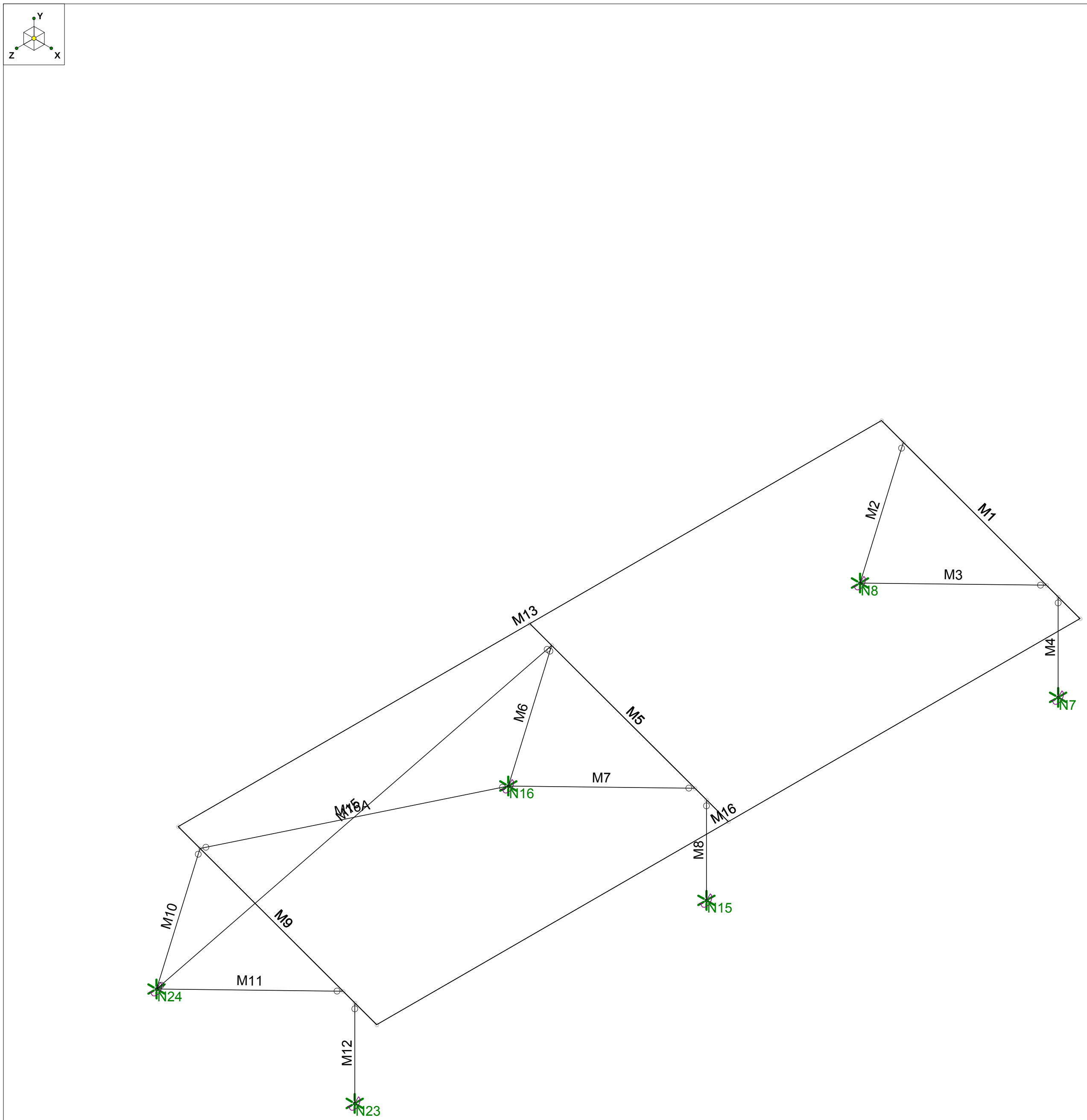


Schletter, Inc.		20° Tilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

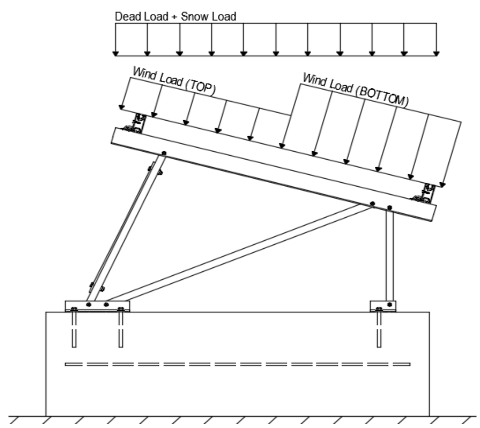
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 1
Module Tilt = 20°
Maximum Height Above Grade = 3 ft



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

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

2. LOAD ACTIONS

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

Self-weight of the PV modules.

2.2 Snow Loads
Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 20.62 psf *(ASCE 7-05, Eq. 7-2)*
I_s = 1.00
C_s = 0.91
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 100 mph
Height ≤ 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 15.70 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.05	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.65	
$Cf-_{TOP}$	=	-2.12	*(Suction)*
$Cf-_{BOTTOM}$	=	-1	

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
1.2D + 1.6W + 0.5S
0.9D + 1.6W [M]
1.54D + 1.3E + 0.2S [R]
0.56D + 1.3E [R]
1.54D + 1.25E + 0.2S [O]
0.56D + 1.25E [O]

(ASCE 7, Eq 2.3.2-1 through 2.3.2-7) & (ASCE 7, Section 12.4.3.2)

Allowable Stress Design, ASD

Member deflection checks and foundation designs are done according to the following ASD load combinations:

1.0D + 1.0S
1.0D + 1.0W
1.0D + 0.75L + 0.75W + 0.75S
0.6D + 1.0W [M]
1.238D + 0.875E [O]
1.1785D + 0.65625E + 0.75S [O]
0.362D + 0.875E [O]

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

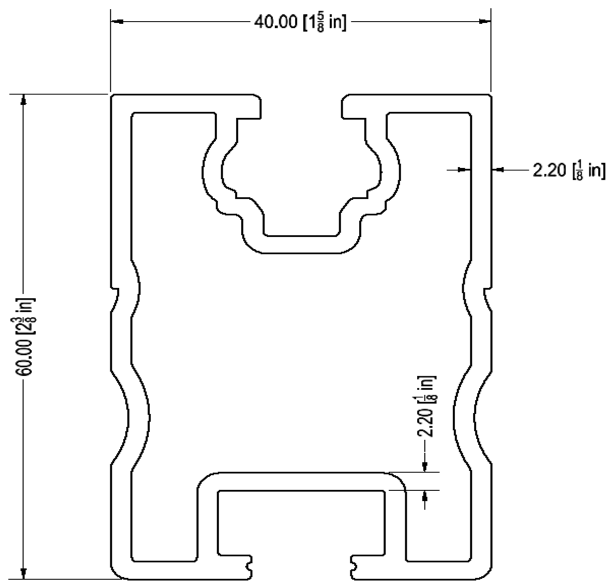
Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M16	Bottom	M7	Inner	N15	Inner
		M11	Outer	N23	Outer
Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24	Outer
Front Struts	Location	**Bracing**			
M4	Outer	M15			
M8	Inner	M16A			
M12	Outer				

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

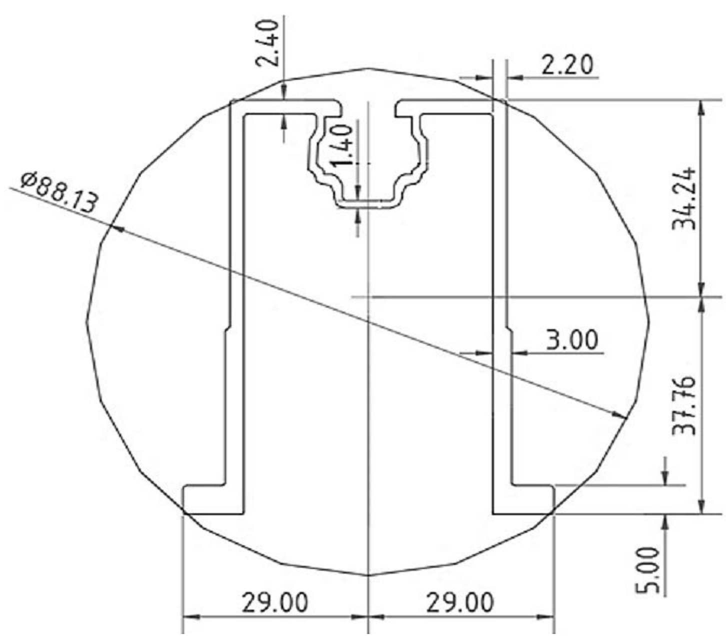
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	75	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.81	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.739	k-ft
M_z =	0.130	k-ft
$M_{y\ allowable}$ =	1.226	k-ft
$M_{z\ allowable}$ =	0.871	k-ft
Utilization =	75%	



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).

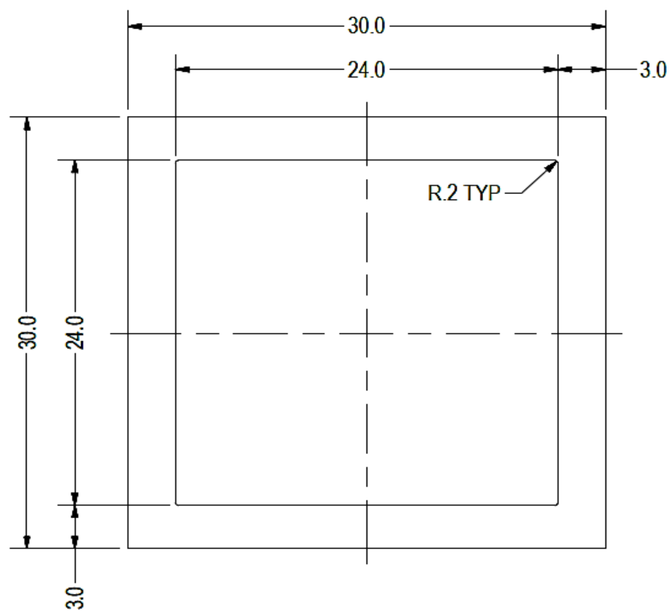
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.46	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.550	k-ft
M_z =	0.000	k-ft
P_n =	0.280	k
$M_{y\ allowable}$ =	1.446	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	40%	



4.3 Front Strut Design

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

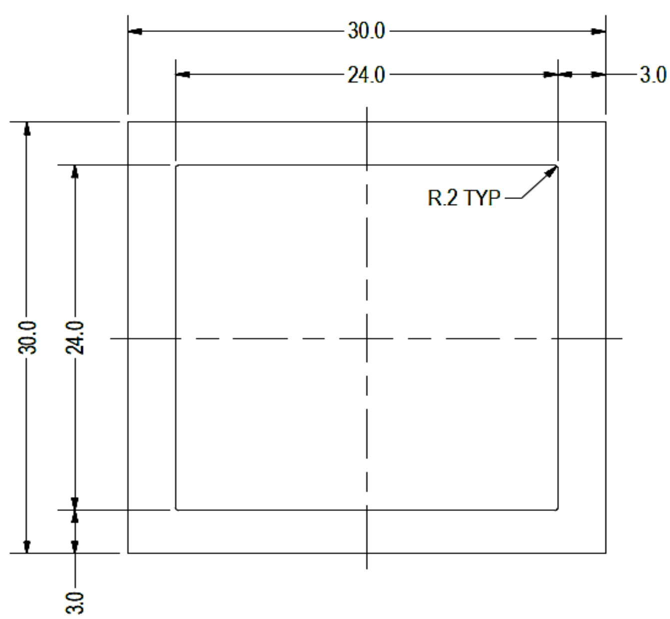
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.283	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	10%	



4.4 Diagonal Strut Design

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

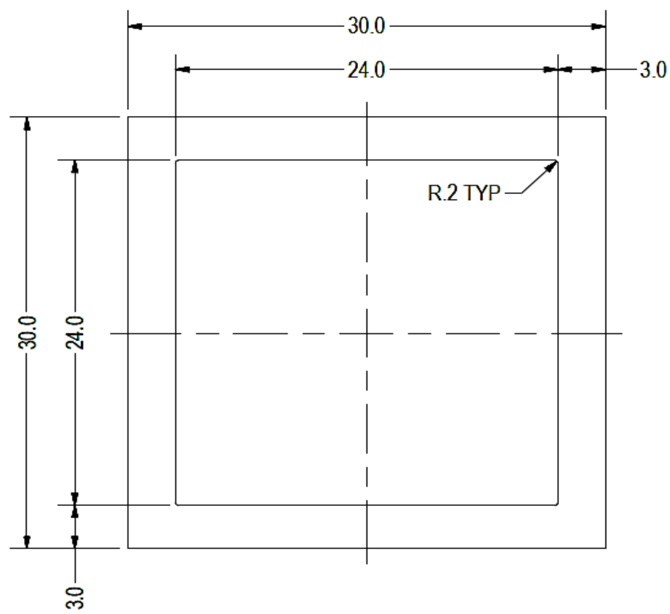
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.334	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	9%	



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).

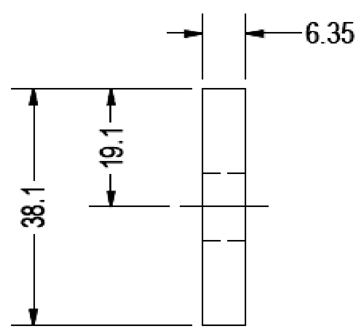
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.07	in
$\Phi F_{ty\ AXIAL}$ =	13.55	ksi
$\Phi F_{ty\ BENDING}$ =	30.37	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.026	k
$M_{y\ allowable}$ =	0.411	k-ft
$M_{z\ allowable}$ =	0.411	k-ft
$P_{n\ allowable}$ =	6.803	k
Utilization =	15%	



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 =	0.004	k-ft
P_n =	0.046	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	9%	



A cross brace kit is required every 21 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

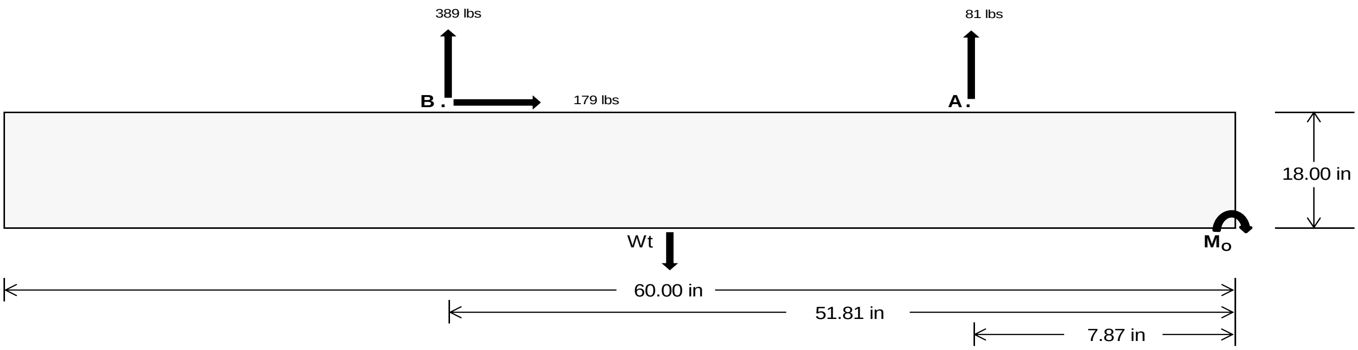
5.1 Helical Pile Foundations

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 =	342.84	1621.75	k
Compressive Load =	1667.55	1301.07	k
Lateral Load =	2.81	745.16	k
Moment (Weak Axis) =	0.01	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (1) #5 rebar.

Overturning Check

M_O =	24024.7 in-lbs
Resisting Force Required =	800.82 lbs
S.F. =	1.67
Weight Required =	1334.71 lbs
Minimum Width =	22 in in
Weight Provided =	1993.75 lbs

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

Sliding

Force =	179.08 lbs
Friction =	0.4
Weight Required =	447.70 lbs
Resisting Weight =	1993.75 lbs
Additional Weight Required =	0 lbs

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

Cohesion

Sliding Force =	179.08 lbs
Cohesion =	130 psf
Area =	9.17 ft^2
Resisting =	996.88 lbs
Additional Weight Required =	0 lbs

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

Shear Key

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

Shear key is not required.

