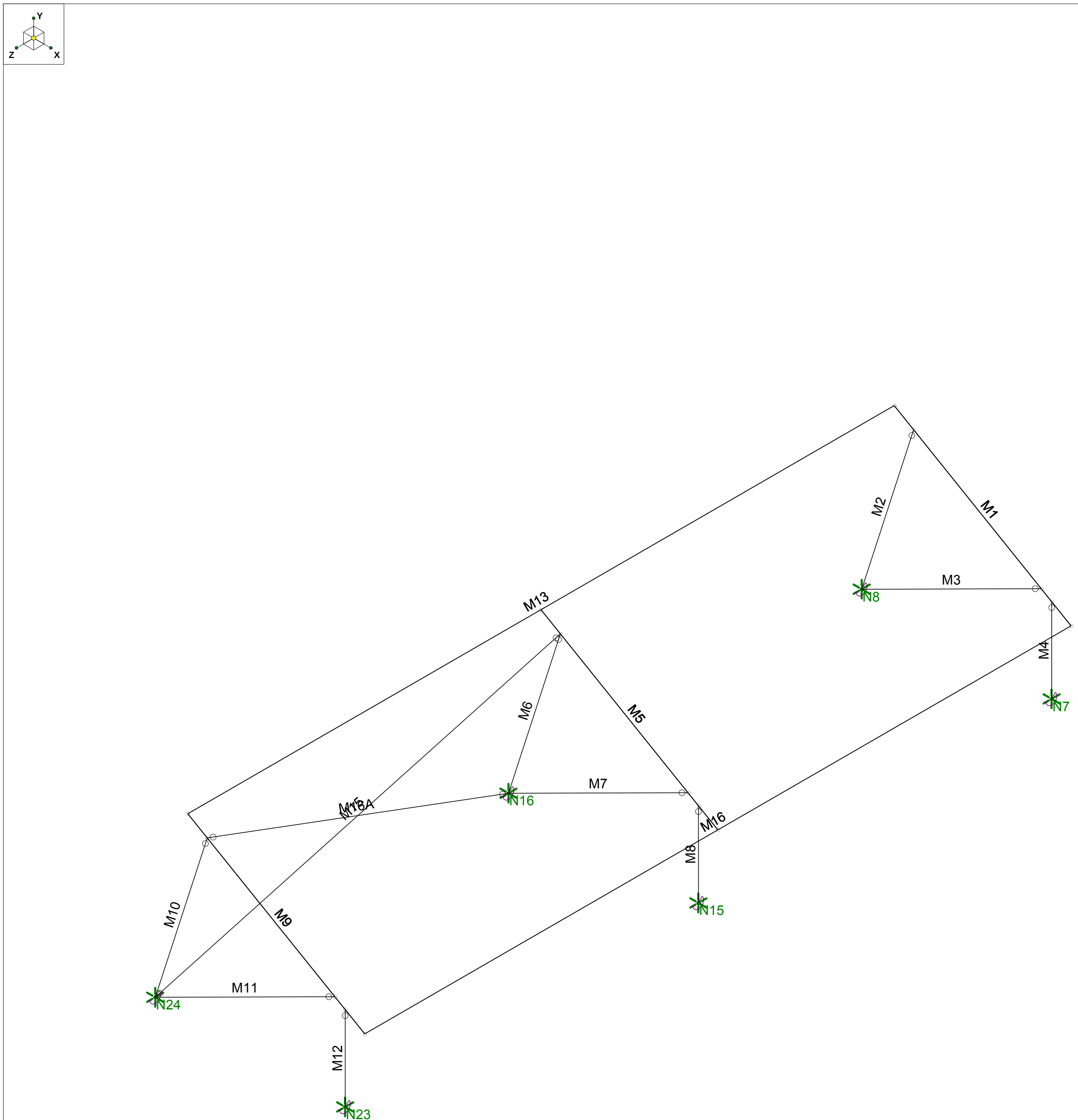


Schletter, Inc.		30° Tilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

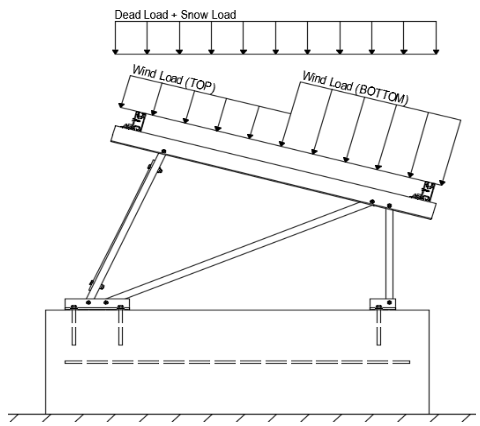
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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 = 30°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes
- ASCE 7-05 - Chapter 6, Wind Loads
- ASCE 7-05 - Chapter 7, Snow Loads
- ASCE 7-05 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2003, 2006, 2009
- Aluminum Design Manual, Eighth Edition, 2005

2. LOAD ACTIONS

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

Self-weight of the PV modules.

2.2 Snow Loads
Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 16.49 psf *(ASCE 7-05, Eq. 7-2)*
I_s = 1.00
C_s = 0.73
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 90 mph
Height ≤ 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 12.72 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$ =	1.15	(Pressure)
$Cf+_{BOTTOM}$ =	1.85	
$Cf-_{TOP}$ =	-2.3	(Suction)
$Cf-_{BOTTOM}$ =	-1.1	

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
1.2D + 1.6W + 0.5S
0.9D + 1.6W [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 + 1.0W
1.0D + 0.75L + 0.75W + 0.75S
0.6D + 1.0W [M]
1.238D + 0.875E [O]
1.1785D + 0.65625E + 0.75S [O]
0.362D + 0.875E [O]

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

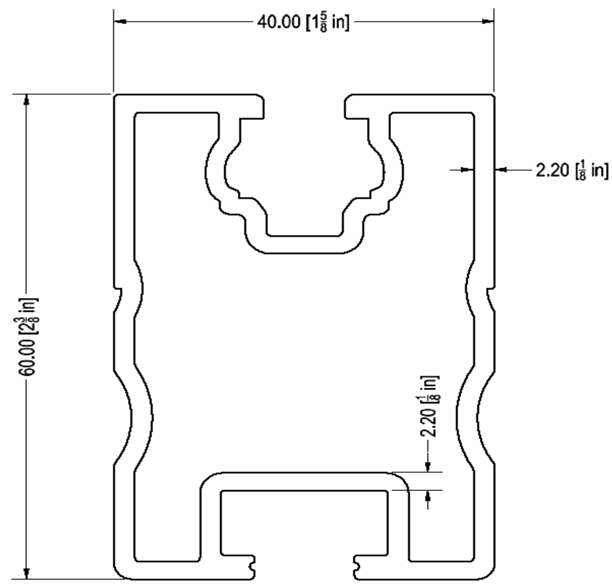
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

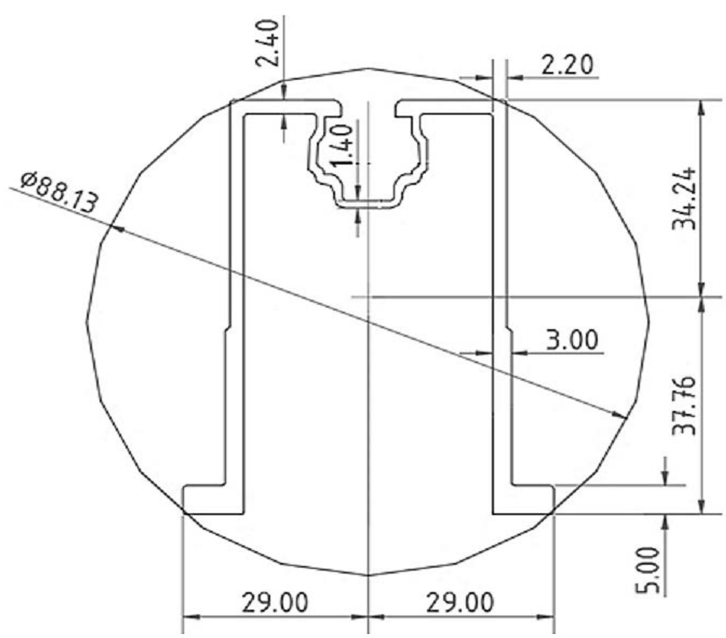
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	87	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.45	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.814	k-ft
M_z =	0.205	k-ft
$M_{y\ allowable}$ =	1.211	k-ft
$M_{z\ allowable}$ =	0.871	k-ft
Utilization =	91%	



4.2 Girder Design

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

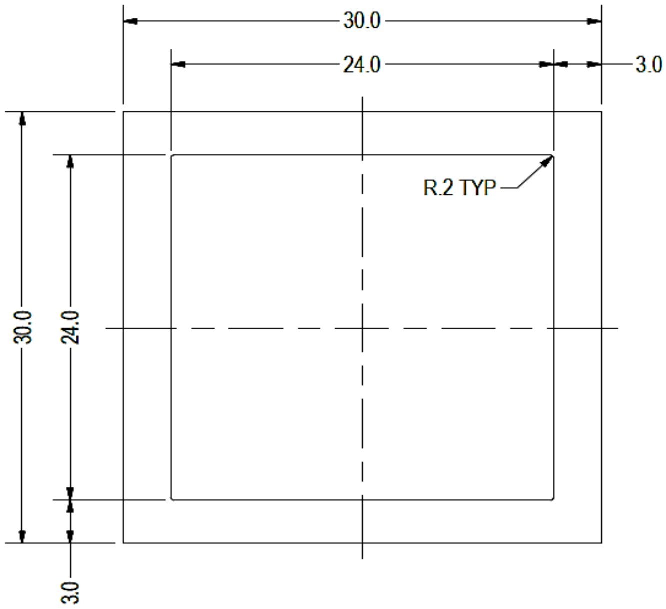
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.65	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.620	k-ft
M_z =	0.000	k-ft
P_n =	0.317	k
$M_{y\ allowable}$ =	1.455	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	45%	



4.3 Front Strut Design

The front aluminum strut connects a portion of the girder to the foundation. Vertical girder forces are then transferred down through the strut into the foundation. The strut is attached with single M8 bolts at each end. See Appendix A.3 for detailed member calculations. Section units are in (mm).

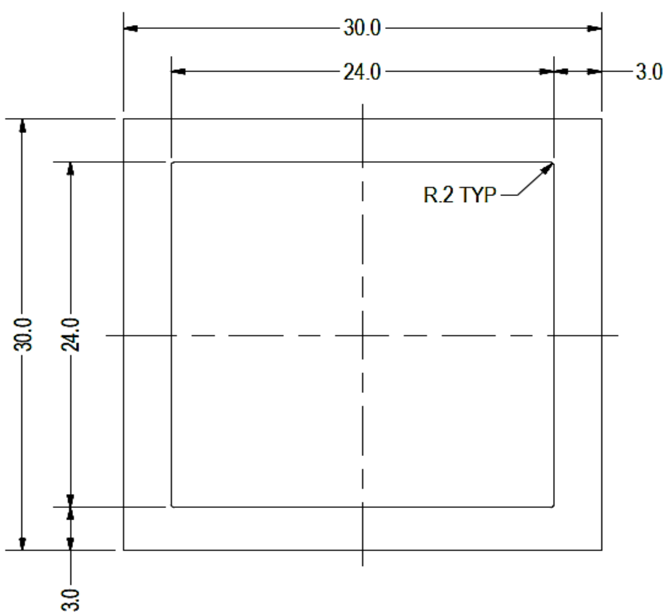
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.001	k-ft
P_n =	1.142	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	10%	



4.4 Diagonal Strut Design

A diagonal aluminum strut braces the support structure. It connects at a front portion of the girder and transfers horizontal forces to the rear foundation connection. The strut is attached with single M8 bolts at each end. See Appendix A.4 for detailed member calculations. Section units are in (mm).

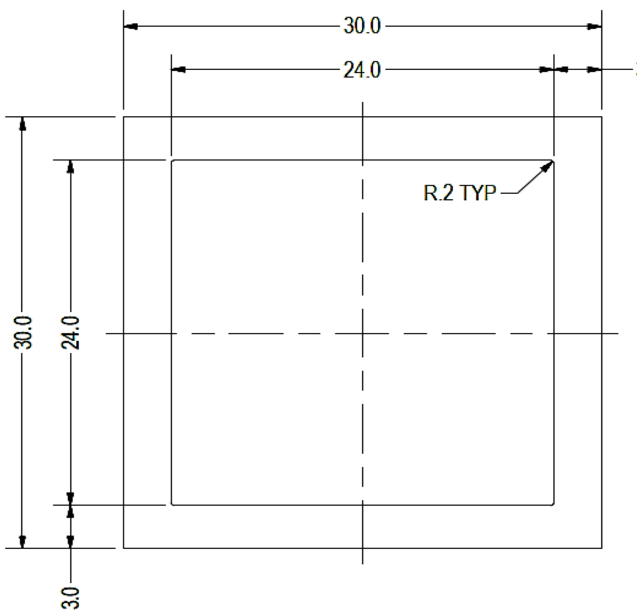
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.642	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	17%	



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).

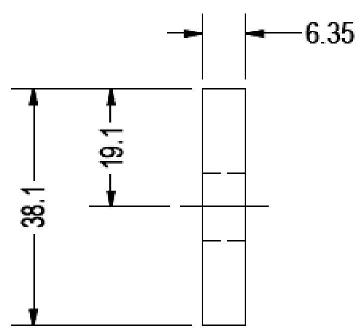
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	39.29	in
$\Phi F_{ty\ AXIAL}$ =	10.06	ksi
$\Phi F_{ty\ BENDING}$ =	30.09	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.958	k
$M_{y\ allowable}$ =	0.408	k-ft
$M_{z\ allowable}$ =	0.408	k-ft
$P_{n\ allowable}$ =	5.050	k
Utilization =	19%	



4.6 Cross Brace Design

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

Brace Type =	**1.5x0.25**	
Aluminum Type =	6061-T6	
F_{ty} =	35	ksi
Φ =	0.90	
S_y =	0.02	in^3
E =	10100	ksi
I_y =	33.25	in^4
A =	0.38	in^2
g =	0.45	lbs/ft
M_y =	0.005	k-ft
P_n =	0.053	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	11%	



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

5. FOUNDATION DESIGN CALCULATIONS

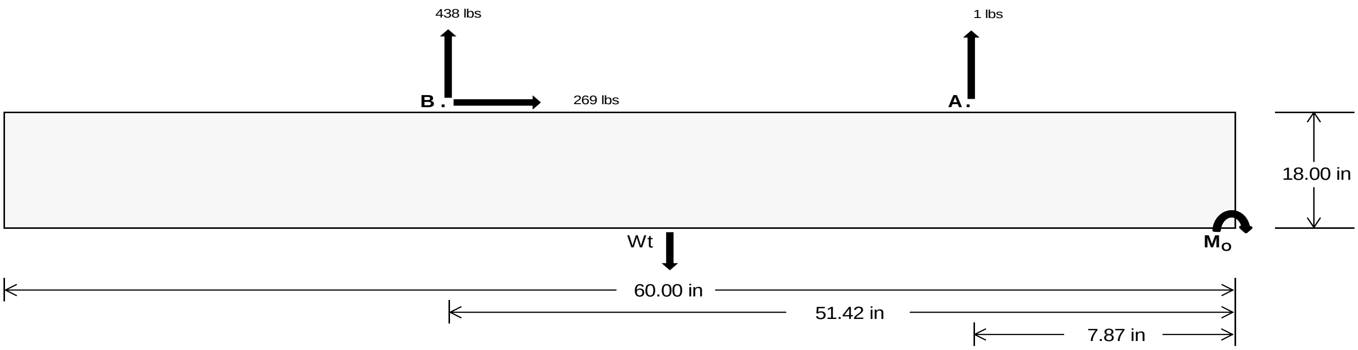
5.1 Helical Pile Foundations

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

Maximum	Front	Rear	
Tensile Load =	10.88	1825.50	k
Compressive Load =	1484.39	1360.88	k
Lateral Load =	4.72	1119.82	k
Moment (Weak Axis) =	0.01	0.00	k

5.2 Design of Ballast Foundations

Ballast foundations are used to secure the racking structure in place. The foundations are checked for potential overturning and sliding. Bearing pressures applied by the racking and ballast foundations are checked against the allowable bearing pressures provided by the IBC tables 1804.2 (2003, 2006) & 1806.2 (2009).



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

Footing Reinforcement

Use fiber reinforcing with (1) #5 rebar.

Overturning Check	
M_O =	27377.4 in-lbs
Resisting Force Required =	912.58 lbs
S.F. =	1.67
Weight Required =	1520.97 lbs
Minimum Width =	22 in in
Weight Provided =	1993.75 lbs

A minimum 60in long x 22in wide x 18in tall ballast foundation is required to resist overturning.

Sliding	
Force =	269.06 lbs
Friction =	0.4
Weight Required =	672.65 lbs
Resisting Weight =	1993.75 lbs
Additional Weight Required =	0 lbs

Use a 60in long x 22in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion	
Sliding Force =	269.06 lbs
Cohesion =	130 psf
Area =	9.17 ft^2
Resisting =	996.88 lbs
Additional Weight Required =	0 lbs

Use a 60in long x 22in wide x 18in tall ballast foundation. Cohesion is OK.

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

Shear key is not required.

