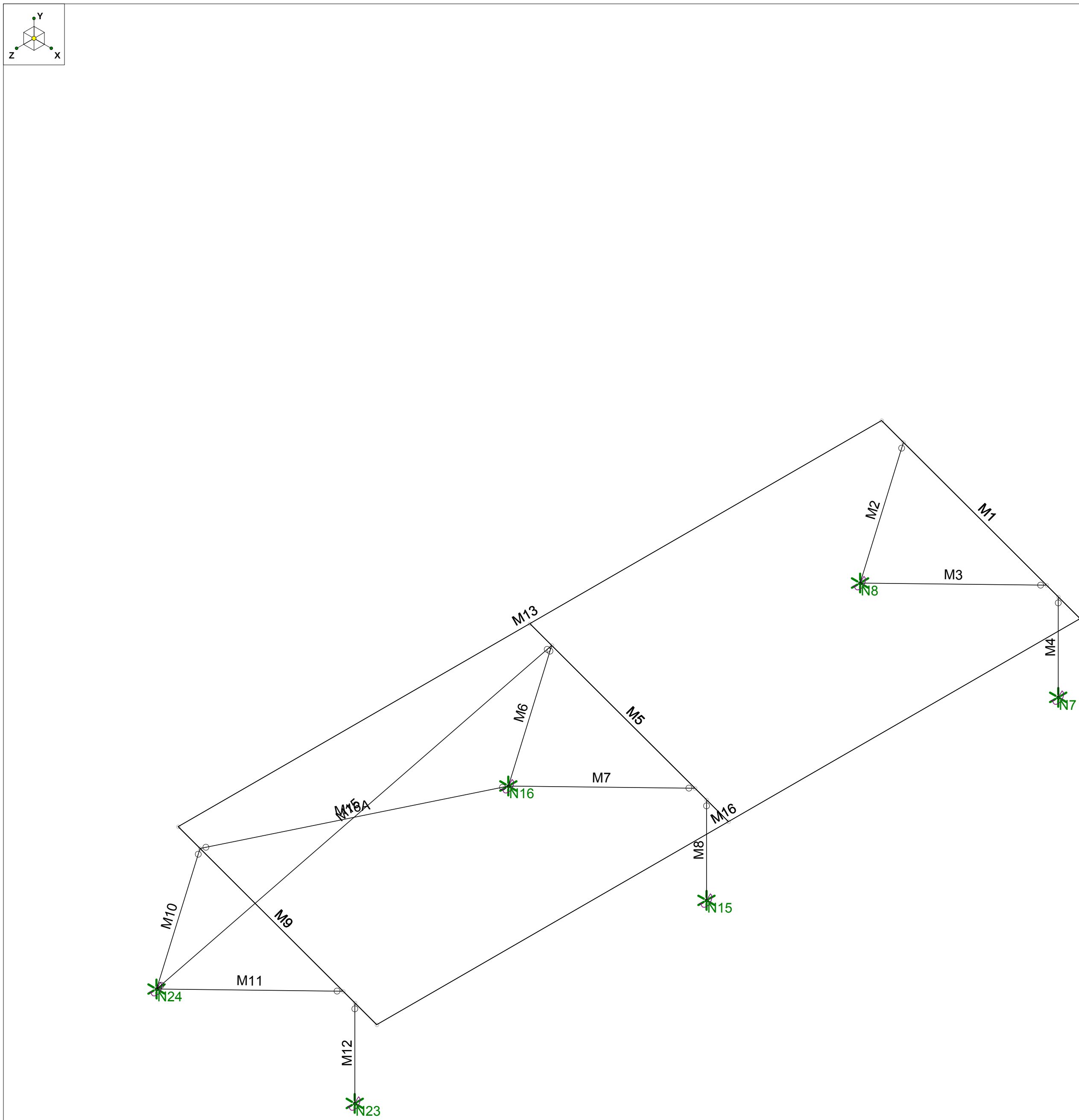


Schletter, Inc.		20° Tilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

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.

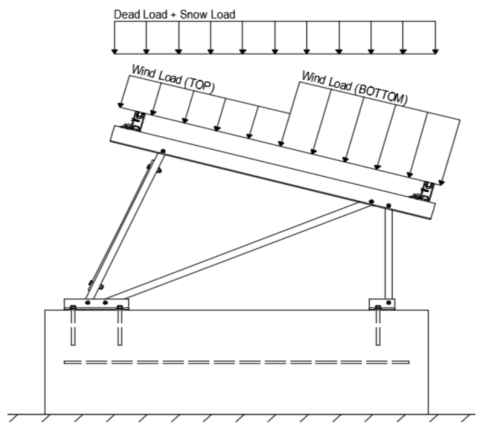
1.2 Construction

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 = 20°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes

- ASCE 7-05 - 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 = 20.62 psf *(ASCE 7-05, Eq. 7-2)*
I_s = 1.00
C_s = 0.91
C_e = 0.90
C_t = 1.20

2.3 Wind Loads

Design Wind Speed, V = 85 mph
Height ≤ 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 11.34 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.05	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.65	
$Cf-_{TOP}$	=	-2.12	*(Suction)*
$Cf-_{BOTTOM}$	=	-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

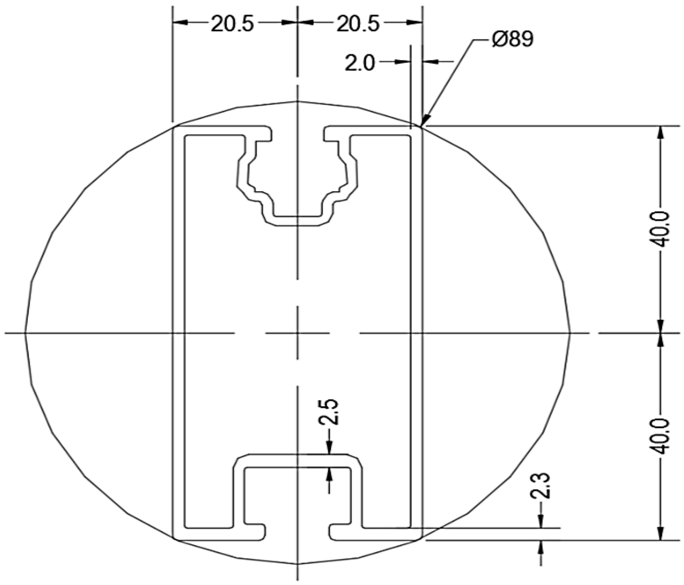
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

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).

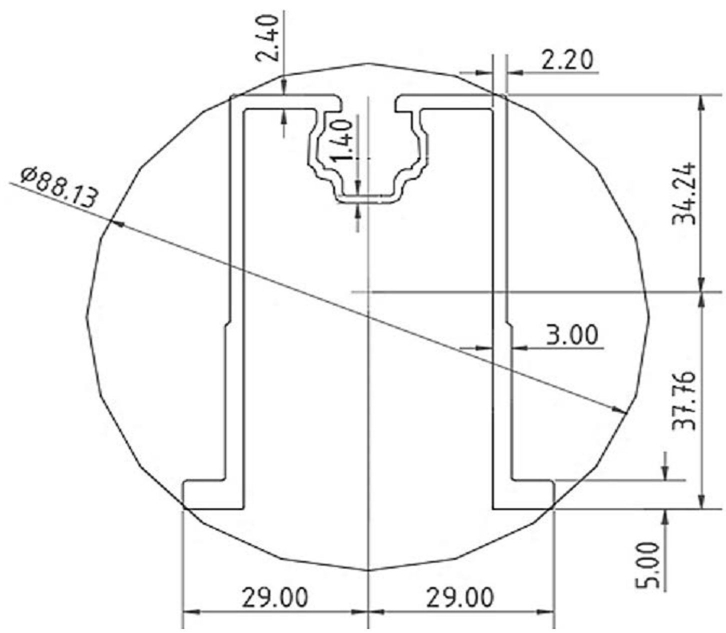
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	102	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.61	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	1.234	k-ft
M_z =	0.235	k-ft
$M_{y\ allowable}$ =	1.778	k-ft
$M_{z\ allowable}$ =	0.838	k-ft
Utilization =	97%	



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).

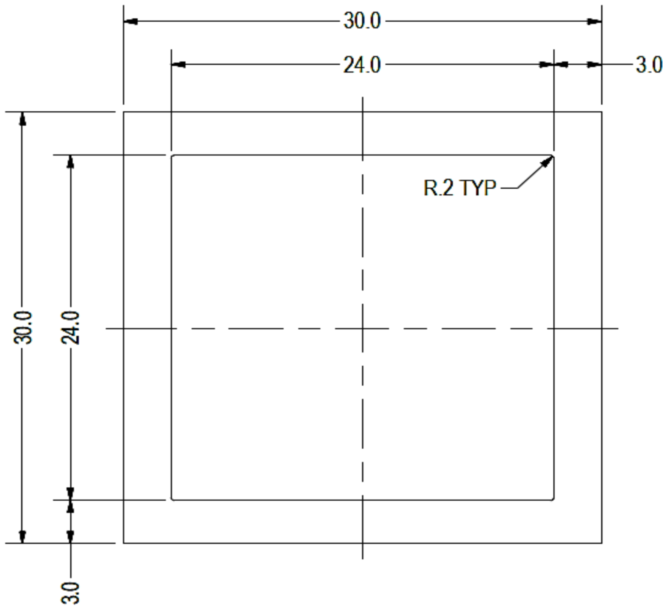
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.98	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.601	k-ft
M_z =	0.000	k-ft
P_n =	0.235	k
$M_{y\ allowable}$ =	1.471	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	43%	



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).

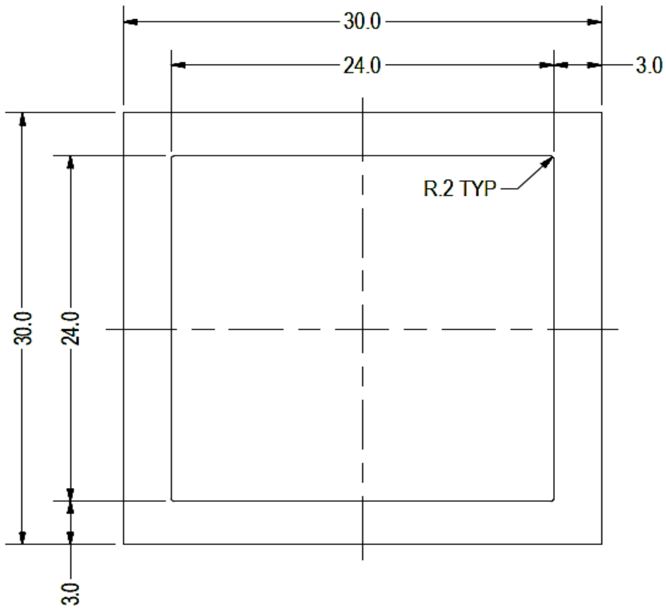
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.001	k-ft
P_n =	1.603	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	13%	



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).

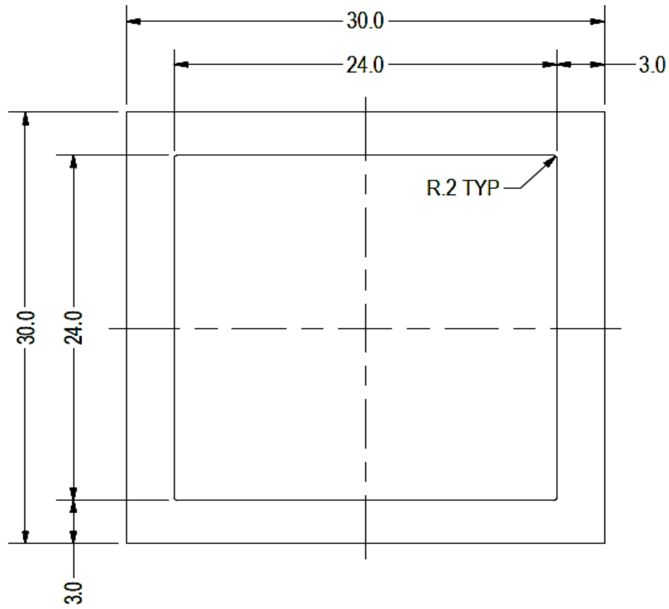
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.309	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	8%	



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).

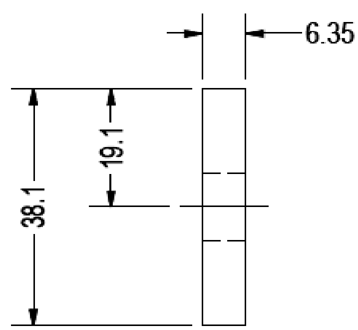
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.07	in
$\Phi F_{ty\ AXIAL}$ =	13.55	ksi
$\Phi F_{ty\ BENDING}$ =	30.37	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.311	k
$M_{y\ allowable}$ =	0.411	k-ft
$M_{z\ allowable}$ =	0.411	k-ft
$P_{n\ allowable}$ =	6.803	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 =	0.007	k-ft
P_n =	0.041	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	16%	



A cross brace kit is required every 12 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

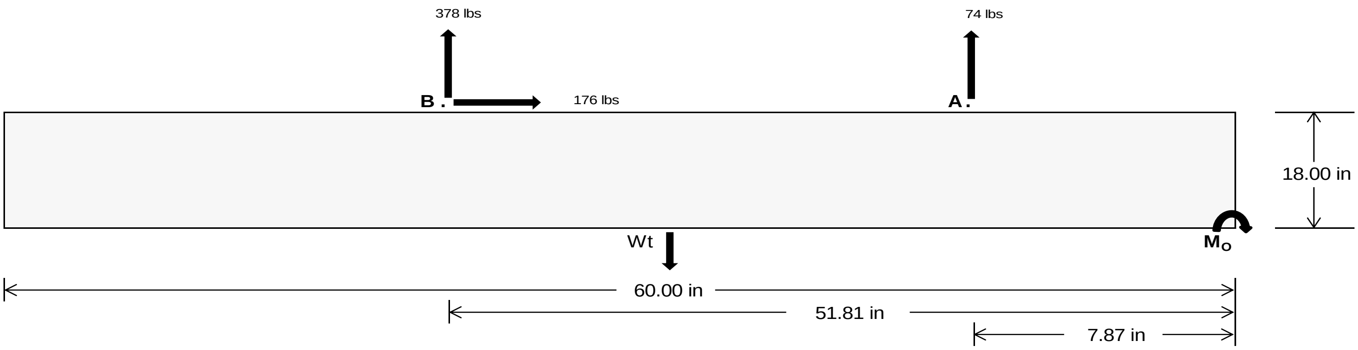
5.1 Helical Pile Foundations

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 =	314.50	1577.14	k
Compressive Load =	2084.18	1613.10	k
Lateral Load =	5.33	733.67	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 =	23347.9 in-lbs
Resisting Force Required =	778.26 lbs
S.F. =	1.67
Weight Required =	1297.10 lbs
Minimum Width =	21 in in
Weight Provided =	1903.13 lbs

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

Sliding	
Force =	176.28 lbs
Friction =	0.4
Weight Required =	440.69 lbs
Resisting Weight =	1903.13 lbs
Additional Weight Required =	0 lbs

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

Cohesion	
Sliding Force =	176.28 lbs
Cohesion =	130 psf
Area =	8.75 ft^2
Resisting =	951.56 lbs
Additional Weight Required =	0 lbs

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

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

Shear key is not required.

Bearing Pressure

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

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in
F_A	810 lbs	810 lbs	810 lbs	810 lbs	564 lbs	564 lbs	564 lbs	564 lbs	971 lbs	971 lbs	971 lbs	971 lbs	-148 lbs	-148 lbs	-148 lbs	-148 lbs
F_B	595 lbs	595 lbs	595 lbs	595 lbs	497 lbs	497 lbs	497 lbs	497 lbs	773 lbs	773 lbs	773 lbs	773 lbs	-756 lbs	-756 lbs	-756 lbs	-756 lbs
F_V	74 lbs	74 lbs	74 lbs	74 lbs	319 lbs	319 lbs	319 lbs	319 lbs	290 lbs	290 lbs	290 lbs	290 lbs	-353 lbs	-353 lbs	-353 lbs	-353 lbs
P_{total}	3308 lbs	3399 lbs	3490 lbs	3580 lbs	2964 lbs	3055 lbs	3145 lbs	3236 lbs	3647 lbs	3738 lbs	3829 lbs	3919 lbs	237 lbs	292 lbs	346 lbs	400 lbs
M	524 lbs-ft	524 lbs-ft	524 lbs-ft	524 lbs-ft	617 lbs-ft	617 lbs-ft	617 lbs-ft	617 lbs-ft	820 lbs-ft	820 lbs-ft	820 lbs-ft	820 lbs-ft	572 lbs-ft	572 lbs-ft	572 lbs-ft	572 lbs-ft
e	0.16 ft	0.15 ft	0.15 ft	0.15 ft	0.21 ft	0.20 ft	0.20 ft	0.19 ft	0.22 ft	0.22 ft	0.21 ft	0.21 ft	2.41 ft	1.96 ft	1.65 ft	1.43 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}	306.3 psf	302.2 psf	298.5 psf	295.2 psf	254.2 psf	252.5 psf	251.0 psf	249.6 psf	304.4 psf	300.5 psf	296.9 psf	293.6 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	449.9 psf	439.4 psf	429.7 psf	420.9 psf	423.3 psf	414.0 psf	405.4 psf	397.6 psf	529.2 psf	515.1 psf	502.1 psf	490.3 psf	1019.7 psf	197.1 psf	142.2 psf	124.6 psf

Maximum Bearing Pressure = 1020 psf
Allowable Bearing Pressure = 1500 psf

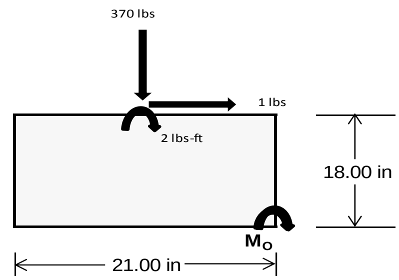
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 320.1 ft-lbs
Resisting Force Required = 365.83 lbs
S.F. = 1.67
Weight Required = 609.72 lbs
Minimum Width = 21 in in
Weight Provided = 1903.13 lbs

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



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	21 in			21 in			21 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	94 lbs	261 lbs	89 lbs	375 lbs	1144 lbs	370 lbs	28 lbs	76 lbs	26 lbs
F_V	5 lbs	5 lbs	0 lbs	24 lbs	22 lbs	1 lbs	1 lbs	1 lbs	0 lbs
P_{total}	2450 lbs	2617 lbs	2445 lbs	2618 lbs	3387 lbs	2613 lbs	717 lbs	765 lbs	715 lbs
M	7 lbs-ft	7 lbs-ft	0 lbs-ft	40 lbs-ft	34 lbs-ft	4 lbs-ft	2 lbs-ft	2 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.02 ft	0.01 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.29 ft	1.74 ft	1.75 ft	1.72 ft	1.73 ft	1.75 ft	1.74 ft	1.74 ft	1.75 ft
f_{min}	277.1 sqft	296.3 sqft	279.3 sqft	283.4 sqft	373.9 sqft	297.2 sqft	81.0 sqft	86.7 sqft	81.7 sqft
f_{max}	283.0 psf	301.9 psf	279.6 psf	315.0 psf	400.3 psf	300.1 psf	82.7 psf	88.3 psf	81.8 psf

Maximum Bearing Pressure = 400 psf
Allowable Bearing Pressure = 1500 psf

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

Foundation Requirements: 60in long x 21in wide x 18in tall ballast foundation and fiber reinforcing with (1) #5 rebar.

