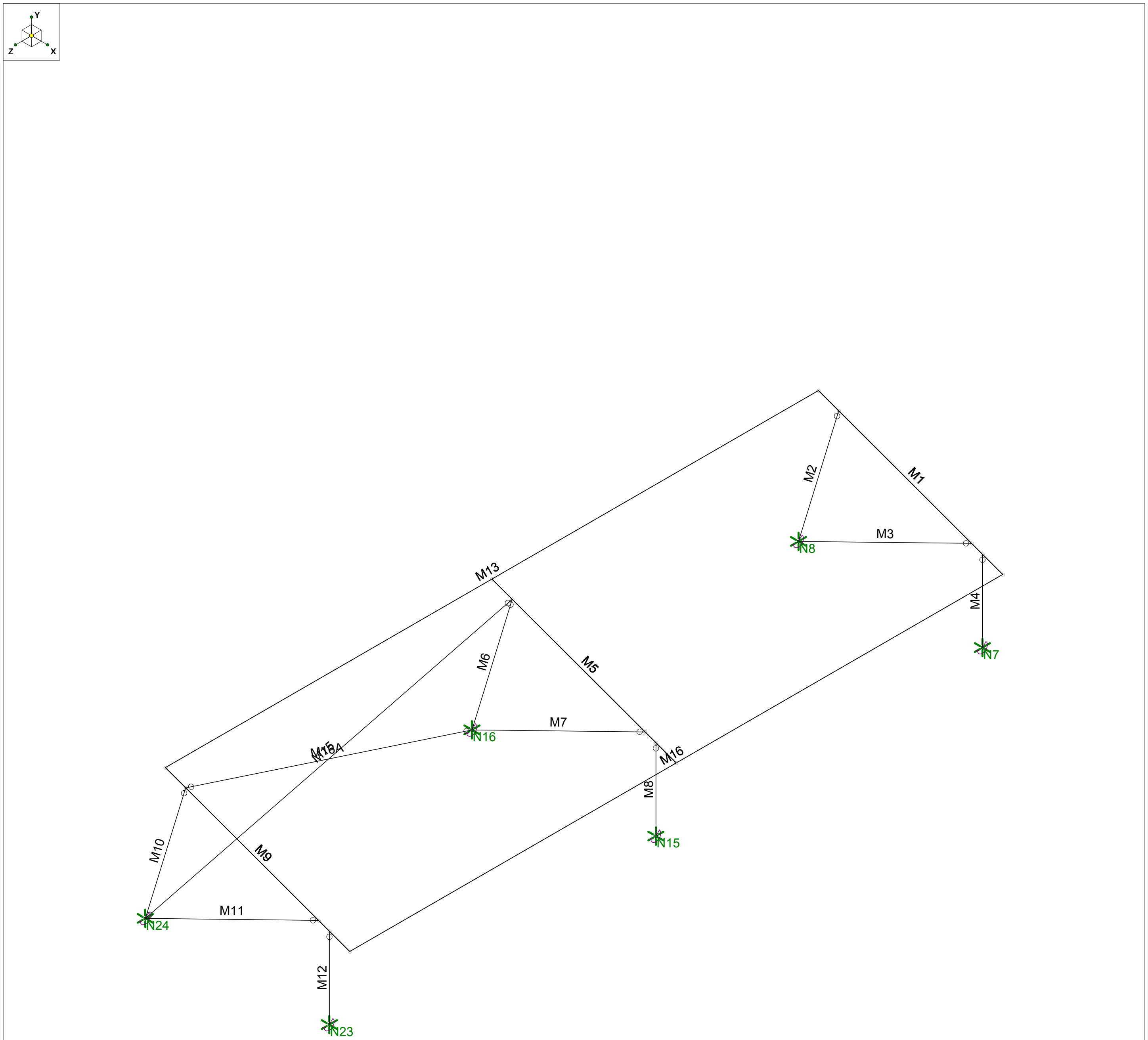


Schletter, Inc.		20° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

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.

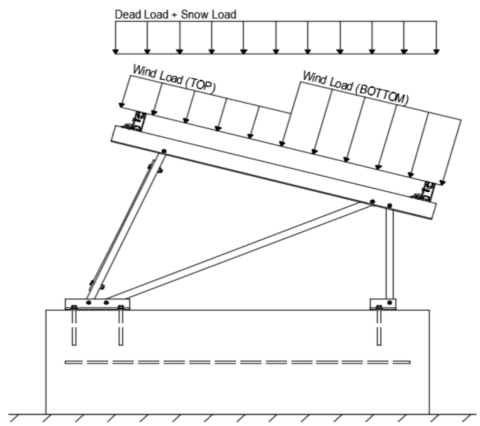
1.2 Construction

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

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
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
M13	Top
M16	Bottom

Girders	Location
M1	Outer
M5	Inner
M9	Outer

Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

Diagonal Struts	Location
M3	Outer
M7	Inner
M11	Outer

Rear Struts	Location
M2	Outer
M6	Inner
M10	Outer

Bracing
M15
M16A

Front Reactions	Location
N7	Outer
N15	Inner
N23	Outer

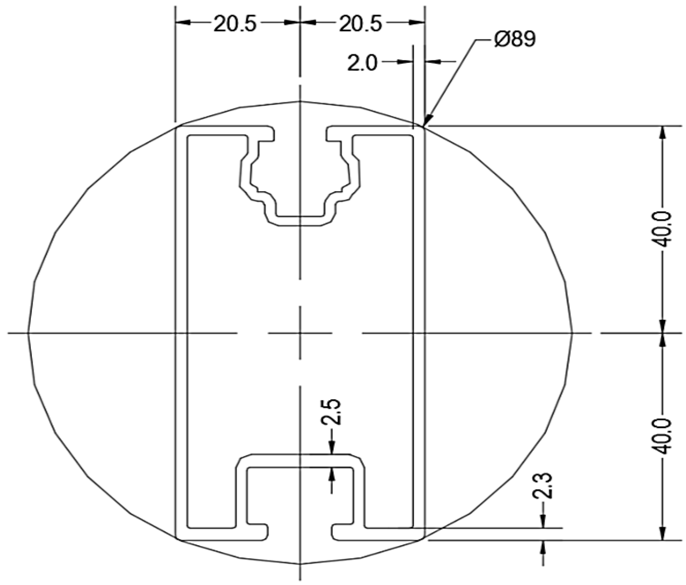
Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

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).

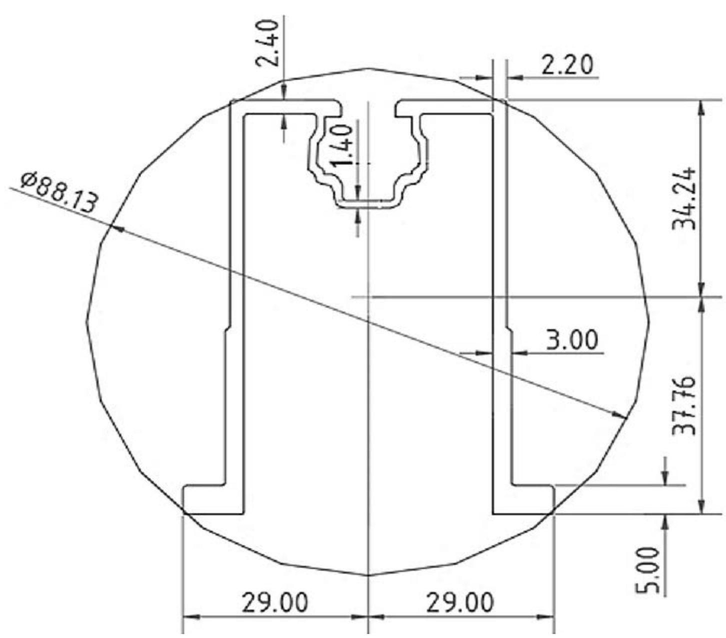
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	102	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.61	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	1.234	k-ft
M_z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

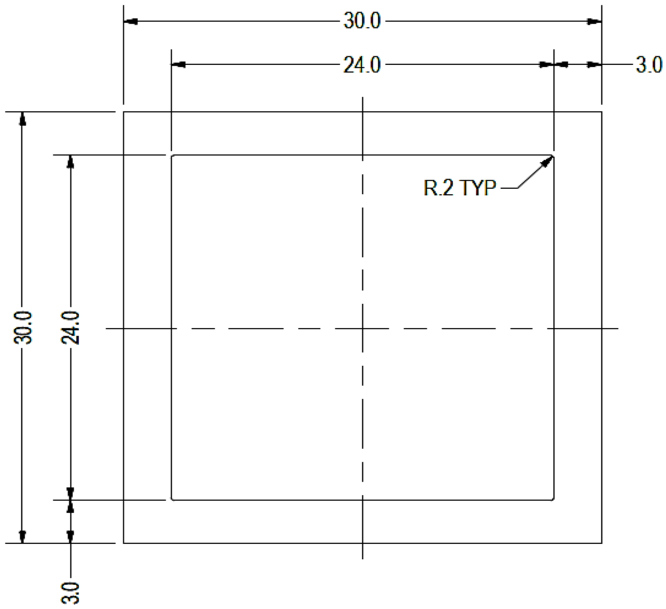
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.98	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
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).

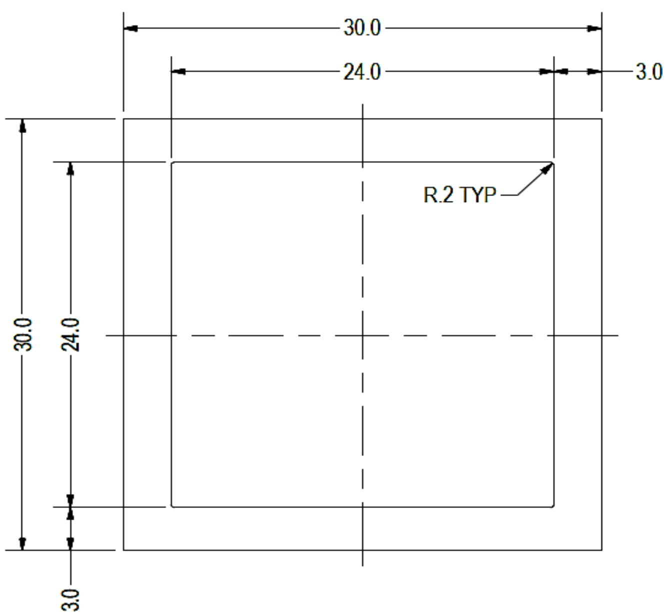
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.059	k-ft
P_n =	0.321	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	17%	



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).

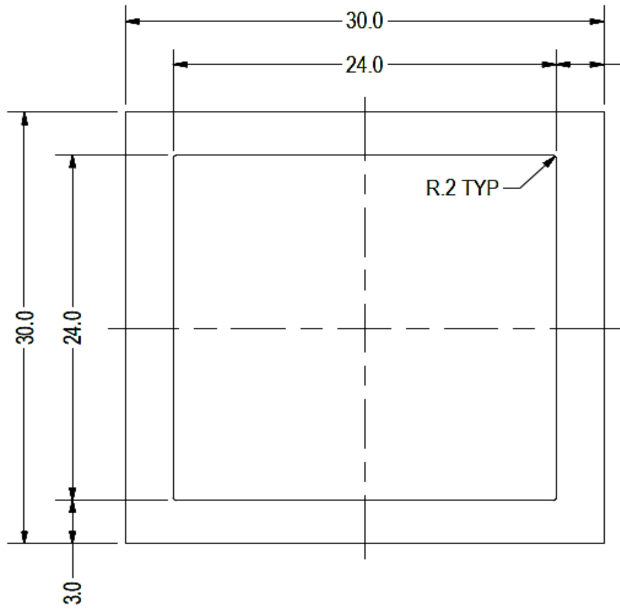
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.309	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).

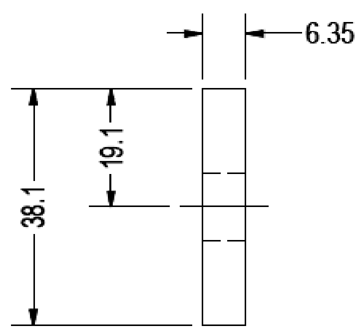
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.07	in
$\Phi F_{ty\ AXIAL}$ =	13.55	ksi
$\Phi F_{ty\ BENDING}$ =	30.37	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.311	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 =	0.008	k-ft
P_n =	0.273	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	20%	



A cross brace kit is required every 10 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

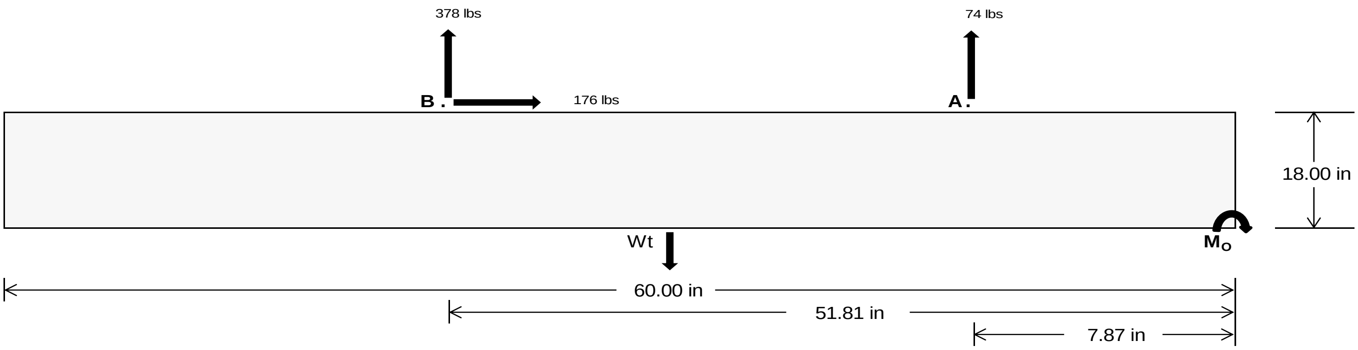
5.1 Helical Pile Foundations

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 =	47.72	733.67	k
Moment (Weak Axis) =	0.08	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			
Width	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
F_B	595 lbs	595 lbs	595 lbs	595 lbs	497 lbs	497 lbs	497 lbs	497 lbs
F_V	74 lbs	74 lbs	74 lbs	74 lbs	319 lbs	319 lbs	319 lbs	319 lbs
P_{total}	3308 lbs	3399 lbs	3490 lbs	3580 lbs	2964 lbs	3055 lbs	3145 lbs	3236 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
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
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
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
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

ASD LC	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
F_A	971 lbs	971 lbs	971 lbs	971 lbs	-148 lbs	-148 lbs	-148 lbs	-148 lbs
F_B	773 lbs	773 lbs	773 lbs	773 lbs	-756 lbs	-756 lbs	-756 lbs	-756 lbs
F_V	290 lbs	290 lbs	290 lbs	290 lbs	-353 lbs	-353 lbs	-353 lbs	-353 lbs
P_{total}	3647 lbs	3738 lbs	3829 lbs	3919 lbs	237 lbs	292 lbs	346 lbs	400 lbs
M	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	0.22 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
f_{min}	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}	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

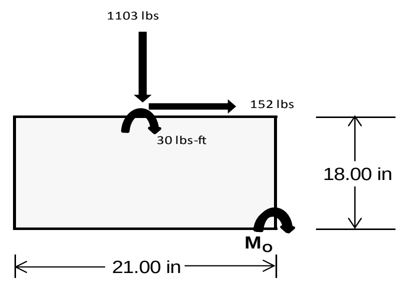
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 707.0 ft-lbs
Resisting Force Required = 808.03 lbs
S.F. = 1.67
Weight Required = 1346.72 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	145 lbs	207 lbs	93 lbs	414 lbs	1103 lbs	373 lbs	79 lbs	22 lbs	29 lbs
F_V	25 lbs	201 lbs	26 lbs	16 lbs	152 lbs	20 lbs	25 lbs	200 lbs	26 lbs
P_{total}	2502 lbs	2563 lbs	2449 lbs	2657 lbs	3346 lbs	2615 lbs	768 lbs	711 lbs	718 lbs
M	72 lbs-ft	341 lbs-ft	78 lbs-ft	48 lbs-ft	258 lbs-ft	61 lbs-ft	73 lbs-ft	340 lbs-ft	78 lbs-ft
e	0.03 ft	0.13 ft	0.03 ft	0.02 ft	0.08 ft	0.02 ft	0.10 ft	0.48 ft	0.11 ft
L/6	0.29 ft	1.48 ft	1.69 ft	1.71 ft	1.60 ft	1.70 ft	1.56 ft	0.79 ft	1.53 ft
f_{min}	257.5 sqft	159.3 sqft	249.4 sqft	285.0 sqft	281.2 sqft	275.0 sqft	59.1 sqft	-52.2 sqft	51.7 sqft
f_{max}	314.2 psf	426.5 psf	310.3 psf	322.3 psf	483.5 psf	322.9 psf	116.3 psf	214.7 psf	112.5 psf

Maximum Bearing Pressure = 484 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.