Bearing Pressure

	Ballast Width			
	22 in	23 in	24 in	25 in
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.83 ft) =	1994 lbs	2084 lbs	2175 lbs	2266 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in
F_A	571 lbs	571 lbs	571 lbs	571 lbs	440 lbs	440 lbs	440 lbs	440 lbs	707 lbs	707 lbs	707 lbs	707 lbs	-3 lbs	-3 lbs	-3 lbs	-3 lbs
F_B	402 lbs	402 lbs	402 lbs	402 lbs	570 lbs	570 lbs	570 lbs	570 lbs	692 lbs	692 lbs	692 lbs	692 lbs	-876 lbs	-876 lbs	-876 lbs	-876 lbs
F_V	70 lbs	70 lbs	70 lbs	70 lbs	491 lbs	491 lbs	491 lbs	491 lbs	415 lbs	415 lbs	415 lbs	415 lbs	-538 lbs	-538 lbs	-538 lbs	-538 lbs
P_{total}	2967 lbs	3058 lbs	3148 lbs	3239 lbs	3004 lbs	3094 lbs	3185 lbs	3275 lbs	3393 lbs	3483 lbs	3574 lbs	3665 lbs	317 lbs	372 lbs	426 lbs	481 lbs
M	440 lbs-ft	440 lbs-ft	440 lbs-ft	440 lbs-ft	530 lbs-ft	530 lbs-ft	530 lbs-ft	530 lbs-ft	691 lbs-ft	691 lbs-ft	691 lbs-ft	691 lbs-ft	752 lbs-ft	752 lbs-ft	752 lbs-ft	752 lbs-ft
e	0.15 ft	0.14 ft	0.14 ft	0.14 ft	0.18 ft	0.17 ft	0.17 ft	0.16 ft	0.20 ft	0.20 ft	0.19 ft	0.19 ft	2.37 ft	2.02 ft	1.76 ft	1.56 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}	266.1 psf	263.9 psf	262.0 psf	260.2 psf	258.3 psf	256.5 psf	254.9 psf	253.4 psf	279.7 psf	277.0 psf	274.5 psf	272.2 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	381.3 psf	374.2 psf	367.6 psf	361.6 psf	397.0 psf	389.2 psf	382.1 psf	375.5 psf	460.5 psf	450.0 psf	440.3 psf	431.4 psf	870.8 psf	270.1 psf	192.9 psf	164.3 psf

Maximum Bearing Pressure = 871 psf
Allowable Bearing Pressure = 1500 psf

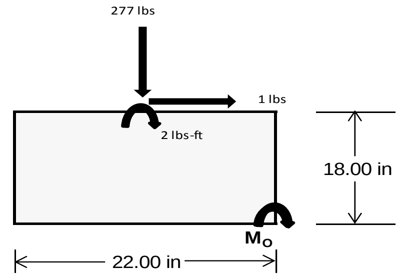
Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 250.7 ft-lbs
Resisting Force Required = 273.52 lbs
S.F. = 1.67
Weight Required = 455.87 lbs
Minimum Width = 22 in in
Weight Provided = 1993.75 lbs

A minimum 60in long x 22in 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	22 in			22 in			22 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	84 lbs	219 lbs	80 lbs	282 lbs	806 lbs	277 lbs	25 lbs	64 lbs	23 lbs
F_V	5 lbs	4 lbs	0 lbs	19 lbs	18 lbs	1 lbs	1 lbs	1 lbs	0 lbs
P_{total}	2553 lbs	2687 lbs	2548 lbs	2632 lbs	3155 lbs	2627 lbs	746 lbs	786 lbs	745 lbs
M	7 lbs-ft	6 lbs-ft	0 lbs-ft	31 lbs-ft	26 lbs-ft	4 lbs-ft	2 lbs-ft	2 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.01 ft	0.01 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.31 ft	1.83 ft	1.83 ft	1.81 ft	1.82 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	276.1 sqft	290.8 sqft	277.8 sqft	276.1 sqft	334.8 sqft	285.3 sqft	80.7 sqft	85.0 sqft	81.2 sqft
f_{max}	280.9 psf	295.4 psf	278.1 psf	298.1 psf	353.6 psf	287.9 psf	82.1 psf	86.4 psf	81.3 psf

Maximum Bearing Pressure = 354 psf
Allowable Bearing Pressure = 1500 psf

Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 60in long x 22in wide x 18in tall ballast foundation and fiber reinforcing with (1) #5 rebar.

5.3 Foundation Anchors

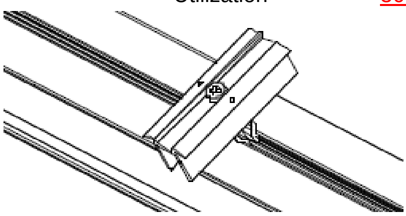
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

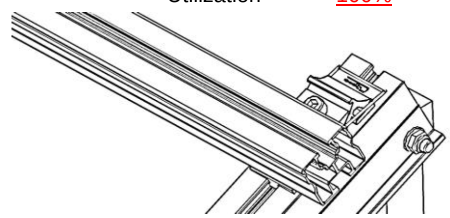
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

Modules are secured to the purlins with Schletter, Inc. Rapid2+ mounting clamps. Purlins are secured to the girders with the use of 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 =	0.434	k
Allowable Uplift =	1.214	k
Utilization =	36%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.114	k
Allowable Uplift =	1.116	k
Utilization =	100%	



6.2 Bolted Connections

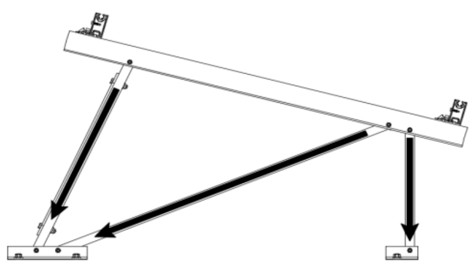
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are used.

Front Strut		
Maximum Axial Load =	1.142	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	20%	

Rear Strut		
Maximum Axial Load =	1.197	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	21%	

Diagonal Strut		
Maximum Axial Load =	0.642	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	11%	

Bracing		
Maximum Axial Load =	0.053	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	1%	



Bolt and bearing capacities are accounting for double shear (ASCE 8-02, Eq. 5.3.4-1). Struts under compression are shown to demonstrate the load transfer from the girder. Single M8 bolts are located at each end of the strut and are subjected to double shear.

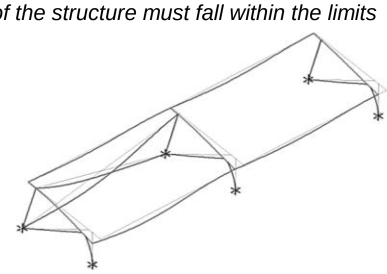
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	32.32	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.646	in
Max Drift, Δ_{MAX} =	0.058	in
N/A		

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



SCHLETTER

APPENDIX A

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

Purlin = **ProfiPlus**

Strong Axis:

3.4.14

L_b = 87.00 in

J = 0.255

226.543

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.5 ksi

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

Weak Axis:

3.4.14

L_b = 87.00 in

J = 0.255

235.251

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.4

3.4.16

b/t = 23.9

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.16.1

N/A for Weak Direction

3.4.18		**3.4.18**	
h/t =	23.9	h/t =	7.4
$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$		$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$	
S1 =	36.9	S1 =	36.9
m =	0.65	m =	0.65
C_0 =	30	C_0 =	20
Cc =	30	Cc =	20
$S2 = \frac{k_1 Bbr}{mDbr}$		$S2 = \frac{k_1 Bbr}{mDbr}$	
S2 =	77.3	S2 =	77.3
φF_L=	1.3φyFcy	φF_L=	1.3φyFcy
φF_L=	43.2 ksi	φF_L=	43.2 ksi
φF_LSt=	28.5 ksi	φF_LWk=	28.5 ksi
Ix =	250988 mm^4	Iy =	120291 mm^4
	0.603 in^4		0.289 in^4
y =	30 mm	x =	20 mm
Sx =	0.511 in^3	Sy =	0.367 in^3
M_{max}St =	1.211 k-ft	M_{max}Wk =	0.871 k-ft

Compression

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 = 1.24
22.039

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.6 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 = 1.24
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= 29.6 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

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_LSt = 29.6 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.455 k-ft

φF_LWk = 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L = φcc(Bc-Dc*λ)

φF_L = 30.1251 ksi

3.4.8

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

3.4.9

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

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

3.4.9.1

b/t = 24.46
t = 2.6
ds = 6.05
rs = 3.49
S = 21.70
ρst = 0.22
F_{UT}= 10.43
F_{ST}= 28.24
φF_L= Fut + (Fst - Fut)ρst < Fst
φF_L= 14.3 ksi

3.4.10

Rb/t = 0.0

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

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

φF_L= 14.29 ksi
A = 576.21 mm^2
0.89 in^2
P_{max} = 12.76 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

$\lambda =$ 0.77182

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.83792

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

$\varphi F_L =$ 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 24.52 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 12.31 kips

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 in³

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 in³

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

<u>Strong Axis:</u>

3.4.14

L_b = 39.29 in

J = 0.16

103.073

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

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= 30.1 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 <u>Not Used</u>

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= 30.1 ksi

lx = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.408 k-ft

<u>Weak Axis:</u>

3.4.14

L_b = 39.29 in

J = 0.16

103.073

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

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= 30.1

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

ly = 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

$\lambda =$ 1.68476

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.81587

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

$\varphi F_L =$ 10.0603 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

$\varphi F_L =$ 10.06 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 5.05 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-45.999	-45.999	0	0
2	M16	Y	-45.999	-45.999	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	-40.786	-40.786	0	0
2	M16	y	-65.613	-65.613	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	81.572	81.572	0	0
2	M16	y	39.013	39.013	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 + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8														
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6														
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																
10	ASD 1.0D + 1.0W	Yes	Y		1	1			4	1														
11	ASD 1.0D + 0.75L + 0.75W + 0....	Yes	Y		1	1	3	.75	4	.75														
12	ASD 0.6D + 1.0W	Yes	Y		2	.6					5	1												
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	212.697	2	305.012	2	-.003	15	0	15	0	1	0	1
2		min	-268.625	3	-426.418	3	-.162	1	0	3	0	1	0	1
3	N7	max	.004	3	437.563	1	-.078	15	0	15	0	1	0	1
4		min	-.174	2	6.025	12	-1.683	1	-.003	1	0	1	0	1
5	N15	max	0	15	1141.838	1	.644	1	.001	1	0	1	0	1
6		min	-1.811	2	-8.369	3	-.42	3	0	3	0	1	0	1
7	N16	max	810.506	2	1046.834	2	-.168	10	0	1	0	1	0	1
8		min	-861.398	3	-1404.229	3	-47.377	3	0	3	0	1	0	1
9	N23	max	.004	3	437.215	1	3.631	1	.006	1	0	1	0	1
10		min	-.174	2	6.387	12	.158	15	0	15	0	1	0	1
11	N24	max	213.186	2	309.341	2	47.702	3	.002	1	0	1	0	1
12		min	-268.756	3	-423.928	3	.021	10	0	3	0	1	0	1
13	Totals:	max	1234.228	2	3574.494	1	0	1						
14		min	-1398.786	3	-2246.526	3	0	10						

