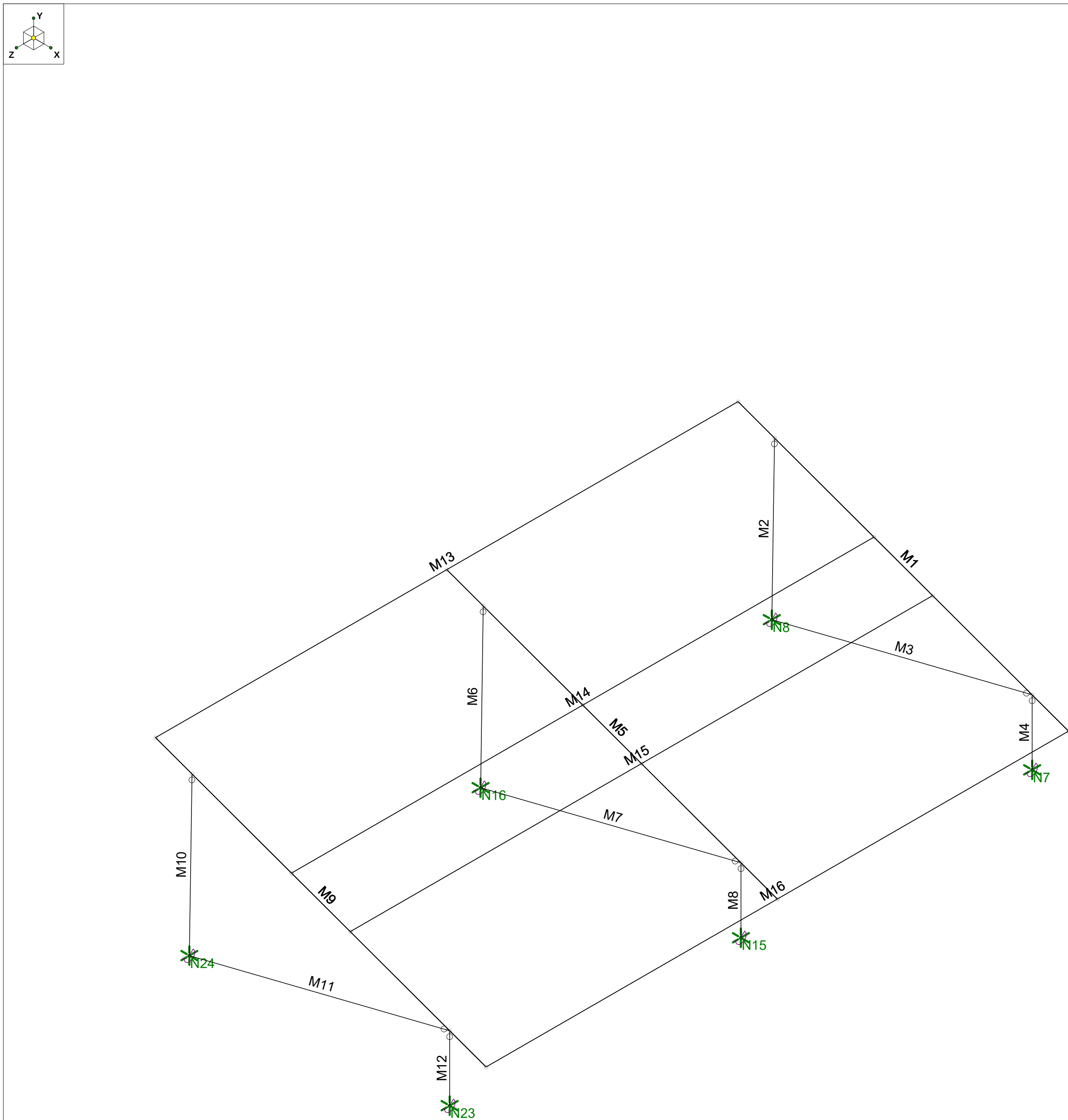


Schletter, Inc.		20° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

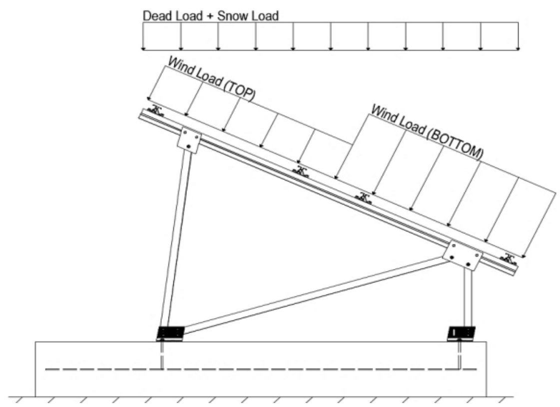
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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

PV modules are required to meet the following specifications:

	Maximum		Minimum
Height =	2000 mm	Height =	1900 mm
Width =	1050 mm	Width =	970 mm
Dead Load =	3.00 psf	Dead Load =	1.75 psf

Modules Per Row = 2
Module Tilt = 20°
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 = 20.62 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.91
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 110 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 19.00 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.050	(Pressure)
$Cf+_{BOTTOM}$	=	1.650	
$Cf-_{TOP,\ OUTER\ PURLIN}$	=	-2.400	
$Cf-_{TOP,\ INNER\ PURLIN}$	=	-1.840	(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.

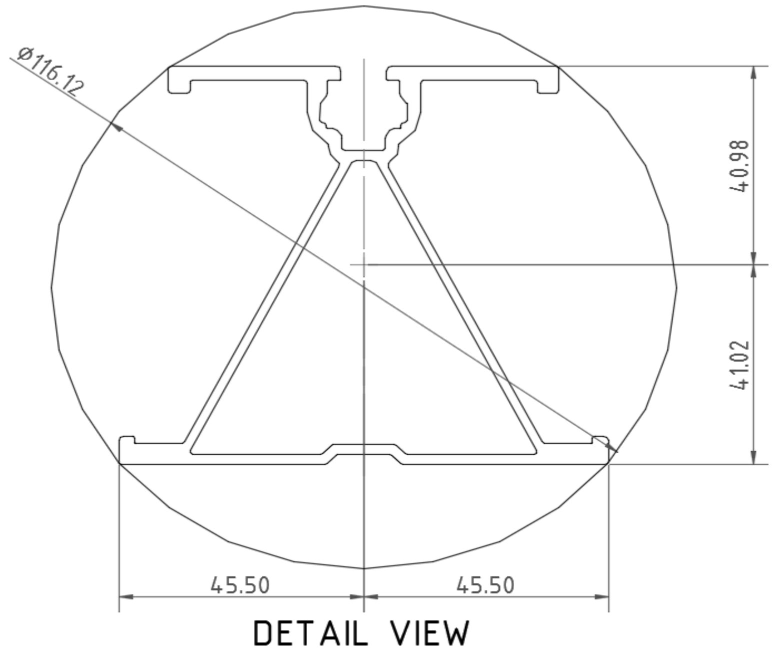
Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M14	Mid-Top	M7	Inner	N15	Inner
M15	Mid-Bottom	M11	Outer	N23	Outer
M16	Bottom				
Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16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

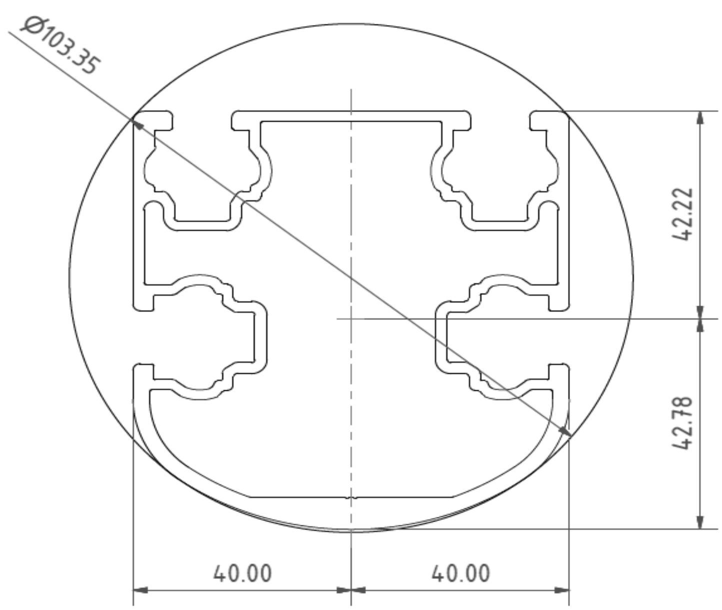
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	111	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.784	k-ft
M_z =	0.308	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	91%	



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).

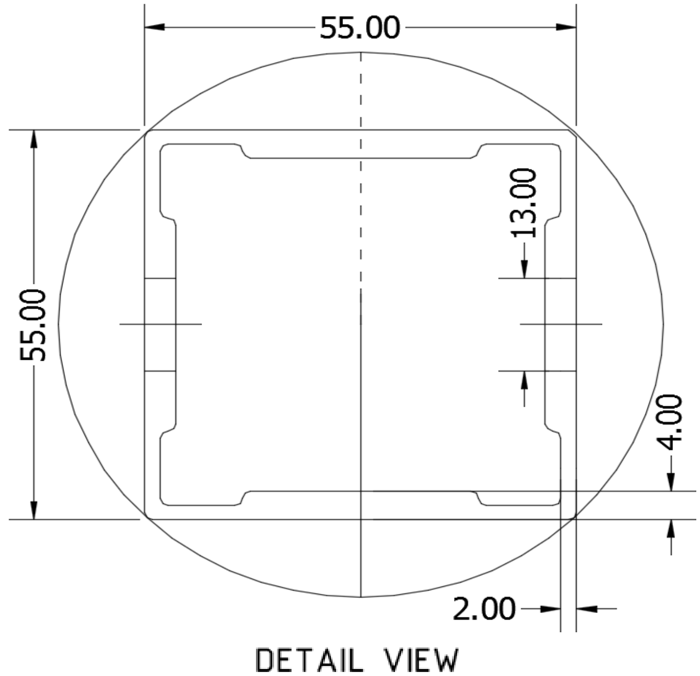
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	104.56	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.00	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.373	k-ft
M_z =	0.000	k-ft
P_n =	-0.372	k
$M_{y\ allowable}$ =	3.422	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	99%	



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).

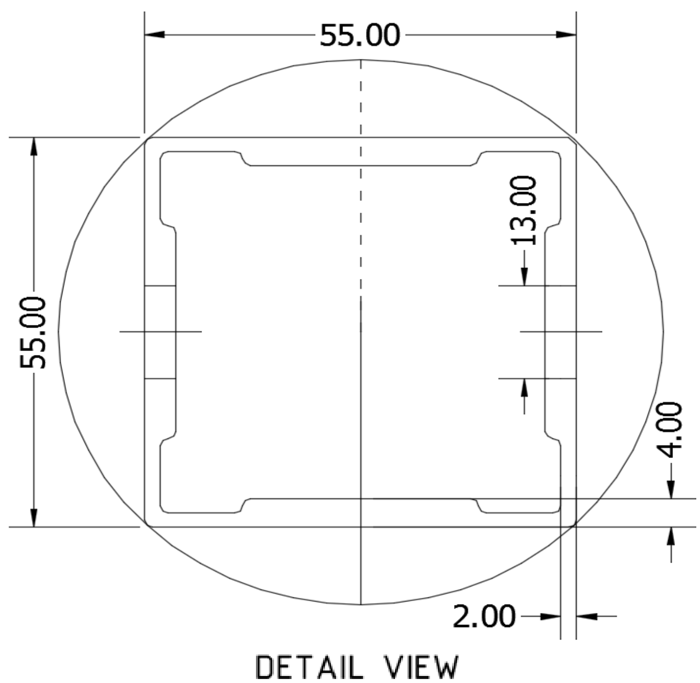
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.290	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	12%	



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).

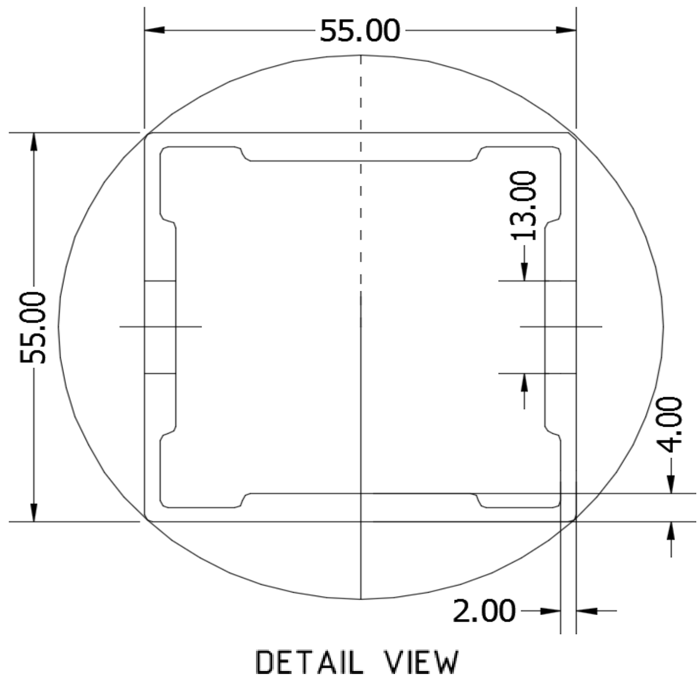
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	98.03	in
$\Phi F_{ty\ AXIAL}$ =	6.11	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.012	k-ft
M_z =	0.000	k-ft
P_n =	1.408	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	6.000	k
Utilization =	24%	



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 =	61.10	in
$\Phi F_{ty\ AXIAL}$ =	13.63	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 =	3.470	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	13.386	k
Utilization =	27%	



5. FOUNDATION DESIGN CALCULATIONS

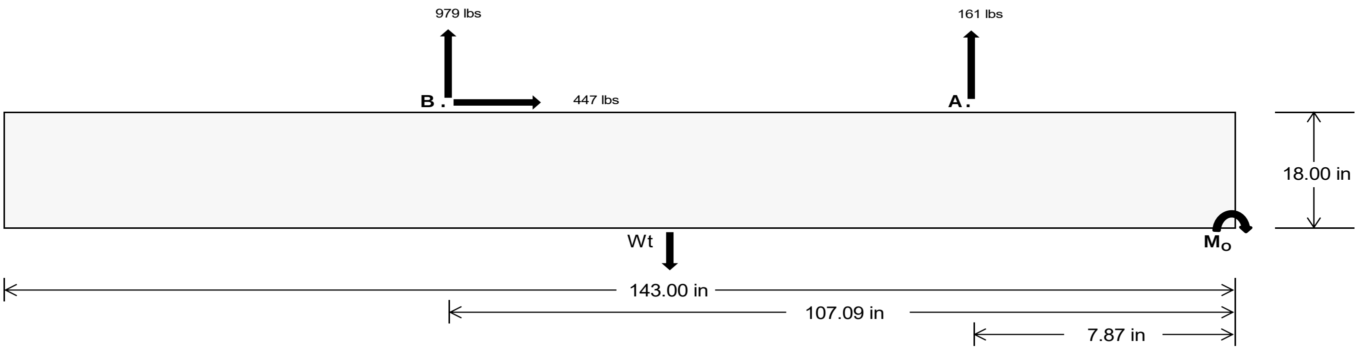
5.1 Helical Pile Foundations

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 =	721.85	4267.34	k
Compressive Load =	4277.12	4801.77	k
Lateral Load =	16.93	1936.60	k
Moment (Weak Axis) =	0.04	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).



<u>Concrete Properties</u>

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

<u>Footing Reinforcement</u>

Use fiber reinforcing with (2) #5 rebar.

<u>Overturning Check</u>

M_O = 114195.0 in-lbs
Resisting Force Required = 1597.13 lbs
S.F. = 1.67
Weight Required = 2661.89 lbs
Minimum Width = <u>35 in</u> in
Weight Provided = 7559.64 lbs

A minimum 143in long x 35in wide x 18in tall ballast foundation is required to resist overturning.

<u>Sliding</u>

Force = 446.54 lbs
Friction = 0.4
Weight Required = 1116.34 lbs
Resisting Weight = 7559.64 lbs
Additional Weight Required = 0 lbs

Use a 143in long x 35in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

<u>Cohesion</u>

Sliding Force = 446.54 lbs
Cohesion = 130 psf
Area = 34.76 ft^2
Resisting = 3779.82 lbs
Additional Weight Required = 0 lbs

Use a 143in long x 35in wide x 18in tall ballast foundation. Cohesion is OK.

<u>Shear Key</u>

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.

