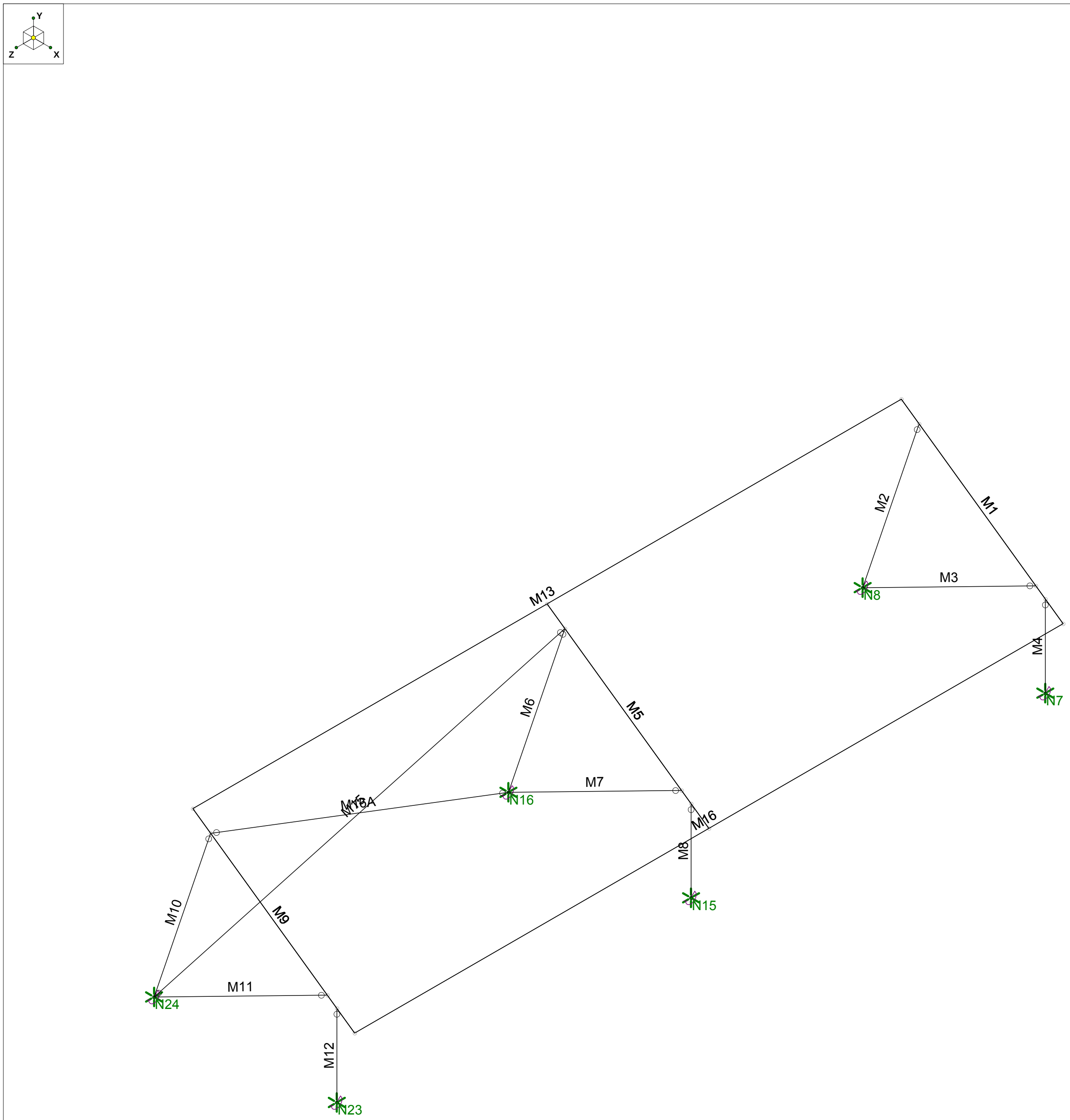


Schletter, Inc.		35° Tilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

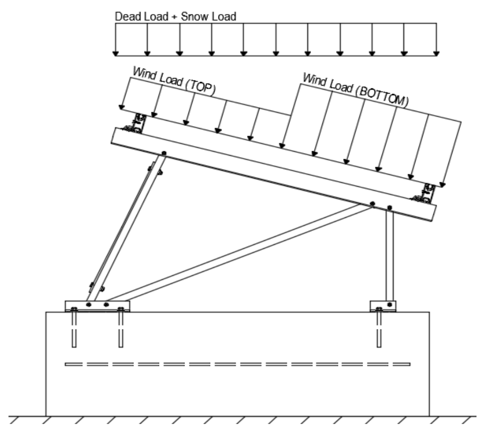
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 1
Module Tilt = 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 - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

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

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

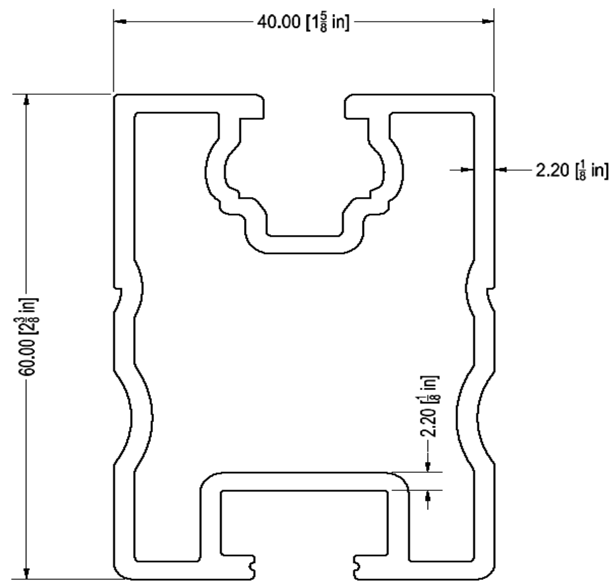
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

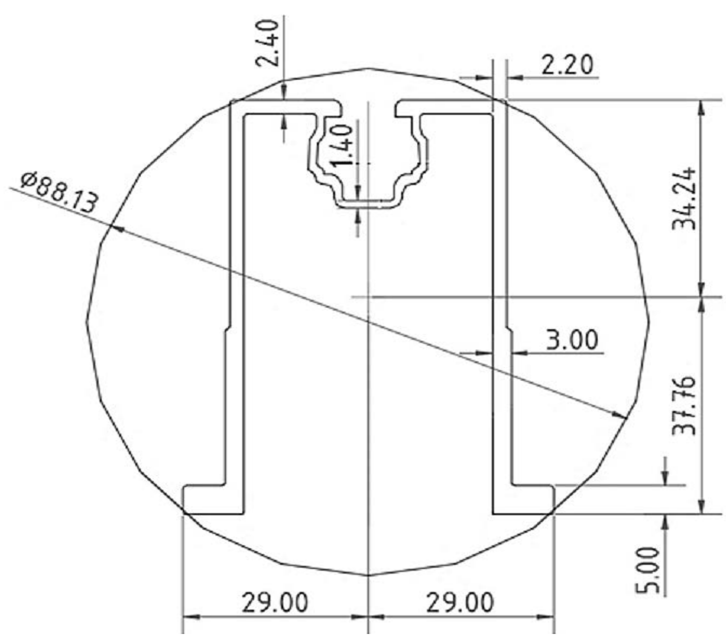
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	81	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.63	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.662	k-ft
M_z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

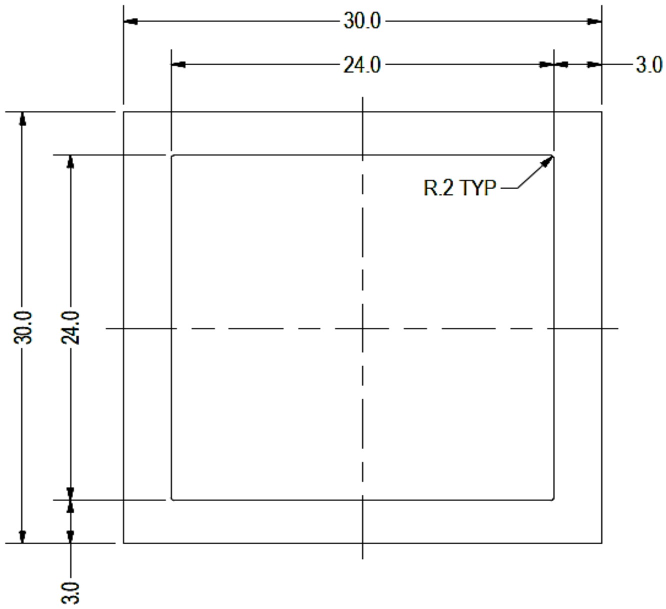
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.46	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
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).

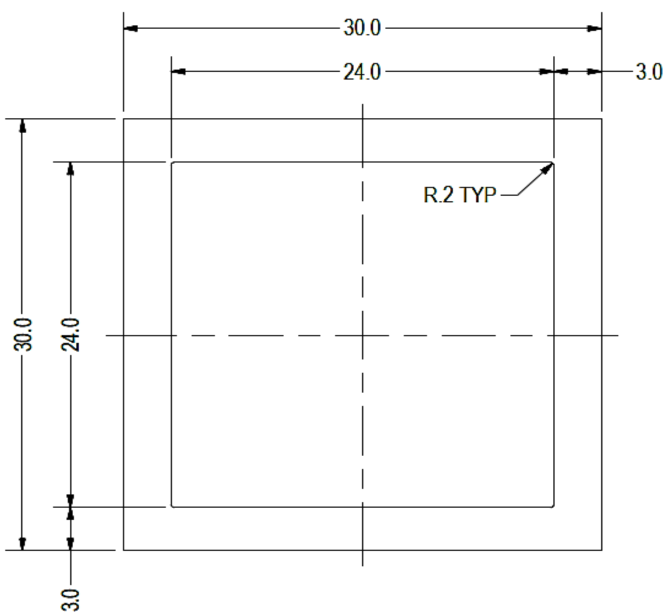
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.001	k-ft
P_n =	0.942	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	8%	



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).

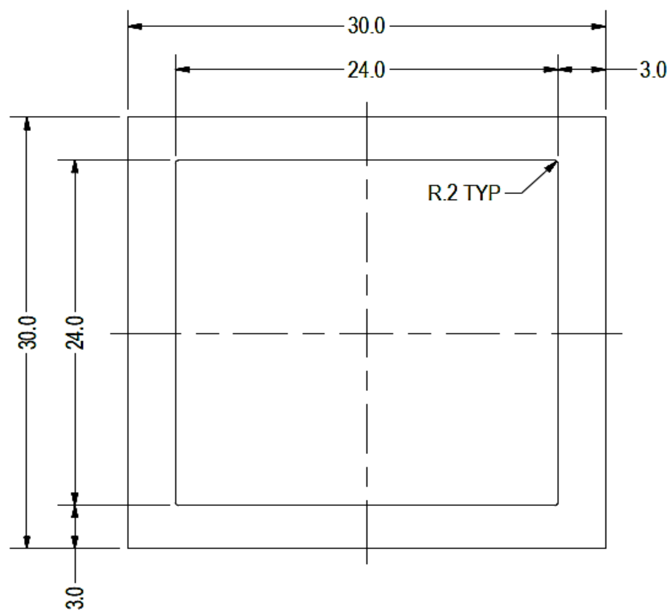
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.771	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).

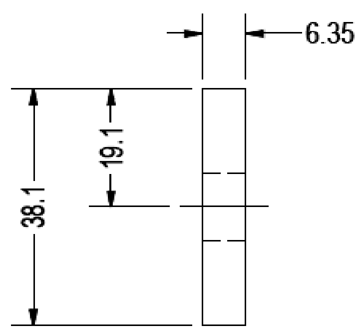
Strut Type =	30x30x3	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	42.32	in
$\Phi F_{ty\ AXIAL}$ =	8.86	ksi
$\Phi F_{ty\ BENDING}$ =	29.96	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.806	k
$M_{y\ allowable}$ =	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 =	0.005	k-ft
P_n =	0.065	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	12%	



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

5. FOUNDATION DESIGN CALCULATIONS

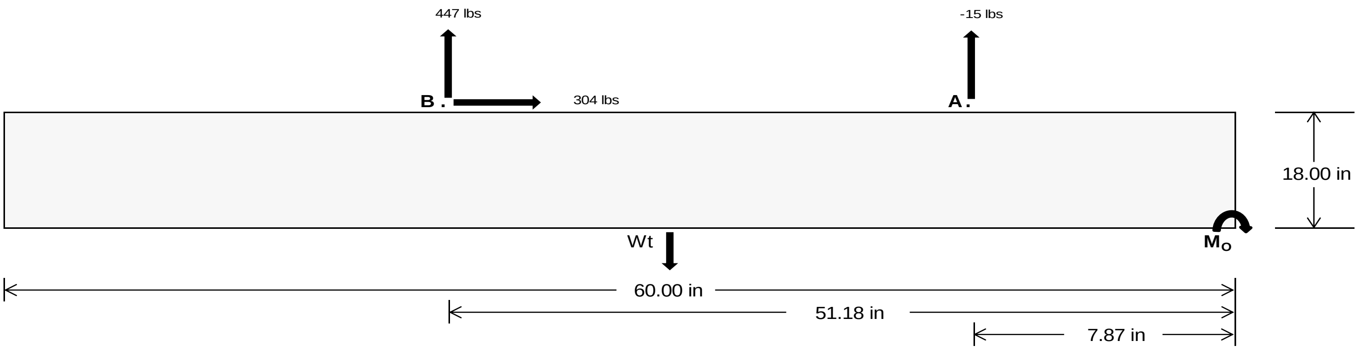
5.1 Helical Pile Foundations

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

Maximum	Front	Rear	
Tensile Load =	31.68	1861.01	k
Compressive Load =	1224.22	1346.85	k
Lateral Load =	4.17	1265.64	k
Moment (Weak Axis) =	0.01	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (1) #5 rebar.

