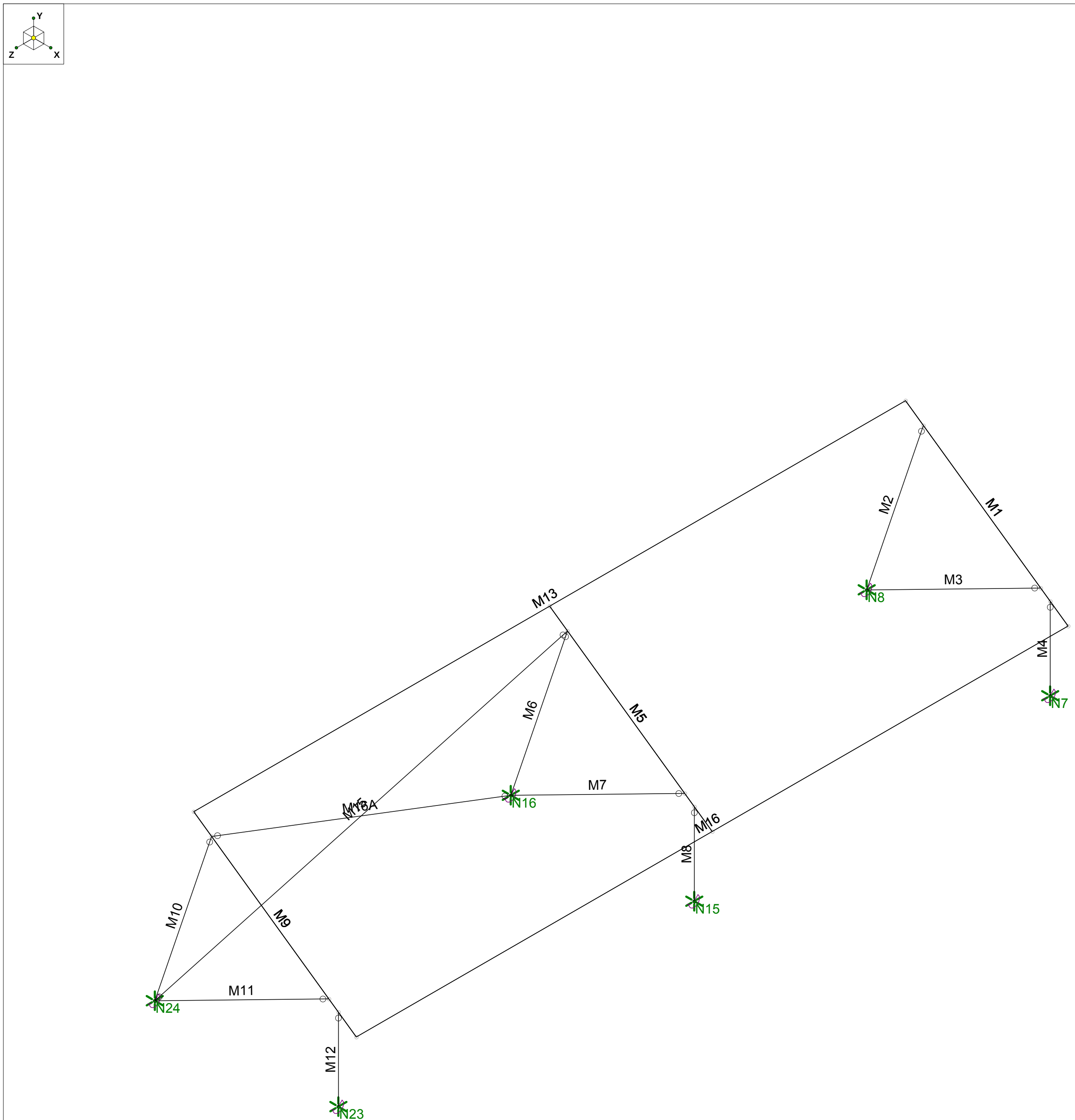


Schletter, Inc.		35° Tilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

1.1 Project Description

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

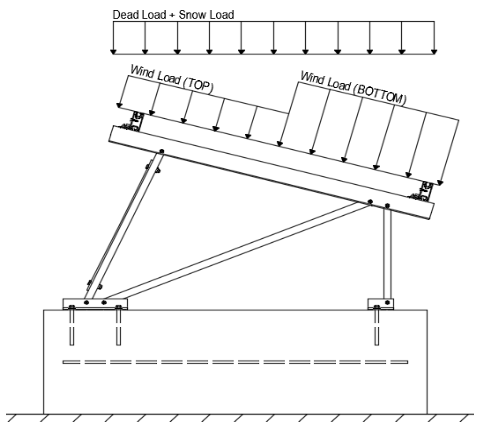
1.2 Construction

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 1
Module Tilt = 35°
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 = 14.43 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.64
C_e = 0.90
C_t = 1.20

2.3 Wind Loads

Design Wind Speed, V = 110 mph — Exposure Category = C
Height ≤ 15 ft — 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

$Cf+_{TOP}$	=	1.2	*(Pressure)*
$Cf+_{BOTTOM}$	=	2	
$Cf-_{TOP}$	=	-2.4	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.2	

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.

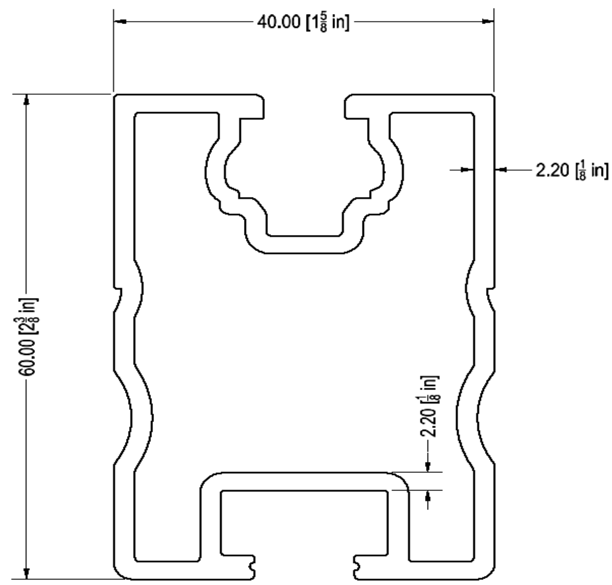
Purlins	Location	Diagonal Struts	Location	Front Reactions	Location
M13	Top	M3	Outer	N7	Outer
M16	Bottom	M7	Inner	N15	Inner
		M11	Outer	N23	Outer
Girders	**Location**	**Rear Struts**	**Location**	**Rear Reactions**	**Location**
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24	Outer
Front Struts	**Location**	**Bracing**			
M4	Outer	M15			
M8	Inner	M16A			
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).

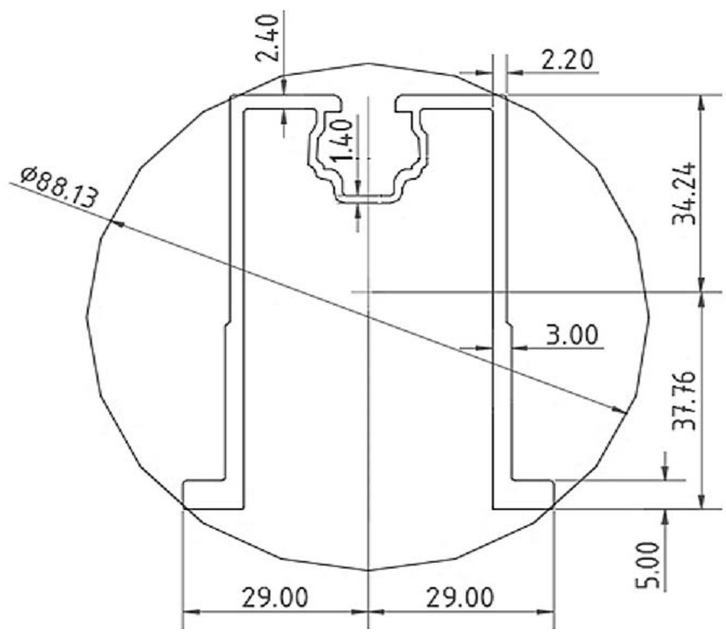
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	87	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.45	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.742	k-ft
M_z =	0.210	k-ft
$M_{y\ allowable}$ =	1.211	k-ft
$M_{z\ allowable}$ =	0.871	k-ft
Utilization =	85%	



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).

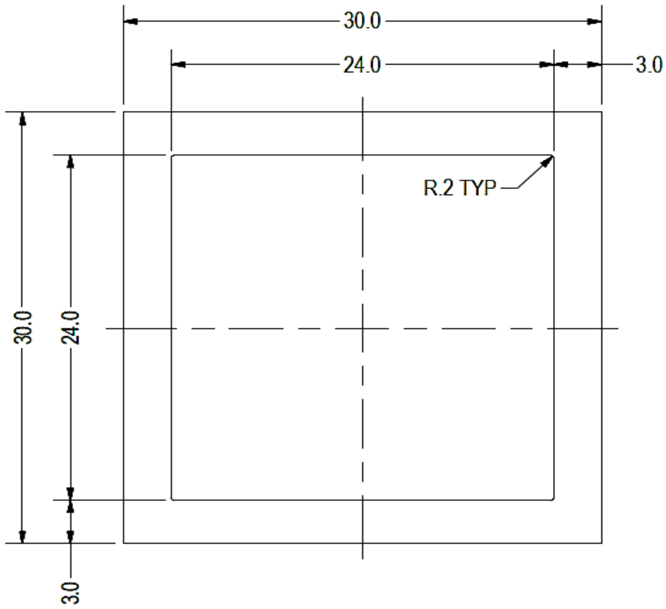
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.66	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.638	k-ft
M_z =	0.000	k-ft
P_n =	0.294	k
$M_{y\ allowable}$ =	1.455	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	46%	



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 M8 bolts at each end. See Appendix A.3 for detailed member calculations. Section units are in (mm).

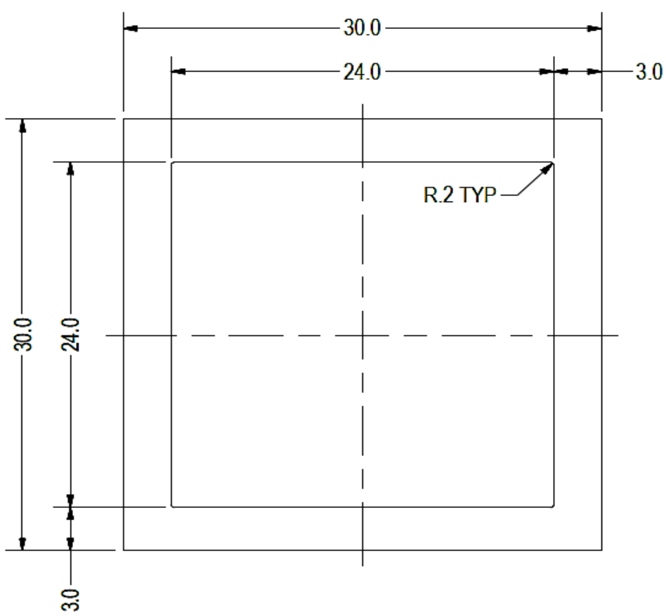
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.001	k-ft
P_n =	0.994	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	8%	



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 M8 bolts at each end. See Appendix A.4 for detailed member calculations. Section units are in (mm).

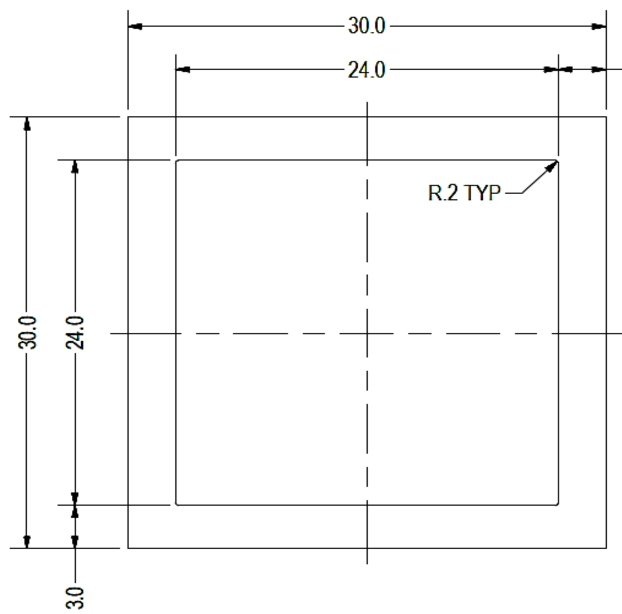
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.773	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	20%	



4.5 Rear Strut Design

An aluminum strut connects the rear portion of the girder to the rear foundation connection. Both vertical and horizontal forces are transferred from the girder. The strut is attached with single M8 bolts at each end. See Appendix A.5 for detailed member calculations. Section units are in (mm).

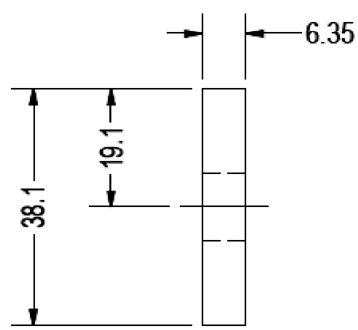
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	42.32	in
$\Phi F_{ty\ AXIAL}$ =	8.86	ksi
$\Phi F_{ty\ BENDING}$ =	29.96	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.852	k
$M_{y\ allowable}$ =	0.406	k-ft
$M_{z\ allowable}$ =	0.406	k-ft
$P_{n\ allowable}$ =	4.450	k
Utilization =	19%	



4.6 Cross Brace Design

In order to resist weak side loading, aluminum cross bracing kits are provided. The cross bracing is attached at one end of a rear aluminum strut diagonally down to the bottom end of an adjacent strut. Single M10 bolts are provided at each of the cross bracing. Section units are in (mm).

Brace Type =	**1.5x0.25**	
Aluminum Type =	6061-T6	
F_{ty} =	35	ksi
Φ =	0.90	
S_y =	0.02	in^3
E =	10100	ksi
I_y =	33.25	in^4
A =	0.38	in^2
g =	0.45	lbs/ft
M_y =	0.005	k-ft
P_n =	0.060	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	11%	



A cross brace kit is required every 17 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

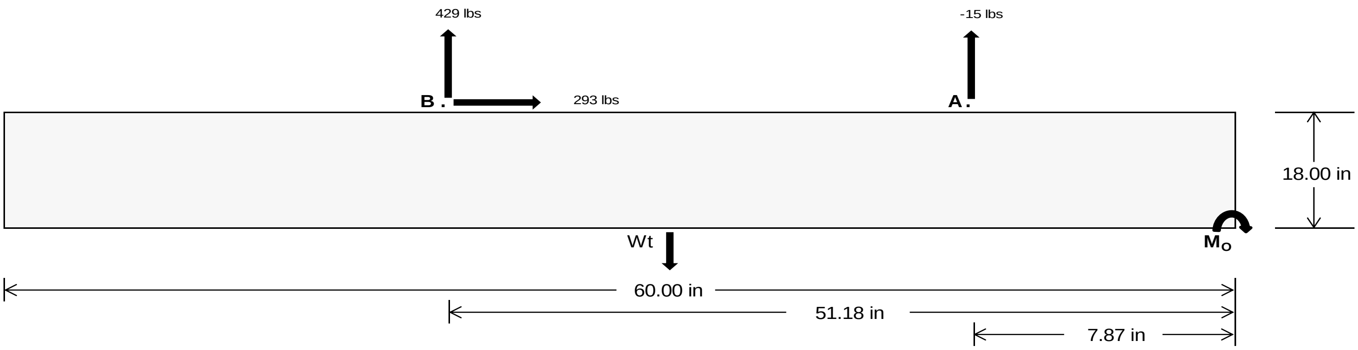
5.1 Helical Pile Foundations

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 =	33.82	1864.99	k
Compressive Load =	1291.98	1371.60	k
Lateral Load =	4.85	1270.64	k
Moment (Weak Axis) =	0.01	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (1) #5 rebar.

Overturning Check

M_O =	27117.2 in-lbs
Resisting Force Required =	903.91 lbs
S.F. =	1.67
Weight Required =	1506.51 lbs
Minimum Width =	21 in in
Weight Provided =	1903.13 lbs

A minimum 60in long x 21in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force =	292.97 lbs
Friction =	0.4
Weight Required =	732.44 lbs
Resisting Weight =	1903.13 lbs
Additional Weight Required =	0 lbs

Use a 60in long x 21in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force =	292.97 lbs
Cohesion =	130 psf
Area =	8.75 ft^2
Resisting =	951.56 lbs
Additional Weight Required =	0 lbs

Use a 60in long x 21in wide x 18in tall ballast foundation. Cohesion is OK.

Shear Key

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

Shear key is not required.

Bearing Pressure

	Ballast Width			
	21 in	22 in	23 in	24 in
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.75 ft) =	1903 lbs	1994 lbs	2084 lbs	2175 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in
F_A	514 lbs	514 lbs	514 lbs	514 lbs	358 lbs	358 lbs	358 lbs	358 lbs	603 lbs	603 lbs	603 lbs	603 lbs	31 lbs	31 lbs	31 lbs	31 lbs
F_B	348 lbs	348 lbs	348 lbs	348 lbs	570 lbs	570 lbs	570 lbs	570 lbs	652 lbs	652 lbs	652 lbs	652 lbs	-858 lbs	-858 lbs	-858 lbs	-858 lbs
F_V	68 lbs	68 lbs	68 lbs	68 lbs	538 lbs	538 lbs	538 lbs	538 lbs	449 lbs	449 lbs	449 lbs	449 lbs	-586 lbs	-586 lbs	-586 lbs	-586 lbs
P_{total}	2765 lbs	2856 lbs	2946 lbs	3037 lbs	2831 lbs	2922 lbs	3013 lbs	3103 lbs	3158 lbs	3249 lbs	3340 lbs	3430 lbs	314 lbs	369 lbs	423 lbs	477 lbs
M	437 lbs-ft	437 lbs-ft	437 lbs-ft	437 lbs-ft	462 lbs-ft	462 lbs-ft	462 lbs-ft	462 lbs-ft	633 lbs-ft	633 lbs-ft	633 lbs-ft	633 lbs-ft	693 lbs-ft	693 lbs-ft	693 lbs-ft	693 lbs-ft
e	0.16 ft	0.15 ft	0.15 ft	0.14 ft	0.16 ft	0.16 ft	0.15 ft	0.15 ft	0.20 ft	0.19 ft	0.19 ft	0.18 ft	2.20 ft	1.88 ft	1.64 ft	1.45 ft
L/6	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft
f_{min}	256.1 psf	254.3 psf	252.7 psf	251.3 psf	260.3 psf	258.3 psf	256.6 psf	254.9 psf	274.2 psf	271.6 psf	269.2 psf	267.1 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	375.9 psf	368.7 psf	362.2 psf	356.1 psf	386.9 psf	379.2 psf	372.1 psf	365.7 psf	447.8 psf	437.3 psf	427.7 psf	419.0 psf	404.5 psf	215.8 psf	170.6 psf	151.7 psf

Maximum Bearing Pressure =	448 psf
Allowable Bearing Pressure =	1500 psf

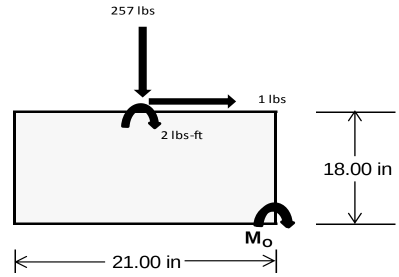
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 221.5 ft-lbs
Resisting Force Required = 253.14 lbs
S.F. = 1.67
Weight Required = 421.90 lbs
Minimum Width = 21 in in
Weight Provided = 1903.13 lbs

A minimum 60in long x 21in 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	21 in			21 in			21 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	86 lbs	216 lbs	82 lbs	262 lbs	721 lbs	257 lbs	25 lbs	63 lbs	24 lbs
F_V	5 lbs	5 lbs	0 lbs	19 lbs	18 lbs	1 lbs	2 lbs	1 lbs	0 lbs
P_{total}	2442 lbs	2572 lbs	2438 lbs	2505 lbs	2964 lbs	2500 lbs	714 lbs	752 lbs	713 lbs
M	9 lbs-ft	7 lbs-ft	0 lbs-ft	33 lbs-ft	27 lbs-ft	4 lbs-ft	2 lbs-ft	2 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.01 ft	0.01 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.29 ft	1.74 ft	1.75 ft	1.72 ft	1.73 ft	1.75 ft	1.74 ft	1.74 ft	1.75 ft
f_{min}	275.7 sqft	291.1 sqft	278.4 sqft	273.4 sqft	328.1 sqft	284.3 sqft	80.7 sqft	85.1 sqft	81.4 sqft
f_{max}	282.6 psf	296.8 psf	278.8 psf	299.2 psf	349.4 psf	287.2 psf	82.5 psf	86.8 psf	81.5 psf

Maximum Bearing Pressure = 349 psf
Allowable Bearing Pressure = 1500 psf

Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 60in long x 21in 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.

