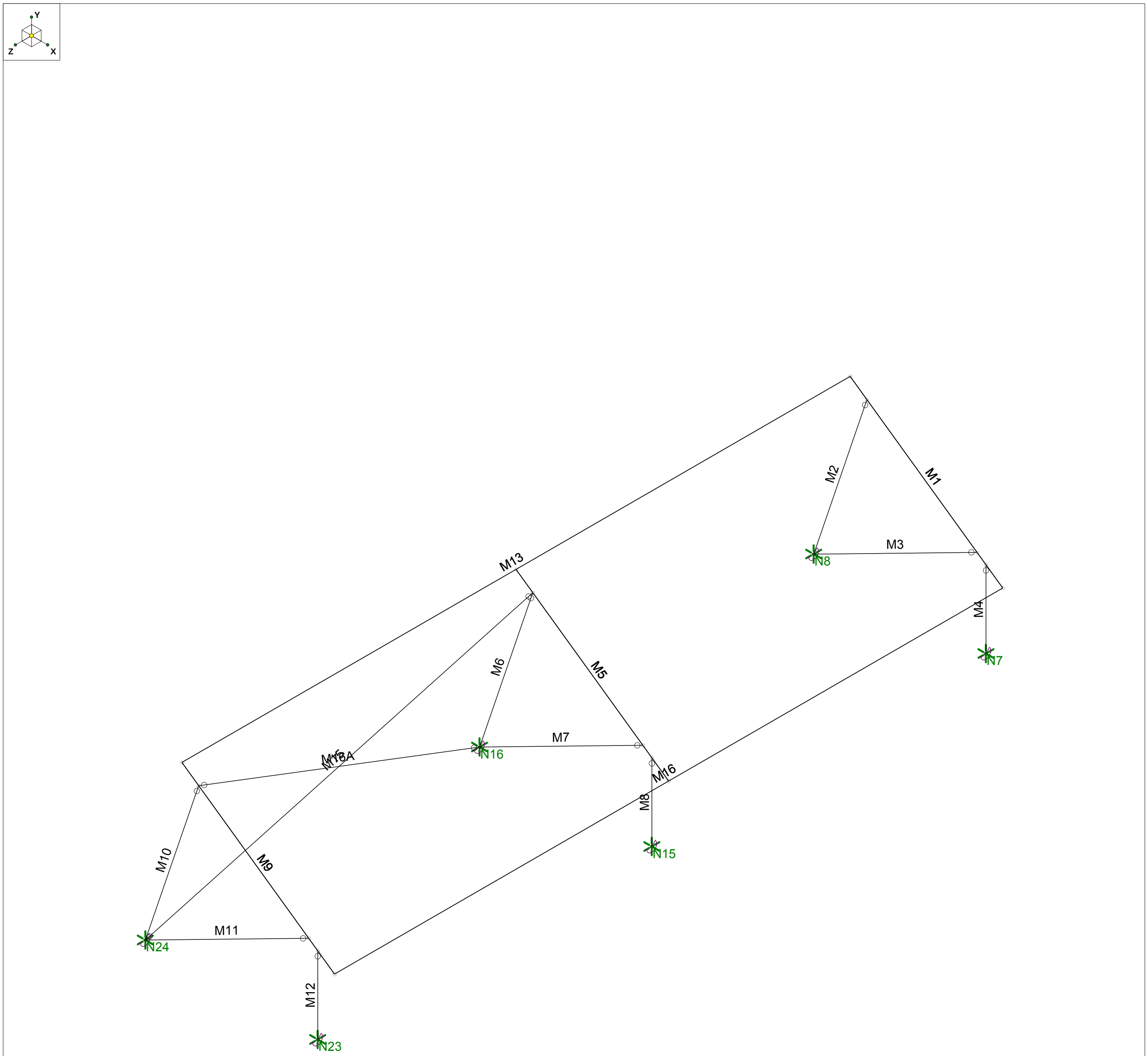


Schletter, Inc.		35° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

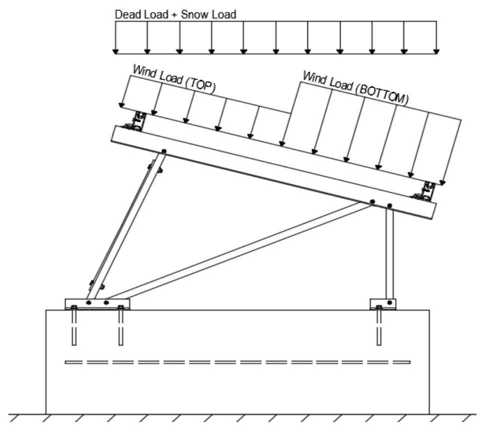
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 1
Module Tilt = 35°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes
- ASCE 7-05 - 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 = 14.43 psf *(ASCE 7-05, Eq. 7-2)*
I_s = 1.00
C_s = 0.64
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 90 mph   Exposure Category = C
Height ≤ 15 ft   Importance Category = II

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

Pressure Coefficients

$Cf+_{TOP}$	=	1.2	*(Pressure)*
$Cf+_{BOTTOM}$	=	2	
$Cf-_{TOP}$	=	-2.4	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.2	

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

2.4 Seismic Loads

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
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

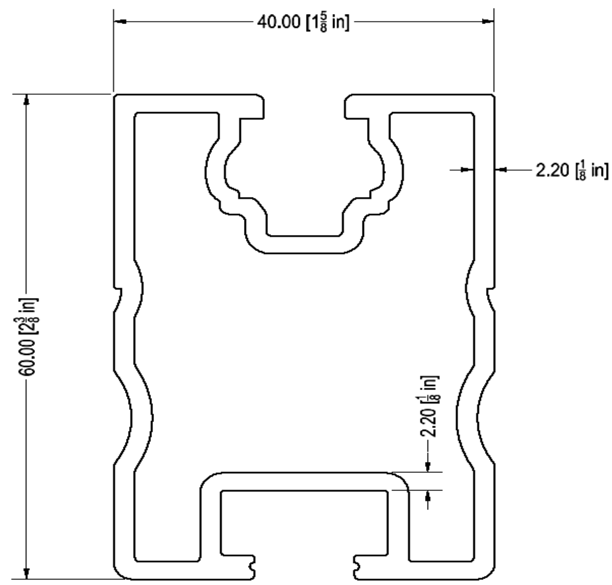
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

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).

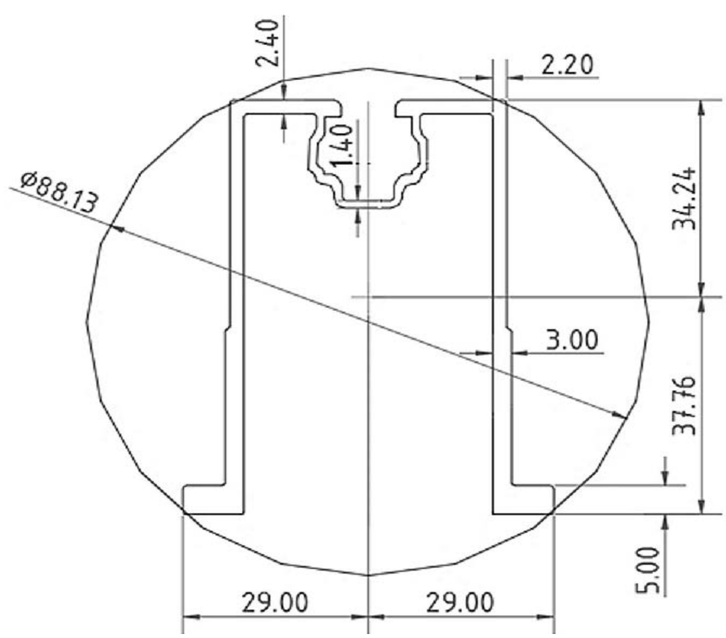
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	81	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.63	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.662	k-ft
M_z =	0.184	k-ft
$M_{y\ allowable}$ =	1.218	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).

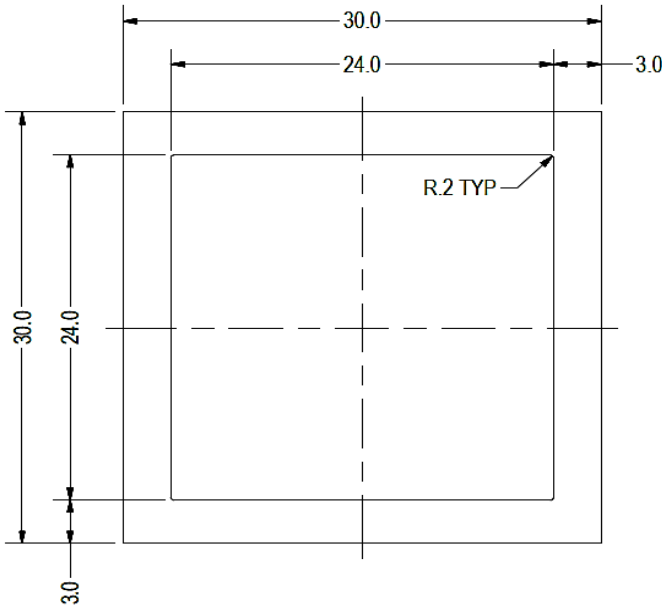
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.46	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.629	k-ft
M_z =	0.000	k-ft
P_n =	0.290	k
$M_{y\ allowable}$ =	1.446	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	46%	



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).

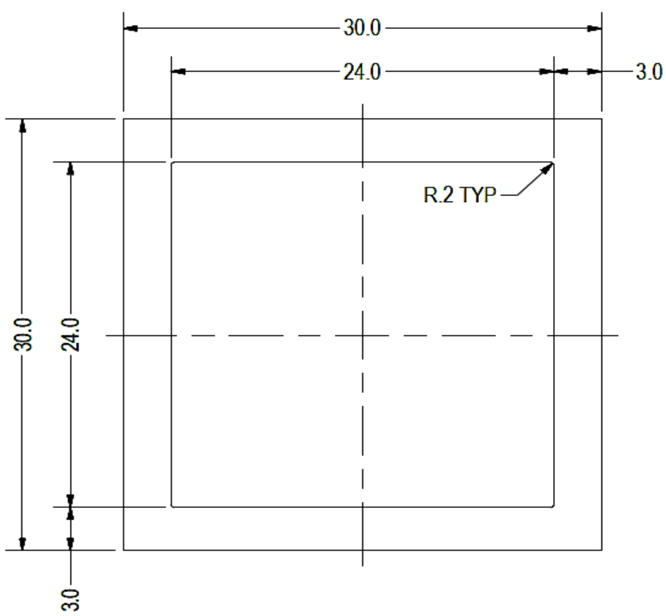
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.047	k-ft
P_n =	0.222	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	13%	



4.4 Diagonal Strut Design

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

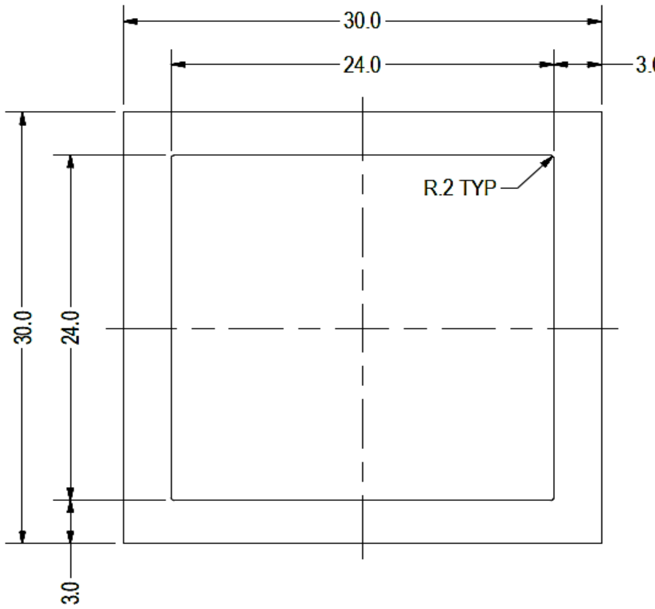
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.771	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	20%	



4.5 Rear Strut Design

An aluminum strut connects the rear portion of the girder to the rear foundation connection. Both vertical and horizontal forces are transferred from the girder. The strut is attached with single M8 bolts at each end. See Appendix A.5 for detailed member calculations. Section units are in (mm).

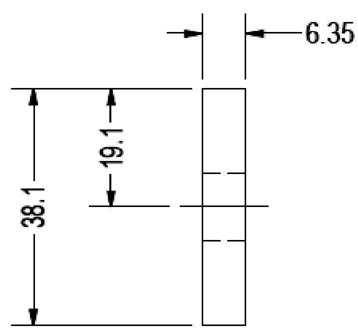
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	42.32	in
$\Phi F_{ty\ AXIAL}$ =	8.86	ksi
$\Phi F_{ty\ BENDING}$ =	29.96	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.806	k
$M_{y\ allowable}$ =	0.406	k-ft
$M_{z\ allowable}$ =	0.406	k-ft
$P_{n\ allowable}$ =	4.450	k
Utilization =	18%	



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 =	0.006	k-ft
P_n =	0.235	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	15%	



A cross brace kit is required every 13 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

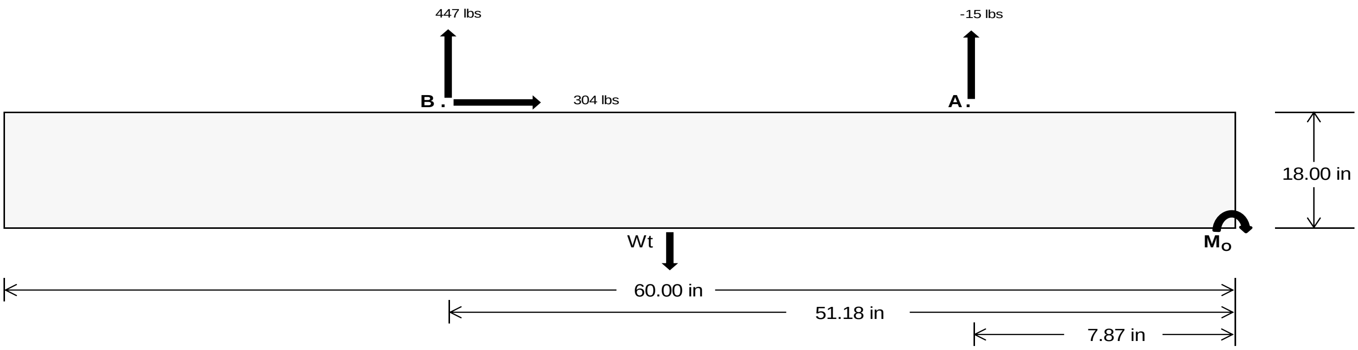
5.1 Helical Pile Foundations

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 =	17.09	1861.01	k
Compressive Load =	1224.22	1346.85	k
Lateral Load =	38.29	1265.64	k
Moment (Weak Axis) =	0.06	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 = 28215.9 in-lbs
Resisting Force Required = 940.53 lbs
S.F. = 1.67
Weight Required = 1567.55 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 = 304.09 lbs
Friction = 0.4
Weight Required = 760.22 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 = 304.09 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	480 lbs	480 lbs	480 lbs	480 lbs	362 lbs	362 lbs	362 lbs	362 lbs	583 lbs	583 lbs	583 lbs	583 lbs	30 lbs	30 lbs	30 lbs	30 lbs
F_B	323 lbs	323 lbs	323 lbs	323 lbs	584 lbs	584 lbs	584 lbs	584 lbs	647 lbs	647 lbs	647 lbs	647 lbs	-893 lbs	-893 lbs	-893 lbs	-893 lbs
F_V	62 lbs	62 lbs	62 lbs	62 lbs	556 lbs	556 lbs	556 lbs	556 lbs	458 lbs	458 lbs	458 lbs	458 lbs	-608 lbs	-608 lbs	-608 lbs	-608 lbs
P_{total}	2797 lbs	2888 lbs	2979 lbs	3069 lbs	2939 lbs	3030 lbs	3121 lbs	3211 lbs	3224 lbs	3315 lbs	3405 lbs	3496 lbs	333 lbs	388 lbs	442 lbs	496 lbs
M	408 lbs-ft	408 lbs-ft	408 lbs-ft	408 lbs-ft	471 lbs-ft	471 lbs-ft	471 lbs-ft	471 lbs-ft	622 lbs-ft	622 lbs-ft	622 lbs-ft	622 lbs-ft	721 lbs-ft	721 lbs-ft	721 lbs-ft	721 lbs-ft
e	0.15 ft	0.14 ft	0.14 ft	0.13 ft	0.16 ft	0.16 ft	0.15 ft	0.15 ft	0.19 ft	0.19 ft	0.18 ft	0.18 ft	2.16 ft	1.86 ft	1.63 ft	1.45 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}	251.7 psf	250.2 psf	248.9 psf	247.6 psf	259.0 psf	257.2 psf	255.5 psf	254.0 psf	270.3 psf	268.0 psf	265.9 psf	264.0 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	358.6 psf	352.5 psf	346.8 psf	341.7 psf	382.4 psf	375.2 psf	368.6 psf	362.6 psf	433.1 psf	423.7 psf	415.1 psf	407.2 psf	359.0 psf	210.4 psf	169.4 psf	151.5 psf

Maximum Bearing Pressure = 433 psf
Allowable Bearing Pressure = 1500 psf

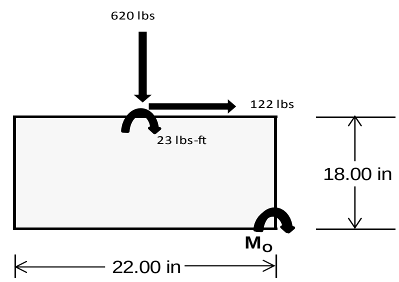
Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 361.6 ft-lbs
Resisting Force Required = 394.47 lbs
S.F. = 1.67
Weight Required = 657.45 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	145 lbs	132 lbs	82 lbs	293 lbs	620 lbs	245 lbs	88 lbs	-11 lbs	28 lbs
F_V	20 lbs	162 lbs	21 lbs	14 lbs	122 lbs	16 lbs	21 lbs	162 lbs	21 lbs
P_{total}	2614 lbs	2600 lbs	2551 lbs	2643 lbs	2969 lbs	2594 lbs	810 lbs	711 lbs	750 lbs
M	59 lbs-ft	275 lbs-ft	63 lbs-ft	39 lbs-ft	207 lbs-ft	50 lbs-ft	60 lbs-ft	274 lbs-ft	63 lbs-ft
e	0.02 ft	0.11 ft	0.02 ft	0.01 ft	0.07 ft	0.02 ft	0.07 ft	0.39 ft	0.08 ft
L/6	0.31 ft	1.62 ft	1.78 ft	1.80 ft	1.69 ft	1.80 ft	1.68 ft	1.06 ft	1.67 ft
f_{min}	264.2 sqft	185.6 sqft	255.8 sqft	274.6 sqft	250.2 sqft	265.3 sqft	66.8 sqft	-20.4 sqft	59.5 sqft
f_{max}	306.1 psf	381.8 psf	300.6 psf	302.1 psf	397.7 psf	300.7 psf	109.9 psf	175.5 psf	104.1 psf

