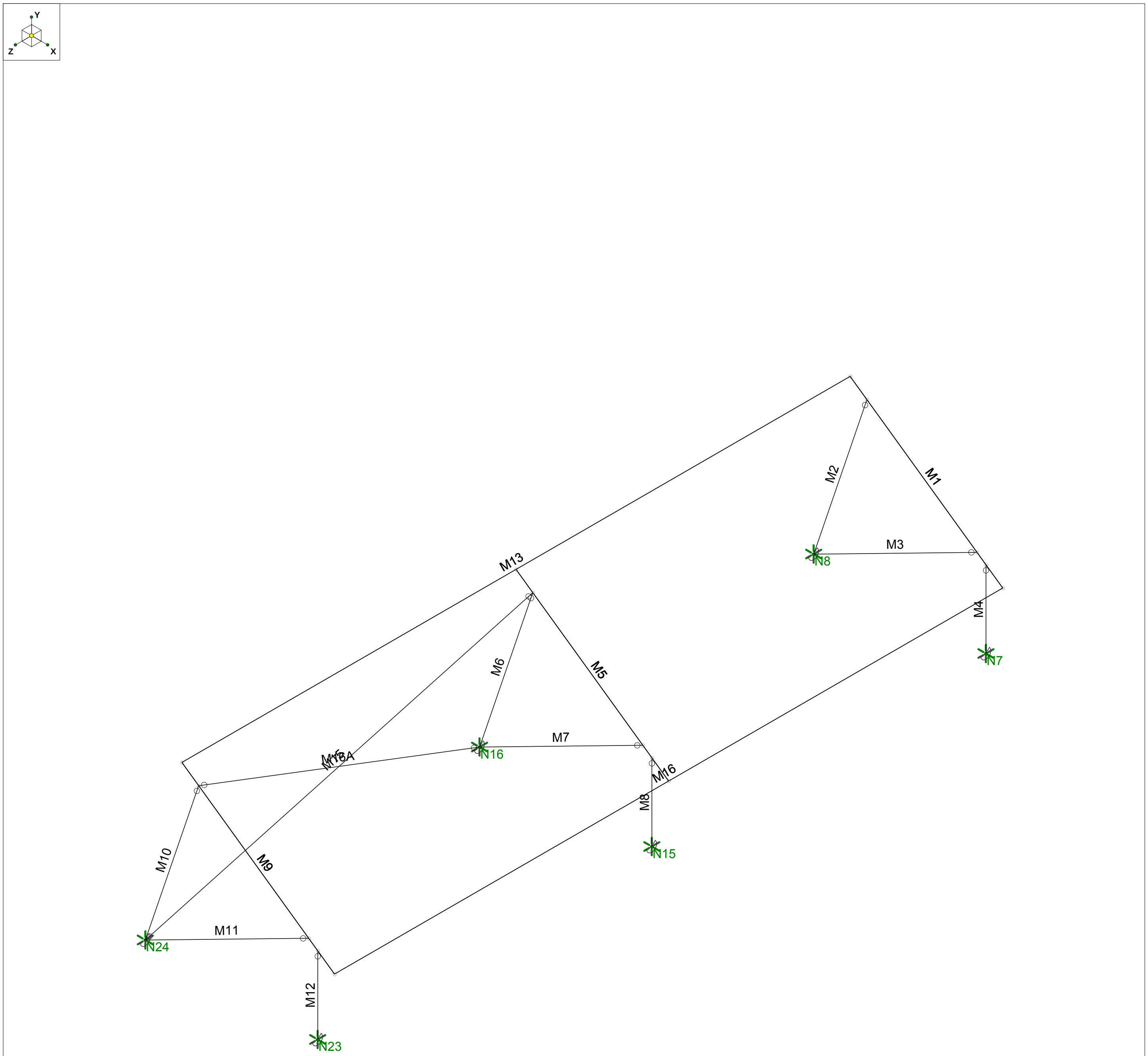


Schletter, Inc.	Standard PVMini Racking System	35° Tilt w/ Seismic Design
HCV	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

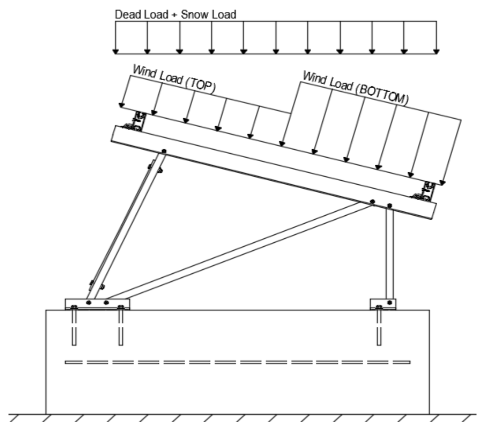
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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 = 150 mph
Height ≤ 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 35.33 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

S_S =	2.50	R =	1.25
S_{DS} =	1.67	C_S =	0.8
S_1 =	1.00	ρ =	1.3
S_{D1} =	1.00	Ω =	1.25
T_a =	0.04	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

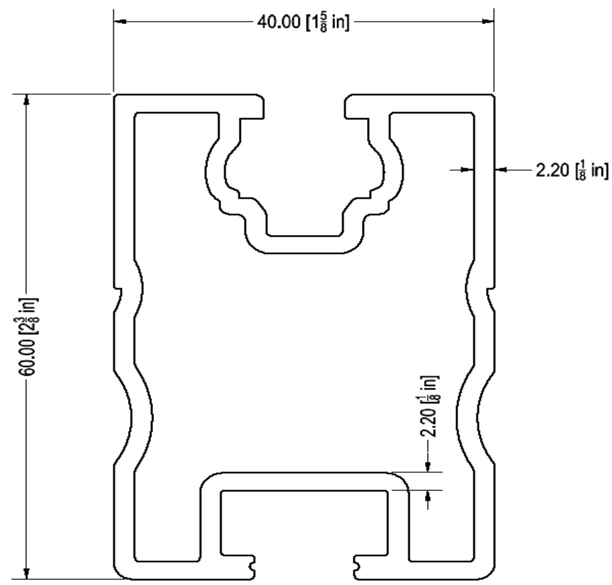
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

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).

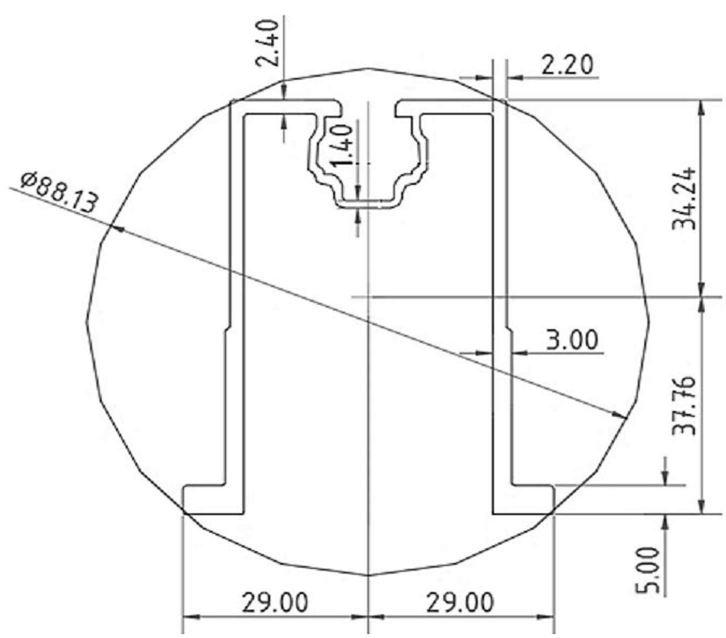
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	45	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.87	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.343	k-ft
M_z =	0.037	k-ft
$M_{y\ allowable}$ =	1.271	k-ft
$M_{z\ allowable}$ =	0.871	k-ft
Utilization =	31%	



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).

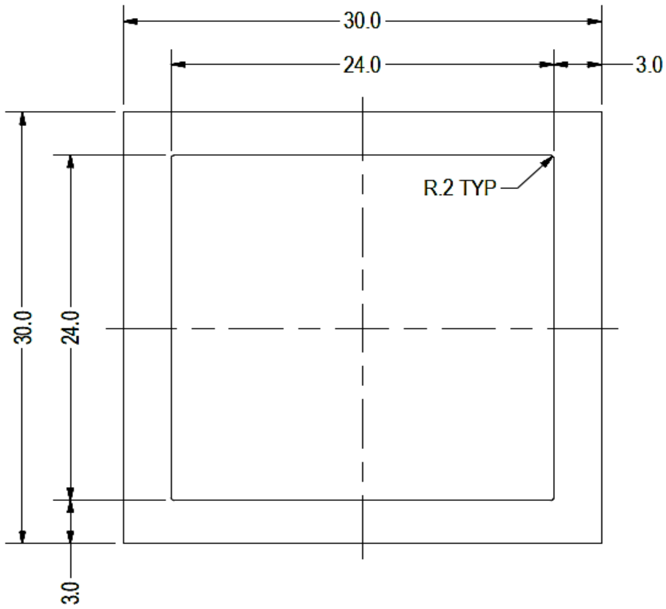
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.74	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.555	k-ft
M_z =	0.000	k-ft
P_n =	0.258	k
$M_{y\ allowable}$ =	1.460	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	40%	



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).

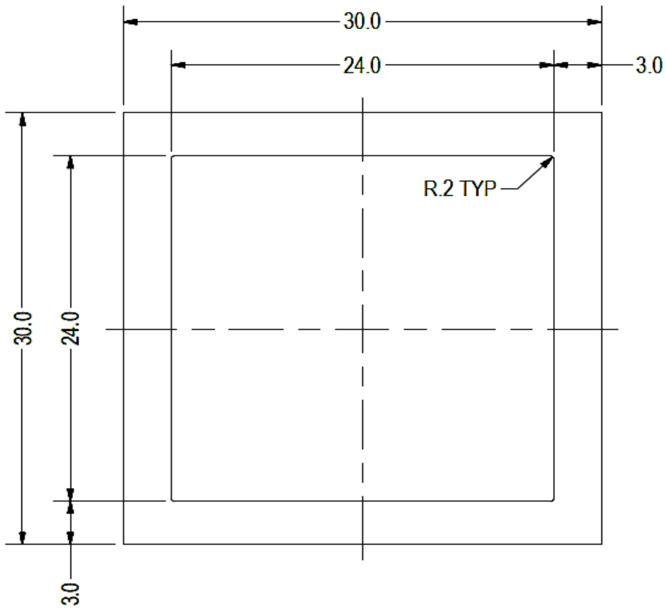
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.025	k-ft
P_n =	0.127	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	7%	



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).

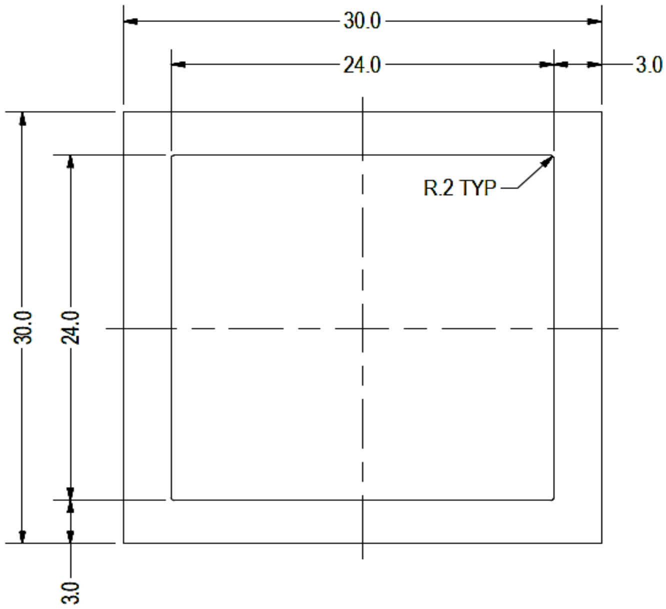
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.718	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	19%	



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).

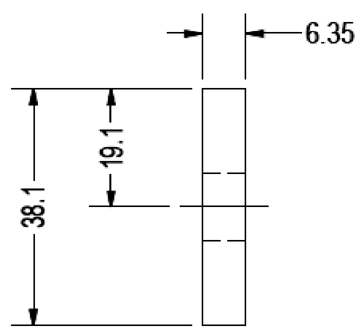
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	42.32	in
$\Phi F_{ty\ AXIAL}$ =	8.86	ksi
$\Phi F_{ty\ BENDING}$ =	29.96	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.588	k
$M_{y\ allowable}$ =	0.406	k-ft
$M_{z\ allowable}$ =	0.406	k-ft
$P_{n\ allowable}$ =	4.450	k
Utilization =	13%	



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 =	0.003	k-ft
P_n =	0.175	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	8%	



A cross brace kit is required every 24 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

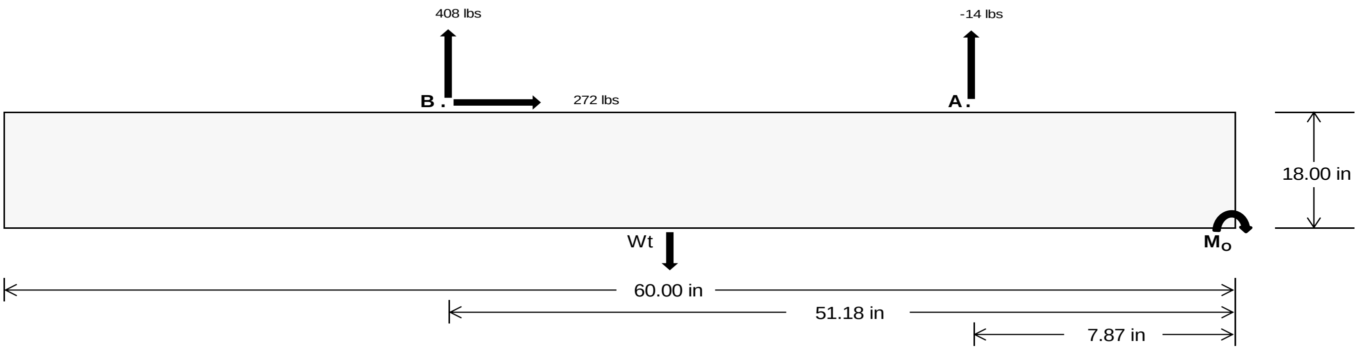
5.1 Helical Pile Foundations

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 =	1.36	1770.57	k
Compressive Load =	814.94	1152.77	k
Lateral Load =	20.45	1178.27	k
Moment (Weak Axis) =	0.03	0.00	k

5.2 Design of Ballast Foundations

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



<u>Concrete Properties</u>		
Weight of Concrete =	145 pcf	
Compressive Strength =	2500 psi	
Yield Strength =	60000 psi	

<u>Footing Reinforcement</u>

Use fiber reinforcing with (1) #5 rebar.

<u>Overturning Check</u>		
M_O =	25663.8	in-lbs
Resisting Force Required =	855.46	lbs
S.F. =	1.67	
Weight Required =	1425.77	lbs
Minimum Width =	<u>20 in</u>	in
Weight Provided =	1812.50	lbs

A minimum 60in long x 20in wide x 18in tall ballast foundation is required to resist overturning.

<u>Sliding</u>		
Force =	271.81	lbs
Friction =	0.4	
Weight Required =	679.53	lbs
Resisting Weight =	1812.50	lbs
Additional Weight Required =	0	lbs

Use a 60in long x 20in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

<u>Cohesion</u>		
Sliding Force =	271.81	lbs
Cohesion =	130	psf
Area =	8.33	ft^2
Resisting =	906.25	lbs
Additional Weight Required =	0	lbs

Use a 60in long x 20in wide x 18in tall ballast foundation. Cohesion is OK.

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

Shear key is not required.

<u>Bearing Pressure</u>

	Ballast Width			
	<u>20 in</u>	<u>21 in</u>	<u>22 in</u>	<u>23 in</u>
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.67 ft) =	<u>1813 lbs</u>	<u>1903 lbs</u>	<u>1994 lbs</u>	<u>2084 lbs</u>

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	20 in	21 in	22 in	23 in	20 in	21 in	22 in	23 in	20 in	21 in	22 in	23 in	20 in	21 in	22 in	23 in
F_A	275 lbs	275 lbs	275 lbs	275 lbs	309 lbs	309 lbs	309 lbs	309 lbs	409 lbs	409 lbs	409 lbs	409 lbs	28 lbs	28 lbs	28 lbs	28 lbs
F_B	175 lbs	175 lbs	175 lbs	175 lbs	501 lbs	501 lbs	501 lbs	501 lbs	488 lbs	488 lbs	488 lbs	488 lbs	-816 lbs	-816 lbs	-816 lbs	-816 lbs
F_V	25 lbs	25 lbs	25 lbs	25 lbs	489 lbs	489 lbs	489 lbs	489 lbs	383 lbs	383 lbs	383 lbs	383 lbs	-544 lbs	-544 lbs	-544 lbs	-544 lbs
P_{total}	2262 lbs	2353 lbs	2444 lbs	2534 lbs	2623 lbs	2713 lbs	2804 lbs	2895 lbs	2710 lbs	2801 lbs	2892 lbs	2982 lbs	299 lbs	354 lbs	408 lbs	462 lbs
M	236 lbs-ft	236 lbs-ft	236 lbs-ft	236 lbs-ft	418 lbs-ft	418 lbs-ft	418 lbs-ft	418 lbs-ft	468 lbs-ft	468 lbs-ft	468 lbs-ft	468 lbs-ft	676 lbs-ft	676 lbs-ft	676 lbs-ft	676 lbs-ft
e	0.10 ft	0.10 ft	0.10 ft	0.09 ft	0.16 ft	0.15 ft	0.15 ft	0.14 ft	0.17 ft	0.17 ft	0.16 ft	0.16 ft	2.26 ft	1.91 ft	1.66 ft	1.46 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}	237.6 psf	236.6 psf	235.7 psf	234.9 psf	254.6 psf	252.8 psf	251.2 psf	249.7 psf	257.9 psf	256.0 psf	254.2 psf	252.6 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	305.4 psf	301.2 psf	297.4 psf	294.0 psf	374.9 psf	367.4 psf	360.6 psf	354.4 psf	392.6 psf	384.2 psf	376.7 psf	369.7 psf	495.3 psf	228.7 psf	175.9 psf	154.9 psf

Maximum Bearing Pressure = 495 psf
Allowable Bearing Pressure = 1500 psf

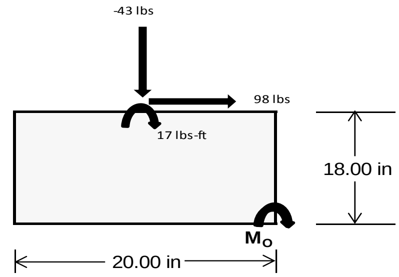
Use a 60in long x 20in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 200.7 ft-lbs
Resisting Force Required = 240.85 lbs
S.F. = 1.67
Weight Required = 401.41 lbs
Minimum Width = 20 in in
Weight Provided = 1812.50 lbs

A minimum 60in long x 20in 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	20 in			20 in			20 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	122 lbs	40 lbs	55 lbs	195 lbs	320 lbs	144 lbs	86 lbs	-43 lbs	21 lbs
F_V	12 lbs	98 lbs	12 lbs	9 lbs	74 lbs	9 lbs	12 lbs	98 lbs	12 lbs
P_{total}	2366 lbs	2284 lbs	2299 lbs	2331 lbs	2456 lbs	2280 lbs	742 lbs	613 lbs	677 lbs
M	33 lbs-ft	165 lbs-ft	34 lbs-ft	24 lbs-ft	123 lbs-ft	27 lbs-ft	33 lbs-ft	165 lbs-ft	34 lbs-ft
e	0.01 ft	0.07 ft	0.01 ft	0.01 ft	0.05 ft	0.01 ft	0.04 ft	0.27 ft	0.05 ft
L/6	0.28 ft	1.52 ft	1.64 ft	1.65 ft	1.57 ft	1.64 ft	1.58 ft	1.13 ft	1.57 ft
f_{min}	269.5 sqft	202.9 sqft	261.2 sqft	269.4 sqft	241.5 sqft	262.1 sqft	74.6 sqft	2.4 sqft	66.6 sqft
f_{max}	298.2 psf	345.2 psf	290.6 psf	290.1 psf	347.9 psf	285.2 psf	103.4 psf	144.7 psf	95.9 psf

Maximum Bearing Pressure = 348 psf
Allowable Bearing Pressure = 1500 psf

Use a 60in long x 20in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 60in long x 20in 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.