<u>Bearing Pressure</u>

	Ballast Width			
	35 in	36 in	37 in	38 in
P_{ftg} = (145 pcf)(11.92 ft)(1.5 ft)(2.92 ft) =	7560 lbs	7776 lbs	7992 lbs	8208 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in
F_A	1627 lbs	1627 lbs	1627 lbs	1627 lbs	1220 lbs	1220 lbs	1220 lbs	1220 lbs	2003 lbs	2003 lbs	2003 lbs	2003 lbs	-323 lbs	-323 lbs	-323 lbs	-323 lbs
F_B	1753 lbs	1753 lbs	1753 lbs	1753 lbs	1484 lbs	1484 lbs	1484 lbs	1484 lbs	2285 lbs	2285 lbs	2285 lbs	2285 lbs	-1959 lbs	-1959 lbs	-1959 lbs	-1959 lbs
F_V	177 lbs	177 lbs	177 lbs	177 lbs	808 lbs	808 lbs	808 lbs	808 lbs	725 lbs	725 lbs	725 lbs	725 lbs	-893 lbs	-893 lbs	-893 lbs	-893 lbs
P_{total}	10939 lbs	11155 lbs	11371 lbs	11587 lbs	10264 lbs	10480 lbs	10696 lbs	10912 lbs	11848 lbs	12064 lbs	12280 lbs	12496 lbs	2254 lbs	2383 lbs	2513 lbs	2643 lbs
M	3692 lbs-ft	3692 lbs-ft	3692 lbs-ft	3692 lbs-ft	3282 lbs-ft	3282 lbs-ft	3282 lbs-ft	3282 lbs-ft	4929 lbs-ft	4929 lbs-ft	4929 lbs-ft	4929 lbs-ft	2757 lbs-ft	2757 lbs-ft	2757 lbs-ft	2757 lbs-ft
e	0.34 ft	0.33 ft	0.32 ft	0.32 ft	0.32 ft	0.31 ft	0.31 ft	0.30 ft	0.42 ft	0.41 ft	0.40 ft	0.39 ft	1.22 ft	1.16 ft	1.10 ft	1.04 ft
L/6	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft
f_{min}	261.3 psf	260.0 psf	258.9 psf	257.8 psf	247.7 psf	246.9 psf	246.1 psf	245.4 psf	269.5 psf	268.0 psf	266.7 psf	265.4 psf	24.9 psf	27.8 psf	30.6 psf	33.2 psf
f_{max}	368.2 psf	364.0 psf	360.1 psf	356.3 psf	342.8 psf	339.4 psf	336.1 psf	332.9 psf	412.3 psf	406.9 psf	401.8 psf	396.9 psf	104.8 psf	105.5 psf	106.2 psf	106.8 psf

Maximum Bearing Pressure = 412 psf
Allowable Bearing Pressure = 1500 psf

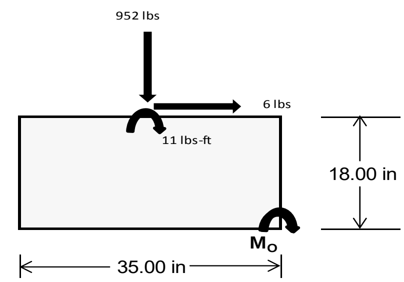
Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 1368.3 ft-lbs
Resisting Force Required = 938.27 lbs
S.F. = 1.67
Weight Required = 1563.79 lbs
Minimum Width = 35 in in
Weight Provided = 7559.64 lbs

A minimum 143in long x 35in 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	35 in			35 in			35 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	262 lbs	681 lbs	262 lbs	952 lbs	2771 lbs	952 lbs	77 lbs	199 lbs	77 lbs
F_V	2 lbs	0 lbs	2 lbs	6 lbs	0 lbs	6 lbs	0 lbs	0 lbs	0 lbs
P_{total}	9621 lbs	7560 lbs	9621 lbs	9862 lbs	7560 lbs	9862 lbs	2813 lbs	7560 lbs	2813 lbs
M	5 lbs-ft	0 lbs-ft	5 lbs-ft	21 lbs-ft	0 lbs-ft	21 lbs-ft	1 lbs-ft	0 lbs-ft	1 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	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft
f_{min}	276.5 psf	217.5 psf	276.5 psf	282.5 psf	217.5 psf	282.5 psf	80.9 psf	217.5 psf	80.9 psf
f_{max}	277.1 psf	217.5 psf	277.1 psf	285.0 psf	217.5 psf	285.0 psf	81.0 psf	217.5 psf	81.0 psf

Maximum Bearing Pressure = 285 psf
Allowable Bearing Pressure = 1500 psf

Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 143in long x 22in wide x 18in tall ballast foundation and fiber reinforcing with (1) #5 rebar.

5.3 Foundation Anchors

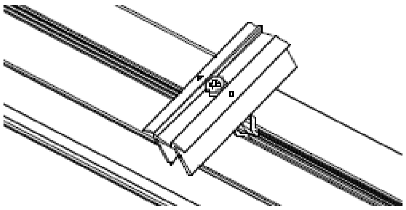
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

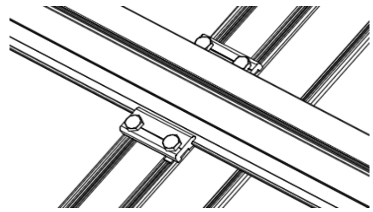
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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 =	0.498 k
Allowable Uplift =	1.214 k
Utilization =	41%



Fastening of Purlins to Girders	
Maximum Uplifting Force =	1.617 k
Allowable Uplift =	4.357 k
Utilization =	37%



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 =	3.290 k
M12 Bolt Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	44%

Rear Strut	
Maximum Axial Load =	3.470 k
M12 Bolt Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	47%

Diagonal Strut	
Maximum Axial Load =	1.486 k
M12 Bolt Shear Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	20%

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.

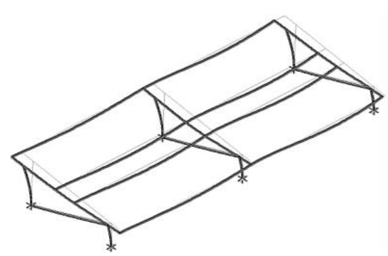
7. SEISMIC DESIGN

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} =	51.89 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$ 1.038 in
Max Drift, Δ_{MAX} =	0.038 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 = 111 in

J = 0.432

307.078

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

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= 27.6 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 in^3

M_{max}St = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 111

J = 0.432

195.283

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

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= 28.8

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 in^3

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 = 104.56 in
J = 1.08
179.85

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

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= 29.0 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 = 104.56
J = 1.08
190.335

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

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= 28.9

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= 29.0 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

M_{max}St = 3.323 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 in³

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 in³

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

$\lambda =$ 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

$\varphi cc =$ 0.87952

$\varphi F_L = \varphi cc(Bc\text{-}Dc^*\lambda)$

$\varphi F_L =$ 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)

$\varphi F_L = \varphi c[Bp\text{-}1.6Dp^*b/t]$

$\varphi F_L =$ 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

$\varphi F_L =$ 28.03 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

$L_b =$ 98.03 in

J = 0.942

152.985

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

S1 = 0.51461

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

S2 = 1701.56

$\varphi F_L = \varphi b[Bc\text{-}1.6Dc^*\surd((LbSc)/(Cb^*\surd(IyJ)/2))]$

$\varphi F_L =$ 29.4 ksi

Weak Axis:

3.4.14

$L_b =$ 98.03

J = 0.942

152.985

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

S1 = 0.51461

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

S2 = 1701.56

$\varphi F_L = \varphi b[Bc\text{-}1.6Dc^*\surd((LbSc)/(Cb^*\surd(IyJ)/2))]$

$\varphi F_L =$ 29.4

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

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 = 2.26776

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.89749

φF_L= (φccFcy)/(λ²)

φF_L= 6.10803 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= 6.11 ksi
A = 663.99 mm^2
1.03 in^2
P_{max} = 6.29 kips

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

Strut = __**55x55**__

Strong Axis:

3.4.14

L_b = 61.10 in
J = 0.942
95.3524

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

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= 30.2 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

Weak Axis:

3.4.14

L_b = 61.1
J = 0.942
95.3524

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

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= 30.2

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

$$S2 = \frac{k_1Bbr}{mDbr}$$

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

$$S2 = \frac{k_1Bbr}{mDbr}$$

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.41345

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.77788

φF_L= (φccFcy)/(λ^2)

