



Date: 3/3/2021

To: Catalina Martinez
Building Three, Suite 370
805 Las Cimas Parkway
Austin TX, 78746

Subject: Mount Structural Analysis Report

T-Mobile Designation: **Site Name:** Longview Farm Tank
Site ID: A5C0335A

EFI Designation: **Project Number:** 049.01014 - 2044017

Site Data: **548 SW Tower Park Road, Lee's Summit, MO 64081**
Latitude 38° 54' 33.4", Longitude -94° 26' 55.4"

Dear Ms. Martinez,

EFI Global, Inc is pleased to submit this "**Mount Structural Analysis Report**" to determine the structural capacity of the antenna mount utilized by T-Mobile at the above referenced site.

The purpose of the analysis is to determine acceptability of the mount stress level for the changes proposed by T-Mobile. Under the following load case we have determined the mount to have:

Existing + Proposed Equipment **Adequate Capacity with Mods (37.3%)**
Note: See Analysis Criteria for loading configuration

The analysis has been performed in accordance with the TIA-222-H Standard and 2018 International Building Code (2018 IBC).

We at *EFI Global, Inc* appreciate the opportunity of providing our continuing professional services to you. If you have any questions or need further assistance on this or any other projects, please give us a call.

Sincerely,
EFI Global, Inc

Ahmet Colakoglu, PE
Missouri Professional Engineer
License No: PE-2011011126

3/3/2021



1) ANALYSIS CRITERIA

The analysis was performed for the existing and proposed appurtenances as specified in the loading information referenced below, and per the following loading criteria of Table 1.

Table 1 – Loading and Analysis Criteria

Rad Center	63'-6" & 63'-0"
Structure Type	Water Tank
Exposure Category	C
Ultimate Wind Speed	109 mph
Ultimate Ice Loading	1.5" with 40 mph Wind
Risk Category	II
Topographic Factor	Kzt = 1.00

Table 1.1 – Existing Appurtenance Configuration

Qty	Model
3	RFS APXVSP18 – Antennas
3	Ericsson IP 65 – Antennas
3	Ericsson RRUS 11 B26A – RRUs
3	Ericsson RRUS 31 B25 – RRUs

Table 1.2 – Proposed and Final Appurtenance Configuration

Qty	Model
3	Commscope FFV4-65C-R3-V1 – Antennas
3	Nokia AEHC – Antennas
3	Nokia AHLOA – RRUs*
3	Nokia AHFIG – RRUs*
3	Ericsson RRUS 31 B25 – RRUs

***To be mounted behind antennas.**

Table 1.3 – Assumed Material Properties

Member Type	ASTM Material Designation	Fy (ksi)	Fu (ksi)
Pipes	A53 Gr. B	35	60
Angles/Channels	A36	36	58
Rectangular HSS	A500 Gr. B - 46	46	58
Round HSS	A500 Gr. B - 42	42	58
Others (UNO)	A572 Gr. 50	50	65

2) ANALYSIS PROCEDURE

The analysis is based on the following information:

Table 2 – Documents

Document	Provided By	Date
Construction Drawings	KGI	02/23/2021
Mount Mapping Report & Site Photos	Engineering Tower Solutions, PLLC	02/16/2021
Field Audit Form & Site Photos	KGI	10/29/2020
RFDS	T-Mobile	09/30/2020
Structural Analysis Report	SSC, Inc.	11/09/2018

2.1) Analysis Method

Risa-3D, a commercially available analysis software package, was used to create a three-dimensional model of the mount and calculate member stresses for various loading cases. Selected output from the analysis is included in the Appendix.

2.2) Analysis Conditions and Assumptions

- 1) The mount was built and installed in accordance with the manufacturer's specifications.
- 2) The mount has been maintained and will be maintained in accordance with the manufacturer's specifications. All structural members and connections of the mount are in good condition and can achieve theoretical strength.
- 3) The configuration of antennas is as specified in "1) Analysis Criteria".
- 4) The analysis was performed for the subject mount only. It does not include an evaluation of the other mounts or the water tank, which should be analyzed by others.
- 5) The evaluation does not include any antenna rigging loads. The equipment should not be rigged using the subject antenna mount as the support.
- 6) The analysis includes a minimum 250 lbf maintenance point load at the worst-case location on the mount, as well as a minimum 250 lbf maintenance point load at each antenna location in conjunction with a 30 mph wind load.
- 7) Any steel grating represented in this model is for loading purposes only and it is not considered to provide any structural restraint or support.
- 8) Member sizes per the mount mapping report, site photos and assumed based on our experience with similar structures. Please refer to calculation output in the appendix of this report for sizes and lengths assumed.
- 9) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.

EFI Global, Inc (EFI), must be notified immediately if any of these assumptions are discovered to be incorrect. The results of this analysis may be affected if any of the assumptions are not valid or have been made in error.

3) ANALYSIS RESULTS AND CONCLUSION

The analysis results are shown on the table below.

Table 3.1 – Mount Component Stresses vs. Capacity

Component	% Capacity	Pass / Fail
Antenna Mount Pipe	37.3	Pass

Pipe Mounts: The existing pipe mounts **will have adequate** capacity for the proposed changes by T-Mobile, **once the offset threaded rod connections at each mount pipe location is replaced with a Commscope Universal Handrail Mount (P/N: WT-HRM-U, refer the attached specs) at each sector.** For the code specified load combinations and as a maximum, the mount members are stressed to **37.3%** of their structural capacity.

APPENDIX

**INPUT LOADS
ANALYSIS OUTPUT
MOUNT SPECS**

CLIENT:KGI

PROJECT:A5C0335A

SUBJECT:Antenna Loads - TIA 222 H Standard

Tower Height

98.00

ft

Ultimate Wind Speed, V

109

mph

Basic Wind Speed w/ Ice, V_i

40

mph

Maintenance Load Factor, L_{FM}

0.0758

Load Factor for Maint. Load Cases
(Basic Wind Speed=30 mph)

Ultimate Ice Thickness, t_i

1.5

inches

Type of Mount

Sector

2

Table 2-3 Importance Factors

Structure Classification	Wind Load Without Ice	Wind Load With Ice	Ice Thickness	Earthquake
II	1	1	1	1