Maximum Bearing Pressure = 398 psf
Allowable Bearing Pressure = 1500 psf

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

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

5.3 Foundation Anchors

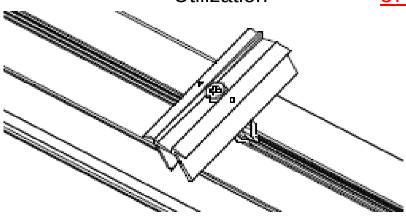
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

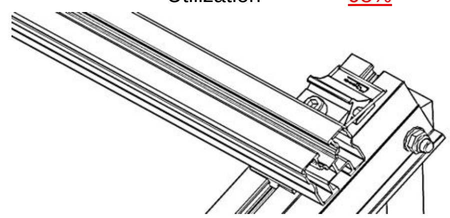
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

Fastening of Modules to Purlins		
Maximum Uplifting Force =	0.454	k
Allowable Uplift =	1.214	k
Utilization =	37%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.088	k
Allowable Uplift =	1.116	k
Utilization =	98%	



6.2 Bolted Connections

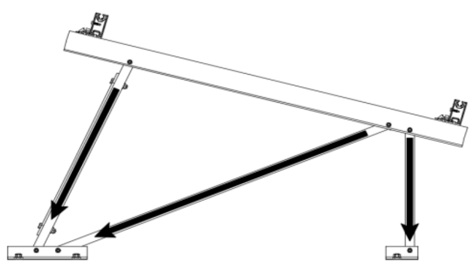
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are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

Front Strut		
Maximum Axial Load =	0.942	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	17%	

Rear Strut		
Maximum Axial Load =	1.164	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	20%	

Diagonal Strut		
Maximum Axial Load =	0.771	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	14%	

Bracing		
Maximum Axial Load =	0.235	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	3%	



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

7. SEISMIC DESIGN

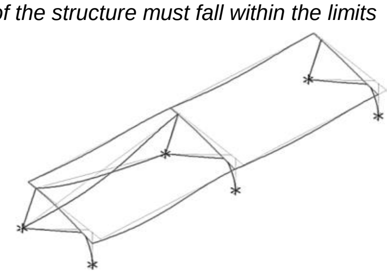
7.1 Seismic Drift

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

Mean Height, h_{sx} =	33.11	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.662	in
Max Drift, Δ_{MAX} =	0.099	in

0.099 ≤ 0.662, OK.

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



APPENDIX A

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

Purlin = **ProfiPlus**

Strong Axis:

3.4.14

L_b = 81.00 in

J = 0.255

210.919

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.6 ksi

3.4.16

b/t = 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 = 81.00 in

J = 0.255

219.027

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.5

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

$\varphi F_L St$= 28.6 ksi
Ix = 250988 mm^4
0.603 in^4
y = 30 mm
Sx = 0.511 in^3
$M_{max}St$ = 1.218 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

3.4.16.1

N/A for Weak Direction

3.4.16.2

N/A for Strong Direction

3.4.16.2

b/t = 24.46

t = 2.6

ds = 6.05

rs = 3.49

S = 21.70

ρst = 0.22

F_{UT}= 9.37

F_{ST}= 28.24

φF_L= Fut + (Fst - Fut)ρst < Fst

φF_L= 13.5 ksi

3.4.18

h/t = 24.46

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

S1 = 34.4

m = 0.70

C_0 = 34.23

Cc = 37.77

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

S2 = 72.1

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.5 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

3.4.18

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

$\varphi F_L St$= 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

$\varphi F_L Wk$= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

$M_{max}Wk$ = 0.423 k-ft

Compression

3.4.7

$\lambda =$ 0.77182

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.83792

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

$\varphi F_L =$ 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

<u>Compression</u>

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 = 42.32 in

J = 0.16

111.025

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.0 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 30.0 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in³

M_{max}St = 0.406 k-ft

Weak Axis:

3.4.14

L_b = 42.32 in

J = 0.16

111.025

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.0

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in³

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

λ = 1.81475

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83406

φF_L= (φccFcy)/(λ²)

φF_L= 8.86409 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 8.86 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 4.45 kips

APPENDIX B

B.1

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

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead Load, Max	DL		-1				2		
2	Dead Load, Min	DL		-1				2		
3	Snow Load	SL						2		
4	Wind Load - Pressure	WL						2		
5	Wind Load - Suction	WL						2		
6	Seismic - Lateral	EL			.8			4		

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-40.249	-40.249	0	0
2	M16	Y	-40.249	-40.249	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-42.559	-42.559	0	0
2	M16	y	-70.932	-70.932	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	85.119	85.119	0	0
2	M16	y	42.559	42.559	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

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

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8														
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6														
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
10	ASD 1.0D + 1.0W	Yes	Y		1	1			4	1														
11	ASD 1.0D + 0.75L + 0.75W + 0....	Yes	Y		1	1	3	.75	4	.75														
12	ASD 0.6D + 1.0W	Yes	Y		2	.6					5	1												
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875												
14	LATERAL - ASD 1.1785D + 0.65...	Yes	Y		1	1.1...	3	.75			6	.656												
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	248.065	2	304.487	2	-.011	10	0	4	0	1	0	1
2		min	-304.165	3	-436.131	3	-2.288	4	0	3	0	1	0	1
3	N7	max	.026	3	376.613	1	-.208	10	0	12	0	1	0	1
4		min	-.164	2	24.915	15	-29.203	4	-.047	4	0	1	0	1
5	N15	max	.202	3	941.707	1	.651	1	.001	1	0	1	0	1
6		min	-1.628	2	33.251	15	-29.45	5	-.047	4	0	1	0	1
7	N16	max	911.478	2	1036.042	2	-.099	10	0	1	0	1	0	1
8		min	-973.57	3	-1431.543	3	-211.98	4	0	3	0	1	0	1
9	N23	max	.026	3	376.27	1	3.205	1	.006	1	0	1	0	1
10		min	-.164	2	8.204	15	-27.256	5	-.043	5	0	1	0	1
11	N24	max	248.481	2	308.496	2	57.262	3	.002	4	0	1	0	1
12		min	-304.355	3	-433.902	3	-3.749	5	0	3	0	1	0	1
13	Totals:	max	1406.068	2	3091.574	1	0	1						
14		min	-1581.835	3	-2092.668	3	-302.283	5						

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	248.764	1	.676	6	1.405	4	0	10	0	12	0	1
2			min	-360.262	3	.158	15	-.033	3	0	1	0	1	0	1
3		2	max	248.899	1	.619	6	1.282	4	0	10	0	5	0	15
4			min	-360.161	3	.145	15	-.033	3	0	1	0	1	0	6
5		3	max	249.034	1	.561	6	1.159	4	0	10	0	5	0	15
6			min	-360.059	3	.131	15	-.033	3	0	1	0	1	0	6
7		4	max	249.169	1	.504	6	1.036	4	0	10	0	4	0	15
8			min	-359.958	3	.118	15	-.033	3	0	1	0	1	0	6
9		5	max	249.303	1	.446	6	.912	4	0	10	0	4	0	15
10			min	-359.857	3	.104	15	-.033	3	0	1	0	3	0	6
11		6	max	249.438	1	.389	6	.789	4	0	10	0	4	0	15
12			min	-359.756	3	.091	15	-.033	3	0	1	0	3	0	6
13		7	max	249.573	1	.331	6	.666	4	0	10	.001	4	0	15
14			min	-359.655	3	.077	15	-.033	3	0	1	0	3	0	6
15		8	max	249.708	1	.274	6	.543	4	0	10	.001	4	0	15
16			min	-359.554	3	.064	15	-.033	3	0	1	0	3	0	6
17		9	max	249.843	1	.216	6	.432	1	0	10	.001	4	0	15
18			min	-359.453	3	.05	15	-.033	3	0	1	0	3	0	6
19		10	max	249.978	1	.159	6	.432	1	0	10	.001	4	0	15
20			min	-359.351	3	.037	15	-.033	3	0	1	0	3	0	6
21		11	max	250.113	1	.108	2	.432	1	0	10	.001	4	0	15
22			min	-359.25	3	.016	12	-.033	3	0	1	0	3	0	6
23		12	max	250.247	1	.063	2	.432	1	0	10	.001	4	0	15
24			min	-359.149	3	-.013	3	-.062	5	0	1	0	3	0	6
25		13	max	250.382	1	.018	2	.432	1	0	10	.001	4	0	15
26			min	-359.048	3	-.046	3	-.185	5	0	1	0	3	0	6
27		14	max	250.517	1	-.017	15	.432	1	0	10	.001	4	0	15
28			min	-358.947	3	-.08	3	-.308	5	0	1	0	3	0	6