Bearing Pressure

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

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in
F_A	598 lbs	598 lbs	598 lbs	598 lbs	543 lbs	543 lbs	543 lbs	543 lbs	811 lbs	811 lbs	811 lbs	811 lbs	-163 lbs	-163 lbs	-163 lbs	-163 lbs
F_B	436 lbs	436 lbs	436 lbs	436 lbs	478 lbs	478 lbs	478 lbs	478 lbs	653 lbs	653 lbs	653 lbs	653 lbs	-778 lbs	-778 lbs	-778 lbs	-778 lbs
F_V	52 lbs	52 lbs	52 lbs	52 lbs	320 lbs	320 lbs	320 lbs	320 lbs	275 lbs	275 lbs	275 lbs	275 lbs	-358 lbs	-358 lbs	-358 lbs	-358 lbs
P_{total}	3028 lbs	3118 lbs	3209 lbs	3300 lbs	3015 lbs	3105 lbs	3196 lbs	3287 lbs	3457 lbs	3547 lbs	3638 lbs	3729 lbs	255 lbs	310 lbs	364 lbs	418 lbs
M	386 lbs-ft	386 lbs-ft	386 lbs-ft	386 lbs-ft	610 lbs-ft	610 lbs-ft	610 lbs-ft	610 lbs-ft	721 lbs-ft	721 lbs-ft	721 lbs-ft	721 lbs-ft	577 lbs-ft	577 lbs-ft	577 lbs-ft	577 lbs-ft
e	0.13 ft	0.12 ft	0.12 ft	0.12 ft	0.20 ft	0.20 ft	0.19 ft	0.19 ft	0.21 ft	0.20 ft	0.20 ft	0.19 ft	2.26 ft	1.86 ft	1.59 ft	1.38 ft
L/6	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft
f_{min}	279.7 psf	277.0 psf	274.5 psf	272.3 psf	249.0 psf	247.6 psf	246.3 psf	245.2 psf	282.7 psf	279.9 psf	277.3 psf	274.9 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	380.9 psf	373.8 psf	367.3 psf	361.3 psf	408.8 psf	400.5 psf	392.9 psf	385.8 psf	471.5 psf	460.5 psf	450.3 psf	441.0 psf	388.9 psf	169.5 psf	132.8 psf	119.5 psf

Maximum Bearing Pressure = 472 psf
Allowable Bearing Pressure = 1500 psf

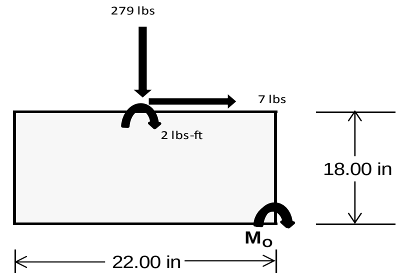
Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 242.4 ft-lbs
Resisting Force Required = 264.39 lbs
S.F. = 1.67
Weight Required = 440.65 lbs
Minimum Width = 22 in in
Weight Provided = 1993.75 lbs

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



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	22 in			22 in			22 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	72 lbs	194 lbs	68 lbs	279 lbs	843 lbs	275 lbs	21 lbs	57 lbs	20 lbs
F_V	1 lbs	1 lbs	0 lbs	7 lbs	7 lbs	1 lbs	0 lbs	0 lbs	0 lbs
P_{total}	2540 lbs	2662 lbs	2536 lbs	2628 lbs	3192 lbs	2624 lbs	743 lbs	778 lbs	742 lbs
M	2 lbs-ft	2 lbs-ft	0 lbs-ft	13 lbs-ft	10 lbs-ft	1 lbs-ft	1 lbs-ft	1 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.31 ft	1.83 ft	1.83 ft	1.82 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	276.4 sqft	289.7 sqft	276.6 sqft	282.0 sqft	344.6 sqft	286.0 sqft	80.8 sqft	84.7 sqft	80.9 sqft
f_{max}	277.9 psf	291.1 psf	276.8 psf	291.4 psf	351.9 psf	286.6 psf	81.3 psf	85.1 psf	80.9 psf

Maximum Bearing Pressure = 352 psf
Allowable Bearing Pressure = 1500 psf

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

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

5.3 Foundation Anchors

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

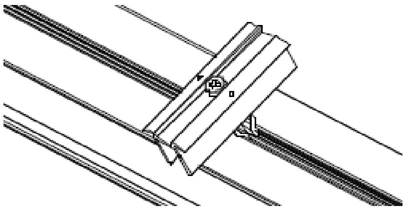
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

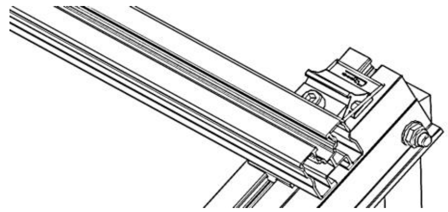
<u>Fastening of Modules to Purlins</u>

Maximum Uplifting Force =	0.497 k
Allowable Uplift =	1.214 k
Utilization =	41%



<u>Fastening of Purlins to Girders</u>

Maximum Uplifting Force =	1.096 k
Allowable Uplift =	1.116 k
Utilization =	98%



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.

<u>Front Strut</u>

Maximum Axial Load =	1.283 k
M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	23%

<u>Rear Strut</u>

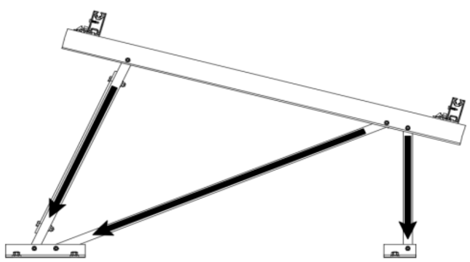
Maximum Axial Load =	1.172 k
M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	21%

<u>Diagonal Strut</u>

Maximum Axial Load =	0.334 k
M8 Bolt Shear Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	6%

<u>Bracing</u>

Maximum Axial Load =	0.046 k
M10 Bolt Capacity =	8.894 k
Strut Bearing Capacity =	7.952 k
Utilization =	1%



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

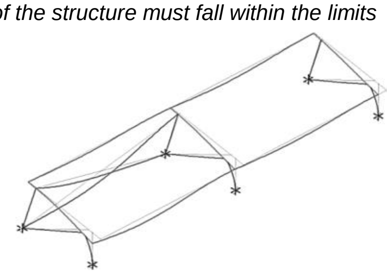
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	29.57 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$ 0.591 in
Max Drift, Δ_{MAX} =	0.024 in
N/A	

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



APPENDIX A

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

Purlin = **ProfiPlus**

Strong Axis:

3.4.14

L_b = 75.00 in

J = 0.255

195.296

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

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= 28.8 ksi

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

Weak Axis:

3.4.14

L_b = 75.00 in

J = 0.255

202.803

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

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= 28.7

3.4.16

b/t = 23.9

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 23.9

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

S1 = 36.9

m = 0.65

C_0 = 30

Cc = 30

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 28.8 ksi

Ix = 250988 mm^4

0.603 in^4

y = 30 mm

Sx = 0.511 in^3

$M_{max}St$ = 1.226 k-ft

3.4.18

h/t = 7.4

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

S1 = 36.9

m = 0.65

C_0 = 20

Cc = 20

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 28.5 ksi

Iy = 120291 mm^4

0.289 in^4

x = 20 mm

Sy = 0.367 in^3

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

Compression

3.4.9

b/t = 7.4

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 23.9

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.47 ksi

A = 578.06 mm^2

0.90 in^2

P_{max} = 25.51 kips

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.13
23.1371

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.5 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 = 1.13
24.5845

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.5 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

3.4.16.2

N/A for Strong Direction

3.4.18

h/t = 24.46

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

S1 = 34.4

m = 0.70

C_0 = 34.23

Cc = 37.77

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

S2 = 72.1

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.5 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.446 k-ft

3.4.16.1

N/A for Weak 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 = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

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

3.4.9

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

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

3.4.9.1

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

$\lambda =$ 0.77182

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

φcc = 0.83792

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

$\varphi F_L =$ 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 24.52 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 12.31 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 33.07 in

J = 0.16

86.7548

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.4 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 30.4 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.411 k-ft

Weak Axis:

3.4.14

L_b = 33.07 in

J = 0.16

86.7548

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.4

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 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

$\varphi cc =$ 0.77853

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

$\varphi F_L =$ 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)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L =$ 13.55 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 6.80 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-57.498	-57.498	0	0
2	M16	Y	-57.498	-57.498	0	0

