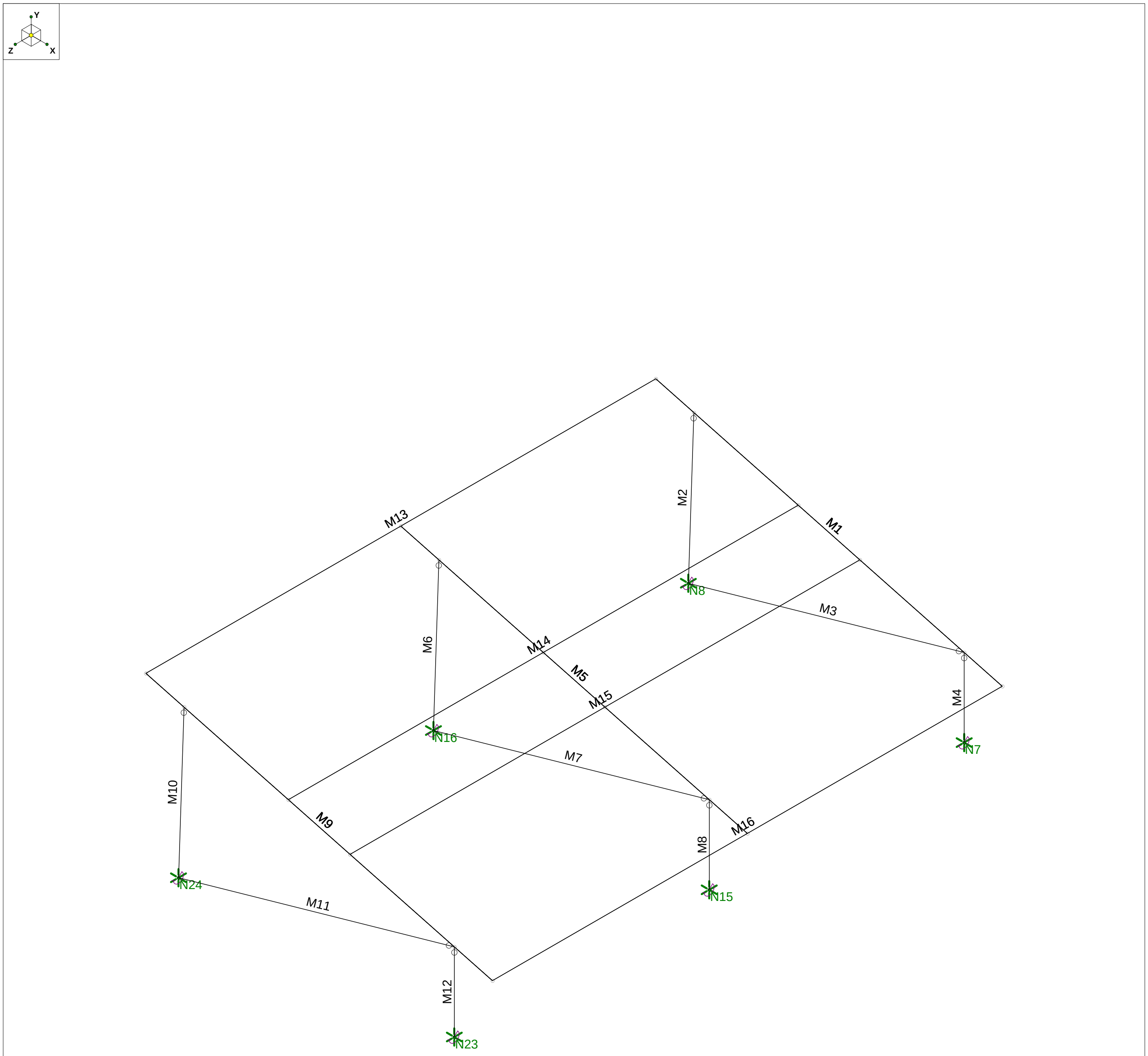


Schletter, Inc.	Standard PVMax Racking System	15ÁTilt w/o Seismic Design
HCV	Representative Calculations - ASCE 7-10	

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.

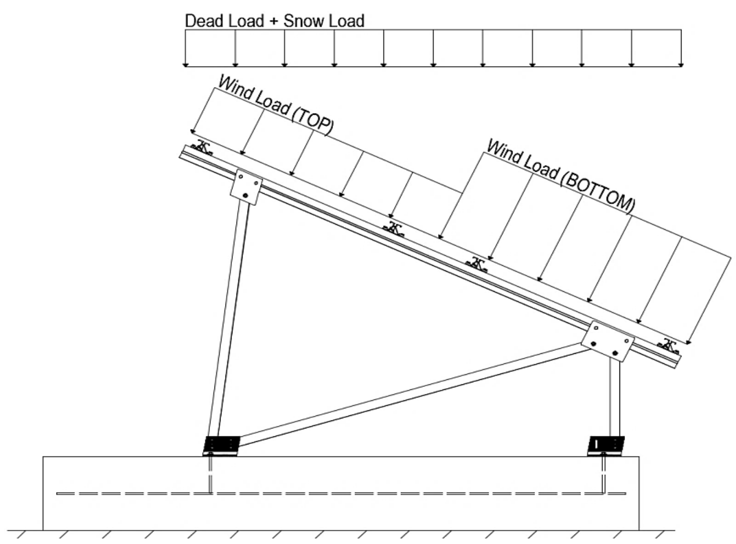
1.2 Construction

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 = 15°
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 =	22.68 psf	*(ASCE 7-10, Eq. 7.4-1)*
I_s =	1.00	
C_s =	1.00	
C_e =	0.90	
C_t =	1.20	

2.3 Wind Loads

Design Wind Speed, V = 140 mph　　Exposure Category = C
Height < 15 ft　　Importance Category = II

Peak Velocity Pressure, q_z = 30.77 psf　*Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.000	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.600	
$Cf-_{TOP, OUTER PURLIN}$	=	-2.300	
$Cf-_{TOP, INNER PURLIN}$	=	-1.780	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.000	

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.

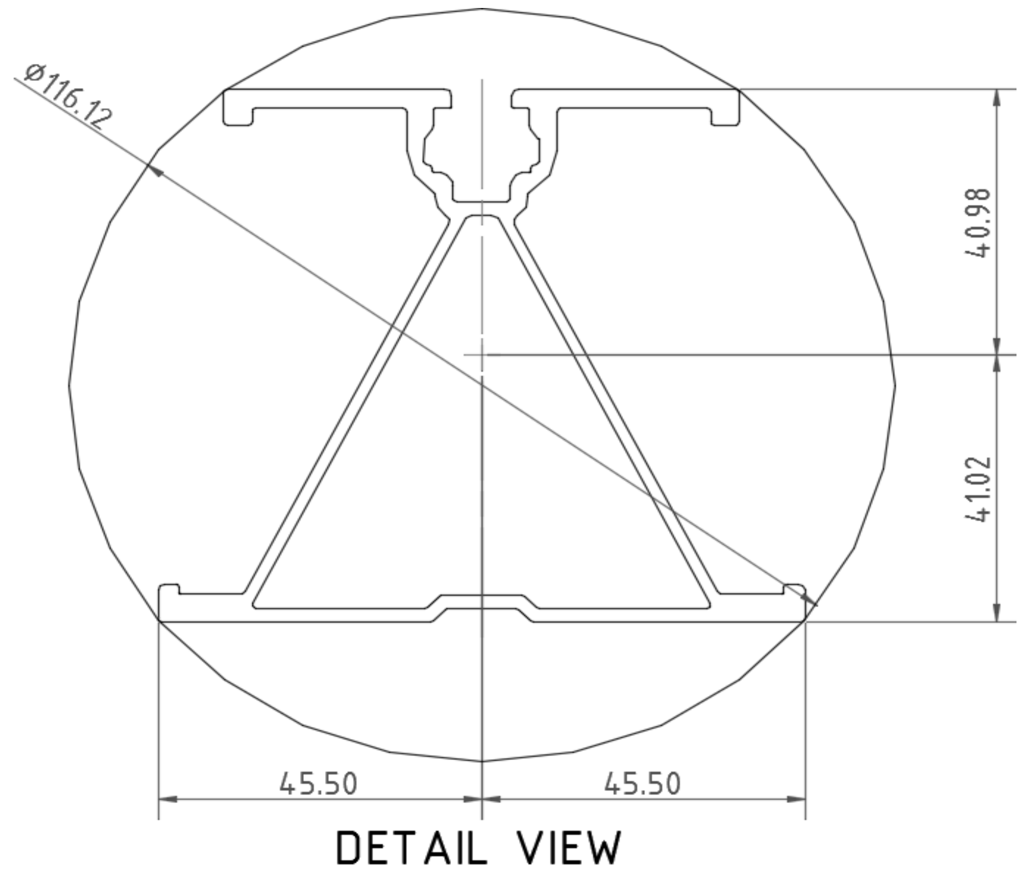
Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M14	Mid-Top	M7	Inner	N15	Inner
M15	Mid-Bottom	M11	Outer	N23	Outer
M16	Bottom				
Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	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).

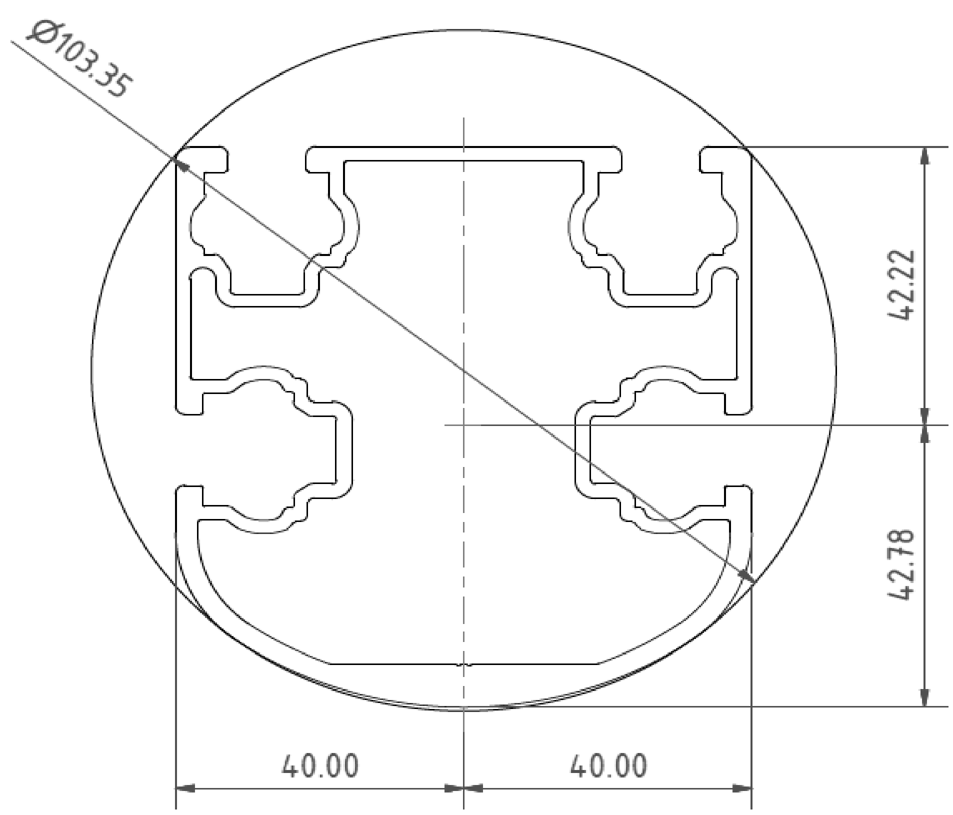
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	117	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	2.132	k-ft
M_z =	0.243	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	98%	



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).

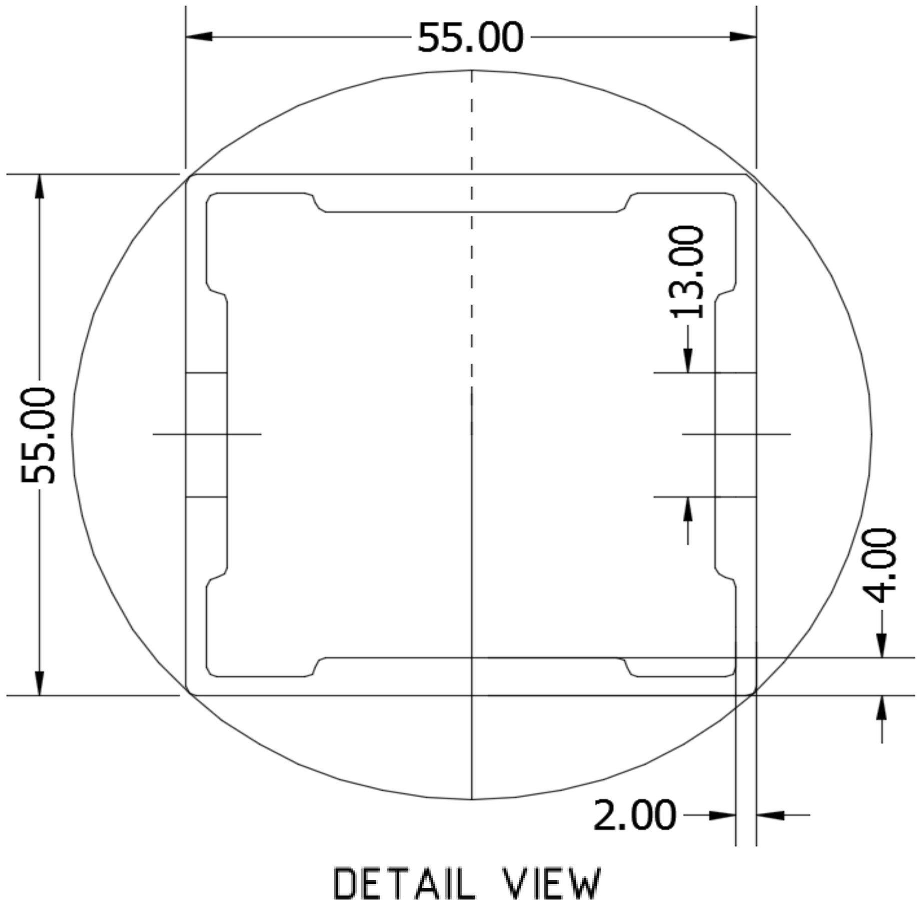
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.393	k-ft
M_z =	0.000	k-ft
P_n =	-0.272	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	98%	



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).

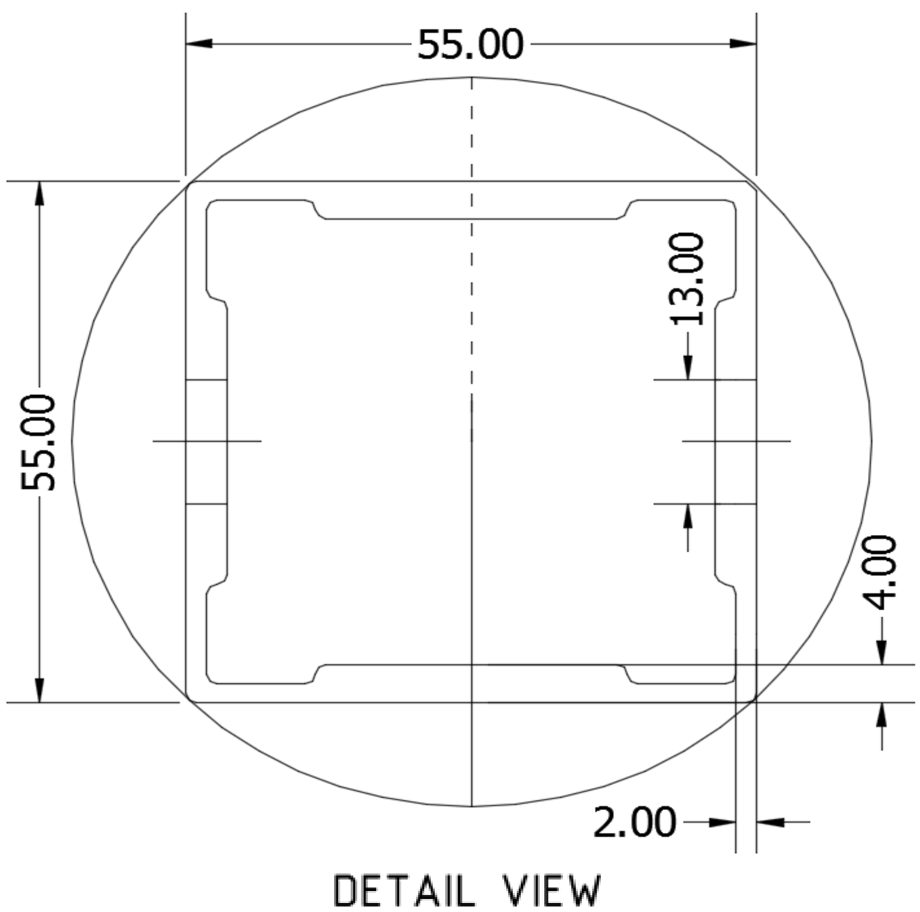
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.863	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	14%	



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).

