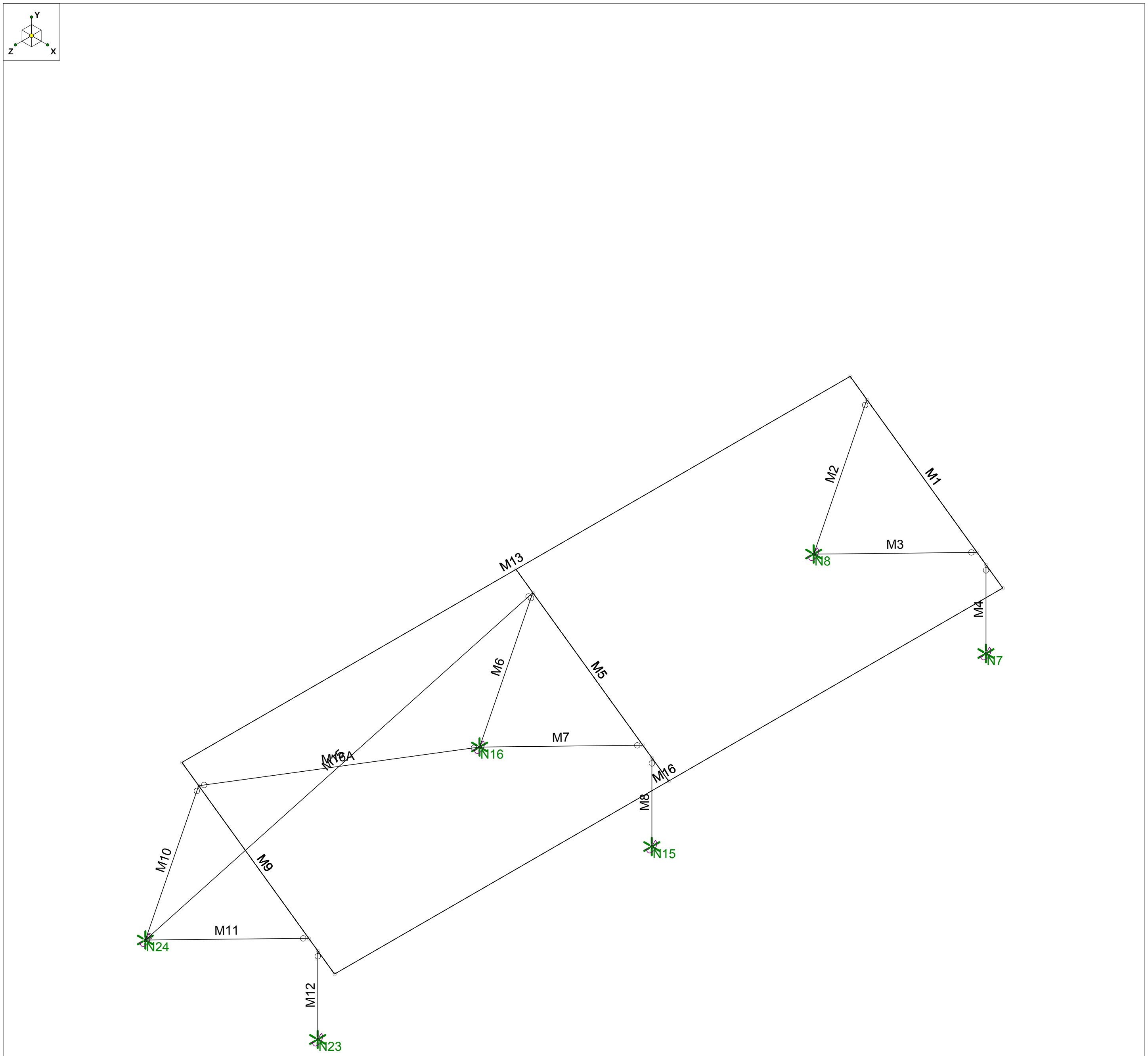


Schletter, Inc.	Standard PVMini Racking System	35° Tilt w/ Seismic Design
HCV	Representative Calculations - ASCE 7-10	

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.

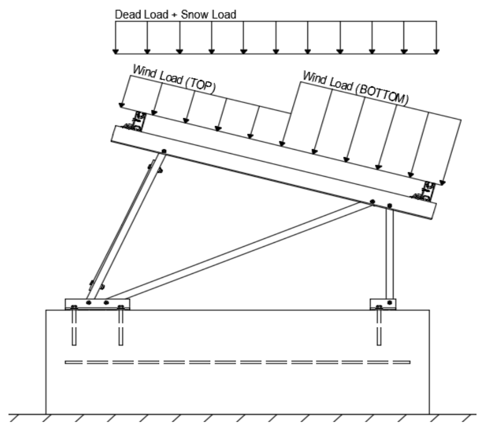
1.2 Construction

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 7-10 - Chapter 26-31, Wind Loads
- ASCE 7-10 - Chapter 7, Snow Loads
- ASCE 7-10 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2012, 2015
- Aluminum Design Manual, Eighth Edition, 2005

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} =	3.00	psf	*Self-weight of the PV modules.*
g_{MIN} =	1.75	psf	

2.2 Snow Loads

Ground Snow Load, P_g =	30.00	psf	
Sloped Roof Snow Load, P_s =	14.43	psf	*(ASCE 7-10, Eq. 7.4-1)*
I_s =	1.00		
C_s =	0.64		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V =	130	mph	Exposure Category = C
Height ≤	15	ft	Importance Category = II

Peak Velocity Pressure, q_z = 26.53 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

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

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

2.4 Seismic Loads

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W [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 + 0.6W
1.0D + 0.75L + 0.45W + 0.75S
0.6D + 0.6W [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.

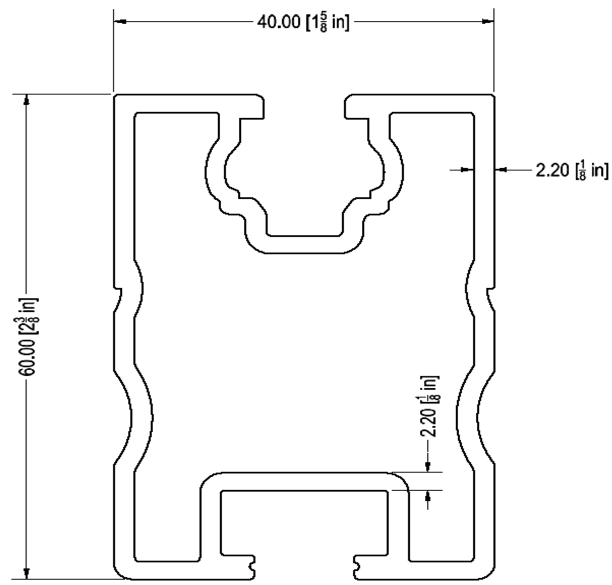
Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M16	Bottom	M7	Inner	N15	Inner
		M11	Outer	N23	Outer
Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24	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).

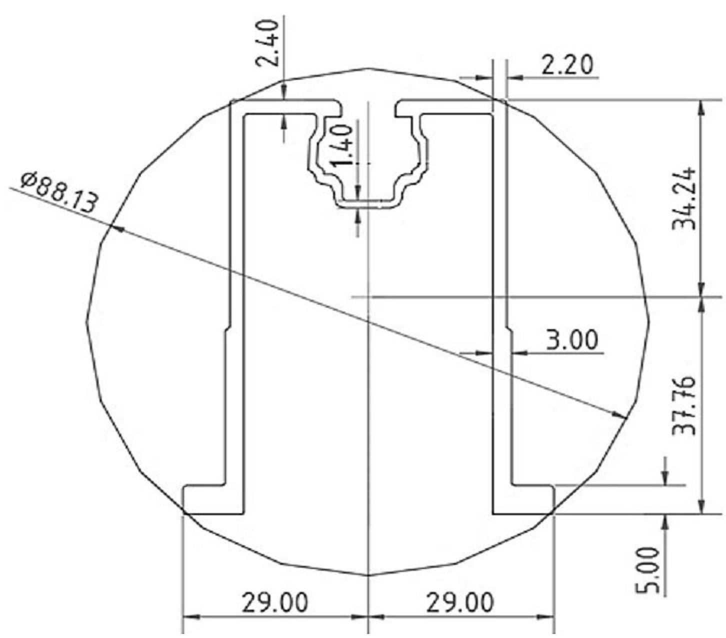
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	63	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.20	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.570	k-ft
M_z =	0.053	k-ft
$M_{y\ allowable}$ =	1.243	k-ft
$M_{z\ allowable}$ =	0.871	k-ft
Utilization =	52%	



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).

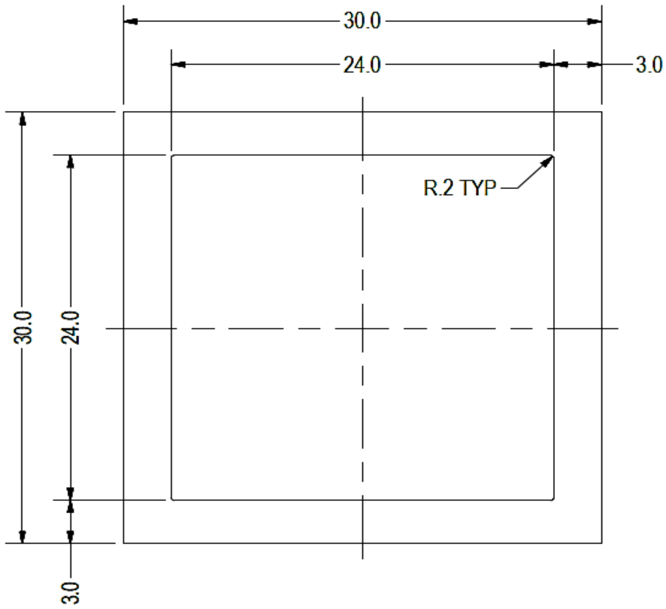
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.59	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.613	k-ft
M_z =	0.000	k-ft
P_n =	0.282	k
$M_{y\ allowable}$ =	1.452	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	44%	



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).

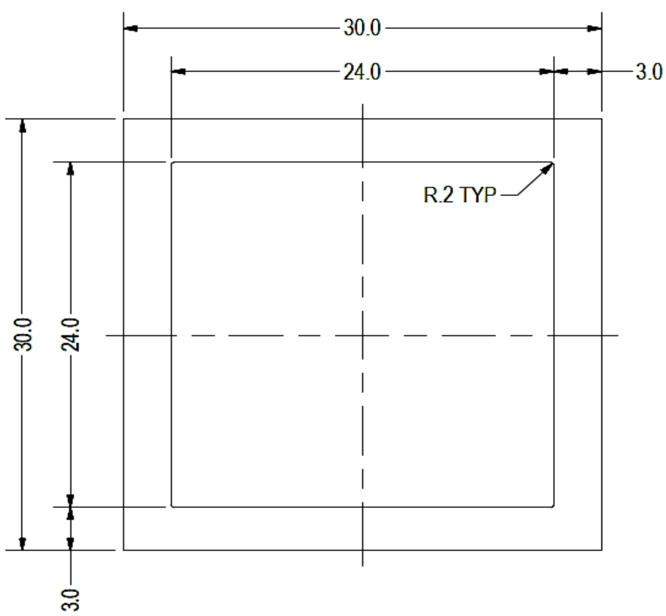
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.035	k-ft
P_n =	0.175	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	10%	



4.4 Diagonal Strut Design

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

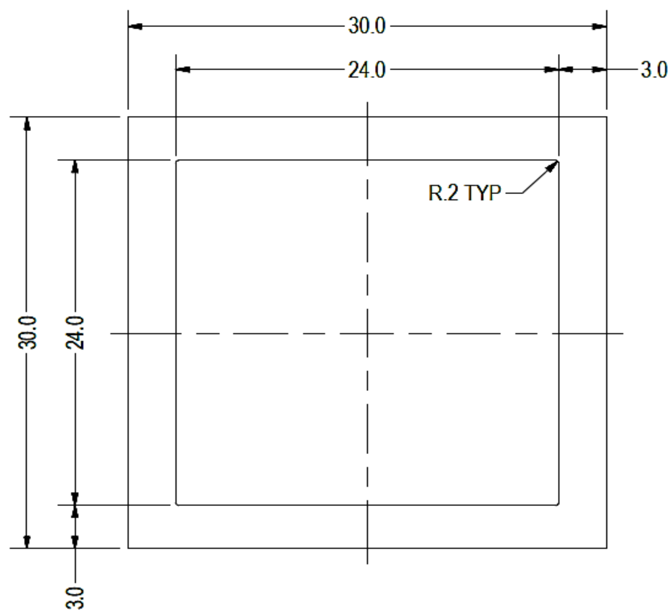
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.778	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).

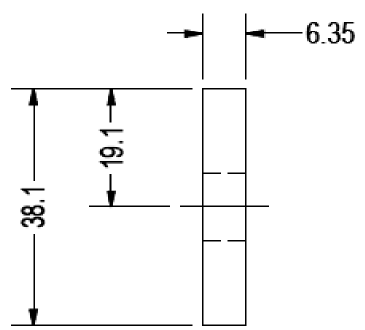
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	42.32	in
$\Phi F_{ty\ AXIAL}$ =	8.86	ksi
$\Phi F_{ty\ BENDING}$ =	29.96	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.678	k
$M_{y\ allowable}$ =	0.406	k-ft
$M_{z\ allowable}$ =	0.406	k-ft
$P_{n\ allowable}$ =	4.450	k
Utilization =	15%	



4.6 Cross Brace Design

In order to resist weak side loading, aluminum cross bracing kits are provided. The cross bracing is attached at one end of a rear aluminum strut diagonally down to the bottom end of an adjacent strut. Single M10 bolts are provided at each of the cross bracing. Section units are in (mm).

Brace Type =	**1.5x0.25**	
Aluminum Type =	6061-T6	
F_{ty} =	35	ksi
Φ =	0.90	
S_y =	0.02	in^3
E =	10100	ksi
I_y =	33.25	in^4
A =	0.38	in^2
g =	0.45	lbs/ft
M_y =	0.004	k-ft
P_n =	0.203	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	10%	



A cross brace kit is required every 19 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

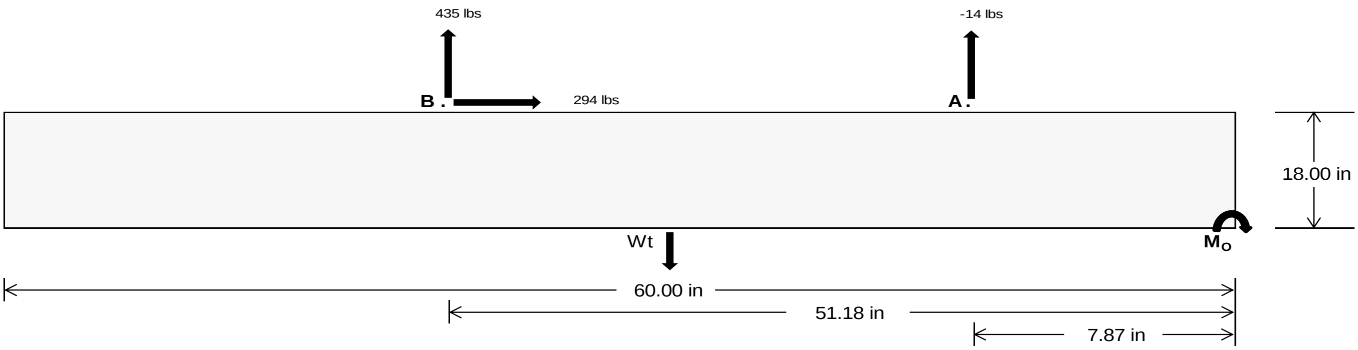
5.1 Helical Pile Foundations

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 =	9.32	1886.98	k
Compressive Load =	1027.54	1292.84	k
Lateral Load =	28.99	1273.65	k
Moment (Weak Axis) =	0.05	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 table 1806.2 (2012, 2015).



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 =	27418.9 in-lbs
Resisting Force Required =	913.96 lbs
S.F. =	1.67
Weight Required =	1523.27 lbs
Minimum Width =	21 in in
Weight Provided =	1903.13 lbs

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

Sliding

Force =	293.75 lbs
Friction =	0.4
Weight Required =	734.38 lbs
Resisting Weight =	1903.13 lbs
Additional Weight Required =	0 lbs

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

Cohesion

Sliding Force =	293.75 lbs
Cohesion =	130 psf
Area =	8.75 ft^2
Resisting =	951.56 lbs
Additional Weight Required =	0 lbs

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

Shear Key

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

Shear key is not required.