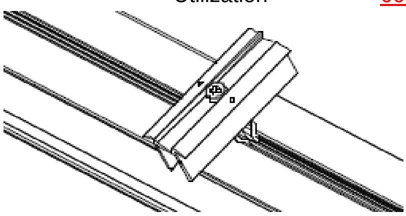
6. DESIGN OF JOINTS AND CONNECTIONS

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.

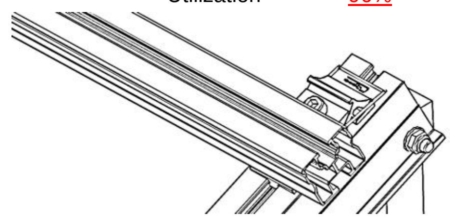
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.799	k
Allowable Uplift =	1.214	k
Utilization =	66%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	1.075	k
Allowable Uplift =	1.116	k
Utilization =	96%	



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 =	0.627	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	11%	

Rear Strut

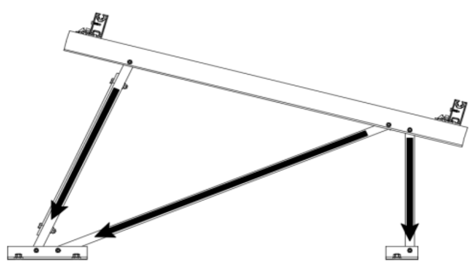
Maximum Axial Load =	1.056	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	19%	

Diagonal Strut

Maximum Axial Load =	0.718	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	13%	

Bracing

Maximum Axial Load =	0.175	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	2%	



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

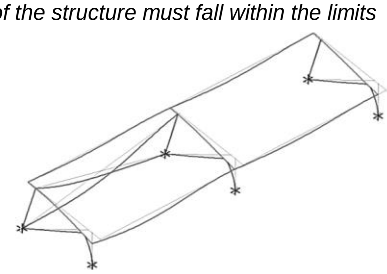
7.1 Seismic Drift

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} =	0.051	in

$0.051 \leq 0.662$, OK.

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 = 45.00 in

J = 0.255

117.177

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

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= 29.9 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 = 45.00 in

J = 0.255

121.682

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

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 = 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

$\varphi F_L St$= 29.9 ksi

Ix = 250988 mm^4

0.603 in^4

y = 30 mm

Sx = 0.511 in^3

$M_{max}St$ = 1.271 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

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.31

21.5027

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

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 = 1.31

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 = 1.460 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
$\varphi F_L = (\varphi ck2 * \sqrt{(BpE)})/(5.1b/t)$
$\varphi F_L =$ 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)
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 33.3 ksi

$b/t =$ 24.46
$S1 =$ 12.21
$S2 =$ 32.70
$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

3.4.9.1

$b/t =$ 24.46
$t =$ 2.6
$ds =$ 6.05
$rs =$ 3.49
$S =$ 21.70
$\rho st =$ 0.22
$F_{UT} =$ 10.43
$F_{ST} =$ 28.24
$\varphi F_L = Fut + (Fst - Fut)\rho st < Fst$
$\varphi F_L =$ 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
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 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

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

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

λ = 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

φcc = 0.85841

φF_L= (φccFcy)/(λ²)

φF_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)

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= 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

$\lambda =$ 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			.8			4		

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	-118.221	-118.221	0	0
2	M16	y	-197.035	-197.035	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	236.442	236.442	0	0
2	M16	y	118.221	118.221	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Z	6.693	6.693	0	0
2	M16	Z	6.693	6.693	0	0
3	M13	Z	0	0	0	0
4	M16	Z	0	0	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																

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
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	267.133	2	289.677	2	.004	10	0	10	0	1	0	1
2		min	-309.336	3	-439.161	3	-2.428	4	0	3	0	1	0	1
3	N7	max	.025	3	230.653	1	.035	10	0	10	0	1	0	1
4		min	-.122	2	21.109	15	-15.406	4	-.024	4	0	1	0	1
5	N15	max	.126	3	626.878	1	.12	9	0	9	0	1	0	1
6		min	-1.181	2	17.968	15	-15.729	5	-.025	4	0	1	0	1
7	N16	max	823.333	2	886.745	2	0	2	0	9	0	1	0	1
8		min	-906.358	3	-1361.98	3	-130.834	4	0	3	0	1	0	1
9	N23	max	.026	3	231.052	1	.577	1	0	1	0	1	0	1
10		min	-.122	2	.322	15	-14.657	5	-.023	5	0	1	0	1
11	N24	max	267.134	2	292.031	2	98.789	3	0	9	0	1	0	1
12		min	-310.181	3	-438.798	3	-3.498	5	0	3	0	1	0	1
13	Totals:	max	1356.176	2	2448.816	2	0	11						
14		min	-1525.698	3	-2074.191	3	-182.115	4						

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	190.068	2	.677	6	1.13	4	0	10	0	10	0	1
2			min	-360.769	3	.158	15	-.06	3	0	4	0	4	0	1
3		2	max	190.203	2	.619	6	1.007	4	0	10	0	5	0	15
4			min	-360.667	3	.145	15	-.06	3	0	4	0	3	0	6
5		3	max	190.338	2	.562	6	.884	4	0	10	0	5	0	15
6			min	-360.566	3	.131	15	-.06	3	0	4	0	3	0	6
7		4	max	190.473	2	.504	6	.761	4	0	10	0	5	0	15
8			min	-360.465	3	.118	15	-.06	3	0	4	0	3	0	6
9		5	max	190.608	2	.447	6	.638	4	0	10	0	4	0	15
10			min	-360.364	3	.104	15	-.06	3	0	4	0	3	0	6
11		6	max	190.743	2	.389	6	.514	4	0	10	0	4	0	15
12			min	-360.263	3	.091	15	-.06	3	0	4	0	3	0	6
13		7	max	190.878	2	.332	6	.391	4	0	10	0	4	0	15
14			min	-360.162	3	.077	15	-.06	3	0	4	0	3	0	6
15		8	max	191.012	2	.274	6	.268	4	0	10	0	4	0	15
16			min	-360.061	3	.064	15	-.06	3	0	4	0	3	0	6
17		9	max	191.147	2	.217	6	.145	4	0	10	0	4	0	15
18			min	-359.959	3	.05	15	-.06	3	0	4	0	3	0	6
19		10	max	191.282	2	.159	6	.077	1	0	10	0	4	0	15
20			min	-359.858	3	.037	15	-.06	3	0	4	0	3	0	6
21		11	max	191.417	2	.111	2	.077	1	0	10	0	4	0	15
22			min	-359.757	3	.016	12	-.127	5	0	4	0	3	0	6
23		12	max	191.552	2	.066	2	.077	1	0	10	0	4	0	15
24			min	-359.656	3	-.013	3	-.25	5	0	4	0	3	0	6
25		13	max	191.687	2	.021	2	.077	1	0	10	0	4	0	15
26			min	-359.555	3	-.047	3	-.373	5	0	4	0	3	0	6
27		14	max	191.822	2	-.017	15	.077	1	0	10	0	4	0	15
28			min	-359.454	3	-.08	3	-.497	5	0	4	0	3	0	6