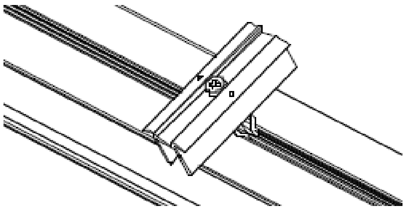
6. DESIGN OF JOINTS AND CONNECTIONS

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.

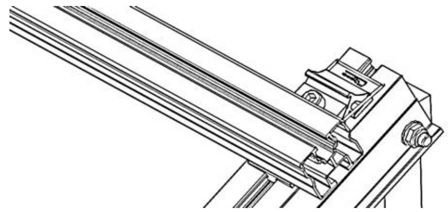
Fastening of Modules to Purlins

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

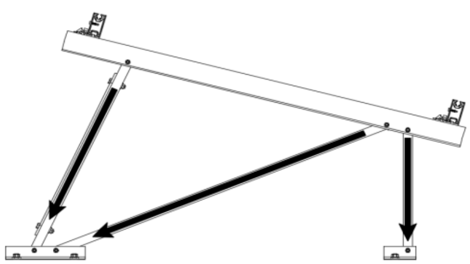
Maximum Axial Load =	1.311 k
M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	23%

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 =	0.273 k
M10 Bolt Capacity =	8.894 k
Strut Bearing Capacity =	7.952 k
Utilization =	3%



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

7. SEISMIC DESIGN

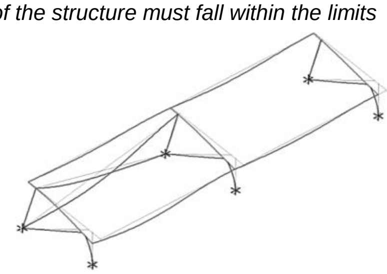
7.1 Seismic Drift

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

Mean Height, h_{sx} =	29.57 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$
	0.591 in
Max Drift, Δ_{MAX} =	0.125 in

$0.125 \leq 0.591$, OK.

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



APPENDIX A

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

Purlin = **ProfiPlus 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

ly = 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

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

3.4.18

h/t = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

φF_LWk = 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L = φcc(Bc-Dc*λ)

φF_L = 30.1251 ksi

3.4.8

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

3.4.9

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

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

3.4.9.1

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

λ = 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

φcc = 0.83792

φF_L= φcc(Bc-Dc*λ)

φF_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)

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= 24.52 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 12.31 kips

Strut = **30x30x3**

Strong Axis:

3.4.14

$L_b =$ 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

$L_b =$ 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

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

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 = $\varphi yFcy$

φF_L = 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L = $\varphi yFcy$

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 = $\varphi yFcy$

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			.8			4		

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

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

Member Distributed Loads (BLC 6 : Seismic - Lateral)

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

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	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																

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
10	ASD 1.0D + 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	14	0	1	0	1
2		min	-176.763	3	-368.968	3	-2.142	5	0	3	0	1	0	1
3	N7	max	0	5	563	1	-.146	12	0	12	0	1	0	1
4		min	-.197	1	-64.913	3	-36.395	4	-.059	4	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	-36.707	5	-.059	4	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	-263.009	4	0	5	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	-34.067	5	-.054	5	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	-3.602	5	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	-373.543	4						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M2	1	max	398.596	1	.639	6	1.214	4	0	12	0	3	0	1
2			min	-349.106	3	.15	15	-.032	3	-.001	1	0	1	0	1
3		2	max	398.703	1	.597	6	1.118	4	0	12	0	4	0	15
4			min	-349.026	3	.14	15	-.032	3	-.001	1	0	10	0	6
5		3	max	398.809	1	.556	6	1.021	4	0	12	0	4	0	15
6			min	-348.946	3	.13	15	-.032	3	-.001	1	0	12	0	6
7		4	max	398.916	1	.515	6	.925	4	0	12	0	4	0	15
8			min	-348.866	3	.12	15	-.032	3	-.001	1	0	3	0	6
9		5	max	399.022	1	.474	6	.871	1	0	12	0	4	0	15
10			min	-348.786	3	.111	15	-.032	3	-.001	1	0	3	0	6
11		6	max	399.129	1	.432	6	.871	1	0	12	0	4	0	15
12			min	-348.706	3	.101	15	-.032	3	-.001	1	0	3	0	6
13		7	max	399.235	1	.391	6	.871	1	0	12	0	4	0	15
14			min	-348.626	3	.091	15	-.032	3	-.001	1	0	3	0	6
15		8	max	399.342	1	.35	6	.871	1	0	12	0	4	0	15
16			min	-348.546	3	.082	15	-.032	3	-.001	1	0	3	0	6
17		9	max	399.448	1	.309	6	.871	1	0	12	0	14	0	15
18			min	-348.466	3	.072	15	-.032	3	-.001	1	0	3	0	6
19		10	max	399.555	1	.267	6	.871	1	0	12	.001	1	0	15
20			min	-348.387	3	.062	15	-.032	3	-.001	1	0	3	0	6
21		11	max	399.662	1	.226	6	.871	1	0	12	.001	1	0	15
22			min	-348.307	3	.053	15	-.032	3	-.001	1	0	3	0	6
23		12	max	399.768	1	.185	6	.871	1	0	12	.001	1	0	15
24			min	-348.227	3	.043	15	-.069	5	-.001	1	0	3	0	6
25		13	max	399.875	1	.144	6	.871	1	0	12	.002	1	0	15
26			min	-348.147	3	.033	15	-.165	5	-.001	1	0	3	0	6
27		14	max	399.981	1	.102	6	.871	1	0	12	.002	1	0	15
28			min	-348.067	3	.023	15	-.262	5	-.001	1	0	3	0	6