Bearing Pressure

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

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in
F_A	378 lbs	378 lbs	378 lbs	378 lbs	337 lbs	337 lbs	337 lbs	337 lbs	498 lbs	498 lbs	498 lbs	498 lbs	28 lbs	28 lbs	28 lbs	28 lbs
F_B	250 lbs	250 lbs	250 lbs	250 lbs	552 lbs	552 lbs	552 lbs	552 lbs	575 lbs	575 lbs	575 lbs	575 lbs	-869 lbs	-869 lbs	-869 lbs	-869 lbs
F_V	44 lbs	44 lbs	44 lbs	44 lbs	533 lbs	533 lbs	533 lbs	533 lbs	429 lbs	429 lbs	429 lbs	429 lbs	-588 lbs	-588 lbs	-588 lbs	-588 lbs
P_{total}	2531 lbs	2621 lbs	2712 lbs	2802 lbs	2792 lbs	2883 lbs	2973 lbs	3064 lbs	2976 lbs	3066 lbs	3157 lbs	3248 lbs	301 lbs	355 lbs	410 lbs	464 lbs
M	322 lbs-ft	322 lbs-ft	322 lbs-ft	322 lbs-ft	447 lbs-ft	447 lbs-ft	447 lbs-ft	447 lbs-ft	547 lbs-ft	547 lbs-ft	547 lbs-ft	547 lbs-ft	705 lbs-ft	705 lbs-ft	705 lbs-ft	705 lbs-ft
e	0.13 ft	0.12 ft	0.12 ft	0.12 ft	0.16 ft	0.16 ft	0.15 ft	0.15 ft	0.18 ft	0.18 ft	0.17 ft	0.17 ft	2.34 ft	1.98 ft	1.72 ft	1.52 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}	245.0 psf	243.8 psf	242.6 psf	241.6 psf	257.7 psf	255.9 psf	254.2 psf	252.7 psf	265.1 psf	263.0 psf	261.0 psf	259.2 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	333.4 psf	328.1 psf	323.3 psf	318.9 psf	380.4 psf	373.0 psf	366.3 psf	360.1 psf	415.1 psf	406.1 psf	397.9 psf	390.4 psf	727.8 psf	250.3 psf	182.8 psf	157.7 psf

Maximum Bearing Pressure =	728 psf
Allowable Bearing Pressure =	1500 psf

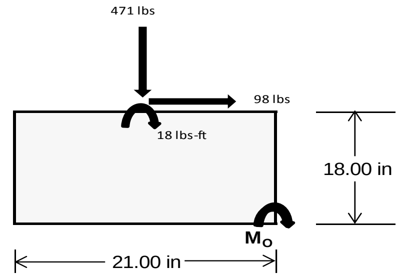
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 246.4 ft-lbs
Resisting Force Required = 281.64 lbs
S.F. = 1.67
Weight Required = 469.40 lbs
Minimum Width = 21 in in
Weight Provided = 1903.13 lbs

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



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	21 in			21 in			21 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	133 lbs	87 lbs	69 lbs	243 lbs	471 lbs	194 lbs	86 lbs	-26 lbs	24 lbs
F_V	16 lbs	131 lbs	16 lbs	11 lbs	98 lbs	13 lbs	16 lbs	130 lbs	16 lbs
P_{total}	2489 lbs	2443 lbs	2425 lbs	2486 lbs	2714 lbs	2437 lbs	775 lbs	663 lbs	713 lbs
M	46 lbs-ft	220 lbs-ft	48 lbs-ft	32 lbs-ft	166 lbs-ft	37 lbs-ft	47 lbs-ft	220 lbs-ft	47 lbs-ft
e	0.02 ft	0.09 ft	0.02 ft	0.01 ft	0.06 ft	0.02 ft	0.06 ft	0.33 ft	0.07 ft
L/6	0.29 ft	1.57 ft	1.71 ft	1.72 ft	1.63 ft	1.72 ft	1.63 ft	1.09 ft	1.62 ft
f_{min}	266.4 sqft	193.1 sqft	258.5 sqft	271.7 sqft	245.2 sqft	264.0 sqft	70.4 sqft	-10.3 sqft	63.0 sqft
f_{max}	302.5 psf	365.3 psf	295.7 psf	296.5 psf	375.1 psf	293.0 psf	106.8 psf	161.8 psf	100.1 psf

Maximum Bearing Pressure = 375 psf
Allowable Bearing Pressure = 1500 psf

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

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

5.3 Foundation Anchors

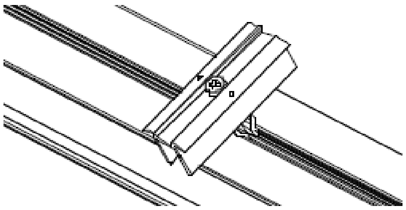
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

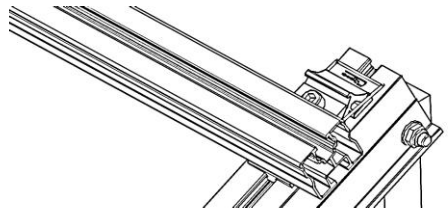
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

Fastening of Modules to Purlins		
Maximum Uplifting Force =	0.597	k
Allowable Uplift =	1.214	k
Utilization =	49%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.118	k
Allowable Uplift =	1.116	k
Utilization =	100%	



6.2 Bolted Connections

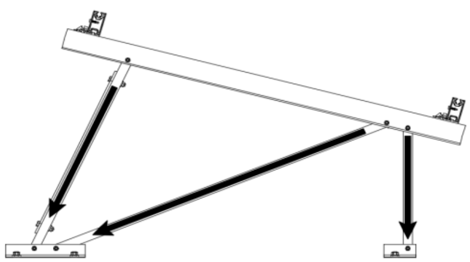
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are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

Front Strut		
Maximum Axial Load =	0.790	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	14%	

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 =	0.778	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	14%	

Bracing		
Maximum Axial Load =	0.203	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	3%	



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

7. SEISMIC DESIGN

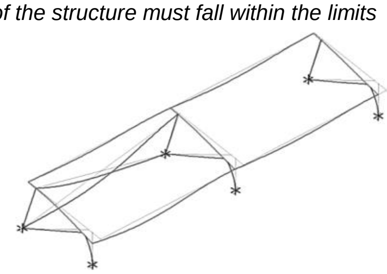
7.1 Seismic Drift

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

Mean Height, h_{sx} =	33.11	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.662	in
Max Drift, Δ_{MAX} =	0.074	in

$0.074 \le 0.662$, OK.

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



APPENDIX A

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

Purlin = **ProfiPlus**

Strong Axis:

3.4.14

L_b = 63.00 in

J = 0.255

164.048

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

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= 29.2 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 = 63.00 in

J = 0.255

170.354

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

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= 29.1

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

$\varphi F_L St$= 29.2 ksi

Ix = 250988 mm^4

0.603 in^4

y = 30 mm

Sx = 0.511 in³

$M_{max}St$ = 1.243 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 in³

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

Compression

3.4.9

b/t = 7.4

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 23.9

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.47 ksi

A = 578.06 mm^2

0.90 in^2

P_{max} = 25.51 kips

Girder = **Flex Profi**

Strong Axis:
3.4.11
L_b = 33.78 in
ry = 1.374
Cb = 1.20
22.3976

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.6 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 = 1.20
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= 29.6 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= 29.6 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.452 k-ft

3.4.18

h/t = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

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

3.4.9

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

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

3.4.9.1

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

λ = 0.77182

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83792

φF_L= φcc(Bc-Dc*λ)

φF_L= 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 24.52 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 12.31 kips

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 in³

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 in³

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

$r =$ 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

$b/t =$ 7.75

$S1 =$ 12.21 (See 3.4.16 above for formula)

$S2 =$ 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

$b/t =$ 7.75

$S1 =$ 12.21

$S2 =$ 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

$Rb/t =$ 0.0

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

$S1 =$ 6.87

$S2 =$ 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

$A =$ 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 42.32 in

J = 0.16

111.025

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.0 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 30.0 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in³

M_{max}St = 0.406 k-ft

Weak Axis:

3.4.14

L_b = 42.32 in

J = 0.16

111.025

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.0

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in³

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

λ = 1.81475

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83406

φF_L= (φccFcy)/(λ²)

φF_L= 8.86409 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 8.86 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 4.45 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

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

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-88.797	-88.797	0	0
2	M16	y	-147.995	-147.995	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	177.594	177.594	0	0
2	M16	y	88.797	88.797	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

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

Load Combinations

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

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
10	ASD 1.0D + 0.6W	Yes	Y		1	1			4	.6														
11	ASD 1.0D + 0.75L + 0.45W + 0....	Yes	Y		1	1	3	.75	4	.45														
12	ASD 0.6D + 0.6W	Yes	Y		2	.6					5	.6												
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	262.137	2	301.972	2	-.005	10	0	5	0	1	0	1
2		min	-312.232	3	-448.159	3	-2.354	4	0	3	0	1	0	1
3	N7	max	.025	3	306.059	1	-.098	10	0	10	0	1	0	1
4		min	-.149	2	22.818	15	-21.962	4	-.035	4	0	1	0	1
5	N15	max	.18	3	790.416	1	.415	1	0	1	0	1	0	1
6		min	-1.475	2	25.755	15	-22.299	5	-.035	4	0	1	0	1
7	N16	max	903.556	2	994.492	2	0	10	0	1	0	1	0	1
8		min	-979.73	3	-1451.526	3	-172.217	4	0	3	0	1	0	1
9	N23	max	.026	3	305.936	1	1.775	1	.003	1	0	1	0	1
10		min	-.149	2	4.309	15	-20.667	5	-.032	5	0	1	0	1
11	N24	max	262.171	2	304.866	2	76.243	3	0	4	0	1	0	1
12		min	-312.623	3	-446.7	3	-3.612	5	0	3	0	1	0	1
13	Totals:	max	1426.092	2	2738.678	2	0	3						
14		min	-1604.354	3	-2155.723	3	-242.146	5						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M2	1	max	212.663	1	.676	6	1.261	4	0	10	0	10	0	1
2			min	-370.314	3	.158	15	-.048	3	0	4	0	1	0	1
3		2	max	212.798	1	.619	6	1.138	4	0	10	0	5	0	15
4			min	-370.213	3	.145	15	-.048	3	0	4	0	1	0	6
5		3	max	212.933	1	.561	6	1.015	4	0	10	0	5	0	15
6			min	-370.111	3	.131	15	-.048	3	0	4	0	1	0	6
7		4	max	213.068	1	.504	6	.892	4	0	10	0	5	0	15
8			min	-370.01	3	.118	15	-.048	3	0	4	0	3	0	6
9		5	max	213.203	1	.446	6	.769	4	0	10	0	4	0	15
10			min	-369.909	3	.104	15	-.048	3	0	4	0	3	0	6
11		6	max	213.337	1	.389	6	.646	4	0	10	0	4	0	15
12			min	-369.808	3	.091	15	-.048	3	0	4	0	3	0	6
13		7	max	213.472	1	.332	6	.522	4	0	10	0	4	0	15
14			min	-369.707	3	.077	15	-.048	3	0	4	0	3	0	6
15		8	max	213.607	1	.274	6	.399	4	0	10	0	4	0	15
16			min	-369.606	3	.064	15	-.048	3	0	4	0	3	0	6
17		9	max	213.742	1	.217	6	.276	4	0	10	.001	4	0	15
18			min	-369.505	3	.05	15	-.048	3	0	4	0	3	0	6
19		10	max	213.877	1	.159	6	.24	1	0	10	.001	4	0	15
20			min	-369.403	3	.037	15	-.048	3	0	4	0	3	0	6
21		11	max	214.012	1	.11	2	.24	1	0	10	.001	4	0	15
22			min	-369.302	3	.016	12	-.048	3	0	4	0	3	0	6
23		12	max	214.147	1	.065	2	.24	1	0	10	.001	4	0	15
24			min	-369.201	3	-.014	3	-.156	5	0	4	0	3	0	6
25		13	max	214.281	1	.02	2	.24	1	0	10	.001	4	0	15
26			min	-369.1	3	-.047	3	-.279	5	0	4	0	3	0	6
27		14	max	214.416	1	-.017	15	.24	1	0	10	.001	4	0	15
28			min	-368.999	3	-.081	3	-.402	5	0	4	0	3	0	6