Table 2-4 Exposure Category Coefficients

Exposure Category	Zg	α	Kzmin	Ke	m
C	900	9.5	0.85	1	0.6

Ground elevation factor, Ke

Zs1011 ft

Ke0.96

Table 2-5 Topographic Categories

Kzt1.000

Table 2-2 Wind Directionality Factor, Kd

Structure Type	Kd
1	1

Water Tank

DOES NOT CHANGE

Gust Effect Factor Gh

Structure Type	Gh
3	0.85

Water Tank

DOES NOT CHANGE

Shielding Factor, Ka

Structure Type	Ka
	0.90

Water Tank

DOES NOT CHANGE

Seismic Factors	
Ss	0.099
S1	0.068
Fa	1.6
Fv	2.4
R	2

Truss or Pole

CLIENT:KGI

PROJECT:A5C0335A

SUBJECT:Antenna Loads - TIA 222 H Standard

Rad Center63.50ft

Antenna AND Mount Without Ice

Antenna AND Mount Without Ice																	Pounds							
Mounting Pole	Height (ft)	Model Number	#	Weight (lbs)	H (in)	*W (in)	D (in)	Ka	**A _N (ft2)	***A _T (ft2)	Aspect (FRONT)	Aspect (SIDE)	Ca (FRONT)	Ca (SIDE)	K _z	q _z (psf)	Wind Load (Front)	Wind Load (Side)	Dead Load	Total Wind Load (Front)	Total Wind Load (Side)	Total Dead Load	Lateral Load (Seismic)	Vertical Load (Seismic)
Pos. 1	63.50	Commscope FFV4-65C-R3-V1	1	131.8	96.0	25.2	9.3	0.90	16.79	6.16	3.81	10.37	1.26	1.51	1.150	33.7	545.0	240.5	131.84	545	357	351	19	7
	63.50	AHLOA	1	83.8	26.6	N/A	8.1	0.90	-	1.50	-	3.28	-	1.23	1.150	33.7	0.0	47.7	83.8					
	63.50	AHFIG	1	79.4	27.6	N/A	5.6	0.90	-	1.07	-	4.93	-	1.31	1.150	33.7	0.0	36.2	79.4					
	63.50	RRUS 31 B25	1	56.1	16.5	N/A	9.3	0.90	-	1.07	-	1.77	-	1.20	1.150	33.7	0.0	33.0	56.1					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	-	0.0	0.0	0				
Pos.2	63.50	Nokia AEHC	1	99.2	35.4	22.8	8.3	0.90	5.62	2.03	1.55	4.29	1.20	1.28	1.150	33.7	173.9	67.1	99.2	174	67	99	5	2
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
Pos.3		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0	0	0	0	0	0
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
Pos.4		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0	0	0	0	0	0
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
		Empty		0.0	-	-	-	0.90	-	-	-	-	-	-	-	-	0.0	0.0	0					
																				0	0	0	0	0

* Enter N/A in the W column for front sheilded apurtanances.

** A_N is the product of H and W

*** A_T is the product of H and D

DL#REF!

Mount	Height (ft)	Member	*L (in)	**W (in)	D (in)	Weight (lb/ft)	*** Ca	K _z	q _z (psf)	Wind Load (PLF)	Lateral Load (Seismic)	Vertical Load (Seismic)
	63.50	4 STD Pipe	0.00	4.50	0.00		-	-	-	-	-	-
	63.50	2.5 STD Pipe	12.00	2.88	0.00		1.20	1.150	30.4	7	-	-
	63.50	2.0 STD Pipe	0.00	2.38	0.00		-	-	-	-	-	-
	63.50	1/2" SR	0.00	0.50	0.00		-	-	-	-	-	-
	63.50	(L4x4)	0.00	4.00	4.00		-	-	-	-	-	-
	63.50	(L2.5x2.5)	0.00	2.50	2.50		-	-	-	-	-	-
	63.50	Horizontal Plate (PL7x1/2)	0.00	0.50	7.00		-	-	-	-	-	-
	63.50	Tube Radial (4x4)	0.00	4.00	4.00		-	-	-	-	-	-
	63.50	Tube Radial (4.5x4.5)	0.00	4.50	4.50		-	-	-	-	-	-
	63.50	Double Angle	0.00	5.00	2.50		-	-	-	-	-	-
	63.50	Channel (1.25x1.25)	0.00	1.25	1.25		-	-	-	-	-	-
	63.50	Channel (2.75x2)	0.00	2.75	2.00		-	-	-	-	-	-

* The dimension L is the longest dimension of the member

** The dimension W is the height or width of the member that resists wind load

*** Ca will equal 1.2 for round members and 2.0 for flat members

CLIENT:KGI

PROJECT:A5C0335A

SUBJECT:Antenna Loads - TIA 222 H Standard

Antenna AND Mount With Ice																Pounds									
Mounting Pole	Height (ft)	Model Number	#	H (in)	W (in)	D (in)	Ka	*A _N (ft2)	*A _T (ft2)	*Volume Ice (ft3)	*Weight Ice (lbs)	**Ca (FRONT)	**Ca (SIDE)	Kz	q _z (psf)	Ice Wind Load (Front)	Ice Wind Load (Side)	Combined Wind Load (Front)	Combined Wind Load (Side)	Ice Dead Load	**Total Wind Load (Front)	**Total Wind Load (Side)	Total Ice Load		
Pos. 1	63.50	Commscope FFV4-65C-R3-V1	1	96.0	25.2	9.3	0.90	2.77	2.41	7.35	411.72	0.72	0.82	1.150	4.5	6.9	6.9	80.3	39.3	412	80	61	637		
	63.50	AHLOA	1	26.6	12.9	8.1	0.90	-	0.84	1.53	85.72	0.70	0.70	1.150	4.5	0.0	2.1	0.0	8.5	86					
	63.50	AHFIG	1	27.6	13.4	5.6	0.90	-	0.81	1.41	78.78	0.70	0.72	1.150	4.5	0.0	2.0	0.0	6.9	79					
	63.50	RRUS 31 B25	1	16.5	11.8	9.3	0.90	-	0.65	1.09	61.09	0.70	0.70	1.150	4.5	0.0	1.6	0.0	6.0	61					
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0	41	31	319		
Pos.2	63.50	Nokia AEHC	1	35.4	22.8	8.3	0.90	1.37	1.04	2.81	157.09	0.70	0.72	1.150	4.5	3.3	2.6	26.7	11.6	157	27	12	157		
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0					
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0					
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0					
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0	14	6	79		
Pos.3		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0	0	0	0		
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0					
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0					
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0					
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0	0	0	0		
Pos.4		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0	0	0	0		
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0					
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0					
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0					
		Empty		-	-	-	0.90	-	-	-	0.00	-	-	-	-	0.0	0.0	0.0	0.0	0	0	0	0		

