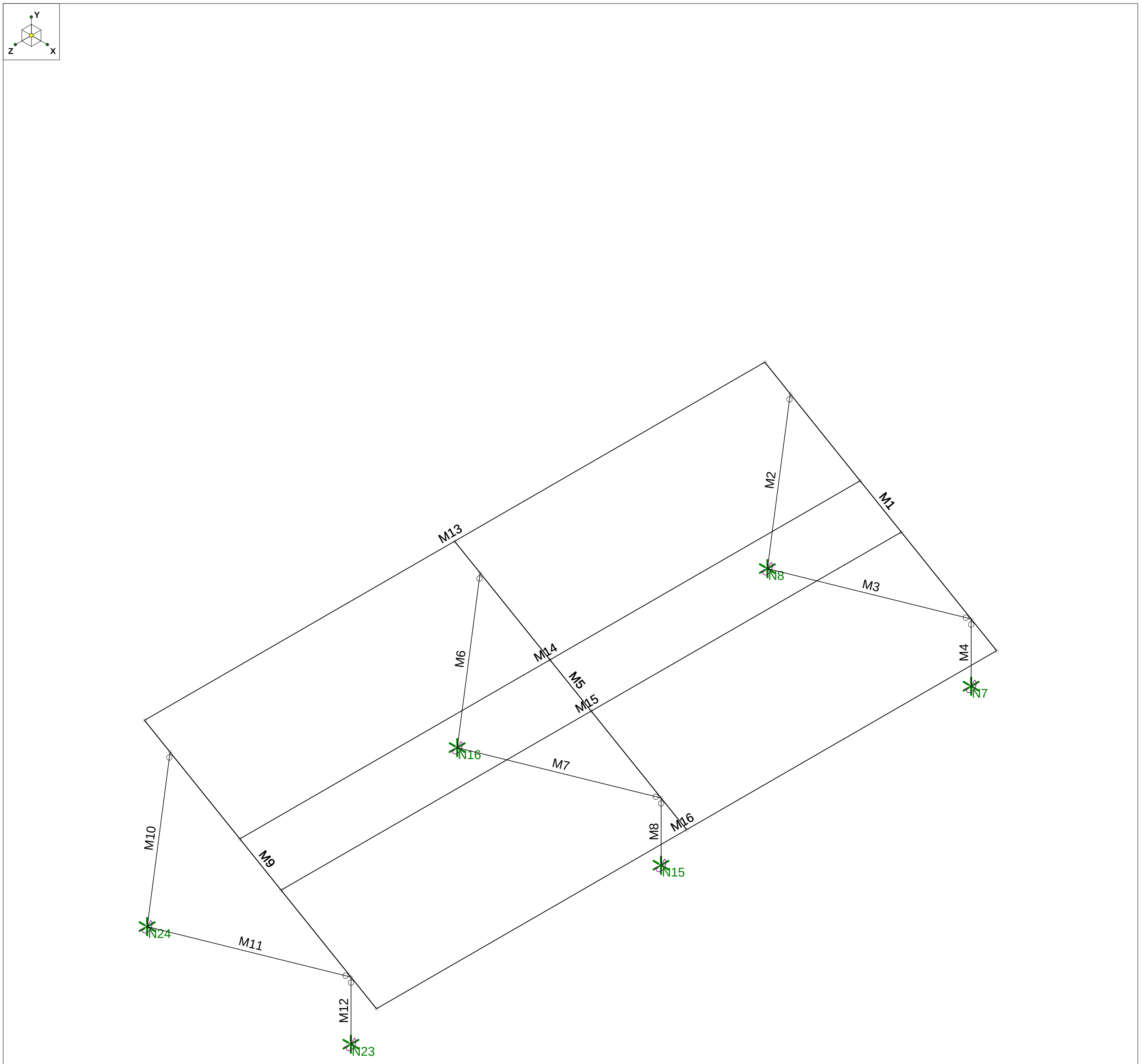


Schletter, Inc.		30ÁTilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

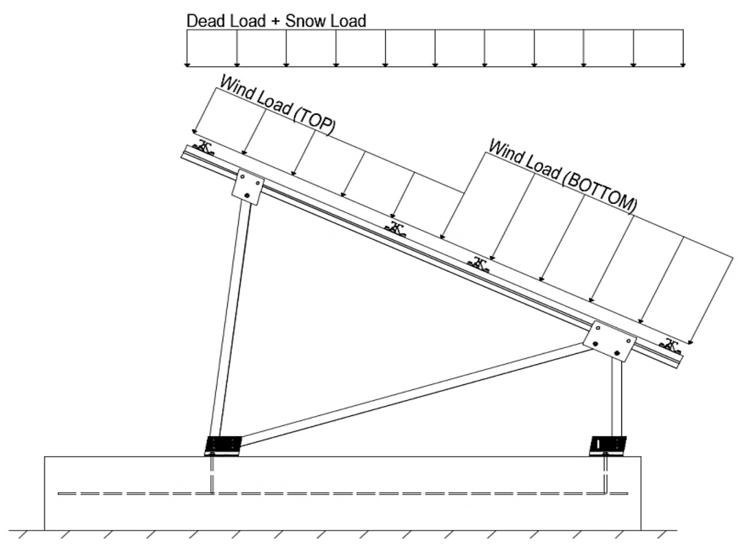
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

1.2 Construction
Photovoltaic modules are attached to aluminum purlins using clamp fasteners. Purlins are clamped to inclined aluminum girders, which are then connected to aluminum struts. Each support structure is equally spaced.

PV modules are required to meet the following specifications:

	Maximum		Minimum
Height =	1700 mm	Height =	1550 mm
Width =	1050 mm	Width =	970 mm
Dead Load =	3.00 psf	Dead Load =	1.75 psf

Modules Per Row = 2
Module Tilt = 30°
Maximum Height Above Grade = 3 ft



Typical loading conditions of the module dead loads, snow loads, and wind loads are shown on the left.

1.3 Technical Codes
- ASCE 7-10 - Chapter 26-31, Wind Loads
- ASCE 7-10 - Chapter 7, Snow Loads
- ASCE 7-10 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2012, 2015
- Aluminum Design Manual, Eighth Edition, 2005

2. LOAD ACTIONS

2.1 Permanent Loads
g_{MAX} = 3.00 psf
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads
Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 16.49 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.73
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 115 mph — Exposure Category = C
Height < 15 ft — Importance Category = II

Peak Velocity Pressure, q_z = 20.76 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.150	(Pressure)
$Cf+_{BOTTOM}$	=	1.850	
$Cf-_{TOP, OUTER PURLIN}$	=	-2.600	
$Cf-_{TOP, INNER PURLIN}$	=	-2.000	(Suction)
$Cf-_{BOTTOM}$	=	-1.100	

Provided pressure coefficients are the result of wind tunnel testing done by Ruscheweyh Consult. Coefficients are located in test report # 1127/0611-1e. Negative forces are applied away from the surface.

2.4 Seismic Loads - N/A

S_S =	0.00	R =	1.25
S_{DS} =	0.00	C_S =	0
S_1 =	0.00	ρ =	1.3
S_{D1} =	0.00	Ω =	1.25
T_a =	0.00	C_d =	1.25

ASCE 7, Section 12.8.1.3: A maximum S_s of 1.5 may be used to calculate the base shear, C_s, of structures under five stories and with a period, T, of 0.5 or less. Therefore, a S_{ds} of 1.0 was used to calculate C_s.

2.5 Combination of Loads

ASCE 7 requires that all structures be checked by specified combinations of loads. Applicable load combinations are provided below.

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W [M]
1.54D + 1.3E + 0.2S [R]
0.56D + 1.3E [R]
1.54D + 1.25E + 0.2S [O]
0.56D + 1.25E [O]

(ASCE 7, Eq 2.3.2-1 through 2.3.2-7) & (ASCE 7, Section 12.4.3.2)

Allowable Stress Design, ASD

Member deflection checks and foundation designs are done according to the following ASD load combinations:

1.0D + 1.0S
1.0D + 0.6W
1.0D + 0.75L + 0.45W + 0.75S
0.6D + 0.6W [M]
1.238D + 0.875E [O]
1.1785D + 0.65625E + 0.75S [O]
0.362D + 0.875E [O]

(ASCE 7, Eq 2.4.1-1 through 2.4.1-8) & (ASCE 7, Section 12.4.3.2)

[M] *Uses the minimum allowable module dead load.*
[R] *Include redundancy factor of 1.3.*
[O] *Includes overstrength factor of 1.25. Used to check seismic drift.*

3. STRUCTURAL ANALYSIS

3.1 RISA Results

Appendix B.1 contains outputs from the structural analysis software package, RISA. These outputs are used to accurately determine resultant member and reaction forces from the loads seen throughout Section 2.

3.2 RISA Components

A member and node list has been provided below to correlate the RISA components with the design calculations in Section 4. Items of significance have been listed.

Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M14	Mid-Top	M7	Inner	N15	Inner
M15	Mid-Bottom	M11	Outer	N23	Outer
M16	Bottom				

Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24	Outer

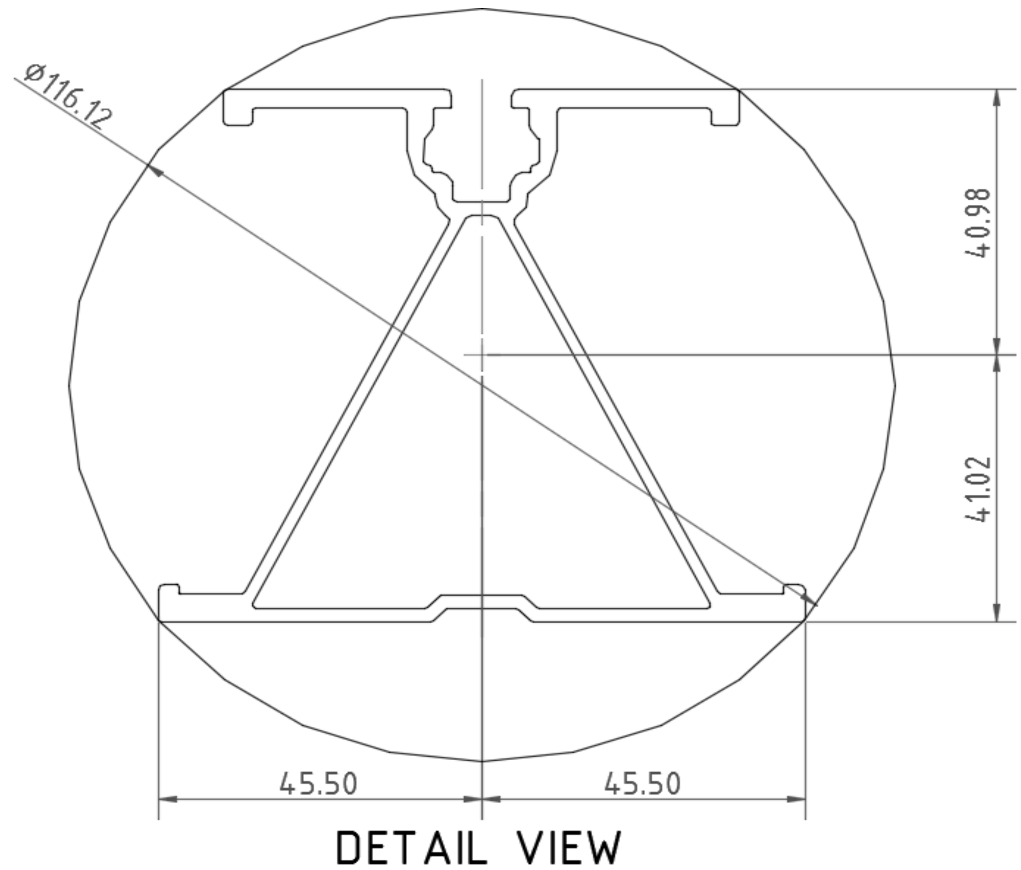
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

Aluminum purlins are used to transfer loads to the support structure. Purlins are designed as continous beams with cantilevers. These are considered beams with internal hinges that can be joined with splices at 25% of the support respective span. See Appendix A.1 for detailed member calculations. Section units are in (mm).

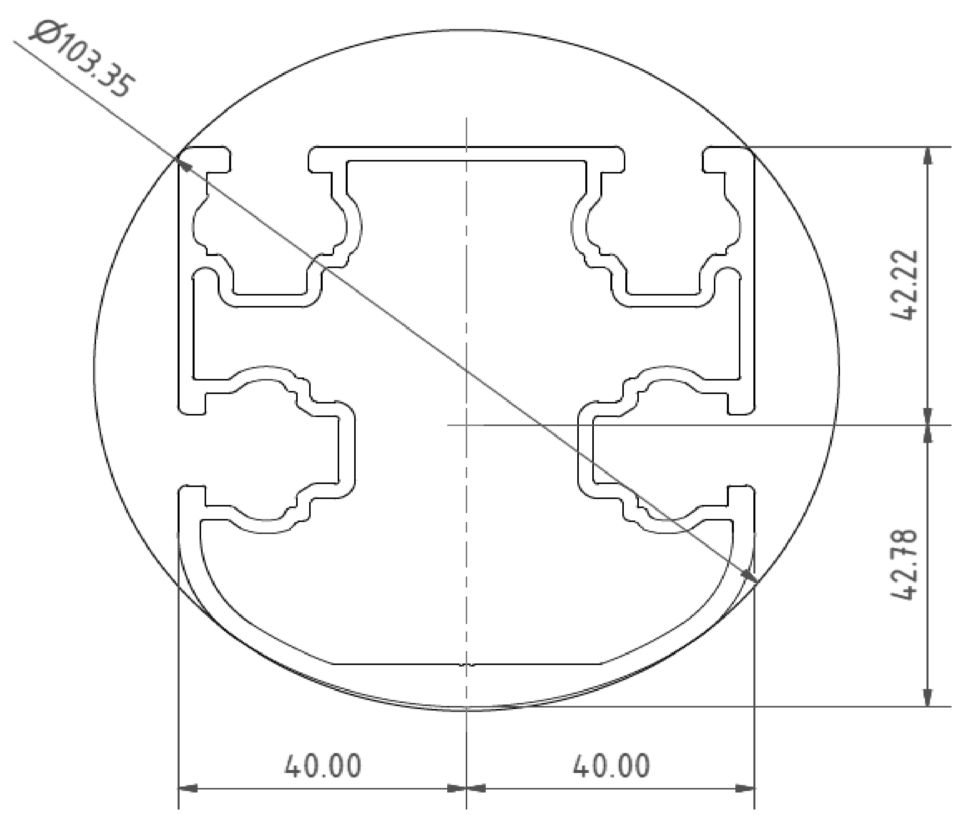
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	129	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.756	k-ft
M_z =	0.390	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	97%	



4.2 Girder Design

Loads from purlins are transferred using an inclined girder, which is connected to a set of aluminum struts. Loads on the girder result from the support reactions of the purlins. See Appendix A.2 for detailed member calculations. Section units are in (mm).

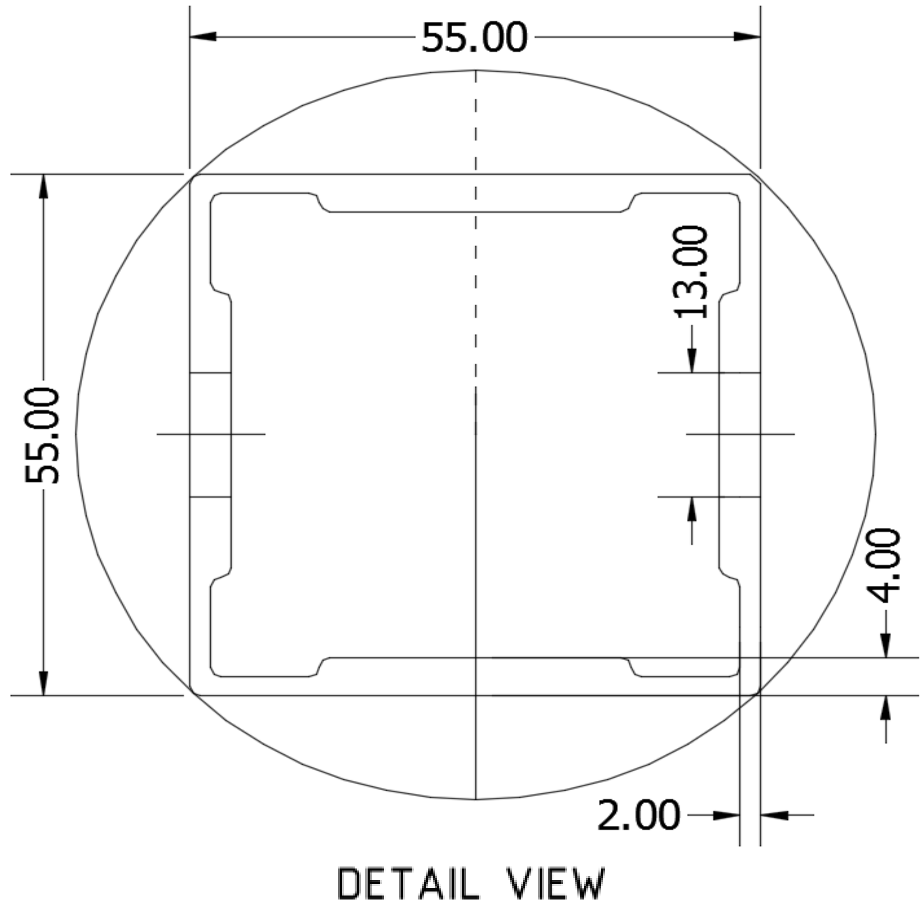
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.691	k-ft
M_z =	0.000	k-ft
P_n =	-0.713	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	79%	



4.3 Front Strut Design

The front aluminum strut connects a portion of the girder to the foundation. Vertical girder forces are then transferred down through the strut into the foundation. The strut is attached with single M12 bolts at each end. See Appendix A.3 for detailed member calculations. Section units are in (mm).

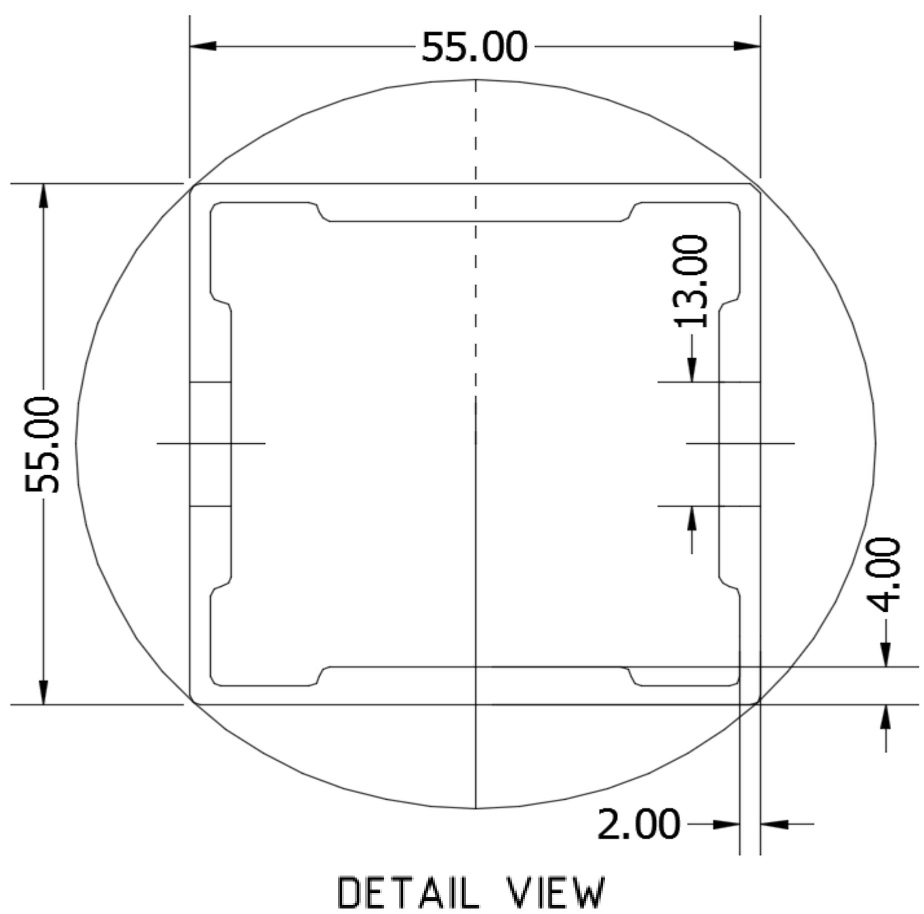
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	2.691	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	10%	



4.4 Diagonal Strut Design

A diagonal aluminum strut braces the support structure. It connects at a front portion of the girder and transfers horizontal forces to the rear foundation connection. The strut is attached with single M12 bolts at each end. See Appendix A.4 for detailed member calculations. Section units are in (mm).