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
29		15	max	214.551	1	-.031	15	.24	1	0	10	0	4	0	15
30			min	-368.898	3	-.128	4	-.525	5	0	4	0	3	0	6
31		16	max	214.686	1	-.044	15	.24	1	0	10	0	4	0	15
32			min	-368.796	3	-.186	4	-.648	5	0	4	0	3	0	6
33		17	max	214.821	1	-.058	15	.24	1	0	10	0	4	0	15
34			min	-368.695	3	-.243	4	-.771	5	0	4	0	3	0	6
35		18	max	214.956	1	-.071	15	.24	1	0	10	0	1	0	15
36			min	-368.594	3	-.301	4	-.894	5	0	4	0	3	0	6
37		19	max	215.091	1	-.085	15	.24	1	0	10	0	1	0	15
38			min	-368.493	3	-.358	4	-1.018	5	0	4	0	3	0	6
39	M3	1	max	220.48	2	1.734	6	-.023	10	0	5	0	1	0	6
40			min	-219.164	3	.407	15	-1.35	4	0	1	0	10	0	15
41		2	max	220.41	2	1.558	6	-.023	10	0	5	0	1	0	2
42			min	-219.217	3	.366	15	-1.216	4	0	1	0	10	0	3
43		3	max	220.34	2	1.381	6	-.023	10	0	5	0	1	0	2
44			min	-219.269	3	.324	15	-1.082	4	0	1	0	5	0	3
45		4	max	220.27	2	1.205	6	-.023	10	0	5	0	1	0	15
46			min	-219.322	3	.283	15	-.949	4	0	1	0	5	0	4
47		5	max	220.2	2	1.028	6	-.023	10	0	5	0	1	0	15
48			min	-219.374	3	.241	15	-.815	4	0	1	0	5	0	4
49		6	max	220.13	2	.852	6	-.023	10	0	5	0	1	0	15
50			min	-219.427	3	.2	15	-.681	4	0	1	0	5	0	4
51		7	max	220.06	2	.676	6	-.023	10	0	5	0	1	0	15
52			min	-219.479	3	.158	15	-.548	4	0	1	0	5	0	4
53		8	max	219.99	2	.499	6	-.023	10	0	5	0	1	0	15
54			min	-219.532	3	.117	15	-.414	4	0	1	0	5	-.001	4
55		9	max	219.92	2	.323	6	-.023	10	0	5	0	1	0	15
56			min	-219.584	3	.075	15	-.28	4	0	1	0	5	-.001	4
57		10	max	219.85	2	.147	6	-.023	10	0	5	0	1	0	15
58			min	-219.637	3	.034	15	-.27	1	0	1	0	5	-.001	4
59		11	max	219.78	2	.005	2	.051	5	0	5	0	1	0	15
60			min	-219.689	3	-.054	3	-.27	1	0	1	0	5	-.001	4
61		12	max	219.71	2	-.049	15	.185	5	0	5	0	1	0	15
62			min	-219.742	3	-.206	4	-.27	1	0	1	0	5	-.001	4
63		13	max	219.64	2	-.09	15	.318	5	0	5	0	1	0	15
64			min	-219.794	3	-.383	4	-.27	1	0	1	0	5	-.001	4
65		14	max	219.57	2	-.132	15	.452	5	0	5	0	1	0	15
66			min	-219.847	3	-.559	4	-.27	1	0	1	0	5	-.001	4
67		15	max	219.5	2	-.173	15	.586	5	0	5	0	1	0	15
68			min	-219.899	3	-.735	4	-.27	1	0	1	0	5	0	4
69		16	max	219.43	2	-.215	15	.719	5	0	5	0	1	0	15
70			min	-219.952	3	-.912	4	-.27	1	0	1	0	5	0	4
71		17	max	219.36	2	-.256	15	.853	5	0	5	0	10	0	15
72			min	-220.004	3	-1.088	4	-.27	1	0	1	0	5	0	4
73		18	max	219.29	2	-.298	15	.987	5	0	5	0	10	0	15
74			min	-220.057	3	-1.264	4	-.27	1	0	1	0	4	0	4
75		19	max	219.22	2	-.339	15	1.12	5	0	5	0	5	0	1
76			min	-220.109	3	-1.441	4	-.27	1	0	1	0	1	0	1
77	M4	1	max	304.895	1	0	1	-.1	10	0	1	0	5	0	1
78			min	22.466	15	0	1	-21.283	4	0	1	0	2	0	1
79		2	max	304.959	1	0	1	-.1	10	0	1	0	12	0	1
80			min	22.486	15	0	1	-21.339	4	0	1	-.002	4	0	1
81		3	max	305.024	1	0	1	-.1	10	0	1	0	10	0	1
82			min	22.505	15	0	1	-21.395	4	0	1	-.004	4	0	1
83		4	max	305.089	1	0	1	-.1	10	0	1	0	10	0	1
84			min	22.525	15	0	1	-21.451	4	0	1	-.006	4	0	1
85		5	max	305.153	1	0	1	-.1	10	0	1	0	10	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
86			min	22.544	15	0	1	-21.507	4	0	1	-.008	4	0	1
87		6	max	305.218	1	0	1	-.1	10	0	1	0	10	0	1
88			min	22.564	15	0	1	-21.563	4	0	1	-.01	4	0	1
89		7	max	305.283	1	0	1	-.1	10	0	1	0	10	0	1
90			min	22.583	15	0	1	-21.619	4	0	1	-.011	4	0	1
91		8	max	305.348	1	0	1	-.1	10	0	1	0	10	0	1
92			min	22.603	15	0	1	-21.675	4	0	1	-.013	4	0	1
93		9	max	305.412	1	0	1	-.1	10	0	1	0	10	0	1
94			min	22.622	15	0	1	-21.731	4	0	1	-.015	4	0	1
95		10	max	305.477	1	0	1	-.1	10	0	1	0	10	0	1
96			min	22.642	15	0	1	-21.787	4	0	1	-.017	4	0	1
97		11	max	305.542	1	0	1	-.1	10	0	1	0	10	0	1
98			min	22.661	15	0	1	-21.843	4	0	1	-.019	4	0	1
99		12	max	305.606	1	0	1	-.1	10	0	1	0	10	0	1
100			min	22.681	15	0	1	-21.899	4	0	1	-.021	4	0	1
101		13	max	305.671	1	0	1	-.1	10	0	1	0	10	0	1
102			min	22.701	15	0	1	-21.956	4	0	1	-.023	4	0	1
103		14	max	305.736	1	0	1	-.1	10	0	1	0	10	0	1
104			min	22.72	15	0	1	-22.012	4	0	1	-.025	4	0	1
105		15	max	305.801	1	0	1	-.1	10	0	1	0	10	0	1
106			min	22.74	15	0	1	-22.068	4	0	1	-.027	4	0	1
107		16	max	305.865	1	0	1	-.1	10	0	1	0	10	0	1
108			min	22.759	15	0	1	-22.124	4	0	1	-.029	4	0	1
109		17	max	305.93	1	0	1	-.1	10	0	1	0	10	0	1
110			min	22.779	15	0	1	-22.18	4	0	1	-.031	4	0	1
111		18	max	305.995	1	0	1	-.1	10	0	1	0	10	0	1
112			min	22.798	15	0	1	-22.236	4	0	1	-.033	4	0	1
113		19	max	306.059	1	0	1	-.1	10	0	1	0	10	0	1
114			min	22.818	15	0	1	-22.292	4	0	1	-.035	4	0	1
115	M6	1	max	675.227	1	.662	6	1.17	4	0	3	0	3	0	1
116			min	-1163.949	3	.147	15	-.215	3	0	5	0	9	0	1
117		2	max	675.362	1	.604	6	1.046	4	0	3	0	4	0	15
118			min	-1163.847	3	.133	15	-.215	3	0	5	0	9	0	6
119		3	max	675.497	1	.547	6	.923	4	0	3	0	4	0	15
120			min	-1163.746	3	.12	15	-.215	3	0	5	0	9	0	6
121		4	max	675.631	1	.491	2	.8	4	0	3	0	4	0	15
122			min	-1163.645	3	.106	15	-.215	3	0	5	0	10	0	6
123		5	max	675.766	1	.447	2	.677	4	0	3	0	4	0	15
124			min	-1163.544	3	.093	15	-.215	3	0	5	0	2	0	6
125		6	max	675.901	1	.402	2	.554	4	0	3	0	4	0	15
126			min	-1163.443	3	.076	12	-.215	3	0	5	0	2	0	6
127		7	max	676.036	1	.357	2	.431	4	0	3	.001	4	0	15
128			min	-1163.342	3	.054	12	-.215	3	0	5	0	2	0	2
129		8	max	676.171	1	.312	2	.307	4	0	3	.001	4	0	15
130			min	-1163.241	3	.032	12	-.215	3	0	5	0	3	0	2
131		9	max	676.306	1	.267	2	.184	4	0	3	.001	4	0	15
132			min	-1163.139	3	.001	3	-.215	3	0	5	0	3	0	2
133		10	max	676.441	1	.223	2	.062	14	0	3	.001	4	0	15
134			min	-1163.038	3	-.032	3	-.215	3	0	5	0	3	0	2
135		11	max	676.576	1	.178	2	.06	9	0	3	.001	4	0	12
136			min	-1162.937	3	-.066	3	-.215	3	0	5	0	3	0	2
137		12	max	676.71	1	.133	2	.06	9	0	3	.001	4	0	12
138			min	-1162.836	3	-.099	3	-.215	3	0	5	0	3	0	2
139		13	max	676.845	1	.088	2	.06	9	0	3	.001	4	0	12
140			min	-1162.735	3	-.133	3	-.329	5	0	5	0	3	0	2
141		14	max	676.98	1	.043	2	.06	9	0	3	.001	4	0	12
142			min	-1162.634	3	-.167	3	-.452	5	0	5	0	3	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
143		15	max	677.115	1	-.001	2	.06	9	0	3	0	4	0	12
144			min	-1162.532	3	-.2	3	-.575	5	0	5	0	3	0	2
145		16	max	677.25	1	-.046	2	.06	9	0	3	0	4	0	3
146			min	-1162.431	3	-.234	3	-.698	5	0	5	0	3	0	2
147		17	max	677.385	1	-.07	15	.06	9	0	3	0	4	0	3
148			min	-1162.33	3	-.267	3	-.821	5	0	5	0	3	0	2
149		18	max	677.52	1	-.083	15	.06	9	0	3	0	4	0	3
150			min	-1162.229	3	-.316	4	-.945	5	0	5	0	3	0	2
151		19	max	677.654	1	-.097	15	.06	9	0	3	0	4	0	3
152			min	-1162.128	3	-.374	4	-1.068	5	0	5	0	3	0	2
153	M7	1	max	778.215	2	1.757	4	.041	3	0	1	0	4	0	2
154			min	-668.462	3	.42	15	-1.297	4	0	3	0	3	0	3
155		2	max	778.145	2	1.58	4	.041	3	0	1	0	4	0	2
156			min	-668.514	3	.379	15	-1.163	4	0	3	0	3	0	3
157		3	max	778.075	2	1.404	4	.041	3	0	1	0	2	0	2
158			min	-668.567	3	.338	15	-1.03	4	0	3	0	3	0	3
159		4	max	778.005	2	1.227	4	.041	3	0	1	0	2	0	2
160			min	-668.619	3	.296	15	-.896	4	0	3	0	3	0	3
161		5	max	777.935	2	1.051	4	.041	3	0	1	0	1	0	15
162			min	-668.672	3	.255	15	-.762	4	0	3	0	5	0	3
163		6	max	777.865	2	.875	4	.041	3	0	1	0	1	0	15
164			min	-668.724	3	.213	15	-.629	4	0	3	0	5	0	3
165		7	max	777.795	2	.698	4	.041	3	0	1	0	1	0	15
166			min	-668.777	3	.172	15	-.495	4	0	3	0	5	0	6
167		8	max	777.725	2	.522	4	.041	3	0	1	0	1	0	15
168			min	-668.829	3	.125	12	-.361	4	0	3	0	5	-.001	6
169		9	max	777.655	2	.346	2	.041	3	0	1	0	1	0	15
170			min	-668.882	3	.057	12	-.228	4	0	3	0	5	-.001	6
171		10	max	777.585	2	.208	2	.041	3	0	1	0	1	0	15
172			min	-668.934	3	-.03	3	-.094	4	0	3	0	5	-.001	6
173		11	max	777.515	2	.071	2	.041	3	0	1	0	1	0	15
174			min	-668.987	3	-.133	3	-.017	2	0	3	0	5	-.001	6
175		12	max	777.445	2	-.036	15	.173	5	0	1	0	1	0	15
176			min	-669.039	3	-.236	3	-.017	2	0	3	0	5	-.001	6
177		13	max	777.375	2	-.077	15	.307	5	0	1	0	1	0	15
178			min	-669.092	3	-.361	6	-.017	2	0	3	0	5	-.001	6
179		14	max	777.305	2	-.119	15	.441	5	0	1	0	1	0	15
180			min	-669.144	3	-.537	6	-.017	2	0	3	0	5	-.001	6
181		15	max	777.235	2	-.16	15	.574	5	0	1	0	1	0	15
182			min	-669.197	3	-.713	6	-.017	2	0	3	0	5	0	6
183		16	max	777.165	2	-.201	15	.708	5	0	1	0	1	0	15
184			min	-669.249	3	-.89	6	-.017	2	0	3	0	5	0	6
185		17	max	777.095	2	-.243	15	.842	5	0	1	0	1	0	15
186			min	-669.302	3	-1.066	6	-.017	2	0	3	0	5	0	6
187		18	max	777.025	2	-.284	15	.975	5	0	1	0	1	0	15
188			min	-669.354	3	-1.242	6	-.017	2	0	3	0	5	0	6
189		19	max	776.955	2	-.326	15	1.109	5	0	1	0	1	0	1
190			min	-669.407	3	-1.419	6	-.017	2	0	3	0	3	0	1
191	M8	1	max	789.251	1	0	1	.476	1	0	1	0	4	0	1
192			min	25.403	15	0	1	-21.468	4	0	1	0	3	0	1
193		2	max	789.316	1	0	1	.476	1	0	1	0	1	0	1
194			min	25.423	15	0	1	-21.524	4	0	1	-.002	4	0	1
195		3	max	789.38	1	0	1	.476	1	0	1	0	1	0	1
196			min	25.442	15	0	1	-21.58	4	0	1	-.004	4	0	1
197		4	max	789.445	1	0	1	.476	1	0	1	0	1	0	1
198			min	25.462	15	0	1	-21.636	4	0	1	-.006	4	0	1
199		5	max	789.51	1	0	1	.476	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
200			min	25.481	15	0	1	-21.692	4	0	1	-.008	4	0	1
201		6	max	789.575	1	0	1	.476	1	0	1	0	1	0	1
202			min	25.501	15	0	1	-21.748	4	0	1	-.01	4	0	1
203		7	max	789.639	1	0	1	.476	1	0	1	0	1	0	1
204			min	25.52	15	0	1	-21.804	4	0	1	-.012	4	0	1
205		8	max	789.704	1	0	1	.476	1	0	1	0	1	0	1
206			min	25.54	15	0	1	-21.861	4	0	1	-.014	4	0	1
207		9	max	789.769	1	0	1	.476	1	0	1	0	1	0	1
208			min	25.559	15	0	1	-21.917	4	0	1	-.015	4	0	1
209		10	max	789.833	1	0	1	.476	1	0	1	0	1	0	1
210			min	25.579	15	0	1	-21.973	4	0	1	-.017	4	0	1
211		11	max	789.898	1	0	1	.476	1	0	1	0	1	0	1
212			min	25.598	15	0	1	-22.029	4	0	1	-.019	4	0	1
213		12	max	789.963	1	0	1	.476	1	0	1	0	1	0	1
214			min	25.618	15	0	1	-22.085	4	0	1	-.021	4	0	1
215		13	max	790.027	1	0	1	.476	1	0	1	0	1	0	1
216			min	25.638	15	0	1	-22.141	4	0	1	-.023	4	0	1
217		14	max	790.092	1	0	1	.476	1	0	1	0	1	0	1
218			min	25.657	15	0	1	-22.197	4	0	1	-.025	4	0	1
219		15	max	790.157	1	0	1	.476	1	0	1	0	1	0	1
220			min	25.677	15	0	1	-22.253	4	0	1	-.027	4	0	1
221		16	max	790.222	1	0	1	.476	1	0	1	0	1	0	1
222			min	25.696	15	0	1	-22.309	4	0	1	-.029	4	0	1
223		17	max	790.286	1	0	1	.476	1	0	1	0	1	0	1
224			min	25.716	15	0	1	-22.365	4	0	1	-.031	4	0	1
225		18	max	790.351	1	0	1	.476	1	0	1	0	1	0	1
226			min	25.735	15	0	1	-22.421	4	0	1	-.033	4	0	1
227		19	max	790.416	1	0	1	.476	1	0	1	0	1	0	1
228			min	25.755	15	0	1	-22.477	4	0	1	-.035	4	0	1
229	M10	1	max	215.058	1	.709	4	1.307	5	0	1	0	1	0	1
230			min	-318.376	3	.18	15	-.139	1	-.001	5	0	3	0	1
231		2	max	215.193	1	.652	4	1.184	5	0	1	0	1	0	15
232			min	-318.274	3	.167	15	-.139	1	-.001	5	0	3	0	4
233		3	max	215.328	1	.594	4	1.061	5	0	1	0	4	0	15
234			min	-318.173	3	.153	15	-.139	1	-.001	5	0	3	0	4
235		4	max	215.463	1	.537	4	.938	5	0	1	0	4	0	15
236			min	-318.072	3	.14	15	-.139	1	-.001	5	0	3	0	4
237		5	max	215.598	1	.479	4	.815	5	0	1	0	4	0	15
238			min	-317.971	3	.126	15	-.139	1	-.001	5	0	3	0	4
239		6	max	215.733	1	.422	4	.692	5	0	1	0	4	0	15
240			min	-317.87	3	.113	15	-.139	1	-.001	5	0	3	0	4
241		7	max	215.867	1	.364	4	.568	5	0	1	0	4	0	15
242			min	-317.769	3	.099	15	-.139	1	-.001	5	0	3	0	4
243		8	max	216.002	1	.307	4	.445	5	0	1	.001	4	0	15
244			min	-317.668	3	.086	15	-.139	1	-.001	5	0	3	0	4
245		9	max	216.137	1	.249	4	.322	5	0	1	.001	4	0	15
246			min	-317.566	3	.072	15	-.139	1	-.001	5	0	3	0	4
247		10	max	216.272	1	.192	4	.199	5	0	1	.001	4	0	15
248			min	-317.465	3	.05	12	-.139	1	-.001	5	0	3	0	4
249		11	max	216.407	1	.134	4	.076	5	0	1	.001	4	0	15
250			min	-317.364	3	.028	12	-.139	1	-.001	5	0	3	0	4
251		12	max	216.542	1	.077	4	.007	3	0	1	.001	4	0	15
252			min	-317.263	3	.006	12	-.139	1	-.001	5	0	3	0	4
253		13	max	216.677	1	.027	5	.007	3	0	1	.001	5	0	15
254			min	-317.162	3	-.027	3	-.194	4	-.001	5	0	3	0	4
255		14	max	216.811	1	.006	5	.007	3	0	1	.001	5	0	15
256			min	-317.061	3	-.061	3	-.317	4	-.001	5	0	3	0	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
257		15	max	216.946	1	-.009	15	.007	3	0	1	.001	5	0	15
258			min	-316.96	3	-.097	6	-.44	4	-.001	5	0	3	0	4
259		16	max	217.081	1	-.022	15	.007	3	0	1	0	5	0	15
260			min	-316.858	3	-.154	6	-.563	4	-.001	5	0	3	0	4
261		17	max	217.216	1	-.036	15	.007	3	0	1	0	5	0	15
262			min	-316.757	3	-.212	6	-.686	4	-.001	5	0	3	0	4
263		18	max	217.351	1	-.049	15	.007	3	0	1	0	5	0	12
264			min	-316.656	3	-.269	6	-.809	4	-.001	5	0	1	0	4
265		19	max	217.486	1	-.063	15	.007	3	0	1	0	5	0	12
266			min	-316.555	3	-.327	6	-.933	4	-.001	5	0	1	0	4
267	M11	1	max	219.995	2	1.721	6	.289	1	.001	4	0	5	0	2
268			min	-219.887	3	.398	15	-1.245	5	0	10	0	1	0	15
269		2	max	219.925	2	1.544	6	.289	1	.001	4	0	5	0	2
270			min	-219.94	3	.356	15	-1.112	5	0	10	0	1	0	3
271		3	max	219.855	2	1.368	6	.289	1	.001	4	0	3	0	2
272			min	-219.992	3	.315	15	-.978	5	0	10	0	1	0	3
273		4	max	219.785	2	1.192	6	.289	1	.001	4	0	3	0	15
274			min	-220.045	3	.273	15	-.844	5	0	10	0	1	0	4
275		5	max	219.715	2	1.015	6	.289	1	.001	4	0	3	0	15
276			min	-220.097	3	.232	15	-.711	5	0	10	0	1	0	4
277		6	max	219.645	2	.839	6	.289	1	.001	4	0	3	0	15
278			min	-220.15	3	.19	15	-.577	5	0	10	0	1	0	4
279		7	max	219.575	2	.663	6	.289	1	.001	4	0	3	0	15
280			min	-220.202	3	.149	15	-.443	5	0	10	0	1	-.001	4
281		8	max	219.505	2	.486	6	.289	1	.001	4	0	3	0	15
282			min	-220.255	3	.108	15	-.31	5	0	10	0	4	-.001	4
283		9	max	219.435	2	.31	6	.289	1	.001	4	0	3	0	15
284			min	-220.307	3	.066	15	-.176	5	0	10	0	4	-.001	4
285		10	max	219.365	2	.142	2	.289	1	.001	4	0	3	0	15
286			min	-220.36	3	.025	15	-.049	3	0	10	0	4	-.001	4
287		11	max	219.295	2	.005	2	.289	1	.001	4	0	3	0	15
288			min	-220.412	3	-.067	3	-.049	3	0	10	0	4	-.001	4
289		12	max	219.225	2	-.058	15	.293	4	.001	4	0	3	0	15
290			min	-220.465	3	-.22	4	-.049	3	0	10	0	4	-.001	4
291		13	max	219.155	2	-.1	15	.427	4	.001	4	0	3	0	15
292			min	-220.517	3	-.396	4	-.049	3	0	10	0	4	-.001	4
293		14	max	219.085	2	-.141	15	.561	4	.001	4	0	3	0	15
294			min	-220.57	3	-.573	4	-.049	3	0	10	0	4	-.001	4
295		15	max	219.015	2	-.183	15	.694	4	.001	4	0	3	0	15
296			min	-220.622	3	-.749	4	-.049	3	0	10	0	4	0	4
297		16	max	218.945	2	-.224	15	.828	4	.001	4	0	3	0	15
298			min	-220.675	3	-.925	4	-.049	3	0	10	0	5	0	4
299		17	max	218.875	2	-.266	15	.962	4	.001	4	0	3	0	15
300			min	-220.727	3	-1.102	4	-.049	3	0	10	0	10	0	4
301		18	max	218.805	2	-.307	15	1.095	4	.001	4	0	4	0	15
302			min	-220.78	3	-1.278	4	-.049	3	0	10	0	10	0	4
303		19	max	218.735	2	-.349	15	1.229	4	.001	4	0	4	0	1
304			min	-220.832	3	-1.455	4	-.049	3	0	10	0	10	0	1
305	M12	1	max	304.771	1	0	1	1.869	1	0	1	0	4	0	1
306			min	3.958	15	0	1	-19.68	5	0	1	0	3	0	1
307		2	max	304.836	1	0	1	1.869	1	0	1	0	1	0	1
308			min	3.978	15	0	1	-19.736	5	0	1	-.002	5	0	1
309		3	max	304.9	1	0	1	1.869	1	0	1	0	1	0	1
310			min	3.997	15	0	1	-19.792	5	0	1	-.003	5	0	1
311		4	max	304.965	1	0	1	1.869	1	0	1	0	1	0	1
312			min	4.017	15	0	1	-19.848	5	0	1	-.005	5	0	1
313		5	max	305.03	1	0	1	1.869	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
314			min	4.036	15	0	1	-19.904	5	0	1	-.007	5	0	1
315		6	max	305.095	1	0	1	1.869	1	0	1	0	1	0	1
316			min	4.056	15	0	1	-19.96	5	0	1	-.009	5	0	1
317		7	max	305.159	1	0	1	1.869	1	0	1	.001	1	0	1
318			min	4.075	15	0	1	-20.016	5	0	1	-.011	5	0	1
319		8	max	305.224	1	0	1	1.869	1	0	1	.001	1	0	1
320			min	4.095	15	0	1	-20.072	5	0	1	-.012	5	0	1
321		9	max	305.289	1	0	1	1.869	1	0	1	.001	1	0	1
322			min	4.114	15	0	1	-20.128	5	0	1	-.014	5	0	1
323		10	max	305.353	1	0	1	1.869	1	0	1	.002	1	0	1
324			min	4.134	15	0	1	-20.184	5	0	1	-.016	5	0	1
325		11	max	305.418	1	0	1	1.869	1	0	1	.002	1	0	1
326			min	4.153	15	0	1	-20.241	5	0	1	-.018	5	0	1
327		12	max	305.483	1	0	1	1.869	1	0	1	.002	1	0	1
328			min	4.173	15	0	1	-20.297	5	0	1	-.02	5	0	1
329		13	max	305.548	1	0	1	1.869	1	0	1	.002	1	0	1
330			min	4.192	15	0	1	-20.353	5	0	1	-.021	5	0	1
331		14	max	305.612	1	0	1	1.869	1	0	1	.002	1	0	1
332			min	4.212	15	0	1	-20.409	5	0	1	-.023	5	0	1
333		15	max	305.677	1	0	1	1.869	1	0	1	.002	1	0	1
334			min	4.231	15	0	1	-20.465	5	0	1	-.025	5	0	1
335		16	max	305.742	1	0	1	1.869	1	0	1	.003	1	0	1
336			min	4.251	15	0	1	-20.521	5	0	1	-.027	5	0	1
337		17	max	305.806	1	0	1	1.869	1	0	1	.003	1	0	1
338			min	4.27	15	0	1	-20.577	5	0	1	-.029	5	0	1
339		18	max	305.871	1	0	1	1.869	1	0	1	.003	1	0	1
340			min	4.29	15	0	1	-20.633	5	0	1	-.031	5	0	1
341		19	max	305.936	1	0	1	1.869	1	0	1	.003	1	0	1
342			min	4.309	15	0	1	-20.689	5	0	1	-.032	5	0	1
343	M1	1	max	106.242	1	346.194	3	-3.01	10	0	2	.074	1	0	2
344			min	7.055	12	-229.612	2	-37.758	1	0	3	.006	10	0	3
345		2	max	106.402	1	346.023	3	-3.01	10	0	2	.066	1	.05	2
346			min	7.135	12	-229.841	2	-37.758	1	0	3	.005	10	-.075	3
347		3	max	117.421	3	5.387	14	-2.994	10	0	12	.057	1	.099	2
348			min	-18.617	10	-29.625	2	-37.666	1	0	1	.005	10	-.149	3
349		4	max	117.541	3	5.162	14	-2.994	10	0	12	.049	1	.106	2
350			min	-18.484	10	-29.854	2	-37.666	1	0	1	.004	10	-.147	3
351		5	max	117.661	3	4.937	14	-2.994	10	0	12	.041	1	.112	2
352			min	-18.35	10	-30.083	2	-37.666	1	0	1	.003	10	-.145	3
353		6	max	117.781	3	4.712	14	-2.994	10	0	12	.033	1	.119	2
354			min	-18.217	10	-30.311	2	-37.666	1	0	1	.003	10	-.143	3
355		7	max	117.901	3	4.488	14	-2.994	10	0	12	.025	1	.125	2
356			min	-18.083	10	-30.54	2	-37.666	1	0	1	.002	10	-.141	3
357		8	max	118.021	3	4.29	9	-2.994	10	0	12	.016	1	.132	2
358			min	-17.95	10	-30.769	2	-37.666	1	0	1	.001	10	-.139	3
359		9	max	118.141	3	4.099	9	-2.994	10	0	12	.008	1	.139	2
360			min	-17.816	10	-30.997	2	-37.666	1	0	1	0	10	-.137	3
361		10	max	118.261	3	3.909	9	-2.994	10	0	12	.002	3	.145	2
362			min	-17.683	10	-31.226	2	-37.666	1	0	1	0	10	-.134	3
363		11	max	118.382	3	3.718	9	-2.994	10	0	12	0	3	.152	2
364			min	-17.549	10	-31.455	2	-37.666	1	0	1	-.008	1	-.132	3
365		12	max	118.502	3	3.528	9	-2.994	10	0	12	0	12	.159	2
366			min	-17.416	10	-31.684	2	-37.666	1	0	1	-.016	1	-.13	3
367		13	max	118.622	3	3.337	9	-2.994	10	0	12	-.001	12	.166	2
368			min	-17.282	10	-31.912	2	-37.666	1	0	1	-.024	1	-.128	3
369		14	max	118.742	3	3.146	9	-2.994	10	0	12	-.002	12	.173	2
370			min	-17.149	10	-32.141	2	-37.666	1	0	1	-.033	1	-.125	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
371		15	max	118.862	3	2.956	9	-2.994	10	0	12	-.003	12	.18	2
372			min	-17.015	10	-32.37	2	-37.666	1	0	1	-.041	1	-.123	3
373		16	max	89.06	2	160.783	2	-3.014	10	0	1	-.003	12	.185	2
374			min	2.576	15	-205.948	3	-37.893	1	0	5	-.049	1	-.119	3
375		17	max	89.22	2	160.554	2	-3.014	10	0	1	-.004	12	.15	2
376			min	2.624	15	-206.12	3	-37.893	1	0	5	-.057	1	-.074	3
377		18	max	-5.565	12	347.542	2	-3.115	10	0	3	-.005	12	.076	2
378			min	-106.392	1	-170.367	3	-38.925	4	0	2	-.066	1	-.037	3
379		19	max	-5.485	12	347.313	2	-3.115	10	0	3	-.006	12	0	2
380			min	-106.232	1	-170.539	3	-38.858	1	0	2	-.074	1	0	3
381	M5	1	max	243.958	1	1129.822	3	0	2	0	1	.035	4	0	3
382			min	6.228	12	-745.183	2	-68.269	3	0	5	0	2	0	2
383		2	max	244.118	1	1129.651	3	0	2	0	1	.03	4	.161	2
384			min	6.308	12	-745.412	2	-68.269	3	0	5	-.006	3	-.245	3
385		3	max	356.74	3	4.883	9	7.661	3	0	3	.025	4	.32	2
386			min	-84.892	2	-104.369	2	-19.061	4	0	4	-.02	3	-.484	3
387		4	max	356.861	3	4.693	9	7.661	3	0	3	.021	4	.343	2
388			min	-84.732	2	-104.597	2	-18.819	4	0	4	-.019	3	-.477	3
389		5	max	356.981	3	4.502	9	7.661	3	0	3	.017	4	.366	2
390			min	-84.572	2	-104.826	2	-18.577	4	0	4	-.017	3	-.469	3
391		6	max	357.101	3	4.311	9	7.661	3	0	3	.013	4	.388	2
392			min	-84.411	2	-105.055	2	-18.335	4	0	4	-.015	3	-.461	3
393		7	max	357.221	3	4.121	9	7.661	3	0	3	.009	4	.411	2
394			min	-84.251	2	-105.284	2	-18.093	4	0	4	-.014	3	-.453	3
395		8	max	357.341	3	3.93	9	7.661	3	0	3	.005	4	.434	2
396			min	-84.091	2	-105.512	2	-17.851	4	0	4	-.012	3	-.445	3
397		9	max	357.461	3	3.739	9	7.661	3	0	3	0	4	.457	2
398			min	-83.931	2	-105.741	2	-17.609	4	0	4	-.01	3	-.437	3
399		10	max	357.581	3	3.549	9	7.661	3	0	3	0	2	.48	2
400			min	-83.771	2	-105.97	2	-17.367	4	0	4	-.009	3	-.429	3
401		11	max	357.701	3	3.358	9	7.661	3	0	3	0	2	.503	2
402			min	-83.611	2	-106.199	2	-17.125	4	0	4	-.007	3	-.421	3
403		12	max	357.822	3	3.168	9	7.661	3	0	3	0	2	.526	2
404			min	-83.45	2	-106.427	2	-16.883	4	0	4	-.01	4	-.413	3
405		13	max	357.942	3	2.977	9	7.661	3	0	3	0	10	.549	2
406			min	-83.29	2	-106.656	2	-16.641	4	0	4	-.014	4	-.404	3
407		14	max	358.062	3	2.786	9	7.661	3	0	3	0	10	.572	2
408			min	-83.13	2	-106.885	2	-16.399	4	0	4	-.017	4	-.396	3
409		15	max	358.182	3	2.596	9	7.661	3	0	3	0	10	.596	2
410			min	-82.97	2	-107.114	2	-16.157	4	0	4	-.021	4	-.388	3
411		16	max	282.484	2	581.829	2	7.641	3	0	3	0	3	.613	2
412			min	1.799	15	-630.278	3	-14.815	4	0	4	-.025	4	-.374	3
413		17	max	282.644	2	581.601	2	7.641	3	0	3	.003	3	.487	2
414			min	1.847	15	-630.449	3	-14.573	4	0	4	-.028	4	-.238	3
415		18	max	-8.552	12	1128.189	2	6.982	3	0	4	.004	3	.244	2
416			min	-244.133	1	-548.148	3	-35.251	5	0	1	-.035	4	-.118	3
417		19	max	-8.472	12	1127.96	2	6.982	3	0	4	.006	3	0	3
418			min	-243.973	1	-548.319	3	-35.009	5	0	1	-.043	4	0	2
419	M9	1	max	105.891	1	346.126	3	149.702	4	0	3	-.001	15	0	2
420			min	2.874	15	-229.612	2	3.01	10	0	2	-.073	1	0	3
421		2	max	106.051	1	345.955	3	149.944	4	0	3	.028	5	.05	2
422			min	2.923	15	-229.841	2	3.01	10	0	2	-.065	1	-.075	3
423		3	max	117.243	3	5.224	9	36.844	1	0	1	.057	5	.099	2
424			min	-18.158	10	-29.629	2	-24.054	5	0	5	-.056	1	-.149	3
425		4	max	117.363	3	5.033	9	36.844	1	0	1	.052	5	.105	2
426			min	-18.024	10	-29.858	2	-23.812	5	0	5	-.048	1	-.147	3
427		5	max	117.483	3	4.843	9	36.844	1	0	1	.047	5	.112	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
428			min	-17.891	10	-30.086	2	-23.57	5	0	5	-.04	1	-.145	3
429		6	max	117.603	3	4.652	9	36.844	1	0	1	.042	5	.119	2
430			min	-17.757	10	-30.315	2	-23.328	5	0	5	-.032	1	-.143	3
431		7	max	117.723	3	4.462	9	36.844	1	0	1	.037	5	.125	2
432			min	-17.624	10	-30.544	2	-23.086	5	0	5	-.024	1	-.141	3
433		8	max	117.844	3	4.271	9	36.844	1	0	1	.032	5	.132	2
434			min	-17.49	10	-30.772	2	-22.844	5	0	5	-.016	1	-.139	3
435		9	max	117.964	3	4.08	9	36.844	1	0	1	.027	5	.138	2
436			min	-17.357	10	-31.001	2	-22.602	5	0	5	-.008	1	-.137	3
437		10	max	118.084	3	3.89	9	36.844	1	0	1	.022	4	.145	2
438			min	-17.223	10	-31.23	2	-22.36	5	0	5	0	1	-.134	3
439		11	max	118.204	3	3.699	9	36.844	1	0	1	.019	4	.152	2
440			min	-17.09	10	-31.459	2	-22.118	5	0	5	0	10	-.132	3
441		12	max	118.324	3	3.509	9	36.844	1	0	1	.016	4	.159	2
442			min	-16.956	10	-31.687	2	-21.876	5	0	5	.001	10	-.13	3
443		13	max	118.444	3	3.318	9	36.844	1	0	1	.024	1	.166	2
444			min	-16.823	10	-31.916	2	-21.634	5	0	5	.002	10	-.128	3
445		14	max	118.564	3	3.127	9	36.844	1	0	1	.032	1	.173	2
446			min	-16.689	10	-32.145	2	-21.392	5	0	5	.002	15	-.126	3
447		15	max	118.684	3	2.937	9	36.844	1	0	1	.04	1	.18	2
448			min	-16.556	10	-32.374	2	-21.15	5	0	5	-.002	5	-.123	3
449		16	max	89.368	2	160.352	2	37.087	1	0	10	.048	1	.185	2
450			min	4.329	15	-206.494	3	-19.749	5	0	4	-.005	5	-.119	3
451		17	max	89.528	2	160.123	2	37.087	1	0	10	.056	1	.15	2
452			min	4.377	15	-206.666	3	-19.507	5	0	4	-.009	5	-.074	3
453		18	max	2.91	5	347.542	2	38.988	1	0	2	.065	1	.076	2
454			min	-106.048	1	-170.359	3	-38.914	5	0	3	-.018	5	-.037	3
455		19	max	2.985	5	347.313	2	38.988	1	0	2	.073	1	0	2
456			min	-105.888	1	-170.53	3	-38.672	5	0	3	-.026	5	0	3
457	M13	1	max	149.706	4	229.478	2	-2.874	15	0	2	.073	1	0	2
458			min	3.011	10	-346.156	3	-105.882	1	0	3	.001	15	0	3
459		2	max	143.977	4	162.649	2	-1.731	15	0	2	.019	1	.172	3
460			min	3.011	10	-244.936	3	-80.544	1	0	3	0	10	-.114	2
461		3	max	138.247	4	95.819	2	-.587	15	0	2	.008	3	.286	3
462			min	3.011	10	-143.717	3	-55.205	1	0	3	-.021	1	-.19	2
463		4	max	132.518	4	28.99	2	.748	5	0	2	.004	3	.34	3
464			min	3.011	10	-42.498	3	-29.867	1	0	3	-.046	1	-.226	2
465		5	max	126.789	4	58.722	3	2.518	5	0	2	.002	3	.335	3
466			min	3.011	10	-37.84	2	-4.528	1	0	3	-.056	1	-.224	2
467		6	max	121.059	4	159.941	3	20.81	1	0	2	.002	5	.272	3
468			min	3.011	10	-104.669	2	-2.063	3	0	3	-.051	1	-.182	2
469		7	max	115.33	4	261.16	3	46.149	1	0	2	.005	5	.149	3
470			min	3.011	10	-171.499	2	-.399	3	0	3	-.031	1	-.101	2
471		8	max	109.601	4	362.38	3	71.487	1	0	2	.009	4	.018	1
472			min	3.011	10	-238.329	2	1.068	12	0	3	0	3	-.033	3
473		9	max	103.872	4	463.599	3	96.826	1	0	2	.052	1	.177	2
474			min	3.011	10	-305.158	2	2.177	12	0	3	0	12	-.274	3
475		10	max	98.142	4	564.818	3	122.164	1	0	2	.116	1	.374	2
476			min	3.011	10	-345.962	1	-52.658	2	0	3	-.006	3	-.574	3
477		11	max	70.23	4	305.158	2	1.671	5	0	3	.051	1	.177	2
478			min	3.011	10	-463.599	3	-96.475	1	0	2	-.013	5	-.274	3
479		12	max	64.501	4	238.329	2	3.44	5	0	3	.004	2	.018	1
480			min	3.011	10	-362.379	3	-71.136	1	0	2	-.012	4	-.033	3
481		13	max	58.772	4	171.499	2	5.21	5	0	3	-.003	10	.149	3
482			min	3.011	10	-261.16	3	-45.798	1	0	2	-.032	1	-.101	2
483		14	max	53.043	4	104.669	2	6.979	5	0	3	-.004	15	.272	3
484			min	3.011	10	-159.941	3	-20.459	1	0	2	-.051	1	-.182	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
485		15	max	47.313	4	37.84	2	10.235	4	0	3	0	15	.335	3
486			min	3.011	10	-58.722	3	-.757	10	0	2	-.055	1	-.224	2
487		16	max	41.584	4	42.498	3	30.218	1	0	3	.004	5	.34	3
488			min	3.011	10	-28.99	2	2.403	10	0	2	-.045	1	-.226	2
489		17	max	37.853	1	143.717	3	55.556	1	0	3	.011	5	.286	3
490			min	3.011	10	-95.819	2	4.836	12	0	2	-.02	1	-.19	2
491		18	max	37.853	1	244.936	3	80.895	1	0	3	.024	4	.172	3
492			min	3.011	10	-162.649	2	5.946	12	0	2	0	10	-.114	2
493		19	max	37.853	1	346.156	3	106.233	1	0	3	.074	1	0	2
494			min	3.011	10	-229.478	2	7.056	12	0	2	.006	10	0	3
495	M16	1	max	38.666	5	347.486	2	2.985	5	0	3	.073	1	0	2
496			min	-38.889	1	-170.562	3	-105.897	1	0	2	-.026	5	0	3
497		2	max	32.937	5	246.124	2	4.754	5	0	3	.019	1	.085	3
498			min	-38.889	1	-121.141	3	-80.559	1	0	2	-.024	5	-.173	2
499		3	max	27.208	5	144.762	2	6.524	5	0	3	0	12	.141	3
500			min	-38.889	1	-71.72	3	-55.22	1	0	2	-.025	4	-.287	2
501		4	max	21.479	5	43.401	2	8.293	5	0	3	-.002	12	.169	3
502			min	-38.889	1	-22.299	3	-29.882	1	0	2	-.046	1	-.342	2
503		5	max	15.749	5	27.122	3	10.063	5	0	3	-.004	12	.167	3
504			min	-38.889	1	-57.961	2	-4.543	1	0	2	-.056	1	-.338	2
505		6	max	10.02	5	76.543	3	20.795	1	0	3	-.003	15	.137	3
506			min	-38.889	1	-159.323	2	-.925	3	0	2	-.051	1	-.274	2
507		7	max	4.291	5	125.964	3	46.134	1	0	3	.003	5	.078	3
508			min	-38.889	1	-260.685	2	.641	12	0	2	-.031	1	-.152	2
509		8	max	1.119	3	175.385	3	71.472	1	0	3	.012	4	.03	2
510			min	-38.889	1	-362.046	2	1.75	12	0	2	-.006	3	-.01	3
511		9	max	1.119	3	224.806	3	96.811	1	0	3	.052	1	.271	2
512			min	-38.889	1	-463.408	2	2.86	12	0	2	-.004	3	-.127	3
513		10	max	22.129	5	-9.098	15	122.149	1	0	14	.116	1	.57	2
514			min	-38.889	1	-564.77	2	-6.627	3	0	2	.003	12	-.272	3
515		11	max	16.4	5	463.408	2	1.249	5	0	2	.051	1	.271	2
516			min	-38.764	1	-224.806	3	-96.467	1	0	3	-.011	5	-.127	3
517		12	max	10.67	5	362.046	2	3.019	5	0	2	.004	2	.03	2
518			min	-38.764	1	-175.385	3	-71.128	1	0	3	-.01	5	-.01	3
519		13	max	4.941	5	260.685	2	4.788	5	0	2	-.002	12	.078	3
520			min	-38.764	1	-125.964	3	-45.79	1	0	3	-.032	1	-.152	2
521		14	max	-.46	15	159.323	2	6.558	5	0	2	-.002	12	.137	3
522			min	-38.764	1	-76.543	3	-20.451	1	0	3	-.051	1	-.274	2
523		15	max	-3.114	10	57.961	2	9.791	4	0	2	0	15	.167	3
524			min	-38.764	1	-27.122	3	-.74	10	0	3	-.055	1	-.338	2
525		16	max	-3.114	10	22.299	3	30.226	1	0	2	.006	5	.169	3
526			min	-38.764	1	-43.401	2	2.155	12	0	3	-.045	1	-.342	2
527		17	max	-3.114	10	71.72	3	55.564	1	0	2	.012	5	.141	3
528			min	-38.764	1	-144.762	2	3.265	12	0	3	-.02	1	-.287	2
529		18	max	-3.114	10	121.141	3	80.903	1	0	2	.025	4	.085	3
530			min	-38.764	1	-246.124	2	4.375	12	0	3	0	10	-.173	2
531		19	max	-3.114	10	170.562	3	106.241	1	0	2	.074	1	0	2
532			min	-38.764	1	-347.486	2	5.484	12	0	3	.006	12	0	3
533	M15	1	max	0	1	1.208	9	.086	3	0	9	0	9	0	1
534			min	-91.278	3	0	1	-.019	9	0	3	0	3	0	1
535		2	max	0	1	1.073	9	.086	3	0	9	0	9	0	1
536			min	-91.354	3	0	1	-.019	9	0	3	0	3	0	9
537		3	max	0	1	.939	9	.086	3	0	9	0	9	0	1
538			min	-91.429	3	0	1	-.019	9	0	3	0	3	0	9
539		4	max	0	1	.805	9	.086	3	0	9	0	9	0	1
540			min	-91.505	3	0	1	-.019	9	0	3	0	3	-.001	9
541		5	max	0	1	.671	9	.086	3	0	9	0	9	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
542			min	-91.58	3	0	1	-.019	9	0	3	0	3	-.001	9
543		6	max	0	1	.537	9	.086	3	0	9	0	9	0	1
544			min	-91.656	3	0	1	-.019	9	0	3	0	3	-.002	9
545		7	max	0	1	.403	9	.086	3	0	9	0	3	0	1
546			min	-91.731	3	0	1	-.019	9	0	3	0	9	-.002	9
547		8	max	0	1	.268	9	.086	3	0	9	0	3	0	1
548			min	-91.807	3	0	1	-.019	9	0	3	0	9	-.002	9
549		9	max	0	1	.134	9	.086	3	0	9	0	3	0	1
550			min	-91.882	3	0	1	-.019	9	0	3	0	9	-.002	9
551		10	max	0	1	0	1	.086	3	0	9	0	3	0	1
552			min	-91.958	3	0	1	-.019	9	0	3	0	9	-.002	9
553		11	max	0	1	0	1	.086	3	0	9	0	3	0	1
554			min	-92.034	3	-.134	9	-.019	9	0	3	0	9	-.002	9
555		12	max	0	1	0	1	.086	3	0	9	0	3	0	1
556			min	-92.109	3	-.268	9	-.019	9	0	3	0	9	-.002	9
557		13	max	0	1	0	1	.086	3	0	9	0	3	0	1
558			min	-92.185	3	-.403	9	-.019	9	0	3	0	9	-.002	9
559		14	max	0	1	0	1	.086	3	0	9	0	3	0	1
560			min	-92.26	3	-.537	9	-.019	9	0	3	0	9	-.002	9
561		15	max	0	1	0	1	.086	3	0	9	0	3	0	1
562			min	-92.336	3	-.671	9	-.019	9	0	3	0	9	-.001	9
563		16	max	0	1	0	1	.086	3	0	9	0	3	0	1
564			min	-92.411	3	-.805	9	-.019	9	0	3	0	9	-.001	9
565		17	max	0	1	0	1	.086	3	0	9	0	3	0	1
566			min	-92.487	3	-.939	9	-.019	9	0	3	0	9	0	9
567		18	max	0	1	0	1	.086	3	0	9	0	3	0	1
568			min	-92.562	3	-1.073	9	-.019	9	0	3	0	9	0	9
569		19	max	0	1	0	1	.086	3	0	9	0	3	0	1
570			min	-92.638	3	-1.208	9	-.019	9	0	3	0	9	0	1
571	M16A	1	max	0	10	2.628	4	.337	4	0	3	0	3	0	1
572			min	-202.986	4	0	10	-.035	3	0	2	0	4	0	1
573		2	max	0	10	2.336	4	.303	4	0	3	0	3	0	10
574			min	-202.993	4	0	10	-.035	3	0	2	0	4	0	4
575		3	max	0	10	2.044	4	.268	4	0	3	0	3	0	10
576			min	-203	4	0	10	-.035	3	0	2	0	4	-.002	4
577		4	max	0	10	1.752	4	.234	4	0	3	0	3	0	10
578			min	-203.008	4	0	10	-.035	3	0	2	0	4	-.002	4
579		5	max	0	10	1.46	4	.2	4	0	3	0	3	0	10
580			min	-203.015	4	0	10	-.035	3	0	2	0	1	-.003	4
581		6	max	0	10	1.168	4	.166	4	0	3	0	3	0	10
582			min	-203.022	4	0	10	-.035	3	0	2	0	1	-.003	4
583		7	max	0	10	.876	4	.132	4	0	3	0	5	0	10
584			min	-203.029	4	0	10	-.035	3	0	2	0	1	-.004	4
585		8	max	0	10	.584	4	.098	4	0	3	0	5	0	10
586			min	-203.037	4	0	10	-.035	3	0	2	0	1	-.004	4
587		9	max	0	10	.292	4	.063	4	0	3	0	5	0	10
588			min	-203.044	4	0	10	-.035	3	0	2	0	1	-.004	4
589		10	max	0	10	0	1	.03	2	0	3	0	5	0	10
590			min	-203.051	4	0	1	-.035	3	0	2	0	1	-.004	4
591		11	max	.091	2	0	10	.03	2	0	3	0	5	0	10
592			min	-203.058	4	-.292	4	-.035	3	0	2	0	1	-.004	4
593		12	max	.191	2	0	10	.03	2	0	3	0	5	0	10
594			min	-203.066	4	-.584	4	-.042	5	0	2	0	1	-.004	4
595		13	max	.292	2	0	10	.03	2	0	3	0	5	0	10
596			min	-203.073	4	-.876	4	-.076	5	0	2	0	3	-.004	4
597		14	max	.393	2	0	10	.03	2	0	3	0	5	0	10
598			min	-203.08	4	-1.168	4	-.111	5	0	2	0	3	-.003	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
599		15	max	.493	2	0	10	.03	2	0	3	0	5	0	10
600			min	-203.088	4	-1.46	4	-.145	5	0	2	0	3	-.003	4
601		16	max	.594	2	0	10	.03	2	0	3	0	2	0	10
602			min	-203.095	4	-1.752	4	-.179	5	0	2	0	3	-.002	4
603		17	max	.695	2	0	10	.03	2	0	3	0	2	0	10
604			min	-203.102	4	-2.044	4	-.213	5	0	2	0	3	-.002	4
605		18	max	.795	2	0	10	.03	2	0	3	0	2	0	10
606			min	-203.109	4	-2.336	4	-.247	5	0	2	0	5	0	4
607		19	max	.896	2	0	10	.03	2	0	3	0	2	0	1
608			min	-203.117	4	-2.628	4	-.282	5	0	2	0	5	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.002	1	.011	2	.007	1	1.25e-3	5	NC	3	NC	2
2			min	-.004	3	-.011	3	-.013	5	-6.159e-4	1	3958.882	2	5786.387	1
3		2	max	.002	1	.01	2	.007	1	1.271e-3	5	NC	3	NC	2
4			min	-.004	3	-.011	3	-.012	5	-5.888e-4	1	4330.489	2	6212.26	1
5		3	max	.002	1	.009	2	.006	1	1.293e-3	5	NC	3	NC	2
6			min	-.003	3	-.01	3	-.012	5	-5.616e-4	1	4774.244	2	6716.88	1
7		4	max	.002	1	.008	2	.006	1	1.314e-3	5	NC	1	NC	2
8			min	-.003	3	-.01	3	-.012	5	-5.344e-4	1	5307.803	2	7318.769	1
9		5	max	.002	1	.007	2	.005	1	1.336e-3	5	NC	1	NC	2
10			min	-.003	3	-.009	3	-.012	5	-5.072e-4	1	5954.771	2	8042.676	1
