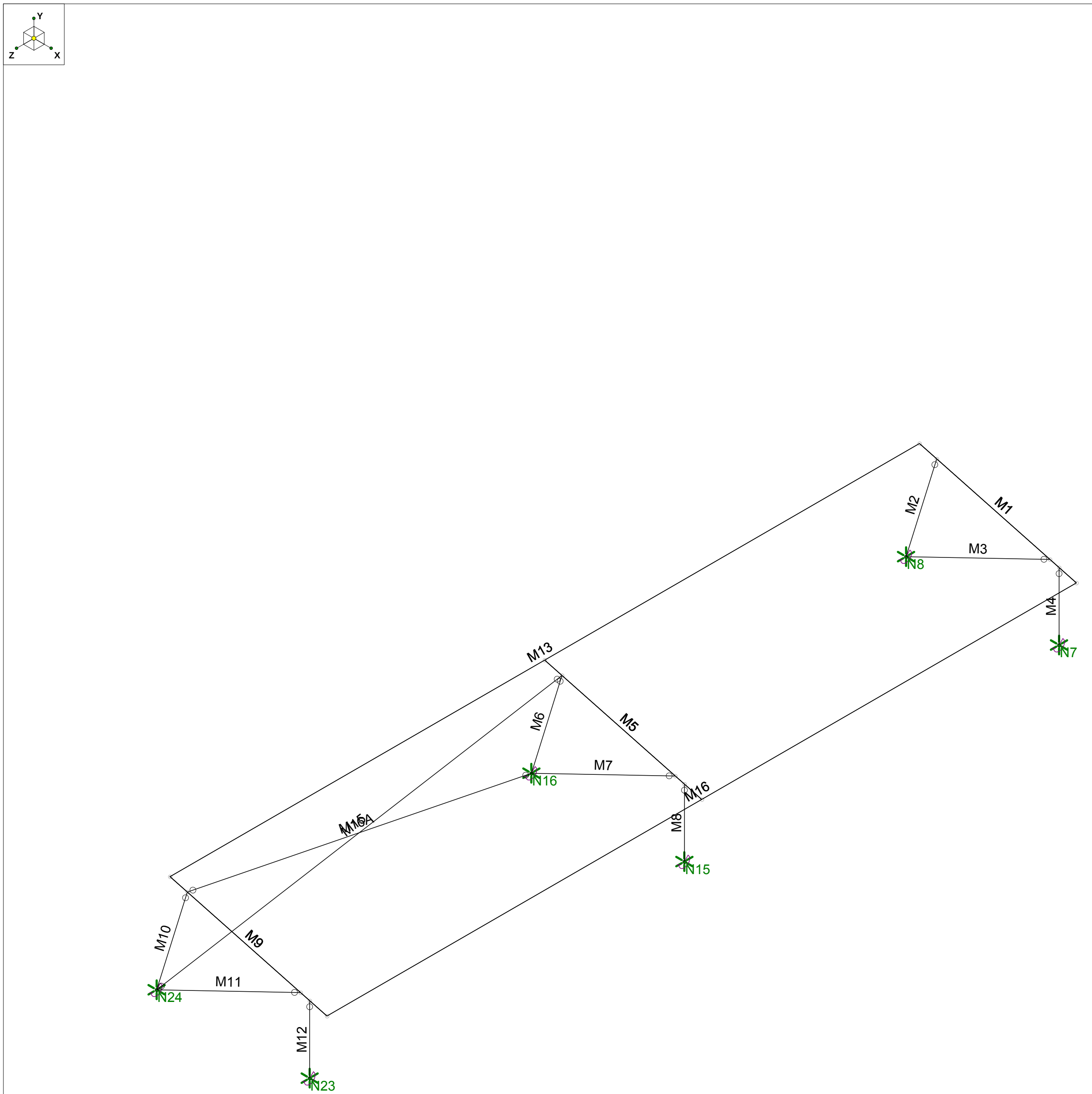


Schletter, Inc.	Standard PVMini Racking System	15° Tilt w/ Seismic Design
HCV	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