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	293.592	1	.654	4	.558	1	0	15	0	3	0	1
2			min	-366.82	3	.154	15	-.039	3	-.001	1	0	1	0	1
3		2	max	293.718	1	.603	4	.558	1	0	15	0	12	0	15
4			min	-366.725	3	.142	15	-.039	3	-.001	1	0	1	0	4
5		3	max	293.843	1	.551	4	.558	1	0	15	0	15	0	15
6			min	-366.631	3	.13	15	-.039	3	-.001	1	0	1	0	4
7		4	max	293.969	1	.5	4	.558	1	0	15	0	1	0	15
8			min	-366.537	3	.118	15	-.039	3	-.001	1	0	3	0	4
9		5	max	294.095	1	.449	4	.558	1	0	15	0	1	0	15
10			min	-366.442	3	.106	15	-.039	3	-.001	1	0	3	0	4
11		6	max	294.221	1	.398	4	.558	1	0	15	0	1	0	15
12			min	-366.348	3	.094	15	-.039	3	-.001	1	0	3	0	4
13		7	max	294.347	1	.347	4	.558	1	0	15	0	1	0	15
14			min	-366.253	3	.082	15	-.039	3	-.001	1	0	3	0	4
15		8	max	294.473	1	.296	4	.558	1	0	15	0	1	0	15
16			min	-366.159	3	.07	15	-.039	3	-.001	1	0	3	0	4
17		9	max	294.599	1	.245	4	.558	1	0	15	0	1	0	15
18			min	-366.065	3	.058	15	-.039	3	-.001	1	0	3	0	4
19		10	max	294.725	1	.193	4	.558	1	0	15	0	1	0	15
20			min	-365.97	3	.046	15	-.039	3	-.001	1	0	3	0	4
21		11	max	294.85	1	.142	4	.558	1	0	15	0	1	0	15
22			min	-365.876	3	.032	12	-.039	3	-.001	1	0	3	0	4
23		12	max	294.976	1	.1	2	.558	1	0	15	0	1	0	15
24			min	-365.781	3	.012	12	-.039	3	-.001	1	0	3	0	4
25		13	max	295.102	1	.06	2	.558	1	0	15	0	1	0	15
26			min	-365.687	3	-.014	3	-.039	3	-.001	1	0	3	0	4
27		14	max	295.228	1	.02	2	.558	1	0	15	.001	1	0	15
28			min	-365.593	3	-.044	3	-.039	3	-.001	1	0	3	0	4
29		15	max	295.354	1	-.014	15	.558	1	0	15	.001	1	0	15
30			min	-365.498	3	-.073	3	-.039	3	-.001	1	0	3	0	4
31		16	max	295.48	1	-.026	15	.558	1	0	15	.001	1	0	15
32			min	-365.404	3	-.113	4	-.039	3	-.001	1	0	3	0	4
33		17	max	295.606	1	-.038	15	.558	1	0	15	.001	1	0	15
34			min	-365.309	3	-.165	4	-.039	3	-.001	1	0	3	0	4
35		18	max	295.731	1	-.05	15	.558	1	0	15	.001	1	0	15
36			min	-365.215	3	-.216	4	-.039	3	-.001	1	0	3	0	4
37		19	max	295.857	1	-.062	15	.558	1	0	15	.002	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
38			min	-365.121	3	-.267	4	-.039	3	-.001	1	0	3	0	4
39	M3	1	max	156.344	2	1.757	4	-.025	15	0	15	.002	1	0	4
40			min	-176.519	3	.413	15	-.603	1	0	1	0	15	0	15
41		2	max	156.274	2	1.58	4	-.025	15	0	15	.002	1	0	2
42			min	-176.571	3	.372	15	-.603	1	0	1	0	15	0	12
43		3	max	156.205	2	1.403	4	-.025	15	0	15	.002	1	0	2
44			min	-176.623	3	.33	15	-.603	1	0	1	0	15	0	3
45		4	max	156.136	2	1.227	4	-.025	15	0	15	.002	1	0	15
46			min	-176.675	3	.289	15	-.603	1	0	1	0	15	0	4
47		5	max	156.066	2	1.05	4	-.025	15	0	15	.001	1	0	15
48			min	-176.727	3	.247	15	-.603	1	0	1	0	15	0	4
49		6	max	155.997	2	.873	4	-.025	15	0	15	.001	1	0	15
50			min	-176.779	3	.205	15	-.603	1	0	1	0	15	0	4
51		7	max	155.928	2	.696	4	-.025	15	0	15	.001	1	0	15
52			min	-176.831	3	.164	15	-.603	1	0	1	0	15	0	4
53		8	max	155.858	2	.519	4	-.025	15	0	15	.001	1	0	15
54			min	-176.883	3	.122	15	-.603	1	0	1	0	15	-.001	4
55		9	max	155.789	2	.342	4	-.025	15	0	15	0	1	0	15
56			min	-176.935	3	.081	15	-.603	1	0	1	0	15	-.001	4
57		10	max	155.72	2	.166	4	-.025	15	0	15	0	1	0	15
58			min	-176.987	3	.039	15	-.603	1	0	1	0	15	-.001	4
59		11	max	155.651	2	.016	2	-.025	15	0	15	0	1	0	15
60			min	-177.039	3	-.038	3	-.603	1	0	1	0	15	-.001	4
61		12	max	155.581	2	-.044	15	-.025	15	0	15	0	1	0	15
62			min	-177.091	3	-.188	4	-.603	1	0	1	0	15	-.001	4
63		13	max	155.512	2	-.085	15	-.025	15	0	15	0	1	0	15
64			min	-177.143	3	-.365	4	-.603	1	0	1	0	15	-.001	4
65		14	max	155.443	2	-.127	15	-.025	15	0	15	0	1	0	15
66			min	-177.195	3	-.542	4	-.603	1	0	1	0	15	-.001	4
67		15	max	155.373	2	-.169	15	-.025	15	0	15	0	1	0	15
68			min	-177.247	3	-.719	4	-.603	1	0	1	0	12	0	4
69		16	max	155.304	2	-.21	15	-.025	15	0	15	0	1	0	15
70			min	-177.299	3	-.895	4	-.603	1	0	1	0	3	0	4
71		17	max	155.235	2	-.252	15	-.025	15	0	15	0	15	0	15
72			min	-177.351	3	-1.072	4	-.603	1	0	1	0	1	0	4
73		18	max	155.165	2	-.293	15	-.025	15	0	15	0	15	0	15
74			min	-177.403	3	-1.249	4	-.603	1	0	1	0	1	0	4
75		19	max	155.096	2	-.335	15	-.025	15	0	15	0	15	0	1
76			min	-177.455	3	-1.426	4	-.603	1	0	1	0	1	0	1
77	M4	1	max	436.398	1	0	1	-.078	15	0	1	0	3	0	1
78			min	5.443	12	0	1	-1.816	1	0	1	0	2	0	1
79		2	max	436.463	1	0	1	-.078	15	0	1	0	12	0	1
80			min	5.475	12	0	1	-1.816	1	0	1	0	1	0	1
81		3	max	436.527	1	0	1	-.078	15	0	1	0	15	0	1
82			min	5.508	12	0	1	-1.816	1	0	1	0	1	0	1
83		4	max	436.592	1	0	1	-.078	15	0	1	0	15	0	1
84			min	5.54	12	0	1	-1.816	1	0	1	0	1	0	1
85		5	max	436.657	1	0	1	-.078	15	0	1	0	15	0	1
86			min	5.572	12	0	1	-1.816	1	0	1	0	1	0	1
87		6	max	436.721	1	0	1	-.078	15	0	1	0	15	0	1
88			min	5.605	12	0	1	-1.816	1	0	1	0	1	0	1
89		7	max	436.786	1	0	1	-.078	15	0	1	0	15	0	1
90			min	5.637	12	0	1	-1.816	1	0	1	-.001	1	0	1
91		8	max	436.851	1	0	1	-.078	15	0	1	0	15	0	1
92			min	5.67	12	0	1	-1.816	1	0	1	-.001	1	0	1
93		9	max	436.916	1	0	1	-.078	15	0	1	0	15	0	1
94			min	5.702	12	0	1	-1.816	1	0	1	-.001	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
95		10	max	436.98	1	0	1	-.078	15	0	1	0	15	0	1
96			min	5.734	12	0	1	-1.816	1	0	1	-.002	1	0	1
97		11	max	437.045	1	0	1	-.078	15	0	1	0	15	0	1
98			min	5.767	12	0	1	-1.816	1	0	1	-.002	1	0	1
99		12	max	437.11	1	0	1	-.078	15	0	1	0	15	0	1
100			min	5.799	12	0	1	-1.816	1	0	1	-.002	1	0	1
101		13	max	437.174	1	0	1	-.078	15	0	1	0	15	0	1
102			min	5.831	12	0	1	-1.816	1	0	1	-.002	1	0	1
103		14	max	437.239	1	0	1	-.078	15	0	1	0	15	0	1
104			min	5.864	12	0	1	-1.816	1	0	1	-.002	1	0	1
105		15	max	437.304	1	0	1	-.078	15	0	1	0	15	0	1
106			min	5.896	12	0	1	-1.816	1	0	1	-.002	1	0	1
107		16	max	437.369	1	0	1	-.078	15	0	1	0	15	0	1
108			min	5.928	12	0	1	-1.816	1	0	1	-.002	1	0	1
109		17	max	437.433	1	0	1	-.078	15	0	1	0	15	0	1
110			min	5.961	12	0	1	-1.816	1	0	1	-.003	1	0	1
111		18	max	437.498	1	0	1	-.078	15	0	1	0	15	0	1
112			min	5.993	12	0	1	-1.816	1	0	1	-.003	1	0	1
113		19	max	437.563	1	0	1	-.078	15	0	1	0	15	0	1
114			min	6.025	12	0	1	-1.816	1	0	1	-.003	1	0	1
115	M6	1	max	956.105	1	.657	4	.172	1	0	1	0	3	0	1
116			min	-1196.554	3	.154	15	-.145	3	0	15	0	11	0	1
117		2	max	956.23	1	.606	4	.172	1	0	1	0	3	0	15
118			min	-1196.46	3	.142	15	-.145	3	0	15	0	11	0	4
119		3	max	956.356	1	.555	4	.172	1	0	1	0	3	0	15
120			min	-1196.365	3	.13	15	-.145	3	0	15	0	15	0	4
121		4	max	956.482	1	.504	4	.172	1	0	1	0	1	0	15
122			min	-1196.271	3	.118	15	-.145	3	0	15	0	15	0	4
123		5	max	956.608	1	.452	4	.172	1	0	1	0	1	0	15
124			min	-1196.177	3	.101	12	-.145	3	0	15	0	15	0	4
125		6	max	956.734	1	.412	2	.172	1	0	1	0	1	0	15
126			min	-1196.082	3	.081	12	-.145	3	0	15	0	15	0	4
127		7	max	956.86	1	.372	2	.172	1	0	1	0	1	0	15
128			min	-1195.988	3	.061	12	-.145	3	0	15	0	3	0	4
129		8	max	956.986	1	.332	2	.172	1	0	1	0	1	0	12
130			min	-1195.893	3	.041	12	-.145	3	0	15	0	3	0	4
131		9	max	957.111	1	.292	2	.172	1	0	1	0	1	0	12
132			min	-1195.799	3	.022	12	-.145	3	0	15	0	3	0	4
133		10	max	957.237	1	.253	2	.172	1	0	1	0	1	0	12
134			min	-1195.705	3	-.005	3	-.145	3	0	15	0	3	0	2
135		11	max	957.363	1	.213	2	.172	1	0	1	0	1	0	12
136			min	-1195.61	3	-.035	3	-.145	3	0	15	0	3	0	2
137		12	max	957.489	1	.173	2	.172	1	0	1	0	1	0	12
138			min	-1195.516	3	-.065	3	-.145	3	0	15	0	3	0	2
139		13	max	957.615	1	.133	2	.172	1	0	1	0	1	0	12
140			min	-1195.421	3	-.095	3	-.145	3	0	15	0	3	0	2
141		14	max	957.741	1	.093	2	.172	1	0	1	0	1	0	12
142			min	-1195.327	3	-.125	3	-.145	3	0	15	0	3	0	2
143		15	max	957.867	1	.053	2	.172	1	0	1	0	1	0	12
144			min	-1195.233	3	-.154	3	-.145	3	0	15	0	3	0	2
145		16	max	957.993	1	.013	2	.172	1	0	1	0	1	0	12
146			min	-1195.138	3	-.184	3	-.145	3	0	15	0	3	0	2
147		17	max	958.118	1	-.026	2	.172	1	0	1	0	1	0	12
148			min	-1195.044	3	-.214	3	-.145	3	0	15	0	3	0	2
149		18	max	958.244	1	-.05	15	.172	1	0	1	0	1	0	3
150			min	-1194.949	3	-.244	3	-.145	3	0	15	0	3	0	2
151		19	max	958.37	1	-.062	15	.172	1	0	1	0	1	0	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
152			min	-1194.855	3	-.274	3	-.145	3	0	15	0	3	0	2
153	M7	1	max	641.788	2	1.762	4	.016	3	0	2	0	2	0	2
154			min	-551.446	3	.414	15	-.005	10	0	3	0	3	0	3
155		2	max	641.719	2	1.585	4	.016	3	0	2	0	2	0	2
156			min	-551.498	3	.372	15	-.005	10	0	3	0	3	0	3
157		3	max	641.65	2	1.408	4	.016	3	0	2	0	2	0	2
158			min	-551.55	3	.331	15	-.005	10	0	3	0	3	0	3
159		4	max	641.58	2	1.231	4	.016	3	0	2	0	2	0	2
160			min	-551.602	3	.289	15	-.005	10	0	3	0	3	0	3
161		5	max	641.511	2	1.054	4	.016	3	0	2	0	2	0	15
162			min	-551.654	3	.248	15	-.005	10	0	3	0	3	0	3
163		6	max	641.442	2	.877	4	.016	3	0	2	0	2	0	15
164			min	-551.706	3	.206	15	-.005	10	0	3	0	3	0	4
165		7	max	641.372	2	.701	4	.016	3	0	2	0	2	0	15
166			min	-551.758	3	.165	15	-.005	10	0	3	0	3	0	4
167		8	max	641.303	2	.524	4	.016	3	0	2	0	2	0	15
168			min	-551.81	3	.123	15	-.005	10	0	3	0	3	-.001	4
169		9	max	641.234	2	.361	2	.016	3	0	2	0	2	0	15
170			min	-551.862	3	.066	12	-.005	10	0	3	0	3	-.001	4
171		10	max	641.164	2	.223	2	.016	3	0	2	0	2	0	15
172			min	-551.914	3	-.011	3	-.005	10	0	3	0	3	-.001	4
173		11	max	641.095	2	.085	2	.016	3	0	2	0	2	0	15
174			min	-551.966	3	-.115	3	-.005	10	0	3	0	3	-.001	4
175		12	max	641.026	2	-.043	15	.016	3	0	2	0	2	0	15
176			min	-552.018	3	-.218	3	-.005	10	0	3	0	3	-.001	4
177		13	max	640.956	2	-.085	15	.016	3	0	2	0	2	0	15
178			min	-552.07	3	-.36	4	-.005	10	0	3	0	3	-.001	4
179		14	max	640.887	2	-.126	15	.016	3	0	2	0	2	0	15
180			min	-552.122	3	-.537	4	-.005	10	0	3	0	3	-.001	4
181		15	max	640.818	2	-.168	15	.016	3	0	2	0	2	0	15
182			min	-552.174	3	-.714	4	-.005	10	0	3	0	3	0	4
183		16	max	640.748	2	-.209	15	.016	3	0	2	0	2	0	15
184			min	-552.226	3	-.891	4	-.005	10	0	3	0	3	0	4
185		17	max	640.679	2	-.251	15	.016	3	0	2	0	2	0	15
186			min	-552.278	3	-1.068	4	-.005	10	0	3	0	3	0	4
187		18	max	640.61	2	-.293	15	.016	3	0	2	0	2	0	15
188			min	-552.33	3	-1.245	4	-.005	10	0	3	0	3	0	4
189		19	max	640.541	2	-.334	15	.016	3	0	2	0	2	0	1
190			min	-552.382	3	-1.421	4	-.005	10	0	3	0	3	0	1
191	M8	1	max	1140.673	1	0	1	.792	1	0	1	0	15	0	1
192			min	-9.242	3	0	1	-.419	3	0	1	0	1	0	1
193		2	max	1140.738	1	0	1	.792	1	0	1	0	1	0	1
194			min	-9.194	3	0	1	-.419	3	0	1	0	3	0	1
195		3	max	1140.802	1	0	1	.792	1	0	1	0	1	0	1
196			min	-9.145	3	0	1	-.419	3	0	1	0	3	0	1
197		4	max	1140.867	1	0	1	.792	1	0	1	0	1	0	1
198			min	-9.097	3	0	1	-.419	3	0	1	0	3	0	1
199		5	max	1140.932	1	0	1	.792	1	0	1	0	1	0	1
200			min	-9.048	3	0	1	-.419	3	0	1	0	3	0	1
201		6	max	1140.996	1	0	1	.792	1	0	1	0	1	0	1
202			min	-8.999	3	0	1	-.419	3	0	1	0	3	0	1
203		7	max	1141.061	1	0	1	.792	1	0	1	0	1	0	1
204			min	-8.951	3	0	1	-.419	3	0	1	0	3	0	1
205		8	max	1141.126	1	0	1	.792	1	0	1	0	1	0	1
206			min	-8.902	3	0	1	-.419	3	0	1	0	3	0	1
207		9	max	1141.19	1	0	1	.792	1	0	1	0	1	0	1
208			min	-8.854	3	0	1	-.419	3	0	1	0	3	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
209		10	max	1141.255	1	0	1	.792	1	0	1	0	1	0	1
210			min	-8.805	3	0	1	-.419	3	0	1	0	3	0	1
211		11	max	1141.32	1	0	1	.792	1	0	1	0	1	0	1
212			min	-8.757	3	0	1	-.419	3	0	1	0	3	0	1
213		12	max	1141.385	1	0	1	.792	1	0	1	0	1	0	1
214			min	-8.708	3	0	1	-.419	3	0	1	0	3	0	1
215		13	max	1141.449	1	0	1	.792	1	0	1	0	1	0	1
216			min	-8.66	3	0	1	-.419	3	0	1	0	3	0	1
217		14	max	1141.514	1	0	1	.792	1	0	1	0	1	0	1
218			min	-8.611	3	0	1	-.419	3	0	1	0	3	0	1
219		15	max	1141.579	1	0	1	.792	1	0	1	0	1	0	1
220			min	-8.563	3	0	1	-.419	3	0	1	0	3	0	1
221		16	max	1141.643	1	0	1	.792	1	0	1	.001	1	0	1
222			min	-8.514	3	0	1	-.419	3	0	1	0	3	0	1
223		17	max	1141.708	1	0	1	.792	1	0	1	.001	1	0	1
224			min	-8.466	3	0	1	-.419	3	0	1	0	3	0	1
225		18	max	1141.773	1	0	1	.792	1	0	1	.001	1	0	1
226			min	-8.417	3	0	1	-.419	3	0	1	0	3	0	1
227		19	max	1141.838	1	0	1	.792	1	0	1	.001	1	0	1
228			min	-8.369	3	0	1	-.419	3	0	1	0	3	0	1
229	M10	1	max	306.335	1	.648	4	-.003	12	.001	1	0	1	0	1
230			min	-343.951	3	.153	15	-.199	1	0	3	0	3	0	1
231		2	max	306.461	1	.597	4	-.003	12	.001	1	0	1	0	15
232			min	-343.856	3	.141	15	-.199	1	0	3	0	3	0	4
233		3	max	306.586	1	.546	4	-.003	12	.001	1	0	1	0	15
234			min	-343.762	3	.129	15	-.199	1	0	3	0	3	0	4
235		4	max	306.712	1	.494	4	-.003	12	.001	1	0	1	0	15
236			min	-343.667	3	.117	15	-.199	1	0	3	0	3	0	4
237		5	max	306.838	1	.443	4	-.003	12	.001	1	0	1	0	15
238			min	-343.573	3	.105	15	-.199	1	0	3	0	3	0	4
239		6	max	306.964	1	.392	4	-.003	12	.001	1	0	1	0	15
240			min	-343.479	3	.093	15	-.199	1	0	3	0	3	0	4
241		7	max	307.09	1	.341	4	-.003	12	.001	1	0	1	0	15
242			min	-343.384	3	.081	15	-.199	1	0	3	0	3	0	4
243		8	max	307.216	1	.29	4	-.003	12	.001	1	0	1	0	15
244			min	-343.29	3	.069	15	-.199	1	0	3	0	3	0	4
245		9	max	307.342	1	.239	4	-.003	12	.001	1	0	1	0	15
246			min	-343.195	3	.057	15	-.199	1	0	3	0	3	0	4
247		10	max	307.467	1	.188	4	-.003	12	.001	1	0	11	0	15
248			min	-343.101	3	.045	15	-.199	1	0	3	0	3	0	4
249		11	max	307.593	1	.14	2	-.003	12	.001	1	0	11	0	15
250			min	-343.007	3	.033	15	-.199	1	0	3	0	3	0	4
251		12	max	307.719	1	.1	2	-.003	12	.001	1	0	15	0	15
252			min	-342.912	3	.021	15	-.199	1	0	3	0	3	0	4
253		13	max	307.845	1	.06	2	-.003	12	.001	1	0	15	0	15
254			min	-342.818	3	.008	1	-.199	1	0	3	0	3	0	4
255		14	max	307.971	1	.02	2	-.003	12	.001	1	0	15	0	15
256			min	-342.723	3	-.032	1	-.199	1	0	3	0	1	0	4
257		15	max	308.097	1	-.015	15	-.003	12	.001	1	0	15	0	15
258			min	-342.629	3	-.072	1	-.199	1	0	3	0	1	0	4
259		16	max	308.223	1	-.027	15	-.003	12	.001	1	0	15	0	15
260			min	-342.535	3	-.119	4	-.199	1	0	3	0	1	0	4
261		17	max	308.349	1	-.039	15	-.003	12	.001	1	0	15	0	15
262			min	-342.44	3	-.17	4	-.199	1	0	3	0	1	0	4
263		18	max	308.474	1	-.051	15	-.003	12	.001	1	0	15	0	15
264			min	-342.346	3	-.221	4	-.199	1	0	3	0	1	0	4
265		19	max	308.6	1	-.063	15	-.003	12	.001	1	0	15	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
266			min	-342.251	3	-.273	4	-.199	1	0	3	0	1	0	4
267	M11	1	max	156.077	2	1.762	4	.687	1	0	1	0	3	0	4
268			min	-177.157	3	.414	15	0	3	0	15	-.002	1	0	12
269		2	max	156.008	2	1.585	4	.687	1	0	1	0	3	0	1
270			min	-177.209	3	.372	15	0	3	0	15	-.002	1	0	3
271		3	max	155.938	2	1.408	4	.687	1	0	1	0	3	0	1
272			min	-177.261	3	.331	15	0	3	0	15	-.002	1	0	3
273		4	max	155.869	2	1.231	4	.687	1	0	1	0	3	0	15
274			min	-177.313	3	.289	15	0	3	0	15	-.002	1	0	3
275		5	max	155.8	2	1.054	4	.687	1	0	1	0	3	0	15
276			min	-177.365	3	.248	15	0	3	0	15	-.001	1	0	4
277		6	max	155.73	2	.877	4	.687	1	0	1	0	3	0	15
278			min	-177.417	3	.206	15	0	3	0	15	-.001	1	0	4
279		7	max	155.661	2	.701	4	.687	1	0	1	0	3	0	15
280			min	-177.469	3	.165	15	0	3	0	15	-.001	1	0	4
281		8	max	155.592	2	.524	4	.687	1	0	1	0	3	0	15
282			min	-177.521	3	.123	15	0	3	0	15	0	1	-.001	4
283		9	max	155.522	2	.347	4	.687	1	0	1	0	3	0	15
284			min	-177.573	3	.081	15	0	3	0	15	0	1	-.001	4
285		10	max	155.453	2	.17	4	.687	1	0	1	0	3	0	15
286			min	-177.625	3	.033	12	0	3	0	15	0	1	-.001	4
287		11	max	155.384	2	.017	1	.687	1	0	1	0	3	0	15
288			min	-177.677	3	-.057	3	0	3	0	15	0	1	-.001	4
289		12	max	155.314	2	-.043	15	.687	1	0	1	0	3	0	15
290			min	-177.729	3	-.184	4	0	3	0	15	0	1	-.001	4
291		13	max	155.245	2	-.085	15	.687	1	0	1	0	3	0	15
292			min	-177.781	3	-.36	4	0	3	0	15	0	1	-.001	4
293		14	max	155.176	2	-.126	15	.687	1	0	1	0	3	0	15
294			min	-177.833	3	-.537	4	0	3	0	15	0	1	-.001	4
295		15	max	155.106	2	-.168	15	.687	1	0	1	0	3	0	15
296			min	-177.885	3	-.714	4	0	3	0	15	0	10	0	4
297		16	max	155.037	2	-.209	15	.687	1	0	1	0	3	0	15
298			min	-177.937	3	-.891	4	0	3	0	15	0	10	0	4
299		17	max	154.968	2	-.251	15	.687	1	0	1	0	1	0	15
300			min	-177.989	3	-1.068	4	0	3	0	15	0	15	0	4
301		18	max	154.898	2	-.293	15	.687	1	0	1	0	1	0	15
302			min	-178.041	3	-1.245	4	0	3	0	15	0	15	0	4
303		19	max	154.829	2	-.334	15	.687	1	0	1	0	1	0	1
304			min	-178.093	3	-1.421	4	0	3	0	15	0	15	0	1
305	M12	1	max	436.051	1	0	1	3.913	1	0	1	0	2	0	1
306			min	5.805	12	0	1	.159	15	0	1	0	3	0	1
307		2	max	436.115	1	0	1	3.913	1	0	1	0	1	0	1
308			min	5.837	12	0	1	.159	15	0	1	0	15	0	1
309		3	max	436.18	1	0	1	3.913	1	0	1	0	1	0	1
310			min	5.87	12	0	1	.159	15	0	1	0	15	0	1
311		4	max	436.245	1	0	1	3.913	1	0	1	.001	1	0	1
312			min	5.902	12	0	1	.159	15	0	1	0	15	0	1
313		5	max	436.31	1	0	1	3.913	1	0	1	.001	1	0	1
314			min	5.934	12	0	1	.159	15	0	1	0	15	0	1
315		6	max	436.374	1	0	1	3.913	1	0	1	.002	1	0	1
316			min	5.967	12	0	1	.159	15	0	1	0	15	0	1
317		7	max	436.439	1	0	1	3.913	1	0	1	.002	1	0	1
318			min	5.999	12	0	1	.159	15	0	1	0	15	0	1
319		8	max	436.504	1	0	1	3.913	1	0	1	.002	1	0	1
320			min	6.031	12	0	1	.159	15	0	1	0	15	0	1
321		9	max	436.568	1	0	1	3.913	1	0	1	.003	1	0	1
322			min	6.064	12	0	1	.159	15	0	1	0	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
323		10	max	436.633	1	0	1	3.913	1	0	1	.003	1	0	1
324			min	6.096	12	0	1	.159	15	0	1	0	15	0	1
325		11	max	436.698	1	0	1	3.913	1	0	1	.004	1	0	1
326			min	6.128	12	0	1	.159	15	0	1	0	15	0	1
327		12	max	436.762	1	0	1	3.913	1	0	1	.004	1	0	1
328			min	6.161	12	0	1	.159	15	0	1	0	15	0	1
329		13	max	436.827	1	0	1	3.913	1	0	1	.004	1	0	1
330			min	6.193	12	0	1	.159	15	0	1	0	15	0	1
331		14	max	436.892	1	0	1	3.913	1	0	1	.005	1	0	1
332			min	6.226	12	0	1	.159	15	0	1	0	15	0	1
333		15	max	436.957	1	0	1	3.913	1	0	1	.005	1	0	1
334			min	6.258	12	0	1	.159	15	0	1	0	15	0	1
335		16	max	437.021	1	0	1	3.913	1	0	1	.005	1	0	1
336			min	6.29	12	0	1	.159	15	0	1	0	15	0	1
337		17	max	437.086	1	0	1	3.913	1	0	1	.006	1	0	1
338			min	6.323	12	0	1	.159	15	0	1	0	15	0	1
339		18	max	437.151	1	0	1	3.913	1	0	1	.006	1	0	1
340			min	6.355	12	0	1	.159	15	0	1	0	15	0	1
341		19	max	437.215	1	0	1	3.913	1	0	1	.006	1	0	1
342			min	6.387	12	0	1	.159	15	0	1	0	15	0	1
343	M1	1	max	147.197	1	344.829	3	-3.175	15	0	1	.153	1	0	1
344			min	5.947	15	-290.772	1	-77.7	1	0	3	.006	15	0	3
345		2	max	147.337	1	344.648	3	-3.175	15	0	1	.136	1	.063	1
346			min	5.989	15	-291.014	1	-77.7	1	0	3	.006	15	-.075	3
347		3	max	89.507	3	7.061	9	-3.154	15	0	12	.118	1	.125	1
348			min	-9.759	10	-23.34	2	-77.586	1	0	1	.005	15	-.148	3
349		4	max	89.612	3	6.86	9	-3.154	15	0	12	.102	1	.126	1
350			min	-9.642	10	-23.582	2	-77.586	1	0	1	.004	15	-.145	3
351		5	max	89.717	3	6.658	9	-3.154	15	0	12	.085	1	.127	1
352			min	-9.526	10	-23.824	2	-77.586	1	0	1	.003	15	-.142	3
353		6	max	89.821	3	6.457	9	-3.154	15	0	12	.068	1	.128	1
354			min	-9.41	10	-24.065	2	-77.586	1	0	1	.003	15	-.139	3
355		7	max	89.926	3	6.255	9	-3.154	15	0	12	.051	1	.133	2
356			min	-9.293	10	-24.307	2	-77.586	1	0	1	.002	15	-.136	3
357		8	max	90.031	3	6.053	9	-3.154	15	0	12	.034	1	.138	2
358			min	-9.177	10	-24.549	2	-77.586	1	0	1	.001	15	-.133	3
359		9	max	90.135	3	5.852	9	-3.154	15	0	12	.017	1	.143	2
360			min	-9.061	10	-24.791	2	-77.586	1	0	1	0	15	-.13	3
361		10	max	90.24	3	5.65	9	-3.154	15	0	12	.001	3	.149	2
362			min	-8.944	10	-25.033	2	-77.586	1	0	1	0	10	-.126	3
363		11	max	90.345	3	5.449	9	-3.154	15	0	12	0	12	.154	2
364			min	-8.828	10	-25.275	2	-77.586	1	0	1	-.016	1	-.123	3
365		12	max	90.45	3	5.247	9	-3.154	15	0	12	-.001	12	.16	2
366			min	-8.712	10	-25.516	2	-77.586	1	0	1	-.033	1	-.12	3
367		13	max	90.554	3	5.046	9	-3.154	15	0	12	-.002	12	.165	2
368			min	-8.595	10	-25.758	2	-77.586	1	0	1	-.05	1	-.117	3
369		14	max	90.659	3	4.844	9	-3.154	15	0	12	-.003	15	.171	2
370			min	-8.479	10	-26	2	-77.586	1	0	1	-.067	1	-.113	3
371		15	max	90.764	3	4.643	9	-3.154	15	0	12	-.003	15	.177	2
372			min	-8.362	10	-26.242	2	-77.586	1	0	1	-.083	1	-.11	3
373		16	max	95.015	2	102.935	2	-3.178	15	0	1	-.004	15	.181	2
374			min	-5.847	3	-164.863	3	-78.087	1	0	12	-.101	1	-.105	3
375		17	max	95.154	2	102.693	2	-3.178	15	0	1	-.005	15	.159	2
376			min	-5.742	3	-165.044	3	-78.087	1	0	12	-.118	1	-.069	3
377		18	max	-5.965	15	368.35	2	-3.257	15	0	3	-.005	15	.08	2
378			min	-146.87	1	-159.097	3	-80.085	1	0	2	-.135	1	-.035	3
379		19	max	-5.923	15	368.108	2	-3.257	15	0	3	-.006	15	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
380			min	-146.731	1	-159.278	3	-80.085	1	0	2	-.153	1	0	3
381	M5	1	max	322.015	1	1140.648	3	-.061	10	0	1	.004	3	0	3
382			min	10.904	12	-963.107	1	-42.545	3	0	3	0	10	0	1
383		2	max	322.155	1	1140.467	3	-.061	10	0	1	0	2	.209	1
384			min	10.974	12	-963.349	1	-42.545	3	0	3	-.005	3	-.247	3
385		3	max	278.847	3	6.408	9	4.912	3	0	3	0	2	.414	1
386			min	-47.126	10	-89.092	2	-.394	2	0	1	-.013	3	-.489	3
387		4	max	278.951	3	6.207	9	4.912	3	0	3	0	2	.422	1
388			min	-47.01	10	-89.334	2	-.394	2	0	1	-.012	3	-.478	3
389		5	max	279.056	3	6.005	9	4.912	3	0	3	0	2	.43	1
390			min	-46.894	10	-89.576	2	-.394	2	0	1	-.011	3	-.467	3
391		6	max	279.161	3	5.804	9	4.912	3	0	3	0	2	.438	1
392			min	-46.777	10	-89.818	2	-.394	2	0	1	-.01	3	-.456	3
393		7	max	279.266	3	5.602	9	4.912	3	0	3	0	2	.447	2
394			min	-46.661	10	-90.06	2	-.394	2	0	1	-.009	3	-.445	3