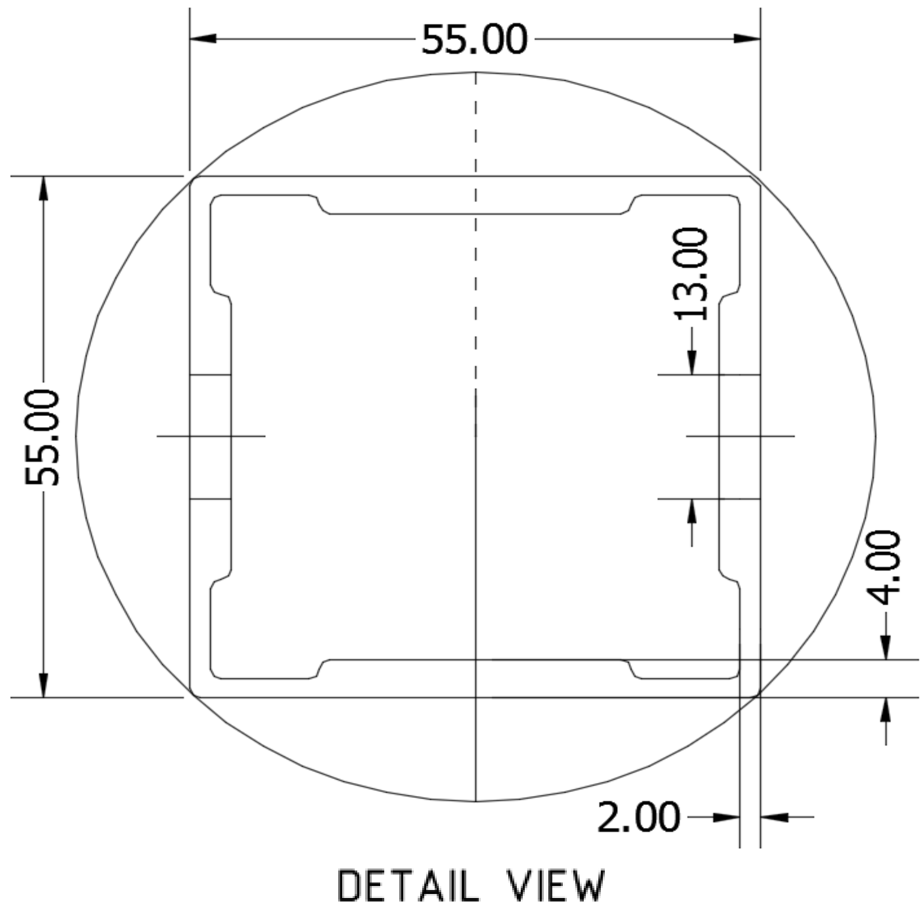
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.127	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	29%	



4.5 Rear Strut Design

An aluminum strut connects the rear portion of the girder to the rear foundation connection. Both vertical and horizontal forces are transferred from the girder. The strut is attached with single M12 bolts at each end. See Appendix A.5 for detailed member calculations. Section units are in (mm).

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	70.83	in
$\Phi F_{ty\ AXIAL}$ =	10.55	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.008	k-ft
M_z =	0.000	k-ft
P_n =	2.934	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	10.365	k
Utilization =	29%	



5. FOUNDATION DESIGN CALCULATIONS

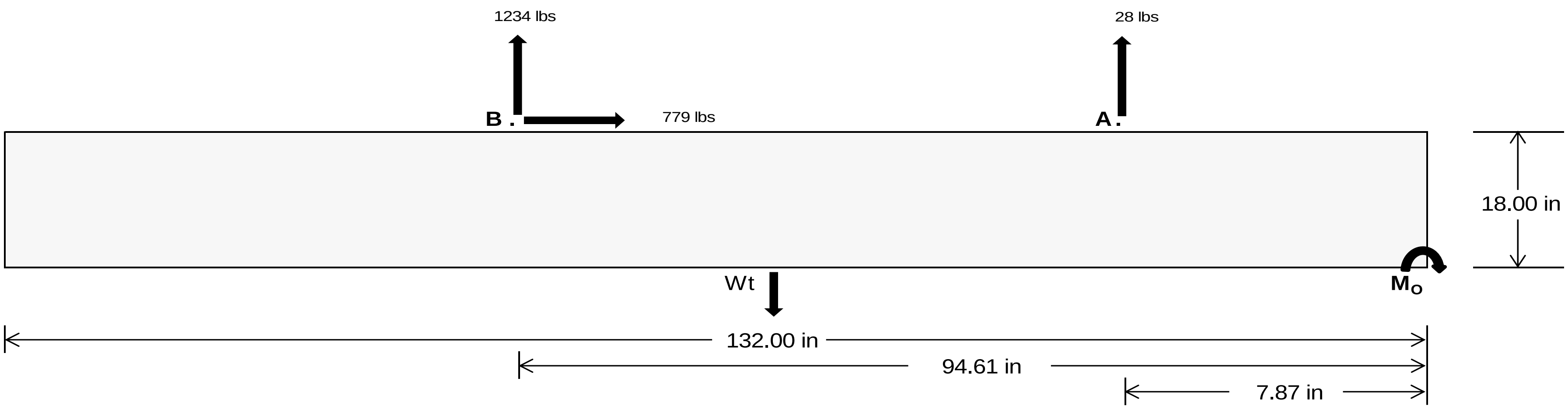
5.1 Helical Pile Foundations

The following LRFD loads include a safety factor of 1.3, and are to be used in conjunction with a Schletter, Inc. Geotechnical Investigation Report. The forces below should fall within the guidelines provided in the Geotechnical Investigation Report. If a Geotechnical Investigation Report is not present, please proceed to Section 5.2 for a concrete foundation design.

Maximum	Front	Rear	
Tensile Load =	142.51	5369.83	k
Compressive Load =	3498.04	4460.90	k
Lateral Load =	17.34	3377.06	k
Moment (Weak Axis) =	0.03	0.00	k

5.2 Design of Ballast Foundations

Ballast foundations are used to secure the racking structure in place. The foundations are checked for potential overturning and sliding. Bearing pressures applied by the racking and ballast foundations are checked against the allowable bearing pressures provided by the IBC table 1806.2 (2012, 2015).



Concrete Properties

Weight of Concrete =	145 pcf
Compressive Strength =	2500 psi
Yield Strength =	60000 psi

Footing Reinforcement

Use fiber reinforcing with (2) #5 rebar.

Overturning Check

M_O =	131009.2 in-lbs
Resisting Force Required =	1984.99 lbs
S.F. =	1.67
Weight Required =	3308.31 lbs
Minimum Width =	27 in in
Weight Provided =	5383.13 lbs

A minimum 132in long x 27in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force =	778.68 lbs
Friction =	0.4
Weight Required =	1946.70 lbs
Resisting Weight =	5383.13 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 27in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force =	778.68 lbs
Cohesion =	130 psf
Area =	24.75 ft^2
Resisting =	2691.56 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 27in wide x 18in tall ballast foundation. Cohesion is OK.

Shear Key

Additional Force =	0 lbs
Lateral Bearing Pressure =	200 psf/ft
Required Depth =	0.00 ft
f'_c =	2500 psi
Length =	8 in

Shear key is not required.

Bearing Pressure

	Ballast Width			
	27 in	28 in	29 in	30 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.25 ft) =	5383 lbs	5583 lbs	5782 lbs	5981 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	27 in	28 in	29 in	30 in	27 in	28 in	29 in	30 in	27 in	28 in	29 in	30 in	27 in	28 in	29 in	30 in
F_A	1317 lbs	1317 lbs	1317 lbs	1317 lbs	1115 lbs	1115 lbs	1115 lbs	1115 lbs	1684 lbs	1684 lbs	1684 lbs	1684 lbs	-55 lbs	-55 lbs	-55 lbs	-55 lbs
F_B	1256 lbs	1256 lbs	1256 lbs	1256 lbs	1835 lbs	1835 lbs	1835 lbs	1835 lbs	2186 lbs	2186 lbs	2186 lbs	2186 lbs	-2469 lbs	-2469 lbs	-2469 lbs	-2469 lbs
F_V	202 lbs	202 lbs	202 lbs	202 lbs	1427 lbs	1427 lbs	1427 lbs	1427 lbs	1202 lbs	1202 lbs	1202 lbs	1202 lbs	-1557 lbs	-1557 lbs	-1557 lbs	-1557 lbs
P_{total}	7956 lbs	8155 lbs	8355 lbs	8554 lbs	8333 lbs	8533 lbs	8732 lbs	8931 lbs	9254 lbs	9453 lbs	9652 lbs	9852 lbs	706 lbs	826 lbs	945 lbs	1065 lbs
M	3687 lbs-ft	3687 lbs-ft	3687 lbs-ft	3687 lbs-ft	3166 lbs-ft	3166 lbs-ft	3166 lbs-ft	3166 lbs-ft	4750 lbs-ft	4750 lbs-ft	4750 lbs-ft	4750 lbs-ft	3282 lbs-ft	3282 lbs-ft	3282 lbs-ft	3282 lbs-ft
e	0.46 ft	0.45 ft	0.44 ft	0.43 ft	0.38 ft	0.37 ft	0.36 ft	0.35 ft	0.51 ft	0.50 ft	0.49 ft	0.48 ft	4.65 ft	3.97 ft	3.47 ft	3.08 ft
L/6	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	240.2 psf	239.4 psf	238.6 psf	237.9 psf	266.9 psf	265.2 psf	263.5 psf	262.0 psf	269.2 psf	267.4 psf	265.6 psf	264.0 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	402.7 psf	396.1 psf	389.9 psf	384.2 psf	406.5 psf	399.7 psf	393.4 psf	387.6 psf	478.6 psf	469.3 psf	460.6 psf	452.5 psf	245.6 psf	154.7 psf	128.6 psf	117.4 psf

Maximum Bearing Pressure = 479 psf
Allowable Bearing Pressure = 1500 psf

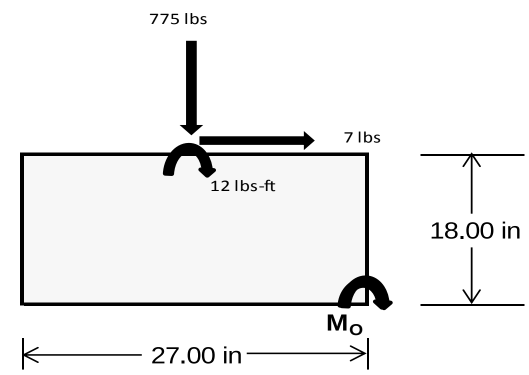
Use a 132in long x 27in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 849.8 ft-lbs
Resisting Force Required = 755.36 lbs
S.F. = 1.67
Weight Required = 1258.93 lbs
Minimum Width = 27 in in
Weight Provided = 5383.13 lbs

A minimum 132in long x 27in wide x 18in tall ballast foundation is required to resist overturning.



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	27 in			27 in			27 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	264 lbs	673 lbs	264 lbs	775 lbs	2163 lbs	775 lbs	77 lbs	197 lbs	77 lbs
F_V	2 lbs	0 lbs	2 lbs	7 lbs	0 lbs	7 lbs	1 lbs	0 lbs	1 lbs
P_{total}	6929 lbs	5383 lbs	6929 lbs	7119 lbs	5383 lbs	7119 lbs	2026 lbs	5383 lbs	2026 lbs
M	7 lbs-ft	0 lbs-ft	7 lbs-ft	23 lbs-ft	0 lbs-ft	23 lbs-ft	2 lbs-ft	0 lbs-ft	2 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft
f_{min}	279.2 psf	217.5 psf	279.2 psf	285.2 psf	217.5 psf	285.2 psf	81.7 psf	217.5 psf	81.7 psf
f_{max}	280.7 psf	217.5 psf	280.7 psf	290.1 psf	217.5 psf	290.1 psf	82.1 psf	217.5 psf	82.1 psf

Maximum Bearing Pressure = 290 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 27in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 27in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

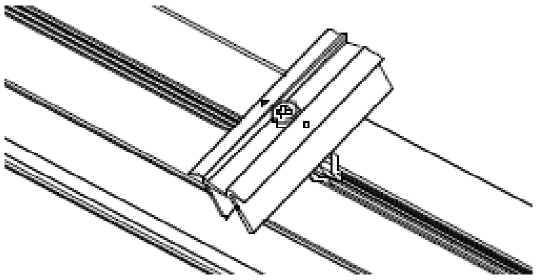
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

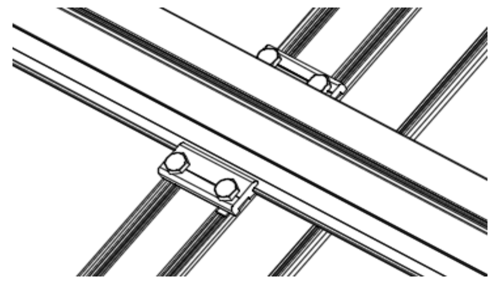
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

Modules are secured to the purlins with Schletter, Inc. Rapid2+ mounting clamps. Purlins are secured to the girders with the use of 80mm mounting clamps. The reliability of calculations is uncertain due to limited standards, therefore the strength of the clamp fasteners has been evaluated by load testing.

Fastening of Modules to Purlins		
Maximum Uplifting Force =	0.504	k
Allowable Uplift =	1.214	k
Utilization =	41%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.921	k
Allowable Uplift =	4.357	k
Utilization =	44%	



6.2 Strut Connections

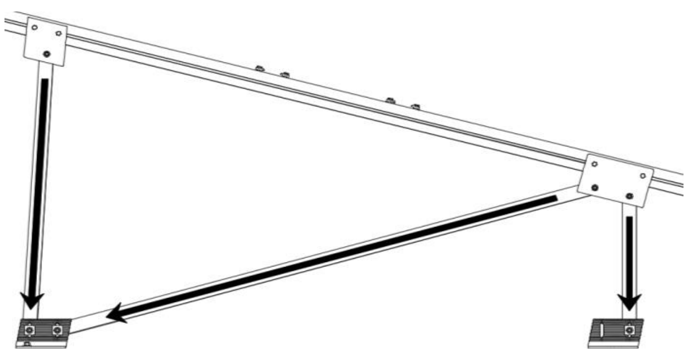
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Single M12 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are used.

Front Strut		
Maximum Axial Load =	2.691	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	36%	

Rear Strut		
Maximum Axial Load =	3.576	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	48%	

Diagonal Strut		
Maximum Axial Load =	2.185	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	29%	

Bolt and bearing capacities are accounting for double shear. (ASCE 8-02, Eq. 5.3.4-1)



Struts under compression are shown to demonstrate the load transfer from the girder. Single M12 bolts are located at each end of the strut and are subjected to double shear.

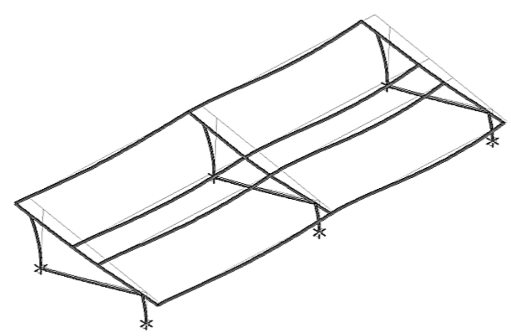
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

The racking structure has been analyzed under seismic loading. The allowable story drift of the structure must fall within the limits provided by (ASCE 7, Table 12.12-1).

Mean Height, h_{sx} =	48.27	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.965	in
Max Drift, Δ_{MAX} =	0.074	in
N/A		

The racking structure's reaction to seismic loads is shown to the right. The deflections have been magnified to provide a clear portrayal of potential story drift.



APPENDIX A

A.1 Design of Aluminum Purlins - Aluminum Design Manual, 2005 Edition

Purlin = **S1.5**

Strong Axis:	Weak Axis:
3.4.14	**3.4.14**
L_b = 129 in	L_b = 129
J = 0.432	J = 0.432
356.874	226.951
$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$	$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$
S1 = 0.51461	S1 = 0.51461
$S2 = \left(\frac{C_c}{1.6}\right)^2$	$S2 = \left(\frac{C_c}{1.6}\right)^2$
S2 = 1701.56	S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]	φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 27.2 ksi	φF_L= 28.4
3.4.16	**3.4.16**
b/t = 32.195	b/t = 37.0588
$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$	$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$
S1 = 12.2	S1 = 12.2
$S2 = \frac{k_1 Bp}{1.6Dp}$	$S2 = \frac{k_1 Bp}{1.6Dp}$
S2 = 46.7	S2 = 46.7
φF_L= φb[Bp-1.6Dp*b/t]	φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 25.1 ksi	φF_L= 23.1 ksi
3.4.16.1 Not Used	**3.4.16.1**
Rb/t =	N/A for Weak Direction
$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b} Fcy}{1.6Dt}\right)^2$	
S1 = 1.1	
$S2 = C_t$	
S2 = 141.0	
φF_L= 1.17φyFcy	
φF_L= 38.9 ksi	
3.4.18	**3.4.18**
h/t = 37.0588	h/t = 32.195
$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$	$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$
S1 = 36.9	S1 = 36.9
m = 0.65	m = 0.65
C_0 = 40.985	C_0 = 45.5
Cc = 41.015	Cc = 45.5
$S2 = \frac{k_1 Bbr}{mDbr}$	$S2 = \frac{k_1 Bbr}{mDbr}$
S2 = 77.2	S2 = 77.3
φF_L= φb[Bbr-mDbr*h/t]	φF_L= 1.3φyFcy
φF_L= 43.2 ksi	φF_L= 43.2 ksi
$\varphi F_L St$= 25.1 ksi	$\varphi F_L Wk$= 23.1 ksi
Ix = 897074 mm^4	Iy = 446476 mm^4
2.155 in^4	1.073 in^4
y = 41.015 mm	x = 45.5 mm
Sx = 1.335 in^3	Sy = 0.599 in^3
$M_{max}St$ = 2.788 k-ft	$M_{max}Wk$ = 1.152 k-ft

Compression

3.4.9

b/t = 32.195
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 25.1 ksi

b/t = 37.0588
S1 = 12.21
S2 = 32.70
φF_L= (φck2*√(BpE))/(1.6b/t)
φF_L= 21.9 ksi

3.4.10

Rb/t = 0.0

$$S1 = \left(\frac{Bt - \frac{\theta_y}{\theta_b}Fcy}{Dt}\right)^2$$

S1 = 6.87
S2 = 131.3
φF_L= φyFcy
φF_L= 33.25 ksi

φF_L= 21.94 ksi
A = 1215.13 mm^2
1.88 in^2
P_{max} = 41.32 kips

A.2 Design of Aluminum Girders - Aluminum Design Manual, 2005 Edition

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 88.9 in
J = 1.08
152.913

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.4 ksi

3.4.16

b/t = 16.2

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7
φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 31.6 ksi

Weak Axis:

3.4.14

L_b = 88.9
J = 1.08
161.829

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.2

3.4.16

b/t = 7.4

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

$$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b}Fcy}{1.6Dt}\right)^2$$

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L = φb[Bt-Dt*√(Rb/t)]

φF_L = 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$$

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 73.8

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

φF_LSt = 29.4 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

M_{max}St = 3.363 k-ft

3.4.18

h/t = 16.2

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$$

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 77.3

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

φF_LWk = 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

M_{max}Wk = 3.904 k-ft

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L = φyFcy

φF_L = 33.3 ksi

3.4.10

Rb/t = 18.1

$$S1 = \left(\frac{Bt - \frac{\theta_y}{\theta_b}Fcy}{Dt}\right)^2$$

S1 = 6.87

S2 = 131.3

φF_L = φc[Bt-Dt*√(Rb/t)]

φF_L = 31.09 ksi

φF_L = 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

A.3 Design of Aluminum Struts (Front) - Aluminum Design Manual, 2005 Edition

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56

φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

$$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b}Fcy}{1.6Dt}\right)^2$$

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$$

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56

φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]

φF_L= 31.4

3.4.16

b/t = 24.5

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$$

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

$$S1^* = \frac{Bc - Fcy}{1.6Dc^*}$$

$S1^*$ = 0.33515

$$S2^* = \frac{Cc}{\pi}\sqrt{Fcy/E}$$

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

$$S1 = \left(\frac{Bt - \frac{\theta_y}{\theta_b}Fcy}{Dt}\right)^2$$

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

A.4 Design of Aluminum Struts (Diagonal) - Aluminum Design Manual, 2005 Edition

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 86.60 in

J = 0.942

135.148

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56

φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]

φF_L= 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56

φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]

φF_L= 29.6

3.4.16

b/t = 24.5

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7

$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$

$\varphi F_L =$ 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

$$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b} Fcy}{1.6Dt}\right)^2$$

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

$\varphi F_L = 1.17\varphi yFcy$

$\varphi F_L =$ 38.9 ksi

3.4.18

h/t = 24.5

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$$

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

$M_{max}St$ = 1.460 k-ft

3.4.16

b/t = 24.5

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7

$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$

$\varphi F_L =$ 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$$

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L Wk =$ 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

$M_{max}Wk$ = 1.460 k-ft

<u>Compression</u>

3.4.7

λ = 2.00335

r = 0.81 in

$$S1^* = \frac{Bc - Fcy}{1.6Dc^*}$$

$S1^*$ = 0.33515

$$S2^* = \frac{Cc}{\pi}\sqrt{Fcy/E}$$

$S2^*$ = 1.23671

φcc = 0.86047

$\varphi F_L = (\varphi ccFcy)/(\lambda^2)$

$\varphi F_L =$ 7.50396 ksi

3.4.9

b/t = 24.5
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

b/t = 24.5
S1 = 12.21
S2 = 32.70
$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

3.4.10

Rb/t = 0.0

$$S1 = \left(\frac{Bt - \frac{\theta_y}{\theta_b} Fcy}{Dt}\right)^2$$

S1 = 6.87
S2 = 131.3
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.50 ksi
A = 663.99 mm^2
1.03 in^2
$P_{max} =$ 7.72 kips

A.5 Design of Aluminum Struts (Rear) - Aluminum Design Manual, 2005 Edition

Strut = **55x55**

Strong Axis:

3.4.14

$L_b =$ 70.83 in
J = 0.942
110.537

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\surd((LbSc)/(Cb*\surd(IyJ)/2))]$
$\varphi F_L =$ 30.0 ksi

3.4.16

b/t = 24.5

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7
$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

Weak Axis:

3.4.14

$L_b =$ 70.83
J = 0.942
110.537

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\surd((LbSc)/(Cb*\surd(IyJ)/2))]$
$\varphi F_L =$ 30.0

3.4.16

b/t = 24.5

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7
$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

$$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b}Fcy}{1.6Dt}\right)^2$$

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L = 1.17φyFcy

φF_L = 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$$

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 77.3

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

φF_LSt = 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$$

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 77.3

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

φF_LWk = 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.63853

r = 0.81 in

$$S1^* = \frac{Bc - Fcy}{1.6Dc^*}$$

$S1^*$ = 0.33515

$$S2^* = \frac{Cc}{\pi}\sqrt{Fcy/E}$$

$S2^*$ = 1.23671

φcc = 0.80939

φF_L = (φccFcy)/(λ^2)

φF_L = 10.5516 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

3.4.10

Rb/t = 0.0

$$S1 = \left(\frac{Bt - \frac{\theta_y}{\theta_b} Fcy}{Dt}\right)^2$$

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 10.55 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 10.86 kips

APPENDIX B

B.1

The following pages will contain the results from RISA. Please refer back to Section 2 for load information and Section 4-5 for member and foundation design.