Member Distributed Loads (BLC 4 : Wind Load - Pressure)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-45.975	-45.975	0	0
2	M16	y	-72.246	-72.246	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	92.825	92.825	0	0
2	M16	y	43.785	43.785	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8														
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6														
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																
10	ASD 1.0D + 1.0W	Yes	Y		1	1			4	1														
11	ASD 1.0D + 0.75L + 0.75W + 0....	Yes	Y		1	1	3	.75	4	.75														
12	ASD 0.6D + 1.0W	Yes	Y		2	.6					5	1												
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875												
14	LATERAL - ASD 1.1785D + 0.65..	Yes	Y		1	1.1...	3	.75			6	.656												
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	139.323	2	278.782	1	.008	11	0	1	0	1	0	1
2		min	-180.405	3	-379.273	3	-.127	3	0	3	0	1	0	1
3	N7	max	0	15	444.462	1	-.036	15	0	15	0	1	0	1
4		min	-.141	2	-72.808	3	-.935	1	-.002	1	0	1	0	1
5	N15	max	0	15	1282.728	1	.485	1	0	1	0	1	0	1
6		min	-1.535	2	-263.723	3	-.362	3	0	3	0	1	0	1
7	N16	max	531.583	2	1000.826	1	0	10	0	1	0	1	0	1
8		min	-573.201	3	-1247.497	3	-40.818	3	0	3	0	1	0	1
9	N23	max	0	15	444.235	1	2.161	1	.004	1	0	1	0	1
10		min	-.141	2	-72.398	3	.078	15	0	15	0	1	0	1
11	N24	max	139.59	2	283.401	1	41.159	3	.001	1	0	1	0	1
12		min	-180.545	3	-377.139	3	.008	10	0	3	0	1	0	1
13	Totals:	max	808.679	2	3734.435	1	0	1						
14		min	-934.467	3	-2412.838	3	0	10						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M2	1	max	315.486	1	.646	4	.506	1	0	15	0	3	0	1
2			min	-359.55	3	.153	15	-.073	3	0	1	0	1	0	1
3		2	max	315.593	1	.604	4	.506	1	0	15	0	1	0	15
4			min	-359.47	3	.143	15	-.073	3	0	1	0	10	0	4
5		3	max	315.699	1	.563	4	.506	1	0	15	0	1	0	15
6			min	-359.39	3	.133	15	-.073	3	0	1	0	10	0	4
7		4	max	315.806	1	.522	4	.506	1	0	15	0	1	0	15
8			min	-359.31	3	.123	15	-.073	3	0	1	0	3	0	4
9		5	max	315.913	1	.48	4	.506	1	0	15	0	1	0	15
10			min	-359.23	3	.114	15	-.073	3	0	1	0	3	0	4
11		6	max	316.019	1	.439	4	.506	1	0	15	0	1	0	15
12			min	-359.15	3	.104	15	-.073	3	0	1	0	3	0	4
13		7	max	316.126	1	.398	4	.506	1	0	15	0	1	0	15
14			min	-359.07	3	.094	15	-.073	3	0	1	0	3	0	4
15		8	max	316.232	1	.357	4	.506	1	0	15	0	1	0	15
16			min	-358.99	3	.085	15	-.073	3	0	1	0	3	0	4
17		9	max	316.339	1	.315	4	.506	1	0	15	0	1	0	15
18			min	-358.91	3	.075	15	-.073	3	0	1	0	3	0	4
19		10	max	316.445	1	.274	4	.506	1	0	15	0	1	0	15
20			min	-358.83	3	.065	15	-.073	3	0	1	0	3	0	4
21		11	max	316.552	1	.233	4	.506	1	0	15	0	1	0	15
22			min	-358.75	3	.056	15	-.073	3	0	1	0	3	0	4
23		12	max	316.658	1	.192	4	.506	1	0	15	0	1	0	15
24			min	-358.671	3	.046	15	-.073	3	0	1	0	3	0	4
25		13	max	316.765	1	.15	4	.506	1	0	15	0	1	0	15
26			min	-358.591	3	.036	15	-.073	3	0	1	0	3	0	4
27		14	max	316.871	1	.109	4	.506	1	0	15	0	1	0	15
28			min	-358.511	3	.026	15	-.073	3	0	1	0	3	0	4
29		15	max	316.978	1	.075	2	.506	1	0	15	.001	1	0	15
30			min	-358.431	3	.014	12	-.073	3	0	1	0	3	0	4
31		16	max	317.084	1	.043	2	.506	1	0	15	.001	1	0	15
32			min	-358.351	3	-.005	3	-.073	3	0	1	0	3	0	4
33		17	max	317.191	1	.011	2	.506	1	0	15	.001	1	0	15
34			min	-358.271	3	-.029	3	-.073	3	0	1	0	3	0	4
35		18	max	317.298	1	-.012	15	.506	1	0	15	.001	1	0	15
36			min	-358.191	3	-.056	4	-.073	3	0	1	0	3	0	4
37		19	max	317.404	1	-.022	15	.506	1	0	15	.001	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
38			min	-358.111	3	-.097	4	-.073	3	0	1	0	3	0	4
39	M3	1	max	75.684	2	1.797	4	-.015	15	0	15	.001	1	0	4
40			min	-85.011	3	.423	15	-.436	1	0	1	0	15	0	15
41		2	max	75.616	2	1.619	4	-.015	15	0	15	.001	1	0	4
42			min	-85.062	3	.381	15	-.436	1	0	1	0	15	0	15
43		3	max	75.549	2	1.441	4	-.015	15	0	15	.001	1	0	2
44			min	-85.112	3	.339	15	-.436	1	0	1	0	15	0	3
45		4	max	75.481	2	1.264	4	-.015	15	0	15	.001	1	0	15
46			min	-85.163	3	.298	15	-.436	1	0	1	0	15	0	4
47		5	max	75.413	2	1.086	4	-.015	15	0	15	0	1	0	15
48			min	-85.214	3	.256	15	-.436	1	0	1	0	15	0	4
49		6	max	75.345	2	.908	4	-.015	15	0	15	0	1	0	15
50			min	-85.265	3	.214	15	-.436	1	0	1	0	15	0	4
51		7	max	75.277	2	.731	4	-.015	15	0	15	0	1	0	15
52			min	-85.316	3	.172	15	-.436	1	0	1	0	15	0	4
53		8	max	75.209	2	.553	4	-.015	15	0	15	0	1	0	15
54			min	-85.367	3	.131	15	-.436	1	0	1	0	15	0	4
55		9	max	75.141	2	.376	4	-.015	15	0	15	0	1	0	15
56			min	-85.418	3	.089	15	-.436	1	0	1	0	15	-.001	4
57		10	max	75.074	2	.198	4	-.015	15	0	15	0	1	0	15
58			min	-85.469	3	.047	15	-.436	1	0	1	0	15	-.001	4
59		11	max	75.006	2	.032	2	-.015	15	0	15	0	1	0	15
60			min	-85.52	3	-.003	3	-.436	1	0	1	0	15	-.001	4
61		12	max	74.938	2	-.036	15	-.015	15	0	15	0	1	0	15
62			min	-85.571	3	-.157	4	-.436	1	0	1	0	15	-.001	4
63		13	max	74.87	2	-.078	15	-.015	15	0	15	0	1	0	15
64			min	-85.621	3	-.335	4	-.436	1	0	1	0	15	-.001	4
65		14	max	74.802	2	-.12	15	-.015	15	0	15	0	1	0	15
66			min	-85.672	3	-.513	4	-.436	1	0	1	0	12	-.001	4
67		15	max	74.734	2	-.162	15	-.015	15	0	15	0	1	0	15
68			min	-85.723	3	-.69	4	-.436	1	0	1	0	3	0	4
69		16	max	74.666	2	-.203	15	-.015	15	0	15	0	15	0	15
70			min	-85.774	3	-.868	4	-.436	1	0	1	0	1	0	4
71		17	max	74.598	2	-.245	15	-.015	15	0	15	0	15	0	15
72			min	-85.825	3	-1.046	4	-.436	1	0	1	0	1	0	4
73		18	max	74.531	2	-.287	15	-.015	15	0	15	0	15	0	15
74			min	-85.876	3	-1.223	4	-.436	1	0	1	0	1	0	4
75		19	max	74.463	2	-.329	15	-.015	15	0	15	0	15	0	1
76			min	-85.927	3	-1.401	4	-.436	1	0	1	0	1	0	1
77	M4	1	max	443.297	1	0	1	-.036	15	0	1	0	3	0	1
78			min	-73.681	3	0	1	-1.011	1	0	1	0	1	0	1
79		2	max	443.362	1	0	1	-.036	15	0	1	0	12	0	1
80			min	-73.633	3	0	1	-1.011	1	0	1	0	1	0	1
81		3	max	443.427	1	0	1	-.036	15	0	1	0	15	0	1
82			min	-73.584	3	0	1	-1.011	1	0	1	0	1	0	1
83		4	max	443.491	1	0	1	-.036	15	0	1	0	15	0	1
84			min	-73.536	3	0	1	-1.011	1	0	1	0	1	0	1
85		5	max	443.556	1	0	1	-.036	15	0	1	0	15	0	1
86			min	-73.487	3	0	1	-1.011	1	0	1	0	1	0	1
87		6	max	443.621	1	0	1	-.036	15	0	1	0	15	0	1
88			min	-73.439	3	0	1	-1.011	1	0	1	0	1	0	1
89		7	max	443.685	1	0	1	-.036	15	0	1	0	15	0	1
90			min	-73.39	3	0	1	-1.011	1	0	1	0	1	0	1
91		8	max	443.75	1	0	1	-.036	15	0	1	0	15	0	1
92			min	-73.342	3	0	1	-1.011	1	0	1	0	1	0	1
93		9	max	443.815	1	0	1	-.036	15	0	1	0	15	0	1
94			min	-73.293	3	0	1	-1.011	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
95		10	max	443.88	1	0	1	-.036	15	0	1	0	15	0	1
96			min	-73.245	3	0	1	-1.011	1	0	1	0	1	0	1
97		11	max	443.944	1	0	1	-.036	15	0	1	0	15	0	1
98			min	-73.196	3	0	1	-1.011	1	0	1	0	1	0	1
99		12	max	444.009	1	0	1	-.036	15	0	1	0	15	0	1
100			min	-73.148	3	0	1	-1.011	1	0	1	-.001	1	0	1
101		13	max	444.074	1	0	1	-.036	15	0	1	0	15	0	1
102			min	-73.099	3	0	1	-1.011	1	0	1	-.001	1	0	1
103		14	max	444.138	1	0	1	-.036	15	0	1	0	15	0	1
104			min	-73.051	3	0	1	-1.011	1	0	1	-.001	1	0	1
105		15	max	444.203	1	0	1	-.036	15	0	1	0	15	0	1
106			min	-73.002	3	0	1	-1.011	1	0	1	-.001	1	0	1
107		16	max	444.268	1	0	1	-.036	15	0	1	0	15	0	1
108			min	-72.953	3	0	1	-1.011	1	0	1	-.001	1	0	1
109		17	max	444.333	1	0	1	-.036	15	0	1	0	15	0	1
110			min	-72.905	3	0	1	-1.011	1	0	1	-.001	1	0	1
111		18	max	444.397	1	0	1	-.036	15	0	1	0	15	0	1
112			min	-72.856	3	0	1	-1.011	1	0	1	-.002	1	0	1
113		19	max	444.462	1	0	1	-.036	15	0	1	0	15	0	1
114			min	-72.808	3	0	1	-1.011	1	0	1	-.002	1	0	1
115	M6	1	max	1023.778	1	.641	4	.236	1	0	1	0	3	0	1
116			min	-1172.304	3	.152	15	-.169	3	0	10	0	1	0	1
117		2	max	1023.885	1	.599	4	.236	1	0	1	0	3	0	15
118			min	-1172.224	3	.142	15	-.169	3	0	10	0	1	0	4
119		3	max	1023.991	1	.558	4	.236	1	0	1	0	3	0	15
120			min	-1172.144	3	.132	15	-.169	3	0	10	0	1	0	4
121		4	max	1024.098	1	.517	4	.236	1	0	1	0	11	0	15
122			min	-1172.064	3	.123	15	-.169	3	0	10	0	10	0	4
123		5	max	1024.204	1	.475	4	.236	1	0	1	0	1	0	15
124			min	-1171.984	3	.113	15	-.169	3	0	10	0	3	0	4
125		6	max	1024.311	1	.434	4	.236	1	0	1	0	1	0	15
126			min	-1171.905	3	.103	15	-.169	3	0	10	0	3	0	4
127		7	max	1024.417	1	.393	4	.236	1	0	1	0	1	0	15
128			min	-1171.825	3	.094	15	-.169	3	0	10	0	3	0	4
129		8	max	1024.524	1	.352	4	.236	1	0	1	0	1	0	15
130			min	-1171.745	3	.084	15	-.169	3	0	10	0	3	0	4
131		9	max	1024.63	1	.319	2	.236	1	0	1	0	1	0	15
132			min	-1171.665	3	.074	15	-.169	3	0	10	0	3	0	4
133		10	max	1024.737	1	.287	2	.236	1	0	1	0	1	0	15
134			min	-1171.585	3	.064	15	-.169	3	0	10	0	3	0	4
135		11	max	1024.843	1	.255	2	.236	1	0	1	0	1	0	15
136			min	-1171.505	3	.051	12	-.169	3	0	10	0	3	0	4
137		12	max	1024.95	1	.222	2	.236	1	0	1	0	1	0	15
138			min	-1171.425	3	.035	12	-.169	3	0	10	0	3	0	4
139		13	max	1025.057	1	.19	2	.236	1	0	1	0	1	0	15
140			min	-1171.345	3	.019	12	-.169	3	0	10	0	3	0	4
141		14	max	1025.163	1	.158	2	.236	1	0	1	0	1	0	15
142			min	-1171.265	3	0	3	-.169	3	0	10	0	3	0	4
143		15	max	1025.27	1	.126	2	.236	1	0	1	0	1	0	15
144			min	-1171.185	3	-.023	3	-.169	3	0	10	0	3	0	4
145		16	max	1025.376	1	.094	2	.236	1	0	1	0	1	0	15
146			min	-1171.105	3	-.047	3	-.169	3	0	10	0	3	0	2
147		17	max	1025.483	1	.062	2	.236	1	0	1	0	1	0	15
148			min	-1171.026	3	-.072	3	-.169	3	0	10	0	3	0	2
149		18	max	1025.589	1	.029	2	.236	1	0	1	0	1	0	15
150			min	-1170.946	3	-.096	3	-.169	3	0	10	0	3	0	2
151		19	max	1025.696	1	-.003	2	.236	1	0	1	0	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
152			min	-1170.866	3	-.12	3	-.169	3	0	10	0	3	0	2
153	M7	1	max	333.603	2	1.796	4	.007	1	0	1	0	1	0	2
154			min	-254.434	3	.423	15	-.007	2	0	3	0	3	0	12
155		2	max	333.535	2	1.618	4	.007	1	0	1	0	1	0	2
156			min	-254.484	3	.381	15	-.007	2	0	3	0	3	0	12
157		3	max	333.468	2	1.44	4	.007	1	0	1	0	1	0	2
158			min	-254.535	3	.339	15	-.007	2	0	3	0	3	0	3
159		4	max	333.4	2	1.263	4	.007	1	0	1	0	1	0	2
160			min	-254.586	3	.298	15	-.007	2	0	3	0	3	0	3
161		5	max	333.332	2	1.085	4	.007	1	0	1	0	1	0	15
162			min	-254.637	3	.256	15	-.007	2	0	3	0	3	0	4
163		6	max	333.264	2	.908	4	.007	1	0	1	0	1	0	15
164			min	-254.688	3	.214	15	-.007	2	0	3	0	3	0	4
165		7	max	333.196	2	.73	4	.007	1	0	1	0	1	0	15
166			min	-254.739	3	.172	15	-.007	2	0	3	0	3	0	4
167		8	max	333.128	2	.552	4	.007	1	0	1	0	1	0	15
168			min	-254.79	3	.131	15	-.007	2	0	3	0	3	0	4
169		9	max	333.06	2	.375	4	.007	1	0	1	0	1	0	15
170			min	-254.841	3	.089	15	-.007	2	0	3	0	3	-.001	4
171		10	max	332.993	2	.217	2	.007	1	0	1	0	1	0	15
172			min	-254.892	3	.043	12	-.007	2	0	3	0	3	-.001	4
173		11	max	332.925	2	.078	2	.007	1	0	1	0	1	0	15
174			min	-254.943	3	-.042	3	-.007	2	0	3	0	3	-.001	4
175		12	max	332.857	2	-.036	15	.007	1	0	1	0	1	0	15
176			min	-254.993	3	-.158	4	-.007	2	0	3	0	3	-.001	4
177		13	max	332.789	2	-.078	15	.007	1	0	1	0	1	0	15
178			min	-255.044	3	-.336	4	-.007	2	0	3	0	3	-.001	4
179		14	max	332.721	2	-.12	15	.007	1	0	1	0	1	0	15
180			min	-255.095	3	-.514	4	-.007	2	0	3	0	3	-.001	4
181		15	max	332.653	2	-.162	15	.007	1	0	1	0	1	0	15
182			min	-255.146	3	-.691	4	-.007	2	0	3	0	3	0	4
183		16	max	332.585	2	-.204	15	.007	1	0	1	0	1	0	15
184			min	-255.197	3	-.869	4	-.007	2	0	3	0	3	0	4
185		17	max	332.517	2	-.245	15	.007	1	0	1	0	1	0	15
186			min	-255.248	3	-1.047	4	-.007	2	0	3	0	3	0	4
187		18	max	332.45	2	-.287	15	.007	1	0	1	0	1	0	15
188			min	-255.299	3	-1.224	4	-.007	2	0	3	0	3	0	4
189		19	max	332.382	2	-.329	15	.007	1	0	1	0	1	0	1
190			min	-255.35	3	-1.402	4	-.007	2	0	3	0	3	0	1
191	M8	1	max	1281.563	1	0	1	.613	1	0	1	0	10	0	1
192			min	-264.596	3	0	1	-.347	3	0	1	0	1	0	1
193		2	max	1281.628	1	0	1	.613	1	0	1	0	1	0	1
194			min	-264.548	3	0	1	-.347	3	0	1	0	3	0	1
195		3	max	1281.693	1	0	1	.613	1	0	1	0	1	0	1
196			min	-264.499	3	0	1	-.347	3	0	1	0	3	0	1
197		4	max	1281.757	1	0	1	.613	1	0	1	0	1	0	1
198			min	-264.451	3	0	1	-.347	3	0	1	0	3	0	1
199		5	max	1281.822	1	0	1	.613	1	0	1	0	1	0	1
200			min	-264.402	3	0	1	-.347	3	0	1	0	3	0	1
201		6	max	1281.887	1	0	1	.613	1	0	1	0	1	0	1
202			min	-264.354	3	0	1	-.347	3	0	1	0	3	0	1
203		7	max	1281.952	1	0	1	.613	1	0	1	0	1	0	1
204			min	-264.305	3	0	1	-.347	3	0	1	0	3	0	1
205		8	max	1282.016	1	0	1	.613	1	0	1	0	1	0	1
206			min	-264.257	3	0	1	-.347	3	0	1	0	3	0	1
207		9	max	1282.081	1	0	1	.613	1	0	1	0	1	0	1
208			min	-264.208	3	0	1	-.347	3	0	1	0	3	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
209		10	max	1282.146	1	0	1	.613	1	0	1	0	1	0	1
210			min	-264.16	3	0	1	-.347	3	0	1	0	3	0	1
211		11	max	1282.21	1	0	1	.613	1	0	1	0	1	0	1
212			min	-264.111	3	0	1	-.347	3	0	1	0	3	0	1
213		12	max	1282.275	1	0	1	.613	1	0	1	0	1	0	1
214			min	-264.063	3	0	1	-.347	3	0	1	0	3	0	1
215		13	max	1282.34	1	0	1	.613	1	0	1	0	1	0	1
216			min	-264.014	3	0	1	-.347	3	0	1	0	3	0	1
217		14	max	1282.404	1	0	1	.613	1	0	1	0	1	0	1
218			min	-263.965	3	0	1	-.347	3	0	1	0	3	0	1
219		15	max	1282.469	1	0	1	.613	1	0	1	0	1	0	1
220			min	-263.917	3	0	1	-.347	3	0	1	0	3	0	1
221		16	max	1282.534	1	0	1	.613	1	0	1	0	1	0	1
222			min	-263.868	3	0	1	-.347	3	0	1	0	3	0	1
223		17	max	1282.599	1	0	1	.613	1	0	1	0	1	0	1
224			min	-263.82	3	0	1	-.347	3	0	1	0	3	0	1
225		18	max	1282.663	1	0	1	.613	1	0	1	0	1	0	1
226			min	-263.771	3	0	1	-.347	3	0	1	0	3	0	1
227		19	max	1282.728	1	0	1	.613	1	0	1	0	1	0	1
228			min	-263.723	3	0	1	-.347	3	0	1	0	3	0	1
229	M10	1	max	319.514	1	.637	4	-.003	15	0	1	0	1	0	1
230			min	-340.203	3	.151	15	-.088	1	0	3	0	3	0	1
231		2	max	319.62	1	.596	4	-.003	15	0	1	0	1	0	15
232			min	-340.123	3	.142	15	-.088	1	0	3	0	3	0	4
233		3	max	319.727	1	.554	4	-.003	15	0	1	0	1	0	15
234			min	-340.043	3	.132	15	-.088	1	0	3	0	3	0	4
235		4	max	319.834	1	.513	4	-.003	15	0	1	0	1	0	15
236			min	-339.964	3	.122	15	-.088	1	0	3	0	3	0	4
237		5	max	319.94	1	.472	4	-.003	15	0	1	0	1	0	15
238			min	-339.884	3	.112	15	-.088	1	0	3	0	3	0	4
239		6	max	320.047	1	.43	4	-.003	15	0	1	0	1	0	15
240			min	-339.804	3	.103	15	-.088	1	0	3	0	3	0	4
241		7	max	320.153	1	.389	4	-.003	15	0	1	0	1	0	15
242			min	-339.724	3	.093	15	-.088	1	0	3	0	3	0	4
243		8	max	320.26	1	.348	4	-.003	15	0	1	0	1	0	15
244			min	-339.644	3	.083	15	-.088	1	0	3	0	3	0	4
245		9	max	320.366	1	.307	4	-.003	15	0	1	0	1	0	15
246			min	-339.564	3	.074	15	-.088	1	0	3	0	3	0	4
247		10	max	320.473	1	.265	4	-.003	15	0	1	0	15	0	15
248			min	-339.484	3	.064	15	-.088	1	0	3	0	3	0	4
249		11	max	320.579	1	.224	4	-.003	15	0	1	0	15	0	15
250			min	-339.404	3	.054	15	-.088	1	0	3	0	3	0	4
251		12	max	320.686	1	.183	4	-.003	15	0	1	0	15	0	15
252			min	-339.324	3	.045	15	-.088	1	0	3	0	3	0	4
253		13	max	320.792	1	.142	4	-.003	15	0	1	0	15	0	15
254			min	-339.244	3	.035	15	-.088	1	0	3	0	3	0	4
255		14	max	320.899	1	.107	2	-.003	15	0	1	0	15	0	15
256			min	-339.164	3	.025	15	-.088	1	0	3	0	3	0	4
257		15	max	321.006	1	.075	2	-.003	15	0	1	0	15	0	15
258			min	-339.085	3	-.003	1	-.088	1	0	3	0	3	0	4
259		16	max	321.112	1	.043	2	-.003	15	0	1	0	15	0	15
260			min	-339.005	3	-.035	1	-.088	1	0	3	0	3	0	4
261		17	max	321.219	1	.011	2	-.003	15	0	1	0	15	0	15
262			min	-338.925	3	-.068	1	-.088	1	0	3	0	3	0	4
263		18	max	321.325	1	-.011	12	-.003	15	0	1	0	15	0	15
264			min	-338.845	3	-.1	1	-.088	1	0	3	0	3	0	4
265		19	max	321.432	1	-.023	15	-.003	15	0	1	0	15	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
266			min	-338.765	3	-.132	1	-.088	1	0	3	0	3	0	4
267	M11	1	max	75.343	2	1.801	4	.535	1	0	1	0	3	0	4
268			min	-85.614	3	.424	15	0	3	0	15	-.001	1	0	15
269		2	max	75.276	2	1.624	4	.535	1	0	1	0	3	0	4
270			min	-85.665	3	.382	15	0	3	0	15	-.001	1	0	12
271		3	max	75.208	2	1.446	4	.535	1	0	1	0	3	0	2
272			min	-85.716	3	.34	15	0	3	0	15	-.001	1	0	3
273		4	max	75.14	2	1.268	4	.535	1	0	1	0	3	0	15
274			min	-85.767	3	.298	15	0	3	0	15	-.001	1	0	3
275		5	max	75.072	2	1.091	4	.535	1	0	1	0	3	0	15
276			min	-85.817	3	.257	15	0	3	0	15	-.001	1	0	4
277		6	max	75.004	2	.913	4	.535	1	0	1	0	3	0	15
278			min	-85.868	3	.215	15	0	3	0	15	0	1	0	4
279		7	max	74.936	2	.735	4	.535	1	0	1	0	3	0	15
280			min	-85.919	3	.173	15	0	3	0	15	0	1	0	4
281		8	max	74.868	2	.558	4	.535	1	0	1	0	3	0	15
282			min	-85.97	3	.131	15	0	3	0	15	0	1	0	4
283		9	max	74.801	2	.38	4	.535	1	0	1	0	3	0	15
284			min	-86.021	3	.089	15	0	3	0	15	0	1	-.001	4
285		10	max	74.733	2	.202	4	.535	1	0	1	0	3	0	15
286			min	-86.072	3	.048	15	0	3	0	15	0	1	-.001	4
287		11	max	74.665	2	.032	2	.535	1	0	1	0	3	0	15
288			min	-86.123	3	-.022	3	0	3	0	15	0	1	-.001	4
289		12	max	74.597	2	-.036	15	.535	1	0	1	0	3	0	15
290			min	-86.174	3	-.153	4	0	3	0	15	0	1	-.001	4
291		13	max	74.529	2	-.078	15	.535	1	0	1	0	3	0	15
292			min	-86.225	3	-.331	4	0	3	0	15	0	1	-.001	4
293		14	max	74.461	2	-.119	15	.535	1	0	1	0	3	0	15
294			min	-86.276	3	-.508	4	0	3	0	15	0	10	-.001	4
295		15	max	74.393	2	-.161	15	.535	1	0	1	0	3	0	15
296			min	-86.326	3	-.686	4	0	3	0	15	0	10	0	4
297		16	max	74.326	2	-.203	15	.535	1	0	1	0	1	0	15
298			min	-86.377	3	-.864	4	0	3	0	15	0	15	0	4
299		17	max	74.258	2	-.245	15	.535	1	0	1	0	1	0	15
300			min	-86.428	3	-1.041	4	0	3	0	15	0	15	0	4
301		18	max	74.19	2	-.286	15	.535	1	0	1	0	1	0	15
302			min	-86.479	3	-1.219	4	0	3	0	15	0	15	0	4
303		19	max	74.122	2	-.328	15	.535	1	0	1	0	1	0	1
304			min	-86.53	3	-1.397	4	0	3	0	15	0	15	0	1
305	M12	1	max	443.071	1	0	1	2.332	1	0	1	0	1	0	1
306			min	-73.272	3	0	1	.078	15	0	1	0	3	0	1
307		2	max	443.135	1	0	1	2.332	1	0	1	0	1	0	1
308			min	-73.223	3	0	1	.078	15	0	1	0	15	0	1
309		3	max	443.2	1	0	1	2.332	1	0	1	0	1	0	1
310			min	-73.175	3	0	1	.078	15	0	1	0	15	0	1
311		4	max	443.265	1	0	1	2.332	1	0	1	0	1	0	1
312			min	-73.126	3	0	1	.078	15	0	1	0	15	0	1
313		5	max	443.329	1	0	1	2.332	1	0	1	0	1	0	1
314			min	-73.078	3	0	1	.078	15	0	1	0	15	0	1
315		6	max	443.394	1	0	1	2.332	1	0	1	.001	1	0	1
316			min	-73.029	3	0	1	.078	15	0	1	0	15	0	1
317		7	max	443.459	1	0	1	2.332	1	0	1	.001	1	0	1
318			min	-72.981	3	0	1	.078	15	0	1	0	15	0	1
319		8	max	443.524	1	0	1	2.332	1	0	1	.001	1	0	1
320			min	-72.932	3	0	1	.078	15	0	1	0	15	0	1
321		9	max	443.588	1	0	1	2.332	1	0	1	.002	1	0	1
322			min	-72.884	3	0	1	.078	15	0	1	0	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
323		10	max	443.653	1	0	1	2.332	1	0	1	.002	1	0	1
324			min	-72.835	3	0	1	.078	15	0	1	0	15	0	1
325		11	max	443.718	1	0	1	2.332	1	0	1	.002	1	0	1
326			min	-72.787	3	0	1	.078	15	0	1	0	15	0	1
327		12	max	443.782	1	0	1	2.332	1	0	1	.002	1	0	1
328			min	-72.738	3	0	1	.078	15	0	1	0	15	0	1
329		13	max	443.847	1	0	1	2.332	1	0	1	.003	1	0	1
330			min	-72.69	3	0	1	.078	15	0	1	0	15	0	1
331		14	max	443.912	1	0	1	2.332	1	0	1	.003	1	0	1
332			min	-72.641	3	0	1	.078	15	0	1	0	15	0	1
333		15	max	443.976	1	0	1	2.332	1	0	1	.003	1	0	1
334			min	-72.592	3	0	1	.078	15	0	1	0	15	0	1
335		16	max	444.041	1	0	1	2.332	1	0	1	.003	1	0	1
336			min	-72.544	3	0	1	.078	15	0	1	0	15	0	1
337		17	max	444.106	1	0	1	2.332	1	0	1	.003	1	0	1
338			min	-72.495	3	0	1	.078	15	0	1	0	15	0	1
339		18	max	444.171	1	0	1	2.332	1	0	1	.004	1	0	1
340			min	-72.447	3	0	1	.078	15	0	1	0	15	0	1
341		19	max	444.235	1	0	1	2.332	1	0	1	.004	1	0	1
342			min	-72.398	3	0	1	.078	15	0	1	0	15	0	1
343	M1	1	max	104.435	1	339.402	3	-1.563	15	0	1	.091	1	0	1
344			min	3.475	15	-316.57	1	-46.293	1	0	3	.003	15	0	3
345		2	max	104.53	1	339.205	3	-1.563	15	0	1	.081	1	.069	1
346			min	3.504	15	-316.833	1	-46.293	1	0	3	.003	15	-.074	3
347		3	max	87.439	1	5.945	9	-1.547	15	0	12	.07	1	.136	1
348			min	2.838	10	-19.981	3	-46.026	1	0	1	.002	15	-.146	3
349		4	max	87.535	1	5.726	9	-1.547	15	0	12	.06	1	.137	1
350			min	2.917	10	-20.177	3	-46.026	1	0	1	.002	15	-.142	3
351		5	max	87.63	1	5.508	9	-1.547	15	0	12	.05	1	.137	1
352			min	2.997	10	-20.374	3	-46.026	1	0	1	.002	15	-.137	3
353		6	max	87.726	1	5.289	9	-1.547	15	0	12	.04	1	.138	1
354			min	3.076	10	-20.571	3	-46.026	1	0	1	.001	15	-.133	3
355		7	max	87.821	1	5.07	9	-1.547	15	0	12	.03	1	.138	1
356			min	3.156	10	-20.768	3	-46.026	1	0	1	.001	15	-.128	3
357		8	max	87.917	1	4.852	9	-1.547	15	0	12	.02	1	.139	1
358			min	3.236	10	-20.965	3	-46.026	1	0	1	0	15	-.124	3
359		9	max	88.012	1	4.633	9	-1.547	15	0	12	.01	1	.14	1
360			min	3.315	10	-21.161	3	-46.026	1	0	1	0	15	-.119	3
361		10	max	88.108	1	4.414	9	-1.547	15	0	12	0	3	.14	1
362			min	3.395	10	-21.358	3	-46.026	1	0	1	0	15	-.115	3
363		11	max	88.203	1	4.196	9	-1.547	15	0	12	0	3	.143	2
364			min	3.437	15	-21.555	3	-46.026	1	0	1	-.01	1	-.11	3
365		12	max	88.299	1	3.977	9	-1.547	15	0	12	0	12	.147	2
366			min	3.466	15	-21.752	3	-46.026	1	0	1	-.02	1	-.105	3
367		13	max	88.394	1	3.758	9	-1.547	15	0	12	0	12	.151	2
368			min	3.495	15	-21.949	3	-46.026	1	0	1	-.03	1	-.1	3
369		14	max	88.49	1	3.54	9	-1.547	15	0	12	-.001	15	.155	2
370			min	3.523	15	-22.145	3	-46.026	1	0	1	-.04	1	-.096	3
371		15	max	88.585	1	3.321	9	-1.547	15	0	12	-.002	15	.16	2
372			min	3.552	15	-22.342	3	-46.026	1	0	1	-.05	1	-.091	3
373		16	max	80.1	2	33.66	2	-1.562	15	0	1	-.002	15	.163	2
374			min	-30.916	3	-84.97	3	-46.412	1	0	12	-.06	1	-.085	3
375		17	max	80.195	2	33.398	2	-1.562	15	0	1	-.002	15	.157	1
376			min	-30.844	3	-85.167	3	-46.412	1	0	12	-.07	1	-.067	3