395		8	max	279.37	3	5.401	9	4.912	3	0	3	0	2	.467	2
396			min	-46.545	10	-90.302	2	-.394	2	0	1	-.008	3	-.434	3
397		9	max	279.475	3	5.199	9	4.912	3	0	3	0	2	.486	2
398			min	-46.428	10	-90.543	2	-.394	2	0	1	-.007	3	-.422	3
399		10	max	279.58	3	4.998	9	4.912	3	0	3	0	10	.506	2
400			min	-46.312	10	-90.785	2	-.394	2	0	1	-.006	3	-.411	3
401		11	max	279.684	3	4.796	9	4.912	3	0	3	0	10	.526	2
402			min	-46.196	10	-91.027	2	-.394	2	0	1	-.005	3	-.4	3
403		12	max	279.789	3	4.595	9	4.912	3	0	3	0	10	.545	2
404			min	-46.079	10	-91.269	2	-.394	2	0	1	-.004	3	-.388	3
405		13	max	279.894	3	4.393	9	4.912	3	0	3	0	10	.565	2
406			min	-45.963	10	-91.511	2	-.394	2	0	1	-.003	3	-.377	3
407		14	max	279.999	3	4.192	9	4.912	3	0	3	0	10	.585	2
408			min	-45.846	10	-91.753	2	-.394	2	0	1	-.002	1	-.366	3
409		15	max	280.103	3	3.99	9	4.912	3	0	3	0	10	.605	2
410			min	-45.73	10	-91.994	2	-.394	2	0	1	-.002	1	-.354	3
411		16	max	317.02	2	446.892	2	4.885	3	0	1	0	3	.62	2
412			min	-22.497	3	-515.266	3	-.423	2	0	15	-.001	1	-.339	3
413		17	max	317.159	2	446.65	2	4.885	3	0	1	.001	3	.523	2
414			min	-22.392	3	-515.447	3	-.423	2	0	15	-.001	1	-.227	3
415		18	max	-11.839	12	1214.82	2	4.467	3	0	12	.002	3	.263	2
416			min	-322.774	1	-523.663	3	-.1	2	0	1	0	1	-.113	3
417		19	max	-11.769	12	1214.578	2	4.467	3	0	12	.003	3	0	3
418			min	-322.634	1	-523.845	3	-.1	2	0	1	0	2	0	2
419	M9	1	max	146.535	1	344.8	3	97.71	1	0	3	-.006	15	0	1
420			min	5.918	15	-290.758	1	4.256	15	0	1	-.152	1	0	3
421		2	max	146.675	1	344.619	3	97.71	1	0	3	-.003	12	.063	1
422			min	5.96	15	-290.999	1	4.256	15	0	1	-.131	1	-.075	3
423		3	max	89.742	3	7.038	9	73.799	1	0	1	.005	3	.125	1
424			min	-9.243	10	-23.35	2	1.068	12	0	15	-.109	1	-.148	3
425		4	max	89.846	3	6.836	9	73.799	1	0	1	.005	3	.126	1
426			min	-9.127	10	-23.592	2	1.068	12	0	15	-.093	1	-.145	3
427		5	max	89.951	3	6.635	9	73.799	1	0	1	.006	3	.127	1
428			min	-9.01	10	-23.834	2	1.068	12	0	15	-.077	1	-.142	3
429		6	max	90.056	3	6.433	9	73.799	1	0	1	.006	3	.128	1
430			min	-8.894	10	-24.076	2	1.068	12	0	15	-.061	1	-.139	3
431		7	max	90.161	3	6.232	9	73.799	1	0	1	.006	3	.133	2
432			min	-8.777	10	-24.318	2	1.068	12	0	15	-.045	1	-.136	3
433		8	max	90.265	3	6.03	9	73.799	1	0	1	.007	3	.138	2
434			min	-8.661	10	-24.56	2	1.068	12	0	15	-.029	1	-.133	3
435		9	max	90.37	3	5.829	9	73.799	1	0	1	.007	3	.143	2
436			min	-8.545	10	-24.801	2	1.068	12	0	15	-.013	1	-.13	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
437		10	max	90.475	3	5.627	9	73.799	1	0	1	.007	3	.149	2
438			min	-8.428	10	-25.043	2	1.068	12	0	15	0	2	-.126	3
439		11	max	90.579	3	5.426	9	73.799	1	0	1	.019	1	.154	2
440			min	-8.312	10	-25.285	2	1.068	12	0	15	0	15	-.123	3
441		12	max	90.684	3	5.224	9	73.799	1	0	1	.035	1	.16	2
442			min	-8.196	10	-25.527	2	1.068	12	0	15	.001	15	-.12	3
443		13	max	90.789	3	5.023	9	73.799	1	0	1	.051	1	.165	2
444			min	-8.079	10	-25.769	2	1.068	12	0	15	.002	15	-.117	3
445		14	max	90.894	3	4.821	9	73.799	1	0	1	.067	1	.171	2
446			min	-7.963	10	-26.011	2	1.068	12	0	15	.003	15	-.113	3
447		15	max	90.998	3	4.62	9	73.799	1	0	1	.083	1	.177	2
448			min	-7.847	10	-26.252	2	1.068	12	0	15	.003	15	-.11	3
449		16	max	95.332	2	102.702	2	74.384	1	0	15	.1	1	.181	2
450			min	-5.947	3	-165.336	3	1.072	12	0	1	.004	15	-.105	3
451		17	max	95.472	2	102.46	2	74.384	1	0	15	.116	1	.159	2
452			min	-5.843	3	-165.517	3	1.072	12	0	1	.005	15	-.069	3
453		18	max	-5.953	15	368.351	2	78.383	1	0	2	.133	1	.08	2
454			min	-146.522	1	-159.093	3	1.399	12	0	3	.005	15	-.035	3
455		19	max	-5.91	15	368.109	2	78.383	1	0	2	.15	1	0	2
456			min	-146.382	1	-159.275	3	1.399	12	0	3	.006	15	0	3
457	M13	1	max	97.967	1	290.297	1	-5.918	15	0	1	.152	1	0	1
458			min	4.257	15	-344.794	3	-146.515	1	0	3	.006	15	0	3
459		2	max	97.967	1	204.762	1	-4.541	15	0	1	.048	1	.237	3
460			min	4.257	15	-243.128	3	-112.307	1	0	3	.002	15	-.199	1
461		3	max	97.967	1	119.227	1	-3.164	15	0	1	.003	3	.392	3
462			min	4.257	15	-141.461	3	-78.099	1	0	3	-.028	1	-.33	1
463		4	max	97.967	1	33.692	1	-1.787	15	0	1	0	12	.465	3
464			min	4.257	15	-39.794	3	-43.891	1	0	3	-.078	1	-.391	1
465		5	max	97.967	1	61.872	3	-.41	15	0	1	-.002	12	.456	3
466			min	4.257	15	-51.842	1	-9.682	1	0	3	-.099	1	-.384	1
467		6	max	97.967	1	163.539	3	24.526	1	0	1	-.003	12	.365	3
468			min	4.257	15	-137.377	1	.194	12	0	3	-.093	1	-.308	1
469		7	max	97.967	1	265.205	3	58.734	1	0	1	-.002	12	.192	3
470			min	4.257	15	-222.912	1	1.53	12	0	3	-.06	1	-.163	1
471		8	max	97.967	1	366.872	3	92.942	1	0	1	.002	2	.051	1
472			min	4.257	15	-308.446	1	2.866	12	0	3	0	3	-.062	3
473		9	max	97.967	1	468.539	3	127.15	1	0	1	.09	1	.334	1
474			min	4.257	15	-393.981	1	4.202	12	0	3	.003	12	-.399	3
475		10	max	97.967	1	570.205	3	161.359	1	0	2	.206	1	.686	1
476			min	4.257	15	-479.516	1	5.538	12	0	1	.007	12	-.817	3
477		11	max	77.975	1	393.981	1	-4.026	12	0	3	.087	1	.334	1
478			min	3.176	15	-468.539	3	-126.485	1	0	1	0	3	-.399	3
479		12	max	77.975	1	308.446	1	-2.69	12	0	3	.001	2	.051	1
480			min	3.176	15	-366.872	3	-92.276	1	0	1	-.004	3	-.062	3
481		13	max	77.975	1	222.912	1	-1.354	12	0	3	-.003	15	.192	3
482			min	3.176	15	-265.205	3	-58.068	1	0	1	-.062	1	-.163	1
483		14	max	77.975	1	137.377	1	.06	3	0	3	-.004	15	.365	3
484			min	3.176	15	-163.539	3	-23.86	1	0	1	-.095	1	-.308	1
485		15	max	77.975	1	51.842	1	10.348	1	0	3	-.004	15	.456	3
486			min	3.176	15	-61.872	3	.44	15	0	1	-.1	1	-.384	1
487		16	max	77.975	1	39.794	3	44.556	1	0	3	-.003	12	.465	3
488			min	3.176	15	-33.693	1	1.817	15	0	1	-.078	1	-.391	1
489		17	max	77.975	1	141.461	3	78.765	1	0	3	0	3	.392	3
490			min	3.176	15	-119.227	1	3.193	15	0	1	-.029	1	-.33	1
491		18	max	77.975	1	243.128	3	112.973	1	0	3	.049	1	.237	3
492			min	3.176	15	-204.762	1	4.57	15	0	1	.002	15	-.199	1
493		19	max	77.975	1	344.794	3	147.181	1	0	3	.153	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
494			min	3.176	15	-290.297	1	5.947	15	0	1	.006	15	0	3
495	M16	1	max	-1.398	12	368.347	2	-5.91	15	0	3	.15	1	0	2
496			min	-78.083	1	-159.303	3	-146.398	1	0	2	.006	15	0	3
497		2	max	-1.398	12	259.828	2	-4.534	15	0	3	.046	1	.109	3
498			min	-78.083	1	-112.49	3	-112.19	1	0	2	.002	15	-.253	2
499		3	max	-1.398	12	151.309	2	-3.157	15	0	3	0	12	.181	3
500			min	-78.083	1	-65.677	3	-77.982	1	0	2	-.03	1	-.419	2
501		4	max	-1.398	12	42.791	2	-1.78	15	0	3	-.003	15	.215	3
502			min	-78.083	1	-18.865	3	-43.774	1	0	2	-.079	1	-.497	2
503		5	max	-1.398	12	27.948	3	-.403	15	0	3	-.004	15	.212	3
504			min	-78.083	1	-65.728	2	-9.566	1	0	2	-.101	1	-.488	2
505		6	max	-1.398	12	74.761	3	24.643	1	0	3	-.004	15	.17	3
506			min	-78.083	1	-174.247	2	.424	12	0	2	-.095	1	-.391	2
507		7	max	-1.398	12	121.574	3	58.851	1	0	3	-.002	15	.091	3
508			min	-78.083	1	-282.766	2	1.76	12	0	2	-.061	1	-.207	2
509		8	max	-1.398	12	168.387	3	93.059	1	0	3	.002	2	.065	2
510			min	-78.083	1	-391.285	2	3.096	12	0	2	-.003	3	-.026	3
511		9	max	-1.398	12	215.199	3	127.267	1	0	3	.089	1	.424	2
512			min	-78.083	1	-499.804	2	4.432	12	0	2	.001	12	-.18	3
513		10	max	-3.256	15	-13.372	15	161.476	1	0	15	.205	1	.87	2
514			min	-79.82	1	-608.323	2	-8.976	3	0	2	.007	12	-.372	3
515		11	max	-3.256	15	499.804	2	-4.666	12	0	2	.089	1	.424	2
516			min	-79.82	1	-215.199	3	-126.918	1	0	3	.003	12	-.18	3
517		12	max	-3.256	15	391.285	2	-3.33	12	0	2	.001	2	.065	2
518			min	-79.82	1	-168.387	3	-92.71	1	0	3	0	3	-.026	3
519		13	max	-3.256	15	282.766	2	-1.994	12	0	2	-.002	15	.091	3
520			min	-79.82	1	-121.574	3	-58.502	1	0	3	-.061	1	-.207	2
521		14	max	-3.256	15	174.247	2	-.658	12	0	2	-.004	12	.17	3
522			min	-79.82	1	-74.761	3	-24.294	1	0	3	-.094	1	-.391	2
523		15	max	-3.256	15	65.728	2	9.915	1	0	2	-.004	12	.212	3
524			min	-79.82	1	-27.948	3	.415	15	0	3	-.1	1	-.488	2
525		16	max	-3.256	15	18.865	3	44.123	1	0	2	-.002	12	.215	3
526			min	-79.82	1	-42.791	2	1.792	15	0	3	-.078	1	-.497	2
527		17	max	-3.256	15	65.677	3	78.331	1	0	2	0	12	.181	3
528			min	-79.82	1	-151.31	2	3.169	15	0	3	-.029	1	-.419	2
529		18	max	-3.256	15	112.49	3	112.539	1	0	2	.048	1	.109	3
530			min	-79.82	1	-259.828	2	4.546	15	0	3	.002	15	-.253	2
531		19	max	-3.256	15	159.303	3	146.748	1	0	2	.153	1	0	2
532			min	-79.82	1	-368.347	2	5.923	15	0	3	.006	15	0	3
533	M15	1	max	0	2	2.536	4	.04	3	0	1	0	1	0	1
534			min	-51.731	3	0	2	-.037	1	0	3	0	3	0	1
535		2	max	0	2	2.254	4	.04	3	0	1	0	1	0	2
536			min	-51.801	3	0	2	-.037	1	0	3	0	3	-.001	4
537		3	max	0	2	1.972	4	.04	3	0	1	0	1	0	2
538			min	-51.872	3	0	2	-.037	1	0	3	0	3	-.002	4
539		4	max	0	2	1.69	4	.04	3	0	1	0	1	0	2
540			min	-51.942	3	0	2	-.037	1	0	3	0	3	-.003	4
541		5	max	0	2	1.409	4	.04	3	0	1	0	1	0	2
542			min	-52.013	3	0	2	-.037	1	0	3	0	3	-.003	4
543		6	max	0	2	1.127	4	.04	3	0	1	0	1	0	2
544			min	-52.083	3	0	2	-.037	1	0	3	0	3	-.004	4
545		7	max	0	2	.845	4	.04	3	0	1	0	3	0	2
546			min	-52.154	3	0	2	-.037	1	0	3	0	1	-.004	4
547		8	max	0	2	.563	4	.04	3	0	1	0	3	0	2
548			min	-52.224	3	0	2	-.037	1	0	3	0	1	-.005	4
549		9	max	0	2	.282	4	.04	3	0	1	0	3	0	2
550			min	-52.295	3	0	2	-.037	1	0	3	0	1	-.005	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
551		10	max	0	2	0	1	.04	3	0	1	0	3	0	2
552			min	-52.365	3	0	1	-.037	1	0	3	0	1	-.005	4
553		11	max	0	2	0	2	.04	3	0	1	0	3	0	2
554			min	-52.436	3	-.282	4	-.037	1	0	3	0	1	-.005	4
555		12	max	0	2	0	2	.04	3	0	1	0	3	0	2
556			min	-52.506	3	-.563	4	-.037	1	0	3	0	1	-.005	4
557		13	max	0	2	0	2	.04	3	0	1	0	3	0	2
558			min	-52.577	3	-.845	4	-.037	1	0	3	0	1	-.004	4
559		14	max	0	2	0	2	.04	3	0	1	0	3	0	2
560			min	-52.647	3	-1.127	4	-.037	1	0	3	0	1	-.004	4
561		15	max	0	2	0	2	.04	3	0	1	0	3	0	2
562			min	-52.718	3	-1.409	4	-.037	1	0	3	0	1	-.003	4
563		16	max	0	2	0	2	.04	3	0	1	0	3	0	2
564			min	-52.788	3	-1.69	4	-.037	1	0	3	0	1	-.003	4
565		17	max	0	2	0	2	.04	3	0	1	0	3	0	2
566			min	-52.859	3	-1.972	4	-.037	1	0	3	0	1	-.002	4
567		18	max	0	2	0	2	.04	3	0	1	0	3	0	2
568			min	-52.929	3	-2.254	4	-.037	1	0	3	0	1	-.001	4
569		19	max	0	2	0	2	.04	3	0	1	0	3	0	1
570			min	-53	3	-2.536	4	-.037	1	0	3	0	1	0	1
571	M16A	1	max	-.887	10	2.536	4	.023	1	0	3	0	3	0	1
572			min	-52.355	3	.596	15	-.016	3	0	2	0	1	0	1
573		2	max	-.808	10	2.254	4	.023	1	0	3	0	3	0	15
574			min	-52.284	3	.53	15	-.016	3	0	2	0	1	-.001	4
575		3	max	-.73	10	1.972	4	.023	1	0	3	0	3	0	15
576			min	-52.214	3	.464	15	-.016	3	0	2	0	1	-.002	4
577		4	max	-.652	10	1.69	4	.023	1	0	3	0	3	0	15
578			min	-52.143	3	.397	15	-.016	3	0	2	0	1	-.003	4
579		5	max	-.573	10	1.409	4	.023	1	0	3	0	3	0	15
580			min	-52.073	3	.331	15	-.016	3	0	2	0	1	-.003	4
581		6	max	-.495	10	1.127	4	.023	1	0	3	0	3	0	15
582			min	-52.002	3	.265	15	-.016	3	0	2	0	1	-.004	4
583		7	max	-.417	10	.845	4	.023	1	0	3	0	3	-.001	15
584			min	-51.932	3	.199	15	-.016	3	0	2	0	1	-.004	4
585		8	max	-.338	10	.563	4	.023	1	0	3	0	3	-.001	15
586			min	-51.861	3	.132	15	-.016	3	0	2	0	1	-.005	4
587		9	max	-.26	10	.282	4	.023	1	0	3	0	3	-.001	15
588			min	-51.791	3	.066	15	-.016	3	0	2	0	1	-.005	4
589		10	max	-.182	10	0	1	.023	1	0	3	0	3	-.001	15
590			min	-51.72	3	0	1	-.016	3	0	2	0	1	-.005	4
591		11	max	-.104	10	-.066	15	.023	1	0	3	0	3	-.001	15
592			min	-51.65	3	-.282	4	-.016	3	0	2	0	1	-.005	4
593		12	max	-.025	10	-.132	15	.023	1	0	3	0	3	-.001	15
594			min	-51.579	3	-.563	4	-.016	3	0	2	0	1	-.005	4
595		13	max	.053	10	-.199	15	.023	1	0	3	0	2	-.001	15
596			min	-51.509	3	-.845	4	-.016	3	0	2	0	3	-.004	4
597		14	max	.131	10	-.265	15	.023	1	0	3	0	1	0	15
598			min	-51.438	3	-1.127	4	-.016	3	0	2	0	3	-.004	4
599		15	max	.21	10	-.331	15	.023	1	0	3	0	1	0	15
600			min	-51.368	3	-1.409	4	-.016	3	0	2	0	3	-.003	4
601		16	max	.288	10	-.397	15	.023	1	0	3	0	1	0	15
602			min	-51.297	3	-1.69	4	-.016	3	0	2	0	3	-.003	4
603		17	max	.366	10	-.464	15	.023	1	0	3	0	1	0	15
604			min	-51.227	3	-1.972	4	-.016	3	0	2	0	3	-.002	4
605		18	max	.445	10	-.53	15	.023	1	0	3	0	1	0	15
606			min	-51.156	3	-2.254	4	-.016	3	0	2	0	3	-.001	4
607		19	max	.523	10	-.596	15	.023	1	0	3	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
608			min	-51.086	3	-2.536	4	-.016	3	0	2	0	3	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.003	1	.009	2	.015	1	-5.114e-5	15	NC	3	NC	3
2			min	-.004	3	-.009	3	0	3	-1.252e-3	1	4195.741	2	2650.555	1
3		2	max	.003	1	.009	2	.014	1	-4.891e-5	15	NC	3	NC	3
4			min	-.003	3	-.009	3	0	3	-1.198e-3	1	4577.808	2	2853.769	1
5		3	max	.003	1	.008	2	.013	1	-4.668e-5	15	NC	3	NC	3
6			min	-.003	3	-.009	3	0	3	-1.144e-3	1	5031.931	2	3093.889	1
7		4	max	.002	1	.007	2	.012	1	-4.445e-5	15	NC	1	NC	3
8			min	-.003	3	-.008	3	0	3	-1.09e-3	1	5575.41	2	3379.709	1
9		5	max	.002	1	.006	2	.011	1	-4.222e-5	15	NC	1	NC	3
10			min	-.003	3	-.008	3	0	3	-1.036e-3	1	6231.274	2	3722.964	1
11		6	max	.002	1	.006	2	.01	1	-4.e-5	15	NC	1	NC	2
12			min	-.003	3	-.007	3	0	3	-9.816e-4	1	7030.68	2	4139.601	1
13		7	max	.002	1	.005	2	.008	1	-3.777e-5	15	NC	1	NC	2
14			min	-.002	3	-.007	3	0	3	-9.274e-4	1	8016.577	2	4651.733	1
15		8	max	.002	1	.004	2	.007	1	-3.554e-5	15	NC	1	NC	2
16			min	-.002	3	-.007	3	0	3	-8.732e-4	1	9249.487	2	5290.76	1
17		9	max	.002	1	.004	2	.006	1	-3.331e-5	15	NC	1	NC	2
18			min	-.002	3	-.006	3	0	3	-8.191e-4	1	NC	1	6102.516	1
19		10	max	.001	1	.003	2	.006	1	-3.108e-5	15	NC	1	NC	2
20			min	-.002	3	-.006	3	0	3	-7.649e-4	1	NC	1	7156.144	1
21		11	max	.001	1	.003	2	.005	1	-2.885e-5	15	NC	1	NC	2
22			min	-.002	3	-.005	3	0	3	-7.108e-4	1	NC	1	8560.127	1
23		12	max	.001	1	.002	2	.004	1	-2.662e-5	15	NC	1	NC	1
24			min	-.001	3	-.005	3	0	3	-6.566e-4	1	NC	1	NC	1
25		13	max	0	1	.002	2	.003	1	-2.439e-5	15	NC	1	NC	1
26			min	-.001	3	-.004	3	0	3	-6.025e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	-2.216e-5	15	NC	1	NC	1
28			min	0	3	-.003	3	0	3	-5.483e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.002	1	-1.993e-5	15	NC	1	NC	1
30			min	0	3	-.003	3	0	3	-4.941e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	.001	1	-1.771e-5	15	NC	1	NC	1
32			min	0	3	-.002	3	0	3	-4.4e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-1.548e-5	15	NC	1	NC	1
34			min	0	3	-.001	3	0	3	-3.858e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-1.325e-5	15	NC	1	NC	1
36			min	0	3	0	3	0	12	-3.317e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-9.085e-6	12	NC	1	NC	1
38			min	0	1	0	1	0	1	-2.775e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.31e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	4.413e-6	12	NC	1	NC	1
41		2	max	0	3	0	2	0	12	1.608e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	6.434e-6	15	NC	1	NC	1
43		3	max	0	3	0	2	0	12	1.907e-4	1	NC	1	NC	1
44			min	0	2	-.002	3	0	1	7.666e-6	15	NC	1	NC	1
45		4	max	0	3	0	2	0	12	2.206e-4	1	NC	1	NC	1
46			min	0	2	-.003	3	-.001	1	8.898e-6	15	NC	1	NC	1
47		5	max	0	3	0	2	0	3	2.505e-4	1	NC	1	NC	1
48			min	0	2	-.003	3	-.001	1	1.013e-5	15	NC	1	NC	1
49		6	max	0	3	0	2	0	3	2.804e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	-.001	1	1.136e-5	15	NC	1	NC	1
51		7	max	0	3	0	2	0	3	3.103e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
52			min	0	2	-.005	3	0	1	1.26e-5	15	NC	1	NC	1
53		8	max	0	3	0	2	0	3	3.402e-4	1	NC	1	NC	1
54			min	0	2	-.006	3	0	1	1.383e-5	15	NC	1	NC	1
55		9	max	0	3	.001	2	0	3	3.701e-4	1	NC	1	NC	1
56			min	0	2	-.006	3	0	1	1.506e-5	15	NC	1	NC	1
57		10	max	.001	3	.002	2	0	1	4.e-4	1	NC	1	NC	1
58			min	0	2	-.007	3	0	15	1.629e-5	15	NC	1	NC	1
59		11	max	.001	3	.002	2	.001	1	4.299e-4	1	NC	1	NC	1
60			min	0	2	-.007	3	0	15	1.752e-5	15	NC	1	NC	1
61		12	max	.001	3	.003	2	.002	1	4.598e-4	1	NC	1	NC	1
62			min	-.001	2	-.008	3	0	15	1.876e-5	15	NC	1	NC	1
63		13	max	.001	3	.004	2	.003	1	4.897e-4	1	NC	1	NC	1
64			min	-.001	2	-.008	3	0	15	1.999e-5	15	NC	1	NC	1
65		14	max	.001	3	.004	2	.004	1	5.195e-4	1	NC	1	NC	1
66			min	-.001	2	-.008	3	0	15	2.122e-5	15	NC	1	NC	1
67		15	max	.002	3	.005	2	.004	1	5.494e-4	1	NC	1	NC	1
68			min	-.001	2	-.008	3	0	15	2.245e-5	15	8813.519	2	NC	1
69		16	max	.002	3	.006	2	.005	1	5.793e-4	1	NC	1	NC	2
70			min	-.001	2	-.008	3	0	15	2.369e-5	15	7475.071	2	8839.01	1
71		17	max	.002	3	.007	2	.006	1	6.092e-4	1	NC	1	NC	2
72			min	-.002	2	-.008	3	0	15	2.492e-5	15	6437.905	2	7577.094	1
73		18	max	.002	3	.008	2	.007	1	6.391e-4	1	NC	3	NC	2
74			min	-.002	2	-.008	3	0	15	2.615e-5	15	5625.272	2	6639.106	1
75		19	max	.002	3	.009	2	.008	1	6.69e-4	1	NC	3	NC	2
76			min	-.002	2	-.008	3	0	15	2.738e-5	15	4983.018	2	5924.559	1
77	M4	1	max	.002	1	.011	2	0	15	-3.905e-5	15	NC	1	NC	3
78			min	0	12	-.009	3	-.006	1	-9.714e-4	1	NC	1	3295.115	1
79		2	max	.002	1	.01	2	0	15	-3.905e-5	15	NC	1	NC	3
80			min	0	12	-.009	3	-.005	1	-9.714e-4	1	NC	1	3594.833	1
81		3	max	.002	1	.01	2	0	15	-3.905e-5	15	NC	1	NC	2
82			min	0	12	-.008	3	-.005	1	-9.714e-4	1	NC	1	3951.539	1
83		4	max	.002	1	.009	2	0	15	-3.905e-5	15	NC	1	NC	2
84			min	0	12	-.008	3	-.004	1	-9.714e-4	1	NC	1	4380.264	1
85		5	max	.002	1	.008	2	0	15	-3.905e-5	15	NC	1	NC	2
86			min	0	12	-.007	3	-.004	1	-9.714e-4	1	NC	1	4901.488	1
87		6	max	.002	1	.008	2	0	15	-3.905e-5	15	NC	1	NC	2
88			min	0	12	-.007	3	-.003	1	-9.714e-4	1	NC	1	5543.695	1
89		7	max	.001	1	.007	2	0	15	-3.905e-5	15	NC	1	NC	2
90			min	0	12	-.006	3	-.003	1	-9.714e-4	1	NC	1	6347.459	1
91		8	max	.001	1	.007	2	0	15	-3.905e-5	15	NC	1	NC	2
92			min	0	12	-.006	3	-.003	1	-9.714e-4	1	NC	1	7372.199	1
93		9	max	.001	1	.006	2	0	15	-3.905e-5	15	NC	1	NC	2
94			min	0	12	-.005	3	-.002	1	-9.714e-4	1	NC	1	8707.8	1
95		10	max	.001	1	.005	2	0	15	-3.905e-5	15	NC	1	NC	1
96			min	0	12	-.005	3	-.002	1	-9.714e-4	1	NC	1	NC	1
97		11	max	0	1	.005	2	0	15	-3.905e-5	15	NC	1	NC	1
98			min	0	12	-.004	3	-.001	1	-9.714e-4	1	NC	1	NC	1
99		12	max	0	1	.004	2	0	15	-3.905e-5	15	NC	1	NC	1
100			min	0	12	-.004	3	-.001	1	-9.714e-4	1	NC	1	NC	1
101		13	max	0	1	.004	2	0	15	-3.905e-5	15	NC	1	NC	1
102			min	0	12	-.003	3	0	1	-9.714e-4	1	NC	1	NC	1
103		14	max	0	1	.003	2	0	15	-3.905e-5	15	NC	1	NC	1
104			min	0	12	-.003	3	0	1	-9.714e-4	1	NC	1	NC	1
105		15	max	0	1	.002	2	0	15	-3.905e-5	15	NC	1	NC	1
106			min	0	12	-.002	3	0	1	-9.714e-4	1	NC	1	NC	1
107		16	max	0	1	.002	2	0	15	-3.905e-5	15	NC	1	NC	1
108			min	0	12	-.002	3	0	1	-9.714e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
109		17	max	0	1	.001	2	0	15	-3.905e-5	15	NC	1	NC	1
110			min	0	12	-.001	3	0	1	-9.714e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	15	-3.905e-5	15	NC	1	NC	1
112			min	0	12	0	3	0	1	-9.714e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-3.905e-5	15	NC	1	NC	1
114			min	0	1	0	1	0	1	-9.714e-4	1	NC	1	NC	1
115	M6	1	max	.009	1	.034	2	.005	1	3.159e-4	3	NC	3	NC	2
116			min	-.012	3	-.03	3	-.004	3	1.216e-6	10	1153.295	2	8120.666	1
117		2	max	.009	1	.032	2	.004	1	3.058e-4	3	NC	3	NC	2
118			min	-.011	3	-.029	3	-.004	3	5.191e-7	10	1233.189	2	8803.252	1
119		3	max	.008	1	.03	2	.004	1	2.957e-4	3	NC	3	NC	2
120			min	-.01	3	-.027	3	-.003	3	-1.773e-7	10	1324.62	2	9610.829	1
121		4	max	.008	1	.028	2	.004	1	2.855e-4	3	NC	3	NC	1
122			min	-.01	3	-.025	3	-.003	3	-8.738e-7	10	1429.891	2	NC	1
123		5	max	.007	1	.025	2	.003	1	2.754e-4	3	NC	3	NC	1
124			min	-.009	3	-.024	3	-.003	3	-3.587e-6	2	1551.968	2	NC	1
125		6	max	.007	1	.023	2	.003	1	2.653e-4	3	NC	3	NC	1
126			min	-.008	3	-.022	3	-.003	3	-6.613e-6	2	1694.731	2	NC	1
127		7	max	.006	1	.021	2	.003	1	2.552e-4	3	NC	3	NC	1
128			min	-.008	3	-.021	3	-.002	3	-9.639e-6	2	1863.357	2	NC	1
129		8	max	.006	1	.019	2	.002	1	2.45e-4	3	NC	3	NC	1
130			min	-.007	3	-.019	3	-.002	3	-1.267e-5	2	2064.909	2	NC	1
131		9	max	.005	1	.017	2	.002	1	2.349e-4	3	NC	3	NC	1
132			min	-.006	3	-.017	3	-.002	3	-1.569e-5	2	2309.271	2	NC	1
133		10	max	.005	1	.015	2	.002	1	2.248e-4	3	NC	3	NC	1
134			min	-.006	3	-.016	3	-.002	3	-1.872e-5	2	2610.722	2	NC	1
135		11	max	.004	1	.013	2	.001	1	2.146e-4	3	NC	3	NC	1
136			min	-.005	3	-.014	3	-.001	3	-2.174e-5	2	2990.67	2	NC	1
137		12	max	.004	1	.011	2	.001	1	2.045e-4	3	NC	3	NC	1
138			min	-.005	3	-.012	3	-.001	3	-2.477e-5	2	3482.749	2	NC	1
139		13	max	.003	1	.01	2	0	1	1.944e-4	3	NC	3	NC	1
140			min	-.004	3	-.011	3	0	3	-2.78e-5	2	4143.001	2	NC	1
141		14	max	.003	1	.008	2	0	1	1.842e-4	3	NC	3	NC	1
142			min	-.003	3	-.009	3	0	3	-3.082e-5	2	5072.272	2	NC	1
143		15	max	.002	1	.006	2	0	1	1.741e-4	3	NC	3	NC	1
144			min	-.003	3	-.007	3	0	3	-3.385e-5	2	6472.216	2	NC	1
145		16	max	.002	1	.004	2	0	1	1.64e-4	3	NC	1	NC	1
146			min	-.002	3	-.005	3	0	3	-3.687e-5	2	8813.284	2	NC	1
147		17	max	.001	1	.003	2	0	1	1.538e-4	3	NC	1	NC	1
148			min	-.001	3	-.004	3	0	3	-3.99e-5	2	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	1.437e-4	3	NC	1	NC	1
150			min	0	3	-.002	3	0	3	-4.293e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.336e-4	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-5.214e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.416e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-6.27e-5	3	NC	1	NC	1