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead Load, Max	DL		-1				4		
2	Dead Load, Min	DL		-1				4		
3	Snow Load	SL						4		
4	Wind Load - Pressure	WL						4		
5	Wind Load - Suction	WL						4		
6	Seismic - Lateral	EL								

Member Distributed Loads (BLC 1 : Dead Load, Max)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-8.366	-8.366	0	0
2	M14	Y	-8.366	-8.366	0	0
3	M15	Y	-8.366	-8.366	0	0
4	M16	Y	-8.366	-8.366	0	0

Member Distributed Loads (BLC 2 : Dead Load, Min)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-4.45	-4.45	0	0
2	M14	Y	-4.45	-4.45	0	0
3	M15	Y	-4.45	-4.45	0	0
4	M16	Y	-4.45	-4.45	0	0

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-39.836	-39.836	0	0
2	M14	Y	-39.836	-39.836	0	0
3	M15	Y	-39.836	-39.836	0	0
4	M16	Y	-39.836	-39.836	0	0

Member Distributed Loads (BLC 4 : Wind Load - Pressure)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-66.592	-66.592	0	0
2	M14	y	-66.592	-66.592	0	0
3	M15	y	-107.127	-107.127	0	0
4	M16	y	-107.127	-107.127	0	0

Member Distributed Loads (BLC 5 : Wind Load - Suction)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	150.556	150.556	0	0
2	M14	y	115.813	115.813	0	0
3	M15	y	63.697	63.697	0	0
4	M16	y	63.697	63.697	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.5W	Yes	Y		1	1.2	3	1.6	4	.5														
2	LRFD 1.2D + 1.0W + 0.5S	Yes	Y		1	1.2	3	.5	4	1														
3	LRFD 0.9D + 1.0W	Yes	Y		2	.9					5	1												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																
10	ASD 1.0D + 0.6W	Yes	Y		1	1			4	.6														
11	ASD 1.0D + 0.75L + 0.45W + 0....	Yes	Y		1	1	3	.75	4	.45														
12	ASD 0.6D + 0.6W	Yes	Y		2	.6					5	.6												
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875												
14	LATERAL - ASD 1.1785D + 0.65...	Yes	Y		1	1.1...	3	.75			6	.656												
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	647.821	2	1042.513	2	.756	1	.003	1	0	1	0	1
2		min	-817.563	3	-1258.062	3	.041	15	0	15	0	1	0	1
3	N7	max	.041	9	1054.206	1	-.651	15	-.001	15	0	1	0	1
4		min	-.139	2	-2.497	3	-13.335	1	-.026	1	0	1	0	1
5	N15	max	.034	9	2690.798	1	0	2	0	2	0	1	0	1
6		min	-1.598	2	-109.621	3	0	14	0	14	0	1	0	1
7	N16	max	2441.193	2	3431.459	2	0	3	0	3	0	1	0	1
8		min	-2597.737	3	-4130.639	3	0	2	0	1	0	1	0	1
9	N23	max	.041	9	1054.206	1	13.335	1	.026	1	0	1	0	1
10		min	-.139	2	-2.497	3	.651	15	.001	15	0	1	0	1
11	N24	max	647.821	2	1042.513	2	-.041	15	0	15	0	1	0	1
12		min	-817.563	3	-1258.062	3	-.756	1	-.003	1	0	1	0	1
13	Totals:	max	3734.959	2	9880.48	1	0	2						
14		min	-4232.952	3	-6761.377	3	0	14						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	130.019	1	394.487	1	-9.265	15	0	3	.311	1	0	1
2			min	6.18	15	-588.331	3	-195.645	1	-.012	2	.015	15	0	3
3		2	max	130.019	1	276.534	1	-7.131	15	0	3	.104	1	.599	3
4			min	6.18	15	-414.043	3	-150.507	1	-.012	2	.005	15	-.401	1
5		3	max	130.019	1	158.582	1	-4.997	15	0	3	0	12	.989	3
6			min	6.18	15	-239.756	3	-105.368	1	-.012	2	-.049	1	-.661	1
7		4	max	130.019	1	40.629	1	-2.863	15	0	3	-.006	12	1.171	3
8			min	6.18	15	-65.468	3	-60.23	1	-.012	2	-.147	1	-.78	1
9		5	max	130.019	1	108.82	3	-.729	15	0	3	-.009	12	1.145	3
10			min	6.18	15	-77.324	1	-15.091	1	-.012	2	-.192	1	-.758	1
11		6	max	130.019	1	283.107	3	30.048	1	0	3	-.009	15	.911	3
12			min	6.18	15	-195.276	1	.887	12	-.012	2	-.183	1	-.595	1
13		7	max	130.019	1	457.395	3	75.186	1	0	3	-.006	15	.469	3
14			min	6.18	15	-313.229	1	3.021	12	-.012	2	-.121	1	-.291	1
15		8	max	130.019	1	631.682	3	120.325	1	0	3	0	10	.153	1
16			min	6.18	15	-431.181	1	5.154	12	-.012	2	-.004	1	-.181	3
17		9	max	130.019	1	805.97	3	165.464	1	0	3	.167	1	.739	1
18			min	6.18	15	-549.134	1	7.288	12	-.012	2	.006	12	-1.04	3
19		10	max	130.019	1	980.258	3	210.602	1	0	3	.391	1	1.465	1
20			min	6.18	15	-667.087	1	9.421	12	-.012	2	.016	12	-2.107	3
21		11	max	130.019	1	549.134	1	-7.288	12	.012	2	.167	1	.739	1
22			min	6.18	15	-805.97	3	-165.464	1	0	3	.006	12	-1.04	3
23		12	max	130.019	1	431.181	1	-5.154	12	.012	2	0	10	.153	1
24			min	6.18	15	-631.682	3	-120.325	1	0	3	-.004	1	-.181	3
25		13	max	130.019	1	313.229	1	-3.021	12	.012	2	-.006	15	.469	3
26			min	6.18	15	-457.395	3	-75.186	1	0	3	-.121	1	-.291	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	130.019	1	195.276	1	-.887	12	.012	2	-.009	15	.911	3
28			min	6.18	15	-283.107	3	-30.048	1	0	3	-.183	1	-.595	1
29		15	max	130.019	1	77.324	1	15.091	1	.012	2	-.009	12	1.145	3
30			min	6.18	15	-108.82	3	.729	15	0	3	-.192	1	-.758	1
31		16	max	130.019	1	65.468	3	60.23	1	.012	2	-.006	12	1.171	3
32			min	6.18	15	-40.629	1	2.863	15	0	3	-.147	1	-.78	1
33		17	max	130.019	1	239.756	3	105.368	1	.012	2	0	12	.989	3
34			min	6.18	15	-158.582	1	4.997	15	0	3	-.049	1	-.661	1
35		18	max	130.019	1	414.043	3	150.507	1	.012	2	.104	1	.599	3
36			min	6.18	15	-276.534	1	7.131	15	0	3	.005	15	-.401	1
37		19	max	130.019	1	588.331	3	195.645	1	.012	2	.311	1	0	1
38			min	6.18	15	-394.487	1	9.265	15	0	3	.015	15	0	3
39	M14	1	max	57.713	1	414.001	1	-9.535	15	.007	3	.352	1	0	1
40			min	2.748	15	-459.372	3	-201.36	1	-.009	2	.017	15	0	3
41		2	max	57.713	1	296.048	1	-7.401	15	.007	3	.138	1	.469	3
42			min	2.748	15	-326.583	3	-156.221	1	-.009	2	.007	15	-.424	1
43		3	max	57.713	1	178.095	1	-5.267	15	.007	3	.001	3	.78	3
44			min	2.748	15	-193.794	3	-111.083	1	-.009	2	-.021	1	-.707	1
45		4	max	57.713	1	60.143	1	-3.133	15	.007	3	-.005	12	.932	3
46			min	2.748	15	-61.005	3	-65.944	1	-.009	2	-.127	1	-.85	1
47		5	max	57.713	1	71.784	3	-.999	15	.007	3	-.008	12	.926	3
48			min	2.748	15	-57.81	1	-20.805	1	-.009	2	-.179	1	-.851	1
49		6	max	57.713	1	204.573	3	24.333	1	.007	3	-.008	15	.761	3
50			min	2.748	15	-175.763	1	.627	12	-.009	2	-.177	1	-.711	1
51		7	max	57.713	1	337.362	3	69.472	1	.007	3	-.006	15	.437	3
52			min	2.748	15	-293.715	1	2.761	12	-.009	2	-.121	1	-.431	1
53		8	max	57.713	1	470.151	3	114.611	1	.007	3	0	10	0	9
54			min	2.748	15	-411.668	1	4.895	12	-.009	2	-.011	1	-.045	3
55		9	max	57.713	1	602.94	3	159.749	1	.007	3	.153	1	.552	1
56			min	2.748	15	-529.62	1	7.028	12	-.009	2	.005	12	-.686	3
57		10	max	57.713	1	735.729	3	204.888	1	.007	3	.371	1	1.255	1
58			min	2.748	15	-647.573	1	9.162	12	-.009	2	.015	12	-1.485	3
59		11	max	57.713	1	529.62	1	-7.028	12	.009	2	.153	1	.552	1
60			min	2.748	15	-602.94	3	-159.749	1	-.007	3	.005	12	-.686	3
61		12	max	57.713	1	411.668	1	-4.895	12	.009	2	0	10	0	9
62			min	2.748	15	-470.151	3	-114.611	1	-.007	3	-.011	1	-.045	3
63		13	max	57.713	1	293.715	1	-2.761	12	.009	2	-.006	15	.437	3
64			min	2.748	15	-337.362	3	-69.472	1	-.007	3	-.121	1	-.431	1
65		14	max	57.713	1	175.763	1	-.627	12	.009	2	-.008	15	.761	3
66			min	2.748	15	-204.573	3	-24.333	1	-.007	3	-.177	1	-.711	1
67		15	max	57.713	1	57.81	1	20.805	1	.009	2	-.008	12	.926	3
68			min	2.748	15	-71.784	3	.999	15	-.007	3	-.179	1	-.851	1
69		16	max	57.713	1	61.005	3	65.944	1	.009	2	-.005	12	.932	3
70			min	2.748	15	-60.143	1	3.133	15	-.007	3	-.127	1	-.85	1
71		17	max	57.713	1	193.794	3	111.083	1	.009	2	.001	3	.78	3
72			min	2.748	15	-178.095	1	5.267	15	-.007	3	-.021	1	-.707	1
73		18	max	57.713	1	326.583	3	156.221	1	.009	2	.138	1	.469	3
74			min	2.748	15	-296.048	1	7.401	15	-.007	3	.007	15	-.424	1
75		19	max	57.713	1	459.372	3	201.36	1	.009	2	.352	1	0	1
76			min	2.748	15	-414.001	1	9.535	15	-.007	3	.017	15	0	3
77	M15	1	max	-2.898	15	559.246	2	-9.532	15	.009	2	.352	1	0	2
78			min	-60.848	1	-249.404	3	-201.327	1	-.006	3	.017	15	0	12
79		2	max	-2.898	15	398.433	2	-7.398	15	.009	2	.138	1	.256	3
80			min	-60.848	1	-178.864	3	-156.188	1	-.006	3	.007	15	-.572	2
81		3	max	-2.898	15	237.621	2	-5.265	15	.009	2	0	3	.427	3
82			min	-60.848	1	-108.325	3	-111.05	1	-.006	3	-.021	1	-.952	2
83		4	max	-2.898	15	76.808	2	-3.131	15	.009	2	-.005	12	.515	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
84			min	-60.848	1	-37.786	3	-65.911	1	-.006	3	-.127	1	-1.14	2
85		5	max	-2.898	15	32.754	3	-.997	15	.009	2	-.008	12	.518	3
86			min	-60.848	1	-84.004	2	-20.772	1	-.006	3	-.179	1	-1.135	2
87		6	max	-2.898	15	103.293	3	24.366	1	.009	2	-.008	15	.436	3
88			min	-60.848	1	-244.816	2	.669	12	-.006	3	-.177	1	-.939	2
89		7	max	-2.898	15	173.833	3	69.505	1	.009	2	-.006	15	.271	3
90			min	-60.848	1	-405.629	2	2.803	12	-.006	3	-.121	1	-.55	2
91		8	max	-2.898	15	244.372	3	114.644	1	.009	2	0	10	.03	2
92			min	-60.848	1	-566.441	2	4.936	12	-.006	3	-.011	1	0	15
93		9	max	-2.898	15	314.911	3	159.782	1	.009	2	.153	1	.803	2
94			min	-60.848	1	-727.254	2	7.07	12	-.006	3	.005	12	-.313	3
95		10	max	-2.898	15	385.451	3	204.921	1	.009	2	.371	1	1.767	2
96			min	-60.848	1	-888.066	2	9.203	12	-.006	3	.015	12	-.731	3
97		11	max	-2.898	15	727.254	2	-7.07	12	.006	3	.153	1	.803	2
98			min	-60.848	1	-314.911	3	-159.782	1	-.009	2	.005	12	-.313	3
99		12	max	-2.898	15	566.441	2	-4.936	12	.006	3	0	10	.03	2
100			min	-60.848	1	-244.372	3	-114.644	1	-.009	2	-.011	1	0	15
101		13	max	-2.898	15	405.629	2	-2.803	12	.006	3	-.006	15	.271	3
102			min	-60.848	1	-173.833	3	-69.505	1	-.009	2	-.121	1	-.55	2
103		14	max	-2.898	15	244.816	2	-.669	12	.006	3	-.008	15	.436	3
104			min	-60.848	1	-103.293	3	-24.366	1	-.009	2	-.177	1	-.939	2
105		15	max	-2.898	15	84.004	2	20.772	1	.006	3	-.008	12	.518	3
106			min	-60.848	1	-32.754	3	.997	15	-.009	2	-.179	1	-1.135	2
107		16	max	-2.898	15	37.786	3	65.911	1	.006	3	-.005	12	.515	3
108			min	-60.848	1	-76.808	2	3.131	15	-.009	2	-.127	1	-1.14	2
109		17	max	-2.898	15	108.325	3	111.05	1	.006	3	0	3	.427	3
110			min	-60.848	1	-237.621	2	5.265	15	-.009	2	-.021	1	-.952	2
111		18	max	-2.898	15	178.864	3	156.188	1	.006	3	.138	1	.256	3
112			min	-60.848	1	-398.433	2	7.398	15	-.009	2	.007	15	-.572	2
113		19	max	-2.898	15	249.404	3	201.327	1	.006	3	.352	1	0	2
114			min	-60.848	1	-559.246	2	9.532	15	-.009	2	.017	15	0	12
115	M16	1	max	-6.639	15	539.533	2	-9.273	15	.009	1	.313	1	0	2
116			min	-139.463	1	-234.957	3	-195.883	1	-.009	3	.015	15	0	3
117		2	max	-6.639	15	378.72	2	-7.139	15	.009	1	.106	1	.239	3
118			min	-139.463	1	-164.417	3	-150.744	1	-.009	3	.005	15	-.548	2
119		3	max	-6.639	15	217.908	2	-5.005	15	.009	1	-.001	12	.393	3
120			min	-139.463	1	-93.878	3	-105.606	1	-.009	3	-.048	1	-.905	2
121		4	max	-6.639	15	57.096	2	-2.871	15	.009	1	-.006	12	.463	3
122			min	-139.463	1	-23.339	3	-60.467	1	-.009	3	-.147	1	-1.069	2
123		5	max	-6.639	15	47.201	3	-.737	15	.009	1	-.009	12	.449	3
124			min	-139.463	1	-103.717	2	-15.329	1	-.009	3	-.192	1	-1.041	2
125		6	max	-6.639	15	117.74	3	29.81	1	.009	1	-.009	15	.35	3
126			min	-139.463	1	-264.529	2	1.021	12	-.009	3	-.183	1	-.821	2
127		7	max	-6.639	15	188.279	3	74.949	1	.009	1	-.006	15	.167	3
128			min	-139.463	1	-425.342	2	3.155	12	-.009	3	-.121	1	-.409	2
129		8	max	-6.639	15	258.819	3	120.087	1	.009	1	0	10	.195	2
130			min	-139.463	1	-586.154	2	5.289	12	-.009	3	-.004	1	-.1	3
131		9	max	-6.639	15	329.358	3	165.226	1	.009	1	.166	1	.991	2
132			min	-139.463	1	-746.966	2	7.422	12	-.009	3	.006	12	-.451	3
133		10	max	-6.639	15	399.897	3	210.365	1	.009	1	.39	1	1.979	2
134			min	-139.463	1	-907.779	2	9.556	12	-.009	3	.016	12	-.887	3
135		11	max	-6.639	15	746.966	2	-7.422	12	.009	3	.166	1	.991	2
136			min	-139.463	1	-329.358	3	-165.226	1	-.009	1	.006	12	-.451	3
137		12	max	-6.639	15	586.154	2	-5.289	12	.009	3	0	10	.195	2
138			min	-139.463	1	-258.819	3	-120.087	1	-.009	1	-.004	1	-.1	3
139		13	max	-6.639	15	425.342	2	-3.155	12	.009	3	-.006	15	.167	3
140			min	-139.463	1	-188.279	3	-74.949	1	-.009	1	-.121	1	-.409	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
141		14	max	-6.639	15	264.529	2	-1.021	12	.009	3	-.009	15	.35	3
142			min	-139.463	1	-117.74	3	-29.81	1	-.009	1	-.183	1	-.821	2
143		15	max	-6.639	15	103.717	2	15.329	1	.009	3	-.009	12	.449	3
144			min	-139.463	1	-47.201	3	.737	15	-.009	1	-.192	1	-1.041	2
145		16	max	-6.639	15	23.339	3	60.467	1	.009	3	-.006	12	.463	3
146			min	-139.463	1	-57.096	2	2.871	15	-.009	1	-.147	1	-1.069	2
147		17	max	-6.639	15	93.878	3	105.606	1	.009	3	-.001	12	.393	3
148			min	-139.463	1	-217.908	2	5.005	15	-.009	1	-.048	1	-.905	2
149		18	max	-6.639	15	164.417	3	150.744	1	.009	3	.106	1	.239	3
150			min	-139.463	1	-378.72	2	7.139	15	-.009	1	.005	15	-.548	2
151		19	max	-6.639	15	234.957	3	195.883	1	.009	3	.313	1	0	2
152			min	-139.463	1	-539.533	2	9.273	15	-.009	1	.015	15	0	3
153	M2	1	max	906.033	1	1.928	4	.599	1	0	5	0	3	0	1
154			min	-1088.755	3	.454	15	.028	15	0	1	0	1	0	1
155		2	max	906.509	1	1.843	4	.599	1	0	5	0	1	0	15
156			min	-1088.398	3	.434	15	.028	15	0	1	0	15	0	4
157		3	max	906.985	1	1.757	4	.599	1	0	5	0	1	0	15
158			min	-1088.041	3	.414	15	.028	15	0	1	0	15	-.001	4
159		4	max	907.46	1	1.671	4	.599	1	0	5	0	1	0	15
160			min	-1087.684	3	.393	15	.028	15	0	1	0	15	-.002	4
161		5	max	907.936	1	1.586	4	.599	1	0	5	0	1	0	15
162			min	-1087.328	3	.373	15	.028	15	0	1	0	15	-.002	4
163		6	max	908.412	1	1.5	4	.599	1	0	5	0	1	0	15
164			min	-1086.971	3	.353	15	.028	15	0	1	0	15	-.003	4
165		7	max	908.888	1	1.415	4	.599	1	0	5	.001	1	0	15
166			min	-1086.614	3	.333	15	.028	15	0	1	0	15	-.003	4
167		8	max	909.363	1	1.329	4	.599	1	0	5	.001	1	0	15
168			min	-1086.257	3	.313	15	.028	15	0	1	0	15	-.004	4
169		9	max	909.839	1	1.243	4	.599	1	0	5	.002	1	0	15
170			min	-1085.9	3	.293	15	.028	15	0	1	0	15	-.004	4
171		10	max	910.315	1	1.158	4	.599	1	0	5	.002	1	-.001	15
172			min	-1085.543	3	.273	15	.028	15	0	1	0	15	-.004	4
173		11	max	910.791	1	1.072	4	.599	1	0	5	.002	1	-.001	15
174			min	-1085.187	3	.253	15	.028	15	0	1	0	15	-.005	4
175		12	max	911.266	1	.987	4	.599	1	0	5	.002	1	-.001	15
176			min	-1084.83	3	.233	15	.028	15	0	1	0	15	-.005	4
177		13	max	911.742	1	.901	4	.599	1	0	5	.002	1	-.001	15
178			min	-1084.473	3	.203	12	.028	15	0	1	0	15	-.005	4
179		14	max	912.218	1	.816	2	.599	1	0	5	.003	1	-.001	15
180			min	-1084.116	3	.17	12	.028	15	0	1	0	15	-.006	4
181		15	max	912.694	1	.75	2	.599	1	0	5	.003	1	-.001	15
182			min	-1083.759	3	.136	12	.028	15	0	1	0	15	-.006	4
183		16	max	913.169	1	.683	2	.599	1	0	5	.003	1	-.001	15
184			min	-1083.403	3	.103	12	.028	15	0	1	0	15	-.006	4