Overturning Check

M_O = 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

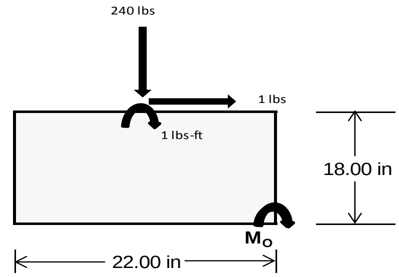
Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 217.8 ft-lbs
Resisting Force Required = 237.65 lbs
S.F. = 1.67
Weight Required = 396.09 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	81 lbs	202 lbs	77 lbs	245 lbs	673 lbs	240 lbs	24 lbs	59 lbs	22 lbs
F_V	4 lbs	4 lbs	0 lbs	15 lbs	14 lbs	1 lbs	1 lbs	1 lbs	0 lbs
P_{total}	2549 lbs	2670 lbs	2545 lbs	2594 lbs	3022 lbs	2590 lbs	745 lbs	781 lbs	744 lbs
M	6 lbs-ft	6 lbs-ft	0 lbs-ft	25 lbs-ft	21 lbs-ft	2 lbs-ft	2 lbs-ft	2 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.01 ft	0.01 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.31 ft	1.83 ft	1.83 ft	1.81 ft	1.82 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	276.0 sqft	289.3 sqft	277.5 sqft	274.0 sqft	322.3 sqft	281.7 sqft	80.7 sqft	84.6 sqft	81.1 sqft
f_{max}	280.2 psf	293.3 psf	277.8 psf	292.1 psf	337.2 psf	283.4 psf	81.9 psf	85.8 psf	81.2 psf

Maximum Bearing Pressure = 337 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

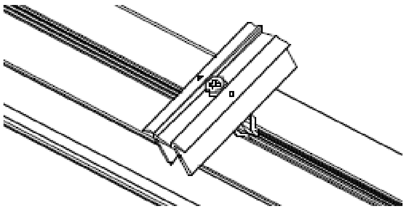
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

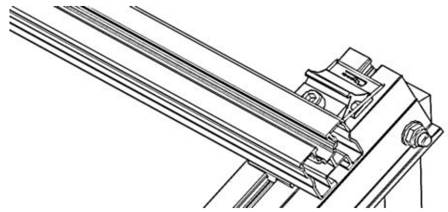
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

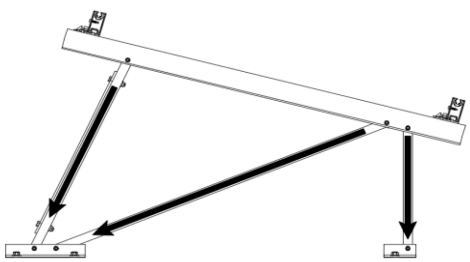
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are 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 =	0.065	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	1%	



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

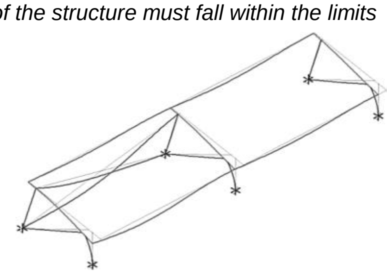
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	33.11	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.662	in
Max Drift, Δ_{MAX} =	0.048	in
N/A		

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



APPENDIX A

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

Purlin = **ProfiPlus**

Strong Axis:

3.4.14

L_b = 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

<u>Compression</u>

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

λ = 0.77182

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83792

φF_L= φcc(Bc-Dc*λ)

φF_L= 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 24.52 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 12.31 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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 in^3
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 in^3
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								

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

Load Combinations

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	248.065	2	304.487	2	-.003	15	0	15	0	1	0	1
2		min	-304.165	3	-436.131	3	-.129	1	0	3	0	1	0	1
3	N7	max	.026	3	376.613	1	-.076	15	0	15	0	1	0	1
4		min	-.164	2	15.753	15	-1.467	1	-.003	1	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	34.716	15	-.497	3	0	3	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	-56.863	3	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	15.901	15	.156	15	0	15	0	1	0	1
11	N24	max	248.481	2	308.496	2	57.262	3	.002	1	0	1	0	1
12		min	-304.355	3	-433.902	3	.01	10	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	0	2						