377		18	max	-3.496	15	365.672	1	-1.598	15	0	3	-.003	15	.08	1
378			min	-104.425	1	-154.669	3	-47.478	1	0	1	-.081	1	-.034	3
379		19	max	-3.467	15	365.409	1	-1.598	15	0	3	-.003	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
380			min	-104.33	1	-154.865	3	-47.478	1	0	1	-.091	1	0	3
381	M5	1	max	233.307	1	1119.431	3	0	10	0	1	.004	3	0	3
382			min	5.698	12	-1044.151	1	-36.724	3	0	3	0	10	0	1
383		2	max	233.402	1	1119.234	3	0	10	0	1	0	1	.226	1
384			min	5.746	12	-1044.414	1	-36.724	3	0	3	-.004	3	-.242	3
385		3	max	176.832	1	7.388	9	4.191	3	0	3	0	11	.448	1
386			min	1.752	10	-71.012	3	-.388	1	0	1	-.011	3	-.48	3
387		4	max	176.928	1	7.17	9	4.191	3	0	3	0	11	.453	1
388			min	1.831	10	-71.209	3	-.388	1	0	1	-.01	3	-.465	3
389		5	max	177.023	1	6.951	9	4.191	3	0	3	0	11	.458	1
390			min	1.911	10	-71.405	3	-.388	1	0	1	-.009	3	-.449	3
391		6	max	177.119	1	6.732	9	4.191	3	0	3	0	11	.463	1
392			min	1.991	10	-71.602	3	-.388	1	0	1	-.009	3	-.434	3
393		7	max	177.214	1	6.514	9	4.191	3	0	3	0	11	.468	1
394			min	2.07	10	-71.799	3	-.388	1	0	1	-.008	3	-.418	3
395		8	max	177.31	1	6.295	9	4.191	3	0	3	0	11	.473	1
396			min	2.15	10	-71.996	3	-.388	1	0	1	-.007	3	-.402	3
397		9	max	177.405	1	6.076	9	4.191	3	0	3	0	11	.479	1
398			min	2.229	10	-72.193	3	-.388	1	0	1	-.006	3	-.387	3
399		10	max	177.501	1	5.858	9	4.191	3	0	3	0	10	.484	1
400			min	2.309	10	-72.389	3	-.388	1	0	1	-.005	3	-.371	3
401		11	max	177.596	1	5.639	9	4.191	3	0	3	0	10	.489	1
402			min	2.389	10	-72.586	3	-.388	1	0	1	-.004	3	-.355	3
403		12	max	177.692	1	5.42	9	4.191	3	0	3	0	10	.496	2
404			min	2.468	10	-72.783	3	-.388	1	0	1	-.003	3	-.34	3
405		13	max	177.787	1	5.202	9	4.191	3	0	3	0	10	.51	2
406			min	2.548	10	-72.98	3	-.388	1	0	1	-.002	3	-.324	3
407		14	max	177.883	1	4.983	9	4.191	3	0	3	0	10	.524	2
408			min	2.627	10	-73.177	3	-.388	1	0	1	-.001	3	-.308	3
409		15	max	177.978	1	4.764	9	4.191	3	0	3	0	10	.538	2
410			min	2.707	10	-73.373	3	-.388	1	0	1	0	1	-.292	3
411		16	max	280.147	2	176.603	2	4.16	3	0	1	0	3	.55	2
412			min	-100.302	3	-257.408	3	-.379	1	0	10	0	1	-.275	3
413		17	max	280.243	2	176.341	2	4.16	3	0	1	.001	3	.516	1
414			min	-100.231	3	-257.605	3	-.379	1	0	10	0	1	-.219	3
415		18	max	-6.666	12	1201.513	1	3.814	3	0	3	.002	3	.26	1
416			min	-233.544	1	-507.222	3	-.072	11	0	1	0	1	-.11	3
417		19	max	-6.618	12	1201.251	1	3.814	3	0	3	.003	3	0	3
418			min	-233.448	1	-507.418	3	-.072	11	0	1	0	1	0	1
419	M9	1	max	104.016	1	339.376	3	49.776	1	0	3	-.003	15	0	1
420			min	3.46	15	-316.566	1	1.875	15	0	1	-.09	1	0	3
421		2	max	104.111	1	339.18	3	49.776	1	0	3	-.001	12	.069	1
422			min	3.488	15	-316.828	1	1.875	15	0	1	-.079	1	-.074	3
423		3	max	87.487	1	5.922	9	44.574	1	0	1	.007	3	.136	1
424			min	3.281	10	-19.916	3	-.347	3	0	15	-.067	1	-.146	3
425		4	max	87.582	1	5.703	9	44.574	1	0	1	.007	3	.137	1
426			min	3.361	10	-20.112	3	-.347	3	0	15	-.058	1	-.141	3
427		5	max	87.678	1	5.485	9	44.574	1	0	1	.006	3	.137	1
428			min	3.407	15	-20.309	3	-.347	3	0	15	-.048	1	-.137	3
429		6	max	87.773	1	5.266	9	44.574	1	0	1	.006	3	.138	1
430			min	3.436	15	-20.506	3	-.347	3	0	15	-.038	1	-.133	3
431		7	max	87.869	1	5.047	9	44.574	1	0	1	.006	3	.138	1
432			min	3.465	15	-20.703	3	-.347	3	0	15	-.029	1	-.128	3
433		8	max	87.964	1	4.829	9	44.574	1	0	1	.006	3	.139	1
434			min	3.494	15	-20.9	3	-.347	3	0	15	-.019	1	-.124	3
435		9	max	88.06	1	4.61	9	44.574	1	0	1	.006	3	.14	1
436			min	3.523	15	-21.096	3	-.347	3	0	15	-.009	1	-.119	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
437		10	max	88.155	1	4.391	9	44.574	1	0	1	.006	3	.14	1
438			min	3.551	15	-21.293	3	-.347	3	0	15	0	2	-.115	3
439		11	max	88.251	1	4.173	9	44.574	1	0	1	.01	1	.143	2
440			min	3.58	15	-21.49	3	-.347	3	0	15	0	15	-.11	3
441		12	max	88.346	1	3.954	9	44.574	1	0	1	.02	1	.147	2
442			min	3.609	15	-21.687	3	-.347	3	0	15	0	15	-.105	3
443		13	max	88.442	1	3.735	9	44.574	1	0	1	.029	1	.151	2
444			min	3.638	15	-21.884	3	-.347	3	0	15	.001	15	-.1	3
445		14	max	88.537	1	3.517	9	44.574	1	0	1	.039	1	.155	2
446			min	3.667	15	-22.08	3	-.347	3	0	15	.001	15	-.096	3
447		15	max	88.633	1	3.298	9	44.574	1	0	1	.049	1	.159	2
448			min	3.695	15	-22.277	3	-.347	3	0	15	.002	15	-.091	3
449		16	max	80.287	2	33.404	2	45.07	1	0	15	.059	1	.163	2
450			min	-31.156	3	-85.352	3	-.338	3	0	1	.002	15	-.086	3
451		17	max	80.382	2	33.141	2	45.07	1	0	15	.069	1	.157	1
452			min	-31.085	3	-85.549	3	-.338	3	0	1	.002	15	-.067	3
453		18	max	-3.485	15	365.673	1	47.377	1	0	2	.079	1	.08	1
454			min	-104.075	1	-154.666	3	.017	3	0	3	.003	15	-.034	3
455		19	max	-3.457	15	365.411	1	47.377	1	0	2	.09	1	0	1
456			min	-103.979	1	-154.862	3	.017	3	0	3	.003	15	0	3
457	M13	1	max	49.894	1	316.203	1	-3.46	15	0	1	.09	1	0	1
458			min	1.875	15	-339.38	3	-104.006	1	0	3	.003	15	0	3
459		2	max	49.894	1	223.232	1	-2.648	15	0	1	.026	1	.201	3
460			min	1.875	15	-239.488	3	-79.464	1	0	3	0	15	-.187	1
461		3	max	49.894	1	130.262	1	-1.836	15	0	1	.003	3	.333	3
462			min	1.875	15	-139.595	3	-54.922	1	0	3	-.021	1	-.31	1
463		4	max	49.894	1	37.291	1	-1.024	15	0	1	0	3	.395	3
464			min	1.875	15	-39.703	3	-30.38	1	0	3	-.05	1	-.368	1
465		5	max	49.894	1	60.19	3	.033	10	0	1	0	12	.388	3
466			min	1.875	15	-55.679	1	-5.838	1	0	3	-.063	1	-.362	1
467		6	max	49.894	1	160.082	3	18.704	1	0	1	0	12	.311	3
468			min	1.875	15	-148.65	1	-.401	3	0	3	-.058	1	-.291	1
469		7	max	49.894	1	259.975	3	43.246	1	0	1	0	12	.165	3
470			min	1.875	15	-241.621	1	.573	12	0	3	-.037	1	-.155	1
471		8	max	49.894	1	359.867	3	67.789	1	0	1	.002	2	.045	1
472			min	1.875	15	-334.591	1	1.361	12	0	3	0	3	-.05	3
473		9	max	49.894	1	459.76	3	92.331	1	0	1	.057	1	.309	1
474			min	1.875	15	-427.562	1	2.149	12	0	3	.001	12	-.334	3
475		10	max	49.894	1	559.652	3	116.873	1	0	1	.13	1	.639	1
476			min	1.875	15	-520.532	1	2.936	12	0	3	.003	12	-.688	3
477		11	max	46.407	1	427.562	1	-1.971	12	0	3	.056	1	.309	1
478			min	1.563	15	-459.76	3	-91.911	1	0	1	-.002	3	-.334	3
479		12	max	46.407	1	334.591	1	-1.183	12	0	3	.002	2	.045	1
480			min	1.563	15	-359.867	3	-67.369	1	0	1	-.004	3	-.05	3
481		13	max	46.407	1	241.62	1	-.395	12	0	3	-.001	15	.165	3
482			min	1.563	15	-259.975	3	-42.827	1	0	1	-.037	1	-.155	1
483		14	max	46.407	1	148.65	1	.683	3	0	3	-.002	15	.311	3
484			min	1.563	15	-160.082	3	-18.285	1	0	1	-.059	1	-.291	1
485		15	max	46.407	1	55.679	1	6.257	1	0	3	-.002	15	.388	3
486			min	1.563	15	-60.19	3	-.033	10	0	1	-.063	1	-.362	1
487		16	max	46.407	1	39.703	3	30.799	1	0	3	-.001	12	.395	3
488			min	1.563	15	-37.291	1	1.04	15	0	1	-.05	1	-.368	1
489		17	max	46.407	1	139.595	3	55.342	1	0	3	0	3	.333	3
490			min	1.563	15	-130.262	1	1.852	15	0	1	-.02	1	-.31	1
491		18	max	46.407	1	239.488	3	79.884	1	0	3	.027	1	.201	3
492			min	1.563	15	-223.233	1	2.664	15	0	1	0	15	-.187	1
493		19	max	46.407	1	339.38	3	104.426	1	0	3	.091	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
494			min	1.563	15	-316.203	1	3.475	15	0	1	.003	15	0	3
495	M16	1	max	-.015	3	365.794	1	-3.457	15	0	3	.09	1	0	2
496			min	-47.255	1	-154.879	3	-103.989	1	0	1	.003	15	0	3
497		2	max	-.015	3	258.229	1	-2.645	15	0	3	.026	1	.092	3
498			min	-47.255	1	-109.475	3	-79.447	1	0	1	0	15	-.217	1
499		3	max	-.015	3	150.663	1	-1.833	15	0	3	0	12	.152	3
500			min	-47.255	1	-64.071	3	-54.905	1	0	1	-.021	1	-.359	1
501		4	max	-.015	3	43.098	1	-1.021	15	0	3	-.002	15	.181	3
502			min	-47.255	1	-18.668	3	-30.363	1	0	1	-.05	1	-.426	1
503		5	max	-.015	3	26.736	3	.031	10	0	3	-.002	15	.178	3
504			min	-47.255	1	-64.468	1	-5.82	1	0	1	-.063	1	-.418	1
505		6	max	-.015	3	72.139	3	18.722	1	0	3	-.002	15	.144	3
506			min	-47.255	1	-172.034	1	.005	3	0	1	-.059	1	-.336	1
507		7	max	-.015	3	117.543	3	43.264	1	0	3	-.001	15	.078	3
508			min	-47.255	1	-279.599	1	.827	12	0	1	-.037	1	-.18	1
509		8	max	-.015	3	162.946	3	67.806	1	0	3	.002	2	.052	1
510			min	-47.255	1	-387.165	1	1.615	12	0	1	-.003	3	-.02	3
511		9	max	-.015	3	208.35	3	92.348	1	0	3	.057	1	.358	1
512			min	-47.255	1	-494.73	1	2.403	12	0	1	0	3	-.149	3
513		10	max	-1.598	15	-12.492	15	116.89	1	0	15	.13	1	.739	1
514			min	-47.367	1	-602.296	1	-5.113	3	0	1	.003	12	-.309	3
515		11	max	-1.598	15	494.73	1	-2.64	12	0	1	.057	1	.358	1
516			min	-47.367	1	-208.35	3	-91.998	1	0	3	.001	12	-.149	3
517		12	max	-1.598	15	387.165	1	-1.852	12	0	1	.002	2	.052	1
518			min	-47.367	1	-162.946	3	-67.456	1	0	3	0	3	-.02	3
519		13	max	-1.598	15	279.599	1	-1.065	12	0	1	-.001	15	.078	3
520			min	-47.367	1	-117.543	3	-42.913	1	0	3	-.037	1	-.18	1
521		14	max	-1.598	15	172.033	1	-.277	12	0	1	-.002	12	.144	3
522			min	-47.367	1	-72.139	3	-18.371	1	0	3	-.058	1	-.336	1
523		15	max	-1.598	15	64.468	1	6.171	1	0	1	-.002	12	.178	3
524			min	-47.367	1	-26.736	3	-.031	10	0	3	-.063	1	-.418	1
525		16	max	-1.598	15	18.668	3	30.713	1	0	1	-.001	12	.181	3
526			min	-47.367	1	-43.098	1	1.031	15	0	3	-.05	1	-.426	1
527		17	max	-1.598	15	64.071	3	55.255	1	0	1	0	3	.152	3
528			min	-47.367	1	-150.663	1	1.843	15	0	3	-.02	1	-.359	1
529		18	max	-1.598	15	109.475	3	79.797	1	0	1	.027	1	.092	3
530			min	-47.367	1	-258.229	1	2.655	15	0	3	0	15	-.217	1
531		19	max	-1.598	15	154.879	3	104.339	1	0	1	.091	1	0	1
532			min	-47.367	1	-365.795	1	3.467	15	0	3	.003	15	0	3
533	M15	1	max	0	2	2.183	4	.051	3	0	1	0	1	0	1
534			min	-44.512	3	0	2	-.054	1	0	3	0	3	0	1
535		2	max	0	2	1.941	4	.051	3	0	1	0	1	0	2
536			min	-44.572	3	0	2	-.054	1	0	3	0	3	0	4
537		3	max	0	2	1.698	4	.051	3	0	1	0	1	0	2
538			min	-44.631	3	0	2	-.054	1	0	3	0	3	-.001	4
539		4	max	0	2	1.456	4	.051	3	0	1	0	1	0	2
540			min	-44.691	3	0	2	-.054	1	0	3	0	3	-.002	4
541		5	max	0	2	1.213	4	.051	3	0	1	0	1	0	2
542			min	-44.751	3	0	2	-.054	1	0	3	0	3	-.003	4
543		6	max	0	2	.97	4	.051	3	0	1	0	1	0	2
544			min	-44.81	3	0	2	-.054	1	0	3	0	3	-.003	4
545		7	max	0	2	.728	4	.051	3	0	1	0	3	0	2
546			min	-44.87	3	0	2	-.054	1	0	3	0	1	-.003	4
547		8	max	0	2	.485	4	.051	3	0	1	0	3	0	2
548			min	-44.93	3	0	2	-.054	1	0	3	0	1	-.004	4
549		9	max	0	2	.243	4	.051	3	0	1	0	3	0	2
550			min	-44.989	3	0	2	-.054	1	0	3	0	1	-.004	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
551		10	max	0	2	0	1	.051	3	0	1	0	3	0	2
552			min	-45.049	3	0	1	-.054	1	0	3	0	1	-.004	4
553		11	max	0	2	0	2	.051	3	0	1	0	3	0	2
554			min	-45.109	3	-.243	4	-.054	1	0	3	0	1	-.004	4
555		12	max	0	2	0	2	.051	3	0	1	0	3	0	2
556			min	-45.168	3	-.485	4	-.054	1	0	3	0	1	-.004	4
557		13	max	0	2	0	2	.051	3	0	1	0	3	0	2
558			min	-45.228	3	-.728	4	-.054	1	0	3	0	1	-.003	4
559		14	max	0	2	0	2	.051	3	0	1	0	3	0	2
560			min	-45.288	3	-.97	4	-.054	1	0	3	0	1	-.003	4
561		15	max	0	2	0	2	.051	3	0	1	0	3	0	2
562			min	-45.347	3	-1.213	4	-.054	1	0	3	0	1	-.003	4
563		16	max	0	2	0	2	.051	3	0	1	0	3	0	2
564			min	-45.407	3	-1.456	4	-.054	1	0	3	0	1	-.002	4
565		17	max	0	2	0	2	.051	3	0	1	0	3	0	2
566			min	-45.467	3	-1.698	4	-.054	1	0	3	0	1	-.001	4
567		18	max	0	2	0	2	.051	3	0	1	0	3	0	2
568			min	-45.526	3	-1.941	4	-.054	1	0	3	0	1	0	4
569		19	max	0	2	0	2	.051	3	0	1	0	3	0	1
570			min	-45.586	3	-2.183	4	-.054	1	0	3	0	1	0	1
571	M16A	1	max	0	10	2.183	4	.027	1	0	3	0	3	0	1
572			min	-44.865	3	0	10	-.02	3	0	1	0	1	0	1
573		2	max	0	10	1.941	4	.027	1	0	3	0	3	0	10
574			min	-44.806	3	0	10	-.02	3	0	1	0	1	0	4
575		3	max	0	10	1.698	4	.027	1	0	3	0	3	0	10
576			min	-44.746	3	0	10	-.02	3	0	1	0	1	-.001	4
577		4	max	0	10	1.456	4	.027	1	0	3	0	3	0	10
578			min	-44.686	3	0	10	-.02	3	0	1	0	1	-.002	4
579		5	max	0	10	1.213	4	.027	1	0	3	0	3	0	10
580			min	-44.627	3	0	10	-.02	3	0	1	0	1	-.003	4
581		6	max	0	10	.97	4	.027	1	0	3	0	3	0	10
582			min	-44.567	3	0	10	-.02	3	0	1	0	1	-.003	4
583		7	max	0	10	.728	4	.027	1	0	3	0	3	0	10
584			min	-44.507	3	0	10	-.02	3	0	1	0	1	-.003	4
585		8	max	0	10	.485	4	.027	1	0	3	0	3	0	10
586			min	-44.448	3	0	10	-.02	3	0	1	0	1	-.004	4
587		9	max	0	10	.243	4	.027	1	0	3	0	3	0	10
588			min	-44.388	3	0	10	-.02	3	0	1	0	1	-.004	4
589		10	max	0	10	0	1	.027	1	0	3	0	3	0	10
590			min	-44.328	3	0	1	-.02	3	0	1	0	1	-.004	4
591		11	max	0	10	0	10	.027	1	0	3	0	3	0	10
592			min	-44.269	3	-.243	4	-.02	3	0	1	0	1	-.004	4
593		12	max	0	10	0	10	.027	1	0	3	0	3	0	10
594			min	-44.209	3	-.485	4	-.02	3	0	1	0	1	-.004	4
595		13	max	0	10	0	10	.027	1	0	3	0	2	0	10
596			min	-44.149	3	-.728	4	-.02	3	0	1	0	4	-.003	4
597		14	max	0	10	0	10	.027	1	0	3	0	1	0	10
598			min	-44.09	3	-.97	4	-.02	3	0	1	0	3	-.003	4
599		15	max	0	10	0	10	.027	1	0	3	0	1	0	10
600			min	-44.03	3	-1.213	4	-.02	3	0	1	0	3	-.003	4
601		16	max	0	10	0	10	.027	1	0	3	0	1	0	10
602			min	-43.97	3	-1.456	4	-.02	3	0	1	0	3	-.002	4
603		17	max	0	10	0	10	.027	1	0	3	0	1	0	10
604			min	-43.911	3	-1.698	4	-.02	3	0	1	0	3	-.001	4
605		18	max	.015	2	0	10	.027	1	0	3	0	1	0	10
606			min	-43.851	3	-1.941	4	-.02	3	0	1	0	3	0	4
607		19	max	.095	2	0	10	.027	1	0	3	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
608			min	-43.791	3	-2.183	4	-.02	3	0	1	0	3	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.003	1	.007	2	.009	1	-2.287e-5	15	NC	3	NC	2
2			min	-.003	3	-.006	3	0	3	-6.723e-4	1	4957.802	2	3553.315	1
3		2	max	.002	1	.006	2	.009	1	-2.194e-5	15	NC	3	NC	2
4			min	-.003	3	-.006	3	0	3	-6.453e-4	1	5391.368	2	3846.571	1
5		3	max	.002	1	.006	2	.008	1	-2.101e-5	15	NC	3	NC	2
6			min	-.003	3	-.006	3	0	3	-6.182e-4	1	5903.705	2	4192.164	1
7		4	max	.002	1	.005	2	.007	1	-2.008e-5	15	NC	1	NC	2
8			min	-.002	3	-.005	3	0	3	-5.912e-4	1	6513.401	2	4602.853	1
9		5	max	.002	1	.005	2	.007	1	-1.914e-5	15	NC	1	NC	2
10			min	-.002	3	-.005	3	0	3	-5.642e-4	1	7245.111	2	5095.681	1
11		6	max	.002	1	.004	2	.006	1	-1.821e-5	15	NC	1	NC	2
12			min	-.002	3	-.005	3	0	3	-5.371e-4	1	8132.083	2	5693.841	1
13		7	max	.002	1	.004	2	.005	1	-1.728e-5	15	NC	1	NC	2
14			min	-.002	3	-.005	3	0	3	-5.101e-4	1	9220.011	2	6429.558	1
15		8	max	.002	1	.003	2	.005	1	-1.635e-5	15	NC	1	NC	2
16			min	-.002	3	-.004	3	0	3	-4.831e-4	1	NC	1	7348.7	1
17		9	max	.001	1	.003	2	.004	1	-1.541e-5	15	NC	1	NC	2
18			min	-.002	3	-.004	3	0	3	-4.56e-4	1	NC	1	8518.419	1
19		10	max	.001	1	.002	2	.003	1	-1.448e-5	15	NC	1	NC	1
20			min	-.001	3	-.004	3	0	3	-4.29e-4	1	NC	1	NC	1
21		11	max	.001	1	.002	2	.003	1	-1.355e-5	15	NC	1	NC	1
22			min	-.001	3	-.003	3	0	3	-4.02e-4	1	NC	1	NC	1
23		12	max	.001	1	.002	2	.002	1	-1.262e-5	15	NC	1	NC	1
24			min	-.001	3	-.003	3	0	3	-3.749e-4	1	NC	1	NC	1
25		13	max	0	1	.001	2	.002	1	-1.168e-5	15	NC	1	NC	1
26			min	0	3	-.003	3	0	3	-3.479e-4	1	NC	1	NC	1
27		14	max	0	1	0	2	.001	1	-1.075e-5	15	NC	1	NC	1
28			min	0	3	-.002	3	0	3	-3.209e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	0	1	-9.817e-6	15	NC	1	NC	1
30			min	0	3	-.002	3	0	3	-2.938e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	-8.885e-6	15	NC	1	NC	1
32			min	0	3	-.001	3	0	3	-2.668e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-7.952e-6	15	NC	1	NC	1
34			min	0	3	0	3	0	3	-2.398e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-7.02e-6	15	NC	1	NC	1
36			min	0	3	0	3	0	3	-2.127e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-5.751e-6	12	NC	1	NC	1
38			min	0	1	0	1	0	1	-1.857e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	8.526e-5	1	NC	1	NC	1
40			min	0	1	0	1	0	1	2.778e-6	12	NC	1	NC	1
41		2	max	0	3	0	2	0	12	1.065e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	3.523e-6	15	NC	1	NC	1
43		3	max	0	3	0	2	0	12	1.278e-4	1	NC	1	NC	1
44			min	0	2	-.001	3	0	1	4.249e-6	15	NC	1	NC	1
45		4	max	0	3	0	2	0	12	1.491e-4	1	NC	1	NC	1
46			min	0	2	-.002	3	0	1	4.976e-6	15	NC	1	NC	1
47		5	max	0	3	0	2	0	3	1.704e-4	1	NC	1	NC	1
48			min	0	2	-.003	3	0	1	5.703e-6	15	NC	1	NC	1
49		6	max	0	3	0	2	0	3	1.917e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	0	1	6.429e-6	15	NC	1	NC	1
51		7	max	0	3	0	2	0	3	2.13e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
52			min	0	2	-.004	3	0	1	7.156e-6	15	NC	1	NC	1
53		8	max	0	3	0	2	0	3	2.343e-4	1	NC	1	NC	1
54			min	0	2	-.005	3	0	1	7.882e-6	15	NC	1	NC	1
55		9	max	0	3	.001	2	0	3	2.556e-4	1	NC	1	NC	1
56			min	0	2	-.005	3	0	1	8.609e-6	15	NC	1	NC	1
57		10	max	0	3	.001	2	0	1	2.769e-4	1	NC	1	NC	1
58			min	0	2	-.006	3	0	15	9.336e-6	15	NC	1	NC	1
59		11	max	0	3	.002	2	0	1	2.982e-4	1	NC	1	NC	1
60			min	0	2	-.006	3	0	15	1.006e-5	15	NC	1	NC	1
61		12	max	0	3	.002	2	.001	1	3.195e-4	1	NC	1	NC	1
62			min	0	2	-.006	3	0	15	1.079e-5	15	NC	1	NC	1
63		13	max	0	3	.003	2	.002	1	3.408e-4	1	NC	1	NC	1
64			min	0	2	-.007	3	0	15	1.152e-5	15	NC	1	NC	1
65		14	max	0	3	.004	2	.002	1	3.62e-4	1	NC	1	NC	1
66			min	0	2	-.007	3	0	15	1.224e-5	15	NC	1	NC	1
67		15	max	0	3	.005	2	.003	1	3.833e-4	1	NC	1	NC	1
68			min	0	2	-.007	3	0	15	1.297e-5	15	9851.229	2	NC	1
69		16	max	0	3	.006	2	.003	1	4.046e-4	1	NC	1	NC	1
70			min	0	2	-.007	3	0	15	1.37e-5	15	8295.427	2	NC	1
71		17	max	0	3	.006	2	.003	1	4.259e-4	1	NC	3	NC	1
72			min	0	2	-.007	3	0	15	1.442e-5	15	7102.038	2	NC	1
73		18	max	0	3	.007	2	.004	1	4.472e-4	1	NC	3	NC	1
74			min	0	2	-.007	3	0	15	1.515e-5	15	6175.267	2	NC	1
75		19	max	0	3	.008	2	.004	1	4.685e-4	1	NC	3	NC	1
76			min	0	2	-.007	3	0	15	1.588e-5	15	5448.539	2	NC	1
77	M4	1	max	.002	1	.008	2	0	15	-1.926e-5	15	NC	1	NC	2
78			min	0	3	-.006	3	-.003	1	-5.786e-4	1	NC	1	5881.548	1
79		2	max	.002	1	.007	2	0	15	-1.926e-5	15	NC	1	NC	2
80			min	0	3	-.006	3	-.003	1	-5.786e-4	1	NC	1	6417.642	1
81		3	max	.002	1	.007	2	0	15	-1.926e-5	15	NC	1	NC	2
82			min	0	3	-.006	3	-.003	1	-5.786e-4	1	NC	1	7055.613	1
83		4	max	.002	1	.006	2	0	15	-1.926e-5	15	NC	1	NC	2
84			min	0	3	-.005	3	-.002	1	-5.786e-4	1	NC	1	7822.347	1
85		5	max	.002	1	.006	2	0	15	-1.926e-5	15	NC	1	NC	2
86			min	0	3	-.005	3	-.002	1	-5.786e-4	1	NC	1	8754.469	1
87		6	max	.002	1	.006	2	0	15	-1.926e-5	15	NC	1	NC	2
88			min	0	3	-.004	3	-.002	1	-5.786e-4	1	NC	1	9902.921	1
89		7	max	.001	1	.005	2	0	15	-1.926e-5	15	NC	1	NC	1
90			min	0	3	-.004	3	-.002	1	-5.786e-4	1	NC	1	NC	1
91		8	max	.001	1	.005	2	0	15	-1.926e-5	15	NC	1	NC	1
92			min	0	3	-.004	3	-.001	1	-5.786e-4	1	NC	1	NC	1
93		9	max	.001	1	.004	2	0	15	-1.926e-5	15	NC	1	NC	1
94			min	0	3	-.003	3	-.001	1	-5.786e-4	1	NC	1	NC	1
95		10	max	.001	1	.004	2	0	15	-1.926e-5	15	NC	1	NC	1
96			min	0	3	-.003	3	-.001	1	-5.786e-4	1	NC	1	NC	1
97		11	max	0	1	.003	2	0	15	-1.926e-5	15	NC	1	NC	1
98			min	0	3	-.003	3	0	1	-5.786e-4	1	NC	1	NC	1
99		12	max	0	1	.003	2	0	15	-1.926e-5	15	NC	1	NC	1
100			min	0	3	-.002	3	0	1	-5.786e-4	1	NC	1	NC	1
101		13	max	0	1	.003	2	0	15	-1.926e-5	15	NC	1	NC	1
102			min	0	3	-.002	3	0	1	-5.786e-4	1	NC	1	NC	1
103		14	max	0	1	.002	2	0	15	-1.926e-5	15	NC	1	NC	1
104			min	0	3	-.002	3	0	1	-5.786e-4	1	NC	1	NC	1
105		15	max	0	1	.002	2	0	15	-1.926e-5	15	NC	1	NC	1
106			min	0	3	-.001	3	0	1	-5.786e-4	1	NC	1	NC	1
107		16	max	0	1	.001	2	0	15	-1.926e-5	15	NC	1	NC	1
108			min	0	3	-.001	3	0	1	-5.786e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
109		17	max	0	1	0	2	0	15	-1.926e-5	15	NC	1	NC	1
110			min	0	3	0	3	0	1	-5.786e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	15	-1.926e-5	15	NC	1	NC	1
112			min	0	3	0	3	0	1	-5.786e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-1.926e-5	15	NC	1	NC	1
114			min	0	1	0	1	0	1	-5.786e-4	1	NC	1	NC	1
115	M6	1	max	.008	1	.024	2	.004	1	2.435e-4	3	NC	3	NC	2
116			min	-.01	3	-.019	3	-.003	3	-6.118e-8	10	1382.269	2	8751.789	1
117		2	max	.008	1	.023	2	.004	1	2.371e-4	3	NC	3	NC	2
118			min	-.009	3	-.018	3	-.003	3	-5.787e-8	10	1475.854	2	9446.255	1
119		3	max	.007	1	.021	2	.003	1	2.306e-4	3	NC	3	NC	1
120			min	-.009	3	-.017	3	-.003	3	-5.457e-8	10	1582.69	2	NC	1
121		4	max	.007	1	.019	2	.003	1	2.242e-4	3	NC	3	NC	1
122			min	-.008	3	-.016	3	-.003	3	-5.126e-8	10	1705.426	2	NC	1
123		5	max	.007	1	.018	2	.003	1	2.177e-4	3	NC	3	NC	1
124			min	-.007	3	-.015	3	-.002	3	-4.137e-7	2	1847.476	2	NC	1
125		6	max	.006	1	.017	2	.002	1	2.112e-4	3	NC	3	NC	1
126			min	-.007	3	-.014	3	-.002	3	-2.485e-6	2	2013.309	2	NC	1
127		7	max	.006	1	.015	2	.002	1	2.048e-4	3	NC	3	NC	1
128			min	-.006	3	-.013	3	-.002	3	-4.556e-6	2	2208.885	2	NC	1
129		8	max	.005	1	.014	2	.002	1	1.983e-4	3	NC	3	NC	1
130			min	-.006	3	-.012	3	-.002	3	-6.627e-6	2	2442.338	2	NC	1
131		9	max	.005	1	.012	2	.002	1	1.919e-4	3	NC	3	NC	1
132			min	-.005	3	-.011	3	-.001	3	-8.698e-6	2	2725.06	2	NC	1
133		10	max	.004	1	.011	2	.001	1	1.854e-4	3	NC	3	NC	1
134			min	-.005	3	-.01	3	-.001	3	-1.172e-5	11	3073.506	2	NC	1
135		11	max	.004	1	.009	2	.001	1	1.79e-4	3	NC	3	NC	1
136			min	-.004	3	-.009	3	-.001	3	-1.518e-5	1	3512.364	2	NC	1
137		12	max	.003	1	.008	2	0	1	1.725e-4	3	NC	3	NC	1
138			min	-.004	3	-.008	3	0	3	-2.211e-5	1	4080.426	2	NC	1
139		13	max	.003	1	.007	2	0	1	1.661e-4	3	NC	3	NC	1
140			min	-.003	3	-.007	3	0	3	-2.905e-5	1	4842.348	2	NC	1
141		14	max	.002	1	.006	2	0	1	1.596e-4	3	NC	3	NC	1
142			min	-.003	3	-.006	3	0	3	-3.598e-5	1	5914.504	2	NC	1
143		15	max	.002	1	.004	2	0	1	1.532e-4	3	NC	3	NC	1
144			min	-.002	3	-.005	3	0	3	-4.292e-5	1	7529.629	2	NC	1
145		16	max	.001	1	.003	2	0	1	1.467e-4	3	NC	1	NC	1