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
29		15	max	250.652	1	-.031	15	.432	1	0	10	.001	4	0	15
30			min	-358.846	3	-.129	4	-.432	5	0	1	0	3	0	6
31		16	max	250.787	1	-.044	15	.432	1	0	10	.001	4	0	15
32			min	-358.745	3	-.186	4	-.555	5	0	1	0	3	0	6
33		17	max	250.922	1	-.058	15	.432	1	0	10	.001	4	0	15
34			min	-358.643	3	-.244	4	-.678	5	0	1	0	3	0	6
35		18	max	251.057	1	-.071	15	.432	1	0	10	.001	1	0	15
36			min	-358.542	3	-.301	4	-.801	5	0	1	0	3	0	6
37		19	max	251.192	1	-.085	15	.432	1	0	10	.001	1	0	15
38			min	-358.441	3	-.359	4	-.924	5	0	1	0	3	0	6
39	M3	1	max	200.341	2	1.734	6	-.035	12	0	5	.002	1	0	6
40			min	-213.674	3	.407	15	-1.399	4	0	1	0	12	0	15
41		2	max	200.271	2	1.557	6	-.035	12	0	5	.002	1	0	2
42			min	-213.726	3	.366	15	-1.265	4	0	1	0	12	0	3
43		3	max	200.201	2	1.381	6	-.035	12	0	5	.001	1	0	2
44			min	-213.779	3	.324	15	-1.132	4	0	1	0	15	0	3
45		4	max	200.131	2	1.204	6	-.035	12	0	5	.001	1	0	15
46			min	-213.831	3	.283	15	-.998	4	0	1	0	5	0	4
47		5	max	200.061	2	1.028	6	-.035	12	0	5	.001	1	0	15
48			min	-213.884	3	.241	15	-.864	4	0	1	0	5	0	4
49		6	max	199.991	2	.852	6	-.035	12	0	5	.001	1	0	15
50			min	-213.936	3	.2	15	-.731	4	0	1	0	5	0	4
51		7	max	199.921	2	.675	6	-.035	12	0	5	.001	1	0	15
52			min	-213.989	3	.158	15	-.597	4	0	1	0	5	0	4
53		8	max	199.851	2	.499	6	-.035	12	0	5	0	1	0	15
54			min	-214.041	3	.117	15	-.484	1	0	1	0	5	-.001	4
55		9	max	199.781	2	.323	6	-.035	12	0	5	0	1	0	15
56			min	-214.094	3	.075	15	-.484	1	0	1	0	5	-.001	4
57		10	max	199.711	2	.146	6	-.035	12	0	5	0	1	0	15
58			min	-214.146	3	.034	15	-.484	1	0	1	0	5	-.001	4
59		11	max	199.641	2	.003	2	.049	5	0	5	0	1	0	15
60			min	-214.199	3	-.053	3	-.484	1	0	1	0	5	-.001	4
61		12	max	199.571	2	-.049	15	.182	5	0	5	0	1	0	15
62			min	-214.251	3	-.207	4	-.484	1	0	1	0	5	-.001	4
63		13	max	199.501	2	-.09	15	.316	5	0	5	0	1	0	15
64			min	-214.304	3	-.383	4	-.484	1	0	1	0	5	-.001	4
65		14	max	199.431	2	-.132	15	.45	5	0	5	0	1	0	15
66			min	-214.356	3	-.559	4	-.484	1	0	1	0	5	-.001	4
67		15	max	199.361	2	-.173	15	.583	5	0	5	0	1	0	15
68			min	-214.409	3	-.736	4	-.484	1	0	1	0	5	0	4
69		16	max	199.291	2	-.215	15	.717	5	0	5	0	1	0	15
70			min	-214.461	3	-.912	4	-.484	1	0	1	0	5	0	4
71		17	max	199.221	2	-.256	15	.851	5	0	5	0	12	0	15
72			min	-214.514	3	-1.088	4	-.484	1	0	1	0	5	0	4
73		18	max	199.151	2	-.298	15	.984	5	0	5	0	12	0	15
74			min	-214.566	3	-1.265	4	-.484	1	0	1	0	1	0	4
75		19	max	199.081	2	-.339	15	1.118	5	0	5	0	5	0	1
76			min	-214.619	3	-1.441	4	-.484	1	0	1	0	1	0	1
77	M4	1	max	375.449	1	0	1	-.213	10	0	1	0	5	0	1
78			min	24.564	15	0	1	-28.73	4	0	1	0	2	0	1
79		2	max	375.513	1	0	1	-.213	10	0	1	0	12	0	1
80			min	24.583	15	0	1	-28.786	4	0	1	-.003	4	0	1
81		3	max	375.578	1	0	1	-.213	10	0	1	0	12	0	1
82			min	24.603	15	0	1	-28.842	4	0	1	-.005	4	0	1
83		4	max	375.643	1	0	1	-.213	10	0	1	0	12	0	1
84			min	24.622	15	0	1	-28.898	4	0	1	-.008	4	0	1
85		5	max	375.707	1	0	1	-.213	10	0	1	0	12	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
86			min	24.642	15	0	1	-28.954	4	0	1	-.01	4	0	1
87		6	max	375.772	1	0	1	-.213	10	0	1	0	12	0	1
88			min	24.661	15	0	1	-29.01	4	0	1	-.013	4	0	1
89		7	max	375.837	1	0	1	-.213	10	0	1	0	12	0	1
90			min	24.681	15	0	1	-29.066	4	0	1	-.015	4	0	1
91		8	max	375.902	1	0	1	-.213	10	0	1	0	12	0	1
92			min	24.7	15	0	1	-29.122	4	0	1	-.018	4	0	1
93		9	max	375.966	1	0	1	-.213	10	0	1	0	12	0	1
94			min	24.72	15	0	1	-29.178	4	0	1	-.021	4	0	1
95		10	max	376.031	1	0	1	-.213	10	0	1	0	12	0	1
96			min	24.739	15	0	1	-29.234	4	0	1	-.023	4	0	1
97		11	max	376.096	1	0	1	-.213	10	0	1	0	12	0	1
98			min	24.759	15	0	1	-29.291	4	0	1	-.026	4	0	1
99		12	max	376.16	1	0	1	-.213	10	0	1	0	12	0	1
100			min	24.778	15	0	1	-29.347	4	0	1	-.029	4	0	1
101		13	max	376.225	1	0	1	-.213	10	0	1	0	12	0	1
102			min	24.798	15	0	1	-29.403	4	0	1	-.031	4	0	1
103		14	max	376.29	1	0	1	-.213	10	0	1	0	12	0	1
104			min	24.817	15	0	1	-29.459	4	0	1	-.034	4	0	1
105		15	max	376.354	1	0	1	-.213	10	0	1	0	12	0	1
106			min	24.837	15	0	1	-29.515	4	0	1	-.036	4	0	1
107		16	max	376.419	1	0	1	-.213	10	0	1	0	12	0	1
108			min	24.856	15	0	1	-29.571	4	0	1	-.039	4	0	1
109		17	max	376.484	1	0	1	-.213	10	0	1	0	12	0	1
110			min	24.876	15	0	1	-29.627	4	0	1	-.042	4	0	1
111		18	max	376.549	1	0	1	-.213	10	0	1	0	12	0	1
112			min	24.895	15	0	1	-29.683	4	0	1	-.044	4	0	1
113		19	max	376.613	1	0	1	-.213	10	0	1	0	12	0	1
114			min	24.915	15	0	1	-29.739	4	0	1	-.047	4	0	1
115	M6	1	max	803.773	1	.664	6	1.274	4	0	3	0	3	0	1
116			min	-1163.955	3	.148	15	-.159	3	0	5	0	11	0	1
117		2	max	803.908	1	.607	6	1.151	4	0	3	0	4	0	15
118			min	-1163.853	3	.134	15	-.159	3	0	5	0	11	0	6
119		3	max	804.042	1	.549	6	1.027	4	0	3	0	4	0	15
120			min	-1163.752	3	.121	15	-.159	3	0	5	0	11	0	6
121		4	max	804.177	1	.492	6	.904	4	0	3	0	4	0	15
122			min	-1163.651	3	.107	15	-.159	3	0	5	0	10	0	6
123		5	max	804.312	1	.446	2	.781	4	0	3	0	4	0	15
124			min	-1163.55	3	.094	15	-.159	3	0	5	0	10	0	6
125		6	max	804.447	1	.401	2	.658	4	0	3	.001	4	0	15
126			min	-1163.449	3	.075	12	-.159	3	0	5	0	10	0	6
127		7	max	804.582	1	.357	2	.535	4	0	3	.001	4	0	15
128			min	-1163.348	3	.052	12	-.159	3	0	5	0	10	0	6
129		8	max	804.717	1	.312	2	.412	4	0	3	.001	4	0	15
130			min	-1163.247	3	.03	12	-.159	3	0	5	0	3	0	2
131		9	max	804.852	1	.267	2	.288	4	0	3	.001	4	0	15
132			min	-1163.145	3	.004	3	-.159	3	0	5	0	3	0	2
133		10	max	804.986	1	.222	2	.165	4	0	3	.001	4	0	12
134			min	-1163.044	3	-.03	3	-.159	3	0	5	0	3	0	2
135		11	max	805.121	1	.177	2	.137	1	0	3	.001	4	0	12
136			min	-1162.943	3	-.063	3	-.159	3	0	5	0	3	0	2
137		12	max	805.256	1	.133	2	.137	1	0	3	.001	4	0	12
138			min	-1162.842	3	-.097	3	-.159	3	0	5	0	3	0	2
139		13	max	805.391	1	.088	2	.137	1	0	3	.001	4	0	12
140			min	-1162.741	3	-.131	3	-.244	5	0	5	0	3	0	2
141		14	max	805.526	1	.043	2	.137	1	0	3	.001	4	0	12
142			min	-1162.64	3	-.164	3	-.368	5	0	5	0	3	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
143		15	max	805.661	1	-.002	2	.137	1	0	3	.001	4	0	12
144			min	-1162.539	3	-.198	3	-.491	5	0	5	0	3	0	2
145		16	max	805.796	1	-.046	2	.137	1	0	3	.001	4	0	12
146			min	-1162.437	3	-.231	3	-.614	5	0	5	0	3	0	2
147		17	max	805.931	1	-.069	15	.137	1	0	3	.001	4	0	3
148			min	-1162.336	3	-.265	3	-.737	5	0	5	0	3	0	2
149		18	max	806.065	1	-.082	15	.137	1	0	3	0	4	0	3
150			min	-1162.235	3	-.314	4	-.86	5	0	5	0	3	0	2
151		19	max	806.2	1	-.096	15	.137	1	0	3	0	4	0	3
152			min	-1162.134	3	-.371	4	-.983	5	0	5	0	3	0	2
153	M7	1	max	770.5	2	1.756	4	.03	3	0	14	0	4	0	2
154			min	-668.996	3	.42	15	-1.291	5	0	3	0	3	0	3
155		2	max	770.43	2	1.58	4	.03	3	0	14	0	4	0	2
156			min	-669.048	3	.378	15	-1.157	5	0	3	0	3	0	3
157		3	max	770.36	2	1.403	4	.03	3	0	14	0	2	0	2
158			min	-669.101	3	.337	15	-1.023	5	0	3	0	3	0	3
159		4	max	770.29	2	1.227	4	.03	3	0	14	0	2	0	2
160			min	-669.153	3	.295	15	-.89	5	0	3	0	5	0	3
161		5	max	770.22	2	1.051	4	.03	3	0	14	0	2	0	15
162			min	-669.206	3	.254	15	-.756	5	0	3	0	5	0	3
163		6	max	770.15	2	.874	4	.03	3	0	14	0	2	0	15
164			min	-669.258	3	.212	15	-.622	5	0	3	0	5	0	3
165		7	max	770.08	2	.698	4	.03	3	0	14	0	2	0	15
166			min	-669.311	3	.171	15	-.489	5	0	3	0	5	0	6
167		8	max	770.01	2	.521	4	.03	3	0	14	0	2	0	15
168			min	-669.363	3	.121	12	-.355	5	0	3	0	5	-.001	6
169		9	max	769.94	2	.348	2	.03	3	0	14	0	2	0	15
170			min	-669.416	3	.052	12	-.221	5	0	3	0	5	-.001	6
171		10	max	769.87	2	.21	2	.03	3	0	14	0	2	0	15
172			min	-669.468	3	-.032	3	-.088	5	0	3	0	5	-.001	6
173		11	max	769.8	2	.073	2	.047	4	0	14	0	2	0	15
174			min	-669.521	3	-.136	3	-.008	2	0	3	0	5	-.001	6
175		12	max	769.73	2	-.036	15	.181	4	0	14	0	2	0	15
176			min	-669.573	3	-.239	3	-.008	2	0	3	0	5	-.001	6
177		13	max	769.66	2	-.078	15	.315	4	0	14	0	2	0	15
178			min	-669.626	3	-.361	6	-.008	2	0	3	0	5	-.001	6
179		14	max	769.59	2	-.119	15	.448	4	0	14	0	11	0	15
180			min	-669.678	3	-.537	6	-.008	2	0	3	0	5	-.001	6
181		15	max	769.52	2	-.161	15	.582	4	0	14	0	11	0	15
182			min	-669.731	3	-.714	6	-.008	2	0	3	0	5	0	6
183		16	max	769.45	2	-.202	15	.716	4	0	14	0	11	0	15
184			min	-669.783	3	-.89	6	-.008	2	0	3	0	5	0	6
185		17	max	769.38	2	-.244	15	.849	4	0	14	0	11	0	15
186			min	-669.836	3	-1.067	6	-.008	2	0	3	0	5	0	6
187		18	max	769.31	2	-.285	15	.983	4	0	14	0	11	0	15
188			min	-669.888	3	-1.243	6	-.008	2	0	3	0	5	0	6
189		19	max	769.24	2	-.327	15	1.117	4	0	14	0	14	0	1
190			min	-669.941	3	-1.419	6	-.008	2	0	3	0	3	0	1
191	M8	1	max	940.542	1	0	1	.769	1	0	1	0	4	0	1
192			min	32.9	15	0	1	-28.749	4	0	1	0	1	0	1
193		2	max	940.607	1	0	1	.769	1	0	1	0	1	0	1
194			min	32.919	15	0	1	-28.805	4	0	1	-.003	4	0	1
195		3	max	940.672	1	0	1	.769	1	0	1	0	1	0	1
196			min	32.939	15	0	1	-28.861	4	0	1	-.005	4	0	1
197		4	max	940.736	1	0	1	.769	1	0	1	0	1	0	1
198			min	32.958	15	0	1	-28.917	4	0	1	-.008	4	0	1
199		5	max	940.801	1	0	1	.769	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
200			min	32.978	15	0	1	-28.974	4	0	1	-.01	4	0	1
201		6	max	940.866	1	0	1	.769	1	0	1	0	1	0	1
202			min	32.997	15	0	1	-29.03	4	0	1	-.013	4	0	1
203		7	max	940.931	1	0	1	.769	1	0	1	0	1	0	1
204			min	33.017	15	0	1	-29.086	4	0	1	-.015	4	0	1
205		8	max	940.995	1	0	1	.769	1	0	1	0	1	0	1
206			min	33.036	15	0	1	-29.142	4	0	1	-.018	4	0	1
207		9	max	941.06	1	0	1	.769	1	0	1	0	1	0	1
208			min	33.056	15	0	1	-29.198	4	0	1	-.021	4	0	1
209		10	max	941.125	1	0	1	.769	1	0	1	0	1	0	1
210			min	33.075	15	0	1	-29.254	4	0	1	-.023	4	0	1
211		11	max	941.189	1	0	1	.769	1	0	1	0	1	0	1
212			min	33.095	15	0	1	-29.31	4	0	1	-.026	4	0	1
213		12	max	941.254	1	0	1	.769	1	0	1	0	1	0	1
214			min	33.114	15	0	1	-29.366	4	0	1	-.029	4	0	1
215		13	max	941.319	1	0	1	.769	1	0	1	0	1	0	1
216			min	33.134	15	0	1	-29.422	4	0	1	-.031	4	0	1
217		14	max	941.383	1	0	1	.769	1	0	1	0	1	0	1
218			min	33.153	15	0	1	-29.478	4	0	1	-.034	4	0	1
219		15	max	941.448	1	0	1	.769	1	0	1	0	1	0	1
220			min	33.173	15	0	1	-29.534	4	0	1	-.036	4	0	1
221		16	max	941.513	1	0	1	.769	1	0	1	.001	1	0	1
222			min	33.192	15	0	1	-29.59	4	0	1	-.039	4	0	1
223		17	max	941.578	1	0	1	.769	1	0	1	.001	1	0	1
224			min	33.212	15	0	1	-29.646	4	0	1	-.042	4	0	1
225		18	max	941.642	1	0	1	.769	1	0	1	.001	1	0	1
226			min	33.231	15	0	1	-29.703	4	0	1	-.044	4	0	1
227		19	max	941.707	1	0	1	.769	1	0	1	.001	1	0	1
228			min	33.251	15	0	1	-29.759	4	0	1	-.047	4	0	1
229	M10	1	max	258.397	1	.707	4	1.442	5	0	1	0	1	0	1
230			min	-329.194	3	.179	15	-.184	1	-.002	5	0	5	0	1
231		2	max	258.531	1	.65	4	1.319	5	0	1	0	1	0	15
232			min	-329.093	3	.166	15	-.184	1	-.002	5	0	3	0	4
233		3	max	258.666	1	.592	4	1.196	5	0	1	0	4	0	15
234			min	-328.992	3	.152	15	-.184	1	-.002	5	0	3	0	4
235		4	max	258.801	1	.535	4	1.072	5	0	1	0	4	0	15
236			min	-328.891	3	.139	15	-.184	1	-.002	5	0	3	0	4
237		5	max	258.936	1	.477	4	.949	5	0	1	0	4	0	15
238			min	-328.789	3	.125	15	-.184	1	-.002	5	0	3	0	4
239		6	max	259.071	1	.42	4	.826	5	0	1	0	4	0	15
240			min	-328.688	3	.112	15	-.184	1	-.002	5	0	3	0	4
241		7	max	259.206	1	.362	4	.703	5	0	1	.001	4	0	15
242			min	-328.587	3	.098	15	-.184	1	-.002	5	0	3	0	4
243		8	max	259.341	1	.305	4	.58	5	0	1	.001	4	0	15
244			min	-328.486	3	.085	15	-.184	1	-.002	5	0	3	0	4
245		9	max	259.475	1	.247	4	.457	5	0	1	.001	4	0	15
246			min	-328.385	3	.071	15	-.184	1	-.002	5	0	3	0	4
247		10	max	259.61	1	.19	4	.333	5	0	1	.001	4	0	15
248			min	-328.284	3	.052	12	-.184	1	-.002	5	0	3	0	4
249		11	max	259.745	1	.132	4	.21	5	0	1	.001	4	0	15
250			min	-328.183	3	.03	12	-.184	1	-.002	5	0	3	0	4
251		12	max	259.88	1	.075	4	.087	5	0	1	.001	4	0	15
252			min	-328.081	3	.007	12	-.184	1	-.002	5	0	3	0	4
253		13	max	260.015	1	.025	5	.006	3	0	1	.001	4	0	15
254			min	-327.98	3	-.023	3	-.184	1	-.002	5	0	3	0	4
255		14	max	260.15	1	.004	5	.006	3	0	1	.001	4	0	15
256			min	-327.879	3	-.066	1	-.193	4	-.002	5	0	3	0	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
257		15	max	260.285	1	-.01	15	.006	3	0	1	.001	5	0	15
258			min	-327.778	3	-.11	1	-.317	4	-.002	5	0	3	0	4
259		16	max	260.42	1	-.023	15	.006	3	0	1	.001	5	0	15
260			min	-327.677	3	-.156	6	-.44	4	-.002	5	0	1	0	4
261		17	max	260.554	1	-.037	15	.006	3	0	1	.001	5	0	15
262			min	-327.576	3	-.214	6	-.563	4	-.002	5	0	1	0	4
263		18	max	260.689	1	-.05	15	.006	3	0	1	.001	5	0	12
264			min	-327.474	3	-.271	6	-.686	4	-.002	5	0	1	0	4
265		19	max	260.824	1	-.064	15	.006	3	0	1	0	5	0	12
266			min	-327.373	3	-.329	6	-.809	4	-.002	5	0	1	0	4
267	M11	1	max	200.029	2	1.721	6	.549	1	.002	4	0	5	0	1
268			min	-214.33	3	.398	15	-1.216	5	0	10	-.002	1	0	12
269		2	max	199.959	2	1.545	6	.549	1	.002	4	0	5	0	1
270			min	-214.383	3	.357	15	-1.082	5	0	10	-.002	1	0	3
271		3	max	199.889	2	1.368	6	.549	1	.002	4	0	5	0	1
272			min	-214.435	3	.315	15	-.949	5	0	10	-.001	1	0	3
273		4	max	199.819	2	1.192	6	.549	1	.002	4	0	3	0	15
274			min	-214.488	3	.274	15	-.815	5	0	10	-.001	1	0	4
275		5	max	199.749	2	1.015	6	.549	1	.002	4	0	3	0	15
276			min	-214.54	3	.232	15	-.681	5	0	10	-.001	1	0	4
277		6	max	199.679	2	.839	6	.549	1	.002	4	0	3	0	15
278			min	-214.593	3	.191	15	-.548	5	0	10	-.001	1	0	4
279		7	max	199.609	2	.663	6	.549	1	.002	4	0	3	0	15
280			min	-214.645	3	.149	15	-.414	5	0	10	-.001	1	-.001	4
281		8	max	199.539	2	.486	6	.549	1	.002	4	0	3	0	15
282			min	-214.698	3	.108	15	-.28	5	0	10	0	1	-.001	4
283		9	max	199.469	2	.31	6	.549	1	.002	4	0	3	0	15
284			min	-214.75	3	.066	15	-.147	5	0	10	0	1	-.001	4
285		10	max	199.399	2	.142	1	.549	1	.002	4	0	3	0	15
286			min	-214.803	3	.024	12	-.019	3	0	10	0	1	-.001	4
287		11	max	199.329	2	.005	1	.549	1	.002	4	0	3	0	15
288			min	-214.855	3	-.07	3	-.019	3	0	10	0	1	-.001	4
289		12	max	199.259	2	-.058	15	.549	1	.002	4	0	3	0	15
290			min	-214.908	3	-.22	4	-.019	3	0	10	0	1	-.001	4
291		13	max	199.189	2	-.099	15	.549	1	.002	4	0	3	0	15
292			min	-214.96	3	-.396	4	-.019	3	0	10	0	1	-.001	4
293		14	max	199.119	2	-.141	15	.643	4	.002	4	0	3	0	15
294			min	-215.013	3	-.572	4	-.019	3	0	10	0	1	-.001	4
295		15	max	199.049	2	-.182	15	.777	4	.002	4	0	3	0	15
296			min	-215.065	3	-.749	4	-.019	3	0	10	0	1	0	4
297		16	max	198.979	2	-.224	15	.91	4	.002	4	0	3	0	15
298			min	-215.118	3	-.925	4	-.019	3	0	10	0	10	0	4
299		17	max	198.909	2	-.265	15	1.044	4	.002	4	0	4	0	15
300			min	-215.17	3	-1.102	4	-.019	3	0	10	0	10	0	4
301		18	max	198.839	2	-.307	15	1.178	4	.002	4	0	4	0	15
302			min	-215.223	3	-1.278	4	-.019	3	0	10	0	10	0	4
303		19	max	198.769	2	-.348	15	1.311	4	.002	4	0	4	0	1
304			min	-215.275	3	-1.454	4	-.019	3	0	10	0	10	0	1
305	M12	1	max	375.105	1	0	1	3.417	1	0	1	0	4	0	1
306			min	7.853	15	0	1	-26.303	5	0	1	0	3	0	1
307		2	max	375.17	1	0	1	3.417	1	0	1	0	1	0	1
308			min	7.872	15	0	1	-26.359	5	0	1	-.002	5	0	1
309		3	max	375.235	1	0	1	3.417	1	0	1	0	1	0	1
310			min	7.892	15	0	1	-26.415	5	0	1	-.005	5	0	1
311		4	max	375.3	1	0	1	3.417	1	0	1	0	1	0	1
312			min	7.911	15	0	1	-26.471	5	0	1	-.007	5	0	1
313		5	max	375.364	1	0	1	3.417	1	0	1	.001	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
314			min	7.931	15	0	1	-26.527	5	0	1	-.009	5	0	1
315		6	max	375.429	1	0	1	3.417	1	0	1	.002	1	0	1
316			min	7.95	15	0	1	-26.583	5	0	1	-.012	5	0	1
317		7	max	375.494	1	0	1	3.417	1	0	1	.002	1	0	1
318			min	7.97	15	0	1	-26.639	5	0	1	-.014	5	0	1
319		8	max	375.558	1	0	1	3.417	1	0	1	.002	1	0	1
320			min	7.989	15	0	1	-26.695	5	0	1	-.017	5	0	1
321		9	max	375.623	1	0	1	3.417	1	0	1	.002	1	0	1
322			min	8.009	15	0	1	-26.751	5	0	1	-.019	5	0	1
323		10	max	375.688	1	0	1	3.417	1	0	1	.003	1	0	1
324			min	8.029	15	0	1	-26.807	5	0	1	-.021	5	0	1
325		11	max	375.753	1	0	1	3.417	1	0	1	.003	1	0	1
326			min	8.048	15	0	1	-26.864	5	0	1	-.024	5	0	1
327		12	max	375.817	1	0	1	3.417	1	0	1	.003	1	0	1
328			min	8.068	15	0	1	-26.92	5	0	1	-.026	5	0	1
329		13	max	375.882	1	0	1	3.417	1	0	1	.004	1	0	1
330			min	8.087	15	0	1	-26.976	5	0	1	-.029	5	0	1
331		14	max	375.947	1	0	1	3.417	1	0	1	.004	1	0	1
332			min	8.107	15	0	1	-27.032	5	0	1	-.031	5	0	1
333		15	max	376.011	1	0	1	3.417	1	0	1	.004	1	0	1
334			min	8.126	15	0	1	-27.088	5	0	1	-.033	5	0	1
335		16	max	376.076	1	0	1	3.417	1	0	1	.005	1	0	1
336			min	8.146	15	0	1	-27.144	5	0	1	-.036	5	0	1
337		17	max	376.141	1	0	1	3.417	1	0	1	.005	1	0	1