φF_L= 13.6277 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

$\varphi F_L =$ 13.63 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 14.03 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	-9.843	-9.843	0	0
2	M14	Y	-9.843	-9.843	0	0
3	M15	Y	-9.843	-9.843	0	0
4	M16	Y	-9.843	-9.843	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	-5.454	-5.454	0	0
2	M14	Y	-5.454	-5.454	0	0
3	M15	Y	-5.454	-5.454	0	0
4	M16	Y	-5.454	-5.454	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	-63.565	-63.565	0	0
2	M14	Y	-63.565	-63.565	0	0
3	M15	Y	-63.565	-63.565	0	0
4	M16	Y	-63.565	-63.565	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	-65.446	-65.446	0	0
2	M14	y	-65.446	-65.446	0	0
3	M15	y	-102.844	-102.844	0	0
4	M16	y	-102.844	-102.844	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	149.592	149.592	0	0
2	M14	y	114.687	114.687	0	0
3	M15	y	62.33	62.33	0	0
4	M16	y	62.33	62.33	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	360.709	2	1129.664	1	.996	1	.005	1	0	1	0	1
2		min	-485.439	3	-1017.666	3	.042	15	0	15	0	1	0	1
3	N7	max	.035	9	1188.401	1	-.482	15	0	15	0	1	0	1
4		min	-.109	2	-152.216	3	-13.024	1	-.027	1	0	1	0	1
5	N15	max	0	15	3290.092	1	0	1	0	1	0	1	0	1
6		min	-1.328	2	-555.271	3	0	2	0	2	0	1	0	1
7	N16	max	1409.796	2	3693.67	1	0	1	0	1	0	1	0	1
8		min	-1489.693	3	-3282.566	3	0	3	0	3	0	1	0	1
9	N23	max	.035	9	1188.401	1	13.024	1	.027	1	0	1	0	1
10		min	-.109	2	-152.216	3	.482	15	0	15	0	1	0	1
11	N24	max	360.709	2	1129.664	1	-.042	15	0	15	0	1	0	1
12		min	-485.439	3	-1017.666	3	-.996	1	-.005	1	0	1	0	1
13	Totals:	max	2129.667	2	11619.893	1	0	1						
14		min	-2460.962	3	-6177.602	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	81.515	1	480.787	1	-6.197	15	0	15	.228	1	0	1
2			min	2.926	15	-499.185	3	-173.608	1	-.015	1	.008	15	0	3
3		2	max	81.515	1	335.779	1	-4.753	15	0	15	.07	1	.437	3
4			min	2.926	15	-351.486	3	-133.07	1	-.015	1	.003	15	-.42	1
5		3	max	81.515	1	190.771	1	-3.31	15	0	15	0	3	.722	3
6			min	2.926	15	-203.786	3	-92.533	1	-.015	1	-.046	1	-.69	1
7		4	max	81.515	1	45.763	1	-1.866	15	0	15	-.004	12	.856	3
8			min	2.926	15	-56.087	3	-51.995	1	-.015	1	-.12	1	-.812	1
9		5	max	81.515	1	91.612	3	-.422	15	0	15	-.005	12	.838	3
10			min	2.926	15	-99.245	1	-11.457	1	-.015	1	-.153	1	-.784	1
11		6	max	81.515	1	239.311	3	29.08	1	0	15	-.005	15	.668	3
12			min	2.926	15	-244.253	1	.41	12	-.015	1	-.143	1	-.608	1
13		7	max	81.515	1	387.01	3	69.618	1	0	15	-.003	15	.346	3
14			min	2.926	15	-389.261	1	1.877	12	-.015	1	-.093	1	-.282	1
15		8	max	81.515	1	534.71	3	110.155	1	0	15	.002	2	.192	1
16			min	2.926	15	-534.269	1	3.345	12	-.015	1	-.003	3	-.128	3
17		9	max	81.515	1	682.409	3	150.693	1	0	15	.134	1	.816	1
18			min	2.926	15	-679.277	1	4.812	12	-.015	1	.002	12	-.753	3
19		10	max	81.515	1	830.108	3	191.23	1	.015	1	.309	1	1.589	1
20			min	2.926	15	-824.285	1	6.28	12	-.001	3	.008	12	-1.531	3
21		11	max	81.515	1	679.277	1	-4.812	12	.015	1	.134	1	.816	1
22			min	2.926	15	-682.409	3	-150.693	1	0	15	.002	12	-.753	3
23		12	max	81.515	1	534.269	1	-3.345	12	.015	1	.002	2	.192	1
24			min	2.926	15	-534.71	3	-110.155	1	0	15	-.003	3	-.128	3
25		13	max	81.515	1	389.261	1	-1.877	12	.015	1	-.003	15	.346	3
26			min	2.926	15	-387.01	3	-69.618	1	0	15	-.093	1	-.282	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	81.515	1	244.253	1	-.41	12	.015	1	-.005	15	.668	3
28			min	2.926	15	-239.311	3	-29.08	1	0	15	-.143	1	-.608	1
29		15	max	81.515	1	99.245	1	11.457	1	.015	1	-.005	12	.838	3
30			min	2.926	15	-91.612	3	.422	15	0	15	-.153	1	-.784	1
31		16	max	81.515	1	56.087	3	51.995	1	.015	1	-.004	12	.856	3
32			min	2.926	15	-45.763	1	1.866	15	0	15	-.12	1	-.812	1
33		17	max	81.515	1	203.786	3	92.533	1	.015	1	0	3	.722	3
34			min	2.926	15	-190.771	1	3.31	15	0	15	-.046	1	-.69	1
35		18	max	81.515	1	351.486	3	133.07	1	.015	1	.07	1	.437	3
36			min	2.926	15	-335.779	1	4.753	15	0	15	.003	15	-.42	1
37		19	max	81.515	1	499.185	3	173.608	1	.015	1	.228	1	0	1
38			min	2.926	15	-480.787	1	6.197	15	0	15	.008	15	0	3
39	M14	1	max	46.477	1	530.199	1	-6.433	15	.008	3	.268	1	0	1
40			min	1.672	15	-397.35	3	-180.206	1	-.015	1	.01	15	0	3
41		2	max	46.477	1	385.191	1	-4.989	15	.008	3	.104	1	.351	3
42			min	1.672	15	-285.526	3	-139.669	1	-.015	1	.004	15	-.47	1
43		3	max	46.477	1	240.183	1	-3.545	15	.008	3	.002	3	.587	3
44			min	1.672	15	-173.701	3	-99.131	1	-.015	1	-.019	1	-.792	1
45		4	max	46.477	1	95.175	1	-2.101	15	.008	3	-.003	12	.708	3
46			min	1.672	15	-61.876	3	-58.594	1	-.015	1	-.1	1	-.964	1
47		5	max	46.477	1	49.948	3	-.657	15	.008	3	-.005	12	.714	3
48			min	1.672	15	-49.833	1	-18.056	1	-.015	1	-.139	1	-.987	1
49		6	max	46.477	1	161.773	3	22.482	1	.008	3	-.005	15	.605	3
50			min	1.672	15	-194.841	1	.148	3	-.015	1	-.137	1	-.862	1
51		7	max	46.477	1	273.597	3	63.019	1	.008	3	-.003	15	.382	3
52			min	1.672	15	-339.849	1	1.636	12	-.015	1	-.093	1	-.587	1
53		8	max	46.477	1	385.422	3	103.557	1	.008	3	0	10	.043	3
54			min	1.672	15	-484.857	1	3.103	12	-.015	1	-.007	1	-.163	1
55		9	max	46.477	1	497.247	3	144.094	1	.008	3	.12	1	.41	1
56			min	1.672	15	-629.865	1	4.571	12	-.015	1	.002	12	-.411	3
57		10	max	46.477	1	609.071	3	184.632	1	.015	1	.289	1	1.132	1
58			min	1.672	15	-774.873	1	6.039	12	-.008	3	.007	12	-.979	3
59		11	max	46.477	1	629.865	1	-4.571	12	.015	1	.12	1	.41	1
60			min	1.672	15	-497.247	3	-144.094	1	-.008	3	.002	12	-.411	3
61		12	max	46.477	1	484.857	1	-3.103	12	.015	1	0	10	.043	3
62			min	1.672	15	-385.422	3	-103.557	1	-.008	3	-.007	1	-.163	1
63		13	max	46.477	1	339.849	1	-1.636	12	.015	1	-.003	15	.382	3
64			min	1.672	15	-273.597	3	-63.019	1	-.008	3	-.093	1	-.587	1
65		14	max	46.477	1	194.841	1	-.148	3	.015	1	-.005	15	.605	3
66			min	1.672	15	-161.773	3	-22.482	1	-.008	3	-.137	1	-.862	1
67		15	max	46.477	1	49.833	1	18.056	1	.015	1	-.005	12	.714	3
68			min	1.672	15	-49.948	3	.657	15	-.008	3	-.139	1	-.987	1
69		16	max	46.477	1	61.876	3	58.594	1	.015	1	-.003	12	.708	3
70			min	1.672	15	-95.175	1	2.101	15	-.008	3	-.1	1	-.964	1
71		17	max	46.477	1	173.701	3	99.131	1	.015	1	.002	3	.587	3
72			min	1.672	15	-240.183	1	3.545	15	-.008	3	-.019	1	-.792	1
73		18	max	46.477	1	285.526	3	139.669	1	.015	1	.104	1	.351	3
74			min	1.672	15	-385.191	1	4.989	15	-.008	3	.004	15	-.47	1
75		19	max	46.477	1	397.35	3	180.206	1	.015	1	.268	1	0	1
76			min	1.672	15	-530.199	1	6.433	15	-.008	3	.01	15	0	3
77	M15	1	max	-1.785	15	595.024	1	-6.43	15	.015	1	.268	1	0	2
78			min	-49.57	1	-216.169	3	-180.156	1	-.007	3	.01	15	0	3
79		2	max	-1.785	15	430.797	1	-4.986	15	.015	1	.104	1	.192	3
80			min	-49.57	1	-158.156	3	-139.618	1	-.007	3	.004	15	-.527	1
81		3	max	-1.785	15	266.571	1	-3.542	15	.015	1	.001	3	.325	3
82			min	-49.57	1	-100.142	3	-99.08	1	-.007	3	-.019	1	-.886	1
83		4	max	-1.785	15	102.345	1	-2.098	15	.015	1	-.003	12	.398	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	-49.57	1	-42.129	3	-58.543	1	-.007	3	-.1	1	-1.075	1
85		5	max	-1.785	15	15.884	3	-.654	15	.015	1	-.005	12	.412	3
86			min	-49.57	1	-61.882	1	-18.005	1	-.007	3	-.139	1	-1.096	1
87		6	max	-1.785	15	73.897	3	22.532	1	.015	1	-.005	15	.366	3
88			min	-49.57	1	-226.108	1	.223	12	-.007	3	-.137	1	-.948	1
89		7	max	-1.785	15	131.911	3	63.07	1	.015	1	-.003	15	.26	3
90			min	-49.57	1	-390.335	1	1.691	12	-.007	3	-.093	1	-.631	1
91		8	max	-1.785	15	189.924	3	103.607	1	.015	1	0	10	.094	3
92			min	-49.57	1	-554.561	1	3.159	12	-.007	3	-.007	1	-.146	1
93		9	max	-1.785	15	247.937	3	144.145	1	.015	1	.12	1	.509	1
94			min	-49.57	1	-718.788	1	4.626	12	-.007	3	.002	12	-.131	3
95		10	max	-1.785	15	305.951	3	184.683	1	.007	3	.289	1	1.332	1
96			min	-49.57	1	-883.014	1	6.094	12	-.015	1	.008	12	-.415	3
97		11	max	-1.785	15	718.788	1	-4.626	12	.007	3	.12	1	.509	1
98			min	-49.57	1	-247.937	3	-144.145	1	-.015	1	.002	12	-.131	3
99		12	max	-1.785	15	554.561	1	-3.159	12	.007	3	0	10	.094	3
100			min	-49.57	1	-189.924	3	-103.607	1	-.015	1	-.007	1	-.146	1
101		13	max	-1.785	15	390.335	1	-1.691	12	.007	3	-.003	15	.26	3
102			min	-49.57	1	-131.911	3	-63.07	1	-.015	1	-.093	1	-.631	1
103		14	max	-1.785	15	226.108	1	-.223	12	.007	3	-.005	15	.366	3
104			min	-49.57	1	-73.897	3	-22.532	1	-.015	1	-.137	1	-.948	1
105		15	max	-1.785	15	61.882	1	18.005	1	.007	3	-.005	12	.412	3
106			min	-49.57	1	-15.884	3	.654	15	-.015	1	-.139	1	-1.096	1
107		16	max	-1.785	15	42.129	3	58.543	1	.007	3	-.003	12	.398	3
108			min	-49.57	1	-102.345	1	2.098	15	-.015	1	-.1	1	-1.075	1
109		17	max	-1.785	15	100.142	3	99.08	1	.007	3	.001	3	.325	3
110			min	-49.57	1	-266.571	1	3.542	15	-.015	1	-.019	1	-.886	1
111		18	max	-1.785	15	158.156	3	139.618	1	.007	3	.104	1	.192	3
112			min	-49.57	1	-430.797	1	4.986	15	-.015	1	.004	15	-.527	1
113		19	max	-1.785	15	216.169	3	180.156	1	.007	3	.268	1	0	2
114			min	-49.57	1	-595.024	1	6.43	15	-.015	1	.01	15	0	3
115	M16	1	max	-3.253	15	546.153	1	-6.21	15	.013	1	.23	1	0	1
116			min	-90.45	1	-190.391	3	-174.049	1	-.009	3	.008	15	0	3
117		2	max	-3.253	15	381.926	1	-4.766	15	.013	1	.072	1	.166	3
118			min	-90.45	1	-132.378	3	-133.512	1	-.009	3	.003	15	-.477	1
119		3	max	-3.253	15	217.7	1	-3.322	15	.013	1	0	12	.272	3
120			min	-90.45	1	-74.364	3	-92.974	1	-.009	3	-.044	1	-.785	1
121		4	max	-3.253	15	53.473	1	-1.878	15	.013	1	-.004	12	.319	3
122			min	-90.45	1	-16.351	3	-52.436	1	-.009	3	-.119	1	-.924	1
123		5	max	-3.253	15	41.662	3	-.435	15	.013	1	-.005	12	.306	3
124			min	-90.45	1	-110.753	1	-11.899	1	-.009	3	-.152	1	-.895	1
125		6	max	-3.253	15	99.675	3	28.639	1	.013	1	-.005	15	.233	3
126			min	-90.45	1	-274.98	1	.576	12	-.009	3	-.143	1	-.697	1
127		7	max	-3.253	15	157.689	3	69.176	1	.013	1	-.003	15	.101	3
128			min	-90.45	1	-439.206	1	2.043	12	-.009	3	-.093	1	-.33	1
129		8	max	-3.253	15	215.702	3	109.714	1	.013	1	0	2	.206	1
130			min	-90.45	1	-603.432	1	3.511	12	-.009	3	-.002	3	-.091	3
131		9	max	-3.253	15	273.715	3	150.251	1	.013	1	.132	1	.911	1
132			min	-90.45	1	-767.659	1	4.978	12	-.009	3	.003	12	-.343	3
133		10	max	-3.253	15	331.729	3	190.789	1	.009	3	.308	1	1.784	1
134			min	-90.45	1	-931.885	1	6.446	12	-.013	1	.009	12	-.654	3
135		11	max	-3.253	15	767.659	1	-4.978	12	.009	3	.132	1	.911	1
136			min	-90.45	1	-273.715	3	-150.251	1	-.013	1	.003	12	-.343	3
137		12	max	-3.253	15	603.432	1	-3.511	12	.009	3	0	2	.206	1
138			min	-90.45	1	-215.702	3	-109.714	1	-.013	1	-.002	3	-.091	3
139		13	max	-3.253	15	439.206	1	-2.043	12	.009	3	-.003	15	.101	3
140			min	-90.45	1	-157.689	3	-69.176	1	-.013	1	-.093	1	-.33	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
141		14	max	-3.253	15	274.98	1	-.576	12	.009	3	-.005	15	.233	3
142			min	-90.45	1	-99.675	3	-28.639	1	-.013	1	-.143	1	-.697	1
143		15	max	-3.253	15	110.753	1	11.899	1	.009	3	-.005	12	.306	3
144			min	-90.45	1	-41.662	3	.435	15	-.013	1	-.152	1	-.895	1
145		16	max	-3.253	15	16.351	3	52.436	1	.009	3	-.004	12	.319	3
146			min	-90.45	1	-53.473	1	1.878	15	-.013	1	-.119	1	-.924	1
147		17	max	-3.253	15	74.364	3	92.974	1	.009	3	0	12	.272	3
148			min	-90.45	1	-217.7	1	3.322	15	-.013	1	-.044	1	-.785	1
149		18	max	-3.253	15	132.378	3	133.512	1	.009	3	.072	1	.166	3
150			min	-90.45	1	-381.926	1	4.766	15	-.013	1	.003	15	-.477	1
151		19	max	-3.253	15	190.391	3	174.049	1	.009	3	.23	1	0	1
152			min	-90.45	1	-546.153	1	6.21	15	-.013	1	.008	15	0	3
153	M2	1	max	1102.237	1	2.156	4	.963	1	0	3	0	3	0	1
154			min	-910.853	3	.507	15	.034	15	0	1	0	1	0	1
155		2	max	1102.652	1	2.147	4	.963	1	0	3	0	1	0	15
156			min	-910.541	3	.505	15	.034	15	0	1	0	15	0	4
157		3	max	1103.068	1	2.138	4	.963	1	0	3	0	1	0	15
158			min	-910.229	3	.503	15	.034	15	0	1	0	15	-.001	4
159		4	max	1103.484	1	2.13	4	.963	1	0	3	0	1	0	15
160			min	-909.917	3	.501	15	.034	15	0	1	0	15	-.002	4
161		5	max	1103.9	1	2.121	4	.963	1	0	3	.001	1	0	15
162			min	-909.605	3	.499	15	.034	15	0	1	0	15	-.002	4
163		6	max	1104.316	1	2.112	4	.963	1	0	3	.001	1	0	15
164			min	-909.293	3	.497	15	.034	15	0	1	0	15	-.003	4
165		7	max	1104.732	1	2.104	4	.963	1	0	3	.002	1	0	15
166			min	-908.981	3	.495	15	.034	15	0	1	0	15	-.004	4
167		8	max	1105.148	1	2.095	4	.963	1	0	3	.002	1	0	15
168			min	-908.67	3	.493	15	.034	15	0	1	0	15	-.004	4
169		9	max	1105.564	1	2.086	4	.963	1	0	3	.002	1	-.001	15
170			min	-908.358	3	.491	15	.034	15	0	1	0	15	-.005	4
171		10	max	1105.979	1	2.077	4	.963	1	0	3	.002	1	-.001	15
172			min	-908.046	3	.488	15	.034	15	0	1	0	15	-.005	4
173		11	max	1106.395	1	2.069	4	.963	1	0	3	.003	1	-.001	15
174			min	-907.734	3	.486	15	.034	15	0	1	0	15	-.006	4
175		12	max	1106.811	1	2.06	4	.963	1	0	3	.003	1	-.002	15
176			min	-907.422	3	.484	15	.034	15	0	1	0	15	-.007	4
177		13	max	1107.227	1	2.051	4	.963	1	0	3	.003	1	-.002	15
178			min	-907.11	3	.482	15	.034	15	0	1	0	15	-.007	4
179		14	max	1107.643	1	2.043	4	.963	1	0	3	.003	1	-.002	15
180			min	-906.798	3	.48	15	.034	15	0	1	0	15	-.008	4
181		15	max	1108.059	1	2.034	4	.963	1	0	3	.004	1	-.002	15
182			min	-906.486	3	.478	15	.034	15	0	1	0	15	-.008	4
183		16	max	1108.475	1	2.025	4	.963	1	0	3	.004	1	-.002	15
184			min	-906.174	3	.476	15	.034	15	0	1	0	15	-.009	4
185		17	max	1108.891	1	2.016	4	.963	1	0	3	.004	1	-.002	15
186			min	-905.862	3	.474	15	.034	15	0	1	0	15	-.009	4
187		18	max	1109.307	1	2.008	4	.963	1	0	3	.005	1	-.002	15
188			min	-905.55	3	.472	15	.034	15	0	1	0	15	-.01	4
189		19	max	1109.722	1	1.999	4	.963	1	0	3	.005	1	-.002	15
190			min	-905.239	3	.47	15	.034	15	0	1	0	15	-.01	4
191	M3	1	max	357.12	2	9.1	4	.221	1	0	5	0	1	.01	4
192			min	-484.652	3	2.139	15	.008	15	0	1	0	15	.002	15
193		2	max	356.949	2	8.226	4	.221	1	0	5	0	1	.006	4
194			min	-484.78	3	1.934	15	.008	15	0	1	0	15	.002	15
195		3	max	356.779	2	7.351	4	.221	1	0	5	0	1	.003	2
196			min	-484.907	3	1.728	15	.008	15	0	1	0	15	0	12
197		4	max	356.609	2	6.477	4	.221	1	0	5	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	-485.035	3	1.523	15	.008	15	0	1	0	15	-.001	3
199		5	max	356.438	2	5.602	4	.221	1	0	5	0	1	0	15
200			min	-485.163	3	1.317	15	.008	15	0	1	0	15	-.003	4
201		6	max	356.268	2	4.728	4	.221	1	0	5	0	1	-.001	15
202			min	-485.291	3	1.111	15	.008	15	0	1	0	15	-.006	4
203		7	max	356.098	2	3.854	4	.221	1	0	5	0	1	-.002	15
204			min	-485.418	3	.906	15	.008	15	0	1	0	15	-.008	4
205		8	max	355.927	2	2.979	4	.221	1	0	5	0	1	-.002	15
206			min	-485.546	3	.7	15	.008	15	0	1	0	15	-.01	4
207		9	max	355.757	2	2.105	4	.221	1	0	5	0	1	-.003	15
208			min	-485.674	3	.495	15	.008	15	0	1	0	15	-.011	4
209		10	max	355.587	2	1.23	4	.221	1	0	5	.001	1	-.003	15
210			min	-485.802	3	.289	15	.008	15	0	1	0	15	-.012	4
211		11	max	355.416	2	.391	2	.221	1	0	5	.001	1	-.003	15
212			min	-485.929	3	.044	12	.008	15	0	1	0	15	-.012	4
213		12	max	355.246	2	-.122	15	.221	1	0	5	.001	1	-.003	15
214			min	-486.057	3	-.519	4	.008	15	0	1	0	15	-.012	4
215		13	max	355.076	2	-.327	15	.221	1	0	5	.001	1	-.003	15
216			min	-486.185	3	-1.393	4	.008	15	0	1	0	15	-.011	4
217		14	max	354.905	2	-.533	15	.221	1	0	5	.001	1	-.002	15
218			min	-486.313	3	-2.268	4	.008	15	0	1	0	15	-.011	4
219		15	max	354.735	2	-.738	15	.221	1	0	5	.002	1	-.002	15
220			min	-486.44	3	-3.142	4	.008	15	0	1	0	15	-.009	4
221		16	max	354.565	2	-.944	15	.221	1	0	5	.002	1	-.002	15
222			min	-486.568	3	-4.016	4	.008	15	0	1	0	15	-.008	4
223		17	max	354.394	2	-1.15	15	.221	1	0	5	.002	1	-.001	15
224			min	-486.696	3	-4.891	4	.008	15	0	1	0	15	-.005	4
225		18	max	354.224	2	-1.355	15	.221	1	0	5	.002	1	0	15
226			min	-486.824	3	-5.765	4	.008	15	0	1	0	15	-.003	4
227		19	max	354.054	2	-1.561	15	.221	1	0	5	.002	1	0	1
228			min	-486.951	3	-6.64	4	.008	15	0	1	0	15	0	1
229	M4	1	max	1185.335	1	0	1	-.482	15	0	1	.001	1	0	1
230			min	-154.516	3	0	1	-13.497	1	0	1	0	15	0	1
231		2	max	1185.505	1	0	1	-.482	15	0	1	0	12	0	1
232			min	-154.388	3	0	1	-13.497	1	0	1	0	1	0	1
233		3	max	1185.676	1	0	1	-.482	15	0	1	0	15	0	1
234			min	-154.26	3	0	1	-13.497	1	0	1	-.002	1	0	1
235		4	max	1185.846	1	0	1	-.482	15	0	1	0	15	0	1
236			min	-154.133	3	0	1	-13.497	1	0	1	-.003	1	0	1
237		5	max	1186.016	1	0	1	-.482	15	0	1	0	15	0	1
238			min	-154.005	3	0	1	-13.497	1	0	1	-.005	1	0	1
239		6	max	1186.187	1	0	1	-.482	15	0	1	0	15	0	1
240			min	-153.877	3	0	1	-13.497	1	0	1	-.007	1	0	1
241		7	max	1186.357	1	0	1	-.482	15	0	1	0	15	0	1
242			min	-153.749	3	0	1	-13.497	1	0	1	-.008	1	0	1
243		8	max	1186.527	1	0	1	-.482	15	0	1	0	15	0	1
244			min	-153.621	3	0	1	-13.497	1	0	1	-.01	1	0	1
245		9	max	1186.698	1	0	1	-.482	15	0	1	0	15	0	1
246			min	-153.494	3	0	1	-13.497	1	0	1	-.011	1	0	1
247		10	max	1186.868	1	0	1	-.482	15	0	1	0	15	0	1
248			min	-153.366	3	0	1	-13.497	1	0	1	-.013	1	0	1
249		11	max	1187.038	1	0	1	-.482	15	0	1	0	15	0	1
250			min	-153.238	3	0	1	-13.497	1	0	1	-.014	1	0	1
251		12	max	1187.209	1	0	1	-.482	15	0	1	0	15	0	1
252			min	-153.11	3	0	1	-13.497	1	0	1	-.016	1	0	1
253		13	max	1187.379	1	0	1	-.482	15	0	1	0	15	0	1
254			min	-152.983	3	0	1	-13.497	1	0	1	-.017	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
255		14	max	1187.55	1	0	1	-.482	15	0	1	0	15	0	1
256			min	-152.855	3	0	1	-13.497	1	0	1	-.019	1	0	1
257		15	max	1187.72	1	0	1	-.482	15	0	1	0	15	0	1
258			min	-152.727	3	0	1	-13.497	1	0	1	-.021	1	0	1
259		16	max	1187.89	1	0	1	-.482	15	0	1	0	15	0	1
260			min	-152.599	3	0	1	-13.497	1	0	1	-.022	1	0	1
261		17	max	1188.061	1	0	1	-.482	15	0	1	0	15	0	1
262			min	-152.472	3	0	1	-13.497	1	0	1	-.024	1	0	1