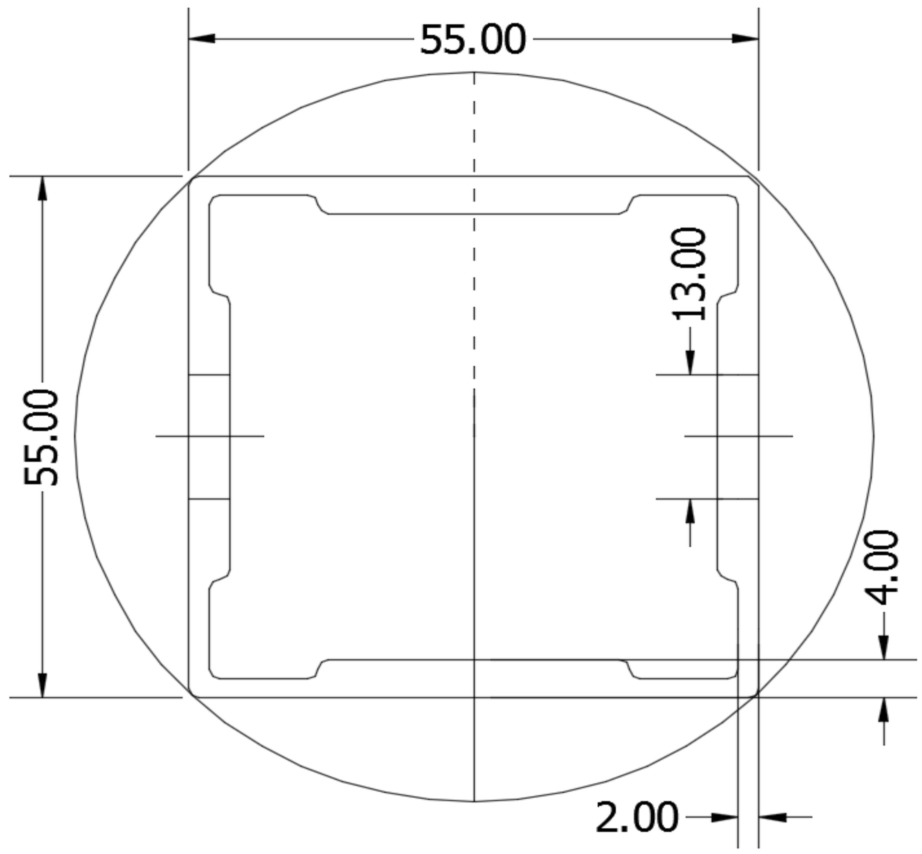
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.011	k-ft
M_z =	0.000	k-ft
P_n =	1.412	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	20%	



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 =	48.30	in
$\Phi F_{ty\ AXIAL}$ =	18.93	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 =	-0.010	k-ft
M_z =	0.000	k-ft
P_n =	3.780	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	18.592	k
Utilization =	21%	



DETAIL VIEW

5. FOUNDATION DESIGN CALCULATIONS

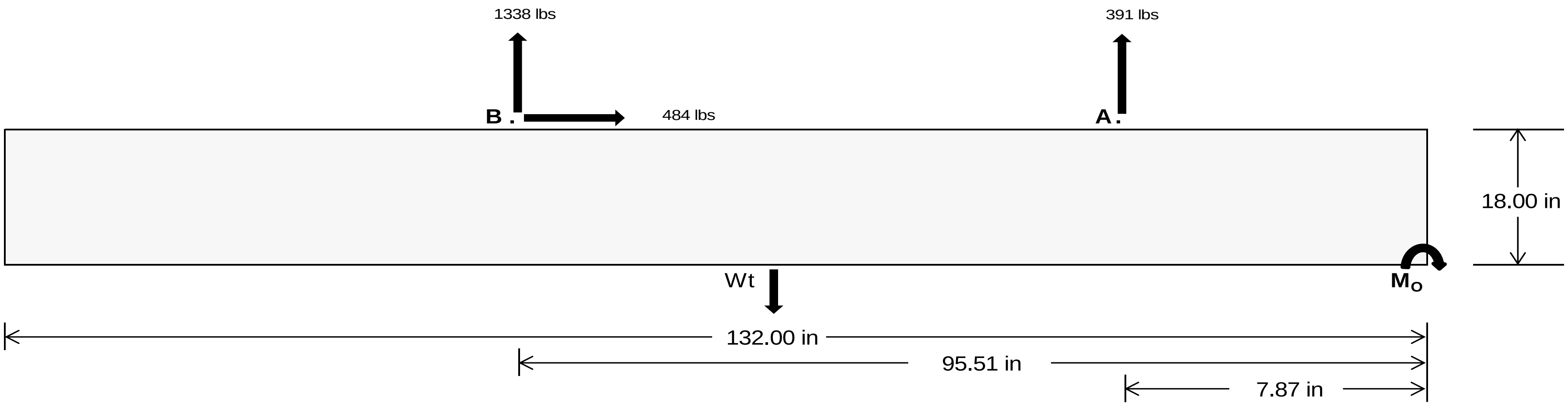
5.1 Helical Pile Foundations

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 =	1712.95	5819.86	k
Compressive Load =	5021.27	5208.03	k
Lateral Load =	9.45	2096.31	k
Moment (Weak Axis) =	0.02	0.01	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 =	139602.1 in-lbs
Resisting Force Required =	2115.18 lbs
S.F. =	1.67
Weight Required =	3525.30 lbs
Minimum Width =	31 in in
Weight Provided =	6180.63 lbs

A minimum 132in long x 31in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force =	483.51 lbs
Friction =	0.4
Weight Required =	1208.78 lbs
Resisting Weight =	6180.63 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 31in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force =	483.51 lbs
Cohesion =	130 psf
Area =	28.42 ft^2
Resisting =	3090.31 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 31in 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			
	31 in	32 in	33 in	34 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.58 ft) =	6181 lbs	6380 lbs	6579 lbs	6779 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	31 in	32 in	33 in	34 in	31 in	32 in	33 in	34 in	31 in	32 in	33 in	34 in	31 in	32 in	33 in	34 in
F_A	1681 lbs	1681 lbs	1681 lbs	1681 lbs	1781 lbs	1781 lbs	1781 lbs	1781 lbs	2471 lbs	2471 lbs	2471 lbs	2471 lbs	-781 lbs	-781 lbs	-781 lbs	-781 lbs
F_B	1740 lbs	1740 lbs	1740 lbs	1740 lbs	1847 lbs	1847 lbs	1847 lbs	1847 lbs	2561 lbs	2561 lbs	2561 lbs	2561 lbs	-2677 lbs	-2677 lbs	-2677 lbs	-2677 lbs
F_V	148 lbs	148 lbs	148 lbs	148 lbs	854 lbs	854 lbs	854 lbs	854 lbs	741 lbs	741 lbs	741 lbs	741 lbs	-967 lbs	-967 lbs	-967 lbs	-967 lbs
P_{total}	9601 lbs	9801 lbs	10000 lbs	10199 lbs	9808 lbs	10007 lbs	10207 lbs	10406 lbs	11212 lbs	11412 lbs	11611 lbs	11810 lbs	251 lbs	370 lbs	490 lbs	610 lbs
M	4082 lbs-ft	4082 lbs-ft	4082 lbs-ft	4082 lbs-ft	5366 lbs-ft	5366 lbs-ft	5366 lbs-ft	5366 lbs-ft	6782 lbs-ft	6782 lbs-ft	6782 lbs-ft	6782 lbs-ft	1349 lbs-ft	1349 lbs-ft	1349 lbs-ft	1349 lbs-ft
e	0.43 ft	0.42 ft	0.41 ft	0.40 ft	0.55 ft	0.54 ft	0.53 ft	0.52 ft	0.60 ft	0.59 ft	0.58 ft	0.57 ft	5.38 ft	3.64 ft	2.75 ft	2.21 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}	259.5 psf	258.2 psf	257.0 psf	255.8 psf	242.2 psf	241.4 psf	240.7 psf	240.0 psf	264.4 psf	262.9 psf	261.6 psf	260.3 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	416.2 psf	410.0 psf	404.2 psf	398.7 psf	448.1 psf	440.9 psf	434.2 psf	427.8 psf	524.7 psf	515.1 psf	506.1 psf	497.6 psf	538.5 psf	49.8 psf	43.2 psf	43.6 psf

Maximum Bearing Pressure = 539 psf
Allowable Bearing Pressure = 1500 psf

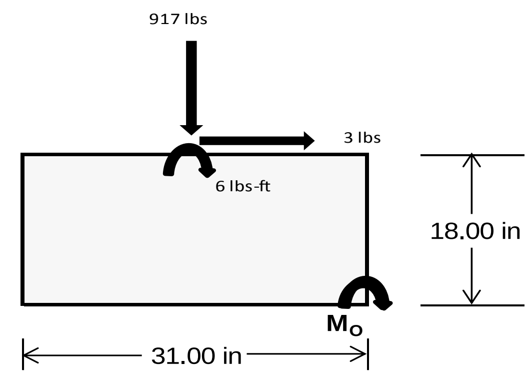
Use a 132in long x 31in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 1173.1 ft-lbs
Resisting Force Required = 908.23 lbs
S.F. = 1.67
Weight Required = 1513.71 lbs
Minimum Width = 31 in in
Weight Provided = 6180.63 lbs

A minimum 132in long x 31in 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	31 in			31 in			31 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	233 lbs	630 lbs	233 lbs	917 lbs	2784 lbs	917 lbs	68 lbs	184 lbs	68 lbs
F_V	1 lbs	0 lbs	1 lbs	3 lbs	0 lbs	3 lbs	0 lbs	0 lbs	0 lbs
P_{total}	7884 lbs	6181 lbs	7884 lbs	8201 lbs	6181 lbs	8201 lbs	2305 lbs	6181 lbs	2305 lbs
M	3 lbs-ft	0 lbs-ft	3 lbs-ft	11 lbs-ft	0 lbs-ft	11 lbs-ft	0 lbs-ft	0 lbs-ft	0 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	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft
f_{min}	277.2 psf	217.5 psf	277.2 psf	287.7 psf	217.5 psf	287.7 psf	81.1 psf	217.5 psf	81.1 psf
f_{max}	277.7 psf	217.5 psf	277.7 psf	289.5 psf	217.5 psf	289.5 psf	81.2 psf	217.5 psf	81.2 psf

Maximum Bearing Pressure = 289 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 31in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 31in 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.

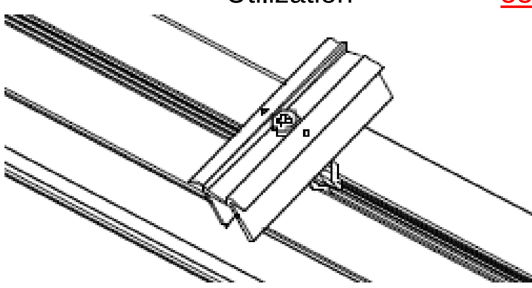
6. DESIGN OF JOINTS AND CONNECTIONS

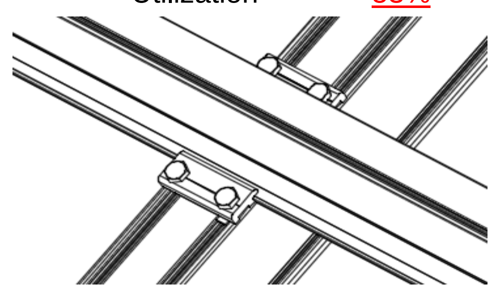
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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 =	0.665	k
Allowable Uplift =	1.214	k
Utilization =	55%	

Fastening of Purlins to Girders		
Maximum Uplifting Force =	2.302	k
Allowable Uplift =	4.357	k
Utilization =	53%	





6.2 Strut Connections

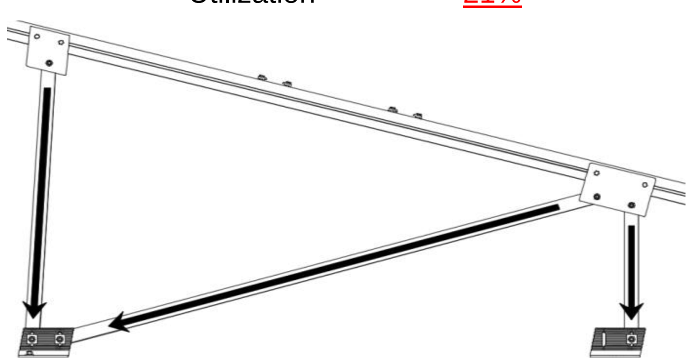
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Single M12 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are used.

Front Strut		
Maximum Axial Load =	3.863	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	52%	

Rear Strut		
Maximum Axial Load =	4.074	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	55%	

Diagonal Strut		
Maximum Axial Load =	1.522	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	21%	

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.

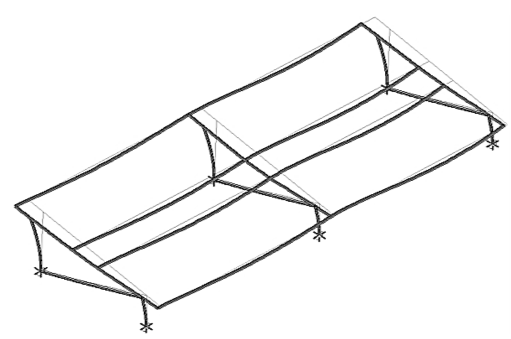
7. SEISMIC DESIGN

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} =	36.30	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.726	in
Max Drift, Δ_{MAX} =	0.031	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:

3.4.14

L_b = 117 in

J = 0.432

323.677

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

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= 27.5 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

φF_LSt= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in³

M_{max}St = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 117

J = 0.432

205.839

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

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= 28.7

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in³

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 = **<u>55x55</u>**

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

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 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

3.4.16.1

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

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

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 = 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

φF_L= (φccFcy)/(λ²)

φF_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)
$\varphi F_L = \varphi c[Bp\text{-}1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

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

$L_b =$ 48.30 in
J = 0.942
75.3767

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc\text{-}1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 30.6 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
$\varphi F_L = \varphi b[Bp\text{-}1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

Weak Axis:

3.4.14

$L_b =$ 48.3
J = 0.942
75.3767

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc\text{-}1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 30.6

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
$\varphi F_L = \varphi b[Bp\text{-}1.6Dp*b/t]$
$\varphi F_L =$ 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		**3.4.18**	
h/t =	24.5	h/t =	24.5
$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$		$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$	
S1 =	36.9	S1 =	36.9
m =	0.65	m =	0.65
C_0 =	27.5	C_0 =	27.5
Cc =	27.5	Cc =	27.5
$S2 = \frac{k_1 Bbr}{mDbr}$		$S2 = \frac{k_1 Bbr}{mDbr}$	
S2 =	77.3	S2 =	77.3
φF_L =	1.3φyFcy	φF_L =	1.3φyFcy
φF_L =	43.2 ksi	φF_L =	43.2 ksi
φF_LSt=	28.2 ksi	φF_LWk=	28.2 ksi
Ix =	279836 mm^4	Iy =	279836 mm^4
	0.672 in^4		0.672 in^4
y =	27.5 mm	x =	27.5 mm
Sx =	0.621 in^3	Sy =	0.621 in^3
M_{max}St =	1.460 k-ft	M_{max}Wk =	1.460 k-ft

Compression

3.4.7

λ = 1.11734

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.76536

φF_L = φcc(Bc-Dc*λ)

φF_L = 18.9268 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

$\varphi F_L =$ 18.93 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 19.48 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	-61.093	-61.093	0	0
2	M14	Y	-61.093	-61.093	0	0
3	M15	Y	-61.093	-61.093	0	0
4	M16	Y	-61.093	-61.093	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	-85.82	-85.82	0	0
2	M14	y	-85.82	-85.82	0	0
3	M15	y	-137.311	-137.311	0	0
4	M16	y	-137.311	-137.311	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	197.385	197.385	0	0
2	M14	y	152.759	152.759	0	0
3	M15	y	85.82	85.82	0	0
4	M16	y	85.82	85.82	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	387.862	2	1202.401	1	1.001	1	.004	1	0	1	0	1
2		min	-510.031	3	-1368.437	3	.037	15	0	15	0	1	0	1
3	N7	max	.031	9	1307.846	1	-.248	15	0	15	0	1	0	1
4		min	-.117	2	-387.608	3	-7.271	1	-.016	1	0	1	0	1
5	N15	max	.023	9	3862.515	1	0	1	0	11	0	1	0	1
6		min	-1.5	2	-1317.65	3	0	2	0	2	0	1	0	1
7	N16	max	1478.281	2	4006.177	1	0	1	0	14	0	1	0	1
8		min	-1612.549	3	-4476.812	3	0	3	0	2	0	1	0	1
9	N23	max	.031	9	1307.846	1	7.271	1	.016	1	0	1	0	1
10		min	-.117	2	-387.608	3	.248	15	0	15	0	1	0	1
11	N24	max	387.862	2	1202.401	1	-.037	15	0	15	0	1	0	1
12		min	-510.031	3	-1368.437	3	-1.001	1	-.004	1	0	1	0	1
13	Totals:	max	2252.272	2	12889.186	1	0	11						
14		min	-2633.429	3	-9306.553	3	0	2						