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
29		15	max	191.956	2	-.031	15	.077	1	0	10	0	4	0	15
30			min	-359.353	3	-.128	4	-.62	5	0	4	0	3	0	6
31		16	max	192.091	2	-.044	15	.077	1	0	10	0	4	0	15
32			min	-359.251	3	-.186	4	-.743	5	0	4	0	3	0	6
33		17	max	192.226	2	-.058	15	.077	1	0	10	0	4	0	15
34			min	-359.15	3	-.243	4	-.866	5	0	4	0	3	0	6
35		18	max	192.361	2	-.071	15	.077	1	0	10	0	9	0	15
36			min	-359.049	3	-.301	4	-.989	5	0	4	0	3	0	6
37		19	max	192.496	2	-.085	15	.077	1	0	10	0	9	0	15
38			min	-358.948	3	-.358	4	-1.112	5	0	4	0	3	0	6
39	M3	1	max	232.738	2	1.734	6	.006	10	0	5	0	4	0	6
40			min	-219.294	3	.407	15	-1.314	4	0	1	0	10	0	15
41		2	max	232.668	2	1.558	6	.006	10	0	5	0	1	0	2
42			min	-219.347	3	.365	15	-1.18	4	0	1	0	10	0	3
43		3	max	232.598	2	1.382	6	.006	10	0	5	0	1	0	2
44			min	-219.399	3	.324	15	-1.047	4	0	1	0	5	0	3
45		4	max	232.528	2	1.205	6	.006	10	0	5	0	1	0	15
46			min	-219.452	3	.283	15	-.913	4	0	1	0	5	0	4
47		5	max	232.458	2	1.029	6	.006	10	0	5	0	1	0	15
48			min	-219.504	3	.241	15	-.779	4	0	1	0	5	0	4
49		6	max	232.388	2	.852	6	.006	10	0	5	0	1	0	15
50			min	-219.557	3	.2	15	-.646	4	0	1	0	5	0	4
51		7	max	232.318	2	.676	6	.006	10	0	5	0	1	0	15
52			min	-219.609	3	.158	15	-.512	4	0	1	0	5	0	4
53		8	max	232.248	2	.5	6	.006	10	0	5	0	1	0	15
54			min	-219.662	3	.117	15	-.378	4	0	1	0	5	-.001	4
55		9	max	232.178	2	.323	6	.006	10	0	5	0	1	0	15
56			min	-219.714	3	.075	15	-.245	4	0	1	0	5	-.001	4
57		10	max	232.108	2	.147	6	.006	10	0	5	0	1	0	15
58			min	-219.767	3	.034	15	-.114	1	0	1	0	5	-.001	4
59		11	max	232.038	2	.006	2	.052	5	0	5	0	1	0	15
60			min	-219.819	3	-.053	3	-.114	1	0	1	0	5	-.001	4
61		12	max	231.968	2	-.049	15	.186	5	0	5	0	1	0	15
62			min	-219.872	3	-.206	4	-.114	1	0	1	0	5	-.001	4
63		13	max	231.898	2	-.091	15	.32	5	0	5	0	1	0	15
64			min	-219.924	3	-.382	4	-.114	1	0	1	0	5	-.001	4
65		14	max	231.828	2	-.132	15	.453	5	0	5	0	1	0	15
66			min	-219.977	3	-.559	4	-.114	1	0	1	0	5	-.001	4
67		15	max	231.758	2	-.173	15	.587	5	0	5	0	1	0	15
68			min	-220.029	3	-.735	4	-.114	1	0	1	0	5	0	4
69		16	max	231.688	2	-.215	15	.721	5	0	5	0	9	0	15
70			min	-220.082	3	-.911	4	-.114	1	0	1	0	5	0	4
71		17	max	231.618	2	-.256	15	.854	5	0	5	0	10	0	15
72			min	-220.134	3	-1.088	4	-.114	1	0	1	0	4	0	4
73		18	max	231.548	2	-.298	15	.988	5	0	5	0	10	0	15
74			min	-220.187	3	-1.264	4	-.114	1	0	1	0	4	0	4
75		19	max	231.478	2	-.339	15	1.122	5	0	5	0	5	0	1
76			min	-220.239	3	-1.441	4	-.114	1	0	1	0	1	0	1
77	M4	1	max	229.488	1	0	1	.035	10	0	1	0	5	0	1
78			min	20.758	15	0	1	-14.578	4	0	1	0	2	0	1
79		2	max	229.553	1	0	1	.035	10	0	1	0	10	0	1
80			min	20.777	15	0	1	-14.634	4	0	1	-.001	4	0	1
81		3	max	229.618	1	0	1	.035	10	0	1	0	10	0	1
82			min	20.797	15	0	1	-14.69	4	0	1	-.003	4	0	1
83		4	max	229.682	1	0	1	.035	10	0	1	0	10	0	1
84			min	20.816	15	0	1	-14.746	4	0	1	-.004	4	0	1
85		5	max	229.747	1	0	1	.035	10	0	1	0	10	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
86			min	20.836	15	0	1	-14.802	4	0	1	-.005	4	0	1
87		6	max	229.812	1	0	1	.035	10	0	1	0	10	0	1
88			min	20.855	15	0	1	-14.858	4	0	1	-.007	4	0	1
89		7	max	229.876	1	0	1	.035	10	0	1	0	10	0	1
90			min	20.875	15	0	1	-14.915	4	0	1	-.008	4	0	1
91		8	max	229.941	1	0	1	.035	10	0	1	0	10	0	1
92			min	20.894	15	0	1	-14.971	4	0	1	-.009	4	0	1
93		9	max	230.006	1	0	1	.035	10	0	1	0	10	0	1
94			min	20.914	15	0	1	-15.027	4	0	1	-.011	4	0	1
95		10	max	230.071	1	0	1	.035	10	0	1	0	10	0	1
96			min	20.933	15	0	1	-15.083	4	0	1	-.012	4	0	1
97		11	max	230.135	1	0	1	.035	10	0	1	0	10	0	1
98			min	20.953	15	0	1	-15.139	4	0	1	-.013	4	0	1
99		12	max	230.2	1	0	1	.035	10	0	1	0	10	0	1
100			min	20.972	15	0	1	-15.195	4	0	1	-.015	4	0	1
101		13	max	230.265	1	0	1	.035	10	0	1	0	10	0	1
102			min	20.992	15	0	1	-15.251	4	0	1	-.016	4	0	1
103		14	max	230.329	1	0	1	.035	10	0	1	0	10	0	1
104			min	21.012	15	0	1	-15.307	4	0	1	-.017	4	0	1
105		15	max	230.394	1	0	1	.035	10	0	1	0	10	0	1
106			min	21.031	15	0	1	-15.363	4	0	1	-.019	4	0	1
107		16	max	230.459	1	0	1	.035	10	0	1	0	10	0	1
108			min	21.051	15	0	1	-15.419	4	0	1	-.02	4	0	1
109		17	max	230.523	1	0	1	.035	10	0	1	0	10	0	1
110			min	21.07	15	0	1	-15.475	4	0	1	-.021	4	0	1
111		18	max	230.588	1	0	1	.035	10	0	1	0	10	0	1
112			min	21.09	15	0	1	-15.531	4	0	1	-.023	4	0	1
113		19	max	230.653	1	0	1	.035	10	0	1	0	10	0	1
114			min	21.109	15	0	1	-15.587	4	0	1	-.024	4	0	1
115	M6	1	max	585.242	2	.658	6	1.064	4	0	3	0	3	0	1
116			min	-1056.077	3	.145	15	-.281	3	0	5	0	2	0	1
117		2	max	585.376	2	.601	6	.941	4	0	3	0	3	0	15
118			min	-1055.976	3	.131	15	-.281	3	0	5	0	2	0	6
119		3	max	585.511	2	.543	6	.817	4	0	3	0	4	0	15
120			min	-1055.875	3	.118	15	-.281	3	0	5	0	2	0	6
121		4	max	585.646	2	.486	6	.694	4	0	3	0	4	0	15
122			min	-1055.774	3	.104	15	-.281	3	0	5	0	2	0	6
123		5	max	585.781	2	.439	2	.571	4	0	3	0	4	0	15
124			min	-1055.673	3	.091	15	-.281	3	0	5	0	2	0	6
125		6	max	585.916	2	.395	2	.448	4	0	3	0	4	0	15
126			min	-1055.571	3	.077	15	-.281	3	0	5	0	1	0	6
127		7	max	586.051	2	.35	2	.325	4	0	3	0	4	0	15
128			min	-1055.47	3	.058	12	-.281	3	0	5	0	1	0	6
129		8	max	586.186	2	.305	2	.202	4	0	3	0	4	0	15
130			min	-1055.369	3	.035	12	-.281	3	0	5	0	3	0	2
131		9	max	586.32	2	.26	2	.078	4	0	3	0	4	0	15
132			min	-1055.268	3	.007	3	-.281	3	0	5	0	3	0	2
133		10	max	586.455	2	.216	2	.014	9	0	3	0	4	0	15
134			min	-1055.167	3	-.026	3	-.281	3	0	5	0	3	0	2
135		11	max	586.59	2	.171	2	.014	9	0	3	0	4	0	15
136			min	-1055.066	3	-.06	3	-.281	3	0	5	0	3	0	2
137		12	max	586.725	2	.126	2	.014	9	0	3	0	4	0	12
138			min	-1054.965	3	-.093	3	-.297	5	0	5	0	3	0	2
139		13	max	586.86	2	.081	2	.014	9	0	3	0	4	0	12
140			min	-1054.863	3	-.127	3	-.42	5	0	5	0	3	0	2
141		14	max	586.995	2	.036	2	.014	9	0	3	0	4	0	12
142			min	-1054.762	3	-.161	3	-.543	5	0	5	0	3	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
143		15	max	587.13	2	-.008	2	.014	9	0	3	0	4	0	12
144			min	-1054.661	3	-.194	3	-.667	5	0	5	0	3	0	2
145		16	max	587.265	2	-.053	2	.014	9	0	3	0	4	0	12
146			min	-1054.56	3	-.228	3	-.79	5	0	5	0	3	0	2
147		17	max	587.399	2	-.071	15	.014	9	0	3	0	4	0	3
148			min	-1054.459	3	-.263	4	-.913	5	0	5	0	3	0	2
149		18	max	587.534	2	-.085	15	.014	9	0	3	0	4	0	3
150			min	-1054.358	3	-.32	4	-1.036	5	0	5	0	3	0	2
151		19	max	587.669	2	-.099	15	.014	9	0	3	0	9	0	3
152			min	-1054.256	3	-.377	4	-1.159	5	0	5	0	3	0	2
153	M7	1	max	717.751	2	1.759	4	.054	3	0	9	0	4	0	2
154			min	-609.928	3	.422	15	-1.296	4	0	3	0	3	0	3
155		2	max	717.681	2	1.582	4	.054	3	0	9	0	1	0	2
156			min	-609.98	3	.381	15	-1.162	4	0	3	0	3	0	3
157		3	max	717.611	2	1.406	4	.054	3	0	9	0	1	0	2
158			min	-610.033	3	.339	15	-1.028	4	0	3	0	3	0	3
159		4	max	717.541	2	1.229	4	.054	3	0	9	0	1	0	2
160			min	-610.085	3	.298	15	-.895	4	0	3	0	3	0	3
161		5	max	717.471	2	1.053	4	.054	3	0	9	0	1	0	15
162			min	-610.138	3	.256	15	-.761	4	0	3	0	5	0	3
163		6	max	717.401	2	.877	4	.054	3	0	9	0	1	0	15
164			min	-610.19	3	.215	15	-.627	4	0	3	0	5	0	3
165		7	max	717.331	2	.7	4	.054	3	0	9	0	1	0	15
166			min	-610.243	3	.173	15	-.494	4	0	3	0	5	0	6
167		8	max	717.261	2	.524	4	.054	3	0	9	0	1	0	15
168			min	-610.295	3	.132	15	-.36	4	0	3	0	5	-.001	6
169		9	max	717.191	2	.348	4	.054	3	0	9	0	1	0	15
170			min	-610.348	3	.066	12	-.226	4	0	3	0	5	-.001	6
171		10	max	717.121	2	.199	2	.054	3	0	9	0	1	0	15
172			min	-610.4	3	-.015	3	-.093	4	0	3	-.001	5	-.001	6
173		11	max	717.051	2	.061	2	.054	3	0	9	0	1	0	15
174			min	-610.453	3	-.118	3	-.014	1	0	3	-.001	5	-.001	6
175		12	max	716.981	2	-.034	15	.175	5	0	9	0	1	0	15
176			min	-610.505	3	-.221	3	-.014	1	0	3	-.001	5	-.001	6
177		13	max	716.911	2	-.075	15	.309	5	0	9	0	1	0	15
178			min	-610.558	3	-.359	6	-.014	1	0	3	0	5	-.001	6
179		14	max	716.841	2	-.117	15	.443	5	0	9	0	1	0	15
180			min	-610.61	3	-.535	6	-.014	1	0	3	0	5	-.001	6
181		15	max	716.771	2	-.158	15	.576	5	0	9	0	1	0	15
182			min	-610.663	3	-.711	6	-.014	1	0	3	0	5	0	6
183		16	max	716.701	2	-.2	15	.71	5	0	9	0	1	0	15
184			min	-610.715	3	-.888	6	-.014	1	0	3	0	5	0	6
185		17	max	716.631	2	-.241	15	.844	5	0	9	0	9	0	15
186			min	-610.768	3	-1.064	6	-.014	1	0	3	0	5	0	6
187		18	max	716.561	2	-.283	15	.977	5	0	9	0	9	0	15
188			min	-610.82	3	-1.241	6	-.014	1	0	3	0	3	0	6
189		19	max	716.491	2	-.324	15	1.111	5	0	9	0	9	0	1
190			min	-610.873	3	-1.417	6	-.014	1	0	3	0	3	0	1
191	M8	1	max	625.714	1	0	1	.126	9	0	1	0	4	0	1
192			min	17.616	15	0	1	-14.825	4	0	1	0	3	0	1
193		2	max	625.778	1	0	1	.126	9	0	1	0	9	0	1
194			min	17.636	15	0	1	-14.881	4	0	1	-.001	4	0	1
195		3	max	625.843	1	0	1	.126	9	0	1	0	9	0	1
196			min	17.655	15	0	1	-14.937	4	0	1	-.003	4	0	1
197		4	max	625.908	1	0	1	.126	9	0	1	0	9	0	1
198			min	17.675	15	0	1	-14.993	4	0	1	-.004	4	0	1
199		5	max	625.973	1	0	1	.126	9	0	1	0	9	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
200			min	17.694	15	0	1	-15.049	4	0	1	-.005	4	0	1
201		6	max	626.037	1	0	1	.126	9	0	1	0	9	0	1
202			min	17.714	15	0	1	-15.105	4	0	1	-.007	4	0	1
203		7	max	626.102	1	0	1	.126	9	0	1	0	9	0	1
204			min	17.733	15	0	1	-15.162	4	0	1	-.008	4	0	1
205		8	max	626.167	1	0	1	.126	9	0	1	0	9	0	1
206			min	17.753	15	0	1	-15.218	4	0	1	-.009	4	0	1
207		9	max	626.231	1	0	1	.126	9	0	1	0	9	0	1
208			min	17.772	15	0	1	-15.274	4	0	1	-.011	4	0	1
209		10	max	626.296	1	0	1	.126	9	0	1	0	9	0	1
210			min	17.792	15	0	1	-15.33	4	0	1	-.012	4	0	1
211		11	max	626.361	1	0	1	.126	9	0	1	0	9	0	1
212			min	17.812	15	0	1	-15.386	4	0	1	-.013	4	0	1
213		12	max	626.426	1	0	1	.126	9	0	1	0	9	0	1
214			min	17.831	15	0	1	-15.442	4	0	1	-.015	4	0	1
215		13	max	626.49	1	0	1	.126	9	0	1	0	9	0	1
216			min	17.851	15	0	1	-15.498	4	0	1	-.016	4	0	1
217		14	max	626.555	1	0	1	.126	9	0	1	0	9	0	1
218			min	17.87	15	0	1	-15.554	4	0	1	-.018	4	0	1
219		15	max	626.62	1	0	1	.126	9	0	1	0	9	0	1
220			min	17.89	15	0	1	-15.61	4	0	1	-.019	4	0	1
221		16	max	626.684	1	0	1	.126	9	0	1	0	9	0	1
222			min	17.909	15	0	1	-15.666	4	0	1	-.02	4	0	1
223		17	max	626.749	1	0	1	.126	9	0	1	0	9	0	1
224			min	17.929	15	0	1	-15.722	4	0	1	-.022	4	0	1
225		18	max	626.814	1	0	1	.126	9	0	1	0	9	0	1
226			min	17.948	15	0	1	-15.778	4	0	1	-.023	4	0	1
227		19	max	626.878	1	0	1	.126	9	0	1	0	9	0	1
228			min	17.968	15	0	1	-15.834	4	0	1	-.025	4	0	1
229	M10	1	max	191.288	2	.712	4	1.166	5	0	1	0	1	0	1
230			min	-267.797	3	.182	15	-.098	1	-.001	5	0	3	0	1
231		2	max	191.423	2	.655	4	1.043	5	0	1	0	4	0	15
232			min	-267.696	3	.169	15	-.098	1	-.001	5	0	3	0	4
233		3	max	191.558	2	.597	4	.92	5	0	1	0	4	0	15
234			min	-267.595	3	.155	15	-.098	1	-.001	5	0	3	0	4
235		4	max	191.693	2	.54	4	.797	5	0	1	0	4	0	15
236			min	-267.494	3	.142	15	-.098	1	-.001	5	0	3	0	4
237		5	max	191.828	2	.482	4	.674	5	0	1	0	4	0	15
238			min	-267.393	3	.128	15	-.098	1	-.001	5	0	3	0	4
239		6	max	191.963	2	.425	4	.551	5	0	1	0	4	0	15
240			min	-267.292	3	.115	15	-.098	1	-.001	5	0	3	0	4
241		7	max	192.097	2	.368	4	.427	5	0	1	0	4	0	15
242			min	-267.19	3	.101	15	-.098	1	-.001	5	0	3	0	4
243		8	max	192.232	2	.31	4	.304	5	0	1	0	4	0	15
244			min	-267.089	3	.088	15	-.098	1	-.001	5	0	3	0	4
245		9	max	192.367	2	.253	4	.181	5	0	1	0	4	0	15
246			min	-266.988	3	.066	12	-.098	1	-.001	5	0	3	0	4
247		10	max	192.502	2	.195	4	.058	5	0	1	0	5	0	15
248			min	-266.887	3	.044	12	-.098	1	-.001	5	0	3	0	4
249		11	max	192.637	2	.138	4	.004	3	0	1	0	5	0	15
250			min	-266.786	3	.022	12	-.098	1	-.001	5	0	3	0	4
251		12	max	192.772	2	.08	4	.004	3	0	1	0	5	0	15
252			min	-266.685	3	-.004	3	-.203	4	-.001	5	0	3	0	4
253		13	max	192.907	2	.03	5	.004	3	0	1	0	5	0	15
254			min	-266.583	3	-.038	3	-.326	4	-.001	5	0	3	0	4
255		14	max	193.042	2	.009	5	.004	3	0	1	0	5	0	15
256			min	-266.482	3	-.071	3	-.449	4	-.001	5	0	3	0	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
257		15	max	193.176	2	-.007	15	.004	3	0	1	0	5	0	15
258			min	-266.381	3	-.105	3	-.572	4	-.001	5	0	3	0	4
259		16	max	193.311	2	-.02	15	.004	3	0	1	0	5	0	12
260			min	-266.28	3	-.151	6	-.696	4	-.001	5	0	3	0	4
261		17	max	193.446	2	-.034	15	.004	3	0	1	0	5	0	12
262			min	-266.179	3	-.209	6	-.819	4	-.001	5	0	3	0	4
263		18	max	193.581	2	-.047	15	.004	3	0	1	0	5	0	12
264			min	-266.078	3	-.266	6	-.942	4	-.001	5	0	3	0	4
265		19	max	193.716	2	-.061	15	.004	3	0	1	0	5	0	12
266			min	-265.977	3	-.324	6	-1.065	4	-.001	5	0	3	0	4
267	M11	1	max	232.307	2	1.72	6	.116	1	0	4	0	5	0	2
268			min	-220.267	3	.397	15	-1.264	5	0	10	0	1	0	15
269		2	max	232.237	2	1.543	6	.116	1	0	4	0	3	0	2
270			min	-220.32	3	.355	15	-1.131	5	0	10	0	1	0	3
271		3	max	232.167	2	1.367	6	.116	1	0	4	0	3	0	2
272			min	-220.372	3	.314	15	-.997	5	0	10	0	1	0	3
273		4	max	232.097	2	1.191	6	.116	1	0	4	0	3	0	15
274			min	-220.425	3	.272	15	-.863	5	0	10	0	1	0	4
275		5	max	232.027	2	1.014	6	.116	1	0	4	0	3	0	15
276			min	-220.477	3	.231	15	-.73	5	0	10	0	4	0	4
277		6	max	231.957	2	.838	6	.116	1	0	4	0	3	0	15
278			min	-220.53	3	.189	15	-.596	5	0	10	0	4	0	4
279		7	max	231.887	2	.661	6	.116	1	0	4	0	3	0	15
280			min	-220.582	3	.148	15	-.462	5	0	10	0	4	-.001	4
281		8	max	231.817	2	.485	6	.116	1	0	4	0	3	0	15
282			min	-220.635	3	.107	15	-.329	5	0	10	0	4	-.001	4
283		9	max	231.747	2	.309	6	.116	1	0	4	0	3	0	15
284			min	-220.687	3	.065	15	-.195	5	0	10	0	4	-.001	4
285		10	max	231.677	2	.143	2	.116	1	0	4	0	3	0	15
286			min	-220.74	3	.024	15	-.07	3	0	10	0	4	-.001	4
287		11	max	231.607	2	.006	2	.116	1	0	4	0	3	0	15
288			min	-220.792	3	-.054	3	-.07	3	0	10	0	4	-.001	4
289		12	max	231.537	2	-.059	15	.237	4	0	4	0	3	0	15
290			min	-220.845	3	-.221	4	-.07	3	0	10	0	4	-.001	4
291		13	max	231.467	2	-.101	15	.371	4	0	4	0	3	0	15
292			min	-220.897	3	-.397	4	-.07	3	0	10	0	4	-.001	4
293		14	max	231.397	2	-.142	15	.504	4	0	4	0	3	0	15
294			min	-220.95	3	-.574	4	-.07	3	0	10	0	4	-.001	4
295		15	max	231.327	2	-.184	15	.638	4	0	4	0	3	0	15
296			min	-221.002	3	-.75	4	-.07	3	0	10	0	4	0	4
297		16	max	231.257	2	-.225	15	.772	4	0	4	0	3	0	15
298			min	-221.055	3	-.927	4	-.07	3	0	10	0	5	0	4
299		17	max	231.187	2	-.267	15	.905	4	0	4	0	3	0	15
300			min	-221.107	3	-1.103	4	-.07	3	0	10	0	5	0	4
301		18	max	231.117	2	-.308	15	1.039	4	0	4	0	3	0	15
302			min	-221.159	3	-1.279	4	-.07	3	0	10	0	10	0	4
303		19	max	231.047	2	-.35	15	1.173	4	0	4	0	4	0	1
304			min	-221.212	3	-1.456	4	-.07	3	0	10	0	10	0	1
305	M12	1	max	229.887	1	0	1	.6	1	0	1	0	4	0	1
306			min	-.029	15	0	1	-13.649	5	0	1	0	3	0	1
307		2	max	229.952	1	0	1	.6	1	0	1	0	1	0	1
308			min	-.01	15	0	1	-13.705	5	0	1	-.001	5	0	1
309		3	max	230.016	1	0	1	.6	1	0	1	0	1	0	1
310			min	.01	15	0	1	-13.761	5	0	1	-.002	5	0	1
311		4	max	230.081	1	0	1	.6	1	0	1	0	1	0	1
312			min	.029	15	0	1	-13.817	5	0	1	-.004	5	0	1
313		5	max	230.146	1	0	1	.6	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
314			min	.049	15	0	1	-13.873	5	0	1	-.005	5	0	1
315		6	max	230.21	1	0	1	.6	1	0	1	0	1	0	1
316			min	.068	15	0	1	-13.93	5	0	1	-.006	5	0	1
317		7	max	230.275	1	0	1	.6	1	0	1	0	1	0	1
318			min	.088	15	0	1	-13.986	5	0	1	-.007	5	0	1
319		8	max	230.34	1	0	1	.6	1	0	1	0	1	0	1
320			min	.107	15	0	1	-14.042	5	0	1	-.009	5	0	1
321		9	max	230.404	1	0	1	.6	1	0	1	0	1	0	1
322			min	.127	15	0	1	-14.098	5	0	1	-.01	5	0	1
323		10	max	230.469	1	0	1	.6	1	0	1	0	1	0	1
324			min	.146	15	0	1	-14.154	5	0	1	-.011	5	0	1
325		11	max	230.534	1	0	1	.6	1	0	1	0	1	0	1
326			min	.166	15	0	1	-14.21	5	0	1	-.012	5	0	1
327		12	max	230.599	1	0	1	.6	1	0	1	0	1	0	1
328			min	.185	15	0	1	-14.266	5	0	1	-.014	5	0	1
329		13	max	230.663	1	0	1	.6	1	0	1	0	1	0	1
330			min	.205	15	0	1	-14.322	5	0	1	-.015	5	0	1
331		14	max	230.728	1	0	1	.6	1	0	1	0	1	0	1
332			min	.224	15	0	1	-14.378	5	0	1	-.016	5	0	1
333		15	max	230.793	1	0	1	.6	1	0	1	0	1	0	1
334			min	.244	15	0	1	-14.434	5	0	1	-.018	5	0	1
335		16	max	230.857	1	0	1	.6	1	0	1	0	1	0	1
