MOUNT MODIFICATION LETTER

Market Name:
Project Name:
FA Location:

Site Number:
Site Name:
Site Data:

Latitude:
Longitude: -

is pleased to submit this "Mount Modification Letter" to validate the structural integrity of the proposed modifications to the antenna mounting system on the above-mentioned site. The purpose of this evaluation is to determine if the proposed loading shown in the attached "Loading Summary" will exceed the structural capacity of the modified mounting system.

Based on our evaluation we have determined the **modified** antenna mounting system to be: **SUFFICIENT**

Structure Rating (max from all components) =	

recommends reinforcing the existing mount in accordance with the attached Drawing "Antenna Mount Reinforcement". If the modifications detailed in the attached drawings are not installed as specified, this evaluation should be considered invalid. The modified mounting system will be capable of supporting the existing and proposed equipment, under the assumptions described in Section 4 of the report and the following conditions:

- Contractor shall be responsible for the means and methods of construction.
- Contractor shall inspect the condition of all existing and proposed structural members, all relevant members and connections and report any deficiencies to the engineer prior to installation of any new antennas and other equipment.

The scope of this evaluation pertains only to the modified antenna mounting system and does not include examination of the loads imparted by the antenna mounting system to the existing tower and its structural components. This document was prepared based on information provided to . If existing conditions do not reflect those represented, this analysis is no longer valid.

Sincerely,

Prepared By:
Submitted By:

TABLE OF CONTENTS

1. LOADING SUMMARY

Appurtenance								
Carrier	Position	Sector	Antenna RAD Center (ft)	Mount Centerline (ft)	Qty	Type	Manufacturer	Model
AT&T	1	A B C	136	134	3	Panel	CCI	TPA65R-BU8D
AT&T	3	A B C	136	134	6	Panel	Andrew	JAH4-65C-R4
AT&T	5	A B C	136	134	3	Panel	Nokia	AEQU
AT&T	5	A B C	136	134	3	Panel	Nokia	AEQK
AT&T	1	A B C	-	134	3	RRH	Nokia	Tri RRH 4T4R B12/14/29 370W AHLBBA
AT&T	3	A B C	-	134	3	RRH	Airscale	Dual RRH 4T4R B25/66 320W AHFIB
AT&T	4	A B C	-	134	3	RRH	Airscale	RRH 4T4R B5 160W AHCA
AT&T	4	A B C	-	134	3	RRH	Alcatel-Lucent	RRH4x25-WCS-4R
AT&T	Arm	A	-	134	1	SS Box	Raycap	DC6-48-60-0-8C
AT&T	Arm	B	-	134	1	SS Box	Raycap	DC6-48-60-18-8C
AT&T	Tower	-	-	134	1	SS Box	Raycap	DC6-48-60-18-8F

2. ANALYSIS CRITERIA SUMMARY

ANALYSIS CRITERIA	
STANDARD	TIA-222-H
WIND SPEED	Ultimate of 109 mph
WIND SPEED WITH ICE	40 mph with 1.5" radial ice thickness
EXPOSURE CATEGORY	C
RISK CATEGORY	II
TOPO CATEGORY	Flat
CREST HEIGHT (ft)	N/A

3. REFERENCES

- American Institute of Steel Construction, AISC 15th Edition
- Telecommunications Industry Association Standard, TIA-222-H & International Building Code, IBC 2018
- Assembly Drawings (Model: MT-196) by CommScope, dated 02/25/2005

4. ASSUMPTIONS

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

- The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
- The configuration of antennas, mounts, and other appurtenances are as specified in the Loading Summary and the referenced drawings.
- 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.
- Sector frame center line: located equidistant between top & bottom boom; Platform center line: located at the base perimeter of platform, unless otherwise specified.
- Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM 500 (GR B-46)
Pipe	ASTM A53 (GR B-35)
Connection Bolts	ASTM A325

5. RESULTS SUMMARY

Name	Bending Stress Ratio		Shear Stress Ratio	
Perimeter: Pipe 3.0 Std	39.1%	Pass	19.1%	Pass
Perimeter Corner: PL6x1/2	43.4%	Pass	21.0%	Pass
Arm: HSS4X4X1/4	33.8%	Pass	13.4%	Pass
Cross Arm: HSS4X4X1/4	29.0%	Pass	11.2%	Pass
Cross Arm Cnxn: PL 6x3/8	72.7%	Pass	65.3%	Pass
Grating Support: L2x2x3/16	29.8%	Pass	1.4%	Pass
Support Rail: Pipe 2.0 Std	65.4%	Pass	36.5%	Pass
Support Rail Corner: L6.5x4.5x1/4	0.7%	Pass	15.9%	Pass
Support Rail Corner Connection: PL 6x3/8	6.7%	Pass	11.3%	Pass
Mount Pipe 2" STD: Pipe 2.0 Std	66.5%	Pass	22.3%	Pass
Mount Pipe 3" STD: Pipe 3.0 Std	58.8%	Pass	28.3%	Pass
Kicker: 2L2.5x2.5x3/16	19.0%	Pass	0.2%	Pass
Proposed Support Rail Bracing: Pipe 3.0 Std	2.5%	Pass	17.6%	Pass
	Tension SR		*Shear SR*	
Bolt Checks on M13 in Load Case 9	15.8%	Pass	10.3%	Pass
	Weld SR		*Base Metal SR*	
Weld Checks on M13 in Load Case 9	45.2%	Pass	17.3%	Pass

*Von Mises SR = (Max Von Mises Value From RISA-3D)/(0.9*Fy)

**Capacity rating per TIA-222-H Section 15.5.

APPENDIX 1:
MOUNT MODIFICATION REPORT

Site Name:

Work Order: Verified By:

Title: MOUNT MODIFICATION REPORT Date:

Dead and Live Loads

Grating Dead Load: DL = 10 psf

Maintenance Live Load: L_V = 250 lb

Installation Live Load: L_M = 500 lb

Appurtenance Dead Loads	
Name	Weight (lb)
TPA65R-BU8D	82.5
JAH4-65C-R4	113.9
AEQU	99.2
AEQK	99.2
Tri RRH 4T4R B12/14/29 370W AHLBBA	101.4
Dual RRH 4T4R B25/66 320W AHFIB	88.2
RRH 4T4R B5 160W AHCA	35.3
RRH4x25-WCS-4R	70
DC6-48-60-0-8C	32.8
DC6-48-60-18-8C	32.8

Client:		Computed By:	
Site Name:		Date:	
Work Order:		Verified By:	
Title:	MOUNT MODIFICATION REPORT	Date:	

Appurtenance Wind Loading

			TIA-222-H
Exposure Category =	C		
Risk Category =	II		
Topographic Category =	1		
Basic Wind Speed, V =	109	mph	
Height Above Ground, z =	136	ft	
Crest Height, H =	N/A	ft	
Velocity Pressure Coefficient, K_z =	1.35		
Topographic Factor, K_{zt} =	1.00		
Wind Directionality Factor, K_d =	0.95		
Shielding Factor, K_a =	0.90		
Ground Elevation Factor, K_e =	0.963		
Wind Velocity Pressure, q_z =	37.56	psf	
Gust Effect Factor, G_h =	1.00		

Equations

$K_z = 2.01\ (z / z_g)^{2/\alpha}$ — 2.6.5.2

$K_h = e^{(f \cdot z / H)}$ — 2.6.6.2.1

$K_{zt} = [1 + K_c K_t / K_h]^2$ — 2.6.6.2.1

$K_e = e^{-0.000032 z^{2.5}}$ — 2.6.8

$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$ — 2.6.11.6

$F_A = q_z G_h (EPA)$ — 2.6.11.2

$F_M = q_z G_h C_f D_p$ — 2.6.11.2

Appurtenance Wind Loads

Name	Height (ft)	Width (ft)	Depth (ft)	Normal			Tangential		
				C_a	EPA FT2	F_A (lb)	C_a	EPA FT2	F_A (lb)
TPA65R-BU8D	8.00	1.75	0.65	1.29	16.28	611.55	1.58	7.38	277.23
JAH4-65C-R4	8.00	1.15	0.68	1.40	11.58	434.85	1.56	7.66	287.74
AEQU	2.46	1.48	0.79	1.20	3.92	147.11	1.23	2.15	80.73
AEQK	2.46	1.48	0.79	1.20	3.92	147.11	1.23	2.15	80.73
Tri RRH 4T4R B12/14/29 370W AHLBBA	2.00	1.24	1.06	1.20	2.68	100.75	1.20	2.29	85.87
Dual RRH 4T4R B25/66 320W AHFIB	2.39	1.28	0.78	1.20	3.31	124.52	1.22	2.06	77.56
RRH 4T4R B5 160W AHCA	1.11	0.97	0.54	1.20	1.16	43.47	1.20	0.65	24.36
RRH4x25-WCS-4R	2.63	1.00	0.73	1.21	2.85	106.99	1.25	2.14	80.41
DC6-48-60-0-8C	1.50	0.92	0.92	1.20	1.49	55.78	1.20	1.49	55.78
DC6-48-60-18-8C	1.50	0.92	0.92	1.20	1.49	55.78	1.20	1.49	55.78

Client:		Computed By:	
Site Name:		Date:	. .
Work Order:		Verified By:	
Title:	MOUNT MODIFICATION REPORT	Date:	

Member Wind Loading

Exposure Category =	C		
Risk Category =	II		
Topographic Category =	1		
Basic Wind Speed, V =	109	mph	
Height Above Ground, z =	136	ft	
Crest Height, H =	N/A	ft	
Velocity Pressure Coefficient, K_z =	1.35		
Topographic Factor, K_{zt} =	1.00		
Wind Directionality Factor, K_d =	0.95		
Shielding Factor, K_a =	0.90		
Ground Elevation Factor, K_e =	0.963		
Wind Velocity Pressure, q_z =	37.56	psf	
Gust Effect Factor, G_h =	1.00		

Equations

	TIA-222-H
$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
$K_e = e^{-0.000032 z^{2.5}}$	2.6.8
$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$	2.6.11.6
$F_A = q_z G_h (EPA)$	2.6.11.2
$F_M = q_z G_h C_f D_p$	2.6.11.2

Member Wind Loads

Name	Depth (ft)	Width (ft)	C_f	D_p (ft)	F_M (lb/ft)
Perimeter: Pipe 3.0 Std	0.29		1.2	0.29	13.15
Perimeter Corner: PL6x1/2	0.50	0.04	2	0.50	37.56
Arm: HSS4X4X1/4	0.33	0.33	2	0.33	25.04
Cross Arm: HSS4X4X1/4	0.33	0.33	2	0.33	25.04
Cross Arm Cnxn: PL 6x3/8	0.50	0.03	2	0.50	37.56
Grating Support: L2x2x3/16	0.17	0.17	2	0.17	12.52
Support Rail: Pipe 2.0 Std	0.20		1.2	0.20	8.92
Support Rail Corner: L6.5x4.5x1/4	0.54	0.38	2	0.54	40.69
Support Rail Corner Connection: PL 6x3/8	0.50	0.03	2	0.50	37.56
Mount Pipe 2" STD: Pipe 2.0 Std	0.20		1.2	0.20	8.92
Mount Pipe 3" STD: Pipe 3.0 Std	0.29		1.2	0.29	13.15
Kicker: 2L2.5x2.5x3/16	0.21	0.42	2	0.21	15.65
Proposed Support Rail Bracing: Pipe 3.0 Std	0.29		1.2	0.29	13.15

Client:		Computed By:	
Site Name:		Date:	
Work Order:		Verified By:	
Title:	MOUNT MODIFICATION REPORT	Date:	

Appurtenance Ice Dead Loading

Exposure Category =	C		
Risk Category =	II		
Topographic Category =	1		
Height Above Ground, z =	136	ft	
Crest Height, H =	N/A	ft	
Design Ice Thickness, T_i =	1.50	in	
Importance Factor, I =	1		
Topographic Factor, K_{zt} =	1.00		
Height Escalation Factor, K_{iz} =	1.15		
Factored Ice Thickness, T_{iz} =	1.73	in	
Grating Ice Dead Load, D_{Gice} =	8.06	psf	

Equations

$K_h = e^{(f \cdot z/H)}$

$K_{zt} = [1 + K_c K_t / K_h]^2$

$K_{iz} = (z/33)^{0.10}$

$T_{iz} = T_i I K_{iz}(K_{zt})^{0.35}$

$DL_{ice}=[(H_{ice}*D_{ice}*W_{ice}) - (H*W*D)]*56pcf$

TIA-222-H

2.6.6.2.1

2.6.6.2.1

2.6.10

2.6.10

Appurtenance Ice Dead Loads

Name	Height w/ ice (ft)	Width w/ice (ft)	Depth w/ ice (ft)	V_{ice} (ft^3)	DL_{ice} (lb)
TPA65R-BU8D	8.29	2.04	0.94	6.74	377.70
JAH4-65C-R4	8.29	1.44	0.97	5.29	296.27
AEQU	2.75	1.76	1.08	2.36	132.00
AEQK	2.75	1.76	1.08	2.36	132.00
Tri RRH 4T4R B12/14/29 370W AHLBBA	2.29	1.53	1.35	2.08	116.71
Dual RRH 4T4R B25/66 320W AHFIB	2.68	1.57	1.07	2.11	117.99
RRH 4T4R B5 160W AHCA	1.40	1.25	0.83	0.87	48.91
RRH4x25-WCS-4R	2.91	1.29	1.01	1.90	106.28
DC6-48-60-0-8C	1.79	1.20	1.20	1.33	74.74
DC6-48-60-18-8C	1.79	1.20	1.20	1.33	74.74