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
29		15	max	400.088	1	.07	2	.871	1	0	12	.002	1	0	15
30			min	-347.987	3	.014	15	-.358	5	-.001	1	0	3	0	6
31		16	max	400.194	1	.038	2	.871	1	0	12	.002	1	0	15
32			min	-347.907	3	-.006	9	-.454	5	-.001	1	0	3	0	6
33		17	max	400.301	1	.009	10	.871	1	0	12	.002	1	0	15
34			min	-347.827	3	-.035	1	-.551	5	-.001	1	0	3	0	6
35		18	max	400.407	1	-.015	15	.871	1	0	12	.002	1	0	15
36			min	-347.747	3	-.067	1	-.647	5	-.001	1	0	3	0	6
37		19	max	400.514	1	-.025	15	.871	1	0	12	.002	1	0	15
38			min	-347.667	3	-.104	4	-.744	5	-.001	1	0	3	0	6
39	M3	1	max	58.955	10	1.792	6	-.037	12	0	5	.003	1	0	6
40			min	-108.672	9	.421	15	-1.522	4	0	1	0	12	0	15
41		2	max	58.899	10	1.614	6	-.037	12	0	5	.002	1	0	6
42			min	-108.729	9	.379	15	-1.388	4	0	1	0	12	0	15
43		3	max	58.842	10	1.437	6	-.037	12	0	5	.002	1	0	2
44			min	-108.786	9	.337	15	-1.254	4	0	1	0	12	0	9
45		4	max	58.786	10	1.259	6	-.037	12	0	5	.002	1	0	15
46			min	-108.842	9	.296	15	-1.121	4	0	1	0	15	0	4
47		5	max	58.729	10	1.081	6	-.037	12	0	5	.002	1	0	15
48			min	-108.899	9	.254	15	-.987	4	0	1	0	5	0	4
49		6	max	58.673	10	.904	6	-.037	12	0	5	.002	1	0	15
50			min	-108.955	9	.212	15	-.853	4	0	1	0	5	0	4
51		7	max	58.616	10	.726	6	-.037	12	0	5	.001	1	0	15
52			min	-109.012	9	.17	15	-.847	1	0	1	0	5	0	4
53		8	max	58.559	10	.548	6	-.037	12	0	5	.001	1	0	15
54			min	-109.068	9	.128	15	-.847	1	0	1	0	5	-.001	4
55		9	max	58.503	10	.371	6	-.037	12	0	5	.001	1	0	15
56			min	-109.125	9	.087	15	-.847	1	0	1	0	5	-.001	4
57		10	max	58.446	10	.193	6	-.037	12	0	5	0	1	0	15
58			min	-109.181	9	.045	15	-.847	1	0	1	0	5	-.001	4
59		11	max	58.39	10	.028	2	-.01	15	0	5	0	1	0	15
60			min	-109.238	9	-.003	9	-.847	1	0	1	0	5	-.001	4
61		12	max	58.333	10	-.039	15	.116	5	0	5	0	1	0	15
62			min	-109.295	9	-.162	4	-.847	1	0	1	0	5	-.001	4
63		13	max	58.277	10	-.08	15	.25	5	0	5	0	1	0	15
64			min	-109.351	9	-.34	4	-.847	1	0	1	0	5	-.001	4
65		14	max	58.22	10	-.122	15	.384	5	0	5	0	1	0	15
66			min	-109.408	9	-.518	4	-.847	1	0	1	0	5	-.001	4
67		15	max	58.164	10	-.164	15	.517	5	0	5	0	1	0	15
68			min	-109.464	9	-.695	4	-.847	1	0	1	0	5	0	4
69		16	max	58.107	10	-.206	15	.651	5	0	5	0	12	0	15
70			min	-109.521	9	-.873	4	-.847	1	0	1	0	4	0	4
71		17	max	58.05	10	-.247	15	.784	5	0	5	0	12	0	15
72			min	-109.577	9	-1.051	4	-.847	1	0	1	0	1	0	4
73		18	max	57.994	10	-.289	15	.918	5	0	5	0	12	0	15
74			min	-109.634	9	-1.228	4	-.847	1	0	1	0	1	0	4
75		19	max	57.937	10	-.331	15	1.052	5	0	5	0	5	0	1
76			min	-109.69	9	-1.406	4	-.847	1	0	1	0	1	0	1
77	M4	1	max	561.836	1	0	1	-.145	12	0	1	0	5	0	1
78			min	-65.786	3	0	1	-36.169	4	0	1	0	1	0	1
79		2	max	561.9	1	0	1	-.145	12	0	1	0	12	0	1
80			min	-65.738	3	0	1	-36.225	4	0	1	-.003	4	0	1
81		3	max	561.965	1	0	1	-.145	12	0	1	0	12	0	1
82			min	-65.689	3	0	1	-36.281	4	0	1	-.006	4	0	1
83		4	max	562.03	1	0	1	-.145	12	0	1	0	12	0	1
84			min	-65.641	3	0	1	-36.338	4	0	1	-.01	4	0	1
85		5	max	562.095	1	0	1	-.145	12	0	1	0	12	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
86			min	-65.592	3	0	1	-36.394	4	0	1	-.013	4	0	1
87		6	max	562.159	1	0	1	-.145	12	0	1	0	12	0	1
88			min	-65.544	3	0	1	-36.45	4	0	1	-.016	4	0	1
89		7	max	562.224	1	0	1	-.145	12	0	1	0	12	0	1
90			min	-65.495	3	0	1	-36.506	4	0	1	-.019	4	0	1
91		8	max	562.289	1	0	1	-.145	12	0	1	0	12	0	1
92			min	-65.446	3	0	1	-36.562	4	0	1	-.023	4	0	1
93		9	max	562.353	1	0	1	-.145	12	0	1	0	12	0	1
94			min	-65.398	3	0	1	-36.618	4	0	1	-.026	4	0	1
95		10	max	562.418	1	0	1	-.145	12	0	1	0	12	0	1
96			min	-65.349	3	0	1	-36.674	4	0	1	-.029	4	0	1
97		11	max	562.483	1	0	1	-.145	12	0	1	0	12	0	1
98			min	-65.301	3	0	1	-36.73	4	0	1	-.033	4	0	1
99		12	max	562.547	1	0	1	-.145	12	0	1	0	12	0	1
100			min	-65.252	3	0	1	-36.786	4	0	1	-.036	4	0	1
101		13	max	562.612	1	0	1	-.145	12	0	1	0	12	0	1
102			min	-65.204	3	0	1	-36.842	4	0	1	-.039	4	0	1
103		14	max	562.677	1	0	1	-.145	12	0	1	0	12	0	1
104			min	-65.155	3	0	1	-36.898	4	0	1	-.042	4	0	1
105		15	max	562.742	1	0	1	-.145	12	0	1	0	12	0	1
106			min	-65.107	3	0	1	-36.954	4	0	1	-.046	4	0	1
107		16	max	562.806	1	0	1	-.145	12	0	1	0	12	0	1
108			min	-65.058	3	0	1	-37.011	4	0	1	-.049	4	0	1
109		17	max	562.871	1	0	1	-.145	12	0	1	0	12	0	1
110			min	-65.01	3	0	1	-37.067	4	0	1	-.052	4	0	1
111		18	max	562.936	1	0	1	-.145	12	0	1	0	12	0	1
112			min	-64.961	3	0	1	-37.123	4	0	1	-.056	4	0	1
113		19	max	563	1	0	1	-.145	12	0	1	0	12	0	1
114			min	-64.913	3	0	1	-37.179	4	0	1	-.059	4	0	1
115	M6	1	max	1308.611	1	.625	6	1.116	4	0	1	0	4	0	1
116			min	-1144.718	3	.143	15	-.107	3	0	5	0	2	0	1
117		2	max	1308.717	1	.584	6	1.02	4	0	1	0	4	0	15
118			min	-1144.638	3	.134	15	-.107	3	0	5	0	2	0	6
119		3	max	1308.824	1	.543	6	.923	4	0	1	0	4	0	15
120			min	-1144.558	3	.124	15	-.107	3	0	5	0	2	0	6
121		4	max	1308.93	1	.502	6	.827	4	0	1	0	4	0	15
122			min	-1144.478	3	.114	15	-.107	3	0	5	0	12	0	6
123		5	max	1309.037	1	.46	6	.73	4	0	1	0	4	0	15
124			min	-1144.398	3	.105	15	-.107	3	0	5	0	3	0	6
125		6	max	1309.143	1	.419	6	.634	4	0	1	0	4	0	15
126			min	-1144.318	3	.095	15	-.107	3	0	5	0	3	0	6
127		7	max	1309.25	1	.378	6	.537	4	0	1	0	4	0	15
128			min	-1144.238	3	.085	15	-.107	3	0	5	0	3	0	6
129		8	max	1309.356	1	.343	2	.441	4	0	1	0	4	0	15
130			min	-1144.158	3	.075	15	-.107	3	0	5	0	3	0	6
131		9	max	1309.463	1	.311	2	.372	14	0	1	0	4	0	15
132			min	-1144.078	3	.066	15	-.107	3	0	5	0	3	0	6
133		10	max	1309.569	1	.279	2	.323	14	0	1	.001	4	0	15
134			min	-1143.998	3	.056	15	-.107	3	0	5	0	3	0	6
135		11	max	1309.676	1	.247	2	.287	1	0	1	.001	4	0	15
136			min	-1143.919	3	.046	15	-.107	3	0	5	0	3	0	6
137		12	max	1309.782	1	.215	2	.287	1	0	1	.001	4	0	15
138			min	-1143.839	3	.036	12	-.107	3	0	5	0	3	0	6
139		13	max	1309.889	1	.182	2	.287	1	0	1	.001	4	0	15
140			min	-1143.759	3	.02	12	-.151	5	0	5	0	3	0	6
141		14	max	1309.996	1	.15	2	.287	1	0	1	.001	4	0	15
142			min	-1143.679	3	.002	3	-.247	5	0	5	0	3	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
143		15	max	1310.102	1	.118	2	.287	1	0	1	.001	4	0	15
144			min	-1143.599	3	-.023	3	-.343	5	0	5	0	3	0	2
145		16	max	1310.209	1	.086	2	.287	1	0	1	0	4	0	15
146			min	-1143.519	3	-.047	3	-.44	5	0	5	0	3	0	2
147		17	max	1310.315	1	.054	2	.287	1	0	1	0	14	0	15
148			min	-1143.439	3	-.071	3	-.536	5	0	5	0	3	0	2
149		18	max	1310.422	1	.022	2	.287	1	0	1	0	14	0	15
150			min	-1143.359	3	-.095	3	-.633	5	0	5	0	3	0	2
151		19	max	1310.528	1	-.011	2	.287	1	0	1	0	14	0	15
152			min	-1143.279	3	-.119	3	-.729	5	0	5	0	3	0	2
153	M7	1	max	308.829	2	1.8	4	.018	1	0	2	0	4	0	2
154			min	-256.324	3	.427	15	-1.447	5	0	5	0	3	0	12
155		2	max	308.761	2	1.623	4	.018	1	0	2	0	4	0	2
156			min	-256.375	3	.386	15	-1.314	5	0	5	0	3	0	12
157		3	max	308.694	2	1.445	4	.018	1	0	2	0	4	0	2
158			min	-256.426	3	.344	15	-1.18	5	0	5	0	3	0	3
159		4	max	308.626	2	1.268	4	.018	1	0	2	0	2	0	2
160			min	-256.477	3	.302	15	-1.046	5	0	5	0	3	0	3
161		5	max	308.558	2	1.09	4	.018	1	0	2	0	2	0	15
162			min	-256.527	3	.26	15	-.913	5	0	5	0	5	0	6
163		6	max	308.49	2	.912	4	.018	1	0	2	0	2	0	15
164			min	-256.578	3	.219	15	-.779	5	0	5	0	5	0	6
165		7	max	308.422	2	.735	4	.018	1	0	2	0	2	0	15
166			min	-256.629	3	.177	15	-.645	5	0	5	0	5	0	6
167		8	max	308.354	2	.557	4	.018	1	0	2	0	2	0	15
168			min	-256.68	3	.135	15	-.512	5	0	5	0	5	0	6
169		9	max	308.286	2	.379	4	.018	1	0	2	0	2	0	15
170			min	-256.731	3	.093	15	-.378	5	0	5	0	5	-.001	6
171		10	max	308.219	2	.213	2	.018	1	0	2	0	2	0	15
172			min	-256.782	3	.043	12	-.245	5	0	5	0	5	-.001	6
173		11	max	308.151	2	.074	2	.018	1	0	2	0	2	0	15
174			min	-256.833	3	-.043	3	-.111	5	0	5	0	5	-.001	6
175		12	max	308.083	2	-.032	15	.029	14	0	2	0	2	0	15
176			min	-256.884	3	-.154	6	-.002	3	0	5	0	5	-.001	6
177		13	max	308.015	2	-.074	15	.161	4	0	2	0	2	0	15
178			min	-256.935	3	-.332	6	-.002	3	0	5	0	5	-.001	6
179		14	max	307.947	2	-.115	15	.294	4	0	2	0	2	0	15
180			min	-256.986	3	-.509	6	-.002	3	0	5	0	5	-.001	6
181		15	max	307.879	2	-.157	15	.428	4	0	2	0	2	0	15
182			min	-257.036	3	-.687	6	-.002	3	0	5	0	5	0	6
183		16	max	307.811	2	-.199	15	.562	4	0	2	0	2	0	15
184			min	-257.087	3	-.865	6	-.002	3	0	5	0	5	0	6
185		17	max	307.744	2	-.241	15	.695	4	0	2	0	2	0	15
186			min	-257.138	3	-1.042	6	-.002	3	0	5	0	5	0	6
187		18	max	307.676	2	-.283	15	.829	4	0	2	0	2	0	15
188			min	-257.189	3	-1.22	6	-.002	3	0	5	0	5	0	6
189		19	max	307.608	2	-.324	15	.963	4	0	2	0	2	0	1
190			min	-257.24	3	-1.398	6	-.002	3	0	5	0	5	0	1
191	M8	1	max	1602.049	1	0	1	.833	1	0	1	0	4	0	1
192			min	-242.797	3	0	1	-36.328	4	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	-36.384	4	0	1	-.003	4	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	-36.44	4	0	1	-.006	4	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	-36.496	4	0	1	-.01	4	0	1
199		5	max	1602.308	1	0	1	.833	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
200			min	-242.603	3	0	1	-36.552	4	0	1	-.013	4	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	-36.608	4	0	1	-.016	4	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	-36.665	4	0	1	-.02	4	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	-36.721	4	0	1	-.023	4	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	-36.777	4	0	1	-.026	4	0	1
209		10	max	1602.632	1	0	1	.833	1	0	1	0	1	0	1
210			min	-242.361	3	0	1	-36.833	4	0	1	-.029	4	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	-36.889	4	0	1	-.033	4	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	-36.945	4	0	1	-.036	4	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	-37.001	4	0	1	-.039	4	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	-37.057	4	0	1	-.043	4	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	-37.113	4	0	1	-.046	4	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	-37.169	4	0	1	-.049	4	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	-37.225	4	0	1	-.053	4	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	-37.281	4	0	1	-.056	4	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	-37.337	4	0	1	-.059	4	0	1
229	M10	1	max	413.185	1	.664	4	1.332	5	.001	1	0	1	0	1
230			min	-338.084	3	.167	15	-.191	1	-.002	5	0	3	0	1
231		2	max	413.291	1	.623	4	1.235	5	.001	1	0	4	0	15
232			min	-338.004	3	.157	15	-.191	1	-.002	5	0	3	0	4
233		3	max	413.398	1	.582	4	1.139	5	.001	1	0	4	0	15
234			min	-337.924	3	.148	15	-.191	1	-.002	5	0	3	0	4
235		4	max	413.504	1	.541	4	1.042	5	.001	1	0	4	0	15
236			min	-337.844	3	.138	15	-.191	1	-.002	5	0	3	0	4
237		5	max	413.611	1	.499	4	.946	5	.001	1	0	4	0	15
238			min	-337.764	3	.128	15	-.191	1	-.002	5	0	3	0	4
239		6	max	413.718	1	.458	4	.849	5	.001	1	0	4	0	15
240			min	-337.685	3	.118	15	-.191	1	-.002	5	0	3	0	4
241		7	max	413.824	1	.417	4	.753	5	.001	1	.001	4	0	15
242			min	-337.605	3	.109	15	-.191	1	-.002	5	0	3	0	4
243		8	max	413.931	1	.376	4	.656	5	.001	1	.001	4	0	15
244			min	-337.525	3	.099	15	-.191	1	-.002	5	0	3	0	4
245		9	max	414.037	1	.334	4	.56	5	.001	1	.001	4	0	15
246			min	-337.445	3	.089	15	-.191	1	-.002	5	0	1	0	4
247		10	max	414.144	1	.293	4	.464	5	.001	1	.001	4	0	15
248			min	-337.365	3	.08	15	-.191	1	-.002	5	0	1	0	4
249		11	max	414.25	1	.252	4	.367	5	.001	1	.001	4	0	15
250			min	-337.285	3	.07	15	-.191	1	-.002	5	0	1	0	4
251		12	max	414.357	1	.211	4	.271	5	.001	1	.001	4	0	15
252			min	-337.205	3	.06	15	-.191	1	-.002	5	0	1	0	4
253		13	max	414.463	1	.169	4	.174	5	.001	1	.001	4	0	15
254			min	-337.125	3	.045	1	-.191	1	-.002	5	0	1	0	4
255		14	max	414.57	1	.128	4	.078	5	.001	1	.001	4	0	15
256			min	-337.045	3	.013	1	-.191	1	-.002	5	0	1	0	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
257		15	max	414.676	1	.087	4	-.013	15	.001	1	.001	4	0	15
258			min	-336.965	3	-.019	1	-.191	1	-.002	5	0	1	0	4
259		16	max	414.783	1	.045	4	-.018	12	.001	1	.001	4	0	15
260			min	-336.885	3	-.051	1	-.191	1	-.002	5	0	1	0	4
261		17	max	414.889	1	.017	5	-.018	12	.001	1	.001	4	0	15
262			min	-336.806	3	-.083	1	-.216	4	-.002	5	0	1	0	4
263		18	max	414.996	1	.002	5	-.018	12	.001	1	.001	4	0	15
264			min	-336.726	3	-.115	1	-.313	4	-.002	5	0	1	0	4
265		19	max	415.103	1	-.008	15	-.018	12	.001	1	.001	4	0	15
266			min	-336.646	3	-.148	1	-.409	4	-.002	5	0	1	0	4
267	M11	1	max	58.42	10	1.788	6	.98	1	.002	4	.001	5	0	6
268			min	-108.584	9	.418	15	-1.139	5	0	10	-.002	1	0	15
269		2	max	58.364	10	1.611	6	.98	1	.002	4	.001	5	0	2
270			min	-108.64	9	.376	15	-1.005	5	0	10	-.002	1	0	15
271		3	max	58.307	10	1.433	6	.98	1	.002	4	.001	5	0	2
272			min	-108.697	9	.335	15	-.871	5	0	10	-.002	1	0	3
273		4	max	58.251	10	1.255	6	.98	1	.002	4	0	5	0	15
274			min	-108.753	9	.293	15	-.738	5	0	10	-.002	1	0	4
275		5	max	58.194	10	1.078	6	.98	1	.002	4	0	5	0	15
276			min	-108.81	9	.251	15	-.604	5	0	10	-.002	1	0	4
277		6	max	58.138	10	.9	6	.98	1	.002	4	0	5	0	15
278			min	-108.867	9	.209	15	-.47	5	0	10	-.001	1	0	4
279		7	max	58.081	10	.722	6	.98	1	.002	4	0	5	0	15
280			min	-108.923	9	.168	15	-.337	5	0	10	-.001	1	0	4
281		8	max	58.025	10	.545	6	.98	1	.002	4	0	5	0	15
282			min	-108.98	9	.126	15	-.203	5	0	10	-.001	1	-.001	4
283		9	max	57.968	10	.367	6	.98	1	.002	4	0	5	0	15
284			min	-109.036	9	.084	15	-.07	5	0	10	0	1	-.001	4
285		10	max	57.911	10	.189	6	.98	1	.002	4	0	5	0	15
286			min	-109.093	9	.042	15	.023	12	0	10	0	1	-.001	4
287		11	max	57.855	10	.048	2	.98	1	.002	4	0	5	0	15
288			min	-109.149	9	-.019	3	.023	12	0	10	0	1	-.001	4
289		12	max	57.798	10	-.041	15	.98	1	.002	4	0	5	0	15
290			min	-109.206	9	-.166	4	.023	12	0	10	0	1	-.001	4
291		13	max	57.742	10	-.083	15	.98	1	.002	4	0	5	0	15
292			min	-109.262	9	-.344	4	.023	12	0	10	0	2	-.001	4
293		14	max	57.685	10	-.125	15	.98	1	.002	4	0	4	0	15
294			min	-109.319	9	-.522	4	.023	12	0	10	0	10	-.001	4
295		15	max	57.629	10	-.166	15	.98	1	.002	4	0	4	0	15
296			min	-109.375	9	-.699	4	.023	12	0	10	0	10	0	4
297		16	max	57.572	10	-.208	15	1.06	4	.002	4	.001	4	0	15
298			min	-109.432	9	-.877	4	.023	12	0	10	0	10	0	4
299		17	max	57.516	10	-.25	15	1.194	4	.002	4	.001	4	0	15
300			min	-109.489	9	-1.055	4	.023	12	0	10	0	10	0	4
301		18	max	57.459	10	-.292	15	1.327	4	.002	4	.002	4	0	15
302			min	-109.545	9	-1.232	4	.023	12	0	10	0	10	0	4
303		19	max	57.402	10	-.333	15	1.461	4	.002	4	.002	4	0	1
304			min	-109.602	9	-1.41	4	.023	12	0	10	0	10	0	1
305	M12	1	max	561.611	1	0	1	4.521	1	0	1	0	4	0	1
306			min	-65.338	3	0	1	-33.148	5	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	-33.204	5	0	1	-.003	5	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	-33.261	5	0	1	-.006	5	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	-33.317	5	0	1	-.009	5	0	1
313		5	max	561.87	1	0	1	4.521	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
314			min	-65.144	3	0	1	-33.373	5	0	1	-.012	5	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	-33.429	5	0	1	-.015	5	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	-33.485	5	0	1	-.018	5	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	-33.541	5	0	1	-.021	5	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	-33.597	5	0	1	-.024	5	0	1
323		10	max	562.193	1	0	1	4.521	1	0	1	.004	1	0	1
324			min	-64.902	3	0	1	-33.653	5	0	1	-.027	5	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	-33.709	5	0	1	-.03	5	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	-33.765	5	0	1	-.033	5	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	-33.821	5	0	1	-.036	5	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	-33.877	5	0	1	-.039	5	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	-33.933	5	0	1	-.042	5	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	-33.99	5	0	1	-.045	5	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	-34.046	5	0	1	-.048	5	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	-34.102	5	0	1	-.051	5	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	-34.158	5	0	1	-.054	5	0	1
343	M1	1	max	143.833	1	328.569	3	-3.366	12	0	1	.175	1	.014	1
344			min	5.118	12	-397.376	1	-88.688	1	0	3	.007	12	-.009	3
345		2	max	143.929	1	328.372	3	-3.366	12	0	1	.156	1	.1	1
346			min	5.166	12	-397.639	1	-88.688	1	0	3	.006	12	-.081	3
347		3	max	122.157	1	7.599	9	-3.386	12	0	15	.135	1	.184	1
348			min	6.516	10	-20.39	3	-88.417	1	0	1	.006	12	-.151	3
349		4	max	122.253	1	7.38	9	-3.386	12	0	15	.116	1	.184	1
350			min	6.595	10	-20.587	3	-88.417	1	0	1	.005	12	-.146	3
351		5	max	122.348	1	7.161	9	-3.386	12	0	15	.097	1	.184	1
352			min	6.675	10	-20.784	3	-88.417	1	0	1	.004	12	-.142	3
353		6	max	122.444	1	6.943	9	-3.386	12	0	15	.078	1	.184	1
354			min	6.754	10	-20.981	3	-88.417	1	0	1	.003	12	-.137	3
355		7	max	122.539	1	6.724	9	-3.386	12	0	15	.059	1	.184	1
356			min	6.834	10	-21.177	3	-88.417	1	0	1	.003	12	-.133	3
357		8	max	122.635	1	6.505	9	-3.386	12	0	15	.039	1	.184	1
358			min	6.914	10	-21.374	3	-88.417	1	0	1	.002	12	-.128	3
359		9	max	122.73	1	6.287	9	-3.386	12	0	15	.02	1	.184	1
360			min	6.993	10	-21.571	3	-88.417	1	0	1	.001	12	-.123	3
361		10	max	122.826	1	6.068	9	-3.386	12	0	15	.003	4	.185	1
362			min	7.073	10	-21.768	3	-88.417	1	0	1	0	10	-.119	3
363		11	max	122.921	1	5.849	9	-3.386	12	0	15	0	15	.185	1
364			min	7.152	10	-21.965	3	-88.417	1	0	1	-.018	1	-.114	3
365		12	max	123.017	1	5.631	9	-3.386	12	0	15	-.001	12	.185	1
366			min	7.232	10	-22.161	3	-88.417	1	0	1	-.037	1	-.109	3
367		13	max	123.112	1	5.412	9	-3.386	12	0	15	-.002	12	.186	1
368			min	7.311	10	-22.358	3	-88.417	1	0	1	-.056	1	-.104	3
369		14	max	123.208	1	5.193	9	-3.386	12	0	15	-.003	12	.186	1
370			min	7.391	10	-22.555	3	-88.417	1	0	1	-.076	1	-.099	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
371		15	max	123.303	1	4.975	9	-3.386	12	0	15	-.003	12	.186	1
372			min	7.471	10	-22.752	3	-88.417	1	0	1	-.095	1	-.094	3
373		16	max	79.479	2	27.826	10	-3.424	12	0	1	-.004	12	.188	1
374			min	-29.889	3	-84.878	3	-89.155	1	0	5	-.115	1	-.089	3
375		17	max	79.575	2	27.608	10	-3.424	12	0	1	-.005	12	.205	1
376			min	-29.818	3	-85.075	3	-89.155	1	0	5	-.134	1	-.07	3
377		18	max	-4.836	12	444.903	1	-3.57	12	0	5	-.006	12	.111	1
378			min	-143.283	1	-147.152	3	-91.355	1	0	1	-.154	1	-.039	3
379		19	max	-4.788	12	444.64	1	-3.57	12	0	5	-.006	12	.015	1
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	.05	4	.019	3
382			min	7.604	15	-1315.435	1	-32.243	1	0	5	0	10	-.027	1
383		2	max	314.436	1	1086.503	3	-.109	10	0	1	.043	4	.258	1
384			min	7.633	15	-1315.697	1	-32.243	1	0	5	-.003	3	-.217	3
385		3	max	242.463	1	9.388	9	2.934	3	0	3	.036	4	.538	1
386			min	6.033	15	-67.793	3	-26.76	4	0	4	-.008	3	-.447	3
387		4	max	242.559	1	9.169	9	2.934	3	0	3	.03	4	.542	1
388			min	6.061	15	-67.99	3	-26.518	4	0	4	-.007	1	-.433	3
389		5	max	242.654	1	8.951	9	2.934	3	0	3	.025	4	.546	1
390			min	6.09	15	-68.187	3	-26.276	4	0	4	-.007	1	-.418	3
391		6	max	242.75	1	8.732	9	2.934	3	0	3	.019	4	.55	1
392			min	6.119	15	-68.384	3	-26.034	4	0	4	-.006	1	-.403	3
393		7	max	242.845	1	8.513	9	2.934	3	0	3	.013	4	.554	1
394			min	6.148	15	-68.58	3	-25.792	4	0	4	-.006	1	-.388	3
395		8	max	242.941	1	8.295	9	2.934	3	0	3	.008	4	.559	1
396			min	6.177	15	-68.777	3	-25.55	4	0	4	-.005	1	-.373	3
397		9	max	243.036	1	8.076	9	2.934	3	0	3	.002	5	.563	1
398			min	6.205	15	-68.974	3	-25.308	4	0	4	-.005	1	-.358	3
399		10	max	243.132	1	7.857	9	2.934	3	0	3	0	10	.567	1
400			min	6.234	15	-69.171	3	-25.066	4	0	4	-.004	1	-.344	3
401		11	max	243.227	1	7.639	9	2.934	3	0	3	0	10	.572	1
402			min	6.263	15	-69.368	3	-24.824	4	0	4	-.009	4	-.328	3
403		12	max	243.323	1	7.42	9	2.934	3	0	3	0	10	.576	1
404			min	6.292	15	-69.564	3	-24.582	4	0	4	-.014	4	-.313	3
405		13	max	243.418	1	7.201	9	2.934	3	0	3	0	10	.581	1
406			min	6.321	15	-69.761	3	-24.34	4	0	4	-.019	4	-.298	3
407		14	max	243.514	1	6.983	9	2.934	3	0	3	0	10	.585	1
408			min	6.35	15	-69.958	3	-24.098	4	0	4	-.024	4	-.283	3
409		15	max	243.609	1	6.764	9	2.934	3	0	3	0	10	.59	1
410			min	6.378	15	-70.155	3	-23.856	4	0	4	-.03	4	-.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	-22.667	4	0	4	-.035	4	-.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	-22.425	4	0	4	-.04	4	-.196	3
415		18	max	-9.909	12	1466.372	1	2.938	1	0	4	.001	3	.289	1
416			min	-315.301	1	-484.841	3	-56.973	5	0	1	-.052	4	-.091	3
417		19	max	-9.862	12	1466.109	1	2.938	1	0	4	.002	3	.014	3
418			min	-315.205	1	-485.038	3	-56.731	5	0	1	-.064	4	-.029	1
