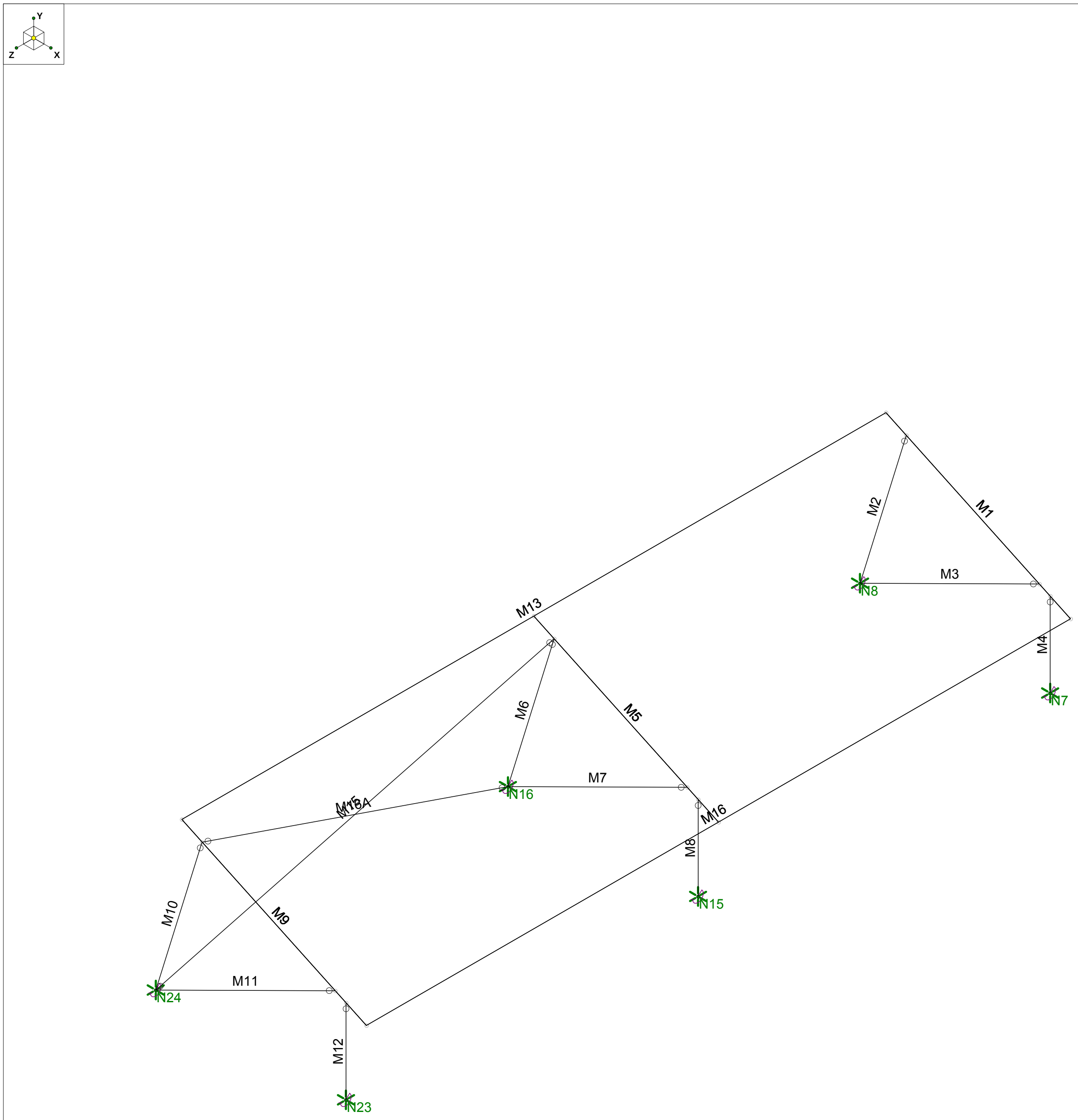


Schletter, Inc.		25° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

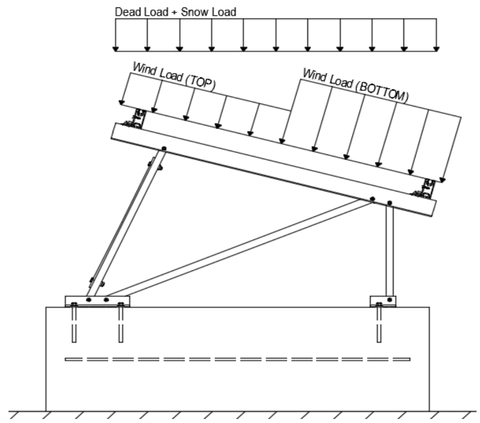
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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 = 25°
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
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads
Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 18.56 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.82
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 110 mph
Height ≤ 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 19.00 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.1	(Pressure)
$Cf+_{BOTTOM}$	=	1.7	
$Cf-_{TOP}$	=	-2.2	(Suction)
$Cf-_{BOTTOM}$	=	-1	

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

2.4 Seismic Loads

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
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

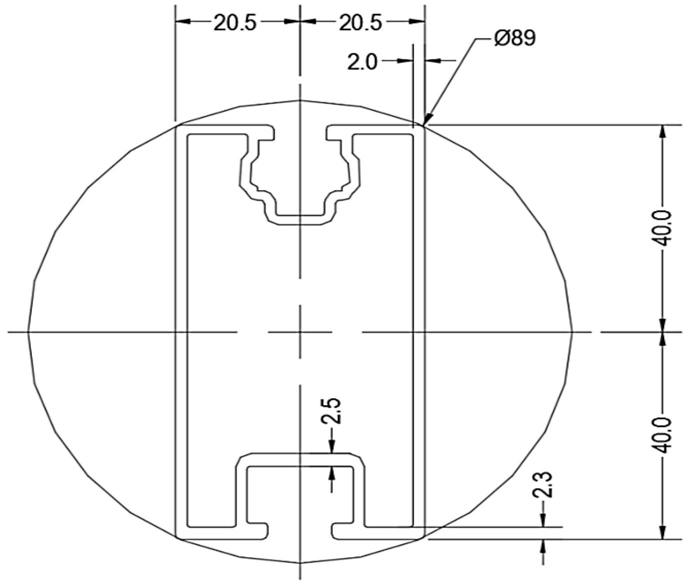
Front Struts	Location	Bracing
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

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).

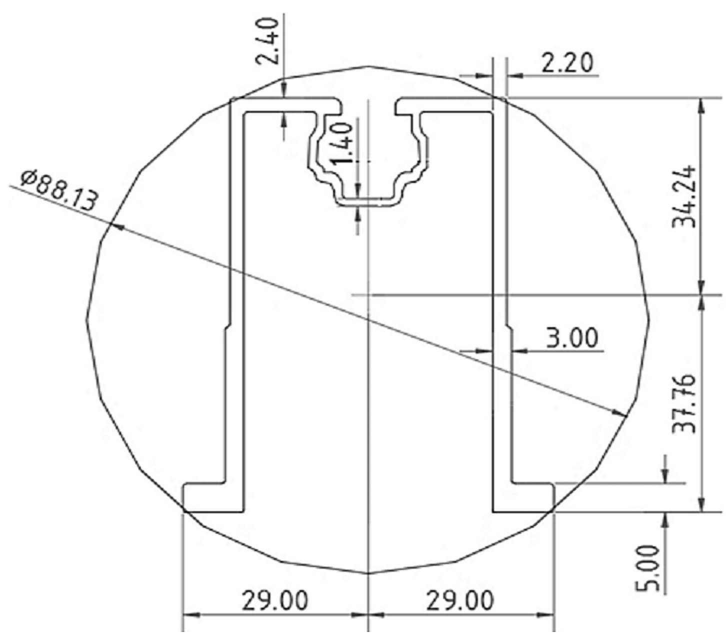
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	96	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.76	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	1.022	k-ft
M_z =	0.235	k-ft
$M_{y\ allowable}$ =	1.787	k-ft
$M_{z\ allowable}$ =	0.838	k-ft
Utilization =	85%	



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).

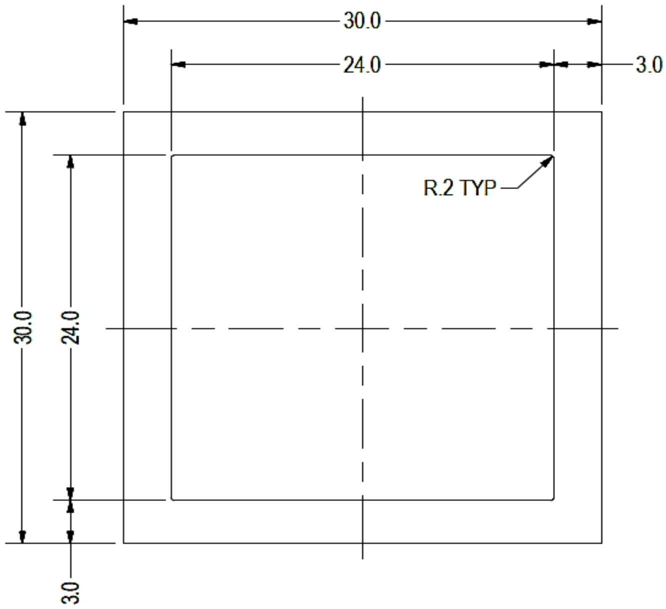
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.76	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.568	k-ft
M_z =	0.000	k-ft
P_n =	0.308	k
$M_{y\ allowable}$ =	1.460	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	41%	



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).

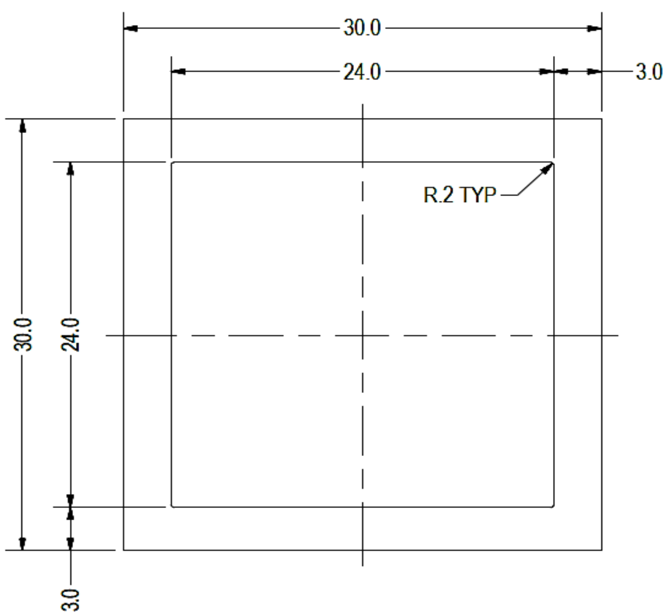
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.055	k-ft
P_n =	0.288	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	15%	



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).

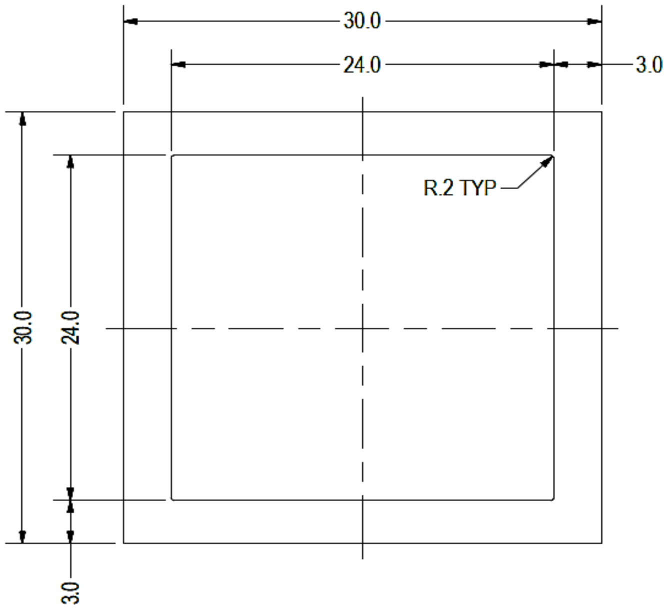
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.467	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	12%	



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).

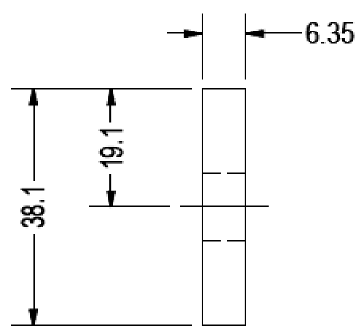
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	36.18	in
$\Phi F_{ty\ AXIAL}$ =	11.59	ksi
$\Phi F_{ty\ BENDING}$ =	30.23	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.143	k
$M_{y\ allowable}$ =	0.410	k-ft
$M_{z\ allowable}$ =	0.410	k-ft
$P_{n\ allowable}$ =	5.820	k
Utilization =	20%	



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 =	0.007	k-ft
P_n =	0.264	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	18%	



A cross brace kit is required every 11 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

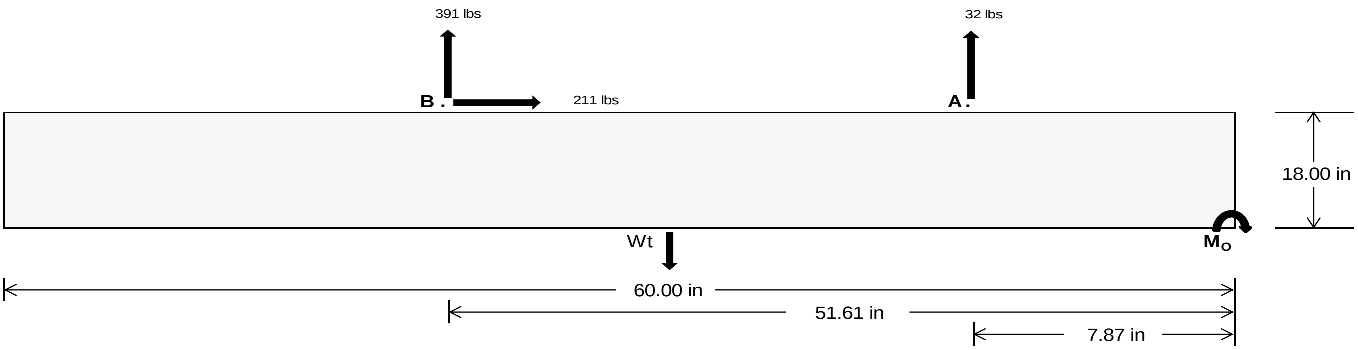
5.1 Helical Pile Foundations

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 =	146.29	1701.36	k
Compressive Load =	1787.40	1472.92	k
Lateral Load =	44.52	915.99	k
Moment (Weak Axis) =	0.07	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 =	24238.0 in-lbs
Resisting Force Required =	807.93 lbs
S.F. =	1.67
Weight Required =	1346.55 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 =	211.20 lbs
Friction =	0.4
Weight Required =	527.99 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 =	211.20 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

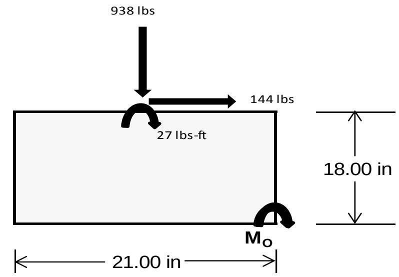
	Ballast Width			
	21 in	22 in	23 in	24 in
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.75 ft) =	1903 lbs	1994 lbs	2084 lbs	2175 lbs

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	696 lbs	696 lbs	696 lbs	696 lbs	482 lbs	482 lbs	482 lbs	482 lbs	827 lbs	827 lbs	827 lbs	827 lbs	-63 lbs	-63 lbs	-63 lbs	-63 lbs
F_B	502 lbs	502 lbs	502 lbs	502 lbs	519 lbs	519 lbs	519 lbs	519 lbs	724 lbs	724 lbs	724 lbs	724 lbs	-782 lbs	-782 lbs	-782 lbs	-782 lbs
F_V	74 lbs	74 lbs	74 lbs	74 lbs	385 lbs	385 lbs	385 lbs	385 lbs	339 lbs	339 lbs	339 lbs	339 lbs	-422 lbs	-422 lbs	-422 lbs	-422 lbs
P_{total}	3101 lbs	3192 lbs	3283 lbs	3373 lbs	2904 lbs	2995 lbs	3085 lbs	3176 lbs	3454 lbs	3544 lbs	3635 lbs	3726 lbs	296 lbs	351 lbs	405 lbs	460 lbs
M	490 lbs-ft	490 lbs-ft	490 lbs-ft	490 lbs-ft	532 lbs-ft	532 lbs-ft	532 lbs-ft	532 lbs-ft	729 lbs-ft	729 lbs-ft	729 lbs-ft	729 lbs-ft	659 lbs-ft	659 lbs-ft	659 lbs-ft	659 lbs-ft
e	0.16 ft	0.15 ft	0.15 ft	0.15 ft	0.18 ft	0.18 ft	0.17 ft	0.17 ft	0.21 ft	0.21 ft	0.20 ft	0.20 ft	2.22 ft	1.88 ft	1.63 ft	1.43 ft
L/6	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	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}	287.3 psf	284.1 psf	281.2 psf	278.5 psf	259.0 psf	257.1 psf	255.4 psf	253.8 psf	294.7 psf	291.2 psf	288.0 psf	285.0 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	421.6 psf	412.3 psf	403.9 psf	396.1 psf	404.8 psf	396.3 psf	388.6 psf	381.4 psf	494.8 psf	482.2 psf	470.6 psf	460.1 psf	407.1 psf	205.1 psf	161.2 psf	143.6 psf

Maximum Bearing Pressure =	495 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 = 576.8 ft-lbs
Resisting Force Required = 659.24 lbs
S.F. = 1.67
Weight Required = 1098.73 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	147 lbs	184 lbs	90 lbs	375 lbs	938 lbs	331 lbs	83 lbs	11 lbs	29 lbs
F_V	23 lbs	191 lbs	24 lbs	15 lbs	144 lbs	19 lbs	24 lbs	190 lbs	24 lbs
P_{total}	2503 lbs	2540 lbs	2446 lbs	2618 lbs	3180 lbs	2573 lbs	771 lbs	700 lbs	718 lbs
M	67 lbs-ft	323 lbs-ft	73 lbs-ft	43 lbs-ft	244 lbs-ft	57 lbs-ft	70 lbs-ft	322 lbs-ft	72 lbs-ft
e	0.03 ft	0.13 ft	0.03 ft	0.02 ft	0.08 ft	0.02 ft	0.09 ft	0.46 ft	0.10 ft
L/6	0.29 ft	1.50 ft	1.69 ft	1.72 ft	1.60 ft	1.71 ft	1.57 ft	0.83 ft	1.55 ft
f_{min}	259.8 sqft	163.8 sqft	250.8 sqft	282.4 sqft	268.0 sqft	271.6 sqft	60.8 sqft	-46.3 sqft	53.8 sqft
f_{max}	312.3 psf	416.8 psf	308.3 psf	316.0 psf	458.9 psf	316.6 psf	115.5 psf	206.3 psf	110.4 psf

Maximum Bearing Pressure = 459 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.