263		18	max	1188.231	1	0	1	-.482	15	0	1	0	15	0	1
264			min	-152.344	3	0	1	-13.497	1	0	1	-.025	1	0	1
265		19	max	1188.401	1	0	1	-.482	15	0	1	0	15	0	1
266			min	-152.216	3	0	1	-13.497	1	0	1	-.027	1	0	1
267	M6	1	max	3462.508	1	2.394	2	0	1	0	1	0	1	0	1
268			min	-2933.351	3	.341	12	0	1	0	1	0	1	0	1
269		2	max	3462.924	1	2.388	2	0	1	0	1	0	1	0	12
270			min	-2933.039	3	.338	12	0	1	0	1	0	1	0	2
271		3	max	3463.34	1	2.381	2	0	1	0	1	0	1	0	12
272			min	-2932.727	3	.335	12	0	1	0	1	0	1	-.001	2
273		4	max	3463.756	1	2.374	2	0	1	0	1	0	1	0	12
274			min	-2932.415	3	.331	12	0	1	0	1	0	1	-.002	2
275		5	max	3464.172	1	2.367	2	0	1	0	1	0	1	0	12
276			min	-2932.103	3	.328	12	0	1	0	1	0	1	-.003	2
277		6	max	3464.588	1	2.36	2	0	1	0	1	0	1	0	12
278			min	-2931.791	3	.325	12	0	1	0	1	0	1	-.003	2
279		7	max	3465.003	1	2.354	2	0	1	0	1	0	1	0	12
280			min	-2931.479	3	.321	12	0	1	0	1	0	1	-.004	2
281		8	max	3465.419	1	2.347	2	0	1	0	1	0	1	0	12
282			min	-2931.167	3	.318	12	0	1	0	1	0	1	-.005	2
283		9	max	3465.835	1	2.34	2	0	1	0	1	0	1	0	12
284			min	-2930.855	3	.314	12	0	1	0	1	0	1	-.005	2
285		10	max	3466.251	1	2.333	2	0	1	0	1	0	1	0	12
286			min	-2930.543	3	.311	12	0	1	0	1	0	1	-.006	2
287		11	max	3466.667	1	2.326	2	0	1	0	1	0	1	0	12
288			min	-2930.231	3	.308	12	0	1	0	1	0	1	-.007	2
289		12	max	3467.083	1	2.32	2	0	1	0	1	0	1	0	12
290			min	-2929.92	3	.304	12	0	1	0	1	0	1	-.007	2
291		13	max	3467.499	1	2.313	2	0	1	0	1	0	1	-.001	12
292			min	-2929.608	3	.301	12	0	1	0	1	0	1	-.008	2
293		14	max	3467.915	1	2.306	2	0	1	0	1	0	1	-.001	12
294			min	-2929.296	3	.297	12	0	1	0	1	0	1	-.009	2
295		15	max	3468.33	1	2.299	2	0	1	0	1	0	1	-.001	12
296			min	-2928.984	3	.294	12	0	1	0	1	0	1	-.009	2
297		16	max	3468.746	1	2.292	2	0	1	0	1	0	1	-.001	12
298			min	-2928.672	3	.291	12	0	1	0	1	0	1	-.01	2
299		17	max	3469.162	1	2.286	2	0	1	0	1	0	1	-.001	12
300			min	-2928.36	3	.287	12	0	1	0	1	0	1	-.01	2
301		18	max	3469.578	1	2.279	2	0	1	0	1	0	1	-.001	12
302			min	-2928.048	3	.284	12	0	1	0	1	0	1	-.011	2
303		19	max	3469.994	1	2.272	2	0	1	0	1	0	1	-.002	12
304			min	-2927.736	3	.28	12	0	1	0	1	0	1	-.012	2
305	M7	1	max	1407.712	2	9.143	4	0	1	0	1	0	1	.012	2
306			min	-1484.108	3	2.145	15	0	1	0	1	0	1	.002	12
307		2	max	1407.542	2	8.268	4	0	1	0	1	0	1	.008	2
308			min	-1484.236	3	1.939	15	0	1	0	1	0	1	0	3
309		3	max	1407.372	2	7.394	4	0	1	0	1	0	1	.005	2
310			min	-1484.364	3	1.734	15	0	1	0	1	0	1	-.002	3
311		4	max	1407.201	2	6.519	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	-1484.492	3	1.528	15	0	1	0	1	0	1	-.004	3
313		5	max	1407.031	2	5.645	4	0	1	0	1	0	1	0	2
314			min	-1484.619	3	1.323	15	0	1	0	1	0	1	-.005	3
315		6	max	1406.861	2	4.77	4	0	1	0	1	0	1	-.001	15
316			min	-1484.747	3	1.117	15	0	1	0	1	0	1	-.006	3
317		7	max	1406.69	2	3.896	4	0	1	0	1	0	1	-.002	15
318			min	-1484.875	3	.912	15	0	1	0	1	0	1	-.008	4
319		8	max	1406.52	2	3.022	4	0	1	0	1	0	1	-.002	15
320			min	-1485.003	3	.706	15	0	1	0	1	0	1	-.009	4
321		9	max	1406.35	2	2.147	4	0	1	0	1	0	1	-.002	15
322			min	-1485.13	3	.501	15	0	1	0	1	0	1	-.011	4
323		10	max	1406.179	2	1.382	2	0	1	0	1	0	1	-.003	15
324			min	-1485.258	3	.184	12	0	1	0	1	0	1	-.011	4
325		11	max	1406.009	2	.7	2	0	1	0	1	0	1	-.003	15
326			min	-1485.386	3	-.285	3	0	1	0	1	0	1	-.012	4
327		12	max	1405.839	2	.019	2	0	1	0	1	0	1	-.003	15
328			min	-1485.514	3	-.796	3	0	1	0	1	0	1	-.012	4
329		13	max	1405.668	2	-.322	15	0	1	0	1	0	1	-.003	15
330			min	-1485.642	3	-1.351	4	0	1	0	1	0	1	-.011	4
331		14	max	1405.498	2	-.527	15	0	1	0	1	0	1	-.002	15
332			min	-1485.769	3	-2.225	4	0	1	0	1	0	1	-.01	4
333		15	max	1405.328	2	-.733	15	0	1	0	1	0	1	-.002	15
334			min	-1485.897	3	-3.1	4	0	1	0	1	0	1	-.009	4
335		16	max	1405.157	2	-.938	15	0	1	0	1	0	1	-.002	15
336			min	-1486.025	3	-3.974	4	0	1	0	1	0	1	-.008	4
337		17	max	1404.987	2	-1.144	15	0	1	0	1	0	1	-.001	15
338			min	-1486.153	3	-4.848	4	0	1	0	1	0	1	-.005	4
339		18	max	1404.817	2	-1.349	15	0	1	0	1	0	1	0	15
340			min	-1486.28	3	-5.723	4	0	1	0	1	0	1	-.003	4
341		19	max	1404.646	2	-1.555	15	0	1	0	1	0	1	0	1
342			min	-1486.408	3	-6.597	4	0	1	0	1	0	1	0	1
343	M8	1	max	3287.026	1	0	1	0	1	0	1	0	1	0	1
344			min	-557.57	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3287.196	1	0	1	0	1	0	1	0	1	0	1
346			min	-557.443	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3287.366	1	0	1	0	1	0	1	0	1	0	1
348			min	-557.315	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3287.537	1	0	1	0	1	0	1	0	1	0	1
350			min	-557.187	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3287.707	1	0	1	0	1	0	1	0	1	0	1
352			min	-557.059	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3287.877	1	0	1	0	1	0	1	0	1	0	1
354			min	-556.932	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3288.048	1	0	1	0	1	0	1	0	1	0	1
356			min	-556.804	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3288.218	1	0	1	0	1	0	1	0	1	0	1
358			min	-556.676	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3288.388	1	0	1	0	1	0	1	0	1	0	1
360			min	-556.548	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3288.559	1	0	1	0	1	0	1	0	1	0	1
362			min	-556.421	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3288.729	1	0	1	0	1	0	1	0	1	0	1
364			min	-556.293	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3288.9	1	0	1	0	1	0	1	0	1	0	1
366			min	-556.165	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3289.07	1	0	1	0	1	0	1	0	1	0	1
368			min	-556.037	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	3289.24	1	0	1	0	1	0	1	0	1	0	1
370			min	-555.91	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3289.411	1	0	1	0	1	0	1	0	1	0	1
372			min	-555.782	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3289.581	1	0	1	0	1	0	1	0	1	0	1
374			min	-555.654	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3289.751	1	0	1	0	1	0	1	0	1	0	1
376			min	-555.526	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3289.922	1	0	1	0	1	0	1	0	1	0	1
378			min	-555.398	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3290.092	1	0	1	0	1	0	1	0	1	0	1
380			min	-555.271	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1102.237	1	2.156	4	-.034	15	0	1	0	1	0	1
382			min	-910.853	3	.507	15	-.963	1	0	3	0	3	0	1
383		2	max	1102.652	1	2.147	4	-.034	15	0	1	0	15	0	15
384			min	-910.541	3	.505	15	-.963	1	0	3	0	1	0	4
385		3	max	1103.068	1	2.138	4	-.034	15	0	1	0	15	0	15
386			min	-910.229	3	.503	15	-.963	1	0	3	0	1	-.001	4
387		4	max	1103.484	1	2.13	4	-.034	15	0	1	0	15	0	15
388			min	-909.917	3	.501	15	-.963	1	0	3	0	1	-.002	4
389		5	max	1103.9	1	2.121	4	-.034	15	0	1	0	15	0	15
390			min	-909.605	3	.499	15	-.963	1	0	3	-.001	1	-.002	4
391		6	max	1104.316	1	2.112	4	-.034	15	0	1	0	15	0	15
392			min	-909.293	3	.497	15	-.963	1	0	3	-.001	1	-.003	4
393		7	max	1104.732	1	2.104	4	-.034	15	0	1	0	15	0	15
394			min	-908.981	3	.495	15	-.963	1	0	3	-.002	1	-.004	4
395		8	max	1105.148	1	2.095	4	-.034	15	0	1	0	15	0	15
396			min	-908.67	3	.493	15	-.963	1	0	3	-.002	1	-.004	4
397		9	max	1105.564	1	2.086	4	-.034	15	0	1	0	15	-.001	15
398			min	-908.358	3	.491	15	-.963	1	0	3	-.002	1	-.005	4
399		10	max	1105.979	1	2.077	4	-.034	15	0	1	0	15	-.001	15
400			min	-908.046	3	.488	15	-.963	1	0	3	-.002	1	-.005	4
401		11	max	1106.395	1	2.069	4	-.034	15	0	1	0	15	-.001	15
402			min	-907.734	3	.486	15	-.963	1	0	3	-.003	1	-.006	4
403		12	max	1106.811	1	2.06	4	-.034	15	0	1	0	15	-.002	15
404			min	-907.422	3	.484	15	-.963	1	0	3	-.003	1	-.007	4
405		13	max	1107.227	1	2.051	4	-.034	15	0	1	0	15	-.002	15
406			min	-907.11	3	.482	15	-.963	1	0	3	-.003	1	-.007	4
407		14	max	1107.643	1	2.043	4	-.034	15	0	1	0	15	-.002	15
408			min	-906.798	3	.48	15	-.963	1	0	3	-.003	1	-.008	4
409		15	max	1108.059	1	2.034	4	-.034	15	0	1	0	15	-.002	15
410			min	-906.486	3	.478	15	-.963	1	0	3	-.004	1	-.008	4
411		16	max	1108.475	1	2.025	4	-.034	15	0	1	0	15	-.002	15
412			min	-906.174	3	.476	15	-.963	1	0	3	-.004	1	-.009	4
413		17	max	1108.891	1	2.016	4	-.034	15	0	1	0	15	-.002	15
414			min	-905.862	3	.474	15	-.963	1	0	3	-.004	1	-.009	4
415		18	max	1109.307	1	2.008	4	-.034	15	0	1	0	15	-.002	15
416			min	-905.55	3	.472	15	-.963	1	0	3	-.005	1	-.01	4
417		19	max	1109.722	1	1.999	4	-.034	15	0	1	0	15	-.002	15
418			min	-905.239	3	.47	15	-.963	1	0	3	-.005	1	-.01	4
419	M11	1	max	357.12	2	9.1	4	-.008	15	0	1	0	15	.01	4
420			min	-484.652	3	2.139	15	-.221	1	0	5	0	1	.002	15
421		2	max	356.949	2	8.226	4	-.008	15	0	1	0	15	.006	4
422			min	-484.78	3	1.934	15	-.221	1	0	5	0	1	.002	15
423		3	max	356.779	2	7.351	4	-.008	15	0	1	0	15	.003	2
424			min	-484.907	3	1.728	15	-.221	1	0	5	0	1	0	12
425		4	max	356.609	2	6.477	4	-.008	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	-485.035	3	1.523	15	-.221	1	0	5	0	1	-.001	3
427		5	max	356.438	2	5.602	4	-.008	15	0	1	0	15	0	15
428			min	-485.163	3	1.317	15	-.221	1	0	5	0	1	-.003	4
429		6	max	356.268	2	4.728	4	-.008	15	0	1	0	15	-.001	15
430			min	-485.291	3	1.111	15	-.221	1	0	5	0	1	-.006	4
431		7	max	356.098	2	3.854	4	-.008	15	0	1	0	15	-.002	15
432			min	-485.418	3	.906	15	-.221	1	0	5	0	1	-.008	4
433		8	max	355.927	2	2.979	4	-.008	15	0	1	0	15	-.002	15
434			min	-485.546	3	.7	15	-.221	1	0	5	0	1	-.01	4
435		9	max	355.757	2	2.105	4	-.008	15	0	1	0	15	-.003	15
436			min	-485.674	3	.495	15	-.221	1	0	5	0	1	-.011	4
437		10	max	355.587	2	1.23	4	-.008	15	0	1	0	15	-.003	15
438			min	-485.802	3	.289	15	-.221	1	0	5	-.001	1	-.012	4
439		11	max	355.416	2	.391	2	-.008	15	0	1	0	15	-.003	15
440			min	-485.929	3	.044	12	-.221	1	0	5	-.001	1	-.012	4
441		12	max	355.246	2	-.122	15	-.008	15	0	1	0	15	-.003	15
442			min	-486.057	3	-.519	4	-.221	1	0	5	-.001	1	-.012	4
443		13	max	355.076	2	-.327	15	-.008	15	0	1	0	15	-.003	15
444			min	-486.185	3	-1.393	4	-.221	1	0	5	-.001	1	-.011	4
445		14	max	354.905	2	-.533	15	-.008	15	0	1	0	15	-.002	15
446			min	-486.313	3	-2.268	4	-.221	1	0	5	-.001	1	-.011	4
447		15	max	354.735	2	-.738	15	-.008	15	0	1	0	15	-.002	15
448			min	-486.44	3	-3.142	4	-.221	1	0	5	-.002	1	-.009	4
449		16	max	354.565	2	-.944	15	-.008	15	0	1	0	15	-.002	15
450			min	-486.568	3	-4.016	4	-.221	1	0	5	-.002	1	-.008	4
451		17	max	354.394	2	-1.15	15	-.008	15	0	1	0	15	-.001	15
452			min	-486.696	3	-4.891	4	-.221	1	0	5	-.002	1	-.005	4
453		18	max	354.224	2	-1.355	15	-.008	15	0	1	0	15	0	15
454			min	-486.824	3	-5.765	4	-.221	1	0	5	-.002	1	-.003	4
455		19	max	354.054	2	-1.561	15	-.008	15	0	1	0	15	0	1
456			min	-486.951	3	-6.64	4	-.221	1	0	5	-.002	1	0	1
457	M12	1	max	1185.335	1	0	1	13.497	1	0	1	0	15	0	1
458			min	-154.516	3	0	1	.482	15	0	1	-.001	1	0	1
459		2	max	1185.505	1	0	1	13.497	1	0	1	0	1	0	1
460			min	-154.388	3	0	1	.482	15	0	1	0	12	0	1
461		3	max	1185.676	1	0	1	13.497	1	0	1	.002	1	0	1
462			min	-154.26	3	0	1	.482	15	0	1	0	15	0	1
463		4	max	1185.846	1	0	1	13.497	1	0	1	.003	1	0	1
464			min	-154.133	3	0	1	.482	15	0	1	0	15	0	1
465		5	max	1186.016	1	0	1	13.497	1	0	1	.005	1	0	1
466			min	-154.005	3	0	1	.482	15	0	1	0	15	0	1
467		6	max	1186.187	1	0	1	13.497	1	0	1	.007	1	0	1
468			min	-153.877	3	0	1	.482	15	0	1	0	15	0	1
469		7	max	1186.357	1	0	1	13.497	1	0	1	.008	1	0	1
470			min	-153.749	3	0	1	.482	15	0	1	0	15	0	1
471		8	max	1186.527	1	0	1	13.497	1	0	1	.01	1	0	1
472			min	-153.621	3	0	1	.482	15	0	1	0	15	0	1
473		9	max	1186.698	1	0	1	13.497	1	0	1	.011	1	0	1
474			min	-153.494	3	0	1	.482	15	0	1	0	15	0	1
475		10	max	1186.868	1	0	1	13.497	1	0	1	.013	1	0	1
476			min	-153.366	3	0	1	.482	15	0	1	0	15	0	1
477		11	max	1187.038	1	0	1	13.497	1	0	1	.014	1	0	1
478			min	-153.238	3	0	1	.482	15	0	1	0	15	0	1
479		12	max	1187.209	1	0	1	13.497	1	0	1	.016	1	0	1
480			min	-153.11	3	0	1	.482	15	0	1	0	15	0	1
481		13	max	1187.379	1	0	1	13.497	1	0	1	.017	1	0	1
482			min	-152.983	3	0	1	.482	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	1187.55	1	0	1	13.497	1	0	1	.019	1	0	1
484			min	-152.855	3	0	1	.482	15	0	1	0	15	0	1
485		15	max	1187.72	1	0	1	13.497	1	0	1	.021	1	0	1
486			min	-152.727	3	0	1	.482	15	0	1	0	15	0	1
487		16	max	1187.89	1	0	1	13.497	1	0	1	.022	1	0	1
488			min	-152.599	3	0	1	.482	15	0	1	0	15	0	1
489		17	max	1188.061	1	0	1	13.497	1	0	1	.024	1	0	1
490			min	-152.472	3	0	1	.482	15	0	1	0	15	0	1
491		18	max	1188.231	1	0	1	13.497	1	0	1	.025	1	0	1
492			min	-152.344	3	0	1	.482	15	0	1	0	15	0	1
493		19	max	1188.401	1	0	1	13.497	1	0	1	.027	1	0	1
494			min	-152.216	3	0	1	.482	15	0	1	0	15	0	1
495	M1	1	max	173.613	1	499.157	3	-2.926	15	0	1	.228	1	0	15
496			min	6.197	15	-478.597	1	-81.381	1	0	3	.008	15	-.015	1
497		2	max	174.189	1	497.97	3	-2.926	15	0	1	.177	1	.283	1
498			min	6.371	15	-480.18	1	-81.381	1	0	3	.006	15	-.311	3
499		3	max	309.692	3	555.635	1	-2.892	15	0	3	.127	1	.57	1
500			min	-213.388	2	-365.703	3	-80.696	1	0	1	.005	15	-.61	3
501		4	max	310.125	3	554.052	1	-2.892	15	0	3	.077	1	.226	1
502			min	-212.812	2	-366.891	3	-80.696	1	0	1	.003	15	-.383	3
503		5	max	310.557	3	552.469	1	-2.892	15	0	3	.027	1	-.005	15
504			min	-212.236	2	-368.078	3	-80.696	1	0	1	0	15	-.155	3
505		6	max	310.989	3	550.886	1	-2.892	15	0	3	0	15	.074	3
506			min	-211.66	2	-369.266	3	-80.696	1	0	1	-.023	1	-.46	1
507		7	max	311.421	3	549.302	1	-2.892	15	0	3	-.003	15	.304	3
508			min	-211.083	2	-370.453	3	-80.696	1	0	1	-.073	1	-.801	1
509		8	max	311.853	3	547.719	1	-2.892	15	0	3	-.004	15	.534	3
510			min	-210.507	2	-371.64	3	-80.696	1	0	1	-.124	1	-1.142	1
511		9	max	323.144	3	33.336	2	-4.564	15	0	9	.078	1	.625	3
512			min	-139.602	2	.482	15	-127.222	1	0	3	.003	15	-1.3	1
513		10	max	323.576	3	31.752	2	-4.564	15	0	9	0	15	.609	3
514			min	-139.025	2	.004	15	-127.222	1	0	3	-.001	1	-1.311	1
515		11	max	324.008	3	30.169	2	-4.564	15	0	9	-.003	15	.594	3
516			min	-138.449	2	-1.918	4	-127.222	1	0	3	-.08	1	-1.321	1
517		12	max	335.207	3	241.193	3	-2.779	15	0	1	.121	1	.518	3
518			min	-76.524	10	-583.891	1	-77.7	1	0	3	.004	15	-1.167	1
519		13	max	335.64	3	240.006	3	-2.779	15	0	1	.073	1	.369	3
520			min	-76.044	10	-585.474	1	-77.7	1	0	3	.003	15	-.804	1
521		14	max	336.072	3	238.819	3	-2.779	15	0	1	.025	1	.22	3
522			min	-75.564	10	-587.058	1	-77.7	1	0	3	0	15	-.44	1
523		15	max	336.504	3	237.631	3	-2.779	15	0	1	0	15	.072	3
524			min	-75.084	10	-588.641	1	-77.7	1	0	3	-.024	1	-.075	1
525		16	max	336.936	3	236.444	3	-2.779	15	0	1	-.003	15	.29	1
526			min	-74.603	10	-590.224	1	-77.7	1	0	3	-.072	1	-.075	3
527		17	max	337.368	3	235.256	3	-2.779	15	0	1	-.004	15	.657	1
528			min	-74.123	10	-591.807	1	-77.7	1	0	3	-.12	1	-.221	3
529		18	max	-6.384	15	549.815	1	-3.253	15	0	3	-.006	15	.328	1
530			min	-174.621	1	-189.263	3	-90.577	1	0	1	-.174	1	-.109	3
531		19	max	-6.21	15	548.232	1	-3.253	15	0	3	-.008	15	.009	3
532			min	-174.045	1	-190.451	3	-90.577	1	0	1	-.23	1	-.013	1
533	M5	1	max	382.45	1	1660.163	3	0	1	0	1	0	1	.029	1
534			min	12.56	12	-1637.96	1	0	1	0	1	0	1	0	15
535		2	max	383.027	1	1658.975	3	0	1	0	1	0	1	1.046	1
536			min	12.848	12	-1639.543	1	0	1	0	1	0	1	-1.027	3
537		3	max	976.844	3	1595.477	1	0	1	0	1	0	1	2.029	1
538			min	-745.955	1	-1130.52	3	0	1	0	1	0	1	-2.026	3
539		4	max	977.276	3	1593.894	1	0	1	0	1	0	1	1.039	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	-745.379	1	-1131.708	3	0	1	0	1	0	1	-1.324	3
541		5	max	977.708	3	1592.311	1	0	1	0	1	0	1	.05	1
542			min	-744.803	1	-1132.895	3	0	1	0	1	0	1	-.621	3
543		6	max	978.14	3	1590.727	1	0	1	0	1	0	1	.082	3
544			min	-744.227	1	-1134.082	3	0	1	0	1	0	1	-.937	1
545		7	max	978.572	3	1589.144	1	0	1	0	1	0	1	.787	3
546			min	-743.65	1	-1135.27	3	0	1	0	1	0	1	-1.924	1
547		8	max	979.004	3	1587.561	1	0	1	0	1	0	1	1.491	3
548			min	-743.074	1	-1136.457	3	0	1	0	1	0	1	-2.91	1
549		9	max	997.344	3	110.833	2	0	1	0	1	0	1	1.722	3
550			min	-583.822	2	.48	15	0	1	0	1	0	1	-3.299	1
551		10	max	997.777	3	109.249	2	0	1	0	1	0	1	1.663	3
552			min	-583.246	2	.002	15	0	1	0	1	0	1	-3.336	1
553		11	max	998.209	3	107.666	2	0	1	0	1	0	1	1.605	3
554			min	-582.67	2	-1.707	4	0	1	0	1	0	1	-3.373	1
555		12	max	1016.73	3	721.624	3	0	1	0	1	0	1	1.405	3
556			min	-435.526	2	-1708.331	1	0	1	0	1	0	1	-3	1
557		13	max	1017.162	3	720.436	3	0	1	0	1	0	1	.957	3
558			min	-434.95	2	-1709.914	1	0	1	0	1	0	1	-1.939	1
559		14	max	1017.595	3	719.249	3	0	1	0	1	0	1	.511	3
560			min	-434.374	2	-1711.498	1	0	1	0	1	0	1	-.877	1
561		15	max	1018.027	3	718.061	3	0	1	0	1	0	1	.23	2
562			min	-433.798	2	-1713.081	1	0	1	0	1	0	1	0	5
563		16	max	1018.459	3	716.874	3	0	1	0	1	0	1	1.249	1
564			min	-433.221	2	-1714.664	1	0	1	0	1	0	1	-.381	3
565		17	max	1018.891	3	715.687	3	0	1	0	1	0	1	2.314	1
566			min	-432.645	2	-1716.247	1	0	1	0	1	0	1	-.825	3
567		18	max	-13.179	12	1875.198	1	0	1	0	1	0	1	1.189	1
568			min	-382.162	1	-662.563	3	0	1	0	1	0	1	-.43	3
569		19	max	-12.891	12	1873.614	1	0	1	0	1	0	1	.025	1
570			min	-381.586	1	-663.751	3	0	1	0	1	0	1	-.018	3
571	M9	1	max	173.613	1	499.157	3	81.381	1	0	3	-.008	15	0	15
572			min	6.197	15	-478.597	1	2.926	15	0	1	-.228	1	-.015	1
573		2	max	174.189	1	497.97	3	81.381	1	0	3	-.006	15	.283	1
574			min	6.371	15	-480.18	1	2.926	15	0	1	-.177	1	-.311	3
575		3	max	309.692	3	555.635	1	80.696	1	0	1	-.005	15	.57	1
576			min	-213.388	2	-365.703	3	2.892	15	0	3	-.127	1	-.61	3
577		4	max	310.125	3	554.052	1	80.696	1	0	1	-.003	15	.226	1
578			min	-212.812	2	-366.891	3	2.892	15	0	3	-.077	1	-.383	3
579		5	max	310.557	3	552.469	1	80.696	1	0	1	0	15	-.005	15
580			min	-212.236	2	-368.078	3	2.892	15	0	3	-.027	1	-.155	3
581		6	max	310.989	3	550.886	1	80.696	1	0	1	.023	1	.074	3