* A_N, A_T, Volume Ice and Weight Ice are calculated per unit

** Ca will equal 1.2 for all ice load calculations

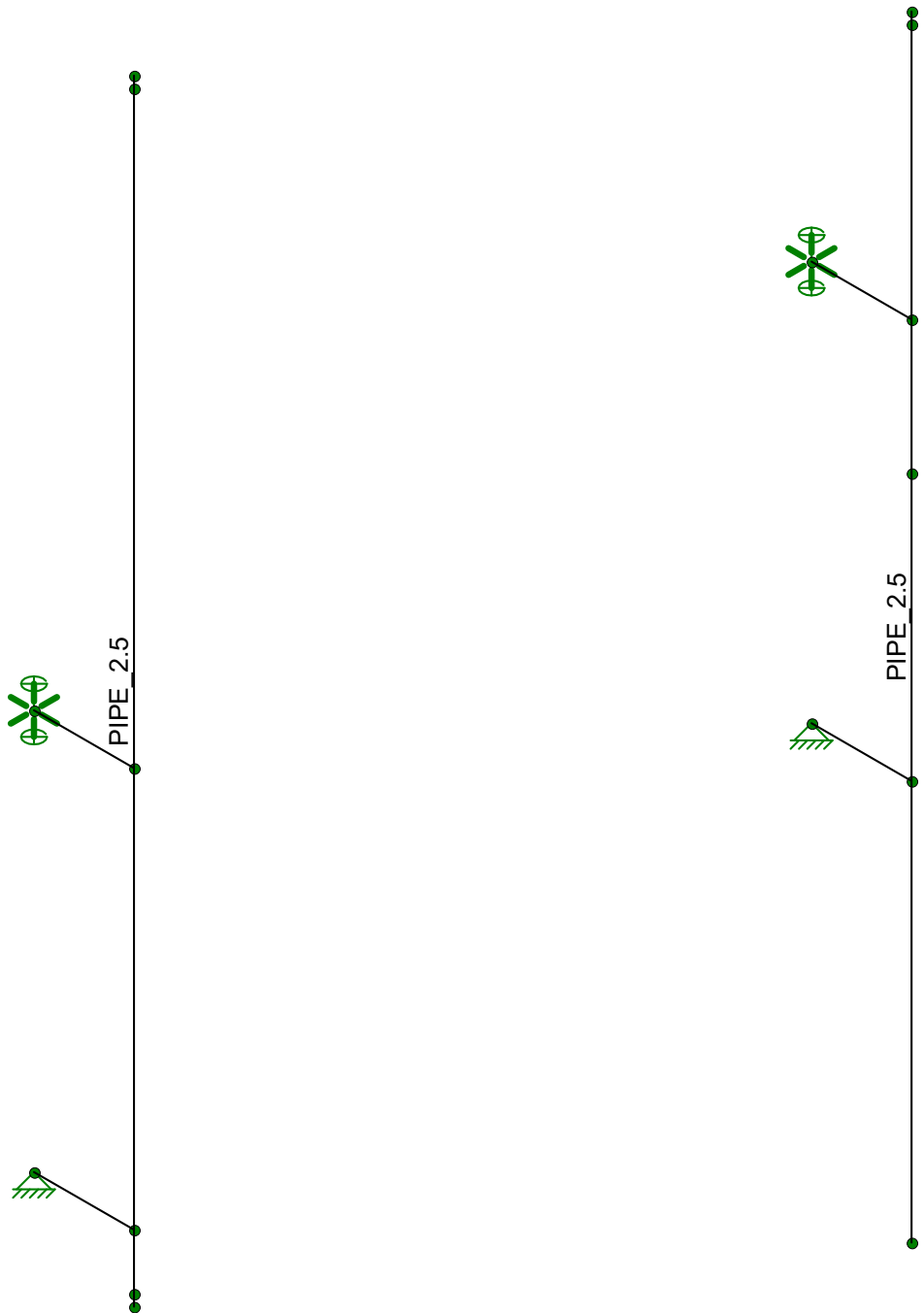
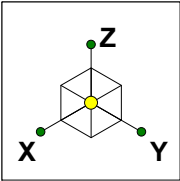
												PLF		
Mount	Height (ft)	Member	*L (in)	**W (in)	D (in)	***A _N (ft2)	Volume Ice (ft3)	Weight Ice (lbs)	****Ca (FRONT)	Kz	q _z (psf)	Ice Wind Load (Front)	Combined Wind Load (Front)	Ice Dead Load
	63.50	4 STD Pipe	0.00	4.50	0.00	-	-	-	-	-	-	-	-	-
	63.50	2.5 STD Pipe	12.00	2.88	0.00	0.40	0.16	8.76	1.20	1.150	4.1	1.7	2.7	9
	63.50	2.0 STD Pipe	0.00	2.38	0.00	-	-	-	-	-	-	-	-	-
	63.50	1/2" SR	0.00	0.50	0.00	-	-	-	-	-	-	-	-	-
	63.50	(L4x4)	0.00	4.00	4.00	-	-	-	-	-	-	-	-	-
	63.50	(L2.5x2.5)	0.00	2.50	2.50	-	-	-	-	-	-	-	-	-
	63.50	Horizontal Plate (PL7x1/2)	0.00	0.50	7.00	-	-	-	-	-	-	-	-	-
	63.50	Tube Radial (4x4)	0.00	4.00	4.00	-	-	-	-	-	-	-	-	-
	63.50	Tube Radial (4.5x4.5)	0.00	4.50	4.50	-	-	-	-	-	-	-	-	-
	63.50	Double Angle	0.00	5.00	2.50	-	-	-	-	-	-	-	-	-
	63.50	Channel (1.25x1.25)	0.00	1.25	1.25	-	-	-	-	-	-	-	-	-
	63.50	Channel (2.75x2)	0.00	2.75	2.00	-	-	-	-	-	-	-	-	-

* The dimension L is the longest dimension of the member

** The dimension W is the height or width of the member that resists wind load

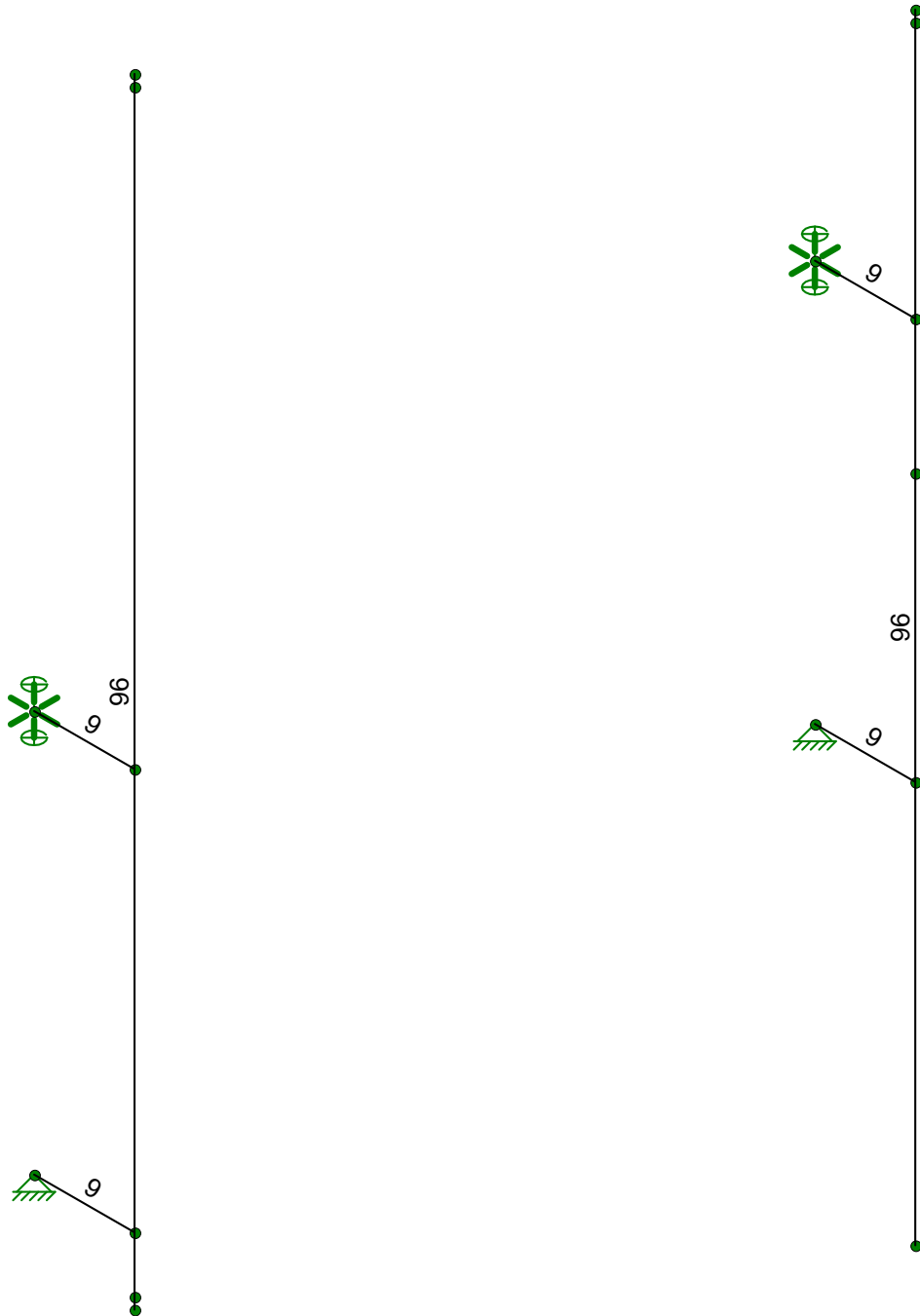
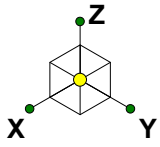
*** A_N is the area of ice built up on the LW plane

