STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950A
E-Mail: siting.council@ct.gov
Web Site: portal.ct.gov/csc

VIA ELECTRONIC MAIL

May 19, 2021

Ryan Clark
Centerline Communications
750 West Center Street, Floor 3
West Bridgewater, MA 02379

RE: **EM-T-MOBILE-089-210429** - T-Mobile notice of intent to modify an existing telecommunications facility located at 1615 Stanley Street, New Britain, Connecticut.

Dear Mr. Clark:

The Connecticut Siting Council (Council) is in receipt of your correspondence of May 18, 2021 submitted in response to the Council's May 17, 2021 notification of an incomplete request for exempt modification with regard to the above-referenced matter.

The submission renders the request for exempt modification complete and the Council will process the request in accordance with the Federal Communications Commission 60-day timeframe.

Thank you for your attention and cooperation.

Sincerely,

s/ Melanie A. Bachman

Melanie A. Bachman
Executive Director

MAB/IN/emr

From: Ryan Clark <rclark@clinellc.com>
Sent: Tuesday, May 18, 2021 8:01 AM
To: Fontaine, Lisa <Lisa.Fontaine@ct.gov>
Cc: CSC-DL Siting Council <Siting.Council@ct.gov>
Subject: RE: Council Incomplete Letter for EM-T-MOBILE-089-210429

Good Morning,

Please find the Connecticut stamped SA and MA for the attached reference site. Let me know if you need anything else.

Ryan Clark | Site Acquisition Consultant
750 W Center St, Suite 301 | West Bridgewater, MA 02379
Mobile: 203.300.7310
rclark@clinellc.com | www.centerlinecommunications.com

From: Fontaine, Lisa <Lisa.Fontaine@ct.gov>
Sent: Monday, May 17, 2021 3:47 PM
To: Ryan Clark <rclark@clinellc.com>
Cc: CSC-DL Siting Council <Siting.Council@ct.gov>
Subject: Council Incomplete Letter for EM-T-MOBILE-089-210429

Please see the attached correspondence.

Lisa Fontaine
Fiscal Administrative Officer
CONNECTICUT SITING COUNCIL
Ten Franklin Square
New Britain, CT 06051
P: 860.827.2969 | F: 860.827.2950 | E: lisa.fontaine@ct.gov

CENTERLINE COMMUNICATIONS
750 West Center Street, Suite 301
West Bridgewater, MA 02379
781.713.4725

Revised Structural Analysis Report

Site ID: CTHA783A
Site Name: CTHA783A
Project Name: SPRINT RETAIN
Address: 1679 Stanley Street
New Britain, CT 06053

Client:

T - Mobile

NORTHEAST, LLC
15 Commerce Way, Suite B
Norton, MA 02766

Date: 4/6/2021 (Rev.1)
3/31/2021 (Rev.0)

Scope of Work:

Centerline Communications was authorized by T-Mobile Northeast LLC to perform an analysis of the existing structure to determine its capacity to support the proposed and existing T-Mobile equipment/appurtenances listed in this report.

Existing & Proposed Equipment:

Carrier	Mounting Level (ft)	Center Line Elevation (ft)	Number of Appurtenances	Antenna Manufacturer	Appurtenance Model	Feed Lines (in)
-	143.0	143.0	1	-	Lightning Rod	-
T-Mobile	138.0	138.0	**3**	**RFS**	**APX16DWV-16DWV-S-E-A20 Panel Antenna**	**(3) 6x12 Hybrid**
			3	**RFS**	**APXVAALL24_43-U-NA20 Panel Antenna**	
			3	**Ericsson**	**AIR6449 B41 Panel Antenna**	
			3	**Ericsson**	**4415 B66A RRH**	
			3	**Ericsson**	**Radio 4449 B71+B85 RRH**	
			3	**Ericsson**	**4424 B25 RRH**	
			3	-	13’ Sector Mount	
-	94.0	94.0	1	-	MF-900B Dish	
-	94.0	94.0	1	-	Pipe Mount	(1) 3/8
-	93.0	108.0	1	-	4-Bay FM Antenna	(1) 7/8
-	84.0	84.0	1	-	4’ Yagi	(1) 3/8

*Note: Proposed equipment shown in **bold**.*

Design Criteria:

Design Codes:

2018 Connecticut State Building Code
2015 International Building Code
ASCE 7-10
TIA-222-G Standards

Ultimate Design Wind Speed (V_{ult})	125 mph
Wind Speed with Ice	50 mph
Ice Thickness	1.00 in.
Exposure Category	B
Topographic Category	1
Risk Category	II
Site Soil Class (Assumed)	D – Stiff Soil
Seismic Design Category	B
Spectral Response Acceleration Parameter at a Short Periods, S_S	0.183 g
Spectral Response Acceleration Parameter at a Period of 1 Second, S_1	0.064 g
Short Period Site Coefficient, F_a	1.60
Long Period Site Coefficient, F_v	2.40

***Refer to calculations for additional design criteria.**

Conclusion:

Section Capacity (Summary)

Section No.	*Elevation ft*	*Component Type*	*Size*	*Critical Element*	*P lb*	*øP$_{allow}$ lb*	*% Capacity*	*Pass Fail*
T1	143 - 123	Leg	ROHN 2.5 X-STR	1	-15953	94407	16.9	Pass
T2	123 - 103	Leg	ROHN 2.5 STD	58	-14906	58406	25.5	Pass
T3	103 - 83	Leg	ROHN 2.5 STD	91	-16815	58406	28.8	Pass
T4	83 - 67.82	Leg	ROHN 2.5 X-STR	124	-16537	76177	21.7	Pass
T5	67.82 - 63	Leg	ROHN 2.5 X-STR	151	-15514	88193	17.6	Pass
T1	143 - 123	Diagonal	ROHN TS1.5x16 ga	27	-1631	5479	29.8 43.1 (b)	Pass
T2	123 - 103	Diagonal	ROHN TS1.5x16 ga	88	-1994	5479	36.4 46.2 (b)	Pass
T3	103 - 83	Diagonal	ROHN TS1.5x16 ga	122	-1090	5479	19.9 25.7 (b)	Pass
T4	83 - 67.82	Diagonal	ROHN TS1.5x16 ga	136	-1204	5479	22.0 33.1 (b)	Pass
T5	67.82 - 63	Horizontal	L4x4x1/4	162	17	62856	16.2	Pass
T1	143 - 123	Top Girt	ROHN TS1.5x16 ga	4	6	8513	0.5	Pass
T2	123 - 103	Top Girt	ROHN TS1.5x16 ga	61	759	8513	8.9 19.8 (b)	Pass
T3	103 - 83	Top Girt	ROHN TS1.5x16 ga	95	-313	6341	4.9 9.2 (b)	Pass
T4	83 - 67.82	Top Girt	ROHN TS1.5x16 ga	129	-326	6341	5.1 10.4 (b)	Pass
T5	67.82 - 63	Top Girt	L4x4x1/4	156	1776	62856.00	12.2	Pass

T1	143 - 123	Bottom Girt	ROHN TS1.5x16 ga	9	600	8513	7.1 15.7 (b)	Pass
T2	123 - 103	Bottom Girt	ROHN TS1.5x16 ga	64	-331	6341	5.2 8.9 (b)	Pass
T3	103 - 83	Bottom Girt	ROHN TS1.5x16 ga	97	-312	6341	4.9 7.1 (b)	Pass
T4	83 - 67.82	Bottom Girt	ROHN TS1.5x16 ga	130	1093	8513	12.8 28.5 (b)	Pass
T5	67.82 - 63	Bottom Girt	L4x4x1/4	159	-209	48854	15.7	Pass
T1	143 - 123	Guy A@125.5	7/16	175	12335	12480	98.8	Pass
T1	143 - 123	Guy B@125.5	7/16	172	10612	12480	85.0	Pass
T1	143 - 123	Guy C@125.5	7/16	166	10722	12480	85.9	Pass
T1	143 - 123	Top Guy Pull-Off@125.5	2L2x2x1/4x3/8	170	-3576	36044	9.9	Pass
T1	143 - 123	Torque Arm Top@125.5	C12x20.7	176	3899	197316	35.3	Pass
							Summary	
						Leg (T3)	28.8	Pass
						Diagonal (T2)	46.2	Pass
						Horizontal (T5)	16.2	Pass
						Top Girt (T2)	19.8	Pass
						Bottom Girt (T4)	28.5	Pass
						Guy A (T1)	98.8	Pass
						Guy B (T1)	85.0	Pass
						Guy C (T1)	85.9	Pass
						Top Guy Pull-Off (T1)	9.9	Pass
						Torque Arm Top (T1)	35.3	Pass
						Bolt Checks	46.2	Pass
						RATING =	**98.8**	**Pass**

Structure Rating (max from all components) =	**98.8%**

Foundation Capacity

Component	Original Design Reaction (kips)[1]	Design Reaction (kips)	Capacity	Overall Result
Axial	41.2	41.1	99.8%	Pass
Shear	-	-	-	Pass
Anchor Uplift	15.4	9.4	61.0%	Pass
Anchor Lateral	14.8	8.0	54.1%	Pass

Foundation Rating (max from all components) =	**99.8%**

[1]Original design reactions multiplied by factor of 1.35 per TIA-222-G paragraph 15.3.

Recommendations:

The existing tower and its foundation have sufficient capacity to support the existing and proposed loading for the final loading configuration. Modifications to the tower structure are not required.

Reference Documents:

- T-Mobile RFDS CTHA783A_Sprint Retain_1, dated January 15, 2021
- Site Photos and Notes by Centerline Communications, dated December 22, 2020
- Construction Drawings by Crown Castle, dated October 19, 2018
- Structural Analysis by Ramaker & Associates, dated July 10, 2014
- Third Party Review of Structural Analysis by URS, dated September 3, 2013

Assumptions and Limitations:

- The tower and structures were built and maintained with the manufacturer's specifications.
- The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in this report and the referenced drawings.
- The proposed structural modifications specified by Ramaker & Associates have been completed.

Design Calculations

ASCE 7 Hazards Report

Address:
1679 Stanley St
New Britain, Connecticut
06053

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)

Elevation: 151.95 ft (NAVD 88)
Latitude: 41.69204
Longitude: -72.77081

Wind

Results:

Wind Speed:	117 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	97 Vmph

Data Source:	ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed:	Tue Apr 06 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 7-16 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 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

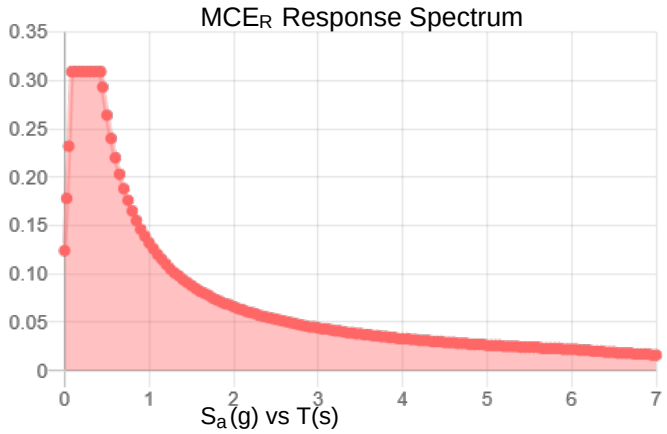
Seismic

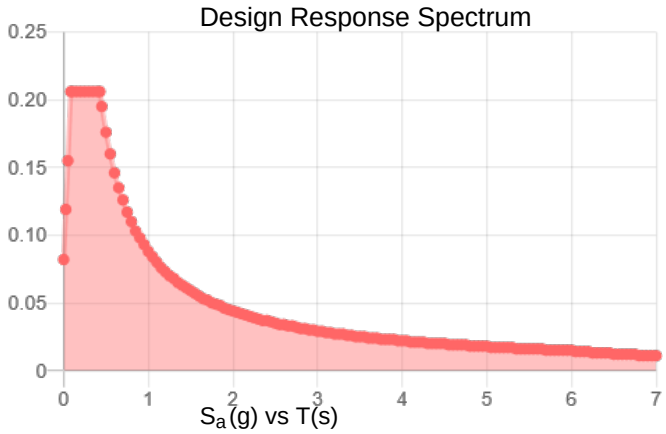
Site Soil Class: D - Default (see Section 11.4.3)

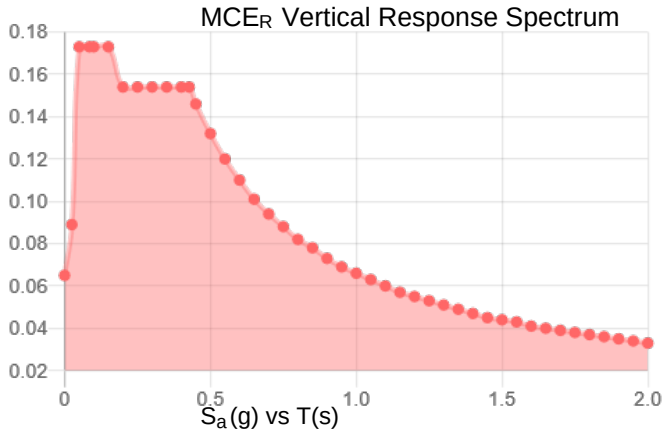
Results:

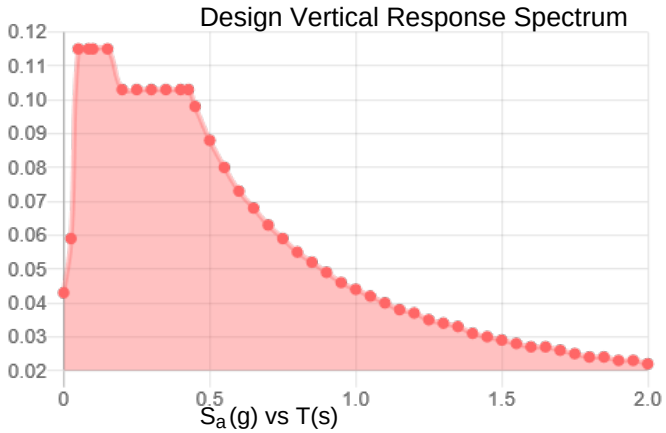
S_S :	0.193	S_{D1} :	0.088
S_1 :	0.055	T_L :	6
F_a :	1.6	PGA :	0.105
F_v :	2.4	PGA_M :	0.167
S_{MS} :	0.309	F_{PGA} :	1.59
S_{M1} :	0.132	I_e :	1
S_{DS} :	0.206	C_v :	0.7

Seismic Design Category B









Data Accessed: Tue Apr 06 2021

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	1.50 in.
Concurrent Temperature:	15 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Tue Apr 06 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 500-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.

Snow

Results:

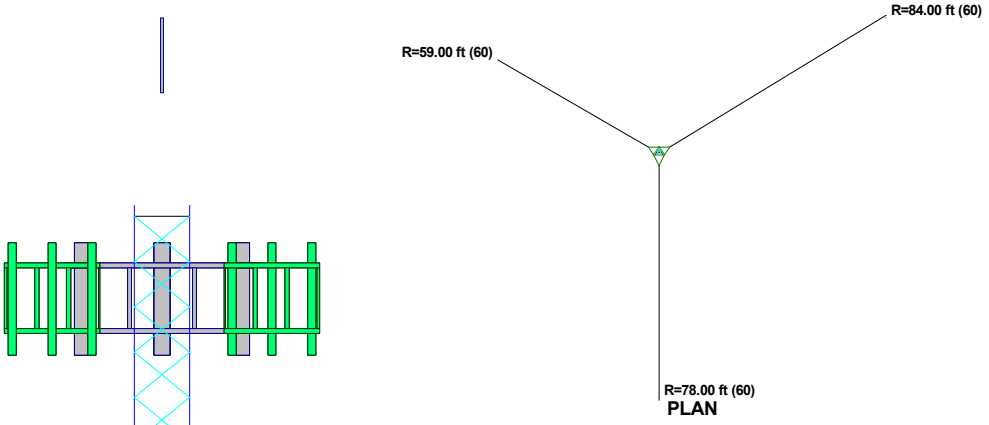
Ground Snow Load, p_g:	30 lb/ft^2
Elevation:	152.0 ft
Data Source:	ASCE/SEI 7-16, Table 7.2-8
Date Accessed:	Tue Apr 06 2021

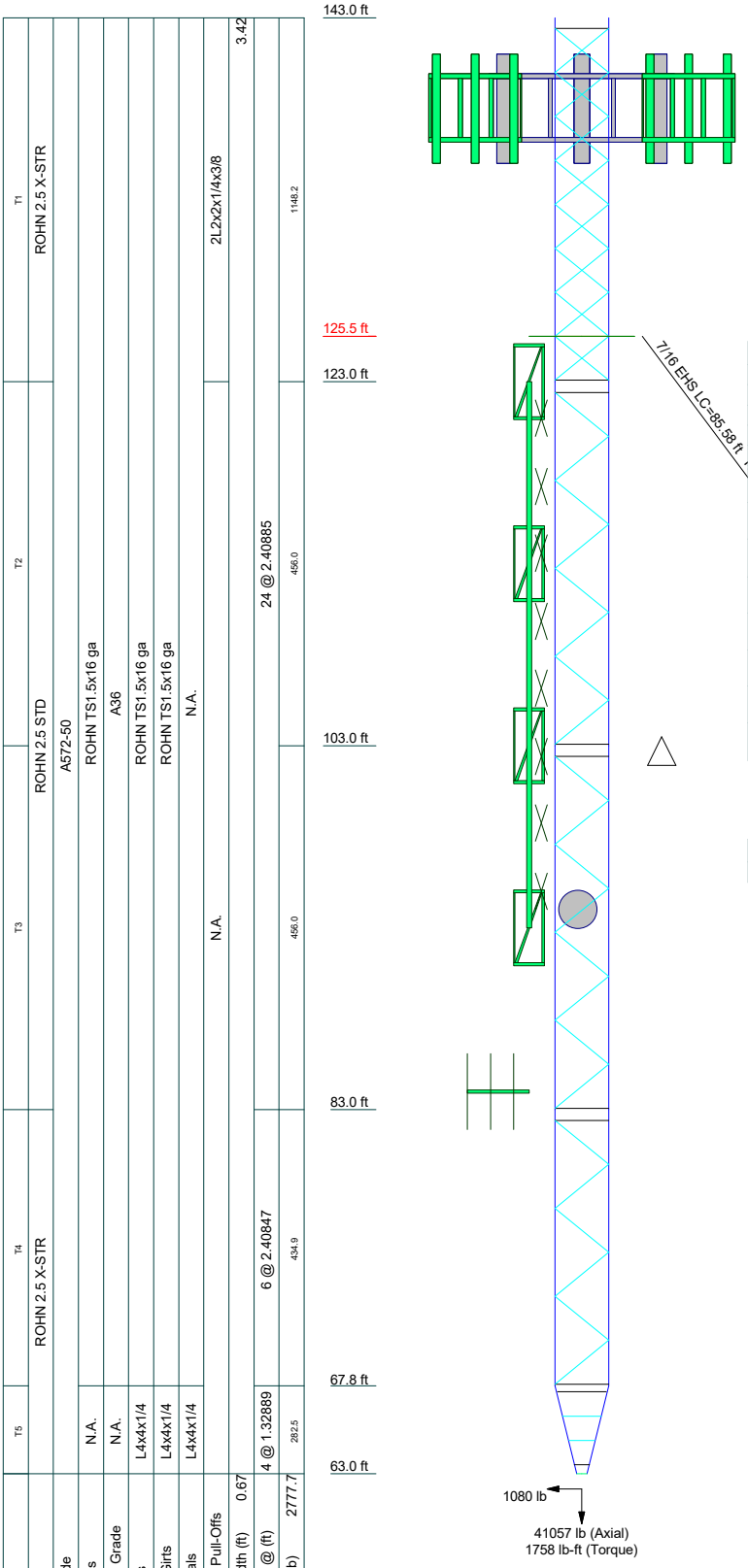
Values provided are ground snow loads. In areas designated "case study required," extreme local variations in ground snow loads preclude mapping at this scale. Site-specific case studies are required to establish ground snow loads at elevations not covered.

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.





Section		T1	T2	T3	T4	T5
Legs		ROHN 2.5 X-STR	ROHN 2.5 STD		ROHN 2.5 X-STR	
Leg Grade		A572-50				
Diagonals	N.A.	ROHN TS1.5x16 ga				
Diagonal Grade	N.A.	A36				
Top Girts	L4x4x1/4	ROHN TS1.5x16 ga				
Bottom Girts	L4x4x1/4	ROHN TS1.5x16 ga				
Horizontals	L4x4x1/4	N.A.				
Top Guy Pull-Offs		2L2x2x1/4x3/8		N.A.		
Face Width (ft)	0.67	3.42				
# Panels @ (ft)	4 @ 1.32889	24 @ 2.40885			6 @ 2.40847	
Weight (lb)	2777.7	1148.2	456.0	456.0	434.9	282.5

DESIGNED APPURTENANCE LOADING

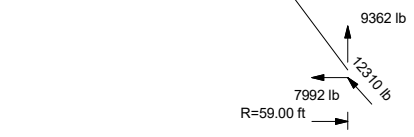
TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 5/8x4'	143	AIR 6449 B41 W/ MOUNT PIPE (T-Mobile)	138
7'x2 1/2" Pipe Mount	143	4415 B66A (T-Mobile)	138
13' Sector Frame (T-Mobile)	138	4415 B66A (T-Mobile)	138
13' Sector Frame (T-Mobile)	138	4415 B66A (T-Mobile)	138
13' Sector Frame (T-Mobile)	138	RADIO 4449 B71+B85 (T-Mobile)	138
APX16DWV-16DWV-S-E-A20 (T-Mobile)	138	RADIO 4449 B71+B85 (T-Mobile)	138
APX16DWV-16DWV-S-E-A20 (T-Mobile)	138	RADIO 4449 B71+B85 (T-Mobile)	138
APX16DWV-16DWV-S-E-A20 (T-Mobile)	138	4424 B25 (T-Mobile)	138
APXVAALL24_43-U-NA20 W/ MP (T-Mobile)	138	4424 B25 (T-Mobile)	138
APXVAALL24_43-U-NA20 W/ MP (T-Mobile)	138	4424 B25 (T-Mobile)	138
APXVAALL24_43-U-NA20 W/ MP (T-Mobile)	138	(3) 7'x2 1/2" Pipe Mount (T-Mobile)	136
AIR 6449 B41 W/ MOUNT PIPE (T-Mobile)	138	2' Standoff	123
AIR 6449 B41 W/ MOUNT PIPE (T-Mobile)	138	30'x2" Pipe Mount	123 - 93
		100-4(M/F)	123 - 93
		2' Standoff	113
		2' Standoff	103
		2" x 4' Pipe Mount	94
		MF-900B	94
		2' Standoff	93
		4' Yagi	84

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 Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 98.8%



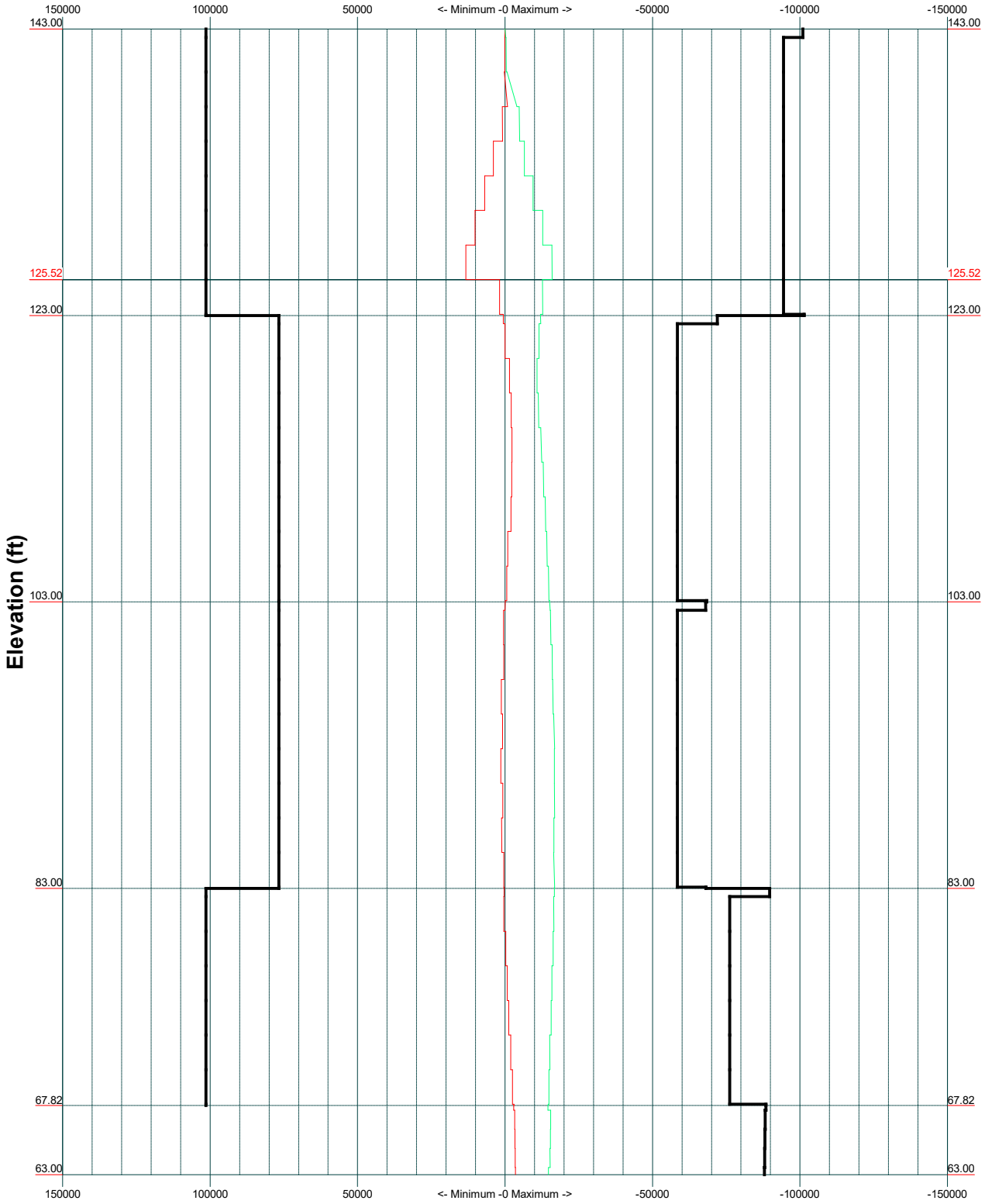
ALL REACTIONS ARE FACTORED

Centerline Communications
750 West Center Street, Suite 301
West Bridgewater, MA 02379
Phone: (781) 713-4725
FAX:

Job: ***CTHA783A***			
Project: ***Anchor***			
Client: T-Mobile	Drawn by: Joshua Gildert		App'd:
Code: TIA-222-G	Date: 03/31/21		Scale: NTS
Path:			Dwg No. E-1

TIA-222-G - 97 mph/50 mph 1.0000 in Ice Exposure B

Leg Capacity ——— **Leg Compression (lb)**



Centerline Communications
750 West Center Street, Suite 301
West Bridgewater, MA 02379
Phone: (781) 713-4725
FAX:

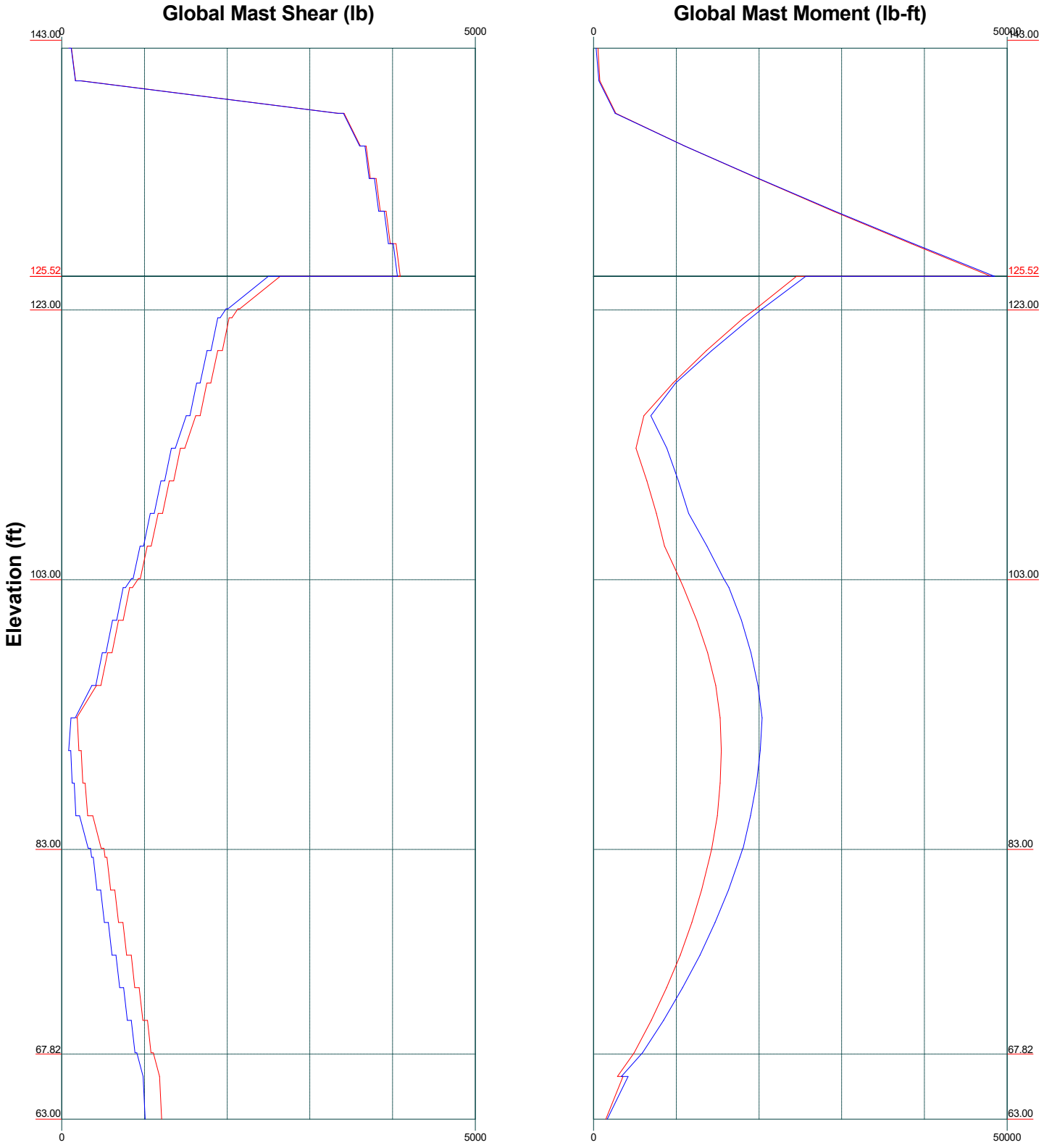
Job: ***CTHA783A***			
Project: ***Anchor***			
Client: T-Mobile	Drawn by: Joshua Gildert		App'd:
Code: TIA-222-G	Date: 03/31/21		Scale: NTS
Path:			Dwg No. E-3

TIA-222-G - 97 mph/50 mph 1.0000 in Ice Exposure B

Vx Vz

Maximum Values

Mx Mz

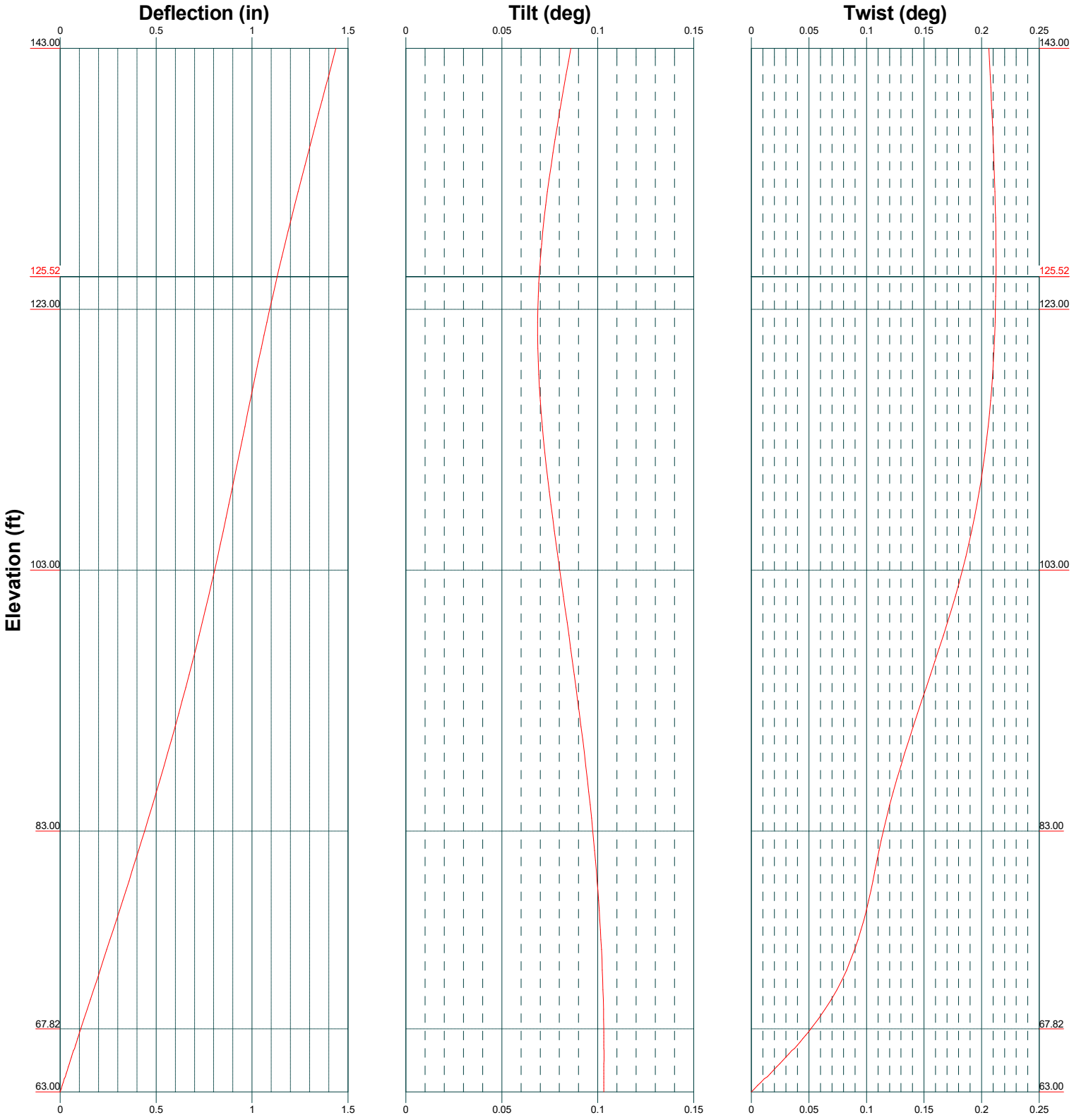


Centerline Communications
750 West Center Street, Suite 301
West Bridgewater, MA 02379
Phone: (781) 713-4725
FAX:

Job: ***CTHA783A***			
Project: ***Anchor***			
Client: T-Mobile	Drawn by: Joshua Gildert		App'd:
Code: TIA-222-G	Date: 03/31/21		Scale: NTS
Path:			Dwg No. E-4

TIA-222-G - Service - 60 mph

Maximum Values



Centerline Communications
750 West Center Street, Suite 301
West Bridgewater, MA 02379
Phone: (781) 713-4725
FAX:

Job: ***CTHA783A***			
Project: ***Anchor***			
Client: T-Mobile	Drawn by: Joshua Gildert		App'd:
Code: TIA-222-G	Date: 03/31/21		Scale: NTS
Path:			Dwg No. E-5

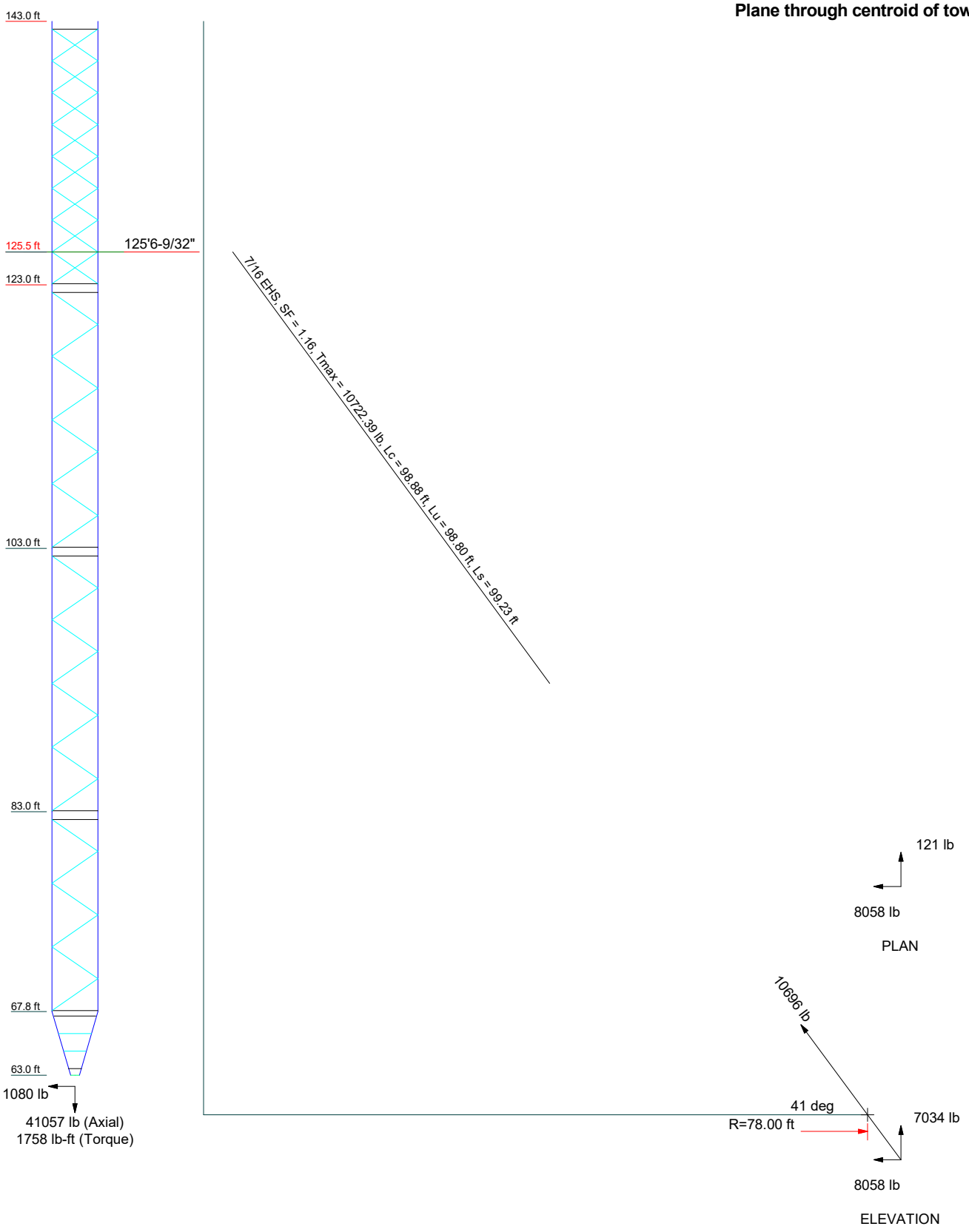
Guy Tensions and Tower Reactions

TIA-222-G - 97 mph/50 mph 1.0000 in Ice Exposure B

Maximum Values

Anchor 'C'@78 ft Azimuth 180 deg Elev 60 ft

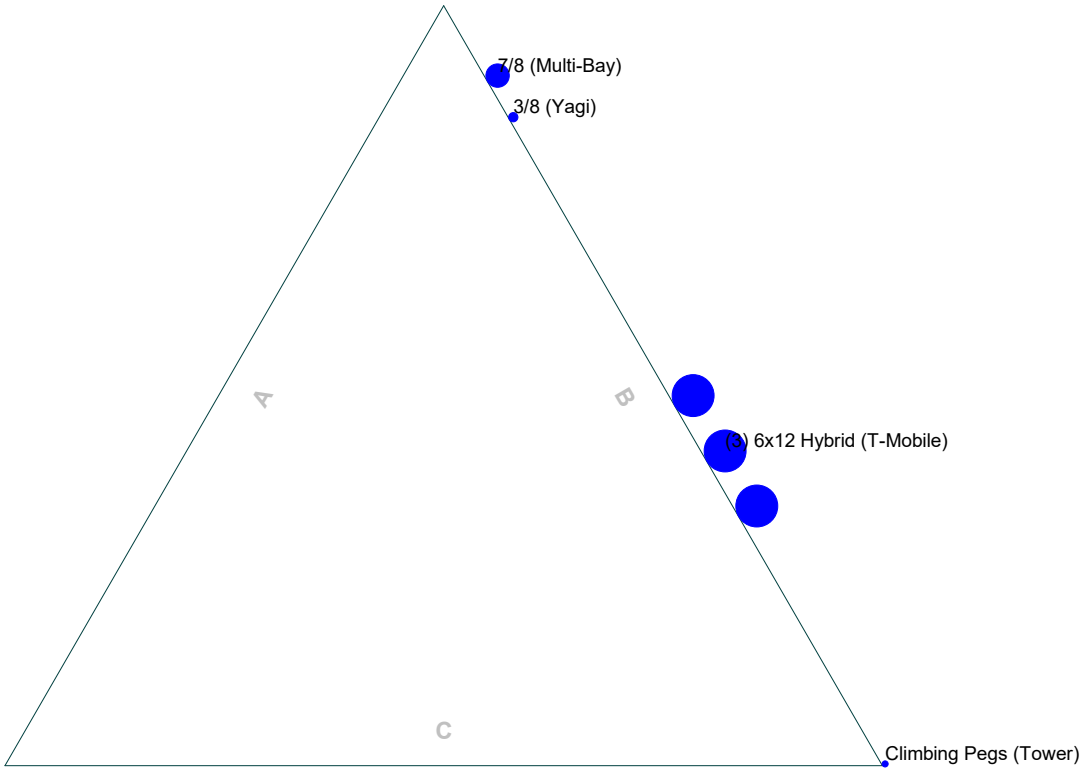
Plane through centroid of tower



Centerline Communications	Job: ***CTHA783A***		
750 West Center Street, Suite 301	Project: ***Anchor***		
West Bridgewater, MA 02379	Client: T-Mobile	Drawn by: Joshua Gildert	App'd:
Phone: (781) 713-4725	Code: TIA-222-G	Date: 03/31/21	Scale: NTS
FAX:	Path:		Dwg No. E-6

Feed Line Plan

Round Flat App In Face App Out Face



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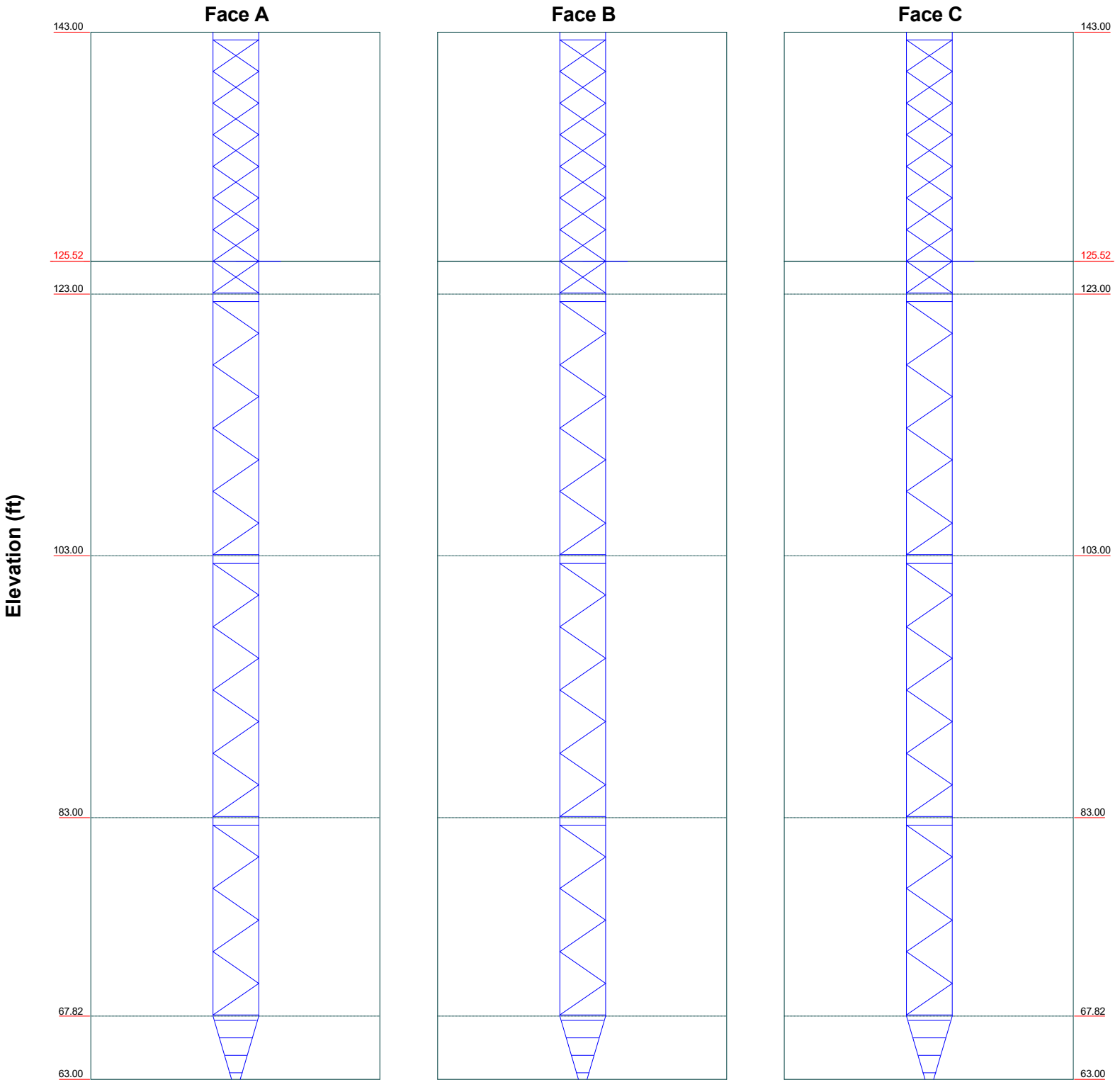
750 West Center Street, Suite 301
West Bridgewater, MA 02379
Phone: (781) 713-4725
FAX:

Job: ***CTHA783A***			
Project: ***Anchor***			
Client: T-Mobile	Drawn by: Joshua Gildert	App'd:	
Code: TIA-222-G	Date: 03/31/21	Scale: NTS	
Path:		Dwg No. E-7	

Stress Distribution Chart
63' - 143'

> 100% | 90%-100% | 75%-90% | 50%-75% | < 50% Overstress



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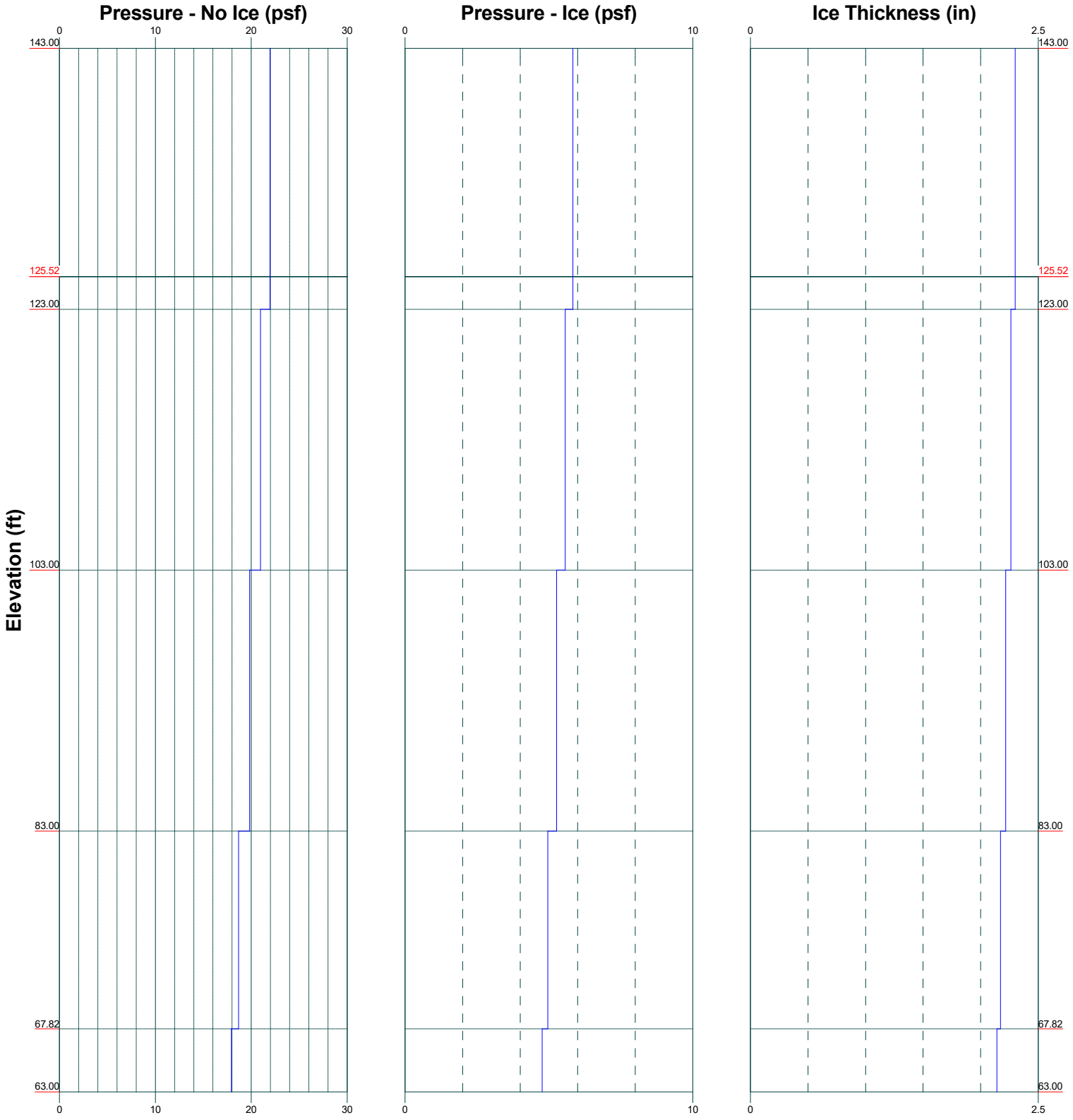
Phone: (781) 713-4725
FAX:

Job: ***CTHA783A***			
Project: ***Anchor***			
Client: T-Mobile	Drawn by: Joshua Gildert	App'd:	
Code: TIA-222-G	Date: 03/31/21	Scale: NTS	
Path:		Dwg No. E-8	

Wind Pressures and Ice Thickness

TIA-222-G - 97 mph/50 mph 1.0000 in Ice Exposure B



Centerline Communications
750 West Center Street, Suite 301
West Bridgewater, MA 02379
Phone: (781) 713-4725
FAX:

Job: ***CTHA783A***			
Project: ***Anchor***			
Client: T-Mobile	Drawn by: Joshua Gildert		App'd:
Code: TIA-222-G	Date: 03/31/21		Scale: NTS
Path:			Dwg No. E-9

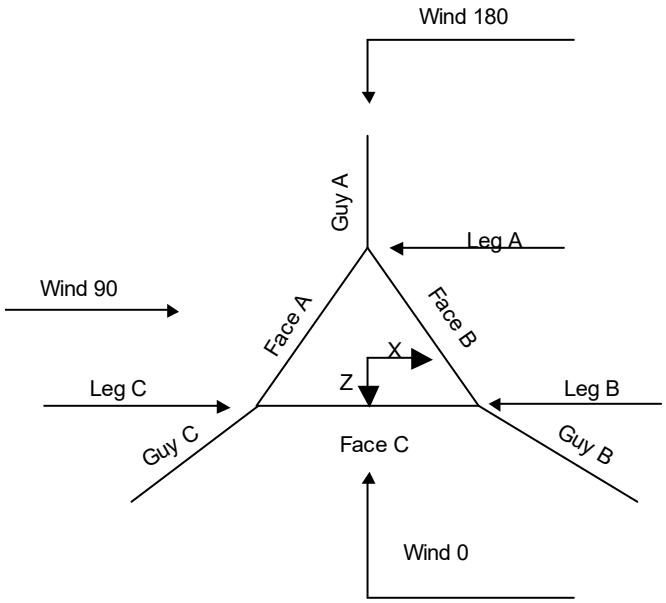
Tower Input Data

The main tower is a 3x guyed tower with an overall height of 143.00 ft above the ground line.
The base of the tower is set at an elevation of 63.00 ft above the ground line.
The face width of the tower is 3.42 ft at the top and 0.67 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in Hartford County, Connecticut.
ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
Basic wind speed of 97 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
Pressures are calculated at each section.
Safety factor used in guy design is 1.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned	√	Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios	√	Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys	√	Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice		Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients	√	Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
√	Include Bolts In Member Capacity	√	Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
√	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known



Corner & Starmount Guyed Tower

Tower Section Geometry

Tower Section	*Tower Elevation*	*Assembly Database*	*Description*	*Section Width*	*Number of Sections*	*Section Length*
	ft			*ft*		*ft*
T1	143.00-123.00			3.42	1	20.00
T2	123.00-103.00			3.42	1	20.00
T3	103.00-83.00			3.42	1	20.00
T4	83.00-67.82			3.42	1	15.18
T5	67.82-63.00			3.42	1	4.82

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	143.00-123.00	2.41	CX Brace	No	No	7.3750	1.3750
T2	123.00-103.00	2.41	K Brace Left	No	No	7.3750	1.3750
T3	103.00-83.00	2.41	K Brace Left	No	No	7.3750	1.3750
T4	83.00-67.82	2.41	K Brace Left	No	No	7.3750	1.3750
T5	67.82-63.00	1.33	CX Brace	No	Yes	4.0000	6.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 143.00-123.00	Pipe	ROHN 2.5 X-STR	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A36 (36 ksi)
T2 123.00-103.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A36 (36 ksi)
T3 103.00-83.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A36 (36 ksi)
T4 83.00-67.82	Pipe	ROHN 2.5 X-STR	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A36 (36 ksi)
T5 67.82-63.00	Pipe	ROHN 2.5 X-STR	A572-50 (50 ksi)	Pipe		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 143.00-123.00	Pipe	ROHN TS1.5x16 ga	A36 (36 ksi)	Pipe	ROHN TS1.5x16 ga	A36 (36 ksi)
T2 123.00-103.00	Pipe	ROHN TS1.5x16 ga	A36 (36 ksi)	Pipe	ROHN TS1.5x16 ga	A36 (36 ksi)
T3 103.00-83.00	Pipe	ROHN TS1.5x16 ga	A36 (36 ksi)	Pipe	ROHN TS1.5x16 ga	A36 (36 ksi)
T4 83.00-67.82	Pipe	ROHN TS1.5x16 ga	A36 (36 ksi)	Pipe	ROHN TS1.5x16 ga	A36 (36 ksi)
T5 67.82-63.00	Equal Angle	L4x4x1/4	A36 (36 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T5 67.82-63.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L4x4x1/4	A36 (36 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 143.00-123.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 123.00-103.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 103.00-83.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 83.00-67.82	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 67.82-63.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
143.00-123.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
123.00-103.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
103.00-83.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
83.00-67.82				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
67.82-63.00				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 143.00-123.00	0.0000	1	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 123.00-103.00	0.0000	1	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 103.00-83.00	0.0000	1	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 83.00-67.82	0.0000	1	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 67.82-63.00	0.0000	1	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 143.00-123.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 123.00-103.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 103.00-83.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 83.00-67.82	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 67.82-63.00	Flange	0.7500 A325N	4	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Guy Data

Guy Elevation ft	Guy Grade		Guy Size	Initial Tension lb	%	Guy Modulus ksi	Guy Weight plf	L_u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
125.523	EHS	A	7/16	2080.00	10%	21000	0.399	85.51	59.00	0.0000	60.00	100%
		B	7/16	2080.00	10%	21000	0.399	103.36	84.00	-1.0000	60.00	100%
		C	7/16	2080.00	10%	21000	0.399	98.80	78.00	0.0000	60.00	100%

Guy Data*(cont'd)*

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
125.523	Torque Corner	6.83	0.0000	Channel	A36 (36 ksi)	Channel	C12x20.7

Guy Data *(cont'd)*

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
125.52	A572-50 (50 ksi)	Solid Round			No	A36 (36 ksi)	Double Equal Angle	2L2x2x1/4x3/8

Guy Data *(cont'd)*

Guy Elevation ft	Cable Weight A lb	Cable Weight B lb	Cable Weight C lb	Cable Weight D lb	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
125.523	34.12	41.24	39.42		0.70 1.4 sec/pulse	1.02 1.7 sec/pulse	0.93 1.7 sec/pulse	

Guy Data *(cont'd)*

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm K_x	Torque Arm K_y	Pull Off K_x	Pull Off K_y	Diagonal K_x	Diagonal K_y
125.523	No	No	1	1	1	1	1	1

Guy Data *(cont'd)*

Guy Elevation ft	Torque-Arm Bolt Size in	Torque-Arm Number	Torque-Arm Net Width Deduct in	Torque-Arm U	Pull Off Bolt Size in	Pull Off Number	Pull Off Net Width Deduct in	Pull Off U	Diagonal Bolt Size in	Diagonal Number	Diagonal Net Width Deduct in	Diagonal U
125.523	0.0000 A325N	0	0.0000	1	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
125.523	A	92.76	20	5	2.2178
	B	92.76	20	5	2.2178
	C	92.76	20	5	2.2178

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
7/8 (Multi-Bay)	B	No	No	Ar (CaAa)	94.00 - 69.00	0.0000	-0.4	1	1	1.1100	1.1100		0.54
3/8 (Yagi)	B	No	No	Ar (CaAa)	84.00 - 69.00	0.0000	-0.35	1	1	0.4400	0.4400		0.08
Climbing Pegs (Tower) ***	B	No	No	Ar (CaAa)	143.00 - 69.00	0.0000	0.5	1	1	0.3000	0.3000		0.00

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
6x12 Hybrid (T-Mobile)	B	No	No	Ar (CaAa)	138.00 - 69.00	0.0000	0.1	3	3	1.0000	1.9800		0.82

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	143.00-123.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	9.510	0.000	36.90
		C	0.000	0.000	0.000	0.000	0.00
T2	123.00-103.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	12.480	0.000	49.20
		C	0.000	0.000	0.000	0.000	0.00
T3	103.00-83.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	13.745	0.000	55.22
		C	0.000	0.000	0.000	0.000	0.00
T4	83.00-67.82	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	10.906	0.000	43.12
		C	0.000	0.000	0.000	0.000	0.00
T5	67.82-63.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	143.00-123.00	A	2.299	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	36.345	0.000	555.99
		C		0.000	0.000	0.000	0.000	0.00
T2	123.00-103.00	A	2.262	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	44.795	0.000	678.85
		C		0.000	0.000	0.000	0.000	0.00
T3	103.00-83.00	A	2.218	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	50.915	0.000	775.27
		C		0.000	0.000	0.000	0.000	0.00
T4	83.00-67.82	A	2.172	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	45.017	0.000	679.98
		C		0.000	0.000	0.000	0.000	0.00
T5	67.82-63.00	A	2.142	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	143.00-123.00	1.8782	-0.3399	0.9558	0.1317
T2	123.00-103.00	2.8192	-0.5604	3.0199	0.2179
T3	103.00-83.00	2.8120	-1.0672	3.0325	-0.6121
T4	83.00-67.82	2.6254	-1.6195	2.8014	-1.9464
T5	67.82-63.00	0.0000	0.0000	0.0000	0.0000

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	8	Climbing Pegs	123.00 - 143.00	0.6000	0.2391
T1	10	6x12 Hybrid	123.00 - 138.00	0.6000	0.2391
T2	8	Climbing Pegs	103.00 - 123.00	0.6000	0.4614
T2	10	6x12 Hybrid	103.00 - 123.00	0.6000	0.4614
T3	6	7/8	83.00 - 94.00	0.6000	0.4675
T3	7	3/8	83.00 - 84.00	0.6000	0.4675
T3	8	Climbing Pegs	83.00 - 103.00	0.6000	0.4675
T3	10	6x12 Hybrid	83.00 - 103.00	0.6000	0.4675
T4	6	7/8	69.00 - 83.00	0.6000	0.4638
T4	7	3/8	69.00 - 83.00	0.6000	0.4638
T4	8	Climbing Pegs	69.00 - 83.00	0.6000	0.4638
T4	10	6x12 Hybrid	69.00 - 83.00	0.6000	0.4638

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Lightning Rod 5/8x4'	A	From Leg	0.00	0.00	0.0000	143.00	No Ice	0.25	0.25	10.00
			0.00	8.00			1/2" Ice	0.66	0.66	13.00
							1" Ice	0.97	0.97	16.00
7'x2 1/2" Pipe Mount	A	From Leg	0.00	0.00	0.0000	143.00	No Ice	2.01	2.01	40.50
			0.00	3.00			1/2" Ice	2.59	2.59	55.31
							1" Ice	3.02	3.02	74.85
***										
(3) 7'x2 1/2" Pipe Mount (T-Mobile)	C	None			0.0000	136.00	No Ice	2.01	2.01	40.50
							1/2" Ice	2.59	2.59	55.31
							1" Ice	3.02	3.02	74.85
***										
***										

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
***									
13' Sector Frame	A	From Leg	2.00	0.0000	138.00	No Ice	15.00	12.00	400.00
(T-Mobile)			0.00			1/2" Ice	20.60	17.40	550.00
			0.00			1" Ice	26.20	22.80	700.00
13' Sector Frame	B	From Leg	2.00	0.0000	138.00	No Ice	15.00	12.00	400.00
(T-Mobile)			0.00			1/2" Ice	20.60	17.40	550.00
			0.00			1" Ice	26.20	22.80	700.00
13' Sector Frame	C	From Leg	2.00	0.0000	138.00	No Ice	15.00	12.00	400.00
(T-Mobile)			0.00			1/2" Ice	20.60	17.40	550.00
			0.00			1" Ice	26.20	22.80	700.00
***									
100-4(M/F)	C	From Leg	2.00	0.0000	123.00 - 93.00	No Ice	7.00	7.00	70.00
			0.00			1/2" Ice	14.00	14.00	170.00
			0.00			1" Ice	21.00	21.00	270.00
30'x2" Pipe Mount	C	From Leg	2.00	0.0000	123.00 - 93.00	No Ice	7.13	7.13	109.50
			0.00			1/2" Ice	10.15	10.15	162.48
			0.00			1" Ice	13.20	13.20	234.17
2' Standoff	C	From Leg	2.00	0.0000	123.00	No Ice	1.80	1.80	33.00
			0.00			1/2" Ice	3.30	3.30	49.00
			0.00			1" Ice	4.80	4.80	65.00
2' Standoff	C	From Leg	2.00	0.0000	113.00	No Ice	1.80	1.80	33.00
			0.00			1/2" Ice	3.30	3.30	49.00
			0.00			1" Ice	4.80	4.80	65.00
2' Standoff	C	From Leg	2.00	0.0000	103.00	No Ice	1.80	1.80	33.00
			0.00			1/2" Ice	3.30	3.30	49.00
			0.00			1" Ice	4.80	4.80	65.00
2' Standoff	C	From Leg	2.00	0.0000	93.00	No Ice	1.80	1.80	33.00
			0.00			1/2" Ice	3.30	3.30	49.00
			0.00			1" Ice	4.80	4.80	65.00
***									
4' Yagi	C	From Leg	2.00	0.0000	84.00	No Ice	2.08	2.08	25.00
			0.00			1/2" Ice	5.43	5.43	47.97
			0.00			1" Ice	8.79	8.79	91.53
***									
APX16DWV-16DWV-S-E-A20	A	From Leg	4.00	0.0000	138.00	No Ice	6.46	2.15	40.70
(T-Mobile)			0.00			1/2" Ice	6.83	2.49	73.65
			0.00			1" Ice	7.21	2.84	111.47
APX16DWV-16DWV-S-E-A20	B	From Leg	4.00	0.0000	138.00	No Ice	6.46	2.15	40.70
(T-Mobile)			0.00			1/2" Ice	6.83	2.49	73.65
			0.00			1" Ice	7.21	2.84	111.47
APX16DWV-16DWV-S-E-A20	C	From Leg	4.00	0.0000	138.00	No Ice	6.46	2.15	40.70
(T-Mobile)			0.00			1/2" Ice	6.83	2.49	73.65
			0.00			1" Ice	7.21	2.84	111.47
APXVAALL24_43-U-NA20 W/ MP	A	From Leg	4.00	0.0000	138.00	No Ice	20.24	10.79	182.50
(T-Mobile)			0.00			1/2" Ice	20.89	12.21	316.19
			0.00			1" Ice	21.55	13.49	460.50
APXVAALL24_43-U-NA20 W/ MP	B	From Leg	4.00	0.0000	138.00	No Ice	20.24	10.79	182.50
(T-Mobile)			0.00			1/2" Ice	20.89	12.21	316.19
			0.00			1" Ice	21.55	13.49	460.50
APXVAALL24_43-U-NA20 W/ MP	C	From Leg	4.00	0.0000	138.00	No Ice	20.24	10.79	182.50
(T-Mobile)			0.00			1/2" Ice	20.89	12.21	316.19
			0.00			1" Ice	21.55	13.49	460.50
AIR 6449 B41 W/ MOUNT PIPE	A	From Leg	4.00	0.0000	138.00	No Ice	5.95	3.36	118.60
(T-Mobile)			0.00			1/2" Ice	6.33	3.83	168.39
			0.00			1" Ice	6.72	4.32	223.69
AIR 6449 B41 W/ MOUNT PIPE	B	From Leg	4.00	0.0000	138.00	No Ice	5.95	3.36	118.60
			0.00			1/2" Ice	6.33	3.83	168.39

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(T-Mobile)			0.00			1" Ice	6.72	4.32	223.69
AIR 6449 B41 W/ MOUNT	C	From Leg	4.00	0.0000	138.00	No Ice	5.95	3.36	118.60
PIPE			0.00			1/2" Ice	6.33	3.83	168.39
(T-Mobile)			0.00			1" Ice	6.72	4.32	223.69
4415 B66A	A	From Leg	3.00	0.0000	138.00	No Ice	1.84	0.82	46.00
(T-Mobile)			0.00			1/2" Ice	2.01	0.94	60.07
			0.00			1" Ice	2.19	1.07	76.66
4415 B66A	B	From Leg	3.00	0.0000	138.00	No Ice	1.84	0.82	46.00
(T-Mobile)			0.00			1/2" Ice	2.01	0.94	60.07
			0.00			1" Ice	2.19	1.07	76.66
4415 B66A	C	From Leg	3.00	0.0000	138.00	No Ice	1.84	0.82	46.00
(T-Mobile)			0.00			1/2" Ice	2.01	0.94	60.07
			0.00			1" Ice	2.19	1.07	76.66
RADIO 4449 B71+B85	A	From Leg	3.00	0.0000	138.00	No Ice	1.63	1.00	74.00
(T-Mobile)			0.00			1/2" Ice	1.79	1.13	89.91
			0.00			1" Ice	1.95	1.27	108.43
RADIO 4449 B71+B85	B	From Leg	3.00	0.0000	138.00	No Ice	1.63	1.00	74.00
(T-Mobile)			0.00			1/2" Ice	1.79	1.13	89.91
			0.00			1" Ice	1.95	1.27	108.43
RADIO 4449 B71+B85	C	From Leg	3.00	0.0000	138.00	No Ice	1.63	1.00	74.00
(T-Mobile)			0.00			1/2" Ice	1.79	1.13	89.91
			0.00			1" Ice	1.95	1.27	108.43
4424 B25	A	From Leg	3.00	0.0000	138.00	No Ice	2.05	1.61	86.00
(T-Mobile)			0.00			1/2" Ice	2.23	1.77	106.93
			0.00			1" Ice	2.42	1.94	130.84
4424 B25	B	From Leg	3.00	0.0000	138.00	No Ice	2.05	1.61	86.00
(T-Mobile)			0.00			1/2" Ice	2.23	1.77	106.93
			0.00			1" Ice	2.42	1.94	130.84
4424 B25	C	From Leg	3.00	0.0000	138.00	No Ice	2.05	1.61	86.00
(T-Mobile)			0.00			1/2" Ice	2.23	1.77	106.93
			0.00			1" Ice	2.42	1.94	130.84
***									
2" x 4' Pipe Mount	A	From Face	0.00	0.0000	94.00	No Ice	1.46	1.46	14.60
			0.00			1/2" Ice	1.75	1.75	23.91
			0.00			1" Ice	2.05	2.05	36.84

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
MF-900B	A	Grid	From Face	0.50	0.0000		94.00	2.66	No Ice	5.55	13.00
				2.00					1/2" Ice	5.90	44.67
				0.00					1" Ice	6.25	76.34

Load Combinations

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

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Guy C @ 78 ft Elev 60 ft Azimuth 180 deg	Max. Vert	8	-39.70	-0.06	29.30
	Max. H_x	24	-2417.51	112.16	3149.15
	Max. H_z	3	-7034.37	-75.24	8058.03
	Min. Vert	3	-7034.37	-75.24	8058.03
	Min. H_x	18	-2642.33	-121.21	3405.38
	Min. H_z	8	-39.70	-0.06	29.30
Guy B @ 84 ft Elev 60 ft Azimuth 59 deg	Max. Vert	4	-28.09	18.39	-11.79
	Max. H_x	11	-6651.42	7096.72	-4178.58
	Max. H_z	4	-28.09	18.39	-11.79
	Min. Vert	11	-6651.42	7096.72	-4178.58

Location	*Condition*	*Gov. Load Comb.*	*Vertical lb*	*Horizontal, X lb*	*Horizontal, Z lb*
	Min. H_x	4	-28.09	18.39	-11.79
	Min. H_z	9	-6497.44	6861.78	-4200.29
Guy A @ 59 ft Elev 60 ft Azimuth -60 deg	Max. Vert	12	-81.52	-38.46	-22.18
	Max. H_x	12	-81.52	-38.46	-22.18
	Max. H_z	12	-81.52	-38.46	-22.18
	Min. Vert	5	-9361.99	-6967.61	-3916.59
	Min. H_x	5	-9361.99	-6967.61	-3916.59
	Min. H_z	5	-9361.99	-6967.61	-3916.59
Mast	Max. Vert	17	41056.87	-495.45	226.19
	Max. H_x	11	18257.69	887.97	-14.68
	Max. H_z	2	14817.48	-26.88	963.34
	Max. M_x	1	0.00	-41.75	-2.60
	Max. M_z	1	0.00	-41.75	-2.60
	Max. Torsion	13	1349.56	328.89	729.94
	Min. Vert	37	10537.45	179.14	128.19
	Min. H_x	5	20770.16	-1026.00	-113.37
	Min. H_z	8	21062.97	-133.96	-810.99
	Min. M_x	1	0.00	-41.75	-2.60
	Min. M_z	1	0.00	-41.75	-2.60
	Min. Torsion	7	-1758.26	-570.38	-681.19

Tower Mast Reaction Summary

Load Combination	*Vertical lb*	*Shear$_x$ lb*	*Shear$_z$ lb*	*Overturning Moment, M_x lb-ft*	*Overturning Moment, M_z lb-ft*	*Torque lb-ft*
Dead Only	10738.33	41.75	2.60	0.00	0.00	90.38
1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy	14817.48	26.88	-963.34	0.00	0.00	-1323.57
1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy	19576.64	474.42	-780.28	0.00	0.00	-662.42
1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy	21857.22	829.64	-364.36	0.00	0.00	-58.38
1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy	20770.16	1026.00	113.37	0.00	0.00	573.25
1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy	16769.37	952.46	509.86	0.00	0.00	1254.58
1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy	19984.46	570.38	681.19	0.00	0.00	1758.26
1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy	21062.97	133.96	810.99	0.00	0.00	1558.44
1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy	18899.14	-403.04	763.05	0.00	0.00	1082.52
1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy	14472.60	-849.86	477.00	0.00	0.00	450.16
1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy	18257.69	-887.97	14.68	0.00	0.00	-197.43
1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy	19630.63	-668.42	-437.13	0.00	0.00	-780.68
1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy	18032.86	-328.89	-729.94	0.00	0.00	-1349.56
1.2 Dead+1.0 Ice+1.0 Temp+Guy	39083.57	52.69	-29.13	0.00	0.00	159.56
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy	39423.68	31.34	-516.84	0.00	0.00	-1049.65

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy	40337.35	283.76	-440.46	0.00	0.00	-594.74
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy	41056.87	495.45	-226.19	0.00	0.00	73.44
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy	40888.46	573.82	27.77	0.00	0.00	802.57
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy	40510.43	518.64	246.41	0.00	0.00	1259.53
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy	40558.80	343.22	388.10	0.00	0.00	1418.91
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy	40552.67	102.74	441.85	0.00	0.00	1298.39
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy	39869.47	-186.87	386.85	0.00	0.00	951.06
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy	39092.86	-401.50	220.29	0.00	0.00	231.30
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy	38894.33	-474.21	-46.95	0.00	0.00	-487.02
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy	39017.53	-390.64	-287.31	0.00	0.00	-958.06
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy	39038.22	-213.41	-453.90	0.00	0.00	-1161.63
Dead+Wind 0 deg - Service+Guy	10698.02	31.15	-238.56	0.00	0.00	-287.98
Dead+Wind 30 deg - Service+Guy	10825.50	161.68	-210.15	0.00	0.00	-151.96
Dead+Wind 60 deg - Service+Guy	10958.56	260.49	-113.97	0.00	0.00	11.88
Dead+Wind 90 deg - Service+Guy	11007.17	303.25	10.80	0.00	0.00	197.44
Dead+Wind 120 deg - Service+Guy	11000.41	261.08	130.23	0.00	0.00	377.28
Dead+Wind 150 deg - Service+Guy	10941.41	162.49	196.92	0.00	0.00	519.92
Dead+Wind 180 deg - Service+Guy	10854.01	51.09	236.77	0.00	0.00	474.07
Dead+Wind 210 deg - Service+Guy	10726.63	-80.17	212.64	0.00	0.00	340.77
Dead+Wind 240 deg - Service+Guy	10617.34	-182.90	120.51	0.00	0.00	171.19
Dead+Wind 270 deg - Service+Guy	10547.77	-222.00	-10.47	0.00	0.00	-15.79
Dead+Wind 300 deg - Service+Guy	10537.45	-179.14	-128.19	0.00	0.00	-190.42
Dead+Wind 330 deg - Service+Guy	10598.50	-83.24	-194.55	0.00	0.00	-333.80