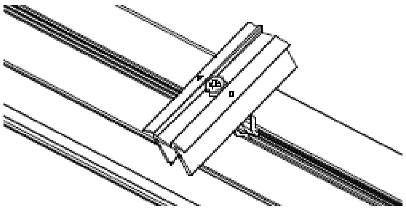
6. DESIGN OF JOINTS AND CONNECTIONS

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 a Schletter, Inc. Klicktop connector. The reliability of calculations is uncertain due to limited standards, therefore the strength of the fasteners has been evaluated by load testing.

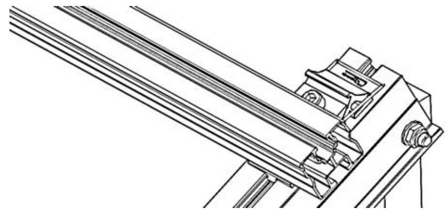
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.423	k
Allowable Uplift =	1.214	k
Utilization =	35%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	1.087	k
Allowable Uplift =	1.116	k
Utilization =	97%	



6.2 Bolted Connections

The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 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 =	0.994	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	17%	

Rear Strut

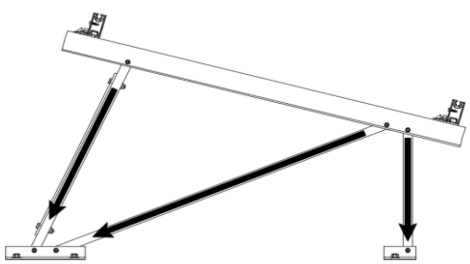
Maximum Axial Load =	1.170	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	21%	

Diagonal Strut

Maximum Axial Load =	0.773	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	14%	

Bracing

Maximum Axial Load =	0.060	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	1%	



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 M8 bolts are located at each end of the strut and are subjected to double shear.

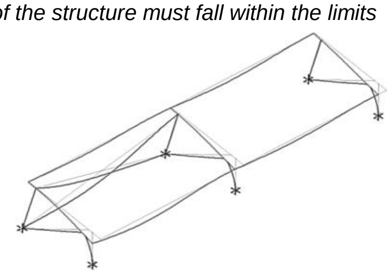
7. SEISMIC DESIGN

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} =	33.11 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$ 0.662 in
Max Drift, Δ_{MAX} =	0.064 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 = **ProfiPlus**

Strong Axis:

3.4.14

L_b = 87.00 in

J = 0.255

226.543

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

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= 28.5 ksi

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 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

Weak Axis:

3.4.14

L_b = 87.00 in

J = 0.255

235.251

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

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= 28.4

3.4.16

b/t = 23.9

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 23.9

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

S1 = 36.9

m = 0.65

C_0 = 30

Cc = 30

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 28.5 ksi

Ix = 250988 mm^4

0.603 in^4

y = 30 mm

Sx = 0.511 in^3

$M_{max}St$ = 1.211 k-ft

3.4.18

h/t = 7.4

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

S1 = 36.9

m = 0.65

C_0 = 20

Cc = 20

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 28.5 ksi

Iy = 120291 mm^4

0.289 in^4

x = 20 mm

Sy = 0.367 in^3

$M_{max}Wk$ = 0.871 k-ft

<u>Compression</u>

3.4.9

b/t = 7.4

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 23.9

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.47 ksi

A = 578.06 mm^2

0.90 in^2

P_{max} = 25.51 kips

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.25

21.9891

$$S1 = \frac{1.2(Bc - \frac{\theta_y}{\theta_b} Fcy)}{Dc}$$

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.7 ksi

3.4.15

N/A for Strong Direction

3.4.16

b/t = 4.29

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16

N/A for Strong Direction

Weak Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.25

24.5845

$$S1 = \frac{1.2(Bc - \frac{\theta_y}{\theta_b} Fcy)}{Dc}$$

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.7 ksi

3.4.15

b/t = 24.46

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{5.1Dp}$$

S1 = 3.8

$$S2 = \frac{k_1 Bp}{5.1Dp}$$

S2 = 14.7

F_{UT}= (φbk2*√(BpE))/(5.1b/t)

F_{UT}= 9.4 ksi

3.4.16

N/A for Weak Direction

3.4.16

b/t = 24.46

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

S1 = 12.2

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

S2 = 46.7

F_{ST}= φb[Bp-1.6Dp*b/t]

F_{ST}= 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

3.4.16.2

N/A for Strong Direction

3.4.16.2

b/t = 24.46

t = 2.6

ds = 6.05

rs = 3.49

S = 21.70

ρst = 0.22

F_{UT}= 9.37

F_{ST}= 28.24

φF_L= Fut + (Fst - Fut)ρst < Fst

φF_L= 13.5 ksi

3.4.18

h/t = 24.46

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

S1 = 34.4

m = 0.70

C_0 = 34.23

Cc = 37.77

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

S2 = 72.1

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.7 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.455 k-ft

3.4.18

h/t = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

b/t = 24.46
S1 = 3.83
S2 = 10.30
φF_L = (φck2*√(BpE))/(5.1b/t)
φF_L = 10.4 ksi

3.4.9

b/t = 4.29
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L = φyFcy
φF_L = 33.3 ksi

b/t = 24.46
S1 = 12.21
S2 = 32.70
φF_L = φc[Bp-1.6Dp*b/t]
φF_L = 28.2 ksi

3.4.9.1

b/t = 24.46
t = 2.6
ds = 6.05
rs = 3.49
S = 21.70
ρst = 0.22
F_{UT} = 10.43
F_{ST} = 28.24
φF_L = Fut + (Fst - Fut)ρst < Fst
φF_L = 14.3 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 = 14.29 ksi
A = 576.21 mm^2
0.89 in^2
P_{max} = 12.76 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

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= 31.2 ksi

3.4.16

b/t = 7.75

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

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 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 = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

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= 31.2

3.4.16

b/t = 7.75

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

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

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

$\lambda =$ 0.77182

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.83792

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

$\varphi F_L =$ 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 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

$\varphi F_L =$ 24.52 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 12.31 kips

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

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= 29.8 ksi

3.4.16

b/t = 7.75

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

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 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 = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

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= 29.8

3.4.16

b/t = 7.75

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

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

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

$r =$ 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

$b/t =$ 7.75

$S1 =$ 12.21 (See 3.4.16 above for formula)

$S2 =$ 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

$b/t =$ 7.75

$S1 =$ 12.21

$S2 =$ 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

$Rb/t =$ 0.0

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

$S1 =$ 6.87

$S2 =$ 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

$A =$ 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 42.32 in

J = 0.16

111.025

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

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= 30.0 ksi

3.4.16

b/t = 7.75

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

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 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 = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 30.0 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.406 k-ft

Weak Axis:

3.4.14

L_b = 42.32 in

J = 0.16

111.025

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

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= 30.0

3.4.16

b/t = 7.75

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

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

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

λ = 1.81475

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83406

φF_L= (φccFcy)/(λ²)

φF_L= 8.86409 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 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= 8.86 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 4.45 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				2		
2	Dead Load, Min	DL		-1				2		
3	Snow Load	SL						2		
4	Wind Load - Pressure	WL						2		
5	Wind Load - Suction	WL						2		
6	Seismic - Lateral	EL								

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-40.249	-40.249	0	0
2	M16	Y	-40.249	-40.249	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	-63.577	-63.577	0	0
2	M16	y	-105.961	-105.961	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	127.153	127.153	0	0
2	M16	y	63.577	63.577	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												
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	246.143	2	307.809	2	-.004	15	0	15	0	1	0	1
2		min	-304.485	3	-436.154	3	-.165	1	0	1	0	1	0	1
3	N7	max	.026	3	400.51	1	-.09	15	0	15	0	1	0	1
4		min	-.171	2	16.818	15	-1.746	1	-.003	1	0	1	0	1
5	N15	max	.211	3	993.834	1	.676	1	.001	1	0	1	0	1
6		min	-1.698	2	37.073	15	-.462	3	0	3	0	1	0	1
7	N16	max	919.273	2	1055.078	2	-.21	10	0	1	0	1	0	1
8		min	-977.418	3	-1434.606	3	-52.708	3	0	3	0	1	0	1
9	N23	max	.027	3	400.17	1	3.734	1	.006	1	0	1	0	1
10		min	-.171	2	16.976	15	.182	15	0	15	0	1	0	1
11	N24	max	246.647	2	312.143	2	53.056	3	.002	1	0	1	0	1
12		min	-304.636	3	-433.707	3	.021	10	0	3	0	1	0	1
13	Totals:	max	1410.024	2	3246.341	1	0	3						
14		min	-1586.274	3	-2088.697	3	0	1						

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	M2	1	max	261.538	1	.677	4	.499	1	0	15	0	12	0	1
2			min	-360.084	3	.159	15	-.029	3	-.001	1	0	1	0	1
3		2	max	261.673	1	.62	4	.499	1	0	15	0	15	0	15
4			min	-359.983	3	.146	15	-.029	3	-.001	1	0	1	0	4
5		3	max	261.808	1	.562	4	.499	1	0	15	0	15	0	15
6			min	-359.881	3	.132	15	-.029	3	-.001	1	0	1	0	4
7		4	max	261.943	1	.505	4	.499	1	0	15	0	15	0	15
8			min	-359.78	3	.119	15	-.029	3	-.001	1	0	1	0	4
9		5	max	262.077	1	.447	4	.499	1	0	15	0	1	0	15
10			min	-359.679	3	.105	15	-.029	3	-.001	1	0	3	0	4
11		6	max	262.212	1	.39	4	.499	1	0	15	0	1	0	15
12			min	-359.578	3	.092	15	-.029	3	-.001	1	0	3	0	4
13		7	max	262.347	1	.332	4	.499	1	0	15	0	1	0	15
14			min	-359.477	3	.078	15	-.029	3	-.001	1	0	3	0	4
15		8	max	262.482	1	.275	4	.499	1	0	15	0	1	0	15
16			min	-359.376	3	.065	15	-.029	3	-.001	1	0	3	0	4
17		9	max	262.617	1	.217	4	.499	1	0	15	0	1	0	15
18			min	-359.275	3	.051	15	-.029	3	-.001	1	0	3	0	4
19		10	max	262.752	1	.16	4	.499	1	0	15	0	1	0	15
20			min	-359.173	3	.038	15	-.029	3	-.001	1	0	3	0	4
21		11	max	262.887	1	.108	2	.499	1	0	15	0	1	0	15
22			min	-359.072	3	.017	12	-.029	3	-.001	1	0	3	0	4
23		12	max	263.022	1	.063	2	.499	1	0	15	0	1	0	15
24			min	-358.971	3	-.013	3	-.029	3	-.001	1	0	3	0	4
25		13	max	263.156	1	.018	2	.499	1	0	15	0	1	0	15
26			min	-358.87	3	-.046	3	-.029	3	-.001	1	0	3	0	4
27		14	max	263.291	1	-.016	15	.499	1	0	15	0	1	0	15
28			min	-358.769	3	-.08	3	-.029	3	-.001	1	0	3	0	4
29		15	max	263.426	1	-.03	15	.499	1	0	15	.001	1	0	15
30			min	-358.668	3	-.128	4	-.029	3	-.001	1	0	3	0	4
31		16	max	263.561	1	-.043	15	.499	1	0	15	.001	1	0	15
32			min	-358.567	3	-.185	4	-.029	3	-.001	1	0	3	0	4
33		17	max	263.696	1	-.057	15	.499	1	0	15	.001	1	0	15
34			min	-358.465	3	-.242	4	-.029	3	-.001	1	0	3	0	4
35		18	max	263.831	1	-.07	15	.499	1	0	15	.001	1	0	15
36			min	-358.364	3	-.3	4	-.029	3	-.001	1	0	3	0	4
37		19	max	263.966	1	-.084	15	.499	1	0	15	.001	1	0	15