146			min	-.002	3	-.003	3	0	3	-4.985e-5	1	NC	1	NC	1
147		17	max	0	1	.002	2	0	1	1.402e-4	3	NC	1	NC	1
148			min	-.001	3	-.002	3	0	3	-5.679e-5	1	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	1.338e-4	3	NC	1	NC	1
150			min	0	3	-.001	3	0	3	-6.372e-5	1	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.273e-4	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-7.066e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	3.204e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-5.825e-5	3	NC	1	NC	1
155		2	max	0	3	.001	2	0	3	2.708e-5	1	NC	1	NC	1
156			min	0	2	-.002	3	0	1	-4.403e-5	3	NC	1	NC	1
157		3	max	0	3	.003	2	0	3	2.213e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	1	-2.98e-5	3	NC	1	NC	1
159		4	max	0	3	.004	2	0	3	1.717e-5	1	NC	1	NC	1
160			min	0	2	-.005	3	0	1	-1.558e-5	3	NC	1	NC	1
161		5	max	0	3	.005	2	.001	3	1.221e-5	1	NC	1	NC	1
162			min	0	2	-.007	3	0	1	-1.354e-6	3	8719.243	2	NC	1
163		6	max	0	3	.007	2	.001	3	1.287e-5	3	NC	3	NC	1
164			min	-.001	2	-.008	3	0	1	0	10	6987.727	2	NC	1
165		7	max	0	3	.008	2	.001	3	2.71e-5	3	NC	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
166			min	-.001	2	-.01	3	0	1	0	10	5803.399	2	NC	1
167		8	max	.001	3	.009	2	.002	3	4.132e-5	3	NC	3	NC	1
168			min	-.001	2	-.011	3	-.001	1	-2.662e-6	1	4935.04	2	NC	1
169		9	max	.001	3	.011	2	.002	3	5.555e-5	3	NC	3	NC	1
170			min	-.002	2	-.012	3	-.001	1	-7.619e-6	1	4267.451	2	NC	1
171		10	max	.001	3	.012	2	.002	3	6.977e-5	3	NC	3	NC	1
172			min	-.002	2	-.014	3	-.001	1	-1.258e-5	1	3736.779	2	NC	1
173		11	max	.002	3	.014	2	.002	3	8.399e-5	3	NC	3	NC	1
174			min	-.002	2	-.015	3	-.001	1	-1.753e-5	1	3304.675	2	NC	1
175		12	max	.002	3	.016	2	.002	3	9.822e-5	3	NC	3	NC	1
176			min	-.002	2	-.016	3	-.002	1	-2.249e-5	1	2946.588	2	NC	1
177		13	max	.002	3	.017	2	.002	3	1.124e-4	3	NC	3	NC	1
178			min	-.003	2	-.017	3	-.002	1	-2.745e-5	1	2645.948	2	NC	1
179		14	max	.002	3	.019	2	.002	3	1.267e-4	3	NC	3	NC	1
180			min	-.003	2	-.018	3	-.002	1	-3.241e-5	1	2391.069	2	NC	1
181		15	max	.002	3	.021	2	.002	3	1.409e-4	3	NC	3	NC	1
182			min	-.003	2	-.019	3	-.002	1	-3.737e-5	1	2173.395	2	NC	1
183		16	max	.002	3	.023	2	.002	3	1.551e-4	3	NC	3	NC	1
184			min	-.003	2	-.02	3	-.002	1	-4.232e-5	1	1986.471	2	NC	1
185		17	max	.003	3	.025	2	.002	3	1.693e-4	3	NC	3	NC	1
186			min	-.003	2	-.021	3	-.002	1	-4.728e-5	1	1825.304	2	NC	1
187		18	max	.003	3	.027	2	.002	3	1.836e-4	3	NC	3	NC	1
188			min	-.004	2	-.022	3	-.002	1	-5.224e-5	1	1685.958	2	NC	1
189		19	max	.003	3	.029	2	.002	3	1.978e-4	3	NC	3	NC	1
190			min	-.004	2	-.022	3	-.002	1	-5.72e-5	1	1565.285	2	NC	1
191	M8	1	max	.006	1	.027	2	.002	1	-7.356e-8	10	NC	1	NC	2
192			min	-.001	3	-.02	3	-.001	3	-1.543e-4	3	NC	1	9990.108	1
193		2	max	.006	1	.026	2	.002	1	-7.356e-8	10	NC	1	NC	1
194			min	-.001	3	-.019	3	-.001	3	-1.543e-4	3	NC	1	NC	1
195		3	max	.005	1	.024	2	.002	1	-7.356e-8	10	NC	1	NC	1
196			min	-.001	3	-.018	3	0	3	-1.543e-4	3	NC	1	NC	1
197		4	max	.005	1	.023	2	.001	1	-7.356e-8	10	NC	1	NC	1
198			min	-.001	3	-.016	3	0	3	-1.543e-4	3	NC	1	NC	1
199		5	max	.005	1	.021	2	.001	1	-7.356e-8	10	NC	1	NC	1
200			min	0	3	-.015	3	0	3	-1.543e-4	3	NC	1	NC	1
201		6	max	.004	1	.02	2	.001	1	-7.356e-8	10	NC	1	NC	1
202			min	0	3	-.014	3	0	3	-1.543e-4	3	NC	1	NC	1
203		7	max	.004	1	.018	2	.001	1	-7.356e-8	10	NC	1	NC	1
204			min	0	3	-.013	3	0	3	-1.543e-4	3	NC	1	NC	1
205		8	max	.004	1	.017	2	0	1	-7.356e-8	10	NC	1	NC	1
206			min	0	3	-.012	3	0	3	-1.543e-4	3	NC	1	NC	1
207		9	max	.003	1	.015	2	0	1	-7.356e-8	10	NC	1	NC	1
208			min	0	3	-.011	3	0	3	-1.543e-4	3	NC	1	NC	1
209		10	max	.003	1	.014	2	0	1	-7.356e-8	10	NC	1	NC	1
210			min	0	3	-.01	3	0	3	-1.543e-4	3	NC	1	NC	1
211		11	max	.003	1	.012	2	0	1	-7.356e-8	10	NC	1	NC	1
212			min	0	3	-.009	3	0	3	-1.543e-4	3	NC	1	NC	1
213		12	max	.002	1	.011	2	0	1	-7.356e-8	10	NC	1	NC	1
214			min	0	3	-.008	3	0	3	-1.543e-4	3	NC	1	NC	1
215		13	max	.002	1	.009	2	0	1	-7.356e-8	10	NC	1	NC	1
216			min	0	3	-.007	3	0	3	-1.543e-4	3	NC	1	NC	1
217		14	max	.002	1	.008	2	0	1	-7.356e-8	10	NC	1	NC	1
218			min	0	3	-.005	3	0	3	-1.543e-4	3	NC	1	NC	1
219		15	max	.001	1	.006	2	0	1	-7.356e-8	10	NC	1	NC	1
220			min	0	3	-.004	3	0	3	-1.543e-4	3	NC	1	NC	1
221		16	max	.001	1	.005	2	0	1	-7.356e-8	10	NC	1	NC	1
222			min	0	3	-.003	3	0	3	-1.543e-4	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
223		17	max	0	1	.003	2	0	1	-7.356e-8	10	NC	1	NC	1
224			min	0	3	-.002	3	0	3	-1.543e-4	3	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	-7.356e-8	10	NC	1	NC	1
226			min	0	3	-.001	3	0	3	-1.543e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-7.356e-8	10	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.543e-4	3	NC	1	NC	1
229	M10	1	max	.003	1	.007	2	0	3	7.029e-4	1	NC	3	NC	1
230			min	-.003	3	-.006	3	-.001	1	-2.848e-4	3	4965.322	2	NC	1
231		2	max	.002	1	.006	2	0	3	6.689e-4	1	NC	3	NC	1
232			min	-.003	3	-.006	3	-.001	1	-2.764e-4	3	5399.734	2	NC	1
233		3	max	.002	1	.006	2	0	3	6.349e-4	1	NC	3	NC	1
234			min	-.002	3	-.006	3	-.001	1	-2.68e-4	3	5913.104	2	NC	1
235		4	max	.002	1	.005	2	0	3	6.01e-4	1	NC	1	NC	1
236			min	-.002	3	-.005	3	-.001	1	-2.596e-4	3	6524.073	2	NC	1
237		5	max	.002	1	.005	2	0	3	5.67e-4	1	NC	1	NC	1
238			min	-.002	3	-.005	3	-.001	1	-2.512e-4	3	7257.37	2	NC	1
239		6	max	.002	1	.004	2	0	3	5.33e-4	1	NC	1	NC	1
240			min	-.002	3	-.005	3	0	1	-2.428e-4	3	8146.34	2	NC	1
241		7	max	.002	1	.004	2	0	3	4.991e-4	1	NC	1	NC	1
242			min	-.002	3	-.005	3	0	1	-2.344e-4	3	9236.822	2	NC	1
243		8	max	.002	1	.003	2	0	3	4.651e-4	1	NC	1	NC	1
244			min	-.002	3	-.004	3	0	1	-2.26e-4	3	NC	1	NC	1
245		9	max	.001	1	.003	2	0	3	4.311e-4	1	NC	1	NC	1
246			min	-.002	3	-.004	3	0	1	-2.176e-4	3	NC	1	NC	1
247		10	max	.001	1	.002	2	0	3	3.972e-4	1	NC	1	NC	1
248			min	-.001	3	-.004	3	0	1	-2.092e-4	3	NC	1	NC	1
249		11	max	.001	1	.002	2	0	3	3.632e-4	1	NC	1	NC	1
250			min	-.001	3	-.003	3	0	1	-2.008e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	3.292e-4	1	NC	1	NC	1
252			min	-.001	3	-.003	3	0	1	-1.923e-4	3	NC	1	NC	1
253		13	max	0	1	.001	2	0	3	2.953e-4	1	NC	1	NC	1
254			min	0	3	-.003	3	0	1	-1.839e-4	3	NC	1	NC	1
255		14	max	0	1	0	2	0	3	2.613e-4	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	-1.755e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	2.273e-4	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	-1.671e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.934e-4	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	-1.587e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.594e-4	1	NC	1	NC	1
262			min	0	3	-.001	3	0	1	-1.503e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.254e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-1.419e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	9.147e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.335e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	6.148e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-4.298e-5	1	NC	1	NC	1
269		2	max	0	3	0	2	0	1	4.661e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-7.817e-5	1	NC	1	NC	1
271		3	max	0	3	0	2	0	1	3.173e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.134e-4	1	NC	1	NC	1
273		4	max	0	3	0	2	0	1	1.685e-5	3	NC	1	NC	1
274			min	0	2	-.002	3	0	3	-1.486e-4	1	NC	1	NC	1
275		5	max	0	3	0	2	0	10	1.972e-6	3	NC	1	NC	1
276			min	0	2	-.003	3	-.001	3	-1.837e-4	1	NC	1	NC	1
277		6	max	0	3	0	2	0	10	-7.203e-6	15	NC	1	NC	1
278			min	0	2	-.004	3	-.001	3	-2.189e-4	1	NC	1	NC	1
279		7	max	0	3	0	2	0	10	-8.449e-6	15	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
280			min	0	2	-.004	3	-.001	3	-2.541e-4	1	NC	1	NC	1
281		8	max	0	3	0	2	0	10	-9.696e-6	15	NC	1	NC	1
282			min	0	2	-.005	3	-.002	3	-2.893e-4	1	NC	1	NC	1
283		9	max	0	3	.001	2	0	10	-1.094e-5	15	NC	1	NC	1
284			min	0	2	-.005	3	-.002	1	-3.245e-4	1	NC	1	NC	1
285		10	max	0	3	.001	2	0	15	-1.219e-5	15	NC	1	NC	1
286			min	0	2	-.006	3	-.003	1	-3.597e-4	1	NC	1	NC	1
287		11	max	0	3	.002	2	0	15	-1.343e-5	15	NC	1	NC	1
288			min	0	2	-.006	3	-.003	1	-3.949e-4	1	NC	1	NC	1
289		12	max	0	3	.002	2	0	15	-1.468e-5	15	NC	1	NC	1
290			min	0	2	-.007	3	-.004	1	-4.301e-4	1	NC	1	NC	1
291		13	max	0	3	.003	2	0	15	-1.593e-5	15	NC	1	NC	2
292			min	0	2	-.007	3	-.005	1	-4.653e-4	1	NC	1	9697.117	1
293		14	max	0	3	.004	2	0	15	-1.717e-5	15	NC	1	NC	2
294			min	0	2	-.007	3	-.005	1	-5.005e-4	1	NC	1	8402.069	1
295		15	max	0	3	.005	2	0	15	-1.842e-5	15	NC	1	NC	2
296			min	0	2	-.007	3	-.006	1	-5.357e-4	1	9867.28	2	7414.971	1
297		16	max	0	3	.006	2	0	15	-1.967e-5	15	NC	1	NC	2
298			min	0	2	-.007	3	-.007	1	-5.708e-4	1	8307.489	2	6648.768	1
299		17	max	0	3	.006	2	0	15	-2.091e-5	15	NC	3	NC	2
300			min	0	2	-.007	3	-.008	1	-6.06e-4	1	7111.374	2	6046.271	1
301		18	max	0	3	.007	2	0	15	-2.216e-5	15	NC	3	NC	2
302			min	0	2	-.007	3	-.008	1	-6.412e-4	1	6182.697	2	5568.769	1
303		19	max	0	3	.008	2	0	15	-2.34e-5	15	NC	3	NC	2
304			min	0	2	-.007	3	-.009	1	-6.764e-4	1	5454.611	2	5189.486	1
305	M12	1	max	.002	1	.008	2	.007	1	5.706e-4	1	NC	1	NC	3
306			min	0	3	-.006	3	0	15	2.026e-5	15	NC	1	2591.551	1
307		2	max	.002	1	.007	2	.007	1	5.706e-4	1	NC	1	NC	3
308			min	0	3	-.006	3	0	15	2.026e-5	15	NC	1	2826.517	1
309		3	max	.002	1	.007	2	.006	1	5.706e-4	1	NC	1	NC	3
310			min	0	3	-.006	3	0	15	2.026e-5	15	NC	1	3106.194	1
311		4	max	.002	1	.006	2	.006	1	5.706e-4	1	NC	1	NC	2
312			min	0	3	-.005	3	0	15	2.026e-5	15	NC	1	3442.37	1
313		5	max	.002	1	.006	2	.005	1	5.706e-4	1	NC	1	NC	2
314			min	0	3	-.005	3	0	15	2.026e-5	15	NC	1	3851.103	1
315		6	max	.002	1	.006	2	.004	1	5.706e-4	1	NC	1	NC	2
316			min	0	3	-.004	3	0	15	2.026e-5	15	NC	1	4354.727	1
317		7	max	.001	1	.005	2	.004	1	5.706e-4	1	NC	1	NC	2
318			min	0	3	-.004	3	0	15	2.026e-5	15	NC	1	4985.058	1
319		8	max	.001	1	.005	2	.003	1	5.706e-4	1	NC	1	NC	2
320			min	0	3	-.004	3	0	15	2.026e-5	15	NC	1	5788.685	1
321		9	max	.001	1	.004	2	.003	1	5.706e-4	1	NC	1	NC	2
322			min	0	3	-.003	3	0	15	2.026e-5	15	NC	1	6836.083	1
323		10	max	.001	1	.004	2	.002	1	5.706e-4	1	NC	1	NC	2
324			min	0	3	-.003	3	0	15	2.026e-5	15	NC	1	8238.052	1
325		11	max	0	1	.003	2	.002	1	5.706e-4	1	NC	1	NC	1
326			min	0	3	-.003	3	0	15	2.026e-5	15	NC	1	NC	1
327		12	max	0	1	.003	2	.001	1	5.706e-4	1	NC	1	NC	1
328			min	0	3	-.002	3	0	15	2.026e-5	15	NC	1	NC	1
329		13	max	0	1	.003	2	.001	1	5.706e-4	1	NC	1	NC	1
330			min	0	3	-.002	3	0	15	2.026e-5	15	NC	1	NC	1
331		14	max	0	1	.002	2	0	1	5.706e-4	1	NC	1	NC	1
332			min	0	3	-.002	3	0	15	2.026e-5	15	NC	1	NC	1
333		15	max	0	1	.002	2	0	1	5.706e-4	1	NC	1	NC	1
334			min	0	3	-.001	3	0	15	2.026e-5	15	NC	1	NC	1
335		16	max	0	1	.001	2	0	1	5.706e-4	1	NC	1	NC	1
336			min	0	3	-.001	3	0	15	2.026e-5	15	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
337		17	max	0	1	0	2	0	1	5.706e-4	1	NC	1	NC	1
338			min	0	3	0	3	0	15	2.026e-5	15	NC	1	NC	1
339		18	max	0	1	0	2	0	1	5.706e-4	1	NC	1	NC	1
340			min	0	3	0	3	0	15	2.026e-5	15	NC	1	NC	1
341		19	max	0	1	0	1	0	1	5.706e-4	1	NC	1	NC	1
342			min	0	1	0	1	0	1	2.026e-5	15	NC	1	NC	1
343	M1	1	max	.006	3	.022	3	.002	3	1.719e-2	1	NC	1	NC	1
344			min	-.007	2	-.023	1	-.004	1	-1.83e-2	3	NC	1	NC	1
345		2	max	.006	3	.012	3	.001	3	8.301e-3	1	NC	4	NC	1
346			min	-.007	2	-.012	1	-.007	1	-9.047e-3	3	4507.234	1	NC	1
347		3	max	.006	3	.003	3	0	3	3.355e-5	3	NC	4	NC	2
348			min	-.007	2	-.003	1	-.009	1	-4.209e-4	1	2325.107	1	8042.894	1
349		4	max	.006	3	.006	1	0	3	3.475e-5	3	NC	4	NC	2
350			min	-.007	2	-.004	3	-.011	1	-3.541e-4	1	1642.947	1	6665.189	1
351		5	max	.006	3	.013	1	0	3	3.594e-5	3	NC	5	NC	2
352			min	-.007	2	-.01	3	-.011	1	-2.874e-4	1	1315.087	1	6413.207	1
353		6	max	.006	3	.018	1	0	3	3.714e-5	3	NC	5	NC	2
354			min	-.007	2	-.015	3	-.01	1	-2.206e-4	1	1129.692	1	6882.937	1
355		7	max	.006	3	.023	1	0	3	3.833e-5	3	NC	5	NC	2
356			min	-.007	2	-.019	3	-.009	1	-1.539e-4	1	1017.326	1	8235.894	1
357		8	max	.006	3	.026	1	0	3	3.953e-5	3	NC	5	NC	1
358			min	-.007	2	-.021	3	-.007	1	-8.711e-5	1	949.116	1	NC	1
359		9	max	.006	3	.028	1	0	3	4.072e-5	3	NC	5	NC	1
360			min	-.007	2	-.023	3	-.005	1	-2.036e-5	1	911.575	1	NC	1
361		10	max	.006	3	.028	1	0	3	4.64e-5	1	NC	5	NC	1
362			min	-.007	2	-.023	3	-.003	1	1.869e-6	15	898.467	1	NC	1
363		11	max	.006	3	.028	1	0	3	1.132e-4	1	NC	5	NC	1
364			min	-.007	2	-.022	3	0	1	4.089e-6	15	907.869	1	NC	1
365		12	max	.006	3	.026	2	0	1	1.799e-4	1	NC	5	NC	1
366			min	-.007	2	-.02	3	0	15	6.31e-6	15	940.881	2	NC	1
367		13	max	.006	3	.023	2	.003	1	2.467e-4	1	NC	5	NC	2
368			min	-.007	2	-.018	3	0	15	8.531e-6	15	998.151	2	8652.234	1
369		14	max	.006	3	.018	2	.004	1	3.134e-4	1	NC	5	NC	2
370			min	-.007	2	-.014	3	0	15	1.075e-5	15	1097.446	2	7140.234	1
371		15	max	.006	3	.012	2	.005	1	3.802e-4	1	NC	5	NC	2
372			min	-.007	2	-.009	3	0	15	1.297e-5	15	1265.676	2	6601.811	1
373		16	max	.006	3	.005	2	.004	1	4.289e-4	1	NC	4	NC	2
374			min	-.007	2	-.004	3	0	15	1.46e-5	15	1568.07	2	6821.288	1
375		17	max	.006	3	.002	3	.003	1	4.886e-5	1	NC	4	NC	2
376			min	-.007	2	-.004	2	0	15	2.158e-6	15	2208.526	2	8198.64	1
377		18	max	.006	3	.009	3	.001	1	9.861e-3	1	NC	4	NC	1
378			min	-.007	2	-.015	2	0	15	-4.246e-3	3	4270.442	2	NC	1
379		19	max	.006	3	.016	3	0	3	1.987e-2	1	NC	1	NC	1
380			min	-.007	2	-.026	2	-.002	1	-8.605e-3	3	NC	1	NC	1
381	M5	1	max	.018	3	.071	3	.002	3	1.235e-6	3	NC	1	NC	1
382			min	-.024	2	-.076	1	-.004	1	3.484e-8	15	NC	1	NC	1
383		2	max	.018	3	.039	3	.002	3	6.409e-5	3	NC	5	NC	1
384			min	-.024	2	-.041	1	-.004	1	-7.396e-5	1	1331.205	1	NC	1
385		3	max	.018	3	.01	3	.003	3	1.258e-4	3	NC	5	NC	1
386			min	-.024	2	-.009	1	-.004	1	-1.466e-4	1	686.031	1	NC	1
387		4	max	.018	3	.019	1	.004	3	1.238e-4	3	NC	5	NC	1
388			min	-.024	2	-.014	3	-.004	1	-1.393e-4	1	483.851	1	NC	1
389		5	max	.018	3	.043	1	.004	3	1.218e-4	3	NC	5	NC	1
390			min	-.024	2	-.034	3	-.003	1	-1.32e-4	1	386.551	1	NC	1
391		6	max	.018	3	.063	1	.004	3	1.199e-4	3	NC	5	NC	1
392			min	-.024	2	-.05	3	-.003	1	-1.247e-4	1	331.426	1	NC	1
393		7	max	.018	3	.078	1	.004	3	1.179e-4	3	NC	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
394			min	-.024	2	-.062	3	-.003	1	-1.174e-4	1	297.911	1	NC	1
395		8	max	.018	3	.089	1	.004	3	1.16e-4	3	NC	15	NC	1
396			min	-.024	2	-.07	3	-.003	1	-1.101e-4	1	277.445	1	NC	1
397		9	max	.018	3	.096	1	.004	3	1.14e-4	3	NC	15	NC	1
398			min	-.024	2	-.074	3	-.003	1	-1.028e-4	1	266.023	1	NC	1
399		10	max	.018	3	.098	1	.004	3	1.121e-4	3	NC	15	NC	1
400			min	-.024	2	-.075	3	-.003	1	-9.554e-5	1	261.784	1	NC	1
401		11	max	.018	3	.096	1	.004	3	1.101e-4	3	NC	15	NC	1
402			min	-.024	2	-.072	3	-.003	1	-8.825e-5	1	264.138	1	NC	1
403		12	max	.018	3	.089	1	.003	3	1.081e-4	3	NC	15	NC	1
404			min	-.024	2	-.066	3	-.002	1	-8.095e-5	1	273.531	1	NC	1
405		13	max	.018	3	.078	1	.003	3	1.062e-4	3	NC	15	NC	1
406			min	-.024	2	-.057	3	-.002	1	-7.366e-5	1	291.642	1	NC	1
407		14	max	.018	3	.062	1	.002	3	1.042e-4	3	NC	5	NC	1
408			min	-.024	2	-.045	3	-.002	1	-6.636e-5	1	322.194	1	NC	1
409		15	max	.018	3	.042	1	.002	3	1.023e-4	3	NC	5	NC	1
410			min	-.024	2	-.03	3	-.002	1	-5.906e-5	1	373.218	1	NC	1
411		16	max	.018	3	.017	1	.002	3	9.758e-5	3	NC	5	NC	1
412			min	-.024	2	-.013	3	-.002	1	-5.578e-5	1	464.039	1	NC	1
413		17	max	.018	3	.008	3	.001	3	2.785e-5	3	NC	5	NC	1
414			min	-.024	2	-.014	2	-.002	1	-1.479e-4	1	654.126	1	NC	1
415		18	max	.018	3	.03	3	0	3	1.33e-5	3	NC	5	NC	1
416			min	-.024	2	-.049	2	-.002	1	-7.553e-5	1	1265.725	1	NC	1
417		19	max	.018	3	.053	3	0	3	0	1	NC	1	NC	1
418			min	-.024	2	-.087	2	-.002	1	-2.102e-7	3	NC	1	NC	1
419	M9	1	max	.006	3	.021	3	.001	3	1.83e-2	3	NC	1	NC	1
420			min	-.007	2	-.023	1	-.005	1	-1.719e-2	1	NC	1	NC	1
421		2	max	.006	3	.012	3	0	3	9.068e-3	3	NC	4	NC	1
422			min	-.007	2	-.012	1	0	1	-8.479e-3	1	4508.518	1	NC	1
423		3	max	.006	3	.003	3	.001	1	6.889e-5	1	NC	4	NC	2
424			min	-.007	2	-.003	1	0	3	2.54e-6	15	2325.789	1	8499.025	1
425		4	max	.006	3	.006	1	.003	1	2.311e-5	2	NC	4	NC	2
426			min	-.007	2	-.004	3	0	3	-3.786e-6	3	1643.427	1	7080.685	1
427		5	max	.006	3	.013	1	.003	1	8.939e-6	10	NC	5	NC	2
428			min	-.007	2	-.011	3	-.001	3	-3.909e-5	1	1315.45	1	6858.181	1
429		6	max	.006	3	.018	1	.003	1	4.688e-6	10	NC	5	NC	2
430			min	-.007	2	-.015	3	-.002	3	-9.308e-5	1	1129.982	1	7430.954	1
431		7	max	.006	3	.023	1	.002	1	4.381e-7	10	NC	5	NC	2
432			min	-.007	2	-.019	3	-.002	3	-1.471e-4	1	1017.563	1	9031.936	1
433		8	max	.006	3	.026	1	0	2	-3.812e-6	10	NC	5	NC	1
434			min	-.007	2	-.022	3	-.003	3	-2.011e-4	1	949.314	1	NC	1
435		9	max	.006	3	.028	1	0	10	-8.062e-6	10	NC	5	NC	1
436			min	-.007	2	-.023	3	-.003	3	-2.551e-4	1	911.743	1	NC	1
437		10	max	.006	3	.028	1	0	10	-1.028e-5	15	NC	5	NC	1
438			min	-.007	2	-.023	3	-.003	1	-3.09e-4	1	898.61	1	NC	1
439		11	max	.006	3	.028	1	0	10	-1.212e-5	15	NC	5	NC	1
440			min	-.007	2	-.022	3	-.005	1	-3.63e-4	1	907.989	1	NC	1
441		12	max	.006	3	.026	2	0	15	-1.395e-5	15	NC	5	NC	1
442			min	-.007	2	-.02	3	-.007	1	-4.17e-4	1	941.334	2	NC	1
443		13	max	.006	3	.023	2	0	15	-1.578e-5	15	NC	5	NC	2
444			min	-.007	2	-.018	3	-.008	1	-4.71e-4	1	998.62	2	8390.898	1
445		14	max	.006	3	.018	2	0	15	-1.761e-5	15	NC	5	NC	2
446			min	-.007	2	-.014	3	-.009	1	-5.25e-4	1	1097.948	2	7029.195	1
447		15	max	.006	3	.012	2	0	15	-1.945e-5	15	NC	5	NC	2
448			min	-.007	2	-.009	3	-.009	1	-5.79e-4	1	1266.237	2	6556.657	1
449		16	max	.006	3	.005	2	0	15	-2.082e-5	15	NC	4	NC	2
450			min	-.007	2	-.004	3	-.009	1	-6.2e-4	1	1568.738	2	6812.241	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
451		17	max	.006	3	.002	3	0	15	-5.491e-6	12	NC	4	NC	2
452			min	-.007	2	-.004	2	-.007	1	-3.509e-4	1	2209.402	2	8217.994	1
453		18	max	.006	3	.009	3	0	15	4.259e-3	3	NC	4	NC	1
454			min	-.007	2	-.015	2	-.005	1	-1.001e-2	1	4272.078	2	NC	1
455		19	max	.006	3	.016	3	0	3	8.604e-3	3	NC	1	NC	1
456			min	-.007	2	-.026	2	-.001	1	-1.987e-2	1	NC	1	NC	1
457	M13	1	max	.005	1	.021	3	.006	3	3.633e-3	3	NC	1	NC	1
458			min	-.001	3	-.023	1	-.007	2	-3.893e-3	1	NC	1	NC	1
459		2	max	.004	1	.169	3	.019	1	4.549e-3	3	NC	5	NC	2
460			min	-.001	3	-.161	1	-.002	10	-4.921e-3	1	1018.578	3	6480.253	1
461		3	max	.004	1	.289	3	.05	1	5.465e-3	3	NC	5	NC	3
462			min	-.001	3	-.274	1	0	10	-5.948e-3	1	559.983	3	2769.704	1
463		4	max	.004	1	.365	3	.076	1	6.38e-3	3	NC	5	NC	3
464			min	-.001	3	-.346	1	0	10	-6.976e-3	1	436.272	3	1881.851	1
465		5	max	.004	1	.388	3	.087	1	7.296e-3	3	NC	5	NC	3
466			min	-.002	3	-.369	1	0	10	-8.004e-3	1	409.131	3	1642.122	1
467		6	max	.004	1	.359	3	.081	1	8.212e-3	3	NC	5	NC	3
468			min	-.002	3	-.342	1	-.001	10	-9.031e-3	1	444.756	3	1754.867	1
469		7	max	.004	1	.288	3	.059	1	9.128e-3	3	NC	5	NC	3
470			min	-.002	3	-.277	1	-.004	10	-1.006e-2	1	563.555	3	2366.746	1
471		8	max	.004	1	.195	3	.027	1	1.004e-2	3	NC	5	NC	2
472			min	-.002	3	-.191	1	-.008	10	-1.109e-2	1	865.719	3	4809.033	1
473		9	max	.004	1	.11	3	.017	3	1.096e-2	3	NC	5	NC	1
474			min	-.002	3	-.112	1	-.018	2	-1.211e-2	1	1674.854	1	NC	1
475		10	max	.004	1	.071	3	.018	3	1.187e-2	3	NC	4	NC	1
476			min	-.002	3	-.076	1	-.024	2	-1.314e-2	1	2800.723	1	8804.989	2
477		11	max	.004	1	.11	3	.021	3	1.096e-2	3	NC	5	NC	1
478			min	-.002	3	-.112	1	-.017	2	-1.211e-2	1	1674.855	1	NC	1
479		12	max	.004	1	.195	3	.028	1	1.004e-2	3	NC	5	NC	2
480			min	-.002	3	-.191	1	-.008	10	-1.109e-2	1	865.719	3	4662.022	1
481		13	max	.004	1	.288	3	.06	1	9.129e-3	3	NC	5	NC	5
482			min	-.002	3	-.277	1	-.004	10	-1.006e-2	1	563.555	3	2329.436	1
483		14	max	.004	1	.359	3	.082	1	8.214e-3	3	NC	5	NC	5
484			min	-.002	3	-.342	1	-.001	10	-9.032e-3	1	444.756	3	1737.575	1
485		15	max	.004	1	.388	3	.088	1	7.299e-3	3	NC	5	NC	3
486			min	-.002	3	-.369	1	0	10	-8.004e-3	1	409.131	3	1631.878	1
487		16	max	.004	1	.365	3	.076	1	6.384e-3	3	NC	5	NC	3
488			min	-.002	3	-.346	1	0	10	-6.976e-3	1	436.272	3	1875.579	1
489		17	max	.004	1	.29	3	.05	1	5.469e-3	3	NC	5	NC	3
490			min	-.002	3	-.274	1	0	10	-5.949e-3	1	559.983	3	2769.026	1
491		18	max	.004	1	.169	3	.019	1	4.554e-3	3	NC	5	NC	2
492			min	-.002	3	-.161	1	-.002	10	-4.921e-3	1	1018.578	3	6509.308	1
493		19	max	.004	1	.022	3	.006	3	3.638e-3	3	NC	1	NC	1
494			min	-.002	3	-.023	1	-.007	2	-3.893e-3	1	NC	1	NC	1
495	M16	1	max	.001	1	.016	3	.006	3	4.265e-3	2	NC	1	NC	1
496			min	0	3	-.026	2	-.007	2	-2.743e-3	3	NC	1	NC	1
497		2	max	.001	1	.086	3	.019	1	5.378e-3	2	NC	5	NC	2
498			min	0	3	-.185	1	-.002	10	-3.423e-3	3	938.098	1	6409.902	1
499		3	max	.002	1	.143	3	.05	1	6.49e-3	2	NC	5	NC	3
500			min	0	3	-.316	1	0	10	-4.103e-3	3	515.372	1	2748.093	1
501		4	max	.002	1	.18	3	.076	1	7.603e-3	2	NC	5	NC	3
502			min	0	3	-.399	1	0	10	-4.782e-3	3	400.998	1	1869.678	1
503		5	max	.002	1	.192	3	.088	1	8.716e-3	2	NC	5	NC	3
504			min	0	3	-.425	1	0	10	-5.462e-3	3	375.232	1	1632.53	1
505		6	max	.002	1	.18	3	.082	1	9.829e-3	2	NC	5	NC	5
506			min	0	3	-.394	1	-.001	10	-6.142e-3	3	406.368	1	1745.015	1
507		7	max	.002	1	.15	3	.059	1	1.094e-2	2	NC	5	NC	5