185		17	max	913.645	1	.616	2	.599	1	0	5	.003	1	-.002	15
186			min	-1083.046	3	.07	12	.028	15	0	1	0	15	-.006	4
187		18	max	914.121	1	.549	2	.599	1	0	5	.003	1	-.002	15
188			min	-1082.689	3	.029	3	.028	15	0	1	0	15	-.007	4
189		19	max	914.597	1	.483	2	.599	1	0	5	.003	1	-.002	15
190			min	-1082.332	3	-.021	3	.028	15	0	1	0	15	-.007	4
191	M3	1	max	545.894	2	7.778	4	.279	1	0	12	0	1	.007	4
192			min	-692.613	3	1.829	15	.013	15	0	1	0	15	.002	15
193		2	max	545.723	2	7.013	4	.279	1	0	12	0	1	.004	2
194			min	-692.741	3	1.649	15	.013	15	0	1	0	15	0	12
195		3	max	545.553	2	6.249	4	.279	1	0	12	0	1	.002	2
196			min	-692.869	3	1.469	15	.013	15	0	1	0	15	0	3
197		4	max	545.383	2	5.484	4	.279	1	0	12	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-692.996	3	1.29	15	.013	15	0	1	0	15	-.002	3
199		5	max	545.212	2	4.72	4	.279	1	0	12	0	1	0	15
200			min	-693.124	3	1.11	15	.013	15	0	1	0	15	-.004	4
201		6	max	545.042	2	3.956	4	.279	1	0	12	.001	1	-.001	15
202			min	-693.252	3	.93	15	.013	15	0	1	0	15	-.006	4
203		7	max	544.872	2	3.191	4	.279	1	0	12	.001	1	-.002	15
204			min	-693.38	3	.751	15	.013	15	0	1	0	15	-.007	4
205		8	max	544.701	2	2.427	4	.279	1	0	12	.001	1	-.002	15
206			min	-693.507	3	.571	15	.013	15	0	1	0	15	-.008	4
207		9	max	544.531	2	1.662	4	.279	1	0	12	.001	1	-.002	15
208			min	-693.635	3	.391	15	.013	15	0	1	0	15	-.009	4
209		10	max	544.361	2	.898	4	.279	1	0	12	.002	1	-.002	15
210			min	-693.763	3	.212	15	.013	15	0	1	0	15	-.01	4
211		11	max	544.19	2	.244	2	.279	1	0	12	.002	1	-.002	15
212			min	-693.891	3	-.114	3	.013	15	0	1	0	15	-.01	4
213		12	max	544.02	2	-.148	15	.279	1	0	12	.002	1	-.002	15
214			min	-694.019	3	-.631	4	.013	15	0	1	0	15	-.01	4
215		13	max	543.849	2	-.328	15	.279	1	0	12	.002	1	-.002	15
216			min	-694.146	3	-1.396	4	.013	15	0	1	0	15	-.009	4
217		14	max	543.679	2	-.507	15	.279	1	0	12	.002	1	-.002	15
218			min	-694.274	3	-2.16	4	.013	15	0	1	0	15	-.009	4
219		15	max	543.509	2	-.687	15	.279	1	0	12	.002	1	-.002	15
220			min	-694.402	3	-2.924	4	.013	15	0	1	0	15	-.007	4
221		16	max	543.338	2	-.867	15	.279	1	0	12	.002	1	-.001	15
222			min	-694.53	3	-3.689	4	.013	15	0	1	0	15	-.006	4
223		17	max	543.168	2	-1.046	15	.279	1	0	12	.002	1	-.001	15
224			min	-694.657	3	-4.453	4	.013	15	0	1	0	15	-.004	4
225		18	max	542.998	2	-1.226	15	.279	1	0	12	.002	1	0	15
226			min	-694.785	3	-5.218	4	.013	15	0	1	0	15	-.002	4
227		19	max	542.827	2	-1.406	15	.279	1	0	12	.003	1	0	1
228			min	-694.913	3	-5.982	4	.013	15	0	1	0	15	0	1
229	M4	1	max	1051.14	1	0	1	-.652	15	0	1	.002	1	0	1
230			min	-4.797	3	0	1	-13.74	1	0	1	0	15	0	1
231		2	max	1051.31	1	0	1	-.652	15	0	1	0	1	0	1
232			min	-4.669	3	0	1	-13.74	1	0	1	0	15	0	1
233		3	max	1051.481	1	0	1	-.652	15	0	1	0	12	0	1
234			min	-4.541	3	0	1	-13.74	1	0	1	-.001	1	0	1
235		4	max	1051.651	1	0	1	-.652	15	0	1	0	15	0	1
236			min	-4.414	3	0	1	-13.74	1	0	1	-.003	1	0	1
237		5	max	1051.821	1	0	1	-.652	15	0	1	0	15	0	1
238			min	-4.286	3	0	1	-13.74	1	0	1	-.004	1	0	1
239		6	max	1051.992	1	0	1	-.652	15	0	1	0	15	0	1
240			min	-4.158	3	0	1	-13.74	1	0	1	-.006	1	0	1
241		7	max	1052.162	1	0	1	-.652	15	0	1	0	15	0	1
242			min	-4.03	3	0	1	-13.74	1	0	1	-.007	1	0	1
243		8	max	1052.332	1	0	1	-.652	15	0	1	0	15	0	1
244			min	-3.903	3	0	1	-13.74	1	0	1	-.009	1	0	1
245		9	max	1052.503	1	0	1	-.652	15	0	1	0	15	0	1
246			min	-3.775	3	0	1	-13.74	1	0	1	-.01	1	0	1
247		10	max	1052.673	1	0	1	-.652	15	0	1	0	15	0	1
248			min	-3.647	3	0	1	-13.74	1	0	1	-.012	1	0	1
249		11	max	1052.844	1	0	1	-.652	15	0	1	0	15	0	1
250			min	-3.519	3	0	1	-13.74	1	0	1	-.014	1	0	1
251		12	max	1053.014	1	0	1	-.652	15	0	1	0	15	0	1
252			min	-3.392	3	0	1	-13.74	1	0	1	-.015	1	0	1
253		13	max	1053.184	1	0	1	-.652	15	0	1	0	15	0	1
254			min	-3.264	3	0	1	-13.74	1	0	1	-.017	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
255		14	max	1053.355	1	0	1	-.652	15	0	1	0	15	0	1
256			min	-3.136	3	0	1	-13.74	1	0	1	-.018	1	0	1
257		15	max	1053.525	1	0	1	-.652	15	0	1	0	15	0	1
258			min	-3.008	3	0	1	-13.74	1	0	1	-.02	1	0	1
259		16	max	1053.695	1	0	1	-.652	15	0	1	-.001	15	0	1
260			min	-2.88	3	0	1	-13.74	1	0	1	-.022	1	0	1
261		17	max	1053.866	1	0	1	-.652	15	0	1	-.001	15	0	1
262			min	-2.753	3	0	1	-13.74	1	0	1	-.023	1	0	1
263		18	max	1054.036	1	0	1	-.652	15	0	1	-.001	15	0	1
264			min	-2.625	3	0	1	-13.74	1	0	1	-.025	1	0	1
265		19	max	1054.206	1	0	1	-.652	15	0	1	-.001	15	0	1
266			min	-2.497	3	0	1	-13.74	1	0	1	-.026	1	0	1
267	M6	1	max	2925.494	1	2.161	2	0	1	0	1	0	1	0	1
268			min	-3575.644	3	.273	12	0	1	0	1	0	1	0	1
269		2	max	2925.969	1	2.094	2	0	1	0	1	0	1	0	12
270			min	-3575.287	3	.24	12	0	1	0	1	0	1	0	2
271		3	max	2926.445	1	2.028	2	0	1	0	1	0	1	0	12
272			min	-3574.93	3	.206	12	0	1	0	1	0	1	-.001	2
273		4	max	2926.921	1	1.961	2	0	1	0	1	0	1	0	12
274			min	-3574.573	3	.173	12	0	1	0	1	0	1	-.002	2
275		5	max	2927.397	1	1.894	2	0	1	0	1	0	1	0	12
276			min	-3574.217	3	.129	3	0	1	0	1	0	1	-.003	2
277		6	max	2927.872	1	1.828	2	0	1	0	1	0	1	0	12
278			min	-3573.86	3	.079	3	0	1	0	1	0	1	-.003	2
279		7	max	2928.348	1	1.761	2	0	1	0	1	0	1	0	12
280			min	-3573.503	3	.028	3	0	1	0	1	0	1	-.004	2
281		8	max	2928.824	1	1.694	2	0	1	0	1	0	1	0	3
282			min	-3573.146	3	-.022	3	0	1	0	1	0	1	-.004	2
283		9	max	2929.3	1	1.628	2	0	1	0	1	0	1	0	3
284			min	-3572.789	3	-.072	3	0	1	0	1	0	1	-.005	2
285		10	max	2929.775	1	1.561	2	0	1	0	1	0	1	0	3
286			min	-3572.433	3	-.122	3	0	1	0	1	0	1	-.005	2
287		11	max	2930.251	1	1.494	2	0	1	0	1	0	1	0	3
288			min	-3572.076	3	-.172	3	0	1	0	1	0	1	-.006	2
289		12	max	2930.727	1	1.427	2	0	1	0	1	0	1	0	3
290			min	-3571.719	3	-.222	3	0	1	0	1	0	1	-.006	2
291		13	max	2931.203	1	1.361	2	0	1	0	1	0	1	0	3
292			min	-3571.362	3	-.272	3	0	1	0	1	0	1	-.007	2
293		14	max	2931.678	1	1.294	2	0	1	0	1	0	1	0	3
294			min	-3571.005	3	-.322	3	0	1	0	1	0	1	-.007	2
295		15	max	2932.154	1	1.227	2	0	1	0	1	0	1	0	3
296			min	-3570.649	3	-.372	3	0	1	0	1	0	1	-.008	2
297		16	max	2932.63	1	1.161	2	0	1	0	1	0	1	0	3
298			min	-3570.292	3	-.422	3	0	1	0	1	0	1	-.008	2
299		17	max	2933.106	1	1.094	2	0	1	0	1	0	1	0	3
300			min	-3569.935	3	-.472	3	0	1	0	1	0	1	-.008	2
301		18	max	2933.581	1	1.027	2	0	1	0	1	0	1	0	3
302			min	-3569.578	3	-.522	3	0	1	0	1	0	1	-.009	2
303		19	max	2934.057	1	.961	2	0	1	0	1	0	1	0	3
304			min	-3569.221	3	-.572	3	0	1	0	1	0	1	-.009	2
305	M7	1	max	2126.87	2	7.813	4	0	1	0	1	0	1	.009	2
306			min	-2182.929	3	1.834	15	0	1	0	1	0	1	0	3
307		2	max	2126.699	2	7.049	4	0	1	0	1	0	1	.006	2
308			min	-2183.057	3	1.654	15	0	1	0	1	0	1	-.002	3
309		3	max	2126.529	2	6.284	4	0	1	0	1	0	1	.004	2
310			min	-2183.185	3	1.475	15	0	1	0	1	0	1	-.004	3
311		4	max	2126.359	2	5.52	4	0	1	0	1	0	1	.002	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-2183.313	3	1.295	15	0	1	0	1	0	1	-.005	3
313		5	max	2126.188	2	4.755	4	0	1	0	1	0	1	0	2
314			min	-2183.441	3	1.115	15	0	1	0	1	0	1	-.006	3
315		6	max	2126.018	2	3.991	4	0	1	0	1	0	1	-.001	15
316			min	-2183.568	3	.936	15	0	1	0	1	0	1	-.007	3
317		7	max	2125.848	2	3.226	4	0	1	0	1	0	1	-.002	15
318			min	-2183.696	3	.756	15	0	1	0	1	0	1	-.007	3
319		8	max	2125.677	2	2.462	4	0	1	0	1	0	1	-.002	15
320			min	-2183.824	3	.575	12	0	1	0	1	0	1	-.008	4
321		9	max	2125.507	2	1.806	2	0	1	0	1	0	1	-.002	15
322			min	-2183.952	3	.277	12	0	1	0	1	0	1	-.009	4
323		10	max	2125.337	2	1.21	2	0	1	0	1	0	1	-.002	15
324			min	-2184.079	3	-.094	3	0	1	0	1	0	1	-.009	4
325		11	max	2125.166	2	.615	2	0	1	0	1	0	1	-.002	15
326			min	-2184.207	3	-.541	3	0	1	0	1	0	1	-.01	4
327		12	max	2124.996	2	.019	2	0	1	0	1	0	1	-.002	15
328			min	-2184.335	3	-.988	3	0	1	0	1	0	1	-.01	4
329		13	max	2124.826	2	-.322	15	0	1	0	1	0	1	-.002	15
330			min	-2184.463	3	-1.435	3	0	1	0	1	0	1	-.009	4
331		14	max	2124.655	2	-.502	15	0	1	0	1	0	1	-.002	15
332			min	-2184.59	3	-2.125	4	0	1	0	1	0	1	-.008	4
333		15	max	2124.485	2	-.682	15	0	1	0	1	0	1	-.002	15
334			min	-2184.718	3	-2.889	4	0	1	0	1	0	1	-.007	4
335		16	max	2124.315	2	-.861	15	0	1	0	1	0	1	-.001	15
336			min	-2184.846	3	-3.654	4	0	1	0	1	0	1	-.006	4
337		17	max	2124.144	2	-1.041	15	0	1	0	1	0	1	-.001	15
338			min	-2184.974	3	-4.418	4	0	1	0	1	0	1	-.004	4
339		18	max	2123.974	2	-1.221	15	0	1	0	1	0	1	0	15
340			min	-2185.101	3	-5.182	4	0	1	0	1	0	1	-.002	4
341		19	max	2123.804	2	-1.4	15	0	1	0	1	0	1	0	1
342			min	-2185.229	3	-5.947	4	0	1	0	1	0	1	0	1
343	M8	1	max	2687.732	1	0	1	0	1	0	1	0	1	0	1
344			min	-111.92	3	0	1	0	1	0	1	0	1	0	1
345		2	max	2687.902	1	0	1	0	1	0	1	0	1	0	1
346			min	-111.793	3	0	1	0	1	0	1	0	1	0	1
347		3	max	2688.072	1	0	1	0	1	0	1	0	1	0	1
348			min	-111.665	3	0	1	0	1	0	1	0	1	0	1
349		4	max	2688.243	1	0	1	0	1	0	1	0	1	0	1
350			min	-111.537	3	0	1	0	1	0	1	0	1	0	1
351		5	max	2688.413	1	0	1	0	1	0	1	0	1	0	1
352			min	-111.409	3	0	1	0	1	0	1	0	1	0	1
353		6	max	2688.583	1	0	1	0	1	0	1	0	1	0	1
354			min	-111.281	3	0	1	0	1	0	1	0	1	0	1
355		7	max	2688.754	1	0	1	0	1	0	1	0	1	0	1
356			min	-111.154	3	0	1	0	1	0	1	0	1	0	1
357		8	max	2688.924	1	0	1	0	1	0	1	0	1	0	1
358			min	-111.026	3	0	1	0	1	0	1	0	1	0	1
359		9	max	2689.094	1	0	1	0	1	0	1	0	1	0	1
360			min	-110.898	3	0	1	0	1	0	1	0	1	0	1
361		10	max	2689.265	1	0	1	0	1	0	1	0	1	0	1
362			min	-110.77	3	0	1	0	1	0	1	0	1	0	1
363		11	max	2689.435	1	0	1	0	1	0	1	0	1	0	1
364			min	-110.643	3	0	1	0	1	0	1	0	1	0	1
365		12	max	2689.605	1	0	1	0	1	0	1	0	1	0	1
366			min	-110.515	3	0	1	0	1	0	1	0	1	0	1
367		13	max	2689.776	1	0	1	0	1	0	1	0	1	0	1
368			min	-110.387	3	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
369		14	max	2689.946	1	0	1	0	1	0	1	0	1	0	1
370			min	-110.259	3	0	1	0	1	0	1	0	1	0	1
371		15	max	2690.116	1	0	1	0	1	0	1	0	1	0	1
372			min	-110.132	3	0	1	0	1	0	1	0	1	0	1
373		16	max	2690.287	1	0	1	0	1	0	1	0	1	0	1
374			min	-110.004	3	0	1	0	1	0	1	0	1	0	1
375		17	max	2690.457	1	0	1	0	1	0	1	0	1	0	1
376			min	-109.876	3	0	1	0	1	0	1	0	1	0	1
377		18	max	2690.627	1	0	1	0	1	0	1	0	1	0	1
378			min	-109.748	3	0	1	0	1	0	1	0	1	0	1
379		19	max	2690.798	1	0	1	0	1	0	1	0	1	0	1
380			min	-109.621	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	906.033	1	1.928	4	-.028	15	0	1	0	1	0	1
382			min	-1088.755	3	.454	15	-.599	1	0	5	0	3	0	1
383		2	max	906.509	1	1.843	4	-.028	15	0	1	0	15	0	15
384			min	-1088.398	3	.434	15	-.599	1	0	5	0	1	0	4
385		3	max	906.985	1	1.757	4	-.028	15	0	1	0	15	0	15
386			min	-1088.041	3	.414	15	-.599	1	0	5	0	1	-.001	4
387		4	max	907.46	1	1.671	4	-.028	15	0	1	0	15	0	15
388			min	-1087.684	3	.393	15	-.599	1	0	5	0	1	-.002	4
389		5	max	907.936	1	1.586	4	-.028	15	0	1	0	15	0	15
390			min	-1087.328	3	.373	15	-.599	1	0	5	0	1	-.002	4
391		6	max	908.412	1	1.5	4	-.028	15	0	1	0	15	0	15
392			min	-1086.971	3	.353	15	-.599	1	0	5	0	1	-.003	4
393		7	max	908.888	1	1.415	4	-.028	15	0	1	0	15	0	15
394			min	-1086.614	3	.333	15	-.599	1	0	5	-.001	1	-.003	4
395		8	max	909.363	1	1.329	4	-.028	15	0	1	0	15	0	15
396			min	-1086.257	3	.313	15	-.599	1	0	5	-.001	1	-.004	4
397		9	max	909.839	1	1.243	4	-.028	15	0	1	0	15	0	15
398			min	-1085.9	3	.293	15	-.599	1	0	5	-.002	1	-.004	4
399		10	max	910.315	1	1.158	4	-.028	15	0	1	0	15	-.001	15
400			min	-1085.543	3	.273	15	-.599	1	0	5	-.002	1	-.004	4
401		11	max	910.791	1	1.072	4	-.028	15	0	1	0	15	-.001	15
402			min	-1085.187	3	.253	15	-.599	1	0	5	-.002	1	-.005	4
403		12	max	911.266	1	.987	4	-.028	15	0	1	0	15	-.001	15
404			min	-1084.83	3	.233	15	-.599	1	0	5	-.002	1	-.005	4
405		13	max	911.742	1	.901	4	-.028	15	0	1	0	15	-.001	15
406			min	-1084.473	3	.203	12	-.599	1	0	5	-.002	1	-.005	4
407		14	max	912.218	1	.816	2	-.028	15	0	1	0	15	-.001	15
408			min	-1084.116	3	.17	12	-.599	1	0	5	-.003	1	-.006	4
409		15	max	912.694	1	.75	2	-.028	15	0	1	0	15	-.001	15
410			min	-1083.759	3	.136	12	-.599	1	0	5	-.003	1	-.006	4
411		16	max	913.169	1	.683	2	-.028	15	0	1	0	15	-.001	15
412			min	-1083.403	3	.103	12	-.599	1	0	5	-.003	1	-.006	4
413		17	max	913.645	1	.616	2	-.028	15	0	1	0	15	-.002	15
414			min	-1083.046	3	.07	12	-.599	1	0	5	-.003	1	-.006	4
415		18	max	914.121	1	.549	2	-.028	15	0	1	0	15	-.002	15
416			min	-1082.689	3	.029	3	-.599	1	0	5	-.003	1	-.007	4
417		19	max	914.597	1	.483	2	-.028	15	0	1	0	15	-.002	15
418			min	-1082.332	3	-.021	3	-.599	1	0	5	-.003	1	-.007	4
419	M11	1	max	545.894	2	7.778	4	-.013	15	0	1	0	15	.007	4
420			min	-692.613	3	1.829	15	-.279	1	0	12	0	1	.002	15
421		2	max	545.723	2	7.013	4	-.013	15	0	1	0	15	.004	2
422			min	-692.741	3	1.649	15	-.279	1	0	12	0	1	0	12
423		3	max	545.553	2	6.249	4	-.013	15	0	1	0	15	.002	2
424			min	-692.869	3	1.469	15	-.279	1	0	12	0	1	0	3
425		4	max	545.383	2	5.484	4	-.013	15	0	1	0	15	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-692.996	3	1.29	15	-.279	1	0	12	0	1	-.002	3
427		5	max	545.212	2	4.72	4	-.013	15	0	1	0	15	0	15
428			min	-693.124	3	1.11	15	-.279	1	0	12	0	1	-.004	4
429		6	max	545.042	2	3.956	4	-.013	15	0	1	0	15	-.001	15
430			min	-693.252	3	.93	15	-.279	1	0	12	-.001	1	-.006	4
431		7	max	544.872	2	3.191	4	-.013	15	0	1	0	15	-.002	15
432			min	-693.38	3	.751	15	-.279	1	0	12	-.001	1	-.007	4
433		8	max	544.701	2	2.427	4	-.013	15	0	1	0	15	-.002	15
434			min	-693.507	3	.571	15	-.279	1	0	12	-.001	1	-.008	4
435		9	max	544.531	2	1.662	4	-.013	15	0	1	0	15	-.002	15
436			min	-693.635	3	.391	15	-.279	1	0	12	-.001	1	-.009	4
437		10	max	544.361	2	.898	4	-.013	15	0	1	0	15	-.002	15
438			min	-693.763	3	.212	15	-.279	1	0	12	-.002	1	-.01	4
439		11	max	544.19	2	.244	2	-.013	15	0	1	0	15	-.002	15
440			min	-693.891	3	-.114	3	-.279	1	0	12	-.002	1	-.01	4
441		12	max	544.02	2	-.148	15	-.013	15	0	1	0	15	-.002	15
442			min	-694.019	3	-.631	4	-.279	1	0	12	-.002	1	-.01	4
443		13	max	543.849	2	-.328	15	-.013	15	0	1	0	15	-.002	15
444			min	-694.146	3	-1.396	4	-.279	1	0	12	-.002	1	-.009	4
445		14	max	543.679	2	-.507	15	-.013	15	0	1	0	15	-.002	15
446			min	-694.274	3	-2.16	4	-.279	1	0	12	-.002	1	-.009	4
447		15	max	543.509	2	-.687	15	-.013	15	0	1	0	15	-.002	15
448			min	-694.402	3	-2.924	4	-.279	1	0	12	-.002	1	-.007	4
449		16	max	543.338	2	-.867	15	-.013	15	0	1	0	15	-.001	15
450			min	-694.53	3	-3.689	4	-.279	1	0	12	-.002	1	-.006	4
451		17	max	543.168	2	-1.046	15	-.013	15	0	1	0	15	-.001	15