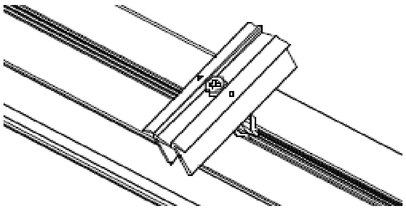
6. DESIGN OF JOINTS AND CONNECTIONS

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.

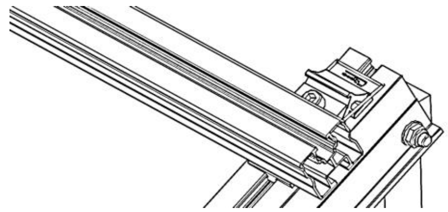
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.386	k
Allowable Uplift =	1.214	k
Utilization =	32%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	1.086	k
Allowable Uplift =	1.116	k
Utilization =	97%	



6.2 Bolted Connections

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

Front Strut

Maximum Axial Load =	1.375	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	24%	

Rear Strut

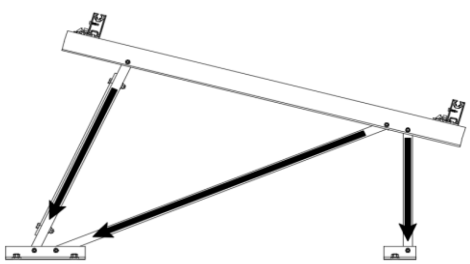
Maximum Axial Load =	1.174	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	21%	

Diagonal Strut

Maximum Axial Load =	0.467	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	8%	

Bracing

Maximum Axial Load =	0.264	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

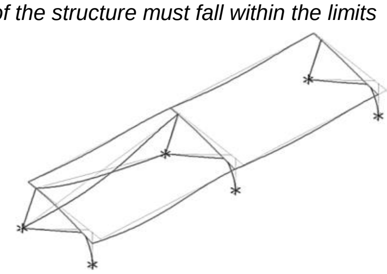
7.1 Seismic Drift

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} =	30.83	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.617	in
Max Drift, Δ_{MAX} =	0.116	in

$0.116 \leq 0.617$, OK.

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



APPENDIX A

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

Purlin = **ProfiPlus XT**

Strong Axis:

3.4.14

L_b = 96.00 in

J = 0.427

200.222

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.8 ksi

3.4.16

b/t = 6.6

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

Weak Axis:

3.4.14

L_b = 96.00 in

J = 0.427

217.57

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.6

3.4.16

b/t = 37.95

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 22.7 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 37.95

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

S1 = 38.1
m = 0.63
C_0 = 40.784
Cc = 39.216

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

S2 = 79.7
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L St$= 28.8 ksi
Ix = 498305 mm^4
1.197 in^4
y = 40.784 mm
Sx = 0.746 in^3
$M_{max}St$ = 1.787 k-ft

3.4.18

h/t = 6.6

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

S1 = 36.9
m = 0.65
C_0 = 20.5
Cc = 20.5

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L Wk$= 22.7 ksi
Iy = 148662 mm^4
0.357 in^4
x = 20.5 mm
Sy = 0.443 in^3
$M_{max}Wk$ = 0.838 k-ft

Compression

3.4.9

b/t = 6.6
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φyFcy
φF_L= 33.3 ksi

b/t = 37.95
S1 = 12.21
S2 = 32.70
φF_L= (φck2*√(BpE))/(1.6b/t)
φF_L= 21.4 ksi

3.4.10

Rb/t = 0.0

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

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

φF_L= 21.42 ksi
A = 620.02 mm^2
0.96 in^2
P_{max} = 20.59 kips

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.32
21.4323

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.8 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 = 1.32
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= 29.8 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 = 29.8 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.460 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

$\lambda =$ 0.77182

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.83792

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

$\varphi F_L =$ 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 24.52 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 12.31 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 36.18 in

J = 0.16

94.9139

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

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= 30.2 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= 30.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.410 k-ft

Weak Axis:

3.4.14

L_b = 36.18 in

J = 0.16

94.9139

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

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= 30.2

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= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.5514

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

φcc = 0.7972

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

$\varphi F_L =$ 11.5927 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

$\varphi F_L =$ 11.59 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 5.82 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	-51.748	-51.748	0	0
2	M16	Y	-51.748	-51.748	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	-58.278	-58.278	0	0
2	M16	y	-90.067	-90.067	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	116.557	116.557	0	0
2	M16	y	52.98	52.98	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	168.178	2	305.32	1	-.006	10	0	14	0	1	0	1
2		min	-220.776	3	-399.182	3	-2.184	4	0	3	0	1	0	1
3	N7	max	0	5	504.68	1	-.167	12	0	12	0	1	0	1
4		min	-.186	1	-24.351	3	-33.949	4	-.055	4	0	1	0	1
5	N15	max	-.001	15	1374.92	1	.673	1	.001	1	0	1	0	1
6		min	-1.921	1	-112.534	3	-34.245	5	-.055	4	0	1	0	1
7	N16	max	668.265	2	1133.016	1	-.269	10	0	1	0	1	0	1
8		min	-704.607	3	-1308.738	3	-250.3	4	0	3	0	1	0	1
9	N23	max	0	15	504.355	1	4.101	1	.007	1	0	1	0	1
10		min	-.186	1	-23.859	3	-31.729	5	-.05	5	0	1	0	1
11	N24	max	168.744	2	311.076	1	37.357	3	.002	1	0	1	0	1
12		min	-220.852	3	-396.336	3	-3.676	5	0	3	0	1	0	1
13	Totals:	max	1003.093	2	4133.367	1	0	10						
14		min	-1146.391	3	-2265	3	-353.868	4						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M2	1	max	348.926	1	.638	6	1.301	4	0	12	0	3	0	1
2			min	-360.122	3	.149	15	-.03	3	-.001	1	0	1	0	1
3		2	max	349.042	1	.592	6	1.195	4	0	12	0	5	0	15
4			min	-360.035	3	.139	15	-.03	3	-.001	1	0	1	0	6
5		3	max	349.159	1	.547	6	1.09	4	0	12	0	4	0	15
6			min	-359.947	3	.128	15	-.03	3	-.001	1	0	3	0	6
7		4	max	349.275	1	.501	6	.984	4	0	12	0	4	0	15
8			min	-359.86	3	.117	15	-.03	3	-.001	1	0	3	0	6
9		5	max	349.391	1	.455	6	.879	4	0	12	0	4	0	15
10			min	-359.773	3	.106	15	-.03	3	-.001	1	0	3	0	6
11		6	max	349.508	1	.41	6	.773	4	0	12	0	4	0	15
12			min	-359.685	3	.096	15	-.03	3	-.001	1	0	3	0	6
13		7	max	349.624	1	.364	6	.715	1	0	12	0	4	0	15
14			min	-359.598	3	.085	15	-.03	3	-.001	1	0	3	0	6
15		8	max	349.741	1	.318	6	.715	1	0	12	0	4	0	15
16			min	-359.511	3	.074	15	-.03	3	-.001	1	0	3	0	6
17		9	max	349.857	1	.273	6	.715	1	0	12	.001	4	0	15
18			min	-359.423	3	.063	15	-.03	3	-.001	1	0	3	0	6
19		10	max	349.974	1	.227	6	.715	1	0	12	.001	4	0	15
20			min	-359.336	3	.053	15	-.03	3	-.001	1	0	3	0	6
21		11	max	350.09	1	.181	6	.715	1	0	12	.001	4	0	15
22			min	-359.249	3	.042	15	-.03	3	-.001	1	0	3	0	6
23		12	max	350.206	1	.136	6	.715	1	0	12	.001	4	0	15
24			min	-359.162	3	.031	15	-.042	5	-.001	1	0	3	0	6
25		13	max	350.323	1	.098	2	.715	1	0	12	.001	1	0	15
26			min	-359.074	3	.018	12	-.148	5	-.001	1	0	3	0	6
27		14	max	350.439	1	.063	2	.715	1	0	12	.001	1	0	15
28			min	-358.987	3	-.002	3	-.253	5	-.001	1	0	3	0	6

