STRUCTURAL CALCULATIONS
for
NM01-148 SPIKE

at
221 NEW MEXICO 165
PLACITAS, NM 87043
for
PINNACLE CONSULTING, INC.
&
RAYCAP (SS24-01302H-00R1)

BY: **JACOB PROCTOR, P.E.**
PROFESSIONAL ENGINEER

PROJECT #: U0142.2054.242

DATE: October 24, 2024

DESIGNED BY MAR; CHECKED BY KJG

Note:
The calculations presented in this package are intended for a single use at the location indicated above, for the client listed above. These calculations shall not be reproduced, reused, "card filed", sold to a third party, or altered in any way without the written authorization of Vector Structural Engineering, LLC and Raycap.

JOB NO.: U0142.2054.242

PROJECT: NM01-148 SPIKE

Design Criteria:

Code: Structural design is based on the 2021 New Mexico Commercial Building Codes (2021 IBC) and the TIA-222-H standard.

Wind: Basic wind speed = 107 mph (3-second gust) per the TIA-222-H standard
Risk Category: II
Wind exposure: C
Topographic category: 1
Crest height: 0 ft

Ice: 0.25" radial ice @ 30 mph basic wind speed (3-second gust) per the TIA-222-H standard

Seismic: Seismic importance factor, I = 1
Risk Category: II
Mapped spectral response accelerations: S_S = 0.487g S_1 = 0.16g
Site class: C
Spectral response coefficients S_{DS} = 0.422g S_{D1} = 0.16g
Seismic design category: C
Basic seismic force-resisting system: Telecom Steel Pole
Seismic base shear, V = 5.17 k
Seismic response coefficient, Cs = 0.252
Response modification factor, R = 1.5
Analysis procedure: Equivalent Lateral Force

General Notes:

1. The contractor shall verify dimensions, conditions and elevations before starting work. The engineer shall be notified immediately if any discrepancies are found.
2. The typical notes and details shall apply in all cases unless specifically detailed elsewhere. Where no detail is shown, the construction shall be as shown for other similar work and as required by the building code.
3. These calculations are limited to the structural members shown in these calculations only.
4. The contractor shall be responsible for compliance with local construction safety orders. Approval of shop drawings by the architect or structural engineer shall not be construed as accepting this responsibility.
5. All structural framing members shall be adequately shored and braced during erection and until full lateral and vertical support is provided by adjoining members.

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Structural Steel:

1 All structural steel code checks based on the AISC, 15th Edition per the TIA-222-H standard
2 All 18-sided, tapered shaft steel to be per ASTM A572 GR. 65, U.N.O.
3 The design length of slip splices is equal to 1.67 times the inside width of the base of the upper section. Slip splice length tolerance is equal to +-10% of the design slip splice length.
4 All steel pipe to be per ASTM A500 GR. B (42 KSI), U.N.O.
4 All steel round tubes (HSS) to be per , U.N.O.
5 All steel rectangular tubes (HSS) to be per ASTM A500 GR. B (46 KSI), U.N.O.
5 All steel wide flange shapes to be per , U.N.O.
6 All other structural steel shapes & plates shall be per ASTM A36, U.N.O.
7 All anchor bolts shall be per ASTM A615 GR. 75, U.N.O.
8 All bolts for steel-to-steel connections shall be per ASTM F3125 GR. A325 U.N.O.
9 All bolted connections shall be tightened per the "turn-of-nut" method as defined by AISC.
10 All welding shall be performed by certified welders in accordance with the latest edition of the American Welding Society (AWS) D1.1. Utilize minimum E70XX low-hydrogen electrode U.N.O. or where higher strength electrode is required by AWS D1.1
11 All steel surfaces shall be galvanized in accordance with ASTM A123 and ASTM F2329 standards, thoroughly coated with a zinc-rich primer, or otherwise protected as noted on the structural drawings.

Fiberglass Reinforced Plastic (FRP):

1 All structural shapes shall be Bedford Reinforced Plastics produced using the pultrusion process.
2 The fabricator and contractor shall exercise precautions necessary to protect the fiberglass pultruded structural shapes from abuse to prevent breakage, nicks, gouges, etc. during fabrication, handling, and installation.
3 Structural shapes shall be fabricated and assembled as indicated on the design drawings.
4 FRP threaded rods and nuts shall be tightened to snug tight and turned an additional 1/2 turn and locked with epoxy.

Foundation / Concrete:

1 All concrete mixing, placement, forming, and reinforcing installation shall be performed in accordance with the requirements of "Building Code Requirements for Reinforced Concrete", ACI 318-19. Foundation installation shall be in accordance with the requirements of "Standard Specifications for the Construction of Drilled Piers", ACI 336, latest edition
2 All concrete shall have a minimum compressive strength of 4000 psi at 28 days.
3 Cement for all concrete shall be II with 6% (+/- 1.5%) entrained air. Maximum aggregate size shall be 3/4".

4 Reinforcing steel shall be per ASTM A615 Gr. 60, U.N.O.
5 Foundation design is based upon the project soils report prepared by:

Geotech: Tower Engineering Professionals, Inc.
Report No: 341545
Date: 31-Jul-24

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DESIGN WIND LOADS ON LARGE RADOME CONCEALMENTS:
(Screenwalls/Concealments on Monopoles)

Round Concealment Calculations
Supported on a Pole structure
Design per TIA-222-H

Label: Concealment tower

INPUT DATA:

Basic Wind Speed, V [mph]	104
Exposure Category	C
Elevation Above Sea Level [ft]	5520

Structure:

Supporting Structure:	Pole
Concealment Shape:	Round
Tower Top of Steel (ft):	75
# of Concealments:	3

	Top	2nd	Bottom
Elevation Centerline (ft):	70	60	50
Concealment Height (ft):	10.0	10.0	10.0
Concealment Diameter (ft):	18.0	18.0	18.0
Open Area Top (%):	100%	0%	0%
Open Area Bottom (%):	0%	0%	100%

WIND DESIGN SUMMARY:

	70 ft.	60 ft.	50 ft.
Full Wind Pressure, 1.0W [psf]:	17.5	16.9	16.3
Full Ice Wind Pressure, 1.0W [psf]:	2.9	2.8	2.7
Full Service Wind Pressure, 1.0W [psf]:	5.8	5.6	5.4
Inside Wind Pressure, 1.0W [psf]:	21.0	20.3	19.6
Inside Ice Wind Pressure, 1.0W [psf]:	3.5	3.4	3.3
Inside Service Wind Pressure, 1.0W [psf]:	7.0	6.8	6.5
Wind Force, Outside Face (lbs):	3161	3061	2936
Wind Force, Inside Face (lbs):	2228	0	2075
Total Wind Force (lbs):	5379	3061	5011

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WEIGHT DESIGN SUMMARY:

Self Weight Only:

	Components:	Densities		Length, Area, Quantity		Self Weight (lb)	Total + 10% (lb)
Top @ 70' Elevation	ESSV Panel:	2.00	psf	Area = ft^2	565	1131	
	Framing w/o Grating	3.0	psf	Area = ft^2	254	763	2084
22d @ 50' Elevation	ESSV Panel:	2.00	psf	Area = ft^2	565	1131	
	Framing w/o Grating	3.0	psf	Area = ft^2	254	763	2084
Bottom @ 50' Elevation	ESSV Panel:	2.00	psf	Area = ft^2	565	1131	
	Framing w/o Grating	3.0	psf	Area = ft^2	254	763	2084
						W_s =	6251

Ice Weight Only:

	Component:	Ice Density		Length, Area		Ice Weight (lb)	Total Weight (lb)
Top @ 70' Elevation	ESSV Panel:	1.3	psf	Area = ft^2	565	711	
	Framing w/o Grating	1.3	psf	Area = ft^2	254	320	1031
22d @ 60' Elevation	ESSV Panel:	1.3	psf	Area = ft^2	565	711	
	Framing w/o Grating	1.3	psf	Area = ft^2	254	320	1031
Bottom @ 50' Elevation	ESSV Panel:	1.3	psf	Area = ft^2	565	711	
	Framing w/o Grating	1.3	psf	Area = ft^2	0	0	711
						W_i =	2774

Total W_t =	9025

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ASCE 7-16

Seismic Base Shear Calculations:

Seismic Parameters:

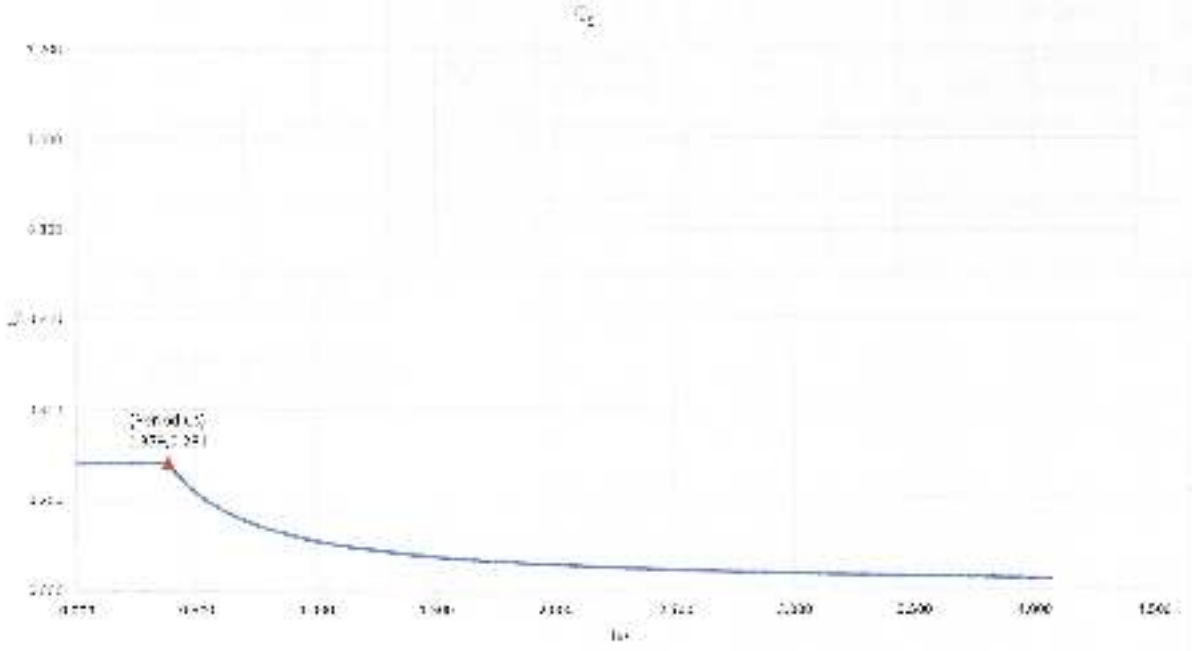
Site Category=	II		S_s =	0.317	g	S_{DS} =	0.422	g
Seismic Design Category	C		S_1 =	0.160	g	S_{D1} =	0.360	g
Importance Factor, I =	1.00		S_{MS} =	0.305	g	α =	1.20	
Site Class	C		S_{M1} =	0.240	g	F_v =	1.50	
R =	1.5							
T_L =	6							

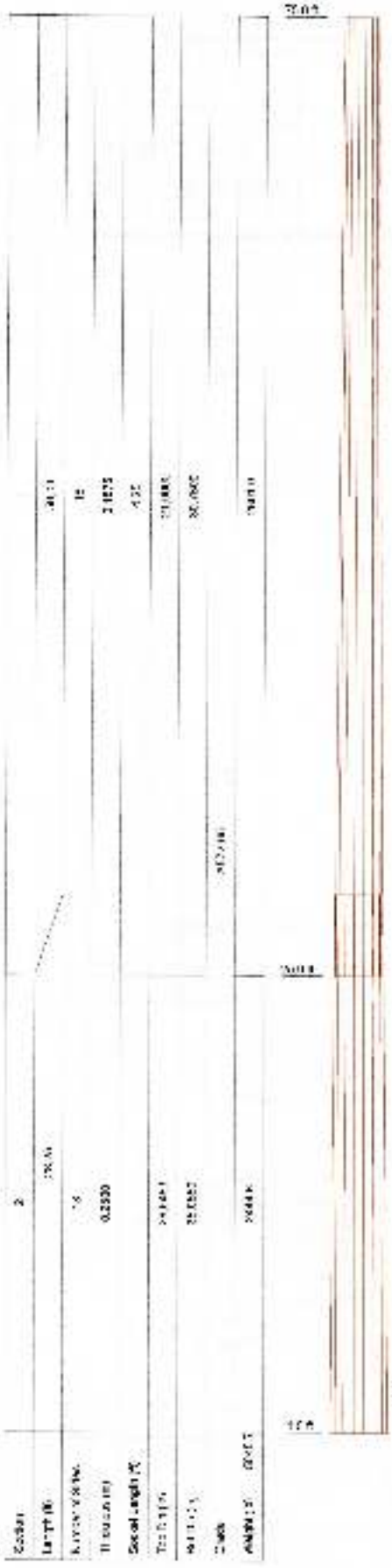
Seismic Base Shear:

Structure Type =	Telescopic Steel Pole						
Wind Type =	Worst Case Cs						
h =	74.0	ft				T_a =	1.64	Hz
I =	294000	lbs	W_s =	15.9	k	T =	0.38	sec
			W_t =	18.9	k	α_1 =	1.00	

C_s =	0.282			
Seismic Shear $V_{Seismic}$ =	3.9	k	ratio =	0.24
Wind Shear =	16.0	k		

Wind Controls, No Seismic Analysis Required





DESIGNED APPURTENANCE LOADING

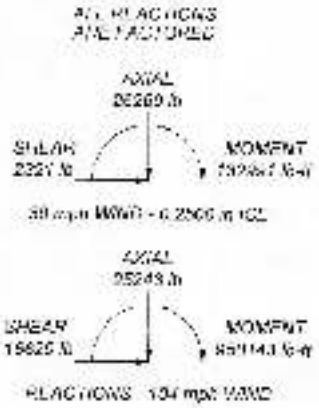
TYPE	ELEVATION	TYPE	ELEVATION
Concentrated Load @ 0 ft	0	(4) Generic RRU (Enclosed, 71 lb)	66
(2) Generic Panel (Enclosed, 75 lbs)	72	(4) Generic RRU (Enclosed, 71 lb)	66
(4) Generic Panel (Enclosed, 115 lbs)	72	(4) Generic RRU (Enclosed, 71 lb)	66
(1) 10-0" Horn DPA= 5.7 ft^2 (Ice) 1,000 lb	70	(4) Generic Panel (Enclosed, 115 lbs)	66
(2) 10-0" Horn DPA= 5.7 ft^2 (Ice) 1,000 lb	70	(4) Generic Panel (Enclosed, 115 lbs)	66
(2) 10-0" Horn DPA= 5.7 ft^2 (Ice) 1,000 lb	70	(4) Generic Panel (Enclosed, 115 lbs)	66
(2) Generic RRL (Enclosed, 75 lb)	70	Concentrated Load @ 66 ft	66
(2) Generic RRL (Enclosed, 75 lb)	70	Concentrated Load @ 66 ft	66
(2) Generic RRL (Enclosed, 75 lb)	70	(2) 10-0" Horn DPA= 5.7 ft^2 (Ice) 1,000 lb	63
(1) Generic Panel (Enclosed, 115 lbs)	70	(2) Generic RRL (Enclosed, 75 lb)	63
Concentrated Load @ 65 ft	65	(2) Generic RRL (Enclosed, 75 lb)	63
Concentrated Load @ 65 ft	65	(2) Generic RRL (Enclosed, 75 lb)	63
(2) 10-0" Horn DPA= 5.7 ft^2 (Ice) 1,000 lb	60	(2) Generic Panel (Enclosed, 115 lbs)	61
(2) 10-0" Horn DPA= 5.7 ft^2 (Ice) 1,000 lb	60	(2) Generic Panel (Enclosed, 115 lbs)	61
(2) 10-0" Horn DPA= 5.7 ft^2 (Ice) 1,000 lb	60	(2) Generic Panel (Enclosed, 115 lbs)	61
		(2) 10-0" Horn DPA= 5.7 ft^2 (Ice) 1,000 lb	61
		(2) 10-0" Horn DPA= 5.7 ft^2 (Ice) 1,000 lb	61
		Concentrated Load @ 46 ft	46

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Bernalillo County, New Mexico.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 105 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 30 mph basic wind with 0.25 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft.
8. TOWER RATING: 74.4%



Vector Structural Engineering	** Spike
651 W Galena Park Blvd	Proj # U0142.2054.242
Draper, UT 84020	Client: Paycell Drawn by: mmb Appd:
Phone: (801) 990-1779	Code: TIA-222-H Date: 10/22/24 Scale: NTS
FAX: (801) 990-1779	Path: Dwg No: E-7

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower is located in Sandoval County, New Mexico.
Tower base elevation above sea level: 5521.00 ft.
Basic wind speed of 101 mph.
Risk Category II.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used
Topographic Category: 1.
Crest Height: 0.00 ft.
Nominal ice thickness of 0.2500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 30 mph is used in combination with ice.
Deflections calculated using a wind speed of 60 mph.
Non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	75.00-25.00	50.00	4.25	18	21.0000	30.7500	0.1875	0.7500	A572-65 (65 ksi)
L2	25.00-0.00	28.25		18	30.6663	45.0000	0.2500	1.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Top Dia in	Area in²	I in⁴	r in	c in	I/c in³	J in⁴	It/Q in²	w in	w/t
L1	51.2950	52.3850	577.8259	3.3884	10.6680	52.5383	1356.3644	6.7042	3.3660	17.952
	51.1974	52.1885	2146.4299	10.8497	13.6210	157.4951	4269.6404	9.0963	5.0820	27.104
L2	40.8050	33.2466	2520.5490	10.4004	13.0097	167.9430	5044.7089	11.6295	4.7601	19.041
	35.6972	23.6175	1276.7766	12.3555	17.8072	237.3553	8459.1149	13.8115	5.7297	22.919

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Distance in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_l	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 75.00-22.00				1	1	1			
L2 25.00-1.00				1	1	1			

User Defined Loads

Description	Elevation ft	Offset From Centroid ft	Azimuth Angle °		Weight lb	F_x lb	F_z lb	Wind Force lb	Cx ft²
Concealment Loading @ 75 ft	75.00	0.00	0.0000	No Ice	1042.00	0.00	0.00	2606.00	90.54
				Ice	716.00	0.00	0.00	555.00	143.59
				Service	1042.00	0.00	0.00	595.00	106.48
Concealment Loading @ 65 ft	65.00	0.00	0.0000	No Ice	1042.00	0.00	0.00	2606.00	90.31
				Ice	716.00	0.00	0.00	553.00	147.99
				Service	1042.00	0.00	0.00	595.00	109.75
Concealment Loading @ 65 ft	65.00	0.00	0.0000	No Ice	1042.00	0.00	0.00	1535.00	53.90
				Ice	516.00	0.00	0.00	354.00	105.88
				Service	1042.00	0.00	0.00	508.00	62.28
Concealment Loading @ 55 ft	55.00	0.00	0.0000	No Ice	1042.00	0.00	0.00	1525.00	54.79
				Ice	316.00	0.00	0.00	254.00	109.67
				Service	1042.00	0.00	0.00	508.00	64.51
Concealment Loading @ 55 ft	55.00	0.00	0.0000	No Ice	1042.00	0.00	0.00	2506.00	90.04
				Ice	356.00	0.00	0.00	341.00	142.92
				Service	1042.00	0.00	0.00	521.00	105.91
Concealment Loading @ 45 ft	45.00	0.00	0.0000	No Ice	1042.00	0.00	0.00	2506.00	93.92
				Ice	356.00	0.00	0.00	341.00	149.09
				Service	1042.00	0.00	0.00	534.00	110.48

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offset From Leg ft	Azimuth Adjustment °	Placement ft		Ctd. From ft	Ctd. Side ft	Weight lb
(4) Generic Panel (Enclosed, 115 lbs)	A	From Face	3.00 3.00 0.00	0.0000	70.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(4) Generic Panel (Enclosed, 115 lbs)	B	From Face	3.00 3.00 0.00	0.0000	70.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(4) Generic Panel (Enclosed, 115 lbs)	C	From Face	3.00 3.00 0.00	0.0000	70.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(2) 10'-0" T-arm EPA = 5.7 SF (161 lbs)	A	From Face	3.00 3.00 0.00	0.0000	70.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	161.00 561.26
(2) 10'-0" T-arm EPA = 5.7 SF (161 lbs)	B	From Face	3.00 3.00 0.00	0.0000	70.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	161.00 561.26
(2) 10'-0" T-arm EPA = 5.7 SF (161 lbs)	C	From Face	3.00 3.00 0.00	0.0000	70.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	161.00 561.26
(4) Generic RRU (Enclosed, 75 lbs)	A	From Face	3.00 3.00 0.00	0.0000	70.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	75.00 75.00
(4) Generic RRU (Enclosed, 75 lbs)	B	From Face	3.00 3.00 0.00	0.0000	70.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	75.00 75.00
(4) Generic RRU (Enclosed, 75 lbs)	C	From Face	3.00 3.00 0.00	0.0000	70.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	75.00 75.00
***									
(4) Generic Panel (Enclosed, 115 lbs)	A	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(4) Generic Panel (Enclosed, 115 lbs)	B	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(4) Generic Panel (Enclosed, 115 lbs)	C	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(2) 10'-0" T-arm EPA = 5.7 SF (161 lbs)	A	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	161.00 561.26
(2) 10'-0" T-arm EPA = 5.7 SF (161 lbs)	B	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	161.00 561.26
(2) 10'-0" T-arm EPA = 5.7 SF (161 lbs)	C	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	161.00 561.26
(4) Generic RRU (Enclosed, 75 lbs)	A	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	75.00 75.00
(4) Generic RRU (Enclosed, 75 lbs)	B	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	75.00 75.00
(4) Generic RRU (Enclosed, 75 lbs)	C	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice .62" Ice	0.00 0.00	0.00 0.00	75.00 75.00
***									
(4) Generic Panel (Enclosed,	A	From Face	3.00	0.0000	30.00	No Ice	0.00	0.00	115.00

Description	Face or Leg	Offset Type	Offset Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight lb
(15 lbs)			0.00 0.00			1/2" Ice	0.00	0.00	115.00
(4) Generic Panel (Enclosed, 115 lbs)	B	From Face	0.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(4) Generic Panel (Enclosed, 115 lbs)	C	From Face	0.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(2) [illegible] T-arm RPA – 5.7 [illegible] (61 lbs)	A	From Face	0.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	161.00 561.26
(2) [illegible] T-arm RPA – 5.7 [illegible] (61 lbs)	B	From Face	0.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	161.00 561.26
(2) [illegible] T-arm RPA – 5.7 [illegible] (61 lbs)	C	From Face	0.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	161.00 561.26
(4) Generic RRU (Enclosed 75 lbs)	A	From Face	0.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	75.00 75.00
(4) Generic RRU (Enclosed, 75 lbs)	B	From Face	0.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	75.00 75.00
(4) Generic RRU (Enclosed 75 lbs)	C	From Face	0.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	75.00 75.00

Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_z	q psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{LG} ft²	Ratio %	C_AA_A on Face ft²	C_AA_A Out Face ft²
L1 25.00-25.00	49.10	1.008	24	106.355	A	0.000	106.355	106.355	100.00	0.000	0.000
					B	0.000	106.355		100.00	0.000	0.000
					C	0.000	106.355		100.00	0.000	0.000
L2 25.00-1.00	12.71	0.856	18	66.362	A	0.000	66.362	66.362	100.00	0.000	0.000
					B	0.000	66.362		100.00	0.000	0.000
					C	0.000	66.362		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_z	q_z psf	A_r ft²	Face	A_e ft²	A_a ft²	$A_{g,f}$ ft²	Ratio %	C_fA_f In Face ft²	C_fA_f Out Face ft²
L1 75.00-25.00	49.10	1.100	7	109.355	A	0.000	109.355	109.355	100.00	0.000	0.000
					B	0.000	109.355		100.00	0.000	0.000
					C	0.000	109.355		100.00	0.000	0.000
L2 25.00-1.00	12.91	0.850	5	66.362	A	0.000	66.362	66.362	100.00	0.000	0.000
					B	0.000	66.362		100.00	0.000	0.000
					C	0.000	66.362		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.100$

Section Elevation ft	z ft	K_z	q_z psf	A_r ft²	Face	A_e ft²	A_a ft²	$A_{g,f}$ ft²	Ratio %	C_fA_f In Face ft²	C_fA_f Out Face ft²
L1 75.00-25.00	49.10	1.100	7	109.355	A	0.000	109.355	109.355	100.00	0.000	0.000
					B	0.000	109.355		100.00	0.000	0.000
					C	0.000	109.355		100.00	0.000	0.000
L2 25.00-1.00	12.91	0.850	5	66.362	A	0.000	66.362	66.362	100.00	0.000	0.000
					B	0.000	66.362		100.00	0.000	0.000
					C	0.000	66.362		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	ε	C_A	q psf	D_c	D_a	A_a ft²	F lb	α plf	Ctrl. Face
L1 75.00-25.00	0.00	2600.97	A	1	0.73	24	1	1	109.355	2151.27	43.03	C
			B	1	0.73		1	1	109.355			
			C	1	0.73		1	1	109.355			
L2 25.00-1.00	0.00	2444.77	A	1	0.73	19	1	1	66.362	1027.02	42.79	C
			B	1	0.73		1	1	66.362			
			C	1	0.73		1	1	66.362			
Sum Weight	0.00	5045.74						OTM	173038.42 lb-ft	3178.29		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	ε	C_A	q psf	D_c	D_a	A_a ft²	F lb	α plf	Ctrl. Face
L1 75.00-25.00	0.00	2600.97	A	1	0.73	24	1	1	109.355	2151.27	43.03	C
			B	1	0.73		1	1	109.355			
			C	1	0.73		1	1	109.355			
L2 25.00-1.00	0.00	2444.77	A	1	0.73	19	1	1	66.362	1027.02	42.79	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_A	q_z psf	D_F	D_R	A_R ft²	F lb	w plf	Ctrl. Face
			B	1	0.75		1	1	66.362			
			C	1	0.75		1	1	66.362			
Sum Weight:	0.00	3045.74						OTM	115508.37 lb-ft	3178.39		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_A	q_z psf	D_F	D_R	A_R ft²	F lb	w plf	Ctrl. Face
L1 75.00-25.00	0.00	2044.97	A	1	0.75	24	1	1	109.355	2151.37	43.06	C
			B	1	0.75		1	1	109.355			
			C	1	0.75		1	1	109.355			
L2 25.00-1.00	0.00	2444.77	A	1	0.75	19	1	1	66.362	1027.02	42.79	C
			B	1	0.75		1	1	66.362			
			C	1	0.75		1	1	66.362			
Sum Weight:	0.00	3045.74						OTM	115508.37 lb-ft	3178.39		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_A	q_z psf	D_F	D_R	A_R ft²	F lb	w plf	Ctrl. Face
L1 75.00-25.00	0.00	2600.97	A	1	0.75	24	1	1	109.355	2151.37	43.06	C
			B	1	0.75		1	1	109.355			
			C	1	0.75		1	1	109.355			
L2 25.00-1.00	0.00	2444.77	A	1	0.75	19	1	1	66.362	1027.02	42.79	C
			B	1	0.75		1	1	66.362			
			C	1	0.75		1	1	66.362			
Sum Weight:	0.00	3045.74						OTM	115508.37 lb-ft	3178.39		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_A	q_z psf	D_F	D_R	A_R ft²	F lb	w plf	Ctrl. Face
L1 75.00-35.00	0.00	3020.56	A	1	1.2	2	1	1	111.325	309.11	5.00	C
			B	1	1.2		1	1	111.325			
			C	1	1.2		1	1	111.325			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	$C_A A_A$	C_A	q_z psf	D_L	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L2 75.00-81.00	0.00	2446.54	A	1	1.2	2	1	1	67.271	142.40	5.93	C
			B	1	1.2		1	1	67.271			
			C	1	1.2		1	1	67.271			
Sum Weight:	0.00	5687.10						OTM	16102.78 lb-ft	442.51		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	$C_A A_A$	C_A	q_z psf	D_L	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	0.00	3020.56	A	1	1.2	2	1	1	111.523	300.11	6.00	C
75.00-75.00			B	1	1.2		1	1	111.523			
			C	1	1.2		1	1	111.523			
L2 25.00-1.00	0.00	2666.54	A	1	1.2	2	1	1	67.271	142.40	5.93	C
			D	1	1.2		1	1	67.271			
			C	1	1.2		1	1	67.271			
Sum Weight:	0.00	5687.10						OTM	16102.78 lb-ft	442.51		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	$C_A A_A$	C_A	q_z psf	D_L	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	0.00	3020.56	A	1	1.2	2	1	1	111.523	300.11	6.00	C
75.00-25.00			B	1	1.2		1	1	111.523			
			C	1	1.2		1	1	111.523			
L2 25.00-1.00	0.00	2666.54	A	1	1.2	2	1	1	67.271	142.40	5.93	C
			B	1	1.2		1	1	67.271			
			C	1	1.2		1	1	67.271			
Sum Weight:	0.00	5687.10						OTM	16102.78 lb-ft	442.51		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	$C_A A_A$	C_A	q_z psf	D_L	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	0.00	3020.56	A	1	1.2	2	1	1	111.523	300.11	6.00	C
75.00-25.00			B	1	1.2		1	1	111.523			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	C_A	C_AA_A	q_z psf	D_i	C_A	A_A ft²	F lb	w plf	Ctrl. Face
L2 25.00-1.00	0.00	2665.54	C	1	1.2		1	1	111.523			
			A	1	1.2	7	1	1	97.271	142.40	5.93	C
			B	1	1.2		1	1	97.271			
			C	1	1.2		1	1	97.271			
Sum Weight:	0.00	5687.10						OTM	16102.78 lb-ft	142.51		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	C_A	C_AA_A	q_z psf	D_i	D_i	C_A	A_A ft²	F lb	w plf	Ctrl. Face
L1 25.00-25.00	0.00	2600.92	A	1	0.75	7	1	1	109.355	578.65	12.17	C
			B	1	0.75			1	109.355			
			C	1	0.75			1	109.355			
L2 25.00-1.00	0.00	2444.77	A	1	0.75	5	1	1	66.362	330.56	12.11	C
			B	1	0.75		1	1	66.362			
			C	1	0.75		1	1	66.362			
Sum Weight:	0.00	5045.69						OTM	32678.95 lb-ft	909.21		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	C_A	C_AA_A	q_z psf	D_i	D_i	C_A	A_A ft²	F lb	w plf	Ctrl. Face
L1 25.00-25.00	0.00	2600.92	A	1	0.75	7	1	1	109.355	578.65	12.17	C
			B	1	0.75			1	109.355			
			C	1	0.75			1	109.355			
L2 25.00-1.00	0.00	2444.77	A	1	0.75	5	1	1	66.362	330.56	12.11	C
			B	1	0.75			1	66.362			
			C	1	0.75			1	66.362			
Sum Weight:	0.00	5045.69						OTM	32678.95 lb-ft	909.21		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	C_A	C_AA_A	q_z psf	D_i	C_A	A_A ft²	F lb	w plf	Ctrl. Face
L1	0.00	2600.92	A	1	0.75	7	1	1	109.355	578.65	12.17	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	ϵ	C_A	q_z psf	D_x	D_z	A_E ft²	F lb	w plf	Ctrl. Face
75.00-25.00			B	1	3.73		1	1	109.355			
			C	1	3.73		1	1	109.355			
25.00-1.00	0.00	2444.77	A	1	3.73	5	1	1	66.363	398.56	12.17	C
			B	1	3.73		1	1	66.363			
			C	1	3.73		1	1	66.363			
Sum Weight:	0.00	5345.74						OTM	32678.96 lb-ft	899.2		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	ϵ	C_A	q_z psf	D_x	D_z	A_E ft²	F lb	w plf	Ctrl. Face
75.00-25.00	0.00	2900.97	A	1	3.73	7	1	1	109.355	608.56	12.17	C
			B	1	3.73		1	1	109.355			
			C	1	3.73		1	1	109.355			
25.00-1.00	0.00	2444.77	A	1	3.73	5	1	1	66.363	398.56	12.17	C
			B	1	3.73		1	1	66.363			
			C	1	3.73		1	1	66.363			
Sum Weight:	0.00	5345.74						OTM	32678.96 lb-ft	899.2		

Discrete Appurtenance Pressures - No Ice $G_H = 1.100$

Description	Azimuth °	Weight lb	Offset f	Offset g	z ft	K_a	q_z psf	C_AA_A Front ft²	C_AA_A Side ft²
Generic Panel (Enclosed, 115 lbs)	300.0000	160.00	-5.39	-1.96	70.00	1.174	27	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	60.0000	160.00	5.39	-1.96	70.00	1.174	27	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	180.0000	160.00	0.00	3.92	70.00	1.174	27	0.00	0.00
10'-0" Team EPA = 5.7 SF (161 lbs)	300.0000	322.00	-5.39	-1.96	70.00	1.174	27	0.00	0.00
10'-0" Team EPA = 5.7 SF (161 lbs)	60.0000	322.00	5.39	-1.96	70.00	1.174	27	0.00	0.00
10'-0" Team EPA = 5.7 SF (161 lbs)	180.0000	322.00	0.00	3.92	70.00	1.174	27	0.00	0.00
Generic RRH (Enclosed, 75 lbs)	300.0000	300.00	-5.39	-1.96	70.00	1.174	27	0.00	0.00
Generic RRH (Enclosed, 75 lbs)	60.0000	300.00	5.39	-1.96	70.00	1.174	27	0.00	0.00
Generic RRH (Enclosed, 75 lbs)	180.0000	300.00	0.00	3.92	70.00	1.174	27	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	300.0000	160.00	5.39	-2.00	60.00	1.157	26	0.00	0.00
Generic Panel (Enclosed,	60.0000	160.00	5.46	-2.00	60.00	1.157	26	0.00	0.00

Description	Azimuth	Weight	Offset	Offset		Kz	qz	C_AAe Front	C_AAe Side
	°	lb	ft	ft	ft		psf	ft²	ft²
115 lbs)									
Generic Panel (Enclosed, 115 lbs)	180.0000	150.00	0.00	4.00	60.00	1.137	25	0.00	0.00
10-4" T-arm EPA = 5.7 ft^2 (61 lbs)	300.0000	322.00	-3.46	-2.00	60.00	1.137	25	0.00	0.00
10-4" T-arm EPA = 5.7 ft^2 (61 lbs)	60.0000	322.00	3.46	-2.00	60.00	1.137	25	0.00	0.00
10-4" T-arm EPA = 5.7 ft^2 (61 lbs)	180.0000	322.00	0.00	4.00	60.00	1.137	25	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	300.0000	300.00	-3.46	-2.00	60.00	1.137	25	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	60.0000	300.00	3.46	-2.00	60.00	1.137	25	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	180.0000	300.00	0.00	4.00	60.00	1.137	25	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	300.0000	400.00	3.53	-2.04	50.00	1.094	25	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	60.0000	400.00	3.53	2.04	50.00	1.094	25	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	180.0000	400.00	0.00	4.08	50.00	1.094	25	0.00	0.00
10-4" T-arm EPA = 5.7 ft^2 (61 lbs)	300.0000	322.00	-3.53	-2.04	50.00	1.094	25	0.00	0.00
10-4" T-arm EPA = 5.7 ft^2 (61 lbs)	60.0000	322.00	3.53	-2.04	50.00	1.094	25	0.00	0.00
10-4" T-arm EPA = 5.7 ft^2 (61 lbs)	180.0000	322.00	0.00	4.08	50.00	1.094	25	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	300.0000	300.00	-3.53	-2.04	50.00	1.094	25	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	60.0000	300.00	3.53	-2.04	50.00	1.094	25	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	180.0000	300.00	0.00	4.08	50.00	1.094	25	0.00	0.00
	Sum Weight:	9756.00							

Discrete Appurtenance Pressures - With Ice $G_H = 1.100$

Description	Azimuth	Weight	Offset	Offset		Kz	qz	C_AAe Front	C_AAe Side	Ca
	°	lb	ft	ft	ft		psf	ft²	ft²	in
Generic Panel (Enclosed, 115 lbs)	300.0000	450.00	-3.50	-1.06	70.00	1.174	2	0.00	0.00	0.2593
Generic Panel (Enclosed, 115 lbs)	60.0000	450.00	3.50	-1.06	70.00	1.174	2	0.00	0.00	0.2593
Generic Panel (Enclosed, 115 lbs)	180.0000	450.00	0.00	4.42	70.00	1.174	2	0.00	0.00	0.2593
10-4" T-arm EPA = 5.7 ft^2 (61 lbs)	300.0000	795.52	-3.50	-1.06	70.00	1.174	2	0.00	0.00	0.2593
10-4" T-arm EPA = 5.7 ft^2 (61 lbs)	60.0000	795.52	3.50	-1.06	70.00	1.174	2	0.00	0.00	0.2593
10-4" T-arm EPA = 5.7 ft^2 (61 lbs)	180.0000	795.52	0.00	4.42	70.00	1.174	2	0.00	0.00	0.2593
Generic RRU (Enclosed, 75 lbs)	300.0000	330.00	-3.50	-1.06	70.00	1.174	2	0.00	0.00	0.2593
Generic RRU (Enclosed, 75 lbs)	60.0000	330.00	3.50	-1.06	70.00	1.174	2	0.00	0.00	0.2593
Generic RRU (Enclosed,	180.0000	330.00	0.00	4.42	70.00	1.174	2	0.00	0.00	0.2593

Description	Azimuth °	Weight lb	Offset, ft	Offset ft	z ft	Kz	qz psf	C_A Front ft²	C_A Side ft²	Ka lb
75 lbs)										
Generic Panel (Enclosed, 115 lbs)	300.0000	460.00	-3.46	-2.00	60.00	1.137	2	0.00	0.00	0.2654
Generic Panel (Enclosed, 115 lbs)	60.0000	460.00	3.46	-2.00	60.00	1.137	2	0.00	0.00	0.2654
Generic Panel (Enclosed, 115 lbs)	180.0000	460.00	0.00	4.00	60.00	1.137	2	0.00	0.00	0.2654
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	300.0000	746.92	-4.96	-2.00	60.00	1.137	2	0.00	0.00	0.2654
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	60.0000	746.92	3.46	2.00	60.00	1.137	2	0.00	0.00	0.2654
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	180.0000	746.92	0.00	4.00	60.00	1.137	2	0.00	0.00	0.2654
Generic RRU (Enclosed, 75 lbs)	300.0000	300.00	-3.46	-2.00	60.00	1.137	2	0.00	0.00	0.2654
Generic RRU (Enclosed, 75 lbs)	60.0000	300.00	3.46	2.00	60.00	1.137	2	0.00	0.00	0.2654
Generic RRU (Enclosed, 75 lbs)	180.0000	300.00	0.00	4.00	60.00	1.137	2	0.00	0.00	0.2654
Generic Panel (Enclosed, 115 lbs)	300.0000	460.00	-3.46	-2.04	60.00	1.094	2	0.00	0.00	0.2605
Generic Panel (Enclosed, 115 lbs)	60.0000	460.00	3.46	-2.04	60.00	1.094	2	0.00	0.00	0.2605
Generic Panel (Enclosed, 115 lbs)	180.0000	460.00	0.00	4.08	60.00	1.094	2	0.00	0.00	0.2605
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	300.0000	739.24	-4.96	-2.04	60.00	1.094	2	0.00	0.00	0.2605
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	60.0000	739.24	3.46	2.04	60.00	1.094	2	0.00	0.00	0.2605
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	180.0000	739.24	0.00	4.08	60.00	1.094	2	0.00	0.00	0.2605
Generic RRU (Enclosed, 75 lbs)	300.0000	300.00	-3.46	-2.04	60.00	1.094	2	0.00	0.00	0.2605
Generic RRU (Enclosed, 75 lbs)	60.0000	300.00	3.46	-2.04	60.00	1.094	2	0.00	0.00	0.2605
Generic RRU (Enclosed, 75 lbs)	180.0000	300.00	0.00	4.08	60.00	1.094	2	0.00	0.00	0.2605
	Sum Weight:	7459.01								

Discrete Appurtenance Pressures - Service $G_H = 1.100$

Description	Azimuth °	Weight lb	Offset, ft	Offset ft	z ft	Kz	qz psf	C_A Front ft²	C_A Side ft²
Generic Panel (Enclosed, 115 lbs)	300.0000	460.00	-3.30	-1.98	70.00	1.174	8	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	60.0000	460.00	3.30	-1.98	70.00	1.174	8	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	180.0000	460.00	0.00	3.92	70.00	1.174	8	0.00	0.00
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	300.0000	922.00	-3.30	-1.98	70.00	1.174	8	0.00	0.00
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	60.0000	922.00	3.30	-1.98	70.00	1.174	8	0.00	0.00
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	180.0000	922.00	0.00	3.92	70.00	1.174	8	0.00	0.00
Generic RRU (Enclosed,	300.0000	400.00	-3.30	-1.98	70.00	1.174	8	0.00	0.00

Description	Mounting Azimuth	Weight	Offset,	Offset,		K	A_f	Front Shield	Side Shield
	°	lb	ft	ft	ft		sqft	ft²	ft²
75 lbs)									
Generic RRU (Enclosed, 75 lbs)	60.0000	300.00	3.99	-1.96	70.00	1.174	5	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	180.0000	300.00	0.00	3.92	70.00	1.171	5	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	300.0000	460.00	-3.46	2.00	50.00	1.137	7	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	60.0000	460.00	3.46	-2.00	60.00	1.137	7	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	180.0000	460.00	0.00	4.00	60.00	1.137	7	0.00	0.00
10'-0" Tarm EPA = 5.7 ft^2 (161 lbs)	300.0000	322.00	-4.93	-2.85	60.00	1.137	7	0.00	0.00
10'-0" Tarm EPA = 5.7 ft^2 (161 lbs)	60.0000	322.00	4.93	-2.85	60.00	1.137	7	0.00	0.00
10'-0" Tarm EPA = 5.7 ft^2 (161 lbs)	180.0000	322.00	0.00	5.70	60.00	1.137	7	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	300.0000	300.00	-3.46	-2.00	60.00	1.137	7	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	60.0000	300.00	3.46	-2.00	60.00	1.137	7	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	180.0000	300.00	0.00	4.00	60.00	1.137	7	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	300.0000	460.00	-3.46	-2.00	50.00	1.094	7	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	60.0000	460.00	3.46	-2.00	50.00	1.094	7	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	180.0000	460.00	0.00	4.00	50.00	1.094	7	0.00	0.00
10'-0" Tarm EPA = 5.7 ft^2 (161 lbs)	300.0000	322.00	-4.93	-2.85	50.00	1.094	7	0.00	0.00
10'-0" Tarm EPA = 5.7 ft^2 (161 lbs)	60.0000	322.00	4.93	-2.85	50.00	1.094	7	0.00	0.00
10'-0" Tarm EPA = 5.7 ft^2 (161 lbs)	180.0000	322.00	0.00	5.70	50.00	1.094	7	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	300.0000	300.00	-3.46	-2.00	50.00	1.094	7	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	60.0000	300.00	3.46	-2.00	50.00	1.094	7	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	180.0000	300.00	0.00	4.00	50.00	1.094	7	0.00	0.00
	Sum Weight	9748.00							

Force Totals

Load Case	Vertical Forces	Sum of Forces X	Sum of Forces Z	Sum of Overturning Moments, M_x	Sum of Overturning Moments, M_z	Sum of Torques
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead Weight	9743.74					
Bracing Weight	0.00					
Total Member Self-Weight	9743.74			0.00	0.00	
Total Weight	21005.74			0.00	0.00	
Wind 0 deg - No Ice		0.00	-16620.39	-910266.37	0.00	0.00
Wind 30 deg - No Ice		8310.20	-14389.68	-799045.85	-456133.15	0.00
Wind 45 deg - No Ice		11752.39	-11752.39	-643069.74	-643069.74	0.00
Wind 60 deg - No Ice		14395.68	8310.20	-456133.15	-799045.85	0.00

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Y lb	Sum of Overturning Moments, Mx lb-ft	Sum of Overturning Moments, My lb-ft	Sum of Torques lb-ft
Wind 90 deg - No Ice		16680.39	0.00	0.00	-912396.37	0.00
Wind 120 deg - No Ice		14592.68	8310.20	454135.19	-290046.85	0.00
Wind 135 deg - No Ice		11752.39	11752.39	643069.74	-643069.74	0.00
Wind 150 deg - No Ice		8310.20	14592.68	798045.85	-456135.19	0.00
Wind 180 deg - No Ice		0.00	16680.39	912396.37	0.00	0.00
Wind 210 deg - No Ice		-8310.20	14592.68	798045.85	456135.19	0.00
Wind 225 deg - No Ice		-11752.39	11752.39	643069.74	643069.74	0.00
Wind 240 deg - No Ice		-14592.68	8310.20	456135.19	798045.85	0.00
Wind 270 deg - No Ice		-16680.39	0.00	0.00	912396.37	0.00
Wind 300 deg - No Ice		-14592.68	-8310.20	-456135.19	798045.85	0.00
Wind 315 deg - No Ice		-11752.39	-11752.39	-643069.74	643069.74	0.00
Wind 330 deg - No Ice		-8310.20	-14592.68	-798045.85	456135.19	0.00
Member Ice	641.66					
Tow Weight Ice	22022.1.			0.00	0.00	
Wind deg - Ice		0.00	-2322.51	-127302.78	0.00	0.00
Wind 30 deg - Ice		1161.25	-2011.35	-110420.65	63751.39	0.00
Wind 45 deg - Ice		1642.26	-1642.26	-90158.08	90158.08	0.00
Wind 60 deg - Ice		2011.35	-1161.25	-63751.39	110420.65	0.00
Wind 90 deg - Ice		2322.51	0.00	0.00	127302.78	0.00
Wind 120 deg - Ice		2011.35	1161.25	63751.39	110420.65	0.00
Wind 135 deg - Ice		1642.26	1642.26	90158.08	-90158.08	0.00
Wind 150 deg - Ice		1161.25	2011.35	110420.65	-63751.39	0.00
Wind 180 deg - Ice		0.00	2322.51	127302.78	0.00	0.00
Wind 210 deg - Ice		-1161.25	2011.35	110420.65	63751.39	0.00
Wind 225 deg - Ice		-1642.26	1642.26	90158.08	90158.08	0.00
Wind 240 deg - Ice		-2011.35	1161.25	63751.39	110420.65	0.00
Wind 270 deg - Ice		-2322.51	0.00	0.00	127302.78	0.00
Wind 300 deg - Ice		-2011.35	-1161.25	-63751.39	110420.65	0.00
Wind 315 deg - Ice		-1642.26	-1642.26	-90158.08	90158.08	0.00
Wind 330 deg - Ice		-1161.25	-2011.35	-110420.65	63751.39	0.00
Total Weight	21031.74			0.00	0.00	
Wind 0 deg - Service		0.00	-5373.21	297864.96	0.00	0.00
Wind 30 deg - Service		4686.61	-4653.34	-257938.62	148932.48	0.00
Wind 45 deg - Service		3799.43	-3799.43	-210622.33	210622.33	0.00
Wind 60 deg - Service		4653.34	-4686.61	-148932.48	257938.62	0.00
Wind 90 deg - Service		5373.21	0.00	0.00	297864.96	0.00
Wind 120 deg - Service		4653.34	2686.61	148932.48	257938.62	0.00
Wind 135 deg - Service		3799.43	3799.43	210622.33	-210622.33	0.00
Wind 150 deg - Service		2686.61	4653.34	257938.62	-148932.48	0.00
Wind 180 deg - Service		0.00	5373.21	297864.96	0.00	0.00
Wind 210 deg - Service		-2686.61	4653.34	257938.62	-148932.48	0.00
Wind 225 deg - Service		-3799.43	3799.43	210622.33	210622.33	0.00
Wind 240 deg - Service		-4653.34	2686.61	148932.48	257938.62	0.00
Wind 270 deg - Service		-5373.21	0.00	0.00	297864.96	0.00
Wind 300 deg - Service		-4653.34	-2686.61	-148932.48	257938.62	0.00
Wind 315 deg - Service		-3799.43	-3799.43	-210622.33	210622.33	0.00
Wind 330 deg - Service		-2686.61	-4653.34	-257938.62	148932.48	0.00

Load Combinations

Comb. No.	Description
1	Dead Only
3	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice

Comb. No.	Description
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 45 deg - No Ice
7	0.9 Dead+1.0 Wind 45 deg - No Ice
8	1.2 Dead+1.0 Wind 60 deg - No Ice
9	0.9 Dead+1.0 Wind 60 deg - No Ice
10	1.2 Dead+1.0 Wind 90 deg - No Ice
11	0.9 Dead+1.0 Wind 90 deg - No Ice
12	1.2 Dead+1.0 Wind 120 deg - No Ice
13	0.9 Dead+1.0 Wind 120 deg - No Ice
14	1.2 Dead+1.0 Wind 135 deg - No Ice
15	0.9 Dead+1.0 Wind 135 deg - No Ice
16	1.2 Dead+1.0 Wind 150 deg - No Ice
17	0.9 Dead+1.0 Wind 150 deg - No Ice
18	1.2 Dead+1.0 Wind 180 deg - No Ice
19	0.9 Dead+1.0 Wind 180 deg - No Ice
20	1.2 Dead+1.0 Wind 210 deg - No Ice
21	0.9 Dead+1.0 Wind 210 deg - No Ice
22	1.2 Dead+1.0 Wind 225 deg - No Ice
23	0.9 Dead+1.0 Wind 225 deg - No Ice
24	1.2 Dead+1.0 Wind 240 deg - No Ice
25	0.9 Dead+1.0 Wind 240 deg - No Ice
26	1.2 Dead+1.0 Wind 270 deg - No Ice
27	0.9 Dead+1.0 Wind 270 deg - No Ice
28	1.2 Dead+1.0 Wind 300 deg - No Ice
29	0.9 Dead+1.0 Wind 300 deg - No Ice
30	1.2 Dead+1.0 Wind 315 deg - No Ice
31	0.9 Dead+1.0 Wind 315 deg - No Ice
32	1.2 Dead+1.0 Wind 330 deg - No Ice
33	0.9 Dead+1.0 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service
65	Dead+Wind 315 deg - Service
66	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
1.1	25 - 25	Pole	Max. Tension	35	0.04	0.00	-0.01
			Max. Compression	34	22726.72	0.00	0.00
			Max. Mx	10	-21330.46	-458072.86	0.00
			Max. My	3	-21330.46	0.00	488072.86
			Max. Vy	10	16039.22	-458072.86	0.00
			Max. Vx	2	-16039.22	0.00	-488072.86
			Max. Torque	16			0.00
1.2	25 - 1	Pole	Max. Tension	1	0.00	0.00	0.00
			Max. Compression	34	-26268.73	0.00	0.00
			Max. Mx	10	-25241.17	-950122.99	0.00
			Max. My	15	-25241.17	0.00	-950122.99
			Max. Vy	10	16667.49	-950122.99	0.00
			Max. Vx	15	16667.49	0.00	-950122.99
			Max. Torque	10			0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	34	26268.73	0.00	0.00
	Max. H$_x$	27	18932.16	16620.17	0.00
	Max. H$_z$	3	18932.16	0.00	16620.17
	Max. M$_x$	2	950122.99	0.00	16620.05
	Max. M$_z$	10	950122.99	-16620.05	0.00
	Max. Torsion	15	0.00	8313.17	-14393.63
	Min Vert	3	18932.16	0.00	16620.17
	Min H$_x$	11	18932.16	-16620.17	0.00
	Min H$_z$	19	18932.16	0.00	-16620.17
	Min M$_x$	18	-950122.99	0.00	-16620.05
	Min M$_z$	26	-950122.99	16620.05	0.00
	Min Torsion	20	-0.00	-8313.17	14393.63

Tower Mast Reaction Summary

Load Combination	Vertical lb	Shear$_x$ lb	Shear$_z$ lb	Overturning Moment, M$_x$ lb-ft	Overturning Moment, M$_z$ lb-ft	Torque lb-ft
Dead Only	21026.91	0.00	0.00	0.00	0.00	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	25242.88	0.00	-16620.05	-950122.99	0.00	0.00
0.9 Dead+1.0 Wind 0 deg - No Ice	18932.16	0.00	-16620.17	-940156.89	0.00	0.00
1.2 Dead+1.0 Wind 30 deg - No Ice	25242.88	8313.17	-14393.64	-822844.26	-475071.71	0.00
0.9 Dead+1.0 Wind 30 deg - No Ice	18932.16	8313.18	-14393.65	-814878.16	-470484.71	0.00

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Load Combination	Vertical lb	Shear$_x$ lb	Shear$_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
1.2 Dead+1.0 Wind 45 deg - No Ice	25242.88	11752.35	-11752.35	671852.82	-671852.82	0.00
0.9 Dead+1.0 Wind 45 deg - No Ice	18932.16	11752.37	-11752.37	664800.16	-664800.16	0.00
1.2 Dead+1.0 Wind 90 deg - No Ice	25242.88	14393.63	-8310.17	475071.71	-822848.26	-0.00
0.9 Dead+1.0 Wind 90 deg - No Ice	18932.16	14393.63	-8310.18	470084.71	-814210.56	-0.00
1.2 Dead+1.0 Wind 90 deg - No Ice	25242.87	16620.05	-0.00	0.00	-950122.99	0.00
0.9 Dead+1.0 Wind 90 deg - No Ice	18932.16	16620.07	0.00	0.00	-940156.89	0.00
1.2 Dead+1.0 Wind 120 deg - No Ice	25242.88	14393.63	8310.17	475071.71	-822848.26	0.00
0.9 Dead+1.0 Wind 120 deg - No Ice	18932.16	14393.63	8310.18	470084.71	-814210.56	0.00
1.2 Dead+1.0 Wind 135 deg - No Ice	25242.88	11752.35	11752.35	671852.82	-671852.82	0.00
0.9 Dead+1.0 Wind 135 deg - No Ice	18932.16	11752.37	11752.37	664800.16	-664800.16	0.00
1.2 Dead+1.0 Wind 150 deg - No Ice	25242.88	8310.17	14393.63	822848.26	-475071.71	-0.00
0.9 Dead+1.0 Wind 150 deg - No Ice	18932.16	8310.18	14393.63	814210.56	-470084.71	-0.00
1.2 Dead+1.0 Wind 180 deg - No Ice	25242.87	0.00	16620.05	950122.99	0.00	0.00
0.9 Dead+1.0 Wind 180 deg - No Ice	18932.16	0.00	16620.07	940156.89	0.00	0.00
1.2 Dead+1.0 Wind 210 deg - No Ice	25242.88	-8310.17	14393.63	822848.26	-475071.71	0.00
0.9 Dead+1.0 Wind 210 deg - No Ice	18932.16	-8310.18	14393.63	814210.56	-470084.71	0.00
1.2 Dead+1.0 Wind 225 deg - No Ice	25242.88	-11752.35	11752.35	671852.82	-671852.82	0.00
0.9 Dead+1.0 Wind 225 deg - No Ice	18932.16	-11752.37	11752.37	664800.16	-664800.16	0.00
1.2 Dead+1.0 Wind 240 deg - No Ice	25242.88	-14393.63	8310.17	475071.71	-822848.26	-0.00
0.9 Dead+1.0 Wind 240 deg - No Ice	18932.16	-14393.63	8310.18	470084.71	-814210.56	-0.00
1.2 Dead+1.0 Wind 270 deg - No Ice	25242.87	-16620.05	0.00	0.00	-950122.99	0.00
0.9 Dead+1.0 Wind 270 deg - No Ice	18932.16	-16620.07	-0.00	0.00	-940156.89	0.00
1.2 Dead+1.0 Wind 300 deg - No Ice	25242.88	-14393.63	-8310.17	-475071.71	-822848.26	0.00
0.9 Dead+1.0 Wind 300 deg - No Ice	18932.16	-14393.63	-8310.18	-470084.71	-814210.56	0.00
1.2 Dead+1.0 Wind 315 deg - No Ice	25242.88	-11752.35	-11752.35	-671852.82	-671852.82	0.00
0.9 Dead+1.0 Wind 315 deg - No Ice	18932.16	-11752.37	-11752.37	-664800.16	-664800.16	0.00
1.2 Dead+1.0 Wind 330 deg - No Ice	25242.88	-8310.17	-14393.63	-822848.26	-475071.71	-0.00
0.9 Dead+1.0 Wind 330 deg - No Ice	18932.16	-8310.18	-14393.63	-814210.56	-470084.71	-0.00
1.2 Dead+1.0 Ice	26264.55	0.00	0.00	0.00	0.00	0.00
1.2 Dead+1.0 Wind 0 deg - 1.0 Ice	26268.51	0.00	-7321.78	-131990.58	0.00	0.00
1.2 Dead+1.0 Wind 30 deg+1.0 Ice	26268.51	3680.64	-2010.39	-115173.25	-66495.97	0.00

Load Combination	Vertical	Shear$_x$	Shear$_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
1.2 Dead+1.0 Wind 45 deg+1.0 Ice	26268.51	1641.39	-1641.39	94038.55	-94038.55	0.00
1.2 Dead+1.0 Wind 90 deg+1.0 Ice	26268.51	2010.29	-1160.64	66495.30	-115173.23	0.00
1.2 Dead+1.0 Wind 90 deg+1.0 Ice	26268.51	2321.28	0.00	0.00	-132990.58	0.00
1.2 Dead+1.0 Wind 120 deg+1.0 Ice	26268.51	2010.29	1160.64	66495.30	-115173.23	0.00
1.2 Dead+1.0 Wind 135 deg+1.0 Ice	26268.51	1641.39	1641.39	94038.55	-94038.55	0.00
1.2 Dead+1.0 Wind 150 deg+1.0 Ice	26268.51	1160.64	2010.29	115173.23	-66495.30	-0.00
1.2 Dead+1.0 Wind 180 deg+1.0 Ice	26268.51	0.00	2321.28	132990.58	0.00	0.00
1.2 Dead+1.0 Wind 210 deg+1.0 Ice	26268.51	-1160.64	2010.29	115173.23	66495.30	0.00
1.2 Dead+1.0 Wind 225 deg+1.0 Ice	26268.51	-1641.39	1641.39	94038.55	94038.55	0.00
1.2 Dead+1.0 Wind 240 deg+1.0 Ice	26268.51	-2010.29	1160.64	66495.30	115173.23	-0.00
1.2 Dead+1.0 Wind 270 deg+1.0 Ice	26268.51	-2321.28	0.00	0.00	132990.58	0.00
1.2 Dead+1.0 Wind 300 deg+1.0 Ice	26268.51	-2010.29	-1160.64	-66495.30	115173.23	0.00
1.2 Dead+1.0 Wind 315 deg+1.0 Ice	26268.51	-1641.39	-1641.39	-94038.55	94038.55	0.00
1.2 Dead+1.0 Wind 330 deg+1.0 Ice	26268.51	-1160.64	-2010.29	-115173.23	66495.30	-0.00
Dead+Wind 0 deg - Service	21035.73	0.00	-5372.75	-308215.42	0.00	0.00
Dead+Wind 30 deg - Service	21035.73	2686.37	-4652.93	-266922.40	-154107.71	0.00
Dead+Wind 45 deg - Service	21035.73	3799.11	-3799.11	-217941.24	-217941.24	0.00
Dead+Wind 60 deg - Service	21035.73	4652.93	-2686.37	-154107.71	-266922.40	-0.00
Dead+Wind 90 deg - Service	21035.73	5372.75	0.00	0.00	-308215.42	0.00
Dead+Wind 120 deg - Service	21035.73	4652.93	2686.37	154107.71	-266922.40	0.00
Dead+Wind 135 deg - Service	21035.73	3799.11	3799.11	217941.24	-217941.24	0.00
Dead+Wind 150 deg - Service	21035.73	2686.37	4652.93	266922.40	-154107.71	0.00
Dead+Wind 180 deg - Service	21035.73	0.00	5372.75	308215.42	0.00	0.00
Dead+Wind 210 deg - Service	21035.73	-2686.37	4652.93	266922.40	154107.71	0.00
Dead+Wind 225 deg - Service	21035.73	-3799.11	3799.11	217941.24	217941.24	0.00
Dead+Wind 240 deg - Service	21035.73	-4652.93	2686.37	154107.71	266922.40	-0.00
Dead+Wind 270 deg - Service	21035.73	-5372.75	-0.00	0.00	308215.42	0.00
Dead+Wind 300 deg - Service	21035.73	-4652.93	-2686.37	-154107.71	266922.40	0.00
Dead+Wind 315 deg - Service	21035.73	-3799.11	-3799.11	-217941.24	217941.24	0.00
Dead+Wind 330 deg - Service	21035.73	-2686.37	-4652.93	-266922.40	154107.71	-0.00

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	0.00	-21035.74	0.00	0.00	21035.74	0.00	0.000%
2	0.00	-25242.88	-14420.89	0.00	25242.87	16620.05	0.000%
3	0.00	18932.16	-14420.89	0.00	18932.16	16620.17	0.000%
4	8310.20	-25242.88	-14393.68	-8310.17	25242.88	14393.63	0.000%
5	8310.20	-18932.16	-14393.68	-8310.18	18932.16	14393.63	0.000%
6	11752.59	-25242.88	-11752.59	-11752.59	25242.88	11752.59	0.000%
7	11752.59	-18932.16	-11752.59	-11752.59	18932.16	11752.59	0.000%
8	14393.68	-25242.88	-8310.20	-14393.63	25242.88	8310.17	0.000%

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
9	-14393.68	-18932.16	-8310.20	-14393.65	18932.16	8310.18	0.000%
10	-16620.49	-25242.88	0.00	-16620.35	25242.87	0.00	0.001%
11	-16620.39	-18932.16	0.00	-16620.17	18932.16	0.00	0.001%
12	-14393.68	-25242.88	8310.20	-14393.65	25242.88	8310.17	0.000%
13	-14393.68	-18932.16	8310.20	-14393.65	18932.16	8310.18	0.000%
14	-11752.39	-25242.88	11752.39	-11752.35	25242.88	11752.35	0.000%
15	-11752.39	-18932.16	11752.39	-11752.37	18932.16	11752.37	0.000%
16	8310.20	-25242.88	14393.68	-8310.17	25242.88	14393.65	0.000%
17	8310.20	-18932.16	14393.68	-8310.18	18932.16	14393.65	0.000%
18	0.00	-25242.88	16620.39	0.00	25242.87	16620.35	0.001%
19	0.00	-18932.16	16620.39	0.00	18932.16	16620.37	0.001%
20	-8310.20	-25242.88	14393.68	-8310.17	25242.88	14393.65	0.000%
21	-8310.20	-18932.16	14393.68	-8310.18	18932.16	14393.65	0.000%
22	-11752.39	-25242.88	11752.39	-11752.35	25242.88	11752.35	0.000%
23	-11752.39	-18932.16	11752.39	-11752.37	18932.16	11752.37	0.000%
24	-14393.68	-25242.88	8310.20	-14393.65	25242.88	8310.17	0.000%
25	-14393.68	-18932.16	8310.20	-14393.65	18932.16	8310.18	0.000%
26	-16620.39	-25242.88	0.00	-16620.35	25242.87	0.00	0.001%
27	-16620.39	-18932.16	0.00	-16620.17	18932.16	0.00	0.001%
28	-14393.68	-25242.88	-8310.20	-14393.65	25242.88	-8310.17	0.000%
29	-14393.68	-18932.16	-8310.20	-14393.65	18932.16	-8310.18	0.000%
30	-11752.39	-25242.88	-11752.39	-11752.35	25242.88	-11752.35	0.000%
31	-11752.39	-18932.16	-11752.39	-11752.37	18932.16	-11752.37	0.000%
32	8310.20	-25242.88	-14393.68	8310.17	25242.88	-14393.65	0.000%
33	8310.20	-18932.16	-14393.68	8310.18	18932.16	-14393.65	0.000%
34	0.00	-26268.53	0.00	0.00	26268.51	0.00	0.000%
35	0.00	-26268.53	-2321.28	0.00	26268.51	2321.28	0.000%
36	1161.25	-26268.53	-2011.35	-1160.64	26268.51	2010.29	0.000%
37	1742.26	-26268.53	-1742.26	-1741.39	26268.51	1741.39	0.000%
38	2011.35	-26268.53	-1161.25	2010.29	26268.51	1160.64	0.000%
39	2321.51	-26268.53	0.00	2321.28	26268.51	0.00	0.000%
40	2011.35	-26268.53	1161.25	-2010.29	26268.51	-1160.64	0.000%
41	1742.26	-26268.53	1742.26	-1741.39	26268.51	-1741.39	0.000%
42	1161.25	-26268.53	2011.35	-1160.64	26268.51	-2010.29	0.000%
43	0.00	-26268.53	2321.51	0.00	26268.51	-2321.28	0.000%
44	-1161.25	-26268.53	2011.35	1160.64	26268.51	-2010.29	0.000%
45	-1742.26	-26268.53	1742.26	1741.39	26268.51	-1741.39	0.000%
46	-2011.35	-26268.53	1161.25	2010.29	26268.51	-1160.64	0.000%
47	-2321.51	-26268.53	0.00	2321.28	26268.51	0.00	0.000%
48	-2011.35	-26268.53	-1161.25	2010.29	26268.51	1160.64	0.000%
49	-1742.26	-26268.53	-1742.26	1741.39	26268.51	1741.39	0.000%
50	-1161.25	-26268.53	-2011.35	1160.64	26268.51	2010.29	0.000%
51	0.00	-21035.74	5372.21	0.00	21035.73	5372.19	0.002%
52	-2686.61	-21035.74	-4653.34	2686.37	21035.73	4652.93	0.002%
53	-3799.43	-21035.74	-3799.43	3796.11	21035.73	3796.11	0.002%
54	-4653.34	-21035.74	-2686.61	4652.93	21035.73	2686.37	0.002%
55	-5372.21	-21035.74	0.00	5372.19	21035.73	0.00	0.002%
56	-4653.34	-21035.74	2686.61	4652.93	21035.73	-2686.37	0.002%
57	-3799.43	-21035.74	3799.43	3796.11	21035.73	-3799.11	0.002%
58	-2686.61	-21035.74	4653.34	2686.37	21035.73	-4652.93	0.002%
59	0.00	-21035.74	5372.21	0.00	21035.73	-5372.19	0.002%
60	2686.61	-21035.74	4653.34	-2686.37	21035.73	-4652.93	0.002%
61	3799.43	-21035.74	3799.43	-3796.11	21035.73	-3799.11	0.002%
62	4653.34	-21035.74	2686.61	-4652.93	21035.73	-2686.37	0.002%
63	5372.21	-21035.74	0.00	-5372.19	21035.73	0.00	0.002%
64	4653.34	-21035.74	-2686.61	-4652.93	21035.73	2686.37	0.002%
65	3799.43	-21035.74	-3799.43	-3796.11	21035.73	3799.11	0.002%
66	2686.61	-21035.74	-4653.34	-2686.37	21035.73	4652.93	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	10	0.00000001	0.00003957
3	Yes	10	0.00000001	0.00003536
4	Yes	11	0.00000001	0.00006147
5	Yes	11	0.00000001	0.00004591
6	Yes	11	0.00000001	0.00002956
7	Yes	11	0.00000001	0.00006254
8	Yes	11	0.00000001	0.00006147
9	Yes	11	0.00000001	0.00004591
10	Yes	10	0.00000001	0.00003955
11	Yes	10	0.00000001	0.00004596
12	Yes	11	0.00000001	0.00006147
13	Yes	11	0.00000001	0.00004591
14	Yes	11	0.00000001	0.00002956
15	Yes	11	0.00000001	0.00003761
16	Yes	11	0.00000001	0.00006147
17	Yes	11	0.00000001	0.00004591
18	Yes	10	0.00000001	0.00003952
19	Yes	10	0.00000001	0.00004596
20	Yes	11	0.00000001	0.00006147
21	Yes	11	0.00000001	0.00004591
22	Yes	11	0.00000001	0.00002956
23	Yes	11	0.00000001	0.00003564
24	Yes	11	0.00000001	0.00006147
25	Yes	11	0.00000001	0.00004591
26	Yes	10	0.00000001	0.00003952
27	Yes	10	0.00000001	0.00003596
28	Yes	11	0.00000001	0.00006147
29	Yes	11	0.00000001	0.00004591
30	Yes	11	0.00000001	0.00002956
31	Yes	11	0.00000001	0.00003564
32	Yes	11	0.00000001	0.00006147
33	Yes	11	0.00000001	0.00004591
34	Yes	6	0.00000001	0.00000001
35	Yes	8	0.00000001	0.00017999
36	Yes	8	0.00000001	0.00012527
37	Yes	8	0.00000001	0.00017366
38	Yes	8	0.00000001	0.00012527
39	Yes	5	0.00000001	0.00012999
40	Yes	5	0.00000001	0.00012527
41	Yes	8	0.00000001	0.00017366
42	Yes	8	0.00000001	0.00012527
43	Yes	5	0.00000001	0.00012999
44	Yes	5	0.00000001	0.00012527
45	Yes	8	0.00000001	0.00017366
46	Yes	8	0.00000001	0.00012527
47	Yes	8	0.00000001	0.00012999
48	Yes	8	0.00000001	0.00012527
49	Yes	8	0.00000001	0.00017366
50	Yes	8	0.00000001	0.00012527
51	Yes	9	0.00000001	0.00007196
52	Yes	9	0.00000001	0.00005807
53	Yes	9	0.00000001	0.00005952
54	Yes	9	0.00000001	0.00007196
55	Yes	9	0.00000001	0.00005807
56	Yes	9	0.00000001	0.00005952

58	Yes	9	0.00000001	0.00005807
59	Yes	9	0.00000001	0.00007156
60	Yes	9	0.00000001	0.00005807
61	Yes	9	0.00000001	0.00005262
62	Yes	9	0.00000001	0.00005807
63	Yes	9	0.00000001	0.00007156
64	Yes	9	0.00000001	0.00005807
65	Yes	9	0.00000001	0.00005262
66	Yes	9	0.00000001	0.00005807

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	75 - 25	10.110	59	1.6415	0.0000
L2	25.25 - 1	1.589	59	0.6265	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
75.00	Centerament Loading @ 75 ft	59	10.110	1.6418	0.0000	21715
70.00	(4) Generic Panel (Enclosed, 115 lbs)	59	8.998	0.9965	0.0000	21715
65.00	Concentrated Loading @ 65 ft	59	7.909	0.9506	0.0000	10857
60.00	(4) Generic Panel (Enclosed, 115 lbs)	59	6.850	0.9038	0.0000	9268
55.00	Concentrated Loading @ 55 ft	59	5.801	0.8559	0.0000	8428
50.00	(4) Generic Panel (Enclosed, 115 lbs)	59	4.827	0.7956	0.0000	4342
45.00	Concentrated Loading @ 45 ft	59	3.922	0.7432	0.0000	4618

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	75 - 25	31.197	15	5.2647	0.0000
L2	25.25 - 1	5.175	15	1.6194	0.0000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft

Elevation ft	Appurtenances	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
75.00	Concealment Cladding @ 75.0	18	31.102	3.2027	0.0000	7004
73.00	(4) Generic Panel (Enclosed, 115 lbs)	18	27.687	3.0650	0.0000	7004
65.00	Concealment Cladding @ 65.0	18	24.410	3.0249	0.0000	3546
63.00	(4) Generic Panel (Enclosed, 115 lbs)	18	21.017	2.9787	0.0000	2364
55.00	Concealment Cladding @ 55.0	18	17.852	2.625.	0.0000	1772
53.00	(4) Generic Panel (Enclosed, 115 lbs)	18	14.857	2.5612	0.0000	1417
45.00	Concealment Cladding @ 45.0	18	12.025	2.2850	0.0000	1180

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	$K l_r$	A in²	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	75 - 72.5021	TP30.75x2.x0.1875	30.00	0.00	0.0	12.6635	-1215.91	370930.00	0.002
	72.5021 - 70.1842					12.5849	-1356.60	352977.00	0.002
	70.1842 - 67.7763					13.2273	-2349.67	279624.00	0.007
	67.7763 - 65.3681					13.3038	-5476.57	789971.00	0.007
	65.3681 - 62.9605					13.7852	-7872.49	806218.00	0.010
	62.9605 - 60.5526					14.0625	-8036.60	822963.00	0.010
	60.5526 - 58.1447					14.8421	-12038.50	839012.00	0.014
	58.1447 - 55.7368					14.6215	-12184.40	853859.00	0.014
	55.7368 - 53.3289					14.9019	-14623.00	870305.00	0.017
	53.3289 - 50.9211					15.1914	-14797.90	886053.00	0.017
	50.9211 - 48.5132					15.7598	-18548.10	904810.00	0.021
	48.5132 - 46.1053					15.7501	-19004.20	900715.00	0.021
	46.1053 - 43.6974					16.0169	-22422.50	919093.00	0.022
	43.6974 - 41.2895					16.2981	-22609.50	936440.00	0.023
	41.2895 - 38.8816					16.5726	-22402.20	949787.00	0.021
	38.8816 - 36.4737					16.8570	-22601.70	986134.00	0.021
	36.4737 - 34.0658					17.1464	-23106.30	1002450.00	0.021
	34.0658 - 31.6579					17.4139	-23315.80	1018830.00	0.021
	31.6579 -					17.6969	-23330.40	1035170.00	0.021

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in²	P_u lb	φP_n lb	Ratio P_u / φP_n
	24.25								
	24.25 - 25					18.7485	-9629.96	1054030.00	0.009
L3	25 - 25	TP35.03x20.0464x0.25	28.25	0.00	0.0	25.4042	-12657.30	1395400.00	0.009
	25 - 23.7368					24.0595	-22439.40	1470930.00	0.016
	23.7368 - 22.4737					23.2951	-22583.80	1421260.00	0.016
	22.4737 - 21.2105					24.4005	-23229.60	1532700.00	0.016
	21.2105 - 19.9474					24.0803	-22876.60	1444130.00	0.016
	19.9474 - 18.6842					24.5813	-23025.00	1553600.00	0.016
	18.6842 - 17.4211					25.0269	-24174.60	1549000.00	0.016
	17.4211 - 16.1579					25.2725	-23925.50	1474480.00	0.016
	16.1579 - 14.8947					25.4678	-23777.70	1589870.00	0.016
	14.8947 - 13.6316					25.6633	-23651.10	1597380.00	0.016
	13.6316 - 12.368					25.8587	-23785.20	1512930.00	0.016
	12.368 - 11.1053					26.0542	-23941.50	1524170.00	0.016
	11.1053 - 9.84211					26.2496	-24098.60	1535600.00	0.016
	9.84211 - 8.57895					26.4451	-24256.90	1547060.00	0.016
	8.57895 - 7.31579					26.6405	-24416.30	1558470.00	0.016
	7.31579 - 6.05263					26.8360	-24576.80	1569980.00	0.016
	6.05263 - 4.78947					27.0314	-24738.50	1581460.00	0.016
	4.78947 - 3.52632					27.2269	-24901.30	1592970.00	0.016
	3.52632 - 2.2631e					27.4223	-25065.40	1604510.00	0.016
	2.2631e - 1					27.6178	-25231.10	1615640.00	0.016

Pole Bending Design Data

Section No.	Elevation ft	Size	M_ux kip-ft	φM_nx kip-ft	Ratio M_ux / φM_nx	M_uy kip-ft	φM_ny kip-ft	Ratio M_uy / φM_ny
L1	70.1842 - 72.5921	TP50.75x27.0x0.1875	6755.77	397586.67	0.017	0.00	392385.67	0.000
	72.5921 - 70.1842		13792.08	407260.17	0.034	0.00	407260.17	0.000
	70.1842 - 67.7763		21473.33	407330.67	0.053	0.00	422301.69	0.000
	67.7763 - 65.3684		23427.67	447475.08	0.052	0.00	447475.08	0.000
	65.3684 - 62.9605		15686.42	452781.67	0.035	0.00	452781.67	0.000
	62.9605 - 60.5526		65543.25	455211.17	0.144	0.00	455211.17	0.000

Section No.	Elevation ft	Size	M_x lb-ft	ϕM_{nx} lb-ft	Ratio M_x / ϕM_{nx}	M_y lb-ft	ϕM_{ny} lb-ft	Ratio M_y / ϕM_{ny}
	60.5526 - 58.1447		85125.00	453795.00	0.188	0.00	453795.00	0.000
	58.1447 - 55.7368		108051.67	496125.67	0.218	0.00	496125.67	0.000
	55.7368 - 53.3289		120156.67	513191.67	0.234	0.00	513191.67	0.000
	53.3289 - 50.9211		163520.83	541093.67	0.302	0.00	541093.67	0.000
	50.9211 - 48.5132		193385.83	547000.00	0.354	0.00	547000.00	0.000
	48.5132 - 46.1053		224613.33	563028.33	0.399	0.00	563028.33	0.000
	46.1053 - 43.6974		239356.67	579129.17	0.413	0.00	579129.17	0.000
	43.6974 - 41.2895		269097.50	596295.00	0.451	0.00	596295.00	0.000
	41.2895 - 38.8816		335000.00	617518.33	0.542	0.00	617518.33	0.000
	38.8816 - 36.4737		378056.67	627791.67	0.602	0.00	627791.67	0.000
	36.4737 - 34.0658		411250.00	641107.50	0.641	0.00	641107.50	0.000
	34.0658 - 31.6579		445604.17	660157.50	0.675	0.00	660157.50	0.000
	31.6579 - 29.25		468884.17	676884.17	0.693	0.00	676884.17	0.000
	29.25 - 25		244523.33	705782.50	0.346	0.00	705782.50	0.000
1.2	29.25 - 25	TP48.053x29.3463x0.25	511455.83	1079525.00	0.474	0.00	1079525.00	0.000
	25 - 23.7368		530929.17	1043741.67	0.509	0.00	1043741.67	0.000
	23.7368 - 22.4737		593510.00	1058000.00	0.561	0.00	1058000.00	0.000
	22.4737 - 21.2105		637021.67	1072308.33	0.594	0.00	1072308.33	0.000
	21.2105 - 19.9474		638164.17	1086650.67	0.588	0.00	1086650.67	0.000
	19.9474 - 18.6842		639856.67	1101066.67	0.581	0.00	1101066.67	0.000
	18.6842 - 17.4211		679650.00	1115508.33	0.609	0.00	1115508.33	0.000
	17.4211 - 16.1579		704272.50	1130000.00	0.623	0.00	1130000.00	0.000
	16.1579 - 14.8947		720965.00	1144525.00	0.630	0.00	1144525.00	0.000
	14.8947 - 13.6316		741627.50	1159091.67	0.640	0.00	1159091.67	0.000
	13.6316 - 12.3684		762569.17	1173708.33	0.650	0.00	1173708.33	0.000
	12.3684 - 11.1053		783100.00	1188350.00	0.659	0.00	1188350.00	0.000
	11.1053 - 9.8421		808880.00	1203041.67	0.668	0.00	1203041.67	0.000
	9.8421 - 8.57895		824689.17	1217758.33	0.677	0.00	1217758.33	0.000
	8.57895 - 7.31579		843525.00	1232516.67	0.684	0.00	1232516.67	0.000
	7.31579 - 6.05263		866391.67	1247308.33	0.695	0.00	1247308.33	0.000
	6.05263 - 4.78947		887291.67	1262133.33	0.703	0.00	1262133.33	0.000
	4.78947 -		908209.45	1276991.67	0.711	0.00	1276991.67	0.000

Section No.	Elevation ft	Size	M_x lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_x}{\phi M_{nx}}$	M_y lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_y}{\phi M_{ny}}$
	4.5-2.42							
	8.5-2.42 - 2.25-3.6		929166.67	1301873.00	0.719	0.00	1301873.00	0.000
	2.25-3.6 - ...		950131.67	1306794.67	0.727	0.00	1306794.67	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_x lb	ϕV_{nx} lb	Ratio $\frac{V_x}{\phi V_{nx}}$	Actual V_y lb-ft	ϕV_{ny} lb-ft	Ratio $\frac{V_y}{\phi V_{ny}}$
1.1	0 - 92.592...	HSS(Tx21)(C 18.0	2850.91	222279.00	0.013	0.00	414278.63	0.000
	92.592... - 70.1842		2956.90	227183.00	0.013	0.00	432704.00	0.000
	70.1842 - 67.7256		3274.07	232087.00	0.014	0.00	431643.00	0.000
	67.7256 - 65.2681		3516.62	236991.00	0.014	0.00	450963.33	0.000
	65.2681 - 62.8105		7821.63	241895.00	0.032	0.00	460625.00	0.000
	62.8105 - 60.3529		7575.58	246799.00	0.032	0.00	470286.00	0.000
	60.3529 - 58.1417		9294.33	251204.00	0.037	0.00	541218.33	0.000
	58.1417 - 55.7368		8330.42	256608.00	0.032	0.00	552120.00	0.000
	55.7368 - 53.3289		12579.90	261512.00	0.048	0.00	562425.00	0.000
	53.3289 - 50.9211		12590.00	266416.00	0.048	0.00	593133.33	0.000
	50.9211 - 48.5132		12946.70	271320.00	0.048	0.00	617240.00	0.000
	48.5132 - 46.1053		13023.50	276225.00	0.049	0.00	637960.00	0.000
	46.1053 - 43.6974		13067.00	281128.00	0.050	0.00	662078.33	0.000
	43.6974 - 41.2895		13571.00	286032.00	0.051	0.00	685200.00	0.000
	41.2895 - 38.8816		13795.80	290936.00	0.054	0.00	709725.00	0.000
	38.8816 - 36.4737		13853.00	295840.00	0.054	0.00	733852.33	0.000
	36.4737 - 34.0658		13927.40	300744.00	0.053	0.00	758587.00	0.000
	34.0658 - 31.6579		13989.90	305648.00	0.052	0.00	783819.17	0.000
	31.6579 - 29.25		15039.80	310552.00	0.057	0.00	808657.50	0.000
	29.25 - 25		7779.33	317918.00	0.032	0.00	854866.67	0.000
1.2	29.25 - 25	HSS(Tx20)(C 16.0)(0.25	9628.32	419618.00	0.022	0.00	1106775.00	0.000
	25 - 23.7368		15216.90	422619.00	0.036	0.00	1104961.67	0.000
	23.7368 - 22.4737		15241.50	425279.00	0.036	0.00	1143766.67	0.000
	22.4737 - 21.2105		16066.20	429609.00	0.038	0.00	1167783.33	0.000
	21.2105 - 19.9474		16240.60	433939.00	0.038	0.00	1189350.00	0.000

Section No.	Elevation ft	Size	Actual P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
	196.672 - 186.842		16414.90	476660.00	0.037	0.00	1599115.67	0.000
	186.842 - 174.211		16338.50	440100.00	0.037	0.00	1218034.33	0.000
	174.211 - 161.579		16462.30	448950.00	0.037	0.00	1237091.67	0.000
	161.579 - 148.947		16385.90	446400.00	0.037	0.00	1256590.00	0.000
	148.947 - 133.6315		16439.40	438300.00	0.038	0.00	1275084.33	0.000
	133.6315 - 123.3684		16430.40	435930.00	0.038	0.00	1295134.33	0.000
	123.3684 - 111.1053		16450.00	457230.00	0.036	0.00	1314816.67	0.000
	111.1053 - 98.8421		16472.10	460651.00	0.036	0.00	1334616.67	0.000
	98.8421 - 86.57895		16502.10	464111.00	0.036	0.00	1354566.67	0.000
	86.57895 - 73.31579		16525.00	467541.00	0.035	0.00	1374638.33	0.000
	73.31579 - 63.05263		16547.80	470471.00	0.035	0.00	1394808.33	0.000
	63.05263 - 48.78947		16570.50	474401.00	0.035	0.00	1415300.00	0.000
	48.78947 - 33.52632		16593.10	477831.00	0.035	0.00	1435861.67	0.000
	33.52632 - 23.26316		16615.70	481262.00	0.035	0.00	1456525.00	0.000
	23.26316 - 1		16638.20	484692.00	0.034	0.00	1477366.67	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
1 1	75 - 72.592	0.002	0.017	0.000	0.013	0.000	0.019 ✔	1.000	✔
	72.5921 - 70.1842	0.002	0.034	0.000	0.013	0.000	0.036 ✔	1.000	✔
	70.1842 - 63.7763	0.007	0.051	0.000	0.014	0.000	0.053 ✔	1.000	✔
	63.7763 - 60.3684	0.007	0.067	0.000	0.014	0.000	0.073 ✔	1.000	✔
	60.3684 - 52.9605	0.010	0.103	0.000	0.017	0.000	0.114 ✔	1.000	✔
	52.9605 - 50.5526	0.010	0.140	0.000	0.022	0.000	0.151 ✔	1.000	✔
	50.5526 - 48.1447	0.014	0.176	0.000	0.023	0.000	0.191 ✔	1.000	✔
	48.1447 - 45.7368	0.014	0.213	0.000	0.022	0.000	0.228 ✔	1.000	✔
	45.7368 -	0.017	0.257	0.000	0.048	0.000	0.276	1.000	✔