**** Ca will equal 1.2 for all ice load calculations



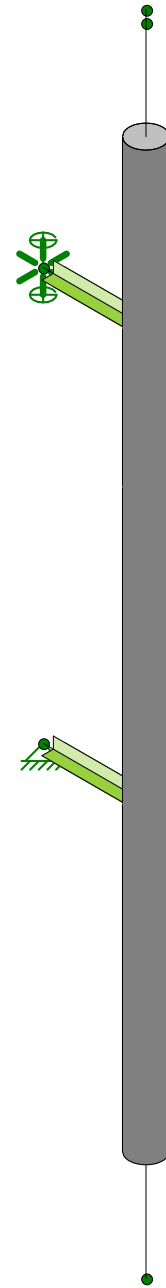
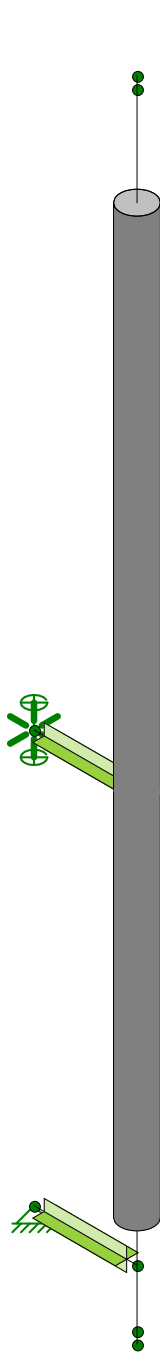
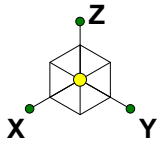
Envelope Only Solution

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049.01014 - 2044017		A5C0335A.r3d



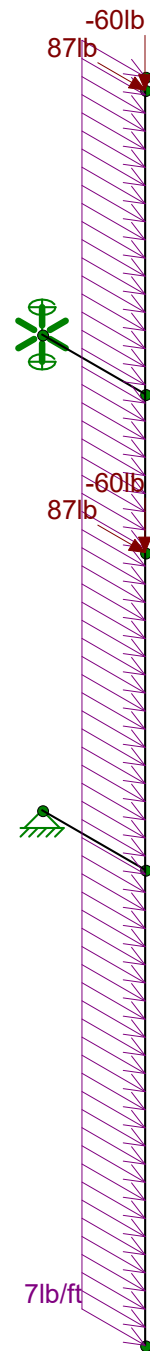
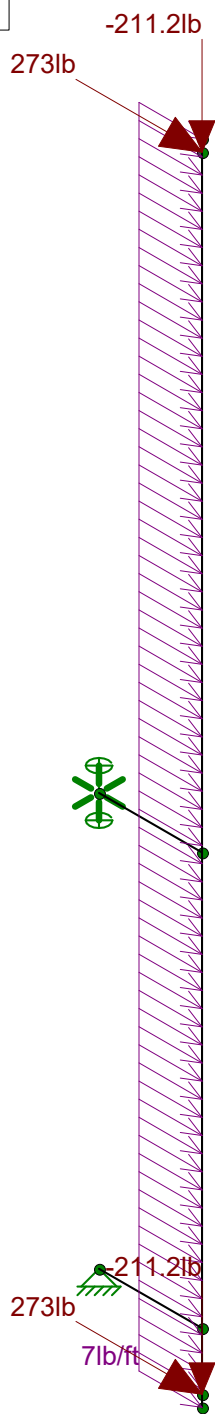
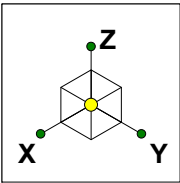
Member Length (in) Displayed
Envelope Only Solution

