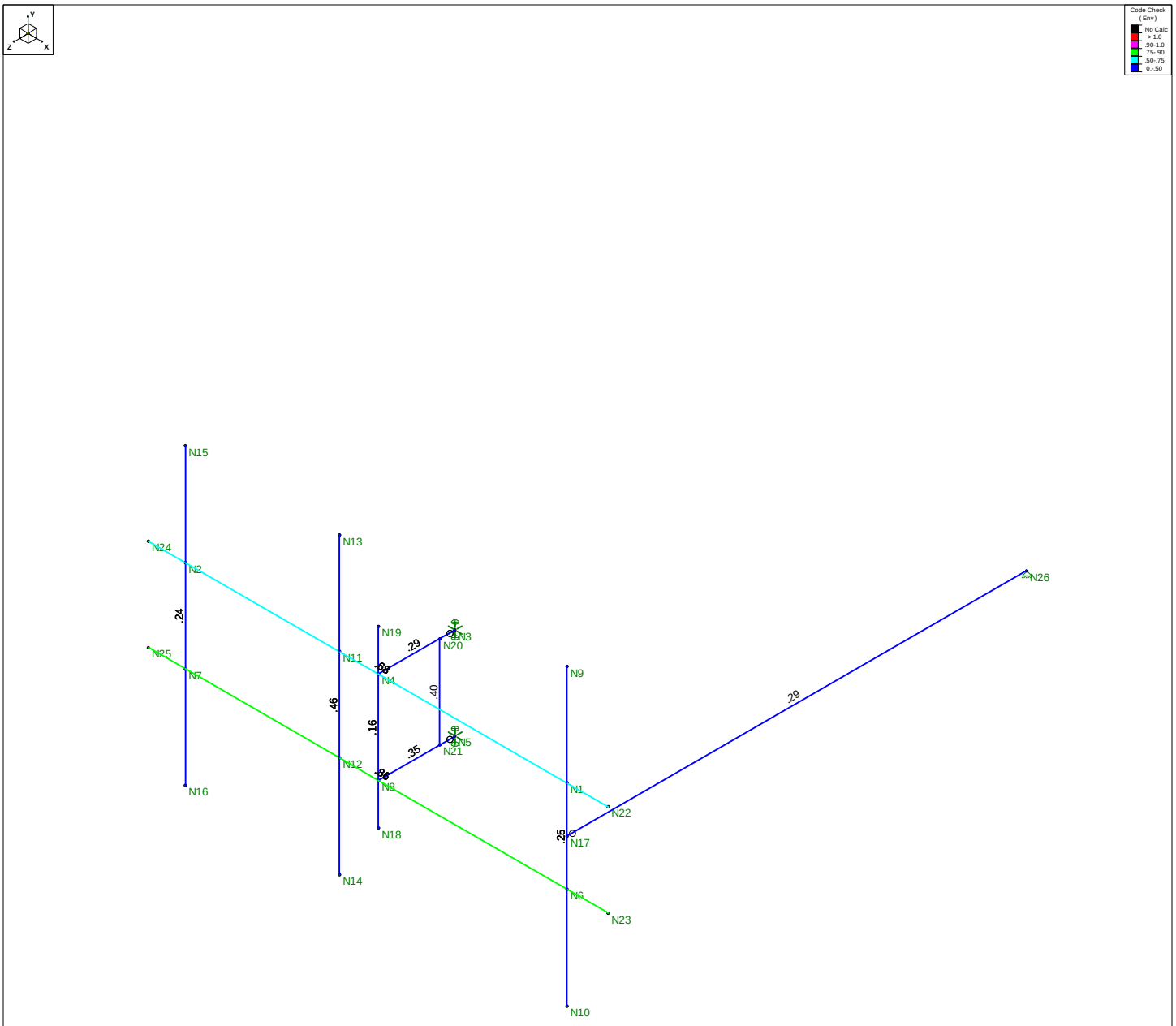
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
1	N1	max	.524	5	-.012	2	.016	3	1.03e-03	3	-1.544e-03	3	1.25e-03	3
2		min	.046	3	-.209	6	-.04	5	-1.827e-03	5	-1.052e-02	4	3.862e-04	5
3	N2	max	.523	5	-.208	5	2.356	5	-3.008e-04	3	4.5e-02	4	5.168e-03	3