419	M9	1	max	143.153	1	328.557	3	237.2	4	0	3	-.002	15	.014	1
420			min	2.859	15	-397.354	1	7.766	10	0	1	-.175	1	-.009	3
421		2	max	143.249	1	328.361	3	237.442	4	0	3	.045	5	.1	1
422			min	2.888	15	-397.616	1	7.766	10	0	1	-.149	1	-.081	3
423		3	max	122.112	1	7.573	9	83.042	1	0	1	.089	5	.184	1
424			min	2.667	15	-20.335	3	-34.837	5	0	12	-.121	1	-.15	3
425		4	max	122.208	1	7.355	9	83.042	1	0	1	.082	5	.184	1
426			min	2.696	15	-20.532	3	-34.595	5	0	12	-.103	1	-.146	3
427		5	max	122.303	1	7.136	9	83.042	1	0	1	.074	5	.184	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
428			min	2.724	15	-20.729	3	-34.353	5	0	12	-.085	1	-.142	3
429		6	max	122.399	1	6.917	9	83.042	1	0	1	.067	5	.184	1
430			min	2.753	15	-20.926	3	-34.111	5	0	12	-.067	1	-.137	3
431		7	max	122.494	1	6.699	9	83.042	1	0	1	.059	5	.184	1
432			min	2.782	15	-21.122	3	-33.869	5	0	12	-.049	1	-.132	3
433		8	max	122.59	1	6.48	9	83.042	1	0	1	.052	5	.184	1
434			min	2.811	15	-21.319	3	-33.627	5	0	12	-.031	1	-.128	3
435		9	max	122.685	1	6.261	9	83.042	1	0	1	.045	5	.184	1
436			min	2.84	15	-21.516	3	-33.385	5	0	12	-.013	1	-.123	3
437		10	max	122.781	1	6.043	9	83.042	1	0	1	.038	4	.185	1
438			min	2.868	15	-21.713	3	-33.143	5	0	12	0	10	-.119	3
439		11	max	122.876	1	5.824	9	83.042	1	0	1	.034	4	.185	1
440			min	2.897	15	-21.91	3	-32.901	5	0	12	.002	10	-.114	3
441		12	max	122.972	1	5.605	9	83.042	1	0	1	.041	1	.185	1
442			min	2.926	15	-22.106	3	-32.659	5	0	12	.003	10	-.109	3
443		13	max	123.067	1	5.387	9	83.042	1	0	1	.059	1	.186	1
444			min	2.955	15	-22.303	3	-32.417	5	0	12	.004	12	-.104	3
445		14	max	123.163	1	5.168	9	83.042	1	0	1	.077	1	.186	1
446			min	2.984	15	-22.5	3	-32.175	5	0	12	.004	12	-.099	3
447		15	max	123.258	1	4.949	9	83.042	1	0	1	.095	1	.187	1
448			min	3.012	15	-22.697	3	-31.933	5	0	12	.001	15	-.094	3
449		16	max	79.712	2	27.457	10	83.936	1	0	10	.115	1	.188	1
450			min	-29.92	3	-85.298	3	-30.432	5	0	4	-.002	5	-.089	3
451		17	max	79.808	2	27.239	10	83.936	1	0	10	.133	1	.205	1
452			min	-29.848	3	-85.495	3	-30.19	5	0	4	-.009	5	-.07	3
453		18	max	1.904	5	444.903	1	88.433	1	0	1	.152	1	.111	1
454			min	-143.029	1	-147.15	3	-62.986	5	0	3	-.022	5	-.039	3
455		19	max	1.949	5	444.64	1	88.433	1	0	1	.172	1	.015	1
456			min	-142.934	1	-147.347	3	-62.743	5	0	3	-.036	5	-.007	3
457	M13	1	max	237.214	4	396.695	1	-2.859	15	.014	1	.175	1	0	1
458			min	7.768	10	-328.543	3	-143.135	1	-.009	3	.002	15	0	3
459		2	max	227.863	4	279.813	1	-1.746	15	.014	1	.055	1	.265	3
460			min	7.768	10	-231.675	3	-109.728	1	-.009	3	0	5	-.319	1
461		3	max	218.511	4	162.93	1	-.632	15	.014	1	.001	3	.438	3
462			min	7.768	10	-134.807	3	-76.321	1	-.009	3	-.032	1	-.529	1
463		4	max	209.16	4	46.048	1	.636	5	.014	1	-.002	12	.519	3
464			min	7.768	10	-37.94	3	-42.914	1	-.009	3	-.089	1	-.627	1
465		5	max	199.808	4	58.928	3	2.358	5	.014	1	0	15	.509	3
466			min	7.768	10	-70.835	1	-9.507	1	-.009	3	-.113	1	-.615	1
467		6	max	190.457	4	155.796	3	23.9	1	.014	1	.002	5	.408	3
468			min	7.768	10	-187.717	1	.411	12	-.009	3	-.107	1	-.493	1
469		7	max	181.105	4	252.663	3	57.308	1	.014	1	.006	5	.215	3
470			min	7.768	10	-304.6	1	1.497	12	-.009	3	-.068	1	-.261	1
471		8	max	171.753	4	349.531	3	90.715	1	.014	1	.013	4	.082	1
472			min	7.768	10	-421.482	1	2.584	12	-.009	3	0	3	-.069	3
473		9	max	162.402	4	446.398	3	124.122	1	.014	1	.103	1	.535	1
474			min	7.768	10	-538.365	1	3.67	12	-.009	3	.003	12	-.445	3
475		10	max	153.05	4	543.266	3	157.529	1	.011	2	.236	1	1.099	1
476			min	7.768	10	-655.247	1	4.756	12	-.014	1	.007	12	-.913	3
477		11	max	113.264	4	538.365	1	.753	5	.009	3	.098	1	.535	1
478			min	3.366	12	-446.398	3	-123.437	1	-.014	1	-.018	5	-.445	3
479		12	max	103.913	4	421.482	1	2.475	5	.009	3	0	10	.082	1
480			min	3.366	12	-349.531	3	-90.03	1	-.014	1	-.017	4	-.069	3
481		13	max	94.561	4	304.6	1	4.197	5	.009	3	-.003	12	.215	3
482			min	3.366	12	-252.663	3	-56.623	1	-.014	1	-.072	1	-.261	1
483		14	max	88.999	1	187.717	1	5.919	5	.009	3	-.004	12	.408	3
484			min	3.366	12	-155.796	3	-23.216	1	-.014	1	-.11	1	-.493	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
485		15	max	88.999	1	70.835	1	10.191	1	.009	3	-.001	15	.509	3
486			min	3.366	12	-58.928	3	.637	10	-.014	1	-.116	1	-.615	1
487		16	max	88.999	1	37.94	3	43.599	1	.009	3	.006	5	.519	3
488			min	3.366	12	-46.048	1	1.859	12	-.014	1	-.09	1	-.627	1
489		17	max	88.999	1	134.807	3	77.006	1	.009	3	.015	5	.438	3
490			min	3.366	12	-162.93	1	2.946	12	-.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	3.366	12	-279.813	1	4.032	12	-.014	1	.003	12	-.319	1
493		19	max	88.999	1	328.543	3	143.82	1	.009	3	.175	1	0	1
494			min	3.366	12	-396.695	1	5.118	12	-.014	1	.007	12	0	3
495	M16	1	max	62.737	5	445.339	1	1.949	5	.007	3	.172	1	0	1
496			min	-88.094	1	-147.367	3	-142.947	1	-.015	1	-.036	5	0	3
497		2	max	53.385	5	314.115	1	3.671	5	.007	3	.052	1	.119	3
498			min	-88.094	1	-104.04	3	-109.54	1	-.015	1	-.033	5	-.359	1
499		3	max	44.034	5	182.892	1	5.393	5	.007	3	-.001	12	.197	3
500			min	-88.094	1	-60.712	3	-76.133	1	-.015	1	-.036	4	-.593	1
501		4	max	34.682	5	51.668	1	7.115	5	.007	3	-.003	12	.233	3
502			min	-88.094	1	-17.385	3	-42.726	1	-.015	1	-.092	1	-.704	1
503		5	max	25.331	5	25.943	3	8.837	5	.007	3	-.004	12	.229	3
504			min	-88.094	1	-79.556	1	-9.319	1	-.015	1	-.116	1	-.691	1
505		6	max	15.979	5	69.27	3	24.088	1	.007	3	-.004	12	.184	3
506			min	-88.094	1	-210.78	1	.529	12	-.015	1	-.109	1	-.554	1
507		7	max	6.628	5	112.598	3	57.495	1	.007	3	.004	5	.099	3
508			min	-88.094	1	-342.003	1	1.615	12	-.015	1	-.071	1	-.293	1
509		8	max	-1.732	15	155.925	3	90.902	1	.007	3	.017	4	.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	35.336	5	-17.144	15	157.716	1	.005	14	.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	25.984	5	604.451	1	.836	5	.015	1	.102	1	.601	1
516			min	-91.059	1	-199.252	3	-124.055	1	-.007	3	-.017	5	-.196	3
517		12	max	16.633	5	473.227	1	2.558	5	.015	1	0	2	.092	1
518			min	-91.059	1	-155.925	3	-90.648	1	-.007	3	-.015	4	-.028	3
519		13	max	7.281	5	342.003	1	4.28	5	.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	-1.265	15	210.779	1	6.003	5	.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	-3.569	12	79.556	1	9.855	4	.015	1	0	15	.229	3
524			min	-91.059	1	-25.943	3	.443	12	-.007	3	-.115	1	-.691	1
525		16	max	-3.569	12	17.385	3	42.981	1	.015	1	.008	5	.233	3
526			min	-91.059	1	-51.668	1	1.529	12	-.007	3	-.09	1	-.704	1
527		17	max	-3.569	12	60.712	3	76.388	1	.015	1	.018	5	.197	3
528			min	-91.059	1	-182.892	1	2.615	12	-.007	3	-.033	1	-.593	1
529		18	max	-3.569	12	104.04	3	109.795	1	.015	1	.055	1	.119	3
530			min	-91.059	1	-314.115	1	3.702	12	-.007	3	.002	12	-.359	1
531		19	max	-3.569	12	147.367	3	143.202	1	.015	1	.174	1	0	1
532			min	-91.059	1	-445.339	1	4.788	12	-.007	3	.006	12	0	5
533	M15	1	max	0	4	2.305	2	.021	3	0	1	0	1	0	1
534			min	-35.432	1	0	4	-.028	1	0	3	0	3	0	1
535		2	max	0	4	2.049	2	.021	3	0	1	0	1	0	4
536			min	-35.511	1	0	4	-.028	1	0	3	0	3	-.001	2
537		3	max	0	4	1.793	2	.021	3	0	1	0	1	0	4
538			min	-35.591	1	0	4	-.028	1	0	3	0	3	-.002	2
539		4	max	0	4	1.537	2	.021	3	0	1	0	1	0	4
540			min	-35.67	1	0	4	-.028	1	0	3	0	3	-.003	2
541		5	max	0	4	1.281	2	.021	3	0	1	0	1	0	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
542			min	-35.75	1	0	4	-.028	1	0	3	0	3	-.004	2
543		6	max	0	4	1.025	2	.021	3	0	1	0	1	0	4
544			min	-35.829	1	0	4	-.028	1	0	3	0	3	-.004	2
545		7	max	0	4	.768	2	.021	3	0	1	0	3	0	4
546			min	-35.909	1	0	4	-.028	1	0	3	0	2	-.005	2
547		8	max	0	4	.512	2	.021	3	0	1	0	3	0	4
548			min	-35.988	1	0	4	-.028	1	0	3	0	1	-.005	2
549		9	max	0	4	.256	2	.021	3	0	1	0	3	0	4
550			min	-36.068	1	0	4	-.028	1	0	3	0	1	-.005	2
551		10	max	0	4	0	1	.021	3	0	1	0	3	0	4
552			min	-36.148	1	0	1	-.028	1	0	3	0	1	-.005	2
553		11	max	0	4	0	4	.021	3	0	1	0	3	0	4
554			min	-36.227	1	-.256	1	-.028	1	0	3	0	1	-.005	2
555		12	max	0	4	0	4	.021	3	0	1	0	3	0	4
556			min	-36.307	1	-.512	1	-.028	1	0	3	0	1	-.005	2
557		13	max	0	4	0	4	.021	3	0	1	0	3	0	4
558			min	-36.386	1	-.768	1	-.028	1	0	3	0	1	-.005	2
559		14	max	0	4	0	4	.021	3	0	1	0	3	0	4
560			min	-36.466	1	-1.025	1	-.028	1	0	3	0	1	-.004	2
561		15	max	0	4	0	4	.021	3	0	1	0	3	0	4
562			min	-36.545	1	-1.281	1	-.028	1	0	3	0	1	-.004	2
563		16	max	0	4	0	4	.021	3	0	1	0	3	0	4
564			min	-36.625	1	-1.537	1	-.028	1	0	3	0	1	-.003	2
565		17	max	0	4	0	4	.021	3	0	1	0	3	0	4
566			min	-36.704	1	-1.793	1	-.028	1	0	3	0	1	-.002	2
567		18	max	0	4	0	4	.021	3	0	1	0	3	0	4
568			min	-36.784	1	-2.049	1	-.028	1	0	3	0	1	-.001	2
569		19	max	0	4	0	4	.021	3	0	1	0	3	0	1
570			min	-36.864	1	-2.305	1	-.028	1	0	3	0	1	0	1
571	M16A	1	max	-.918	10	3.576	4	.225	4	0	3	0	3	0	1
572			min	-271.21	4	1.111	15	-.009	3	0	1	0	4	0	1
573		2	max	-.852	10	3.179	4	.203	4	0	3	0	3	0	15
574			min	-271.329	4	.988	15	-.009	3	0	1	0	4	-.002	4
575		3	max	-.786	10	2.781	4	.181	4	0	3	0	3	0	15
576			min	-271.448	4	.864	15	-.009	3	0	1	0	4	-.003	4
577		4	max	-.719	10	2.384	4	.159	4	0	3	0	3	-.001	15
578			min	-271.567	4	.741	15	-.009	3	0	1	0	4	-.004	4
579		5	max	-.653	10	1.987	4	.138	4	0	3	0	3	-.002	15
580			min	-271.686	4	.617	15	-.009	3	0	1	0	1	-.006	4
581		6	max	-.587	10	1.589	4	.116	4	0	3	0	5	-.002	15
582			min	-271.805	4	.494	15	-.009	3	0	1	0	1	-.006	4
583		7	max	-.52	10	1.192	4	.094	4	0	3	0	5	-.002	15
584			min	-271.923	4	.37	15	-.009	3	0	1	0	1	-.007	4
585		8	max	-.454	10	.795	4	.072	4	0	3	0	5	-.002	15
586			min	-272.042	4	.247	15	-.009	3	0	1	0	1	-.008	4
587		9	max	-.388	10	.397	4	.05	4	0	3	0	5	-.002	15
588			min	-272.161	4	.123	15	-.009	3	0	1	0	1	-.008	4
589		10	max	-.322	10	0	1	.029	4	0	3	0	5	-.002	15
590			min	-272.28	4	0	1	-.009	3	0	1	0	1	-.008	4
591		11	max	-.255	10	-.123	15	.02	1	0	3	0	5	-.002	15
592			min	-272.399	4	-.397	4	-.009	3	0	1	0	1	-.008	4
593		12	max	-.189	10	-.247	15	.02	1	0	3	0	5	-.002	15
594			min	-272.518	4	-.795	4	-.019	5	0	1	0	1	-.008	4
595		13	max	-.123	10	-.37	15	.02	1	0	3	0	5	-.002	15
596			min	-272.637	4	-1.192	4	-.04	5	0	1	0	3	-.007	4
597		14	max	-.056	10	-.494	15	.02	1	0	3	0	4	-.002	15
598			min	-272.756	4	-1.589	4	-.062	5	0	1	0	3	-.006	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
599		15	max	.01	10	-.617	15	.02	1	0	3	0	4	-.002	15
600			min	-272.875	4	-1.987	4	-.084	5	0	1	0	3	-.006	4
601		16	max	.076	10	-.741	15	.02	1	0	3	0	4	-.001	15
602			min	-272.994	4	-2.384	4	-.106	5	0	1	0	3	-.004	4
603		17	max	.142	10	-.864	15	.02	1	0	3	0	1	0	15
604			min	-273.112	4	-2.781	4	-.128	5	0	1	0	3	-.003	4
605		18	max	.209	10	-.988	15	.02	1	0	3	0	1	0	15
606			min	-273.231	4	-3.179	4	-.149	5	0	1	0	5	-.002	4
607		19	max	.275	10	-1.111	15	.02	1	0	3	0	1	0	1
608			min	-273.35	4	-3.576	4	-.171	5	0	1	0	5	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	2.04e-3	5	NC	3	NC	3
2			min	-.003	3	-.006	3	-.02	5	-1.346e-3	1	4574.669	2	2024.261	1
3		2	max	.003	1	.007	2	.015	1	2.068e-3	5	NC	3	NC	3
4			min	-.003	3	-.006	3	-.019	5	-1.291e-3	1	4962.582	2	2190.534	1
5		3	max	.003	1	.006	2	.014	1	2.095e-3	5	NC	3	NC	3
6			min	-.003	3	-.006	3	-.019	5	-1.235e-3	1	5418.769	2	2386.31	1
7		4	max	.003	1	.006	2	.013	1	2.123e-3	5	NC	3	NC	3
8			min	-.002	3	-.005	3	-.018	5	-1.18e-3	1	5958.844	2	2618.742	1
9		5	max	.003	1	.005	2	.011	1	2.151e-3	5	NC	3	NC	3
10			min	-.002	3	-.005	3	-.017	5	-1.125e-3	1	6603.371	2	2897.373	1
11		6	max	.002	1	.005	2	.01	1	2.178e-3	5	NC	1	NC	3
12			min	-.002	3	-.005	3	-.016	5	-1.069e-3	1	7379.877	2	3235.17	1
13		7	max	.002	1	.004	2	.009	1	2.206e-3	5	NC	1	NC	3
14			min	-.002	3	-.005	3	-.015	5	-1.014e-3	1	8325.9	2	3650.121	1
15		8	max	.002	1	.004	2	.008	1	2.234e-3	5	NC	1	NC	2
16			min	-.002	3	-.004	3	-.014	5	-9.587e-4	1	9493.755	2	4167.779	1
17		9	max	.002	1	.003	2	.007	1	2.261e-3	5	NC	1	NC	2
18			min	-.002	3	-.004	3	-.013	5	-9.034e-4	1	NC	1	4825.48	1
19		10	max	.002	1	.003	2	.006	1	2.289e-3	5	NC	1	NC	2
20			min	-.001	3	-.004	3	-.012	5	-8.481e-4	1	NC	1	5679.599	1
21		11	max	.001	1	.002	2	.005	1	2.317e-3	5	NC	1	NC	2
22			min	-.001	3	-.003	3	-.01	5	-7.927e-4	1	NC	1	6818.688	1
23		12	max	.001	1	.002	2	.004	1	2.344e-3	5	NC	1	NC	2
24			min	-.001	3	-.003	3	-.009	5	-7.374e-4	1	NC	1	8388.732	1
25		13	max	.001	1	.001	2	.003	1	2.372e-3	5	NC	1	NC	1
26			min	0	3	-.003	3	-.008	5	-6.821e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	2.399e-3	5	NC	1	NC	1
28			min	0	3	-.002	3	-.007	5	-6.267e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.002	1	2.427e-3	5	NC	1	NC	1
30			min	0	3	-.002	3	-.005	5	-5.714e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	.001	1	2.455e-3	5	NC	1	NC	1
32			min	0	3	-.001	3	-.004	5	-5.161e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	2.482e-3	5	NC	1	NC	1
34			min	0	3	0	3	-.003	5	-4.607e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	2.51e-3	5	NC	1	NC	1
36			min	0	3	0	3	-.001	5	-4.054e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	2.538e-3	5	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	-1.167e-3	5	NC	1	NC	1
41		2	max	0	9	0	2	.006	5	2.032e-4	1	NC	1	NC	1
42			min	0	10	0	3	0	1	-1.175e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
43		3	max	0	9	0	2	.012	5	2.456e-4	1	NC	1	NC	1
44			min	0	10	-.001	3	-.001	1	-1.182e-3	5	NC	1	8040.159	14
45		4	max	0	9	0	2	.018	5	2.879e-4	1	NC	1	NC	1
46			min	0	10	-.002	3	-.001	1	-1.19e-3	5	NC	1	5241.313	14
47		5	max	0	9	0	2	.025	5	3.302e-4	1	NC	1	NC	1
48			min	0	10	-.003	3	-.001	1	-1.198e-3	5	NC	1	3854.555	14
49		6	max	0	9	0	2	.031	4	3.725e-4	1	NC	1	NC	1
50			min	0	10	-.004	3	-.001	1	-1.206e-3	5	NC	1	3031.274	14
51		7	max	0	9	0	2	.037	4	4.148e-4	1	NC	1	NC	1
52			min	0	10	-.004	3	-.001	1	-1.214e-3	5	NC	1	2488.796	14
53		8	max	0	9	.001	2	.043	4	4.571e-4	1	NC	1	NC	1
54			min	0	10	-.005	3	0	1	-1.221e-3	5	NC	1	2106.105	14
55		9	max	0	9	.002	2	.05	4	4.995e-4	1	NC	1	NC	1
56			min	0	10	-.005	3	0	2	-1.229e-3	5	NC	1	1822.781	14
57		10	max	0	9	.002	2	.056	4	5.418e-4	1	NC	1	NC	1
58			min	0	10	-.006	3	0	10	-1.237e-3	5	NC	1	1605.323	14
59		11	max	0	9	.003	2	.062	4	5.841e-4	1	NC	1	NC	1
60			min	0	10	-.006	3	0	10	-1.245e-3	5	NC	1	1433.672	14
61		12	max	0	9	.003	2	.068	4	6.264e-4	1	NC	1	NC	1
62			min	0	10	-.007	3	0	12	-1.253e-3	5	NC	1	1295.099	14
63		13	max	0	9	.004	2	.074	4	6.687e-4	1	NC	1	NC	1
64			min	0	10	-.007	3	0	12	-1.26e-3	5	NC	1	1181.138	14
65		14	max	0	9	.005	2	.08	4	7.111e-4	1	NC	1	NC	1
66			min	0	10	-.007	3	0	12	-1.268e-3	5	9980.391	2	1085.947	14
67		15	max	0	9	.005	2	.086	4	7.534e-4	1	NC	3	NC	2
68			min	0	10	-.007	3	0	12	-1.276e-3	5	8396.026	2	1005.366	14
69		16	max	.001	9	.006	2	.092	4	7.957e-4	1	NC	3	NC	2
70			min	0	10	-.007	3	0	12	-1.284e-3	5	7167.701	2	936.35	14
71		17	max	.001	9	.007	2	.098	4	8.38e-4	1	NC	3	NC	2
72			min	0	10	-.007	3	0	12	-1.292e-3	5	6205.429	2	876.626	14
73		18	max	.001	9	.008	2	.103	4	8.803e-4	1	NC	3	NC	2
74			min	0	10	-.007	3	0	12	-1.299e-3	5	5444.762	2	824.456	14
75		19	max	.001	9	.01	2	.109	4	9.226e-4	1	NC	3	NC	2
76			min	0	10	-.007	3	0	12	-1.307e-3	5	4839.202	2	778.492	14
77	M4	1	max	.003	1	.008	2	0	12	5.613e-3	5	NC	1	NC	3
78			min	0	3	-.006	3	-.115	4	-1.115e-3	1	NC	1	167.555	4
79		2	max	.003	1	.008	2	0	12	5.613e-3	5	NC	1	NC	3
80			min	0	3	-.006	3	-.106	4	-1.115e-3	1	NC	1	182.662	4
81		3	max	.002	1	.008	2	0	12	5.613e-3	5	NC	1	NC	3
82			min	0	3	-.006	3	-.096	4	-1.115e-3	1	NC	1	200.644	4
83		4	max	.002	1	.007	2	0	12	5.613e-3	5	NC	1	NC	2
84			min	0	3	-.005	3	-.087	4	-1.115e-3	1	NC	1	222.259	4
85		5	max	.002	1	.007	2	0	12	5.613e-3	5	NC	1	NC	2
86			min	0	3	-.005	3	-.078	4	-1.115e-3	1	NC	1	248.536	4
87		6	max	.002	1	.006	2	0	12	5.613e-3	5	NC	1	NC	2
88			min	0	3	-.005	3	-.069	4	-1.115e-3	1	NC	1	280.912	4
89		7	max	.002	1	.006	2	0	12	5.613e-3	5	NC	1	NC	2
90			min	0	3	-.004	3	-.06	4	-1.115e-3	1	NC	1	321.43	4
91		8	max	.002	1	.005	2	0	12	5.613e-3	5	NC	1	NC	2
92			min	0	3	-.004	3	-.052	4	-1.115e-3	1	NC	1	373.08	4
93		9	max	.001	1	.005	2	0	12	5.613e-3	5	NC	1	NC	2
94			min	0	3	-.004	3	-.044	4	-1.115e-3	1	NC	1	440.39	4
95		10	max	.001	1	.004	2	0	12	5.613e-3	5	NC	1	NC	2
96			min	0	3	-.003	3	-.036	4	-1.115e-3	1	NC	1	530.472	4
97		11	max	.001	1	.004	2	0	12	5.613e-3	5	NC	1	NC	1
98			min	0	3	-.003	3	-.03	4	-1.115e-3	1	NC	1	655.043	4
99		12	max	.001	1	.003	2	0	12	5.613e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
100			min	0	3	-.002	3	-.023	4	-1.115e-3	1	NC	1	834.542	4
101		13	max	0	1	.003	2	0	12	5.613e-3	5	NC	1	NC	1
102			min	0	3	-.002	3	-.017	4	-1.115e-3	1	NC	1	1107.305	4
103		14	max	0	1	.002	2	0	12	5.613e-3	5	NC	1	NC	1
104			min	0	3	-.002	3	-.012	4	-1.115e-3	1	NC	1	1552.41	4
105		15	max	0	1	.002	2	0	12	5.613e-3	5	NC	1	NC	1
106			min	0	3	-.001	3	-.008	4	-1.115e-3	1	NC	1	2355.646	4
107		16	max	0	1	.001	2	0	12	5.613e-3	5	NC	1	NC	1
108			min	0	3	-.001	3	-.005	4	-1.115e-3	1	NC	1	4045.174	4
109		17	max	0	1	0	2	0	12	5.613e-3	5	NC	1	NC	1
110			min	0	3	0	3	-.002	4	-1.115e-3	1	NC	1	8672.292	4
111		18	max	0	1	0	2	0	12	5.613e-3	5	NC	1	NC	1
112			min	0	3	0	3	0	4	-1.115e-3	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	5.613e-3	5	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	2.26e-3	4	NC	3	NC	2
116			min	-.009	3	-.018	3	-.02	5	4.557e-6	10	1389.411	2	7269.017	1
117		2	max	.01	1	.022	2	.004	1	2.282e-3	4	NC	3	NC	2
118			min	-.009	3	-.017	3	-.02	5	3.612e-6	10	1483.313	2	7899.215	1
119		3	max	.01	1	.021	2	.004	1	2.304e-3	4	NC	3	NC	2
120			min	-.008	3	-.016	3	-.019	5	2.667e-6	10	1590.488	2	8647.76	1
121		4	max	.009	1	.019	2	.003	1	2.326e-3	4	NC	3	NC	2
122			min	-.008	3	-.015	3	-.018	5	1.721e-6	10	1713.587	2	9545.032	1
123		5	max	.008	1	.018	2	.003	1	2.349e-3	4	NC	3	NC	1
124			min	-.007	3	-.014	3	-.017	5	7.759e-7	10	1856.024	2	NC	1
125		6	max	.008	1	.016	2	.003	1	2.371e-3	4	NC	3	NC	1
126			min	-.007	3	-.013	3	-.016	5	-1.694e-7	10	2022.27	2	NC	1
127		7	max	.007	1	.015	2	.002	1	2.393e-3	4	NC	3	NC	1
128			min	-.006	3	-.012	3	-.015	5	-1.115e-6	10	2218.287	2	NC	1
129		8	max	.007	1	.014	2	.002	1	2.416e-3	4	NC	3	NC	1
130			min	-.006	3	-.011	3	-.014	5	-2.06e-6	10	2452.21	2	NC	1
131		9	max	.006	1	.012	2	.002	1	2.438e-3	4	NC	3	NC	1
132			min	-.005	3	-.01	3	-.013	5	-3.005e-6	10	2735.433	2	NC	1
133		10	max	.005	1	.011	2	.002	1	2.46e-3	4	NC	3	NC	1
134			min	-.005	3	-.009	3	-.012	5	-3.951e-6	10	3084.41	2	NC	1
135		11	max	.005	1	.009	2	.001	1	2.483e-3	4	NC	3	NC	1
136			min	-.004	3	-.008	3	-.011	5	-4.896e-6	10	3523.831	2	NC	1
137		12	max	.004	1	.008	2	0	1	2.505e-3	4	NC	3	NC	1
138			min	-.004	3	-.007	3	-.01	5	-6.481e-6	2	4092.486	2	NC	1
139		13	max	.004	1	.007	2	0	1	2.527e-3	4	NC	3	NC	1
140			min	-.003	3	-.006	3	-.008	5	-1.17e-5	2	4855.026	2	NC	1
141		14	max	.003	1	.006	2	0	1	2.549e-3	4	NC	3	NC	1
142			min	-.003	3	-.005	3	-.007	5	-1.693e-5	2	5927.815	2	NC	1
143		15	max	.002	1	.004	2	0	1	2.572e-3	4	NC	3	NC	1
144			min	-.002	3	-.004	3	-.006	5	-2.215e-5	2	7543.566	2	NC	1
145		16	max	.002	1	.003	2	0	1	2.594e-3	4	NC	1	NC	1
146			min	-.002	3	-.003	3	-.004	5	-2.737e-5	2	NC	1	NC	1
147		17	max	.001	1	.002	2	0	1	2.616e-3	4	NC	1	NC	1
148			min	-.001	3	-.002	3	-.003	5	-3.26e-5	2	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	2.639e-3	4	NC	1	NC	1
150			min	0	3	-.001	3	-.001	5	-3.782e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	2.661e-3	4	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	-1.223e-3	4	NC	1	NC	1
155		2	max	0	3	.001	2	.006	4	1.661e-5	2	NC	1	NC	1
156			min	0	2	-.002	3	0	2	-1.213e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
157		3	max	0	3	.003	2	.013	4	1.509e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	2	-1.202e-3	4	NC	1	NC	1
159		4	max	0	3	.004	2	.019	4	1.65e-5	1	NC	1	NC	1
160			min	0	2	-.005	3	0	2	-1.191e-3	4	NC	1	NC	1
161		5	max	0	3	.005	2	.026	4	1.791e-5	1	NC	3	NC	1
162			min	0	2	-.006	3	0	2	-1.18e-3	4	8699.754	2	NC	1
163		6	max	0	3	.007	2	.032	4	1.932e-5	1	NC	3	NC	1
164			min	0	2	-.008	3	0	2	-1.169e-3	4	6968.799	2	NC	1
165		7	max	0	3	.008	2	.039	4	2.073e-5	1	NC	3	NC	1
166			min	-.001	2	-.009	3	0	2	-1.158e-3	4	5785.139	2	NC	1
167		8	max	.001	3	.009	2	.045	4	3.034e-5	3	NC	3	NC	1
168			min	-.001	2	-.01	3	0	1	-1.147e-3	4	4917.549	2	NC	1
169		9	max	.001	3	.011	2	.051	4	4.043e-5	3	NC	3	NC	1
170			min	-.002	2	-.012	3	0	1	-1.136e-3	4	4250.81	2	NC	1
171		10	max	.001	3	.012	2	.058	4	5.052e-5	3	NC	3	NC	1