155		2	max	0	3	.002	2	0	3	2.242e-5	1	NC	1	NC	1
156			min	0	2	-.002	3	0	1	-4.595e-5	3	NC	1	NC	1
157		3	max	0	3	.003	2	0	3	2.069e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	1	-2.921e-5	3	NC	1	NC	1
159		4	max	.001	3	.005	2	0	3	1.895e-5	1	NC	1	NC	1
160			min	-.001	2	-.006	3	0	1	-1.246e-5	3	9938.134	2	NC	1
161		5	max	.001	3	.006	2	.001	3	1.722e-5	1	NC	1	NC	1
162			min	-.002	2	-.008	3	0	1	5.539e-7	15	7507.779	2	NC	1
163		6	max	.002	3	.008	2	.001	3	2.102e-5	3	NC	3	NC	1
164			min	-.002	2	-.01	3	0	1	5.995e-7	15	6020.214	2	NC	1
165		7	max	.002	3	.009	2	.001	3	3.777e-5	3	NC	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
166			min	-.002	2	-.012	3	0	1	6.451e-7	15	5006.135	2	NC	1
167		8	max	.002	3	.011	2	.002	3	5.451e-5	3	NC	3	NC	1
168			min	-.003	2	-.013	3	0	1	-2.129e-6	2	4264.926	2	NC	1
169		9	max	.003	3	.012	2	.002	3	7.126e-5	3	NC	3	NC	1
170			min	-.003	2	-.015	3	-.001	1	-5.503e-6	2	3696.566	2	NC	1
171		10	max	.003	3	.014	2	.002	3	8.8e-5	3	NC	3	NC	1
172			min	-.004	2	-.017	3	-.001	1	-8.878e-6	2	3245.602	2	NC	1
173		11	max	.003	3	.016	2	.002	3	1.047e-4	3	NC	3	NC	1
174			min	-.004	2	-.018	3	-.001	1	-1.225e-5	2	2878.759	2	NC	1
175		12	max	.004	3	.018	2	.002	3	1.215e-4	3	NC	3	NC	1
176			min	-.004	2	-.019	3	-.001	1	-1.563e-5	2	2574.786	2	NC	1
177		13	max	.004	3	.02	2	.002	3	1.382e-4	3	NC	3	NC	1
178			min	-.005	2	-.021	3	-.002	1	-1.9e-5	2	2319.395	2	NC	1
179		14	max	.005	3	.022	2	.002	3	1.55e-4	3	NC	3	NC	1
180			min	-.005	2	-.022	3	-.002	1	-2.238e-5	2	2102.563	2	NC	1
181		15	max	.005	3	.024	2	.002	3	1.717e-4	3	NC	3	NC	1
182			min	-.006	2	-.023	3	-.002	1	-2.575e-5	2	1916.996	2	NC	1
183		16	max	.005	3	.026	2	.002	3	1.885e-4	3	NC	3	NC	1
184			min	-.006	2	-.024	3	-.002	1	-2.913e-5	2	1757.227	2	NC	1
185		17	max	.006	3	.028	2	.002	3	2.052e-4	3	NC	3	NC	1
186			min	-.006	2	-.025	3	-.002	1	-3.25e-5	2	1619.052	2	NC	1
187		18	max	.006	3	.031	2	.002	3	2.22e-4	3	NC	3	NC	1
188			min	-.007	2	-.026	3	-.002	1	-3.587e-5	2	1499.174	2	NC	1
189		19	max	.006	3	.033	2	.002	3	2.387e-4	3	NC	3	NC	1
190			min	-.007	2	-.027	3	-.002	1	-3.925e-5	2	1394.966	2	NC	1
191	M8	1	max	.005	1	.039	2	.002	1	-3.678e-6	10	NC	1	NC	2
192			min	0	3	-.03	3	-.001	3	-1.893e-4	3	NC	1	7739.091	1
193		2	max	.005	1	.037	2	.002	1	-3.678e-6	10	NC	1	NC	2
194			min	0	3	-.028	3	-.001	3	-1.893e-4	3	NC	1	8437.689	1
195		3	max	.005	1	.035	2	.002	1	-3.678e-6	10	NC	1	NC	2
196			min	0	3	-.027	3	-.001	3	-1.893e-4	3	NC	1	9269.371	1
197		4	max	.005	1	.033	2	.002	1	-3.678e-6	10	NC	1	NC	1
198			min	0	3	-.025	3	0	3	-1.893e-4	3	NC	1	NC	1
199		5	max	.004	1	.03	2	.002	1	-3.678e-6	10	NC	1	NC	1
200			min	0	3	-.023	3	0	3	-1.893e-4	3	NC	1	NC	1
201		6	max	.004	1	.028	2	.001	1	-3.678e-6	10	NC	1	NC	1
202			min	0	3	-.022	3	0	3	-1.893e-4	3	NC	1	NC	1
203		7	max	.004	1	.026	2	.001	1	-3.678e-6	10	NC	1	NC	1
204			min	0	3	-.02	3	0	3	-1.893e-4	3	NC	1	NC	1
205		8	max	.003	1	.024	2	.001	1	-3.678e-6	10	NC	1	NC	1
206			min	0	3	-.018	3	0	3	-1.893e-4	3	NC	1	NC	1
207		9	max	.003	1	.022	2	0	1	-3.678e-6	10	NC	1	NC	1
208			min	0	3	-.017	3	0	3	-1.893e-4	3	NC	1	NC	1
209		10	max	.003	1	.02	2	0	1	-3.678e-6	10	NC	1	NC	1
210			min	0	3	-.015	3	0	3	-1.893e-4	3	NC	1	NC	1
211		11	max	.002	1	.017	2	0	1	-3.678e-6	10	NC	1	NC	1
212			min	0	3	-.013	3	0	3	-1.893e-4	3	NC	1	NC	1
213		12	max	.002	1	.015	2	0	1	-3.678e-6	10	NC	1	NC	1
214			min	0	3	-.012	3	0	3	-1.893e-4	3	NC	1	NC	1
215		13	max	.002	1	.013	2	0	1	-3.678e-6	10	NC	1	NC	1
216			min	0	3	-.01	3	0	3	-1.893e-4	3	NC	1	NC	1
217		14	max	.002	1	.011	2	0	1	-3.678e-6	10	NC	1	NC	1
218			min	0	3	-.008	3	0	3	-1.893e-4	3	NC	1	NC	1
219		15	max	.001	1	.009	2	0	1	-3.678e-6	10	NC	1	NC	1
220			min	0	3	-.007	3	0	3	-1.893e-4	3	NC	1	NC	1
221		16	max	0	1	.007	2	0	1	-3.678e-6	10	NC	1	NC	1
222			min	0	3	-.005	3	0	3	-1.893e-4	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
223		17	max	0	1	.004	2	0	1	-3.678e-6	10	NC	1	NC	1
224			min	0	3	-.003	3	0	3	-1.893e-4	3	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	-3.678e-6	10	NC	1	NC	1
226			min	0	3	-.002	3	0	3	-1.893e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-3.678e-6	10	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.893e-4	3	NC	1	NC	1
229	M10	1	max	.003	1	.009	2	0	3	1.077e-3	1	NC	3	NC	1
230			min	-.003	3	-.009	3	-.002	1	-3.147e-4	3	4198.332	2	NC	1
231		2	max	.003	1	.009	2	0	3	1.022e-3	1	NC	3	NC	1
232			min	-.003	3	-.009	3	-.002	1	-3.046e-4	3	4580.733	2	NC	1
233		3	max	.003	1	.008	2	0	3	9.665e-4	1	NC	3	NC	1
234			min	-.003	3	-.009	3	-.002	1	-2.945e-4	3	5035.272	2	NC	1
235		4	max	.002	1	.007	2	0	3	9.11e-4	1	NC	1	NC	1
236			min	-.003	3	-.008	3	-.002	1	-2.845e-4	3	5579.272	2	NC	1
237		5	max	.002	1	.006	2	0	3	8.556e-4	1	NC	1	NC	1
238			min	-.003	3	-.008	3	-.002	1	-2.744e-4	3	6235.8	2	NC	1
239		6	max	.002	1	.006	2	0	3	8.001e-4	1	NC	1	NC	1
240			min	-.002	3	-.008	3	-.002	1	-2.643e-4	3	7036.06	2	NC	1
241		7	max	.002	1	.005	2	0	3	7.446e-4	1	NC	1	NC	1
242			min	-.002	3	-.007	3	-.002	1	-2.542e-4	3	8023.072	2	NC	1
243		8	max	.002	1	.004	2	0	3	6.891e-4	1	NC	1	NC	1
244			min	-.002	3	-.007	3	-.001	1	-2.441e-4	3	9257.462	2	NC	1
245		9	max	.002	1	.004	2	0	3	6.337e-4	1	NC	1	NC	1
246			min	-.002	3	-.006	3	-.001	1	-2.341e-4	3	NC	1	NC	1
247		10	max	.001	1	.003	2	0	3	5.782e-4	1	NC	1	NC	1
248			min	-.002	3	-.006	3	-.001	1	-2.24e-4	3	NC	1	NC	1
249		11	max	.001	1	.003	2	0	3	5.227e-4	1	NC	1	NC	1
250			min	-.001	3	-.005	3	0	1	-2.139e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	4.672e-4	1	NC	1	NC	1
252			min	-.001	3	-.005	3	0	1	-2.038e-4	3	NC	1	NC	1
253		13	max	0	1	.002	2	0	3	4.118e-4	1	NC	1	NC	1
254			min	-.001	3	-.004	3	0	1	-1.937e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	3.563e-4	1	NC	1	NC	1
256			min	0	3	-.004	3	0	1	-1.837e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	3.008e-4	1	NC	1	NC	1
258			min	0	3	-.003	3	0	1	-1.736e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	2.453e-4	1	NC	1	NC	1
260			min	0	3	-.002	3	0	1	-1.635e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.899e-4	1	NC	1	NC	1
262			min	0	3	-.001	3	0	1	-1.534e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.344e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-1.433e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	7.891e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.333e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	6.284e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-3.843e-5	1	NC	1	NC	1
269		2	max	0	3	0	2	0	1	4.456e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-9.385e-5	1	NC	1	NC	1
271		3	max	0	3	0	2	0	11	2.629e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.493e-4	1	NC	1	NC	1
273		4	max	0	3	0	2	0	10	8.021e-6	3	NC	1	NC	1
274			min	0	2	-.003	3	0	3	-2.047e-4	1	NC	1	NC	1
275		5	max	0	3	0	2	0	10	-7.097e-6	12	NC	1	NC	1
276			min	0	2	-.004	3	-.001	3	-2.601e-4	1	NC	1	NC	1
277		6	max	0	3	0	2	0	10	-1.275e-5	15	NC	1	NC	1
278			min	0	2	-.004	3	-.001	3	-3.155e-4	1	NC	1	NC	1
279		7	max	0	3	0	2	0	15	-1.51e-5	15	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
280			min	0	2	-.005	3	-.002	1	-3.709e-4	1	NC	1	NC	1
281		8	max	0	3	0	2	0	15	-1.745e-5	15	NC	1	NC	1
282			min	0	2	-.006	3	-.003	1	-4.264e-4	1	NC	1	NC	1
283		9	max	0	3	.001	2	0	15	-1.98e-5	15	NC	1	NC	1
284			min	0	2	-.006	3	-.004	1	-4.818e-4	1	NC	1	NC	1
285		10	max	.001	3	.002	2	0	15	-2.215e-5	15	NC	1	NC	2
286			min	0	2	-.007	3	-.005	1	-5.372e-4	1	NC	1	9691.061	1
287		11	max	.001	3	.002	2	0	15	-2.45e-5	15	NC	1	NC	2
288			min	0	2	-.007	3	-.006	1	-5.926e-4	1	NC	1	7908.062	1
289		12	max	.001	3	.003	2	0	15	-2.685e-5	15	NC	1	NC	2
290			min	-.001	2	-.008	3	-.007	1	-6.48e-4	1	NC	1	6627.168	1
291		13	max	.001	3	.004	2	0	15	-2.92e-5	15	NC	1	NC	2
292			min	-.001	2	-.008	3	-.008	1	-7.035e-4	1	NC	1	5675.782	1
293		14	max	.001	3	.004	2	0	15	-3.155e-5	15	NC	1	NC	2
294			min	-.001	2	-.008	3	-.009	1	-7.589e-4	1	NC	1	4950.26	1
295		15	max	.002	3	.005	2	0	15	-3.39e-5	15	NC	1	NC	2
296			min	-.001	2	-.008	3	-.011	1	-8.143e-4	1	8824.815	2	4385.229	1
297		16	max	.002	3	.006	2	0	15	-3.625e-5	15	NC	1	NC	2
298			min	-.001	2	-.008	3	-.012	1	-8.697e-4	1	7483.818	2	3937.782	1
299		17	max	.002	3	.007	2	0	15	-3.86e-5	15	NC	1	NC	3
300			min	-.002	2	-.008	3	-.013	1	-9.251e-4	1	6444.855	2	3578.817	1
301		18	max	.002	3	.008	2	0	15	-4.094e-5	15	NC	3	NC	3
302			min	-.002	2	-.008	3	-.014	1	-9.806e-4	1	5630.931	2	3288.058	1
303		19	max	.002	3	.009	2	0	15	-4.329e-5	15	NC	3	NC	3
304			min	-.002	2	-.008	3	-.015	1	-1.036e-3	1	4987.736	2	3051.071	1
305	M12	1	max	.002	1	.011	2	.012	1	9.66e-4	1	NC	1	NC	3
306			min	0	12	-.009	3	0	15	4.114e-5	15	NC	1	1547.681	1
307		2	max	.002	1	.01	2	.011	1	9.66e-4	1	NC	1	NC	3
308			min	0	12	-.009	3	0	15	4.114e-5	15	NC	1	1687.905	1
309		3	max	.002	1	.01	2	.01	1	9.66e-4	1	NC	1	NC	3
310			min	0	12	-.008	3	0	15	4.114e-5	15	NC	1	1854.816	1
311		4	max	.002	1	.009	2	.009	1	9.66e-4	1	NC	1	NC	3
312			min	0	12	-.008	3	0	15	4.114e-5	15	NC	1	2055.449	1
313		5	max	.002	1	.008	2	.008	1	9.66e-4	1	NC	1	NC	3
314			min	0	12	-.007	3	0	15	4.114e-5	15	NC	1	2299.389	1
315		6	max	.002	1	.008	2	.007	1	9.66e-4	1	NC	1	NC	3
316			min	0	12	-.007	3	0	15	4.114e-5	15	NC	1	2599.965	1
317		7	max	.001	1	.007	2	.006	1	9.66e-4	1	NC	1	NC	3
318			min	0	12	-.006	3	0	15	4.114e-5	15	NC	1	2976.164	1
319		8	max	.001	1	.007	2	.006	1	9.66e-4	1	NC	1	NC	3
320			min	0	12	-.006	3	0	15	4.114e-5	15	NC	1	3455.791	1
321		9	max	.001	1	.006	2	.005	1	9.66e-4	1	NC	1	NC	2
322			min	0	12	-.005	3	0	15	4.114e-5	15	NC	1	4080.905	1
323		10	max	.001	1	.005	2	.004	1	9.66e-4	1	NC	1	NC	2
324			min	0	12	-.005	3	0	15	4.114e-5	15	NC	1	4917.633	1
325		11	max	0	1	.005	2	.003	1	9.66e-4	1	NC	1	NC	2
326			min	0	12	-.004	3	0	15	4.114e-5	15	NC	1	6074.892	1
327		12	max	0	1	.004	2	.002	1	9.66e-4	1	NC	1	NC	2
328			min	0	12	-.004	3	0	15	4.114e-5	15	NC	1	7742.696	1
329		13	max	0	1	.004	2	.002	1	9.66e-4	1	NC	1	NC	1
330			min	0	12	-.003	3	0	15	4.114e-5	15	NC	1	NC	1
331		14	max	0	1	.003	2	.001	1	9.66e-4	1	NC	1	NC	1
332			min	0	12	-.003	3	0	15	4.114e-5	15	NC	1	NC	1
333		15	max	0	1	.002	2	0	1	9.66e-4	1	NC	1	NC	1
334			min	0	12	-.002	3	0	15	4.114e-5	15	NC	1	NC	1
335		16	max	0	1	.002	2	0	1	9.66e-4	1	NC	1	NC	1
336			min	0	12	-.002	3	0	15	4.114e-5	15	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
337		17	max	0	1	.001	2	0	1	9.66e-4	1	NC	1	NC	1
338			min	0	12	-.001	3	0	15	4.114e-5	15	NC	1	NC	1
339		18	max	0	1	0	2	0	1	9.66e-4	1	NC	1	NC	1
340			min	0	12	0	3	0	15	4.114e-5	15	NC	1	NC	1
341		19	max	0	1	0	1	0	1	9.66e-4	1	NC	1	NC	1
342			min	0	1	0	1	0	1	4.114e-5	15	NC	1	NC	1
343	M1	1	max	.008	3	.025	3	.002	3	2.09e-2	1	NC	1	NC	1
344			min	-.009	2	-.023	2	-.005	1	-2.468e-2	3	NC	1	NC	1
345		2	max	.008	3	.015	3	.001	3	9.979e-3	1	NC	4	NC	2
346			min	-.009	2	-.013	2	-.011	1	-1.222e-2	3	4622.042	2	7820.557	1
347		3	max	.008	3	.005	3	0	3	-5.088e-7	3	NC	4	NC	2
348			min	-.009	2	-.004	2	-.015	1	-7.353e-4	1	2372.433	2	4744.195	1
349		4	max	.008	3	.004	1	0	3	4.712e-6	3	NC	4	NC	2
350			min	-.009	2	-.003	3	-.017	1	-6.296e-4	1	1659.757	2	3927.794	1
351		5	max	.008	3	.011	2	0	3	9.933e-6	3	NC	5	NC	3
352			min	-.009	2	-.009	3	-.017	1	-5.238e-4	1	1314.932	2	3774.288	1
353		6	max	.008	3	.017	2	0	3	1.515e-5	3	NC	5	NC	2
354			min	-.009	2	-.015	3	-.016	1	-4.181e-4	1	1117.991	2	4042.724	1
355		7	max	.008	3	.022	2	0	3	2.037e-5	3	NC	5	NC	2
356			min	-.009	2	-.019	3	-.014	1	-3.123e-4	1	996.603	2	4821.627	1
357		8	max	.008	3	.025	2	0	3	2.56e-5	3	NC	5	NC	2
358			min	-.009	2	-.022	3	-.012	1	-2.066e-4	1	920.55	2	6639.646	1
359		9	max	.008	3	.027	2	0	3	3.082e-5	3	NC	5	NC	1
360			min	-.009	2	-.023	3	-.008	1	-1.009e-4	1	875.566	2	NC	1
361		10	max	.008	3	.028	2	0	3	3.604e-5	3	NC	5	NC	1
362			min	-.009	2	-.024	3	-.005	1	6.766e-8	11	854.852	2	NC	1
363		11	max	.008	3	.028	2	0	3	1.106e-4	1	NC	5	NC	1
364			min	-.009	2	-.023	3	-.001	1	4.871e-6	15	855.965	2	NC	1
365		12	max	.008	3	.026	2	.002	1	2.163e-4	1	NC	5	NC	2
366			min	-.009	2	-.021	3	0	15	9.15e-6	15	879.905	2	7457.4	1
367		13	max	.008	3	.023	2	.005	1	3.221e-4	1	NC	5	NC	2
368			min	-.009	2	-.018	3	0	15	1.343e-5	15	931.658	2	5209.044	1
369		14	max	.008	3	.018	2	.007	1	4.278e-4	1	NC	5	NC	2
370			min	-.009	2	-.014	3	0	15	1.771e-5	15	1022.717	2	4283.4	1
371		15	max	.008	3	.011	2	.008	1	5.335e-4	1	NC	5	NC	2
372			min	-.009	2	-.009	3	0	15	2.199e-5	15	1178.295	2	3952.339	1
373		16	max	.008	3	.003	2	.008	1	6.073e-4	1	NC	4	NC	2
374			min	-.009	2	-.003	3	0	15	2.499e-5	15	1460.017	2	4078.776	1
375		17	max	.008	3	.004	3	.006	1	3.014e-5	3	NC	4	NC	2
376			min	-.009	2	-.007	2	0	15	-7.95e-5	1	2064.711	2	4898.519	1
377		18	max	.008	3	.012	3	.002	1	1.313e-2	2	NC	4	NC	2
378			min	-.009	2	-.018	2	0	15	-5.781e-3	3	3999.039	2	8043.346	1
379		19	max	.008	3	.02	3	0	3	2.654e-2	2	NC	1	NC	1
380			min	-.009	2	-.03	2	-.003	1	-1.17e-2	3	NC	1	NC	1
381	M5	1	max	.027	3	.082	3	.002	3	1.486e-6	3	NC	1	NC	1
382			min	-.032	2	-.078	2	-.006	1	4.908e-8	10	NC	1	NC	1
383		2	max	.027	3	.048	3	.003	3	8.529e-5	3	NC	5	NC	1
384			min	-.032	2	-.045	2	-.005	1	-6.527e-5	1	1374.048	2	NC	1
385		3	max	.027	3	.017	3	.004	3	1.675e-4	3	NC	5	NC	1
386			min	-.032	2	-.014	2	-.005	1	-1.3e-4	1	704.844	2	NC	1
387		4	max	.027	3	.013	2	.004	3	1.624e-4	3	NC	5	NC	1
388			min	-.032	2	-.009	3	-.004	1	-1.235e-4	1	492.569	2	NC	1
389		5	max	.027	3	.037	2	.005	3	1.574e-4	3	NC	5	NC	1
390			min	-.032	2	-.03	3	-.004	1	-1.171e-4	1	389.809	2	NC	1
391		6	max	.027	3	.057	2	.005	3	1.524e-4	3	NC	15	NC	1
392			min	-.032	2	-.048	3	-.004	1	-1.106e-4	1	331.083	2	NC	1
393		7	max	.027	3	.073	2	.005	3	1.473e-4	3	NC	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
394			min	-.032	2	-.061	3	-.003	1	-1.042e-4	1	294.849	2	NC	1
395		8	max	.027	3	.085	2	.005	3	1.423e-4	3	NC	15	NC	1
396			min	-.032	2	-.07	3	-.003	1	-9.774e-5	1	272.105	2	NC	1
397		9	max	.026	3	.092	2	.005	3	1.373e-4	3	NC	15	NC	1
398			min	-.032	2	-.075	3	-.003	1	-9.129e-5	1	258.597	2	NC	1
399		10	max	.026	3	.096	2	.005	3	1.323e-4	3	NC	15	NC	1
400			min	-.032	2	-.077	3	-.003	1	-8.483e-5	1	252.294	2	NC	1
401		11	max	.026	3	.094	2	.004	3	1.272e-4	3	NC	15	NC	1
402			min	-.032	2	-.074	3	-.002	1	-7.838e-5	1	252.462	2	NC	1
403		12	max	.026	3	.088	2	.004	3	1.222e-4	3	NC	15	NC	1
404			min	-.032	2	-.068	3	-.002	1	-7.193e-5	1	259.384	2	NC	1
405		13	max	.026	3	.077	2	.004	3	1.172e-4	3	NC	15	NC	1
406			min	-.032	2	-.058	3	-.002	1	-6.547e-5	1	274.528	2	NC	1
407		14	max	.026	3	.06	2	.003	3	1.121e-4	3	NC	15	NC	1
408			min	-.032	2	-.045	3	-.002	1	-5.902e-5	1	301.288	2	NC	1
409		15	max	.026	3	.038	2	.002	3	1.071e-4	3	NC	5	NC	1
410			min	-.032	2	-.028	3	-.002	1	-5.257e-5	1	347.125	2	NC	1
411		16	max	.026	3	.011	2	.002	3	9.815e-5	3	NC	5	NC	1
412			min	-.032	2	-.009	3	-.002	1	-5.371e-5	1	430.334	2	NC	1
413		17	max	.026	3	.015	3	.001	3	-2.843e-6	12	NC	5	NC	1
414			min	-.032	2	-.023	2	-.002	1	-2.356e-4	1	609.863	2	NC	1
415		18	max	.026	3	.04	3	0	3	-2.127e-6	12	NC	5	NC	1
416			min	-.032	2	-.061	2	-.003	1	-1.206e-4	1	1182.369	2	NC	1
417		19	max	.026	3	.066	3	0	3	-3.285e-8	15	NC	1	NC	1
418			min	-.032	2	-.102	2	-.003	1	-2.931e-7	3	NC	1	NC	1
419	M9	1	max	.008	3	.025	3	.002	3	2.468e-2	3	NC	1	NC	1
420			min	-.009	2	-.023	2	-.007	1	-2.09e-2	1	NC	1	NC	1
421		2	max	.008	3	.015	3	0	3	1.221e-2	3	NC	4	NC	2
422			min	-.009	2	-.013	2	-.001	1	-1.023e-2	1	4624.12	2	8887.218	1
423		3	max	.008	3	.005	3	.002	1	2.455e-4	1	NC	4	NC	2
424			min	-.009	2	-.004	2	0	3	-3.22e-5	3	2373.527	2	5500.071	1
425		4	max	.008	3	.004	2	.004	1	1.561e-4	1	NC	4	NC	2
426			min	-.009	2	-.003	3	0	3	-3.934e-5	3	1660.537	2	4645.794	1
427		5	max	.008	3	.011	2	.004	1	6.66e-5	1	NC	5	NC	2
428			min	-.009	2	-.009	3	-.002	3	-4.648e-5	3	1315.548	2	4584.997	1
429		6	max	.008	3	.017	2	.004	1	9.878e-6	2	NC	5	NC	2
430			min	-.009	2	-.015	3	-.002	3	-5.363e-5	3	1118.507	2	5111.927	1
431		7	max	.008	3	.022	2	.002	1	-2.085e-7	10	NC	5	NC	2
432			min	-.009	2	-.019	3	-.003	3	-1.123e-4	1	997.056	2	6531.243	1
433		8	max	.008	3	.025	2	0	2	-8.244e-6	15	NC	5	NC	1
434			min	-.009	2	-.022	3	-.003	3	-2.017e-4	1	920.961	2	NC	1
435		9	max	.008	3	.027	2	0	10	-1.188e-5	15	NC	5	NC	1
436			min	-.009	2	-.023	3	-.003	3	-2.912e-4	1	875.948	2	NC	1
437		10	max	.008	3	.028	2	0	10	-1.551e-5	15	NC	5	NC	1
438			min	-.009	2	-.024	3	-.006	1	-3.806e-4	1	855.217	2	NC	1
439		11	max	.008	3	.028	2	0	15	-1.915e-5	15	NC	5	NC	2
440			min	-.009	2	-.023	3	-.009	1	-4.701e-4	1	856.322	2	8937.68	1
441		12	max	.008	3	.026	2	0	15	-2.278e-5	15	NC	5	NC	2
442			min	-.009	2	-.021	3	-.012	1	-5.595e-4	1	880.263	2	5696.743	1
443		13	max	.008	3	.023	2	0	15	-2.642e-5	15	NC	5	NC	2
444			min	-.009	2	-.018	3	-.014	1	-6.49e-4	1	932.027	2	4393.29	1
445		14	max	.008	3	.018	2	0	15	-3.005e-5	15	NC	5	NC	3
446			min	-.009	2	-.014	3	-.016	1	-7.384e-4	1	1023.111	2	3804.28	1
447		15	max	.008	3	.011	2	0	15	-3.369e-5	15	NC	5	NC	3
448			min	-.009	2	-.009	3	-.016	1	-8.279e-4	1	1178.734	2	3623.215	1
449		16	max	.008	3	.003	2	0	15	-3.626e-5	15	NC	4	NC	3
450			min	-.009	2	-.003	3	-.015	1	-8.923e-4	1	1460.54	2	3819.277	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
451		17	max	.008	3	.005	3	0	15	3.236e-5	3	NC	4	NC	2
452			min	-.009	2	-.007	2	-.013	1	-3.611e-4	1	2065.401	2	4656.645	1
453		18	max	.008	3	.012	3	0	15	5.813e-3	3	NC	4	NC	2
454			min	-.009	2	-.018	2	-.008	1	-1.322e-2	2	4000.333	2	7731.624	1
455		19	max	.008	3	.02	3	0	3	1.17e-2	3	NC	1	NC	1
456			min	-.009	2	-.03	2	-.002	1	-2.654e-2	2	NC	1	NC	1
457	M13	1	max	.007	1	.025	3	.008	3	3.856e-3	3	NC	1	NC	1
458			min	-.002	3	-.023	2	-.009	2	-3.704e-3	2	NC	1	NC	1
459		2	max	.007	1	.255	3	.043	1	4.833e-3	3	NC	5	NC	3
460			min	-.002	3	-.218	1	0	10	-4.675e-3	2	755.26	3	3686.451	1
461		3	max	.007	1	.443	3	.109	1	5.809e-3	3	NC	5	NC	3
462			min	-.002	3	-.377	1	.005	15	-5.647e-3	2	415.768	3	1529.038	1
463		4	max	.007	1	.561	3	.166	1	6.786e-3	3	NC	15	NC	3
464			min	-.002	3	-.477	1	.007	15	-6.618e-3	2	324.699	3	1021.549	1
465		5	max	.007	1	.594	3	.194	1	7.762e-3	3	NC	15	NC	3
466			min	-.002	3	-.506	1	.008	15	-7.589e-3	2	305.745	3	879.136	1
467		6	max	.006	1	.545	3	.184	1	8.739e-3	3	NC	15	NC	3
468			min	-.002	3	-.465	1	.008	15	-8.56e-3	2	334.746	3	924.136	1
469		7	max	.006	1	.43	3	.139	1	9.715e-3	3	NC	5	NC	3
470			min	-.002	3	-.369	1	.002	10	-9.541e-3	1	429.994	3	1210.746	1
471		8	max	.006	1	.28	3	.073	1	1.069e-2	3	NC	5	NC	3
472			min	-.002	3	-.244	1	-.006	10	-1.053e-2	1	681.223	3	2257.044	1
473		9	max	.006	1	.144	3	.025	3	1.167e-2	3	NC	5	NC	1
474			min	-.002	3	-.13	1	-.019	2	-1.151e-2	1	1463.511	3	NC	1
475		10	max	.006	1	.082	3	.027	3	1.264e-2	3	NC	4	NC	4
476			min	-.002	3	-.078	2	-.032	2	-1.25e-2	1	3057.207	3	7554.791	2
477		11	max	.006	1	.144	3	.031	3	1.167e-2	3	NC	5	NC	1
478			min	-.002	3	-.13	1	-.018	2	-1.151e-2	1	1463.509	3	7770.664	3
479		12	max	.006	1	.28	3	.078	1	1.069e-2	3	NC	5	NC	5
480			min	-.002	3	-.244	1	-.006	10	-1.053e-2	1	681.223	3	2110.605	1
481		13	max	.006	1	.43	3	.146	1	9.717e-3	3	NC	5	NC	5
482			min	-.002	3	-.369	1	.002	10	-9.541e-3	1	429.994	3	1160.217	1
483		14	max	.006	1	.545	3	.19	1	8.742e-3	3	NC	15	NC	5
484			min	-.002	3	-.465	1	.008	15	-8.561e-3	2	334.746	3	894.364	1
485		15	max	.006	1	.594	3	.199	1	7.766e-3	3	NC	15	NC	5
486			min	-.002	3	-.506	1	.008	15	-7.59e-3	2	305.745	3	855.026	1
487		16	max	.006	1	.561	3	.17	1	6.79e-3	3	NC	15	NC	5
488			min	-.002	3	-.477	1	.007	15	-6.619e-3	2	324.699	3	995.798	1
489		17	max	.005	1	.444	3	.112	1	5.815e-3	3	NC	5	NC	3
490			min	-.002	3	-.377	1	.005	15	-5.647e-3	2	415.768	3	1490.464	1
491		18	max	.005	1	.255	3	.044	1	4.839e-3	3	NC	5	NC	3
492			min	-.002	3	-.217	1	0	10	-4.676e-3	2	755.259	3	3579.652	1
493		19	max	.005	1	.025	3	.008	3	3.863e-3	3	NC	1	NC	1
494			min	-.002	3	-.023	2	-.009	2	-3.705e-3	2	NC	1	NC	1
495	M16	1	max	.002	1	.02	3	.008	3	4.583e-3	2	NC	1	NC	1
496			min	0	3	-.03	2	-.009	2	-3.091e-3	3	NC	1	NC	1
497		2	max	.002	1	.13	3	.045	1	5.799e-3	2	NC	5	NC	3
498			min	0	3	-.278	2	0	10	-3.86e-3	3	702.212	2	3501.909	1
499		3	max	.002	1	.22	3	.113	1	7.015e-3	2	NC	5	NC	3
500			min	0	3	-.48	2	.005	15	-4.629e-3	3	386.31	2	1473.823	1
501		4	max	.002	1	.277	3	.171	1	8.232e-3	2	NC	15	NC	5
502			min	0	3	-.607	2	.007	15	-5.398e-3	3	301.329	2	990.36	1
503		5	max	.002	1	.295	3	.199	1	9.448e-3	2	NC	15	NC	5
504			min	0	3	-.644	2	.008	15	-6.167e-3	3	283.158	2	853.998	1
505		6	max	.002	1	.274	3	.189	1	1.066e-2	2	NC	15	NC	5
506			min	0	3	-.593	2	.008	15	-6.936e-3	3	308.903	2	897.052	1
507		7	max	.002	1	.223	3	.144	1	1.188e-2	2	NC	5	NC	5