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
4		min	.044	3	-.558	3	.199	3	-7.398e-04	4	3.282e-03	3	1.92e-03	5
5	N3	max	0	6	0	6	0	6	0	6	0	6	1.573e-03	3
6		min	0	1	0	1	0	1	0	1	0	1	5.284e-04	5
7	N4	max	.524	5	-.027	5	0	4	9.656e-04	6	2.143e-02	5	3.22e-03	3
8		min	.045	3	-.076	3	0	2	3.099e-04	2	2.395e-03	3	1.079e-03	5
9	N5	max	0	6	0	6	0	6	0	6	0	6	1.552e-03	3
10		min	0	1	0	1	0	1	0	1	0	1	5.311e-04	5
11	N6	max	.564	4	-.012	2	.051	5	1.799e-03	1	-1.498e-03	3	2.743e-03	1
12		min	.145	3	-.209	6	-.027	1	-4.469e-03	5	-1.18e-02	4	3.806e-04	5
13	N7	max	.565	4	-.208	5	2.465	4	-2.984e-04	3	4.619e-02	4	5.405e-03	3
14		min	.147	3	-.558	3	.208	3	-6.751e-03	4	3.187e-03	3	1.915e-03	5
15	N8	max	.564	4	-.027	5	0	5	9.009e-04	3	2.218e-02	4	3.164e-03	3
16		min	.146	3	-.076	3	0	3	-2.675e-04	5	4.046e-03	3	1.083e-03	5
17	N9	max	.511	5	-.012	2	.05	3	1.033e-03	3	-1.544e-03	3	1.212e-03	3
18		min	.006	3	-.209	6	-.092	5	-1.535e-03	5	-1.052e-02	4	3.865e-04	5
19	N10	max	.581	4	-.012	2	.257	5	1.797e-03	1	-1.498e-03	3	4.158e-03	1
20		min	.189	6	-.209	6	-.086	1	-6.627e-03	5	-1.18e-02	4	3.802e-04	5
21	N11	max	.523	5	-.049	5	.344	5	4.301e-03	5	3.124e-02	5	5.387e-03	3
22		min	.045	3	-.139	3	.036	3	-1.334e-04	1	3.051e-03	3	1.985e-03	5
23	N12	max	.565	4	-.049	5	.359	4	-2.739e-06	3	3.256e-02	4	5.654e-03	3
24		min	.147	3	-.14	3	.046	3	-5.233e-03	4	3.403e-03	3	1.993e-03	5
25	N13	max	.458	5	-.049	5	.673	5	1.139e-02	5	3.124e-02	5	5.305e-03	6
26		min	-.118	3	-.14	3	.036	3	-1.336e-04	1	3.051e-03	3	-4.794e-04	2
27	N14	max	.673	1	-.049	5	.717	4	-2.725e-06	3	3.256e-02	4	7.307e-03	1
28		min	.326	6	-.14	3	.046	3	-1.229e-02	4	3.403e-03	3	1.991e-03	5
29	N15	max	.46	5	-.208	5	2.345	5	-3.019e-04	3	4.5e-02	4	5.141e-03	3
30		min	-.126	3	-.558	3	.189	3	-4.519e-04	1	3.282e-03	3	1.922e-03	5
31	N16	max	.649	4	-.208	5	2.75	4	-2.974e-04	3	4.619e-02	4	6.072e-03	1
32		min	.317	6	-.558	3	.218	3	-9.059e-03	4	3.187e-03	3	1.912e-03	5
33	N17	max	.541	4	-.012	2	0	6	1.301e-03	3	-1.521e-03	3	4.16e-03	3
34		min	.094	3	-.209	6	-.003	1	-3.018e-03	5	-1.116e-02	4	1.48e-03	5
35	N18	max	.584	4	-.027	5	.004	5	9.009e-04	3	2.218e-02	4	3.162e-03	3
36		min	.189	3	-.076	3	-.013	3	-2.6e-04	5	4.046e-03	3	1.083e-03	5
37	N19	max	.509	5	-.027	5	.014	6	9.646e-04	6	2.143e-02	5	3.221e-03	3
38		min	.002	3	-.076	3	.005	2	3.099e-04	2	2.395e-03	3	1.079e-03	5
39	N20	max	.104	5	-.006	5	0	6	3.095e-03	3	2.079e-02	5	1.573e-03	3
40		min	.008	3	-.017	3	0	2	1.042e-03	5	1.711e-03	3	5.284e-04	5
41	N21	max	.114	4	-.006	2	0	5	3.101e-03	6	2.268e-02	4	1.552e-03	3
42		min	.033	6	-.017	3	0	3	1.157e-03	2	6.395e-03	6	5.311e-04	5
43	N22	max	.524	5	-.002	2	.104	4	1.03e-03	3	-1.544e-03	3	1.24e-03	3
44		min	.046	3	-.193	6	.036	6	-1.827e-03	5	-1.05e-02	4	3.788e-04	5
45	N23	max	.564	4	.023	2	.21	5	1.799e-03	1	-1.498e-03	3	2.734e-03	1
46		min	.145	3	-.193	6	-.002	3	-4.469e-03	5	-1.177e-02	4	3.732e-04	5
47	N24	max	.523	5	-.231	5	2.896	5	-3.008e-04	3	4.498e-02	4	5.175e-03	3
48		min	.044	3	-.62	3	.238	3	-7.398e-04	4	3.282e-03	3	1.925e-03	5
49	N25	max	.565	4	-.231	5	3.02	4	-2.984e-04	3	4.617e-02	4	5.412e-03	3
50		min	.147	3	-.623	3	.247	3	-6.751e-03	4	3.187e-03	3	1.92e-03	5
51	N26	max	0	6	0	6	0	6	8.398e-03	6	3.609e-03	4	4.16e-03	3
52		min	0	1	0	1	0	1	5.338e-03	2	-1.928e-02	2	1.48e-03	5