11		6	max	.002	1	.006	2	.005	1	1.358e-3	5	NC	1	NC	2
12			min	-.003	3	-.009	3	-.011	5	-4.8e-4	1	6747.208	2	8922.238	1
13		7	max	.001	1	.005	2	.004	1	1.379e-3	5	NC	1	NC	1
14			min	-.003	3	-.008	3	-.011	5	-4.528e-4	1	7729.482	2	NC	1
15		8	max	.001	1	.005	2	.004	1	1.401e-3	5	NC	1	NC	1
16			min	-.002	3	-.008	3	-.011	5	-4.257e-4	1	8964.365	2	NC	1
17		9	max	.001	1	.004	2	.003	1	1.423e-3	5	NC	1	NC	1
18			min	-.002	3	-.007	3	-.01	5	-3.985e-4	1	NC	1	NC	1
19		10	max	.001	1	.003	2	.003	1	1.444e-3	5	NC	1	NC	1
20			min	-.002	3	-.007	3	-.009	5	-3.713e-4	1	NC	1	NC	1
21		11	max	0	1	.003	2	.002	1	1.466e-3	5	NC	1	NC	1
22			min	-.002	3	-.006	3	-.009	5	-3.441e-4	1	NC	1	NC	1
23		12	max	0	1	.002	2	.002	1	1.487e-3	5	NC	1	NC	1
24			min	-.002	3	-.005	3	-.008	5	-3.169e-4	1	NC	1	NC	1
25		13	max	0	1	.002	2	.002	1	1.509e-3	5	NC	1	NC	1
26			min	-.001	3	-.005	3	-.007	5	-2.897e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.001	1	1.531e-3	5	NC	1	NC	1
28			min	-.001	3	-.004	3	-.006	5	-2.626e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	0	1	1.552e-3	5	NC	1	NC	1
30			min	0	3	-.003	3	-.005	5	-2.354e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	1.574e-3	5	NC	1	NC	1
32			min	0	3	-.002	3	-.004	5	-2.082e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	1.596e-3	5	NC	1	NC	1
34			min	0	3	-.002	3	-.003	5	-1.81e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	1.617e-3	5	NC	1	NC	1
36			min	0	3	0	3	-.001	5	-1.538e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	1.639e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-1.267e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	6.066e-5	1	NC	1	NC	1
40			min	0	1	0	1	0	1	-7.838e-4	5	NC	1	NC	1
41		2	max	0	3	0	2	.004	5	7.401e-5	1	NC	1	NC	1
42			min	0	2	0	3	0	1	-7.931e-4	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
43		3	max	0	3	0	2	.008	5	8.737e-5	1	NC	1	NC	1
44			min	0	2	-.002	3	0	1	-8.023e-4	5	NC	1	NC	1
45		4	max	0	3	0	2	.012	5	1.007e-4	1	NC	1	NC	1
46			min	0	2	-.003	3	0	1	-8.116e-4	5	NC	1	NC	1
47		5	max	0	3	0	2	.016	5	1.141e-4	1	NC	1	NC	1
48			min	0	2	-.004	3	0	1	-8.209e-4	5	NC	1	NC	1
49		6	max	0	3	0	2	.02	5	1.274e-4	1	NC	1	NC	1
50			min	0	2	-.005	3	0	1	-8.302e-4	5	NC	1	NC	1
51		7	max	0	3	0	2	.024	4	1.408e-4	1	NC	1	NC	1
52			min	0	2	-.005	3	0	1	-8.395e-4	5	NC	1	NC	1
53		8	max	0	3	.001	2	.027	4	1.541e-4	1	NC	1	NC	1
54			min	0	2	-.006	3	0	1	-8.488e-4	5	NC	1	NC	1
55		9	max	.001	3	.001	2	.031	4	1.675e-4	1	NC	1	NC	1
56			min	-.001	2	-.007	3	0	9	-8.581e-4	5	NC	1	NC	1
57		10	max	.001	3	.002	2	.035	4	1.809e-4	1	NC	1	NC	1
58			min	-.001	2	-.007	3	0	10	-8.674e-4	5	NC	1	NC	1
59		11	max	.001	3	.002	2	.038	4	1.942e-4	1	NC	1	NC	1
60			min	-.001	2	-.008	3	0	10	-8.767e-4	5	NC	1	NC	1
61		12	max	.002	3	.003	2	.042	4	2.076e-4	1	NC	1	NC	1
62			min	-.002	2	-.008	3	0	10	-8.86e-4	5	NC	1	NC	1
63		13	max	.002	3	.004	2	.045	4	2.209e-4	1	NC	1	NC	1
64			min	-.002	2	-.008	3	0	10	-8.953e-4	5	NC	1	NC	1
65		14	max	.002	3	.005	2	.049	4	2.343e-4	1	NC	1	NC	1
66			min	-.002	2	-.009	3	0	10	-9.046e-4	5	NC	1	NC	1
67		15	max	.002	3	.005	2	.052	4	2.476e-4	1	NC	1	NC	1
68			min	-.002	2	-.009	3	0	10	-9.139e-4	5	8523.619	2	NC	1
69		16	max	.002	3	.006	2	.055	4	2.61e-4	1	NC	1	NC	1
70			min	-.002	2	-.009	3	0	10	-9.232e-4	5	7235.804	2	NC	1
71		17	max	.002	3	.007	2	.059	4	2.743e-4	1	NC	1	NC	1
72			min	-.002	2	-.009	3	0	10	-9.325e-4	5	6237.12	2	NC	1
73		18	max	.002	3	.008	2	.062	4	2.877e-4	1	NC	1	NC	1
74			min	-.002	2	-.009	3	0	10	-9.418e-4	5	5453.925	2	NC	1
75		19	max	.002	3	.01	2	.065	4	3.01e-4	1	NC	3	NC	1
76			min	-.002	2	-.009	3	0	10	-9.511e-4	5	4834.303	2	NC	1
77	M4	1	max	.001	1	.013	2	0	10	5.201e-3	5	NC	1	NC	2
78			min	0	15	-.011	3	-.068	4	-4.832e-4	1	NC	1	282.822	4
79		2	max	.001	1	.012	2	0	10	5.201e-3	5	NC	1	NC	2
80			min	0	15	-.01	3	-.063	4	-4.832e-4	1	NC	1	308.296	4
81		3	max	.001	1	.011	2	0	10	5.201e-3	5	NC	1	NC	2
82			min	0	15	-.01	3	-.057	4	-4.832e-4	1	NC	1	338.615	4
83		4	max	.001	1	.01	2	0	10	5.201e-3	5	NC	1	NC	2
84			min	0	15	-.009	3	-.052	4	-4.832e-4	1	NC	1	375.054	4
85		5	max	.001	1	.01	2	0	10	5.201e-3	5	NC	1	NC	2
86			min	0	15	-.009	3	-.046	4	-4.832e-4	1	NC	1	419.351	4
87		6	max	.001	1	.009	2	0	10	5.201e-3	5	NC	1	NC	1
88			min	0	15	-.008	3	-.041	4	-4.832e-4	1	NC	1	473.923	4
89		7	max	0	1	.008	2	0	10	5.201e-3	5	NC	1	NC	1
90			min	0	15	-.007	3	-.036	4	-4.832e-4	1	NC	1	542.212	4
91		8	max	0	1	.008	2	0	10	5.201e-3	5	NC	1	NC	1
92			min	0	15	-.007	3	-.031	4	-4.832e-4	1	NC	1	629.258	4
93		9	max	0	1	.007	2	0	10	5.201e-3	5	NC	1	NC	1
94			min	0	15	-.006	3	-.026	4	-4.832e-4	1	NC	1	742.685	4
95		10	max	0	1	.006	2	0	10	5.201e-3	5	NC	1	NC	1
96			min	0	15	-.006	3	-.022	4	-4.832e-4	1	NC	1	894.475	4
97		11	max	0	1	.006	2	0	10	5.201e-3	5	NC	1	NC	1
98			min	0	15	-.005	3	-.018	4	-4.832e-4	1	NC	1	1104.364	4
99		12	max	0	1	.005	2	0	10	5.201e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
100			min	0	15	-.004	3	-.014	4	-4.832e-4	1	NC	1	1406.774	4
101		13	max	0	1	.004	2	0	10	5.201e-3	5	NC	1	NC	1
102			min	0	15	-.004	3	-.01	4	-4.832e-4	1	NC	1	1866.273	4
103		14	max	0	1	.003	2	0	10	5.201e-3	5	NC	1	NC	1
104			min	0	15	-.003	3	-.007	4	-4.832e-4	1	NC	1	2616.041	4
105		15	max	0	1	.003	2	0	10	5.201e-3	5	NC	1	NC	1
106			min	0	15	-.002	3	-.005	4	-4.832e-4	1	NC	1	3968.957	4
107		16	max	0	1	.002	2	0	10	5.201e-3	5	NC	1	NC	1
108			min	0	15	-.002	3	-.003	4	-4.832e-4	1	NC	1	6814.439	4
109		17	max	0	1	.001	2	0	10	5.201e-3	5	NC	1	NC	1
110			min	0	15	-.001	3	-.001	4	-4.832e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	10	5.201e-3	5	NC	1	NC	1
112			min	0	15	0	3	0	4	-4.832e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	5.201e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-4.832e-4	1	NC	1	NC	1
115	M6	1	max	.007	1	.036	2	.003	1	1.348e-3	4	NC	3	NC	1
116			min	-.012	3	-.035	3	-.013	5	-2.028e-7	2	1163.36	2	7106.513	3
117		2	max	.007	1	.034	2	.003	1	1.369e-3	4	NC	3	NC	1
118			min	-.011	3	-.033	3	-.013	5	-1.694e-6	1	1245.767	2	7516.469	3
119		3	max	.006	1	.032	2	.002	1	1.389e-3	4	NC	3	NC	1
120			min	-.011	3	-.031	3	-.013	5	-4.88e-6	1	1340.309	2	8006.948	3
121		4	max	.006	1	.029	2	.002	1	1.41e-3	4	NC	3	NC	1
122			min	-.01	3	-.029	3	-.012	5	-8.067e-6	1	1449.406	2	8594.546	3
123		5	max	.006	1	.027	2	.002	1	1.431e-3	4	NC	3	NC	1
124			min	-.009	3	-.028	3	-.012	5	-1.125e-5	1	1576.177	2	9301.366	3
125		6	max	.005	1	.025	2	.002	1	1.451e-3	4	NC	3	NC	1
126			min	-.009	3	-.026	3	-.012	5	-1.444e-5	1	1724.703	2	NC	1
127		7	max	.005	1	.022	2	.002	1	1.472e-3	4	NC	3	NC	1
128			min	-.008	3	-.024	3	-.011	5	-1.763e-5	1	1900.426	2	NC	1
129		8	max	.004	1	.02	2	.001	1	1.493e-3	4	NC	3	NC	1
130			min	-.007	3	-.022	3	-.011	5	-2.081e-5	1	2110.766	2	NC	1
131		9	max	.004	1	.018	2	.001	1	1.513e-3	4	NC	3	NC	1
132			min	-.007	3	-.02	3	-.01	5	-2.4e-5	1	2366.107	2	NC	1
133		10	max	.004	1	.016	2	.001	1	1.534e-3	4	NC	3	NC	1
134			min	-.006	3	-.018	3	-.01	5	-2.719e-5	1	2681.442	2	NC	1
135		11	max	.003	1	.014	2	0	1	1.555e-3	4	NC	3	NC	1
136			min	-.005	3	-.016	3	-.009	5	-3.037e-5	1	3079.24	2	NC	1
137		12	max	.003	1	.012	2	0	1	1.575e-3	4	NC	3	NC	1
138			min	-.005	3	-.014	3	-.008	5	-3.356e-5	1	3594.792	2	NC	1
139		13	max	.002	1	.01	2	0	1	1.596e-3	4	NC	3	NC	1
140			min	-.004	3	-.012	3	-.007	5	-3.675e-5	1	4286.875	2	NC	1
141		14	max	.002	1	.008	2	0	1	1.617e-3	4	NC	3	NC	1
142			min	-.003	3	-.01	3	-.006	5	-3.993e-5	1	5261.237	2	NC	1
143		15	max	.002	1	.006	2	0	1	1.637e-3	4	NC	1	NC	1
144			min	-.003	3	-.008	3	-.005	5	-4.312e-5	1	6729.282	2	NC	1
145		16	max	.001	1	.005	2	0	1	1.658e-3	4	NC	1	NC	1
146			min	-.002	3	-.006	3	-.004	5	-4.631e-5	1	9184.155	2	NC	1
147		17	max	0	1	.003	2	0	1	1.679e-3	5	NC	1	NC	1
148			min	-.001	3	-.004	3	-.003	5	-4.949e-5	1	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	1.7e-3	5	NC	1	NC	1
150			min	0	3	-.002	3	-.001	5	-5.268e-5	1	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.722e-3	5	NC	1	NC	1
152			min	0	1	0	1	0	1	-5.587e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.655e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-8.233e-4	5	NC	1	NC	1
155		2	max	0	3	.002	2	.004	5	2.269e-5	1	NC	1	NC	1
156			min	0	2	-.002	3	0	1	-8.202e-4	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
157		3	max	0	3	.003	2	.008	5	1.883e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	1	-8.179e-4	4	NC	1	NC	1
159		4	max	.001	3	.004	2	.012	5	1.497e-5	1	NC	1	NC	1
160			min	-.001	2	-.006	3	0	1	-8.156e-4	4	NC	1	NC	1
161		5	max	.002	3	.006	2	.017	5	1.112e-5	1	NC	1	NC	1
162			min	-.002	2	-.008	3	0	1	-8.133e-4	4	7835.427	2	NC	1
163		6	max	.002	3	.007	2	.021	5	2.81e-5	3	NC	1	NC	1
164			min	-.002	2	-.01	3	0	1	-8.11e-4	4	6273.529	2	NC	1
165		7	max	.003	3	.009	2	.025	5	5.203e-5	3	NC	3	NC	1
166			min	-.003	2	-.012	3	0	1	-8.087e-4	4	5208.433	2	NC	1
167		8	max	.003	3	.01	2	.029	5	7.595e-5	3	NC	3	NC	1
168			min	-.003	2	-.014	3	0	1	-8.065e-4	4	4429.897	2	NC	1
169		9	max	.003	3	.012	2	.032	5	9.988e-5	3	NC	3	NC	1
170			min	-.004	2	-.016	3	0	1	-8.042e-4	4	3833.073	2	NC	1
171		10	max	.004	3	.014	2	.036	5	1.238e-4	3	NC	3	NC	1
172			min	-.004	2	-.017	3	0	1	-8.019e-4	4	3359.805	2	NC	1
173		11	max	.004	3	.015	2	.04	4	1.477e-4	3	NC	3	NC	1
174			min	-.005	2	-.019	3	-.001	1	-7.996e-4	4	2975.16	2	NC	1
175		12	max	.005	3	.017	2	.043	4	1.717e-4	3	NC	3	NC	1
176			min	-.005	2	-.02	3	-.001	1	-7.973e-4	4	2656.797	2	NC	1
177		13	max	.005	3	.019	2	.047	4	1.956e-4	3	NC	3	NC	1
178			min	-.006	2	-.022	3	-.001	1	-7.951e-4	4	2389.673	2	NC	1
179		14	max	.005	3	.021	2	.05	4	2.195e-4	3	NC	3	NC	1
180			min	-.006	2	-.023	3	-.001	1	-7.928e-4	4	2163.211	2	NC	1
181		15	max	.006	3	.023	2	.053	4	2.434e-4	3	NC	3	NC	1
182			min	-.007	2	-.024	3	-.001	1	-7.905e-4	4	1969.707	2	NC	1
183		16	max	.006	3	.026	2	.056	4	2.674e-4	3	NC	3	NC	1
184			min	-.007	2	-.025	3	-.001	1	-7.882e-4	4	1803.373	2	NC	1
185		17	max	.007	3	.028	2	.06	4	2.913e-4	3	NC	3	NC	1
186			min	-.008	2	-.026	3	-.001	1	-7.859e-4	4	1659.755	2	NC	1
187		18	max	.007	3	.03	2	.063	4	3.152e-4	3	NC	3	NC	1
188			min	-.008	2	-.027	3	-.002	1	-7.836e-4	4	1535.359	2	NC	1
189		19	max	.008	3	.032	2	.066	4	3.391e-4	3	NC	3	NC	1
190			min	-.009	2	-.028	3	-.002	1	-7.814e-4	4	1427.399	2	NC	1
191	M8	1	max	.004	1	.042	2	.002	1	5.027e-3	4	NC	1	NC	1
192			min	0	15	-.035	3	-.069	4	-2.617e-4	3	NC	1	280.449	4
193		2	max	.004	1	.04	2	.001	1	5.027e-3	4	NC	1	NC	1
194			min	0	15	-.033	3	-.063	4	-2.617e-4	3	NC	1	305.709	4
195		3	max	.003	1	.038	2	.001	1	5.027e-3	4	NC	1	NC	1
196			min	0	15	-.031	3	-.058	4	-2.617e-4	3	NC	1	335.773	4
197		4	max	.003	1	.035	2	.001	1	5.027e-3	4	NC	1	NC	1
198			min	0	15	-.029	3	-.052	4	-2.617e-4	3	NC	1	371.906	4
199		5	max	.003	1	.033	2	.001	1	5.027e-3	4	NC	1	NC	1
200			min	0	15	-.027	3	-.046	4	-2.617e-4	3	NC	1	415.831	4
201		6	max	.003	1	.03	2	0	1	5.027e-3	4	NC	1	NC	1
202			min	0	15	-.025	3	-.041	4	-2.617e-4	3	NC	1	469.945	4
203		7	max	.003	1	.028	2	0	1	5.027e-3	4	NC	1	NC	1
204			min	0	15	-.023	3	-.036	4	-2.617e-4	3	NC	1	537.661	4
205		8	max	.002	1	.026	2	0	1	5.027e-3	4	NC	1	NC	1
206			min	0	15	-.021	3	-.031	4	-2.617e-4	3	NC	1	623.977	4
207		9	max	.002	1	.023	2	0	1	5.027e-3	4	NC	1	NC	1
208			min	0	15	-.019	3	-.026	4	-2.617e-4	3	NC	1	736.452	4
209		10	max	.002	1	.021	2	0	1	5.027e-3	4	NC	1	NC	1
210			min	0	15	-.017	3	-.022	4	-2.617e-4	3	NC	1	886.969	4
211		11	max	.002	1	.019	2	0	1	5.027e-3	4	NC	1	NC	1
212			min	0	15	-.015	3	-.018	4	-2.617e-4	3	NC	1	1095.098	4
213		12	max	.001	1	.016	2	0	1	5.027e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
214			min	0	15	-.013	3	-.014	4	-2.617e-4	3	NC	1	1394.973	4
215		13	max	.001	1	.014	2	0	1	5.027e-3	4	NC	1	NC	1
216			min	0	15	-.012	3	-.01	4	-2.617e-4	3	NC	1	1850.62	4
217		14	max	.001	1	.012	2	0	1	5.027e-3	4	NC	1	NC	1
218			min	0	15	-.01	3	-.007	4	-2.617e-4	3	NC	1	2594.104	4
219		15	max	0	1	.009	2	0	1	5.027e-3	4	NC	1	NC	1
220			min	0	15	-.008	3	-.005	4	-2.617e-4	3	NC	1	3935.681	4
221		16	max	0	1	.007	2	0	1	5.027e-3	4	NC	1	NC	1
222			min	0	15	-.006	3	-.003	4	-2.617e-4	3	NC	1	6757.318	4
223		17	max	0	1	.005	2	0	1	5.027e-3	4	NC	1	NC	1
224			min	0	15	-.004	3	-.001	4	-2.617e-4	3	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	5.027e-3	4	NC	1	NC	1
226			min	0	15	-.002	3	0	4	-2.617e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	5.027e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-2.617e-4	3	NC	1	NC	1
229	M10	1	max	.002	1	.011	2	0	3	6.107e-4	1	NC	3	NC	1
230			min	-.003	3	-.011	3	-.006	4	-5.297e-4	3	3963.376	2	NC	1
231		2	max	.002	1	.01	2	0	3	5.792e-4	1	NC	3	NC	1
232			min	-.003	3	-.011	3	-.006	4	-5.109e-4	3	4335.568	2	NC	1
233		3	max	.002	1	.009	2	0	3	5.476e-4	1	NC	3	NC	1
234			min	-.003	3	-.01	3	-.007	4	-4.922e-4	3	4780.052	2	NC	1
235		4	max	.002	1	.008	2	0	3	5.161e-4	1	NC	1	NC	1
236			min	-.003	3	-.01	3	-.007	4	-4.734e-4	3	5314.533	2	NC	1
237		5	max	.002	1	.007	2	0	3	5.423e-4	4	NC	1	NC	1
238			min	-.003	3	-.009	3	-.007	4	-4.546e-4	3	5962.675	2	NC	1
239		6	max	.002	1	.006	2	0	3	6.025e-4	4	NC	1	NC	1
240			min	-.002	3	-.009	3	-.007	4	-4.358e-4	3	6756.628	2	NC	1
241		7	max	.002	1	.005	2	0	3	6.627e-4	4	NC	1	NC	1
242			min	-.002	3	-.008	3	-.007	4	-4.17e-4	3	7740.891	2	NC	1
243		8	max	.001	1	.005	2	0	3	7.229e-4	4	NC	1	NC	1
244			min	-.002	3	-.008	3	-.007	4	-3.982e-4	3	8978.429	2	NC	1
245		9	max	.001	1	.004	2	0	3	7.83e-4	4	NC	1	NC	1
246			min	-.002	3	-.007	3	-.007	4	-3.795e-4	3	NC	1	NC	1
247		10	max	.001	1	.003	2	0	3	8.432e-4	4	NC	1	NC	1
248			min	-.002	3	-.007	3	-.007	4	-3.607e-4	3	NC	1	NC	1
249		11	max	.001	1	.003	2	0	3	9.034e-4	4	NC	1	NC	1
250			min	-.001	3	-.006	3	-.006	4	-3.419e-4	3	NC	1	NC	1
251		12	max	0	1	.002	2	0	3	9.636e-4	4	NC	1	NC	1
252			min	-.001	3	-.006	3	-.006	4	-3.231e-4	3	NC	1	NC	1
253		13	max	0	1	.002	2	0	3	1.024e-3	4	NC	1	NC	1
254			min	-.001	3	-.005	3	-.005	4	-3.043e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	1.084e-3	4	NC	1	NC	1
256			min	0	3	-.004	3	-.005	4	-2.855e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	1.144e-3	4	NC	1	NC	1
258			min	0	3	-.003	3	-.004	4	-2.668e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.204e-3	4	NC	1	NC	1
260			min	0	3	-.003	3	-.003	4	-2.48e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.265e-3	4	NC	1	NC	1
262			min	0	3	-.002	3	-.002	4	-2.292e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.325e-3	4	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-2.104e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.385e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.916e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	9.173e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-6.629e-4	4	NC	1	NC	1
269		2	max	0	3	0	2	.003	4	6.799e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-7.271e-4	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
271		3	max	0	3	0	2	.007	4	4.424e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-7.913e-4	4	NC	1	NC	1
273		4	max	0	3	0	2	.01	4	2.05e-5	3	NC	1	NC	1
274			min	0	2	-.003	3	-.001	3	-8.554e-4	4	NC	1	NC	1
275		5	max	0	3	0	2	.013	4	-2.553e-6	12	NC	1	NC	1
276			min	0	2	-.004	3	-.002	3	-9.196e-4	4	NC	1	NC	1
277		6	max	0	3	0	2	.017	5	-1.029e-5	10	NC	1	NC	1
278			min	0	2	-.005	3	-.002	3	-9.838e-4	4	NC	1	NC	1
279		7	max	0	3	0	2	.02	5	-1.17e-5	10	NC	1	NC	1
280			min	0	2	-.005	3	-.002	3	-1.048e-3	4	NC	1	NC	1
281		8	max	0	3	.001	2	.024	5	-1.31e-5	10	NC	1	NC	1
282			min	0	2	-.006	3	-.002	3	-1.112e-3	4	NC	1	NC	1
283		9	max	.001	3	.001	2	.027	5	-1.451e-5	10	NC	1	NC	1
284			min	-.001	2	-.007	3	-.002	3	-1.176e-3	4	NC	1	NC	1
285		10	max	.001	3	.002	2	.03	5	-1.591e-5	10	NC	1	NC	1
286			min	-.001	2	-.007	3	-.003	3	-1.24e-3	4	NC	1	NC	1
287		11	max	.001	3	.002	2	.033	5	-1.732e-5	10	NC	1	NC	1
288			min	-.001	2	-.008	3	-.003	3	-1.305e-3	4	NC	1	NC	1
289		12	max	.002	3	.003	2	.036	5	-1.872e-5	10	NC	1	NC	1
290			min	-.002	2	-.008	3	-.003	1	-1.369e-3	4	NC	1	NC	1
291		13	max	.002	3	.004	2	.039	5	-2.013e-5	10	NC	1	NC	1
292			min	-.002	2	-.009	3	-.004	1	-1.433e-3	4	NC	1	NC	1
293		14	max	.002	3	.005	2	.043	5	-2.153e-5	10	NC	1	NC	1
294			min	-.002	2	-.009	3	-.004	1	-1.497e-3	4	NC	1	NC	1
295		15	max	.002	3	.005	2	.046	5	-2.294e-5	10	NC	1	NC	2
296			min	-.002	2	-.009	3	-.005	1	-1.561e-3	4	8539.629	2	9630.367	1
297		16	max	.002	3	.006	2	.049	5	-2.434e-5	10	NC	1	NC	2
298			min	-.002	2	-.009	3	-.005	1	-1.626e-3	4	7248.16	2	8586.68	1
299		17	max	.002	3	.007	2	.052	5	-2.575e-5	10	NC	1	NC	2
300			min	-.002	2	-.009	3	-.006	1	-1.69e-3	4	6246.908	2	7748.932	1
301		18	max	.002	3	.008	2	.055	5	-2.715e-5	10	NC	1	NC	2
302			min	-.002	2	-.009	3	-.007	1	-1.754e-3	4	5461.875	2	7068.429	1
303		19	max	.003	3	.01	2	.058	5	-2.856e-5	10	NC	3	NC	2
304			min	-.002	2	-.009	3	-.007	1	-1.818e-3	4	4840.914	2	6510.59	1
305	M12	1	max	.001	1	.012	2	.006	1	6.004e-3	4	NC	1	NC	2
306			min	0	15	-.011	3	-.063	5	3.46e-5	10	NC	1	305.528	5
307		2	max	.001	1	.012	2	.005	1	6.004e-3	4	NC	1	NC	2
308			min	0	15	-.01	3	-.058	5	3.46e-5	10	NC	1	333.04	5
309		3	max	.001	1	.011	2	.005	1	6.004e-3	4	NC	1	NC	2
310			min	0	15	-.01	3	-.053	5	3.46e-5	10	NC	1	365.783	5
311		4	max	.001	1	.01	2	.004	1	6.004e-3	4	NC	1	NC	2
312			min	0	15	-.009	3	-.048	5	3.46e-5	10	NC	1	405.134	5
313		5	max	.001	1	.01	2	.004	1	6.004e-3	4	NC	1	NC	2
314			min	0	15	-.009	3	-.043	5	3.46e-5	10	NC	1	452.971	5
315		6	max	.001	1	.009	2	.004	1	6.004e-3	4	NC	1	NC	2
316			min	0	15	-.008	3	-.038	5	3.46e-5	10	NC	1	511.903	5
317		7	max	0	1	.008	2	.003	1	6.004e-3	4	NC	1	NC	2
318			min	0	15	-.007	3	-.033	5	3.46e-5	10	NC	1	585.648	5
319		8	max	0	1	.008	2	.003	1	6.004e-3	4	NC	1	NC	2
320			min	0	15	-.007	3	-.028	5	3.46e-5	10	NC	1	679.646	5
321		9	max	0	1	.007	2	.002	1	6.004e-3	4	NC	1	NC	2
322			min	0	15	-.006	3	-.024	5	3.46e-5	10	NC	1	802.13	5
323		10	max	0	1	.006	2	.002	1	6.004e-3	4	NC	1	NC	1
324			min	0	15	-.006	3	-.02	5	3.46e-5	10	NC	1	966.038	5
325		11	max	0	1	.006	2	.002	1	6.004e-3	4	NC	1	NC	1
326			min	0	15	-.005	3	-.016	5	3.46e-5	10	NC	1	1192.678	5
327		12	max	0	1	.005	2	.001	1	6.004e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
328			min	0	15	-.004	3	-.013	5	3.46e-5	10	NC	1	1519.219	5
329		13	max	0	1	.004	2	0	1	6.004e-3	4	NC	1	NC	1
330			min	0	15	-.004	3	-.01	5	3.46e-5	10	NC	1	2015.376	5
331		14	max	0	1	.003	2	0	1	6.004e-3	4	NC	1	NC	1
332			min	0	15	-.003	3	-.007	5	3.46e-5	10	NC	1	2824.944	5
333		15	max	0	1	.003	2	0	1	6.004e-3	4	NC	1	NC	1
334			min	0	15	-.002	3	-.005	5	3.46e-5	10	NC	1	4285.737	5
335		16	max	0	1	.002	2	0	1	6.004e-3	4	NC	1	NC	1
336			min	0	15	-.002	3	-.003	5	3.46e-5	10	NC	1	7358.05	5
337		17	max	0	1	.001	2	0	1	6.004e-3	4	NC	1	NC	1
338			min	0	15	-.001	3	-.001	5	3.46e-5	10	NC	1	NC	1
339		18	max	0	1	0	2	0	1	6.004e-3	4	NC	1	NC	1
340			min	0	15	0	3	0	5	3.46e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	6.004e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	3.46e-5	10	NC	1	NC	1
343	M1	1	max	.01	3	.027	3	.007	5	9.429e-3	2	NC	1	NC	1
344			min	-.01	2	-.023	2	-.003	1	-1.382e-2	3	NC	1	NC	1
345		2	max	.01	3	.017	3	.01	5	4.62e-3	2	NC	4	NC	1
346			min	-.01	2	-.014	2	-.006	1	-6.834e-3	3	5117.376	2	NC	1
347		3	max	.01	3	.007	3	.013	5	4.43e-4	5	NC	4	NC	2
348			min	-.01	2	-.005	2	-.007	1	-3.767e-4	1	2625.197	2	8638.561	5
349		4	max	.01	3	.003	2	.016	5	4.547e-4	5	NC	4	NC	2
350			min	-.01	2	-.002	3	-.008	1	-3.258e-4	1	1834.315	2	5423.057	5
351		5	max	.01	3	.009	2	.019	5	4.663e-4	5	NC	4	NC	2
352			min	-.01	2	-.009	3	-.008	1	-2.748e-4	1	1452.023	2	3863.579	5
353		6	max	.01	3	.015	2	.023	5	4.78e-4	5	NC	4	NC	2
354			min	-.01	2	-.014	3	-.008	1	-2.239e-4	1	1234.239	2	2957.637	5
355		7	max	.009	3	.02	2	.027	5	4.896e-4	5	NC	4	NC	1
356			min	-.01	2	-.019	3	-.007	1	-1.729e-4	1	1100.753	2	2373.588	5
357		8	max	.009	3	.023	2	.031	5	5.013e-4	5	NC	4	NC	1
358			min	-.01	2	-.022	3	-.006	1	-1.22e-4	1	1018.164	2	1970.434	5
359		9	max	.009	3	.025	2	.035	5	5.13e-4	5	NC	4	NC	1
360			min	-.01	2	-.023	3	-.004	1	-7.103e-5	1	970.887	2	1678.381	5
361		10	max	.009	3	.026	2	.039	5	5.246e-4	5	NC	4	NC	1
362			min	-.01	2	-.024	3	-.002	1	-2.007e-5	1	951.807	2	1439.484	4
363		11	max	.009	3	.026	2	.044	4	5.459e-4	4	NC	4	NC	1
364			min	-.01	2	-.023	3	0	1	8.36e-6	10	958.976	2	1258.929	4
365		12	max	.009	3	.024	2	.048	4	5.701e-4	4	NC	4	NC	1
366			min	-.01	2	-.021	3	0	10	1.209e-5	10	994.937	2	1120.009	4
367		13	max	.009	3	.021	2	.053	4	5.943e-4	4	NC	4	NC	1
368			min	-.01	2	-.018	3	0	10	1.581e-5	10	1068.123	2	1011.335	4
369		14	max	.009	3	.016	2	.057	4	6.185e-4	4	NC	4	NC	2
370			min	-.01	2	-.014	3	0	10	1.954e-5	10	1197.855	2	925.328	4
371		15	max	.009	3	.01	2	.061	4	6.427e-4	4	NC	4	NC	2
372			min	-.01	2	-.008	3	0	10	2.327e-5	10	1429.516	2	856.803	4
373		16	max	.009	3	.002	2	.065	4	9.16e-4	4	NC	4	NC	2
374			min	-.01	2	-.002	3	0	10	2.595e-5	10	1874.033	3	802.129	4
375		17	max	.009	3	.006	3	.068	4	7.118e-3	4	NC	4	NC	2
376			min	-.01	2	-.008	2	0	10	-8.76e-5	1	2719.951	3	758.775	4
377		18	max	.009	3	.014	3	.071	4	6.995e-3	2	NC	2	NC	1
378			min	-.01	2	-.019	2	0	10	-3.565e-3	3	5334.252	3	724.806	4
379		19	max	.009	3	.023	3	.073	4	1.412e-2	2	NC	1	NC	1
380			min	-.01	2	-.031	2	-.002	1	-7.254e-3	3	5718.141	2	699.724	4
381	M5	1	max	.03	3	.087	3	.007	5	1.424e-5	4	NC	1	NC	1
382			min	-.033	2	-.075	2	-.003	1	0	2	3598.275	3	NC	1
383		2	max	.03	3	.053	3	.01	5	2.218e-4	5	NC	4	NC	1
384			min	-.033	2	-.045	2	-.003	1	-4.572e-5	1	1561.816	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
385		3	max	.03	3	.021	3	.013	5	4.26e-4	5	NC	5	NC	1
386			min	-.033	2	-.017	2	-.003	1	-9.069e-5	1	800.842	2	NC	1
387		4	max	.03	3	.009	2	.016	5	4.464e-4	5	NC	5	NC	1
388			min	-.033	2	-.006	3	-.003	1	-8.652e-5	1	559.171	2	NC	1
389		5	max	.03	3	.031	2	.02	5	4.668e-4	5	NC	5	NC	1
390			min	-.033	2	-.028	3	-.003	1	-8.235e-5	1	442.325	2	9800.915	3
391		6	max	.03	3	.05	2	.024	5	4.872e-4	5	NC	5	NC	1
392			min	-.033	2	-.046	3	-.003	1	-7.818e-5	1	375.743	2	8827.321	3
393		7	max	.03	3	.065	2	.028	5	5.076e-4	5	NC	5	NC	1
394			min	-.033	2	-.06	3	-.003	1	-7.402e-5	1	334.916	2	8367.71	3
395		8	max	.029	3	.076	2	.033	5	5.28e-4	5	NC	5	NC	1
396			min	-.033	2	-.069	3	-.002	1	-6.985e-5	1	309.636	2	8247.756	3
397		9	max	.029	3	.084	2	.037	5	5.483e-4	5	NC	5	NC	1
398			min	-.033	2	-.075	3	-.002	1	-6.568e-5	1	295.139	2	8400.139	3
399		10	max	.029	3	.087	2	.042	5	5.687e-4	5	NC	5	NC	1
400			min	-.033	2	-.077	3	-.002	1	-6.151e-5	1	289.247	2	8814.036	3
401		11	max	.029	3	.086	2	.046	5	5.891e-4	5	NC	5	NC	1
402			min	-.033	2	-.074	3	-.002	1	-5.734e-5	1	291.364	2	9521.898	3
403		12	max	.029	3	.08	2	.051	5	6.095e-4	5	NC	5	NC	1
404			min	-.033	2	-.068	3	-.002	1	-5.317e-5	1	302.264	2	NC	1
405		13	max	.029	3	.069	2	.055	5	6.299e-4	5	NC	5	NC	1
406			min	-.033	2	-.058	3	-.002	1	-4.9e-5	1	324.523	2	NC	1
407		14	max	.029	3	.054	2	.059	5	6.502e-4	5	NC	5	NC	1
408			min	-.033	2	-.044	3	-.002	1	-4.484e-5	1	364.057	2	NC	1
409		15	max	.029	3	.033	2	.062	4	6.706e-4	5	NC	5	NC	1
410			min	-.033	2	-.027	3	-.002	1	-4.067e-5	1	434.788	2	NC	1
411		16	max	.029	3	.006	2	.066	4	9.378e-4	5	NC	5	NC	1
412			min	-.033	2	-.006	3	-.002	1	-3.999e-5	1	575.994	2	NC	1
413		17	max	.029	3	.019	3	.069	4	7.099e-3	4	NC	5	NC	1
414			min	-.033	2	-.026	2	-.002	1	-1.223e-4	1	855.501	3	NC	1
415		18	max	.029	3	.046	3	.071	4	3.642e-3	4	NC	4	NC	1
416			min	-.033	2	-.063	2	-.001	1	-6.253e-5	1	1677.693	3	NC	1
417		19	max	.029	3	.074	3	.074	4	3.697e-6	5	NC	3	NC	1
418			min	-.033	2	-.103	2	-.001	1	-9.318e-7	3	1708.002	2	NC	1
419	M9	1	max	.01	3	.027	3	.006	5	1.383e-2	3	NC	1	NC	1
420			min	-.01	2	-.023	2	-.003	1	-9.429e-3	2	NC	1	NC	1
421		2	max	.01	3	.016	3	.006	5	6.804e-3	3	NC	4	NC	1
422			min	-.01	2	-.014	2	0	9	-4.628e-3	2	5120.472	2	NC	1
423		3	max	.01	3	.006	3	.006	4	1.798e-4	1	NC	4	NC	1
424			min	-.01	2	-.005	2	0	3	-9.007e-5	3	2626.827	2	NC	1
425		4	max	.01	3	.003	2	.007	4	1.367e-4	1	NC	4	NC	1
426			min	-.01	2	-.002	3	-.001	3	-9.217e-5	3	1835.471	2	NC	1
427		5	max	.01	3	.009	2	.009	4	9.361e-5	1	NC	4	NC	1
428			min	-.01	2	-.009	3	-.002	3	-9.427e-5	3	1445.796	3	9839.376	3
429		6	max	.01	3	.015	2	.011	4	5.05e-5	1	NC	4	NC	1
430			min	-.01	2	-.015	3	-.003	3	-9.637e-5	3	1232.392	3	7666.683	4
431		7	max	.01	3	.02	2	.014	4	4.102e-5	4	NC	4	NC	1
432			min	-.01	2	-.019	3	-.004	3	-9.847e-5	3	1101.404	2	5189.696	4
433		8	max	.009	3	.023	2	.018	4	6.263e-5	5	NC	4	NC	1
434			min	-.01	2	-.022	3	-.004	3	-1.006e-4	3	1018.744	2	3771.405	4
435		9	max	.009	3	.025	2	.022	5	8.664e-5	5	NC	4	NC	1
436			min	-.01	2	-.024	3	-.005	3	-1.027e-4	3	971.417	2	2883.5	4
437		10	max	.009	3	.026	2	.026	5	1.107e-4	5	NC	4	NC	1
438			min	-.01	2	-.024	3	-.005	3	-1.219e-4	1	952.299	2	2290.297	4
439		11	max	.009	3	.026	2	.031	5	1.347e-4	5	NC	4	NC	1
440			min	-.01	2	-.023	3	-.005	3	-1.65e-4	1	959.441	2	1873.942	4
441		12	max	.009	3	.024	2	.036	5	1.587e-4	5	NC	4	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
442			min	-.01	2	-.021	3	-.005	1	-2.081e-4	1	995.379	2	1566.875	5
443		13	max	.009	3	.021	2	.041	5	1.827e-4	5	NC	4	NC	2
444			min	-.01	2	-.018	3	-.006	1	-2.512e-4	1	1068.542	2	1330.402	5
445		14	max	.009	3	.016	2	.047	5	2.067e-4	5	NC	4	NC	2
446			min	-.01	2	-.014	3	-.007	1	-2.943e-4	1	1198.241	2	1152.668	5
447		15	max	.009	3	.01	2	.052	5	2.307e-4	5	NC	4	NC	2
448			min	-.01	2	-.008	3	-.007	1	-3.374e-4	1	1429.824	2	1015.869	5
449		16	max	.009	3	.002	2	.058	5	5.236e-4	5	NC	4	NC	2
450			min	-.01	2	-.002	3	-.007	1	-3.702e-4	1	1864.206	3	908.582	5
451		17	max	.009	3	.006	3	.063	5	7.23e-3	4	NC	4	NC	2
452			min	-.01	2	-.008	2	-.006	1	-1.567e-4	1	2706.177	3	823.089	5
453		18	max	.009	3	.015	3	.068	5	3.648e-3	3	NC	2	NC	1
454			min	-.01	2	-.019	2	-.004	1	-7.001e-3	2	5307.77	3	748.866	4
455		19	max	.009	3	.023	3	.074	4	7.252e-3	3	NC	1	NC	1
456			min	-.01	2	-.031	2	-.001	1	-1.412e-2	2	5733.322	2	686.65	4
457	M13	1	max	.003	1	.027	3	.01	3	3.982e-3	3	NC	1	NC	1
458			min	-.006	5	-.023	2	-.01	2	-3.477e-3	2	NC	1	NC	1
459		2	max	.003	1	.12	3	.01	9	4.968e-3	3	NC	4	NC	2
460			min	-.006	5	-.087	2	-.005	10	-4.357e-3	2	1347.235	3	8488.804	1
461		3	max	.003	1	.197	3	.029	1	5.954e-3	3	NC	5	NC	2
462			min	-.006	5	-.14	2	-.004	10	-5.238e-3	2	737.236	3	3734.267	1
463		4	max	.003	1	.248	3	.044	1	6.94e-3	3	NC	5	NC	3
464			min	-.007	5	-.175	2	-.003	10	-6.118e-3	2	569.555	3	2586.233	1
465		5	max	.003	1	.266	3	.05	1	7.926e-3	3	NC	5	NC	3
466			min	-.007	5	-.189	2	-.005	5	-6.998e-3	2	526.669	3	2300.171	1
467		6	max	.003	1	.252	3	.045	1	8.912e-3	3	NC	5	NC	2
468			min	-.007	5	-.181	2	-.007	10	-7.878e-3	2	558.988	3	2525.164	1
469		7	max	.003	1	.213	3	.03	1	9.898e-3	3	NC	5	NC	2
470			min	-.007	5	-.156	2	-.01	10	-8.758e-3	2	677.869	3	3596.525	1
471		8	max	.003	1	.159	3	.024	3	1.088e-2	3	NC	5	NC	2
472			min	-.007	5	-.122	2	-.019	2	-9.639e-3	2	951.05	3	8237.139	9
473		9	max	.003	1	.11	3	.027	3	1.187e-2	3	NC	4	NC	1
474			min	-.007	5	-.09	2	-.028	2	-1.052e-2	2	1522.428	3	6682.299	2
475		10	max	.003	1	.087	3	.03	3	1.286e-2	3	NC	4	NC	4
476			min	-.007	5	-.075	2	-.033	2	-1.14e-2	2	2102.47	3	5412.282	2
477		11	max	.003	1	.11	3	.033	3	1.187e-2	3	NC	4	NC	1
478			min	-.007	5	-.09	2	-.028	2	-1.052e-2	2	1522.426	3	5454.063	3
479		12	max	.003	1	.159	3	.034	3	1.089e-2	3	NC	5	NC	2
480			min	-.007	5	-.122	2	-.019	2	-9.639e-3	2	951.049	3	5177.655	3
481		13	max	.003	1	.213	3	.034	3	9.904e-3	3	NC	5	NC	2
482			min	-.007	5	-.156	2	-.01	10	-8.759e-3	2	677.868	3	3579.345	1
483		14	max	.003	1	.252	3	.045	1	8.92e-3	3	NC	5	NC	2
484			min	-.007	5	-.181	2	-.007	10	-7.879e-3	2	558.987	3	2522.671	1
485		15	max	.003	1	.266	3	.05	1	7.936e-3	3	NC	5	NC	5
486			min	-.007	5	-.189	2	-.004	10	-6.999e-3	2	526.668	3	2303.882	1
487		16	max	.003	1	.248	3	.044	1	6.952e-3	3	NC	5	NC	4
488			min	-.007	5	-.175	2	-.003	10	-6.119e-3	2	569.555	3	2597.064	1
489		17	max	.003	1	.198	3	.029	1	5.968e-3	3	NC	5	NC	2
490			min	-.007	5	-.14	2	-.004	10	-5.239e-3	2	737.235	3	3762.627	1
491		18	max	.003	1	.121	3	.013	3	4.984e-3	3	NC	4	NC	2
492			min	-.007	5	-.087	2	-.005	10	-4.359e-3	2	1347.234	3	8604.946	1
493		19	max	.003	1	.027	3	.01	3	4.e-3	3	NC	1	NC	1
494			min	-.007	5	-.023	2	-.01	2	-3.479e-3	2	NC	1	NC	1
495	M16	1	max	.001	1	.023	3	.009	3	4.528e-3	2	NC	1	NC	1
496			min	-.074	4	-.031	2	-.01	2	-3.363e-3	3	NC	1	NC	1
497		2	max	.001	1	.073	3	.014	4	5.683e-3	2	NC	4	NC	2
498			min	-.074	4	-.127	2	-.005	10	-4.171e-3	3	1318.405	2	8492.395	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
499		3	max	.001	1	.114	3	.029	1	6.837e-3	2	NC	5	NC	2
500			min	-.074	4	-.206	2	-.003	10	-4.979e-3	3	720.293	2	3735.225	1
501		4	max	.001	1	.142	3	.044	1	7.992e-3	2	NC	5	NC	10
502			min	-.074	4	-.258	2	-.003	10	-5.787e-3	3	554.852	2	2586.706	1
503		5	max	.001	1	.153	3	.05	1	9.146e-3	2	NC	5	NC	10
504			min	-.074	4	-.278	2	-.004	10	-6.596e-3	3	510.625	2	2300.542	1
505		6	max	.001	1	.149	3	.045	1	1.03e-2	2	NC	5	NC	2
506			min	-.074	4	-.265	2	-.007	10	-7.404e-3	3	537.67	2	2525.678	1
507		7	max	.001	1	.132	3	.031	3	1.146e-2	2	NC	5	NC	2
508			min	-.074	4	-.227	2	-.01	10	-8.212e-3	3	642.986	2	3598.037	1
509		8	max	.001	1	.108	3	.031	3	1.261e-2	2	NC	5	NC	2
510			min	-.074	4	-.174	2	-.019	2	-9.02e-3	3	878.587	2	5749.648	3
511		9	max	.001	1	.085	3	.03	3	1.376e-2	2	NC	4	NC	1
512			min	-.074	4	-.125	2	-.028	2	-9.828e-3	3	1337.496	2	5986.39	3
513		10	max	.001	1	.074	3	.029	3	1.492e-2	2	NC	4	NC	4
514			min	-.074	4	-.103	2	-.033	2	-1.064e-2	3	1761.059	2	5458.373	2
515		11	max	.001	1	.085	3	.027	3	1.376e-2	2	NC	4	NC	1
516			min	-.074	4	-.125	2	-.028	2	-9.826e-3	3	1337.496	2	6750.477	2
517		12	max	.001	1	.108	3	.026	3	1.261e-2	2	NC	5	NC	2
518			min	-.074	4	-.174	2	-.019	2	-9.016e-3	3	878.587	2	7500.344	3
519		13	max	.001	1	.132	3	.03	1	1.146e-2	2	NC	5	NC	2
520			min	-.074	4	-.227	2	-.01	10	-8.206e-3	3	642.986	2	3592.176	1
521		14	max	.002	1	.149	3	.045	1	1.03e-2	2	NC	5	NC	2
522			min	-.074	4	-.265	2	-.007	10	-7.396e-3	3	537.67	2	2529.289	1
523		15	max	.002	1	.153	3	.05	1	9.148e-3	2	NC	5	NC	3
524			min	-.074	4	-.278	2	-.004	10	-6.586e-3	3	510.625	2	2309.224	1
525		16	max	.002	1	.141	3	.044	1	7.994e-3	2	NC	5	NC	3
526			min	-.074	4	-.258	2	-.004	5	-5.776e-3	3	554.852	2	2603.088	1
527		17	max	.002	1	.114	3	.029	1	6.84e-3	2	NC	5	NC	2
528			min	-.074	4	-.206	2	-.005	5	-4.966e-3	3	720.293	2	3772.435	1
529		18	max	.002	1	.072	3	.011	3	5.685e-3	2	NC	4	NC	2
530			min	-.073	4	-.127	2	-.005	10	-4.156e-3	3	1318.405	2	8634.397	1
531		19	max	.002	1	.023	3	.009	3	4.531e-3	2	NC	1	NC	1
532			min	-.073	4	-.031	2	-.01	2	-3.346e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	4.197e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-6.863e-4	5	NC	1	NC	1
535		2	max	0	3	0	5	.007	4	8.959e-4	3	NC	1	NC	1
536			min	0	5	-.005	1	0	3	-7.028e-4	5	NC	1	NC	1
537		3	max	0	3	.001	5	.016	4	1.372e-3	3	NC	3	NC	1
538			min	-.001	5	-.01	1	-.004	3	-1.002e-3	2	7512.566	1	4856.669	4
539		4	max	0	3	.002	5	.025	4	1.848e-3	3	NC	5	NC	9
540			min	-.002	5	-.014	1	-.008	3	-1.472e-3	2	5154.059	1	3046.713	4
541		5	max	0	3	.003	5	.034	4	2.325e-3	3	NC	5	NC	9
542			min	-.002	5	-.019	1	-.013	3	-1.942e-3	2	4021.765	1	2239.264	4
543		6	max	0	3	.003	5	.042	4	2.801e-3	3	NC	5	NC	9
544			min	-.003	5	-.022	1	-.019	3	-2.413e-3	2	3384.74	1	1814.946	4
545		7	max	0	3	.004	5	.048	4	3.277e-3	3	NC	5	8026.553	9
546			min	-.004	5	-.025	1	-.025	3	-2.883e-3	2	3001.654	1	1578.277	4
547		8	max	0	3	.004	5	.052	4	3.753e-3	3	NC	5	6719.192	9
548			min	-.004	5	-.027	1	-.031	3	-3.353e-3	2	2771.745	1	1451.91	4
549		9	max	0	3	.005	5	.054	4	4.229e-3	3	NC	5	5854.034	9
550			min	-.005	5	-.028	1	-.036	3	-3.824e-3	2	2647.994	1	1402.781	4
551		10	max	0	3	.005	5	.054	4	4.706e-3	3	NC	5	5281.042	9
552			min	-.005	5	-.028	1	-.04	3	-4.294e-3	2	2608.845	1	1294.506	3
553		11	max	.001	3	.005	5	.051	4	5.182e-3	3	NC	5	4920.889	9
554			min	-.006	5	-.028	1	-.043	3	-4.764e-3	2	2647.994	1	1197.769	3
555		12	max	.001	3	.006	5	.046	4	5.658e-3	3	NC	5	4735.211	9