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	.677	4	.432	1	0	15	0	15	0	1
2			min	-360.262	3	.159	15	-.033	3	0	1	0	1	0	1
3		2	max	248.899	1	.62	4	.432	1	0	15	0	15	0	15
4			min	-360.161	3	.146	15	-.033	3	0	1	0	1	0	4
5		3	max	249.034	1	.562	4	.432	1	0	15	0	15	0	15
6			min	-360.059	3	.132	15	-.033	3	0	1	0	1	0	4
7		4	max	249.169	1	.505	4	.432	1	0	15	0	15	0	15
8			min	-359.958	3	.119	15	-.033	3	0	1	0	1	0	4
9		5	max	249.303	1	.448	4	.432	1	0	15	0	1	0	15
10			min	-359.857	3	.105	15	-.033	3	0	1	0	3	0	4
11		6	max	249.438	1	.39	4	.432	1	0	15	0	1	0	15
12			min	-359.756	3	.092	15	-.033	3	0	1	0	3	0	4
13		7	max	249.573	1	.333	4	.432	1	0	15	0	1	0	15
14			min	-359.655	3	.078	15	-.033	3	0	1	0	3	0	4
15		8	max	249.708	1	.275	4	.432	1	0	15	0	1	0	15
16			min	-359.554	3	.065	15	-.033	3	0	1	0	3	0	4
17		9	max	249.843	1	.218	4	.432	1	0	15	0	1	0	15
18			min	-359.453	3	.051	15	-.033	3	0	1	0	3	0	4
19		10	max	249.978	1	.16	4	.432	1	0	15	0	1	0	15
20			min	-359.351	3	.038	15	-.033	3	0	1	0	3	0	4
21		11	max	250.113	1	.108	2	.432	1	0	15	0	1	0	15
22			min	-359.25	3	.016	12	-.033	3	0	1	0	3	0	4
23		12	max	250.247	1	.063	2	.432	1	0	15	0	1	0	15
24			min	-359.149	3	-.013	3	-.033	3	0	1	0	3	0	4
25		13	max	250.382	1	.018	2	.432	1	0	15	0	1	0	15
26			min	-359.048	3	-.046	3	-.033	3	0	1	0	3	0	4
27		14	max	250.517	1	-.016	15	.432	1	0	15	0	1	0	15
28			min	-358.947	3	-.08	3	-.033	3	0	1	0	3	0	4
29		15	max	250.652	1	-.03	15	.432	1	0	15	0	1	0	15
30			min	-358.846	3	-.127	4	-.033	3	0	1	0	3	0	4
31		16	max	250.787	1	-.043	15	.432	1	0	15	0	1	0	15
32			min	-358.745	3	-.185	4	-.033	3	0	1	0	3	0	4
33		17	max	250.922	1	-.057	15	.432	1	0	15	.001	1	0	15
34			min	-358.643	3	-.242	4	-.033	3	0	1	0	3	0	4
35		18	max	251.057	1	-.07	15	.432	1	0	15	.001	1	0	15
36			min	-358.542	3	-.3	4	-.033	3	0	1	0	3	0	4
37		19	max	251.192	1	-.084	15	.432	1	0	15	.001	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
38			min	-358.441	3	-.357	4	-.033	3	0	1	0	3	0	4
39	M3	1	max	200.341	2	1.735	4	-.022	15	0	15	.002	1	0	4
40			min	-213.674	3	.408	15	-.484	1	0	1	0	15	0	15
41		2	max	200.271	2	1.559	4	-.022	15	0	15	.002	1	0	2
42			min	-213.726	3	.367	15	-.484	1	0	1	0	15	0	3
43		3	max	200.201	2	1.382	4	-.022	15	0	15	.001	1	0	2
44			min	-213.779	3	.325	15	-.484	1	0	1	0	15	0	3
45		4	max	200.131	2	1.206	4	-.022	15	0	15	.001	1	0	15
46			min	-213.831	3	.284	15	-.484	1	0	1	0	15	0	4
47		5	max	200.061	2	1.029	4	-.022	15	0	15	.001	1	0	15
48			min	-213.884	3	.242	15	-.484	1	0	1	0	15	0	4
49		6	max	199.991	2	.853	4	-.022	15	0	15	.001	1	0	15
50			min	-213.936	3	.201	15	-.484	1	0	1	0	15	0	4
51		7	max	199.921	2	.677	4	-.022	15	0	15	.001	1	0	15
52			min	-213.989	3	.159	15	-.484	1	0	1	0	15	0	4
53		8	max	199.851	2	.5	4	-.022	15	0	15	0	1	0	15
54			min	-214.041	3	.118	15	-.484	1	0	1	0	15	-.001	4
55		9	max	199.781	2	.324	4	-.022	15	0	15	0	1	0	15
56			min	-214.094	3	.076	15	-.484	1	0	1	0	15	-.001	4
57		10	max	199.711	2	.148	4	-.022	15	0	15	0	1	0	15
58			min	-214.146	3	.035	15	-.484	1	0	1	0	15	-.001	4
59		11	max	199.641	2	.003	2	-.022	15	0	15	0	1	0	15
60			min	-214.199	3	-.053	3	-.484	1	0	1	0	15	-.001	4
61		12	max	199.571	2	-.048	15	-.022	15	0	15	0	1	0	15
62			min	-214.251	3	-.205	4	-.484	1	0	1	0	15	-.001	4
63		13	max	199.501	2	-.09	15	-.022	15	0	15	0	1	0	15
64			min	-214.304	3	-.382	4	-.484	1	0	1	0	15	-.001	4
65		14	max	199.431	2	-.131	15	-.022	15	0	15	0	1	0	15
66			min	-214.356	3	-.558	4	-.484	1	0	1	0	15	-.001	4
67		15	max	199.361	2	-.172	15	-.022	15	0	15	0	1	0	15
68			min	-214.409	3	-.734	4	-.484	1	0	1	0	15	0	4
69		16	max	199.291	2	-.214	15	-.022	15	0	15	0	1	0	15
70			min	-214.461	3	-.911	4	-.484	1	0	1	0	12	0	4
71		17	max	199.221	2	-.255	15	-.022	15	0	15	0	15	0	15
72			min	-214.514	3	-1.087	4	-.484	1	0	1	0	1	0	4
73		18	max	199.151	2	-.297	15	-.022	15	0	15	0	15	0	15
74			min	-214.566	3	-1.263	4	-.484	1	0	1	0	1	0	4
75		19	max	199.081	2	-.338	15	-.022	15	0	15	0	15	0	1
76			min	-214.619	3	-1.44	4	-.484	1	0	1	0	1	0	1
77	M4	1	max	375.449	1	0	1	-.076	15	0	1	0	3	0	1
78			min	15.402	15	0	1	-1.566	1	0	1	0	2	0	1
79		2	max	375.513	1	0	1	-.076	15	0	1	0	15	0	1
80			min	15.421	15	0	1	-1.566	1	0	1	0	1	0	1
81		3	max	375.578	1	0	1	-.076	15	0	1	0	15	0	1
82			min	15.441	15	0	1	-1.566	1	0	1	0	1	0	1
83		4	max	375.643	1	0	1	-.076	15	0	1	0	15	0	1
84			min	15.46	15	0	1	-1.566	1	0	1	0	1	0	1
85		5	max	375.707	1	0	1	-.076	15	0	1	0	15	0	1
86			min	15.48	15	0	1	-1.566	1	0	1	0	1	0	1
87		6	max	375.772	1	0	1	-.076	15	0	1	0	15	0	1
88			min	15.499	15	0	1	-1.566	1	0	1	0	1	0	1
89		7	max	375.837	1	0	1	-.076	15	0	1	0	15	0	1
90			min	15.519	15	0	1	-1.566	1	0	1	0	1	0	1
91		8	max	375.902	1	0	1	-.076	15	0	1	0	15	0	1
92			min	15.538	15	0	1	-1.566	1	0	1	-.001	1	0	1
93		9	max	375.966	1	0	1	-.076	15	0	1	0	15	0	1
94			min	15.558	15	0	1	-1.566	1	0	1	-.001	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
95		10	max	376.031	1	0	1	-.076	15	0	1	0	15	0	1
96			min	15.577	15	0	1	-1.566	1	0	1	-.001	1	0	1
97		11	max	376.096	1	0	1	-.076	15	0	1	0	15	0	1
98			min	15.597	15	0	1	-1.566	1	0	1	-.001	1	0	1
99		12	max	376.16	1	0	1	-.076	15	0	1	0	15	0	1
100			min	15.616	15	0	1	-1.566	1	0	1	-.002	1	0	1
101		13	max	376.225	1	0	1	-.076	15	0	1	0	15	0	1
102			min	15.636	15	0	1	-1.566	1	0	1	-.002	1	0	1
103		14	max	376.29	1	0	1	-.076	15	0	1	0	15	0	1
104			min	15.655	15	0	1	-1.566	1	0	1	-.002	1	0	1
105		15	max	376.354	1	0	1	-.076	15	0	1	0	15	0	1
106			min	15.675	15	0	1	-1.566	1	0	1	-.002	1	0	1
107		16	max	376.419	1	0	1	-.076	15	0	1	0	15	0	1
108			min	15.695	15	0	1	-1.566	1	0	1	-.002	1	0	1
109		17	max	376.484	1	0	1	-.076	15	0	1	0	15	0	1
110			min	15.714	15	0	1	-1.566	1	0	1	-.002	1	0	1
111		18	max	376.549	1	0	1	-.076	15	0	1	0	15	0	1
112			min	15.734	15	0	1	-1.566	1	0	1	-.002	1	0	1
113		19	max	376.613	1	0	1	-.076	15	0	1	0	15	0	1
114			min	15.753	15	0	1	-1.566	1	0	1	-.003	1	0	1
115	M6	1	max	803.773	1	.682	4	.137	1	0	3	0	3	0	1
116			min	-1163.955	3	.16	15	-.159	3	0	15	0	11	0	1
117		2	max	803.908	1	.624	4	.137	1	0	3	0	3	0	15
118			min	-1163.853	3	.146	15	-.159	3	0	15	0	11	0	4
119		3	max	804.042	1	.567	4	.137	1	0	3	0	3	0	15
120			min	-1163.752	3	.133	15	-.159	3	0	15	0	11	0	4
121		4	max	804.177	1	.509	4	.137	1	0	3	0	3	0	15
122			min	-1163.651	3	.119	15	-.159	3	0	15	0	15	0	4
123		5	max	804.312	1	.452	4	.137	1	0	3	0	3	0	15
124			min	-1163.55	3	.097	12	-.159	3	0	15	0	10	0	4
125		6	max	804.447	1	.401	2	.137	1	0	3	0	1	0	15
126			min	-1163.449	3	.075	12	-.159	3	0	15	0	10	0	4
127		7	max	804.582	1	.357	2	.137	1	0	3	0	1	0	15
128			min	-1163.348	3	.052	12	-.159	3	0	15	0	10	0	4
129		8	max	804.717	1	.312	2	.137	1	0	3	0	1	0	12
130			min	-1163.247	3	.03	12	-.159	3	0	15	0	3	0	4
131		9	max	804.852	1	.267	2	.137	1	0	3	0	1	0	12
132			min	-1163.145	3	.004	3	-.159	3	0	15	0	3	0	4
133		10	max	804.986	1	.222	2	.137	1	0	3	0	1	0	12
134			min	-1163.044	3	-.03	3	-.159	3	0	15	0	3	0	2
135		11	max	805.121	1	.177	2	.137	1	0	3	0	1	0	12
136			min	-1162.943	3	-.063	3	-.159	3	0	15	0	3	0	2
137		12	max	805.256	1	.133	2	.137	1	0	3	0	1	0	12
138			min	-1162.842	3	-.097	3	-.159	3	0	15	0	3	0	2
139		13	max	805.391	1	.088	2	.137	1	0	3	0	1	0	12
140			min	-1162.741	3	-.131	3	-.159	3	0	15	0	3	0	2
141		14	max	805.526	1	.043	2	.137	1	0	3	0	1	0	12
142			min	-1162.64	3	-.164	3	-.159	3	0	15	0	3	0	2
143		15	max	805.661	1	-.002	2	.137	1	0	3	0	1	0	12
144			min	-1162.539	3	-.198	3	-.159	3	0	15	0	3	0	2
145		16	max	805.796	1	-.043	15	.137	1	0	3	0	1	0	12
146			min	-1162.437	3	-.231	3	-.159	3	0	15	0	3	0	2
147		17	max	805.931	1	-.056	15	.137	1	0	3	0	1	0	3
148			min	-1162.336	3	-.265	3	-.159	3	0	15	0	3	0	2
149		18	max	806.065	1	-.07	15	.137	1	0	3	0	1	0	3
150			min	-1162.235	3	-.299	3	-.159	3	0	15	0	3	0	2
151		19	max	806.2	1	-.083	15	.137	1	0	3	0	1	0	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
152			min	-1162.134	3	-.353	4	-.159	3	0	15	0	3	0	2
153	M7	1	max	770.5	2	1.74	4	.03	3	0	1	0	2	0	2
154			min	-668.996	3	.409	15	-.008	2	0	3	0	3	0	3
155		2	max	770.43	2	1.564	4	.03	3	0	1	0	2	0	2
156			min	-669.048	3	.367	15	-.008	2	0	3	0	3	0	3
157		3	max	770.36	2	1.387	4	.03	3	0	1	0	2	0	2
158			min	-669.101	3	.326	15	-.008	2	0	3	0	3	0	3
159		4	max	770.29	2	1.211	4	.03	3	0	1	0	2	0	2
160			min	-669.153	3	.284	15	-.008	2	0	3	0	3	0	3
161		5	max	770.22	2	1.035	4	.03	3	0	1	0	2	0	15
162			min	-669.206	3	.243	15	-.008	2	0	3	0	3	0	3
163		6	max	770.15	2	.858	4	.03	3	0	1	0	2	0	15
164			min	-669.258	3	.202	15	-.008	2	0	3	0	3	0	3
165		7	max	770.08	2	.682	4	.03	3	0	1	0	2	0	15
166			min	-669.311	3	.16	15	-.008	2	0	3	0	3	0	4
167		8	max	770.01	2	.506	4	.03	3	0	1	0	2	0	15
168			min	-669.363	3	.119	15	-.008	2	0	3	0	3	-.001	4
169		9	max	769.94	2	.348	2	.03	3	0	1	0	2	0	15
170			min	-669.416	3	.052	12	-.008	2	0	3	0	3	-.001	4
171		10	max	769.87	2	.21	2	.03	3	0	1	0	2	0	15
172			min	-669.468	3	-.032	3	-.008	2	0	3	0	3	-.001	4
173		11	max	769.8	2	.073	2	.03	3	0	1	0	2	0	15
174			min	-669.521	3	-.136	3	-.008	2	0	3	0	3	-.001	4
175		12	max	769.73	2	-.047	15	.03	3	0	1	0	2	0	15
176			min	-669.573	3	-.239	3	-.008	2	0	3	0	3	-.001	4
177		13	max	769.66	2	-.089	15	.03	3	0	1	0	2	0	15
178			min	-669.626	3	-.376	4	-.008	2	0	3	0	3	-.001	4
179		14	max	769.59	2	-.13	15	.03	3	0	1	0	11	0	15
180			min	-669.678	3	-.553	4	-.008	2	0	3	0	3	-.001	4
181		15	max	769.52	2	-.172	15	.03	3	0	1	0	11	0	15
182			min	-669.731	3	-.729	4	-.008	2	0	3	0	3	0	4
183		16	max	769.45	2	-.213	15	.03	3	0	1	0	11	0	15
184			min	-669.783	3	-.905	4	-.008	2	0	3	0	3	0	4
185		17	max	769.38	2	-.255	15	.03	3	0	1	0	11	0	15
186			min	-669.836	3	-1.082	4	-.008	2	0	3	0	3	0	4
187		18	max	769.31	2	-.296	15	.03	3	0	1	0	11	0	15
188			min	-669.888	3	-1.258	4	-.008	2	0	3	0	3	0	4
189		19	max	769.24	2	-.337	15	.03	3	0	1	0	11	0	1
190			min	-669.941	3	-1.435	4	-.008	2	0	3	0	3	0	1
191	M8	1	max	940.542	1	0	1	.769	1	0	1	0	15	0	1
192			min	34.365	15	0	1	-.507	3	0	1	0	1	0	1
193		2	max	940.607	1	0	1	.769	1	0	1	0	1	0	1
194			min	34.384	15	0	1	-.507	3	0	1	0	3	0	1
195		3	max	940.672	1	0	1	.769	1	0	1	0	1	0	1
196			min	34.404	15	0	1	-.507	3	0	1	0	3	0	1
197		4	max	940.736	1	0	1	.769	1	0	1	0	1	0	1
198			min	34.423	15	0	1	-.507	3	0	1	0	3	0	1
199		5	max	940.801	1	0	1	.769	1	0	1	0	1	0	1
200			min	34.443	15	0	1	-.507	3	0	1	0	3	0	1
201		6	max	940.866	1	0	1	.769	1	0	1	0	1	0	1
202			min	34.462	15	0	1	-.507	3	0	1	0	3	0	1
203		7	max	940.931	1	0	1	.769	1	0	1	0	1	0	1
204			min	34.482	15	0	1	-.507	3	0	1	0	3	0	1
205		8	max	940.995	1	0	1	.769	1	0	1	0	1	0	1
206			min	34.501	15	0	1	-.507	3	0	1	0	3	0	1
207		9	max	941.06	1	0	1	.769	1	0	1	0	1	0	1
208			min	34.521	15	0	1	-.507	3	0	1	0	3	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
209		10	max	941.125	1	0	1	.769	1	0	1	0	1	0	1
210			min	34.54	15	0	1	-.507	3	0	1	0	3	0	1
211		11	max	941.189	1	0	1	.769	1	0	1	0	1	0	1
212			min	34.56	15	0	1	-.507	3	0	1	0	3	0	1
213		12	max	941.254	1	0	1	.769	1	0	1	0	1	0	1
214			min	34.579	15	0	1	-.507	3	0	1	0	3	0	1
215		13	max	941.319	1	0	1	.769	1	0	1	0	1	0	1
216			min	34.599	15	0	1	-.507	3	0	1	0	3	0	1
217		14	max	941.383	1	0	1	.769	1	0	1	0	1	0	1
218			min	34.618	15	0	1	-.507	3	0	1	0	3	0	1
219		15	max	941.448	1	0	1	.769	1	0	1	0	1	0	1
220			min	34.638	15	0	1	-.507	3	0	1	0	3	0	1
221		16	max	941.513	1	0	1	.769	1	0	1	.001	1	0	1
222			min	34.657	15	0	1	-.507	3	0	1	0	3	0	1
223		17	max	941.578	1	0	1	.769	1	0	1	.001	1	0	1
224			min	34.677	15	0	1	-.507	3	0	1	0	3	0	1
225		18	max	941.642	1	0	1	.769	1	0	1	.001	1	0	1
226			min	34.697	15	0	1	-.507	3	0	1	0	3	0	1
227		19	max	941.707	1	0	1	.769	1	0	1	.001	1	0	1
228			min	34.716	15	0	1	-.507	3	0	1	0	3	0	1
229	M10	1	max	258.397	1	.673	4	.006	3	0	1	0	1	0	1
230			min	-329.194	3	.159	15	-.184	1	0	3	0	3	0	1
231		2	max	258.531	1	.616	4	.006	3	0	1	0	1	0	15
232			min	-329.093	3	.145	15	-.184	1	0	3	0	3	0	4
233		3	max	258.666	1	.558	4	.006	3	0	1	0	1	0	15
234			min	-328.992	3	.132	15	-.184	1	0	3	0	3	0	4
235		4	max	258.801	1	.501	4	.006	3	0	1	0	1	0	15
236			min	-328.891	3	.118	15	-.184	1	0	3	0	3	0	4
237		5	max	258.936	1	.443	4	.006	3	0	1	0	1	0	15
238			min	-328.789	3	.105	15	-.184	1	0	3	0	3	0	4
239		6	max	259.071	1	.386	4	.006	3	0	1	0	1	0	15
240			min	-328.688	3	.091	15	-.184	1	0	3	0	3	0	4
241		7	max	259.206	1	.328	4	.006	3	0	1	0	1	0	15
242			min	-328.587	3	.078	15	-.184	1	0	3	0	3	0	4
243		8	max	259.341	1	.271	4	.006	3	0	1	0	1	0	15
244			min	-328.486	3	.064	15	-.184	1	0	3	0	3	0	4
245		9	max	259.475	1	.213	4	.006	3	0	1	0	1	0	15
246			min	-328.385	3	.051	15	-.184	1	0	3	0	3	0	4
247		10	max	259.61	1	.156	4	.006	3	0	1	0	1	0	15
248			min	-328.284	3	.037	15	-.184	1	0	3	0	3	0	4
249		11	max	259.745	1	.108	2	.006	3	0	1	0	11	0	15
250			min	-328.183	3	.024	15	-.184	1	0	3	0	3	0	4
251		12	max	259.88	1	.063	2	.006	3	0	1	0	11	0	15
252			min	-328.081	3	.007	12	-.184	1	0	3	0	3	0	4
253		13	max	260.015	1	.018	2	.006	3	0	1	0	15	0	15
254			min	-327.98	3	-.023	3	-.184	1	0	3	0	3	0	4
255		14	max	260.15	1	-.017	15	.006	3	0	1	0	15	0	15
256			min	-327.879	3	-.074	4	-.184	1	0	3	0	3	0	4
257		15	max	260.285	1	-.03	15	.006	3	0	1	0	15	0	15
258			min	-327.778	3	-.132	4	-.184	1	0	3	0	3	0	4
259		16	max	260.42	1	-.044	15	.006	3	0	1	0	15	0	15
260			min	-327.677	3	-.189	4	-.184	1	0	3	0	1	0	4
261		17	max	260.554	1	-.058	15	.006	3	0	1	0	15	0	15
262			min	-327.576	3	-.247	4	-.184	1	0	3	0	1	0	4
263		18	max	260.689	1	-.071	15	.006	3	0	1	0	15	0	15
264			min	-327.474	3	-.304	4	-.184	1	0	3	0	1	0	4
265		19	max	260.824	1	-.085	15	.006	3	0	1	0	15	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
266			min	-327.373	3	-.361	4	-.184	1	0	3	0	1	0	4
267	M11	1	max	200.029	2	1.739	4	.549	1	0	1	0	3	0	4
268			min	-214.33	3	.409	15	-.019	3	0	15	-.002	1	0	12
269		2	max	199.959	2	1.562	4	.549	1	0	1	0	3	0	1
270			min	-214.383	3	.367	15	-.019	3	0	15	-.002	1	0	3
271		3	max	199.889	2	1.386	4	.549	1	0	1	0	3	0	1
272			min	-214.435	3	.326	15	-.019	3	0	15	-.001	1	0	3
273		4	max	199.819	2	1.21	4	.549	1	0	1	0	3	0	15
274			min	-214.488	3	.284	15	-.019	3	0	15	-.001	1	0	3
275		5	max	199.749	2	1.033	4	.549	1	0	1	0	3	0	15
276			min	-214.54	3	.243	15	-.019	3	0	15	-.001	1	0	4
277		6	max	199.679	2	.857	4	.549	1	0	1	0	3	0	15
278			min	-214.593	3	.201	15	-.019	3	0	15	-.001	1	0	4
279		7	max	199.609	2	.681	4	.549	1	0	1	0	3	0	15
280			min	-214.645	3	.16	15	-.019	3	0	15	-.001	1	0	4
281		8	max	199.539	2	.504	4	.549	1	0	1	0	3	0	15
282			min	-214.698	3	.118	15	-.019	3	0	15	0	1	-.001	4
283		9	max	199.469	2	.328	4	.549	1	0	1	0	3	0	15
284			min	-214.75	3	.077	15	-.019	3	0	15	0	1	-.001	4
285		10	max	199.399	2	.151	4	.549	1	0	1	0	3	0	15
286			min	-214.803	3	.024	12	-.019	3	0	15	0	1	-.001	4
287		11	max	199.329	2	.005	1	.549	1	0	1	0	3	0	15
288			min	-214.855	3	-.07	3	-.019	3	0	15	0	1	-.001	4
289		12	max	199.259	2	-.047	15	.549	1	0	1	0	3	0	15
290			min	-214.908	3	-.201	4	-.019	3	0	15	0	1	-.001	4
291		13	max	199.189	2	-.089	15	.549	1	0	1	0	3	0	15
292			min	-214.96	3	-.378	4	-.019	3	0	15	0	1	-.001	4
293		14	max	199.119	2	-.13	15	.549	1	0	1	0	3	0	15
294			min	-215.013	3	-.554	4	-.019	3	0	15	0	1	-.001	4
295		15	max	199.049	2	-.172	15	.549	1	0	1	0	3	0	15
296			min	-215.065	3	-.73	4	-.019	3	0	15	0	1	0	4
297		16	max	198.979	2	-.213	15	.549	1	0	1	0	3	0	15
298			min	-215.118	3	-.907	4	-.019	3	0	15	0	10	0	4
299		17	max	198.909	2	-.255	15	.549	1	0	1	0	3	0	15
300			min	-215.17	3	-1.083	4	-.019	3	0	15	0	15	0	4
301		18	max	198.839	2	-.296	15	.549	1	0	1	0	1	0	15
302			min	-215.223	3	-1.26	4	-.019	3	0	15	0	15	0	4
303		19	max	198.769	2	-.338	15	.549	1	0	1	0	1	0	1
304			min	-215.275	3	-1.436	4	-.019	3	0	15	0	15	0	1
305	M12	1	max	375.105	1	0	1	3.417	1	0	1	0	2	0	1
306			min	15.55	15	0	1	.156	15	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	15.569	15	0	1	.156	15	0	1	0	15	0	1
309		3	max	375.235	1	0	1	3.417	1	0	1	0	1	0	1
310			min	15.589	15	0	1	.156	15	0	1	0	15	0	1
311		4	max	375.3	1	0	1	3.417	1	0	1	0	1	0	1
312			min	15.608	15	0	1	.156	15	0	1	0	15	0	1
313		5	max	375.364	1	0	1	3.417	1	0	1	.001	1	0	1
314			min	15.628	15	0	1	.156	15	0	1	0	15	0	1
315		6	max	375.429	1	0	1	3.417	1	0	1	.002	1	0	1
316			min	15.647	15	0	1	.156	15	0	1	0	15	0	1
317		7	max	375.494	1	0	1	3.417	1	0	1	.002	1	0	1
318			min	15.667	15	0	1	.156	15	0	1	0	15	0	1
319		8	max	375.558	1	0	1	3.417	1	0	1	.002	1	0	1
320			min	15.686	15	0	1	.156	15	0	1	0	15	0	1
321		9	max	375.623	1	0	1	3.417	1	0	1	.002	1	0	1
322			min	15.706	15	0	1	.156	15	0	1	0	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
323		10	max	375.688	1	0	1	3.417	1	0	1	.003	1	0	1
324			min	15.725	15	0	1	.156	15	0	1	0	15	0	1
325		11	max	375.753	1	0	1	3.417	1	0	1	.003	1	0	1
326			min	15.745	15	0	1	.156	15	0	1	0	15	0	1
327		12	max	375.817	1	0	1	3.417	1	0	1	.003	1	0	1
328			min	15.764	15	0	1	.156	15	0	1	0	15	0	1
329		13	max	375.882	1	0	1	3.417	1	0	1	.004	1	0	1
330			min	15.784	15	0	1	.156	15	0	1	0	15	0	1
331		14	max	375.947	1	0	1	3.417	1	0	1	.004	1	0	1
332			min	15.803	15	0	1	.156	15	0	1	0	15	0	1
333		15	max	376.011	1	0	1	3.417	1	0	1	.004	1	0	1
334			min	15.823	15	0	1	.156	15	0	1	0	15	0	1
335		16	max	376.076	1	0	1	3.417	1	0	1	.005	1	0	1
336			min	15.842	15	0	1	.156	15	0	1	0	15	0	1
337		17	max	376.141	1	0	1	3.417	1	0	1	.005	1	0	1
338			min	15.862	15	0	1	.156	15	0	1	0	15	0	1
339		18	max	376.205	1	0	1	3.417	1	0	1	.005	1	0	1
340			min	15.881	15	0	1	.156	15	0	1	0	15	0	1
341		19	max	376.27	1	0	1	3.417	1	0	1	.006	1	0	1
342			min	15.901	15	0	1	.156	15	0	1	0	15	0	1
343	M1	1	max	139.568	1	336.601	3	-3.119	15	0	1	.134	1	0	2
344			min	6.334	15	-245.396	1	-67.8	1	0	3	.006	15	0	3
345		2	max	139.728	1	336.43	3	-3.119	15	0	1	.119	1	.053	1
346			min	6.382	15	-245.625	1	-67.8	1	0	3	.005	15	-.073	3
347		3	max	114.721	3	6.523	9	-3.1	15	0	12	.103	1	.106	1
348			min	-15.647	10	-27.926	2	-67.713	1	0	1	.005	15	-.145	3
349		4	max	114.841	3	6.332	9	-3.1	15	0	12	.089	1	.11	2
350			min	-15.513	10	-28.155	2	-67.713	1	0	1	.004	15	-.143	3
351		5	max	114.962	3	6.142	9	-3.1	15	0	12	.074	1	.116	2
352			min	-15.38	10	-28.384	2	-67.713	1	0	1	.003	15	-.141	3
353		6	max	115.082	3	5.951	9	-3.1	15	0	12	.059	1	.122	2
354			min	-15.246	10	-28.612	2	-67.713	1	0	1	.003	15	-.139	3
355		7	max	115.202	3	5.76	9	-3.1	15	0	12	.044	1	.128	2
356			min	-15.113	10	-28.841	2	-67.713	1	0	1	.002	15	-.137	3
357		8	max	115.322	3	5.57	9	-3.1	15	0	12	.03	1	.134	2
358			min	-14.979	10	-29.07	2	-67.713	1	0	1	.001	15	-.135	3
359		9	max	115.442	3	5.379	9	-3.1	15	0	12	.015	1	.141	2
360			min	-14.846	10	-29.299	2	-67.713	1	0	1	0	15	-.133	3
361		10	max	115.562	3	5.189	9	-3.1	15	0	12	.001	3	.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	-3.1	15	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	-3.1	15	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	-3.1	15	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	-3.1	15	0	12	-.003	15	.173	2
370			min	-14.179	10	-30.442	2	-67.713	1	0	1	-.058	1	-.121	3
371		15	max	116.163	3	4.236	9	-3.1	15	0	12	-.003	15	.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	-3.122	15	0	1	-.004	15	.185	2
374			min	2.379	15	-201.058	3	-68.109	1	0	12	-.088	1	-.115	3
375		17	max	91.08	2	144.481	2	-3.122	15	0	1	-.005	15	.153	2
376			min	2.427	15	-201.23	3	-68.109	1	0	12	-.103	1	-.071	3
377		18	max	-6.359	15	355.165	2	-3.199	15	0	3	-.005	15	.077	2
378			min	-139.414	1	-163.622	3	-69.841	1	0	2	-.118	1	-.036	3
379		19	max	-6.31	15	354.937	2	-3.199	15	0	3	-.006	15	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
380			min	-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	.006	3	0	3
382			min	11.213	12	-810.476	1	-51.135	3	0	3	0	10	0	2
383		2	max	308.036	1	1110.513	3	-.034	10	0	1	0	11	.175	1
384			min	11.293	12	-810.705	1	-51.135	3	0	3	-.005	3	-.24	3
385		3	max	358.745	3	5.51	9	5.873	3	0	3	0	2	.348	1
386			min	-73.711	2	-103.214	2	-.351	11	0	1	-.016	3	-.476	3
387		4	max	358.865	3	5.32	9	5.873	3	0	3	0	2	.362	2
388			min	-73.551	2	-103.442	2	-.351	11	0	1	-.015	3	-.469	3
389		5	max	358.985	3	5.129	9	5.873	3	0	3	0	2	.384	2
390			min	-73.391	2	-103.671	2	-.351	11	0	1	-.013	3	-.461	3
391		6	max	359.105	3	4.938	9	5.873	3	0	3	0	2	.407	2
392			min	-73.23	2	-103.9	2	-.351	11	0	1	-.012	3	-.453	3
393		7	max	359.226	3	4.748	9	5.873	3	0	3	0	2	.429	2
394			min	-73.07	2	-104.129	2	-.351	11	0	1	-.011	3	-.446	3
395		8	max	359.346	3	4.557	9	5.873	3	0	3	0	2	.452	2
396			min	-72.91	2	-104.357	2	-.351	11	0	1	-.01	3	-.438	3
397		9	max	359.466	3	4.367	9	5.873	3	0	3	0	2	.475	2
398			min	-72.75	2	-104.586	2	-.351	11	0	1	-.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	-.351	11	0	1	-.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	-.351	11	0	1	-.006	3	-.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	-.351	11	0	1	-.005	3	-.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	-.351	11	0	1	-.003	3	-.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	-.351	11	0	1	-.002	3	-.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	-.351	11	0	1	-.001	1	-.383	3
411		16	max	290.035	2	576.388	2	5.856	3	0	1	0	3	.629	2
412			min	5.701	15	-629.742	3	-.367	11	0	15	-.001	1	-.369	3
413		17	max	290.196	2	576.159	2	5.856	3	0	1	.001	3	.504	2
414			min	5.749	15	-629.913	3	-.367	11	0	15	-.001	1	-.233	3
415		18	max	-12.47	12	1167.869	2	5.343	3	0	10	.003	3	.253	2
416			min	-308.455	1	-536.249	3	-.08	2	0	1	0	1	-.116	3
417		19	max	-12.39	12	1167.64	2	5.343	3	0	10	.004	3	0	3
418			min	-308.294	1	-536.42	3	-.08	2	0	1	0	1	0	2
419	M9	1	max	138.96	1	336.562	3	79.992	1	0	3	-.006	15	0	2
420			min	6.303	15	-245.387	1	4.049	15	0	1	-.133	1	0	3
421		2	max	139.121	1	336.391	3	79.992	1	0	3	-.003	12	.053	1
422			min	6.351	15	-245.616	1	4.049	15	0	1	-.115	1	-.073	3
423		3	max	114.875	3	6.503	9	64.962	1	0	1	.007	3	.106	1
424			min	-15.113	10	-27.934	2	.706	12	0	12	-.097	1	-.145	3
425		4	max	114.995	3	6.313	9	64.962	1	0	1	.008	3	.109	2
426			min	-14.98	10	-28.163	2	.706	12	0	12	-.083	1	-.143	3
427		5	max	115.115	3	6.122	9	64.962	1	0	1	.008	3	.116	2
428			min	-14.846	10	-28.391	2	.706	12	0	12	-.069	1	-.141	3
429		6	max	115.235	3	5.931	9	64.962	1	0	1	.008	3	.122	2
430			min	-14.713	10	-28.62	2	.706	12	0	12	-.055	1	-.139	3
431		7	max	115.355	3	5.741	9	64.962	1	0	1	.008	3	.128	2
432			min	-14.58	10	-28.849	2	.706	12	0	12	-.04	1	-.137	3
433		8	max	115.476	3	5.55	9	64.962	1	0	1	.008	3	.134	2
434			min	-14.446	10	-29.078	2	.706	12	0	12	-.026	1	-.135	3
435		9	max	115.596	3	5.359	9	64.962	1	0	1	.008	3	.141	2
436			min	-14.313	10	-29.306	2	.706	12	0	12	-.012	1	-.133	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
437		10	max	115.716	3	5.169	9	64.962	1	0	1	.009	3	.147	2
438			min	-14.179	10	-29.535	2	.706	12	0	12	0	2	-.13	3
439		11	max	115.836	3	4.978	9	64.962	1	0	1	.016	1	.153	2
440			min	-14.046	10	-29.764	2	.706	12	0	12	0	15	-.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	.706	12	0	12	.001	15	-.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	.706	12	0	12	.002	15	-.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	.706	12	0	12	.003	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	.706	12	0	12	.003	15	-.119	3
449		16	max	91.275	2	144.428	2	65.417	1	0	15	.087	1	.185	2
450			min	2.478	15	-201.568	3	.695	12	0	1	.004	15	-.115	3
451		17	max	91.435	2	144.199	2	65.417	1	0	15	.101	1	.153	2
452			min	2.527	15	-201.739	3	.695	12	0	1	.005	15	-.071	3
453		18	max	-6.344	15	355.166	2	68.926	1	0	2	.116	1	.077	2
454			min	-139.016	1	-163.617	3	1.048	12	0	3	.005	15	-.036	3
455		19	max	-6.295	15	354.938	2	68.926	1	0	2	.131	1	0	2
456			min	-138.856	1	-163.788	3	1.048	12	0	3	.006	15	0	3
457	M13	1	max	80.212	1	245.006	1	-6.303	15	0	2	.133	1	0	1
458			min	4.05	15	-336.563	3	-138.944	1	0	3	.006	15	0	3
459		2	max	80.212	1	172.944	1	-4.833	15	0	2	.041	1	.215	3
460			min	4.05	15	-237.477	3	-106.366	1	0	3	.002	15	-.157	1
461		3	max	80.212	1	100.883	1	-3.362	15	0	2	.004	3	.356	3
462			min	4.05	15	-138.39	3	-73.788	1	0	3	-.027	1	-.259	1
463		4	max	80.212	1	28.821	1	-1.891	15	0	2	0	3	.423	3
464			min	4.05	15	-39.304	3	-41.21	1	0	3	-.07	1	-.308	1
465		5	max	80.212	1	59.783	3	-.4	10	0	2	-.002	12	.415	3
466			min	4.05	15	-43.241	1	-8.632	1	0	3	-.089	1	-.303	1
467		6	max	80.212	1	158.869	3	23.946	1	0	2	-.002	12	.333	3
468			min	4.05	15	-115.302	1	-.091	3	0	3	-.083	1	-.243	1
469		7	max	80.212	1	257.956	3	56.524	1	0	2	-.002	12	.177	3
470			min	4.05	15	-187.364	1	1.434	12	0	3	-.053	1	-.13	1
471		8	max	80.212	1	357.042	3	89.103	1	0	2	.002	2	.038	1
472			min	4.05	15	-259.426	1	2.861	12	0	3	0	3	-.054	3
473		9	max	80.212	1	456.128	3	121.681	1	0	2	.081	1	.259	1
474			min	4.05	15	-331.487	1	4.288	12	0	3	.002	12	-.359	3
475		10	max	80.212	1	555.215	3	154.259	1	0	2	.184	1	.535	1
476			min	4.05	15	-403.549	1	5.714	12	0	3	.006	12	-.738	3
477		11	max	68.026	1	331.487	1	-4.065	12	0	3	.078	1	.259	1
478			min	3.119	15	-456.128	3	-121.071	1	0	2	-.002	3	-.359	3
479		12	max	68.026	1	259.426	1	-2.638	12	0	3	.002	2	.038	1
480			min	3.119	15	-357.042	3	-88.493	1	0	2	-.005	3	-.054	3
481		13	max	68.026	1	187.364	1	-1.212	12	0	3	-.003	15	.177	3
482			min	3.119	15	-257.955	3	-55.915	1	0	2	-.055	1	-.13	1
483		14	max	68.026	1	115.302	1	.441	3	0	3	-.004	15	.333	3
484			min	3.119	15	-158.869	3	-23.337	1	0	2	-.084	1	-.243	1
485		15	max	68.026	1	43.241	1	9.241	1	0	3	-.004	15	.415	3
486			min	3.119	15	-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	-.003	12	.423	3
488			min	3.119	15	-28.821	1	1.922	15	0	2	-.07	1	-.308	1
489		17	max	68.026	1	138.39	3	74.397	1	0	3	0	3	.356	3
490			min	3.119	15	-100.883	1	3.393	15	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	3.119	15	-172.944	1	4.863	15	0	2	.002	15	-.157	1
493		19	max	68.026	1	336.563	3	139.554	1	0	3	.134	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
494			min	3.119	15	-245.006	1	6.334	15	0	2	.006	15	0	3
495	M16	1	max	-1.046	12	355.168	2	-6.295	15	0	3	.131	1	0	2
496			min	-68.682	1	-163.821	3	-138.871	1	0	2	.006	15	0	3
497		2	max	-1.046	12	250.724	2	-4.825	15	0	3	.039	1	.105	3
498			min	-68.682	1	-115.806	3	-106.292	1	0	2	.002	15	-.227	2
499		3	max	-1.046	12	146.279	2	-3.354	15	0	3	0	12	.174	3
500			min	-68.682	1	-67.792	3	-73.714	1	0	2	-.028	1	-.376	2
501		4	max	-1.046	12	41.835	2	-1.884	15	0	3	-.003	15	.207	3
502			min	-68.682	1	-19.777	3	-41.136	1	0	2	-.071	1	-.447	2
503		5	max	-1.046	12	28.237	3	-.411	10	0	3	-.004	15	.203	3
504			min	-68.682	1	-62.61	2	-8.558	1	0	2	-.09	1	-.439	2
505		6	max	-1.046	12	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	-1.046	12	124.266	3	56.598	1	0	3	-.002	15	.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	.002	2	.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	-3.198	15	-11.766	15	154.332	1	0	15	.184	1	.775	2
514			min	-69.622	1	-584.831	2	-9.49	3	0	2	.007	12	-.353	3
515		11	max	-3.198	15	480.387	2	-4.924	12	0	2	.08	1	.376	2
516			min	-69.622	1	-220.295	3	-121.356	1	0	3	.003	12	-.169	3
517		12	max	-3.198	15	375.943	2	-3.497	12	0	2	.002	2	.055	2
518			min	-69.622	1	-172.28	3	-88.778	1	0	3	0	3	-.022	3
519		13	max	-3.198	15	271.498	2	-2.07	12	0	2	-.002	15	.089	3
520			min	-69.622	1	-124.266	3	-56.2	1	0	3	-.054	1	-.188	2
521		14	max	-3.198	15	167.054	2	-.644	12	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	-3.198	15	62.609	2	8.956	1	0	2	-.003	12	.203	3
524			min	-69.622	1	-28.237	3	.428	15	0	3	-.089	1	-.439	2
525		16	max	-3.198	15	19.778	3	41.534	1	0	2	-.002	12	.207	3
526			min	-69.622	1	-41.835	2	1.899	15	0	3	-.07	1	-.447	2
527		17	max	-3.198	15	67.792	3	74.112	1	0	2	0	3	.174	3
528			min	-69.622	1	-146.279	2	3.369	15	0	3	-.027	1	-.376	2
529		18	max	-3.198	15	115.806	3	106.69	1	0	2	.041	1	.105	3
530			min	-69.622	1	-250.724	2	4.84	15	0	3	.002	15	-.227	2
531		19	max	-3.198	15	163.821	3	139.268	1	0	2	.133	1	0	2
532			min	-69.622	1	-355.168	2	6.31	15	0	3	.006	15	0	3
533	M15	1	max	0	2	2.371	4	.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	2.107	4	.049	3	0	1	0	1	0	2
536			min	-64.04	3	0	2	-.039	1	0	3	0	3	0	4
537		3	max	0	2	1.844	4	.049	3	0	1	0	1	0	2
538			min	-64.116	3	0	2	-.039	1	0	3	0	3	-.002	4
539		4	max	0	2	1.58	4	.049	3	0	1	0	1	0	2
540			min	-64.191	3	0	2	-.039	1	0	3	0	3	-.003	4
541		5	max	0	2	1.317	4	.049	3	0	1	0	1	0	2
542			min	-64.267	3	0	2	-.039	1	0	3	0	3	-.003	4
543		6	max	0	2	1.054	4	.049	3	0	1	0	1	0	2
544			min	-64.343	3	0	2	-.039	1	0	3	0	3	-.004	4
545		7	max	0	2	.79	4	.049	3	0	1	0	3	0	2
546			min	-64.418	3	0	2	-.039	1	0	3	0	1	-.004	4
547		8	max	0	2	.527	4	.049	3	0	1	0	3	0	2
548			min	-64.494	3	0	2	-.039	1	0	3	0	1	-.004	4
549		9	max	0	2	.263	4	.049	3	0	1	0	3	0	2
550			min	-64.569	3	0	2	-.039	1	0	3	0	1	-.004	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
551		10	max	0	2	0	1	.049	3	0	1	0	3	0	2
552			min	-64.645	3	0	1	-.039	1	0	3	0	1	-.005	4
553		11	max	0	2	0	2	.049	3	0	1	0	3	0	2
554			min	-64.72	3	-.263	4	-.039	1	0	3	0	1	-.004	4
555		12	max	0	2	0	2	.049	3	0	1	0	3	0	2
556			min	-64.796	3	-.527	4	-.039	1	0	3	0	1	-.004	4
557		13	max	0	2	0	2	.049	3	0	1	0	3	0	2
558			min	-64.871	3	-.79	4	-.039	1	0	3	0	1	-.004	4