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

	Me...	Shape	Code C...	Loc...	LC	Shear C...	Loc[ft]	Dir	LC	phi*Pn...	phi*P...	phi*Mn...	phi*...	Cb	Eqn
1	M5	PIPE_2.0	.863	6.25	4	.354	7.292		4	31.698	32.13	1.872	1.872	1.898	H3-6
2	M7	PIPE_2.0	.683	6.25	4	.256	7.292		5	31.698	32.13	1.872	1.872	1.9	H1-1b
3	M2	PIPE_2.0	.462	5.25	4	.079	5.25		4	14.916	32.13	1.872	1.872	4.978	H1-1b
4	M9	PIPE_2.0	.398	0	3	.172	0		3	29.81	32.13	1.872	1.872	2.283	H1-1b
5	M4	HSS2.5X2.5...	.349	2.0...	1	.090	.434	y	3	61.829	63.756	4.554	4.554	2.146	H1-1b
6	M6	HSS2.5X2.5...	.293	2.0...	6	.092	.434	y	3	61.829	63.756	4.554	4.554	2.15	H1-1b
7	M10	PIPE_1.25	.290	6.25	1	.009	0		1	1.847	19.688	.801	.801	1.136	H1-1b
8	M3	PIPE_2.0	.247	5.25	3	.054	2.75		4	14.916	32.13	1.872	1.872	4.496	H1-1b
9	M1	PIPE_2.0	.239	2.75	3	.047	5.25		4	14.916	32.13	1.872	1.872	4.569	H1-1b
10	M8	PIPE_3.0	.157	1.1...	6	.094	3.612		3	63.06	65.205	5.749	5.749	1.515	H1-1b



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek		
FJP	CT11033E_AMA	Apr 30, 2019 at 2:32 PM
19027.01	Member Unity Check	CT11033E_AMA.R3D

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: CT11033E

CT State Police_1
315 Spencer Plains Road
Westbrook, Connecticut 06498

May 24, 2019

EBI Project Number: 6219001812

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**20.72%**

May 24, 2019

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

Emissions Analysis for Site: CT11033E - CT State Police_1

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **315 Spencer Plains Road** in **Westbrook, 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 315 Spencer Plains Road in Westbrook, Connecticut using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report, the sample point is the top of a 6-foot person standing at the base of the tower.