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
29		15	max	350.556	1	.027	2	.715	1	0	12	.001	1	0	15
30			min	-358.9	3	-.029	3	-.359	5	-.001	1	0	3	0	6
31		16	max	350.672	1	-.008	2	.715	1	0	12	.002	1	0	15
32			min	-358.812	3	-.056	3	-.464	5	-.001	1	0	3	0	6
33		17	max	350.788	1	-.022	15	.715	1	0	12	.002	1	0	15
34			min	-358.725	3	-.093	4	-.57	5	-.001	1	0	3	0	6
35		18	max	350.905	1	-.033	15	.715	1	0	12	.002	1	0	15
36			min	-358.638	3	-.138	4	-.675	5	-.001	1	0	3	0	6
37		19	max	351.021	1	-.044	15	.715	1	0	12	.002	1	0	15
38			min	-358.55	3	-.184	4	-.781	5	-.001	1	0	3	0	6
39	M3	1	max	102.182	2	1.774	6	-.037	12	0	5	.002	1	0	6
40			min	-128.742	3	.417	15	-1.491	4	0	1	0	12	0	15
41		2	max	102.114	2	1.597	6	-.037	12	0	5	.002	1	0	2
42			min	-128.794	3	.375	15	-1.357	4	0	1	0	12	0	15
43		3	max	102.045	2	1.42	6	-.037	12	0	5	.002	1	0	2
44			min	-128.845	3	.333	15	-1.224	4	0	1	0	12	0	3
45		4	max	101.976	2	1.243	6	-.037	12	0	5	.002	1	0	15
46			min	-128.897	3	.292	15	-1.09	4	0	1	0	5	0	4
47		5	max	101.908	2	1.065	6	-.037	12	0	5	.002	1	0	15
48			min	-128.948	3	.25	15	-.956	4	0	1	0	5	0	4
49		6	max	101.839	2	.888	6	-.037	12	0	5	.002	1	0	15
50			min	-129	3	.208	15	-.823	4	0	1	0	5	0	4
51		7	max	101.771	2	.711	6	-.037	12	0	5	.001	1	0	15
52			min	-129.051	3	.167	15	-.747	1	0	1	0	5	0	4
53		8	max	101.702	2	.534	6	-.037	12	0	5	.001	1	0	15
54			min	-129.103	3	.125	15	-.747	1	0	1	0	5	-.001	4
55		9	max	101.633	2	.356	6	-.037	12	0	5	.001	1	0	15
56			min	-129.154	3	.083	15	-.747	1	0	1	0	5	-.001	4
57		10	max	101.565	2	.179	6	-.037	12	0	5	0	1	0	15
58			min	-129.205	3	.042	15	-.747	1	0	1	0	5	-.001	4
59		11	max	101.496	2	.024	2	.001	15	0	5	0	1	0	15
60			min	-129.257	3	-.021	3	-.747	1	0	1	0	5	-.001	4
61		12	max	101.428	2	-.042	15	.134	5	0	5	0	1	0	15
62			min	-129.308	3	-.175	4	-.747	1	0	1	0	5	-.001	4
63		13	max	101.359	2	-.083	15	.267	5	0	5	0	1	0	15
64			min	-129.36	3	-.352	4	-.747	1	0	1	0	5	-.001	4
65		14	max	101.29	2	-.125	15	.401	5	0	5	0	1	0	15
66			min	-129.411	3	-.53	4	-.747	1	0	1	0	5	-.001	4
67		15	max	101.222	2	-.167	15	.535	5	0	5	0	1	0	15
68			min	-129.463	3	-.707	4	-.747	1	0	1	0	5	0	4
69		16	max	101.153	2	-.208	15	.668	5	0	5	0	12	0	15
70			min	-129.514	3	-.884	4	-.747	1	0	1	0	4	0	4
71		17	max	101.085	2	-.25	15	.802	5	0	5	0	12	0	15
72			min	-129.566	3	-1.061	4	-.747	1	0	1	0	4	0	4
73		18	max	101.016	2	-.292	15	.935	5	0	5	0	12	0	15
74			min	-129.617	3	-1.238	4	-.747	1	0	1	0	1	0	4
75		19	max	100.947	2	-.333	15	1.069	5	0	5	0	5	0	1
76			min	-129.669	3	-1.416	4	-.747	1	0	1	0	1	0	1
77	M4	1	max	503.515	1	0	1	-.167	12	0	1	0	5	0	1
78			min	-25.225	3	0	1	-33.644	4	0	1	0	1	0	1
79		2	max	503.58	1	0	1	-.167	12	0	1	0	12	0	1
80			min	-25.176	3	0	1	-33.7	4	0	1	-.003	4	0	1
81		3	max	503.644	1	0	1	-.167	12	0	1	0	12	0	1
82			min	-25.128	3	0	1	-33.756	4	0	1	-.006	4	0	1
83		4	max	503.709	1	0	1	-.167	12	0	1	0	12	0	1
84			min	-25.079	3	0	1	-33.812	4	0	1	-.009	4	0	1
85		5	max	503.774	1	0	1	-.167	12	0	1	0	12	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
86			min	-25.031	3	0	1	-33.868	4	0	1	-.012	4	0	1
87		6	max	503.839	1	0	1	-.167	12	0	1	0	12	0	1
88			min	-24.982	3	0	1	-33.924	4	0	1	-.015	4	0	1
89		7	max	503.903	1	0	1	-.167	12	0	1	0	12	0	1
90			min	-24.934	3	0	1	-33.98	4	0	1	-.018	4	0	1
91		8	max	503.968	1	0	1	-.167	12	0	1	0	12	0	1
92			min	-24.885	3	0	1	-34.036	4	0	1	-.021	4	0	1
93		9	max	504.033	1	0	1	-.167	12	0	1	0	12	0	1
94			min	-24.837	3	0	1	-34.092	4	0	1	-.024	4	0	1
95		10	max	504.097	1	0	1	-.167	12	0	1	0	12	0	1
96			min	-24.788	3	0	1	-34.149	4	0	1	-.027	4	0	1
97		11	max	504.162	1	0	1	-.167	12	0	1	0	12	0	1
98			min	-24.74	3	0	1	-34.205	4	0	1	-.03	4	0	1
99		12	max	504.227	1	0	1	-.167	12	0	1	0	12	0	1
100			min	-24.691	3	0	1	-34.261	4	0	1	-.033	4	0	1
101		13	max	504.291	1	0	1	-.167	12	0	1	0	12	0	1
102			min	-24.643	3	0	1	-34.317	4	0	1	-.036	4	0	1
103		14	max	504.356	1	0	1	-.167	12	0	1	0	12	0	1
104			min	-24.594	3	0	1	-34.373	4	0	1	-.04	4	0	1
105		15	max	504.421	1	0	1	-.167	12	0	1	0	12	0	1
106			min	-24.545	3	0	1	-34.429	4	0	1	-.043	4	0	1
107		16	max	504.486	1	0	1	-.167	12	0	1	0	12	0	1
108			min	-24.497	3	0	1	-34.485	4	0	1	-.046	4	0	1
109		17	max	504.55	1	0	1	-.167	12	0	1	0	12	0	1
110			min	-24.448	3	0	1	-34.541	4	0	1	-.049	4	0	1
111		18	max	504.615	1	0	1	-.167	12	0	1	0	12	0	1
112			min	-24.4	3	0	1	-34.597	4	0	1	-.052	4	0	1
113		19	max	504.68	1	0	1	-.167	12	0	1	0	12	0	1
114			min	-24.351	3	0	1	-34.653	4	0	1	-.055	4	0	1
115	M6	1	max	1141.044	1	.628	6	1.183	4	0	1	0	3	0	1
116			min	-1174.157	3	.142	15	-.12	3	0	5	0	11	0	1
117		2	max	1141.161	1	.582	6	1.077	4	0	1	0	4	0	15
118			min	-1174.069	3	.131	15	-.12	3	0	5	0	11	0	6
119		3	max	1141.277	1	.537	6	.972	4	0	1	0	4	0	15
120			min	-1173.982	3	.121	15	-.12	3	0	5	0	10	0	6
121		4	max	1141.393	1	.491	6	.866	4	0	1	0	4	0	15
122			min	-1173.895	3	.11	15	-.12	3	0	5	0	10	0	6
123		5	max	1141.51	1	.448	2	.761	4	0	1	0	4	0	15
124			min	-1173.807	3	.099	15	-.12	3	0	5	0	12	0	6
125		6	max	1141.626	1	.412	2	.655	4	0	1	0	4	0	15
126			min	-1173.72	3	.088	15	-.12	3	0	5	0	3	0	6
127		7	max	1141.743	1	.377	2	.55	4	0	1	0	4	0	15
128			min	-1173.633	3	.078	15	-.12	3	0	5	0	3	0	6
129		8	max	1141.859	1	.341	2	.444	4	0	1	.001	4	0	15
130			min	-1173.546	3	.067	15	-.12	3	0	5	0	3	0	6
131		9	max	1141.975	1	.306	2	.339	4	0	1	.001	4	0	15
132			min	-1173.458	3	.05	12	-.12	3	0	5	0	3	0	2
133		10	max	1142.092	1	.27	2	.26	14	0	1	.001	4	0	15
134			min	-1173.371	3	.032	12	-.12	3	0	5	0	3	0	2
135		11	max	1142.208	1	.234	2	.219	1	0	1	.001	4	0	15
136			min	-1173.284	3	.012	3	-.12	3	0	5	0	3	0	2
137		12	max	1142.325	1	.199	2	.219	1	0	1	.001	4	0	15
138			min	-1173.196	3	-.015	3	-.12	3	0	5	0	3	0	2
139		13	max	1142.441	1	.163	2	.219	1	0	1	.001	4	0	15
140			min	-1173.109	3	-.042	3	-.164	5	0	5	0	3	0	2
141		14	max	1142.557	1	.128	2	.219	1	0	1	.001	4	0	15
142			min	-1173.022	3	-.068	3	-.27	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	1142.674	1	.092	2	.219	1	0	1	.001	4	0	15
144			min	-1172.934	3	-.095	3	-.375	5	0	5	0	3	0	2
145		16	max	1142.79	1	.057	2	.219	1	0	1	.001	4	0	12
146			min	-1172.847	3	-.122	3	-.481	5	0	5	0	3	0	2
147		17	max	1142.907	1	.021	2	.219	1	0	1	0	4	0	12
148			min	-1172.76	3	-.148	3	-.586	5	0	5	0	3	0	2
149		18	max	1143.023	1	-.015	2	.219	1	0	1	0	4	0	12
150			min	-1172.673	3	-.175	3	-.692	5	0	5	0	3	0	2
151		19	max	1143.139	1	-.05	2	.219	1	0	1	0	14	0	12
152			min	-1172.585	3	-.202	3	-.797	5	0	5	0	3	0	2
153	M7	1	max	466.953	2	1.788	4	.017	1	0	2	0	4	0	2
154			min	-397.893	3	.425	15	-1.394	5	0	3	0	3	0	12
155		2	max	466.885	2	1.611	4	.017	1	0	2	0	4	0	2
156			min	-397.945	3	.383	15	-1.26	5	0	3	0	3	0	3
157		3	max	466.816	2	1.434	4	.017	1	0	2	0	4	0	2
158			min	-397.996	3	.342	15	-1.127	5	0	3	0	3	0	3
159		4	max	466.747	2	1.257	4	.017	1	0	2	0	2	0	2
160			min	-398.048	3	.3	15	-.993	5	0	3	0	3	0	3
161		5	max	466.679	2	1.079	4	.017	1	0	2	0	2	0	15
162			min	-398.099	3	.258	15	-.859	5	0	3	0	5	0	3
163		6	max	466.61	2	.902	4	.017	1	0	2	0	2	0	15
164			min	-398.15	3	.217	15	-.726	5	0	3	0	5	0	6
165		7	max	466.542	2	.725	4	.017	1	0	2	0	2	0	15
166			min	-398.202	3	.175	15	-.592	5	0	3	0	5	0	6
167		8	max	466.473	2	.548	4	.017	1	0	2	0	2	0	15
168			min	-398.253	3	.133	15	-.459	5	0	3	0	5	-.001	6
169		9	max	466.404	2	.371	4	.017	1	0	2	0	2	0	15
170			min	-398.305	3	.089	12	-.325	5	0	3	0	5	-.001	6
171		10	max	466.336	2	.223	2	.017	1	0	2	0	2	0	15
172			min	-398.356	3	.02	12	-.191	5	0	3	0	5	-.001	6
173		11	max	466.267	2	.085	2	.017	1	0	2	0	2	0	15
174			min	-398.408	3	-.083	3	-.058	5	0	3	0	5	-.001	6
175		12	max	466.199	2	-.033	15	.08	4	0	2	0	2	0	15
176			min	-398.459	3	-.186	3	-.003	10	0	3	0	5	-.001	6
177		13	max	466.13	2	-.075	15	.213	4	0	2	0	2	0	15
178			min	-398.511	3	-.339	6	-.003	10	0	3	0	5	-.001	6
179		14	max	466.061	2	-.117	15	.347	4	0	2	0	2	0	15
180			min	-398.562	3	-.516	6	-.003	10	0	3	0	5	-.001	6
181		15	max	465.993	2	-.158	15	.481	4	0	2	0	2	0	15
182			min	-398.614	3	-.693	6	-.003	10	0	3	0	5	0	6
183		16	max	465.924	2	-.2	15	.614	4	0	2	0	2	0	15
184			min	-398.665	3	-.87	6	-.003	10	0	3	0	5	0	6
185		17	max	465.856	2	-.242	15	.748	4	0	2	0	2	0	15
186			min	-398.716	3	-1.047	6	-.003	10	0	3	0	5	0	6
187		18	max	465.787	2	-.283	15	.881	4	0	2	0	2	0	15
188			min	-398.768	3	-1.225	6	-.003	10	0	3	0	5	0	6
189		19	max	465.718	2	-.325	15	1.015	4	0	2	0	2	0	1
190			min	-398.819	3	-1.402	6	-.003	10	0	3	0	3	0	1
191	M8	1	max	1373.755	1	0	1	.868	1	0	1	0	4	0	1
192			min	-113.407	3	0	1	-33.722	4	0	1	0	1	0	1
193		2	max	1373.82	1	0	1	.868	1	0	1	0	1	0	1
194			min	-113.359	3	0	1	-33.778	4	0	1	-.003	4	0	1
195		3	max	1373.884	1	0	1	.868	1	0	1	0	1	0	1
196			min	-113.31	3	0	1	-33.835	4	0	1	-.006	4	0	1
197		4	max	1373.949	1	0	1	.868	1	0	1	0	1	0	1
198			min	-113.262	3	0	1	-33.891	4	0	1	-.009	4	0	1
199		5	max	1374.014	1	0	1	.868	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	-113.213	3	0	1	-33.947	4	0	1	-.012	4	0	1
201		6	max	1374.079	1	0	1	.868	1	0	1	0	1	0	1
202			min	-113.164	3	0	1	-34.003	4	0	1	-.015	4	0	1
203		7	max	1374.143	1	0	1	.868	1	0	1	0	1	0	1
204			min	-113.116	3	0	1	-34.059	4	0	1	-.018	4	0	1
205		8	max	1374.208	1	0	1	.868	1	0	1	0	1	0	1
206			min	-113.067	3	0	1	-34.115	4	0	1	-.021	4	0	1
207		9	max	1374.273	1	0	1	.868	1	0	1	0	1	0	1
208			min	-113.019	3	0	1	-34.171	4	0	1	-.024	4	0	1
209		10	max	1374.337	1	0	1	.868	1	0	1	0	1	0	1
210			min	-112.97	3	0	1	-34.227	4	0	1	-.027	4	0	1
211		11	max	1374.402	1	0	1	.868	1	0	1	0	1	0	1
212			min	-112.922	3	0	1	-34.283	4	0	1	-.03	4	0	1
213		12	max	1374.467	1	0	1	.868	1	0	1	0	1	0	1
214			min	-112.873	3	0	1	-34.339	4	0	1	-.033	4	0	1
215		13	max	1374.531	1	0	1	.868	1	0	1	0	1	0	1
216			min	-112.825	3	0	1	-34.395	4	0	1	-.037	4	0	1
217		14	max	1374.596	1	0	1	.868	1	0	1	.001	1	0	1
218			min	-112.776	3	0	1	-34.451	4	0	1	-.04	4	0	1
219		15	max	1374.661	1	0	1	.868	1	0	1	.001	1	0	1
220			min	-112.728	3	0	1	-34.507	4	0	1	-.043	4	0	1
221		16	max	1374.726	1	0	1	.868	1	0	1	.001	1	0	1
222			min	-112.679	3	0	1	-34.564	4	0	1	-.046	4	0	1
223		17	max	1374.79	1	0	1	.868	1	0	1	.001	1	0	1
224			min	-112.631	3	0	1	-34.62	4	0	1	-.049	4	0	1
225		18	max	1374.855	1	0	1	.868	1	0	1	.001	1	0	1
226			min	-112.582	3	0	1	-34.676	4	0	1	-.052	4	0	1
227		19	max	1374.92	1	0	1	.868	1	0	1	.001	1	0	1
228			min	-112.534	3	0	1	-34.732	4	0	1	-.055	4	0	1
229	M10	1	max	364.006	1	.665	4	1.376	5	.001	1	0	1	0	1
230			min	-344.492	3	.168	15	-.207	1	-.002	5	0	5	0	1
231		2	max	364.122	1	.619	4	1.27	5	.001	1	0	1	0	15
232			min	-344.404	3	.157	15	-.207	1	-.002	5	0	3	0	4
233		3	max	364.239	1	.574	4	1.165	5	.001	1	0	4	0	15
234			min	-344.317	3	.146	15	-.207	1	-.002	5	0	3	0	4
235		4	max	364.355	1	.528	4	1.059	5	.001	1	0	4	0	15
236			min	-344.23	3	.135	15	-.207	1	-.002	5	0	3	0	4
237		5	max	364.471	1	.482	4	.954	5	.001	1	0	4	0	15
238			min	-344.142	3	.125	15	-.207	1	-.002	5	0	3	0	4
239		6	max	364.588	1	.437	4	.848	5	.001	1	0	4	0	15
240			min	-344.055	3	.114	15	-.207	1	-.002	5	0	3	0	4
241		7	max	364.704	1	.391	4	.743	5	.001	1	.001	4	0	15
242			min	-343.968	3	.103	15	-.207	1	-.002	5	0	3	0	4
243		8	max	364.821	1	.345	4	.637	5	.001	1	.001	4	0	15
244			min	-343.88	3	.092	15	-.207	1	-.002	5	0	3	0	4
245		9	max	364.937	1	.3	4	.532	5	.001	1	.001	4	0	15
246			min	-343.793	3	.082	15	-.207	1	-.002	5	0	3	0	4
247		10	max	365.053	1	.254	4	.426	5	.001	1	.001	4	0	15
248			min	-343.706	3	.071	15	-.207	1	-.002	5	0	3	0	4
249		11	max	365.17	1	.208	4	.321	5	.001	1	.001	4	0	15
250			min	-343.619	3	.06	15	-.207	1	-.002	5	0	3	0	4
251		12	max	365.286	1	.163	4	.216	5	.001	1	.001	4	0	15
252			min	-343.531	3	.049	15	-.207	1	-.002	5	0	1	0	4
253		13	max	365.403	1	.117	4	.11	5	.001	1	.001	4	0	15
254			min	-343.444	3	.031	1	-.207	1	-.002	5	0	1	0	4
255		14	max	365.519	1	.071	4	.005	5	.001	1	.001	4	0	15
256			min	-343.357	3	-.004	1	-.207	1	-.002	5	0	1	0	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
257		15	max	365.635	1	.027	2	-.013	12	.001	1	.001	4	0	15
258			min	-343.269	3	-.04	1	-.207	1	-.002	5	0	1	0	4
259		16	max	365.752	1	.009	5	-.013	12	.001	1	.001	4	0	15
260			min	-343.182	3	-.076	1	-.228	4	-.002	5	0	1	0	4
261		17	max	365.868	1	-.004	15	-.013	12	.001	1	.001	4	0	15
262			min	-343.095	3	-.111	1	-.333	4	-.002	5	0	1	0	4
263		18	max	365.985	1	-.015	15	-.013	12	.001	1	.001	4	0	15
264			min	-343.007	3	-.147	1	-.439	4	-.002	5	0	1	0	4
265		19	max	366.101	1	-.026	15	-.013	12	.001	1	.001	5	0	15
266			min	-342.92	3	-.182	1	-.544	4	-.002	5	0	1	0	4
267	M11	1	max	101.941	2	1.768	6	.852	1	.002	4	.001	5	0	6
268			min	-129.374	3	.412	15	-1.181	5	0	10	-.002	1	0	15
269		2	max	101.872	2	1.591	6	.852	1	.002	4	.001	5	0	2
270			min	-129.426	3	.371	15	-1.048	5	0	10	-.002	1	0	12
271		3	max	101.804	2	1.414	6	.852	1	.002	4	0	5	0	2
272			min	-129.477	3	.329	15	-.914	5	0	10	-.002	1	0	3
273		4	max	101.735	2	1.237	6	.852	1	.002	4	0	5	0	15
274			min	-129.529	3	.287	15	-.781	5	0	10	-.002	1	0	4
275		5	max	101.667	2	1.059	6	.852	1	.002	4	0	5	0	15
276			min	-129.58	3	.246	15	-.647	5	0	10	-.002	1	0	4
277		6	max	101.598	2	.882	6	.852	1	.002	4	0	5	0	15
278			min	-129.631	3	.204	15	-.513	5	0	10	-.001	1	0	4
279		7	max	101.529	2	.705	6	.852	1	.002	4	0	5	0	15
280			min	-129.683	3	.162	15	-.38	5	0	10	-.001	1	0	4
281		8	max	101.461	2	.528	6	.852	1	.002	4	0	5	0	15
282			min	-129.734	3	.121	15	-.246	5	0	10	-.001	1	-.001	4
283		9	max	101.392	2	.351	6	.852	1	.002	4	0	3	0	15
284			min	-129.786	3	.079	15	-.112	5	0	10	0	1	-.001	4
285		10	max	101.324	2	.173	6	.852	1	.002	4	0	3	0	15
286			min	-129.837	3	.037	15	.013	15	0	10	0	1	-.001	4
287		11	max	101.255	2	.024	2	.852	1	.002	4	0	3	0	15
288			min	-129.889	3	-.039	3	.016	12	0	10	0	1	-.001	4
289		12	max	101.186	2	-.046	15	.852	1	.002	4	0	5	0	15
290			min	-129.94	3	-.181	4	.016	12	0	10	0	1	-.001	4
291		13	max	101.118	2	-.088	15	.852	1	.002	4	0	5	0	15
292			min	-129.992	3	-.359	4	.016	12	0	10	0	1	-.001	4
293		14	max	101.049	2	-.129	15	.852	1	.002	4	0	4	0	15
294			min	-130.043	3	-.536	4	.016	12	0	10	0	2	-.001	4
295		15	max	100.981	2	-.171	15	.865	4	.002	4	0	4	0	15
296			min	-130.095	3	-.713	4	.016	12	0	10	0	10	0	4
297		16	max	100.912	2	-.212	15	.998	4	.002	4	0	4	0	15
298			min	-130.146	3	-.89	4	.016	12	0	10	0	10	0	4
299		17	max	100.843	2	-.254	15	1.132	4	.002	4	0	4	0	15
300			min	-130.197	3	-1.067	4	.016	12	0	10	0	10	0	4
301		18	max	100.775	2	-.296	15	1.266	4	.002	4	.001	4	0	15
302			min	-130.249	3	-1.245	4	.016	12	0	10	0	10	0	4
303		19	max	100.706	2	-.337	15	1.399	4	.002	4	.002	4	0	1
304			min	-130.3	3	-1.422	4	.016	12	0	10	0	10	0	1
305	M12	1	max	503.191	1	0	1	4.471	1	0	1	0	4	0	1
306			min	-24.732	3	0	1	-30.798	5	0	1	0	3	0	1
307		2	max	503.255	1	0	1	4.471	1	0	1	0	1	0	1
308			min	-24.684	3	0	1	-30.854	5	0	1	-.003	5	0	1
309		3	max	503.32	1	0	1	4.471	1	0	1	0	1	0	1
310			min	-24.635	3	0	1	-30.91	5	0	1	-.005	5	0	1
311		4	max	503.385	1	0	1	4.471	1	0	1	.001	1	0	1
312			min	-24.587	3	0	1	-30.966	5	0	1	-.008	5	0	1
313		5	max	503.449	1	0	1	4.471	1	0	1	.002	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
314			min	-24.538	3	0	1	-31.022	5	0	1	-.011	5	0	1
315		6	max	503.514	1	0	1	4.471	1	0	1	.002	1	0	1
316			min	-24.489	3	0	1	-31.079	5	0	1	-.014	5	0	1
317		7	max	503.579	1	0	1	4.471	1	0	1	.002	1	0	1
318			min	-24.441	3	0	1	-31.135	5	0	1	-.017	5	0	1
319		8	max	503.643	1	0	1	4.471	1	0	1	.003	1	0	1
320			min	-24.392	3	0	1	-31.191	5	0	1	-.019	5	0	1
321		9	max	503.708	1	0	1	4.471	1	0	1	.003	1	0	1
322			min	-24.344	3	0	1	-31.247	5	0	1	-.022	5	0	1
323		10	max	503.773	1	0	1	4.471	1	0	1	.004	1	0	1
324			min	-24.295	3	0	1	-31.303	5	0	1	-.025	5	0	1
325		11	max	503.838	1	0	1	4.471	1	0	1	.004	1	0	1
326			min	-24.247	3	0	1	-31.359	5	0	1	-.028	5	0	1
327		12	max	503.902	1	0	1	4.471	1	0	1	.004	1	0	1
328			min	-24.198	3	0	1	-31.415	5	0	1	-.031	5	0	1
329		13	max	503.967	1	0	1	4.471	1	0	1	.005	1	0	1
330			min	-24.15	3	0	1	-31.471	5	0	1	-.033	5	0	1
331		14	max	504.032	1	0	1	4.471	1	0	1	.005	1	0	1
332			min	-24.101	3	0	1	-31.527	5	0	1	-.036	5	0	1
333		15	max	504.096	1	0	1	4.471	1	0	1	.006	1	0	1
334			min	-24.053	3	0	1	-31.583	5	0	1	-.039	5	0	1
335		16	max	504.161	1	0	1	4.471	1	0	1	.006	1	0	1
336			min	-24.004	3	0	1	-31.639	5	0	1	-.042	5	0	1
337		17	max	504.226	1	0	1	4.471	1	0	1	.006	1	0	1
338			min	-23.956	3	0	1	-31.695	5	0	1	-.045	5	0	1
339		18	max	504.291	1	0	1	4.471	1	0	1	.007	1	0	1
340			min	-23.907	3	0	1	-31.752	5	0	1	-.048	5	0	1
341		19	max	504.355	1	0	1	4.471	1	0	1	.007	1	0	1
342			min	-23.859	3	0	1	-31.808	5	0	1	-.05	5	0	1
343	M1	1	max	151.936	1	338.064	3	-3.77	12	0	1	.172	1	.013	1
344			min	6.042	12	-346.647	1	-87.301	1	0	3	.008	12	-.01	3
345		2	max	152.054	1	337.874	3	-3.77	12	0	1	.154	1	.088	1
346			min	6.101	12	-346.9	1	-87.301	1	0	3	.007	12	-.084	3
347		3	max	104.033	1	7.482	9	-3.787	12	0	12	.133	1	.162	1
348			min	-1.355	10	-18.915	3	-87.143	1	0	1	.006	12	-.156	3
349		4	max	104.151	1	7.271	9	-3.787	12	0	12	.114	1	.162	1
350			min	-1.257	10	-19.105	3	-87.143	1	0	1	.005	12	-.151	3
351		5	max	104.269	1	7.06	9	-3.787	12	0	12	.095	1	.162	1