582			min	-211.66	2	-369.266	3	2.892	15	0	3	0	15	-.46	1
583		7	max	311.421	3	549.302	1	80.696	1	0	1	.073	1	.304	3
584			min	-211.083	2	-370.453	3	2.892	15	0	3	.003	15	-.801	1
585		8	max	311.853	3	547.719	1	80.696	1	0	1	.124	1	.534	3
586			min	-210.507	2	-371.64	3	2.892	15	0	3	.004	15	-1.142	1
587		9	max	323.144	3	33.336	2	127.222	1	0	3	-.003	15	.625	3
588			min	-139.602	2	.482	15	4.564	15	0	9	-.078	1	-1.3	1
589		10	max	323.576	3	31.752	2	127.222	1	0	3	.001	1	.609	3
590			min	-139.025	2	.004	15	4.564	15	0	9	0	15	-1.311	1
591		11	max	324.008	3	30.169	2	127.222	1	0	3	.08	1	.594	3
592			min	-138.449	2	-1.918	4	4.564	15	0	9	.003	15	-1.321	1
593		12	max	335.207	3	241.193	3	77.7	1	0	3	-.004	15	.518	3
594			min	-76.524	10	-583.891	1	2.779	15	0	1	-.121	1	-1.167	1
595		13	max	335.64	3	240.006	3	77.7	1	0	3	-.003	15	.369	3
596			min	-76.044	10	-585.474	1	2.779	15	0	1	-.073	1	-.804	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	336.072	3	238.819	3	77.7	1	0	3	0	15	.22	3
598			min	-75.564	10	-587.058	1	2.779	15	0	1	-.025	1	-.44	1
599		15	max	336.504	3	237.631	3	77.7	1	0	3	.024	1	.072	3
600			min	-75.084	10	-588.641	1	2.779	15	0	1	0	15	-.075	1
601		16	max	336.936	3	236.444	3	77.7	1	0	3	.072	1	.29	1
602			min	-74.603	10	-590.224	1	2.779	15	0	1	.003	15	-.075	3
603		17	max	337.368	3	235.256	3	77.7	1	0	3	.12	1	.657	1
604			min	-74.123	10	-591.807	1	2.779	15	0	1	.004	15	-.221	3
605		18	max	-6.384	15	549.815	1	90.577	1	0	1	.174	1	.328	1
606			min	-174.621	1	-189.263	3	3.253	15	0	3	.006	15	-.109	3
607		19	max	-6.21	15	548.232	1	90.577	1	0	1	.23	1	.009	3
608			min	-174.045	1	-190.451	3	3.253	15	0	3	.008	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	.191	1	.006	3	1.275e-2	1	NC	1	NC	1
2			min	0	15	-.028	3	-.003	2	-1.767e-3	3	NC	1	NC	1
3		2	max	0	1	.16	3	.035	1	1.407e-2	1	NC	5	NC	2
4			min	0	15	.002	15	0	10	-1.638e-3	3	1176.932	3	6620.255	1
5		3	max	0	1	.313	3	.081	1	1.539e-2	1	NC	5	NC	3
6			min	0	15	-.081	1	.003	15	-1.509e-3	3	649.752	3	2792.774	1
7		4	max	0	1	.407	3	.12	1	1.671e-2	1	NC	5	NC	3
8			min	0	15	-.143	1	.004	15	-1.381e-3	3	510.099	3	1875.867	1
9		5	max	0	1	.43	3	.139	1	1.804e-2	1	NC	5	NC	3
10			min	0	15	-.138	1	.005	15	-1.252e-3	3	484.659	3	1613.522	1
11		6	max	0	1	.383	3	.133	1	1.936e-2	1	NC	5	NC	3
12			min	0	15	-.068	1	.005	15	-1.123e-3	3	539.185	3	1685.336	1
13		7	max	0	1	.282	3	.104	1	2.068e-2	1	NC	5	NC	3
14			min	0	15	.002	15	.004	15	-9.94e-4	3	714.978	3	2170.461	1
15		8	max	0	1	.194	1	.059	1	2.2e-2	1	NC	1	NC	2
16			min	0	15	.006	15	0	10	-8.652e-4	3	1224.257	3	3840.579	1
17		9	max	0	1	.319	1	.02	3	2.332e-2	1	NC	5	NC	1
18			min	0	15	.009	15	-.006	10	-7.364e-4	3	1725.173	1	NC	1
19		10	max	0	1	.375	1	.019	3	2.465e-2	1	NC	3	NC	1
20			min	0	1	-.018	3	-.013	2	-6.075e-4	3	1203.907	1	NC	1
21		11	max	0	15	.319	1	.02	3	2.332e-2	1	NC	5	NC	1
22			min	0	1	.009	15	-.006	10	-7.364e-4	3	1725.173	1	NC	1
23		12	max	0	15	.194	1	.059	1	2.2e-2	1	NC	1	NC	2
24			min	0	1	.006	15	0	10	-8.652e-4	3	1224.257	3	3840.579	1
25		13	max	0	15	.282	3	.104	1	2.068e-2	1	NC	5	NC	3
26			min	0	1	.002	15	.004	15	-9.94e-4	3	714.978	3	2170.461	1
27		14	max	0	15	.383	3	.133	1	1.936e-2	1	NC	5	NC	3
28			min	0	1	-.068	1	.005	15	-1.123e-3	3	539.185	3	1685.336	1
29		15	max	0	15	.43	3	.139	1	1.804e-2	1	NC	5	NC	3
30			min	0	1	-.138	1	.005	15	-1.252e-3	3	484.659	3	1613.522	1
31		16	max	0	15	.407	3	.12	1	1.671e-2	1	NC	5	NC	3
32			min	0	1	-.143	1	.004	15	-1.381e-3	3	510.099	3	1875.867	1
33		17	max	0	15	.313	3	.081	1	1.539e-2	1	NC	5	NC	3
34			min	0	1	-.081	1	.003	15	-1.509e-3	3	649.752	3	2792.774	1
35		18	max	0	15	.16	3	.035	1	1.407e-2	1	NC	5	NC	2
36			min	0	1	.002	15	0	10	-1.638e-3	3	1176.932	3	6620.255	1
37		19	max	0	15	.191	1	.006	3	1.275e-2	1	NC	1	NC	1
38			min	0	1	-.028	3	-.003	2	-1.767e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.255	3	.006	3	7.708e-3	1	NC	1	NC	1
40			min	0	15	-.589	1	-.002	2	-3.944e-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	.465	3	.023	1	9.027e-3	1	NC	5	NC	1
42			min	0	15	-.914	1	0	10	-4.704e-3	3	683.768	1	NC	1
43		3	max	0	1	.647	3	.063	1	1.035e-2	1	NC	15	NC	3
44			min	0	15	-1.2	1	.002	15	-5.464e-3	3	363.367	1	3626.6	1
45		4	max	0	1	.78	3	.1	1	1.167e-2	1	9973.304	15	NC	3
46			min	0	15	-1.421	1	.004	15	-6.224e-3	3	266.858	1	2257.868	1
47		5	max	0	1	.855	3	.121	1	1.298e-2	1	8546.675	15	NC	3
48			min	0	15	-1.562	1	.004	15	-6.984e-3	3	228.141	1	1862.041	1
49		6	max	0	1	.87	3	.119	1	1.43e-2	1	8081.034	15	NC	3
50			min	0	15	-1.622	1	.004	15	-7.744e-3	3	215.006	1	1892.851	1
51		7	max	0	1	.836	3	.094	1	1.562e-2	1	8209.392	15	NC	3
52			min	0	15	-1.61	1	.004	15	-8.504e-3	3	217.479	1	2390.074	1
53		8	max	0	1	.771	3	.055	1	1.694e-2	1	8767.493	15	NC	2
54			min	0	15	-1.55	1	0	10	-9.263e-3	3	231.036	1	4155.228	1
55		9	max	0	1	.703	3	.017	3	1.826e-2	1	9534.545	15	NC	1
56			min	0	15	-1.478	1	-.005	10	-1.002e-2	3	249.899	1	NC	1
57		10	max	0	1	.67	3	.017	3	1.958e-2	1	9977.976	15	NC	1
58			min	0	1	-1.44	1	-.011	2	-1.078e-2	3	260.803	1	NC	1
59		11	max	0	15	.703	3	.017	3	1.826e-2	1	9534.545	15	NC	1
60			min	0	1	-1.478	1	-.005	10	-1.002e-2	3	249.899	1	NC	1
61		12	max	0	15	.771	3	.055	1	1.694e-2	1	8767.493	15	NC	2
62			min	0	1	-1.55	1	0	10	-9.263e-3	3	231.036	1	4155.228	1
63		13	max	0	15	.836	3	.094	1	1.562e-2	1	8209.392	15	NC	3
64			min	0	1	-1.61	1	.004	15	-8.504e-3	3	217.479	1	2390.074	1
65		14	max	0	15	.87	3	.119	1	1.43e-2	1	8081.034	15	NC	3
66			min	0	1	-1.622	1	.004	15	-7.744e-3	3	215.006	1	1892.851	1
67		15	max	0	15	.855	3	.121	1	1.298e-2	1	8546.675	15	NC	3
68			min	0	1	-1.562	1	.004	15	-6.984e-3	3	228.141	1	1862.041	1
69		16	max	0	15	.78	3	.1	1	1.167e-2	1	9973.304	15	NC	3
70			min	0	1	-1.421	1	.004	15	-6.224e-3	3	266.858	1	2257.868	1
71		17	max	0	15	.647	3	.063	1	1.035e-2	1	NC	15	NC	3
72			min	0	1	-1.2	1	.002	15	-5.464e-3	3	363.367	1	3626.6	1
73		18	max	0	15	.465	3	.023	1	9.027e-3	1	NC	5	NC	1
74			min	0	1	-.914	1	0	10	-4.704e-3	3	683.768	1	NC	1
75		19	max	0	15	.255	3	.006	3	7.708e-3	1	NC	1	NC	1
76			min	0	1	-.589	1	-.002	2	-3.944e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.261	3	.005	3	3.285e-3	3	NC	1	NC	1
78			min	0	1	-.589	1	-.002	2	-7.844e-3	1	NC	1	NC	1
79		2	max	0	15	.405	3	.023	1	3.915e-3	3	NC	5	NC	1
80			min	0	1	-.937	1	0	10	-9.195e-3	1	636.526	1	NC	1
81		3	max	0	15	.533	3	.063	1	4.545e-3	3	NC	15	NC	3
82			min	0	1	-1.243	1	.002	15	-1.055e-2	1	339.177	1	3607.243	1
83		4	max	0	15	.635	3	.1	1	5.175e-3	3	9986.586	15	NC	3
84			min	0	1	-1.476	1	.004	15	-1.19e-2	1	250.215	1	2248.304	1
85		5	max	0	15	.703	3	.121	1	5.804e-3	3	8559.293	15	NC	3
86			min	0	1	-1.62	1	.004	15	-1.325e-2	1	215.324	1	1854.729	1
87		6	max	0	15	.738	3	.119	1	6.434e-3	3	8094.579	15	NC	3
88			min	0	1	-1.673	1	.004	15	-1.46e-2	1	204.781	1	1884.933	1
89		7	max	0	15	.742	3	.095	1	7.064e-3	3	8225.326	15	NC	3
90			min	0	1	-1.647	1	.004	15	-1.595e-2	1	209.653	1	2377.406	1
91		8	max	0	15	.725	3	.055	1	7.694e-3	3	8787.371	15	NC	2
92			min	0	1	-1.57	1	0	10	-1.73e-2	1	226.076	1	4117.796	1
93		9	max	0	15	.7	3	.016	3	8.324e-3	3	9559.345	15	NC	1
94			min	0	1	-1.483	1	-.005	10	-1.865e-2	1	248.313	1	NC	1
95		10	max	0	1	.687	3	.016	3	8.953e-3	3	NC	15	NC	1
96			min	0	1	-1.438	1	-.011	2	-2.e-2	1	261.201	1	NC	1
97		11	max	0	1	.7	3	.016	3	8.324e-3	3	9559.345	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	-1.483	1	-.005	10	-1.865e-2	1	248.313	1	NC	1
99		12	max	0	1	.725	3	.055	1	7.694e-3	3	8787.371	15	NC	2
100			min	0	15	-1.57	1	0	10	-1.73e-2	1	226.076	1	4117.796	1
101		13	max	0	1	.742	3	.095	1	7.064e-3	3	8225.326	15	NC	3
102			min	0	15	-1.647	1	.004	15	-1.595e-2	1	209.653	1	2377.406	1
103		14	max	0	1	.738	3	.119	1	6.434e-3	3	8094.579	15	NC	3
104			min	0	15	-1.673	1	.004	15	-1.46e-2	1	204.781	1	1884.933	1
105		15	max	0	1	.703	3	.121	1	5.804e-3	3	8559.293	15	NC	3
106			min	0	15	-1.62	1	.004	15	-1.325e-2	1	215.324	1	1854.729	1
107		16	max	0	1	.635	3	.1	1	5.175e-3	3	9986.586	15	NC	3
108			min	0	15	-1.476	1	.004	15	-1.19e-2	1	250.215	1	2248.304	1
109		17	max	0	1	.533	3	.063	1	4.545e-3	3	NC	15	NC	3
110			min	0	15	-1.243	1	.002	15	-1.055e-2	1	339.177	1	3607.243	1
111		18	max	0	1	.405	3	.023	1	3.915e-3	3	NC	5	NC	1
112			min	0	15	-.937	1	0	10	-9.195e-3	1	636.526	1	NC	1
113		19	max	0	1	.261	3	.005	3	3.285e-3	3	NC	1	NC	1
114			min	0	15	-.589	1	-.002	2	-7.844e-3	1	NC	1	NC	1
115	M16	1	max	0	15	.185	1	.004	3	6.017e-3	3	NC	1	NC	1
116			min	0	1	-.09	3	-.002	2	-1.202e-2	1	NC	1	NC	1
117		2	max	0	15	.015	9	.034	1	6.83e-3	3	NC	5	NC	2
118			min	0	1	-.036	3	.001	15	-1.317e-2	1	1241.475	1	6697.277	1
119		3	max	0	15	.005	3	.08	1	7.643e-3	3	NC	5	NC	3
120			min	0	1	-.15	2	.003	15	-1.432e-2	1	696.273	1	2808.306	1
121		4	max	0	15	.023	3	.119	1	8.456e-3	3	NC	5	NC	3
122			min	0	1	-.223	2	.004	15	-1.547e-2	1	563.12	1	1879.654	1
123		5	max	0	15	.016	3	.139	1	9.27e-3	3	NC	5	NC	3
124			min	0	1	-.226	2	.005	15	-1.662e-2	1	564.433	1	1611.863	1
125		6	max	0	15	0	15	.134	1	1.008e-2	3	NC	5	NC	3
126			min	0	1	-.161	2	.005	15	-1.777e-2	1	696.898	1	1677.389	1
127		7	max	0	15	.021	9	.105	1	1.09e-2	3	NC	3	NC	3
128			min	0	1	-.07	3	.004	15	-1.891e-2	1	1153.179	2	2146.69	1
129		8	max	0	15	.157	1	.061	1	1.171e-2	3	NC	4	NC	2
130			min	0	1	-.13	3	0	10	-2.006e-2	1	4409.996	2	3737.715	1
131		9	max	0	15	.297	1	.017	1	1.252e-2	3	NC	5	NC	1
132			min	0	1	-.182	3	-.004	10	-2.121e-2	1	1984.333	1	NC	1
133		10	max	0	1	.36	1	.013	3	1.334e-2	3	NC	5	NC	1
134			min	0	1	-.205	3	-.01	2	-2.236e-2	1	1273.233	1	NC	1
135		11	max	0	1	.297	1	.017	1	1.252e-2	3	NC	5	NC	1
136			min	0	15	-.182	3	-.004	10	-2.121e-2	1	1984.333	1	NC	1
137		12	max	0	1	.157	1	.061	1	1.171e-2	3	NC	4	NC	2
138			min	0	15	-.13	3	0	10	-2.006e-2	1	4409.996	2	3737.715	1
139		13	max	0	1	.021	9	.105	1	1.09e-2	3	NC	3	NC	3
140			min	0	15	-.07	3	.004	15	-1.891e-2	1	1153.179	2	2146.69	1
141		14	max	0	1	0	15	.134	1	1.008e-2	3	NC	5	NC	3
142			min	0	15	-.161	2	.005	15	-1.777e-2	1	696.898	1	1677.389	1
143		15	max	0	1	.016	3	.139	1	9.27e-3	3	NC	5	NC	3
144			min	0	15	-.226	2	.005	15	-1.662e-2	1	564.433	1	1611.863	1
145		16	max	0	1	.023	3	.119	1	8.456e-3	3	NC	5	NC	3
146			min	0	15	-.223	2	.004	15	-1.547e-2	1	563.12	1	1879.654	1
147		17	max	0	1	.005	3	.08	1	7.643e-3	3	NC	5	NC	3
148			min	0	15	-.15	2	.003	15	-1.432e-2	1	696.273	1	2808.306	1
149		18	max	0	1	.015	9	.034	1	6.83e-3	3	NC	5	NC	2
150			min	0	15	-.036	3	.001	15	-1.317e-2	1	1241.475	1	6697.277	1
151		19	max	0	1	.185	1	.004	3	6.017e-3	3	NC	1	NC	1
152			min	0	15	-.09	3	-.002	2	-1.202e-2	1	NC	1	NC	1
153	M2	1	max	.006	1	.005	2	.011	1	-8.585e-6	15	NC	1	NC	2
154			min	-.005	3	-.008	3	0	15	-2.399e-4	1	NC	1	5709.826	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.006	1	.004	2	.01	1	-8.041e-6	15	NC	1	NC	2
156			min	-.005	3	-.008	3	0	15	-2.246e-4	1	NC	1	6225.676	1
157		3	max	.006	1	.003	2	.009	1	-7.497e-6	15	NC	1	NC	2
158			min	-.005	3	-.008	3	0	15	-2.094e-4	1	NC	1	6839.999	1
159		4	max	.005	1	.002	2	.008	1	-6.953e-6	15	NC	1	NC	2
160			min	-.004	3	-.008	3	0	15	-1.942e-4	1	NC	1	7578.779	1
161		5	max	.005	1	.002	2	.007	1	-6.409e-6	15	NC	1	NC	2
162			min	-.004	3	-.008	3	0	15	-1.79e-4	1	NC	1	8477.439	1
163		6	max	.005	1	0	2	.006	1	-5.866e-6	15	NC	1	NC	2
164			min	-.004	3	-.007	3	0	15	-1.638e-4	1	NC	1	9585.274	1
165		7	max	.004	1	0	2	.006	1	-5.322e-6	15	NC	1	NC	1
166			min	-.004	3	-.007	3	0	15	-1.486e-4	1	NC	1	NC	1
167		8	max	.004	1	0	2	.005	1	-4.778e-6	15	NC	1	NC	1
168			min	-.003	3	-.007	3	0	15	-1.334e-4	1	NC	1	NC	1
169		9	max	.004	1	0	2	.004	1	-4.234e-6	15	NC	1	NC	1
170			min	-.003	3	-.007	3	0	15	-1.182e-4	1	NC	1	NC	1
171		10	max	.003	1	-.001	15	.003	1	-3.691e-6	15	NC	1	NC	1
172			min	-.003	3	-.006	3	0	15	-1.029e-4	1	NC	1	NC	1
173		11	max	.003	1	-.001	15	.003	1	-3.147e-6	15	NC	1	NC	1
174			min	-.002	3	-.006	3	0	15	-8.773e-5	1	NC	1	NC	1
175		12	max	.003	1	-.001	15	.002	1	-2.603e-6	15	NC	1	NC	1
176			min	-.002	3	-.005	3	0	15	-7.251e-5	1	NC	1	NC	1
177		13	max	.002	1	-.001	15	.002	1	-2.059e-6	15	NC	1	NC	1
178			min	-.002	3	-.005	3	0	15	-5.73e-5	1	NC	1	NC	1
179		14	max	.002	1	0	15	.001	1	-1.515e-6	15	NC	1	NC	1
180			min	-.001	3	-.004	3	0	15	-4.209e-5	1	NC	1	NC	1
181		15	max	.001	1	0	15	0	1	-9.716e-7	15	NC	1	NC	1
182			min	-.001	3	-.004	4	0	15	-2.687e-5	1	NC	1	NC	1
183		16	max	.001	1	0	15	0	1	-4.279e-7	15	NC	1	NC	1
184			min	0	3	-.003	4	0	15	-1.166e-5	1	NC	1	NC	1
185		17	max	0	1	0	15	0	1	3.554e-6	1	NC	1	NC	1
186			min	0	3	-.002	4	0	15	-2.52e-7	3	NC	1	NC	1
187		18	max	0	1	0	15	0	1	1.877e-5	1	NC	1	NC	1
188			min	0	3	-.001	4	0	15	6.096e-7	12	NC	1	NC	1
189		19	max	0	1	0	1	0	1	3.398e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	1.203e-6	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-3.667e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-1.033e-5	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	2.011e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	15	7.202e-7	15	NC	1	NC	1
195		3	max	0	3	-.001	15	0	1	5.056e-5	1	NC	1	NC	1
196			min	0	2	-.005	4	0	15	1.807e-6	15	NC	1	NC	1
197		4	max	0	3	-.002	15	0	1	8.1e-5	1	NC	1	NC	1
198			min	0	2	-.008	4	0	15	2.894e-6	15	NC	1	NC	1
199		5	max	.001	3	-.003	15	0	1	1.114e-4	1	NC	1	NC	1
200			min	0	2	-.011	4	0	15	3.981e-6	15	9251.258	4	NC	1
201		6	max	.001	3	-.003	15	.001	1	1.419e-4	1	NC	2	NC	1
202			min	0	2	-.014	4	0	15	5.068e-6	15	7426.89	4	NC	1
203		7	max	.002	3	-.004	15	.001	1	1.723e-4	1	NC	5	NC	1
204			min	-.001	2	-.016	4	0	15	6.155e-6	15	6332.129	4	NC	1
205		8	max	.002	3	-.004	15	.002	1	2.028e-4	1	NC	5	NC	1
206			min	-.001	2	-.018	4	0	15	7.242e-6	15	5656.331	4	NC	1
207		9	max	.002	3	-.005	15	.002	1	2.332e-4	1	NC	5	NC	1
208			min	-.002	2	-.02	4	0	15	8.328e-6	15	5253.609	4	NC	1
209		10	max	.002	3	-.005	15	.003	1	2.637e-4	1	NC	5	NC	1
210			min	-.002	2	-.021	4	0	15	9.415e-6	15	5052.851	4	NC	1
211		11	max	.003	3	-.005	15	.003	1	2.941e-4	1	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.002	2	-.021	4	0	15	1.05e-5	15	5024.134	4	NC	1
213		12	max	.003	3	-.005	15	.004	1	3.246e-4	1	NC	5	NC	1
214			min	-.002	2	-.02	4	0	15	1.159e-5	15	5167.187	4	NC	1
215		13	max	.003	3	-.004	15	.004	1	3.55e-4	1	NC	5	NC	1
216			min	-.002	2	-.019	4	0	15	1.268e-5	15	5512.726	4	NC	1
217		14	max	.003	3	-.004	15	.005	1	3.854e-4	1	NC	5	NC	1
218			min	-.003	2	-.017	4	0	15	1.376e-5	15	6138.689	4	NC	1
219		15	max	.004	3	-.003	15	.006	1	4.159e-4	1	NC	3	NC	1
220			min	-.003	2	-.015	4	0	15	1.485e-5	15	7219.056	4	NC	1
221		16	max	.004	3	-.003	15	.007	1	4.463e-4	1	NC	1	NC	1
222			min	-.003	2	-.012	4	0	15	1.594e-5	15	9176.137	4	NC	1
223		17	max	.004	3	-.002	15	.008	1	4.768e-4	1	NC	1	NC	1
224			min	-.003	2	-.008	4	0	15	1.702e-5	15	NC	1	NC	1
225		18	max	.005	3	-.001	15	.009	1	5.072e-4	1	NC	1	NC	1
226			min	-.003	2	-.006	1	0	15	1.811e-5	15	NC	1	NC	1
227		19	max	.005	3	0	15	.01	1	5.377e-4	1	NC	1	NC	1
228			min	-.003	2	-.003	1	0	15	1.92e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.003	2	0	15	8.132e-5	1	NC	1	NC	3
230			min	0	3	-.005	3	-.01	1	2.926e-6	15	NC	1	2506.432	1
231		2	max	.003	1	.003	2	0	15	8.132e-5	1	NC	1	NC	3
232			min	0	3	-.005	3	-.009	1	2.926e-6	15	NC	1	2726.142	1
233		3	max	.003	1	.003	2	0	15	8.132e-5	1	NC	1	NC	3
234			min	0	3	-.004	3	-.008	1	2.926e-6	15	NC	1	2987.598	1
235		4	max	.002	1	.003	2	0	15	8.132e-5	1	NC	1	NC	3
236			min	0	3	-.004	3	-.008	1	2.926e-6	15	NC	1	3301.65	1
237		5	max	.002	1	.002	2	0	15	8.132e-5	1	NC	1	NC	3
238			min	0	3	-.004	3	-.007	1	2.926e-6	15	NC	1	3683.044	1
239		6	max	.002	1	.002	2	0	15	8.132e-5	1	NC	1	NC	2
240			min	0	3	-.003	3	-.006	1	2.926e-6	15	NC	1	4152.226	1
241		7	max	.002	1	.002	2	0	15	8.132e-5	1	NC	1	NC	2
242			min	0	3	-.003	3	-.005	1	2.926e-6	15	NC	1	4738.226	1
243		8	max	.002	1	.002	2	0	15	8.132e-5	1	NC	1	NC	2
244			min	0	3	-.003	3	-.005	1	2.926e-6	15	NC	1	5483.377	1
245		9	max	.002	1	.002	2	0	15	8.132e-5	1	NC	1	NC	2
246			min	0	3	-.003	3	-.004	1	2.926e-6	15	NC	1	6451.414	1
247		10	max	.001	1	.002	2	0	15	8.132e-5	1	NC	1	NC	2
248			min	0	3	-.002	3	-.003	1	2.926e-6	15	NC	1	7741.967	1
249		11	max	.001	1	.001	2	0	15	8.132e-5	1	NC	1	NC	2
250			min	0	3	-.002	3	-.003	1	2.926e-6	15	NC	1	9518.027	1
251		12	max	.001	1	.001	2	0	15	8.132e-5	1	NC	1	NC	1
252			min	0	3	-.002	3	-.002	1	2.926e-6	15	NC	1	NC	1
253		13	max	0	1	.001	2	0	15	8.132e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	-.002	1	2.926e-6	15	NC	1	NC	1
255		14	max	0	1	0	2	0	15	8.132e-5	1	NC	1	NC	1
256			min	0	3	-.001	3	-.001	1	2.926e-6	15	NC	1	NC	1
257		15	max	0	1	0	2	0	15	8.132e-5	1	NC	1	NC	1
258			min	0	3	-.001	3	0	1	2.926e-6	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	8.132e-5	1	NC	1	NC	1
260			min	0	3	0	3	0	1	2.926e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	8.132e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	2.926e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	8.132e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	2.926e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	8.132e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	2.926e-6	15	NC	1	NC	1
267	M6	1	max	.02	1	.019	2	0	1	0	1	NC	3	NC	1
268			min	-.017	3	-.026	3	0	1	0	1	3140.604	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.019	1	.017	2	0	1	0	1	NC	3	NC	1
270			min	-.016	3	-.025	3	0	1	0	1	3461.465	2	NC	1
271		3	max	.018	1	.016	2	0	1	0	1	NC	3	NC	1
272			min	-.015	3	-.023	3	0	1	0	1	3852.05	2	NC	1