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	58.3389						✔		
	53.3389 - 50.9211	0.019	0.306	0.000	0.044	0.000	0.325	1.000	✔
	50.9211 - 48.5122	0.021	0.304	0.000	0.048	0.000	0.327	1.000	✔
	48.5122 - 46.1053	0.021	0.325	0.000	0.047	0.000	0.423	1.000	✔
	46.1053 - 43.6974	0.022	0.448	0.000	0.046	0.000	0.473	1.000	✔
	43.6974 - 41.2895	0.022	0.492	0.000	0.055	0.000	0.524	1.000	✔
	41.2895 - 38.8816	0.021	0.518	0.000	0.054	0.000	0.572	1.000	✔
	38.8816 - 36.4737	0.021	0.564	0.000	0.054	0.000	0.618	1.000	✔
	36.4737 - 34.0658	0.021	0.535	0.000	0.053	0.000	0.568	1.000	✔
	34.0658 - 31.6579	0.021	0.681	0.000	0.052	0.000	0.704	1.000	✔
	31.6579 - 29.25	0.021	0.721	0.000	0.052	0.000	0.715	1.000	✔
	29.25 - 25	0.016	0.340	0.000	0.022	0.000	0.356	1.000	✔
13	29.25 - 25	0.009	0.474	0.000	0.022	0.000	0.478	1.000	✔
	25 - 23.7368	0.016	0.553	0.000	0.038	0.000	0.570	1.000	✔
	23.7368 - 22.4737	0.016	0.565	0.000	0.038	0.000	0.582	1.000	✔
	22.4737 - 21.2105	0.016	0.576	0.000	0.038	0.000	0.594	1.000	✔
	21.2105 - 19.9474	0.016	0.588	0.000	0.038	0.000	0.605	1.000	✔
	19.9474 - 18.6842	0.016	0.599	0.000	0.037	0.000	0.616	1.000	✔
	18.6842 - 17.4211	0.016	0.609	0.000	0.037	0.000	0.626	1.000	✔
	17.4211 - 16.1579	0.016	0.620	0.000	0.037	0.000	0.637	1.000	✔
	16.1579 - 14.8947	0.016	0.630	0.000	0.037	0.000	0.647	1.000	✔
	14.8947 - 13.6316	0.016	0.640	0.000	0.036	0.000	0.657	1.000	✔
	13.6316 - 12.3684	0.016	0.650	0.000	0.036	0.000	0.667	1.000	✔
	12.3684 - 11.1053	0.016	0.659	0.000	0.036	0.000	0.676	1.000	✔
	11.1053 - 9.8421	0.016	0.668	0.000	0.036	0.000	0.685	1.000	✔
	9.8421 - 8.57895	0.016	0.677	0.000	0.036	0.000	0.694	1.000	✔
	8.57895 - [illegible]	0.016	0.646	0.000	0.035	0.000	0.663	1.000	✔

Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uz} / ϕM_{nz}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	2.31575						✔		
	2.31575 -	0.016	0.695	0.000	0.025	0.003	0.711	1.000	✔
	6.03253						✔		
	6.03253 -	0.016	0.705	0.000	0.035	0.000	0.720	1.000	✔
	9.75087						✔		
	9.75087 -	0.016	0.711	0.000	0.035	0.000	0.724	1.000	✔
	13.62502						✔		
	13.62502 -	0.016	0.713	0.000	0.035	0.000	0.726	1.000	✔
	17.36315						✔		
	17.36315 - 1	0.016	0.727	0.000	0.034	0.000	0.741	1.000	✔

Section Capacity Table

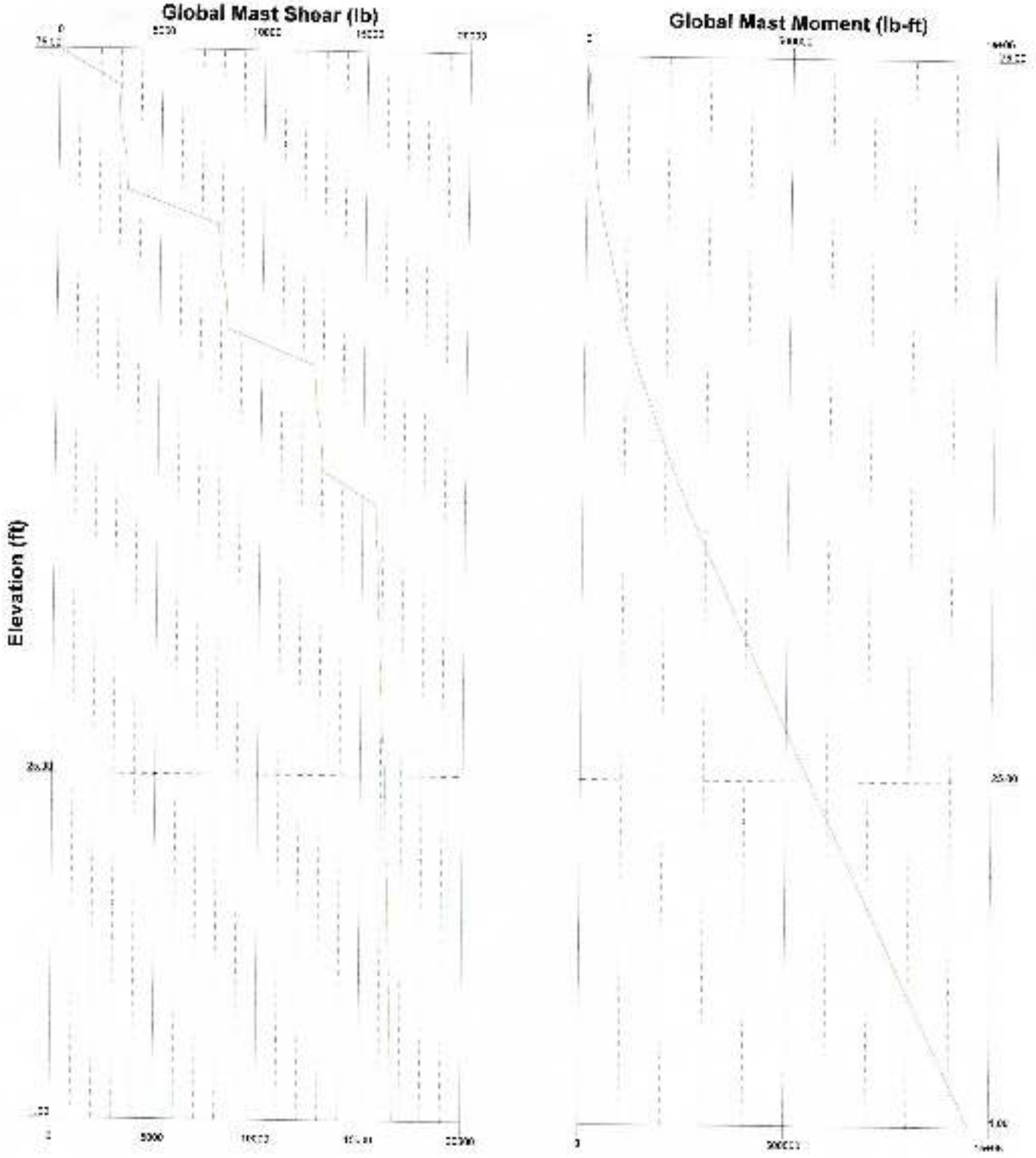
Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
L1	75 - 35	Pole	TP35.75x21.90.1875	1	-21330.40	105170.00	74.5	Pass
L2	35 - 1	Pole	TP35.355x29.5463x0.25	2	-25341.10	135600.00	74.4	Pass
						Summary		
						Pole (L1)	74.5	Pass
						RATING =	74.5	Pass

TIA-222-H - 104 mph/30 mph 0.2500 in Ice Exposure C

Vx Vz

Maximum Values

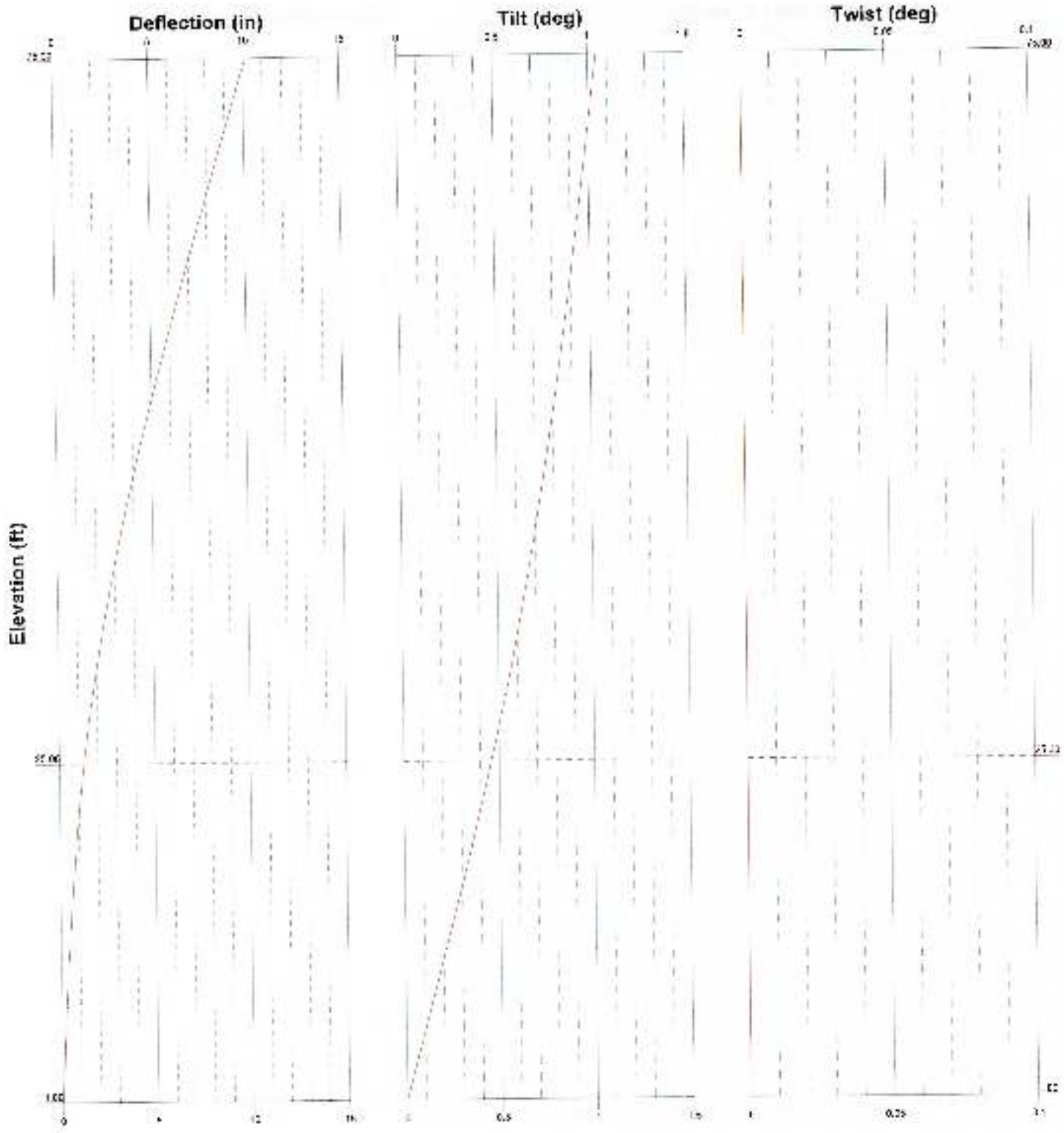
Mx Mz



Vector Structural Engineering 60[illegible] W Galena Park Blvd Draper, UT 84020 Phone: (801) 990-1776 FAX: (801) 990-1776	Spike Project: U0142.2054.242 Drawn by: mirza Appd: Code: [illegible] Date: 10/24/24 Dwg No. E-1

TIA-222-H - Service - 60 mph

Maximum Values
36 of 137

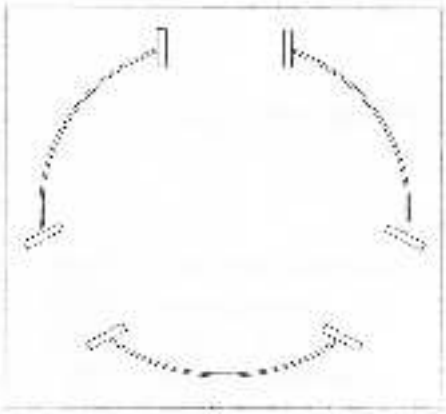


Vector Structural Engineering 551 W Galena Park Blvd Draper, UT 84020 Phone: (801) 990-1775 FAX: (801) 990-1776	Spike		
	Proj: U0142.2054.242		
	Client: Easy Ag	Drawn by: mg DB	App'd:
	Code: TIA-222-H	Date: 03/24/21	Scale: NTS
	Path:		Dwg No. E-3

JOB NO.: U0142.2054.242

PROJECT: NM01-148 SPIKE

Port Design:



Label: Ports at 70 ft A.G.L.

Geometry Input

Elevation of Port, AGL	70.00	ft
Pole Diameter	21.975	in
Pole Thickness	0.1875	in
Pole Yield Strength	65	ksi
Pole Unit Tensile Strength	11.0	k/in
Weld Filler Strength:	70	ksi
Required Fillet Weld:	3/8	in
Reinforcing Rim Yield Strength	50	ksi
# of Ports	3	

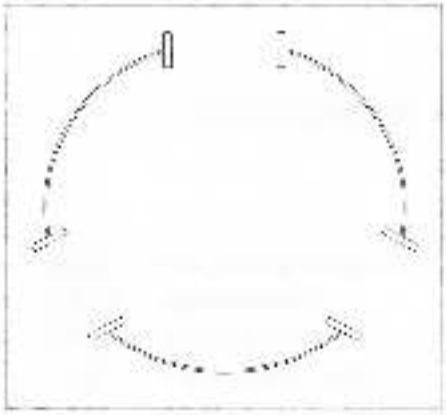
	Port 1	Port 2	Port 3
Azimuth (°)	0	120	240
Height (in)	12	12	12
Width (in)	8	8	8
Depth (in)	2.5	2.5	2.5
Thickness (in)	0.5	0.5	0.5
Projection (in)	0.5	0.5	0.5
Reinforcing Area (in^2)	2.5	2.5	2.5
Pole Area Removed (in^2)	1.54	1.54	1.54
Dist. From Center to Reinf. (in)	10.7375	10.2375	10.2375
Area Check	**79.9%**	**79.9%**	**79.9%**
MOI Check	**85.0%**	**85.0%**	**85.0%**

Individual Port Weights (lbs)	14	14	14
Reduction in Pole Weight (lbs)	16		
Total Port Weight (lbs)	27		

JOB NO.: UC142.2054.242

PROJECT: NM01-148 SPIKE

Port Design:



Label: Ports at 60 ft A.G.L.

Geometry Input

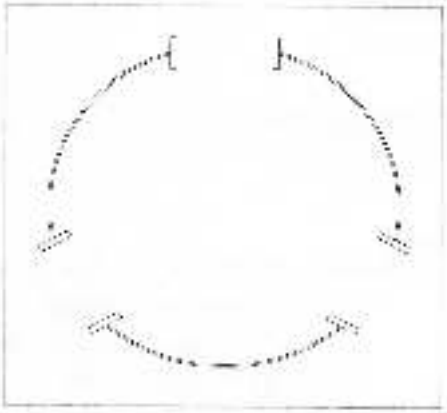
Elevation of Port, AGL	60.00	ft
Pole Diameter	23.925	in
Pole Thickness	0.1875	in
Pole Yield Strength	65	ksi
Pole Unit Tensile Strength	11.0	k/in
Weld Filler Strength:	70	ksi
Required Fillet Weld:	3/8	in
Reinforcing Rim Yield Strength	50	ksi
# of Ports	3	

	Port 1	Port 2	Port 3
Azimuth (°)	0	120	240
Height (in)	12	12	12
Width (in)	8	8	8
Depth (in)	2.5	2.5	2.5
Thickness (in)	0.5	0.5	0.5
Projection (in)	0.5	0.5	0.5
Reinforcing Area (in^2)	2.5	2.5	2.5
Pole Area Removed (in^2)	1.53	1.53	1.53
Dist. From Center to Reinf. (in)	11.2125	11.2125	11.2125
Area Check	**79.6%**	**79.6%**	**79.6%**
MOI Check	**84.2%**	**84.2%**	**84.2%**
Individual Port Weights (lbs)	14	14	14
Reduction in Pole Weight (lbs)	16		
Total Port Weight (lbs)	27		

JOB NO.: U0142.2054.242

PROJECT: NVI01-148 SPIKE

Port Design:



Label: Ports at 50 ft A.G.L.

Geometry Input

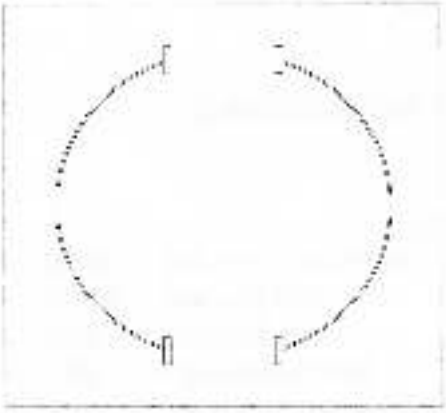
Elevation of Port, AGL	50.00	ft
Pole Diameter	25.875	in
Pole Thickness	0.1875	in
Pole Yield Strength	65	ksi
Pole Unit Tensile Strength	11.0	k/in
Weld Filler Strength:	70	ksi
Required Fillet Weld:	3/8	in
Reinforcing Rim Yield Strength	50	ksi
# of Ports	3	

	Port 1	Port 2	Port 3
Azimuth (°)	0	120	240
Height (in)	12	12	12
Width (in)	8	8	8
Depth (in)	2.5	2.5	2.5
Thickness (in)	0.5	0.5	0.5
Projection (in)	0.5	0.5	0.5
Reinforcing Area (in^2)	2.5	2.5	2.5
Pole Area Removed (in^2)	1.53	1.53	1.53
Dist. From Center to Reinf. (in)	12.1875	12.1875	12.1875
Area Check	**79.3%**	**79.3%**	**79.3%**
MDI Check	**83.6%**	**83.6%**	**83.6%**
Individual Port Weights (lbs)	14	14	14
Reduction in Pole Weight (lbs)	16		
Total Port Weight (lbs)	27		

JOB NO.: U0142.2054.242

PROJECT: NM01-148 SPIKE

Port Design:



Label: Ports at 7 ft A.G.L.

Geometry Input

Elevation of Port, AGL	7.00	ft
Pole Diameter	33.885	in
Pole Thickness	0.25	in
Pole Yield Strength	65	ksi
Pole Unit Tensile Strength	14.6	k/in
Weld Filler Strength:	70	ksi
Required Fillet Weld:	1/2	in
Reinforcing Rim Yield Strength	50	ksi
# of Ports	2	

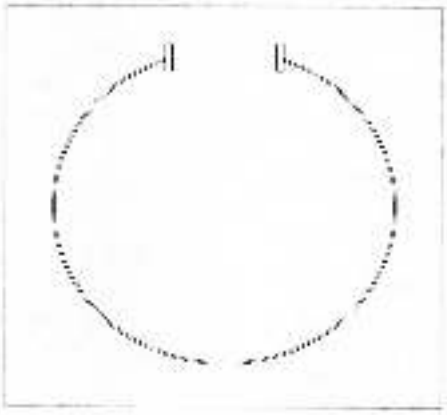
	Port 1	Port 2
Azimuth (°)	0	180
Height (in)	24	24
Width (in)	12	12
Depth (in)	3	3
Thickness (in)	0.75	0.75
Projection (in)	0.5	0.5
Reinforcing Area (in^2)	4.5	4.5
Pole Area Removed (in^2)	3.07	3.07
Dist. From Center to Reinf. (in)	15.9425	15.9425
Area Check	**88.6%**	**88.6%**
MOI Check	**93.5%**	**93.5%**
Individual Port Weights (lbs)	46	46
Reduction in Pole Weight (lbs)	42	
Total Port Weight (lbs)	50	

VECTOR ENGINEERS

JOB NO.: U0142.2054.242

PROJECT: NM01-148 SPIKE

Port Design:



Label: Ports at 3 ft A.G.L.

Geometry Input

Elevation of Port, AGL	3.00	ft
Pole Diameter	34.665	in
Pole Thickness	0.25	in
Pole Yield Strength	65	ksi
Pole Unit Tensile Strength	14.6	k/in
Weld Filler Strength:	70	ksi
Required Fillet Weld:	1/2	in
Reinforcing Rim Yield Strength	50	ksi
# of Ports	1	

	Port 1
Azimuth (°)	0
Height (in)	24
Width (in)	12
Depth (in)	3
Thickness (in)	0.75
Projection (in)	0.5
Reinforcing Area (in^2)	4.5
Pole Area Removed (in^2)	3.06
Dist. From Center to Reinf. (in)	16.3325
Area Check	**88.5%**
MOI Check	**93.3%**

Individual Port Weights (lbs)	46
Reduction in Pole Weight (lbs)	23
Total Port Weight (lbs)	23

VECTOR ENGINEERS

JOB NO.: 00142.206.122

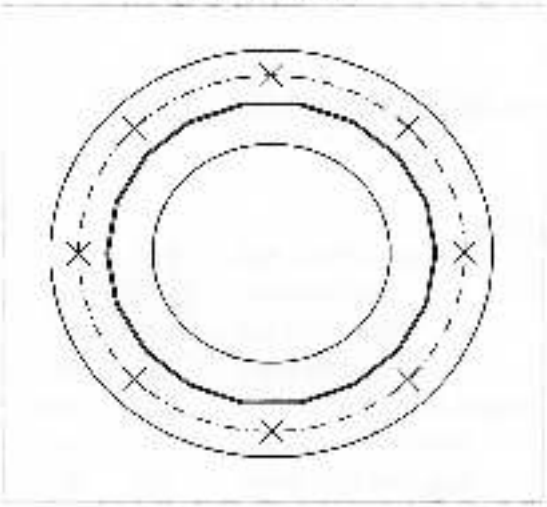
PROJECT: NM01-179 SPIRE

Monopole Baseplate & Anchorage Design per TIA-222-H Annex Q & TIA-222-H Section 4.9.9

Basic Input & Geometry

Quantity	Symbol	Value	Units
Number of sides		18	
Pole O.D.	D	36.06	in
Pole wall thickness	t	0.25	in
Pole yield strength	F_{yp}	65	ksi
Pole fillet weld size		0.75	in
base plate fillet weld size		0.75	in
Anchor diameter	d	2.25	in
Number of anchors	n	8	
Anchor grade		A615-75	
Base plate thickness	t_p	2.25	in
Base plate yield strength	F_y	50	ksi
Anchor hole diameter		2.625	in
Slotted to outside edge?		No	
Flat washer diameter		4	
Zinc drain hole diameter		2.625	
Zinc drain hole		90.0	in
Bolt circle diameter	D_{BC}	41.5	in
Plate O.D.	D_{PL}	47.5	in
Plate ID		25.5	in

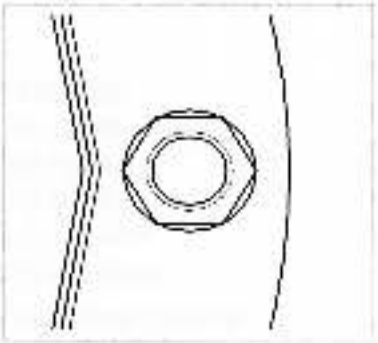
Base Plate Illustration



LRFD Loads

	Symbol	Wind		Seismic	
Axial down	$R_{u,v}$	26.27	k	0.00	k
Axial up	$R_{u,v}$	0	k	0.00	k
Shear	V_u	16.62	k	0.00	k
Moment	M_u	950.14	k-ft	0.00	k-ft
Member mom. capacity	ϕM_n	1320	k-ft		

Fit Check



Checks

Plate stress ratio	46.8%	OK	
Anchor utility check	55.0%	OK	
Min. number of sides	18	OK	6 minimum
Min. number of anchors	8	OK	8 minimum
Max. anchor rod to pole distance	3.1"	OK	13.5" maximum
Min. anchor diameter	2.25"	OK	0.75" minimum
Max. anchor rod spacing	16.3"	NG	13.5" maximum
Min. anchor rod spacing	15.88"	OK	6.75" minimum
Min. base plate thickness	2.25"	OK	2" minimum
Min. inside diameter	25.5"	OK	20.52" minimum
Max. inside diameter	25.5"	OK	21.125" maximum

Note: when number of anchors is less than minimum and when maximum anchor rod spacing is exceeded, adjustments are made to the effective plate width calculations as if requirements of TIA-222-H Annex Q were met.

Check	Dist.	Result
Washer vs weld	0.3339	OK
Washer vs OD	0.8125	OK
Washer covers hole	0.5	OK

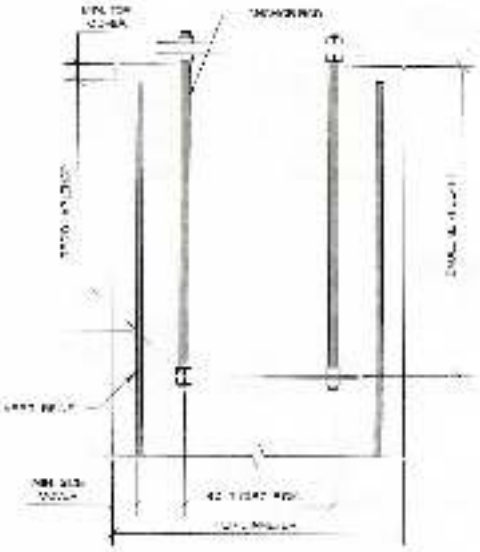
JOB NO.: U0142.2024.242

PROJECT: VM21-149 SPIKE

Anchorage Embedment Design

(per ACI 318-19)

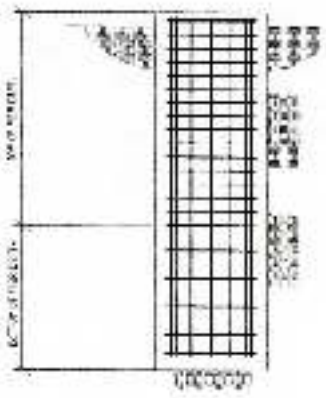
Vertical Bar Size:	#6
# of Vertical Bars:	22
Concrete Compressive Strength [psi]:	4000
Pier Diameter [ft]:	5.5
Pier Depth [ft]:	20
Top of Pier Elevation [ft]:	5
Concrete Volume [yd³]:	18.0
Side Concrete Cover [in]:	4
Top Concrete Cover [in]:	3
Horizontal Tie Size:	#4
Bolt Circle Diameter [in]:	41.5
# of Anchor Rods:	8
Anchor Rod Diameter [in]:	2.25



ψ_t (bar location factor):	1.0	Table 25.4.2.4
ψ_e (epoxy coating factor):	1.0	Table 25.4.2.4
ψ_s (bar size factor):	1.0	Table 25.4.2.4
λ (concrete type factor):	1.0	Table 25.4.2.4
Vertical Bar Diameter [in]:	0.750	
Horizontal Tie Diameter [in]:	0.500	
Buffer [in]:	4.25	
Req'd Lap Length [in]:	37.0	in (Section 25.4.2.2)
Min. Req'd Embedment Depth [in]:	**46.2**	

Transverse Reinforcement Design

Seismic Design Category:	C
Apply Seismic Detailing?	No
Site Class:	C
Type of Transverse Reinforcement:	Spiral
Transverse f_y [ksi]:	50
Seismic Hooks Required?	No
Tie Size OK?	Yes
Spacing at Top of Pier [in]:	12
Spacing at Bottom of Pier [in]:	12
Total Pier Length [ft]:	20.5
Top Pier Length [ft]:	20.5
Bottom Pier Length [ft]:	0



JOB NO.: UC142.2054.242

Project: NM01-118 SPIKE

Drilled Pier Design:

Applied Loads:

Max. shear, V:	22.2	k	Design methodology:	LRFD	
Max. moment, M:	1,266.9	k-ft	Maximum foundation rating:	100%	
Max. down, P_{down}:	35.0	k			
Max. uplift, P_{uplift}:	0.0	k			

Pier Properties:

Pier shape:	Round		Volume of concrete:	487	ft^3
Pier diameter, b:	5.5	ft	Volume of concrete:	18.0	yd^3
Min. pier diameter, bmin (opt'l):	0.0	ft	Weight of concrete:	73.1	k
b:	5.5				
Top of pier elevation:	0.5	ft			
Pier depth, d:	20	ft			
Min. pier depth, d_{min} (opt'l):	0.0	ft			

Soil Properties & Analysis:

Allow. bearing pressure:	65,600	psf	F.S.: 1
Gross or net?	Net		
1/3 increase for short term loads?	No		
Skin friction (down):	0	psf	F.S.: 1
Skin friction (uplift):	0	psf	F.S.: 1
Top length to ignore:	2.75	ft	
1/3 increase for short term loads?	No		
Combine skin friction w/ end bearing?	No		
Bearing capacity:	1,558.5	k	
Uplift capacity:	65.9	k	

Results:

Bearing capacity OK.
Uplift capacity OK.

Lateral analysis in LPile

JOB NO.: Uc142.2004.242

PROJECT: NM01 149 Soka

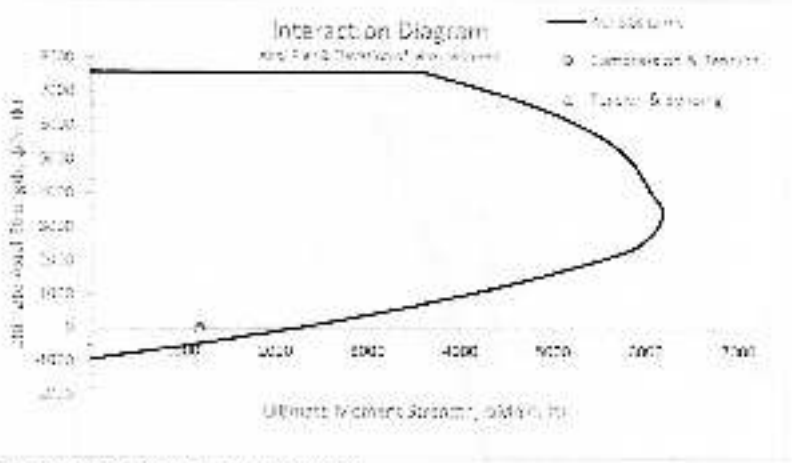
Drilled Pier Reinforcement:

Design Requirements:

Max. Moment, M (k-ft):	900.1	Max. Down, P_{max} (k):	23.0	Required Foundation UC : (ini):	100%
Max. Shear, V (k):	16.0	Max. Uplift, P_{up} (k):	0.0	Mu, M+VH+P*e*E (k-ft):	1108.7
Height or V (ft):	15.833	Eccentricity for P (in):	3	(Uplift is negative for comparison w/ Interaction Diagram)	
		Concrete Self-weight (k):	47.7 (0.145 pcf)		

Pier Properties:

Code Reference:	ACI 318-19	
Pier Diameter (ft):	5.5	
Top of Pier Elevation (ft):	0	
Pier Depth (ft):	20	
Vertical Bar Size:	#8	
Bar Diameter (in):	1	
Bar Area (in^2):	0.79	
Seismic Design Category:	C	
# of Vertical Bars:	22	
Vert. Yield Strength (psi):	60000	
Horizontal Reinf. Type:	Spiral	
Horizontal Reinf. Size:	#4	
Horizontal Reinf. Diameter (in):	0.5	
Side Concrete Cover (in):	4	
Vert. Lage Distance (in):	4.5	
Conc. Comp. Strength f'c (psi):	4000	
Angle Between Bars, δ (radians):	0.286	
Area of Steel (in^2):	17.4	
Gross Column Area (in^2):	3421.2	
Min. Reinforcement Ratio:	0.50%	(IBC Sections 1810.3.9.4.1 and 1810.3.9.4.2)
β_1:	0.85	Table 22.2.2.4.3
Concrete Yield Strain, ε_{cy} (min):	0.003	Section 22.2.2.1
P_o (k):	12619	Eqn. 22.4.2.2
α:	0.75	Table 21.2.2
Pn Factor:	0.80	Table 22.4.2.1
ϕP_n (pure compression, k):	7569	
Es (ksi):	29000	
Steel Yield Strain, ε_y (min):	0.002069	Section 21.2.2.1
Number of verticals in top row:	1	



Axial & Bending Checks:

Steel/Concrete Ratio: 0.51% > Min. Reinf. Ratio

Compression & Bending:

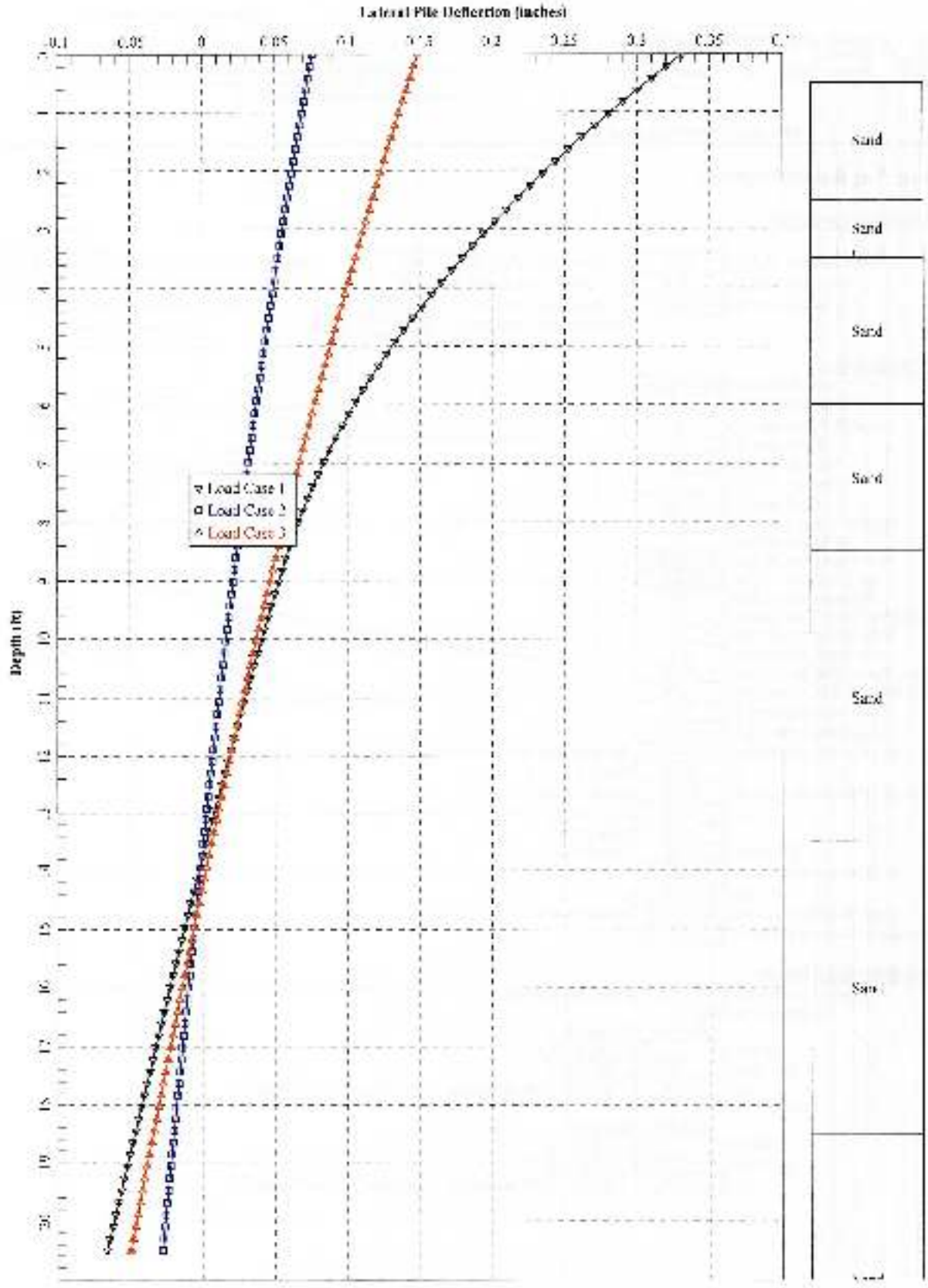
	@ V Pier	@ Max. M	
ϕP_n (k):	1917	3283	
ϕM_n (k-ft):	2222.9	2313.2	
UC:	53.1%	51.1%	OK, Adequate

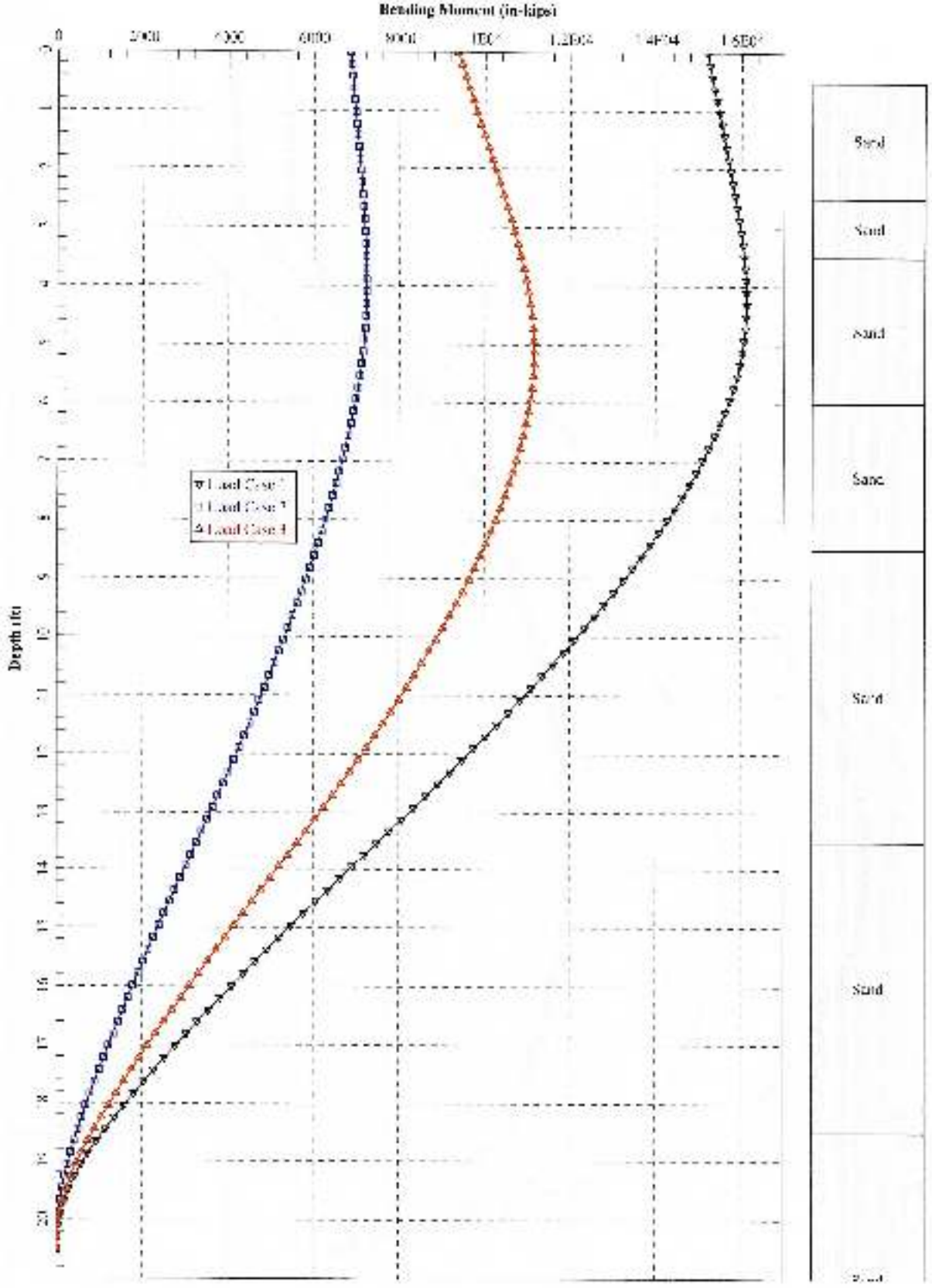
$(P_u/\phi P_n)^{1.0}+(M_u/\phi M_n)^{1.0}$

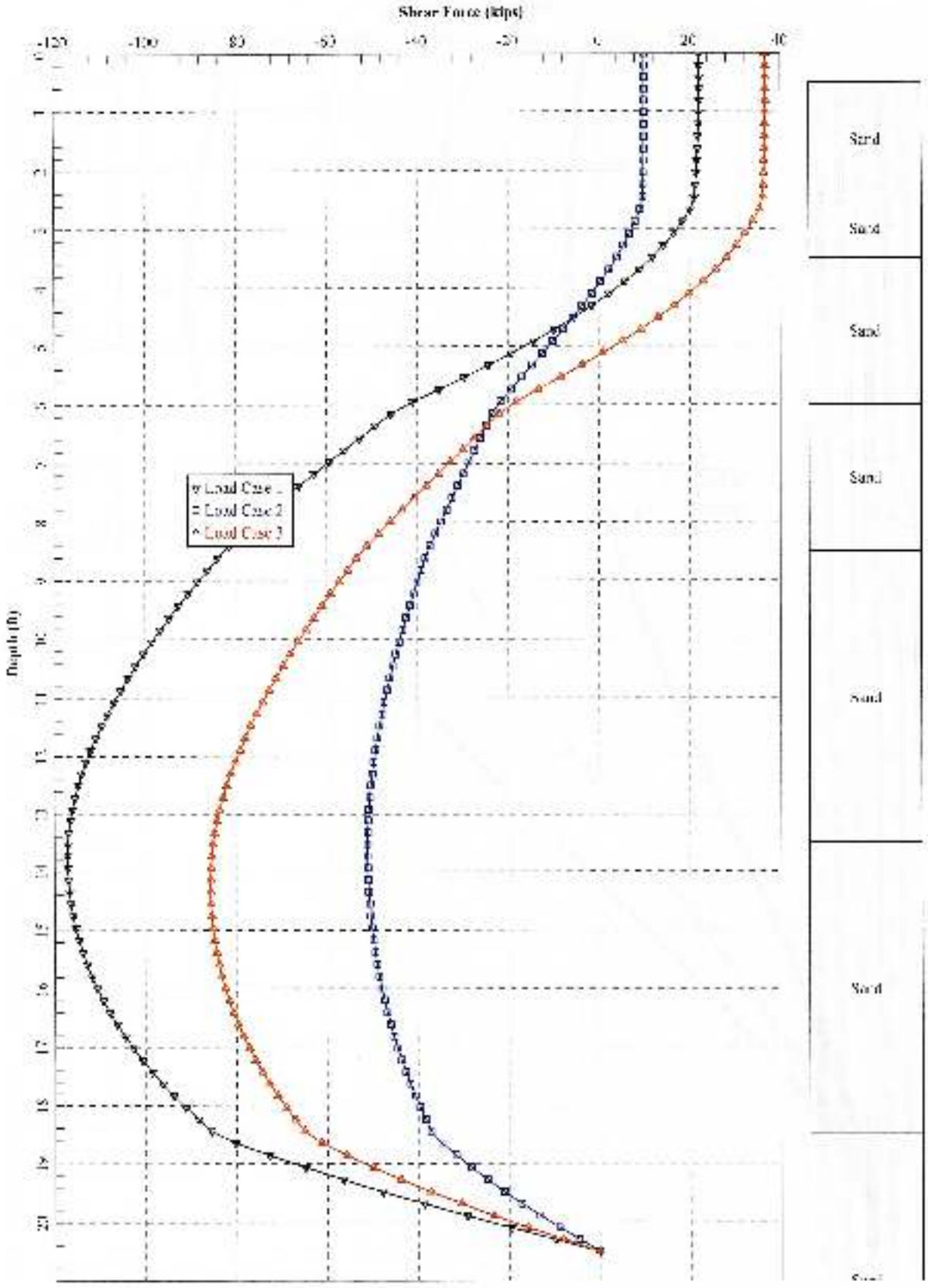
Tension & Bending:

	@ V Pier	@ Max. M	
ϕP_n (k):	0.0	42.9	
ϕM_n (k-ft):	2152.5	2270.1	
UC:	54.1%	52.0%	OK, Adequate

$(P_u/\phi P_n)^{1.0}+(M_u/\phi M_n)^{1.0}$


Lateral Pile Deflection (inches)
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Depth (ft)
Load Case 1
Load Case 2
Load Case 3
Sand
Sand
Sand
Sand
Sand
Sand


Bending Moment (in-kips)
0
2400
4800
7200
9600
12000
14400
16800
Depth (ft)
Load Case 2
Load Case 3
Load Case 4
Sand
Sand
Sand
Sand
Sand
Sand


Shear Force (kips)
-120
-100
-80
-60
-40
-20
0
20
40
Depth (ft)
Load Case 1
Load Case 2
Load Case 3
Sand
Sand
Sand
Sand
Sand
Sand

LPILE for Windows, Version 2017-11.021

Analysis of Laterally Loaded Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method
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This program LPILE is being run by:

Name
Date

Serial Number of Security Device: 197268936

This copy of LPILE is licensed to Fellow, US Gov

Assign Structural Engineer: Ms. J

Run of this program by any party other than "Master Structural" may void Ms. J
the provisions of the software license agreement.

Files Used for Analysis

Path to file locations:
C:\Users\Ms. J\Local Projects\2017 Projects\2017 Examples\Ex11-2014-Dra
Name of data file: 2002 MRD-146 Cpile (Dr, Manager's edit version).lp11d

Name of input data file:
Ex 11-2014-Dra.lp11d

Name of output report file:
Ex 11-2014-Dra.lo11

Name of plot output file:
Ex 11-2014-Dra.lp11

Name of runtime message file:
C:\LPILE\Data\Ex11.ld1

Title of Analysis

Date: October 24, 2019 Time: 1:21:57

Title Page

Cpile Sim. #002: 146 Cpiles

of Mexico: 20142.2014.203

Client: Cheap

Engineer: Proper

Project Title:

Program Options and Settings

Computational Options:
- Use 6 divisions (nodes or calculations) per layer
Engineering Units for Input and Computations:
- US Customary System (lb, in, deg, F, sec)

Analysis Control Options:
- Maximum number of iterations allowed = 500
- Deflection tolerance for convergence = 1.2000E-02 in
- Pile-head loading and pile-head = 100.0000 in
- Number of pile increments = 100

Loading Type and Number of Cycles of Loading:
- Static loading specified

- Use of pay modification factors for pay curves not selected
- Analysis type (layering considered (Method of Georgiadis)
- No distributed lateral loads are applied
- Loading by lateral soil movements not acting on piles not selected
- Input of axial pile-head loads on the pile tip not selected
- Input of moment pile-head loads on the pile tip not selected
- Elastic analysis: pile-head foundation stiffness matrix not selected
- Pressure analysis of piles not selected
- Buckling analysis of piles not selected

Input Options
- Units: pile-soil-pile system units: Kips, feet, degrees
- Slopes of p-y curves: Variable with depth
- Number of pile sections defined = 1
- Total length of pile = 31.500 ft
- Depth of ground surface below top of pile = 0.5000 ft

Pile dimensions used for p-y curves computations are defined using a points.

p-y curves are computed using a pile section with a constant diameter equal to the largest of the pile. A summary of the p-y curve computations at each depth follows

Pt. No.	Depth Below Pile Head ft	Pile Diameter in
1	0.500	30.0000
2	31.500	30.0000

Pile structural properties for Pile Section

Pile Section No. 1

Section is a Drilled Shaft, Cast-in-Place, or Slurry Wall
Length of section = 31.000000 ft
Shear Capacity = 2.9022 kips

Pile-head deflection and pile batter angles

Batter Angle = 0.000 degrees
0.000 radians

Pile Rotation Angle = 0.000 degrees
0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 1 layers

Layer 1 is sand, p-y criteria by Reese et al., 2017

Distance from top of pile to top of layer = 0.500000 ft
Distance from top of pile to bottom of layer = 2.000000 ft
Effective unit weight at top of layer = 110.000000 pcf
Effective unit weight at bottom of layer = 110.000000 pcf
Angle of friction for soil = 35.000000 deg.
Angle of friction for soil = 35.000000 deg.
Subgrade k for soil = 0.0000 pci
Subgrade k for soil = 0.0000 pci

Wedge failure solution for subgrade reaction will be executed for this layer.

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 2.000000 ft
Distance from top of pile to bottom of layer = 31.000000 ft
Effective unit weight at top of layer = 110.000000 pcf
Effective unit weight at bottom of layer = 110.000000 pcf
Friction angle of soil = 42.000000 deg
Friction angle of soil = 42.000000 deg
Subgrade k of soil = 0.0000 pci
Subgrade k of soil = 0.0000 pci

Wedge failure solution for subgrade reaction will be computed for this layer

User-specified p-y criteria by Reese et al., 1974

[illegible]	=	2.000000 ft
[illegible]	=	0.000000 ft
Effective unit weight at top of layer	=	115.000000 pcf
Effective unit weight at bottom of layer	=	115.000000 pcf
Friction angle at top of layer	=	45.000000 deg.
Friction angle at bottom of layer	=	45.000000 deg.
Subgrade k at top of layer	=	0.0000 pci
Subgrade k at bottom of layer	=	0.0000 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 3 is sand, dry criteria by Kezdi et al., 1979

Distance from top of pile to top of layer	=	5.000000 ft
Distance from top of pile to bottom of layer	=	9.000000 ft
Effective unit weight at top of layer	=	110.000000 pcf
Effective unit weight at bottom of layer	=	110.000000 pcf
Friction angle at top of layer	=	30.000000 deg.
Friction angle at bottom of layer	=	30.000000 deg.
Subgrade k at top of layer	=	0.0000 pci
Subgrade k at bottom of layer	=	0.0000 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 4 is sand, dry criteria by Kezdi et al., 1979

Distance from top of pile to top of layer	=	9.000000 ft
Distance from top of pile to bottom of layer	=	17.000000 ft
Effective unit weight at top of layer	=	124.000000 pcf
Effective unit weight at bottom of layer	=	124.000000 pcf
Friction angle at top of layer	=	35.000000 deg.
Friction angle at bottom of layer	=	35.000000 deg.
Subgrade k at top of layer	=	0.7500 pci
Subgrade k at bottom of layer	=	0.7500 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 5 is clay, dry criteria by Kezdi et al., 1979

Distance from top of pile to top of layer	=	17.000000 ft
Distance from top of pile to bottom of layer	=	19.000000 ft
Effective unit weight at top of layer	=	124.000000 pcf
Effective unit weight at bottom of layer	=	124.000000 pcf
Friction angle at top of layer	=	24.000000 deg.
Friction angle at bottom of layer	=	24.000000 deg.
Subgrade k at top of layer	=	0.0000 pci
Subgrade k at bottom of layer	=	0.0000 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 6 is sand, dry criteria by Kezdi et al., 1979

Distance from top of pile to top of layer	=	19.000000 ft
Distance from top of pile to bottom of layer	=	33.000000 ft
Effective unit weight at top of layer	=	111.000000 pcf
Effective unit weight at bottom of layer	=	111.000000 pcf
Friction angle at top of layer	=	40.000000 deg.
Friction angle at bottom of layer	=	40.000000 deg.
Subgrade k at top of layer	=	0.2000 pci
Subgrade k at bottom of layer	=	0.2000 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 7 is sand, dry criteria by Kezdi et al., 1979

Distance from top of pile to top of layer	=	33.000000 ft
Distance from top of pile to bottom of layer	=	43.000000 ft
Effective unit weight at top of layer	=	111.000000 pcf
Effective unit weight at bottom of layer	=	111.000000 pcf
Friction angle at top of layer	=	40.000000 deg.
Friction angle at bottom of layer	=	40.000000 deg.
Subgrade k at top of layer	=	0.2000 pci
Subgrade k at bottom of layer	=	0.2000 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 8 is clay, dry criteria by Kezdi et al., 1979

Distance from top of pile to top of layer	=	43.000000 ft
Distance from top of pile to bottom of layer	=	45.000000 ft
Effective unit weight at top of layer	=	119.000000 pcf
Effective unit weight at bottom of layer	=	119.000000 pcf
Friction angle at top of layer	=	45.000000 deg.
Friction angle at bottom of layer	=	45.000000 deg.
Subgrade k at top of layer	=	0.7500 pci
Subgrade k at bottom of layer	=	0.7500 pci

With the unit value "k" sigma-k will be computed for each layer.

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	20.000000 ft
Distance from top of pile to bottom of layer	43.000000 ft
Effective unit weight at top of layer	115.000000 pcf
Effective unit weight at bottom of layer	115.000000 pcf
Friction angle at top of layer	42.000000 deg.
Friction angle at bottom of layer	42.000000 deg.
k-grade 1 at top of layer	40.0000 pci
k-grade 1 at bottom of layer	40.0000 pci

Default values for p-y curves will be used for this layer.

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	43.020002 ft
Distance from top of pile to bottom of layer	=	63.020002 ft
Effective unit weight at top of layer	=	115.020004 pcf
Effective unit weight at bottom of layer	=	115.020004 pcf
Friction angle at top of layer	=	42.000004 deg.
Friction angle at bottom of layer	=	42.000004 deg.
k-grade 1 at top of layer	=	40.0000 pci
k-grade 1 at bottom of layer	=	40.0000 pci

Default values for p-y curves will be computed for this layer.

Layer 3 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	63.020004 ft
Distance from top of pile to bottom of layer	=	83.020004 ft
Effective unit weight at top of layer	=	115.000004 pcf
Effective unit weight at bottom of layer	=	115.000004 pcf
Friction angle at top of layer	=	42.000004 deg.
Friction angle at bottom of layer	=	42.000004 deg.
k-grade 1 at top of layer	=	40.0000 pci
k-grade 1 at bottom of layer	=	40.0000 pci

Default values for p-y curves will be computed for this layer.

Layer 4 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	83.020004 ft
Distance from top of pile to bottom of layer	=	103.020004 ft
Effective unit weight at top of layer	=	115.000004 pcf
Effective unit weight at bottom of layer	=	115.000004 pcf
Friction angle at top of layer	=	42.000004 deg.
Friction angle at bottom of layer	=	42.000004 deg.
k-grade 1 at top of layer	=	40.0000 pci
k-grade 1 at bottom of layer	=	40.0000 pci

Default values for p-y curves will be computed for this layer.

Layer 5 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	103.020004 ft
Distance from top of pile to bottom of layer	=	123.020004 ft
Effective unit weight at top of layer	=	115.000004 pcf
Effective unit weight at bottom of layer	=	115.000004 pcf
Friction angle at top of layer	=	42.000004 deg.
Friction angle at bottom of layer	=	42.000004 deg.
k-grade 1 at top of layer	=	40.0000 pci
k-grade 1 at bottom of layer	=	40.0000 pci

Default values for p-y curves will be computed for this layer.

Layer 6 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	123.020004 ft
Distance from top of pile to bottom of layer	=	143.020004 ft
Effective unit weight at top of layer	=	115.000004 pcf
Effective unit weight at bottom of layer	=	115.000004 pcf
Friction angle at top of layer	=	42.000004 deg.
Friction angle at bottom of layer	=	42.000004 deg.
k-grade 1 at top of layer	=	40.0000 pci
k-grade 1 at bottom of layer	=	40.0000 pci

Default values for p-y curves will be computed for this layer.

Layer 7 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	143.020004 ft
Distance from top of pile to bottom of layer	=	163.020004 ft
Effective unit weight at top of layer	=	115.000004 pcf
Effective unit weight at bottom of layer	=	115.000004 pcf
Friction angle at top of layer	=	42.000004 deg.
Friction angle at bottom of layer	=	42.000004 deg.
k-grade 1 at top of layer	=	40.0000 pci
k-grade 1 at bottom of layer	=	40.0000 pci

Default values for p-y curves will be computed for this layer.

Layer 8 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	163.020004 ft
Distance from top of pile to bottom of layer	=	183.020004 ft
Effective unit weight at top of layer	=	115.000004 pcf
Effective unit weight at bottom of layer	=	115.000004 pcf
Friction angle at top of layer	=	42.000004 deg.
Friction angle at bottom of layer	=	42.000004 deg.
k-grade 1 at top of layer	=	40.0000 pci
k-grade 1 at bottom of layer	=	40.0000 pci

Default values for p-y curves will be computed for this layer.

Beginning the input soil layer values to solve the pile problem

Summary of Input Soil Properties

Layer Num.	Soil Type (p-y Curve Type)	Depth to Layer ft	Effective Unit Weight pcf	Friction Angle deg	Subgrade k pci
1	Sand (Reese, et al.)	0.0000	115.0000	36.0000	default
2	Sand (Reese, et al.)	3.9370	115.0000	36.0000	default
3	Sand (Reese, et al.)	5.9370	115.0000	42.0000	default
4	Sand (Reese, et al.)	9.8740	115.0000	42.0000	default
5	Sand (Reese, et al.)	13.8110	115.0000	45.0000	default
6	Sand (Reese, et al.)	19.6850	115.0000	45.0000	default
7	Sand (Reese, et al.)	23.6220	115.0000	45.0000	default
8	Sand (Reese, et al.)	29.5280	115.0000	45.0000	default
9	Sand (Reese, et al.)	33.4650	115.0000	45.0000	default
10	Sand (Reese, et al.)	39.3700	115.0000	45.0000	default
11	Sand (Reese, et al.)	43.3070	115.0000	45.0000	default
12	Sand (Reese, et al.)	49.2130	115.0000	45.0000	default
13	Sand (Reese, et al.)	53.1500	115.0000	45.0000	default
14	Sand (Reese, et al.)	59.0550	115.0000	45.0000	default
15	Sand (Reese, et al.)	62.9920	115.0000	45.0000	default
16	Sand (Reese, et al.)	68.8980	115.0000	45.0000	default
17	Sand (Reese, et al.)	72.8350	115.0000	45.0000	default
18	Sand (Reese, et al.)	78.7400	115.0000	45.0000	default
19	Sand (Reese, et al.)	82.6770	115.0000	45.0000	default
20	Sand (Reese, et al.)	88.5830	115.0000	45.0000	default
21	Sand (Reese, et al.)	92.5200	115.0000	45.0000	default
22	Sand (Reese, et al.)	98.4250	115.0000	45.0000	default
23	Sand (Reese, et al.)	102.3620	115.0000	45.0000	default

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 2

Load Case No.	Load Type	Pile-head Condition	Axial Thrust Force, lbs
1	V, H and M	Free	0.0
2	V, H and M	Free	0.0

1	1	0	[illegible]	in	M =	[illegible]	[illegible]
2	1	0	[illegible]	in	M =	[illegible]	[illegible]
3	1	0	[illegible]	in	M =	[illegible]	[illegible]

V = shear force applied to [illegible]
M = bending moment applied to [illegible]
y = lateral deflection normal to [illegible]
θ = pile slope relative to [illegible]
P = additional pressure applied to [illegible]
Values of [illegible], pile length [illegible] for load cases with
[illegible] of prior loading (case types 1, 2, and 3)
[illegible] were to assume to be [illegible], pile bottom angles.

Computations of Nominal Moment Strength and Ultimate Bending Resistance

Note: Ensure [illegible] values are [illegible] for pile-head loading conditions.

Number of Pile Sections Analyzed = 1

Pile Section No. 1

Dimensions and Properties of the Cast Steel Pile:

Length of Section	=	30.000000 ft
Pile Diameter	=	96.000000 in
Concrete Cover Thickness (to edge of longitudinal reinforcing steel)	=	4.000000 in
Number of Reinforcing Bars	=	12 bars
Yield Strength of Reinforcing Bars	=	60000. psi
Modulus of Elasticity of Reinforcing Bars	=	29000000. psi
Gross Area of Pile	=	7238. sq. in.
Total Area of Reinforcing Steel	=	37.200020 sq. in.
Gross Ratio of Steel Reinforcement	=	0.51 percent
Pile to Pile Spacing	=	7.500000 ft
Minimum Concrete Compressive Strength	=	5.000000 ksi
Ratio of Soil Resistance to Ultimate Value	=	0.70
Offset of Center of Rotation from Center of Pile	=	4.0000 in

Axial Structural Capacities:

Nominal Structural Capacity for Pile Section	=	[illegible] kips
Tensile Load for Cracking of Concrete	=	1,471. kips
Nominal Tensile Capacity	=	1,842.800 kips

Reinforcing Bar Dimensions and Positions Used in Analyses:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	1.002300	0.7896	43.500000	0.0000
2	1.002300	0.7896	41.849775	8.385512
3	1.002300	0.7896	37.127553	16.177522
4	1.002300	0.7896	30.000000	22.500000
5	1.002300	0.7896	21.872447	27.177522
6	1.002300	0.7896	12.150225	30.385512
7	1.002300	0.7896	1.849775	32.125000
8	1.002300	0.7896	-8.385512	32.125000
9	1.002300	0.7896	-18.177522	30.385512
10	1.002300	0.7896	-26.500000	27.177522
11	1.002300	0.7896	-33.127553	22.500000
12	1.002300	0.7896	-37.849775	16.385512
13	1.002300	0.7896	-39.500000	8.125000
14	1.002300	0.7896	-39.500000	0.000000
15	1.002300	0.7896	-39.500000	-8.125000
16	1.002300	0.7896	-37.849775	-16.385512
17	1.002300	0.7896	-33.127553	-23.177522
18	1.002300	0.7896	-26.500000	-28.500000
19	1.002300	0.7896	-18.177522	-32.177553
20	1.002300	0.7896	-8.385512	-34.849775
21	1.002300	0.7896	1.849775	-36.500000
22	1.002300	0.7896	12.150225	-36.500000
23	1.002300	0.7896	21.872447	-34.849775
24	1.002300	0.7896	30.000000	-32.177553
25	1.002300	0.7896	37.127553	-28.500000
26	1.002300	0.7896	41.849775	-23.177522
27	1.002300	0.7896	43.500000	-16.385512
28	1.002300	0.7896	43.500000	-8.125000

NOTE: The positions of the reinforcing bars were corrected by [illegible]

Minimum spacing between any reinforcing bars equal to zero - Ensure bottom
between bars is not [illegible].

Ratio of bar spacing to [illegible] = 0.23

Axial Properties

Compressive Strength of Concrete	[illegible] ksi
Modulus of Elasticity of Concrete	[illegible] ksi
Modulus of Rupture of Concrete	[illegible] ksi
Compressive Strength of Bare Steel	60.000 ksi
Modulus of Elasticity of Reinforcing Steel	29,000.000 ksi

Maximum tensile aggregate size [illegible]

Index of solid thrust force values determined for [illegible]

Material	Solid thrust force class
1	[illegible]
2	[illegible]
3	[illegible]

Definitions of key features and [illegible]

1 = concrete in [illegible]
2 = areas in reinforcing steel [illegible]
3 = All [illegible] for cross-sectional [illegible], tensile strain is relieved/removed outside 0.005 axial [illegible] / compressive strain is concrete more than 0.003 [illegible]
4 = spall of [illegible] [illegible]

During Stirrups (P [illegible]
No. [illegible]
Compressive [illegible]
Tensile [illegible]

S.n. Bias Fact = [illegible] clps

Material Number	Bending Moment [illegible]	Diff [illegible]	Bending Degrees	Min Dep	Min Res
[illegible]	[illegible]	clp-[illegible]	[illegible]	[illegible]	[illegible]
1.375019 (1)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Axial Thrust Force = [illegible] Kips

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0.1[illegible]	0.7[illegible]				

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] CY				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] CY				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] CY				
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[illegible]	[illegible] CY				
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[illegible]	[illegible] CY				
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[illegible]	[illegible] CY				
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[illegible]	[illegible] CY				
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[illegible]	[illegible] CY				
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[illegible]	[illegible] CY				
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[illegible]	[illegible] CY				
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[illegible]	[illegible] CY				
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[illegible]	[illegible] CY				
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[illegible]	[illegible] CY				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] CY				
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[illegible]	[illegible] CY				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] CY				

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Moment values interpolated at maximum compressive strain of [illegible] or maximum developed moment if pile fails [illegible]

Load No.	Axial Thrust kips	Nominal Moment Cap. in-kip	Max. Comp. Strain
1	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]

Note that the values of moment capacity in the table above are not factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.70).

The moment values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to ACI 318, Section [illegible] or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding bending stiffnesses [illegible] reinforced concrete sections.

Load No.	Resist. Factor for Moment	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in^2
1	0.65	[illegible]	[illegible]	[illegible]	[illegible]
2	0.65	[illegible]	[illegible]	[illegible]	[illegible]
3	0.65	[illegible]	[illegible]	[illegible]	[illegible]

1	0.75	39479.	3.723e+00	147481.	4932771.63
2	0.75	39479.	11.171e+00	442443.	49331548.0
3	0.75	39822.	19.617e+00	781447.	49277334.3
1	0.50	39479.	18.619e+00	735013.	33197.207
2	0.50	39479.	33.514e+00	1323..8.	49944.427
3	0.50	39739.	48.409e+00	1912..8.	49944.973

Layering Terminology Problem: Depths of Soil & Rock Types

Layer No.	(1) / Layer Thick. ft	Equivalent Top Depth Below Mud Line ft	Type Layer Type Is Layer Above	Layer Is Rock or Soil Below Rock Layer	(4) Strength Or Index	(5) Unit Weight Of Layer lbs/
1	0.7500	0.00	S.A.	NO	0.00	0000
2	2.5000	1.2500	YES	NO	0000.	77.000
3	5.0000	5.1000	YES	NO	0000.	125.00
4	5.0000	9.7500	YES	NO	0000.	125.00
5	5.0000	14.3750	YES	NO	0000.	125.00
6	10.0000	19.7500	YES	NO	0000.	125.00
7	10.0000	26.2500	YES	NO	0000.	125.00
8	20.0000	35.0000	YES	NO	0000.	125.00
9	20.0000	45.0000	YES	NO	0.00	0.00
10	0.0000	55.0000	YES	NO	0.00	0.00
11	0.0000	65.0000	YES	NO	0.00	0.00
12	0.0000	65.0000	YES	NO	0.00	0.00
13	0.0000	65.0000	YES	NO	0.00	0.00

Notes: (1) If "Type of Layer" is "Rock", the sum of the "U and V Intercepts" (2) Input is Layering Information on Which Depths and Soil Types Will Be Input. In Locating Critical Depth Correlations for Each Lateral Load Case, There Is Only One Soil and Soil Plus, Non-Unique Top Rock, and a Variable Soil.

Computed Values of Pile Capacity and Ultimate Per Lateral Loading for Each Pile Head

Pile Head Fixity Type

Pile Head Fixity Type						=	22.20.2 lbs	
Applied Moment at Pile Head						=	1.5100230.2 lb-in	
Applied Lateral Load at Pile Head						=	22.20.2 lbs	
Point No.	Depth Below Mud Line ft	Bending Moment lb-in	Shear Force lbs	y Deflection in	(4) Soil Reaction lbs/in	Bending Stress psi	Soil Modulus psi/in	
1	0.00	0.000e+00	22.20.	+0.64726	0.00	0.00e+00		
0.00	0.00	0.00						
2	0.7500	0.4248	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
0.00	0.00	0.00						
3	1.5000	0.8497	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
0.00	0.00	0.00						
4	2.2500	1.2745	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
0.00	0.00	0.00						
5	3.0000	1.6993	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
0.00	12.0000	2.00						
6	3.7500	2.1242	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	147.7500	0.00						
7	5.0000	2.8323	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	341.7500	0.00						
8	7.5000	4.2484	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	666.7500	0.00						
9	12.5000	7.0807	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	1304.7500	0.00						
10	17.5000	9.9130	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	1942.7500	0.00						
11	22.5000	12.7453	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	2580.7500	0.00						
12	27.5000	15.5776	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	3218.7500	0.00						
13	32.5000	18.4099	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	3856.7500	0.00						
14	37.5000	21.2422	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	4494.7500	0.00						
15	42.5000	24.0745	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	5132.7500	0.00						
16	47.5000	26.9068	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	5770.7500	0.00						
17	52.5000	29.7391	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	6408.7500	0.00						
18	57.5000	32.5714	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	7046.7500	0.00						
19	62.5000	35.4037	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	7684.7500	0.00						
20	67.5000	38.2360	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	8322.7500	0.00						
21	72.5000	41.0683	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	8960.7500	0.00						
22	77.5000	43.9006	1.53E-07	22.20.	+0.64726	0.00	0.00e+00	
-33.0000	9598.7500	0.00						

14.1450	-0.22403	1534914.	119912	0.430E-04	0.00	4.294E+12	59.9978	40020.	0.00
14.3900	-0.20431	1440916.	119772	0.430E-04	0.00	4.199E+12	124.7787	42832.	0.00
14.5550	-0.18818	1443944.	119414	0.420E-04	0.00	4.199E+12	164.2527	26224.	0.00
14.7000	-0.16601	1349891.	117944	-0.361E-04	0.00	4.090E+12	214.8422	51012.	0.00
14.9850	-0.01231	1259442.	115997	-0.320E-04	0.00	4.044E+12	290.4523	53279.	0.00
15.1702	-0.01446	1099591.	114662.	-0.330E-04	0.00	4.090E+12	390.2210	52294.	0.00
15.3752	-0.01504	1019944.	113044.	-0.330E-04	0.00	4.097E+12	356.8332	53625.	0.00
15.5822	-0.01874	1049963.	111734.	-0.330E-04	0.00	4.098E+12	400.2486	27212.	0.00
15.7652	-0.02476	1062218	111042.	-0.330E-04	0.00	4.098E+12	457.5114	27461.	0.00
15.8720	-0.02274	1044464	108852.	-0.320E-04	0.00	4.134E+12	985.4423	22732.	0.00
16.1050	-0.02756	1012949	107334.	-0.280E-04	0.00	4.137E+12	262.4424	24274.	1.00
16.4200	-0.02407	1044191	107334.	-0.220E-04	0.00	4.137E+12	524.2222	27254.	1.00
16.6230	-0.02203	1002779	106296.	-0.170E-04	0.00	4.139E+12	671.0000	24674.	1.00
16.8100	-0.02062	1026474.	104473	0.120E-04	0.00	4.140E+12	777.0485	20082.	4.00
17.2150	-0.01925	2224424.	132716	0.100E-04	0.00	4.140E+12	785.2223	22151.	4.00
17.2200	-0.03934	2427995.	123712	-0.200E-04	0.00	4.140E+12	840.7331	64271.	4.00
17.4250	-0.04444	2224995.	73964	-0.970E-04	0.00	4.140E+12	720.3033	61881.	4.00
17.3300	-0.02617	2444941.	49697	0.000E-04	0.00	4.119E+12	999.7279	61220.	4.04
17.3002	-2.04213	2044044.	-19222	0.020E-04	0.00	4.119E+12	3326.	22278.	0.00
18.0402	-2.04313	1974490.	-31022	-0.040E-04	0.00	4.119E+12	7097	22124.	0.00
18.2452	-2.04149	1755444.	-44244	0.020E-04	0.00	4.119E+12	7152	22052.	0.00
18.4402	-2.04232	1841244.	-64442.	0.077E-04	0.00	4.120E+12	2226	44494.	1.00
18.6502	-4.04595	724544	-20272.	-4.000E-04	0.00	4.115E+12	2061.	47172.	1.00
18.8552	-4.04550	749424	-72821.	-4.000E-04	0.00	4.115E+12	3147.	[illegible]	1.00
19.0602	-4.04524	979228	-72832.	-4.000E-04	0.00	4.115E+12	3267.	[illegible]	1.00
19.2702	-2.05413	726471	-59559.	-3.000E-04	0.00	4.115E+12	3407	137174.	0.00
19.4752	-2.05533	194440	-27772.	-3.000E-04	0.00	4.115E+12	3504	130544.	0.00
19.6802	-2.05424	391414	50479.	-3.000E-04	0.00	4.115E+12	3902.	160711.	0.00
19.8852	-2.05541	304244.	-17775.	-3.020E-04	0.00	4.115E+12	4077	152177.	0.00
20.0533	-0.22242	14424.	-455426.	-0.237E-04	0.00	4.121E+12	4444	155931.	0.00
20.2250	-0.22731	13444.	5990.	-0.200E-04	0.00	4.121E+12	4777.	152734.	0.00
20.5200	-0.22442	0.00	0.00	-0.200E-04	0.00	4.121E+12	4719.	34224	0.00

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.20400400	inches
Computed slope at pile head	=	-0.00474534	radians
Maximum bending moment	=	1534914.	inch-lbs
Maximum shear force	=	-45927.	lbs
Depth of maximum bending moment	=	4.0403900	feet below pile head
Depth of maximum shear force	=	11.2437900	feet below pile head
Number of iterations	=	174	
Number of zero deflection points	=	1	

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 2

Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head	=	9032.0 lbs
Applied moment at pile head	=	9341022.0 in-lbs
Axial thrust load on pile head	=	21633.0 lbs