5.3 Foundation Anchors

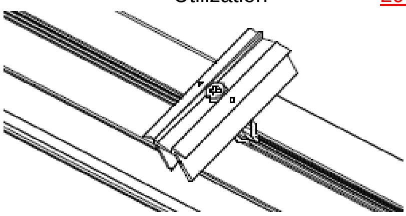
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

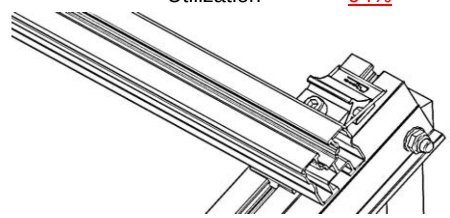
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

Modules are secured to the purlins with Schletter, Inc. Rapid2+ mounting clamps. Purlins are secured to the girders with the use of a Schletter, Inc. Klicktop connector. The reliability of calculations is uncertain due to limited standards, therefore the strength of the fasteners has been evaluated by load testing.

Fastening of Modules to Purlins		
Maximum Uplifting Force =	0.355	k
Allowable Uplift =	1.214	k
Utilization =	29%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.052	k
Allowable Uplift =	1.116	k
Utilization =	94%	



6.2 Bolted Connections

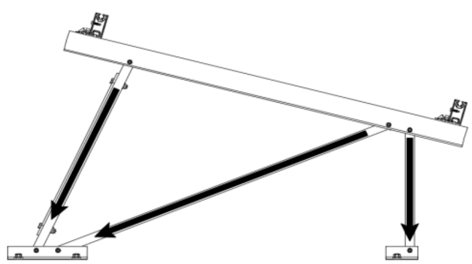
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are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

Front Strut		
Maximum Axial Load =	1.603	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	28%	

Rear Strut		
Maximum Axial Load =	1.311	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	23%	

Diagonal Strut		
Maximum Axial Load =	0.309	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	5%	

Bracing		
Maximum Axial Load =	0.041	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.

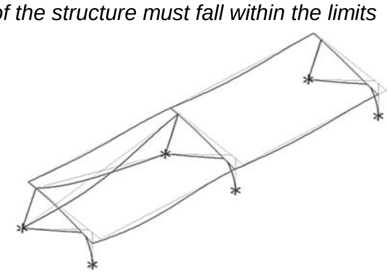
7. SEISMIC DESIGN

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} =	29.57	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.591	in
Max Drift, Δ_{MAX} =	0.068	in
N/A		

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



APPENDIX A

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

Purlin = **ProfiPlus XT**

Strong Axis:

3.4.14

L_b = 102.00 in

J = 0.427

212.736

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

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= 28.6 ksi

3.4.16

b/t = 6.6

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

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 = 102.00 in

J = 0.427

231.168

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

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 = 37.95

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 22.7 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 37.95

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

S1 = 38.1
m = 0.63
C_0 = 40.784
Cc = 39.216

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

S2 = 79.7
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L St$= 28.6 ksi
Ix = 498305 mm^4
1.197 in^4
y = 40.784 mm
Sx = 0.746 in^3
$M_{max}St$ = 1.778 k-ft

3.4.18

h/t = 6.6

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

S1 = 36.9
m = 0.65
C_0 = 20.5
Cc = 20.5

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L Wk$= 22.7 ksi
Iy = 148662 mm^4
0.357 in^4
x = 20.5 mm
Sy = 0.443 in^3
$M_{max}Wk$ = 0.838 k-ft

<u>Compression</u>

3.4.9

b/t = 6.6
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 = 37.95
S1 = 12.21
S2 = 32.70
φF_L= (φck2*√(BpE))/(1.6b/t)
φF_L= 21.4 ksi

3.4.10

Rb/t = 0.0

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

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

φF_L= 21.42 ksi
A = 620.02 mm^2
0.96 in^2
P_{max} = 20.59 kips

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.49

20.14

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 30.0 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 = 1.49

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= 30.0 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= 30.0 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.471 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 in^3
M_{max}St = 0.404 k-ft

Weak Axis:
3.4.14
L_b = 46.38 in
J = 0.16
121.663

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.8

3.4.16
b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1
N/A for Weak Direction

3.4.18
h/t = 7.75

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

S1 = 36.9
m = 0.65
C_0 = 15
Cc = 15

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

φF_LWk= 33.3 ksi
Iy = 39958.2 mm^4
0.096 in^4
x = 15 mm
Sy = 0.163 in^3
M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 33.07 in

J = 0.16

86.7548

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

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= 30.4 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 30.4 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.411 k-ft

Weak Axis:

3.4.14

L_b = 33.07 in

J = 0.16

86.7548

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

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= 30.4

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

λ = 1.41804

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.77853

φF_L= (φccFcy)/(λ²)