273		4	max	.017	1	.014	2	0	1	0	1	NC	3	NC	1
274			min	-.014	3	-.022	3	0	1	0	1	4333.641	2	NC	1
275		5	max	.016	1	.012	2	0	1	0	1	NC	3	NC	1
276			min	-.013	3	-.021	3	0	1	0	1	4936.606	2	NC	1
277		6	max	.015	1	.011	2	0	1	0	1	NC	3	NC	1
278			min	-.012	3	-.019	3	0	1	0	1	5705.523	2	NC	1
279		7	max	.013	1	.009	2	0	1	0	1	NC	1	NC	1
280			min	-.011	3	-.018	3	0	1	0	1	6708.084	2	NC	1
281		8	max	.012	1	.008	2	0	1	0	1	NC	1	NC	1
282			min	-.01	3	-.017	3	0	1	0	1	8051.356	2	NC	1
283		9	max	.011	1	.006	2	0	1	0	1	NC	1	NC	1
284			min	-.009	3	-.015	3	0	1	0	1	9913.396	2	NC	1
285		10	max	.01	1	.005	2	0	1	0	1	NC	1	NC	1
286			min	-.009	3	-.014	3	0	1	0	1	NC	1	NC	1
287		11	max	.009	1	.004	2	0	1	0	1	NC	1	NC	1
288			min	-.008	3	-.012	3	0	1	0	1	NC	1	NC	1
289		12	max	.008	1	.003	2	0	1	0	1	NC	1	NC	1
290			min	-.007	3	-.011	3	0	1	0	1	NC	1	NC	1
291		13	max	.007	1	.002	2	0	1	0	1	NC	1	NC	1
292			min	-.006	3	-.009	3	0	1	0	1	NC	1	NC	1
293		14	max	.006	1	0	2	0	1	0	1	NC	1	NC	1
294			min	-.005	3	-.008	3	0	1	0	1	NC	1	NC	1
295		15	max	.004	1	0	2	0	1	0	1	NC	1	NC	1
296			min	-.004	3	-.006	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	-.005	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	-.003	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	1	0	2	0	1	0	1	NC	1	NC	1
302			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	0	3	0	15	0	1	0	1	NC	1	NC	1
308			min	0	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	-.001	15	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.006	3	0	1	0	1	NC	1	NC	1
311		4	max	.002	3	-.002	15	0	1	0	1	NC	1	NC	1
312			min	-.002	2	-.008	3	0	1	0	1	NC	1	NC	1
313		5	max	.003	3	-.003	15	0	1	0	1	NC	1	NC	1
314			min	-.003	2	-.011	4	0	1	0	1	9547.324	4	NC	1
315		6	max	.004	3	-.003	15	0	1	0	1	NC	1	NC	1
316			min	-.004	2	-.014	4	0	1	0	1	7640.779	4	NC	1
317		7	max	.005	3	-.004	15	0	1	0	1	NC	1	NC	1
318			min	-.005	2	-.016	4	0	1	0	1	6498.385	4	NC	1
319		8	max	.006	3	-.004	15	0	1	0	1	NC	2	NC	1
320			min	-.005	2	-.018	4	0	1	0	1	5793.202	4	NC	1
321		9	max	.006	3	-.005	15	0	1	0	1	NC	5	NC	1
322			min	-.006	2	-.02	4	0	1	0	1	5371.859	4	NC	1
323		10	max	.007	3	-.005	15	0	1	0	1	NC	5	NC	1
324			min	-.007	2	-.021	4	0	1	0	1	5159.502	4	NC	1
325		11	max	.008	3	-.005	15	0	1	0	1	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.008	2	-.021	4	0	1	0	1	5124.301	4	NC	1
327		12	max	.009	3	-.005	15	0	1	0	1	NC	5	NC	1
328			min	-.008	2	-.02	4	0	1	0	1	5265.15	4	NC	1
329		13	max	.01	3	-.004	15	0	1	0	1	NC	5	NC	1
330			min	-.009	2	-.019	4	0	1	0	1	5612.739	4	NC	1
331		14	max	.011	3	-.004	15	0	1	0	1	NC	2	NC	1
332			min	-.01	2	-.017	4	0	1	0	1	6245.91	4	NC	1
333		15	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
334			min	-.011	2	-.015	4	0	1	0	1	7341.187	4	NC	1
335		16	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1
336			min	-.012	2	-.012	4	0	1	0	1	9327.432	4	NC	1
337		17	max	.013	3	-.002	15	0	1	0	1	NC	1	NC	1
338			min	-.012	2	-.01	1	0	1	0	1	NC	1	NC	1
339		18	max	.014	3	-.001	15	0	1	0	1	NC	1	NC	1
340			min	-.013	2	-.008	1	0	1	0	1	NC	1	NC	1
341		19	max	.015	3	0	15	0	1	0	1	NC	1	NC	1
342			min	-.014	2	-.006	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.008	1	.013	2	0	1	0	1	NC	1	NC	1
344			min	-.001	3	-.015	3	0	1	0	1	NC	1	NC	1
345		2	max	.007	1	.012	2	0	1	0	1	NC	1	NC	1
346			min	-.001	3	-.014	3	0	1	0	1	NC	1	NC	1
347		3	max	.007	1	.011	2	0	1	0	1	NC	1	NC	1
348			min	-.001	3	-.013	3	0	1	0	1	NC	1	NC	1
349		4	max	.007	1	.011	2	0	1	0	1	NC	1	NC	1
350			min	-.001	3	-.012	3	0	1	0	1	NC	1	NC	1
351		5	max	.006	1	.01	2	0	1	0	1	NC	1	NC	1
352			min	-.001	3	-.011	3	0	1	0	1	NC	1	NC	1
353		6	max	.006	1	.009	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.011	3	0	1	0	1	NC	1	NC	1
355		7	max	.005	1	.008	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
357		8	max	.005	1	.008	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	1	.007	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	1	.006	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.006	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	1	.005	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
367		13	max	.003	1	.004	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.004	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	.003	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	.001	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	0	1	.001	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	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	.006	1	.005	2	0	15	2.399e-4	1	NC	1	NC	2
382			min	-.005	3	-.008	3	-.011	1	8.585e-6	15	NC	1	5709.826	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.006	1	.004	2	0	15	2.246e-4	1	NC	1	NC	2
384			min	-.005	3	-.008	3	-.01	1	8.041e-6	15	NC	1	6225.676	1
385		3	max	.006	1	.003	2	0	15	2.094e-4	1	NC	1	NC	2
386			min	-.005	3	-.008	3	-.009	1	7.497e-6	15	NC	1	6839.999	1
387		4	max	.005	1	.002	2	0	15	1.942e-4	1	NC	1	NC	2
388			min	-.004	3	-.008	3	-.008	1	6.953e-6	15	NC	1	7578.779	1
389		5	max	.005	1	.002	2	0	15	1.79e-4	1	NC	1	NC	2
390			min	-.004	3	-.008	3	-.007	1	6.409e-6	15	NC	1	8477.439	1
391		6	max	.005	1	0	2	0	15	1.638e-4	1	NC	1	NC	2
392			min	-.004	3	-.007	3	-.006	1	5.866e-6	15	NC	1	9585.274	1
393		7	max	.004	1	0	2	0	15	1.486e-4	1	NC	1	NC	1
394			min	-.004	3	-.007	3	-.006	1	5.322e-6	15	NC	1	NC	1
395		8	max	.004	1	0	2	0	15	1.334e-4	1	NC	1	NC	1
396			min	-.003	3	-.007	3	-.005	1	4.778e-6	15	NC	1	NC	1
397		9	max	.004	1	0	2	0	15	1.182e-4	1	NC	1	NC	1
398			min	-.003	3	-.007	3	-.004	1	4.234e-6	15	NC	1	NC	1
399		10	max	.003	1	-.001	15	0	15	1.029e-4	1	NC	1	NC	1
400			min	-.003	3	-.006	3	-.003	1	3.691e-6	15	NC	1	NC	1
401		11	max	.003	1	-.001	15	0	15	8.773e-5	1	NC	1	NC	1
402			min	-.002	3	-.006	3	-.003	1	3.147e-6	15	NC	1	NC	1
403		12	max	.003	1	-.001	15	0	15	7.251e-5	1	NC	1	NC	1
404			min	-.002	3	-.005	3	-.002	1	2.603e-6	15	NC	1	NC	1
405		13	max	.002	1	-.001	15	0	15	5.73e-5	1	NC	1	NC	1
406			min	-.002	3	-.005	3	-.002	1	2.059e-6	15	NC	1	NC	1
407		14	max	.002	1	0	15	0	15	4.209e-5	1	NC	1	NC	1
408			min	-.001	3	-.004	3	-.001	1	1.515e-6	15	NC	1	NC	1
409		15	max	.001	1	0	15	0	15	2.687e-5	1	NC	1	NC	1
410			min	-.001	3	-.004	4	0	1	9.716e-7	15	NC	1	NC	1
411		16	max	.001	1	0	15	0	15	1.166e-5	1	NC	1	NC	1
412			min	0	3	-.003	4	0	1	4.279e-7	15	NC	1	NC	1
413		17	max	0	1	0	15	0	15	2.52e-7	3	NC	1	NC	1
414			min	0	3	-.002	4	0	1	-3.554e-6	1	NC	1	NC	1
415		18	max	0	1	0	15	0	15	-6.096e-7	12	NC	1	NC	1
416			min	0	3	-.001	4	0	1	-1.877e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-1.203e-6	15	NC	1	NC	1
418			min	0	1	0	1	0	1	-3.398e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	1.033e-5	1	NC	1	NC	1
420			min	0	1	0	1	0	1	3.667e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-7.202e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-2.011e-5	1	NC	1	NC	1
423		3	max	0	3	-.001	15	0	15	-1.807e-6	15	NC	1	NC	1
424			min	0	2	-.005	4	0	1	-5.056e-5	1	NC	1	NC	1
425		4	max	0	3	-.002	15	0	15	-2.894e-6	15	NC	1	NC	1
426			min	0	2	-.008	4	0	1	-8.1e-5	1	NC	1	NC	1
427		5	max	.001	3	-.003	15	0	15	-3.981e-6	15	NC	1	NC	1
428			min	0	2	-.011	4	0	1	-1.114e-4	1	9251.258	4	NC	1
429		6	max	.001	3	-.003	15	0	15	-5.068e-6	15	NC	2	NC	1
430			min	0	2	-.014	4	-.001	1	-1.419e-4	1	7426.89	4	NC	1
431		7	max	.002	3	-.004	15	0	15	-6.155e-6	15	NC	5	NC	1
432			min	-.001	2	-.016	4	-.001	1	-1.723e-4	1	6332.129	4	NC	1
433		8	max	.002	3	-.004	15	0	15	-7.242e-6	15	NC	5	NC	1
434			min	-.001	2	-.018	4	-.002	1	-2.028e-4	1	5656.331	4	NC	1
435		9	max	.002	3	-.005	15	0	15	-8.328e-6	15	NC	5	NC	1
436			min	-.002	2	-.02	4	-.002	1	-2.332e-4	1	5253.609	4	NC	1
437		10	max	.002	3	-.005	15	0	15	-9.415e-6	15	NC	5	NC	1
438			min	-.002	2	-.021	4	-.003	1	-2.637e-4	1	5052.851	4	NC	1
439		11	max	.003	3	-.005	15	0	15	-1.05e-5	15	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.002	2	-.021	4	-.003	1	-2.941e-4	1	5024.134	4	NC	1
441		12	max	.003	3	-.005	15	0	15	-1.159e-5	15	NC	5	NC	1
442			min	-.002	2	-.02	4	-.004	1	-3.246e-4	1	5167.187	4	NC	1
443		13	max	.003	3	-.004	15	0	15	-1.268e-5	15	NC	5	NC	1
444			min	-.002	2	-.019	4	-.004	1	-3.55e-4	1	5512.726	4	NC	1
445		14	max	.003	3	-.004	15	0	15	-1.376e-5	15	NC	5	NC	1
446			min	-.003	2	-.017	4	-.005	1	-3.854e-4	1	6138.689	4	NC	1
447		15	max	.004	3	-.003	15	0	15	-1.485e-5	15	NC	3	NC	1
448			min	-.003	2	-.015	4	-.006	1	-4.159e-4	1	7219.056	4	NC	1
449		16	max	.004	3	-.003	15	0	15	-1.594e-5	15	NC	1	NC	1
450			min	-.003	2	-.012	4	-.007	1	-4.463e-4	1	9176.137	4	NC	1
451		17	max	.004	3	-.002	15	0	15	-1.702e-5	15	NC	1	NC	1
452			min	-.003	2	-.008	4	-.008	1	-4.768e-4	1	NC	1	NC	1
453		18	max	.005	3	-.001	15	0	15	-1.811e-5	15	NC	1	NC	1
454			min	-.003	2	-.006	1	-.009	1	-5.072e-4	1	NC	1	NC	1
455		19	max	.005	3	0	15	0	15	-1.92e-5	15	NC	1	NC	1
456			min	-.003	2	-.003	1	-.01	1	-5.377e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.003	2	.01	1	-2.926e-6	15	NC	1	NC	3
458			min	0	3	-.005	3	0	15	-8.132e-5	1	NC	1	2506.432	1
459		2	max	.003	1	.003	2	.009	1	-2.926e-6	15	NC	1	NC	3
460			min	0	3	-.005	3	0	15	-8.132e-5	1	NC	1	2726.142	1
461		3	max	.003	1	.003	2	.008	1	-2.926e-6	15	NC	1	NC	3
462			min	0	3	-.004	3	0	15	-8.132e-5	1	NC	1	2987.598	1
463		4	max	.002	1	.003	2	.008	1	-2.926e-6	15	NC	1	NC	3
464			min	0	3	-.004	3	0	15	-8.132e-5	1	NC	1	3301.65	1
465		5	max	.002	1	.002	2	.007	1	-2.926e-6	15	NC	1	NC	3
466			min	0	3	-.004	3	0	15	-8.132e-5	1	NC	1	3683.044	1
467		6	max	.002	1	.002	2	.006	1	-2.926e-6	15	NC	1	NC	2
468			min	0	3	-.003	3	0	15	-8.132e-5	1	NC	1	4152.226	1
469		7	max	.002	1	.002	2	.005	1	-2.926e-6	15	NC	1	NC	2
470			min	0	3	-.003	3	0	15	-8.132e-5	1	NC	1	4738.226	1
471		8	max	.002	1	.002	2	.005	1	-2.926e-6	15	NC	1	NC	2
472			min	0	3	-.003	3	0	15	-8.132e-5	1	NC	1	5483.377	1
473		9	max	.002	1	.002	2	.004	1	-2.926e-6	15	NC	1	NC	2
474			min	0	3	-.003	3	0	15	-8.132e-5	1	NC	1	6451.414	1
475		10	max	.001	1	.002	2	.003	1	-2.926e-6	15	NC	1	NC	2
476			min	0	3	-.002	3	0	15	-8.132e-5	1	NC	1	7741.967	1
477		11	max	.001	1	.001	2	.003	1	-2.926e-6	15	NC	1	NC	2
478			min	0	3	-.002	3	0	15	-8.132e-5	1	NC	1	9518.027	1
479		12	max	.001	1	.001	2	.002	1	-2.926e-6	15	NC	1	NC	1
480			min	0	3	-.002	3	0	15	-8.132e-5	1	NC	1	NC	1
481		13	max	0	1	.001	2	.002	1	-2.926e-6	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-8.132e-5	1	NC	1	NC	1
483		14	max	0	1	0	2	.001	1	-2.926e-6	15	NC	1	NC	1
484			min	0	3	-.001	3	0	15	-8.132e-5	1	NC	1	NC	1
485		15	max	0	1	0	2	0	1	-2.926e-6	15	NC	1	NC	1
486			min	0	3	-.001	3	0	15	-8.132e-5	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-2.926e-6	15	NC	1	NC	1
488			min	0	3	0	3	0	15	-8.132e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-2.926e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-8.132e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-2.926e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-8.132e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-2.926e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-8.132e-5	1	NC	1	NC	1
495	M1	1	max	.006	3	.191	1	0	1	1.295e-2	1	NC	1	NC	1
496			min	-.003	2	-.028	3	0	15	-1.587e-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	.006	3	.095	1	0	15	6.252e-3	1	NC	5	NC	1
498			min	-.003	2	-.014	3	-.008	1	-7.876e-3	3	1406.509	1	NC	1
499		3	max	.006	3	.008	3	0	15	3.948e-6	10	NC	5	NC	1
500			min	-.003	2	-.008	1	-.011	1	-2.366e-4	1	675.463	1	NC	1
501		4	max	.006	3	.046	3	0	15	4.793e-3	1	NC	15	NC	1
502			min	-.003	2	-.126	1	-.01	1	-3.308e-3	3	424.752	1	NC	1
503		5	max	.006	3	.095	3	0	15	9.822e-3	1	9445.433	15	NC	1
504			min	-.003	2	-.25	1	-.007	1	-6.534e-3	3	305.369	1	NC	1
505		6	max	.006	3	.148	3	0	15	1.485e-2	1	7464.651	15	NC	1
506			min	-.003	2	-.37	1	-.003	1	-9.76e-3	3	239.756	1	NC	1
507		7	max	.006	3	.199	3	0	1	1.988e-2	1	6295.223	15	NC	1
508			min	-.003	2	-.478	1	0	3	-1.299e-2	3	201.116	1	NC	1
509		8	max	.006	3	.241	3	0	1	2.491e-2	1	5603.284	15	NC	1
510			min	-.003	2	-.563	1	0	15	-1.621e-2	3	178.302	1	NC	1
511		9	max	.005	3	.269	3	0	15	2.731e-2	1	5241.379	15	NC	1
512			min	-.002	2	-.617	1	0	1	-1.646e-2	3	166.423	1	NC	1
513		10	max	.005	3	.279	3	0	1	2.794e-2	1	5130.81	15	NC	1
514			min	-.002	2	-.635	1	0	15	-1.471e-2	3	162.854	1	NC	1
515		11	max	.005	3	.273	3	0	1	2.857e-2	1	5241.198	15	NC	1
516			min	-.002	2	-.617	1	0	15	-1.297e-2	3	166.614	1	NC	1
517		12	max	.005	3	.25	3	0	15	2.685e-2	1	5602.902	15	NC	1
518			min	-.002	2	-.562	1	-.001	1	-1.103e-2	3	178.887	1	NC	1
519		13	max	.005	3	.213	3	0	15	2.161e-2	1	6294.559	15	NC	1
520			min	-.002	2	-.475	1	0	1	-8.827e-3	3	202.539	1	NC	1
521		14	max	.005	3	.165	3	.003	1	1.638e-2	1	7463.53	15	NC	1
522			min	-.002	2	-.365	1	0	15	-6.621e-3	3	242.789	1	NC	1
523		15	max	.005	3	.112	3	.006	1	1.114e-2	1	9443.503	15	NC	1
524			min	-.002	2	-.244	1	0	15	-4.414e-3	3	311.571	1	NC	1
525		16	max	.005	3	.056	3	.009	1	5.899e-3	1	NC	15	NC	1
526			min	-.002	2	-.12	1	0	15	-2.207e-3	3	437.68	1	NC	1
527		17	max	.004	3	.003	3	.01	1	6.6e-4	1	NC	5	NC	1
528			min	-.002	2	-.005	2	0	15	-3.794e-7	3	704.27	1	NC	1
529		18	max	.004	3	.095	1	.007	1	7.783e-3	1	NC	5	NC	1
530			min	-.002	2	-.045	3	0	15	-2.273e-3	3	1479.2	1	NC	1
531		19	max	.004	3	.185	1	0	15	1.513e-2	1	NC	1	NC	1
532			min	-.002	2	-.09	3	0	1	-4.626e-3	3	NC	1	NC	1
533	M5	1	max	.019	3	.375	1	0	1	0	1	NC	1	NC	1
534			min	-.013	2	-.018	3	0	1	0	1	NC	1	NC	1
535		2	max	.019	3	.188	1	0	1	0	1	NC	5	NC	1
536			min	-.013	2	-.01	3	0	1	0	1	720.492	1	NC	1
537		3	max	.019	3	.026	3	0	1	0	1	NC	15	NC	1
538			min	-.013	2	-.028	1	0	1	0	1	334.211	1	NC	1
539		4	max	.018	3	.113	3	0	1	0	1	6941.944	15	NC	1
540			min	-.013	2	-.294	1	0	1	0	1	201.063	1	NC	1
541		5	max	.018	3	.237	3	0	1	0	1	4836.252	15	NC	1
542			min	-.012	2	-.589	1	0	1	0	1	139.484	1	NC	1
543		6	max	.018	3	.378	3	0	1	0	1	3710.78	15	NC	1
544			min	-.012	2	-.886	1	0	1	0	1	106.662	1	NC	1
545		7	max	.017	3	.516	3	0	1	0	1	3062.964	15	NC	1
546			min	-.012	2	-1.157	1	0	1	0	1	87.809	1	NC	1
547		8	max	.017	3	.633	3	0	1	0	1	2687.355	15	NC	1
548			min	-.012	2	-1.374	1	0	1	0	1	76.895	1	NC	1
549		9	max	.017	3	.709	3	0	1	0	1	2494.902	15	NC	1
550			min	-.011	2	-1.512	1	0	1	0	1	71.313	1	NC	1
551		10	max	.016	3	.737	3	0	1	0	1	2436.886	15	NC	1
552			min	-.011	2	-1.557	1	0	1	0	1	69.651	1	NC	1
553		11	max	.016	3	.719	3	0	1	0	1	2494.985	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	-.011	2	-1.511	1	0	1	0	1	71.407	1	NC	1
555		12	max	.015	3	.656	3	0	1	0	1	2687.553	15	NC	1
556			min	-.011	2	-1.371	1	0	1	0	1	77.208	1	NC	1
557		13	max	.015	3	.555	3	0	1	0	1	3063.371	15	NC	1
558			min	-.011	2	-1.148	1	0	1	0	1	88.629	1	NC	1
559		14	max	.015	3	.427	3	0	1	0	1	3711.577	15	NC	1
560			min	-.01	2	-.871	1	0	1	0	1	108.529	1	NC	1
561		15	max	.014	3	.285	3	0	1	0	1	4837.833	15	NC	1
562			min	-.01	2	-.571	1	0	1	0	1	143.585	1	NC	1
563		16	max	.014	3	.142	3	0	1	0	1	6945.268	15	NC	1
564			min	-.01	2	-.275	1	0	1	0	1	210.39	1	NC	1
565		17	max	.013	3	.008	3	0	1	0	1	NC	15	NC	1
566			min	-.01	2	-.014	1	0	1	0	1	357.245	1	NC	1
567		18	max	.013	3	.189	1	0	1	0	1	NC	5	NC	1
568			min	-.01	2	-.104	3	0	1	0	1	783.229	1	NC	1
569		19	max	.013	3	.36	1	0	1	0	1	NC	1	NC	1
570			min	-.01	2	-.205	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.006	3	.191	1	0	15	1.587e-2	3	NC	1	NC	1
572			min	-.003	2	-.028	3	0	1	-1.295e-2	1	NC	1	NC	1
573		2	max	.006	3	.095	1	.008	1	7.876e-3	3	NC	5	NC	1
574			min	-.003	2	-.014	3	0	15	-6.252e-3	1	1406.509	1	NC	1
575		3	max	.006	3	.008	3	.011	1	2.366e-4	1	NC	5	NC	1
576			min	-.003	2	-.008	1	0	15	-3.948e-6	10	675.463	1	NC	1
577		4	max	.006	3	.046	3	.01	1	3.308e-3	3	NC	15	NC	1
578			min	-.003	2	-.126	1	0	15	-4.793e-3	1	424.752	1	NC	1
579		5	max	.006	3	.095	3	.007	1	6.534e-3	3	9445.433	15	NC	1
580			min	-.003	2	-.25	1	0	15	-9.822e-3	1	305.369	1	NC	1
581		6	max	.006	3	.148	3	.003	1	9.76e-3	3	7464.651	15	NC	1
582			min	-.003	2	-.37	1	0	15	-1.485e-2	1	239.756	1	NC	1
583		7	max	.006	3	.199	3	0	3	1.299e-2	3	6295.223	15	NC	1
584			min	-.003	2	-.478	1	0	1	-1.988e-2	1	201.116	1	NC	1
585		8	max	.006	3	.241	3	0	15	1.621e-2	3	5603.284	15	NC	1
586			min	-.003	2	-.563	1	0	1	-2.491e-2	1	178.302	1	NC	1
587		9	max	.005	3	.269	3	0	1	1.646e-2	3	5241.379	15	NC	1
588			min	-.002	2	-.617	1	0	15	-2.731e-2	1	166.423	1	NC	1
589		10	max	.005	3	.279	3	0	15	1.471e-2	3	5130.81	15	NC	1
590			min	-.002	2	-.635	1	0	1	-2.794e-2	1	162.854	1	NC	1
591		11	max	.005	3	.273	3	0	15	1.297e-2	3	5241.198	15	NC	1
592			min	-.002	2	-.617	1	0	1	-2.857e-2	1	166.614	1	NC	1
593		12	max	.005	3	.25	3	.001	1	1.103e-2	3	5602.902	15	NC	1
594			min	-.002	2	-.562	1	0	15	-2.685e-2	1	178.887	1	NC	1
595		13	max	.005	3	.213	3	0	1	8.827e-3	3	6294.559	15	NC	1
596			min	-.002	2	-.475	1	0	15	-2.161e-2	1	202.539	1	NC	1
597		14	max	.005	3	.165	3	0	15	6.621e-3	3	7463.53	15	NC	1
598			min	-.002	2	-.365	1	-.003	1	-1.638e-2	1	242.789	1	NC	1
599		15	max	.005	3	.112	3	0	15	4.414e-3	3	9443.503	15	NC	1
600			min	-.002	2	-.244	1	-.006	1	-1.114e-2	1	311.571	1	NC	1
601		16	max	.005	3	.056	3	0	15	2.207e-3	3	NC	15	NC	1
602			min	-.002	2	-.12	1	-.009	1	-5.899e-3	1	437.68	1	NC	1
603		17	max	.004	3	.003	3	0	15	3.794e-7	3	NC	5	NC	1
604			min	-.002	2	-.005	2	-.01	1	-6.6e-4	1	704.27	1	NC	1
605		18	max	.004	3	.095	1	0	15	2.273e-3	3	NC	5	NC	1
606			min	-.002	2	-.045	3	-.007	1	-7.783e-3	1	1479.2	1	NC	1
607		19	max	.004	3	.185	1	0	1	4.626e-3	3	NC	1	NC	1
608			min	-.002	2	-.09	3	0	15	-1.513e-2	1	NC	1	NC	1