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. p
Soil Spr.	Distrib.						

```
1651.    0.4126.      0.02
   24.0404   -0.1244     2002.     8730   2.37E-04      0.40   7.31E-02
1701.    0.4126.      0.02
   24.0404   -0.1230-     2018.     4530   2.37E-04      0.40   7.31E-02
1751.    0.4126.      0.02
   24.0404   -0.1230     0.02      2.50   2.37E-04      0.40   7.31E-02
1804     0.4126.      0.02

 * this analysis computed pile response using the user-supplied moment-curvature rela-
   tionship. values of bending moment and shear force computed using stresses
   are computed only for station locations at which the user has requested stress
   stresses in special printout. Moments and shears are computed and stored only at inter-
   polated from the pile deflection, bearing properties relative to the
   magnitude of bearing, and reinforcement in the pile.


Input Summary for Load Case No. 2:

Pile-head deflection              =    0.4126-0.01 inches
Computed slope at pile head       =    0.0404461 radians
Maximum bending moment            =      730370. in-lbs
Maximum shear force               =       -2277. lbs
Depth of maximum bending moment   =    0.04 inches      feet below pile head
Depth of maximum shear force      =   15.4000 inches      feet below pile head
Number of iterations              =           4
Number of load increments used    =           1


                    Computed values of pile loading and deflection
                      for Load Case Number 2


Values of Applied Lateral and Shear and Moment Loading Type 1:

Shear force at pile head                          =     4000.0 lbs.
Applied moment at pile head                       =     0.0 in-lbs
Assumed displacement at pile head                 =     0.4000 inches

   Depth      Deflection      Bending      Shear         Slope      Total      Bending    Soil
    X            Y            Moment      Force          S          Stress     Stiffness   Resistance
   inches       inches      in-lbs        lbs        radians        psi        lbs-in**2     p
  ------    ----------    ----------    ----------    ----------    ----------    ----------
    0.00        0.4126      730370.      -2277.      -0.04045      -4.31      4.80E+12
 1.00       0.01
```

```
    3.0000     0.3161     9442320.      30000.     0.23108      -4.31      4.80E+12
 3.00       0.01       1.00
    3.0200     0.3447     9442320.      30000.     0.23107      -4.31      4.80E+12
 3.00       0.01       1.00
    3.0400     0.3446     9442320.      30000.     0.23107      -4.31      4.80E+12
 4.0000     0.3161     0.00
    4.0400     0.3162     9442320.      30000.     0.23106      -4.31      4.80E+12
 4.0000     0.3161     0.00
    5.0200     0.2877     9442320.      30000.     0.23105      -4.31      4.80E+12
 5.0000     0.2878     0.00
    5.0400     0.2877     9442320.      30000.     0.23104      -4.31      4.80E+12
 5.0000     0.2878     0.00
    6.0200     0.2594     9442320.      30000.     0.23103      -4.31      4.80E+12
 6.0000     0.2595     0.00
    6.0400     0.2594     9442320.      30000.     0.23102      -4.31      4.80E+12
 6.0000     0.2595     0.00
    7.0200     0.2312     9442320.      30000.     0.23101      -4.31      4.80E+12
 7.0000     0.2312     0.00
    7.0400     0.2312     9442320.      30000.     0.23100      -4.31      4.80E+12
 7.0000     0.2312     0.00
    8.0200     0.2030     9442320.      30000.     0.23099      -4.31      4.80E+12
 8.0000     0.2030     0.00
    8.0400     0.2030     9442320.      30000.     0.23098      -4.31      4.80E+12
 8.0000     0.2030     0.00
    9.0200     0.1749     9442320.      30000.     0.23097      -4.31      4.80E+12
 9.0000     0.1749     0.00
    9.0400     0.1749     9442320.      30000.     0.23096      -4.31      4.80E+12
 9.0000     0.1749     0.00
   10.0200     0.1468     9442320.      30000.     0.23095      -4.31      4.80E+12
10.0000     0.1468     0.00
   10.0400     0.1468     9442320.      30000.     0.23094      -4.31      4.80E+12
10.0000     0.1468     0.00
   11.0200     0.1188     9442320.      30000.     0.23093      -4.31      4.80E+12
11.0000     0.1188     0.00
   11.0400     0.1188     9442320.      30000.     0.23092      -4.31      4.80E+12
11.0000     0.1188     0.00
   12.0200     0.0908     9442320.      30000.     0.23091      -4.31      4.80E+12
12.0000     0.0908     0.00
   12.0400     0.0908     9442320.      30000.     0.23090      -4.31      4.80E+12
12.0000     0.0908     0.00
   13.0200     0.0629     9442320.      30000.     0.23089      -4.31      4.80E+12
13.0000     0.0629     0.00
   13.0400     0.0629     9442320.      30000.     0.23088      -4.31      4.80E+12
13.0000     0.0629     0.00
   14.0200     0.0351     9442320.      30000.     0.23087      -4.31      4.80E+12
14.0000     0.0351     0.00
   14.0400     0.0351     9442320.      30000.     0.23086      -4.31      4.80E+12
14.0000     0.0351     0.00
   15.0200     0.0074     9442320.      30000.     0.23085      -4.31      4.80E+12
15.0000     0.0074     0.00
   15.0400     0.0074     9442320.      30000.     0.23084      -4.31      4.80E+12
15.0000     0.0074     0.00
   16.0200    -0.0202     9442320.      30000.     0.23083      -4.31      4.80E+12
16.0000    -0.0202     0.00
   16.0400    -0.0202     9442320.      30000.     0.23082      -4.31      4.80E+12
16.0000    -0.0202     0.00
   17.0200    -0.0479     9442320.      30000.     0.23081      -4.31      4.80E+12
17.0000    -0.0479     0.00
   17.0400    -0.0479     9442320.      30000.     0.23080      -4.31      4.80E+12
17.0000    -0.0479     0.00
   18.0200    -0.0755     9442320.      30000.     0.23079      -4.31      4.80E+12
18.0000    -0.0755     0.00
   18.0400    -0.0755     9442320.      30000.     0.23078      -4.31      4.80E+12
18.0000    -0.0755     0.00
   19.0200    -0.1031     9442320.      30000.     0.23077      -4.31      4.80E+12
19.0000    -0.1031     0.00
   19.0400    -0.1031     9442320.      30000.     0.23076      -4.31      4.80E+12
19.0000    -0.1031     0.00
   20.0200    -0.1307     9442320.      30000.     0.23075      -4.31      4.80E+12
20.0000    -0.1307     0.00
   20.0400    -0.1307     9442320.      30000.     0.23074      -4.31      4.80E+12
20.0000    -0.1307     0.00
   21.0200    -0.1583     9442320.      30000.     0.23073      -4.31      4.80E+12
21.0000    -0.1583     0.00
   21.0400    -0.1583     9442320.      30000.     0.23072      -4.31      4.80E+12
21.0000    -0.1583     0.00
   22.0200    -0.1859     9442320.      30000.     0.23071      -4.31      4.80E+12
22.0000    -0.1859     0.00
   22.0400    -0.1859     9442320.      30000.     0.23070      -4.31      4.80E+12
22.0000    -0.1859     0.00
   23.0200    -0.2135     9442320.      30000.     0.23069      -4.31      4.80E+12
23.0000    -0.2135     0.00
   23.0400    -0.2135     9442320.      30000.     0.23068      -4.31      4.80E+12
23.0000    -0.2135     0.00
   24.0200    -0.2411     9442320.      30000.     0.23067      -4.31      4.80E+12
24.0000    -0.2411     0.00
   24.0400    -0.2411     9442320.      30000.     0.23066      -4.31      4.80E+12
24.0000    -0.2411     0.00
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35.4000	-0.00142	3.01E+07	-4208.	5.77E-06	0.00	4.19E+12
2464.2362	5120.	0.00				
35.7000	-0.00139	3.00E+07	-4167.	5.72E-06	0.00	4.18E+12
2478.4409	15000.	0.00				
36.0000	-0.00136	3.00E+07	-4125.	5.66E-06	0.00	4.18E+12
2492.5138	25737.	0.00				
36.3000	-0.00133	2.99E+07	-4083.	-5.61E-06	0.00	4.18E+12
2506.5551	36475.	0.00				
36.6000	-0.00130	2.98E+07	-4042.	-5.55E-06	0.00	4.18E+12
2520.5872	47215.	0.00				
36.9000	-0.00127	2.98E+07	-4000.	-5.49E-06	0.00	4.18E+12
2534.5873	57954.	0.00				
37.2000	-0.00124	2.97E+07	-3958.	-5.43E-06	0.00	4.18E+12
2548.5553	68694.	0.00				
37.5000	-0.00121	2.96E+07	-3917.	-5.37E-06	0.00	4.18E+12
2562.4914	79433.	0.00				
37.8000	-0.00118	2.96E+07	-3875.	-5.31E-06	0.00	4.18E+12
2576.3954	90173.	0.00				
38.1000	-0.00115	2.95E+07	-3833.	-5.25E-06	0.00	4.18E+12
2590.2674	100912.	0.00				
38.4000	-0.00112	2.94E+07	-3792.	-5.19E-06	0.00	4.18E+12
2604.1074	111652.	0.00				
38.7000	-0.00109	2.94E+07	-3750.	-5.13E-06	0.00	4.18E+12
2617.9154	122391.	0.00				
39.0000	-0.00106	2.93E+07	-3708.	-5.07E-06	0.00	4.18E+12
2631.6914	133131.	0.00				
39.3000	-0.00103	2.92E+07	-3667.	-5.01E-06	0.00	4.18E+12
2645.4354	143870.	0.00				
39.6000	-0.00100	2.92E+07	-3625.	-4.95E-06	0.00	4.18E+12
2659.1474	154610.	0.00				
39.9000	-0.00097	2.91E+07	-3583.	-4.89E-06	0.00	4.18E+12
2672.8274	165349.	0.00				
40.2000	-0.00094	2.90E+07	-3542.	-4.83E-06	0.00	4.18E+12
2686.4754	176089.	0.00				
40.5000	-0.00091	2.89E+07	-3500.	-4.77E-06	0.00	4.18E+12
2700.0914	186828.	0.00				
40.8000	-0.00088	2.89E+07	-3458.	-4.71E-06	0.00	4.18E+12
2713.6754	197568.	0.00				
41.1000	-0.00085	2.88E+07	-3417.	-4.65E-06	0.00	4.18E+12
2727.2274	208307.	0.00				
41.4000	-0.00082	2.87E+07	-3375.	-4.59E-06	0.00	4.18E+12
2740.7474	219047.	0.00				
41.7000	-0.00079	2.86E+07	-3333.	-4.53E-06	0.00	4.18E+12
2754.2354	229786.	0.00				
42.0000	-0.00076	2.86E+07	-3292.	-4.47E-06	0.00	4.18E+12
2767.6914	240526.	0.00				
42.3000	-0.00073	2.85E+07	-3250.	-4.41E-06	0.00	4.18E+12
2781.1154	251265.	0.00				
42.6000	-0.00070	2.84E+07	-3208.	-4.35E-06	0.00	4.18E+12
2794.5074	262005.	0.00				
42.9000	-0.00067	2.83E+07	-3167.	-4.29E-06	0.00	4.18E+12
2807.8674	272744.	0.00				
43.2000	-0.00064	2.83E+07	-3125.	-4.23E-06	0.00	4.18E+12
2821.1954	283484.	0.00				
43.5000	-0.00061	2.82E+07	-3083.	-4.17E-06	0.00	4.18E+12
2834.4914	294223.	0.00				
43.8000	-0.00058	2.81E+07	-3042.	-4.11E-06	0.00	4.18E+12
2847.7554	304963.	0.00				
44.1000	-0.00055	2.80E+07	-3000.	-4.05E-06	0.00	4.18E+12
2860.9874	315702.	0.00				
44.4000	-0.00052	2.80E+07	-2958.	-3.99E-06	0.00	4.18E+12
2874.1874	326442.	0.00				
44.7000	-0.00049	2.79E+07	-2917.	-3.93E-06	0.00	4.18E+12
2887.3554	337181.	0.00				
45.0000	-0.00046	2.78E+07	-2875.	-3.87E-06	0.00	4.18E+12
2900.4914	347921.	0.00				
45.3000	-0.00043	2.77E+07	-2833.	-3.81E-06	0.00	4.18E+12
2913.5954	358660.	0.00				
45.6000	-0.00040	2.77E+07	-2792.	-3.75E-06	0.00	4.18E+12
2926.6674	369400.	0.00				
45.9000	-0.00037	2.76E+07	-2750.	-3.69E-06	0.00	4.18E+12
2939.7074	380139.	0.00				
46.2000	-0.00034	2.75E+07	-2708.	-3.63E-06	0.00	4.18E+12
2952.7154	390879.	0.00				
46.5000	-0.00031	2.74E+07	-2667.	-3.57E-06	0.00	4.18E+12
2965.6914	401618.	0.00				
46.8000	-0.00028	2.74E+07	-2625.	-3.51E-06	0.00	4.18E+12
2978.6354	412358.	0.00				
47.1000	-0.00025	2.73E+07	-2583.	-3.45E-06	0.00	4.18E+12
2991.5474	423097.	0.00				
47.4000	-0.00022	2.72E+07	-2542.	-3.39E-06	0.00	4.18E+12
3004.4274	433837.	0.00				
47.7000	-0.00019	2.71E+07	-2500.	-3.33E-06	0.00	4.18E+12
3017.2754	444576.	0.00				
48.0000	-0.00016	2.71E+07	-2458.	-3.27E-06	0.00	4.18E+12
3030.0914	455316.	0.00				
48.3000	-0.00013	2.70E+07	-2417.	-3.21E-06	0.00	4.18E+12
3042.8754	466055.	0.00				
48.6000	-0.00010	2.69E+07	-2375.	-3.15E-06	0.00	4.18E+12
3055.6274	476795.	0.00				
48.9000	-0.00007	2.68E+07	-2333.	-3.09E-06	0.00	4.18E+12
3068.3474	487534.	0.00				
49.2000	-0.00004	2.68E+07	-2292.	-3.03E-06	0.00	4.18E+12
3081.0354	498274.	0.00				
49.5000	-0.00001	2.67E+07	-2250.	-2.97E-06	0.00	4.18E+12
3093.6914	509013.	0.00				
49.8000	0.00002	2.66E+07	-2208.	2.91E-06	0.00	4.18E+12
3106.3154	519753.	0.00				
50.1000	0.00005	2.65E+07	-2167.	2.85E-06	0.00	4.18E+12
3118.9074	530492.	0.00				
50.4000	0.00008	2.65E+07	-2125.	2.79E-06	0.00	4.18E+12
3131.4674	541232.	0.00				
50.7000	0.00011	2.64E+07	-2083.	2.73E-06	0.00	4.18E+12
3143.9954	551971.	0.00				
51.0000	0.00014	2.63E+07	-2042.	2.67E-06	0.00	4.18E+12
3156.4914	562711.	0.00				
51.3000	0.00017	2.62E+07	-2000.	2.61E-06	0.00	4.18E+12
3168.9554	573450.	0.00				
51.6000	0.00020	2.62E+07	-1958.	2.55E-06	0.00	4.18E+12
3181.3874	584190.	0.00				
51.9000	0.00023	2.61E+07	-1917.	2.49E-06	0.00	4.18E+12
3193.7874	594929.	0.00				
52.2000	0.00026	2.60E+07	-1875.	2.43E-06	0.00	4.18E+12
3206.1554	605669.	0.00				
52.5000	0.00029	2.59E+07	-1833.	2.37E-06	0.00	4.18E+12
3218.4914	616408.	0.00				
52.8000	0.00032	2.58E+07	-1792.	2.31E-06	0.00	4.18E+12
3230.7954	627148.	0.00				
53.1000	0.00035	2.58E+07	-1750.	2.25E-06	0.00	4.18E+12
3243.0674	637887.	0.00				
53.4000	0.00038	2.57E+07	-1708.	2.19E-06	0.00	4.18E+12
3255.3074	648627.	0.00				
53.7000	0.00041	2.56E+07	-1667.	2.13E-06	0.00	4.18E+12
3267.5154	659366.	0.00				
54.0000	0.00044	2.55E+07	-1625.	2.07E-06	0.00	4.18E+12
3279.6914	670106.	0.00				
54.3000	0.00047	2.55E+07	-1583.	2.01E-06	0.00	4.18E+12
3291.8354	680845.	0.00				
54.6000	0.00050	2.54E+07	-1542.	1.95E-06	0.00	4.18E+12
3303.9474	691585.	0.00				
54.9000	0.00053	2.53E+07	-1500.	1.89E-06	0.00	4.18E+12
3316.0274	702324.	0.00				
55.2000	0.00056	2.52E+07	-1458.	1.83E-06	0.00	4.18E+12
3328.0754	713064.	0.00				
55.5000	0.00059	2.52E+07	-1417.	1.77E-06	0.00	4.18E+12
3340.0914	723803.	0.00				
55.8000	0.00062	2.51E+07	-1375.	1.71E-06	0.00	4.18E+12
3352.0754	734543.	0.00				
56.1000	0.00065	2.50E+07	-1333.	1.65E-06	0.00	4.18E+12
3364.0274	745282.	0.00				
56.4000	0.00068	2.49E+07	-1292.	1.59E-06	0.00	4.18E+12
3375.9474	756022.	0.00				
56.7000	0.00071	2.49E+07	-1250.	1.53E-06	0.00	4.18E+12
3387.8354	766761.	0.00				
57.0000	0.00074	2.48E+07	-1208.	1.47E-06	0.00	4.18E+12
3399.6914	777501.	0.00				
57.3000	0.00077	2.47E+07	-1167.	1.41E-06	0.00	4.18E+12
3411.5154	788240.	0.00				
57.6000	0.00080	2.46E+07	-1125.	1.35E-06	0.00	4.18E+12
3423.3074	798980.	0.00				
57.9000	0.00083	2.46E+07	-1083.	1.29E-06	0.00	4.18E+12
3435.0674	809719.	0.00				
58.2000	0.00086	2.45E+07	-1042.	1.23E-06	0.00	4.18E+12
3446.7954	820459.	0.00				
58.5000	0.00089	2.44E+07	-1000.	1.17E-06	0.00	4.18E+12
3458.4914	831198.	0.00				
58.8000	0.00092	2.43E+07	-958.	1.11E-06	0.00	4.18E+12
3470.1554	841938.	0.00				
59.1000	0.00095	2.43E+07	-917.	1.05E-06	0.00	4.18E+12
3481.7874	852677.	0.00				
59.4000	0.00098	2.42E+07	-875.	9.89E-07	0.00	4.18E+12
3493.3874	863417.	0.00				
59.7000	0.00101	2.41E+07	-833.	9.30E-07	0.00	4.18E+12
3504.9554	874156.	0.00				
60.0000	0.00104	2.40E+07	-792.	8.70E-07	0.00	4.18E+12
3516.4914	884896.	0.00				

* Pile-soil-pile interaction factors using nonlinear moment-curvature rela
  Leading factor is total stress due to combined axial and bending stresses
  calculated only in plastic sections only and at top node. Structural
  elements are pile and steel. Stresses in concrete and steel may be lower
  plastic flow. The datum for nonlinear bending properties relative to the
  magnitude of bending moment does not matter.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.12873729 inches
Computed slope at pile head	=	0.00139579 rad
Maximum bending moment	=	-11822368. in-lbs
Pile-head shear force	=	-6273.1 lbs
Depth of maximum bending moment	=	5.12164e+001 feet below pile head
Depth of maximum shear force	=	14.11414e+001 feet below pile head
Number of increments	=	1
Number of p-y curves computed	=	2

Summary of Pile-head Responses for Conventional Analysis

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 - Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 - Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Ratio of Pile-head Deflection to Pile Diameter, y/D
Load Type 4: Load 1 = Top Mobilized Lateral Soil Resistance, R, lbs, and Load 2 = Pile-head Deflection, y, inches
Load Type 5: Load 1 = Top Mobilized Lateral Soil Resistance, R, lbs, and Load 2 = Shear, V, in lbs

Load Case Number	Load Type	Pile-head Load	Pile-head Deflection, inches	Pile-head Rotation, radians	Maximum Bending Moment, in-lbs	Maximum Shear in Pile, lbs
1	1	10.000	0.0128	0.00139	1182237.	6273.
2	1	20.000	0.0274	0.00298	2540230.	9102.
3	1	30.000	0.0427	0.00463	3902230.	12003.

[illegible]

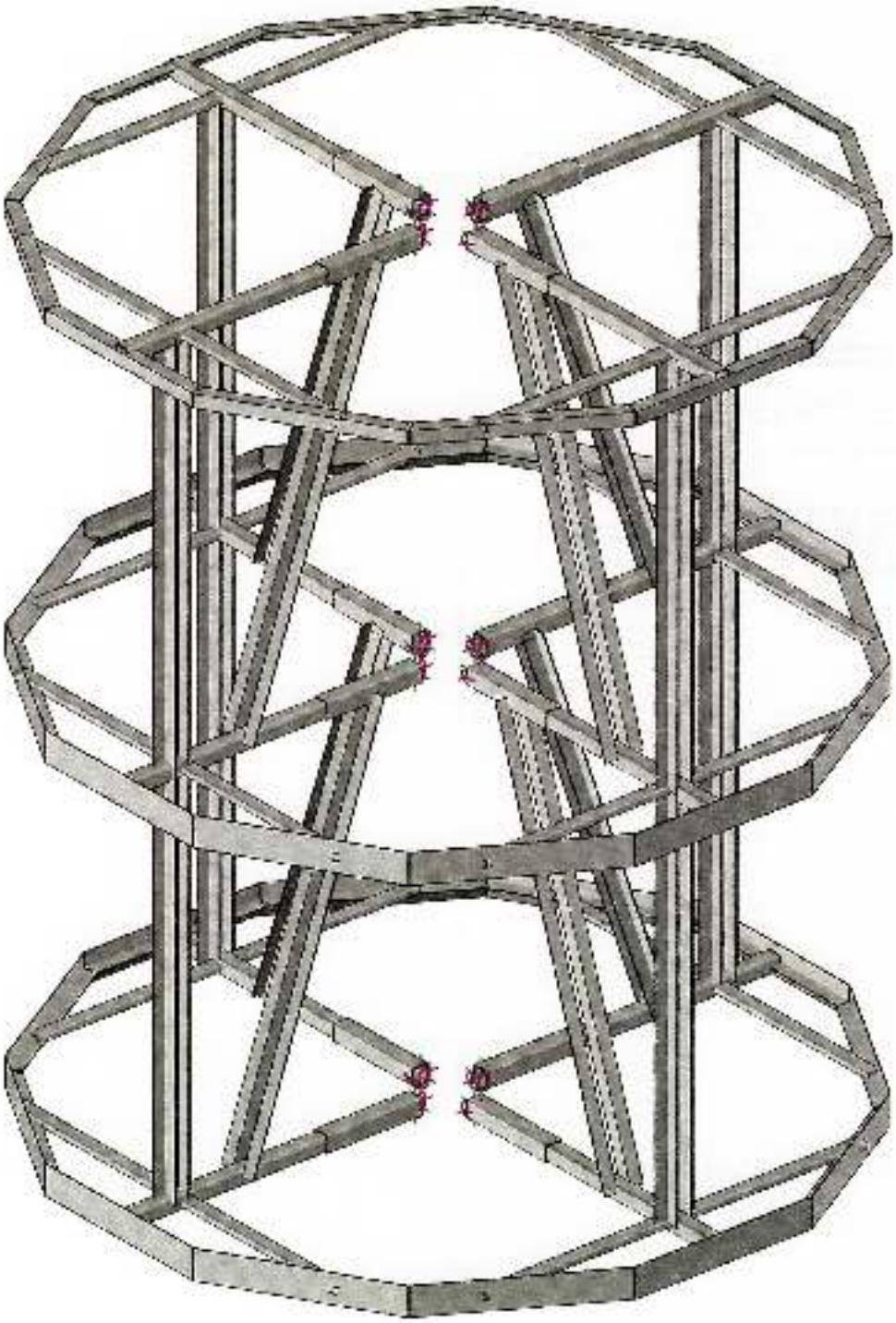
Summary of Missing Assays

[illegible]

*** Warning ***

[illegible]

[illegible]



RISA	Vector SE		SK-1
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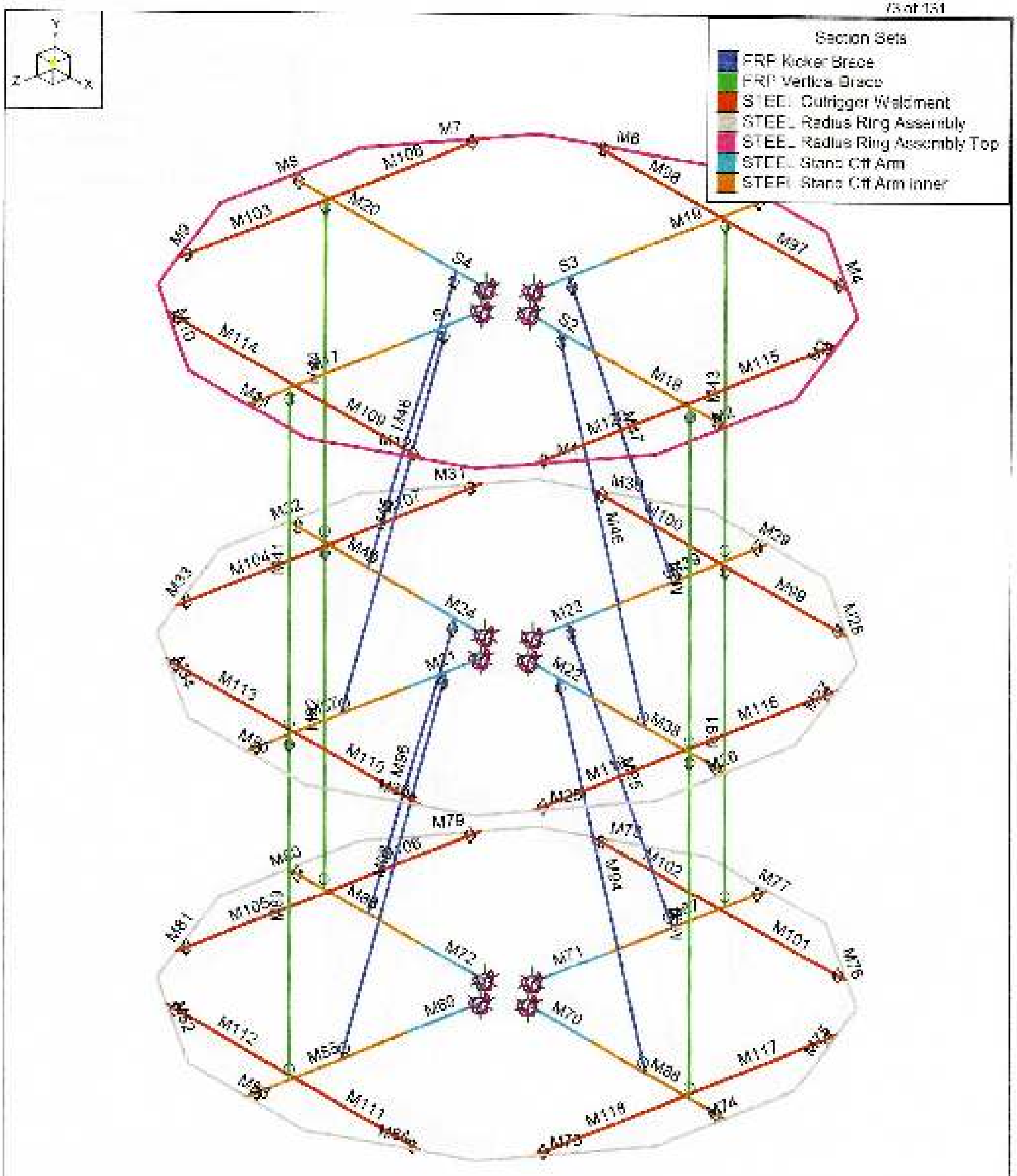
			NM1-145 Spoke Concealmen..



RISA	Vector SE		SK-2
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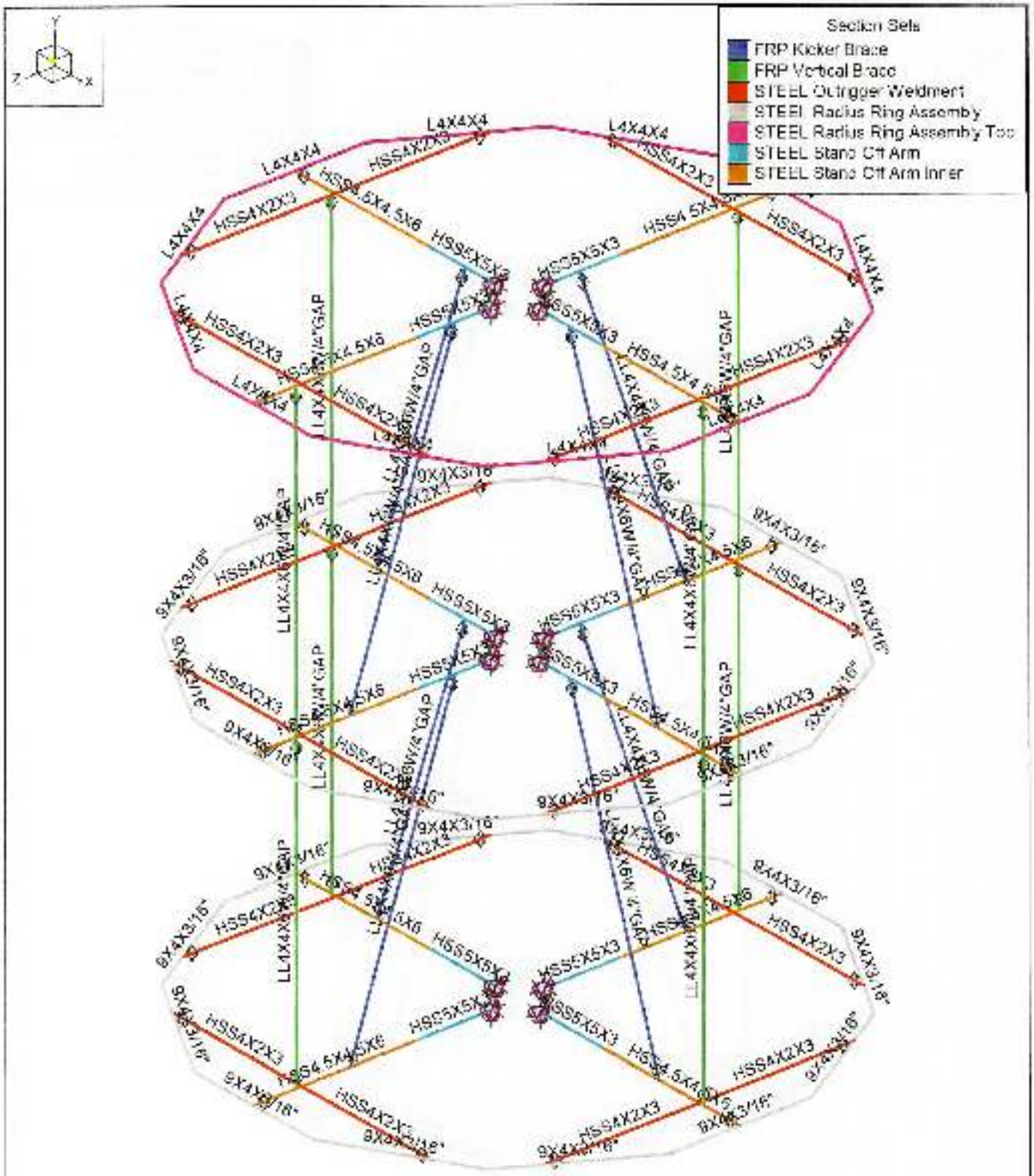
			NM'-1/6 Spike Concealmen...



RISA	Vector SE		SK-3
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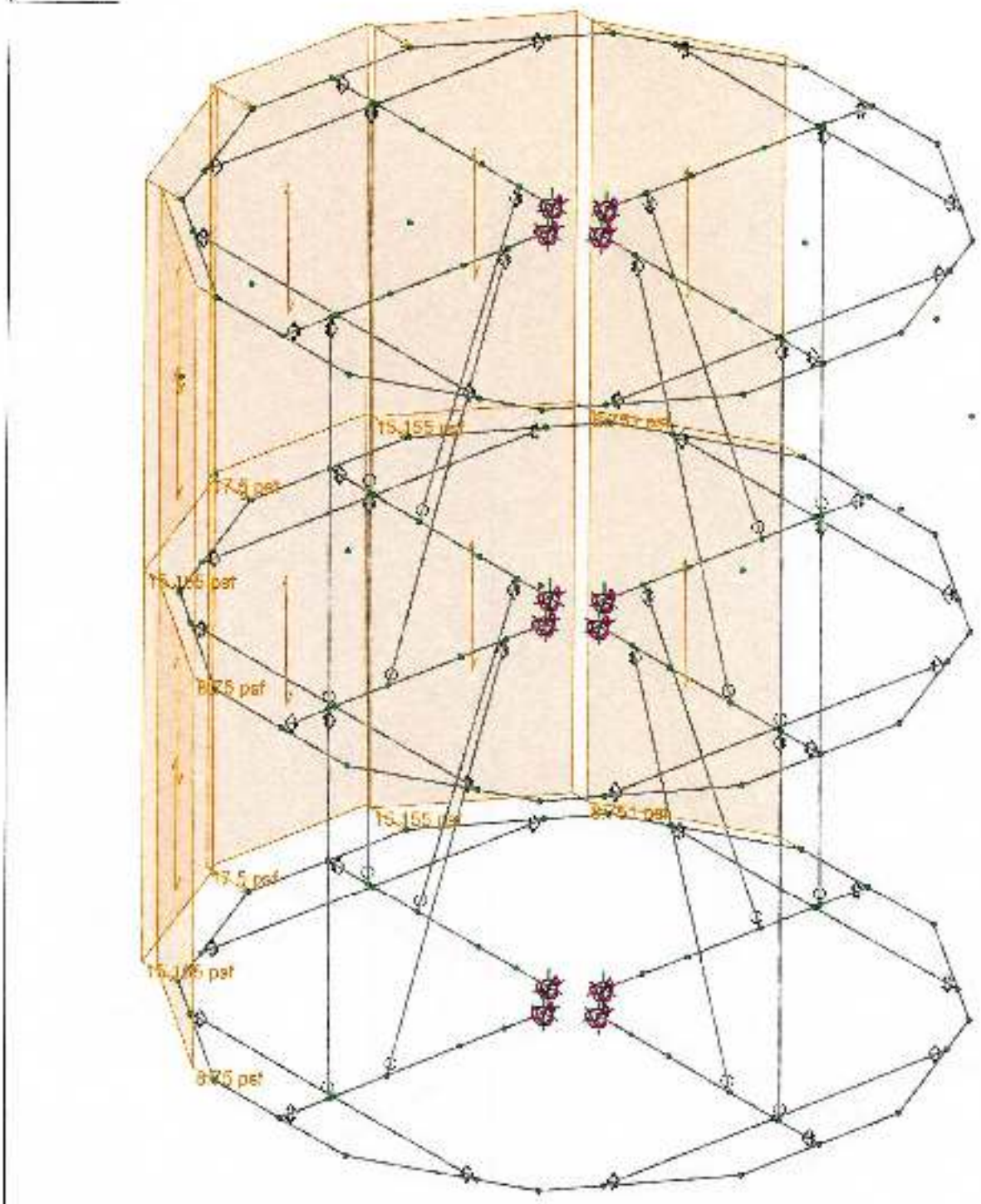
			NM1-148 Spike Concealmen...



Loads: BLC 2, WLX

RISA	Vector SE		SK-4
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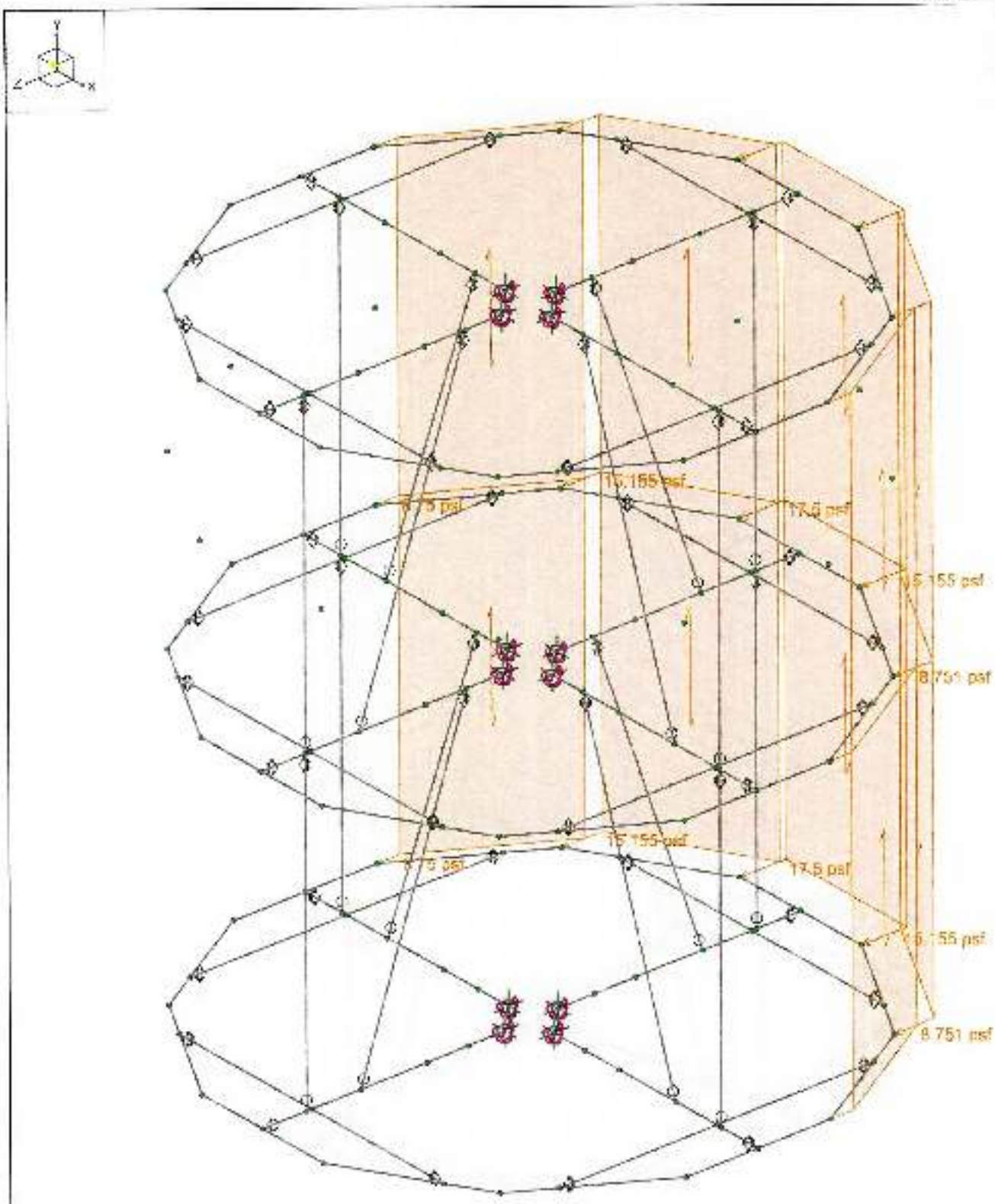
			NM1-146 Spike Corrosalmon...



Loads: BLC 2, W_Z

RISA	Vector SE		SK-5
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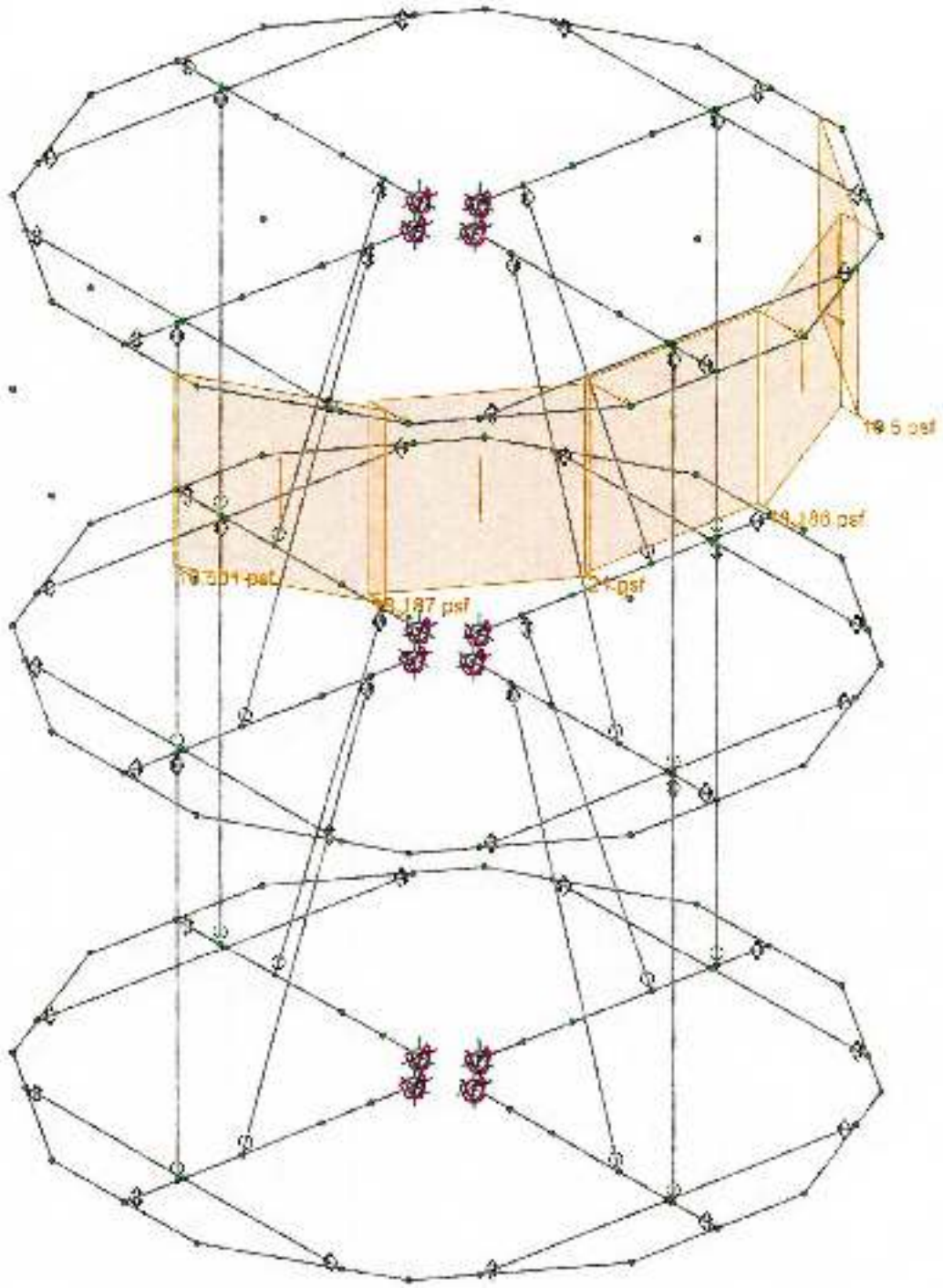
			NM1-148 Spike Concealmen



Loads: BLC 4, WLX Inside

RISA	Vector SE		SK-6
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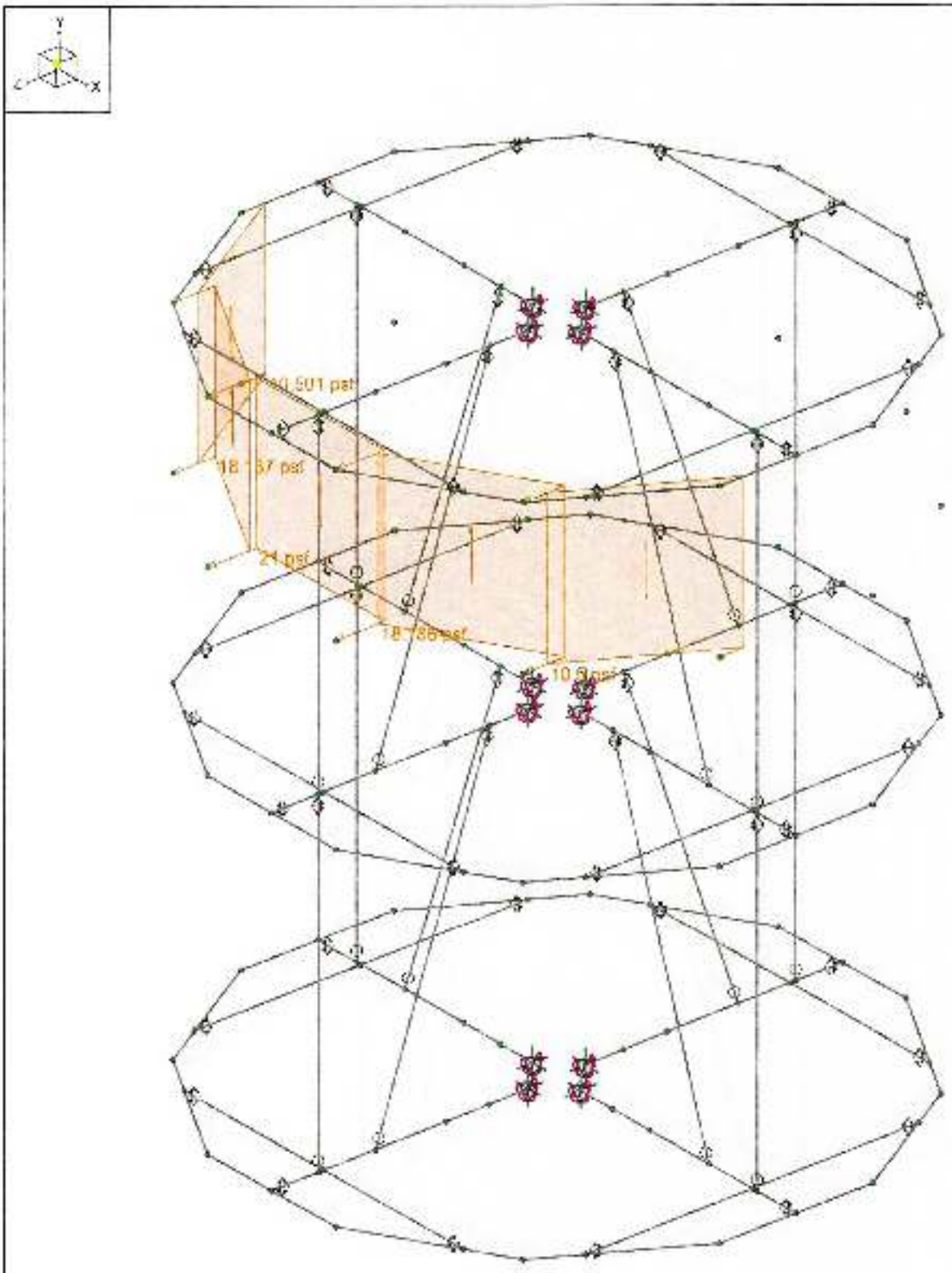
			NM1-148 Spike Concealmen...



Loads: SLC 5, WLZ Inside

RISA	Vector SE	SK-7
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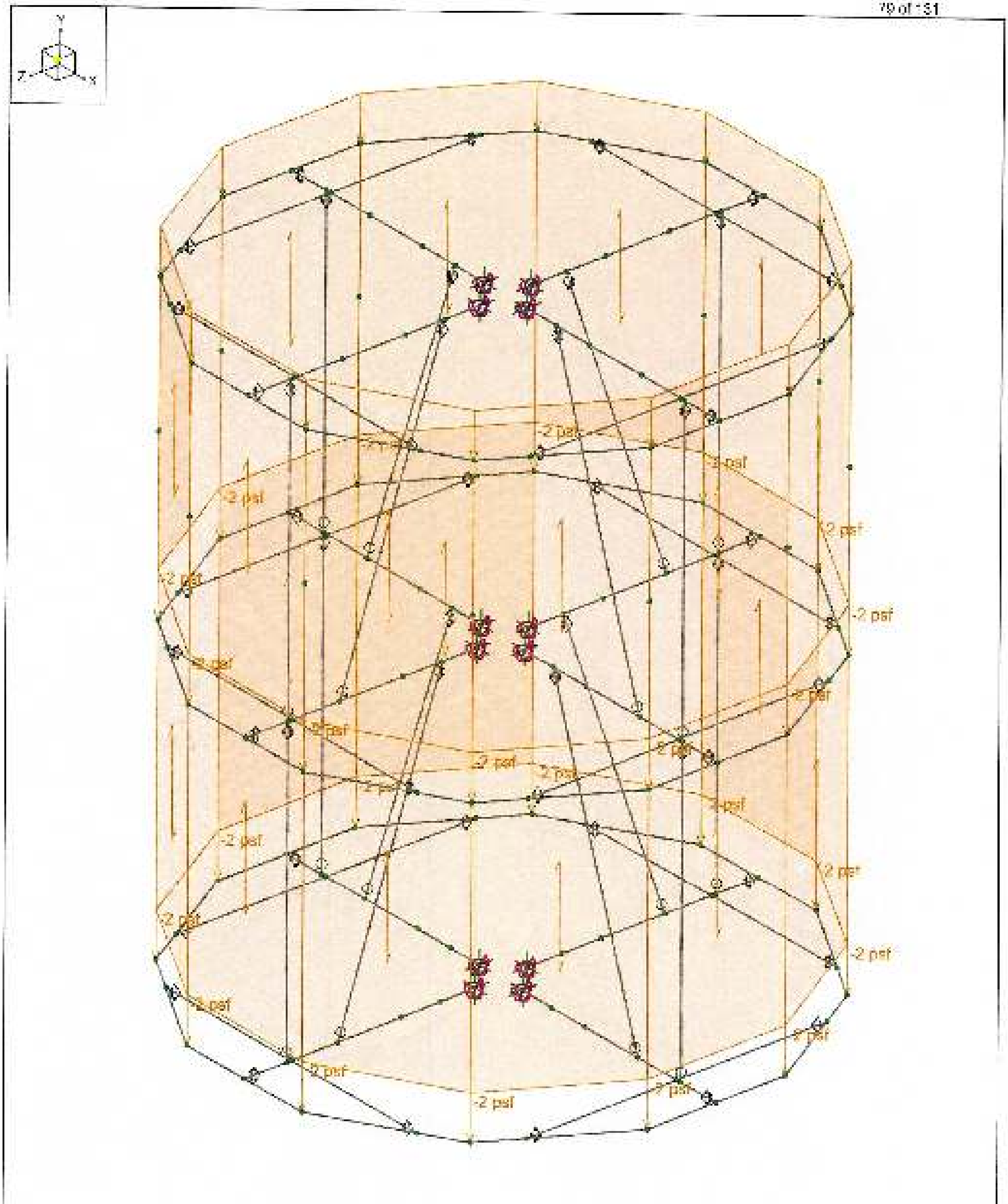
		NM1-148 Spike Concealmen...



Loads: BLC 5, Panels

RISA	Vector SE		SK-6
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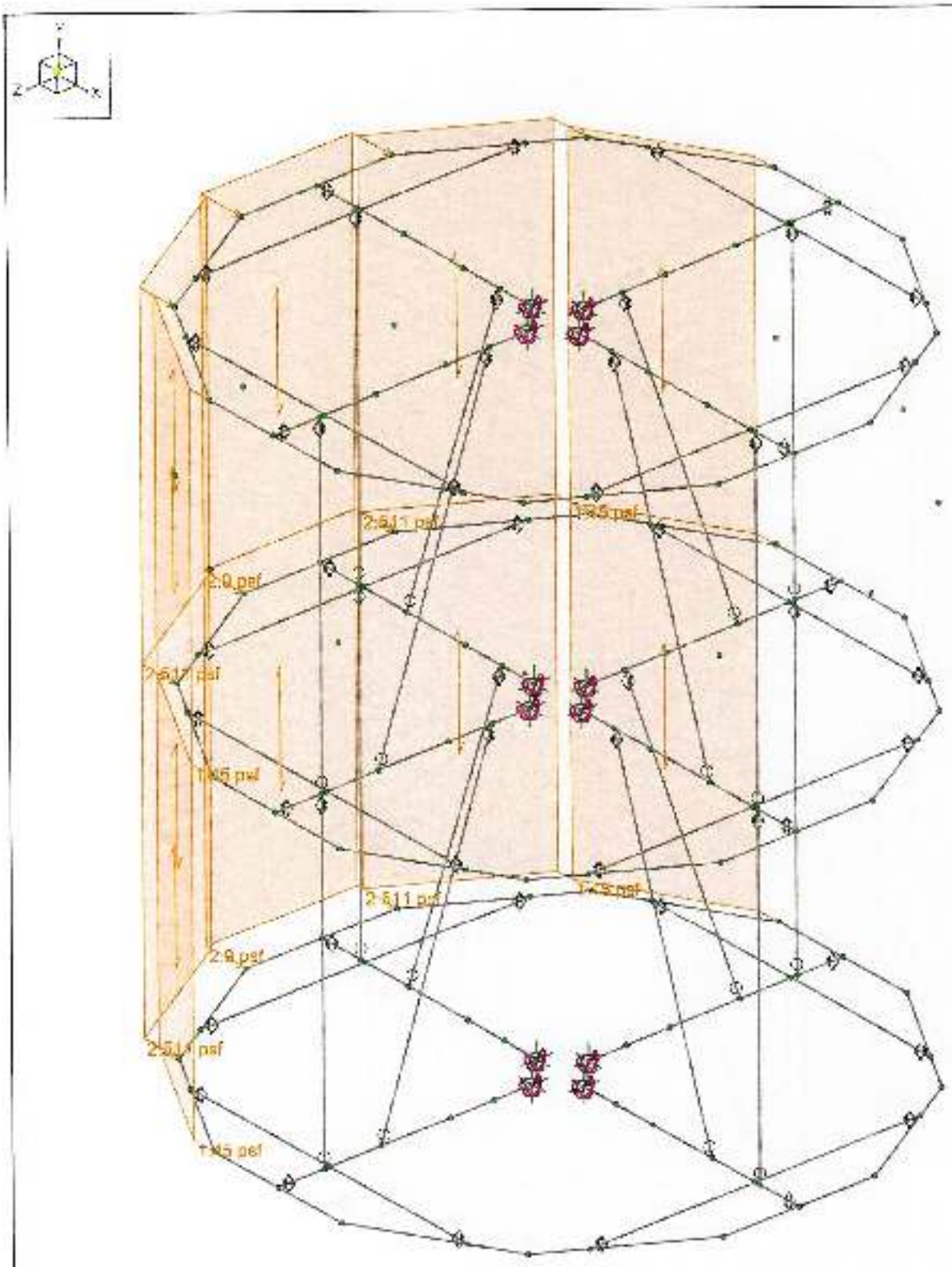

Loads: BLC 8, WLX Ice

RISA	Vector SE	SK-9
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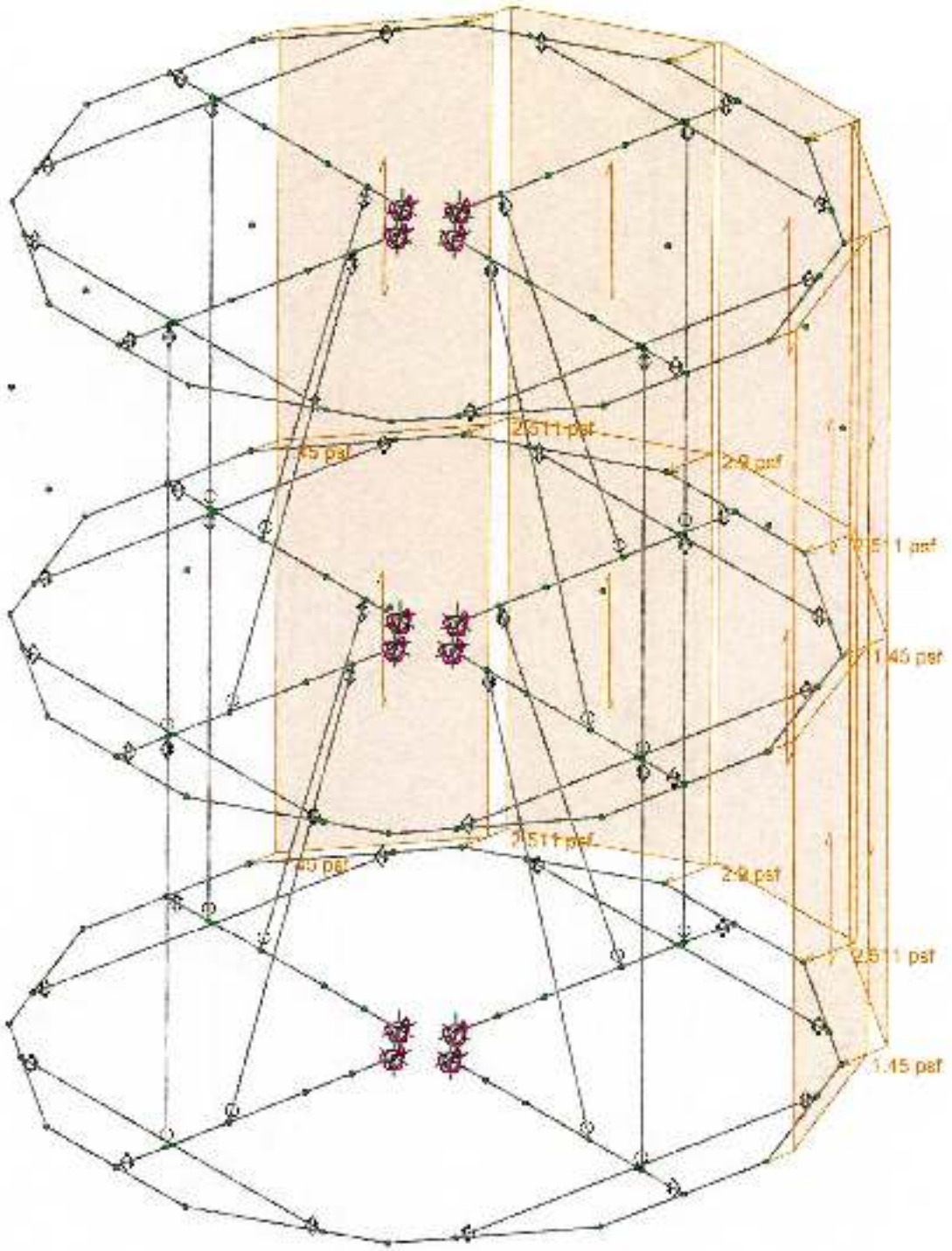
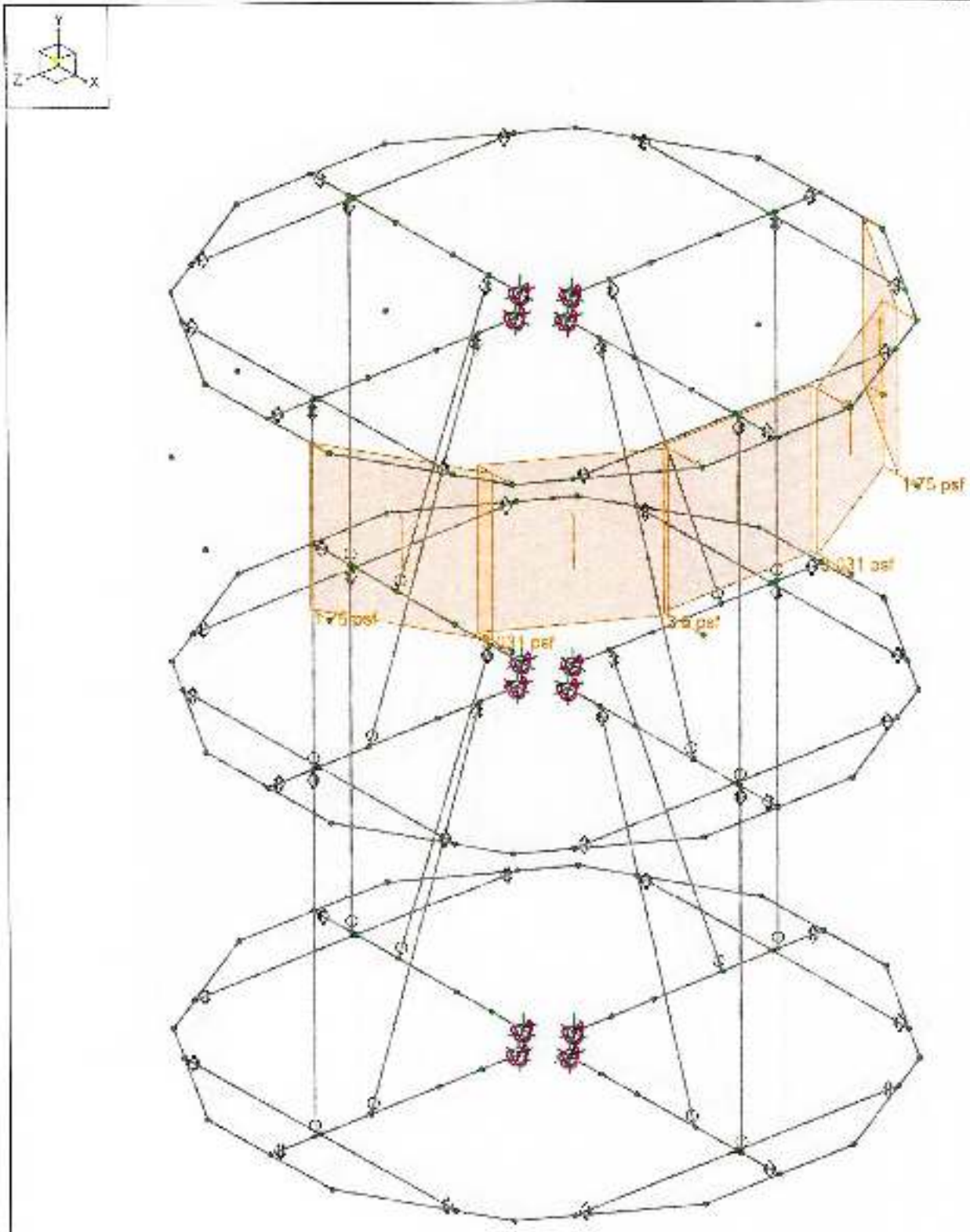
		NM1-148 Spike Concealmen



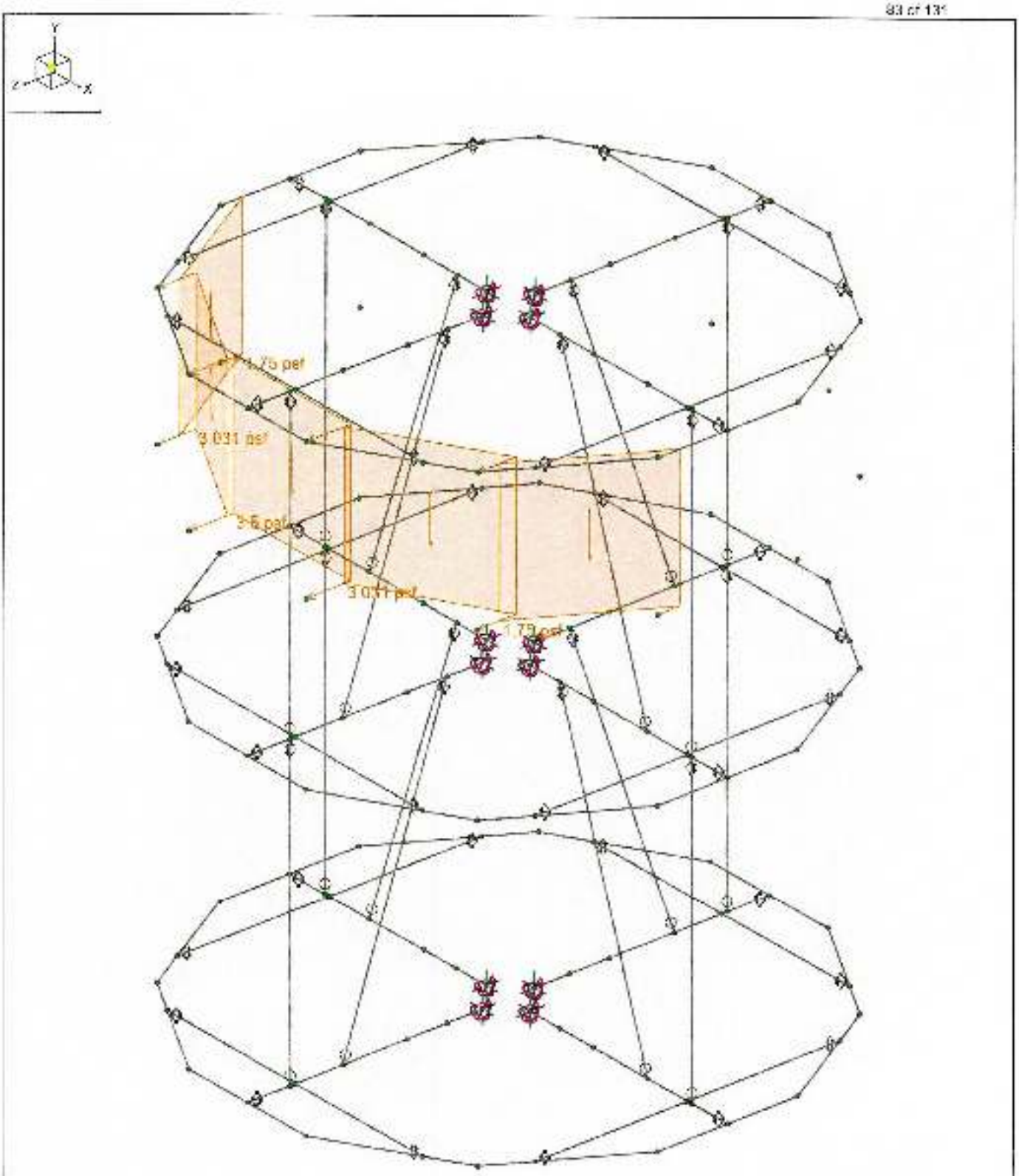
Loads: BLC 9, W_Z Ice

RISA	Vector SE		SK-10
			Oct 24, 2024 at 10:54 AM
			NM1-148 Spike Concealmon



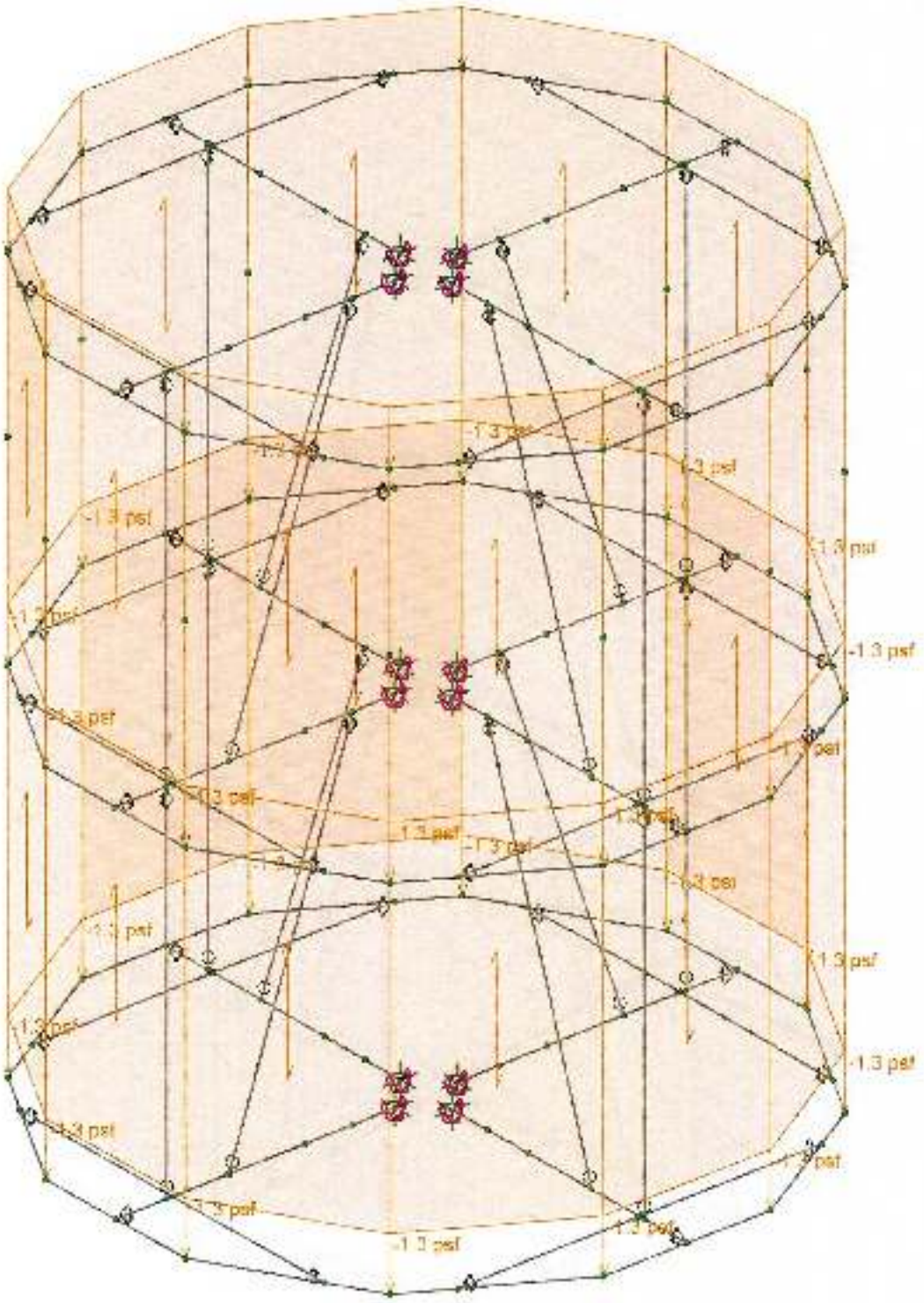
Loads: BLC 10, WLX loc. inside

RISA	Vector SF		SK-11
			Oct 24, 2024 at 10:54 AM
			NM1-148 Spike Concealmer



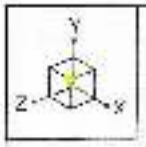
Loads: BLC 11, WLZ Ice inside

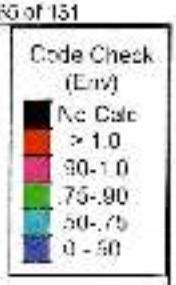
RISA	Vector SE		SK-12
			Oct 24, 2024 at 10:54 AM
			NM1-148 Spike Concentrate ...

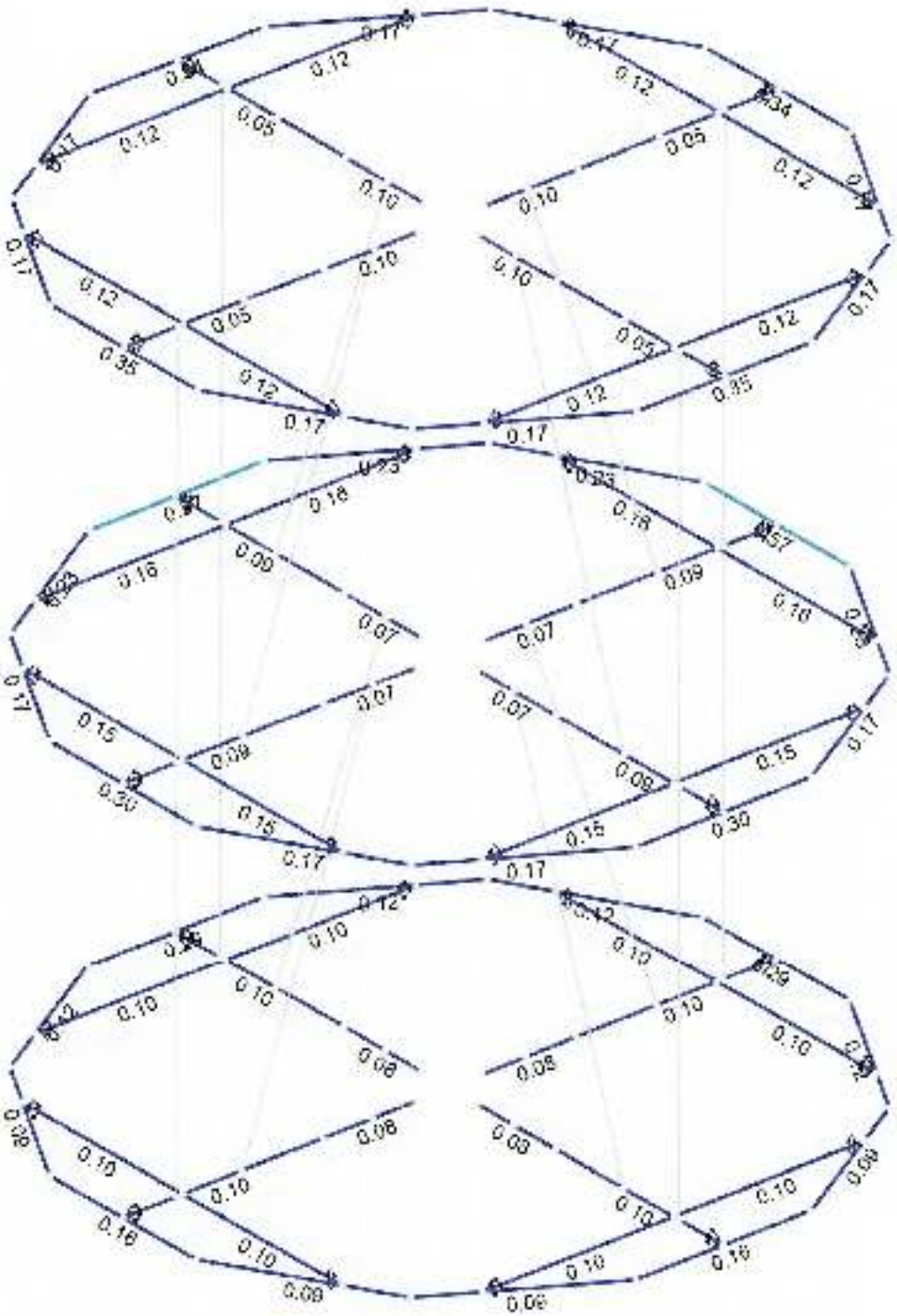


Loads: BLC 12, Ice Weight

RISA	Vector SE		SK-13
			Oct 24, 2024 at 10:54 AM
			NM1-148 Spike Concealmen...

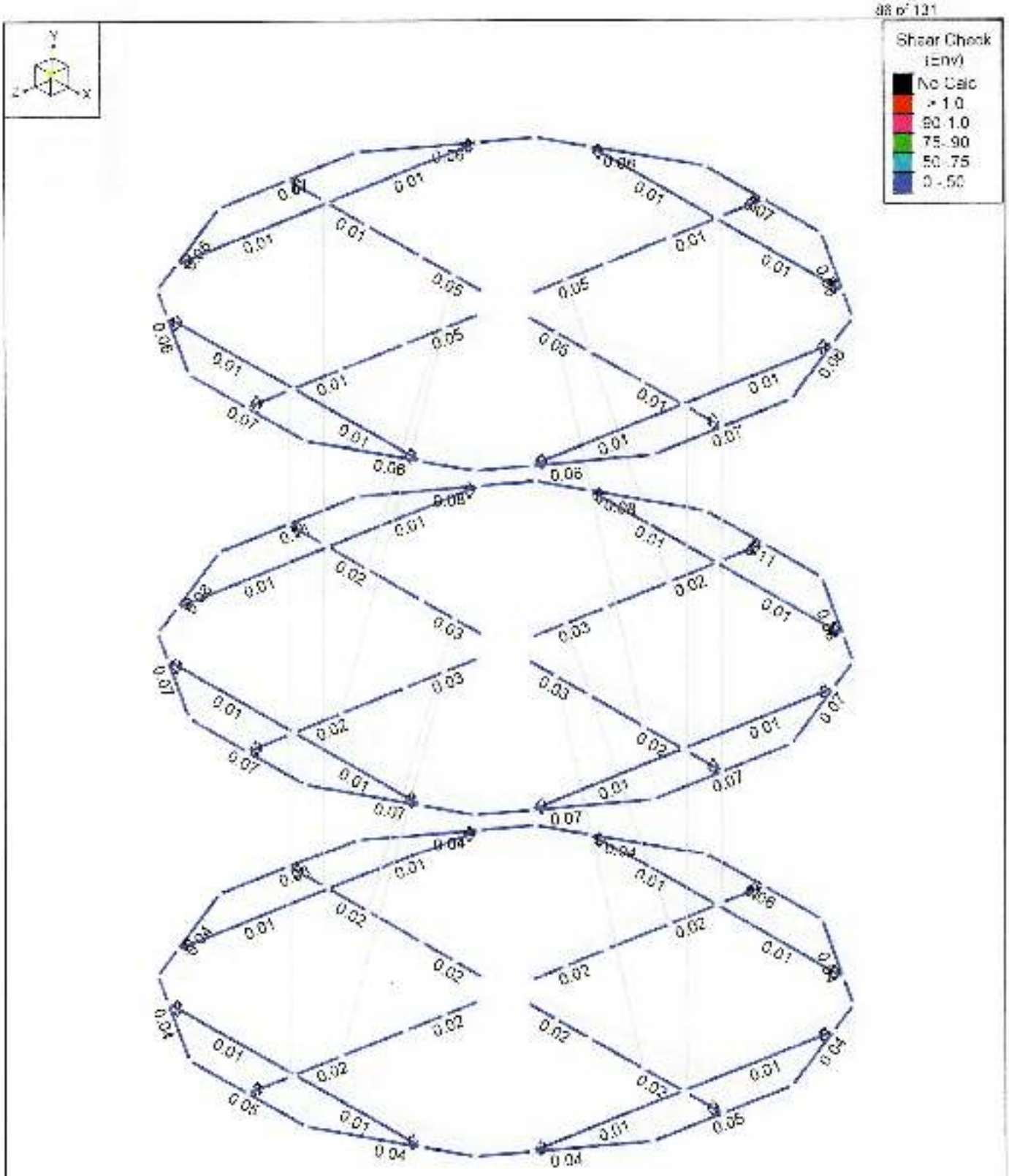






Member Code Checks Displayed (Enveloped)

RISA	Vector SE	SK-14
		Oct 24, 2024 at 10:54 AM
		NM-148 Spike Concealmen...



Member Shear Checks Displayed (Enveloped)

RISA	Vector SF		SK-15
			Oct 24, 2024 at 10:55 AM
			NM1-148 Spike Concealmen...

Model Settings

Number of Reported Sections	5
Number of Internal Sections	100
Member Area Load Mesh Size (in)	144
Consider Shear Deformation	Yes
Consider Torsional Warping	Yes
Approximate Mesh Size (in)	24
Transfer Forces Between Intersecting Wood Walls	Yes
Increase Wood Wall Nailing Capacity for Wind Loads	Yes
Include P-Delta for Walls	Yes
Optimize Masonry and Wood Walls	Yes
Maximum Number of Iterations	3
Single	No
Multiple (Optimum)	No
Maximum	Yes

Global Axis corresponding to vertical direction	Y
Convert Existing Data	Yes
Default Global Plane for z-axis	XZ
Plate Local Axis Orientation	Global

Hot Rolled Steel	AISC 15th (360-16): LRFD
Stiffness Adjustment	Yes (Iterative)
Notional Annex	None
Connections	None
Cold Formed Steel	None
Stiffness Adjustment	Yes (Iterative)
Wood	None
Temperature	< 100F
Concrete	None
Masonry	None
Aluminum	None
Structure Type	Building
Stiffness Adjustment	Yes (Iterative)
Stainless	None
Stiffness Adjustment	Yes (Iterative)

Compression Stress Block	Rectangular Stress Block
Analyze using Cracked Sections	Yes
Leave room for horizontal rebar splices (2nd bar spacing)	No
List forces which were ignored for design in the Detail Report	Yes

Column Min Steel	1
Column Max Steel	8
Rebar Material Spec	ASTM A615
Warn if beam-column framing arrangement is not understood	No
Number of Shear Regions	4
Region 2 & 3 Spacing Increase Increment (in)	4

Code	ASCE 7-16
Risk Category	I or II
Drift Cat	Other

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e^-6/F^-1]	Density [k/ft^3]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
2	A500 Gr.B RECT	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
3	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
4	FRP	2500	460	0.3	0.65	0.11	10	1.2	30	1.1

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in^2]	Iyy [in^4]	Izz [in^4]	J [in^4]
1	FRP Kicker Brace	LL4X4X3W4"GAP	VBrace	None	FRP	Typical	5.719	65.042	8.717	0.251
2	FRP Vertical Brace	LL4X4X3W4"GAP	VBrace	None	FRP	Typical	5.719	65.042	8.717	0.251
3	STEEL Outrigger Weldment	HSS4X2X3	Beam	None	A500 Gr.B RECT	Typical	1.89	1.22	3.56	3.08
4	STEEL Radius Ring Assembly	9X4X5/16"	Beam	None	A36 Gr.36	Typical	2.429	11.423	2.887	0.028
5	STEEL Radius Ring Assembly Top	L4X4X4	Beam	None	A36 Gr.36	Typical	1.93	3	3	0.044
6	STEEL Stand Off Arm	HSS5X5X3	Beam	None	A500 Gr.B RECT	Typical	3.28	12.5	12.5	19.9
7	STEEL Stand Off Arm Inner	HSS4.5X4.5X6	Beam	None	A500 Gr.B RECT	Typical	5.48	15.5	15.3	25.7

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor
1	1.0D	Yes	Y	DL	1				
2	1.4D	Yes	Y	DL	1.4				
3	1.2D+1.6L	Yes	Y	DL	1.2	LL	1.6		
4	1.2D + 0.5LL + 1.0WLx	Yes	Y	DL	1.2	LL	0.5	WLX	1
5	1.2D + 0.5LL + 1.0WLz	Yes	Y	DL	1.2	LL	0.5	WLZ	1
6	1.2D + 0.5LL - 1.0WLx	Yes	Y	DL	1.2	LL	0.5	WLX	-1
7	1.2D + 0.5LL - 1.0WLz	Yes	Y	DL	1.2	LL	0.5	WLZ	-1
8	1.2D + 1.0WLx	Yes	Y	DL	1.2	WLX	1		
9	1.2D + 1.0WLz	Yes	Y	DL	1.2	WLZ	1		
10	1.2D - 1.0WLx	Yes	Y	DL	1.2	WLX	-1		
11	1.2D - 1.0WLz	Yes	Y	DL	1.2	WLZ	-1		
12	0.9D + 1.0WLx	Yes	Y	DL	0.9	WLX	1		
13	0.9D + 1.0WLz	Yes	Y	DL	0.9	WLZ	1		
14	0.9D - 1.0WLx	Yes	Y	DL	0.9	WLX	-1		
15	0.9D - 1.0WLz	Yes	Y	DL	0.9	WLZ	-1		
16	1.2D + 1.0Di + 1.0Wlx	Yes	Y	DL	1.2	OL1	1	OL2	1
17	1.2D + 1.0Di + 1.0Wlz	Yes	Y	DL	1.2	OL1	1	OL3	1
18	1.2D + 1.0Di - 1.0Wlx	Yes	Y	DL	1.2	OL1	1	OL2	-1
19	1.2D + 1.0Di - 1.0Wlz	Yes	Y	DL	1.2	OL1	1	OL3	-1

Envelope Maximum Member Section Forces

	Member		Axial [lb]	Loc [ft]	LC	y Shear [lb]	Loc [ft]	LC	z Shear [lb]	Loc [ft]	LC	Torque [lb-ft]	Loc [ft]	LC	y Moment [lb-ft]	Loc [ft]	LC	z-z Moment [lb-ft]	Loc [ft]	LC
1	M96	max	-1414.201	0	14	11.722	0	2	0	10.5919	2	0	10.5919	2	0	10.5919	2	0	10.5919	2
2		min	-2362.771	10.5919	16	-11.722	10.5919	2	0	0	1	0	0	1	0	0	1	-31.034	5.295	2
3	M94	max	-1418.207	0	12	11.722	0	2	0	10.5919	2	0	10.5919	2	0	10.5919	2	0	10.5919	2
4		min	-2361.772	10.5919	18	11.722	10.5919	2	0	0	1	0	0	1	0	0	1	-31.034	5.295	2
5	M93	max	-1418.207	0	13	11.722	0	2	0	10.5919	2	0	10.5919	2	0	10.5919	2	0	10.5919	2
6		min	-2361.772	10.5919	19	-11.722	10.5919	2	0	0	1	0	0	1	0	0	1	-31.034	5.295	2
7	M95	max	-1414.201	0	15	11.722	0	2	0	10.5919	2	0	10.5919	2	0	10.5919	2	0	10.5919	2
8		min	-2362.771	10.5919	17	-11.722	10.5919	2	0	0	1	0	0	1	0	0	1	-31.034	5.295	2
9	M48	max	-1446.854	0	14	11.722	0	2	0	10.5919	2	0	10.5919	2	0	10.5919	2	0	10.5919	2
10		min	-2384.567	10.5919	16	-11.722	10.5919	2	0	0	1	0	0	1	0	0	1	-31.034	5.295	2
11	M47	max	-1446.854	0	15	11.722	0	2	0	10.5919	2	0	10.5919	2	0	10.5919	2	0	10.5919	2
12		min	-2384.567	10.5919	17	-11.722	10.5919	2	0	0	1	0	0	1	0	0	1	-31.034	5.295	2

Envelope Maximum Member Section Forces (Continued)

	Member		Axial[lb]	Loc[ft]	LC	y Shear[lb]	Loc[ft]	LC	z Shear[lb]	Loc[ft]	LC	Torque[lb-ft]	Loc[ft]	LC	y Moment[lb-ft]	Loc[ft]	LC	z Moment[lb-ft]	Loc[ft]	LC
13	M46	max	1449.261	0	12	11.722	0	2	0	10.59	19	0	10.59	19	0	10.59	19	0	10.59	19
14		min	2383.899	10.59	8	-11.722	10.59	2	0	0	1	0	0	1	0	0	1	-31.034	5.295	2
15	M45	max	1449.261	0	13	11.722	0	2	0	10.59	19	0	10.59	19	0	10.59	19	0	10.59	19
16		min	-2383.899	10.59	19	-11.722	10.59	2	0	0	1	0	0	1	0	0	1	-31.034	5.295	2
17	M89	max	905.681	0	19	0	10	19	0	10	19	0	10	19	0	10	19	0	10	19
18		min	501.605	10	15	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
19	M90	max	905.681	0	18	0	10	19	0	10	19	0	10	19	0	10	19	0	10	19
20		min	501.605	10	12	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
21	M91	max	906.079	0	17	0	10	19	0	10	19	0	10	19	0	10	19	0	10	19
22		min	499.864	10	15	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
23	M42	max	1083.508	0	19	0	10	19	0	10	19	0	10	19	0	10	19	0	10	19
24		min	540.67	10	12	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
25	M41	max	1083.508	0	19	0	10	19	0	10	19	0	10	19	0	10	19	0	10	19
26		min	540.67	10	13	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
27	M44	max	1083.507	0	16	0	10	19	0	10	19	0	10	19	0	10	19	0	10	19
28		min	640.958	10	14	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
29	M92	max	905.079	0	16	0	10	19	0	10	19	0	10	19	0	10	19	0	10	19
30		min	499.864	10	14	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
31	M43	max	1083.507	0	17	0	10	19	0	10	19	0	10	19	0	10	19	0	10	19
32		min	640.958	10	15	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
33	M31	max	1072.307	4.658	10	405.526	1.504	12	104.12	4.658	18	19.793	1.458	19	69.031	4.658	19	492.436	4.61	10
34		min	-1058.54	4.658	12	-407.959	1.504	6	-45.96	1.504	16	11.031	1.504	13	-73.855	0	18	-486.494	4.61	12
35	M77	max	471.748	4.658	11	474.391	2.261	11	130.859	2.329	18	11.71	4.658	17	267.953	2.329	17	613.707	2.329	13
36		min	-449.358	2.329	13	-476.553	2.329	7	-131.021	2.329	17	-11.742	0	16	25.126	0	14	-628.636	2.329	7
37	M78	max	545.708	0	11	205.186	5.154	11	30.017	5.154	17	-6.656	5.154	15	42.484	0	17	248.948	0.049	11
38		min	-521.659	0	13	-201.578	5.154	13	-62.515	0	19	-11.029	0	17	-41.099	4.658	16	-241.279	0.097	13
39	M76	max	545.758	4.658	11	201.859	1.504	13	62.514	4.658	18	11.053	4.658	15	42.626	4.658	16	248.914	4.61	11
40		min	-521.851	4.658	13	-205.167	1.504	7	-30.013	1.504	19	6.507	0	14	-41.239	0	16	-241.247	4.561	13
41	M75	max	599.936	3.154	8	127.066	4.659	14	30.011	3.154	17	-6.55	4.659	14	42.578	0	16	179.503	0	8
42		min	-575.737	0	14	-130.845	3.203	4	-62.509	0	19	-11.045	0	15	-41.241	4.658	18	-171.773	0	14
43	M79	max	545.758	4.658	13	201.859	1.504	13	62.512	4.658	19	11.01	4.658	15	42.49	4.658	15	248.914	4.61	10
44		min	-521.8514	658	12	-205.167	1.504	6	-30.012	1.504	18	6.659	1.504	14	-41.088	0	17	-241.247	4.561	12
45	M36	max	1160.9330	154	9	266.237	4.559	19	46.926	3.154	18	-10.559	3.154	14	69.514	0	18	353.366	0	9
46		min	-1166.028	0	15	-258.014	3.203	5	-104.087	0	16	-19.946	0	16	-74.426	4.658	17	-347.814	0	15
47	M35	max	1127.1852	329	9	410.613	2.261	9	214.421	2.261	18	17.497	4.659	13	444.316	2.329	18	592.859	2.329	15
48		min	-1112.849	0	15	-410.626	2.329	5	-216.745	2.329	19	-17.455	0	17	37.464	4.658	14	-603.146	2.329	5
49	M34	max	1151.0314	658	9	258.942	1.456	9	104.06	4.658	18	19.934	4.658	17	69.437	4.658	17	350.337	4.659	9
50		min	-1166.0921	504	15	-256.251	0	15	-48.902	1.504	16	10.6	0	15	-74.426	0	17	-347.772	4.658	15
51	M33	max	1072.531	0	10	406	3.154	10	46.966	3.154	16	-10.558	4.659	15	69.514	0	17	492.507	0.049	10
52		min	-1058.591	0	12	-405.575	3.154	2	-104.124	0	18	-19.946	0	17	-74.422	4.559	17	-486.575	0.049	12
53	M32	max	925.709	4.658	10	942.911	2.329	12	214.037	2.281	16	17.487	4.659	17	443.891	2.329	16	1235.293	2.329	12
54		min	-912.475	2.329	12	-950.439	2.329	6	-216.362	2.329	16	-17.374	0	19	37.464	4.559	15	1246.78	2.329	6
55	M30	max	1072.331	0	11	406	3.154	11	46.969	3.154	17	-11.03	3.154	12	69.023	0	18	492.507	0.049	11
56		min	-1058.591	0	13	-405.576	3.154	13	-104.124	0	19	-19.792	3.203	18	-73.96	4.658	19	-486.575	0.049	13
57	M26	max	1127.185	2.329	8	410.613	2.261	8	215.826	2.329	19	17.456	4.659	16	444.316	2.329	18	592.859	2.329	14
58		min	-1112.848	0	14	-410.626	2.329	4	-216.745	2.329	18	-17.487	0	17	37.468	0	15	-603.146	2.329	4
59	M28	max	1072.307	4.658	11	405.526	1.504	13	104.12	4.658	19	19.948	1.458	15	69.523	4.658	16	492.436	4.61	11
60		min	-1058.54	4.658	13	-407.959	1.504	7	-45.96	1.504	17	10.599	1.504	14	-74.422	0	16	-486.494	4.61	13
61	M29	max	925.705	4.659	11	942.911	2.329	13	215.825	2.329	18	17.375	4.659	18	443.891	2.329	17	1235.293	2.329	13
62		min	-912.475	2.329	13	-950.439	2.329	7	-216.362	2.329	17	-17.487	0	16	37.468	0	14	-1246.78	2.329	7
63	M84	max	599.936	3.154	9	127.066	4.659	15	30.018	3.154	18	-6.506	4.659	14	42.622	0	16	179.503	0	9
64		min	-575.737	0	15	-130.845	3.203	5	-62.517	0	18	-11.052	3.203	16	-41.241	4.659	17	-171.773	0	15
65	M83	max	572.347	2.329	9	208.825	2.261	9	129.696	2.261	19	11.742	4.659	16	266.081	2.329	19	292.357	2.329	15
66		min	-549.593	0	15	-209.837	2.329	5	-131.124	2.329	19	-11.725	0	17	-35.123	4.659	14	-306.563	2.329	5
67	M82	max	599.964	4.658	9	130.85	1.456	9	62.506	4.659	18	11.045	4.658	17	42.583	4.658	17	179.477	4.658	9

Envelope Maximum Member Section Forces (Continued)

	Member		Axial[lb]	Loc[ft]	LC	Shear[lb]	Loc[ft]	LC	Shear[lb]	Loc[ft]	LC	Torque[lb-ft]	Loc[ft]	LC	Moment[lb-ft]	Loc[ft]	LC	Moment[lb-ft]	Loc[ft]	LC
64		min	-575.769	1.504	14	-127.073	0	15	-30.006	1.504	16	6.531	0	15	-41.241	0	17	-171.752	4.658	15
65	M73	max	599.954	4.658	8	130.85	1.456	8	82.514	4.658	17	11.053	1.456	17	42.629	4.658	17	179.477	4.658	8
70		min	-575.769	1.504	14	-127.073	0	14	-30.013	1.504	16	6.507	0	15	-41.241	0	15	-171.752	4.658	14
71	M80	max	471.749	4.659	10	474.391	2.281	13	129.596	2.281	16	11.742	4.659	17	287.953	2.329	16	613.707	2.329	12
72		min	-449.358	2.329	12	-478.653	2.329	6	-131.021	2.329	16	-11.71	0	15	25.123	4.659	15	-628.635	2.329	6
73	M25	max	1161.031	4.658	8	256.942	1.456	8	104.083	4.658	17	19.948	4.658	17	69.523	4.658	17	353.337	4.658	8
74		min	-1166.092	1.504	14	-256.251	0	14	-46.52	1.504	19	10.558	0	15	74.426	0	18	-347.772	4.658	14
75	M74	max	572.347	2.329	8	206.825	2.281	8	130.859	2.329	19	11.725	4.659	16	268.061	2.329	19	292.337	2.329	14
76		min	-549.693	0	14	-205.837	2.329	4	-131.124	2.329	16	-11.742	0	17	25.125	0	16	-306.963	2.329	4
77	M27	max	1180.933	5.154	8	256.237	4.659	14	46.911	5.154	17	-10.599	5.154	14	69.429	0	16	353.396	0	6
78		min	-1166.075	0	14	-255.914	3.203	4	-104.064	0	19	-19.932	0	16	-74.426	4.659	16	-347.814	0	14
79	M81	max	545.768	0	10	205.188	3.154	10	30.018	3.154	19	-8.506	5.154	15	42.622	0	17	248.949	0.049	10
80		min	-521.859	0	12	-207.678	3.154	12	-82.517	0	17	-11.052	3.203	17	-41.239	4.659	17	-241.279	0.097	12
81	M1	max	1161.402	4.658	8	69.213	4.658	16	306.015	1.504	12	18.22	1.456	16	320.076	4.658	8	263.337	4.658	12
82		min	-1061.695	4.658	14	-17.536	1.504	18	-329.222	1.504	3	7.945	1.504	14	-294.19	4.658	14	-342.409	4.658	6
83	M2	max	1045.489	2.329	8	131.65	2.329	17	733.885	2.329	8	12.733	4.659	16	725.485	2.329	10	482.88	2.329	14
84		min	-970.539	0	14	-131.779	2.329	16	-729.272	2.281	4	-12.732	0	16	-599.268	2.329	12	-901.106	2.329	4
85	M9	max	1161.398	0	8	17.543	3.154	18	329.237	3.154	10	-7.945	0.154	14	320.12	0	8	263.379	0	12
86		min	-1061.658	0	14	-69.215	0	16	-306.041	3.154	12	-16.219	0	16	-294.213	0	14	-342.437	0	6
87	M4	max	1165.957	4.658	11	69.194	4.658	19	297.906	1.504	16	16.226	1.456	19	316.268	4.658	11	259.369	4.658	15
88		min	-1066.154	4.658	3	-17.519	1.504	17	-321.113	1.504	5	7.925	0	13	-290.376	4.658	13	-338.436	4.658	5
89	M5	max	1053.651	2.329	11	131.65	2.329	16	712.497	2.329	11	12.742	4.659	19	707.765	2.329	9	464.888	2.329	13
90		min	-978.646	0	13	-131.805	2.329	17	-708.227	2.281	7	-12.74	0	19	-581.491	2.329	15	-883.095	2.329	7
91	M7	max	1165.957	4.658	10	69.194	4.658	18	297.906	1.504	14	16.225	1.456	18	316.268	4.658	10	259.369	4.658	14
92		min	-1066.154	4.658	12	-17.519	1.504	16	-321.113	1.504	4	7.925	0	12	-290.376	4.658	12	-338.436	4.658	4
93	M6	max	1053.651	2.329	10	131.651	2.329	19	712.497	2.329	10	12.742	4.659	18	707.768	2.329	8	464.888	2.329	12
94		min	-978.646	0	12	-131.805	2.329	16	-708.227	2.281	6	-12.74	0	18	-581.491	2.329	14	-883.095	2.329	6
95	M9	max	1165.931	0	10	17.524	3.154	16	321.12	3.154	8	-7.925	3.154	12	316.303	0	10	259.408	0	14
96		min	-1066.126	0	12	-69.196	0	18	-297.926	3.154	14	-16.225	3.203	18	-290.405	0	12	-338.459	0	4
97	M11	max	1045.489	2.329	9	131.651	2.329	18	733.885	2.329	9	12.733	4.659	17	725.485	2.329	11	482.88	2.329	15
98		min	-970.539	0	15	-131.779	2.329	18	-729.272	2.281	5	-12.732	0	17	-599.268	2.329	13	-901.105	2.329	5
99	M12	max	1161.398	0	9	17.543	3.154	19	329.237	3.154	11	-7.945	3.154	15	320.12	0	9	263.379	0	13
100		min	-1061.658	0	15	-69.215	0	17	-306.041	3.154	13	-16.219	3.203	17	-294.213	0	15	-342.437	0	7
101	M6	max	1165.931	0	11	17.524	3.154	17	321.12	3.154	9	-7.925	3.154	13	316.303	0	11	259.408	0	15
102		min	-1066.126	0	13	-69.196	0	19	-297.926	3.154	15	16.225	3.203	15	-290.405	0	13	-338.459	0	5
103	M10	max	1161.402	4.658	9	69.213	4.658	17	306.015	1.504	13	18.22	1.456	14	320.076	4.658	9	263.337	4.658	13
104		min	-1061.695	4.658	15	-17.536	1.504	19	-329.222	1.504	7	7.945	1.504	15	-294.19	4.658	15	-342.409	4.658	7
105	S1	max	1442.868	2.5	15	1879.352	0	19	101.831	2.5	8	1.059	2.5	14	243.321	2.5	9	176.863	0	19
106		min	-2229.018	0	5	-412.193	2.5	19	-101.815	1.172	6	-1.062	0	12	-243.288	2.5	6	-2002.893	1.172	19
107	M71	max	1838.182	2.5	9	-346.145	0	15	41.198	1.146	10	0.071	2.5	12	98.775	2.5	10	1506.218	2.5	17
108		min	-838.469	0	15	-623.792	2.5	17	-41.17	0	4	-0.073	0	14	-98.719	2.5	4	-4.198	0	17
109	M70	max	1066.073	2.5	10	-347.787	0	12	41.198	1.146	11	0.071	1.146	15	98.775	2.5	11	1505.203	2.5	18
110		min	28.387	1.172	12	-623.397	2.5	18	-41.17	0	5	-0.073	0	15	-98.719	2.5	5	-4.202	0	13
111	M69	max	1066.073	2.5	11	-347.787	0	13	41.152	1.146	8	0.068	2.5	14	98.691	2.5	8	1505.203	2.5	18
112		min	28.387	1.172	13	-623.397	2.5	19	-41.174	0	6	-0.073	0	12	-98.725	2.5	6	-4.202	0	13
113	S2	max	1442.868	2.5	14	1879.352	0	18	101.818	2.5	11	1.057	1.146	13	243.295	2.5	11	176.863	0	19
114		min	-2229.018	0	4	-412.193	2.5	18	-101.809	1.172	5	-1.064	0	15	-243.287	2.5	13	-2002.893	1.172	18
115	S3	max	1357.253	2.5	13	1879.85	0	17	101.818	2.5	10	1.057	2.5	12	243.296	2.5	10	176.943	0	17
116		min	-2182.479	0	7	-412.317	2.5	17	-101.809	1.172	4	-1.064	0	14	-243.287	2.5	12	-2003.994	1.172	17
117	S4	max	1397.253	2.5	12	1879.85	0	16	101.831	2.5	9	1.059	2.5	15	243.321	2.5	9	176.943	0	15
118		min	-2182.479	0	6	-412.317	2.5	16	-101.815	1.172	7	-1.062	0	13	-243.299	2.5	7	-2003.994	1.172	15
119	M24	max	2648.43	2.5	8	1217.787	0	16	82.329	2.5	9	1.694	1.146	9	197.043	2.5	13	88.87	0	15
120		min	-1999.485	0	14	-1055.778	2.5	18	-82.402	1.172	7	-1.565	0	7	-197.259	2.5	15	-1317.708	1.172	15
121	M23	max	2645.43	2.5	9	1217.787	0	17	82.462	2.5	10	1.555	1.146	10	197.355	2.5	14	88.87	0	17
122		min	-1999.485	0	15	-1055.778	2.5	17	-82.4	1.172	4	-1.705	0	4	-197.171	2.5	12	-1317.708	1.172	17

Envelope Maximum Member Section Forces (Continued)

	Member		Axial[lb]	Loc[ft]	Lc	y Shear[lb]	Loc[ft]	Lc	z Shear[lb]	Loc[ft]	Lc	Torque[lb-ft]	Loc[ft]	Lc	y-y Moment[lb-ft]	Loc[ft]	Lc	z-z Moment[lb-ft]	Loc[ft]	Lc
123	M22	max	1515.158	2.5	10	1217.065	0	16	82.452	2.5	11	1.555	1.146	1	197.355	2.5	15	85.759	0	19
124		min	-869.006	0	12	-1055.431	2.5	16	-82.4	1.172	5	-1.705	0	5	-197.171	2.5	13	-1316.949	1.172	18
125	M21	max	1515.158	2.5	11	1217.065	0	19	82.329	2.5	8	1.594	1.146	9	197.043	2.5	12	85.789	0	19
126		min	-869.006	0	12	-1055.431	2.5	19	-82.402	1.172	6	-1.555	0	6	-197.259	2.5	14	-1316.949	1.172	19
127	M72	max	1538.182	2.5	8	-348.145	0	14	41.152	1.146	9	0.068	2.5	15	98.681	2.5	9	1506.218	2.5	16
128		min	-539.469	0	14	-623.782	2.5	16	-41.174	0	7	-0.076	0	13	-98.725	2.5	7	-4.198	0	16
129	M17	max	1442.866	2.105	15	300.464	3.93319		194.382	5.31814		1.059	5.712	14	621.371	5.712	8	366.293	3.933	19
130		min	-1584.209	0	5	-723.908	3.67819		-194.419	3.933	4	-1.062	0	12	-621.316	5.712	6	1469.424	0	19
131	M18	max	1442.866	2.105	14	300.464	5.93319		194.377	5.31813		1.057	3.712	13	621.335	5.712	11	366.293	3.93318	
132		min	-1584.209	0	4	-723.908	3.67813		-194.365	3.933	15	-1.064	0	15	-621.256	5.712	5	-1469.424	0	18
133	M19	max	1397.253	2.105	13	300.529	3.93317		194.377	5.31812		1.057	3.712	12	621.335	3.712	19	366.372	3.93317	
134		min	-1538.546	0	7	-723.861	3.67817		-194.359	3.933	14	-1.064	0	14	-621.256	3.712	4	-1469.761	0	17
135	M85	max	1066.073	2.105	11	1491.806	2.16119		86.619	3.878	10	0.068	2.105	14	251.182	3.712	12	2892.162	2.161	19
136		min	-448.314	2.161	5	-676.074	2.10519		-85.58	3.767	4	-0.075	0	12	-251.102	3.712	14	-23.451	5.318	17
137	M87	max	1535.182	2.105	5	1492.654	2.16117		86.611	3.878	5	0.071	0.712	12	251.24	3.712	14	2893.737	2.161	17
138		min	-1313.866	2.161	7	-676.339	2.10517		-86.685	3.767	6	-0.073	2.161	14	-251.3	3.712	12	-23.44	5.318	16
139	M86	max	1066.073	2.105	10	1491.906	2.16118		86.611	3.878	9	0.071	3.712	13	251.24	3.712	15	2892.162	2.161	18
140		min	-448.314	2.161	4	-676.074	2.10518		-86.685	3.767	7	-0.073	2.161	15	-251.3	3.712	13	-23.451	5.318	16
141	M20	max	1397.253	3.712	12	300.529	3.93315		194.382	5.31815		1.059	2.105	15	621.371	3.712	9	366.372	3.933	16
142		min	-1538.546	2.161	6	-723.861	3.67813		-194.419	3.933	5	-1.062	2.161	13	-621.316	3.712	7	-1469.761	0	16
143	M37	max	1515.153	2.105	11	1080.883	2.16117		173.168	5.31813		1.694	2.105	8	502.544	3.712	8	2392.771	2.161	19
144		min	-880.983	2.161	5	-1110.3222	2.10519		-172.842	3.933	4	-1.565	0	6	-502.325	3.712	6	-34.911	5.31	17
145	M39	max	2646.43	2.105	9	1080.796	2.16117		173.036	5.318	8	1.555	3.712	10	502.81	3.712	12	2393.101	2.161	17
146		min	-2012.3062	2.161	7	-1111.2182	2.10517		-173.304	3.933	6	-1.705	2.161	4	-502.943	3.712	4	-34.524	5.31	19
147	M40	max	2646.43	2.105	6	1080.796	2.16116		173.168	5.318	11	1.694	3.712	9	502.541	3.712	9	2393.101	2.161	16
148		min	-2012.3062	2.161	8	-1111.2182	2.10516		-172.842	3.933	5	-1.565	0	7	-502.325	3.712	7	-34.924	5.318	17
149	M88	max	1605.182	2.105	8	1492.654	2.16116		86.619	3.878	11	0.068	0.712	15	251.182	3.712	13	2893.737	2.161	16
150		min	-1313.866	2.161	8	-676.339	2.10516		-85.58	3.767	5	-0.075	2.161	13	-251.102	3.712	15	-23.44	5.318	17
151	M38	max	1515.153	2.105	10	1080.883	2.16116		173.036	5.318	9	1.555	2.105	11	502.61	3.712	11	2392.771	2.161	19
152		min	-880.983	2.161	4	-1110.9222	2.10516		-173.304	3.933	7	-1.705	2.161	5	-502.943	3.712	5	-34.911	5.318	16
153	M97	max	920.745	5.072	13	57.795	5.07215		-30.152	5.07215		0	5.072	19	414.198	0	17	293.137	0	15
154		min	-924.285	0	7	-59.42	0	5	-104.816	0	17	0	0	1	0	5.072	1	-296.308	0	5
155	M98	max	920.67	5.072	13	58.422	5.072	9	-30.15	5.07215		0	5.072	19	414.194	0	17	295.323	0	9
156		min	-924.243	0	7	-57.8	0	15	-104.816	0	17	0	0	1	0	5.072	1	-293.167	0	15
157	M99	max	1012	5.072	13	55.385	5.072	11	-62.726	5.07214		0	5.072	19	722.458	0	16	285.986	0	11
158		min	-1018.222	0	7	-55.84	0	13	-165.594	0	16	0	0	1	0	5.072	1	-283.223	0	13
159	M100	max	1012.056	5.072	13	55.851	5.072	13	-62.95	5.07214		0	5.072	19	722.356	0	13	283.279	0	15
160		min	-1018.245	0	7	-56.393	0	7	-165.514	0	16	0	0	1	0	5.072	1	-286.026	0	7
161	M101	max	502.04	5.072	13	28.455	5.072	11	-42.211	5.07214		0	5.072	19	494.084	0	15	144.326	0	11
162		min	-514.168	0	7	-27.723	0	13	-120.568	0	16	0	0	1	0	5.072	1	-140.61	0	13
163	M102	max	502.045	5.072	13	27.726	5.072	13	-42.196	5.07214		0	5.072	19	494.089	0	16	140.629	0	13
164		min	-514.18	0	7	-28.459	0	7	-120.559	0	16	0	0	1	0	5.072	1	-144.347	0	7
165	M103	max	920.67	5.072	12	58.422	5.072	6	30.15	5.07214		0	5.072	19	414.194	0	16	296.323	0	8
166		min	-924.243	0	6	-57.8	0	14	-104.816	0	16	0	0	1	0	5.072	1	293.167	0	14
167	M104	max	1012.056	5.072	12	55.851	5.072	12	-62.723	5.07215		0	5.072	19	722.451	0	17	283.279	0	12
168		min	-1018.245	0	5	-56.393	0	5	-165.552	0	17	0	0	1	0	5.072	1	-286.028	0	6
169	M105	max	502.045	5.072	12	27.726	5.072	12	-42.21	5.07215		0	5.072	19	494.079	0	17	140.629	0	12
170		min	-514.18	0	5	-28.459	0	6	-120.566	0	17	0	0	1	0	5.072	1	-144.347	0	6
171	M106	max	502.04	5.072	12	28.455	5.072	10	-42.197	5.07215		0	5.072	19	494.093	0	17	144.326	0	10
172		min	-514.168	0	6	-27.723	0	12	-120.57	0	17	0	0	1	0	5.072	1	-140.61	0	12
173	M107	max	1012	5.072	12	56.385	5.072	10	-62.952	5.07215		0	5.072	19	722.065	0	17	285.906	0	10
174		min	-1018.222	0	6	-55.84	0	12	-165.517	0	17	0	0	1	0	5.072	1	-283.223	0	12
175	M108	max	920.745	5.072	12	57.795	5.072	14	-30.152	5.07214		0	5.072	18	414.198	0	16	293.137	0	14
176		min	-924.285	0	6	-59.42	0	4	-104.816	0	19	0	0	1	0	5.072	1	-296.308	0	4
177	M109	max	926.452	5.072	15	59.672	5.072	11	-29.762	5.07213		0	5.072	18	414.815	0	19	303.676	0	11

Company : Vector SE
Designer :
Job Number :
Model Name :

Envelope Maximum Member Section Forces (Continued)

	Member		Axial[lb]	Loc[ft]	LC	Shear[lb]	Loc[ft]	LC	Shear[lb]	Loc[ft]	LC	Torque[lb-ft]	Loc[ft]	LC	Moment[lb-ft]	Loc[ft]	LC	Moment[lb-ft]	Loc[ft]	LC
178		min	-929.948	0	5	-59.254	0	13	-104.899	0	19	0	0	1	0	5.072	1	300.543	0	13
179	M110	max	873.921	5.072	15	33.905	5.072	14	-61.921	5.072	15	0	5.072	19	723.816	0	17	171.969	0	14