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	-0.00	-6456.37	0.00	-1.05	6456.37	-1.20	0.025%
2	-26.14	-7711.28	-7821.73	13.74	7711.32	7822.41	0.113%
3	3967.12	-7724.33	-6888.98	-3973.26	7724.65	6891.37	0.060%
4	6910.23	-7737.15	-3967.36	-6914.19	7737.45	3970.43	0.045%
5	8014.91	-7722.08	13.73	-8019.90	7722.43	-7.10	0.075%
6	6812.42	-7709.07	3935.98	-6820.69	7709.09	-3922.34	0.145%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
7	3822.28	-7723.33	6595.51	-3820.05	7723.53	-6600.28	0.049%
8	21.79	-7738.09	7788.32	-20.50	7738.52	-7795.88	0.070%
9	-3980.31	-7725.04	6881.36	3979.74	7725.24	-6885.71	0.040%
10	-6941.34	-7712.22	3980.29	6946.58	7712.23	-3971.24	0.094%
11	-8014.89	-7727.29	-18.46	8017.67	7727.46	21.22	0.035%
12	-6792.70	-7740.30	-3924.60	6797.71	7740.63	3927.45	0.052%
13	-3826.36	-7726.04	-6593.13	3829.75	7726.18	6594.01	0.032%
14	0.00	-31572.04	0.00	-0.49	31572.03	6.13	0.019%
15	-28.34	-31547.23	-3507.92	21.16	31547.31	3509.61	0.023%
16	1758.00	-31571.38	-3050.30	-1770.67	31571.70	3056.72	0.045%
17	3131.93	-31595.09	-1738.90	-3140.91	31595.39	1746.06	0.036%
18	3597.41	-31567.22	42.49	-3603.39	31567.38	-35.74	0.028%
19	3095.98	-31543.15	1792.70	-3099.12	31543.16	-1787.85	0.018%
20	1802.12	-31569.54	3041.20	-1799.94	31569.60	-3046.52	0.018%
21	64.67	-31596.84	3516.27	-63.22	31596.99	-3523.37	0.023%
22	-1758.65	-31572.69	3049.93	1758.44	31572.85	-3058.36	0.027%
23	-3106.52	-31548.98	1766.19	3103.72	31549.04	-1774.62	0.028%
24	-3582.55	-31576.85	-18.38	3589.29	31576.92	26.71	0.034%
25	-3078.20	-31600.93	-1782.43	3087.24	31601.05	1787.09	0.032%
26	-1773.82	-31574.54	-3040.40	1782.61	31574.57	3040.96	0.028%
27	-6.25	-6453.16	-1870.43	5.55	6453.16	1870.37	0.011%
28	948.67	-6456.28	-1647.38	-949.67	6456.29	1647.88	0.017%
29	1652.46	-6459.35	-948.73	-1653.02	6459.35	949.38	0.013%
30	1916.63	-6455.74	3.28	-1917.12	6455.75	-1.64	0.025%
31	1629.07	-6452.63	941.22	-1627.77	6452.62	-939.90	0.028%
32	914.03	-6456.04	1577.20	-913.43	6456.04	-1577.70	0.012%
33	5.21	-6459.57	1862.44	-4.68	6459.58	-1863.57	0.019%
34	-951.82	-6456.45	1645.56	951.87	6456.46	-1646.22	0.010%
35	-1659.90	-6453.39	951.82	1659.36	6453.39	-953.05	0.020%
36	-1916.62	-6456.99	-4.41	1917.25	6456.99	4.87	0.011%
37	-1624.36	-6460.10	-938.50	1626.47	6460.12	939.63	0.036%
38	-915.01	-6456.69	-1576.63	916.92	6456.70	1577.31	0.030%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	9	0.00000001	0.00014103
2	Yes	27	0.00000001	0.00014492
3	Yes	22	0.00000001	0.00010361
4	Yes	23	0.00000001	0.00006550
5	Yes	22	0.00000001	0.00011851
6	Yes	26	0.00000001	0.00013737
7	Yes	22	0.00000001	0.00008221
8	Yes	22	0.00000001	0.00010709
9	Yes	22	0.00000001	0.00007447
10	Yes	26	0.00000001	0.00012223
11	Yes	22	0.00000001	0.00006771
12	Yes	22	0.00000001	0.00008821
13	Yes	22	0.00000001	0.00006240
14	Yes	13	0.00000001	0.00008675
15	Yes	17	0.00000001	0.00010707
16	Yes	18	0.00000001	0.00013678
17	Yes	19	0.00000001	0.00010215
18	Yes	19	0.00000001	0.00010033
19	Yes	17	0.00000001	0.00008031

20	Yes	19	0.00000001	0.00007341
21	Yes	19	0.00000001	0.00007043
22	Yes	18	0.00000001	0.00008503
23	Yes	16	0.00000001	0.00013809
24	Yes	16	0.00000001	0.00014628
25	Yes	17	0.00000001	0.00009954
26	Yes	16	0.00000001	0.00013313
27	Yes	11	0.00000001	0.00006234
28	Yes	12	0.00000001	0.00008347
29	Yes	13	0.00000001	0.00004875
30	Yes	12	0.00000001	0.00011112
31	Yes	11	0.00000001	0.00009432
32	Yes	12	0.00000001	0.00005453
33	Yes	12	0.00000001	0.00007067
34	Yes	12	0.00000001	0.00005463
35	Yes	10	0.00000001	0.00010185
36	Yes	11	0.00000001	0.00006379
37	Yes	10	0.00000001	0.00011151
38	Yes	10	0.00000001	0.00014176

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
T1	143 - 123	1.437	31	0.0832	0.2075
T2	123 - 103	1.092	31	0.0716	0.2093
T3	103 - 83	0.805	30	0.0781	0.1835
T4	83 - 67.82	0.440	30	0.0972	0.1135
T5	67.82 - 63	0.107	30	0.1046	0.0528

Critical Deflections and Radius of Curvature - Service Wind

Elevation	*Appurtenance*	*Gov. Load Comb.*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature*
ft			*in*	°	°	*ft*
143.00	Lightning Rod 5/8x4'	31	1.437	0.0832	0.2075	117109
138.00	13' Sector Frame	31	1.346	0.0794	0.2087	117109
136.00	(3) 7'x2 1/2" Pipe Mount	31	1.310	0.0780	0.2091	83649
125.52	Guy	31	1.131	0.0722	0.2097	33988
123.00	100-4(M/F)	31	1.092	0.0716	0.2093	32616
118.00	100-4(M/F)	31	1.018	0.0713	0.2073	46044
113.00	100-4(M/F)	31	0.948	0.0723	0.2031	107749
108.00	100-4(M/F)	30	0.878	0.0746	0.1956	73272
103.00	100-4(M/F)	30	0.805	0.0781	0.1835	41359
98.00	100-4(M/F)	30	0.724	0.0826	0.1667	40508
94.00	MF-900B	30	0.654	0.0866	0.1513	43310
93.00	100-4(M/F)	30	0.636	0.0877	0.1473	44073
84.00	4' Yagi	30	0.460	0.0964	0.1161	53542

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	143 - 123	12.654	4	0.7690	0.6509
T2	123 - 103	9.448	4	0.7170	0.6626
T3	103 - 83	6.561	4	0.7210	0.6190
T4	83 - 67.82	3.417	4	0.7880	0.3909
T5	67.82 - 63	0.829	4	0.8148	0.1803

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
143.00	Lightning Rod 5/8x4'	4	12.654	0.7690	0.6509	29317
138.00	13' Sector Frame	4	11.830	0.7478	0.6535	29317
136.00	(3) 7'x2 1/2" Pipe Mount	4	11.502	0.7400	0.6545	20941
125.52	Guy	4	9.832	0.7163	0.6608	8513
123.00	100-4(M/F)	4	9.448	0.7170	0.6626	8201
118.00	100-4(M/F)	4	8.712	0.7263	0.6656	11975
113.00	100-4(M/F)	4	7.996	0.7376	0.6632	32717
108.00	100-4(M/F)	4	7.284	0.7395	0.6497	21793
103.00	100-4(M/F)	4	6.561	0.7210	0.6190	11216
98.00	100-4(M/F)	4	5.813	0.6796	0.5682	10844
94.00	MF-900B	4	5.195	0.6520	0.5187	11545
93.00	100-4(M/F)	4	5.038	0.6487	0.5058	11734
84.00	4' Yagi	4	3.583	0.7549	0.3998	14081

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	143	Leg	A325N	0.7500	4	1001.95	29820.60	0.034 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	1651.14	3834.96	0.431 ✔	1	Member Bearing
		Top Girt	A325N	0.5000	1	7.56	3834.96	0.002 ✔	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	600.23	3834.96	0.157 ✔	1	Member Bearing
T2	123	Leg	A325N	0.7500	4	1259.37	29820.60	0.042 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	1769.90	3834.96	0.462 ✔	1	Member Bearing
		Top Girt	A325N	0.5000	1	759.08	3834.96	0.198 ✔	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	342.49	3834.96	0.089 ✔	1	Member Bearing
T3	103	Leg	A325N	0.7500	4	1393.02	29820.60	0.047 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	984.03	3834.96	0.257 ✔	1	Member Bearing
		Top Girt	A325N	0.5000	1	353.25	3834.96	0.092 ✔	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	273.63	3834.96	0.071 ✔	1	Member Bearing
T4	83	Leg	A325N	0.7500	4	1215.96	29820.60	0.041 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	1268.49	3834.96	0.331 ✔	1	Member Bearing

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
		Top Girt	A325N	0.5000	1	399.61	3834.96	0.104 ✔	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	1093.18	3834.96	0.285 ✔	1	Member Bearing
T5	67.82	Leg	A325N	0.7500	4	1229.02	29820.60	0.041 ✔	1	Bolt Tension

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension lb	Breaking Load lb	Actual T_u lb	Allowable ϕT_n lb	Required S.F.	Actual S.F.
T1	125.52 (A) (175)	7/16 EHS	2080.00	20800.02	12335.40	12480.00	1.000	1.012 ✔
	125.52 (B) (172)	7/16 EHS	2080.00	20800.02	10611.80	12480.00	1.000	1.176 ✔
	125.52 (C) (166)	7/16 EHS	2080.00	20800.02	10722.40	12480.00	1.000	1.164 ✔

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	Mast Stability Index	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	143 - 123	ROHN 2.5 X-STR	20.00	2.41	31.3 K=1.00	2.2535	1.00	-15953.10	94406.90	0.169 [1]
T2	123 - 103	ROHN 2.5 STD	20.00	2.41	61.0 K=2.00	1.7040	1.00	-14905.70	58405.60	0.255 [1]
T3	103 - 83	ROHN 2.5 STD	20.00	2.41	61.0 K=2.00	1.7040	1.00	-16815.50	58405.60	0.288 [1]
T4	83 - 67.82	ROHN 2.5 X-STR	15.18	2.41	62.6 K=2.00	2.2535	1.00	-16536.60	76176.60	0.217 [1]
T5	67.82 - 63	ROHN 2.5 X-STR	5.07	1.40	18.2 K=1.00	2.2535	0.89	-15514.30	88193.40	0.176 [1]

[1] P_u / ϕP_n controls

Leg Bending Design Data (Compression)

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	143 - 123	ROHN 2.5 X-STR	0.00	7017.50	0.000	0.00	7017.50	0.000
T2	123 - 103	ROHN 2.5 STD	0.00	5445.47	0.000	0.00	5445.47	0.000
T3	103 - 83	ROHN 2.5 STD	0.00	5445.47	0.000	0.00	5445.47	0.000
T4	83 - 67.82	ROHN 2.5 X-STR	0.00	7017.50	0.000	0.00	7017.50	0.000
T5	67.82 - 63	ROHN 2.5 X-STR	104.69	7017.50	0.015	0.00	7017.50	0.000

Leg Interaction Design Data (Compression)

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	143 - 123	ROHN 2.5 X-STR	0.169	0.000	0.000	0.169 [1] ✔	1.000	4.8.1 ✔
T2	123 - 103	ROHN 2.5 STD	0.255	0.000	0.000	0.255 [1] ✔	1.000	4.8.1 ✔
T3	103 - 83	ROHN 2.5 STD	0.288	0.000	0.000	0.288 [1] ✔	1.000	4.8.1 ✔
T4	83 - 67.82	ROHN 2.5 X-STR	0.217	0.000	0.000	0.217 [1] ✔	1.000	4.8.1 ✔
T5	67.82 - 63	ROHN 2.5 X-STR	0.176	0.015	0.000	0.176 [1] ✔	1.000	4.8.1 ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	143 - 123	ROHN TS1.5x16 ga	4.18	3.89	91.5 K=1.00	0.2627	-1630.57	5479.15	0.298 [1] ✔
T2	123 - 103	ROHN TS1.5x16 ga	4.18	3.89	91.5 K=1.00	0.2627	-1993.92	5479.15	0.364 [1] ✔
T3	103 - 83	ROHN TS1.5x16 ga	4.18	3.89	91.5 K=1.00	0.2627	-1089.91	5479.15	0.199 [1] ✔
T4	83 - 67.82	ROHN TS1.5x16 ga	4.18	3.89	91.5 K=1.00	0.2627	-1203.83	5479.40	0.220 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T5	67.82 - 63	L4x4x1/4	1.71	1.47	71.1 K=3.20	1.9400	-12.35	46951.70	0.000

Horizontal Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T5	67.82 - 63	L4x4x1/4	399.35	6931.57	0.058	297.14	3462.58	0.086

Horizontal Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T5	67.82 - 63	L4x4x1/4	0.000	0.058	0.086	0.144 ✔	1.000	4.8.1 ✔

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	143 - 123	ROHN TS1.5x16 ga	3.42	3.18	74.8 K=1.00	0.2627	-3.92	6341.21	0.001 [1]
T2	123 - 103	ROHN TS1.5x16 ga	3.42	3.18	74.8 K=1.00	0.2627	-564.88	6341.21	0.089 [1]
T3	103 - 83	ROHN TS1.5x16 ga	3.42	3.18	74.8 K=1.00	0.2627	-313.17	6341.21	0.049 [1]
T4	83 - 67.82	ROHN TS1.5x16 ga	3.42	3.18	74.8 K=1.00	0.2627	-326.18	6341.21	0.051 [1]

[1] P_u / ϕP_n controls

Top Girt Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	143 - 123	ROHN TS1.5x16 ga	0.00	325.80	0.000	0.00	325.80	0.000
T2	123 - 103	ROHN TS1.5x16 ga	0.00	325.80	0.000	0.00	325.80	0.000
T3	103 - 83	ROHN TS1.5x16 ga	0.00	325.80	0.000	0.00	325.80	0.000
T4	83 - 67.82	ROHN TS1.5x16 ga	0.00	325.80	0.000	0.00	325.80	0.000

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$

Top Girt Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	143 - 123	ROHN TS1.5x16 ga	0.001	0.000	0.000	0.001 [1] ✔	1.000	4.8.1 ✔
T2	123 - 103	ROHN TS1.5x16 ga	0.089	0.000	0.000	0.089 [1] ✔	1.000	4.8.1 ✔
T3	103 - 83	ROHN TS1.5x16 ga	0.049	0.000	0.000	0.049 [1] ✔	1.000	4.8.1 ✔
T4	83 - 67.82	ROHN TS1.5x16 ga	0.051	0.000	0.000	0.051 [1] ✔	1.000	4.8.1 ✔

[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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	143 - 123	ROHN TS1.5x16 ga	3.42	3.18	74.8 K=1.00	0.2627	-319.86	6341.21	0.050 [1]
T2	123 - 103	ROHN TS1.5x16 ga	3.42	3.18	74.8 K=1.00	0.2627	-331.44	6341.21	0.052 [1]
T3	103 - 83	ROHN TS1.5x16 ga	3.42	3.18	74.8 K=1.00	0.2627	-311.67	6341.21	0.049 [1]
T5	67.82 - 63	L4x4x1/4	0.96	0.72	65.4 K=6.05	1.9400	-208.97	48854.90	0.004

[1] P_u / ϕP_n controls

Bottom Girt Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	143 - 123	ROHN TS1.5x16 ga	0.00	325.80	0.000	0.00	325.80	0.000
T2	123 - 103	ROHN TS1.5x16 ga	0.00	325.80	0.000	0.00	325.80	0.000
T3	103 - 83	ROHN TS1.5x16 ga	0.00	325.80	0.000	0.00	325.80	0.000
T5	67.82 - 63	L4x4x1/4	401.46	6931.57	0.058	334.03	3462.58	0.096

Bottom Girt Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	143 - 123	ROHN TS1.5x16 ga	0.050	0.000	0.000	0.050 [1] ✔	1.000	4.8.1 ✔
T2	123 - 103	ROHN TS1.5x16 ga	0.052	0.000	0.000	0.052 [1] ✔	1.000	4.8.1 ✔
T3	103 - 83	ROHN TS1.5x16 ga	0.049	0.000	0.000	0.049 [1] ✔	1.000	4.8.1 ✔
T5	67.82 - 63	L4x4x1/4	0.004	0.058	0.096	0.157 ✔	1.000	4.8.1 ✔

[1] P_u / ϕP_n controls

Top Guy Pull-Off Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	143 - 123	2L2x2x1/4x3/8 2L 'a' > 18.3775 in - 170	3.42	3.18	99.8 K=1.00	1.8800	-3575.78	36044.60	0.099 [1]

[1] P_u / ϕP_n controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	143 - 123	2L2x2x1/4x3/8	0.00	2000.70	0.000	0.00	3391.69	0.000

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	143 - 123	2L2x2x1/4x3/8	0.099	0.000	0.000	0.099 [1] ✔	1.000	4.8.1 ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	143 - 123	ROHN 2.5 X-STR	20.00	2.41	31.3	2.2535	13302.00	101409.00	0.131 [1]
T2	123 - 103	ROHN 2.5 STD	20.00	0.61	7.8	1.7040	634.84	76682.30	0.008 [1]
T3	103 - 83	ROHN 2.5 STD	20.00	2.41	30.5	1.7040	1456.95	76682.30	0.019 [1]
T4	83 - 67.82	ROHN 2.5 X-STR	15.18	2.41	31.3	2.2535	447.86	101409.00	0.004 [1]

[1] $P_u / \phi P_n$ controls

Leg Bending Design Data (Tension)

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	143 - 123	ROHN 2.5 X-STR	0.00	7017.50	0.000	0.00	7017.50	0.000
T2	123 - 103	ROHN 2.5 STD	0.00	5445.47	0.000	0.00	5445.47	0.000
T3	103 - 83	ROHN 2.5 STD	0.00	5445.47	0.000	0.00	5445.47	0.000
T4	83 - 67.82	ROHN 2.5 X-STR	0.00	7017.50	0.000	0.00	7017.50	0.000

Leg Interaction Design Data (Tension)

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	143 - 123	ROHN 2.5 X-STR	0.131	0.000	0.000	0.131 [1] ✔	1.000	4.8.1 ✔
T2	123 - 103	ROHN 2.5 STD	0.008	0.000	0.000	0.008 [1] ✔	1.000	4.8.1 ✔
T3	103 - 83	ROHN 2.5 STD	0.019	0.000	0.000	0.019 [1] ✔	1.000	4.8.1 ✔
T4	83 - 67.82	ROHN 2.5 X-STR	0.004	0.000	0.000	0.004 [1] ✔	1.000	4.8.1 ✔

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	143 - 123	ROHN TS1.5x16 ga	4.18	3.89	91.5	0.2627	1651.14	8513.11	0.194 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	123 - 103	ROHN TS1.5x16 ga	4.18	3.89	91.5	0.2627	1769.90	8513.11	0.208 [1]
T3	103 - 83	ROHN TS1.5x16 ga	4.18	3.89	91.5	0.2627	984.03	8513.11	0.116 [1]
T4	83 - 67.82	ROHN TS1.5x16 ga	4.18	3.89	91.5	0.2627	1268.49	8513.11	0.149 [1]

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T5	67.82 - 63	L4x4x1/4	1.71	1.47	14.1	1.9400	17.03	62856.00	0.000

Horizontal Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T5	67.82 - 63	L4x4x1/4	360.39	6931.57	0.052	381.13	3462.58	0.110

Horizontal Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T5	67.82 - 63	L4x4x1/4	0.000	0.052	0.110	0.162	1.000	4.8.1

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	143 - 123	ROHN TS1.5x16 ga	3.42	3.18	74.8	0.2627	7.56	8513.11	0.001 [1]
T2	123 - 103	ROHN TS1.5x16 ga	3.42	3.18	74.8	0.2627	759.08	8513.11	0.089 [1]
T3	103 - 83	ROHN TS1.5x16 ga	3.42	3.18	74.8	0.2627	353.25	8513.11	0.041 [1]
T4	83 - 67.82	ROHN TS1.5x16 ga	3.42	3.18	74.8	0.2627	399.61	8513.11	0.047 [1]
T5	67.82 - 63	L4x4x1/4	3.23	2.99	28.7	1.9400	1775.59	62856.00	0.028

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

[1] P_u / ϕP_n controls

Top Girt Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	143 - 123	ROHN TS1.5x16 ga	0.00	325.80	0.000	0.00	325.80	0.000
T2	123 - 103	ROHN TS1.5x16 ga	0.00	325.80	0.000	0.00	325.80	0.000
T3	103 - 83	ROHN TS1.5x16 ga	0.00	325.80	0.000	0.00	325.80	0.000
T4	83 - 67.82	ROHN TS1.5x16 ga	0.00	325.80	0.000	0.00	325.80	0.000
T5	67.82 - 63	L4x4x1/4	280.93	6931.57	0.041	231.86	3462.58	0.067

Top Girt Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	143 - 123	ROHN TS1.5x16 ga	0.001	0.000	0.000	0.001 [1] ✔	1.000	4.8.1 ✔
T2	123 - 103	ROHN TS1.5x16 ga	0.089	0.000	0.000	0.089 [1] ✔	1.000	4.8.1 ✔
T3	103 - 83	ROHN TS1.5x16 ga	0.041	0.000	0.000	0.041 [1] ✔	1.000	4.8.1 ✔
T4	83 - 67.82	ROHN TS1.5x16 ga	0.047	0.000	0.000	0.047 [1] ✔	1.000	4.8.1 ✔
T5	67.82 - 63	L4x4x1/4	0.028	0.041	0.067	0.122 ✔	1.000	4.8.1 ✔

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	143 - 123	ROHN TS1.5x16 ga	3.42	3.18	74.8	0.2627	600.23	8513.11	0.071 [1]
T2	123 - 103	ROHN TS1.5x16 ga	3.42	3.18	74.8	0.2627	342.49	8513.11	0.040 [1]
T3	103 - 83	ROHN TS1.5x16 ga	3.42	3.18	74.8	0.2627	273.63	8513.11	0.032 [1]
T4	83 - 67.82	ROHN TS1.5x16 ga	3.42	3.18	74.8	0.2627	1093.18	8513.11	0.128 [1]
T5	67.82 - 63	L4x4x1/4	0.96	0.72	6.9	1.9400	54.11	62856.00	0.001

[1] P_u / ϕP_n controls

Bottom Girt Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	143 - 123	ROHN TS1.5x16 ga	0.00	325.80	0.000	0.00	325.80	0.000
T2	123 - 103	ROHN TS1.5x16 ga	0.00	325.80	0.000	0.00	325.80	0.000
T3	103 - 83	ROHN TS1.5x16 ga	0.00	325.80	0.000	0.00	325.80	0.000
T4	83 - 67.82	ROHN TS1.5x16 ga	0.00	325.80	0.000	0.00	325.80	0.000
T5	67.82 - 63	L4x4x1/4	-487.85	6931.57	0.070	-282.22	3462.58	0.082

Bottom Girt Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	143 - 123	ROHN TS1.5x16 ga	0.071	0.000	0.000	0.071 [1] ✔	1.000	4.8.1 ✔
T2	123 - 103	ROHN TS1.5x16 ga	0.040	0.000	0.000	0.040 [1] ✔	1.000	4.8.1 ✔
T3	103 - 83	ROHN TS1.5x16 ga	0.032	0.000	0.000	0.032 [1] ✔	1.000	4.8.1 ✔
T4	83 - 67.82	ROHN TS1.5x16 ga	0.128	0.000	0.000	0.128 [1] ✔	1.000	4.8.1 ✔
T5	67.82 - 63	L4x4x1/4	0.001	0.070	0.082	0.152 ✔	1.000	4.8.1 ✔

[1] P_u / ϕP_n controls

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	143 - 123	2L2x2x1/4x3/8 2L 'a' > 18.3775 in - 170	3.42	3.18	62.7	1.8800	3876.57	60912.00	0.064 [1]

[1] P_u / ϕP_n controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	143 - 123	2L2x2x1/4x3/8	0.00	2000.70	0.000	0.00	3391.69	0.000

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	143 - 123	2L2x2x1/4x3/8	0.064	0.000	0.000	0.064 [1] ✔	1.000	4.8.1 ✔

[1] P_u / ϕP_n controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	143 - 123 (167)	C12x20.7	3.41	3.30	49.5	6.0900	4007.27	197316.00	0.020
T1	143 - 123 (168)	C12x20.7	3.41	3.30	49.5	6.0900	3976.93	197316.00	0.020
T1	143 - 123 (173)	C12x20.7	3.41	3.30	49.5	6.0900	4179.66	197316.00	0.021
T1	143 - 123 (174)	C12x20.7	3.41	3.30	49.5	6.0900	3873.52	197316.00	0.020
T1	143 - 123 (176)	C12x20.7	3.41	3.30	49.5	6.0900	3899.34	197316.00	0.020
T1	143 - 123 (177)	C12x20.7	3.41	3.30	49.5	6.0900	3707.76	197316.00	0.019

Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	143 - 123 (167)	C12x20.7	-19667.92	68580.00	0.287	-0.00	7006.50	0.000
T1	143 - 123 (168)	C12x20.7	-23284.67	68580.00	0.340	-0.00	7006.50	0.000
T1	143 - 123 (173)	C12x20.7	-19564.58	68580.00	0.285	-0.00	7006.50	0.000
T1	143 - 123 (174)	C12x20.7	-21957.58	68580.00	0.320	0.00	7006.50	0.000
T1	143 - 123 (176)	C12x20.7	-23556.75	68580.00	0.343	-0.00	7006.50	0.000
T1	143 - 123 (177)	C12x20.7	-22209.83	68580.00	0.324	0.00	7006.50	0.000

Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	143 - 123 (167)	C12x20.7	0.020	0.287	0.000	0.297 ✔	1.000	4.8.1 ✔

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	143 - 123 (168)	C12x20.7	0.020	0.340	0.000	0.350 ✔	1.000	4.8.1 ✔
T1	143 - 123 (173)	C12x20.7	0.021	0.285	0.000	0.296 ✔	1.000	4.8.1 ✔
T1	143 - 123 (174)	C12x20.7	0.020	0.320	0.000	0.330 ✔	1.000	4.8.1 ✔
T1	143 - 123 (176)	C12x20.7	0.020	0.343	0.000	0.353 ✔	1.000	4.8.1 ✔
T1	143 - 123 (177)	C12x20.7	0.019	0.324	0.000	0.333 ✔	1.000	4.8.1 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	143 - 123	Leg	ROHN 2.5 X-STR	1	-15953.10	94406.90	16.9	Pass
T2	123 - 103	Leg	ROHN 2.5 STD	58	-14905.70	58405.60	25.5	Pass
T3	103 - 83	Leg	ROHN 2.5 STD	91	-16815.50	58405.60	28.8	Pass
T4	83 - 67.82	Leg	ROHN 2.5 X-STR	124	-16536.60	76176.60	21.7	Pass
T5	67.82 - 63	Leg	ROHN 2.5 X-STR	151	-15514.30	88193.40	17.6	Pass
T1	143 - 123	Diagonal	ROHN TS1.5x16 ga	27	-1630.57	5479.15	29.8 43.1 (b)	Pass
T2	123 - 103	Diagonal	ROHN TS1.5x16 ga	88	-1993.92	5479.15	36.4 46.2 (b)	Pass
T3	103 - 83	Diagonal	ROHN TS1.5x16 ga	122	-1089.91	5479.15	19.9 25.7 (b)	Pass
T4	83 - 67.82	Diagonal	ROHN TS1.5x16 ga	136	-1203.83	5479.40	22.0 33.1 (b)	Pass
T5	67.82 - 63	Horizontal	L4x4x1/4	162	17.03	62856.00	16.2	Pass
T1	143 - 123	Top Girt	ROHN TS1.5x16 ga	4	5.99	8513.11	0.5	Pass
T2	123 - 103	Top Girt	ROHN TS1.5x16 ga	61	759.08	8513.11	8.9 19.8 (b)	Pass
T3	103 - 83	Top Girt	ROHN TS1.5x16 ga	95	-313.17	6341.21	4.9 9.2 (b)	Pass
T4	83 - 67.82	Top Girt	ROHN TS1.5x16 ga	129	-326.18	6341.21	5.1 10.4 (b)	Pass
T5	67.82 - 63	Top Girt	L4x4x1/4	156	1775.59	62856.00	12.2	Pass
T1	143 - 123	Bottom Girt	ROHN TS1.5x16 ga	9	600.23	8513.11	7.1 15.7 (b)	Pass
T2	123 - 103	Bottom Girt	ROHN TS1.5x16 ga	64	-331.44	6341.21	5.2 8.9 (b)	Pass
T3	103 - 83	Bottom Girt	ROHN TS1.5x16 ga	97	-311.67	6341.21	4.9 7.1 (b)	Pass
T4	83 - 67.82	Bottom Girt	ROHN TS1.5x16 ga	130	1093.18	8513.11	12.8 28.5 (b)	Pass
T5	67.82 - 63	Bottom Girt	L4x4x1/4	159	-208.97	48854.90	15.7	Pass
T1	143 - 123	Guy A@125.523	7/16	175	12335.40	12480.00	98.8	Pass
T1	143 - 123	Guy B@125.523	7/16	172	10611.80	12480.00	85.0	Pass
T1	143 - 123	Guy C@125.523 (-1 deg)	7/16	166	10722.40	12480.00	85.9	Pass
T1	143 - 123	Top Guy Pull-Off@125.523	2L2x2x1/4x3/8	170	-3575.78	36044.60	9.9	Pass
T1	143 - 123	Torque Arm Top@125.523	C12x20.7	176	3899.34	197316.00	35.3	Pass

Summary

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
						Leg (T3)	28.8	Pass
						Diagonal (T2)	46.2	Pass
						Horizontal (T5)	16.2	Pass
						Top Girt (T2)	19.8	Pass
						Bottom Girt (T4)	28.5	Pass
						Guy A (T1)	98.8	Pass
						Guy B (T1)	85.0	Pass
						Guy C (T1)	85.9	Pass
						Top Guy Pull-Off (T1)	9.9	Pass
						Torque Arm Top (T1)	35.3	Pass
						Bolt Checks	46.2	Pass
						RATING =	**98.8**	**Pass**

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Revised Mount Analysis Report

Site Address	1679 Stanley Street New Britain, CT 06053
Site Name	CTHA783A
Site ID	CTHA783A
Project Name	Sprint Retain
Design Codes	2015 International Building Code ASCE 7-10 TIA-222-G Standards 2018 CT State Building Code

	Stress Ratio	Overall Result
Existing Mount with Modifications	**86%**	**PASS**

Client:

T - Mobile

NORTHEAST, LLC
15 Commerce Way, Suite B
Norton, MA 02766

Date: 04/06/2021 (Rev.1)
03/31/2021 (Rev.0)

Scope of Work:

Centerline Communications was authorized by T-Mobile Northeast LLC to perform an analysis of the existing antenna mounts to determine their capacity to support the proposed T-Mobile equipment listed in this report. These mounts were analyzed using RISA 3D v17.0.4.

Final Appurtenances Configuration:

Elevation (ft)	Position[1]	Azimuth (degrees)	Quantity	Appurtenance	Sector
138	**MP1**	**125**	**1**	**APX16DWV-16DWV-S-E-A20 Antenna**	Sector 1
138	**MP3**	**125**	**1**	**APXVAALL24_43-U-NA20 Antenna**	
138	**MP4**	**125**	**1**	**AIR6449 B41 Antenna**	
138	**MP1**	**125**	**1**	**4415 B66A RRH**	
138	**MP3**	**125**	**1**	**4449 B71+B85 RRH**	
138	**MP3**	**125**	**1**	**4424 B25 RRH**	
138	**-**	**240**	**1**	**APX16DWV-16DWV-S-E-A20 Antenna**	Sector 2
138	**-**	**240**	**1**	**APXVAALL24_43-U-NA20 Antenna**	
138	**-**	**240**	**1**	**AIR6449 B41 Antenna**	
138	**-**	**240**	**1**	**4415 B66A RRH**	
138	**-**	**240**	**1**	**4449 B71+B85 RRH**	
138	**-**	**240**	**1**	**4424 B25 RRH**	
138	**-**	**345**	**1**	**APX16DWV-16DWV-S-E-A20 Antenna**	Sector 3
138	**-**	**345**	**1**	**APXVAALL24_43-U-NA20 Antenna**	
138	**-**	**345**	**1**	**AIR6449 B41 Antenna**	
138	**-**	**345**	**1**	**4415 B66A RRH**	
138	**-**	**345**	**1**	**4449 B71+B85 RRH**	
138	**-**	**345**	**1**	**4424 B25 RRH**	

Notes:

1. MP represent Mount Pipe.
2. Existing Appurtenance
3. **Proposed Appurtenance**

Design Criteria:

Design Codes:

2015 International Building Code
ASCE 7-10
TIA-222-G Standards
2018 CT State Building Code

Ultimate Wind Speed	125 mph
Nominal Wind Speed	97 mph
Wind Speed with Ice	50 mph
Ice Thickness	1.00 in.
Exposure Category	B
Topographic Category	1
Structure Class	II
Site Soil Class (Assumed)	D – Stiff Soil
Seismic Design Category	B
Spectral Response Acceleration Parameter at a Short Periods, S_S	0.183 g
Spectral Response Acceleration Parameter at a Period of 1 Second, S_1	0.064 g
Short Period Site Coefficient, F_a	1.6
Long Period Site Coefficient, F_v	2.4

***Refer to calculations for additional design criteria.**

Conclusion:

The results of the analysis concluded that the proposed T-Mobile mounts *are adequate* to support the proposed T-Mobile equipment loading *upon completion* of the following modifications. Centerline Communications recommends the following:

- Remove and replace the existing Position 2 mount pipes with 2" STD. x 8 ft mount pipes in all sectors.
- Relocate existing tieback to the mount pipe. See the attached drawings for details.

	Stress Ratio	Overall Result
Existing Mount with Modifications	**86%**	**PASS**

Reference Documents:

- T-Mobile RFDS CTHA783A_Sprint Retain_1_draft, dated 01/15/2021
- Structural Assessment by Ramaker & Associates, Inc., dated 07/10/2014

Assumptions and Limitations:

- The calculations performed by Centerline Communications are limited to the structural members in these calculations only.
- Structural calculations in this report do not check the adequacy of the supporting structure, other mounts, or coax mounting attachments.
- The calculation assumes all structural members to be in good condition i.e. no damage, rust, or other defects.

Photos:

Existing Alpha Sector

Existing Beta Sector

Existing Gamma Sector

Overall

Design Calculations

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West Bridgewater, MA 02379
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Site Details	
Site Name	CTHA783A
Carrier	T-Mobile
City, State	New Britain, CT
Project	Sprint Retain

Mount Details		
Mount Type	Sector Frame	
Mount Height, z	138	ft
Number of Sectors	3	
Tower Type	Guyed	
Tower Height, h	143	ft

Topographic Factors		
Topographic Category	1	
Feature	Flat	
Crest Height, H	N/A	ft
Distance from Crest, x	N/A	ft
Slope (H/L)	N/A	
Topographic Factor, K_{zt}	1.00	

Seismic Factors		
Importance Factor, I_E	1	
Short Period Spectral Acceleration, S_s	0.183	g
1 Second Period Spectral Acceleration, S_1	0.064	g
Long-Period Transition Period, T_L	6	
Design Category	B	
Short Period Site Coefficient, F_a	1.60	
Long-Period Site Coefficient, F_v	2.4	

Site Parameters		
Ultimate Wind Speed, V_{ULT}	125	mph
Nominal Wind Speed, V	97	mph
Wind Speed with Ice, V_i	50	mph
Design Ice Thickness, t_i	1	in
Structural Class	II	
Exposure Category	B	
Site Soil Class	D-Stiff Soil (Assumed)	

Code	
Building Code	2015 IBC
TIA Code	TIA-222-G
ASCE Code	7-10

Site Constants		
Importance Factor, I (Wind no Ice)	1.00	
Importance Factor, I (Ice Thickness)	1.00	
Importance Factor, I (wind with Ice)	1.00	
Wind Direction Prob. Factor, K_d	0.95	
Velocity Pressure Coefficient, K_z	1.08	
Gust Effect Factor, G_h	1.00	
Design Ice Thickness, t_{iz}	2.31	in
Velocity Pressure, q_z	24.79	psf
Velocity Pressure with Ice, q_{zi}	6.59	psf
Shielding Factor, K_a	1.00	
Flat Velocity Pressure (Ca =2.0)	49.59	psf
Round Velocity Pressure (Ca = 1.2)	29.75	psf
Round Velocity Pressure with Ice (Ca = 1.2)	7.91	psf
Engineer Initials	**AP**	

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Members Forces							
Member Label	**Shape**	**Type**	**w, lbs/ft**	**q_z, psf**	**w_i, lbs/ft**	**q_{zi}, psf**	**V_s, lbs/ft**
Pipe 3.0	PIPE_3.0	Beam	7.04	29.75	16.37	7.91	0.92
Pipe 2.5	PIPE_2.5	Beam	5.48	29.75	14.61	7.91	0.71
Pipe 2.0	PIPE_2.0	Beam	3.47	29.75	13.20	7.91	0.45
Pipe 1.0	PIPE_1.0	Beam	1.60	29.75	10.17	7.91	0.21

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Sector 1							
		Wind Force				Dimensions	Weights
Appurtenances	Rad. Ht., ft	Front EPA ft^2	Side EPA ft^2	0° Force lbs.	90° Force lbs.	H/W/D, in	$Wt./Wt._{ice}$, lbs.
APX16DWV-16DWV-S-E-A20 Antenna	138	6.46	2.15	160.15	53.30	55.9\13\3.15	40.7\194.08
APXVAALL24_43-U-NA20 Antenna	138	20.24	8.89	501.88	220.37	95.9\24\8.7	153.3\592.23
AIR6449 B41 Antenna	138	5.68	2.49	140.88	61.75	33.1\20.6\8.6	104\217.25
4415 B66A RRH	138	1.86	0.82	46.03	20.39	16.54\13.47\5.9	49.6\87.78
4449 B71+B85 RRH	138	1.65	1.30	40.91	32.23	15\13.2\10.4	75\103.31
4424 B25 RRH	138	1.64	0.67	40.64	16.62	14.9\13.2\5.4	46.3\78.42

*Dish force coefficient is calculated per Annex C.2 of TIA-222-G, if available.

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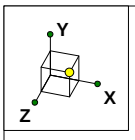
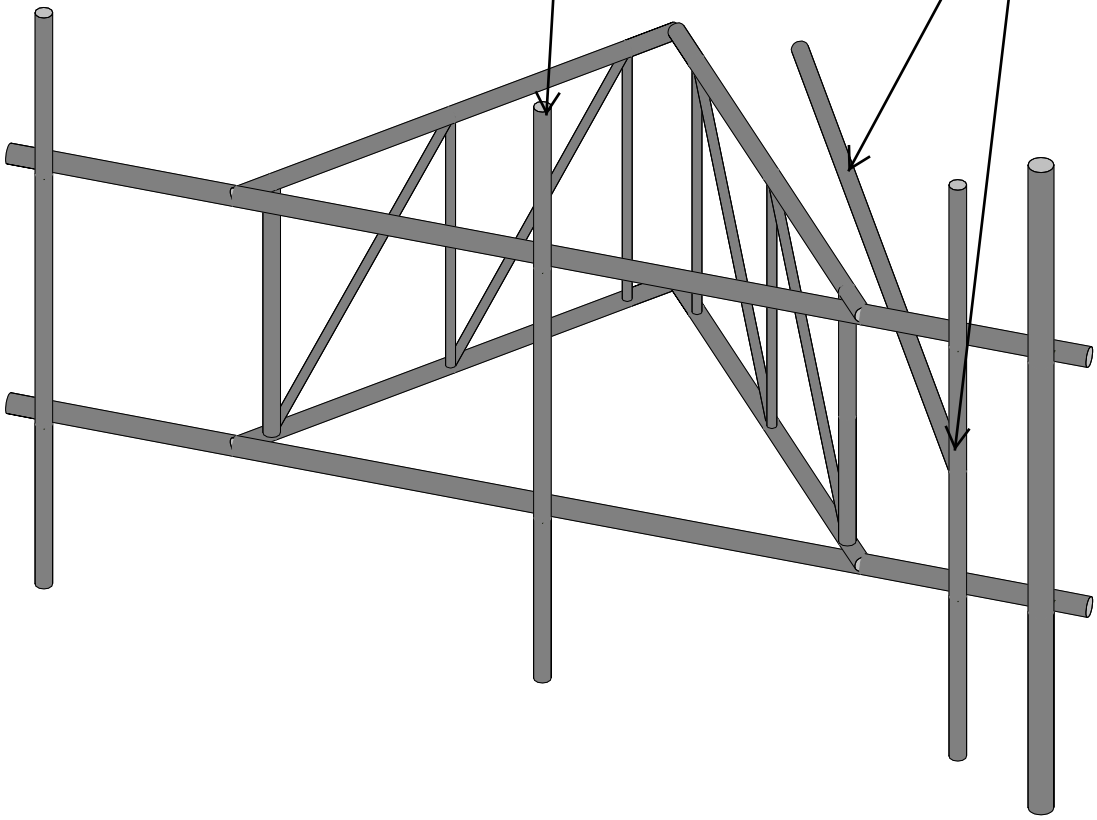
Sector 1 Continue…								
		Wind Force with Ice				Wind Force V = 30 mph		Seismic Force
Appurtenances	Rad. Ht., ft	Front EPA ft^2	Side EPA ft^2	0° Force lbs.	90° Force lbs.	0° Force lbs.	90° Force lbs.	Vs, lbs
APX16DWV-16DWV-S-E-A20 Antenna	138	5.34	2.67	77.70	31.74	15.32	5.10	5.30
APXVAALL24_43-U-NA20 Antenna	138	14.43	7.55	228.42	108.28	48.01	21.08	19.95
AIR6449 B41 Antenna	138	4.62	2.45	67.89	32.55	13.48	5.91	13.53
4415 B66A RRH	138	1.86	1.08	24.48	12.54	4.40	1.95	6.45
4449 B71+B85 RRH	138	1.70	1.43	22.06	18.00	3.91	3.08	9.76
4424 B25 RRH	138	1.69	0.95	21.93	10.68	3.89	1.59	6.03

Existing Mount with Modifications Results



Remove and replace existing mount pipes from Position 2 with (1) 2" STD. x 8 ft mount pipe and use existing crossover plate kit for the installation of APXVAALL24_43-U-NA20 antenna in all sectors.

Relocate existing tieback to the mount pipe.



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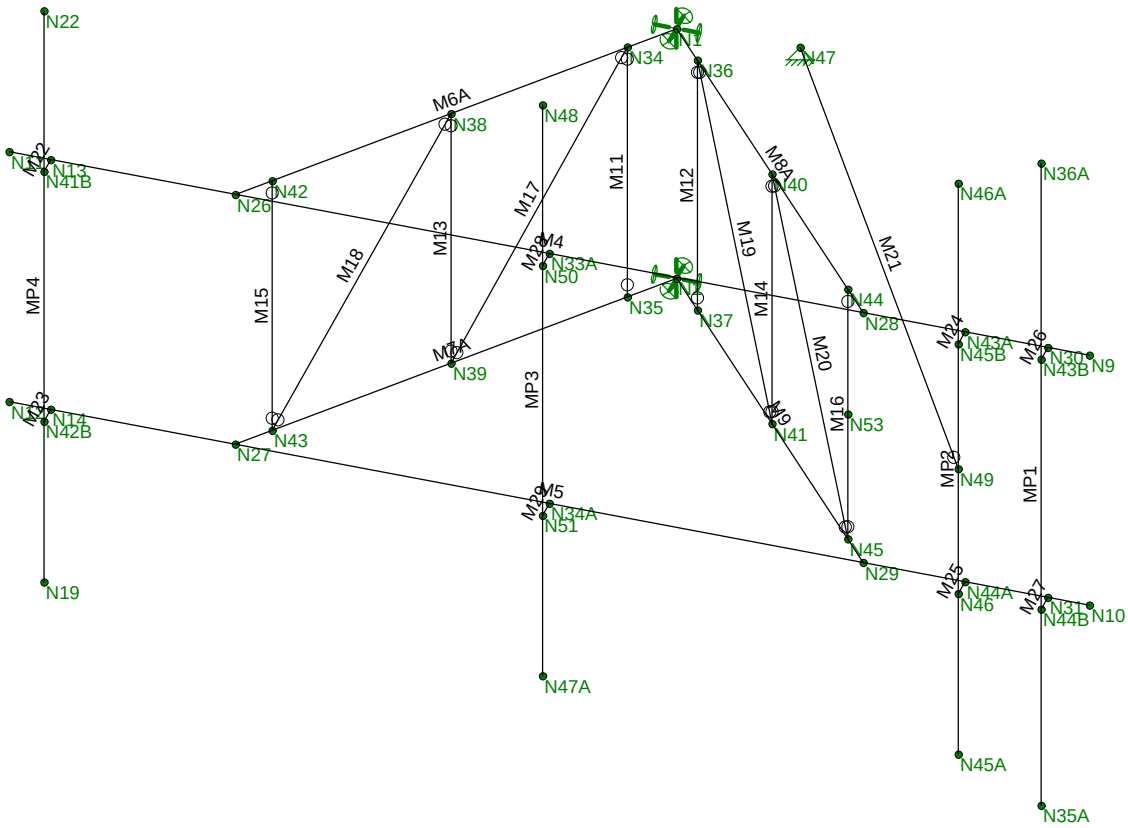
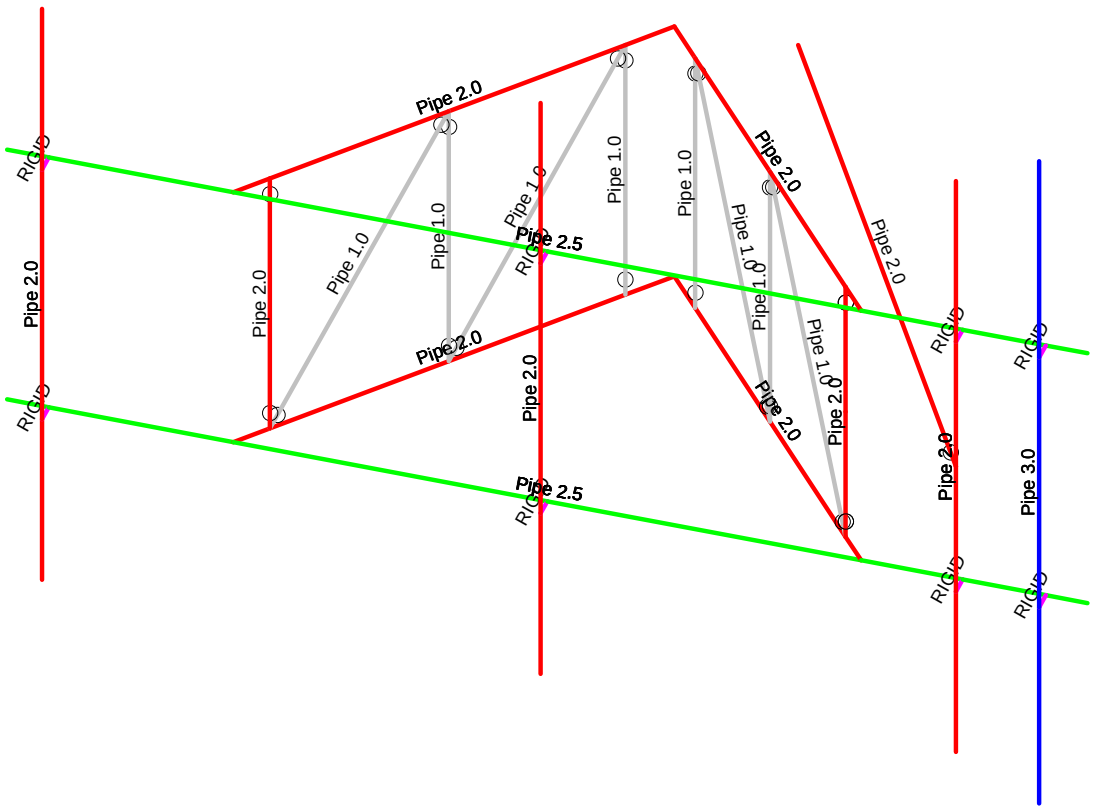
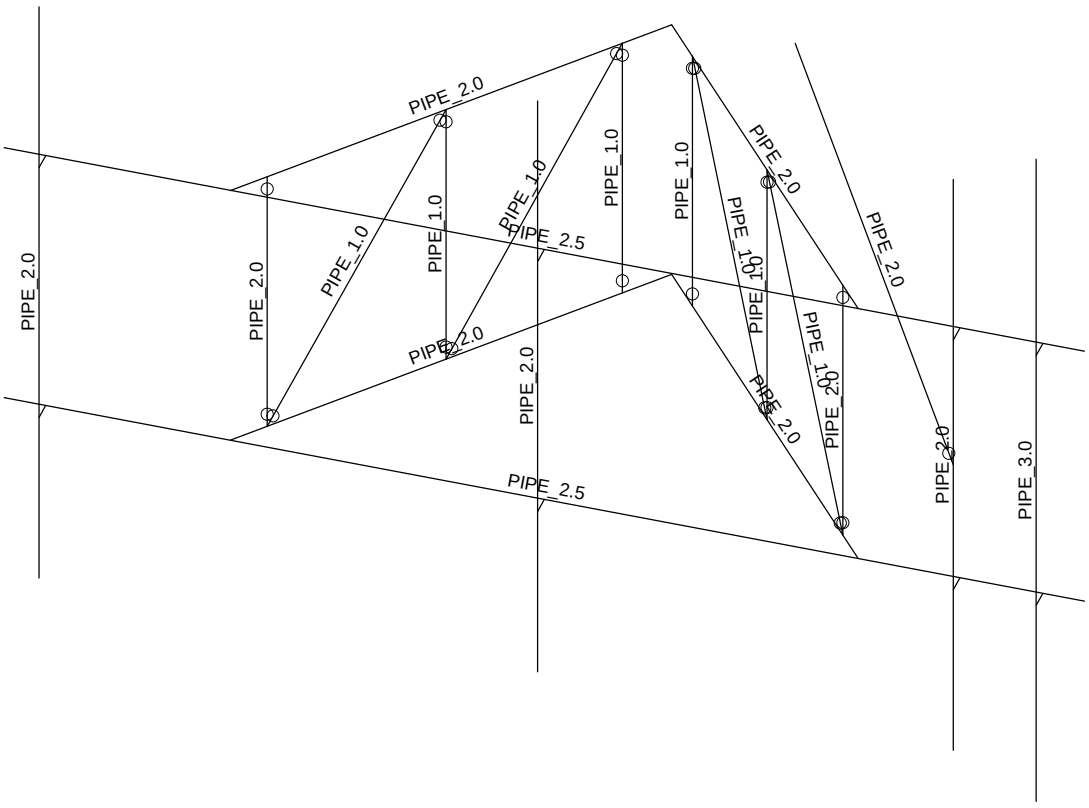
AP		Mar 30, 2021 at 4:15 PM
		CTHA783A_MA.r3d