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
38			min	-358.263	3	-.357	4	-.029	3	-.001	1	0	3	0	4
39	M3	1	max	196.256	2	1.735	4	-.026	15	0	15	.002	1	0	4
40			min	-214.096	3	.408	15	-.569	1	0	1	0	15	0	15
41		2	max	196.186	2	1.558	4	-.026	15	0	15	.002	1	0	2
42			min	-214.149	3	.366	15	-.569	1	0	1	0	15	0	3
43		3	max	196.116	2	1.382	4	-.026	15	0	15	.002	1	0	2
44			min	-214.201	3	.325	15	-.569	1	0	1	0	15	0	3
45		4	max	196.046	2	1.206	4	-.026	15	0	15	.002	1	0	15
46			min	-214.254	3	.284	15	-.569	1	0	1	0	15	0	4
47		5	max	195.976	2	1.029	4	-.026	15	0	15	.001	1	0	15
48			min	-214.306	3	.242	15	-.569	1	0	1	0	15	0	4
49		6	max	195.906	2	.853	4	-.026	15	0	15	.001	1	0	15
50			min	-214.359	3	.201	15	-.569	1	0	1	0	15	0	4
51		7	max	195.836	2	.676	4	-.026	15	0	15	.001	1	0	15
52			min	-214.411	3	.159	15	-.569	1	0	1	0	15	0	4
53		8	max	195.766	2	.5	4	-.026	15	0	15	.001	1	0	15
54			min	-214.464	3	.118	15	-.569	1	0	1	0	15	-.001	4
55		9	max	195.696	2	.324	4	-.026	15	0	15	0	1	0	15
56			min	-214.516	3	.076	15	-.569	1	0	1	0	15	-.001	4
57		10	max	195.626	2	.147	4	-.026	15	0	15	0	1	0	15
58			min	-214.569	3	.035	15	-.569	1	0	1	0	15	-.001	4
59		11	max	195.556	2	.003	2	-.026	15	0	15	0	1	0	15
60			min	-214.621	3	-.053	3	-.569	1	0	1	0	15	-.001	4
61		12	max	195.486	2	-.048	15	-.026	15	0	15	0	1	0	15
62			min	-214.674	3	-.205	4	-.569	1	0	1	0	15	-.001	4
63		13	max	195.416	2	-.09	15	-.026	15	0	15	0	1	0	15
64			min	-214.726	3	-.382	4	-.569	1	0	1	0	15	-.001	4
65		14	max	195.346	2	-.131	15	-.026	15	0	15	0	1	0	15
66			min	-214.779	3	-.558	4	-.569	1	0	1	0	15	-.001	4
67		15	max	195.276	2	-.172	15	-.026	15	0	15	0	1	0	15
68			min	-214.831	3	-.735	4	-.569	1	0	1	0	12	0	4
69		16	max	195.206	2	-.214	15	-.026	15	0	15	0	1	0	15
70			min	-214.884	3	-.911	4	-.569	1	0	1	0	12	0	4
71		17	max	195.136	2	-.255	15	-.026	15	0	15	0	15	0	15
72			min	-214.936	3	-1.087	4	-.569	1	0	1	0	1	0	4
73		18	max	195.066	2	-.297	15	-.026	15	0	15	0	15	0	15
74			min	-214.989	3	-1.264	4	-.569	1	0	1	0	1	0	4
75		19	max	194.996	2	-.338	15	-.026	15	0	15	0	15	0	1
76			min	-215.041	3	-1.44	4	-.569	1	0	1	0	1	0	1
77	M4	1	max	399.345	1	0	1	-.09	15	0	1	0	3	0	1
78			min	16.467	15	0	1	-1.871	1	0	1	0	2	0	1
79		2	max	399.41	1	0	1	-.09	15	0	1	0	12	0	1
80			min	16.487	15	0	1	-1.871	1	0	1	0	1	0	1
81		3	max	399.475	1	0	1	-.09	15	0	1	0	15	0	1
82			min	16.506	15	0	1	-1.871	1	0	1	0	1	0	1
83		4	max	399.539	1	0	1	-.09	15	0	1	0	15	0	1
84			min	16.526	15	0	1	-1.871	1	0	1	0	1	0	1
85		5	max	399.604	1	0	1	-.09	15	0	1	0	15	0	1
86			min	16.545	15	0	1	-1.871	1	0	1	0	1	0	1
87		6	max	399.669	1	0	1	-.09	15	0	1	0	15	0	1
88			min	16.565	15	0	1	-1.871	1	0	1	0	1	0	1
89		7	max	399.733	1	0	1	-.09	15	0	1	0	15	0	1
90			min	16.584	15	0	1	-1.871	1	0	1	-.001	1	0	1
91		8	max	399.798	1	0	1	-.09	15	0	1	0	15	0	1
92			min	16.604	15	0	1	-1.871	1	0	1	-.001	1	0	1
93		9	max	399.863	1	0	1	-.09	15	0	1	0	15	0	1
94			min	16.623	15	0	1	-1.871	1	0	1	-.001	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
95		10	max	399.928	1	0	1	-.09	15	0	1	0	15	0	1
96			min	16.643	15	0	1	-1.871	1	0	1	-.002	1	0	1
97		11	max	399.992	1	0	1	-.09	15	0	1	0	15	0	1
98			min	16.662	15	0	1	-1.871	1	0	1	-.002	1	0	1
99		12	max	400.057	1	0	1	-.09	15	0	1	0	15	0	1
100			min	16.682	15	0	1	-1.871	1	0	1	-.002	1	0	1
101		13	max	400.122	1	0	1	-.09	15	0	1	0	15	0	1
102			min	16.701	15	0	1	-1.871	1	0	1	-.002	1	0	1
103		14	max	400.186	1	0	1	-.09	15	0	1	0	15	0	1
104			min	16.721	15	0	1	-1.871	1	0	1	-.002	1	0	1
105		15	max	400.251	1	0	1	-.09	15	0	1	0	15	0	1
106			min	16.74	15	0	1	-1.871	1	0	1	-.002	1	0	1
107		16	max	400.316	1	0	1	-.09	15	0	1	0	15	0	1
108			min	16.76	15	0	1	-1.871	1	0	1	-.003	1	0	1
109		17	max	400.381	1	0	1	-.09	15	0	1	0	15	0	1
110			min	16.779	15	0	1	-1.871	1	0	1	-.003	1	0	1
111		18	max	400.445	1	0	1	-.09	15	0	1	0	15	0	1
112			min	16.799	15	0	1	-1.871	1	0	1	-.003	1	0	1
113		19	max	400.51	1	0	1	-.09	15	0	1	0	15	0	1
114			min	16.818	15	0	1	-1.871	1	0	1	-.003	1	0	1
115	M6	1	max	849.622	1	.682	4	.137	1	0	3	0	3	0	1
116			min	-1169.541	3	.16	15	-.146	3	0	15	0	11	0	1
117		2	max	849.757	1	.624	4	.137	1	0	3	0	3	0	15
118			min	-1169.44	3	.147	15	-.146	3	0	15	0	11	0	4
119		3	max	849.892	1	.567	4	.137	1	0	3	0	3	0	15
120			min	-1169.339	3	.133	15	-.146	3	0	15	0	15	0	4
121		4	max	850.026	1	.509	4	.137	1	0	3	0	3	0	15
122			min	-1169.238	3	.119	15	-.146	3	0	15	0	15	0	4
123		5	max	850.161	1	.452	4	.137	1	0	3	0	1	0	15
124			min	-1169.137	3	.1	12	-.146	3	0	15	0	15	0	4
125		6	max	850.296	1	.402	2	.137	1	0	3	0	1	0	15
126			min	-1169.036	3	.078	12	-.146	3	0	15	0	15	0	4
127		7	max	850.431	1	.357	2	.137	1	0	3	0	1	0	15
128			min	-1168.934	3	.055	12	-.146	3	0	15	0	12	0	4
129		8	max	850.566	1	.312	2	.137	1	0	3	0	1	0	12
130			min	-1168.833	3	.033	12	-.146	3	0	15	0	3	0	4
131		9	max	850.701	1	.268	2	.137	1	0	3	0	1	0	12
132			min	-1168.732	3	.004	3	-.146	3	0	15	0	3	0	4
133		10	max	850.836	1	.223	2	.137	1	0	3	0	1	0	12
134			min	-1168.631	3	-.03	3	-.146	3	0	15	0	3	0	2
135		11	max	850.97	1	.178	2	.137	1	0	3	0	1	0	12
136			min	-1168.53	3	-.064	3	-.146	3	0	15	0	3	0	2
137		12	max	851.105	1	.133	2	.137	1	0	3	0	1	0	12
138			min	-1168.429	3	-.097	3	-.146	3	0	15	0	3	0	2
139		13	max	851.24	1	.089	2	.137	1	0	3	0	1	0	12
140			min	-1168.328	3	-.131	3	-.146	3	0	15	0	3	0	2
141		14	max	851.375	1	.044	2	.137	1	0	3	0	1	0	12
142			min	-1168.226	3	-.164	3	-.146	3	0	15	0	3	0	2
143		15	max	851.51	1	-.001	2	.137	1	0	3	0	1	0	12
144			min	-1168.125	3	-.198	3	-.146	3	0	15	0	3	0	2
145		16	max	851.645	1	-.043	15	.137	1	0	3	0	1	0	3
146			min	-1168.024	3	-.232	3	-.146	3	0	15	0	3	0	2
147		17	max	851.78	1	-.056	15	.137	1	0	3	0	1	0	3
148			min	-1167.923	3	-.265	3	-.146	3	0	15	0	3	0	2
149		18	max	851.915	1	-.07	15	.137	1	0	3	0	1	0	3
150			min	-1167.822	3	-.299	3	-.146	3	0	15	0	3	0	2
151		19	max	852.049	1	-.083	15	.137	1	0	3	0	1	0	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
152			min	-1167.721	3	-.353	4	-.146	3	0	15	0	3	0	2
153	M7	1	max	772.583	2	1.74	4	.027	3	0	2	0	2	0	2
154			min	-672.763	3	.409	15	-.005	2	0	3	0	3	0	3
155		2	max	772.513	2	1.564	4	.027	3	0	2	0	2	0	2
156			min	-672.815	3	.367	15	-.005	2	0	3	0	3	0	3
157		3	max	772.443	2	1.388	4	.027	3	0	2	0	2	0	2
158			min	-672.868	3	.326	15	-.005	2	0	3	0	3	0	3
159		4	max	772.373	2	1.211	4	.027	3	0	2	0	2	0	2
160			min	-672.92	3	.284	15	-.005	2	0	3	0	3	0	3
161		5	max	772.303	2	1.035	4	.027	3	0	2	0	2	0	15
162			min	-672.973	3	.243	15	-.005	2	0	3	0	3	0	3
163		6	max	772.233	2	.859	4	.027	3	0	2	0	2	0	15
164			min	-673.025	3	.202	15	-.005	2	0	3	0	3	0	3
165		7	max	772.163	2	.682	4	.027	3	0	2	0	2	0	15
166			min	-673.078	3	.16	15	-.005	2	0	3	0	3	0	4
167		8	max	772.093	2	.506	4	.027	3	0	2	0	2	0	15
168			min	-673.13	3	.119	15	-.005	2	0	3	0	3	-.001	4
169		9	max	772.023	2	.349	2	.027	3	0	2	0	2	0	15
170			min	-673.183	3	.054	12	-.005	2	0	3	0	3	-.001	4
171		10	max	771.953	2	.211	2	.027	3	0	2	0	2	0	15
172			min	-673.235	3	-.033	3	-.005	2	0	3	0	3	-.001	4
173		11	max	771.883	2	.074	2	.027	3	0	2	0	2	0	15
174			min	-673.288	3	-.137	3	-.005	2	0	3	0	3	-.001	4
175		12	max	771.813	2	-.047	15	.027	3	0	2	0	2	0	15
176			min	-673.34	3	-.24	3	-.005	2	0	3	0	3	-.001	4
177		13	max	771.743	2	-.089	15	.027	3	0	2	0	2	0	15
178			min	-673.393	3	-.376	4	-.005	2	0	3	0	3	-.001	4
179		14	max	771.673	2	-.13	15	.027	3	0	2	0	2	0	15
180			min	-673.445	3	-.552	4	-.005	2	0	3	0	3	-.001	4
181		15	max	771.603	2	-.172	15	.027	3	0	2	0	2	0	15
182			min	-673.498	3	-.729	4	-.005	2	0	3	0	3	0	4
183		16	max	771.533	2	-.213	15	.027	3	0	2	0	2	0	15
184			min	-673.55	3	-.905	4	-.005	2	0	3	0	3	0	4
185		17	max	771.463	2	-.254	15	.027	3	0	2	0	2	0	15
186			min	-673.603	3	-1.082	4	-.005	2	0	3	0	3	0	4
187		18	max	771.393	2	-.296	15	.027	3	0	2	0	2	0	15
188			min	-673.655	3	-1.258	4	-.005	2	0	3	0	3	0	4
189		19	max	771.323	2	-.337	15	.027	3	0	2	0	2	0	1
190			min	-673.708	3	-1.434	4	-.005	2	0	3	0	3	0	1
191	M8	1	max	992.669	1	0	1	.807	1	0	1	0	15	0	1
192			min	36.722	15	0	1	-.471	3	0	1	0	1	0	1
193		2	max	992.734	1	0	1	.807	1	0	1	0	1	0	1
194			min	36.741	15	0	1	-.471	3	0	1	0	3	0	1
195		3	max	992.799	1	0	1	.807	1	0	1	0	1	0	1
196			min	36.761	15	0	1	-.471	3	0	1	0	3	0	1
197		4	max	992.863	1	0	1	.807	1	0	1	0	1	0	1
198			min	36.78	15	0	1	-.471	3	0	1	0	3	0	1
199		5	max	992.928	1	0	1	.807	1	0	1	0	1	0	1
200			min	36.8	15	0	1	-.471	3	0	1	0	3	0	1
201		6	max	992.993	1	0	1	.807	1	0	1	0	1	0	1
202			min	36.819	15	0	1	-.471	3	0	1	0	3	0	1
203		7	max	993.058	1	0	1	.807	1	0	1	0	1	0	1
204			min	36.839	15	0	1	-.471	3	0	1	0	3	0	1
205		8	max	993.122	1	0	1	.807	1	0	1	0	1	0	1
206			min	36.858	15	0	1	-.471	3	0	1	0	3	0	1
207		9	max	993.187	1	0	1	.807	1	0	1	0	1	0	1
208			min	36.878	15	0	1	-.471	3	0	1	0	3	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
209		10	max	993.252	1	0	1	.807	1	0	1	0	1	0	1
210			min	36.897	15	0	1	-.471	3	0	1	0	3	0	1
211		11	max	993.316	1	0	1	.807	1	0	1	0	1	0	1
212			min	36.917	15	0	1	-.471	3	0	1	0	3	0	1
213		12	max	993.381	1	0	1	.807	1	0	1	0	1	0	1
214			min	36.936	15	0	1	-.471	3	0	1	0	3	0	1
215		13	max	993.446	1	0	1	.807	1	0	1	0	1	0	1
216			min	36.956	15	0	1	-.471	3	0	1	0	3	0	1
217		14	max	993.511	1	0	1	.807	1	0	1	0	1	0	1
218			min	36.975	15	0	1	-.471	3	0	1	0	3	0	1
219		15	max	993.575	1	0	1	.807	1	0	1	.001	1	0	1
220			min	36.995	15	0	1	-.471	3	0	1	0	3	0	1
221		16	max	993.64	1	0	1	.807	1	0	1	.001	1	0	1
222			min	37.015	15	0	1	-.471	3	0	1	0	3	0	1
223		17	max	993.705	1	0	1	.807	1	0	1	.001	1	0	1
224			min	37.034	15	0	1	-.471	3	0	1	0	3	0	1
225		18	max	993.769	1	0	1	.807	1	0	1	.001	1	0	1
226			min	37.054	15	0	1	-.471	3	0	1	0	3	0	1
227		19	max	993.834	1	0	1	.807	1	0	1	.001	1	0	1
228			min	37.073	15	0	1	-.471	3	0	1	0	3	0	1
229	M10	1	max	274.98	1	.673	4	.005	3	.001	1	0	1	0	1
230			min	-333.007	3	.159	15	-.214	1	0	3	0	3	0	1
231		2	max	275.115	1	.615	4	.005	3	.001	1	0	1	0	15
232			min	-332.906	3	.145	15	-.214	1	0	3	0	3	0	4
233		3	max	275.25	1	.558	4	.005	3	.001	1	0	1	0	15
234			min	-332.805	3	.132	15	-.214	1	0	3	0	3	0	4
235		4	max	275.385	1	.5	4	.005	3	.001	1	0	1	0	15
236			min	-332.704	3	.118	15	-.214	1	0	3	0	3	0	4
237		5	max	275.519	1	.443	4	.005	3	.001	1	0	1	0	15
238			min	-332.603	3	.105	15	-.214	1	0	3	0	3	0	4
239		6	max	275.654	1	.385	4	.005	3	.001	1	0	1	0	15
240			min	-332.501	3	.091	15	-.214	1	0	3	0	3	0	4
241		7	max	275.789	1	.328	4	.005	3	.001	1	0	1	0	15
242			min	-332.4	3	.078	15	-.214	1	0	3	0	3	0	4
243		8	max	275.924	1	.27	4	.005	3	.001	1	0	1	0	15
244			min	-332.299	3	.064	15	-.214	1	0	3	0	3	0	4
245		9	max	276.059	1	.213	4	.005	3	.001	1	0	1	0	15
246			min	-332.198	3	.051	15	-.214	1	0	3	0	3	0	4
247		10	max	276.194	1	.155	4	.005	3	.001	1	0	1	0	15
248			min	-332.097	3	.037	15	-.214	1	0	3	0	3	0	4
249		11	max	276.329	1	.108	2	.005	3	.001	1	0	11	0	15
250			min	-331.996	3	.024	15	-.214	1	0	3	0	3	0	4
251		12	max	276.463	1	.063	2	.005	3	.001	1	0	15	0	15
252			min	-331.895	3	.008	12	-.214	1	0	3	0	3	0	4
253		13	max	276.598	1	.018	2	.005	3	.001	1	0	15	0	15
254			min	-331.793	3	-.023	3	-.214	1	0	3	0	3	0	4
255		14	max	276.733	1	-.017	15	.005	3	.001	1	0	15	0	15
256			min	-331.692	3	-.074	4	-.214	1	0	3	0	3	0	4
257		15	max	276.868	1	-.031	15	.005	3	.001	1	0	15	0	15
258			min	-331.591	3	-.132	4	-.214	1	0	3	0	1	0	4
259		16	max	277.003	1	-.044	15	.005	3	.001	1	0	15	0	15
260			min	-331.49	3	-.189	4	-.214	1	0	3	0	1	0	4
261		17	max	277.138	1	-.058	15	.005	3	.001	1	0	15	0	15
262			min	-331.389	3	-.247	4	-.214	1	0	3	0	1	0	4
263		18	max	277.273	1	-.071	15	.005	3	.001	1	0	15	0	15
264			min	-331.288	3	-.304	4	-.214	1	0	3	0	1	0	4
265		19	max	277.408	1	-.085	15	.005	3	.001	1	0	15	0	15