180		min	-881.283	0	5	-34.491	0	4	-165.861	0	17	0	0	1	0	5.072	1	-174.94	0	4
181	M111	max	433.152	5.072	15	16.757	5.072	14	-42.11	5.072	15	0	5.072	19	494.253	0	17	84.992	0	14
182		min	-445.585	0	5	-17.501	0	4	-120.6	0	17	0	0	1	0	5.072	1	-85.754	0	4
183	M112	max	433.199	5.072	15	15.457	5.072	9	-42.112	5.072	15	0	5.072	19	494.257	0	17	78.399	0	9
184		min	-445.623	0	5	-14.737	0	15	-120.602	0	17	0	0	1	0	5.072	1	-74.745	0	15
185	M113	max	874.015	5.072	15	30.38	5.072	9	-61.923	5.072	15	0	5.072	19	725.625	0	17	154.086	0	9
186		min	-881.422	0	5	-29.983	0	15	-165.864	0	17	0	0	1	0	5.072	1	-151.567	0	15
187	M114	max	926.508	5.072	16	59.247	5.072	13	-29.763	5.072	13	0	5.072	19	414.618	0	19	300.504	0	13
188		min	-929.954	0	5	-58.866	0	7	-104.901	0	19	0	0	1	0	5.072	1	-303.649	0	7
189	M115	max	926.452	5.072	4	59.872	5.072	19	-29.762	5.072	12	0	5.072	19	414.615	0	18	303.676	0	19
190		min	-929.948	0	4	-59.254	0	13	-104.899	0	16	0	0	1	0	5.072	1	-300.543	0	13
191	M116	max	873.921	5.072	14	29.882	5.072	14	-61.921	5.072	14	0	5.072	19	723.816	0	16	151.566	0	14
192		min	-881.283	0	4	-30.376	0	4	-165.861	0	16	0	0	1	0	5.072	1	-154.07	0	4
193	M117	max	433.152	5.072	14	14.737	5.072	14	-42.11	5.072	14	0	5.072	19	494.253	0	16	74.745	0	14
194		min	-445.585	0	4	-15.459	0	4	-120.6	0	16	0	0	1	0	5.072	1	-75.403	0	4
195	M118	max	433.199	5.072	14	17.503	5.072	9	-42.112	5.072	14	0	5.072	19	494.257	0	16	88.776	0	9
196		min	-445.623	0	4	-16.76	0	15	-120.602	0	16	0	0	1	0	5.072	1	-85.009	0	15
197	M119	max	874.015	5.072	14	34.501	5.072	9	-61.923	5.072	14	0	5.072	19	725.625	0	16	174.989	0	9
198		min	-881.422	0	4	-33.912	0	15	-165.864	0	16	0	0	1	0	5.072	1	-172.001	0	15
199	M120	max	926.508	5.072	14	59.247	5.072	12	-29.763	5.072	12	0	5.072	19	414.618	0	16	300.504	0	12
200		min	-929.954	0	4	-59.866	0	6	-104.901	0	16	0	0	1	0	5.072	1	-303.649	0	6

Envelope Node Reactions

	Node Label		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	R4	max	2162.479	10	1882.099	10	102.294	11	1.062	13	10.868	11	-110.414	14
2		min	-910.27	12	1189.089	14	-102.281	5	-1.059	15	-10.876	5	176.943	16
3	R1	max	102.294	10	1881.573	18	956.345	15	-110.711	13	10.868	10	1.059	14
4		min	-102.281	4	1190.196	13	-2229.018	5	-176.803	19	-10.875	4	-1.062	12
5	R3	max	102.3	10	1882.085	17	2162.479	11	176.943	17	10.863	8	1.064	14
6		min	-102.263	4	1189.085	15	-910.27	13	110.414	15	-10.871	6	-1.057	12
7	R2	max	956.348	14	1991.573	19	102.3	11	1.067	13	10.863	9	176.863	18
8		min	-2229.018	4	1190.199	12	-102.283	5	-1.064	15	-10.871	7	110.711	12
9	N53	max	81.825	14	1216.824	19	874.296	11	55.055	13	8.356	14	1.694	8
10		min	-82.28	12	770.079	13	-869.006	13	-86.789	19	-8.351	12	-1.585	6
11	N54	max	874.296	10	1216.824	18	81.872	15	1.555	11	8.386	9	86.789	18
12		min	-869.006	12	770.079	12	-82.345	13	-1.705	5	-8.379	7	55.055	12
13	N55	max	81.872	14	1217.227	17	1999.465	15	86.87	17	8.386	8	1.705	8
14		min	-82.345	12	767.985	15	-2003.773	5	54.645	15	-8.379	6	-1.555	6
15	N56	max	1999.465	14	1217.227	16	81.825	15	1.565	11	8.356	15	-54.846	14
16		min	-2003.773	4	767.985	14	-82.28	13	-1.694	5	-8.351	13	-86.87	16
17	N101	max	40.895	14	-347.780	19	1056.073	11	4.202	19	4.179	10	0.068	14
18		min	-41.014	12	-584.106	19	25.327	13	1.505	13	-4.181	4	-0.076	12
19	N102	max	1056.073	10	-347.756	12	40.919	15	0.071	13	4.19	13	-1.905	12
20		min	28.387	12	-584.106	19	-41.035	13	-0.073	15	-4.191	7	-4.202	18
21	N103	max	40.919	14	-346.152	15	528.469	15	-1.561	15	4.19	12	0.073	14
22		min	-41.035	12	-584.628	17	-1633.152	5	-4.198	17	-4.191	6	-0.071	12
23	N104	max	528.469	14	-346.152	14	40.895	15	0.076	13	4.179	11	4.196	16
24		min	-1633.152	4	-584.628	16	-41.014	13	-0.068	15	-4.181	5	1.561	14
25	Totals:	max	7728.274	10	10057.249	19	7728.274	11						
26		min	-7728.274	12	6452.807	14	-7728.274	13						

JOB NO.: U0142.2054.242

PROJECT: NM01-148 SPIKE

ENCLOSURE CALCULATIONS

FRP Member Design for Compression (RISA):

Label: FRP Kicker Brace

INPUT:

Unbraced Length, L [ft]:	10.6
Axial: C [lb]:	662
K:	1

Notes:
See RISA model member M18 for max axial force. Force divided by 2 to account for double angles. Force multiplied by 0.6 to convert LRFD forces to ASD

Column: 4x4x3/8 FRP Angle

r [in]:	0.79
E [psi]:	2,800,000
A [in^2]:	2.85

OUTPUT:

f_a [psi]:	242	<	F_a [psi]:	356	OK, 68%

Select 4x4x3/8 FRP Angle FRP column

FRP Shear Connection w/ Steel Bolts:

Label: Kicker to HSS, typ.

Bearing stress of FRP member controls

INPUT:

Design Force, P [lb]:	662
Steel Bolt Diameter, d_b [in]:	1/2
# Bolts, n:	2
FRP Web Thickness, t_w [in]:	3/8
Double Shear:	No
Bearing Stress:	Lengthwise
Factor of Safety, FS:	4

Notes:
Design Force = axial in FRP Kicker Brace, typ.

OUTPUT:

f_{br} [psi]:	1,844	<	F_{br} [psi]:	7,500	OK, 25%

Select (2) 1/2" diameter steel bolts

See attached FRP material and section properties.

JOB NO.: U0142.2054.242

PROJECT: NM01-148 SPIKE

FRP Member Design for Compression (RISA):

Label: FRP Vertical Brace

INPUT:

Unbraced Length, L [ft]:	10.6	Notes: See RISA model member M42 for max axial force. Force divided by 2 to account for double angles. Force multiplied by 0.6 to convert LRFD forces to ASD
Axial, C [lb]:	319	
K:	1	

Column: 4x4x3/8 FRP Angle

r [in]:	0.75
E [psi]:	2,800,000
A [in^2]:	2.85

OUTPUT:

f_a [psi]	111	<	F_a [psi]	356	**OK, 31%**

Select 4x4x3/8 FRP Angle FRP column

FRP Shear Connection w/ Steel Bolts:

Label: Vertical Brace to HSS, typ. Bearing stress of FRP member controls.

INPUT:

Design Force, P [lb]:	318	Notes: Design Force = axial in FRP Vertical Brace, typ.
Steel Bolt Diameter, d_b [in]:	1/2	
# Bolts, n_b:	2	
FRP Web Thickness, t_w [in]:	3/8	
Double Shear:	No	
Bearing Stress:	Lengthwise	
Factor of Safety, FS:	4	

OUTPUT:

$f_{b,v}$ [psi]	847	<	$F_{b,v}$ [psi]:	7,500	**OK, 11%**

Select (2) 1/2" diameter steel bolts

See attached FRP material and section properties.

JOB NO.: U0142.2054.242

PROJECT: NM01-148 Spike

DESIGN APPROACH: LRFD

BOLTED SHEAR CONNECTION

Location: STEEL Stand Off Arm

Bolt Grade:	ASTM A325		
Bolt Diameter:	0.625	in	
Number of Bolts:	2		
Double Shear?	No		
Bolt Capacity:	24850	lbs	(AISC Equation J3-1)
Shear Load:	2646	lbs	
Check Bolt:	10.6%		

Result: **Select (2) 0.625 in. dia. ASTM A325 bolts.**

Note: See RISA model section set 'STEEL Stand Off Arm' load combination 4 for max Axial [lb]

BOLT/PIN BEARING & MATERIAL TENSILE/SHEAR STRENGTH

Location: STEEL Stand Off Arm

Bolt or Pin Diameter:	0.625	in	
Hole Diameter or Slot Width:	0.6875	in	
Number of Bolts or Pins:	2		
Plate Thickness:	0.375	in	
Plate Yield Strength (F_y):	36	ksi	
Plate Ultimate Strength (F_u):	58	ksi	
Bolt/Pin Parallel Edge Distance:	1	in	(measured from center of hole)
Bearing Capacity:	25692	lbs	
Perpendicular Edge Distance:	1	in	(measured from center of hole)
Effective Perp. Edge Distance:	1		
Tensile Rupture Capacity:	42820	lbs	(AISC Equation D5-1)
Shear Rupture Capacity:	37927	lbs	(AISC Equation D5-2)
Load:	2646	lbs	
Check Bearing:	10.3%		

Available AISC Checks

Equation	Check?	Capacity
J3-6a	Yes	12846
J3-6b	No	
J3-6c	No	
J7-1	No	

Result: **Selected connection type is adequate.**

Note: See RISA model section set 'STEEL Stand Off Arm' load combination 4 for max Axial [lb]

JOB NO.: U0142.2054.242

PROJECT: NM01-148 Spike

BOLTED SHEAR CONNECTION

Location: STEEL Outrigger Weldment

Bolt Grade:	ASTM A325		
Bolt Diameter:	0.625	in	
Number of Bolts:	1		
Double Shear?	No		
Bolt Capacity:	12425	lbs	(AISC Equation J3-1)
Shear Load:	1018	lbs	
Check Bolt	8.2%		

Result: **Select (1) 0.625 in. dia. ASTM A325 bolt.**

Note: See RISA model section set 'STEEL Outrigger Weldment' load combination 6 for max Axial [lb]

BOLT/PIN BEARING & MATERIAL TENSILE/SHEAR STRENGTH

Location: STEEL Outrigger Weldment

Bolt or Pin Diameter:	0.625	in	
Hole Diameter or Slot Width:	0.6875	in	
Number of Bolts or Pins:	1		
Plate Thickness	0.375	in	
Plate Yield Strength (F_y):	36	ksi	
Plate Ultimate Strength (F_u):	58	ksi	
Bolt/Pin Parallel Edge Distance:	1	in	(measured from center of hole)
Bearing Capacity:	12846	lbs	
Perpendicular Edge Distance:	1	in	(measured from center of hole)
Effective Perp. Edge Distance:	1		
Tensile Rupture Capacity:	21410	lbs	(AISC Equation D5-1)
Shear Rupture Capacity:	18963	lbs	(AISC Equation D5-2)
Load:	1018	lbs	
Check Bearing	7.9%		

Available AISC Checks:

Equation	Check?	Capacity
J3-6a	Yes	12846
J3-6b	No	
J3-6c	No	
J7-1	No	

Result: **Selected connection type is adequate.**

Note: See RISA model section set 'STEEL Outrigger Weldment' load combination 6 for max Axial [lb]

JOB NO.: U0142.2054.242

PROJECT: NM01-148 Spike

BOLTED SHEAR CONNECTION

Location: STEEL Stand Off Arm Inner

Bolt Grade:	ASTM A325		
Bolt Diameter:	0.75	in	
Number of Bolts:	3		
Double Shear?	No		
Bolt Capacity:	53677	lbs	(AISC Equation J3-1)
Shear Load:	1898	lbs	
Check Bolt:	3.5%		

Result: **Select (3) 0.75 in. dia. ASTM A325 bolts.**

Note: See RISA model section set 'STEEL Stand Off Arm Inner' load combination 6 for max Axial [lb]

BOLT/PIN BEARING & MATERIAL TENSILE/SHEAR STRENGTH

Location: STEEL Stand Off Arm Inner

Bolt or Pin Diameter:	0.75	in	
Hole Diameter or Slot Width:	0.8125	in	
Number of Bolts or Pins:	3		
Plate Thickness:	0.375	in	
Plate Yield Strength (F_y):	36	ksi	
Plate Ultimate Strength (F_u):	58	ksi	
Bolt/Pin Parallel Edge Distance:	1	in	(measured from center of hole)
Bearing Capacity:	34868	lbs	
Perpendicular Edge Distance:	1	in	(measured from center of hole)
Effective Perp. Edge Distance:	1		
Tensile Rupture Capacity:	58113	lbs	(AISC Equation D5-1)
Shear Rupture Capacity:	56800	lbs	(AISC Equation D5-2)
Load:	1898	lbs	
Check Bearing:	5.4%		

Available AISC Checks

Equation	Check?	Capacity
J3-6a	Yes	11623
J3-6b	No	
J3-6c	No	
J7-1	No	

Result: **Selected connection type is adequate.**

Note: See RISA model section set 'STEEL Stand Off Arm Inner' load combination 6 for max Axial [lb]

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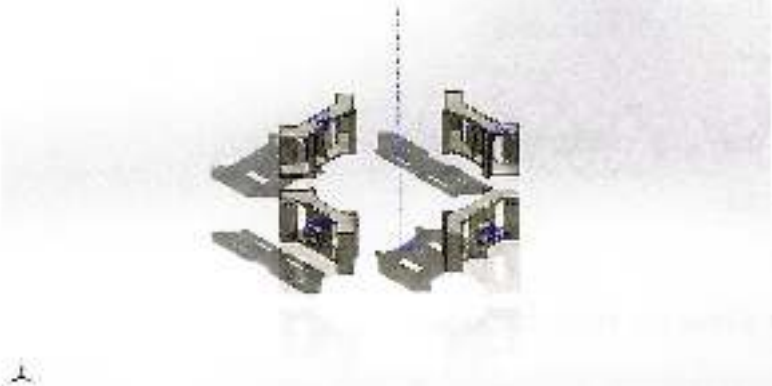
651 W Galena Park Blvd., Suite 101
Draper, UT 84020
Phone: (801) 990-1776
www.vectorse.com



Simulation of MONOPOLE MOUNT

Date: Thursday, October 24, 2024
Designer: JJB
Study name: Static 1
Analysis type: Static

Table of Contents

Description

Four-sided Raycap Clamp

Vector Structural Engineers, LLC
651 W Galena Park Blvd., Suite 101
Draper, UT 84020

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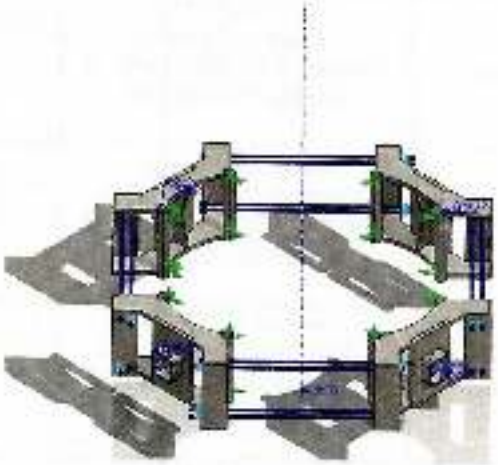
10/24/2024



Model name: MONOPOLE MOUNT
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Mirror1	Solid Body	Mass:2.7207 lb Volume:9.59348 in^3 Density:0.283599 lb/in^3 Weight:2.71886 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\2 x 0.145 - 6.sldprt Oct 24 13:00:27 2024
Mirror1	Solic Body	Mass:2.7207 lb Volume:9.59348 in^3 Density:0.283599 lb/in^3 Weight:2.71886 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\2 x 0.145 - 6.sldprt Oct 24 13:00:27 2024
Cut-Extrude1	Solid Body	Mass:6.53976 lb Volume:23.0598 in^3 Density:0.283599 lb/in^3 Weight:6.53532 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\4 - 6.sldprt Oct 23 17:20:18 2024

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Cut-Extrude1	Solid Body	Mass:6.53976 lb Volume:23.0598 in^3 Density:0.283599 lb/in^3 Weight:6.53532 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\4 - 6.sldprt Oct 23 17:20:18 2024
Boss-Extrude1	Solid Body	Mass:20.4191 lb Volume:72 in^3 Density:0.283599 lb/in^3 Weight:20.4053 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\MONOPOLE MOUNT PLATE.sldprt Oct 23 17:42:47 2024
Cut-Extrude1	Solid Body	Mass:3.18636 lb Volume:11.2354 in^3 Density:0.283599 lb/in^3 Weight:3.18419 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\MONOPOLE MOUNT STEEL TUBE.sldprt Oct 23 18:11:10 2024
Boss-Extrude1	Solid Body	Mass:2.33967 lb Volume:8.2499 in^3 Density:0.283599 lb/in^3 Weight:2.33808 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\MONOPOLE MOUNT SUPPORT.sldprt Oct 24 09:18:20 2024
Boss-Extrude1	Solid Body	Mass:19.6216 lb Volume:69.1876 in^3 Density:0.283599 lb/in^3 Weight:19.6083 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\W PLATE.sldprt Oct 24 09:10:00 2024
Mirror2	Solid Body	Mass:19.6216 lb Volume:69.1876 in^3 Density:0.283599 lb/in^3 Weight:19.6083 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\W PLATE.sldprt Oct 24 09:10:00 2024
Mirror1	Solid Body	Mass:2.7207 lb Volume:9.59348 in^3 Density:0.283599 lb/in^3 Weight:2.71886 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\2 x 0.145 - 6.sldprt Oct 24 13:00:27 2024
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Mirror2	Solid Body	Mass:19.6216 lb Volume:69.1876 in^3 Density:0.283599 lb/in^3 Weight:19.6083 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\W PLATE.sldprt Oct 24 09:10:00 2024
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Study Properties

Study name	Static 1
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	77 Fahrenheit
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	Off
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (C:\Users\joshua.blom\Desktop\Raycap Clamp\Results)

Units

Unit system:	English (IPS)
Length/Displacement	in
Temperature	Fahrenheit
Angular velocity	Hertz
Pressure/Stress	ksi

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Material Properties

Model Reference	Properties	Components
	Name: ASTM A36 Steel Model type: Linear Elastic Isotropic Default failure criterion: Max von Mises Stress Yield strength: 250 N/mm^2 Tensile strength: 400 N/mm^2 Elastic modulus: 200,000 N/mm^2 Poisson's ratio: 0.26 Mass density: 7.85 g/cm^3 Shear modulus: 79,300 N/mm^2	SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-1/2 x 0.145 - 6-1), SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-1/2 x 0.145 - 6-2), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-1/4 - 6-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-1/4 - 6-2), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-1/MONOPOLE MOUNT PLATE-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-1/MONOPOLE MOUNT STEEL TUBE-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-1/MONOPOLE MOUNT SUPPORT-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-1/W PLATE-2), SolidBody 2(Mirror2)(Assem8^MONOPOLE MOUNT-1/W PLATE-2), SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-10/2 x 0.145 - 6-1), SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-10/2 x 0.145 - 6-2), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-10/4 - 6-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-10/4 - 6-2), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE

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		MOUNT-10/MONOPOLE MOUNT PLATE-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-10/MONOPOLE MOUNT STEEL TUBE-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-10/MONOPOLE MOUNT SUPPORT-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-10/W PLATE-2), SolidBody 2(Mirror2)(Assem8^MONOPOLE MOUNT-10/W PLATE-2), SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-11/2 x 0.145 - 6-1), SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-11/2 x 0.145 - 6-2), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-11/4 - 6-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-11/4 - 6-2), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-11/MONOPOLE MOUNT PLATE-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-11/MONOPOLE MOUNT STEEL TUBE-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-11/MONOPOLE MOUNT SUPPORT-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-11/W PLATE-2), SolidBody 2(Mirror2)(Assem8^MONOPOLE MOUNT-11/W PLATE-2), SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-8/2 x 0.145 - 6-1),

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		SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-8/2 x 0.145 - 6-2), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-8/4 - 6-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-8/4 - 6-2), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-8/MONOPOLE MOUNT PLATE-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-8/MONOPOLE MOUNT STEEL TUBE-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-8/MONOPOLE MOUNT SUPPORT-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-8/W PLATE-2), SolidBody 2(Mirror2)(Assem8^MONOPOLE MOUNT-8/W PLATE-2)
Curve Data:N/A		

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Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Reference Geometry-2		Entities: 8 edge(s) Reference: Face< 1 > Type: Use reference geometry Translation: 0, 0 rad., 0 Units: in

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(lbf)	0.729984	-7,184.11	0.138231	7,184.11
Reaction Moment(lbf.in)	0	0	0	0

Load name	Load Image	Load Details
Gravity-1		Reference: Top Plane Values: 0 0 -386.22 Units: in/s^2
Force-1		Entities: 1 face(s) Type: Apply normal force Value: -2,229 lbf

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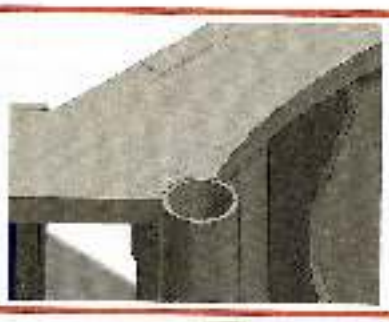
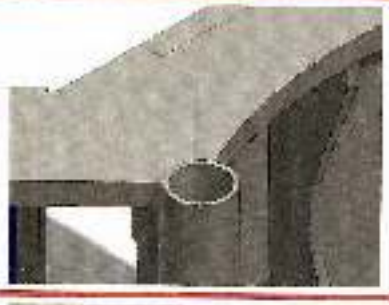
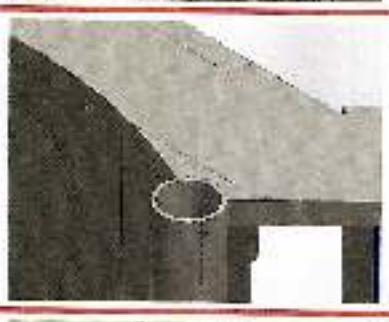
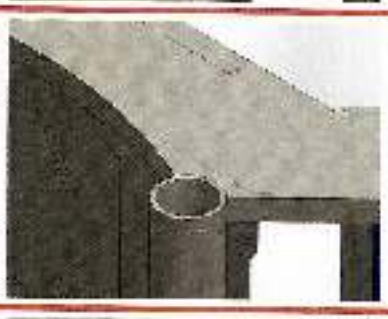
Force-2		Entities: 1 face(s) Reference: Axis2 Type: Apply force Values: ---, ---, -1,879.9 lbf
Torque-1		Entities: 1 face(s) Reference: Axis6 Type: Apply torque Value: 18,074.6 lbf.in
Copy[1] Force-1		Entities: 1 face(s) Type: Apply normal force Value: -2,229 lbf
Copy[1] Force-2		Entities: 1 face(s) Reference: Axis17 Type: Apply force Values: ---, ---, 1,879.9 lbf
Copy[1] Torque-1		Entities: 1 face(s) Reference: Axis18 Type: Apply torque Value: 18,074.6 lbf.in

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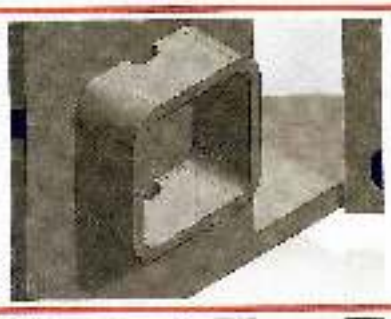
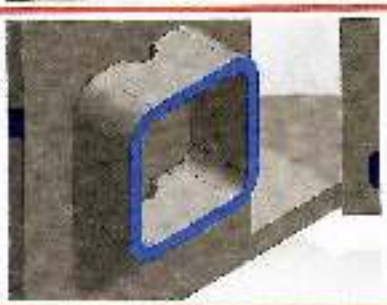
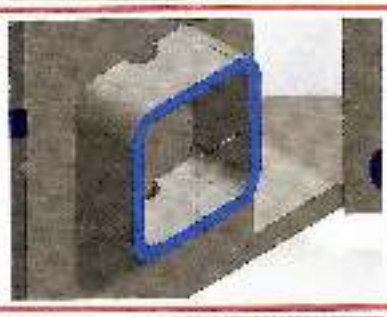
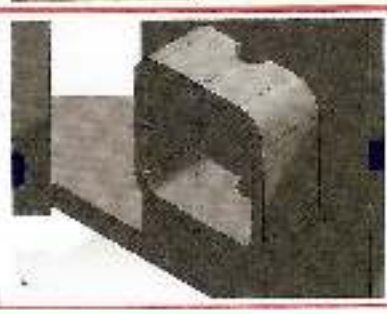
Copy[1] Force-1{1}		Entities: 1 face(s) Type: Apply normal force Value: -2,229 lbf
Copy[1] Force-2{1}		Entities: 1 face(s) Reference: Axis19 Type: Apply force Values: ---, ---, 1,879.9 lbf
Copy[1] Torque-1{1}		Entities: 1 face(s) Reference: Axis20 Type: Apply torque Value: 18,074.6 lb*.in
Copy[1] Force-1{1}{1}		Entities: 1 face(s) Type: Apply normal force Value: -2,229 lbf

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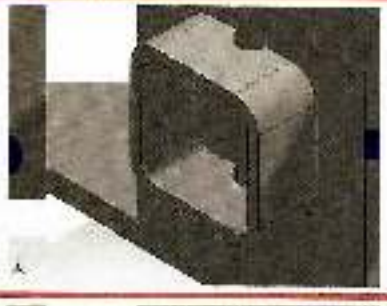
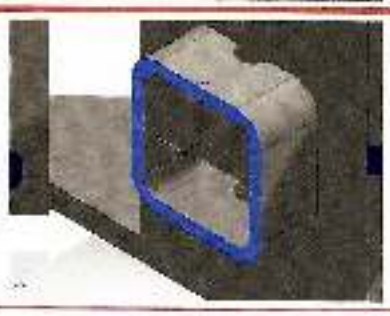
Copy[1] Force-2{1}{1}		Entities: 1 face(s) Reference: Axis16 Type: Apply force Values: ---, ---, -1,879.9 lbf
Copy[1] Torque-1[1]{1}		Entities: 1 face(s) Reference: Axis15 Type: Apply torque Value: 18,074.6 lbf.in

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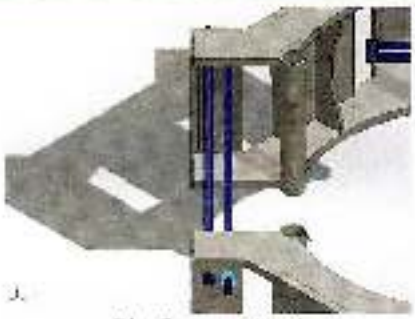
Connector Definitions

Pin/Bolt/Bearing Connector

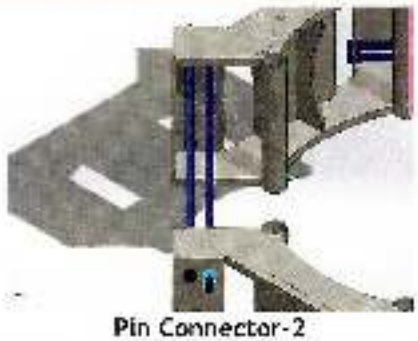
Model Reference	Connector Details	Strength Details
 Pin Connector-1	Entities: 2 face(s) Type: Pin With retaining ring (No translation): Yes With key (No rotation): No Connection Type: Rigid Units: English (IPS) Rotational stiffness value: 0	No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	299.43	0	299.43	423.46
Shear Force (lbf)	0.29259	0.15461	-0.29257	0.44171
Torque (lbf.in)	0	0	0	0
Bending moment (lbf.in)	95.95	137.48	-95.95	193.17

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-299.43	-0	-299.43	-423.46
Shear Force (lbf)	-0.29259	-0.15461	0.29257	0.44171
Torque (lbf.in)	4.2204e-06	0	4.2204e-06	5.9685e-06
Bending moment (lbf.in)	-99.197	-125.19	99.197	188.02

 Pin Connector-2	Entities: 2 face(s) Type: Pin With retaining ring (No translation): Yes With key (No rotation): No Connection Type: Rigid Units: English (IPS) Rotational stiffness value: 0	No Data

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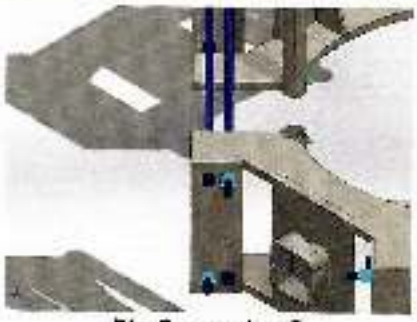
Connector Forces Joint 1				
Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	167.08	-0	167.08	-236.29
Shear Force (lbf)	-0.14211	-0.044949	0.14209	0.20592
Torque (lbf.in)	-2.2336e-08	0	-2.2336e-08	3.1589e-08
Bending moment (lbf.in)	50.597	-57.461	-50.597	91.771

Connector Forces Joint 2				
Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-167.08	0	-167.08	236.29
Shear Force (lbf)	0.14211	0.044949	-0.14209	0.20592
Torque (lbf.in)	6.4084e-08	-0	6.4084e-08	-9.0628e-08
Bending moment (lbf.in)	-51.588	63.724	51.588	96.868



Pin Connector-3

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1				
Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	148.6	-0	148.6	-210.15
Shear Force (lbf)	0.34643	-0.28745	-0.34642	0.56802
Torque (lbf.in)	-0	0	-0	0
Bending moment (lbf.in)	-60.912	46.294	60.912	97.794

Connector Forces Joint 2				
Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-148.6	0	-148.6	210.15
Shear Force (lbf)	-0.34643	0.28745	0.34642	0.56802
Torque (lbf.in)	-0	0	-0	0
Bending moment (lbf.in)	54.792	-61.043	-54.792	98.644

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Pin Connector-4

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

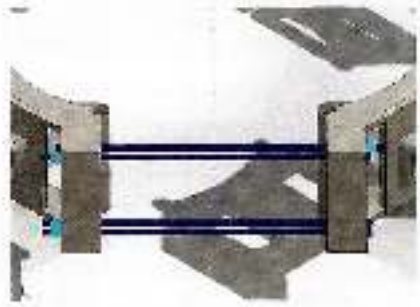
No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	8.3205	0	8.3205	11.767
Shear Force (lbf)	-0.13743	0.077944	0.13743	0.2094
Torque (lbf.in)	6.2462e-08	0	6.2462e-08	8.8335e-08
Bending moment (lbf.in)	23.552	-22.282	-23.552	40.073

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-8.3205	-0	-8.3205	-11.767
Shear Force (lbf)	0.13743	-0.077944	-0.13743	0.2094
Torque (lbf.in)	7.6283e-09	0	7.6283e-09	1.0788e-08
Bending moment (lbf.in)	-25.215	16.418	25.215	39.257



Pin Connector-5

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

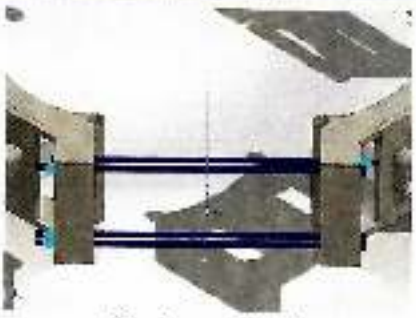
No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	296.1	0	-296.1	418.75
Shear Force (lbf)	0.17629	-0.14127	0.17627	0.28655
Torque (lbf.in)	0	0	-0	0
Bending moment (lbf.in)	-100.37	124.44	-100.37	188.77

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-296.1	-0	296.1	-418.75
Shear Force (lbf)	-0.17629	0.14127	-0.17627	0.28655
Torque (lbf.in)	0	0	-0	0
Bending moment (lbf.in)	97.468	-131.69	97.468	190.64



Pin Connector-6

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	177.69	-0	-177.69	-251.29
Shear Force (lbf)	-0.041436	0.011963	-0.041423	0.059799
Torque (lbf.in)	3.2385e-07	-0	-3.2385e-07	-4.5799e-07
Bending moment (lbf.in)	-57.751	-60.293	-57.751	101.52

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-177.69	0	177.69	251.29
Shear Force (lbf)	0.041436	-0.011963	0.041423	0.059799
Torque (lbf.in)	-3.0908e-07	0	3.0908e-07	4.3711e-07
Bending moment (lbf.in)	57.401	57.866	57.401	99.69

Pin Connector-7

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant

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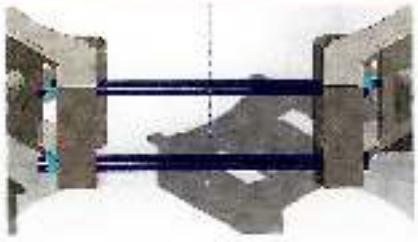
Axial Force (lbf)	-138.99	-0	138.99	-196.57
Shear Force (lbf)	-0.073459	0.13005	-0.073473	0.16646
Torque (lbf.in)	-2.034e-06	-0	2.034e-06	-2.8765e-06
Bending moment (lbf.in)	-51.875	-49.749	-51.875	88.64

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	138.99	0	-138.99	196.57
Shear Force (lbf)	0.073459	-0.13005	0.073473	0.16646
Torque (lbf.in)	1.913e-06	0	-1.913e-06	2.7054e-06
Bending moment (lbf.in)	54.745	52.992	54.745	93.82



Pin Connector-8

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	12.477	0	-12.477	17.645
Shear Force (lbf)	-0.055332	-0.039551	-0.055333	0.08768
Torque (lbf.in)	0	0	-0	0
Bending moment (lbf.in)	-21.054	-17.507	-21.054	34.538

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-12.477	-0	12.477	-17.645
Shear Force (lbf)	0.055332	0.039551	0.055333	0.08768
Torque (lbf.in)	1.0551e-06	0	-1.0551e-06	1.4921e-06
Bending moment (lbf.in)	20.211	19.861	20.211	34.806

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Pin Connector-9

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-289.93	0	-289.93	410.03
Shear Force (lbf)	0.31207	-0.4776	-0.31209	0.6503
Torque (lbf.in)	-0	0	-0	0
Bending moment (lbf.in)	-97.56	122.94	97.56	184.8

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	289.93	-0	289.93	-410.03
Shear Force (lbf)	-0.31207	0.4776	0.31209	0.6503
Torque (lbf.in)	-0	0	-0	0
Bending moment (lbf.in)	87.434	-136.17	-87.434	183.94

Pin Connector-10

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	195.92	-0	195.92	-277.07
Shear Force (lbf)	0.23139	-0.1846	-0.23138	0.37571
Torque (lbf.in)	-0	0	-0	0
Bending moment (lbf.in)	63.693	65.093	-63.693	111.13

Connector Forces Joint 2

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Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-195.92	0	-195.92	277.07
Shear Force (lbf)	-0.23139	0.1846	0.23138	0.37571
Torque (lbf.in)	2.1102e-06	-0	2.1102e-06	-2.9842e-06
Bending moment (lbf.in)	-67.595	-74.877	67.595	121.43

Pin Connector-11

Entities:	7 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-140.61	-0	-140.61	-198.85
Shear Force (lbf)	0.40394	0.44276	-0.40395	0.72276
Torque (lbf.in)	0	0	0	0
Bending moment (lbf.in)	51.57	57.884	-51.57	92.11

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	140.61	0	140.61	198.85
Shear Force (lbf)	-0.40394	-0.44276	0.40395	0.72276
Torque (lbf.in)	0	0	0	0
Bending moment (lbf.in)	-61.01	-40.66	61.01	95.382

Pin Connector-12

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

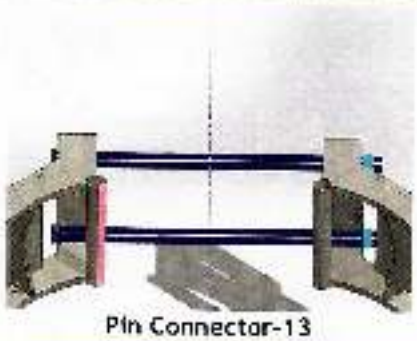
Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant

Axial Force (lbf)	21.421	0	21.421	30.293
Shear Force (lbf)	0.19279	0.31392	-0.19279	0.41578
Torque (lbf.in)	-9.8166e-09	-0	-9.8166e-09	-1.3883e-08
Bending moment (lbf.in)	12.75	24.596	-12.75	30.497

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-21.421	-0	-21.421	-30.293
Shear Force (lbf)	-0.19279	-0.31392	0.19279	0.41578
Torque (lbf.in)	-2.3525e-07	-0	-2.3525e-07	-3.327e-07
Bending moment (lbf.in)	-19.452	-16.364	19.452	32.008



Pin Connector-13

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-4.5667	0	4.5667	6.4583
Shear Force (lbf)	0.29607	1.3987	0.29607	1.46
Torque (lbf.in)	-0	0	0	0
Bending moment (lbf.in)	-17.015	14.157	-17.015	27.919

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	4.5667	-0	-4.5667	-6.4583
Shear Force (lbf)	-0.29607	-1.3987	-0.29607	1.46
Torque (lbf.in)	-5.2755e-07	0	5.2755e-07	7.4606e-07
Bending moment (lbf.in)	-12.839	-1.5182	-12.839	18.22

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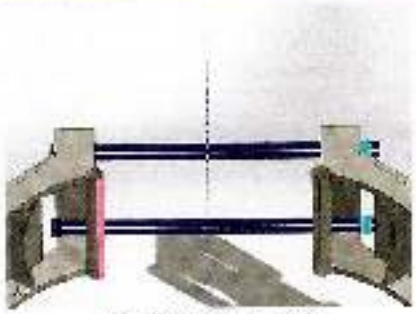


Pin Connector-14

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

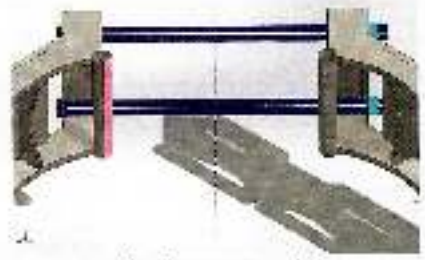
No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	11.271	-0	-11.271	-15.94
Shear Force (lbf)	0.2995	1.7639	0.2995	1.814
Torque (lbf.in)	-0	0	0	0
Bending moment (lbf.in)	-18.251	7.4271	-18.251	26.858

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-11.271	0	11.771	15.94
Shear Force (lbf)	-0.2995	-1.7639	-0.2995	1.814
Torque (lbf.in)	-0	0	0	0
Bending moment (lbf.in)	-19.398	5.3579	-19.398	27.951



Pin Connector-15

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

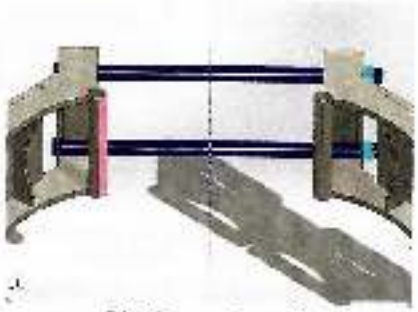
No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	4.7067	-0	-4.7067	-6.6563
Shear Force (lbf)	-0.36657	1.48	-0.36657	1.5682
Torque (lbf.in)	-2.8054e-07	0	2.8054e-07	3.9674e-07
Bending moment (lbf.in)	-18.377	-16.867	-18.377	30.983

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-4.7067	0	4.7067	6.6563
Shear Force (lbf)	0.36657	-1.48	0.36657	1.5682
Torque (lbf.in)	2.9124e-08	-0	-2.9124e-08	-4.1187e-08
Bending moment (lbf.in)	-13.208	1.221	-13.208	18.719



Pin Connector-16

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-11.411	0	11.411	16.138
Shear Force (lbf)	-0.22899	1.8998	-0.22899	1.9272
Torque (lbf.in)	-0	0	0	0
Bending moment (lbf.in)	-21.217	-4.4196	-21.217	30.329

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	11.411	-0	-11.411	-16.138
Shear Force (lbf)	0.22899	-1.8998	0.22899	1.9272
Torque (lbf.in)	-0	0	0	0
Bending moment (lbf.in)	-19.333	-5.3556	-19.333	27.861

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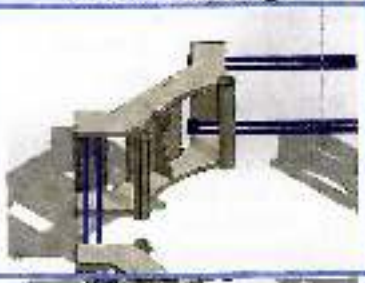
Interaction Information

Interaction	Interaction Image	Interaction Properties
Component Contact-9		**Type:** Bonded **Components:** 5 component(s), 2 Solid Body (s) **Options:** Continuous mesh
Component Interaction-12		**Type:** Bonded **Components:** 8 component(s) **Options:** Independent mesh
Component Interaction-13		**Type:** Bonded **Components:** 8 component(s) **Options:** Independent mesh
Component Interaction-14		**Type:** Bonded **Components:** 8 component(s) **Options:** Independent mesh

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Mesh information

Mesh type	Solid Mesh
Mesher Used:	Curvature-based mesh
Jacobian points for High quality mesh	16 Points
Maximum element size	2 in
Minimum element size	0.4 in
Mesh Quality	High
Remesh failed parts independently	Off

Mesh information - Details

Total Nodes	74378
Total Elements	35555
Maximum Aspect Ratio	53.291
% of elements with Aspect Ratio < 3	49.7
Percentage of elements with Aspect Ratio > 10	3.55
Percentage of distorted elements	0
Time to complete mesh(hh;mm;ss):	00:00:05
Computer name:	VSE096

Mesh Quality Plots

Name	Type	Min	Max
Quality1	Jacobian ratio	1.0 Element: 2023	28.9 Element: 20129

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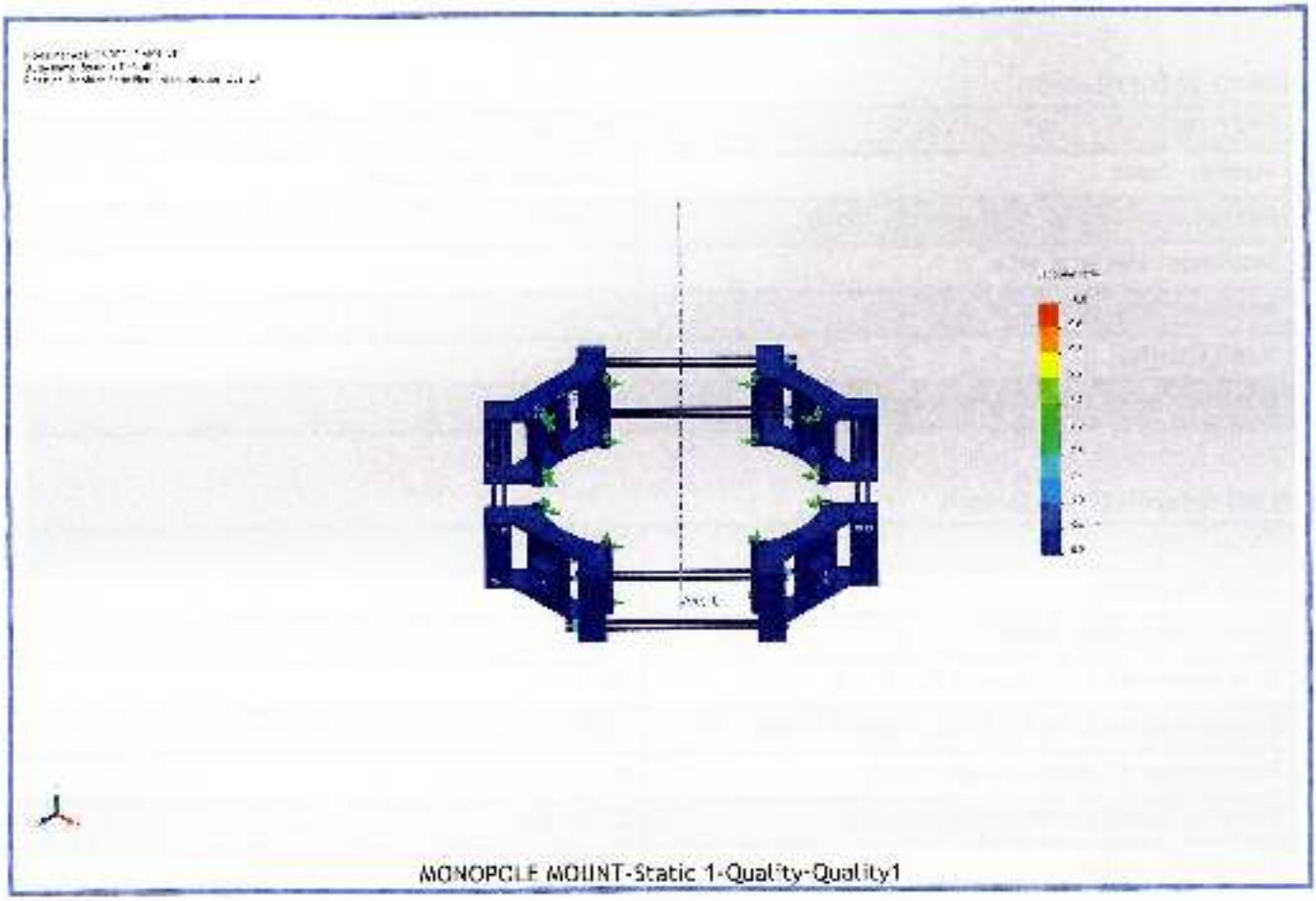

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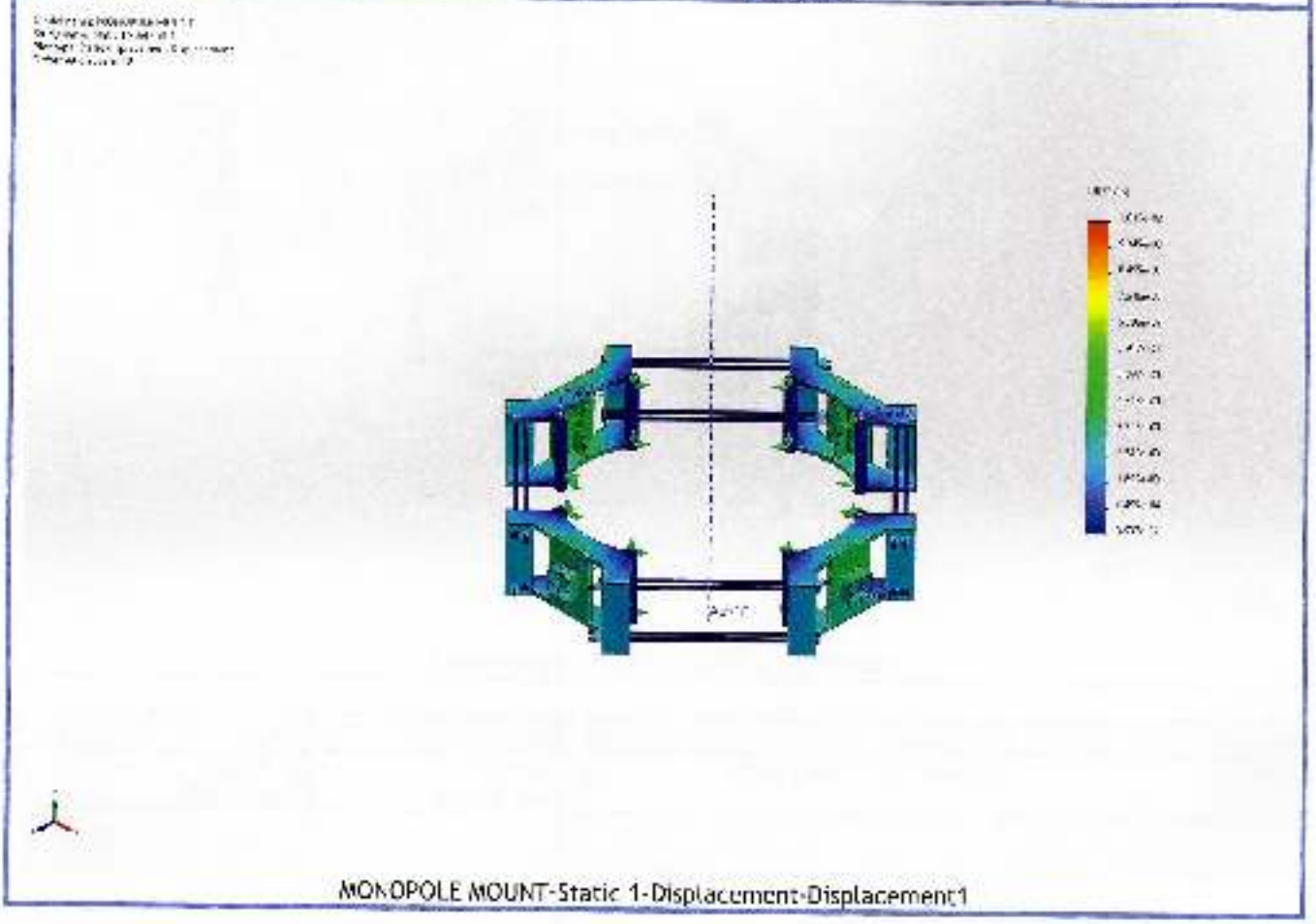
Study Results

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+00in Node: 15	1.019e-02in Node: 8757



MONOPOLE MOUNT-Static 1-Displacement-Displacement1

Name	Type	Min	Max
Stress1	VON: von Mises Stress	0.000ksi Node: 18526	30.273ksi Node: 479

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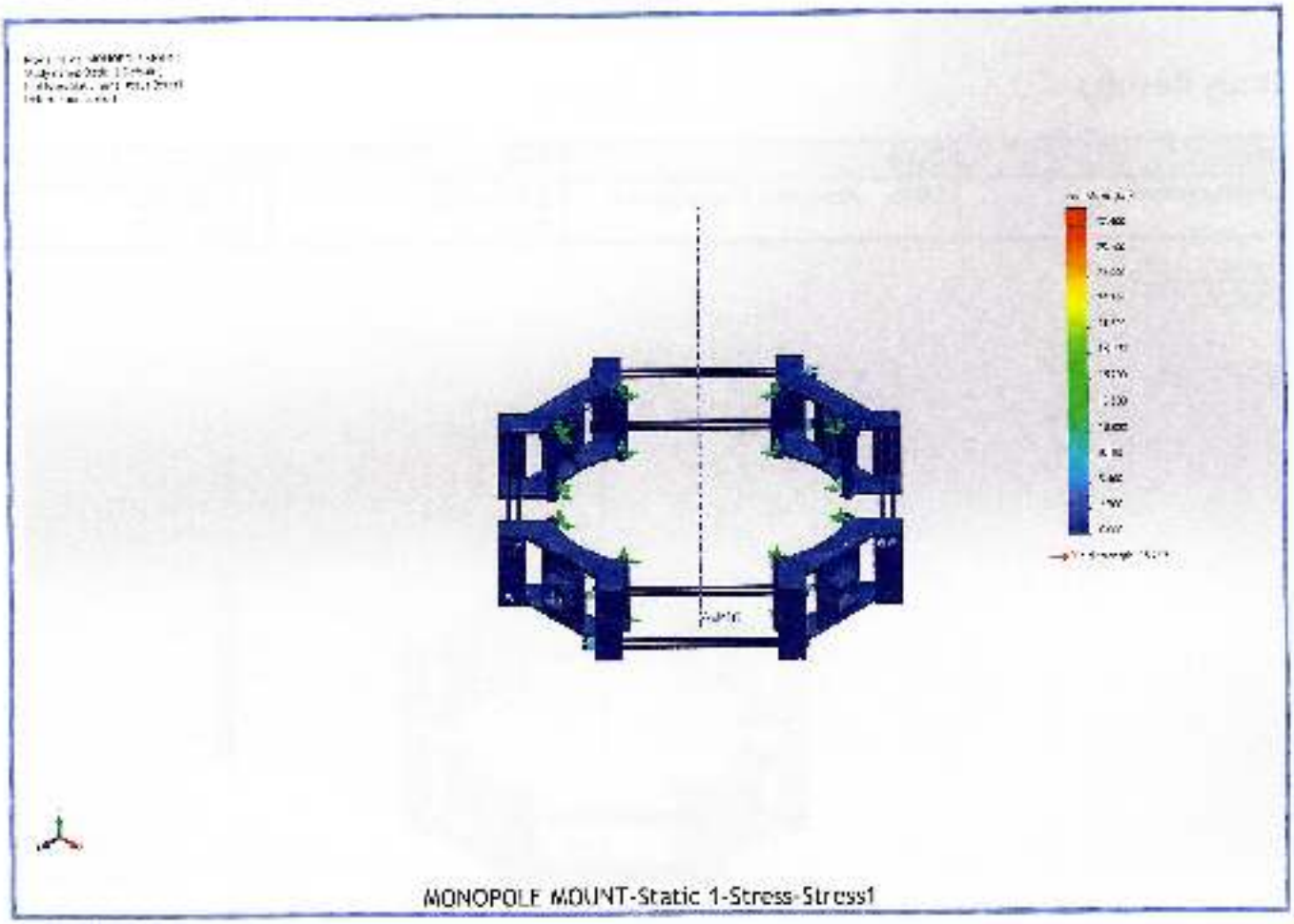

MONOPOLE MOUNT-Static 1-Stress-Stress1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	1.38e-09 Node: 18526	0.000877 Node: 479

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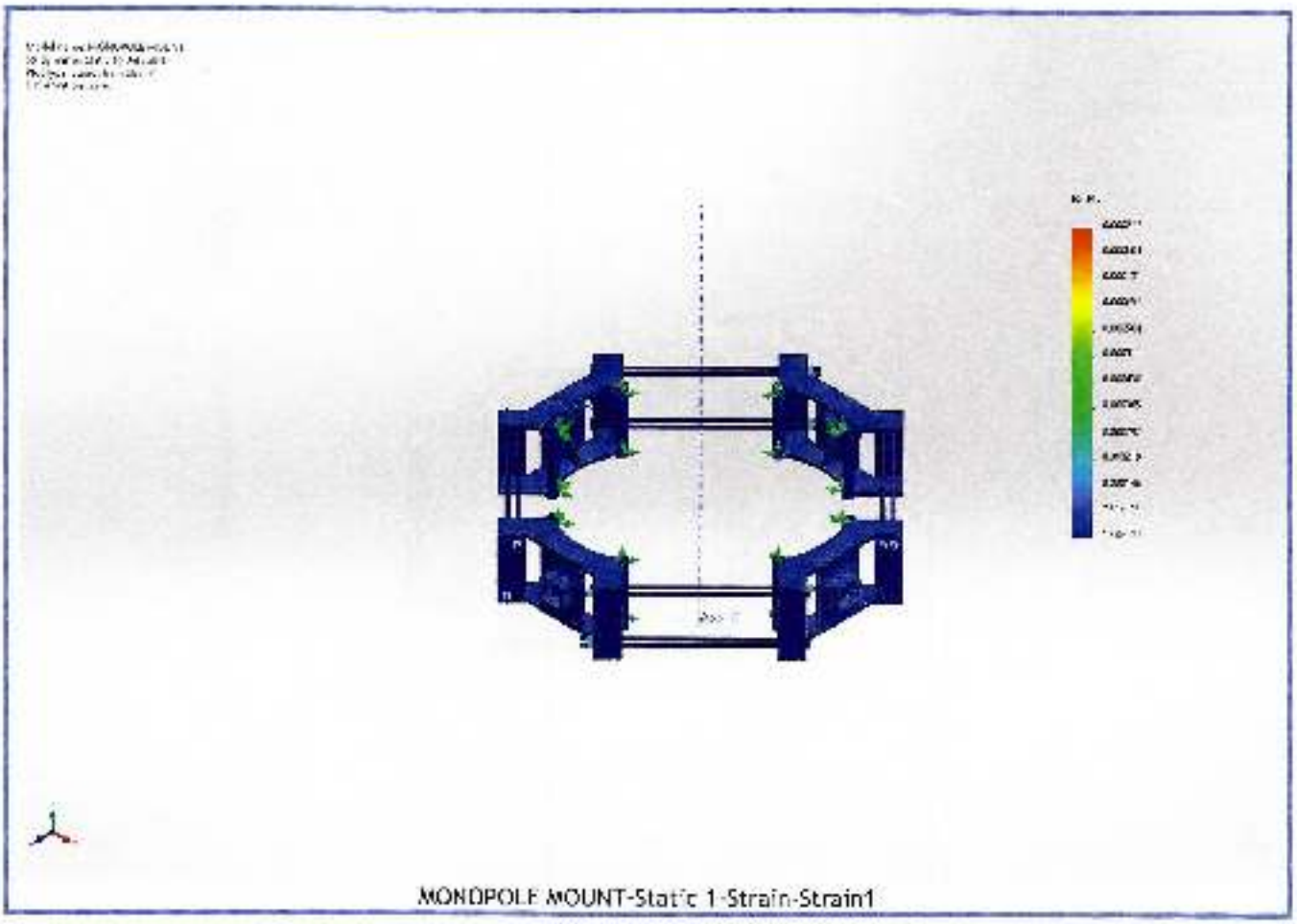

MONOPOLE MOUNT-Static 1-Strain-Strain1

Name	Type	Min	Max
Stress2	VON: von Mises Stress	0.000ksi Node: 18526	30.273ksi Node: 479

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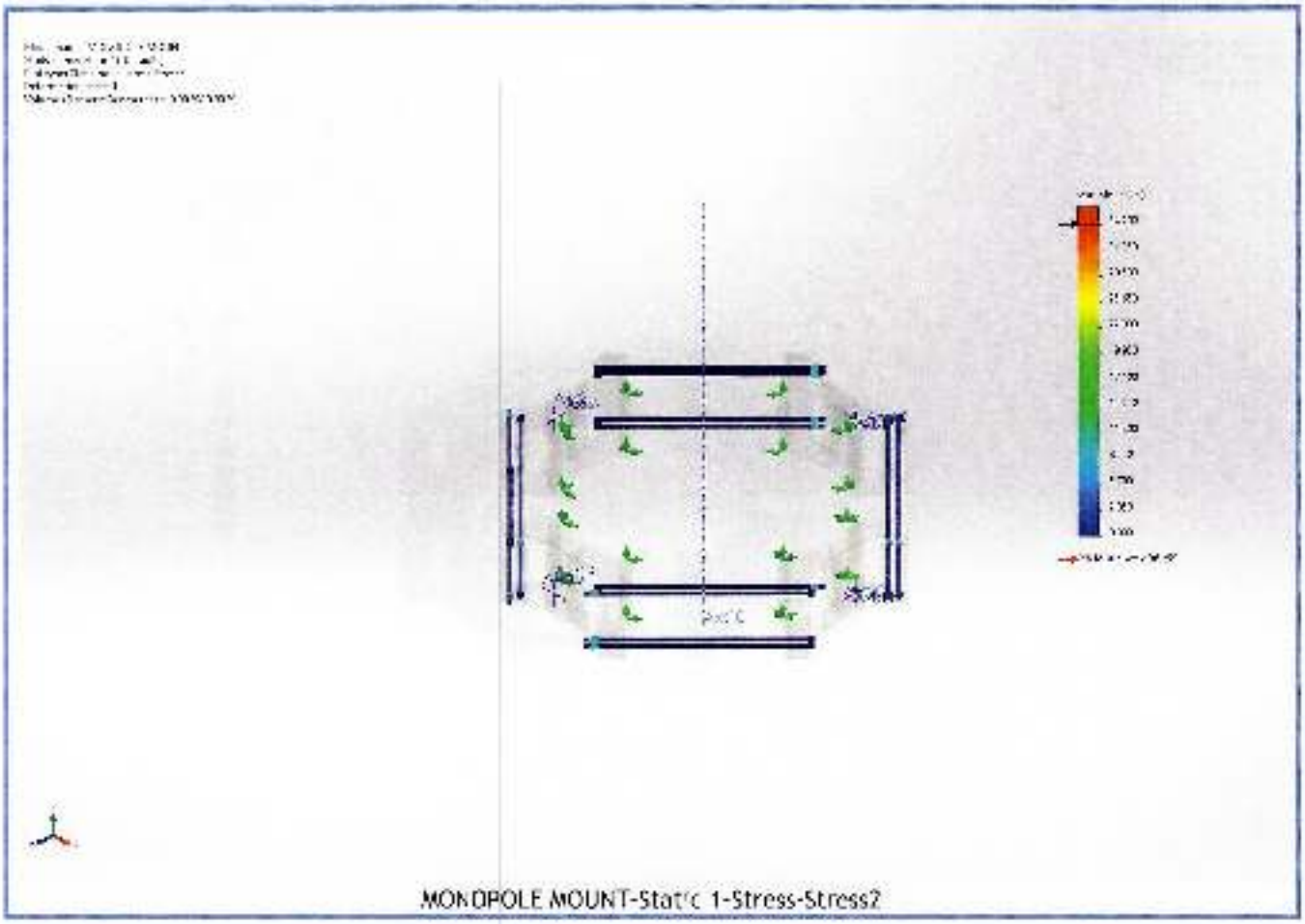


Conclusion

Comments:

No part of the assembly exceeds the permissible Von-Mises stress. Therefore, OK.

ASCE Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: C - Very Dense Soil and Soft Rock

Latitude: 35.30946
Longitude: -106.49543
Elevation: 5504.708854228105 ft (NAVD 88)

Wind

Results:

Wind Speed	104 Vmph
10-year MRI	75 Vmph
25-year MRI	82 Vmph
50-year MRI	88 Vmph
100-year MRI	91 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Thu Oct 24 2024

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

ASCE

Seismic

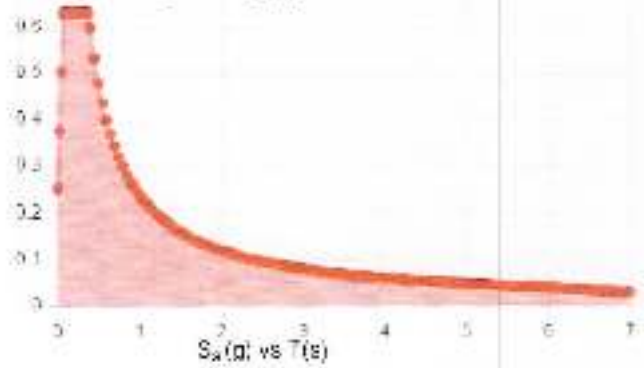
Site Soil Class: C - Very Dense Soil and Soft Rock

Results:

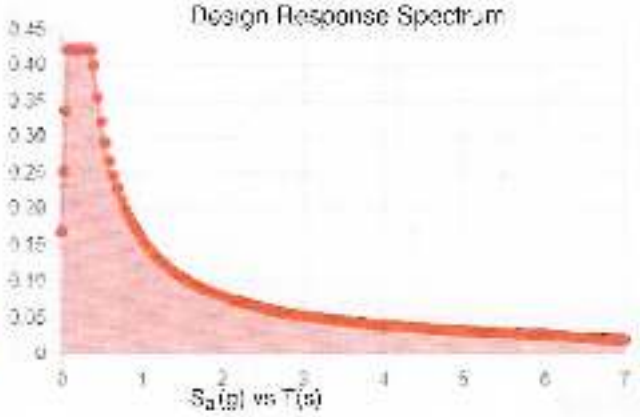
S_s :	0.487	S_{D1} :	0.16
S_1 :	0.15	T_L :	6
F_a :	1.3	PGA :	0.21
F_v :	1.5	PGA_M :	0.252
S_{MS} :	0.633	F_{PGA} :	1.2
S_{M1} :	0.24	I_e :	1
S_{DS} :	0.422	C_v :	0.926

Seismic Design Category: C

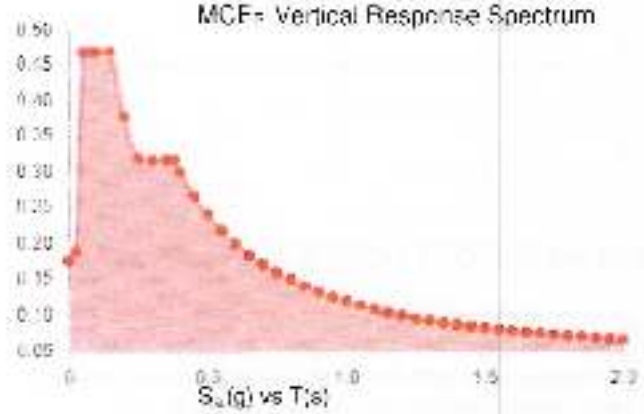
MCE$_R$ Response Spectrum



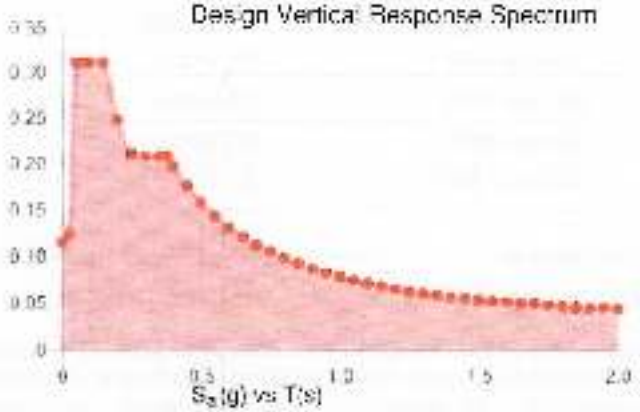
Design Response Spectrum



MCE$_R$ Vertical Response Spectrum



Design Vertical Response Spectrum



Data Accessed: Thu Oct 24 2024

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.

ASCE

Ice

Results:

Ice Thickness:	0.25 in.
Concurrent Temperature:	15 F
Gust Speed	30 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Thu Oct 24 2024

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

In the mountain west, ice thicknesses may exceed the mapped values in the foothills and passes. However, at elevations above 5,000 ft, freezing rain is unlikely.

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.

VECTOR
ENGINEERS

STRUCTURAL CALCULATIONS
for
NM01-148 SPIKE

at
221 NEW MEXICO 165
PLACITAS, NM 87043
for
PINNACLE CONSULTING, INC.
&
RAYCAP (SS24-01302H-00R1)

10/24/2024

BY: JACOB PROCTOR, P.E.
PROFESSIONAL ENGINEER

PROJECT #: U0142.2054.242

DATE: October 24, 2024

DESIGNED BY MAR; CHECKED BY KJG

Note:
The calculations presented in this package are intended for a single use at the location indicated above, for the client listed above. These calculations shall not be reproduced, reused, "card filed", sold to a third party, or altered in any way without the written authorization of Vector Structural Engineering, LLC and Raycap.

JOB NO.: U0142.2054.242

PROJECT: NM01-148 SPIKE

Design Criteria:

Code: Structural design is based on the 2021 New Mexico Commercial Building Codes (2021 IBC) and the TIA-222-H standard.

Wind: Basic wind speed = 104 mph (3-second gust) per the TIA-222-H standard
Risk Category: II
Wind exposure: C
Topographic category: 1
Crest height: 0 ft

Ice: 0.25" radial ice @ 30 mph basic wind speed (3-second gust) per the TIA-222-H standard

Seismic: Seismic importance factor, I = 1
Risk Category: II
Mapped spectral response accelerations: S_s = 0.487g S_1 = 0.16g
Site class: C
Spectral response coefficients: S_{ds} = 0.422g S_{d1} = 0.16g
Seismic design category: C
Basic seismic-force-resisting-system: Telecom. Steel Pole
Seismic base shear: V = 5.17 k
Seismic response coefficient, Cs = 0.282
Response modification factor: R = 1.5
Analysis procedure: Equivalent Lateral Force

General Notes:

1. The contractor shall verify dimensions, conditions and elevations before starting work. The engineer shall be notified immediately if any discrepancies are found.
2. The typical notes and details shall apply in all cases unless specifically detailed elsewhere. Where no detail is shown, the construction shall be as shown for other similar work and as required by the building code.
3. These calculations are limited to the structural members shown in these calculations only.
4. The contractor shall be responsible for compliance with local construction safety orders. Approval of shop drawings by the architect or structural engineer shall not be construed as accepting this responsibility.
5. All structural framing members shall be adequately shored and braced during erection and until full lateral and vertical support is provided by adjoining members.

JOB NO.: U0142.2054.242

PROJECT: NM01-148 SPIKE

Structural Steel:

1 All structural steel code checks based on the AISC 15th Edition per the TIA-222-H standard
2 All 18-sided, tapered shaft steel to be per ASTM A572 GR. 65 U.N.O.
3 The design length of slip splices is equal to 1.67 times the inside width of the base of the upper section. Slip splice length tolerance is equal to ± 10% of the design slip splice length.
4 All steel pipe to be per ASTM A500 GR. B (42 KSI), U.N.O.
4 All steel round tubes (HSS) to be per , U.N.O.
5 All steel rectangular tubes (HSS) to be per ASTM A500 GR. B (46 KSI), U.N.O.
5 All steel wide flange shapes to be per , U.N.O.
6 All other structural steel shapes & plates shall be per ASTM A36, U.N.O.
7 All anchor bolts shall be per ASTM A615 GR. 75, U.N.O.
8 All bolts for steel-to-steel connections shall be per ASTM F3125 GR. A325 U.N.O.
9 All bolted connections shall be tightened per the "turn-of-nut" method as defined by AISC.
10 All welding shall be performed by certified welders in accordance with the latest edition of the American Welding Society (AWS) D1.1. Utilize minimum E70XX low-hydrogen electrode U.N.O. or where higher strength electrode is required by AWS D1.1
11 All steel surfaces shall be galvanized in accordance with ASTM A123 and ASTM F2329 standards, thoroughly coated with a zinc-rich primer, or otherwise protected as noted on the structural drawings.

Fiberglass Reinforced Plastic (FRP):

1 All structural shapes shall be Bedford Reinforced Plastics produced using the pultrusion process.
2 The fabricator and contractor shall exercise precautions necessary to protect the fiberglass pultruded structural shapes from abuse to prevent breakage, nicks, gouges, etc. during fabrication, handling, and installation.
3 Structural shapes shall be fabricated and assembled as indicated on the design drawings.
4 FRP threaded rods and nuts shall be tightened to snug tight and turned an additional 1/2 turn and locked with epoxy.

Foundation / Concrete:

1 All concrete mixing, placement, forming, and reinforcing installation shall be performed in accordance with the requirements of "Building Code Requirements for Reinforced Concrete", ACI 318-19. Foundation installation shall be in accordance with the requirements of "Standard Specifications for the Construction of Drilled Piers", ACI 336, latest edition
2 All concrete shall have a minimum compressive strength of 4000 psi at 28 days
3 Cement for all concrete shall be II with 6% (+/- 1.5%) entrained air. Maximum aggregate size shall be 3/4".

4 Reinforcing steel shall be per ASTM A615 Gr. 60, U.N.O.
5 Foundation design is based upon the project soils report prepared by:

Geotech: Tower Engineering Professionals, Inc.
Report No: 341545
Date: 31-Jul-24

PROJECT: MM01-149 Spire

DESIGN WIND LOADS ON LARGE RADOME CONCEALMENTS:
(Screenwall/Concealments on Monopoles)

Round Concealment Calculations
Supported on a Pole structure
Design per: IA-222-H

Label: Concealment tower

INPUT DATA:

Basic Wind Speed, V [mph]:	104
Exposure Category:	C
Elevation Above Sea Level (ft):	5523

Structure:

Supporting Structure:	Pole
Concealment Shape:	Round
Tower Top at Steel (ft):	75
# of Concealments:	3

	Top	2nd	Bottom
Elevation Centerline (ft):	70	60	50
Concealment Height (ft):	10.0	10.0	10.0
Concealment Diameter (ft):	18.0	18.0	18.0
Open Area Top (%):	100%	0%	0%
Open Area Bottom (%):	0%	0%	100%

WIND DESIGN SUMMARY:

	70 ft	60 ft	50 ft
Full Wind Pressure, 1.0W [psf]:	17.5	16.9	16.3
Full Ice Wind Pressure, 1.0W [psf]:	2.8	2.8	2.7
Full Service Wind Pressure, 1.0W [psf]:	5.6	5.6	5.4
Inside Wind Pressure, 1.0W [psf]:	21.0	20.3	19.6
Inside Ice Wind Pressure, 1.0W [psf]:	3.5	3.4	3.3
Inside Service Wind Pressure, 1.0W [psf]:	7.0	6.8	6.6
Wind Force, Outside Face (lbs):	3151	3051	2936
Wind Force, Inside Face (lbs):	2228	0	2075
Total Wind Force (lbs):	5379	3051	5011

PROJECT: NM01-148 Spike

WEIGHT DESIGN SUMMARY:

Self Weight Only:

	Component:	Densities		Length, Area	Quantity	Self Weight (lb)	Total + 10% (lb)
Top @ 70' Elevation	ESSV Panel:	2.00	psf	Area = ft^2	565	1131	
	Framing w/o Grating	3.0	psf	Area = ft^2	254	763	2084
22d @ 50' Elevation	ESSV Panel:	2.00	psf	Area = ft^2	565	1131	
	Framing w/o Grating	3.0	psf	Area = ft^2	254	763	2084
Bottom @ 50' Elevation	ESSV Panel:	2.00	psf	Area = ft^2	565	1131	
	Framing w/o Grating	3.0	psf	Area = ft^2	254	763	2084
						W_p =	8251

Ice Weight Only:

	Component:	Ice Density		Length, Area		Ice Weight (lb)	Total Weight (lb)
Top @ 70' Elevation	ESSV Panel:	1.3	psf	Area = ft^2	565	711	
	Framing w/o Grating	1.3	psf	Area = ft^2	254	320	1031
22d @ 50' Elevation	ESSV Panel:	1.3	psf	Area = ft^2	565	711	
	Framing w/o Grating	1.3	psf	Area = ft^2	254	320	1031
Bottom @ 50' Elevation	ESSV Panel:	1.3	psf	Area = ft^2	565	711	
	Framing w/o Grating	1.3	psf	Area = ft^2	0	0	711
						W_a =	2774

Total W_p =	9025

JOB NO.: U0142.0054.042

PROJECT: NSB - 140 SPIKE

ASCE 7-16

Seismic Base Shear Calculations:

Seismic Parameters:

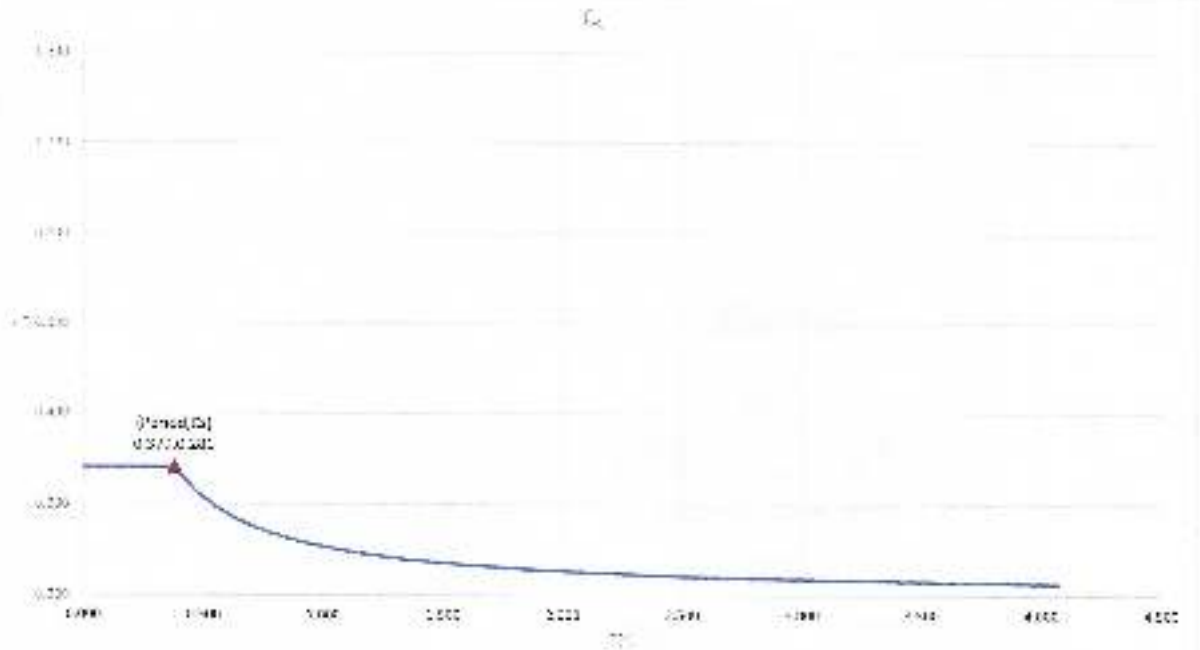
Risk Category =	I		S_s =	0.107	g	S_{DS} =	0.112 g
Seismic Design Category:	C		S_1 =	0.160	g	S_{D1} =	0.170 g
Importance I =	1.00		S_{MS} =	0.283	g	F_a =	1.50
Site Class:	C		S_{M1} =	0.240	g	F_v =	1.50
R =	1.5						
T_L =	6						

Seismic Base Shear:

Structure Type =	Telecom Steel Pole						
Period Type =	Worst Case Ck						
h =	74.0	ft				f_1 =	2.54 Hz
E =	29000	ksi	W_s =	18.0	k	T =	0.39 sec.
			W_{ps} =	19.0	k	k_p =	1.00

C_s =	0.252		
Seismic Shear, $V_{Seismic}$ =	9.0	k	ratio = 0.21
Wind Shear =	43.6	k	

Wind Controls, No Seismic Analysis Required



DESIGNED APPURTENANCE LOADING

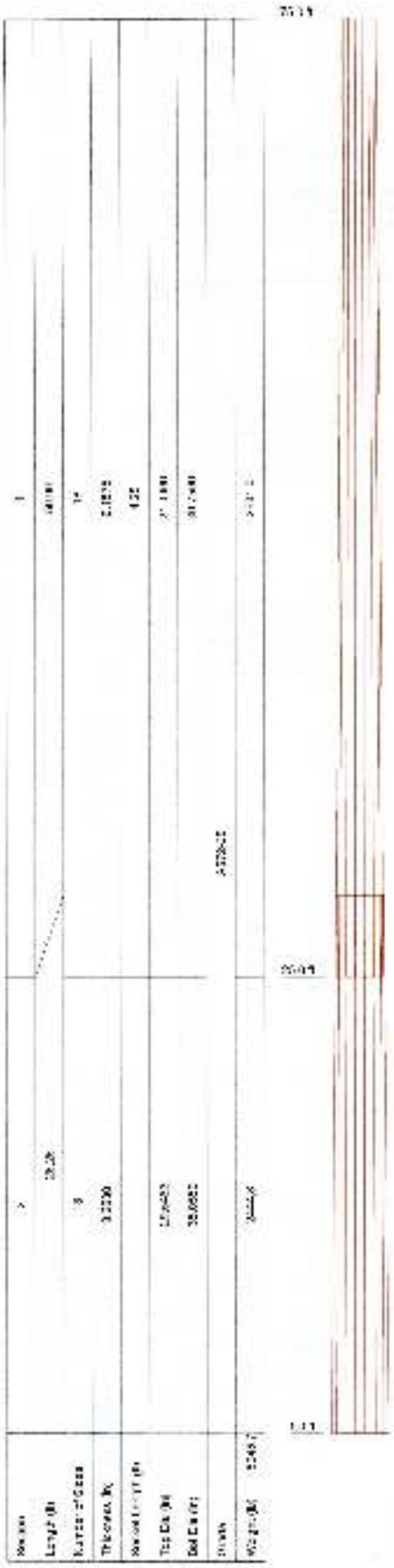
TYPE	ELEVATION	TYPE	ELEVATION
[illegible]	[illegible]	(4) Generic RRU [Enclosed, 75 sq	85
(4) Generic Panel [Enclosed, 75 sq	[illegible]	[illegible]	[illegible]
(4) Generic RRU [Enclosed, 75 sq	[illegible]	(4) Generic RRU [Enclosed, 75 sq	65
(2) [illegible]	[illegible]	(4) Generic Panel [Enclosed, 75 sq	65
[illegible]	[illegible]	(4) Generic Panel [Enclosed, 75 sq	65
(2) [illegible]	[illegible]	Concentrated Loading @ 65 ft	65
(2) [illegible]	[illegible]	Concentrated Loading @ 65 ft	65
(4) Generic RRU [Enclosed, 75 sq	[illegible]	(2) [illegible]	[illegible]