452			min	-694.657	3	-4.453	4	-.279	1	0	12	-.002	1	-.004	4
453		18	max	542.998	2	-1.226	15	-.013	15	0	1	0	15	0	15
454			min	-694.785	3	-5.218	4	-.279	1	0	12	-.002	1	-.002	4
455		19	max	542.827	2	-1.406	15	-.013	15	0	1	0	15	0	1
456			min	-694.913	3	-5.982	4	-.279	1	0	12	-.003	1	0	1
457	M12	1	max	1051.14	1	0	1	13.74	1	0	1	0	15	0	1
458			min	-4.797	3	0	1	.652	15	0	1	-.002	1	0	1
459		2	max	1051.31	1	0	1	13.74	1	0	1	0	15	0	1
460			min	-4.669	3	0	1	.652	15	0	1	0	1	0	1
461		3	max	1051.481	1	0	1	13.74	1	0	1	.001	1	0	1
462			min	-4.541	3	0	1	.652	15	0	1	0	12	0	1
463		4	max	1051.651	1	0	1	13.74	1	0	1	.003	1	0	1
464			min	-4.414	3	0	1	.652	15	0	1	0	15	0	1
465		5	max	1051.821	1	0	1	13.74	1	0	1	.004	1	0	1
466			min	-4.286	3	0	1	.652	15	0	1	0	15	0	1
467		6	max	1051.992	1	0	1	13.74	1	0	1	.006	1	0	1
468			min	-4.158	3	0	1	.652	15	0	1	0	15	0	1
469		7	max	1052.162	1	0	1	13.74	1	0	1	.007	1	0	1
470			min	-4.03	3	0	1	.652	15	0	1	0	15	0	1
471		8	max	1052.332	1	0	1	13.74	1	0	1	.009	1	0	1
472			min	-3.903	3	0	1	.652	15	0	1	0	15	0	1
473		9	max	1052.503	1	0	1	13.74	1	0	1	.01	1	0	1
474			min	-3.775	3	0	1	.652	15	0	1	0	15	0	1
475		10	max	1052.673	1	0	1	13.74	1	0	1	.012	1	0	1
476			min	-3.647	3	0	1	.652	15	0	1	0	15	0	1
477		11	max	1052.844	1	0	1	13.74	1	0	1	.014	1	0	1
478			min	-3.519	3	0	1	.652	15	0	1	0	15	0	1
479		12	max	1053.014	1	0	1	13.74	1	0	1	.015	1	0	1
480			min	-3.392	3	0	1	.652	15	0	1	0	15	0	1
481		13	max	1053.184	1	0	1	13.74	1	0	1	.017	1	0	1
482			min	-3.264	3	0	1	.652	15	0	1	0	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
483		14	max	1053.355	1	0	1	13.74	1	0	1	.018	1	0	1
484			min	-3.136	3	0	1	.652	15	0	1	0	15	0	1
485		15	max	1053.525	1	0	1	13.74	1	0	1	.02	1	0	1
486			min	-3.008	3	0	1	.652	15	0	1	0	15	0	1
487		16	max	1053.695	1	0	1	13.74	1	0	1	.022	1	0	1
488			min	-2.88	3	0	1	.652	15	0	1	.001	15	0	1
489		17	max	1053.866	1	0	1	13.74	1	0	1	.023	1	0	1
490			min	-2.753	3	0	1	.652	15	0	1	.001	15	0	1
491		18	max	1054.036	1	0	1	13.74	1	0	1	.025	1	0	1
492			min	-2.625	3	0	1	.652	15	0	1	.001	15	0	1
493		19	max	1054.206	1	0	1	13.74	1	0	1	.026	1	0	1
494			min	-2.497	3	0	1	.652	15	0	1	.001	15	0	1
495	M1	1	max	195.652	1	588.303	3	-6.179	15	0	1	.311	1	0	3
496			min	9.265	15	-393.153	1	-129.841	1	0	3	.015	15	-.012	2
497		2	max	196.368	1	587.373	3	-6.179	15	0	1	.242	1	.197	1
498			min	9.481	15	-394.393	1	-129.841	1	0	3	.012	15	-.309	3
499		3	max	424.697	3	442.456	2	-6.151	15	0	3	.174	1	.395	1
500			min	-247.8	2	-424.722	3	-129.507	1	0	1	.008	15	-.607	3
501		4	max	425.234	3	441.216	2	-6.151	15	0	3	.106	1	.162	1
502			min	-247.084	2	-425.652	3	-129.507	1	0	1	.005	15	-.383	3
503		5	max	425.771	3	439.975	2	-6.151	15	0	3	.037	1	-.003	15
504			min	-246.368	2	-426.583	3	-129.507	1	0	1	.002	15	-.158	3
505		6	max	426.309	3	438.735	2	-6.151	15	0	3	-.001	15	.068	3
506			min	-245.652	2	-427.513	3	-129.507	1	0	1	-.031	1	-.322	2
507		7	max	426.846	3	437.494	2	-6.151	15	0	3	-.005	15	.294	3
508			min	-244.935	2	-428.444	3	-129.507	1	0	1	-.099	1	-.553	2
509		8	max	427.383	3	436.254	2	-6.151	15	0	3	-.008	15	.52	3
510			min	-244.219	2	-429.374	3	-129.507	1	0	1	-.168	1	-.784	2
511		9	max	443.064	3	41.389	2	-8.9	15	0	9	.098	1	.607	3
512			min	-159.406	2	.379	15	-187.259	1	0	3	.005	15	-.898	2
513		10	max	443.601	3	40.148	2	-8.9	15	0	9	0	15	.591	3
514			min	-158.69	2	.004	15	-187.259	1	0	3	-.001	1	-.919	2
515		11	max	444.138	3	38.908	2	-8.9	15	0	9	-.005	15	.575	3
516			min	-157.974	2	-1.503	4	-187.259	1	0	3	-.1	1	-.94	2
517		12	max	459.751	3	280.26	3	-6.002	15	0	2	.166	1	.501	3
518			min	-89.181	10	-521.072	2	-126.495	1	0	3	.008	15	-.833	2
519		13	max	460.289	3	279.329	3	-6.002	15	0	2	.099	1	.353	3
520			min	-88.584	10	-522.313	2	-126.495	1	0	3	.005	15	-.558	2
521		14	max	460.826	3	278.399	3	-6.002	15	0	2	.032	1	.206	3
522			min	-87.987	10	-523.553	2	-126.495	1	0	3	.002	15	-.282	2
523		15	max	461.363	3	277.468	3	-6.002	15	0	2	-.002	15	.06	3
524			min	-87.39	10	-524.794	2	-126.495	1	0	3	-.035	1	-.027	1
525		16	max	461.9	3	276.538	3	-6.002	15	0	2	-.005	15	.272	2
526			min	-86.793	10	-526.034	2	-126.495	1	0	3	-.101	1	-.086	3
527		17	max	462.437	3	275.608	3	-6.002	15	0	2	-.008	15	.55	2
528			min	-86.197	10	-527.275	2	-126.495	1	0	3	-.168	1	-.232	3
529		18	max	-9.489	15	541.29	2	-6.64	15	0	3	-.011	15	.277	2
530			min	-196.594	1	-234.093	3	-139.635	1	0	2	-.239	1	-.115	3
531		19	max	-9.273	15	540.05	2	-6.64	15	0	3	-.015	15	.009	3
532			min	-195.878	1	-235.023	3	-139.635	1	0	2	-.313	1	-.009	1
533	M5	1	max	421.192	1	1960.403	3	0	1	0	1	0	1	.023	2
534			min	18.844	12	-1326.096	1	0	1	0	1	0	1	-.002	3
535		2	max	421.908	1	1959.472	3	0	1	0	1	0	1	.722	1
536			min	19.202	12	-1327.336	1	0	1	0	1	0	1	-1.036	3
537		3	max	1368.448	3	1360.874	1	0	1	0	1	0	1	1.39	1
538			min	-891.628	2	-1377.102	3	0	1	0	1	0	1	-2.029	3
539		4	max	1368.985	3	1359.633	1	0	1	0	1	0	1	.672	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-890.912	2	-1378.032	3	0	1	0	1	0	1	-1.303	3
541		5	max	1369.522	3	1358.393	1	0	1	0	1	0	1	.003	9
542			min	-890.196	2	-1378.962	3	0	1	0	1	0	1	-.575	3
543		6	max	1370.059	3	1357.152	1	0	1	0	1	0	1	.153	3
544			min	-889.479	2	-1379.893	3	0	1	0	1	0	1	-.811	2
545		7	max	1370.596	3	1355.912	1	0	1	0	1	0	1	.881	3
546			min	-888.763	2	-1380.823	3	0	1	0	1	0	1	-1.525	2
547		8	max	1371.133	3	1354.671	1	0	1	0	1	0	1	1.61	3
548			min	-888.047	2	-1381.754	3	0	1	0	1	0	1	-2.237	2
549		9	max	1398.989	3	137.761	2	0	1	0	1	0	1	1.853	3
550			min	-714.083	2	.376	15	0	1	0	1	0	1	-2.547	2
551		10	max	1399.526	3	136.521	2	0	1	0	1	0	1	1.796	3
552			min	-713.367	2	.002	15	0	1	0	1	0	1	-2.62	2
553		11	max	1400.063	3	135.28	2	0	1	0	1	0	1	1.739	3
554			min	-712.651	2	-1.335	4	0	1	0	1	0	1	-2.691	2
555		12	max	1428.055	3	900.021	3	0	1	0	1	0	1	1.528	3
556			min	-538.709	2	-1629.061	2	0	1	0	1	0	1	-2.41	2
557		13	max	1428.592	3	899.091	3	0	1	0	1	0	1	1.053	3
558			min	-537.993	2	-1630.302	2	0	1	0	1	0	1	-1.55	2
559		14	max	1429.129	3	898.161	3	0	1	0	1	0	1	.579	3
560			min	-537.276	2	-1631.543	2	0	1	0	1	0	1	-.698	1
561		15	max	1429.666	3	897.23	3	0	1	0	1	0	1	.172	2
562			min	-536.56	2	-1632.783	2	0	1	0	1	0	1	-.004	13
563		16	max	1430.204	3	896.3	3	0	1	0	1	0	1	1.034	2
564			min	-535.844	2	-1634.024	2	0	1	0	1	0	1	-.368	3
565		17	max	1430.741	3	895.369	3	0	1	0	1	0	1	1.897	2
566			min	-535.128	2	-1635.264	2	0	1	0	1	0	1	-.841	3
567		18	max	-19.469	12	1819.829	2	0	1	0	1	0	1	.978	2
568			min	-421.456	1	-799.288	3	0	1	0	1	0	1	-.44	3
569		19	max	-19.11	12	1818.589	2	0	1	0	1	0	1	.019	1
570			min	-420.74	1	-800.218	3	0	1	0	1	0	1	-.018	3
571	M9	1	max	195.652	1	588.303	3	129.841	1	0	3	-.015	15	0	3
572			min	9.265	15	-393.153	1	6.179	15	0	1	-.311	1	-.012	2
573		2	max	196.368	1	587.373	3	129.841	1	0	3	-.012	15	.197	1
574			min	9.481	15	-394.393	1	6.179	15	0	1	-.242	1	-.309	3
575		3	max	424.697	3	442.456	2	129.507	1	0	1	-.008	15	.395	1
576			min	-247.8	2	-424.722	3	6.151	15	0	3	-.174	1	-.607	3
577		4	max	425.234	3	441.216	2	129.507	1	0	1	-.005	15	.162	1
578			min	-247.084	2	-425.652	3	6.151	15	0	3	-.106	1	-.383	3
579		5	max	425.771	3	439.975	2	129.507	1	0	1	-.002	15	-.003	15
580			min	-246.368	2	-426.583	3	6.151	15	0	3	-.037	1	-.158	3
581		6	max	426.309	3	438.735	2	129.507	1	0	1	.031	1	.068	3
582			min	-245.652	2	-427.513	3	6.151	15	0	3	.001	15	-.322	2
583		7	max	426.846	3	437.494	2	129.507	1	0	1	.099	1	.294	3
584			min	-244.935	2	-428.444	3	6.151	15	0	3	.005	15	-.553	2
585		8	max	427.383	3	436.254	2	129.507	1	0	1	.168	1	.52	3
586			min	-244.219	2	-429.374	3	6.151	15	0	3	.008	15	-.784	2
587		9	max	443.064	3	41.389	2	187.259	1	0	3	-.005	15	.607	3
588			min	-159.406	2	.379	15	8.9	15	0	9	-.098	1	-.898	2
589		10	max	443.601	3	40.148	2	187.259	1	0	3	.001	1	.591	3
590			min	-158.69	2	.004	15	8.9	15	0	9	0	15	-.919	2
591		11	max	444.138	3	38.908	2	187.259	1	0	3	.1	1	.575	3
592			min	-157.974	2	-1.503	4	8.9	15	0	9	.005	15	-.94	2
593		12	max	459.751	3	280.26	3	126.495	1	0	3	-.008	15	.501	3
594			min	-89.181	10	-521.072	2	6.002	15	0	2	-.166	1	-.833	2
595		13	max	460.289	3	279.329	3	126.495	1	0	3	-.005	15	.353	3
596			min	-88.584	10	-522.313	2	6.002	15	0	2	-.099	1	-.558	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
597		14	max	460.826	3	278.399	3	126.495	1	0	3	-.002	15	.206	3
598			min	-87.987	10	-523.553	2	6.002	15	0	2	-.032	1	-.282	2
599		15	max	461.363	3	277.468	3	126.495	1	0	3	.035	1	.06	3
600			min	-87.39	10	-524.794	2	6.002	15	0	2	.002	15	-.027	1
601		16	max	461.9	3	276.538	3	126.495	1	0	3	.101	1	.272	2
602			min	-86.793	10	-526.034	2	6.002	15	0	2	.005	15	-.086	3
603		17	max	462.437	3	275.608	3	126.495	1	0	3	.168	1	.55	2
604			min	-86.197	10	-527.275	2	6.002	15	0	2	.008	15	-.232	3
605		18	max	-9.489	15	541.29	2	139.635	1	0	2	.239	1	.277	2
606			min	-196.594	1	-234.093	3	6.64	15	0	3	.011	15	-.115	3
607		19	max	-9.273	15	540.05	2	139.635	1	0	2	.313	1	.009	3
608			min	-195.878	1	-235.023	3	6.64	15	0	3	.015	15	-.009	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	.001	1	.092	2	.008	3	7.651e-3	2	NC	1	NC	1
2			min	0	15	-.012	3	-.004	2	-1.263e-3	3	NC	1	NC	1
3		2	max	.001	1	.334	3	.055	1	8.879e-3	2	NC	5	NC	2
4			min	0	15	-.127	1	.003	15	-1.351e-3	3	746.376	3	4862.935	1
5		3	max	.001	1	.614	3	.133	1	1.011e-2	2	NC	5	NC	3
6			min	0	15	-.297	1	.006	15	-1.44e-3	3	412.449	3	1971.677	1
7		4	max	0	1	.784	3	.2	1	1.134e-2	2	NC	5	NC	3
8			min	0	15	-.393	1	.01	15	-1.528e-3	3	324.375	3	1298.878	1
9		5	max	0	1	.823	3	.236	1	1.256e-2	2	NC	5	NC	3
10			min	0	15	-.403	1	.011	15	-1.616e-3	3	309.142	3	1103.054	1
11		6	max	0	1	.734	3	.228	1	1.379e-2	2	NC	5	NC	5
12			min	0	15	-.328	1	.011	15	-1.705e-3	3	345.827	3	1139.529	1
13		7	max	0	1	.544	3	.18	1	1.502e-2	2	NC	5	NC	3
14			min	0	15	-.187	1	.009	15	-1.793e-3	3	463.792	3	1447.772	1
15		8	max	0	1	.304	3	.105	1	1.625e-2	2	NC	4	NC	3
16			min	0	15	-.015	9	.005	10	-1.882e-3	3	818.069	3	2490.839	1
17		9	max	0	1	.157	2	.031	1	1.748e-2	2	NC	4	NC	2
18			min	0	15	.004	15	-.005	10	-1.97e-3	3	2661.057	3	8867.317	1
19		10	max	0	1	.223	2	.023	3	1.871e-2	2	NC	3	NC	1
20			min	0	1	-.014	3	-.016	2	-2.058e-3	3	1969.21	2	NC	1
21		11	max	0	15	.157	2	.031	1	1.748e-2	2	NC	4	NC	2
22			min	0	1	.004	15	-.005	10	-1.97e-3	3	2661.057	3	8867.317	1
23		12	max	0	15	.304	3	.105	1	1.625e-2	2	NC	4	NC	3
24			min	0	1	-.015	9	.005	10	-1.882e-3	3	818.069	3	2490.839	1
25		13	max	0	15	.544	3	.18	1	1.502e-2	2	NC	5	NC	3
26			min	0	1	-.187	1	.009	15	-1.793e-3	3	463.792	3	1447.772	1
27		14	max	0	15	.734	3	.228	1	1.379e-2	2	NC	5	NC	5
28			min	0	1	-.328	1	.011	15	-1.705e-3	3	345.827	3	1139.529	1
29		15	max	0	15	.823	3	.236	1	1.256e-2	2	NC	5	NC	3
30			min	0	1	-.403	1	.011	15	-1.616e-3	3	309.142	3	1103.054	1
31		16	max	0	15	.784	3	.2	1	1.134e-2	2	NC	5	NC	3
32			min	0	1	-.393	1	.01	15	-1.528e-3	3	324.375	3	1298.878	1
33		17	max	0	15	.614	3	.133	1	1.011e-2	2	NC	5	NC	3
34			min	-.001	1	-.297	1	.006	15	-1.44e-3	3	412.449	3	1971.677	1
35		18	max	0	15	.334	3	.055	1	8.879e-3	2	NC	5	NC	2
36			min	-.001	1	-.127	1	.003	15	-1.351e-3	3	746.376	3	4862.935	1
37		19	max	0	15	.092	2	.008	3	7.651e-3	2	NC	1	NC	1
38			min	-.001	1	-.012	3	-.004	2	-1.263e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.182	3	.007	3	4.541e-3	2	NC	1	NC	1
40			min	0	15	-.3	2	-.003	2	-3.205e-3	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
41		2	max	0	1	.506	3	.038	1	5.472e-3	2	NC	5	NC	2
42			min	0	15	-.613	2	.002	15	-3.927e-3	3	796.097	3	7040.115	1
43		3	max	0	1	.779	3	.108	1	6.404e-3	2	NC	15	NC	3
44			min	0	15	-.881	1	.005	15	-4.65e-3	3	432.51	3	2438.888	1
45		4	max	0	1	.964	3	.173	1	7.335e-3	2	NC	15	NC	3
46			min	0	15	-1.076	1	.008	15	-5.372e-3	3	326.996	1	1507.885	1
47		5	max	0	1	1.046	3	.21	1	8.266e-3	2	9556.326	15	NC	3
48			min	0	15	-1.176	1	.01	15	-6.095e-3	3	290.181	1	1237.171	1
49		6	max	0	1	1.024	3	.208	1	9.198e-3	2	9560.959	15	NC	3
50			min	0	15	-1.185	2	.01	15	-6.817e-3	3	288.528	1	1250.488	1
51		7	max	0	1	.918	3	.167	1	1.013e-2	2	NC	15	NC	3
52			min	0	15	-1.119	2	.008	15	-7.539e-3	3	314.605	1	1564.421	1
53		8	max	0	1	.763	3	.099	1	1.106e-2	2	NC	15	NC	3
54			min	0	15	-1.007	2	.005	15	-8.262e-3	3	365.28	2	2657.652	1
55		9	max	0	1	.615	3	.03	1	1.199e-2	2	NC	15	NC	2
56			min	0	15	-.893	2	-.005	10	-8.984e-3	3	435.16	2	9276.749	1
57		10	max	0	1	.547	3	.021	3	1.292e-2	2	NC	5	NC	1
58			min	0	1	-.839	2	-.014	2	-9.707e-3	3	478.765	2	NC	1
59		11	max	0	15	.615	3	.03	1	1.199e-2	2	NC	15	NC	2
60			min	0	1	-.893	2	-.005	10	-8.984e-3	3	435.16	2	9276.749	1
61		12	max	0	15	.763	3	.099	1	1.106e-2	2	NC	15	NC	3
62			min	0	1	-1.007	2	.005	15	-8.262e-3	3	365.28	2	2657.652	1
63		13	max	0	15	.918	3	.167	1	1.013e-2	2	NC	15	NC	3
64			min	0	1	-1.119	2	.008	15	-7.539e-3	3	314.605	1	1564.421	1
65		14	max	0	15	1.024	3	.208	1	9.198e-3	2	9560.959	15	NC	3
66			min	0	1	-1.185	2	.01	15	-6.817e-3	3	288.528	1	1250.488	1
67		15	max	0	15	1.046	3	.21	1	8.266e-3	2	9556.326	15	NC	3
68			min	0	1	-1.176	1	.01	15	-6.095e-3	3	290.181	1	1237.171	1
69		16	max	0	15	.964	3	.173	1	7.335e-3	2	NC	15	NC	3
70			min	0	1	-1.076	1	.008	15	-5.372e-3	3	326.996	1	1507.885	1
71		17	max	0	15	.779	3	.108	1	6.404e-3	2	NC	15	NC	3
72			min	0	1	-.881	1	.005	15	-4.65e-3	3	432.51	3	2438.888	1
73		18	max	0	15	.506	3	.038	1	5.472e-3	2	NC	5	NC	2
74			min	0	1	-.613	2	.002	15	-3.927e-3	3	796.097	3	7040.115	1
75		19	max	0	15	.182	3	.007	3	4.541e-3	2	NC	1	NC	1
76			min	0	1	-.3	2	-.003	2	-3.205e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.186	3	.006	3	2.767e-3	3	NC	1	NC	1
78			min	0	1	-.3	2	-.003	2	-4.741e-3	2	NC	1	NC	1
79		2	max	0	15	.387	3	.039	1	3.396e-3	3	NC	5	NC	2
80			min	0	1	-.708	2	.002	15	-5.718e-3	2	631.641	2	7007.943	1
81		3	max	0	15	.561	3	.108	1	4.025e-3	3	NC	15	NC	3
82			min	0	1	-1.054	2	.005	15	-6.695e-3	2	342.184	2	2432.38	1
83		4	max	0	15	.686	3	.173	1	4.655e-3	3	NC	15	NC	3
84			min	0	1	-1.293	2	.008	15	-7.671e-3	2	259.674	2	1504.777	1
85		5	max	0	15	.755	3	.211	1	5.284e-3	3	9571.639	15	NC	3
86			min	0	1	-1.406	2	.01	15	-8.648e-3	2	233.29	2	1234.872	1
87		6	max	0	15	.765	3	.208	1	5.914e-3	3	9579.366	15	NC	3