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

1) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

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

3) 4 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

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

5) 2 UMTS channels (AWS Band - 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

6) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

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

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

9) The antennas used in this modeling are the Ericsson AIR 21 for the 1900 MHz / 2100 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 700 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 2100 MHz channel(s) in Sector A, the Ericsson AIR 21 for the 1900 MHz / 2100 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 700 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 2100 MHz channel(s) in Sector B, the Ericsson AIR 21 for the 1900 MHz / 2100 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 700 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 2100 MHz channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

10) The antenna mounting height centerline of the proposed antennas is 130 feet above ground level (AGL).

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

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson AIR 21	Make / Model:	Ericsson AIR 21	Make / Model:	Ericsson AIR 21
Frequency Bands:	1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 2100 MHz
Gain:	15.35 dBd / 15.35 dBd	Gain:	15.35 dBd / 15.35 dBd	Gain:	15.35 dBd / 15.35 dBd
Height (AGL):	130 feet	Height (AGL):	130 feet	Height (AGL):	130 feet
Channel Count:	6	Channel Count:	6	Channel Count:	6
Total TX Power (W):	180 Watts	Total TX Power (W):	180 Watts	Total TX Power (W):	180 Watts
ERP (W):	6,169.82	ERP (W):	6,169.82	ERP (W):	6,169.82
Antenna A1 MPE %:	**1.31%**	Antenna B1 MPE %:	**1.31%**	Antenna C1 MPE %:	**1.31%**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Frequency Bands:	600 MHz / 700 MHz	Frequency Bands:	600 MHz / 700 MHz	Frequency Bands:	600 MHz / 700 MHz
Gain:	12.95 dBd / 13.35 dBd	Gain:	12.95 dBd / 13.35 dBd	Gain:	12.95 dBd / 13.35 dBd
Height (AGL):	130 feet	Height (AGL):	130 feet	Height (AGL):	130 feet
Channel Count:	4	Channel Count:	4	Channel Count:	4
Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts
ERP (W):	2,481.08	ERP (W):	2,481.08	ERP (W):	2,481.08
Antenna A2 MPE %:	**1.22%**	Antenna B2 MPE %:	**1.22%**	Antenna C2 MPE %:	**1.22%**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32
Frequency Bands:	1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 2100 MHz
Gain:	15.35 dBd / 15.85 dBd	Gain:	15.35 dBd / 15.85 dBd	Gain:	15.35 dBd / 15.85 dBd
Height (AGL):	130 feet	Height (AGL):	130 feet	Height (AGL):	130 feet
Channel Count:	4	Channel Count:	4	Channel Count:	4
Total TX Power (W):	240 Watts	Total TX Power (W):	240 Watts	Total TX Power (W):	240 Watts
ERP (W):	8,728.31	ERP (W):	8,728.31	ERP (W):	8,728.31
Antenna A3 MPE %:	**1.86%**	Antenna B3 MPE %:	**1.86%**	Antenna C3 MPE %:	**1.86%**

Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	4.39%
AT&T	2.09%
Town	3.25%
Sprint	3.21%
MWs	0.65%
CL&P	7.13%
Site Total MPE % :	20.72%

T-Mobile Sector A Total:	4.39%
T-Mobile Sector B Total:	4.39%
T-Mobile Sector C Total:	4.39%
Site Total:	20.72%

T-Mobile Maximum MPE Power Values (Sector A)

T-Mobile Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm²)	Frequency (MHz)	Allowable MPE (μW/cm²)	Calculated % MPE
T-Mobile 1900 MHz GSM	4	1028.30	130.0	8.75	1900 MHz GSM	1000	0.88%
T-Mobile 2100 MHz UMTS	2	1028.30	130.0	4.38	2100 MHz UMTS	1000	0.44%
T-Mobile 600 MHz LTE	2	591.73	130.0	2.52	600 MHz LTE	400	0.63%
T-Mobile 700 MHz LTE	2	648.82	130.0	2.76	700 MHz LTE	467	0.59%
T-Mobile 1900 MHz LTE	2	2056.61	130.0	8.75	1900 MHz LTE	1000	0.88%
T-Mobile 2100 MHz LTE	2	2307.55	130.0	9.82	2100 MHz LTE	1000	0.98%
						Total:	**4.39%**

• NOTE: Totals may vary by approximately 0.01% due to summation of remainders in calculations.

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:	4.39%
Sector B:	4.39%
Sector C:	4.39%
T-Mobile Maximum MPE % (Sector A):	4.39%
Site Total:	20.72%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **20.72%** 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.