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
508			min	0	3	-.318	1	-.004	10	-6.822e-3	3	511.253	1	2353.373	1
509		8	max	.002	1	.109	3	.027	1	1.206e-2	2	NC	5	NC	2
510			min	0	3	-.219	1	-.008	10	-7.502e-3	3	773.22	1	4782.55	1
511		9	max	.002	1	.07	3	.02	3	1.317e-2	2	NC	5	NC	1
512			min	0	3	-.128	2	-.018	2	-8.181e-3	3	1462.833	1	NC	1
513		10	max	.002	1	.053	3	.018	3	1.428e-2	2	NC	4	NC	1
514			min	0	3	-.087	2	-.024	2	-8.861e-3	3	2464.399	1	8732.938	2
515		11	max	.002	1	.07	3	.017	3	1.317e-2	2	NC	5	NC	1
516			min	0	3	-.128	2	-.018	2	-8.181e-3	3	1462.834	1	NC	1
517		12	max	.002	1	.109	3	.027	1	1.206e-2	2	NC	5	NC	2
518			min	0	3	-.219	1	-.008	10	-7.5e-3	3	773.22	1	4781.584	1
519		13	max	.002	1	.15	3	.059	1	1.094e-2	2	NC	5	NC	3
520			min	0	3	-.318	1	-.004	10	-6.82e-3	3	511.253	1	2360.792	1
521		14	max	.002	1	.18	3	.081	1	9.83e-3	2	NC	5	NC	3
522			min	0	3	-.394	1	-.001	10	-6.14e-3	3	406.368	1	1754.283	1
523		15	max	.002	1	.192	3	.087	1	8.717e-3	2	NC	5	NC	3
524			min	0	3	-.425	1	0	10	-5.459e-3	3	375.232	1	1644.806	1
525		16	max	.002	1	.18	3	.075	1	7.605e-3	2	NC	5	NC	3
526			min	0	3	-.399	1	0	10	-4.779e-3	3	400.998	1	1889.119	1
527		17	max	.002	1	.143	3	.049	1	6.492e-3	2	NC	5	NC	3
528			min	0	3	-.316	1	0	10	-4.099e-3	3	515.373	1	2789.191	1
529		18	max	.002	1	.086	3	.018	1	5.379e-3	2	NC	5	NC	2
530			min	0	3	-.185	1	-.002	10	-3.418e-3	3	938.099	1	6564.817	1
531		19	max	.002	1	.016	3	.006	3	4.267e-3	2	NC	1	NC	1
532			min	0	3	-.026	2	-.007	2	-2.738e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.201e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-6.109e-5	2	NC	1	NC	1
535		2	max	0	3	-.002	15	.001	1	8.146e-4	3	NC	1	NC	1
536			min	0	2	-.01	4	0	3	-6.393e-4	1	8402.101	4	NC	1
537		3	max	0	3	-.005	15	.004	1	1.309e-3	3	NC	5	NC	1
538			min	0	2	-.019	4	-.003	3	-1.226e-3	1	4275.543	4	NC	1
539		4	max	0	3	-.007	15	.008	1	1.804e-3	3	NC	15	NC	4
540			min	0	2	-.028	4	-.007	3	-1.812e-3	1	2933.272	4	7336.254	1
541		5	max	0	3	-.008	15	.012	1	2.298e-3	3	9737.147	15	NC	4
542			min	0	2	-.036	4	-.011	3	-2.398e-3	1	2288.862	4	4838.526	1
543		6	max	0	3	-.01	15	.017	1	2.793e-3	3	8194.839	15	NC	4
544			min	0	2	-.043	4	-.015	3	-2.984e-3	1	1926.319	4	3534.957	1
545		7	max	0	3	-.011	15	.023	1	3.287e-3	3	7267.343	15	NC	4
546			min	0	2	-.048	4	-.02	3	-3.57e-3	1	1708.298	4	2770.212	1
547		8	max	0	3	-.012	15	.028	1	3.782e-3	3	6710.707	15	NC	4
548			min	0	2	-.052	4	-.025	3	-4.157e-3	1	1577.452	4	2288.389	1
549		9	max	0	3	-.013	15	.032	1	4.276e-3	3	6411.092	15	NC	4
550			min	0	2	-.055	4	-.029	3	-4.743e-3	1	1507.023	4	1972.637	1
551		10	max	0	3	-.013	15	.036	1	4.771e-3	3	6316.308	15	NC	5
552			min	0	2	-.056	4	-.032	3	-5.329e-3	1	1484.743	4	1764.118	1
553		11	max	0	3	-.013	15	.039	1	5.266e-3	3	6411.092	15	NC	5
554			min	0	2	-.055	4	-.035	3	-5.915e-3	1	1507.023	4	1631.91	1
555		12	max	0	3	-.012	15	.04	1	5.76e-3	3	6710.707	15	NC	5
556			min	-.001	2	-.053	4	-.036	3	-6.501e-3	1	1577.452	4	1560.704	1
557		13	max	0	3	-.011	15	.039	1	6.255e-3	3	7267.343	15	NC	5
558			min	-.001	2	-.049	4	-.035	3	-7.088e-3	1	1708.298	4	1546.169	1
559		14	max	0	3	-.01	15	.036	1	6.749e-3	3	8194.839	15	NC	5
560			min	-.001	2	-.043	4	-.032	3	-7.674e-3	1	1926.319	4	1595.204	1
561		15	max	0	3	-.009	15	.031	1	7.244e-3	3	9737.147	15	NC	4
562			min	-.001	2	-.037	4	-.028	3	-8.26e-3	1	2288.862	4	1732.725	1
563		16	max	0	3	-.007	15	.023	1	7.738e-3	3	NC	15	NC	4
564			min	-.001	2	-.029	4	-.02	3	-8.846e-3	1	2933.272	4	2026.219	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
565		17	max	0	3	-.005	15	.012	1	8.233e-3	3	NC	5	NC	4
566			min	-.002	2	-.02	4	-.01	3	-9.432e-3	1	4275.543	4	2687.281	1
567		18	max	0	3	-.002	12	.004	3	8.727e-3	3	NC	1	NC	4
568			min	-.002	2	-.011	4	-.008	2	-1.002e-2	1	8402.101	4	4786.146	1
569		19	max	0	3	.004	3	.021	3	9.222e-3	3	NC	1	NC	1
570			min	-.002	2	-.003	1	-.025	2	-1.06e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	3	.007	3	2.739e-3	3	NC	1	NC	1
572			min	0	3	-.001	1	-.007	2	-2.837e-3	1	NC	1	NC	1
573		2	max	0	10	-.002	15	.003	1	2.622e-3	3	NC	1	NC	1
574			min	0	3	-.01	4	-.001	10	-2.704e-3	1	8402.101	4	NC	1
575		3	max	0	10	-.005	15	.009	1	2.505e-3	3	NC	5	NC	4
576			min	0	3	-.02	4	-.004	3	-2.57e-3	1	4275.543	4	6095.921	1
577		4	max	0	10	-.007	15	.014	1	2.389e-3	3	NC	15	NC	4
578			min	0	3	-.028	4	-.007	3	-2.436e-3	1	2933.272	4	4631.484	1
579		5	max	0	10	-.008	15	.017	1	2.272e-3	3	9737.147	15	NC	4
580			min	0	3	-.036	4	-.01	3	-2.303e-3	1	2288.862	4	3995.086	1
581		6	max	0	10	-.01	15	.019	1	2.155e-3	3	8194.839	15	NC	4
582			min	0	3	-.043	4	-.011	3	-2.169e-3	1	1926.319	4	3714.767	1
583		7	max	0	10	-.011	15	.019	1	2.039e-3	3	7267.343	15	NC	4
584			min	0	3	-.048	4	-.012	3	-2.041e-3	2	1708.298	4	3642.343	1
585		8	max	0	10	-.012	15	.019	1	1.922e-3	3	6710.707	15	NC	4
586			min	0	3	-.052	4	-.012	3	-1.914e-3	2	1577.452	4	3726.682	1
587		9	max	0	10	-.013	15	.018	1	1.805e-3	3	6411.092	15	NC	4
588			min	0	3	-.055	4	-.011	3	-1.787e-3	2	1507.023	4	3959.992	1
589		10	max	0	10	-.013	15	.016	1	1.689e-3	3	6316.308	15	NC	4
590			min	0	3	-.056	4	-.01	3	-1.66e-3	2	1484.743	4	4365.098	1
591		11	max	0	10	-.013	15	.014	1	1.572e-3	3	6411.092	15	NC	4
592			min	0	3	-.055	4	-.009	3	-1.533e-3	2	1507.023	4	5000.061	1
593		12	max	0	10	-.012	15	.012	1	1.455e-3	3	6710.707	15	NC	4
594			min	0	3	-.052	4	-.007	3	-1.406e-3	2	1577.452	4	5980.2	1
595		13	max	0	10	-.011	15	.009	1	1.339e-3	3	7267.343	15	NC	2
596			min	0	3	-.048	4	-.006	3	-1.279e-3	2	1708.298	4	7534.52	1
597		14	max	0	10	-.01	15	.007	1	1.222e-3	3	8194.839	15	NC	1
598			min	0	3	-.043	4	-.004	3	-1.152e-3	2	1926.319	4	NC	1
599		15	max	0	10	-.008	15	.004	1	1.105e-3	3	9737.147	15	NC	1
600			min	0	3	-.036	4	-.002	3	-1.025e-3	2	2288.862	4	NC	1
601		16	max	0	10	-.007	15	.002	1	9.885e-4	3	NC	15	NC	1
602			min	0	3	-.028	4	-.001	3	-8.978e-4	2	2933.272	4	NC	1
603		17	max	0	10	-.005	15	0	1	8.718e-4	3	NC	5	NC	1
604			min	0	3	-.019	4	0	10	-7.708e-4	2	4275.543	4	NC	1
605		18	max	0	10	-.002	15	0	4	7.551e-4	3	NC	1	NC	1
606			min	0	3	-.01	4	0	2	-6.437e-4	2	8402.101	4	NC	1
607		19	max	0	1	0	1	0	1	6.384e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.167e-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