559		14	max	0	2	0	2	.049	3	0	1	0	3	0	2
560			min	-64.947	3	-1.054	4	-.039	1	0	3	0	1	-.004	4
561		15	max	0	2	0	2	.049	3	0	1	0	3	0	2
562			min	-65.022	3	-1.317	4	-.039	1	0	3	0	1	-.003	4
563		16	max	0	2	0	2	.049	3	0	1	0	3	0	2
564			min	-65.098	3	-1.58	4	-.039	1	0	3	0	1	-.003	4
565		17	max	0	2	0	2	.049	3	0	1	0	3	0	2
566			min	-65.173	3	-1.844	4	-.039	1	0	3	0	1	-.002	4
567		18	max	0	2	0	2	.049	3	0	1	0	3	0	2
568			min	-65.249	3	-2.107	4	-.039	1	0	3	0	1	0	4
569		19	max	0	2	0	2	.049	3	0	1	0	3	0	1
570			min	-65.324	3	-2.371	4	-.039	1	0	3	0	1	0	1
571	M16A	1	max	-.859	10	2.371	4	.023	1	0	3	0	3	0	1
572			min	-64.547	3	.557	15	-.02	3	0	2	0	1	0	1
573		2	max	-.775	10	2.107	4	.023	1	0	3	0	3	0	15
574			min	-64.472	3	.495	15	-.02	3	0	2	0	1	0	4
575		3	max	-.691	10	1.844	4	.023	1	0	3	0	3	0	15
576			min	-64.396	3	.433	15	-.02	3	0	2	0	1	-.002	4
577		4	max	-.607	10	1.58	4	.023	1	0	3	0	3	0	15
578			min	-64.321	3	.371	15	-.02	3	0	2	0	1	-.003	4
579		5	max	-.523	10	1.317	4	.023	1	0	3	0	3	0	15
580			min	-64.245	3	.31	15	-.02	3	0	2	0	1	-.003	4
581		6	max	-.439	10	1.054	4	.023	1	0	3	0	3	0	15
582			min	-64.17	3	.248	15	-.02	3	0	2	0	1	-.004	4
583		7	max	-.355	10	.79	4	.023	1	0	3	0	3	0	15
584			min	-64.094	3	.186	15	-.02	3	0	2	0	1	-.004	4
585		8	max	-.271	10	.527	4	.023	1	0	3	0	3	-.001	15
586			min	-64.019	3	.124	15	-.02	3	0	2	0	1	-.004	4
587		9	max	-.187	10	.263	4	.023	1	0	3	0	3	-.001	15
588			min	-63.943	3	.062	15	-.02	3	0	2	0	1	-.004	4
589		10	max	-.103	10	0	1	.023	1	0	3	0	3	-.001	15
590			min	-63.868	3	0	1	-.02	3	0	2	0	1	-.005	4
591		11	max	-.019	10	-.062	15	.023	1	0	3	0	3	-.001	15
592			min	-63.792	3	-.263	4	-.02	3	0	2	0	1	-.004	4
593		12	max	.064	10	-.124	15	.023	1	0	3	0	3	-.001	15
594			min	-63.717	3	-.527	4	-.02	3	0	2	0	1	-.004	4
595		13	max	.148	10	-.186	15	.023	1	0	3	0	2	0	15
596			min	-63.641	3	-.79	4	-.02	3	0	2	0	3	-.004	4
597		14	max	.232	10	-.248	15	.023	1	0	3	0	2	0	15
598			min	-63.566	3	-1.054	4	-.02	3	0	2	0	3	-.004	4
599		15	max	.316	10	-.31	15	.023	1	0	3	0	2	0	15
600			min	-63.49	3	-1.317	4	-.02	3	0	2	0	3	-.003	4
601		16	max	.4	10	-.371	15	.023	1	0	3	0	1	0	15
602			min	-63.415	3	-1.58	4	-.02	3	0	2	0	3	-.003	4
603		17	max	.484	10	-.433	15	.023	1	0	3	0	1	0	15
604			min	-63.339	3	-1.844	4	-.02	3	0	2	0	3	-.002	4
605		18	max	.568	10	-.495	15	.023	1	0	3	0	1	0	15
606			min	-63.263	3	-2.107	4	-.02	3	0	2	0	3	0	4
607		19	max	.652	10	-.557	15	.023	1	0	3	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
608			min	-63.188	3	-2.371	4	-.02	3	0	2	0	3	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.003	1	.01	2	.013	1	-5.169e-5	15	NC	3	NC	3
2			min	-.004	3	-.011	3	-.001	3	-1.12e-3	1	4083.109	2	3196.295	1
3		2	max	.002	1	.009	2	.012	1	-4.94e-5	15	NC	3	NC	3
4			min	-.004	3	-.01	3	-.001	3	-1.071e-3	1	4470.284	2	3431.114	1
5		3	max	.002	1	.009	2	.011	1	-4.711e-5	15	NC	1	NC	3
6			min	-.003	3	-.01	3	-.001	3	-1.022e-3	1	4933.423	2	3709.302	1
7		4	max	.002	1	.008	2	.011	1	-4.481e-5	15	NC	1	NC	2
8			min	-.003	3	-.01	3	0	3	-9.724e-4	1	5491.327	2	4041.046	1
9		5	max	.002	1	.007	2	.01	1	-4.252e-5	15	NC	1	NC	2
10			min	-.003	3	-.009	3	0	3	-9.231e-4	1	6169.194	2	4439.951	1
11		6	max	.002	1	.006	2	.009	1	-4.022e-5	15	NC	1	NC	2
12			min	-.003	3	-.009	3	0	3	-8.738e-4	1	7001.351	2	4924.502	1
13		7	max	.002	1	.005	2	.008	1	-3.793e-5	15	NC	1	NC	2
14			min	-.003	3	-.008	3	0	3	-8.245e-4	1	8035.459	2	5520.326	1
15		8	max	.002	1	.005	2	.007	1	-3.564e-5	15	NC	1	NC	2
16			min	-.002	3	-.008	3	0	3	-7.752e-4	1	9339.174	2	6263.785	1
17		9	max	.001	1	.004	2	.006	1	-3.334e-5	15	NC	1	NC	2
18			min	-.002	3	-.007	3	0	3	-7.259e-4	1	NC	1	7207.921	1
19		10	max	.001	1	.003	2	.005	1	-3.105e-5	15	NC	1	NC	2
20			min	-.002	3	-.007	3	0	3	-6.766e-4	1	NC	1	8432.664	1
21		11	max	.001	1	.003	2	.004	1	-2.875e-5	15	NC	1	NC	1
22			min	-.002	3	-.006	3	0	3	-6.273e-4	1	NC	1	NC	1
23		12	max	.001	1	.002	2	.003	1	-2.646e-5	15	NC	1	NC	1
24			min	-.001	3	-.005	3	0	3	-5.78e-4	1	NC	1	NC	1
25		13	max	0	1	.002	2	.003	1	-2.417e-5	15	NC	1	NC	1
26			min	-.001	3	-.005	3	0	3	-5.287e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	-2.187e-5	15	NC	1	NC	1
28			min	-.001	3	-.004	3	0	3	-4.794e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.001	1	-1.958e-5	15	NC	1	NC	1
30			min	0	3	-.003	3	0	3	-4.301e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	-1.728e-5	15	NC	1	NC	1
32			min	0	3	-.002	3	0	3	-3.808e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-1.499e-5	15	NC	1	NC	1
34			min	0	3	-.002	3	0	3	-3.316e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-1.27e-5	15	NC	1	NC	1
36			min	0	3	0	3	0	12	-2.823e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-8.371e-6	12	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	4.138e-6	12	NC	1	NC	1
41		2	max	0	3	0	2	0	12	1.349e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	6.069e-6	15	NC	1	NC	1
43		3	max	0	3	0	2	0	12	1.582e-4	1	NC	1	NC	1
44			min	0	2	-.002	3	0	1	7.155e-6	15	NC	1	NC	1
45		4	max	0	3	0	2	0	12	1.815e-4	1	NC	1	NC	1
46			min	0	2	-.003	3	0	1	8.241e-6	15	NC	1	NC	1
47		5	max	0	3	0	2	0	3	2.048e-4	1	NC	1	NC	1
48			min	0	2	-.004	3	-.001	1	9.327e-6	15	NC	1	NC	1
49		6	max	0	3	0	2	0	3	2.282e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	0	1	1.041e-5	15	NC	1	NC	1
51		7	max	0	3	0	2	0	3	2.515e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
52			min	0	2	-.005	3	0	1	1.15e-5	15	NC	1	NC	1
53		8	max	0	3	0	2	0	3	2.748e-4	1	NC	1	NC	1
54			min	0	2	-.006	3	0	1	1.258e-5	15	NC	1	NC	1
55		9	max	.001	3	.001	2	0	3	2.981e-4	1	NC	1	NC	1
56			min	-.001	2	-.007	3	0	1	1.367e-5	15	NC	1	NC	1
57		10	max	.001	3	.002	2	0	1	3.214e-4	1	NC	1	NC	1
58			min	-.001	2	-.007	3	0	15	1.476e-5	15	NC	1	NC	1
59		11	max	.001	3	.002	2	0	1	3.447e-4	1	NC	1	NC	1
60			min	-.001	2	-.008	3	0	15	1.584e-5	15	NC	1	NC	1
61		12	max	.001	3	.003	2	.002	1	3.681e-4	1	NC	1	NC	1
62			min	-.001	2	-.008	3	0	15	1.693e-5	15	NC	1	NC	1
63		13	max	.002	3	.004	2	.002	1	3.914e-4	1	NC	1	NC	1
64			min	-.002	2	-.008	3	0	15	1.801e-5	15	NC	1	NC	1
65		14	max	.002	3	.004	2	.003	1	4.147e-4	1	NC	1	NC	1
66			min	-.002	2	-.008	3	0	15	1.91e-5	15	NC	1	NC	1
67		15	max	.002	3	.005	2	.004	1	4.38e-4	1	NC	1	NC	1
68			min	-.002	2	-.009	3	0	15	2.018e-5	15	8822.132	2	NC	1
69		16	max	.002	3	.006	2	.004	1	4.613e-4	1	NC	1	NC	1
70			min	-.002	2	-.009	3	0	15	2.127e-5	15	7462.98	2	NC	1
71		17	max	.002	3	.007	2	.005	1	4.846e-4	1	NC	1	NC	2
72			min	-.002	2	-.009	3	0	15	2.236e-5	15	6414.837	2	8838.925	1
73		18	max	.002	3	.008	2	.006	1	5.08e-4	1	NC	1	NC	2
74			min	-.002	2	-.009	3	0	15	2.344e-5	15	5596.631	2	7714.121	1
75		19	max	.002	3	.009	2	.007	1	5.313e-4	1	NC	3	NC	2
76			min	-.002	2	-.009	3	0	15	2.453e-5	15	4951.791	2	6855.301	1
77	M4	1	max	.002	1	.012	2	0	15	-3.628e-5	12	NC	1	NC	3
78			min	0	15	-.011	3	-.005	1	-8.638e-4	1	NC	1	3824.226	1
79		2	max	.002	1	.012	2	0	15	-3.628e-5	12	NC	1	NC	3
80			min	0	15	-.01	3	-.005	1	-8.638e-4	1	NC	1	4171.977	1
81		3	max	.002	1	.011	2	0	15	-3.628e-5	12	NC	1	NC	2
82			min	0	15	-.01	3	-.004	1	-8.638e-4	1	NC	1	4585.852	1
83		4	max	.001	1	.01	2	0	15	-3.628e-5	12	NC	1	NC	2
84			min	0	15	-.009	3	-.004	1	-8.638e-4	1	NC	1	5083.293	1
85		5	max	.001	1	.01	2	0	15	-3.628e-5	12	NC	1	NC	2
86			min	0	15	-.008	3	-.003	1	-8.638e-4	1	NC	1	5688.061	1
87		6	max	.001	1	.009	2	0	15	-3.628e-5	12	NC	1	NC	2
88			min	0	15	-.008	3	-.003	1	-8.638e-4	1	NC	1	6433.207	1
89		7	max	.001	1	.008	2	0	15	-3.628e-5	12	NC	1	NC	2
90			min	0	15	-.007	3	-.003	1	-8.638e-4	1	NC	1	7365.807	1
91		8	max	.001	1	.007	2	0	15	-3.628e-5	12	NC	1	NC	2
92			min	0	15	-.007	3	-.002	1	-8.638e-4	1	NC	1	8554.804	1
93		9	max	0	1	.007	2	0	15	-3.628e-5	12	NC	1	NC	1
94			min	0	15	-.006	3	-.002	1	-8.638e-4	1	NC	1	NC	1
95		10	max	0	1	.006	2	0	15	-3.628e-5	12	NC	1	NC	1
96			min	0	15	-.005	3	-.002	1	-8.638e-4	1	NC	1	NC	1
97		11	max	0	1	.005	2	0	15	-3.628e-5	12	NC	1	NC	1
98			min	0	15	-.005	3	-.001	1	-8.638e-4	1	NC	1	NC	1
99		12	max	0	1	.005	2	0	15	-3.628e-5	12	NC	1	NC	1
100			min	0	15	-.004	3	-.001	1	-8.638e-4	1	NC	1	NC	1
101		13	max	0	1	.004	2	0	15	-3.628e-5	12	NC	1	NC	1
102			min	0	15	-.004	3	0	1	-8.638e-4	1	NC	1	NC	1
103		14	max	0	1	.003	2	0	15	-3.628e-5	12	NC	1	NC	1
104			min	0	15	-.003	3	0	1	-8.638e-4	1	NC	1	NC	1
105		15	max	0	1	.003	2	0	15	-3.628e-5	12	NC	1	NC	1
106			min	0	15	-.002	3	0	1	-8.638e-4	1	NC	1	NC	1
107		16	max	0	1	.002	2	0	15	-3.628e-5	12	NC	1	NC	1
108			min	0	15	-.002	3	0	1	-8.638e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
109		17	max	0	1	.001	2	0	15	-3.628e-5	12	NC	1	NC	1
110			min	0	15	-.001	3	0	1	-8.638e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	15	-3.628e-5	12	NC	1	NC	1
112			min	0	15	0	3	0	1	-8.638e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-3.628e-5	12	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	3.83e-4	3	NC	3	NC	2
116			min	-.012	3	-.035	3	-.005	3	2.533e-7	10	1143.055	2	8850.968	1
117		2	max	.008	1	.035	2	.004	1	3.701e-4	3	NC	3	NC	2
118			min	-.011	3	-.033	3	-.004	3	-3.301e-7	10	1223.77	2	9564.729	1
119		3	max	.007	1	.032	2	.004	1	3.572e-4	3	NC	3	NC	1
120			min	-.011	3	-.031	3	-.004	3	-1.889e-6	2	1316.335	2	NC	1
121		4	max	.007	1	.03	2	.004	1	3.443e-4	3	NC	3	NC	1
122			min	-.01	3	-.029	3	-.004	3	-4.212e-6	2	1423.112	2	NC	1
123		5	max	.007	1	.027	2	.003	1	3.314e-4	3	NC	3	NC	1
124			min	-.009	3	-.027	3	-.004	3	-6.534e-6	2	1547.143	2	NC	1
125		6	max	.006	1	.025	2	.003	1	3.185e-4	3	NC	3	NC	1
126			min	-.009	3	-.026	3	-.003	3	-8.857e-6	2	1692.407	2	NC	1
127		7	max	.006	1	.023	2	.003	1	3.056e-4	3	NC	3	NC	1
128			min	-.008	3	-.024	3	-.003	3	-1.118e-5	2	1864.212	2	NC	1
129		8	max	.005	1	.021	2	.002	1	2.927e-4	3	NC	3	NC	1
130			min	-.007	3	-.022	3	-.003	3	-1.35e-5	2	2069.793	2	NC	1
131		9	max	.005	1	.018	2	.002	1	2.798e-4	3	NC	3	NC	1
132			min	-.007	3	-.02	3	-.002	3	-1.582e-5	2	2319.276	2	NC	1
133		10	max	.004	1	.016	2	.002	1	2.669e-4	3	NC	3	NC	1
134			min	-.006	3	-.018	3	-.002	3	-1.815e-5	2	2627.279	2	NC	1
135		11	max	.004	1	.014	2	.001	1	2.54e-4	3	NC	3	NC	1
136			min	-.005	3	-.016	3	-.002	3	-2.047e-5	2	3015.711	2	NC	1
137		12	max	.003	1	.012	2	.001	1	2.411e-4	3	NC	3	NC	1
138			min	-.005	3	-.014	3	-.001	3	-2.279e-5	2	3518.982	2	NC	1
139		13	max	.003	1	.01	2	0	1	2.282e-4	3	NC	3	NC	1
140			min	-.004	3	-.012	3	-.001	3	-2.511e-5	2	4194.404	2	NC	1
141		14	max	.002	1	.008	2	0	1	2.153e-4	3	NC	3	NC	1
142			min	-.003	3	-.01	3	0	3	-2.778e-5	11	5145.083	2	NC	1
143		15	max	.002	1	.006	2	0	1	2.024e-4	3	NC	1	NC	1
144			min	-.003	3	-.008	3	0	3	-3.16e-5	11	6577.155	2	NC	1
145		16	max	.001	1	.005	2	0	1	1.895e-4	3	NC	1	NC	1
146			min	-.002	3	-.006	3	0	3	-3.613e-5	1	8971.465	2	NC	1
147		17	max	0	1	.003	2	0	1	1.766e-4	3	NC	1	NC	1
148			min	-.001	3	-.004	3	0	3	-4.537e-5	1	NC	1	NC	1
149		18	max	0	1	.002	2	0	1	1.637e-4	3	NC	1	NC	1
150			min	0	3	-.002	3	0	3	-5.462e-5	1	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.508e-4	3	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	-7.181e-5	3	NC	1	NC	1
155		2	max	0	3	.002	2	0	3	2.668e-5	1	NC	1	NC	1
156			min	0	2	-.002	3	0	1	-5.242e-5	3	NC	1	NC	1
157		3	max	0	3	.003	2	0	3	2.316e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	1	-3.302e-5	3	NC	1	NC	1
159		4	max	.001	3	.005	2	0	3	1.964e-5	1	NC	1	NC	1
160			min	-.001	2	-.006	3	0	1	-1.363e-5	3	NC	1	NC	1
161		5	max	.002	3	.006	2	.001	3	1.612e-5	1	NC	1	NC	1
162			min	-.002	2	-.008	3	0	1	5.828e-7	15	7635.773	2	NC	1
163		6	max	.002	3	.008	2	.001	3	2.515e-5	3	NC	1	NC	1
164			min	-.002	2	-.01	3	0	1	5.761e-7	15	6114.8	2	NC	1
165		7	max	.003	3	.009	2	.002	3	4.455e-5	3	NC	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
166			min	-.003	2	-.012	3	0	1	5.695e-7	15	5078.125	2	NC	1
167		8	max	.003	3	.011	2	.002	3	6.394e-5	3	NC	3	NC	1
168			min	-.003	2	-.014	3	-.001	1	-2.346e-6	11	4320.701	2	NC	1
169		9	max	.003	3	.012	2	.002	3	8.333e-5	3	NC	3	NC	1
170			min	-.004	2	-.016	3	-.001	1	-5.855e-6	11	3740.265	2	NC	1
171		10	max	.004	3	.014	2	.002	3	1.027e-4	3	NC	3	NC	1
172			min	-.004	2	-.017	3	-.001	1	-9.364e-6	11	3280.095	2	NC	1
173		11	max	.004	3	.016	2	.002	3	1.221e-4	3	NC	3	NC	1
174			min	-.005	2	-.019	3	-.001	1	-1.287e-5	11	2906.126	2	NC	1
175		12	max	.005	3	.018	2	.002	3	1.415e-4	3	NC	3	NC	1
176			min	-.005	2	-.02	3	-.002	1	-1.638e-5	11	2596.582	2	NC	1
177		13	max	.005	3	.02	2	.002	3	1.609e-4	3	NC	3	NC	1
178			min	-.006	2	-.022	3	-.002	1	-1.989e-5	11	2336.809	2	NC	1
179		14	max	.005	3	.022	2	.002	3	1.803e-4	3	NC	3	NC	1
180			min	-.006	2	-.023	3	-.002	1	-2.34e-5	11	2116.515	2	NC	1
181		15	max	.006	3	.024	2	.002	3	1.997e-4	3	NC	3	NC	1
182			min	-.007	2	-.024	3	-.002	1	-2.691e-5	11	1928.205	2	NC	1
183		16	max	.006	3	.026	2	.002	3	2.191e-4	3	NC	3	NC	1
184			min	-.007	2	-.025	3	-.002	1	-3.042e-5	11	1766.259	2	NC	1
185		17	max	.007	3	.028	2	.002	3	2.385e-4	3	NC	3	NC	1
186			min	-.008	2	-.026	3	-.002	1	-3.393e-5	11	1626.354	2	NC	1
187		18	max	.007	3	.031	2	.002	3	2.579e-4	3	NC	3	NC	1
188			min	-.008	2	-.027	3	-.002	1	-3.744e-5	11	1505.101	2	NC	1
189		19	max	.008	3	.033	2	.002	3	2.773e-4	3	NC	3	NC	1
190			min	-.009	2	-.028	3	-.002	1	-4.095e-5	11	1399.8	2	NC	1
191	M8	1	max	.004	1	.043	2	.002	1	-3.523e-6	10	NC	1	NC	2
192			min	0	15	-.034	3	-.002	3	-2.223e-4	3	NC	1	7968.527	1
193		2	max	.004	1	.041	2	.002	1	-3.523e-6	10	NC	1	NC	2
194			min	0	15	-.032	3	-.001	3	-2.223e-4	3	NC	1	8687.836	1
195		3	max	.004	1	.038	2	.002	1	-3.523e-6	10	NC	1	NC	2
196			min	0	15	-.03	3	-.001	3	-2.223e-4	3	NC	1	9544.175	1
197		4	max	.004	1	.036	2	.002	1	-3.523e-6	10	NC	1	NC	1
198			min	0	15	-.029	3	-.001	3	-2.223e-4	3	NC	1	NC	1
199		5	max	.003	1	.033	2	.002	1	-3.523e-6	10	NC	1	NC	1
200			min	0	15	-.027	3	-.001	3	-2.223e-4	3	NC	1	NC	1
201		6	max	.003	1	.031	2	.001	1	-3.523e-6	10	NC	1	NC	1
202			min	0	15	-.025	3	0	3	-2.223e-4	3	NC	1	NC	1
203		7	max	.003	1	.029	2	.001	1	-3.523e-6	10	NC	1	NC	1
204			min	0	15	-.023	3	0	3	-2.223e-4	3	NC	1	NC	1
205		8	max	.003	1	.026	2	.001	1	-3.523e-6	10	NC	1	NC	1
206			min	0	15	-.021	3	0	3	-2.223e-4	3	NC	1	NC	1
207		9	max	.002	1	.024	2	0	1	-3.523e-6	10	NC	1	NC	1
208			min	0	15	-.019	3	0	3	-2.223e-4	3	NC	1	NC	1
209		10	max	.002	1	.022	2	0	1	-3.523e-6	10	NC	1	NC	1
210			min	0	15	-.017	3	0	3	-2.223e-4	3	NC	1	NC	1
211		11	max	.002	1	.019	2	0	1	-3.523e-6	10	NC	1	NC	1
212			min	0	15	-.015	3	0	3	-2.223e-4	3	NC	1	NC	1
213		12	max	.002	1	.017	2	0	1	-3.523e-6	10	NC	1	NC	1
214			min	0	15	-.013	3	0	3	-2.223e-4	3	NC	1	NC	1
215		13	max	.001	1	.014	2	0	1	-3.523e-6	10	NC	1	NC	1
216			min	0	15	-.011	3	0	3	-2.223e-4	3	NC	1	NC	1
217		14	max	.001	1	.012	2	0	1	-3.523e-6	10	NC	1	NC	1
218			min	0	15	-.01	3	0	3	-2.223e-4	3	NC	1	NC	1
219		15	max	0	1	.01	2	0	1	-3.523e-6	10	NC	1	NC	1
220			min	0	15	-.008	3	0	3	-2.223e-4	3	NC	1	NC	1
221		16	max	0	1	.007	2	0	1	-3.523e-6	10	NC	1	NC	1
222			min	0	15	-.006	3	0	3	-2.223e-4	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
223		17	max	0	1	.005	2	0	1	-3.523e-6	10	NC	1	NC	1
224			min	0	15	-.004	3	0	3	-2.223e-4	3	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	-3.523e-6	10	NC	1	NC	1
226			min	0	15	-.002	3	0	3	-2.223e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-3.523e-6	10	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	-.002	1	-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	-.002	1	-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	-.002	1	-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	-.002	1	-3.493e-4	3	5494.839	2	NC	1
237		5	max	.002	1	.007	2	0	3	7.979e-4	1	NC	1	NC	1
238			min	-.003	3	-.009	3	-.002	1	-3.359e-4	3	6173.372	2	NC	1
239		6	max	.002	1	.006	2	0	3	7.467e-4	1	NC	1	NC	1
240			min	-.002	3	-.009	3	-.002	1	-3.226e-4	3	7006.401	2	NC	1
241		7	max	.002	1	.005	2	0	3	6.955e-4	1	NC	1	NC	1
242			min	-.002	3	-.008	3	-.002	1	-3.092e-4	3	8041.669	2	NC	1
243		8	max	.002	1	.005	2	0	3	6.443e-4	1	NC	1	NC	1
244			min	-.002	3	-.008	3	-.001	1	-2.959e-4	3	9346.956	2	NC	1
245		9	max	.002	1	.004	2	0	3	5.93e-4	1	NC	1	NC	1
246			min	-.002	3	-.007	3	-.001	1	-2.825e-4	3	NC	1	NC	1
247		10	max	.001	1	.003	2	0	3	5.418e-4	1	NC	1	NC	1
248			min	-.002	3	-.007	3	-.001	1	-2.692e-4	3	NC	1	NC	1
249		11	max	.001	1	.003	2	0	3	4.906e-4	1	NC	1	NC	1
250			min	-.002	3	-.006	3	0	1	-2.559e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	4.394e-4	1	NC	1	NC	1
252			min	-.001	3	-.005	3	0	1	-2.425e-4	3	NC	1	NC	1
253		13	max	0	1	.002	2	0	3	3.882e-4	1	NC	1	NC	1
254			min	-.001	3	-.005	3	0	1	-2.292e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	3.37e-4	1	NC	1	NC	1
256			min	0	3	-.004	3	0	1	-2.158e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	2.857e-4	1	NC	1	NC	1
258			min	0	3	-.003	3	0	1	-2.025e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	2.345e-4	1	NC	1	NC	1
260			min	0	3	-.003	3	0	1	-1.891e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.833e-4	1	NC	1	NC	1
262			min	0	3	-.002	3	0	1	-1.758e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.321e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-1.625e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	8.087e-5	1	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	-3.968e-5	1	NC	1	NC	1
269		2	max	0	3	0	2	0	1	5.089e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-8.247e-5	1	NC	1	NC	1
271		3	max	0	3	0	2	0	11	3.044e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.253e-4	1	NC	1	NC	1
273		4	max	0	3	0	2	0	10	9.993e-6	3	NC	1	NC	1
274			min	0	2	-.003	3	0	3	-1.68e-4	1	NC	1	NC	1
275		5	max	0	3	0	2	0	10	-7.182e-6	12	NC	1	NC	1
276			min	0	2	-.004	3	-.001	3	-2.108e-4	1	NC	1	NC	1
277		6	max	0	3	0	2	0	10	-1.152e-5	15	NC	1	NC	1
278			min	0	2	-.005	3	-.001	3	-2.536e-4	1	NC	1	NC	1
279		7	max	0	3	0	2	0	10	-1.36e-5	15	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
280			min	0	2	-.005	3	-.002	3	-2.964e-4	1	NC	1	NC	1
281		8	max	0	3	0	2	0	15	-1.569e-5	15	NC	1	NC	1
282			min	0	2	-.006	3	-.002	1	-3.392e-4	1	NC	1	NC	1
283		9	max	.001	3	.001	2	0	15	-1.778e-5	15	NC	1	NC	1
284			min	-.001	2	-.007	3	-.003	1	-3.82e-4	1	NC	1	NC	1
285		10	max	.001	3	.002	2	0	15	-1.987e-5	15	NC	1	NC	1
286			min	-.001	2	-.007	3	-.004	1	-4.248e-4	1	NC	1	NC	1
287		11	max	.001	3	.002	2	0	15	-2.196e-5	15	NC	1	NC	2
288			min	-.001	2	-.008	3	-.005	1	-4.676e-4	1	NC	1	9633.364	1
289		12	max	.001	3	.003	2	0	15	-2.405e-5	15	NC	1	NC	2
290			min	-.001	2	-.008	3	-.006	1	-5.104e-4	1	NC	1	8003.542	1
291		13	max	.002	3	.004	2	0	15	-2.614e-5	15	NC	1	NC	2
292			min	-.002	2	-.008	3	-.007	1	-5.532e-4	1	NC	1	6802.376	1
293		14	max	.002	3	.004	2	0	15	-2.823e-5	15	NC	1	NC	2
294			min	-.002	2	-.009	3	-.008	1	-5.959e-4	1	NC	1	5891.496	1
295		15	max	.002	3	.005	2	0	15	-3.031e-5	15	NC	1	NC	2
296			min	-.002	2	-.009	3	-.009	1	-6.387e-4	1	8834.619	2	5184.763	1
297		16	max	.002	3	.006	2	0	15	-3.24e-5	15	NC	1	NC	2
298			min	-.002	2	-.009	3	-.01	1	-6.815e-4	1	7472.624	2	4626.214	1
299		17	max	.002	3	.007	2	0	15	-3.449e-5	15	NC	1	NC	2
300			min	-.002	2	-.009	3	-.011	1	-7.243e-4	1	6422.487	2	4178.191	1
301		18	max	.002	3	.008	2	0	15	-3.658e-5	15	NC	1	NC	2
302			min	-.002	2	-.009	3	-.012	1	-7.671e-4	1	5602.855	2	3814.603	1
303		19	max	.002	3	.009	2	0	15	-3.867e-5	15	NC	3	NC	3
304			min	-.002	2	-.009	3	-.013	1	-8.099e-4	1	4956.978	2	3516.931	1
305	M12	1	max	.002	1	.012	2	.011	1	7.81e-4	1	NC	1	NC	3
306			min	0	15	-.011	3	0	15	3.82e-5	15	NC	1	1773.758	1
307		2	max	.002	1	.012	2	.01	1	7.81e-4	1	NC	1	NC	3
308			min	0	15	-.01	3	0	15	3.82e-5	15	NC	1	1934.434	1
309		3	max	.002	1	.011	2	.009	1	7.81e-4	1	NC	1	NC	3
310			min	0	15	-.01	3	0	15	3.82e-5	15	NC	1	2125.691	1
311		4	max	.001	1	.01	2	.008	1	7.81e-4	1	NC	1	NC	3
312			min	0	15	-.009	3	0	15	3.82e-5	15	NC	1	2355.591	1
313		5	max	.001	1	.009	2	.007	1	7.81e-4	1	NC	1	NC	3
314			min	0	15	-.008	3	0	15	3.82e-5	15	NC	1	2635.115	1
315		6	max	.001	1	.009	2	.006	1	7.81e-4	1	NC	1	NC	3
316			min	0	15	-.008	3	0	15	3.82e-5	15	NC	1	2979.537	1
317		7	max	.001	1	.008	2	.006	1	7.81e-4	1	NC	1	NC	3
318			min	0	15	-.007	3	0	15	3.82e-5	15	NC	1	3410.614	1
319		8	max	.001	1	.007	2	.005	1	7.81e-4	1	NC	1	NC	2
320			min	0	15	-.007	3	0	15	3.82e-5	15	NC	1	3960.208	1
321		9	max	0	1	.007	2	.004	1	7.81e-4	1	NC	1	NC	2
322			min	0	15	-.006	3	0	15	3.82e-5	15	NC	1	4676.512	1
323		10	max	0	1	.006	2	.003	1	7.81e-4	1	NC	1	NC	2
324			min	0	15	-.005	3	0	15	3.82e-5	15	NC	1	5635.296	1
325		11	max	0	1	.005	2	.003	1	7.81e-4	1	NC	1	NC	2
326			min	0	15	-.005	3	0	15	3.82e-5	15	NC	1	6961.367	1
327		12	max	0	1	.005	2	.002	1	7.81e-4	1	NC	1	NC	2
328			min	0	15	-.004	3	0	15	3.82e-5	15	NC	1	8872.452	1
329		13	max	0	1	.004	2	.002	1	7.81e-4	1	NC	1	NC	1
330			min	0	15	-.004	3	0	15	3.82e-5	15	NC	1	NC	1
331		14	max	0	1	.003	2	.001	1	7.81e-4	1	NC	1	NC	1
332			min	0	15	-.003	3	0	15	3.82e-5	15	NC	1	NC	1
333		15	max	0	1	.003	2	0	1	7.81e-4	1	NC	1	NC	1
334			min	0	15	-.002	3	0	15	3.82e-5	15	NC	1	NC	1
335		16	max	0	1	.002	2	0	1	7.81e-4	1	NC	1	NC	1
336			min	0	15	-.002	3	0	15	3.82e-5	15	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
337		17	max	0	1	.001	2	0	1	7.81e-4	1	NC	1	NC	1
338			min	0	15	-.001	3	0	15	3.82e-5	15	NC	1	NC	1
339		18	max	0	1	0	2	0	1	7.81e-4	1	NC	1	NC	1
340			min	0	15	0	3	0	15	3.82e-5	15	NC	1	NC	1
341		19	max	0	1	0	1	0	1	7.81e-4	1	NC	1	NC	1
342			min	0	1	0	1	0	1	3.82e-5	15	NC	1	NC	1
343	M1	1	max	.009	3	.026	3	.003	3	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	.002	3	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	.001	3	-5.348e-6	12	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	0	3	-5.601e-8	3	NC	4	NC	2
350			min	-.009	2	-.002	3	-.015	1	-5.913e-4	1	1794.669	2	4523.391	1
351		5	max	.009	3	.01	2	0	3	5.54e-6	3	NC	4	NC	2
352			min	-.009	2	-.008	3	-.015	1	-4.997e-4	1	1422.065	2	4350.872	1
353		6	max	.009	3	.015	2	0	3	1.114e-5	3	NC	5	NC	2
354			min	-.009	2	-.014	3	-.014	1	-4.082e-4	1	1209.938	2	4667.126	1
355		7	max	.009	3	.02	2	0	3	1.673e-5	3	NC	5	NC	2
356			min	-.009	2	-.018	3	-.013	1	-3.166e-4	1	1080.054	2	5579.716	1
357		8	max	.009	3	.024	2	0	3	2.233e-5	3	NC	5	NC	2
358			min	-.009	2	-.021	3	-.01	1	-2.25e-4	1	999.845	2	7719.654	1
359		9	max	.009	3	.026	2	0	3	2.792e-5	3	NC	5	NC	1
360			min	-.009	2	-.023	3	-.007	1	-1.334e-4	1	954.124	2	NC	1
361		10	max	.009	3	.027	2	0	3	3.352e-5	3	NC	5	NC	1
362			min	-.009	2	-.023	3	-.004	1	-4.186e-5	1	935.961	2	NC	1
363		11	max	.009	3	.026	2	0	3	4.971e-5	1	NC	5	NC	1
364			min	-.009	2	-.022	3	-.001	1	2.696e-6	15	943.468	2	NC	1
365		12	max	.009	3	.025	2	.002	1	1.413e-4	1	NC	5	NC	2
366			min	-.009	2	-.021	3	0	15	6.866e-6	15	979.128	2	8410.043	1
367		13	max	.009	3	.021	2	.004	1	2.329e-4	1	NC	5	NC	2
368			min	-.009	2	-.018	3	0	15	1.104e-5	15	1051.144	2	5907.225	1
369		14	max	.009	3	.016	2	.006	1	3.244e-4	1	NC	4	NC	2
370			min	-.009	2	-.013	3	0	15	1.521e-5	15	1178.242	2	4870.803	1
371		15	max	.009	3	.01	2	.007	1	4.16e-4	1	NC	4	NC	2
372			min	-.009	2	-.008	3	0	15	1.938e-5	15	1404.182	2	4501.764	1
373		16	max	.009	3	.002	1	.007	1	4.78e-4	1	NC	4	NC	2
374			min	-.009	2	-.002	3	0	15	2.222e-5	15	1850.769	2	4651.108	1
375		17	max	.009	3	.006	3	.005	1	3.322e-5	3	NC	4	NC	2
376			min	-.009	2	-.008	2	0	15	-1.63e-4	1	2657.803	1	5590.61	1
377		18	max	.009	3	.014	3	.002	1	1.111e-2	2	NC	2	NC	2
378			min	-.009	2	-.019	2	0	15	-5.251e-3	3	5138.037	1	9185.523	1
379		19	max	.009	3	.022	3	0	3	2.249e-2	2	NC	1	NC	1
380			min	-.009	2	-.031	2	-.003	1	-1.063e-2	3	5933.943	2	NC	1
381	M5	1	max	.03	3	.086	3	.003	3	2.364e-6	3	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	.004	3	1.071e-4	3	NC	5	NC	1
384			min	-.033	2	-.047	2	-.005	1	-5.782e-5	1	1494.373	2	NC	1
385		3	max	.03	3	.021	3	.005	3	2.098e-4	3	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	.005	3	2.018e-4	3	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	.006	3	1.937e-4	3	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	.006	3	1.857e-4	3	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	.006	3	1.777e-4	3	NC	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
394			min	-.033	2	-.059	3	-.004	1	-9.63e-5	1	321.463	2	NC	1
395		8	max	.029	3	.079	2	.006	3	1.696e-4	3	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	.006	3	1.616e-4	3	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	.006	3	1.535e-4	3	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	.005	3	1.455e-4	3	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	.005	3	1.374e-4	3	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	.004	3	1.294e-4	3	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	.004	3	1.214e-4	3	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	.003	3	1.133e-4	3	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	.002	3	1.006e-4	3	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	.002	3	-8.607e-6	10	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	0	3	-4.483e-6	10	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	0	3	-3.827e-8	15	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	.002	3	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	.001	3	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	.002	1	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	.004	1	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	.004	1	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	.003	1	4.511e-5	1	NC	5	NC	2
430			min	-.009	2	-.014	3	-.003	3	-7.733e-5	3	1210.337	2	5494.991	1
431		7	max	.009	3	.02	2	.002	1	8.141e-6	10	NC	5	NC	2
432			min	-.009	2	-.018	3	-.003	3	-8.16e-5	3	1080.386	2	6864.701	1
433		8	max	.009	3	.024	2	0	2	-3.819e-7	10	NC	5	NC	1
434			min	-.009	2	-.021	3	-.004	3	-1.098e-4	1	1000.126	2	9377.01	3
435		9	max	.009	3	.026	2	0	10	-8.735e-6	15	NC	5	NC	1
436			min	-.009	2	-.023	3	-.004	3	-1.872e-4	1	954.362	2	8938.098	3
437		10	max	.009	3	.027	2	0	10	-1.226e-5	15	NC	5	NC	1
438			min	-.009	2	-.023	3	-.005	1	-2.646e-4	1	936.161	2	8747.093	3
439		11	max	.009	3	.026	2	0	15	-1.578e-5	15	NC	5	NC	1
440			min	-.009	2	-.023	3	-.008	1	-3.421e-4	1	943.628	2	8778.657	3
441		12	max	.009	3	.025	2	0	15	-1.93e-5	15	NC	5	NC	2
442			min	-.009	2	-.021	3	-.01	1	-4.195e-4	1	979.239	2	7008.785	1
443		13	max	.009	3	.021	2	0	15	-2.282e-5	15	NC	5	NC	2
444			min	-.009	2	-.018	3	-.012	1	-4.969e-4	1	1051.187	2	5283.904	1
445		14	max	.009	3	.016	2	0	15	-2.634e-5	15	NC	4	NC	2
446			min	-.009	2	-.013	3	-.013	1	-5.744e-4	1	1178.171	2	4518.466	1
447		15	max	.009	3	.01	2	0	15	-2.987e-5	15	NC	4	NC	2
448			min	-.009	2	-.008	3	-.014	1	-6.518e-4	1	1403.875	2	4269.452	1
449		16	max	.009	3	.002	1	0	15	-3.234e-5	15	NC	4	NC	2
450			min	-.009	2	-.002	3	-.013	1	-7.076e-4	1	1849.836	2	4476.251	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
451		17	max	.009	3	.006	3	0	15	7.608e-5	3	NC	4	NC	2
452			min	-.009	2	-.008	2	-.011	1	-2.49e-4	1	2657.585	1	5436.397	1
453		18	max	.009	3	.014	3	0	15	5.307e-3	3	NC	2	NC	2
454			min	-.009	2	-.019	2	-.007	1	-1.119e-2	2	5137.63	1	8999.156	1
455		19	max	.009	3	.023	3	0	3	1.063e-2	3	NC	1	NC	1
456			min	-.009	2	-.031	2	-.002	1	-2.249e-2	2	5957.378	2	NC	1
457	M13	1	max	.006	1	.026	3	.009	3	3.872e-3	3	NC	1	NC	1
458			min	-.002	3	-.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	-.002	3	-.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	-.002	3	-.265	1	.004	10	-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	-.002	3	-.335	1	.006	15	-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	-.002	3	-.357	1	.007	15	-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	-.002	3	-.331	2	.005	10	-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	-.002	3	-.269	2	-.001	10	-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	-.002	3	-.188	2	-.009	10	-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	-.002	3	-.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	-.003	3	-.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	-.003	3	-.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	-.003	3	-.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	-.003	3	-.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	-.003	3	-.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	-.003	3	-.357	1	.007	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	-.003	3	-.335	1	.006	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	-.003	3	-.265	1	.003	10	-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	-.003	3	-.156	2	-.002	10	-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	-.003	3	-.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	0	3	-.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	0	3	-.227	2	-.002	10	-4.049e-3	3	828.354	2	4174.102	1
499		3	max	.002	1	.191	3	.087	1	6.974e-3	2	NC	5	NC	3
500			min	0	3	-.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	5
502			min	0	3	-.489	2	.006	15	-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	5
504			min	0	3	-.52	2	.007	15	-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	5
506			min	0	3	-.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