Client:		Computed By:	
Site Name:		Date:	
Work Order:		Verified By:	
Title:	MOUNT MODIFICATION REPORT	Date:	

Member Ice Dead Loading

Exposure Category =	C	
Risk Category =	II	
Topographic Category =	1	
Height Above Ground, z =	136	ft
Crest Height, H =	N/A	ft
Design Ice Thickness, T_i =	1.50	in
Importance Factor, I =	1	
Topographic Factor, K_{zt} =	1.00	
Height Escalation Factor, K_{iz} =	1.15	
Factored Ice Thickness, T_{iz} =	1.73	in
Grating Ice Dead Load, D_{Gice} =	8.06	psf

Equations

	TIA-222-H
$K_h = e^{(f \cdot z/H)}$	2.6.6.2.1
$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
$K_{iz} = (z/33)^{0.10}$	2.6.10
$T_{iz} = T_i I K_{iz} (K_{zt})^{0.35}$	2.6.10
Aiz = pi*Tiz*(Dc+Tiz)	2.6.10
DL_{ice}=Aiz*56pcf	

Member Ice Dead Loads

Name	Depth w/ ice (ft)	Width w/ ice (ft)	Dc (ft)	Aiz (ft^2)	DL_{ice} (lb/ft)
Perimeter: Pipe 3.0 Std	0.58		0.29	0.20	11.04
Perimeter Corner: PL6x1/2	0.79	0.33	0.50	0.29	16.36
Arm: HSS4X4X1/4	0.62	0.62	0.47	0.28	15.59
Cross Arm: HSS4X4X1/4	0.62	0.62	0.47	0.28	15.59
Cross Arm Cnxn: PL 6x3/8	0.79	0.32	0.50	0.29	16.34
Grating Support: L2x2x3/16	0.45	0.45	0.24	0.17	9.62
Support Rail: Pipe 2.0 Std	0.49		0.20	0.15	8.66
Support Rail Corner: L6.5x4.5x1/4	0.83	0.66	0.66	0.36	20.34
Support Rail Corner Connection: PL 6x3/8	0.79	0.32	0.50	0.29	16.34
Mount Pipe 2" STD: Pipe 2.0 Std	0.49		0.20	0.15	8.66
Mount Pipe 3" STD: Pipe 3.0 Std	0.58		0.29	0.20	11.04
Kicker: 2L2.5x2.5x3/16	0.50	0.70	0.42	0.25	14.21
Proposed Support Rail Bracing: Pipe 3.0 Std	0.58		0.29	0.20	11.04

Client:		Computed By:	
Site Name:		Date:	
Work Order:		Verified By:	
Title:	MOUNT MODIFICATION REPORT	Date:	

Appurtenance Ice Wind Loading

			Equations	TIA-222-H
Exposure Category =	C		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	II			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Ice Wind Speed, V_{ice} =	40	mph		
Height Above Ground, z =	136	ft	$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
Crest Height, H =	N/A	ft		
Velocity Pressure Coefficient, K_z =	1.35	psf	$K_e = e^{-0.000032 \cdot z s}$	2.6.8
Topographic Factor, K_{zt} =	1.00			
Wind Directionality Factor, K_d =	0.95		$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$	2.6.11.6
Shielding Factor, K_a =	0.90			
Ground Elevation Factory, K_e =	0.963		$F_{A(ice)} = q_{z(ice)} G_h (EPA)_{A(ice)}$	2.6.11.2
Ice Wind Velocity Pressure, $q_{z(ice)}$ =	5.059			
Factored Ice Thickness, T_{iz} =	1.73	in	$F_{M(ice)} = q_{z(ice)} G_h C_f D_{p(ice)}$	2.6.11.2
Gust Effect Factor, G_h =	1			

Appurtenance Ice Wind Loads

Name	Height w/ Ice (ft)	Width w/ Ice (ft)	Depth w/ Ice (ft)	Normal			Tangential		
				C_a	EPA FT2	F_A (lb)	C_a	EPA FT2	F_A (lb)
TPA65R-BU8D	8.29	2.04	0.94	-	17.91	90.60	-	8.79	44.45
JAH4-65C-R4	8.29	1.44	0.97	-	13.03	65.90	-	9.08	45.93
AEQU	2.75	1.76	1.08	-	4.68	23.69	-	2.75	13.90
AEQK	2.75	1.76	1.08	-	4.68	23.69	-	2.75	13.90
Tri RRH 4T4R B12/14/29 370W AHLBBA	2.29	1.53	1.35	-	3.32	16.81	-	2.89	14.64
Dual RRH 4T4R B25/66 320W AHFIB	2.68	1.57	1.07	-	4.03	20.41	-	2.65	13.42
RRH 4T4R B5 160W AHCA	1.40	1.25	0.83	-	1.59	8.02	-	1.00	5.06
RRH4x25-WCS-4R	2.91	1.29	1.01	-	3.55	17.93	-	2.75	13.92
DC6-48-60-0-8C	1.79	1.20	1.20	-	1.98	10.00	-	1.98	10.00
DC6-48-60-18-8C	1.79	1.20	1.20	-	1.98	10.00	-	1.98	10.00

Client:		Computed By:	
Site Name:		Date:	
Work Order:		Verified By:	
Title:	MOUNT MODIFICATION REPORT	Date:	

Member Ice Wind Loading

				TIA-222-H
Exposure Category =	C		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	II			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Ice Wind Speed, V_{ice} =	40	mph		
Height Above Ground, z =	136	ft	$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
Crest Height, H =	N/A	ft		
Velocity Pressure Coefficient, K_z =	1.35	psf	$K_e = e^{-0.000032 \cdot z s}$	2.6.8
Topographic Factor, K_{zt} =	1.00			
Wind Directionality Factor, K_d =	0.95		$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$	2.6.11.6
Shielding Factor, K_a =	0.90			
Ground Elevation Factory, K_e =	0.963		$F_{A(ice)} = q_{z(ice)} G_h (EPA)_{A(ice)}$	2.6.11.2
Ice Wind Velocity Pressure, $q_{z(ice)}$ =	5.059			
Factored Ice Thickness, T_{iz} =	1.73	in	$F_{M(ice)} = q_{z(ice)} G_h C_f D_{p(ice)}$	2.6.11.2
Gust Effect Factor, G_h =	1			

Member Ice Wind Loads

Name	Depth w/ Ice (ft)	Width w/ Ice (ft)	C_f	$D_{p(ice)}$ (ft)	$F_{M(ice)}$ (lb/ft)
Perimeter: Pipe 3.0 Std	0.58		1.2	0.58	3.52
Perimeter Corner: PL6x1/2	0.79	0.33	2	0.79	7.97
Arm: HSS4X4X1/4	0.62	0.62	2	0.62	6.29
Cross Arm: HSS4X4X1/4	0.62	0.62	2	0.62	6.29
Cross Arm Cnxn: PL 6x3/8	0.79	0.32	2	0.79	7.97
Grating Support: L2x2x3/16	0.45	0.45	2	0.45	4.60
Support Rail: Pipe 2.0 Std	0.49		1.2	0.49	2.95
Support Rail Corner: L6.5x4.5x1/4	0.83	0.66	2	0.83	8.39
Support Rail Corner Connection: PL 6x3/8	0.79	0.32	2	0.79	7.97
Mount Pipe 2" STD: Pipe 2.0 Std	0.49		1.2	0.49	2.95
Mount Pipe 3" STD: Pipe 3.0 Std	0.58		1.2	0.58	3.52
Kicker: 2L2.5x2.5x3/16	0.50	0.70	2	0.50	5.02
Proposed Support Rail Bracing: Pipe 3.0 Std	0.58		1.2	0.58	3.52

Client:		Computed By:	
Site Name:		Date:	
Work Order:		Verified By:	
Title:	MOUNT MODIFICATION REPORT	Date:	

Rectangular Weld Analysis for Antenna Mount to Tower Connection

The forces acting on the plate are from M13 from RISA-3D Load Combination 9

Design Method: LRFD

Applied Loads:

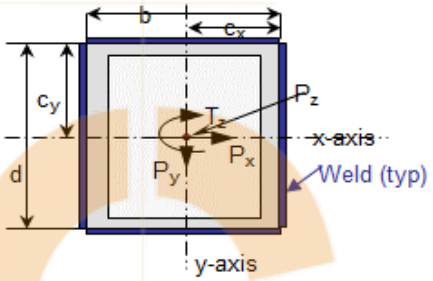
P_x =	1.757	kip	M_x =	1.647	kip-in
P_y =	1.429	kip	M_y =	34.441	kip-in
P_z =	1.057	kip	M_z =	12.211	kip-in
ϕF_w =	1.392	$(^{kip}/_{in})/(^{1}/_{16}$" weld)	AISC Eq. (8-2a)		

Base Metal Properties:

$d_{(arm)}$ =	4	in	$t_{(arm)}$ =	0.233	in
$b_{(arm)}$ =	4	in	$t_{(plate)}$ =	0.75	in
$F_{y(arm)}$ =	46	ksi	$F_{y(plate)}$ =	36	ksi
$F_{u(arm)}$ =	58	ksi	$F_{u(plate)}$ =	58	ksi

CALCULATIONS

Distance from y-axis to Edge of Weld, c_x =	2	in
Distance from x-axis to Edge of Weld, c_y =	2	in
Total Length of Weld in x-direction, L_x =	8	in
Total Length of Weld in y-direction, L_y =	8	in
Total Length of Weld, L_w =	16	in
Section Modulus of Weld About x-axis, S_x =	21.333	in^2
Section Modulus of Weld About y-axis, S_y =	21.333	in^2
Polar Moment of Inertia About z-axis, I_z =	85.333	in^3
Shear Stress on x-axis of Weld, f_{vx} =	0.22	kip/in
Shear Stress on y-axis of Weld, f_{vy} =	0.179	kip/in
Torsional Stress on x-axis of Weld, f_{tx} =	0.286	kip/in
Torsional Stress on y-axis of Weld, f_{ty} =	0.286	kip/in
Axial Stress on Weld, f_a =	0.066	kip/in
Bending Stress about x-axis of Weld, f_{bx} =	0.077	kip/in
Bending Stress about y-axis of Weld, f_{by} =	1.614	kip/in
Total Force Acting in x-direction, f_1 =	0.506	kip/in
Total Force Acting in y-direction, f_2 =	0.465	kip/in
Total Force Acting in z-direction, f_3 =	1.757	kip/in
Resultant Force on Weld, f_r =	1.887	kip/in



Weld Strength Check

Existing Weld Size, t_w =	0.1875	in
Weld Stress Ratio, SR_w =	45.19%	

Base Metal Check

Arm Tensile Rupture Strength, ϕT_{arm} =	162.17	kip
Arm Shear Rupture Strength, ϕV_{arm} =	38.58	kip
Plate Tensile Rupture Strength, ϕT_{plate} =	522	kip
Plate Shear Rupture Strength, ϕV_{plate} =	97.2	kip
Base Metal Stress Ratio, SR_b =	17.33%	

P_x = Major axis load (x-axis) P_y = Minor axis load (y-axis) P_z = Axial Load (z-axis) F_{EXX} = 70 ksi Assumed

M_x = Moment about x-axis M_y = Moment about y-axis T_z = Torque about z-axis

$c_x = b/2$	$L_y = 2d$	$f_{vy} = P_y/L_y$	$f_{by} = M_y/S_y$	$S_y = b/3(3d + b)$	$f_1 = f_{vx} + f_{tx}$	$f_r = (f_1^2 + f_2^2 + f_3^2)^{1/2}$
$c_y = d/2$	$L_w = L_x + L_y$	$f_a = P_z/L_w$	$f_{tx} = T_z(c_y/I_z)$	$S_x = d/3(3b + d)$	$f_2 = f_{vy} + f_{ty}$	$\phi T = 0.75(F_u t L_w)$
$L_x = 2b$	$f_{vx} = P_x/L_x$	$f_{bx} = M_x/S_x$	$f_{ty} = T_z(c_x/I_z)$	$I_z = [(b + d)^3]/6$	$f_3 = f_a + f_{bx} + f_{by}$	$\phi V = 0.75(0.6F_y t L_x)$
	$SR_T = f_3 L_w/\phi T_{plate}$			$SR_w = f_r/(\phi F_w t_w 16)$		$SR_V = f_2 L_x/\phi V_{plate}$

Client:		Computed By:	
Site Name:		Date:	
Work Order:		Verified By:	
Title:	MOUNT MODIFICATION REPORT	Date:	