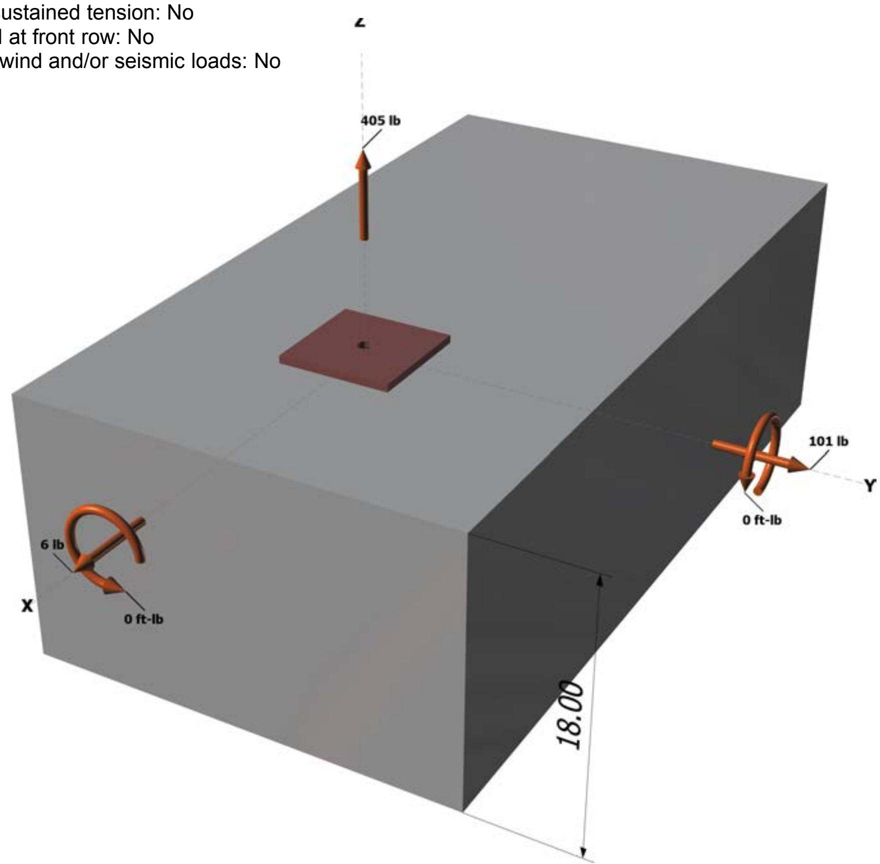
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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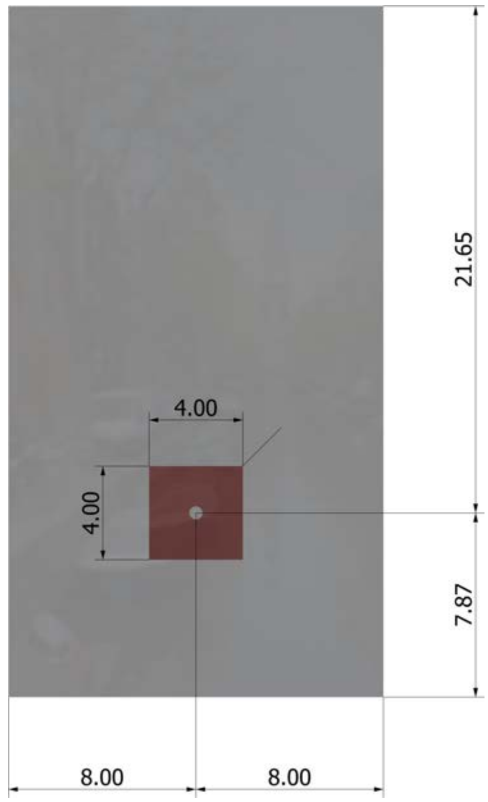