φF_L= 13.5508 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 13.55 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 6.80 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	-57.498	-57.498	0	0
2	M16	Y	-57.498	-57.498	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	-33.217	-33.217	0	0
2	M16	y	-52.198	-52.198	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	67.066	67.066	0	0
2	M16	y	31.635	31.635	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	128.755	2	337.396	1	.002	10	0	2	0	1	0	1
2		min	-176.763	3	-368.968	3	-.195	1	0	3	0	1	0	1
3	N7	max	0	15	563	1	-.072	15	0	15	0	1	0	1
4		min	-.197	1	-64.913	3	-1.866	1	-.003	1	0	1	0	1
5	N15	max	-.001	15	1603.214	1	.615	1	.001	1	0	1	0	1
6		min	-2.122	1	-241.924	3	-.242	3	0	3	0	1	0	1
7	N16	max	538.649	2	1240.848	1	-.29	10	0	1	0	1	0	1
8		min	-564.363	3	-1213.183	3	-37.883	1	0	3	0	1	0	1
9	N23	max	0	15	562.776	1	4.103	1	.007	1	0	1	0	1
10		min	-.197	1	-64.465	3	.149	15	0	15	0	1	0	1
11	N24	max	129.256	2	343.246	1	35.225	1	.002	1	0	1	0	1
12		min	-176.809	3	-365.889	3	.051	10	0	3	0	1	0	1
13	Totals:	max	794.611	2	4650.48	1	0	3						
14		min	-918.21	3	-2319.341	3	0	1						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M2	1	max	398.596	1	.642	4	.871	1	0	15	0	3	0	1
2			min	-349.106	3	.152	15	-.032	3	-.001	1	0	1	0	1
3		2	max	398.703	1	.601	4	.871	1	0	15	0	1	0	15
4			min	-349.026	3	.142	15	-.032	3	-.001	1	0	10	0	4
5		3	max	398.809	1	.56	4	.871	1	0	15	0	1	0	15
6			min	-348.946	3	.133	15	-.032	3	-.001	1	0	12	0	4
7		4	max	398.916	1	.519	4	.871	1	0	15	0	1	0	15
8			min	-348.866	3	.123	15	-.032	3	-.001	1	0	3	0	4
9		5	max	399.022	1	.477	4	.871	1	0	15	0	1	0	15
10			min	-348.786	3	.113	15	-.032	3	-.001	1	0	3	0	4
11		6	max	399.129	1	.436	4	.871	1	0	15	0	1	0	15
12			min	-348.706	3	.104	15	-.032	3	-.001	1	0	3	0	4
13		7	max	399.235	1	.395	4	.871	1	0	15	0	1	0	15
14			min	-348.626	3	.094	15	-.032	3	-.001	1	0	3	0	4
15		8	max	399.342	1	.354	4	.871	1	0	15	0	1	0	15
16			min	-348.546	3	.084	15	-.032	3	-.001	1	0	3	0	4
17		9	max	399.448	1	.312	4	.871	1	0	15	0	1	0	15
18			min	-348.466	3	.075	15	-.032	3	-.001	1	0	3	0	4
19		10	max	399.555	1	.271	4	.871	1	0	15	.001	1	0	15
20			min	-348.387	3	.065	15	-.032	3	-.001	1	0	3	0	4
21		11	max	399.662	1	.23	4	.871	1	0	15	.001	1	0	15
22			min	-348.307	3	.055	15	-.032	3	-.001	1	0	3	0	4
23		12	max	399.768	1	.189	4	.871	1	0	15	.001	1	0	15
24			min	-348.227	3	.045	15	-.032	3	-.001	1	0	3	0	4
25		13	max	399.875	1	.147	4	.871	1	0	15	.002	1	0	15
26			min	-348.147	3	.036	15	-.032	3	-.001	1	0	3	0	4
27		14	max	399.981	1	.106	4	.871	1	0	15	.002	1	0	15
28			min	-348.067	3	.026	15	-.032	3	-.001	1	0	3	0	4
29		15	max	400.088	1	.07	2	.871	1	0	15	.002	1	0	15
30			min	-347.987	3	.014	12	-.032	3	-.001	1	0	3	0	4
31		16	max	400.194	1	.038	2	.871	1	0	15	.002	1	0	15
32			min	-347.907	3	-.006	9	-.032	3	-.001	1	0	3	0	4
33		17	max	400.301	1	.009	10	.871	1	0	15	.002	1	0	15
34			min	-347.827	3	-.035	1	-.032	3	-.001	1	0	3	0	4
35		18	max	400.407	1	-.013	15	.871	1	0	15	.002	1	0	15
36			min	-347.747	3	-.067	1	-.032	3	-.001	1	0	3	0	4
37		19	max	400.514	1	-.022	15	.871	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	-347.667	3	-.1	4	-.032	3	-.001	1	0	3	0	4
39	M3	1	max	58.955	10	1.795	4	-.028	15	0	15	.003	1	0	4
40			min	-108.672	9	.423	15	-.847	1	0	1	0	15	0	15
41		2	max	58.899	10	1.617	4	-.028	15	0	15	.002	1	0	4
42			min	-108.729	9	.381	15	-.847	1	0	1	0	15	0	15
43		3	max	58.842	10	1.439	4	-.028	15	0	15	.002	1	0	2
44			min	-108.786	9	.339	15	-.847	1	0	1	0	15	0	9
45		4	max	58.786	10	1.262	4	-.028	15	0	15	.002	1	0	15
46			min	-108.842	9	.297	15	-.847	1	0	1	0	15	0	4
47		5	max	58.729	10	1.084	4	-.028	15	0	15	.002	1	0	15
48			min	-108.899	9	.256	15	-.847	1	0	1	0	15	0	4
49		6	max	58.673	10	.906	4	-.028	15	0	15	.002	1	0	15
50			min	-108.955	9	.214	15	-.847	1	0	1	0	15	0	4
51		7	max	58.616	10	.729	4	-.028	15	0	15	.001	1	0	15
52			min	-109.012	9	.172	15	-.847	1	0	1	0	15	0	4
53		8	max	58.559	10	.551	4	-.028	15	0	15	.001	1	0	15
54			min	-109.068	9	.13	15	-.847	1	0	1	0	15	0	4
55		9	max	58.503	10	.373	4	-.028	15	0	15	.001	1	0	15
56			min	-109.125	9	.089	15	-.847	1	0	1	0	15	-.001	4
57		10	max	58.446	10	.196	4	-.028	15	0	15	0	1	0	15
58			min	-109.181	9	.047	15	-.847	1	0	1	0	15	-.001	4
59		11	max	58.39	10	.028	2	-.028	15	0	15	0	1	0	15
60			min	-109.238	9	-.003	9	-.847	1	0	1	0	15	-.001	4
61		12	max	58.333	10	-.037	15	-.028	15	0	15	0	1	0	15
62			min	-109.295	9	-.16	4	-.847	1	0	1	0	15	-.001	4
63		13	max	58.277	10	-.078	15	-.028	15	0	15	0	1	0	15
64			min	-109.351	9	-.337	4	-.847	1	0	1	0	12	-.001	4
65		14	max	58.22	10	-.12	15	-.028	15	0	15	0	1	0	15
66			min	-109.408	9	-.515	4	-.847	1	0	1	0	12	-.001	4
67		15	max	58.164	10	-.162	15	-.028	15	0	15	0	1	0	15
68			min	-109.464	9	-.693	4	-.847	1	0	1	0	3	0	4
69		16	max	58.107	10	-.204	15	-.028	15	0	15	0	15	0	15
70			min	-109.521	9	-.87	4	-.847	1	0	1	0	1	0	4
71		17	max	58.05	10	-.246	15	-.028	15	0	15	0	15	0	15
72			min	-109.577	9	-1.048	4	-.847	1	0	1	0	1	0	4
73		18	max	57.994	10	-.287	15	-.028	15	0	15	0	15	0	15
74			min	-109.634	9	-1.226	4	-.847	1	0	1	0	1	0	4
75		19	max	57.937	10	-.329	15	-.028	15	0	15	0	15	0	1
76			min	-109.69	9	-1.403	4	-.847	1	0	1	0	1	0	1
77	M4	1	max	561.836	1	0	1	-.072	15	0	1	0	3	0	1
78			min	-65.786	3	0	1	-2.058	1	0	1	0	1	0	1
79		2	max	561.9	1	0	1	-.072	15	0	1	0	12	0	1
80			min	-65.738	3	0	1	-2.058	1	0	1	0	1	0	1
81		3	max	561.965	1	0	1	-.072	15	0	1	0	15	0	1
82			min	-65.689	3	0	1	-2.058	1	0	1	0	1	0	1
83		4	max	562.03	1	0	1	-.072	15	0	1	0	15	0	1
84			min	-65.641	3	0	1	-2.058	1	0	1	0	1	0	1
85		5	max	562.095	1	0	1	-.072	15	0	1	0	15	0	1
86			min	-65.592	3	0	1	-2.058	1	0	1	0	1	0	1
87		6	max	562.159	1	0	1	-.072	15	0	1	0	15	0	1
88			min	-65.544	3	0	1	-2.058	1	0	1	0	1	0	1
89		7	max	562.224	1	0	1	-.072	15	0	1	0	15	0	1
90			min	-65.495	3	0	1	-2.058	1	0	1	-.001	1	0	1
91		8	max	562.289	1	0	1	-.072	15	0	1	0	15	0	1
92			min	-65.446	3	0	1	-2.058	1	0	1	-.001	1	0	1
93		9	max	562.353	1	0	1	-.072	15	0	1	0	15	0	1
94			min	-65.398	3	0	1	-2.058	1	0	1	-.002	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	562.418	1	0	1	-.072	15	0	1	0	15	0	1
96			min	-65.349	3	0	1	-2.058	1	0	1	-.002	1	0	1
97		11	max	562.483	1	0	1	-.072	15	0	1	0	15	0	1
98			min	-65.301	3	0	1	-2.058	1	0	1	-.002	1	0	1
99		12	max	562.547	1	0	1	-.072	15	0	1	0	15	0	1
100			min	-65.252	3	0	1	-2.058	1	0	1	-.002	1	0	1
101		13	max	562.612	1	0	1	-.072	15	0	1	0	15	0	1
102			min	-65.204	3	0	1	-2.058	1	0	1	-.002	1	0	1
103		14	max	562.677	1	0	1	-.072	15	0	1	0	15	0	1
104			min	-65.155	3	0	1	-2.058	1	0	1	-.002	1	0	1
105		15	max	562.742	1	0	1	-.072	15	0	1	0	15	0	1
106			min	-65.107	3	0	1	-2.058	1	0	1	-.003	1	0	1
107		16	max	562.806	1	0	1	-.072	15	0	1	0	15	0	1
108			min	-65.058	3	0	1	-2.058	1	0	1	-.003	1	0	1
109		17	max	562.871	1	0	1	-.072	15	0	1	0	15	0	1
110			min	-65.01	3	0	1	-2.058	1	0	1	-.003	1	0	1
111		18	max	562.936	1	0	1	-.072	15	0	1	0	15	0	1
112			min	-64.961	3	0	1	-2.058	1	0	1	-.003	1	0	1
113		19	max	563	1	0	1	-.072	15	0	1	0	15	0	1
114			min	-64.913	3	0	1	-2.058	1	0	1	-.003	1	0	1
115	M6	1	max	1308.611	1	.637	4	.287	1	0	1	0	3	0	1
116			min	-1144.718	3	.151	15	-.107	3	0	15	0	2	0	1
117		2	max	1308.717	1	.595	4	.287	1	0	1	0	3	0	15
118			min	-1144.638	3	.142	15	-.107	3	0	15	0	2	0	4
119		3	max	1308.824	1	.554	4	.287	1	0	1	0	1	0	15
120			min	-1144.558	3	.132	15	-.107	3	0	15	0	15	0	4
121		4	max	1308.93	1	.513	4	.287	1	0	1	0	1	0	15
122			min	-1144.478	3	.122	15	-.107	3	0	15	0	12	0	4
123		5	max	1309.037	1	.471	4	.287	1	0	1	0	1	0	15
124			min	-1144.398	3	.112	15	-.107	3	0	15	0	3	0	4
125		6	max	1309.143	1	.43	4	.287	1	0	1	0	1	0	15
126			min	-1144.318	3	.103	15	-.107	3	0	15	0	3	0	4
127		7	max	1309.25	1	.389	4	.287	1	0	1	0	1	0	15
128			min	-1144.238	3	.093	15	-.107	3	0	15	0	3	0	4
129		8	max	1309.356	1	.348	4	.287	1	0	1	0	1	0	15
130			min	-1144.158	3	.083	15	-.107	3	0	15	0	3	0	4
131		9	max	1309.463	1	.311	2	.287	1	0	1	0	1	0	15
132			min	-1144.078	3	.074	15	-.107	3	0	15	0	3	0	4
133		10	max	1309.569	1	.279	2	.287	1	0	1	0	1	0	15
134			min	-1143.998	3	.064	15	-.107	3	0	15	0	3	0	4
135		11	max	1309.676	1	.247	2	.287	1	0	1	0	1	0	15
136			min	-1143.919	3	.052	12	-.107	3	0	15	0	3	0	4
137		12	max	1309.782	1	.215	2	.287	1	0	1	0	1	0	15
138			min	-1143.839	3	.036	12	-.107	3	0	15	0	3	0	4
139		13	max	1309.889	1	.182	2	.287	1	0	1	0	1	0	15
140			min	-1143.759	3	.02	12	-.107	3	0	15	0	3	0	4
141		14	max	1309.996	1	.15	2	.287	1	0	1	0	1	0	15
142			min	-1143.679	3	.002	3	-.107	3	0	15	0	3	0	4
143		15	max	1310.102	1	.118	2	.287	1	0	1	0	1	0	15
144			min	-1143.599	3	-.023	3	-.107	3	0	15	0	3	0	4
145		16	max	1310.209	1	.086	2	.287	1	0	1	0	1	0	15
146			min	-1143.519	3	-.047	3	-.107	3	0	15	0	3	0	2
147		17	max	1310.315	1	.054	2	.287	1	0	1	0	1	0	15
148			min	-1143.439	3	-.071	3	-.107	3	0	15	0	3	0	2
149		18	max	1310.422	1	.022	2	.287	1	0	1	0	1	0	15
150			min	-1143.359	3	-.095	3	-.107	3	0	15	0	3	0	2
151		19	max	1310.528	1	-.011	2	.287	1	0	1	0	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
152			min	-1143.279	3	-.119	3	-.107	3	0	15	0	3	0	2
153	M7	1	max	308.829	2	1.793	4	.018	1	0	2	0	2	0	2
154			min	-256.324	3	.423	15	-.002	3	0	3	0	3	0	12
155		2	max	308.761	2	1.616	4	.018	1	0	2	0	2	0	2
156			min	-256.375	3	.381	15	-.002	3	0	3	0	3	0	12
157		3	max	308.694	2	1.438	4	.018	1	0	2	0	2	0	2
158			min	-256.426	3	.339	15	-.002	3	0	3	0	3	0	3
159		4	max	308.626	2	1.26	4	.018	1	0	2	0	2	0	2
160			min	-256.477	3	.297	15	-.002	3	0	3	0	3	0	3
161		5	max	308.558	2	1.083	4	.018	1	0	2	0	2	0	15
162			min	-256.527	3	.255	15	-.002	3	0	3	0	3	0	4
163		6	max	308.49	2	.905	4	.018	1	0	2	0	2	0	15
164			min	-256.578	3	.214	15	-.002	3	0	3	0	3	0	4
165		7	max	308.422	2	.727	4	.018	1	0	2	0	2	0	15
166			min	-256.629	3	.172	15	-.002	3	0	3	0	3	0	4
167		8	max	308.354	2	.55	4	.018	1	0	2	0	2	0	15
168			min	-256.68	3	.13	15	-.002	3	0	3	0	3	-.001	4
169		9	max	308.286	2	.372	4	.018	1	0	2	0	2	0	15
170			min	-256.731	3	.088	15	-.002	3	0	3	0	3	-.001	4
171		10	max	308.219	2	.213	2	.018	1	0	2	0	2	0	15
172			min	-256.782	3	.043	12	-.002	3	0	3	0	3	-.001	4
173		11	max	308.151	2	.074	2	.018	1	0	2	0	2	0	15
174			min	-256.833	3	-.043	3	-.002	3	0	3	0	3	-.001	4
175		12	max	308.083	2	-.037	15	.018	1	0	2	0	2	0	15
176			min	-256.884	3	-.161	4	-.002	3	0	3	0	3	-.001	4
177		13	max	308.015	2	-.079	15	.018	1	0	2	0	2	0	15
178			min	-256.935	3	-.338	4	-.002	3	0	3	0	3	-.001	4
179		14	max	307.947	2	-.12	15	.018	1	0	2	0	2	0	15
180			min	-256.986	3	-.516	4	-.002	3	0	3	0	3	-.001	4
181		15	max	307.879	2	-.162	15	.018	1	0	2	0	2	0	15
182			min	-257.036	3	-.694	4	-.002	3	0	3	0	3	0	4
183		16	max	307.811	2	-.204	15	.018	1	0	2	0	2	0	15
184			min	-257.087	3	-.871	4	-.002	3	0	3	0	3	0	4
185		17	max	307.744	2	-.246	15	.018	1	0	2	0	2	0	15
186			min	-257.138	3	-1.049	4	-.002	3	0	3	0	3	0	4
187		18	max	307.676	2	-.287	15	.018	1	0	2	0	2	0	15
188			min	-257.189	3	-1.227	4	-.002	3	0	3	0	3	0	4
189		19	max	307.608	2	-.329	15	.018	1	0	2	0	2	0	1
190			min	-257.24	3	-1.404	4	-.002	3	0	3	0	3	0	1
191	M8	1	max	1602.049	1	0	1	.833	1	0	1	0	15	0	1
192			min	-242.797	3	0	1	-.233	3	0	1	0	1	0	1
193		2	max	1602.114	1	0	1	.833	1	0	1	0	1	0	1
194			min	-242.749	3	0	1	-.233	3	0	1	0	3	0	1
195		3	max	1602.179	1	0	1	.833	1	0	1	0	1	0	1
196			min	-242.7	3	0	1	-.233	3	0	1	0	3	0	1
197		4	max	1602.244	1	0	1	.833	1	0	1	0	1	0	1
198			min	-242.652	3	0	1	-.233	3	0	1	0	3	0	1
199		5	max	1602.308	1	0	1	.833	1	0	1	0	1	0	1
200			min	-242.603	3	0	1	-.233	3	0	1	0	3	0	1
201		6	max	1602.373	1	0	1	.833	1	0	1	0	1	0	1
202			min	-242.555	3	0	1	-.233	3	0	1	0	3	0	1
203		7	max	1602.438	1	0	1	.833	1	0	1	0	1	0	1
204			min	-242.506	3	0	1	-.233	3	0	1	0	3	0	1
205		8	max	1602.502	1	0	1	.833	1	0	1	0	1	0	1
206			min	-242.458	3	0	1	-.233	3	0	1	0	3	0	1
207		9	max	1602.567	1	0	1	.833	1	0	1	0	1	0	1
208			min	-242.409	3	0	1	-.233	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	1602.632	1	0	1	.833	1	0	1	0	1	0	1
210			min	-242.361	3	0	1	-.233	3	0	1	0	3	0	1
211		11	max	1602.697	1	0	1	.833	1	0	1	0	1	0	1
212			min	-242.312	3	0	1	-.233	3	0	1	0	3	0	1
213		12	max	1602.761	1	0	1	.833	1	0	1	0	1	0	1
214			min	-242.264	3	0	1	-.233	3	0	1	0	3	0	1
215		13	max	1602.826	1	0	1	.833	1	0	1	0	1	0	1
216			min	-242.215	3	0	1	-.233	3	0	1	0	3	0	1
217		14	max	1602.891	1	0	1	.833	1	0	1	0	1	0	1
218			min	-242.166	3	0	1	-.233	3	0	1	0	3	0	1
219		15	max	1602.955	1	0	1	.833	1	0	1	.001	1	0	1
220			min	-242.118	3	0	1	-.233	3	0	1	0	3	0	1
221		16	max	1603.02	1	0	1	.833	1	0	1	.001	1	0	1
222			min	-242.069	3	0	1	-.233	3	0	1	0	3	0	1
223		17	max	1603.085	1	0	1	.833	1	0	1	.001	1	0	1
224			min	-242.021	3	0	1	-.233	3	0	1	0	3	0	1
225		18	max	1603.15	1	0	1	.833	1	0	1	.001	1	0	1
226			min	-241.972	3	0	1	-.233	3	0	1	0	3	0	1
227		19	max	1603.214	1	0	1	.833	1	0	1	.001	1	0	1
228			min	-241.924	3	0	1	-.233	3	0	1	0	3	0	1
229	M10	1	max	413.185	1	.633	4	-.007	15	.001	1	0	1	0	1
230			min	-338.084	3	.151	15	-.191	1	0	3	0	3	0	1
231		2	max	413.291	1	.591	4	-.007	15	.001	1	0	1	0	15
232			min	-338.004	3	.141	15	-.191	1	0	3	0	3	0	4
233		3	max	413.398	1	.55	4	-.007	15	.001	1	0	1	0	15
234			min	-337.924	3	.131	15	-.191	1	0	3	0	3	0	4
235		4	max	413.504	1	.509	4	-.007	15	.001	1	0	1	0	15
236			min	-337.844	3	.122	15	-.191	1	0	3	0	3	0	4
237		5	max	413.611	1	.467	4	-.007	15	.001	1	0	2	0	15
238			min	-337.764	3	.112	15	-.191	1	0	3	0	3	0	4
239		6	max	413.718	1	.426	4	-.007	15	.001	1	0	2	0	15
240			min	-337.685	3	.102	15	-.191	1	0	3	0	3	0	4
241		7	max	413.824	1	.385	4	-.007	15	.001	1	0	2	0	15
242			min	-337.605	3	.093	15	-.191	1	0	3	0	3	0	4
243		8	max	413.931	1	.344	4	-.007	15	.001	1	0	2	0	15
244			min	-337.525	3	.083	15	-.191	1	0	3	0	3	0	4
245		9	max	414.037	1	.302	4	-.007	15	.001	1	0	2	0	15
246			min	-337.445	3	.073	15	-.191	1	0	3	0	1	0	4
247		10	max	414.144	1	.261	4	-.007	15	.001	1	0	15	0	15
248			min	-337.365	3	.063	15	-.191	1	0	3	0	1	0	4