352			min	-1.158	10	-19.295	3	-87.143	1	0	1	.005	12	-.147	3
353		6	max	104.387	1	6.849	9	-3.787	12	0	12	.077	1	.163	1
354			min	-1.06	10	-19.484	3	-87.143	1	0	1	.004	12	-.143	3
355		7	max	104.505	1	6.638	9	-3.787	12	0	12	.058	1	.163	1
356			min	-.962	10	-19.674	3	-87.143	1	0	1	.003	12	-.139	3
357		8	max	104.623	1	6.428	9	-3.787	12	0	12	.039	1	.163	1
358			min	-.863	10	-19.864	3	-87.143	1	0	1	.002	12	-.135	3
359		9	max	104.741	1	6.217	9	-3.787	12	0	12	.02	1	.164	1
360			min	-.765	10	-20.054	3	-87.143	1	0	1	.001	12	-.13	3
361		10	max	104.859	1	6.006	9	-3.787	12	0	12	.003	4	.164	1
362			min	-.667	10	-20.244	3	-87.143	1	0	1	0	10	-.126	3
363		11	max	104.977	1	5.795	9	-3.787	12	0	12	0	12	.165	1
364			min	-.568	10	-20.433	3	-87.143	1	0	1	-.018	1	-.121	3
365		12	max	105.095	1	5.584	9	-3.787	12	0	12	-.001	12	.169	2
366			min	-.47	10	-20.682	2	-87.143	1	0	1	-.037	1	-.117	3
367		13	max	105.213	1	5.373	9	-3.787	12	0	12	-.002	12	.174	2
368			min	-.371	10	-20.935	2	-87.143	1	0	1	-.056	1	-.112	3
369		14	max	105.331	1	5.162	9	-3.787	12	0	12	-.003	12	.178	2
370			min	-.273	10	-21.188	2	-87.143	1	0	1	-.075	1	-.108	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	105.449	1	4.951	9	-3.787	12	0	12	-.004	12	.183	2
372			min	-.175	10	-21.441	2	-87.143	1	0	1	-.094	1	-.103	3
373		16	max	88.885	2	56.918	2	-3.825	12	0	1	-.004	12	.187	2
374			min	-19.325	3	-123.229	3	-87.778	1	0	5	-.113	1	-.098	3
375		17	max	89.003	2	56.665	2	-3.825	12	0	1	-.005	12	.183	1
376			min	-19.236	3	-123.419	3	-87.778	1	0	5	-.132	1	-.071	3
377		18	max	-5.645	12	393.599	1	-3.993	12	0	5	-.006	12	.099	1
378			min	-151.416	1	-146.501	3	-89.99	1	0	1	-.152	1	-.039	3
379		19	max	-5.586	12	393.346	1	-3.993	12	0	5	-.007	12	.014	1
380			min	-151.298	1	-146.691	3	-89.99	1	0	1	-.171	1	-.008	3
381	M5	1	max	333.963	1	1115.91	3	-.101	10	0	1	.048	4	.021	3
382			min	9.181	15	-1145.125	1	-33.356	3	0	5	0	10	-.025	1
383		2	max	334.081	1	1115.72	3	-.101	10	0	1	.041	4	.223	1
384			min	9.216	15	-1145.378	1	-33.356	3	0	5	-.003	3	-.221	3
385		3	max	181.892	3	7.938	9	3.795	3	0	3	.035	4	.467	1
386			min	-19.562	10	-68.599	2	-25.962	4	0	4	-.01	3	-.458	3
387		4	max	181.98	3	7.727	9	3.795	3	0	3	.029	4	.472	1
388			min	-19.464	10	-68.852	2	-25.72	4	0	4	-.009	3	-.445	3
389		5	max	182.069	3	7.516	9	3.795	3	0	3	.024	4	.478	1
390			min	-19.365	10	-69.105	2	-25.478	4	0	4	-.009	3	-.431	3
391		6	max	182.157	3	7.305	9	3.795	3	0	3	.018	4	.483	1
392			min	-19.267	10	-69.358	2	-25.236	4	0	4	-.008	3	-.417	3
393		7	max	182.246	3	7.094	9	3.795	3	0	3	.013	4	.489	1
394			min	-19.169	10	-69.611	2	-24.994	4	0	4	-.007	3	-.403	3
395		8	max	182.334	3	6.883	9	3.795	3	0	3	.007	4	.495	1
396			min	-19.07	10	-69.864	2	-24.752	4	0	4	-.006	3	-.389	3
397		9	max	182.423	3	6.673	9	3.795	3	0	3	.002	5	.5	1
398			min	-18.972	10	-70.117	2	-24.51	4	0	4	-.005	3	-.376	3
399		10	max	182.511	3	6.462	9	3.795	3	0	3	0	10	.506	1
400			min	-18.874	10	-70.37	2	-24.268	4	0	4	-.005	3	-.362	3
401		11	max	182.6	3	6.251	9	3.795	3	0	3	0	10	.512	1
402			min	-18.775	10	-70.623	2	-24.026	4	0	4	-.008	4	-.348	3
403		12	max	182.689	3	6.04	9	3.795	3	0	3	0	10	.518	1
404			min	-18.677	10	-70.876	2	-23.784	4	0	4	-.014	4	-.334	3
405		13	max	182.777	3	5.829	9	3.795	3	0	3	0	10	.525	2
406			min	-18.579	10	-71.129	2	-23.542	4	0	4	-.019	4	-.32	3
407		14	max	182.866	3	5.618	9	3.795	3	0	3	0	10	.54	2
408			min	-18.48	10	-71.382	2	-23.3	4	0	4	-.024	4	-.306	3
409		15	max	182.954	3	5.407	9	3.795	3	0	3	0	10	.555	2
410			min	-18.382	10	-71.635	2	-23.058	4	0	4	-.029	4	-.292	3
411		16	max	307.512	2	295.411	2	3.771	3	0	1	0	3	.568	2
412			min	-65.101	3	-377.203	3	-21.816	4	0	4	-.034	4	-.275	3
413		17	max	307.63	2	295.158	2	3.771	3	0	1	0	3	.529	1
414			min	-65.013	3	-377.392	3	-21.574	4	0	4	-.039	4	-.193	3
415		18	max	-11.47	12	1294.087	1	3.468	3	0	4	.002	3	.253	1
416			min	-334.943	1	-480.77	3	-53.722	5	0	1	-.05	4	-.089	3
417		19	max	-11.411	12	1293.834	1	3.468	3	0	4	.002	3	.015	3
418			min	-334.825	1	-480.96	3	-53.48	5	0	1	-.062	4	-.028	1
419	M9	1	max	151.215	1	338.046	3	227.109	4	0	3	-.003	15	.013	1
420			min	3.626	15	-346.627	1	8.259	10	0	1	-.172	1	-.01	3
421		2	max	151.333	1	337.857	3	227.351	4	0	3	.041	5	.088	1
422			min	3.662	15	-346.88	1	8.259	10	0	1	-.147	1	-.084	3
423		3	max	103.948	1	7.453	9	82.142	1	0	1	.084	5	.162	1
424			min	-.833	10	-18.856	3	-32.789	5	0	5	-.12	1	-.156	3
425		4	max	104.066	1	7.242	9	82.142	1	0	1	.076	5	.162	1
426			min	-.735	10	-19.046	3	-32.547	5	0	5	-.102	1	-.151	3
427		5	max	104.184	1	7.031	9	82.142	1	0	1	.069	5	.162	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
428			min	-.636	10	-19.236	3	-32.305	5	0	5	-.085	1	-.147	3
429		6	max	104.302	1	6.821	9	82.142	1	0	1	.062	5	.163	1
430			min	-.538	10	-19.425	3	-32.063	5	0	5	-.067	1	-.143	3
431		7	max	104.42	1	6.61	9	82.142	1	0	1	.055	5	.163	1
432			min	-.439	10	-19.615	3	-31.821	5	0	5	-.049	1	-.139	3
433		8	max	104.538	1	6.399	9	82.142	1	0	1	.049	5	.163	1
434			min	-.341	10	-19.805	3	-31.579	5	0	5	-.031	1	-.135	3
435		9	max	104.656	1	6.188	9	82.142	1	0	1	.042	5	.164	1
436			min	-.243	10	-19.995	3	-31.337	5	0	5	-.013	1	-.13	3
437		10	max	104.774	1	5.977	9	82.142	1	0	1	.035	4	.164	1
438			min	-.144	10	-20.189	2	-31.095	5	0	5	0	2	-.126	3
439		11	max	104.892	1	5.766	9	82.142	1	0	1	.032	4	.165	1
440			min	-.046	10	-20.442	2	-30.853	5	0	5	.002	10	-.121	3
441		12	max	105.01	1	5.555	9	82.142	1	0	1	.04	1	.169	2
442			min	.052	10	-20.695	2	-30.611	5	0	5	.003	10	-.117	3
443		13	max	105.128	1	5.344	9	82.142	1	0	1	.058	1	.174	2
444			min	.151	10	-20.948	2	-30.369	5	0	5	.004	12	-.113	3
445		14	max	105.246	1	5.133	9	82.142	1	0	1	.076	1	.178	2
446			min	.249	10	-21.201	2	-30.127	5	0	5	.005	12	-.108	3
447		15	max	105.364	1	4.922	9	82.142	1	0	1	.094	1	.183	2
448			min	.347	10	-21.454	2	-29.885	5	0	5	.001	15	-.103	3
449		16	max	89.189	2	56.717	2	82.894	1	0	10	.113	1	.187	2
450			min	-19.378	3	-123.675	3	-28.426	5	0	4	-.002	5	-.098	3
451		17	max	89.307	2	56.464	2	82.894	1	0	10	.131	1	.183	1
452			min	-19.29	3	-123.864	3	-28.184	5	0	4	-.009	5	-.071	3
453		18	max	.96	5	393.599	1	87.412	1	0	1	.15	1	.099	1
454			min	-151.109	1	-146.499	3	-58.64	5	0	3	-.021	5	-.039	3
455		19	max	1.015	5	393.346	1	87.412	1	0	1	.169	1	.014	1
456			min	-150.991	1	-146.689	3	-58.398	5	0	3	-.034	5	-.008	3
457	M13	1	max	227.125	4	346.012	1	-3.626	15	.013	1	.172	1	0	1
458			min	8.263	10	-338.031	3	-151.196	1	-.01	3	.003	15	0	3
459		2	max	218.324	4	244.205	1	-2.331	15	.013	1	.053	1	.256	3
460			min	8.263	10	-238.488	3	-115.801	1	-.01	3	0	15	-.262	1
461		3	max	209.522	4	142.398	1	-1.036	15	.013	1	.002	3	.424	3
462			min	8.263	10	-138.946	3	-80.406	1	-.01	3	-.034	1	-.434	1
463		4	max	200.721	4	40.591	1	.292	5	.013	1	-.001	12	.503	3
464			min	8.263	10	-39.403	3	-45.01	1	-.01	3	-.09	1	-.515	1
465		5	max	191.919	4	60.14	3	2.294	5	.013	1	-.001	15	.494	3
466			min	8.263	10	-61.215	1	-9.615	1	-.01	3	-.114	1	-.506	1
467		6	max	183.118	4	159.683	3	25.78	1	.013	1	0	5	.396	3
468			min	8.263	10	-163.022	1	.402	12	-.01	3	-.107	1	-.407	1
469		7	max	174.317	4	259.225	3	61.176	1	.013	1	.006	5	.21	3
470			min	8.263	10	-264.829	1	1.665	12	-.01	3	-.068	1	-.216	1
471		8	max	165.515	4	358.768	3	96.571	1	.013	1	.012	4	.064	1
472			min	8.263	10	-366.636	1	2.929	12	-.01	3	0	3	-.065	3
473		9	max	156.714	4	458.311	3	131.966	1	.013	1	.104	1	.435	1
474			min	8.263	10	-468.443	1	4.192	12	-.01	3	.003	12	-.428	3
475		10	max	147.912	4	557.853	3	167.362	1	.011	2	.237	1	.897	1
476			min	8.263	10	-570.249	1	5.455	12	-.013	1	.007	12	-.879	3
477		11	max	109.503	4	468.442	1	.14	15	.01	3	.099	1	.435	1
478			min	3.77	12	-458.311	3	-131.241	1	-.013	1	-.017	5	-.428	3
479		12	max	100.702	4	366.636	1	1.928	5	.01	3	.001	2	.064	1
480			min	3.77	12	-358.768	3	-95.845	1	-.013	1	-.017	4	-.065	3
481		13	max	91.9	4	264.829	1	3.931	5	.01	3	-.004	12	.21	3
482			min	3.77	12	-259.225	3	-60.45	1	-.013	1	-.071	1	-.216	1
483		14	max	87.623	1	163.022	1	5.933	5	.01	3	-.005	12	.396	3
484			min	3.77	12	-159.683	3	-25.055	1	-.013	1	-.109	1	-.407	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
485		15	max	87.623	1	61.215	1	10.341	1	.01	3	-.002	15	.494	3
486			min	3.77	12	-60.14	3	.644	10	-.013	1	-.116	1	-.506	1
487		16	max	87.623	1	39.403	3	45.736	1	.01	3	.005	5	.503	3
488			min	3.77	12	-40.592	1	2.253	12	-.013	1	-.091	1	-.515	1
489		17	max	87.623	1	138.946	3	81.131	1	.01	3	.015	5	.424	3
490			min	3.77	12	-142.398	1	3.516	12	-.013	1	-.035	1	-.434	1
491		18	max	87.623	1	238.488	3	116.526	1	.01	3	.053	1	.256	3
492			min	3.77	12	-244.205	1	4.779	12	-.013	1	.003	12	-.262	1
493		19	max	87.623	1	338.031	3	151.922	1	.01	3	.172	1	0	1
494			min	3.77	12	-346.012	1	6.043	12	-.013	1	.008	12	0	3
495	M16	1	max	58.395	5	394.005	1	1.015	5	.008	3	.169	1	0	1
496			min	-87.062	1	-146.714	3	-151.006	1	-.014	1	-.034	5	0	3
497		2	max	49.594	5	278.069	1	3.018	5	.008	3	.05	1	.111	3
498			min	-87.062	1	-103.684	3	-115.611	1	-.014	1	-.032	5	-.299	1
499		3	max	40.792	5	162.134	1	5.021	5	.008	3	-.001	12	.184	3
500			min	-87.062	1	-60.654	3	-80.216	1	-.014	1	-.037	1	-.494	1
501		4	max	31.991	5	46.199	1	7.024	5	.008	3	-.003	12	.219	3
502			min	-87.062	1	-17.625	3	-44.82	1	-.014	1	-.092	1	-.587	1
503		5	max	23.189	5	25.405	3	9.026	5	.008	3	-.005	12	.216	3
504			min	-87.062	1	-69.736	1	-9.425	1	-.014	1	-.116	1	-.576	1
505		6	max	14.388	5	68.435	3	25.97	1	.008	3	-.005	15	.174	3
506			min	-87.062	1	-185.671	1	.575	12	-.014	1	-.109	1	-.463	1
507		7	max	5.586	5	111.465	3	61.366	1	.008	3	.004	5	.094	3
508			min	-87.062	1	-301.607	1	1.838	12	-.014	1	-.07	1	-.246	1
509		8	max	-1.896	12	154.495	3	96.761	1	.008	3	.016	4	.073	1
510			min	-87.062	1	-417.542	1	3.101	12	-.014	1	-.002	3	-.024	3
511		9	max	-1.896	12	197.524	3	132.156	1	.008	3	.102	1	.496	1
512			min	-87.062	1	-533.477	1	4.364	12	-.014	1	.002	12	-.181	3
513		10	max	32.695	5	-15.548	15	167.551	1	.005	14	.235	1	1.022	1
514			min	-89.682	1	-649.412	1	-8.647	3	-.014	1	.008	12	-.375	3
515		11	max	23.894	5	533.477	1	.146	15	.014	1	.102	1	.496	1
516			min	-89.682	1	-197.524	3	-131.849	1	-.008	3	-.015	5	-.181	3
517		12	max	15.092	5	417.542	1	1.934	5	.014	1	.001	2	.073	1
518			min	-89.682	1	-154.495	3	-96.454	1	-.008	3	-.015	4	-.024	3
519		13	max	6.291	5	301.606	1	3.936	5	.014	1	-.003	12	.094	3
520			min	-89.682	1	-111.465	3	-61.059	1	-.008	3	-.069	1	-.246	1
521		14	max	-1.553	15	185.671	1	5.939	5	.014	1	-.004	12	.174	3
522			min	-89.682	1	-68.435	3	-25.664	1	-.008	3	-.108	1	-.463	1
523		15	max	-3.992	12	69.736	1	10.192	4	.014	1	0	15	.216	3
524			min	-89.682	1	-25.405	3	.533	12	-.008	3	-.115	1	-.576	1
525		16	max	-3.992	12	17.625	3	45.127	1	.014	1	.007	5	.219	3
526			min	-89.682	1	-46.199	1	1.796	12	-.008	3	-.091	1	-.587	1
527		17	max	-3.992	12	60.654	3	80.522	1	.014	1	.017	5	.184	3
528			min	-89.682	1	-162.134	1	3.059	12	-.008	3	-.035	1	-.494	1
529		18	max	-3.992	12	103.684	3	115.918	1	.014	1	.053	1	.111	3
530			min	-89.682	1	-278.07	1	4.323	12	-.008	3	.003	12	-.299	1
531		19	max	-3.992	12	146.714	3	151.313	1	.014	1	.171	1	0	1
532			min	-89.682	1	-394.005	1	5.586	12	-.008	3	.007	12	0	5
533	M15	1	max	0	2	2.173	1	.028	3	0	1	0	1	0	1
534			min	-39.351	3	0	2	-.03	1	0	3	0	3	0	1
535		2	max	0	2	1.932	1	.028	3	0	1	0	1	0	2
536			min	-39.416	3	0	2	-.03	1	0	3	0	3	0	1
537		3	max	0	2	1.69	1	.028	3	0	1	0	1	0	2
538			min	-39.481	3	0	2	-.03	1	0	3	0	3	-.002	1
539		4	max	0	2	1.449	1	.028	3	0	1	0	1	0	2
540			min	-39.547	3	0	2	-.03	1	0	3	0	3	-.003	1
541		5	max	0	2	1.207	1	.028	3	0	1	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
542			min	-39.612	3	0	2	-.03	1	0	3	0	3	-.003	1
543		6	max	0	2	.966	1	.028	3	0	1	0	1	0	2
544			min	-39.677	3	0	2	-.03	1	0	3	0	3	-.004	1
545		7	max	0	2	.724	1	.028	3	0	1	0	3	0	2
546			min	-39.742	3	0	2	-.03	1	0	3	0	1	-.004	1
547		8	max	0	2	.483	1	.028	3	0	1	0	3	0	2
548			min	-39.807	3	0	2	-.03	1	0	3	0	1	-.004	1
549		9	max	0	2	.241	1	.028	3	0	1	0	3	0	2
550			min	-39.873	3	0	2	-.03	1	0	3	0	1	-.005	1
551		10	max	0	2	0	1	.028	3	0	1	0	3	0	2
552			min	-39.938	3	0	1	-.03	1	0	3	0	1	-.005	1
553		11	max	0	2	0	2	.028	3	0	1	0	3	0	2
554			min	-40.003	3	-.241	1	-.03	1	0	3	0	1	-.005	1
555		12	max	0	2	0	2	.028	3	0	1	0	3	0	2
556			min	-40.068	3	-.483	1	-.03	1	0	3	0	1	-.004	1
557		13	max	0	2	0	2	.028	3	0	1	0	3	0	2
558			min	-40.133	3	-.724	1	-.03	1	0	3	0	1	-.004	1
559		14	max	0	2	0	2	.028	3	0	1	0	3	0	2
560			min	-40.198	3	-.966	1	-.03	1	0	3	0	1	-.004	1
561		15	max	0	2	0	2	.028	3	0	1	0	3	0	2
562			min	-40.264	3	-1.207	1	-.03	1	0	3	0	1	-.003	1
563		16	max	0	2	0	2	.028	3	0	1	0	3	0	2
564			min	-40.329	3	-1.449	1	-.03	1	0	3	0	1	-.003	1
565		17	max	0	2	0	2	.028	3	0	1	0	3	0	2
566			min	-40.394	3	-1.69	1	-.03	1	0	3	0	1	-.002	1
567		18	max	0	2	0	2	.028	3	0	1	0	3	0	2
568			min	-40.459	3	-1.932	1	-.03	1	0	3	0	1	0	1
569		19	max	0	2	0	2	.028	3	0	1	0	3	0	1
570			min	-40.524	3	-2.173	1	-.03	1	0	3	0	1	0	1
571	M16A	1	max	-.947	10	3.463	4	.249	4	0	3	0	3	0	1
572			min	-262.409	4	1.087	12	-.012	3	0	1	0	4	0	1
573		2	max	-.875	10	3.078	4	.225	4	0	3	0	3	0	12
574			min	-262.505	4	.966	12	-.012	3	0	1	0	4	-.002	4
575		3	max	-.802	10	2.693	4	.2	4	0	3	0	3	0	12
576			min	-262.601	4	.845	12	-.012	3	0	1	0	4	-.003	4
577		4	max	-.73	10	2.309	4	.176	4	0	3	0	3	-.001	12
578			min	-262.698	4	.724	12	-.012	3	0	1	0	4	-.004	4
579		5	max	-.657	10	1.924	4	.151	4	0	3	0	3	-.002	12
580			min	-262.794	4	.604	12	-.012	3	0	1	0	1	-.005	4
581		6	max	-.585	10	1.539	4	.127	4	0	3	0	5	-.002	12
582			min	-262.891	4	.483	12	-.012	3	0	1	0	1	-.006	4
583		7	max	-.512	10	1.154	4	.102	4	0	3	0	5	-.002	12
584			min	-262.987	4	.362	12	-.012	3	0	1	0	1	-.007	4
585		8	max	-.44	10	.77	4	.078	4	0	3	0	5	-.002	12
586			min	-263.084	4	.241	12	-.012	3	0	1	0	1	-.007	4
587		9	max	-.368	10	.385	4	.053	4	0	3	0	5	-.002	12
588			min	-263.18	4	.121	12	-.012	3	0	1	0	1	-.007	4
589		10	max	-.295	10	0	1	.029	4	0	3	0	5	-.002	12
590			min	-263.277	4	0	1	-.012	3	0	1	0	1	-.007	4
591		11	max	-.223	10	-.121	12	.021	1	0	3	0	5	-.002	12
592			min	-263.373	4	-.385	4	-.012	3	0	1	0	1	-.007	4
593		12	max	-.15	10	-.241	12	.021	1	0	3	0	5	-.002	12
594			min	-263.47	4	-.77	4	-.024	5	0	1	0	1	-.007	4
595		13	max	-.078	10	-.362	12	.021	1	0	3	0	5	-.002	12
596			min	-263.566	4	-1.154	4	-.048	5	0	1	0	3	-.007	4
597		14	max	-.005	10	-.483	12	.021	1	0	3	0	4	-.002	12
598			min	-263.662	4	-1.539	4	-.073	5	0	1	0	3	-.006	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
599		15	max	.067	10	-.604	12	.021	1	0	3	0	4	-.002	12
600			min	-263.759	4	-1.924	4	-.097	5	0	1	0	3	-.005	4
601		16	max	.139	10	-.724	12	.021	1	0	3	0	4	-.001	12
602			min	-263.855	4	-2.309	4	-.122	5	0	1	0	3	-.004	4
603		17	max	.212	10	-.845	12	.021	1	0	3	0	1	0	12
604			min	-263.952	4	-2.693	4	-.146	5	0	1	0	3	-.003	4
605		18	max	.284	10	-.966	12	.021	1	0	3	0	1	0	12
606			min	-264.048	4	-3.078	4	-.171	5	0	1	0	5	-.002	4
607		19	max	.357	10	-1.087	12	.021	1	0	3	0	1	0	1
608			min	-264.145	4	-3.463	4	-.195	5	0	1	0	5	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.003	1	.009	2	.016	1	1.917e-3	5	NC	3	NC	3
2			min	-.003	3	-.008	3	-.019	5	-1.374e-3	1	4215.442	2	2219.344	1
3		2	max	.003	1	.008	2	.015	1	1.943e-3	5	NC	3	NC	3
4			min	-.003	3	-.008	3	-.018	5	-1.316e-3	1	4581.023	2	2396.303	1
5		3	max	.003	1	.007	2	.014	1	1.969e-3	5	NC	3	NC	3
6			min	-.003	3	-.007	3	-.018	5	-1.258e-3	1	5012.318	2	2604.93	1
7		4	max	.003	1	.007	2	.013	1	1.996e-3	5	NC	3	NC	3
8			min	-.003	3	-.007	3	-.017	5	-1.2e-3	1	5524.52	2	2852.847	1
9		5	max	.002	1	.006	2	.012	1	2.022e-3	5	NC	1	NC	3
10			min	-.003	3	-.007	3	-.016	5	-1.142e-3	1	6137.688	2	3150.224	1
11		6	max	.002	1	.005	2	.01	1	2.048e-3	5	NC	1	NC	3
12			min	-.002	3	-.006	3	-.015	5	-1.084e-3	1	6878.728	2	3510.879	1
13		7	max	.002	1	.005	2	.009	1	2.075e-3	5	NC	1	NC	3
14			min	-.002	3	-.006	3	-.014	5	-1.026e-3	1	7784.406	2	3953.968	1
15		8	max	.002	1	.004	2	.008	1	2.101e-3	5	NC	1	NC	2
16			min	-.002	3	-.006	3	-.013	5	-9.677e-4	1	8906.063	2	4506.702	1
17		9	max	.002	1	.004	2	.007	1	2.127e-3	5	NC	1	NC	2
18			min	-.002	3	-.005	3	-.012	5	-9.096e-4	1	NC	1	5208.814	1
19		10	max	.002	1	.003	2	.006	1	2.154e-3	5	NC	1	NC	2
20			min	-.002	3	-.005	3	-.011	5	-8.516e-4	1	NC	1	6120.262	1
21		11	max	.001	1	.003	2	.005	1	2.18e-3	5	NC	1	NC	2
22			min	-.001	3	-.004	3	-.01	5	-7.935e-4	1	NC	1	7335.17	1
23		12	max	.001	1	.002	2	.004	1	2.207e-3	5	NC	1	NC	2
24			min	-.001	3	-.004	3	-.009	5	-7.354e-4	1	NC	1	9008.584	1
25		13	max	.001	1	.002	2	.003	1	2.233e-3	5	NC	1	NC	1
26			min	-.001	3	-.003	3	-.008	5	-6.773e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	2.259e-3	5	NC	1	NC	1
28			min	0	3	-.003	3	-.007	5	-6.192e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.002	1	2.286e-3	5	NC	1	NC	1
30			min	0	3	-.002	3	-.006	5	-5.611e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	.001	1	2.312e-3	5	NC	1	NC	1
32			min	0	3	-.002	3	-.004	5	-5.031e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	2.338e-3	5	NC	1	NC	1
34			min	0	3	-.001	3	-.003	5	-4.45e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	2.365e-3	5	NC	1	NC	1