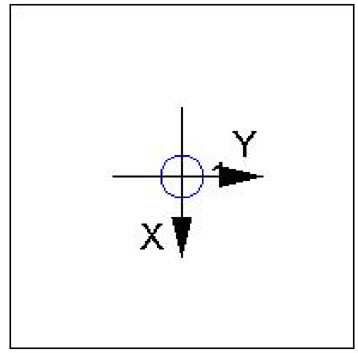
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ	ϕV_{cp} (lb)
253.92	256.00	0.995	1.000	1.000	10469	10334	0.70	13657

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, øN_n (lb)	Ratio	Status
Steel	405	6071	0.07	Pass
Concrete breakout	405	6717	0.06	Pass
Adhesive	**405**	**5365**	**0.08**	**Pass (Governs)**

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

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

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

12. Warnings

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

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

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

Anchor Designer™
Software
Version 2.4.5673.0

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

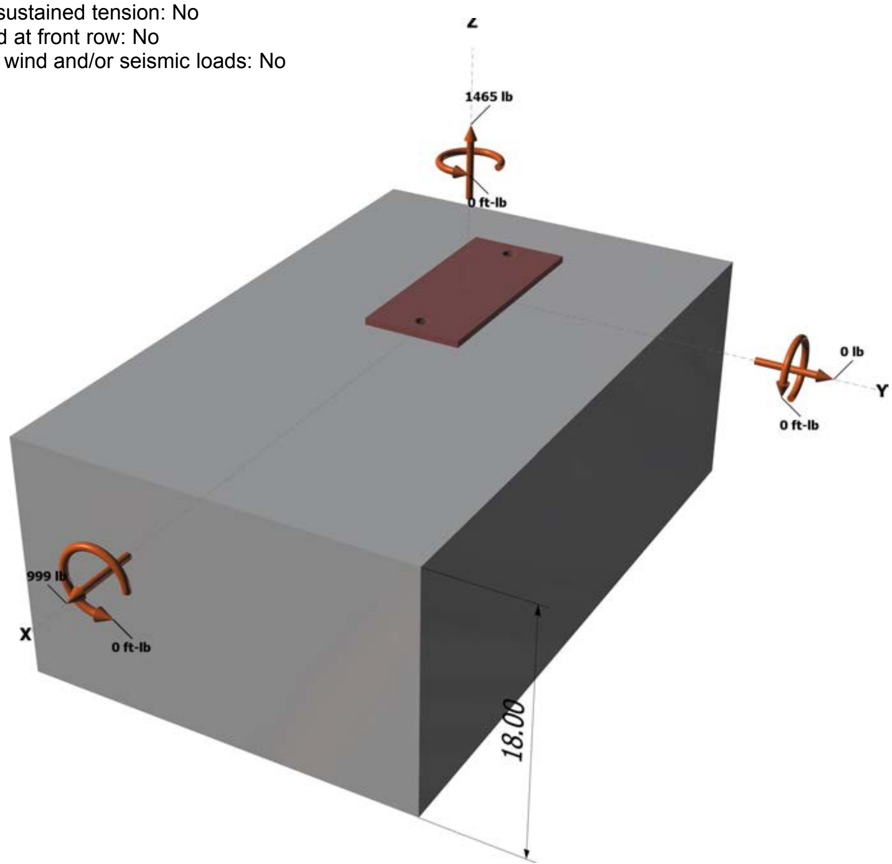
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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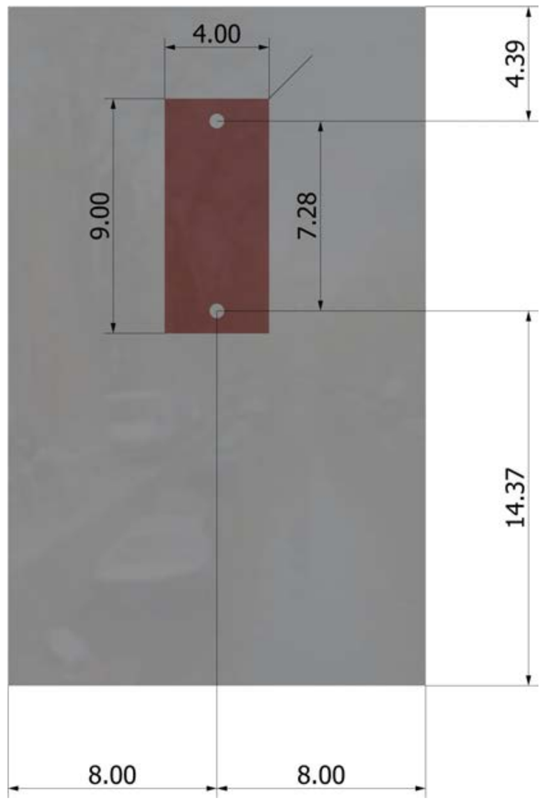


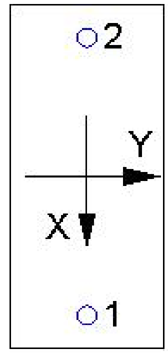
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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.