88			min	0	1	-1.391	2	.01	15	-9.625e-3	2	236.358	2	1248.089	1
89		7	max	0	15	.727	3	.167	1	6.543e-3	3	NC	15	NC	3
90			min	0	1	-1.272	2	.008	15	-1.06e-2	2	265.234	2	1560.753	1
91		8	max	0	15	.659	3	.099	1	7.173e-3	3	NC	15	NC	3
92			min	0	1	-1.093	2	.005	15	-1.158e-2	2	325.192	2	2647.567	1
93		9	max	0	15	.59	3	.03	1	7.802e-3	3	NC	5	NC	2
94			min	0	1	-.919	2	-.004	10	-1.255e-2	2	416.634	2	9160.615	1
95		10	max	0	1	.556	3	.019	3	8.432e-3	3	NC	5	NC	1
96			min	0	1	-.838	2	-.014	2	-1.353e-2	2	479.723	2	NC	1
97		11	max	0	1	.59	3	.03	1	7.802e-3	3	NC	5	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-.919	2	-.004	10	-1.255e-2	2	416.634	2	9160.615	1
99		12	max	0	1	.659	3	.099	1	7.173e-3	3	NC	15	NC	3
100			min	0	15	-1.093	2	.005	15	-1.158e-2	2	325.192	2	2647.567	1
101		13	max	0	1	.727	3	.167	1	6.543e-3	3	NC	15	NC	3
102			min	0	15	-1.272	2	.008	15	-1.06e-2	2	265.234	2	1560.753	1
103		14	max	0	1	.765	3	.208	1	5.914e-3	3	9579.366	15	NC	3
104			min	0	15	-1.391	2	.01	15	-9.625e-3	2	236.358	2	1248.089	1
105		15	max	0	1	.755	3	.211	1	5.284e-3	3	9571.639	15	NC	3
106			min	0	15	-1.406	2	.01	15	-8.648e-3	2	233.29	2	1234.872	1
107		16	max	0	1	.686	3	.173	1	4.655e-3	3	NC	15	NC	3
108			min	0	15	-1.293	2	.008	15	-7.671e-3	2	259.674	2	1504.777	1
109		17	max	0	1	.561	3	.108	1	4.025e-3	3	NC	15	NC	3
110			min	0	15	-1.054	2	.005	15	-6.695e-3	2	342.184	2	2432.38	1
111		18	max	0	1	.387	3	.039	1	3.396e-3	3	NC	5	NC	2
112			min	0	15	-.708	2	.002	15	-5.718e-3	2	631.641	2	7007.943	1
113		19	max	0	1	.186	3	.006	3	2.767e-3	3	NC	1	NC	1
114			min	0	15	-.3	2	-.003	2	-4.741e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.084	1	.005	3	4.814e-3	3	NC	1	NC	1
116			min	-.001	1	-.06	3	-.003	2	-6.473e-3	1	NC	1	NC	1
117		2	max	0	15	.063	3	.054	1	5.735e-3	3	NC	5	NC	2
118			min	-.001	1	-.219	2	.003	15	-7.452e-3	1	857.49	2	4897.278	1
119		3	max	0	15	.16	3	.132	1	6.657e-3	3	NC	5	NC	3
120			min	-.001	1	-.459	2	.006	15	-8.432e-3	1	476.47	2	1978.609	1
121		4	max	0	15	.212	3	.2	1	7.578e-3	3	NC	5	NC	3
122			min	0	1	-.599	2	.01	15	-9.411e-3	1	378.592	2	1300.998	1
123		5	max	0	15	.214	3	.235	1	8.499e-3	3	NC	5	NC	3
124			min	0	1	-.62	2	.011	15	-1.039e-2	1	367.389	2	1103.207	1
125		6	max	0	15	.165	3	.228	1	9.42e-3	3	NC	5	NC	3
126			min	0	1	-.525	2	.011	15	-1.137e-2	1	425.057	2	1137.767	1
127		7	max	0	15	.077	3	.18	1	1.034e-2	3	NC	5	NC	3
128			min	0	1	-.339	2	.009	15	-1.235e-2	1	613.493	2	1441.614	1
129		8	max	0	15	0	15	.106	1	1.126e-2	3	NC	4	NC	3
130			min	0	1	-.108	2	.005	15	-1.333e-2	1	1360.784	2	2463.85	1
131		9	max	0	15	.119	1	.032	1	1.218e-2	3	NC	2	NC	2
132			min	0	1	-.122	3	-.003	10	-1.431e-2	1	4110.723	3	8458.492	1
133		10	max	0	1	.202	1	.017	3	1.31e-2	3	NC	4	NC	1
134			min	0	1	-.164	3	-.012	2	-1.529e-2	1	2196.472	1	NC	1
135		11	max	0	1	.119	1	.032	1	1.218e-2	3	NC	2	NC	2
136			min	0	15	-.122	3	-.003	10	-1.431e-2	1	4110.723	3	8458.492	1
137		12	max	0	1	0	15	.106	1	1.126e-2	3	NC	4	NC	3
138			min	0	15	-.108	2	.005	15	-1.333e-2	1	1360.784	2	2463.85	1
139		13	max	0	1	.077	3	.18	1	1.034e-2	3	NC	5	NC	3
140			min	0	15	-.339	2	.009	15	-1.235e-2	1	613.493	2	1441.614	1
141		14	max	0	1	.165	3	.228	1	9.42e-3	3	NC	5	NC	3
142			min	0	15	-.525	2	.011	15	-1.137e-2	1	425.057	2	1137.767	1
143		15	max	0	1	.214	3	.235	1	8.499e-3	3	NC	5	NC	3
144			min	0	15	-.62	2	.011	15	-1.039e-2	1	367.389	2	1103.207	1
145		16	max	0	1	.212	3	.2	1	7.578e-3	3	NC	5	NC	3
146			min	0	15	-.599	2	.01	15	-9.411e-3	1	378.592	2	1300.998	1
147		17	max	.001	1	.16	3	.132	1	6.657e-3	3	NC	5	NC	3
148			min	0	15	-.459	2	.006	15	-8.432e-3	1	476.47	2	1978.609	1
149		18	max	.001	1	.063	3	.054	1	5.735e-3	3	NC	5	NC	2
150			min	0	15	-.219	2	.003	15	-7.452e-3	1	857.49	2	4897.278	1
151		19	max	.001	1	.084	1	.005	3	4.814e-3	3	NC	1	NC	1
152			min	0	15	-.06	3	-.003	2	-6.473e-3	1	NC	1	NC	1
153	M2	1	max	.006	1	.006	2	.01	1	-1.368e-5	15	NC	1	NC	2
154			min	-.007	3	-.011	3	0	15	-2.882e-4	1	NC	1	6964.012	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.006	1	.005	2	.009	1	-1.289e-5	15	NC	1	NC	2
156			min	-.007	3	-.011	3	0	15	-2.716e-4	1	NC	1	7594.737	1
157		3	max	.005	1	.004	2	.008	1	-1.211e-5	15	NC	1	NC	2
158			min	-.006	3	-.01	3	0	15	-2.55e-4	1	NC	1	8346.334	1
159		4	max	.005	1	.003	2	.008	1	-1.132e-5	15	NC	1	NC	2
160			min	-.006	3	-.01	3	0	15	-2.384e-4	1	NC	1	9250.818	1
161		5	max	.005	1	.002	2	.007	1	-1.053e-5	15	NC	1	NC	1
162			min	-.006	3	-.01	3	0	15	-2.218e-4	1	NC	1	NC	1
163		6	max	.004	1	.002	2	.006	1	-9.743e-6	15	NC	1	NC	1
164			min	-.005	3	-.009	3	0	15	-2.052e-4	1	NC	1	NC	1
165		7	max	.004	1	0	2	.005	1	-8.955e-6	15	NC	1	NC	1
166			min	-.005	3	-.009	3	0	15	-1.886e-4	1	NC	1	NC	1
167		8	max	.004	1	0	2	.004	1	-8.167e-6	15	NC	1	NC	1
168			min	-.004	3	-.008	3	0	15	-1.72e-4	1	NC	1	NC	1
169		9	max	.003	1	0	2	.004	1	-7.379e-6	15	NC	1	NC	1
170			min	-.004	3	-.008	3	0	15	-1.554e-4	1	NC	1	NC	1
171		10	max	.003	1	-.001	2	.003	1	-6.591e-6	15	NC	1	NC	1
172			min	-.004	3	-.007	3	0	15	-1.388e-4	1	NC	1	NC	1
173		11	max	.003	1	-.001	15	.003	1	-5.804e-6	15	NC	1	NC	1
174			min	-.003	3	-.007	3	0	15	-1.222e-4	1	NC	1	NC	1
175		12	max	.002	1	-.001	15	.002	1	-5.016e-6	15	NC	1	NC	1
176			min	-.003	3	-.006	3	0	15	-1.056e-4	1	NC	1	NC	1
177		13	max	.002	1	-.001	15	.001	1	-4.228e-6	15	NC	1	NC	1
178			min	-.002	3	-.006	3	0	15	-8.897e-5	1	NC	1	NC	1
179		14	max	.002	1	-.001	15	.001	1	-3.44e-6	15	NC	1	NC	1
180			min	-.002	3	-.005	3	0	15	-7.237e-5	1	NC	1	NC	1
181		15	max	.001	1	0	15	0	1	-2.652e-6	15	NC	1	NC	1
182			min	-.002	3	-.004	3	0	15	-5.577e-5	1	NC	1	NC	1
183		16	max	.001	1	0	15	0	1	-1.865e-6	15	NC	1	NC	1
184			min	-.001	3	-.003	4	0	15	-3.916e-5	1	NC	1	NC	1
185		17	max	0	1	0	15	0	1	-1.077e-6	15	NC	1	NC	1
186			min	0	3	-.002	4	0	15	-2.256e-5	1	NC	1	NC	1
187		18	max	0	1	0	15	0	1	-2.889e-7	15	NC	1	NC	1
188			min	0	3	-.001	4	0	15	-5.953e-6	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	1.065e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	4.555e-7	12	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-2.008e-7	12	NC	1	NC	1
192			min	0	1	0	1	0	1	-4.323e-6	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	2.315e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	12	1.098e-6	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	5.063e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	12	2.4e-6	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	1	7.811e-5	1	NC	1	NC	1
198			min	0	2	-.006	4	0	15	3.702e-6	15	NC	1	NC	1
199		5	max	.001	3	-.002	15	0	1	1.056e-4	1	NC	1	NC	1
200			min	-.001	2	-.008	4	0	15	5.004e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	1.331e-4	1	NC	1	NC	1
202			min	-.001	2	-.01	4	0	15	6.305e-6	15	9625.224	4	NC	1
203		7	max	.002	3	-.003	15	0	1	1.605e-4	1	NC	1	NC	1
204			min	-.002	2	-.011	4	0	15	7.607e-6	15	8290.912	4	NC	1
205		8	max	.002	3	-.003	15	.001	1	1.88e-4	1	NC	1	NC	1
206			min	-.002	2	-.012	4	0	15	8.909e-6	15	7468.572	4	NC	1
207		9	max	.003	3	-.003	15	.002	1	2.155e-4	1	NC	3	NC	1
208			min	-.002	2	-.013	4	0	15	1.021e-5	15	6985.398	4	NC	1
209		10	max	.003	3	-.003	15	.002	1	2.43e-4	1	NC	5	NC	1
210			min	-.002	2	-.014	4	0	15	1.151e-5	15	6757.831	4	NC	1
211		11	max	.003	3	-.003	15	.002	1	2.704e-4	1	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.003	2	-.014	4	0	15	1.281e-5	15	6752.532	4	NC	1
213		12	max	.004	3	-.003	15	.003	1	2.979e-4	1	NC	3	NC	1
214			min	-.003	2	-.013	4	0	15	1.412e-5	15	6973.607	4	NC	1
215		13	max	.004	3	-.003	15	.004	1	3.254e-4	1	NC	2	NC	1
216			min	-.003	2	-.013	4	0	15	1.542e-5	15	7465.839	4	NC	1
217		14	max	.004	3	-.003	15	.004	1	3.529e-4	1	NC	1	NC	1
218			min	-.003	2	-.011	4	0	15	1.672e-5	15	8337.614	4	NC	1
219		15	max	.005	3	-.002	15	.005	1	3.804e-4	1	NC	1	NC	1
220			min	-.004	2	-.01	4	0	15	1.802e-5	15	9828.082	4	NC	1
221		16	max	.005	3	-.002	15	.006	1	4.078e-4	1	NC	1	NC	1
222			min	-.004	2	-.008	4	0	15	1.932e-5	15	NC	1	NC	1
223		17	max	.005	3	-.001	15	.007	1	4.353e-4	1	NC	1	NC	1
224			min	-.004	2	-.006	1	0	15	2.062e-5	15	NC	1	NC	1
225		18	max	.006	3	0	15	.008	1	4.628e-4	1	NC	1	NC	1
226			min	-.004	2	-.004	1	0	15	2.193e-5	15	NC	1	NC	1
227		19	max	.006	3	0	10	.01	1	4.903e-4	1	NC	1	NC	2
228			min	-.005	2	-.002	1	0	15	2.323e-5	15	NC	1	9455.893	1
229	M4	1	max	.003	1	.004	2	0	15	1.131e-4	1	NC	1	NC	3
230			min	0	3	-.006	3	-.01	1	5.373e-6	15	NC	1	2599.914	1
231		2	max	.002	1	.004	2	0	15	1.131e-4	1	NC	1	NC	3
232			min	0	3	-.006	3	-.009	1	5.373e-6	15	NC	1	2823.285	1
233		3	max	.002	1	.004	2	0	15	1.131e-4	1	NC	1	NC	3
234			min	0	3	-.006	3	-.008	1	5.373e-6	15	NC	1	3089.371	1
235		4	max	.002	1	.004	2	0	15	1.131e-4	1	NC	1	NC	3
236			min	0	3	-.005	3	-.007	1	5.373e-6	15	NC	1	3409.227	1
237		5	max	.002	1	.003	2	0	15	1.131e-4	1	NC	1	NC	3
238			min	0	3	-.005	3	-.007	1	5.373e-6	15	NC	1	3797.877	1
239		6	max	.002	1	.003	2	0	15	1.131e-4	1	NC	1	NC	2
240			min	0	3	-.005	3	-.006	1	5.373e-6	15	NC	1	4276.158	1
241		7	max	.002	1	.003	2	0	15	1.131e-4	1	NC	1	NC	2
242			min	0	3	-.004	3	-.005	1	5.373e-6	15	NC	1	4873.646	1
243		8	max	.002	1	.003	2	0	15	1.131e-4	1	NC	1	NC	2
244			min	0	3	-.004	3	-.004	1	5.373e-6	15	NC	1	5633.473	1
245		9	max	.001	1	.002	2	0	15	1.131e-4	1	NC	1	NC	2
246			min	0	3	-.003	3	-.004	1	5.373e-6	15	NC	1	6620.564	1
247		10	max	.001	1	.002	2	0	15	1.131e-4	1	NC	1	NC	2
248			min	0	3	-.003	3	-.003	1	5.373e-6	15	NC	1	7936.391	1
249		11	max	.001	1	.002	2	0	15	1.131e-4	1	NC	1	NC	2
250			min	0	3	-.003	3	-.003	1	5.373e-6	15	NC	1	9746.92	1
251		12	max	0	1	.002	2	0	15	1.131e-4	1	NC	1	NC	1
252			min	0	3	-.002	3	-.002	1	5.373e-6	15	NC	1	NC	1
253		13	max	0	1	.001	2	0	15	1.131e-4	1	NC	1	NC	1
254			min	0	3	-.002	3	-.002	1	5.373e-6	15	NC	1	NC	1
255		14	max	0	1	.001	2	0	15	1.131e-4	1	NC	1	NC	1
256			min	0	3	-.002	3	-.001	1	5.373e-6	15	NC	1	NC	1
257		15	max	0	1	0	2	0	15	1.131e-4	1	NC	1	NC	1
258			min	0	3	-.001	3	0	1	5.373e-6	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	1.131e-4	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	5.373e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	1.131e-4	1	NC	1	NC	1
262			min	0	3	0	3	0	1	5.373e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	1.131e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	5.373e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.131e-4	1	NC	1	NC	1
266			min	0	1	0	1	0	1	5.373e-6	15	NC	1	NC	1
267	M6	1	max	.02	1	.025	2	0	1	0	1	NC	3	NC	1
268			min	-.024	3	-.035	3	0	1	0	1	2798.379	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.019	1	.023	2	0	1	0	1	NC	3	NC	1
270			min	-.023	3	-.033	3	0	1	0	1	3076.141	2	NC	1
271		3	max	.018	1	.021	2	0	1	0	1	NC	3	NC	1
272			min	-.021	3	-.031	3	0	1	0	1	3412.055	2	NC	1
273		4	max	.016	1	.018	2	0	1	0	1	NC	3	NC	1
274			min	-.02	3	-.029	3	0	1	0	1	3822.732	2	NC	1
275		5	max	.015	1	.016	2	0	1	0	1	NC	3	NC	1
276			min	-.019	3	-.027	3	0	1	0	1	4331.379	2	NC	1
277		6	max	.014	1	.014	2	0	1	0	1	NC	1	NC	1
278			min	-.017	3	-.025	3	0	1	0	1	4971.201	2	NC	1
279		7	max	.013	1	.012	2	0	1	0	1	NC	1	NC	1
280			min	-.016	3	-.024	3	0	1	0	1	5791.076	2	NC	1
281		8	max	.012	1	.01	2	0	1	0	1	NC	1	NC	1
282			min	-.015	3	-.022	3	0	1	0	1	6865.381	2	NC	1
283		9	max	.011	1	.008	2	0	1	0	1	NC	1	NC	1
284			min	-.013	3	-.02	3	0	1	0	1	8311.901	2	NC	1
285		10	max	.01	1	.007	2	0	1	0	1	NC	1	NC	1
286			min	-.012	3	-.018	3	0	1	0	1	NC	1	NC	1
287		11	max	.009	1	.005	2	0	1	0	1	NC	1	NC	1
288			min	-.011	3	-.016	3	0	1	0	1	NC	1	NC	1
289		12	max	.008	1	.004	2	0	1	0	1	NC	1	NC	1
290			min	-.009	3	-.014	3	0	1	0	1	NC	1	NC	1
291		13	max	.007	1	.003	2	0	1	0	1	NC	1	NC	1
292			min	-.008	3	-.012	3	0	1	0	1	NC	1	NC	1
293		14	max	.005	1	.002	2	0	1	0	1	NC	1	NC	1
294			min	-.007	3	-.01	3	0	1	0	1	NC	1	NC	1
295		15	max	.004	1	0	2	0	1	0	1	NC	1	NC	1
296			min	-.005	3	-.008	3	0	1	0	1	NC	1	NC	1
297		16	max	.003	1	0	2	0	1	0	1	NC	1	NC	1
298			min	-.004	3	-.006	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	1	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.004	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	1	0	2	0	1	0	1	NC	1	NC	1
302			min	-.001	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	15	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.002	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	0	15	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.005	3	0	1	0	1	NC	1	NC	1
311		4	max	.003	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.003	2	-.007	3	0	1	0	1	NC	1	NC	1
313		5	max	.004	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.004	2	-.009	3	0	1	0	1	NC	1	NC	1
315		6	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.005	2	-.011	3	0	1	0	1	9654.367	3	NC	1
317		7	max	.006	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.006	2	-.012	3	0	1	0	1	8474.869	4	NC	1
319		8	max	.007	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.007	2	-.013	3	0	1	0	1	7622.656	4	NC	1
321		9	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.008	2	-.014	3	0	1	0	1	7120.441	4	NC	1
323		10	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.009	2	-.015	3	0	1	0	1	6881.096	4	NC	1
325		11	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.01	2	-.015	3	0	1	0	1	6869.476	4	NC	1
327		12	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.011	2	-.014	3	0	1	0	1	7088.951	4	NC	1
329		13	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.012	2	-.014	3	0	1	0	1	7584.435	4	NC	1
331		14	max	.014	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.013	2	-.013	3	0	1	0	1	8465.512	4	NC	1
333		15	max	.015	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.014	2	-.012	3	0	1	0	1	9974.467	4	NC	1
335		16	max	.016	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.015	2	-.01	3	0	1	0	1	NC	1	NC	1
337		17	max	.017	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.016	2	-.009	3	0	1	0	1	NC	1	NC	1
339		18	max	.018	3	0	15	0	1	0	1	NC	1	NC	1
340			min	-.017	2	-.007	3	0	1	0	1	NC	1	NC	1
341		19	max	.019	3	0	10	0	1	0	1	NC	1	NC	1
342			min	-.018	2	-.005	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.006	1	.018	2	0	1	0	1	NC	1	NC	1
344			min	0	3	-.02	3	0	1	0	1	NC	1	NC	1
345		2	max	.006	1	.017	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.019	3	0	1	0	1	NC	1	NC	1
