Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

October 19, 2021

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

RE: **Notice of Exempt Modification for T-Mobile: CT11381C**
Crown Site ID#876338
41 Manitock Hill Road, Waterford, CT 06385
Latitude: 41° 21′ 16.70″ / Longitude: -72° 09′ 1.60″

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 117-foot mount level on the existing 136-foot self-support tower, located at 41 Manitock Hill Road, Waterford, CT. The property is owned by The City of New London. The tower is owned by Crown Castle. T-Mobile now intends to replace six (6) antennas and ancillary equipment at the 117-ft level. T-Mobile to also to replace the antenna mount at the same level. This modification/proposal includes hardware that is both 4G (LTE) and 5G capable through remote software configuration and either or both services may be turned on or off at various times.

Panned Modification:
Tower:

Installed New:
(3) RFS/Celwave – APXVAARR24_43-U-NA20
(3) Ericsson – AIR6449 B41 Antenna
(3) Ericsson-Radio 4449 B71/B85
(3) Ericsson Radio 4460 B25+B66
(3) HYBRID 6x12 HCS Hybrid Cable
(1) 6/24 4AWG Hybrid Cable
(1) Sitepro1 Antenna Mount Per Trylon MA 8/24/2021

Remove:
(3) Ericsson-Air 21 B4A B2P
(3) Ericsson Air 21 B2A B4P Antennas
(3) Generic Twin TMAs Style 1B
(12) 1 5/8" Coaxial Cables
(1) 1-1/4" Coax Cable
(1) Existing antenna mount

Ground:

Install New:
(1) Emerson AAV Cabinet
(1) RBS 6160 Cabinet
(1) B160 battery Cabinet
(1) BB 6648
(1) RBS 6601
(1) CSR IXRE V2 (GEN 2)
(2) PSU 4813 Voltage Booster

Remove:
(1) RBS 6131 Cabinet

The facility was approved by the Town of Waterford Planning & Zoning on September 29, 1997 via grant of Special Permit#97-112/304.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Mr. Rob Brule, First Selectman, Town of Waterford, Ms. Abby Piersall, Planning Director, Town of Waterford and the property owner, City of New London, CT. Crown Castle is the tower owner.

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

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

3. The proposed modification 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 Communication 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-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Please send approval/rejection letter to Attn: Jeffrey Barbadora.

Sincerely,

Jeffrey Barbadora
Site Acquisition Specialist
1800 W. Park Drive
Westborough, MA 01581
(781) 970-0053
Jeff.Barbadora@crowncastle.com

Attachments
cc:

First Selectman, Mr. Rob Brule
15 Rope Ferry Road
Waterford, CT 06438
(860)-444-5834

Town Planner, Ms Abby Piersall,
15 Rope Ferry Road
Waterford, CT 06438
(860)-444-5813

Property Owner
City of New London
181 State Street, Treasurer's Office
New London, CT 06320

Crown Castle, Tower Owner.

VOL. 496 PAGE 0358

TOWN OF WATERFORD
PLANNING & ZONING COMMISSION

NOTICE OF GRANT OF A SPECIAL PERMIT

This is to certify that on September 29, 1997 the Waterford Planning & Zoning Commission granted Special Permit #97-112/304.

Owner of Record: City of New London

Address: 41 Manitock Hill Road

Description of Premises:

As recorded in Volume 173, Page 256 of the Waterford Land Records.

Nature of Special Permit: Special Permit granted for the construction of a 140 foot lattice design communications tower by Sprint. Co-location for additional carriers is provided for on this tower.

Applicable Zoning Regulations: Section 3.6, 5.2.1, 5.2.3 and 23.

Permit findings, stipulations and conditions are filed in the office of the Town Clerk as stated in the minutes of the Planning & Zoning Commission meeting of September 29, 1997.

PLANNING & ZONING COMMISSION

By: Pam Hagerman
Pamela Hagerman
Recording Secretary
Planning & Zoning Commission

This notice is to be recorded on the land records of the Town of Waterford, indexed in the Grantor's Index under the name of the record owner.

RECEIVED FOR RECORD March 16, 1999
4:02 P M. ATTEST
TOWN CLERK

41 MANITOCK HILL ROAD

Location	41 MANITOCK HILL ROAD	**Mblu**	117/ / 4375/ /
Acct#	00395700	**Owner**	NEW LONDON CITY OF
Assessment	$9,180	**Appraisal**	$13,110
PID	4375	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$2,250	$10,860	$13,110

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$1,580	$7,600	$9,180

Parcel Addreses

Additional Addresses
No Additional Addresses available for this parcel

Owner of Record

Owner NEW LONDON CITY OF
Co-Owner WATER DEPT

Sale Price $0
Certificate
Book & Page 0173/0256
Sale Date 06/11/1968
Instrument 00

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
NEW LONDON CITY OF	$0		0173/0256	00	06/11/1968

Building Information

Building 1 : Section 1

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

Building Attributes	
Field	**Description**
Style	Outbuildings
Model	
Grade:	
Stories	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Percent	
Total Bedrooms:	
Full Bthrms:	
Half Baths:	
Extra Fixtures	
Total Rooms:	
Bath Style:	
Kitchen Style:	
Num Kitchens	
Fireplace(s)	
Extra Opening(s)	
Gas Fireplace(s)	
% Attic Fin	
LF Dormer	
Foundation	
Bsmt Gar(s)	
Bsmt %	
SF FBM	
SF Rec Rm	

Building Photo

(http://images.vgsi.com/photos/WaterfordCTPhotos//default.jpg)

Building Layout

Building Layout
(http://images.vgsi.com/photos/WaterfordCTPhotos//Sketches/4375_4375.j

Building Sub-Areas (sq ft)	Legend
No Data for Building Sub-Areas	

Fin Bsmt Qual	
Bsmt Access	
Usrfld 300	
Usrfld 301	

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code	109
Description	Vacant W/ OB
Zone	R-40
Neighborhood	600
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	5.5
Frontage	0
Depth	0
Assessed Value	$7,600
Appraised Value	$10,860

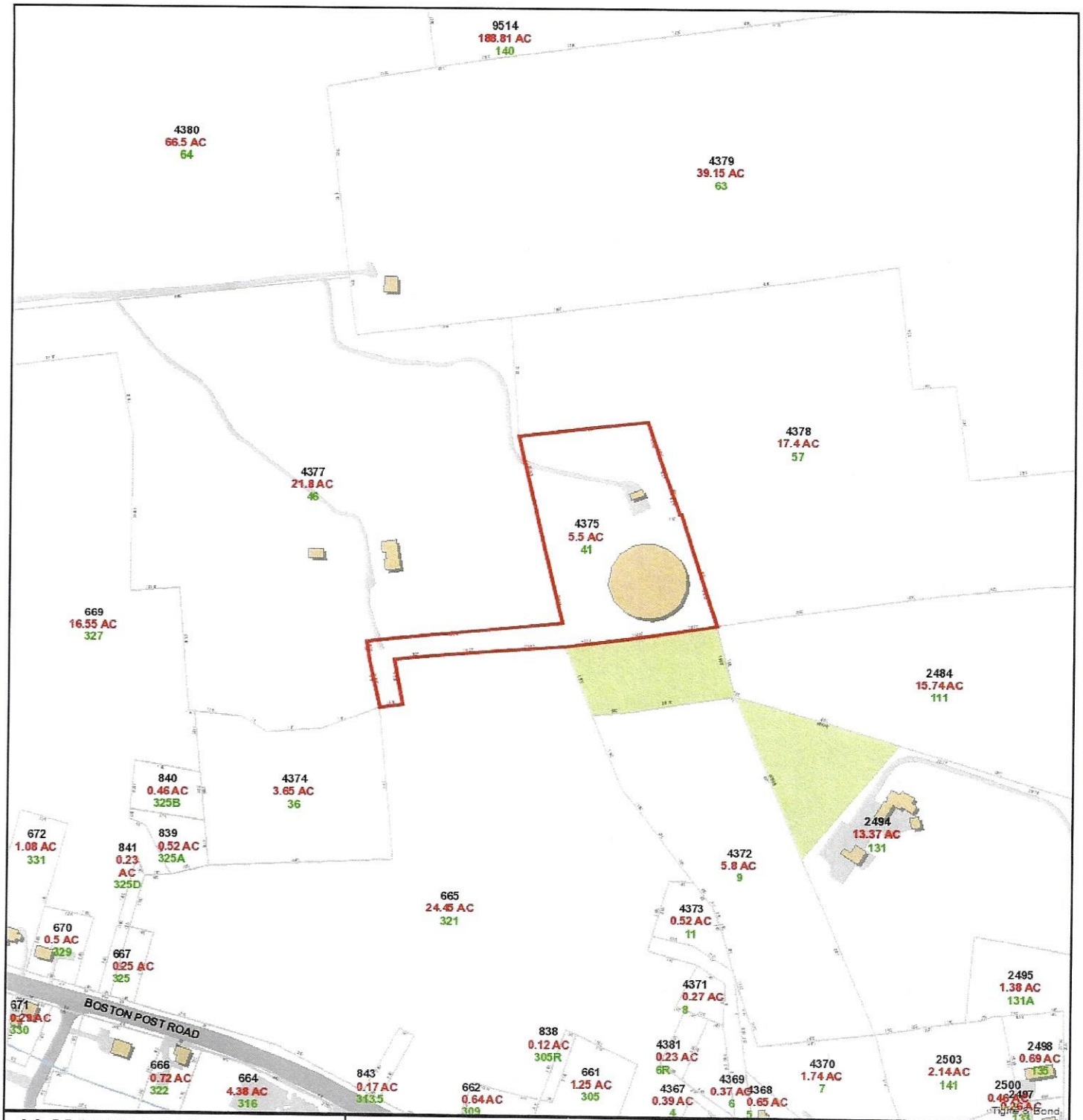
Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
SHD1	Shed	FR	Frame	200.00 S.F.	$2,250	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2020	$2,250	$10,860	$13,110
4000	$2,250	$10,860	$13,110

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2020	$1,580	$7,600	$9,180
4000	$1,580	$7,600	$9,180



41 MANITOCK HILL

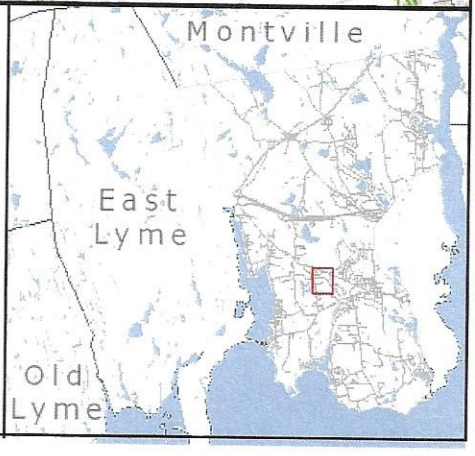
3/16/2021 3:40:44

1"=333'

Property Information

AV PID	undefined
Street Address	undefined
Total Appraised Parcel	undefined

The information depicted on this map is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analyses.



Barbadora, Jeff

From: TrackingUpdates@fedex.com
Sent: Wednesday, October 20, 2021 3:18 PM
To: Barbadora, Jeff
Subject: FedEx Shipment 285104441839: Your package has been delivered

Hi. Your package was delivered Wed, 10/20/2021 at 3:15pm.

Delivered to 15 ROPE FERRY RD, WATERFORD, CT 06385

OBTAIN PROOF OF DELIVERY

TRACKING NUMBER 285104441839

FROM Jeff Barbadora
1800 W. Park Drive
WESTBOROUGH, MA, US, 01581

TO	Town of Waterford First Selectman Rob Brule 15 Rope Ferry Road WATERFORD, CT, US, 06385
REFERENCE	799001.7680
SHIPPER REFERENCE	799001.7680
SHIP DATE	Tue 10/19/2021 06:17 PM
PACKAGING TYPE	FedEx Envelope
ORIGIN	WESTBOROUGH, MA, US, 01581
DESTINATION	WATERFORD, CT, US, 06385
SPECIAL HANDLING	Deliver Weekday
NUMBER OF PIECES	1
TOTAL SHIPMENT WEIGHT	1.00 LB
SERVICE TYPE	FedEx Priority Overnight

Barbadora, Jeff

From: TrackingUpdates@fedex.com
Sent: Wednesday, October 20, 2021 3:18 PM
To: Barbadora, Jeff
Subject: FedEx Shipment 285104532550: Your package has been delivered

Hi. Your package was delivered Wed, 10/20/2021 at 3:15pm.

Delivered to 15 ROPE FERRY RD, WATERFORD, CT 06385

OBTAIN PROOF OF DELIVERY

TRACKING NUMBER 285104532550

FROM Jeff Barbadora
1800 W. Park Drive
WESTBOROUGH, MA, US, 01581

TO	Town of Waterford Town Planner Abby Piersall 15 Rope Ferry Road WATERFORD, CT, US, 06385
REFERENCE	799001.7680
SHIPPER REFERENCE	799001.7680
SHIP DATE	Tue 10/19/2021 06:17 PM
PACKAGING TYPE	FedEx Envelope
ORIGIN	WESTBOROUGH, MA, US, 01581
DESTINATION	WATERFORD, CT, US, 06385
SPECIAL HANDLING	Deliver Weekday
NUMBER OF PIECES	1
TOTAL SHIPMENT WEIGHT	1.00 LB
SERVICE TYPE	FedEx Priority Overnight

Barbadora, Jeff

From: TrackingUpdates@fedex.com
Sent: Wednesday, October 20, 2021 11:03 AM
To: Barbadora, Jeff
Subject: FedEx Shipment 285104234187: Your package has been delivered

Hi. Your package was delivered Wed, 10/20/2021 at 11:00am.

Delivered to 181 STATE ST, NEW LONDON, CT 06320

OBTAIN PROOF OF DELIVERY

TRACKING NUMBER 285104234187

FROM Jeff Barbadora
1800 W. Park Drive
WESTBOROUGH, MA, US, 01581

TO	City of New London Treasurer's Office 181 State Street NEW LONDON, CT, US, 06320
REFERENCE	799001.7680
SHIPPER REFERENCE	799001.7680
SHIP DATE	Tue 10/19/2021 06:17 PM
PACKAGING TYPE	FedEx Envelope
ORIGIN	WESTBOROUGH, MA, US, 01581
DESTINATION	NEW LONDON, CT, US, 06320
SPECIAL HANDLING	Deliver Weekday
NUMBER OF PIECES	1
TOTAL SHIPMENT WEIGHT	1.00 LB
SERVICE TYPE	FedEx Priority Overnight

Date: **August 31, 2021**

MORRISON HERSHFIELD

Morrison Hershfield
1455 Lincoln Parkway, Suite 500
Atlanta, GA 30346
(770) 379-8500

Subject:	**Structural Analysis Report**	
Carrier Designation:	***T-Mobile* Co-Locate**	
	Site Number:	CT11381C
	Site Name:	Waterford South/RT 1
Crown Castle Designation:	**BU Number:**	876338
	Site Name:	Waterford
	JDE Job Number:	675143
	Work Order Number:	2011627
	Order Number:	576542 Rev. 0
Engineering Firm Designation:	**Morrison Hershfield Project Number:** CN8-185R1 / 2101398	
Site Data:	**41 Manitock Hill Road, Waterford, New London County, CT 06385-2000** **Latitude *41° 21' 16.7"*, Longitude *-72° 9' 1.6"*** **136 Foot – PiROD Self Support Tower**	

Morrison Hershfield is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above-mentioned tower.

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

LC7: Proposed Equipment Configuration **Sufficient Capacity – 74.6%**

This analysis utilizes an ultimate 3-second gust wind speed of 135 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 – Analysis Criteria.

Respectfully submitted by:

STATE OF CONNECTICUT
G. LANCE COOKE
No. 28133
LICENSED PROFESSIONAL ENGINEER

G. Lance Cooke, P.E. (CT License No. 28133)
Senior Engineer

Digitally signed by G. Lance Cooke
Date: 2021.08.31 11:32:24-07'00'

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 136 ft Self Support tower designed by PiROD Manufactures, Inc.

The tower has been modified per reinforcement drawings prepared by Vertical Structures, Inc. in January of 2009. Reinforcement consists of secondary horizontal members between the elevations 90’ and 95’ and 1-1/4” tie-rod assemblies for tower legs from 80’ to 90’.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	135 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	1.5 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
117.0	119.0	3	ericsson	AIR6449 B41_T-MOBILE	4	1-5/8
		3	rfs celwave	APXVAALL24_43-U-NA20_TMO		
		3	ericsson	RADIO 4449 B71 B85A_T-MOBILE		
		3	ericsson	RADIO 4460 B2/B25 B66_TMO		
	117.0	9	site pro 1	8' Antenna Pipe [#P2STD]		
		3	site pro 1	12' HD V-Frame [#VFA12-HD]		

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
136.0	137.0	3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe	4	1-1/4
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe		
		3	alcatel lucent	TD-RRH8X20-25		
	136.0	1	-	Platform Mount [LP 405-1]		
134.0	136.0	3	rfs celwave	IBC1900BB-1	-	-
		3	rfs celwave	IBC1900HG-2A		
	134.0	3	alcatel lucent	1900MHZ RRH (65MHZ)		
		3	alcatel lucent	800MHZ 2X50W RRH W/FILTER		
		1	-	Pipe Mount [PM 601-3]		
127.0	127.0	12	decibel	DB844H90E-XY w/ Mount Pipe	12	1-1/4
		1	-	Sector Mount [SM 411-3]		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
107.0	107.0	3	antel	BXA-80063/4CF w/ Mount Pipe	14	1-5/8
		6	jma wireless	MX06FRO660-03 w/ Mount Pipe		
		3	vzw	Sub6 Antenna - VZS01 w/ Mount Pipe		
		1	commscope	RC2DC-3315-PF-48		
		3	samsung	RFV01U-D1A		
		3	samsung	RFV01U-D2A		
		12	site pro 1	Crossover Plate [#VZWSMART-MSK1]		
		3	site pro 1	Tieback Assembly [#VZWSMART-SFK1]		
		3	site pro 1	V-Bracing Kit [#VZWSMART-SFK3]		
		1	-	Sector Mount [SM 402-3]		
97.0	97.0	1	cci antennas	DMP65R-BU4D w/ Mount Pipe	6 4 2	1-1/4 7/8 3/8
		1	cci antennas	DMP65R-BU6D w/ Mount Pipe		
		1	cci antennas	DMP65R-BU8D w/ Mount Pipe		
		1	cci antennas	OPA65R-BU4D w/ Mount Pipe		
		1	cci antennas	OPA65R-BU6D w/ Mount Pipe		
		1	cci antennas	OPA65R-BU8D w/ Mount Pipe		
		3	powerwave	7770.00 w/ Mount Pipe		
		3	ericsson	RRUS 4449 B5/B12		
		3	ericsson	RRUS 4478 B14_CCIV2		
		3	ericsson	RRUS 8843 B2/B66A_CCIV2		
		6	powerwave	LGP21401		
		1	raycap	DC6-48-60-18-8F		
		1	raycap	DC9-48-60-24-8C-EV		
		1	-	Sector Mount [SM 504-3]		
87.0	89.0	3	kathrein	800 10504 w/ Mount Pipe	6	7/8
	87.0	1	-	Sector Mount [SM 104-3]		
80.0	81.0	1	gps	GPS_A	1	1/2
	80.0	1	-	Side Arm Mount [SO 701-1]		
72.0	72.0	2	gps	GPS_A	2	1/2
		2	-	Side Arm Mount [SO 701-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Reference	Source
4-GEOTECHNICAL REPORTS	2035622	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	2068030	CCISITES
4-TOWER MANUFACTURER DRAWINGS	1441523	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	2125417	CCISITES
4-POST-MODIFICATION INSPECTION	2376132	CCISITES

3.1) Analysis Method

tnxTower (version 8.1.1.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 standard.

tnxTower was used to determine the loads on the modified structure. Additional calculations were performed to determine the stresses in the reinforced leg sections. These calculations are presented in Appendix C.

3.2) Assumptions

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

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	136 - 133.625	Leg	1 1/2	2	-2.83	54.73	5.2	Pass
T2	133.625 - 130	Leg	1 1/2	14	-4.40	49.84	8.8	Pass
T3	130 - 110	Leg	2	29	-38.02	117.05	32.5	Pass
T4	110 - 94.9427	Leg	2 1/4	107	-82.44	156.33	52.7	Pass
T5	94.9427 - 92.5938	Leg	2 1/4	149	-91.06	179.34	50.8	Pass
T6	92.5938 - 90	Leg	2 1/4	161	-103.76	185.75	55.9	Pass
T7	90 - 80	Leg	PiRod 105244 w/ (2) 1-1/4" Tie Rod	176	-111.72	249.51	44.8	Pass
T8	80 - 60	Leg	Pirod 105217	185	-154.00	225.60	68.3	Pass
T9	60 - 40	Leg	Pirod 105218	200	-188.77	315.72	59.8	Pass
T10	40 - 20	Leg	Pirod 105218	214	-219.27	315.72	69.5	Pass
T11	20 - 0	Leg	Pirod 105219	229	-247.63	419.86	59.0	Pass
T1	136 - 133.625	Diagonal	3/4	7	-1.00	5.77	17.4	Pass
T2	133.625 - 130	Diagonal	3/4	25	-1.48	5.88	25.2	Pass
T3	130 - 110	Diagonal	7/8	40	-4.24	9.77	43.4	Pass
T4	110 - 94.9427	Diagonal	1	115	-5.71	14.70	38.9	Pass
T5	94.9427 - 92.5938	Diagonal	1	153	-6.04	14.41	41.9	Pass
T6	92.5938 - 90	Diagonal	1	169	-7.03	14.87	47.3	Pass
T7	90 - 80	Diagonal	L3x3x3/16	180	-8.25	25.34	32.6 74.6 (b)	Pass
T8	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	190	-6.50	14.57	44.6 64.3 (b)	Pass
T9	60 - 40	Diagonal	L3x3x3/16	202	-6.16	20.18	30.5 53.2 (b)	Pass
T10	40 - 20	Diagonal	L3x3x3/16	217	-6.34	16.11	39.4 52.4 (b)	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T11	20 - 0	Diagonal	L3x3x5/16	232	-8.54	20.97	40.7	Pass
T2	133.625 - 130	Horizontal	3/4	16	-0.21	3.48	6.0	Pass
T3	130 - 110	Horizontal	3/4	43	-0.72	2.88	25.0	Pass
T5	94.9427 - 92.5938	Secondary Horizontal	1 1/2	157	-1.58	50.44	3.1	Pass
T6	92.5938 - 90	Secondary Horizontal	1 1/2	172	-1.80	49.85	3.6	Pass
T1	136 - 133.625	Top Girt	6x3/8	4	-0.72	5.14	14.0	Pass
T3	130 - 110	Top Girt	7/8	31	-0.72	6.54	11.0	Pass
T4	110 - 94.9427	Top Girt	1	111	-1.75	8.78	19.9	Pass
T2	133.625 - 130	Bottom Girt	7/8	19	-0.63	6.44	9.7	Pass
T3	130 - 110	Bottom Girt	7/8	36	-1.76	5.18	34.0	Pass
T6	92.5938 - 90	Bottom Girt	1	163	-1.80	7.17	25.1	Pass
							Summary	
						Leg (T10)	69.5	Pass
						Diagonal (T7)	74.6	Pass
						Horizontal (T3)	25.0	Pass
						Secondary Horizontal (T6)	3.6	Pass
						Top Girt (T4)	19.9	Pass
						Bottom Girt (T3)	34.0	Pass
						Bolt Checks	71.0	Pass
						Rating =	74.6	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	39.2	Pass
1	Base Foundation (Structure)	0	20.4	Pass
1	Base Foundation (Soil Interaction)		69.5	Pass

Structure Rating (max from all components) =	74.6%*

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

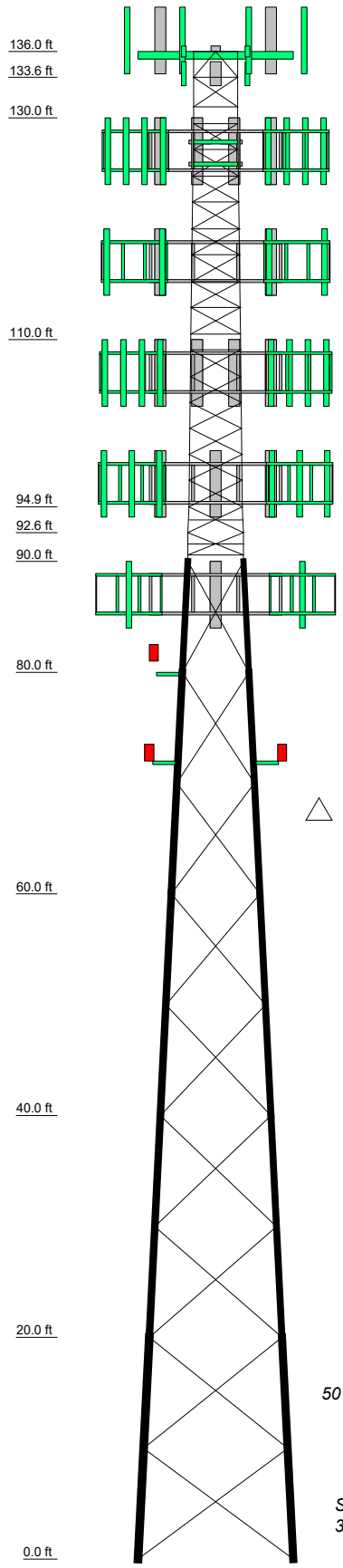
4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Section	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	Pirod 105219	Pirod 105218		Pirod 105217	A			SR 2 1/4	SR 2	SR 1 1/2	
Leg Grade				A572-50							
Diagonals	L3x3x5/16	L3x3x3/16		L2 1/2x2 1/2x3/16	L3x3x3/16			SR 1	SR 7/8	SR 3/4	
Diagonal Grade		A36							A572-50		
Top Girts			N.A.					SR 1	SR 7/8	N.A.	B
Bottom Girts			N.A.			C		N.A.	SR 7/8	N.A.	N.A.
Horizontals			N.A.						SR 3/4	N.A.	N.A.
Sec. Horizontals			N.A.			SR 1 1/2			N.A.		4
Face Width (ft)	14	12	10	8	6	4.875		4.5	8 @ 2.375		D
# Panels @ (ft)			9 @ 10			G	F	6 @ 2.34983		E	
Weight (K)	17.3	4.5	2.9	2.8	2.2	1.4	0.3	1.2	1.4	0.2	0.2



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	PiRod 105244 w/ (2) 1-1/4" Tie Rod	E	1 @ 2.625
B	6x3/8	F	1 @ 2.34896
C	SR 1	G	1 @ 2.01042
D	1 @ 2.375		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 135 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 74.6%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 257 K
SHEAR: 25 K

UPLIFT: -224 K
SHEAR: 22 K

AXIAL 113 K
SHEAR 8 K
MOMENT 700 kip-ft

TORQUE 3 kip-ft
50 mph WIND - 1.5000 in ICE

AXIAL 51 K
SHEAR 36 K
MOMENT 2911 kip-ft

TORQUE 16 kip-ft
REACTIONS - 135 mph WIND

Morrison Hershfield
Consulting Engineers
1455 Lincoln Parkway, Suite 500
Atlanta, GA 30346
Phone: (770) 379-8500
FAX: (770) 379-8501

Job: **CN8-185R1 / 2101398**			
Project: ***876338 / Waterford***			
Client: Crown Castle USA	Drawn by: CKK	App'd:	
Code: TIA-222-H	Date: 08/31/21	Scale: NTS	
Path: C:\Users\CKATARI\Desktop\CN8-185 - 876338 - WATERFORD\CN8-185R1 SIA\Analysis\CN8-185R1 BU_876338 WO_2011627.eri		Dwg No. E-1	

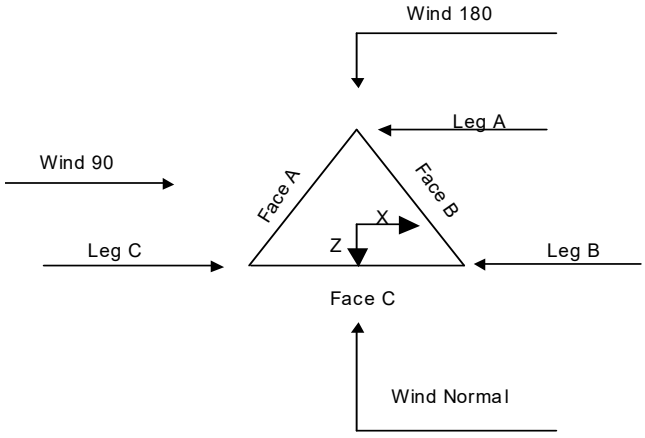
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 136.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 4.00 ft at the top and 14.00 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

- Tower is located in New London County, Connecticut.
- Tower base elevation above sea level: 242.00 ft.
- Basic wind speed of 135 mph.
- Risk Category II.
- Exposure Category B.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 1.5000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.
- Tower analysis based on target reliabilities in accordance with Annex S.
- Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
- Maximum demand-capacity ratio is: 1.05.
- 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-H Bracing Resist. Exemption
√	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-H 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	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	136.00-133.63			4.00	1	2.38
T2	133.63-130.00			4.00	1	3.63
T3	130.00-110.00			4.00	1	20.00
T4	110.00-94.94			4.50	1	15.06
T5	94.94-92.59			4.88	1	2.35
T6	92.59-90.00			4.93	1	2.59
T7	90.00-80.00			5.00	1	10.00
T8	80.00-60.00			6.00	1	20.00
T9	60.00-40.00			8.00	1	20.00
T10	40.00-20.00			10.00	1	20.00
T11	20.00-0.00			12.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	136.00-133.63	2.38	K Brace Down	No	Yes	0.0000	0.0000
T2	133.63-130.00	2.63	X Brace	No	Yes	0.0000	12.0000
T3	130.00-110.00	2.38	X Brace	No	Yes	6.0000	6.0000
T4	110.00-94.94	2.35	X Brace	No	No	11.5000	0.0000
T5	94.94-92.59	2.35	X Brace	No	Yes	0.0000	0.0000
T6	92.59-90.00	2.01	X Brace	No	Yes	0.0000	7.0000
T7	90.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T8	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T9	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T10	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T11	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 136.00-133.63	Solid Round	1 1/2	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T2 133.63-130.00	Solid Round	1 1/2	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T3 130.00-110.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T4 110.00-94.94	Solid Round	2 1/4	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T5 94.94-92.59	Solid Round	2 1/4	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T6 92.59-90.00	Solid Round	2 1/4	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T7 90.00-80.00	Truss Leg	PiRod 105244 w/ (2) 1-1/4" Tie Rod	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T8 80.00-60.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T9 60.00-40.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T10 40.00-20.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T11 20.00-0.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 136.00-133.63	Flat Bar	6x3/8	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)
T2 133.63-130.00	Solid Round		A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T3 130.00-110.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T4 110.00-94.94	Solid Round	1	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T6 92.59-90.00	Solid Round		A572-50 (50 ksi)	Solid Round	1	A572-50 (50 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 136.00-133.63	None	Flat Bar		A36 (36 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T2 133.63-130.00	None	Flat Bar		A36 (36 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T3 130.00-110.00	None	Solid Round		A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 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 94.94-92.59	Solid Round	1 1/2	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T6 92.59-90.00	Solid Round	1 1/2	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 136.00-133.63	0.00	0.0000	A36 (36 ksi)	1	1.03	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T2 133.63-130.00	0.00	0.0000	A36 (36 ksi)	1	1.03	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T3 130.00-110.00	0.00	0.0000	A36 (36 ksi)	1	1.03	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T4 110.00-94.94	0.00	0.0000	A36 (36 ksi)	1	1.03	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T5 94.94-92.59	0.00	0.0000	A36 (36 ksi)	1	1.03	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T6 92.59-90.00	0.00	0.0000	A36 (36 ksi)	1	1.03	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T7 90.00-80.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T8 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T9 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T10 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T11 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-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 136.00-133.63	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 133.63-130.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 130.00-110.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 110.00-94.94	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 94.94-92.59	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 0.5	1 1
T6 92.59-90.00	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 0.5	1 1
T7 90.00-80.00	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 80.00-60.00	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
T9 60.00-40.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T10 40.00-20.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T11 20.00-0.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Truss-Leg K Factors: Truss-Legs Used As Leg Members: Leg Panels	X Brace Diagonals	Z Brace Diagonals	Truss-Legs Used As Inner Members: Leg Panels	X Brace Diagonals	Z Brace Diagonals
T7 90.00-80.00	1.29	0.5	0.85	1	1	1
T8 80.00-60.00	1	0.5	0.85	1	1	1
T9 60.00-40.00	1	0.5	0.85	1	1	1
T10 40.00-20.00	1	0.5	0.85	1	1	1
T11 20.00-0.00	1	0.5	0.85	1	0.5	0.85

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	U	Diagonal Net Width Deduct in	U	Top Girt Net Width Deduct in	U	Bottom Girt Net Width Deduct in	U	Mid Girt Net Width Deduct in	U	Long Horizontal Net Width Deduct in	U	Short Horizontal Net Width Deduct in	U
T1 136.00-133.63	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1
T2 133.63-130.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1
T3 130.00-110.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 110.00-94.94	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 94.94-92.59	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 92.59-90.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 90.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T9 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T10 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T11 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 136.00-133.63	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 133.63-130.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 130.00-110.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 110.00-94.94	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 94.94-92.59	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 92.59-90.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 90.00-80.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 80.00-60.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 60.00-40.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 40.00-20.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T11 20.00-0.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	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 136.00-133.63	Flange	0.6250 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0
T2 133.63-130.00	Sleeve DS	0.6250 A325N	5	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0
T3 130.00-110.00	Sleeve DS	0.7500 A325N	5	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.5000 A325N	0	0.0000 A325N	0	0.5000 A325N	0
T4 110.00-94.94	Flange	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.5000 A325N	0	0.0000 A325N	0	0.5000 A325N	0
T5 94.94-92.59	Flange	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.5000 A325N	0	0.0000 A325N	0	0.5000 A325N	0
T6 92.59-90.00	Flange	1.0000 A325N	6	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.5000 A325N	0	0.0000 A325N	0	0.5000 A325N	0
T7 90.00-80.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.5000 A325N	0	0.0000 A325N	0	0.5000 A325N	0
T8 80.00-60.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.5000 A325N	0	0.0000 A325N	0	0.5000 A325N	0
T9 60.00-40.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.5000 A325N	0	0.0000 A325N	0	0.5000 A325N	0
T10 40.00-20.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.5000 A325N	0	0.0000 A325N	0	0.5000 A325N	0
T11 20.00-0.00	Flange	1.2500 A-687	0	1.2500 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 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
LDF6-50A(1-1/4)	B	No	No	Ar (CaAa)	97.00 - 0.00	-9.0000	0.4	6	6	0.8500 0.7500	1.5500		0.60
WR-VG86ST-BRDA(7/8)	C	No	No	Ar (CaAa)	97.00 - 0.00	-5.0000	-0.35	6	3	0.8500 0.7500	0.8800		0.68
HB114-21U3M12-XXXF(1-1/4)	C	No	No	Ar (CaAa)	136.00 - 0.00	-5.0000	-0.4	4	3	0.8500 0.7500	1.5400		1.22
FLC 12-50J(1/2")	C	No	No	Ar (CaAa)	80.00 - 0.00	-5.0000	-0.47	1	1	0.8500 0.7500	0.6400		0.17
LDF7-50A(1-5/8)	B	No	No	Ar (CaAa)	107.00 - 0.00	-4.0000	0.37	14	7	0.5000	1.9800		0.82
T-Brackets ***	B	No	No	Af (CaAa)	136.00 - 0.00	-7.0000	0.4	1	1	1.0000	1.0000		8.40
LDF6-50A(1-1/4)	A	No	No	Ar (CaAa)	127.00 - 0.00	-7.0000	0.4	12	6	0.5000	1.5500		0.60
LDF4-50A(1/2)	A	No	No	Ar (CaAa)	72.00 - 0.00	-9.0000	0.4	2	2	0.5000	0.6250		0.15
T-Brackets ***	A	No	No	Af (CaAa)	127.00 - 0.00	-7.0000	0.4	1	1	1.0000	1.0000		8.40
T-Brackets *	C	No	No	Af (CaAa)	117.00 - 0.00	-5.0000	0.4	1	1	1.0000	1.0000		8.40
HCS 6X12 4AWG(1-5/8)	C	No	No	Ar (CaAa)	117.00 - 0.00	-5.0000	0.4	3	2	0.5000	1.6600		2.40
HB158-21U6S24-xxM_TMO(1-5/8) ***	C	No	No	Ar (CaAa)	117.00 - 0.00	-7.0000	0.45	1	1	0.5000	1.9960		2.50
FXL 780 PE(7/8)	A	No	No	Ar (CaAa)	87.00 - 0.00	0.0000	0	6	6	0.5000	1.0900		0.25
LDF1-50A(1/4)	A	No	No	Ar (CaAa)	87.00 - 0.00	0.0000	0.1	1	1	0.5000	0.3450		0.06
Feedline Ladder (Af) ***	A	No	No	Af (CaAa)	87.00 - 0.00	0.0000	0	1	1	3.0000	3.0000		8.40
Safety Line 3/8	C	No	No	Ar (CaAa)	90.00 - 0.00	0.0000	0.48	1	1	0.3750	0.3750		0.22
Safety Line 3/8	C	No	No	Ar (CaAa)	136.00 - 90.00	0.0000	0	1	1	0.3750	0.3750		0.22
Ladder Rung SR 3/4 (48"w 26"s) ***	C	No	No	Af (CaAa)	136.00 - 90.00	0.0000	0	1	1	1.3500	1.3500		2.71

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	136.00-133.63	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.237	0.000	0.02
		C	0.000	0.000	2.086	0.000	0.02
T2	133.63-130.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.362	0.000	0.03
		C	0.000	0.000	3.185	0.000	0.03
T3	130.00-110.00	A	0.000	0.000	33.320	0.000	0.27
		B	0.000	0.000	2.000	0.000	0.17
		C	0.000	0.000	23.153	0.000	0.28

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T4	110.00-94.94	A	0.000	0.000	29.512	0.000	0.23
		B	0.000	0.000	36.842	0.000	0.27
		C	0.000	0.000	26.324	0.000	0.40
T5	94.94-92.59	A	0.000	0.000	4.604	0.000	0.04
		B	0.000	0.000	8.931	0.000	0.06
		C	0.000	0.000	5.177	0.000	0.07
T6	92.59-90.00	A	0.000	0.000	5.084	0.000	0.04
		B	0.000	0.000	9.861	0.000	0.06
		C	0.000	0.000	5.717	0.000	0.08
T7	90.00-80.00	A	0.000	0.000	27.919	0.000	0.23
		B	0.000	0.000	38.020	0.000	0.23
		C	0.000	0.000	19.791	0.000	0.27
T8	80.00-60.00	A	0.000	0.000	64.470	0.000	0.51
		B	0.000	0.000	76.040	0.000	0.47
		C	0.000	0.000	40.862	0.000	0.55
T9	60.00-40.00	A	0.000	0.000	65.470	0.000	0.52
		B	0.000	0.000	76.040	0.000	0.47
		C	0.000	0.000	40.862	0.000	0.55
T10	40.00-20.00	A	0.000	0.000	65.470	0.000	0.52
		B	0.000	0.000	76.040	0.000	0.47
		C	0.000	0.000	40.862	0.000	0.55
T11	20.00-0.00	A	0.000	0.000	65.470	0.000	0.52
		B	0.000	0.000	76.040	0.000	0.47
		C	0.000	0.000	40.862	0.000	0.55

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	136.00-133.63	A	1.468	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.935	0.000	0.03
		C		0.000	0.000	5.421	0.000	0.08
T2	133.63-130.00	A	1.464	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	1.424	0.000	0.05
		C		0.000	0.000	8.266	0.000	0.12
T3	130.00-110.00	A	1.451	0.000	0.000	40.791	0.000	0.79
		B		0.000	0.000	7.803	0.000	0.25
		C		0.000	0.000	59.874	0.000	0.91
T4	110.00-94.94	A	1.428	0.000	0.000	35.949	0.000	0.69
		B		0.000	0.000	41.869	0.000	0.83
		C		0.000	0.000	67.112	0.000	1.09
T5	94.94-92.59	A	1.415	0.000	0.000	5.592	0.000	0.11
		B		0.000	0.000	12.044	0.000	0.20
		C		0.000	0.000	12.690	0.000	0.20
T6	92.59-90.00	A	1.412	0.000	0.000	6.170	0.000	0.12
		B		0.000	0.000	13.291	0.000	0.22
		C		0.000	0.000	13.995	0.000	0.22
T7	90.00-80.00	A	1.402	0.000	0.000	42.308	0.000	0.71
		B		0.000	0.000	51.158	0.000	0.86
		C		0.000	0.000	48.715	0.000	0.77
T8	80.00-60.00	A	1.375	0.000	0.000	108.302	0.000	1.69
		B		0.000	0.000	101.871	0.000	1.70
		C		0.000	0.000	103.319	0.000	1.60
T9	60.00-40.00	A	1.329	0.000	0.000	112.477	0.000	1.68
		B		0.000	0.000	101.119	0.000	1.66
		C		0.000	0.000	101.634	0.000	1.55
T10	40.00-20.00	A	1.263	0.000	0.000	110.369	0.000	1.62
		B		0.000	0.000	100.028	0.000	1.61
		C		0.000	0.000	99.182	0.000	1.50
T11	20.00-0.00	A	1.132	0.000	0.000	106.194	0.000	1.50
		B		0.000	0.000	97.868	0.000	1.52
		C		0.000	0.000	94.316	0.000	1.38

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	136.00-133.63	2.6714	1.7636	2.0354	1.8729
T2	133.63-130.00	5.4840	3.4246	3.3407	2.9871
T3	130.00-110.00	2.7843	-3.3933	1.7174	-0.4192
T4	110.00-94.94	3.5778	0.7189	2.0426	1.7846
T5	94.94-92.59	5.9579	3.0678	3.3697	3.0596
T6	92.59-90.00	5.8788	3.0288	2.8531	2.6153
T7	90.00-80.00	3.7454	1.6723	1.6490	1.6464
T8	80.00-60.00	4.4010	1.4292	2.3914	1.4717
T9	60.00-40.00	5.2439	1.4345	3.2898	1.5330
T10	40.00-20.00	6.1833	1.6162	4.1521	1.8512
T11	20.00-0.00	6.9382	1.7606	4.8831	2.0615