(4) Generic RRU [Enclosed, 75 sq	[illegible]	(4) Generic RRU [Enclosed, 75 sq	55
(4) Generic RRU [Enclosed, 75 sq	[illegible]	(4) Generic RRU [Enclosed, 75 sq	55
(4) Generic Panel [Enclosed, 75 sq	55	(4) Generic Panel [Enclosed, 75 sq	55
Concentrated Loading @ 55 ft	55	(4) Generic Panel [Enclosed, 75 sq	55
Concentrated Loading @ 55 ft	55	(4) Generic Panel [Enclosed, 75 sq	55
(2) [illegible]	50	(4) Generic Panel [Enclosed, 75 sq	50
(2) 6'-0" Flat Pipe DBA (57.92 lb/ft)	50	[illegible]	[illegible]
(2) 6'-0" Flat Pipe DBA (57.92 lb/ft)	50	[illegible]	[illegible]
		Concentrated Loading @ 45 ft	45

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Sandoval County, New Mexico.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 104 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 30 mph basic wind with 0.25 in Ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 50 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 74.5%



Vector Structural Engineering
851 W Galena Park Blvd
Draper, UT 84020
Phone: (801) 980-1770
FAX: (801) 990-1778

By: Spike	
Project: U0142.2054.242	
Client: Regeo	Drawn By: mmills App'd:
Code: TIA-222-H	Date: 10/21/21 Scale: NTS
Path:	Job No.: [illegible]

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-I standard.
The following design criteria apply:

Tower is located in Sandoval County, New Mexico.
Tower base elevation above sea level: 5521.00 ft.
Basic wind speed of 104 mph.
Risk Category II.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1
Crest Height: 0.00 ft.
Nominal ice thickness of 0.2500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 30 mph is used in combination with ice.
Deflections calculated using a wind speed of 60 mph.
Non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Assume Legs Pinned	√ Calculate Redundant Bracing Forces
Consider Moments - Horizontals	√ Assume Rigid Index Plate	Ignore Redundant Members in FEA
Consider Moments - Diagonals	√ Use Clear Spans For Wind Area	SR Leg Bolts Resist Compression
Use Moment Magnification	√ Use Clear Spans For KL/r	√ All Leg Panels Have Same Allowable
√ Use Code Stress Ratios	√ Retension Guys To Initial Tension	Offset Girt At Foundation
√ Use Code Safety Factors - Guys	√ Bypass Mast Stability Checks	Consider Feed Line Torque
Escalate Ice	√ Use Azimuth Dish Coefficients	Include Angle Block Shear Check
Always Use Max Kz	√ Project Wind Area of Appurtenances	Use TIA-222-H Bracing Resist. Exemption
Use Special Wind Profile	Autocalculate Appurtenance Wind Area	Use TIA-222-H Tension Ice Exemption
√ Include Bolts In Member Capacity	√ Autocalculate Tapered Pole Area	Dales
√ Leg Bolts Are At K Of Section	Add IBC .6D+W Combination	Include Shear-Torsion Interaction
√ Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	√ Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Pole Without Linear Attachments
SR Members Are Concentric	Ignore KL/r For 90 Deg. Angle Legs	√ Pole Without Step Bolts Or No Appurtenances
Distribute Leg Loads As Uniform	Use ASCE 10 X-Brace Ly Rules	Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	75.00-25.00	50.00	4.25	18	31.0000	30.7500	0.1875	0.7500	A572-65 (65 ksi)
L2	25.00-1.00	38.25		18	29.7463	31.0000	0.2500	1.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Top Dia. in	Area in²	I in⁴	r in	A in²	I in⁴	J in⁴	It/Q in²	w in	w/t
L1	21.2650	12.3860	677.8263	7.3881	10.5630	63.5383	1356.5464	6.1942	3.5564	12.952
	31.9624	18.3885	2175.4083	10.8467	15.5210	137.4033	4295.6403	9.0964	5.0830	27.194
L2	33.8650	23.2466	3523.6563	10.4907	15.7993	167.9401	5044.7089	11.5233	4.7561	19.04
	35.5572	27.6178	4926.7766	12.3538	17.8079	247.5345	8459.1749	13.8115	5.1247	22.919

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor K_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 75.00-27.00				1	1	1			
L2 27.00-0.00				1	1	1			

User Defined Loads

Description	Elevation ft	Offset From Centroid ft	Azimuth Angle °		Weight lb	F_x lb	F_z lb	Wind Force lb	I_{xx} ft⁴
Concealment, Loading @ 75.0	75.00	0.00	0.0000	No Ice	1042.00	0.00	0.00	2600.00	90.64
				Ice	5[illegible]6.00	0.00	0.00	355.00	143.69
				Service	1042.00	0.00	0.00	895.00	106.48
Concealment, Loading @ 55.0	55.00	0.00	0.0000	No Ice	1042.00	0.00	0.00	2620.00	93.31
				Ice	5[illegible]6.00	0.00	0.00	355.00	147.99
				Service	1042.00	0.00	0.00	895.00	109.73
Concealment, Loading @ 55.0	55.00	0.00	0.0000	No Ice	1042.00	0.00	0.00	1525.00	53.90
				Ice	516.00	0.00	0.00	254.00	105.88
				Service	1042.00	0.00	0.00	525.00	61.28
Concealment, Loading @ 55.0	55.00	0.00	0.0000	No Ice	1042.00	0.00	0.00	1525.00	51.79
				Ice	516.00	0.00	0.00	254.00	109.67
				Service	1042.00	0.00	0.00	525.00	61.51
Concealment, Loading @ 55.0	55.00	0.00	0.0000	No Ice	1042.00	0.00	0.00	2526.00	90.04
				Ice	556.00	0.00	0.00	337.00	142.92
				Service	1042.00	0.00	0.00	854.00	105.91
Concealment, Loading @ 15.0	15.00	0.00	0.0000	No Ice	1042.00	0.00	0.00	2526.00	93.92
				Ice	556.00	0.00	0.00	337.00	149.09
				Service	1042.00	0.00	0.00	854.00	110.48

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offset: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA Front ft²	C_AA Side ft²	Weight lb
(4) Generic Panel (Enclosed, 115 lbs)	A	From Face	3.00 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(4) Generic Panel (Enclosed, 115 lbs)	B	From Face	3.00 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(4) Generic Panel (Enclosed, 115 lbs)	C	From Face	3.00 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(2) [illegible] Yagi, EPA = 5.7 ft^2 (161 lbs)	A	From Face	3.00 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	161.00 561.25
(2) [illegible] Yagi, EPA = 5.7 ft^2 (161 lbs)	B	From Face	3.00 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	161.00 561.25
(2) [illegible] Yagi, EPA = 5.7 ft^2 (161 lbs)	C	From Face	3.00 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	161.00 561.25
(4) Generic RRU (Enclosed, 75 lbs)	A	From Face	3.00 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	75.00 75.00
(4) Generic RRU (Enclosed, 75 lbs)	B	From Face	3.00 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	75.00 75.00
(4) Generic RRU (Enclosed, 75 lbs)	C	From Face	3.00 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	75.00 75.00
***									
(4) Generic Panel (Enclosed, 115 lbs)	A	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(4) Generic Panel (Enclosed, 115 lbs)	B	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(4) Generic Panel (Enclosed, 115 lbs)	C	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(2) [illegible] Yagi, EPA = 5.7 ft^2 (161 lbs)	A	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	161.00 561.25
(2) [illegible] Yagi, EPA = 5.7 ft^2 (161 lbs)	B	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	161.00 561.25
(2) [illegible] Yagi, EPA = 5.7 ft^2 (161 lbs)	C	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	161.00 561.25
(4) Generic RRU (Enclosed, 75 lbs)	A	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	75.00 75.00
(4) Generic RRU (Enclosed, 75 lbs)	B	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	75.00 75.00
(4) Generic RRU (Enclosed, 75 lbs)	C	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	75.00 75.00
***									
(4) Generic Panel (Enclosed,	A	From Face	3.00	0.0000	50.00	No Ice	0.00	0.00	115.00

Description	Face or Leg	Offset Type	Offset: Horz Lateral Vert x y z	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
5 lbs)			0.00 0.00			No Ice 1/2" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(4) Generic Radio (Enclosed, 115 lbs)	B	From Face	3.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(4) Generic Radio (Enclosed, 115 lbs)	C	From Face	3.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	115.00 115.00
(2) 10-4/7 T-arm EPA = 5.7 ft^2 (15. lbs)	A	From Face	3.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	161.00 561.56
(2) 10-4/7 T-arm EPA = 5.7 ft^2 (15. lbs)	B	From Face	3.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	161.00 561.56
(2) 10-4/7 T-arm EPA = 5.7 ft^2 (15. lbs)	C	From Face	3.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	161.00 561.56
(4) Generic RRU (Enclosed, 75 lbs)	A	From Face	3.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	75.00 75.00
(4) Generic RRU (Enclosed, 75 lbs)	B	From Face	3.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	75.00 75.00
(4) Generic RRU (Enclosed, 75 lbs)	C	From Face	3.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	75.00 75.00

Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_z	q_z psf	A_G ft	Face	A_F ft^2	A_R ft^2	A_{LG} ft^2	Ice %	C_AA_A In Face ft	C_AA_A Out Face ft
125.00-25.00	19.00	1.090	27	109.555	A	0.000	109.555	109.555	100.00	0.000	0.000
					B	0.000	109.555		100.00	0.000	0.000
					C	0.000	109.555		100.00	0.000	0.000
125.00-0.00	12.50	0.850	19	66.362	A	0.000	66.362	66.362	100.00	0.000	0.000
					B	0.000	66.362		100.00	0.000	0.000
					C	0.000	66.362		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_z	q_z psf	G_H	A_R ft²	Face	A_F ft²	A_F ft²	A_{Rn} ft²	Exp %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 75.00-25.00	49.50	1.090	2	0.2960	111.523	A	0.000	111.523	111.523	100.00	0.000	0.000
						B	0.000	111.523		100.00	0.000	0.000
						C	0.000	111.523		100.00	0.000	0.000
L2 25.00-0.00	12.71	0.850	2	0.2973	67.403	A	0.000	67.403	67.403	100.00	0.000	0.000
						B	0.000	67.403		100.00	0.000	0.000
						C	0.000	67.403		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.106$

Section Elevation ft	z ft	K_z	q_z psf	A_R ft²	Face	A_F ft²	A_F ft²	A_{Rn} ft²	Exp %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 75.00-25.00	49.50	1.090	2	109.355	A	0.000	109.355	109.355	100.00	0.000	0.000
					B	0.000	109.355		100.00	0.000	0.000
					C	0.000	109.355		100.00	0.000	0.000
L2 25.00-0.00	12.71	0.850	2	66.362	A	0.000	66.362	66.362	100.00	0.000	0.000
					D	0.000	66.362		100.00	0.000	0.000
					C	0.000	66.362		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	a	C_A	q_z psf	G_H	D_F	A_F ft²	F lb	ϕ plf	Ctrl Face
L1 75.00-25.00	0.00	2600.97	A	1	0.74	24	1	1	109.355	2151.57	44.85	C
			B	1	0.73		1	1	109.355			
			C	1	0.73		1	1	109.355			
L2 25.00-0.00	0.00	2444.77	A	1	0.73	19	1	1	66.362	1027.03	42.79	C
			D	1	0.74		1	1	66.362			
			C	1	0.73		1	1	66.362			
Sum Weight:	0.00	5045.74						0.00	1178.72	3178.59		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	a	C_A	q_z psf	D_F	D_B	A_F ft²	F lb	ϕ plf	Ctrl Face
L1 75.00-25.00	0.00	2600.97	A	1	0.74	24	1	1	109.355	2151.57	44.85	C
			D	1	0.73		1	1	109.355			
			C	1	0.73		1	1	109.355			
L2 25.00-0.00	0.00	2444.77	A	1	0.73	19	1	1	66.362	1027.03	42.79	C

tnxTower	Job	Page 13 of 131
	Spike	
Vector Structural Engineering 631 W Yakima Park Blvd Denver, UT 84026 Phone: (801) 999-1775 FAX: (801) 999-1776	Project U0142 2054.242	Date 17:04:43 10/24/24
	Client Raycap	Designed by mrine

Section Elevation ft	Add Weight lb	Self Weight lb	Face	C_AA_A	C_A	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			D	1	0.73		1	1	66.362			
			C	1	0.73		1	1	66.362			
Sum Weight:	0.00	5043.24						QTM	115508.37 lb-ft	3178.59		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	C_AA_A	C_A	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 75.00-25.00	0.00	2600.92	A	1	0.73	24	1	1	109.355	2151.37	43.03	C
			B	1	0.73		1	1	109.355			
			C	1	0.73		1	1	109.355			
L2 25.00-1.00	0.00	2444.77	A	1	0.73	19	1	1	66.362	1027.02	42.79	C
			B	1	0.73		1	1	66.362			
			C	1	0.73		1	1	66.362			
Sum Weight:	0.00	5045.69						QTM	115508.37 lb-ft	3178.39		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	C_AA_A	C_A	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 75.00-25.00	0.00	2600.92	A	1	0.73	24	1	1	109.355	2151.37	43.03	C
			B	1	0.73		1	1	109.355			
			C	1	0.73		1	1	109.355			
L2 25.00-1.00	0.00	2444.77	A	1	0.73	19	1	1	66.362	1027.02	42.79	C
			B	1	0.73		1	1	66.362			
			C	1	0.73		1	1	66.362			
Sum Weight:	0.00	5045.69						QTM	115508.37 lb-ft	3178.39		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	C_AA_A	C_A	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 75.00-25.00	0.00	3000.56	A	1	1.2	2	1	1	111.522	308.11	6.16	C
			B	1	1.2		1	1	111.522			
			C	1	1.2		1	1	111.522			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_A	q_z psf	G_H	D_z	A_E ft²	F lb	w plf	Ctrl Face
L3 25.00-1.00	0.00	3666.54	A	1	1.2	2	1	1	67.271	142.40	5.93	C
			B	1	1.2		1	1	67.271			
			C	1	1.2		1	1	67.271			
Sum Weight	0.00	5687.10						OTM	16102.78 lb-ft	442.31		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_A	q_z psf	G_H	D_z	A_E ft²	F lb	w plf	Ctrl Face
L1 75.00-25.00	0.00	3020.56	A	1	1.2	2	1	1	111.523	303.11	6.06	C
			B	1	1.2		1	1	111.523			
			C	1	1.2		1	1	111.523			
L2 25.00-1.00	0.00	3666.54	A	1	1.2	2	1	1	67.271	142.40	5.93	C
			B	1	1.2		1	1	67.271			
			C	1	1.2		1	1	67.271			
Sum Weight	0.00	5687.10						OTM	16102.78 lb-ft	442.31		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_A	q_z psf	G_H	D_z	A_E ft²	F lb	w plf	Ctrl Face
L1 75.00-25.00	0.00	3020.56	A	1	1.2	2	1	1	111.523	303.11	6.06	C
			B	1	1.2		1	1	111.523			
			C	1	1.2		1	1	111.523			
L2 25.00-1.00	0.00	3666.54	A	1	1.2	2	1	1	67.271	142.40	5.93	C
			B	1	1.2		1	1	67.271			
			C	1	1.2		1	1	67.271			
Sum Weight	0.00	5687.10						OTM	16102.78 lb-ft	442.31		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_A	q_z psf	G_H	D_z	A_E ft²	F lb	w plf	Ctrl Face
L1 75.00-25.00	0.00	3020.56	A	1	1.2	2	1	1	111.523	303.11	6.06	C
			B	1	1.2		1	1	111.523			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_r	q_z psf	D_r	D_s	A_R ft²	F lb	w plf	Ctrl. Face
T2 25.00-T1.00	0.00	2650.56	C	1	1.2	2	1	1	11.523	747.01	5.95	C
			A	1	1.2			1	63.271			
			B	1	1.2		1	1	63.271			
			C	1	1.2			1	63.271			
Sum Weight:	0.00	3687.10						0.0134	16.02.76 lb-ft	442.51		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_r	q_z psf	D_r	D_s	A_R ft²	F lb	w plf	Ctrl. Face
L1	0.00	2600.97	A	1	0.73	7	1	1	109.355	608.66	12.17	C
T1.00-T2.00			B	1	0.73		1	1	109.355			
			C	1	0.73		1	1	109.355			
L2 25.00-1.00	0.00	2444.77	A	1	0.73	5	1	1	66.362	290.56	12.17	C
			B	1	0.73		1	1	66.362			
			C	1	0.73		1	1	66.362			
Sum Weight:	0.00	5045.74						0.0134	32678.96 lb-ft	899.21		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_r	q_z psf	D_r	D_s	A_R ft²	F lb	w plf	Ctrl. Face
L1	0.00	2600.97	A	1	0.73	7	1	1	109.355	608.66	12.17	C
T1.00-T2.00			B	1	0.73		1	1	109.355			
			C	1	0.73		1	1	109.355			
L2 25.00-1.00	0.00	2444.77	A	1	0.73	5	1	1	66.362	290.56	12.17	C
			B	1	0.73		1	1	66.362			
			C	1	0.73		1	1	66.362			
Sum Weight:	0.00	5045.74						0.0134	32678.96 lb-ft	899.21		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_r	q_z psf	D_r	D_s	A_R ft²	F lb	w plf	Ctrl. Face
L1	0.00	2600.97	A	1	0.73	7	1	1	109.355	608.65	12.17	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	A_R	C_A	q_z psf	D_f	D_b	A_F ft²	A' lb	w plf	Ctrl. Face
75.00-75.00			B	1	0.73		1	1	109.353			
			C	1	0.73		1	1	109.353			
L2 25.00-1.00	0.00	2444.77	A	1	0.73	5	1	1	66.362	293.56	12.11	C
			D	1	0.73		1	1	66.362			
			C	1	0.73		1	1	66.362			
Sum Weight:	0.00	3045.74						OTM	32575.95 lb-ft	899.21		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	A_R	C_A	q_z psf	D_f	D_b	A_F ft²	A' lb	w plf	Ctrl. Face
L1 75.00-25.00	0.00	2600.97	A	1	0.73	5	1	1	109.353	608.63	12.17	C
			D	1	0.73		1	1	109.353			
			C	1	0.73		1	1	109.353			
L2 25.00-1.00	0.00	2444.77	A	1	0.73	5	1	1	66.362	293.56	12.11	C
			B	1	0.73			1	66.362			
			C	1	0.73			1	66.362			
Sum Weight:	0.00	3045.74						OTM	32575.95 lb-ft	899.21		

Discrete Appurtenance Pressures - No Ice $G_H = 1.100$

Description	Mounting Azimuth °	Weight lb	Offset ft	Offset ft	Z ft	K_a	q_z psf	Front ft²	Side ft²
Generic Panel (Enclosed, 115 lbs)	300.0000	460.00	-3.39	-1.96	70.00	1.124	27	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	60.0000	460.00	3.39	-1.96	70.00	1.124	27	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	180.0000	460.00	0.00	3.92	70.00	1.124	27	0.00	0.00
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	300.0000	322.00	-3.39	-1.96	70.00	1.124	27	0.00	0.00
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	60.0000	322.00	3.39	-1.96	70.00	1.124	27	0.00	0.00
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	180.0000	322.00	0.00	3.92	70.00	1.124	27	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	300.0000	208.00	-3.39	-1.96	70.00	1.124	27	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	60.0000	208.00	3.39	-1.96	70.00	1.124	27	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	180.0000	208.00	0.00	3.92	70.00	1.124	27	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	300.0000	460.00	-3.46	-2.00	60.00	1.137	25	0.00	0.00
Generic Panel (Enclosed,	60.0000	460.00	3.46	-2.00	60.00	1.137	25	0.00	0.00

Description	Assign Number	Weight lb	Offset, f	Offset, b	c ft	K_a	q psf	Cf*A Front ft²	Cf*A Side ft²
115 lbs) Generic Panel (Enclosed, 115 lbs)	180.0000	460.00	0.00	4.00	60.00	1.197	25	0.00	0.00
10'-0" T-arm EPA = 5.7 ft^2 (15" lbs)	300.0000	922.00	-5.46	-2.00	60.00	1.197	26	0.00	0.00
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	60.0000	922.00	5.46	-2.00	60.00	1.197	26	0.00	0.00
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	180.0000	922.00	0.00	4.00	60.00	1.197	26	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	300.0000	300.00	-3.46	-2.00	60.00	1.197	26	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	60.0000	300.00	3.46	-2.00	60.00	1.197	26	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	180.0000	300.00	0.00	4.00	60.00	1.197	26	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	300.0000	460.00	-5.97	-2.04	50.00	1.094	25	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	60.0000	460.00	5.97	2.04	50.00	1.094	25	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	180.0000	460.00	0.00	4.08	50.00	1.094	25	0.00	0.00
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	300.0000	922.00	-5.46	-2.04	50.00	1.094	25	0.00	0.00
10'-0" T-arm EPA = 5.7 ft^2 (15" lbs)	60.0000	922.00	5.46	-2.04	50.00	1.094	25	0.00	0.00
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	180.0000	922.00	0.00	4.08	50.00	1.094	25	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	300.0000	300.00	-3.64	-2.04	50.00	1.094	25	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	60.0000	300.00	3.64	-2.04	50.00	1.094	25	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	180.0000	300.00	0.00	4.08	50.00	1.094	25	0.00	0.00
	Sum Weight:	9726.00							

Discrete Appurtenance Pressures - With Ice $G_H = 1.260$

Description	Assign Number	Weight lb	Offset, f	Offset, b	c ft	K_a	q psf	Cf*A Front ft²	Cf*A Side ft²	t in
Generic Panel (Enclosed, 115 lbs)	300.0000	760.00	-3.49	1.96	70.00	1.174	2	0.00	0.00	0.2695
Generic Panel (Enclosed, 115 lbs)	60.0000	460.00	3.35	-1.96	50.00	1.174	2	0.00	0.00	0.2695
Generic Panel (Enclosed, 115 lbs)	180.0000	460.00	0.00	3.92	70.00	1.174	2	0.00	0.00	0.2695
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	300.0000	754.92	-3.39	-1.96	70.00	1.174	2	0.00	0.00	0.2695
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	60.0000	754.92	3.39	-1.96	70.00	1.174	2	0.00	0.00	0.2695
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	180.0000	754.92	0.00	3.92	70.00	1.174	2	0.00	0.00	0.2695
Generic RRU (Enclosed, 75 lbs)	300.0000	300.00	-3.39	-1.96	70.00	1.174	2	0.00	0.00	0.2695
Generic RRU (Enclosed, 75 lbs)	60.0000	300.00	3.39	-1.96	70.00	1.174	2	0.00	0.00	0.2695
Generic RRU (Enclosed,	180.0000	300.00	0.00	3.92	70.00	1.174	2	0.00	0.00	0.2695

Description	Adjust. Azimuth °	Weight lb	Offset ft	Offset ft	z ft	K_z	q_z psf	C_AA_A Front ft²	C_AA_A Side ft²	ice in
75 lbs)										
Generic Panel (Enclosed, 115 lbs)	300.0000	460.00	-3.46	-2.00	60.00	1.137	2	0.00	0.00	0.2654
Generic Panel (Enclosed, 115 lbs)	60.0000	460.00	3.46	-2.00	50.00	1.129	2	0.00	0.00	0.2654
Generic Panel (Enclosed, 115 lbs)	180.0000	460.00	0.00	4.00	60.00	1.137	2	0.00	0.00	0.2654
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	300.0000	746.92	-3.46	-2.00	60.00	1.137	2	0.00	0.00	0.2654
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	60.0000	746.92	3.46	-2.00	50.00	1.129	2	0.00	0.00	0.2654
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	180.0000	746.92	0.00	4.00	60.00	1.137	2	0.00	0.00	0.2654
Generic RRU (Enclosed 75 lbs)	300.0000	300.00	-3.46	-2.00	60.00	1.137	2	0.00	0.00	0.2654
Generic RRU (Enclosed, 75 lbs)	60.0000	300.00	3.46	2.00	50.00	1.129	2	0.00	0.00	0.2654
Generic RRU (Enclosed, 75 lbs)	180.0000	300.00	0.00	4.00	60.00	1.137	2	0.00	0.00	0.2654
Generic Panel (Enclosed, 115 lbs)	300.0000	460.00	-3.53	-2.04	50.00	1.094	2	0.00	0.00	0.2606
Generic Panel (Enclosed, 115 lbs)	60.0000	460.00	3.53	-2.04	50.00	1.094	2	0.00	0.00	0.2606
Generic Panel (Enclosed, 115 lbs)	180.0000	460.00	0.00	4.08	50.00	1.094	2	0.00	0.00	0.2606
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	300.0000	739.24	-3.53	-2.04	50.00	1.094	2	0.00	0.00	0.2638
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	60.0000	739.24	3.53	2.04	50.00	1.094	2	0.00	0.00	0.2638
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	180.0000	739.24	0.00	4.08	50.00	1.094	2	0.00	0.00	0.2638
Generic RRU (Enclosed, 75 lbs)	300.0000	300.00	-3.53	-2.04	50.00	1.094	2	0.00	0.00	0.2606
Generic RRU (Enclosed, 75 lbs)	60.0000	300.00	3.53	2.04	50.00	1.094	2	0.00	0.00	0.2606
Generic RRU (Enclosed, 75 lbs)	180.0000	300.00	0.00	4.08	50.00	1.094	2	0.00	0.00	0.2606
	Sum Weight:	3955.01								

Discrete Appurtenance Pressures - Service $G_H = 1.100$

Description	Adjust. Azimuth °	Weight lb	Offset ft	Offset ft	z ft	K_z	q_z psf	C_AA_A Front ft²	C_AA_A Side ft²
Generic Panel (Enclosed, 115 lbs)	300.0000	460.00	-3.39	-1.96	70.00	1.174	8	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	60.0000	460.00	3.39	1.96	70.00	1.174	8	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	180.0000	460.00	0.00	3.92	70.00	1.174	8	0.00	0.00
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	300.0000	322.00	-3.39	-1.96	70.00	1.174	8	0.00	0.00
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	60.0000	322.00	3.39	-1.96	70.00	1.174	8	0.00	0.00
10'-0" T-arm EPA = 5.7 ft^2 (161 lbs)	180.0000	322.00	0.00	3.92	70.00	1.174	8	0.00	0.00
Generic RRU (Enclosed,	300.0000	300.00	-3.39	-1.96	70.00	1.174	8	0.00	0.00

Description	Face Leg Azimuth °	Weight lb	Offset in	Offset in	Offset in	K	Ice in	C_AA Front ft²	C_AA Side ft²
75 lbs) Generic RRU (Enclosed, 75 lbs)	90.0000	300.00	3.39	-1.06	70.00	1.174	8	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	180.0000	300.00	3.00	3.42	70.00	1.174	8	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	300.0000	460.00	-3.46	2.00	60.00	1.137	7	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	60.0000	460.00	3.46	-3.00	50.00	1.127	7	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	180.0000	460.00	0.00	4.00	60.00	1.137	7	0.00	0.00
10.3" Tarm EPA = 5.7 ft^2 (161 lbs)	300.0000	322.00	-3.46	-2.00	60.00	1.137	7	0.00	0.00
10.3" Tarm EPA = 5.7 ft^2 (161 lbs)	60.0000	322.00	3.46	-2.00	60.00	1.137	7	0.00	0.00
10.3" Tarm EPA = 5.7 ft^2 (161 lbs)	180.0000	322.00	0.00	4.00	60.00	1.137	7	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	300.0000	300.00	-3.46	-2.00	60.00	1.137	7	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	60.0000	300.00	3.46	-2.00	60.00	1.137	7	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	180.0000	300.00	0.00	4.00	60.00	1.137	7	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	300.0000	460.00	-3.55	-2.05	50.00	1.094	7	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	60.0000	460.00	3.55	-2.05	50.00	1.094	7	0.00	0.00
Generic Panel (Enclosed, 115 lbs)	180.0000	460.00	0.00	4.09	50.00	1.094	7	0.00	0.00
10.3" Tarm EPA = 5.7 ft^2 (161 lbs)	300.0000	322.00	-3.55	-2.05	50.00	1.094	7	0.00	0.00
10.3" Tarm EPA = 5.7 ft^2 (161 lbs)	60.0000	322.00	3.55	-2.05	50.00	1.094	7	0.00	0.00
10.3" Tarm EPA = 5.7 ft^2 (161 lbs)	180.0000	322.00	0.00	4.09	50.00	1.094	7	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	300.0000	300.00	-3.55	-2.05	50.00	1.094	7	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	60.0000	300.00	3.55	-2.05	50.00	1.094	7	0.00	0.00
Generic RRU (Enclosed, 75 lbs)	180.0000	300.00	0.00	4.09	50.00	1.094	7	0.00	0.00
	Sum Weight	9756.00							

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, Mx lb-ft	Sum of Overturning Moments, Mz lb-ft	Sum of Torques lb-ft
Leg Weight	5043.74					
Bracing Weight	0.00					
Total Member Self-Weight	5043.74			0.00	0.00	
Total Weight	14799.74			0.00	0.00	
Wind 0 deg - No Ice		0.00	-15620.39	-972265.83	0.00	0.00
Wind 30 deg - No Ice		8410.20	-14493.68	-793045.85	-456155.19	0.00
Wind 60 deg - No Ice		11752.39	-11752.39	-645069.74	-645069.74	0.00
Wind 90 deg - No Ice		14393.68	-8410.20	-456155.19	-793045.85	0.00

tnxTower	Job: Spike	Page 20 of 131
Vector Structural Engineering 631 W Interstate Park Blvd Draper, UT 84020 Phone: (801) 936-1775 FAX: (801) 990-1776	Project: U0142.2054.242	Date: 17:04:43 10/24/24
	Client: Raycap	Designed by: mirie

Load Case	Vertical Forces # lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M lb-ft	Sum of Overturning Moments, M lb-ft	Sum of Torques lb-ft
Wind 90 deg - No Ice		166230.36	0.00	0.00	-972966.27	0.00
Wind 120 deg - No Ice		14393.68	8310.20	496133.19	-298047.85	0.00
Wind 135 deg - No Ice		11752.39	11752.39	643069.74	-643069.74	0.00
Wind 150 deg - No Ice		8310.20	14393.68	746045.85	-856149.19	0.00
Wind 180 deg - No Ice		0.00	16620.39	912266.45	0.00	0.00
Wind 210 deg - No Ice		-8310.20	14393.68	750045.45	856133.19	0.00
Wind 225 deg - No Ice		-11752.39	11752.39	643069.71	643069.74	0.00
Wind 240 deg - No Ice		-14393.68	8310.20	496133.19	298047.85	0.00
Wind 270 deg - No Ice		-16620.39	0.00	0.00	912266.45	0.00
Wind 300 deg - No Ice		-14393.68	8310.20	-496133.19	790045.85	0.00
Wind 315 deg - No Ice		-11752.39	-11752.39	-643069.74	643069.74	0.00
Wind 360 deg - No Ice		-8310.20	-14393.68	-790045.85	496133.19	0.00
Member Ice	6411.26					
Total Weight Ice	22022.21			0.00	0.00	
Wind 0 deg - Ice		0.00	2322.51	-127808.78	0.00	0.00
Wind 30 deg - Ice		1161.25	2011.35	-110420.65	-63751.39	0.00
Wind 45 deg - Ice		1642.26	1642.26	-90158.08	-90158.08	0.00
Wind 60 deg - Ice		2011.35	1161.25	-63751.39	-110420.65	0.00
Wind 90 deg - Ice		2322.51	0.00	0.00	-127808.78	0.00
Wind 120 deg - Ice		2011.35	1161.25	63751.39	-110420.65	0.00
Wind 135 deg - Ice		1642.26	1642.26	90158.08	-90158.08	0.00
Wind 150 deg - Ice		1161.25	2011.35	110420.65	-63751.39	0.00
Wind 180 deg - Ice		0.00	2322.51	127808.78	0.00	0.00
Wind 210 deg - Ice		-1161.25	2011.35	110420.65	63751.39	0.00
Wind 225 deg - Ice		-1642.26	1642.26	90158.08	90158.08	0.00
Wind 240 deg - Ice		-2011.35	1161.25	63751.39	110420.65	0.00
Wind 270 deg - Ice		-2322.51	0.00	0.00	127808.78	0.00
Wind 300 deg - Ice		-2011.35	-1161.25	-63751.39	110420.65	0.00
Wind 315 deg - Ice		-1642.26	-1642.26	-90158.08	90158.08	0.00
Wind 330 deg - Ice		-1161.25	-2011.35	-110420.65	63751.39	0.00
Total Weight	21035.74			0.00	0.00	
Wind 0 deg - Service		0.00	-5573.21	-297664.98	0.00	0.00
Wind 30 deg - Service		2688.61	-4654.84	-257958.62	-148932.48	0.00
Wind 45 deg - Service		3799.43	-3799.43	-210622.33	-210622.33	0.00
Wind 60 deg - Service		4654.84	-2686.61	-148932.48	-257958.62	0.00
Wind 90 deg - Service		5573.21	0.00	0.00	-297664.98	0.00
Wind 120 deg - Service		4654.84	2686.61	148932.48	-257958.62	0.00
Wind 135 deg - Service		3799.43	3799.43	210622.33	-210622.33	0.00
Wind 150 deg - Service		2686.61	4654.84	257958.62	-148932.48	0.00
Wind 180 deg - Service		0.00	5573.21	297664.98	0.00	0.00
Wind 210 deg - Service		-2686.61	4654.84	257958.62	148932.48	0.00
Wind 225 deg - Service		-3799.43	3799.43	210622.33	210622.33	0.00
Wind 240 deg - Service		-4654.84	2686.61	148932.48	257958.62	0.00
Wind 270 deg - Service		-5573.21	0.00	0.00	297664.98	0.00
Wind 300 deg - Service		-4654.84	-2686.61	-148932.48	257958.62	0.00
Wind 315 deg - Service		-3799.43	-3799.43	-210622.33	210622.33	0.00
Wind 330 deg - Service		-2686.61	-4654.84	-257958.62	148932.48	0.00

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice

Comb. No.	Description
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 45 deg - No Ice
7	0.9 Dead+1.0 Wind 45 deg - No Ice
8	1.2 Dead+1.0 Wind 60 deg - No Ice
9	0.9 Dead+1.0 Wind 60 deg - No Ice
10	1.2 Dead+1.0 Wind 90 deg - No Ice
11	0.9 Dead+1.0 Wind 90 deg - No Ice
12	1.2 Dead+1.0 Wind 120 deg - No Ice
13	0.9 Dead+1.0 Wind 120 deg - No Ice
14	1.2 Dead+1.0 Wind 135 deg - No Ice
15	0.9 Dead+1.0 Wind 135 deg - No Ice
16	1.2 Dead+1.0 Wind 150 deg - No Ice
17	0.9 Dead+1.0 Wind 150 deg - No Ice
18	1.2 Dead+1.0 Wind 180 deg - No Ice
19	0.9 Dead+1.0 Wind 180 deg - No Ice
20	1.2 Dead+1.0 Wind 210 deg - No Ice
21	0.9 Dead+1.0 Wind 210 deg - No Ice
22	1.2 Dead+1.0 Wind 225 deg - No Ice
23	0.9 Dead+1.0 Wind 225 deg - No Ice
24	1.2 Dead+1.0 Wind 240 deg - No Ice
25	0.9 Dead+1.0 Wind 240 deg - No Ice
26	1.2 Dead+1.0 Wind 270 deg - No Ice
27	0.9 Dead+1.0 Wind 270 deg - No Ice
28	1.2 Dead+1.0 Wind 300 deg - No Ice
29	0.9 Dead+1.0 Wind 300 deg - No Ice
30	1.2 Dead+1.0 Wind 315 deg - No Ice
31	0.9 Dead+1.0 Wind 315 deg - No Ice
32	1.2 Dead+1.0 Wind 330 deg - No Ice
33	0.9 Dead+1.0 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service
65	Dead+Wind 315 deg - Service
66	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Max. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	75 - 25	Pole	Max. Tension	35	0.00	0.00	0.00
			Max. Compression	34	-37726.93	0.00	0.00
			Max. Mx	30	-31330.48	448072.86	0.00
			Max. My	2	-21950.49	0.00	-880272.85
			Max. Vy	10	16039.92	-488072.85	0.00
			Max. Vx	2	-16039.92	0.00	488072.86
			Max. Torque	16			0.00
L2	25 - 1	Pole	Max. Tension	1	0.00	0.00	0.00
			Max. Compression	34	-20968.53	0.00	0.00
			Max. Mx	30	-17431.17	-950122.99	0.00
			Max. My	18	-17431.17	0.00	-950122.99
			Max. Vy	30	16567.49	-950122.99	0.00
			Max. Vx	18	16567.49	0.00	950122.99
			Max. Torque	6			0.00

Maximum Reactions

Location	Condition	Max. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	27	20968.53	0.00	0.00
	Max. Hx	27	18942.16	16620.17	0.00
	Max. Hz	3	18942.16	0.00	16620.17
	Max. Mx	2	950122.99	0.00	16620.05
	Max. Mz	10	950122.99	-16620.05	0.00
	Max. Torsion	15	0.00	-8310.17	-14393.64
	Min. Vert	3	18942.16	0.00	16620.17
	Min. Hx	15	18942.16	-16620.17	0.00
	Min. Hz	15	18942.16	0.00	-16620.17
	Min. Mx	26	-950122.99	16620.05	0.00
	Min. Mz	20	-950122.99	8310.17	14393.65

Tower Mast Reaction Summary

Load Combination	Vertical lb	Shear$_x$ lb	Shear$_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	21035.27	0.00	0.00	0.00	0.00	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	29243.87	0.00	-16620.05	-950122.99	0.00	0.00
0.9 Dead+1.0 Wind 0 deg - No Ice	18942.16	0.00	-16620.17	-910156.59	0.00	0.00
1.2 Dead+1.0 Wind 30 deg - No Ice	25242.88	8310.17	-14393.65	-822818.26	-475007.71	0.00
0.9 Dead+1.0 Wind 30 deg - No Ice	18942.16	8310.18	-14393.65	-814210.36	-470064.21	0.00

Load Combination	Vertical lb	Shear, Q lb	Shear, Qz lb	Overturning Moment, Mx lb-ft	Overturning Moment, My lb-ft	Torque lb-ft
1.2 Dead+1.0 Wind 45 deg - No Ice	25242.88	11752.35	-11752.35	-671852.82	-671852.82	0.00
0.9 Dead+1.0 Wind 45 deg - No Ice	18932.16	11752.37	-11752.37	-664800.16	-664800.16	0.00
1.2 Dead+1.0 Wind 60 deg - No Ice	25242.88	14393.63	-8310.17	-479071.71	822848.26	-0.00
0.9 Dead+1.0 Wind 60 deg - No Ice	18932.16	14393.65	-8310.18	-476081.71	-814210.56	-0.00
1.2 Dead+1.0 Wind 90 deg - No Ice	25242.88	16620.05	0.00	0.00	-950122.99	0.00
0.9 Dead+1.0 Wind 90 deg - No Ice	18932.16	16620.17	0.00	0.00	-940156.89	0.00
1.2 Dead+1.0 Wind 120 deg - No Ice	25242.88	14393.65	8310.17	479071.71	-822848.26	0.00
0.9 Dead+1.0 Wind 120 deg - No Ice	18932.16	14393.65	8310.18	476081.71	-814210.56	0.00
1.2 Dead+1.0 Wind 135 deg - No Ice	25242.88	11752.35	11752.35	671852.82	-671852.82	0.00
0.9 Dead+1.0 Wind 135 deg - No Ice	18932.16	11752.37	11752.37	664800.16	-664800.16	0.00
1.2 Dead+1.0 Wind 150 deg - No Ice	25242.88	8310.17	14393.63	822848.26	-479071.71	0.00
0.9 Dead+1.0 Wind 150 deg - No Ice	18932.16	8310.18	14393.65	814210.56	-476081.71	0.00
1.2 Dead+1.0 Wind 180 deg - No Ice	25242.88	0.00	16620.05	950122.99	0.00	0.00
0.9 Dead+1.0 Wind 180 deg - No Ice	18932.16	0.00	16620.17	940156.89	0.00	0.00
1.2 Dead+1.0 Wind 210 deg - No Ice	25242.88	-8310.17	14393.63	822848.26	479071.71	0.00
0.9 Dead+1.0 Wind 210 deg - No Ice	18932.16	-8310.18	14393.65	814210.56	476081.71	0.00
1.2 Dead+1.0 Wind 225 deg - No Ice	25242.88	-11752.35	11752.35	671852.82	671852.82	0.00
0.9 Dead+1.0 Wind 225 deg - No Ice	18932.16	-11752.37	11752.37	664800.16	664800.16	0.00
1.2 Dead+1.0 Wind 240 deg - No Ice	25242.88	-14393.63	8310.17	479071.71	822848.26	-0.00
0.9 Dead+1.0 Wind 240 deg - No Ice	18932.16	-14393.65	8310.18	476081.71	814210.56	0.00
1.2 Dead+1.0 Wind 270 deg - No Ice	25242.87	-16620.05	0.00	0.00	950122.99	0.00
0.9 Dead+1.0 Wind 270 deg - No Ice	18932.16	-16620.17	0.00	0.00	940156.89	0.00
1.2 Dead+1.0 Wind 300 deg - No Ice	25242.88	-14393.63	-8310.17	-479071.71	822848.26	0.00
0.9 Dead+1.0 Wind 300 deg - No Ice	18932.16	-14393.65	-8310.18	-476081.71	814210.56	0.00
1.2 Dead+1.0 Wind 315 deg - No Ice	25242.88	-11752.35	-11752.35	671852.82	-671852.82	0.00
0.9 Dead+1.0 Wind 315 deg - No Ice	18932.16	-11752.37	-11752.37	664800.16	-664800.16	0.00
1.2 Dead+1.0 Wind 330 deg - No Ice	25242.88	-8310.17	-14393.63	822848.26	-479071.71	0.00
0.9 Dead+1.0 Wind 330 deg - No Ice	18932.16	-8310.18	-14393.65	814210.56	-476081.71	-0.00
1.2 Dead+1.0 Ice	26768.93	0.00	0.00	0.00	0.00	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice	26268.51	0.00	2317.28	-132990.58	0.00	0.00
1.2 Dead+1.0 Wind 30 deg+1.0 Ice	26268.51	1160.64	2010.29	-115179.23	66495.30	0.00

Load Combination	Vertical lb	Shear, lb	Shear, lb	Overturning Moment, kip-ft	Overturning Moment, kip-ft	Torque lb-ft
1.2 Dead+1.0 Wind 45 deg+1.0 Ice	26268.51	1641.39	-1641.39	-94038.55	-94038.55	0.00
1.2 Dead+1.0 Wind 60 deg+1.0 Ice	26268.51	2010.29	-1160.64	-66495.30	-115173.23	-0.00
1.2 Dead+1.0 Wind 90 deg+1.0 Ice	26268.51	2321.28	0.00	0.00	-132990.58	0.00
1.2 Dead+1.0 Wind 120 deg+1.0 Ice	26268.51	2010.29	1160.64	66495.30	-115173.23	0.00
1.2 Dead+1.0 Wind 135 deg+1.0 Ice	26268.51	1641.39	1641.39	94038.55	-94038.55	0.00
1.2 Dead+1.0 Wind 150 deg+1.0 Ice	26268.51	1160.64	2010.29	115173.23	-66495.30	-0.00
1.2 Dead+1.0 Wind 180 deg+1.0 Ice	26268.51	0.00	2321.28	132990.58	0.00	0.00
1.2 Dead+1.0 Wind 210 deg+1.0 Ice	26268.51	-1160.64	2010.29	115173.23	66495.30	0.00
1.2 Dead+1.0 Wind 225 deg+1.0 Ice	26268.51	-1641.39	1641.39	94038.55	94038.55	0.00
1.2 Dead+1.0 Wind 240 deg+1.0 Ice	26268.51	-2010.29	1160.64	66495.30	115173.23	-0.00
1.2 Dead+1.0 Wind 270 deg+1.0 Ice	26268.51	-2321.28	0.00	0.00	132990.58	0.00
1.2 Dead+1.0 Wind 300 deg+1.0 Ice	26268.51	-2010.29	-1160.64	-66495.30	115173.23	0.00
1.2 Dead+1.0 Wind 315 deg+1.0 Ice	26268.51	-1641.39	-1641.39	-94038.55	94038.55	0.00
1.2 Dead+1.0 Wind 330 deg+1.0 Ice	26268.51	-1160.64	-2010.29	-115173.23	66495.30	0.00
Dead+Wind 0 deg - Service	21035.73	0.00	-5372.75	-308213.42	0.00	0.00
Dead+Wind 30 deg - Service	21035.73	2586.37	-4652.93	-266922.40	-154107.74	0.00
Dead+Wind 45 deg - Service	21035.73	3799.11	-3799.11	-217941.24	-217941.24	0.00
Dead+Wind 60 deg - Service	21035.73	4652.93	-2686.37	-154107.74	-266922.40	0.00
Dead+Wind 90 deg - Service	21035.73	5372.75	0.00	0.00	-308213.42	0.00
Dead+Wind 120 deg - Service	21035.73	4652.93	2686.37	154107.74	-266922.40	0.00
Dead+Wind 135 deg - Service	21035.73	3799.11	3799.11	217941.24	-217941.24	0.00
Dead+Wind 150 deg - Service	21035.73	2686.37	4652.93	266922.40	-154107.74	0.00
Dead+Wind 180 deg - Service	21035.73	0.00	5372.75	308213.42	0.00	0.00
Dead+Wind 210 deg - Service	21035.73	-2686.37	4652.93	266922.40	154107.74	0.00
Dead+Wind 225 deg - Service	21035.73	-3799.11	3799.11	217941.24	217941.24	0.00
Dead+Wind 240 deg - Service	21035.73	-4652.93	2686.37	154107.74	266922.40	-0.00
Dead+Wind 270 deg - Service	21035.73	-5372.75	-0.00	0.00	308213.42	0.00
Dead+Wind 300 deg - Service	21035.73	-4652.93	-2686.37	-154107.74	266922.40	0.00
Dead+Wind 315 deg - Service	21035.73	-3799.11	-3799.11	-217941.24	217941.24	0.00
Dead+Wind 330 deg - Service	21035.73	-2686.37	-4652.93	-266922.40	154107.74	0.00

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	0.00	-21035.74	0.00	0.00	21035.74	0.00	0.000%
2	0.00	-25242.88	-16620.39	0.00	25242.87	16620.39	0.001%
3	0.00	-18932.16	-16620.39	0.00	18932.16	16620.17	0.001%
4	8310.20	-25242.88	-14293.68	-83.0.17	25242.88	14293.68	0.000%
5	8310.20	-18932.16	-11293.68	-831.0.18	18932.16	14293.68	0.000%
6	11752.39	-25242.88	-11752.39	11752.35	25242.88	11752.35	0.000%
7	11752.39	-18932.16	-11752.39	-11752.37	18932.16	11752.37	0.000%
8	14293.68	-25242.88	-8310.20	-14293.68	25242.88	8310.17	0.000%

Load Combination	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
9	4994.68	-1.8932.16	-8310.20	-14393.65	1.8932.16	8310.18	0.000%
10	10620.39	-25242.88	0.00	-16930.39	25242.87	0.00	0.001%
11	10620.39	-18932.16	0.00	-16930.17	18932.16	0.00	0.001%
12	14293.68	-25242.88	8310.20	-14393.65	25242.88	-8310.17	0.000%
13	14293.68	-18932.16	8310.20	-14393.65	18932.16	-8310.18	0.000%
14	11752.39	-25242.88	11752.39	-11752.35	25242.88	-11752.35	0.000%
15	11752.39	-18932.16	11752.39	-11752.37	18932.16	-11752.37	0.000%
16	8310.20	-25242.88	14293.68	-8310.17	25242.88	-14393.64	0.000%
17	8310.20	-18932.16	14293.68	-8310.18	18932.16	-14393.65	0.000%
18	0.00	-25242.88	16620.39	0.00	25242.87	-16620.35	0.001%
19	0.00	-18932.16	16620.39	0.00	18932.16	-16620.17	0.001%
20	-8310.20	-25242.88	14293.68	-8310.17	25242.88	-14393.63	0.000%
21	-8310.20	-18932.16	14293.68	-8310.18	18932.16	-14393.65	0.000%
22	-11752.39	-25242.88	11752.39	-11752.35	25242.88	-11752.35	0.000%
23	-11752.39	-18932.16	11752.39	-11752.37	18932.16	-11752.37	0.000%
24	-14293.68	-25242.88	8310.20	-14393.64	25242.88	-8310.17	0.000%
25	-14293.68	-18932.16	8310.20	-14393.65	18932.16	-8310.18	0.000%
26	-16930.39	-25242.88	0.00	-16620.35	25242.87	0.00	0.001%
27	-16620.39	-18932.16	0.00	-16620.17	18932.16	0.00	0.001%
28	-14293.68	-25242.88	-8310.20	-14393.65	25242.88	8310.17	0.000%
29	-14293.68	-18932.16	-8310.20	-14393.65	18932.16	8310.18	0.000%
30	-11752.39	-25242.88	-11752.39	-11752.35	25242.88	11752.35	0.000%
31	-11752.39	-18932.16	-11752.39	-11752.37	18932.16	11752.37	0.000%
32	-8310.20	-25242.88	-14293.68	-8310.17	25242.88	14393.64	0.000%
33	-8310.20	-18932.16	-14293.68	-8310.18	18932.16	14393.65	0.000%
34	0.00	-26268.53	0.00	0.00	26268.53	0.00	0.000%
35	0.00	-26268.53	2322.51	0.00	26268.51	2321.95	0.001%
36	1161.25	-26268.53	201...35	-1160.94	26268.51	2010.29	0.001%
37	1642.76	26268.53	-1642.76	-1641.39	26268.51	1641.39	0.001%
38	2011.35	26268.53	-1161.25	-2010.29	26268.51	1160.64	0.001%
39	2322.51	-26268.53	0.00	2321.28	26268.51	0.00	0.001%
40	2011.35	-26268.53	1161.25	-2010.29	26268.51	-1160.64	0.001%
41	1642.76	-26268.53	1642.76	-1641.39	26268.51	-1641.39	0.001%
42	1161.25	-26268.53	201...35	-1160.64	26268.51	-2010.29	0.001%
43	0.00	-26268.53	2322.51	0.00	26268.51	2321.28	0.001%
44	-1161.25	-26268.53	201...35	1160.64	26268.51	-2010.29	0.001%
45	-1642.76	26268.53	1642.76	1641.39	26268.51	-1641.39	0.001%
46	-2011.35	-26268.53	1161.25	-2010.29	26268.51	-1160.64	0.001%
47	-2322.51	-26268.53	0.00	2321.28	26268.51	0.00	0.001%
48	-2011.35	-26268.53	-1161.25	2010.29	26268.51	1160.64	0.001%
49	-1642.76	-26268.53	-1642.76	1641.39	26268.51	1641.39	0.001%
50	-1161.25	26268.53	-201...35	1160.64	26268.51	2010.29	0.001%
51	0.00	-21035.74	-4694.94	0.00	21035.73	5372.75	0.002%
52	2685.61	-21035.74	-4694.94	-2686.37	21035.73	4692.93	0.002%
53	4799.44	-21035.74	-4799.44	4799.11	21035.73	4799.11	0.002%
54	4653.21	-21035.74	-2685.61	4652.93	21035.73	2686.37	0.002%
55	5373.21	-21035.74	0.00	5373.75	21035.73	0.00	0.002%
56	4653.34	-21035.74	2686.61	-4652.93	21035.73	-2686.37	0.002%
57	4799.44	-21035.74	4799.44	-4799.11	21035.73	-4799.11	0.002%
58	2686.61	-21035.74	4694.94	-2686.37	21035.73	-4692.93	0.002%
59	0.00	-21035.74	5373.21	0.00	21035.73	-5372.75	0.002%
60	-2686.61	-21035.74	4653.21	2686.37	21035.73	-4652.93	0.002%
61	-4799.44	21035.74	4799.44	4799.11	21035.73	-4799.11	0.002%
62	-4653.21	-21035.74	2685.61	4652.93	21035.73	-2686.37	0.002%
63	-5373.21	-21035.74	0.00	5373.75	21035.73	0.00	0.002%
64	-4653.34	-21035.74	-2586.61	4652.93	21035.73	2686.37	0.002%