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
508			min	0	3	-.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	0	3	-.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	0	3	-.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	0	3	-.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	0	3	-.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	0	3	-.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	0	3	-.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	0	3	-.483	2	.005	10	-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	0	3	-.52	2	.007	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	0	3	-.489	2	.006	15	-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	0	3	-.387	2	.004	10	-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	0	3	-.227	2	-.002	10	-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	0	3	-.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	-5.848e-5	2	NC	1	NC	1
535		2	max	0	3	-.003	15	.001	1	9.092e-4	3	NC	3	NC	1
536			min	0	2	-.015	4	0	3	-5.832e-4	2	6227.544	4	NC	1
537		3	max	0	3	-.007	15	.004	1	1.418e-3	3	NC	15	NC	1
538			min	0	2	-.029	4	-.004	3	-1.108e-3	2	3168.984	4	NC	1
539		4	max	0	3	-.01	15	.008	1	1.927e-3	3	9248.97	15	NC	4
540			min	0	2	-.042	4	-.008	3	-1.633e-3	2	2174.108	4	6502.015	3
541		5	max	0	3	-.013	15	.012	1	2.436e-3	3	7217.065	15	NC	4
542			min	0	2	-.054	4	-.013	3	-2.157e-3	2	1696.479	4	4289.833	3
543		6	max	0	3	-.015	15	.017	1	2.945e-3	3	6073.923	15	NC	4
544			min	0	2	-.064	4	-.019	3	-2.682e-3	2	1427.766	4	3134.862	3
545		7	max	0	3	-.017	15	.022	1	3.453e-3	3	5386.474	15	NC	4
546			min	0	2	-.073	4	-.025	3	-3.207e-3	2	1266.171	4	2457.118	3
547		8	max	0	3	-.018	15	.027	1	3.962e-3	3	4973.901	15	NC	4
548			min	0	2	-.079	4	-.031	3	-3.731e-3	2	1169.19	4	2030.035	3
549		9	max	0	3	-.019	15	.032	1	4.471e-3	3	4751.83	15	NC	4
550			min	0	2	-.082	4	-.036	3	-4.256e-3	2	1116.989	4	1750.123	3
551		10	max	0	3	-.02	15	.035	1	4.98e-3	3	4681.577	15	NC	4
552			min	0	2	-.084	4	-.04	3	-4.781e-3	2	1100.475	4	1565.265	3
553		11	max	0	3	-.019	15	.037	1	5.489e-3	3	4751.83	15	NC	5
554			min	-.001	2	-.083	4	-.043	3	-5.305e-3	2	1116.989	4	1448.066	3
555		12	max	0	3	-.019	15	.038	1	5.998e-3	3	4973.901	15	NC	5
556			min	-.001	2	-.079	4	-.043	3	-5.83e-3	2	1169.19	4	1384.968	3
557		13	max	.001	3	-.017	15	.037	1	6.507e-3	3	5386.474	15	NC	5
558			min	-.001	2	-.073	4	-.042	3	-6.355e-3	2	1266.171	4	1372.142	3
559		14	max	.001	3	-.015	15	.034	1	7.016e-3	3	6073.923	15	NC	4
560			min	-.001	2	-.065	4	-.038	3	-6.88e-3	2	1427.766	4	1415.723	3
561		15	max	.001	3	-.013	15	.028	1	7.524e-3	3	7217.065	15	NC	4
562			min	-.001	2	-.055	4	-.031	3	-7.404e-3	2	1696.479	4	1537.833	3
563		16	max	.001	3	-.01	15	.019	1	8.033e-3	3	9248.97	15	NC	4
564			min	-.002	2	-.043	4	-.02	3	-7.929e-3	2	2174.108	4	1798.378	3