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	3	HB114-21U3M12-XXXF(1-1/4)	133.63 - 136.00	0.6000	0.3616
T1	6	T-Brackets	133.63 - 136.00	0.6000	0.3616
T1	24	Safety Line 3/8	133.63 - 136.00	0.6000	0.3616
T1	25	Ladder Rung SR 3/4 (48"w 26"s)	133.63 - 136.00	0.6000	0.3616
T2	3	HB114-21U3M12-XXXF(1-1/4)	130.00 - 133.63	0.6000	0.4840
T2	6	T-Brackets	130.00 - 133.63	0.6000	0.4840
T2	24	Safety Line 3/8	130.00 - 133.63	0.6000	0.4840
T2	25	Ladder Rung SR 3/4 (48"w 26"s)	130.00 - 133.63	0.6000	0.4840
T3	3	HB114-21U3M12-XXXF(1-1/4)	110.00 - 130.00	0.6000	0.4344
T3	6	T-Brackets	110.00 - 130.00	0.6000	0.4344
T3	8	LDF6-50A(1-1/4)	110.00 - 127.00	0.6000	0.4344
T3	10	T-Brackets	110.00 - 127.00	0.6000	0.4344
T3	14	T-Brackets	110.00 - 117.00	0.6000	0.4344
T3	16	HCS 6X12 4AWG(1-5/8)	110.00 - 117.00	0.6000	0.4344
T3	17	HB158-21U6S24-xxM_TMO(1-5/8)	110.00 - 117.00	0.6000	0.4344
T3	24	Safety Line 3/8	110.00 - 130.00	0.6000	0.4344
T3	25	Ladder Rung SR 3/4 (48"w 26"s)	110.00 - 130.00	0.6000	0.4344
T4	1	LDF6-50A(1-1/4)	94.94 - 97.00	0.6000	0.5497
T4	2	WR-VG86ST-BRDA(7/8)	94.94 - 97.00	0.6000	0.5497
T4	3	HB114-21U3M12-XXXF(1-1/4)	94.94 - 110.00	0.6000	0.5497
T4	5	LDF7-50A(1-5/8)	94.94 - 107.00	0.6000	0.5497
T4	6	T-Brackets	94.94 - 110.00	0.6000	0.5497
T4	8	LDF6-50A(1-1/4)	94.94 - 110.00	0.6000	0.5497

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T4	10	T-Brackets	94.94 - 110.00	0.6000	0.5497
T4	14	T-Brackets	94.94 - 110.00	0.6000	0.5497
T4	16	HCS 6X12 4AWG(1-5/8)	94.94 - 110.00	0.6000	0.5497
T4	17	HB158-21U6S24-xxM_TMO(1-5/8)	94.94 - 110.00	0.6000	0.5497
T4	24	Safety Line 3/8	94.94 - 110.00	0.6000	0.5497
T4	25	Ladder Rung SR 3/4 (48"w 26"s)	94.94 - 110.00	0.6000	0.5497
T5	1	LDF6-50A(1-1/4)	92.59 - 94.94	0.6000	0.4214
T5	2	WR-VG86ST-BRDA(7/8)	92.59 - 94.94	0.6000	0.4214
T5	3	HB114-21U3M12-XXXF(1-1/4)	92.59 - 94.94	0.6000	0.4214
T5	5	LDF7-50A(1-5/8)	92.59 - 94.94	0.6000	0.4214
T5	6	T-Brackets	92.59 - 94.94	0.6000	0.4214
T5	8	LDF6-50A(1-1/4)	92.59 - 94.94	0.6000	0.4214
T5	10	T-Brackets	92.59 - 94.94	0.6000	0.4214
T5	14	T-Brackets	92.59 - 94.94	0.6000	0.4214
T5	16	HCS 6X12 4AWG(1-5/8)	92.59 - 94.94	0.6000	0.4214
T5	17	HB158-21U6S24-xxM_TMO(1-5/8)	92.59 - 94.94	0.6000	0.4214
T5	24	Safety Line 3/8	92.59 - 94.94	0.6000	0.4214
T5	25	Ladder Rung SR 3/4 (48"w 26"s)	92.59 - 94.94	0.6000	0.4214
T6	1	LDF6-50A(1-1/4)	90.00 - 92.59	0.6000	0.3574
T6	2	WR-VG86ST-BRDA(7/8)	90.00 - 92.59	0.6000	0.3574
T6	3	HB114-21U3M12-XXXF(1-1/4)	90.00 - 92.59	0.6000	0.3574
T6	5	LDF7-50A(1-5/8)	90.00 - 92.59	0.6000	0.3574
T6	6	T-Brackets	90.00 - 92.59	0.6000	0.3574
T6	8	LDF6-50A(1-1/4)	90.00 - 92.59	0.6000	0.3574
T6	10	T-Brackets	90.00 - 92.59	0.6000	0.3574
T6	14	T-Brackets	90.00 - 92.59	0.6000	0.3574
T6	16	HCS 6X12 4AWG(1-5/8)	90.00 - 92.59	0.6000	0.3574
T6	17	HB158-21U6S24-xxM_TMO(1-5/8)	90.00 - 92.59	0.6000	0.3574
T6	24	Safety Line 3/8	90.00 - 92.59	0.6000	0.3574
T6	25	Ladder Rung SR 3/4 (48"w 26"s)	90.00 - 92.59	0.6000	0.3574
T7	1	LDF6-50A(1-1/4)	80.00 - 90.00	0.6000	0.3989
T7	2	WR-VG86ST-BRDA(7/8)	80.00 - 90.00	0.6000	0.3989
T7	3	HB114-21U3M12-XXXF(1-1/4)	80.00 - 90.00	0.6000	0.3989
T7	5	LDF7-50A(1-5/8)	80.00 - 90.00	0.6000	0.3989
T7	6	T-Brackets	80.00 -	0.6000	0.3989

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T7	8	LDF6-50A(1-1/4)	90.00 80.00 - 90.00	0.6000	0.3989
T7	10	T-Brackets	80.00 - 90.00	0.6000	0.3989
T7	14	T-Brackets	80.00 - 90.00	0.6000	0.3989
T7	16	HCS 6X12 4AWG(1-5/8)	80.00 - 90.00	0.6000	0.3989
T7	17	HB158-21U6S24-xxM_TMO(1-5/8)	80.00 - 90.00	0.6000	0.3989
T7	19	FXL 780 PE(7/8)	80.00 - 87.00	0.6000	0.3989
T7	20	LDF1-50A(1/4)	80.00 - 87.00	0.6000	0.3989
T7	21	Feedline Ladder (Af)	80.00 - 87.00	0.6000	0.3989
T7	23	Safety Line 3/8	80.00 - 90.00	0.6000	0.3989
T8	1	LDF6-50A(1-1/4)	60.00 - 80.00	0.6000	0.4754
T8	2	WR-VG86ST-BRDA(7/8)	60.00 - 80.00	0.6000	0.4754
T8	3	HB114-21U3M12-XXXF(1-1/4)	60.00 - 80.00	0.6000	0.4754
T8	4	FLC 12-50J(1/2")	60.00 - 80.00	0.6000	0.4754
T8	5	LDF7-50A(1-5/8)	60.00 - 80.00	0.6000	0.4754
T8	6	T-Brackets	60.00 - 80.00	0.6000	0.4754
T8	8	LDF6-50A(1-1/4)	60.00 - 80.00	0.6000	0.4754
T8	9	LDF4-50A(1/2)	60.00 - 72.00	0.6000	0.4754
T8	10	T-Brackets	60.00 - 80.00	0.6000	0.4754
T8	14	T-Brackets	60.00 - 80.00	0.6000	0.4754
T8	16	HCS 6X12 4AWG(1-5/8)	60.00 - 80.00	0.6000	0.4754
T8	17	HB158-21U6S24-xxM_TMO(1-5/8)	60.00 - 80.00	0.6000	0.4754
T8	19	FXL 780 PE(7/8)	60.00 - 80.00	0.6000	0.4754
T8	20	LDF1-50A(1/4)	60.00 - 80.00	0.6000	0.4754
T8	21	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.4754
T8	23	Safety Line 3/8	60.00 - 80.00	0.6000	0.4754
T9	1	LDF6-50A(1-1/4)	40.00 - 60.00	0.6000	0.5541
T9	2	WR-VG86ST-BRDA(7/8)	40.00 - 60.00	0.6000	0.5541
T9	3	HB114-21U3M12-XXXF(1-1/4)	40.00 - 60.00	0.6000	0.5541
T9	4	FLC 12-50J(1/2")	40.00 - 60.00	0.6000	0.5541
T9	5	LDF7-50A(1-5/8)	40.00 - 60.00	0.6000	0.5541
T9	6	T-Brackets	40.00 - 60.00	0.6000	0.5541
T9	8	LDF6-50A(1-1/4)	40.00 - 60.00	0.6000	0.5541
T9	9	LDF4-50A(1/2)	40.00 - 60.00	0.6000	0.5541
T9	10	T-Brackets	40.00 - 60.00	0.6000	0.5541

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T9	14	T-Brackets	40.00 - 60.00	0.6000	0.5541
T9	16	HCS 6X12 4AWG(1-5/8)	40.00 - 60.00	0.6000	0.5541
T9	17	HB158-21U6S24-xxM_TMO(1-5/8)	40.00 - 60.00	0.6000	0.5541
T9	19	FXL 780 PE(7/8)	40.00 - 60.00	0.6000	0.5541
T9	20	LDF1-50A(1/4)	40.00 - 60.00	0.6000	0.5541
T9	21	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.5541
T9	23	Safety Line 3/8	40.00 - 60.00	0.6000	0.5541
T10	1	LDF6-50A(1-1/4)	20.00 - 40.00	0.6000	0.6000
T10	2	WR-VG86ST-BRDA(7/8)	20.00 - 40.00	0.6000	0.6000
T10	3	HB114-21U3M12-XXXF(1-1/4)	20.00 - 40.00	0.6000	0.6000
T10	4	FLC 12-50J(1/2")	20.00 - 40.00	0.6000	0.6000
T10	5	LDF7-50A(1-5/8)	20.00 - 40.00	0.6000	0.6000
T10	6	T-Brackets	20.00 - 40.00	0.6000	0.6000
T10	8	LDF6-50A(1-1/4)	20.00 - 40.00	0.6000	0.6000
T10	9	LDF4-50A(1/2)	20.00 - 40.00	0.6000	0.6000
T10	10	T-Brackets	20.00 - 40.00	0.6000	0.6000
T10	14	T-Brackets	20.00 - 40.00	0.6000	0.6000
T10	16	HCS 6X12 4AWG(1-5/8)	20.00 - 40.00	0.6000	0.6000
T10	17	HB158-21U6S24-xxM_TMO(1-5/8)	20.00 - 40.00	0.6000	0.6000
T10	19	FXL 780 PE(7/8)	20.00 - 40.00	0.6000	0.6000
T10	20	LDF1-50A(1/4)	20.00 - 40.00	0.6000	0.6000
T10	21	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T10	23	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T11	1	LDF6-50A(1-1/4)	0.00 - 20.00	0.6000	0.6000
T11	2	WR-VG86ST-BRDA(7/8)	0.00 - 20.00	0.6000	0.6000
T11	3	HB114-21U3M12-XXXF(1-1/4)	0.00 - 20.00	0.6000	0.6000
T11	4	FLC 12-50J(1/2")	0.00 - 20.00	0.6000	0.6000
T11	5	LDF7-50A(1-5/8)	0.00 - 20.00	0.6000	0.6000
T11	6	T-Brackets	0.00 - 20.00	0.6000	0.6000
T11	8	LDF6-50A(1-1/4)	0.00 - 20.00	0.6000	0.6000
T11	9	LDF4-50A(1/2)	0.00 - 20.00	0.6000	0.6000
T11	10	T-Brackets	0.00 - 20.00	0.6000	0.6000
T11	14	T-Brackets	0.00 - 20.00	0.6000	0.6000
T11	16	HCS 6X12 4AWG(1-5/8)	0.00 - 20.00	0.6000	0.6000
T11	17	HB158-21U6S24-xxM_TMO(1-5/8)	0.00 - 20.00	0.6000	0.6000
T11	19	FXL 780 PE(7/8)	0.00 - 20.00	0.6000	0.6000
T11	20	LDF1-50A(1/4)	0.00 - 20.00	0.6000	0.6000
T11	21	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T11	23	Safety Line 3/8	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.60 5.05 5.50 6.44	4.01 4.45 4.89 5.82	0.10 0.16 0.23 0.42
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.60 5.05 5.50 6.44	4.01 4.45 4.89 5.82	0.10 0.16 0.23 0.42
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.60 5.05 5.50 6.44	4.01 4.45 4.89 5.82	0.10 0.16 0.23 0.42
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.09 4.48 4.88 5.71	2.86 3.23 3.61 4.40	0.08 0.13 0.19 0.33
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.09 4.48 4.88 5.71	2.86 3.23 3.61 4.40	0.08 0.13 0.19 0.33
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.09 4.48 4.88 5.71	2.86 3.23 3.61 4.40	0.08 0.13 0.19 0.33
TD-RRH8X20-25	A	From Leg	4.00 0.00 1.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.30	0.07 0.10 0.13 0.20
TD-RRH8X20-25	B	From Leg	4.00 0.00 1.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.30	0.07 0.10 0.13 0.20
TD-RRH8X20-25	C	From Leg	4.00 0.00 1.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.30	0.07 0.10 0.13 0.20
6' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
6' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
6' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
Platform Mount [LP 405-1]	A	None		0.0000	136.00	No Ice 1/2" Ice 1" Ice 2" Ice	20.88 28.89 37.04 53.73	20.88 28.89 37.04 53.73	1.80 2.28 2.87 4.39
***									
1900MHZ RRH (65MHZ)	A	From Leg	1.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.32 2.53 2.74 3.19	2.24 2.44 2.65 3.09	0.06 0.08 0.11 0.17
1900MHZ RRH (65MHZ)	B	From Leg	1.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.32 2.53 2.74 3.19	2.24 2.44 2.65 3.09	0.06 0.08 0.11 0.17
1900MHZ RRH (65MHZ)	C	From Leg	1.00	0.0000	134.00	No Ice	2.32	2.24	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00				1/2" Ice	2.53	2.44	0.08
			0.00				1" Ice	2.74	2.65	0.11
							2" Ice	3.19	3.09	0.17
800MHZ 2X50W RRH W/FILTER	A	From Leg	1.00		0.0000	134.00	No Ice	2.06	1.93	0.06
			0.00				1/2" Ice	2.24	2.11	0.09
			0.00				1" Ice	2.43	2.29	0.11
							2" Ice	2.83	2.68	0.17
800MHZ 2X50W RRH W/FILTER	B	From Leg	1.00		0.0000	134.00	No Ice	2.06	1.93	0.06
			0.00				1/2" Ice	2.24	2.11	0.09
			0.00				1" Ice	2.43	2.29	0.11
							2" Ice	2.83	2.68	0.17
800MHZ 2X50W RRH W/FILTER	C	From Leg	1.00		0.0000	134.00	No Ice	2.06	1.93	0.06
			0.00				1/2" Ice	2.24	2.11	0.09
			0.00				1" Ice	2.43	2.29	0.11
							2" Ice	2.83	2.68	0.17
IBC1900BB-1	A	From Leg	1.00		0.0000	134.00	No Ice	0.97	0.46	0.02
			0.00				1/2" Ice	1.09	0.56	0.03
			2.00				1" Ice	1.22	0.66	0.04
							2" Ice	1.51	0.89	0.06
IBC1900BB-1	B	From Leg	1.00		0.0000	134.00	No Ice	0.97	0.46	0.02
			0.00				1/2" Ice	1.09	0.56	0.03
			2.00				1" Ice	1.22	0.66	0.04
							2" Ice	1.51	0.89	0.06
IBC1900BB-1	C	From Leg	1.00		0.0000	134.00	No Ice	0.97	0.46	0.02
			0.00				1/2" Ice	1.09	0.56	0.03
			2.00				1" Ice	1.22	0.66	0.04
							2" Ice	1.51	0.89	0.06
IBC1900HG-2A	A	From Leg	1.00		0.0000	134.00	No Ice	0.97	0.46	0.02
			0.00				1/2" Ice	1.09	0.56	0.03
			2.00				1" Ice	1.22	0.66	0.04
							2" Ice	1.51	0.89	0.06
IBC1900HG-2A	B	From Leg	1.00		0.0000	134.00	No Ice	0.97	0.46	0.02
			0.00				1/2" Ice	1.09	0.56	0.03
			2.00				1" Ice	1.22	0.66	0.04
							2" Ice	1.51	0.89	0.06
IBC1900HG-2A	C	From Leg	1.00		0.0000	134.00	No Ice	0.97	0.46	0.02
			0.00				1/2" Ice	1.09	0.56	0.03
			2.00				1" Ice	1.22	0.66	0.04
							2" Ice	1.51	0.89	0.06
Pipe Mount [PM 601-3]	A	None			0.0000	134.00	No Ice	3.17	3.17	0.20
							1/2" Ice	3.79	3.79	0.23
							1" Ice	4.42	4.42	0.28
							2" Ice	5.76	5.76	0.40
***										
(4) DB844H90E-XY w/ Mount Pipe	A	From Leg	4.00		0.0000	127.00	No Ice	2.24	3.34	0.04
			0.00				1/2" Ice	2.61	3.73	0.08
			0.00				1" Ice	2.99	4.13	0.12
							2" Ice	3.78	4.97	0.23
(4) DB844H90E-XY w/ Mount Pipe	B	From Leg	4.00		0.0000	127.00	No Ice	2.24	3.34	0.04
			0.00				1/2" Ice	2.61	3.73	0.08
			0.00				1" Ice	2.99	4.13	0.12
							2" Ice	3.78	4.97	0.23
(4) DB844H90E-XY w/ Mount Pipe	C	From Leg	4.00		0.0000	127.00	No Ice	2.24	3.34	0.04
			0.00				1/2" Ice	2.61	3.73	0.08
			0.00				1" Ice	2.99	4.13	0.12
							2" Ice	3.78	4.97	0.23
HSS 4"x4"x4'	A	From Face	0.50		0.0000	127.00	No Ice	2.09	0.00	0.04
			0.00				1/2" Ice	2.39	0.00	0.05
			1.00				1" Ice	2.70	0.00	0.07
							2" Ice	3.33	0.00	0.12
HSS 4"x4"x4'	A	From Face	0.50		0.0000	127.00	No Ice	2.09	0.00	0.04
			0.00				1/2" Ice	2.39	0.00	0.05
			-1.00				1" Ice	2.70	0.00	0.07
							2" Ice	3.33	0.00	0.12
HSS 4"x4"x4'	B	From	0.50		0.0000	127.00	No Ice	2.09	0.00	0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
		Face	0.00			1/2" Ice	2.39	0.00	0.05
			1.00			1" Ice	2.70	0.00	0.07
						2" Ice	3.33	0.00	0.12
HSS 4"x4"x4'	B	From Face	0.50	0.0000	127.00	No Ice	2.09	0.00	0.04
			0.00			1/2" Ice	2.39	0.00	0.05
			-1.00			1" Ice	2.70	0.00	0.07
						2" Ice	3.33	0.00	0.12
HSS 4"x4"x4'	C	From Face	0.50	0.0000	127.00	No Ice	2.09	0.00	0.04
			0.00			1/2" Ice	2.39	0.00	0.05
			1.00			1" Ice	2.70	0.00	0.07
						2" Ice	3.33	0.00	0.12
HSS 4"x4"x4'	C	From Face	0.50	0.0000	127.00	No Ice	2.09	0.00	0.04
			0.00			1/2" Ice	2.39	0.00	0.05
			-1.00			1" Ice	2.70	0.00	0.07
						2" Ice	3.33	0.00	0.12
Sector Mount [SM 411-3]	A	None		0.0000	127.00	No Ice	20.53	20.53	1.07
						1/2" Ice	28.62	28.62	1.46
						1" Ice	36.63	36.63	1.97
						2" Ice	52.73	52.73	3.37
***									
AIR6449 B41_T-MOBILE	A	From Leg	4.00	0.0000	117.00	No Ice	5.27	2.03	0.11
			0.00			1/2" Ice	5.70	2.36	0.15
			2.00			1" Ice	6.14	2.70	0.20
						2" Ice	7.06	3.43	0.30
AIR6449 B41_T-MOBILE	B	From Leg	4.00	0.0000	117.00	No Ice	5.27	2.03	0.11
			0.00			1/2" Ice	5.70	2.36	0.15
			2.00			1" Ice	6.14	2.70	0.20
						2" Ice	7.06	3.43	0.30
AIR6449 B41_T-MOBILE	C	From Leg	4.00	0.0000	117.00	No Ice	5.27	2.03	0.11
			0.00			1/2" Ice	5.70	2.36	0.15
			2.00			1" Ice	6.14	2.70	0.20
						2" Ice	7.06	3.43	0.30
APXVAALL24_43-U-NA20_TMO	A	From Leg	4.00	0.0000	117.00	No Ice	14.67	5.32	0.15
			0.00			1/2" Ice	15.43	5.99	0.26
			2.00			1" Ice	16.21	6.68	0.38
						2" Ice	17.81	8.08	0.65
APXVAALL24_43-U-NA20_TMO	B	From Leg	4.00	0.0000	117.00	No Ice	14.67	5.32	0.15
			0.00			1/2" Ice	15.43	5.99	0.26
			2.00			1" Ice	16.21	6.68	0.38
						2" Ice	17.81	8.08	0.65
APXVAALL24_43-U-NA20_TMO	C	From Leg	4.00	0.0000	117.00	No Ice	14.67	5.32	0.15
			0.00			1/2" Ice	15.43	5.99	0.26
			2.00			1" Ice	16.21	6.68	0.38
						2" Ice	17.81	8.08	0.65
RADIO 4449 B71 B85A_T-MOBILE	A	From Leg	4.00	0.0000	117.00	No Ice	1.97	1.59	0.07
			0.00			1/2" Ice	2.15	1.75	0.09
			2.00			1" Ice	2.33	1.92	0.12
						2" Ice	2.72	2.28	0.17
RADIO 4449 B71 B85A_T-MOBILE	B	From Leg	4.00	0.0000	117.00	No Ice	1.97	1.59	0.07
			0.00			1/2" Ice	2.15	1.75	0.09
			2.00			1" Ice	2.33	1.92	0.12
						2" Ice	2.72	2.28	0.17
RADIO 4449 B71 B85A_T-MOBILE	C	From Leg	4.00	0.0000	117.00	No Ice	1.97	1.59	0.07
			0.00			1/2" Ice	2.15	1.75	0.09
			2.00			1" Ice	2.33	1.92	0.12
						2" Ice	2.72	2.28	0.17
RADIO 4460 B2/B25 B66_TMO	A	From Leg	4.00	0.0000	117.00	No Ice	2.14	1.69	0.11
			0.00			1/2" Ice	2.32	1.85	0.13
			2.00			1" Ice	2.51	2.02	0.16
						2" Ice	2.91	2.39	0.22
RADIO 4460 B2/B25 B66_TMO	B	From Leg	4.00	0.0000	117.00	No Ice	2.14	1.69	0.11
			0.00			1/2" Ice	2.32	1.85	0.13
			2.00			1" Ice	2.51	2.02	0.16
						2" Ice	2.91	2.39	0.22
RADIO 4460 B2/B25 B66_TMO	C	From Leg	4.00	0.0000	117.00	No Ice	2.14	1.69	0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00				1/2" Ice	2.32	1.85	0.13
			2.00				1" Ice	2.51	2.02	0.16
							2" Ice	2.91	2.39	0.22
(3) 8' Antenna Pipe [#P2STD]	A	From Leg	4.00	0.0000		117.00	No Ice	1.90	1.90	0.03
			0.00				1/2" Ice	2.73	2.73	0.04
			0.00				1" Ice	3.40	3.40	0.06
							2" Ice	4.40	4.40	0.12
(3) 8' Antenna Pipe [#P2STD]	B	From Leg	4.00	0.0000		117.00	No Ice	1.90	1.90	0.03
			0.00				1/2" Ice	2.73	2.73	0.04
			0.00				1" Ice	3.40	3.40	0.06
							2" Ice	4.40	4.40	0.12
(3) 8' Antenna Pipe [#P2STD]	C	From Leg	4.00	0.0000		117.00	No Ice	1.90	1.90	0.03
			0.00				1/2" Ice	2.73	2.73	0.04
			0.00				1" Ice	3.40	3.40	0.06
							2" Ice	4.40	4.40	0.12
12' HD V-Frame [#VFA12-HD]	A	From Leg	2.00	0.0000		117.00	No Ice	13.20	9.20	0.66
			0.00				1/2" Ice	19.50	14.60	0.80
			0.00				1" Ice	25.80	19.50	1.01
							2" Ice	38.40	29.30	1.44
12' HD V-Frame [#VFA12-HD]	B	From Leg	2.00	0.0000		117.00	No Ice	13.20	9.20	0.66
			0.00				1/2" Ice	19.50	14.60	0.80
			0.00				1" Ice	25.80	19.50	1.01
							2" Ice	38.40	29.30	1.44
12' HD V-Frame [#VFA12-HD]	C	From Leg	2.00	0.0000		117.00	No Ice	13.20	9.20	0.66
			0.00				1/2" Ice	19.50	14.60	0.80
			0.00				1" Ice	25.80	19.50	1.01
							2" Ice	38.40	29.30	1.44
***										
BXA-80063/4CF w/ Mount Pipe	A	From Leg	4.00	0.0000		107.00	No Ice	4.83	3.65	0.03
			0.00				1/2" Ice	5.35	4.14	0.06
			0.00				1" Ice	5.88	4.64	0.11
							2" Ice	6.98	5.70	0.22
BXA-80063/4CF w/ Mount Pipe	B	From Leg	4.00	0.0000		107.00	No Ice	4.83	3.65	0.03
			0.00				1/2" Ice	5.35	4.14	0.06
			0.00				1" Ice	5.88	4.64	0.11
							2" Ice	6.98	5.70	0.22
BXA-80063/4CF w/ Mount Pipe	C	From Leg	4.00	0.0000		107.00	No Ice	4.83	3.65	0.03
			0.00				1/2" Ice	5.35	4.14	0.06
			0.00				1" Ice	5.88	4.64	0.11
							2" Ice	6.98	5.70	0.22
RC2DC-3315-PF-48	A	From Leg	4.00	0.0000		107.00	No Ice	3.79	2.51	0.03
			0.00				1/2" Ice	4.04	2.72	0.06
			0.00				1" Ice	4.30	2.94	0.10
							2" Ice	4.84	3.41	0.18
Sector Mount [SM 402-3]	A	None		0.0000		107.00	No Ice	18.87	18.87	0.85
							1/2" Ice	26.47	26.47	1.21
							1" Ice	33.99	33.99	1.70
							2" Ice	48.84	48.84	3.04
*										
(2) MX06FRO660-03 w/ Mount Pipe	A	From Leg	4.00	0.0000		107.00	No Ice	6.54	5.55	0.10
			0.00				1/2" Ice	7.06	6.05	0.18
			0.00				1" Ice	7.60	6.57	0.28
							2" Ice	8.70	7.65	0.50
(2) MX06FRO660-03 w/ Mount Pipe	B	From Leg	4.00	0.0000		107.00	No Ice	6.54	5.55	0.10
			0.00				1/2" Ice	7.06	6.05	0.18
			0.00				1" Ice	7.60	6.57	0.28
							2" Ice	8.70	7.65	0.50
(2) MX06FRO660-03 w/ Mount Pipe	C	From Leg	4.00	0.0000		107.00	No Ice	6.54	5.55	0.10
			0.00				1/2" Ice	7.06	6.05	0.18
			0.00				1" Ice	7.60	6.57	0.28
							2" Ice	8.70	7.65	0.50
Sub6 Antenna - VZS01 w/ Mount Pipe	A	From Leg	4.00	0.0000		107.00	No Ice	4.92	2.69	0.10
			0.00				1/2" Ice	5.26	3.15	0.14
			0.00				1" Ice	5.62	3.63	0.19
							2" Ice	6.37	4.64	0.29

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Sub6 Antenna - VZS01 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.92 5.26 5.62 6.37	2.69 3.15 3.63 4.64	0.10 0.14 0.19 0.29
Sub6 Antenna - VZS01 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.92 5.26 5.62 6.37	2.69 3.15 3.63 4.64	0.10 0.14 0.19 0.29
RFV01U-D1A	A	From Leg	4.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.25 1.39 1.54 1.86	0.08 0.10 0.12 0.18
RFV01U-D1A	B	From Leg	4.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.25 1.39 1.54 1.86	0.08 0.10 0.12 0.18
RFV01U-D1A	C	From Leg	4.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.25 1.39 1.54 1.86	0.08 0.10 0.12 0.18
RFV01U-D2A	A	From Leg	4.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.01 1.14 1.28 1.59	0.07 0.09 0.11 0.15
RFV01U-D2A	B	From Leg	4.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.01 1.14 1.28 1.59	0.07 0.09 0.11 0.15
RFV01U-D2A	C	From Leg	4.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.01 1.14 1.28 1.59	0.07 0.09 0.11 0.15
(4) Crossover Plate [#VZWSMART-MSK1]	A	From Leg	4.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.05 0.07 0.09 0.12	0.05 0.07 0.09 0.12	0.01 0.02 0.02 0.03
(4) Crossover Plate [#VZWSMART-MSK1]	B	From Leg	4.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.05 0.07 0.09 0.12	0.05 0.07 0.09 0.12	0.01 0.02 0.02 0.03
(4) Crossover Plate [#VZWSMART-MSK1]	C	From Leg	4.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.05 0.07 0.09 0.12	0.05 0.07 0.09 0.12	0.01 0.02 0.02 0.03
Tieback Assembly [#VZWSMART-SFK1]	A	From Leg	2.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.38 3.41 4.45 5.91	1.19 1.71 2.22 3.25	0.08 0.11 0.13 0.19
Tieback Assembly [#VZWSMART-SFK1]	B	From Leg	2.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.38 3.41 4.45 5.91	1.19 1.71 2.22 3.25	0.08 0.11 0.13 0.19
Tieback Assembly [#VZWSMART-SFK1]	C	From Leg	2.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.38 3.41 4.45 5.91	1.19 1.71 2.22 3.25	0.08 0.11 0.13 0.19
V-Bracing Kit [#VZWSMART-SFK3]	A	From Leg	2.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.24 4.78 5.44 6.76	3.96 4.46 5.06 6.26	0.13 0.18 0.22 0.31
V-Bracing Kit [#VZWSMART-SFK3]	B	From Leg	2.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.24 4.78 5.44 6.76	3.96 4.46 5.06 6.26	0.13 0.18 0.22 0.31

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
V-Bracing Kit [#VZWSMART-SFK3]	C	From Leg	2.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.24 4.78 5.44 6.76	3.96 4.46 5.06 6.26	0.13 0.18 0.22 0.31
***									
DMP65R-BU8D w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	15.89 16.81 17.76 19.70	7.89 8.74 9.60 11.37	0.14 0.25 0.38 0.68
DMP65R-BU4D w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	7.53 8.04 8.57 9.68	3.79 4.23 4.68 5.63	0.09 0.16 0.22 0.39
DMP65R-BU6D w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.96 12.70 13.46 15.02	5.97 6.63 7.30 8.69	0.11 0.20 0.30 0.53
OPA65R-BU8D w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	17.46 18.46 19.48 21.58	8.58 9.49 10.42 12.33	0.11 0.22 0.35 0.66
OPA65R-BU4D w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.10 8.65 9.21 10.39	4.03 4.50 4.98 5.98	0.08 0.14 0.21 0.38
OPA65R-BU6D w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	12.25 13.00 13.76 15.34	6.05 6.71 7.39 8.79	0.09 0.18 0.27 0.51
7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.10 0.16 0.29
7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.10 0.16 0.29
7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.10 0.16 0.29
RRUS 4449 B5/B12	A	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 4449 B5/B12	B	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 4449 B5/B12	C	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 4478 B14_CCIV2	A	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.02 2.20 2.39 2.78	1.25 1.40 1.55 1.89	0.06 0.08 0.10 0.15
RRUS 4478 B14_CCIV2	B	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.02 2.20 2.39 2.78	1.25 1.40 1.55 1.89	0.06 0.08 0.10 0.15
RRUS 4478 B14_CCIV2	C	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.02 2.20 2.39 2.78	1.25 1.40 1.55 1.89	0.06 0.08 0.10 0.15

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RRUS 8843 B2/B66A_CCIV2	A	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.98 2.16 2.34 2.73	1.70 1.86 2.04 2.41	0.07 0.10 0.12 0.18
RRUS 8843 B2/B66A_CCIV2	B	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.98 2.16 2.34 2.73	1.70 1.86 2.04 2.41	0.07 0.10 0.12 0.18
RRUS 8843 B2/B66A_CCIV2	C	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.98 2.16 2.34 2.73	1.70 1.86 2.04 2.41	0.07 0.10 0.12 0.18
(2) LGP21401	A	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.21 0.27 0.35 0.52	0.01 0.02 0.03 0.05
(2) LGP21401	B	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.21 0.27 0.35 0.52	0.01 0.02 0.03 0.05
(2) LGP21401	C	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.21 0.27 0.35 0.52	0.01 0.02 0.03 0.05
DC9-48-60-24-8C-EV	A	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.74 2.96 3.20 3.68	4.78 5.06 5.35 5.95	0.03 0.06 0.10 0.20
DC6-48-60-18-8F	B	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.92 1.46 1.64 2.04	0.92 1.46 1.64 2.04	0.02 0.04 0.06 0.11
8' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
8' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
8' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
Sector Mount [SM 504-3]	A	None		0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	31.05 43.83 56.44 81.28	31.05 43.83 56.44 81.28	1.71 2.33 3.14 5.36
***									
800 10504 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.69 3.12 3.56 4.49	2.26 2.68 3.12 4.03	0.04 0.07 0.11 0.21
800 10504 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.69 3.12 3.56 4.49	2.26 2.68 3.12 4.03	0.04 0.07 0.11 0.21
800 10504 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.69 3.12 3.56 4.49	2.26 2.68 3.12 4.03	0.04 0.07 0.11 0.21
6' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
6' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
6' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
Sector Mount [SM 104-3]	A	None		0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	30.21 38.12 46.01 62.03	30.21 38.12 46.01 62.03	0.95 1.43 2.03 3.58
***									
GPS_A	C	From Leg	3.00 0.00 1.00	0.0000	80.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.26 0.32 0.39 0.56	0.26 0.32 0.39 0.56	0.00 0.00 0.01 0.02
Side Arm Mount [SO 701-1]	C	From Leg	1.50 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.85 1.14 1.43 2.01	1.67 2.34 3.01 4.35	0.07 0.08 0.09 0.12
***									
GPS_A	B	From Leg	3.00 0.00 0.00	0.0000	72.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.26 0.32 0.39 0.56	0.26 0.32 0.39 0.56	0.00 0.00 0.01 0.02
GPS_A	C	From Leg	3.00 0.00 0.00	0.0000	72.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.26 0.32 0.39 0.56	0.26 0.32 0.39 0.56	0.00 0.00 0.01 0.02
Side Arm Mount [SO 701-1]	B	From Leg	1.50 0.00 0.00	0.0000	72.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.85 1.14 1.43 2.01	1.67 2.34 3.01 4.35	0.07 0.08 0.09 0.12
Side Arm Mount [SO 701-1]	C	From Leg	1.50 0.00 0.00	0.0000	72.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.85 1.14 1.43 2.01	1.67 2.34 3.01 4.35	0.07 0.08 0.09 0.12
***									

Truss-Leg Properties

Section Designation	Area in^2	Area Ice in^2	Self Weight K	Ice Weight K	Equiv. Diameter in	Equiv. Diameter Ice in	Leg Area in^2
PiRod 105244 w/ (2) 1-1/4" Tie Rod	1076.4663	2615.0684	0.73	0.50	7.4755	18.1602	6.1379
Pirod 105217	2296.2363	5959.0264	0.59	0.67	7.9730	20.6911	5.3014
Pirod 105218	2425.3141	5998.6741	0.72	0.65	8.4212	20.8287	7.2158
Pirod 105218	2425.3141	5951.5920	0.72	0.60	8.4212	20.6652	7.2158
Pirod 105219	2597.9095	5930.1266	1.09	0.56	9.0205	20.5907	9.4248

Load Combinations

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	136 - 133.625	Leg	Max Tension	1	0.00	0.000	0.000
			Max. Compression	31	-2.83	-0.031	-0.017
			Max. Mx	8	-1.66	-0.153	-0.002
			Max. My	2	-1.67	0.004	0.157
			Max. Vy	8	0.23	-0.153	-0.002
			Max. Vx	3	-0.24	0.002	0.152
		Diagonal	Max Tension	9	0.93	0.000	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	8	-1.00	0.000	0.000
			Max. Mx	26	-0.08	0.005	0.000
			Max. Vy	26	0.01	0.000	0.000
		Top Girt	Max Tension	7	0.72	0.000	0.000
			Max. Compression	18	-0.72	-0.051	0.000
			Max. Mx	33	-0.08	-0.077	0.000
			Max. My	3	0.36	0.011	-0.000
			Max. Vy	33	0.06	-0.077	0.000
			Max. Vx	10	-0.00	0.000	0.000
T2	133.625 - 130	Leg	Max Tension	15	3.22	0.008	0.477
			Max. Compression	10	-5.87	-0.458	-0.264
			Max. Mx	8	-5.26	-0.514	-0.014
			Max. My	2	-5.80	0.010	0.531
			Max. Vy	8	0.99	-0.514	-0.014
			Max. Vx	2	-1.02	0.010	0.531
		Diagonal	Max Tension	25	1.37	0.000	0.000
			Max. Compression	24	-1.48	0.000	0.000
			Max. Mx	33	0.16	-0.004	-0.000
			Max. My	20	1.34	-0.001	-0.000
			Max. Vy	33	0.01	-0.004	-0.000
			Max. Vx	20	0.00	-0.001	-0.000
		Horizontal	Max Tension	2	0.34	0.000	0.000
			Max. Compression	15	-0.21	0.000	0.000
			Max. Mx	26	0.15	0.012	0.000
			Max. Vy	26	0.01	0.000	0.000
		Bottom Girt	Max Tension	14	0.71	0.000	0.000
			Max. Compression	3	-0.63	0.000	0.000
			Max. Mx	26	0.12	0.014	0.000
			Max. Vy	26	0.01	0.000	0.000
T3	130 - 110	Leg	Max Tension	23	33.32	1.701	0.050
			Max. Compression	10	-41.54	-0.240	-0.007
			Max. Mx	10	-41.53	-1.707	-0.050
			Max. My	20	-4.33	-0.001	1.510
			Max. Vy	10	-2.94	-0.240	-0.007
			Max. Vx	20	2.56	0.001	0.230
		Diagonal	Max Tension	25	4.08	0.000	0.000
			Max. Compression	24	-4.24	0.000	0.000
			Max. Mx	32	0.84	-0.005	0.000
			Max. My	24	-4.22	-0.001	0.000
			Max. Vy	32	0.01	-0.005	0.000
			Max. Vx	24	-0.00	0.000	0.000
		Horizontal	Max Tension	22	0.59	0.000	0.000
			Max. Compression	11	-0.41	0.000	0.000
			Max. Mx	26	0.28	0.014	0.000
			Max. Vy	26	-0.01	0.000	0.000
		Top Girt	Max Tension	2	0.64	0.000	0.000
			Max. Compression	15	-0.61	0.000	0.000
			Max. Mx	26	0.03	0.013	0.000
			Max. Vy	26	-0.01	0.000	0.000
		Bottom Girt	Max Tension	22	1.89	0.000	0.000
			Max. Compression	11	-1.76	0.000	0.000
			Max. Mx	26	0.17	0.017	0.000
			Max. Vy	26	-0.02	0.000	0.000
T4	110 - 94.9427	Leg	Max Tension	23	69.29	-0.200	-0.013
			Max. Compression	10	-82.44	0.012	0.012
			Max. Mx	10	-45.07	2.578	0.077
			Max. My	20	-4.48	0.006	-2.229
			Max. Vy	10	-2.94	2.578	0.077
			Max. Vx	20	2.57	0.006	-2.229
		Diagonal	Max Tension	13	5.68	0.000	0.000
			Max. Compression	24	-5.71	0.000	0.000
			Max. Mx	27	1.08	-0.008	-0.000
			Max. My	12	-4.73	-0.001	-0.001
			Max. Vy	27	0.01	-0.008	-0.000
			Max. Vx	12	0.00	-0.001	-0.001
		Top Girt	Max Tension	10	1.79	0.000	0.000
			Max. Compression	23	-1.75	0.000	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	26	0.05	0.019	0.000
			Max. Vy	26	-0.02	0.000	0.000
T5	94.9427 - 92.5938	Leg	Max Tension	23	76.69	-0.033	-0.013
			Max. Compression	10	-91.06	-0.243	-0.001
			Max. Mx	10	-91.02	0.309	-0.001
			Max. My	8	-8.11	-0.012	0.238
			Max. Vy	10	0.47	0.309	-0.002
			Max. Vx	8	0.25	-0.012	0.238
		Diagonal	Max Tension	25	5.94	-0.004	0.000
			Max. Compression	12	-6.04	0.000	0.000
			Max. Mx	27	1.11	-0.008	-0.000
			Max. My	24	2.43	-0.007	0.001
			Max. Vy	27	0.01	-0.008	-0.000
			Max. Vx	24	-0.00	0.000	0.000
		Secondary Horizontal	Max Tension	6	0.60	0.000	0.000
			Max. Compression	19	-0.49	-0.001	-0.001
			Max. Mx	36	0.23	-0.010	-0.000
			Max. My	4	-0.47	-0.004	-0.001
			Max. Vy	36	-0.02	-0.010	-0.000
			Max. Vx	16	0.00	-0.004	-0.001
T6	92.5938 - 90	Leg	Max Tension	23	88.77	1.190	0.057
			Max. Compression	10	-103.76	3.168	0.144
			Max. Mx	10	-103.76	3.168	0.144
			Max. My	8	-8.46	0.050	1.417
			Max. Vy	18	-7.46	3.165	-0.022
			Max. Vx	8	-3.30	0.050	1.417
		Diagonal	Max Tension	13	6.87	-0.004	-0.000
			Max. Compression	24	-7.03	0.000	0.000
			Max. Mx	27	0.95	-0.008	-0.000
			Max. My	10	-0.07	-0.004	-0.001
			Max. Vy	27	0.01	-0.008	-0.000
			Max. Vx	10	-0.00	0.000	0.000
		Secondary Horizontal	Max Tension	10	1.46	-0.006	0.000
			Max. Compression	23	-1.37	0.000	0.000
			Max. Mx	31	-0.13	-0.012	-0.001
			Max. My	24	-1.34	-0.008	-0.001
			Max. Vy	31	0.02	-0.012	-0.001
			Max. Vx	24	-0.00	0.000	0.000
		Bottom Girt	Max Tension	22	0.83	0.000	0.000
			Max. Compression	11	-0.77	0.000	0.000
			Max. Mx	26	0.07	0.023	0.000
			Max. Vy	26	-0.02	0.000	0.000
T7	90 - 80	Leg	Max Tension	23	96.36	-3.090	-0.145
			Max. Compression	10	-111.72	3.411	0.000
			Max. Mx	22	93.53	-4.089	-0.013
			Max. My	12	-8.85	-0.347	-6.825
			Max. Vy	22	0.34	-4.089	-0.013
			Max. Vx	4	0.83	-0.355	-6.786
		Diagonal	Max Tension	23	7.58	0.107	-0.031
			Max. Compression	10	-8.25	0.000	0.000
			Max. Mx	10	-6.81	-0.109	-0.019
			Max. My	12	-7.14	-0.079	0.036
			Max. Vy	28	-0.03	0.048	-0.000
			Max. Vx	12	-0.01	0.000	0.000
T8	80 - 60	Leg	Max Tension	23	134.31	-5.926	-0.042
			Max. Compression	10	-154.00	5.837	0.077
			Max. Mx	10	-153.58	6.104	0.049
			Max. My	12	-10.21	-0.347	-6.825
			Max. Vy	2	-0.39	6.010	-0.005
			Max. Vx	4	-0.27	-0.355	-6.786
		Diagonal	Max Tension	24	6.86	0.064	0.002
			Max. Compression	25	-6.67	0.000	0.000
			Max. Mx	10	5.52	0.088	0.007
			Max. My	4	5.69	0.064	-0.009
			Max. Vy	31	-0.03	0.061	-0.007
			Max. Vx	28	0.00	0.000	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T9	60 - 40	Leg	Max Tension	7	165.56	-5.558	-0.011
			Max. Compression	10	-188.77	5.504	0.030
			Max. Mx	22	147.93	-5.858	-0.072
			Max. My	8	-11.53	-0.029	5.641
			Max. Vy	22	-0.14	-5.858	-0.072
			Max. Vx	16	0.22	-0.020	5.637
		Diagonal	Max Tension	20	6.22	0.000	0.000
			Max. Compression	20	-6.22	0.000	0.000
			Max. Mx	10	4.92	0.104	0.008
			Max. My	16	5.45	0.088	0.010
			Max. Vy	29	0.04	0.069	-0.010
			Max. Vx	34	-0.00	0.000	0.000
T10	40 - 20	Leg	Max Tension	7	192.83	-4.904	0.010
			Max. Compression	18	-219.27	6.850	0.163
			Max. Mx	18	-219.27	6.850	0.163
			Max. My	8	-13.66	-0.208	5.963
			Max. Vy	37	0.41	-3.873	-0.015
			Max. Vx	16	0.29	-0.195	5.835
		Diagonal	Max Tension	20	6.12	0.000	0.000
			Max. Compression	18	-6.34	0.000	0.000
			Max. Mx	10	4.79	0.096	0.006
			Max. My	28	1.65	0.088	-0.012
			Max. Vy	29	0.05	0.080	0.011
			Max. Vx	28	0.00	0.000	0.000
T11	20 - 0	Leg	Max Tension	7	216.76	-5.142	0.007
			Max. Compression	18	-247.63	0.000	0.000
			Max. Mx	18	-234.59	6.850	0.163
			Max. My	8	-15.94	-0.486	9.052
			Max. Vy	37	-0.72	-3.873	-0.015
			Max. Vx	16	1.03	-0.474	8.825
		Diagonal	Max Tension	7	7.83	0.000	0.000
			Max. Compression	18	-8.54	0.000	0.000
			Max. Mx	18	4.03	0.136	0.021
			Max. My	16	5.69	0.115	0.023
			Max. Vy	29	0.06	0.126	-0.014
			Max. Vx	28	0.00	0.000	0.000