Bolt Analysis of Antenna Mount Arm to Tower Connection

The forces acting on the plate are from M13 from RISA-3D Load Combination 9

Design Method: LRFD

Applied Loads:

P_x =	1.757	kip
P_y =	1.429	kip
P_z =	1.057	kip
M_x =	1.647	kip-in
M_y =	34.441	kip-in
M_z =	12.211	kip-in

Bolt Properties:

d_b =	0.625	in
A_b =	0.307	in^2
N_b =	4	

Load Location Coordinates:

X_o =	4	in
Y_o =	4	in

Bolt Strength: A325 AISC Table (J3.2)

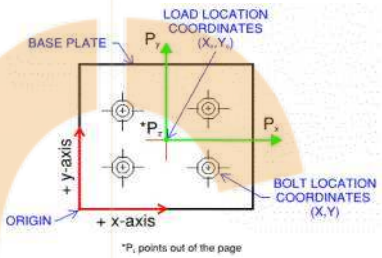
F_{nt} =	90	ksi
F_{nv} =	54	ksi

Bolt Location Coordinates (in):

Bolt #	X_b	Y_b
#1	1	1
#2	1	7
#3	7	7
#4	7	1

CALCULATIONS

Bolt Group Centroid y-coordinate, Y_c =	4	in
Bolt Group Centroid x-coordinate, X_c =	4	in
Load Eccentricity in x-direction, e_x =	0	in
Load Eccentricity in y-direction, e_y =	0	in
Total Moment Including Load Eccentricity, ΣM_x =	1.65	kip-in
Total Moment Including Load Eccentricity, ΣM_y =	34.44	kip-in
Total Moment Including Load Eccentricity, ΣM_z =	12.21	kip-in



Bolt #	Centroid Dist. (in)		Polar Moments of Inertia (in^4/in^2)			Force per Bolt (kip)	
	d_x	d_y	I_x	I_y	I_{xy}	Tension	Shear
#1	-3	-3	9	9	9	2.997	0.96
#2	-3	3	9	9	-9	3.272	0.167
#3	3	3	9	9	9	2.468	0.869
#4	3	-3	9	9	-9	2.743	1.284
	SUM:		36	36	0		

Bolt Shear Strength Check

Available Shear Strength per Bolt, ϕV_n =	12.43	kip	AISC Eq. (J3-1)
Bolt Shear Stress Ratio, SR_V =	10.33%		

Bolt Tensile Strength Check

Nom. Tensile Stress (Including Effects of Shear), F'_{nt} =	90	ksi	AISC Eq. (J3-3a)
Available Tensile Strength per Bolt, ϕT_n =	20.72	kip	AISC Eq. (J3-2)
Bolt Tension Stress Ratio, SR_T =	15.79%		

P_x = Major Axis Load (X-Axis) | M_x = Moment About X-Axis | d_b = Diameter of Bolt

P_y = Minor Axis Load (Y-Axis) | M_y = Moment About Y-Axis | A_b = Cross-Sectional Area of Bolt

P_z = Axial Load (Z-Axis) | M_z = Torque About Z-Axis | N_b = Number of Bolts

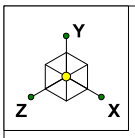
$d_x = Y_b - Y_c$ | $I_{xy} = d_x d_y$ | $SR_V = V_u/\phi V_n$ | $F'_{nt} = 1.3F_{nt} - (F_{nt}/\phi F_{nv})(V_u/A_b) \le F_{nt}$

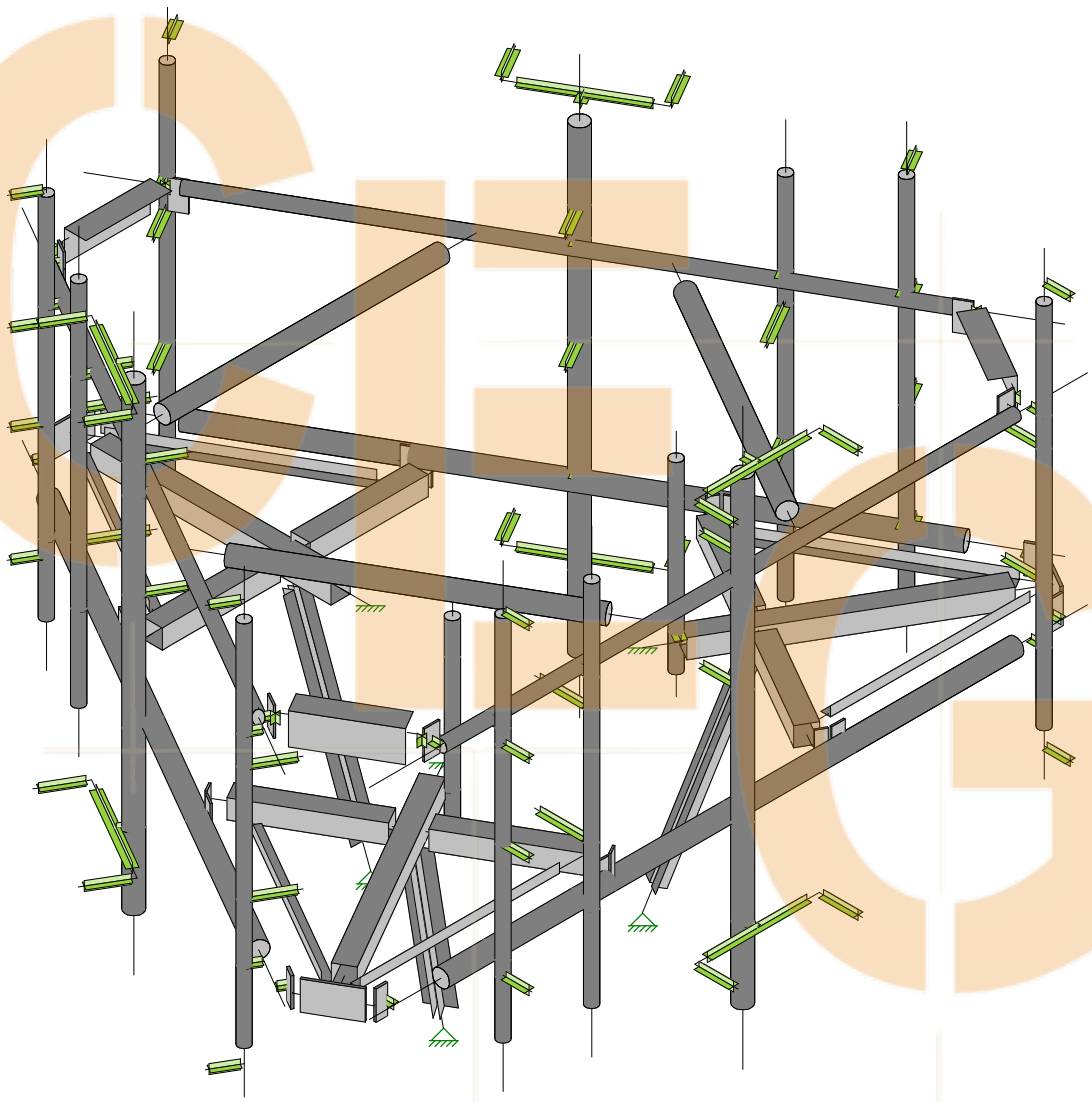
$d_y = X_b - X_c$ | $\Sigma M_x = M_x + P_z(e_y)$ | $SR_T = T_u/\phi T_n$ | $T_{ui} = \Sigma P_z/N_b - [(\Sigma M_x \Sigma I_y + \Sigma M_y \Sigma I_{xy})/(\Sigma I_x \Sigma I_y - \Sigma I_{xy}^2)]d_x + [(\Sigma M_y \Sigma I_x + \Sigma M_x \Sigma I_{xy})/(\Sigma I_x \Sigma I_y - \Sigma I_{xy}^2)]d_y$

$I_x = d_y^2$ | $\Sigma M_y = M_y + P_z(e_x)$ | $\phi V_n = 0.75F_{nv}A_b$

$I_y = d_x^2$ | $\Sigma M_z = M_z + P_x(e_y) + P_y(e_x)$ | $\phi T_n = 0.75F'_{nt}A_b$ | $V_{ui} = [(\Sigma P_x/N_b - \Sigma M_z d_y/(\Sigma I_x + \Sigma I_y))^2 + (\Sigma P_y/N_b - \Sigma M_z d_x/(\Sigma I_x + \Sigma I_y))^2]^{1/2}$

APPENDIX 2:
RISA PRINTOUTS





Envelope Only Solution

		SK - 1
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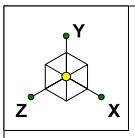