338			min	8.165	15	0	1	-27.2	5	0	1	-.038	5	0	1
339		18	max	376.205	1	0	1	3.417	1	0	1	.005	1	0	1
340			min	8.185	15	0	1	-27.256	5	0	1	-.041	5	0	1
341		19	max	376.27	1	0	1	3.417	1	0	1	.006	1	0	1
342			min	8.204	15	0	1	-27.312	5	0	1	-.043	5	0	1
343	M1	1	max	139.568	1	336.601	3	-4.114	12	0	1	.134	1	0	2
344			min	7.348	12	-245.396	1	-67.8	1	0	3	.009	12	0	3
345		2	max	139.728	1	336.43	3	-4.114	12	0	1	.119	1	.053	1
346			min	7.428	12	-245.625	1	-67.8	1	0	3	.008	12	-.073	3
347		3	max	114.721	3	6.523	9	-4.138	12	0	12	.103	1	.106	1
348			min	-15.647	10	-27.926	2	-67.713	1	0	1	.007	12	-.145	3
349		4	max	114.841	3	6.332	9	-4.138	12	0	12	.089	1	.11	2
350			min	-15.513	10	-28.155	2	-67.713	1	0	1	.006	12	-.143	3
351		5	max	114.962	3	6.142	9	-4.138	12	0	12	.074	1	.116	2
352			min	-15.38	10	-28.384	2	-67.713	1	0	1	.005	12	-.141	3
353		6	max	115.082	3	5.951	9	-4.138	12	0	12	.059	1	.122	2
354			min	-15.246	10	-28.612	2	-67.713	1	0	1	.004	12	-.139	3
355		7	max	115.202	3	5.76	9	-4.138	12	0	12	.044	1	.128	2
356			min	-15.113	10	-28.841	2	-67.713	1	0	1	.003	12	-.137	3
357		8	max	115.322	3	5.57	9	-4.138	12	0	12	.03	1	.134	2
358			min	-14.979	10	-29.07	2	-67.713	1	0	1	.003	12	-.135	3
359		9	max	115.442	3	5.379	9	-4.138	12	0	12	.015	1	.141	2
360			min	-14.846	10	-29.299	2	-67.713	1	0	1	.002	10	-.133	3
361		10	max	115.562	3	5.189	9	-4.138	12	0	12	.002	4	.147	2
362			min	-14.712	10	-29.527	2	-67.713	1	0	1	0	10	-.13	3
363		11	max	115.682	3	4.998	9	-4.138	12	0	12	0	12	.153	2
364			min	-14.579	10	-29.756	2	-67.713	1	0	1	-.014	1	-.128	3
365		12	max	115.802	3	4.807	9	-4.138	12	0	12	-.001	12	.16	2
366			min	-14.445	10	-29.985	2	-67.713	1	0	1	-.029	1	-.126	3
367		13	max	115.923	3	4.617	9	-4.138	12	0	12	-.002	12	.166	2
368			min	-14.312	10	-30.214	2	-67.713	1	0	1	-.044	1	-.124	3
369		14	max	116.043	3	4.426	9	-4.138	12	0	12	-.003	12	.173	2
370			min	-14.179	10	-30.442	2	-67.713	1	0	1	-.058	1	-.121	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
371		15	max	116.163	3	4.236	9	-4.138	12	0	12	-.004	12	.18	2
372			min	-14.045	10	-30.671	2	-67.713	1	0	1	-.073	1	-.119	3
373		16	max	90.92	2	144.71	2	-4.175	12	0	1	-.005	12	.185	2
374			min	2.765	15	-201.058	3	-68.109	1	0	5	-.088	1	-.115	3
375		17	max	91.08	2	144.481	2	-4.175	12	0	1	-.006	12	.153	2
376			min	2.813	15	-201.23	3	-68.109	1	0	5	-.103	1	-.071	3
377		18	max	-6.571	12	355.165	2	-4.399	12	0	3	-.007	12	.077	2
378			min	-139.414	1	-163.622	3	-69.841	1	0	2	-.118	1	-.036	3
379		19	max	-6.491	12	354.937	2	-4.399	12	0	3	-.007	12	0	2
380			min	-139.254	1	-163.793	3	-69.841	1	0	2	-.133	1	0	3
381	M5	1	max	307.876	1	1110.684	3	-.034	10	0	1	.04	4	0	3
382			min	10.891	15	-810.476	1	-51.135	3	0	5	0	10	0	2
383		2	max	308.036	1	1110.513	3	-.034	10	0	1	.035	4	.175	1
384			min	10.94	15	-810.705	1	-51.135	3	0	5	-.005	3	-.24	3
385		3	max	358.745	3	5.51	9	5.873	3	0	3	.029	4	.348	1
386			min	-73.711	2	-103.214	2	-21.862	4	0	4	-.016	3	-.476	3
387		4	max	358.865	3	5.32	9	5.873	3	0	3	.024	4	.362	2
388			min	-73.551	2	-103.442	2	-21.62	4	0	4	-.015	3	-.469	3
389		5	max	358.985	3	5.129	9	5.873	3	0	3	.02	4	.384	2
390			min	-73.391	2	-103.671	2	-21.378	4	0	4	-.013	3	-.461	3
391		6	max	359.105	3	4.938	9	5.873	3	0	3	.015	4	.407	2
392			min	-73.23	2	-103.9	2	-21.136	4	0	4	-.012	3	-.453	3
393		7	max	359.226	3	4.748	9	5.873	3	0	3	.01	4	.429	2
394			min	-73.07	2	-104.129	2	-20.894	4	0	4	-.011	3	-.446	3
395		8	max	359.346	3	4.557	9	5.873	3	0	3	.006	4	.452	2
396			min	-72.91	2	-104.357	2	-20.652	4	0	4	-.01	3	-.438	3
397		9	max	359.466	3	4.367	9	5.873	3	0	3	.002	4	.475	2
398			min	-72.75	2	-104.586	2	-20.41	4	0	4	-.008	3	-.43	3
399		10	max	359.586	3	4.176	9	5.873	3	0	3	0	10	.497	2
400			min	-72.59	2	-104.815	2	-20.168	4	0	4	-.007	3	-.422	3
401		11	max	359.706	3	3.985	9	5.873	3	0	3	0	10	.52	2
402			min	-72.43	2	-105.044	2	-19.926	4	0	4	-.007	4	-.414	3
403		12	max	359.826	3	3.795	9	5.873	3	0	3	0	10	.543	2
404			min	-72.269	2	-105.272	2	-19.684	4	0	4	-.012	4	-.406	3
405		13	max	359.946	3	3.604	9	5.873	3	0	3	0	10	.566	2
406			min	-72.109	2	-105.501	2	-19.442	4	0	4	-.016	4	-.399	3
407		14	max	360.066	3	3.414	9	5.873	3	0	3	0	10	.589	2
408			min	-71.949	2	-105.73	2	-19.2	4	0	4	-.02	4	-.391	3
409		15	max	360.187	3	3.223	9	5.873	3	0	3	0	10	.612	2
410			min	-71.789	2	-105.959	2	-18.958	4	0	4	-.024	4	-.383	3
411		16	max	290.035	2	576.388	2	5.856	3	0	1	0	3	.629	2
412			min	3.4	15	-629.742	3	-17.613	4	0	4	-.028	4	-.369	3
413		17	max	290.196	2	576.159	2	5.856	3	0	1	.001	3	.504	2
414			min	3.449	15	-629.913	3	-17.371	4	0	4	-.032	4	-.233	3
415		18	max	-12.47	12	1167.869	2	5.343	3	0	4	.003	3	.253	2
416			min	-308.455	1	-536.249	3	-44.936	5	0	1	-.041	4	-.116	3
417		19	max	-12.39	12	1167.64	2	5.343	3	0	4	.004	3	0	3
418			min	-308.294	1	-536.42	3	-44.694	5	0	1	-.051	4	0	2
419	M9	1	max	138.96	1	336.562	3	192.178	4	0	3	-.003	15	0	2
420			min	4.367	15	-245.387	1	7.344	10	0	1	-.133	1	0	3
421		2	max	139.121	1	336.391	3	192.42	4	0	3	.034	5	.053	1
422			min	4.415	15	-245.616	1	7.344	10	0	1	-.115	1	-.073	3
423		3	max	114.875	3	6.503	9	64.962	1	0	1	.07	5	.106	1
424			min	-15.113	10	-27.934	2	-27.21	5	0	5	-.097	1	-.145	3
425		4	max	114.995	3	6.313	9	64.962	1	0	1	.064	5	.109	2
426			min	-14.98	10	-28.163	2	-26.968	5	0	5	-.083	1	-.143	3
427		5	max	115.115	3	6.122	9	64.962	1	0	1	.058	5	.116	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
428			min	-14.846	10	-28.391	2	-26.726	5	0	5	-.069	1	-.141	3
429		6	max	115.235	3	5.931	9	64.962	1	0	1	.052	5	.122	2
430			min	-14.713	10	-28.62	2	-26.484	5	0	5	-.055	1	-.139	3
431		7	max	115.355	3	5.741	9	64.962	1	0	1	.047	5	.128	2
432			min	-14.58	10	-28.849	2	-26.242	5	0	5	-.04	1	-.137	3
433		8	max	115.476	3	5.55	9	64.962	1	0	1	.041	5	.134	2
434			min	-14.446	10	-29.078	2	-26	5	0	5	-.026	1	-.135	3
435		9	max	115.596	3	5.359	9	64.962	1	0	1	.035	5	.141	2
436			min	-14.313	10	-29.306	2	-25.758	5	0	5	-.012	1	-.133	3
437		10	max	115.716	3	5.169	9	64.962	1	0	1	.03	4	.147	2
438			min	-14.179	10	-29.535	2	-25.516	5	0	5	0	2	-.13	3
439		11	max	115.836	3	4.978	9	64.962	1	0	1	.028	4	.153	2
440			min	-14.046	10	-29.764	2	-25.274	5	0	5	.002	10	-.128	3
441		12	max	115.956	3	4.788	9	64.962	1	0	1	.03	1	.16	2
442			min	-13.912	10	-29.993	2	-25.032	5	0	5	.003	10	-.126	3
443		13	max	116.076	3	4.597	9	64.962	1	0	1	.044	1	.166	2
444			min	-13.779	10	-30.221	2	-24.79	5	0	5	.005	10	-.124	3
445		14	max	116.196	3	4.406	9	64.962	1	0	1	.058	1	.173	2
446			min	-13.645	10	-30.45	2	-24.548	5	0	5	.005	15	-.121	3
447		15	max	116.316	3	4.216	9	64.962	1	0	1	.072	1	.18	2
448			min	-13.512	10	-30.679	2	-24.306	5	0	5	.002	15	-.119	3
449		16	max	91.275	2	144.428	2	65.417	1	0	10	.087	1	.185	2
450			min	4.393	15	-201.568	3	-22.879	5	0	4	0	5	-.115	3
451		17	max	91.435	2	144.199	2	65.417	1	0	10	.101	1	.153	2
452			min	4.441	15	-201.739	3	-22.637	5	0	4	-.006	5	-.071	3
453		18	max	-.015	15	355.166	2	68.926	1	0	2	.116	1	.077	2
454			min	-139.016	1	-163.617	3	-48.622	5	0	3	-.016	5	-.036	3
455		19	max	.033	15	354.938	2	68.926	1	0	2	.131	1	0	2
456			min	-138.856	1	-163.788	3	-48.38	5	0	3	-.027	5	0	3
457	M13	1	max	192.193	4	245.006	1	-4.367	15	0	2	.133	1	0	1
458			min	7.347	10	-336.563	3	-138.944	1	0	3	.003	15	0	3
459		2	max	184.827	4	172.944	1	-2.896	15	0	2	.041	1	.215	3
460			min	7.347	10	-237.477	3	-106.366	1	0	3	0	15	-.157	1
461		3	max	177.461	4	100.883	1	-1.426	15	0	2	.004	3	.356	3
462			min	7.347	10	-138.39	3	-73.788	1	0	3	-.027	1	-.259	1
463		4	max	170.095	4	28.821	1	.045	15	0	2	0	3	.423	3
464			min	7.347	10	-39.304	3	-41.21	1	0	3	-.07	1	-.308	1
465		5	max	162.728	4	59.783	3	2.235	5	0	2	-.002	15	.415	3
466			min	7.347	10	-43.241	1	-8.632	1	0	3	-.089	1	-.303	1
467		6	max	155.362	4	158.869	3	23.946	1	0	2	0	15	.333	3
468			min	7.347	10	-115.302	1	-.091	3	0	3	-.083	1	-.243	1
469		7	max	147.996	4	257.956	3	56.524	1	0	2	.004	5	.177	3
470			min	7.347	10	-187.364	1	1.434	12	0	3	-.053	1	-.13	1
471		8	max	140.63	4	357.042	3	89.103	1	0	2	.01	4	.038	1
472			min	7.347	10	-259.426	1	2.861	12	0	3	0	3	-.054	3
473		9	max	133.264	4	456.128	3	121.681	1	0	2	.081	1	.259	1
474			min	7.347	10	-331.487	1	4.288	12	0	3	.002	12	-.359	3
475		10	max	125.897	4	555.215	3	154.259	1	0	2	.184	1	.535	1
476			min	7.347	10	-403.549	1	5.714	12	0	3	.006	12	-.738	3
477		11	max	93.159	4	331.487	1	-.552	15	0	3	.078	1	.259	1
478			min	4.115	12	-456.128	3	-121.071	1	0	2	-.014	5	-.359	3
479		12	max	85.793	4	259.426	1	1.131	5	0	3	.002	2	.038	1
480			min	4.115	12	-357.042	3	-88.493	1	0	2	-.014	4	-.054	3
481		13	max	78.426	4	187.364	1	3.406	5	0	3	-.005	12	.177	3
482			min	4.115	12	-257.955	3	-55.915	1	0	2	-.055	1	-.13	1
483		14	max	71.06	4	115.302	1	5.681	5	0	3	-.005	12	.333	3
484			min	4.115	12	-158.869	3	-23.337	1	0	2	-.084	1	-.243	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
485		15	max	68.026	1	43.241	1	10.27	4	0	3	-.002	15	.415	3
486			min	4.115	12	-59.783	3	.416	10	0	2	-.09	1	-.303	1
487		16	max	68.026	1	39.304	3	41.819	1	0	3	.004	5	.423	3
488			min	4.115	12	-28.821	1	3.069	12	0	2	-.07	1	-.308	1
489		17	max	68.026	1	138.39	3	74.397	1	0	3	.012	5	.356	3
490			min	4.115	12	-100.883	1	4.495	12	0	2	-.027	1	-.259	1
491		18	max	68.026	1	237.477	3	106.976	1	0	3	.041	1	.215	3
492			min	4.115	12	-172.944	1	5.922	12	0	2	.003	10	-.157	1
493		19	max	68.026	1	336.563	3	139.554	1	0	3	.134	1	0	1
494			min	4.115	12	-245.006	1	7.349	12	0	2	.009	12	0	3
495	M16	1	max	48.381	5	355.168	2	.033	15	0	3	.131	1	0	2
496			min	-68.682	1	-163.821	3	-138.871	1	0	2	-.027	5	0	3
497		2	max	41.015	5	250.724	2	1.948	5	0	3	.039	1	.105	3
498			min	-68.682	1	-115.806	3	-106.292	1	0	2	-.026	5	-.227	2
499		3	max	33.648	5	146.279	2	4.223	5	0	3	0	12	.174	3
500			min	-68.682	1	-67.792	3	-73.714	1	0	2	-.03	4	-.376	2
501		4	max	26.282	5	41.835	2	6.498	5	0	3	-.003	12	.207	3
502			min	-68.682	1	-19.777	3	-41.136	1	0	2	-.071	1	-.447	2
503		5	max	18.916	5	28.237	3	8.773	5	0	3	-.005	12	.203	3
504			min	-68.682	1	-62.61	2	-8.558	1	0	2	-.09	1	-.439	2
505		6	max	11.55	5	76.251	3	24.02	1	0	3	-.004	15	.164	3
506			min	-68.682	1	-167.054	2	.333	12	0	2	-.084	1	-.353	2
507		7	max	4.184	5	124.266	3	56.598	1	0	3	.003	5	.089	3
508			min	-68.682	1	-271.498	2	1.76	12	0	2	-.054	1	-.188	2
509		8	max	-1.046	12	172.28	3	89.176	1	0	3	.014	4	.055	2
510			min	-68.682	1	-375.943	2	3.186	12	0	2	-.004	3	-.022	3
511		9	max	-1.046	12	220.295	3	121.754	1	0	3	.08	1	.376	2
512			min	-68.682	1	-480.387	2	4.613	12	0	2	0	12	-.169	3
513		10	max	26.811	5	-11.759	15	154.332	1	0	14	.184	1	.775	2
514			min	-69.622	1	-584.831	2	-9.49	3	0	2	.007	12	-.353	3
515		11	max	19.445	5	480.387	2	-.586	15	0	2	.08	1	.376	2
516			min	-69.622	1	-220.295	3	-121.356	1	0	3	-.012	5	-.169	3
517		12	max	12.078	5	375.943	2	1.078	5	0	2	.002	2	.055	2
518			min	-69.622	1	-172.28	3	-88.778	1	0	3	-.012	4	-.022	3
519		13	max	4.712	5	271.498	2	3.353	5	0	2	-.002	12	.089	3
520			min	-69.622	1	-124.266	3	-56.2	1	0	3	-.054	1	-.188	2
521		14	max	-1.659	15	167.054	2	5.628	5	0	2	-.003	12	.164	3
522			min	-69.622	1	-76.251	3	-23.622	1	0	3	-.084	1	-.353	2
523		15	max	-4.398	12	62.609	2	10.192	4	0	2	-.001	15	.203	3
524			min	-69.622	1	-28.237	3	.428	10	0	3	-.089	1	-.439	2
525		16	max	-4.398	12	19.778	3	41.534	1	0	2	.005	5	.207	3
526			min	-69.622	1	-41.835	2	2.21	12	0	3	-.07	1	-.447	2
527		17	max	-4.398	12	67.792	3	74.112	1	0	2	.014	5	.174	3
528			min	-69.622	1	-146.279	2	3.637	12	0	3	-.027	1	-.376	2
529		18	max	-4.398	12	115.806	3	106.69	1	0	2	.041	1	.105	3
530			min	-69.622	1	-250.724	2	5.063	12	0	3	.003	12	-.227	2
531		19	max	-4.398	12	163.821	3	139.268	1	0	2	.133	1	0	2
532			min	-69.622	1	-355.168	2	6.49	12	0	3	.007	12	0	3
533	M15	1	max	0	2	1.847	1	.049	3	0	1	0	1	0	1
534			min	-63.965	3	0	2	-.039	1	0	3	0	3	0	1
535		2	max	0	2	1.642	1	.049	3	0	1	0	1	0	2
536			min	-64.04	3	0	2	-.039	1	0	3	0	3	0	1
537		3	max	0	2	1.437	1	.049	3	0	1	0	1	0	2
538			min	-64.116	3	0	2	-.039	1	0	3	0	3	-.001	1
539		4	max	0	2	1.231	1	.049	3	0	1	0	1	0	2
540			min	-64.191	3	0	2	-.039	1	0	3	0	3	-.002	1
541		5	max	0	2	1.026	1	.049	3	0	1	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
542			min	-64.267	3	0	2	-.039	1	0	3	0	3	-.002	1
543		6	max	0	2	.821	1	.049	3	0	1	0	1	0	2
544			min	-64.343	3	0	2	-.039	1	0	3	0	3	-.003	1
545		7	max	0	2	.616	1	.049	3	0	1	0	3	0	2
546			min	-64.418	3	0	2	-.039	1	0	3	0	1	-.003	1
547		8	max	0	2	.41	1	.049	3	0	1	0	3	0	2
548			min	-64.494	3	0	2	-.039	1	0	3	0	1	-.003	1
549		9	max	0	2	.205	1	.049	3	0	1	0	3	0	2
550			min	-64.569	3	0	2	-.039	1	0	3	0	1	-.003	1
551		10	max	0	2	0	1	.049	3	0	1	0	3	0	2
552			min	-64.645	3	0	1	-.039	1	0	3	0	1	-.004	1
553		11	max	0	2	0	2	.049	3	0	1	0	3	0	2
554			min	-64.72	3	-.205	1	-.039	1	0	3	0	1	-.003	1
555		12	max	0	2	0	2	.049	3	0	1	0	3	0	2
556			min	-64.796	3	-.41	1	-.039	1	0	3	0	1	-.003	1
557		13	max	0	2	0	2	.049	3	0	1	0	3	0	2
558			min	-64.871	3	-.616	1	-.039	1	0	3	0	1	-.003	1
559		14	max	0	2	0	2	.049	3	0	1	0	3	0	2
560			min	-64.947	3	-.821	1	-.039	1	0	3	0	1	-.003	1
561		15	max	0	2	0	2	.049	3	0	1	0	3	0	2
562			min	-65.022	3	-1.026	1	-.039	1	0	3	0	1	-.002	1
563		16	max	0	2	0	2	.049	3	0	1	0	3	0	2
564			min	-65.098	3	-1.231	1	-.039	1	0	3	0	1	-.002	1
565		17	max	0	2	0	2	.049	3	0	1	0	3	0	2
566			min	-65.173	3	-1.437	1	-.039	1	0	3	0	1	-.001	1
567		18	max	0	2	0	2	.049	3	0	1	0	3	0	2
568			min	-65.249	3	-1.642	1	-.039	1	0	3	0	1	0	1
569		19	max	0	2	0	2	.049	3	0	1	0	3	0	1
570			min	-65.324	3	-1.847	1	-.039	1	0	3	0	1	0	1
571	M16A	1	max	-.859	10	3.146	4	.32	4	0	3	0	3	0	1
572			min	-234.383	4	.924	12	-.02	3	0	2	0	4	0	1
573		2	max	-.775	10	2.796	4	.288	4	0	3	0	3	0	12
574			min	-234.429	4	.821	12	-.02	3	0	2	0	4	-.001	4
575		3	max	-.691	10	2.447	4	.255	4	0	3	0	3	0	12
576			min	-234.475	4	.718	12	-.02	3	0	2	0	4	-.002	4
577		4	max	-.607	10	2.097	4	.223	4	0	3	0	3	0	12
578			min	-234.521	4	.616	12	-.02	3	0	2	0	4	-.003	4
579		5	max	-.523	10	1.748	4	.191	4	0	3	0	3	-.001	12
580			min	-234.568	4	.513	12	-.02	3	0	2	0	1	-.004	4
581		6	max	-.439	10	1.398	4	.159	4	0	3	0	5	-.001	12
582			min	-234.614	4	.41	12	-.02	3	0	2	0	1	-.005	4
583		7	max	-.355	10	1.049	4	.126	4	0	3	0	5	-.002	12
584			min	-234.66	4	.308	12	-.02	3	0	2	0	1	-.005	4
585		8	max	-.271	10	.699	4	.094	4	0	3	0	5	-.002	12
586			min	-234.706	4	.205	12	-.02	3	0	2	0	1	-.006	4
587		9	max	-.187	10	.35	4	.062	4	0	3	0	5	-.002	12
588			min	-234.753	4	.103	12	-.02	3	0	2	0	1	-.006	4
589		10	max	-.103	10	0	1	.029	4	0	3	0	5	-.002	12
590			min	-234.799	4	0	1	-.02	3	0	2	0	1	-.006	4
591		11	max	-.019	10	-.103	12	.023	1	0	3	0	5	-.002	12
592			min	-234.845	4	-.35	4	-.02	3	0	2	0	1	-.006	4
593		12	max	.064	10	-.205	12	.023	1	0	3	0	5	-.002	12
594			min	-234.891	4	-.699	4	-.039	5	0	2	0	1	-.006	4
595		13	max	.148	10	-.308	12	.023	1	0	3	0	5	-.002	12
596			min	-234.938	4	-1.049	4	-.071	5	0	2	0	3	-.005	4
597		14	max	.232	10	-.41	12	.023	1	0	3	0	4	-.001	12
598			min	-234.984	4	-1.398	4	-.103	5	0	2	0	3	-.005	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
599		15	max	.316	10	-.513	12	.023	1	0	3	0	4	-.001	12
600			min	-235.03	4	-1.748	4	-.136	5	0	2	0	3	-.004	4
601		16	max	.4	10	-.616	12	.023	1	0	3	0	4	0	12
602			min	-235.076	4	-2.097	4	-.168	5	0	2	0	3	-.003	4
603		17	max	.484	10	-.718	12	.023	1	0	3	0	1	0	12
604			min	-235.123	4	-2.447	4	-.2	5	0	2	0	5	-.002	4
605		18	max	.568	10	-.821	12	.023	1	0	3	0	1	0	12
606			min	-235.169	4	-2.796	4	-.232	5	0	2	0	5	-.001	4
607		19	max	.652	10	-.924	12	.023	1	0	3	0	1	0	1
608			min	-235.215	4	-3.146	4	-.265	5	0	2	0	5	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.003	1	.01	2	.013	1	1.703e-3	5	NC	3	NC	3
2			min	-.004	3	-.011	3	-.016	5	-1.12e-3	1	4083.109	2	3196.295	1
3		2	max	.002	1	.009	2	.012	1	1.725e-3	5	NC	3	NC	3
4			min	-.004	3	-.01	3	-.016	5	-1.071e-3	1	4470.284	2	3431.114	1
5		3	max	.002	1	.009	2	.011	1	1.747e-3	5	NC	1	NC	3
6			min	-.003	3	-.01	3	-.016	5	-1.022e-3	1	4933.423	2	3709.302	1
7		4	max	.002	1	.008	2	.011	1	1.77e-3	5	NC	1	NC	2
8			min	-.003	3	-.01	3	-.015	5	-9.724e-4	1	5491.327	2	4041.046	1
9		5	max	.002	1	.007	2	.01	1	1.792e-3	5	NC	1	NC	2