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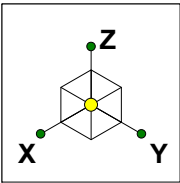
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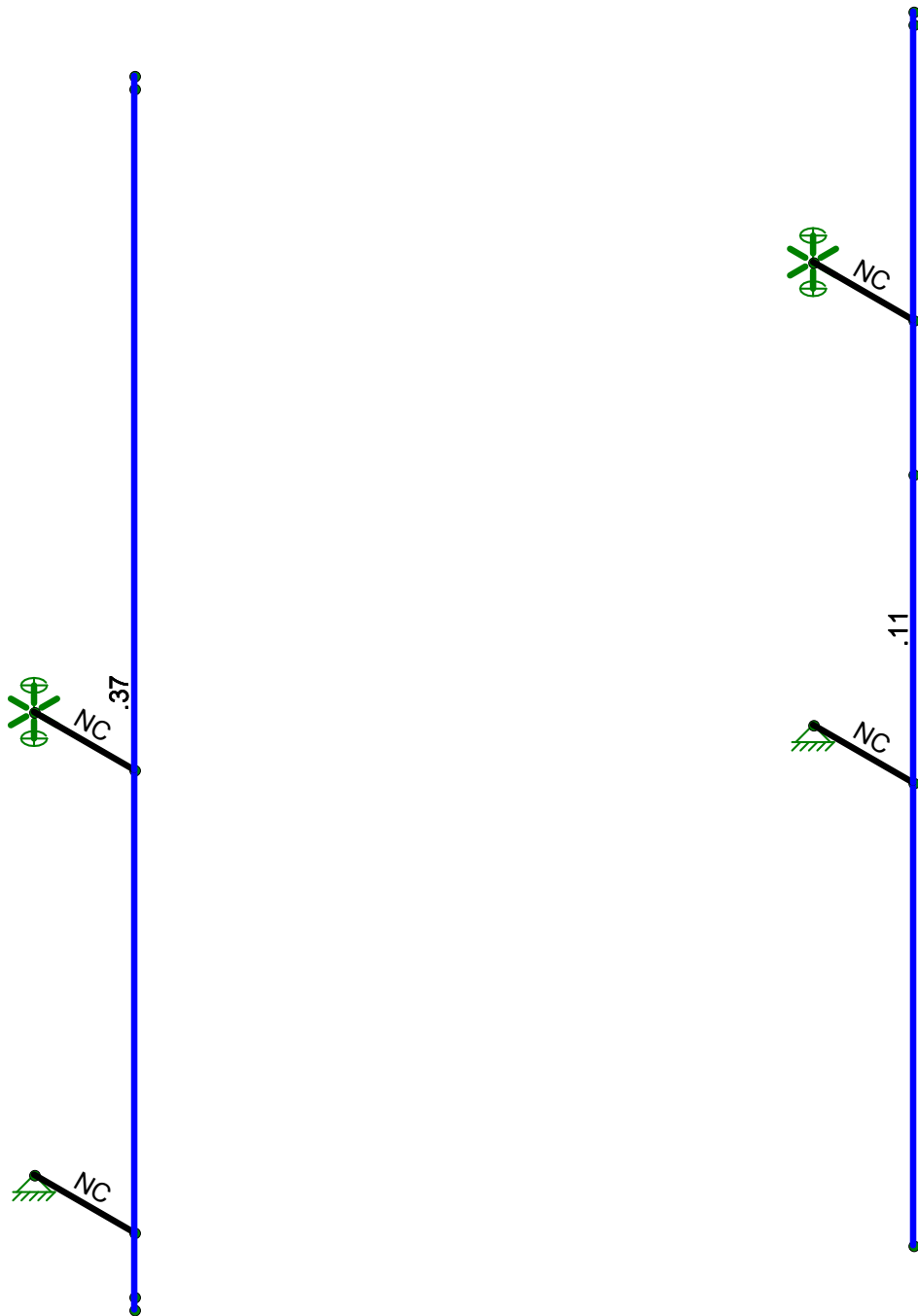


Loads: LC 1, DL + WL (NO ICE) 0 Degree
Envelope Only Solution

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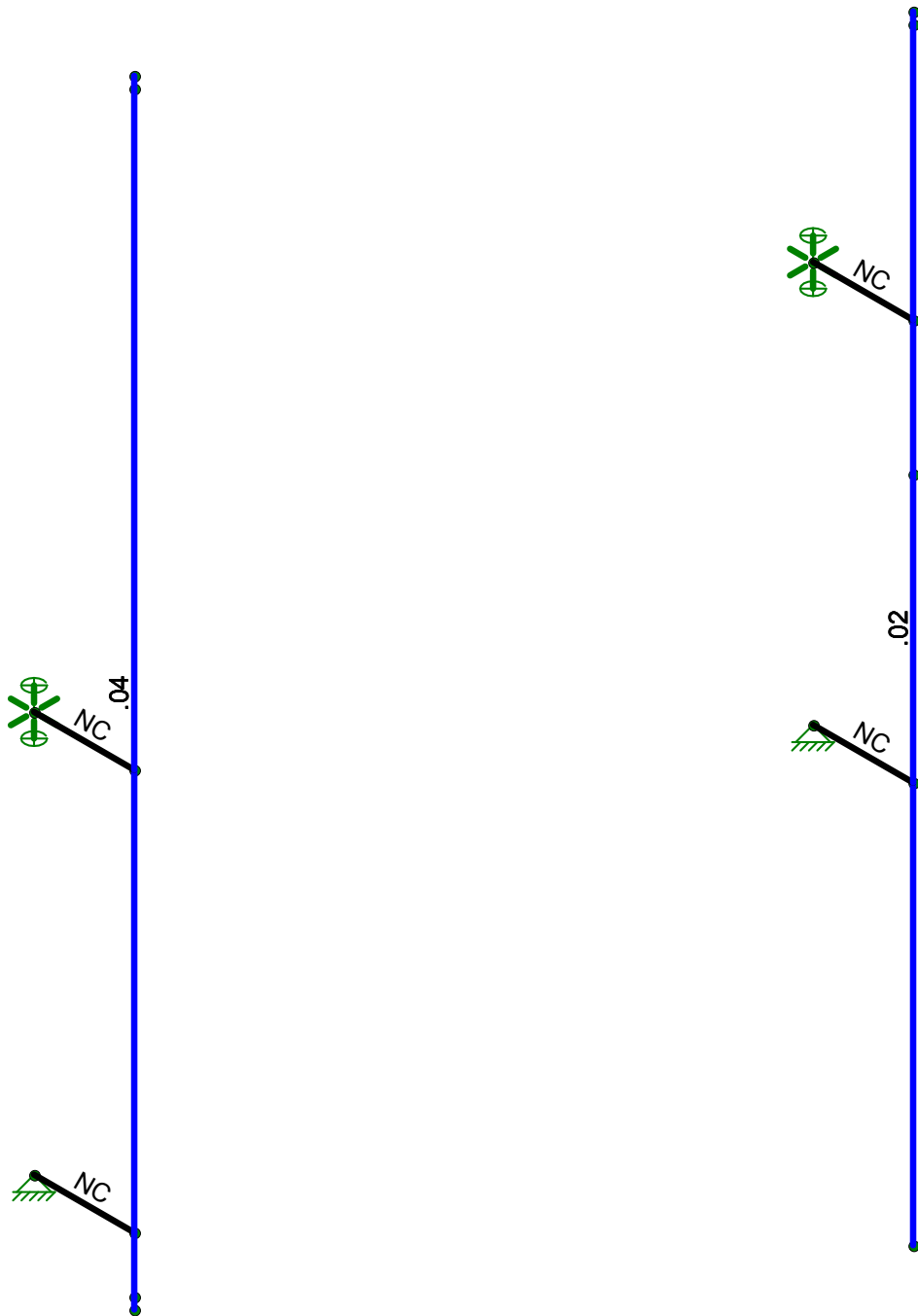
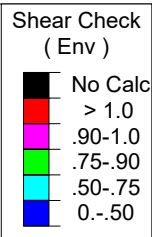
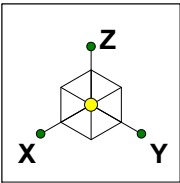