336			min	.263	15	0	1	-14.49	5	0	1	-.019	5	0	1
337		17	max	230.922	1	0	1	.6	1	0	1	0	1	0	1
338			min	.283	15	0	1	-14.546	5	0	1	-.02	5	0	1
339		18	max	230.987	1	0	1	.6	1	0	1	0	1	0	1
340			min	.303	15	0	1	-14.603	5	0	1	-.021	5	0	1
341		19	max	231.052	1	0	1	.6	1	0	1	0	1	0	1
342			min	.322	15	0	1	-14.659	5	0	1	-.023	5	0	1
343	M1	1	max	72.04	1	338.104	3	.763	10	0	2	.03	1	0	2
344			min	5.88	10	-211.853	2	-16.583	4	0	3	-.002	10	0	3
345		2	max	72.2	1	337.932	3	.763	10	0	2	.027	1	.046	2
346			min	6.014	10	-212.081	2	-16.341	4	0	3	-.001	10	-.074	3
347		3	max	117.376	3	4.526	4	.761	10	0	10	.023	1	.092	2
348			min	-28.235	2	-29.955	2	-15.363	1	0	1	-.001	10	-.146	3
349		4	max	117.496	3	4.232	4	.761	10	0	10	.02	1	.098	2
350			min	-28.075	2	-30.184	2	-15.363	1	0	1	-.001	10	-.144	3
351		5	max	117.616	3	3.939	4	.761	10	0	10	.017	1	.105	2
352			min	-27.915	2	-30.412	2	-15.363	1	0	1	0	10	-.142	3
353		6	max	117.736	3	3.685	14	.761	10	0	10	.013	1	.111	2
354			min	-27.755	2	-30.641	2	-15.363	1	0	1	0	10	-.14	3
355		7	max	117.857	3	3.461	14	.761	10	0	10	.01	1	.118	2
356			min	-27.594	2	-30.87	2	-15.363	1	0	1	0	10	-.138	3
357		8	max	117.977	3	3.236	14	.761	10	0	10	.007	1	.125	2
358			min	-27.434	2	-31.099	2	-15.363	1	0	1	0	10	-.137	3
359		9	max	118.097	3	3.011	14	.761	10	0	10	.003	3	.131	2
360			min	-27.274	2	-31.327	2	-15.363	1	0	1	0	10	-.135	3
361		10	max	118.217	3	2.787	14	.761	10	0	10	.002	3	.138	2
362			min	-27.114	2	-31.556	2	-15.363	1	0	1	0	10	-.133	3
363		11	max	118.337	3	2.562	14	.761	10	0	10	0	3	.145	2
364			min	-26.954	2	-31.785	2	-15.363	1	0	1	-.003	1	-.131	3
365		12	max	118.457	3	2.337	14	.761	10	0	10	0	10	.152	2
366			min	-26.794	2	-32.014	2	-15.363	1	0	1	-.007	1	-.129	3
367		13	max	118.577	3	2.112	14	.761	10	0	10	0	10	.159	2
368			min	-26.634	2	-32.242	2	-15.363	1	0	1	-.01	1	-.127	3
369		14	max	118.697	3	1.888	14	.761	10	0	10	0	10	.166	2
370			min	-26.473	2	-32.471	2	-15.363	1	0	1	-.013	1	-.125	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
371		15	max	118.818	3	1.663	14	.761	10	0	10	0	10	.173	2
372			min	-26.313	2	-32.7	2	-15.363	1	0	1	-.017	1	-.122	3
373		16	max	83.475	2	171.24	2	.766	10	0	1	0	10	.178	2
374			min	2.519	15	-205.015	3	-15.462	1	0	5	-.02	1	-.119	3
375		17	max	83.636	2	171.011	2	.766	10	0	1	.001	10	.141	2
376			min	2.567	15	-205.187	3	-15.462	1	0	5	-.023	1	-.074	3
377		18	max	-5.391	12	326.309	2	.801	10	0	5	.001	10	.071	2
378			min	-72.212	1	-169.668	3	-24.631	4	0	2	-.027	1	-.037	3
379		19	max	-5.311	12	326.08	2	.801	10	0	5	.001	10	0	2
380			min	-72.051	1	-169.84	3	-24.389	4	0	2	-.03	1	0	3
381	M5	1	max	181.711	1	1066.703	3	0	11	0	9	.028	4	0	3
382			min	-4.889	3	-657.228	2	-88.845	3	0	3	0	11	0	2
383		2	max	181.871	1	1066.531	3	0	11	0	9	.024	4	.142	2
384			min	-4.769	3	-657.456	2	-88.845	3	0	3	-.006	3	-.231	3
385		3	max	324.361	3	4.365	9	9.57	3	0	3	.02	4	.282	2
386			min	-81.554	2	-97.106	2	-15.55	4	0	4	-.024	3	-.457	3
387		4	max	324.481	3	4.175	9	9.57	3	0	3	.016	4	.303	2
388			min	-81.393	2	-97.334	2	-15.308	4	0	4	-.022	3	-.449	3
389		5	max	324.601	3	3.984	9	9.57	3	0	3	.013	4	.325	2
390			min	-81.233	2	-97.563	2	-15.066	4	0	4	-.02	3	-.442	3
391		6	max	324.721	3	3.794	9	9.57	3	0	3	.01	4	.346	2
392			min	-81.073	2	-97.792	2	-14.824	4	0	4	-.018	3	-.434	3
393		7	max	324.841	3	3.603	9	9.57	3	0	3	.007	4	.367	2
394			min	-80.913	2	-98.021	2	-14.582	4	0	4	-.016	3	-.426	3
395		8	max	324.961	3	3.412	9	9.57	3	0	3	.004	4	.388	2
396			min	-80.753	2	-98.249	2	-14.34	4	0	4	-.014	3	-.418	3
397		9	max	325.082	3	3.222	9	9.57	3	0	3	0	4	.41	2
398			min	-80.593	2	-98.478	2	-14.098	4	0	4	-.012	3	-.41	3
399		10	max	325.202	3	3.031	9	9.57	3	0	3	0	1	.431	2
400			min	-80.432	2	-98.707	2	-13.856	4	0	4	-.01	3	-.402	3
401		11	max	325.322	3	2.84	9	9.57	3	0	3	0	2	.452	2
402			min	-80.272	2	-98.935	2	-13.614	4	0	4	-.008	3	-.394	3
403		12	max	325.442	3	2.65	9	9.57	3	0	3	0	2	.474	2
404			min	-80.112	2	-99.164	2	-13.372	4	0	4	-.008	4	-.386	3
405		13	max	325.562	3	2.459	9	9.57	3	0	3	0	2	.495	2
406			min	-79.952	2	-99.393	2	-13.13	4	0	4	-.011	4	-.378	3
407		14	max	325.682	3	2.269	9	9.57	3	0	3	0	2	.517	2
408			min	-79.792	2	-99.622	2	-12.888	4	0	4	-.014	4	-.37	3
409		15	max	325.802	3	2.078	9	9.57	3	0	3	0	3	.539	2
410			min	-79.632	2	-99.85	2	-12.646	4	0	4	-.017	4	-.362	3
411		16	max	257.515	2	535.048	2	9.555	3	0	3	.002	3	.555	2
412			min	-.081	15	-577.97	3	-11.3	4	0	4	-.02	4	-.349	3
413		17	max	257.675	2	534.82	2	9.555	3	0	3	.004	3	.439	2
414			min	-.033	15	-578.142	3	-11.057	4	0	4	-.022	4	-.224	3
415		18	max	-2.745	12	1017.752	2	8.749	3	0	4	.006	3	.22	2
416			min	-181.856	1	-516.164	3	-25.373	5	0	9	-.028	4	-.111	3
417		19	max	-2.665	12	1017.523	2	8.749	3	0	4	.008	3	0	3
418			min	-181.696	1	-516.335	3	-25.131	5	0	9	-.033	4	0	2
419	M9	1	max	72.029	1	337.99	3	108.529	4	0	3	.002	10	0	2
420			min	1.441	15	-211.853	2	-.763	10	0	2	-.03	1	0	3
421		2	max	72.189	1	337.818	3	108.771	4	0	3	.021	5	.046	2
422			min	1.489	15	-212.081	2	-.763	10	0	2	-.027	1	-.074	3
423		3	max	116.702	3	3.928	9	15.32	1	0	1	.043	5	.092	2
424			min	-27.786	2	-29.926	2	-19.763	5	0	5	-.023	1	-.145	3
425		4	max	116.822	3	3.737	9	15.32	1	0	1	.038	5	.098	2
426			min	-27.626	2	-30.155	2	-19.521	5	0	5	-.02	1	-.144	3
427		5	max	116.942	3	3.547	9	15.32	1	0	1	.034	5	.105	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
428			min	-27.466	2	-30.384	2	-19.279	5	0	5	-.017	1	-.142	3
429		6	max	117.063	3	3.356	9	15.32	1	0	1	.03	5	.111	2
430			min	-27.306	2	-30.613	2	-19.037	5	0	5	-.013	1	-.14	3
431		7	max	117.183	3	3.166	9	15.32	1	0	1	.026	5	.118	2
432			min	-27.146	2	-30.841	2	-18.795	5	0	5	-.01	1	-.138	3
433		8	max	117.303	3	2.975	9	15.32	1	0	1	.022	5	.125	2
434			min	-26.986	2	-31.07	2	-18.553	5	0	5	-.007	1	-.136	3
435		9	max	117.423	3	2.784	9	15.32	1	0	1	.018	5	.131	2
436			min	-26.825	2	-31.299	2	-18.311	5	0	5	-.003	1	-.135	3
437		10	max	117.543	3	2.594	9	15.32	1	0	1	.014	4	.138	2
438			min	-26.665	2	-31.528	2	-18.069	5	0	5	0	1	-.133	3
439		11	max	117.663	3	2.403	9	15.32	1	0	1	.012	3	.145	2
440			min	-26.505	2	-31.756	2	-17.827	5	0	5	0	10	-.131	3
441		12	max	117.783	3	2.212	9	15.32	1	0	1	.011	3	.152	2
442			min	-26.345	2	-31.985	2	-17.585	5	0	5	0	10	-.129	3
443		13	max	117.903	3	2.022	9	15.32	1	0	1	.011	3	.159	2
444			min	-26.185	2	-32.214	2	-17.343	5	0	5	0	10	-.127	3
445		14	max	118.024	3	1.831	9	15.32	1	0	1	.013	1	.166	2
446			min	-26.025	2	-32.443	2	-17.101	5	0	5	-.001	5	-.125	3
447		15	max	118.144	3	1.641	9	15.32	1	0	1	.017	1	.173	2
448			min	-25.864	2	-32.671	2	-16.859	5	0	5	-.005	5	-.123	3
449		16	max	83.722	2	170.889	2	15.421	1	0	10	.02	1	.178	2
450			min	4.415	15	-205.737	3	-15.474	5	0	4	-.008	5	-.119	3
451		17	max	83.882	2	170.66	2	15.421	1	0	10	.023	1	.141	2
452			min	4.463	15	-205.909	3	-15.232	5	0	4	-.011	5	-.074	3
453		18	max	6.524	5	326.309	2	16.034	1	0	2	.027	1	.071	2
454			min	-72.192	1	-169.654	3	-28.636	5	0	3	-.017	5	-.037	3
455		19	max	6.599	5	326.08	2	16.034	1	0	2	.03	1	0	2
456			min	-72.032	1	-169.825	3	-28.394	5	0	3	-.024	5	0	3
457	M13	1	max	108.529	4	211.773	2	-1.441	15	0	2	.03	1	0	2
458			min	-.763	10	-338.058	3	-72.025	1	0	3	-.002	10	0	3
459		2	max	104.437	4	151.777	2	-.624	15	0	2	.018	3	.121	3
460			min	-.763	10	-241.238	3	-53.926	1	0	3	-.004	2	-.076	2
461		3	max	100.344	4	91.782	2	.193	15	0	2	.014	3	.201	3
462			min	-.763	10	-144.419	3	-35.827	1	0	3	-.015	1	-.126	2
463		4	max	96.252	4	31.786	2	1.449	5	0	2	.01	3	.241	3
464			min	-.763	10	-47.599	3	-17.728	1	0	3	-.026	1	-.152	2
465		5	max	94.586	3	49.22	3	4.73	2	0	2	.006	3	.241	3
466			min	-.763	10	-28.209	2	-7.921	3	0	3	-.029	1	-.153	2
467		6	max	94.586	3	146.04	3	18.47	1	0	2	.003	3	.2	3
468			min	-.763	10	-88.204	2	-6.732	3	0	3	-.025	1	-.129	2
469		7	max	94.586	3	242.859	3	36.569	1	0	2	.005	5	.119	3
470			min	-.763	10	-148.2	2	-5.543	3	0	3	-.014	1	-.079	2
471		8	max	94.586	3	339.679	3	54.668	1	0	2	.008	4	0	4
472			min	-.763	10	-208.195	2	-4.354	3	0	3	-.002	3	-.005	2
473		9	max	94.586	3	436.498	3	72.766	1	0	2	.032	1	.094	2
474			min	-.763	10	-268.191	2	-3.165	3	0	3	-.003	3	-.164	3
475		10	max	94.586	3	-6.506	15	90.865	1	0	2	.066	1	.218	2
476			min	-.763	10	-533.318	3	1.39	12	0	3	-.017	3	-.366	3
477		11	max	49.303	4	268.191	2	4.907	5	0	3	.032	1	.094	2
478			min	-.763	10	-436.498	3	-72.755	1	0	2	-.016	3	-.164	3
479		12	max	45.211	4	208.195	2	6.171	5	0	3	.008	2	0	4
480			min	-.763	10	-339.679	3	-54.656	1	0	2	-.014	3	-.005	2
481		13	max	41.119	4	148.2	2	7.435	5	0	3	0	10	.119	3
482			min	-.763	10	-242.859	3	-36.557	1	0	2	-.014	1	-.079	2
483		14	max	37.026	4	88.204	2	8.699	5	0	3	-.002	10	.2	3
484			min	-.763	10	-146.04	3	-18.458	1	0	2	-.026	1	-.129	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
485		15	max	32.934	4	28.209	2	10.622	4	0	3	0	5	.241	3
486			min	-.763	10	-49.22	3	-4.73	2	0	2	-.029	1	-.153	2
487		16	max	28.841	4	47.599	3	17.739	1	0	3	.005	5	.241	3
488			min	-.763	10	-31.786	2	-.89	10	0	2	-.026	1	-.152	2
489		17	max	24.749	4	144.419	3	35.838	1	0	3	.01	5	.201	3
490			min	-.763	10	-91.782	2	1.367	10	0	2	-.015	1	-.126	2
491		18	max	20.657	4	241.238	3	53.937	1	0	3	.017	4	.121	3
492			min	-.763	10	-151.777	2	3.624	10	0	2	-.004	2	-.076	2
493		19	max	16.564	4	338.058	3	72.036	1	0	3	.03	1	0	2
494			min	-.763	10	-211.773	2	5.881	10	0	2	-.002	10	0	3
495	M16	1	max	28.387	5	326.185	2	6.599	5	0	3	.03	1	0	2
496			min	-16.007	1	-169.861	3	-72.037	1	0	2	-.024	5	0	3
497		2	max	24.294	5	233.351	2	7.863	5	0	3	.005	9	.061	3
498			min	-16.007	1	-122.3	3	-53.938	1	0	2	-.02	5	-.117	2
499		3	max	20.202	5	140.516	2	9.127	5	0	3	0	3	.102	3
500			min	-16.007	1	-74.739	3	-35.839	1	0	2	-.02	4	-.194	2
501		4	max	16.109	5	47.681	2	10.39	5	0	3	-.002	12	.123	3
502			min	-16.007	1	-27.179	3	-17.74	1	0	2	-.026	1	-.234	2
503		5	max	12.017	5	20.382	3	11.654	5	0	3	-.003	12	.125	3
504			min	-16.007	1	-45.153	2	-5.187	3	0	2	-.029	1	-.234	2
505		6	max	7.925	5	67.943	3	18.458	1	0	3	-.002	10	.106	3
506			min	-16.007	1	-137.988	2	-3.998	3	0	2	-.025	1	-.196	2
507		7	max	3.832	5	115.504	3	36.557	1	0	3	.002	5	.068	3
508			min	-16.007	1	-230.822	2	-2.809	3	0	2	-.014	1	-.119	2
509		8	max	2.399	3	163.064	3	54.656	1	0	3	.009	4	.01	3
510			min	-16.007	1	-323.657	2	-1.62	3	0	2	-.009	3	-.004	2
511		9	max	2.399	3	210.625	3	72.755	1	0	3	.032	1	.151	2
512			min	-16.007	1	-416.491	2	-.431	3	0	2	-.01	3	-.068	3
513		10	max	16.695	5	-6.382	15	90.854	1	0	14	.066	1	.343	2
514			min	-16.007	1	-509.326	2	-2.405	3	0	2	-.009	3	-.166	3
515		11	max	12.602	5	416.491	2	3.831	5	0	2	.032	1	.151	2
516			min	-15.994	1	-210.625	3	-72.735	1	0	3	-.009	5	-.068	3
517		12	max	8.51	5	323.657	2	5.095	5	0	2	.008	2	.01	3
518			min	-15.994	1	-163.064	3	-54.636	1	0	3	-.007	5	-.004	2
519		13	max	4.417	5	230.822	2	6.359	5	0	2	0	10	.068	3
520			min	-15.994	1	-115.503	3	-36.537	1	0	3	-.014	1	-.119	2
521		14	max	.801	10	137.988	2	7.623	5	0	2	-.001	12	.106	3
522			min	-15.994	1	-67.943	3	-18.439	1	0	3	-.025	1	-.196	2
523		15	max	.801	10	45.153	2	9.525	4	0	2	.002	5	.125	3
524			min	-15.994	1	-20.382	3	-4.691	2	0	3	-.029	1	-.234	2
525		16	max	.801	10	27.179	3	17.759	1	0	2	.006	5	.123	3
526			min	-15.994	1	-47.681	2	-.867	10	0	3	-.026	1	-.234	2
527		17	max	.801	10	74.74	3	35.858	1	0	2	.01	5	.102	3
528			min	-16.225	4	-140.516	2	1.39	10	0	3	-.015	1	-.194	2
529		18	max	.801	10	122.3	3	53.957	1	0	2	.017	4	.061	3
530			min	-20.318	4	-233.351	2	3.647	10	0	3	-.004	2	-.117	2
531		19	max	.801	10	169.861	3	72.056	1	0	2	.03	1	0	2
532			min	-24.41	4	-326.185	2	5.31	12	0	3	-.001	10	0	5
533	M15	1	max	0	1	.792	3	.146	3	0	1	0	1	0	1
534			min	-135.17	3	0	1	0	1	0	3	0	3	0	1
535		2	max	0	1	.704	3	.146	3	0	1	0	1	0	1
536			min	-135.246	3	0	1	0	1	0	3	0	3	0	3
537		3	max	0	1	.616	3	.146	3	0	1	0	1	0	1
538			min	-135.321	3	0	1	0	1	0	3	0	3	0	3
539		4	max	0	1	.528	3	.146	3	0	1	0	1	0	1
540			min	-135.397	3	0	1	0	1	0	3	0	3	0	3
541		5	max	0	1	.44	3	.146	3	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
542			min	-135.473	3	0	1	0	1	0	3	0	3	0	3
543		6	max	0	1	.352	3	.146	3	0	1	0	1	0	1
544			min	-135.548	3	0	1	0	1	0	3	0	3	0	3
545		7	max	0	1	.264	3	.146	3	0	1	0	3	0	1
546			min	-135.624	3	0	1	0	1	0	3	0	1	0	3
547		8	max	0	1	.176	3	.146	3	0	1	0	3	0	1
548			min	-135.699	3	0	1	0	1	0	3	0	1	0	3
549		9	max	0	1	.088	3	.146	3	0	1	0	3	0	1
550			min	-135.775	3	0	1	0	1	0	3	0	1	-.001	3
551		10	max	0	1	0	1	.146	3	0	1	0	3	0	1
552			min	-135.85	3	0	1	0	1	0	3	0	1	-.001	3
553		11	max	0	1	0	1	.146	3	0	1	0	3	0	1
554			min	-135.926	3	-.088	3	0	1	0	3	0	1	-.001	3
555		12	max	0	1	0	1	.146	3	0	1	0	3	0	1
556			min	-136.001	3	-.176	3	0	1	0	3	0	1	0	3
557		13	max	0	1	0	1	.146	3	0	1	0	3	0	1
558			min	-136.077	3	-.264	3	0	1	0	3	0	1	0	3
559		14	max	0	1	0	1	.146	3	0	1	0	3	0	1
560			min	-136.152	3	-.352	3	0	1	0	3	0	1	0	3
561		15	max	0	1	0	1	.146	3	0	1	0	3	0	1
562			min	-136.228	3	-.44	3	0	1	0	3	0	1	0	3
563		16	max	0	1	0	1	.146	3	0	1	0	3	0	1
564			min	-136.303	3	-.528	3	0	1	0	3	0	1	0	3
565		17	max	0	1	0	1	.146	3	0	1	0	3	0	1
566			min	-136.379	3	-.616	3	0	1	0	3	0	1	0	3
567		18	max	0	1	0	1	.146	3	0	1	0	3	0	1
568			min	-136.454	3	-.704	3	0	1	0	3	0	1	0	3
569		19	max	0	1	0	1	.146	3	0	1	0	3	0	1
570			min	-136.53	3	-.792	3	0	1	0	3	0	1	0	1
571	M16A	1	max	0	2	2.109	4	.37	4	0	3	0	3	0	1
572			min	-175.118	4	0	2	-.061	3	0	1	0	4	0	1
573		2	max	0	2	1.874	4	.332	4	0	3	0	3	0	2
574			min	-175.086	4	0	2	-.061	3	0	1	0	4	0	4
575		3	max	0	2	1.64	4	.294	4	0	3	0	3	0	2
576			min	-175.054	4	0	2	-.061	3	0	1	0	4	-.001	4
577		4	max	0	2	1.406	4	.255	4	0	3	0	3	0	2
578			min	-175.022	4	0	2	-.061	3	0	1	0	1	-.002	4
579		5	max	0	2	1.171	4	.217	4	0	3	0	3	0	2
580			min	-174.991	4	0	2	-.061	3	0	1	0	1	-.002	4
581		6	max	0	2	.937	4	.179	4	0	3	0	3	0	2
582			min	-174.959	4	0	2	-.061	3	0	1	0	1	-.002	4
583		7	max	0	2	.703	4	.141	4	0	3	0	3	0	2
584			min	-174.927	4	0	2	-.061	3	0	1	0	1	-.002	4
585		8	max	0	2	.469	4	.103	4	0	3	0	5	0	2
586			min	-174.895	4	0	2	-.061	3	0	1	0	1	-.003	4
587		9	max	0	2	.234	4	.064	4	0	3	0	5	0	2
588			min	-174.864	4	0	2	-.061	3	0	1	0	1	-.003	4
589		10	max	0	2	0	1	.036	1	0	3	0	5	0	2
590			min	-174.832	4	0	1	-.061	3	0	1	0	1	-.003	4
591		11	max	.04	1	0	2	.036	1	0	3	0	5	0	2
592			min	-174.8	4	-.234	4	-.061	3	0	1	0	1	-.003	4
593		12	max	.14	1	0	2	.036	1	0	3	0	5	0	2
594			min	-174.768	4	-.469	4	-.061	3	0	1	0	1	-.003	4
595		13	max	.241	1	0	2	.036	1	0	3	0	5	0	2
596			min	-174.737	4	-.703	4	-.09	5	0	1	0	3	-.002	4
597		14	max	.342	1	0	2	.036	1	0	3	0	5	0	2
598			min	-174.705	4	-.937	4	-.128	5	0	1	0	3	-.002	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
599		15	max	.442	1	0	2	.036	1	0	3	0	5	0	2
600			min	-174.673	4	-1.171	4	-.167	5	0	1	0	3	-.002	4
601		16	max	.543	1	0	2	.036	1	0	3	0	1	0	2
602			min	-174.657	5	-1.406	4	-.205	5	0	1	0	3	-.002	4
603		17	max	.644	1	0	2	.036	1	0	3	0	1	0	2
604			min	-174.707	5	-1.64	4	-.243	5	0	1	0	3	-.001	4
605		18	max	.745	1	0	2	.036	1	0	3	0	1	0	2
606			min	-174.758	5	-1.874	4	-.281	5	0	1	0	4	0	4
607		19	max	.845	1	0	2	.036	1	0	3	0	1	0	1
608			min	-174.808	5	-2.109	4	-.319	5	0	1	0	4	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	.002	2	.011	2	.002	9	8.319e-4	5	NC	3	NC	1
2			min	-.004	3	-.011	3	-.01	5	-2.543e-4	1	3980.894	2	NC	1
3		2	max	.002	2	.01	2	.002	9	8.533e-4	5	NC	3	NC	1
4			min	-.004	3	-.011	3	-.01	5	-2.422e-4	1	4355.688	2	NC	1
5		3	max	.002	2	.009	2	.002	9	8.747e-4	5	NC	3	NC	1
6			min	-.003	3	-.01	3	-.01	5	-2.301e-4	1	4803.479	2	NC	1
7		4	max	.002	2	.008	2	.002	9	8.962e-4	5	NC	1	NC	1
8			min	-.003	3	-.01	3	-.009	5	-2.181e-4	1	5342.2	2	NC	1
9		5	max	.002	2	.007	2	.002	9	9.176e-4	5	NC	1	NC	1