249		11	max	414.25	1	.22	4	-.007	15	.001	1	0	15	0	15
250			min	-337.285	3	.054	15	-.191	1	0	3	0	1	0	4
251		12	max	414.357	1	.179	4	-.007	15	.001	1	0	15	0	15
252			min	-337.205	3	.044	15	-.191	1	0	3	0	1	0	4
253		13	max	414.463	1	.137	4	-.007	15	.001	1	0	15	0	15
254			min	-337.125	3	.034	15	-.191	1	0	3	0	1	0	4
255		14	max	414.57	1	.096	4	-.007	15	.001	1	0	15	0	15
256			min	-337.045	3	.013	1	-.191	1	0	3	0	1	0	4
257		15	max	414.676	1	.062	10	-.007	15	.001	1	0	15	0	15
258			min	-336.965	3	-.019	1	-.191	1	0	3	0	1	0	4
259		16	max	414.783	1	.036	10	-.007	15	.001	1	0	15	0	15
260			min	-336.885	3	-.051	1	-.191	1	0	3	0	1	0	4
261		17	max	414.889	1	.009	10	-.007	15	.001	1	0	15	0	15
262			min	-336.806	3	-.083	1	-.191	1	0	3	0	1	0	4
263		18	max	414.996	1	-.014	15	-.007	15	.001	1	0	15	0	15
264			min	-336.726	3	-.115	1	-.191	1	0	3	0	1	0	4
265		19	max	415.103	1	-.024	15	-.007	15	.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	-336.646	3	-.148	1	-.191	1	0	3	0	1	0	4
267	M11	1	max	58.42	10	1.8	4	.98	1	.001	1	0	3	0	4
268			min	-108.584	9	.423	15	.023	12	0	15	-.002	1	0	15
269		2	max	58.364	10	1.622	4	.98	1	.001	1	0	3	0	2
270			min	-108.64	9	.382	15	.023	12	0	15	-.002	1	0	12
271		3	max	58.307	10	1.444	4	.98	1	.001	1	0	3	0	2
272			min	-108.697	9	.34	15	.023	12	0	15	-.002	1	0	3
273		4	max	58.251	10	1.267	4	.98	1	.001	1	0	3	0	15
274			min	-108.753	9	.298	15	.023	12	0	15	-.002	1	0	3
275		5	max	58.194	10	1.089	4	.98	1	.001	1	0	3	0	15
276			min	-108.81	9	.256	15	.023	12	0	15	-.002	1	0	4
277		6	max	58.138	10	.911	4	.98	1	.001	1	0	3	0	15
278			min	-108.867	9	.215	15	.023	12	0	15	-.001	1	0	4
279		7	max	58.081	10	.734	4	.98	1	.001	1	0	3	0	15
280			min	-108.923	9	.173	15	.023	12	0	15	-.001	1	0	4
281		8	max	58.025	10	.556	4	.98	1	.001	1	0	3	0	15
282			min	-108.98	9	.131	15	.023	12	0	15	-.001	1	0	4
283		9	max	57.968	10	.378	4	.98	1	.001	1	0	3	0	15
284			min	-109.036	9	.089	15	.023	12	0	15	0	1	-.001	4
285		10	max	57.911	10	.201	4	.98	1	.001	1	0	3	0	15
286			min	-109.093	9	.048	15	.023	12	0	15	0	1	-.001	4
287		11	max	57.855	10	.048	2	.98	1	.001	1	0	3	0	15
288			min	-109.149	9	-.019	3	.023	12	0	15	0	1	-.001	4
289		12	max	57.798	10	-.036	15	.98	1	.001	1	0	3	0	15
290			min	-109.206	9	-.155	4	.023	12	0	15	0	1	-.001	4
291		13	max	57.742	10	-.078	15	.98	1	.001	1	0	3	0	15
292			min	-109.262	9	-.332	4	.023	12	0	15	0	2	-.001	4
293		14	max	57.685	10	-.12	15	.98	1	.001	1	0	1	0	15
294			min	-109.319	9	-.51	4	.023	12	0	15	0	10	-.001	4
295		15	max	57.629	10	-.161	15	.98	1	.001	1	0	1	0	15
296			min	-109.375	9	-.688	4	.023	12	0	15	0	15	0	4
297		16	max	57.572	10	-.203	15	.98	1	.001	1	0	1	0	15
298			min	-109.432	9	-.865	4	.023	12	0	15	0	15	0	4
299		17	max	57.516	10	-.245	15	.98	1	.001	1	0	1	0	15
300			min	-109.489	9	-1.043	4	.023	12	0	15	0	15	0	4
301		18	max	57.459	10	-.287	15	.98	1	.001	1	.001	1	0	15
302			min	-109.545	9	-1.22	4	.023	12	0	15	0	15	0	4
303		19	max	57.402	10	-.328	15	.98	1	.001	1	.001	1	0	1
304			min	-109.602	9	-1.398	4	.023	12	0	15	0	15	0	1
305	M12	1	max	561.611	1	0	1	4.521	1	0	1	0	1	0	1
306			min	-65.338	3	0	1	.15	15	0	1	0	3	0	1
307		2	max	561.676	1	0	1	4.521	1	0	1	0	1	0	1
308			min	-65.29	3	0	1	.15	15	0	1	0	15	0	1
309		3	max	561.741	1	0	1	4.521	1	0	1	0	1	0	1
310			min	-65.241	3	0	1	.15	15	0	1	0	15	0	1
311		4	max	561.805	1	0	1	4.521	1	0	1	.001	1	0	1
312			min	-65.193	3	0	1	.15	15	0	1	0	15	0	1
313		5	max	561.87	1	0	1	4.521	1	0	1	.002	1	0	1
314			min	-65.144	3	0	1	.15	15	0	1	0	15	0	1
315		6	max	561.935	1	0	1	4.521	1	0	1	.002	1	0	1
316			min	-65.096	3	0	1	.15	15	0	1	0	15	0	1
317		7	max	561.999	1	0	1	4.521	1	0	1	.002	1	0	1
318			min	-65.047	3	0	1	.15	15	0	1	0	15	0	1
319		8	max	562.064	1	0	1	4.521	1	0	1	.003	1	0	1
320			min	-64.999	3	0	1	.15	15	0	1	0	15	0	1
321		9	max	562.129	1	0	1	4.521	1	0	1	.003	1	0	1
322			min	-64.95	3	0	1	.15	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	562.193	1	0	1	4.521	1	0	1	.004	1	0	1
324			min	-64.902	3	0	1	.15	15	0	1	0	15	0	1
325		11	max	562.258	1	0	1	4.521	1	0	1	.004	1	0	1
326			min	-64.853	3	0	1	.15	15	0	1	0	15	0	1
327		12	max	562.323	1	0	1	4.521	1	0	1	.004	1	0	1
328			min	-64.805	3	0	1	.15	15	0	1	0	15	0	1
329		13	max	562.388	1	0	1	4.521	1	0	1	.005	1	0	1
330			min	-64.756	3	0	1	.15	15	0	1	0	15	0	1
331		14	max	562.452	1	0	1	4.521	1	0	1	.005	1	0	1
332			min	-64.707	3	0	1	.15	15	0	1	0	15	0	1
333		15	max	562.517	1	0	1	4.521	1	0	1	.006	1	0	1
334			min	-64.659	3	0	1	.15	15	0	1	0	15	0	1
335		16	max	562.582	1	0	1	4.521	1	0	1	.006	1	0	1
336			min	-64.61	3	0	1	.15	15	0	1	0	15	0	1
337		17	max	562.646	1	0	1	4.521	1	0	1	.007	1	0	1
338			min	-64.562	3	0	1	.15	15	0	1	0	15	0	1
339		18	max	562.711	1	0	1	4.521	1	0	1	.007	1	0	1
340			min	-64.513	3	0	1	.15	15	0	1	0	15	0	1
341		19	max	562.776	1	0	1	4.521	1	0	1	.007	1	0	1
342			min	-64.465	3	0	1	.15	15	0	1	0	15	0	1
343	M1	1	max	143.833	1	328.569	3	-2.989	15	0	1	.175	1	.014	1
344			min	4.803	15	-397.376	1	-88.688	1	0	3	.006	15	-.009	3
345		2	max	143.929	1	328.372	3	-2.989	15	0	1	.156	1	.1	1
346			min	4.831	15	-397.639	1	-88.688	1	0	3	.005	15	-.081	3
347		3	max	122.157	1	7.599	9	-2.961	15	0	12	.135	1	.184	1
348			min	4.372	15	-20.39	3	-88.417	1	0	1	.005	15	-.151	3
349		4	max	122.253	1	7.38	9	-2.961	15	0	12	.116	1	.184	1
350			min	4.401	15	-20.587	3	-88.417	1	0	1	.004	15	-.146	3
351		5	max	122.348	1	7.161	9	-2.961	15	0	12	.097	1	.184	1
352			min	4.429	15	-20.784	3	-88.417	1	0	1	.003	15	-.142	3
353		6	max	122.444	1	6.943	9	-2.961	15	0	12	.078	1	.184	1
354			min	4.458	15	-20.981	3	-88.417	1	0	1	.003	15	-.137	3
355		7	max	122.539	1	6.724	9	-2.961	15	0	12	.059	1	.184	1
356			min	4.487	15	-21.177	3	-88.417	1	0	1	.002	15	-.133	3
357		8	max	122.635	1	6.505	9	-2.961	15	0	12	.039	1	.184	1
358			min	4.516	15	-21.374	3	-88.417	1	0	1	.001	15	-.128	3
359		9	max	122.73	1	6.287	9	-2.961	15	0	12	.02	1	.184	1
360			min	4.545	15	-21.571	3	-88.417	1	0	1	0	15	-.123	3
361		10	max	122.826	1	6.068	9	-2.961	15	0	12	.001	1	.185	1
362			min	4.574	15	-21.768	3	-88.417	1	0	1	0	10	-.119	3
363		11	max	122.921	1	5.849	9	-2.961	15	0	12	0	12	.185	1
364			min	4.602	15	-21.965	3	-88.417	1	0	1	-.018	1	-.114	3
365		12	max	123.017	1	5.631	9	-2.961	15	0	12	-.001	12	.185	1
366			min	4.631	15	-22.161	3	-88.417	1	0	1	-.037	1	-.109	3
367		13	max	123.112	1	5.412	9	-2.961	15	0	12	-.002	12	.186	1
368			min	4.66	15	-22.358	3	-88.417	1	0	1	-.056	1	-.104	3
369		14	max	123.208	1	5.193	9	-2.961	15	0	12	-.003	15	.186	1
370			min	4.689	15	-22.555	3	-88.417	1	0	1	-.076	1	-.099	3
371		15	max	123.303	1	4.975	9	-2.961	15	0	12	-.003	15	.186	1
372			min	4.718	15	-22.752	3	-88.417	1	0	1	-.095	1	-.094	3
373		16	max	79.479	2	27.826	10	-2.989	15	0	1	-.004	15	.188	1
374			min	-29.889	3	-84.878	3	-89.155	1	0	12	-.115	1	-.089	3
375		17	max	79.575	2	27.608	10	-2.989	15	0	1	-.004	15	.205	1
376			min	-29.818	3	-85.075	3	-89.155	1	0	12	-.134	1	-.07	3
377		18	max	-4.808	15	444.903	1	-3.062	15	0	3	-.005	15	.111	1
378			min	-143.283	1	-147.152	3	-91.355	1	0	1	-.154	1	-.039	3
379		19	max	-4.779	15	444.64	1	-3.062	15	0	3	-.006	15	.015	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
380			min	-143.188	1	-147.348	3	-91.355	1	0	1	-.174	1	-.007	3
381	M5	1	max	314.34	1	1086.7	3	-.109	10	0	1	.006	1	.019	3
382			min	9.416	12	-1315.435	1	-32.243	1	0	3	0	10	-.027	1
383		2	max	314.436	1	1086.503	3	-.109	10	0	1	0	2	.258	1
384			min	9.464	12	-1315.697	1	-32.243	1	0	3	-.003	3	-.217	3
385		3	max	242.463	1	9.388	9	2.934	3	0	3	0	10	.538	1
386			min	7.679	10	-67.793	3	-.091	10	0	1	-.008	3	-.447	3
387		4	max	242.559	1	9.169	9	2.934	3	0	3	0	10	.542	1
388			min	7.758	10	-67.99	3	-.091	10	0	1	-.007	1	-.433	3
389		5	max	242.654	1	8.951	9	2.934	3	0	3	0	10	.546	1
390			min	7.838	10	-68.187	3	-.091	10	0	1	-.007	1	-.418	3
391		6	max	242.75	1	8.732	9	2.934	3	0	3	0	10	.55	1
392			min	7.918	10	-68.384	3	-.091	10	0	1	-.006	1	-.403	3
393		7	max	242.845	1	8.513	9	2.934	3	0	3	0	10	.554	1
394			min	7.997	10	-68.58	3	-.091	10	0	1	-.006	1	-.388	3
395		8	max	242.941	1	8.295	9	2.934	3	0	3	0	10	.559	1
396			min	8.077	10	-68.777	3	-.091	10	0	1	-.005	1	-.373	3
397		9	max	243.036	1	8.076	9	2.934	3	0	3	0	10	.563	1
398			min	8.156	10	-68.974	3	-.091	10	0	1	-.005	1	-.358	3
399		10	max	243.132	1	7.857	9	2.934	3	0	3	0	10	.567	1
400			min	8.236	10	-69.171	3	-.091	10	0	1	-.004	1	-.344	3
401		11	max	243.227	1	7.639	9	2.934	3	0	3	0	10	.572	1
402			min	8.316	10	-69.368	3	-.091	10	0	1	-.004	1	-.328	3
403		12	max	243.323	1	7.42	9	2.934	3	0	3	0	10	.576	1
404			min	8.395	10	-69.564	3	-.091	10	0	1	-.003	1	-.313	3
405		13	max	243.418	1	7.201	9	2.934	3	0	3	0	10	.581	1
406			min	8.475	10	-69.761	3	-.091	10	0	1	-.003	1	-.298	3
407		14	max	243.514	1	6.983	9	2.934	3	0	3	0	15	.585	1
408			min	8.554	10	-69.958	3	-.091	10	0	1	-.002	1	-.283	3
409		15	max	243.609	1	6.764	9	2.934	3	0	3	0	15	.59	1
410			min	8.634	10	-70.155	3	-.091	10	0	1	-.002	1	-.268	3
411		16	max	288.223	2	162.397	2	2.911	3	0	1	0	3	.595	1
412			min	-97.794	3	-255.636	3	-.095	10	0	15	-.001	1	-.251	3
413		17	max	288.318	2	162.135	2	2.911	3	0	1	0	3	.601	1
414			min	-97.722	3	-255.833	3	-.095	10	0	15	0	1	-.196	3
415		18	max	-9.909	12	1466.372	1	2.938	1	0	3	.001	3	.289	1
416			min	-315.301	1	-484.841	3	-.019	10	0	1	0	2	-.091	3
417		19	max	-9.862	12	1466.109	1	2.938	1	0	3	.002	3	.014	3
418			min	-315.205	1	-485.038	3	-.019	10	0	1	0	2	-.029	1
419	M9	1	max	143.153	1	328.557	3	120.87	1	0	3	-.006	15	.014	1
420			min	4.778	15	-397.354	1	4.183	15	0	1	-.175	1	-.009	3
421		2	max	143.249	1	328.361	3	120.87	1	0	3	-.004	12	.1	1
422			min	4.807	15	-397.616	1	4.183	15	0	1	-.149	1	-.081	3
423		3	max	122.112	1	7.573	9	83.042	1	0	1	0	3	.184	1
424			min	4.556	15	-20.335	3	1.618	12	0	15	-.121	1	-.15	3
425		4	max	122.208	1	7.355	9	83.042	1	0	1	.001	3	.184	1
426			min	4.585	15	-20.532	3	1.618	12	0	15	-.103	1	-.146	3
427		5	max	122.303	1	7.136	9	83.042	1	0	1	.002	3	.184	1
428			min	4.614	15	-20.729	3	1.618	12	0	15	-.085	1	-.142	3
429		6	max	122.399	1	6.917	9	83.042	1	0	1	.002	3	.184	1
430			min	4.642	15	-20.926	3	1.618	12	0	15	-.067	1	-.137	3
431		7	max	122.494	1	6.699	9	83.042	1	0	1	.003	3	.184	1
432			min	4.671	15	-21.122	3	1.618	12	0	15	-.049	1	-.132	3
433		8	max	122.59	1	6.48	9	83.042	1	0	1	.003	3	.184	1
434			min	4.7	15	-21.319	3	1.618	12	0	15	-.031	1	-.128	3
435		9	max	122.685	1	6.261	9	83.042	1	0	1	.004	3	.184	1
436			min	4.729	15	-21.516	3	1.618	12	0	15	-.013	1	-.123	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	122.781	1	6.043	9	83.042	1	0	1	.005	1	.185	1
438			min	4.758	15	-21.713	3	1.618	12	0	15	0	10	-.119	3
439		11	max	122.876	1	5.824	9	83.042	1	0	1	.023	1	.185	1
440			min	4.786	15	-21.91	3	1.618	12	0	15	0	15	-.114	3
441		12	max	122.972	1	5.605	9	83.042	1	0	1	.041	1	.185	1
442			min	4.815	15	-22.106	3	1.618	12	0	15	.001	15	-.109	3
443		13	max	123.067	1	5.387	9	83.042	1	0	1	.059	1	.186	1
444			min	4.844	15	-22.303	3	1.618	12	0	15	.002	15	-.104	3
445		14	max	123.163	1	5.168	9	83.042	1	0	1	.077	1	.186	1
446			min	4.873	15	-22.5	3	1.618	12	0	15	.003	15	-.099	3
447		15	max	123.258	1	4.949	9	83.042	1	0	1	.095	1	.187	1
448			min	4.902	15	-22.697	3	1.618	12	0	15	.003	15	-.094	3
449		16	max	79.712	2	27.457	10	83.936	1	0	15	.115	1	.188	1
450			min	-29.92	3	-85.298	3	1.643	12	0	1	.004	15	-.089	3
451		17	max	79.808	2	27.239	10	83.936	1	0	15	.133	1	.205	1
452			min	-29.848	3	-85.495	3	1.643	12	0	1	.004	15	-.07	3
453		18	max	-4.799	15	444.903	1	88.433	1	0	1	.152	1	.111	1
454			min	-143.029	1	-147.15	3	1.885	12	0	3	.005	15	-.039	3
455		19	max	-4.771	15	444.64	1	88.433	1	0	1	.172	1	.015	1
456			min	-142.934	1	-147.347	3	1.885	12	0	3	.006	15	-.007	3
457	M13	1	max	121.142	1	396.695	1	-4.778	15	.014	1	.175	1	0	1
458			min	4.183	15	-328.543	3	-143.135	1	-.009	3	.006	15	0	3
459		2	max	121.142	1	279.813	1	-3.665	15	.014	1	.055	1	.265	3
460			min	4.183	15	-231.675	3	-109.728	1	-.009	3	.002	15	-.319	1
461		3	max	121.142	1	162.93	1	-2.552	15	.014	1	.001	3	.438	3
462			min	4.183	15	-134.807	3	-76.321	1	-.009	3	-.032	1	-.529	1
463		4	max	121.142	1	46.048	1	-1.438	15	.014	1	-.002	12	.519	3
464			min	4.183	15	-37.94	3	-42.914	1	-.009	3	-.089	1	-.627	1
465		5	max	121.142	1	58.928	3	-.325	15	.014	1	-.003	12	.509	3
466			min	4.183	15	-70.835	1	-9.507	1	-.009	3	-.113	1	-.615	1
467		6	max	121.142	1	155.796	3	23.9	1	.014	1	-.003	12	.408	3
468			min	4.183	15	-187.717	1	.411	12	-.009	3	-.107	1	-.493	1
469		7	max	121.142	1	252.663	3	57.308	1	.014	1	-.002	12	.215	3
470			min	4.183	15	-304.6	1	1.497	12	-.009	3	-.068	1	-.261	1
471		8	max	121.142	1	349.531	3	90.715	1	.014	1	.002	1	.082	1
472			min	4.183	15	-421.482	1	2.584	12	-.009	3	0	3	-.069	3
473		9	max	121.142	1	446.398	3	124.122	1	.014	1	.103	1	.535	1
474			min	4.183	15	-538.365	1	3.67	12	-.009	3	.003	12	-.445	3
475		10	max	121.142	1	543.266	3	157.529	1	.011	2	.236	1	1.099	1
476			min	4.183	15	-655.247	1	4.756	12	-.014	1	.007	12	-.913	3
477		11	max	88.999	1	538.365	1	-3.572	12	.009	3	.098	1	.535	1
478			min	2.989	15	-446.398	3	-123.437	1	-.014	1	.001	12	-.445	3
479		12	max	88.999	1	421.482	1	-2.486	12	.009	3	0	10	.082	1
480			min	2.989	15	-349.531	3	-90.03	1	-.014	1	-.003	1	-.069	3
481		13	max	88.999	1	304.6	1	-1.399	12	.009	3	-.002	15	.215	3
482			min	2.989	15	-252.663	3	-56.623	1	-.014	1	-.072	1	-.261	1
483		14	max	88.999	1	187.717	1	-.313	12	.009	3	-.004	15	.408	3
484			min	2.989	15	-155.796	3	-23.216	1	-.014	1	-.11	1	-.493	1
485		15	max	88.999	1	70.835	1	10.191	1	.009	3	-.004	15	.509	3
486			min	2.989	15	-58.928	3	.349	15	-.014	1	-.116	1	-.615	1
487		16	max	88.999	1	37.94	3	43.599	1	.009	3	-.003	12	.519	3
488			min	2.989	15	-46.048	1	1.463	15	-.014	1	-.09	1	-.627	1
489		17	max	88.999	1	134.807	3	77.006	1	.009	3	0	12	.438	3
490			min	2.989	15	-162.93	1	2.576	15	-.014	1	-.033	1	-.529	1
491		18	max	88.999	1	231.675	3	110.413	1	.009	3	.055	1	.265	3