Company:	Schletter, Inc.	Date:	8/1/2016
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 14-40 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

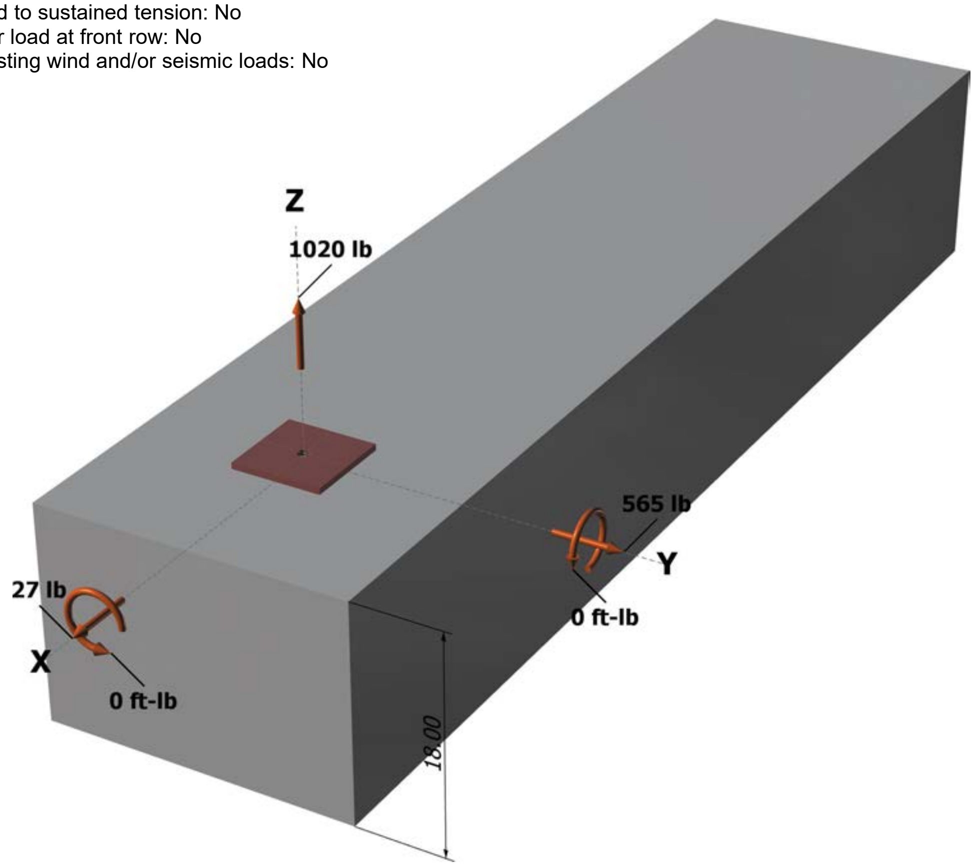
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