10			min	-.003	3	-.009	3	-.009	5	-2.06e-4	1	5995.845	2	NC	1
11		6	max	.001	2	.006	2	.001	9	9.39e-4	5	NC	1	NC	1
12			min	-.003	3	-.009	3	-.009	5	-1.939e-4	1	6797.034	2	NC	1
13		7	max	.001	2	.005	2	.001	9	9.604e-4	5	NC	1	NC	1
14			min	-.003	3	-.008	3	-.009	5	-1.819e-4	1	7790.966	2	NC	1
15		8	max	.001	2	.005	2	.001	9	9.819e-4	5	NC	1	NC	1
16			min	-.002	3	-.008	3	-.008	5	-1.698e-4	1	9041.659	2	NC	1
17		9	max	.001	2	.004	2	0	9	1.003e-3	5	NC	1	NC	1
18			min	-.002	3	-.007	3	-.008	5	-1.577e-4	1	NC	1	NC	1
19		10	max	.001	2	.003	2	0	9	1.025e-3	5	NC	1	NC	1
20			min	-.002	3	-.007	3	-.007	5	-1.456e-4	1	NC	1	NC	1
21		11	max	0	2	.003	2	0	9	1.046e-3	5	NC	1	NC	1
22			min	-.002	3	-.006	3	-.007	5	-1.336e-4	1	NC	1	NC	1
23		12	max	0	2	.002	2	0	9	1.068e-3	5	NC	1	NC	1
24			min	-.001	3	-.005	3	-.006	5	-1.215e-4	1	NC	1	NC	1
25		13	max	0	2	.002	2	0	9	1.089e-3	5	NC	1	NC	1
26			min	-.001	3	-.005	3	-.005	5	-1.094e-4	1	NC	1	NC	1
27		14	max	0	2	.001	2	0	9	1.11e-3	5	NC	1	NC	1
28			min	-.001	3	-.004	3	-.005	5	-9.735e-5	1	NC	1	NC	1
29		15	max	0	2	0	2	0	9	1.132e-3	5	NC	1	NC	1
30			min	0	3	-.003	3	-.004	5	-8.528e-5	1	NC	1	NC	1
31		16	max	0	2	0	2	0	9	1.153e-3	5	NC	1	NC	1
32			min	0	3	-.002	3	-.003	5	-7.32e-5	1	NC	1	NC	1
33		17	max	0	2	0	2	0	9	1.175e-3	5	NC	1	NC	1
34			min	0	3	-.002	3	-.002	5	-6.113e-5	1	NC	1	NC	1
35		18	max	0	2	0	2	0	9	1.196e-3	5	NC	1	NC	1
36			min	0	3	0	3	0	5	-4.906e-5	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	1.218e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-3.742e-5	9	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.793e-5	9	NC	1	NC	1
40			min	0	1	0	1	0	1	-5.82e-4	5	NC	1	NC	1
41		2	max	0	3	0	2	.003	5	2.462e-5	1	NC	1	NC	1
42			min	0	2	0	3	0	9	-5.853e-4	5	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
43		3	max	0	3	0	2	.006	5	3.145e-5	1	NC	1	NC	1
44			min	0	2	-.002	3	0	9	-5.886e-4	5	NC	1	NC	1
45		4	max	0	3	0	2	.009	5	3.828e-5	1	NC	1	NC	1
46			min	0	2	-.003	3	0	9	-5.918e-4	5	NC	1	NC	1
47		5	max	0	3	0	2	.012	5	4.511e-5	1	NC	1	NC	1
48			min	0	2	-.004	3	0	9	-5.951e-4	5	NC	1	NC	1
49		6	max	0	3	0	2	.015	4	5.193e-5	1	NC	1	NC	1
50			min	0	2	-.004	3	0	9	-5.984e-4	5	NC	1	NC	1
51		7	max	0	3	0	2	.017	4	5.876e-5	1	NC	1	NC	1
52			min	0	2	-.005	3	0	9	-6.016e-4	5	NC	1	NC	1
53		8	max	0	3	0	2	.02	4	6.559e-5	1	NC	1	NC	1
54			min	-.001	2	-.006	3	0	9	-6.049e-4	5	NC	1	NC	1
55		9	max	.001	3	.001	2	.023	4	7.241e-5	1	NC	1	NC	1
56			min	-.001	2	-.007	3	0	10	-6.081e-4	5	NC	1	NC	1
57		10	max	.001	3	.002	2	.025	4	7.924e-5	1	NC	1	NC	1
58			min	-.001	2	-.007	3	0	10	-6.114e-4	5	NC	1	NC	1
59		11	max	.001	3	.002	2	.028	4	8.607e-5	1	NC	1	NC	1
60			min	-.001	2	-.008	3	0	10	-6.147e-4	5	NC	1	NC	1
61		12	max	.002	3	.003	2	.03	4	9.29e-5	1	NC	1	NC	1
62			min	-.002	2	-.008	3	0	10	-6.179e-4	5	NC	1	NC	1
63		13	max	.002	3	.004	2	.033	4	9.972e-5	1	NC	1	NC	1
64			min	-.002	2	-.008	3	0	10	-6.212e-4	5	NC	1	NC	1
65		14	max	.002	3	.004	2	.035	4	1.065e-4	1	NC	1	NC	1
66			min	-.002	2	-.009	3	0	10	-6.245e-4	5	NC	1	NC	1
67		15	max	.002	3	.005	2	.037	4	1.134e-4	1	NC	1	NC	1
68			min	-.002	2	-.009	3	0	10	-6.277e-4	5	8671.563	2	NC	1
69		16	max	.002	3	.006	2	.039	4	1.202e-4	1	NC	1	NC	1
70			min	-.002	2	-.009	3	0	10	-6.31e-4	5	7351	2	NC	1
71		17	max	.002	3	.007	2	.041	4	1.27e-4	1	NC	1	NC	1
72			min	-.002	2	-.009	3	0	10	-6.342e-4	5	6329.132	2	NC	1
73		18	max	.002	3	.008	2	.043	4	1.339e-4	1	NC	1	NC	1
74			min	-.002	2	-.009	3	0	10	-6.375e-4	5	5529.215	2	NC	1
75		19	max	.002	3	.009	2	.045	4	1.407e-4	1	NC	3	NC	1
76			min	-.003	2	-.009	3	0	10	-6.408e-4	5	4897.347	2	NC	1
77	M4	1	max	.001	1	.012	2	0	10	3.527e-3	5	NC	1	NC	1
78			min	0	15	-.011	3	-.047	4	-1.793e-4	1	NC	1	409.605	4
79		2	max	.001	1	.012	2	0	10	3.527e-3	5	NC	1	NC	1
80			min	0	15	-.01	3	-.043	4	-1.793e-4	1	NC	1	446.464	4
81		3	max	0	1	.011	2	0	10	3.527e-3	5	NC	1	NC	1
82			min	0	15	-.01	3	-.039	4	-1.793e-4	1	NC	1	490.326	4
83		4	max	0	1	.01	2	0	10	3.527e-3	5	NC	1	NC	1
84			min	0	15	-.009	3	-.036	4	-1.793e-4	1	NC	1	543.036	4
85		5	max	0	1	.01	2	0	10	3.527e-3	5	NC	1	NC	1
86			min	0	15	-.009	3	-.032	4	-1.793e-4	1	NC	1	607.106	4
87		6	max	0	1	.009	2	0	10	3.527e-3	5	NC	1	NC	1
88			min	0	15	-.008	3	-.028	4	-1.793e-4	1	NC	1	686.029	4
89		7	max	0	1	.008	2	0	10	3.527e-3	5	NC	1	NC	1
90			min	0	15	-.007	3	-.025	4	-1.793e-4	1	NC	1	784.782	4
91		8	max	0	1	.008	2	0	10	3.527e-3	5	NC	1	NC	1
92			min	0	15	-.007	3	-.021	4	-1.793e-4	1	NC	1	910.648	4
93		9	max	0	1	.007	2	0	10	3.527e-3	5	NC	1	NC	1
94			min	0	15	-.006	3	-.018	4	-1.793e-4	1	NC	1	1074.645	4
95		10	max	0	1	.006	2	0	10	3.527e-3	5	NC	1	NC	1
96			min	0	15	-.005	3	-.015	4	-1.793e-4	1	NC	1	1294.09	4
97		11	max	0	1	.005	2	0	10	3.527e-3	5	NC	1	NC	1
98			min	0	15	-.005	3	-.012	4	-1.793e-4	1	NC	1	1597.503	4
99		12	max	0	1	.005	2	0	10	3.527e-3	5	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
100			min	0	15	-.004	3	-.009	4	-1.793e-4	1	NC	1	2034.626	4
101		13	max	0	1	.004	2	0	10	3.527e-3	5	NC	1	NC	1
102			min	0	15	-.004	3	-.007	4	-1.793e-4	1	NC	1	2698.759	4
103		14	max	0	1	.003	2	0	10	3.527e-3	5	NC	1	NC	1
104			min	0	15	-.003	3	-.005	4	-1.793e-4	1	NC	1	3782.337	4
105		15	max	0	1	.003	2	0	10	3.527e-3	5	NC	1	NC	1
106			min	0	15	-.002	3	-.003	4	-1.793e-4	1	NC	1	5737.419	4
107		16	max	0	1	.002	2	0	10	3.527e-3	5	NC	1	NC	1
108			min	0	15	-.002	3	-.002	4	-1.793e-4	1	NC	1	9849.021	4
109		17	max	0	1	.001	2	0	10	3.527e-3	5	NC	1	NC	1
110			min	0	15	-.001	3	0	4	-1.793e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	10	3.527e-3	5	NC	1	NC	1
112			min	0	15	0	3	0	4	-1.793e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	3.527e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-1.793e-4	1	NC	1	NC	1
115	M6	1	max	.006	2	.033	2	0	9	8.791e-4	4	NC	3	NC	1
116			min	-.011	3	-.032	3	-.01	5	-3.473e-7	9	1282.548	2	5766.329	3
117		2	max	.006	2	.031	2	0	9	9.014e-4	4	NC	3	NC	1
118			min	-.01	3	-.031	3	-.01	5	-1.17e-6	1	1374.707	2	6091.115	3
119		3	max	.005	2	.029	2	0	9	9.236e-4	4	NC	3	NC	1
120			min	-.01	3	-.029	3	-.01	5	-2.117e-6	1	1480.616	2	6481.651	3
121		4	max	.005	2	.026	2	0	9	9.459e-4	4	NC	3	NC	1
122			min	-.009	3	-.027	3	-.01	5	-3.063e-6	1	1603.032	2	6951.335	3
123		5	max	.005	2	.024	2	0	9	9.682e-4	4	NC	3	NC	1
124			min	-.009	3	-.026	3	-.009	5	-4.01e-6	1	1745.504	2	7518.078	3
125		6	max	.004	2	.022	2	0	9	9.904e-4	4	NC	3	NC	1
126			min	-.008	3	-.024	3	-.009	5	-4.957e-6	1	1912.681	2	8206.112	3
127		7	max	.004	2	.02	2	0	9	1.013e-3	4	NC	3	NC	1
128			min	-.007	3	-.022	3	-.009	5	-5.904e-6	1	2110.761	2	9048.738	3
129		8	max	.004	2	.018	2	0	9	1.035e-3	4	NC	3	NC	1
130			min	-.007	3	-.02	3	-.009	5	-6.851e-6	1	2348.201	2	NC	1
131		9	max	.003	2	.016	2	0	9	1.057e-3	4	NC	3	NC	1
132			min	-.006	3	-.019	3	-.008	5	-7.798e-6	1	2636.835	2	NC	1
133		10	max	.003	2	.014	2	0	9	1.079e-3	4	NC	3	NC	1
134			min	-.006	3	-.017	3	-.008	5	-8.745e-6	1	2993.745	2	NC	1
135		11	max	.003	2	.012	2	0	9	1.102e-3	4	NC	3	NC	1
136			min	-.005	3	-.015	3	-.007	5	-9.692e-6	1	3444.541	2	NC	1
137		12	max	.002	2	.011	2	0	9	1.124e-3	4	NC	3	NC	1
138			min	-.004	3	-.013	3	-.006	5	-1.064e-5	1	4029.434	2	NC	1
139		13	max	.002	2	.009	2	0	9	1.146e-3	4	NC	3	NC	1
140			min	-.004	3	-.011	3	-.006	5	-1.159e-5	1	4815.402	2	NC	1
141		14	max	.002	2	.007	2	0	9	1.168e-3	4	NC	1	NC	1
142			min	-.003	3	-.009	3	-.005	5	-1.253e-5	1	5922.931	2	NC	1
143		15	max	.001	2	.006	2	0	9	1.191e-3	4	NC	1	NC	1
144			min	-.002	3	-.008	3	-.004	5	-1.348e-5	1	7592.879	2	NC	1
145		16	max	.001	2	.004	2	0	9	1.213e-3	4	NC	1	NC	1
146			min	-.002	3	-.006	3	-.003	5	-1.443e-5	1	NC	1	NC	1
147		17	max	0	2	.003	2	0	9	1.235e-3	4	NC	1	NC	1
148			min	-.001	3	-.004	3	-.002	5	-1.537e-5	1	NC	1	NC	1
149		18	max	0	2	.001	2	0	9	1.258e-3	4	NC	1	NC	1
150			min	0	3	-.002	3	-.001	5	-1.632e-5	1	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.28e-3	4	NC	1	NC	1
152			min	0	1	0	1	0	1	-1.727e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	8.276e-6	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-6.117e-4	4	NC	1	NC	1
155		2	max	0	3	.001	2	.003	4	7.936e-6	1	NC	1	NC	1
156			min	0	2	-.002	3	0	1	-6.057e-4	4	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
157		3	max	0	3	.003	2	.006	4	7.596e-6	1	NC	1	NC	1
158			min	0	2	-.004	3	0	1	-5.997e-4	4	NC	1	NC	1
159		4	max	.001	3	.004	2	.009	4	7.257e-6	1	NC	1	NC	1
160			min	-.001	2	-.006	3	0	1	-5.938e-4	4	NC	1	NC	1
161		5	max	.002	3	.005	2	.012	4	6.917e-6	1	NC	1	NC	1
162			min	-.002	2	-.008	3	0	9	-5.878e-4	4	8951.288	2	NC	1
163		6	max	.002	3	.006	2	.015	4	2.816e-5	3	NC	1	NC	1
164			min	-.002	2	-.01	3	0	9	-5.818e-4	4	7159.011	2	NC	1
165		7	max	.002	3	.008	2	.018	4	5.578e-5	3	NC	1	NC	1
166			min	-.003	2	-.012	3	0	9	-5.759e-4	4	5933.53	2	NC	1
167		8	max	.003	3	.009	2	.021	4	8.339e-5	3	NC	1	NC	1
168			min	-.003	2	-.013	3	0	9	-5.699e-4	4	5035.642	2	NC	1
169		9	max	.003	3	.011	2	.024	4	1.11e-4	3	NC	3	NC	1
170			min	-.004	2	-.015	3	0	9	-5.639e-4	4	4346.106	2	NC	1
171		10	max	.003	3	.012	2	.026	4	1.386e-4	3	NC	3	NC	1
172			min	-.004	2	-.016	3	0	9	-5.58e-4	4	3798.756	2	NC	1
173		11	max	.004	3	.014	2	.029	4	1.662e-4	3	NC	3	NC	1
174			min	-.005	2	-.018	3	0	9	-5.52e-4	4	3353.8	2	NC	1
175		12	max	.004	3	.015	2	.031	4	1.939e-4	3	NC	3	NC	1
176			min	-.005	2	-.019	3	0	9	-5.46e-4	4	2985.72	2	NC	1
177		13	max	.005	3	.017	2	.034	4	2.215e-4	3	NC	3	NC	1
178			min	-.005	2	-.02	3	0	9	-5.401e-4	4	2677.265	2	NC	1
179		14	max	.005	3	.019	2	.036	4	2.491e-4	3	NC	3	NC	1
180			min	-.006	2	-.022	3	0	9	-5.341e-4	4	2416.248	2	NC	1
181		15	max	.005	3	.021	2	.038	4	2.767e-4	3	NC	3	NC	1
182			min	-.006	2	-.023	3	0	9	-5.281e-4	4	2193.739	2	NC	1
183		16	max	.006	3	.023	2	.04	4	3.043e-4	3	NC	3	NC	1
184			min	-.007	2	-.024	3	0	9	-5.222e-4	4	2002.998	2	NC	1
185		17	max	.006	3	.025	2	.042	4	3.32e-4	3	NC	3	NC	1
186			min	-.007	2	-.025	3	0	9	-5.162e-4	4	1838.811	2	NC	1
187		18	max	.007	3	.027	2	.044	4	3.596e-4	3	NC	3	NC	1
188			min	-.008	2	-.026	3	0	9	-5.102e-4	4	1697.074	2	NC	1
189		19	max	.007	3	.029	2	.046	4	3.872e-4	3	NC	3	NC	1
190			min	-.008	2	-.026	3	0	9	-5.043e-4	4	1574.505	2	NC	1
191	M8	1	max	.003	1	.038	2	0	9	3.387e-3	4	NC	1	NC	1
192			min	0	15	-.032	3	-.048	4	-2.809e-4	3	NC	1	402.966	4
193		2	max	.003	1	.036	2	0	9	3.387e-3	4	NC	1	NC	1
194			min	0	15	-.03	3	-.044	4	-2.809e-4	3	NC	1	439.228	4
195		3	max	.003	1	.034	2	0	9	3.387e-3	4	NC	1	NC	1
196			min	0	15	-.029	3	-.04	4	-2.809e-4	3	NC	1	482.381	4
197		4	max	.002	1	.032	2	0	9	3.387e-3	4	NC	1	NC	1
198			min	0	15	-.027	3	-.036	4	-2.809e-4	3	NC	1	534.239	4
199		5	max	.002	1	.03	2	0	9	3.387e-3	4	NC	1	NC	1
200			min	0	15	-.025	3	-.032	4	-2.809e-4	3	NC	1	597.274	4
201		6	max	.002	1	.028	2	0	9	3.387e-3	4	NC	1	NC	1
202			min	0	15	-.023	3	-.029	4	-2.809e-4	3	NC	1	674.924	4
203		7	max	.002	1	.026	2	0	9	3.387e-3	4	NC	1	NC	1
204			min	0	15	-.021	3	-.025	4	-2.809e-4	3	NC	1	772.082	4
205		8	max	.002	1	.023	2	0	9	3.387e-3	4	NC	1	NC	1
206			min	0	15	-.02	3	-.022	4	-2.809e-4	3	NC	1	895.917	4
207		9	max	.002	1	.021	2	0	9	3.387e-3	4	NC	1	NC	1
208			min	0	15	-.018	3	-.018	4	-2.809e-4	3	NC	1	1057.268	4
209		10	max	.001	1	.019	2	0	9	3.387e-3	4	NC	1	NC	1
210			min	0	15	-.016	3	-.015	4	-2.809e-4	3	NC	1	1273.174	4
211		11	max	.001	1	.017	2	0	9	3.387e-3	4	NC	1	NC	1
212			min	0	15	-.014	3	-.012	4	-2.809e-4	3	NC	1	1571.694	4
213		12	max	.001	1	.015	2	0	9	3.387e-3	4	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
214			min	0	15	-.013	3	-.01	4	-2.809e-4	3	NC	1	2001.77	4
215		13	max	0	1	.013	2	0	9	3.387e-3	4	NC	1	NC	1
216			min	0	15	-.011	3	-.007	4	-2.809e-4	3	NC	1	2655.2	4
217		14	max	0	1	.011	2	0	9	3.387e-3	4	NC	1	NC	1
218			min	0	15	-.009	3	-.005	4	-2.809e-4	3	NC	1	3721.318	4
219		15	max	0	1	.009	2	0	9	3.387e-3	4	NC	1	NC	1
220			min	0	15	-.007	3	-.003	4	-2.809e-4	3	NC	1	5644.908	4
221		16	max	0	1	.006	2	0	9	3.387e-3	4	NC	1	NC	1
222			min	0	15	-.005	3	-.002	4	-2.809e-4	3	NC	1	9690.298	4
223		17	max	0	1	.004	2	0	9	3.387e-3	4	NC	1	NC	1
224			min	0	15	-.004	3	0	4	-2.809e-4	3	NC	1	NC	1
225		18	max	0	1	.002	2	0	9	3.387e-3	4	NC	1	NC	1
226			min	0	15	-.002	3	0	4	-2.809e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	3.387e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-2.809e-4	3	NC	1	NC	1
229	M10	1	max	.002	2	.011	2	0	10	2.492e-4	1	NC	3	NC	1
230			min	-.003	3	-.011	3	-.005	4	-6.319e-4	3	3984.194	2	NC	1
231		2	max	.002	2	.01	2	0	10	2.372e-4	1	NC	3	NC	1
232			min	-.003	3	-.01	3	-.006	4	-6.091e-4	3	4359.417	2	NC	1
233		3	max	.002	2	.009	2	0	10	2.333e-4	4	NC	3	NC	1
234			min	-.002	3	-.01	3	-.006	4	-5.862e-4	3	4807.745	2	NC	1
235		4	max	.002	2	.008	2	0	3	2.845e-4	4	NC	1	NC	1
236			min	-.002	3	-.01	3	-.006	4	-5.634e-4	3	5347.144	2	NC	1
237		5	max	.002	2	.007	2	0	3	3.357e-4	4	NC	1	NC	1
238			min	-.002	3	-.009	3	-.006	4	-5.405e-4	3	6001.653	2	NC	1
239		6	max	.001	2	.006	2	0	3	3.869e-4	4	NC	1	NC	1
240			min	-.002	3	-.009	3	-.006	4	-5.177e-4	3	6803.96	2	NC	1
241		7	max	.001	2	.005	2	0	3	4.381e-4	4	NC	1	NC	1
242			min	-.002	3	-.008	3	-.006	4	-4.948e-4	3	7799.359	2	NC	1
243		8	max	.001	2	.005	2	0	3	4.893e-4	4	NC	1	NC	1
244			min	-.002	3	-.008	3	-.006	4	-4.72e-4	3	9052.013	2	NC	1
245		9	max	.001	2	.004	2	0	3	5.405e-4	4	NC	1	NC	1
246			min	-.002	3	-.007	3	-.006	4	-4.491e-4	3	NC	1	NC	1
247		10	max	.001	2	.003	2	0	3	5.917e-4	4	NC	1	NC	1
248			min	-.001	3	-.007	3	-.006	4	-4.263e-4	3	NC	1	NC	1
249		11	max	0	2	.003	2	0	3	6.428e-4	4	NC	1	NC	1
250			min	-.001	3	-.006	3	-.005	4	-4.034e-4	3	NC	1	NC	1
251		12	max	0	2	.002	2	0	3	6.94e-4	4	NC	1	NC	1
252			min	-.001	3	-.005	3	-.005	4	-3.806e-4	3	NC	1	NC	1
253		13	max	0	2	.002	2	0	3	7.452e-4	4	NC	1	NC	1
254			min	0	3	-.005	3	-.004	4	-3.577e-4	3	NC	1	NC	1
255		14	max	0	2	.001	2	0	3	7.964e-4	4	NC	1	NC	1
256			min	0	3	-.004	3	-.004	4	-3.349e-4	3	NC	1	NC	1
257		15	max	0	2	0	2	0	3	8.476e-4	4	NC	1	NC	1
258			min	0	3	-.003	3	-.003	4	-3.12e-4	3	NC	1	NC	1
259		16	max	0	2	0	2	0	3	8.988e-4	4	NC	1	NC	1
260			min	0	3	-.002	3	-.002	4	-2.892e-4	3	NC	1	NC	1
261		17	max	0	2	0	2	0	3	9.5e-4	4	NC	1	NC	1
262			min	0	3	-.002	3	-.002	4	-2.663e-4	3	NC	1	NC	1
263		18	max	0	2	0	2	0	3	1.001e-3	4	NC	1	NC	1
264			min	0	3	0	3	0	4	-2.435e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.052e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-2.206e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	1.057e-4	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-5.033e-4	4	NC	1	NC	1
269		2	max	0	3	0	2	.003	4	7.928e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-5.404e-4	4	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
271		3	max	0	3	0	2	.005	4	5.29e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-5.776e-4	4	NC	1	NC	1
273		4	max	0	3	0	2	.008	4	2.653e-5	3	NC	1	NC	1
274			min	0	2	-.003	3	-.001	3	-6.147e-4	4	NC	1	NC	1
275		5	max	0	3	0	2	.01	4	2.139e-6	10	NC	1	NC	1
276			min	0	2	-.004	3	-.002	3	-6.518e-4	4	NC	1	NC	1
277		6	max	0	3	0	2	.013	4	2.447e-6	10	NC	1	NC	1
278			min	0	2	-.005	3	-.002	3	-6.889e-4	4	NC	1	NC	1
279		7	max	0	3	0	2	.015	5	2.756e-6	10	NC	1	NC	1
280			min	0	2	-.005	3	-.002	3	-7.261e-4	4	NC	1	NC	1
281		8	max	0	3	0	2	.018	5	3.064e-6	10	NC	1	NC	1
282			min	-.001	2	-.006	3	-.003	3	-7.632e-4	4	NC	1	NC	1
283		9	max	.001	3	.001	2	.02	5	3.372e-6	10	NC	1	NC	1
284			min	-.001	2	-.007	3	-.003	3	-8.003e-4	4	NC	1	NC	1
285		10	max	.001	3	.002	2	.022	5	3.681e-6	10	NC	1	NC	1
286			min	-.001	2	-.007	3	-.003	3	-8.375e-4	4	NC	1	NC	1
287		11	max	.001	3	.002	2	.025	5	3.989e-6	10	NC	1	NC	1
288			min	-.001	2	-.008	3	-.003	3	-8.746e-4	4	NC	1	NC	1
289		12	max	.002	3	.003	2	.027	5	4.298e-6	10	NC	1	NC	1
290			min	-.002	2	-.008	3	-.003	3	-9.117e-4	4	NC	1	NC	1