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	79.569	1	537.49	1	-4.335	15	0	3	.189	1	0	1
2			min	2.613	15	-702.488	3	-132.697	1	-.015	1	.006	15	0	3
3		2	max	79.569	1	376.323	1	-3.333	15	0	3	.062	1	.648	3
4			min	2.613	15	-494.261	3	-101.968	1	-.015	1	.002	15	-.495	1
5		3	max	79.569	1	215.156	1	-2.332	15	0	3	0	3	1.071	3
6			min	2.613	15	-286.035	3	-71.24	1	-.015	1	-.032	1	-.815	1
7		4	max	79.569	1	53.989	1	-1.33	15	0	3	-.002	12	1.268	3
8			min	2.613	15	-77.809	3	-40.511	1	-.015	1	-.092	1	-.961	1
9		5	max	79.569	1	130.418	3	-.328	15	0	3	-.004	12	1.239	3
10			min	2.613	15	-107.177	1	-9.782	1	-.015	1	-.12	1	-.932	1
11		6	max	79.569	1	338.644	3	20.947	1	0	3	-.004	15	.985	3
12			min	2.613	15	-268.344	1	.201	12	-.015	1	-.114	1	-.729	1
13		7	max	79.569	1	546.87	3	51.675	1	0	3	-.002	15	.506	3
14			min	2.613	15	-429.511	1	1.203	12	-.015	1	-.074	1	-.351	1
15		8	max	79.569	1	755.096	3	82.404	1	0	3	0	10	.202	1
16			min	2.613	15	-590.678	1	2.205	12	-.015	1	-.002	3	-.199	3
17		9	max	79.569	1	963.323	3	113.133	1	0	3	.104	1	.929	1
18			min	2.613	15	-751.845	1	3.207	12	-.015	1	.001	12	-1.13	3
19		10	max	79.569	1	913.012	1	-4.208	12	0	3	.243	1	1.831	1
20			min	2.613	15	-1171.549	3	-143.861	1	-.015	1	.005	12	-2.287	3
21		11	max	79.569	1	751.845	1	-3.207	12	.015	1	.104	1	.929	1
22			min	2.613	15	-963.323	3	-113.133	1	0	3	.001	12	-1.13	3
23		12	max	79.569	1	590.678	1	-2.205	12	.015	1	0	10	.202	1
24			min	2.613	15	-755.096	3	-82.404	1	0	3	-.002	3	-.199	3
25		13	max	79.569	1	429.511	1	-1.203	12	.015	1	-.002	15	.506	3
26			min	2.613	15	-546.87	3	-51.675	1	0	3	-.074	1	-.351	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	79.569	1	268.344	1	-.201	12	.015	1	-.004	15	.985	3
28			min	2.613	15	-338.644	3	-20.947	1	0	3	-.114	1	-.729	1
29		15	max	79.569	1	107.177	1	9.782	1	.015	1	-.004	12	1.239	3
30			min	2.613	15	-130.418	3	.328	15	0	3	-.12	1	-.932	1
31		16	max	79.569	1	77.809	3	40.511	1	.015	1	-.002	12	1.268	3
32			min	2.613	15	-53.989	1	1.33	15	0	3	-.092	1	-.961	1
33		17	max	79.569	1	286.035	3	71.24	1	.015	1	0	3	1.071	3
34			min	2.613	15	-215.156	1	2.332	15	0	3	-.032	1	-.815	1
35		18	max	79.569	1	494.261	3	101.968	1	.015	1	.062	1	.648	3
36			min	2.613	15	-376.323	1	3.333	15	0	3	.002	15	-.495	1
37		19	max	79.569	1	702.488	3	132.697	1	.015	1	.189	1	0	1
38			min	2.613	15	-537.49	1	4.335	15	0	3	.006	15	0	3
39	M14	1	max	37.677	1	571.431	1	-4.472	15	.009	3	.216	1	0	1
40			min	1.239	15	-556.751	3	-136.89	1	-.012	1	.007	15	0	3
41		2	max	37.677	1	410.264	1	-3.47	15	.009	3	.085	1	.517	3
42			min	1.239	15	-396.87	3	-106.161	1	-.012	1	.003	15	-.532	1
43		3	max	37.677	1	249.097	1	-2.468	15	.009	3	.001	3	.86	3
44			min	1.239	15	-236.988	3	-75.432	1	-.012	1	-.014	1	-.889	1
45		4	max	37.677	1	87.93	1	-1.466	15	.009	3	-.002	12	1.03	3
46			min	1.239	15	-77.107	3	-44.704	1	-.012	1	-.079	1	-1.071	1
47		5	max	37.677	1	82.775	3	-.465	15	.009	3	-.003	12	1.027	3
48			min	1.239	15	-73.236	1	-13.975	1	-.012	1	-.111	1	-1.079	1
49		6	max	37.677	1	242.656	3	16.754	1	.009	3	-.004	15	.851	3
50			min	1.239	15	-234.403	1	.027	3	-.012	1	-.109	1	-.913	1
51		7	max	37.677	1	402.538	3	47.482	1	.009	3	-.002	15	.501	3
52			min	1.239	15	-395.57	1	1.071	12	-.012	1	-.074	1	-.572	1
53		8	max	37.677	1	562.419	3	78.211	1	.009	3	0	10	0	15
54			min	1.239	15	-556.737	1	2.073	12	-.012	1	-.006	1	-.065	2
55		9	max	37.677	1	722.3	3	108.94	1	.009	3	.095	1	.635	1
56			min	1.239	15	-717.904	1	3.074	12	-.012	1	.001	12	-.717	3
57		10	max	37.677	1	879.071	1	-4.076	12	.009	3	.23	1	1.5	1
58			min	1.239	15	-882.182	3	-139.668	1	-.012	1	.005	12	-1.586	3
59		11	max	37.677	1	717.904	1	-3.074	12	.012	1	.095	1	.635	1
60			min	1.239	15	-722.3	3	-108.94	1	-.009	3	.001	12	-.717	3
61		12	max	37.677	1	556.737	1	-2.073	12	.012	1	0	10	0	15
62			min	1.239	15	-562.419	3	-78.211	1	-.009	3	-.006	1	-.065	2
63		13	max	37.677	1	395.57	1	-1.071	12	.012	1	-.002	15	.501	3
64			min	1.239	15	-402.538	3	-47.482	1	-.009	3	-.074	1	-.572	1
65		14	max	37.677	1	234.403	1	-.027	3	.012	1	-.004	15	.851	3
66			min	1.239	15	-242.656	3	-16.754	1	-.009	3	-.109	1	-.913	1
67		15	max	37.677	1	73.236	1	13.975	1	.012	1	-.003	12	1.027	3
68			min	1.239	15	-82.775	3	.465	15	-.009	3	-.111	1	-1.079	1
69		16	max	37.677	1	77.107	3	44.704	1	.012	1	-.002	12	1.03	3
70			min	1.239	15	-87.93	1	1.466	15	-.009	3	-.079	1	-1.071	1
71		17	max	37.677	1	236.988	3	75.432	1	.012	1	.001	3	.86	3
72			min	1.239	15	-249.097	1	2.468	15	-.009	3	-.014	1	-.889	1
73		18	max	37.677	1	396.87	3	106.161	1	.012	1	.085	1	.517	3
74			min	1.239	15	-410.264	1	3.47	15	-.009	3	.003	15	-.532	1
75		19	max	37.677	1	556.751	3	136.89	1	.012	1	.216	1	0	1
76			min	1.239	15	-571.431	1	4.472	15	-.009	3	.007	15	0	3
77	M15	1	max	-1.3	15	677.556	2	-4.471	15	.013	1	.216	1	0	2
78			min	-39.476	1	-312.282	3	-136.877	1	-.008	3	.007	15	0	3
79		2	max	-1.3	15	484.443	2	-3.469	15	.013	1	.084	1	.291	3
80			min	-39.476	1	-224.918	3	-106.149	1	-.008	3	.003	15	-.629	2
81		3	max	-1.3	15	291.331	2	-2.467	15	.013	1	.001	3	.487	3
82			min	-39.476	1	-137.554	3	-75.42	1	-.008	3	-.014	1	-1.05	2
83		4	max	-1.3	15	98.395	1	-1.466	15	.013	1	-.002	12	.589	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	-39.476	1	-50.19	3	-44.691	1	-.008	3	-.079	1	-1.261	2
85		5	max	-1.3	15	37.174	3	-.464	15	.013	1	-.003	12	.596	3
86			min	-39.476	1	-94.893	2	-13.963	1	-.008	3	-.111	1	-1.262	2
87		6	max	-1.3	15	124.539	3	16.766	1	.013	1	-.004	15	.508	3
88			min	-39.476	1	-288.006	2	.088	3	-.008	3	-.109	1	-1.055	2
89		7	max	-1.3	15	211.903	3	47.495	1	.013	1	-.002	15	.326	3
90			min	-39.476	1	-481.118	2	1.108	12	-.008	3	-.074	1	-.64	1
91		8	max	-1.3	15	299.267	3	78.223	1	.013	1	0	10	.049	3
92			min	-39.476	1	-674.23	2	2.109	12	-.008	3	-.006	1	-.029	1
93		9	max	-1.3	15	386.631	3	108.952	1	.013	1	.095	1	.822	2
94			min	-39.476	1	-867.342	2	3.111	12	-.008	3	.001	12	-.322	3
95		10	max	-1.3	15	1060.455	2	-4.113	12	.013	1	.23	1	1.867	2
96			min	-39.476	1	-473.995	3	-139.681	1	-.012	2	.005	12	-.788	3
97		11	max	-1.3	15	867.342	2	-3.111	12	.008	3	.095	1	.822	2
98			min	-39.476	1	-386.631	3	-108.952	1	-.013	1	.001	12	-.322	3
99		12	max	-1.3	15	674.23	2	-2.109	12	.008	3	0	10	.049	3
100			min	-39.476	1	-299.267	3	-78.223	1	-.013	1	-.006	1	-.029	1
101		13	max	-1.3	15	481.118	2	-1.108	12	.008	3	-.002	15	.326	3
102			min	-39.476	1	-211.903	3	-47.495	1	-.013	1	-.074	1	-.64	1
103		14	max	-1.3	15	288.006	2	-.088	3	.008	3	-.004	15	.508	3
104			min	-39.476	1	-124.539	3	-16.766	1	-.013	1	-.109	1	-1.055	2
105		15	max	-1.3	15	94.893	2	13.963	1	.008	3	-.003	12	.596	3
106			min	-39.476	1	-37.174	3	.464	15	-.013	1	-.111	1	-1.262	2
107		16	max	-1.3	15	50.19	3	44.691	1	.008	3	-.002	12	.589	3
108			min	-39.476	1	-98.395	1	1.466	15	-.013	1	-.079	1	-1.261	2
109		17	max	-1.3	15	137.554	3	75.42	1	.008	3	.001	3	.487	3
110			min	-39.476	1	-291.331	2	2.467	15	-.013	1	-.014	1	-1.05	2
111		18	max	-1.3	15	224.918	3	106.149	1	.008	3	.084	1	.291	3
112			min	-39.476	1	-484.443	2	3.469	15	-.013	1	.003	15	-.629	2
113		19	max	-1.3	15	312.282	3	136.877	1	.008	3	.216	1	0	2
114			min	-39.476	1	-677.556	2	4.471	15	-.013	1	.007	15	0	3
115	M16	1	max	-2.763	15	646.673	2	-4.34	15	.013	1	.19	1	0	2
116			min	-84.04	1	-290.057	3	-132.892	1	-.011	3	.006	15	0	3
117		2	max	-2.763	15	453.56	2	-3.338	15	.013	1	.063	1	.267	3
118			min	-84.04	1	-202.693	3	-102.163	1	-.011	3	.002	15	-.596	2
119		3	max	-2.763	15	260.448	2	-2.336	15	.013	1	0	3	.439	3
120			min	-84.04	1	-115.329	3	-71.434	1	-.011	3	-.031	1	-.983	2
121		4	max	-2.763	15	67.336	2	-1.334	15	.013	1	-.002	12	.517	3
122			min	-84.04	1	-27.965	3	-40.706	1	-.011	3	-.092	1	-1.16	2
123		5	max	-2.763	15	59.4	3	-.332	15	.013	1	-.004	12	.5	3
124			min	-84.04	1	-125.776	2	-9.977	1	-.011	3	-.119	1	-1.129	2
125		6	max	-2.763	15	146.764	3	20.752	1	.013	1	-.004	15	.388	3
126			min	-84.04	1	-318.889	2	.324	12	-.011	3	-.114	1	-.888	2
127		7	max	-2.763	15	234.128	3	51.481	1	.013	1	-.002	15	.182	3
128			min	-84.04	1	-512.001	2	1.325	12	-.011	3	-.074	1	-.438	2
129		8	max	-2.763	15	321.492	3	82.209	1	.013	1	0	10	.224	1
130			min	-84.04	1	-705.113	2	2.327	12	-.011	3	-.002	1	-.119	3
131		9	max	-2.763	15	408.856	3	112.938	1	.013	1	.104	1	1.09	2
132			min	-84.04	1	-898.225	2	3.329	12	-.011	3	.002	12	-.515	3
133		10	max	-2.763	15	1091.338	2	-4.33	12	.013	1	.243	1	2.168	2
134			min	-84.04	1	-496.221	3	-143.667	1	-.011	3	.006	12	-1.005	3
135		11	max	-2.763	15	898.225	2	-3.329	12	.011	3	.104	1	1.09	2
136			min	-84.04	1	-408.856	3	-112.938	1	-.013	1	.002	12	-.515	3
137		12	max	-2.763	15	705.113	2	-2.327	12	.011	3	0	10	.224	1
138			min	-84.04	1	-321.492	3	-82.209	1	-.013	1	-.002	1	-.119	3
139		13	max	-2.763	15	512.001	2	-1.325	12	.011	3	-.002	15	.182	3
140			min	-84.04	1	-234.128	3	-51.481	1	-.013	1	-.074	1	-.438	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	-2.763	15	318.889	2	-.324	12	.011	3	-.004	15	.388	3
142			min	-84.04	1	-146.764	3	-20.752	1	-.013	1	-.114	1	-.888	2
143		15	max	-2.763	15	125.776	2	9.977	1	.011	3	-.004	12	.5	3
144			min	-84.04	1	-59.4	3	.332	15	-.013	1	-.119	1	-1.129	2
145		16	max	-2.763	15	27.965	3	40.706	1	.011	3	-.002	12	.517	3
146			min	-84.04	1	-67.336	2	1.334	15	-.013	1	-.092	1	-1.16	2
147		17	max	-2.763	15	115.329	3	71.434	1	.011	3	0	3	.439	3
148			min	-84.04	1	-260.448	2	2.336	15	-.013	1	-.031	1	-.983	2
149		18	max	-2.763	15	202.693	3	102.163	1	.011	3	.063	1	.267	3
150			min	-84.04	1	-453.56	2	3.338	15	-.013	1	.002	15	-.596	2
151		19	max	-2.763	15	290.057	3	132.892	1	.011	3	.19	1	0	2
152			min	-84.04	1	-646.673	2	4.34	15	-.013	1	.006	15	0	3
153	M2	1	max	1174.445	1	2.28	4	1.133	1	0	3	0	3	0	1
154			min	-1246.551	3	.537	15	.037	15	0	1	0	1	0	1
155		2	max	1174.773	1	2.265	4	1.133	1	0	3	0	1	0	15
156			min	-1246.304	3	.534	15	.037	15	0	1	0	15	0	4
157		3	max	1175.102	1	2.25	4	1.133	1	0	3	0	1	0	15
158			min	-1246.058	3	.53	15	.037	15	0	1	0	15	-.001	4
159		4	max	1175.43	1	2.235	4	1.133	1	0	3	0	1	0	15
160			min	-1245.812	3	.526	15	.037	15	0	1	0	15	-.002	4
161		5	max	1175.759	1	2.219	4	1.133	1	0	3	0	1	0	15
162			min	-1245.565	3	.523	15	.037	15	0	1	0	15	-.002	4
163		6	max	1176.087	1	2.204	4	1.133	1	0	3	.001	1	0	15
164			min	-1245.319	3	.519	15	.037	15	0	1	0	15	-.002	4
165		7	max	1176.416	1	2.189	4	1.133	1	0	3	.001	1	0	15
166			min	-1245.073	3	.516	15	.037	15	0	1	0	15	-.003	4
167		8	max	1176.744	1	2.174	4	1.133	1	0	3	.002	1	0	15
168			min	-1244.826	3	.512	15	.037	15	0	1	0	15	-.003	4
169		9	max	1177.072	1	2.158	4	1.133	1	0	3	.002	1	0	15
170			min	-1244.58	3	.509	15	.037	15	0	1	0	15	-.004	4
171		10	max	1177.401	1	2.143	4	1.133	1	0	3	.002	1	-.001	15
172			min	-1244.334	3	.505	15	.037	15	0	1	0	15	-.004	4
173		11	max	1177.729	1	2.128	4	1.133	1	0	3	.002	1	-.001	15
174			min	-1244.087	3	.501	15	.037	15	0	1	0	15	-.005	4
175		12	max	1178.058	1	2.113	4	1.133	1	0	3	.003	1	-.001	15
176			min	-1243.841	3	.498	15	.037	15	0	1	0	15	-.005	4
177		13	max	1178.386	1	2.097	4	1.133	1	0	3	.003	1	-.001	15
178			min	-1243.595	3	.494	15	.037	15	0	1	0	15	-.006	4
179		14	max	1178.715	1	2.082	4	1.133	1	0	3	.003	1	-.001	15
180			min	-1243.348	3	.491	15	.037	15	0	1	0	15	-.006	4
181		15	max	1179.043	1	2.067	4	1.133	1	0	3	.003	1	-.002	15
182			min	-1243.102	3	.487	15	.037	15	0	1	0	15	-.007	4
183		16	max	1179.371	1	2.052	4	1.133	1	0	3	.004	1	-.002	15
184			min	-1242.856	3	.483	15	.037	15	0	1	0	15	-.007	4
185		17	max	1179.7	1	2.036	4	1.133	1	0	3	.004	1	-.002	15
186			min	-1242.609	3	.48	15	.037	15	0	1	0	15	-.008	4
187		18	max	1180.028	1	2.021	4	1.133	1	0	3	.004	1	-.002	15
188			min	-1242.363	3	.476	15	.037	15	0	1	0	15	-.008	4
189		19	max	1180.357	1	2.006	4	1.133	1	0	3	.005	1	-.002	15
190			min	-1242.117	3	.473	15	.037	15	0	1	0	15	-.009	4
191	M3	1	max	364.107	2	8.078	4	.015	1	0	3	0	1	.009	4
192			min	-482.703	3	1.899	15	0	15	0	1	0	15	.002	15
193		2	max	363.936	2	7.305	4	.015	1	0	3	0	1	.005	4
194			min	-482.831	3	1.718	15	0	15	0	1	0	15	.001	12
195		3	max	363.766	2	6.533	4	.015	1	0	3	0	1	.003	2
196			min	-482.959	3	1.536	15	0	15	0	1	0	15	0	3
197		4	max	363.596	2	5.761	4	.015	1	0	3	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	-483.086	3	1.355	15	0	15	0	1	0	15	-.001	3
199		5	max	363.425	2	4.988	4	.015	1	0	3	0	1	0	15
200			min	-483.214	3	1.173	15	0	15	0	1	0	15	-.003	3
201		6	max	363.255	2	4.216	4	.015	1	0	3	0	1	-.001	15
202			min	-483.342	3	.992	15	0	15	0	1	0	15	-.004	4
203		7	max	363.085	2	3.443	4	.015	1	0	3	0	1	-.001	15
204			min	-483.47	3	.81	15	0	15	0	1	0	15	-.006	4
205		8	max	362.914	2	2.671	4	.015	1	0	3	0	1	-.002	15
206			min	-483.597	3	.628	15	0	15	0	1	0	15	-.007	4
207		9	max	362.744	2	1.898	4	.015	1	0	3	0	1	-.002	15
208			min	-483.725	3	.447	15	0	15	0	1	0	15	-.008	4
209		10	max	362.574	2	1.126	4	.015	1	0	3	0	1	-.002	15
210			min	-483.853	3	.265	15	0	15	0	1	0	15	-.009	4
211		11	max	362.403	2	.43	2	.015	1	0	3	0	1	-.002	15
212			min	-483.981	3	-.006	3	0	15	0	1	0	15	-.009	4
213		12	max	362.233	2	-.098	15	.015	1	0	3	0	1	-.002	15
214			min	-484.108	3	-.458	3	0	15	0	1	0	15	-.009	4
215		13	max	362.063	2	-.279	15	.015	1	0	3	0	1	-.002	15
216			min	-484.236	3	-1.191	4	0	15	0	1	0	15	-.009	4
217		14	max	361.892	2	-.461	15	.015	1	0	3	0	1	-.002	15
218			min	-484.364	3	-1.964	4	0	15	0	1	0	15	-.008	4
219		15	max	361.722	2	-.643	15	.015	1	0	3	0	1	-.002	15
220			min	-484.492	3	-2.736	4	0	15	0	1	0	15	-.007	4
221		16	max	361.551	2	-.824	15	.015	1	0	3	0	1	-.001	15