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
556			min	-.007	5	-.026	1	-.043	3	-5.235e-3	2	2771.745	1	1145.729	3
557		13	max	.001	3	.006	5	.039	4	6.134e-3	3	NC	5	4715.926	9
558			min	-.007	5	-.024	1	-.042	3	-5.705e-3	2	3001.654	1	1135.248	3
559		14	max	.001	3	.006	5	.03	4	6.611e-3	3	NC	5	4887.793	9
560			min	-.008	5	-.021	1	-.038	3	-6.175e-3	2	3384.74	1	1171.418	3
561		15	max	.001	3	.006	5	.024	1	7.087e-3	3	NC	5	7061.614	15
562			min	-.008	5	-.018	1	-.031	3	-6.646e-3	2	4021.765	1	1272.564	3
563		16	max	.002	3	.006	5	.017	1	7.563e-3	3	NC	5	NC	15
564			min	-.009	5	-.014	9	-.02	3	-7.116e-3	2	5154.059	1	1488.279	3
565		17	max	.002	3	.006	5	.006	1	8.039e-3	3	NC	3	NC	4
566			min	-.01	5	-.01	9	-.005	3	-7.586e-3	2	7512.566	1	1974.028	3
567		18	max	.002	3	.006	5	.014	3	8.515e-3	3	NC	1	NC	4
568			min	-.01	5	-.006	9	-.016	2	-8.057e-3	2	NC	1	3516.122	3
569		19	max	.002	3	.008	2	.037	3	8.992e-3	3	NC	1	NC	1
570			min	-.011	5	-.002	9	-.036	2	-8.527e-3	2	NC	1	NC	1
571	M16A	1	max	0	10	.002	2	.011	3	2.574e-3	3	NC	1	NC	1
572			min	-.004	4	-.004	4	-.011	2	-2.478e-3	2	NC	1	NC	1
573		2	max	0	10	-.003	10	.003	3	2.476e-3	3	NC	1	NC	1
574			min	-.004	4	-.013	4	-.004	2	-2.369e-3	2	8140.473	4	9977.315	3
575		3	max	0	10	-.006	12	.006	1	2.379e-3	3	NC	3	NC	4
576			min	-.004	4	-.022	4	-.009	5	-2.26e-3	2	4142.409	4	5654.56	3
577		4	max	0	10	-.008	12	.01	1	2.281e-3	3	NC	12	NC	9
578			min	-.003	4	-.03	4	-.017	5	-2.151e-3	2	2841.935	4	4308.888	3
579		5	max	0	10	-.01	12	.012	1	2.184e-3	3	8043.53	12	NC	9
580			min	-.003	4	-.038	4	-.026	5	-2.042e-3	2	2217.59	4	3104.412	5
581		6	max	0	10	-.012	12	.014	1	2.086e-3	3	6769.48	12	9610.901	9
582			min	-.003	4	-.044	4	-.035	5	-1.933e-3	2	1866.337	4	2252.782	5
583		7	max	0	10	-.013	12	.015	1	1.988e-3	3	6003.308	12	9299.89	9
584			min	-.003	4	-.049	4	-.044	5	-1.824e-3	2	1655.104	4	1797.336	5
585		8	max	0	10	-.014	12	.015	1	1.891e-3	3	5543.489	12	9369.146	9
586			min	-.002	4	-.052	4	-.051	5	-1.715e-3	2	1528.333	4	1537.444	5
587		9	max	0	10	-.015	12	.014	1	1.793e-3	3	5295.987	12	9774.428	9
588			min	-.002	4	-.054	4	-.056	5	-1.606e-3	2	1460.097	4	1390.72	5
589		10	max	0	10	-.015	12	.013	1	1.696e-3	3	5217.69	12	NC	9
590			min	-.002	4	-.055	4	-.059	5	-1.496e-3	2	1438.51	4	1320.324	5
591		11	max	0	10	-.015	12	.011	1	1.598e-3	3	5295.987	12	NC	9
592			min	-.002	4	-.054	4	-.059	5	-1.387e-3	2	1460.097	4	1311.073	5
593		12	max	0	10	-.014	12	.009	1	1.501e-3	3	5543.489	12	NC	9
594			min	-.002	4	-.051	4	-.057	5	-1.278e-3	2	1528.333	4	1361.436	5
595		13	max	0	10	-.013	12	.007	1	1.403e-3	3	6003.308	12	NC	2
596			min	-.001	4	-.047	4	-.052	5	-1.169e-3	2	1655.104	4	1482.974	5
597		14	max	0	10	-.011	12	.005	1	1.306e-3	3	6769.48	12	NC	1
598			min	-.001	4	-.042	4	-.045	5	-1.06e-3	2	1866.337	4	1706.884	5
599		15	max	0	10	-.01	12	.003	1	1.208e-3	3	8043.53	12	NC	1
600			min	0	4	-.035	4	-.037	5	-9.511e-4	2	2217.59	4	2105.219	5
601		16	max	0	10	-.008	12	.002	9	1.11e-3	3	NC	12	NC	1
602			min	0	4	-.027	4	-.027	5	-8.42e-4	2	2841.935	4	2859.007	5
603		17	max	0	10	-.005	12	0	9	1.013e-3	3	NC	3	NC	1
604			min	0	4	-.019	4	-.017	5	-7.33e-4	2	4142.409	4	4539.225	5
605		18	max	0	10	-.003	12	0	3	1.034e-3	4	NC	1	NC	1
606			min	0	4	-.01	4	-.008	5	-6.239e-4	2	8140.473	4	NC	1
607		19	max	0	1	0	1	0	1	1.103e-3	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.148e-4	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