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	256.84	22.13	-12.16
	Max. H_x	18	256.84	22.13	-12.16
	Max. H_z	7	-224.27	-19.55	10.69
	Min. Vert	7	-224.27	-19.55	10.69
	Min. H_x	7	-224.27	-19.55	10.69
	Min. H_z	18	256.84	22.13	-12.16
Leg B	Max. Vert	10	255.64	-21.44	-12.69
	Max. H_x	23	-222.25	18.86	11.20
	Max. H_z	23	-222.25	18.86	11.20
	Min. Vert	23	-222.25	18.86	11.20
	Min. H_x	10	255.64	-21.44	-12.69
	Min. H_z	10	255.64	-21.44	-12.69
Leg A	Max. Vert	2	248.17	0.32	24.06
	Max. H_x	4	218.70	0.55	21.20
	Max. H_z	2	248.17	0.32	24.06
	Min. Vert	15	-215.91	-0.31	-21.10
	Min. H_x	17	-189.26	-0.54	-18.69
	Min. H_z	15	-215.91	-0.31	-21.10

Tower Mast Reaction Summary

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	42.73	0.00	0.00	2.764	-2.730	0.000
1.2 Dead+1.0 Wind 0 deg - No Ice	51.27	0.04	-34.29	-2801.719	-7.017	7.574
0.9 Dead+1.0 Wind 0 deg - No Ice	38.46	0.04	-34.29	-2802.548	-6.198	7.574
1.2 Dead+1.0 Wind 30 deg - No Ice	51.27	17.24	-29.98	-2444.319	-1409.670	16.425
0.9 Dead+1.0 Wind 30 deg - No Ice	38.46	17.24	-29.98	-2445.148	-1408.851	16.425
1.2 Dead+1.0 Wind 60 deg - No Ice	51.27	30.70	-17.84	-1441.832	-2487.177	12.724
0.9 Dead+1.0 Wind 60 deg - No Ice	38.46	30.70	-17.84	-1442.662	-2486.358	12.724
1.2 Dead+1.0 Wind 90 deg - No Ice	51.27	36.12	-0.04	-0.424	-2911.235	0.357
0.9 Dead+1.0 Wind 90 deg - No Ice	38.46	36.12	-0.04	-1.253	-2910.416	0.357
1.2 Dead+1.0 Wind 120 deg - No Ice	51.27	30.85	17.89	1452.226	-2501.170	-6.597
0.9 Dead+1.0 Wind 120 deg - No Ice	38.46	30.85	17.89	1451.397	-2500.351	-6.597
1.2 Dead+1.0 Wind 150 deg - No Ice	51.27	16.81	29.31	2424.296	-1389.960	-4.317
0.9 Dead+1.0 Wind 150 deg - No Ice	38.46	16.81	29.31	2423.467	-1389.141	-4.317
1.2 Dead+1.0 Wind 180 deg - No Ice	51.27	-0.04	33.54	2774.034	0.465	-7.574
0.9 Dead+1.0 Wind 180 deg - No Ice	38.46	-0.04	33.54	2773.204	1.284	-7.574
1.2 Dead+1.0 Wind 210 deg - No Ice	51.27	-17.24	29.98	2450.953	1403.118	-16.425
0.9 Dead+1.0 Wind 210 deg - No Ice	38.46	-17.24	29.98	2450.124	1403.937	-16.425
1.2 Dead+1.0 Wind 240 deg - No Ice	51.27	-31.35	18.22	1465.626	2510.346	-12.724
0.9 Dead+1.0 Wind 240 deg - No Ice	38.46	-31.35	18.22	1464.797	2511.165	-12.724
1.2 Dead+1.0 Wind 270 deg - No Ice	51.27	-36.12	0.04	7.058	2904.682	-0.357
0.9 Dead+1.0 Wind 270 deg - No Ice	38.46	-36.12	0.04	6.229	2905.501	-0.357
1.2 Dead+1.0 Wind 300 deg - No Ice	51.27	-30.20	-17.51	-1428.432	2464.896	6.597
0.9 Dead+1.0 Wind 300 deg - No Ice	38.46	-30.20	-17.51	-1429.261	2465.715	6.597
1.2 Dead+1.0 Wind 330 deg - No Ice	51.27	-16.81	-29.31	-2417.662	1383.407	4.317
0.9 Dead+1.0 Wind 330 deg - No Ice	38.46	-16.81	-29.31	-2418.491	1384.226	4.317
1.2 Dead+1.0 Ice+1.0 Temp	112.82	0.00	0.00	6.446	-20.553	0.000
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	112.82	0.00	-8.13	-659.898	-20.923	1.121
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	112.82	4.10	-7.13	-574.691	-354.832	2.608
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	112.82	7.25	-4.20	-333.486	-606.444	2.376
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	112.82	8.42	-0.00	6.076	-700.058	0.433
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	112.82	7.21	4.18	345.176	-605.103	-0.605
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	112.82	4.04	7.02	583.131	-351.834	-0.408
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	112.82	-0.00	8.05	669.198	-20.183	-1.121
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	112.82	-4.10	7.13	587.583	313.727	-2.608

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	112.82	-7.31	4.24	348.174	568.450	-2.376
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	112.82	-8.42	0.00	6.816	658.952	-0.433
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	112.82	-7.14	-4.14	-330.489	560.887	0.605
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	112.82	-4.04	-7.02	-570.239	310.729	0.408
Dead+Wind 0 deg - Service	42.73	0.01	-7.13	-580.568	-3.508	1.580
Dead+Wind 30 deg - Service	42.73	3.58	-6.23	-506.243	-295.203	3.422
Dead+Wind 60 deg - Service	42.73	6.38	-3.71	-297.766	-519.278	2.651
Dead+Wind 90 deg - Service	42.73	7.51	-0.01	1.986	-607.463	0.077
Dead+Wind 120 deg - Service	42.73	6.42	3.72	304.077	-522.188	-1.372
Dead+Wind 150 deg - Service	42.73	3.50	6.10	506.229	-291.104	-0.901
Dead+Wind 180 deg - Service	42.73	-0.01	6.98	578.961	-1.952	-1.580
Dead+Wind 210 deg - Service	42.73	-3.58	6.23	511.772	289.742	-3.422
Dead+Wind 240 deg - Service	42.73	-6.52	3.79	306.863	519.997	-2.651
Dead+Wind 270 deg - Service	42.73	-7.51	0.01	3.542	602.003	-0.077
Dead+Wind 300 deg - Service	42.73	-6.28	-3.64	-294.980	510.547	1.372
Dead+Wind 330 deg - Service	42.73	-3.50	-6.10	-500.700	285.644	0.901

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-42.73	0.00	0.00	42.73	0.00	0.000%
2	0.04	-51.27	-34.29	-0.04	51.27	34.29	0.000%
3	0.04	-38.46	-34.29	-0.04	38.46	34.29	0.000%
4	17.24	-51.27	-29.98	-17.24	51.27	29.98	0.000%
5	17.24	-38.46	-29.98	-17.24	38.46	29.98	0.000%
6	30.70	-51.27	-17.84	-30.70	51.27	17.84	0.000%
7	30.70	-38.46	-17.84	-30.70	38.46	17.84	0.000%
8	36.12	-51.27	-0.04	-36.12	51.27	0.04	0.000%
9	36.12	-38.46	-0.04	-36.12	38.46	0.04	0.000%
10	30.85	-51.27	17.89	-30.85	51.27	-17.89	0.000%
11	30.85	-38.46	17.89	-30.85	38.46	-17.89	0.000%
12	16.81	-51.27	29.31	-16.81	51.27	-29.31	0.000%
13	16.81	-38.46	29.31	-16.81	38.46	-29.31	0.000%
14	-0.04	-51.27	33.54	0.04	51.27	-33.54	0.000%
15	-0.04	-38.46	33.54	0.04	38.46	-33.54	0.000%
16	-17.24	-51.27	29.98	17.24	51.27	-29.98	0.000%
17	-17.24	-38.46	29.98	17.24	38.46	-29.98	0.000%
18	-31.35	-51.27	18.22	31.35	51.27	-18.22	0.000%
19	-31.35	-38.46	18.22	31.35	38.46	-18.22	0.000%
20	-36.12	-51.27	0.04	36.12	51.27	-0.04	0.000%
21	-36.12	-38.46	0.04	36.12	38.46	-0.04	0.000%
22	-30.20	-51.27	-17.51	30.20	51.27	17.51	0.000%
23	-30.20	-38.46	-17.51	30.20	38.46	17.51	0.000%
24	-16.81	-51.27	-29.31	16.81	51.27	29.31	0.000%
25	-16.81	-38.46	-29.31	16.81	38.46	29.31	0.000%
26	0.00	-112.82	0.00	-0.00	112.82	0.00	0.000%
27	0.00	-112.82	-8.13	-0.00	112.82	8.13	0.000%
28	4.10	-112.82	-7.13	-4.10	112.82	7.13	0.000%
29	7.25	-112.82	-4.20	-7.25	112.82	4.20	0.000%
30	8.42	-112.82	-0.00	-8.42	112.82	0.00	0.000%
31	7.21	-112.82	4.18	-7.21	112.82	-4.18	0.000%
32	4.04	-112.82	7.02	-4.04	112.82	-7.02	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
33	-0.00	-112.82	8.05	0.00	112.82	-8.05	0.000%
34	-4.10	-112.82	7.13	4.10	112.82	-7.13	0.000%
35	-7.31	-112.82	4.24	7.31	112.82	-4.24	0.000%
36	-8.42	-112.82	0.00	8.42	112.82	-0.00	0.000%
37	-7.14	-112.82	-4.14	7.14	112.82	4.14	0.000%
38	-4.04	-112.82	-7.02	4.04	112.82	7.02	0.000%
39	0.01	-42.73	-7.13	-0.01	42.73	7.13	0.000%
40	3.58	-42.73	-6.23	-3.58	42.73	6.23	0.000%
41	6.38	-42.73	-3.71	-6.38	42.73	3.71	0.000%
42	7.51	-42.73	-0.01	-7.51	42.73	0.01	0.000%
43	6.42	-42.73	3.72	-6.42	42.73	-3.72	0.000%
44	3.50	-42.73	6.10	-3.50	42.73	-6.10	0.000%
45	-0.01	-42.73	6.98	0.01	42.73	-6.98	0.000%
46	-3.58	-42.73	6.23	3.58	42.73	-6.23	0.000%
47	-6.52	-42.73	3.79	6.52	42.73	-3.79	0.000%
48	-7.51	-42.73	0.01	7.51	42.73	-0.01	0.000%
49	-6.28	-42.73	-3.64	6.28	42.73	3.64	0.000%
50	-3.50	-42.73	-6.10	3.50	42.73	6.10	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	136 - 133.625	3.661	43	0.2349	0.0210
T2	133.625 - 130	3.543	43	0.2348	0.0210
T3	130 - 110	3.342	43	0.2335	0.0212
T4	110 - 94.9427	2.357	42	0.2151	0.0192
T5	94.9427 - 92.5938	1.683	42	0.1839	0.0152
T6	92.5938 - 90	1.591	42	0.1769	0.0147
T7	90 - 80	1.491	42	0.1684	0.0146
T8	80 - 60	1.145	42	0.1470	0.0132
T9	60 - 40	0.611	42	0.0971	0.0090
T10	40 - 20	0.262	42	0.0609	0.0054
T11	20 - 0	0.064	42	0.0259	0.0021

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
136.00	APXVSPP18-C-A20 w/ Mount Pipe	43	3.661	0.2349	0.0210	28211
134.00	1900MHZ RRH (65MHZ)	43	3.563	0.2349	0.0210	28211
127.00	(4) DB844H90E-XY w/ Mount Pipe	43	3.178	0.2319	0.0213	14008
117.00	AIR6449 B41_T-MOBILE	43	2.683	0.2239	0.0205	42793
107.00	BXA-80063/4CF w/ Mount Pipe	42	2.217	0.2105	0.0185	152517
97.00	DMP65R-BU8D w/ Mount Pipe	42	1.767	0.1894	0.0158	15256
87.00	800 10504 w/ Mount Pipe	42	1.380	0.1605	0.0143	18208
80.00	GPS_A	42	1.145	0.1470	0.0132	22937
72.00	GPS_A	42	0.908	0.1282	0.0116	24124

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	136 - 133.625	17.534	10	1.1236	0.1009
T2	133.625 - 130	16.971	10	1.1232	0.1010
T3	130 - 110	16.008	10	1.1173	0.1019
T4	110 - 94.9427	11.300	8	1.0301	0.0924
T5	94.9427 - 92.5938	8.069	8	0.8806	0.0729
T6	92.5938 - 90	7.627	8	0.8469	0.0701
T7	90 - 80	7.148	8	0.8064	0.0698
T8	80 - 60	5.491	8	0.7044	0.0632
T9	60 - 40	2.930	8	0.4653	0.0433
T10	40 - 20	1.258	8	0.2919	0.0259
T11	20 - 0	0.305	19	0.1240	0.0099

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
136.00	APXVSPP18-C-A20 w/ Mount Pipe	10	17.534	1.1236	0.1009	5886
134.00	1900MHZ RRH (65MHZ)	10	17.063	1.1235	0.1009	5886
127.00	(4) DB844H90E-XY w/ Mount Pipe	10	15.224	1.1098	0.1023	2910
117.00	AIR6449 B41_T-MOBILE	8	12.857	1.0717	0.0985	8954
107.00	BXA-80063/4CF w/ Mount Pipe	8	10.630	1.0077	0.0891	32968
97.00	DMP65R-BU8D w/ Mount Pipe	8	8.474	0.9072	0.0760	3180
87.00	800 10504 w/ Mount Pipe	8	6.619	0.7686	0.0685	3799
80.00	GPS_A	8	5.491	0.7044	0.0632	4788
72.00	GPS_A	8	4.353	0.6143	0.0554	5036

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T2	133.625	Leg	A325N	0.6250	5	1.17	27.61	0.043	1.05	Bolt DS
T3	130	Leg	A325N	0.7500	5	8.31	39.76	0.209	1.05	Bolt DS
T6	92.5938	Leg	A325N	1.0000	6	14.79	54.52	0.271	1.05	Bolt Tension
T7	90	Leg	A325N	1.0000	6	16.06	54.52	0.295	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	7.58	10.16	0.746	1.05	Member Block Shear
T8	80	Leg	A325N	1.0000	6	22.39	54.52	0.411	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	6.86	10.66	0.643	1.05	Member Block Shear
T9	60	Leg	A325N	1.0000	6	27.59	54.52	0.506	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	6.22	11.68	0.532	1.05	Member Block Shear
T10	40	Leg	A325N	1.0000	6	32.14	54.52	0.590	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	6.12	11.68	0.524	1.05	Member Block Shear
T11	20	Diagonal	A325N	1.2500	1	7.83	23.70	0.330	1.05	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 K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	136 - 133.625	1 1/2	2.38	2.38	76.0 K=1.00	1.7672	-2.83	52.13	0.054 [1]
T2	133.625 - 130	1 1/2	3.63	2.63	84.0 K=1.00	1.7672	-4.40	47.47	0.093 [1]
T3	130 - 110	2	20.00	2.38	57.0 K=1.00	3.1416	-38.02	111.47	0.341 [1]
T4	110 - 94.9427	2 1/4	15.06	2.35	50.1 K=1.00	3.9761	-82.44	148.89	0.554 [1]
T5	94.9427 - 92.5938	2 1/4	2.35	1.18	25.2 K=1.00	3.9761	-91.06	170.80	0.533 [1]
T6	92.5938 - 90	2 1/4	2.59	0.58	12.4 K=1.00	3.9761	-103.76	176.91	0.587 [1]
T7	90 - 80	PiRod 105244 w/ (2) 1-1/4" Tie Rod	10.02	10.02	45.4 K=1.00	6.1379	-111.72	237.63	0.470 [1]
T8	80 - 60	Pirod 105217	20.03	10.02	37.8 K=1.00	5.3014	-154.00	214.86	0.717 [1]
T9	60 - 40	Pirod 105218	20.03	10.02	32.4 K=1.00	7.2158	-188.77	300.68	0.628 [1]
T10	40 - 20	Pirod 105218	20.03	10.02	32.4 K=1.00	7.2158	-219.27	300.68	0.729 [1]
T11	20 - 0	Pirod 105219	20.03	10.02	28.4 K=1.00	9.4248	-247.63	399.87	0.619 [1]

[1] P_u / ϕP_n controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T7	90 - 80	0.5	1.35	109.8	276.20	0.1963	0.83	3.48	0.239
T8	80 - 60	0.5	1.47	120.0	238.57	0.1963	0.39	3.34	0.117
T9	60 - 40	0.5	1.46	119.0	324.71	0.1963	0.22	3.38	0.066
T10	40 - 20	0.5	1.46	119.0	324.71	0.1963	0.41	3.38	0.123
T11	20 - 0	0.625	1.45	94.4	424.12	0.3068	1.03	6.96	0.149

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	136 - 133.625	3/4	3.10	3.01	134.8 K=0.70	0.4418	-1.00	5.50	0.182 [1]
T2	133.625 - 130	3/4	4.78	2.32	133.5 K=0.90	0.4418	-1.48	5.60	0.265 [1]
T3	130 - 110	7/8	5.05	2.45	120.9 K=0.90	0.6013	-4.24	9.30	0.455 [1]
T4	110 - 94.9427	1	5.39	2.60	112.5 K=0.90	0.7854	-5.71	14.00	0.408 [1]
T5	94.9427 - 92.5938	1	5.44	2.63	113.7 K=0.90	0.7854	-6.04	13.73	0.440 [1]
T6	92.5938 - 90	1	5.35	2.59	111.8 K=0.90	0.7854	-7.03	14.17	0.496 [1]
T7	90 - 80	L3x3x3/16	11.42	5.26	109.4	1.0900	-8.25	24.13	0.342 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T8	80 - 60	L2 1/2x2 1/2x3/16	12.50	5.63	K=1.03 136.4 K=1.00	0.9020	-6.50	13.87	0.468 [1]
T9	60 - 40	L3x3x3/16	13.80	6.33	127.4 K=1.00	1.0900	-6.16	19.22	0.320 [1]
T10	40 - 20	L3x3x3/16	15.24	7.08	142.6 K=1.00	1.0900	-6.34	15.35	0.413 [1]
T11	20 - 0	L3x3x5/16	16.80	7.84	159.7 K=1.00	1.7800	-8.54	19.97	0.428 [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 K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	133.625 - 130	3/4	4.00	3.88	173.6 K=0.70	0.4418	-0.21	3.31	0.063 [1]
T3	130 - 110	3/4	4.43	4.26	190.9 K=0.70	0.4418	-0.72	2.74	0.263 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T5	94.9427 - 92.5938	1 1/2	4.90	2.36	83.0 K=1.10	1.7672	-1.58	48.04	0.033 [1]
T6	92.5938 - 90	1 1/2	4.96	2.39	84.0 K=1.10	1.7672	-1.80	47.47	0.038 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	136 - 133.625	6x3/8	4.00	2.91	322.2 K=1.00	2.2500	-0.72	4.90	0.147 [1]
T3	130 - 110	KL/R > 200 (C) - 4 7/8	4.01	3.85	147.7 K=0.70	0.6013	-0.72	6.23	0.116 [1]
T4	110 - 94.9427	1	4.52	4.34	145.7 K=0.70	0.7854	-1.75	8.36	0.209 [1]

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	133.625 - 130	7/8	4.00	3.88	148.8 K=0.70	0.6013	-0.63	6.14	0.102 [1]
T3	130 - 110	7/8	4.49	4.32	165.9 K=0.70	0.6013	-1.76	4.93	0.357 [1]
T6	92.5938 - 90	1	4.99	4.80	161.2 K=0.70	0.7854	-1.80	6.83	0.263 [1]

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	133.625 - 130	1 1/2	3.63	1.00	32.0	1.7672	3.22	79.52	0.041 [1]
T3	130 - 110	2	20.00	0.50	12.0	2.1885	33.32	106.69	0.312 [1] [#]
T4	110 - 94.9427	2 1/4	15.06	2.35	50.1	3.9761	69.29	178.92	0.387 [1]
T5	94.9427 - 92.5938	2 1/4	2.35	1.17	24.9	3.9761	76.69	178.92	0.429 [1]
T6	92.5938 - 90	2 1/4	2.59	0.58	12.4	3.9761	88.77	178.92	0.496 [1]
T7	90 - 80	PiRod 105244 w/ (2) 1-1/4" Tie Rod	10.02	10.02	45.4	6.1379	96.36	276.20	0.349 [1]
T8	80 - 60	Pirod 105217	20.03	10.02	37.8	5.3014	134.31	238.57	0.563 [1]
T9	60 - 40	Pirod 105218	20.03	10.02	32.4	7.2158	165.56	324.71	0.510 [1]
T10	40 - 20	Pirod 105218	20.03	10.02	32.4	7.2158	192.83	324.71	0.594 [1]
T11	20 - 0	Pirod 105219	20.03	10.02	28.4	9.4248	216.76	424.12	0.511 [1]

[1] P_u / ϕP_n controls
[#] Based on net area of leg in section below

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T7	90 - 80	0.5	1.35	109.8	276.20	0.1963	0.83	3.48	0.239
T8	80 - 60	0.5	1.47	120.0	238.57	0.1963	0.39	3.34	0.117
T9	60 - 40	0.5	1.46	119.0	324.71	0.1963	0.22	3.38	0.066
T10	40 - 20	0.5	1.46	119.0	324.71	0.1963	0.41	3.38	0.123
T11	20 - 0	0.625	1.45	94.4	424.12	0.3068	1.03	6.96	0.149

Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	136 - 133.625	3/4	3.10	3.01	192.5	0.4418	0.93	19.88	0.047 [1]
T2	133.625 - 130	3/4	4.78	2.32	148.3	0.4418	1.37	19.88	0.069 [1]
T3	130 - 110	7/8	5.05	2.45	134.3	0.6013	4.08	27.06	0.151 [1]
T4	110 - 94.9427	1	5.39	2.60	125.0	0.7854	5.68	35.34	0.161 [1]
T5	94.9427 - 92.5938	1	5.44	2.63	126.3	0.7854	5.94	35.34	0.168 [1]
T6	92.5938 - 90	1	5.35	2.59	124.2	0.7854	6.87	35.34	0.194 [1]
T7	90 - 80	L3x3x3/16	11.42	5.26	69.3	0.6593	7.58	28.68	0.264 [1]
T8	80 - 60	L2 1/2x2 1/2x3/16	11.93	5.38	86.2	0.5183	6.86	22.55	0.304 [1]
T9	60 - 40	L3x3x3/16	13.13	6.02	79.5	0.6593	6.22	28.68	0.217 [1]
T10	40 - 20	L3x3x3/16	14.50	6.73	88.6	0.6593	6.12	28.68	0.213 [1]
T11	20 - 0	L3x3x5/16	16.80	7.84	105.3	1.0127	7.83	44.05	0.178 [1]

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T2	133.625 - 130	3/4	4.00	3.88	248.0	0.4418	0.34	19.88	0.017 [1]
T3	130 - 110	3/4	4.43	4.26	272.7	0.4418	0.72	19.88	0.036 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T5	94.9427 - 92.5938	1 1/2	4.90	2.36	151.0	1.7672	1.58	79.52	0.020 [1]
T6	92.5938 - 90	1 1/2	4.96	2.39	152.7	1.7672	1.80	79.52	0.023 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	136 - 133.625	6x3/8	4.00	2.91	322.2	2.2500	0.72	72.90	0.010 [1]
T3	130 - 110	7/8	4.01	3.85	211.0	0.6013	0.72	27.06	0.027 [1]
T4	110 - 94.9427	1	4.52	4.34	208.1	0.7854	1.79	35.34	0.051 [1]

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T2	133.625 - 130	7/8	4.00	3.88	212.6	0.6013	0.71	27.06	0.026 [1]
T3	130 - 110	7/8	4.49	4.32	237.0	0.6013	1.89	27.06	0.070 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T6	92.5938 - 90	1	4.99	4.80	230.3	0.7854	1.80	35.34	0.051 [1]

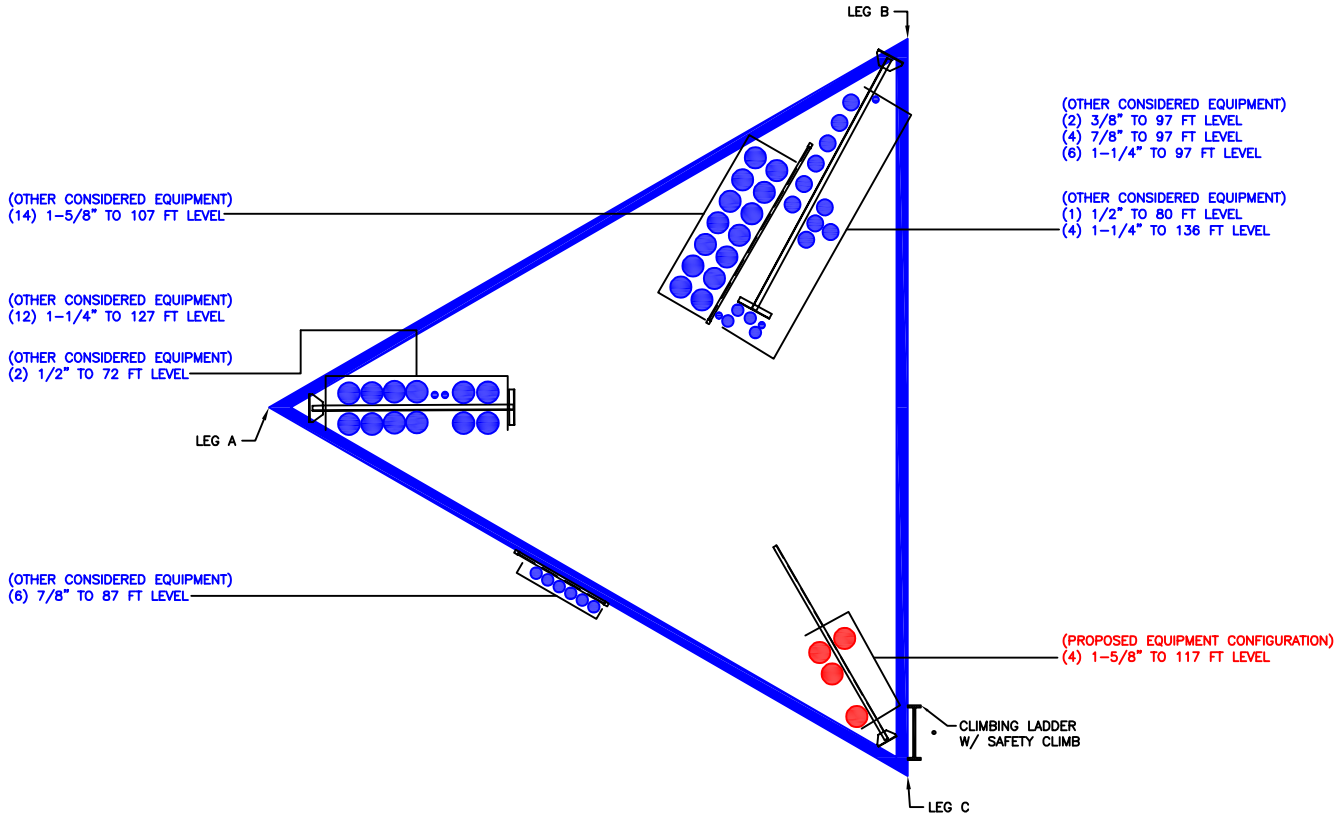
[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	136 - 133.625	Leg	1 1/2	2	-2.83	54.73	5.2	Pass
T2	133.625 - 130	Leg	1 1/2	14	-4.40	49.84	8.8	Pass
T3	130 - 110	Leg	2	29	-38.02	117.05	32.5	Pass
T4	110 - 94.9427	Leg	2 1/4	107	-82.44	156.33	52.7	Pass
T5	94.9427 - 92.5938	Leg	2 1/4	149	-91.06	179.34	50.8	Pass
T6	92.5938 - 90	Leg	2 1/4	161	-103.76	185.75	55.9	Pass
T7	90 - 80	Leg	PiRod 105244 w/ (2) 1-1/4" Tie Rod	176	-111.72	249.51	44.8	Pass
T8	80 - 60	Leg	Pirod 105217	185	-154.00	225.60	68.3	Pass
T9	60 - 40	Leg	Pirod 105218	200	-188.77	315.72	59.8	Pass
T10	40 - 20	Leg	Pirod 105218	214	-219.27	315.72	69.5	Pass
T11	20 - 0	Leg	Pirod 105219	229	-247.63	419.86	59.0	Pass
T1	136 - 133.625	Diagonal	3/4	7	-1.00	5.77	17.4	Pass
T2	133.625 - 130	Diagonal	3/4	25	-1.48	5.88	25.2	Pass
T3	130 - 110	Diagonal	7/8	40	-4.24	9.77	43.4	Pass
T4	110 - 94.9427	Diagonal	1	115	-5.71	14.70	38.9	Pass
T5	94.9427 - 92.5938	Diagonal	1	153	-6.04	14.41	41.9	Pass
T6	92.5938 - 90	Diagonal	1	169	-7.03	14.87	47.3	Pass
T7	90 - 80	Diagonal	L3x3x3/16	180	-8.25	25.34	32.6 74.6 (b)	Pass
T8	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	190	-6.50	14.57	44.6 64.3 (b)	Pass
T9	60 - 40	Diagonal	L3x3x3/16	202	-6.16	20.18	30.5 53.2 (b)	Pass
T10	40 - 20	Diagonal	L3x3x3/16	217	-6.34	16.11	39.4 52.4 (b)	Pass
T11	20 - 0	Diagonal	L3x3x5/16	232	-8.54	20.97	40.7	Pass
T2	133.625 - 130	Horizontal	3/4	16	-0.21	3.48	6.0	Pass
T3	130 - 110	Horizontal	3/4	43	-0.72	2.88	25.0	Pass
T5	94.9427 - 92.5938	Secondary Horizontal	1 1/2	157	-1.58	50.44	3.1	Pass
T6	92.5938 - 90	Secondary Horizontal	1 1/2	172	-1.80	49.85	3.6	Pass
T1	136 - 133.625	Top Girt	6x3/8	4	-0.72	5.14	14.0	Pass
T3	130 - 110	Top Girt	7/8	31	-0.72	6.54	11.0	Pass
T4	110 - 94.9427	Top Girt	1	111	-1.75	8.78	19.9	Pass
T2	133.625 - 130	Bottom Girt	7/8	19	-0.63	6.44	9.7	Pass
T3	130 - 110	Bottom Girt	7/8	36	-1.76	5.18	34.0	Pass
T6	92.5938 - 90	Bottom Girt	1	163	-1.80	7.17	25.1	Pass
							Summary	
						Leg (T10)	69.5	Pass
						Diagonal (T7)	74.6	Pass
						Horizontal (T3)	25.0	Pass
						Secondary Horizontal (T6)	3.6	Pass
						Top Girt (T4)	19.9	Pass
						Bottom Girt (T3)	34.0	Pass
						Bolt Checks	71.0	Pass
						RATING =	**74.6**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 876338 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Truss Leg Reinforcement

BU # :	876338
Site Name:	Waterford
Order:	576542 Rev. 0
Elevation:	90-80
TIA-222 Revision:	H

Existing Tie Rods		
Diameter, de:	1.25	in
Unbraced Length, Le:	14.18	in
Yield Strength, Fye:	50	ksi

New Tie Rods		
Diameter, dn:	1.25	in
Unbraced Length, Ln:	14.18	in
Offset, X:	0.625	in
Yield Strength, Fyn:	50	ksi

Truss Leg		
Width, w:	12	in
Unbraced Length, Lleg:	10	ft

Reactions from tnx		
Compression, C:	111.72	kip
Tension, T:	96.36	kip

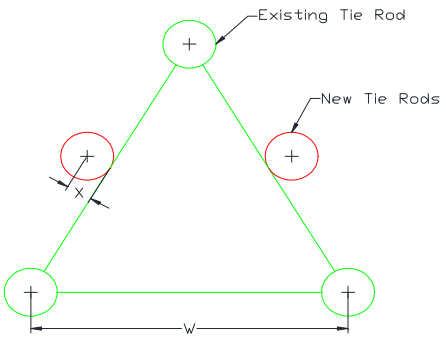
Output from tnx		
KL/r Modified Leg, KLtnx:	35.2	

Length Factors		
Length Factor of Existing Tie Rods, Ke:	1	
Length Factor of New Tie Rods, Kn:	1	
Length Factor of the Leg, Kleg:	1	

Results				
	Demand	Capacity	Rating*	Check
Compression (Existing Tie Rods), kip:	22.34	47.51	44.8%	**Pass**
Compression (New Tie Rods), kip:	22.34	47.51	44.8%	**Pass**
Compression (Modified Tie Rods), kip:	111.72	257.98	41.2%	**Pass**
Tension (Existing Tie Rods), kip:	19.27	55.22	33.2%	**Pass**
Tension (New Tie Rods), kip:	19.27	55.22	33.2%	**Pass**
Tension (Modified Tie Rods), kip:	96.36	276.12	33.2%	**Pass**

**Section 15.5 Applied*

Adjustments for tnx		
Diameter of modified truss leg, Deqv:	1.614	in
Leg K Factor Adjustment, K:	1.289	



Self Support Anchor Rod Capacity

Site Info	
BU #	876338
Site Name	Waterford
Order #	576542 Rev. 0

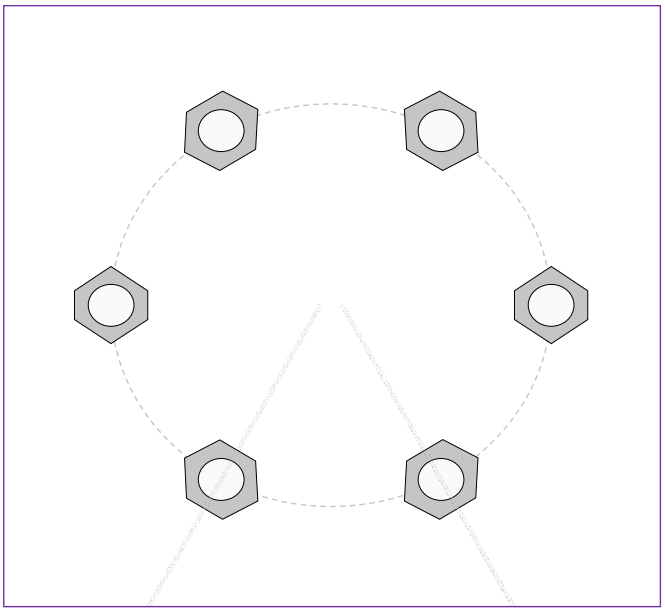
Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	Yes
l_{ar} (in)	0

Applied Loads		
	Comp.	Uplift
Axial Force (kips)	256.84	224.27
Shear Force (kips)	25.25	22.28

**TIA-222-H Section 15.5 Applied*

Considered Eccentricity	
Leg Mod Eccentricity (in)	0.000
Anchor Rod N.A Shift (in)	0.000
Total Eccentricity (in)	0.000

**Anchor Rod Eccentricity Applied*



Connection Properties

Anchor Rod Data

(6) 1-1/4" ø bolts (A687 N; Fy=105 ksi, Fu=125 ksi)

l_{ar} (in): 0

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

Pu_t = 37.38	ϕPn_t = 90.84	**Stress Rating**
Vu = 3.71	ϕVn = 57.52	**39.2%**
Mu = n/a	ϕMn = n/a	**Pass**

SST Unit Base Foundation

BU # :	876338
Site Name:	Waterford
App. Number:	576542 Rev. 0
TIA-222 Revision:	H

Top & Bot. Pad Rein. Different?:	☐
Tower Centroid Offset?:	☐
Block Foundation?:	☐
Rectangular Pad?:	☐

Superstructure Analysis Reactions		
Global Moment, **M**:	2911.24	ft-kips
Global Axial, **P**:	51.27	kips
Global Shear, **V**:	36.12	kips
Leg Compression, P_{comp}:	256.84	kips
Leg Comp. Shear, V_{u_comp}:	25.25	kips
Leg Uplift, P_{uplift}:	224.27	kips
Leg Uplift. Shear, V_{u_uplift}:	22.28	kips
Tower Height, **H**:	136	ft
Base Face Width, **BW**:	14	ft
BP Dist. Above Fdn, bp_{dist}:	2.5	in

Pier Properties		
Pier Shape:	Circular	
Pier Diameter, **dpier**:	3.0	ft
Ext. Above Grade, **E**:	0.50	ft
Pier Rebar Size, **Sc**:	8	
Pier Rebar Quantity, **mc**:	15	
Pier Tie/Spiral Size, **St**:	4	
Pier Tie/Spiral Quantity, **mt**:	7	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	3	in

Pad Properties		
Depth, **D**:	6.00	ft
Pad Width, W_1:	23.00	ft
Pad Thickness, **T**:	3.25	ft
Pad Rebar Size (Bottom dir. 2), Sp_2:	9	
Pad Rebar Quantity (Bottom dir. 2), mp_2:	46	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties		
Rebar Grade, **Fy**:	60	ksi
Concrete Compressive Strength, **F'c**:	3	ksi
Dry Concrete Density, δc:	150	pcf

Soil Properties		
Total Soil Unit Weight, γ:	120	pcf
Ultimate Gross Bearing, Qult:	8.000	ksf
Cohesion, **Cu**:	0.000	ksf
Friction Angle, φ:	36	degrees
SPT Blow Count, N_{blows}:	25	
Base Friction, μ:		
Neglected Depth, **N**:	3.3	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, **gw**:	N/A	ft

<-- Toggle between Gross and Net

Foundation Analysis Checks				
	Capacity	**Demand**	**Rating***	**Check**
Lateral (Sliding) (kips)	243.91	36.12	**14.1%**	**Pass**
Bearing Pressure (ksf)	6.00	2.49	**41.5%**	**Pass**
*Overturning (kip*ft)*	4538.31	3153.55	**69.5%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	852.07	82.06	**9.2%**	**Pass**
*Pier Flexure (Tension) (kip*ft)*	497.51	72.41	**13.9%**	**Pass**
Pier Compression (kip)	3374.26	260.98	**7.4%**	**Pass**
*Pad Flexure (kip*ft)*	6695.87	862.93	**12.3%**	**Pass**
Pad Shear - 1-way (kips)	777.96	134.87	**16.5%**	**Pass**
Pad Shear - Comp 2-way (ksi)	0.164	0.035	**20.4%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	5260.90	49.24	**0.9%**	**Pass**
Pad Shear - Tension 2-way (ksi)	0.164	0.034	**20.0%**	**Pass**
*Flexural 2-way (Tension) (kip*ft)*	5260.90	43.45	**0.8%**	**Pass**

**Rating per TIA-222-H Section 15.5*

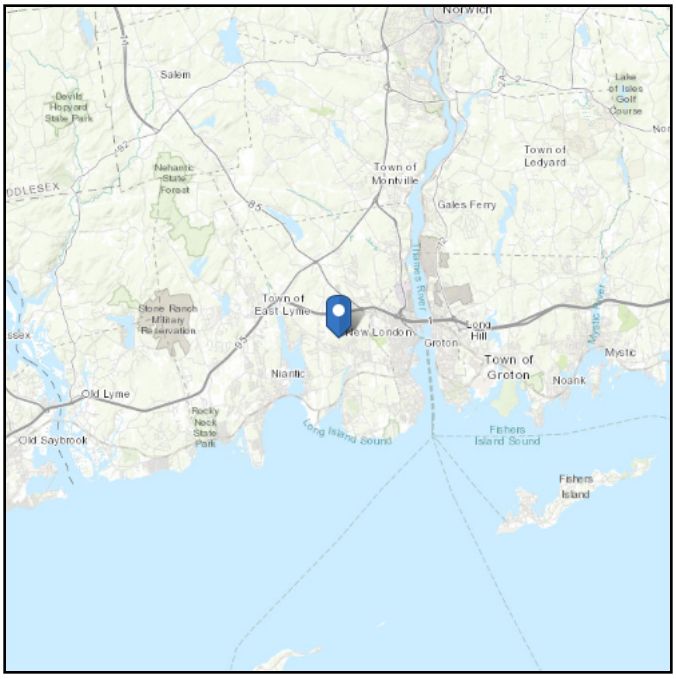
Structural Rating*:	**20.4%**
Soil Rating*:	**69.5%**

ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 242 ft (NAVD 88)
Latitude: 41.354639
Longitude: -72.150444



Wind

Results:

Wind Speed:	134 Vmph	*135 Vmph as required CT Design Criteria for New London County
10-year MRI	79 Vmph	
25-year MRI	89 Vmph	
50-year MRI	99 Vmph	
100-year MRI	109 Vmph	

Data Source: ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, and Section 26.5.2, incorporating errata of March 12, 2014

Date Accessed: Tue Aug 31 2021

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

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

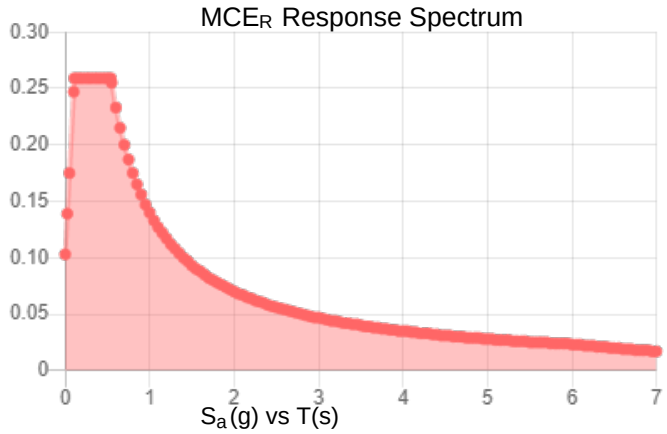
Seismic

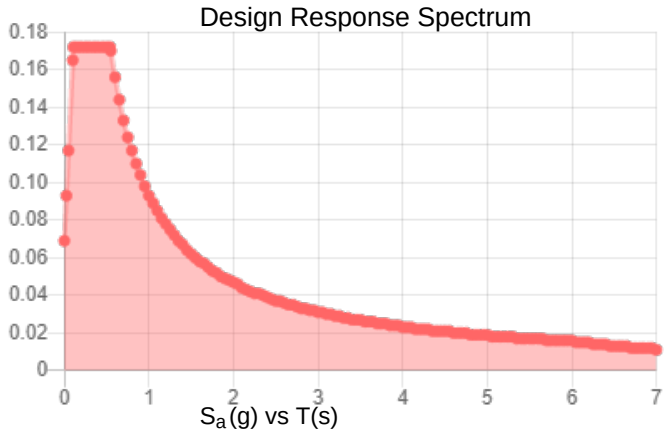
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.162	S_{DS} :	0.172
S_1 :	0.058	S_{D1} :	0.093
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.081
S_{MS} :	0.259	PGA_M :	0.129
S_{M1} :	0.14	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Tue Aug 31 2021

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

Ice

Results:

Ice Thickness:	0.75 in.	Design Ice: 2*0.75 in. = 1.50 in.
Concurrent Temperature:	15 F	
Gust Speed:	50 mph	

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

Date Accessed: Tue Aug 31 2021

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

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

Date: **August 24, 2021**

Darcy Tarr
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
(704) 405-6589

Trylon
1825 W. Walnut Hill Lane,
Suite 302
Irving, TX 75038
214-930-1730

Subject:	**Mount Replacement Analysis Report**	
Carrier Designation:	**T-Mobile Anchor**	
	Carrier Site Number:	CT11381C
	Carrier Site Name:	WATERFORD SOUTH/RT 1
Crown Castle Designation:	**Crown Castle BU Number:**	876338
	Crown Castle Site Name:	WATERFORD
	Crown Castle JDE Job Number:	675143
	Crown Castle Order Number:	576542 Rev. 0
Engineering Firm Designation:	**Trylon Report Designation:**	190496
Site Data:	**41 Manitock Hill Road, Waterford, New London County, CT, 06385-2000 Latitude 41°21'16.70" Longitude -72°9'1.60"**	
Structure Information:	**Tower Height & Type:**	**136.0 ft Self Support**
	Mount Elevation:	**117.0 ft**
	Mount Type:	**12.5 ft Sector Frame**

Dear Darcy Tarr,

Trylon is pleased to submit this **"Mount Replacement Analysis Report"** to determine the structural integrity of T-Mobile's antenna mounting system with the proposed appurtenance and equipment addition on the abovementioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point for fall protection or rigging is not part of this document.