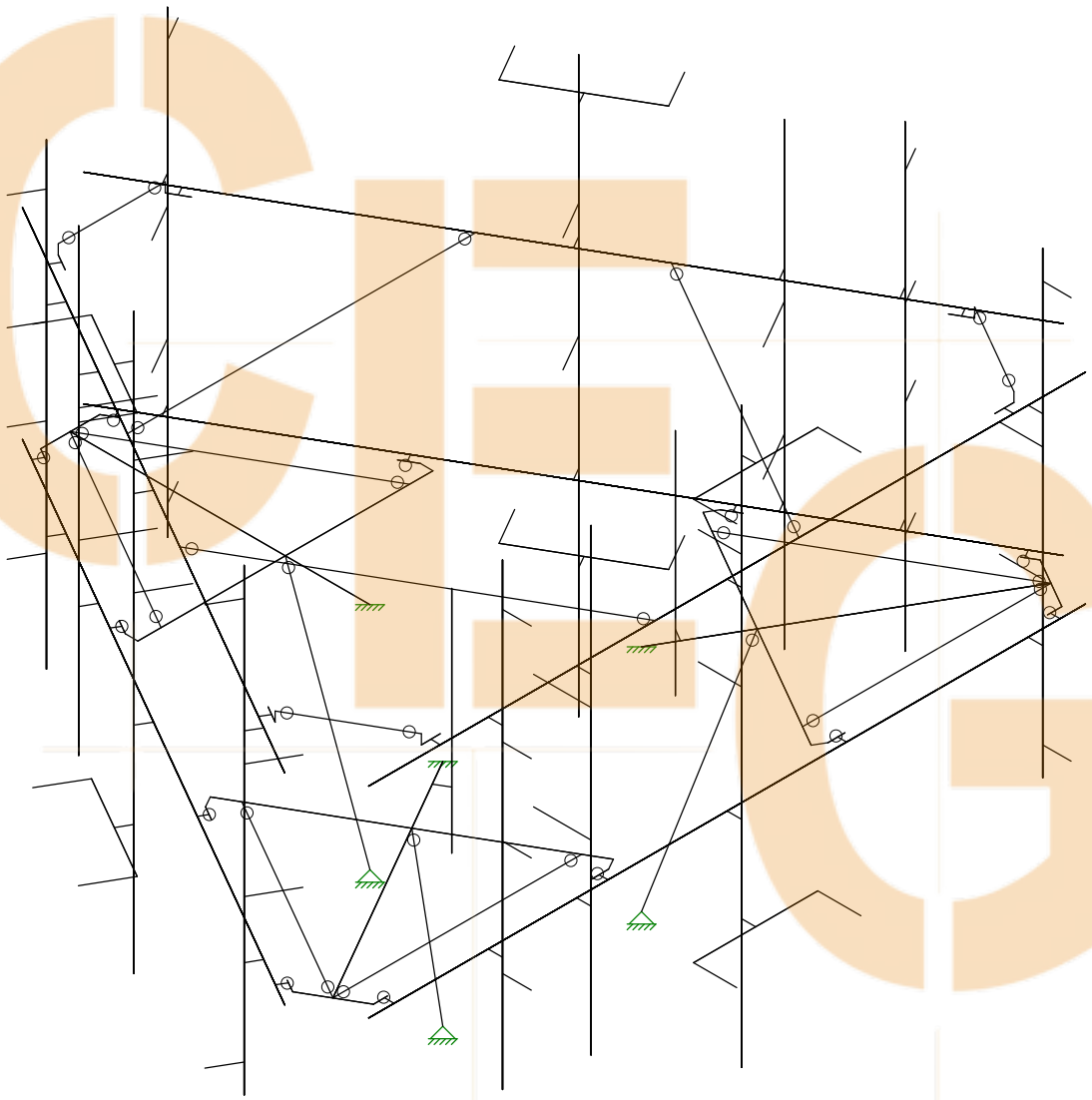

Envelope Only Solution

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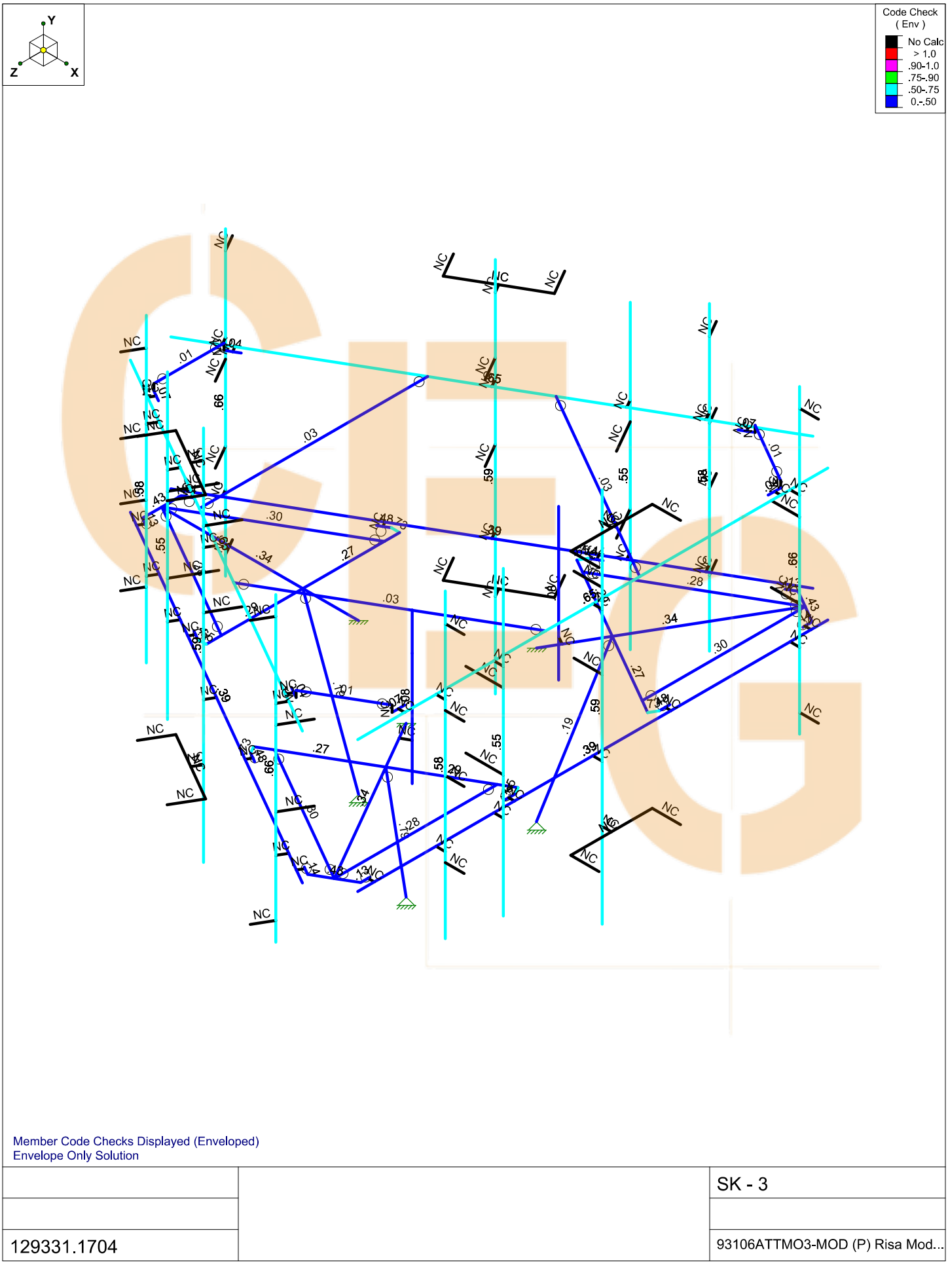

Member Code Checks Displayed (Enveloped)
Envelope Only Solution

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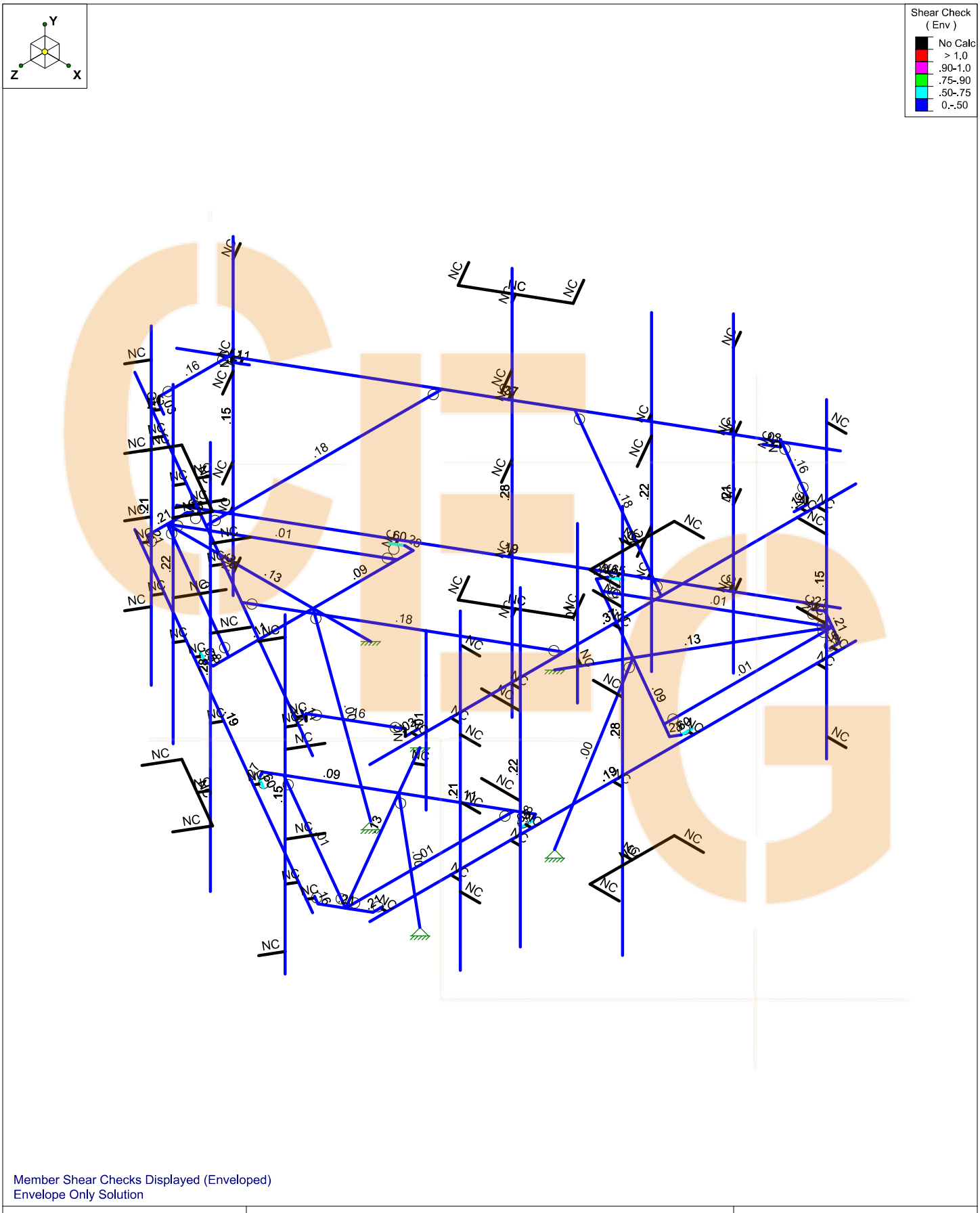

Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

		SK - 4
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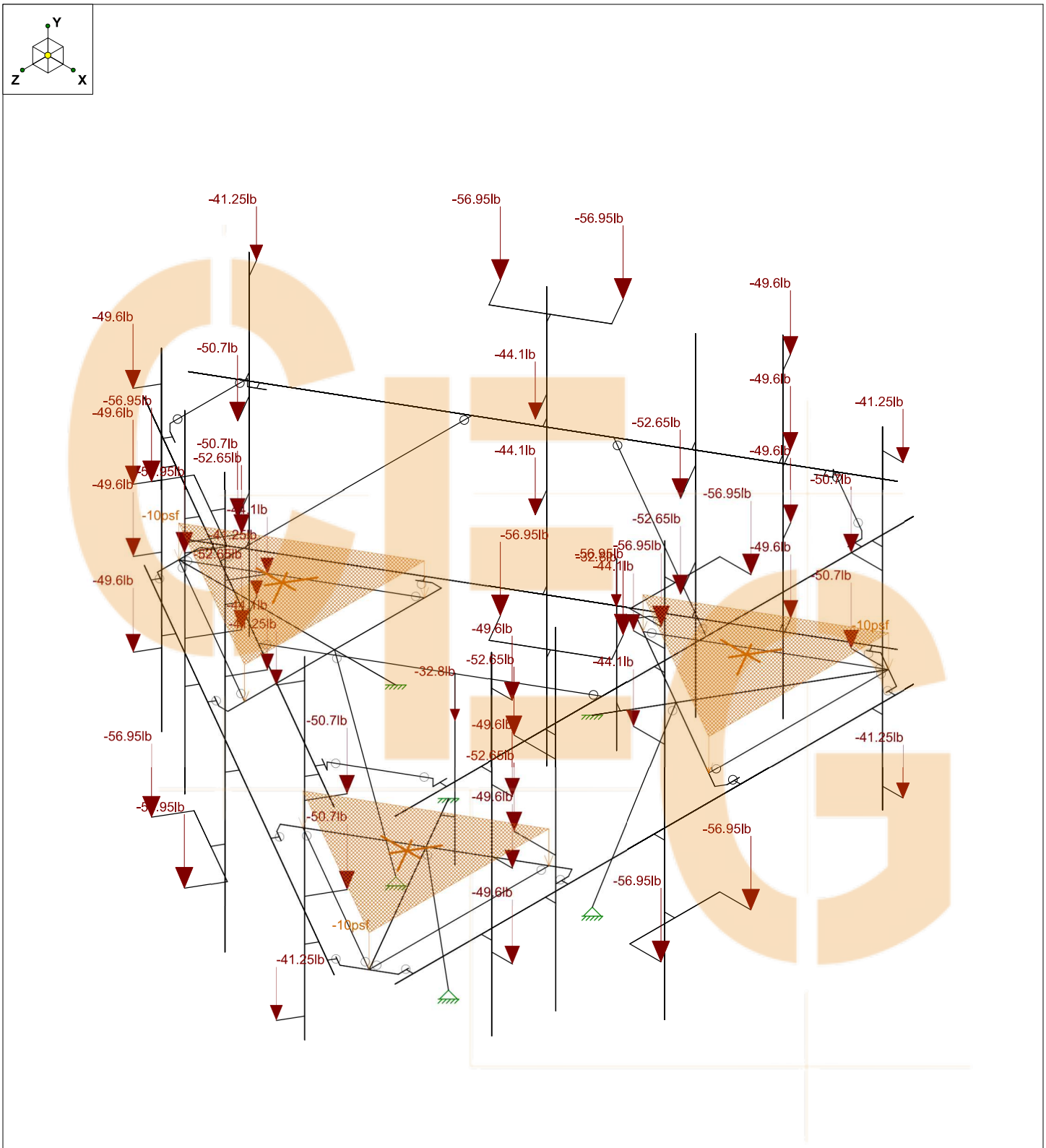


Loads: BLC 1, DL
Envelope Only Solution

		SK - 5
129331.1704		93106ATTMO3-MOD (P) Risa Mod...

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	24
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

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

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	No
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	None
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/...	Density[...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A36 Gr.36 (Reduced)	29000	11154	.3	.65	.49	30.6	1.5	49.3	1.2
3	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3
4	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2

General Material Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E5 F)	Density[k/ft^3]
1	RIGID	1e+6		.3	0	0

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Perimeter	PIPE_3.0	Beam	None	A53 Gr.B	Typical	2.07	2.85	2.85	5.69
2	Perimeter Corner	PL6x1/2	Beam	None	A36 Gr.36	Typical	3	.063	9	.237
3	Arm	HSS4X4X4	Beam	None	A500 Gr.B ...	Typical	3.37	7.8	7.8	12.8
4	Cross Arm	HSS4X4X4	Beam	None	A500 Gr.B ...	Typical	3.37	7.8	7.8	12.8
5	Cross Arm Cnxn	PL 6x3/8	Beam	None	A36 Gr.36	Typical	2.25	.026	6.75	.101
6	Grating Support	L2x2x3	Beam	None	A36 Gr.36	Typical	.722	.271	.271	.009
7	Support Rail	PIPE_2.0	Beam	None	A53 Gr.B	Typical	1.02	.627	.627	1.25
8	Support Rail Corner	L6.5x4.5x4	Beam	None	A36 Gr.36 (...	Typical	2.688	4.86	12.001	.054
9	Support Rail Corner Conn...	PL 6x3/8	Beam	None	A36 Gr.36	Typical	2.25	.026	6.75	.101
10	Mount Pipe 2" STD	PIPE_2.0	Column	None	A53 Gr.B	Typical	1.02	.627	.627	1.25
11	Mount Pipe 3" STD	PIPE_3.0	Column	None	A53 Gr.B	Typical	2.07	2.85	2.85	5.69
12	Kicker	LL2.5x2.5x3x3	VBrace	None	A36 Gr.36	Typical	1.8	2.46	1.07	.023
13	Proposed Support Rail Br...	PIPE_3.0	Beam	None	A53 Gr.B	Typical	2.07	2.85	2.85	5.69