Code Check (Env)	
	No Calc
	> 1.0
	.90-1.0
	.75-.90
	.50-.75
	0-.50



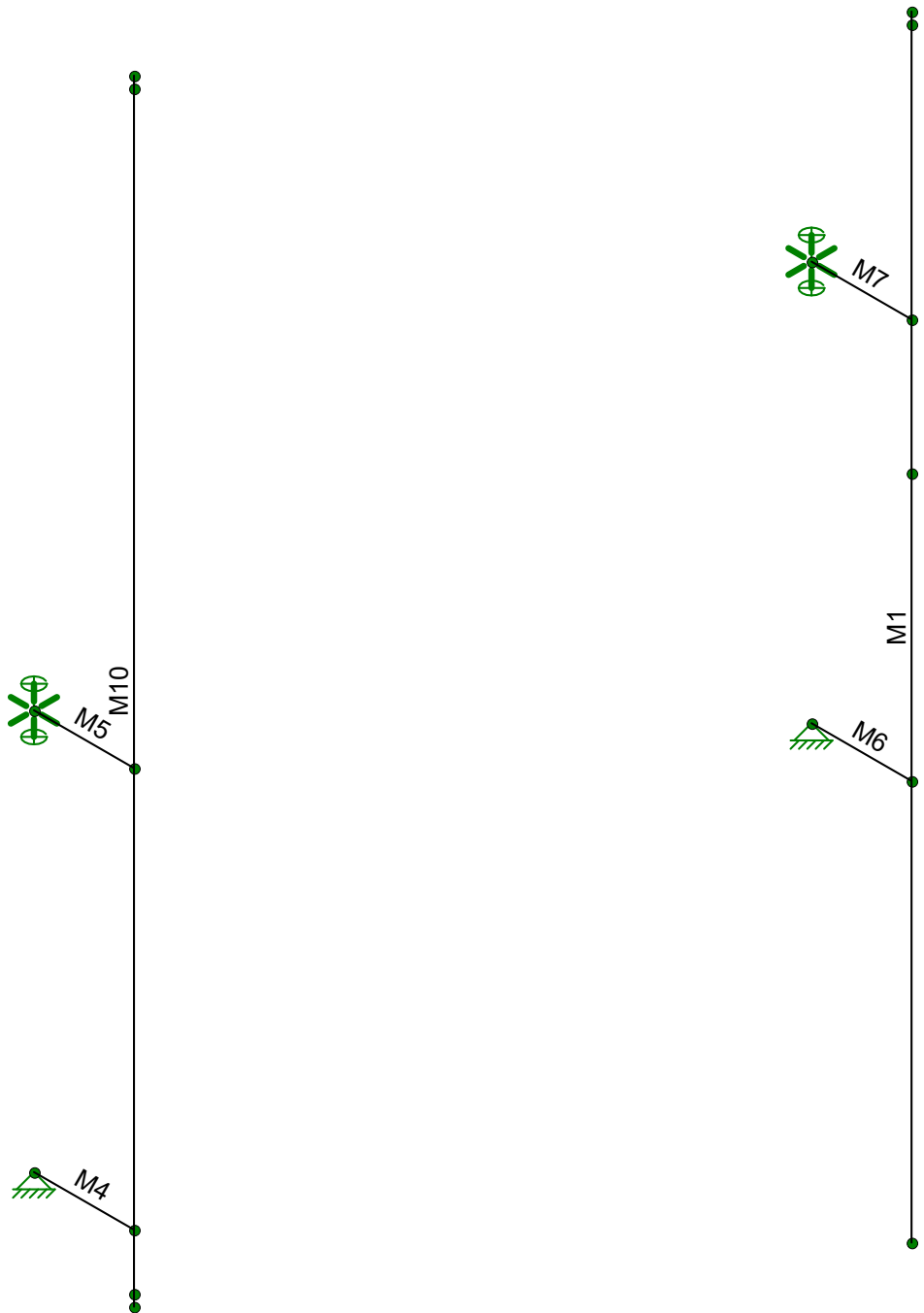
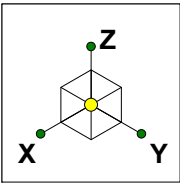
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

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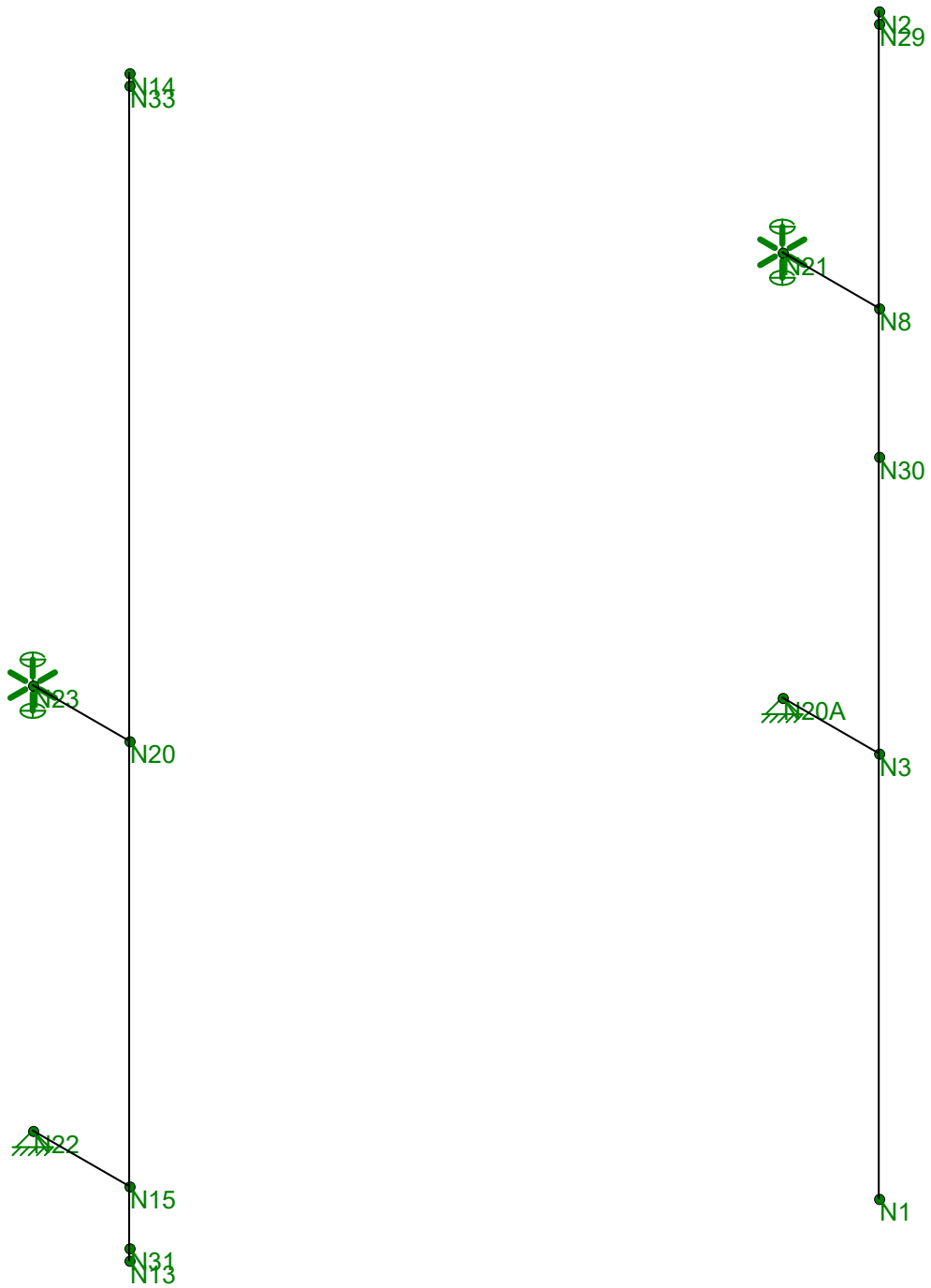
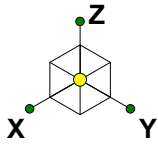
Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