291		13	max	.002	3	.004	2	.029	5	4.606e-6	10	NC	1	NC	1
292			min	-.002	2	-.008	3	-.003	3	-9.488e-4	4	NC	1	NC	1
293		14	max	.002	3	.004	2	.031	5	4.915e-6	10	NC	1	NC	1
294			min	-.002	2	-.009	3	-.003	3	-9.86e-4	4	NC	1	NC	1
295		15	max	.002	3	.005	2	.033	5	5.223e-6	10	NC	1	NC	1
296			min	-.002	2	-.009	3	-.003	3	-1.023e-3	4	8683.311	2	NC	1
297		16	max	.002	3	.006	2	.035	5	5.531e-6	10	NC	1	NC	1
298			min	-.002	2	-.009	3	-.003	3	-1.06e-3	4	7360.037	2	NC	1
299		17	max	.002	3	.007	2	.037	5	5.84e-6	10	NC	1	NC	1
300			min	-.002	2	-.009	3	-.003	3	-1.097e-3	4	6336.272	2	NC	1
301		18	max	.002	3	.008	2	.039	5	6.148e-6	10	NC	1	NC	1
302			min	-.002	2	-.009	3	-.003	3	-1.134e-3	4	5535.001	2	NC	1
303		19	max	.003	3	.009	2	.041	5	6.457e-6	10	NC	3	NC	1
304			min	-.003	2	-.009	3	-.003	3	-1.172e-3	4	4902.149	2	NC	1
305	M12	1	max	.001	1	.012	2	.002	1	4.008e-3	4	NC	1	NC	1
306			min	0	15	-.011	3	-.044	5	-8.66e-6	10	NC	1	436.842	5
307		2	max	.001	1	.012	2	.002	1	4.008e-3	4	NC	1	NC	1
308			min	0	15	-.01	3	-.041	5	-8.66e-6	10	NC	1	476.14	5
309		3	max	0	1	.011	2	.002	1	4.008e-3	4	NC	1	NC	1
310			min	0	15	-.01	3	-.037	5	-8.66e-6	10	NC	1	522.904	5
311		4	max	0	1	.01	2	.001	1	4.008e-3	4	NC	1	NC	1
312			min	0	15	-.009	3	-.033	5	-8.66e-6	10	NC	1	579.1	5
313		5	max	0	1	.01	2	.001	1	4.008e-3	4	NC	1	NC	1
314			min	0	15	-.009	3	-.03	5	-8.66e-6	10	NC	1	647.405	5
315		6	max	0	1	.009	2	.001	1	4.008e-3	4	NC	1	NC	1
316			min	0	15	-.008	3	-.026	5	-8.66e-6	10	NC	1	731.545	5
317		7	max	0	1	.008	2	.001	1	4.008e-3	4	NC	1	NC	1
318			min	0	15	-.007	3	-.023	5	-8.66e-6	10	NC	1	836.822	5
319		8	max	0	1	.008	2	0	1	4.008e-3	4	NC	1	NC	1
320			min	0	15	-.007	3	-.02	5	-8.66e-6	10	NC	1	971.002	5
321		9	max	0	1	.007	2	0	1	4.008e-3	4	NC	1	NC	1
322			min	0	15	-.006	3	-.017	5	-8.66e-6	10	NC	1	1145.827	5
323		10	max	0	1	.006	2	0	1	4.008e-3	4	NC	1	NC	1
324			min	0	15	-.006	3	-.014	5	-8.66e-6	10	NC	1	1379.757	5
325		11	max	0	1	.005	2	0	1	4.008e-3	4	NC	1	NC	1
326			min	0	15	-.005	3	-.011	5	-8.66e-6	10	NC	1	1703.192	5
327		12	max	0	1	.005	2	0	1	4.008e-3	4	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
328			min	0	15	-.004	3	-.009	5	-8.66e-6	10	NC	1	2169.151	5
329		13	max	0	1	.004	2	0	1	4.008e-3	4	NC	1	NC	1
330			min	0	15	-.004	3	-.007	5	-8.66e-6	10	NC	1	2877.081	5
331		14	max	0	1	.003	2	0	1	4.008e-3	4	NC	1	NC	1
332			min	0	15	-.003	3	-.005	5	-8.66e-6	10	NC	1	4032.093	5
333		15	max	0	1	.003	2	0	1	4.008e-3	4	NC	1	NC	1
334			min	0	15	-.002	3	-.003	5	-8.66e-6	10	NC	1	6116.019	5
335		16	max	0	1	.002	2	0	1	4.008e-3	4	NC	1	NC	1
336			min	0	15	-.002	3	-.002	5	-8.66e-6	10	NC	1	NC	1
337		17	max	0	1	.001	2	0	1	4.008e-3	4	NC	1	NC	1
338			min	0	15	-.001	3	0	5	-8.66e-6	10	NC	1	NC	1
339		18	max	0	1	0	2	0	1	4.008e-3	4	NC	1	NC	1
340			min	0	15	0	3	0	5	-8.66e-6	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	4.008e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	-8.66e-6	10	NC	1	NC	1
343	M1	1	max	.01	3	.027	3	.006	5	5.275e-3	2	NC	1	NC	1
344			min	-.01	2	-.022	2	0	9	-7.886e-3	3	NC	1	NC	1
345		2	max	.01	3	.016	3	.008	5	2.604e-3	2	NC	4	NC	1
346			min	-.01	2	-.013	2	-.002	9	-3.888e-3	3	5438.194	2	NC	1
347		3	max	.01	3	.007	3	.01	5	2.945e-4	5	NC	4	NC	1
348			min	-.01	2	-.005	2	-.002	9	-1.219e-4	1	2788.467	2	NC	1
349		4	max	.01	3	.002	2	.012	5	2.987e-4	5	NC	4	NC	1
350			min	-.01	2	-.002	3	-.002	9	-1.022e-4	1	1903.094	3	8215.359	5
351		5	max	.009	3	.009	2	.014	5	3.03e-4	5	NC	4	NC	1
352			min	-.01	2	-.008	3	-.003	9	-8.255e-5	1	1487.615	3	5812.863	5
353		6	max	.009	3	.014	2	.017	5	3.073e-4	5	NC	4	NC	1
354			min	-.01	2	-.014	3	-.002	9	-6.624e-5	9	1264.096	3	4426.529	5
355		7	max	.009	3	.019	2	.02	5	3.115e-4	5	NC	4	NC	1
356			min	-.01	2	-.018	3	-.002	9	-5.041e-5	9	1133.226	3	3538.262	5
357		8	max	.009	3	.022	2	.022	5	3.158e-4	5	NC	4	NC	1
358			min	-.01	2	-.021	3	-.002	9	-3.459e-5	9	1056.358	3	2928.571	5
359		9	max	.009	3	.024	2	.025	5	3.2e-4	5	NC	4	NC	1
360			min	-.01	2	-.023	3	-.001	9	-1.877e-5	9	1016.174	3	2489.212	5
361		10	max	.009	3	.025	2	.028	5	3.259e-4	4	NC	4	NC	1
362			min	-.01	2	-.024	3	0	9	-2.941e-6	9	1004.908	3	2145.273	4
363		11	max	.009	3	.025	2	.031	4	3.358e-4	4	NC	4	NC	1
364			min	-.01	2	-.023	3	0	9	-1.193e-6	10	1012.19	2	1881.016	4
365		12	max	.009	3	.023	2	.034	4	3.457e-4	4	NC	4	NC	1
366			min	-.01	2	-.021	3	0	10	-2.224e-6	10	1049.831	2	1677.075	4
367		13	max	.009	3	.02	2	.037	4	3.555e-4	4	NC	4	NC	1
368			min	-.01	2	-.018	3	0	10	-3.255e-6	10	1127.022	2	1517.07	4
369		14	max	.009	3	.015	2	.04	4	3.654e-4	4	NC	4	NC	1
370			min	-.01	2	-.014	3	0	10	-4.286e-6	10	1264.43	2	1390.065	4
371		15	max	.009	3	.009	2	.042	4	3.753e-4	4	NC	4	NC	1
372			min	-.01	2	-.008	3	0	10	-5.317e-6	10	1497.294	3	1288.551	4
373		16	max	.009	3	.002	2	.045	4	5.592e-4	4	NC	4	NC	1
374			min	-.01	2	-.002	3	0	10	-6.072e-6	10	1891.473	3	1207.25	4
375		17	max	.009	3	.006	3	.047	4	4.886e-3	4	NC	4	NC	1
376			min	-.01	2	-.008	2	0	10	-1.995e-5	9	2744.708	3	1142.483	4
377		18	max	.009	3	.014	3	.049	4	3.921e-3	2	NC	1	NC	1
378			min	-.01	2	-.018	2	0	10	-2.191e-3	3	5382.11	3	1091.353	4
379		19	max	.009	3	.023	3	.051	4	7.913e-3	2	NC	1	NC	1
380			min	-.01	2	-.03	2	0	9	-4.513e-3	3	5767.669	2	1053.133	4
381	M5	1	max	.028	3	.081	3	.006	5	2.129e-5	4	NC	1	NC	1
382			min	-.03	2	-.067	2	0	9	0	1	3923.823	3	NC	1
383		2	max	.028	3	.049	3	.008	5	1.633e-4	3	NC	4	NC	1
384			min	-.03	2	-.04	2	0	9	-1.157e-5	9	1751.394	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
385		3	max	.028	3	.019	3	.01	5	3.108e-4	3	NC	5	NC	1
386			min	-.03	2	-.015	2	0	9	-2.305e-5	9	897.773	2	NC	1
387		4	max	.028	3	.008	2	.012	5	2.981e-4	3	NC	5	NC	1
388			min	-.03	2	-.006	3	0	9	-2.199e-5	9	626.075	3	NC	1
389		5	max	.028	3	.028	2	.015	5	2.925e-4	5	NC	5	NC	1
390			min	-.03	2	-.027	3	0	9	-2.094e-5	9	489.08	3	8415.383	3
391		6	max	.028	3	.044	2	.018	5	3.045e-4	5	NC	5	NC	1
392			min	-.03	2	-.044	3	0	9	-1.988e-5	9	415.739	3	7602.045	3
393		7	max	.027	3	.058	2	.02	5	3.166e-4	5	NC	5	NC	1
394			min	-.03	2	-.057	3	0	9	-1.882e-5	9	372.995	3	7232.069	3
395		8	max	.027	3	.068	2	.024	5	3.286e-4	5	NC	5	NC	1
396			min	-.03	2	-.066	3	0	9	-1.777e-5	9	346.169	2	7158.122	3
397		9	max	.027	3	.075	2	.027	5	3.406e-4	5	NC	5	NC	1
398			min	-.03	2	-.071	3	0	9	-1.671e-5	9	329.824	2	7325.372	3
399		10	max	.027	3	.078	2	.03	5	3.527e-4	5	NC	5	NC	1
400			min	-.03	2	-.072	3	0	9	-1.566e-5	9	323.129	2	7728.738	3
401		11	max	.027	3	.077	2	.033	5	3.647e-4	5	NC	5	NC	1
402			min	-.03	2	-.07	3	0	9	-1.46e-5	9	325.411	2	8402.612	3
403		12	max	.027	3	.072	2	.036	4	3.767e-4	5	NC	5	NC	1
404			min	-.03	2	-.064	3	0	9	-1.355e-5	9	337.542	2	9428.178	3
405		13	max	.027	3	.062	2	.039	4	3.887e-4	5	NC	5	NC	1
406			min	-.03	2	-.054	3	0	9	-1.249e-5	9	362.422	2	NC	1
407		14	max	.027	3	.048	2	.041	4	4.008e-4	5	NC	5	NC	1
408			min	-.03	2	-.041	3	0	9	-1.143e-5	9	406.725	2	NC	1
409		15	max	.027	3	.029	2	.044	4	4.129e-4	4	NC	5	NC	1
410			min	-.03	2	-.025	3	0	9	-1.038e-5	9	486.211	2	NC	1
411		16	max	.027	3	.005	2	.046	4	5.974e-4	4	NC	5	NC	1
412			min	-.03	2	-.005	3	0	9	-1.028e-5	9	628.982	3	NC	1
413		17	max	.027	3	.018	3	.048	4	4.874e-3	4	NC	5	NC	1
414			min	-.03	2	-.024	2	0	9	-3.304e-5	9	912.378	3	NC	1
415		18	max	.027	3	.043	3	.05	4	2.503e-3	4	NC	4	NC	1
416			min	-.03	2	-.057	2	0	9	-1.692e-5	9	1789.121	3	NC	1
417		19	max	.027	3	.069	3	.051	4	5.986e-6	5	NC	3	NC	1
418			min	-.03	2	-.093	2	0	9	-2.27e-6	3	1838.031	2	NC	1
419	M9	1	max	.01	3	.026	3	.006	5	7.912e-3	3	NC	1	NC	1
420			min	-.01	2	-.022	2	0	9	-5.275e-3	2	NC	1	NC	1
421		2	max	.01	3	.015	3	.005	4	3.872e-3	3	NC	4	NC	1
422			min	-.01	2	-.013	2	0	10	-2.604e-3	2	5438.719	2	NC	1
423		3	max	.01	3	.006	3	.005	4	1.022e-4	1	NC	4	NC	1
424			min	-.01	2	-.005	2	0	10	-9.266e-5	3	2659.661	3	NC	1
425		4	max	.01	3	.002	2	.006	4	8.363e-5	1	NC	4	NC	1
426			min	-.01	2	-.002	3	-.001	3	-9.45e-5	3	1820.564	3	NC	1
427		5	max	.01	3	.009	2	.007	4	6.504e-5	1	NC	4	NC	1
428			min	-.01	2	-.009	3	-.002	3	-9.633e-5	3	1440.087	3	8284.666	3
429		6	max	.01	3	.014	2	.009	4	4.646e-5	1	NC	4	NC	1
430			min	-.01	2	-.015	3	-.003	3	-9.816e-5	3	1232.044	3	7197.453	3
431		7	max	.009	3	.019	2	.011	4	2.788e-5	1	NC	4	NC	1
432			min	-.01	2	-.019	3	-.004	3	-9.999e-5	3	1109.342	3	6568.231	3
433		8	max	.009	3	.022	2	.013	4	1.736e-5	4	NC	4	NC	1
434			min	-.01	2	-.022	3	-.005	3	-1.018e-4	3	1037.253	3	5883.87	4
435		9	max	.009	3	.024	2	.016	4	3.236e-5	5	NC	4	NC	1
436			min	-.01	2	-.024	3	-.005	3	-1.037e-4	3	1000.03	3	4376.303	4
437		10	max	.009	3	.025	2	.019	5	4.756e-5	5	NC	4	NC	1
438			min	-.01	2	-.024	3	-.005	3	-1.055e-4	3	990.628	3	3416.581	4
439		11	max	.009	3	.025	2	.023	5	6.277e-5	5	NC	4	NC	1
440			min	-.01	2	-.023	3	-.005	3	-1.073e-4	3	1007.118	3	2766.244	4
441		12	max	.009	3	.023	2	.026	5	7.797e-5	5	NC	4	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
442			min	-.01	2	-.021	3	-.005	3	-1.092e-4	3	1049.887	2	2294.006	5
443		13	max	.009	3	.02	2	.03	5	9.318e-5	5	NC	4	NC	1
444			min	-.01	2	-.018	3	-.005	3	-1.11e-4	3	1127.04	2	1947.731	5
445		14	max	.009	3	.015	2	.034	5	1.084e-4	5	NC	4	NC	1
446			min	-.01	2	-.014	3	-.004	3	-1.128e-4	3	1264.041	3	1689.915	5
447		15	max	.009	3	.009	2	.037	5	1.236e-4	5	NC	4	NC	1
448			min	-.01	2	-.008	3	-.003	3	-1.208e-4	1	1482.747	3	1493.266	5
449		16	max	.009	3	.002	2	.041	5	3.249e-4	5	NC	4	NC	1
450			min	-.01	2	-.002	3	-.003	3	-1.342e-4	1	1873.968	3	1340.496	5
451		17	max	.009	3	.006	3	.044	5	4.964e-3	4	NC	4	NC	1
452			min	-.01	2	-.008	2	-.002	1	-4.601e-5	9	2720.169	3	1220.116	5
453		18	max	.009	3	.014	3	.047	5	2.468e-3	5	NC	1	NC	1
454			min	-.01	2	-.018	2	-.001	9	-3.921e-3	2	5334.938	3	1121.644	4
455		19	max	.009	3	.023	3	.051	4	4.508e-3	3	NC	1	NC	1
456			min	-.01	2	-.03	2	0	9	-7.913e-3	2	5782.938	2	1038.601	4
457	M13	1	max	0	9	.026	3	.01	3	3.897e-3	3	NC	1	NC	1
458			min	-.006	5	-.022	2	-.01	2	-3.274e-3	2	NC	1	NC	1
459		2	max	0	9	.064	3	.008	3	4.806e-3	3	NC	4	NC	1
460			min	-.006	5	-.047	2	-.009	2	-4.04e-3	2	2351.071	3	NC	1
461		3	max	0	9	.096	3	.008	3	5.715e-3	3	NC	4	NC	1
462			min	-.006	5	-.069	2	-.009	2	-4.806e-3	2	1271.335	3	NC	1
463		4	max	0	9	.119	3	.009	9	6.625e-3	3	NC	4	NC	2
464			min	-.006	5	-.085	2	-.01	2	-5.572e-3	2	961.715	3	8259.21	1
465		5	max	0	9	.13	3	.012	3	7.534e-3	3	NC	4	NC	2
466			min	-.006	5	-.094	2	-.012	2	-6.337e-3	2	859.711	3	8078.147	1
467		6	max	0	9	.13	3	.015	3	8.443e-3	3	NC	4	NC	1
468			min	-.006	5	-.095	2	-.016	2	-7.103e-3	2	864.396	3	9505.493	9
469		7	max	0	9	.12	3	.018	3	9.352e-3	3	NC	4	NC	1
470			min	-.006	5	-.09	2	-.02	2	-7.869e-3	2	958.659	3	8664.536	2
471		8	max	0	9	.104	3	.022	3	1.026e-2	3	NC	4	NC	1
472			min	-.006	5	-.081	2	-.025	2	-8.635e-3	2	1154.48	3	6025.204	2
473		9	max	0	9	.088	3	.025	3	1.117e-2	3	NC	4	NC	4
474			min	-.006	5	-.071	2	-.028	2	-9.4e-3	2	1444.265	3	4818.149	2
475		10	max	0	9	.081	3	.028	3	1.208e-2	3	NC	4	NC	4
476			min	-.006	5	-.067	2	-.03	2	-1.017e-2	2	1639.106	3	4436.965	2
477		11	max	0	9	.088	3	.03	3	1.117e-2	3	NC	4	NC	4
478			min	-.006	5	-.071	2	-.028	2	-9.4e-3	2	1444.263	3	4479.996	3
479		12	max	0	9	.104	3	.03	3	1.027e-2	3	NC	4	NC	1
480			min	-.006	5	-.081	2	-.025	2	-8.635e-3	2	1154.478	3	4423.206	3
481		13	max	0	9	.12	3	.029	3	9.362e-3	3	NC	4	NC	1
482			min	-.006	5	-.09	2	-.02	2	-7.869e-3	2	958.658	3	4692.611	3
483		14	max	0	9	.13	3	.026	3	8.457e-3	3	NC	4	NC	1
484			min	-.006	5	-.095	2	-.016	2	-7.103e-3	2	864.395	3	5344.838	3
485		15	max	0	9	.131	3	.023	3	7.551e-3	3	NC	4	NC	2
486			min	-.006	5	-.094	2	-.012	2	-6.338e-3	2	859.71	3	6602.73	3
487		16	max	0	9	.12	3	.019	3	6.645e-3	3	NC	4	NC	2
488			min	-.006	5	-.085	2	-.01	2	-5.572e-3	2	961.714	3	8260.05	1
489		17	max	0	9	.097	3	.016	3	5.739e-3	3	NC	4	NC	1
490			min	-.006	5	-.069	2	-.009	2	-4.806e-3	2	1271.333	3	NC	1
491		18	max	0	9	.065	3	.012	3	4.833e-3	3	NC	4	NC	1
492			min	-.006	5	-.047	2	-.009	2	-4.04e-3	2	2351.068	3	NC	1
493		19	max	0	9	.027	3	.01	3	3.928e-3	3	NC	1	NC	1
494			min	-.006	5	-.022	2	-.01	2	-3.275e-3	2	NC	1	NC	1
495	M16	1	max	0	9	.023	3	.009	3	4.321e-3	2	NC	1	NC	1
496			min	-.051	4	-.03	2	-.01	2	-3.346e-3	3	NC	1	NC	1
497		2	max	0	9	.045	3	.012	3	5.335e-3	2	NC	4	NC	1
498			min	-.051	4	-.068	2	-.009	2	-4.082e-3	3	2344.07	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
499		3	max	0	9	.064	3	.015	3	6.349e-3	2	NC	4	NC	1
500			min	-.051	4	-.101	2	-.009	2	-4.819e-3	3	1263.76	2	NC	1
501		4	max	0	9	.078	3	.019	3	7.363e-3	2	NC	4	NC	2
502			min	-.051	4	-.124	2	-.01	2	-5.555e-3	3	951.038	2	8292.942	1
503		5	max	0	9	.086	3	.022	3	8.378e-3	2	NC	4	NC	2
504			min	-.051	4	-.136	2	-.012	2	-6.291e-3	3	843.336	2	7140.049	3
505		6	max	0	9	.088	3	.024	3	9.392e-3	2	NC	4	NC	1
506			min	-.051	4	-.137	2	-.015	2	-7.028e-3	3	837.625	2	5922.339	3
507		7	max	0	9	.085	3	.026	3	1.041e-2	2	NC	4	NC	1
508			min	-.051	4	-.128	2	-.02	2	-7.764e-3	3	911.921	2	5264.72	3
509		8	max	0	9	.079	3	.027	3	1.142e-2	2	NC	4	NC	1
510			min	-.051	4	-.114	2	-.024	2	-8.5e-3	3	1068.429	2	4957.616	3
511		9	max	0	9	.072	3	.027	3	1.243e-2	2	NC	4	NC	4
512			min	-.051	4	-.1	2	-.028	2	-9.237e-3	3	1290.199	2	4855.378	2
513		10	max	0	9	.069	3	.027	3	1.345e-2	2	NC	4	NC	4
514			min	-.051	4	-.093	2	-.03	2	-9.973e-3	3	1432.247	2	4469.429	2
515		11	max	0	9	.072	3	.025	3	1.243e-2	2	NC	4	NC	4
516			min	-.051	4	-.1	2	-.028	2	-9.233e-3	3	1290.199	2	4855.383	2
517		12	max	0	9	.079	3	.023	3	1.142e-2	2	NC	4	NC	1
518			min	-.051	4	-.114	2	-.024	2	-8.494e-3	3	1068.429	2	6078.98	2
519		13	max	0	9	.085	3	.021	3	1.041e-2	2	NC	4	NC	1
520			min	-.051	4	-.128	2	-.02	2	-7.754e-3	3	911.921	2	7298.586	3
521		14	max	0	9	.088	3	.019	3	9.393e-3	2	NC	4	NC	1
522			min	-.051	4	-.137	2	-.015	2	-7.015e-3	3	837.625	2	8876.835	3
523		15	max	0	9	.086	3	.017	3	8.379e-3	2	NC	4	NC	2
524			min	-.051	4	-.136	2	-.012	2	-6.275e-3	3	843.336	2	8119.661	1
525		16	max	0	9	.078	3	.015	3	7.365e-3	2	NC	4	NC	2
526			min	-.051	4	-.124	2	-.01	2	-5.535e-3	3	951.038	2	8298.107	1
527		17	max	0	9	.064	3	.012	3	6.351e-3	2	NC	4	NC	1
528			min	-.051	4	-.101	2	-.009	2	-4.796e-3	3	1263.76	2	NC	1
529		18	max	0	9	.045	3	.01	3	5.337e-3	2	NC	4	NC	1
530			min	-.051	4	-.068	2	-.009	2	-4.056e-3	3	2344.07	2	NC	1
531		19	max	0	9	.023	3	.009	3	4.323e-3	2	NC	1	NC	1
532			min	-.051	4	-.03	2	-.01	2	-3.316e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	4.164e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-6.464e-4	5	NC	1	NC	1
535		2	max	0	3	0	5	.004	4	7.958e-4	3	NC	1	NC	1
536			min	0	4	-.002	1	0	3	-6.52e-4	5	NC	1	NC	1
537		3	max	0	3	.002	5	.01	4	1.175e-3	3	NC	1	NC	1
538			min	0	4	-.003	1	-.003	3	-7.789e-4	2	NC	1	6562.912	4
539		4	max	0	3	.002	5	.015	4	1.555e-3	3	NC	1	NC	9
540			min	-.001	4	-.005	1	-.007	3	-1.148e-3	2	NC	1	4077.269	4
541		5	max	0	3	.003	5	.021	4	1.934e-3	3	NC	3	NC	9
542			min	-.002	4	-.006	1	-.012	3	-1.516e-3	2	8320.216	2	2972.928	4
543		6	max	0	3	.004	5	.026	4	2.313e-3	3	NC	4	NC	9
544			min	-.002	4	-.008	1	-.017	3	-1.885e-3	2	7002.341	2	2317.661	3
545		7	max	0	3	.004	5	.03	4	2.693e-3	3	NC	4	9358.079	9
546			min	-.003	4	-.009	9	-.022	3	-2.254e-3	2	6209.813	2	1815.668	3
547		8	max	0	3	.005	5	.033	4	3.072e-3	3	NC	4	7853.987	9
548			min	-.003	4	-.009	9	-.028	3	-2.623e-3	2	5734.178	2	1499.492	3
549		9	max	0	3	.006	5	.035	4	3.452e-3	3	NC	5	6857.006	9
550			min	-.003	4	-.01	9	-.032	3	-2.992e-3	2	5478.162	2	1292.335	3
551		10	max	.001	3	.006	5	.035	4	3.831e-3	3	NC	5	6196.543	9
552			min	-.004	4	-.01	9	-.036	3	-3.36e-3	2	5397.171	2	1155.541	3
553		11	max	.001	3	.006	5	.033	4	4.21e-3	3	NC	5	5782.363	9
554			min	-.004	4	-.01	9	-.039	3	-3.729e-3	2	5478.162	2	1068.799	3
555		12	max	.001	3	.006	5	.03	4	4.59e-3	3	NC	4	5571.094	9