General Section Sets

	Label	Shape	Type	Material	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	RIGID		None	RIGID	1e+6	1e+6	1e+6	1e+6

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N24	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N47	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N293	Reaction	Reaction	Reaction			
5	N294	Reaction	Reaction	Reaction			
6	N295	Reaction	Reaction	Reaction			
7	N296						

Joint Boundary Conditions (Continued)

	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]
8	N297						
9	N298						
10	N299						
11	N300						
12	N301						
13	N302						
14	N303						
15	N304						
16	N305						

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
1	M1	N70	N71			Perimeter	Beam	None	A53 Gr.B	Typical
2	M2	N72	N73			Perimeter	Beam	None	A53 Gr.B	Typical
3	M3	N74	N75			Perimeter	Beam	None	A53 Gr.B	Typical
4	M4	N10	N5			Perimeter Corner	Beam	None	A36 Gr.36	Typical
5	M5	N14	N10			Perimeter Corner	Beam	None	A36 Gr.36	Typical
6	M6	N14	N15			Perimeter Corner	Beam	None	A36 Gr.36	Typical
7	M7	N33	N28			Perimeter Corner	Beam	None	A36 Gr.36	Typical
8	M8	N37	N33			Perimeter Corner	Beam	None	A36 Gr.36	Typical
9	M9	N37	N38			Perimeter Corner	Beam	None	A36 Gr.36	Typical
10	M10	N56	N51			Perimeter Corner	Beam	None	A36 Gr.36	Typical
11	M11	N60	N56			Perimeter Corner	Beam	None	A36 Gr.36	Typical
12	M12	N60	N61			Perimeter Corner	Beam	None	A36 Gr.36	Typical
13	M13	N3	N1			Arm	Beam	None	A500 Gr....	Typical
14	M14	N26	N24			Arm	Beam	None	A500 Gr....	Typical
15	M15	N49	N47			Arm	Beam	None	A500 Gr....	Typical
16	M16	N20	N11			Cross Arm	Beam	None	A500 Gr....	Typical
17	M17	N20	N21			Cross Arm	Beam	None	A500 Gr....	Typical
18	M18	N43	N34			Cross Arm	Beam	None	A500 Gr....	Typical
19	M19	N43	N44			Cross Arm	Beam	None	A500 Gr....	Typical
20	M20	N66	N57			Cross Arm	Beam	None	A500 Gr....	Typical
21	M21	N66	N67			Cross Arm	Beam	None	A500 Gr....	Typical
22	M22	N11	N6			Cross Arm Cnxn	Beam	None	A36 Gr.36	Typical
23	M23	N6	N7			Cross Arm Cnxn	Beam	None	A36 Gr.36	Typical
24	M24	N21	N16			Cross Arm Cnxn	Beam	None	A36 Gr.36	Typical
25	M25	N16	N17			Cross Arm Cnxn	Beam	None	A36 Gr.36	Typical
26	M26	N34	N29			Cross Arm Cnxn	Beam	None	A36 Gr.36	Typical
27	M27	N29	N30			Cross Arm Cnxn	Beam	None	A36 Gr.36	Typical
28	M28	N44	N39			Cross Arm Cnxn	Beam	None	A36 Gr.36	Typical
29	M29	N39	N40			Cross Arm Cnxn	Beam	None	A36 Gr.36	Typical
30	M30	N57	N52			Cross Arm Cnxn	Beam	None	A36 Gr.36	Typical
31	M31	N52	N53			Cross Arm Cnxn	Beam	None	A36 Gr.36	Typical
32	M32	N67	N62			Cross Arm Cnxn	Beam	None	A36 Gr.36	Typical
33	M33	N62	N63			Cross Arm Cnxn	Beam	None	A36 Gr.36	Typical
34	M34	N2	N3			Grating Support	Beam	None	A36 Gr.36	Typical
35	M35	N3	N4			Grating Support	Beam	None	A36 Gr.36	Typical
36	M36	N27	N26			Grating Support	Beam	None	A36 Gr.36	Typical
37	M37	N26	N25			Grating Support	Beam	None	A36 Gr.36	Typical
38	M38	N50	N49			Grating Support	Beam	None	A36 Gr.36	Typical
39	M39	N49	N48			Grating Support	Beam	None	A36 Gr.36	Typical
40	M40	N79	N76			Support Rail	Beam	None	A53 Gr.B	Typical
41	M41	N77	N78			Support Rail	Beam	None	A53 Gr.B	Typical
42	M42	N81	N82			Support Rail	Beam	None	A53 Gr.B	Typical
43	M43	N151	N152		180	Support Rail Corner	Beam	None	A36 Gr.3...	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
44	M44	N161	N162		180	Support Rail Corner	Beam	None	A36 Gr.3...	Typical
45	M45	N171	N172		180	Support Rail Corner	Beam	None	A36 Gr.3...	Typical
46	M46	N145	N146			Support Rail Corner Conne...	Beam	None	A36 Gr.36	Typical
47	M47	N149	N150			Support Rail Corner Conne...	Beam	None	A36 Gr.36	Typical
48	M48	N155	N156			Support Rail Corner Conne...	Beam	None	A36 Gr.36	Typical
49	M49	N159	N160			Support Rail Corner Conne...	Beam	None	A36 Gr.36	Typical
50	M50	N165	N166			Support Rail Corner Conne...	Beam	None	A36 Gr.36	Typical
51	M51	N169	N170			Support Rail Corner Conne...	Beam	None	A36 Gr.36	Typical
52	M52	N85	N86			Mount Pipe 2" STD	Column	None	A53 Gr.B	Typical
53	M53	N105	N106			Mount Pipe 2" STD	Column	None	A53 Gr.B	Typical
54	M54	N111	N112			Mount Pipe 2" STD	Column	None	A53 Gr.B	Typical
55	M55	N175	N176			Mount Pipe 2" STD	Column	None	A53 Gr.B	Typical
56	M56	N195	N196			Mount Pipe 2" STD	Column	None	A53 Gr.B	Typical
57	M57	N201	N202			Mount Pipe 2" STD	Column	None	A53 Gr.B	Typical
58	M58	N235	N236			Mount Pipe 2" STD	Column	None	A53 Gr.B	Typical
59	M59	N255	N256			Mount Pipe 2" STD	Column	None	A53 Gr.B	Typical
60	M60	N261	N262			Mount Pipe 2" STD	Column	None	A53 Gr.B	Typical
61	M61	N95	N96			Mount Pipe 3" STD	Column	None	A53 Gr.B	Typical
62	M62	N185	N186			Mount Pipe 3" STD	Column	None	A53 Gr.B	Typical
63	M63	N245	N246			Mount Pipe 3" STD	Column	None	A53 Gr.B	Typical
64	M64	N43	N294			Kicker	VBrace	None	A36 Gr.36	Typical
65	M65	N20	N293			Kicker	VBrace	None	A36 Gr.36	Typical
66	M66	N66	N295			Kicker	VBrace	None	A36 Gr.36	Typical
67	M67	N8	N9			RIGID	None	None	RIGID	Typical
68	M68	N12	N13			RIGID	None	None	RIGID	Typical
69	M69	N18	N19			RIGID	None	None	RIGID	Typical
70	M70	N22	N23			RIGID	None	None	RIGID	Typical
71	M71	N31	N32			RIGID	None	None	RIGID	Typical
72	M72	N35	N36			RIGID	None	None	RIGID	Typical
73	M73	N41	N42			RIGID	None	None	RIGID	Typical
74	M74	N45	N46			RIGID	None	None	RIGID	Typical
75	M75	N54	N55			RIGID	None	None	RIGID	Typical
76	M76	N58	N59			RIGID	None	None	RIGID	Typical
77	M77	N64	N65			RIGID	None	None	RIGID	Typical
78	M78	N68	N69			RIGID	None	None	RIGID	Typical
79	M79	N88	N84			RIGID	None	None	RIGID	Typical
80	M80	N87	N83			RIGID	None	None	RIGID	Typical
81	M81	N89	N91			RIGID	None	None	RIGID	Typical
82	M82	N90	N92			RIGID	None	None	RIGID	Typical
83	M83	N98	N94			RIGID	None	None	RIGID	Typical
84	M84	N97	N93			RIGID	None	None	RIGID	Typical
85	M85	N99	N101			RIGID	None	None	RIGID	Typical
86	M86	N100	N102			RIGID	None	None	RIGID	Typical
87	M87	N108	N104			RIGID	None	None	RIGID	Typical
88	M88	N107	N103			RIGID	None	None	RIGID	Typical
89	M89	N114	N110			RIGID	None	None	RIGID	Typical
90	M90	N113	N109			RIGID	None	None	RIGID	Typical
91	M91	N115	N116			RIGID	None	None	RIGID	Typical
92	M92	N117	N119			RIGID	None	None	RIGID	Typical
93	M93	N118	N120			RIGID	None	None	RIGID	Typical
94	M94	N119	N123			RIGID	None	None	RIGID	Typical
95	M95	N117	N121			RIGID	None	None	RIGID	Typical
96	M96	N120	N124			RIGID	None	None	RIGID	Typical
97	M97	N118	N122			RIGID	None	None	RIGID	Typical
98	M98	N127	N125			RIGID	None	None	RIGID	Typical
99	M99	N128	N126			RIGID	None	None	RIGID	Typical
100	M100	N131	N129			RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
101	M101	N132	N130			RIGID	None	None	RIGID	Typical
102	M102	N135	N133			RIGID	None	None	RIGID	Typical
103	M103	N136	N134			RIGID	None	None	RIGID	Typical
104	M104	N137	N138			RIGID	None	None	RIGID	Typical
105	M105	N139	N140			RIGID	None	None	RIGID	Typical
106	M106	N141	N142			RIGID	None	None	RIGID	Typical
107	M107	N144	N143			RIGID	None	None	RIGID	Typical
108	M108	N148	N147			RIGID	None	None	RIGID	Typical
109	M109	N149	N152			RIGID	None	None	RIGID	Typical
110	M110	N146	N151			RIGID	None	None	RIGID	Typical
111	M111	N154	N153			RIGID	None	None	RIGID	Typical
112	M112	N158	N157			RIGID	None	None	RIGID	Typical
113	M113	N159	N162			RIGID	None	None	RIGID	Typical
114	M114	N156	N161			RIGID	None	None	RIGID	Typical
115	M115	N164	N163			RIGID	None	None	RIGID	Typical
116	M116	N168	N167			RIGID	None	None	RIGID	Typical
117	M117	N169	N172			RIGID	None	None	RIGID	Typical
118	M118	N166	N171			RIGID	None	None	RIGID	Typical
119	M119	N178	N174			RIGID	None	None	RIGID	Typical
120	M120	N177	N173			RIGID	None	None	RIGID	Typical
121	M121	N179	N181			RIGID	None	None	RIGID	Typical
122	M122	N180	N182			RIGID	None	None	RIGID	Typical
123	M123	N188	N184			RIGID	None	None	RIGID	Typical
124	M124	N187	N183			RIGID	None	None	RIGID	Typical
125	M125	N189	N191			RIGID	None	None	RIGID	Typical
126	M126	N190	N192			RIGID	None	None	RIGID	Typical
127	M127	N198	N194			RIGID	None	None	RIGID	Typical
128	M128	N197	N193			RIGID	None	None	RIGID	Typical
129	M129	N204	N200			RIGID	None	None	RIGID	Typical
130	M130	N203	N199			RIGID	None	None	RIGID	Typical
131	M131	N205	N206			RIGID	None	None	RIGID	Typical
132	M132	N207	N209			RIGID	None	None	RIGID	Typical
133	M133	N208	N210			RIGID	None	None	RIGID	Typical
134	M134	N209	N213			RIGID	None	None	RIGID	Typical
135	M135	N207	N211			RIGID	None	None	RIGID	Typical
136	M136	N210	N214			RIGID	None	None	RIGID	Typical
137	M137	N208	N212			RIGID	None	None	RIGID	Typical
138	M138	N217	N215			RIGID	None	None	RIGID	Typical
139	M139	N218	N216			RIGID	None	None	RIGID	Typical
140	M140	N221	N219			RIGID	None	None	RIGID	Typical
141	M141	N222	N220			RIGID	None	None	RIGID	Typical
142	M142	N225	N223			RIGID	None	None	RIGID	Typical
143	M143	N226	N224			RIGID	None	None	RIGID	Typical
144	M144	N227	N228			RIGID	None	None	RIGID	Typical
145	M145	N229	N230			RIGID	None	None	RIGID	Typical
146	M146	N231	N232			RIGID	None	None	RIGID	Typical
147	M147	N238	N234			RIGID	None	None	RIGID	Typical
148	M148	N237	N233			RIGID	None	None	RIGID	Typical
149	M149	N239	N241			RIGID	None	None	RIGID	Typical
150	M150	N240	N242			RIGID	None	None	RIGID	Typical
151	M151	N248	N244			RIGID	None	None	RIGID	Typical
152	M152	N247	N243			RIGID	None	None	RIGID	Typical
153	M153	N249	N251			RIGID	None	None	RIGID	Typical
154	M154	N250	N252			RIGID	None	None	RIGID	Typical
155	M155	N258	N254			RIGID	None	None	RIGID	Typical
156	M156	N257	N253			RIGID	None	None	RIGID	Typical
157	M157	N264	N260			RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
158	M158	N263	N259			RIGID	None	None	RIGID	Typical
159	M159	N265	N266			RIGID	None	None	RIGID	Typical
160	M160	N267	N269			RIGID	None	None	RIGID	Typical
161	M161	N268	N270			RIGID	None	None	RIGID	Typical
162	M162	N269	N273			RIGID	None	None	RIGID	Typical
163	M163	N267	N271			RIGID	None	None	RIGID	Typical
164	M164	N270	N274			RIGID	None	None	RIGID	Typical
165	M165	N268	N272			RIGID	None	None	RIGID	Typical
166	M166	N277	N275			RIGID	None	None	RIGID	Typical
167	M167	N278	N276			RIGID	None	None	RIGID	Typical
168	M168	N281	N279			RIGID	None	None	RIGID	Typical
169	M169	N282	N280			RIGID	None	None	RIGID	Typical
170	M170	N285	N283			RIGID	None	None	RIGID	Typical
171	M171	N286	N284			RIGID	None	None	RIGID	Typical
172	M172	N287	N288			RIGID	None	None	RIGID	Typical
173	M173	N289	N290			RIGID	None	None	RIGID	Typical
174	M174	N291	N292			RIGID	None	None	RIGID	Typical
175	M175	N298	N299			Mount Pipe 2" STD	Column	None	A53 Gr.B	Typical
176	M176	N297	N296			RIGID	None	None	RIGID	Typical
177	M177	N303	N304			Mount Pipe 2" STD	Column	None	A53 Gr.B	Typical
178	M178	N302	N301			RIGID	None	None	RIGID	Typical
179	M179	N306	N309			Proposed Support Rail Bra...	Beam	None	A53 Gr.B	Typical
180	M180	N308	N311			Proposed Support Rail Bra...	Beam	None	A53 Gr.B	Typical
181	M181	N310	N307			Proposed Support Rail Bra...	Beam	None	A53 Gr.B	Typical