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
266			min	-331.186	3	-.362	4	-.214	1	0	3	0	1	0	4
267	M11	1	max	195.97	2	1.739	4	.634	1	0	1	0	3	0	4
268			min	-214.751	3	.409	15	-.009	3	0	15	-.002	1	0	12
269		2	max	195.9	2	1.563	4	.634	1	0	1	0	3	0	1
270			min	-214.804	3	.367	15	-.009	3	0	15	-.002	1	0	3
271		3	max	195.83	2	1.386	4	.634	1	0	1	0	3	0	1
272			min	-214.856	3	.326	15	-.009	3	0	15	-.002	1	0	3
273		4	max	195.76	2	1.21	4	.634	1	0	1	0	3	0	15
274			min	-214.909	3	.284	15	-.009	3	0	15	-.002	1	0	3
275		5	max	195.69	2	1.033	4	.634	1	0	1	0	3	0	15
276			min	-214.961	3	.243	15	-.009	3	0	15	-.001	1	0	4
277		6	max	195.62	2	.857	4	.634	1	0	1	0	3	0	15
278			min	-215.014	3	.201	15	-.009	3	0	15	-.001	1	0	4
279		7	max	195.55	2	.681	4	.634	1	0	1	0	3	0	15
280			min	-215.066	3	.16	15	-.009	3	0	15	-.001	1	0	4
281		8	max	195.48	2	.504	4	.634	1	0	1	0	3	0	15
282			min	-215.119	3	.118	15	-.009	3	0	15	0	1	-.001	4
283		9	max	195.41	2	.328	4	.634	1	0	1	0	3	0	15
284			min	-215.171	3	.077	15	-.009	3	0	15	0	1	-.001	4
285		10	max	195.34	2	.152	4	.634	1	0	1	0	3	0	15
286			min	-215.224	3	.025	12	-.009	3	0	15	0	1	-.001	4
287		11	max	195.27	2	.005	1	.634	1	0	1	0	3	0	15
288			min	-215.276	3	-.07	3	-.009	3	0	15	0	1	-.001	4
289		12	max	195.2	2	-.047	15	.634	1	0	1	0	3	0	15
290			min	-215.329	3	-.201	4	-.009	3	0	15	0	1	-.001	4
291		13	max	195.13	2	-.089	15	.634	1	0	1	0	3	0	15
292			min	-215.381	3	-.378	4	-.009	3	0	15	0	1	-.001	4
293		14	max	195.06	2	-.13	15	.634	1	0	1	0	3	0	15
294			min	-215.434	3	-.554	4	-.009	3	0	15	0	1	-.001	4
295		15	max	194.99	2	-.172	15	.634	1	0	1	0	3	0	15
296			min	-215.486	3	-.73	4	-.009	3	0	15	0	1	0	4
297		16	max	194.92	2	-.213	15	.634	1	0	1	0	3	0	15
298			min	-215.539	3	-.907	4	-.009	3	0	15	0	10	0	4
299		17	max	194.85	2	-.255	15	.634	1	0	1	0	1	0	15
300			min	-215.591	3	-1.083	4	-.009	3	0	15	0	15	0	4
301		18	max	194.78	2	-.296	15	.634	1	0	1	0	1	0	15
302			min	-215.644	3	-1.259	4	-.009	3	0	15	0	15	0	4
303		19	max	194.71	2	-.338	15	.634	1	0	1	0	1	0	1
304			min	-215.696	3	-1.436	4	-.009	3	0	15	0	15	0	1
305	M12	1	max	399.005	1	0	1	3.998	1	0	1	0	2	0	1
306			min	16.624	15	0	1	.182	15	0	1	0	3	0	1
307		2	max	399.07	1	0	1	3.998	1	0	1	0	1	0	1
308			min	16.644	15	0	1	.182	15	0	1	0	15	0	1
309		3	max	399.135	1	0	1	3.998	1	0	1	0	1	0	1
310			min	16.663	15	0	1	.182	15	0	1	0	15	0	1
311		4	max	399.199	1	0	1	3.998	1	0	1	.001	1	0	1
312			min	16.683	15	0	1	.182	15	0	1	0	15	0	1
313		5	max	399.264	1	0	1	3.998	1	0	1	.001	1	0	1
314			min	16.702	15	0	1	.182	15	0	1	0	15	0	1
315		6	max	399.329	1	0	1	3.998	1	0	1	.002	1	0	1
316			min	16.722	15	0	1	.182	15	0	1	0	15	0	1
317		7	max	399.393	1	0	1	3.998	1	0	1	.002	1	0	1
318			min	16.741	15	0	1	.182	15	0	1	0	15	0	1
319		8	max	399.458	1	0	1	3.998	1	0	1	.003	1	0	1
320			min	16.761	15	0	1	.182	15	0	1	0	15	0	1
321		9	max	399.523	1	0	1	3.998	1	0	1	.003	1	0	1
322			min	16.78	15	0	1	.182	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
323		10	max	399.588	1	0	1	3.998	1	0	1	.003	1	0	1
324			min	16.8	15	0	1	.182	15	0	1	0	15	0	1
325		11	max	399.652	1	0	1	3.998	1	0	1	.004	1	0	1
326			min	16.819	15	0	1	.182	15	0	1	0	15	0	1
327		12	max	399.717	1	0	1	3.998	1	0	1	.004	1	0	1
328			min	16.839	15	0	1	.182	15	0	1	0	15	0	1
329		13	max	399.782	1	0	1	3.998	1	0	1	.004	1	0	1
330			min	16.858	15	0	1	.182	15	0	1	0	15	0	1
331		14	max	399.846	1	0	1	3.998	1	0	1	.005	1	0	1
332			min	16.878	15	0	1	.182	15	0	1	0	15	0	1
333		15	max	399.911	1	0	1	3.998	1	0	1	.005	1	0	1
334			min	16.897	15	0	1	.182	15	0	1	0	15	0	1
335		16	max	399.976	1	0	1	3.998	1	0	1	.005	1	0	1
336			min	16.917	15	0	1	.182	15	0	1	0	15	0	1
337		17	max	400.041	1	0	1	3.998	1	0	1	.006	1	0	1
338			min	16.936	15	0	1	.182	15	0	1	0	15	0	1
339		18	max	400.105	1	0	1	3.998	1	0	1	.006	1	0	1
340			min	16.956	15	0	1	.182	15	0	1	0	15	0	1
341		19	max	400.17	1	0	1	3.998	1	0	1	.006	1	0	1
342			min	16.976	15	0	1	.182	15	0	1	0	15	0	1
343	M1	1	max	150.591	1	336.402	3	-3.646	15	0	1	.157	1	0	2
344			min	6.825	15	-257.044	1	-79.517	1	0	3	.007	15	0	3
345		2	max	150.751	1	336.231	3	-3.646	15	0	1	.14	1	.056	1
346			min	6.874	15	-257.273	1	-79.517	1	0	3	.006	15	-.073	3
347		3	max	115.036	3	6.946	9	-3.625	15	0	12	.121	1	.111	1
348			min	-13.557	10	-27.675	2	-79.453	1	0	1	.006	15	-.145	3
349		4	max	115.156	3	6.756	9	-3.625	15	0	12	.104	1	.112	1
350			min	-13.423	10	-27.904	2	-79.453	1	0	1	.005	15	-.143	3
351		5	max	115.276	3	6.565	9	-3.625	15	0	12	.087	1	.118	2
352			min	-13.29	10	-28.133	2	-79.453	1	0	1	.004	15	-.141	3
353		6	max	115.396	3	6.374	9	-3.625	15	0	12	.07	1	.124	2
354			min	-13.157	10	-28.361	2	-79.453	1	0	1	.003	15	-.139	3
355		7	max	115.516	3	6.184	9	-3.625	15	0	12	.052	1	.13	2
356			min	-13.023	10	-28.59	2	-79.453	1	0	1	.002	15	-.137	3
357		8	max	115.637	3	5.993	9	-3.625	15	0	12	.035	1	.136	2
358			min	-12.89	10	-28.819	2	-79.453	1	0	1	.002	15	-.135	3
359		9	max	115.757	3	5.803	9	-3.625	15	0	12	.018	1	.142	2
360			min	-12.756	10	-29.048	2	-79.453	1	0	1	0	15	-.132	3
361		10	max	115.877	3	5.612	9	-3.625	15	0	12	.001	3	.149	2
362			min	-12.623	10	-29.276	2	-79.453	1	0	1	0	10	-.13	3
363		11	max	115.997	3	5.421	9	-3.625	15	0	12	0	12	.155	2
364			min	-12.489	10	-29.505	2	-79.453	1	0	1	-.017	1	-.128	3
365		12	max	116.117	3	5.231	9	-3.625	15	0	12	-.001	12	.162	2
366			min	-12.356	10	-29.734	2	-79.453	1	0	1	-.034	1	-.126	3
367		13	max	116.237	3	5.04	9	-3.625	15	0	12	-.002	12	.168	2
368			min	-12.222	10	-29.963	2	-79.453	1	0	1	-.051	1	-.123	3
369		14	max	116.357	3	4.849	9	-3.625	15	0	12	-.003	15	.175	2
370			min	-12.089	10	-30.191	2	-79.453	1	0	1	-.068	1	-.121	3
371		15	max	116.477	3	4.659	9	-3.625	15	0	12	-.004	15	.181	2
372			min	-11.955	10	-30.42	2	-79.453	1	0	1	-.086	1	-.119	3
373		16	max	92.173	2	141.363	2	-3.651	15	0	1	-.005	15	.186	2
374			min	2.503	15	-201.461	3	-79.913	1	0	12	-.103	1	-.115	3
375		17	max	92.333	2	141.134	2	-3.651	15	0	1	-.006	15	.156	2
376			min	2.551	15	-201.633	3	-79.913	1	0	12	-.121	1	-.071	3
377		18	max	-6.845	15	360.314	2	-3.741	15	0	3	-.006	15	.078	2
378			min	-150.288	1	-163.007	3	-81.994	1	0	2	-.138	1	-.036	3
379		19	max	-6.797	15	360.085	2	-3.741	15	0	3	-.007	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
380			min	-150.128	1	-163.179	3	-81.994	1	0	2	-.156	1	0	3
381	M5	1	max	329.335	1	1112.179	3	-.077	10	0	1	.005	3	0	3
382			min	12.641	12	-851.007	1	-47.347	3	0	3	0	10	0	2
383		2	max	329.495	1	1112.007	3	-.077	10	0	1	0	2	.184	1
384			min	12.721	12	-851.236	1	-47.347	3	0	3	-.005	3	-.241	3
385		3	max	361.278	3	5.731	9	5.466	3	0	3	0	2	.365	1
386			min	-70.493	2	-103.508	2	-.407	2	0	1	-.015	3	-.477	3
387		4	max	361.399	3	5.541	9	5.466	3	0	3	0	2	.375	1
388			min	-70.333	2	-103.736	2	-.407	2	0	1	-.014	3	-.469	3
389		5	max	361.519	3	5.35	9	5.466	3	0	3	0	2	.392	2
390			min	-70.172	2	-103.965	2	-.407	2	0	1	-.013	3	-.462	3
391		6	max	361.639	3	5.159	9	5.466	3	0	3	0	2	.415	2
392			min	-70.012	2	-104.194	2	-.407	2	0	1	-.011	3	-.454	3
393		7	max	361.759	3	4.969	9	5.466	3	0	3	0	2	.438	2
394			min	-69.852	2	-104.422	2	-.407	2	0	1	-.01	3	-.446	3
395		8	max	361.879	3	4.778	9	5.466	3	0	3	0	2	.46	2
396			min	-69.692	2	-104.651	2	-.407	2	0	1	-.009	3	-.439	3
397		9	max	361.999	3	4.588	9	5.466	3	0	3	0	2	.483	2
398			min	-69.532	2	-104.88	2	-.407	2	0	1	-.008	3	-.431	3
399		10	max	362.119	3	4.397	9	5.466	3	0	3	0	10	.506	2
400			min	-69.372	2	-105.109	2	-.407	2	0	1	-.007	3	-.423	3
401		11	max	362.239	3	4.206	9	5.466	3	0	3	0	10	.529	2
402			min	-69.211	2	-105.337	2	-.407	2	0	1	-.006	3	-.415	3
403		12	max	362.36	3	4.016	9	5.466	3	0	3	0	10	.552	2
404			min	-69.051	2	-105.566	2	-.407	2	0	1	-.004	3	-.407	3
405		13	max	362.48	3	3.825	9	5.466	3	0	3	0	10	.574	2
406			min	-68.891	2	-105.795	2	-.407	2	0	1	-.003	3	-.399	3
407		14	max	362.6	3	3.635	9	5.466	3	0	3	0	10	.597	2
408			min	-68.731	2	-106.024	2	-.407	2	0	1	-.002	3	-.391	3
409		15	max	362.72	3	3.444	9	5.466	3	0	3	0	15	.62	2
410			min	-68.571	2	-106.252	2	-.407	2	0	1	-.002	1	-.383	3
411		16	max	294.224	2	578.051	2	5.45	3	0	1	0	3	.638	2
412			min	6.067	15	-633.084	3	-.444	2	0	15	-.001	1	-.37	3
413		17	max	294.384	2	577.823	2	5.45	3	0	1	.001	3	.512	2
414			min	6.115	15	-633.256	3	-.444	2	0	15	-.001	1	-.233	3
415		18	max	-13.654	12	1187.431	2	4.971	3	0	15	.002	3	.257	2
416			min	-330.111	1	-535.972	3	-.103	2	0	1	0	1	-.116	3
417		19	max	-13.574	12	1187.203	2	4.971	3	0	15	.003	3	0	3
418			min	-329.951	1	-536.143	3	-.103	2	0	1	0	2	0	2
419	M9	1	max	149.915	1	336.368	3	99.395	1	0	3	-.007	15	0	2
420			min	6.792	15	-257.031	1	4.888	15	0	1	-.156	1	0	3
421		2	max	150.076	1	336.197	3	99.395	1	0	3	-.004	12	.056	1
422			min	6.84	15	-257.26	1	4.888	15	0	1	-.134	1	-.073	3
423		3	max	115.267	3	6.927	9	75.671	1	0	1	.006	3	.111	1
424			min	-13.008	10	-27.683	2	1.376	12	0	12	-.112	1	-.145	3
425		4	max	115.387	3	6.736	9	75.671	1	0	1	.006	3	.112	1
426			min	-12.875	10	-27.912	2	1.376	12	0	12	-.095	1	-.143	3
427		5	max	115.507	3	6.545	9	75.671	1	0	1	.006	3	.118	2
428			min	-12.741	10	-28.141	2	1.376	12	0	12	-.079	1	-.141	3
429		6	max	115.627	3	6.355	9	75.671	1	0	1	.007	3	.124	2
430			min	-12.608	10	-28.369	2	1.376	12	0	12	-.062	1	-.139	3
431		7	max	115.747	3	6.164	9	75.671	1	0	1	.007	3	.13	2
432			min	-12.474	10	-28.598	2	1.376	12	0	12	-.046	1	-.137	3
433		8	max	115.867	3	5.973	9	75.671	1	0	1	.007	3	.136	2
434			min	-12.341	10	-28.827	2	1.376	12	0	12	-.03	1	-.135	3
435		9	max	115.988	3	5.783	9	75.671	1	0	1	.008	3	.142	2
436			min	-12.207	10	-29.056	2	1.376	12	0	12	-.013	1	-.132	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
437		10	max	116.108	3	5.592	9	75.671	1	0	1	.008	3	.149	2
438			min	-12.074	10	-29.284	2	1.376	12	0	12	0	2	-.13	3
439		11	max	116.228	3	5.402	9	75.671	1	0	1	.02	1	.155	2
440			min	-11.94	10	-29.513	2	1.376	12	0	12	0	15	-.128	3
441		12	max	116.348	3	5.211	9	75.671	1	0	1	.036	1	.162	2
442			min	-11.807	10	-29.742	2	1.376	12	0	12	.002	15	-.126	3
443		13	max	116.468	3	5.02	9	75.671	1	0	1	.052	1	.168	2
444			min	-11.673	10	-29.971	2	1.376	12	0	12	.002	15	-.124	3
445		14	max	116.588	3	4.83	9	75.671	1	0	1	.069	1	.175	2
446			min	-11.54	10	-30.199	2	1.376	12	0	12	.003	15	-.121	3
447		15	max	116.708	3	4.639	9	75.671	1	0	1	.085	1	.181	2
448			min	-11.406	10	-30.428	2	1.376	12	0	12	.004	15	-.119	3
449		16	max	92.546	2	141.103	2	76.188	1	0	15	.103	1	.186	2
450			min	2.607	15	-201.973	3	1.373	12	0	1	.005	15	-.115	3
451		17	max	92.706	2	140.875	2	76.188	1	0	15	.119	1	.156	2
452			min	2.656	15	-202.144	3	1.373	12	0	1	.005	15	-.071	3
453		18	max	-6.831	15	360.315	2	80.312	1	0	2	.137	1	.078	2
454			min	-149.923	1	-163.003	3	1.732	12	0	3	.006	15	-.036	3
455		19	max	-6.783	15	360.086	2	80.312	1	0	2	.154	1	0	2
456			min	-149.763	1	-163.175	3	1.732	12	0	3	.007	15	0	3
457	M13	1	max	99.665	1	256.608	1	-6.792	15	0	2	.156	1	0	1
458			min	4.888	15	-336.363	3	-149.895	1	0	3	.007	15	0	3
459		2	max	99.665	1	181.028	1	-5.212	15	0	2	.049	1	.231	3
460			min	4.888	15	-237.217	3	-114.904	1	0	3	.002	15	-.176	1
461		3	max	99.665	1	105.448	1	-3.633	15	0	2	.003	3	.382	3
462			min	4.888	15	-138.071	3	-79.913	1	0	3	-.029	1	-.292	1
463		4	max	99.665	1	29.868	1	-2.053	15	0	2	-.001	12	.453	3
464			min	4.888	15	-38.925	3	-44.922	1	0	3	-.079	1	-.346	1
465		5	max	99.665	1	60.221	3	-.474	15	0	2	-.003	12	.445	3
466			min	4.888	15	-45.712	1	-9.93	1	0	3	-.102	1	-.34	1
467		6	max	99.665	1	159.367	3	25.061	1	0	2	-.003	12	.356	3
468			min	4.888	15	-121.293	1	.282	12	0	3	-.095	1	-.272	1
469		7	max	99.665	1	258.513	3	60.052	1	0	2	-.002	12	.188	3
470			min	4.888	15	-196.873	1	1.814	12	0	3	-.061	1	-.144	1
471		8	max	99.665	1	357.659	3	95.043	1	0	2	.002	2	.045	1
472			min	4.888	15	-272.453	1	3.347	12	0	3	0	3	-.06	3
473		9	max	99.665	1	456.805	3	130.034	1	0	2	.092	1	.295	1
474			min	4.888	15	-348.033	1	4.879	12	0	3	.003	12	-.388	3
475		10	max	99.665	1	555.951	3	165.026	1	0	2	.211	1	.605	1
476			min	4.888	15	-423.613	1	6.411	12	0	3	.008	12	-.796	3
477		11	max	79.805	1	348.033	1	-4.692	12	0	3	.089	1	.295	1
478			min	3.647	15	-456.805	3	-129.355	1	0	2	0	3	-.388	3
479		12	max	79.805	1	272.453	1	-3.16	12	0	3	.002	2	.045	1
480			min	3.647	15	-357.659	3	-94.363	1	0	2	-.005	3	-.06	3
481		13	max	79.805	1	196.872	1	-1.627	12	0	3	-.003	15	.188	3
482			min	3.647	15	-258.513	3	-59.372	1	0	2	-.063	1	-.144	1
483		14	max	79.805	1	121.292	1	.014	3	0	3	-.004	15	.356	3
484			min	3.647	15	-159.367	3	-24.381	1	0	2	-.097	1	-.272	1
485		15	max	79.805	1	45.712	1	10.61	1	0	3	-.005	15	.445	3
486			min	3.647	15	-60.221	3	.507	15	0	2	-.103	1	-.34	1
487		16	max	79.805	1	38.925	3	45.602	1	0	3	-.003	12	.453	3
488			min	3.647	15	-29.868	1	2.087	15	0	2	-.08	1	-.346	1
489		17	max	79.805	1	138.071	3	80.593	1	0	3	0	3	.382	3
490			min	3.647	15	-105.448	1	3.666	15	0	2	-.029	1	-.292	1
491		18	max	79.805	1	237.217	3	115.584	1	0	3	.05	1	.231	3
492			min	3.647	15	-181.028	1	5.246	15	0	2	.002	15	-.176	1
493		19	max	79.805	1	336.363	3	150.575	1	0	3	.157	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
494			min	3.647	15	-256.608	1	6.825	15	0	2	.007	15	0	3
495	M16	1	max	-1.73	12	360.337	2	-6.783	15	0	3	.154	1	0	2
496			min	-79.998	1	-163.208	3	-149.779	1	0	2	.007	15	0	3
497		2	max	-1.73	12	254.222	2	-5.203	15	0	3	.047	1	.112	3
498			min	-79.998	1	-115.276	3	-114.788	1	0	2	.002	15	-.247	2
499		3	max	-1.73	12	148.107	2	-3.624	15	0	3	-.001	12	.186	3
500			min	-79.998	1	-67.344	3	-79.797	1	0	2	-.031	1	-.41	2
501		4	max	-1.73	12	41.992	2	-2.044	15	0	3	-.004	15	.221	3
502			min	-79.998	1	-19.412	3	-44.806	1	0	2	-.081	1	-.486	2
503		5	max	-1.73	12	28.52	3	-.465	15	0	3	-.005	15	.217	3
504			min	-79.998	1	-64.123	2	-9.814	1	0	2	-.103	1	-.477	2
505		6	max	-1.73	12	76.452	3	25.177	1	0	3	-.004	15	.175	3
506			min	-79.998	1	-170.238	2	.532	12	0	2	-.097	1	-.383	2
507		7	max	-1.73	12	124.384	3	60.168	1	0	3	-.003	15	.094	3
508			min	-79.998	1	-276.353	2	2.065	12	0	2	-.063	1	-.203	2
509		8	max	-1.73	12	172.316	3	95.159	1	0	3	.002	2	.062	2
510			min	-79.998	1	-382.468	2	3.597	12	0	2	-.003	3	-.026	3
511		9	max	-1.73	12	220.248	3	130.15	1	0	3	.091	1	.413	2
512			min	-79.998	1	-488.583	2	5.13	12	0	2	.002	12	-.184	3
513		10	max	-3.741	15	-12.647	15	165.142	1	0	15	.21	1	.85	2
514			min	-81.716	1	-594.698	2	-10.323	3	0	2	.008	12	-.381	3
515		11	max	-3.741	15	488.583	2	-5.381	12	0	2	.091	1	.413	2
516			min	-81.716	1	-220.248	3	-129.785	1	0	3	.003	12	-.184	3
517		12	max	-3.741	15	382.468	2	-3.848	12	0	2	.002	2	.062	2
518			min	-81.716	1	-172.316	3	-94.794	1	0	3	0	3	-.026	3
519		13	max	-3.741	15	276.353	2	-2.316	12	0	2	-.003	12	.094	3
520			min	-81.716	1	-124.384	3	-59.803	1	0	3	-.062	1	-.203	2
521		14	max	-3.741	15	170.238	2	-.783	12	0	2	-.004	12	.175	3
522			min	-81.716	1	-76.452	3	-24.812	1	0	3	-.096	1	-.383	2
523		15	max	-3.741	15	64.123	2	10.18	1	0	2	-.004	12	.217	3
524			min	-81.716	1	-28.52	3	.479	15	0	3	-.102	1	-.477	2
525		16	max	-3.741	15	19.412	3	45.171	1	0	2	-.003	12	.221	3
526			min	-81.716	1	-41.992	2	2.058	15	0	3	-.08	1	-.486	2
527		17	max	-3.741	15	67.344	3	80.162	1	0	2	0	12	.186	3
528			min	-81.716	1	-148.107	2	3.638	15	0	3	-.029	1	-.41	2
529		18	max	-3.741	15	115.276	3	115.153	1	0	2	.049	1	.112	3
530			min	-81.716	1	-254.222	2	5.218	15	0	3	.002	15	-.247	2
531		19	max	-3.741	15	163.208	3	150.144	1	0	2	.156	1	0	2
532			min	-81.716	1	-360.337	2	6.797	15	0	3	.007	15	0	3
533	M15	1	max	0	2	2.542	4	.042	3	0	1	0	1	0	1
534			min	-58.341	3	0	2	-.034	1	0	3	0	3	0	1
535		2	max	0	2	2.259	4	.042	3	0	1	0	1	0	2
536			min	-58.417	3	0	2	-.034	1	0	3	0	3	-.001	4
537		3	max	0	2	1.977	4	.042	3	0	1	0	1	0	2
538			min	-58.492	3	0	2	-.034	1	0	3	0	3	-.002	4
539		4	max	0	2	1.694	4	.042	3	0	1	0	1	0	2
540			min	-58.568	3	0	2	-.034	1	0	3	0	3	-.003	4
541		5	max	0	2	1.412	4	.042	3	0	1	0	1	0	2
542			min	-58.643	3	0	2	-.034	1	0	3	0	3	-.004	4
543		6	max	0	2	1.13	4	.042	3	0	1	0	1	0	2
544			min	-58.719	3	0	2	-.034	1	0	3	0	3	-.004	4
545		7	max	0	2	.847	4	.042	3	0	1	0	3	0	2
546			min	-58.794	3	0	2	-.034	1	0	3	0	1	-.005	4
547		8	max	0	2	.565	4	.042	3	0	1	0	3	0	2
548			min	-58.87	3	0	2	-.034	1	0	3	0	1	-.005	4
549		9	max	0	2	.282	4	.042	3	0	1	0	3	0	2
550			min	-58.946	3	0	2	-.034	1	0	3	0	1	-.005	4