10			min	-.003	3	-.009	3	-.015	5	-9.231e-4	1	6169.194	2	4439.951	1
11		6	max	.002	1	.006	2	.009	1	1.814e-3	5	NC	1	NC	2
12			min	-.003	3	-.009	3	-.014	5	-8.738e-4	1	7001.351	2	4924.502	1
13		7	max	.002	1	.005	2	.008	1	1.836e-3	5	NC	1	NC	2
14			min	-.003	3	-.008	3	-.014	5	-8.245e-4	1	8035.459	2	5520.326	1
15		8	max	.002	1	.005	2	.007	1	1.859e-3	5	NC	1	NC	2
16			min	-.002	3	-.008	3	-.013	5	-7.752e-4	1	9339.174	2	6263.785	1
17		9	max	.001	1	.004	2	.006	1	1.881e-3	5	NC	1	NC	2
18			min	-.002	3	-.007	3	-.012	5	-7.259e-4	1	NC	1	7207.921	1
19		10	max	.001	1	.003	2	.005	1	1.903e-3	5	NC	1	NC	2
20			min	-.002	3	-.007	3	-.012	5	-6.766e-4	1	NC	1	8432.664	1
21		11	max	.001	1	.003	2	.004	1	1.925e-3	5	NC	1	NC	1
22			min	-.002	3	-.006	3	-.011	5	-6.273e-4	1	NC	1	NC	1
23		12	max	.001	1	.002	2	.003	1	1.948e-3	5	NC	1	NC	1
24			min	-.001	3	-.005	3	-.01	5	-5.78e-4	1	NC	1	NC	1
25		13	max	0	1	.002	2	.003	1	1.97e-3	5	NC	1	NC	1
26			min	-.001	3	-.005	3	-.009	5	-5.287e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	1.992e-3	5	NC	1	NC	1
28			min	-.001	3	-.004	3	-.007	5	-4.794e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.001	1	2.015e-3	5	NC	1	NC	1
30			min	0	3	-.003	3	-.006	5	-4.301e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	2.037e-3	5	NC	1	NC	1
32			min	0	3	-.002	3	-.005	5	-3.808e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	2.059e-3	5	NC	1	NC	1
34			min	0	3	-.002	3	-.003	5	-3.316e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	2.081e-3	5	NC	1	NC	1
36			min	0	3	0	3	-.002	5	-2.823e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	2.104e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-2.33e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.116e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	-1.006e-3	5	NC	1	NC	1
41		2	max	0	3	0	2	.005	5	1.349e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	-1.022e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
43		3	max	0	3	0	2	.01	5	1.582e-4	1	NC	1	NC	1
44			min	0	2	-.002	3	0	1	-1.037e-3	5	NC	1	9633.166	14
45		4	max	0	3	0	2	.015	5	1.815e-4	1	NC	1	NC	1
46			min	0	2	-.003	3	0	1	-1.053e-3	5	NC	1	6314.433	14
47		5	max	0	3	0	2	.02	5	2.048e-4	1	NC	1	NC	1
48			min	0	2	-.004	3	-.001	1	-1.068e-3	5	NC	1	4667.904	14
49		6	max	0	3	0	2	.025	5	2.282e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	0	1	-1.084e-3	5	NC	1	3688.928	14
51		7	max	0	3	0	2	.03	4	2.515e-4	1	NC	1	NC	1
52			min	0	2	-.005	3	0	1	-1.099e-3	5	NC	1	3042.793	14
53		8	max	0	3	0	2	.035	4	2.748e-4	1	NC	1	NC	1
54			min	0	2	-.006	3	0	1	-1.115e-3	5	NC	1	2586.165	14
55		9	max	.001	3	.001	2	.04	4	2.981e-4	1	NC	1	NC	1
56			min	-.001	2	-.007	3	0	1	-1.13e-3	5	NC	1	2247.454	14
57		10	max	.001	3	.002	2	.045	4	3.214e-4	1	NC	1	NC	1
58			min	-.001	2	-.007	3	0	10	-1.146e-3	5	NC	1	1986.942	14
59		11	max	.001	3	.002	2	.05	4	3.447e-4	1	NC	1	NC	1
60			min	-.001	2	-.008	3	0	10	-1.161e-3	5	NC	1	1780.834	14
61		12	max	.001	3	.003	2	.055	4	3.681e-4	1	NC	1	NC	1
62			min	-.001	2	-.008	3	0	10	-1.177e-3	5	NC	1	1614.016	14
63		13	max	.002	3	.004	2	.06	4	3.914e-4	1	NC	1	NC	1
64			min	-.002	2	-.008	3	0	12	-1.192e-3	5	NC	1	1476.427	14
65		14	max	.002	3	.004	2	.064	4	4.147e-4	1	NC	1	NC	1
66			min	-.002	2	-.008	3	0	12	-1.208e-3	5	NC	1	1361.115	14
67		15	max	.002	3	.005	2	.069	4	4.38e-4	1	NC	1	NC	1
68			min	-.002	2	-.009	3	0	12	-1.223e-3	5	8822.132	2	1263.12	14
69		16	max	.002	3	.006	2	.074	4	4.613e-4	1	NC	1	NC	1
70			min	-.002	2	-.009	3	0	12	-1.239e-3	5	7462.98	2	1178.812	14
71		17	max	.002	3	.007	2	.078	4	4.846e-4	1	NC	1	NC	2
72			min	-.002	2	-.009	3	0	12	-1.254e-3	5	6414.837	2	1105.469	14
73		18	max	.002	3	.008	2	.083	4	5.08e-4	1	NC	1	NC	2
74			min	-.002	2	-.009	3	0	12	-1.27e-3	5	5596.631	2	1041.01	14
75		19	max	.002	3	.009	2	.087	4	5.313e-4	1	NC	3	NC	2
76			min	-.002	2	-.009	3	0	12	-1.285e-3	5	4951.791	2	983.817	14
77	M4	1	max	.002	1	.012	2	0	12	7.036e-3	5	NC	1	NC	3
78			min	0	15	-.011	3	-.092	4	-8.638e-4	1	NC	1	210.456	4
79		2	max	.002	1	.012	2	0	12	7.036e-3	5	NC	1	NC	3
80			min	0	15	-.01	3	-.084	4	-8.638e-4	1	NC	1	229.422	4
81		3	max	.002	1	.011	2	0	12	7.036e-3	5	NC	1	NC	2
82			min	0	15	-.01	3	-.077	4	-8.638e-4	1	NC	1	251.998	4
83		4	max	.001	1	.01	2	0	12	7.036e-3	5	NC	1	NC	2
84			min	0	15	-.009	3	-.069	4	-8.638e-4	1	NC	1	279.132	4
85		5	max	.001	1	.01	2	0	12	7.036e-3	5	NC	1	NC	2
86			min	0	15	-.008	3	-.062	4	-8.638e-4	1	NC	1	312.12	4
87		6	max	.001	1	.009	2	0	12	7.036e-3	5	NC	1	NC	2
88			min	0	15	-.008	3	-.055	4	-8.638e-4	1	NC	1	352.761	4
89		7	max	.001	1	.008	2	0	12	7.036e-3	5	NC	1	NC	2
90			min	0	15	-.007	3	-.048	4	-8.638e-4	1	NC	1	403.621	4
91		8	max	.001	1	.007	2	0	12	7.036e-3	5	NC	1	NC	2
92			min	0	15	-.007	3	-.041	4	-8.638e-4	1	NC	1	468.455	4
93		9	max	0	1	.007	2	0	12	7.036e-3	5	NC	1	NC	1
94			min	0	15	-.006	3	-.035	4	-8.638e-4	1	NC	1	552.941	4
95		10	max	0	1	.006	2	0	12	7.036e-3	5	NC	1	NC	1
96			min	0	15	-.005	3	-.029	4	-8.638e-4	1	NC	1	666.007	4
97		11	max	0	1	.005	2	0	12	7.036e-3	5	NC	1	NC	1
98			min	0	15	-.005	3	-.024	4	-8.638e-4	1	NC	1	822.359	4
99		12	max	0	1	.005	2	0	12	7.036e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
100			min	0	15	-.004	3	-.018	4	-8.638e-4	1	NC	1	1047.643	4
101		13	max	0	1	.004	2	0	12	7.036e-3	5	NC	1	NC	1
102			min	0	15	-.004	3	-.014	4	-8.638e-4	1	NC	1	1389.97	4
103		14	max	0	1	.003	2	0	12	7.036e-3	5	NC	1	NC	1
104			min	0	15	-.003	3	-.01	4	-8.638e-4	1	NC	1	1948.575	4
105		15	max	0	1	.003	2	0	12	7.036e-3	5	NC	1	NC	1
106			min	0	15	-.002	3	-.007	4	-8.638e-4	1	NC	1	2956.598	4
107		16	max	0	1	.002	2	0	12	7.036e-3	5	NC	1	NC	1
108			min	0	15	-.002	3	-.004	4	-8.638e-4	1	NC	1	5076.805	4
109		17	max	0	1	.001	2	0	12	7.036e-3	5	NC	1	NC	1
110			min	0	15	-.001	3	-.002	4	-8.638e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	12	7.036e-3	5	NC	1	NC	1
112			min	0	15	0	3	0	4	-8.638e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	7.036e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-8.638e-4	1	NC	1	NC	1
115	M6	1	max	.008	1	.037	2	.005	1	1.865e-3	4	NC	3	NC	2
116			min	-.012	3	-.035	3	-.016	5	2.533e-7	10	1143.055	2	8850.968	1
117		2	max	.008	1	.035	2	.004	1	1.884e-3	4	NC	3	NC	2
118			min	-.011	3	-.033	3	-.016	5	-3.301e-7	10	1223.77	2	9564.729	1
119		3	max	.007	1	.032	2	.004	1	1.903e-3	4	NC	3	NC	1
120			min	-.011	3	-.031	3	-.016	5	-1.889e-6	2	1316.335	2	NC	1
121		4	max	.007	1	.03	2	.004	1	1.922e-3	4	NC	3	NC	1
122			min	-.01	3	-.029	3	-.016	5	-4.212e-6	2	1423.112	2	NC	1
123		5	max	.007	1	.027	2	.003	1	1.941e-3	4	NC	3	NC	1
124			min	-.009	3	-.027	3	-.015	5	-6.534e-6	2	1547.143	2	NC	1
125		6	max	.006	1	.025	2	.003	1	1.96e-3	4	NC	3	NC	1
126			min	-.009	3	-.026	3	-.015	5	-8.857e-6	2	1692.407	2	NC	1
127		7	max	.006	1	.023	2	.003	1	1.979e-3	4	NC	3	NC	1
128			min	-.008	3	-.024	3	-.014	5	-1.118e-5	2	1864.212	2	NC	1
129		8	max	.005	1	.021	2	.002	1	1.998e-3	4	NC	3	NC	1
130			min	-.007	3	-.022	3	-.014	5	-1.35e-5	2	2069.793	2	NC	1
131		9	max	.005	1	.018	2	.002	1	2.017e-3	4	NC	3	NC	1
132			min	-.007	3	-.02	3	-.013	5	-1.582e-5	2	2319.276	2	NC	1
133		10	max	.004	1	.016	2	.002	1	2.036e-3	4	NC	3	NC	1
134			min	-.006	3	-.018	3	-.012	5	-1.815e-5	2	2627.279	2	9931.28	4
135		11	max	.004	1	.014	2	.001	1	2.055e-3	4	NC	3	NC	1
136			min	-.005	3	-.016	3	-.011	5	-2.047e-5	2	3015.711	2	9983.507	4
137		12	max	.003	1	.012	2	.001	1	2.074e-3	4	NC	3	NC	1
138			min	-.005	3	-.014	3	-.01	5	-2.279e-5	2	3518.982	2	NC	1
139		13	max	.003	1	.01	2	0	1	2.093e-3	4	NC	3	NC	1
140			min	-.004	3	-.012	3	-.009	5	-2.511e-5	2	4194.404	2	NC	1
141		14	max	.002	1	.008	2	0	1	2.112e-3	4	NC	3	NC	1
142			min	-.003	3	-.01	3	-.008	5	-2.778e-5	11	5145.083	2	NC	1
143		15	max	.002	1	.006	2	0	1	2.131e-3	4	NC	1	NC	1
144			min	-.003	3	-.008	3	-.006	5	-3.16e-5	11	6577.155	2	NC	1
145		16	max	.001	1	.005	2	0	1	2.15e-3	4	NC	1	NC	1
146			min	-.002	3	-.006	3	-.005	5	-3.613e-5	1	8971.465	2	NC	1
147		17	max	0	1	.003	2	0	1	2.169e-3	5	NC	1	NC	1
148			min	-.001	3	-.004	3	-.003	5	-4.537e-5	1	NC	1	NC	1
149		18	max	0	1	.002	2	0	1	2.189e-3	5	NC	1	NC	1
150			min	0	3	-.002	3	-.002	5	-5.462e-5	1	NC	1	NC	1
151		19	max	0	1	0	1	0	1	2.21e-3	5	NC	1	NC	1
152			min	0	1	0	1	0	1	-6.387e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	3.02e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-1.057e-3	5	NC	1	NC	1
155		2	max	0	3	.002	2	.005	5	2.668e-5	1	NC	1	NC	1
156			min	0	2	-.002	3	0	1	-1.058e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
157		3	max	0	3	.003	2	.011	5	2.316e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	1	-1.061e-3	4	NC	1	NC	1
159		4	max	.001	3	.005	2	.016	5	1.964e-5	1	NC	1	NC	1
160			min	-.001	2	-.006	3	0	1	-1.064e-3	4	NC	1	NC	1
161		5	max	.002	3	.006	2	.021	5	1.612e-5	1	NC	1	NC	1
162			min	-.002	2	-.008	3	0	1	-1.066e-3	4	7635.773	2	NC	1
163		6	max	.002	3	.008	2	.027	5	2.515e-5	3	NC	1	NC	1
164			min	-.002	2	-.01	3	0	1	-1.069e-3	4	6114.8	2	NC	1
165		7	max	.003	3	.009	2	.032	5	4.455e-5	3	NC	3	NC	1
166			min	-.003	2	-.012	3	0	1	-1.072e-3	4	5078.125	2	NC	1
167		8	max	.003	3	.011	2	.037	5	6.394e-5	3	NC	3	NC	1
168			min	-.003	2	-.014	3	-.001	1	-1.074e-3	4	4320.701	2	NC	1
169		9	max	.003	3	.012	2	.042	5	8.333e-5	3	NC	3	NC	1
170			min	-.004	2	-.016	3	-.001	1	-1.077e-3	4	3740.265	2	NC	1
171		10	max	.004	3	.014	2	.047	5	1.027e-4	3	NC	3	NC	1
172			min	-.004	2	-.017	3	-.001	1	-1.08e-3	4	3280.095	2	NC	1
173		11	max	.004	3	.016	2	.052	5	1.221e-4	3	NC	3	NC	1
174			min	-.005	2	-.019	3	-.001	1	-1.083e-3	4	2906.126	2	NC	1
175		12	max	.005	3	.018	2	.056	4	1.415e-4	3	NC	3	NC	1
176			min	-.005	2	-.02	3	-.002	1	-1.085e-3	4	2596.582	2	NC	1
177		13	max	.005	3	.02	2	.061	4	1.609e-4	3	NC	3	NC	1
178			min	-.006	2	-.022	3	-.002	1	-1.088e-3	4	2336.809	2	NC	1
179		14	max	.005	3	.022	2	.065	4	1.803e-4	3	NC	3	NC	1
180			min	-.006	2	-.023	3	-.002	1	-1.091e-3	4	2116.515	2	NC	1
181		15	max	.006	3	.024	2	.07	4	1.997e-4	3	NC	3	NC	1
182			min	-.007	2	-.024	3	-.002	1	-1.093e-3	4	1928.205	2	NC	1
183		16	max	.006	3	.026	2	.074	4	2.191e-4	3	NC	3	NC	1
184			min	-.007	2	-.025	3	-.002	1	-1.096e-3	4	1766.259	2	NC	1
185		17	max	.007	3	.028	2	.079	4	2.385e-4	3	NC	3	NC	1
186			min	-.008	2	-.026	3	-.002	1	-1.099e-3	4	1626.354	2	NC	1
187		18	max	.007	3	.031	2	.083	4	2.579e-4	3	NC	3	NC	1
188			min	-.008	2	-.027	3	-.002	1	-1.101e-3	4	1505.101	2	NC	1
189		19	max	.008	3	.033	2	.087	4	2.773e-4	3	NC	3	NC	1
190			min	-.009	2	-.028	3	-.002	1	-1.104e-3	4	1399.8	2	NC	1
191	M8	1	max	.004	1	.043	2	.002	1	6.859e-3	4	NC	1	NC	2
192			min	0	15	-.034	3	-.092	4	-2.223e-4	3	NC	1	210.35	4
193		2	max	.004	1	.041	2	.002	1	6.859e-3	4	NC	1	NC	2
194			min	0	15	-.032	3	-.084	4	-2.223e-4	3	NC	1	229.306	4
195		3	max	.004	1	.038	2	.002	1	6.859e-3	4	NC	1	NC	2
196			min	0	15	-.03	3	-.077	4	-2.223e-4	3	NC	1	251.869	4
197		4	max	.004	1	.036	2	.002	1	6.859e-3	4	NC	1	NC	1
198			min	0	15	-.029	3	-.069	4	-2.223e-4	3	NC	1	278.989	4
199		5	max	.003	1	.033	2	.002	1	6.859e-3	4	NC	1	NC	1
200			min	0	15	-.027	3	-.062	4	-2.223e-4	3	NC	1	311.958	4
201		6	max	.003	1	.031	2	.001	1	6.859e-3	4	NC	1	NC	1
202			min	0	15	-.025	3	-.055	4	-2.223e-4	3	NC	1	352.577	4
203		7	max	.003	1	.029	2	.001	1	6.859e-3	4	NC	1	NC	1
204			min	0	15	-.023	3	-.048	4	-2.223e-4	3	NC	1	403.41	4
205		8	max	.003	1	.026	2	.001	1	6.859e-3	4	NC	1	NC	1
206			min	0	15	-.021	3	-.041	4	-2.223e-4	3	NC	1	468.207	4
207		9	max	.002	1	.024	2	0	1	6.859e-3	4	NC	1	NC	1
208			min	0	15	-.019	3	-.035	4	-2.223e-4	3	NC	1	552.647	4
209		10	max	.002	1	.022	2	0	1	6.859e-3	4	NC	1	NC	1
210			min	0	15	-.017	3	-.029	4	-2.223e-4	3	NC	1	665.652	4
211		11	max	.002	1	.019	2	0	1	6.859e-3	4	NC	1	NC	1
212			min	0	15	-.015	3	-.024	4	-2.223e-4	3	NC	1	821.917	4
213		12	max	.002	1	.017	2	0	1	6.859e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
214			min	0	15	-.013	3	-.018	4	-2.223e-4	3	NC	1	1047.078	4
215		13	max	.001	1	.014	2	0	1	6.859e-3	4	NC	1	NC	1
216			min	0	15	-.011	3	-.014	4	-2.223e-4	3	NC	1	1389.216	4
217		14	max	.001	1	.012	2	0	1	6.859e-3	4	NC	1	NC	1
218			min	0	15	-.01	3	-.01	4	-2.223e-4	3	NC	1	1947.513	4
219		15	max	0	1	.01	2	0	1	6.859e-3	4	NC	1	NC	1
220			min	0	15	-.008	3	-.007	4	-2.223e-4	3	NC	1	2954.979	4
221		16	max	0	1	.007	2	0	1	6.859e-3	4	NC	1	NC	1
222			min	0	15	-.006	3	-.004	4	-2.223e-4	3	NC	1	5074.011	4
223		17	max	0	1	.005	2	0	1	6.859e-3	4	NC	1	NC	1
224			min	0	15	-.004	3	-.002	4	-2.223e-4	3	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	6.859e-3	4	NC	1	NC	1
226			min	0	15	-.002	3	0	4	-2.223e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	6.859e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-2.223e-4	3	NC	1	NC	1
229	M10	1	max	.003	1	.01	2	0	3	1.003e-3	1	NC	3	NC	1
230			min	-.003	3	-.011	3	-.007	4	-3.893e-4	3	4085.38	2	NC	1
231		2	max	.003	1	.009	2	0	3	9.516e-4	1	NC	3	NC	1
232			min	-.003	3	-.01	3	-.008	4	-3.759e-4	3	4472.875	2	NC	1
233		3	max	.002	1	.009	2	0	3	9.003e-4	1	NC	1	NC	1
234			min	-.003	3	-.01	3	-.008	4	-3.626e-4	3	4936.419	2	NC	1
235		4	max	.002	1	.008	2	0	3	8.491e-4	1	NC	1	NC	1
236			min	-.003	3	-.01	3	-.008	4	-3.493e-4	3	5494.839	2	NC	1
237		5	max	.002	1	.007	2	0	3	8.283e-4	4	NC	1	NC	1
238			min	-.003	3	-.009	3	-.008	4	-3.359e-4	3	6173.372	2	NC	1
239		6	max	.002	1	.006	2	0	3	8.954e-4	4	NC	1	NC	1
240			min	-.002	3	-.009	3	-.008	4	-3.226e-4	3	7006.401	2	NC	1
241		7	max	.002	1	.005	2	0	3	9.625e-4	4	NC	1	NC	1
242			min	-.002	3	-.008	3	-.008	4	-3.092e-4	3	8041.669	2	NC	1
243		8	max	.002	1	.005	2	0	3	1.03e-3	4	NC	1	NC	1
244			min	-.002	3	-.008	3	-.008	4	-2.959e-4	3	9346.956	2	NC	1
245		9	max	.002	1	.004	2	0	3	1.097e-3	4	NC	1	NC	1
246			min	-.002	3	-.007	3	-.008	4	-2.825e-4	3	NC	1	NC	1
247		10	max	.001	1	.003	2	0	3	1.164e-3	4	NC	1	NC	1
248			min	-.002	3	-.007	3	-.008	4	-2.692e-4	3	NC	1	9787.098	4
249		11	max	.001	1	.003	2	0	3	1.231e-3	4	NC	1	NC	1
250			min	-.002	3	-.006	3	-.008	4	-2.559e-4	3	NC	1	9771.077	4
251		12	max	.001	1	.002	2	0	3	1.298e-3	4	NC	1	NC	1
252			min	-.001	3	-.005	3	-.007	4	-2.425e-4	3	NC	1	NC	1
253		13	max	0	1	.002	2	0	3	1.365e-3	4	NC	1	NC	1
254			min	-.001	3	-.005	3	-.006	4	-2.292e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	1.432e-3	4	NC	1	NC	1
256			min	0	3	-.004	3	-.006	4	-2.158e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	1.499e-3	4	NC	1	NC	1
258			min	0	3	-.003	3	-.005	4	-2.025e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.567e-3	4	NC	1	NC	1
260			min	0	3	-.003	3	-.004	4	-1.891e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.634e-3	4	NC	1	NC	1
262			min	0	3	-.002	3	-.003	4	-1.758e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.701e-3	4	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-1.625e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.768e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.491e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	7.133e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-8.466e-4	4	NC	1	NC	1
269		2	max	0	3	0	2	.004	4	5.089e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-9.404e-4	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
271		3	max	0	3	0	2	.009	4	3.044e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.034e-3	4	NC	1	NC	1
273		4	max	0	3	0	2	.013	4	9.993e-6	3	NC	1	NC	1
274			min	0	2	-.003	3	0	3	-1.128e-3	4	NC	1	NC	1
275		5	max	0	3	0	2	.017	4	-7.182e-6	12	NC	1	NC	1
276			min	0	2	-.004	3	-.001	3	-1.222e-3	4	NC	1	NC	1
277		6	max	0	3	0	2	.021	5	-2.009e-5	12	NC	1	NC	1
278			min	0	2	-.005	3	-.001	3	-1.316e-3	4	NC	1	NC	1
279		7	max	0	3	0	2	.026	5	-2.892e-5	10	NC	1	NC	1
280			min	0	2	-.005	3	-.002	3	-1.409e-3	4	NC	1	NC	1
281		8	max	0	3	0	2	.03	5	-3.261e-5	10	NC	1	NC	1
282			min	0	2	-.006	3	-.002	1	-1.503e-3	4	NC	1	NC	1
283		9	max	.001	3	.001	2	.034	5	-3.629e-5	10	NC	1	NC	1
284			min	-.001	2	-.007	3	-.003	1	-1.597e-3	4	NC	1	NC	1
285		10	max	.001	3	.002	2	.039	5	-3.997e-5	10	NC	1	NC	1
286			min	-.001	2	-.007	3	-.004	1	-1.691e-3	4	NC	1	NC	1
287		11	max	.001	3	.002	2	.043	5	-4.365e-5	10	NC	1	NC	2
288			min	-.001	2	-.008	3	-.005	1	-1.784e-3	4	NC	1	9633.364	1
289		12	max	.001	3	.003	2	.047	5	-4.733e-5	10	NC	1	NC	2