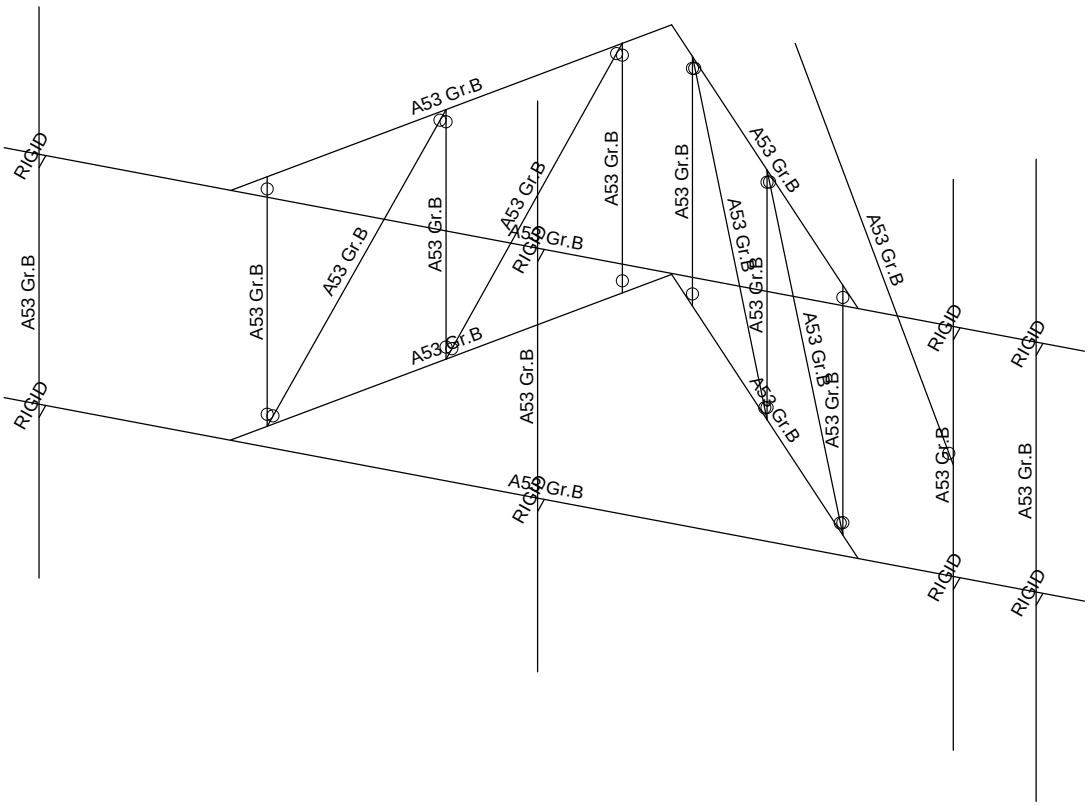
Centerline Communcation...	CTHA783A_MA	Wireframe
AP		Mar 30, 2021 at 4:15 PM
		CTHA783A_MA.r3d



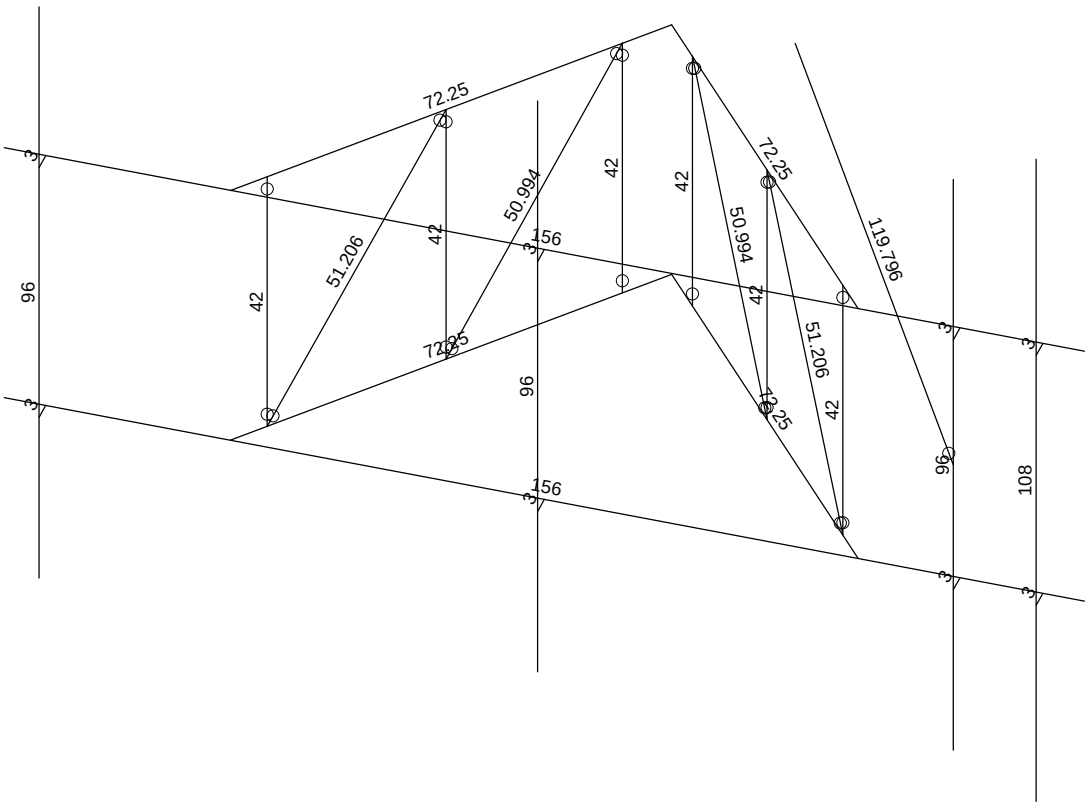
Centerline Communcation...	CTHA783A_MA	Section Sets
AP		Mar 30, 2021 at 4:15 PM
		CTHA783A_MA.r3d



Centerline Communcation...	CTHA783A_MA	Member Shape
AP		Mar 30, 2021 at 4:16 PM
		CTHA783A_MA.r3d

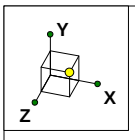


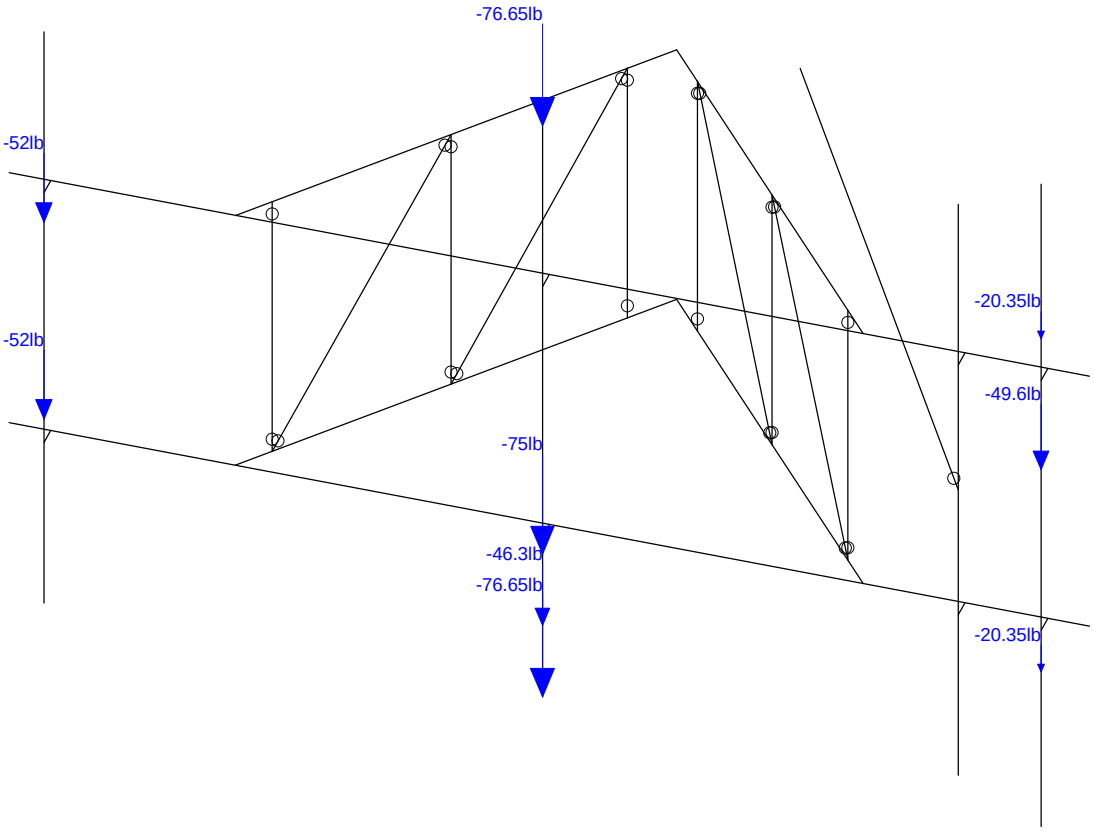
Centerline Communcation...	CTHA783A_MA	Material Sets
AP		Mar 30, 2021 at 4:16 PM
		CTHA783A_MA.r3d



Member Length (in) Displayed

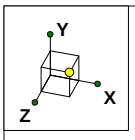
Centerline Communcation...	CTHA783A_MA	Member Length
AP		Mar 30, 2021 at 4:16 PM
		CTHA783A_MA.r3d

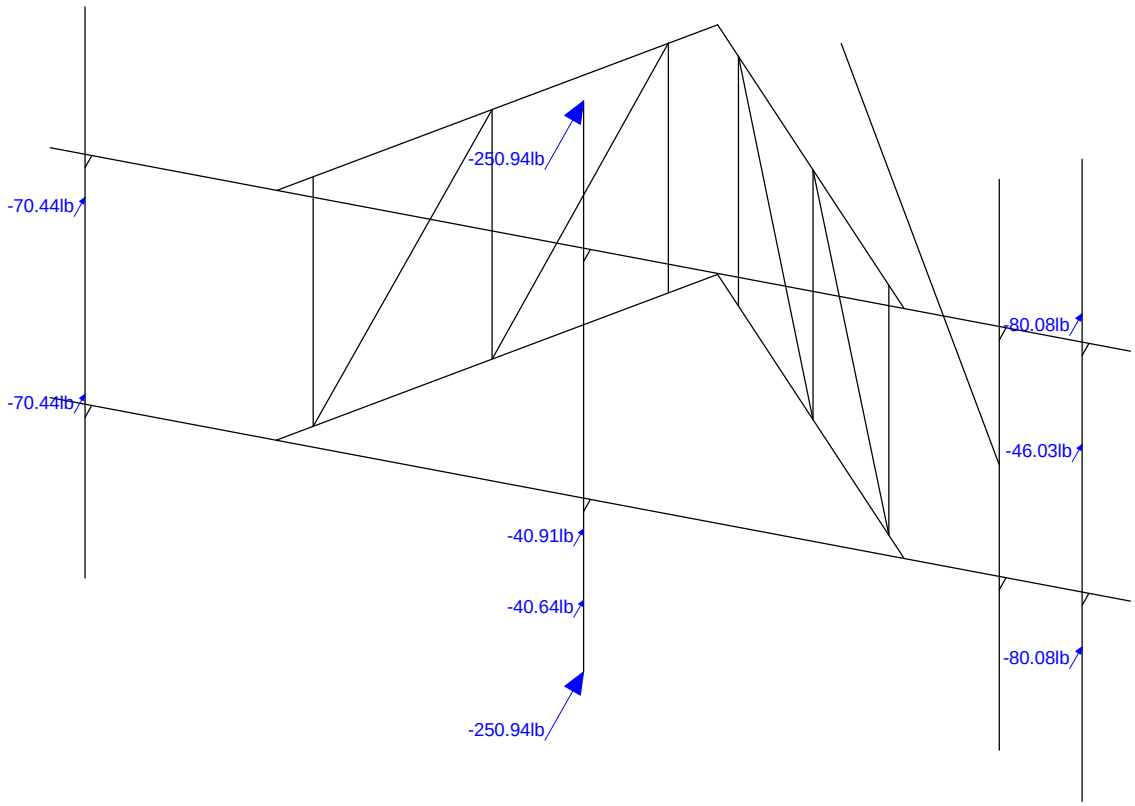




Loads: BLC 1, Dead Load

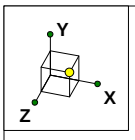
Centerline Communcation...	CTHA783A_MA	Dead Load
AP		Mar 30, 2021 at 4:17 PM
		CTHA783A_MA.r3d

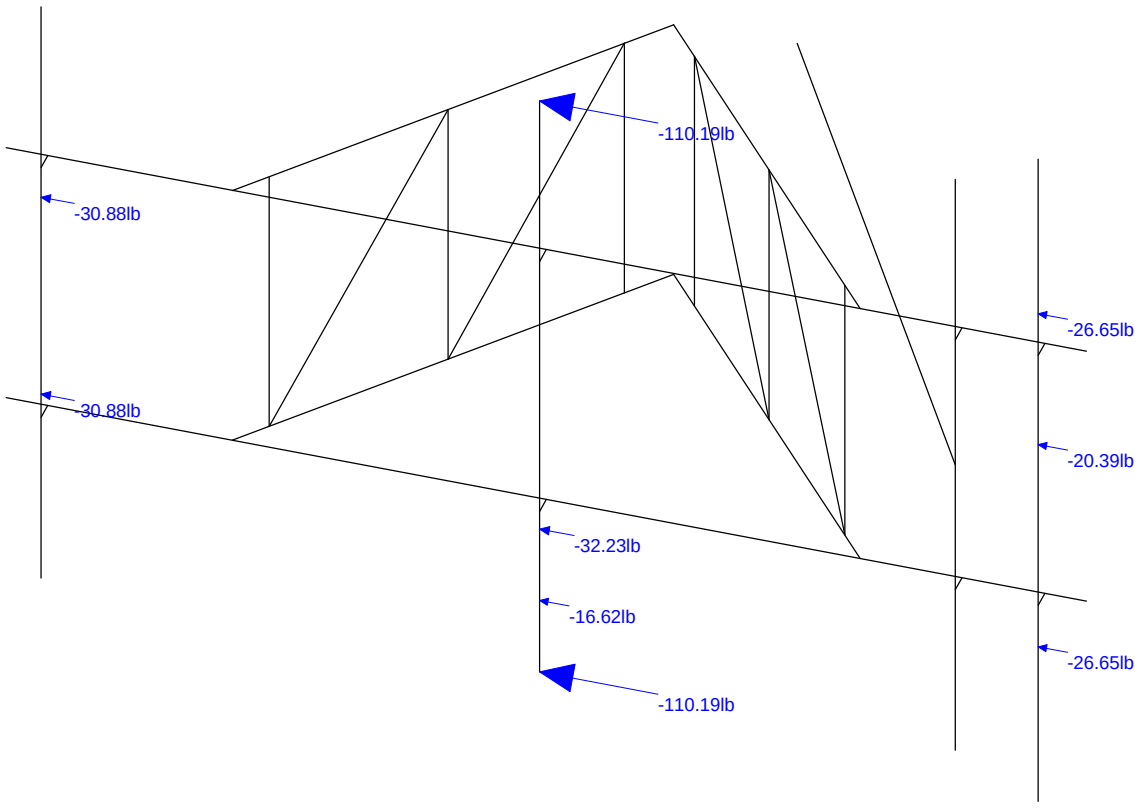




Loads: BLC 2, Wind 0

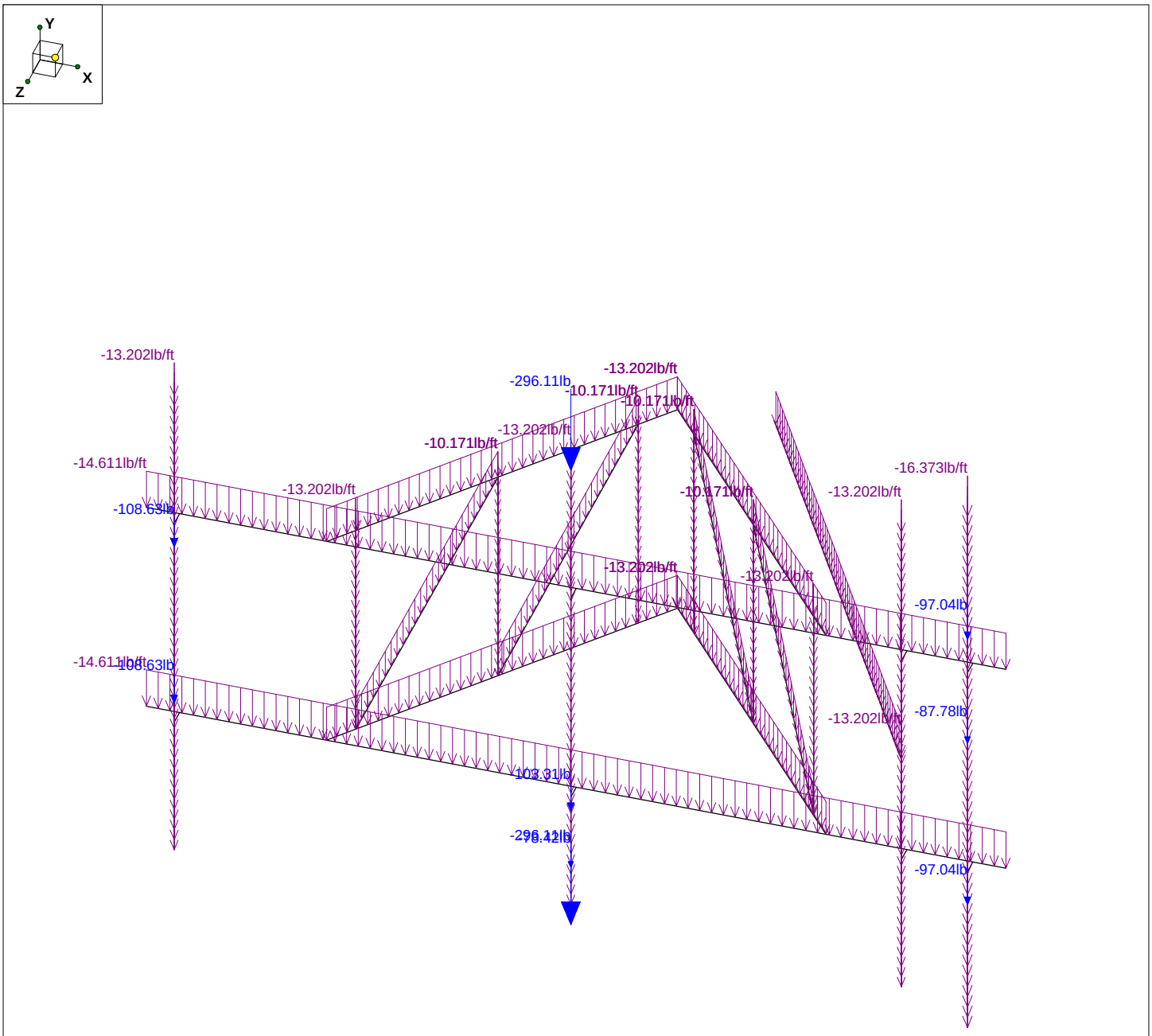
Centerline Communcation...	CTHA783A_MA	Wind 0
AP		Mar 30, 2021 at 4:17 PM
		CTHA783A_MA.r3d





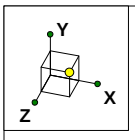
Loads: BLC 5, Wind 90

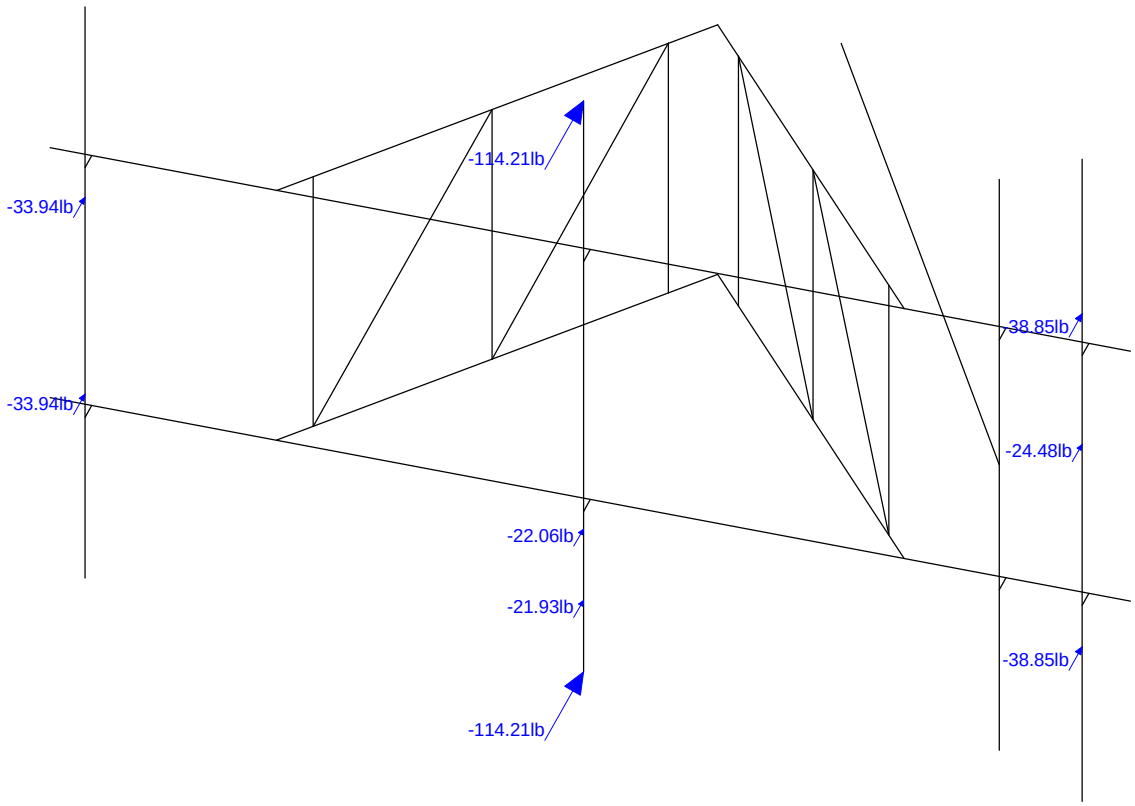
Centerline Communcation...	CTHA783A_MA	Wind 90
AP		Mar 30, 2021 at 4:17 PM
		CTHA783A_MA.r3d



Loads: BLC 9, Ice Weight

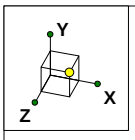
Centerline Communcation...	CTHA783A_MA	Ice Weight
AP		Mar 30, 2021 at 4:17 PM
		CTHA783A_MA.r3d

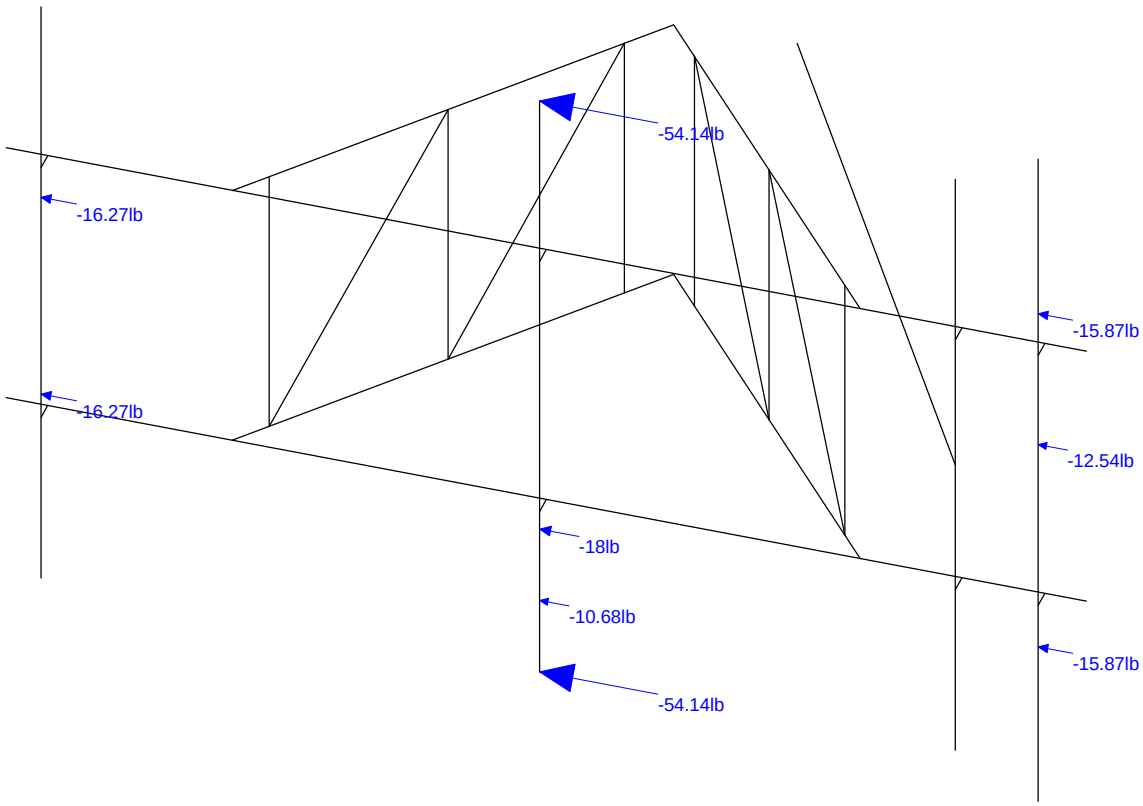




Loads: BLC 10, Ice + Wind 0

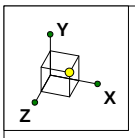
Centerline Communcation...	CTHA783A_MA	Ice + Wind 0
AP		Mar 30, 2021 at 4:18 PM
		CTHA783A_MA.r3d