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
565		17	max	.001	3	-.007	15	.008	1	8.542e-3	3	NC	15	NC	4
566			min	-.002	2	-.03	4	-.005	3	-8.454e-3	2	3168.984	4	2385.18	3
567		18	max	.001	3	-.004	15	.013	3	9.051e-3	3	NC	3	NC	4
568			min	-.002	2	-.016	4	-.016	2	-8.978e-3	2	6227.544	4	4248.211	3
569		19	max	.002	3	.006	2	.037	3	9.56e-3	3	NC	1	NC	1
570			min	-.002	2	-.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	-.002	3	-.002	9	-.011	2	-2.631e-3	2	NC	1	NC	1
573		2	max	0	10	-.004	15	.004	9	2.69e-3	3	NC	3	NC	1
574			min	-.001	3	-.015	4	-.003	2	-2.517e-3	2	6227.544	4	NC	1
575		3	max	0	10	-.007	15	.01	1	2.58e-3	3	NC	15	NC	4
576			min	-.001	3	-.03	4	-.003	3	-2.402e-3	2	3168.984	4	5800.512	1
577		4	max	0	10	-.01	15	.016	1	2.471e-3	3	9248.97	15	NC	4
578			min	-.001	3	-.043	4	-.008	3	-2.288e-3	2	2174.108	4	4405.004	1
579		5	max	0	10	-.013	15	.019	1	2.361e-3	3	7217.065	15	NC	4
580			min	-.001	3	-.055	4	-.011	3	-2.174e-3	2	1696.479	4	3797.711	1
581		6	max	0	10	-.015	15	.021	1	2.251e-3	3	6073.923	15	NC	4
582			min	-.001	3	-.065	4	-.013	3	-2.059e-3	2	1427.766	4	3529.073	1
583		7	max	0	10	-.017	15	.022	1	2.141e-3	3	5386.474	15	NC	4
584			min	-.001	3	-.073	4	-.014	3	-1.945e-3	2	1266.171	4	3457.782	1
585		8	max	0	10	-.018	15	.022	1	2.032e-3	3	4973.901	15	NC	4
586			min	0	3	-.079	4	-.014	3	-1.83e-3	2	1169.19	4	3534.826	1
587		9	max	0	10	-.019	15	.021	1	1.922e-3	3	4751.83	15	NC	4
588			min	0	3	-.082	4	-.013	3	-1.716e-3	2	1116.989	4	3752.255	1
589		10	max	0	10	-.02	15	.019	1	1.812e-3	3	4681.577	15	NC	4
590			min	0	3	-.084	4	-.012	3	-1.601e-3	2	1100.475	4	4130.866	1
591		11	max	0	10	-.019	15	.017	1	1.703e-3	3	4751.83	15	NC	4
592			min	0	3	-.082	4	-.01	3	-1.487e-3	2	1116.989	4	4724.193	1
593		12	max	0	10	-.018	15	.014	1	1.593e-3	3	4973.901	15	NC	4
594			min	0	3	-.079	4	-.008	3	-1.372e-3	2	1169.19	4	5638.519	1
595		13	max	0	10	-.017	15	.011	1	1.483e-3	3	5386.474	15	NC	4
596			min	0	3	-.072	4	-.006	3	-1.258e-3	2	1266.171	4	7084.075	1
597		14	max	0	10	-.015	15	.008	1	1.374e-3	3	6073.923	15	NC	2
598			min	0	3	-.064	4	-.004	3	-1.143e-3	2	1427.766	4	9509.054	1
599		15	max	0	10	-.013	15	.005	1	1.264e-3	3	7217.065	15	NC	1
600			min	0	3	-.054	4	-.002	3	-1.029e-3	2	1696.479	4	NC	1
601		16	max	0	10	-.01	15	.003	1	1.154e-3	3	9248.97	15	NC	1
602			min	0	3	-.042	4	0	3	-9.141e-4	2	2174.108	4	NC	1
603		17	max	0	10	-.007	15	.001	9	1.044e-3	3	NC	15	NC	1
604			min	0	3	-.029	4	0	2	-7.996e-4	2	3168.984	4	NC	1
605		18	max	0	10	-.003	15	0	3	9.348e-4	3	NC	3	NC	1
606			min	0	3	-.015	4	0	2	-6.851e-4	2	6227.544	4	NC	1
607		19	max	0	1	0	1	0	1	8.251e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.706e-4	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