172			min	-.002	2	-.013	3	0	1	-1.125e-3	4	3721.039	2	NC	1
173		11	max	.002	3	.014	2	.064	4	6.061e-5	3	NC	3	NC	1
174			min	-.002	2	-.014	3	-.001	1	-1.114e-3	4	3289.858	2	NC	1
175		12	max	.002	3	.016	2	.07	4	7.07e-5	3	NC	3	NC	1
176			min	-.002	2	-.015	3	-.001	1	-1.104e-3	4	2932.691	2	NC	1
177		13	max	.002	3	.017	2	.076	4	8.079e-5	3	NC	3	NC	1
178			min	-.002	2	-.016	3	-.001	1	-1.093e-3	4	2632.948	2	NC	1
179		14	max	.002	3	.019	2	.082	4	9.088e-5	3	NC	3	NC	1
180			min	-.003	2	-.017	3	-.002	1	-1.082e-3	4	2378.926	2	NC	1
181		15	max	.002	3	.021	2	.087	4	1.01e-4	3	NC	3	NC	1
182			min	-.003	2	-.018	3	-.002	1	-1.071e-3	4	2162.059	2	NC	1
183		16	max	.002	3	.023	2	.093	4	1.111e-4	3	NC	3	NC	1
184			min	-.003	2	-.019	3	-.002	1	-1.06e-3	4	1975.883	2	NC	1
185		17	max	.003	3	.025	1	.099	4	1.212e-4	3	NC	3	NC	1
186			min	-.003	2	-.019	3	-.002	1	-1.049e-3	4	1811.688	1	NC	1
187		18	max	.003	3	.028	1	.104	4	1.312e-4	3	NC	3	NC	1
188			min	-.003	2	-.02	3	-.002	1	-1.038e-3	4	1668.909	1	NC	1
189		19	max	.003	3	.03	1	.11	4	1.413e-4	3	NC	3	NC	1
190			min	-.003	2	-.021	3	-.002	1	-1.027e-3	4	1545.856	1	NC	1
191	M8	1	max	.008	1	.027	2	.003	1	5.375e-3	4	NC	1	NC	2
192			min	-.001	3	-.018	3	-.116	4	-1.618e-4	1	NC	1	166.855	4
193		2	max	.007	1	.026	2	.002	1	5.375e-3	4	NC	1	NC	2
194			min	-.001	3	-.017	3	-.106	4	-1.618e-4	1	NC	1	181.899	4
195		3	max	.007	1	.024	2	.002	1	5.375e-3	4	NC	1	NC	2
196			min	-.001	3	-.016	3	-.097	4	-1.618e-4	1	NC	1	199.805	4
197		4	max	.006	1	.023	2	.002	1	5.375e-3	4	NC	1	NC	2
198			min	0	3	-.015	3	-.087	4	-1.618e-4	1	NC	1	221.328	4
199		5	max	.006	1	.021	2	.002	1	5.375e-3	4	NC	1	NC	1
200			min	0	3	-.014	3	-.078	4	-1.618e-4	1	NC	1	247.495	4
201		6	max	.006	1	.02	2	.002	1	5.375e-3	4	NC	1	NC	1
202			min	0	3	-.013	3	-.069	4	-1.618e-4	1	NC	1	279.735	4
203		7	max	.005	1	.018	2	.001	1	5.375e-3	4	NC	1	NC	1
204			min	0	3	-.012	3	-.06	4	-1.618e-4	1	NC	1	320.082	4
205		8	max	.005	1	.017	2	.001	1	5.375e-3	4	NC	1	NC	1
206			min	0	3	-.011	3	-.052	4	-1.618e-4	1	NC	1	371.515	4
207		9	max	.004	1	.015	2	0	1	5.375e-3	4	NC	1	NC	1
208			min	0	3	-.01	3	-.044	4	-1.618e-4	1	NC	1	438.541	4
209		10	max	.004	1	.014	2	0	1	5.375e-3	4	NC	1	NC	1
210			min	0	3	-.009	3	-.037	4	-1.618e-4	1	NC	1	528.244	4
211		11	max	.003	1	.012	2	0	1	5.375e-3	4	NC	1	NC	1
212			min	0	3	-.008	3	-.03	4	-1.618e-4	1	NC	1	652.291	4
213		12	max	.003	1	.011	2	0	1	5.375e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
214			min	0	3	-.007	3	-.023	4	-1.618e-4	1	NC	1	831.034	4
215		13	max	.003	1	.009	2	0	1	5.375e-3	4	NC	1	NC	1
216			min	0	3	-.006	3	-.018	4	-1.618e-4	1	NC	1	1102.648	4
217		14	max	.002	1	.008	2	0	1	5.375e-3	4	NC	1	NC	1
218			min	0	3	-.005	3	-.013	4	-1.618e-4	1	NC	1	1545.879	4
219		15	max	.002	1	.006	2	0	1	5.375e-3	4	NC	1	NC	1
220			min	0	3	-.004	3	-.008	4	-1.618e-4	1	NC	1	2345.732	4
221		16	max	.001	1	.005	2	0	1	5.375e-3	4	NC	1	NC	1
222			min	0	3	-.003	3	-.005	4	-1.618e-4	1	NC	1	4028.143	4
223		17	max	0	1	.003	2	0	1	5.375e-3	4	NC	1	NC	1
224			min	0	3	-.002	3	-.002	4	-1.618e-4	1	NC	1	8635.761	4
225		18	max	0	1	.002	2	0	1	5.375e-3	4	NC	1	NC	1
226			min	0	3	-.001	3	0	4	-1.618e-4	1	NC	1	NC	1
227		19	max	0	1	0	1	0	1	5.375e-3	4	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	-.009	4	-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	-.009	4	-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	-.008	4	-1.531e-4	3	5395.324	2	NC	1
235		4	max	.003	1	.006	2	0	3	9.544e-4	14	NC	3	NC	1
236			min	-.002	3	-.006	3	-.008	4	-1.489e-4	3	5913.014	2	NC	1
237		5	max	.003	1	.005	2	0	3	9.77e-4	4	NC	3	NC	1
238			min	-.002	3	-.005	3	-.008	4	-1.447e-4	3	6527.045	2	NC	1
239		6	max	.002	1	.005	2	0	3	1.048e-3	4	NC	1	NC	1
240			min	-.002	3	-.005	3	-.008	4	-1.405e-4	3	7261.824	2	NC	1
241		7	max	.002	1	.004	2	0	3	1.119e-3	4	NC	1	NC	1
242			min	-.002	3	-.005	3	-.008	4	-1.363e-4	3	8150.344	2	NC	1
243		8	max	.002	1	.004	2	0	3	1.19e-3	4	NC	1	NC	1
244			min	-.002	3	-.004	3	-.008	4	-1.321e-4	3	9238.179	2	NC	1
245		9	max	.002	1	.003	2	0	3	1.261e-3	4	NC	1	NC	1
246			min	-.002	3	-.004	3	-.007	4	-1.278e-4	3	NC	1	NC	1
247		10	max	.002	1	.003	2	0	3	1.332e-3	4	NC	1	NC	1
248			min	-.001	3	-.004	3	-.007	4	-1.236e-4	3	NC	1	NC	1
249		11	max	.002	1	.002	2	0	3	1.403e-3	4	NC	1	NC	1
250			min	-.001	3	-.004	3	-.006	4	-1.194e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	1.474e-3	4	NC	1	NC	1
252			min	-.001	3	-.003	3	-.006	4	-1.152e-4	3	NC	1	NC	1
253		13	max	.001	1	.002	2	0	3	1.545e-3	4	NC	1	NC	1
254			min	0	3	-.003	3	-.005	4	-1.11e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	1.616e-3	4	NC	1	NC	1
256			min	0	3	-.002	3	-.005	4	-1.068e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	1.687e-3	4	NC	1	NC	1
258			min	0	3	-.002	3	-.004	4	-1.025e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.758e-3	4	NC	1	NC	1
260			min	0	3	-.002	3	-.003	4	-9.833e-5	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.829e-3	4	NC	1	NC	1
262			min	0	3	-.001	3	-.002	4	-9.411e-5	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.9e-3	4	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-8.989e-5	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.971e-3	4	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	-9.079e-4	4	NC	1	NC	1
269		2	max	0	9	0	2	.005	4	2.686e-5	3	NC	1	NC	1
270			min	0	10	0	3	0	3	-1.022e-3	4	NC	1	9649.582	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
271		3	max	0	9	0	2	.01	4	1.432e-5	3	NC	1	NC	1
272			min	0	10	-.002	3	0	3	-1.136e-3	4	NC	1	4784.794	4
273		4	max	0	9	0	2	.015	4	1.784e-6	3	NC	1	NC	1
274			min	0	10	-.002	3	0	1	-1.251e-3	4	NC	1	3167.139	4
275		5	max	0	9	0	2	.02	4	-7.426e-6	12	NC	1	NC	1
276			min	0	10	-.003	3	-.001	1	-1.365e-3	4	NC	1	2360.798	4
277		6	max	0	9	0	2	.025	4	-1.542e-5	12	NC	1	NC	1
278			min	0	10	-.004	3	-.002	1	-1.479e-3	4	NC	1	1878.636	4
279		7	max	0	9	.001	2	.03	5	-2.342e-5	12	NC	1	NC	1
280			min	0	10	-.004	3	-.003	1	-1.593e-3	4	NC	1	1554.08	5
281		8	max	0	9	.001	2	.035	5	-3.142e-5	12	NC	1	NC	1
282			min	0	10	-.005	3	-.004	1	-1.707e-3	4	NC	1	1322.286	5
283		9	max	0	9	.002	2	.04	5	-3.941e-5	12	NC	1	NC	2
284			min	0	10	-.006	3	-.005	1	-1.822e-3	4	NC	1	1149.289	5
285		10	max	0	9	.002	2	.045	5	-4.741e-5	12	NC	1	NC	2
286			min	0	10	-.006	3	-.006	1	-1.936e-3	4	NC	1	1015.316	5
287		11	max	0	9	.003	2	.051	5	-5.541e-5	12	NC	1	NC	2
288			min	0	10	-.006	3	-.008	1	-2.05e-3	4	NC	1	908.512	5
289		12	max	0	9	.003	2	.056	5	-6.341e-5	12	NC	1	NC	2
290			min	0	10	-.007	3	-.009	1	-2.164e-3	4	NC	1	821.341	5
291		13	max	0	9	.004	2	.061	5	-7.14e-5	12	NC	1	NC	2
292			min	0	10	-.007	3	-.01	1	-2.279e-3	4	NC	1	748.782	5
293		14	max	0	9	.005	2	.067	5	-7.721e-5	10	NC	1	NC	2
294			min	0	10	-.007	3	-.012	1	-2.393e-3	4	9762.413	2	687.367	5
295		15	max	0	9	.006	2	.073	5	-8.271e-5	10	NC	3	NC	2
296			min	0	10	-.007	3	-.013	1	-2.507e-3	4	8270.412	2	634.619	5
297		16	max	.001	9	.006	2	.078	5	-8.82e-5	10	NC	3	NC	3
298			min	0	10	-.007	3	-.014	1	-2.621e-3	4	7099.378	2	588.727	5
299		17	max	.001	9	.007	2	.084	5	-9.369e-5	10	NC	3	NC	3
300			min	0	10	-.007	3	-.015	1	-2.735e-3	4	6172.955	2	548.337	5
301		18	max	.001	9	.008	2	.09	5	-9.918e-5	10	NC	3	NC	3
302			min	0	10	-.007	3	-.016	1	-2.85e-3	4	5434.886	2	512.417	5
303		19	max	.001	9	.01	2	.096	5	-1.047e-4	10	NC	3	NC	3
304			min	0	10	-.007	3	-.017	1	-2.964e-3	4	4843.65	2	480.17	5
305	M12	1	max	.003	1	.008	2	.014	1	7.047e-3	4	NC	1	NC	3
306			min	0	3	-.006	3	-.106	5	9.409e-5	10	NC	1	182.713	5
307		2	max	.003	1	.008	2	.013	1	7.047e-3	4	NC	1	NC	3
308			min	0	3	-.006	3	-.097	5	9.409e-5	10	NC	1	199.183	5
309		3	max	.002	1	.008	2	.012	1	7.047e-3	4	NC	1	NC	3
310			min	0	3	-.006	3	-.088	5	9.409e-5	10	NC	1	218.787	5
311		4	max	.002	1	.007	2	.011	1	7.047e-3	4	NC	1	NC	3
312			min	0	3	-.005	3	-.08	5	9.409e-5	10	NC	1	242.351	5
313		5	max	.002	1	.007	2	.01	1	7.047e-3	4	NC	1	NC	3
314			min	0	3	-.005	3	-.071	5	9.409e-5	10	NC	1	270.999	5
315		6	max	.002	1	.006	2	.009	1	7.047e-3	4	NC	1	NC	3
316			min	0	3	-.005	3	-.063	5	9.409e-5	10	NC	1	306.294	5
317		7	max	.002	1	.006	2	.007	1	7.047e-3	4	NC	1	NC	3
318			min	0	3	-.004	3	-.055	5	9.409e-5	10	NC	1	350.465	5
319		8	max	.002	1	.005	2	.006	1	7.047e-3	4	NC	1	NC	3
320			min	0	3	-.004	3	-.048	5	9.409e-5	10	NC	1	406.772	5
321		9	max	.001	1	.005	2	.005	1	7.047e-3	4	NC	1	NC	3
322			min	0	3	-.004	3	-.04	5	9.409e-5	10	NC	1	480.149	5
323		10	max	.001	1	.004	2	.005	1	7.047e-3	4	NC	1	NC	2
324			min	0	3	-.003	3	-.033	5	9.409e-5	10	NC	1	578.35	5
325		11	max	.001	1	.004	2	.004	1	7.047e-3	4	NC	1	NC	2
326			min	0	3	-.003	3	-.027	5	9.409e-5	10	NC	1	714.147	5
327		12	max	.001	1	.003	2	.003	1	7.047e-3	4	NC	1	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
328			min	0	3	-.003	3	-.021	5	9.409e-5	10	NC	1	909.819	5
329		13	max	0	1	.003	2	.002	1	7.047e-3	4	NC	1	NC	2
330			min	0	3	-.002	3	-.016	5	9.409e-5	10	NC	1	1207.155	5
331		14	max	0	1	.002	2	.002	1	7.047e-3	4	NC	1	NC	1
332			min	0	3	-.002	3	-.011	5	9.409e-5	10	NC	1	1692.354	5
333		15	max	0	1	.002	2	.001	1	7.047e-3	4	NC	1	NC	1
334			min	0	3	-.001	3	-.008	5	9.409e-5	10	NC	1	2567.93	5
335		16	max	0	1	.001	2	0	1	7.047e-3	4	NC	1	NC	1
336			min	0	3	-.001	3	-.004	5	9.409e-5	10	NC	1	4409.594	5
337		17	max	0	1	0	2	0	1	7.047e-3	4	NC	1	NC	1
338			min	0	3	0	3	-.002	5	9.409e-5	10	NC	1	9453.287	5
339		18	max	0	1	0	2	0	1	7.047e-3	4	NC	1	NC	1
340			min	0	3	0	3	0	5	9.409e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	7.047e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	9.409e-5	10	NC	1	NC	1
343	M1	1	max	.006	3	.022	3	.011	5	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	.015	5	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	.02	5	6.035e-4	5	NC	4	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	.026	5	6.07e-4	5	NC	5	NC	3
350			min	-.007	2	-.005	3	-.019	1	-6.203e-4	1	1238.252	1	3135.205	5
351		5	max	.006	3	.017	1	.032	5	6.105e-4	5	NC	5	NC	3
352			min	-.007	2	-.011	3	-.019	1	-4.956e-4	1	992.549	1	2249.958	5
353		6	max	.006	3	.024	1	.038	5	6.139e-4	5	NC	5	NC	3
354			min	-.007	2	-.016	3	-.018	1	-3.709e-4	1	853.789	1	1732.242	5
355		7	max	.006	3	.03	1	.045	5	6.174e-4	5	NC	5	NC	2
356			min	-.007	2	-.02	3	-.016	1	-2.461e-4	1	769.9	1	1396.331	5
357		8	max	.006	3	.034	1	.051	5	6.208e-4	5	NC	5	NC	2
358			min	-.007	2	-.022	3	-.013	1	-1.214e-4	1	719.235	1	1163.046	5
359		9	max	.006	3	.037	1	.058	5	6.243e-4	5	NC	5	NC	1
360			min	-.007	2	-.024	3	-.009	1	-8.485e-6	2	691.698	1	987.125	4
361		10	max	.006	3	.038	1	.065	5	6.448e-4	4	NC	5	NC	1
362			min	-.007	2	-.024	3	-.005	1	1.24e-5	10	682.642	1	845.414	4
363		11	max	.006	3	.037	1	.073	4	6.755e-4	4	NC	5	NC	1
364			min	-.007	2	-.023	3	-.001	1	2.314e-5	10	690.671	1	738.688	4
365		12	max	.006	3	.034	1	.081	4	7.063e-4	4	NC	5	NC	2
366			min	-.007	2	-.021	3	0	10	2.867e-5	12	717.062	1	656.494	4
367		13	max	.006	3	.03	1	.088	4	7.37e-4	4	NC	5	NC	2
368			min	-.007	2	-.018	3	0	12	3.174e-5	12	766.302	1	592.12	4
369		14	max	.006	3	.024	1	.096	4	7.678e-4	4	NC	5	NC	3
370			min	-.007	2	-.014	3	0	12	3.481e-5	12	848.202	1	541.097	4
371		15	max	.006	3	.016	1	.103	4	7.985e-4	4	NC	5	NC	3
372			min	-.007	2	-.01	3	0	12	3.788e-5	12	983.784	1	500.364	4
373		16	max	.006	3	.007	1	.109	4	1.185e-3	4	NC	5	NC	3
374			min	-.007	2	-.004	3	0	12	3.995e-5	12	1223.152	1	467.772	4
375		17	max	.006	3	.002	3	.115	4	1.003e-2	4	NC	4	NC	2
376			min	-.007	2	-.005	1	0	12	1.306e-5	10	1716.7	1	441.823	4
377		18	max	.006	3	.01	3	.12	4	1.103e-2	1	NC	4	NC	2
378			min	-.007	2	-.018	1	0	10	-3.682e-3	3	3308.834	1	421.389	4
379		19	max	.006	3	.017	3	.125	4	2.217e-2	1	NC	1	NC	1
380			min	-.007	2	-.032	1	-.004	1	-7.461e-3	3	NC	1	406.154	4
381	M5	1	max	.017	3	.066	3	.01	5	4.903e-6	4	NC	1	NC	1
382			min	-.023	2	-.091	1	-.006	1	5.663e-8	10	NC	1	NC	1
383		2	max	.017	3	.037	3	.015	5	2.965e-4	5	NC	5	NC	1
384			min	-.023	2	-.05	1	-.005	1	-9.111e-5	1	1128.995	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
385		3	max	.017	3	.01	3	.021	5	5.831e-4	5	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	.026	5	6.048e-4	5	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	.033	5	6.264e-4	5	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	.04	5	6.481e-4	5	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	.047	5	6.697e-4	5	NC	15	NC	1
394			min	-.024	2	-.057	3	-.002	1	-1.325e-4	1	253.359	1	NC	1
395		8	max	.017	3	.104	1	.054	5	6.914e-4	5	9994.549	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	.061	5	7.13e-4	5	9638.134	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	.069	5	7.347e-4	5	9536.836	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	.076	5	7.563e-4	5	9673.141	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	.083	5	7.779e-4	5	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	.091	4	7.996e-4	5	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	.098	4	8.212e-4	5	NC	15	NC	1
408			min	-.024	2	-.041	3	-.002	1	-4.765e-5	1	275.946	1	9259.72	4
409		15	max	.017	3	.049	1	.104	4	8.429e-4	5	NC	15	NC	1
410			min	-.024	2	-.028	3	-.002	1	-3.764e-5	2	319.925	1	9113.521	4
411		16	max	.017	3	.019	1	.11	4	1.216e-3	5	NC	5	NC	1
412			min	-.024	2	-.012	3	-.002	1	-3.529e-5	2	398.066	1	9830.575	4
413		17	max	.017	3	.007	3	.116	4	1.003e-2	4	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	.121	4	5.145e-3	4	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	.125	4	1.649e-6	5	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	.009	5	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	.008	5	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	.009	4	1.365e-4	1	NC	5	NC	2
424			min	-.007	2	-.003	1	0	3	6.052e-6	12	1750.116	1	5066.488	1
425		4	max	.006	3	.007	1	.011	4	3.898e-5	5	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	.014	4	2.458e-5	5	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	.018	4	1.017e-5	5	NC	5	NC	2
430			min	-.007	2	-.016	3	-.001	3	-1.82e-4	1	853.967	1	3869.3	14
431		7	max	.006	3	.03	1	.023	4	-2.531e-6	15	NC	5	NC	2
432			min	-.007	2	-.02	3	-.002	3	-2.882e-4	1	770.045	1	2787.812	4
433		8	max	.006	3	.034	1	.029	4	-1.213e-5	15	NC	5	NC	1
434			min	-.007	2	-.022	3	-.002	3	-3.943e-4	1	719.357	1	2087.483	4
435		9	max	.006	3	.037	1	.035	5	-2.173e-5	15	NC	5	NC	1
436			min	-.007	2	-.024	3	-.004	1	-5.005e-4	1	691.802	1	1628.296	4
437		10	max	.006	3	.038	1	.043	5	-3.133e-5	15	NC	5	NC	1
438			min	-.007	2	-.024	3	-.008	1	-6.067e-4	1	682.73	1	1310.944	4
439		11	max	.006	3	.037	1	.051	5	-4.093e-5	15	NC	5	NC	2
440			min	-.007	2	-.023	3	-.011	1	-7.128e-4	1	690.746	1	1082.371	4
441		12	max	.006	3	.034	1	.059	5	-4.816e-5	12	NC	5	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
442			min	-.007	2	-.021	3	-.014	1	-8.19e-4	1	717.126	1	912.189	4
443		13	max	.006	3	.03	1	.068	5	-5.418e-5	12	NC	5	NC	2
444			min	-.007	2	-.018	3	-.017	1	-9.252e-4	1	766.355	1	781.992	4
445		14	max	.006	3	.024	1	.078	5	-6.02e-5	12	NC	5	NC	3
446			min	-.007	2	-.015	3	-.018	1	-1.031e-3	1	848.245	1	678.583	5
447		15	max	.006	3	.016	1	.087	5	-6.623e-5	12	NC	5	NC	3
448			min	-.007	2	-.01	3	-.019	1	-1.138e-3	1	983.817	1	597.685	5
449		16	max	.006	3	.007	1	.096	5	2.501e-4	5	NC	5	NC	3
450			min	-.007	2	-.004	3	-.017	1	-1.216e-3	1	1223.176	1	532.966	4
451		17	max	.006	3	.002	3	.106	5	9.758e-3	5	NC	5	NC	2
452			min	-.007	2	-.005	1	-.014	1	-6.3e-4	1	1716.733	1	478.695	4
453		18	max	.006	3	.01	3	.115	5	4.617e-3	5	NC	4	NC	2
454			min	-.007	2	-.018	1	-.009	1	-1.13e-2	1	3308.891	1	433.329	4
455		19	max	.006	3	.017	3	.125	4	7.46e-3	3	NC	1	NC	1
456			min	-.007	2	-.032	1	-.002	1	-2.217e-2	1	NC	1	395.398	4
457	M13	1	max	.007	1	.022	3	.006	3	3.786e-3	3	NC	1	NC	1
458			min	-.009	5	-.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	-.009	5	-.246	1	-.002	5	-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	-.009	5	-.423	1	-.003	5	-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	-.009	5	-.534	1	-.006	5	-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	-.009	5	-.566	1	-.01	5	-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	-.01	5	-.521	1	-.014	5	-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	-.01	5	-.414	1	-.018	5	-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	-.01	5	-.276	1	-.018	5	-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	-.01	5	-.149	1	-.014	5	-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	-.01	5	-.091	1	-.023	2	-1.549e-2	1	3348.318	1	NC	1
477		11	max	.006	1	.114	3	.023	14	1.018e-2	3	NC	5	NC	2
478			min	-.01	5	-.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	-.011	5	-.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	10
482			min	-.011	5	-.414	1	.008	10	-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	-.011	5	-.521	1	.011	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	-.011	5	-.566	1	.005	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	-.011	5	-.534	1	-.002	5	-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	-.011	5	-.423	1	-.009	5	-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	-.011	5	-.246	1	-.01	5	-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	-.011	5	-.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	-.125	4	-.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	-.125	4	-.275	1	.001	10	-3.453e-3	3	840.936	1	3122.657	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
499		3	max	.002	1	.166	3	.149	1	7.882e-3	1	NC	5	NC	3
500			min	-.125	4	-.473	1	.009	10	-4.032e-3	3	462.708	1	1323.526	1
501		4	max	.002	1	.208	3	.224	1	9.105e-3	1	NC	15	NC	3
502			min	-.125	4	-.597	1	.014	10	-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	12
504			min	-.125	4	-.633	1	.017	10	-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	10
506			min	-.125	4	-.583	1	.014	10	-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
508			min	-.125	4	-.463	1	.008	10	-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	-.125	4	-.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	-.125	4	-.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	-.125	4	-.1	1	-.024	2	-8.083e-3	3	3020.539	1	NC	1
515		11	max	.003	1	.07	3	.02	14	1.522e-2	1	NC	5	NC	2
516			min	-.125	4	-.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	-.125	4	-.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	-.125	4	-.463	1	.008	10	-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	-.125	4	-.583	1	.006	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	-.125	4	-.633	1	0	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	15	NC	3
526			min	-.125	4	-.597	1	-.01	5	-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	-.125	4	-.473	1	-.016	5	-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	-.125	4	-.275	1	-.014	5	-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	-.125	4	-.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	-5.342e-4	5	NC	1	NC	1
535		2	max	0	1	-.003	15	.014	4	7.872e-4	3	NC	5	NC	1
536			min	-.001	5	-.023	6	0	3	-7.942e-4	1	4537.219	6	7739.616	4
537		3	max	0	1	-.005	15	.03	4	1.268e-3	3	NC	5	NC	1
538			min	-.002	5	-.046	6	-.003	3	-1.519e-3	1	2308.836	6	3587.518	4
539		4	max	0	1	-.007	15	.046	4	1.748e-3	3	NC	15	NC	3
540			min	-.003	5	-.067	6	-.006	3	-2.243e-3	1	1583.996	6	2316.238	4
541		5	max	0	1	-.009	15	.061	4	2.228e-3	3	NC	15	NC	9
542			min	-.004	5	-.086	6	-.01	3	-2.968e-3	1	1236.008	6	1742.101	4
543		6	max	0	1	-.011	15	.074	4	2.709e-3	3	8797.406	15	9856.28	10
544			min	-.005	5	-.102	6	-.014	3	-3.692e-3	1	1040.232	6	1440.574	4
545		7	max	0	1	-.012	15	.084	4	3.189e-3	3	7801.712	15	7767.956	10
546			min	-.007	5	-.115	1	-.019	3	-4.416e-3	1	922.498	6	1276.369	4
547		8	max	0	1	-.013	15	.089	4	3.67e-3	3	7204.146	15	6445.009	10
548			min	-.008	5	-.125	1	-.023	3	-5.141e-3	1	851.84	6	1196.24	4
549		9	max	0	1	-.014	15	.09	4	4.15e-3	3	6882.5	15	5575.063	10
550			min	-.009	5	-.131	1	-.027	3	-5.865e-3	1	813.807	6	1178.757	4
551		10	max	0	1	-.014	15	.087	4	4.631e-3	3	6780.747	15	4999.861	10
552			min	-.01	5	-.133	1	-.03	3	-6.59e-3	1	801.776	6	1219.307	4
553		11	max	0	1	-.013	15	.08	4	5.111e-3	3	6882.5	15	4636.014	10
554			min	-.011	5	-.131	1	-.032	3	-7.314e-3	1	813.807	6	1327.128	4
555		12	max	0	1	-.013	15	.069	4	5.591e-3	3	7204.146	15	4442.497	10