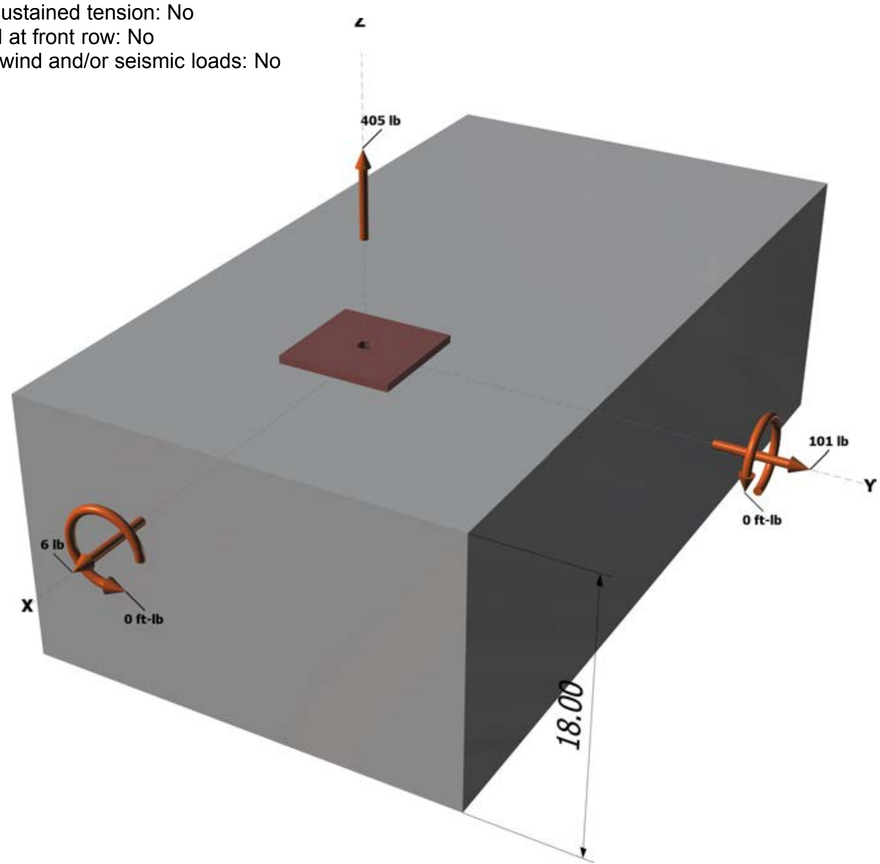
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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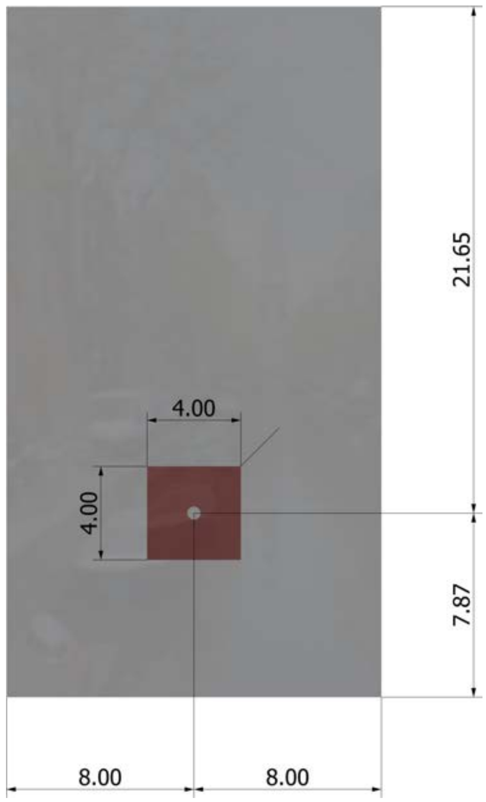