KGI/EFI	A5C0335A	SK - 6
DU		Mar 1, 2021 at 9:10 PM
049.01014 - 2044017		A5C0335A.r3d



Envelope Only Solution

KGI/EFI	A5C0335A	SK - 7
DU		Mar 1, 2021 at 9:11 PM
049.01014 - 2044017		A5C0335A.r3d



Envelope Only Solution

KGI/EFI	A5C0335A	SK - 8
DU		Mar 1, 2021 at 9:11 PM
049.01014 - 2044017		A5C0335A.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	No
Max Iterations for Wall Stiffness	3
Gravity Acceleration (in/sec^2)	386.4
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Z
Global Member Orientation Plane	XY
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISACONNECTION CODE	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI NAS-01: LRFD
Wood Code	AF&PA NDS-05/08: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-05
Masonry Code	ACI 530-05: ASD
Aluminum Code	AA ADM1-05: ASD - Building AISC 14th(360-10): ASD

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parame Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	No
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR SET ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-05
Seismic Base Elevation (in)	Not Entered
Add Base Weight?	Yes
Ct X	.035
Ct Z	.035
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	8.5
R Z	8.5
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	Not Entered
Occupancy Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	4
Cd X	4
Rho Z	1
Rho X	1

Project Grid Lines

Label	Start X [in]	End X [in]	Start Y [in]	End Y [in]	Start Bubble	End Bubble
No Data to Print ...						

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	2.5" STD Pipe	PIPE 2.5	Beam	Wide Flange	A53 Gr.B	Typical	1.61	1.45	1.45	2.89
2	2" STD Pipe	PIPE 2.0	Beam	Wide Flange	A53 Gr.B	Typical	1.02	.627	.627	1.25
3	1.25" STD Pi...	PIPE 1.25	Beam	Wide Flange	A53 Gr.B	Typical	.625	.184	.184	.368
4	1" STD Pipe	PIPE 1.0	Beam	Wide Flange	A53 Gr.B	Typical	.469	.083	.083	.166
5	1" Solid Rod	1.0" SR	Beam	Wide Flange	A36 Gr.36	Typical	.785	.049	.049	.098
6	0.75" Solid ...	0.75" SR	Beam	Wide Flange	A36 Gr.36	Typical	.442	.016	.016	.031
7	1 5/8 Unistrut	1.75x1.75x...	Beam	Wide Flange	A36 Gr.36	Typical	.422	.126	.126	.002

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N2			PIPE 2.5	Beam	Wide Flange	A53 Gr.B	Typical
2	M10	N13	N14			PIPE 2.5	Beam	Wide Flange	A53 Gr.B	Typical
3	M4	N15	N22			RIGID	None	None	LINK	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
4	M5	N20	N23			RIGID	None	None	LINK	Typical
5	M6	N3	N20A			RIGID	None	None	LINK	Typical
6	M7	N8	N21			RIGID	None	None	LINK	Typical

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Analysis ...	Inactive	Seismic Design ...
1	M1						Yes			None
2	M10						Yes			None
3	M4						Yes			None
4	M5						Yes			None
5	M6						Yes			None
6	M7						Yes			None

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	M1	PIPE 2.5	96			Lbyy						Lateral
2	M10	PIPE 2.5	96			Lbyy						Lateral

Joint Coordinates and Temperatures

	Label	X [in]	Y [in]	Z [in]	Temp [F]	Detach From Diap...
1	N1	0	0	-36	0	
2	N2	0	0	60	0	
3	N3	0	0	0	0	
4	N8	0	0	36	0	
5	N13	70	0	-6	0	
6	N14	70	0	90	0	
7	N15	70	0	0	0	
8	N20	70	0	36	0	
9	N29	0	0	59	0	
10	N30	0	0	24	0	
11	N31	70	0	-5	0	
12	N33	70	0	89	0	
13	N20A	0	-9	0	0	
14	N21	0	-9	36	0	
15	N22	70	-9	0	0	
16	N23	70	-9	36	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N22	Reaction	Reaction	Reaction			
2	N20A	Reaction	Reaction	Reaction			
3	N23	Reaction	Reaction	Reaction			Reaction
4	N21	Reaction	Reaction	Reaction			Reaction

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed Area(Me...	Surface(...
1	DEAD LOAD	None			-1	4			
2	DEAD LOAD ICE	None				4		2	
3	WIND LOAD (NO ICE) FRONT	None				4		2	

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed Area(Me...	Surface(...
4	WIND LOAD (NO ICE) SIDE	None				4		2	
5	WIND LOAD (ICE) FRONT	None				4		2	
6	WIND LOAD (ICE) SIDE	None				4		2	
7	LIVE LOAD1	None				1			
8	LIVE LOAD2	None				1			
9	LIVE LOAD3	None							
10	MAINTENANCE LOAD1	None				1			
11	MAINTENANCE LOAD2	None				1			
12	MAINTENANCE LOAD3	None							
13	MAINTENANCE LOAD4	None							

Joint Loads and Enforced Displacements (BLC 1 : DEAD LOAD)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*...
1	N29	L	Z	-50
2	N30	L	Z	-50
3	N31	L	Z	-176
4	N33	L	Z	-176

Joint Loads and Enforced Displacements (BLC 2 : DEAD LOAD ICE)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*...
1	N29	L	Z	-79
2	N30	L	Z	-79
3	N31	L	Z	-319
4	N33	L	Z	-319

Joint Loads and Enforced Displacements (BLC 3 : WIND LOAD (NO ICE) FRONT)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*...
1	N29	L	Y	87
2	N30	L	Y	87
3	N31	L	Y	273
4	N33	L	Y	273

Joint Loads and Enforced Displacements (BLC 4 : WIND LOAD (NO ICE) SIDE)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*...
1	N29	L	X	34
2	N30	L	X	34
3	N31	L	X	179
4	N33	L	X	179

Joint Loads and Enforced Displacements (BLC 5 : WIND LOAD (ICE) FRONT)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*...
1	N29	L	Y	14
2	N30	L	Y	14
3	N31	L	Y	41
4	N33	L	Y	41

Joint Loads and Enforced Displacements (BLC 6 : WIND LOAD (ICE) SIDE)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*...
1	N29	L	X	6
2	N30	L	X	6
3	N31	L	X	31
4	N33	L	X	31

Joint Loads and Enforced Displacements (BLC 7 : LIVE LOAD1)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*...]
1	N1	L	Z	-250

Joint Loads and Enforced Displacements (BLC 8 : LIVE LOAD2)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*...]
1	N13	L	Z	-250

Joint Loads and Enforced Displacements (BLC 10 : MAINTENANCE LOAD1)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*...]
1	N1	L	Z	-500

Joint Loads and Enforced Displacements (BLC 11 : MAINTENANCE LOAD2)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/in, lb*...]
1	N13	L	Z	-500

Member Point Loads

Member Label	Direction	Magnitude[(lb,k-ft)]	Location[in,%]
No Data to Print ...			