222			min	-484.619	3	-3.509	4	0	15	0	1	0	15	-.006	4
223		17	max	361.381	2	-1.006	15	.015	1	0	3	0	1	-.001	15
224			min	-484.747	3	-4.281	4	0	15	0	1	0	15	-.004	4
225		18	max	361.211	2	-1.187	15	.015	1	0	3	0	1	0	15
226			min	-484.875	3	-5.053	4	0	15	0	1	0	15	-.002	4
227		19	max	361.04	2	-1.369	15	.015	1	0	3	0	1	0	1
228			min	-485.003	3	-5.826	4	0	15	0	1	0	15	0	1
229	M4	1	max	1304.78	1	0	1	-.248	15	0	1	0	1	0	1
230			min	-389.908	3	0	1	-7.579	1	0	1	0	10	0	1
231		2	max	1304.951	1	0	1	-.248	15	0	1	0	12	0	1
232			min	-389.78	3	0	1	-7.579	1	0	1	0	1	0	1
233		3	max	1305.121	1	0	1	-.248	15	0	1	0	15	0	1
234			min	-389.652	3	0	1	-7.579	1	0	1	-.002	1	0	1
235		4	max	1305.291	1	0	1	-.248	15	0	1	0	15	0	1
236			min	-389.525	3	0	1	-7.579	1	0	1	-.002	1	0	1
237		5	max	1305.462	1	0	1	-.248	15	0	1	0	15	0	1
238			min	-389.397	3	0	1	-7.579	1	0	1	-.003	1	0	1
239		6	max	1305.632	1	0	1	-.248	15	0	1	0	15	0	1
240			min	-389.269	3	0	1	-7.579	1	0	1	-.004	1	0	1
241		7	max	1305.802	1	0	1	-.248	15	0	1	0	15	0	1
242			min	-389.141	3	0	1	-7.579	1	0	1	-.005	1	0	1
243		8	max	1305.973	1	0	1	-.248	15	0	1	0	15	0	1
244			min	-389.014	3	0	1	-7.579	1	0	1	-.006	1	0	1
245		9	max	1306.143	1	0	1	-.248	15	0	1	0	15	0	1
246			min	-388.886	3	0	1	-7.579	1	0	1	-.007	1	0	1
247		10	max	1306.313	1	0	1	-.248	15	0	1	0	15	0	1
248			min	-388.758	3	0	1	-7.579	1	0	1	-.008	1	0	1
249		11	max	1306.484	1	0	1	-.248	15	0	1	0	15	0	1
250			min	-388.63	3	0	1	-7.579	1	0	1	-.009	1	0	1
251		12	max	1306.654	1	0	1	-.248	15	0	1	0	15	0	1
252			min	-388.502	3	0	1	-7.579	1	0	1	-.009	1	0	1
253		13	max	1306.824	1	0	1	-.248	15	0	1	0	15	0	1
254			min	-388.375	3	0	1	-7.579	1	0	1	-.01	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	1306.995	1	0	1	-.248	15	0	1	0	15	0	1
256			min	-388.247	3	0	1	-7.579	1	0	1	-.011	1	0	1
257		15	max	1307.165	1	0	1	-.248	15	0	1	0	15	0	1
258			min	-388.119	3	0	1	-7.579	1	0	1	-.012	1	0	1
259		16	max	1307.335	1	0	1	-.248	15	0	1	0	15	0	1
260			min	-387.991	3	0	1	-7.579	1	0	1	-.013	1	0	1
261		17	max	1307.506	1	0	1	-.248	15	0	1	0	15	0	1
262			min	-387.864	3	0	1	-7.579	1	0	1	-.014	1	0	1
263		18	max	1307.676	1	0	1	-.248	15	0	1	0	15	0	1
264			min	-387.736	3	0	1	-7.579	1	0	1	-.015	1	0	1
265		19	max	1307.846	1	0	1	-.248	15	0	1	0	15	0	1
266			min	-387.608	3	0	1	-7.579	1	0	1	-.016	1	0	1
267	M6	1	max	3773.857	1	2.86	2	0	1	0	1	0	1	0	1
268			min	-4074.007	3	.031	3	0	1	0	1	0	1	0	1
269		2	max	3774.185	1	2.849	2	0	1	0	1	0	1	0	3
270			min	-4073.761	3	.022	3	0	1	0	1	0	1	0	2
271		3	max	3774.514	1	2.837	2	0	1	0	1	0	1	0	3
272			min	-4073.515	3	.013	3	0	1	0	1	0	1	-.001	2
273		4	max	3774.842	1	2.825	2	0	1	0	1	0	1	0	3
274			min	-4073.268	3	.004	3	0	1	0	1	0	1	-.002	2
275		5	max	3775.171	1	2.813	2	0	1	0	1	0	1	0	3
276			min	-4073.022	3	-.005	3	0	1	0	1	0	1	-.003	2
277		6	max	3775.499	1	2.801	2	0	1	0	1	0	1	0	3
278			min	-4072.776	3	-.014	3	0	1	0	1	0	1	-.003	2
279		7	max	3775.828	1	2.789	2	0	1	0	1	0	1	0	3
280			min	-4072.529	3	-.023	3	0	1	0	1	0	1	-.004	2
281		8	max	3776.156	1	2.777	2	0	1	0	1	0	1	0	3
282			min	-4072.283	3	-.032	3	0	1	0	1	0	1	-.004	2
283		9	max	3776.484	1	2.765	2	0	1	0	1	0	1	0	3
284			min	-4072.037	3	-.041	3	0	1	0	1	0	1	-.005	2
285		10	max	3776.813	1	2.753	2	0	1	0	1	0	1	0	3
286			min	-4071.79	3	-.05	3	0	1	0	1	0	1	-.006	2
287		11	max	3777.141	1	2.742	2	0	1	0	1	0	1	0	3
288			min	-4071.544	3	-.059	3	0	1	0	1	0	1	-.006	2
289		12	max	3777.47	1	2.73	2	0	1	0	1	0	1	0	3
290			min	-4071.298	3	-.067	3	0	1	0	1	0	1	-.007	2
291		13	max	3777.798	1	2.718	2	0	1	0	1	0	1	0	3
292			min	-4071.051	3	-.076	3	0	1	0	1	0	1	-.007	2
293		14	max	3778.127	1	2.706	2	0	1	0	1	0	1	0	3
294			min	-4070.805	3	-.085	3	0	1	0	1	0	1	-.008	2
295		15	max	3778.455	1	2.694	2	0	1	0	1	0	1	0	3
296			min	-4070.559	3	-.094	3	0	1	0	1	0	1	-.009	2
297		16	max	3778.783	1	2.682	2	0	1	0	1	0	1	0	3
298			min	-4070.312	3	-.103	3	0	1	0	1	0	1	-.009	2
299		17	max	3779.112	1	2.67	2	0	1	0	1	0	1	0	3
300			min	-4070.066	3	-.112	3	0	1	0	1	0	1	-.01	2
301		18	max	3779.44	1	2.658	2	0	1	0	1	0	1	0	3
302			min	-4069.82	3	-.121	3	0	1	0	1	0	1	-.01	2
303		19	max	3779.769	1	2.646	2	0	1	0	1	0	1	0	3
304			min	-4069.573	3	-.13	3	0	1	0	1	0	1	-.011	2
305	M7	1	max	1412.08	2	8.117	4	0	1	0	1	0	1	.011	2
306			min	-1519.755	3	1.905	15	0	1	0	1	0	1	0	3
307		2	max	1411.91	2	7.344	4	0	1	0	1	0	1	.008	2
308			min	-1519.883	3	1.723	15	0	1	0	1	0	1	-.002	3
309		3	max	1411.74	2	6.572	4	0	1	0	1	0	1	.006	2
310			min	-1520.011	3	1.541	15	0	1	0	1	0	1	-.003	3
311		4	max	1411.569	2	5.799	4	0	1	0	1	0	1	.003	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	-1520.138	3	1.36	15	0	1	0	1	0	1	-.004	3
313		5	max	1411.399	2	5.027	4	0	1	0	1	0	1	.001	2
314			min	-1520.266	3	1.178	15	0	1	0	1	0	1	-.005	3
315		6	max	1411.228	2	4.255	4	0	1	0	1	0	1	0	2
316			min	-1520.394	3	.997	15	0	1	0	1	0	1	-.006	3
317		7	max	1411.058	2	3.482	4	0	1	0	1	0	1	-.001	15
318			min	-1520.522	3	.815	15	0	1	0	1	0	1	-.007	3
319		8	max	1410.888	2	2.71	4	0	1	0	1	0	1	-.002	15
320			min	-1520.65	3	.631	12	0	1	0	1	0	1	-.007	3
321		9	max	1410.717	2	2.049	2	0	1	0	1	0	1	-.002	15
322			min	-1520.777	3	.33	12	0	1	0	1	0	1	-.008	4
323		10	max	1410.547	2	1.447	2	0	1	0	1	0	1	-.002	15
324			min	-1520.905	3	-.026	3	0	1	0	1	0	1	-.009	4
325		11	max	1410.377	2	.845	2	0	1	0	1	0	1	-.002	15
326			min	-1521.033	3	-.478	3	0	1	0	1	0	1	-.009	4
327		12	max	1410.206	2	.243	2	0	1	0	1	0	1	-.002	15
328			min	-1521.161	3	-.929	3	0	1	0	1	0	1	-.009	4
329		13	max	1410.036	2	-.274	15	0	1	0	1	0	1	-.002	15
330			min	-1521.288	3	-1.38	3	0	1	0	1	0	1	-.009	4
331		14	max	1409.866	2	-.456	15	0	1	0	1	0	1	-.002	15
332			min	-1521.416	3	-1.925	4	0	1	0	1	0	1	-.008	4
333		15	max	1409.695	2	-.637	15	0	1	0	1	0	1	-.002	15
334			min	-1521.544	3	-2.697	4	0	1	0	1	0	1	-.007	4
335		16	max	1409.525	2	-.819	15	0	1	0	1	0	1	-.001	15
336			min	-1521.672	3	-3.47	4	0	1	0	1	0	1	-.006	4
337		17	max	1409.355	2	-1.001	15	0	1	0	1	0	1	0	15
338			min	-1521.799	3	-4.242	4	0	1	0	1	0	1	-.004	4
339		18	max	1409.184	2	-1.182	15	0	1	0	1	0	1	0	15
340			min	-1521.927	3	-5.014	4	0	1	0	1	0	1	-.002	4
341		19	max	1409.014	2	-1.364	15	0	1	0	1	0	1	0	1
342			min	-1522.055	3	-5.787	4	0	1	0	1	0	1	0	1
343	M8	1	max	3859.448	1	0	1	0	1	0	1	0	1	0	1
344			min	-1319.95	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3859.619	1	0	1	0	1	0	1	0	1	0	1
346			min	-1319.822	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3859.789	1	0	1	0	1	0	1	0	1	0	1
348			min	-1319.694	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3859.959	1	0	1	0	1	0	1	0	1	0	1
350			min	-1319.566	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3860.13	1	0	1	0	1	0	1	0	1	0	1
352			min	-1319.439	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3860.3	1	0	1	0	1	0	1	0	1	0	1
354			min	-1319.311	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3860.47	1	0	1	0	1	0	1	0	1	0	1
356			min	-1319.183	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3860.641	1	0	1	0	1	0	1	0	1	0	1
358			min	-1319.055	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3860.811	1	0	1	0	1	0	1	0	1	0	1
360			min	-1318.928	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3860.981	1	0	1	0	1	0	1	0	1	0	1
362			min	-1318.8	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3861.152	1	0	1	0	1	0	1	0	1	0	1
364			min	-1318.672	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3861.322	1	0	1	0	1	0	1	0	1	0	1
366			min	-1318.544	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3861.493	1	0	1	0	1	0	1	0	1	0	1
368			min	-1318.417	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	3861.663	1	0	1	0	1	0	1	0	1	0	1
370			min	-1318.289	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3861.833	1	0	1	0	1	0	1	0	1	0	1
372			min	-1318.161	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3862.004	1	0	1	0	1	0	1	0	1	0	1
374			min	-1318.033	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3862.174	1	0	1	0	1	0	1	0	1	0	1
376			min	-1317.906	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3862.344	1	0	1	0	1	0	1	0	1	0	1
378			min	-1317.778	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3862.515	1	0	1	0	1	0	1	0	1	0	1
380			min	-1317.65	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1174.445	1	2.28	4	-.037	15	0	1	0	1	0	1
382			min	-1246.551	3	.537	15	-1.133	1	0	3	0	3	0	1
383		2	max	1174.773	1	2.265	4	-.037	15	0	1	0	15	0	15
384			min	-1246.304	3	.534	15	-1.133	1	0	3	0	1	0	4
385		3	max	1175.102	1	2.25	4	-.037	15	0	1	0	15	0	15
386			min	-1246.058	3	.53	15	-1.133	1	0	3	0	1	-.001	4
387		4	max	1175.43	1	2.235	4	-.037	15	0	1	0	15	0	15
388			min	-1245.812	3	.526	15	-1.133	1	0	3	0	1	-.002	4
389		5	max	1175.759	1	2.219	4	-.037	15	0	1	0	15	0	15
390			min	-1245.565	3	.523	15	-1.133	1	0	3	0	1	-.002	4
391		6	max	1176.087	1	2.204	4	-.037	15	0	1	0	15	0	15
392			min	-1245.319	3	.519	15	-1.133	1	0	3	-.001	1	-.002	4
393		7	max	1176.416	1	2.189	4	-.037	15	0	1	0	15	0	15
394			min	-1245.073	3	.516	15	-1.133	1	0	3	-.001	1	-.003	4
395		8	max	1176.744	1	2.174	4	-.037	15	0	1	0	15	0	15
396			min	-1244.826	3	.512	15	-1.133	1	0	3	-.002	1	-.003	4
397		9	max	1177.072	1	2.158	4	-.037	15	0	1	0	15	0	15
398			min	-1244.58	3	.509	15	-1.133	1	0	3	-.002	1	-.004	4
399		10	max	1177.401	1	2.143	4	-.037	15	0	1	0	15	-.001	15
400			min	-1244.334	3	.505	15	-1.133	1	0	3	-.002	1	-.004	4
401		11	max	1177.729	1	2.128	4	-.037	15	0	1	0	15	-.001	15
402			min	-1244.087	3	.501	15	-1.133	1	0	3	-.002	1	-.005	4
403		12	max	1178.058	1	2.113	4	-.037	15	0	1	0	15	-.001	15
404			min	-1243.841	3	.498	15	-1.133	1	0	3	-.003	1	-.005	4
405		13	max	1178.386	1	2.097	4	-.037	15	0	1	0	15	-.001	15
406			min	-1243.595	3	.494	15	-1.133	1	0	3	-.003	1	-.006	4
407		14	max	1178.715	1	2.082	4	-.037	15	0	1	0	15	-.001	15
408			min	-1243.348	3	.491	15	-1.133	1	0	3	-.003	1	-.006	4
409		15	max	1179.043	1	2.067	4	-.037	15	0	1	0	15	-.002	15
410			min	-1243.102	3	.487	15	-1.133	1	0	3	-.003	1	-.007	4
411		16	max	1179.371	1	2.052	4	-.037	15	0	1	0	15	-.002	15
412			min	-1242.856	3	.483	15	-1.133	1	0	3	-.004	1	-.007	4
413		17	max	1179.7	1	2.036	4	-.037	15	0	1	0	15	-.002	15
414			min	-1242.609	3	.48	15	-1.133	1	0	3	-.004	1	-.008	4
415		18	max	1180.028	1	2.021	4	-.037	15	0	1	0	15	-.002	15
416			min	-1242.363	3	.476	15	-1.133	1	0	3	-.004	1	-.008	4
417		19	max	1180.357	1	2.006	4	-.037	15	0	1	0	15	-.002	15
418			min	-1242.117	3	.473	15	-1.133	1	0	3	-.005	1	-.009	4
419	M11	1	max	364.107	2	8.078	4	0	15	0	1	0	15	.009	4
420			min	-482.703	3	1.899	15	-.015	1	0	3	0	1	.002	15
421		2	max	363.936	2	7.305	4	0	15	0	1	0	15	.005	4
422			min	-482.831	3	1.718	15	-.015	1	0	3	0	1	.001	12
423		3	max	363.766	2	6.533	4	0	15	0	1	0	15	.003	2
424			min	-482.959	3	1.536	15	-.015	1	0	3	0	1	0	3
425		4	max	363.596	2	5.761	4	0	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	-483.086	3	1.355	15	-.015	1	0	3	0	1	-.001	3
427		5	max	363.425	2	4.988	4	0	15	0	1	0	15	0	15
428			min	-483.214	3	1.173	15	-.015	1	0	3	0	1	-.003	3
429		6	max	363.255	2	4.216	4	0	15	0	1	0	15	-.001	15
430			min	-483.342	3	.992	15	-.015	1	0	3	0	1	-.004	4
431		7	max	363.085	2	3.443	4	0	15	0	1	0	15	-.001	15
432			min	-483.47	3	.81	15	-.015	1	0	3	0	1	-.006	4
433		8	max	362.914	2	2.671	4	0	15	0	1	0	15	-.002	15
434			min	-483.597	3	.628	15	-.015	1	0	3	0	1	-.007	4
435		9	max	362.744	2	1.898	4	0	15	0	1	0	15	-.002	15
436			min	-483.725	3	.447	15	-.015	1	0	3	0	1	-.008	4
437		10	max	362.574	2	1.126	4	0	15	0	1	0	15	-.002	15
438			min	-483.853	3	.265	15	-.015	1	0	3	0	1	-.009	4
439		11	max	362.403	2	.43	2	0	15	0	1	0	15	-.002	15
440			min	-483.981	3	-.006	3	-.015	1	0	3	0	1	-.009	4
441		12	max	362.233	2	-.098	15	0	15	0	1	0	15	-.002	15
442			min	-484.108	3	-.458	3	-.015	1	0	3	0	1	-.009	4
443		13	max	362.063	2	-.279	15	0	15	0	1	0	15	-.002	15
444			min	-484.236	3	-1.191	4	-.015	1	0	3	0	1	-.009	4
445		14	max	361.892	2	-.461	15	0	15	0	1	0	15	-.002	15
446			min	-484.364	3	-1.964	4	-.015	1	0	3	0	1	-.008	4
447		15	max	361.722	2	-.643	15	0	15	0	1	0	15	-.002	15
448			min	-484.492	3	-2.736	4	-.015	1	0	3	0	1	-.007	4
449		16	max	361.551	2	-.824	15	0	15	0	1	0	15	-.001	15
450			min	-484.619	3	-3.509	4	-.015	1	0	3	0	1	-.006	4
451		17	max	361.381	2	-1.006	15	0	15	0	1	0	15	-.001	15
452			min	-484.747	3	-4.281	4	-.015	1	0	3	0	1	-.004	4
453		18	max	361.211	2	-1.187	15	0	15	0	1	0	15	0	15
454			min	-484.875	3	-5.053	4	-.015	1	0	3	0	1	-.002	4
455		19	max	361.04	2	-1.369	15	0	15	0	1	0	15	0	1
456			min	-485.003	3	-5.826	4	-.015	1	0	3	0	1	0	1
457	M12	1	max	1304.78	1	0	1	7.579	1	0	1	0	10	0	1
458			min	-389.908	3	0	1	.248	15	0	1	0	1	0	1
459		2	max	1304.951	1	0	1	7.579	1	0	1	0	1	0	1
460			min	-389.78	3	0	1	.248	15	0	1	0	12	0	1
461		3	max	1305.121	1	0	1	7.579	1	0	1	.002	1	0	1
462			min	-389.652	3	0	1	.248	15	0	1	0	15	0	1
463		4	max	1305.291	1	0	1	7.579	1	0	1	.002	1	0	1
464			min	-389.525	3	0	1	.248	15	0	1	0	15	0	1
465		5	max	1305.462	1	0	1	7.579	1	0	1	.003	1	0	1
466			min	-389.397	3	0	1	.248	15	0	1	0	15	0	1
467		6	max	1305.632	1	0	1	7.579	1	0	1	.004	1	0	1
468			min	-389.269	3	0	1	.248	15	0	1	0	15	0	1
469		7	max	1305.802	1	0	1	7.579	1	0	1	.005	1	0	1
470			min	-389.141	3	0	1	.248	15	0	1	0	15	0	1
471		8	max	1305.973	1	0	1	7.579	1	0	1	.006	1	0	1
472			min	-389.014	3	0	1	.248	15	0	1	0	15	0	1
473		9	max	1306.143	1	0	1	7.579	1	0	1	.007	1	0	1
474			min	-388.886	3	0	1	.248	15	0	1	0	15	0	1
475		10	max	1306.313	1	0	1	7.579	1	0	1	.008	1	0	1
476			min	-388.758	3	0	1	.248	15	0	1	0	15	0	1
477		11	max	1306.484	1	0	1	7.579	1	0	1	.009	1	0	1