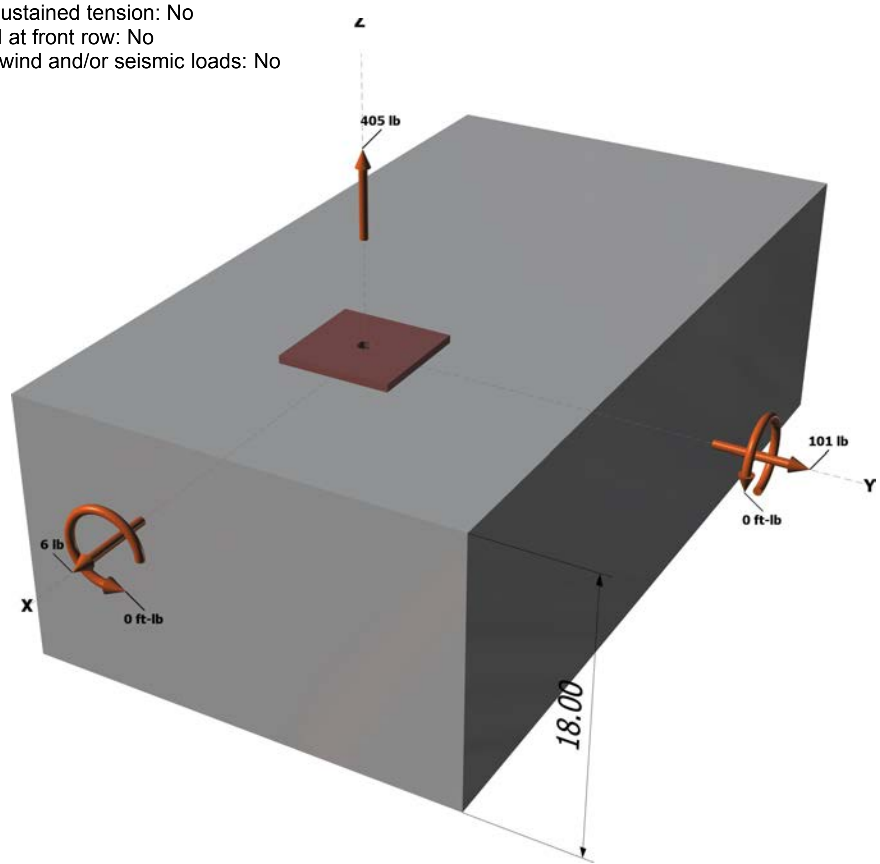
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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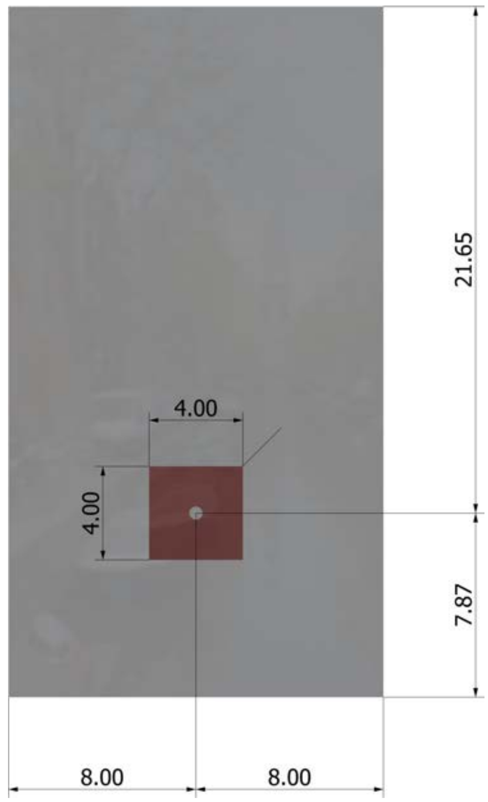