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rati...	Analysis ...	Inactive	Seismic...
1	M1						Yes				None
2	M2						Yes				None
3	M3						Yes				None
4	M4						Yes				None
5	M5						Yes				None
6	M6						Yes				None
7	M7						Yes				None
8	M8						Yes				None
9	M9						Yes				None
10	M10						Yes				None
11	M11						Yes				None
12	M12						Yes				None
13	M13						Yes				None
14	M14						Yes	Default			None
15	M15						Yes				None
16	M16						Yes				None
17	M17						Yes				None
18	M18						Yes				None
19	M19						Yes				None
20	M20						Yes				None
21	M21						Yes				None
22	M22						Yes				None
23	M23						Yes				None
24	M24						Yes				None
25	M25						Yes				None
26	M26						Yes				None
27	M27						Yes				None
28	M28						Yes				None

Member Advanced Data (Continued)

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rati...	Analysis ...	Inactive	Seismic...
29	M29						Yes				None
30	M30						Yes				None
31	M31						Yes				None
32	M32						Yes				None
33	M33						Yes				None
34	M34	BenPIN	BenPIN				Yes				None
35	M35	BenPIN	BenPIN				Yes				None
36	M36	BenPIN	BenPIN				Yes				None
37	M37	BenPIN	BenPIN				Yes				None
38	M38	BenPIN	BenPIN				Yes				None
39	M39	BenPIN	BenPIN				Yes				None
40	M40						Yes				None
41	M41						Yes	Default			None
42	M42						Yes				None
43	M43	BenPIN	BenPIN				Yes	Default			None
44	M44	BenPIN	BenPIN				Yes	Default			None
45	M45	BenPIN	BenPIN				Yes	Default			None
46	M46						Yes				None
47	M47						Yes				None
48	M48						Yes				None
49	M49						Yes				None
50	M50						Yes				None
51	M51						Yes				None
52	M52						Yes	** NA **			None
53	M53						Yes	** NA **			None
54	M54						Yes	** NA **			None
55	M55						Yes	** NA **			None
56	M56						Yes	** NA **			None
57	M57						Yes	** NA **			None
58	M58						Yes	** NA **			None
59	M59						Yes	** NA **			None
60	M60						Yes	** NA **			None
61	M61						Yes	** NA **			None
62	M62						Yes	** NA **			None
63	M63						Yes	** NA **			None
64	M64	BenPIN					Yes	** NA **			None
65	M65	BenPIN					Yes	** NA **			None
66	M66	BenPIN					Yes	** NA **			None
67	M67		BenPIN				Yes	** NA **			None
68	M68		BenPIN				Yes	** NA **			None
69	M69		BenPIN				Yes	** NA **			None
70	M70		BenPIN				Yes	** NA **			None
71	M71		BenPIN				Yes	** NA **			None
72	M72		BenPIN				Yes	** NA **			None
73	M73		BenPIN				Yes	** NA **			None
74	M74		BenPIN				Yes	** NA **			None
75	M75		BenPIN				Yes	** NA **			None
76	M76		BenPIN				Yes	** NA **			None
77	M77		BenPIN				Yes	** NA **			None
78	M78		BenPIN				Yes	** NA **			None
79	M79						Yes	** NA **			None
80	M80						Yes	** NA **			None
81	M81						Yes	** NA **			None
82	M82						Yes	** NA **			None
83	M83						Yes	** NA **			None
84	M84						Yes	** NA **			None
85	M85						Yes	** NA **			None

Member Advanced Data (Continued)

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rati...	Analysis ...	Inactive	Seismic...
86	M86						Yes	** NA **			None
87	M87						Yes	** NA **			None
88	M88						Yes	** NA **			None
89	M89						Yes	** NA **			None
90	M90						Yes	** NA **			None
91	M91						Yes	** NA **			None
92	M92						Yes	** NA **			None
93	M93						Yes	** NA **			None
94	M94						Yes	** NA **			None
95	M95						Yes	** NA **			None
96	M96						Yes	** NA **			None
97	M97						Yes	** NA **			None
98	M98						Yes	** NA **			None
99	M99						Yes	** NA **			None
100	M100						Yes	** NA **			None
101	M101						Yes	** NA **			None
102	M102						Yes	** NA **			None
103	M103						Yes	** NA **			None
104	M104						Yes	** NA **			None
105	M105						Yes	** NA **			None
106	M106						Yes	** NA **			None
107	M107						Yes	** NA **			None
108	M108						Yes	** NA **			None
109	M109						Yes	** NA **			None
110	M110						Yes	** NA **			None
111	M111						Yes	** NA **			None
112	M112						Yes	** NA **			None
113	M113						Yes	** NA **			None
114	M114						Yes	** NA **			None
115	M115						Yes	** NA **			None
116	M116						Yes	** NA **			None
117	M117						Yes	** NA **			None
118	M118						Yes	** NA **			None
119	M119						Yes	** NA **			None
120	M120						Yes	** NA **			None
121	M121						Yes	** NA **			None
122	M122						Yes	** NA **			None
123	M123						Yes	** NA **			None
124	M124						Yes	** NA **			None
125	M125						Yes	** NA **			None
126	M126						Yes	** NA **			None
127	M127						Yes	** NA **			None
128	M128						Yes	** NA **			None
129	M129						Yes	** NA **			None
130	M130						Yes	** NA **			None
131	M131						Yes	** NA **			None
132	M132						Yes	** NA **			None
133	M133						Yes	** NA **			None
134	M134						Yes	** NA **			None
135	M135						Yes	** NA **			None
136	M136						Yes	** NA **			None
137	M137						Yes	** NA **			None
138	M138						Yes	** NA **			None
139	M139						Yes	** NA **			None
140	M140						Yes	** NA **			None
141	M141						Yes	** NA **			None
142	M142						Yes	** NA **			None

Member Advanced Data (Continued)

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rati...	Analysis ...	Inactive	Seismic...
143	M143						Yes	** NA **			None
144	M144						Yes	** NA **			None
145	M145						Yes	** NA **			None
146	M146						Yes	** NA **			None
147	M147						Yes	** NA **			None
148	M148						Yes	** NA **			None
149	M149						Yes	** NA **			None
150	M150						Yes	** NA **			None
151	M151						Yes	** NA **			None
152	M152						Yes	** NA **			None
153	M153						Yes	** NA **			None
154	M154						Yes	** NA **			None
155	M155						Yes	** NA **			None
156	M156						Yes	** NA **			None
157	M157						Yes	** NA **			None
158	M158						Yes	** NA **			None
159	M159						Yes	** NA **			None
160	M160						Yes	** NA **			None
161	M161						Yes	** NA **			None
162	M162						Yes	** NA **			None
163	M163						Yes	** NA **			None
164	M164						Yes	** NA **			None
165	M165						Yes	** NA **			None
166	M166						Yes	** NA **			None
167	M167						Yes	** NA **			None
168	M168						Yes	** NA **			None
169	M169						Yes	** NA **			None
170	M170						Yes	** NA **			None
171	M171						Yes	** NA **			None
172	M172						Yes	** NA **			None
173	M173						Yes	** NA **			None
174	M174						Yes	** NA **			None
175	M175						Yes	** NA **			None
176	M176						Yes	** NA **			None
177	M177						Yes	** NA **			None
178	M178						Yes	** NA **			None
179	M179	BenPIN	BenPIN				Yes	Default			None
180	M180	BenPIN	BenPIN				Yes	Default			None
181	M181	BenPIN	BenPIN				Yes	Default			None

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torq...	Kyy	Kzz	Cb	Functi...
1	M1	Perimeter	12.5	4.161	5.25							Lateral
2	M2	Perimeter	12.5	4.161	5.25							Lateral
3	M3	Perimeter	12.5	4.161	5.25							Lateral
4	M4	Perimeter Corner	.25									Lateral
5	M5	Perimeter Corner	1.031									Lateral
6	M6	Perimeter Corner	.25									Lateral
7	M7	Perimeter Corner	.25									Lateral
8	M8	Perimeter Corner	1.031									Lateral
9	M9	Perimeter Corner	.25									Lateral
10	M10	Perimeter Corner	.25									Lateral
11	M11	Perimeter Corner	1.031									Lateral
12	M12	Perimeter Corner	.25									Lateral
13	M13	Arm	5.229									Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torq...	Kyy	Kzz	Cb	Functi...
14	M14	Arm	5.229									Lateral
15	M15	Arm	5.229									Lateral
16	M16	Cross Arm	2.573									Lateral
17	M17	Cross Arm	2.573									Lateral
18	M18	Cross Arm	2.573									Lateral
19	M19	Cross Arm	2.573									Lateral
20	M20	Cross Arm	2.573									Lateral
21	M21	Cross Arm	2.573									Lateral
22	M22	Cross Arm Cnxn	.219									Lateral
23	M23	Cross Arm Cnxn	.292									Lateral
24	M24	Cross Arm Cnxn	.219									Lateral
25	M25	Cross Arm Cnxn	.292									Lateral
26	M26	Cross Arm Cnxn	.219									Lateral
27	M27	Cross Arm Cnxn	.292									Lateral
28	M28	Cross Arm Cnxn	.219									Lateral
29	M29	Cross Arm Cnxn	.292									Lateral
30	M30	Cross Arm Cnxn	.219									Lateral
31	M31	Cross Arm Cnxn	.292									Lateral
32	M32	Cross Arm Cnxn	.219									Lateral
33	M33	Cross Arm Cnxn	.292									Lateral
34	M34	Grating Support	4.333									Lateral
35	M35	Grating Support	4.333									Lateral
36	M36	Grating Support	4.333									Lateral
37	M37	Grating Support	4.333									Lateral
38	M38	Grating Support	4.333									Lateral
39	M39	Grating Support	4.333									Lateral
40	M40	Support Rail	12.5	3.75	5.25							Lateral
41	M41	Support Rail	12.5	3.75	5.25							Lateral
42	M42	Support Rail	12.5	3.75	5.25							Lateral
43	M43	Support Rail Corner	1.867									Lateral
44	M44	Support Rail Corner	1.867									Lateral
45	M45	Support Rail Corner	1.867									Lateral
46	M46	Support Rail Corner ...	.333									Lateral
47	M47	Support Rail Corner ...	.333									Lateral
48	M48	Support Rail Corner ...	.333									Lateral
49	M49	Support Rail Corner ...	.333									Lateral
50	M50	Support Rail Corner ...	.333									Lateral
51	M51	Support Rail Corner ...	.333									Lateral
52	M52	Mount Pipe 2" STD	8									Lateral
53	M53	Mount Pipe 2" STD	8									Lateral
54	M54	Mount Pipe 2" STD	8									Lateral
55	M55	Mount Pipe 2" STD	8									Lateral
56	M56	Mount Pipe 2" STD	8									Lateral
57	M57	Mount Pipe 2" STD	8									Lateral
58	M58	Mount Pipe 2" STD	8									Lateral
59	M59	Mount Pipe 2" STD	8									Lateral
60	M60	Mount Pipe 2" STD	8									Lateral
61	M61	Mount Pipe 3" STD	10									Lateral
62	M62	Mount Pipe 3" STD	10									Lateral
63	M63	Mount Pipe 3" STD	10									Lateral
64	M64	Kicker	4.264									Lateral
65	M65	Kicker	4.264									Lateral
66	M66	Kicker	4.264									Lateral
67	M175	Mount Pipe 2" STD	4									Lateral
68	M177	Mount Pipe 2" STD	4									Lateral
69	M179	Proposed Support R...	6.073			Lbyy						Lateral
70	M180	Proposed Support R...	6.073			Lbyy						Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torq...	Kyy	Kzz	Cb	Functi...
71	M181	Proposed Support R...	6.073			Lbyy						Lateral