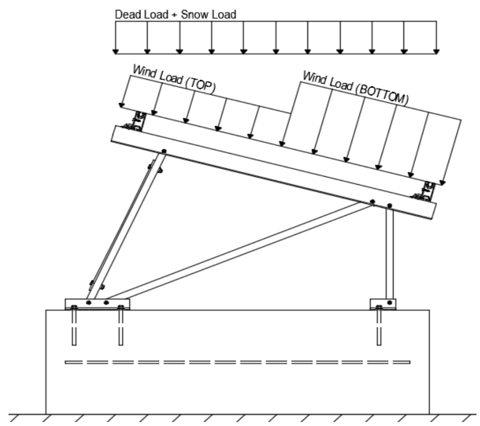
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 1
Module Tilt = 15°
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 = 22.68 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 1.00
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 140 mph
Height ≤ 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 30.77 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$	=	1	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.6	
$Cf-_{TOP}$	=	-2.04	*(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

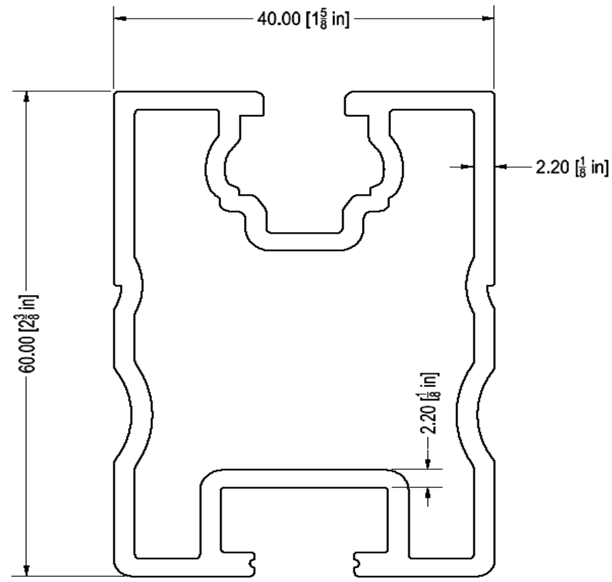
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

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).

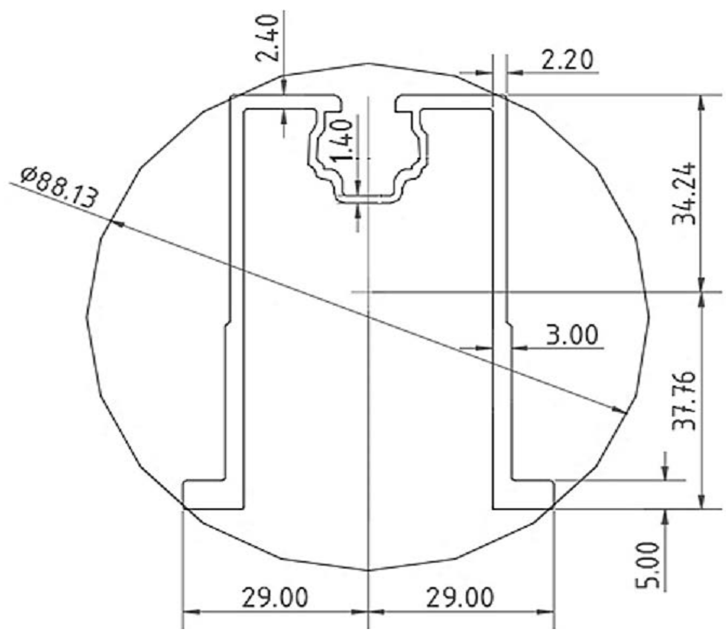
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	63	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.20	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.589	k-ft
M_z =	0.078	k-ft
$M_{y\ allowable}$ =	1.243	k-ft
$M_{z\ allowable}$ =	0.871	k-ft
Utilization =	56%	



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).

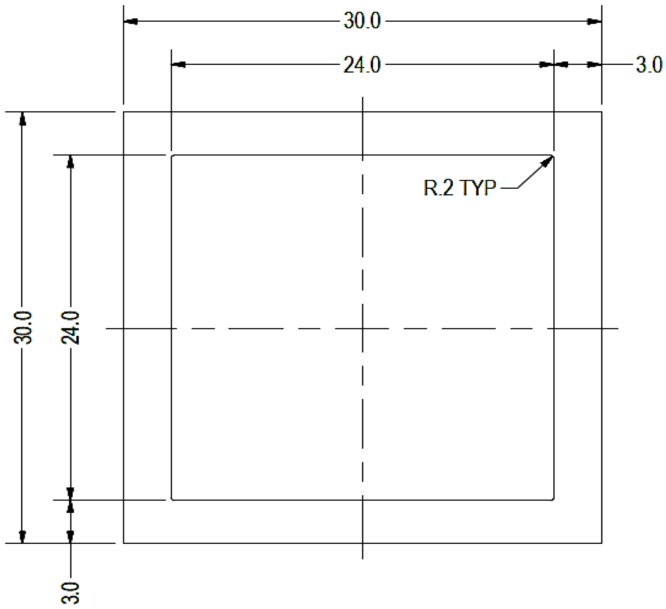
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.76	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.514	k-ft
M_z =	0.000	k-ft
P_n =	0.232	k
$M_{y\ allowable}$ =	1.460	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	37%	