The purpose of the analysis is to determine acceptability of the mount stress level. Based on our analysis we have determined the mount stress level to be:

Sector Frame **Sufficient***

***Sufficient upon completion of the changes listed in the 'Recommendations' section of this report.**

This analysis utilizes an ultimate 3-second gust wind speed of 135 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Mount analysis prepared by: Andrei Florea

Respectfully Submitted by:
Jinshan Wang, P.E

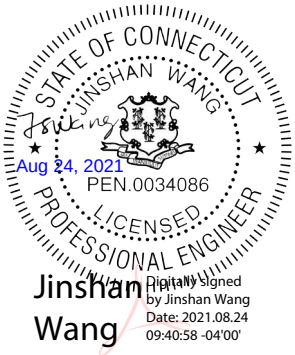


TABLE OF CONTENTS

1) INTRODUCTION

This is a proposed 3 sector 12.5 ft Sector Frame, designed by Site Pro 1.

2) ANALYSIS CRITERIA

Building Code:	2015 IBC
TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	135 mph
Exposure Category:	B
Topographic Factor at Base:	1.000
Topographic Factor at Mount:	1.000
Ice Thickness:	1.50 in
Wind Speed with Ice:	50 mph
Seismic S_s:	0.162
Seismic S_1:	0.058
Live Loading Wind Speed:	30 mph
Man Live Load at Mid/End-Points:	250 lb
Man Live Load at Mount Pipes:	500 lb

Table 1 - Proposed Equipment Configuration

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
117.0	119.0	3	ERICSSON	AIR6449 B41_T-MOBILE	12.5 ft Sector Frame **[Site Pro 1, VFA12-HD]**
		3	RFS/CELWAVE	APXVAALL24_43-U-NA20_TMO	
		3	ERICSSON	RADIO 4449 B71 B85A_T-MOBILE	
		3	ERICSSON	RADIO 4460 B2/B25 B66_TMO	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
Crown Application	T-Mobile Application	576542 Rev.0	CCI Sites
Structural Analysis Report	Morrison Hershfield	9759292	CCI Sites
Mount Manufacturer Drawings	Site Pro 1	VFA12-HD	Trylon

3.1) Analysis Method

RISA-3D (Version 17.0.4), a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases.

A tool internally developed, using Microsoft Excel, by Trylon was used to calculate wind loading on all appurtenances, dishes, and mount members for various load cases. Selected output from the analysis is included in Appendix B.

This analysis was performed in accordance with Crown Castle's ENG-SOW-10208 *Tower Mount Analysis* (Revision B).

3.2) Assumptions

1) The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
2) The configuration of antennas, mounts, and other appurtenances are as specified in Table 1 and the referenced drawings.
3) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
4) The analysis will be required to be revised if the existing conditions in the field differ from those shown in the above-referenced documents or assumed in this analysis. No allowance was made for any damaged, missing, or rusted members.
5) Prior structural modifications to the tower mounting system are assumed to be installed as shown per available data.
6) Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM A500 (GR B-46)
Pipe	ASTM A53 (GR 35)
Connection Bolts	ASTM A325

This analysis may be affected if any assumptions are not valid or have been made in error. Trylon should be notified to determine the effect on the structural integrity of the antenna mounting system.

4) ANALYSIS RESULTS

Table 3 - Mount Component Stresses vs. Capacity (Sector Frame, Worst Case Sector)

Notes	Component	Critical Member	Centerline (ft)	% Capacity	Pass / Fail
1,2,3	Mount Pipe(s)	MP3	117.0	69.2	Pass
	Horizontal(s)	M19		50.4	Pass
	Standoff(s)	M24		20.2	Pass
	Bracing(s)	M45		32.0	Pass
	Plate(s)	M13		57.5	Pass
	Tieback(s)	M56		2.4	Pass
	Mount Connection(s)	-		28.7	Pass

Structure Rating (max from all components) =	**69.2%**

Notes:
1) See additional documentation in "Appendix C - Software Analysis Output" for calculations supporting the % capacity consumed.
2) All sectors are typical
3) Rating per TIA-222-H, Section 15.5

Table 4 - Tieback Connection Data Table

Tower Connection Node No.	Existing / Proposed	Resultant End Reaction (lb)	Connected Member Type	Connected Member Size	Member Compressive Capacity (lb)[3]	Notes
N79A	Proposed	972.4	Leg	SR 2''	5,573.6	1
N80	Proposed	496.8	Leg	SR 2''	5,573.6	1

Notes:

1) Tieback connection point is within 25% of either end of the connected tower member
2) Tieback connection point is NOT within 25% of either end of the connected tower member
3) Reduced member compressive capacity according to CED-STD-10294 *Standard for Installation of Mounts and Appurtenances*

4.1) Recommendations

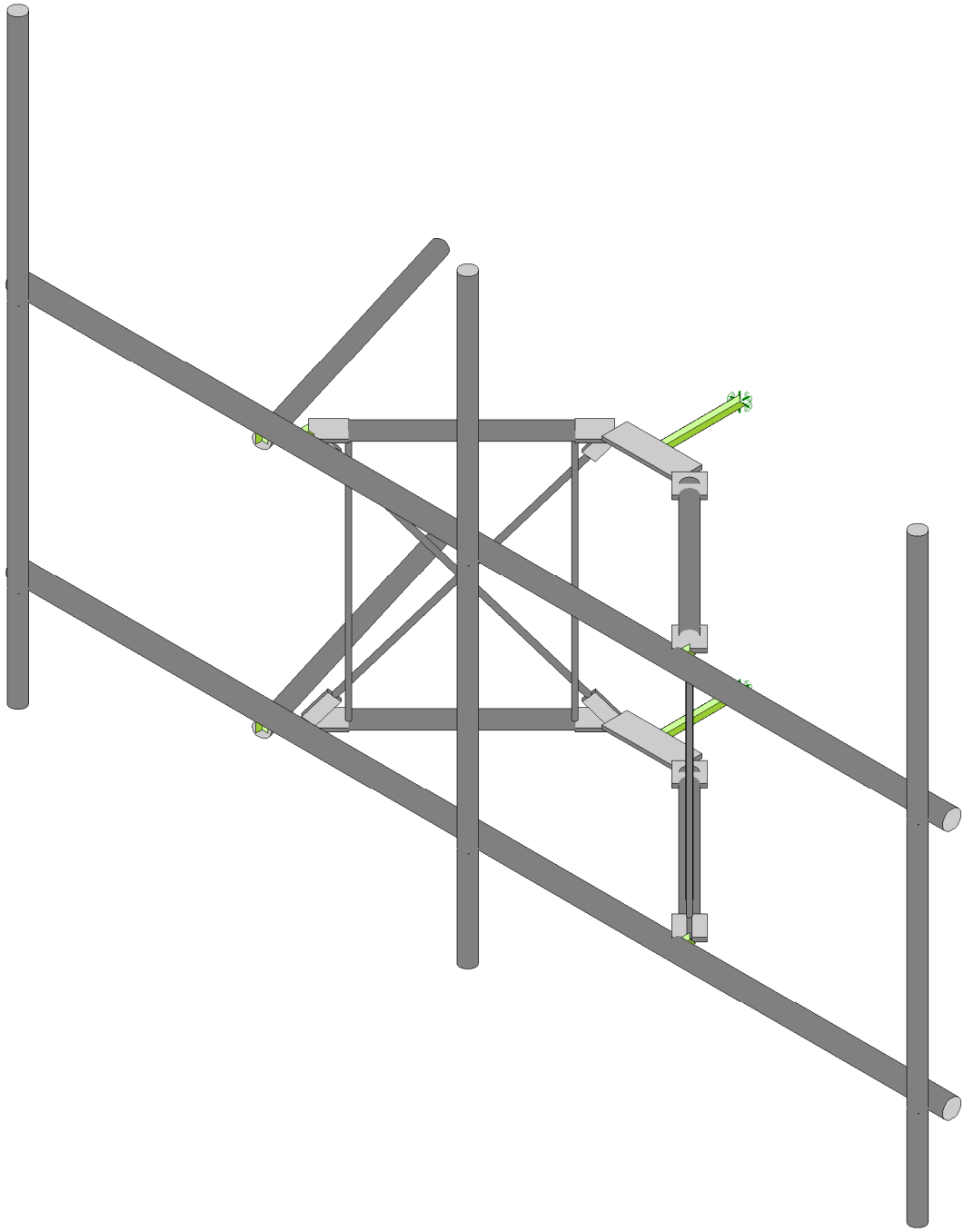
The mount has sufficient capacity to carry the proposed loading configuration. In order for the results of the analysis to be considered valid, the proposed mount listed below must be installed.

1. Site Pro 1, VFA12-HD.
2. Install 2.375'' O.D Schd.40, 8-ft. long antenna pipes.
3. Install the tiebacks as recommended in manufacturer's drawings (Tie-Back Position 3). Tieback connection point needs to be within 25% ends of the tower leg.

No structural modifications are required at this time, provided that the above-listed changes are implemented.

APPENDIX A

WIRE FRAME AND RENDERED MODELS



Envelope Only Solution

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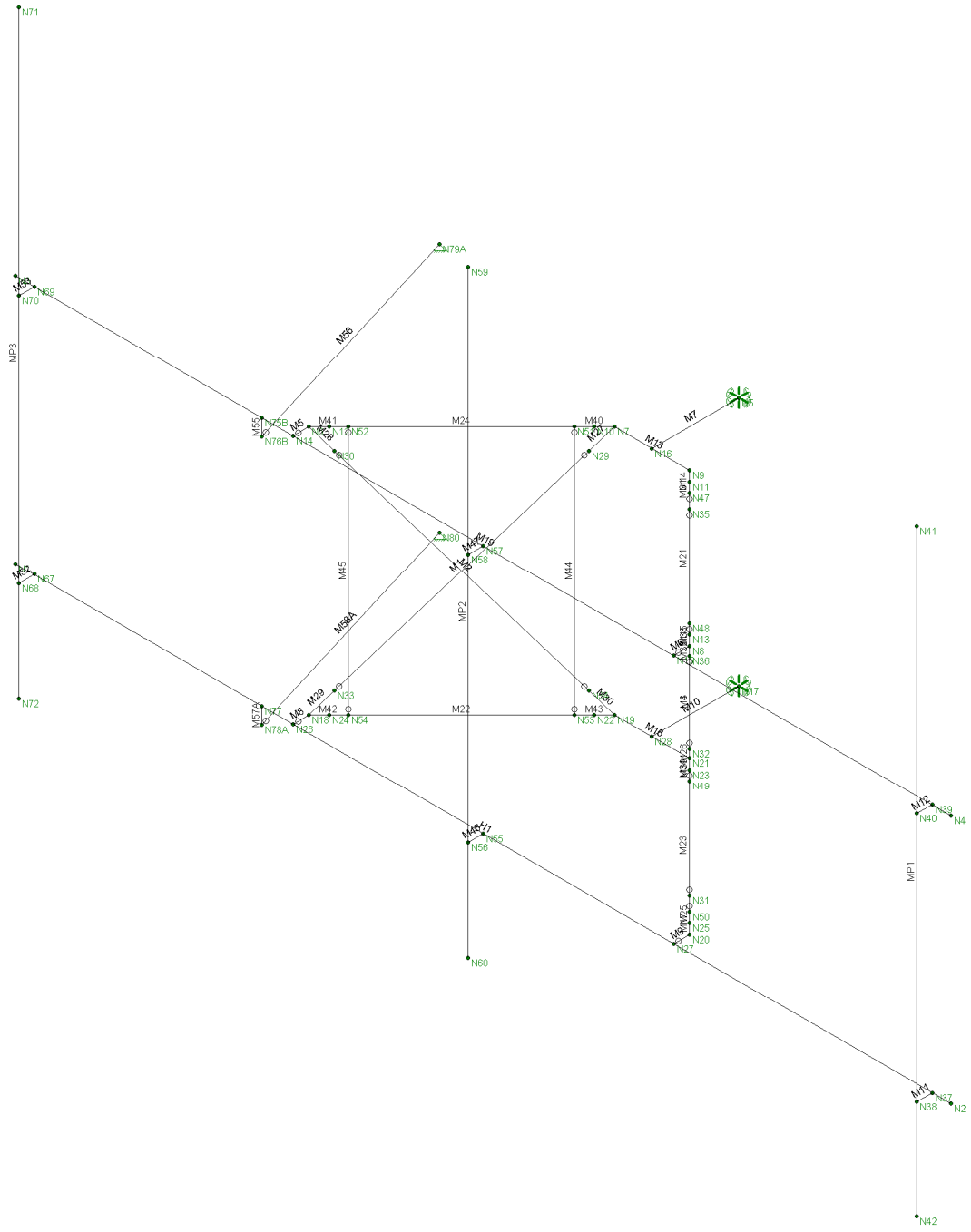
AF		Aug 24, 2021 at 12:09 PM
190496		876338.r3d



Envelope Only Solution

Trylon	876338	SK - 2
AF		Aug 24, 2021 at 12:10 PM
190496		876338.r3d

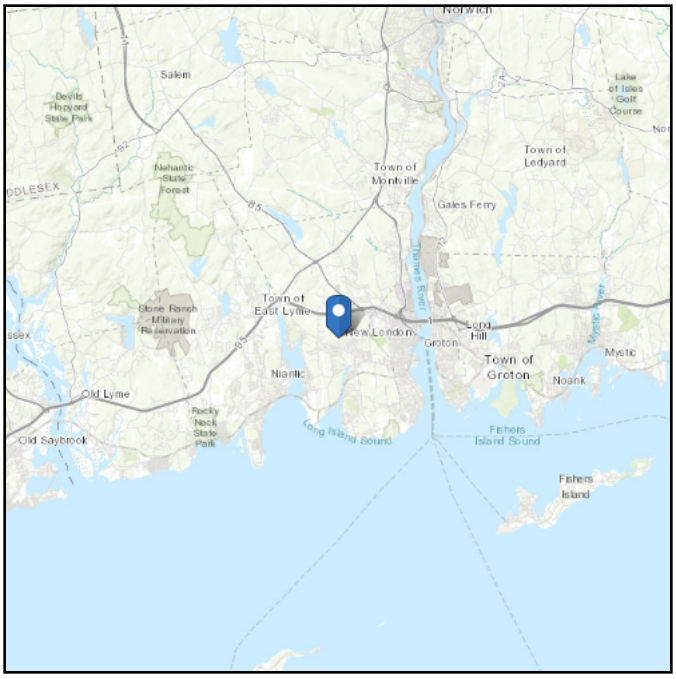
APPENDIX B

SOFTWARE INPUT CALCULATIONS

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-10	**Elevation:**	242 ft (NAVD 88)
Risk Category:	II	**Latitude:**	41.354639
Soil Class:	D - Stiff Soil	**Longitude:**	-72.150444



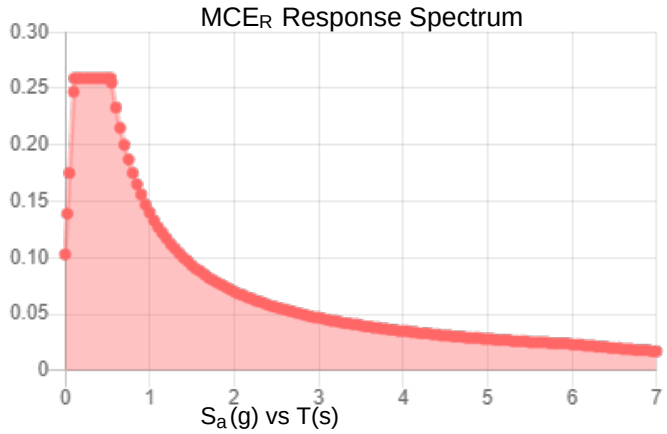
Seismic

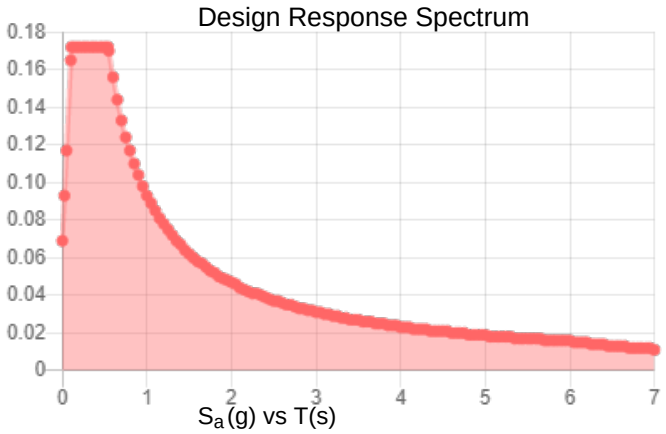
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.162	S_{DS} :	0.172
S_1 :	0.058	S_{D1} :	0.093
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.081
S_{MS} :	0.259	PGA_M :	0.129
S_{M1} :	0.14	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Tue Aug 24 2021

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

Ice

Results:

Ice Thickness:	0.75 in.
Concurrent Temperature:	15 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Tue Aug 24 2021

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

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

Trylon
1825 W. Walnut Hill Lane Suite 120
Irving, TX 75038

TIA LOAD CALCULATOR 2.1

PROJECT DATA	
Job Code:	190496
Carrier Site ID:	CT11381C
Carrier Site Name:	WATERFORD SOUTH/RT 1

CODES AND STANDARDS	
Building Code:	2015 IBC
Local Building Code:	2018 CSBC
Design Standard:	TIA-222-H

STRUCTURE DETAILS		
Mount Type:	Sector Frame	--
Mount Elevation:	117.0	ft.
Number of Sectors:	3	--
Structure Type:	Self Support Tower	--
Structure Height:	136.0	ft.

ANALYSIS CRITERIA		
Structure Risk Category:	II	--
Exposure Category:	B	--
Site Class:	D - Default	--
Ground Elevation:	242	ft.

TOPOGRAPHIC DATA		
Topographic Category:	1.00	--
Topographic Feature:	N/A	--
Crest Point Elevation:	0.00	ft.
Base Point Elevation:	0.00	ft.
Crest to Mid-Height (L/2):	0.00	ft.
Distance from Crest (x):	0.00	ft.
Base Topo Factor (K_{zt}):	1.00	--
Mount Topo Factor (K_{zt}):	1.00	--

WIND PARAMETERS		
Design Wind Speed:	135	mph
Wind Escalation Factor (K_s):	1.00	--
Velocity Coefficient (K_z):	1.03	--
Directionality Factor (K_d):	0.95	--
Gust Effect Factor (Gh):	1.00	--
Shielding Factor (K_a):	0.90	--
Velocity Pressure (q_z):	45.41	psf
Ground Elevation Factor (K_e):	0.99	--

ICE PARAMETERS		
Design Ice Wind Speed:	50	mph
Design Ice Thickness (t_i):	1.50	in
Importance Factor (I_i):	1.00	--
Ice Velocity Pressure (q_{zi}):	45.41	psf
Mount Ice Thickness (t_{iz}):	1.70	in

WIND STRUCTURE CALCULATIONS		
Flat Member Pressure:	81.74	psf
Round Member Pressure:	49.04	psf
Ice Wind Pressure:	7.39	psf

SEISMIC PARAMETERS		
Importance Factor (I_e):	1.00	--
Short Period Accel .(S_s):	0.16	g
1 Second Accel (S_1):	0.06	g
Short Period Des. (S_{DS}):	0.17	g
1 Second Des. (S_{D1}):	0.09	g
Short Period Coeff. (F_a):	1.60	--
1 Second Coeff. (F_v):	2.40	--
Response Coefficient (Cs):	0.09	--
Amplification Factor (A_S):	1.20	--

LOAD COMBINATIONS [LRFD]

#	Description
1	1.4DL
2	1.2DL + 1WL 0 AZI
3	1.2DL + 1WL 30 AZI
4	1.2DL + 1WL 45 AZI
5	1.2DL + 1WL 60 AZI
6	1.2DL + 1WL 90 AZI
7	1.2DL + 1WL 120 AZI
8	1.2DL + 1WL 135 AZI
9	1.2DL + 1WL 150 AZI
10	1.2DL + 1WL 180 AZI
11	1.2DL + 1WL 210 AZI
12	1.2DL + 1WL 225 AZI
13	1.2DL + 1WL 240 AZI
14	1.2DL + 1WL 270 AZI
15	1.2DL + 1WL 300 AZI
16	1.2DL + 1WL 315 AZI
17	1.2DL + 1WL 330 AZI
18	0.9DL + 1WL 0 AZI
19	0.9DL + 1WL 30 AZI
20	0.9DL + 1WL 45 AZI
21	0.9DL + 1WL 60 AZI
22	0.9DL + 1WL 90 AZI
23	0.9DL + 1WL 120 AZI
24	0.9DL + 1WL 135 AZI
25	0.9DL + 1WL 150 AZI
26	0.9DL + 1WL 180 AZI
27	0.9DL + 1WL 210 AZI
28	0.9DL + 1WL 225 AZI
29	0.9DL + 1WL 240 AZI
30	0.9DL + 1WL 270 AZI
31	0.9DL + 1WL 300 AZI
32	0.9DL + 1WL 315 AZI
33	0.9DL + 1WL 330 AZI
34	1.2DL + 1DLi + 1WLi 0 AZI
35	1.2DL + 1DLi + 1WLi 30 AZI
36	1.2DL + 1DLi + 1WLi 45 AZI
37	1.2DL + 1DLi + 1WLi 60 AZI
38	1.2DL + 1DLi + 1WLi 90 AZI
39	1.2DL + 1DLi + 1WLi 120 AZI
40	1.2DL + 1DLi + 1WLi 135 AZI
41	1.2DL + 1DLi + 1WLi 150 AZI

#	Description
42	1.2DL + 1DLi + 1WLi 180 AZI
43	1.2DL + 1DLi + 1WLi 210 AZI
44	1.2DL + 1DLi + 1WLi 225 AZI
45	1.2DL + 1DLi + 1WLi 240 AZI
46	1.2DL + 1DLi + 1WLi 270 AZI
47	1.2DL + 1DLi + 1WLi 300 AZI
48	1.2DL + 1DLi + 1WLi 315 AZI
49	1.2DL + 1DLi + 1WLi 330 AZI
50	(1.2+0.2Sds) + 1.0E 0 AZI
51	(1.2+0.2Sds) + 1.0E 30 AZI
52	(1.2+0.2Sds) + 1.0E 45 AZI
53	(1.2+0.2Sds) + 1.0E 60 AZI
54	(1.2+0.2Sds) + 1.0E 90 AZI
55	(1.2+0.2Sds) + 1.0E 120 AZI
56	(1.2+0.2Sds) + 1.0E 135 AZI
57	(1.2+0.2Sds) + 1.0E 150 AZI
58	(1.2+0.2Sds) + 1.0E 180 AZI
59	(1.2+0.2Sds) + 1.0E 210 AZI
60	(1.2+0.2Sds) + 1.0E 225 AZI
61	(1.2+0.2Sds) + 1.0E 240 AZI
62	(1.2+0.2Sds) + 1.0E 270 AZI
63	(1.2+0.2Sds) + 1.0E 300 AZI
64	(1.2+0.2Sds) + 1.0E 315 AZI
65	(1.2+0.2Sds) + 1.0E 330 AZI
66	(0.9-0.2Sds) + 1.0E 0 AZI
67	(0.9-0.2Sds) + 1.0E 30 AZI
68	(0.9-0.2Sds) + 1.0E 45 AZI
69	(0.9-0.2Sds) + 1.0E 60 AZI
70	(0.9-0.2Sds) + 1.0E 90 AZI
71	(0.9-0.2Sds) + 1.0E 120 AZI
72	(0.9-0.2Sds) + 1.0E 135 AZI
73	(0.9-0.2Sds) + 1.0E 150 AZI
74	(0.9-0.2Sds) + 1.0E 180 AZI
75	(0.9-0.2Sds) + 1.0E 210 AZI
76	(0.9-0.2Sds) + 1.0E 225 AZI
77	(0.9-0.2Sds) + 1.0E 240 AZI
78	(0.9-0.2Sds) + 1.0E 270 AZI
79	(0.9-0.2Sds) + 1.0E 300 AZI
80	(0.9-0.2Sds) + 1.0E 315 AZI
81	(0.9-0.2Sds) + 1.0E 330 AZI
82-88	1.2D + 1.5 Lv1

#	Description
89	1.2D + 1.5Lm + 1.0Wm 0 AZI - MP1
90	1.2D + 1.5Lm + 1.0Wm 30 AZI - MP1
91	1.2D + 1.5Lm + 1.0Wm 45 AZI - MP1
92	1.2D + 1.5Lm + 1.0Wm 60 AZI - MP1
93	1.2D + 1.5Lm + 1.0Wm 90 AZI - MP1
94	1.2D + 1.5Lm + 1.0Wm 120 AZI - MP1
95	1.2D + 1.5Lm + 1.0Wm 135 AZI - MP1
96	1.2D + 1.5Lm + 1.0Wm 150 AZI - MP1
97	1.2D + 1.5Lm + 1.0Wm 180 AZI - MP1
98	1.2D + 1.5Lm + 1.0Wm 210 AZI - MP1
99	1.2D + 1.5Lm + 1.0Wm 225 AZI - MP1
100	1.2D + 1.5Lm + 1.0Wm 240 AZI - MP1
101	1.2D + 1.5Lm + 1.0Wm 270 AZI - MP1
102	1.2D + 1.5Lm + 1.0Wm 300 AZI - MP1
103	1.2D + 1.5Lm + 1.0Wm 315 AZI - MP1
104	1.2D + 1.5Lm + 1.0Wm 330 AZI - MP1
105	1.2D + 1.5Lm + 1.0Wm 0 AZI - MP2
106	1.2D + 1.5Lm + 1.0Wm 30 AZI - MP2
107	1.2D + 1.5Lm + 1.0Wm 45 AZI - MP2
108	1.2D + 1.5Lm + 1.0Wm 60 AZI - MP2
109	1.2D + 1.5Lm + 1.0Wm 90 AZI - MP2
110	1.2D + 1.5Lm + 1.0Wm 120 AZI - MP2
111	1.2D + 1.5Lm + 1.0Wm 135 AZI - MP2
112	1.2D + 1.5Lm + 1.0Wm 150 AZI - MP2
113	1.2D + 1.5Lm + 1.0Wm 180 AZI - MP2
114	1.2D + 1.5Lm + 1.0Wm 210 AZI - MP2
115	1.2D + 1.5Lm + 1.0Wm 225 AZI - MP2
116	1.2D + 1.5Lm + 1.0Wm 240 AZI - MP2
117	1.2D + 1.5Lm + 1.0Wm 270 AZI - MP2
118	1.2D + 1.5Lm + 1.0Wm 300 AZI - MP2
119	1.2D + 1.5Lm + 1.0Wm 315 AZI - MP2
120	1.2D + 1.5Lm + 1.0Wm 330 AZI - MP2

#	Description
121	1.2D + 1.5Lm + 1.0Wm 0 AZI - MP3
122	1.2D + 1.5Lm + 1.0Wm 30 AZI - MP3
123	1.2D + 1.5Lm + 1.0Wm 45 AZI - MP3
124	1.2D + 1.5Lm + 1.0Wm 60 AZI - MP3
125	1.2D + 1.5Lm + 1.0Wm 90 AZI - MP3
126	1.2D + 1.5Lm + 1.0Wm 120 AZI - MP3
127	1.2D + 1.5Lm + 1.0Wm 135 AZI - MP3
128	1.2D + 1.5Lm + 1.0Wm 150 AZI - MP3
129	1.2D + 1.5Lm + 1.0Wm 180 AZI - MP3
130	1.2D + 1.5Lm + 1.0Wm 210 AZI - MP3
131	1.2D + 1.5Lm + 1.0Wm 225 AZI - MP3
132	1.2D + 1.5Lm + 1.0Wm 240 AZI - MP3
133	1.2D + 1.5Lm + 1.0Wm 270 AZI - MP3
134	1.2D + 1.5Lm + 1.0Wm 300 AZI - MP3
135	1.2D + 1.5Lm + 1.0Wm 315 AZI - MP3
136	1.2D + 1.5Lm + 1.0Wm 330 AZI - MP3
137	1.2D + 1.5Lm + 1.0Wm 0 AZI - MP4
138	1.2D + 1.5Lm + 1.0Wm 30 AZI - MP4
139	1.2D + 1.5Lm + 1.0Wm 45 AZI - MP4
140	1.2D + 1.5Lm + 1.0Wm 60 AZI - MP4
141	1.2D + 1.5Lm + 1.0Wm 90 AZI - MP4
142	1.2D + 1.5Lm + 1.0Wm 120 AZI - MP4
143	1.2D + 1.5Lm + 1.0Wm 135 AZI - MP4
144	1.2D + 1.5Lm + 1.0Wm 150 AZI - MP4
145	1.2D + 1.5Lm + 1.0Wm 180 AZI - MP4
146	1.2D + 1.5Lm + 1.0Wm 210 AZI - MP4
147	1.2D + 1.5Lm + 1.0Wm 225 AZI - MP4
148	1.2D + 1.5Lm + 1.0Wm 240 AZI - MP4
149	1.2D + 1.5Lm + 1.0Wm 270 AZI - MP4
150	1.2D + 1.5Lm + 1.0Wm 300 AZI - MP4
151	1.2D + 1.5Lm + 1.0Wm 315 AZI - MP4
152	1.2D + 1.5Lm + 1.0Wm 330 AZI - MP4

*This page shows an example of maintenance loads for (4) pipes, the number of mount pipe LCs may vary per site

EQUIPMENT LOADING

Appurtenance Name	Qty.	Elevation [ft]	--	EPA_N (ft2)	EPA_T (ft2)	Weight (lbs)
AIR6449 B41_T-MOBILE	1	119	No Ice	5.27	2.03	114.63
--	--	--	w/ Ice	6.63	3.10	150.39
APXVAALL24_43-U-NA20_TMO	1	119	No Ice	14.67	5.32	149.90
--	--	--	w/ Ice	17.04	7.41	416.72
RADIO 4449 B71 B85A_T-MOBILE	1	119	No Ice	1.97	1.59	73.21
--	--	--	w/ Ice	2.39	1.98	79.70
RADIO 4460 B2/B25 B66_TMO	1	119	No Ice	2.14	1.69	109.00
--	--	--	w/ Ice	2.57	2.08	88.46
			No Ice			
--	--	--	w/ Ice			
			No Ice			
--	--	--	w/ Ice			
			No Ice			
--	--	--	w/ Ice			
			No Ice			
--	--	--	w/ Ice			
			No Ice			
--	--	--	w/ Ice			
			No Ice			
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			No Ice			
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			No Ice			
--	--	--	w/ Ice			
			No Ice			
--	--	--	w/ Ice			
			No Ice			
--	--	--	w/ Ice			

EQUIPMENT WIND CALCULATIONS

Appurtenance Name	Qty.	Elevation [ft]	K_{zt}	K_z	K_d	t_d	q_z [psf]	q_{zi} [psf]
AIR6449 B41_T-MOBILE	1	119	1.00	1.04	0.95	1.71	45.63	6.26
XVAALL24_43-U-NA20_TI	1	119	1.00	1.04	0.95	1.71	45.63	6.26
)IO 4449 B71 B85A_T-MOI	1	119	1.00	1.04	0.95	1.71	45.63	6.26
\DIO 4460 B2/B25 B66_TM	1	119	1.00	1.04	0.95	1.71	45.63	6.26

EQUIPMENT LATERAL WIND FORCE CALCULATIONS

Appurtenance Name	*Qty.*	*--*	*0° 180°*	*30° 210°*	*60° 240°*	*90° 270°*	*120° 300°*	*150° 330°*
AIR6449 B41_T-MOBILE	1	No Ice	216.43	116.64	183.17	83.37	183.17	116.64
--	--	w/ Ice	37.37	22.44	32.40	17.46	32.40	22.44
APXVAALL24_43-U-NA20_TMO	1	No Ice	602.48	314.48	506.48	218.49	506.48	314.48
--	--	w/ Ice	95.98	55.28	82.42	41.72	82.42	55.28
ADIO 4449 B71 B85A_T-MOBIL	1	No Ice	80.91	69.10	76.97	65.16	76.97	69.10
--	--	w/ Ice	13.49	11.74	12.91	11.16	12.91	11.74
RADIO 4460 B2/B25 B66_TMO	1	No Ice	87.85	73.89	83.20	69.24	83.20	73.89
--	--	w/ Ice	14.50	12.43	13.81	11.74	13.81	12.43
		No Ice						
--	--	w/ Ice						
		No Ice						
--	--	w/ Ice						
		No Ice						
--	--	w/ Ice						
		No Ice						
--	--	w/ Ice						
		No Ice						
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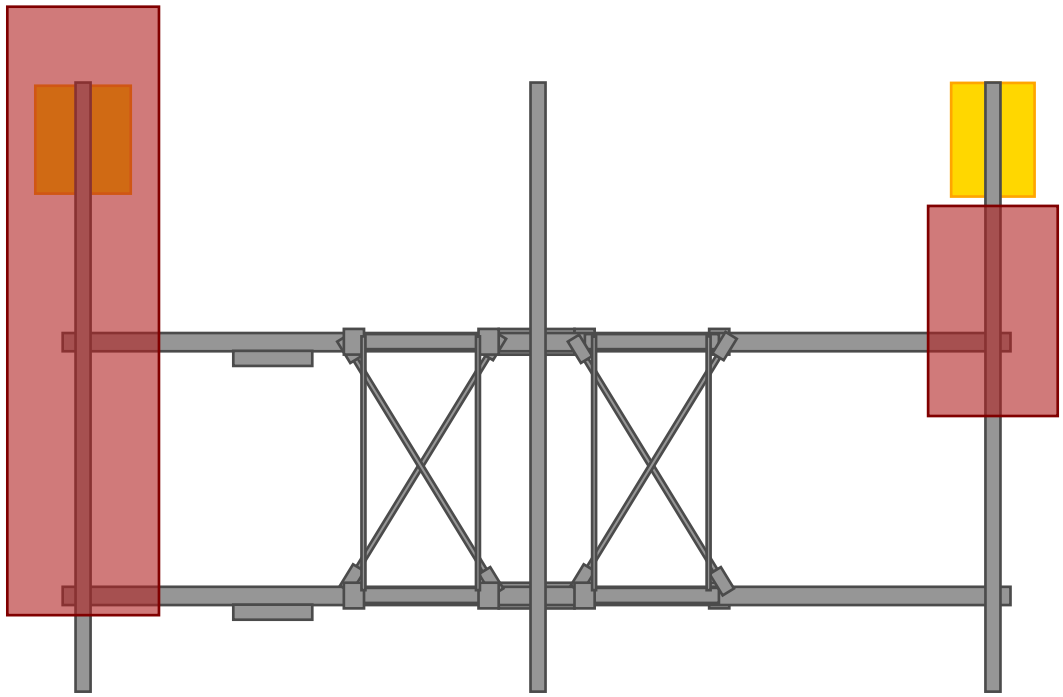
		No Ice						
--	--	w/ Ice						

EQUIPMENT SEISMIC FORCE CALCULATIONS

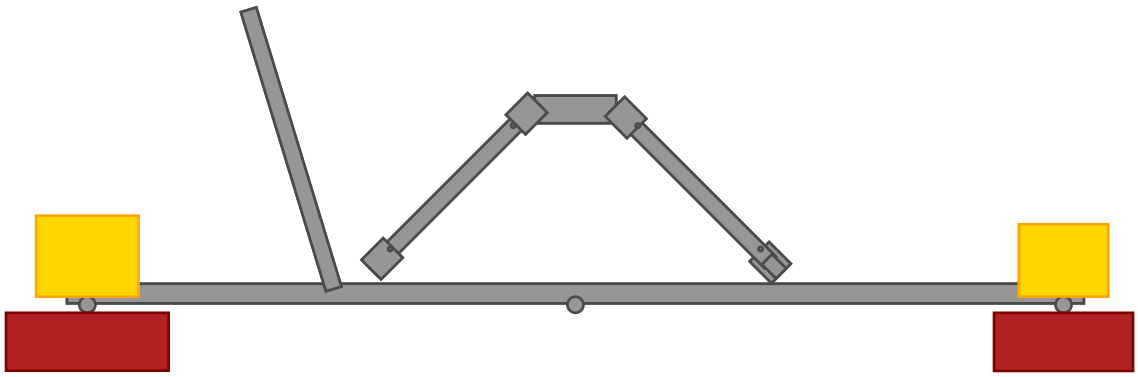
Appurtenance Name	*Qty.*	*Elevation [ft]*	*Weight [lbs]*	F_p [lbs]
AIR6449 B41_T-MOBILE	1	119	114.63	11.88
APXVAALL24_43-U-NA20_TMO	1	119	149.9	15.54
RADIO 4449 B71 B85A_T-MOBILE	1	119	73.21	7.59
RADIO 4460 B2/B25 B66_TMO	1	119	109	11.30

ELEVATION VIEW



MP3 MP2 MP1

PLAN VIEW



1825 W. Walnut Hill Lane, Suite 120
Irving, Texas 75038

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Equipment Name	Total Quantity	Antenna Centerline	Mount Pipe Positions	Equipment Azimuths
AIR6449 B41_T-MOBILE	1	119	MP1	0
APXVAALL24_43-U-NA20_TMO	1	119	MP3	0
RADIO 4449 B71 B85A_T-MOBILE	1	119	MP1	0
RADIO 4460 B2/B25 B66_TMO	1	119	MP3	0

APPENDIX C

SOFTWARE ANALYSIS OUTPUT

(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 (in/sec^2)	386.4
Wall Mesh Size (in)	24
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Z
Global Member Orientation Plane	XY
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 15th(360-16): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 15th(360-16): LRFD
Cold Formed Steel Code	AISI S100-16: LRFD
Wood Code	None
Wood Temperature	< 100F
Concrete Code	None
Masonry Code	None
Aluminum Code	None - Building
Stainless Steel Code	None

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

Cold Formed Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E5 F)	Density[k/ft^3]	Yield[ksi]	Fu[ksi]
1	A653 SS Gr33	29500	11346	.3	.65	.49	33	45
2	A653 SS Gr50/1	29500	11346	.3	.65	.49	50	65