492			min	2.989	15	-279.813	1	3.689	15	-.014	1	.002	15	-.319	1
493		19	max	88.999	1	328.543	3	143.82	1	.009	3	.175	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	2.989	15	-396.695	1	4.803	15	-.014	1	.006	15	0	3
495	M16	1	max	-1.884	12	445.339	1	-4.771	15	.007	3	.172	1	0	1
496			min	-88.094	1	-147.367	3	-142.947	1	-.015	1	.006	15	0	3
497		2	max	-1.884	12	314.115	1	-3.657	15	.007	3	.052	1	.119	3
498			min	-88.094	1	-104.04	3	-109.54	1	-.015	1	.002	15	-.359	1
499		3	max	-1.884	12	182.892	1	-2.544	15	.007	3	-.001	12	.197	3
500			min	-88.094	1	-60.712	3	-76.133	1	-.015	1	-.035	1	-.593	1
501		4	max	-1.884	12	51.668	1	-1.431	15	.007	3	-.003	15	.233	3
502			min	-88.094	1	-17.385	3	-42.726	1	-.015	1	-.092	1	-.704	1
503		5	max	-1.884	12	25.943	3	-.318	15	.007	3	-.004	15	.229	3
504			min	-88.094	1	-79.556	1	-9.319	1	-.015	1	-.116	1	-.691	1
505		6	max	-1.884	12	69.27	3	24.088	1	.007	3	-.004	15	.184	3
506			min	-88.094	1	-210.78	1	.529	12	-.015	1	-.109	1	-.554	1
507		7	max	-1.884	12	112.598	3	57.495	1	.007	3	-.002	15	.099	3
508			min	-88.094	1	-342.003	1	1.615	12	-.015	1	-.071	1	-.293	1
509		8	max	-1.884	12	155.925	3	90.902	1	.007	3	0	2	.092	1
510			min	-88.094	1	-473.227	1	2.701	12	-.015	1	-.002	3	-.028	3
511		9	max	-1.884	12	199.252	3	124.309	1	.007	3	.101	1	.601	1
512			min	-88.094	1	-604.451	1	3.788	12	-.015	1	.002	12	-.196	3
513		10	max	-3.061	15	-17.148	15	157.716	1	0	15	.235	1	1.234	1
514			min	-91.059	1	-735.674	1	-7.47	3	-.015	1	.007	12	-.405	3
515		11	max	-3.061	15	604.451	1	-3.902	12	.015	1	.102	1	.601	1
516			min	-91.059	1	-199.252	3	-124.055	1	-.007	3	.003	12	-.196	3
517		12	max	-3.061	15	473.227	1	-2.816	12	.015	1	0	2	.092	1
518			min	-91.059	1	-155.925	3	-90.648	1	-.007	3	0	3	-.028	3
519		13	max	-3.061	15	342.003	1	-1.729	12	.015	1	-.002	12	.099	3
520			min	-91.059	1	-112.598	3	-57.241	1	-.007	3	-.07	1	-.293	1
521		14	max	-3.061	15	210.779	1	-.643	12	.015	1	-.003	12	.184	3
522			min	-91.059	1	-69.27	3	-23.833	1	-.007	3	-.108	1	-.554	1
523		15	max	-3.061	15	79.556	1	9.574	1	.015	1	-.004	12	.229	3
524			min	-91.059	1	-25.943	3	.326	15	-.007	3	-.115	1	-.691	1
525		16	max	-3.061	15	17.385	3	42.981	1	.015	1	-.003	12	.233	3
526			min	-91.059	1	-51.668	1	1.439	15	-.007	3	-.09	1	-.704	1
527		17	max	-3.061	15	60.712	3	76.388	1	.015	1	0	12	.197	3
528			min	-91.059	1	-182.892	1	2.553	15	-.007	3	-.033	1	-.593	1
529		18	max	-3.061	15	104.04	3	109.795	1	.015	1	.055	1	.119	3
530			min	-91.059	1	-314.115	1	3.666	15	-.007	3	.002	15	-.359	1
531		19	max	-3.061	15	147.367	3	143.202	1	.015	1	.174	1	0	1
532			min	-91.059	1	-445.339	1	4.779	15	-.007	3	.006	15	0	3
533	M15	1	max	0	10	2.958	4	.021	3	0	1	0	1	0	1
534			min	-35.432	1	0	10	-.028	1	0	3	0	3	0	1
535		2	max	0	10	2.63	4	.021	3	0	1	0	1	0	10
536			min	-35.511	1	0	10	-.028	1	0	3	0	3	-.001	4
537		3	max	0	10	2.301	4	.021	3	0	1	0	1	0	10
538			min	-35.591	1	0	10	-.028	1	0	3	0	3	-.003	4
539		4	max	0	10	1.972	4	.021	3	0	1	0	1	0	10
540			min	-35.67	1	0	10	-.028	1	0	3	0	3	-.004	4
541		5	max	0	10	1.643	4	.021	3	0	1	0	1	0	10
542			min	-35.75	1	0	10	-.028	1	0	3	0	3	-.005	4
543		6	max	0	10	1.315	4	.021	3	0	1	0	1	0	10
544			min	-35.829	1	0	10	-.028	1	0	3	0	3	-.005	4
545		7	max	0	10	.986	4	.021	3	0	1	0	3	0	10
546			min	-35.909	1	0	10	-.028	1	0	3	0	2	-.006	4
547		8	max	0	10	.657	4	.021	3	0	1	0	3	0	10
548			min	-35.988	1	0	10	-.028	1	0	3	0	1	-.006	4
549		9	max	0	10	.329	4	.021	3	0	1	0	3	0	10
550			min	-36.068	1	0	10	-.028	1	0	3	0	1	-.007	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	10	0	1	.021	3	0	1	0	3	0	10
552			min	-36.148	1	0	1	-.028	1	0	3	0	1	-.007	4
553		11	max	0	10	0	10	.021	3	0	1	0	3	0	10
554			min	-36.227	1	-.329	4	-.028	1	0	3	0	1	-.007	4
555		12	max	0	10	0	10	.021	3	0	1	0	3	0	10
556			min	-36.307	1	-.657	4	-.028	1	0	3	0	1	-.006	4
557		13	max	0	10	0	10	.021	3	0	1	0	3	0	10
558			min	-36.386	1	-.986	4	-.028	1	0	3	0	1	-.006	4
559		14	max	0	10	0	10	.021	3	0	1	0	3	0	10
560			min	-36.466	1	-1.315	4	-.028	1	0	3	0	1	-.005	4
561		15	max	0	10	0	10	.021	3	0	1	0	3	0	10
562			min	-36.545	1	-1.643	4	-.028	1	0	3	0	1	-.005	4
563		16	max	0	10	0	10	.021	3	0	1	0	3	0	10
564			min	-36.625	1	-1.972	4	-.028	1	0	3	0	1	-.004	4
565		17	max	0	10	0	10	.021	3	0	1	0	3	0	10
566			min	-36.704	1	-2.301	4	-.028	1	0	3	0	1	-.003	4
567		18	max	0	10	0	10	.021	3	0	1	0	3	0	10
568			min	-36.784	1	-2.63	4	-.028	1	0	3	0	1	-.001	4
569		19	max	0	10	0	10	.021	3	0	1	0	3	0	1
570			min	-36.864	1	-2.958	4	-.028	1	0	3	0	1	0	1
571	M16A	1	max	-.918	10	2.958	4	.02	1	0	3	0	3	0	1
572			min	-40.693	1	.695	15	-.009	3	0	1	0	1	0	1
573		2	max	-.852	10	2.63	4	.02	1	0	3	0	3	0	15
574			min	-40.614	1	.618	15	-.009	3	0	1	0	1	-.001	4
575		3	max	-.786	10	2.301	4	.02	1	0	3	0	3	0	15
576			min	-40.534	1	.541	15	-.009	3	0	1	0	1	-.003	4
577		4	max	-.719	10	1.972	4	.02	1	0	3	0	3	0	15
578			min	-40.455	1	.464	15	-.009	3	0	1	0	1	-.004	4
579		5	max	-.653	10	1.643	4	.02	1	0	3	0	3	-.001	15
580			min	-40.375	1	.386	15	-.009	3	0	1	0	1	-.005	4
581		6	max	-.587	10	1.315	4	.02	1	0	3	0	3	-.001	15
582			min	-40.296	1	.309	15	-.009	3	0	1	0	1	-.005	4
583		7	max	-.52	10	.986	4	.02	1	0	3	0	3	-.001	15
584			min	-40.216	1	.232	15	-.009	3	0	1	0	1	-.006	4
585		8	max	-.454	10	.657	4	.02	1	0	3	0	3	-.001	15
586			min	-40.136	1	.155	15	-.009	3	0	1	0	1	-.006	4
587		9	max	-.388	10	.329	4	.02	1	0	3	0	3	-.002	15
588			min	-40.057	1	.077	15	-.009	3	0	1	0	1	-.007	4
589		10	max	-.322	10	0	1	.02	1	0	3	0	3	-.002	15
590			min	-39.977	1	0	1	-.009	3	0	1	0	1	-.007	4
591		11	max	-.255	10	-.077	15	.02	1	0	3	0	3	-.002	15
592			min	-39.898	1	-.329	4	-.009	3	0	1	0	1	-.007	4
593		12	max	-.189	10	-.155	15	.02	1	0	3	0	3	-.001	15
594			min	-39.818	1	-.657	4	-.009	3	0	1	0	1	-.006	4
595		13	max	-.123	10	-.232	15	.02	1	0	3	0	1	-.001	15
596			min	-39.739	1	-.986	4	-.009	3	0	1	0	13	-.006	4
597		14	max	-.056	10	-.309	15	.02	1	0	3	0	1	-.001	15
598			min	-39.659	1	-1.315	4	-.009	3	0	1	0	3	-.005	4
599		15	max	.01	10	-.386	15	.02	1	0	3	0	1	-.001	15
600			min	-39.58	1	-1.643	4	-.009	3	0	1	0	3	-.005	4
601		16	max	.076	10	-.464	15	.02	1	0	3	0	1	0	15
602			min	-39.5	1	-1.972	4	-.009	3	0	1	0	3	-.004	4
603		17	max	.142	10	-.541	15	.02	1	0	3	0	1	0	15
604			min	-39.42	1	-2.301	4	-.009	3	0	1	0	3	-.003	4
605		18	max	.209	10	-.618	15	.02	1	0	3	0	1	0	15
606			min	-39.341	1	-2.63	4	-.009	3	0	1	0	3	-.001	4
607		19	max	.275	10	-.695	15	.02	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	-39.261	1	-2.958	4	-.009	3	0	1	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	.007	2	.016	1	-4.506e-5	15	NC	3	NC	3
2			min	-.003	3	-.006	3	0	3	-1.346e-3	1	4574.669	2	2024.261	1
3		2	max	.003	1	.007	2	.015	1	-4.32e-5	15	NC	3	NC	3
4			min	-.003	3	-.006	3	0	3	-1.291e-3	1	4962.582	2	2190.534	1
5		3	max	.003	1	.006	2	.014	1	-4.133e-5	15	NC	3	NC	3
6			min	-.003	3	-.006	3	0	3	-1.235e-3	1	5418.769	2	2386.31	1
7		4	max	.003	1	.006	2	.013	1	-3.947e-5	15	NC	3	NC	3
8			min	-.002	3	-.005	3	0	3	-1.18e-3	1	5958.844	2	2618.742	1
9		5	max	.003	1	.005	2	.011	1	-3.76e-5	15	NC	3	NC	3
10			min	-.002	3	-.005	3	0	3	-1.125e-3	1	6603.371	2	2897.373	1
11		6	max	.002	1	.005	2	.01	1	-3.573e-5	15	NC	1	NC	3
12			min	-.002	3	-.005	3	0	3	-1.069e-3	1	7379.877	2	3235.17	1
13		7	max	.002	1	.004	2	.009	1	-3.387e-5	15	NC	1	NC	3
14			min	-.002	3	-.005	3	0	3	-1.014e-3	1	8325.9	2	3650.121	1
15		8	max	.002	1	.004	2	.008	1	-3.2e-5	15	NC	1	NC	2
16			min	-.002	3	-.004	3	0	3	-9.587e-4	1	9493.755	2	4167.779	1
17		9	max	.002	1	.003	2	.007	1	-3.013e-5	15	NC	1	NC	2
18			min	-.002	3	-.004	3	0	3	-9.034e-4	1	NC	1	4825.48	1
19		10	max	.002	1	.003	2	.006	1	-2.827e-5	15	NC	1	NC	2
20			min	-.001	3	-.004	3	0	3	-8.481e-4	1	NC	1	5679.599	1
21		11	max	.001	1	.002	2	.005	1	-2.64e-5	15	NC	1	NC	2
22			min	-.001	3	-.003	3	0	3	-7.927e-4	1	NC	1	6818.688	1
23		12	max	.001	1	.002	2	.004	1	-2.454e-5	15	NC	1	NC	2
24			min	-.001	3	-.003	3	0	3	-7.374e-4	1	NC	1	8388.732	1
25		13	max	.001	1	.001	2	.003	1	-2.267e-5	15	NC	1	NC	1
26			min	0	3	-.003	3	0	3	-6.821e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	-2.08e-5	15	NC	1	NC	1
28			min	0	3	-.002	3	0	3	-6.267e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.002	1	-1.894e-5	15	NC	1	NC	1
30			min	0	3	-.002	3	0	3	-5.714e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	.001	1	-1.707e-5	15	NC	1	NC	1
32			min	0	3	-.001	3	0	12	-5.161e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-1.52e-5	15	NC	1	NC	1
34			min	0	3	0	3	0	12	-4.607e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-1.334e-5	15	NC	1	NC	1
36			min	0	3	0	3	0	12	-4.054e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-9.848e-6	12	NC	1	NC	1
38			min	0	1	0	1	0	1	-3.501e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.609e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	4.629e-6	12	NC	1	NC	1
41		2	max	0	9	0	2	0	12	2.032e-4	1	NC	1	NC	1
42			min	0	10	0	3	0	1	6.705e-6	15	NC	1	NC	1
43		3	max	0	9	0	2	0	12	2.456e-4	1	NC	1	NC	1
44			min	0	10	-.001	3	-.001	1	8.134e-6	15	NC	1	NC	1
45		4	max	0	9	0	2	0	12	2.879e-4	1	NC	1	NC	1
46			min	0	10	-.002	3	-.001	1	9.564e-6	15	NC	1	NC	1
47		5	max	0	9	0	2	0	12	3.302e-4	1	NC	1	NC	1
48			min	0	10	-.003	3	-.001	1	1.099e-5	15	NC	1	NC	1
49		6	max	0	9	0	2	0	3	3.725e-4	1	NC	1	NC	1
50			min	0	10	-.004	3	-.001	1	1.242e-5	15	NC	1	NC	1
51		7	max	0	9	0	2	0	3	4.148e-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	10	-.004	3	-.001	1	1.385e-5	15	NC	1	NC	1
53		8	max	0	9	.001	2	0	3	4.571e-4	1	NC	1	NC	1
54			min	0	10	-.005	3	0	1	1.528e-5	15	NC	1	NC	1
55		9	max	0	9	.002	2	0	3	4.995e-4	1	NC	1	NC	1
56			min	0	10	-.005	3	0	2	1.671e-5	15	NC	1	NC	1
57		10	max	0	9	.002	2	0	1	5.418e-4	1	NC	1	NC	1
58			min	0	10	-.006	3	0	15	1.814e-5	15	NC	1	NC	1
59		11	max	0	9	.003	2	.001	1	5.841e-4	1	NC	1	NC	1
60			min	0	10	-.006	3	0	15	1.957e-5	15	NC	1	NC	1
61		12	max	0	9	.003	2	.002	1	6.264e-4	1	NC	1	NC	1
62			min	0	10	-.007	3	0	15	2.1e-5	15	NC	1	NC	1
63		13	max	0	9	.004	2	.003	1	6.687e-4	1	NC	1	NC	1
64			min	0	10	-.007	3	0	15	2.243e-5	15	NC	1	NC	1
65		14	max	0	9	.005	2	.004	1	7.111e-4	1	NC	1	NC	1
66			min	0	10	-.007	3	0	15	2.386e-5	15	9980.391	2	NC	1
67		15	max	0	9	.005	2	.005	1	7.534e-4	1	NC	3	NC	2
68			min	0	10	-.007	3	0	15	2.529e-5	15	8396.026	2	9005.239	1
69		16	max	.001	9	.006	2	.006	1	7.957e-4	1	NC	3	NC	2
70			min	0	10	-.007	3	0	15	2.672e-5	15	7167.701	2	7573.807	1
71		17	max	.001	9	.007	2	.007	1	8.38e-4	1	NC	3	NC	2
72			min	0	10	-.007	3	0	15	2.815e-5	15	6205.429	2	6551.439	1
73		18	max	.001	9	.008	2	.008	1	8.803e-4	1	NC	3	NC	2
74			min	0	10	-.007	3	0	15	2.958e-5	15	5444.762	2	5798.417	1
75		19	max	.001	9	.01	2	.009	1	9.226e-4	1	NC	3	NC	2
76			min	0	10	-.007	3	0	15	3.101e-5	15	4839.202	2	5232.762	1
77	M4	1	max	.003	1	.008	2	0	15	-3.704e-5	15	NC	1	NC	3
78			min	0	3	-.006	3	-.007	1	-1.115e-3	1	NC	1	2924.672	1
79		2	max	.003	1	.008	2	0	15	-3.704e-5	15	NC	1	NC	3
80			min	0	3	-.006	3	-.006	1	-1.115e-3	1	NC	1	3190.185	1
81		3	max	.002	1	.008	2	0	15	-3.704e-5	15	NC	1	NC	3
82			min	0	3	-.006	3	-.006	1	-1.115e-3	1	NC	1	3506.204	1
83		4	max	.002	1	.007	2	0	15	-3.704e-5	15	NC	1	NC	2
84			min	0	3	-.005	3	-.005	1	-1.115e-3	1	NC	1	3886.05	1
85		5	max	.002	1	.007	2	0	15	-3.704e-5	15	NC	1	NC	2
86			min	0	3	-.005	3	-.004	1	-1.115e-3	1	NC	1	4347.866	1
87		6	max	.002	1	.006	2	0	15	-3.704e-5	15	NC	1	NC	2
88			min	0	3	-.005	3	-.004	1	-1.115e-3	1	NC	1	4916.888	1
89		7	max	.002	1	.006	2	0	15	-3.704e-5	15	NC	1	NC	2
90			min	0	3	-.004	3	-.003	1	-1.115e-3	1	NC	1	5629.065	1
91		8	max	.002	1	.005	2	0	15	-3.704e-5	15	NC	1	NC	2
92			min	0	3	-.004	3	-.003	1	-1.115e-3	1	NC	1	6537.039	1
93		9	max	.001	1	.005	2	0	15	-3.704e-5	15	NC	1	NC	2
94			min	0	3	-.004	3	-.003	1	-1.115e-3	1	NC	1	7720.442	1
95		10	max	.001	1	.004	2	0	15	-3.704e-5	15	NC	1	NC	2
96			min	0	3	-.003	3	-.002	1	-1.115e-3	1	NC	1	9304.473	1
97		11	max	.001	1	.004	2	0	15	-3.704e-5	15	NC	1	NC	1
98			min	0	3	-.003	3	-.002	1	-1.115e-3	1	NC	1	NC	1
99		12	max	.001	1	.003	2	0	15	-3.704e-5	15	NC	1	NC	1
100			min	0	3	-.002	3	-.001	1	-1.115e-3	1	NC	1	NC	1
101		13	max	0	1	.003	2	0	15	-3.704e-5	15	NC	1	NC	1
102			min	0	3	-.002	3	0	1	-1.115e-3	1	NC	1	NC	1
103		14	max	0	1	.002	2	0	15	-3.704e-5	15	NC	1	NC	1
104			min	0	3	-.002	3	0	1	-1.115e-3	1	NC	1	NC	1
105		15	max	0	1	.002	2	0	15	-3.704e-5	15	NC	1	NC	1
106			min	0	3	-.001	3	0	1	-1.115e-3	1	NC	1	NC	1
107		16	max	0	1	.001	2	0	15	-3.704e-5	15	NC	1	NC	1
108			min	0	3	-.001	3	0	1	-1.115e-3	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
109		17	max	0	1	0	2	0	15	-3.704e-5	15	NC	1	NC	1
110			min	0	3	0	3	0	1	-1.115e-3	1	NC	1	NC	1
111		18	max	0	1	0	2	0	15	-3.704e-5	15	NC	1	NC	1
112			min	0	3	0	3	0	1	-1.115e-3	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-3.704e-5	15	NC	1	NC	1
114			min	0	1	0	1	0	1	-1.115e-3	1	NC	1	NC	1
115	M6	1	max	.011	1	.024	2	.005	1	2.778e-4	1	NC	3	NC	2
116			min	-.009	3	-.018	3	-.002	3	4.557e-6	10	1389.411	2	7269.017	1
117		2	max	.01	1	.022	2	.004	1	2.608e-4	1	NC	3	NC	2
118			min	-.009	3	-.017	3	-.002	3	3.612e-6	10	1483.313	2	7899.215	1
119		3	max	.01	1	.021	2	.004	1	2.438e-4	1	NC	3	NC	2
120			min	-.008	3	-.016	3	-.002	3	2.667e-6	10	1590.488	2	8647.76	1
121		4	max	.009	1	.019	2	.003	1	2.268e-4	1	NC	3	NC	2
122			min	-.008	3	-.015	3	-.002	3	1.721e-6	10	1713.587	2	9545.032	1
123		5	max	.008	1	.018	2	.003	1	2.098e-4	1	NC	3	NC	1
124			min	-.007	3	-.014	3	-.002	3	7.759e-7	10	1856.024	2	NC	1
125		6	max	.008	1	.016	2	.003	1	1.928e-4	1	NC	3	NC	1
126			min	-.007	3	-.013	3	-.001	3	-1.694e-7	10	2022.27	2	NC	1
127		7	max	.007	1	.015	2	.002	1	1.758e-4	1	NC	3	NC	1
128			min	-.006	3	-.012	3	-.001	3	-1.115e-6	10	2218.287	2	NC	1
129		8	max	.007	1	.014	2	.002	1	1.589e-4	1	NC	3	NC	1
130			min	-.006	3	-.011	3	-.001	3	-2.06e-6	10	2452.21	2	NC	1
131		9	max	.006	1	.012	2	.002	1	1.419e-4	1	NC	3	NC	1
132			min	-.005	3	-.01	3	-.001	3	-3.005e-6	10	2735.433	2	NC	1