347		3	max	.006	1	.016	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.017	3	0	1	0	1	NC	1	NC	1
349		4	max	.005	1	.015	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.016	3	0	1	0	1	NC	1	NC	1
351		5	max	.005	1	.014	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.015	3	0	1	0	1	NC	1	NC	1
353		6	max	.005	1	.013	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.014	3	0	1	0	1	NC	1	NC	1
355		7	max	.004	1	.012	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.013	3	0	1	0	1	NC	1	NC	1
357		8	max	.004	1	.011	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.012	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	1	.01	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.011	3	0	1	0	1	NC	1	NC	1
361		10	max	.003	1	.009	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.008	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
365		12	max	.002	1	.007	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	1	.006	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.005	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
371		15	max	.001	1	.004	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.006	1	.006	2	0	15	2.882e-4	1	NC	1	NC	2
382			min	-.007	3	-.011	3	-.01	1	1.368e-5	15	NC	1	6964.012	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.006	1	.005	2	0	15	2.716e-4	1	NC	1	NC	2
384			min	-.007	3	-.011	3	-.009	1	1.289e-5	15	NC	1	7594.737	1
385		3	max	.005	1	.004	2	0	15	2.55e-4	1	NC	1	NC	2
386			min	-.006	3	-.01	3	-.008	1	1.211e-5	15	NC	1	8346.334	1
387		4	max	.005	1	.003	2	0	15	2.384e-4	1	NC	1	NC	2
388			min	-.006	3	-.01	3	-.008	1	1.132e-5	15	NC	1	9250.818	1
389		5	max	.005	1	.002	2	0	15	2.218e-4	1	NC	1	NC	1
390			min	-.006	3	-.01	3	-.007	1	1.053e-5	15	NC	1	NC	1
391		6	max	.004	1	.002	2	0	15	2.052e-4	1	NC	1	NC	1
392			min	-.005	3	-.009	3	-.006	1	9.743e-6	15	NC	1	NC	1
393		7	max	.004	1	0	2	0	15	1.886e-4	1	NC	1	NC	1
394			min	-.005	3	-.009	3	-.005	1	8.955e-6	15	NC	1	NC	1
395		8	max	.004	1	0	2	0	15	1.72e-4	1	NC	1	NC	1
396			min	-.004	3	-.008	3	-.004	1	8.167e-6	15	NC	1	NC	1
397		9	max	.003	1	0	2	0	15	1.554e-4	1	NC	1	NC	1
398			min	-.004	3	-.008	3	-.004	1	7.379e-6	15	NC	1	NC	1
399		10	max	.003	1	-.001	2	0	15	1.388e-4	1	NC	1	NC	1
400			min	-.004	3	-.007	3	-.003	1	6.591e-6	15	NC	1	NC	1
401		11	max	.003	1	-.001	15	0	15	1.222e-4	1	NC	1	NC	1
402			min	-.003	3	-.007	3	-.003	1	5.804e-6	15	NC	1	NC	1
403		12	max	.002	1	-.001	15	0	15	1.056e-4	1	NC	1	NC	1
404			min	-.003	3	-.006	3	-.002	1	5.016e-6	15	NC	1	NC	1
405		13	max	.002	1	-.001	15	0	15	8.897e-5	1	NC	1	NC	1
406			min	-.002	3	-.006	3	-.001	1	4.228e-6	15	NC	1	NC	1
407		14	max	.002	1	-.001	15	0	15	7.237e-5	1	NC	1	NC	1
408			min	-.002	3	-.005	3	-.001	1	3.44e-6	15	NC	1	NC	1
409		15	max	.001	1	0	15	0	15	5.577e-5	1	NC	1	NC	1
410			min	-.002	3	-.004	3	0	1	2.652e-6	15	NC	1	NC	1
411		16	max	.001	1	0	15	0	15	3.916e-5	1	NC	1	NC	1
412			min	-.001	3	-.003	4	0	1	1.865e-6	15	NC	1	NC	1
413		17	max	0	1	0	15	0	15	2.256e-5	1	NC	1	NC	1
414			min	0	3	-.002	4	0	1	1.077e-6	15	NC	1	NC	1
415		18	max	0	1	0	15	0	15	5.953e-6	1	NC	1	NC	1
416			min	0	3	-.001	4	0	1	2.889e-7	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-4.555e-7	12	NC	1	NC	1
418			min	0	1	0	1	0	1	-1.065e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	4.323e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	2.008e-7	12	NC	1	NC	1
421		2	max	0	3	0	15	0	12	-1.098e-6	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-2.315e-5	1	NC	1	NC	1
423		3	max	0	3	0	15	0	12	-2.4e-6	15	NC	1	NC	1
424			min	0	2	-.004	4	0	1	-5.063e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	15	-3.702e-6	15	NC	1	NC	1
426			min	0	2	-.006	4	0	1	-7.811e-5	1	NC	1	NC	1
427		5	max	.001	3	-.002	15	0	15	-5.004e-6	15	NC	1	NC	1
428			min	-.001	2	-.008	4	0	1	-1.056e-4	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	15	-6.305e-6	15	NC	1	NC	1
430			min	-.001	2	-.01	4	0	1	-1.331e-4	1	9625.224	4	NC	1
431		7	max	.002	3	-.003	15	0	15	-7.607e-6	15	NC	1	NC	1
432			min	-.002	2	-.011	4	0	1	-1.605e-4	1	8290.912	4	NC	1
433		8	max	.002	3	-.003	15	0	15	-8.909e-6	15	NC	1	NC	1
434			min	-.002	2	-.012	4	-.001	1	-1.88e-4	1	7468.572	4	NC	1
435		9	max	.003	3	-.003	15	0	15	-1.021e-5	15	NC	3	NC	1
436			min	-.002	2	-.013	4	-.002	1	-2.155e-4	1	6985.398	4	NC	1
437		10	max	.003	3	-.003	15	0	15	-1.151e-5	15	NC	5	NC	1
438			min	-.002	2	-.014	4	-.002	1	-2.43e-4	1	6757.831	4	NC	1
439		11	max	.003	3	-.003	15	0	15	-1.281e-5	15	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.003	2	-.014	4	-.002	1	-2.704e-4	1	6752.532	4	NC	1
441		12	max	.004	3	-.003	15	0	15	-1.412e-5	15	NC	3	NC	1
442			min	-.003	2	-.013	4	-.003	1	-2.979e-4	1	6973.607	4	NC	1
443		13	max	.004	3	-.003	15	0	15	-1.542e-5	15	NC	2	NC	1
444			min	-.003	2	-.013	4	-.004	1	-3.254e-4	1	7465.839	4	NC	1
445		14	max	.004	3	-.003	15	0	15	-1.672e-5	15	NC	1	NC	1
446			min	-.003	2	-.011	4	-.004	1	-3.529e-4	1	8337.614	4	NC	1
447		15	max	.005	3	-.002	15	0	15	-1.802e-5	15	NC	1	NC	1
448			min	-.004	2	-.01	4	-.005	1	-3.804e-4	1	9828.082	4	NC	1
449		16	max	.005	3	-.002	15	0	15	-1.932e-5	15	NC	1	NC	1
450			min	-.004	2	-.008	4	-.006	1	-4.078e-4	1	NC	1	NC	1
451		17	max	.005	3	-.001	15	0	15	-2.062e-5	15	NC	1	NC	1
452			min	-.004	2	-.006	1	-.007	1	-4.353e-4	1	NC	1	NC	1
453		18	max	.006	3	0	15	0	15	-2.193e-5	15	NC	1	NC	1
454			min	-.004	2	-.004	1	-.008	1	-4.628e-4	1	NC	1	NC	1
455		19	max	.006	3	0	10	0	15	-2.323e-5	15	NC	1	NC	2
456			min	-.005	2	-.002	1	-.01	1	-4.903e-4	1	NC	1	9455.893	1
457	M12	1	max	.003	1	.004	2	.01	1	-5.373e-6	15	NC	1	NC	3
458			min	0	3	-.006	3	0	15	-1.131e-4	1	NC	1	2599.914	1
459		2	max	.002	1	.004	2	.009	1	-5.373e-6	15	NC	1	NC	3
460			min	0	3	-.006	3	0	15	-1.131e-4	1	NC	1	2823.285	1
461		3	max	.002	1	.004	2	.008	1	-5.373e-6	15	NC	1	NC	3
462			min	0	3	-.006	3	0	15	-1.131e-4	1	NC	1	3089.371	1
463		4	max	.002	1	.004	2	.007	1	-5.373e-6	15	NC	1	NC	3
464			min	0	3	-.005	3	0	15	-1.131e-4	1	NC	1	3409.227	1
465		5	max	.002	1	.003	2	.007	1	-5.373e-6	15	NC	1	NC	3
466			min	0	3	-.005	3	0	15	-1.131e-4	1	NC	1	3797.877	1
467		6	max	.002	1	.003	2	.006	1	-5.373e-6	15	NC	1	NC	2
468			min	0	3	-.005	3	0	15	-1.131e-4	1	NC	1	4276.158	1
469		7	max	.002	1	.003	2	.005	1	-5.373e-6	15	NC	1	NC	2
470			min	0	3	-.004	3	0	15	-1.131e-4	1	NC	1	4873.646	1
471		8	max	.002	1	.003	2	.004	1	-5.373e-6	15	NC	1	NC	2
472			min	0	3	-.004	3	0	15	-1.131e-4	1	NC	1	5633.473	1
473		9	max	.001	1	.002	2	.004	1	-5.373e-6	15	NC	1	NC	2
474			min	0	3	-.003	3	0	15	-1.131e-4	1	NC	1	6620.564	1
475		10	max	.001	1	.002	2	.003	1	-5.373e-6	15	NC	1	NC	2
476			min	0	3	-.003	3	0	15	-1.131e-4	1	NC	1	7936.391	1
477		11	max	.001	1	.002	2	.003	1	-5.373e-6	15	NC	1	NC	2
478			min	0	3	-.003	3	0	15	-1.131e-4	1	NC	1	9746.92	1
479		12	max	0	1	.002	2	.002	1	-5.373e-6	15	NC	1	NC	1
480			min	0	3	-.002	3	0	15	-1.131e-4	1	NC	1	NC	1
481		13	max	0	1	.001	2	.002	1	-5.373e-6	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-1.131e-4	1	NC	1	NC	1
483		14	max	0	1	.001	2	.001	1	-5.373e-6	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-1.131e-4	1	NC	1	NC	1
485		15	max	0	1	0	2	0	1	-5.373e-6	15	NC	1	NC	1
486			min	0	3	-.001	3	0	15	-1.131e-4	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-5.373e-6	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-1.131e-4	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-5.373e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-1.131e-4	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-5.373e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-1.131e-4	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-5.373e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-1.131e-4	1	NC	1	NC	1
495	M1	1	max	.008	3	.092	2	.001	1	1.552e-2	1	NC	1	NC	1
496			min	-.004	2	-.012	3	0	15	-2.501e-2	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
497		2	max	.007	3	.043	2	0	15	7.517e-3	1	NC	3	NC	1
498			min	-.004	2	-.003	3	-.007	1	-1.238e-2	3	2369.222	2	NC	1
499		3	max	.007	3	.011	3	0	15	1.13e-5	10	NC	5	NC	1
500			min	-.004	2	-.009	2	-.01	1	-2.092e-4	1	1140.238	2	NC	1
501		4	max	.007	3	.037	3	0	15	4.125e-3	2	NC	5	NC	1
502			min	-.004	2	-.068	2	-.009	1	-4.42e-3	3	718.344	2	NC	1
503		5	max	.007	3	.071	3	0	15	8.381e-3	1	NC	5	NC	1
504			min	-.003	2	-.131	2	-.007	1	-8.714e-3	3	517.565	2	NC	1
505		6	max	.007	3	.108	3	0	15	1.268e-2	1	NC	15	NC	1
506			min	-.003	2	-.191	2	-.003	1	-1.301e-2	3	407.109	2	NC	1
507		7	max	.007	3	.143	3	0	1	1.697e-2	1	NC	15	NC	1
508			min	-.003	2	-.245	2	0	12	-1.73e-2	3	341.983	2	NC	1
509		8	max	.007	3	.173	3	.001	1	2.127e-2	1	9184.871	15	NC	1
510			min	-.003	2	-.288	2	0	15	-2.16e-2	3	303.495	2	NC	1
511		9	max	.007	3	.192	3	0	15	2.371e-2	2	8580.806	15	NC	1
512			min	-.003	2	-.315	2	0	1	-2.164e-2	3	283.474	2	NC	1
513		10	max	.006	3	.199	3	0	1	2.588e-2	2	8396.916	15	NC	1
514			min	-.003	2	-.324	2	0	12	-1.887e-2	3	277.601	2	NC	1
515		11	max	.006	3	.194	3	0	1	2.804e-2	2	8580.504	15	NC	1
516			min	-.003	2	-.314	2	0	15	-1.61e-2	3	284.427	2	NC	1
517		12	max	.006	3	.178	3	0	15	2.72e-2	2	9184.242	15	NC	1
518			min	-.003	2	-.286	2	-.001	1	-1.337e-2	3	306.416	2	NC	1
519		13	max	.006	3	.151	3	0	15	2.183e-2	2	NC	15	NC	1
520			min	-.003	2	-.241	2	0	1	-1.07e-2	3	349.136	2	NC	1
521		14	max	.006	3	.118	3	.002	1	1.646e-2	2	NC	15	NC	1
522			min	-.003	2	-.185	2	0	15	-8.031e-3	3	422.459	2	NC	1
523		15	max	.006	3	.08	3	.006	1	1.109e-2	2	NC	5	NC	1
524			min	-.003	2	-.123	2	0	15	-5.36e-3	3	549.289	2	NC	1
525		16	max	.006	3	.041	3	.009	1	5.713e-3	2	NC	5	NC	1
526			min	-.003	2	-.061	2	0	15	-2.689e-3	3	785.546	2	NC	1
527		17	max	.005	3	.004	3	.01	1	6.351e-4	1	NC	5	NC	1
528			min	-.003	2	-.005	2	0	15	-1.845e-5	3	1293.452	2	NC	1
529		18	max	.005	3	.043	1	.007	1	1.089e-2	2	NC	4	NC	1
530			min	-.003	2	-.029	3	0	15	-4.386e-3	3	2749.003	1	NC	1
531		19	max	.005	3	.084	1	0	15	2.182e-2	2	NC	1	NC	1
532			min	-.003	2	-.06	3	-.001	1	-8.917e-3	3	NC	1	NC	1
533	M5	1	max	.023	3	.223	2	0	1	0	1	NC	1	NC	1
534			min	-.016	2	-.014	3	0	1	0	1	NC	1	NC	1
535		2	max	.023	3	.103	2	0	1	0	1	NC	5	NC	1
536			min	-.016	2	.001	3	0	1	0	1	965.117	2	NC	1
537		3	max	.023	3	.037	3	0	1	0	1	NC	5	NC	1
538			min	-.016	2	-.031	2	0	1	0	1	455.726	2	NC	1
539		4	max	.023	3	.11	3	0	1	0	1	9645.784	15	NC	1
540			min	-.016	2	-.189	2	0	1	0	1	280.281	2	NC	1
541		5	max	.023	3	.21	3	0	1	0	1	6754.799	15	NC	1
542			min	-.015	2	-.359	2	0	1	0	1	198.036	2	NC	1
543		6	max	.022	3	.321	3	0	1	0	1	5203.083	15	NC	1
544			min	-.015	2	-.528	2	0	1	0	1	153.511	2	NC	1
545		7	max	.022	3	.429	3	0	1	0	1	4306.452	15	NC	1
546			min	-.015	2	-.68	2	0	1	0	1	127.607	2	NC	1
547		8	max	.021	3	.519	3	0	1	0	1	3784.883	15	NC	1
548			min	-.014	2	-.802	2	0	1	0	1	112.464	2	NC	1
549		9	max	.021	3	.577	3	0	1	0	1	3517.325	15	NC	1
550			min	-.014	2	-.88	2	0	1	0	1	104.667	2	NC	1
551		10	max	.02	3	.597	3	0	1	0	1	3436.71	15	NC	1
552			min	-.014	2	-.906	2	0	1	0	1	102.384	2	NC	1
553		11	max	.02	3	.582	3	0	1	0	1	3517.427	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
554			min	-.014	2	-.879	2	0	1	0	1	105.031	2	NC	1
555		12	max	.019	3	.532	3	0	1	0	1	3785.13	15	NC	1
556			min	-.014	2	-.799	2	0	1	0	1	113.647	2	NC	1
557		13	max	.019	3	.451	3	0	1	0	1	4306.968	15	NC	1
558			min	-.013	2	-.67	2	0	1	0	1	130.658	2	NC	1
559		14	max	.018	3	.349	3	0	1	0	1	5204.11	15	NC	1
560			min	-.013	2	-.51	2	0	1	0	1	160.351	2	NC	1
561		15	max	.018	3	.236	3	0	1	0	1	6756.855	15	NC	1
562			min	-.013	2	-.336	2	0	1	0	1	212.844	2	NC	1
563		16	max	.017	3	.121	3	0	1	0	1	9650.12	15	NC	1
564			min	-.013	2	-.166	2	0	1	0	1	313.445	2	NC	1
565		17	max	.017	3	.012	3	0	1	0	1	NC	5	NC	1
566			min	-.013	2	-.017	2	0	1	0	1	529.925	1	NC	1
567		18	max	.017	3	.103	1	0	1	0	1	NC	5	NC	1
568			min	-.013	2	-.08	3	0	1	0	1	1153.494	1	NC	1
569		19	max	.017	3	.202	1	0	1	0	1	NC	1	NC	1
570			min	-.012	2	-.164	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.008	3	.092	2	0	15	2.501e-2	3	NC	1	NC	1
572			min	-.004	2	-.012	3	-.001	1	-1.552e-2	1	NC	1	NC	1
573		2	max	.007	3	.043	2	.007	1	1.238e-2	3	NC	3	NC	1
574			min	-.004	2	-.003	3	0	15	-7.517e-3	1	2369.222	2	NC	1
575		3	max	.007	3	.011	3	.01	1	2.092e-4	1	NC	5	NC	1
576			min	-.004	2	-.009	2	0	15	-1.13e-5	10	1140.238	2	NC	1
577		4	max	.007	3	.037	3	.009	1	4.42e-3	3	NC	5	NC	1
578			min	-.004	2	-.068	2	0	15	-4.125e-3	2	718.344	2	NC	1
579		5	max	.007	3	.071	3	.007	1	8.714e-3	3	NC	5	NC	1
580			min	-.003	2	-.131	2	0	15	-8.381e-3	1	517.565	2	NC	1
581		6	max	.007	3	.108	3	.003	1	1.301e-2	3	NC	15	NC	1
582			min	-.003	2	-.191	2	0	15	-1.268e-2	1	407.109	2	NC	1
583		7	max	.007	3	.143	3	0	12	1.73e-2	3	NC	15	NC	1
584			min	-.003	2	-.245	2	0	1	-1.697e-2	1	341.983	2	NC	1
585		8	max	.007	3	.173	3	0	15	2.16e-2	3	9184.871	15	NC	1
586			min	-.003	2	-.288	2	-.001	1	-2.127e-2	1	303.495	2	NC	1
587		9	max	.007	3	.192	3	0	1	2.164e-2	3	8580.806	15	NC	1
588			min	-.003	2	-.315	2	0	15	-2.371e-2	2	283.474	2	NC	1
589		10	max	.006	3	.199	3	0	12	1.887e-2	3	8396.916	15	NC	1
590			min	-.003	2	-.324	2	0	1	-2.588e-2	2	277.601	2	NC	1
591		11	max	.006	3	.194	3	0	15	1.61e-2	3	8580.504	15	NC	1
592			min	-.003	2	-.314	2	0	1	-2.804e-2	2	284.427	2	NC	1
593		12	max	.006	3	.178	3	.001	1	1.337e-2	3	9184.242	15	NC	1
594			min	-.003	2	-.286	2	0	15	-2.72e-2	2	306.416	2	NC	1
595		13	max	.006	3	.151	3	0	1	1.07e-2	3	NC	15	NC	1
596			min	-.003	2	-.241	2	0	15	-2.183e-2	2	349.136	2	NC	1
597		14	max	.006	3	.118	3	0	15	8.031e-3	3	NC	15	NC	1
598			min	-.003	2	-.185	2	-.002	1	-1.646e-2	2	422.459	2	NC	1
599		15	max	.006	3	.08	3	0	15	5.36e-3	3	NC	5	NC	1
600			min	-.003	2	-.123	2	-.006	1	-1.109e-2	2	549.289	2	NC	1
601		16	max	.006	3	.041	3	0	15	2.689e-3	3	NC	5	NC	1
602			min	-.003	2	-.061	2	-.009	1	-5.713e-3	2	785.546	2	NC	1
603		17	max	.005	3	.004	3	0	15	1.845e-5	3	NC	5	NC	1
604			min	-.003	2	-.005	2	-.01	1	-6.351e-4	1	1293.452	2	NC	1
605		18	max	.005	3	.043	1	0	15	4.386e-3	3	NC	4	NC	1
606			min	-.003	2	-.029	3	-.007	1	-1.089e-2	2	2749.003	1	NC	1
607		19	max	.005	3	.084	1	.001	1	8.917e-3	3	NC	1	NC	1
608			min	-.003	2	-.06	3	0	15	-2.182e-2	2	NC	1	NC	1