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Pipe 2.375" O.D S...	PIPE_2.0	Beam	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25
2	Pipe 2.875"O.D Sc...	PIPE_2.5	Beam	Pipe	A53 Gr.B	Typical	1.61	1.45	1.45	2.89
3	SR 3/4"	SR 3/4"	Beam	BAR	A36 Gr.36	Typical	.442	.016	.016	.031
4	Plate	PL 4"x0.625"	Beam	RECT	A36 Gr.36	Typical	2.5	.081	3.333	.293
5	SR 5/8"	SR 5/8_HRB	Beam	BAR	A36 Gr.36	Typical	.307	.007	.007	.015
6	D Plate	PL 2"x0.625"	Beam	RECT	A36 Gr.36	Typical	1.25	.041	.417	.131

Cold Formed Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	CF1	162T125-18	Beam	None	A653 SS Gr33	Typical	.078	.013	.042	9e-6

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	N5	Reaction	Reaction	Reaction	Reaction	Reaction	
2	N17	Reaction	Reaction	Reaction	Reaction	Reaction	
3	N79A	Reaction	Reaction	Reaction			
4	N80	Reaction	Reaction	Reaction			

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Self Weight	DL			-1		6			
2	Structure Wind X	WLX						51		
3	Structure Wind Y	WLY						51		
4	Wind Load 0 AZI	WLX					12			
5	Wind Load 30 AZI	None					12			
6	Wind Load 45 AZI	None					12			
7	Wind Load 60 AZI	None					12			
8	Wind Load 90 AZI	WLY					12			
9	Wind Load 120 AZI	None					12			
10	Wind Load 135 AZI	None					12			
11	Wind Load 150 AZI	None					12			
12	Ice Weight	OL1					6	51		
13	Ice Structure Wind X	OL2						51		
14	Ice Structure Wind Y	OL3						51		
15	Ice Wind Load 0 AZI	OL2					12			
16	Ice Wind Load 30 AZI	None					12			
17	Ice Wind Load 45 AZI	None					12			
18	Ice Wind Load 60 AZI	None					12			
19	Ice Wind Load 90 AZI	OL3					12			
20	Ice Wind Load 120 AZI	None					12			
21	Ice Wind Load 135 AZI	None					12			
22	Ice Wind Load 150 AZI	None					12			
23	Seismic Load X	ELX	-.104				6			
24	Seismic Load Y	ELY		-.104			6			
25	Live Load 1 (Lv)	None					1			
26	Live Load 2 (Lv)	None					1			
27	Live Load 3 (Lv)	None					1			
28	Maintenance Load 1 (...	None					1			
29	Maintenance Load 2 (...	None					1			
30	Maintenance Load 3 (...	None					1			

Load Combinations

	Description	Sol...	PD...	SR...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...
1	1.4DL	Yes	Y		DL	1.4																				
2	1.2DL + 1...	Yes	Y		DL	1.2	2	1	3		4	1														
3	1.2DL + 1...	Yes	Y		DL	1.2	2	.866	3	.5	5	1														
4	1.2DL + 1...	Yes	Y		DL	1.2	2	.707	3	.707	6	1														
5	1.2DL + 1...	Yes	Y		DL	1.2	2	.5	3	.866	7	1														
6	1.2DL + 1...	Yes	Y		DL	1.2	2		3	1	8	1														
7	1.2DL + 1...	Yes	Y		DL	1.2	2	-.5	3	.866	9	1														
8	1.2DL + 1...	Yes	Y		DL	1.2	2	-.707	3	.707	10	1														

Load Combinations (Continued)

	Description	Sol...	PD...	SR...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...
9	1.2DL + 1...	Yes	Y		DL	1.2	2	-.866	3	.5	11	1												
10	1.2DL + 1...	Yes	Y		DL	1.2	2	-1	3		4	-1												
11	1.2DL + 1...	Yes	Y		DL	1.2	2	-.866	3	-.5	5	-1												
12	1.2DL + 1...	Yes	Y		DL	1.2	2	-.707	3	-.707	6	-1												
13	1.2DL + 1...	Yes	Y		DL	1.2	2	-.5	3	-.866	7	-1												
14	1.2DL + 1...	Yes	Y		DL	1.2	2		3	-1	8	-1												
15	1.2DL + 1...	Yes	Y		DL	1.2	2	.5	3	-.866	9	-1												
16	1.2DL + 1...	Yes	Y		DL	1.2	2	.707	3	-.707	10	-1												
17	1.2DL + 1...	Yes	Y		DL	1.2	2	.866	3	-.5	11	-1												
18	0.9DL + 1...	Yes	Y		DL	.9	2	1	3		4	1												
19	0.9DL + 1...	Yes	Y		DL	.9	2	.866	3	.5	5	1												
20	0.9DL + 1...	Yes	Y		DL	.9	2	.707	3	.707	6	1												
21	0.9DL + 1...	Yes	Y		DL	.9	2	.5	3	.866	7	1												
22	0.9DL + 1...	Yes	Y		DL	.9	2		3	1	8	1												
23	0.9DL + 1...	Yes	Y		DL	.9	2	-.5	3	.866	9	1												
24	0.9DL + 1...	Yes	Y		DL	.9	2	-.707	3	.707	10	1												
25	0.9DL + 1...	Yes	Y		DL	.9	2	-.866	3	.5	11	1												
26	0.9DL + 1...	Yes	Y		DL	.9	2	-1	3		4	-1												
27	0.9DL + 1...	Yes	Y		DL	.9	2	-.866	3	-.5	5	-1												
28	0.9DL + 1...	Yes	Y		DL	.9	2	-.707	3	-.707	6	-1												
29	0.9DL + 1...	Yes	Y		DL	.9	2	-.5	3	-.866	7	-1												
30	0.9DL + 1...	Yes	Y		DL	.9	2		3	-1	8	-1												
31	0.9DL + 1...	Yes	Y		DL	.9	2	.5	3	-.866	9	-1												
32	0.9DL + 1...	Yes	Y		DL	.9	2	.707	3	-.707	10	-1												
33	0.9DL + 1...	Yes	Y		DL	.9	2	.866	3	-.5	11	-1												
34	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13	1	14		15	1										
35	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13	.866	14	.5	16	1										
36	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13	.707	14	.707	17	1										
37	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13	.5	14	.866	18	1										
38	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13		14	1	19	1										
39	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13	-.5	14	.866	20	1										
40	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13	-.707	14	.707	21	1										
41	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13	-.866	14	.5	22	1										
42	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13	-1	14		15	-1										
43	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13	-.866	14	-.5	16	-1										
44	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13	-.707	14	-.707	17	-1										
45	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13	-.5	14	-.866	18	-1										
46	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13		14	-1	19	-1										
47	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13	.5	14	-.866	20	-1										
48	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13	.707	14	-.707	21	-1										
49	1.2DL + 1...	Yes	Y		DL	1.2	OL1	1	13	.866	14	-.5	22	-1										
50	(1.2+0.2S...	Yes	Y		DL	1.235	23	1	24															
51	(1.2+0.2S...	Yes	Y		DL	1.235	23	.866	24	.5														
52	(1.2+0.2S...	Yes	Y		DL	1.235	23	.707	24	.707														
53	(1.2+0.2S...	Yes	Y		DL	1.235	23	.5	24	.866														
54	(1.2+0.2S...	Yes	Y		DL	1.235	23		24	1														
55	(1.2+0.2S...	Yes	Y		DL	1.235	23	-.5	24	.866														
56	(1.2+0.2S...	Yes	Y		DL	1.235	23	-.707	24	.707														
57	(1.2+0.2S...	Yes	Y		DL	1.235	23	-.866	24	.5														
58	(1.2+0.2S...	Yes	Y		DL	1.235	23	-1	24															
59	(1.2+0.2S...	Yes	Y		DL	1.235	23	-.866	24	-.5														
60	(1.2+0.2S...	Yes	Y		DL	1.235	23	-.707	24	-.707														
61	(1.2+0.2S...	Yes	Y		DL	1.235	23	-.5	24	-.866														
62	(1.2+0.2S...	Yes	Y		DL	1.235	23		24	-1														
63	(1.2+0.2S...	Yes	Y		DL	1.235	23	.5	24	-.866														
64	(1.2+0.2S...	Yes	Y		DL	1.235	23	.707	24	-.707														
65	(1.2+0.2S...	Yes	Y		DL	1.235	23	.866	24	-.5														

Load Combinations (Continued)

	Description	Sol..	PD..	SR..	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...
66	(0.9-0.2Sd..	Yes	Y		DL	.865	23	1	24															
67	(0.9-0.2Sd..	Yes	Y		DL	.865	23	.866	24	.5														
68	(0.9-0.2Sd..	Yes	Y		DL	.865	23	.707	24	.707														
69	(0.9-0.2Sd..	Yes	Y		DL	.865	23	.5	24	.866														
70	(0.9-0.2Sd..	Yes	Y		DL	.865	23		24	1														
71	(0.9-0.2Sd..	Yes	Y		DL	.865	23	-.5	24	.866														
72	(0.9-0.2Sd..	Yes	Y		DL	.865	23	-.707	24	.707														
73	(0.9-0.2Sd..	Yes	Y		DL	.865	23	-.866	24	.5														
74	(0.9-0.2Sd..	Yes	Y		DL	.865	23	-1	24															
75	(0.9-0.2Sd..	Yes	Y		DL	.865	23	-.866	24	-.5														
76	(0.9-0.2Sd..	Yes	Y		DL	.865	23	-.707	24	-.707														
77	(0.9-0.2Sd..	Yes	Y		DL	.865	23	-.5	24	-.866														
78	(0.9-0.2Sd..	Yes	Y		DL	.865	23		24	-1														
79	(0.9-0.2Sd..	Yes	Y		DL	.865	23	.5	24	-.866														
80	(0.9-0.2Sd..	Yes	Y		DL	.865	23	.707	24	-.707														
81	(0.9-0.2Sd..	Yes	Y		DL	.865	23	.866	24	-.5														
82	1.2DL + 1...	Yes	Y		DL	1.2	25	1.5																
83	1.2DL + 1...	Yes	Y		DL	1.2	26	1.5																
84	1.2DL + 1...	Yes	Y		DL	1.2	27	1.5																
85	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2	.049	3		4	.049										
86	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2	.043	3	.025	5	.049										
87	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2	.035	3	.035	6	.049										
88	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2	.025	3	.043	7	.049										
89	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2		3	.049	8	.049										
90	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2	-.025	3	.043	9	.049										
91	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2	-.035	3	.035	10	.049										
92	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2	-.043	3	.025	11	.049										
93	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2	-.049	3		4	-.049										
94	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2	-.043	3	-.025	5	-.049										
95	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2	-.035	3	-.035	6	-.049										
96	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2	-.025	3	-.043	7	-.049										
97	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2		3	-.049	8	-.049										
98	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2	.025	3	-.043	9	-.049										
99	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2	.035	3	-.035	10	-.049										
100	1.2DL + 1...	Yes	Y		DL	1.2	28	1.5	2	.043	3	-.025	11	-.049										
101	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2	.049	3		4	.049										
102	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2	.043	3	.025	5	.049										
103	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2	.035	3	.035	6	.049										
104	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2	.025	3	.043	7	.049										
105	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2		3	.049	8	.049										
106	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2	-.025	3	.043	9	.049										
107	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2	-.035	3	.035	10	.049										
108	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2	-.043	3	.025	11	.049										
109	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2	-.049	3		4	-.049										
110	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2	-.043	3	-.025	5	-.049										
111	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2	-.035	3	-.035	6	-.049										
112	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2	-.025	3	-.043	7	-.049										
113	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2		3	-.049	8	-.049										
114	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2	.025	3	-.043	9	-.049										
115	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2	.035	3	-.035	10	-.049										
116	1.2DL + 1...	Yes	Y		DL	1.2	29	1.5	2	.043	3	-.025	11	-.049										
117	1.2DL + 1...	Yes	Y		DL	1.2	30	1.5	2	.049	3		4	.049										
118	1.2DL + 1...	Yes	Y		DL	1.2	30	1.5	2	.043	3	.025	5	.049										
119	1.2DL + 1...	Yes	Y		DL	1.2	30	1.5	2	.035	3	.035	6	.049										
120	1.2DL + 1...	Yes	Y		DL	1.2	30	1.5	2	.025	3	.043	7	.049										
121	1.2DL + 1...	Yes	Y		DL	1.2	30	1.5	2		3	.049	8	.049										
122	1.2DL + 1...	Yes	Y		DL	1.2	30	1.5	2	-.025	3	.043	9	.049										

Load Combinations (Continued)

	Description	Sol...	PD...	SR...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...
123	1.2DL + 1....	Yes	Y		DL	1.2	30	1.5	2	-.035	3	.035	10	.049										
124	1.2DL + 1....	Yes	Y		DL	1.2	30	1.5	2	-.043	3	.025	11	.049										
125	1.2DL + 1....	Yes	Y		DL	1.2	30	1.5	2	-.049	3		4	-.049										
126	1.2DL + 1....	Yes	Y		DL	1.2	30	1.5	2	-.043	3	-.025	5	-.049										
127	1.2DL + 1....	Yes	Y		DL	1.2	30	1.5	2	-.035	3	-.035	6	-.049										
128	1.2DL + 1....	Yes	Y		DL	1.2	30	1.5	2	-.025	3	-.043	7	-.049										
129	1.2DL + 1....	Yes	Y		DL	1.2	30	1.5	2		3	-.049	8	-.049										
130	1.2DL + 1....	Yes	Y		DL	1.2	30	1.5	2	.025	3	-.043	9	-.049										
131	1.2DL + 1....	Yes	Y		DL	1.2	30	1.5	2	.035	3	-.035	10	-.049										
132	1.2DL + 1....	Yes	Y		DL	1.2	30	1.5	2	.043	3	-.025	11	-.049										

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N5	max	904.41	33	1239.418	122	1899.267	34	295.978	98	-532.686	26	0	132
2		min	-2204.117	41	-967.517	98	509.562	26	-391.764	122	-2047.394	34	0	1
3	N17	max	1939.706	48	936.925	94	599.155	42	132.782	98	-110.646	18	0	132
4		min	402.442	23	-1208.011	118	127.52	18	-175.695	122	-640.629	42	0	1
5	N79A	max	927.117	4	293.534	4	22.538	44	0	132	0	132	0	132
6		min	-856.786	28	-271.739	28	4.663	20	0	1	0	1	0	1
7	N80	max	405.262	85	123.777	86	23.048	45	0	132	0	132	0	132
8		min	-475.155	125	-145.715	126	5.381	70	0	1	0	1	0	1
9	Totals:	max	1722.131	2	881.853	7	2526.172	40						
10		min	-1722.131	26	-881.852	31	707.68	79						

Envelope AISC 15th(360-16): LRFD Steel Code Checks

	Member	Shape	Code Check	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	phi*Pnc ...	phi*Pnt [...	phi*Mn y...	phi*Mn z...	Cb	Eqn
1	MP3	PIPE_2.0	.727	40	2	.234	40		2	14916.0...	32130	1871.625	1871.625	1	H1-1b
2	M13	PL 4"x0.625"	.604	6	1...	.185	6	y	1...	76418.78	81000	1054.688	6750	1	H1-1b
3	MP1	PIPE_2.0	.542	80	96	.135	40		2	14916.0...	32130	1871.625	1871.625	1	H1-1b
4	M19	PIPE_2.5	.530	43.75	10	.217	45.313		10	41048.6...	50715	3596.25	3596.25	1	H1-1b
5	MP2	PIPE_2.0	.442	40	10	.054	40		10	14916.0...	32130	1871.625	1871.625	1...	H1-1b
6	M16	PL 4"x0.625"	.373	6	1...	.098	6	y	1...	76418.78	81000	1054.688	6750	1...	H1-1b
7	M45	SR 5/8_HRB	.337	18.75	34	.011	0		1...	2503.081	9940.19	103.542	103.542	1	H1-1a
8	M42	PL 4"x0.625"	.310	4.512	1...	.074	2.209	y	1...	79311.0...	81000	1054.688	6750	1...	H1-1b
9	H1	PIPE_2.5	.301	43.75	1...	.098	43.75		10	41048.6...	50715	3596.25	3596.25	1	H1-1b
10	M39	SR 5/8_HRB	.280	14.583	85	.015	0		1...	2503.081	9940.19	103.542	103.542	1	H1-1a
11	M17	PL 4"x0.625"	.270	4.512	96	.066	2.209	y	86	79311.0...	81000	1054.688	6750	1...	H1-1b
12	M41	PL 4"x0.625"	.260	2.209	1...	.095	4.512	y	1...	79311.0...	81000	1054.688	6750	1	H1-1b
13	M40	PL 4"x0.625"	.230	0	1...	.095	2.303	y	1...	79311.0...	81000	1054.688	6750	1...	H1-1b
14	M15	PL 4"x0.625"	.220	2.209	85	.084	2.209	y	1...	79311.0...	81000	1054.688	6750	1	H1-1b
15	M24	PIPE_2.0	.213	2.188	1...	.065	2.188		1...	29810.2...	32130	1871.625	1871.625	1...	H1-1b
16	M22	PIPE_2.0	.197	2.188	1...	.083	27.813		1...	29810.2...	32130	1871.625	1871.625	1	H1-1b
17	M14	PL 4"x0.625"	.194	0	96	.084	0	y	1...	79311.0...	81000	1054.688	6750	1	H1-1b
18	M21	PIPE_2.0	.176	27.813	85	.055	27.813		1...	29810.2...	32130	1871.625	1871.625	1...	H1-1b
19	M1	SR 3/4"	.159	0	1...	.007	0		1...	4289.781	14313.8...	178.929	178.929	1	H1-1b*
20	M23	PIPE_2.0	.150	2.188	1...	.074	27.813		86	29810.2...	32130	1871.625	1871.625	1	H1-1b
21	M44	SR 5/8_HRB	.146	40	41	.013	0		1...	2503.081	9940.19	103.542	103.542	1	H1-1b*
22	M3	SR 3/4"	.142	44	98	.007	0		5	4289.781	14313.8...	178.929	178.929	1	H1-1b*
23	M38	SR 5/8_HRB	.131	40	94	.017	0		1...	2503.081	9940.19	103.542	103.542	1	H1-1b*
24	M43	PL 4"x0.625"	.112	2.209	1...	.074	4.512	y	1...	79311.0...	81000	1054.688	6750	1...	H1-1b
25	M34	PL 4"x0.625"	.092	2.209	94	.066	4.512	y	86	79311.0...	81000	1054.688	6750	1	H1-1b
26	M29	PL 2"x0.625"	.038	4.46	45	.003	4.46	y	1...	39953.2...	40500	527.345	1687.5	1...	H1-1b
27	M27	PL 2"x0.625"	.036	0	35	.003	0	y	17	39953.2...	40500	527.345	1687.5	1...	H1-1b
28	M56	PIPE_2.0	.036	42.863	4	.002	0		46	27148.6	32130	1871.625	1871.625	1	H1-1b*

Envelope AISC 15th(360-16): LRFD Steel Code Checks (Continued)

	Member	Shape	Code Check	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	phi*Pnc ...	phi*Pnt [...	phi*Mn y...	phi*Mn z...	Cb	Eqn
29	M25	PL 2"x0.625"	.032	0	90	.003	0	y	5	39953.2...	40500	527.345	1687.5	1...	H1-1b
30	M31	PL 2"x0.625"	.029	4.46	98	.003	4.46	y	5	39953.2...	40500	527.345	1687.5	1	H1-1b
31	M58A	PIPE_2.0	.016	42.863	85	.002	0		46	27148.6	32130	1871.625	1871.625	1	H1-1b*
32	M28	PL 2"x0.625"	.005	0	37	.001	0	y	40	39953.2...	40500	527.345	1687.5	1...	H1-1b
33	M30	PL 2"x0.625"	.005	4.46	37	.001	4.46	y	40	39953.2...	40500	527.345	1687.5	1...	H1-1b
34	M32	PL 2"x0.625"	.005	4.46	47	.001	4.46	y	44	39953.2...	40500	527.345	1687.5	1...	H1-1b
35	M26	PL 2"x0.625"	.005	0	47	.001	0	y	44	39953.2...	40500	527.345	1687.5	1...	H1-1b
36	M2	SR 3/4"	.000	0	1...	.000	0		1...	4289.781	14313.8...	178.929	178.929	1	H1-1a
37	M4	SR 3/4"	.000	0	1...	.000	0		1...	4289.781	14313.8...	178.929	178.929	1	H1-1a

Envelope AISI S100-16: LRFD Cold Formed Steel Code Checks

Member	Shape	Code ...	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	phi*Pn[lb]	phi*Tn[lb]	phi*Mny...	phi*Mnz...	phi*V...	phi*V...	Cb	Eqn
No Data to Print ...																

APPENDIX D

ADDITIONAL CALCUATIONS

Trylon

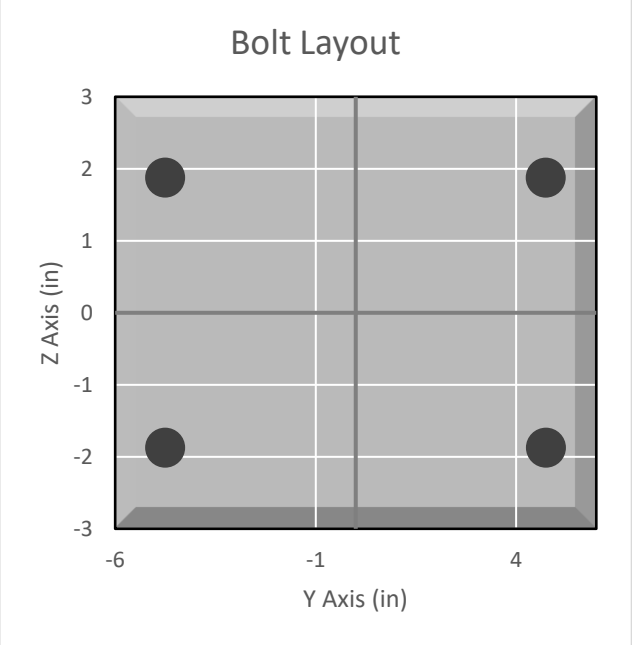
Analysis date: 8/24/2021

BOLT TOOL 1.5.2

Project Data	
Job Code:	190496
Carrier Site ID:	CT11381C
Carrier Site Name:	VATERFORD SOUTH/RT

Code	
Design Standard:	TIA-222-H
Slip Check:	Yes
Pretension Standard:	TIA-222-H

Bolt Properties		
Connection Type:	Threaded Rod	
Diameter:	0.625	in
Grade:	SAE J429 Gr.	--
Yield Strength (Fy):	57	ksi
Ultimate Strength (Fu):	74	ksi
Number of Bolts:	4	--
Threads Included:	Yes	--
Double Shear:	No	--
Connection Pipe Size:	9.5	in



Connection Description
Mounting Kit to Monopole Collar

Bolt Check*		
Tensile Capacity (ϕT_n):	12543.1	lbs
Shear Capacity (ϕV_n):	8513.6	lbs
Tension Force (T_u):	3786.3	lbs
Shear Force (V_u):	610.8	lbs
Tension Usage:	28.7%	--
Shear Usage:	6.8%	--
Interaction:	28.7%	Pass
Controlling Member:	M7	--
Controlling LC:	41	--

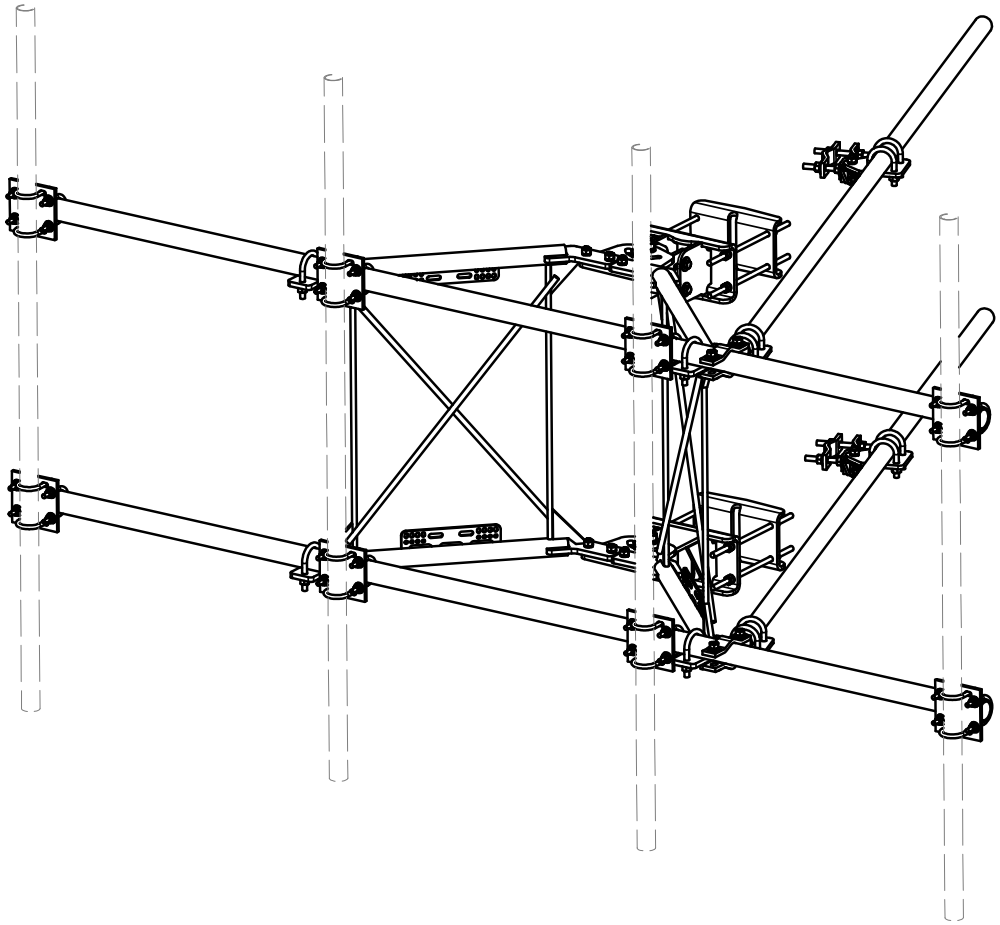
**Rating per TIA-222-H Section 15.5*

Slip Check*		
Sliding Capacity (ϕR_{ns}):	13403.7	lbs
Torsion Capacity (ϕR_{nr}):	5305.6	lb-ft
Sliding Force (V_{us}):	1883.3	lbs
Torsional Force (T_{ur}):	0.0	lb-ft
Sliding Usage:	13.4%	--
Torsion Usage:	0.0%	--
Interaction:	13.4%	Pass
Controlling Member:	M7	--
Controlling LC:	41	--

**Rating per TIA-222-H Section 15.5*

APPENDIX E

SUPPLEMENTAL DRAWINGS



PARTS LIST

ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	2	X-VFAW	SUPPORT ARM		71.41	142.81
2	1	X-HDCAMTBW	CLAMP WELDMENT FOR BCAM-HD		33.86	33.86
3	1	X-MHTPHD	MULTI-HOLE TAPER PLATE WELDMENT		36.24	36.24
4	2	X-VFAPL4	VFA-HD PIVOT PLATE	12 in	15.88	31.77
5	2	X-LCBP4	BENT BACKING PLATE	13 in	19.00	38.01
6	1	X-HDCAMSS	ANGLE ADJUSTMENT WELDMENT FOR BCAM-HD		16.39	16.39
7	4	X-SPTB	SLIDING PIPE TIE BACK PLATE	5 1/2 in	5.87	23.49
8	1	X-HDCAMSP	POSITIONING PLATE WELDMENT FOR BCAM-HD		2.58	2.58
9	4	X-TBCA	TIE BACK CLIP ANGLE		2.01	8.02
10	8	SCX2	CROSSOVER PLATE	7 in	4.80	38.37
11	4	MCP	CLAMP HALF 1/2" THICK, 11-5/8" LONG	12 1/16 in	3.59	14.37
12	8	DCP	1/2" THICK, 5-3/4" CNTER TO CENTER CLAMP HALF	8 1/8 in	2.36	18.90
13	2	P2126	2-3/8" X 126" (2" SCH. 40) GALVANIZED PIPE	126 in	40.75	81.50
14	2	P30150	2-7/8" X 150" (2-1/2" SCH. 40) GALVANIZED PIPE	150 in	76.94	153.87
15	4	A34212	3/4" x 2-1/2" UNC HEX BOLT (A325)	2 1/2 in	0.48	1.92
16	4	G34FW	3/4" HDG USS FLATWASHER		0.06	0.24
17	4	G34LW	3/4" HDG LOCKWASHER		0.04	0.17
18	4	G34NUT	3/4" HDG HEAVY 2H HEX NUT		0.21	0.85
19	8	G58R-18	5/8" x 18" THREADED ROD (HDG.)	18 in	0.40	3.19
20	4	G58R-12	5/8" x 12" THREADED ROD (HDG.)		1.05	4.18
21	4	G58R-8	5/8" x 8" THREADED ROD (HDG.)		0.70	2.79
22	4	X-UB5300	5/8" X 3" X 5-1/4" X 2-1/2" U-BOLT (HDG.)		1.15	4.60
23	8	X-UB5258	5/8" X 2-5/8" X 4-1/2" X 2" U-BOLT (HDG.)		1.00	8.00
24	2	G5807	5/8" x 7" HDG HEX BOLT GR5 FULL THREAD	7 in	0.70	1.41
25	1	G5806	5/8" x 6" HDG HEX BOLT GR5 FULL THREAD	6 in	0.62	0.62
26	8	G5804	5/8" x 4" HDG HEX BOLT GR5		0.44	3.55
27	4	G5802	5/8" x 2" HDG HEX BOLT GR5		0.27	1.08
28	8	A582114	5/8" x 2-1/4" HDG A325 HEX BOLT	2 1/4 in	0.31	2.50
29	25	G58FW	5/8" HDG USS FLATWASHER	1/8 in	0.07	1.76
30	66	G58LW	5/8" HDG LOCKWASHER		0.03	1.72
31	71	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	9.22
32	32	X-UB1300	1/2" X 3" X 5" X 2" GALV U-BOLT		0.74	23.64
33	16	X-UB1212	1/2" X 2" X 3" X 1-1/4" U-BOLT (HDG.)		0.60	9.56
34	64	G12FW	1/2" HDG USS FLATWASHER	3/32 in	0.03	2.18
35	64	G12LW	1/2" HDG LOCKWASHER	1/8 in	0.01	0.89
36	64	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	4.58
					TOTAL WT. #	738.06

REVISION HISTORY

REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
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V-FRAME ASSEMBLY
WITH TWO STIFF ARMS

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A valmont COMPANY

Engineering Support Team:
1-888-753-7446

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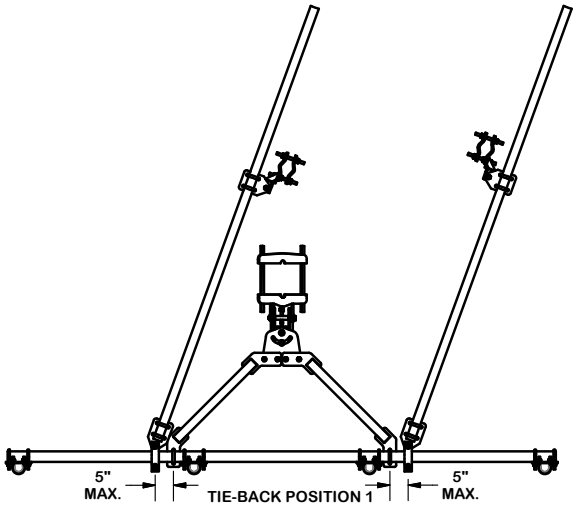
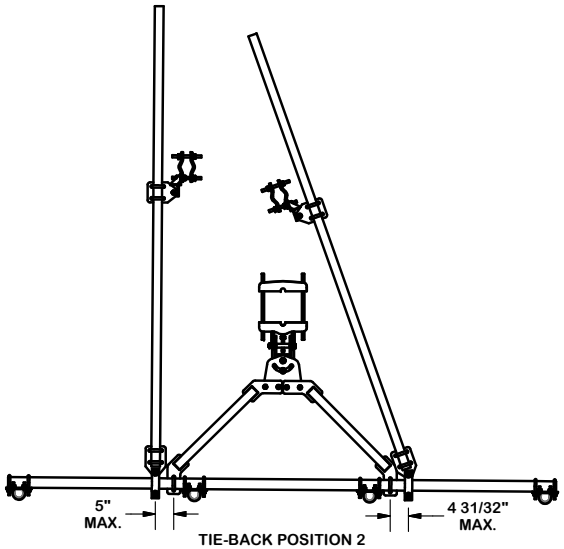
CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	02	CUSTOMER	BMC 12/13/2017	VFA12-HD

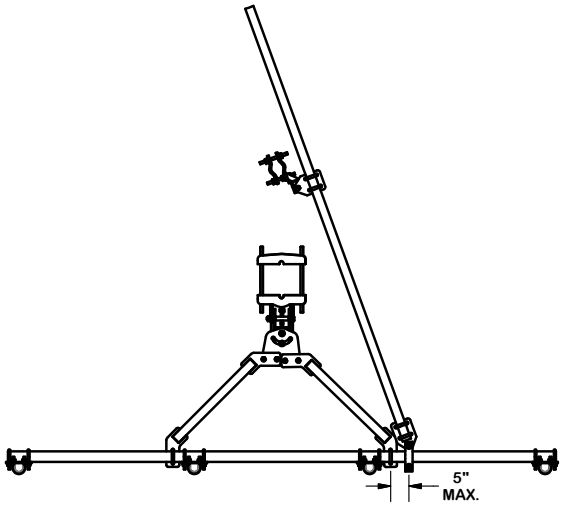
TIE-BACK POSITIONS



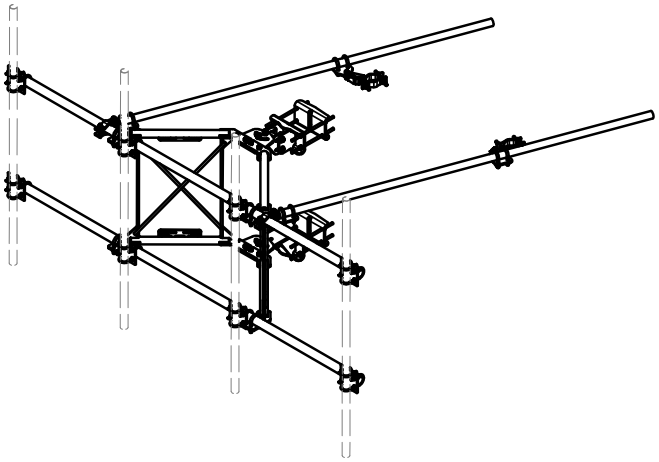
TIE-BACK POSITION 1
-20° / +20° TOP PARALLEL

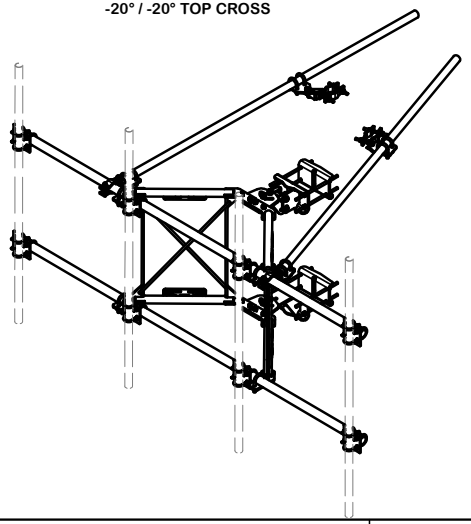


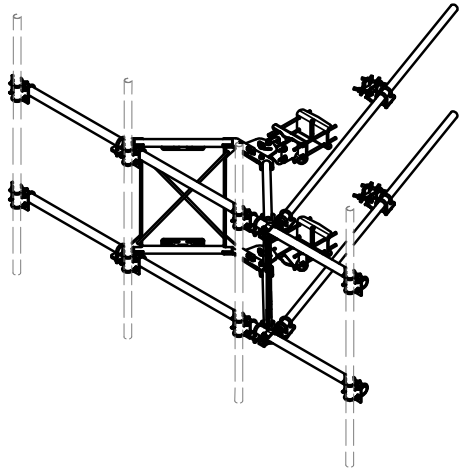
TIE-BACK POSITION 2
-20° / -20° TOP CROSS



TIE-BACK POSITION 3
-20° SAME SIDE STACKED







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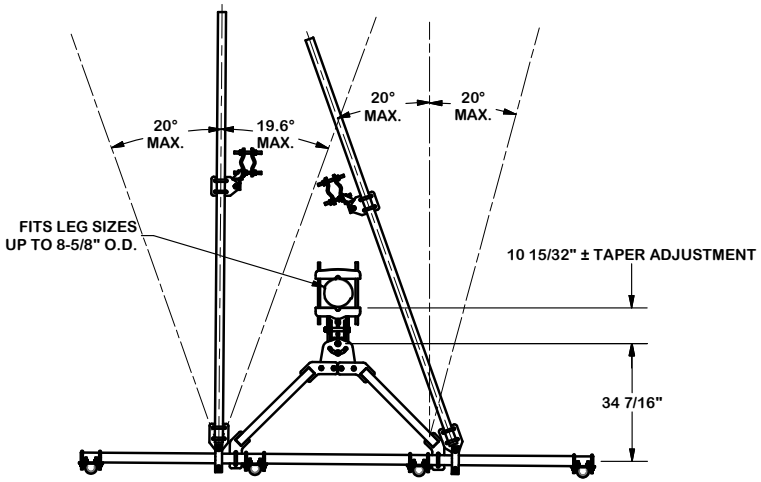
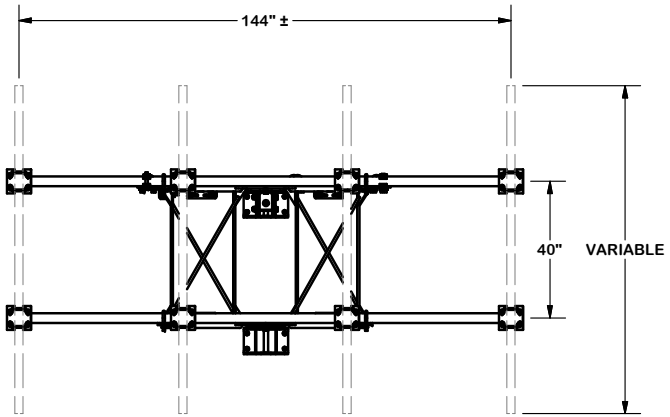
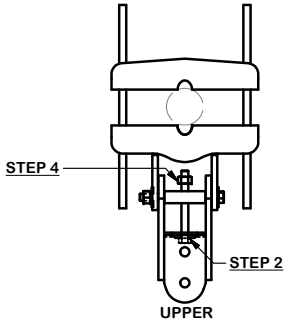
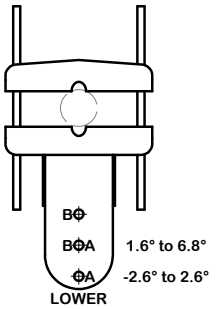


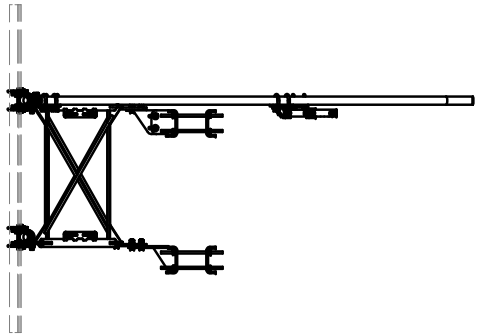


ANGLE CALIBRATING PROCEDURE:

1. MEASURE TOWER TAPER AND PICK LOWER BRACKET HOLE:
   - HOLE A = -2.6° TO 2.6°
   - HOLE B = 1.6° TO 6.8°
2. USE CALIBRATING BOLT TO ADJUST FRAME TO DESIRED TAPER
3. TORQUE LOCKING BOLTS TO 100 ft.-lbs.
4. ADVANCE LOCKING NUT TO POSITIONING PLATE, THEN TIGHTEN.