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
556			min	-.012	5	-.126	1	-.033	3	-8.039e-3	1	851.84	6	1530.51	4
557		13	max	0	1	-.011	15	.056	4	6.072e-3	3	7801.712	15	4408.56	10
558			min	-.013	5	-.117	1	-.033	3	-8.763e-3	1	922.498	6	1792.759	1
559		14	max	0	1	-.009	15	.041	1	6.552e-3	3	8797.406	15	4945.31	15
560			min	-.014	5	-.104	1	-.03	3	-9.488e-3	1	1040.232	6	1848.022	1
561		15	max	0	1	-.007	15	.035	1	7.033e-3	3	NC	15	9050.349	15
562			min	-.015	5	-.088	1	-.026	3	-1.021e-2	1	1236.008	6	2005.834	1
563		16	max	0	1	-.005	15	.026	1	7.513e-3	3	NC	15	NC	5
564			min	-.016	5	-.07	1	-.019	3	-1.094e-2	1	1583.996	6	2344.043	1
565		17	max	0	1	-.002	15	.014	1	7.994e-3	3	NC	5	NC	4
566			min	-.017	5	-.049	1	-.009	3	-1.166e-2	1	2308.836	6	3106.982	1
567		18	max	0	1	0	15	.004	3	8.474e-3	3	NC	5	NC	4
568			min	-.018	5	-.027	1	-.008	2	-1.239e-2	1	4537.219	6	5530.769	1
569		19	max	.001	1	.006	5	.02	3	8.955e-3	3	NC	1	NC	1
570			min	-.02	5	-.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	-.008	4	-.004	4	-.008	2	-3.969e-3	1	NC	1	NC	1
573		2	max	0	10	-.011	12	.007	1	2.883e-3	3	9653.368	15	NC	2
574			min	-.007	4	-.039	4	-.003	5	-3.776e-3	1	2999.654	4	8717.228	1
575		3	max	0	10	-.022	12	.016	1	2.749e-3	3	4912.269	15	NC	3
576			min	-.007	4	-.073	4	-.013	5	-3.583e-3	1	1526.422	4	4929.462	1
577		4	max	0	10	-.033	12	.024	1	2.615e-3	3	3370.104	15	NC	10
578			min	-.006	4	-.105	4	-.027	5	-3.389e-3	1	1047.214	4	3746.852	1
579		5	max	0	10	-.042	12	.028	1	2.481e-3	3	2629.726	15	NC	10
580			min	-.006	4	-.134	4	-.044	5	-3.196e-3	1	817.152	4	2479.38	5
581		6	max	0	10	-.05	15	.031	1	2.347e-3	3	2213.193	15	NC	10
582			min	-.006	4	-.159	4	-.062	5	-3.003e-3	1	687.72	4	1759.681	5
583		7	max	0	10	-.056	15	.032	1	2.213e-3	3	1962.702	15	NC	10
584			min	-.005	4	-.178	4	-.079	5	-2.809e-3	1	609.883	4	1381.109	5
585		8	max	0	10	-.06	15	.032	1	2.079e-3	3	1812.371	15	NC	10
586			min	-.005	4	-.193	4	-.093	5	-2.616e-3	1	563.17	4	1165.515	5
587		9	max	0	10	-.063	15	.03	1	1.945e-3	3	1731.453	15	NC	10
588			min	-.004	4	-.201	4	-.104	5	-2.422e-3	1	538.026	4	1041.491	5
589		10	max	0	10	-.064	15	.027	1	1.811e-3	3	1705.855	15	NC	10
590			min	-.004	4	-.204	4	-.11	5	-2.229e-3	1	530.071	4	977.162	5
591		11	max	0	10	-.063	15	.024	1	1.677e-3	3	1731.453	15	NC	10
592			min	-.003	4	-.201	4	-.112	5	-2.036e-3	1	538.026	4	958.639	5
593		12	max	0	10	-.06	15	.02	1	1.543e-3	3	1812.371	15	NC	3
594			min	-.003	4	-.192	4	-.11	5	-1.842e-3	1	563.17	4	982.574	5
595		13	max	0	10	-.055	15	.015	1	1.409e-3	3	1962.702	15	NC	3
596			min	-.003	4	-.177	4	-.102	5	-1.649e-3	1	609.883	4	1054.726	5
597		14	max	0	10	-.049	15	.011	1	1.275e-3	3	2213.193	15	NC	2
598			min	-.002	4	-.157	4	-.09	5	-1.456e-3	1	687.72	4	1193.34	5
599		15	max	0	10	-.041	15	.007	1	1.141e-3	3	2629.726	15	NC	1
600			min	-.002	4	-.132	4	-.075	5	-1.262e-3	1	817.152	4	1441.395	5
601		16	max	0	10	-.032	15	.004	1	1.007e-3	3	3370.104	15	NC	1
602			min	-.001	4	-.103	4	-.057	5	-1.069e-3	1	1047.214	4	1906.11	5
603		17	max	0	10	-.022	15	.001	1	8.728e-4	3	4912.269	15	NC	1
604			min	0	4	-.071	4	-.037	5	-8.756e-4	1	1526.422	4	2920.302	5
605		18	max	0	10	-.011	15	0	9	8.19e-4	4	9653.368	15	NC	1
606			min	0	4	-.036	4	-.017	5	-6.965e-4	2	2999.654	4	6181.29	5
607		19	max	0	1	0	1	0	1	9.018e-4	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.383e-4	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