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
551		10	max	0	2	0	1	.042	3	0	1	0	3	0	2
552			min	-59.021	3	0	1	-.034	1	0	3	0	1	-.005	4
553		11	max	0	2	0	2	.042	3	0	1	0	3	0	2
554			min	-59.097	3	-.282	4	-.034	1	0	3	0	1	-.005	4
555		12	max	0	2	0	2	.042	3	0	1	0	3	0	2
556			min	-59.172	3	-.565	4	-.034	1	0	3	0	1	-.005	4
557		13	max	0	2	0	2	.042	3	0	1	0	3	0	2
558			min	-59.248	3	-.847	4	-.034	1	0	3	0	1	-.005	4
559		14	max	0	2	0	2	.042	3	0	1	0	3	0	2
560			min	-59.323	3	-1.13	4	-.034	1	0	3	0	1	-.004	4
561		15	max	0	2	0	2	.042	3	0	1	0	3	0	2
562			min	-59.399	3	-1.412	4	-.034	1	0	3	0	1	-.004	4
563		16	max	0	2	0	2	.042	3	0	1	0	3	0	2
564			min	-59.474	3	-1.694	4	-.034	1	0	3	0	1	-.003	4
565		17	max	0	2	0	2	.042	3	0	1	0	3	0	2
566			min	-59.55	3	-1.977	4	-.034	1	0	3	0	1	-.002	4
567		18	max	0	2	0	2	.042	3	0	1	0	3	0	2
568			min	-59.625	3	-2.259	4	-.034	1	0	3	0	1	-.001	4
569		19	max	0	2	0	2	.042	3	0	1	0	3	0	1
570			min	-59.701	3	-2.542	4	-.034	1	0	3	0	1	0	1
571	M16A	1	max	-.985	10	2.542	4	.021	1	0	3	0	3	0	1
572			min	-59.025	3	.597	15	-.017	3	0	2	0	1	0	1
573		2	max	-.901	10	2.259	4	.021	1	0	3	0	3	0	15
574			min	-58.949	3	.531	15	-.017	3	0	2	0	1	-.001	4
575		3	max	-.817	10	1.977	4	.021	1	0	3	0	3	0	15
576			min	-58.874	3	.465	15	-.017	3	0	2	0	1	-.002	4
577		4	max	-.733	10	1.694	4	.021	1	0	3	0	3	0	15
578			min	-58.798	3	.398	15	-.017	3	0	2	0	1	-.003	4
579		5	max	-.649	10	1.412	4	.021	1	0	3	0	3	0	15
580			min	-58.723	3	.332	15	-.017	3	0	2	0	1	-.004	4
581		6	max	-.565	10	1.13	4	.021	1	0	3	0	3	0	15
582			min	-58.647	3	.266	15	-.017	3	0	2	0	1	-.004	4
583		7	max	-.481	10	.847	4	.021	1	0	3	0	3	-.001	15
584			min	-58.572	3	.199	15	-.017	3	0	2	0	1	-.005	4
585		8	max	-.397	10	.565	4	.021	1	0	3	0	3	-.001	15
586			min	-58.496	3	.133	15	-.017	3	0	2	0	1	-.005	4
587		9	max	-.313	10	.282	4	.021	1	0	3	0	3	-.001	15
588			min	-58.421	3	.066	15	-.017	3	0	2	0	1	-.005	4
589		10	max	-.229	10	0	1	.021	1	0	3	0	3	-.001	15
590			min	-58.345	3	0	1	-.017	3	0	2	0	1	-.005	4
591		11	max	-.145	10	-.066	15	.021	1	0	3	0	3	-.001	15
592			min	-58.27	3	-.282	4	-.017	3	0	2	0	1	-.005	4
593		12	max	-.061	10	-.133	15	.021	1	0	3	0	3	-.001	15
594			min	-58.194	3	-.565	4	-.017	3	0	2	0	1	-.005	4
595		13	max	.023	10	-.199	15	.021	1	0	3	0	2	-.001	15
596			min	-58.119	3	-.847	4	-.017	3	0	2	0	3	-.005	4
597		14	max	.106	10	-.266	15	.021	1	0	3	0	2	0	15
598			min	-58.043	3	-1.13	4	-.017	3	0	2	0	3	-.004	4
599		15	max	.19	10	-.332	15	.021	1	0	3	0	1	0	15
600			min	-57.968	3	-1.412	4	-.017	3	0	2	0	3	-.004	4
601		16	max	.274	10	-.398	15	.021	1	0	3	0	1	0	15
602			min	-57.892	3	-1.694	4	-.017	3	0	2	0	3	-.003	4
603		17	max	.358	10	-.465	15	.021	1	0	3	0	1	0	15
604			min	-57.817	3	-1.977	4	-.017	3	0	2	0	3	-.002	4
605		18	max	.442	10	-.531	15	.021	1	0	3	0	1	0	15
606			min	-57.741	3	-2.259	4	-.017	3	0	2	0	3	-.001	4
607		19	max	.526	10	-.597	15	.021	1	0	3	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
608			min	-57.665	3	-2.542	4	-.017	3	0	2	0	3	0	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	M2	1	max	.003	1	.01	2	.015	1	-6.067e-5	15	NC	3	NC	3
2			min	-.004	3	-.011	3	-.001	3	-1.323e-3	1	4084.842	2	2787.788	1
3		2	max	.003	1	.009	2	.014	1	-5.797e-5	15	NC	3	NC	3
4			min	-.004	3	-.01	3	0	3	-1.265e-3	1	4472.134	2	2991.38	1
5		3	max	.002	1	.009	2	.013	1	-5.527e-5	15	NC	1	NC	3
6			min	-.003	3	-.01	3	0	3	-1.206e-3	1	4935.4	2	3232.632	1
7		4	max	.002	1	.008	2	.012	1	-5.257e-5	15	NC	1	NC	3
8			min	-.003	3	-.01	3	0	3	-1.148e-3	1	5493.442	2	3520.369	1
9		5	max	.002	1	.007	2	.011	1	-4.987e-5	15	NC	1	NC	3
10			min	-.003	3	-.009	3	0	3	-1.089e-3	1	6171.452	2	3866.374	1
11		6	max	.002	1	.006	2	.01	1	-4.717e-5	15	NC	1	NC	2
12			min	-.003	3	-.009	3	0	3	-1.031e-3	1	7003.75	2	4286.654	1
13		7	max	.002	1	.005	2	.009	1	-4.447e-5	15	NC	1	NC	2
14			min	-.003	3	-.008	3	0	3	-9.726e-4	1	8037.982	2	4803.395	1
15		8	max	.002	1	.005	2	.008	1	-4.177e-5	15	NC	1	NC	2
16			min	-.002	3	-.008	3	0	3	-9.142e-4	1	9341.778	2	5448.071	1
17		9	max	.002	1	.004	2	.007	1	-3.907e-5	15	NC	1	NC	2
18			min	-.002	3	-.007	3	0	3	-8.557e-4	1	NC	1	6266.573	1
19		10	max	.001	1	.003	2	.006	1	-3.637e-5	15	NC	1	NC	2
20			min	-.002	3	-.007	3	0	3	-7.973e-4	1	NC	1	7328.032	1
21		11	max	.001	1	.003	2	.005	1	-3.368e-5	15	NC	1	NC	2
22			min	-.002	3	-.006	3	0	3	-7.388e-4	1	NC	1	8740.742	1
23		12	max	.001	1	.002	2	.004	1	-3.098e-5	15	NC	1	NC	1
24			min	-.001	3	-.005	3	0	3	-6.804e-4	1	NC	1	NC	1
25		13	max	0	1	.002	2	.003	1	-2.828e-5	15	NC	1	NC	1
26			min	-.001	3	-.005	3	0	3	-6.219e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	-2.558e-5	15	NC	1	NC	1
28			min	-.001	3	-.004	3	0	3	-5.635e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.002	1	-2.288e-5	15	NC	1	NC	1
30			min	0	3	-.003	3	0	3	-5.05e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	.001	1	-2.018e-5	15	NC	1	NC	1
32			min	0	3	-.002	3	0	3	-4.466e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-1.748e-5	15	NC	1	NC	1
34			min	0	3	-.002	3	0	3	-3.881e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-1.478e-5	15	NC	1	NC	1
36			min	0	3	0	3	0	12	-3.297e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-9.651e-6	12	NC	1	NC	1
38			min	0	1	0	1	0	1	-2.712e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.299e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	4.742e-6	12	NC	1	NC	1
41		2	max	0	3	0	2	0	12	1.575e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	7.069e-6	15	NC	1	NC	1
43		3	max	0	3	0	2	0	12	1.852e-4	1	NC	1	NC	1
44			min	0	2	-.002	3	0	1	8.349e-6	15	NC	1	NC	1
45		4	max	0	3	0	2	0	12	2.128e-4	1	NC	1	NC	1
46			min	0	2	-.003	3	-.001	1	9.628e-6	15	NC	1	NC	1
47		5	max	0	3	0	2	0	3	2.404e-4	1	NC	1	NC	1
48			min	0	2	-.004	3	-.001	1	1.091e-5	15	NC	1	NC	1
49		6	max	0	3	0	2	0	3	2.68e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	-.001	1	1.219e-5	15	NC	1	NC	1
51		7	max	0	3	0	2	0	3	2.956e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
52			min	0	2	-.005	3	0	1	1.347e-5	15	NC	1	NC	1
53		8	max	0	3	0	2	0	3	3.233e-4	1	NC	1	NC	1
54			min	0	2	-.006	3	0	1	1.475e-5	15	NC	1	NC	1
55		9	max	.001	3	.001	2	0	3	3.509e-4	1	NC	1	NC	1
56			min	0	2	-.007	3	0	11	1.603e-5	15	NC	1	NC	1
57		10	max	.001	3	.002	2	0	1	3.785e-4	1	NC	1	NC	1
58			min	-.001	2	-.007	3	0	15	1.731e-5	15	NC	1	NC	1
59		11	max	.001	3	.002	2	.001	1	4.061e-4	1	NC	1	NC	1
60			min	-.001	2	-.008	3	0	15	1.858e-5	15	NC	1	NC	1
61		12	max	.001	3	.003	2	.002	1	4.338e-4	1	NC	1	NC	1
62			min	-.001	2	-.008	3	0	15	1.986e-5	15	NC	1	NC	1
63		13	max	.002	3	.004	2	.003	1	4.614e-4	1	NC	1	NC	1
64			min	-.001	2	-.008	3	0	15	2.114e-5	15	NC	1	NC	1
65		14	max	.002	3	.004	2	.004	1	4.89e-4	1	NC	1	NC	1
66			min	-.002	2	-.008	3	0	15	2.242e-5	15	NC	1	NC	1
67		15	max	.002	3	.005	2	.004	1	5.166e-4	1	NC	1	NC	1
68			min	-.002	2	-.009	3	0	15	2.37e-5	15	8804.49	2	NC	1
69		16	max	.002	3	.006	2	.005	1	5.442e-4	1	NC	1	NC	2
70			min	-.002	2	-.009	3	0	15	2.498e-5	15	7449.056	2	8663.05	1
71		17	max	.002	3	.007	2	.006	1	5.719e-4	1	NC	1	NC	2
72			min	-.002	2	-.009	3	0	15	2.626e-5	15	6403.576	2	7409.618	1
73		18	max	.002	3	.008	2	.007	1	5.995e-4	1	NC	1	NC	2
74			min	-.002	2	-.009	3	0	15	2.754e-5	15	5587.31	2	6474.635	1
75		19	max	.002	3	.009	2	.008	1	6.271e-4	1	NC	3	NC	2
76			min	-.002	2	-.009	3	0	15	2.882e-5	15	4943.906	2	5759.289	1
77	M4	1	max	.002	1	.012	2	0	15	-4.346e-5	12	NC	1	NC	3
78			min	0	15	-.011	3	-.006	1	-1.009e-3	1	NC	1	3200.497	1
79		2	max	.002	1	.012	2	0	15	-4.346e-5	12	NC	1	NC	3
80			min	0	15	-.01	3	-.006	1	-1.009e-3	1	NC	1	3491.512	1
81		3	max	.002	1	.011	2	0	15	-4.346e-5	12	NC	1	NC	3
82			min	0	15	-.01	3	-.005	1	-1.009e-3	1	NC	1	3837.863	1
83		4	max	.002	1	.01	2	0	15	-4.346e-5	12	NC	1	NC	2
84			min	0	15	-.009	3	-.005	1	-1.009e-3	1	NC	1	4254.147	1
85		5	max	.001	1	.01	2	0	15	-4.346e-5	12	NC	1	NC	2
86			min	0	15	-.008	3	-.004	1	-1.009e-3	1	NC	1	4760.249	1
87		6	max	.001	1	.009	2	0	15	-4.346e-5	12	NC	1	NC	2
88			min	0	15	-.008	3	-.004	1	-1.009e-3	1	NC	1	5383.826	1
89		7	max	.001	1	.008	2	0	15	-4.346e-5	12	NC	1	NC	2
90			min	0	15	-.007	3	-.003	1	-1.009e-3	1	NC	1	6164.276	1
91		8	max	.001	1	.007	2	0	15	-4.346e-5	12	NC	1	NC	2
92			min	0	15	-.007	3	-.003	1	-1.009e-3	1	NC	1	7159.292	1
93		9	max	.001	1	.007	2	0	15	-4.346e-5	12	NC	1	NC	2
94			min	0	15	-.006	3	-.002	1	-1.009e-3	1	NC	1	8456.15	1
95		10	max	0	1	.006	2	0	15	-4.346e-5	12	NC	1	NC	1
96			min	0	15	-.005	3	-.002	1	-1.009e-3	1	NC	1	NC	1
97		11	max	0	1	.005	2	0	15	-4.346e-5	12	NC	1	NC	1
98			min	0	15	-.005	3	-.002	1	-1.009e-3	1	NC	1	NC	1
99		12	max	0	1	.005	2	0	15	-4.346e-5	12	NC	1	NC	1
100			min	0	15	-.004	3	-.001	1	-1.009e-3	1	NC	1	NC	1
101		13	max	0	1	.004	2	0	15	-4.346e-5	12	NC	1	NC	1
102			min	0	15	-.004	3	0	1	-1.009e-3	1	NC	1	NC	1
103		14	max	0	1	.003	2	0	15	-4.346e-5	12	NC	1	NC	1
104			min	0	15	-.003	3	0	1	-1.009e-3	1	NC	1	NC	1
105		15	max	0	1	.003	2	0	15	-4.346e-5	12	NC	1	NC	1
106			min	0	15	-.002	3	0	1	-1.009e-3	1	NC	1	NC	1
107		16	max	0	1	.002	2	0	15	-4.346e-5	12	NC	1	NC	1
108			min	0	15	-.002	3	0	1	-1.009e-3	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
109		17	max	0	1	.001	2	0	15	-4.346e-5	12	NC	1	NC	1
110			min	0	15	-.001	3	0	1	-1.009e-3	1	NC	1	NC	1
111		18	max	0	1	0	2	0	15	-4.346e-5	12	NC	1	NC	1
112			min	0	15	0	3	0	1	-1.009e-3	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-4.346e-5	12	NC	1	NC	1
114			min	0	1	0	1	0	1	-1.009e-3	1	NC	1	NC	1
115	M6	1	max	.009	1	.038	2	.005	1	3.619e-4	3	NC	3	NC	2
116			min	-.012	3	-.035	3	-.004	3	8.892e-7	10	1130.202	2	8484.385	1
117		2	max	.008	1	.035	2	.005	1	3.496e-4	3	NC	3	NC	2
118			min	-.012	3	-.033	3	-.004	3	1.456e-7	10	1209.878	2	9197.586	1
119		3	max	.008	1	.033	2	.004	1	3.373e-4	3	NC	3	NC	1
120			min	-.011	3	-.031	3	-.004	3	-1.04e-6	2	1301.234	2	NC	1
121		4	max	.007	1	.03	2	.004	1	3.25e-4	3	NC	3	NC	1
122			min	-.01	3	-.029	3	-.004	3	-3.858e-6	2	1406.597	2	NC	1
123		5	max	.007	1	.028	2	.003	1	3.128e-4	3	NC	3	NC	1
124			min	-.01	3	-.027	3	-.003	3	-6.677e-6	2	1528.963	2	NC	1
125		6	max	.006	1	.025	2	.003	1	3.005e-4	3	NC	3	NC	1
126			min	-.009	3	-.026	3	-.003	3	-9.495e-6	2	1672.252	2	NC	1
127		7	max	.006	1	.023	2	.003	1	2.882e-4	3	NC	3	NC	1
128			min	-.008	3	-.024	3	-.003	3	-1.231e-5	2	1841.693	2	NC	1
129		8	max	.005	1	.021	2	.002	1	2.759e-4	3	NC	3	NC	1
130			min	-.007	3	-.022	3	-.002	3	-1.513e-5	2	2044.414	2	NC	1
131		9	max	.005	1	.019	2	.002	1	2.637e-4	3	NC	3	NC	1
132			min	-.007	3	-.02	3	-.002	3	-1.795e-5	2	2290.387	2	NC	1
133		10	max	.004	1	.016	2	.002	1	2.514e-4	3	NC	3	NC	1
134			min	-.006	3	-.018	3	-.002	3	-2.077e-5	2	2594.013	2	NC	1
135		11	max	.004	1	.014	2	.001	1	2.391e-4	3	NC	3	NC	1
136			min	-.005	3	-.016	3	-.002	3	-2.359e-5	2	2976.875	2	NC	1
137		12	max	.003	1	.012	2	.001	1	2.268e-4	3	NC	3	NC	1
138			min	-.005	3	-.014	3	-.001	3	-2.641e-5	2	3472.865	2	NC	1
139		13	max	.003	1	.01	2	0	1	2.146e-4	3	NC	3	NC	1
140			min	-.004	3	-.012	3	-.001	3	-2.922e-5	2	4138.441	2	NC	1
141		14	max	.002	1	.008	2	0	1	2.023e-4	3	NC	3	NC	1
142			min	-.003	3	-.01	3	0	3	-3.204e-5	2	5075.169	2	NC	1
143		15	max	.002	1	.007	2	0	1	1.9e-4	3	NC	1	NC	1
144			min	-.003	3	-.008	3	0	3	-3.486e-5	2	6486.106	2	NC	1
145		16	max	.001	1	.005	2	0	1	1.777e-4	3	NC	1	NC	1
146			min	-.002	3	-.006	3	0	3	-3.768e-5	2	8844.924	2	NC	1
147		17	max	0	1	.003	2	0	1	1.655e-4	3	NC	1	NC	1
148			min	-.001	3	-.004	3	0	3	-4.05e-5	2	NC	1	NC	1
149		18	max	0	1	.002	2	0	1	1.532e-4	3	NC	1	NC	1
150			min	0	3	-.002	3	0	3	-4.332e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.409e-4	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-5.349e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.522e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-6.711e-5	3	NC	1	NC	1
155		2	max	0	3	.002	2	0	3	2.347e-5	1	NC	1	NC	1
156			min	0	2	-.002	3	0	1	-4.88e-5	3	NC	1	NC	1
157		3	max	0	3	.003	2	0	3	2.172e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	1	-3.049e-5	3	NC	1	NC	1
159		4	max	.001	3	.005	2	0	3	1.997e-5	1	NC	1	NC	1
160			min	-.001	2	-.006	3	0	1	-1.219e-5	3	9965.3	2	NC	1
161		5	max	.002	3	.006	2	.001	3	1.823e-5	1	NC	1	NC	1
162			min	-.002	2	-.008	3	0	1	6.798e-7	15	7518.677	2	NC	1
163		6	max	.002	3	.008	2	.001	3	2.443e-5	3	NC	3	NC	1
164			min	-.002	2	-.01	3	0	1	7.425e-7	15	6021.548	2	NC	1
165		7	max	.003	3	.009	2	.002	3	4.274e-5	3	NC	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
166			min	-.003	2	-.012	3	0	1	8.051e-7	15	5001.43	2	NC	1
167		8	max	.003	3	.011	2	.002	3	6.105e-5	3	NC	3	NC	1
168			min	-.003	2	-.014	3	0	1	-1.682e-6	2	4256.307	2	NC	1
169		9	max	.003	3	.012	2	.002	3	7.936e-5	3	NC	3	NC	1
170			min	-.004	2	-.016	3	-.001	1	-5.053e-6	2	3685.427	2	NC	1
171		10	max	.004	3	.014	2	.002	3	9.767e-5	3	NC	3	NC	1
172			min	-.004	2	-.017	3	-.001	1	-8.425e-6	2	3232.9	2	NC	1
173		11	max	.004	3	.016	2	.002	3	1.16e-4	3	NC	3	NC	1
174			min	-.005	2	-.019	3	-.001	1	-1.18e-5	2	2865.17	2	NC	1
175		12	max	.005	3	.018	2	.002	3	1.343e-4	3	NC	3	NC	1
176			min	-.005	2	-.02	3	-.002	1	-1.517e-5	2	2560.787	2	NC	1
177		13	max	.005	3	.02	2	.002	3	1.526e-4	3	NC	3	NC	1
178			min	-.006	2	-.022	3	-.002	1	-1.854e-5	2	2305.323	2	NC	1
179		14	max	.006	3	.022	2	.002	3	1.709e-4	3	NC	3	NC	1
180			min	-.006	2	-.023	3	-.002	1	-2.191e-5	2	2088.649	2	NC	1
181		15	max	.006	3	.024	2	.002	3	1.892e-4	3	NC	3	NC	1
182			min	-.007	2	-.024	3	-.002	1	-2.528e-5	2	1903.395	2	NC	1
183		16	max	.006	3	.026	2	.002	3	2.075e-4	3	NC	3	NC	1
184			min	-.007	2	-.025	3	-.002	1	-2.865e-5	2	1744.034	2	NC	1
185		17	max	.007	3	.029	2	.002	3	2.258e-4	3	NC	3	NC	1
186			min	-.008	2	-.026	3	-.002	1	-3.203e-5	2	1606.321	2	NC	1
187		18	max	.007	3	.031	2	.002	3	2.441e-4	3	NC	3	NC	1
188			min	-.008	2	-.027	3	-.002	1	-3.54e-5	2	1486.927	2	NC	1
189		19	max	.008	3	.033	2	.002	3	2.625e-4	3	NC	3	NC	1
190			min	-.009	2	-.028	3	-.002	1	-3.877e-5	2	1383.202	2	NC	1
191	M8	1	max	.005	1	.044	2	.003	1	-6.195e-6	10	NC	1	NC	2
192			min	0	15	-.034	3	-.001	3	-2.128e-4	3	NC	1	7595.615	1
193		2	max	.004	1	.041	2	.002	1	-6.195e-6	10	NC	1	NC	2
194			min	0	15	-.032	3	-.001	3	-2.128e-4	3	NC	1	8281.229	1
195		3	max	.004	1	.039	2	.002	1	-6.195e-6	10	NC	1	NC	2
196			min	0	15	-.031	3	-.001	3	-2.128e-4	3	NC	1	9097.456	1
197		4	max	.004	1	.036	2	.002	1	-6.195e-6	10	NC	1	NC	1
198			min	0	15	-.029	3	-.001	3	-2.128e-4	3	NC	1	NC	1
199		5	max	.004	1	.034	2	.002	1	-6.195e-6	10	NC	1	NC	1
200			min	0	15	-.027	3	-.001	3	-2.128e-4	3	NC	1	NC	1
201		6	max	.003	1	.031	2	.002	1	-6.195e-6	10	NC	1	NC	1
202			min	0	15	-.025	3	0	3	-2.128e-4	3	NC	1	NC	1
203		7	max	.003	1	.029	2	.001	1	-6.195e-6	10	NC	1	NC	1
204			min	0	15	-.023	3	0	3	-2.128e-4	3	NC	1	NC	1
205		8	max	.003	1	.027	2	.001	1	-6.195e-6	10	NC	1	NC	1
206			min	0	15	-.021	3	0	3	-2.128e-4	3	NC	1	NC	1
207		9	max	.003	1	.024	2	0	1	-6.195e-6	10	NC	1	NC	1
208			min	0	15	-.019	3	0	3	-2.128e-4	3	NC	1	NC	1
209		10	max	.002	1	.022	2	0	1	-6.195e-6	10	NC	1	NC	1
210			min	0	15	-.017	3	0	3	-2.128e-4	3	NC	1	NC	1
211		11	max	.002	1	.019	2	0	1	-6.195e-6	10	NC	1	NC	1
212			min	0	15	-.015	3	0	3	-2.128e-4	3	NC	1	NC	1
213		12	max	.002	1	.017	2	0	1	-6.195e-6	10	NC	1	NC	1
214			min	0	15	-.013	3	0	3	-2.128e-4	3	NC	1	NC	1
215		13	max	.002	1	.015	2	0	1	-6.195e-6	10	NC	1	NC	1
216			min	0	15	-.011	3	0	3	-2.128e-4	3	NC	1	NC	1
217		14	max	.001	1	.012	2	0	1	-6.195e-6	10	NC	1	NC	1
218			min	0	15	-.01	3	0	3	-2.128e-4	3	NC	1	NC	1
219		15	max	.001	1	.01	2	0	1	-6.195e-6	10	NC	1	NC	1
220			min	0	15	-.008	3	0	3	-2.128e-4	3	NC	1	NC	1
221		16	max	0	1	.007	2	0	1	-6.195e-6	10	NC	1	NC	1
222			min	0	15	-.006	3	0	3	-2.128e-4	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
223		17	max	0	1	.005	2	0	1	-6.195e-6	10	NC	1	NC	1
224			min	0	15	-.004	3	0	3	-2.128e-4	3	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	-6.195e-6	10	NC	1	NC	1
226			min	0	15	-.002	3	0	3	-2.128e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-6.195e-6	10	NC	1	NC	1
228			min	0	1	0	1	0	1	-2.128e-4	3	NC	1	NC	1
229	M10	1	max	.003	1	.01	2	0	3	1.124e-3	1	NC	3	NC	1
230			min	-.003	3	-.011	3	-.002	1	-3.506e-4	3	4086.647	2	NC	1
231		2	max	.003	1	.009	2	0	3	1.066e-3	1	NC	3	NC	1
232			min	-.003	3	-.01	3	-.002	1	-3.388e-4	3	4474.201	2	NC	1
233		3	max	.003	1	.009	2	0	3	1.008e-3	1	NC	1	NC	1
234			min	-.003	3	-.01	3	-.002	1	-3.27e-4	3	4937.801	2	NC	1
235		4	max	.002	1	.008	2	0	3	9.498e-4	1	NC	1	NC	1
236			min	-.003	3	-.01	3	-.002	1	-3.152e-4	3	5496.27	2	NC	1
237		5	max	.002	1	.007	2	0	3	8.915e-4	1	NC	1	NC	1
238			min	-.003	3	-.009	3	-.002	1	-3.034e-4	3	6174.835	2	NC	1
239		6	max	.002	1	.006	2	0	3	8.333e-4	1	NC	1	NC	1
240			min	-.003	3	-.009	3	-.002	1	-2.916e-4	3	7007.862	2	NC	1
241		7	max	.002	1	.005	2	0	3	7.751e-4	1	NC	1	NC	1
242			min	-.002	3	-.008	3	-.002	1	-2.798e-4	3	8043.067	2	NC	1
243		8	max	.002	1	.005	2	0	3	7.168e-4	1	NC	1	NC	1
244			min	-.002	3	-.008	3	-.002	1	-2.68e-4	3	9348.189	2	NC	1
245		9	max	.002	1	.004	2	0	3	6.586e-4	1	NC	1	NC	1
246			min	-.002	3	-.007	3	-.001	1	-2.563e-4	3	NC	1	NC	1
247		10	max	.001	1	.003	2	0	3	6.003e-4	1	NC	1	NC	1
248			min	-.002	3	-.007	3	-.001	1	-2.445e-4	3	NC	1	NC	1
249		11	max	.001	1	.003	2	0	3	5.421e-4	1	NC	1	NC	1
250			min	-.002	3	-.006	3	-.001	1	-2.327e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	4.839e-4	1	NC	1	NC	1
252			min	-.001	3	-.005	3	0	1	-2.209e-4	3	NC	1	NC	1
253		13	max	0	1	.002	2	0	3	4.256e-4	1	NC	1	NC	1
254			min	-.001	3	-.005	3	0	1	-2.091e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	3.674e-4	1	NC	1	NC	1
256			min	0	3	-.004	3	0	1	-1.973e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	3.092e-4	1	NC	1	NC	1
258			min	0	3	-.003	3	0	1	-1.855e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	2.509e-4	1	NC	1	NC	1
260			min	0	3	-.003	3	0	1	-1.737e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.927e-4	1	NC	1	NC	1
262			min	0	3	-.002	3	0	1	-1.619e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.345e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-1.501e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	7.623e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.383e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	6.613e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-3.762e-5	1	NC	1	NC	1
269		2	max	0	3	0	2	0	1	4.629e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-8.996e-5	1	NC	1	NC	1
271		3	max	0	3	0	2	0	11	2.645e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.423e-4	1	NC	1	NC	1
273		4	max	0	3	0	2	0	10	6.614e-6	3	NC	1	NC	1
274			min	0	2	-.003	3	0	3	-1.946e-4	1	NC	1	NC	1
275		5	max	0	3	0	2	0	10	-9.084e-6	12	NC	1	NC	1
276			min	0	2	-.004	3	-.001	3	-2.47e-4	1	NC	1	NC	1
277		6	max	0	3	0	2	0	15	-1.359e-5	15	NC	1	NC	1
278			min	0	2	-.005	3	-.001	3	-2.993e-4	1	NC	1	NC	1
279		7	max	0	3	0	2	0	15	-1.61e-5	15	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
280			min	0	2	-.005	3	-.002	1	-3.516e-4	1	NC	1	NC	1
281		8	max	0	3	0	2	0	15	-1.861e-5	15	NC	1	NC	1
282			min	0	2	-.006	3	-.003	1	-4.04e-4	1	NC	1	NC	1
283		9	max	.001	3	.001	2	0	15	-2.112e-5	15	NC	1	NC	1
284			min	0	2	-.007	3	-.004	1	-4.563e-4	1	NC	1	NC	1
285		10	max	.001	3	.002	2	0	15	-2.362e-5	15	NC	1	NC	2
286			min	-.001	2	-.007	3	-.005	1	-5.086e-4	1	NC	1	9758.443	1
287		11	max	.001	3	.002	2	0	15	-2.613e-5	15	NC	1	NC	2
288			min	-.001	2	-.008	3	-.006	1	-5.61e-4	1	NC	1	7945.959	1
289		12	max	.001	3	.003	2	0	15	-2.864e-5	15	NC	1	NC	2
290			min	-.001	2	-.008	3	-.007	1	-6.133e-4	1	NC	1	6643.196	1
291		13	max	.002	3	.004	2	0	15	-3.115e-5	15	NC	1	NC	2
292			min	-.001	2	-.008	3	-.008	1	-6.657e-4	1	NC	1	5674.827	1
293		14	max	.002	3	.004	2	0	15	-3.366e-5	15	NC	1	NC	2
294			min	-.002	2	-.009	3	-.009	1	-7.18e-4	1	NC	1	4935.523	1
295		15	max	.002	3	.005	2	0	15	-3.617e-5	15	NC	1	NC	2
296			min	-.002	2	-.009	3	-.011	1	-7.703e-4	1	8816.236	2	4358.823	1
297		16	max	.002	3	.006	2	0	15	-3.868e-5	15	NC	1	NC	2
298			min	-.002	2	-.009	3	-.012	1	-8.227e-4	1	7458.15	2	3901.072	1
299		17	max	.002	3	.007	2	0	15	-4.118e-5	15	NC	1	NC	3
300			min	-.002	2	-.009	3	-.013	1	-8.75e-4	1	6410.806	2	3532.635	1
301		18	max	.002	3	.008	2	0	15	-4.369e-5	15	NC	1	NC	3
302			min	-.002	2	-.009	3	-.014	1	-9.273e-4	1	5593.205	2	3232.825	1
303		19	max	.002	3	.009	2	0	15	-4.62e-5	15	NC	3	NC	3
304			min	-.002	2	-.009	3	-.015	1	-9.797e-4	1	4948.827	2	2986.874	1
305	M12	1	max	.002	1	.012	2	.013	1	9.58e-4	1	NC	1	NC	3
306			min	0	15	-.011	3	0	15	4.61e-5	15	NC	1	1515.768	1
307		2	max	.002	1	.012	2	.012	1	9.58e-4	1	NC	1	NC	3
308			min	0	15	-.01	3	0	15	4.61e-5	15	NC	1	1653.08	1
309		3	max	.002	1	.011	2	.011	1	9.58e-4	1	NC	1	NC	3
310			min	0	15	-.01	3	0	15	4.61e-5	15	NC	1	1816.527	1
311		4	max	.002	1	.01	2	.01	1	9.58e-4	1	NC	1	NC	3
312			min	0	15	-.009	3	0	15	4.61e-5	15	NC	1	2012.998	1
313		5	max	.001	1	.01	2	.009	1	9.58e-4	1	NC	1	NC	3
314			min	0	15	-.008	3	0	15	4.61e-5	15	NC	1	2251.876	1
315		6	max	.001	1	.009	2	.008	1	9.58e-4	1	NC	1	NC	3
316			min	0	15	-.008	3	0	15	4.61e-5	15	NC	1	2546.216	1
317		7	max	.001	1	.008	2	.007	1	9.58e-4	1	NC	1	NC	3
318			min	0	15	-.007	3	0	15	4.61e-5	15	NC	1	2914.611	1
319		8	max	.001	1	.007	2	.006	1	9.58e-4	1	NC	1	NC	3
320			min	0	15	-.007	3	0	15	4.61e-5	15	NC	1	3384.289	1
321		9	max	.001	1	.007	2	.005	1	9.58e-4	1	NC	1	NC	2
322			min	0	15	-.006	3	0	15	4.61e-5	15	NC	1	3996.435	1
323		10	max	0	1	.006	2	.004	1	9.58e-4	1	NC	1	NC	2
324			min	0	15	-.005	3	0	15	4.61e-5	15	NC	1	4815.804	1
325		11	max	0	1	.005	2	.003	1	9.58e-4	1	NC	1	NC	2
326			min	0	15	-.005	3	0	15	4.61e-5	15	NC	1	5949.053	1
327		12	max	0	1	.005	2	.003	1	9.58e-4	1	NC	1	NC	2
328			min	0	15	-.004	3	0	15	4.61e-5	15	NC	1	7582.251	1
329		13	max	0	1	.004	2	.002	1	9.58e-4	1	NC	1	NC	1
330			min	0	15	-.004	3	0	15	4.61e-5	15	NC	1	NC	1
331		14	max	0	1	.003	2	.001	1	9.58e-4	1	NC	1	NC	1
332			min	0	15	-.003	3	0	15	4.61e-5	15	NC	1	NC	1
333		15	max	0	1	.003	2	0	1	9.58e-4	1	NC	1	NC	1
334			min	0	15	-.002	3	0	15	4.61e-5	15	NC	1	NC	1
335		16	max	0	1	.002	2	0	1	9.58e-4	1	NC	1	NC	1
336			min	0	15	-.002	3	0	15	4.61e-5	15	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
337		17	max	0	1	.001	2	0	1	9.58e-4	1	NC	1	NC	1
338			min	0	15	-.001	3	0	15	4.61e-5	15	NC	1	NC	1
339		18	max	0	1	0	2	0	1	9.58e-4	1	NC	1	NC	1
340			min	0	15	0	3	0	15	4.61e-5	15	NC	1	NC	1
341		19	max	0	1	0	1	0	1	9.58e-4	1	NC	1	NC	1
342			min	0	1	0	1	0	1	4.61e-5	15	NC	1	NC	1
343	M1	1	max	.009	3	.026	3	.002	3	1.853e-2	1	NC	1	NC	1
344			min	-.009	2	-.024	2	-.005	1	-2.414e-2	3	NC	1	NC	1
345		2	max	.009	3	.016	3	.002	3	8.776e-3	1	NC	4	NC	2
346			min	-.009	2	-.014	2	-.011	1	-1.196e-2	3	4924.142	2	7644.944	1
347		3	max	.009	3	.007	3	0	3	-1.225e-5	12	NC	4	NC	2
348			min	-.009	2	-.005	2	-.015	1	-7.915e-4	1	2527.671	2	4638.269	1
349		4	max	.009	3	.003	1	0	3	-7.824e-6	12	NC	4	NC	3
350			min	-.009	2	-.002	3	-.017	1	-6.845e-4	1	1768.448	2	3840.809	1
351		5	max	.009	3	.01	2	0	3	-1.578e-6	3	NC	4	NC	3
352			min	-.009	2	-.008	3	-.018	1	-5.775e-4	1	1401.684	2	3691.663	1
353		6	max	.009	3	.016	2	0	3	5.e-6	3	NC	5	NC	2
354			min	-.009	2	-.014	3	-.017	1	-4.705e-4	1	1192.921	2	3955.753	1
355		7	max	.009	3	.02	2	0	3	1.158e-5	3	NC	5	NC	2
356			min	-.009	2	-.018	3	-.015	1	-3.635e-4	1	1065.135	2	4720.89	1
357		8	max	.009	3	.024	2	0	3	1.816e-5	3	NC	5	NC	2
358			min	-.009	2	-.021	3	-.012	1	-2.566e-4	1	986.266	2	6508.925	1
359		9	max	.009	3	.026	2	0	3	2.474e-5	3	NC	5	NC	1
360			min	-.009	2	-.023	3	-.008	1	-1.496e-4	1	941.363	2	NC	1
361		10	max	.009	3	.027	2	0	3	3.131e-5	3	NC	5	NC	1
362			min	-.009	2	-.023	3	-.005	1	-4.26e-5	1	923.609	2	NC	1
363		11	max	.009	3	.027	2	0	3	6.438e-5	1	NC	5	NC	1
364			min	-.009	2	-.022	3	-.001	1	3.354e-6	15	931.146	2	NC	1
365		12	max	.009	3	.025	2	.002	1	1.714e-4	1	NC	5	NC	2
366			min	-.009	2	-.021	3	0	15	8.215e-6	15	966.419	2	7252.262	1
367		13	max	.009	3	.022	2	.005	1	2.784e-4	1	NC	5	NC	2
368			min	-.009	2	-.018	3	0	15	1.308e-5	15	1037.498	2	5073.349	1
369		14	max	.009	3	.017	2	.007	1	3.853e-4	1	NC	5	NC	2
370			min	-.009	2	-.013	3	0	15	1.794e-5	15	1162.786	2	4174.946	1
371		15	max	.009	3	.01	2	.008	1	4.923e-4	1	NC	4	NC	3
372			min	-.009	2	-.008	3	0	15	2.28e-5	15	1385.218	2	3854.094	1
373		16	max	.009	3	.002	1	.008	1	5.649e-4	1	NC	4	NC	3
374			min	-.009	2	-.002	3	0	15	2.612e-5	15	1824.001	2	3978.836	1
375		17	max	.009	3	.006	3	.006	1	2.785e-5	3	NC	4	NC	2
376			min	-.009	2	-.008	2	0	15	-1.821e-4	1	2573.052	1	4779.874	1
377		18	max	.009	3	.014	3	.002	1	1.286e-2	2	NC	2	NC	2
378			min	-.009	2	-.019	2	0	15	-5.95e-3	3	4973.31	1	7850.126	1
379		19	max	.009	3	.022	3	0	3	2.604e-2	2	NC	1	NC	1
380			min	-.009	2	-.032	2	-.004	1	-1.204e-2	3	5950.696	2	NC	1
381	M5	1	max	.03	3	.086	3	.002	3	1.914e-6	3	NC	1	NC	1
382			min	-.034	2	-.08	2	-.006	1	5.091e-8	10	3560.161	3	NC	1
383		2	max	.03	3	.052	3	.003	3	1.004e-4	3	NC	5	NC	1
384			min	-.034	2	-.048	2	-.006	1	-5.483e-5	1	1465.845	2	NC	1
385		3	max	.03	3	.021	3	.004	3	1.97e-4	3	NC	5	NC	1
386			min	-.034	2	-.018	2	-.005	1	-1.095e-4	1	751.991	2	NC	1
387		4	max	.03	3	.009	2	.005	3	1.895e-4	3	NC	5	NC	1
388			min	-.034	2	-.005	3	-.004	1	-1.048e-4	1	525.553	2	NC	1
389		5	max	.03	3	.033	2	.006	3	1.82e-4	3	NC	5	NC	1
390			min	-.034	2	-.027	3	-.004	1	-1.002e-4	1	416.118	2	NC	1
391		6	max	.03	3	.053	2	.006	3	1.746e-4	3	NC	15	NC	1
392			min	-.034	2	-.045	3	-.004	1	-9.556e-5	1	353.794	2	NC	1
393		7	max	.029	3	.069	2	.006	3	1.671e-4	3	NC	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
394			min	-.034	2	-.059	3	-.003	1	-9.093e-5	1	315.612	2	NC	1
395		8	max	.029	3	.081	2	.006	3	1.596e-4	3	NC	15	NC	1
396			min	-.034	2	-.068	3	-.003	1	-8.629e-5	1	292.009	2	NC	1
397		9	max	.029	3	.088	2	.006	3	1.521e-4	3	NC	15	NC	1
398			min	-.034	2	-.074	3	-.003	1	-8.165e-5	1	278.522	2	NC	1
399		10	max	.029	3	.092	2	.005	3	1.446e-4	3	NC	15	NC	1
400			min	-.034	2	-.075	3	-.003	1	-7.702e-5	1	273.114	2	NC	1
401		11	max	.029	3	.09	2	.005	3	1.371e-4	3	NC	15	NC	1
402			min	-.034	2	-.073	3	-.003	1	-7.238e-5	1	275.227	2	NC	1
403		12	max	.029	3	.084	2	.005	3	1.297e-4	3	NC	15	NC	1
404			min	-.034	2	-.067	3	-.002	1	-6.775e-5	1	285.585	2	NC	1
405		13	max	.029	3	.073	2	.004	3	1.222e-4	3	NC	15	NC	1
406			min	-.034	2	-.057	3	-.002	1	-6.311e-5	1	306.593	2	NC	1
407		14	max	.029	3	.056	2	.003	3	1.147e-4	3	NC	5	NC	1
408			min	-.034	2	-.043	3	-.002	1	-5.847e-5	1	343.754	2	NC	1
409		15	max	.029	3	.034	2	.003	3	1.072e-4	3	NC	5	NC	1
410			min	-.034	2	-.026	3	-.002	1	-5.384e-5	1	409.953	2	NC	1
411		16	max	.028	3	.007	1	.002	3	9.514e-5	3	NC	5	NC	1
412			min	-.034	2	-.006	3	-.002	1	-5.733e-5	1	541.216	2	NC	1
413		17	max	.028	3	.019	3	.002	3	-1.08e-5	15	NC	5	NC	1
414			min	-.034	2	-.027	2	-.003	1	-2.543e-4	1	868.16	3	NC	1
415		18	max	.028	3	.045	3	0	3	-5.551e-6	15	NC	5	NC	1
416			min	-.034	2	-.066	2	-.003	1	-1.302e-4	1	1702.75	3	NC	1
417		19	max	.028	3	.073	3	0	3	-3.899e-8	15	NC	3	NC	1
418			min	-.034	2	-.107	2	-.003	1	-3.901e-7	3	1707.929	2	NC	1
419	M9	1	max	.009	3	.026	3	.002	3	2.414e-2	3	NC	1	NC	1
420			min	-.009	2	-.024	2	-.007	1	-1.852e-2	1	NC	1	NC	1
421		2	max	.009	3	.016	3	0	3	1.193e-2	3	NC	4	NC	2
422			min	-.009	2	-.014	2	-.001	1	-9.015e-3	1	4925.585	2	8657.882	1
423		3	max	.009	3	.006	3	.002	1	3.151e-4	1	NC	4	NC	2
424			min	-.009	2	-.005	2	0	3	-5.6e-5	3	2528.431	2	5355.385	1
425		4	max	.009	3	.003	2	.004	1	2.247e-4	1	NC	4	NC	2
426			min	-.009	2	-.002	3	0	3	-6.122e-5	3	1768.98	2	4521.531	1
427		5	max	.009	3	.01	2	.005	1	1.343e-4	1	NC	4	NC	3
428			min	-.009	2	-.009	3	-.002	3	-6.644e-5	3	1402.087	2	4459.803	1
429		6	max	.009	3	.016	2	.004	1	4.391e-5	1	NC	5	NC	2
430			min	-.009	2	-.014	3	-.002	3	-7.166e-5	3	1193.241	2	4968.038	1
431		7	max	.009	3	.02	2	.002	1	5.894e-6	10	NC	5	NC	2
432			min	-.009	2	-.018	3	-.003	3	-7.688e-5	3	1065.396	2	6337.53	1
433		8	max	.009	3	.024	2	0	2	-4.407e-6	10	NC	5	NC	1
434			min	-.009	2	-.021	3	-.003	3	-1.369e-4	1	986.481	2	NC	1
435		9	max	.009	3	.026	2	0	10	-1.052e-5	15	NC	5	NC	1
436			min	-.009	2	-.023	3	-.004	3	-2.273e-4	1	941.538	2	9562.301	3
437		10	max	.009	3	.027	2	0	15	-1.462e-5	15	NC	5	NC	1
438			min	-.009	2	-.023	3	-.006	1	-3.177e-4	1	923.744	2	9278.352	3
439		11	max	.009	3	.027	2	0	15	-1.872e-5	15	NC	5	NC	2
440			min	-.009	2	-.023	3	-.01	1	-4.081e-4	1	931.239	2	8789.787	1
441		12	max	.009	3	.025	2	0	15	-2.283e-5	15	NC	5	NC	2
442			min	-.009	2	-.021	3	-.012	1	-4.985e-4	1	966.459	2	5585.059	1
443		13	max	.009	3	.022	2	0	15	-2.693e-5	15	NC	5	NC	2
444			min	-.009	2	-.018	3	-.015	1	-5.889e-4	1	1037.46	2	4301.343	1
445		14	max	.009	3	.017	2	0	15	-3.103e-5	15	NC	5	NC	2
446			min	-.009	2	-.013	3	-.016	1	-6.793e-4	1	1162.616	2	3721.939	1
447		15	max	.009	3	.01	2	0	15	-3.514e-5	15	NC	4	NC	3
448			min	-.009	2	-.008	3	-.016	1	-7.697e-4	1	1384.781	2	3543.29	1
449		16	max	.009	3	.002	1	0	15	-3.797e-5	15	NC	4	NC	2
450			min	-.009	2	-.002	3	-.015	1	-8.336e-4	1	1822.862	2	3734.21	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
451		17	max	.009	3	.006	3	0	15	6.864e-5	3	NC	4	NC	2
452			min	-.009	2	-.008	2	-.013	1	-2.667e-4	1	2572.856	1	4552.407	1
453		18	max	.009	3	.014	3	0	15	6.e-3	3	NC	2	NC	2
454			min	-.009	2	-.019	2	-.008	1	-1.296e-2	2	4972.944	1	7557.78	1
455		19	max	.009	3	.023	3	0	3	1.204e-2	3	NC	1	NC	1
456			min	-.009	2	-.031	2	-.002	1	-2.604e-2	2	5976.384	2	NC	1
457	M13	1	max	.007	1	.026	3	.009	3	3.87e-3	3	NC	1	NC	1
458			min	-.002	3	-.024	2	-.009	2	-3.614e-3	2	NC	1	NC	1
459		2	max	.007	1	.251	3	.044	1	4.849e-3	3	NC	5	NC	3
460			min	-.002	3	-.194	1	0	10	-4.561e-3	2	772.062	3	3597.31	1
461		3	max	.007	1	.436	3	.112	1	5.828e-3	3	NC	5	NC	3
462			min	-.002	3	-.335	1	.005	15	-5.509e-3	2	424.903	3	1492.342	1
463		4	max	.007	1	.551	3	.17	1	6.807e-3	3	NC	15	NC	3
464			min	-.002	3	-.424	1	.008	15	-6.457e-3	2	331.669	3	996.947	1
465		5	max	.007	1	.584	3	.199	1	7.786e-3	3	NC	15	NC	3
466			min	-.002	3	-.45	1	.009	15	-7.404e-3	2	312.046	3	857.708	1
467		6	max	.007	1	.536	3	.189	1	8.765e-3	3	NC	15	NC	3
468			min	-.002	3	-.415	1	.009	15	-8.352e-3	2	341.141	3	901.05	1
469		7	max	.006	1	.424	3	.143	1	9.744e-3	3	NC	5	NC	5
470			min	-.002	3	-.33	1	.004	10	-9.3e-3	2	436.959	3	1178.865	1
471		8	max	.006	1	.279	3	.075	1	1.072e-2	3	NC	5	NC	5
472			min	-.002	3	-.22	1	-.006	10	-1.025e-2	2	687.727	3	2188.392	1
473		9	max	.006	1	.146	3	.028	3	1.17e-2	3	NC	5	NC	1
474			min	-.002	3	-.124	2	-.02	2	-1.12e-2	2	1449.093	3	9401.507	3
475		10	max	.006	1	.086	3	.03	3	1.268e-2	3	NC	4	NC	4
476			min	-.002	3	-.08	2	-.034	2	-1.214e-2	2	2914.107	3	7111.719	2
477		11	max	.006	1	.146	3	.034	3	1.17e-2	3	NC	5	NC	1
478			min	-.002	3	-.124	2	-.02	2	-1.12e-2	2	1449.091	3	6985.165	3
479		12	max	.006	1	.279	3	.081	1	1.072e-2	3	NC	5	NC	5
480			min	-.002	3	-.22	1	-.006	10	-1.025e-2	2	687.727	3	2050.703	1
481		13	max	.006	1	.424	3	.15	1	9.747e-3	3	NC	5	NC	5
482			min	-.002	3	-.33	1	.004	10	-9.3e-3	2	436.959	3	1131.103	1
483		14	max	.006	1	.536	3	.195	1	8.769e-3	3	NC	15	NC	5
484			min	-.002	3	-.415	1	.009	15	-8.353e-3	2	341.141	3	872.917	1
485		15	max	.006	1	.584	3	.204	1	7.791e-3	3	NC	15	NC	5
486			min	-.002	3	-.45	1	.01	15	-7.405e-3	2	312.046	3	834.979	1
487		16	max	.006	1	.551	3	.175	1	6.813e-3	3	NC	15	NC	5
488			min	-.002	3	-.424	1	.008	15	-6.457e-3	2	331.668	3	972.765	1
489		17	max	.006	1	.436	3	.115	1	5.835e-3	3	NC	5	NC	3
490			min	-.002	3	-.335	1	.006	15	-5.51e-3	2	424.903	3	1456.325	1
491		18	max	.005	1	.252	3	.046	1	4.857e-3	3	NC	5	NC	3
492			min	-.002	3	-.194	1	0	10	-4.562e-3	2	772.062	3	3498.424	1
493		19	max	.005	1	.026	3	.009	3	3.879e-3	3	NC	1	NC	1
494			min	-.002	3	-.024	2	-.009	2	-3.615e-3	2	NC	1	NC	1
495	M16	1	max	.002	1	.023	3	.009	3	4.616e-3	2	NC	1	NC	1
496			min	0	3	-.031	2	-.009	2	-3.24e-3	3	NC	1	NC	1
497		2	max	.002	1	.135	3	.046	1	5.841e-3	2	NC	5	NC	3
498			min	0	3	-.275	2	0	10	-4.045e-3	3	715.483	2	3421.31	1
499		3	max	.002	1	.227	3	.116	1	7.067e-3	2	NC	5	NC	3
500			min	0	3	-.474	2	.006	15	-4.849e-3	3	393.485	2	1439.645	1
501		4	max	.002	1	.286	3	.175	1	8.292e-3	2	NC	15	NC	5
502			min	0	3	-.599	2	.008	15	-5.654e-3	3	306.748	2	967.163	1
503		5	max	.002	1	.305	3	.204	1	9.517e-3	2	NC	15	NC	5
504			min	0	3	-.636	2	.01	15	-6.458e-3	3	287.966	2	833.689	1
505		6	max	.002	1	.285	3	.194	1	1.074e-2	2	NC	15	NC	5
506			min	0	3	-.586	2	.009	15	-7.263e-3	3	313.611	2	875.155	1
507		7	max	.002	1	.233	3	.148	1	1.197e-2	2	NC	5	NC	5