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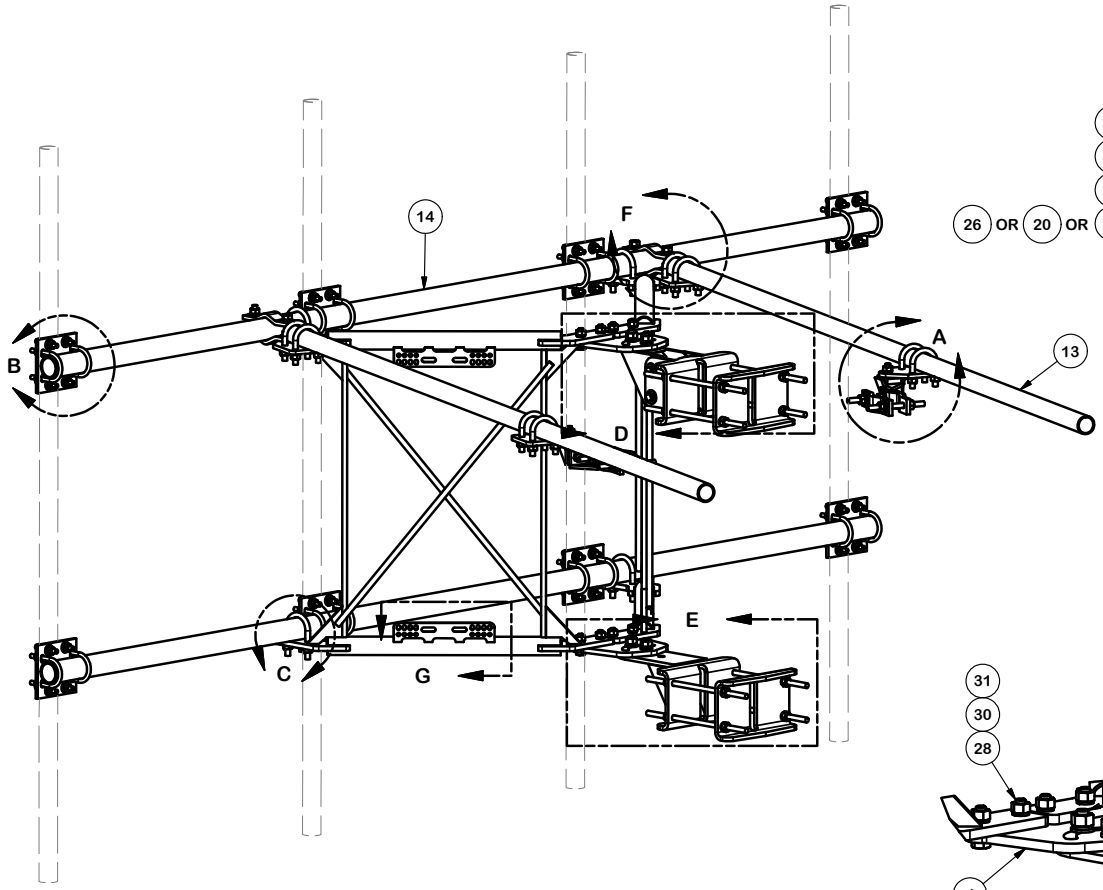
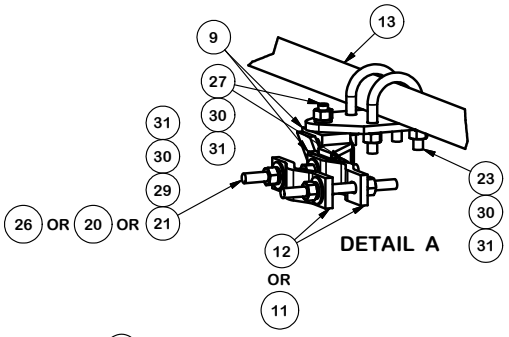
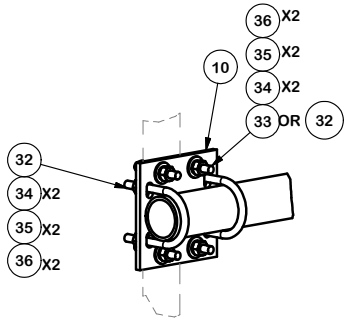
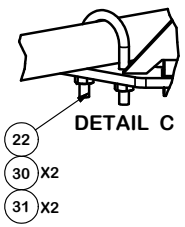




DETAIL A



DETAIL B



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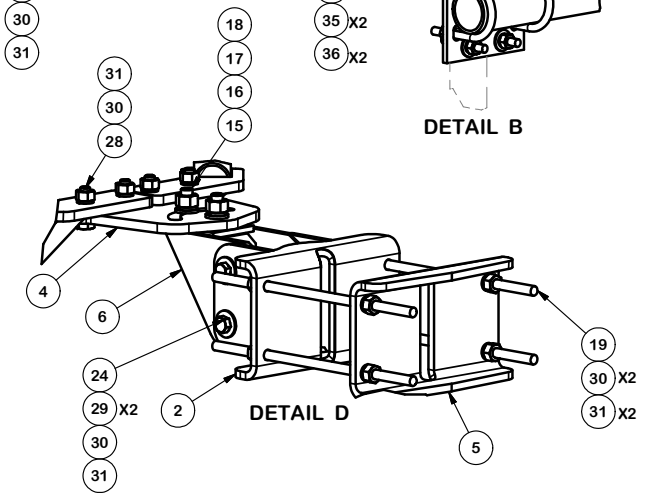
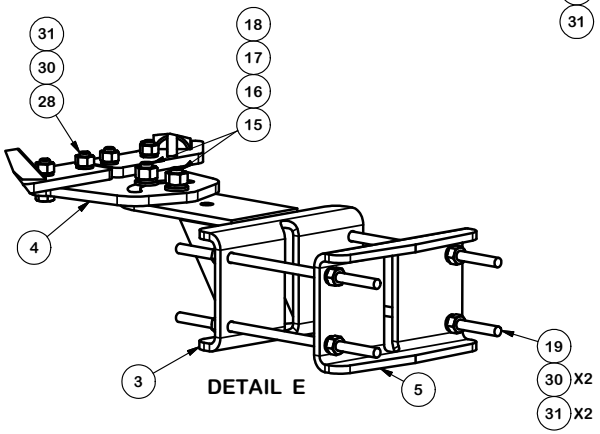
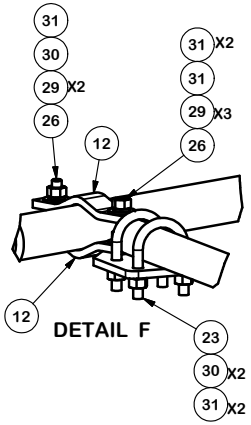


DETAIL D



DETAIL E

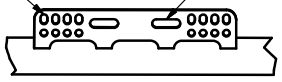


DETAIL F

7/16" LUG HOLES

REVIEW CARRIER STANDARDS FOR PROPER SURFACE PREPARTION AND ASSEMBLY OF ELECTRICAL CONNECTIONS

9/16" SLOTTED HOLE FOR EQUIPMENT PIPE U-BOLT



DETAIL G

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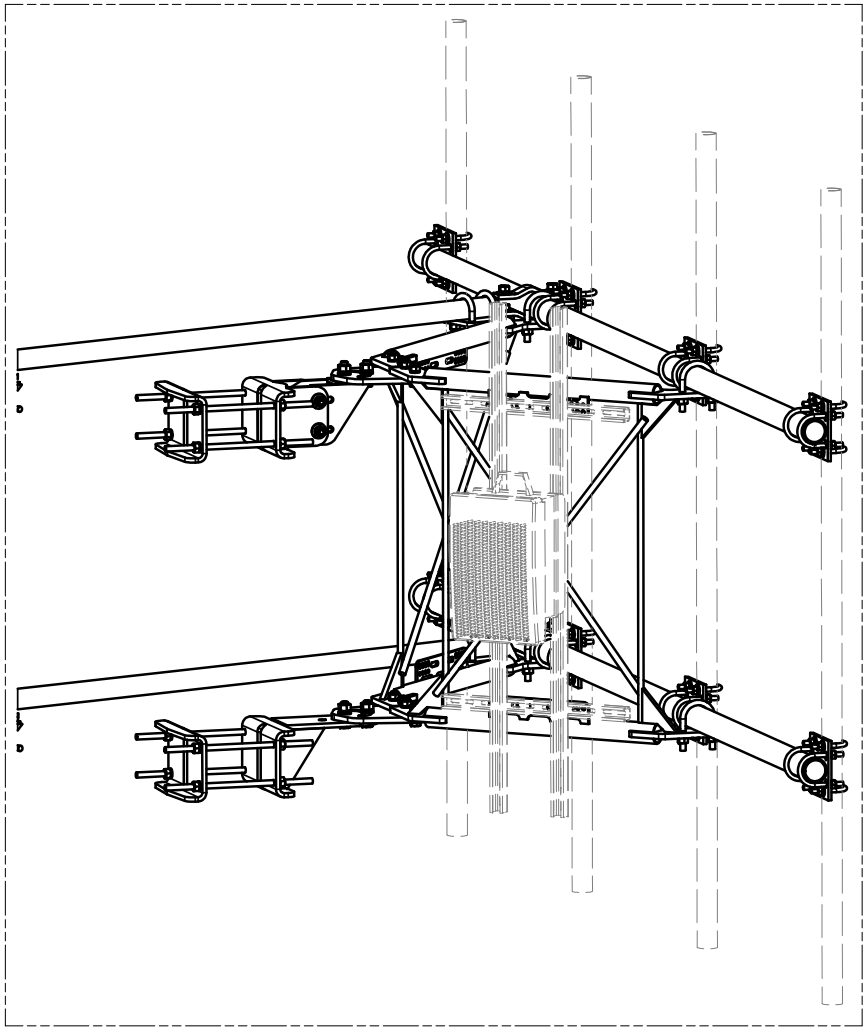
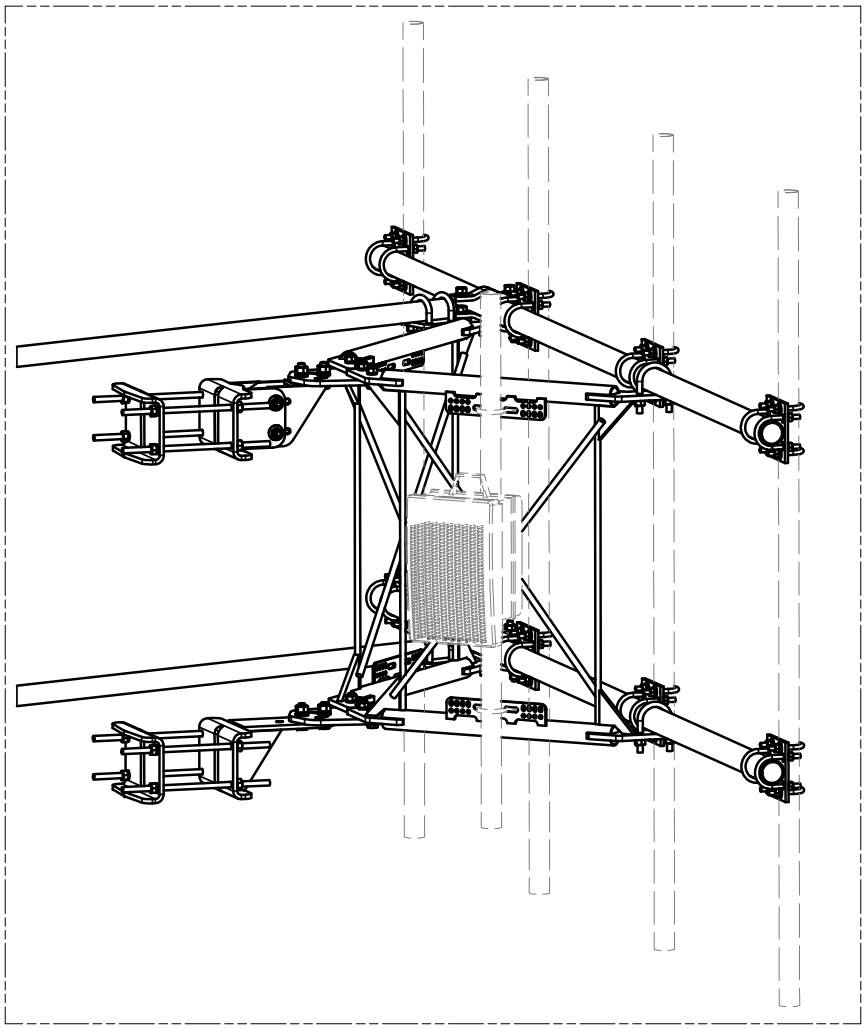


UNISTRUT AND HARDWARE
SOLD SEPARATELY.

REQUIRES 3/8" HARDWARE



EQUIPMENT PIPE AND HARDWARE
SOLD SEPARATELY.

REQUIRES 1/2" HARDWARE
AND 2-3/8" TO 4-1/2" O.D. PIPE

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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: CT11381C

876338
41 Manitock Hill Road
Waterford, Connecticut 06385

October 13, 2021

EBI Project Number: 6221005725

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**36.97%**

October 13, 2021

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

Emissions Analysis for Site: CT11381C - 876338

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **41 Manitock Hill Road** in **Waterford, 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 41 Manitock Hill Road in Waterford, 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 power density calculations, the broadcast footprint of the AIR6449 antenna has been considered. Due to the beamforming nature of this antenna, the actual beam locations vary depending on demand and are narrow in nature. Using the broadcast footprint accounts for the potential location of beams at any given time.

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) 1 NR channel (600 MHz Band) was considered for each sector of the proposed installation. This Channel has a transmit power of 80 Watts.

3) 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.

4) 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.

5) 2 UMTS channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

6) 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.

7) 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.

8) 1 LTE Traffic channel (LTE 1C and 2C BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 60 Watts.

9) 1 LTE Broadcast channel (LTE 1C and 2C BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 20 Watts.

10) 1 NR Traffic channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 120 Watts.

11) 1 NR Broadcast channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 40 Watts.

12) 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.

13) 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.

14) The antennas used in this modeling are the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz channel(s), the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector A, the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz channel(s), the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector B, the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz channel(s), the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 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.

15) The antenna mounting height centerline of the proposed antennas is 119 feet above ground level (AGL).

16) 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.

17) 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 6449	Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449
Frequency Bands:	2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz
Gain:	22.65 dBd / 17.3 dBd / 22.65 dBd / 17.3 dBd	Gain:	22.65 dBd / 17.3 dBd / 22.65 dBd / 17.3 dBd	Gain:	22.65 dBd / 17.3 dBd / 22.65 dBd / 17.3 dBd
Height (AGL):	119 feet	Height (AGL):	119 feet	Height (AGL):	119 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):	36,356.09	ERP (W):	36,356.09	ERP (W):	36,356.09
Antenna A1 MPE %:	**10.24%**	Antenna B1 MPE %:	**10.24%**	Antenna C1 MPE %:	**10.24%**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APXVAALL24_43-U-NA20	Make / Model:	RFS APXVAALL24_43-U-NA20	Make / Model:	RFS APXVAALL24_43-U-NA20
Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 1900 MHz / 2100 MHz
Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd / 15.45 dBd / 16.45 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd / 15.45 dBd / 16.45 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd / 15.45 dBd / 16.45 dBd
Height (AGL):	119 feet	Height (AGL):	119 feet	Height (AGL):	119 feet
Channel Count:	15	Channel Count:	15	Channel Count:	15
Total TX Power (W):	620 Watts	Total TX Power (W):	620 Watts	Total TX Power (W):	620 Watts
ERP (W):	19,973.23	ERP (W):	19,973.23	ERP (W):	19,973.23
Antenna A2 MPE %:	**7.24%**	Antenna B2 MPE %:	**7.24%**	Antenna C2 MPE %:	**7.24%**

Site Composite MPE %	
Carrier	MPE %
T-Mobile (Max at Sector A):	17.47%
Nextel	0.39%
Sprint	3.09%
Metro PCS	0.69%
AT&T	8.75%
Verizon	6.58%
Site Total MPE % :	36.97%

T-Mobile MPE % Per Sector	
T-Mobile Sector A Total:	17.47%
T-Mobile Sector B Total:	17.47%
T-Mobile Sector C Total:	17.47%
Site Total MPE % :	36.97%

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 2500 MHz LTE 1C & 2C Traffic	1	11044.63	119.0	31.10	2500 MHz LTE 1C & 2C Traffic	1000	3.11%
T-Mobile 2500 MHz LTE 1C & 2C Broadcast	1	1074.06	119.0	3.02	2500 MHz LTE 1C & 2C Broadcast	1000	0.30%
T-Mobile 2500 MHz NR Traffic	1	22089.26	119.0	62.19	2500 MHz NR Traffic	1000	6.22%
T-Mobile 2500 MHz NR Broadcast	1	2148.13	119.0	6.05	2500 MHz NR Broadcast	1000	0.60%
T-Mobile 600 MHz LTE	2	591.73	119.0	3.33	600 MHz LTE	400	0.83%
T-Mobile 600 MHz NR	1	1577.94	119.0	4.44	600 MHz NR	400	1.11%
T-Mobile 700 MHz LTE	2	695.22	119.0	3.91	700 MHz LTE	467	0.84%
T-Mobile 1900 MHz GSM	4	1052.26	119.0	11.85	1900 MHz GSM	1000	1.19%
T-Mobile 1900 MHz UMTS	2	1052.26	119.0	5.93	1900 MHz UMTS	1000	0.59%
T-Mobile 1900 MHz LTE	2	2104.51	119.0	11.85	1900 MHz LTE	1000	1.19%
T-Mobile 2100 MHz LTE	2	2649.42	119.0	14.92	2100 MHz LTE	1000	1.49%
						Total:	**17.47%**

• 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:	17.47%
Sector B:	17.47%
Sector C:	17.47%
T-Mobile Maximum MPE % (Sector A):	17.47%
Site Total:	36.97%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **36.97%** 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.

T-Mobile

T-MOBILE SITE NUMBER: CT11381C
T-MOBILE SITE NAME: WATERFORD SOUTH/RT 1
SITE TYPE: SELF-SUPPORT TOWER
TOWER HEIGHT: 136'-0"

BUSINESS UNIT #: 876338
SITE ADDRESS: 41 MANITOCK HILL ROAD WATERFORD, CT 06385
COUNTY: NEW LONDON
JURISDICTION: CONNECTICUT SITING COUNCIL

T-MOBILE ANCHOR SITE CONFIGURATION: 67D5A998E OUTDOOR

SITE INFORMATION

CROWN CASTLE USA INC. SITE NAME:	WATERFORD
SITE ADDRESS:	41 MANITOCK HILL ROAD WATERFORD, CT 06385
COUNTY:	NEW LONDON
MAP/PARCEL #:	038 0154A
AREA OF CONSTRUCTION:	EXISTING
LATITUDE:	41.354639
LONGITUDE:	-72.150444
LAT/LONG TYPE:	NAD83
GROUND ELEVATION:	248 FT
CURRENT ZONING:	R-40
JURISDICTION:	CONNECTICUT SITING COUNCIL
OCCUPANCY CLASSIFICATION:	U
TYPE OF CONSTRUCTION:	IIB
A.D.A. COMPLIANCE:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION
PROPERTY OWNER:	NEW LONDON CITY OF 15 MASONIC ST NEW LONDON, CT 06320
TOWER OWNER:	CROWN CASTLE 2000 CORPORATE DRIVE CANONSBURG, PA 15317
CARRIER/APPLICANT:	T-MOBILE 35 GRIFFIN ROAD BLOOMFIELD, CT 06002
ELECTRIC PROVIDER:	BOZRAH LIGHT AND POWER CO
TELCO PROVIDER:	AT&T

PROJECT TEAM

A&E FIRM:	B+T GROUP 1717 S. BOULDER AVE. TULSA, OK 74119 MARVIN PHILLIPS MARVIN.PHILLIPS@BTGRP.COM
CROWN CASTLE USA INC. DISTRICT CONTACTS:	3 CORPORATE PARK DRIVE, SUITE 101 CLIFTON PARK, NY 12065

DRAWING INDEX

SHEET #	SHEET DESCRIPTION
T-1	TITLE SHEET
T-2	GENERAL NOTES
C-1.1	OVERALL SITE PLAN
C-1.2	SITE PLAN & ENLARGED SITE PLAN
C-2	FINAL ELEVATION & ANTENNA PLANS
C-3	ANTENNA & CABLE SCHEDULE
C-4	PLUMBING DIAGRAM
C-5	EQUIPMENT SPECS
E-1	AC PANEL SCHEDULES & ONE LINE DIAGRAM
G-1	ANTENNA GROUNDING DIAGRAM
G-2	GROUNDING DETAILS
G-3	GROUNDING DETAILS
ATTACHED	MOUNT ANALYSIS
ATTACHED	MOUNT SPECS

ALL DRAWINGS CONTAINED HEREIN ARE FORMATTED FOR 24X36. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

PROJECT DESCRIPTION

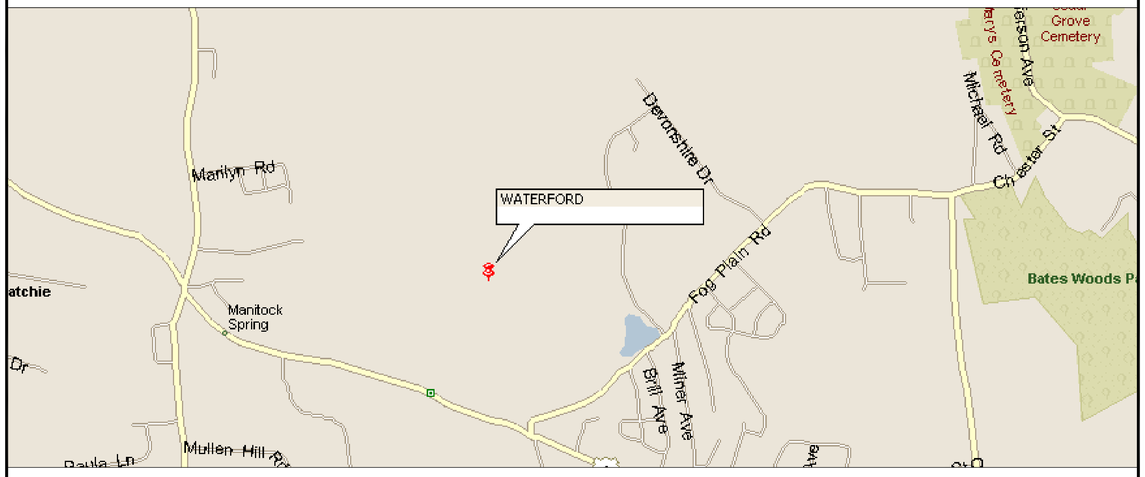
THE PURPOSE OF THIS PROJECT IS TO ENHANCE BROADBAND CONNECTIVITY AND CAPACITY TO THE EXISTING ELIGIBLE WIRELESS FACILITY.

TOWER SCOPE OF WORK:
- REMOVE (3) MOUNTS
- REMOVE (6) ANTENNAS
- REMOVE (3) TMAs
- REMOVE (12) 1-5/8" COAX CABLES
- REMOVE (1) 1-1/4" COAX CABLE
- INSTALL MOUNT MODIFICATION PER MA BY TRYLON DATED 8/24/21
- INSTALL (6) ANTENNAS
- INSTALL (6) RRHs
- INSTALL (3) 6/24 4AWG HYBRID CABLE

GROUND SCOPE OF WORK:
- REMOVE (1) RBS 6131 CABINET
- RELOCATE (1) DUW30, (1) DUG20, (1) BB 6630, (1) BB 6648 EQUIPMENT FROM (E) RBS 6131 CABINET
- INSTALL (1) EMERSON AAV CABINET
- INSTALL (1) RBS 6160 CABINET
- INSTALL (1) B160 BATTERY CABINET
- INSTALL (1) BB 6648
- INSTALL (1) RBS 6601
- INSTALL (1) CSR IXRE V2 (GEN2)
- INSTALL (2) PSU 4813 VOLTAGE BOOSTER

NOTE:
PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE CROWN NOC AT (800) 788-7011 & CROWN CONSTRUCTION MANAGER.

LOCATION MAP



NO SCALE

APPLICABLE CODES/REFERENCE DOCUMENTS

ALL WORK SHALL BE PERFORMED AND MATERIALS INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES:

CODE TYPE	CODE
BUILDING	2015 IBC
MECHANICAL	2015 IMC
ELECTRICAL	2017 NEC

REFERENCE DOCUMENTS:

STRUCTURAL ANALYSIS:	MORRION HERSHFIELD
DATED:	AUGUST 31, 2021
MOUNT ANALYSIS:	TRYLON
DATED:	8/24/21
RFDS REVISION:	9
DATED:	7/8/21
ORDER ID:	576542
REVISION:	0

CALL CONNECTICUT ONE CALL
(800) 922-4455 CBYD.COM
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APPROVALS

APPROVAL	SIGNATURE	DATE
PROPERTY OWNER OR REP.		
LAND USE PLANNER		
T-MOBILE		
OPERATIONS		
RF		
NETWORK		
BACKHAUL		
CONSTRUCTION MANAGER		

THE PARTIES ABOVE HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE CONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN. ALL CONSTRUCTION DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND ANY CHANGES AND MODIFICATIONS THEY MAY IMPOSE.

T-Mobile
35 GRIFFIN ROAD
BLOOMFIELD, CT 06002

CROWN CASTLE
3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

B+T GRP
1717 S. BOULDER
SUITE 300
TULSA, OK 74119
PH: (918) 587-4630
www.btgrp.com

T-MOBILE SITE NUMBER:
CT11381C

BU #: **876338**
WATERFORD

41 MANITOCK HILL ROAD
WATERFORD, CT 06385

EXISTING
136'-0" SELF-SUPPORT TOWER

ISSUED FOR:

REV.	DATE	DRWN	DESCRIPTION	DES./QA
0	9/01/21	KT	CONSTRUCTION	KT
1	9/02/21	KT	CONSTRUCTION	KT
1	9/24/21	YXI	CONSTRUCTION	YXI

STATE OF CONNECTICUT
No. 23924
LICENSED
PROFESSIONAL ENGINEER
9/24/21

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/22

SHEET NUMBER: T-1
REVISION: 1

CROWN CASTLE USA INC. SITE ACTIVITY REQUIREMENTS:

1. NOTICE TO PROCEED– NO WORK SHALL COMMENCE PRIOR TO CROWN CASTLE USA INC. WRITTEN NOTICE TO PROCEED (NTP) AND THE ISSUANCE OF A PURCHASE ORDER. PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE CROWN CASTLE USA INC. NOC AT 800–788–7011 & THE CROWN CASTLE USA INC. CONSTRUCTION MANAGER.
2. "LOOK UP" – CROWN CASTLE USA INC. SAFETY CLIMB REQUIREMENT:
THE INTEGRITY OF THE SAFETY CLIMB AND ALL COMPONENTS OF THE CLIMBING FACILITY SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER MODIFICATION, MOUNT REINFORCEMENTS, AND/OR EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF THE SAFETY CLIMB OR ANY COMPONENTS OF THE CLIMBING FACILITY ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, IMPACT TO THE ANCHORAGE POINTS IN ANY WAY, OR TO IMPEDE/BLOCK ITS INTENDED USE. ANY COMPROMISED SAFETY CLIMB, INCLUDING EXISTING CONDITIONS MUST BE TAGGED OUT AND REPORTED TO YOUR CROWN CASTLE USA INC. POC OR CALL THE NOC TO GENERATE A SAFETY CLIMB MAINTENANCE AND CONTRACTOR NOTICE TICKET.
3. PRIOR TO THE START OF CONSTRUCTION, ALL REQUIRED JURISDICTIONAL PERMITS SHALL BE OBTAINED. THIS INCLUDES, BUT IS NOT LIMITED TO, BUILDING, ELECTRICAL, MECHANICAL, FIRE, FLOOD ZONE, ENVIRONMENTAL, AND ZONING. AFTER ONSITE ACTIVITIES AND CONSTRUCTION ARE COMPLETED, ALL REQUIRED PERMITS SHALL BE SATISFIED AND CLOSED OUT ACCORDING TO LOCAL JURISDICTIONAL REQUIREMENTS.
4. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN, AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION); FEDERAL, STATE, AND LOCAL REGULATIONS; AND ANY APPLICABLE INDUSTRY CONSENSUS STANDARDS RELATED TO THE CONSTRUCTION ACTIVITIES BEING PERFORMED. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION) AND CROWN CASTLE USA INC. STANDARD CED–STD–10253, INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION, TO CERTIFY THE SUPPORTING STRUCTURE(S) IN ACCORDANCE WITH ANSI/TIA–322 (LATEST EDITION).
5. ALL SITE WORK TO COMPLY WITH QAS–STD–10068 "INSTALLATION STANDARDS FOR CONSTRUCTION ACTIVITIES ON CROWN CASTLE USA INC. TOWER SITE," CED–STD–10294 "STANDARD FOR INSTALLATION OF MOUNTS AND APPURTENANCES," AND LATEST VERSION OF ANSI/TIA–1019–A–2012 "STANDARD FOR INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS."
6. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY CROWN CASTLE USA INC. PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
8. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
9. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
10. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION E) CONSTRUCTION SAFETY PROCEDURES.
11. ALL SITE WORK SHALL BE AS INDICATED ON THE STAMPED CONSTRUCTION DRAWINGS AND PROJECT SPECIFICATIONS, LATEST APPROVED REVISION.
12. CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH AT THE COMPLETION OF THE WORK. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
13. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF CONTRACTOR, TOWER OWNER, CROWN CASTLE USA INC., AND/OR LOCAL UTILITIES.
14. THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE REQUIRED BY LOCAL JURISDICTION AND SIGNAGE REQUIRED ON INDIVIDUAL PIECES OF EQUIPMENT, ROOMS, AND SHELTERS.
15. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE CARRIER'S EQUIPMENT AND TOWER AREAS.
16. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
17. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION AS SPECIFIED ON THE CONSTRUCTION DRAWINGS AND/OR PROJECT SPECIFICATIONS.
18. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
19. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
20. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
21. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.
22. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
CONTRACTOR: GENERAL CONTRACTOR RESPONSIBLE FOR CONSTRUCTION
CARRIER: T–MOBILE
TOWER OWNER: CROWN CASTLE USA INC.
2. THESE DRAWINGS HAVE BEEN PREPARED USING STANDARDS OF PROFESSIONAL CARE AND COMPLETENESS NORMALLY EXERCISED UNDER SIMILAR CIRCUMSTANCES BY REPUTABLE ENGINEERS IN THIS OR SIMILAR LOCALITIES. IT IS ASSUMED THAT THE WORK DEPICTED WILL BE PERFORMED BY AN EXPERIENCED CONTRACTOR AND/OR WORKPEOPLE WHO HAVE A WORKING KNOWLEDGE OF THE APPLICABLE CODE STANDARDS AND REQUIREMENTS AND OF INDUSTRY ACCEPTED STANDARD GOOD PRACTICE. AS NOT EVERY CONDITION OR ELEMENT IS (OR CAN BE) EXPLICITLY SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL USE INDUSTRY ACCEPTED STANDARD GOOD PRACTICE FOR MISCELLANEOUS WORK NOT EXPLICITLY SHOWN.
3. THESE DRAWINGS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE MEANS OR METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY FOR PROTECTION OF LIFE AND PROPERTY DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, FORMWORK, SHORING, ETC. SITE VISITS BY THE ENGINEER OR HIS REPRESENTATIVE WILL NOT INCLUDE INSPECTION OF THESE ITEMS AND IS FOR STRUCTURAL OBSERVATION OF THE FINISHED STRUCTURE ONLY.
4. NOTES AND DETAILS IN THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS. WHERE NO DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT, AND/OR AS PROVIDED FOR IN THE CONTRACT DOCUMENTS. WHERE DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL NOTES, AND SPECIFICATIONS, THE GREATER, MORE STRICT REQUIREMENTS, SHALL GOVERN. IF FURTHER CLARIFICATION IS REQUIRED CONTACT THE ENGINEER OF RECORD.
5. SUBSTANTIAL EFFORT HAS BEEN MADE TO PROVIDE ACCURATE DIMENSIONS AND MEASUREMENTS ON THE DRAWINGS TO ASSIST IN THE FABRICATION AND/OR PLACEMENT OF CONSTRUCTION ELEMENTS BUT IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE DIMENSIONS, MEASUREMENTS, AND/OR CLEARANCES SHOWN IN THE CONSTRUCTION DRAWINGS PRIOR TO FABRICATION OR CUTTING OF ANY NEW OR EXISTING CONSTRUCTION ELEMENTS. IF IT IS DETERMINED THAT THERE ARE DISCREPANCIES AND/OR CONFLICTS WITH THE CONSTRUCTION DRAWINGS THE ENGINEER OF RECORD IS TO BE NOTIFIED AS SOON AS POSSIBLE.
6. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CROWN CASTLE.
7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
8. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
9. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
10. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CARRIER AND CROWN CASTLE PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
11. CONTRACTOR IS TO PERFORM A SITE INVESTIGATION AND IS TO DETERMINE THE BEST ROUTING OF ALL CONDUITS FOR POWER, AND TELCO AND FOR GROUNDING CABLES AS SHOWN IN THE POWER, TELCO, AND GROUNDING PLAN DRAWINGS.
12. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF CROWN CASTLE USA INC.
13. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
14. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.

CONCRETE, FOUNDATIONS, AND REINFORCING STEEL:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST–IN–PLACE CONCRETE.
2. UNLESS NOTED OTHERWISE, SOIL BEARING PRESSURE USED FOR DESIGN OF SLABS AND FOUNDATIONS IS ASSUMED TO BE 1000 psf.
3. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 3000 psi AT 28 DAYS, UNLESS NOTED OTHERWISE. NO MORE THAN 90 MINUTES SHALL ELAPSE FROM BATCH TIME TO TIME OF PLACEMENT UNLESS APPROVED BY THE ENGINEER OF RECORD. TEMPERATURE OF CONCRETE SHALL NOT EXCEED 90°f AT TIME OF PLACEMENT.
4. CONCRETE EXPOSED TO FREEZE–THAW CYCLES SHALL CONTAIN AIR ENTRAINING ADMIXTURES. AMOUNT OF AIR ENTRAINMENT TO BE BASED ON SIZE OF AGGREGATE AND F3 CLASS EXPOSURE (VERY SEVERE). CEMENT USED TO BE TYPE II PORTLAND CEMENT WITH A MAXIMUM WATER–TO–CEMENT RATIO (W/C) OF 0.45.
5. ALL STEEL REINFORCING SHALL CONFORM TO ASTM A615. ALL WELDED WIRE FABRIC (WWF) SHALL CONFORM TO ASTM A185. ALL SPLICES SHALL BE CLASS "B" TENSION SPLICES, UNLESS NOTED OTHERWISE. ALL HOOKS SHALL BE STANDARD 90 DEGREE HOOKS, UNLESS NOTED OTHERWISE. YIELD STRENGTH (Fy) OF STANDARD DEFORMED BARS ARE AS FOLLOWS:
#4 BARS AND SMALLER....................40 ksi
#5 BARS AND LARGER....................60 ksi
6. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:
CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH....................3"
CONCRETE EXPOSED TO EARTH OR WEATHER:
#6 BARS AND LARGER....................2"
#5 BARS AND SMALLER....................1–1/2"
CONCRETE NOT EXPOSED TO EARTH OR WEATHER:
SLAB AND WALLS....................3/4"
BEAMS AND COLUMNS....................1–1/2"
7. A TOOLED EDGE OR A 3/4" CHAMFER SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNLESS NOTED OTHERWISE, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

ELECTRICAL INSTALLATION NOTES:

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES/ORDINANCES.
2. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED AND TRIP HAZARDS ARE ELIMINATED.
3. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC.
4. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC.
4.1. ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.
4.2. ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING THAT SHALL BE GREATER THAN THE SHORT CIRCUIT CURRENT TO WHICH THEY ARE SUBJECTED, 22,000 AIC MINIMUM. VERYIFY AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT IN ACCORDANCE WITH ARTICLE 110.24 NEC OR THE MOST CURRENT ADOPTED CODE PRE THE GOVERNING JURISDICTION.
5. EACH END OF EVERY POWER PHASE CONDUCTOR, GROUNDING CONDUCTOR, AND TELCO CONDUCTOR OR CABLE SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2" PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA.
6. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH LAMICOID TAGS SHOWING THEIR RATED VOLTAGE, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING AND BRANCH CIRCUIT ID NUMBERS (i.e. PANEL BOARD AND CIRCUIT ID'S).
7. PANEL BOARDS (ID NUMBERS) SHALL BE CLEARLY LABELED WITH PLASTIC LABELS.
8. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.
9. ALL POWER AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE COPPER CONDUCTOR (#14 OR LARGER) WITH TYPE THHW, THWN, THWN–2, XHHW, XHHW–2, THW, THW–2, RHW, OR RHW–2 INSULATION UNLESS OTHERWISE SPECIFIED.
10. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE COPPER CONDUCTOR (#6 OR LARGER) WITH TYPE THHW, THWN, THWN–2, XHHW, XHHW–2, THW, THW–2, RHW, OR RHW–2 INSULATION UNLESS OTHERWISE SPECIFIED.
11. POWER AND CONTROL WIRING IN FLEXIBLE CORD SHALL BE MULTI–CONDUCTOR, TYPE SOOW CORD (#14 OR LARGER) UNLESS OTHERWISE SPECIFIED.
12. POWER AND CONTROL WIRING FOR USE IN CABLE TRAY SHALL BE MULTI–CONDUCTOR, TYPE TC CABLE (#14 OR LARGER), WITH TYPE THHW, THWN, THWN–2, XHHW, XHHW–2, THW, THW–2, RHW, OR RHW–2 INSULATION UNLESS OTHERWISE SPECIFIED.
13. ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP–STYLE, COMPRESSION WIRE LUGS AND WIRE NUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRE NUTS SHALL BE RATED FOR OPERATION NOT LESS THAN 75° C (90° C IF AVAILABLE).
14. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.
15. ELECTRICAL METALLIC TUBING (EMT), INTERMEDIATE METAL CONDUIT (IMC), OR RIGID METAL CONDUIT (RMC) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.
16. ELECTRICAL METALLIC TUBING (EMT) OR METAL–CLAD CABLE (MC) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
17. SCHEDULE 40 PVC UNDERGROUND ON STRAIGHTS AND SCHEDULE 80 PVC FOR ALL ELBOWS/90s AND ALL APPROVED ABOVE GRADE PVC CONDUIT.
18. LIQUID–TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID–TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
19. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION–TYPE AND APPROVED FOR THE LOCATION USED. SET SCREW FITTINGS ARE NOT ACCEPTABLE.
20. CABINETS, BOXES AND WIRE WAYS SHALL BE LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND THE NEC.
21. WIREWAYS SHALL BE METAL WITH AN ENAMEL FINISH AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARDS (WIREMOLD SPECMATE WIREWAY).
22. SLOTTED WIRING DUCT SHALL BE PVC AND INCLUDE COVER (PANDUIT TYPE E OR EQUAL).
23. CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON–PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES (i.e. POWDER–ACTUATED) FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED FLUSH TO FINISH GRADE TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.
24. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES AND PULL BOXES SHALL BE GALVANIZED OR EPOXY–COATED SHEET STEEL. SHALL MEET OR EXCEED UL 50 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND NEMA 3R (OR BETTER) FOR EXTERIOR LOCATIONS.
25. METAL RECEPTACLE, SWITCH AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY–COATED OR NON–CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
26. NONMETALLIC RECEPTACLE, SWITCH AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2 (NEWEST REVISION) AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
27. THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CARRIER AND/OR CROWN CASTLE USA INC. BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
28. THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD LIFE AND PROPERTY.
29. INSTALL LAMICOID LABEL ON THE METER CENTER TO SHOW "T–MOBILE".
30. ALL EMPTY/SPARE CONDUITS THAT ARE INSTALLED ARE TO HAVE A METERED MULE TAPE PULL CORD INSTALLED.

CONDUCTOR COLOR CODE		
SYSTEM	CONDUCTOR	COLOR
120/240V, 1Ø	A PHASE	BLACK
	B PHASE	RED
	NEUTRAL	WHITE
	GROUND	GREEN
120/208V, 3Ø	A PHASE	BLACK
	B PHASE	RED
	C PHASE	BLUE
	NEUTRAL	WHITE
	GROUND	GREEN
277/480V, 3Ø	A PHASE	BROWN
	B PHASE	ORANGE OR PURPLE
	C PHASE	YELLOW
	NEUTRAL	GREY
	GROUND	GREEN
DC VOLTAGE	POS (+)	RED**
	NEG (–)	BLACK**

* SEE NEC 210.5(C)(1) AND (2)
** POLARITY MARKED AT TERMINATION

APWA UNIFORM COLOR CODE:

WHITE	PROPOSED EXCAVATION
PINK	TEMPORARY SURVEY MARKINGS
RED	ELECTRIC POWER LINES, CABLES, CONDUIT, AND LIGHTING CABLES
YELLOW	GAS, OIL, STEAM, PETROLEUM, OR GASEOUS MATERIALS
ORANGE	COMMUNICATION, ALARM OR SIGNAL LINES, CABLES, OR CONDUIT AND TRAFFIC LOOPS
BLUE	POTABLE WATER
PURPLE	RECLAIMED WATER, IRRIGATION, AND SLURRY LINES
GREEN	SEWERS AND DRAIN LINES

GREENFIELD GROUNDING NOTES:

1. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION AND AC POWER GES'S) SHALL BE BONDED TOGETHER AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
2. THE CONTRACTOR SHALL PERFORM IEEE FALL–OF–POTENTAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS, THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT AND PROVIDE TESTING RESULTS.
4. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
5. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
6. EACH CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, #6 STRANDED COPPER OR LARGER FOR INDOOR BTS; #2 BARE SOLID TINNED COPPER FOR OUTDOOR BTS.
7. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED BACK TO BACK CONNECTIONS ON OPPOSITE SIDE OF THE GROUND BUS ARE PERMITTED.
8. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING SHALL BE #2 SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED.
11. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
12. ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR AND EXTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS.
13. COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.
14. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR.
15. APPROVED ANTIOXIDANT COATINGS (i.e. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
16. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
17. MISCELLANEOUS ELECTRICAL AND NON–ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
18. BOND ALL METALLIC OBJECTS WITHIN 6 ft OF MAIN GROUND RING WITH (1) #2 BARE SOLID TINNED COPPER GROUND CONDUCTOR.
19. GROUND CONDUCTORS USED FOR THE FACILITY GROUNDING AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON–METALLIC MATERIAL SUCH AS PVC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (i.e., NONMETALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.
20. ALL GROUNDS THAT TRANSITION FROM BELOW GRADE TO ABOVE GRADE MUST BE #2 BARE SOLID TINNED COPPER IN 3/4" NON–METALLIC, FLEXIBLE CONDUIT FROM 24" BELOW GRADE TO WITHIN 3" TO 6" OF CAD–WELD TERMINATION POINT. THE EXPOSED END OF THE CONDUIT MUST BE SEALED WITH SILICONE CAULK. (ADD TRANSITIONING GROUND STANDARD DETAIL AS WELL).
21. BUILDINGS WHERE THE MAIN GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONTRACTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP, TOWERS, AND WATER TOWERS GROUNDING RING, TO THE EXISTING GROUNDING SYSTEM, THE GROUNDING CONDUCTORS SHALL NOT BE SMALLER THAN 2/0 COPPER. ROOFTOP GROUNDING RING SHALL BE BONDED TO THE EXISTING GROUNDING SYSTEM, THE BUILDING STEEL COLUMNS, LIGHTNING PROTECTION SYSTEM, AND BUILDING MAIN WATER LINE (FERROUS OR NONFERROUS METAL PIPING ONLY).

ABBREVIATIONS:

ANT	ANTENNA
(E)	EXISTING
FIF	FACILITY INTERFACE FRAME
GEN	GENERATOR
GPS	GLOBAL POSITIONING SYSTEM
GSM	GLOBAL SYSTEM FOR MOBILE
LTE	LONG TERM EVOLUTION
MGB	MASTER GROUND BAR
MW	MICROWAVE
(N)	NEW
NEC	NATIONAL ELECTRIC CODE
(P)	PROPOSED
PP	POWER PLANT
QTY	QUANTITY
RECT	RECTIFIER
RBS	RADIO BASE STATION
RET	REMOTE ELECTRIC TILT
RFDS	RADIO FREQUENCY DATA SHEET
RRH	REMOTE RADIO HEAD
RRU	REMOTE RADIO UNIT
SIAD	SMART INTEGRATED DEVICE
TMA	TOWER MOUNTED AMPLIFIER
TYP	TYPICAL
UMTS	UNIVERSAL MOBILE TELECOMMUNICATIONS SYSTEM
W.P.	WORK POINT

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B+T GRP
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SUITE 300
TULSA, OK 74119
PH: (918) 587-4630
www.btgrp.com

T-MOBILE SITE NUMBER:
CT11381C

BU #: **876338**
WATERFORD

41 MANITOCK HILL ROAD
WATERFORD, CT 06385

EXISTING
136'-0" SELF-SUPPORT TOWER

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
0	9/01/21	KT	CONSTRUCTION	KT
1	9/02/21	KT	CONSTRUCTION	KT
1	9/24/21	YXI	CONSTRUCTION	YXI

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/22

SHEET NUMBER: T-2
REVISION: 1

SITE PLAN DISCLAIMER:

PROPERTY LINES AND STRUCTURES HAVE BEEN DIGITIZED FROM PREVIOUS PLAN SETS. CROWN CASTLE USA INC. HAS NOT COMPLETED A SITE SURVEY AND THEREFORE MAKES NO CLAIMS AS TO THE ACCURACY OF INFORMATION DEPICTED ON THIS SHEET.