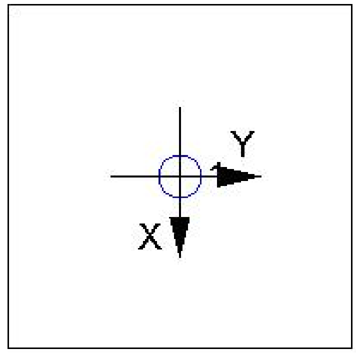
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

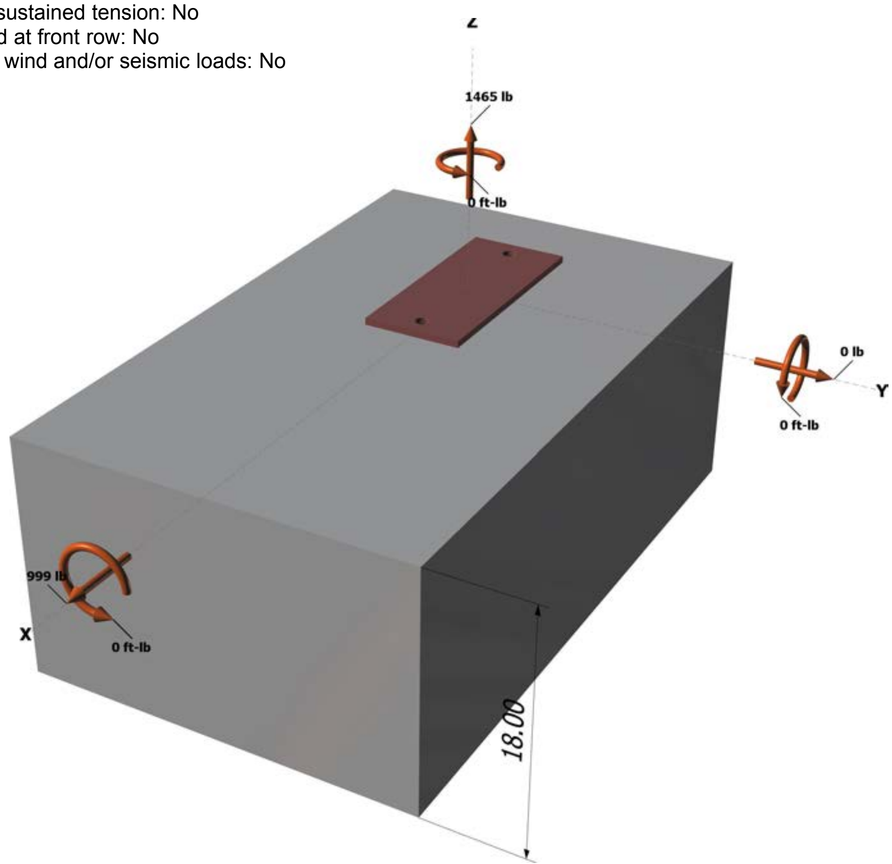
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