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-05
Units: Imperial units

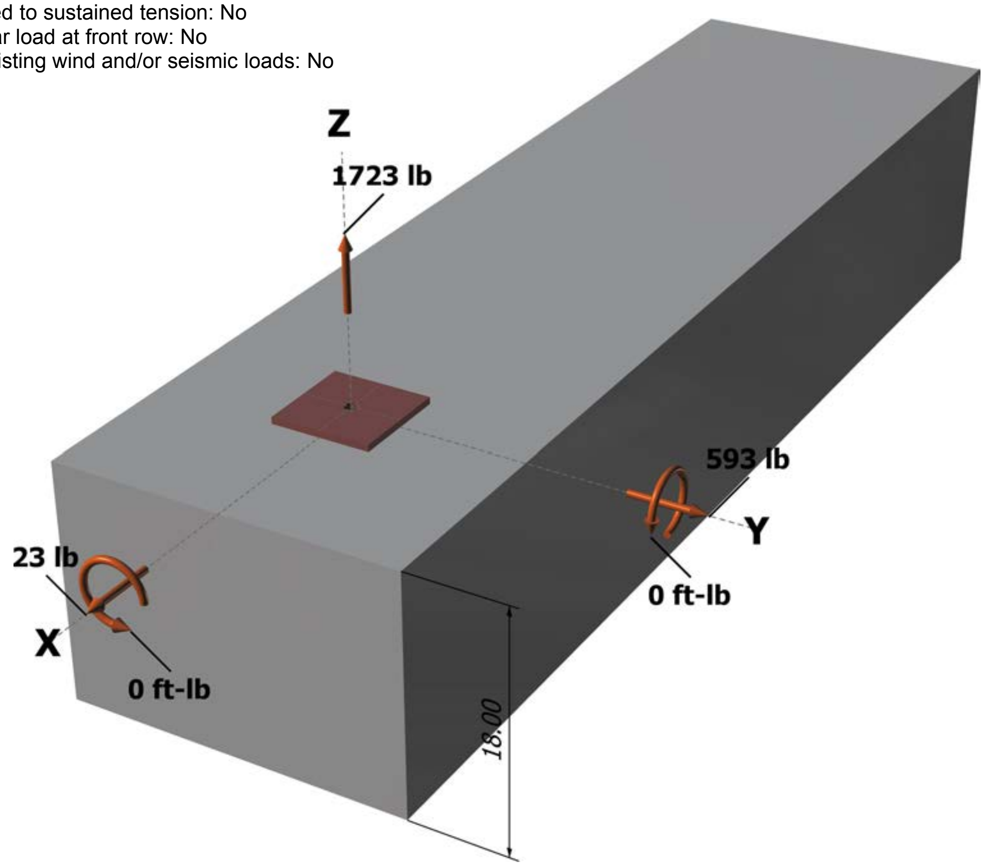
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Load and Geometry
Load factor source: ACI 318 Section 9.2
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: No
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout in tension: No
Do not evaluate concrete breakout in shear: No
Hole condition: Dry concrete
Inspection: Periodic
Temperature range, Short/Long: 110/75°F
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 4.00 x 4.00 x 0.28

<Figure 1>



<Figure 2>

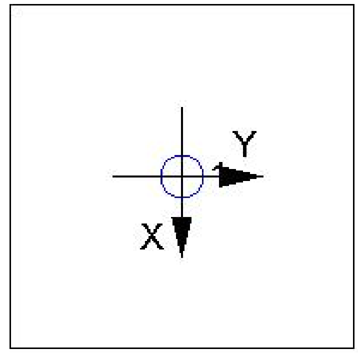
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	1723.0	23.0	593.0	593.4
Sum	1723.0	23.0	593.0	593.4

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1723
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension(Sec. D.5.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
8095	0.75	6071

5. Concrete Breakout Strength of Anchor in Tension (Sec. D.5.2)

$N_b = k_c \lambda \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. D-7)

k_c	λ	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	5.247	10215

$\phi N_{cb} = \phi\,(A_{Nc} / A_{Nco})\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N} N_b$ (Sec. D.4.1 & Eq. D-4)

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cb} (lb)
220.36	247.75	0.967	1.00	1.000	10215	0.65	5710

6. Adhesive Strength of Anchor in Tension (AC308 Sec. 3.3)

$\tau_{k,cr} = \tau_{k,cr} f_{short\text{-}term} K_{sat}$

$\tau_{k,cr}$ (psi)	$f_{short\text{-}term}$	K_{sat}	$\tau_{k,cr}$ (psi)
1035	1.00	1.00	1035

$N_{a0} = \tau_{k,cr} \pi d_a h_{ef}$ (Eq. D-16f)

$\tau_{k,cr}$ (psi)	d_a (in)	h_{ef} (in)	N_{a0} (lb)
1035	0.50	6.000	9755

$\phi N_a = \phi\,(A_{Na} / A_{Na0})\,\Psi_{ed,Na}\,\Psi_{p,Na} N_{a0}$ (Sec. D.4.1 & Eq. D-16a)

A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	ϕ	ϕN_a (lb)
109.66	109.66	1.000	1.000	9755	0.55	5365

8. Steel Strength of Anchor in Shear (Sec. D.6.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
4855	1.0	0.65	3156

9. Concrete Breakout Strength of Anchor in Shear (Sec. D.6.2)

Shear perpendicular to edge in y-direction:

$V_{by} = 7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda\sqrt{f'_c}c_{a1}^{1.5}$ (Eq. D-24)

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	7.00	6947

$\phi V_{cby} = \phi\, (A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. D.4.1 & Eq. D-21)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cby} (lb)
192.89	220.50	0.925	1.000	1.000	6947	0.70	3934

Shear perpendicular to edge in x-direction:

$V_{bx} = 7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda\sqrt{f'_c}c_{a1}^{1.5}$ (Eq. D-24)

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
4.00	0.50	1.00	2500	7.87	8282

$\phi V_{cbx} = \phi\, (A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. D.4.1 & Eq. D-21)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
165.27	278.72	0.878	1.000	1.000	8282	0.70	3018

Shear parallel to edge in x-direction:

$V_{by} = 7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda\sqrt{f'_c}c_{a1}^{1.5}$ (Eq. D-24)

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	7.00	6947

$\phi V_{cbx} = \phi\, (2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. D.4.1, D.6.2.1(c) & Eq. D-21)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
192.89	220.50	1.000	1.000	1.000	6947	0.70	8508

Shear parallel to edge in y-direction:

$V_{bx} = 7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda\sqrt{f'_c}c_{a1}^{1.5}$ (Eq. D-24)

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
4.00	0.50	1.00	2500	7.87	8282

$\phi V_{cby} = \phi\, (2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. D.4.1, D.6.2.1(c) & Eq. D-21)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cby} (lb)
165.27	278.72	1.000	1.000	1.000	8282	0.70	6875

10. Concrete Pryout Strength of Anchor in Shear (Sec. D.6.3)

$\phi V_{cp} = \phi \min|k_{cp}N_a\,;\, k_{cp}N_{cb}| = \phi \min|k_{cp}(A_{Na} / A_{Na0})\Psi_{ed,Na}\Psi_{p,Na}N_{a0}\,;\, k_{cp}(A_{Nc} / A_{Nco})\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b|$ (Eq. D-30a)

k_{cp}	A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	109.66	109.66	1.000	1.000	9755	9755

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ	ϕV_{cp} (lb)
220.36	247.75	0.967	1.000	1.000	10215	8785	0.70	12298

11. Results

Interaction of Tensile and Shear Forces (Sec. D.7)

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	1723	6071	0.28	Pass
Concrete breakout	1723	5710	0.30	Pass
Adhesive	**1723**	**5365**	**0.32**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	**593**	**3156**	**0.19**	**Pass (Governs)**
T Concrete breakout y+	593	3934	0.15	Pass
T Concrete breakout x+	23	3018	0.01	Pass
|| Concrete breakout y+	23	8508	0.00	Pass
|| Concrete breakout x+	593	6875	0.09	Pass
Concrete breakout, combined	-	-	0.15	Pass
Pryout	593	12298	0.05	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.32	0.00	32.1 %	1.0	Pass

AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS) with hef = 6.000 inch meets the selected design criteria.

12. Warnings

- This temperature range is currently outside the scope of ACI 318-11 and ACI 355.4, and is provided for historical purposes.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer’s product literature for hole cleaning and installation instructions.

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-05
Units: Imperial units

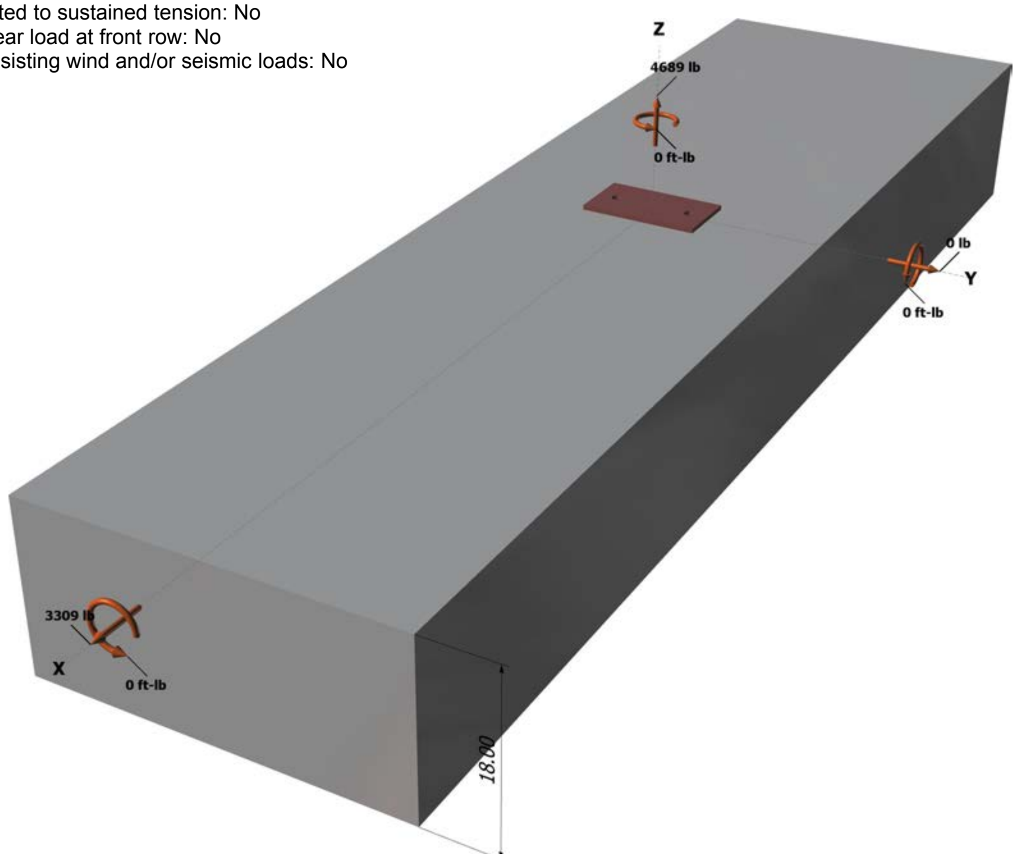
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Load and Geometry
Load factor source: ACI 318 Section 9.2
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: No
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

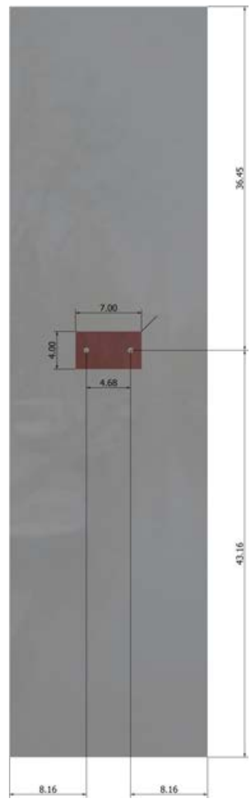
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout in tension: No
Do not evaluate concrete breakout in shear: No
Hole condition: Dry concrete
Inspection: Periodic
Temperature range, Short/Long: 110/75°F
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 4.00 x 7.00 x 0.28

<Figure 1>



<Figure 2>



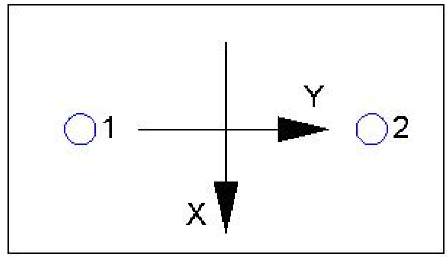
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2344.5	1654.5	0.0	1654.5
2	2344.5	1654.5	0.0	1654.5
Sum	4689.0	3309.0	0.0	3309.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 4689
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension(Sec. D.5.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
8095	0.75	6071

5. Concrete Breakout Strength of Anchor in Tension (Sec. D.5.2)

$N_b = k_c \lambda \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. D-7)

k_c	λ	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	6.000	12492

$\phi N_{cbg} = \phi\, (A_{Nc} / A_{Nco})\, \Psi_{ec,N}\, \Psi_{ed,N}\, \Psi_{c,N}\, \Psi_{cp,N} N_b$ (Sec. D.4.1 & Eq. D-5)

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
378.00	324.00	1.000	0.972	1.00	1.000	12492	0.65	9208

6. Adhesive Strength of Anchor in Tension (AC308 Sec. 3.3)

$\tau_{k,cr} = \tau_{k,cr} f_{short\text{-}term} K_{sat}$

$\tau_{k,cr}$ (psi)	$f_{short\text{-}term}$	K_{sat}	$\tau_{k,cr}$ (psi)
1035	1.00	1.00	1035

$N_{a0} = \tau_{k,cr} \pi d_a h_{ef}$ (Eq. D-16f)

$\tau_{k,cr}$ (psi)	d_a (in)	h_{ef} (in)	N_{a0} (lb)
1035	0.50	6.000	9755

$\phi N_{ag} = \phi\, (A_{Na} / A_{Na0})\, \Psi_{ed,Na}\, \Psi_{g,Na}\, \Psi_{ec,Na}\, \Psi_{p,Na} N_{a0}$ (Sec. D.4.1 & Eq. D-16b)

A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0}(lb)	ϕ	ϕN_{ag} (lb)
158.66	109.66	1.000	1.043	1.000	1.000	9755	0.55	8093

8. Steel Strength of Anchor in Shear (Sec. D.6.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
4855	1.0	0.65	3156

9. Concrete Breakout Strength of Anchor in Shear (Sec. D.6.2)

Shear perpendicular to edge in x-direction:

$V_{bx} = 7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda\sqrt{f'_c}c_{a1}^{1.5}$ (Eq. D-24)

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
4.00	0.50	1.00	2500	12.00	15593

$\phi V_{cbgx} = \phi\,(A_{Vc} / A_{Vco})\,\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. D.4.1 & Eq. D-22)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
378.00	648.00	1.000	0.836	1.000	1.000	15593	0.70	5323

Shear parallel to edge in x-direction:

$V_{by} = 7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda\sqrt{f'_c}c_{a1}^{1.5}$ (Eq. D-24)

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	8.16	8744

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. D.4.1, D.6.2.1(c) & Eq. D-21)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
299.64	299.64	1.000	1.000	1.000	8744	0.70	12241

10. Concrete Pryout Strength of Anchor in Shear (Sec. D.6.3)

$\phi V_{cpg} = \phi\min|k_{cp}N_{ag}\,;\,k_{cp}N_{cbg}| = \phi\min|k_{cp}(A_{Na} / A_{Na0})\Psi_{ed,Na}\Psi_{g,Na}\Psi_{ec,Na}\Psi_{p,Na}N_{a0}\,;\,k_{cp}(A_{Nc} / A_{Nco})\Psi_{ec,N}\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b|$ (Eq. D-30b)

k_{cp}	A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	158.66	109.66	1.000	1.043	1.000	1.000	9755	14715

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
378.00	324.00	1.000	0.972	1.000	1.000	12492	14166	0.70

ϕV_{cpg} (lb)
19833

11. Results

Interaction of Tensile and Shear Forces (Sec. D.7)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	2345	6071	0.39	Pass
Concrete breakout	4689	9208	0.51	Pass
Adhesive	**4689**	**8093**	**0.58**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	1655	3156	0.52	Pass
T Concrete breakout x+	**3309**	**5323**	**0.62**	**Pass (Governs)**
|| Concrete breakout y-	**1655**	**12241**	**0.14**	**Pass (Governs)**
Pryout	3309	19833	0.17	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status

Sec. D.7.3	0.58	0.62	120.1 %	1.2	Pass

AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS) with hef = 6.000 inch meets the selected design criteria.

12. Warnings

- This temperature range is currently outside the scope of ACI 318-11 and ACI 355.4, and is provided for historical purposes.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer’s product literature for hole cleaning and installation instructions.