1 OVERALL SITE PLAN

SCALE: 80' 40' 0 80' 1" = 80'-0" (FULL SIZE) 1" = 160'-0" (11x17)

N

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STATE OF CONNECTICUT
CHAD D. TUTTLE
No. 23824
LICENSED PROFESSIONAL ENGINEER
9/24/21

B&T ENGINEERING, INC.
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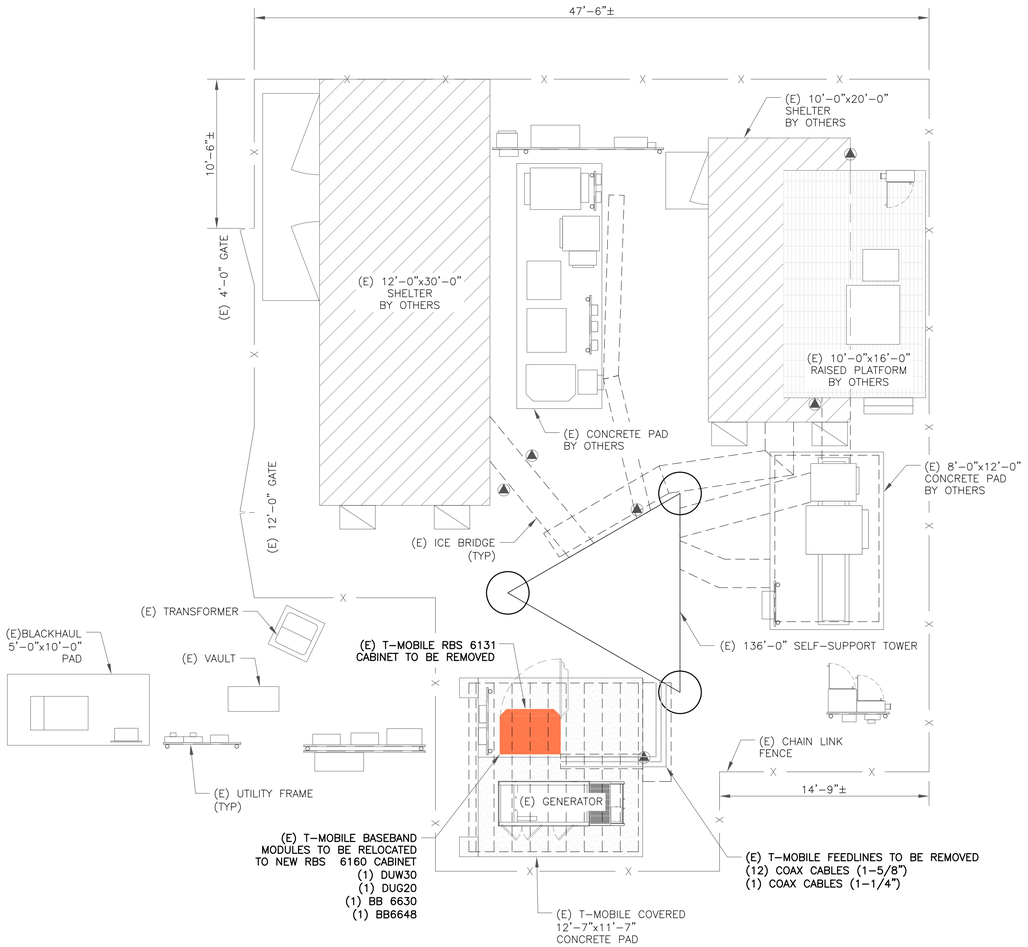
SHEET NUMBER:	REVISION:
C-1.1	1

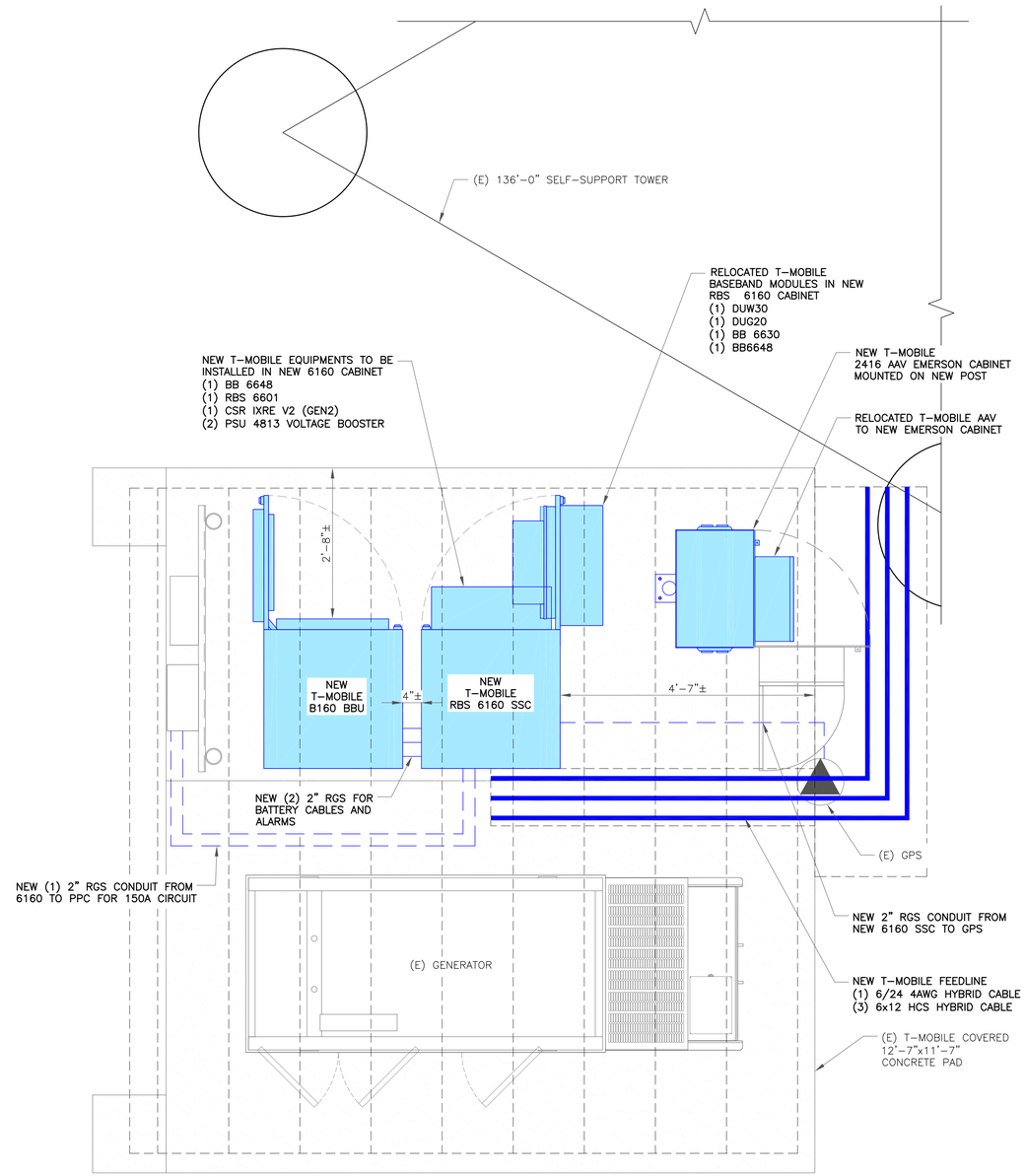


1 SITE PLAN
SCALE: 4' 2' 0 4' 3/16"=1'-0" (FULL SIZE) 3/32"=1'-0" (11x17)

N

NOTES:

THE POWER DESIGN FOR ANY AC ELECTRICAL POWER CHANGES IS TO BE PERFORMED BY OTHERS AND IS SHOWN HERE FOR REFERENCE PURPOSES ONLY. T-MOBILE IS SOLELY RESPONSIBLE FOR THE ELECTRICAL POWER DESIGN.



2 ENLARGED SITE PLAN
SCALE: 1' 6" 0 1' 3/4"=1'-0" (FULL SIZE) 3/8"=1'-0" (11x17)

N

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STATE OF CONNECTICUT
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PROFESSIONAL ENGINEER
9/24/21

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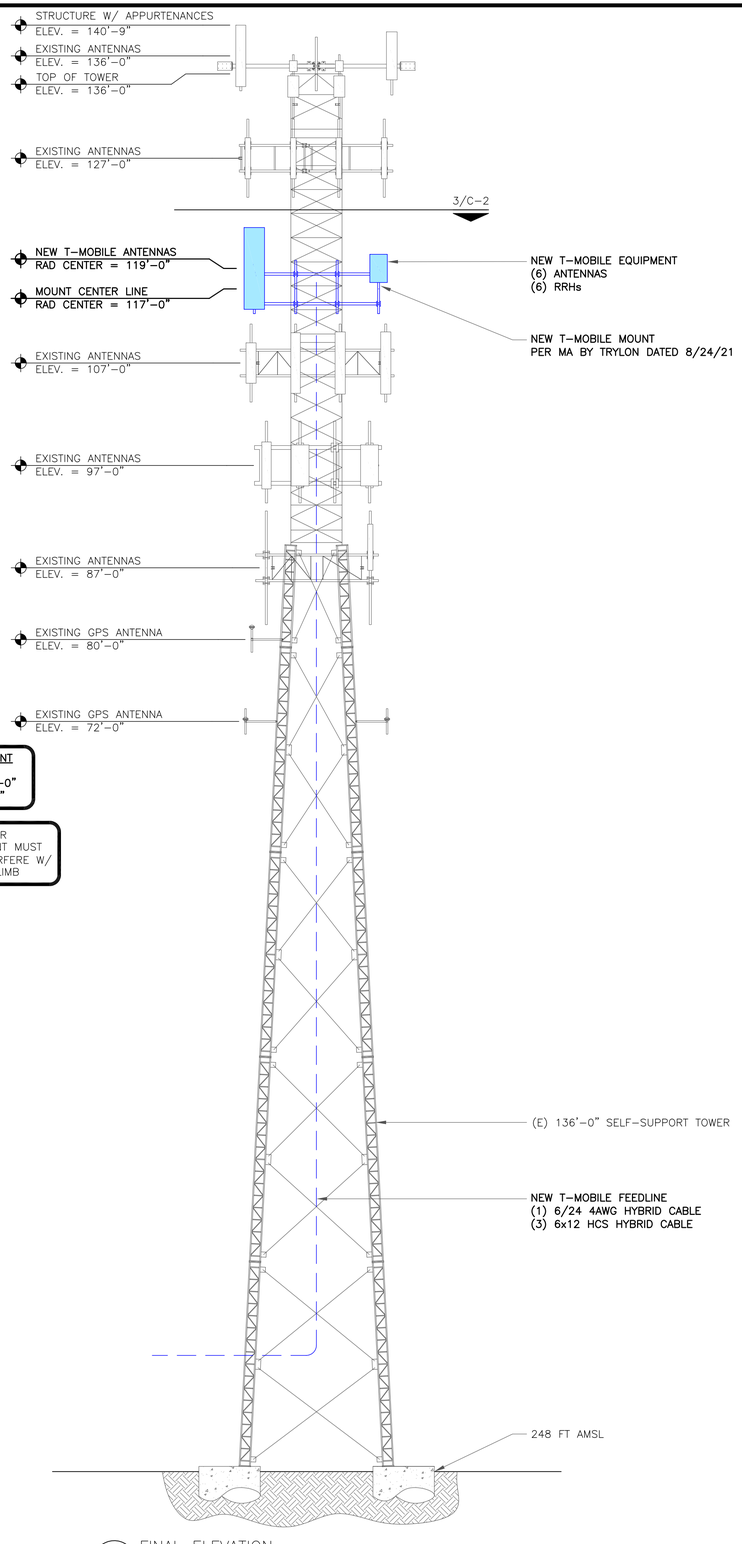
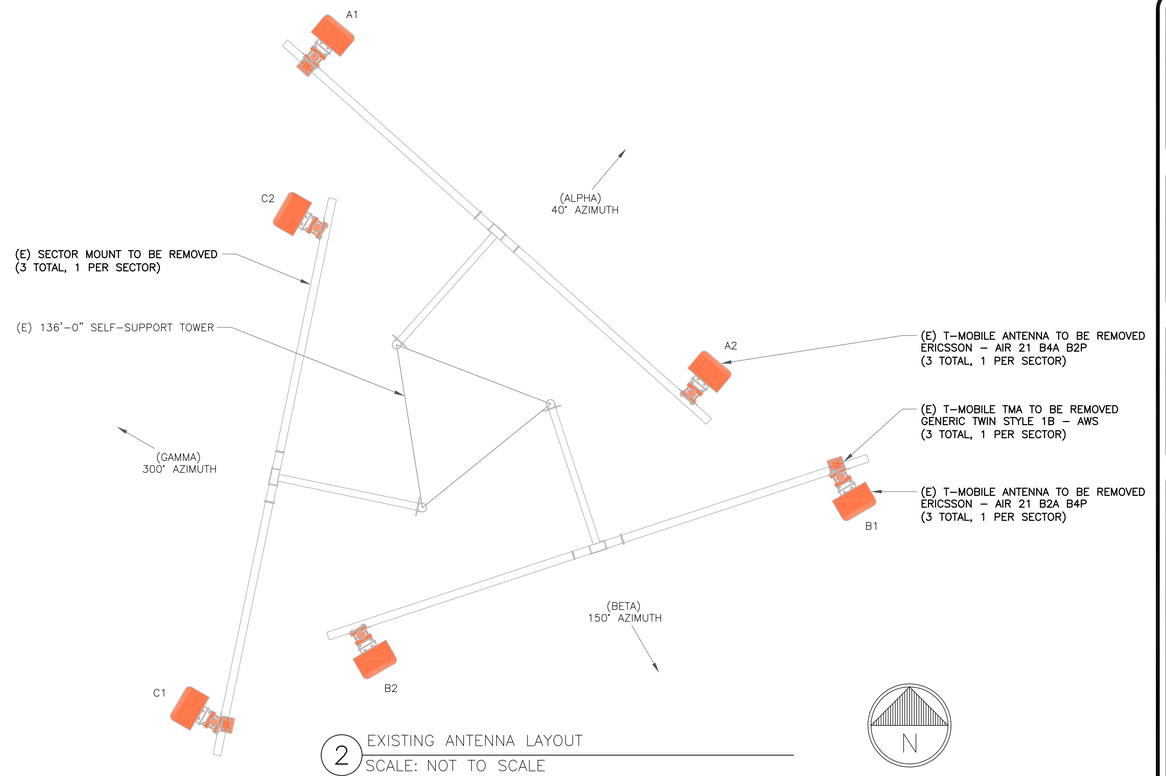
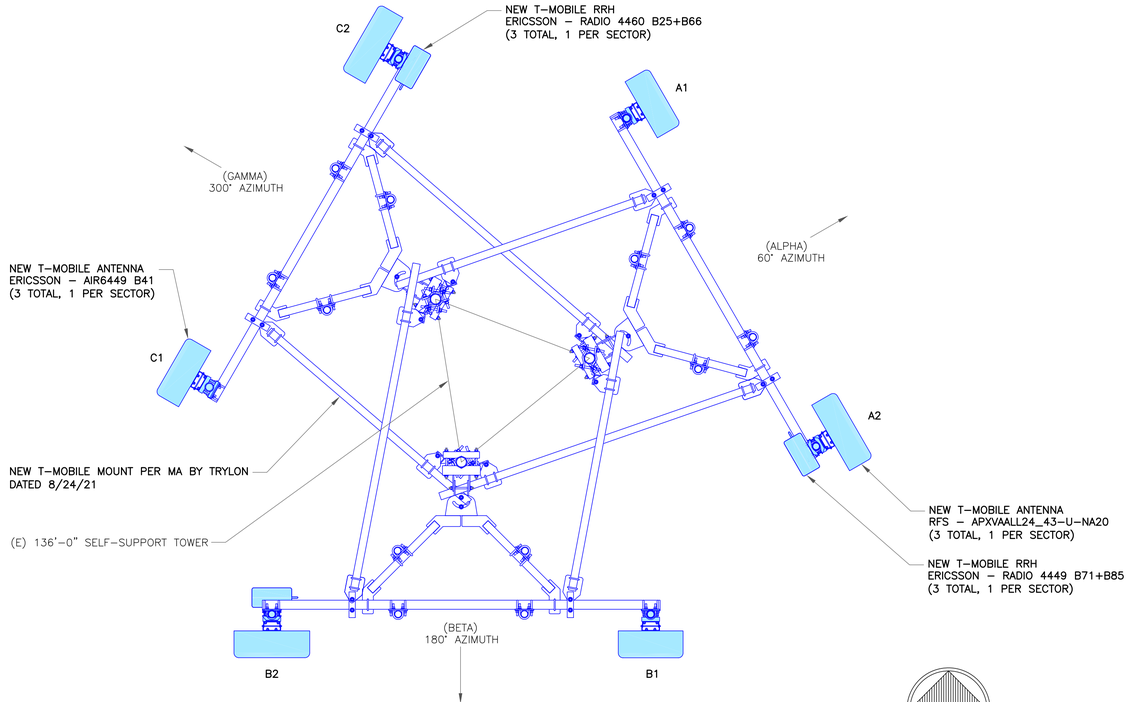


1 FINAL ELEVATION
SCALE: NOT TO SCALE



2 EXISTING ANTENNA LAYOUT
SCALE: NOT TO SCALE



3 FINAL ANTENNA LAYOUT
SCALE: NOT TO SCALE

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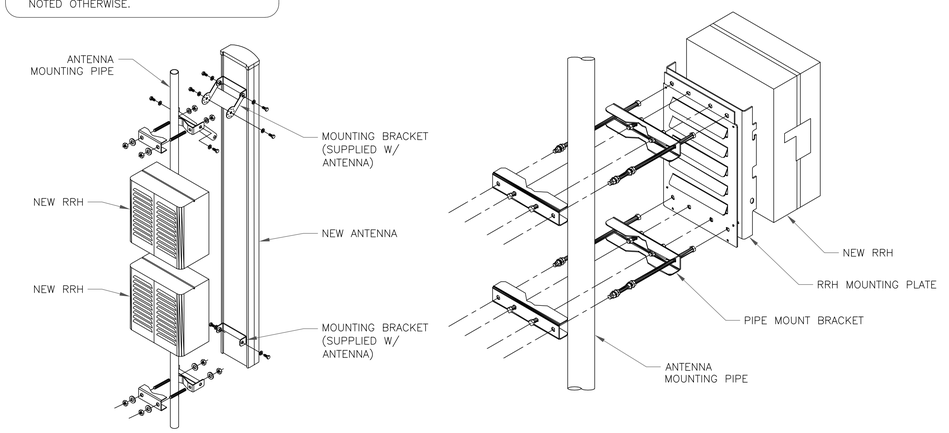
RF SYSTEM SCHEDULE

SECTOR	ANTENNA	TECH	MANUFACTURER	ANTENNA MODEL	AZIMUTH	M-TILT	E-TILT	RAD CENTER	TMA/RRU	FEEDLINE TYPE
ALPHA	A1	L2500 / N2500	ERICSSON	AIR6449 B41	60°	2°	5°/5°	119'-0"	–	–
	A2	L700 / L600 / N600 / U1900 / L2100 / L1900 / G1900	RFS	APXVAALL24_43-U-NA20	60°	2°	5°/5°/5°/5°	119'-0"	RADIO 4449 B71+B85 RADIO 4460 B25+B66	(1) 6X24 HYBRID
BETA	B1	L2500 / N2500	ERICSSON	AIR6449 B41	180°	2°	5°/5°	119'-0"	–	–
	B2	L700 / L600 / N600 / U1900 / L2100 / L1900 / G1900	RFS	APXVAALL24_43-U-NA20	180°	2°	5°/5°/5°/5°	119'-0"	RADIO 4449 B71+B85 RADIO 4460 B25+B66	(1) 6X24 HYBRID
GAMMA	C1	L2500 / N2500	ERICSSON	AIR6449 B41	300°	2°	5°/5°	119'-0"	–	–
	C2	L700 / L600 / N600 / U1900 / L2100 / L1900 / G1900	RFS	APXVAALL24_43-U-NA20	300°	2°	5°/5°/5°/5°	119'-0"	RADIO 4449 B71+B85 RADIO 4460 B25+B66	(1) 6X24 HYBRID

1 ANTENNA AND CABLE SCHEDULE
SCALE: NOT TO SCALE

INSTALLER NOTES:

1. COMPLY WITH MANUFACTURERS INSTRUCTIONS TO ENSURE THAT ALL RRHs RECEIVE ELECTRICAL POWER WITHIN 24 HOURS OF BEING REMOVED FROM THE MANUFACTURER'S PACKAGING.
2. DO NOT OPEN RRH PACKAGES IN THE RAIN.
3. ALL PIPES, BRACKETS, AND MISCELLANEOUS HARDWARE TO BE GALVANIZED UNLESS NOTED OTHERWISE.



2 ANTENNA WITH RRHs MOUNTING DETAIL
SCALE: NOT TO SCALE

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EXISTING
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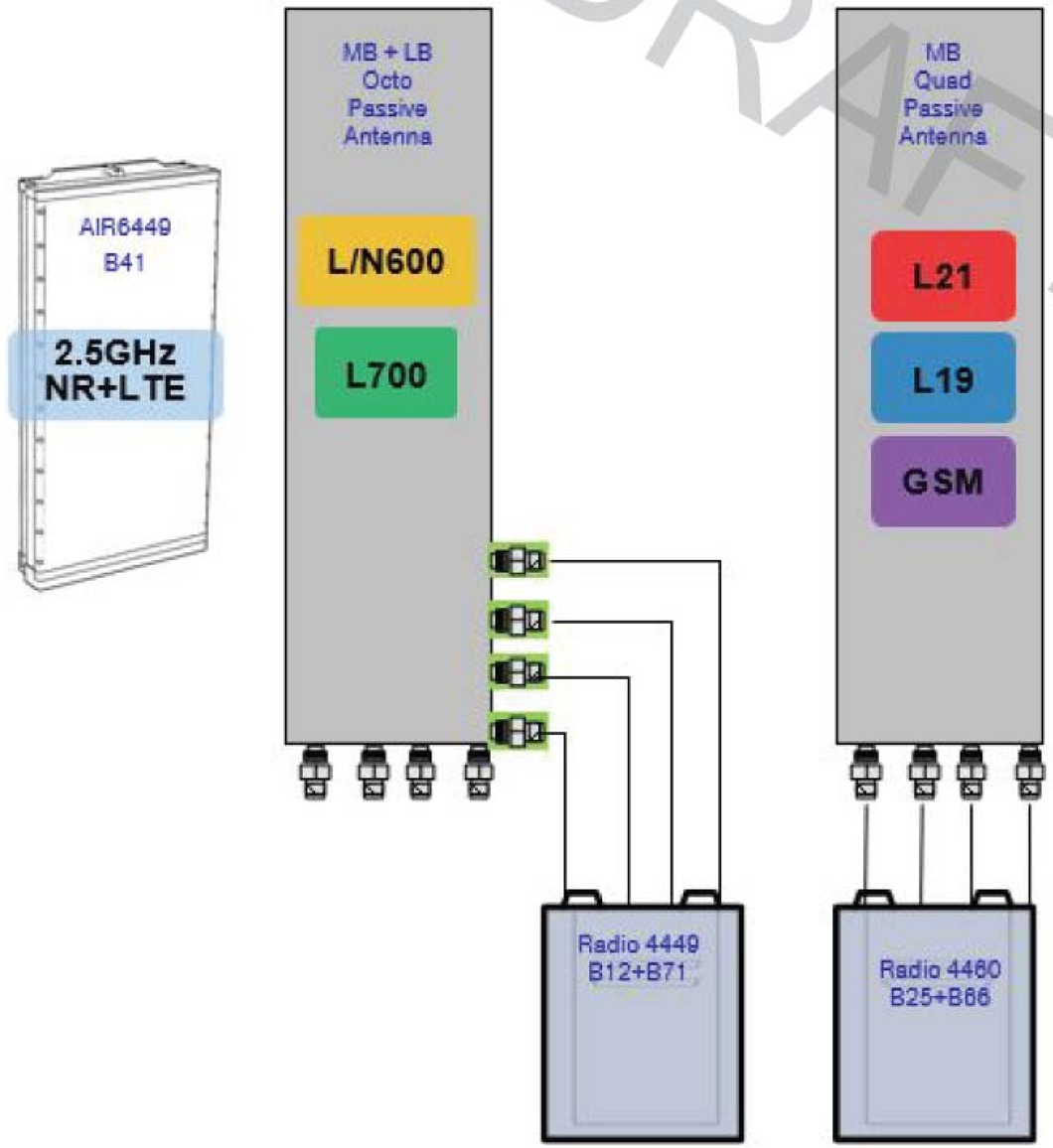

1 PLUMBING DIAGRAM
SCALE: NOT TO SCALE

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3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

B+T GRP
1717 S. BOULDER
SUITE 300
TULSA, OK 74119
PH: (918) 587-4630
www.btgrp.com

T-MOBILE SITE NUMBER:
CT11381C

BU #: **876338**
WATERFORD

41 MANITOCK HILL ROAD
WATERFORD, CT 06385

EXISTING
136'-0" SELF-SUPPORT TOWER

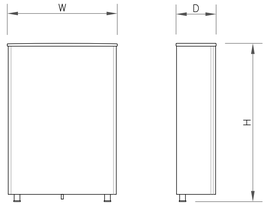
ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
0	9/01/21	KT	CONSTRUCTION	KT
1	9/02/21	KT	CONSTRUCTION	KT
1	9/24/21	YXI	CONSTRUCTION	YXI

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/22

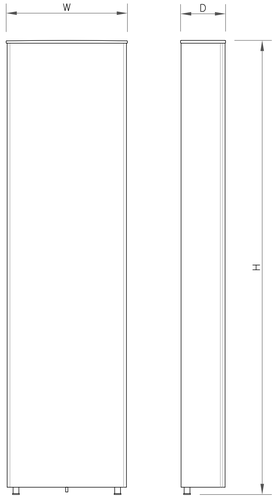
SHEET NUMBER: C-4

REVISION: 1



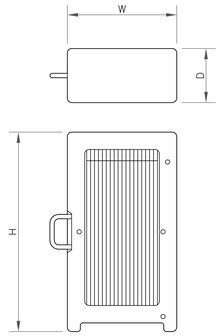
ANTENNA SPECS	
MANUFACTURER	ERICSSON
MODEL #	AIR6449 B41
WIDTH	20.51"
DEPTH	8.54"
HEIGHT	33.11"
WEIGHT	114.63 LBS

1 ANTENNA SPECS
SCALE: NOT TO SCALE



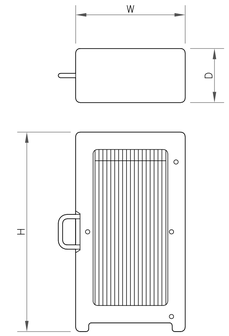
ANTENNA SPECS	
MANUFACTURER	RFS/CELWAVE
MODEL #	APXVAALL24_43-U-NA20
WIDTH	24.00"
DEPTH	8.50"
HEIGHT	95.90"
WEIGHT	149.90 LBS

2 ANTENNA SPECS
SCALE: NOT TO SCALE



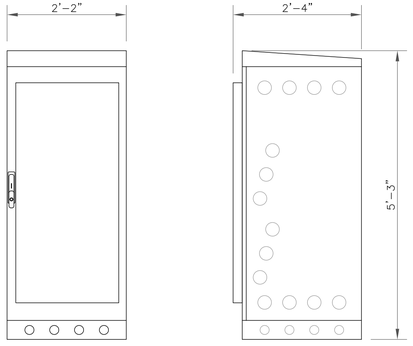
RRU SPECIFICATIONS	
MANUFACTURER	ERICSSON
MODEL #	RADIO 4480 B71+B85
WIDTH	15.70"
DEPTH	7.50"
HEIGHT	21.80"
WEIGHT	92.60 LBS

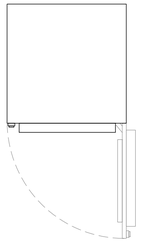
3 RRU SPECS
SCALE: NOT TO SCALE



RRU SPECIFICATIONS	
MANUFACTURER	ERICSSON
MODEL #	RADIO 4460 B25+B66
WIDTH	15.10"
DEPTH	11.90"
HEIGHT	17"
WEIGHT	109 LBS

4 RRU SPECS
SCALE: NOT TO SCALE





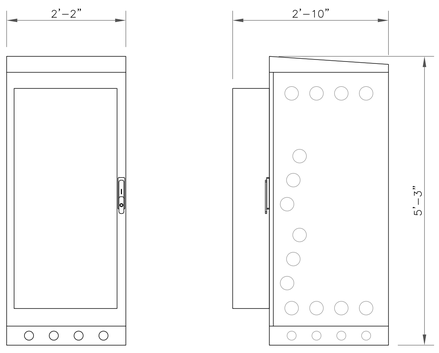
EQUIPMENT NOTES:

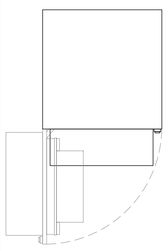
HEIGHTxWIDTHxDEPTH: 63.0" x 26.0" x 28.0"
(1600.0mm x 660.0mm x 711.0mm)

WEIGHT (EMPTY): 295 LBS (134 kg)

WEIGHT (FULLY LOADED): 2000 LBS (908 kg)

5 ERICSSON – B160
SCALE: NOT TO SCALE





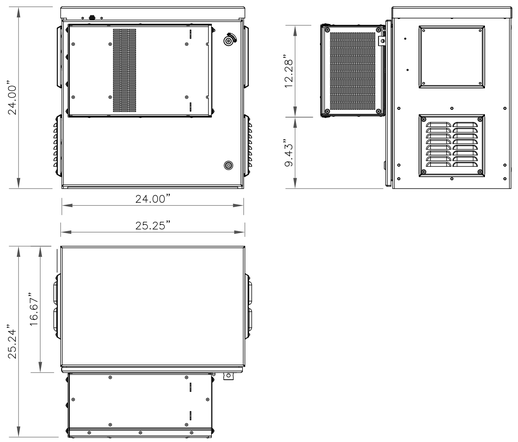
EQUIPMENT NOTES:

HEIGHTxWIDTHxDEPTH: 63.0" x 26.0" x 34.0"
(1600.0mm x 660.0mm x 864.0mm)

WEIGHT (EMPTY): 320 LBS (145 kg)

WEIGHT (FULLY LOADED): 1000 LBS (454 kg)

6 ERICSSON – 6160
SCALE: NOT TO SCALE



EMERSON 2416 AAV CABINET (OUTDOOR)
WALL OR H-FRAME MOUNTED, POLE MOUNT
(WALL-MOUNT KIT INCLUDED)
WEIGHT: 64.0 LBS WITHOUT BATTERIES
ENCLOSURE: 24"x24"x16"
BATTERY TRAY: 22"Wx13"D

8 EMERSON 2416 AAV CABINET
SCALE: NOT TO SCALE

T-Mobile
35 GRIFFIN ROAD
BLOOMFIELD, CT 06002

CROWN CASTLE
3 CORPORATE PARK DRIVE, SUITE 101
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T-MOBILE SITE NUMBER:
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BU #: **876338**
WATERFORD

41 MANITOCK HILL ROAD
WATERFORD, CT 06385

EXISTING
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B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/22

SHEET NUMBER: C-5

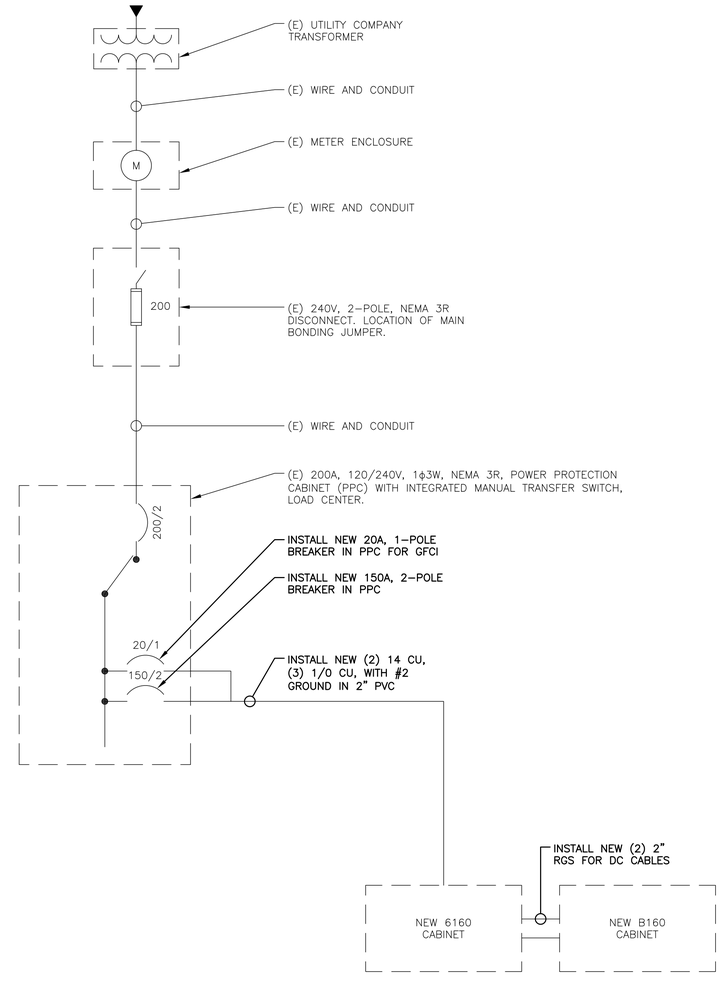
REVISION: 1

FINAL PANEL SCHEDULE							
LOAD	POLES	AMPS	BUS L1	BUS L2	AMPS	POLES	LOAD
–	1	–	1	2	60A	2	AC SURGE PROTECTOR
GFCI	1	20A	3	4			
6160 CABINET	2	150A	5	6	–	2	–
			7	8			
PLG LT			9	10	–	1	TELCO GFI
FAN			11	12			

RATED VOLTAGE: ■120/240 □_____, 1 PHASE, 3 WIRE	BRANCH POLES: ■12 □24 □30 □42	APPROVED MF'RS
RATED AMPS: □100 ■200 □400 □_____,	CABINET: ■SURFACE □FLUSH	NEMA □1 ■3R □4X
□MAIN LUGS ONLY MAIN 200 AMPS ■BREAKER □FUSED SWITCH	■HINGED DOOR	■KEYED DOOR LATCH
□FUSED ■CIRCUIT BREAKER BRANCH DEVICES	□_____ TO BE GFCI BREAKERS	FULL NEUTRAL BUS GROUND BAR
ALL BREAKERS MUST BE RATED TO INTERRUPT A SHORT CIRCUIT ISC OF 10,000 AMPS SYMMETRICAL		

REPLACE EXISTING BREAKER IN POSITION 5 AND 7 WITH A NEW 2P 150A BREAKER
REPLACE EXISTING BREAKER IN POSITION 3WITH A NEW 1P 20A BREAKER
REPLACE EXISTING WIRES FOR EXISTING RBS 6131 CABINET WITH (3) 1/0 AWG THWN (COPPER) AND (1) #2G AWG. MINIMUM CONDUIT SIZE TO BE 2".
IF 150A BREAKER WILL NOT PROPERLY FIT IN EXISTING PANEL, REPLACE (E) PANEL WITH SQUARE D PANEL QO12040M200RB (OR APPROVED EQUAL).
UPGRADE FEEDER WIRES TO MEET AMPACITY IF NEW PANEL IS REQUIRED.
FINAL PANEL DESIGN AND CALCULATIONS FOR WIRE SIZE WERE BASED OFF OF EXISTING DOCUMENTS AND PHOTOS

1 AC PANEL SCHEDULE
SCALE: NOT TO SCALE



NOTES:

1. ALL NEW CONDUCTORS TO BE INSTALLED SHALL BE COPPER. ALL CONDUCTORS SHALL BE THHW, THWN, THWN–2, XHHW, XHHW–2, THW, THW–2, RHW, OR RHW–2 UNLESS NOTED OTHERWISE.
2. CONTRACTOR IS TO FIELD VERIFY ALL EXISTING ITEMS SHOWN ON THE ELECTRICAL ONE–LINE DIAGRAM AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES.
3. ALL GROUNDING AND BONDING PER THE NEC.

2 ONE LINE DIAGRAM
SCALE: NOT TO SCALE

T-Mobile
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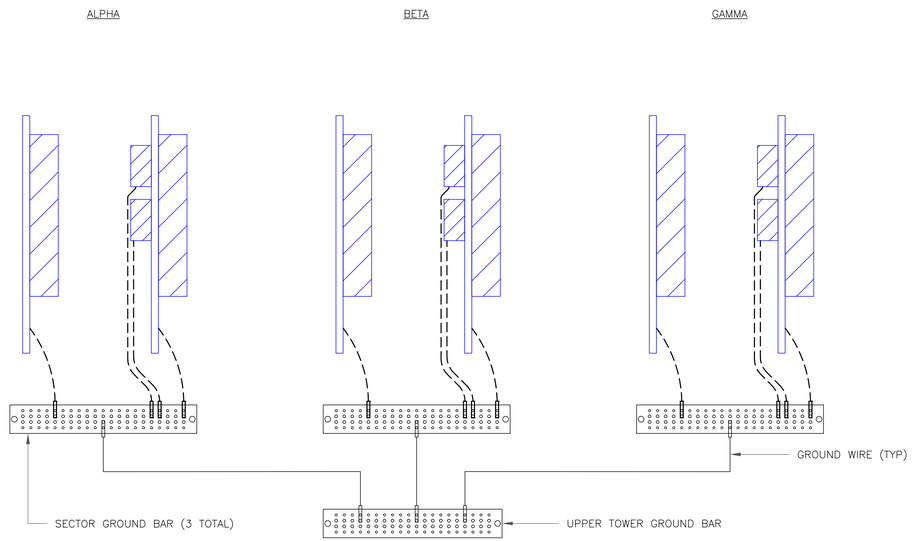
1	9/24/21	YXI	CONSTRUCTION	YXI

STATE OF CONNECTICUT
CHRISTOPHER E. FUSCO
No. 23924
LICENSED
PROFESSIONAL ENGINEER
9/24/21

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/22

SHEET NUMBER: E-1
REVISION: 1



NOTE:

ALL NEW GROUNDS TO BE #6 STRANDED COPPER WITH GREEN INSULATION UNLESS NOTED OTHERWISE.

1 ANTENNA GROUNDING DIAGRAM
SCALE: NOT TO SCALE

T-Mobile

35 GRIFFIN ROAD
BLOOMFIELD, CT 06002

CROWN CASTLE
3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

B+T GRP
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T-MOBILE SITE NUMBER:
CT11381C

BU #: **876338**
WATERFORD

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WATERFORD, CT 06385

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136'-0" SELF-SUPPORT TOWER

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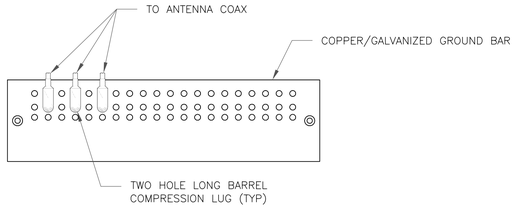
1	9/02/21	KT	CONSTRUCTION	KT
1	9/24/21	YXI	CONSTRUCTION	YXI

STATE OF CONNECTICUT
No. 23924
LICENSED
PROFESSIONAL ENGINEER
9/24/21

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/22

SHEET NUMBER: G-1

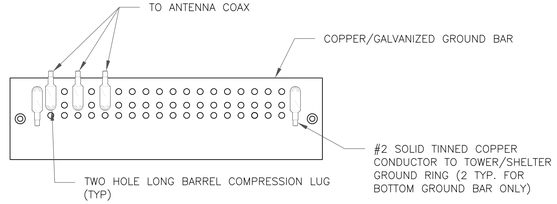
REVISION: 1



NOTES:

1. DOUBLING UP "OR STACKING" OF CONNECTIONS IS NOT PERMITTED.
2. EXTERIOR ANTIOXIDANT JOINT COMPOUND TO BE USED ON ALL EXTERIOR CONNECTIONS.
3. GROUND BAR SHALL NOT BE ISOLATED FROM TOWER. MOUNT DIRECTLY TO ANTENNA MOUNT STEEL.

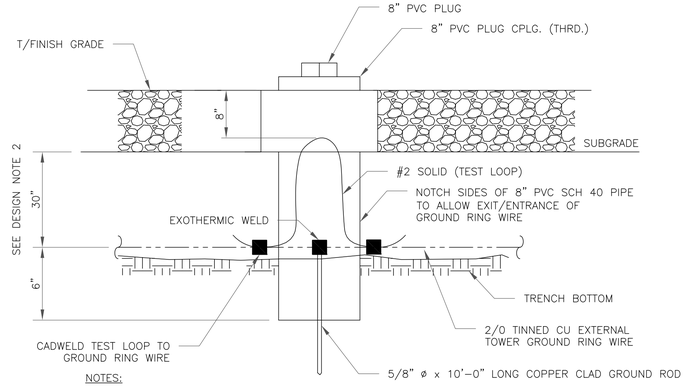
1 ANTENNA SECTOR GROUND BAR DETAIL
SCALE: NOT TO SCALE



NOTES:

1. EXTERIOR ANTIOXIDANT JOINT COMPOUND TO BE USED ON ALL EXTERIOR CONNECTIONS.
2. GROUND BAR SHALL NOT BE ISOLATED FROM TOWER. MOUNT DIRECTLY TO TOWER STEEL (TOWER ONLY).
3. GROUND BAR SHALL BE ISOLATED FROM BUILDING OR SHELTER.