36			min	0	3	0	3	-.001	5	-3.869e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	2.391e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-3.288e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.531e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	-1.113e-3	5	NC	1	NC	1
41		2	max	0	3	0	2	.006	5	1.906e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	-1.122e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
43		3	max	0	3	0	2	.012	5	2.281e-4	1	NC	1	NC	1
44			min	0	2	-.002	3	-.001	1	-1.132e-3	5	NC	1	8597.277	14
45		4	max	0	3	0	2	.017	5	2.656e-4	1	NC	1	NC	1
46			min	0	2	-.002	3	-.001	1	-1.142e-3	5	NC	1	5606.574	14
47		5	max	0	3	0	2	.023	5	3.031e-4	1	NC	1	NC	1
48			min	0	2	-.003	3	-.001	1	-1.151e-3	5	NC	1	4124.729	14
49		6	max	0	3	0	2	.029	5	3.406e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	-.001	1	-1.161e-3	5	NC	1	3244.965	14
51		7	max	0	3	0	2	.035	4	3.781e-4	1	NC	1	NC	1
52			min	0	2	-.005	3	-.001	1	-1.17e-3	5	NC	1	2665.23	14
53		8	max	0	3	.001	2	.041	4	4.156e-4	1	NC	1	NC	1
54			min	0	2	-.005	3	0	1	-1.18e-3	5	NC	1	2256.216	14
55		9	max	0	3	.002	2	.046	4	4.53e-4	1	NC	1	NC	1
56			min	0	2	-.006	3	0	2	-1.19e-3	5	NC	1	1953.361	14
57		10	max	0	3	.002	2	.052	4	4.905e-4	1	NC	1	NC	1
58			min	0	2	-.006	3	0	10	-1.199e-3	5	NC	1	1720.866	14
59		11	max	0	3	.003	2	.058	4	5.28e-4	1	NC	1	NC	1
60			min	0	2	-.007	3	0	10	-1.209e-3	5	NC	1	1537.298	14
61		12	max	0	3	.003	2	.064	4	5.655e-4	1	NC	1	NC	1
62			min	0	2	-.007	3	0	12	-1.219e-3	5	NC	1	1389.053	14
63		13	max	0	3	.004	2	.069	4	6.03e-4	1	NC	1	NC	1
64			min	0	2	-.008	3	0	12	-1.228e-3	5	NC	1	1267.083	14
65		14	max	.001	3	.005	2	.075	4	6.405e-4	1	NC	1	NC	1
66			min	0	2	-.008	3	0	12	-1.238e-3	5	9735.987	2	1165.146	14
67		15	max	.001	3	.006	2	.08	4	6.78e-4	1	NC	1	NC	2
68			min	0	2	-.008	3	0	12	-1.248e-3	5	8202.804	2	1078.792	14
69		16	max	.001	3	.007	2	.086	4	7.155e-4	1	NC	3	NC	2
70			min	0	2	-.008	3	0	12	-1.257e-3	5	7011.889	2	1004.769	14
71		17	max	.001	3	.008	2	.091	4	7.53e-4	1	NC	3	NC	2
72			min	-.001	2	-.008	3	0	12	-1.267e-3	5	6077.292	2	940.643	14
73		18	max	.001	3	.009	2	.096	4	7.905e-4	1	NC	3	NC	2
74			min	-.001	2	-.008	3	0	12	-1.277e-3	5	5337.32	2	884.557	14
75		19	max	.001	3	.01	2	.102	4	8.28e-4	1	NC	3	NC	2
76			min	-.001	2	-.008	3	0	12	-1.286e-3	5	4747.366	2	835.069	14
77	M4	1	max	.002	1	.01	2	0	12	6.097e-3	5	NC	1	NC	3
78			min	0	3	-.008	3	-.107	4	-1.095e-3	1	NC	1	180.012	4
79		2	max	.002	1	.009	2	0	12	6.097e-3	5	NC	1	NC	3
80			min	0	3	-.008	3	-.098	4	-1.095e-3	1	NC	1	196.24	4
81		3	max	.002	1	.009	2	0	12	6.097e-3	5	NC	1	NC	3
82			min	0	3	-.007	3	-.09	4	-1.095e-3	1	NC	1	215.557	4
83		4	max	.002	1	.008	2	0	12	6.097e-3	5	NC	1	NC	2
84			min	0	3	-.007	3	-.081	4	-1.095e-3	1	NC	1	238.774	4
85		5	max	.002	1	.008	2	0	12	6.097e-3	5	NC	1	NC	2
86			min	0	3	-.006	3	-.072	4	-1.095e-3	1	NC	1	267.001	4
87		6	max	.002	1	.007	2	0	12	6.097e-3	5	NC	1	NC	2
88			min	0	3	-.006	3	-.064	4	-1.095e-3	1	NC	1	301.778	4
89		7	max	.002	1	.007	2	0	12	6.097e-3	5	NC	1	NC	2
90			min	0	3	-.005	3	-.056	4	-1.095e-3	1	NC	1	345.3	4
91		8	max	.001	1	.006	2	0	12	6.097e-3	5	NC	1	NC	2
92			min	0	3	-.005	3	-.048	4	-1.095e-3	1	NC	1	400.78	4
93		9	max	.001	1	.006	2	0	12	6.097e-3	5	NC	1	NC	2
94			min	0	3	-.004	3	-.041	4	-1.095e-3	1	NC	1	473.08	4
95		10	max	.001	1	.005	2	0	12	6.097e-3	5	NC	1	NC	2
96			min	0	3	-.004	3	-.034	4	-1.095e-3	1	NC	1	569.839	4
97		11	max	.001	1	.004	2	0	12	6.097e-3	5	NC	1	NC	1
98			min	0	3	-.004	3	-.027	4	-1.095e-3	1	NC	1	703.643	4
99		12	max	0	1	.004	2	0	12	6.097e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
100			min	0	3	-.003	3	-.022	4	-1.095e-3	1	NC	1	896.444	4
101		13	max	0	1	.003	2	0	12	6.097e-3	5	NC	1	NC	1
102			min	0	3	-.003	3	-.016	4	-1.095e-3	1	NC	1	1189.417	4
103		14	max	0	1	.003	2	0	12	6.097e-3	5	NC	1	NC	1
104			min	0	3	-.002	3	-.012	4	-1.095e-3	1	NC	1	1667.499	4
105		15	max	0	1	.002	2	0	12	6.097e-3	5	NC	1	NC	1
106			min	0	3	-.002	3	-.008	4	-1.095e-3	1	NC	1	2530.235	4
107		16	max	0	1	.002	2	0	12	6.097e-3	5	NC	1	NC	1
108			min	0	3	-.001	3	-.004	4	-1.095e-3	1	NC	1	4344.898	4
109		17	max	0	1	.001	2	0	12	6.097e-3	5	NC	1	NC	1
110			min	0	3	0	3	-.002	4	-1.095e-3	1	NC	1	9314.672	4
111		18	max	0	1	0	2	0	12	6.097e-3	5	NC	1	NC	1
112			min	0	3	0	3	0	4	-1.095e-3	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	6.097e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-1.095e-3	1	NC	1	NC	1
115	M6	1	max	.01	1	.028	2	.005	1	2.123e-3	4	NC	3	NC	2
116			min	-.011	3	-.023	3	-.019	5	2.789e-6	10	1288.602	2	7521.228	1
117		2	max	.01	1	.026	2	.004	1	2.144e-3	4	NC	3	NC	2
118			min	-.01	3	-.022	3	-.018	5	1.92e-6	10	1377.135	2	8170.568	1
119		3	max	.009	1	.025	2	.004	1	2.165e-3	4	NC	3	NC	2
120			min	-.009	3	-.021	3	-.018	5	1.051e-6	10	1478.366	2	8940.039	1
121		4	max	.009	1	.023	2	.004	1	2.186e-3	4	NC	3	NC	2
122			min	-.009	3	-.019	3	-.017	5	1.825e-7	10	1594.836	2	9860.127	1
123		5	max	.008	1	.021	2	.003	1	2.208e-3	4	NC	3	NC	1
124			min	-.008	3	-.018	3	-.016	5	-6.862e-7	10	1729.817	2	NC	1
125		6	max	.007	1	.019	2	.003	1	2.229e-3	4	NC	3	NC	1
126			min	-.008	3	-.017	3	-.016	5	-4.091e-6	2	1887.591	2	NC	1
127		7	max	.007	1	.018	2	.003	1	2.25e-3	4	NC	3	NC	1
128			min	-.007	3	-.016	3	-.015	5	-8.006e-6	2	2073.876	2	NC	1
129		8	max	.006	1	.016	2	.002	1	2.272e-3	4	NC	3	NC	1
130			min	-.006	3	-.015	3	-.014	5	-1.192e-5	2	2296.469	2	NC	1
131		9	max	.006	1	.014	2	.002	1	2.293e-3	4	NC	3	NC	1
132			min	-.006	3	-.013	3	-.013	5	-1.584e-5	2	2566.29	2	NC	1
133		10	max	.005	1	.013	2	.002	1	2.314e-3	4	NC	3	NC	1
134			min	-.005	3	-.012	3	-.012	5	-1.975e-5	2	2899.113	2	NC	1
135		11	max	.005	1	.011	2	.001	1	2.335e-3	4	NC	3	NC	1
136			min	-.005	3	-.011	3	-.011	5	-2.367e-5	2	3318.6	2	NC	1
137		12	max	.004	1	.009	2	.001	1	2.357e-3	4	NC	3	NC	1
138			min	-.004	3	-.009	3	-.01	5	-2.758e-5	2	3861.931	2	NC	1
139		13	max	.003	1	.008	2	0	1	2.378e-3	4	NC	3	NC	1
140			min	-.004	3	-.008	3	-.008	5	-3.15e-5	2	4591.063	2	NC	1
141		14	max	.003	1	.006	2	0	1	2.399e-3	4	NC	3	NC	1
142			min	-.003	3	-.007	3	-.007	5	-3.541e-5	2	5617.508	2	NC	1
143		15	max	.002	1	.005	2	0	1	2.421e-3	4	NC	3	NC	1
144			min	-.002	3	-.005	3	-.006	5	-3.933e-5	2	7164.267	2	NC	1
145		16	max	.002	1	.004	2	0	1	2.442e-3	4	NC	1	NC	1
146			min	-.002	3	-.004	3	-.004	5	-4.324e-5	2	9751.632	2	NC	1
147		17	max	.001	1	.002	2	0	1	2.463e-3	4	NC	1	NC	1
148			min	-.001	3	-.003	3	-.003	5	-4.716e-5	2	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	2.484e-3	4	NC	1	NC	1
150			min	0	3	-.001	3	-.002	5	-5.107e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	2.507e-3	5	NC	1	NC	1
152			min	0	1	0	1	0	1	-5.499e-5	2	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.532e-5	2	NC	1	NC	1
154			min	0	1	0	1	0	1	-1.166e-3	5	NC	1	NC	1
155		2	max	0	3	.001	2	.006	5	2.108e-5	2	NC	1	NC	1
156			min	0	2	-.002	3	0	2	-1.159e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
157		3	max	0	3	.003	2	.012	5	1.916e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	2	-1.152e-3	4	NC	1	NC	1
159		4	max	0	3	.004	2	.018	4	1.941e-5	1	NC	1	NC	1
160			min	0	2	-.005	3	0	2	-1.145e-3	4	NC	1	NC	1
161		5	max	.001	3	.006	2	.024	4	1.966e-5	1	NC	1	NC	1
162			min	-.001	2	-.007	3	0	2	-1.138e-3	4	8359.494	2	NC	1
163		6	max	.001	3	.007	2	.03	4	1.99e-5	1	NC	3	NC	1
164			min	-.001	2	-.009	3	0	2	-1.131e-3	4	6704.645	2	NC	1
165		7	max	.002	3	.008	2	.036	4	2.706e-5	3	NC	3	NC	1
166			min	-.002	2	-.01	3	0	1	-1.124e-3	4	5573.652	2	NC	1
167		8	max	.002	3	.01	2	.042	4	3.981e-5	3	NC	3	NC	1
168			min	-.002	2	-.012	3	0	1	-1.117e-3	4	4744.905	2	NC	1
169		9	max	.002	3	.011	2	.048	4	5.255e-5	3	NC	3	NC	1
170			min	-.002	2	-.013	3	0	1	-1.109e-3	4	4107.992	2	NC	1
171		10	max	.002	3	.013	2	.054	4	6.53e-5	3	NC	3	NC	1
172			min	-.003	2	-.014	3	-.001	1	-1.102e-3	4	3601.727	2	NC	1
173		11	max	.003	3	.014	2	.06	4	7.805e-5	3	NC	3	NC	1
174			min	-.003	2	-.016	3	-.001	1	-1.095e-3	4	3189.387	2	NC	1
175		12	max	.003	3	.016	2	.065	4	9.079e-5	3	NC	3	NC	1
176			min	-.003	2	-.017	3	-.001	1	-1.088e-3	4	2847.493	2	NC	1
177		13	max	.003	3	.018	2	.071	4	1.035e-4	3	NC	3	NC	1
178			min	-.004	2	-.018	3	-.002	1	-1.081e-3	4	2560.222	2	NC	1
179		14	max	.003	3	.02	2	.076	4	1.163e-4	3	NC	3	NC	1
180			min	-.004	2	-.019	3	-.002	1	-1.074e-3	4	2316.437	2	NC	1
181		15	max	.004	3	.022	2	.081	4	1.29e-4	3	NC	3	NC	1
182			min	-.004	2	-.02	3	-.002	1	-1.067e-3	4	2108.001	2	NC	1
183		16	max	.004	3	.024	2	.087	4	1.418e-4	3	NC	3	NC	1
184			min	-.004	2	-.021	3	-.002	1	-1.06e-3	4	1928.786	2	NC	1
185		17	max	.004	3	.026	2	.092	4	1.545e-4	3	NC	3	NC	1
186			min	-.005	2	-.021	3	-.002	1	-1.053e-3	4	1774.061	2	NC	1
187		18	max	.004	3	.028	2	.097	4	1.673e-4	3	NC	3	NC	1
188			min	-.005	2	-.022	3	-.002	1	-1.046e-3	4	1640.099	2	NC	1
189		19	max	.005	3	.03	2	.102	4	1.8e-4	3	NC	3	NC	1
190			min	-.005	2	-.023	3	-.003	1	-1.039e-3	4	1523.922	2	NC	1
191	M8	1	max	.007	1	.032	2	.003	1	5.876e-3	4	NC	1	NC	2
192			min	0	3	-.023	3	-.108	4	-1.714e-4	1	NC	1	179.621	4
193		2	max	.006	1	.03	2	.003	1	5.876e-3	4	NC	1	NC	2
194			min	0	3	-.022	3	-.099	4	-1.714e-4	1	NC	1	195.813	4
195		3	max	.006	1	.029	2	.002	1	5.876e-3	4	NC	1	NC	2
196			min	0	3	-.021	3	-.09	4	-1.714e-4	1	NC	1	215.087	4
197		4	max	.005	1	.027	2	.002	1	5.876e-3	4	NC	1	NC	2
198			min	0	3	-.019	3	-.081	4	-1.714e-4	1	NC	1	238.253	4
199		5	max	.005	1	.025	2	.002	1	5.876e-3	4	NC	1	NC	1
200			min	0	3	-.018	3	-.073	4	-1.714e-4	1	NC	1	266.418	4
201		6	max	.005	1	.023	2	.002	1	5.876e-3	4	NC	1	NC	1
202			min	0	3	-.017	3	-.064	4	-1.714e-4	1	NC	1	301.118	4
203		7	max	.004	1	.021	2	.001	1	5.876e-3	4	NC	1	NC	1
204			min	0	3	-.015	3	-.056	4	-1.714e-4	1	NC	1	344.544	4
205		8	max	.004	1	.02	2	.001	1	5.876e-3	4	NC	1	NC	1
206			min	0	3	-.014	3	-.048	4	-1.714e-4	1	NC	1	399.902	4
207		9	max	.004	1	.018	2	.001	1	5.876e-3	4	NC	1	NC	1
208			min	0	3	-.013	3	-.041	4	-1.714e-4	1	NC	1	472.042	4
209		10	max	.003	1	.016	2	0	1	5.876e-3	4	NC	1	NC	1
210			min	0	3	-.012	3	-.034	4	-1.714e-4	1	NC	1	568.588	4
211		11	max	.003	1	.014	2	0	1	5.876e-3	4	NC	1	NC	1
212			min	0	3	-.01	3	-.028	4	-1.714e-4	1	NC	1	702.097	4
213		12	max	.003	1	.012	2	0	1	5.876e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
214			min	0	3	-.009	3	-.022	4	-1.714e-4	1	NC	1	894.472	4
215		13	max	.002	1	.011	2	0	1	5.876e-3	4	NC	1	NC	1
216			min	0	3	-.008	3	-.016	4	-1.714e-4	1	NC	1	1186.799	4
217		14	max	.002	1	.009	2	0	1	5.876e-3	4	NC	1	NC	1
218			min	0	3	-.006	3	-.012	4	-1.714e-4	1	NC	1	1663.825	4
219		15	max	.001	1	.007	2	0	1	5.876e-3	4	NC	1	NC	1
220			min	0	3	-.005	3	-.008	4	-1.714e-4	1	NC	1	2524.657	4
221		16	max	.001	1	.005	2	0	1	5.876e-3	4	NC	1	NC	1
222			min	0	3	-.004	3	-.004	4	-1.714e-4	1	NC	1	4335.312	4
223		17	max	0	1	.004	2	0	1	5.876e-3	4	NC	1	NC	1
224			min	0	3	-.003	3	-.002	4	-1.714e-4	1	NC	1	9294.099	4
225		18	max	0	1	.002	2	0	1	5.876e-3	4	NC	1	NC	1
226			min	0	3	-.001	3	0	4	-1.714e-4	1	NC	1	NC	1
227		19	max	0	1	0	1	0	1	5.876e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.714e-4	1	NC	1	NC	1
229	M10	1	max	.003	1	.009	2	0	3	1.136e-3	1	NC	3	NC	1
230			min	-.003	3	-.008	3	-.008	4	-2.201e-4	3	4218.605	2	NC	1
231		2	max	.003	1	.008	2	0	3	1.077e-3	1	NC	3	NC	1
232			min	-.003	3	-.008	3	-.008	4	-2.137e-4	3	4584.551	2	NC	1
233		3	max	.003	1	.007	2	0	3	1.017e-3	1	NC	3	NC	1
234			min	-.003	3	-.007	3	-.008	4	-2.072e-4	3	5016.293	2	NC	1
235		4	max	.003	1	.007	2	0	3	9.578e-4	1	NC	3	NC	1
236			min	-.003	3	-.007	3	-.008	4	-2.008e-4	3	5529.046	2	NC	1
237		5	max	.003	1	.006	2	0	3	9.332e-4	4	NC	3	NC	1
238			min	-.002	3	-.007	3	-.008	4	-1.943e-4	3	6142.901	2	NC	1
239		6	max	.002	1	.005	2	0	3	1.003e-3	4	NC	1	NC	1
240			min	-.002	3	-.006	3	-.008	4	-1.879e-4	3	6884.807	2	NC	1
241		7	max	.002	1	.005	2	0	3	1.073e-3	4	NC	1	NC	1
242			min	-.002	3	-.006	3	-.008	4	-1.814e-4	3	7791.591	2	NC	1
243		8	max	.002	1	.004	2	0	3	1.143e-3	4	NC	1	NC	1
244			min	-.002	3	-.006	3	-.008	4	-1.75e-4	3	8914.682	2	NC	1
245		9	max	.002	1	.004	2	0	3	1.213e-3	4	NC	1	NC	1
246			min	-.002	3	-.005	3	-.007	4	-1.685e-4	3	NC	1	NC	1
247		10	max	.002	1	.003	2	0	3	1.283e-3	4	NC	1	NC	1
248			min	-.002	3	-.005	3	-.007	4	-1.62e-4	3	NC	1	NC	1
249		11	max	.001	1	.003	2	0	3	1.353e-3	4	NC	1	NC	1
250			min	-.001	3	-.004	3	-.007	4	-1.556e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	1.423e-3	4	NC	1	NC	1
252			min	-.001	3	-.004	3	-.006	4	-1.491e-4	3	NC	1	NC	1
253		13	max	.001	1	.002	2	0	3	1.493e-3	4	NC	1	NC	1
254			min	-.001	3	-.003	3	-.006	4	-1.427e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	1.563e-3	4	NC	1	NC	1
256			min	0	3	-.003	3	-.005	4	-1.362e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	1.633e-3	4	NC	1	NC	1
258			min	0	3	-.002	3	-.004	4	-1.298e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.703e-3	4	NC	1	NC	1
260			min	0	3	-.002	3	-.003	4	-1.233e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.773e-3	4	NC	1	NC	1
262			min	0	3	-.001	3	-.002	4	-1.169e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.843e-3	4	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-1.104e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.913e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.039e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	4.837e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-8.915e-4	4	NC	1	NC	1
269		2	max	0	3	0	2	.005	4	3.334e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-9.99e-4	4	NC	1	9977.447	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
271		3	max	0	3	0	2	.009	4	1.831e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.107e-3	4	NC	1	4956.885	4
273		4	max	0	3	0	2	.014	4	3.283e-6	3	NC	1	NC	1
274			min	0	2	-.003	3	0	3	-1.214e-3	4	NC	1	3287.721	4
275		5	max	0	3	0	2	.019	4	-8.182e-6	12	NC	1	NC	1
276			min	0	2	-.003	3	-.001	1	-1.322e-3	4	NC	1	2455.932	4
277		6	max	0	3	0	2	.024	5	-1.746e-5	12	NC	1	NC	1
278			min	0	2	-.004	3	-.002	1	-1.429e-3	4	NC	1	1956.303	5
279		7	max	0	3	0	2	.028	5	-2.673e-5	12	NC	1	NC	1
280			min	0	2	-.005	3	-.003	1	-1.537e-3	4	NC	1	1620.55	5
281		8	max	0	3	.001	2	.033	5	-3.6e-5	12	NC	1	NC	1
282			min	0	2	-.005	3	-.004	1	-1.644e-3	4	NC	1	1382.04	5
283		9	max	0	3	.002	2	.038	5	-4.528e-5	12	NC	1	NC	2
284			min	0	2	-.006	3	-.005	1	-1.752e-3	4	NC	1	1204.09	5
285		10	max	0	3	.002	2	.043	5	-5.409e-5	10	NC	1	NC	2
286			min	0	2	-.007	3	-.006	1	-1.859e-3	4	NC	1	1066.333	5
287		11	max	0	3	.003	2	.048	5	-5.941e-5	10	NC	1	NC	2
288			min	0	2	-.007	3	-.007	1	-1.967e-3	4	NC	1	956.554	5
289		12	max	0	3	.003	2	.053	5	-6.473e-5	10	NC	1	NC	2
290			min	0	2	-.007	3	-.008	1	-2.074e-3	4	NC	1	866.986	5
291		13	max	0	3	.004	2	.058	5	-7.005e-5	10	NC	1	NC	2
292			min	0	2	-.008	3	-.01	1	-2.182e-3	4	NC	1	792.453	5
293		14	max	.001	3	.005	2	.063	5	-7.537e-5	10	NC	1	NC	2
294			min	0	2	-.008	3	-.011	1	-2.289e-3	4	9748.057	2	729.377	5
295		15	max	.001	3	.006	2	.068	5	-8.069e-5	10	NC	1	NC	2
296			min	0	2	-.008	3	-.012	1	-2.397e-3	4	8212.027	2	675.201	5
297		16	max	.001	3	.007	2	.073	5	-8.601e-5	10	NC	3	NC	3
298			min	0	2	-.008	3	-.014	1	-2.504e-3	4	7019.108	2	628.055	5
299		17	max	.001	3	.008	2	.079	5	-9.133e-5	10	NC	3	NC	3
300			min	-.001	2	-.008	3	-.015	1	-2.612e-3	4	6083.074	2	586.538	5
301		18	max	.001	3	.009	2	.084	5	-9.665e-5	10	NC	3	NC	3
302			min	-.001	2	-.008	3	-.016	1	-2.719e-3	4	5342.057	2	549.582	5
303		19	max	.001	3	.01	2	.089	5	-1.02e-4	10	NC	3	NC	3
304			min	-.001	2	-.008	3	-.017	1	-2.827e-3	4	4751.334	2	516.359	5
305	M12	1	max	.002	1	.01	2	.014	1	7.455e-3	4	NC	1	NC	3
306			min	0	3	-.008	3	-.098	5	9.577e-5	10	NC	1	196.507	5
307		2	max	.002	1	.009	2	.013	1	7.455e-3	4	NC	1	NC	3
308			min	0	3	-.008	3	-.09	5	9.577e-5	10	NC	1	214.219	5
309		3	max	.002	1	.009	2	.012	1	7.455e-3	4	NC	1	NC	3
310			min	0	3	-.007	3	-.082	5	9.577e-5	10	NC	1	235.3	5
311		4	max	.002	1	.008	2	.011	1	7.455e-3	4	NC	1	NC	3
312			min	0	3	-.007	3	-.074	5	9.577e-5	10	NC	1	260.638	5
313		5	max	.002	1	.008	2	.01	1	7.455e-3	4	NC	1	NC	3
314			min	0	3	-.006	3	-.066	5	9.577e-5	10	NC	1	291.444	5
315		6	max	.002	1	.007	2	.008	1	7.455e-3	4	NC	1	NC	3
316			min	0	3	-.006	3	-.059	5	9.577e-5	10	NC	1	329.397	5
317		7	max	.002	1	.007	2	.007	1	7.455e-3	4	NC	1	NC	3
318			min	0	3	-.005	3	-.051	5	9.577e-5	10	NC	1	376.893	5
319		8	max	.001	1	.006	2	.006	1	7.455e-3	4	NC	1	NC	3
320			min	0	3	-.005	3	-.044	5	9.577e-5	10	NC	1	437.439	5
321		9	max	.001	1	.006	2	.005	1	7.455e-3	4	NC	1	NC	3
322			min	0	3	-.004	3	-.037	5	9.577e-5	10	NC	1	516.338	5
323		10	max	.001	1	.005	2	.004	1	7.455e-3	4	NC	1	NC	2
324			min	0	3	-.004	3	-.031	5	9.577e-5	10	NC	1	621.93	5
325		11	max	.001	1	.004	2	.004	1	7.455e-3	4	NC	1	NC	2
326			min	0	3	-.004	3	-.025	5	9.577e-5	10	NC	1	767.945	5
327		12	max	0	1	.004	2	.003	1	7.455e-3	4	NC	1	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
328			min	0	3	-.003	3	-.02	5	9.577e-5	10	NC	1	978.339	5
329		13	max	0	1	.003	2	.002	1	7.455e-3	4	NC	1	NC	2
330			min	0	3	-.003	3	-.015	5	9.577e-5	10	NC	1	1298.042	5
331		14	max	0	1	.003	2	.002	1	7.455e-3	4	NC	1	NC	1