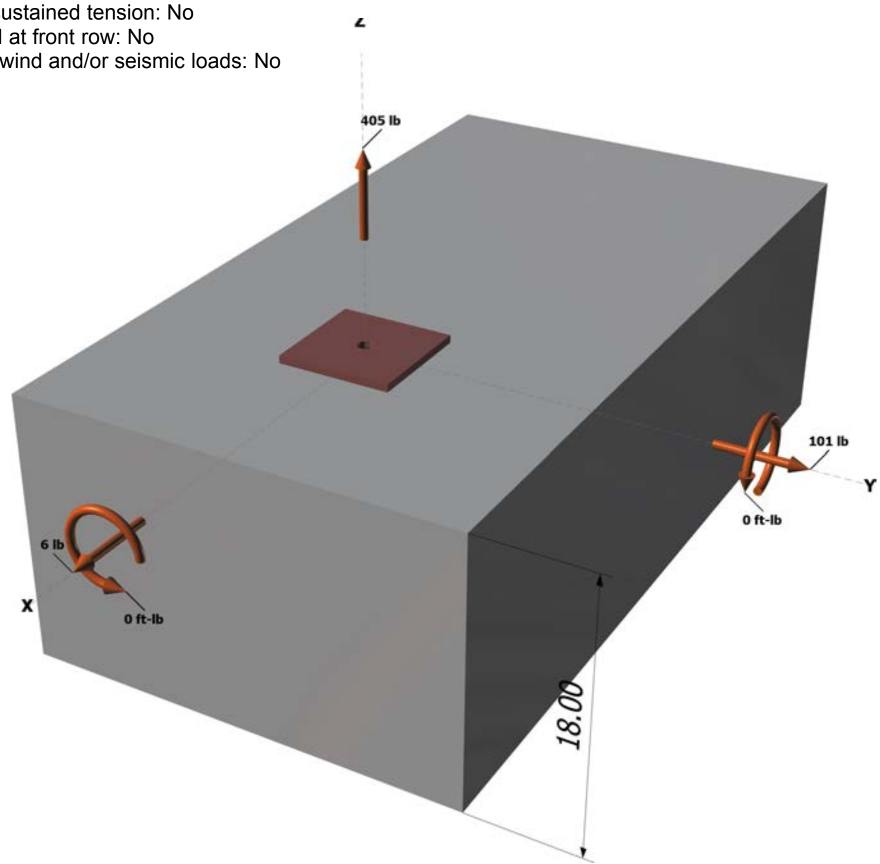
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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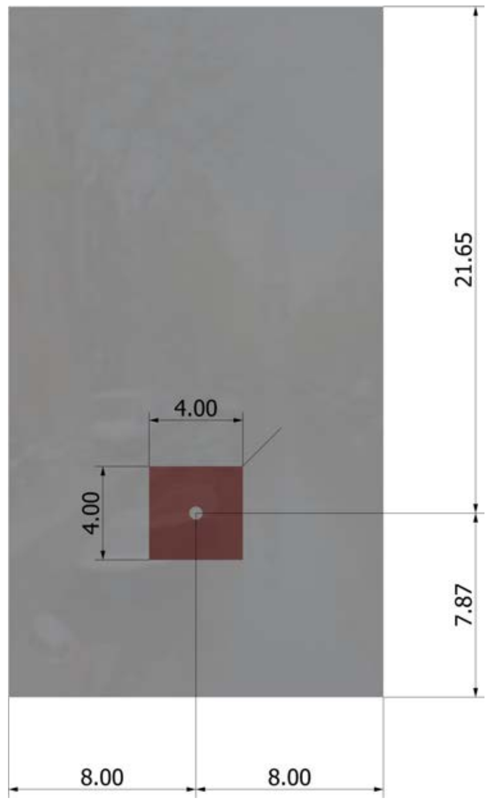


Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

SIMPSON Strong-Tie

Anchor Designer™
Software
Version 2.4.5673.0

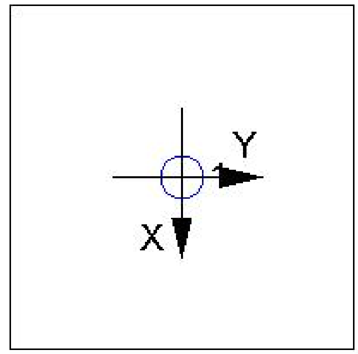
Company:	Schletter, Inc.	Date:	12/10/2015
Engineer:	HCV	Page:	3/5
Project:	Standard PVMini - Worst Case		
Address:			
Phone:			
E-mail:			

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, ϕN_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, ϕV_n (lb)	Ratio	Status
Steel	**101**	**3156**	**0.03**	**Pass (Governs)**
T Concrete breakout y+	101	4411	0.02	Pass
T Concrete breakout x+	6	3549	0.00	Pass
|| Concrete breakout y+	6	9838	0.00	Pass
|| Concrete breakout x+	101	7858	0.01	Pass
Concrete breakout, combined	-	-	0.02	Pass
Pryout	101	13657	0.01	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.08	0.00	7.5 %	1.0	Pass

AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS) with hef = 6.000 inch meets the selected design criteria.

12. Warnings

- This temperature range is currently outside the scope of ACI 318-11 and ACI 355.4, and is provided for historical purposes.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer’s product literature for hole cleaning and installation instructions.

Anchor Designer™
Software
Version 2.4.5673.0

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

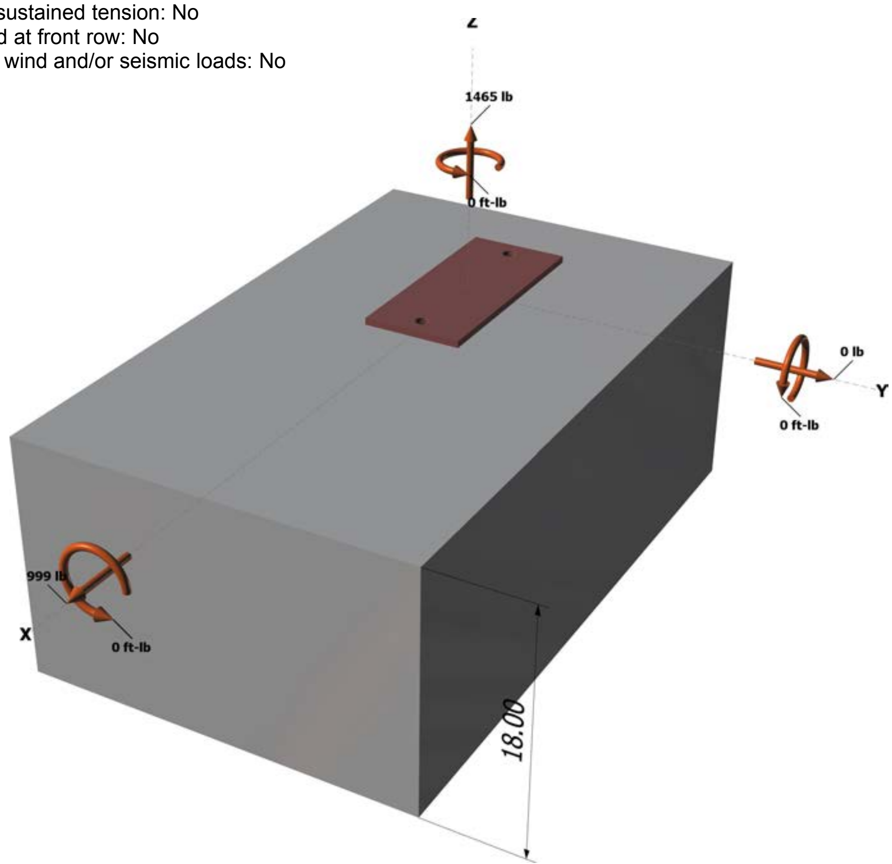
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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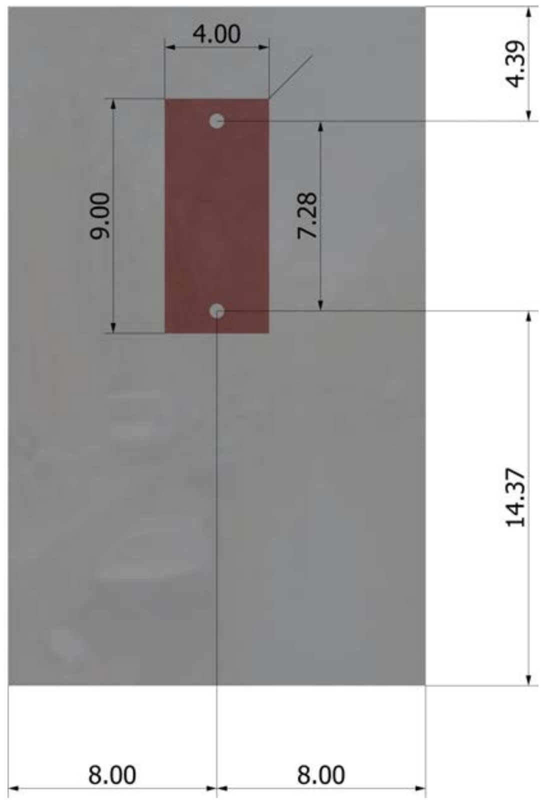


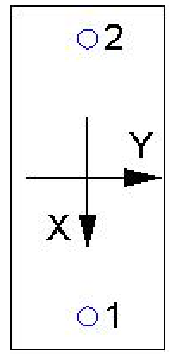
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
288.00	648.00	0.833	1.000	1.000	15593	0.70	4043

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
314.72	256.00	1.000	0.865	1.000	1.000	10469	11128	0.70

ϕV_{cpg} (lb)
15580

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	733	6071	0.12	Pass
Concrete breakout	**1465**	**7233**	**0.20**	**Pass (Governs)**
Adhesive	1465	8418	0.17	Pass

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS) with hef = 6.000 inch meets the selected design criteria.

12. Warnings

- This temperature range is currently outside the scope of ACI 318-11 and ACI 355.4, and is provided for historical purposes.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.