65	-4799.44	21035.74	-4799.44	4799.11	21035.73	4799.11	0.002%
66	-2686.61	-21035.74	-4694.94	2686.37	21035.73	4692.93	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000.01
2	Yes	10	0.00000001	0.00003637
3	Yes	10	0.00000001	0.00003796
4	Yes	11	0.00000001	0.00006.42
5	Yes	11	0.00000001	0.00004591
6	Yes	11	0.00000001	0.00007056
7	Yes	11	0.00000001	0.00005261
8	Yes	11	0.00000001	0.00005.47
9	Yes	11	0.00000001	0.00004791
10	Yes	10	0.00000001	0.00003937
11	Yes	10	0.00000001	0.00003996
12	Yes	11	0.00000001	0.00006.42
13	Yes	11	0.00000001	0.00004591
14	Yes	11	0.00000001	0.00007056
15	Yes	11	0.00000001	0.00005764
16	Yes	11	0.00000001	0.00006147
17	Yes	11	0.00000001	0.00004591
18	Yes	10	0.00000001	0.00003e42
19	Yes	10	0.00000001	0.00003956
20	Yes	11	0.00000001	0.00006147
21	Yes	11	0.00000001	0.00005797
22	Yes	11	0.00000001	0.00007056
23	Yes	11	0.00000001	0.00005764
24	Yes	11	0.00000001	0.00006147
25	Yes	11	0.00000001	0.00004591
26	Yes	10	0.00000001	0.00003957
27	Yes	10	0.00000001	0.00003796
28	Yes	11	0.00000001	0.00006147
29	Yes	11	0.00000001	0.00005764
30	Yes	11	0.00000001	0.00007056
31	Yes	11	0.00000001	0.00005764
32	Yes	11	0.00000001	0.00006147
33	Yes	11	0.00000001	0.00004591
34	Yes	6	0.00000001	0.00000001
35	Yes	8	0.00000001	0.00012999
36	Yes	8	0.00000001	0.00012527
37	Yes	8	0.00000001	0.00012560
38	Yes	8	0.00000001	0.00012527
39	Yes	8	0.00000001	0.00012999
40	Yes	8	0.00000001	0.00012527
41	Yes	8	0.00000001	0.00012560
42	Yes	8	0.00000001	0.00012527
43	Yes	8	0.00000001	0.00012999
44	Yes	8	0.00000001	0.00012527
45	Yes	8	0.00000001	0.00012866
46	Yes	8	0.00000001	0.00012527
47	Yes	8	0.00000001	0.00012e99
48	Yes	8	0.00000001	0.00012427
49	Yes	8	0.00000001	0.00012866
50	Yes	8	0.00000001	0.00012527
51	Yes	9	0.00000001	0.00007.56
52	Yes	9	0.00000001	0.00005860
53	Yes	9	0.00000001	0.00005262
54	Yes	9	0.00000001	0.00005807
55	Yes	9	0.00000001	0.00007196
56	Yes	9	0.00000001	0.00005860
57	Yes	9	0.00000001	0.00005262

58	Yes	9	0.00000001	0.00065807
59	Yes	9	0.00000001	0.00067136
60	Yes	9	0.00000001	0.00065807
61	Yes	9	0.00000001	0.00065242
62	Yes	9	0.00000001	0.00065807
63	Yes	9	0.00000001	0.00067136
64	Yes	9	0.00000001	0.00065807
65	Yes	9	0.00000001	0.00065242
66	Yes	9	0.00000001	0.00065807

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	75 - 25	10.110	59	1.0474	0.0000
L2	25.25 - 1	1.048	59	0.9254	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
73.00	Concealment Loading @ 75 ft	59	10.110	1.0474	0.0000	21715
70.00	(4) Generic Panel (Enclosed, 115 lbs)	59	8.998	0.9966	0.0000	21715
63.00	Concealment Loading @ 65 ft	59	7.900	0.9926	0.0000	10857
60.00	(4) Generic Panel (Enclosed, 115 lbs)	59	6.859	0.9948	0.0000	7238
55.00	Concealment Loading @ 55 ft	59	5.807	0.9939	0.0000	5428
50.00	(4) Generic Panel (Enclosed, 115 lbs)	59	4.837	0.9796	0.0000	4342
45.00	Concealment Loading @ 45 ft	59	3.922	0.9422	0.0000	3615

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	75 - 25	31.137	8	3.2067	0.0000
L2	25.25 - 1	3.175	8	2.6194	0.0000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
70.00	Concealment Loading @ 70 ft	18	31.135	3.2047	0.0000	7094
70.00	[4] Generic Panel (Enclosed, 115 lbs)	18	27.687	3.0060	0.0000	7094
65.00	Concealment Loading @ 65 ft	18	25.630	2.7749	0.0000	8646
60.00	[4] Generic Panel (Enclosed, 115 lbs)	18	21.917	2.5787	0.0000	2594
55.00	Concealment Loading @ 55 ft	18	17.852	2.0251	0.0000	1772
50.00	[4] Generic Panel (Enclosed, 115 lbs)	18	14.437	1.8615	0.0000	1417
45.00	Concealment Loading @ 45 ft	18	12.005	1.5850	0.0000	1181

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	K_u	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	75 - 72.5921	TP40.77x21x0.1875	5.000	5.00	1.0	23.6655	-127.91	740930.00	0.002
	72.592 - 70.1842					22.9442	-133e.69	737277.00	0.002
	70.1842 - 65.3763					14.2241	-5349.67	772621.00	0.007
	65.3763 - 65.3684					14.0044	-5476.57	759971.00	0.007
	65.3684 - 63.0605					13.7832	-7852.69	869818.00	0.009
	63.0605 - 60.5526					14.0836	-8908.53	822665.00	0.010
	60.5526 - 58.1447					14.3427	-12098.90	849812.00	0.014
	58.1447 - 55.7368					14.6213	-12183.70	855364.00	0.014
	55.7368 - 53.3289					14.9000	-14623.00	871705.00	0.017
	53.3289 - 50.9211					15.1804	-14787.50	858053.00	0.017
	50.9211 - 48.5132					15.4598	-18638.10	868808.00	0.021
	48.5132 - 46.1053					15.7393	-19099.80	892756.00	0.021
	46.1053 - 43.6974					16.0187	-20422.60	947895.00	0.022
	43.6974 - 41.2895					16.2981	-20506.50	952693.00	0.022
	41.2895 - 38.8816					16.5776	-20708.20	969787.00	0.021
	38.8816 - 36.4737					16.8570	-20961.20	996134.00	0.021
	36.4737 - 34.0658					17.1364	-21106.10	1002180.00	0.021
	34.0658 - 31.6579					17.4159	-21126.80	1018890.00	0.021
	31.6579 - 29.2500					17.6953	-21530.10	1035170.00	0.021

Section No.	Elevation ft	Size	L ft	L_u ft	$K\ell/r$	A in²	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
	29.25								
	29.25 - 25					15.1885	-9620.96	1048090.00	0.009
L2	29.25 - 25	TP35.055x29.5463x0.33	28.33	0.00	0.0	24.9042	-12650.20	1699480.00	0.007
	25 - 23.7368					24.0996	-22446.40	1468840.00	0.015
	23.7368 - 22.4737					24.2951	-22583.80	1482260.00	0.015
	22.4737 - 21.2105					24.4935	-22725.60	1497700.00	0.015
	21.2105 - 19.9474					24.6863	-22879.60	1444470.00	0.016
	19.9474 - 18.6842					24.4814	-23023.00	1433360.00	0.016
	18.6842 - 17.4211					25.0759	-23171.60	1597000.00	0.015
	17.4211 - 16.1579					25.3725	-23323.80	1478480.00	0.016
	16.1579 - 14.8947					25.4678	-23477.70	1483470.00	0.016
	14.8947 - 13.6316					25.0633	-23631.10	1501300.00	0.016
	13.6316 - 12.3684					25.4587	-23785.70	1513780.00	0.016
	12.3684 - 11.1053					25.0512	-23941.50	1521700.00	0.016
	11.1053 - 9.84211					25.2195	-24096.60	1535600.00	0.016
	9.84211 - 8.57895					25.4151	-24256.50	1547010.00	0.016
	8.57895 - 7.31579					25.6405	-24416.30	1558470.00	0.016
	7.31579 - 6.05263					25.9360	-24576.50	1569480.00	0.016
	6.05263 - 4.78947					27.0814	-24738.70	1681340.00	0.015
	4.78947 - 3.52632					27.3269	-24901.70	1692790.00	0.015
	3.52632 - 2.26316					27.4223	-25065.40	1694210.00	0.015
	2.26316 - 1					27.6178	-25231.10	1715640.00	0.015

Pole Bending Design Data

Section No.	Elevation ft	Size	M_x ft-lb	ϕM_{nx} ft-lb	Ratio $\frac{M_x}{\phi M_{nx}}$	M_y ft-lb	ϕM_{ny} ft-lb	Ratio $\frac{M_y}{\phi M_{ny}}$
L1	92 - 92.592	TP33.78x21x0.1875	6755.73	392586.67	0.017	0.00	392586.67	0.000
	92.592 - 90.1842		13752.08	407259.17	0.034	0.00	407259.17	0.000
	90.1842 - 87.7763		21475.33	422301.67	0.051	0.00	422301.67	0.000
	87.7763 - 85.3684		29477.67	437175.00	0.067	0.00	437175.00	0.000
	85.3684 - 82.9605		46388.43	452781.67	0.103	0.00	452781.67	0.000
	82.9605 - 80.5526		35549.25	468214.17	0.140	0.00	468214.17	0.000

Section No.	Elevation ft	Size	M_u lb-ft	ϕM_n lb-ft	Ratio $\frac{M_u}{\phi M_n}$	V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$
	60.3325 - 58.1467		80133.00	485765.00	0.165	0.00	485765.00	0.000
	58.1467 - 55.7368		109051.67	499426.67	0.218	0.00	499426.67	0.000
	55.7368 - 53.3289		132146.67	515551.67	0.257	0.00	515551.67	0.000
	53.3289 - 50.9211		162330.83	551051.67	0.295	0.00	551051.67	0.000
	50.9211 - 48.5132		193385.83	564068.00	0.343	0.00	564068.00	0.000
	48.5132 - 46.1053		224613.33	563028.33	0.399	0.00	563028.33	0.000
	46.1053 - 43.6974		259436.67	579129.17	0.448	0.00	579129.17	0.000
	43.6974 - 41.2895		297067.50	595295.00	0.499	0.00	595295.00	0.000
	41.2895 - 38.8816		335003.00	615318.33	0.544	0.00	615318.33	0.000
	38.8816 - 36.4737		377036.67	627791.67	0.601	0.00	627791.67	0.000
	36.4737 - 34.0658		411260.00	644107.50	0.638	0.00	644107.50	0.000
	34.0658 - 31.6579		449014.17	660457.50	0.680	0.00	660457.50	0.000
	31.6579 - 29.25		486081.17	676834.17	0.718	0.00	676834.17	0.000
	29.25 - 25		514523.33	703782.50	0.731	0.00	703782.50	0.000
12	29.25 - 25	TP33.055x29.516x0.23	511955.83	1089525.00	0.470	0.00	1089525.00	0.000
	25 - 24.7386		575529.17	1042211.67	0.552	0.00	1044741.67	0.000
	24.7386 - 22.4767		597410.00	1058033.00	0.565	0.00	1058033.00	0.000
	22.4767 - 22.1737		617021.67	1077308.33	0.573	0.00	1077308.33	0.000
	22.1737 - 21.2105		638161.17	1080666.67	0.591	0.00	1080666.67	0.000
	21.2105 - 19.6474		659706.67	1110066.67	0.594	0.00	1110066.67	0.000
	19.6474 - 18.6842		679610.00	1113308.33	0.610	0.00	1113308.33	0.000
	18.6842 - 17.4211		700252.50	1130033.00	0.620	0.00	1130033.00	0.000
	17.4211 - 15.1579		720215.00	1144525.00	0.630	0.00	1144525.00	0.000
	15.1579 - 14.8947		741023.50	1150091.67	0.645	0.00	1150091.67	0.000
	14.8947 - 12.6316		762348.17	1172708.33	0.650	0.00	1172708.33	0.000
	12.6316 - 12.3684		783100.00	1188350.00	0.659	0.00	1188350.00	0.000
	12.3684 - 11.1053		803880.00	1203041.67	0.668	0.00	1203041.67	0.000
	11.1053 - 9.84211		824639.17	1217758.33	0.677	0.00	1217758.33	0.000
	9.84211 - 8.57895		845523.00	1232316.67	0.686	0.00	1232316.67	0.000
	8.57895 - 7.31579		866532.67	1247708.33	0.695	0.00	1247708.33	0.000
	7.31579 - 6.05263		887291.67	1262133.33	0.703	0.00	1262133.33	0.000
	6.05263 - 4.78947		908209.33	1275961.67	0.711	0.00	1275961.67	0.000

Section No.	Elevation ft	Size	M_x lb-ft	ϕM_{nx} lb-ft	Ratio M_x / ϕM_{nx}	M_y lb-ft	ϕM_{ny} lb-ft	Ratio M_y / ϕM_{ny}
	3.52032							
	3.52032		925165.67	1291875.00	0.719	0.00	1291875.00	0.000
	2.263.6							
	2.263.6 -		950[illegible]1.67	1306791.67	0.727	0.00	1306791.67	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_x lb	ϕV_{nx} lb	Ratio V_x / ϕV_{nx}	Actual V_y lb	ϕV_{ny} lb	Ratio V_y / ϕV_{ny}
L1	72.5921	[illegible]	2856.91	222209.00	0.013	0.00	214238.34	0.000
	72.5921		2956.70	227183.00	0.013	0.00	232760.00	0.000
	70.1642							
	70.1642 - 67.7363		3274.97	253087.00	0.013	0.00	457645.00	0.000
	67.7363 - 65.3084		3296.62	260691.00	0.013	0.00	469633.34	0.000
	65.3084 - 62.8805		7834.65	241895.00	0.032	0.00	436935.00	0.000
	62.8805		7926.58	244059.00	0.032	0.00	510023.00	0.000
	60.5526							
	60.5526 - 58.1447		8234.22	253904.00	0.033	0.00	547218.34	0.000
	58.1447 - 55.7368		8330.72	256608.00	0.032	0.00	552120.00	0.000
	55.7368 - 53.3289		12579.50	257312.00	0.048	0.00	573475.00	0.000
	53.3289 - 50.9211		12670.30	266416.00	0.048	0.00	595133.33	0.000
	50.9211 - 48.5132		12946.70	277320.00	0.048	0.00	617245.00	0.000
	48.5132 - 46.1053		13025.50	270224.00	0.047	0.00	599260.00	0.000
	46.1053 - 43.6974		15561.00	28.128.00	0.056	0.00	5026[illegible]8.33	0.000
	43.6974 - 41.2895		15731.50	286032.00	0.055	0.00	586003.00	0.000
	41.2895 - 38.8816		15768.80	249936.00	0.064	0.00	507025.00	0.000
	38.8816 - 36.4737		15563.00	2258[illegible]0.00	0.07[illegible]	0.00	723853.33	0.000
	36.4737 - 34.0658		15924.50	300744.00	0.053	0.00	755385.00	0.000
	34.0658 - 31.6579		15983.00	3056[illegible]8.00	0.052	0.00	783819.[illegible]	0.000
	31.6579 - 29.25		16049.80	310352.00	0.052	0.00	8046[illegible]7.50	0.000
	29.25 - 25		2176.33	316208.00	0.022	0.00	554866.67	0.000
L2	29.25 - 25	TP35.033x20.3463x0.25	9028.32	415518.00	0.022	0.00	1106[illegible]75.00	0.000
	25 - 22.7368		16316.90	423949.00	0.038	0.00	1134961.67	0.000
	22.7368 - 20.4737		16241.50	426879.00	0.038	0.00	1144266.67	0.000
	20.4737 - 18.2105		15266.20	425809.00	0.036	0.00	1161561.33	0.000
	18.2105 - 15.9474		15[illegible]0.50	431239.00	0.035	0.00	1180350.00	0.000

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
	19.9474 - 14.6843		6314.60	436656.00	0.037	0.00	1991?.67	0.000
	18.0842 - 13.72..		.6318.60	440160.00	0.037	0.00	.218303.33	0.000
	17.12.1 - 16.1579		6362.30	443530.00	0.037	0.00	1737301.67	0.000
	16.1579 - 14.8947		6386.00	446960.00	0.037	0.00	1256940.00	0.000
	14.8947 - 13.6316		6409.40	450330.00	0.035	0.00	1275638.33	0.000
	13.6316 - 12.3684		6432.80	453820.00	0.036	0.00	1295138.33	0.000
	12.3684 - 11.1053		6456.00	457230.00	0.036	0.00	1314836.67	0.000
	11.1053 - 9.84211		6479.10	460641.00	0.036	0.00	1334536.67	0.000
	9.84211 - 8.57896		6502.10	464...1.00	0.036	0.00	1354736.67	0.000
	8.57896 - 7.31579		6525.00	467541.00	0.035	0.00	1374438.33	0.000
	7.31579 - 6.05263		6547.80	470971.00	0.035	0.00	1394638.33	0.000
	6.05263 - 4.78947		6570.50	474461.00	0.035	0.00	1415338.33	0.000
	4.78947 - 3.52632		6593.10	477931.00	0.035	0.00	1436041.67	0.000
	3.52632 - 2.26316		6615.70	481362.00	0.035	0.00	1456735.00	0.000
	2.26316 - 1		6638.20	484862.00	0.034	0.00	1477366.67	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Status
L1	95 - 92.592	0.002	0.017	0.000	0.013	0.000	0.019	1.000	✔
	92.592 - 90.1812	0.002	0.034	0.000	0.013	0.000	0.036	1.000	✔
	90.1812 - 87.7703	0.007	0.051	0.000	0.014	0.000	0.058	1.000	✔
	87.7703 - 85.3594	0.007	0.067	0.000	0.014	0.000	0.075	1.000	✔
	85.3594 - 82.9485	0.010	0.105	0.000	0.032	0.000	0.111	1.000	✔
	82.9485 - 80.5376	0.010	0.140	0.000	0.032	0.000	0.151	1.000	✔
	80.5376 - 78.1447	0.015	0.176	0.000	0.033	0.000	0.191	1.000	✔
	78.1447 - 75.7368	0.015	0.210	0.000	0.032	0.000	0.226	1.000	✔
	75.7368	0.017	0.257	0.000	0.048	0.000	0.276	1.000	✔

Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	52.3289						✔		
	54.9289 - 50.9211	0.017	0.350	0.000	0.048	0.000	0.325	1.000	✔
	50.9211 - 48.5133	0.021	0.354	0.000	0.048	0.000	0.327	1.000	✔
	48.5133 - 46.1053	0.021	0.399	0.000	0.047	0.000	0.422	1.000	✔
	46.1053 - 43.6974	0.022	0.445	0.000	0.050	0.000	0.475	1.000	✔
	43.6974 - 41.2895	0.022	0.499	0.000	0.055	0.000	0.524	1.000	✔
	41.2895 - 38.8816	0.021	0.546	0.000	0.054	0.000	0.572	1.000	✔
	38.8816 - 36.4737	0.021	0.594	0.000	0.054	0.000	0.618	1.000	✔
	36.4737 - 34.0658	0.021	0.638	0.000	0.053	0.000	0.662	1.000	✔
	34.0658 - 31.6579	0.021	0.681	0.000	0.052	0.000	0.704	1.000	✔
	31.6579 - 29.25	0.021	0.721	0.000	0.052	0.000	0.745	1.000	✔
	29.25 - 29.25	0.000	0.346	0.000	0.000	0.000	0.356	1.000	✔
2.2	29.25 - 25	0.039	0.330	0.000	0.022	0.000	0.314	1.000	✔
	25 - 24.7364	0.016	0.554	0.000	0.038	0.000	0.570	1.000	✔
	24.7364 - 22.4725	0.016	0.565	0.000	0.038	0.000	0.583	1.000	✔
	22.4725 - 20.2085	0.016	0.576	0.000	0.038	0.000	0.594	1.000	✔
	20.2085 - 17.9446	0.016	0.588	0.000	0.038	0.000	0.606	1.000	✔
	17.9446 - 15.6842	0.016	0.599	0.000	0.037	0.000	0.616	1.000	✔
	15.6842 - 13.4211	0.016	0.609	0.000	0.037	0.000	0.626	1.000	✔
	13.4211 - 11.1579	0.016	0.620	0.000	0.037	0.000	0.637	1.000	✔
	11.1579 - 8.8947	0.016	0.630	0.000	0.037	0.000	0.647	1.000	✔
	8.8947 - 6.6316	0.016	0.640	0.000	0.036	0.000	0.657	1.000	✔
	6.6316 - 4.3684	0.016	0.650	0.000	0.036	0.000	0.667	1.000	✔
	4.3684 - 2.1053	0.016	0.659	0.000	0.036	0.000	0.676	1.000	✔
	2.1053 - -0.1579	0.016	0.668	0.000	0.036	0.000	0.685	1.000	✔
	-0.1579 - -2.4211	0.016	0.677	0.000	0.036	0.000	0.694	1.000	✔
	-2.4211 - -4.6842	0.016	0.686	0.000	0.035	0.000	0.703	1.000	✔

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uz}}{\phi M_{nz}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	7.51579						✔		
	7.51579 - 6.05263	0.016	0.595	0.000	0.035	0.000	0.611 ✔	1.000	✔
	6.05263 - 4.78947	0.016	0.708	0.000	0.035	0.000	0.730 ✔	1.000	✔
	4.78947 - 3.52632	0.016	0.717	0.000	0.035	0.000	0.738 ✔	1.000	✔
	3.52632 - 2.26316	0.016	0.719	0.000	0.035	0.000	0.736 ✔	1.000	✔
	2.26316 - 1	0.016	0.727	0.000	0.034	0.000	0.744 ✔	1.000	✔

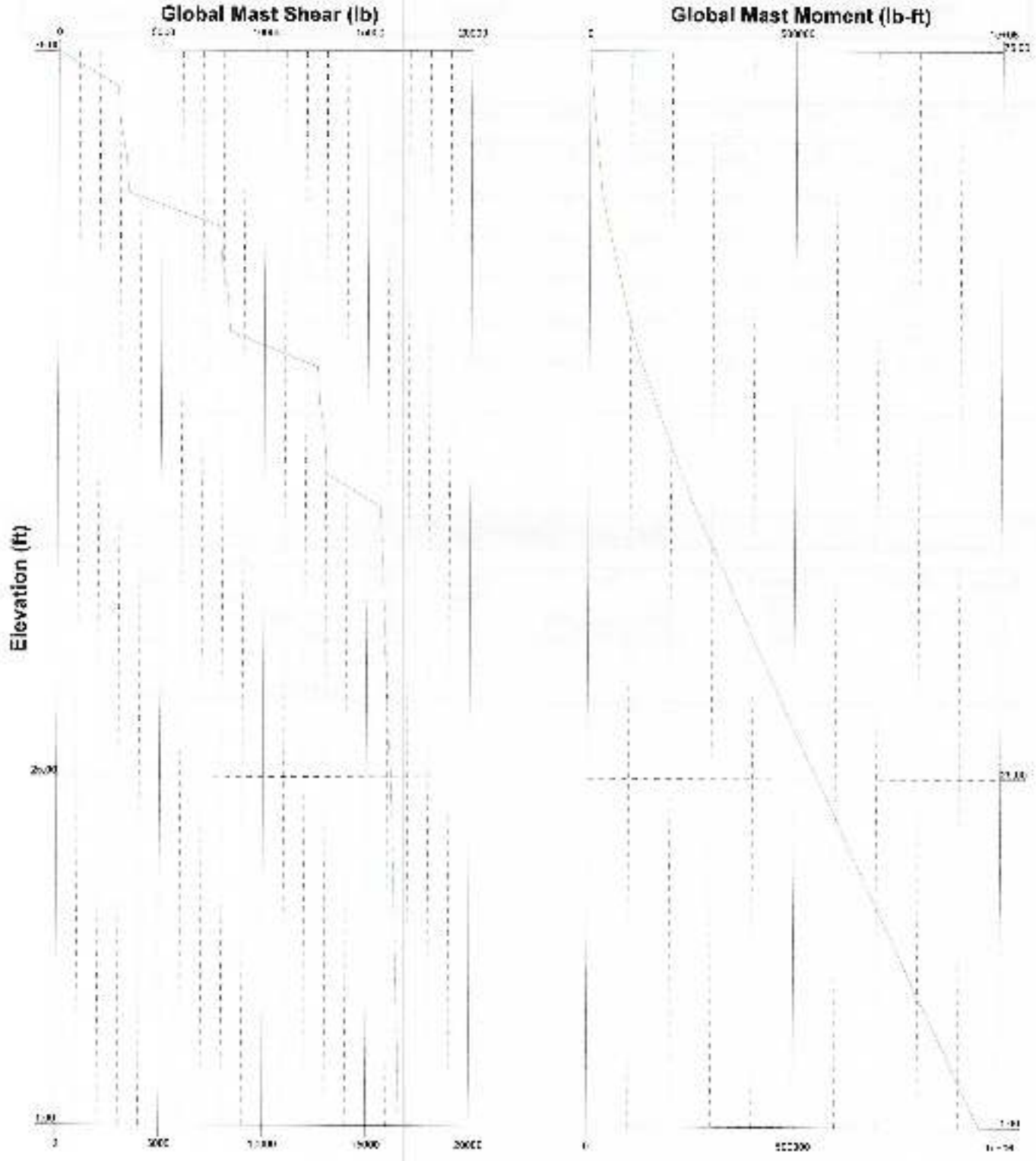
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass / Fail
L1	75 - 25	Pole	TP30.73x23.4x0.1875	1	-23340.40	169179.00	74.3	Pass
L2	25 - 1	Pole	TP35.053x29.5463x0.25	3	-23931.10	161364.00	74.4	Pass
						Summary		
						Pole (L1)	74.3	Pass
						RATING =	74.5	Pass

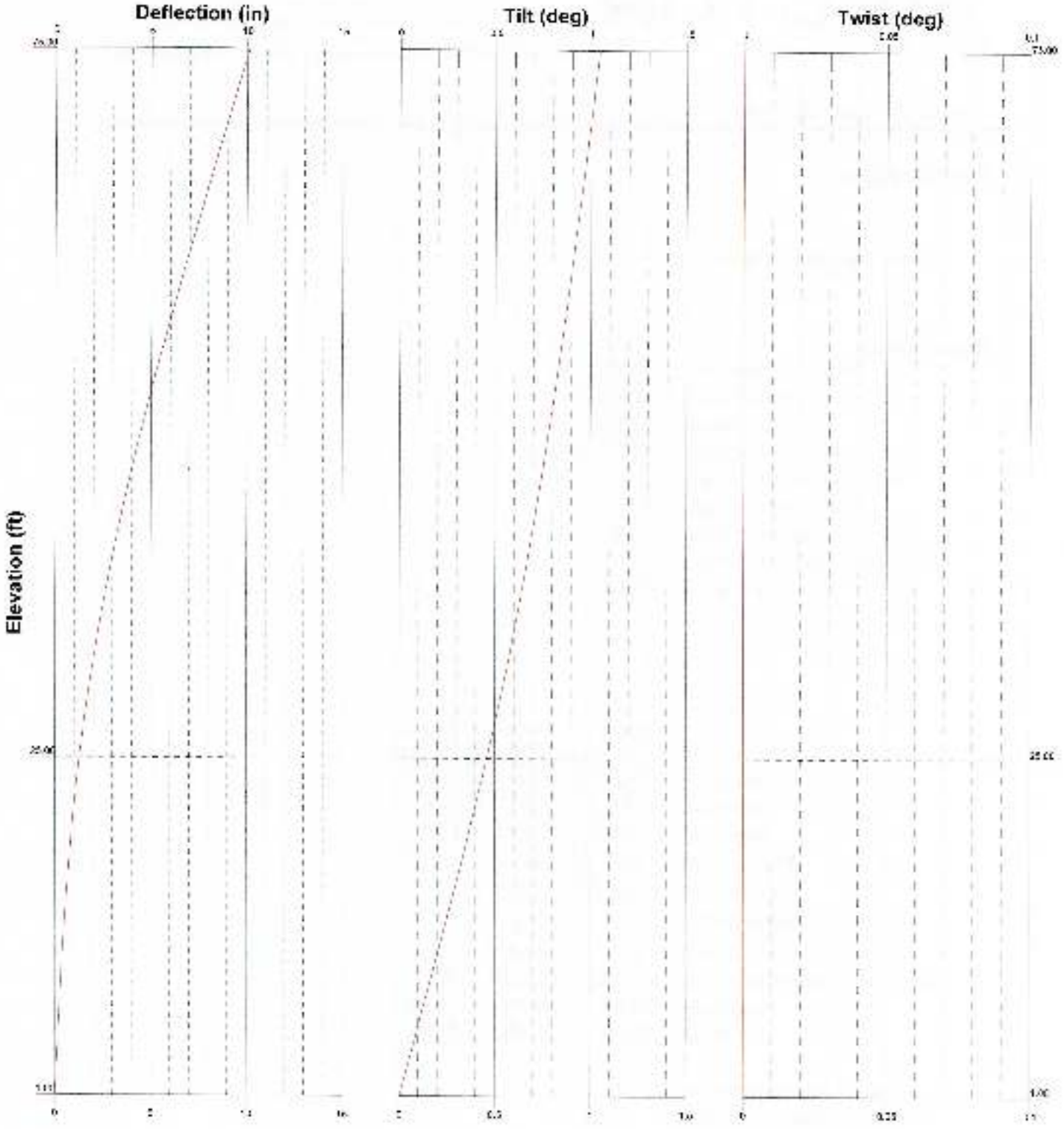
TIA-222-H - 104 mph/30 mph 0.2500 in Ice Exposure C

Maximum Values

Vx Vz Mx Mz



Vector Structural Engineering 651 W Calera Park Blvd Draper, UT 84020 Phone: (801) 990-1775 FAX: (801) 990-1776	Spike Job: 00142.2054.242 Dsgn: Tsaysap Drawn: mmc Appr: Code: TIA-222-H Date: 10/24/24 Scale: NTS Path: Dwg No. E-4



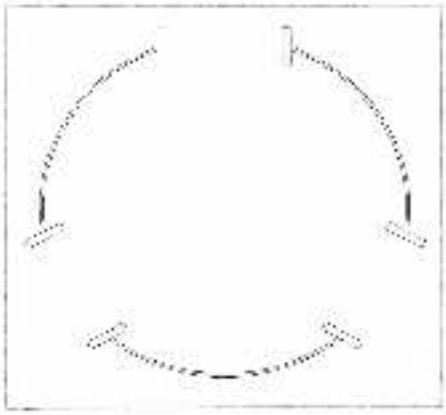
Vector Structural Engineering
651 W Gelene Park Blvd
Draper, UT 84020
Phone: (801) 949-1775
FAX: (801) 990-1775

Spike		
Job # 00142.2054.242		
Dsgnr: Taylor	Drawn by: mario	Appr:
Dwg: TIA-222-H	Date: 10/21/24	Scale: N.T.S.
Path:		Dwg No. E-5

JOB NO.: U0142.2054.242

PROJECT: NM01-1/8 SPIKE

Port Design:



Label: Ports at 70 ft A.G.L.

Geometry Input

Elevation of Port, AGL	70.00	ft
Pole Diameter	21.975	in
Pole Thickness	0.1875	in
Pole Yield Strength	65	ksi
Pole Unit Tensile Strength	11.0	k/in
Weld Filler Strength:	70	ksi
Required Fillet Weld:	3/8	in
Reinforcing Rim Yield Strength	50	ksi
# of Ports	3	

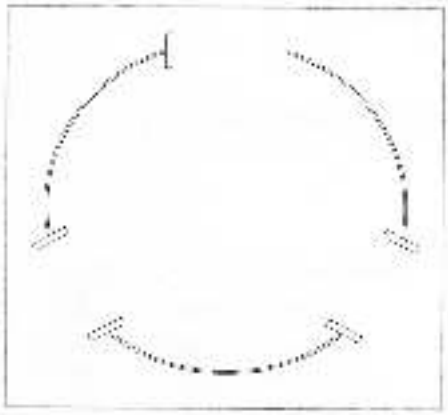
	Port 1	Port 2	Port 3
Azimuth (°)	0	120	240
Height (in)	12	12	12
Width (in)	8	8	8
Depth (in)	2.5	2.5	2.5
thickness (in)	0.5	0.5	0.5
Projection (in)	0.5	0.5	0.5
Reinforcing Area (in^2)	2.5	2.5	2.5
Pole Area Removed (in^2)	1.54	1.54	1.54
Dist. From Center to Reinf. (in)	10.2375	10.2375	10.2375
Area Check	**79.9%**	**79.9%**	**79.9%**
MOI Check	**85.0%**	**85.0%**	**85.0%**
Individual Port Weights (lbs)	14	14	14
Reduction in Pole Weight (lbs)	16		
Total Port Weight (lbs)	27		

VECTOR ENGINEERS

JOB NO.: UC142.2054.242

PROJECT: NMOL 148 SPIKE

Port Design:



Label: Ports at 60 ft A.G.L.

Geometry Input

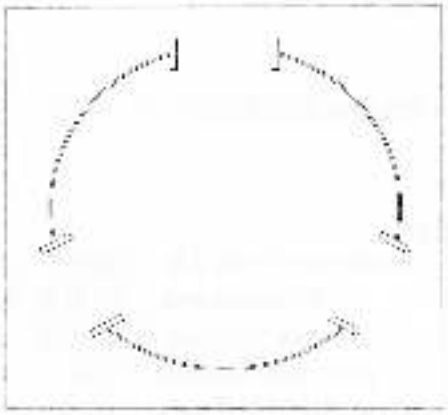
Elevation of Port, AGL	60.00	ft
Pole Diameter	23.925	in
Pole Thickness	0.1875	in
Pole Yield Strength	65	ksi
Pole Unit Tensile Strength	11.0	k/in
Weld Filler Strength:	70	ksi
Required Fillet Weld:	3/8	in
Reinforcing Rim Yield Strength	50	ksi
# of Ports	3	

	Port 1	Port 2	Port 3
Azimuth (°)	0	120	240
Height (in)	12	12	12
Width (in)	8	8	8
Depth (in)	2.5	2.5	2.5
Thickness (in)	0.5	0.5	0.5
Projection (in)	0.5	0.5	0.5
Reinforcing Area (in^2)	2.5	2.5	2.5
Pole Area Removed (in^2)	1.53	1.53	1.53
Dist. From Center to Reinf. (in)	11.2125	11.2125	11.2125
Area Check	**79.6%**	**79.6%**	**79.6%**
MOI Check	**84.2%**	**84.2%**	**84.2%**
Incividual Port Weights (lbs)	14	14	14
Reduction in Pole Weight (lbs)	16		
Total Port Weight (lbs)	27		

JOB NO.: U0142.2054.242

PROJECT: NM01-148 SPIKE

Port Design:



Label: Ports at 50 ft A.G.L.

Geometry Input

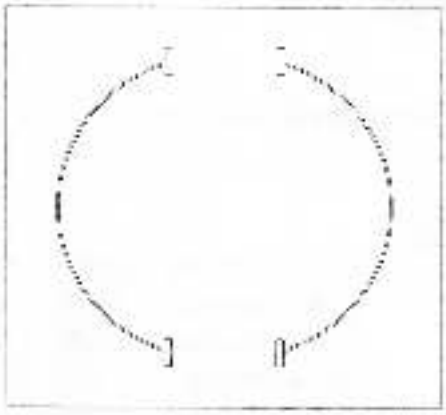
Elevation of Port, AGL	50.00	ft
Pole Diameter	25.875	in
Pole Thickness	0.1875	in
Pole Yield Strength	65	ksi
Pole Unit Tensile Strength	11.0	k/in
Weld Filler Strength:	70	ksi
Required Fillet Weld:	3/8	in
Reinforcing Rim Yield Strength	50	ksi
# of Ports	3	

	Port 1	Port 2	Port 3
Azimuth (°)	0	120	240
Height (in)	12	12	12
Width (in)	8	8	8
Depth (in)	2.5	2.5	2.5
Thickness (in)	0.5	0.5	0.5
Projection (in)	0.5	0.5	0.5
Reinforcing Area (in^2)	2.5	2.5	2.5
Pole Area Removed (in^2)	1.53	1.53	1.53
Dist. From Center to Reinf. (in)	12.1875	12.1875	12.1875
Area Check	**79.3%**	**79.3%**	**79.3%**
MOI Check	**83.6%**	**83.6%**	**83.6%**
Individual Port Weights (lbs)	14	14	14
Reduction in Pole Weight (lbs)	16		
Total Port Weight (lbs)	27		

JOB NO.: U0142.2054.242

PROJECT: NM01-148 SPIKE

Port Design:



Label: Ports at 7 ft A.G.L.

Geometry Input

Elevation of Port, AGL	7.00	ft
Pole Diameter	33.885	in
Pole Thickness	0.25	in
Pole Yield Strength	65	ksi
Pole Unit Tensile Strength	14.6	k/in
Weld Filler Strength:	70	ksi
Required Fillet Weld:	1/2	in
Reinforcing Rim Yield Strength	50	ksi
# of Ports	2	

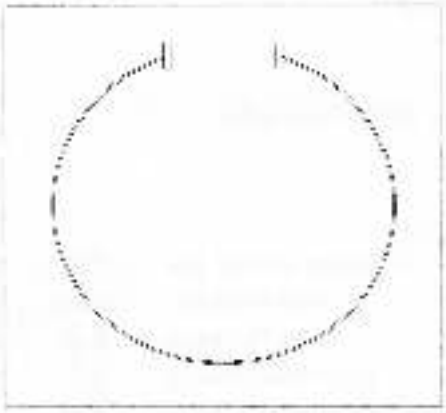
	Port 1	Port 2
Azimuth (°)	0	180
Height (in)	24	24
Width (in)	12	12
Depth (in)	3	3
Thickness (in)	0.75	0.75
Projection (in)	0.5	0.5
Reinforcing Area (in^2)	4.5	4.5
Pole Area Removed (in^2)	3.07	3.07
Dist. From Center to Reinf. (in)	15.9425	15.9425
Area Check	**88.6%**	**88.6%**
MOI Check	**93.5%**	**93.5%**

Individual Port Weights (lbs)	46	46
Reduction in Pole Weight (lbs)	42	
Total Port Weight (lbs)	50	

JOB NO.: U0142.2054.242

PROJECT: NM01-148 SPIKE

Port Design:



Label: Ports at 3 ft A.G.L.

Geometry Input

Elevation of Port, AGL	3.00	ft
Pole Diameter	34.665	in
Pole Thickness	0.25	in
Pole Yield Strength	65	ksi
Pole Unit Tensile Strength	14.6	k/in
Weld Filler Strength:	70	ksi
Required Fillet Weld:	1/2	in
Reinforcing Rim Yield Strength	50	ksi
# of Ports	1	

	Port 1
Azimuth (°)	0
Height (in)	24
Width (in)	12
Depth (in)	3
Thickness (in)	0.75
Projection (in)	0.5
Reinforcing Area (in^2)	4.5
Pole Area Removed (in^2)	3.06
Dist. From Center to Reinf. (in)	16.3325
Area Check	88.5%
MOI Check	93.3%

Incividual Port Weights (lbs)	46
Reduction in Pole Weight (lbs)	23
Total Port Weight (lbs)	23

VECTOR ENGINEERS

JOB NO.: 103142.2054.242

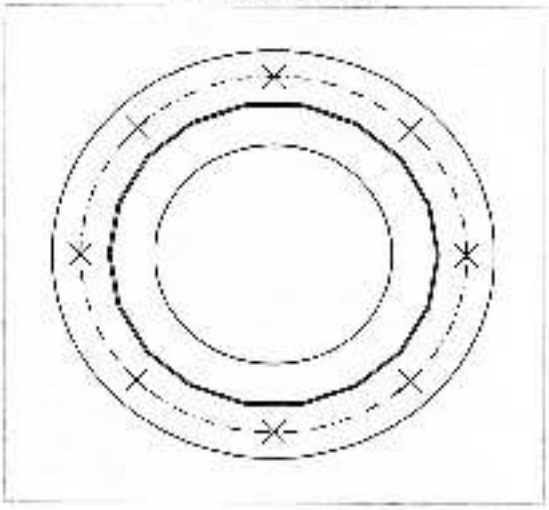
PROJECT: \\401-148 SPIKE

Monopole Baseplate & Anchorage Design per TIA-222-H Annex Q & TIA-222-H Section 4.9.9

Basic Input & Geometry

Quantity	Symbol	Value	Units
Number of sides		18	
Flat O.D	D_F	15.06	in
Pole wall thickness	t_P	0.25	in
Pole yield strength	F_y	65	ksi
Bend Radius		1	in
Base plate fillet weld size		0.25	in
Anchor diameter	d	2.25	in
Number of anchors	n	8	
Anchor grade		A615-75	
Base plate thickness	t_{bp}	2.25	in
Base plate yield strength	F_y	50	ksi
Anchor hole diameter		2.625	in
Slotted to outside edge?		No	
Flat washer diameter		6	
Bolt circle diameter		2.625	
Pole chain radius		30.5	in
Bolt circle diameter	D_{BC}	41.5	in
Plate O.D	D_{PC}	47.5	in
Plate I.D.		25.5	in

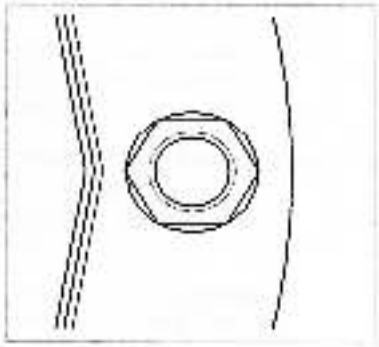
Base Plate Illustration



LRFD Loads

	Symbol	Wind		Seismic	
Axial down	R_{up}	26.27	k	0.00	k
Axial up	R_{up}	0	k	0.00	k
Shear	V_u	16.52	k	0.00	k
Moment	M_u	950.14	k-ft	0.00	k-ft
Member mom. capacity	ϕM_n	1322	k-ft		

Fit Check



Checks

Plate stress ratio	46.8%	OK	
Anchor rod stress	55.0%	OK	
Min. number of sides	18	OK	6 minimum
Min. number of anchors	8	OK	8 minimum
Max anchor rod to pole distance	3.1"	OK	13.5" maximum
Min. anchor diameter	2.25"	OK	0.75" minimum
Max anchor rod spacing	16.3"	NG	13.5" maximum
Min. anchor rod spacing	15.88"	OK	0.75" minimum
Min. base plate thickness	2.25"	OK	2" minimum
Min. inside diameter	25.5"	OK	19.52" minimum
Max inside diameter	25.5"	OK	31.123" maximum

Check:	Dist.	Result
Washer vs weld	0.5339	OK
Washer vs OD	0.8125	OK
Washer covers hole	0.5	OK

Note: when number of anchors is less than minimum and when maximum anchor rod spacing is exceeded, adjustments are made to the effective plate width calculations as the requirements of TIA-222-H Annex Q were met

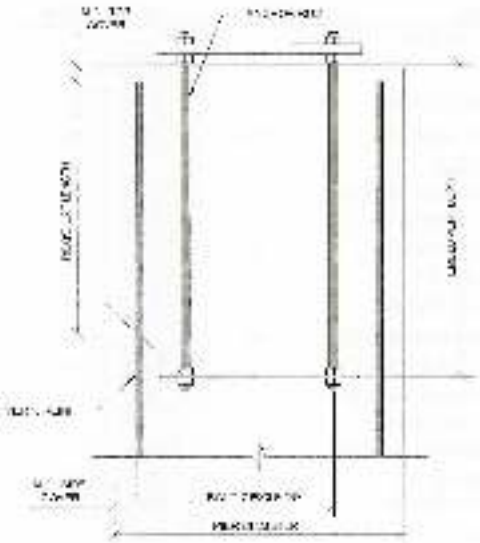
JOB NO.: U0142.2054.242

PROJECT: NM01-146 SPIKE

Anchorage Embedment Design

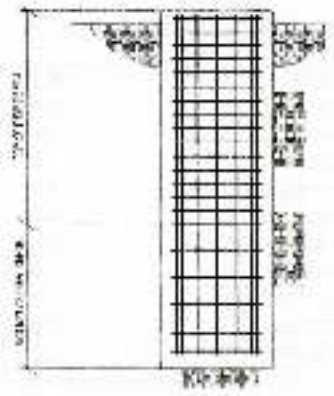
(per ACI 318-19)

Vertical Bar Size:	#8		
# of Vertical Bars:	22		
Concrete Compressive Strength [psi]:	4000		
Pier Diameter [ft]:	5.5		
Pier Depth [ft]:	20		
Top of Pier Elevation [in]:	6		
Concrete Volume [yd³]:	18.0		
Side Concrete Cover [in]:	4		
Top Concrete Cover [in]:	2		
Horizontal Tie Size:	#4		
Bolt Circle Diameter [in]:	41.5		
# of Anchor Rods:	8		
Anchor Rod Diameter [in]:	2.25		
ψ_t (bar location factor):	1.0	Table 25.4.2.4	
ψ_e (epoxy coating factor):	1.0	Table 25.4.2.4	
ψ_s (bar size factor):	1.0	Table 25.4.2.4	
λ (concrete type factor):	1.0	Table 25.4.2.4	
Vertical Bar Diameter [in]:	1.0		
Horizontal Tie Diameter [in]:	0.500		
Buffer [in]:	4.25		
Req'd Lap Length [in]:	37.0	in (Section 25.4.2.3)	
Min. Req'd Embedment Depth [in]:	**48.2**		



Transverse Reinforcement Design

Seismic Design Category:	C
Apply Seismic Detailing?	No
Site Class:	C
Type of Transverse Reinforcement:	Spiral
Transverse f_y [ksi]:	60
Seismic Hooks Required?	No
Tie Size OK?	Yes
Spacing at Top of Pier [in]:	12
Spacing at Bottom of Pier [in]:	12
Total Pier Length [ft]:	20.5
Top Pier Length [ft]:	20.5
Bottom Pier Length [ft]:	0



JOB NO.: U0142.2054.242

Project: NM01-148 SPIKE

Drilled Pier Design:

Applied Loads:

Max. shear, V:	22.2	k	Design methodology:	LRFD
Max. moment, M:	1,266.9	k-ft	Maximum foundation rating:	100%
Max. down, P_{down}:	35.0	k		
Max. uplift, P_{uplift}:	0.0	k		

Pier Properties:

Pier shape:	Round		Volume of concrete:	467	ft³
Pier diameter, b:	5.5	ft	Volume of concrete:	17.3	yd³
Min. pier diameter, b_{min} (opt'l):	3.0	ft	Weight of concrete:	73.1	k
ε:	5.5				
Top of pier elevation:	0.5	ft			
Pier depth, d:	20	ft			
Min. pier depth, d_{min} (opt'l):	0.0	ft			

Soil Properties & Analysis:

Allow. bearing pressure:	65,620	psf	F.S.: 1
Gross or net?	Net		
1/3 increase for short term loads?	No		
Skin friction (down):	0	psf	F.S.: 1
Skin friction (uplift):	0	psf	F.S.: 1
Top length to ignore:	2.75	ft	
1/3 increase for short term loads?	No		
Combine skin friction w/ end bearing?	No		
Bearing capacity:	1,058.0	k	
Uplift capacity:	65.8	k	

Results:

Bearing capacity OK.
Uplift capacity OK.

Lateral analysis in LPile

JOB NO.: L0142.2024.242

PROJECT: NMC -145 Spike

Drilled Pier Reinforcement:

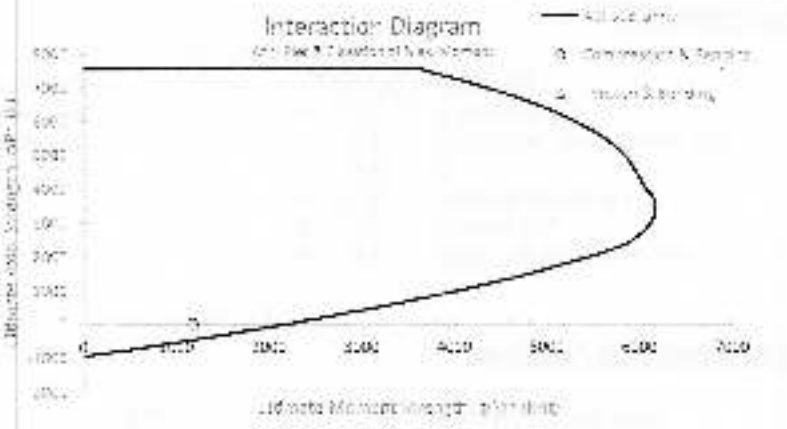
Design Requirements:

Max. Moment, M (k-ft)	940.1	Max. Down, P_{down} (k)	23.3			Required Foundation UC Limit	100%
Max. Shear, V (k)	16.6	Max. Uplift, P_{up} (k)	0.0			Mu, M at "H" Pinned E (k-ft)	1183.1
Height of V (ft)	13.333	Eccentricity for F (in)	0			(Uplift is negative for comparison w	
		Concrete Self-weight (k)	47.7	(0.145 kcf)		Interaction Diagram)	

Pier Properties:

Code Reference	ACI 318-19
Pier Diameter (ft)	3.5
Top of Pier Elevation (ft)	6
Pier Depth (ft)	20
Vertical Bar Size	#8
Bar Diameter (in)	1
Bar Area (in^2)	0.79
Seismic Design Category	C
# of Vertical Bars	22
Vert. Yield strength (psi)	60000
Horizontal Reinf. Type	Spiral
Horizontal Reinf. Size	#4
Horizontal Reinf. Diameter (in)	0.5
Side Concrete Cover (in)	4
Vert. Edge Distance (in)	4.5
Conc. Comp. Strength, f'c (psi)	4000
Angle between Bars, θ (radians)	0.283
Area of Steel (in^2)	17.4
Gross Column Area (in^2)	3421.2
Min. Reinforcement Ratio	0.50%
β_1	0.85
Concrete Yield Strain, ε_y (min)	0.003
P_o (k)	12818
α	0.75
Tr. Factor:	0.80
ϕP, (pure compression), (k)	7589
Es (ksi)	29000
Steel Yield Strain, ε_s (min)	0.002069
Number of verticals in bar cage	7

(IBC Section 1810.3.9.4.1 and 1810.3.9.4.2)
Table 22.2.2.4.3
Section 22.2.2.1
Eqn. 22.4.2.2
Table 21.2.2
Table 22.4.2.1
Section 21.2.2.1



Axial & Bending Checks:

Steel/Concrete Ratio: 0.51% > Min. Reinf. Ratio

Compression & Bending

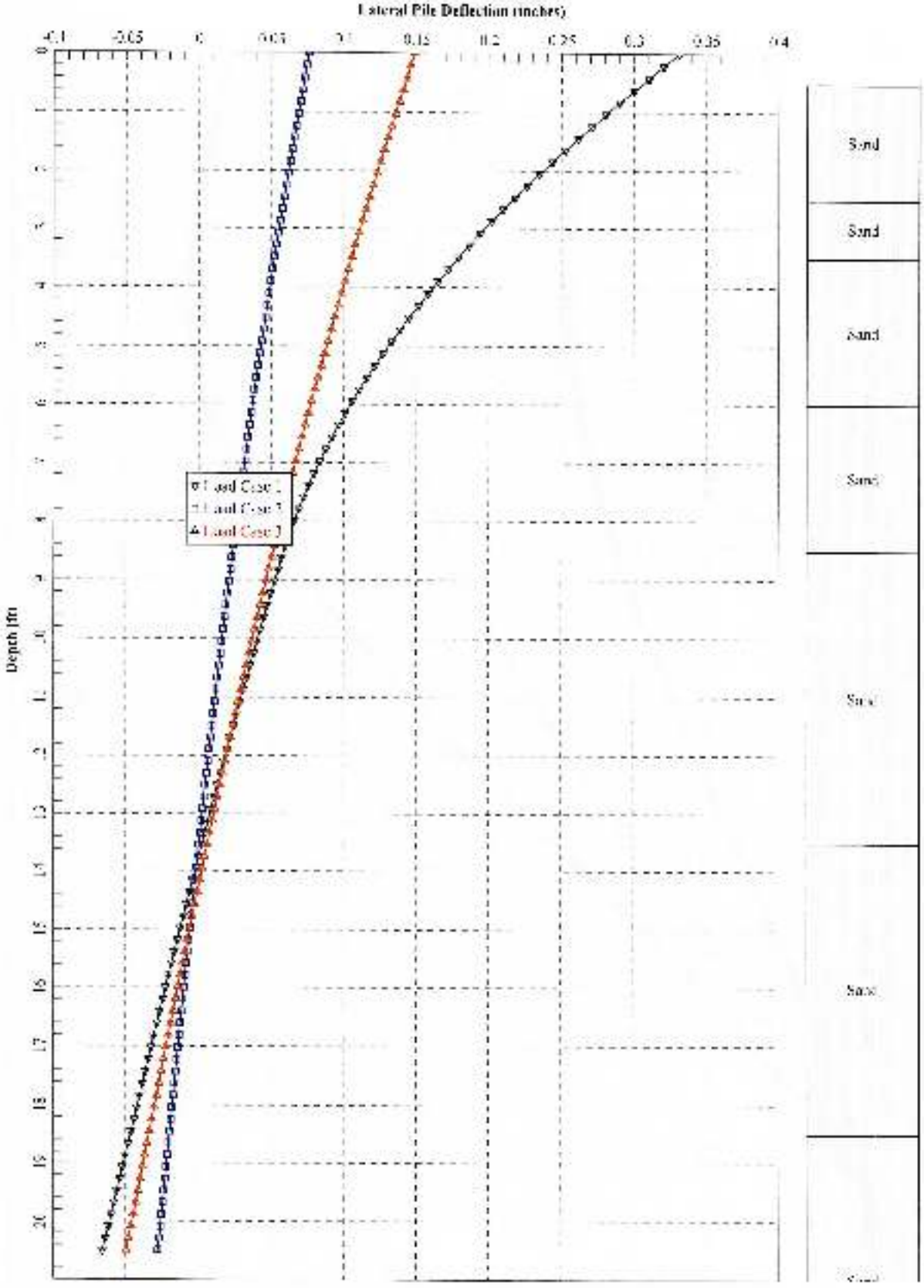
	@ V Pier	@ Max. V	
ϕPn (k):	13.7	52.5	
ϕMn (k-ft):	2222.8	2310.2	
UC:	53.1%	51.1%	OK, Adequate

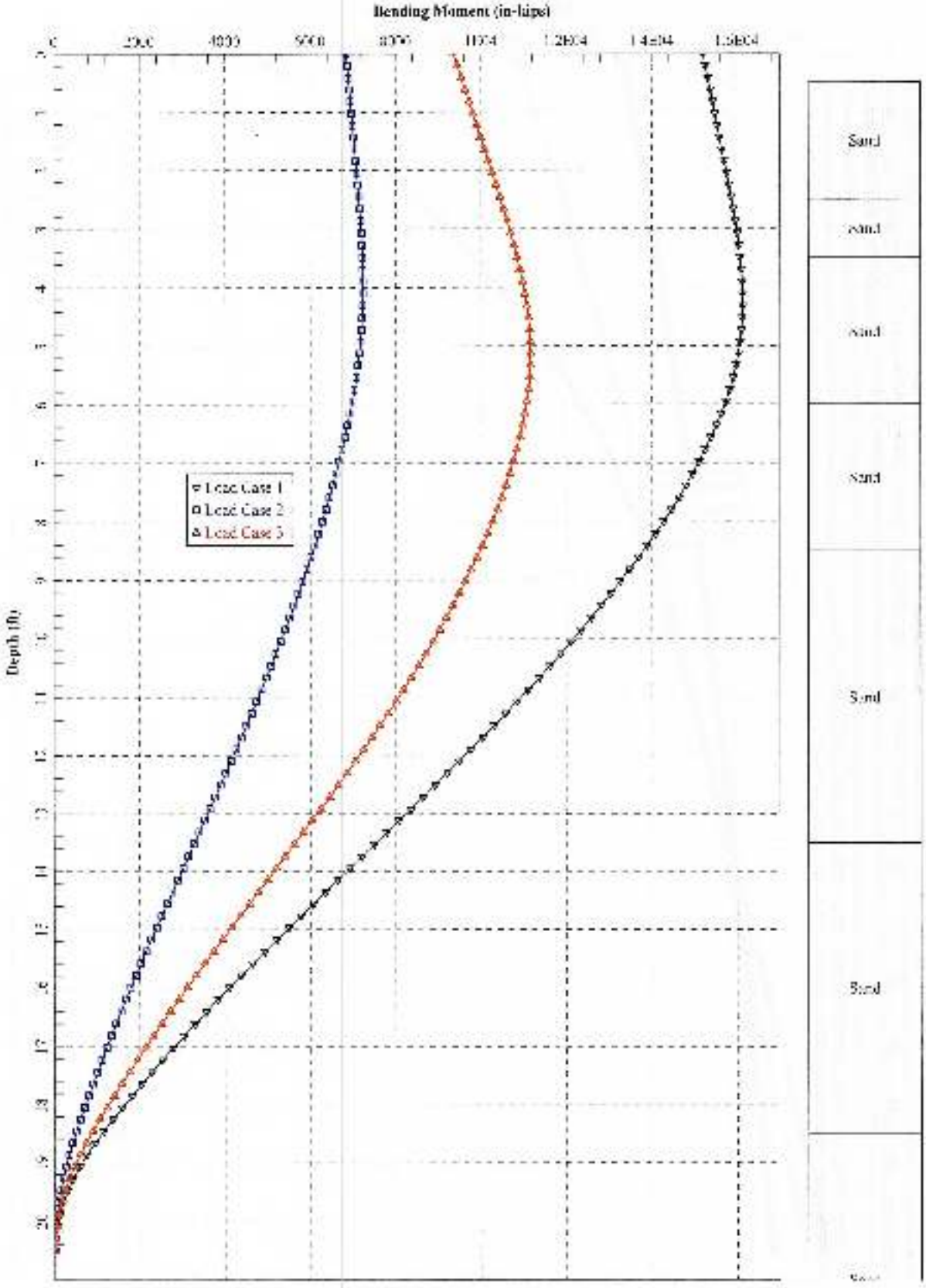
$(P_u/\phi P_n)^{\lambda 5}+(M_u/\phi M_n)^{\lambda 5}\leq 1.0$

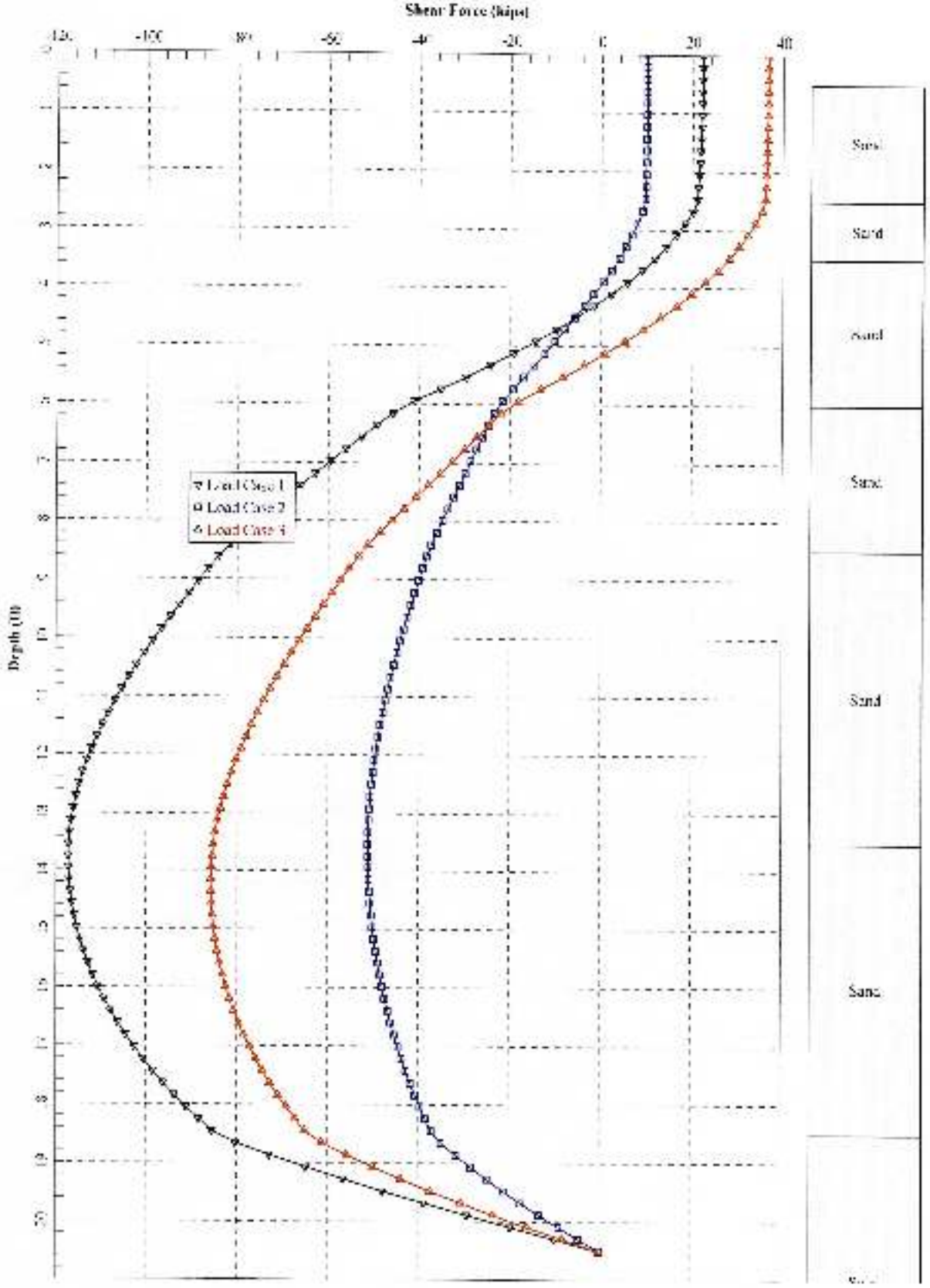
Tension & Bending

	@ V Pier	@ Max. M	
ϕPn (k):	0.0	42.8	
ϕMn (k-ft):	2182.5	2270.1	
UC:	54.1%	52.0%	OK, Adequate

$(P_u/\phi P_n)^{\lambda 5}+(M_u/\phi M_n)^{\lambda 5}\leq 1.0$


Lateral Pile Deflection (inches)
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Depth (ft)
Sand
Sand
Sand
Sand
Sand
Sand


Bending Moment (in-kips)
0
2000
4000
6000
8000
10000
12000
14000
16000
Depth (ft)
Load Case 1
Load Case 2
Load Case 3
Sand
Sand
Sand
Sand
Sand
Sand


Shear Force (kips)
-120
-100
-80
-60
-40
-20
0
20
40
Depth (ft)
Load Case 1
Load Case 2
Load Case 3
Sand
Sand
Sand
Sand
Sand
Sand

[illegible]

Analysis of Individual Piles and Pile Groups
Subjected to Lateral Loading Using the Jeyapalan Method
[illegible]
w.r.t. B.G.S. Practice

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lpilexmpsample.lpi

Name of output report file:
lpilexmpsample.lpo

Name of plot output file:
lpilexmpsample.plt

Name of runtime execution file:
[illegible]

Date and Time of Analysis

Date: October 14, 1974 Time: 11:21:47

Problem Title

[illegible]

Job Number: 89342.1054.242

Client: ccorp

Engineer: [illegible]

Description:

Program Options and Settings

Computational Options:
- Use reflection rules in computing [illegible]
Engineering Units Used for Data Input and Output Files:
- US Customary System (in, lbs, deg, lbs/in)

Analysis Control Options:
- Maximum number of iterations allowed = 150
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in
- Number of pile segments = 120

Loading Type and Number of Cycles of Loading:
- Static loading specified

- Use of p-y mo[illegible] factors for p-y curves
- Analysis uses lateral spring correction (Method of [illegible])
- Tip resistance (lateral loads are ignored)
- Cyclic or [illegible] pile movements acting on the pile are ignored
- Input of user-defined resistance at the pile tip is [illegible]
- Simulation of pile-head foundation stiffness matrix not allowed
- Time-over analysis of pile or structure
- Buckling analysis of pile or structure

Output Options:
- Output files are decimal values in [illegible] symbols.
- Output of pile-head deflection, rotation, shear force, and [illegible] are printed for full length of pile.
- Output increment (node) spacing of output matrix = 1
- Pile response [illegible] computed and reported [illegible] pile depth
- [illegible] short report formats

Pile Structural Properties Summary

Number of pile sections defined = 1
Total length of pile = 24.104 ft
Depth of ground surface below pile head = 0.1604 ft

Pile dimensions used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile dimensions interpolated with depth over the length of the pile. A summary of pile dimensions vs. depth follows:

Point No.	Depth below Pile Head, feet	Pile Diameter, inches
1	2.661	48.000
2	26.765	48.000

Input Structural Properties for Pile Sections:

Pile section No. 1:

Section 1 is a drilled shaft, cased pile, or steel pile
Length of section = 26.81446 ft
Shaft Diameter = 48.00000 in

Shear capacity of section = 0.4000 lbs

Driven Slope and Pile Batter Angles

Actual Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modeled using 3 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 0.33160 ft
Distance from top of pile to bottom of layer = 2.99340 ft
Effective unit weight at top of layer = 53.00000 pcf
Effective unit weight at bottom of layer = 53.00000 pcf
Friction angle at top of layer = 36.00000 deg.
Friction angle at bottom of layer = 36.00000 deg.
Subgrade k at top of layer = 1.0000 pci
Subgrade k at bottom of layer = 1.0000 pci

NOTE: Default values for subgrade k are to remain for this layer.

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 2.99340 ft
Distance from top of pile to bottom of layer = 7.32000 ft
Effective unit weight at top of layer = 110.00000 pcf
Effective unit weight at bottom of layer = 110.00000 pcf
Friction angle at top of layer = 42.00000 deg.
Friction angle at bottom of layer = [illegible] deg.
Subgrade k at top of layer = 0.0000 pci
Subgrade k at bottom of layer = 0.0000 pci

Input default values for subgrade k will be computed for this layer.

Layer 3 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 3.500330 ft
Distance from top of pile to bottom of layer = 6.500330 ft
Effective unit weight at top of layer = 115.300220 pcf
Effective unit weight at bottom of layer = 115.300220 pcf
Friction angle at top of layer = 45.000220 deg.
Friction angle at bottom of layer = 45.000220 deg.
Subgrade k at top of layer = 0.0220 pci
Subgrade k at bottom of layer = 0.0220 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 4 is sand, per criteria by Terzaghi et al., 1974

Distance from top of pile to top of layer = 6.500330 ft
Distance from top of pile to bottom of layer = 9.500330 ft
Effective unit weight at top of layer = 115.300220 pcf
Effective unit weight at bottom of layer = 115.300220 pcf
Friction angle at top of layer = 45.000220 deg.
Friction angle at bottom of layer = 45.000220 deg.
Subgrade k at top of layer = 0.0220 pci
Subgrade k at bottom of layer = 0.0220 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 5 is sand, per criteria by Terzaghi et al., 1974

Distance from top of pile to top of layer = 9.500330 ft
Distance from top of pile to bottom of layer = 25.500330 ft
Effective unit weight at top of layer = 115.300220 pcf
Effective unit weight at bottom of layer = 115.300220 pcf
Friction angle at top of layer = 45.000220 deg.
Friction angle at bottom of layer = 45.000220 deg.
Subgrade k at top of layer = 0.0220 pci
Subgrade k at bottom of layer = 0.0220 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 6 is sand, per criteria by Terzaghi et al., 1974

Distance from top of pile to top of layer = 25.500330 ft
Distance from top of pile to bottom of layer = 29.500330 ft
Effective unit weight at top of layer = 115.300220 pcf
Effective unit weight at bottom of layer = 115.300220 pcf
Friction angle at top of layer = 45.000220 deg.
Friction angle at bottom of layer = 45.000220 deg.
Subgrade k at top of layer = 0.0220 pci
Subgrade k at bottom of layer = 0.0220 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 7 is sand, per criteria by Terzaghi et al., 1974

Distance from top of pile to top of layer = 29.500330 ft
Distance from top of pile to bottom of layer = 33.500330 ft
Effective unit weight at top of layer = 115.300220 pcf
Effective unit weight at bottom of layer = 115.300220 pcf
Friction angle at top of layer = 45.000220 deg.
Friction angle at bottom of layer = 45.000220 deg.
Subgrade k at top of layer = 0.0220 pci
Subgrade k at bottom of layer = 0.0220 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 8 is sand, per criteria by Terzaghi et al., 1974

Distance from top of pile to top of layer = 33.500330 ft
Distance from top of pile to bottom of layer = 37.500330 ft
Effective unit weight at top of layer = 115.300220 pcf
Effective unit weight at bottom of layer = 115.300220 pcf
Friction angle at top of layer = 45.000220 deg.
Friction angle at bottom of layer = 45.000220 deg.
Subgrade k at top of layer = 0.0220 pci
Subgrade k at bottom of layer = 0.0220 pci

NOTE: Default values for subgrade k will be computed for this layer.

Note: Default value for subgrade k will be computed for this layer.

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	55.020002 ft
Distance from top of pile to bottom of layer	=	45.020002 ft
Effective unit weight at top of layer	=	110.020002 pcf
Effective unit weight at bottom of layer	=	110.020002 pcf
Friction angle at top of layer	=	45.020002 deg.
Friction angle at bottom of layer	=	45.020020 deg.
Subgrade k at top of layer	=	0.0020 pci
Subgrade k at bottom of layer	=	0.0020 pci

Note: Input values for subgrade k will be ignored for this layer.

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	45.020220 ft
Distance from top of pile to bottom of layer	=	35.020220 ft
Effective unit weight at top of layer	=	110.020220 pcf
Effective unit weight at bottom of layer	=	110.020220 pcf
Friction angle at top of layer	=	45.020220 deg.
Friction angle at bottom of layer	=	45.020220 deg.
Subgrade k at top of layer	=	0.1020 pci
Subgrade k at bottom of layer	=	0.1020 pci

Note: Default values for subgrade k will be computed for this layer.

Layer 3 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	35.020200 ft
Distance from top of pile to bottom of layer	=	25.020200 ft
Effective unit weight at top of layer	=	110.020200 pcf
Effective unit weight at bottom of layer	=	110.020200 pcf
Friction angle at top of layer	=	45.020200 deg.
Friction angle at bottom of layer	=	45.020200 deg.
Subgrade k at top of layer	=	0.2200 pci
Subgrade k at bottom of layer	=	0.2200 pci

Note: Default values for subgrade k will be computed for this layer.

(Top of the lowest soil layer extends upward to the pile tip)

Summary of Input Soil Properties

Layer No.	Soil Type	Layer Depth ft	Effective Unit Wt. pcf	Friction Angle deg.	p-y Modulus pci
1	Sand (Reese, et al.)	20.0000	110.0000	45.0000	Default
2	Sand (Reese, et al.)	10.0000	110.0000	45.0000	Default
3	Sand (Reese, et al.)	10.0000	110.0000	45.0000	Default
4	Sand (Reese, et al.)	10.0000	110.0000	45.0000	Default
5	Sand (Reese, et al.)	10.0000	110.0000	40.0000	Default
6	Sand (Reese, et al.)	10.0000	110.0000	40.0000	Default
7	Sand (Reese, et al.)	10.0000	110.0000	40.0000	Default
8	Sand (Reese, et al.)	10.0000	110.0000	40.0000	Default
9	Sand (Reese, et al.)	10.0000	110.0000	40.0000	Default
10	Sand (Reese, et al.)	10.0000	110.0000	40.0000	Default
11	Sand (Reese, et al.)	10.0000	110.0000	40.0000	Default
12	Sand (Reese, et al.)	10.0000	110.0000	40.0000	Default
13	Sand (Reese, et al.)	10.0000	110.0000	40.0000	Default

Static Loading Criteria

Static loading criteria were used when computing p-y curves for all analyses.

Pile-Head Loading and Pile-Head Fixity Conditions

Number of load cases to be analyzed = 1

Load Case No.	Load Type	Condition 1	Condition 2	Axial Force, lbs
1	Compute Top y vs. Pile Length	1	2	Force, lbs

3	1	0.0	22500.	lbs/	ft	distrib.	lbs/in 2222.
4	1	0.0	3167.	lbs/	ft	distrib.	lbs/in 1831.
5	1	0.0	9500.	lbs/	ft	distrib.	lbs/in 1830.

x = axial force applied normal to pile axis
y = shearing forces applied to pile face
z = lateral deflection normal to pile axis
s = pile slope relative to original pile batter angle
m = distributed bending moments applied to pile head
Additional deflection, slope, and moment values can be computed only for the loads which
have been specified at lateral loading points (load types 1, 2, and 3).
Axial loads are assumed to be acting equally for all pile batter angles.

Computation of Lateral Pile-Head Stiffness Capacity and Maximum Bending Stiffness

Pile-head lateral load values were determined from pile-head loading conditions.

Number of pile sections analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Driven Steel Pipe Pile

Length of Section	=	24.000000 ft
Shaft Diameter	=	24.000000 in
Concrete Shell Thickness (= 0.5 * Dia. of Pipe, Minus)	=	0.000000 in
Number of Reinforcing Bars	=	32 each
Yield Stress of Reinforcing Bars	=	60000. psi
Modulus of Elasticity of Reinforcing Bars	=	29000000. psi
Gross Area of Shell	=	2827. sq. in
Total Area of Reinforcing Steel	=	27.720000 sq. in
Area Ratio of Steel Reinforcement	=	9.80 percent
Center-to-Center Bar Spacing	=	2.748553 in
Maximum Concrete Aggregate Size	=	3.750000 in
Ratio of Bar Spacing to Aggregate Size	=	0.73
Offset of Center of Rebar Cage from Center of Pile	=	0.000000 in

Axial Structural Capacities:

Nom. Axial Structural Capacity = 0.85 fc Ac + fy As	=	1161.720 kips
Tensile Load for Yielding of Concrete	=	1693.056 kips
Nominal Axial Tensile Capacity	=	1662.000 kips

Interaction Diagram for Nominal Moment and Factored Axial Load Combinations:

Point Number	Axial Comp. Force (kips)	Axial Load Ecc. (in)	Moment (in-kips)	Curvature (1/in)
1	1.000000	0.000000	0.000000	0.000000
2	1.000000	0.000000	16.950000	0.000417
3	1.000000	0.000000	33.900000	0.000833
4	1.000000	0.000000	50.850000	0.001250
5	1.000000	0.000000	67.800000	0.001667
6	1.000000	0.000000	84.750000	0.002083
7	1.000000	0.000000	101.700000	0.002500
8	1.000000	0.000000	118.650000	0.002917
9	1.000000	0.000000	135.600000	0.003333
10	1.000000	0.000000	152.550000	0.003750
11	1.000000	0.000000	169.500000	0.004167
12	1.000000	0.000000	186.450000	0.004583
13	1.000000	0.000000	203.400000	0.005000
14	1.000000	0.000000	220.350000	0.005417
15	1.000000	0.000000	237.300000	0.005833
16	1.000000	0.000000	254.250000	0.006250
17	1.000000	0.000000	271.200000	0.006667
18	1.000000	0.000000	288.150000	0.007083
19	1.000000	0.000000	305.100000	0.007500
20	1.000000	0.000000	322.050000	0.007917
21	1.000000	0.000000	339.000000	0.008333

Note: The positions of the above points were computed by Utile

Minimum spacing between the points [illegible] = 0.000 kips
between bars 17 and 32.

Strength reduction factor for Aggregate size = 0.82

Concrete Properties:

Compressive Strength of Concrete		4000. psi
Modulus of Elasticity of Concrete	=	3824997. psi
Modulus of Rupture of Concrete	=	497.391643 psi
Compression Strain at Peak Stress	=	0.001167
Ultimate Strain at Fracture of Concrete	=	0.0021154

Confinement Aggregate Size = 0.75000 in

Number of Axial Thrust Force Values Considered for Moment-Curvature = 3

Number	Axial Thrust Force kips
1	13.032
2	21.651
3	35.875

Information and Messages and Notes:

C = concrete in section has cracked in tension
S = steel in outermost tension layer has reached yield stress
* ACI 318 criteria for tension-controlled section met: tensile strain in reinforcement exceeds 0.005 while simultaneous compressive strain in concrete more than 0.003. See ACI 318, Section 10.3.4.
Z = depth of tensile zone in concrete section is less than 10 percent of section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
Position of neutral axis is measured from edge of compression side of pile.
Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.

Axial Thrust Force = 13.032 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in