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
556			min	-.005	4	-.009	9	-.039	3	-4.098e-3	2	5734.178	2	1022.049	3
557		13	max	.001	3	.007	5	.029	2	4.969e-3	3	NC	4	5554.359	9
558			min	-.005	4	-.009	9	-.038	3	-4.467e-3	2	6209.813	2	1012.434	3
559		14	max	.002	3	.007	5	.025	2	5.349e-3	3	NC	4	5762.168	9
560			min	-.006	4	-.008	9	-.034	3	-4.835e-3	2	7002.341	2	1044.456	3
561		15	max	.002	3	.007	5	.02	2	5.728e-3	3	NC	3	8112.372	15
562			min	-.006	4	-.007	9	-.027	3	-5.204e-3	2	8320.216	2	1134.416	3
563		16	max	.002	3	.007	5	.013	1	6.107e-3	3	NC	1	NC	13
564			min	-.006	4	-.006	3	-.018	3	-5.573e-3	2	NC	1	1326.483	3
565		17	max	.002	3	.006	5	.006	4	6.487e-3	3	NC	1	NC	4
566			min	-.007	4	-.004	3	-.004	3	-5.942e-3	2	NC	1	1759.154	3
567		18	max	.002	3	.007	2	.013	3	6.866e-3	3	NC	1	NC	4
568			min	-.007	4	-.003	3	-.014	2	-6.311e-3	2	NC	1	3132.962	3
569		19	max	.002	3	.01	2	.035	3	7.246e-3	3	NC	1	NC	1
570			min	-.008	4	-.002	3	-.032	2	-6.679e-3	2	NC	1	NC	1
571	M16A	1	max	.001	2	.003	2	.011	3	2.03e-3	3	NC	1	NC	1
572			min	-.003	4	-.004	4	-.01	2	-2.122e-3	2	NC	1	NC	1
573		2	max	.001	2	0	2	.003	3	1.958e-3	3	NC	1	NC	1
574			min	-.003	4	-.008	4	-.005	2	-2.026e-3	2	NC	1	8722.988	3
575		3	max	.001	2	-.001	2	.002	1	1.887e-3	3	NC	1	NC	4
576			min	-.003	4	-.012	4	-.007	5	-1.93e-3	2	7786.01	4	4943.826	3
577		4	max	0	2	-.003	10	.005	1	1.815e-3	3	NC	1	NC	9
578			min	-.002	4	-.015	4	-.011	5	-1.833e-3	2	5341.658	4	3767.42	3
579		5	max	0	2	-.005	10	.007	1	1.743e-3	3	NC	3	NC	9
580			min	-.002	4	-.018	4	-.017	5	-1.737e-3	2	4168.15	4	3260.963	3
581		6	max	0	2	-.006	12	.008	1	1.672e-3	3	NC	12	NC	9
582			min	-.002	4	-.021	4	-.022	5	-1.641e-3	2	3507.938	4	3044.322	3
583		7	max	0	2	-.006	12	.009	1	1.6e-3	3	NC	12	NC	9
584			min	-.002	4	-.023	4	-.027	5	-1.544e-3	2	3110.909	4	2448.739	5
585		8	max	0	2	-.006	12	.009	1	1.528e-3	3	NC	12	NC	9
586			min	-.002	4	-.024	4	-.031	5	-1.448e-3	2	2872.631	4	2104.485	5
587		9	max	0	2	-.007	12	.008	1	1.457e-3	3	NC	12	NC	9
588			min	-.002	4	-.025	4	-.034	5	-1.352e-3	2	2744.376	4	1911.895	5
589		10	max	0	2	-.007	12	.008	1	1.385e-3	3	NC	12	NC	9
590			min	-.001	4	-.025	4	-.035	5	-1.255e-3	2	2703.802	4	1822.895	5
591		11	max	0	2	-.006	12	.007	1	1.313e-3	3	NC	12	NC	9
592			min	-.001	4	-.024	4	-.035	5	-1.159e-3	2	2744.376	4	1818.244	5
593		12	max	0	2	-.006	12	.005	1	1.242e-3	3	NC	12	NC	9
594			min	-.001	4	-.023	4	-.034	5	-1.063e-3	2	2872.631	4	1897.407	5
595		13	max	0	2	-.006	12	.004	1	1.17e-3	3	NC	12	NC	1
596			min	0	4	-.021	4	-.031	5	-9.663e-4	2	3110.909	4	2078.521	5
597		14	max	0	2	-.005	12	.003	1	1.098e-3	3	NC	12	NC	1
598			min	0	4	-.019	4	-.026	5	-8.7e-4	2	3507.938	4	2408.648	5
599		15	max	0	2	-.004	12	.002	1	1.027e-3	3	NC	3	NC	1
600			min	0	4	-.016	4	-.021	5	-7.736e-4	2	4168.15	4	2996.15	5
601		16	max	0	2	-.003	12	.001	9	9.551e-4	3	NC	1	NC	1
602			min	0	4	-.012	4	-.015	5	-6.773e-4	2	5341.658	4	4114.874	5
603		17	max	0	2	-.002	12	0	9	8.851e-4	4	NC	1	NC	1
604			min	0	4	-.008	4	-.01	5	-5.81e-4	2	7786.01	4	6636.871	5
605		18	max	0	2	-.001	12	0	3	9.478e-4	4	NC	1	NC	1
606			min	0	4	-.004	4	-.004	5	-4.847e-4	2	NC	1	NC	1
607		19	max	0	1	0	1	0	1	1.011e-3	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-3.883e-4	2	NC	1	NC	1