133		10	max	.005	1	.011	2	.002	1	1.321e-4	3	NC	3	NC	1
134			min	-.005	3	-.009	3	0	3	-3.951e-6	10	3084.41	2	NC	1
135		11	max	.005	1	.009	2	.001	1	1.272e-4	3	NC	3	NC	1
136			min	-.004	3	-.008	3	0	3	-4.896e-6	10	3523.831	2	NC	1
137		12	max	.004	1	.008	2	0	1	1.223e-4	3	NC	3	NC	1
138			min	-.004	3	-.007	3	0	3	-6.481e-6	2	4092.486	2	NC	1
139		13	max	.004	1	.007	2	0	1	1.174e-4	3	NC	3	NC	1
140			min	-.003	3	-.006	3	0	3	-1.17e-5	2	4855.026	2	NC	1
141		14	max	.003	1	.006	2	0	1	1.125e-4	3	NC	3	NC	1
142			min	-.003	3	-.005	3	0	3	-1.693e-5	2	5927.815	2	NC	1
143		15	max	.002	1	.004	2	0	1	1.076e-4	3	NC	3	NC	1
144			min	-.002	3	-.004	3	0	3	-2.215e-5	2	7543.566	2	NC	1
145		16	max	.002	1	.003	2	0	1	1.027e-4	3	NC	1	NC	1
146			min	-.002	3	-.003	3	0	3	-2.737e-5	2	NC	1	NC	1
147		17	max	.001	1	.002	2	0	1	9.785e-5	3	NC	1	NC	1
148			min	-.001	3	-.002	3	0	3	-3.26e-5	2	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	9.296e-5	3	NC	1	NC	1
150			min	0	3	-.001	3	0	3	-3.782e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	8.807e-5	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-4.304e-5	2	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	1.949e-5	2	NC	1	NC	1
154			min	0	1	0	1	0	1	-4.03e-5	3	NC	1	NC	1
155		2	max	0	3	.001	2	0	3	1.661e-5	2	NC	1	NC	1
156			min	0	2	-.002	3	0	2	-3.021e-5	3	NC	1	NC	1
157		3	max	0	3	.003	2	0	3	1.509e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	2	-2.012e-5	3	NC	1	NC	1
159		4	max	0	3	.004	2	0	3	1.65e-5	1	NC	1	NC	1
160			min	0	2	-.005	3	0	2	-1.002e-5	3	NC	1	NC	1
161		5	max	0	3	.005	2	0	3	1.791e-5	1	NC	3	NC	1
162			min	0	2	-.006	3	0	2	5.38e-8	12	8699.754	2	NC	1
163		6	max	0	3	.007	2	0	3	1.932e-5	1	NC	3	NC	1
164			min	0	2	-.008	3	0	2	5.69e-7	15	6968.799	2	NC	1
165		7	max	0	3	.008	2	0	3	2.073e-5	1	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	-.001	2	-.009	3	0	2	6.692e-7	15	5785.139	2	NC	1
167		8	max	.001	3	.009	2	.001	3	3.034e-5	3	NC	3	NC	1
168			min	-.001	2	-.01	3	0	1	-6.358e-7	2	4917.549	2	NC	1
169		9	max	.001	3	.011	2	.001	3	4.043e-5	3	NC	3	NC	1
170			min	-.002	2	-.012	3	0	1	-3.511e-6	2	4250.81	2	NC	1
171		10	max	.001	3	.012	2	.001	3	5.052e-5	3	NC	3	NC	1
172			min	-.002	2	-.013	3	0	1	-6.386e-6	2	3721.039	2	NC	1
173		11	max	.002	3	.014	2	.001	3	6.061e-5	3	NC	3	NC	1
174			min	-.002	2	-.014	3	-.001	1	-9.261e-6	2	3289.858	2	NC	1
175		12	max	.002	3	.016	2	.001	3	7.07e-5	3	NC	3	NC	1
176			min	-.002	2	-.015	3	-.001	1	-1.214e-5	2	2932.691	2	NC	1
177		13	max	.002	3	.017	2	.001	3	8.079e-5	3	NC	3	NC	1
178			min	-.002	2	-.016	3	-.001	1	-1.501e-5	2	2632.948	2	NC	1
179		14	max	.002	3	.019	2	.001	3	9.088e-5	3	NC	3	NC	1
180			min	-.003	2	-.017	3	-.002	1	-1.789e-5	2	2378.926	2	NC	1
181		15	max	.002	3	.021	2	.001	3	1.01e-4	3	NC	3	NC	1
182			min	-.003	2	-.018	3	-.002	1	-2.076e-5	2	2162.059	2	NC	1
183		16	max	.002	3	.023	2	.001	3	1.111e-4	3	NC	3	NC	1
184			min	-.003	2	-.019	3	-.002	1	-2.364e-5	2	1975.883	2	NC	1
185		17	max	.003	3	.025	1	.001	3	1.212e-4	3	NC	3	NC	1
186			min	-.003	2	-.019	3	-.002	1	-2.651e-5	2	1811.688	1	NC	1
187		18	max	.003	3	.028	1	.001	3	1.312e-4	3	NC	3	NC	1
188			min	-.003	2	-.02	3	-.002	1	-2.939e-5	2	1668.909	1	NC	1
189		19	max	.003	3	.03	1	.001	3	1.413e-4	3	NC	3	NC	1
190			min	-.003	2	-.021	3	-.002	1	-3.226e-5	2	1545.856	1	NC	1
191	M8	1	max	.008	1	.027	2	.003	1	-1.971e-6	10	NC	1	NC	2
192			min	-.001	3	-.018	3	0	3	-1.618e-4	1	NC	1	7355.315	1
193		2	max	.007	1	.026	2	.002	1	-1.971e-6	10	NC	1	NC	2
194			min	-.001	3	-.017	3	0	3	-1.618e-4	1	NC	1	8019.279	1
195		3	max	.007	1	.024	2	.002	1	-1.971e-6	10	NC	1	NC	2
196			min	-.001	3	-.016	3	0	3	-1.618e-4	1	NC	1	8809.73	1
197		4	max	.006	1	.023	2	.002	1	-1.971e-6	10	NC	1	NC	2
198			min	0	3	-.015	3	0	3	-1.618e-4	1	NC	1	9759.985	1
199		5	max	.006	1	.021	2	.002	1	-1.971e-6	10	NC	1	NC	1
200			min	0	3	-.014	3	0	3	-1.618e-4	1	NC	1	NC	1
201		6	max	.006	1	.02	2	.002	1	-1.971e-6	10	NC	1	NC	1
202			min	0	3	-.013	3	0	3	-1.618e-4	1	NC	1	NC	1
203		7	max	.005	1	.018	2	.001	1	-1.971e-6	10	NC	1	NC	1
204			min	0	3	-.012	3	0	3	-1.618e-4	1	NC	1	NC	1
205		8	max	.005	1	.017	2	.001	1	-1.971e-6	10	NC	1	NC	1
206			min	0	3	-.011	3	0	3	-1.618e-4	1	NC	1	NC	1
207		9	max	.004	1	.015	2	0	1	-1.971e-6	10	NC	1	NC	1
208			min	0	3	-.01	3	0	3	-1.618e-4	1	NC	1	NC	1
209		10	max	.004	1	.014	2	0	1	-1.971e-6	10	NC	1	NC	1
210			min	0	3	-.009	3	0	3	-1.618e-4	1	NC	1	NC	1
211		11	max	.003	1	.012	2	0	1	-1.971e-6	10	NC	1	NC	1
212			min	0	3	-.008	3	0	3	-1.618e-4	1	NC	1	NC	1
213		12	max	.003	1	.011	2	0	1	-1.971e-6	10	NC	1	NC	1
214			min	0	3	-.007	3	0	3	-1.618e-4	1	NC	1	NC	1
215		13	max	.003	1	.009	2	0	1	-1.971e-6	10	NC	1	NC	1
216			min	0	3	-.006	3	0	3	-1.618e-4	1	NC	1	NC	1
217		14	max	.002	1	.008	2	0	1	-1.971e-6	10	NC	1	NC	1
218			min	0	3	-.005	3	0	3	-1.618e-4	1	NC	1	NC	1
219		15	max	.002	1	.006	2	0	1	-1.971e-6	10	NC	1	NC	1
220			min	0	3	-.004	3	0	3	-1.618e-4	1	NC	1	NC	1
221		16	max	.001	1	.005	2	0	1	-1.971e-6	10	NC	1	NC	1
222			min	0	3	-.003	3	0	3	-1.618e-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
223		17	max	0	1	.003	2	0	1	-1.971e-6	10	NC	1	NC	1
224			min	0	3	-.002	3	0	3	-1.618e-4	1	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	-1.971e-6	10	NC	1	NC	1
226			min	0	3	-.001	3	0	3	-1.618e-4	1	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-1.971e-6	10	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.618e-4	1	NC	1	NC	1
229	M10	1	max	.003	1	.007	2	0	3	1.117e-3	1	NC	3	NC	1
230			min	-.003	3	-.006	3	-.002	1	-1.616e-4	3	4579.768	2	NC	1
231		2	max	.003	1	.007	2	0	3	1.058e-3	1	NC	3	NC	1
232			min	-.003	3	-.006	3	-.002	1	-1.574e-4	3	4955.596	2	NC	1
233		3	max	.003	1	.006	2	0	3	9.997e-4	1	NC	3	NC	1
234			min	-.002	3	-.006	3	-.002	1	-1.531e-4	3	5395.324	2	NC	1
235		4	max	.003	1	.006	2	0	3	9.41e-4	1	NC	3	NC	1
236			min	-.002	3	-.006	3	-.002	1	-1.489e-4	3	5913.014	2	NC	1
237		5	max	.003	1	.005	2	0	3	8.823e-4	1	NC	3	NC	1
238			min	-.002	3	-.005	3	-.002	1	-1.447e-4	3	6527.045	2	NC	1
239		6	max	.002	1	.005	2	0	3	8.236e-4	1	NC	1	NC	1
240			min	-.002	3	-.005	3	-.002	1	-1.405e-4	3	7261.824	2	NC	1
241		7	max	.002	1	.004	2	0	3	7.649e-4	1	NC	1	NC	1
242			min	-.002	3	-.005	3	-.001	1	-1.363e-4	3	8150.344	2	NC	1
243		8	max	.002	1	.004	2	0	3	7.062e-4	1	NC	1	NC	1
244			min	-.002	3	-.004	3	-.001	1	-1.321e-4	3	9238.179	2	NC	1
245		9	max	.002	1	.003	2	0	3	6.475e-4	1	NC	1	NC	1
246			min	-.002	3	-.004	3	-.001	1	-1.278e-4	3	NC	1	NC	1
247		10	max	.002	1	.003	2	0	3	5.889e-4	1	NC	1	NC	1
248			min	-.001	3	-.004	3	0	1	-1.236e-4	3	NC	1	NC	1
249		11	max	.002	1	.002	2	0	3	5.302e-4	1	NC	1	NC	1
250			min	-.001	3	-.004	3	0	1	-1.194e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	4.715e-4	1	NC	1	NC	1
252			min	-.001	3	-.003	3	0	1	-1.152e-4	3	NC	1	NC	1
253		13	max	.001	1	.002	2	0	3	4.128e-4	1	NC	1	NC	1
254			min	0	3	-.003	3	0	1	-1.11e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	3.541e-4	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	-1.068e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	2.954e-4	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	-1.025e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	2.367e-4	1	NC	1	NC	1
260			min	0	3	-.002	3	0	1	-9.833e-5	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.78e-4	1	NC	1	NC	1
262			min	0	3	-.001	3	0	1	-9.411e-5	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.193e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-8.989e-5	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	6.059e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-8.568e-5	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	3.94e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-2.948e-5	1	NC	1	NC	1
269		2	max	0	9	0	2	0	2	2.686e-5	3	NC	1	NC	1
270			min	0	10	0	3	0	3	-1.061e-4	1	NC	1	NC	1
271		3	max	0	9	0	2	0	2	1.432e-5	3	NC	1	NC	1
272			min	0	10	-.002	3	0	3	-1.828e-4	1	NC	1	NC	1
273		4	max	0	9	0	2	0	10	1.784e-6	3	NC	1	NC	1
274			min	0	10	-.002	3	0	1	-2.595e-4	1	NC	1	NC	1
275		5	max	0	9	0	2	0	10	-7.426e-6	12	NC	1	NC	1
276			min	0	10	-.003	3	-.001	1	-3.361e-4	1	NC	1	NC	1
277		6	max	0	9	0	2	0	15	-1.38e-5	15	NC	1	NC	1
278			min	0	10	-.004	3	-.002	1	-4.128e-4	1	NC	1	NC	1
279		7	max	0	9	.001	2	0	15	-1.641e-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	10	-.004	3	-.003	1	-4.895e-4	1	NC	1	NC	1
281		8	max	0	9	.001	2	0	15	-1.902e-5	15	NC	1	NC	1
282			min	0	10	-.005	3	-.004	1	-5.661e-4	1	NC	1	NC	1
283		9	max	0	9	.002	2	0	15	-2.163e-5	15	NC	1	NC	2
284			min	0	10	-.006	3	-.005	1	-6.428e-4	1	NC	1	9038.252	1
285		10	max	0	9	.002	2	0	15	-2.424e-5	15	NC	1	NC	2
286			min	0	10	-.006	3	-.006	1	-7.195e-4	1	NC	1	7288.378	1
287		11	max	0	9	.003	2	0	15	-2.685e-5	15	NC	1	NC	2
288			min	0	10	-.006	3	-.008	1	-7.961e-4	1	NC	1	6058.296	1
289		12	max	0	9	.003	2	0	15	-2.946e-5	15	NC	1	NC	2
290			min	0	10	-.007	3	-.009	1	-8.728e-4	1	NC	1	5161.163	1
291		13	max	0	9	.004	2	0	15	-3.207e-5	15	NC	1	NC	2
292			min	0	10	-.007	3	-.01	1	-9.495e-4	1	NC	1	4487.934	1
293		14	max	0	9	.005	2	0	15	-3.468e-5	15	NC	1	NC	2
294			min	0	10	-.007	3	-.012	1	-1.026e-3	1	9762.413	2	3971.454	1
295		15	max	0	9	.006	2	0	15	-3.729e-5	15	NC	3	NC	2
296			min	0	10	-.007	3	-.013	1	-1.103e-3	1	8270.412	2	3568.548	1
297		16	max	.001	9	.006	2	0	15	-3.99e-5	15	NC	3	NC	3
298			min	0	10	-.007	3	-.014	1	-1.179e-3	1	7099.378	2	3250.486	1
299		17	max	.001	9	.007	2	0	15	-4.251e-5	15	NC	3	NC	3
300			min	0	10	-.007	3	-.015	1	-1.256e-3	1	6172.955	2	2997.628	1
301		18	max	.001	9	.008	2	0	15	-4.512e-5	15	NC	3	NC	3
302			min	0	10	-.007	3	-.016	1	-1.333e-3	1	5434.886	2	2796.282	1
303		19	max	.001	9	.01	2	0	15	-4.773e-5	15	NC	3	NC	3
304			min	0	10	-.007	3	-.017	1	-1.409e-3	1	4843.65	2	2636.799	1
305	M12	1	max	.003	1	.008	2	.014	1	1.236e-3	1	NC	1	NC	3
306			min	0	3	-.006	3	0	15	4.238e-5	15	NC	1	1343.524	1
307		2	max	.003	1	.008	2	.013	1	1.236e-3	1	NC	1	NC	3
308			min	0	3	-.006	3	0	15	4.238e-5	15	NC	1	1465.135	1
309		3	max	.002	1	.008	2	.012	1	1.236e-3	1	NC	1	NC	3
310			min	0	3	-.006	3	0	15	4.238e-5	15	NC	1	1609.897	1
311		4	max	.002	1	.007	2	.011	1	1.236e-3	1	NC	1	NC	3
312			min	0	3	-.005	3	0	15	4.238e-5	15	NC	1	1783.911	1
313		5	max	.002	1	.007	2	.01	1	1.236e-3	1	NC	1	NC	3
314			min	0	3	-.005	3	0	15	4.238e-5	15	NC	1	1995.49	1
315		6	max	.002	1	.006	2	.009	1	1.236e-3	1	NC	1	NC	3
316			min	0	3	-.005	3	0	15	4.238e-5	15	NC	1	2256.194	1
317		7	max	.002	1	.006	2	.007	1	1.236e-3	1	NC	1	NC	3
318			min	0	3	-.004	3	0	15	4.238e-5	15	NC	1	2582.493	1
319		8	max	.002	1	.005	2	.006	1	1.236e-3	1	NC	1	NC	3
320			min	0	3	-.004	3	0	15	4.238e-5	15	NC	1	2998.5	1
321		9	max	.001	1	.005	2	.005	1	1.236e-3	1	NC	1	NC	3
322			min	0	3	-.004	3	0	15	4.238e-5	15	NC	1	3540.696	1
323		10	max	.001	1	.004	2	.005	1	1.236e-3	1	NC	1	NC	2
324			min	0	3	-.003	3	0	15	4.238e-5	15	NC	1	4266.429	1
325		11	max	.001	1	.004	2	.004	1	1.236e-3	1	NC	1	NC	2
326			min	0	3	-.003	3	0	15	4.238e-5	15	NC	1	5270.164	1
327		12	max	.001	1	.003	2	.003	1	1.236e-3	1	NC	1	NC	2
328			min	0	3	-.003	3	0	15	4.238e-5	15	NC	1	6716.696	1
329		13	max	0	1	.003	2	.002	1	1.236e-3	1	NC	1	NC	2
330			min	0	3	-.002	3	0	15	4.238e-5	15	NC	1	8915.169	1
331		14	max	0	1	.002	2	.002	1	1.236e-3	1	NC	1	NC	1
332			min	0	3	-.002	3	0	15	4.238e-5	15	NC	1	NC	1
333		15	max	0	1	.002	2	.001	1	1.236e-3	1	NC	1	NC	1
334			min	0	3	-.001	3	0	15	4.238e-5	15	NC	1	NC	1
335		16	max	0	1	.001	2	0	1	1.236e-3	1	NC	1	NC	1
336			min	0	3	-.001	3	0	15	4.238e-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	0	2	0	1	1.236e-3	1	NC	1	NC	1
338			min	0	3	0	3	0	15	4.238e-5	15	NC	1	NC	1
339		18	max	0	1	0	2	0	1	1.236e-3	1	NC	1	NC	1
340			min	0	3	0	3	0	15	4.238e-5	15	NC	1	NC	1
341		19	max	0	1	0	1	0	1	1.236e-3	1	NC	1	NC	1
342			min	0	1	0	1	0	1	4.238e-5	15	NC	1	NC	1
343	M1	1	max	.006	3	.022	3	.001	3	1.976e-2	1	NC	1	NC	1
344			min	-.007	2	-.03	1	-.005	1	-1.628e-2	3	NC	1	NC	1
345		2	max	.006	3	.012	3	0	3	9.411e-3	1	NC	4	NC	2
346			min	-.007	2	-.016	1	-.012	1	-8.063e-3	3	3382.628	1	6819.916	1
347		3	max	.006	3	.003	3	0	3	4.029e-6	3	NC	5	NC	2
348			min	-.007	2	-.003	1	-.016	1	-7.451e-4	1	1749.696	1	4133.958	1
349		4	max	.006	3	.008	1	0	3	8.535e-6	3	NC	5	NC	3
350			min	-.007	2	-.005	3	-.019	1	-6.203e-4	1	1238.252	1	3418.895	1
351		5	max	.006	3	.017	1	0	12	1.304e-5	3	NC	5	NC	3
352			min	-.007	2	-.011	3	-.019	1	-4.956e-4	1	992.549	1	3280.297	1
353		6	max	.006	3	.024	1	0	12	1.755e-5	3	NC	5	NC	3
354			min	-.007	2	-.016	3	-.018	1	-3.709e-4	1	853.789	1	3505.663	1
355		7	max	.006	3	.03	1	0	12	2.205e-5	3	NC	5	NC	2
356			min	-.007	2	-.02	3	-.016	1	-2.461e-4	1	769.9	1	4165.641	1
357		8	max	.006	3	.034	1	0	12	2.656e-5	3	NC	5	NC	2
358			min	-.007	2	-.022	3	-.013	1	-1.214e-4	1	719.235	1	5695.422	1
359		9	max	.006	3	.037	1	0	3	3.106e-5	3	NC	5	NC	1
360			min	-.007	2	-.024	3	-.009	1	-8.485e-6	2	691.698	1	NC	1
361		10	max	.006	3	.038	1	0	3	1.281e-4	1	NC	5	NC	1
362			min	-.007	2	-.024	3	-.005	1	4.568e-6	15	682.642	1	NC	1
363		11	max	.006	3	.037	1	0	3	2.528e-4	1	NC	5	NC	1
364			min	-.007	2	-.023	3	-.001	1	8.732e-6	15	690.671	1	NC	1
365		12	max	.006	3	.034	1	.002	1	3.775e-4	1	NC	5	NC	2
366			min	-.007	2	-.021	3	0	15	1.29e-5	15	717.062	1	6711.661	1
367		13	max	.006	3	.03	1	.006	1	5.023e-4	1	NC	5	NC	2
368			min	-.007	2	-.018	3	0	15	1.706e-5	15	766.302	1	4645.728	1
369		14	max	.006	3	.024	1	.008	1	6.27e-4	1	NC	5	NC	3
370			min	-.007	2	-.014	3	0	15	2.122e-5	15	848.202	1	3803.237	1
371		15	max	.006	3	.016	1	.009	1	7.517e-4	1	NC	5	NC	3
372			min	-.007	2	-.01	3	0	15	2.539e-5	15	983.784	1	3499.79	1
373		16	max	.006	3	.007	1	.009	1	8.42e-4	1	NC	5	NC	3
374			min	-.007	2	-.004	3	0	15	2.842e-5	15	1223.152	1	3604.74	1
375		17	max	.006	3	.002	3	.007	1	1.121e-4	1	NC	4	NC	2
376			min	-.007	2	-.005	1	0	15	4.551e-6	15	1716.7	1	4322.88	1
377		18	max	.006	3	.01	3	.003	1	1.103e-2	1	NC	4	NC	2
378			min	-.007	2	-.018	1	0	15	-3.682e-3	3	3308.834	1	7090.646	1
379		19	max	.006	3	.017	3	0	3	2.217e-2	1	NC	1	NC	1