4.16667E-07	1712.	4108739344.	45.2452448	0.0001443	2.0000000
0.0014521	0.2129669				
8.33333E-07	3427.	4112133333.	44.1084425	0.0001524	2.0000070
0.0314424	0.4174984				
0.0000013	5773.	4472477192.	22.7565301	0.0000125	-0.0000094
0.0375284	1.3179447				
0.0000017	6622.	3963252341.	22.5646051	0.0000334	-0.0000098
0.0374733	1.7468446				
0.0000021	6885.	3301196782.	22.4655312	0.0000346	-0.0000033
0.0375843	1.7496404				
0.0000033	10623.	3400218456.	[illegible]	0.0000941	-0.0000030
0.1472168	2.0000000				
0.0000033	11087.	3400384651.	[illegible]	0.0000736	-0.0000220
0.1577462	2.4221068				
0.0000033	12473.	3401467481.	[illegible]	0.0000110	-0.0000490
0.1522271	2.7391151				
0.0000033	12473.	3403899413.	14.3287198	0.0000349	-0.0000143
0.1391743	-3.0292402 C				
0.0000057	12473.	3223744621.	14.1489140	0.0000057	-0.0002102
0.1411287	-5.6720655 C				
0.0000046	12473.	2077930031.	13.9962332	0.0000478	-0.0002227
0.2141847	-6.2543249 C				
0.0000058	12473.	2054022187.	13.9861322	0.0000485	-0.0002299
0.2427144	-6.8542154 C				
0.0000062	12473.	2062344499.	14.0210444	0.0002424	-0.0002010
0.2341528	-7.4028878 C				
0.0000065	12473.	2202414624.	14.0164784	0.0002497	-0.0002047
0.2355972	-7.7334941 C				
0.0000065	12473.	2152266134.	14.0127164	0.0002567	-0.0002108
0.2456059	-8.5706823 C				
0.0000067	12473.	2016847444.	13.8447184	2.0002112	-0.0002461
0.3211294	-9.2161122 C				
0.0000068	12473.	1842468444.	13.6721077	2.0002047	-0.0002432
0.3202531	-9.7148428 C				
0.0000070	12473.	1744273474.	13.5244188	2.0002017	-0.0002411
0.4106133	-10.3213341 C				
0.0000072	12473.	1741617270.	13.5520894	0.0021494	0.0024152
0.4516257	-10.3047299 C				
0.0000085	12473.	1615772012.	13.5320760	0.0001747	-0.0002544
0.1506427	-11.4071416 C				
0.0000087	12473.	1559784570.	13.4042249	0.0000105	-0.0002254
0.1726255	-12.3627356 C				
0.0000094	12473.	1494774456.	13.4037027	0.0000111	-0.0002276
0.1467426	-12.9224471 C				
0.0000094	12473.	1474557352.	13.4473048	0.0001444	-0.0004445
0.1571445	-13.2755464 C				
0.0000108	12473.	1247331284.	13.4128632	0.0001444	-0.0004252
0.1445417	-14.4188742 C				
0.0000142	12473.	1235431138.	13.4238605	0.0001467	-0.0004444
0.1444425	-14.9767422 C				
0.0000140	12473.	1240472248.	13.3329605	0.0001475	-0.0004444
0.1344427	-14.9775427 C				
0.0000118	12473.	1037013208.	13.3372165	[illegible]	-0.0004432
0.2063810	-15.2021346 C				
0.0000107	12473.	1172344446.	13.4460074	0.0021513	0.0220141
0.3128730	-16.1241319 C				
0.0000120	12473.	1112463145.	13.4440847	0.0021639	0.0220222
0.3264237	-16.7144673 C				
0.0000125	12473.	1177044423.	13.4440867	0.0021647	0.0220253
0.5227212	-17.2203736 C				

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]				

Axial Thrust Force = [illegible] kips

Spacing Bet Conc [illegible]	Bending Mom [illegible] Moment [illegible]	Bending [illegible]	[illegible]	Max Comp [illegible]	Max Tens [illegible]
[illegible]	3712.	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0.0015730				
[illegible]	3417.	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]				
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0.0021200	28191.	2.963199%	-14.1945394	0.0212283	-0.0272533
0.0042331	02.002000 CY				
0.0021322	28276.	2.963444%	-14.1913677	0.0212456	0.0272431
0.0148752	02.002000 CY				
0.0021362	28500.	2.0021284%	-14.1913474	0.0212643	0.0272285
0.0254400	02.002000 CY				
0.0021399	28737.	2.0021882%	-14.1913214	0.0212847	-0.0272178
0.0360729	02.002000 CY				
0.0021419	28819.	2.0021977%	-14.1913141	0.0212911	-0.0272122
0.0466900	02.002000 CY				
0.0021269	28571.	2.0021792%	-14.1913346	0.0212748	0.0272248
0.0573169	02.002000 CY				
0.0021249	28381.	2.0021672%	-14.1913511	0.0212602	0.0272361
0.0679418	02.002000 CY				
0.0021277	28563.	2.0021844%	-14.1913343	0.0212750	0.0272256
0.0785695	02.002000 CY				
0.0021253	28501.	2.0021795%	-14.1913398	0.0212703	-0.0272293
0.0891948	02.002000 CY				
0.0021222	28411.	2.0021717%	-14.1913477	0.0212637	-0.0272344
0.0998170	-14.002000 CY				
0.0021232	28444.	2.0021747%	-14.1913450	0.0212660	0.0272326
0.0104402	-14.002000 CY				
0.0021222	28411.	2.0021717%	-14.1913477	0.0212637	0.0272309
0.0210624	-14.002000 CY				
0.0021211	28346.	2.0021662%	-14.1913530	0.0212591	0.0272273
0.0316835	02.002000 CY				
0.0021211	28375.	2.0021687%	-14.1913507	0.0212611	0.0272288
0.0423046	02.002000 CY				
0.0021182	28232.	2.0021557%	-14.1913625	0.0212509	0.0272209
0.0529228	02.002000 CY				
0.0021182	28241.	2.0021565%	-14.1913618	0.0212515	0.0272214
0.0635410	02.002000 CY				
0.0021213	28378.	2.0021690%	-14.1913505	0.0212613	0.0272290
0.0741623	02.002000 CY				
0.0021223	28423.	2.0021731%	-14.1913468	0.0212646	0.0272316
0.0847846	02.002000 CY				
0.0021223	28423.	2.0021731%	-14.1913468	0.0212646	0.0272316
0.0954069	02.002000 CY				
0.0021223	28423.	2.0021731%	-14.1913468	0.0212646	0.0272316
0.1060292	02.002000 CY				
0.0021223	28423.	2.0021731%	-14.1913468	0.0212646	0.0272316
0.1166515	02.002000 CY				
0.0021223	28423.	2.0021731%	-14.1913468	0.0212646	0.0272316
0.1272738	02.002000 CY				
0.0021223	28423.	2.0021731%	-14.1913468	0.0212646	0.0272316
0.1378961	02.002000 CY				
0.0021223	28423.	2.0021731%	-14.1913468	0.0212646	0.0272316
0.1485184	-14.002000 CY				
0.0021223	28423.	2.0021731%	-14.1913468	0.0212646	0.0272316
0.1591407	-14.002000 CY				
0.0021223	28423.	2.0021731%	-14.1913468	0.0212646	0.0272316
0.1697630	-14.002000 CY				
0.0021223	28423.	2.0021731%	-14.1913468	0.0212646	0.0272316
0.1803853	-14.002000 CY				

0.0210921	28223.	2.0021561%	-14.1913618	0.0212509	-0.0272209
0.1910076	02.002000 CY				
0.0210921	28223.	2.0021561%	-14.1913618	0.0212509	-0.0272209
0.2017176	02.002000 CY				
0.1060324	28424.	2.0021732%	-14.1913468	0.0212646	-0.0272316
0.2166616	-14.002000 CY				
0.2280329	28681.	2.0021951%	-14.1913271	0.0212797	-0.0272432
0.2272389	-28.002000 CY				
0.2280329	28644.	2.0021920%	-14.1913299	0.0212773	-0.0272414
0.2378629	-28.002000 CY				
0.2280329	28644.	2.0021920%	-14.1913299	0.0212773	-0.0272414
0.2484852	-28.002000 CY				

Summary of results for Member 1 (Bi-axial Moment Capacity per Section 1

Moment values corresponding to minimum compressive strain: 1.0e-
(+ moment envelopes may not be fully fully at smaller strains.

Ang. No.	Axial Force, Pn kip	Bending Mom. Cap. Mn kip-ft	Max. Comp. Strain
1	11.944	19495.199	0.0022302
2	21.941	19636.547	0.0022302
3	11.671	19317.748	0.0022302

Note that the value of Moment Capacity in the table above are not factored by a strength reduction factor (phi factor).

To get the value of the strength reduction factor depends on whether the compression controlled (tied or spiral) as per Table 18.8.1 or as per Table 18.8.2.

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to ACI 318, Section 9.3.2.2 of the code provided the design standard being followed.

The following table provides factored moment capacities corresponding bending directions selected for the cross-section and the axial forces forces sections.

Axial Force, Pn kip	Moment, Mn-x kip-ft	Moment, Mn-y kip-ft	Ult. Axial Moment Cap. Mn kip-ft	Ult. Axial Moment Cap. Mn kip-ft	Axial Strain at Ult Mom kip-in/in
1	0.00	24160	0.000000	13824	49020823.
2	0.00	24363	17.221859	13824	49778062.
3	0.00	24040	20.190799	13824	48839172.

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	[illegible]	[illegible]	N.A.	No	[illegible]	[illegible]
2	[illegible]	[illegible]	Yes	No	[illegible]	[illegible]
3	[illegible]	[illegible]	Yes	No	[illegible]	[illegible]
4	[illegible]	[illegible]	Yes	No	[illegible]	[illegible]
5	[illegible]	[illegible]	Yes	No	[illegible]	[illegible]
6	[illegible]	[illegible]	Yes	No	[illegible]	[illegible]
7	[illegible]	[illegible]	Yes	No	[illegible]	[illegible]
8	[illegible]	[illegible]	No	No	[illegible]	0.00
9	[illegible]	[illegible]	No	No	0.00	0.00
10	[illegible]	[illegible]	No	No	0.00	0.00
11	[illegible]	[illegible]	No	No	0.00	0.00
12	[illegible]	[illegible]	No	No	0.00	0.00
13	[illegible]	[illegible]	No	No	0.00	N.A.

Notes: The F1 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = [illegible] lbs
Applied moment at pile head = [illegible] in-lbs
Axial thrust load on pile head = [illegible] lbs

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only [illegible]

Output summary for Load Case No. 2:

[illegible]

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 2

[illegible]

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. p
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] 1e7425 0.22
24.5799 0.23516 32566. -9404. -1.23E-04 2.00 4.[illegible]
[illegible] 164741 0.22
24.5799 0.23757 [illegible] -9404. -1.23E-04 2.00 4.[illegible]
[illegible] 165859 0.22
24.5799 0.23958 0.04 0.00 -1.23E-04 2.00 4.[illegible]
[illegible] 83736 0.24

* This analysis computes pile response using nonlinear moment-curvature relationships. Values of total stress (bending, axial and bearing) stresses are computed only for the bending only and do not account for lateral stresses in the soil. Stresses in concrete and steel may be calculated from output for an input bending moment value.

Output Summary for Load Case No. 2:

Pile-head deflection	=	0.2597240 inches
Computed slope at pile head	=	0.0067331 radians
Maximum bending moment	=	9214.35 inch-lbs
Maximum shear force	=	-597.19 lbs
Depth of maximum bending moment	=	7.9987300 feet below pile head
Depth of maximum shear force	=	12.5982200 feet below pile head
Number of iterations	=	6
Number of soil [illegible]	=	2

Computed Values of Pile Bending and Deflection
for [illegible] Load Case Number 2

Pile-head conditions are [illegible] Moment (Loading Type 3)

Shear force at pile head = [illegible]
Applied moment at pile head = [illegible]
Axial thrust force acting on pile = [illegible]

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bearing Capacity	Soil Resistance
inches	inches	inch-lbs	lbs	radians	psi	lbs/inch	lbs/inch
0.00	0.2597	0.00	-597.19	-0.00674	0.00	0.00	0.00
0.12	0.2589	71.71	-597.19	-0.00674	0.00	0.00	0.00
0.24	0.2581	143.42	-597.19	-0.00674	0.00	0.00	0.00
0.36	0.2572	215.13	-597.19	-0.00674	0.00	0.00	0.00
0.48	0.2564	286.84	-597.19	-0.00674	0.00	0.00	0.00
0.60	0.2556	358.55	-597.19	-0.00674	0.00	0.00	0.00
0.72	0.2547	430.26	-597.19	-0.00674	0.00	0.00	0.00
0.84	0.2539	501.97	-597.19	-0.00674	0.00	0.00	0.00
0.96	0.2530	573.68	-597.19	-0.00674	0.00	0.00	0.00
1.08	0.2522	645.39	-597.19	-0.00674	0.00	0.00	0.00
1.20	0.2513	717.10	-597.19	-0.00674	0.00	0.00	0.00
1.32	0.2505	788.81	-597.19	-0.00674	0.00	0.00	0.00
1.44	0.2496	860.52	-597.19	-0.00674	0.00	0.00	0.00
1.56	0.2488	932.23	-597.19	-0.00674	0.00	0.00	0.00
1.68	0.2479	1003.94	-597.19	-0.00674	0.00	0.00	0.00
1.80	0.2471	1075.65	-597.19	-0.00674	0.00	0.00	0.00
1.92	0.2462	1147.36	-597.19	-0.00674	0.00	0.00	0.00
2.04	0.2454	1219.07	-597.19	-0.00674	0.00	0.00	0.00
2.16	0.2445	1290.78	-597.19	-0.00674	0.00	0.00	0.00
2.28	0.2437	1362.49	-597.19	-0.00674	0.00	0.00	0.00
2.40	0.2428	1434.20	-597.19	-0.00674	0.00	0.00	0.00
2.52	0.2420	1505.91	-597.19	-0.00674	0.00	0.00	0.00
2.64	0.2411	1577.62	-597.19	-0.00674	0.00	0.00	0.00
2.76	0.2403	1649.33	-597.19	-0.00674	0.00	0.00	0.00
2.88	0.2394	1721.04	-597.19	-0.00674	0.00	0.00	0.00
3.00	0.2386	1792.75	-597.19	-0.00674	0.00	0.00	0.00
3.12	0.2377	1864.46	-597.19	-0.00674	0.00	0.00	0.00
3.24	0.2369	1936.17	-597.19	-0.00674	0.00	0.00	0.00
3.36	0.2360	2007.88	-597.19	-0.00674	0.00	0.00	0.00
3.48	0.2352	2079.59	-597.19	-0.00674	0.00	0.00	0.00
3.60	0.2343	2151.30	-597.19	-0.00674	0.00	0.00	0.00
3.72	0.2335	2223.01	-597.19	-0.00674	0.00	0.00	0.00
3.84	0.2326	2294.72	-597.19	-0.00674	0.00	0.00	0.00
3.96	0.2318	2366.43	-597.19	-0.00674	0.00	0.00	0.00
4.08	0.2309	2438.14	-597.19	-0.00674	0.00	0.00	0.00
4.20	0.2301	2509.85	-597.19	-0.00674	0.00	0.00	0.00
4.32	0.2292	2581.56	-597.19	-0.00674	0.00	0.00	0.00
4.44	0.2284	2653.27	-597.19	-0.00674	0.00	0.00	0.00
4.56	0.2275	2724.98	-597.19	-0.00674	0.00	0.00	0.00
4.68	0.2267	2796.69	-597.19	-0.00674	0.00	0.00	0.00
4.80	0.2258	2868.40	-597.19	-0.00674	0.00	0.00	0.00
4.92	0.2250	2940.11	-597.19	-0.00674	0.00	0.00	0.00
5.04	0.2241	3011.82	-597.19	-0.00674	0.00	0.00	0.00
5.16	0.2233	3083.53	-597.19	-0.00674	0.00	0.00	0.00
5.28	0.2224	3155.24	-597.19	-0.00674	0.00	0.00	0.00
5.40	0.2216	3226.95	-597.19	-0.00674	0.00	0.00	0.00
5.52	0.2207	3298.66	-597.19	-0.00674	0.00	0.00	0.00
5.64	0.2199	3370.37	-597.19	-0.00674	0.00	0.00	0.00
5.76	0.2190	3442.08	-597.19	-0.00674	0.00	0.00	0.00
5.88	0.2182	3513.79	-597.19	-0.00674	0.00	0.00	0.00
6.00	0.2173	3585.50	-597.19	-0.00674	0.00	0.00	0.00
6.12	0.2165	3657.21	-597.19	-0.00674	0.00	0.00	0.00
6.24	0.2156	3728.92	-597.19	-0.00674	0.00	0.00	0.00
6.36	0.2148	3800.63	-597.19	-0.00674	0.00	0.00	0.00
6.48	0.2139	3872.34	-597.19	-0.00674	0.00	0.00	0.00
6.60	0.2131	3944.05	-597.19	-0.00674	0.00	0.00	0.00
6.72	0.2122	4015.76	-597.19	-0.00674	0.00	0.00	0.00
6.84	0.2114	4087.47	-597.19	-0.00674	0.00	0.00	0.00
6.96	0.2105	4159.18	-597.19	-0.00674	0.00	0.00	0.00
7.08	0.2097	4230.89	-597.19	-0.00674	0.00	0.00	0.00
7.20	0.2088	4302.60	-597.19	-0.00674	0.00	0.00	0.00
7.32	0.2080	4374.31	-597.19	-0.00674	0.00	0.00	0.00
7.44	0.2071	4446.02	-597.19	-0.00674	0.00	0.00	0.00
7.56	0.2063	4517.73	-597.19	-0.00674	0.00	0.00	0.00
7.68	0.2054	4589.44	-597.19	-0.00674	0.00	0.00	0.00
7.80	0.2046	4661.15	-597.19	-0.00674	0.00	0.00	0.00
7.92	0.2037	4732.86	-597.19	-0.00674	0.00	0.00	0.00
8.04	0.2029	4804.57	-597.19	-0.00674	0.00	0.00	0.00
8.16	0.2020	4876.28	-597.19	-0.00674	0.00	0.00	0.00
8.28	0.2012	4947.99	-597.19	-0.00674	0.00	0.00	0.00
8.40	0.2003	5019.70	-597.19	-0.00674	0.00	0.00	0.00
8.52	0.1995	5091.41	-597.19	-0.00674	0.00	0.00	0.00
8.64	0.1986	5163.12	-597.19	-0.00674	0.00	0.00	0.00
8.76	0.1978	5234.83	-597.19	-0.00674	0.00	0.00	0.00
8.88	0.1969	5306.54	-597.19	-0.00674	0.00	0.00	0.00
9.00	0.1961	5378.25	-597.19	-0.00674	0.00	0.00	0.00
9.12	0.1952	5449.96	-597.19	-0.00674	0.00	0.00	0.00
9.24	0.1944	5521.67	-597.19	-0.00674	0.00	0.00	0.00
9.36	0.1935	5593.38	-597.19	-0.00674	0.00	0.00	0.00
9.48	0.1927	5665.09	-597.19	-0.00674	0.00	0.00	0.00
9.60	0.1918	5736.80	-597.19	-0.00674	0.00	0.00	0.00
9.72	0.1910	5808.51	-597.19	-0.00674	0.00	0.00	0.00
9.84	0.1901	5880.22	-597.19	-0.00674	0.00	0.00	0.00
9.96	0.1893	5951.93	-597.19	-0.00674	0.00	0.00	0.00
10.08	0.1884	6023.64	-597.19	-0.00674	0.00	0.00	0.00
10.20	0.1876	6095.35	-597.19	-0.00674	0.00	0.00	0.00
10.32	0.1867	6167.06	-597.19	-0.00674	0.00	0.00	0.00
10.44	0.1859	6238.77	-597.19	-0.00674	0.00	0.00	0.00
10.56	0.1850	6310.48	-597.19	-0.00674	0.00	0.00	0.00
10.68	0.1842	6382.19	-597.19	-0.00674	0.00	0.00	0.00
10.80	0.1833	6453.90	-597.19	-0.00674	0.00	0.00	0.00
10.92	0.1825	6525.61	-597.19	-0.00674	0.00	0.00	0.00
11.04	0.1816	6597.32	-597.19	-0.00674	0.00	0.00	0.00
11.16	0.1808	6669.03	-597.19	-0.00674	0.00	0.00	0.00
11.28	0.1799	6740.74	-597.19	-0.00674	0.00	0.00	0.00
11.40	0.1791	6812.45	-597.19	-0.00674	0.00	0.00	0.00
11.52	0.1782	6884.16	-597.19	-0.00674	0.00	0.00	0.00
11.64	0.1774	6955.87	-597.19	-0.00674	0.00	0.00	0.00
11.76	0.1765	7027.58	-597.19	-0.00674	0.00	0.00	0.00
11.88	0.1757	7099.29	-597.19	-0.00674	0.00	0.00	0.00
12.00	0.1748	7171.00	-597.19	-0.00674	0.00	0.00	0.00
12.12	0.1740	7242.71	-597.19	-0.00674	0.00	0.00	0.00
12.24	0.1731	7314.42	-597.19	-0.00674	0.00	0.00	0.00
12.36	0.1723	7386.13	-597.19	-0.00674	0.00	0.00	0.00
12.48	0.1714	7457.84	-597.19	-0.00674	0.00	0.00	0.00
12.60	0.1706	7529.55	-597.19	-0.00674	0.00	0.00	0.00
12.72	0.1697	7601.26	-597.19	-0.00674	0.00	0.00	0.00
12.84	0.1689	7672.97	-597.19	-0.00674	0.00	0.00	0.00
12.96	0.1680	7744.68	-597.19	-0.00674	0.00	0.00	0.00
13.08	0.1672	7816.39	-597.19	-0.00674	0.00	0.00	0.00
13.20	0.1663	7888.10	-597.19	-0.00674	0.00	0.00	0.00
13.32	0.1655	7959.81	-597.19	-0.00674	0.00	0.00	0.00
13.44	0.1646	8031.52	-597.19	-0.00674	0.00	0.00	0.00
13.56	0.1638	8103.23	-597.19	-0.00674	0.00	0.00	0.00
13.68	0.1629	8174.94	-597.19	-0.00674	0.00	0.00	0.00
13.80	0.1621	8246.65	-597.19	-0.00674	0.00	0.00	0.00
13.92	0.1612	8318.36	-597.19	-0.00674	0.00	0.00	0.00
14.04	0.1604	8390.07	-597.19	-0.00674	0.00	0.00	0.00
14.16	0.1595	8461.78	-597.19	-0.00674	0.00	0.00	0.00
14.28	0.1587	8533.49	-597.19	-0.00674	0.00	0.00	0.00
14.40	0.1578	8605.20	-597.19	-0.00674	0.00	0.00	0.00
14.52	0.1570	8676.91	-597.19	-0.00674	0.00	0.00	0.00
14.64	0.1561	8748.62	-597.19	-0.00674	0.00	0.00	0.00
14.76	0.1553	8820.33	-597.19	-0.00674	0.00	0.00	0.00
14.88	0.1544	8892.04	-597.19	-0.00674	0.00	0.00	0.00
15.00	0.1536	8963.75	-597.19	-0.00674	0.00	0.00	0.00
15.12	0.1527	9035.46	-597.19	-0.00674	0.00	0.00	0.00
15.24	0.1519	9107.17	-597.19	-0.00674	0.00	0.00	0.00
15.36	0.1510	9178.88	-597.19	-0.00674	0.00	0.00	0.00
15.48	0.1502	9250.59	-597.19	-0.00674	0.00	0.00	0.00
15.60	0.1493	9322.30	-597.19	-0.00674	0.00	0.00	0.00
15.72	0.1485	9394.01	-597.19	-0.00674	0.00	0.00	0.00
15.84	0.1476	9465.72	-597.19	-0.00674	0.00	0.00	0.00
15.96	0.1468	9537.43	-597.19	-0.00674	0.00	0.00	0.00
16.08	0.1459	9609.14	-597.19	-0.00674	0.00	0.00	0.00
16.20	0.1451	9680.85	-597.19	-0.00674	0.00	0.00	0.00
16.32	0.1442	9752.56	-597.19	-0.00674	0.00	0.00	0.00
16.44	0.1434	9824.27	-597.19	-0.00674	0.00	0.00	0.00
16.56	0.1425	9895.98	-597.19	-0.00674	0.00	0.00	0.00
16.68	0.1417	9967.69	-597.19	-0.00674	0.00	0.00	0.00
16.80	0.1408	10039.40	-597.19	-0.00674	0.00	0.00	0.00
16.92	0.1400	10111.11	-597.19	-0.00674	0.00	0.00	0.00
17.04	0.1391	10182.82	-597.19	-0.00674	0.00	0.00	0.00
17.16	0.1383	10254.53	-597.19	-0.00674	0.00	0.00	0.00
17.28	0.1374	10326.24	-597.19	-0.00674	0.00	0.00	0.00
17.40	0.1366	10397.95	-597.19	-0.00674	0.00	0.00	0.00
17.52	0.1357	10469.66	-597.19	-0.00674	0.00	0.00	0.00
17.64	0.1349	10541.37	-597.19	-0.00674	0.00	0.00	0.00
17.76	0.1340	10613.08	-597.19	-0.00674	0.00	0.00	0.00
17.88	0.1332	10684.79	-597.19	-0.00674	0.00	0.00	0.00
18.00	0.1323	10756.50	-597.19	-0.00674	0.00	0.00	0.00
18.12	0.1315	10828.21	-597.19	-0.00674	0.00	0.00	0.00
18.24	0.1306	10899.92	-597.19	-0.00674	0.00	0.00	0.00
18.36	0.1298	10971.63	-597.19	-0.00674	0.00	0.00	0.00
18.48	0.1289	11043.34	-597.19	-0.00674	0.00	0.00	0.00
18.60	0.1281	11115.05	-597.19	-0.00674	0.00	0.00	0.00
18.72	0.1272	11186.76	-597.19	-0.00674	0.00	0.00	0.00
18.84	0.1264	11258.47	-597.19	-0.00674	0.00	0.00	0.00
18.96	0.1255	11330.18	-597.19	-0.00674	0.00	0.00	0.00
19.08	0.1247	11401.89	-597.19	-0.00674	0.00	0.00	0.00
19.20	0.1238	11473.60	-597.19	-0.00674	0.00	0.00	0.00
19.32	0.1230	11545.31	-597.19	-0.00674	0.00	0.00	0.00
19.44	0.1221	11617.02	-597.19	-0.00674	0.00	0.00	0.00
19.56	0.1213	11688.73	-597.19	-0.00674	0.00	0.00	0.00
19.68	0.1204	11760.44	-597.19	-0.00674	0.00	0.00	0.00
19.80	0.1196	11832.15	-597.19	-0.00674	0.00	0.00	0.00
19.92	0.1187	11903.86	-597.19	-0.00674	0.00	0.00	0.00
20.04	0.1179	11975.57	-597.19	-0.00674	0.00	0.00	0.00
20.16	0.1170	12047.28	-597.19	-0.00674	0.00	0.00	0.00
20.28	0.1162	12118.99	-597.19	-0.00674	0.00	0.00	0.00
20.40	0.1153	12190.70	-597.19	-0.00674	0.00	0.00	0.00
20.52	0.1145	12262.41	-597.19	-0.00674	0.00	0.00	0.00
20.64	0.1136	12334.12	-597.19	-0.00674	0.00	0.00	0.00
20.76	0.1128	12405.83	-597.19	-0.00674	0.00	0.00	0.00
20.88	0.1119	12477.54	-597.19	-0.00674	0.00	0.00	0.00
21.00	0.1111	12549.25	-597.19	-0.00674	0.00	0.00	0.00
21.12	0.1102	12620.96	-597.19	-0.00674	0.00	0.00	0.00
21.24	0.1094	12692.67	-597.19	-0.00674	0.00	0.00	0.00
21.36	0.1085	12764.38	-597.19	-0.00674	0.00	0.00	0.00
21.48	0.1077	12836.09	-597.19	-0.00674	0.00	0.00	0.00
21.60	0.1068	12907.80	-597.19	-0.00674	0.00	0.00	0.00
21.72	0.1060	12979.51	-597.19	-0.00674	0.00	0.00	0.00
21.84	0.1051	13051.22	-597.19	-0.00674	0.00	0.00	0.00
21.96	0.1043	13122.93	-597.19	-0.00674	0.00	0.00	0.00
22.08	0.1034	13194.64	-597.19	-0.00674	0.00	0.00	0.00
22.20	0.1026	13266.35	-597.19	-0.00674	0.00	0.00	0.00
22.32	0.1017	13338.06	-597.19	-0.00674	0.00	0.00	0.00
22.44	0.1009	13409.77	-597.19	-0.00674	0.00	0.00	0.00
22.56	0.1000	13481.48	-597.19	-0.00674	0.00	0.00	0.00
22.68	0.0992	13553.19	-597.19	-0.00674	0.00	0.00	0.00
22.80	0.0983	13624.90	-597.19	-0.00674	0.00	0.00	0.00
22.92	0.0975	13696.61	-597.19	-0.00674	0.00	0.00	0.00
23.04	0.0966	13768.32	-597.19	-0.00674	0.00	0.00	0.00
23.16	0.0958	13840.03	-597.19	-0.00674	0.00	0.00	0.00
23.28	0.0949	13911.74	-597.19	-0.00674	0.00	0.00	0.00
23.40	0.0941	13983.45	-597.19	-0.00674	0.00	0.00	0.00
23.52	0.0932	14055.16	-597.19	-0.00674	0.00	0.00	0.00
23.64	0.0924	14126.87	-597.19	-0.00674	0.00	0.00	0.00
23.76	0.0915	14198.58	-597.19	-0.00674	0.00	0.00	0.00
23.88	0.0907	14270.29	-597.19	-0.00674	0.00	0.00	0.00
24.00	0.0898	14342.00	-597.19	-0.00674	0.00	0.00	0.00

39.4493	2.00835	3.01E+07	-4.09E...	-6.77E+06	0.33	4.18E+12
360.7755	54800.	0.00				
39.7952	-2.00339	3.04E+07	-4.14E...	-6.77E+06	0.33	4.20E+12
370.4800	55400.	0.00				
40.1902	-2.00E+0	3.06E+07	-4.19E...	-6.77E+06	0.33	4.22E+12
380.2250	55970.	0.00				
40.5852	-2.00179	3.08E+07	-4.24E...	-6.77E+06	0.33	4.24E+12
391.5334	56715.	0.00				
40.9802	-2.00179	3.10E+07	-4.29E...	-6.77E+06	0.33	4.26E+12
400.2370	57283.	0.00				
41.3752	-2.00447	3.12E+07	-4.29E...	-6.77E+06	0.33	4.28E+12
410.1206	57901.	0.00				
41.7702	-2.00179	3.14E+07	-4.34E...	-6.77E+06	0.33	4.30E+12
420.7344	58606.	0.00				
42.1652	-2.00179	3.16E+07	-4.37E...	-6.77E+06	0.33	4.32E+12
430.2864	59241.	0.00				
42.5602	-2.00179	3.18E+07	-4.39E...	-6.77E+06	0.33	4.34E+12
439.7954	59911.	0.00				
42.9553	-2.00179	3.20E+07	-4.42E...	-6.77E+06	0.33	4.36E+12
449.3044	60581.	0.00				
43.3503	-2.00179	3.22E+07	-4.45E...	-6.77E+06	0.33	4.38E+12
458.8134	61251.	0.00				
43.7453	-2.00179	3.24E+07	-4.47E...	-6.77E+06	0.33	4.40E+12
468.3224	61921.	0.00				
44.1403	-2.00179	3.26E+07	-4.50E...	-6.77E+06	0.33	4.42E+12
477.8314	62591.	0.00				
44.5353	-2.00179	3.28E+07	-4.53E...	-6.77E+06	0.33	4.44E+12
487.3404	63261.	0.00				
44.9303	-2.00179	3.30E+07	-4.55E...	-6.77E+06	0.33	4.46E+12
496.8494	63931.	0.00				
45.3253	-2.00179	3.32E+07	-4.58E...	-6.77E+06	0.33	4.48E+12
506.3584	64601.	0.00				
45.7203	-2.00179	3.34E+07	-4.61E...	-6.77E+06	0.33	4.50E+12
515.8674	65271.	0.00				
46.1153	-2.00179	3.36E+07	-4.63E...	-6.77E+06	0.33	4.52E+12
525.3764	65941.	0.00				
46.5104	-2.00179	3.38E+07	-4.66E...	-6.77E+06	0.33	4.54E+12
534.8854	66611.	0.00				
46.9054	-2.00179	3.40E+07	-4.69E...	-6.77E+06	0.33	4.56E+12
544.3944	67281.	0.00				
47.3004	-2.00179	3.42E+07	-4.71E...	-6.77E+06	0.33	4.58E+12
553.9034	67951.	0.00				
47.6954	-2.00179	3.44E+07	-4.74E...	-6.77E+06	0.33	4.60E+12
563.4124	68621.	0.00				
48.0904	-2.00179	3.46E+07	-4.77E...	-6.77E+06	0.33	4.62E+12
572.9214	69291.	0.00				
48.4854	-2.00179	3.48E+07	-4.79E...	-6.77E+06	0.33	4.64E+12
582.4304	69961.	0.00				
48.8804	-2.00179	3.50E+07	-4.82E...	-6.77E+06	0.33	4.66E+12
591.9394	70631.	0.00				
49.2754	-2.00179	3.52E+07	-4.85E...	-6.77E+06	0.33	4.68E+12
601.4484	71301.	0.00				
49.6704	-2.00179	3.54E+07	-4.87E...	-6.77E+06	0.33	4.70E+12
610.9574	71971.	0.00				
50.0654	-2.00179	3.56E+07	-4.90E...	-6.77E+06	0.33	4.72E+12
620.4664	72641.	0.00				
50.4604	-2.00179	3.58E+07	-4.93E...	-6.77E+06	0.33	4.74E+12
629.9754	73311.	0.00				
50.8554	-2.00179	3.60E+07	-4.95E...	-6.77E+06	0.33	4.76E+12
639.4844	73981.	0.00				
51.2504	-2.00179	3.62E+07	-4.98E...	-6.77E+06	0.33	4.78E+12
648.9934	74651.	0.00				
51.6454	-2.00179	3.64E+07	-5.01E...	-6.77E+06	0.33	4.80E+12
658.5024	75321.	0.00				
52.0404	-2.00179	3.66E+07	-5.03E...	-6.77E+06	0.33	4.82E+12
668.0114	75991.	0.00				

Transcribed complete pile response using nonlinear soil reaction-p-y curves. Values of total applied load, pile-head deflection, and bending moments are computed only to a limited number of significant figures. The actual behavior is accurate and stable. However, truncated values may be incorrectly interpreted as being inaccurate. Users should be aware of the capabilities and limitations of the computer program.

Output Summary for Load Case No. 1:

Pile-head deflection	[illegible] inches
Computed slope at pile head	[illegible] radians
Maximum bending moment	[illegible] inch-lbs
Maximum shear force	[illegible] lbs
Depth of maximum bending moment	[illegible] inches
Depth of maximum shear force	[illegible] inches
Number of Cycles	1
Number of soil deflection points	1

Summary of Pile-head Responses for Specified Values

Definitions of Pile-head Loading Conditions:

Load Type 1: Load = Shear, V, Lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load = Shear, V, Lbs, and Load 2 = Slope, S, radians
Load Type 3: Load = Shear, V, Lbs, and Load 2 = Rotational Stiffness, R, in-lbs/rad.
Load Type 4: Load = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case Number	Load Type	Pile-Head Load 1	Load 2	Max Bending Moment, in-lbs	Max Shear Force, lbs	Pile-Head Deflection, inches	Pile-Head Slope, radians
1	1	2000.	0.	1.57E+07	2000.	2.72E+00	-2.00E-03
1.1E+12	1.1E+12						
2	1	3000.	0.	2.36E+07	3000.	4.08E+00	-3.00E-03
5111.	2124.00						
3	1	3600.	0.	2.83E+07	3600.	5.03E+00	-3.60E-03
5978.	1.32E+07						

[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]

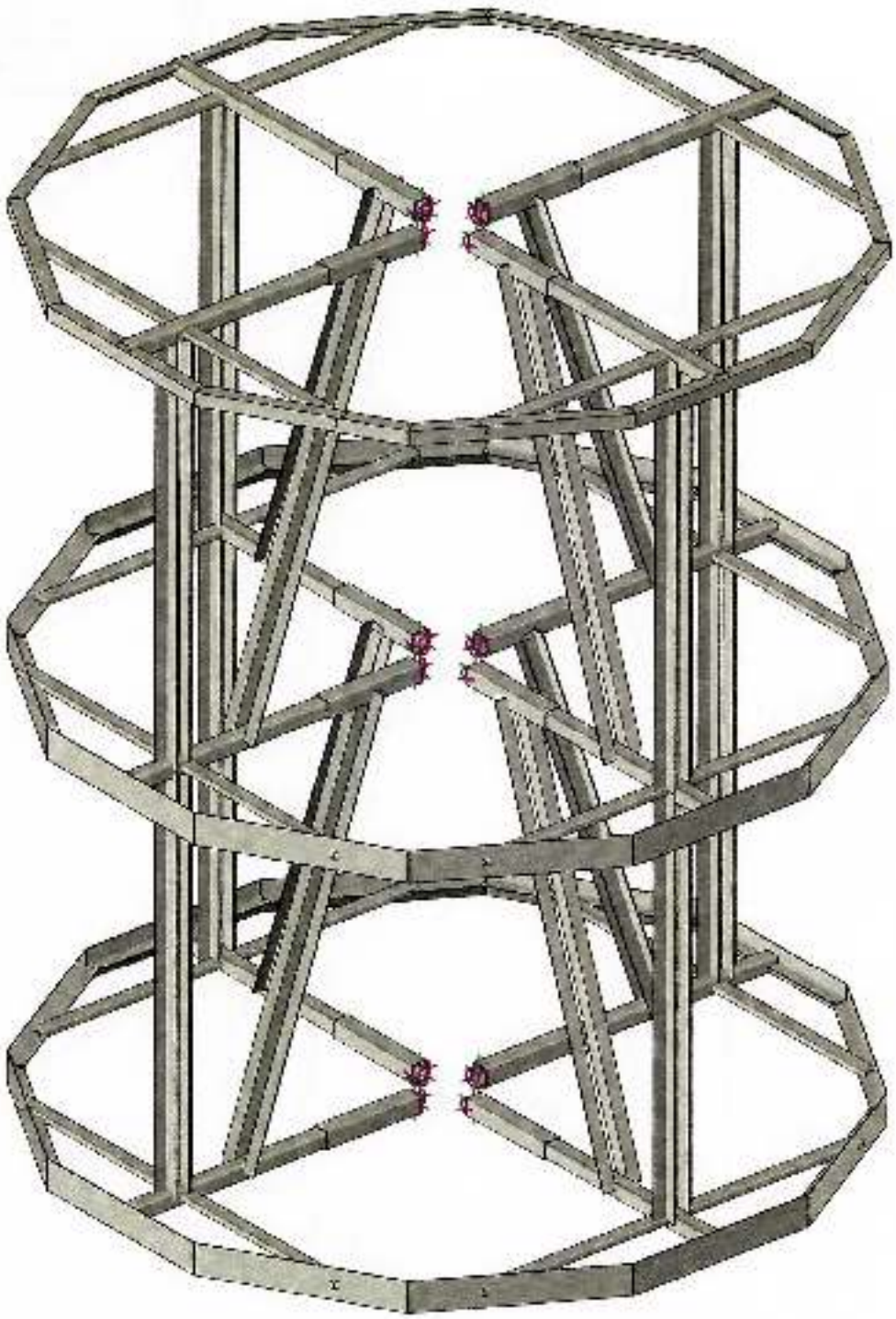
Summary of Warning Messages

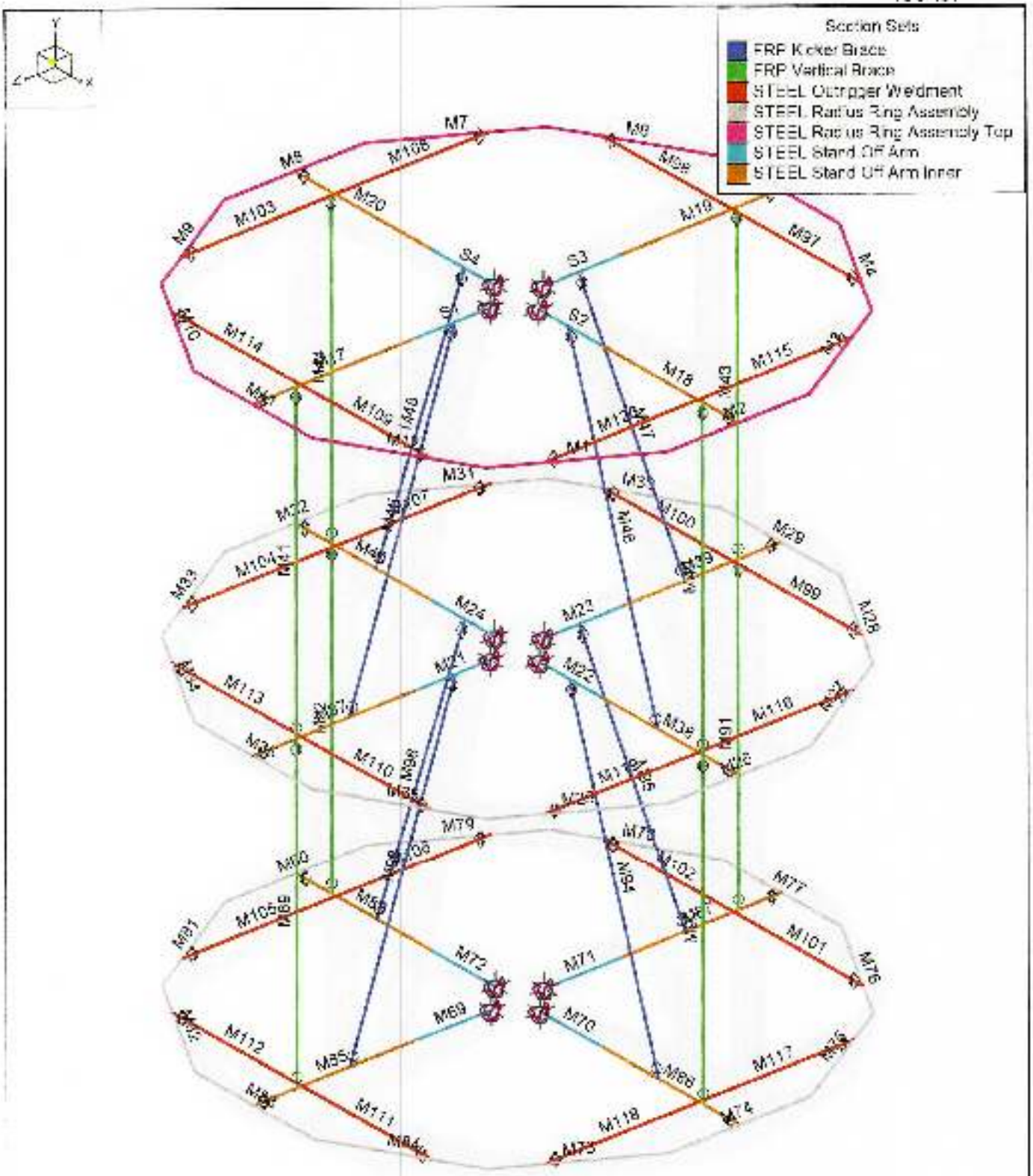
[illegible] following warning was reported [illegible] times:

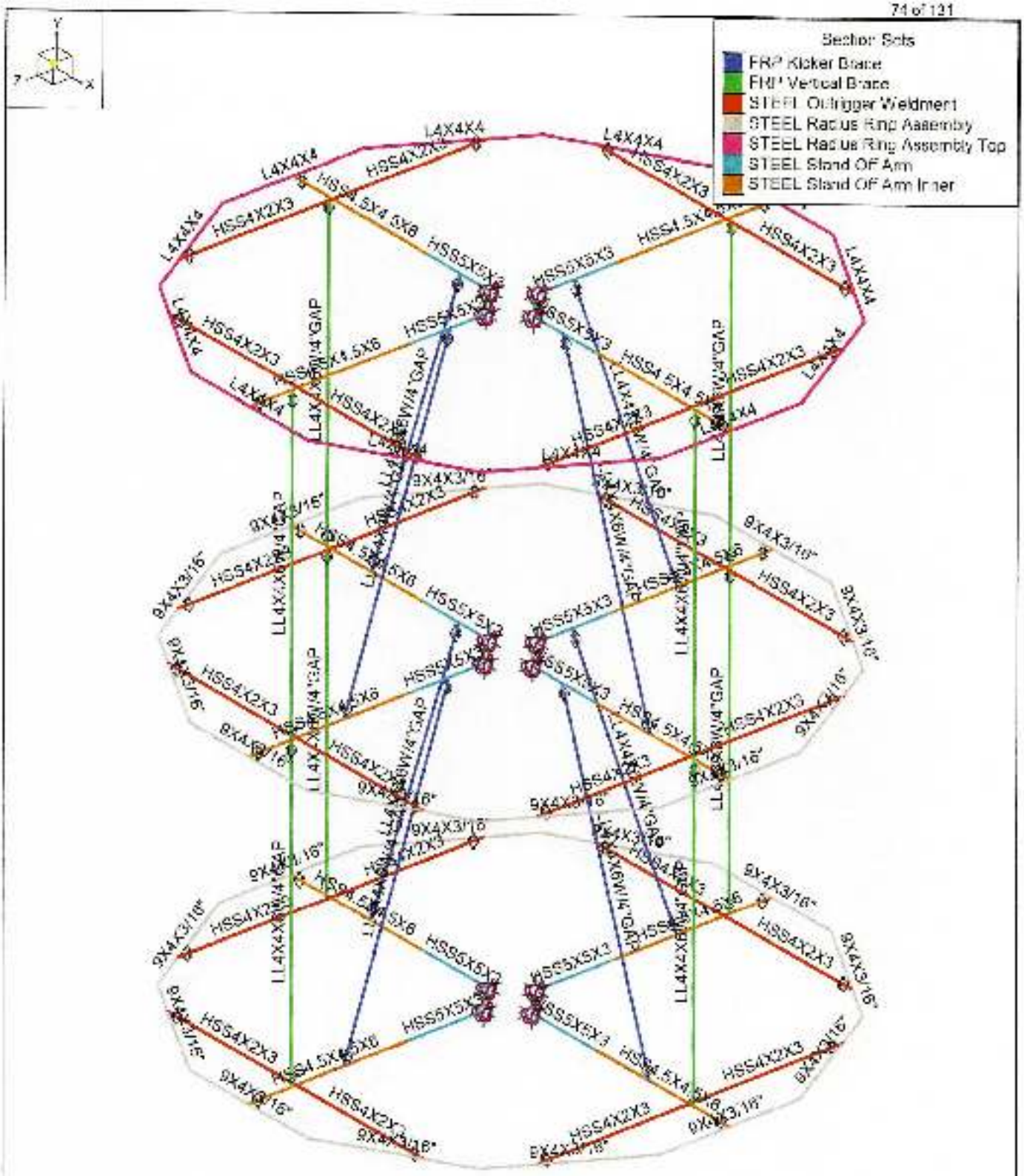
*** Warning ***

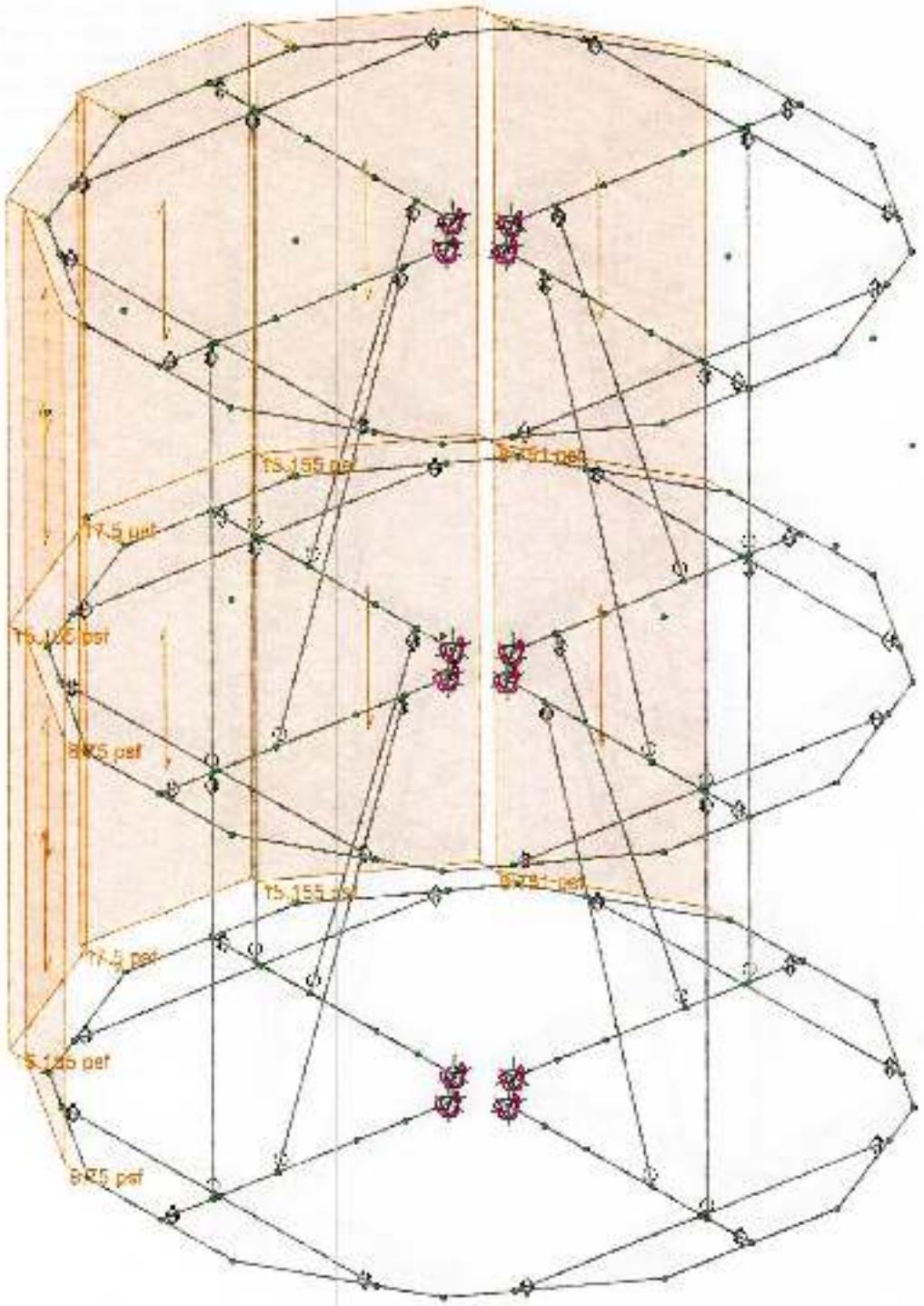
[illegible] value for friction angle is either smaller than 10 degrees or
higher than 70 degrees and no value of b has been specified for a soil layer
defined using the same criteria. Program LEM assigns an internal default value,
[illegible], but the friction angle is outside the range of [illegible]
Please check your input data for correctness.

The analysis ended normally



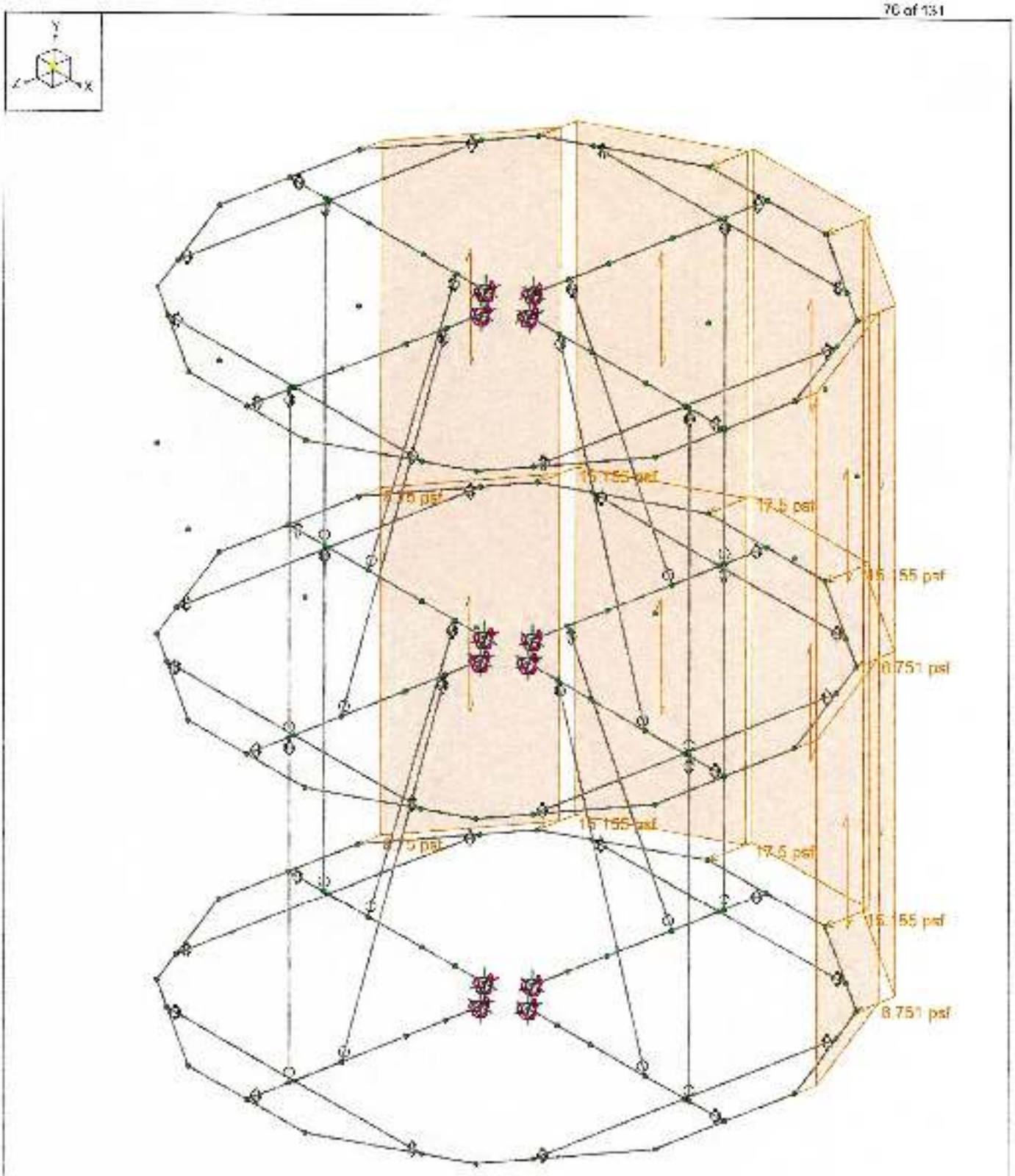

Section Sets
FRP Kicker Brace
FRP Vertical Brace
STEEL Outrigger Weldment
STEEL Radius Ring Assembly
STEEL Radius Ring Assembly Top
STEEL Stand Off Arm
STEEL Stand Off Arm Inner


Section Sets
FRP Kicker Brace
FRP Vertical Brace
STEEL Outrigger Weldment
STEEL Radius Ring Assembly
STEEL Radius Ring Assembly Top
STEEL Stand Off Arm
STEEL Stand Off Arm Inner
L4X4X4
HSS4X2X3
HSS5X5X3
HSS5X5X6
9X4X3/16"
LL4X4X6W1/4"GAP



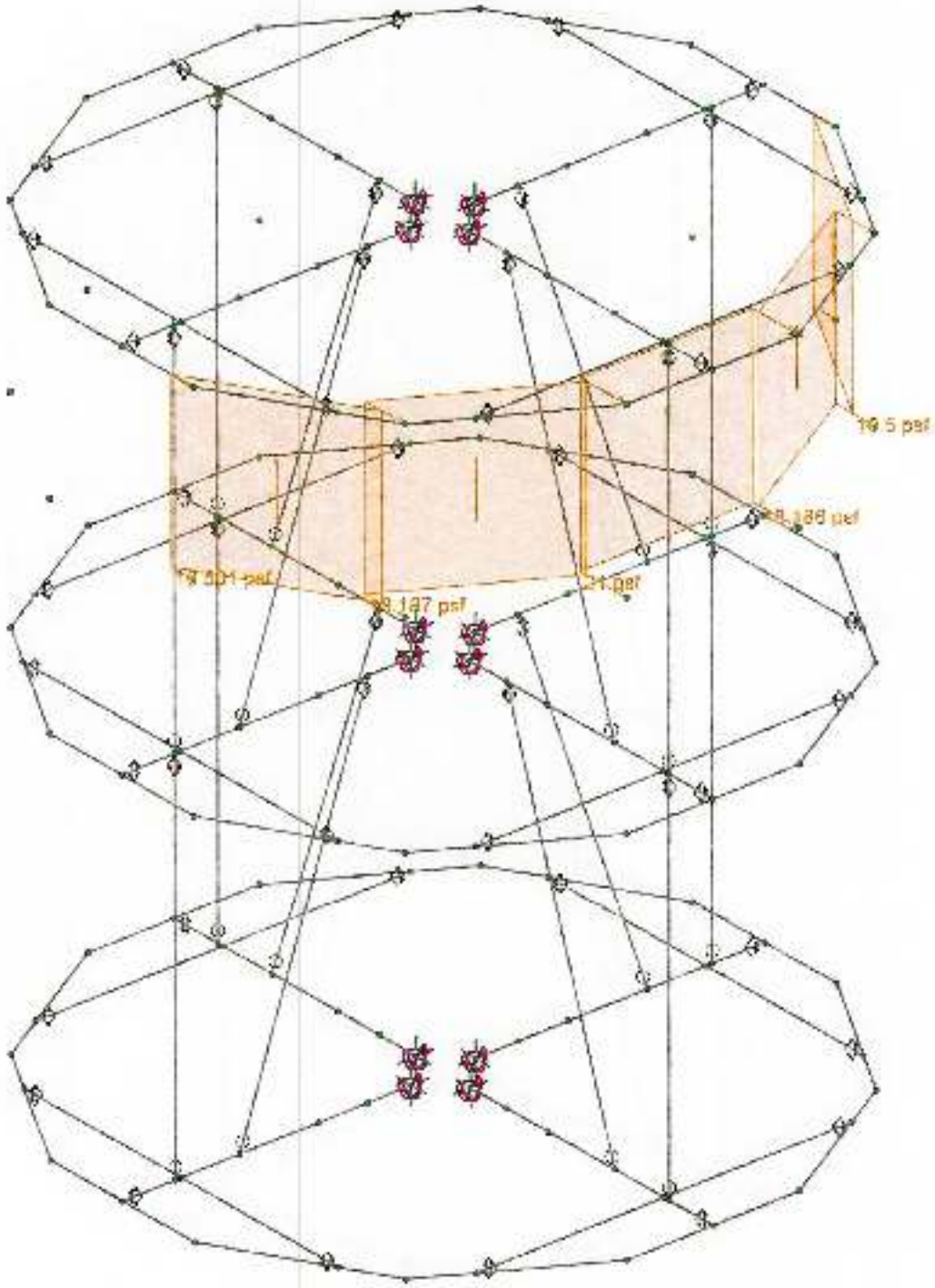
Loads: BLC 2, WL X

RISA	Vector SF		SK-4
			Oct 24, 2024 at 10:53 AM
			NM: 149 Spks Concealmen...



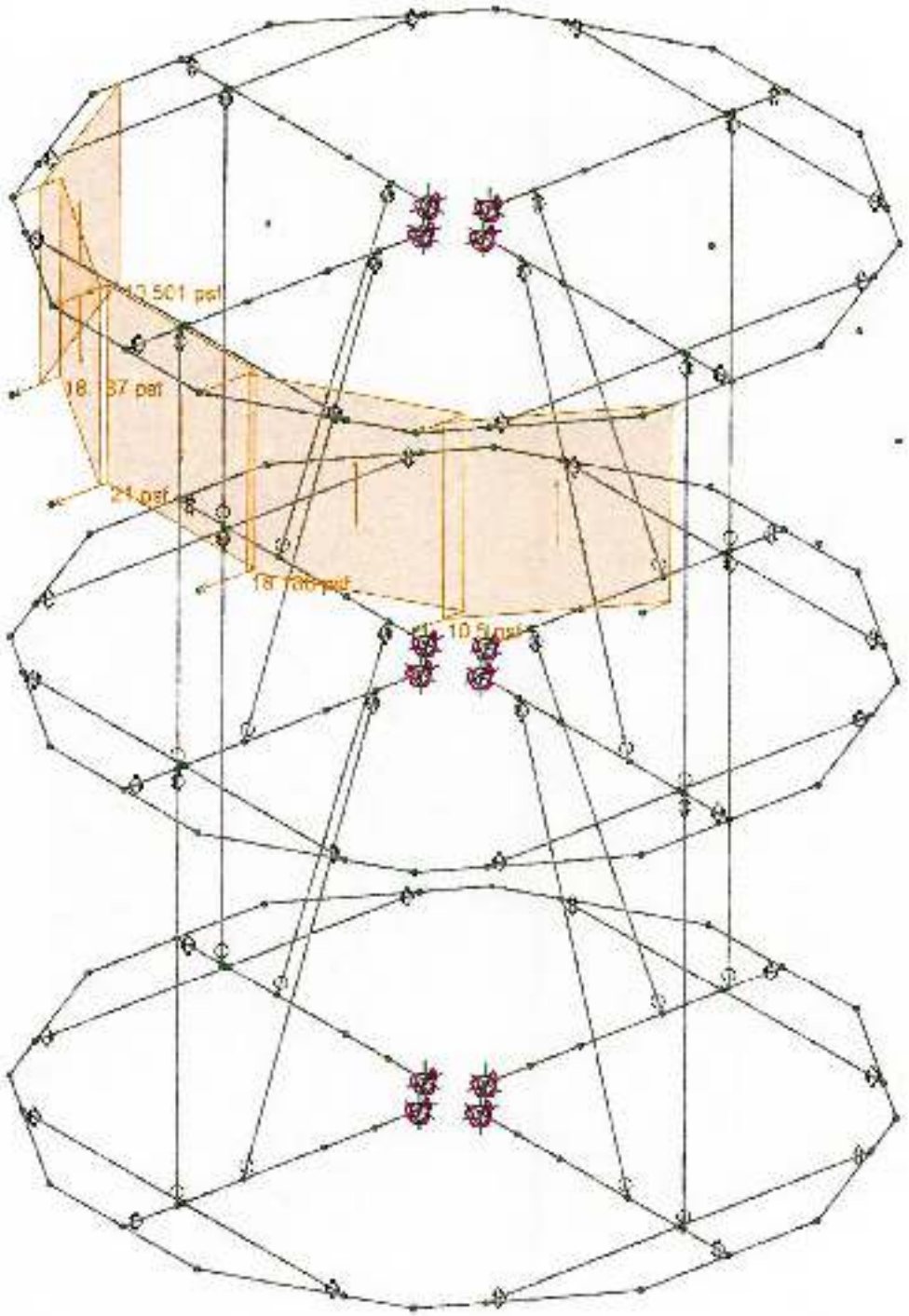
Loads: BLC 3, WLZ

RISA	Vector SE		SK-6
			Oct 24, 2024 at 10:53 AM
			NM1-148 Spike Concealment ...



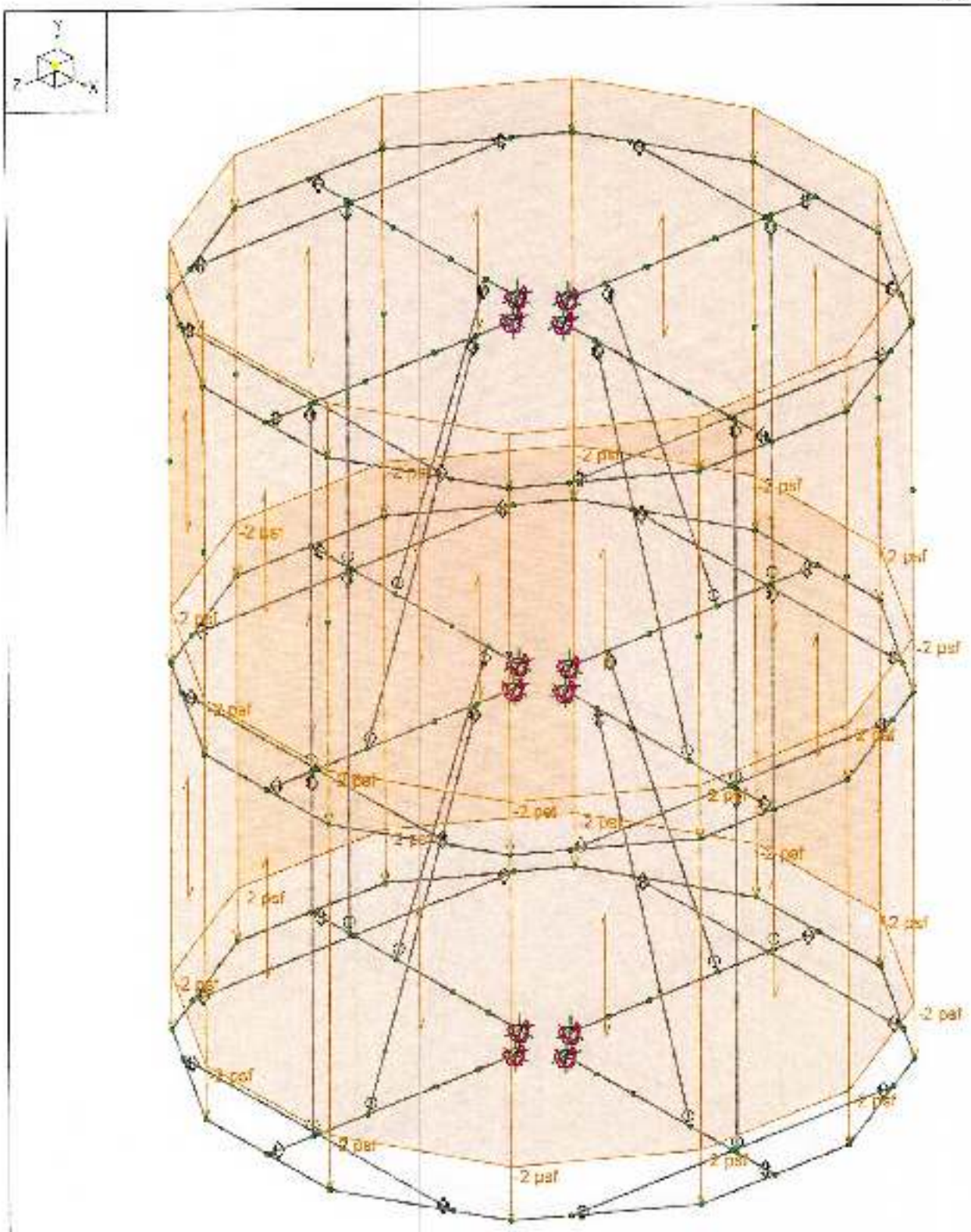
Loads: BLC 4 W_X Inside

RISA	Vector SE		SK 6
			Oct 24, 2024 at 10:54 AM
			NM1-148 Spike Concealmer...



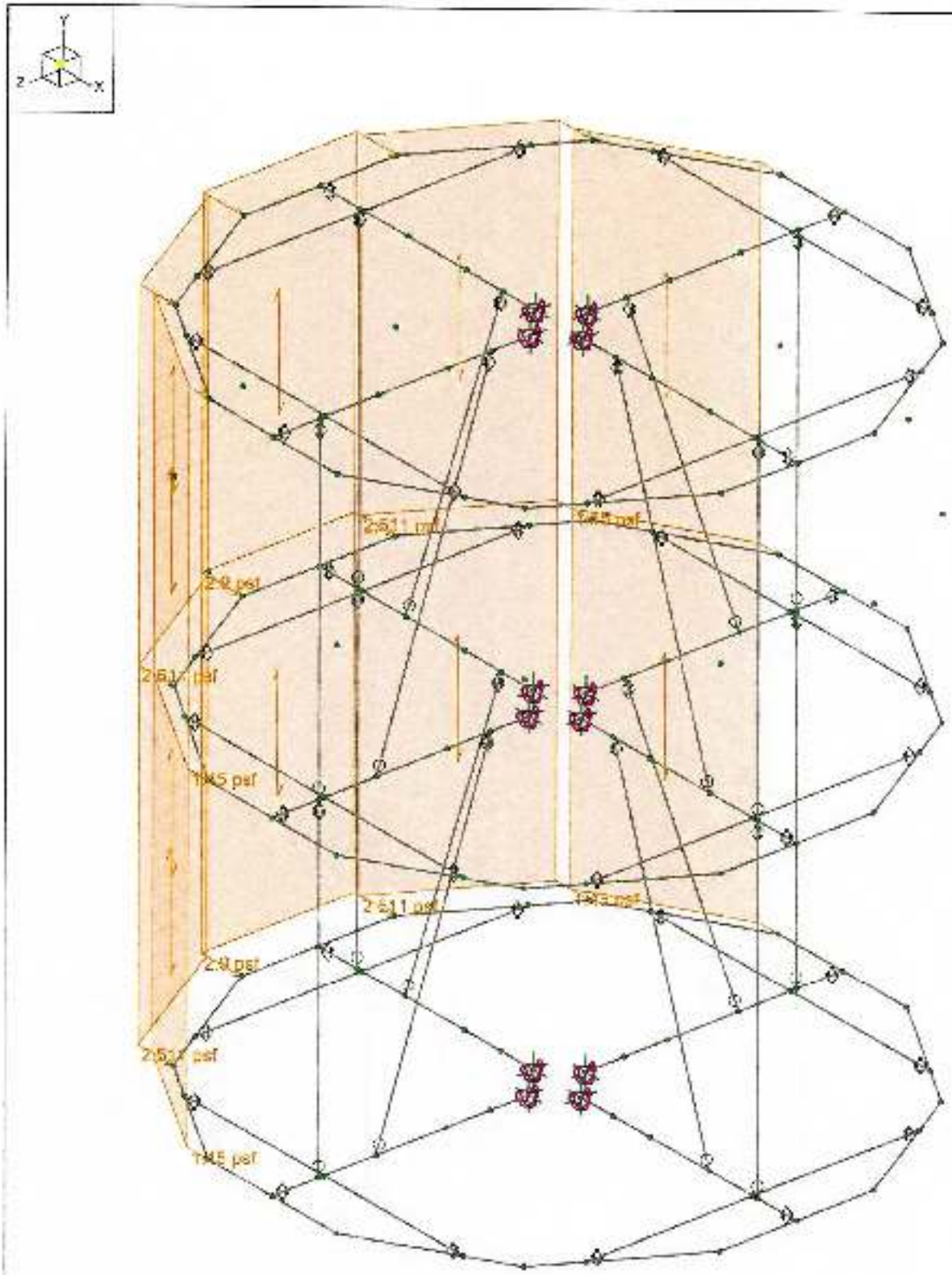
Loads: BLC 5, Wl Z Inside

RISA	Vector SF	SK-7
		Oct 24, 2024 at 10:54 AM
		NM1-14d Spike Concealmen...



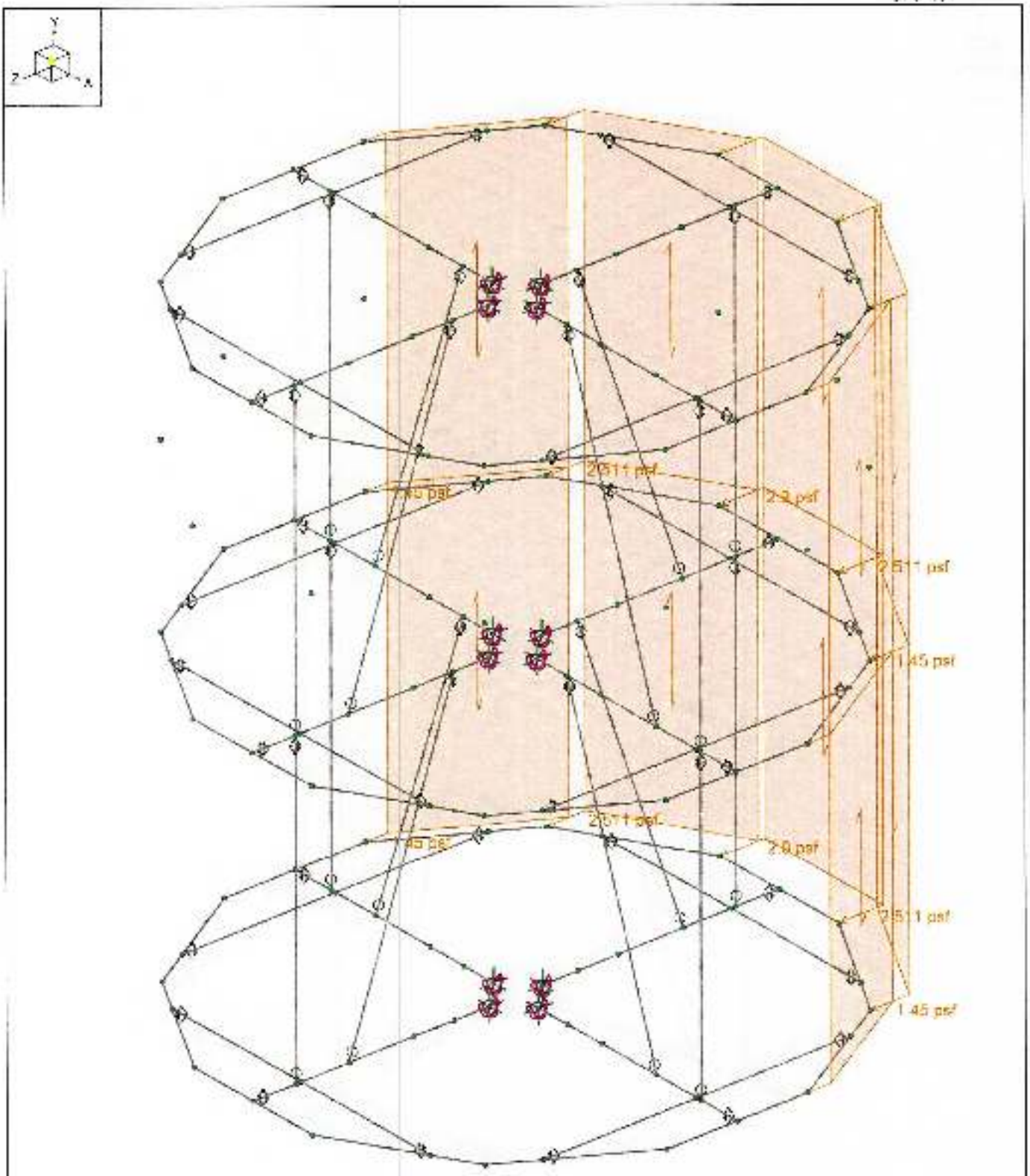
Loads: BLC 8, Panels

RISA	Vector SE		SK-8
			Oct 24, 2024 at 10:54 AM
			NV1-115 Solke Concealmen...



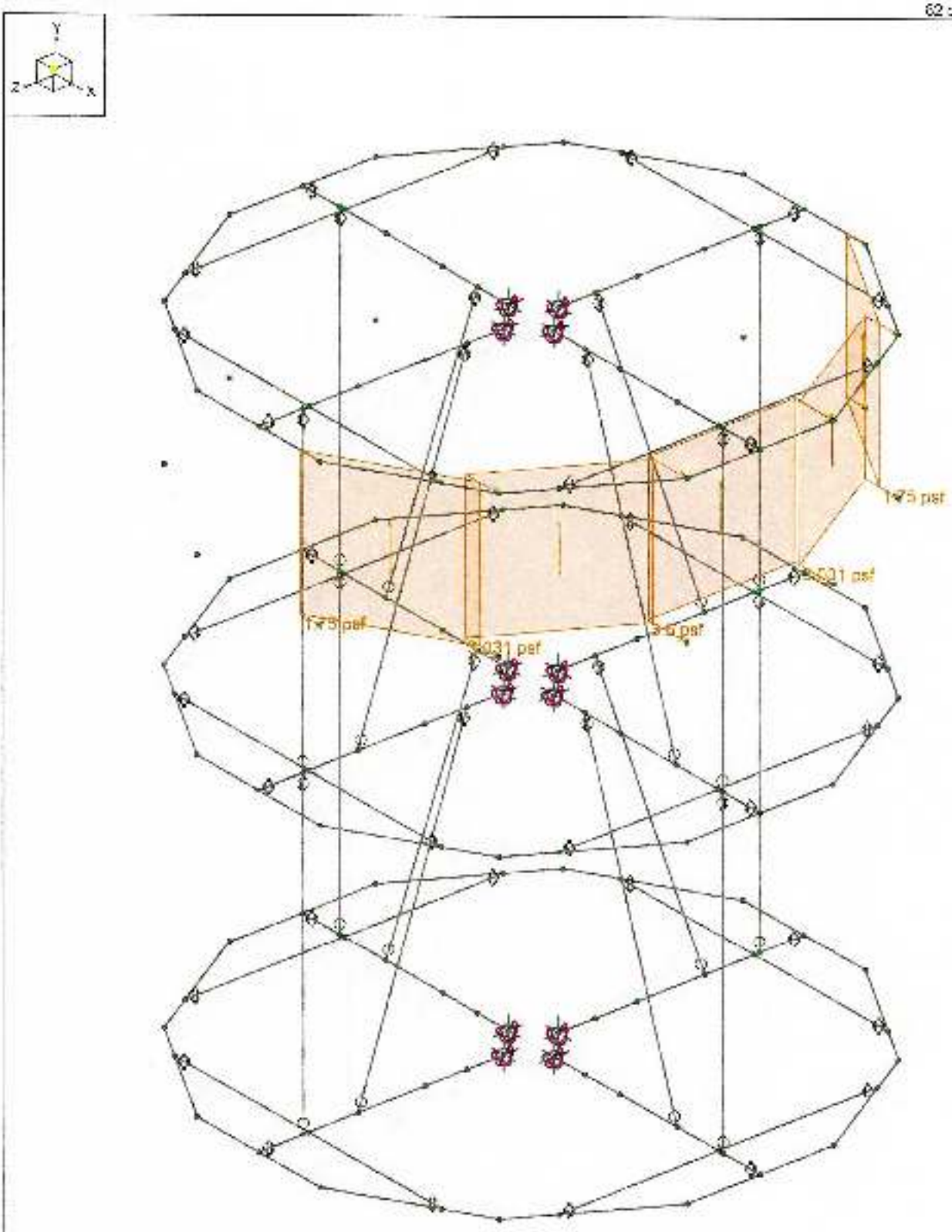
Loads: BLC 8 W: X cn

RISA	Vector SE		SK-9
			Oct 24, 2024 at 10:54 AM
			NM -145 Spike Concealmen...



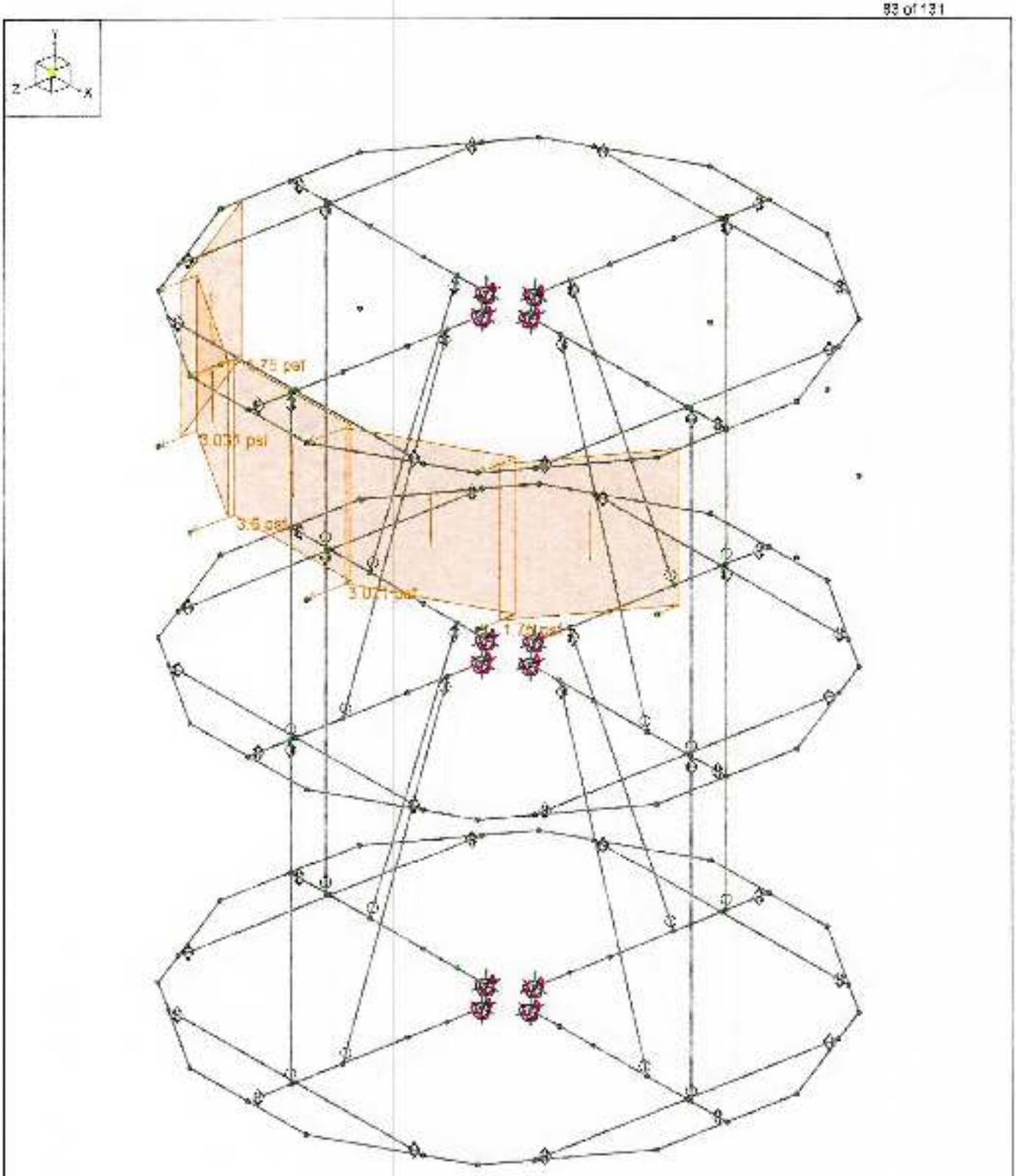
Loads: BLC 9, WL 7 Ice

RISA	Vector SE		SK-10
			Oct 24, 2024 at 10:54 AM
			NV1-145 Solid Concealmen..



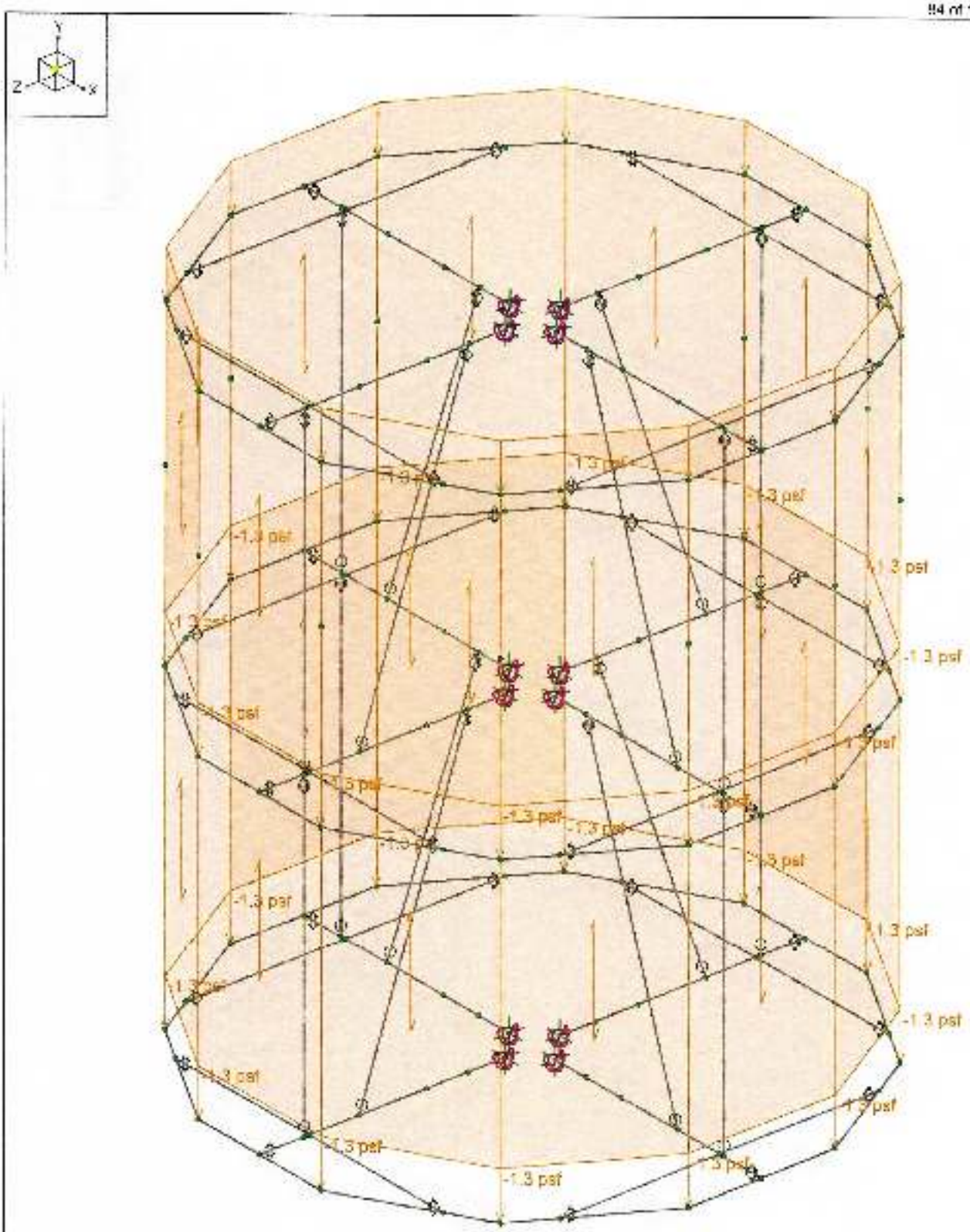
Loads: BLC 10, WLX Ice Inside

RISA	Vector SE		SK-11
			Oct 24, 2024 at 10:54 AM
			NM1-148 Spike Concealmen...



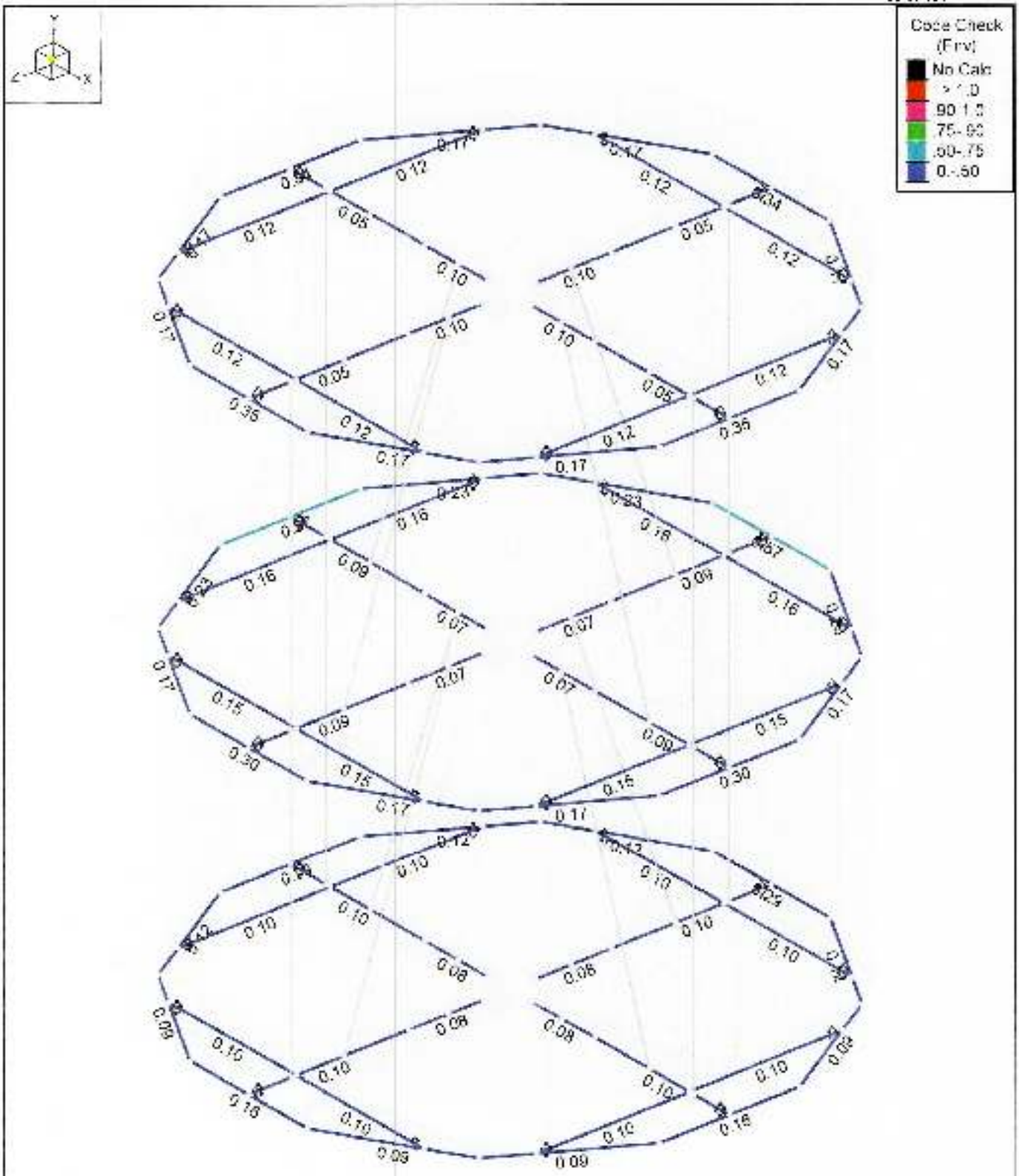
Loads: BLC 11, WLZ Ice Inside

IRISA	Vestar SE	SK-12
		Oct 24, 2021 at 10:54 AM
		NM1-148 Spike Concealmen...



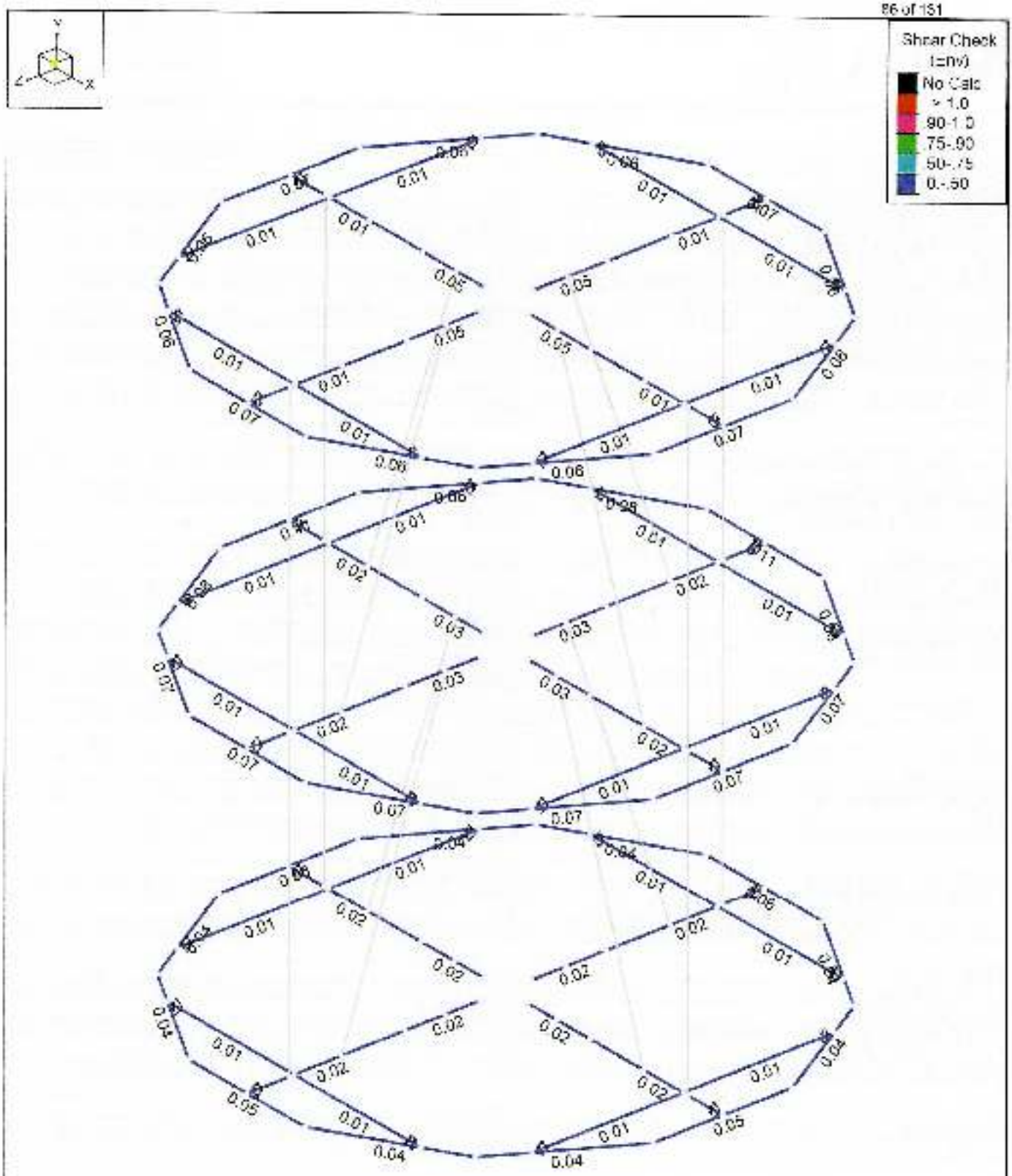
Loads: BLC 12, Ice Weight

RISA	Vector SE	SK-13
		Oct 24, 2024 at 10:54 AM
		NM1-148 Spike Concealmen...



Member Code Checks Displayed (Envelope)

RISA	Vector SE	SK-14
		Oct 21, 2024 at 10:54 AM
		NM1-148 Spike Connection ...



Member Shear Checks Displayed (Enveloped)

RISA	Vector SE		SK-15
			Oct 24, 2024 at 10:55 AM
			NM: 146 Spike Concealmen

Model Settings

Number of Reported Sections	5
Number of Internal Sections	100
Member Area Load Mesh Size (in²)	144
Consider Shear Deformation	Yes
Consider Torsional Warping	Yes
Approximate Mesh Size (in)	24
Transfer Forces Between Intersecting Wood Walls	Yes
Increase Wood Wall Nailing Capacity for Wind Loads	Yes
Include P-Delta for Walls	Yes
Optimize Masonry and Wood Walls	Yes
Maximum Number of Iterations	3
Single	No
Multiple (Optimum)	No
Maximum	Yes

Global Axis corresponding to vertical direction	Y
Convert Existing Data	Yes
Default Global Plane for z-axis	XZ
Plate Local Axis Orientation	Global

Hot Rolled Steel	AISC 15th (360-16): LRFD
Stiffness Adjustment	Yes (Iterative)
National Annex	None
Connections	None
Cold Formed Steel	None
Stiffness Adjustment	Yes (Iterative)
Wood	None
Temperature	< 100F
Concrete	None
Masonry	None
Aluminum	None
Structure Type	Building
Stiffness Adjustment	Yes (Iterative)
Stainless	None
Stiffness Adjustment	Yes (Iterative)

Compression Stress Block	Rectangular Stress Block
Analyze using Cracked Sections	Yes
Leave room for horizontal rebar splices (2*d bar spacing)	No
List forces which were ignored for design in the Detail Report	Yes

Column Min Steel	1
Column Max Steel	6
Rebar Material Spec	ASTM A615
Warn if beam-column framing arrangement is not understood	No
Number of Shear Regions	4
Region 2 & 3 Spacing Increase Increment (in)	4

Code	ASCE 7-16
Risk Category	I or II
Drift Cat	Other

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff [1n/in°F]	Density [k/ft^3]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
2	A500 Gr.B RECT	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
3	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
4	FRP	2800	450	0.3	0.65	0.11	12	1.2	30	1.4

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in^2]	Iyy [in^4]	Izz [in^4]	J [in^4]
1	FRP Kicker Brace	LL4X4X6WM4"GAP	VBrace	None	FRP	Typical	5.719	55.042	8.717	0.251
2	FRP Vertical Brace	LL4X4X6WM4"GAP	VBrace	None	FRP	Typical	5.719	55.042	8.717	0.251
3	STEEL Outrigger Weldment	HSS4X2X3	Beam	None	A500 Gr.B RECT	Typical	1.89	1.22	3.56	3.08
4	STEEL Radius Ring Assembly	9X4X3/16"	Beam	None	A36 Gr.36	Typical	2.409	11.423	2.887	0.028
5	STEEL Radius Ring Assembly Top	L4X4X4	Beam	None	A36 Gr.36	Typical	1.93	3	3	0.044
6	STEEL Stand Off Arm	HSS5X5X2	Beam	None	A500 Gr.B RECT	Typical	3.29	12.6	12.6	19.9
7	STEEL Stand Off Arm Inner	HSS4.5X4.5X6	Beam	None	A500 Gr.B RECT	Typical	5.48	15.3	15.3	25.7

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor
1	1.0D	Yes	Y	DL	1				
2	1.4D	Yes	Y	DL	1.4				
3	1.2D+1.6L	Yes	Y	DL	1.2	LL	1.6		
4	1.2D + 0.5LL + 1.0WLx	Yes	Y	DL	1.2	LL	0.5	WLX	1
5	1.2D + 0.5LL + 1.0WLz	Yes	Y	DL	1.2	LL	0.5	WLZ	1
6	1.2D + 0.5LL - 1.0WLx	Yes	Y	DL	1.2	LL	0.5	WLX	-1
7	1.2D + 0.5LL - 1.0WLz	Yes	Y	DL	1.2	LL	0.5	WLZ	-1
8	1.2D + 1.0WLx	Yes	Y	DL	1.2	WLX	1		
9	1.2D + 1.0WLz	Yes	Y	DL	1.2	WLZ	1		
10	1.2D - 1.0WLx	Yes	Y	DL	1.2	WLX	-1		
11	1.2D - 1.0WLz	Yes	Y	DL	1.2	WLZ	-1		
12	0.9D + 1.0WLx	Yes	Y	DL	0.9	WLX	1		
13	0.9D + 1.0WLz	Yes	Y	DL	0.9	WLZ	1		
14	0.9D - 1.0WLx	Yes	Y	DL	0.9	WLX	-1		
15	0.9D - 1.0WLz	Yes	Y	DL	0.9	WLZ	-1		
16	1.2D + 1.0D + 1.0Wlx	Yes	Y	DL	1.2	OL1	1	OL2	1
17	1.2D + 1.0D + 1.0Wlz	Yes	Y	DL	1.2	OL1	1	OL3	1
18	1.2D + 1.0D - 1.0Wlx	Yes	Y	DL	1.2	OL1	1	OL2	-1
19	1.2D + 1.0D - 1.0Wlz	Yes	Y	DL	1.2	OL1	1	OL3	-1

Envelope Maximum Member Section Forces

	Member		Axial[lb]	Loc[ft]	LC	Vy Shear[lb]	Loc[ft]	LC	Vz Shear[lb]	Loc[ft]	LC	Torque[lb-ft]	Loc[ft]	LC	My-y Moment[lb-ft]	Loc[ft]	LC	Mz-z Moment[lb-ft]	Loc[ft]	LC
1	M96	max	1414.201	0	14	11.722	0	2	0	10.5919	19	0	10.5919	19	0	10.5919	19	0	10.5919	19
2		min	-2362.771	10.5919	16	-11.722	10.59	2	0	0	1	0	0	1	0	0	1	-31.034	5.295	2
3	M94	max	1418.207	0	12	11.722	0	2	0	10.5919	19	0	10.5919	19	0	10.5919	19	0	10.5919	19
4		min	-2361.772	10.5919	16	-11.722	10.59	2	0	0	1	0	0	1	0	0	1	-31.034	5.295	2
5	M93	max	1418.207	0	13	11.722	0	2	0	10.5919	19	0	10.5919	19	0	10.5919	19	0	10.5919	19
6		min	-2361.772	10.5919	19	11.722	10.59	2	0	0	1	0	0	1	0	0	1	-31.034	5.295	2
7	M95	max	1414.201	0	15	11.722	0	2	0	10.5919	19	0	10.5919	19	0	10.5919	19	0	10.5919	19
8		min	-2362.771	10.5919	17	-11.722	10.59	2	0	0	1	0	0	1	0	0	1	-31.034	5.295	2
9	M48	max	1446.864	0	14	11.722	0	2	0	10.5919	19	0	10.5919	19	0	10.5919	19	0	10.5919	19
10		min	-2394.567	10.5919	16	-11.722	10.59	2	0	0	1	0	0	1	0	0	1	-31.034	5.295	2
11	M47	max	1446.864	0	15	11.722	0	2	0	10.5919	19	0	10.5919	19	0	10.5919	19	0	10.5919	19
12		min	-2394.567	10.5919	17	-11.722	10.59	2	0	0	1	0	0	1	0	0	1	-31.034	5.295	2

Envelope Maximum Member Section Forces (Continued)

	Member		Axial[lb]	Loc[ft]	LC	y Shear[lb]	Loc[ft]	LC	z Shear[lb]	Loc[ft]	LC	Torque[lb-ft]	Loc[ft]	LC	y Moment[lb-ft]	Loc[ft]	LC	z Moment[lb-ft]	Loc[ft]	LC
13	M46	max	-1448.251	0	12	11.722	0	2	0	10.59	19	0	10.59	18	0	10.59	18	0	10.59	19
14		min	-2383.886	10.59	18	-11.722	10.59	2	0	0	1	0	0	1	0	0	1	-31.024	5.295	2
15	M45	max	-1448.251	0	13	11.722	0	2	0	10.59	19	0	10.59	18	0	10.59	19	0	10.59	19
16		min	-2383.886	10.59	19	-11.722	10.59	2	0	0	1	0	0	1	0	0	1	-31.024	5.295	2
17	M89	max	905.661	0	19	0	10	19	0	10	19	0	10	19	0	10	19	0	10	19
18		min	501.605	10	13	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
19	M90	max	905.661	0	18	0	10	18	0	10	18	0	10	19	0	10	19	0	10	19
20		min	501.605	10	12	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
21	M91	max	906.079	0	17	0	10	19	0	10	19	0	10	19	0	10	19	0	10	19
22		min	499.864	10	15	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
23	M42	max	1083.508	0	18	0	10	19	0	10	19	0	10	19	0	10	19	0	10	19
24		min	640.67	10	12	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
25	M41	max	1083.508	0	19	0	10	19	0	10	19	0	10	19	0	10	19	0	10	19
26		min	640.67	10	13	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
27	M44	max	1083.507	0	16	0	10	19	0	10	19	0	10	19	0	10	19	0	10	19
28		min	640.956	10	14	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
29	M92	max	906.079	0	16	0	10	19	0	10	19	0	10	19	0	10	19	0	10	19
30		min	499.864	10	14	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
31	M43	max	1083.507	0	17	0	10	19	0	10	19	0	10	19	0	10	19	0	10	19
32		min	640.956	10	15	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
33	M31	max	1072.307	4.658	10	405.526	1.504	12	104.12	4.658	18	19.793	1.455	19	58.031	4.658	19	492.438	4.61	19
34		min	-1058.54	4.658	12	-407.959	1.504	6	-46.96	1.504	16	11.031	1.504	13	-73.859	0	18	-486.494	4.61	12
35	M77	max	471.748	4.658	11	474.391	2.281	11	130.859	2.329	18	11.71	4.659	17	267.953	2.329	17	513.707	2.329	13
36		min	-749.359	2.329	13	-478.853	2.329	7	-131.021	2.329	17	-11.742	0	16	25.126	0	14	-625.536	2.329	7
37	M78	max	545.768	0	11	205.186	3.154	11	30.017	3.154	17	-6.659	3.154	15	42.484	0	17	248.949	0.045	11
38		min	-521.653	0	15	-201.878	3.154	13	-32.515	0	19	-11.009	0	17	-41.086	4.659	16	-241.279	0.097	13
39	M76	max	545.756	4.658	11	201.859	1.504	13	62.514	4.658	16	11.053	4.658	16	42.529	4.658	16	248.914	4.61	11
40		min	-521.651	4.658	13	-205.157	1.504	7	-30.013	1.504	18	6.507	0	14	-41.239	0	16	-241.247	4.561	13
41	M75	max	599.938	3.154	8	127.086	4.659	14	30.011	3.154	17	-6.53	4.660	14	42.579	0	16	179.503	0	8
42		min	-575.737	0	14	-130.845	3.203	4	-62.508	0	19	-11.045	0	16	-41.241	4.659	16	-171.773	0	11
43	M79	max	545.756	4.658	10	201.859	1.504	12	62.512	4.658	16	11.01	4.659	16	42.49	4.658	16	248.914	4.61	13
44		min	-521.651	4.658	12	-205.157	1.504	5	-30.012	1.504	16	6.959	1.504	14	41.086	0	17	-241.247	4.561	12
45	M36	max	1180.933	3.154	9	256.237	4.659	15	46.928	3.154	18	10.558	3.154	14	69.514	0	16	353.366	0	9
46		min	-1166.028	0	15	-256.914	3.203	5	-104.057	0	16	-19.946	0	16	-74.426	4.659	17	-347.814	0	15
47	M35	max	1127.185	2.329	9	410.613	2.281	9	214.421	2.281	19	17.487	4.659	16	444.316	2.329	19	592.859	2.329	15
48		min	-1112.849	0	15	-410.625	2.329	5	-216.745	2.329	19	-17.455	0	17	37.464	4.659	14	-603.146	2.329	5
49	M34	max	1151.031	4.658	9	258.912	1.456	9	104.05	4.658	18	19.934	4.658	17	69.437	4.658	17	350.397	4.658	9
50		min	-1166.092	1.504	13	-256.257	0	15	-46.902	1.504	16	10.6	0	15	74.426	0	17	347.772	4.658	15
51	M33	max	1072.331	0	10	408	3.154	10	46.966	3.154	16	-10.558	4.659	15	69.514	0	17	492.507	0.045	10
52		min	-1058.581	0	12	-405.576	3.154	12	-104.124	0	18	-19.946	0	17	-74.422	4.659	17	-486.575	0.045	12
53	M32	max	925.705	4.659	10	942.911	2.329	12	214.037	2.281	16	17.487	4.659	17	443.891	2.329	16	1235.293	2.329	12
54		min	-912.475	2.329	12	-950.439	2.329	6	-216.362	2.329	16	-17.574	0	18	37.461	4.659	15	-1245.75	2.329	6
55	M30	max	1072.331	0	11	408	3.154	11	46.966	3.154	17	-11.03	3.154	12	69.023	0	19	492.507	0.045	11
56		min	-1058.581	0	13	-405.576	3.154	13	-104.124	0	19	-19.792	3.203	18	-73.86	4.659	19	-486.575	0.045	13
57	M26	max	1127.185	2.329	8	410.613	2.281	8	215.826	2.329	19	17.486	4.659	16	444.316	2.329	18	592.859	2.329	14
58		min	-1112.849	0	14	-410.625	2.329	4	-216.745	2.329	18	-17.487	0	17	37.465	0	15	-603.146	2.329	4
59	M28	max	1072.307	4.658	11	405.526	1.504	13	104.12	4.658	19	19.948	1.456	15	69.523	4.658	15	492.438	4.61	11
60		min	-1058.54	1.558	13	-407.959	1.504	7	-46.96	1.504	17	10.558	1.504	11	-74.422	0	16	-486.494	4.61	13
61	M29	max	925.705	4.659	11	942.911	2.329	13	215.826	2.329	18	17.375	4.659	18	443.891	2.329	17	1235.293	2.329	13
62		min	-912.475	2.329	13	-950.439	2.329	7	-216.362	2.329	17	-17.487	0	15	37.465	0	14	-1246.78	2.329	7
63	M84	max	599.938	3.154	9	127.086	4.659	15	30.018	3.154	18	-8.506	4.659	14	42.622	0	16	179.503	0	9
64		min	-575.737	0	15	-130.845	3.203	5	-62.517	0	19	-11.052	3.203	15	-41.241	4.659	17	-171.773	0	10
65	M83	max	572.347	2.329	9	206.828	2.281	9	129.696	2.281	18	11.742	4.659	16	268.061	2.329	19	292.537	2.329	10
66		min	-549.693	0	15	-208.537	2.329	5	-131.124	2.329	18	-11.725	0	14	-25.123	4.659	14	-306.963	2.329	5
67	M82	max	599.964	4.658	9	130.85	1.455	9	62.506	4.658	19	11.046	4.658	17	42.583	4.658	17	179.477	4.658	9

Envelope Maximum Member Section Forces (Continued)

	Member		Axial[lb]	Loc[ft]	LC	y Shear[lb]	Loc[ft]	LC	z Shear[lb]	Loc[ft]	LC	Torque[lb-ft]	Loc[ft]	LC	y-y Moment[lb-ft]	Loc[ft]	LC	z-z Moment[lb-ft]	Loc[ft]	LC
68		min	-575.759	1.50415	15	-127.073	0	15	-30.006	1.50416	8	6.531	0	15	-41.241	0	17	-171.752	4.658	15
69	M73	max	599.964	4.658	8	130.65	1.458	9	62.514	4.65817	11	11.053	1.45817	12	42.628	4.658	17	179.477	4.658	8
70		min	-575.759	1.50414	15	-127.073	0	14	-30.013	1.50419	8	6.507	0	15	-41.241	0	16	-171.752	4.658	14
71	M60	max	471.748	4.65816	10	474.391	2.28116	10	129.595	2.28116	11	11.742	4.65917	12	267.953	2.328	16	613.707	2.329	12
72		min	-445.558	2.32912	8	-478.653	2.329	6	-131.021	2.32916	11	-11.71	0	16	25.123	4.659	19	-628.635	2.329	6
73	M25	max	1181.051	4.658	8	258.942	1.456	9	104.083	4.65817	12	19.948	4.65817	12	89.523	4.658	17	353.337	4.658	8
74		min	-1106.092	1.50414	15	-255.251	0	14	-46.92	1.50419	10	10.558	0	15	-74.426	0	16	-347.772	4.658	14
75	M74	max	572.347	2.328	8	208.825	2.281	8	130.859	2.32919	11	11.725	4.65815	12	266.061	2.329	16	292.337	2.329	14
76		min	-548.693	0	14	-205.537	2.329	4	-131.124	2.32918	11	-11.742	0	17	25.126	0	15	326.963	2.329	4
77	M27	max	1180.933	5.154	8	256.237	4.658	14	46.911	5.15417	10	10.599	5.15414	12	89.429	0	16	353.366	0	6
78		min	-1166.028	0	14	-259.914	5.203	4	-104.064	0	19	19.902	0	16	-74.426	4.659	16	-347.814	0	14
79	MB1	max	545.766	0	10	205.188	5.15410	10	30.018	5.15419	8	8.506	5.15415	12	42.622	0	17	248.949	0.049	10
80		min	-521.559	0	12	-201.978	5.15412	8	-82.517	0	17	-11.252	5.20017	8	-41.239	4.659	17	-241.279	0.097	12
81	M1	max	1161.403	4.658	8	69.213	4.65818	8	306.015	1.50413	16	16.22	1.45816	12	320.076	4.658	8	263.337	4.658	12
82		min	-1051.595	4.65814	8	-17.536	1.50419	8	-326.222	1.504	6	7.945	1.50414	8	-294.19	4.65814	8	-342.409	4.658	6
83	M2	max	1045.489	2.329	8	131.65	2.32917	8	733.885	2.329	8	12.733	4.65915	8	725.485	2.329	10	492.88	2.329	14
84		min	-970.539	0	14	-131.779	2.32918	8	-729.272	2.251	4	-12.732	0	15	599.266	2.329	12	-901.105	2.329	4
85	M3	max	1161.396	0	8	17.543	5.15418	8	329.237	5.15419	8	-7.915	5.15414	8	320.12	0	8	263.379	0	12
86		min	-1061.858	0	14	-69.215	0	15	-306.041	5.15412	8	-16.219	0	15	-294.213	0	14	-342.437	0	5
87	M4	max	1165.857	4.65811	8	69.194	4.65818	8	297.906	1.50415	16	16.226	1.45818	12	316.266	4.658	11	259.369	4.658	5
88		min	-1066.184	4.65813	8	-17.519	1.50417	8	-321.113	1.504	6	7.925	0	13	-290.375	4.658	13	-338.436	4.658	5
89	M5	max	1053.661	2.32911	8	131.65	2.32918	8	712.497	2.32911	8	12.742	4.65919	8	707.768	2.329	8	464.868	2.329	8