Member Distributed Loads (BLC 2 : DEAD LOAD ICE)

	Member Label	Direction	Start Magnitude[(lb/ft,...]	End Magnitude[(lb/ft,...]	Start Location[in,%]	End Location[in,%]
1	M1	Z	-9	-9	0	0
2	M10	Z	-9	-9	0	0

Member Distributed Loads (BLC 3 : WIND LOAD (NO ICE) FRONT)

	Member Label	Direction	Start Magnitude[(lb/ft,...]	End Magnitude[(lb/ft,...]	Start Location[in,%]	End Location[in,%]
1	M1	PY	7	7	0	0
2	M10	PY	7	7	0	0

Member Distributed Loads (BLC 4 : WIND LOAD (NO ICE) SIDE)

	Member Label	Direction	Start Magnitude[(lb/ft,...]	End Magnitude[(lb/ft,...]	Start Location[in,%]	End Location[in,%]
1	M1	PX	7	7	0	0
2	M10	PX	7	7	0	0

Member Distributed Loads (BLC 5 : WIND LOAD (ICE) FRONT)

	Member Label	Direction	Start Magnitude[(lb/ft,...]	End Magnitude[(lb/ft,...]	Start Location[in,%]	End Location[in,%]
1	M1	PY	2.6	2.6	0	0
2	M10	PY	2.6	2.6	0	0

Member Distributed Loads (BLC 6 : WIND LOAD (ICE) SIDE)

	Member Label	Direction	Start Magnitude[(lb/ft,...]	End Magnitude[(lb/ft,...]	Start Location[in,%]	End Location[in,%]
1	M1	PX	2.6	2.6	0	0
2	M10	PX	2.6	2.6	0	0

Member Area Loads

Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
No Data to Print ...						

Envelope Joint Reactions (Continued)

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
9	Totals:	max	538	10	832	7	1587.587	13						
10		min	-538	4	-832	1	647.587	7						

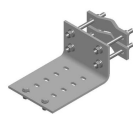
Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...]	LC
1	N1	max	.016	4	-.004	7	0	7	-1.367e-04	7	4.068e-04	10	2.708e-04	10
2		min	-.016	10	-.028	28	-.008	28	-7.695e-04	28	-4.068e-04	4	-2.708e-04	4
3	N2	max	.011	4	.019	1	0	7	7.287e-04	7	5.334e-04	4	0	10
4		min	-.011	10	-.012	7	-.007	28	-1.019e-03	1	-5.334e-04	10	0	4
5	N3	max	.002	4	0	1	0	7	-1.865e-06	7	2.72e-04	10	2.708e-04	10
6		min	-.002	10	0	36	-.007	28	-7.907e-04	28	-2.72e-04	4	-2.708e-04	4
7	N8	max	0	4	0	1	0	7	4.401e-06	7	2.259e-04	4	0	10
8		min	0	10	0	7	-.007	28	-7.557e-04	28	-2.259e-04	10	0	4
9	N13	max	.006	4	.005	7	.008	7	7.5e-04	7	2.01e-03	10	7.267e-04	4
10		min	-.006	10	-.009	1	-.015	1	-1.535e-03	1	-2.01e-03	4	-7.267e-04	10
11	N14	max	.514	4	.531	1	.008	7	1.289e-02	7	1.208e-02	4	0	10
12		min	-.514	10	-.488	7	-.016	1	-1.368e-02	1	-1.208e-02	10	0	4
13	N15	max	.007	10	0	7	.008	7	8.522e-04	7	1.943e-03	10	7.267e-04	4
14		min	-.007	4	0	13	-.015	1	-1.637e-03	1	-1.943e-03	4	-7.267e-04	10
15	N20	max	0	4	0	1	.009	7	9.489e-04	7	4.065e-03	4	0	10
16		min	0	10	0	7	-.016	1	-1.737e-03	1	-4.065e-03	10	0	4
17	N29	max	.01	4	.018	28	0	7	7.287e-04	7	5.334e-04	4	0	10
18		min	-.01	10	-.011	7	-.007	28	-1.019e-03	1	-5.334e-04	10	0	4
19	N30	max	.001	10	0	1	0	7	2.335e-04	28	1.319e-05	22	9.026e-05	10
20		min	-.001	4	-.002	36	-.007	28	-3.104e-05	7	-1.319e-05	16	-9.026e-05	4
21	N31	max	.003	4	.004	7	.008	7	7.5e-04	7	2.01e-03	10	7.267e-04	4
22		min	-.003	10	-.008	1	-.015	1	-1.535e-03	1	-2.01e-03	4	-7.267e-04	10
23	N33	max	.502	4	.518	1	.008	7	1.289e-02	7	1.208e-02	4	0	10
24		min	-.502	10	-.476	7	-.016	1	-1.368e-02	1	-1.208e-02	10	0	4
25	N20A	max	0	4	0	1	0	7	-1.865e-06	7	2.72e-04	10	2.708e-04	10
26		min	0	10	0	36	0	28	-7.907e-04	28	-2.72e-04	4	-2.708e-04	4
27	N21	max	0	4	0	1	0	1	4.401e-06	7	2.259e-04	4	0	10
28		min	0	10	0	7	0	36	-7.557e-04	28	-2.259e-04	10	0	4
29	N22	max	0	10	0	7	0	7	8.522e-04	7	1.943e-03	10	7.267e-04	4
30		min	0	4	0	13	0	1	-1.637e-03	1	-1.943e-03	4	-7.267e-04	10
31	N23	max	0	4	0	1	0	1	9.489e-04	7	4.065e-03	4	0	10
32		min	0	10	0	7	0	7	-1.737e-03	1	-4.065e-03	10	0	4

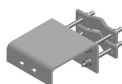
Envelope AISC 14th(360-10): LRFD Steel Code Checks

Member	Shape	Code Check	Loc[i...]	LC	Shear ...	Loc[i...]	Dir LC	phi*Pnc...	phi*Pnt ...	phi*Mn ...	phi*Mn ...	Cb	Eqn
1	M1	PIPE 2.5	.105	36	.016	72	28	30038.4...	50715	3.596	3.596	1...	H1-1b
2	M10	PIPE 2.5	.373	42	.041	42	3	30038.4...	50715	3.596	3.596	1...	H1-1b

WT-HRM-U



Universal Handrail Mount for 2-3/8 in thru 4-1/2 in OD mounting pipe, plain end pipe not included



Product Classification

Product Type Water tower mount

General Specifications

Mounting Handrail | Toe board
Pipe, quantity 0
Sectors, quantity 1

Dimensions

Height 889 mm | 35 in
Width 203.2 mm | 8 in
Length 609.6 mm | 24 in
Stand-off Distance 228.6 mm | 9 in

Material Specifications

Material Type Hot dip galvanized steel

Packaging and Weights

Included Hardware | Mount
Packaging quantity 1
Weight, net 24.902 kg | 54.9 lb

Regulatory Compliance/Certifications

Agency	Classification
CHINA-ROHS	Below maximum concentration value
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system

WT-HRM-U

REACH-SVHC

Compliant as per SVHC revision on www.commscope.com/ProductCompliance

ROHS

Compliant