478			min	-388.63	3	0	1	.248	15	0	1	0	15	0	1
479		12	max	1306.654	1	0	1	7.579	1	0	1	.009	1	0	1
480			min	-388.502	3	0	1	.248	15	0	1	0	15	0	1
481		13	max	1306.824	1	0	1	7.579	1	0	1	.01	1	0	1
482			min	-388.375	3	0	1	.248	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	1306.995	1	0	1	7.579	1	0	1	.011	1	0	1
484			min	-388.247	3	0	1	.248	15	0	1	0	15	0	1
485		15	max	1307.165	1	0	1	7.579	1	0	1	.012	1	0	1
486			min	-388.119	3	0	1	.248	15	0	1	0	15	0	1
487		16	max	1307.335	1	0	1	7.579	1	0	1	.013	1	0	1
488			min	-387.991	3	0	1	.248	15	0	1	0	15	0	1
489		17	max	1307.506	1	0	1	7.579	1	0	1	.014	1	0	1
490			min	-387.864	3	0	1	.248	15	0	1	0	15	0	1
491		18	max	1307.676	1	0	1	7.579	1	0	1	.015	1	0	1
492			min	-387.736	3	0	1	.248	15	0	1	0	15	0	1
493		19	max	1307.846	1	0	1	7.579	1	0	1	.016	1	0	1
494			min	-387.608	3	0	1	.248	15	0	1	0	15	0	1
495	M1	1	max	132.7	1	702.469	3	-2.613	15	0	1	.189	1	0	3
496			min	4.335	15	-536.246	1	-79.496	1	0	3	.006	15	-.015	1
497		2	max	133.071	1	701.431	3	-2.613	15	0	1	.147	1	.269	1
498			min	4.447	15	-537.63	1	-79.496	1	0	3	.005	15	-.37	3
499		3	max	287.439	3	603.317	1	-2.576	15	0	3	.105	1	.539	1
500			min	-176.907	2	-516.187	3	-78.562	1	0	1	.003	15	-.725	3
501		4	max	287.717	3	601.933	1	-2.576	15	0	3	.064	1	.221	1
502			min	-176.536	2	-517.225	3	-78.562	1	0	1	.002	15	-.452	3
503		5	max	287.995	3	600.549	1	-2.576	15	0	3	.022	1	-.004	15
504			min	-176.166	2	-518.262	3	-78.562	1	0	1	0	15	-.179	3
505		6	max	288.273	3	599.166	1	-2.576	15	0	3	0	15	.095	3
506			min	-175.795	2	-519.3	3	-78.562	1	0	1	-.019	1	-.413	1
507		7	max	288.551	3	597.782	1	-2.576	15	0	3	-.002	15	.369	3
508			min	-175.424	2	-520.338	3	-78.562	1	0	1	-.061	1	-.729	1
509		8	max	288.829	3	596.399	1	-2.576	15	0	3	-.003	15	.644	3
510			min	-175.053	2	-521.375	3	-78.562	1	0	1	-.102	1	-1.044	1
511		9	max	296.592	3	47.313	2	-3.816	15	0	9	.061	1	.751	3
512			min	-122.18	2	.42	15	-116.263	1	0	3	.002	15	-1.19	1
513		10	max	296.87	3	45.93	2	-3.816	15	0	9	0	15	.732	3
514			min	-121.809	2	.002	15	-116.263	1	0	3	0	1	-1.203	1
515		11	max	297.148	3	44.546	2	-3.816	15	0	9	-.002	15	.714	3
516			min	-121.439	2	-1.717	4	-116.263	1	0	3	-.062	1	-1.215	1
517		12	max	304.852	3	347.326	3	-2.515	15	0	2	.101	1	.623	3
518			min	-72.515	10	-646.424	1	-76.815	1	0	3	.003	15	-1.073	1
519		13	max	305.13	3	346.288	3	-2.515	15	0	2	.06	1	.44	3
520			min	-72.206	10	-647.808	1	-76.815	1	0	3	.002	15	-.732	1
521		14	max	305.408	3	345.251	3	-2.515	15	0	2	.02	1	.257	3
522			min	-71.897	10	-649.191	1	-76.815	1	0	3	0	15	-.39	1
523		15	max	305.686	3	344.213	3	-2.515	15	0	2	0	15	.075	3
524			min	-71.588	10	-650.575	1	-76.815	1	0	3	-.021	1	-.047	1
525		16	max	305.964	3	343.175	3	-2.515	15	0	2	-.002	15	.32	2
526			min	-71.279	10	-651.959	1	-76.815	1	0	3	-.061	1	-.106	3
527		17	max	306.242	3	342.137	3	-2.515	15	0	2	-.003	15	.658	2
528			min	-70.97	10	-653.342	1	-76.815	1	0	3	-.102	1	-.287	3
529		18	max	-4.452	15	648.461	2	-2.763	15	0	3	-.005	15	.331	2
530			min	-133.26	1	-289.06	3	-84.11	1	0	2	-.146	1	-.142	3
531		19	max	-4.34	15	647.078	2	-2.763	15	0	3	-.006	15	.011	3
532			min	-132.889	1	-290.097	3	-84.11	1	0	2	-.19	1	-.013	1
533	M5	1	max	287.716	1	2343.035	3	0	1	0	1	0	1	.03	1
534			min	8.417	12	-1818.817	1	0	1	0	1	0	1	-.002	3
535		2	max	288.087	1	2341.997	3	0	1	0	1	0	1	.99	1
536			min	8.602	12	-1820.2	1	0	1	0	1	0	1	-1.238	3
537		3	max	922.702	3	1833.293	1	0	1	0	1	0	1	1.907	1
538			min	-624.328	2	-1646.7	3	0	1	0	1	0	1	-2.425	3
539		4	max	922.98	3	1831.909	1	0	1	0	1	0	1	.94	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	-623.958	2	-1647.738	3	0	1	0	1	0	1	-1.556	3
541		5	max	923.258	3	1830.525	1	0	1	0	1	0	1	.016	9
542			min	-623.587	2	-1648.776	3	0	1	0	1	0	1	-.686	3
543		6	max	923.536	3	1829.142	1	0	1	0	1	0	1	.184	3
544			min	-623.216	2	-1649.813	3	0	1	0	1	0	1	-.992	1
545		7	max	923.815	3	1827.758	1	0	1	0	1	0	1	1.055	3
546			min	-622.845	2	-1650.851	3	0	1	0	1	0	1	-1.957	1
547		8	max	924.093	3	1826.374	1	0	1	0	1	0	1	1.926	3
548			min	-622.475	2	-1651.889	3	0	1	0	1	0	1	-2.921	1
549		9	max	936.445	3	158.091	2	0	1	0	1	0	1	2.215	3
550			min	-513.163	2	.418	15	0	1	0	1	0	1	-3.307	1
551		10	max	936.724	3	156.708	2	0	1	0	1	0	1	2.148	3
552			min	-512.792	2	0	15	0	1	0	1	0	1	-3.351	1
553		11	max	937.002	3	155.324	2	0	1	0	1	0	1	2.082	3
554			min	-512.421	2	-1.608	4	0	1	0	1	0	1	-3.393	1
555		12	max	949.475	3	1090.775	3	0	1	0	1	0	1	1.828	3
556			min	-403.149	2	-1992.677	1	0	1	0	1	0	1	-3.025	1
557		13	max	949.753	3	1089.738	3	0	1	0	1	0	1	1.253	3
558			min	-402.778	2	-1994.061	1	0	1	0	1	0	1	-1.973	1
559		14	max	950.031	3	1088.7	3	0	1	0	1	0	1	.678	3
560			min	-402.407	2	-1995.445	1	0	1	0	1	0	1	-.921	1
561		15	max	950.309	3	1087.662	3	0	1	0	1	0	1	.21	2
562			min	-402.036	2	-1996.828	1	0	1	0	1	0	1	-.004	13
563		16	max	950.587	3	1086.624	3	0	1	0	1	0	1	1.244	2
564			min	-401.666	2	-1998.212	1	0	1	0	1	0	1	-.47	3
565		17	max	950.865	3	1085.587	3	0	1	0	1	0	1	2.279	2
566			min	-401.295	2	-1999.595	1	0	1	0	1	0	1	-1.043	3
567		18	max	-8.846	12	2186.325	2	0	1	0	1	0	1	1.175	2
568			min	-287.709	1	-991.627	3	0	1	0	1	0	1	-.545	3
569		19	max	-8.661	12	2184.941	2	0	1	0	1	0	1	.026	1
570			min	-287.338	1	-992.665	3	0	1	0	1	0	1	-.021	3
571	M9	1	max	132.7	1	702.469	3	79.496	1	0	3	-.006	15	0	3
572			min	4.335	15	-536.246	1	2.613	15	0	1	-.189	1	-.015	1
573		2	max	133.071	1	701.431	3	79.496	1	0	3	-.005	15	.269	1
574			min	4.447	15	-537.63	1	2.613	15	0	1	-.147	1	-.37	3
575		3	max	287.439	3	603.317	1	78.562	1	0	1	-.003	15	.539	1
576			min	-176.907	2	-516.187	3	2.576	15	0	3	-.105	1	-.725	3
577		4	max	287.717	3	601.933	1	78.562	1	0	1	-.002	15	.221	1
578			min	-176.536	2	-517.225	3	2.576	15	0	3	-.064	1	-.452	3
579		5	max	287.995	3	600.549	1	78.562	1	0	1	0	15	-.004	15
580			min	-176.166	2	-518.262	3	2.576	15	0	3	-.022	1	-.179	3
581		6	max	288.273	3	599.166	1	78.562	1	0	1	.019	1	.095	3
582			min	-175.795	2	-519.3	3	2.576	15	0	3	0	15	-.413	1
583		7	max	288.551	3	597.782	1	78.562	1	0	1	.061	1	.369	3
584			min	-175.424	2	-520.338	3	2.576	15	0	3	.002	15	-.729	1
585		8	max	288.829	3	596.399	1	78.562	1	0	1	.102	1	.644	3
586			min	-175.053	2	-521.375	3	2.576	15	0	3	.003	15	-1.044	1
587		9	max	296.592	3	47.313	2	116.263	1	0	3	-.002	15	.751	3
588			min	-122.18	2	.42	15	3.816	15	0	9	-.061	1	-1.19	1
589		10	max	296.87	3	45.93	2	116.263	1	0	3	0	1	.732	3
590			min	-121.809	2	.002	15	3.816	15	0	9	0	15	-1.203	1
591		11	max	297.148	3	44.546	2	116.263	1	0	3	.062	1	.714	3
592			min	-121.439	2	-1.717	4	3.816	15	0	9	.002	15	-1.215	1
593		12	max	304.852	3	347.326	3	76.815	1	0	3	-.003	15	.623	3
594			min	-72.515	10	-646.424	1	2.515	15	0	2	-.101	1	-1.073	1
595		13	max	305.13	3	346.288	3	76.815	1	0	3	-.002	15	.44	3
596			min	-72.206	10	-647.808	1	2.515	15	0	2	-.06	1	-.732	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
597		14	max	305.408	3	345.251	3	76.815	1	0	3	0	15	.257	3
598			min	-71.897	10	-649.191	1	2.515	15	0	2	-.02	1	-.39	1
599		15	max	305.686	3	344.213	3	76.815	1	0	3	.021	1	.075	3
600			min	-71.588	10	-650.575	1	2.515	15	0	2	0	15	-.047	1
601		16	max	305.964	3	343.175	3	76.815	1	0	3	.061	1	.32	2
602			min	-71.279	10	-651.959	1	2.515	15	0	2	.002	15	-.106	3
603		17	max	306.242	3	342.137	3	76.815	1	0	3	.102	1	.658	2
604			min	-70.97	10	-653.342	1	2.515	15	0	2	.003	15	-.287	3
605		18	max	-4.452	15	648.461	2	84.11	1	0	2	.146	1	.331	2
606			min	-133.26	1	-289.06	3	2.763	15	0	3	.005	15	-.142	3
607		19	max	-4.34	15	647.078	2	84.11	1	0	2	.19	1	.011	3
608			min	-132.889	1	-290.097	3	2.763	15	0	3	.006	15	-.013	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	0	1	.122	1	.005	3	9.72e-3	1	NC	1	NC	1
2			min	0	15	-.025	3	-.002	2	-1.897e-3	3	NC	1	NC	1
3		2	max	0	1	.281	3	.029	1	1.113e-2	1	NC	5	NC	2
4			min	0	15	-.09	1	0	10	-1.977e-3	3	763.841	3	8440.101	1
5		3	max	0	1	.529	3	.069	1	1.255e-2	1	NC	5	NC	3
6			min	0	15	-.257	1	.002	15	-2.056e-3	3	422.327	3	3463.973	1
7		4	max	0	1	.679	3	.103	1	1.396e-2	1	NC	5	NC	3
8			min	0	15	-.349	1	.003	15	-2.136e-3	3	332.472	3	2295.777	1
9		5	max	0	1	.712	3	.121	1	1.537e-2	1	NC	5	NC	3
10			min	0	15	-.353	1	.004	15	-2.216e-3	3	317.407	3	1957.851	1
11		6	max	0	1	.632	3	.117	1	1.679e-2	1	NC	5	NC	3
12			min	0	15	-.272	1	.004	15	-2.296e-3	3	356.192	3	2030.683	1
13		7	max	0	1	.462	3	.091	1	1.82e-2	1	NC	5	NC	3
14			min	0	15	-.124	1	.003	15	-2.375e-3	3	480.837	3	2594.291	1
15		8	max	0	1	.246	3	.053	1	1.961e-2	1	NC	4	NC	2
16			min	0	15	.001	15	0	10	-2.455e-3	3	863.456	3	4519.326	1
17		9	max	0	1	.219	2	.017	3	2.103e-2	1	NC	4	NC	1
18			min	0	15	.005	15	-.005	10	-2.535e-3	3	2337.225	2	NC	1
19		10	max	0	1	.285	1	.016	3	2.244e-2	1	NC	3	NC	1
20			min	0	1	-.038	3	-.01	2	-2.615e-3	3	1437.703	1	NC	1
21		11	max	0	15	.219	2	.017	3	2.103e-2	1	NC	4	NC	1
22			min	0	1	.005	15	-.005	10	-2.535e-3	3	2337.225	2	NC	1
23		12	max	0	15	.246	3	.053	1	1.961e-2	1	NC	4	NC	2
24			min	0	1	.001	15	0	10	-2.455e-3	3	863.456	3	4519.326	1
25		13	max	0	15	.462	3	.091	1	1.82e-2	1	NC	5	NC	3
26			min	0	1	-.124	1	.003	15	-2.375e-3	3	480.837	3	2594.291	1
27		14	max	0	15	.632	3	.117	1	1.679e-2	1	NC	5	NC	3
28			min	0	1	-.272	1	.004	15	-2.296e-3	3	356.192	3	2030.683	1
29		15	max	0	15	.712	3	.121	1	1.537e-2	1	NC	5	NC	3
30			min	0	1	-.353	1	.004	15	-2.216e-3	3	317.407	3	1957.851	1
31		16	max	0	15	.679	3	.103	1	1.396e-2	1	NC	5	NC	3
32			min	0	1	-.349	1	.003	15	-2.136e-3	3	332.472	3	2295.777	1
33		17	max	0	15	.529	3	.069	1	1.255e-2	1	NC	5	NC	3
34			min	0	1	-.257	1	.002	15	-2.056e-3	3	422.327	3	3463.973	1
35		18	max	0	15	.281	3	.029	1	1.113e-2	1	NC	5	NC	2
36			min	0	1	-.09	1	0	10	-1.977e-3	3	763.841	3	8440.101	1
37		19	max	0	15	.122	1	.005	3	9.72e-3	1	NC	1	NC	1
38			min	0	1	-.025	3	-.002	2	-1.897e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.223	3	.005	3	6.015e-3	1	NC	1	NC	1
40			min	0	15	-.391	1	-.002	2	-4.003e-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	.529	3	.02	1	7.207e-3	1	NC	5	NC	1
42			min	0	15	-.741	1	0	10	-4.862e-3	3	668.685	1	NC	1
43		3	max	0	1	.788	3	.055	1	8.398e-3	1	NC	5	NC	2
44			min	0	15	-1.042	1	.002	15	-5.721e-3	3	359.053	1	4340.168	1
45		4	max	0	1	.968	3	.088	1	9.59e-3	1	NC	15	NC	3
46			min	0	15	-1.263	1	.003	15	-6.58e-3	3	268.331	1	2690.455	1
47		5	max	0	1	1.054	3	.107	1	1.078e-2	1	NC	15	NC	3
48			min	0	15	-1.385	1	.004	15	-7.439e-3	3	235.42	1	2211.969	1
49		6	max	0	1	1.045	3	.106	1	1.197e-2	1	NC	15	NC	3
50			min	0	15	-1.407	1	.004	15	-8.297e-3	3	230.155	1	2241.185	1
51		7	max	0	1	.959	3	.085	1	1.316e-2	1	NC	15	NC	3
52			min	0	15	-1.346	1	.003	15	-9.156e-3	3	244.823	1	2815.256	1
53		8	max	0	1	.828	3	.05	1	1.436e-2	1	NC	15	NC	2
54			min	0	15	-1.234	1	0	10	-1.002e-2	3	277.579	1	4831.933	1
55		9	max	0	1	.699	3	.015	3	1.555e-2	1	NC	15	NC	1
56			min	0	15	-1.117	1	-.004	10	-1.087e-2	3	322.145	1	NC	1
57		10	max	0	1	.639	3	.014	3	1.674e-2	1	NC	5	NC	1
58			min	0	1	-1.061	1	-.009	2	-1.173e-2	3	349.135	1	NC	1
59		11	max	0	15	.699	3	.015	3	1.555e-2	1	NC	15	NC	1
60			min	0	1	-1.117	1	-.004	10	-1.087e-2	3	322.145	1	NC	1
61		12	max	0	15	.828	3	.05	1	1.436e-2	1	NC	15	NC	2
62			min	0	1	-1.234	1	0	10	-1.002e-2	3	277.579	1	4831.933	1
63		13	max	0	15	.959	3	.085	1	1.316e-2	1	NC	15	NC	3
64			min	0	1	-1.346	1	.003	15	-9.156e-3	3	244.823	1	2815.256	1
65		14	max	0	15	1.045	3	.106	1	1.197e-2	1	NC	15	NC	3
66			min	0	1	-1.407	1	.004	15	-8.297e-3	3	230.155	1	2241.185	1
67		15	max	0	15	1.054	3	.107	1	1.078e-2	1	NC	15	NC	3
68			min	0	1	-1.385	1	.004	15	-7.439e-3	3	235.42	1	2211.969	1
69		16	max	0	15	.968	3	.088	1	9.59e-3	1	NC	15	NC	3
70			min	0	1	-1.263	1	.003	15	-6.58e-3	3	268.331	1	2690.455	1
71		17	max	0	15	.788	3	.055	1	8.398e-3	1	NC	5	NC	2
72			min	0	1	-1.042	1	.002	15	-5.721e-3	3	359.053	1	4340.168	1
73		18	max	0	15	.529	3	.02	1	7.207e-3	1	NC	5	NC	1
74			min	0	1	-.741	1	0	10	-4.862e-3	3	668.685	1	NC	1
75		19	max	0	15	.223	3	.005	3	6.015e-3	1	NC	1	NC	1
76			min	0	1	-.391	1	-.002	2	-4.003e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.228	3	.004	3	3.398e-3	3	NC	1	NC	1
78			min	0	1	-.39	1	-.002	2	-6.131e-3	1	NC	1	NC	1
79		2	max	0	15	.428	3	.02	1	4.128e-3	3	NC	5	NC	1
80			min	0	1	-.781	1	0	10	-7.35e-3	1	598.244	1	NC	1
81		3	max	0	15	.601	3	.055	1	4.858e-3	3	NC	5	NC	2
82			min	0	1	-1.116	1	.002	15	-8.569e-3	1	322.196	1	4327.264	1
83		4	max	0	15	.73	3	.089	1	5.588e-3	3	NC	15	NC	3
84			min	0	1	-1.357	1	.003	15	-9.788e-3	1	242.029	1	2683.865	1
85		5	max	0	15	.805	3	.107	1	6.319e-3	3	NC	15	NC	3
86			min	0	1	-1.484	1	.004	15	-1.101e-2	1	214.02	1	2206.726	1
87		6	max	0	15	.825	3	.106	1	7.049e-3	3	NC	15	NC	3
88			min	0	1	-1.496	1	.004	15	-1.223e-2	1	211.674	1	2235.264	1
89		7	max	0	15	.799	3	.085	1	7.779e-3	3	NC	15	NC	3
90			min	0	1	-1.412	1	.003	15	-1.344e-2	1	228.996	1	2805.405	1
91		8	max	0	15	.742	3	.05	1	8.509e-3	3	NC	15	NC	2
92			min	0	1	-1.27	1	0	10	-1.466e-2	1	265.83	1	4802.221	1
93		9	max	0	15	.682	3	.015	1	9.24e-3	3	NC	15	NC	1
94			min	0	1	-1.128	1	-.004	10	-1.588e-2	1	317.275	1	NC	1
95		10	max	0	1	.653	3	.013	3	9.97e-3	3	NC	5	NC	1
96			min	0	1	-1.06	1	-.009	2	-1.71e-2	1	349.479	1	NC	1
97		11	max	0	1	.682	3	.015	1	9.24e-3	3	NC	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
98			min	0	15	-1.128	1	-.004	10	-1.588e-2	1	317.275	1	NC	1
99		12	max	0	1	.742	3	.05	1	8.509e-3	3	NC	15	NC	2
100			min	0	15	-1.27	1	0	10	-1.466e-2	1	265.83	1	4802.221	1
101		13	max	0	1	.799	3	.085	1	7.779e-3	3	NC	15	NC	3
102			min	0	15	-1.412	1	.003	15	-1.344e-2	1	228.996	1	2805.405	1