90		min	-978.646	0	13	-131.805	2.32914	8	-708.227	2.281	7	-12.74	0	19	-581.497	2.329	15	883.085	2.329	7
91	M7	max	1165.957	4.65810	8	69.194	4.65818	8	297.906	1.50414	16	16.226	1.45818	12	316.266	4.658	10	259.369	4.658	14
92		min	-1066.184	4.65812	8	-17.519	1.50418	8	-321.113	1.504	4	7.925	0	13	-290.375	4.658	12	-338.436	4.658	4
93	M6	max	1053.661	2.32910	8	131.651	2.32918	8	712.497	2.32910	8	12.742	4.65918	8	707.768	2.329	8	464.868	2.329	12
94		min	-978.646	0	12	-131.805	2.32916	8	-708.227	2.281	6	-12.74	0	19	-581.497	2.329	14	-883.085	2.329	6
95	M9	max	1165.931	0	10	17.524	5.15419	8	321.12	5.154	8	-7.925	5.15412	8	316.303	0	10	259.408	0	14
96		min	-1066.178	0	12	-69.196	0	15	-297.925	5.15414	8	-16.225	5.20019	8	-290.405	0	12	-338.456	0	4
97	M11	max	1045.489	2.329	9	131.651	2.32918	8	733.885	2.329	9	12.733	4.65917	8	725.485	2.329	11	492.88	2.329	15
98		min	-970.539	0	15	-131.779	2.32919	8	-729.272	2.251	5	-12.732	0	17	-599.266	2.329	13	-901.106	2.329	5
99	M12	max	1161.396	0	9	17.543	5.15419	8	329.237	5.15417	8	-7.915	5.15415	8	320.12	0	9	263.379	0	13
100		min	-1061.858	0	15	-69.215	0	17	-306.041	5.15413	8	-16.219	5.20014	8	-294.213	0	15	-342.437	0	7
101	M6	max	1165.931	0	11	17.524	5.15417	8	321.12	5.154	9	-7.925	5.15413	8	316.303	0	11	259.408	0	15
102		min	-1066.128	0	13	-69.195	0	19	-297.926	5.15415	8	-16.225	5.20019	8	-290.405	0	13	-338.456	0	5
103	M10	max	1161.402	4.658	9	69.213	4.65817	8	306.015	1.50413	16	16.22	1.45817	12	320.076	4.658	9	263.337	4.658	13
104		min	-1061.8954	4.65815	8	-17.535	1.50419	8	-326.222	1.504	7	7.945	1.50415	8	-294.19	4.65815	8	-342.409	4.658	7
105	S1	max	1442.866	2.5	15	1879.352	0	16	101.831	2.5	8	1.059	2.5	14	243.321	2.5	8	176.863	0	19
106		min	-2229.018	0	5	-412.193	2.5	19	-101.815	1.172	6	-1.062	0	12	-243.285	2.5	5	-2002.693	1.172	19
107	M71	max	1633.182	2.5	9	-346.145	0	15	41.198	1.14810	8	0.071	2.5	12	98.775	2.5	10	1506.218	2.5	17
108		min	-539.469	0	15	-623.782	2.5	17	-41.17	0	4	-0.073	0	14	-96.719	2.5	4	-4.198	0	17
109	M70	max	1665.073	2.5	10	-347.767	0	12	41.198	1.14811	8	0.071	1.14813	8	99.775	2.5	11	1506.203	2.5	18
110		min	26.387	1.17212	8	-623.337	2.5	19	-41.17	0	5	-0.072	0	15	-96.719	2.5	5	-4.202	0	18
111	M69	max	1665.073	2.5	11	-347.767	0	13	41.152	1.146	8	0.068	2.5	14	99.681	2.5	9	1506.203	2.5	19
112		min	26.387	1.17213	8	-623.337	2.5	19	-41.174	0	6	-0.076	0	12	-96.725	2.5	6	-4.202	0	19
113	S2	max	1442.966	2.5	14	1879.352	0	16	101.818	2.5	11	1.057	1.14813	8	243.296	2.5	11	176.863	0	18
114		min	-2229.018	0	4	-412.193	2.5	16	-101.809	1.172	5	-1.054	0	15	-243.287	2.5	13	-2002.693	1.172	18
115	S3	max	1397.253	2.5	13	1879.35	0	17	101.818	2.5	10	1.057	2.5	12	243.286	2.5	10	176.943	0	17
116		min	-2182.478	0	7	-412.317	2.5	17	-101.809	1.172	4	-1.054	0	14	-243.287	2.5	12	-2003.394	1.172	17
117	S4	max	1397.353	2.5	12	1879.35	0	16	101.831	2.5	9	1.059	2.5	15	243.321	2.5	9	176.943	0	16
118		min	-2182.479	0	8	-412.317	2.5	16	-101.815	1.172	7	-1.062	0	13	-243.288	2.5	7	-2003.394	1.172	16
119	M24	max	2646.43	2.5	8	1217.787	0	16	82.529	2.5	9	1.694	1.14609		197.043	2.5	13	86.87	0	16
120		min	-1999.465	0	14	-1055.776	2.5	16	-52.402	1.172	7	-1.585	0	7	-157.269	2.5	15	-1317.708	1.172	16
121	M23	max	2646.43	2.5	9	1217.787	0	17	82.452	2.5	10	1.555	1.14610		197.355	2.5	14	86.87	0	17
122		min	-1999.465	0	15	-1055.776	2.5	17	-82.4	1.172	4	-1.705	0	4	-157.171	2.5	12	-1317.706	1.172	17

Envelope Maximum Member Section Forces (Continued)

	Member		Axial[lb]	Loc[ft]	LC	y Shear[lb]	Loc[ft]	LC	z Shear[lb]	Loc[ft]	LC	Torque[lb-ft]	Loc[ft]	LC	y-y Moment[lb-ft]	Loc[ft]	LC	z-z Moment[lb-ft]	Loc[ft]	LC
123	M22	max	1515.153	2.5	10	1217.065	0	18	82.452	2.5	11	1.555	1.146	11	197.355	2.5	19	86.759	0	19
124		min	-869.008	0	12	-1056.431	2.5	18	-82.4	1.172	5	-1.705	0	5	-197.171	2.5	13	-1316.949	1.1719	
125	M21	max	1515.153	2.5	11	1217.065	0	19	82.329	2.5	8	1.694	1.146	8	197.043	2.5	12	86.759	0	19
126		min	-869.008	0	13	-1056.431	2.5	10	-82.402	1.172	6	-1.565	0	6	-197.259	2.5	14	-1316.949	1.1719	
127	M72	max	1633.182	2.5	5	-346.145	0	14	41.152	1.146	9	0.059	2.5	15	98.691	2.5	9	1506.218	2.5	19
128		min	-538.469	0	14	-623.782	2.5	16	-41.174	0	7	-0.078	0	13	-98.725	2.5	7	-4.196	0	15
129	M17	max	1442.866	2.105	5	300.484	3.933	18	194.362	5.318	14	1.058	3.712	14	621.371	3.712	8	366.293	3.9331	
130		min	-1584.205	0	5	-723.906	3.878	19	-194.419	3.933	4	-1.062	0	12	-621.316	3.712	6	-1469.424	0	18
131	M16	max	1442.866	2.105	4	300.484	3.933	18	194.377	5.318	13	1.057	3.712	13	621.335	3.712	11	366.293	3.9331	
132		min	-1584.205	0	4	-723.906	3.878	18	-194.365	3.933	15	-1.064	0	15	-621.256	3.712	5	-1469.424	0	19
133	M19	max	1397.253	2.105	13	300.529	3.933	17	194.377	5.318	12	1.057	3.712	12	621.335	3.712	10	366.372	3.9331	
134		min	-1539.545	0	7	-723.851	3.878	17	-194.365	3.933	14	-1.064	0	14	-621.256	3.712	4	-1469.761	0	17
135	M85	max	1066.073	2.105	11	1491.806	2.161	19	86.618	3.878	10	0.058	2.105	14	251.182	3.712	17	2892.152	2.1611	
136		min	-448.314	2.161	5	-678.074	2.105	19	-86.56	3.767	4	-0.075	0	12	-251.102	3.712	14	-23.451	5.3181	
137	M87	max	1633.182	2.105	9	1492.654	2.161	17	86.611	3.878	8	0.071	3.712	12	251.24	3.712	14	2893.737	2.1611	
138		min	-1013.858	2.161	7	-678.338	2.105	17	-86.565	3.767	5	-0.073	2.161	14	-251.3	3.712	12	-23.44	5.3181	
139	M85	max	1066.073	2.105	10	1491.806	2.161	18	86.611	3.878	9	0.071	3.712	13	251.24	3.712	15	2892.152	2.1611	
140		min	-448.314	2.161	4	-678.074	2.105	18	-86.565	3.767	7	-0.073	2.161	15	-251.3	3.712	13	-23.451	5.3181	
141	M20	max	1397.253	3.712	2	300.529	3.933	16	194.362	5.318	15	1.058	2.105	15	621.371	3.712	9	366.372	3.9331	
142		min	-1538.545	2.161	8	-723.851	3.878	16	-194.419	3.933	5	-1.062	2.161	13	-621.316	3.712	7	-1469.761	0	15
143	M37	max	1515.153	2.105	11	1080.883	2.161	17	173.168	5.318	10	1.694	2.105	6	502.544	3.712	6	2392.771	2.1611	
144		min	-880.963	2.161	5	-1110.922	2.105	19	-172.842	3.933	4	-1.565	0	6	-502.325	3.712	6	-34.911	5.3181	
145	M39	max	2646.43	2.105	9	1080.796	2.161	17	173.036	5.318	6	1.555	3.712	10	502.61	3.712	10	2393.101	2.1611	
146		min	-2012.306	2.161	7	-1111.218	2.105	17	-173.304	3.933	8	1.705	2.161	4	502.843	3.712	4	-34.824	5.3181	
147	M40	max	2646.43	2.105	6	1080.796	2.161	16	173.168	5.318	11	1.694	3.712	9	502.544	3.712	9	2393.101	2.1611	
148		min	-2012.306	2.161	5	-1111.218	2.105	16	-172.842	3.933	5	-1.565	0	7	-502.325	3.712	7	-34.524	5.3181	
149	M86	max	1633.182	2.105	8	1492.654	2.161	16	86.618	3.878	11	0.058	3.712	15	251.182	3.712	13	2893.737	2.1611	
150		min	-1013.858	2.161	5	-678.338	2.105	16	-86.56	3.767	5	-0.075	2.161	13	-251.102	3.712	15	-23.44	5.3181	
151	M38	max	1515.153	2.105	10	1080.883	2.161	16	173.036	5.318	9	1.555	2.105	11	502.61	3.712	11	2392.771	2.1611	
152		min	-880.963	2.161	4	-1110.922	2.105	16	-173.304	3.933	7	-1.705	2.161	5	-502.843	3.712	5	-34.911	5.3181	
153	M97	max	920.746	5.072	8	57.795	5.072	5	-30.152	5.072	5	0	5.072	19	414.198	0	17	283.137	0	15
154		min	924.265	0	7	56.42	0	5	-104.618	0	7	0	0	1	0	5.072	1	-296.309	0	5
155	M98	max	920.67	5.072	3	58.422	5.072	9	-30.15	5.072	5	0	5.072	19	414.194	0	17	296.323	0	9
156		min	-924.243	0	7	-57.8	0	5	-104.616	0	7	0	0	1	0	5.072	1	-293.187	0	15
157	M99	max	1012	5.072	3	56.385	5.072	11	-62.726	5.072	4	0	5.072	19	722.458	0	16	285.986	0	11
158		min	-1018.222	0	7	-55.84	0	3	-165.594	0	6	0	0	1	0	5.072	1	-283.223	0	13
159	M100	max	1012.056	5.072	3	55.851	5.072	3	-62.95	5.072	4	0	5.072	19	722.058	0	16	283.279	0	13
160		min	-1018.245	0	7	-55.393	0	7	-165.514	0	6	0	0	1	0	5.072	1	-286.029	0	7
161	M101	max	502.04	5.072	3	28.455	5.072	11	-42.211	5.072	4	0	5.072	19	494.084	0	16	144.326	0	11
162		min	-514.168	0	7	-27.723	0	3	-120.558	0	6	0	0	1	0	5.072	1	-140.61	0	13
163	M102	max	502.046	5.072	3	27.726	5.072	3	-42.196	5.072	4	0	5.072	19	494.089	0	16	140.629	0	13
164		min	-514.18	0	7	-28.459	0	7	-120.552	0	6	0	0	1	0	5.072	1	-144.547	0	7
165	M103	max	920.67	5.072	2	58.422	5.072	8	-30.15	5.072	4	0	5.072	19	414.194	0	16	296.323	0	8
166		min	-924.243	0	8	-57.8	0	14	-104.616	0	6	0	0	1	0	5.072	1	-293.157	0	14
167	M104	max	1012.056	5.072	2	55.851	5.072	12	-62.723	5.072	5	0	5.072	19	722.451	0	17	283.279	0	12
168		min	-1018.245	0	6	-55.593	0	6	-165.592	0	7	0	0	1	0	5.072	1	-286.029	0	6
169	M105	max	502.046	5.072	2	27.726	5.072	12	-42.21	5.072	5	0	5.072	19	494.079	0	17	140.629	0	12
170		min	-514.18	0	5	-28.459	0	6	-120.556	0	7	0	0	1	0	5.072	1	-144.347	0	6
171	M106	max	502.04	5.072	2	28.455	5.072	10	-42.197	5.072	5	0	5.072	19	494.093	0	17	144.326	0	10
172		min	-514.168	0	5	-27.723	0	12	-120.57	0	7	0	0	1	0	5.072	1	-140.61	0	12
173	M107	max	1012	5.072	2	56.385	5.072	10	-62.952	5.072	5	0	5.072	19	722.065	0	17	285.986	0	13
174		min	-1018.222	0	5	-55.84	0	12	-165.517	0	7	0	0	1	0	5.072	1	-283.223	0	13
175	M108	max	920.746	5.072	2	57.795	5.072	14	-30.152	5.072	4	0	5.072	19	414.198	0	16	283.137	0	14
176		min	-924.265	0	8	-58.42	0	4	-104.618	0	6	0	0	1	0	5.072	1	-296.309	0	4
177	M109	max	926.452	5.072	5	59.872	5.072	11	-29.762	5.072	13	0	5.072	19	414.615	0	19	303.670	0	11

Envelope Maximum Member Section Forces (Continued)

	Member		Axial [lb]	Loc [ft]	LC	y Shear [lb]	Loc [ft]	LC	z Shear [lb]	Loc [ft]	LC	Torque [lb-ft]	Loc [ft]	LC	y-y Moment [lb-ft]	Loc [ft]	LC	z-z Moment [lb-ft]	Loc [ft]	LC
175		min	-929.948	0	5	-59.254	0	13	-104.895	0	19	0	0	1	0	5.072	1	-300.542	0	13
179	M110	max	873.921	5.072	15	33.905	5.072	14	-61.821	5.072	15	0	5.072	19	723.818	0	17	171.969	0	14
180		min	-881.293	0	5	-34.491	0	4	-165.881	0	17	0	0	1	0	5.072	1	-174.941	0	4
181	M111	max	433.152	5.072	15	16.757	5.072	14	-42.11	5.072	15	0	5.072	19	494.253	0	17	84.992	0	14
182		min	-445.535	0	5	-17.501	0	4	-120.6	0	17	0	0	1	0	5.072	1	-88.764	0	4
183	M112	max	433.199	5.072	15	15.457	5.072	9	-42.112	5.072	15	0	5.072	19	494.257	0	17	76.599	0	9
184		min	-445.523	0	5	-14.737	0	15	-120.602	0	17	0	0	1	0	5.072	1	-74.746	0	15
185	M113	max	874.015	5.072	15	30.38	5.072	9	-61.923	5.072	15	0	5.072	19	725.825	0	17	154.085	0	9
186		min	-881.422	0	5	-29.583	0	15	-165.964	0	17	0	0	1	0	5.072	1	-157.567	0	15
187	M114	max	926.506	5.072	15	59.247	5.072	13	-29.765	5.072	15	0	5.072	19	414.818	0	19	300.504	0	13
188		min	-929.964	0	5	-59.868	0	7	-104.901	0	19	0	0	1	0	5.072	1	-303.549	0	7
189	M115	max	926.452	5.072	14	59.872	5.072	10	-29.762	5.072	13	0	5.072	19	414.815	0	18	303.675	0	10
190		min	-929.948	0	4	-59.254	0	12	-104.899	0	18	0	0	1	0	5.072	1	-300.543	0	12
191	M116	max	873.921	5.072	14	29.852	5.072	14	-61.921	5.072	14	0	5.072	19	723.818	0	16	151.566	0	14
192		min	-881.293	0	4	-30.375	0	4	-165.881	0	16	0	0	1	0	5.072	1	-154.07	0	4
193	M117	max	433.152	5.072	14	14.737	5.072	14	-42.11	5.072	14	0	5.072	19	494.253	0	16	74.746	0	14
194		min	-445.535	0	4	-15.496	0	4	-120.6	0	16	0	0	1	0	5.072	1	-78.403	0	4
195	M118	max	433.199	5.072	14	17.503	5.072	9	-42.112	5.072	14	0	5.072	19	494.257	0	16	88.776	0	9
196		min	-445.523	0	4	-16.76	0	15	-120.602	0	16	0	0	1	0	5.072	1	-85.009	0	15
197	M119	max	874.015	5.072	14	34.501	5.072	9	-61.923	5.072	14	0	5.072	19	725.825	0	16	174.969	0	9
198		min	-881.422	0	4	-33.912	0	15	-165.964	0	16	0	0	1	0	5.072	1	-172.001	0	15
199	M120	max	926.506	5.072	14	59.247	5.072	12	-29.763	5.072	13	0	5.072	19	414.818	0	18	300.501	0	12
200		min	-929.964	0	4	-59.868	0	6	-104.901	0	19	0	0	1	0	5.072	1	-303.679	0	6

Envelope Node Reactions

	Node Label		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	R4	max	2182.479	10	1882.085	18	102.294	11	1.062	13	10.855	11	-110.414	14
2		min	-910.27	12	1189.088	14	-102.261	5	-1.059	15	-10.876	5	-176.943	16
3	R1	max	102.294	10	1881.573	18	956.348	15	-110.711	13	10.855	10	1.059	14
4		min	-102.261	4	1190.199	13	2229.019	5	-176.963	19	-10.876	4	-1.062	12
5	R3	max	102.3	10	1882.085	17	2182.479	11	176.943	17	10.853	8	1.064	14
6		min	-102.263	4	1189.088	15	-910.27	13	110.414	15	-10.871	6	-1.057	12
7	R2	max	956.348	14	1881.573	19	102.3	11	1.057	13	10.853	9	176.803	18
8		min	-2229.018	4	1190.199	12	-102.263	5	-1.064	15	-10.871	7	110.711	12
9	N53	max	81.825	14	1216.824	19	874.296	11	-55.055	13	8.356	14	1.894	8
10		min	-82.26	12	770.079	13	-869.008	13	86.769	19	-8.357	12	-1.555	6
11	N54	max	874.296	10	1216.824	18	81.872	15	1.555	11	8.396	9	86.769	18
12		min	-869.008	12	770.079	12	-52.345	13	-1.725	5	-8.379	7	55.055	12
13	N55	max	81.872	14	1217.227	17	1999.465	15	86.87	17	8.586	8	1.765	8
14		min	-82.345	12	767.955	15	-2003.773	5	54.646	15	-8.379	6	-1.555	6
15	N56	max	1999.465	14	1217.227	18	81.825	15	1.565	11	8.356	15	-54.646	14
16		min	-2003.773	4	767.955	14	-82.29	13	-1.584	5	-8.357	13	-86.87	16
17	N101	max	40.895	14	-347.765	13	1066.073	11	4.202	19	4.179	10	0.068	14
18		min	-41.014	12	-584.105	19	28.387	13	1.505	13	-4.187	4	-0.075	12
19	N102	max	1066.073	10	-347.765	12	40.919	15	0.071	13	4.19	13	-1.505	12
20		min	28.387	12	-584.105	18	-41.035	13	-0.073	15	-4.197	7	-4.202	16
21	N103	max	40.919	14	-346.152	15	538.469	15	-1.561	15	4.19	12	0.073	14
22		min	-41.035	12	-584.526	17	-1533.182	5	-4.158	17	-4.197	6	-0.071	12
23	N104	max	538.469	14	-346.152	14	40.895	15	0.076	13	4.179	11	4.199	16
24		min	-1633.182	4	-584.526	16	-41.014	13	-0.053	15	-4.181	5	1.561	14
25	Totals:	max	7728.274	10	10057.249	19	7728.274	11						
26		min	-7728.274	12	6452.807	14	-7728.274	13						

JOB NO.: U0142.2054.242

PROJECT: NMC1-148 SPIKE

ENCLOSURE CALCULATIONS

FRP Member Design for Compression (RISA):

Label: FRP Kicker Brace

INPUT:

Unbraced Length, L [ft]:	10.6
Axial, C [lb]:	682
K	1

Notes:
See RISA model member M48 for max axial force. Force divided by 2 to account for double angles. Force multiplied by 0.6 to convert LRFD forces to ASD

Column: 4x4x3/8 FRP Angle

r [in]:	0.79
E [psi]:	2,800,000
A [in^2]:	2.86

OUTPUT:

f_a [psi]	242	<	F_a [psi]:	395	OK, 58%

Select 4x4x3/8 FRP Angle FRP column

FRP Shear Connection w/ Steel Bolts:

Label: Kicker to HSS, typ.

Bearing stress of FRP member controls

INPUT:

Design Force, P [lb]:	682
Steel Bolt Diameter, d_b [in]:	1/2
# Bolts, n_b	2
FRP Web Thickness, t_w [in]:	3/8
Double Shear:	No
Bearing Stress:	Lengthwise
Factor of Safety, FS:	4

Notes:
Design Force = axial in FRP Kicker Brace, typ.

OUTPUT:

f_{by} [psi]:	1,844	<	F_{by} [psi]:	7,500	OK, 25%

Select (2) 1/2" diameter steel bolts

See attached FRP material and section properties.

JOB NO.: UC142.2054.242

PROJECT: NM01146 SPIKE

FRP Member Design for Compression (RISA):

Label: FRP Vertical Brace

INPUT:

Unbraced Length, L [ft]:	10.0	Notes:
Axial: C [lb]:	318	See RISA model member M42 for max axial force. Force divided by 2 to account for double angles. Force multiplied by 0.6 to convert LRFD forces to ASD
K:	1	

Column: 4x4x3/8 FRP Angle

r [in]: 0.79
E [psi]: 2,800,000
A [in^2]: 2.86

OUTPUT:

f_c [psi]	111	<	F_c [psi]:	356	OK, 31%

Select 4x4x3/8 FRP Angle FRP column

FRP Shear Connection w/ Steel Bolts:

Label: Vertical Brace to HSS, typ.

Bearing stress of FRP member controls.

INPUT:

Design Force, P [lb]:	318	Notes:
Steel Bolt Diameter, d_b [in]:	1/2	Design Force = axial in FRP Vertical Brace, typ.
# Bolts, n_b:	2	
FRP Web Thickness, t_w [in]:	3/8	
Double Shear:	No	
Bearing Stress:	Lengthwise	
Factor of Safety, FS:	4	

OUTPUT:

f_{br} [psi]:	847	<	F_{brg} [psi]:	7,500	OK, 11%

Select (2) 1/2" diameter steel bolts

See attached FRP material and section properties.

JOB NO.: D0142.2054.242

PROJECT: NM01-148 Spike

DESIGN APPROACH: LRFD

BOLTED SHEAR CONNECTION

Location: STEEL Stand Off Arm

Bolt Grade:	ASTM A325		
Bolt Diameter:	0.625	in	
Number of Bolts:	2		
Double Shear?	No		
Bolt Capacity:	24850	lbs	(AISC Equation J3-1)
Shear Load:	2646	lbs	
Check Bolt:	10.6%		

Result: **Select (2) 0.625 in. dia. ASTM A325 bolts.**

Note: See RISA model section set 'STEEL Stand Off Arm' load combination 4 for max Axial [lb]

BOLT/PIN BEARING & MATERIAL TENSILE/SHEAR STRENGTH

Location: STEEL Stand Off Arm

Bolt or Pin Diameter:	0.625	in	
Hole Diameter or Slot Width:	0.6875	in	
Number of Bolts or Pins:	2		
Plate Thickness:	0.375	in	
Plate Yield Strength (F_y):	36	ksi	
Plate Ultimate Strength (F_u):	58	ksi	
Bolt/Pin Parallel Edge Distance:	1	in	(measured from center of hole)
Bearing Capacity:	25692	lbs	
Perpendicular Edge Distance:	1	in	(measured from center of hole)
Effective Perp. Edge Distance:	1		
Tensile Rupture Capacity:	42820	lbs	(AISC Equation D5-1)
Shear Rupture Capacity:	37927	lbs	(AISC Equation D5-2)
Load:	2646	lbs	
Check Bearing:	10.3%		

Available AISC Checks:

Equation	Check?	Capacity
J3-6a	Yes	12646
J3-6b	No	
J3-6c	No	
J7-1	No	

Result: **Selected connection type is adequate.**

Note: See RISA model section set 'STEEL Stand Off Arm' load combination 4 for max Axial [lb]

JOB NO.: U0142.2054.242

PROJECT: NM01-145 Spike

BOLTED SHEAR CONNECTION Location: STEEL Outrigger Weldment

Bolt Grade:	ASTM A325		
Bolt Diameter:	0.625	in	
Number of Bolts:	1		
Double Shear?	No		
Bolt Capacity:	12425	lbs	(AISC Equation J3-1)
Shear Load:	1018	lbs	
Check Bolt:	8.2%		

Result: **Select (1) 0.625 in. dia. ASTM A325 bolt**

Note: See RISA model section set 'STEEL Outrigger Weldment' load combination 6 for max Axial [lb]

BOLT/PIN BEARING & MATERIAL TENSILE/SHEAR STRENGTH Location: STEEL Outrigger Weldment

Bolt or Pin Diameter:	0.625	in	
Hole Diameter or Slot Width:	0.6875	in	
Number of Bolts or Pins:	1		
Plate Thickness:	0.375	in	
Plate Yield Strength (F_y):	55	ksi	
Plate Ultimate Strength (F_u):	58	ksi	
Bolt/Pin Parallel Edge Distance:	1	in	(measured from center of hole)
Bearing Capacity:	12846	lbs	
Perpendicular Edge Distance:	1	in	(measured from center of hole)
Effective Perp. Edge Distance:	1		
Tensile Rupture Capacity:	21410	lbs	(AISC Equation D5-1)
Shear Rupture Capacity:	13963	lbs	(AISC Equation D5-2)
Load:	1018	lbs	
Check Bearing:	7.9%		

Available AISC Checks:

Equation	Check?	Capacity
J3-6a	Yes	12846
J3-6b	No	
J3-6c	No	
J7-1	No	

Result: **Selected connection type is adequate.**

Note: See RISA model section set 'STEEL Outrigger Weldment' load combination 6 for max Axial [lb]

JOB NO.: U0142.2054.242

PROJECT: NMC1-148 Spike

BOLTED SHEAR CONNECTION Location: STEEL Stand Off Arm Inner

Bolt Grade:	ASTM A325		
Bolt Diameter:	0.75	in	
Number of Bolts:	3		
Double Shear?	No		
Bolt Capacity:	53677	lbs	(AISC Equation J3-1)
Shear Load:	1898	lbs	
Check Bolt:	3.5%		

Result: **Select (3) 0.75 in. dia. ASTM A325 bolts.**

Note: See RISA model section set 'STEEL Stand Off Arm Inner' load combination 6 for max Axial (lb)

BOLT/PIN BEARING & MATERIAL TENSILE/SHEAR STRENGTH Location: STEEL Stand Off Arm Inner

Bolt or Pin Diameter:	0.75	in	
Hole Diameter or Slot Width:	0.8125	in	
Number of Bolts or Pins:	3		
Plate Thickness:	0.375	in	
Plate Yield Strength (F_y):	36	ksi	
Plate Ultimate Strength (F_u):	58	ksi	
Bolt/Pin Parallel Edge Distance:	1	in	(measured from center of hole)
Bearing Capacity:	34638	lbs	
Perpendicular Edge Distance:	1	in	(measured from center of hole)
Effective Perp. Edge Distance:	1		
Tensile Rupture Capacity:	56113	lbs	(AISC Equation D5-1)
Shear Rupture Capacity:	56690	lbs	(AISC Equation D5-2)
Load:	1898	lbs	
Check Bearing:	5.4%		

Available AISC Checks:

Equation	Check?	Capacity
J3-6a	Yes	11623
J3-6b	No	
J3-6c	No	
J7-1	No	

Result: **Selected connection type is adequate.**

Note: See RISA model section set 'STEEL Stand Off Arm Inner' load combination 6 for max Axial (lb)

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Phone: (801) 990-1776
www.vectorse.com

Simulation of MONOPOLE MOUNT

Date: Thursday, October 24, 2024
Designer: JJB
Study name: Static 1
Analysis type: Static

Table of Contents

Description

Four-sided Raycap Clamp

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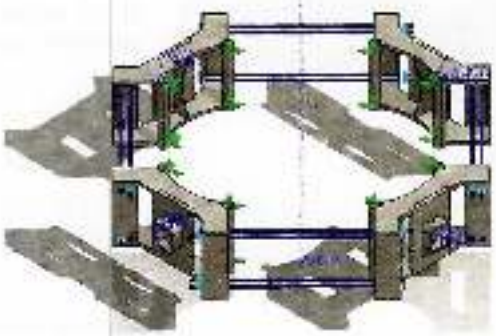

Model name: MONOPOLE MOUNT
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Mirror1	Solid Body	Mass:2.7207 lb Volume:9.59348 in^3 Density:0.283599 lb/in^3 Weight:2.71886 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\2 x 0.145 - 6.sldprt Oct 24 13:00:27 2024
Mirror1	Solid Body	Mass:2.7207 lb Volume:9.59348 in^3 Density:0.283599 lb/in^3 Weight:2.71886 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\2 x 0.145 - 6.sldprt Oct 24 13:00:27 2024
Cut-Extrude1	Solid Body	Mass:6.53976 lb Volume:23.0598 in^3 Density:0.283599 lb/in^3 Weight:6.53532 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\4 - 6.sldprt Oct 23 17:20:18 2024

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Cut-Extrude1	Solid Body	Mass:6.53976 lb Volume:23.0598 in^3 Density:0.283599 lb/in^3 Weight:6.53532 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\4 - 6.sldprt Oct 23 17:20:18 2024
Boss-Extrude1	Solid Body	Mass:20.4191 lb Volume:72 in^3 Density:0.283599 lb/in^3 Weight:20.4053 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\MONOPOLE MOUNT PLATE.sldprt Oct 23 17:42:47 2024
Cut-Extrude1	Solid Body	Mass:3.18636 lb Volume:11.2354 in^3 Density:0.283599 lb/in^3 Weight:3.18419 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\MONOPOLE MOUNT STEEL TUBE.sldprt Oct 23 18:11:10 2024
Boss-Extrude1	Solid Body	Mass:2.33967 lb Volume:8.2499 in^3 Density:0.283599 lb/in^3 Weight:2.33808 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\MONOPOLE MOUNT SUPPORT.sldprt Oct 24 09:18:20 2024
Boss-Extrude1	Solid Body	Mass:19.6216 lb Volume:69.1876 in^3 Density:0.283599 lb/in^3 Weight:19.6083 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\W PLATE.sldprt Oct 24 09:10:00 2024
Mirror2	Solid Body	Mass:19.6216 lb Volume:69.1876 in^3 Density:0.283599 lb/in^3 Weight:19.6083 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\W PLATE.sldprt Oct 24 09:10:00 2024
Mirror1	Solid Body	Mass:2.7207 lb Volume:9.59348 in^3 Density:0.283599 lb/in^3 Weight:2.71886 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\2 x 0.145 - 6.sldprt Oct 24 13:00:27 2024
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		Density:0.283599 lb/in^3 Weight:6.53532 lbf	Oct 23 17:20:18 2024
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Mirror1	Solid Body	Mass:2.7207 lb Volume:9.59348 in^3 Density:0.283599 lb/in^3 Weight:2.71886 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\2 x 0.145 - 6.sldprt Oct 24 13:00:27 2024
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Mirror2	Solid Body	Mass:19.6216 lb Volume:69.1876 in^3 Density:0.283599 lb/in^3 Weight:19.6083 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\W PLATE.sldprt Oct 24 09:10:00 2024
Mirror1	Solid Body	Mass:2.7207 lb Volume:9.59348 in^3 Density:0.283599 lb/in^3 Weight:2.71886 lbf	C:\Users\joshua.blom\Desktop\Raycap Clamp\2 x 0.145 - 6.sldprt Oct 24 13:00:27 2024
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Study Properties

Study name	Static 1
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	77 Fahrenheit
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	Off
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (C:\Users\joshua.blom\Desktop\Raycap Clamp\Results)

Units

Unit system:	English (IPS)
Length/Displacement	in
Temperature	Fahrenheit
Angular velocity	Hertz
Pressure/Stress	ksi

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Material Properties

Model Reference	Properties	Components
	Name: ASTM A36 Steel Model type: Linear Elastic Isotropic Default failure criterion: Max von Mises Stress Yield strength: 250 N/mm^2 Tensile strength: 400 N/mm^2 Elastic modulus: 200,000 N/mm^2 Poisson's ratio: 0.26 Mass density: 7.85 g/cm^3 Shear modulus: 79,300 N/mm^2	SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-1/2 x 0.145 - 6-1), SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-1/2 x 0.145 - 6-2), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-1/4 - 6-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-1/4 - 6-2), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-1/MONOPOLE MOUNT PLATE-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-1/MONOPOLE MOUNT STEEL TUBE-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-1/MONOPOLE MOUNT SUPPORT-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-1/W PLATE-2), SolidBody 2(Mirror2)(Assem8^MONOPOLE MOUNT-1/W PLATE-2), SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-10/2 x 0.145 - 6-1), SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-10/2 x 0.145 - 6-2), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-10/4 - 6-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-10/4 - 6-2), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE

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		MOUNT-10/MONOPOLE MOUNT PLATE-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-10/MONOPOLE MOUNT STEEL TUBE-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-10/MONOPOLE MOUNT SUPPORT-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-10/W PLATE-2), SolidBody 2(Mirror2)(Assem8^MONOPOLE MOUNT-10/W PLATE-2), SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-11/2 x 0.145 - 6-1), SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-11/2 x 0.145 - 6-2), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-11/4 - 6-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-11/4 - 6-2), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-11/MONOPOLE MOUNT PLATE-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-11/MONOPOLE MOUNT STEEL TUBE-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-11/MONOPOLE MOUNT SUPPORT-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-11/W PLATE-2), SolidBody 2(Mirror2)(Assem8^MONOPOLE MOUNT-11/W PLATE-2), SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-8/2 x 0.145 - 6-1),

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		SolidBody 1(Mirror1)(Assem8^MONOPOLE MOUNT-8/2 x 0.145 - 6-2), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-8/4 - 6-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-8/4 - 6-2), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-8/MONOPOLE MOUNT PLATE-1), SolidBody 1(Cut-Extrude1)(Assem8^MONOPOLE MOUNT-8/MONOPOLE MOUNT STEEL TUBE-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-8/MONOPOLE MOUNT SUPPORT-1), SolidBody 1(Boss-Extrude1)(Assem8^MONOPOLE MOUNT-8/W PLATE-2), SolidBody 2(Mirror2)(Assem8^MONOPOLE MOUNT-8/W PLATE-2)
Curve Data:N/A		

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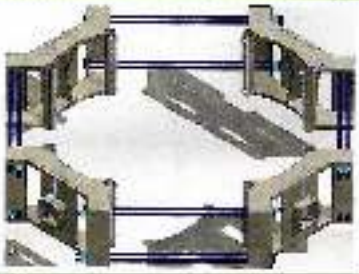
Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Reference Geometry-2		Entities: 8 edge(s) Reference: Face< 1 > Type: Use reference geometry Translation: 0, 0 rad., 0 Units: in

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(lbf)	0.729984	-7,184.11	0.138231	7,184.11
Reaction Moment(lbf.in)	0	0	0	0

Load name	Load Image	Load Details
Gravity-1		Reference: Top Plane Values: 0 0 -386.22 Units: in/s^2
Force-1		Entities: 1 face(s) Type: Apply normal force Value: -2,229 lbf

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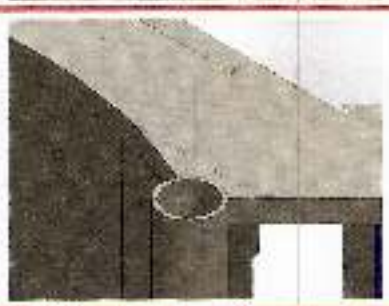
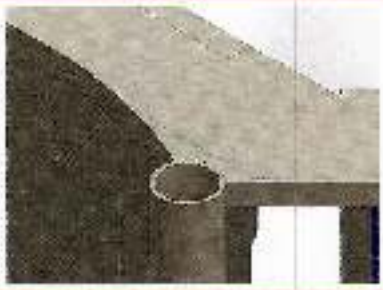
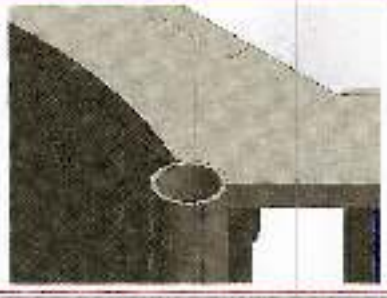
Force-2		**Entities:** 1 face(s) **Reference:** Axis2 **Type:** Apply force **Values:** ---, ---, -1,879.9 lbf
Torque-1		**Entities:** 1 face(s) **Reference:** Axis6 **Type:** Apply torque **Value:** 18,074.6 lbf.in
Copy[1] Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** -2,229 lbf
Copy[1] Force-2		**Entities:** 1 face(s) **Reference:** Axis17 **Type:** Apply force **Values:** ---, ---, 1,879.9 lbf
Copy[1] Torque-1		**Entities:** 1 face(s) **Reference:** Axis18 **Type:** Apply torque **Value:** 18,074.6 lbf.in

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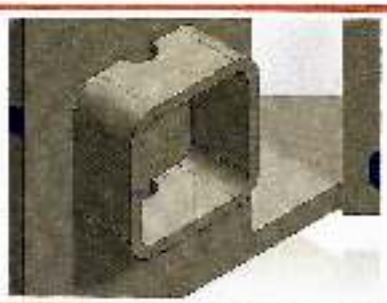
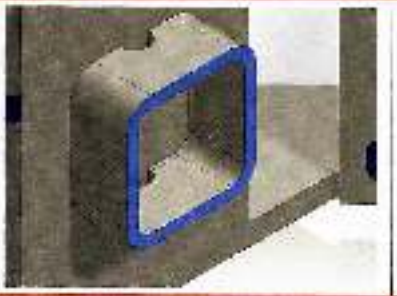
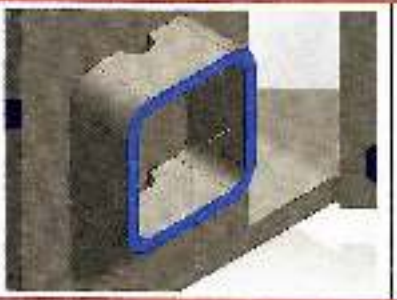
Copy[1] Force-1[1]		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** -2,229 lbf
Copy[1] Force-2[1]		**Entities:** 1 face(s) **Reference:** Axis19 **Type:** Apply force **Values:** ---, ---, 1,879.9 lbf
Copy[1] Torque-1[1]		**Entities:** 1 face(s) **Reference:** Axis20 **Type:** Apply torque **Value:** 18,074.6 lbf.in
Copy[1] Force-1[1][1]		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** -2,229 lbf

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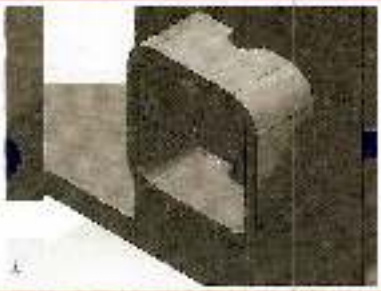
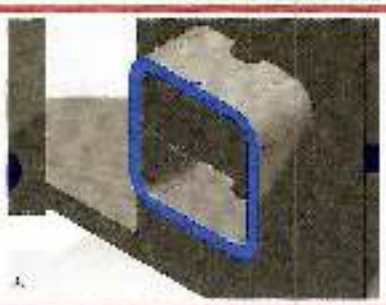
Copy[1] Force-2[1]{1}		Entities: 1 face(s) Reference: Axis16 Type: Apply force Values: ---, ---, -1,879.9 lbf
Copy[1] Torque-1[1]{1}		Entities: 1 face(s) Reference: Axis15 Type: Apply torque Value: 18,074.6 lbf.in

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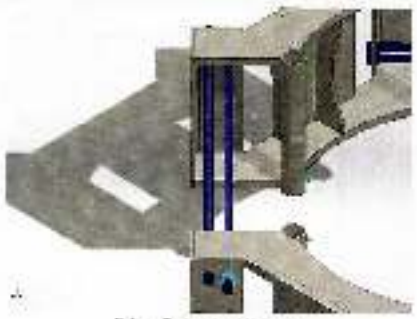
Connector Definitions

Pin/Bolt/Bearing Connector

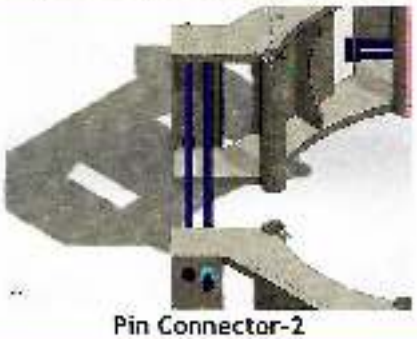
Model Reference	Connector Details	Strength Details
 Pin Connector-1	Entities: 2 face(s) Type: Pin With retaining ring (No translation): Yes With key (No rotation): No Connection Type: Rigid Units: English (IPS) Rotational stiffness value: 0	No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	299.43	0	299.43	423.46
Shear Force (lbf)	0.29259	0.15461	-0.29257	0.44171
Torque (lbf.in)	0	0	0	0
Bending moment (lbf.in)	95.95	137.48	-95.95	193.17

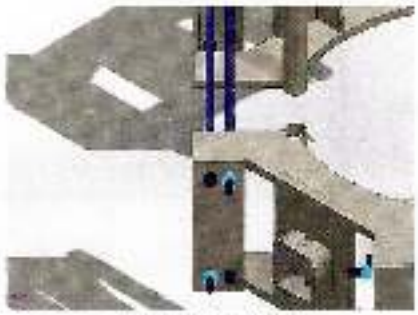
Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-299.43	-0	-299.43	-423.46
Shear Force (lbf)	-0.29259	-0.15461	0.29257	0.44171
Torque (lbf.in)	4.2204e-06	0	4.2204e-06	5.9685e-06
Bending moment (lbf.in)	-99.197	-125.19	99.197	188.02

 Pin Connector-2	Entities: 2 face(s) Type: Pin With retaining ring (No translation): Yes With key (No rotation): No Connection Type: Rigid Units: English (IPS) Rotational stiffness value: 0	No Data

Connector Forces Joint 1				
Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	167.08	-0	167.08	-236.29
Shear Force (lbf)	-0.14211	-0.044949	0.14209	0.20592
Torque (lbf.in)	-2.2336e-08	0	-2.2336e-08	3.1589e-08
Bending moment (lbf.in)	50.597	-57.461	-50.597	91.771

Connector Forces Joint 2				
Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-167.08	0	-167.08	236.29
Shear Force (lbf)	0.14211	0.044949	-0.14209	0.20592
Torque (lbf.in)	6.4084e-08	-0	6.4084e-08	-9.0628e-08
Bending moment (lbf.in)	-51.588	63.724	51.588	96.868



Pin Connector-3

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1				
Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	148.6	-0	148.6	-210.15
Shear Force (lbf)	0.34643	-0.28745	-0.34642	0.56802
Torque (lbf.in)	-0	0	-0	0
Bending moment (lbf.in)	-60.912	46.294	60.912	97.794

Connector Forces Joint 2				
Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-148.6	0	-148.6	210.15
Shear Force (lbf)	-0.34643	0.28745	0.34642	0.56802
Torque (lbf.in)	-0	0	-0	0
Bending moment (lbf.in)	54.792	-61.043	-54.792	98.644

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Pin Connector-4

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

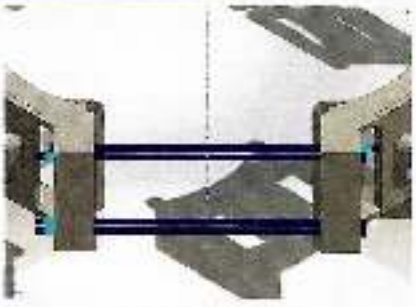
No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	8.3205	0	8.3205	11.767
Shear Force (lbf)	-0.13743	0.077944	0.13743	0.2094
Torque (lbf.in)	6.2462e-08	0	6.2462e-08	8.8335e-08
Bending moment (lbf.in)	23.552	-22.282	-23.552	40.073

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-8.3205	-0	-8.3205	-11.767
Shear Force (lbf)	0.13743	-0.077944	-0.13743	0.2094
Torque (lbf.in)	7.6283e-09	0	7.6283e-09	1.0788e-08
Bending moment (lbf.in)	-25.215	16.418	25.215	39.257



Pin Connector-5

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	296.1	0	-296.1	418.75
Shear Force (lbf)	0.17629	-0.14127	0.17627	0.28655
Torque (lbf.in)	0	0	-0	0
Bending moment (lbf.in)	-100.37	124.44	-100.37	188.77

Connector Forces Joint 2

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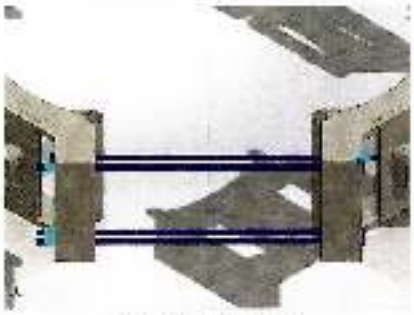
Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-296.1	-0	296.1	-418.75
Shear Force (lbf)	-0.17629	0.14127	-0.17627	0.28655
Torque (lbf.in)	0	0	-0	0
Bending moment (lbf.in)	97.468	-131.69	97.468	190.64



Pin Connector-6

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

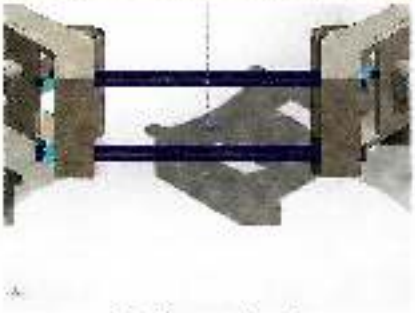
No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	177.69	-0	-177.69	-251.29
Shear Force (lbf)	-0.041436	0.011963	-0.041423	0.059799
Torque (lbf.in)	3.2385e-07	-0	-3.2385e-07	-4.5799e-07
Bending moment (lbf.in)	-57.751	-60.293	-57.751	101.52

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-177.69	0	177.69	251.29
Shear Force (lbf)	0.041436	-0.011963	0.041423	0.059799
Torque (lbf.in)	-3.0908e-07	0	3.0908e-07	4.3711e-07
Bending moment (lbf.in)	57.401	57.866	57.401	99.69



Pin Connector-7

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant

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Axial Force (lbf)	-138.99	-0	138.99	-196.57
Shear Force (lbf)	-0.073459	0.13005	-0.073473	0.16646
Torque (lbf.in)	-2.034e-06	-0	2.034e-06	-2.8765e-06
Bending moment (lbf.in)	-51.875	-49.749	-51.875	88.64

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	138.99	0	-138.99	196.57
Shear Force (lbf)	0.073459	-0.13005	0.073473	0.16646
Torque (lbf.in)	1.913e-06	0	-1.913e-06	2.7054e-06
Bending moment (lbf.in)	54.745	52.992	54.745	93.82

Pin Connector-8

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	12.477	0	-12.477	17.645
Shear Force (lbf)	-0.055332	-0.039551	-0.055333	0.08768
Torque (lbf.in)	0	0	-0	0
Bending moment (lbf.in)	-21.054	-17.502	-21.054	34.538

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-12.477	-0	12.477	-17.645
Shear Force (lbf)	0.055332	0.039551	0.055333	0.08768
Torque (lbf.in)	1.0551e-06	0	-1.0551e-06	1.4921e-06
Bending moment (lbf.in)	20.211	19.861	20.211	34.806

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Pin Connector-9

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-289.93	0	-289.93	410.03
Shear Force (lbf)	0.31207	-0.4776	-0.31209	0.6503
Torque (lbf.in)	-0	0	-0	0
Bending moment (lbf.in)	-97.56	122.94	97.56	184.8

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	289.93	-0	289.93	-410.03
Shear Force (lbf)	-0.31207	0.4776	0.31209	0.6503
Torque (lbf.in)	-0	0	-0	0
Bending moment (lbf.in)	87.434	-136.17	-87.434	183.94

Pin Connector-10

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	195.92	-0	195.92	-277.07
Shear Force (lbf)	0.23139	-0.1846	-0.23138	0.37571
Torque (lbf.in)	-0	0	-0	0
Bending moment (lbf.in)	63.693	65.091	-63.693	111.13

Connector Forces Joint 2

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Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-195.92	0	-195.92	277.07
Shear Force (lbf)	-0.23139	0.1846	0.23138	0.37571
Torque (lbf.in)	2.1102e-06	-0	2.1102e-06	-2.9842e-06
Bending moment (lbf.in)	-67.595	-74.877	67.595	121.43

Pin Connector-11

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-140.61	-0	-140.61	-198.85
Shear Force (lbf)	0.40394	0.44276	-0.40395	0.72276
Torque (lbf.in)	0	0	0	0
Bending moment (lbf.in)	51.57	57.884	-51.57	93.11

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	140.61	0	140.61	198.85
Shear Force (lbf)	-0.40394	-0.44276	0.40395	0.72276
Torque (lbf.in)	0	0	0	0
Bending moment (lbf.in)	-61.01	-40.66	61.01	95.382

Pin Connector-12

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant

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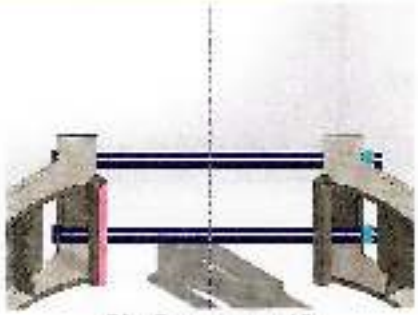
Axial Force (lbf)	21.421	0	21.421	30.293
Shear Force (lbf)	0.19279	0.31392	-0.19279	0.41578
Torque (lbf.in)	-9.8166e-09	-0	-9.8166e-09	-1.3883e-08
Bending moment (lbf.in)	12.75	24.596	-12.75	30.497

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-21.421	-0	-21.421	-30.293
Shear Force (lbf)	-0.19279	-0.31392	0.19279	0.41578
Torque (lbf.in)	-2.3525e-07	-0	-2.3525e-07	-3.327e-07
Bending moment (lbf.in)	-19.452	-16.364	19.452	32.008



Pin Connector-13

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-4.5667	0	4.5667	6.4583
Shear Force (lbf)	0.29607	1.3987	0.29607	1.46
Torque (lbf.in)	-0	0	0	0
Bending moment (lbf.in)	-17.015	14.157	17.015	27.919

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	4.5667	-0	-4.5667	-6.4583
Shear Force (lbf)	-0.29607	-1.3987	-0.29607	1.46
Torque (lbf.in)	-5.2755e-07	0	5.2755e-07	7.4606e-07
Bending moment (lbf.in)	-12.839	-1.5182	-12.839	18.22

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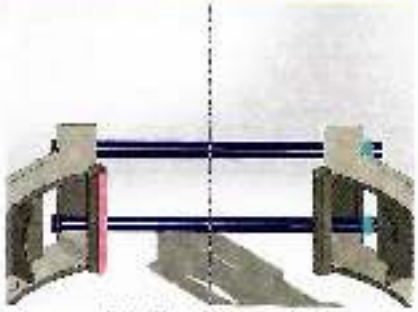


Pin Connector-14

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

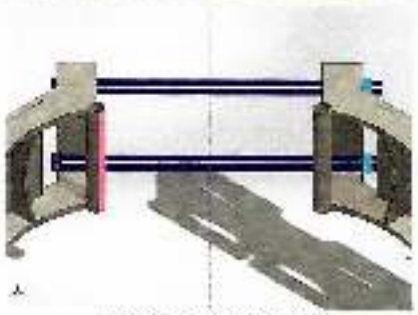
No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	11.271	-0	-11.271	-15.94
Shear Force (lbf)	0.2995	1.7639	0.2995	1.814
Torque (lbf.in)	-0	0	0	0
Bending moment (lbf.in)	-18.251	7.4271	-18.251	26.858

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-11.271	0	11.271	15.94
Shear Force (lbf)	-0.2995	-1.7639	-0.2995	1.814
Torque (lbf.in)	-0	0	0	0
Bending moment (lbf.in)	-19.398	5.3579	-19.398	27.951



Pin Connector-15

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	4.7067	-0	-4.7067	-6.6563
Shear Force (lbf)	-0.36657	1.48	-0.36657	1.5682
Torque (lbf.in)	-2.8054e-07	0	2.8054e-07	3.9674e-07
Bending moment (lbf.in)	-18.377	-16.867	-18.377	30.983

Connector Forces Joint 2

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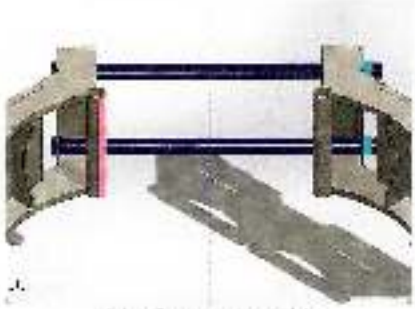
Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-4.7067	0	4.7067	6.6563
Shear Force (lbf)	0.36657	-1.48	0.36657	1.5682
Torque (lbf.in)	2.9124e-08	-0	-2.9124e-08	-4.1187e-08
Bending moment (lbf.in)	-13.208	1.221	-13.208	18.719



Pin Connector-16

Entities:	2 face(s)
Type:	Pin
With retaining ring (No translation):	Yes
With key (No rotation):	No
Connection Type:	Rigid
Units:	English (IPS)
Rotational stiffness value:	0

No Data

Connector Forces Joint 1

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	-11.411	0	11.411	16.138
Shear Force (lbf)	-0.22899	1.8998	-0.22899	1.9272
Torque (lbf.in)	-0	0	0	0
Bending moment (lbf.in)	-21.217	-4.4156	-21.217	30.329

Connector Forces Joint 2

Type	X-Component	Y-Component	Z-Component	Resultant
Axial Force (lbf)	11.411	-0	-11.411	-16.138
Shear Force (lbf)	0.22899	-1.8998	0.22899	1.9272
Torque (lbf.in)	-0	0	0	0
Bending moment (lbf.in)	-19.333	-5.3556	-19.333	27.861

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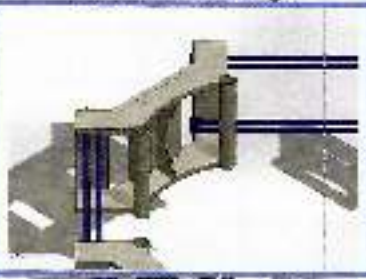
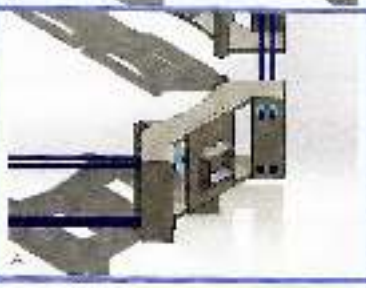
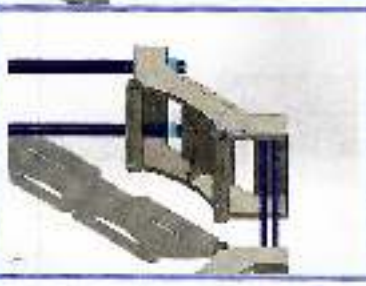
Interaction Information

Interaction	Interaction Image	Interaction Properties
Component Contact-9		**Type:** Bonded **Components:** 5 component(s), 2 Solid Body (s) **Options:** Continuous mesh
Component Interaction-12		**Type:** Bonded **Components:** 8 component(s) **Options:** Independent mesh
Component Interaction-13		**Type:** Bonded **Components:** 8 component(s) **Options:** Independent mesh
Component Interaction-14		**Type:** Bonded **Components:** 8 component(s) **Options:** Independent mesh

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Mesh information

Mesh type	Solid Mesh
Mesher Used:	Curvature-based mesh
Jacobian points for High quality mesh	16 Points
Maximum element size	2 in
Minimum element size	0.4 in
Mesh Quality	High
Remesh failed parts independently	Off

Mesh information - Details

Total Nodes	74378
Total Elements	35555
Maximum Aspect Ratio	53.291
% of elements with Aspect Ratio < 3	49.7
Percentage of elements with Aspect Ratio > 10	3.55
Percentage of distorted elements	0
Time to complete mesh(hh;mm;ss):	00:00:05
Computer name:	VSE096

Mesh Quality Plots

Name	Type	Min	Max
Quality1	Jacobian ratio	1.0 Element: 2023	28.9 Element: 20129

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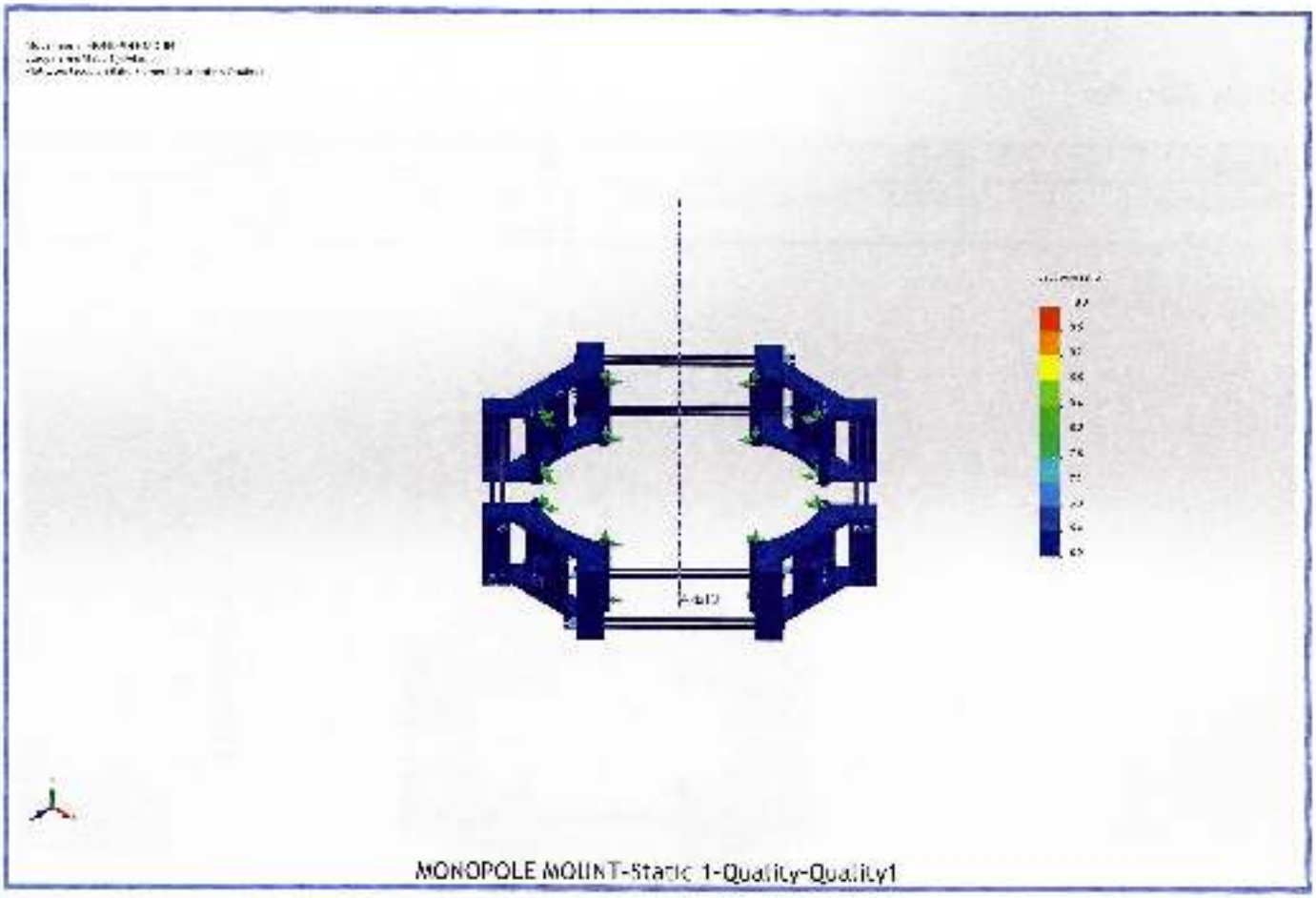

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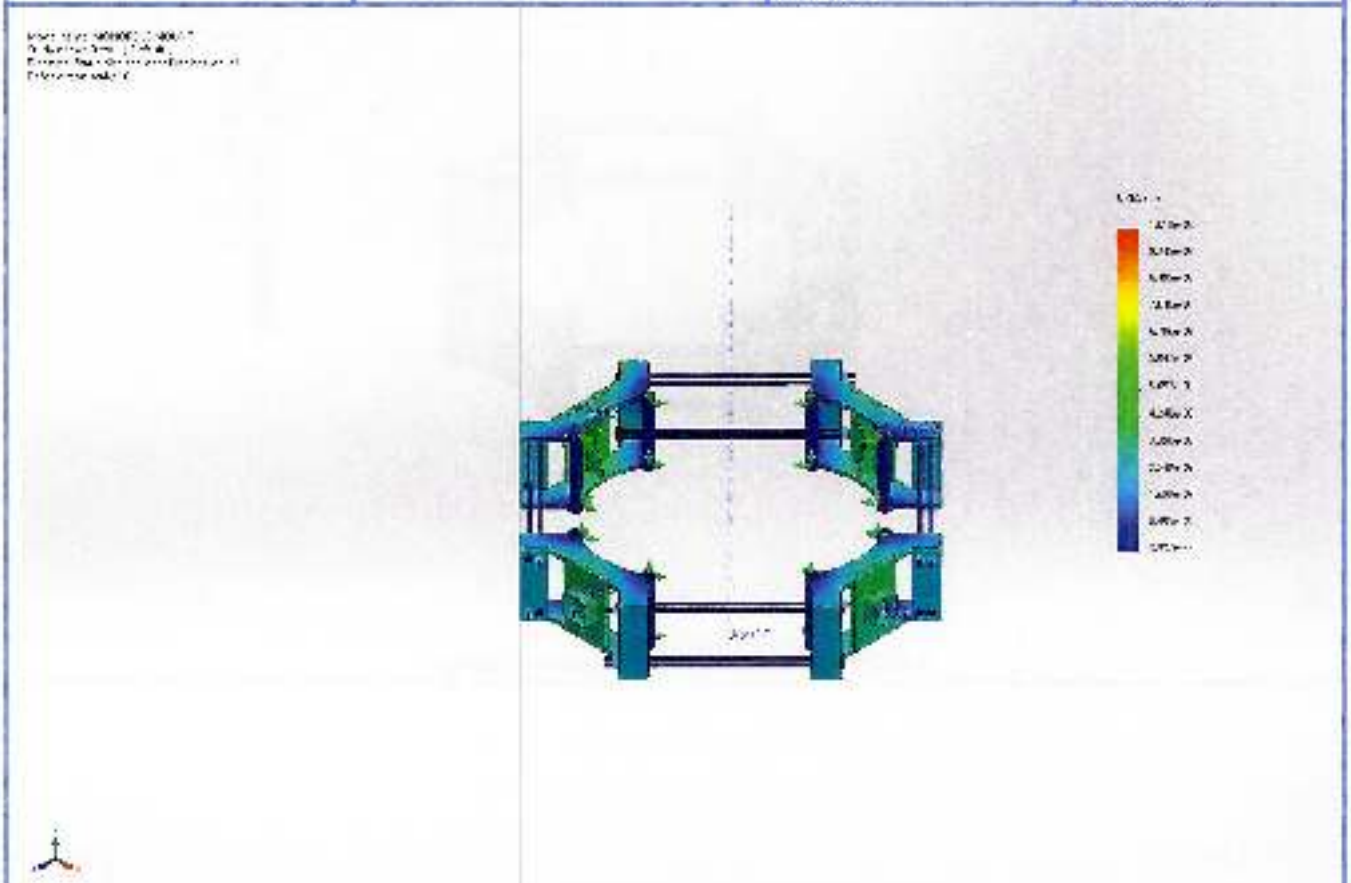
Study Results

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+00in Node: 15	1.019e-02in Node: 8757



MONOPOLE MOUNT-Static 1-Displacement-Displacement1

Name	Type	Min	Max
Stress1	VON: von Mises Stress	0.000ksi Node: 18526	30.273ksi Node: 479

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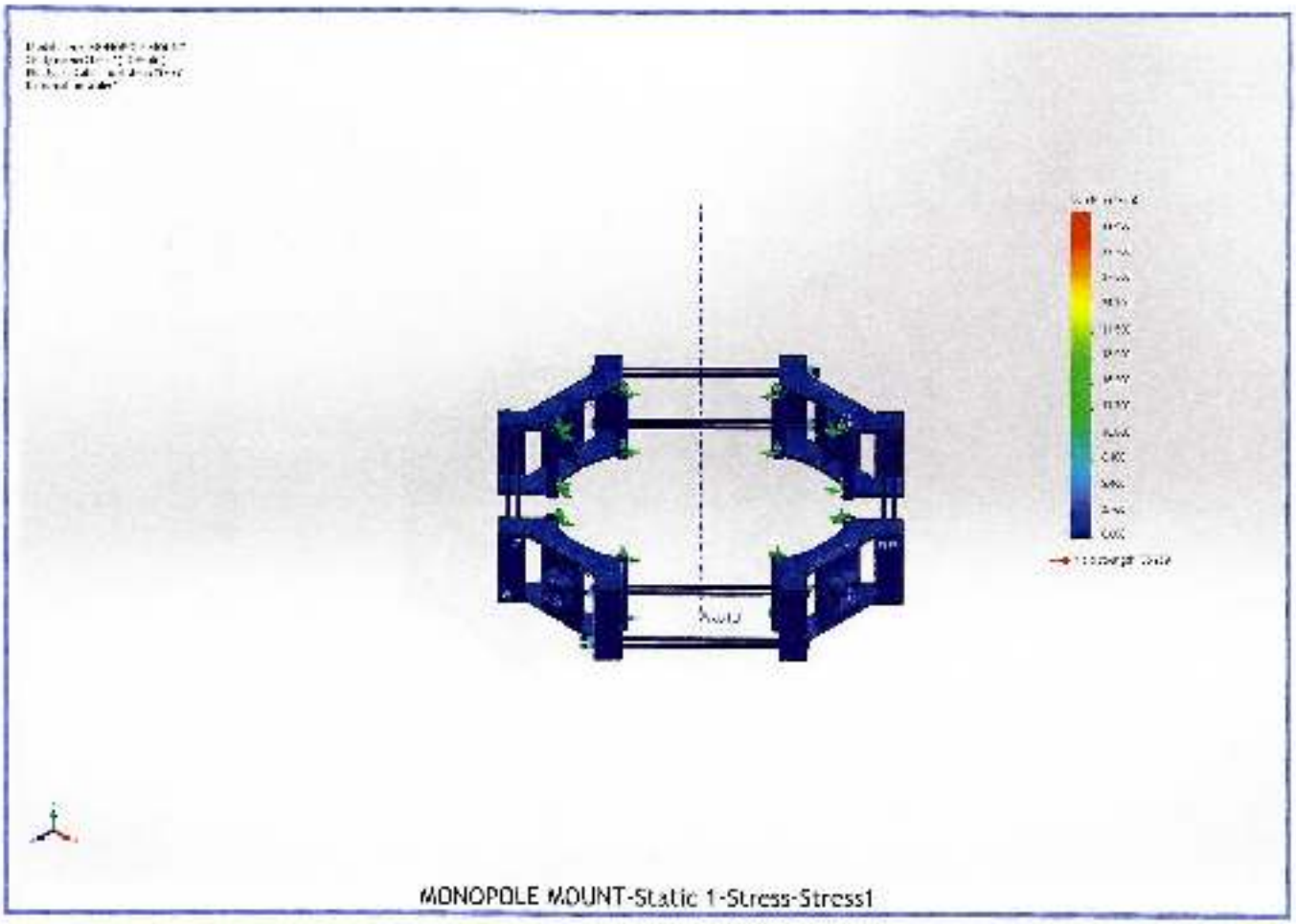

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	1.38e-09 Node: 18526	0.000877 Node: 479

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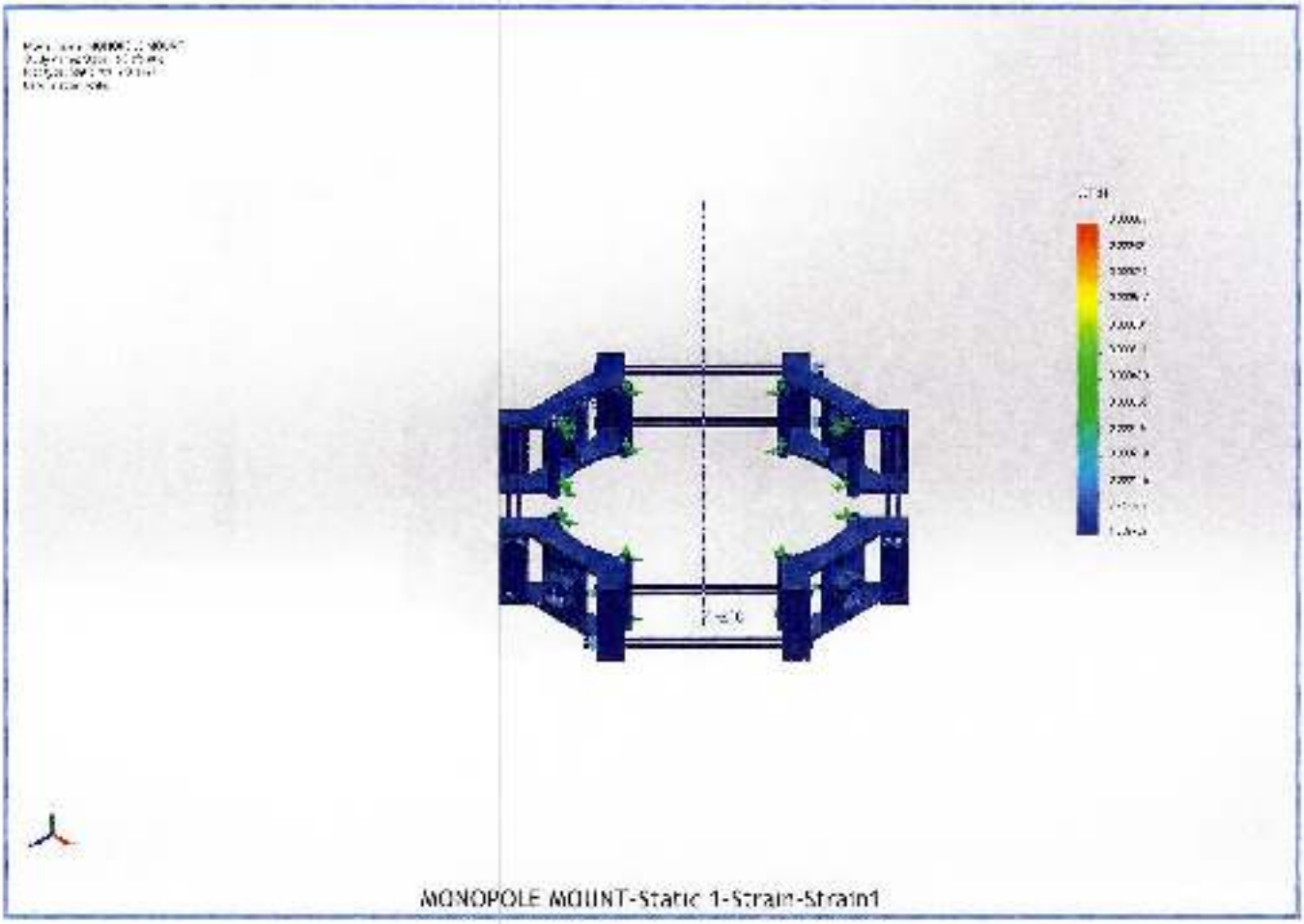

Name	Type	Min	Max
Stress2	VON: von Mises Stress	0.000ksi Node: 18526	30.273ksi Node: 479

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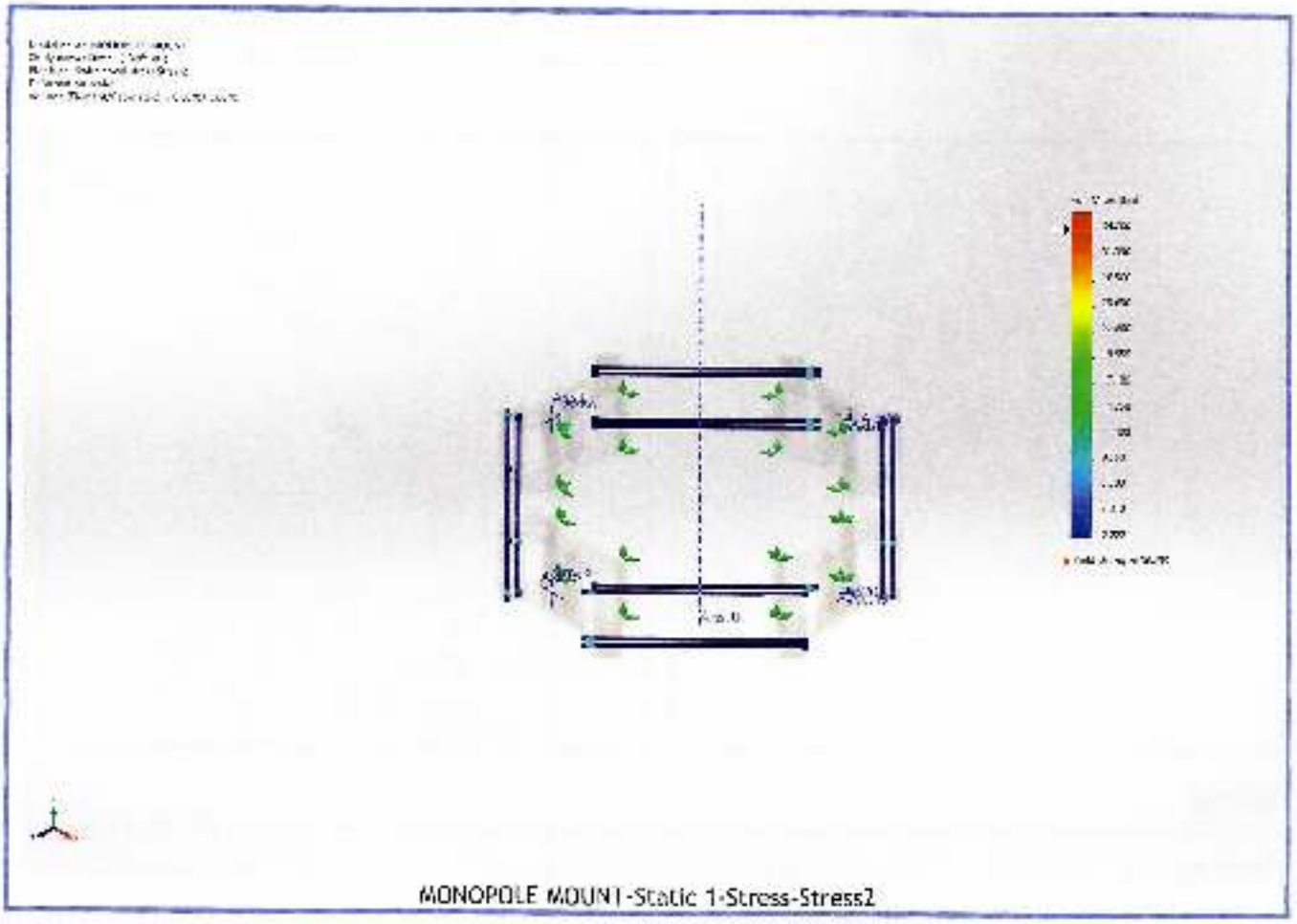

MONOPOLE MOUNT-Static 1-Stress-Stress2

Conclusion

Comments:

No part of the assembly exceeds the permissible Von-Mises stress. Therefore, OK.