Member Area Loads (BLC 1 : DL)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N26	N25	N27		Y	Two Way	-10
2	N3	N4	N2		Y	Two Way	-10
3	N49	N48	N50		Y	Two Way	-10

Member Area Loads (BLC 28 : Ice DL)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N26	N25	N27		Y	Two Way	-8.065
2	N3	N4	N2		Y	Two Way	-8.065
3	N49	N48	N50		Y	Two Way	-8.065

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib...	Area(...	Surfac...
1	DL	DL		-1		56			3	
2	Maintenance LL - LV	LL				1				
3	Installation LL - LM	LL				1				
4	Wind - 0 Deg (X)	WL				56		65		
5	Wind - 30 Deg (X)	WL				56		65		
6	Wind - 60 Deg (X)	WL				56		65		
7	Wind - 90 Deg (X)	WL				56		65		
8	Wind - 120 Deg (X)	WL				56		65		
9	Wind - 150 Deg (X)	WL				56		65		
10	Wind - 180 Deg (X)	WL				56		65		
11	Wind - 210 Deg (X)	WL				56		65		
12	Wind - 240 Deg (X)	WL				56		65		
13	Wind - 270 Deg (X)	WL				56		65		
14	Wind - 300 Deg (X)	WL				56		65		
15	Wind - 330 Deg (X)	WL				56		65		
16	Wind - 0 Deg (Z)	WL				56		65		
17	Wind - 30 Deg (Z)	WL				56		65		
18	Wind - 60 Deg (Z)	WL				56		65		
19	Wind - 90 Deg (Z)	WL				56		65		
20	Wind - 120 Deg (Z)	WL				56		65		
21	Wind - 150 Deg (Z)	WL				56		65		
22	Wind - 180 Deg (Z)	WL				56		65		
23	Wind - 210 Deg (Z)	WL				56		65		
24	Wind - 240 Deg (Z)	WL				56		65		
25	Wind - 270 Deg (Z)	WL				56		65		
26	Wind - 300 Deg (Z)	WL				56		65		
27	Wind - 330 Deg (Z)	WL				56		65		
28	Ice DL	DL				56		65	3	
29	Ice Wind - 0 Deg (X)	WL				56		65		
30	Ice Wind - 30 Deg (X)	WL				56		65		
31	Ice Wind - 60 Deg (X)	WL				56		65		
32	Ice Wind - 90 Deg (X)	WL				56		65		
33	Ice Wind - 120 Deg (X)	WL				56		65		
34	Ice Wind - 150 Deg (X)	WL				56		65		
35	Ice Wind - 180 Deg (X)	WL				56		65		
36	Ice Wind - 210 Deg (X)	WL				56		65		
37	Ice Wind - 240 Deg (X)	WL				56		65		

Basic Load Cases (Continued)

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib...	Area(...	Surfac...
38	Ice Wind - 270 Deg (X)	WL				56		65		
39	Ice Wind - 300 Deg (X)	WL				56		65		
40	Ice Wind - 330 Deg (X)	WL				56		65		
41	Ice Wind - 0 Deg (Z)	WL				56		65		
42	Ice Wind - 30 Deg (Z)	WL				56		65		
43	Ice Wind - 60 Deg (Z)	WL				56		65		
44	Ice Wind - 90 Deg (Z)	WL				56		65		
45	Ice Wind - 120 Deg (Z)	WL				56		65		
46	Ice Wind - 150 Deg (Z)	WL				56		65		
47	Ice Wind - 180 Deg (Z)	WL				56		65		
48	Ice Wind - 210 Deg (Z)	WL				56		65		
49	Ice Wind - 240 Deg (Z)	WL				56		65		
50	Ice Wind - 270 Deg (Z)	WL				56		65		
51	Ice Wind - 300 Deg (Z)	WL				56		65		
52	Ice Wind - 330 Deg (Z)	WL				56		65		
53	BLC 1 Transient Area Loads	None						21		
54	BLC 28 Transient Area Loads	None						21		

Load Combinations

	Description	Solve	PD...	B...	Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...
1	WIND LOAD COMBOS (109 MPH)																	
2	1.2DL + WL (0 DEG)	Yes	Y	1	1.2	4	1	16	1									
3	1.2DL + WL (30 DEG)	Yes	Y	1	1.2	5	1	17	1									
4	1.2DL + WL (60 DEG)	Yes	Y	1	1.2	6	1	18	1									
5	1.2DL + WL (90 DEG)	Yes	Y	1	1.2	7	1	19	1									
6	1.2DL + WL (120 DEG)	Yes	Y	1	1.2	8	1	20	1									
7	1.2DL + WL (150 DEG)	Yes	Y	1	1.2	9	1	21	1									
8	1.2DL + WL (180 DEG)	Yes	Y	1	1.2	10	1	22	1									
9	1.2DL + WL (210 DEG)	Yes	Y	1	1.2	11	1	23	1									
10	1.2DL + WL (240 DEG)	Yes	Y	1	1.2	12	1	24	1									
11	1.2DL + WL (270 DEG)	Yes	Y	1	1.2	13	1	25	1									
12	1.2DL + WL (300 DEG)	Yes	Y	1	1.2	14	1	26	1									
13	1.2DL + WL (330 DEG)	Yes	Y	1	1.2	15	1	27	1									
14																		
15	MOUNT LOAD COMBOS (30 MPH)																	
16	1.4DL	Yes	Y	1	1.4													
17	1.2DL + 1.5LV	Yes	Y	1	1.2	2	1.5											
18	1.2DL + 1.5LM + WL (0 DEG)	Yes	Y	1	1.2	3	1.5	4	.076	16	.076							
19	1.2DL + 1.5LM + WL (30 DEG)	Yes	Y	1	1.2	3	1.5	5	.076	17	.076							
20	1.2DL + 1.5LM + WL (60 DEG)	Yes	Y	1	1.2	3	1.5	6	.076	18	.076							
21	1.2DL + 1.5LM + WL (90 DEG)	Yes	Y	1	1.2	3	1.5	7	.076	19	.076							
22	1.2DL + 1.5LM + WL (120 DEG)	Yes	Y	1	1.2	3	1.5	8	.076	20	.076							
23	1.2DL + 1.5LM + WL (150 DEG)	Yes	Y	1	1.2	3	1.5	9	.076	21	.076							
24	1.2DL + 1.5LM + WL (180 DEG)	Yes	Y	1	1.2	3	1.5	10	.076	22	.076							
25	1.2DL + 1.5LM + WL (210 DEG)	Yes	Y	1	1.2	3	1.5	11	.076	23	.076							
26	1.2DL + 1.5LM + WL (240 DEG)	Yes	Y	1	1.2	3	1.5	12	.076	24	.076							
27	1.2DL + 1.5LM + WL (270 DEG)	Yes	Y	1	1.2	3	1.5	13	.076	25	.076							
28	1.2DL + 1.5LM + WL (300 DEG)	Yes	Y	1	1.2	3	1.5	14	.076	26	.076							
29	1.2DL + 1.5LM + WL (330 DEG)	Yes	Y	1	1.2	3	1.5	15	.076	27	.076							
30																		
31	ICE LOAD COMBOS (1.5", 40 MPH)																	
32	1.2DL + Ice DL + Ice WL (0 DEG)	Yes	Y	1	1.2	28	1	29	1	41	1							
33	1.2DL + Ice DL + Ice WL (30 DEG)	Yes	Y	1	1.2	28	1	30	1	42	1							
34	1.2DL + Ice DL + Ice WL (60 DEG)	Yes	Y	1	1.2	28	1	31	1	43	1							
35	1.2DL + Ice DL + Ice WL (90 DEG)	Yes	Y	1	1.2	28	1	32	1	44	1							

Load Combinations (Continued)

	Description	Solve	PD		B...	Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...
36	1.2DL + Ice DL + Ice WL (120 DEG)	Yes	Y		1	1.2	28	1	33	1	45	1							
37	1.2DL + Ice DL + Ice WL (150 DEG)	Yes	Y		1	1.2	28	1	34	1	46	1							
38	1.2DL + Ice DL + Ice WL (180 DEG)	Yes	Y		1	1.2	28	1	35	1	47	1							
39	1.2DL + Ice DL + Ice WL (210 DEG)	Yes	Y		1	1.2	28	1	36	1	48	1							
40	1.2DL + Ice DL + Ice WL (240 DEG)	Yes	Y		1	1.2	28	1	37	1	49	1							
41	1.2DL + Ice DL + Ice WL (270 DEG)	Yes	Y		1	1.2	28	1	38	1	50	1							
42	1.2DL + Ice DL + Ice WL (300 DEG)	Yes	Y		1	1.2	28	1	39	1	51	1							
43	1.2DL + Ice DL + Ice WL (330 DEG)	Yes	Y		1	1.2	28	1	40	1	52	1							
44																			

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	2784.853	13	1713.961	12	6086.741	6	631.823	11	2870.104	9	632.396	3
2		min	-3649.575	7	-3718.233	6	-4565.407	12	-509.265	5	-2856.12	3	-949.92	9
3	N24	max	6866.268	2	1597.102	8	1666.075	5	859.411	12	2826.449	5	405.012	2
4		min	-5115.697	8	-3697.542	2	-1668.744	11	-1173.778	6	-2812.647	11	-319.497	8
5	N47	max	2696.92	3	1713.818	4	4490.024	4	628.502	13	2866.066	13	956.708	2
6		min	-3565.843	9	-3718.483	10	-6010.77	10	-409.39	7	-2852.189	7	-693.072	8
7	N293	max	1452.611	36	7944.039	36	635.499	12	0	43	0	43	0	43
8		min	-366.935	12	-2063.161	12	-2516.048	36	0	2	0	2	0	2
9	N294	max	712.533	8	7904.384	32	31.869	5	0	43	0	43	0	43
10		min	-2890.627	32	-2005.462	8	-32.263	11	0	2	0	2	0	2
11	N295	max	1452.416	40	7942.718	40	2515.598	40	0	43	0	43	0	43
12		min	-366.964	4	-2063.671	4	-635.7	4	0	2	0	2	0	2
13	Totals:	max	8904.568	2	13229.5	37	8904.475	5						
14		min	-8904.561	8	5273.873	13	-8904.478	11						

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

	Member	Shape	Code ...	Loc[ft]	LC	Shear Che...	Loc[ft]	Dir	LC	phi*Pnc [...	phi*Pnt [l...	phi*Mn y...	phi*Mn z...	Cb	Eqn
1	M1	PIPE_3.0	.391	6.25	5	.191	6.25		6	56260.412	65205	5748.75	5748.75	1....	H1-1b
2	M2	PIPE_3.0	.391	6.25	9	.191	6.25		10	56260.412	65205	5748.75	5748.75	1....	H1-1b
3	M3	PIPE_3.0	.391	6.25	13	.191	6.25		2	56260.412	65205	5748.75	5748.75	1....	H1-1b
4	M4	PL6x1/2	.134	.193	6	.210	0	y	8	95031.538	97200	1012.5	12150	1....	H1-1b
5	M5	PL6x1/2	.434	.516	7	.206	.516	y	36	66212.251	97200	1012.5	12150	1....	H1-1b
6	M6	PL6x1/2	.136	.193	6	.162	0	y	4	95031.538	97200	1012.5	12150	1....	H1-1b
7	M7	PL6x1/2	.136	.193	2	.162	0	y	12	95031.538	97200	1012.5	12150	1....	H1-1b
8	M8	PL6x1/2	.434	.516	3	.206	.516	y	32	66212.251	97200	1012.5	12150	1....	H1-1b
9	M9	PL6x1/2	.134	.193	2	.210	0	y	4	95031.538	97200	1012.5	12150	1....	H1-1b
10	M10	PL6x1/2	.136	.193	10	.162	0	y	8	95031.538	97200	1012.5	12150	1....	H1-1b
11	M11	PL6x1/2	.434	.516	11	.206	.516	y	40	66212.251	97200	1012.5	12150	1....	H1-1b
12	M12	PL6x1/2	.134	.193	10	.210	0	y	12	95031.538	97200	1012.5	12150	1....	H1-1b
13	M13	HSS4X4X4	.337	3.758	6	.134	3.758	y	5	124431....	139518	16180.5	16180.5	1....	H1-1b
14	M14	HSS4X4X4	.338	3.758	2	.131	3.758	y	13	124431....	139518	16180.5	16180.5	1....	H1-1b
15	M15	HSS4X4X4	.338	3.758	10	.133	3.758	y	9	124431....	139518	16180.5	16180.5	1....	H1-1b
16	M16	HSS4X4X4	.290	0	36	.112	0	y	37	135705....	139518	16180.5	16180.5	1....	H1-1b
17	M17	HSS4X4X4	.274	0	35	.094	0	y	36	135705....	139518	16180.5	16180.5	1....	H1-1b
18	M18	HSS4X4X4	.274	0	43	.094	0	y	32	135705....	139518	16180.5	16180.5	1....	H1-1b
19	M19	HSS4X4X4	.290	0	32	.112	0	y	33	135705....	139518	16180.5	16180.5	1....	H1-1b
20	M20	HSS4X4X4	.274	0	39	.094	0	y	40	135705....	139518	16180.5	16180.5	1....	H1-1b
21	M21	HSS4X4X4	.290	0	40	.112	0	y	41	135705....	139518	16180.5	16180.5	1....	H1-1b
22	M22	PL 6x3/8	.648	0	6	.381	0	y	2	70647.064	72900	569.7	9112.5	1....	H1-1b
23	M23	PL 6x3/8	.437	.164	11	.653	0	y	36	68943.028	72900	569.7	9112.5	1....	H1-1b
24	M24	PL 6x3/8	.727	0	6	.275	0	y	39	70647.064	72900	569.7	9112.5	1....	H1-1b
25	M25	PL 6x3/8	.477	.164	13	.605	0	y	36	68943.028	72900	569.7	9112.5	1....	H1-1b