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
508			min	0	3	-.472	2	.003	10	-7.705e-3	3	394.057	2	1170.219	1
509		8	max	.003	1	.156	3	.076	1	1.31e-2	2	NC	5	NC	5
510			min	0	3	-.313	2	-.006	10	-8.474e-3	3	614.474	2	2152.641	1
511		9	max	.003	1	.094	3	.029	3	1.431e-2	2	NC	5	NC	1
512			min	0	3	-.168	2	-.019	2	-9.243e-3	3	1260.775	2	8418.885	3
513		10	max	.003	1	.066	3	.026	3	1.553e-2	2	NC	4	NC	4
514			min	0	3	-.102	2	-.032	2	-1.001e-2	3	2414.722	2	7587.109	2
515		11	max	.003	1	.094	3	.026	3	1.431e-2	2	NC	5	NC	1
516			min	0	3	-.168	2	-.018	2	-9.243e-3	3	1260.775	2	9913.147	3
517		12	max	.003	1	.156	3	.074	1	1.31e-2	2	NC	5	NC	5
518			min	0	3	-.313	2	-.006	10	-8.473e-3	3	614.474	2	2198.374	1
519		13	max	.003	1	.223	3	.142	1	1.188e-2	2	NC	5	NC	5
520			min	0	3	-.472	2	.003	10	-7.703e-3	3	394.057	2	1190.117	1
521		14	max	.003	1	.274	3	.186	1	1.066e-2	2	NC	15	NC	5
522			min	0	3	-.593	2	.008	15	-6.933e-3	3	308.904	2	911.728	1
523		15	max	.003	1	.295	3	.196	1	9.449e-3	2	NC	15	NC	5
524			min	0	3	-.644	2	.008	15	-6.163e-3	3	283.158	2	868.849	1
525		16	max	.003	1	.277	3	.168	1	8.233e-3	2	NC	15	NC	3
526			min	0	3	-.607	2	.007	15	-5.393e-3	3	301.329	2	1010.246	1
527		17	max	.003	1	.219	3	.11	1	7.017e-3	2	NC	5	NC	3
528			min	0	3	-.48	2	.005	15	-4.624e-3	3	386.31	2	1511.487	1
529		18	max	.003	1	.13	3	.043	1	5.801e-3	2	NC	5	NC	3
530			min	0	3	-.278	2	0	10	-3.854e-3	3	702.212	2	3635.447	1
531		19	max	.003	1	.02	3	.008	3	4.585e-3	2	NC	1	NC	1
532			min	0	3	-.03	2	-.009	2	-3.084e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.763e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-6.837e-5	2	NC	1	NC	1
535		2	max	0	3	-.004	15	.001	1	9.013e-4	3	NC	5	NC	1
536			min	0	10	-.018	4	0	3	-6.292e-4	2	5336.546	4	NC	1
537		3	max	0	3	-.008	15	.004	1	1.426e-3	3	NC	15	NC	1
538			min	0	10	-.035	4	-.004	3	-1.19e-3	2	2715.586	4	NC	1
539		4	max	0	3	-.012	15	.008	1	1.951e-3	3	7925.685	15	NC	4
540			min	0	10	-.051	4	-.008	3	-1.751e-3	2	1863.051	4	7313.115	2
541		5	max	0	3	-.015	15	.013	1	2.476e-3	3	6184.492	15	NC	4
542			min	0	10	-.066	4	-.013	3	-2.312e-3	2	1453.757	4	4833.873	3
543		6	max	0	3	-.018	15	.018	1	3.001e-3	3	5204.904	15	NC	4
544			min	0	10	-.078	4	-.018	3	-2.873e-3	2	1223.49	4	3526.538	3
545		7	max	0	3	-.021	15	.024	1	3.527e-3	3	4615.811	15	NC	4
546			min	0	10	-.088	4	-.024	3	-3.434e-3	2	1085.015	4	2760.725	3
547		8	max	0	3	-.022	15	.029	1	4.052e-3	3	4262.266	15	NC	4
548			min	0	10	-.096	4	-.029	3	-3.994e-3	2	1001.909	4	2278.726	3
549		9	max	0	3	-.024	15	.034	1	4.577e-3	3	4071.968	15	NC	4
550			min	0	10	-.1	4	-.034	3	-4.555e-3	2	957.177	4	1963.062	3
551		10	max	0	3	-.024	15	.038	1	5.102e-3	3	4011.766	15	NC	4
552			min	0	10	-.102	4	-.038	3	-5.116e-3	2	943.026	4	1754.654	3
553		11	max	0	3	-.024	15	.04	1	5.627e-3	3	4071.968	15	NC	5
554			min	0	10	-.101	4	-.041	3	-5.677e-3	2	957.177	4	1622.467	3
555		12	max	0	3	-.023	15	.041	1	6.152e-3	3	4262.266	15	NC	5
556			min	0	10	-.096	4	-.042	3	-6.238e-3	2	1001.909	4	1551.118	3
557		13	max	0	3	-.021	15	.04	1	6.677e-3	3	4615.811	15	NC	5
558			min	0	10	-.089	4	-.041	3	-6.799e-3	2	1085.015	4	1536.206	3
559		14	max	0	3	-.018	15	.037	1	7.202e-3	3	5204.904	15	NC	5
560			min	0	10	-.079	4	-.037	3	-7.36e-3	2	1223.49	4	1584.508	3
561		15	max	.001	3	-.016	15	.031	1	7.727e-3	3	6184.492	15	NC	4
562			min	0	10	-.067	4	-.03	3	-7.921e-3	2	1453.757	4	1720.714	3
563		16	max	.001	3	-.012	15	.022	1	8.252e-3	3	7925.685	15	NC	4
564			min	-.001	10	-.052	4	-.02	3	-8.481e-3	2	1863.051	4	2011.769	3