103		14	max	0	1	.825	3	.106	1	7.049e-3	3	NC	15	NC	3
104			min	0	15	-1.496	1	.004	15	-1.223e-2	1	211.674	1	2235.264	1
105		15	max	0	1	.805	3	.107	1	6.319e-3	3	NC	15	NC	3
106			min	0	15	-1.484	1	.004	15	-1.101e-2	1	214.02	1	2206.726	1
107		16	max	0	1	.73	3	.089	1	5.588e-3	3	NC	15	NC	3
108			min	0	15	-1.357	1	.003	15	-9.788e-3	1	242.029	1	2683.865	1
109		17	max	0	1	.601	3	.055	1	4.858e-3	3	NC	5	NC	2
110			min	0	15	-1.116	1	.002	15	-8.569e-3	1	322.196	1	4327.264	1
111		18	max	0	1	.428	3	.02	1	4.128e-3	3	NC	5	NC	1
112			min	0	15	-.781	1	0	10	-7.35e-3	1	598.244	1	NC	1
113		19	max	0	1	.228	3	.004	3	3.398e-3	3	NC	1	NC	1
114			min	0	15	-.39	1	-.002	2	-6.131e-3	1	NC	1	NC	1
115	M16	1	max	0	15	.116	1	.004	3	5.963e-3	3	NC	1	NC	1
116			min	0	1	-.076	3	-.002	2	-8.968e-3	1	NC	1	NC	1
117		2	max	0	15	.034	3	.029	1	6.984e-3	3	NC	5	NC	2
118			min	0	1	-.161	2	0	10	-1.02e-2	1	884.811	2	8483.796	1
119		3	max	0	15	.119	3	.069	1	8.005e-3	3	NC	5	NC	3
120			min	0	1	-.371	2	.002	15	-1.143e-2	1	492.581	2	3470.185	1
121		4	max	0	15	.164	3	.103	1	9.026e-3	3	NC	5	NC	3
122			min	0	1	-.492	2	.003	15	-1.267e-2	1	392.791	2	2295.188	1
123		5	max	0	15	.162	3	.121	1	1.005e-2	3	NC	5	NC	3
124			min	0	1	-.506	2	.004	15	-1.39e-2	1	383.611	2	1953.619	1
125		6	max	0	15	.114	3	.117	1	1.107e-2	3	NC	5	NC	3
126			min	0	1	-.417	2	.004	15	-1.513e-2	1	449.34	2	2021.246	1
127		7	max	0	15	.031	3	.092	1	1.209e-2	3	NC	5	NC	3
128			min	0	1	-.247	2	.003	15	-1.637e-2	1	667.653	2	2570.808	1
129		8	max	0	15	.017	9	.054	1	1.311e-2	3	NC	3	NC	2
130			min	0	1	-.069	3	0	10	-1.76e-2	1	1658.838	2	4427.229	1
131		9	max	0	15	.185	1	.016	1	1.413e-2	3	NC	4	NC	1
132			min	0	1	-.157	3	-.003	10	-1.883e-2	1	2886.549	3	NC	1
133		10	max	0	1	.267	1	.012	3	1.515e-2	3	NC	5	NC	1
134			min	0	1	-.196	3	-.008	2	-2.007e-2	1	1548.404	1	NC	1
135		11	max	0	1	.185	1	.016	1	1.413e-2	3	NC	4	NC	1
136			min	0	15	-.157	3	-.003	10	-1.883e-2	1	2886.549	3	NC	1
137		12	max	0	1	.017	9	.054	1	1.311e-2	3	NC	3	NC	2
138			min	0	15	-.069	3	0	10	-1.76e-2	1	1658.838	2	4427.229	1
139		13	max	0	1	.031	3	.092	1	1.209e-2	3	NC	5	NC	3
140			min	0	15	-.247	2	.003	15	-1.637e-2	1	667.653	2	2570.808	1
141		14	max	0	1	.114	3	.117	1	1.107e-2	3	NC	5	NC	3
142			min	0	15	-.417	2	.004	15	-1.513e-2	1	449.34	2	2021.246	1
143		15	max	0	1	.162	3	.121	1	1.005e-2	3	NC	5	NC	3
144			min	0	15	-.506	2	.004	15	-1.39e-2	1	383.611	2	1953.619	1
145		16	max	0	1	.164	3	.103	1	9.026e-3	3	NC	5	NC	3
146			min	0	15	-.492	2	.003	15	-1.267e-2	1	392.791	2	2295.188	1
147		17	max	0	1	.119	3	.069	1	8.005e-3	3	NC	5	NC	3
148			min	0	15	-.371	2	.002	15	-1.143e-2	1	492.581	2	3470.185	1
149		18	max	0	1	.034	3	.029	1	6.984e-3	3	NC	5	NC	2
150			min	0	15	-.161	2	0	10	-1.02e-2	1	884.811	2	8483.796	1
151		19	max	0	1	.116	1	.004	3	5.963e-3	3	NC	1	NC	1
152			min	0	15	-.076	3	-.002	2	-8.968e-3	1	NC	1	NC	1
153	M2	1	max	.005	1	.003	2	.006	1	-5.108e-6	15	NC	1	NC	2
154			min	-.006	3	-.007	3	0	15	-1.559e-4	1	NC	1	7839.162	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	.005	1	.003	2	.006	1	-4.734e-6	15	NC	1	NC	2
156			min	-.005	3	-.006	3	0	15	-1.445e-4	1	NC	1	8548.744	1
157		3	max	.005	1	.002	2	.005	1	-4.36e-6	15	NC	1	NC	2
158			min	-.005	3	-.006	3	0	15	-1.33e-4	1	NC	1	9394.157	1
159		4	max	.005	1	.002	2	.005	1	-3.985e-6	15	NC	1	NC	1
160			min	-.005	3	-.006	3	0	15	-1.216e-4	1	NC	1	NC	1
161		5	max	.004	1	.002	2	.004	1	-3.611e-6	15	NC	1	NC	1
162			min	-.004	3	-.006	3	0	15	-1.101e-4	1	NC	1	NC	1
163		6	max	.004	1	.001	2	.004	1	-3.237e-6	15	NC	1	NC	1
164			min	-.004	3	-.005	3	0	15	-9.871e-5	1	NC	1	NC	1
165		7	max	.004	1	0	2	.003	1	-2.862e-6	15	NC	1	NC	1
166			min	-.004	3	-.005	3	0	15	-8.727e-5	1	NC	1	NC	1
167		8	max	.003	1	0	2	.003	1	-2.488e-6	15	NC	1	NC	1
168			min	-.004	3	-.005	3	0	15	-7.584e-5	1	NC	1	NC	1
169		9	max	.003	1	0	2	.002	1	-2.113e-6	15	NC	1	NC	1
170			min	-.003	3	-.005	3	0	15	-6.44e-5	1	NC	1	NC	1
171		10	max	.003	1	0	2	.002	1	-1.739e-6	15	NC	1	NC	1
172			min	-.003	3	-.004	3	0	15	-5.296e-5	1	NC	1	NC	1
173		11	max	.002	1	0	2	.002	1	-1.365e-6	15	NC	1	NC	1
174			min	-.003	3	-.004	3	0	15	-4.152e-5	1	NC	1	NC	1
175		12	max	.002	1	0	15	.001	1	-9.903e-7	15	NC	1	NC	1
176			min	-.002	3	-.003	3	0	15	-3.008e-5	1	NC	1	NC	1
177		13	max	.002	1	0	15	0	1	-6.159e-7	15	NC	1	NC	1
178			min	-.002	3	-.003	3	0	15	-1.865e-5	1	NC	1	NC	1
179		14	max	.002	1	0	15	0	1	-2.415e-7	15	NC	1	NC	1
180			min	-.002	3	-.003	3	0	15	-7.208e-6	1	NC	1	NC	1
181		15	max	.001	1	0	15	0	1	4.23e-6	1	NC	1	NC	1
182			min	-.001	3	-.002	3	0	15	-2.08e-7	3	NC	1	NC	1
183		16	max	0	1	0	15	0	1	1.567e-5	1	NC	1	NC	1
184			min	0	3	-.002	3	0	15	3.996e-7	12	NC	1	NC	1
185		17	max	0	1	0	15	0	1	2.711e-5	1	NC	1	NC	1
186			min	0	3	-.001	3	0	15	8.816e-7	15	NC	1	NC	1
187		18	max	0	1	0	15	0	1	3.854e-5	1	NC	1	NC	1
188			min	0	3	0	4	0	15	1.256e-6	15	NC	1	NC	1
189		19	max	0	1	0	1	0	1	4.998e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	1.63e-6	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-5.065e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-1.552e-5	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	3.987e-6	1	NC	1	NC	1
194			min	0	2	-.001	4	0	15	1.31e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	2.349e-5	1	NC	1	NC	1
196			min	0	2	-.003	4	0	15	7.685e-7	15	NC	1	NC	1
197		4	max	0	3	-.001	15	0	1	4.3e-5	1	NC	1	NC	1
198			min	0	2	-.005	4	0	15	1.406e-6	15	NC	1	NC	1
199		5	max	0	3	-.002	15	.001	1	6.251e-5	1	NC	1	NC	1
200			min	0	2	-.007	4	0	15	2.044e-6	15	NC	1	NC	1
201		6	max	.001	3	-.002	15	.001	1	8.201e-5	1	NC	1	NC	1
202			min	0	2	-.009	4	0	15	2.681e-6	15	NC	1	NC	1
203		7	max	.001	3	-.002	15	.002	1	1.015e-4	1	NC	1	NC	1
204			min	-.001	2	-.01	4	0	15	3.319e-6	15	9286.424	4	NC	1
205		8	max	.002	3	-.003	15	.002	1	1.21e-4	1	NC	1	NC	1
206			min	-.001	2	-.011	4	0	15	3.956e-6	15	8277.867	4	NC	1
207		9	max	.002	3	-.003	15	.002	1	1.405e-4	1	NC	1	NC	1
208			min	-.001	2	-.012	4	0	15	4.594e-6	15	7675.184	4	NC	1
209		10	max	.002	3	-.003	15	.003	1	1.6e-4	1	NC	2	NC	1
210			min	-.002	2	-.013	4	0	15	5.231e-6	15	7371.274	4	NC	1
211		11	max	.002	3	-.003	15	.003	1	1.795e-4	1	NC	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
212			min	-.002	2	-.013	4	0	15	5.869e-6	15	7320.569	4	NC	1
213		12	max	.003	3	-.003	15	.003	1	1.99e-4	1	NC	1	NC	1
214			min	-.002	2	-.013	4	0	15	6.506e-6	15	7521.429	4	NC	1
215		13	max	.003	3	-.003	15	.004	1	2.186e-4	1	NC	1	NC	1
216			min	-.002	2	-.012	4	0	15	7.144e-6	15	8017.653	4	NC	1
217		14	max	.003	3	-.002	15	.004	1	2.381e-4	1	NC	1	NC	1
218			min	-.002	2	-.011	4	0	15	7.781e-6	15	8921.831	4	NC	1
219		15	max	.003	3	-.002	15	.004	1	2.576e-4	1	NC	1	NC	1
220			min	-.002	2	-.009	4	0	15	8.419e-6	15	NC	1	NC	1
221		16	max	.004	3	-.002	15	.005	1	2.771e-4	1	NC	1	NC	1
222			min	-.003	2	-.008	1	0	15	9.056e-6	15	NC	1	NC	1
223		17	max	.004	3	-.001	15	.005	1	2.966e-4	1	NC	1	NC	1
224			min	-.003	2	-.006	1	0	15	9.694e-6	15	NC	1	NC	1
225		18	max	.004	3	0	15	.005	1	3.161e-4	1	NC	1	NC	1
226			min	-.003	2	-.005	1	0	15	1.033e-5	15	NC	1	NC	1
227		19	max	.004	3	0	15	.006	1	3.356e-4	1	NC	1	NC	1
228			min	-.003	2	-.003	1	0	15	1.097e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.003	2	0	15	-2.633e-7	12	NC	1	NC	2
230			min	0	3	-.004	3	-.006	1	-1.067e-5	1	NC	1	4242.42	1
231		2	max	.003	1	.002	2	0	15	-2.633e-7	12	NC	1	NC	2
232			min	0	3	-.004	3	-.005	1	-1.067e-5	1	NC	1	4620.882	1
233		3	max	.003	1	.002	2	0	15	-2.633e-7	12	NC	1	NC	2
234			min	0	3	-.004	3	-.005	1	-1.067e-5	1	NC	1	5070.894	1
235		4	max	.003	1	.002	2	0	15	-2.633e-7	12	NC	1	NC	2
236			min	0	3	-.003	3	-.004	1	-1.067e-5	1	NC	1	5611.12	1
237		5	max	.002	1	.002	2	0	15	-2.633e-7	12	NC	1	NC	2
238			min	0	3	-.003	3	-.004	1	-1.067e-5	1	NC	1	6266.92	1
239		6	max	.002	1	.002	2	0	15	-2.633e-7	12	NC	1	NC	2
240			min	0	3	-.003	3	-.004	1	-1.067e-5	1	NC	1	7073.462	1
241		7	max	.002	1	.002	2	0	15	-2.633e-7	12	NC	1	NC	2
242			min	0	3	-.003	3	-.003	1	-1.067e-5	1	NC	1	8080.673	1
243		8	max	.002	1	.002	2	0	15	-2.633e-7	12	NC	1	NC	2
244			min	0	3	-.003	3	-.003	1	-1.067e-5	1	NC	1	9361.377	1
245		9	max	.002	1	.001	2	0	15	-2.633e-7	12	NC	1	NC	1
246			min	0	3	-.002	3	-.002	1	-1.067e-5	1	NC	1	NC	1
247		10	max	.002	1	.001	2	0	15	-2.633e-7	12	NC	1	NC	1
248			min	0	3	-.002	3	-.002	1	-1.067e-5	1	NC	1	NC	1
249		11	max	.001	1	.001	2	0	15	-2.633e-7	12	NC	1	NC	1
250			min	0	3	-.002	3	-.002	1	-1.067e-5	1	NC	1	NC	1
251		12	max	.001	1	0	2	0	15	-2.633e-7	12	NC	1	NC	1
252			min	0	3	-.002	3	-.001	1	-1.067e-5	1	NC	1	NC	1
253		13	max	.001	1	0	2	0	15	-2.633e-7	12	NC	1	NC	1
254			min	0	3	-.001	3	0	1	-1.067e-5	1	NC	1	NC	1
255		14	max	0	1	0	2	0	15	-2.633e-7	12	NC	1	NC	1
256			min	0	3	-.001	3	0	1	-1.067e-5	1	NC	1	NC	1
257		15	max	0	1	0	2	0	15	-2.633e-7	12	NC	1	NC	1
258			min	0	3	0	3	0	1	-1.067e-5	1	NC	1	NC	1
259		16	max	0	1	0	2	0	15	-2.633e-7	12	NC	1	NC	1
260			min	0	3	0	3	0	1	-1.067e-5	1	NC	1	NC	1
261		17	max	0	1	0	2	0	15	-2.633e-7	12	NC	1	NC	1
262			min	0	3	0	3	0	1	-1.067e-5	1	NC	1	NC	1
263		18	max	0	1	0	2	0	15	-2.633e-7	12	NC	1	NC	1
264			min	0	3	0	3	0	1	-1.067e-5	1	NC	1	NC	1
265		19	max	0	1	0	1	0	1	-2.633e-7	12	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.067e-5	1	NC	1	NC	1
267	M6	1	max	.017	1	.014	2	0	1	0	1	NC	4	NC	1
268			min	-.019	3	-.021	3	0	1	0	1	2299.822	3	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	.016	1	.013	2	0	1	0	1	NC	4	NC	1
270			min	-.018	3	-.02	3	0	1	0	1	2435.284	3	NC	1
271		3	max	.015	1	.012	2	0	1	0	1	NC	4	NC	1
272			min	-.017	3	-.018	3	0	1	0	1	2587.713	3	NC	1
273		4	max	.014	1	.01	2	0	1	0	1	NC	4	NC	1
274			min	-.016	3	-.017	3	0	1	0	1	2760.516	3	NC	1
275		5	max	.014	1	.009	2	0	1	0	1	NC	1	NC	1
276			min	-.015	3	-.016	3	0	1	0	1	2958.075	3	NC	1
277		6	max	.013	1	.008	2	0	1	0	1	NC	1	NC	1
278			min	-.014	3	-.015	3	0	1	0	1	3186.122	3	NC	1
279		7	max	.012	1	.007	2	0	1	0	1	NC	1	NC	1
280			min	-.012	3	-.014	3	0	1	0	1	3452.294	3	NC	1
281		8	max	.011	1	.006	2	0	1	0	1	NC	1	NC	1
282			min	-.011	3	-.013	3	0	1	0	1	3767.012	3	NC	1
283		9	max	.01	1	.005	2	0	1	0	1	NC	1	NC	1
284			min	-.01	3	-.012	3	0	1	0	1	4144.862	3	NC	1
285		10	max	.009	1	.004	2	0	1	0	1	NC	1	NC	1
286			min	-.009	3	-.01	3	0	1	0	1	4606.911	3	NC	1
287		11	max	.008	1	.003	2	0	1	0	1	NC	1	NC	1
288			min	-.008	3	-.009	3	0	1	0	1	5184.764	3	NC	1
289		12	max	.007	1	.003	2	0	1	0	1	NC	1	NC	1
290			min	-.007	3	-.008	3	0	1	0	1	5928.083	3	NC	1
291		13	max	.006	1	.002	2	0	1	0	1	NC	1	NC	1
292			min	-.006	3	-.007	3	0	1	0	1	6919.639	3	NC	1
293		14	max	.005	1	.001	2	0	1	0	1	NC	1	NC	1
294			min	-.005	3	-.006	3	0	1	0	1	8308.422	3	NC	1
295		15	max	.004	1	0	2	0	1	0	1	NC	1	NC	1
296			min	-.004	3	-.005	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	-.003	3	-.003	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	-.002	3	-.002	3	0	1	0	1	NC	1	NC	1
301		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
302			min	-.001	3	-.001	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	0	3	0	2	0	1	0	1	NC	1	NC	1
308			min	0	2	-.002	3	0	1	0	1	NC	1	NC	1
309		3	max	.001	3	0	15	0	1	0	1	NC	1	NC	1
310			min	-.001	2	-.004	3	0	1	0	1	NC	1	NC	1
311		4	max	.002	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.002	2	-.006	3	0	1	0	1	NC	1	NC	1
313		5	max	.003	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.003	2	-.008	3	0	1	0	1	NC	1	NC	1
315		6	max	.004	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.003	2	-.009	3	0	1	0	1	9822.235	3	NC	1
317		7	max	.004	3	-.002	15	0	1	0	1	NC	1	NC	1
318			min	-.004	2	-.011	3	0	1	0	1	8718.336	3	NC	1
319		8	max	.005	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.005	2	-.011	3	0	1	0	1	8056.856	3	NC	1
321		9	max	.006	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.005	2	-.012	4	0	1	0	1	7702.415	3	NC	1
323		10	max	.007	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.006	2	-.013	4	0	1	0	1	7537.198	4	NC	1
325		11	max	.007	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	-.007	2	-.013	4	0	1	0	1	7476.017	4	NC	1
327		12	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.008	2	-.013	4	0	1	0	1	7673.139	4	NC	1
329		13	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.008	2	-.012	4	0	1	0	1	8172.264	4	NC	1
331		14	max	.01	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.009	2	-.012	1	0	1	0	1	9087.347	4	NC	1
333		15	max	.01	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.01	2	-.011	1	0	1	0	1	NC	1	NC	1
335		16	max	.011	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.01	2	-.01	1	0	1	0	1	NC	1	NC	1
337		17	max	.012	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.011	2	-.01	1	0	1	0	1	NC	1	NC	1
339		18	max	.013	3	0	15	0	1	0	1	NC	1	NC	1
340			min	-.012	2	-.009	1	0	1	0	1	NC	1	NC	1
341		19	max	.013	3	0	15	0	1	0	1	NC	1	NC	1
342			min	-.012	2	-.008	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.009	1	.01	2	0	1	0	1	NC	1	NC	1
344			min	-.003	3	-.013	3	0	1	0	1	NC	1	NC	1
345		2	max	.009	1	.01	2	0	1	0	1	NC	1	NC	1
346			min	-.003	3	-.012	3	0	1	0	1	NC	1	NC	1
347		3	max	.008	1	.009	2	0	1	0	1	NC	1	NC	1
348			min	-.003	3	-.012	3	0	1	0	1	NC	1	NC	1
349		4	max	.008	1	.009	2	0	1	0	1	NC	1	NC	1
350			min	-.003	3	-.011	3	0	1	0	1	NC	1	NC	1
351		5	max	.007	1	.008	2	0	1	0	1	NC	1	NC	1
352			min	-.002	3	-.01	3	0	1	0	1	NC	1	NC	1
353		6	max	.007	1	.008	2	0	1	0	1	NC	1	NC	1
354			min	-.002	3	-.009	3	0	1	0	1	NC	1	NC	1
355		7	max	.006	1	.007	2	0	1	0	1	NC	1	NC	1
356			min	-.002	3	-.009	3	0	1	0	1	NC	1	NC	1
357		8	max	.006	1	.006	2	0	1	0	1	NC	1	NC	1