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
508			min	0	3	-.468	2	.005	10	-8.067e-3	3	398.751	2	1140.106	1
509		8	max	.003	1	.165	3	.079	1	1.319e-2	2	NC	5	NC	5
510			min	0	3	-.313	2	-.005	10	-8.872e-3	3	617.223	2	2088.761	1
511		9	max	.003	1	.102	3	.032	3	1.442e-2	2	NC	5	NC	1
512			min	0	3	-.172	2	-.02	2	-9.676e-3	3	1240.746	2	7613.91	3
513		10	max	.003	1	.073	3	.028	3	1.564e-2	2	NC	4	NC	4
514			min	0	3	-.107	2	-.034	2	-1.048e-2	3	2294.212	2	7168.635	2
515		11	max	.003	1	.102	3	.028	3	1.442e-2	2	NC	5	NC	1
516			min	0	3	-.172	2	-.02	2	-9.675e-3	3	1240.746	2	8980.524	3
517		12	max	.003	1	.165	3	.077	1	1.319e-2	2	NC	5	NC	5
518			min	0	3	-.313	2	-.005	10	-8.869e-3	3	617.223	2	2130.928	1
519		13	max	.003	1	.233	3	.146	1	1.197e-2	2	NC	5	NC	5
520			min	0	3	-.468	2	.005	10	-8.064e-3	3	398.751	2	1158.771	1
521		14	max	.003	1	.285	3	.191	1	1.074e-2	2	NC	15	NC	5
522			min	0	3	-.586	2	.009	15	-7.258e-3	3	313.611	2	889.053	1
523		15	max	.003	1	.305	3	.201	1	9.518e-3	2	NC	15	NC	5
524			min	0	3	-.636	2	.01	15	-6.453e-3	3	287.966	2	847.845	1
525		16	max	.003	1	.286	3	.172	1	8.293e-3	2	NC	15	NC	3
526			min	0	3	-.599	2	.008	15	-5.647e-3	3	306.748	2	986.214	1
527		17	max	.003	1	.227	3	.113	1	7.068e-3	2	NC	5	NC	3
528			min	0	3	-.474	2	.005	15	-4.842e-3	3	393.485	2	1475.87	1
529		18	max	.003	1	.135	3	.044	1	5.843e-3	2	NC	5	NC	3
530			min	0	3	-.275	2	0	10	-4.036e-3	3	715.483	2	3550.159	1
531		19	max	.004	1	.022	3	.009	3	4.618e-3	2	NC	1	NC	1
532			min	0	3	-.032	2	-.009	2	-3.231e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.97e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-5.991e-5	2	NC	1	NC	1
535		2	max	0	3	-.004	15	.001	1	9.16e-4	3	NC	5	NC	1
536			min	0	10	-.019	4	0	3	-6.025e-4	2	5183.539	4	NC	1
537		3	max	0	3	-.009	15	.004	1	1.435e-3	3	NC	15	NC	1
538			min	0	10	-.037	4	-.004	3	-1.145e-3	2	2637.726	4	NC	1
539		4	max	0	3	-.013	15	.008	1	1.954e-3	3	7698.444	15	NC	4
540			min	0	10	-.054	4	-.008	3	-1.688e-3	2	1809.634	4	6863.476	3
541		5	max	0	3	-.016	15	.013	1	2.473e-3	3	6007.174	15	NC	4
542			min	0	10	-.069	4	-.013	3	-2.23e-3	2	1412.076	4	4526.864	3
543		6	max	0	3	-.019	15	.018	1	2.992e-3	3	5055.672	15	NC	4
544			min	0	10	-.082	4	-.019	3	-2.773e-3	2	1188.411	4	3307.339	3
545		7	max	0	3	-.022	15	.023	1	3.511e-3	3	4483.469	15	NC	4
546			min	0	10	-.092	4	-.025	3	-3.315e-3	2	1053.906	4	2591.881	3
547		8	max	0	3	-.023	15	.028	1	4.03e-3	3	4140.061	15	NC	4
548			min	0	10	-.1	4	-.031	3	-3.858e-3	2	973.183	4	2141.104	3
549		9	max	0	3	-.025	15	.033	1	4.549e-3	3	3955.218	15	NC	4
550			min	0	10	-.105	4	-.036	3	-4.4e-3	2	929.733	4	1845.693	3
551		10	max	0	3	-.025	15	.036	1	5.068e-3	3	3896.743	15	NC	4
552			min	0	10	-.106	4	-.04	3	-4.943e-3	2	915.988	4	1650.607	3
553		11	max	0	3	-.025	15	.039	1	5.587e-3	3	3955.218	15	NC	5
554			min	0	10	-.105	4	-.043	3	-5.485e-3	2	929.733	4	1526.917	3
555		12	max	0	3	-.024	15	.039	1	6.106e-3	3	4140.061	15	NC	5
556			min	0	10	-.1	4	-.044	3	-6.028e-3	2	973.183	4	1460.3	3
557		13	max	.001	3	-.022	15	.038	1	6.625e-3	3	4483.469	15	NC	5
558			min	0	10	-.093	4	-.042	3	-6.571e-3	2	1053.906	4	1446.708	3
559		14	max	.001	3	-.019	15	.035	1	7.143e-3	3	5055.672	15	NC	4
560			min	0	10	-.082	4	-.038	3	-7.113e-3	2	1188.411	4	1492.595	3
561		15	max	.001	3	-.016	15	.029	1	7.662e-3	3	6007.174	15	NC	4
562			min	-.001	10	-.07	4	-.031	3	-7.656e-3	2	1412.076	4	1621.276	3
563		16	max	.001	3	-.013	15	.02	1	8.181e-3	3	7698.444	15	NC	4
564			min	-.001	10	-.055	4	-.02	3	-8.198e-3	2	1809.634	4	1895.899	3