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
565		17	max	.001	3	-.008	15	.009	1	8.777e-3	3	NC	15	NC	4
566			min	-.001	10	-.036	4	-.007	3	-9.042e-3	2	2715.586	4	2667.641	3
567		18	max	.001	3	-.004	15	.011	3	9.302e-3	3	NC	5	NC	4
568			min	-.001	10	-.019	4	-.014	2	-9.603e-3	2	5336.546	4	4750.412	3
569		19	max	.001	3	.004	2	.032	3	9.827e-3	3	NC	1	NC	1
570			min	-.001	10	-.003	9	-.035	2	-1.016e-2	2	NC	1	NC	1
571	M16A	1	max	0	10	0	10	.01	3	2.909e-3	3	NC	1	NC	1
572			min	-.001	3	-.002	9	-.01	2	-2.816e-3	2	NC	1	NC	1
573		2	max	0	10	-.004	15	.004	1	2.792e-3	3	NC	5	NC	2
574			min	-.001	3	-.019	4	-.002	10	-2.693e-3	2	5336.546	4	9565.214	1
575		3	max	0	10	-.008	15	.012	1	2.674e-3	3	NC	15	NC	4
576			min	-.001	3	-.036	4	-.003	3	-2.57e-3	2	2715.586	4	5408.571	1
577		4	max	0	10	-.012	15	.018	1	2.556e-3	3	7925.685	15	NC	4
578			min	-.001	3	-.052	4	-.008	3	-2.447e-3	2	1863.051	4	4110.662	1
579		5	max	0	10	-.016	15	.022	1	2.438e-3	3	6184.492	15	NC	4
580			min	-.001	3	-.066	4	-.011	3	-2.323e-3	2	1453.757	4	3547.217	1
581		6	max	0	10	-.018	15	.025	1	2.32e-3	3	5204.904	15	NC	4
582			min	0	3	-.079	4	-.013	3	-2.2e-3	2	1223.49	4	3299.821	1
583		7	max	0	10	-.021	15	.025	1	2.203e-3	3	4615.811	15	NC	4
584			min	0	3	-.089	4	-.013	3	-2.077e-3	2	1085.015	4	3237.21	1
585		8	max	0	10	-.022	15	.025	1	2.085e-3	3	4262.266	15	NC	4
586			min	0	3	-.096	4	-.013	3	-1.954e-3	2	1001.909	4	3314.265	1
587		9	max	0	10	-.024	15	.024	1	1.967e-3	3	4071.968	15	NC	4
588			min	0	3	-.1	4	-.013	3	-1.831e-3	2	957.177	4	3524.452	1
589		10	max	0	10	-.024	15	.022	1	1.849e-3	3	4011.766	15	NC	4
590			min	0	3	-.102	4	-.011	3	-1.708e-3	2	943.026	4	3888.671	1
591		11	max	0	10	-.024	15	.019	1	1.732e-3	3	4071.968	15	NC	4
592			min	0	3	-.1	4	-.01	3	-1.585e-3	2	957.177	4	4459.648	1
593		12	max	0	10	-.022	15	.016	1	1.614e-3	3	4262.266	15	NC	4
594			min	0	3	-.096	4	-.008	3	-1.461e-3	2	1001.909	4	5342.158	1
595		13	max	0	10	-.021	15	.012	1	1.496e-3	3	4615.811	15	NC	3
596			min	0	3	-.088	4	-.006	3	-1.338e-3	2	1085.015	4	6744.886	1
597		14	max	0	10	-.018	15	.009	1	1.378e-3	3	5204.904	15	NC	2
598			min	0	3	-.078	4	-.004	3	-1.215e-3	2	1223.49	4	9117.868	1
599		15	max	0	10	-.015	15	.006	1	1.26e-3	3	6184.492	15	NC	1
600			min	0	3	-.066	4	-.002	3	-1.092e-3	2	1453.757	4	NC	1
601		16	max	0	10	-.012	15	.003	1	1.143e-3	3	7925.685	15	NC	1
602			min	0	3	-.051	4	0	3	-9.689e-4	2	1863.051	4	NC	1
603		17	max	0	10	-.008	15	.001	9	1.025e-3	3	NC	15	NC	1
604			min	0	3	-.035	4	0	10	-8.458e-4	2	2715.586	4	NC	1
605		18	max	0	10	-.004	15	0	3	9.069e-4	3	NC	5	NC	1
606			min	0	3	-.018	4	0	2	-7.227e-4	2	5336.546	4	NC	1
607		19	max	0	1	0	1	0	1	7.891e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.995e-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:			