290			min	-.001	2	-.008	3	-.006	1	-1.878e-3	4	NC	1	8003.542	1
291		13	max	.002	3	.004	2	.051	5	-5.102e-5	10	NC	1	NC	2
292			min	-.002	2	-.008	3	-.007	1	-1.972e-3	4	NC	1	6802.376	1
293		14	max	.002	3	.004	2	.055	5	-5.47e-5	10	NC	1	NC	2
294			min	-.002	2	-.009	3	-.008	1	-2.066e-3	4	NC	1	5891.496	1
295		15	max	.002	3	.005	2	.06	5	-5.838e-5	10	NC	1	NC	2
296			min	-.002	2	-.009	3	-.009	1	-2.159e-3	4	8834.619	2	5184.763	1
297		16	max	.002	3	.006	2	.064	5	-6.206e-5	10	NC	1	NC	2
298			min	-.002	2	-.009	3	-.01	1	-2.253e-3	4	7472.624	2	4626.214	1
299		17	max	.002	3	.007	2	.068	5	-6.574e-5	10	NC	1	NC	2
300			min	-.002	2	-.009	3	-.011	1	-2.347e-3	4	6422.487	2	4178.191	1
301		18	max	.002	3	.008	2	.072	5	-6.942e-5	10	NC	1	NC	2
302			min	-.002	2	-.009	3	-.012	1	-2.441e-3	4	5602.855	2	3814.603	1
303		19	max	.002	3	.009	2	.076	5	-7.311e-5	10	NC	3	NC	3
304			min	-.002	2	-.009	3	-.013	1	-2.535e-3	4	4956.978	2	3516.931	1
305	M12	1	max	.002	1	.012	2	.011	1	8.221e-3	4	NC	1	NC	3
306			min	0	15	-.011	3	-.084	5	8.225e-5	10	NC	1	229.699	5
307		2	max	.002	1	.012	2	.01	1	8.221e-3	4	NC	1	NC	3
308			min	0	15	-.01	3	-.077	5	8.225e-5	10	NC	1	250.394	5
309		3	max	.002	1	.011	2	.009	1	8.221e-3	4	NC	1	NC	3
310			min	0	15	-.01	3	-.07	5	8.225e-5	10	NC	1	275.027	5
311		4	max	.001	1	.01	2	.008	1	8.221e-3	4	NC	1	NC	3
312			min	0	15	-.009	3	-.063	5	8.225e-5	10	NC	1	304.632	5
313		5	max	.001	1	.009	2	.007	1	8.221e-3	4	NC	1	NC	3
314			min	0	15	-.008	3	-.057	5	8.225e-5	10	NC	1	340.625	5
315		6	max	.001	1	.009	2	.006	1	8.221e-3	4	NC	1	NC	3
316			min	0	15	-.008	3	-.05	5	8.225e-5	10	NC	1	384.967	5
317		7	max	.001	1	.008	2	.006	1	8.221e-3	4	NC	1	NC	3
318			min	0	15	-.007	3	-.044	5	8.225e-5	10	NC	1	440.458	5
319		8	max	.001	1	.007	2	.005	1	8.221e-3	4	NC	1	NC	2
320			min	0	15	-.007	3	-.038	5	8.225e-5	10	NC	1	511.194	5
321		9	max	0	1	.007	2	.004	1	8.221e-3	4	NC	1	NC	2
322			min	0	15	-.006	3	-.032	5	8.225e-5	10	NC	1	603.37	5
323		10	max	0	1	.006	2	.003	1	8.221e-3	4	NC	1	NC	2
324			min	0	15	-.005	3	-.027	5	8.225e-5	10	NC	1	726.726	5
325		11	max	0	1	.005	2	.003	1	8.221e-3	4	NC	1	NC	2
326			min	0	15	-.005	3	-.022	5	8.225e-5	10	NC	1	897.304	5
327		12	max	0	1	.005	2	.002	1	8.221e-3	4	NC	1	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
328			min	0	15	-.004	3	-.017	5	8.225e-5	10	NC	1	1143.083	5
329		13	max	0	1	.004	2	.002	1	8.221e-3	4	NC	1	NC	1
330			min	0	15	-.004	3	-.013	5	8.225e-5	10	NC	1	1516.546	5
331		14	max	0	1	.003	2	.001	1	8.221e-3	4	NC	1	NC	1
332			min	0	15	-.003	3	-.009	5	8.225e-5	10	NC	1	2125.95	5
333		15	max	0	1	.003	2	0	1	8.221e-3	4	NC	1	NC	1
334			min	0	15	-.002	3	-.006	5	8.225e-5	10	NC	1	3225.622	5
335		16	max	0	1	.002	2	0	1	8.221e-3	4	NC	1	NC	1
336			min	0	15	-.002	3	-.003	5	8.225e-5	10	NC	1	5538.556	5
337		17	max	0	1	.001	2	0	1	8.221e-3	4	NC	1	NC	1
338			min	0	15	-.001	3	-.002	5	8.225e-5	10	NC	1	NC	1
339		18	max	0	1	0	2	0	1	8.221e-3	4	NC	1	NC	1
340			min	0	15	0	3	0	5	8.225e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	8.221e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	8.225e-5	10	NC	1	NC	1
343	M1	1	max	.009	3	.026	3	.009	5	1.55e-2	1	NC	1	NC	1
344			min	-.009	2	-.023	2	-.005	1	-2.113e-2	3	NC	1	NC	1
345		2	max	.009	3	.016	3	.012	5	7.425e-3	2	NC	4	NC	2
346			min	-.009	2	-.014	2	-.01	1	-1.047e-2	3	4999.263	2	8995.44	1
347		3	max	.009	3	.007	3	.016	5	6.187e-4	5	NC	4	NC	2
348			min	-.009	2	-.005	2	-.013	1	-6.829e-4	1	2565.875	2	5459.766	1
349		4	max	.009	3	.003	1	.021	5	6.377e-4	5	NC	4	NC	2
350			min	-.009	2	-.002	3	-.015	1	-5.913e-4	1	1794.669	2	3972.562	5
351		5	max	.009	3	.01	2	.025	5	6.568e-4	5	NC	4	NC	2
352			min	-.009	2	-.008	3	-.015	1	-4.997e-4	1	1422.065	2	2840.641	5
353		6	max	.009	3	.015	2	.03	5	6.758e-4	5	NC	4	NC	2
354			min	-.009	2	-.014	3	-.014	1	-4.082e-4	1	1209.938	2	2180.736	5
355		7	max	.009	3	.02	2	.036	5	6.949e-4	5	NC	5	NC	2
356			min	-.009	2	-.018	3	-.013	1	-3.166e-4	1	1080.054	2	1753.883	5
357		8	max	.009	3	.024	2	.041	5	7.14e-4	5	NC	5	NC	2
358			min	-.009	2	-.021	3	-.01	1	-2.25e-4	1	999.845	2	1458.316	5
359		9	max	.009	3	.026	2	.047	5	7.33e-4	5	NC	5	NC	1
360			min	-.009	2	-.023	3	-.007	1	-1.334e-4	1	954.124	2	1242.218	4
361		10	max	.009	3	.027	2	.052	5	7.521e-4	5	NC	5	NC	1
362			min	-.009	2	-.023	3	-.004	1	-4.186e-5	1	935.961	2	1061.167	4
363		11	max	.009	3	.026	2	.058	4	7.852e-4	4	NC	5	NC	1
364			min	-.009	2	-.022	3	-.001	1	1.488e-5	10	943.468	2	925.568	4
365		12	max	.009	3	.025	2	.064	4	8.264e-4	4	NC	5	NC	2
366			min	-.009	2	-.021	3	0	10	2.421e-5	10	979.128	2	821.69	4
367		13	max	.009	3	.021	2	.071	4	8.676e-4	4	NC	4	NC	2
368			min	-.009	2	-.018	3	0	10	3.219e-5	12	1051.144	2	740.766	4
369		14	max	.009	3	.016	2	.077	4	9.088e-4	4	NC	4	NC	2
370			min	-.009	2	-.013	3	0	12	3.594e-5	12	1178.242	2	676.994	4
371		15	max	.009	3	.01	2	.082	4	9.5e-4	4	NC	4	NC	2
372			min	-.009	2	-.008	3	0	12	3.969e-5	12	1404.182	2	626.422	4
373		16	max	.009	3	.002	1	.087	4	1.322e-3	4	NC	4	NC	2
374			min	-.009	2	-.002	3	0	12	4.243e-5	12	1850.769	2	586.301	4
375		17	max	.009	3	.006	3	.092	4	9.58e-3	4	NC	4	NC	2
376			min	-.009	2	-.008	2	0	12	-1.63e-4	1	2657.803	1	554.721	4
377		18	max	.009	3	.014	3	.096	4	1.111e-2	2	NC	2	NC	2
378			min	-.009	2	-.019	2	0	10	-5.251e-3	3	5138.037	1	530.257	4
379		19	max	.009	3	.022	3	.099	4	2.249e-2	2	NC	1	NC	1
380			min	-.009	2	-.031	2	-.003	1	-1.063e-2	3	5933.943	2	512.547	4
381	M5	1	max	.03	3	.086	3	.008	5	1.054e-5	4	NC	1	NC	1
382			min	-.033	2	-.078	2	-.006	1	4.16e-8	10	3584.04	3	NC	1
383		2	max	.03	3	.052	3	.012	5	3.136e-4	5	NC	5	NC	1
384			min	-.033	2	-.047	2	-.005	1	-5.782e-5	1	1494.373	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
385		3	max	.03	3	.021	3	.016	5	6.117e-4	5	NC	5	NC	1
386			min	-.033	2	-.017	2	-.005	1	-1.152e-4	1	766.545	2	NC	1
387		4	max	.03	3	.009	2	.021	5	6.394e-4	5	NC	5	NC	1
388			min	-.033	2	-.005	3	-.004	1	-1.105e-4	1	535.613	2	NC	1
389		5	max	.03	3	.032	2	.026	5	6.671e-4	5	NC	5	NC	1
390			min	-.033	2	-.027	3	-.004	1	-1.057e-4	1	423.995	2	NC	1
391		6	max	.029	3	.052	2	.032	5	6.948e-4	5	NC	5	NC	1
392			min	-.033	2	-.045	3	-.004	1	-1.01e-4	1	360.419	2	NC	1
393		7	max	.029	3	.067	2	.037	5	7.226e-4	5	NC	15	NC	1
394			min	-.033	2	-.059	3	-.004	1	-9.63e-5	1	321.463	2	NC	1
395		8	max	.029	3	.079	2	.043	5	7.503e-4	5	NC	15	NC	1
396			min	-.033	2	-.068	3	-.003	1	-9.158e-5	1	297.372	2	NC	1
397		9	max	.029	3	.087	2	.049	5	7.78e-4	5	NC	15	NC	1
398			min	-.033	2	-.074	3	-.003	1	-8.685e-5	1	283.595	2	NC	1
399		10	max	.029	3	.09	2	.055	5	8.057e-4	5	NC	15	NC	1
400			min	-.033	2	-.075	3	-.003	1	-8.213e-5	1	278.053	2	NC	1
401		11	max	.029	3	.089	2	.061	5	8.335e-4	5	NC	15	NC	1
402			min	-.033	2	-.073	3	-.003	1	-7.74e-5	1	280.178	2	NC	1
403		12	max	.029	3	.083	2	.067	5	8.612e-4	5	NC	15	NC	1
404			min	-.033	2	-.067	3	-.003	1	-7.268e-5	1	290.708	2	NC	1
405		13	max	.029	3	.072	2	.072	5	8.889e-4	5	NC	15	NC	1
406			min	-.033	2	-.057	3	-.003	1	-6.796e-5	1	312.098	2	NC	1
407		14	max	.029	3	.055	2	.078	5	9.166e-4	5	NC	5	NC	1
408			min	-.033	2	-.043	3	-.003	1	-6.323e-5	1	349.969	2	NC	1
409		15	max	.028	3	.034	2	.083	4	9.444e-4	5	NC	5	NC	1
410			min	-.033	2	-.026	3	-.002	1	-5.851e-5	1	417.498	2	NC	1
411		16	max	.028	3	.007	1	.087	4	1.302e-3	5	NC	5	NC	1
412			min	-.033	2	-.006	3	-.002	1	-6.055e-5	1	551.603	2	NC	1
413		17	max	.028	3	.019	3	.092	4	9.556e-3	4	NC	5	NC	1
414			min	-.033	2	-.027	2	-.002	1	-2.237e-4	1	869.3	3	NC	1
415		18	max	.028	3	.045	3	.096	4	4.901e-3	4	NC	5	NC	1
416			min	-.033	2	-.065	2	-.002	1	-1.144e-4	1	1704.93	3	NC	1
417		19	max	.028	3	.073	3	.099	4	2.509e-6	5	NC	3	NC	1
418			min	-.033	2	-.106	2	-.002	1	-4.663e-7	3	1716.184	2	NC	1
419	M9	1	max	.009	3	.026	3	.007	5	2.113e-2	3	NC	1	NC	1
420			min	-.009	2	-.023	2	-.006	1	-1.549e-2	1	NC	1	NC	1
421		2	max	.009	3	.016	3	.007	5	1.044e-2	3	NC	4	NC	2
422			min	-.009	2	-.014	2	-.001	1	-7.534e-3	1	5001.009	2	9871.653	1
423		3	max	.009	3	.006	3	.007	4	2.774e-4	1	NC	4	NC	2
424			min	-.009	2	-.005	2	0	3	-6.45e-5	3	2566.795	2	6073.019	1
425		4	max	.009	3	.003	2	.009	4	2.e-4	1	NC	4	NC	2
426			min	-.009	2	-.002	3	-.001	3	-6.877e-5	3	1795.315	2	5098.868	1
427		5	max	.009	3	.01	2	.012	4	1.225e-4	1	NC	4	NC	2
428			min	-.009	2	-.009	3	-.002	3	-7.305e-5	3	1422.561	2	4991.076	1
429		6	max	.009	3	.015	2	.015	4	8.437e-5	4	NC	4	NC	2
430			min	-.009	2	-.014	3	-.003	3	-7.733e-5	3	1210.337	2	4839.668	4
431		7	max	.009	3	.02	2	.019	4	9.87e-5	4	NC	4	NC	2
432			min	-.009	2	-.018	3	-.003	3	-8.16e-5	3	1080.386	2	3474.297	4
433		8	max	.009	3	.024	2	.023	4	1.302e-4	5	NC	5	NC	1
434			min	-.009	2	-.021	3	-.004	3	-1.098e-4	1	1000.126	2	2623.417	4
435		9	max	.009	3	.026	2	.028	5	1.616e-4	5	NC	5	NC	1
436			min	-.009	2	-.023	3	-.004	3	-1.872e-4	1	954.362	2	2058.034	4
437		10	max	.009	3	.027	2	.034	5	1.931e-4	5	NC	5	NC	1
438			min	-.009	2	-.023	3	-.005	1	-2.646e-4	1	936.161	2	1663.306	4
439		11	max	.009	3	.026	2	.041	5	2.245e-4	5	NC	5	NC	1
440			min	-.009	2	-.023	3	-.008	1	-3.421e-4	1	943.628	2	1376.721	4
441		12	max	.009	3	.025	2	.047	5	2.56e-4	5	NC	5	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
442			min	-.009	2	-.021	3	-.01	1	-4.195e-4	1	979.239	2	1161.954	4
443		13	max	.009	3	.021	2	.054	5	2.875e-4	5	NC	5	NC	2
444			min	-.009	2	-.018	3	-.012	1	-4.969e-4	1	1051.187	2	989.683	5
445		14	max	.009	3	.016	2	.062	5	3.189e-4	5	NC	4	NC	2
446			min	-.009	2	-.013	3	-.013	1	-5.744e-4	1	1178.171	2	857.744	5
447		15	max	.009	3	.01	2	.069	5	3.504e-4	5	NC	4	NC	2
448			min	-.009	2	-.008	3	-.014	1	-6.518e-4	1	1403.875	2	755.321	5
449		16	max	.009	3	.002	1	.077	5	7.418e-4	5	NC	4	NC	2
450			min	-.009	2	-.002	3	-.013	1	-7.076e-4	1	1849.836	2	674.33	5
451		17	max	.009	3	.006	3	.084	5	9.728e-3	4	NC	4	NC	2
452			min	-.009	2	-.008	2	-.011	1	-2.49e-4	1	2657.585	1	608.204	4
453		18	max	.009	3	.014	3	.091	5	5.307e-3	3	NC	2	NC	2
454			min	-.009	2	-.019	2	-.007	1	-1.119e-2	2	5137.63	1	549.539	4
455		19	max	.009	3	.023	3	.099	4	1.063e-2	3	NC	1	NC	1
456			min	-.009	2	-.031	2	-.002	1	-2.249e-2	2	5957.378	2	500.321	4
457	M13	1	max	.006	1	.026	3	.009	3	3.872e-3	3	NC	1	NC	1
458			min	-.007	5	-.023	2	-.009	2	-3.559e-3	2	NC	1	NC	1
459		2	max	.006	1	.21	3	.033	1	4.848e-3	3	NC	5	NC	2
460			min	-.007	5	-.156	2	-.002	10	-4.487e-3	2	881.973	3	4324.848	1
461		3	max	.006	1	.36	3	.085	1	5.825e-3	3	NC	5	NC	3
462			min	-.007	5	-.265	1	0	5	-5.415e-3	2	484.956	3	1818.28	1
463		4	max	.006	1	.455	3	.128	1	6.801e-3	3	NC	5	NC	3
464			min	-.008	5	-.335	1	-.002	5	-6.343e-3	2	377.924	3	1223.427	1
465		5	max	.006	1	.483	3	.149	1	7.778e-3	3	NC	5	NC	3
466			min	-.008	5	-.357	1	-.004	5	-7.272e-3	2	354.578	3	1058.431	1
467		6	max	.006	1	.446	3	.141	1	8.754e-3	3	NC	5	NC	3
468			min	-.008	5	-.331	2	-.006	5	-8.2e-3	2	385.763	3	1118.81	1
469		7	max	.006	1	.357	3	.105	1	9.731e-3	3	NC	5	NC	3
470			min	-.008	5	-.269	2	-.009	5	-9.128e-3	2	489.549	3	1478.816	1
471		8	max	.006	1	.241	3	.053	1	1.071e-2	3	NC	5	NC	2
472			min	-.008	5	-.188	2	-.011	5	-1.006e-2	2	754.547	3	2824.413	1
473		9	max	.006	1	.134	3	.027	3	1.168e-2	3	NC	4	NC	1
474			min	-.008	5	-.113	2	-.023	2	-1.098e-2	2	1499.49	3	9017.927	3
475		10	max	.006	1	.086	3	.03	3	1.266e-2	3	NC	4	NC	4
476			min	-.008	5	-.078	2	-.033	2	-1.191e-2	2	2721.808	3	6721.744	2
477		11	max	.005	1	.134	3	.034	3	1.168e-2	3	NC	4	NC	1
478			min	-.008	5	-.113	2	-.023	2	-1.098e-2	2	1499.488	3	6679.248	3
479		12	max	.005	1	.241	3	.056	1	1.071e-2	3	NC	5	NC	2
480			min	-.008	5	-.188	2	-.009	10	-1.006e-2	2	754.546	3	2678.642	1
481		13	max	.005	1	.357	3	.109	1	9.734e-3	3	NC	5	NC	5
482			min	-.009	5	-.269	2	-.001	10	-9.128e-3	2	489.548	3	1432.318	1
483		14	max	.005	1	.446	3	.144	1	8.759e-3	3	NC	5	NC	5
484			min	-.009	5	-.331	2	.005	10	-8.2e-3	2	385.763	3	1092.819	1
485		15	max	.005	1	.483	3	.152	1	7.783e-3	3	NC	5	NC	5
486			min	-.009	5	-.357	1	.005	15	-7.272e-3	2	354.577	3	1038.509	1
487		16	max	.005	1	.455	3	.13	1	6.808e-3	3	NC	5	NC	5
488			min	-.009	5	-.335	1	0	15	-6.344e-3	2	377.924	3	1203.561	1
489		17	max	.005	1	.36	3	.086	1	5.833e-3	3	NC	5	NC	3
490			min	-.009	5	-.265	1	-.004	5	-5.416e-3	2	484.955	3	1791.248	1
491		18	max	.005	1	.21	3	.034	1	4.857e-3	3	NC	5	NC	2
492			min	-.009	5	-.156	2	-.006	5	-4.488e-3	2	881.972	3	4260.555	1
493		19	max	.005	1	.026	3	.009	3	3.882e-3	3	NC	1	NC	1
494			min	-.009	5	-.023	2	-.009	2	-3.561e-3	2	NC	1	NC	1
495	M16	1	max	.002	1	.023	3	.009	3	4.567e-3	2	NC	1	NC	1
496			min	-.099	4	-.031	2	-.009	2	-3.247e-3	3	NC	1	NC	1
497		2	max	.002	1	.115	3	.034	1	5.77e-3	2	NC	5	NC	2
498			min	-.099	4	-.227	2	-.002	10	-4.049e-3	3	828.354	2	4174.102	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
499		3	max	.002	1	.191	3	.087	1	6.974e-3	2	NC	5	NC	3
500			min	-.099	4	-.387	2	.004	10	-4.851e-3	3	455.082	2	1772.093	1
501		4	max	.002	1	.24	3	.131	1	8.178e-3	2	NC	5	NC	10
502			min	-.099	4	-.489	2	.007	10	-5.653e-3	3	354.088	2	1196.975	1
503		5	max	.002	1	.257	3	.152	1	9.381e-3	2	NC	5	NC	10
504			min	-.099	4	-.52	2	.008	10	-6.456e-3	3	331.336	2	1036.864	1
505		6	max	.002	1	.242	3	.143	1	1.058e-2	2	NC	5	NC	10
506			min	-.099	4	-.483	2	.005	10	-7.258e-3	3	358.828	2	1095.268	1
507		7	max	.002	1	.201	3	.108	1	1.179e-2	2	NC	5	NC	5
508			min	-.099	4	-.39	2	0	10	-8.06e-3	3	451.435	2	1442.849	1
509		8	max	.002	1	.146	3	.055	1	1.299e-2	2	NC	5	NC	2
510			min	-.099	4	-.268	2	-.009	10	-8.862e-3	3	682.704	2	2726.62	1
511		9	max	.002	1	.096	3	.031	3	1.42e-2	2	NC	4	NC	1
512			min	-.099	4	-.157	2	-.023	2	-9.665e-3	3	1291.232	2	7295.543	3
513		10	max	.002	1	.073	3	.028	3	1.54e-2	2	NC	4	NC	4
514			min	-.099	4	-.106	2	-.033	2	-1.047e-2	3	2173.572	2	6776.662	2
515		11	max	.003	1	.096	3	.028	3	1.42e-2	2	NC	4	NC	1
516			min	-.099	4	-.157	2	-.022	2	-9.664e-3	3	1291.232	2	8604.349	3
517		12	max	.003	1	.146	3	.054	1	1.299e-2	2	NC	5	NC	2
518			min	-.099	4	-.268	2	-.009	10	-8.86e-3	3	682.704	2	2761.48	1
519		13	max	.003	1	.201	3	.106	1	1.179e-2	2	NC	5	NC	5
520			min	-.099	4	-.39	2	0	10	-8.057e-3	3	451.435	2	1459.257	1
521		14	max	.003	1	.242	3	.142	1	1.059e-2	2	NC	5	NC	5
522			min	-.099	4	-.483	2	.005	15	-7.253e-3	3	358.828	2	1108.261	1
523		15	max	.003	1	.257	3	.15	1	9.383e-3	2	NC	5	NC	5
524			min	-.099	4	-.52	2	.001	15	-6.45e-3	3	331.336	2	1050.753	1
525		16	max	.003	1	.24	3	.129	1	8.179e-3	2	NC	5	NC	3
526			min	-.099	4	-.489	2	-.004	5	-5.646e-3	3	354.088	2	1216.358	1
527		17	max	.003	1	.191	3	.085	1	6.976e-3	2	NC	5	NC	3
528			min	-.099	4	-.387	2	-.008	5	-4.843e-3	3	455.082	2	1809.895	1
529		18	max	.003	1	.115	3	.033	1	5.772e-3	2	NC	5	NC	2
530			min	-.099	4	-.227	2	-.008	5	-4.04e-3	3	828.355	2	4309.978	1
531		19	max	.003	1	.022	3	.009	3	4.569e-3	2	NC	1	NC	1
532			min	-.099	4	-.031	2	-.009	2	-3.236e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	4.003e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-7.235e-4	5	NC	1	NC	1
535		2	max	0	3	0	15	.011	4	9.092e-4	3	NC	3	NC	1
536			min	0	5	-.011	1	0	3	-7.49e-4	5	7992.014	2	8271.858	4
537		3	max	0	3	0	15	.025	4	1.418e-3	3	NC	5	NC	1
538			min	-.002	5	-.023	1	-.004	3	-1.108e-3	2	4066.863	2	3680.672	4
539		4	max	0	3	0	15	.04	4	1.927e-3	3	NC	5	NC	9
540			min	-.002	5	-.033	1	-.008	3	-1.633e-3	2	2790.106	2	2308.85	4
541		5	max	0	3	0	15	.054	4	2.436e-3	3	NC	5	NC	9
542			min	-.003	5	-.042	1	-.013	3	-2.157e-3	2	2177.148	2	1698.286	4
543		6	max	0	3	0	15	.066	4	2.945e-3	3	NC	5	9977.038	9
544			min	-.004	5	-.05	1	-.019	3	-2.682e-3	2	1832.3	2	1378.514	4
545		7	max	0	3	0	15	.076	4	3.453e-3	3	NC	5	7922.298	9
546			min	-.005	5	-.056	1	-.025	3	-3.207e-3	2	1624.92	2	1201.328	4
547		8	max	0	3	0	15	.082	4	3.962e-3	3	NC	5	6611.605	9
548			min	-.006	5	-.061	1	-.031	3	-3.731e-3	2	1500.46	2	1108.32	4
549		9	max	0	3	0	15	.085	4	4.471e-3	3	NC	5	5746.038	9
550			min	-.007	5	-.064	1	-.036	3	-4.256e-3	2	1433.469	2	1074.833	4
551		10	max	0	3	.001	15	.084	4	4.98e-3	3	NC	5	5173.026	9
552			min	-.007	5	-.065	1	-.04	3	-4.781e-3	2	1412.276	2	1092.811	4
553		11	max	0	3	.001	15	.078	4	5.489e-3	3	NC	5	4811.976	9
554			min	-.008	5	-.064	1	-.043	3	-5.305e-3	2	1433.469	2	1166.03	4
555		12	max	0	3	.002	15	.07	4	5.998e-3	3	NC	5	4623.651	9