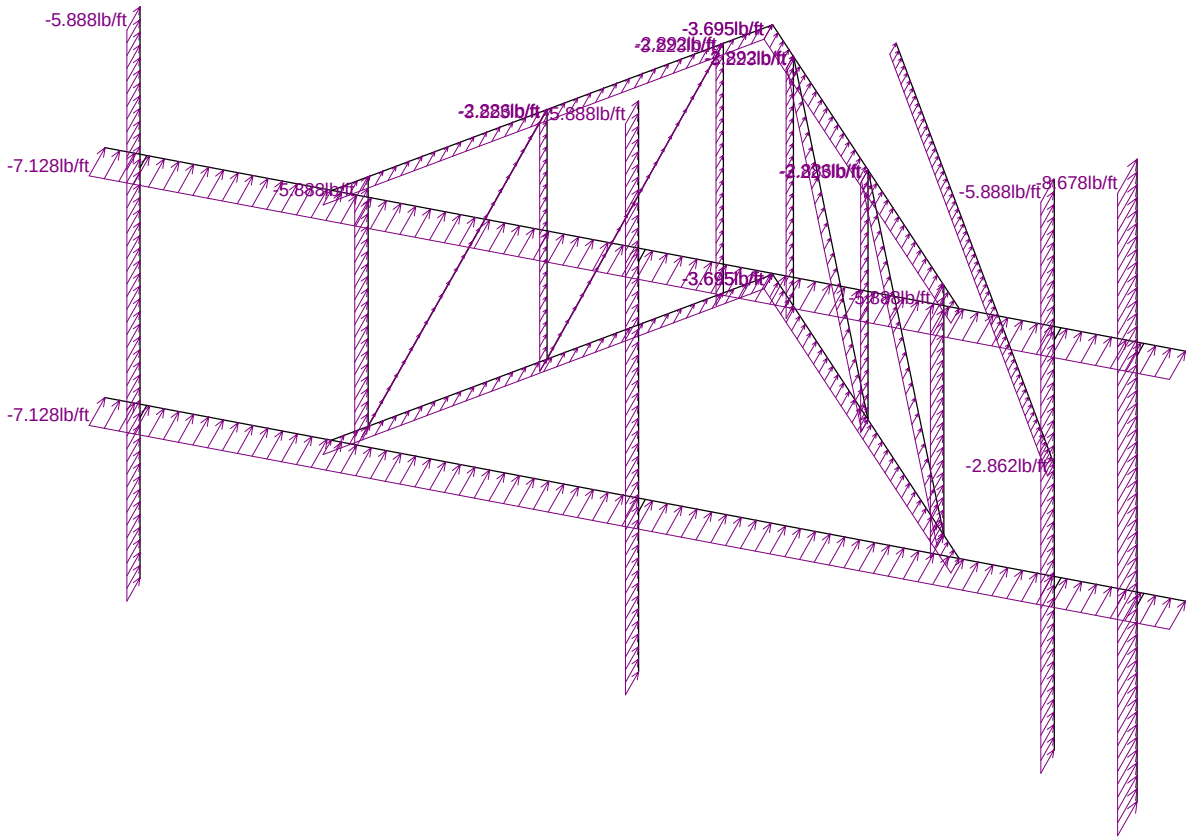




Loads: BLC 13, Ice + Wind 90

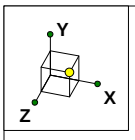
Centerline Communcation...	CTHA783A_MA	Ice + Wind 90
AP		Mar 30, 2021 at 4:18 PM
		CTHA783A_MA.r3d

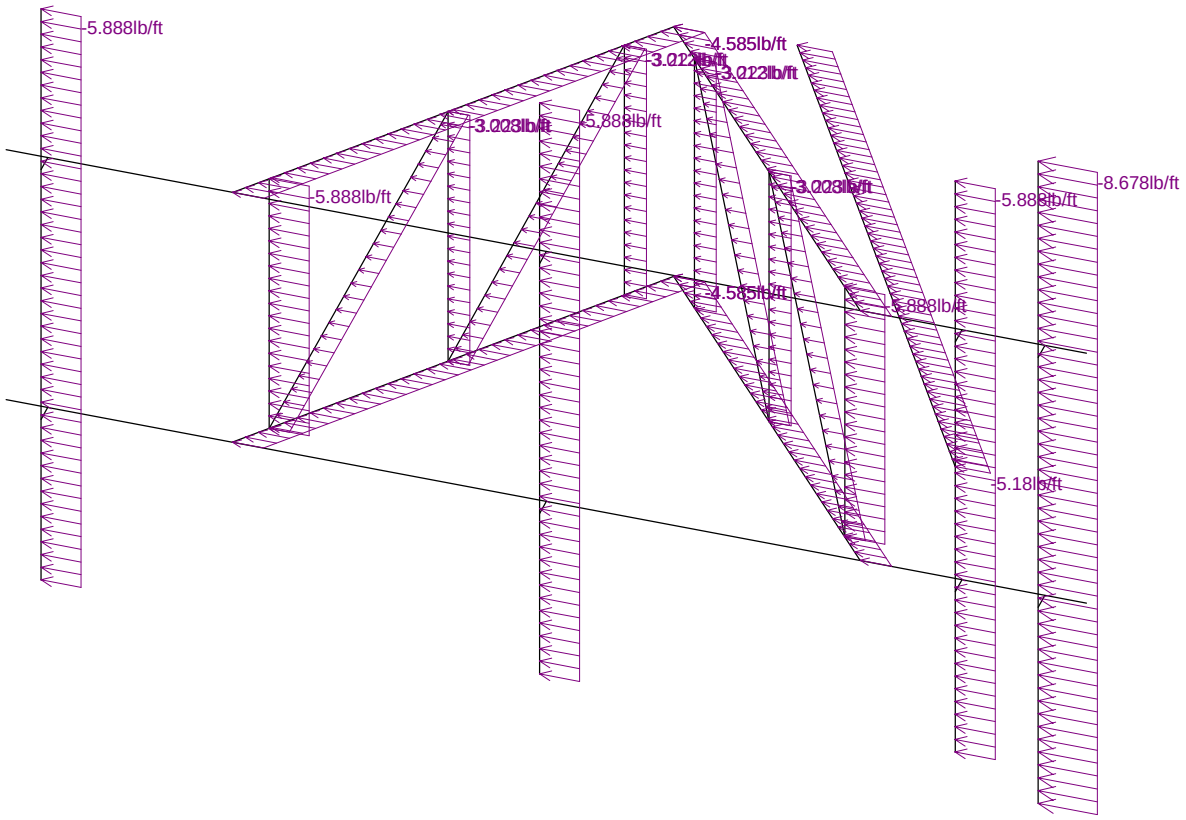




Loads: BLC 17, Distri. Wind Z

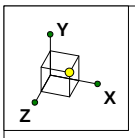
Centerline Communcation...	CTHA783A_MA	Distr. Wind 0
AP		Mar 30, 2021 at 4:18 PM
		CTHA783A_MA.r3d

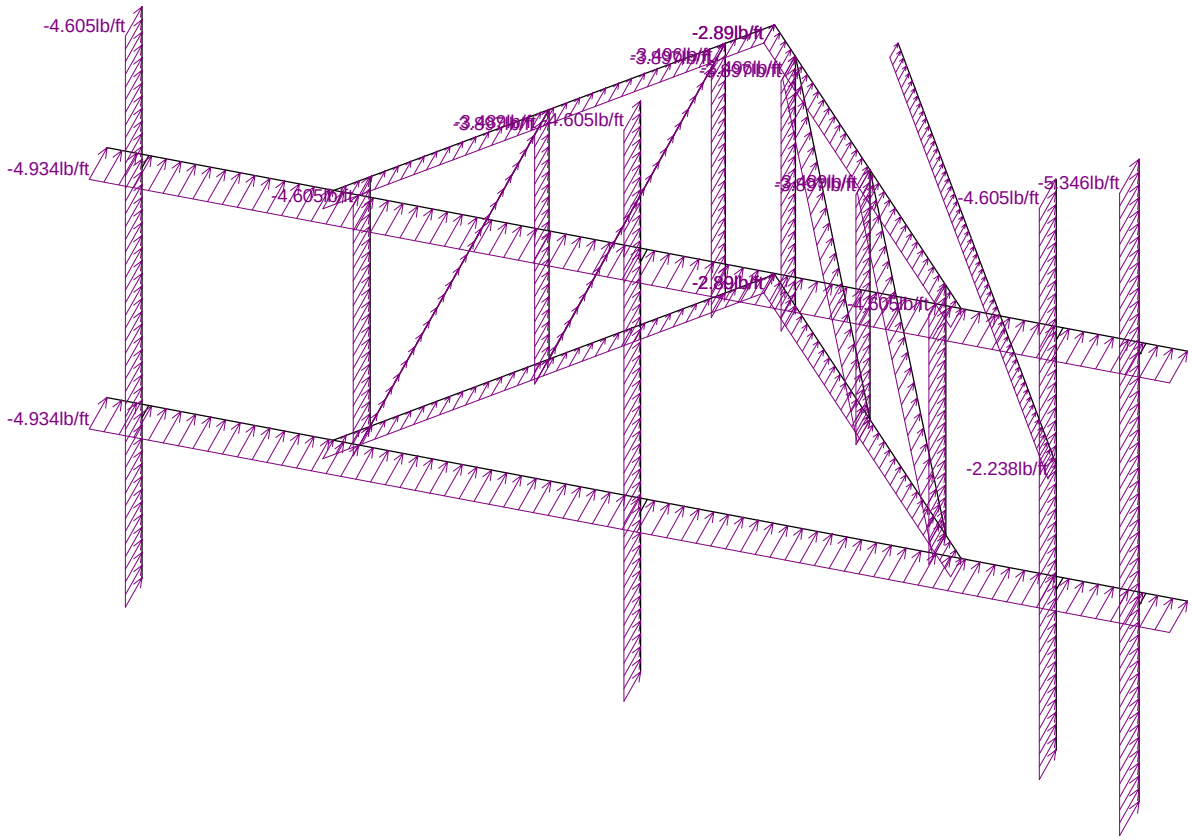




Loads: BLC 18, Distri. Wind X

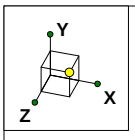
Centerline Communcation...	CTHA783A_MA	Distr. Wind 90
AP		Mar 30, 2021 at 4:18 PM
		CTHA783A_MA.r3d

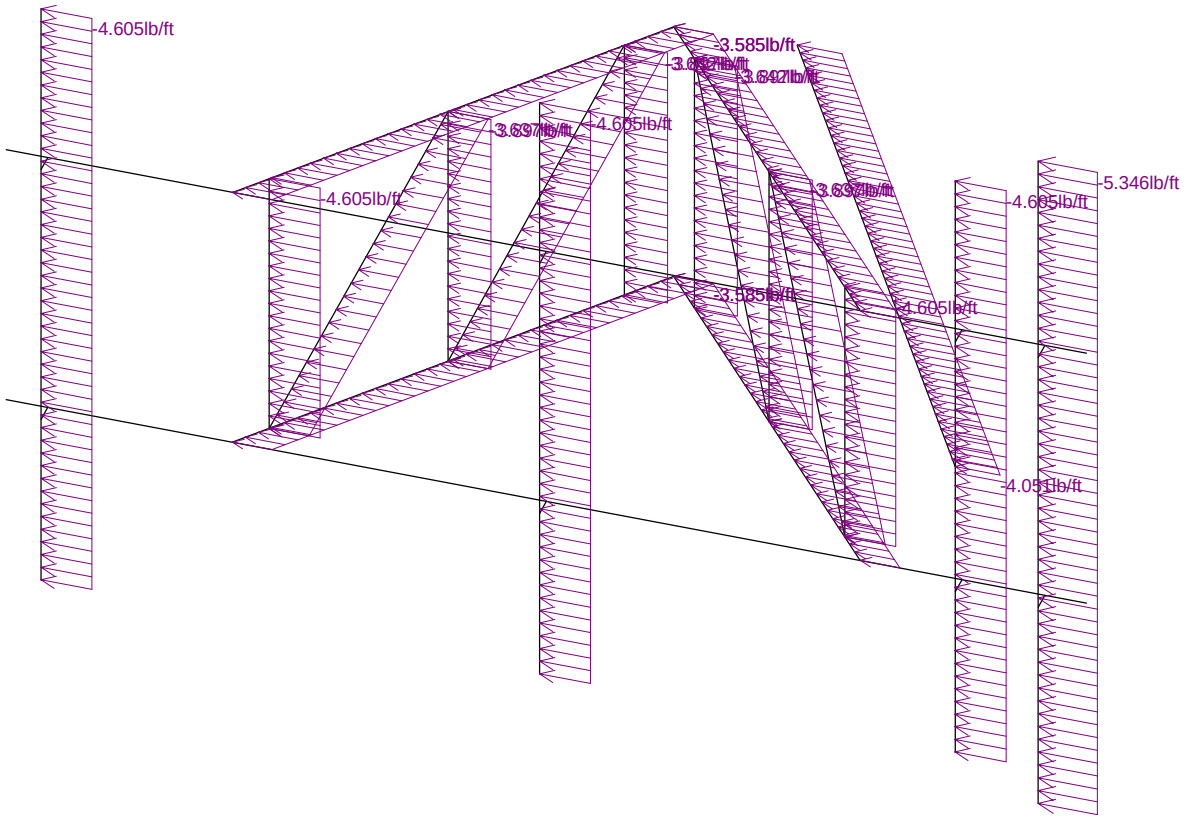




Loads: BLC 19, Distri. Ice + Wind Z

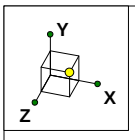
Centerline Communcation...	CTHA783A_MA	Distr. Ice + Wind 0
AP		Mar 30, 2021 at 4:18 PM
		CTHA783A_MA.r3d

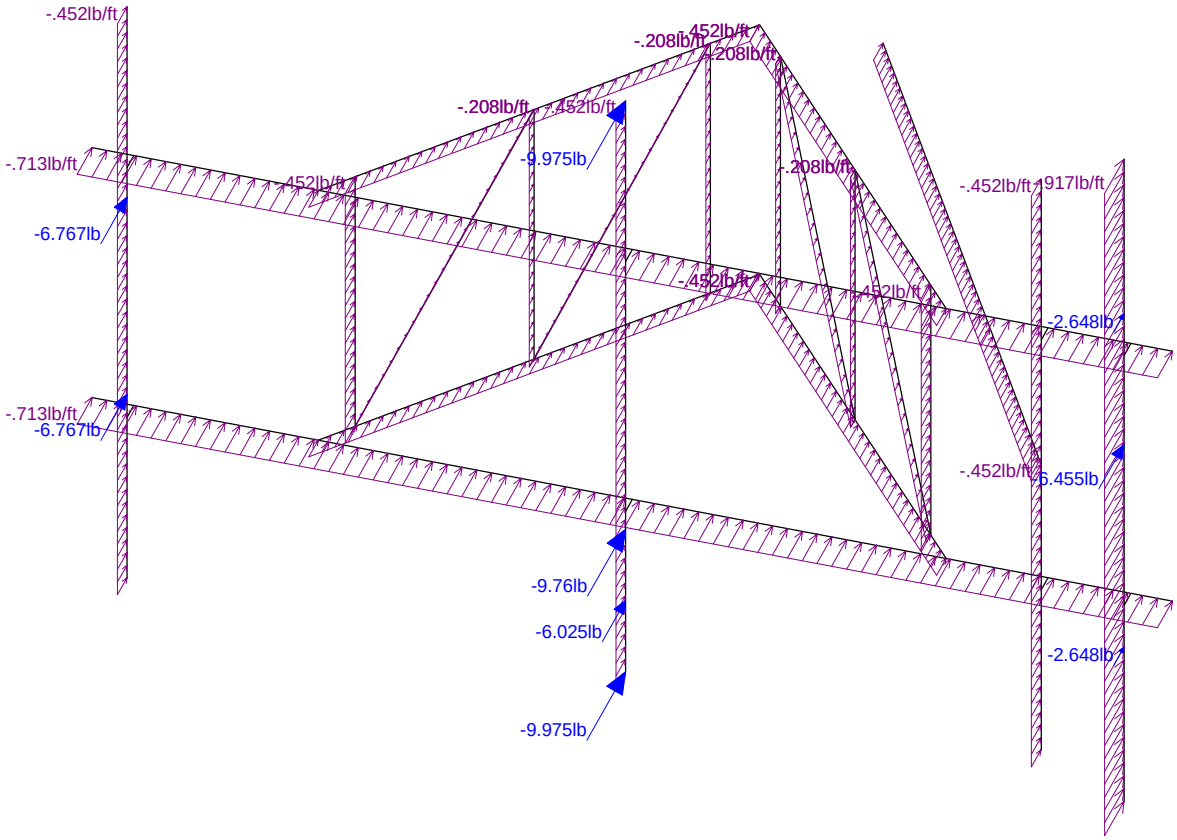




Loads: BLC 20, Distrr. Ice + Wind X

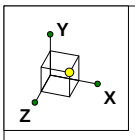
Centerline Communcation...	CTHA783A_MA	Distr. Ice + Wind 90
AP		Mar 30, 2021 at 4:19 PM
		CTHA783A_MA.r3d

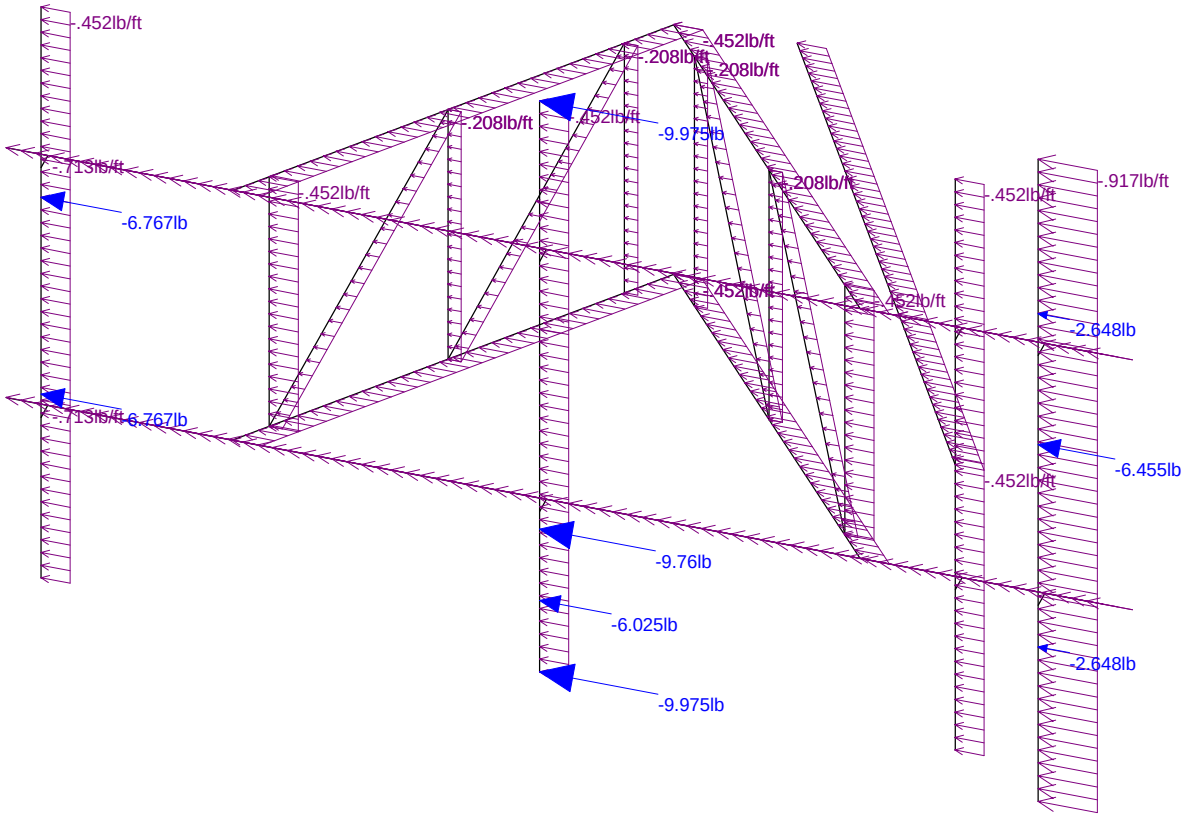




Loads: BLC 21, Seismic Load Z

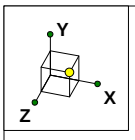
Centerline Communcation...	CTHA783A_MA	Seismic Z
AP		Mar 30, 2021 at 4:19 PM
		CTHA783A_MA.r3d

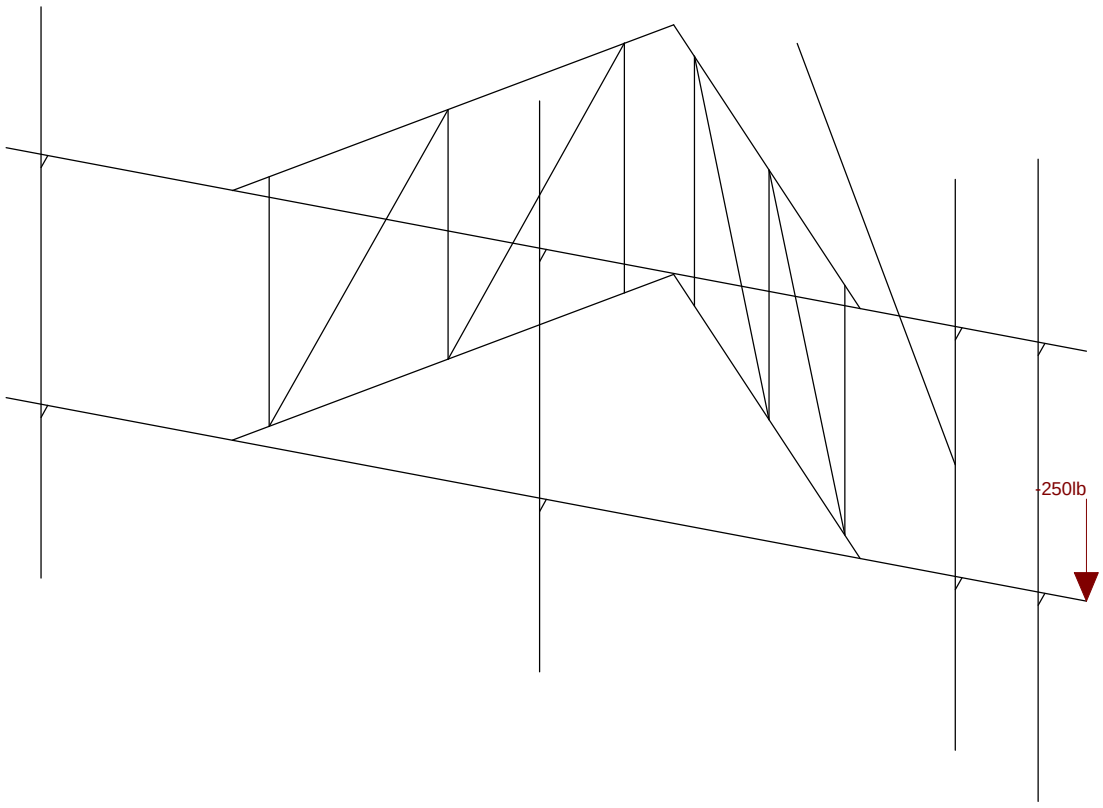




Loads: BLC 22, Seismic Load X

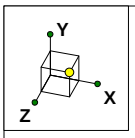
Centerline Communcation...	CTHA783A_MA	Seismic X
AP		Mar 30, 2021 at 4:19 PM
		CTHA783A_MA.r3d