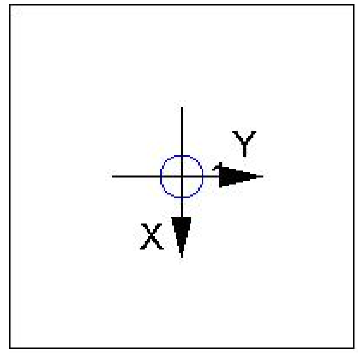
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	1020.0	27.0	565.0	565.6
Sum	1020.0	27.0	565.0	565.6

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1020
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	1020	6071	0.17	Pass
Concrete breakout	1020	5710	0.18	Pass
Adhesive	**1020**	**5365**	**0.19**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	**566**	**3156**	**0.18**	**Pass (Governs)**
T Concrete breakout y+	565	3934	0.14	Pass
T Concrete breakout x+	27	3018	0.01	Pass
|| Concrete breakout y+	27	8508	0.00	Pass
|| Concrete breakout x+	565	6875	0.08	Pass
Concrete breakout, combined	-	-	0.14	Pass
Pryout	566	12298	0.05	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.19	0.00	19.0 %	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

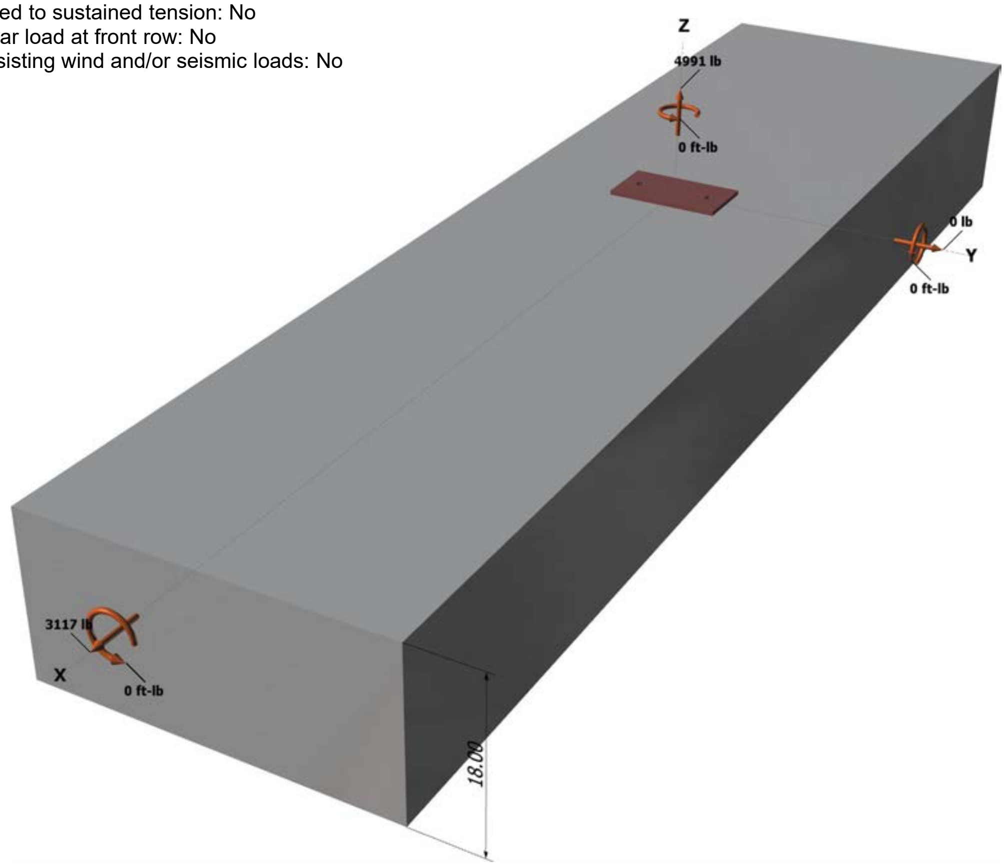
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

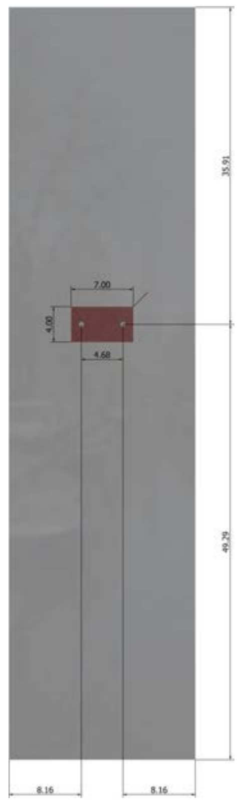


SIMPSON Strong-Tie

Anchor Designer™
Software
Version 2.4.6025.0

Company:	Schletter, Inc.	Date:	8/1/2016
Engineer:	HCV	Page:	2/5
Project:	Standard PVMax - Worst Case, 21-31 Inch Width		
Address:			
Phone:			
E-mail:			

<Figure 2>



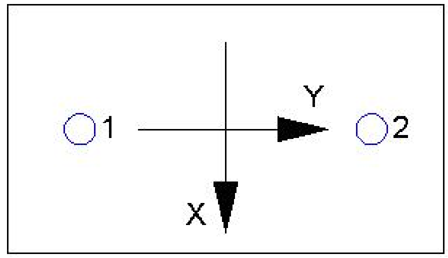
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2495.5	1558.5	0.0	1558.5
2	2495.5	1558.5	0.0	1558.5
Sum	4991.0	3117.0	0.0	3117.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 4991
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
19833

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	2496	6071	0.41	Pass
Concrete breakout	4991	9208	0.54	Pass
Adhesive	**4991**	**8093**	**0.62**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	1559	3156	0.49	Pass
T Concrete breakout x+	**3117**	**5323**	**0.59**	**Pass (Governs)**

|| Concrete breakout y-	**1559**	**12241**	**0.13**	**Pass (Governs)**
Pryout	3117	19833	0.16	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.3	0.62	0.59	120.2 %	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.