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
556			min	-.009	5	-.061	1	-.043	3	-5.83e-3	2	1500.46	2	1312.008	4
557		13	max	.001	3	.002	15	.058	4	6.507e-3	3	NC	5	4599.033	9
558			min	-.01	5	-.057	1	-.042	3	-6.355e-3	2	1624.92	2	1372.142	3
559		14	max	.001	3	.003	5	.045	4	7.016e-3	3	NC	5	4761.425	9
560			min	-.011	5	-.05	1	-.038	3	-6.88e-3	2	1832.3	2	1415.723	3
561		15	max	.001	3	.003	5	.03	4	7.524e-3	3	NC	5	5674.545	15
562			min	-.011	5	-.042	1	-.031	3	-7.404e-3	2	2177.148	2	1537.833	3
563		16	max	.001	3	.004	5	.019	1	8.033e-3	3	NC	5	NC	15
564			min	-.012	5	-.033	1	-.02	3	-7.929e-3	2	2790.106	2	1798.378	3
565		17	max	.001	3	.005	5	.008	1	8.542e-3	3	NC	5	NC	4
566			min	-.013	5	-.023	1	-.005	3	-8.454e-3	2	4066.863	2	2385.18	3
567		18	max	.001	3	.006	5	.013	3	9.051e-3	3	NC	3	NC	4
568			min	-.014	5	-.012	9	-.016	2	-8.978e-3	2	7992.014	2	4248.211	3
569		19	max	.002	3	.007	5	.037	3	9.56e-3	3	NC	1	NC	1
570			min	-.015	5	-.003	9	-.037	2	-9.503e-3	2	NC	1	NC	1
571	M16A	1	max	0	10	.001	2	.011	3	2.8e-3	3	NC	1	NC	1
572			min	-.006	4	-.004	4	-.011	2	-2.631e-3	2	NC	1	NC	1
573		2	max	0	10	-.006	12	.004	9	2.69e-3	3	NC	3	NC	1
574			min	-.005	4	-.024	4	-.005	5	-2.517e-3	2	4693.191	4	NC	1
575		3	max	0	10	-.012	12	.01	1	2.58e-3	3	8133.727	12	NC	4
576			min	-.005	4	-.042	4	-.013	5	-2.402e-3	2	2388.205	4	5800.512	1
577		4	max	0	10	-.017	12	.016	1	2.471e-3	3	5580.212	12	NC	10
578			min	-.005	4	-.06	4	-.026	5	-2.288e-3	2	1638.448	4	3738.822	5
579		5	max	0	10	-.021	12	.019	1	2.361e-3	3	4354.296	12	9406.465	10
580			min	-.004	4	-.075	4	-.041	5	-2.174e-3	2	1278.498	4	2325.265	5
581		6	max	0	10	-.025	12	.021	1	2.251e-3	3	3664.6	12	8795.119	10
582			min	-.004	4	-.088	4	-.056	5	-2.059e-3	2	1075.991	4	1677.513	5
583		7	max	0	10	-.029	12	.022	1	2.141e-3	3	3249.839	12	8680.265	10
584			min	-.004	4	-.099	4	-.07	5	-1.945e-3	2	954.21	4	1333.157	5
585		8	max	0	10	-.031	12	.022	1	2.032e-3	3	3000.92	12	8951.096	10
586			min	-.003	4	-.107	4	-.082	5	-1.83e-3	2	881.123	4	1137.167	5
587		9	max	0	10	-.032	12	.021	1	1.922e-3	3	2866.937	12	9602.703	10
588			min	-.003	4	-.111	4	-.09	5	-1.716e-3	2	841.783	4	1026.404	5
589		10	max	0	10	-.033	12	.019	1	1.812e-3	3	2824.552	12	NC	10
590			min	-.003	4	-.112	4	-.095	5	-1.601e-3	2	829.338	4	972.723	5
591		11	max	0	10	-.032	12	.017	1	1.703e-3	3	2866.937	12	NC	10
592			min	-.003	4	-.111	4	-.096	5	-1.487e-3	2	841.783	4	964.447	5
593		12	max	0	10	-.031	12	.014	1	1.593e-3	3	3000.92	12	NC	9
594			min	-.002	4	-.106	4	-.092	5	-1.372e-3	2	881.123	4	1000.138	5
595		13	max	0	10	-.028	12	.011	1	1.483e-3	3	3249.839	12	NC	9
596			min	-.002	4	-.097	4	-.085	5	-1.258e-3	2	954.21	4	1088.033	5
597		14	max	0	10	-.025	12	.008	1	1.374e-3	3	3664.6	12	NC	2
598			min	-.002	4	-.086	4	-.074	5	-1.143e-3	2	1075.991	4	1250.727	5
599		15	max	0	10	-.021	12	.005	1	1.264e-3	3	4354.296	12	NC	1
600			min	-.001	4	-.073	4	-.06	5	-1.029e-3	2	1278.498	4	1540.546	5
601		16	max	0	10	-.016	12	.003	1	1.154e-3	3	5580.212	12	NC	1
602			min	0	4	-.057	4	-.044	5	-9.141e-4	2	1638.448	4	2088.98	5
603		17	max	0	10	-.011	12	.001	9	1.044e-3	3	8133.727	12	NC	1
604			min	0	4	-.039	4	-.028	5	-7.996e-4	2	2388.205	4	3310.481	5
605		18	max	0	10	-.006	12	0	3	1.092e-3	4	NC	3	NC	1
606			min	0	4	-.02	4	-.013	5	-6.851e-4	2	4693.191	4	7355.616	5
607		19	max	0	1	0	1	0	1	1.166e-3	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.706e-4	2	NC	1	NC	1