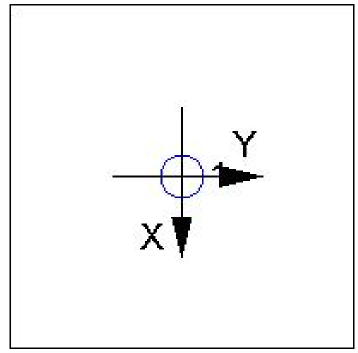
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

Anchor Designer™
Software
Version 2.4.5673.0

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

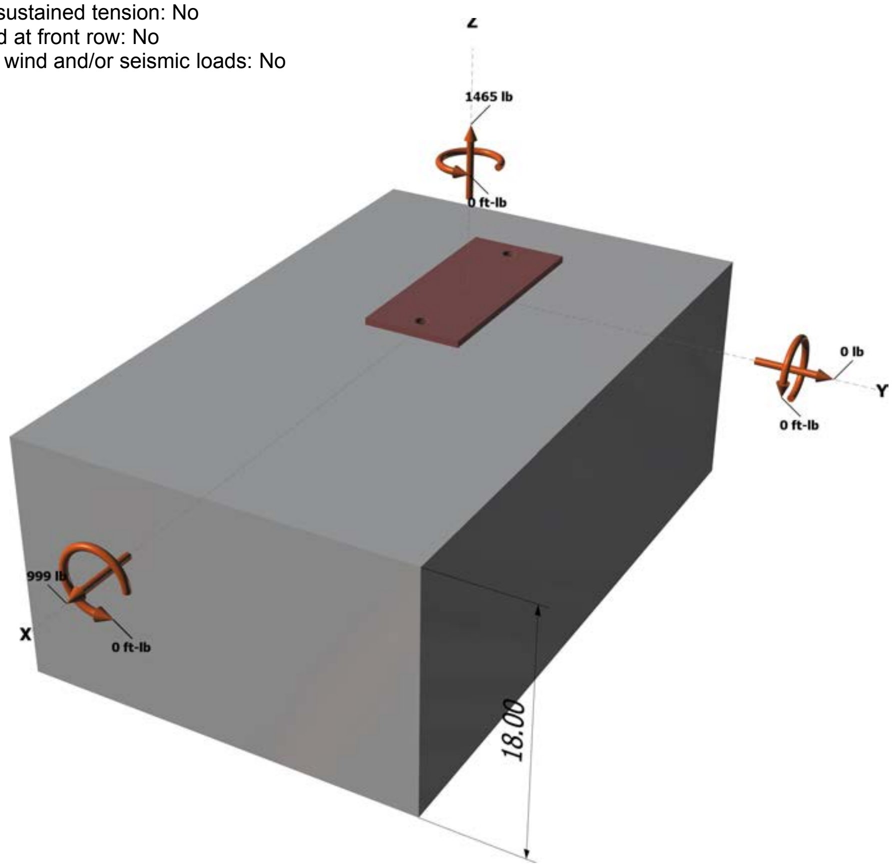
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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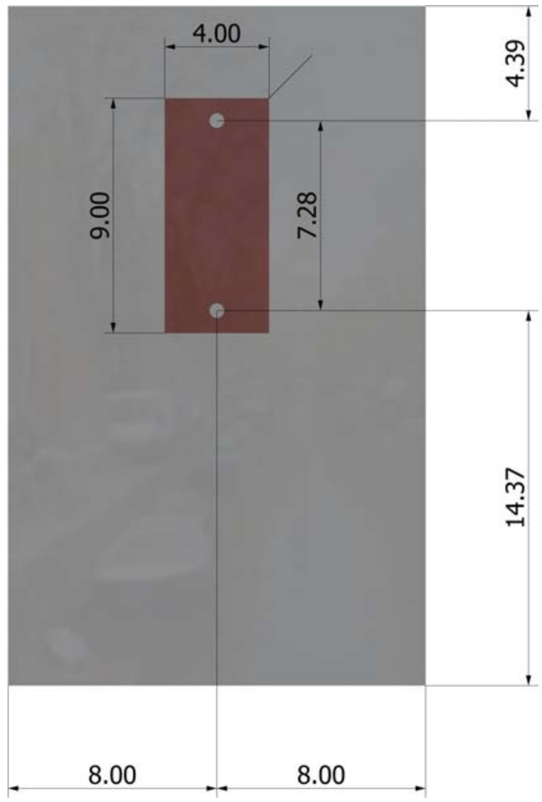


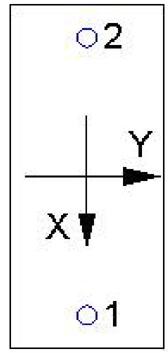
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
15580

11. Results

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

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

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

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

12. Warnings

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

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

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