380			min	-.007	2	-.032	1	-.004	1	-7.461e-3	3	NC	1	NC	1
381	M5	1	max	.017	3	.066	3	.001	3	6.379e-7	1	NC	1	NC	1
382			min	-.023	2	-.091	1	-.006	1	4.46e-8	15	NC	1	NC	1
383		2	max	.017	3	.037	3	.002	3	4.404e-5	3	NC	5	NC	1
384			min	-.023	2	-.05	1	-.005	1	-9.111e-5	1	1128.995	1	NC	1
385		3	max	.017	3	.01	3	.002	3	8.674e-5	3	NC	5	NC	1
386			min	-.023	2	-.011	1	-.005	1	-1.809e-4	1	581.284	1	NC	1
387		4	max	.017	3	.022	1	.003	3	8.559e-5	3	NC	5	NC	1
388			min	-.023	2	-.013	3	-.004	1	-1.688e-4	1	410.285	1	NC	1
389		5	max	.017	3	.05	1	.003	3	8.443e-5	3	NC	15	NC	1
390			min	-.024	2	-.031	3	-.003	1	-1.567e-4	1	328.082	1	NC	1
391		6	max	.017	3	.073	1	.003	3	8.327e-5	3	NC	15	NC	1
392			min	-.024	2	-.046	3	-.003	1	-1.446e-4	1	281.575	1	NC	1
393		7	max	.017	3	.091	1	.003	3	8.212e-5	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	-.024	2	-.057	3	-.002	1	-1.325e-4	1	253.359	1	NC	1
395		8	max	.017	3	.104	1	.003	3	8.096e-5	3	NC	15	NC	1
396			min	-.024	2	-.064	3	-.002	1	-1.203e-4	1	236.197	1	NC	1
397		9	max	.017	3	.112	1	.003	3	7.981e-5	3	9737.909	15	NC	1
398			min	-.024	2	-.068	3	-.002	1	-1.082e-4	1	226.707	1	NC	1
399		10	max	.017	3	.115	1	.003	3	7.865e-5	3	9637.71	15	NC	1
400			min	-.024	2	-.069	3	-.002	1	-9.612e-5	1	223.324	1	NC	1
401		11	max	.017	3	.112	1	.003	3	7.749e-5	3	9777.439	15	NC	1
402			min	-.024	2	-.066	3	-.002	1	-8.4e-5	1	225.562	1	NC	1
403		12	max	.017	3	.104	1	.002	3	7.634e-5	3	NC	15	NC	1
404			min	-.024	2	-.061	3	-.002	1	-7.189e-5	1	233.819	1	NC	1
405		13	max	.017	3	.091	1	.002	3	7.518e-5	3	NC	15	NC	1
406			min	-.024	2	-.053	3	-.002	1	-5.977e-5	1	249.545	1	NC	1
407		14	max	.017	3	.073	1	.002	3	7.403e-5	3	NC	15	NC	1
408			min	-.024	2	-.041	3	-.002	1	-4.765e-5	1	275.946	1	NC	1
409		15	max	.017	3	.049	1	.001	3	7.287e-5	3	NC	15	NC	1
410			min	-.024	2	-.028	3	-.002	1	-3.764e-5	2	319.925	1	NC	1
411		16	max	.017	3	.019	1	.001	3	6.959e-5	3	NC	5	NC	1
412			min	-.024	2	-.012	3	-.002	1	-3.529e-5	2	398.066	1	NC	1
413		17	max	.017	3	.007	3	0	3	1.573e-5	3	NC	5	NC	1
414			min	-.024	2	-.015	1	-.003	1	-2.412e-4	1	561.237	1	NC	1
415		18	max	.017	3	.028	3	0	3	7.382e-6	3	NC	5	NC	1
416			min	-.024	2	-.056	1	-.003	1	-1.237e-4	1	1087.607	1	NC	1
417		19	max	.017	3	.049	3	0	3	0	15	NC	1	NC	1
418			min	-.024	2	-.1	1	-.003	1	-1.08e-7	3	NC	1	NC	1
419	M9	1	max	.006	3	.022	3	0	3	1.628e-2	3	NC	1	NC	1
420			min	-.007	2	-.03	1	-.007	1	-1.976e-2	1	NC	1	NC	1
421		2	max	.006	3	.012	3	0	3	8.07e-3	3	NC	4	NC	2
422			min	-.007	2	-.016	1	-.001	1	-9.718e-3	1	3383.422	1	8119.332	1
423		3	max	.006	3	.003	3	.002	1	1.365e-4	1	NC	5	NC	2
424			min	-.007	2	-.003	1	0	3	4.741e-6	15	1750.116	1	5066.488	1
425		4	max	.006	3	.007	1	.004	1	3.033e-5	1	NC	5	NC	3
426			min	-.007	2	-.005	3	0	3	-7.942e-8	3	1238.546	1	4314.897	1
427		5	max	.006	3	.017	1	.005	1	-6.452e-7	10	NC	5	NC	3
428			min	-.007	2	-.011	3	0	3	-7.584e-5	1	992.772	1	4306.42	1
429		6	max	.006	3	.024	1	.004	1	-5.963e-6	15	NC	5	NC	2
430			min	-.007	2	-.016	3	-.001	3	-1.82e-4	1	853.967	1	4886.543	1
431		7	max	.006	3	.03	1	.002	1	-9.531e-6	15	NC	5	NC	2
432			min	-.007	2	-.02	3	-.002	3	-2.882e-4	1	770.045	1	6450.665	1
433		8	max	.006	3	.034	1	0	10	-1.31e-5	15	NC	5	NC	1
434			min	-.007	2	-.022	3	-.002	3	-3.943e-4	1	719.357	1	NC	1
435		9	max	.006	3	.037	1	0	10	-1.667e-5	15	NC	5	NC	1
436			min	-.007	2	-.024	3	-.004	1	-5.005e-4	1	691.802	1	NC	1
437		10	max	.006	3	.038	1	0	15	-2.024e-5	15	NC	5	NC	1
438			min	-.007	2	-.024	3	-.008	1	-6.067e-4	1	682.73	1	NC	1
439		11	max	.006	3	.037	1	0	15	-2.38e-5	15	NC	5	NC	2
440			min	-.007	2	-.023	3	-.011	1	-7.128e-4	1	690.746	1	6874.677	1
441		12	max	.006	3	.034	1	0	15	-2.737e-5	15	NC	5	NC	2
442			min	-.007	2	-.021	3	-.014	1	-8.19e-4	1	717.126	1	4620.002	1
443		13	max	.006	3	.03	1	0	15	-3.094e-5	15	NC	5	NC	2
444			min	-.007	2	-.018	3	-.017	1	-9.252e-4	1	766.355	1	3650.528	1
445		14	max	.006	3	.024	1	0	15	-3.451e-5	15	NC	5	NC	3
446			min	-.007	2	-.015	3	-.018	1	-1.031e-3	1	848.245	1	3205.298	1
447		15	max	.006	3	.016	1	0	15	-3.808e-5	15	NC	5	NC	3
448			min	-.007	2	-.01	3	-.019	1	-1.138e-3	1	983.817	1	3080.002	1
449		16	max	.006	3	.007	1	0	15	-4.068e-5	15	NC	5	NC	3
450			min	-.007	2	-.004	3	-.017	1	-1.216e-3	1	1223.176	1	3266.277	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	.006	3	.002	3	0	15	-1.428e-5	12	NC	4	NC	2
452			min	-.007	2	-.005	1	-.014	1	-6.3e-4	1	1716.733	1	3999.645	1
453		18	max	.006	3	.01	3	0	15	3.686e-3	3	NC	4	NC	2
454			min	-.007	2	-.018	1	-.009	1	-1.13e-2	1	3308.891	1	6663.262	1
455		19	max	.006	3	.017	3	0	3	7.46e-3	3	NC	1	NC	1
456			min	-.007	2	-.032	1	-.002	1	-2.217e-2	1	NC	1	NC	1
457	M13	1	max	.007	1	.022	3	.006	3	3.786e-3	3	NC	1	NC	1
458			min	0	3	-.03	1	-.007	2	-5.231e-3	1	NC	1	NC	1
459		2	max	.007	1	.2	3	.056	1	4.585e-3	3	NC	5	NC	3
460			min	0	3	-.246	1	.001	10	-6.371e-3	1	943.56	1	3361.754	1
461		3	max	.007	1	.346	3	.141	1	5.384e-3	3	NC	5	NC	3
462			min	0	3	-.423	1	.005	15	-7.51e-3	1	519.148	1	1395.413	1
463		4	max	.007	1	.436	3	.214	1	6.183e-3	3	NC	5	NC	3
464			min	0	3	-.534	1	.007	15	-8.649e-3	1	405.036	1	931.609	1
465		5	max	.007	1	.462	3	.25	1	6.981e-3	3	NC	15	NC	3
466			min	0	3	-.566	1	.009	15	-9.789e-3	1	380.757	1	800.121	1
467		6	max	.007	1	.424	3	.239	1	7.78e-3	3	NC	5	NC	3
468			min	0	3	-.521	1	.008	15	-1.093e-2	1	415.658	1	837.546	1
469		7	max	.007	1	.335	3	.183	1	8.579e-3	3	NC	5	NC	3
470			min	0	3	-.414	1	.006	15	-1.207e-2	1	530.94	1	1086.824	1
471		8	max	.007	1	.22	3	.099	1	9.378e-3	3	NC	5	NC	3
472			min	-.001	3	-.276	1	0	10	-1.321e-2	1	830.448	1	1966.136	1
473		9	max	.006	1	.114	3	.017	9	1.018e-2	3	NC	5	NC	2
474			min	-.001	3	-.149	1	-.009	10	-1.435e-2	1	1719.047	1	9439.858	1
475		10	max	.006	1	.066	3	.017	3	1.098e-2	3	NC	4	NC	1
476			min	-.001	3	-.091	1	-.023	2	-1.549e-2	1	3348.318	1	NC	1
477		11	max	.006	1	.114	3	.022	1	1.018e-2	3	NC	5	NC	2
478			min	-.001	3	-.149	1	-.009	10	-1.435e-2	1	1719.048	1	7450.592	1
479		12	max	.006	1	.22	3	.108	1	9.379e-3	3	NC	5	NC	3
480			min	-.001	3	-.276	1	0	10	-1.321e-2	1	830.448	1	1801.977	1
481		13	max	.006	1	.335	3	.194	1	8.58e-3	3	NC	5	NC	5
482			min	-.001	3	-.414	1	.007	15	-1.207e-2	1	530.94	1	1024.99	1
483		14	max	.006	1	.424	3	.25	1	7.782e-3	3	NC	5	NC	5
484			min	-.001	3	-.521	1	.009	15	-1.093e-2	1	415.659	1	799.283	1
485		15	max	.006	1	.462	3	.261	1	6.983e-3	3	NC	15	NC	5
486			min	-.001	3	-.566	1	.009	15	-9.788e-3	1	380.757	1	767.784	1
487		16	max	.006	1	.436	3	.223	1	6.184e-3	3	NC	5	NC	3
488			min	-.001	3	-.534	1	.008	15	-8.648e-3	1	405.036	1	895.48	1
489		17	max	.005	1	.346	3	.148	1	5.386e-3	3	NC	5	NC	3
490			min	-.001	3	-.423	1	.005	15	-7.509e-3	1	519.148	1	1338.409	1
491		18	max	.005	1	.2	3	.059	1	4.587e-3	3	NC	5	NC	3
492			min	-.001	3	-.246	1	.001	10	-6.369e-3	1	943.561	1	3193.888	1
493		19	max	.005	1	.022	3	.006	3	3.789e-3	3	NC	1	NC	1
494			min	-.001	3	-.03	1	-.007	2	-5.229e-3	1	NC	1	NC	1
495	M16	1	max	.002	1	.017	3	.006	3	5.437e-3	1	NC	1	NC	1
496			min	0	3	-.032	1	-.007	2	-2.875e-3	3	NC	1	NC	1
497		2	max	.002	1	.099	3	.06	1	6.659e-3	1	NC	5	NC	3
498			min	0	3	-.275	1	.001	10	-3.453e-3	3	840.936	1	3122.657	1
499		3	max	.002	1	.166	3	.149	1	7.882e-3	1	NC	5	NC	3
500			min	0	3	-.473	1	.005	15	-4.032e-3	3	462.708	1	1323.526	1
501		4	max	.002	1	.208	3	.224	1	9.105e-3	1	NC	5	NC	3
502			min	0	3	-.597	1	.008	15	-4.611e-3	3	361.036	1	891.088	1
503		5	max	.003	1	.221	3	.26	1	1.033e-2	1	NC	15	NC	5
504			min	0	3	-.633	1	.009	15	-5.189e-3	3	339.448	1	767.679	1
505		6	max	.003	1	.206	3	.249	1	1.155e-2	1	NC	5	NC	5
506			min	0	3	-.583	1	.009	15	-5.768e-3	3	370.666	1	803.041	1
507		7	max	.003	1	.167	3	.191	1	1.277e-2	1	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	-.463	1	.007	15	-6.347e-3	3	473.722	1	1036.53	1
509		8	max	.003	1	.117	3	.105	1	1.4e-2	1	NC	5	NC	3
510			min	0	3	-.307	1	0	10	-6.925e-3	3	741.854	1	1845.611	1
511		9	max	.003	1	.07	3	.02	1	1.522e-2	1	NC	5	NC	2
512			min	0	3	-.165	1	-.009	10	-7.504e-3	3	1540.989	1	8109.334	1
513		10	max	.003	1	.049	3	.017	3	1.644e-2	1	NC	4	NC	1
514			min	0	3	-.1	1	-.024	2	-8.083e-3	3	3020.539	1	NC	1
515		11	max	.003	1	.07	3	.018	1	1.522e-2	1	NC	5	NC	2
516			min	0	3	-.165	1	-.009	10	-7.503e-3	3	1540.99	1	8766.733	1
517		12	max	.003	1	.117	3	.102	1	1.4e-2	1	NC	5	NC	3
518			min	0	3	-.307	1	0	10	-6.924e-3	3	741.854	1	1906.693	1
519		13	max	.003	1	.167	3	.187	1	1.277e-2	1	NC	5	NC	3
520			min	0	3	-.463	1	.007	15	-6.345e-3	3	473.722	1	1062.779	1
521		14	max	.004	1	.206	3	.243	1	1.155e-2	1	NC	5	NC	3
522			min	0	3	-.583	1	.008	15	-5.766e-3	3	370.666	1	821.617	1
523		15	max	.004	1	.221	3	.254	1	1.033e-2	1	NC	15	NC	3
524			min	0	3	-.633	1	.009	15	-5.187e-3	3	339.448	1	785.673	1
525		16	max	.004	1	.208	3	.218	1	9.107e-3	1	NC	5	NC	3
526			min	0	3	-.597	1	.007	15	-4.608e-3	3	361.036	1	914.191	1
527		17	max	.004	1	.166	3	.144	1	7.885e-3	1	NC	5	NC	3
528			min	0	3	-.473	1	.005	15	-4.029e-3	3	462.708	1	1365.516	1
529		18	max	.004	1	.099	3	.057	1	6.662e-3	1	NC	5	NC	3
530			min	0	3	-.275	1	.001	10	-3.45e-3	3	840.937	1	3264.855	1
531		19	max	.004	1	.017	3	.006	3	5.44e-3	1	NC	1	NC	1
532			min	0	3	-.032	1	-.007	2	-2.871e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.067e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-1.058e-4	2	NC	1	NC	1
535		2	max	0	1	-.007	15	.001	1	7.872e-4	3	NC	15	NC	1
536			min	0	10	-.03	4	0	3	-7.942e-4	1	3626.105	4	NC	1
537		3	max	0	1	-.014	15	.004	1	1.268e-3	3	7849.751	15	NC	1
538			min	0	10	-.058	4	-.003	3	-1.519e-3	1	1845.201	4	NC	1
539		4	max	0	1	-.02	15	.008	1	1.748e-3	3	5385.388	15	NC	3
540			min	0	10	-.085	4	-.006	3	-2.243e-3	1	1265.916	4	8721.573	1
541		5	max	0	1	-.026	15	.014	1	2.228e-3	3	4202.273	15	NC	4
542			min	0	10	-.109	4	-.01	3	-2.968e-3	1	987.807	4	5713.088	1
543		6	max	0	1	-.03	15	.019	1	2.709e-3	3	3536.657	15	NC	4
544			min	0	10	-.129	4	-.014	3	-3.692e-3	1	831.344	4	4154.243	1
545		7	max	0	1	-.034	15	.025	1	3.189e-3	3	3136.376	15	NC	4
546			min	0	10	-.146	4	-.019	3	-4.416e-3	1	737.252	4	3244.276	1
547		8	max	0	1	-.037	15	.031	1	3.67e-3	3	2896.148	15	NC	4
548			min	0	10	-.158	4	-.023	3	-5.141e-3	1	680.783	4	2672.918	1
549		9	max	0	1	-.039	15	.036	1	4.15e-3	3	2766.843	15	NC	4
550			min	0	10	-.166	4	-.027	3	-5.865e-3	1	650.388	4	2299.301	1
551		10	max	0	1	-.039	15	.04	1	4.631e-3	3	2725.937	15	NC	4
552			min	0	10	-.168	4	-.03	3	-6.59e-3	1	640.772	4	2052.779	1
553		11	max	0	1	-.039	15	.043	1	5.111e-3	3	2766.843	15	NC	5
554			min	0	10	-.166	4	-.032	3	-7.314e-3	1	650.388	4	1896.289	1
555		12	max	0	1	-.037	15	.045	1	5.591e-3	3	2896.148	15	NC	5
556			min	0	10	-.159	4	-.033	3	-8.039e-3	1	680.783	4	1811.421	1
557		13	max	0	1	-.034	15	.044	1	6.072e-3	3	3136.376	15	NC	5
558			min	0	10	-.147	4	-.033	3	-8.763e-3	1	737.252	4	1792.759	1
559		14	max	0	1	-.03	15	.041	1	6.552e-3	3	3536.657	15	NC	5
560			min	0	10	-.13	4	-.03	3	-9.488e-3	1	831.344	4	1848.022	1
561		15	max	0	1	-.026	15	.035	1	7.033e-3	3	4202.273	15	NC	4
562			min	0	10	-.11	4	-.026	3	-1.021e-2	1	987.807	4	2005.834	1
563		16	max	0	1	-.02	15	.026	1	7.513e-3	3	5385.388	15	NC	4
564			min	0	10	-.086	4	-.019	3	-1.094e-2	1	1265.916	4	2344.043	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
565		17	max	0	1	-.014	15	.014	1	7.994e-3	3	7849.751	15	NC	4
566			min	0	10	-.059	4	-.009	3	-1.166e-2	1	1845.201	4	3106.982	1
567		18	max	0	1	-.007	15	.004	3	8.474e-3	3	NC	15	NC	4
568			min	0	10	-.031	4	-.008	2	-1.239e-2	1	3626.105	4	5530.769	1
569		19	max	.001	1	.004	3	.02	3	8.955e-3	3	NC	1	NC	1
570			min	0	10	-.005	1	-.025	2	-1.311e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	3	.007	3	3.017e-3	3	NC	1	NC	1
572			min	-.001	1	-.002	1	-.008	2	-3.969e-3	1	NC	1	NC	1
573		2	max	0	10	-.007	15	.007	1	2.883e-3	3	NC	15	NC	2
574			min	-.001	1	-.03	4	0	10	-3.776e-3	1	3626.105	4	8717.228	1
575		3	max	0	10	-.014	15	.016	1	2.749e-3	3	7849.751	15	NC	3
576			min	-.001	1	-.059	4	-.004	3	-3.583e-3	1	1845.201	4	4929.462	1
577		4	max	0	10	-.02	15	.024	1	2.615e-3	3	5385.388	15	NC	4
578			min	0	1	-.085	4	-.007	3	-3.389e-3	1	1265.916	4	3746.852	1
579		5	max	0	10	-.026	15	.028	1	2.481e-3	3	4202.273	15	NC	4
580			min	0	1	-.109	4	-.01	3	-3.196e-3	1	987.807	4	3233.598	1
581		6	max	0	10	-.03	15	.031	1	2.347e-3	3	3536.657	15	NC	4
582			min	0	1	-.13	4	-.011	3	-3.003e-3	1	831.344	4	3008.423	1
583		7	max	0	10	-.034	15	.032	1	2.213e-3	3	3136.376	15	NC	4
584			min	0	1	-.146	4	-.012	3	-2.809e-3	1	737.252	4	2951.743	1
585		8	max	0	10	-.037	15	.032	1	2.079e-3	3	2896.148	15	NC	4
586			min	0	1	-.158	4	-.012	3	-2.616e-3	1	680.783	4	3022.492	1
587		9	max	0	10	-.039	15	.03	1	1.945e-3	3	2766.843	15	NC	4
588			min	0	1	-.165	4	-.011	3	-2.422e-3	1	650.388	4	3214.805	1
589		10	max	0	10	-.039	15	.027	1	1.811e-3	3	2725.937	15	NC	4
590			min	0	1	-.168	4	-.01	3	-2.229e-3	1	640.772	4	3547.882	1
591		11	max	0	10	-.039	15	.024	1	1.677e-3	3	2766.843	15	NC	4
592			min	0	1	-.165	4	-.009	3	-2.036e-3	1	650.388	4	4070.066	1
593		12	max	0	10	-.037	15	.02	1	1.543e-3	3	2896.148	15	NC	3
594			min	0	1	-.158	4	-.007	3	-1.842e-3	1	680.783	4	4877.432	1
595		13	max	0	10	-.034	15	.015	1	1.409e-3	3	3136.376	15	NC	3
596			min	0	1	-.146	4	-.005	3	-1.649e-3	1	737.252	4	6161.487	1
597		14	max	0	10	-.03	15	.011	1	1.275e-3	3	3536.657	15	NC	2
598			min	0	1	-.129	4	-.004	3	-1.456e-3	1	831.344	4	8335.758	1
599		15	max	0	10	-.026	15	.007	1	1.141e-3	3	4202.273	15	NC	1
600			min	0	1	-.109	4	-.002	3	-1.262e-3	1	987.807	4	NC	1
601		16	max	0	10	-.02	15	.004	1	1.007e-3	3	5385.388	15	NC	1
602			min	0	1	-.085	4	-.001	3	-1.069e-3	1	1265.916	4	NC	1
603		17	max	0	10	-.014	15	.001	1	8.728e-4	3	7849.751	15	NC	1
604			min	0	1	-.058	4	0	3	-8.756e-4	1	1845.201	4	NC	1
605		18	max	0	10	-.007	15	0	4	7.388e-4	3	NC	15	NC	1
606			min	0	1	-.03	4	0	2	-6.965e-4	2	3626.105	4	NC	1
607		19	max	0	1	0	1	0	1	6.048e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.383e-4	2	NC	1	NC	1