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
565		17	max	.001	3	-.009	15	.008	1	8.7e-3	3	NC	15	NC	4
566			min	-.001	10	-.038	4	-.006	3	-8.741e-3	2	2637.726	4	2514.451	3
567		18	max	.001	3	-.005	15	.013	3	9.219e-3	3	NC	5	NC	4
568			min	-.001	10	-.02	4	-.016	2	-9.283e-3	2	5183.539	4	4478.342	3
569		19	max	.002	3	.006	2	.037	3	9.738e-3	3	NC	1	NC	1
570			min	-.001	10	-.003	9	-.038	2	-9.826e-3	2	NC	1	NC	1
571	M16A	1	max	0	10	.001	2	.011	3	2.869e-3	3	NC	1	NC	1
572			min	-.001	3	-.002	9	-.011	2	-2.689e-3	2	NC	1	NC	1
573		2	max	0	10	-.005	15	.004	9	2.756e-3	3	NC	5	NC	2
574			min	-.001	3	-.02	4	-.002	10	-2.572e-3	2	5183.539	4	9769.173	1
575		3	max	0	10	-.009	15	.012	1	2.642e-3	3	NC	15	NC	4
576			min	-.001	3	-.037	4	-.003	3	-2.456e-3	2	2637.726	4	5521.55	1
577		4	max	0	10	-.013	15	.018	1	2.529e-3	3	7698.444	15	NC	4
578			min	-.001	3	-.054	4	-.008	3	-2.339e-3	2	1809.634	4	4194.499	1
579		5	max	0	10	-.016	15	.022	1	2.416e-3	3	6007.174	15	NC	4
580			min	-.001	3	-.069	4	-.011	3	-2.222e-3	2	1412.076	4	3617.556	1
581		6	max	0	10	-.019	15	.024	1	2.303e-3	3	5055.672	15	NC	4
582			min	-.001	3	-.082	4	-.013	3	-2.106e-3	2	1188.411	4	3363.091	1
583		7	max	0	10	-.022	15	.025	1	2.189e-3	3	4483.469	15	NC	4
584			min	0	3	-.092	4	-.014	3	-1.989e-3	2	1053.906	4	3296.794	1
585		8	max	0	10	-.023	15	.025	1	2.076e-3	3	4140.061	15	NC	4
586			min	0	3	-.1	4	-.014	3	-1.872e-3	2	973.183	4	3372.245	1
587		9	max	0	10	-.025	15	.024	1	1.963e-3	3	3955.218	15	NC	4
588			min	0	3	-.105	4	-.013	3	-1.756e-3	2	929.733	4	3582.228	1
589		10	max	0	10	-.025	15	.021	1	1.85e-3	3	3896.743	15	NC	4
590			min	0	3	-.106	4	-.012	3	-1.639e-3	2	915.988	4	3947.144	1
591		11	max	0	10	-.025	15	.019	1	1.736e-3	3	3955.218	15	NC	4
592			min	0	3	-.105	4	-.01	3	-1.522e-3	2	929.733	4	4519.079	1
593		12	max	0	10	-.023	15	.015	1	1.623e-3	3	4140.061	15	NC	4
594			min	0	3	-.1	4	-.008	3	-1.406e-3	2	973.183	4	5401.462	1
595		13	max	0	10	-.022	15	.012	1	1.51e-3	3	4483.469	15	NC	3
596			min	0	3	-.092	4	-.006	3	-1.289e-3	2	1053.906	4	6799.438	1
597		14	max	0	10	-.019	15	.009	1	1.397e-3	3	5055.672	15	NC	2
598			min	0	3	-.082	4	-.004	3	-1.172e-3	2	1188.411	4	9152.315	1
599		15	max	0	10	-.016	15	.006	1	1.283e-3	3	6007.174	15	NC	1
600			min	0	3	-.069	4	-.002	3	-1.056e-3	2	1412.076	4	NC	1
601		16	max	0	10	-.013	15	.003	1	1.17e-3	3	7698.444	15	NC	1
602			min	0	3	-.054	4	0	3	-9.392e-4	2	1809.634	4	NC	1
603		17	max	0	10	-.009	15	.001	9	1.057e-3	3	NC	15	NC	1
604			min	0	3	-.037	4	0	2	-8.226e-4	2	2637.726	4	NC	1
605		18	max	0	10	-.004	15	0	3	9.437e-4	3	NC	5	NC	1
606			min	0	3	-.019	4	0	2	-7.059e-4	2	5183.539	4	NC	1
607		19	max	0	1	0	1	0	1	8.305e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.893e-4	2	NC	1	NC	1