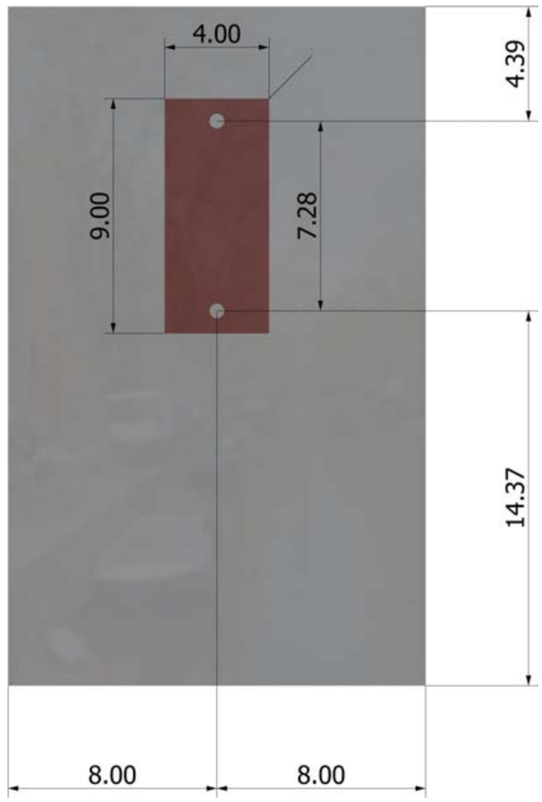
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



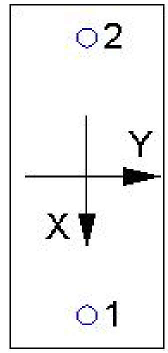
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
15580

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, 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.