Anchor Designer™
Software
Version 2.4.5673.0

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

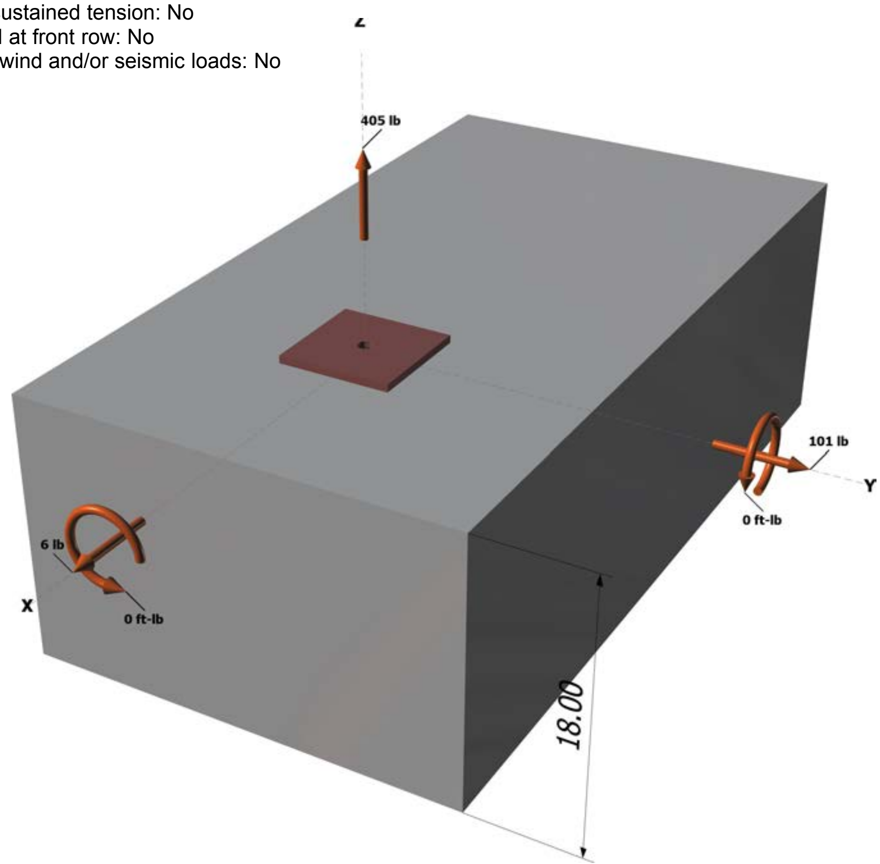
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>

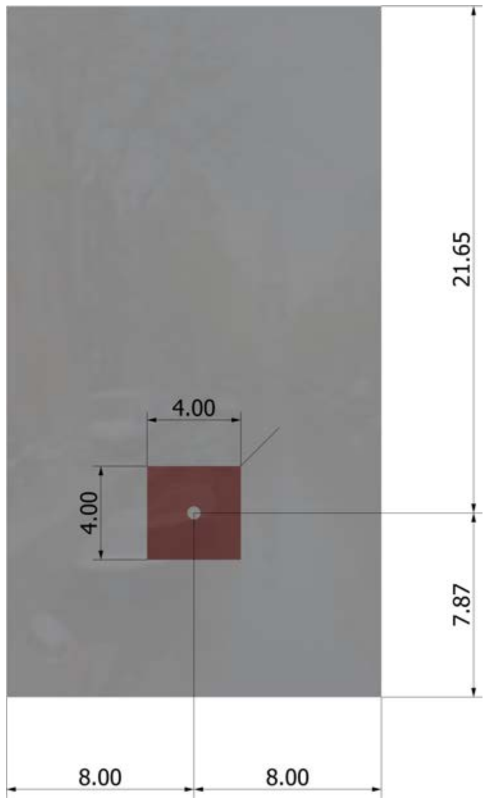


SIMPSON Strong-Tie

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

SIMPSON Strong-Tie

Anchor Designer™
Software
Version 2.4.5673.0

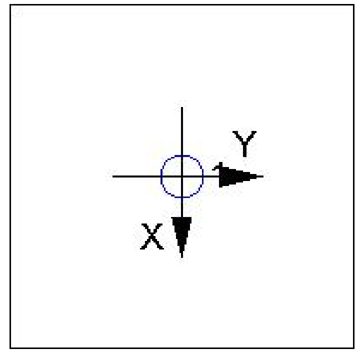
Company:	Schletter, Inc.	Date:	12/10/2015
Engineer:	HCV	Page:	3/5
Project:	Standard PVMini - Worst Case		
Address:			
Phone:			
E-mail:			

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

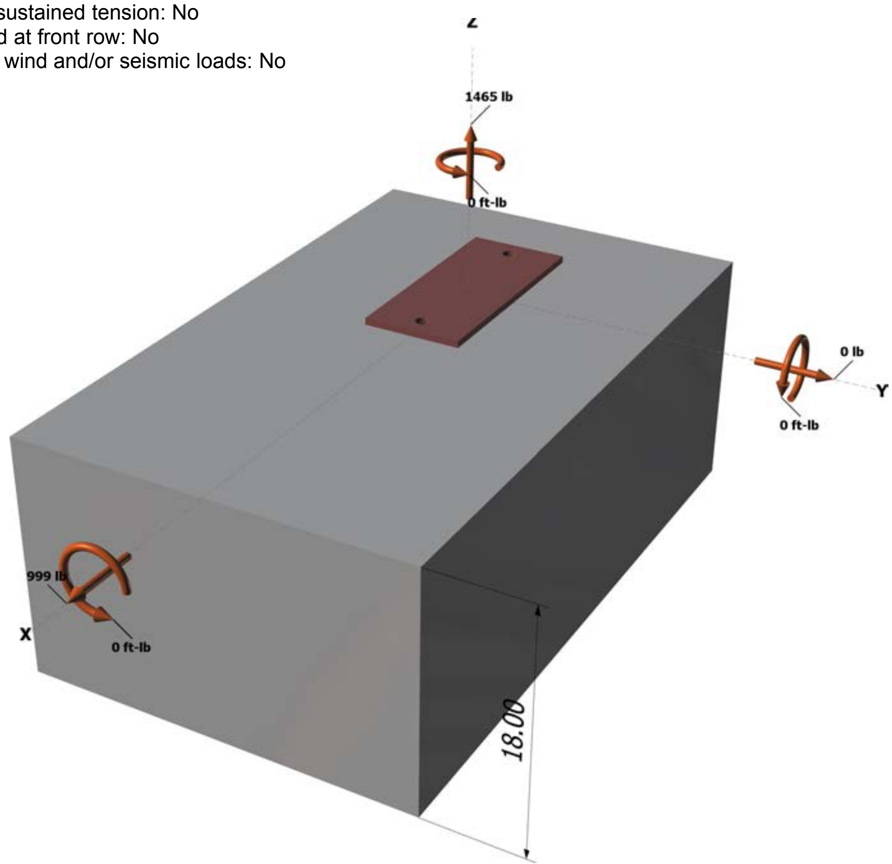
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

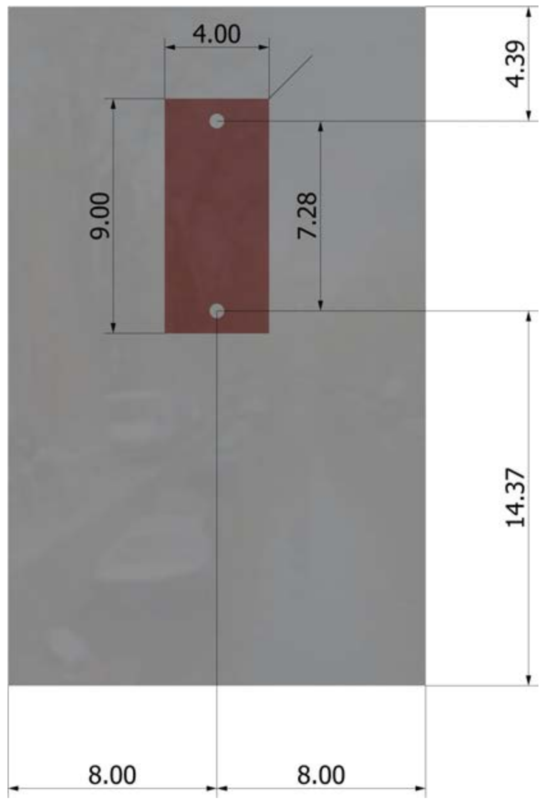
Load and Geometry
Load factor source: ACI 318 Section 9.2
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: No
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

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

<Figure 1>



<Figure 2>



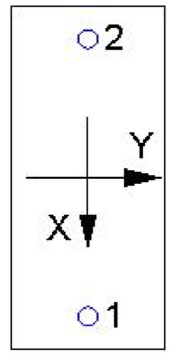
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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.