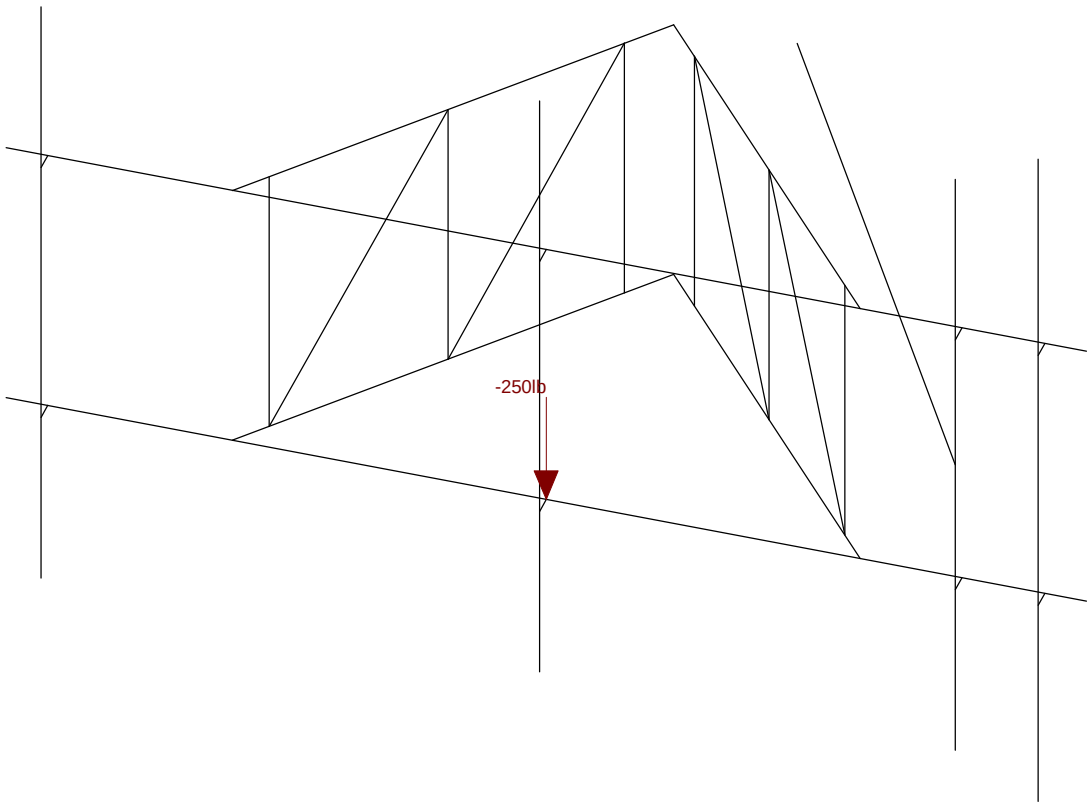




Loads: BLC 23, Live Load 1

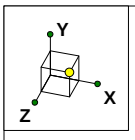
Centerline Communcation...	CTHA783A_MA	Live Load
AP		Mar 30, 2021 at 4:19 PM
		CTHA783A_MA.r3d

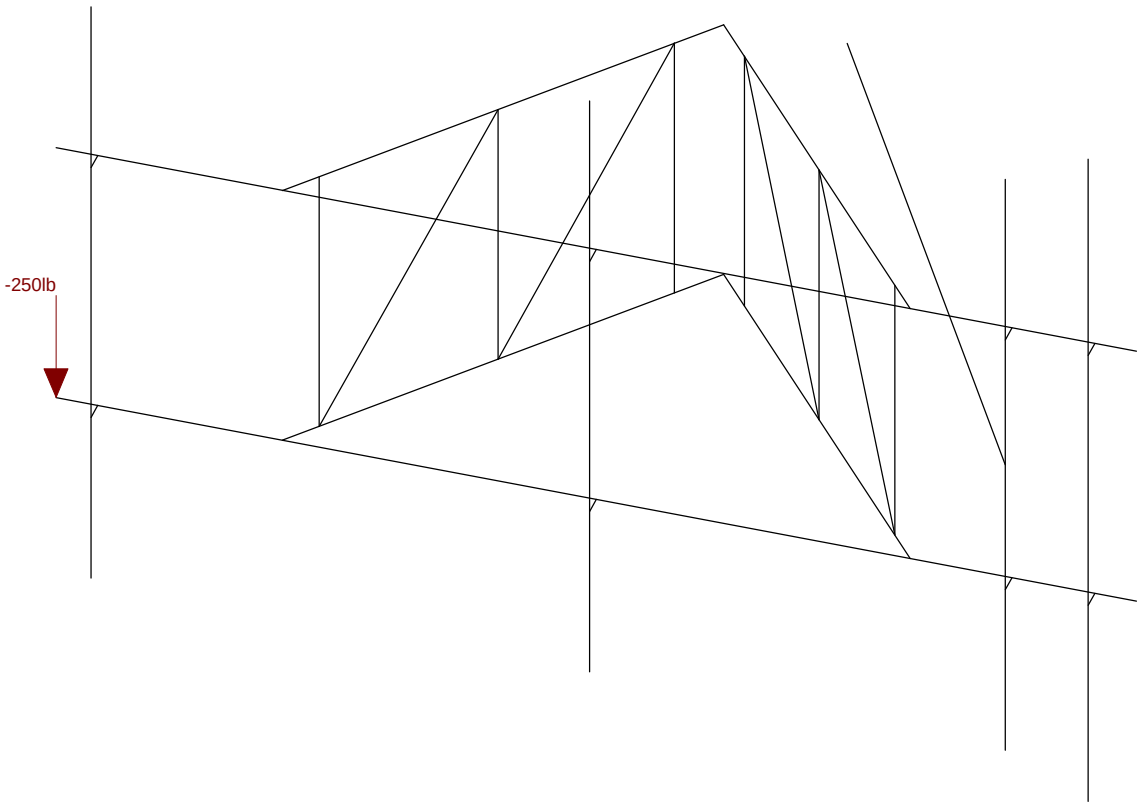




Loads: BLC 24, Live Load 2

Centerline Communcation...	CTHA783A_MA	Live Load 2
AP		Mar 30, 2021 at 4:19 PM
		CTHA783A_MA.r3d





Loads: BLC 25, Live Load 3

Centerline Communcation...	CTHA783A_MA	Live Load 3
AP		Mar 30, 2021 at 4:19 PM
		CTHA783A_MA.r3d

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/...	Density[lb/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A992	29000	11154	.3	.65	490	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	.3	.65	490	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	.3	.65	490	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	490	35	1.6	60	1.2
7	A1085	29000	11154	.3	.65	490	50	1.25	65	1.15
8	A913 Gr.65	29000	11154	.3	.65	490	65	1.1	80	1.1

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Pipe 3.0	PIPE_3.0	Beam	Pipe	A53 Gr.B	Typical	2.07	2.85	2.85	5.69
2	Pipe 2.5	PIPE_2.5	Beam	Pipe	A53 Gr.B	Typical	1.61	1.45	1.45	2.89
3	Pipe 2.0	PIPE_2.0	Beam	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25
4	Pipe 1.0	PIPE_1.0	Beam	Pipe	A53 Gr.B	Typical	.469	.083	.083	.166

Joint Coordinates and Temperatures

	Label	X [in]	Y [in]	Z [in]	Temp [F]	Detach From Diap...
1	N1	0	-3	-36	0	
2	N2	0	-45	-36	0	
3	N9	78	-3	20.254284	0	
4	N10	78	-45	20.254284	0	
5	N11	-78	-3	20.254284	0	
6	N12	-78	-45	20.254284	0	
7	N13	-72	-3	20.254284	0	
8	N14	-72	-45	20.254284	0	
9	N19	-72	-72	23.254284	0	
10	N22	-72	24	23.254284	0	
11	N26	-45.33714	-3	20.254284	0	
12	N27	-45.33714	-45	20.254284	0	
13	N28	45.33714	-3	20.254284	0	
14	N29	45.33714	-45	20.254284	0	
15	N30	72	-3	20.254284	0	
16	N31	72	-45	20.254284	0	
17	N34	-5.04516	-3	-29.739972	0	
18	N35	-5.04516	-45	-29.739972	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [in]	Y [in]	Z [in]	Temp [F]	Detach From Diap...
19	N36	5.04516	-3	-29.739972	0	
20	N37	5.04516	-45	-29.739972	0	
21	N38	-23.192676	-3	-7.222548	0	
22	N39	-23.192676	-45	-7.222548	0	
23	N40	23.192676	-3	-7.222548	0	
24	N41	23.192676	-45	-7.222548	0	
25	N42	-41.573616	-3	15.584508	0	
26	N43	-41.573616	-45	15.584508	0	
27	N44	41.573616	-3	15.584508	0	
28	N45	41.573616	-45	15.584508	0	
29	N47	3.029448	-36	-81.442332	0	
30	N33A	0	-3	20.254284	0	
31	N34A	0	-45	20.254284	0	
32	N35A	72	-78	23.254284	0	
33	N36A	72	30	23.254284	0	
34	N43A	60	-3	20.254284	0	
35	N44A	60	-45	20.254284	0	
36	N45A	60	-72	23.254284	0	
37	N46A	60	24	23.254284	0	
38	N41B	-72	-3	23.254284	0	
39	N42B	-72	-45	23.254284	0	
40	N43B	72	-3	23.254284	0	
41	N44B	72	-45	23.254284	0	
42	N45B	60	-3	23.254284	0	
43	N46	60	-45	23.254284	0	
44	N53	41.573616	-24	15.584508	0	
45	N47A	0	-72	23.254284	0	
46	N48	0	24	23.254284	0	
47	N50	0	-3	23.254284	0	
48	N51	0	-45	23.254284	0	
49	N49	60	-24	23.254284	0	

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	N1	max	936.028	12	2422.715	20	341.748	10	-188.566	9	0	78	177.855	40
2		min	-733.834	37	464.05	9	-4831.081	22	-1129.108	20	0	1	-131.094	51
3	N2	max	1968.444	5	1768.633	20	5296.888	18	-151.085	15	0	78	143.729	40
4		min	-583.009	51	304.415	9	15.548	15	-822.943	18	0	1	-107.36	51
5	N47	max	338.367	9	111.932	16	642.908	9	0	78	0	78	0	78

Envelope Joint Reactions (Continued)

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
6		min	-1402.162	5	-290.868	12	-2696.032	5	0	1	0	1	0	1
7	Totals:	max	1478.149	5	4115.068	18	2541.378	9						
8		min	0	51	855.084	15	-2541.379	8						

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	N1	Reaction	Reaction	Reaction	Reaction		Reaction
2	N2	Reaction	Reaction	Reaction	Reaction		Reaction
3	N47	Reaction	Reaction	Reaction			

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torq...	Kyy	Kzz	Cb	Function
1	M4	Pipe 2.5	156			Lbyy						Lateral
2	M5	Pipe 2.5	156			Lbyy						Lateral
3	MP4	Pipe 2.0	96			Lbyy						Lateral
4	M6A	Pipe 2.0	72.25			Lbyy						Lateral
5	M7A	Pipe 2.0	72.25			Lbyy						Lateral
6	M8A	Pipe 2.0	72.25			Lbyy						Lateral
7	M9	Pipe 2.0	72.25			Lbyy						Lateral
8	M11	Pipe 1.0	42			Lbyy						Lateral
9	M12	Pipe 1.0	42			Lbyy						Lateral
10	M13	Pipe 1.0	42			Lbyy						Lateral
11	M14	Pipe 1.0	42			Lbyy						Lateral
12	M15	Pipe 2.0	42			Lbyy						Lateral
13	M16	Pipe 2.0	42	22	22	Lbyy						Lateral
14	M17	Pipe 1.0	50.994			Lbyy						Lateral
15	M18	Pipe 1.0	51.206			Lbyy						Lateral
16	M19	Pipe 1.0	50.994			Lbyy						Lateral
17	M20	Pipe 1.0	51.206			Lbyy						Lateral
18	M21	Pipe 2.0	119.796			Lbyy						Lateral
19	MP1	Pipe 3.0	108			Lbyy						Lateral
20	MP2	Pipe 2.0	96			Lbyy						Lateral
21	MP3	Pipe 2.0	96			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M4	N11	N9			Pipe 2.5	Beam	Pipe	A53 Gr.B	Typical
2	M5	N12	N10			Pipe 2.5	Beam	Pipe	A53 Gr.B	Typical
3	MP4	N22	N19			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
4	M6A	N1	N26			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
5	M7A	N2	N27			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
6	M8A	N1	N28			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
7	M9	N2	N29			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
8	M11	N34	N35			Pipe 1.0	Beam	Pipe	A53 Gr.B	Typical
9	M12	N36	N37			Pipe 1.0	Beam	Pipe	A53 Gr.B	Typical
10	M13	N38	N39			Pipe 1.0	Beam	Pipe	A53 Gr.B	Typical
11	M14	N40	N41			Pipe 1.0	Beam	Pipe	A53 Gr.B	Typical
12	M15	N42	N43			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
13	M16	N44	N45			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
14	M17	N34	N39			Pipe 1.0	Beam	Pipe	A53 Gr.B	Typical
15	M18	N38	N43			Pipe 1.0	Beam	Pipe	A53 Gr.B	Typical
16	M19	N36	N41			Pipe 1.0	Beam	Pipe	A53 Gr.B	Typical
17	M20	N40	N45			Pipe 1.0	Beam	Pipe	A53 Gr.B	Typical
18	M21	N49	N47			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
19	MP1	N36A	N35A			Pipe 3.0	Beam	Pipe	A53 Gr.B	Typical
20	MP2	N46A	N45A			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
21	M22	N13	N41B			RIGID	None	None	RIGID	Typical
22	M23	N14	N42B			RIGID	None	None	RIGID	Typical
23	M24	N43A	N45B			RIGID	None	None	RIGID	Typical
24	M25	N44A	N46			RIGID	None	None	RIGID	Typical
25	M26	N30	N43B			RIGID	None	None	RIGID	Typical
26	M27	N31	N44B			RIGID	None	None	RIGID	Typical
27	MP3	N48	N47A			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
28	M28	N33A	N50			RIGID	None	None	RIGID	Typical
29	M29	N34A	N51			RIGID	None	None	RIGID	Typical

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rat...	Analysis ...	Inactive	Seismic...
1	M4						Yes				None
2	M5						Yes				None
3	MP4						Yes				None
4	M6A						Yes				None
5	M7A						Yes				None
6	M8A						Yes				None

Member Advanced Data (Continued)

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rat...	Analysis ...	Inactive	Seismic...
7	M9						Yes				None
8	M11	BenPIN	BenPIN				Yes				None
9	M12	BenPIN	BenPIN				Yes				None
10	M13	BenPIN	BenPIN				Yes				None
11	M14	BenPIN	BenPIN				Yes				None
12	M15	BenPIN	BenPIN				Yes				None
13	M16	BenPIN	BenPIN				Yes	Default			None
14	M17	BenPIN	BenPIN				Yes				None
15	M18	BenPIN	BenPIN				Yes				None
16	M19	BenPIN	BenPIN				Yes				None
17	M20	BenPIN	BenPIN				Yes				None
18	M21	BenPIN					Yes	Default			None
19	MP1						Yes				None
20	MP2						Yes				None
21	M22						Yes	** NA **			None
22	M23						Yes	** NA **			None
23	M24						Yes	** NA **			None
24	M25						Yes	** NA **			None
25	M26						Yes	** NA **			None
26	M27						Yes	** NA **			None
27	MP3						Yes				None
28	M28						Yes	** NA **			None
29	M29						Yes	** NA **			None

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Dead Load	DL		-1			9			
2	Wind 0	WLZ					18			
3	Wind 30	None					18			
4	Wind 60	None					18			
5	Wind 90	WLX					18			
6	Wind 120	None					18			
7	Wind 150	None					18			
8	Wind 180	WLZ					18			
9	Ice Weight	DL					9	29		
10	Ice + Wind 0	WLZ					18			
11	Ice + Wind 30	None					18			
12	Ice + Wind 60	None					18			
13	Ice + Wind 90	WLX					18			

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
14	Ice + Wind 120	None					18			
15	Ice + Wind 150	None					18			
16	Ice + Wind 180	WLZ					18			
17	Distri. Wind Z	WLZ						29		
18	Distri. Wind X	WLX						29		
19	Distri. Ice + Wind Z	WLZ						29		
20	Distrr. Ice + Wind X	WLX						29		
21	Seismic Load Z	ELZ					9	29		
22	Seismic Load X	ELX					9	29		
23	Live Load 1	LL				1				
24	Live Load 2	LL				1				
25	Live Load 3	LL				1				

Load Combinations

	Description	Solve	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.4D	Yes	Y		1	1.4																		
2	1.2D + 1.6W 0°	Yes	Y		1	1.2	2	1.6	17	1.6	18													
3	1.2D + 1.6W 30°	Yes	Y		1	1.2	3	1.6	17	1.3...	18	.8												
4	1.2D + 1.6W 60°	Yes	Y		1	1.2	4	1.6	17	.8	18	1.3...												
5	1.2D + 1.6W 90°	Yes	Y		1	1.2	5	1.6	17		18	1.6												
6	1.2D + 1.6W 120°	Yes	Y		1	1.2	6	1.6	17	-.8	18	1.3...												
7	1.2D + 1.6W 150°	Yes	Y		1	1.2	7	1.6	17	-1....	18	.8												
8	1.2D + 1.6W 180°	Yes	Y		1	1.2	8	1.6	17	-1.6	18													
9	0.9D + 1.6W 0°	Yes	Y		1	.9	2	1.6	17	1.6	18													
10	0.9D + 1.6W 30°	Yes	Y		1	.9	3	1.6	17	1.3...	18	.8												
11	0.9D + 1.6W 60°	Yes	Y		1	.9	4	1.6	17	.8	18	1.3...												
12	0.9D + 1.6W 90°	Yes	Y		1	.9	5	1.6	17		18	1.6												
13	0.9D + 1.6W 120°	Yes	Y		1	.9	6	1.6	17	-.8	18	1.3...												
14	0.9D + 1.6W 150°	Yes	Y		1	.9	7	1.6	17	-1....	18	.8												
15	0.9D + 1.6W 180°	Yes	Y		1	.9	8	1.6	17	-1.6	18													
16	1.2D + 1.0Di + 1.0Wi 0°	Yes	Y		1	1.2	9	1	10	1	19	1	20											
17	1.2D + 1.0Di + 1.0Wi 3...	Yes	Y		1	1.2	9	1	11	1	19	.866	20	.5										
18	1.2D + 1.0Di + 1.0Wi 6...	Yes	Y		1	1.2	9	1	12	1	19	.5	20	.866										
19	1.2D + 1.0Di + 1.0Wi 9...	Yes	Y		1	1.2	9	1	13	1	19		20	1										
20	1.2D + 1.0Di + 1.0Wi 1...	Yes	Y		1	1.2	9	1	14	1	19	-.5	20	.866										
21	1.2D + 1.0Di + 1.0Wi 1...	Yes	Y		1	1.2	9	1	15	1	19	-.866	20	.5										
22	1.2D + 1.0Di + 1.0Wi 1...	Yes	Y		1	1.2	9	1	16	1	19	-1	20											
23	1.2D + 1.0Eh 0°	Yes	Y		1	1.2	21	1	22															
24	1.2D + 1.0Eh 30°	Yes	Y		1	1.2	21	.866	22	.5														

Load Combinations (Continued)

	Description	Solve	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
25	1.2D + 1.0Eh 60°	Yes	Y		1	1.2	21	.5	22	.866														
26	1.2D + 1.0Eh 90°	Yes	Y		1	1.2	21		22	1														
27	1.2D + 1.0Eh 120°	Yes	Y		1	1.2	21	-.5	22	.866														
28	1.2D + 1.0Eh 150°	Yes	Y		1	1.2	21	-.866	22	.5														
29	1.2D + 1.0Eh 180°	Yes	Y		1	1.2	21	-1	22															
30	0.9D + 1.0Eh 0°	Yes	Y		1	.9	21	1	22															
31	0.9D + 1.0Eh 30°	Yes	Y		1	.9	21	.866	22	.5														
32	0.9D + 1.0Eh 60°	Yes	Y		1	.9	21	.5	22	.866														
33	0.9D + 1.0Eh 90°	Yes	Y		1	.9	21		22	1														
34	0.9D + 1.0Eh 120°	Yes	Y		1	.9	21	-.5	22	.866														
35	0.9D + 1.0Eh 150°	Yes	Y		1	.9	21	-.866	22	.5														
36	0.9D + 1.0Eh 180°	Yes	Y		1	.9	21	-1	22															
37	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	23	1.5	2	.342	17	.342	18											
38	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	23	1.5	3	.342	17	.296	18	.171										
39	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	23	1.5	4	.342	17	.171	18	.296										
40	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	23	1.5	5	.342	17		18	.342										
41	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	23	1.5	6	.342	17	-.171	18	.296										
42	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	23	1.5	7	.342	17	-.296	18	.171										
43	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	23	1.5	8	.342	17	-.342	18											
44	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	24	1.5	2	.342	17	.342	18											
45	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	24	1.5	3	.342	17	.296	18	.171										
46	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	24	1.5	4	.342	17	.171	18	.296										
47	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	24	1.5	5	.342	17		18	.342										
48	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	24	1.5	6	.342	17	-.171	18	.296										
49	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	24	1.5	7	.342	17	-.296	18	.171										
50	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	24	1.5	8	.342	17	-.342	18											
51	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	25	1.5	2	.342	17	.342	18											
52	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	25	1.5	3	.342	17	.296	18	.171										
53	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	25	1.5	4	.342	17	.171	18	.296										
54	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	25	1.5	5	.342	17		18	.342										
55	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	25	1.5	6	.342	17	-.171	18	.296										
56	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	25	1.5	7	.342	17	-.296	18	.171										
57	1.0D +1.5Lv + 1.0W (6...	Yes	Y		1	1	25	1.5	8	.342	17	-.342	18											
58	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	23	1	2	.096	17	.096	18											
59	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	23	1	3	.096	17	.083	18	.048										
60	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	23	1	4	.096	17	.048	18	.083										
61	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	23	1	5	.096	17		18	.096										
62	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	23	1	6	.096	17	-.048	18	.083										
63	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	23	1	7	.096	17	-.083	18	.048										
64	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	23	1	8	.096	17	-.096	18											

Load Combinations (Continued)

	Description	Solve	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
65	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	24	1	2	.096	17	.096	18											
66	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	24	1	3	.096	17	.083	18	.048										
67	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	24	1	4	.096	17	.048	18	.083										
68	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	24	1	5	.096	17		18	.096										
69	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	24	1	6	.096	17	-.048	18	.083										
70	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	24	1	7	.096	17	-.083	18	.048										
71	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	24	1	8	.096	17	-.096	18											
72	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	25	1	2	.096	17	.096	18											
73	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	25	1	3	.096	17	.083	18	.048										
74	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	25	1	4	.096	17	.048	18	.083										
75	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	25	1	5	.096	17		18	.096										
76	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	25	1	6	.096	17	-.048	18	.083										
77	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	25	1	7	.096	17	-.083	18	.048										
78	1.2D + 1.0Lv + 1.0W (...	Yes	Y		1	1.2	25	1	8	.096	17	-.096	18											

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

	Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	Dir	LC	phi*P...	phi*P...	phi*M...	phi*M...	...	Eqn
1	MP2	PIPE_2.0	.858	48	5	.175	69		5	14916...	32130	1871....	1871....	...	H1-1b
2	MP3	PIPE_2.0	.552	69	15	.059	69		8	14916...	32130	1871....	1871....	...	H1-1b
3	M9	PIPE_2.0	.505	0	20	.168	66.9...		6	20804...	32130	1871....	1871....	...	H1-1a
4	M8A	PIPE_2.0	.478	0	20	.164	0		20	20804...	32130	1871....	1871....	...	H1-1b
5	M5	PIPE_2.5	.463	123.5	5	.259	123.5		5	13460...	50715	3596....	3596....	...	H1-1b
6	M4	PIPE_2.5	.399	123.5	12	.179	136.5		12	13460...	50715	3596....	3596....	...	H1-1b
7	M6A	PIPE_2.0	.358	0	22	.133	0		22	20804...	32130	1871....	1871....	...	H1-1b
8	M7A	PIPE_2.0	.302	0	16	.106	0		16	20804...	32130	1871....	1871....	...	H1-1b
9	M14	PIPE_1.0	.275	23.188	20	.009	0		41	8869....	14773...	464.6...	464.6...	...	H1-1a
10	M13	PIPE_1.0	.192	42	16	.010	0		40	8869....	14773...	464.6...	464.6...	1	H1-1...
11	MP4	PIPE_2.0	.189	69	56	.035	27		20	14916...	32130	1871....	1871....	...	H1-1b
12	M21	PIPE_2.0	.143	59.898	20	.009	0		20	9870....	32130	1871....	1871....	...	H1-1b
13	M19	PIPE_1.0	.142	25.497	18	.014	50.9...		12	6964....	14773...	464.6...	464.6...	...	H1-1b
14	M20	PIPE_1.0	.138	25.603	18	.062	51.2...		13	6920....	14773...	464.6...	464.6...	...	H1-1b
15	M12	PIPE_1.0	.117	42	20	.011	0		40	8869....	14773...	464.6...	464.6...	...	H1-1...
16	M17	PIPE_1.0	.116	25.497	16	.012	0		4	6964....	14773...	464.6...	464.6...	...	H1-1b
17	M18	PIPE_1.0	.112	25.603	16	.024	0		14	6920....	14773...	464.6...	464.6...	...	H1-1b
18	MP1	PIPE_3.0	.110	33.75	6	.024	74.25		20	42263...	65205	5748....	5748....	...	H1-1b
19	M11	PIPE_1.0	.086	42	22	.011	0		40	8869....	14773...	464.6...	464.6...	1	H1-1...
20	M16	PIPE_2.0	.038	42	16	.007	42		38	30860...	32130	1871....	1871....	1	H1-1...
21	M15	PIPE_2.0	.031	42	16	.010	0		20	27741...	32130	1871....	1871....	1	H1-1...