Anchor Designer™ Software
Version 2.4.5673.0

Company:	Schletter, Inc.	Date:	12/10/2015
Engineer:	HCV	Page:	1/5
Project:	Standard PVMini - Worst Case		
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

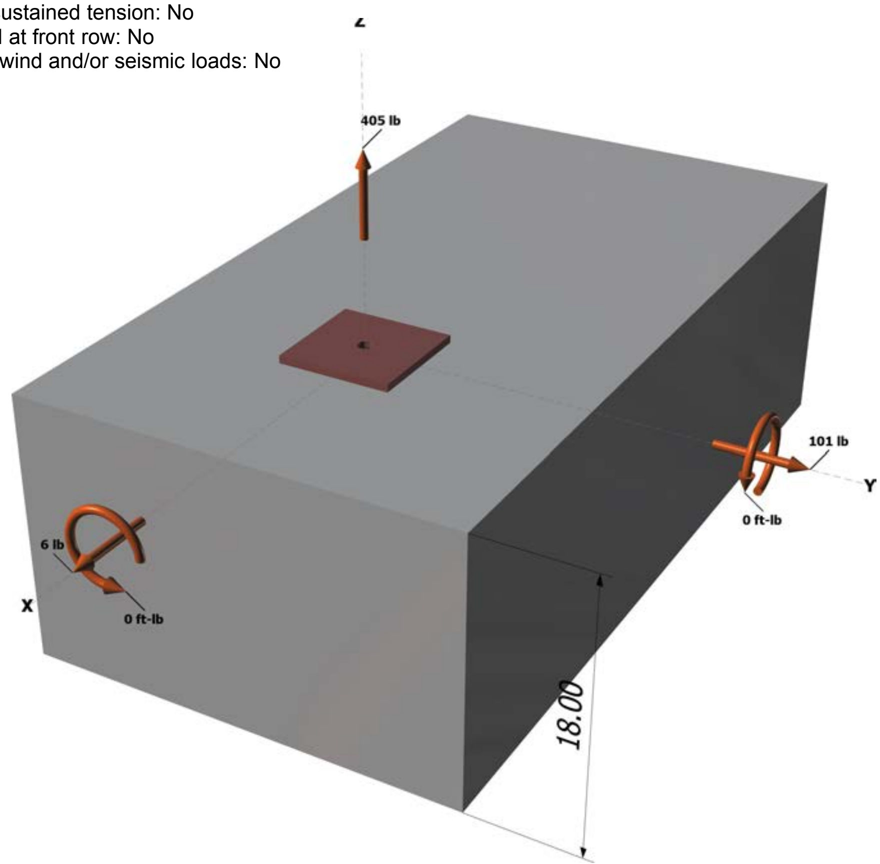
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

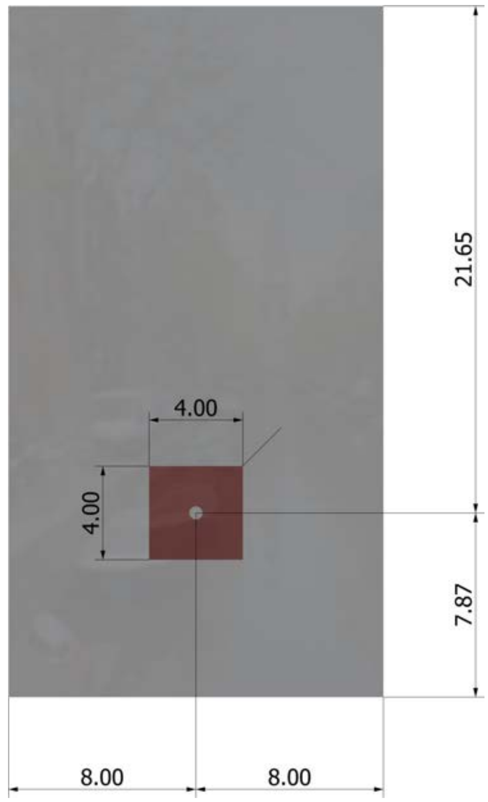
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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



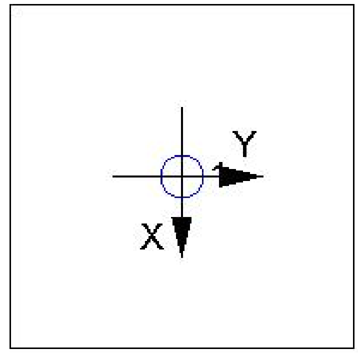
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	405.0	6.0	101.0	101.2
Sum	405.0	6.0	101.0	101.2

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 405
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	5.333	10469

$\phi N_{cb} = \phi\, (A_{Nc} / A_{Nco})\, \Psi_{ed,N}\, \Psi_{c,N}\, \Psi_{cp,N} N_b$ (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)
253.92	256.00	0.995	1.00	1.000	10469	0.65	6717

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	8.00	8488

$\phi V_{cby} = \phi\,(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
238.44	288.00	0.897	1.000	1.000	8488	0.70	4411

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)
188.88	278.72	0.903	1.000	1.000	8282	0.70	3549

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	8.00	8488

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
238.44	288.00	1.000	1.000	1.000	8488	0.70	9838

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)
188.88	278.72	1.000	1.000	1.000	8282	0.70	7858

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

$\phi V_{cp} = \phi\,\mathrm{min}|k_{cp}N_a\,;\,k_{cp}N_{cb}| = \phi\,\mathrm{min}|k_{cp}(A_{Na} / A_{Na0})\Psi_{ed,Na}\Psi_{p,Na}N_{a0}\,;\,k_{cp}(A_{Nc} / A_{Nco})\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b|$ (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)
253.92	256.00	0.995	1.000	1.000	10469	10334	0.70	13657

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	405	6071	0.07	Pass
Concrete breakout	405	6717	0.06	Pass
Adhesive	**405**	**5365**	**0.08**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	**101**	**3156**	**0.03**	**Pass (Governs)**
T Concrete breakout y+	101	4411	0.02	Pass
T Concrete breakout x+	6	3549	0.00	Pass
|| Concrete breakout y+	6	9838	0.00	Pass
|| Concrete breakout x+	101	7858	0.01	Pass
Concrete breakout, combined	-	-	0.02	Pass
Pryout	101	13657	0.01	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.08	0.00	7.5 %	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.

SIMPSON Strong-Tie	Anchor Designer™ Software Version 2.4.5673.0	Company:	Schletter, Inc.	Date:	12/10/2015
		Engineer:	HCV	Page:	1/5
		Project:	Standard PVMini - Worst Case		
		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

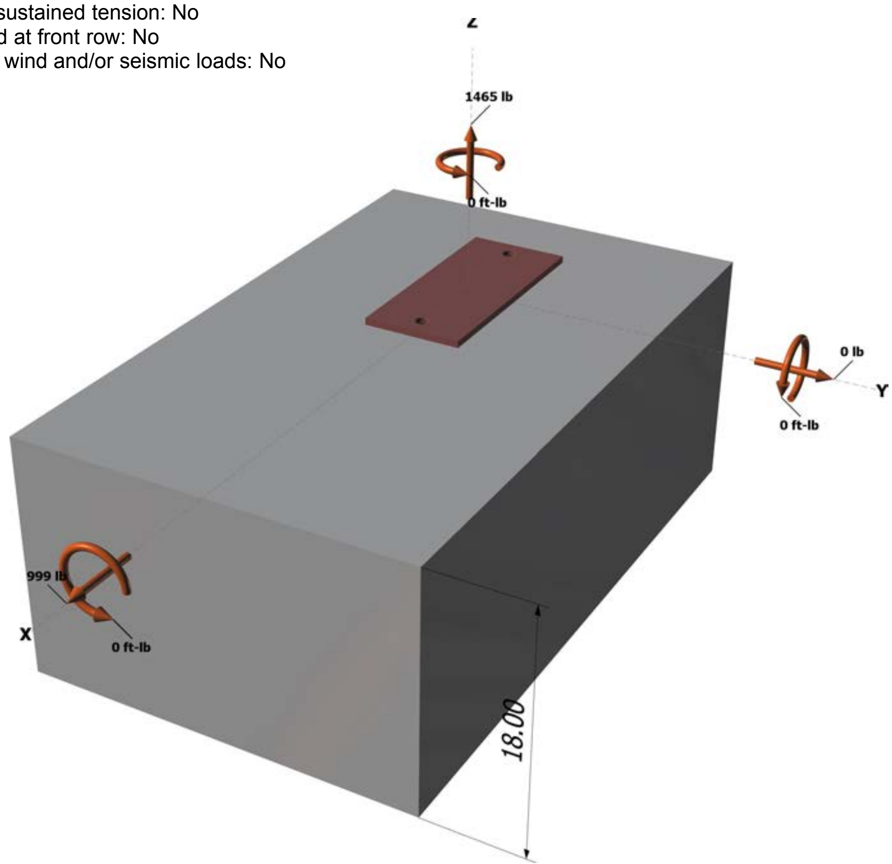
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

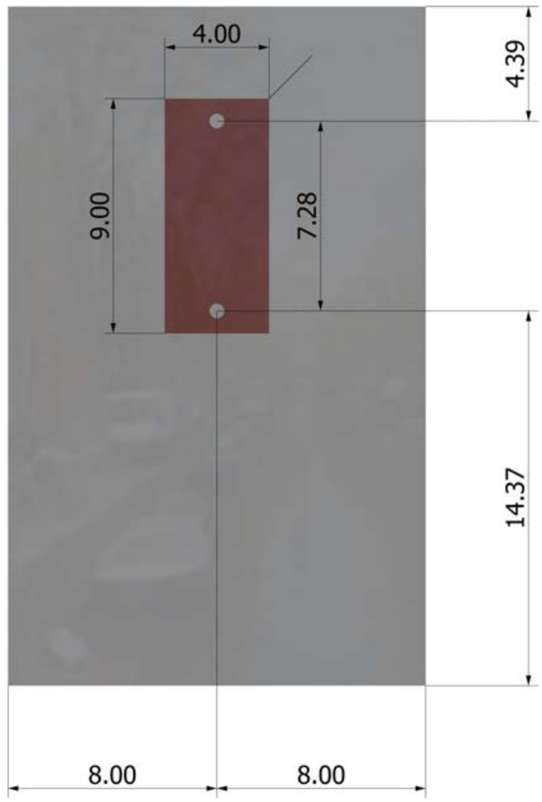
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout 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): 9.00 x 4.00 x 0.28

<Figure 1>



<Figure 2>



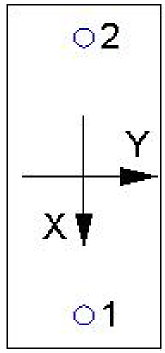
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	732.5	499.5	0.0	499.5
2	732.5	499.5	0.0	499.5
Sum	1465.0	999.0	0.0	999.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1465
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	5.333	10469

$\phi N_{cbg} = \phi (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (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)
314.72	256.00	1.000	0.865	1.00	1.000	10469	0.65	7233

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)
177.03	109.66	0.952	1.021	1.000	1.000	9755	0.55	8418

Company:	Schletter, Inc.	Date:	12/10/2015
Engineer:	HCV	Page:	4/5
Project:	Standard PVMini - Worst Case		
Address:			
Phone:			
E-mail:			

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

$\phi V_{cbx} = \phi\, (A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (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)
288.00	648.00	0.833	1.000	1.000	15593	0.70	4043

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	8.00	8488

$\phi V_{cbgx} = \phi\ (2)(A_{Vc} / A_{Vco})\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. D.4.1, D.6.2.1(c) & Eq. D-22)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbgx} (lb)
284.04	288.00	1.000	1.000	1.000	1.000	8488	0.70	11720

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

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

k_{cp}	A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	177.03	109.66	0.952	1.021	1.000	1.000	9755	15305

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
314.72	256.00	1.000	0.865	1.000	1.000	10469	11128	0.70

ϕV_{cpg} (lb)
15580

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	733	6071	0.12	Pass
Concrete breakout	**1465**	**7233**	**0.20**	**Pass (Governs)**
Adhesive	1465	8418	0.17	Pass

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	500	3156	0.16	Pass
T Concrete breakout x+	**999**	**4043**	**0.25**	**Pass (Governs)**
|| Concrete breakout y-	**999**	**11720**	**0.09**	**Pass (Governs)**
Pryout	999	15580	0.06	Pass

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

Sec. D.7.3	0.20	0.25	45.0 %	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.