358			min	-.002	3	-.008	3	0	1	0	1	NC	1	NC	1
359		9	max	.005	1	.006	2	0	1	0	1	NC	1	NC	1
360			min	-.002	3	-.007	3	0	1	0	1	NC	1	NC	1
361		10	max	.005	1	.005	2	0	1	0	1	NC	1	NC	1
362			min	-.002	3	-.006	3	0	1	0	1	NC	1	NC	1
363		11	max	.004	1	.005	2	0	1	0	1	NC	1	NC	1
364			min	-.001	3	-.006	3	0	1	0	1	NC	1	NC	1
365		12	max	.004	1	.004	2	0	1	0	1	NC	1	NC	1
366			min	-.001	3	-.005	3	0	1	0	1	NC	1	NC	1
367		13	max	.003	1	.003	2	0	1	0	1	NC	1	NC	1
368			min	-.001	3	-.004	3	0	1	0	1	NC	1	NC	1
369		14	max	.003	1	.003	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	1	.002	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
373		16	max	.002	1	.002	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
375		17	max	.001	1	.001	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.001	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	0	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	.005	1	.003	2	0	15	1.559e-4	1	NC	1	NC	2
382			min	-.006	3	-.007	3	-.006	1	5.108e-6	15	NC	1	7839.162	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	.005	1	.003	2	0	15	1.445e-4	1	NC	1	NC	2
384			min	-.005	3	-.006	3	-.006	1	4.734e-6	15	NC	1	8548.744	1
385		3	max	.005	1	.002	2	0	15	1.33e-4	1	NC	1	NC	2
386			min	-.005	3	-.006	3	-.005	1	4.36e-6	15	NC	1	9394.157	1
387		4	max	.005	1	.002	2	0	15	1.216e-4	1	NC	1	NC	1
388			min	-.005	3	-.006	3	-.005	1	3.985e-6	15	NC	1	NC	1
389		5	max	.004	1	.002	2	0	15	1.101e-4	1	NC	1	NC	1
390			min	-.004	3	-.006	3	-.004	1	3.611e-6	15	NC	1	NC	1
391		6	max	.004	1	.001	2	0	15	9.871e-5	1	NC	1	NC	1
392			min	-.004	3	-.005	3	-.004	1	3.237e-6	15	NC	1	NC	1
393		7	max	.004	1	0	2	0	15	8.727e-5	1	NC	1	NC	1
394			min	-.004	3	-.005	3	-.003	1	2.862e-6	15	NC	1	NC	1
395		8	max	.003	1	0	2	0	15	7.584e-5	1	NC	1	NC	1
396			min	-.004	3	-.005	3	-.003	1	2.488e-6	15	NC	1	NC	1
397		9	max	.003	1	0	2	0	15	6.44e-5	1	NC	1	NC	1
398			min	-.003	3	-.005	3	-.002	1	2.113e-6	15	NC	1	NC	1
399		10	max	.003	1	0	2	0	15	5.296e-5	1	NC	1	NC	1
400			min	-.003	3	-.004	3	-.002	1	1.739e-6	15	NC	1	NC	1
401		11	max	.002	1	0	2	0	15	4.152e-5	1	NC	1	NC	1
402			min	-.003	3	-.004	3	-.002	1	1.365e-6	15	NC	1	NC	1
403		12	max	.002	1	0	15	0	15	3.008e-5	1	NC	1	NC	1
404			min	-.002	3	-.003	3	-.001	1	9.903e-7	15	NC	1	NC	1
405		13	max	.002	1	0	15	0	15	1.865e-5	1	NC	1	NC	1
406			min	-.002	3	-.003	3	0	1	6.159e-7	15	NC	1	NC	1
407		14	max	.002	1	0	15	0	15	7.208e-6	1	NC	1	NC	1
408			min	-.002	3	-.003	3	0	1	2.415e-7	15	NC	1	NC	1
409		15	max	.001	1	0	15	0	15	2.08e-7	3	NC	1	NC	1
410			min	-.001	3	-.002	3	0	1	-4.23e-6	1	NC	1	NC	1
411		16	max	0	1	0	15	0	15	-3.996e-7	12	NC	1	NC	1
412			min	0	3	-.002	3	0	1	-1.567e-5	1	NC	1	NC	1
413		17	max	0	1	0	15	0	15	-8.816e-7	15	NC	1	NC	1
414			min	0	3	-.001	3	0	1	-2.711e-5	1	NC	1	NC	1
415		18	max	0	1	0	15	0	15	-1.256e-6	15	NC	1	NC	1
416			min	0	3	0	4	0	1	-3.854e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-1.63e-6	15	NC	1	NC	1
418			min	0	1	0	1	0	1	-4.998e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	1.552e-5	1	NC	1	NC	1
420			min	0	1	0	1	0	1	5.065e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-1.31e-7	15	NC	1	NC	1
422			min	0	2	-.001	4	0	1	-3.987e-6	1	NC	1	NC	1
423		3	max	0	3	0	15	0	15	-7.685e-7	15	NC	1	NC	1
424			min	0	2	-.003	4	0	1	-2.349e-5	1	NC	1	NC	1
425		4	max	0	3	-.001	15	0	15	-1.406e-6	15	NC	1	NC	1
426			min	0	2	-.005	4	0	1	-4.3e-5	1	NC	1	NC	1
427		5	max	0	3	-.002	15	0	15	-2.044e-6	15	NC	1	NC	1
428			min	0	2	-.007	4	-.001	1	-6.251e-5	1	NC	1	NC	1
429		6	max	.001	3	-.002	15	0	15	-2.681e-6	15	NC	1	NC	1
430			min	0	2	-.009	4	-.001	1	-8.201e-5	1	NC	1	NC	1
431		7	max	.001	3	-.002	15	0	15	-3.319e-6	15	NC	1	NC	1
432			min	-.001	2	-.01	4	-.002	1	-1.015e-4	1	9286.424	4	NC	1
433		8	max	.002	3	-.003	15	0	15	-3.956e-6	15	NC	1	NC	1
434			min	-.001	2	-.011	4	-.002	1	-1.21e-4	1	8277.867	4	NC	1
435		9	max	.002	3	-.003	15	0	15	-4.594e-6	15	NC	1	NC	1
436			min	-.001	2	-.012	4	-.002	1	-1.405e-4	1	7675.184	4	NC	1
437		10	max	.002	3	-.003	15	0	15	-5.231e-6	15	NC	2	NC	1
438			min	-.002	2	-.013	4	-.003	1	-1.6e-4	1	7371.274	4	NC	1
439		11	max	.002	3	-.003	15	0	15	-5.869e-6	15	NC	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
440			min	-.002	2	-.013	4	-.003	1	-1.795e-4	1	7320.569	4	NC	1
441		12	max	.003	3	-.003	15	0	15	-6.506e-6	15	NC	1	NC	1
442			min	-.002	2	-.013	4	-.003	1	-1.99e-4	1	7521.429	4	NC	1
443		13	max	.003	3	-.003	15	0	15	-7.144e-6	15	NC	1	NC	1
444			min	-.002	2	-.012	4	-.004	1	-2.186e-4	1	8017.653	4	NC	1
445		14	max	.003	3	-.002	15	0	15	-7.781e-6	15	NC	1	NC	1
446			min	-.002	2	-.011	4	-.004	1	-2.381e-4	1	8921.831	4	NC	1
447		15	max	.003	3	-.002	15	0	15	-8.419e-6	15	NC	1	NC	1
448			min	-.002	2	-.009	4	-.004	1	-2.576e-4	1	NC	1	NC	1
449		16	max	.004	3	-.002	15	0	15	-9.056e-6	15	NC	1	NC	1
450			min	-.003	2	-.008	1	-.005	1	-2.771e-4	1	NC	1	NC	1
451		17	max	.004	3	-.001	15	0	15	-9.694e-6	15	NC	1	NC	1
452			min	-.003	2	-.006	1	-.005	1	-2.966e-4	1	NC	1	NC	1
453		18	max	.004	3	0	15	0	15	-1.033e-5	15	NC	1	NC	1
454			min	-.003	2	-.005	1	-.005	1	-3.161e-4	1	NC	1	NC	1
455		19	max	.004	3	0	15	0	15	-1.097e-5	15	NC	1	NC	1
456			min	-.003	2	-.003	1	-.006	1	-3.356e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.003	2	.006	1	1.067e-5	1	NC	1	NC	2
458			min	0	3	-.004	3	0	15	2.633e-7	12	NC	1	4242.42	1
459		2	max	.003	1	.002	2	.005	1	1.067e-5	1	NC	1	NC	2
460			min	0	3	-.004	3	0	15	2.633e-7	12	NC	1	4620.882	1
461		3	max	.003	1	.002	2	.005	1	1.067e-5	1	NC	1	NC	2
462			min	0	3	-.004	3	0	15	2.633e-7	12	NC	1	5070.894	1
463		4	max	.003	1	.002	2	.004	1	1.067e-5	1	NC	1	NC	2
464			min	0	3	-.003	3	0	15	2.633e-7	12	NC	1	5611.12	1
465		5	max	.002	1	.002	2	.004	1	1.067e-5	1	NC	1	NC	2
466			min	0	3	-.003	3	0	15	2.633e-7	12	NC	1	6266.92	1
467		6	max	.002	1	.002	2	.004	1	1.067e-5	1	NC	1	NC	2
468			min	0	3	-.003	3	0	15	2.633e-7	12	NC	1	7073.462	1
469		7	max	.002	1	.002	2	.003	1	1.067e-5	1	NC	1	NC	2
470			min	0	3	-.003	3	0	15	2.633e-7	12	NC	1	8080.673	1
471		8	max	.002	1	.002	2	.003	1	1.067e-5	1	NC	1	NC	2
472			min	0	3	-.003	3	0	15	2.633e-7	12	NC	1	9361.377	1
473		9	max	.002	1	.001	2	.002	1	1.067e-5	1	NC	1	NC	1
474			min	0	3	-.002	3	0	15	2.633e-7	12	NC	1	NC	1
475		10	max	.002	1	.001	2	.002	1	1.067e-5	1	NC	1	NC	1
476			min	0	3	-.002	3	0	15	2.633e-7	12	NC	1	NC	1
477		11	max	.001	1	.001	2	.002	1	1.067e-5	1	NC	1	NC	1
478			min	0	3	-.002	3	0	15	2.633e-7	12	NC	1	NC	1
479		12	max	.001	1	0	2	.001	1	1.067e-5	1	NC	1	NC	1
480			min	0	3	-.002	3	0	15	2.633e-7	12	NC	1	NC	1
481		13	max	.001	1	0	2	0	1	1.067e-5	1	NC	1	NC	1
482			min	0	3	-.001	3	0	15	2.633e-7	12	NC	1	NC	1
483		14	max	0	1	0	2	0	1	1.067e-5	1	NC	1	NC	1
484			min	0	3	-.001	3	0	15	2.633e-7	12	NC	1	NC	1
485		15	max	0	1	0	2	0	1	1.067e-5	1	NC	1	NC	1
486			min	0	3	0	3	0	15	2.633e-7	12	NC	1	NC	1
487		16	max	0	1	0	2	0	1	1.067e-5	1	NC	1	NC	1
488			min	0	3	0	3	0	15	2.633e-7	12	NC	1	NC	1
489		17	max	0	1	0	2	0	1	1.067e-5	1	NC	1	NC	1
490			min	0	3	0	3	0	15	2.633e-7	12	NC	1	NC	1
491		18	max	0	1	0	2	0	1	1.067e-5	1	NC	1	NC	1
492			min	0	3	0	3	0	15	2.633e-7	12	NC	1	NC	1
493		19	max	0	1	0	1	0	1	1.067e-5	1	NC	1	NC	1
494			min	0	1	0	1	0	1	2.633e-7	12	NC	1	NC	1
495	M1	1	max	.005	3	.122	1	0	1	1.697e-2	1	NC	1	NC	1
496			min	-.002	2	-.025	3	0	15	-2.446e-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	.005	3	.06	1	0	15	8.275e-3	1	NC	5	NC	1
498			min	-.002	2	-.012	3	-.004	1	-1.209e-2	3	1852.007	1	NC	1
499		3	max	.005	3	.008	3	0	15	3.203e-5	10	NC	5	NC	1
500			min	-.002	2	-.007	2	-.006	1	-1.177e-4	3	887.146	1	NC	1
501		4	max	.005	3	.041	3	0	15	5.035e-3	1	NC	5	NC	1
502			min	-.002	2	-.084	1	-.006	1	-4.585e-3	3	555.231	1	NC	1
503		5	max	.005	3	.084	3	0	15	1.017e-2	1	NC	15	NC	1
504			min	-.002	2	-.166	1	-.004	1	-9.052e-3	3	397.831	1	NC	1
505		6	max	.005	3	.13	3	0	15	1.531e-2	1	NC	15	NC	1
506			min	-.002	2	-.245	1	-.002	1	-1.352e-2	3	311.592	1	NC	1
507		7	max	.005	3	.174	3	0	1	2.045e-2	1	9837.428	15	NC	1
508			min	-.002	2	-.317	1	0	12	-1.799e-2	3	260.916	1	NC	1
509		8	max	.005	3	.211	3	0	1	2.559e-2	1	8743.188	15	NC	1
510			min	-.002	2	-.373	1	0	15	-2.245e-2	3	231.04	1	NC	1
511		9	max	.005	3	.235	3	0	15	2.826e-2	1	8172.494	15	NC	1
512			min	-.002	2	-.409	1	0	1	-2.265e-2	3	215.523	1	NC	1
513		10	max	.004	3	.244	3	0	1	2.928e-2	1	7998.65	15	NC	1
514			min	-.002	2	-.421	1	0	15	-2.001e-2	3	210.887	1	NC	1
515		11	max	.004	3	.238	3	0	1	3.031e-2	1	8172.325	15	NC	1
516			min	-.002	2	-.409	1	0	15	-1.736e-2	3	215.84	1	NC	1
517		12	max	.004	3	.218	3	0	15	2.868e-2	1	8742.831	15	NC	1
518			min	-.002	2	-.373	1	0	1	-1.461e-2	3	232.018	1	NC	1
519		13	max	.004	3	.185	3	0	15	2.303e-2	1	9836.794	15	NC	1
520			min	-.002	2	-.315	1	0	1	-1.17e-2	3	263.32	1	NC	1
521		14	max	.004	3	.144	3	.001	1	1.739e-2	1	NC	15	NC	1
522			min	-.002	2	-.242	1	0	15	-8.786e-3	3	316.75	1	NC	1
523		15	max	.004	3	.097	3	.004	1	1.175e-2	1	NC	15	NC	1
524			min	-.002	2	-.161	1	0	15	-5.873e-3	3	408.464	1	NC	1
525		16	max	.004	3	.049	3	.005	1	6.103e-3	1	NC	5	NC	1
526			min	-.002	2	-.08	1	0	15	-2.959e-3	3	577.652	1	NC	1
527		17	max	.004	3	.003	3	.006	1	4.599e-4	1	NC	5	NC	1
528			min	-.002	2	-.005	2	0	15	-4.592e-5	3	937.921	1	NC	1
529		18	max	.004	3	.059	1	.004	1	1.052e-2	2	NC	5	NC	1
530			min	-.002	2	-.038	3	0	15	-4.334e-3	3	1981.078	1	NC	1
531		19	max	.004	3	.116	1	0	15	2.116e-2	2	NC	1	NC	1
532			min	-.002	2	-.076	3	0	1	-8.789e-3	3	NC	1	NC	1
533	M5	1	max	.016	3	.285	1	0	1	0	1	NC	1	NC	1
534			min	-.01	2	-.038	3	0	1	0	1	NC	1	NC	1
535		2	max	.016	3	.141	1	0	1	0	1	NC	5	NC	1
536			min	-.01	2	-.019	3	0	1	0	1	797.113	1	NC	1
537		3	max	.016	3	.024	3	0	1	0	1	NC	5	NC	1
538			min	-.01	2	-.023	1	0	1	0	1	372.678	1	NC	1
539		4	max	.016	3	.113	3	0	1	0	1	9627.532	15	NC	1
540			min	-.01	2	-.222	1	0	1	0	1	226.187	1	NC	1
541		5	max	.015	3	.233	3	0	1	0	1	6735.734	15	NC	1
542			min	-.01	2	-.44	1	0	1	0	1	158.134	1	NC	1
543		6	max	.015	3	.367	3	0	1	0	1	5185.055	15	NC	1
544			min	-.01	2	-.657	1	0	1	0	1	121.63	1	NC	1
545		7	max	.015	3	.497	3	0	1	0	1	4289.698	15	NC	1
546			min	-.009	2	-.854	1	0	1	0	1	100.546	1	NC	1
547		8	max	.015	3	.605	3	0	1	0	1	3769.164	15	NC	1
548			min	-.009	2	-1.013	1	0	1	0	1	88.287	1	NC	1
549		9	max	.014	3	.676	3	0	1	0	1	3502.246	15	NC	1
550			min	-.009	2	-1.113	1	0	1	0	1	82.003	1	NC	1
551		10	max	.014	3	.701	3	0	1	0	1	3421.823	15	NC	1
552			min	-.009	2	-1.146	1	0	1	0	1	80.136	1	NC	1
553		11	max	.014	3	.683	3	0	1	0	1	3502.309	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	-.009	2	-1.113	1	0	1	0	1	82.131	1	NC	1
555		12	max	.013	3	.624	3	0	1	0	1	3769.312	15	NC	1
556			min	-.009	2	-1.011	1	0	1	0	1	88.708	1	NC	1
557		13	max	.013	3	.528	3	0	1	0	1	4290.001	15	NC	1
558			min	-.008	2	-.848	1	0	1	0	1	101.642	1	NC	1
559		14	max	.013	3	.407	3	0	1	0	1	5185.649	15	NC	1
560			min	-.008	2	-.646	1	0	1	0	1	124.098	1	NC	1
561		15	max	.012	3	.273	3	0	1	0	1	6736.91	15	NC	1
562			min	-.008	2	-.426	1	0	1	0	1	163.492	1	NC	1
563		16	max	.012	3	.136	3	0	1	0	1	9629.995	15	NC	1
564			min	-.008	2	-.208	1	0	1	0	1	238.202	1	NC	1
565		17	max	.012	3	.009	3	0	1	0	1	NC	5	NC	1
566			min	-.008	2	-.015	2	0	1	0	1	401.952	1	NC	1
567		18	max	.012	3	.138	1	0	1	0	1	NC	5	NC	1
568			min	-.008	2	-.099	3	0	1	0	1	875.66	1	NC	1
569		19	max	.012	3	.267	1	0	1	0	1	NC	1	NC	1
570			min	-.008	2	-.196	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.005	3	.122	1	0	15	2.446e-2	3	NC	1	NC	1
572			min	-.002	2	-.025	3	0	1	-1.697e-2	1	NC	1	NC	1
573		2	max	.005	3	.06	1	.004	1	1.209e-2	3	NC	5	NC	1
574			min	-.002	2	-.012	3	0	15	-8.275e-3	1	1852.007	1	NC	1
575		3	max	.005	3	.008	3	.006	1	1.177e-4	3	NC	5	NC	1
576			min	-.002	2	-.007	2	0	15	-3.203e-5	10	887.146	1	NC	1
577		4	max	.005	3	.041	3	.006	1	4.585e-3	3	NC	5	NC	1
578			min	-.002	2	-.084	1	0	15	-5.035e-3	1	555.231	1	NC	1
579		5	max	.005	3	.084	3	.004	1	9.052e-3	3	NC	15	NC	1
580			min	-.002	2	-.166	1	0	15	-1.017e-2	1	397.831	1	NC	1
581		6	max	.005	3	.13	3	.002	1	1.352e-2	3	NC	15	NC	1
582			min	-.002	2	-.245	1	0	15	-1.531e-2	1	311.592	1	NC	1
583		7	max	.005	3	.174	3	0	12	1.799e-2	3	9837.428	15	NC	1
584			min	-.002	2	-.317	1	0	1	-2.045e-2	1	260.916	1	NC	1
585		8	max	.005	3	.211	3	0	15	2.245e-2	3	8743.188	15	NC	1
586			min	-.002	2	-.373	1	0	1	-2.559e-2	1	231.04	1	NC	1
587		9	max	.005	3	.235	3	0	1	2.265e-2	3	8172.494	15	NC	1
588			min	-.002	2	-.409	1	0	15	-2.826e-2	1	215.523	1	NC	1
589		10	max	.004	3	.244	3	0	15	2.001e-2	3	7998.65	15	NC	1
590			min	-.002	2	-.421	1	0	1	-2.928e-2	1	210.887	1	NC	1
591		11	max	.004	3	.238	3	0	15	1.736e-2	3	8172.325	15	NC	1
592			min	-.002	2	-.409	1	0	1	-3.031e-2	1	215.84	1	NC	1
593		12	max	.004	3	.218	3	0	1	1.461e-2	3	8742.831	15	NC	1
594			min	-.002	2	-.373	1	0	15	-2.868e-2	1	232.018	1	NC	1
595		13	max	.004	3	.185	3	0	1	1.17e-2	3	9836.794	15	NC	1
596			min	-.002	2	-.315	1	0	15	-2.303e-2	1	263.32	1	NC	1
597		14	max	.004	3	.144	3	0	15	8.786e-3	3	NC	15	NC	1
598			min	-.002	2	-.242	1	-.001	1	-1.739e-2	1	316.75	1	NC	1
599		15	max	.004	3	.097	3	0	15	5.873e-3	3	NC	15	NC	1
600			min	-.002	2	-.161	1	-.004	1	-1.175e-2	1	408.464	1	NC	1
601		16	max	.004	3	.049	3	0	15	2.959e-3	3	NC	5	NC	1
602			min	-.002	2	-.08	1	-.005	1	-6.103e-3	1	577.652	1	NC	1
603		17	max	.004	3	.003	3	0	15	4.592e-5	3	NC	5	NC	1
604			min	-.002	2	-.005	2	-.006	1	-4.599e-4	1	937.921	1	NC	1
605		18	max	.004	3	.059	1	0	15	4.334e-3	3	NC	5	NC	1
606			min	-.002	2	-.038	3	-.004	1	-1.052e-2	2	1981.078	1	NC	1
607		19	max	.004	3	.116	1	0	1	8.789e-3	3	NC	1	NC	1
608			min	-.002	2	-.076	3	0	15	-2.116e-2	2	NC	1	NC	1