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

	Member	Shape	Code ...	Loc[ft]	LC	Shear Che...	Loc[ft]	Dir	LC	phi*Pnc [...	phi*Pnt [l...	phi*Mn y...	phi*Mn z...	Cb	Eqn
26	M26	PL 6x3/8	.727	0	2	.275	0	y	35	70647.064	72900	569.7	9112.5	1....	H1-1b
27	M27	PL 6x3/8	.477	.164	9	.605	0	y	32	68943.028	72900	569.7	9112.5	1....	H1-1b
28	M28	PL 6x3/8	.648	0	2	.384	0	y	10	70647.064	72900	569.7	9112.5	1....	H1-1b
29	M29	PL 6x3/8	.437	.164	7	.653	0	y	32	68943.028	72900	569.7	9112.5	1....	H1-1b
30	M30	PL 6x3/8	.726	0	10	.275	0	y	43	70647.064	72900	569.7	9112.5	1....	H1-1b
31	M31	PL 6x3/8	.477	.164	5	.604	0	y	40	68943.028	72900	569.7	9112.5	1....	H1-1b
32	M32	PL 6x3/8	.648	0	10	.382	0	y	6	70647.064	72900	569.7	9112.5	1....	H1-1b
33	M33	PL 6x3/8	.437	.164	3	.652	0	y	40	68943.028	72900	569.7	9112.5	1....	H1-1b
34	M34	L2x2x3	.281	2.167	5	.014	0	y	33	9131.325	23392.8	557.717	1088.647	1....	H2-1
35	M35	L2x2x3	.298	2.167	7	.012	4.333	y	38	9131.322	23392.8	557.717	1088.704	1....	H2-1
36	M36	L2x2x3	.281	2.167	13	.014	0	y	41	9131.322	23392.8	557.717	1088.675	1....	H2-1
37	M37	L2x2x3	.298	2.167	3	.012	4.333	y	34	9131.325	23392.8	557.717	1088.675	1....	H2-1
38	M38	L2x2x3	.281	2.167	9	.014	0	y	37	9131.322	23392.8	557.717	1088.704	1....	H2-1
39	M39	L2x2x3	.298	2.167	11	.012	4.333	y	42	9131.325	23392.8	557.717	1088.647	1....	H2-1
40	M40	PIPE_2.0	.654	6.25	9	.365	3.646		4	23088.171	32130	1871.625	1871.625	1....	H1-1b
41	M41	PIPE_2.0	.654	6.25	13	.365	3.646		8	23088.171	32130	1871.625	1871.625	1....	H1-1b
42	M42	PIPE_2.0	.654	6.25	5	.365	8.854		12	23088.171	32130	1871.625	1871.625	1....	H1-1b
43	M43	L6.5x4.5x4	.007	.973	13	.159	0	y	3	49108.669	74013.75	3885.473	7104.862	1....	H2-1
44	M44	L6.5x4.5x4	.007	.973	9	.159	1.867	y	11	49108.669	74013.75	3885.473	7104.862	1....	H2-1
45	M45	L6.5x4.5x4	.007	.973	5	.159	0	y	7	49108.669	74013.75	3885.473	7104.862	1....	H2-1
46	M46	PL 6x3/8	.041	.167	2	.113	.167	y	2	67775.2	72900	569.7	9112.5	1....	H1-1b
47	M47	PL 6x3/8	.067	.167	2	.030	.167	y	4	67775.2	72900	569.7	9112.5	1....	H1-1b
48	M48	PL 6x3/8	.041	.167	10	.113	.167	y	10	67775.2	72900	569.7	9112.5	1....	H1-1b
49	M49	PL 6x3/8	.067	.167	10	.030	.167	y	12	67775.2	72900	569.7	9112.5	1....	H1-1b
50	M50	PL 6x3/8	.041	.167	6	.113	.167	y	6	67775.2	72900	569.7	9112.5	1....	H1-1b
51	M51	PL 6x3/8	.067	.167	6	.030	.167	y	8	67775.2	72900	569.7	9112.5	1....	H1-1b
52	M52	PIPE_2.0	.664	6	10	.149	3		3	14916.096	32130	1871.625	1871.625	1....	H1-1b
53	M53	PIPE_2.0	.547	5.75	5	.223	2.75		6	14916.096	32130	1871.625	1871.625	3....	H1-1b
54	M54	PIPE_2.0	.581	6	12	.206	4.25		6	14916.096	32130	1871.625	1871.625	1....	H1-1b
55	M55	PIPE_2.0	.665	6	6	.149	3		11	14916.096	32130	1871.625	1871.625	2....	H1-1b
56	M56	PIPE_2.0	.547	5.75	13	.223	2.75		2	14916.096	32130	1871.625	1871.625	4....	H1-1b
57	M57	PIPE_2.0	.581	6	8	.206	4.25		2	14916.096	32130	1871.625	1871.625	2....	H1-1b
58	M58	PIPE_2.0	.664	6	2	.149	3		7	14916.096	32130	1871.625	1871.625	1....	H1-1b
59	M59	PIPE_2.0	.547	5.75	9	.223	2.75		10	14916.096	32130	1871.625	1871.625	4....	H1-1b
60	M60	PIPE_2.0	.582	6	4	.206	4.25		10	14916.096	32130	1871.625	1871.625	1....	H1-1b
61	M61	PIPE_3.0	.588	6.25	5	.283	4.167		5	38176.7	65205	5748.75	5748.75	2....	H3-6
62	M62	PIPE_3.0	.588	6.25	13	.283	4.167		13	38176.7	65205	5748.75	5748.75	2....	H3-6
63	M63	PIPE_3.0	.588	6.25	9	.283	4.167		9	38176.7	65205	5748.75	5748.75	2....	H3-6
64	M64	LL2.5x2.5x3...	.189	4.264	32	.002	4.264	y	2	44568.333	58320	3954.307	2549.586	1	H1-1b*
65	M65	LL2.5x2.5x3...	.190	4.264	36	.002	4.264	y	6	44568.333	58320	3954.307	2549.586	1....	H1-1b*
66	M66	LL2.5x2.5x3...	.190	4.264	40	.002	4.264	y	10	44568.333	58320	3954.307	2549.586	1....	H1-1b*
67	M175	PIPE_2.0	.082	1	10	.009	1		10	26521.424	32130	1871.625	1871.625	1....	H1-1b
68	M177	PIPE_2.0	.082	1	6	.009	1		6	26521.424	32130	1871.625	1871.625	1....	H1-1b
69	M179	PIPE_3.0	.025	3.036	12	.176	0		9	53523.587	65205	5748.75	5748.75	1....	H1-1b
70	M180	PIPE_3.0	.025	3.036	8	.176	0		5	53523.587	65205	5748.75	5748.75	1....	H1-1b
71	M181	PIPE_3.0	.025	3.036	4	.176	0		13	53523.587	65205	5748.75	5748.75	1....	H1-1b

Member End Reactions (By Combination)

	LC	Member Label	Me...	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-in]	y-y Moment[k-in]	z-z Moment[k-in]
1	9	M13	I	.104	-.371	-.007	9.387	.179	-1.929
2			J	-1.057	1.429	-1.757	12.211	-34.441	-1.647

APPENDIX 3:
ATTACHMENTS

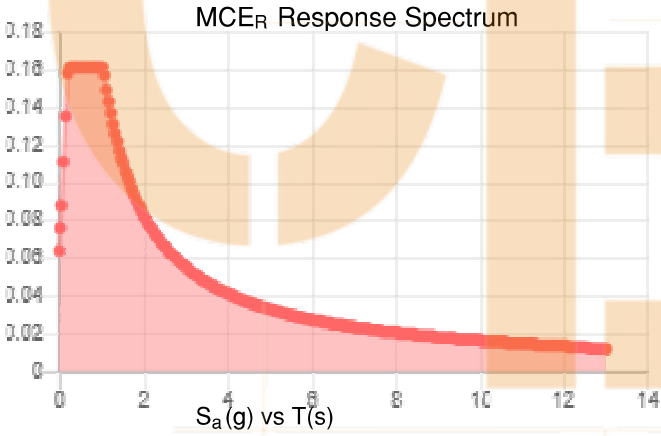
Seismic

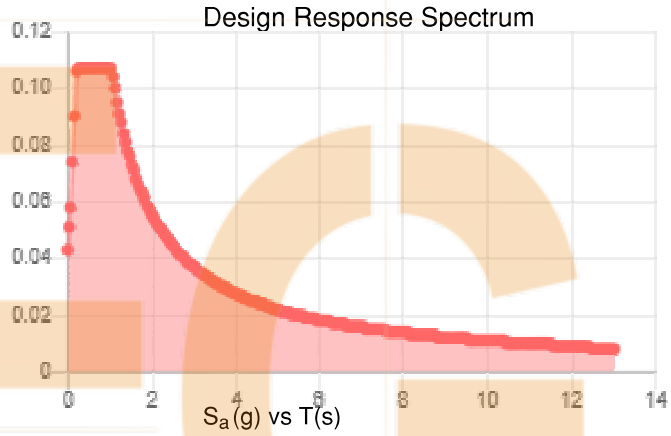
Site Soil Class: D - Stiff Soil

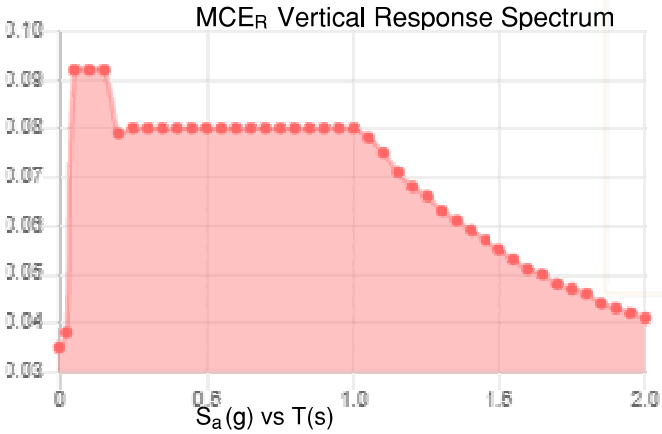
Results:

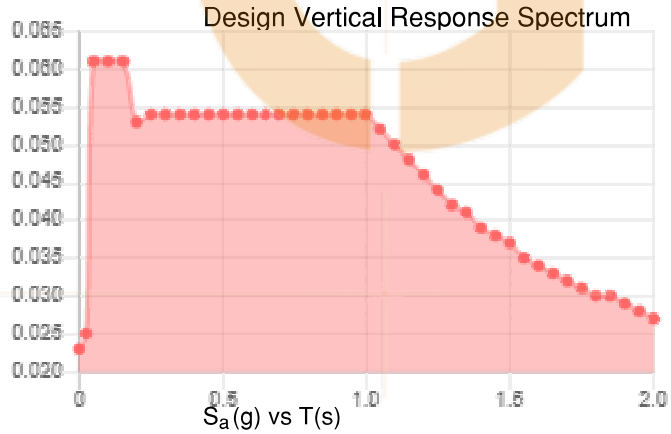
S_S :	0.1	S_{D1} :	0.11
S_1 :	0.068	T_L :	12
F_a :	1.6	PGA :	0.047
F_v :	2.4	PGA_M :	0.076
S_{MS} :	0.161	F_{PGA} :	1.6
S_{M1} :	0.164	I_e :	1
S_{DS} :	0.107	C_v :	0.7

Seismic Design Category B









Data Accessed: **Fri Feb 04 2022**

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:	5 F
Gust Speed	40 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Fri Feb 04 2022

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.

APPENDIX 4:
STRUCTURAL MODIFICATION DESIGN DRAWINGS