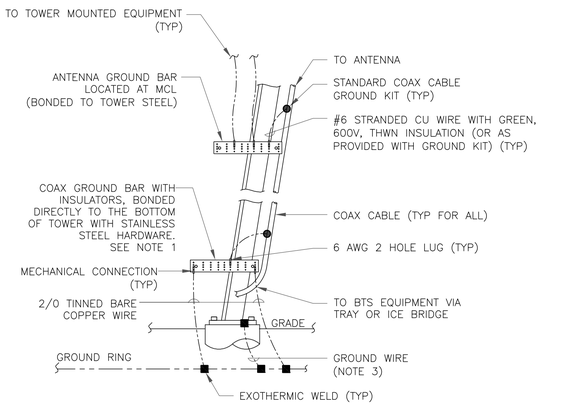
2 TOWER/SHELTER GROUND BAR DETAIL
SCALE: NOT TO SCALE



NOTES:

1. GROUND ROD SHALL BE DRIVEN VERTICALLY, NOT TO EXCEED 45 DEGREES FROM THE VERTICAL
2. GROUND WIRE SHALL BE MIN. 30" BELOW GRADE OR 6" BELOW FROST LINE. (WHICH EVER IS GREATER) AS PER N.E.C. ARTICLE 250-50(D)

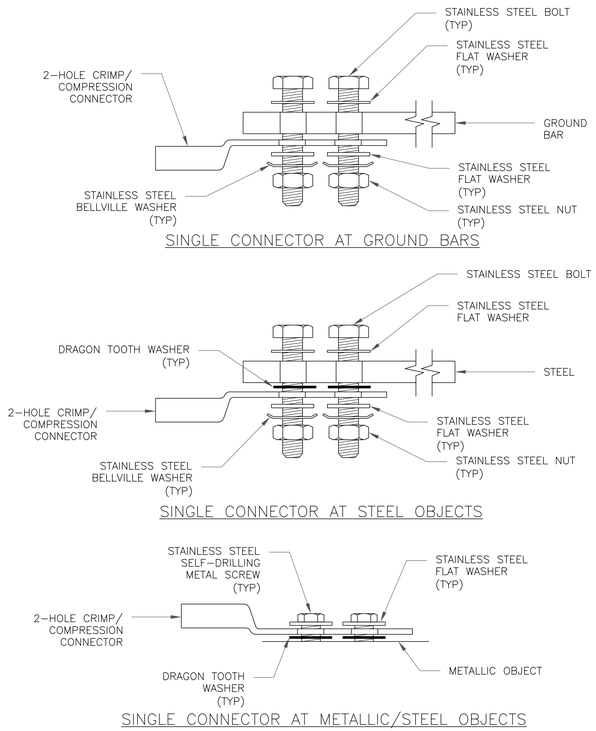
3 INSPECTION WELL DETAIL
SCALE: NOT TO SCALE



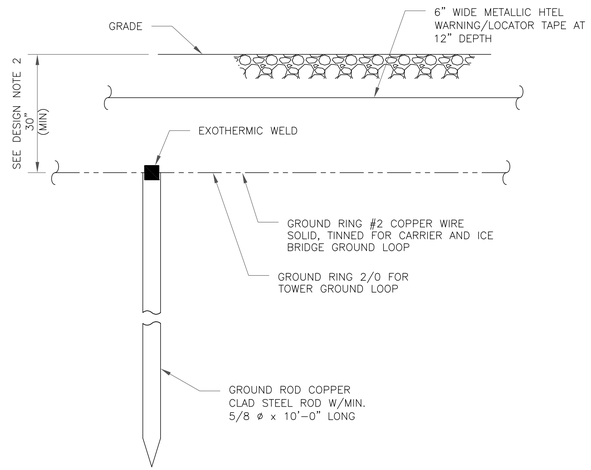
NOTES:

1. NUMBER OF GROUNDING BARS MAY VARY DEPENDING ON THE TYPE OF TOWER, ANTENNA LOCATIONS AND CONNECTION ORIENTATION. COAXIAL CABLES EXCEEDING 200 FEET ON THE TOWER SHALL HAVE GROUND KITS AT THE MIDPOINT. PROVIDE AS REQUIRED.
2. ONLY MECHANICAL CONNECTIONS ARE ALLOWED TO BE MADE TO CROWN CASTLE USA INC. TOWERS. ALL MECHANICAL CONNECTIONS SHALL BE TREATED WITH AN ANTI-OXIDANT COATING.
3. ALL TOWER GROUNDING SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF THE RECOGNIZED EDITION OF ANSI/TIA 222 AND NFPA 780.

4 TYPICAL ANTENNA CABLE GROUNDING
SCALE: NOT TO SCALE



5 HARDWARE DETAIL FOR EXTERIOR CONNECTIONS
SCALE: NOT TO SCALE



NOTES:

1. GROUND ROD SHALL BE DRIVEN VERTICALLY, NOT TO EXCEED 45 DEGREES FROM THE VERTICAL
2. GROUND WIRE SHALL BE MIN. 30" BELOW GRADE OR 6" BELOW FROST LINE. (WHICH EVER IS GREATER) AS PER N.E.C. ARTICLE 250-50(D)

6 GROUND ROD DETAIL
SCALE: NOT TO SCALE

T-Mobile
35 GRIFFIN ROAD
BLOOMFIELD, CT 06002

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WATERFORD

41 MANITOCK HILL ROAD
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EXISTING
136'-0" SELF-SUPPORT TOWER

ISSUED FOR:

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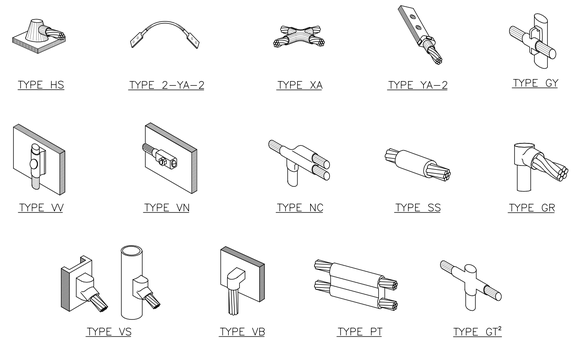
1	9/02/21	KT	CONSTRUCTION	KT
1	9/24/21	YXI	CONSTRUCTION	YXI

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/22

SHEET NUMBER: G-2
REVISION: 1

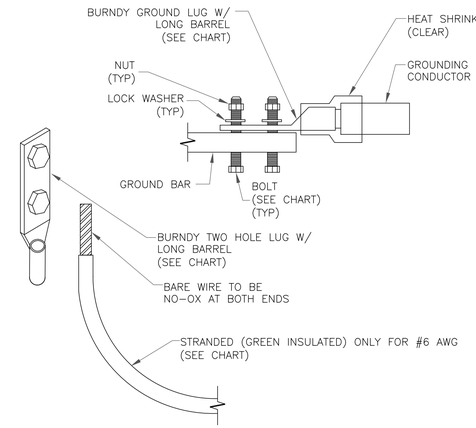


NOTE:

1. ERICO EXOTHERMIC "MOLD TYPES" SHOWN HERE ARE EXAMPLES. CONSULT WITH CONSTRUCTION MANAGER FOR SPECIFIC MOLDS TO BE USED FOR THIS PROJECT.
2. MOLD TYPE ONLY TO BE USED BELOW GRADE WHEN CONNECTING GROUND RING TO GROUND ROD.

1 CADWELD GROUNDING CONNECTIONS
SCALE: NOT TO SCALE

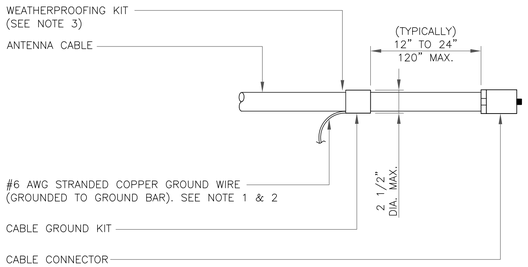
WIRE SIZE	BURNDY LUG	BOLT SIZE
#6 AWG GREEN INSULATED	YA6C-2TC38	3/8" - 16 NC S 2 BOLT
#2 AWG SOLID TINNED	YA3C-2TC38	3/8" - 16 NC S 2 BOLT
#2 AWG STRANDED	YA2C-2TC38	3/8" - 16 NC S 2 BOLT
#2/0 AWG STRANDED	YA26-2TC38	3/8" - 16 NC S 2 BOLT
#4/0 AWG STRANDED	YA28-2N	1/2" - 16 NC S 2 BOLT



NOTES:

1. ALL GROUNDING LUGS ARE TO BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS. ALL HARDWARE BOLTS, NUTS, LOCK WASHERS SHALL BE STAINLESS STEEL. ALL HARDWARE ARE TO BE AS FOLLOWS: BOLT, FLAT WASHER,GROUND BAR, GROUND LUG, FLAT WASHER AND NUT.

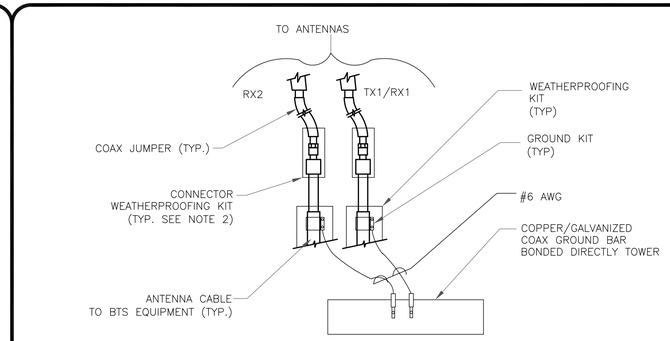
2 MECHANICAL LUG CONNECTION
SCALE: NOT TO SCALE



NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.
2. GROUNDING KIT SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.
3. WEATHER PROOFING SHALL BE TWO-PART TAPE KIT, COLD SHRINK SHALL NOT BE USED.

3 CABLE GROUND KIT CONNECTION
SCALE: NOT TO SCALE

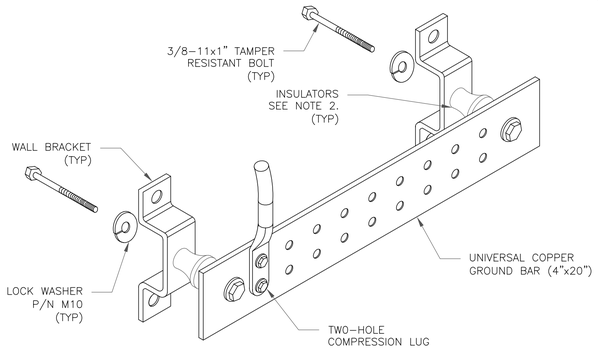


NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO ANTENNA GROUND BAR.
2. WEATHER PROOFING SHALL BE TWO-PART TAPE KIT. COLD SHRINK SHALL NOT BE USED.

4 GROUND CABLE CONNECTION
SCALE: NOT TO SCALE

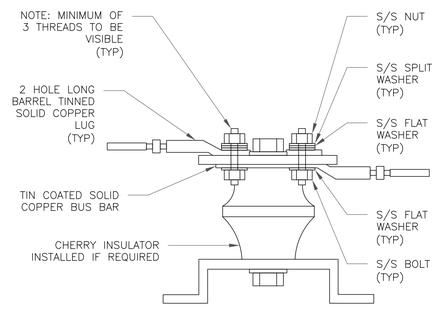
5 GROUNDWIRE INSTALLATION
SCALE: NOT TO SCALE



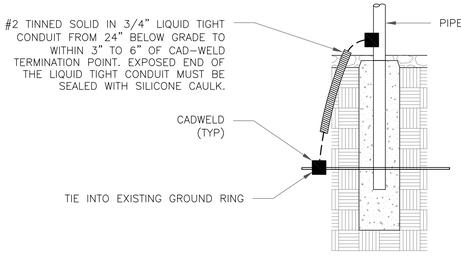
NOTES:

1. DOWN LEAD (HOME RUN) CONDUCTORS ARE NOT TO BE INSTALLED ON CROWN CASTLE USA INC. TOWER, PER THE GROUNDING DOWN CONDUCTOR POLICY QAS-STD-10091. NO MODIFICATION OR DRILLING TO TOWER STEEL IS ALLOWED IN ANY FORM OR FASHION, CAD-WELDING ON THE TOWER AND/OR IN THE AIR ARE NOT PERMITTED.
2. OMIT INSULATOR WHEN MOUNTING TO TOWER STEEL OR PLATFORM STEEL USE INSULATORS WHEN ATTACHING TO BUILDING OR SHELTERS.

6 GROUND BAR DETAIL
SCALE: NOT TO SCALE



7 LUG DETAIL
SCALE: NOT TO SCALE



8 TRANSITIONING GROUND DETAIL
SCALE: NOT TO SCALE

T-Mobile
35 GRIFFIN ROAD
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B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/22

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

SHEET NUMBER: G-3
REVISION: 1

Date: **August 24, 2021**

Darcy Tarr
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
(704) 405-6589

Trylon
1825 W. Walnut Hill Lane,
Suite 302
Irving, TX 75038
214-930-1730

Subject:	**Mount Replacement Analysis Report**	
Carrier Designation:	**T-Mobile Anchor**	
	Carrier Site Number:	CT11381C
	Carrier Site Name:	WATERFORD SOUTH/RT 1
Crown Castle Designation:	**Crown Castle BU Number:**	876338
	Crown Castle Site Name:	WATERFORD
	Crown Castle JDE Job Number:	675143
	Crown Castle Order Number:	576542 Rev. 0
Engineering Firm Designation:	**Trylon Report Designation:**	190496
Site Data:	**41 Manitock Hill Road, Waterford, New London County, CT, 06385-2000 Latitude 41°21'16.70" Longitude -72°9'1.60"**	
Structure Information:	**Tower Height & Type:**	**136.0 ft Self Support**
	Mount Elevation:	**117.0 ft**
	Mount Type:	**12.5 ft Sector Frame**

Dear Darcy Tarr,

Trylon is pleased to submit this **"Mount Replacement Analysis Report"** to determine the structural integrity of T-Mobile's antenna mounting system with the proposed appurtenance and equipment addition on the abovementioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point for fall protection or rigging is not part of this document.

The purpose of the analysis is to determine acceptability of the mount stress level. Based on our analysis we have determined the mount stress level to be:

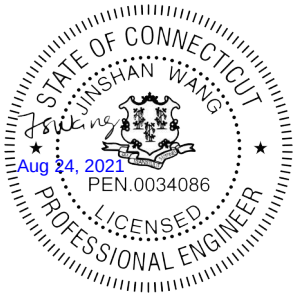
Sector Frame **Sufficient***

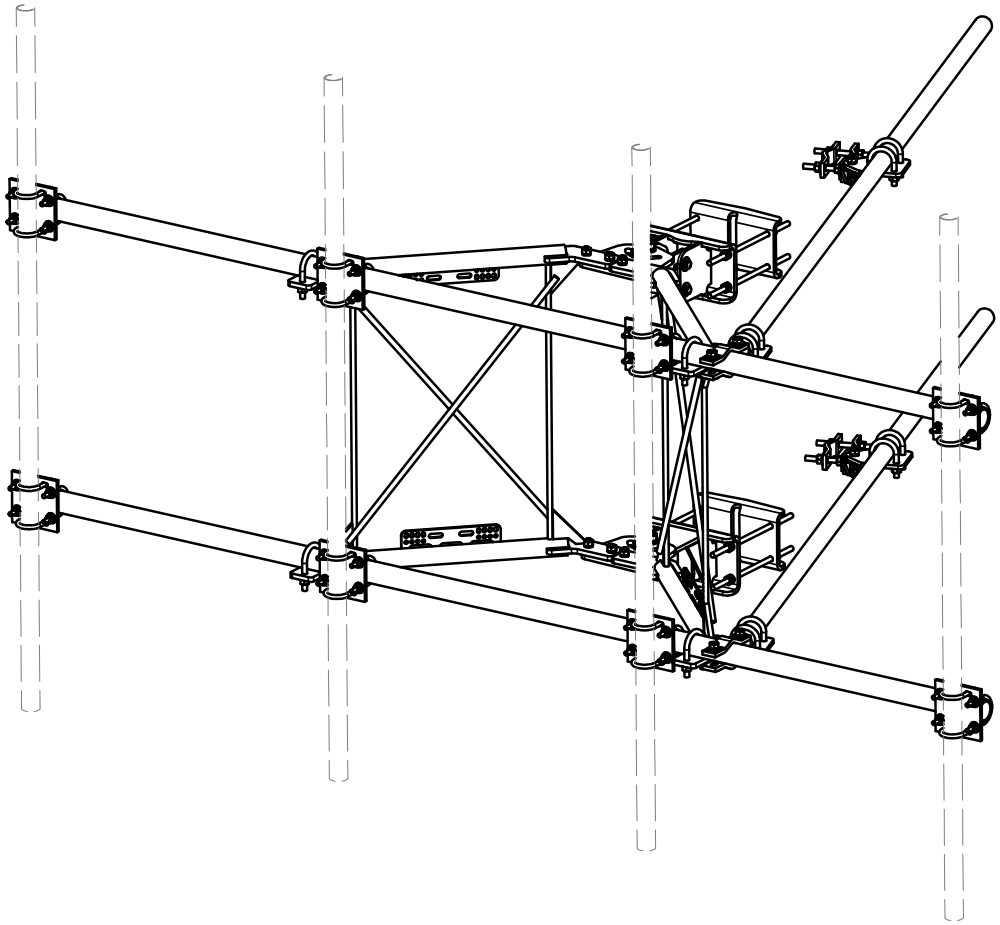
***Sufficient upon completion of the changes listed in the 'Recommendations' section of this report.**

This analysis utilizes an ultimate 3-second gust wind speed of 135 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Mount analysis prepared by: Andrei Florea

Respectfully Submitted by:
Jinshan Wang, P.E





PARTS LIST

ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	2	X-VFAW	SUPPORT ARM		71.41	142.81
2	1	X-HDCAMTBW	CLAMP WELDMENT FOR BCAM-HD		33.86	33.86
3	1	X-MHTPHD	MULTI-HOLE TAPER PLATE WELDMENT		36.24	36.24
4	2	X-VFAPL4	VFA-HD PIVOT PLATE	12 in	15.88	31.77
5	2	X-LCBP4	BENT BACKING PLATE	13 in	19.00	38.01
6	1	X-HDCAMSS	ANGLE ADJUSTMENT WELDMENT FOR BCAM-HD		16.39	16.39
7	4	X-SPTB	SLIDING PIPE TIE BACK PLATE	5 1/2 in	5.87	23.49
8	1	X-HDCAMSP	POSITIONING PLATE WELDMENT FOR BCAM-HD		2.58	2.58
9	4	X-TBCA	TIE BACK CLIP ANGLE		2.01	8.02
10	8	SCX2	CROSSOVER PLATE	7 in	4.80	38.37
11	4	MCP	CLAMP HALF 1/2" THICK, 11-5/8" LONG	12 1/16 in	3.59	14.37
12	8	DCP	1/2" THICK, 5-3/4" CNTER TO CENTER CLAMP HALF	8 1/8 in	2.36	18.90
13	2	P2126	2-3/8" X 126" (2" SCH. 40) GALVANIZED PIPE	126 in	40.75	81.50
14	2	P30150	2-7/8" X 150" (2-1/2" SCH. 40) GALVANIZED PIPE	150 in	76.94	153.87
15	4	A34212	3/4" x 2-1/2" UNC HEX BOLT (A325)	2 1/2 in	0.48	1.92
16	4	G34FW	3/4" HDG USS FLATWASHER		0.06	0.24
17	4	G34LW	3/4" HDG LOCKWASHER		0.04	0.17
18	4	G34NUT	3/4" HDG HEAVY 2H HEX NUT		0.21	0.85
19	8	G58R-18	5/8" x 18" THREADED ROD (HDG.)	18 in	0.40	3.19
20	4	G58R-12	5/8" x 12" THREADED ROD (HDG.)		1.05	4.18
21	4	G58R-8	5/8" x 8" THREADED ROD (HDG.)		0.70	2.79
22	4	X-UB5300	5/8" X 3" X 5-1/4" X 2-1/2" U-BOLT (HDG.)		1.15	4.60
23	8	X-UB5258	5/8" X 2-5/8" X 4-1/2" X 2" U-BOLT (HDG.)		1.00	8.00
24	2	G5807	5/8" x 7" HDG HEX BOLT GR5 FULL THREAD	7 in	0.70	1.41
25	1	G5806	5/8" x 6" HDG HEX BOLT GR5 FULL THREAD	6 in	0.62	0.62
26	8	G5804	5/8" x 4" HDG HEX BOLT GR5		0.44	3.55
27	4	G5802	5/8" x 2" HDG HEX BOLT GR5		0.27	1.08
28	8	A582114	5/8" x 2-1/4" HDG A325 HEX BOLT	2 1/4 in	0.31	2.50
29	25	G58FW	5/8" HDG USS FLATWASHER	1/8 in	0.07	1.76
30	66	G58LW	5/8" HDG LOCKWASHER		0.03	1.72
31	71	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	9.22
32	32	X-UB1300	1/2" X 3" X 5" X 2" GALV U-BOLT		0.74	23.64
33	16	X-UB1212	1/2" X 2" X 3" X 1-1/4" U-BOLT (HDG.)		0.60	9.56
34	64	G12FW	1/2" HDG USS FLATWASHER	3/32 in	0.03	2.18
35	64	G12LW	1/2" HDG LOCKWASHER	1/8 in	0.01	0.89
36	64	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	4.58
					TOTAL WT. #	738.06

REVISION HISTORY

REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
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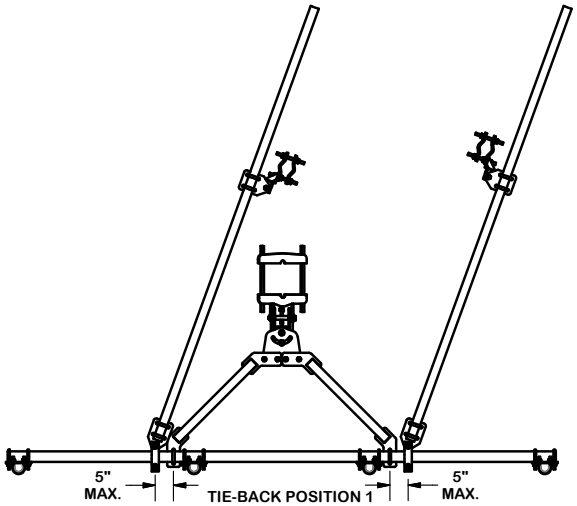
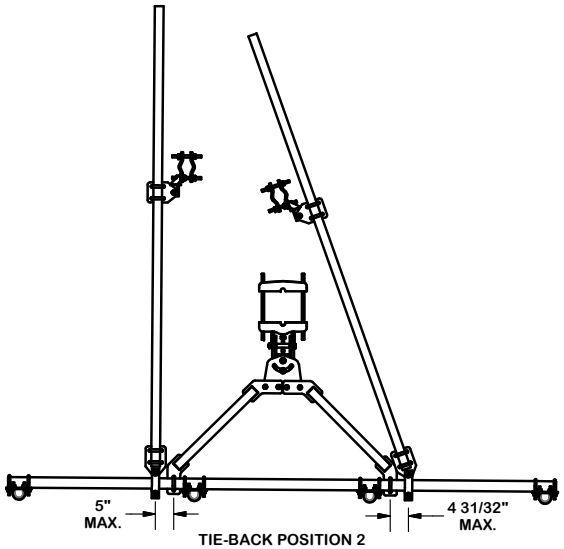
	CEK 1/25/2017		VFA12-HD

CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	02	CUSTOMER	BMC 12/13/2017	VFA12-HD

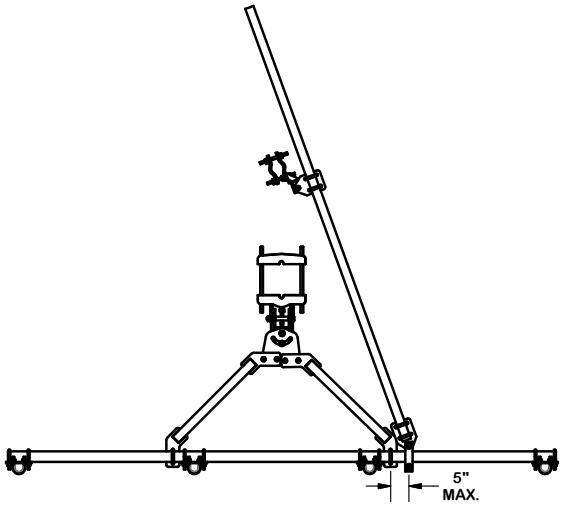
TIE-BACK POSITIONS



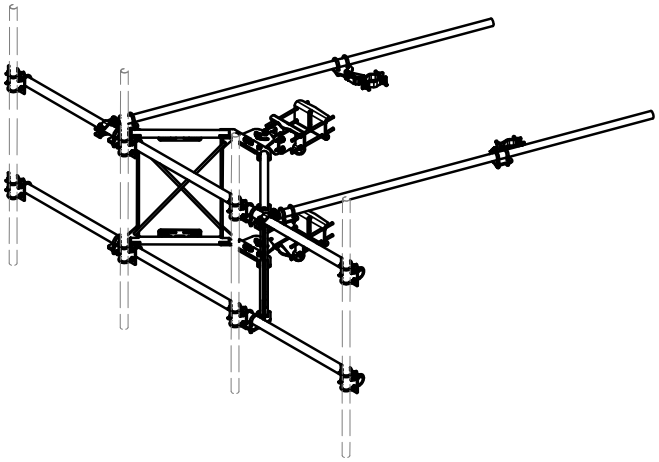
TIE-BACK POSITION 1
-20° / +20° TOP PARALLEL

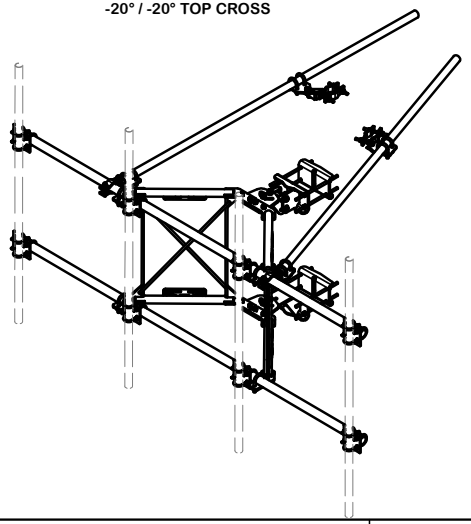


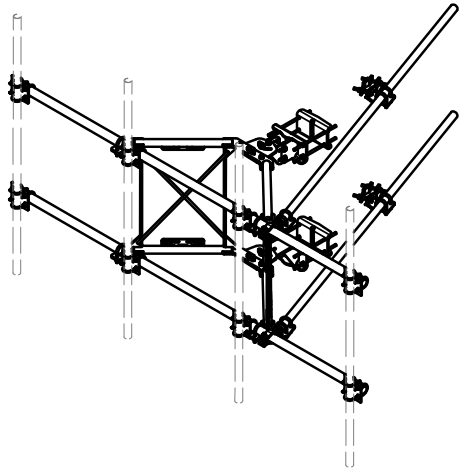
TIE-BACK POSITION 2
-20° / -20° TOP CROSS



TIE-BACK POSITION 3
-20° SAME SIDE STACKED







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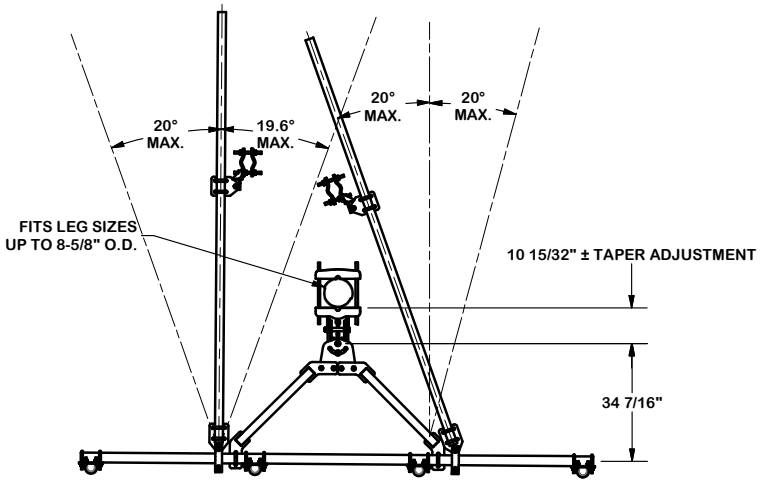
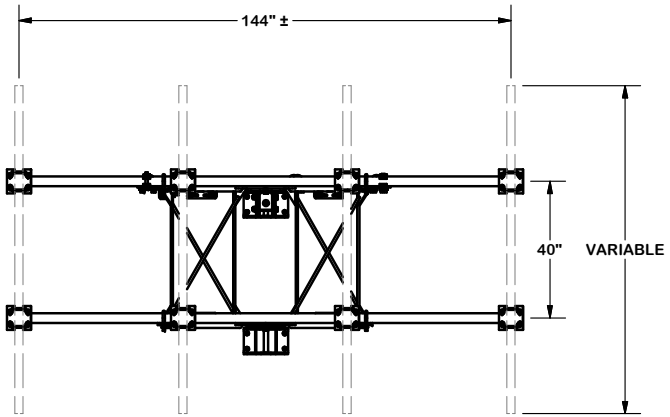
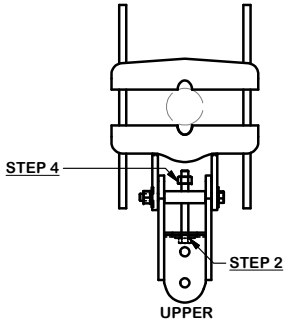
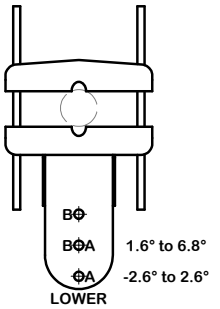


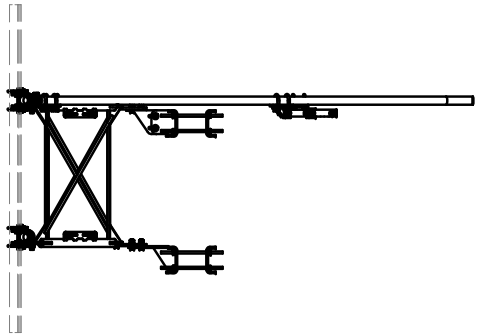


ANGLE CALIBRATING PROCEDURE:

1. MEASURE TOWER TAPER AND PICK LOWER BRACKET HOLE:
   - HOLE A = -2.6° TO 2.6°
   - HOLE B = 1.6° TO 6.8°
2. USE CALIBRATING BOLT TO ADJUST FRAME TO DESIRED TAPER
3. TORQUE LOCKING BOLTS TO 100 ft.-lbs.
4. ADVANCE LOCKING NUT TO POSITIONING PLATE, THEN TIGHTEN.







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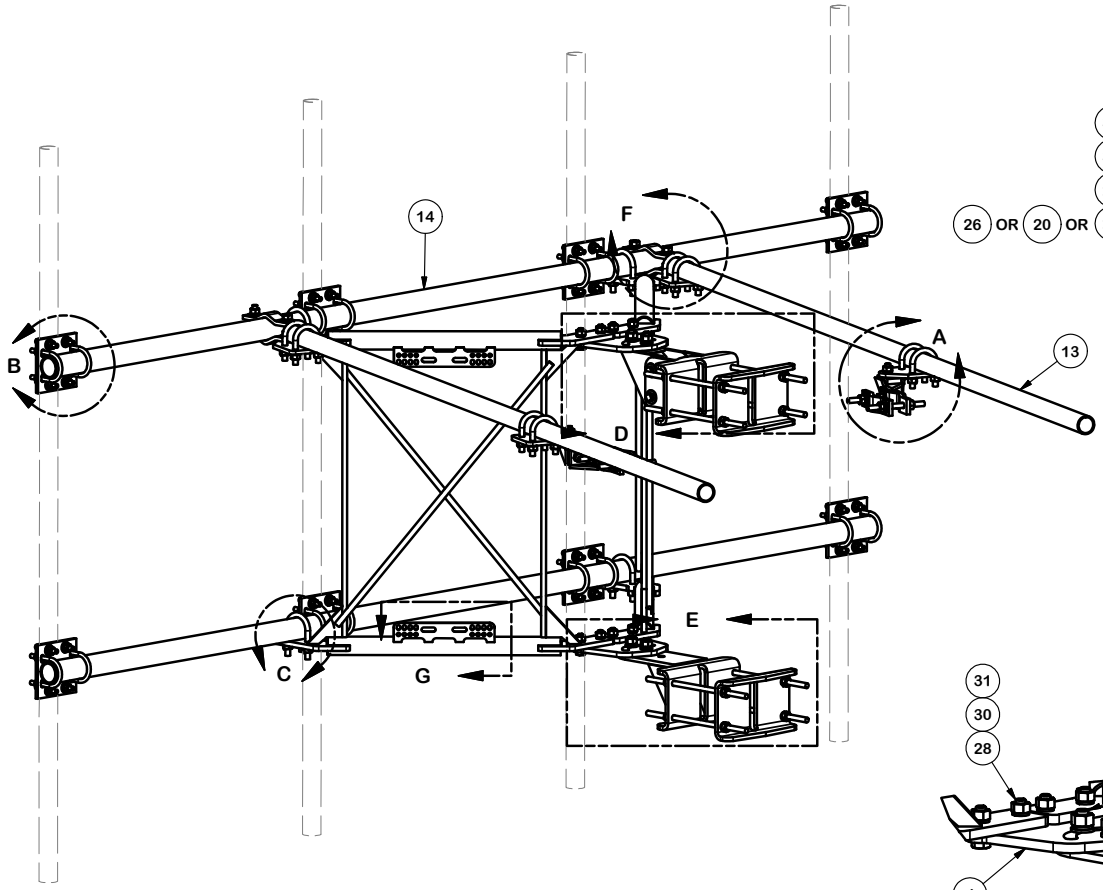
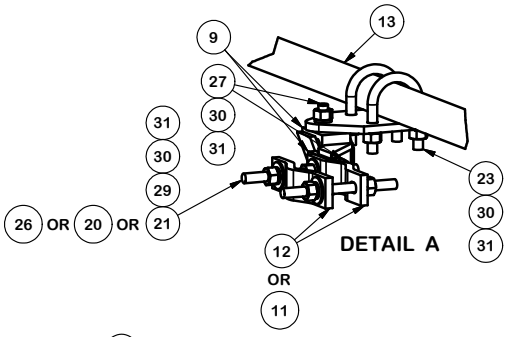
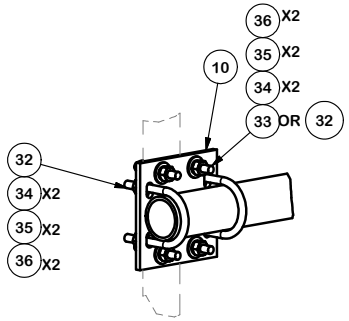
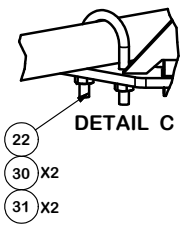




DETAIL A



DETAIL B



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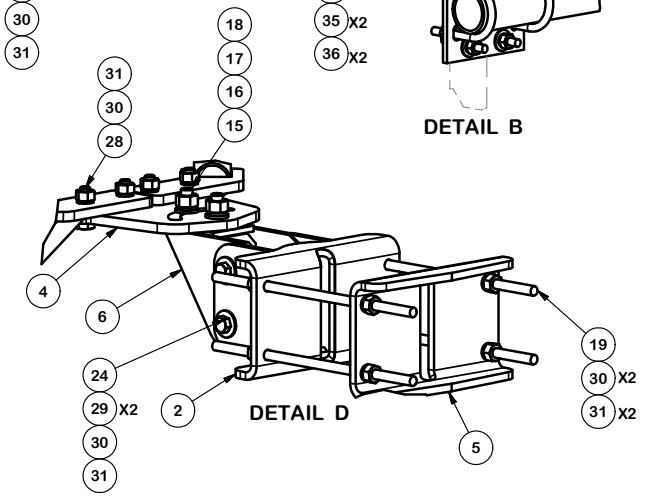
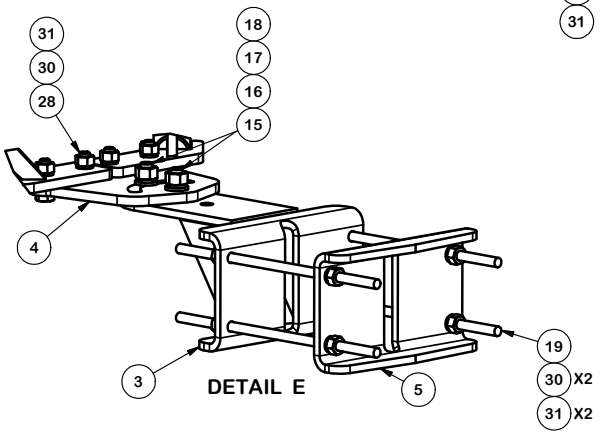
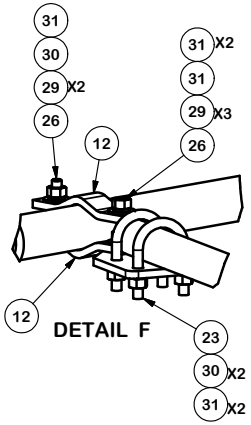


DETAIL D



DETAIL E

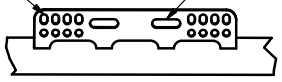


DETAIL F

7/16" LUG HOLES

REVIEW CARRIER STANDARDS FOR PROPER SURFACE PREPARTION AND ASSEMBLY OF ELECTRICAL CONNECTIONS

9/16" SLOTTED HOLE FOR EQUIPMENT PIPE U-BOLT



DETAIL G

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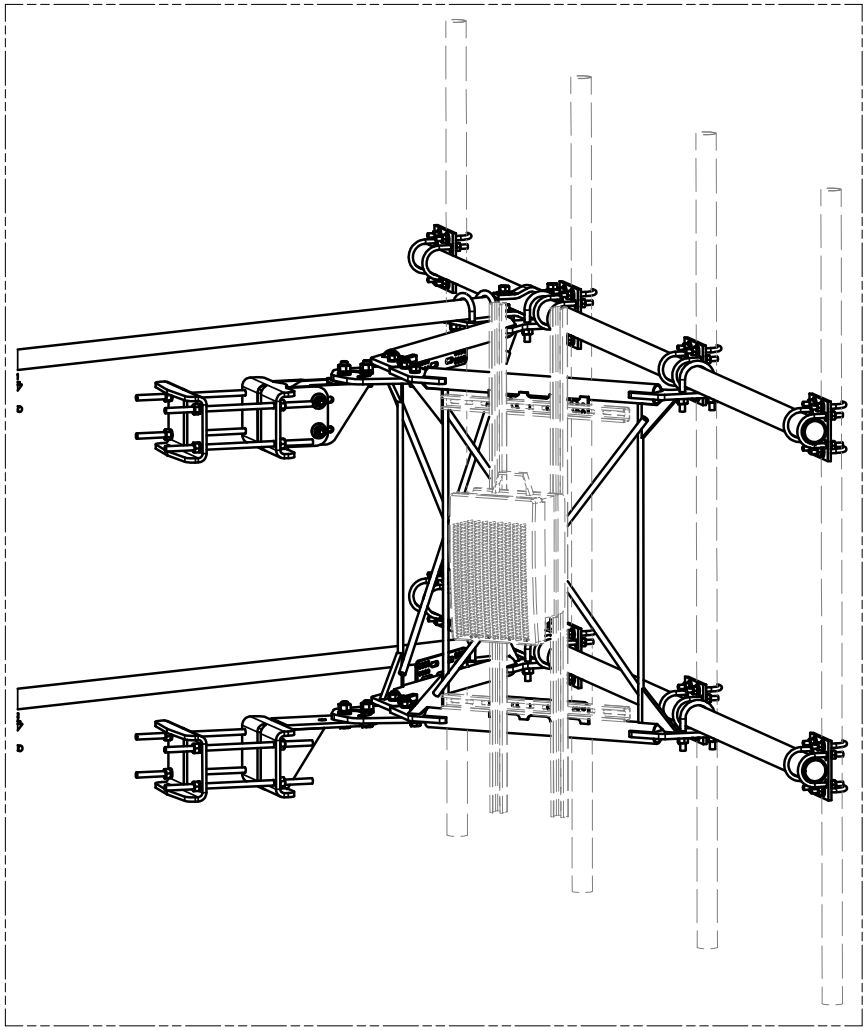
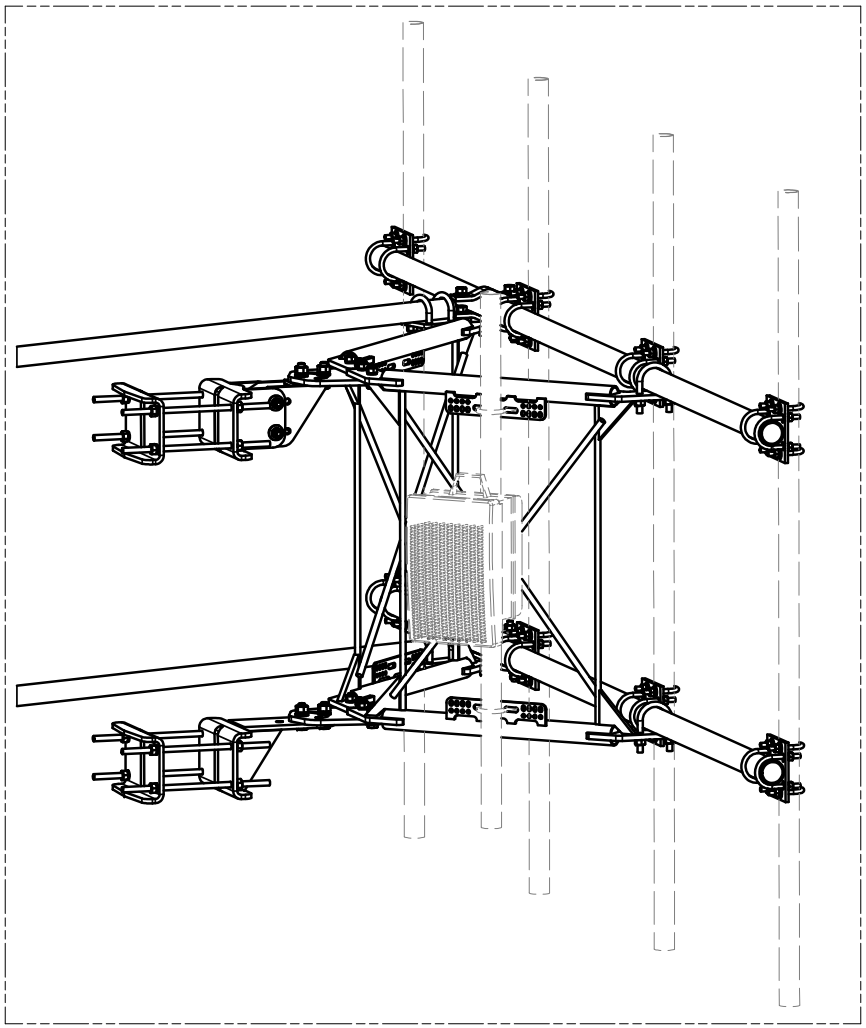


UNISTRUT AND HARDWARE
SOLD SEPARATELY.

REQUIRES 3/8" HARDWARE



EQUIPMENT PIPE AND HARDWARE
SOLD SEPARATELY.

REQUIRES 1/2" HARDWARE
AND 2-3/8" TO 4-1/2" O.D. PIPE

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