Anchor Designer™
Software
Version 2.4.5673.0

Company:	Schletter, Inc.	Date:	11/17/2015
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 14-42 Inch Width		
Address:			
Phone:			
E-mail:			

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

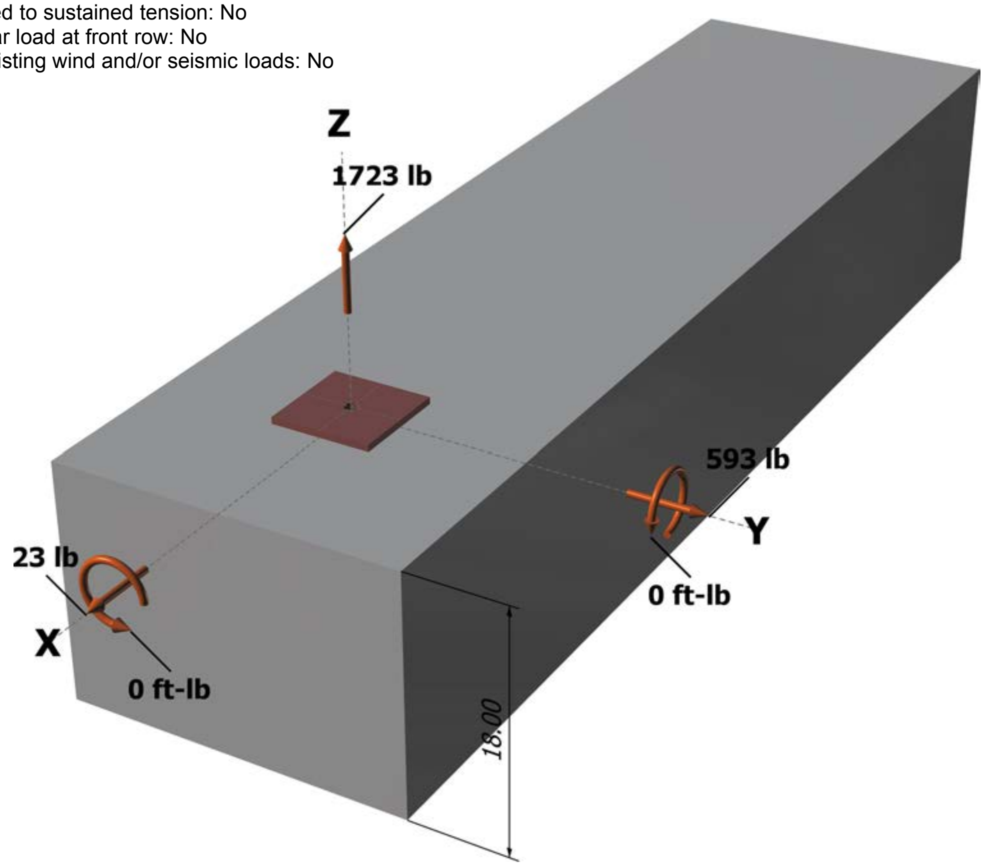
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

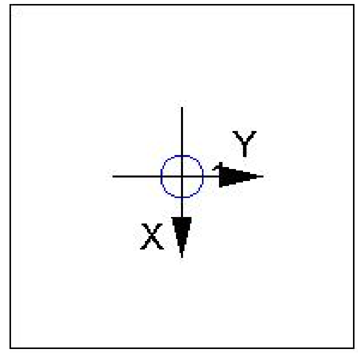
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

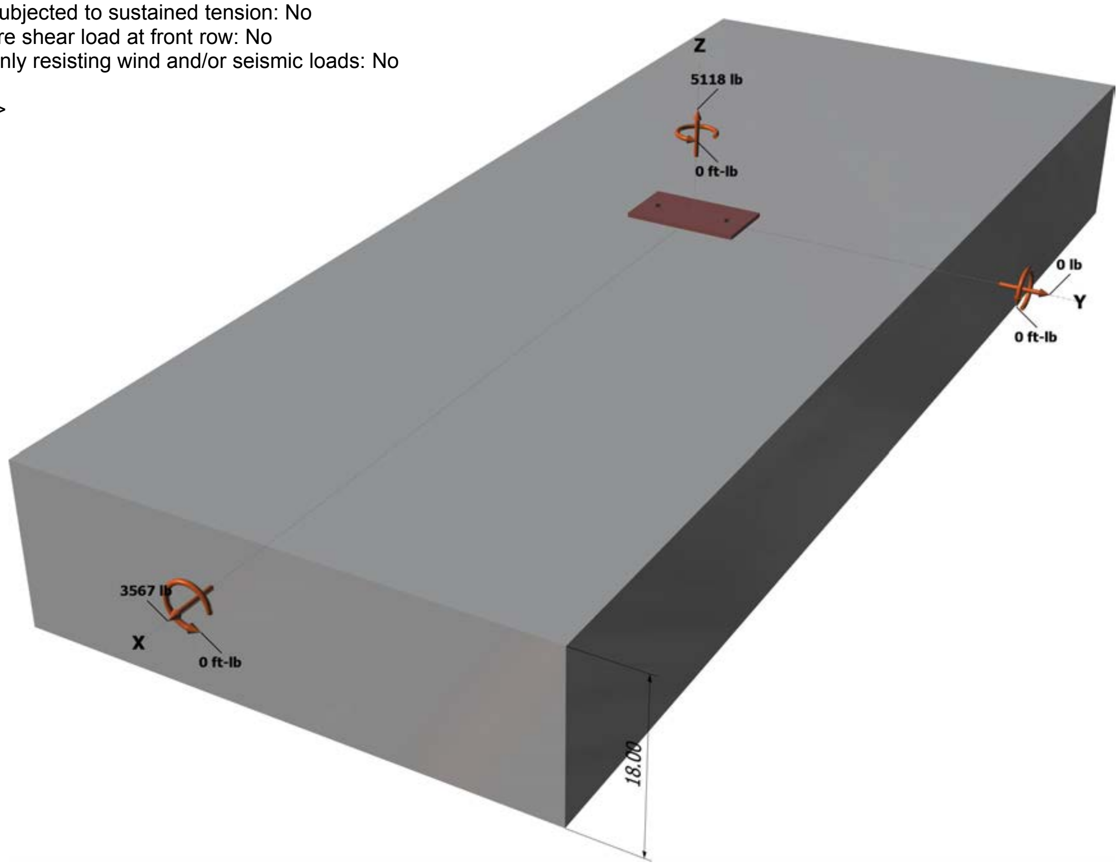
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

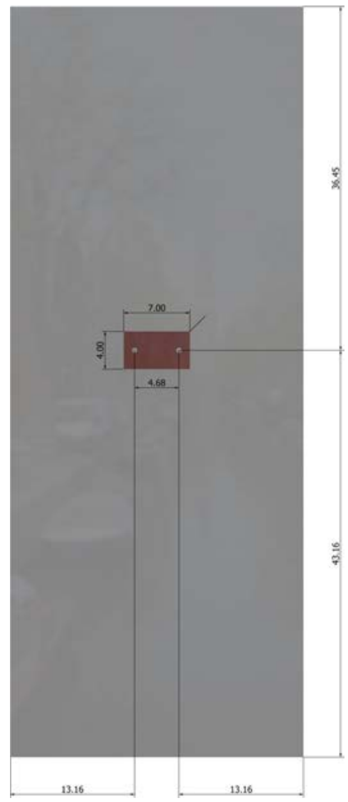
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout 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>



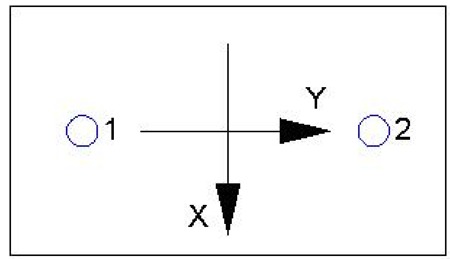
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2559.0	1783.5	0.0	1783.5
2	2559.0	1783.5	0.0	1783.5
Sum	5118.0	3567.0	0.0	3567.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5118
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)
408.24	324.00	1.000	1.000	1.00	1.000	12492	0.65	10231

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} (in²)	A_{Vco} (in²)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
558.00	648.00	1.000	0.919	1.000	1.000	15593	0.70	8641

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	13.16	17908

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

A_{Vc} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
710.64	779.34	1.000	1.000	1.000	17908	0.70	22862

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} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	158.66	109.66	1.000	1.043	1.000	1.000	9755	14715

A_{Nc} (in²)	A_{Nco} (in²)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
408.24	324.00	1.000	1.000	1.000	1.000	12492	15740	0.70

ϕV_{cpg} (lb)
20601

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	2559	6071	0.42	Pass
Concrete breakout	5118	10231	0.50	Pass
Adhesive	**5118**	**8093**	**0.63**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**1784**	**3156**	**0.57**	**Pass (Governs)**
T Concrete breakout x+	3567	8641	0.41	Pass
|| Concrete breakout y-	1784	22862	0.08	Pass
Pryout	3567	20601	0.17	Pass

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

Sec. D.7.3	0.63	0.57	119.8 %	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.