Anchor Designer™
Software
Version 2.4.5673.0

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

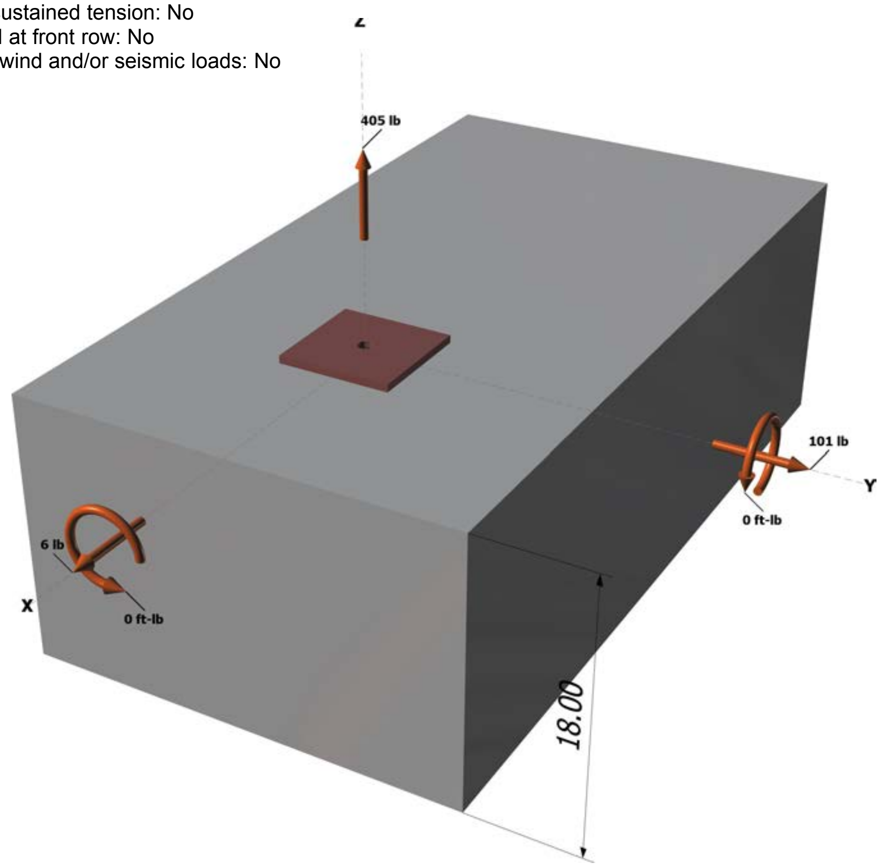
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

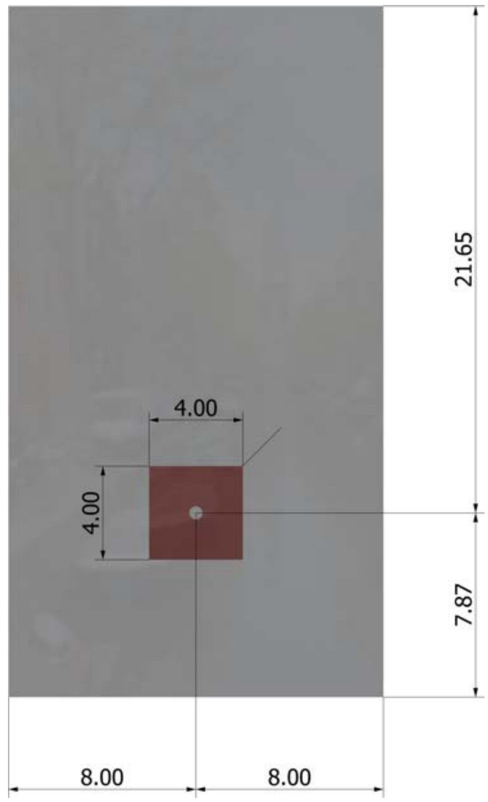
Load and Geometry
Load factor source: ACI 318 Section 9.2
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: No
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

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

<Figure 1>



<Figure 2>



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

SIMPSON Strong-Tie

Anchor Designer™ Software
Version 2.4.5673.0

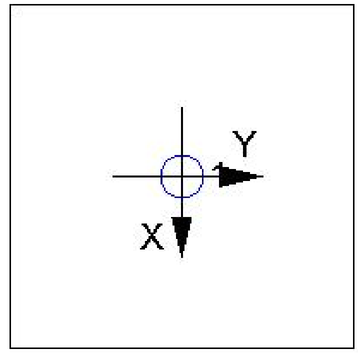
Company:	Schletter, Inc.	Date:	12/10/2015
Engineer:	HCV	Page:	3/5
Project:	Standard PVMini - Worst Case		
Address:			
Phone:			
E-mail:			

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

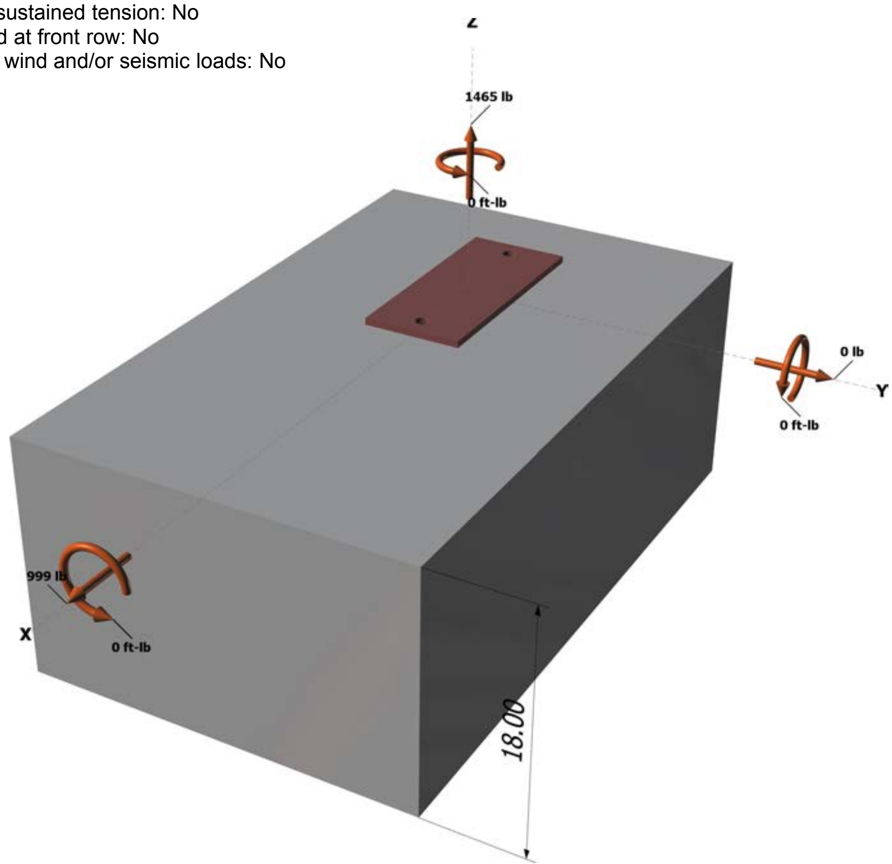
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

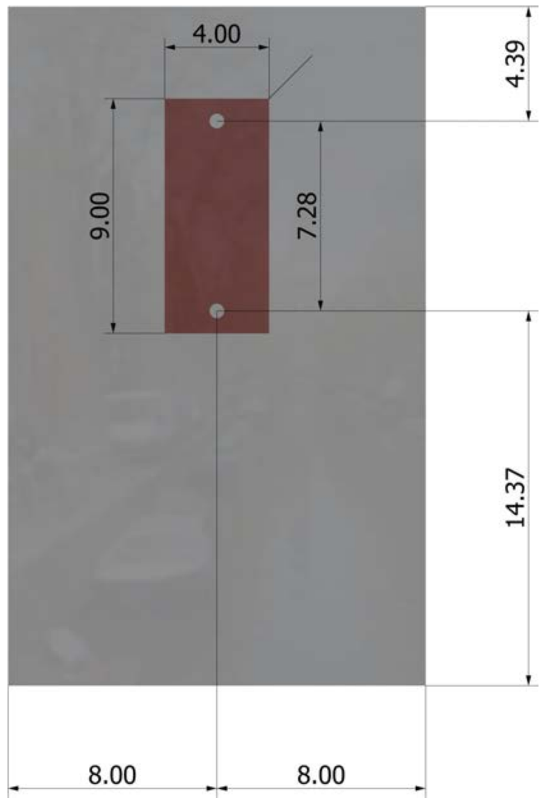
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



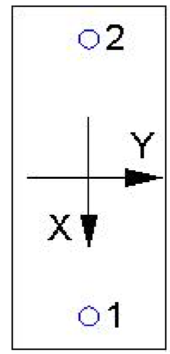
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
15580

11. Results

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

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

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

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

12. Warnings

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

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

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