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

Anchor Designer™ Software
Version 2.4.5673.0

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

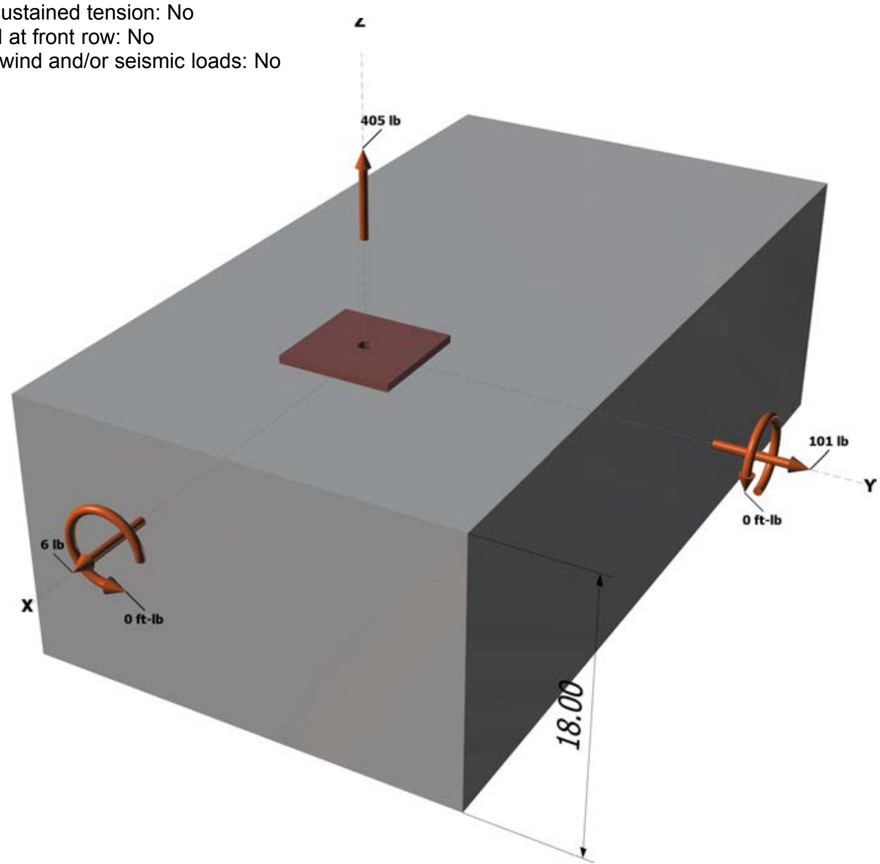
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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



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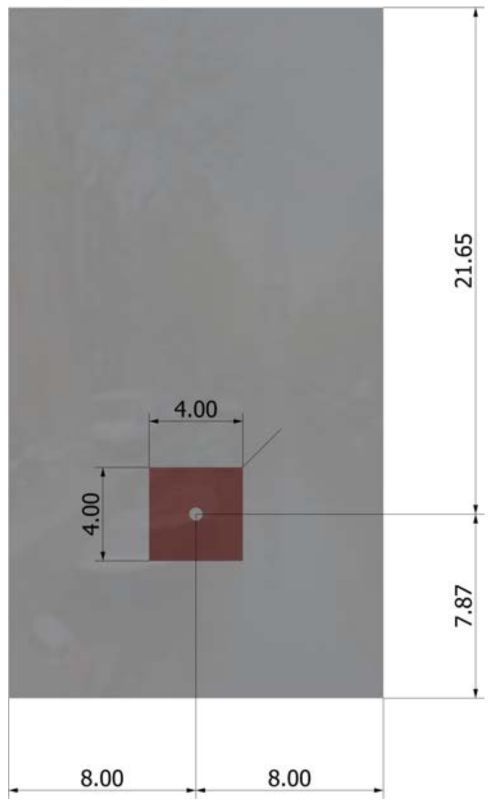


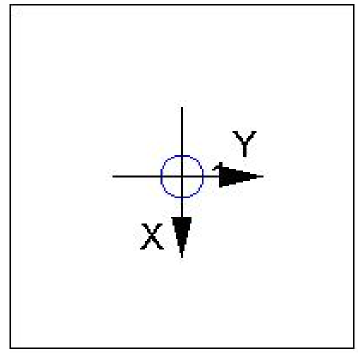
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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)

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

$\tau_{k,cr}$ (psi)	$f_{short-term}$	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)

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

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ	ϕV_{cp} (lb)
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.

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

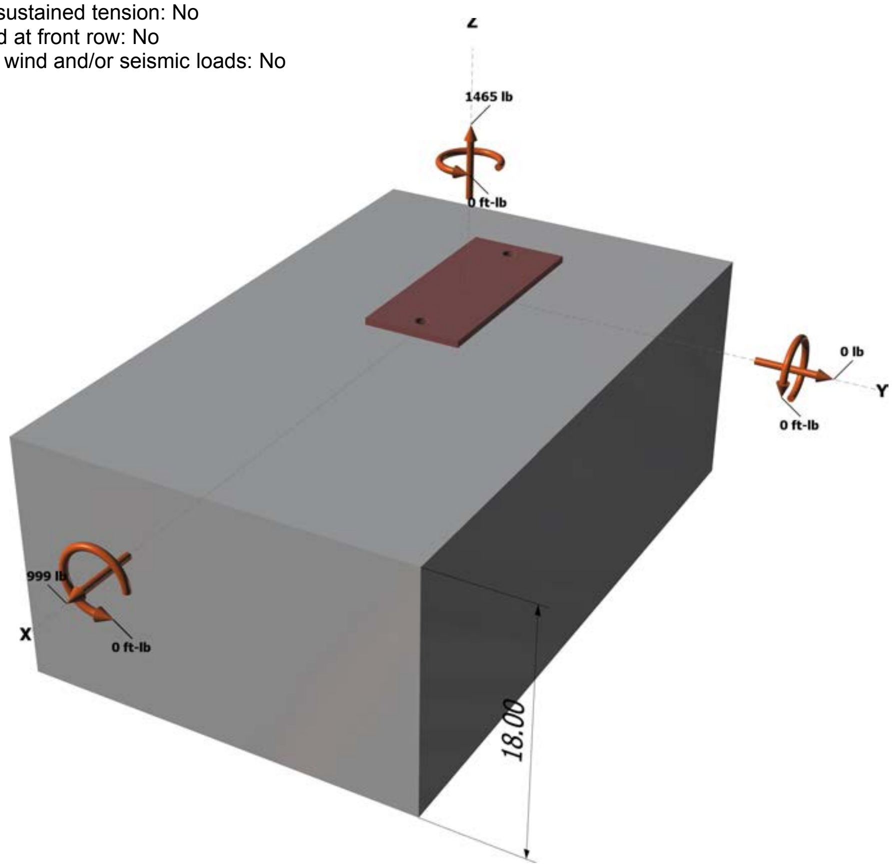
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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 Plate
Length x Width x Thickness (inch): 9.00 x 4.00 x 0.28

<Figure 1>



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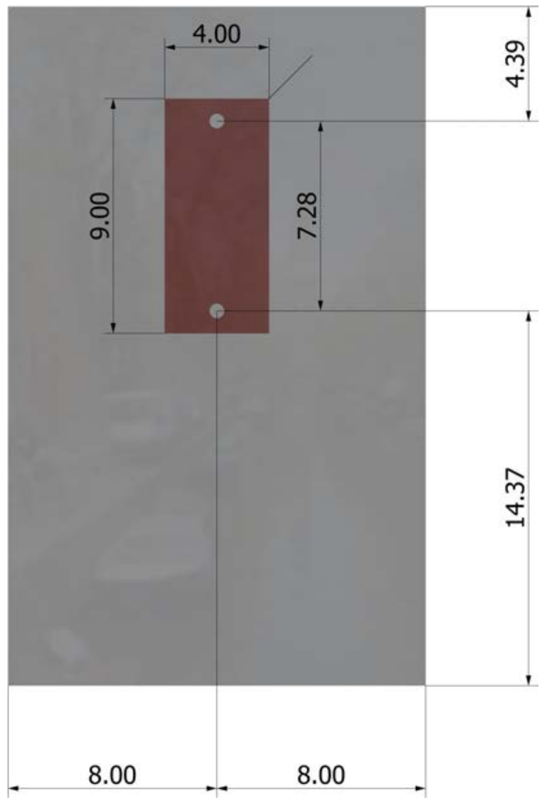


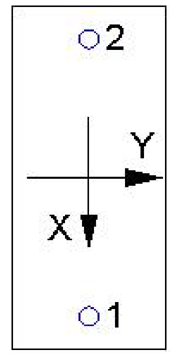
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

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.