SIMPSON Strong-Tie

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

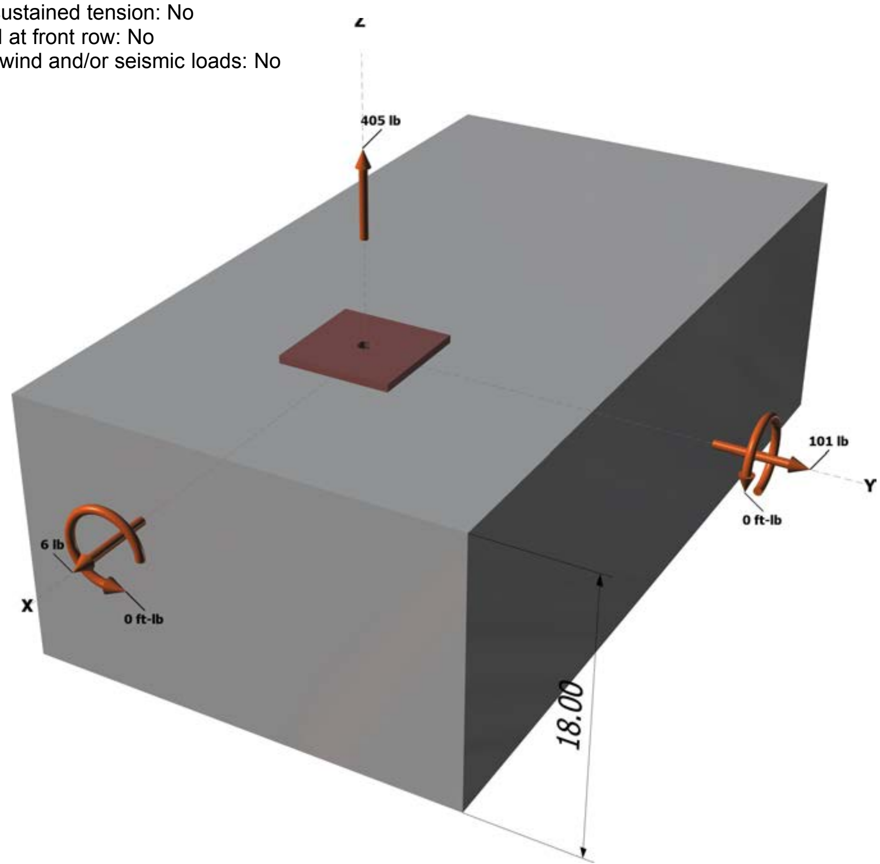
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

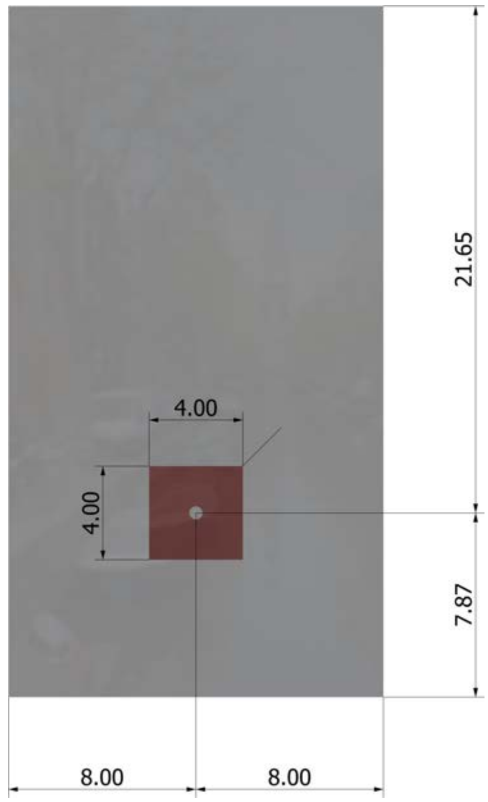


SIMPSON Strong-Tie

Anchor Designer™
Software
Version 2.4.5673.0

Company:	Schletter, Inc.	Date:	12/10/2015
Engineer:	HCV	Page:	2/5
Project:	Standard PVMini - Worst Case		
Address:			
Phone:			
E-mail:			

<Figure 2>



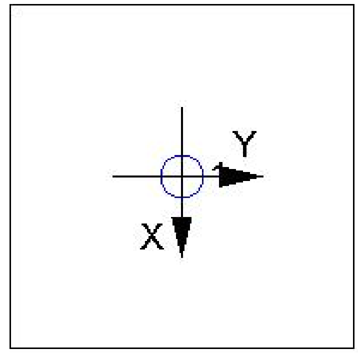
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	405.0	6.0	101.0	101.2
Sum	405.0	6.0	101.0	101.2

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 405
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

k_c	λ	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	5.333	10469

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cb} (lb)
253.92	256.00	0.995	1.00	1.000	10469	0.65	6717

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	8.00	8488

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cby} (lb)
238.44	288.00	0.897	1.000	1.000	8488	0.70	4411

Shear perpendicular to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
188.88	278.72	0.903	1.000	1.000	8282	0.70	3549

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	8.00	8488

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
238.44	288.00	1.000	1.000	1.000	8488	0.70	9838

Shear parallel to edge in y-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cby} (lb)
188.88	278.72	1.000	1.000	1.000	8282	0.70	7858

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

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

Anchor Designer™
Software
Version 2.4.5673.0

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

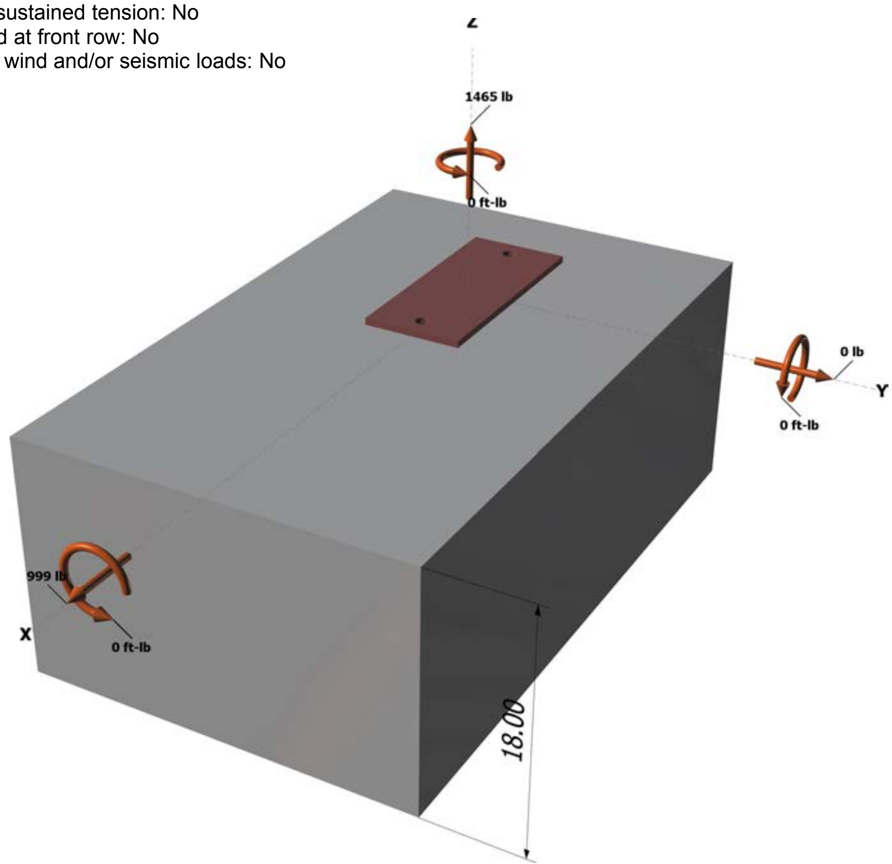
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

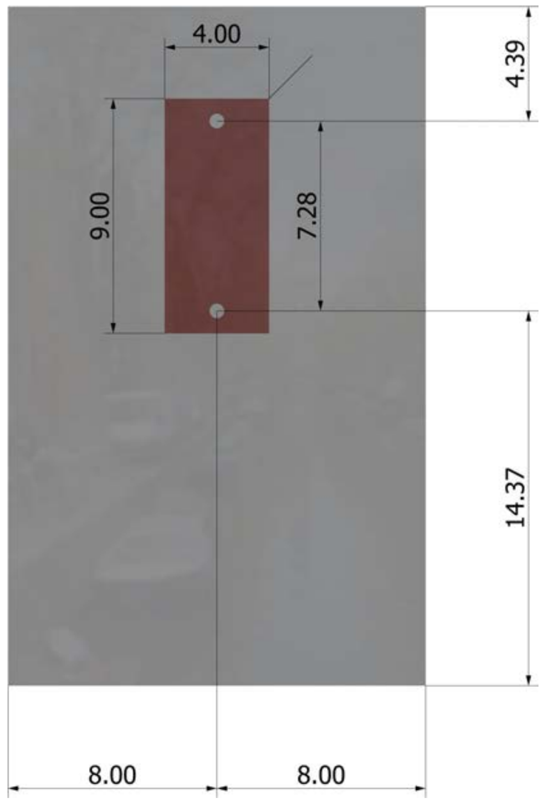
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



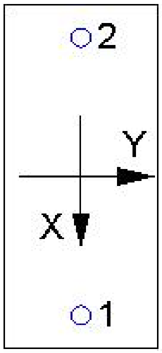
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	732.5	499.5	0.0	499.5
2	732.5	499.5	0.0	499.5
Sum	1465.0	999.0	0.0	999.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1465
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

k_c	λ	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	5.333	10469

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
314.72	256.00	1.000	0.865	1.00	1.000	10469	0.65	7233

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

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

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

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

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

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

A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0}(lb)	ϕ	ϕN_{ag} (lb)
177.03	109.66	0.952	1.021	1.000	1.000	9755	0.55	8418

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, $øN_n$ (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, $øV_n$ (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.