332			min	0	3	-.002	3	-.011	5	9.577e-5	10	NC	1	1819.734	5
333		15	max	0	1	.002	2	.001	1	7.455e-3	4	NC	1	NC	1
334			min	0	3	-.002	3	-.007	5	9.577e-5	10	NC	1	2761.156	5
335		16	max	0	1	.002	2	0	1	7.455e-3	4	NC	1	NC	1
336			min	0	3	-.001	3	-.004	5	9.577e-5	10	NC	1	4741.296	5
337		17	max	0	1	.001	2	0	1	7.455e-3	4	NC	1	NC	1
338			min	0	3	0	3	-.002	5	9.577e-5	10	NC	1	NC	1
339		18	max	0	1	0	2	0	1	7.455e-3	4	NC	1	NC	1
340			min	0	3	0	3	0	5	9.577e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	7.455e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	9.577e-5	10	NC	1	NC	1
343	M1	1	max	.007	3	.024	3	.01	5	1.543e-2	1	NC	1	NC	1
344			min	-.008	2	-.027	1	-.005	1	-1.498e-2	3	NC	1	NC	1
345		2	max	.007	3	.014	3	.015	5	7.249e-3	1	NC	4	NC	2
346			min	-.008	2	-.015	1	-.012	1	-7.419e-3	3	3817.981	1	6935.363	1
347		3	max	.007	3	.004	3	.019	5	6.263e-4	5	NC	4	NC	2
348			min	-.008	2	-.004	1	-.016	1	-7.789e-4	1	1974.477	1	4205.02	1
349		4	max	.007	3	.006	1	.024	5	6.363e-4	5	NC	5	NC	3
350			min	-.008	2	-.004	3	-.019	1	-6.584e-4	1	1396.441	1	3424.09	5
351		5	max	.007	3	.014	1	.03	5	6.462e-4	5	NC	5	NC	3
352			min	-.008	2	-.011	3	-.019	1	-5.379e-4	1	1118.59	1	2448.242	5
353		6	max	.007	3	.021	1	.035	5	6.561e-4	5	NC	5	NC	3
354			min	-.008	2	-.016	3	-.018	1	-4.175e-4	1	961.541	1	1879.223	5
355		7	max	.007	3	.026	1	.041	5	6.66e-4	5	NC	5	NC	2
356			min	-.008	2	-.02	3	-.016	1	-2.97e-4	1	866.456	1	1511.089	5
357		8	max	.007	3	.03	1	.048	5	6.76e-4	5	NC	5	NC	2
358			min	-.008	2	-.023	3	-.013	1	-1.765e-4	1	808.869	1	1256.13	5
359		9	max	.007	3	.032	1	.054	5	6.859e-4	5	NC	5	NC	1
360			min	-.008	2	-.024	3	-.009	1	-5.606e-5	1	777.355	1	1067.144	4
361		10	max	.007	3	.033	1	.061	5	7.037e-4	4	NC	5	NC	1
362			min	-.008	2	-.025	3	-.005	1	9.325e-6	10	766.645	1	911.244	4
363		11	max	.007	3	.032	1	.068	4	7.407e-4	4	NC	5	NC	1
364			min	-.008	2	-.024	3	-.001	1	2.044e-5	10	775.132	1	794.482	4
365		12	max	.007	3	.03	1	.075	4	7.776e-4	4	NC	5	NC	2
366			min	-.008	2	-.022	3	0	10	2.879e-5	12	804.217	1	705.026	4
367		13	max	.007	3	.026	1	.082	4	8.145e-4	4	NC	5	NC	2
368			min	-.008	2	-.019	3	0	12	3.225e-5	12	858.897	1	635.327	4
369		14	max	.007	3	.02	1	.089	4	8.515e-4	4	NC	5	NC	3
370			min	-.008	2	-.015	3	0	12	3.572e-5	12	950.139	1	580.383	4
371		15	max	.007	3	.013	1	.096	4	8.884e-4	4	NC	5	NC	3
372			min	-.008	2	-.01	3	0	12	3.918e-5	12	1101.474	1	536.792	4
373		16	max	.007	3	.005	1	.102	4	1.269e-3	4	NC	5	NC	3
374			min	-.008	2	-.004	3	0	12	4.157e-5	12	1367.83	2	502.182	4
375		17	max	.007	3	.003	3	.107	4	9.822e-3	4	NC	4	NC	2
376			min	-.008	2	-.006	2	0	12	-9.698e-6	2	1922.243	1	474.913	4
377		18	max	.007	3	.011	3	.112	4	8.695e-3	1	NC	4	NC	2
378			min	-.008	2	-.018	2	0	10	-3.304e-3	3	3704.984	1	453.764	4
379		19	max	.007	3	.019	3	.115	4	1.756e-2	1	NC	1	NC	1
380			min	-.008	2	-.03	2	-.004	1	-6.7e-3	3	NC	1	438.416	4
381	M5	1	max	.021	3	.072	3	.01	5	6.413e-6	4	NC	1	NC	1
382			min	-.027	2	-.083	1	-.006	1	5.582e-8	10	NC	1	NC	1
383		2	max	.021	3	.041	3	.014	5	3.143e-4	5	NC	5	NC	1
384			min	-.027	2	-.047	1	-.006	1	-7.769e-5	1	1278.241	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
385		3	max	.021	3	.013	3	.019	5	6.17e-4	5	NC	5	NC	1
386			min	-.027	2	-.013	1	-.005	1	-1.545e-4	1	657.698	1	NC	1
387		4	max	.021	3	.017	1	.025	5	6.414e-4	5	NC	5	NC	1
388			min	-.027	2	-.01	3	-.004	1	-1.454e-4	1	463.683	1	NC	1
389		5	max	.021	3	.042	1	.031	5	6.659e-4	5	NC	15	NC	1
390			min	-.027	2	-.03	3	-.004	1	-1.363e-4	1	370.34	1	NC	1
391		6	max	.021	3	.062	1	.037	5	6.903e-4	5	NC	15	NC	1
392			min	-.027	2	-.045	3	-.003	1	-1.271e-4	1	317.462	1	NC	1
393		7	max	.021	3	.078	1	.044	5	7.147e-4	5	NC	15	NC	1
394			min	-.027	2	-.057	3	-.003	1	-1.18e-4	1	285.309	1	NC	1
395		8	max	.021	3	.09	1	.05	5	7.391e-4	5	NC	15	NC	1
396			min	-.027	2	-.065	3	-.003	1	-1.089e-4	1	265.671	1	NC	1
397		9	max	.021	3	.097	1	.057	5	7.635e-4	5	NC	15	NC	1
398			min	-.027	2	-.069	3	-.002	1	-9.975e-5	1	254.703	1	NC	1
399		10	max	.021	3	.099	1	.064	5	7.879e-4	5	NC	15	NC	1
400			min	-.027	2	-.07	3	-.002	1	-9.062e-5	1	250.62	1	NC	1
401		11	max	.021	3	.097	1	.071	5	8.123e-4	5	NC	15	NC	1
402			min	-.027	2	-.068	3	-.002	1	-8.149e-5	1	252.857	1	NC	1
403		12	max	.021	3	.09	1	.078	5	8.368e-4	5	NC	15	NC	1
404			min	-.027	2	-.062	3	-.002	1	-7.235e-5	1	261.843	1	NC	1
405		13	max	.021	3	.079	1	.084	5	8.612e-4	5	NC	15	NC	1
406			min	-.027	2	-.053	3	-.002	1	-6.322e-5	1	279.189	1	NC	1
407		14	max	.021	3	.062	1	.091	4	8.856e-4	5	NC	15	NC	1
408			min	-.027	2	-.042	3	-.002	1	-5.409e-5	1	308.473	1	9423.092	4
409		15	max	.021	3	.041	1	.097	4	9.1e-4	5	NC	15	NC	1
410			min	-.027	2	-.027	3	-.002	1	-4.796e-5	2	357.42	1	9299.413	4
411		16	max	.021	3	.015	1	.102	4	1.275e-3	5	NC	5	NC	1
412			min	-.027	2	-.01	3	-.003	1	-4.565e-5	2	444.653	1	NC	1
413		17	max	.021	3	.01	3	.108	4	9.811e-3	4	NC	5	NC	1
414			min	-.027	2	-.017	2	-.003	1	-2.592e-4	1	627.804	1	NC	1
415		18	max	.021	3	.031	3	.112	4	5.032e-3	4	NC	5	NC	1
416			min	-.027	2	-.054	2	-.003	1	-1.329e-4	1	1217.403	1	NC	1
417		19	max	.021	3	.054	3	.116	4	1.981e-6	5	NC	1	NC	1
418			min	-.027	2	-.092	1	-.003	1	-1.686e-7	3	NC	1	NC	1
419	M9	1	max	.007	3	.024	3	.008	5	1.498e-2	3	NC	1	NC	1
420			min	-.008	2	-.027	1	-.007	1	-1.543e-2	1	NC	1	NC	1
421		2	max	.007	3	.014	3	.008	5	7.417e-3	3	NC	4	NC	2
422			min	-.008	2	-.015	1	-.001	1	-7.538e-3	1	3818.8	1	8134.498	1
423		3	max	.007	3	.004	3	.008	4	2.051e-4	1	NC	4	NC	2
424			min	-.008	2	-.004	1	0	3	-6.528e-6	3	1974.909	1	5062.324	1
425		4	max	.007	3	.006	1	.01	4	1.027e-4	1	NC	5	NC	2
426			min	-.008	2	-.004	3	0	3	-1.531e-5	3	1396.737	1	4299.519	1
427		5	max	.007	3	.014	1	.013	4	4.166e-5	4	NC	5	NC	2
428			min	-.008	2	-.011	3	-.001	3	-2.41e-5	3	1118.808	1	4274.951	1
429		6	max	.007	3	.021	1	.017	4	4.383e-5	5	NC	5	NC	2
430			min	-.008	2	-.016	3	-.002	3	-1.02e-4	1	961.708	1	4057.097	14
431		7	max	.007	3	.026	1	.022	4	4.652e-5	5	NC	5	NC	2
432			min	-.008	2	-.02	3	-.002	3	-2.044e-4	1	866.586	1	2999.49	4
433		8	max	.007	3	.03	1	.027	4	4.922e-5	5	NC	5	NC	1
434			min	-.008	2	-.023	3	-.002	3	-3.068e-4	1	808.971	1	2253.768	4
435		9	max	.007	3	.032	1	.033	5	5.191e-5	5	NC	5	NC	1
436			min	-.008	2	-.024	3	-.004	1	-4.092e-4	1	777.434	1	1761.949	4
437		10	max	.007	3	.033	1	.04	5	5.46e-5	5	NC	5	NC	1
438			min	-.008	2	-.025	3	-.008	1	-5.116e-4	1	766.703	1	1420.555	4
439		11	max	.007	3	.032	1	.047	5	5.729e-5	5	NC	5	NC	2
440			min	-.008	2	-.024	3	-.011	1	-6.14e-4	1	775.172	1	1173.827	4
441		12	max	.007	3	.03	1	.055	5	5.998e-5	5	NC	5	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
442			min	-.008	2	-.022	3	-.014	1	-7.163e-4	1	804.238	1	989.624	4
443		13	max	.007	3	.026	1	.064	5	6.267e-5	5	NC	5	NC	3
444			min	-.008	2	-.019	3	-.016	1	-8.187e-4	1	858.899	1	845.733	5
445		14	max	.007	3	.02	1	.072	5	6.536e-5	5	NC	5	NC	3
446			min	-.008	2	-.015	3	-.018	1	-9.211e-4	1	950.121	1	732.678	5
447		15	max	.007	3	.013	1	.081	5	6.805e-5	5	NC	5	NC	3
448			min	-.008	2	-.01	3	-.018	1	-1.023e-3	1	1101.431	1	645.123	5
449		16	max	.007	3	.005	1	.09	5	4.437e-4	5	NC	5	NC	3
450			min	-.008	2	-.004	3	-.017	1	-1.098e-3	1	1368.235	2	576.045	5
451		17	max	.007	3	.003	3	.098	5	9.694e-3	5	NC	4	NC	2
452			min	-.008	2	-.006	2	-.014	1	-5.183e-4	1	1922.151	1	518.027	4
453		18	max	.007	3	.011	3	.107	5	4.657e-3	5	NC	4	NC	2
454			min	-.008	2	-.018	2	-.009	1	-8.955e-3	1	3704.807	1	468.418	4
455		19	max	.007	3	.019	3	.116	4	6.7e-3	3	NC	1	NC	1
456			min	-.008	2	-.03	2	-.002	1	-1.756e-2	1	NC	1	426.877	4
457	M13	1	max	.007	1	.024	3	.007	3	3.97e-3	3	NC	1	NC	1
458			min	-.008	5	-.027	1	-.008	2	-4.628e-3	1	NC	1	NC	1
459		2	max	.007	1	.178	3	.05	1	4.796e-3	3	NC	5	NC	3
460			min	-.008	5	-.186	1	-.001	5	-5.629e-3	1	1208.187	1	3498.089	1
461		3	max	.007	1	.305	3	.126	1	5.623e-3	3	NC	5	NC	3
462			min	-.009	5	-.316	1	-.002	5	-6.631e-3	1	664.054	1	1466.074	1
463		4	max	.007	1	.384	3	.19	1	6.449e-3	3	NC	5	NC	3
464			min	-.009	5	-.399	1	-.004	5	-7.632e-3	1	517.108	1	983.584	1
465		5	max	.007	1	.407	3	.222	1	7.275e-3	3	NC	5	NC	3
466			min	-.009	5	-.423	1	-.007	5	-8.634e-3	1	484.552	1	847.653	1
467		6	max	.007	1	.376	3	.211	1	8.101e-3	3	NC	5	NC	3
468			min	-.009	5	-.392	1	-.011	5	-9.635e-3	1	526.02	1	890.211	1
469		7	max	.007	1	.301	3	.16	1	8.928e-3	3	NC	5	NC	3
470			min	-.009	5	-.316	1	-.014	5	-1.064e-2	1	664.794	1	1160.548	1
471		8	max	.007	1	.203	3	.085	1	9.754e-3	3	NC	5	NC	3
472			min	-.009	5	-.216	1	-.015	5	-1.164e-2	1	1015.434	1	2123.393	1
473		9	max	.006	1	.113	3	.02	3	1.058e-2	3	NC	4	NC	1
474			min	-.01	5	-.125	1	-.012	2	-1.264e-2	1	1970.598	1	NC	1
475		10	max	.006	1	.072	3	.021	3	1.141e-2	3	NC	4	NC	1
476			min	-.01	5	-.083	1	-.027	2	-1.364e-2	1	3448.69	1	NC	1
477		11	max	.006	1	.113	3	.025	3	1.058e-2	3	NC	4	NC	2
478			min	-.01	5	-.125	1	-.012	2	-1.264e-2	1	1970.6	1	8710.905	1
479		12	max	.006	1	.203	3	.093	1	9.755e-3	3	NC	5	NC	7
480			min	-.01	5	-.216	1	-.003	10	-1.164e-2	1	1015.435	1	1951.823	1
481		13	max	.006	1	.301	3	.17	1	8.929e-3	3	NC	5	NC	10
482			min	-.01	5	-.316	1	.006	10	-1.064e-2	1	664.795	1	1097.61	1
483		14	max	.006	1	.376	3	.22	1	8.103e-3	3	NC	5	NC	5
484			min	-.01	5	-.392	1	.011	15	-9.634e-3	1	526.02	1	851.798	1
485		15	max	.006	1	.407	3	.23	1	7.278e-3	3	NC	5	NC	5
486			min	-.01	5	-.423	1	.005	15	-8.632e-3	1	484.552	1	815.563	1
487		16	max	.006	1	.384	3	.198	1	6.452e-3	3	NC	5	NC	3
488			min	-.01	5	-.398	1	0	15	-7.63e-3	1	517.108	1	948.182	1
489		17	max	.006	1	.305	3	.131	1	5.626e-3	3	NC	5	NC	3
490			min	-.01	5	-.316	1	-.007	5	-6.629e-3	1	664.055	1	1411.133	1
491		18	max	.006	1	.178	3	.053	1	4.8e-3	3	NC	5	NC	3
492			min	-.01	5	-.186	1	-.008	5	-5.627e-3	1	1208.189	1	3340.577	1
493		19	max	.005	1	.024	3	.007	3	3.974e-3	3	NC	1	NC	1
494			min	-.01	5	-.027	1	-.008	2	-4.625e-3	1	NC	1	NC	1
495	M16	1	max	.002	1	.019	3	.007	3	4.92e-3	2	NC	1	NC	1
496			min	-.116	4	-.03	2	-.008	2	-3.061e-3	3	NC	1	NC	1
497		2	max	.002	1	.088	3	.053	1	5.979e-3	2	NC	5	NC	3
498			min	-.116	4	-.21	1	0	10	-3.667e-3	3	1061.55	1	3266.476	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
499		3	max	.002	1	.145	3	.132	1	7.057e-3	1	NC	5	NC	3
500			min	-.116	4	-.359	1	.008	10	-4.272e-3	3	583.486	1	1395.203	1
501		4	max	.003	1	.181	3	.198	1	8.152e-3	1	NC	5	NC	3
502			min	-.116	4	-.452	1	.013	10	-4.878e-3	3	454.409	1	943.257	1
503		5	max	.003	1	.194	3	.23	1	9.247e-3	1	NC	5	NC	12
504			min	-.116	4	-.48	1	.015	10	-5.484e-3	3	425.863	1	815.138	1
505		6	max	.003	1	.182	3	.219	1	1.034e-2	1	NC	5	NC	10
506			min	-.116	4	-.445	1	.013	10	-6.09e-3	3	462.428	1	855.369	1
507		7	max	.003	1	.151	3	.168	1	1.144e-2	1	NC	5	NC	5
508			min	-.116	4	-.358	1	.006	10	-6.695e-3	3	584.711	1	1109.195	1
509		8	max	.003	1	.11	3	.091	1	1.253e-2	1	NC	5	NC	5
510			min	-.116	4	-.244	1	-.003	10	-7.301e-3	3	894.069	1	1997.015	1
511		9	max	.003	1	.071	3	.023	3	1.363e-2	1	NC	4	NC	2
512			min	-.116	4	-.14	1	-.013	2	-7.907e-3	3	1739.935	1	9499.886	1
513		10	max	.003	1	.054	3	.021	3	1.472e-2	1	NC	4	NC	1
514			min	-.116	4	-.092	1	-.027	2	-8.513e-3	3	3058.117	1	NC	1
515		11	max	.003	1	.071	3	.021	3	1.363e-2	1	NC	4	NC	1
516			min	-.116	4	-.14	1	-.012	2	-7.906e-3	3	1739.935	1	NC	1
517		12	max	.003	1	.11	3	.088	1	1.253e-2	1	NC	5	NC	3
518			min	-.116	4	-.244	1	-.003	10	-7.3e-3	3	894.07	1	2058.454	1
519		13	max	.003	1	.151	3	.164	1	1.144e-2	1	NC	5	NC	3
520			min	-.116	4	-.358	1	.006	10	-6.694e-3	3	584.711	1	1135.426	1
521		14	max	.003	1	.182	3	.214	1	1.034e-2	1	NC	5	NC	3
522			min	-.116	4	-.445	1	.005	15	-6.088e-3	3	462.428	1	874.011	1
523		15	max	.004	1	.194	3	.225	1	9.249e-3	1	NC	5	NC	3
524			min	-.116	4	-.48	1	0	15	-5.481e-3	3	425.864	1	833.292	1
525		16	max	.004	1	.181	3	.193	1	8.154e-3	1	NC	5	NC	3
526			min	-.116	4	-.452	1	-.007	5	-4.875e-3	3	454.409	1	966.66	1
527		17	max	.004	1	.145	3	.128	1	7.06e-3	1	NC	5	NC	3
528			min	-.116	4	-.359	1	-.012	5	-4.269e-3	3	583.487	1	1437.764	1
529		18	max	.004	1	.088	3	.051	1	5.981e-3	2	NC	5	NC	3
530			min	-.116	4	-.211	1	-.011	5	-3.662e-3	3	1061.55	1	3409.482	1
531		19	max	.004	1	.019	3	.007	3	4.922e-3	2	NC	1	NC	1
532			min	-.115	4	-.03	2	-.008	2	-3.056e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.442e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-5.943e-4	5	NC	1	NC	1
535		2	max	0	3	-.002	15	.013	4	8.336e-4	3	NC	5	NC	1
536			min	-.001	5	-.019	1	0	3	-6.801e-4	1	5390.999	2	7866.991	4
537		3	max	0	3	-.003	15	.028	4	1.323e-3	3	NC	5	NC	1
538			min	-.002	5	-.038	1	-.003	3	-1.311e-3	1	2743.295	2	3600.093	4
539		4	max	0	3	-.004	15	.044	4	1.812e-3	3	NC	5	NC	9
540			min	-.003	5	-.055	1	-.006	3	-1.941e-3	1	1882.061	2	2302.849	4
541		5	max	0	3	-.006	15	.059	4	2.302e-3	3	NC	15	NC	9
542			min	-.004	5	-.071	1	-.011	3	-2.571e-3	1	1468.591	2	1719.362	4
543		6	max	0	3	-.007	15	.072	4	2.791e-3	3	NC	15	9143.995	9
544			min	-.005	5	-.084	1	-.015	3	-3.202e-3	1	1235.975	2	1412.933	4
545		7	max	0	3	-.007	15	.082	4	3.28e-3	3	NC	15	7175.309	9
546			min	-.006	5	-.095	1	-.02	3	-3.832e-3	1	1096.087	2	1244.813	4
547		8	max	0	3	-.008	15	.088	4	3.77e-3	3	NC	15	5933.346	9
548			min	-.007	5	-.103	1	-.025	3	-4.463e-3	1	1012.133	2	1160.293	4
549		9	max	0	3	-.008	15	.09	4	4.259e-3	3	NC	15	5118.786	9
550			min	-.008	5	-.108	1	-.029	3	-5.093e-3	1	966.944	2	1136.899	4
551		10	max	0	3	-.008	15	.087	4	4.748e-3	3	NC	15	4580.697	9
552			min	-.009	5	-.11	1	-.033	3	-5.724e-3	1	952.648	2	1168.739	4
553		11	max	0	3	-.008	15	.081	4	5.238e-3	3	NC	15	4239.702	9
554			min	-.01	5	-.108	1	-.035	3	-6.354e-3	1	966.944	2	1262.862	4
555		12	max	0	3	-.007	15	.07	4	5.727e-3	3	NC	15	4056.556	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	-.011	5	-.104	1	-.036	3	-6.984e-3	1	1012.133	2	1443.077	4
557		13	max	0	3	-.006	15	.057	4	6.217e-3	3	NC	15	4020.34	9
558			min	-.012	5	-.096	1	-.035	3	-7.615e-3	1	1096.087	2	1765.089	1
559		14	max	0	3	-.005	15	.042	4	6.706e-3	3	NC	15	4399.569	15
560			min	-.013	5	-.086	1	-.032	3	-8.245e-3	1	1235.975	2	1821.194	1
561		15	max	0	3	-.003	15	.032	1	7.195e-3	3	NC	15	7533.404	15
562			min	-.014	5	-.073	1	-.027	3	-8.876e-3	1	1468.591	2	1978.318	1
563		16	max	0	3	-.002	15	.024	1	7.685e-3	3	NC	5	NC	5
564			min	-.015	5	-.058	1	-.019	3	-9.506e-3	1	1882.061	2	2313.535	1
565		17	max	0	3	0	15	.011	1	8.174e-3	3	NC	5	NC	4
566			min	-.016	5	-.041	1	-.008	3	-1.014e-2	1	2743.295	2	3068.48	1
567		18	max	.001	3	.003	5	.007	3	8.663e-3	3	NC	5	NC	4
568			min	-.017	5	-.023	1	-.011	2	-1.077e-2	1	5390.999	2	5465.307	1
569		19	max	.001	3	.006	5	.025	3	9.153e-3	3	NC	1	NC	1
570			min	-.018	5	-.004	1	-.029	2	-1.14e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	10	.008	3	3.091e-3	3	NC	1	NC	1
572			min	-.007	4	-.004	4	-.009	2	-3.355e-3	1	NC	1	NC	1
573		2	max	0	10	-.009	12	.006	1	2.958e-3	3	NC	12	NC	2
574			min	-.007	4	-.034	4	-.004	5	-3.193e-3	1	3383.318	4	8729.279	1
575		3	max	0	10	-.019	12	.015	1	2.824e-3	3	5486.591	12	NC	4
576			min	-.006	4	-.063	4	-.013	5	-3.031e-3	1	1721.655	4	4934.32	1
577		4	max	0	10	-.027	12	.022	1	2.69e-3	3	3764.122	12	NC	10
578			min	-.006	4	-.09	4	-.027	5	-2.87e-3	1	1181.156	4	3748.853	1
579		5	max	0	10	-.035	12	.027	1	2.556e-3	3	2937.182	12	NC	10
580			min	-.006	4	-.114	4	-.044	5	-2.708e-3	1	921.668	4	2416.944	5
581		6	max	0	10	-.041	12	.029	1	2.422e-3	3	2471.949	12	NC	10
582			min	-.005	4	-.135	4	-.061	5	-2.546e-3	1	775.681	4	1725.585	5
583		7	max	0	10	-.047	12	.031	1	2.289e-3	3	2192.173	12	NC	10
584			min	-.005	4	-.152	4	-.076	5	-2.384e-3	1	687.889	4	1360.409	5
585		8	max	0	10	-.051	12	.03	1	2.155e-3	3	2024.265	12	NC	10
586			min	-.004	4	-.164	4	-.09	5	-2.222e-3	1	635.201	4	1152.395	5
587		9	max	0	10	-.053	12	.028	1	2.021e-3	3	1933.887	12	NC	10
588			min	-.004	4	-.171	4	-.1	5	-2.06e-3	1	606.841	4	1033.374	5
589		10	max	0	10	-.054	12	.026	1	1.887e-3	3	1905.296	12	NC	10
590			min	-.004	4	-.174	4	-.106	5	-1.898e-3	1	597.869	4	972.906	5
591		11	max	0	10	-.053	12	.022	1	1.753e-3	3	1933.887	12	NC	10
592			min	-.003	4	-.171	4	-.108	5	-1.748e-3	2	606.841	4	957.916	5
593		12	max	0	10	-.051	12	.019	1	1.62e-3	3	2024.265	12	NC	10
594			min	-.003	4	-.163	4	-.105	5	-1.599e-3	2	635.201	4	985.709	5
595		13	max	0	10	-.047	12	.015	1	1.486e-3	3	2192.173	12	NC	3
596			min	-.002	4	-.151	4	-.097	5	-1.45e-3	2	687.889	4	1062.822	5
597		14	max	0	10	-.041	12	.011	1	1.352e-3	3	2471.949	12	NC	2
598			min	-.002	4	-.133	4	-.085	5	-1.302e-3	2	775.681	4	1208.813	5
599		15	max	0	10	-.035	12	.007	1	1.218e-3	3	2937.182	12	NC	1
600			min	-.002	4	-.112	4	-.07	5	-1.153e-3	2	921.668	4	1469.406	5
601		16	max	0	10	-.027	12	.004	1	1.084e-3	3	3764.122	12	NC	1
602			min	-.001	4	-.088	4	-.053	5	-1.004e-3	2	1181.156	4	1958.821	5
603		17	max	0	10	-.019	12	.001	1	9.505e-4	3	5486.591	12	NC	1
604			min	0	4	-.06	4	-.034	5	-8.557e-4	2	1721.655	4	3033.027	5
605		18	max	0	10	-.01	12	0	3	9.069e-4	4	NC	12	NC	1
606			min	0	4	-.031	4	-.016	5	-7.071e-4	2	3383.318	4	6515.489	5
607		19	max	0	1	0	1	0	1	9.871e-4	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.584e-4	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

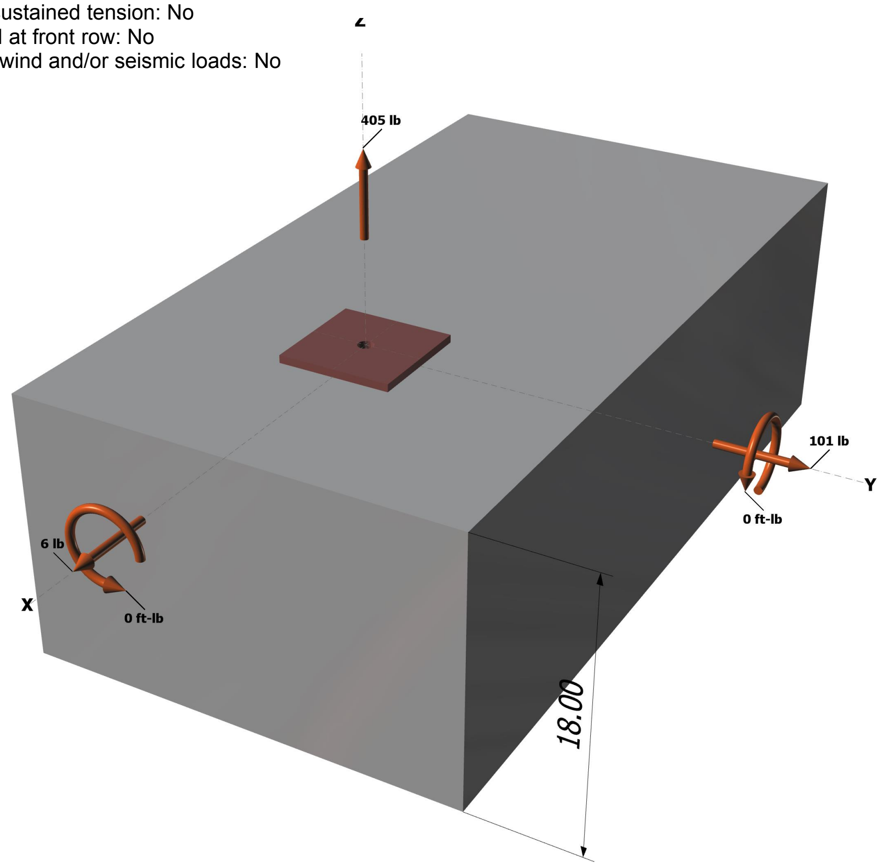
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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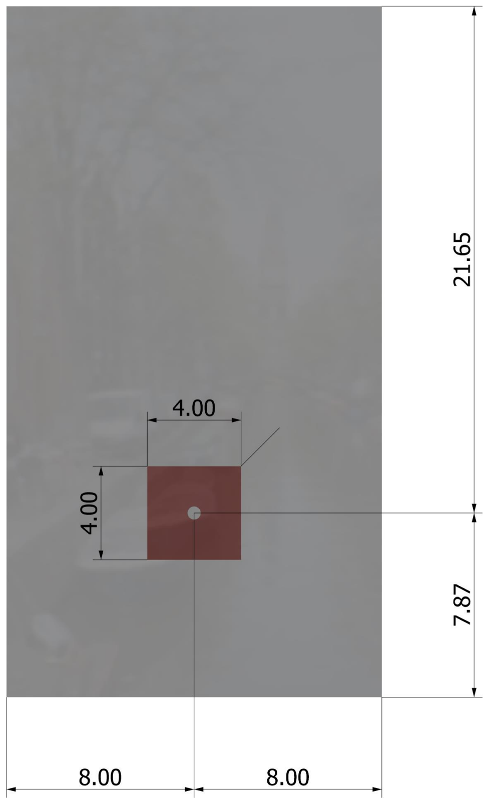


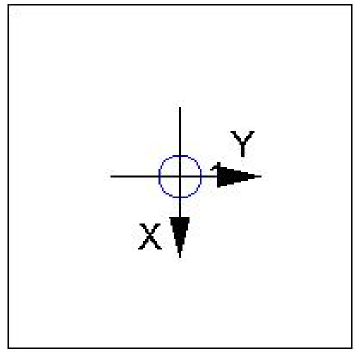
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

Anchor Designer™
Software
Version 2.4.5673.0

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

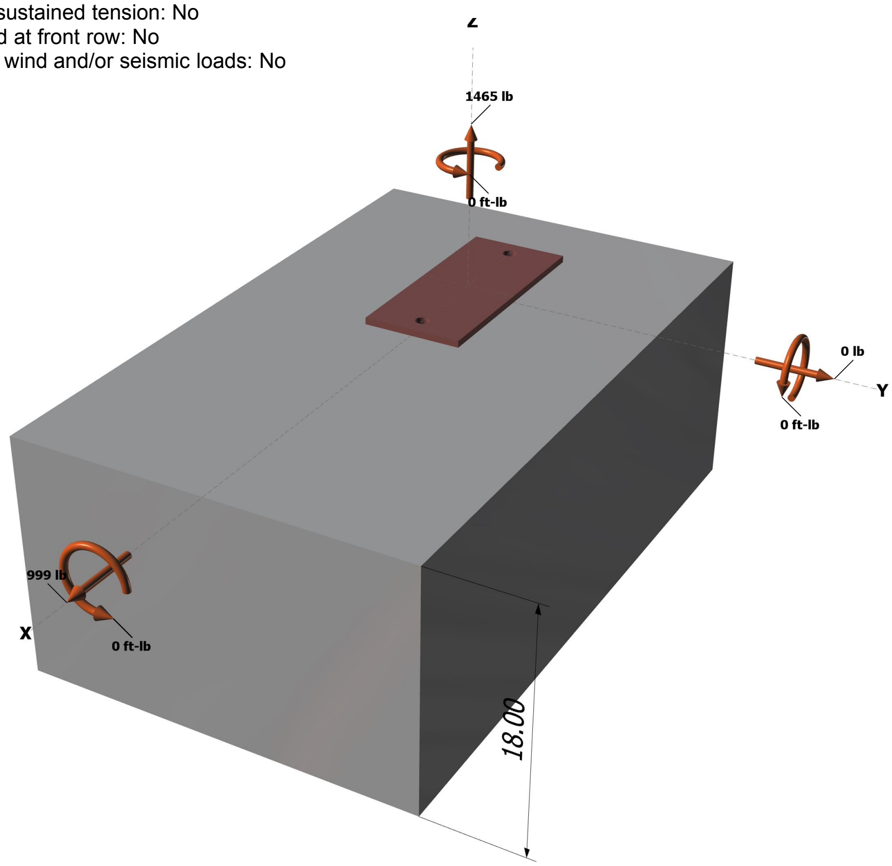
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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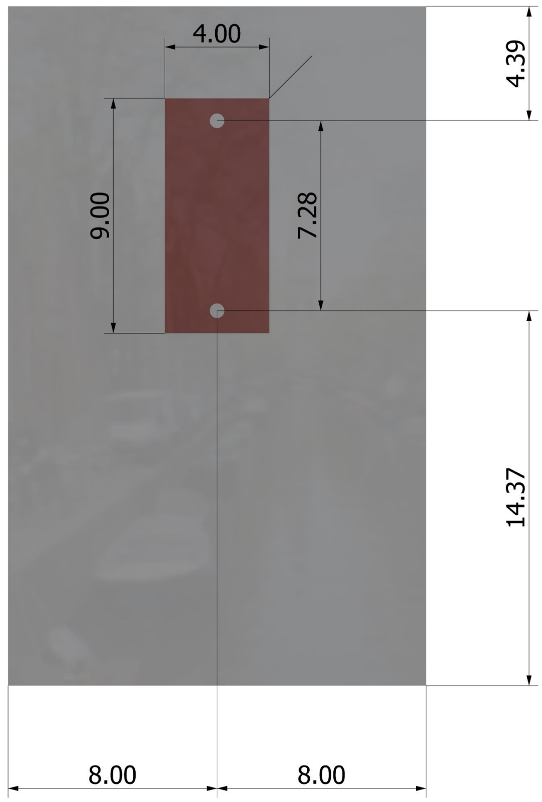


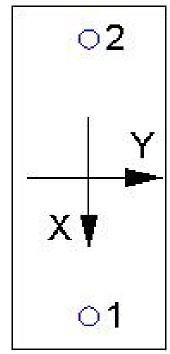
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
15580

11. Results

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

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

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

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

12. Warnings

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

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

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