4.3 Front Strut Design

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

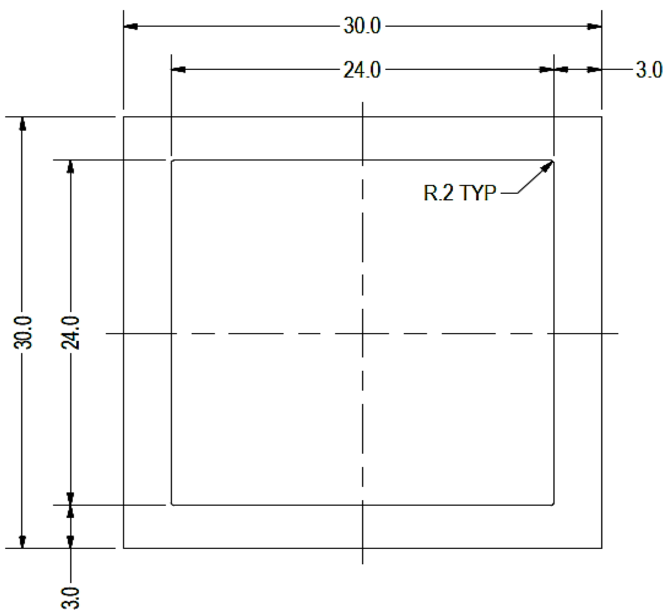
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.257	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	10%	



4.4 Diagonal Strut Design

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

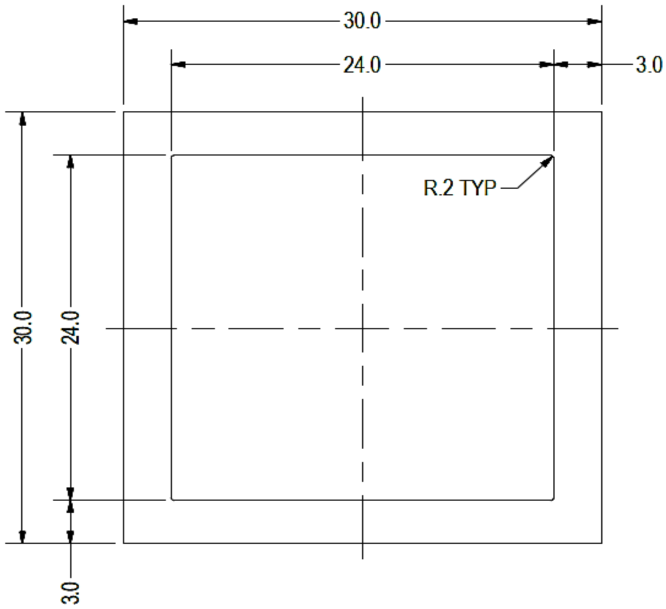
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.184	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	5%	



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).

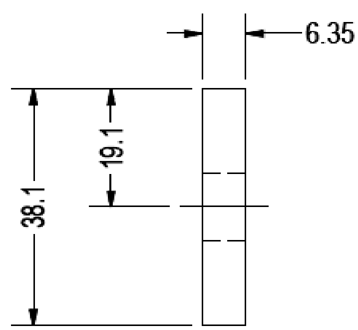
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	29.96	in
$\Phi F_{ty\ AXIAL}$ =	16.11	ksi
$\Phi F_{ty\ BENDING}$ =	30.52	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.973	k
$M_{y\ allowable}$ =	0.413	k-ft
$M_{z\ allowable}$ =	0.413	k-ft
$P_{n\ allowable}$ =	8.089	k
Utilization =	12%	



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 =	0.003	k-ft
P_n =	0.186	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	8%	



A cross brace kit is required every 24 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

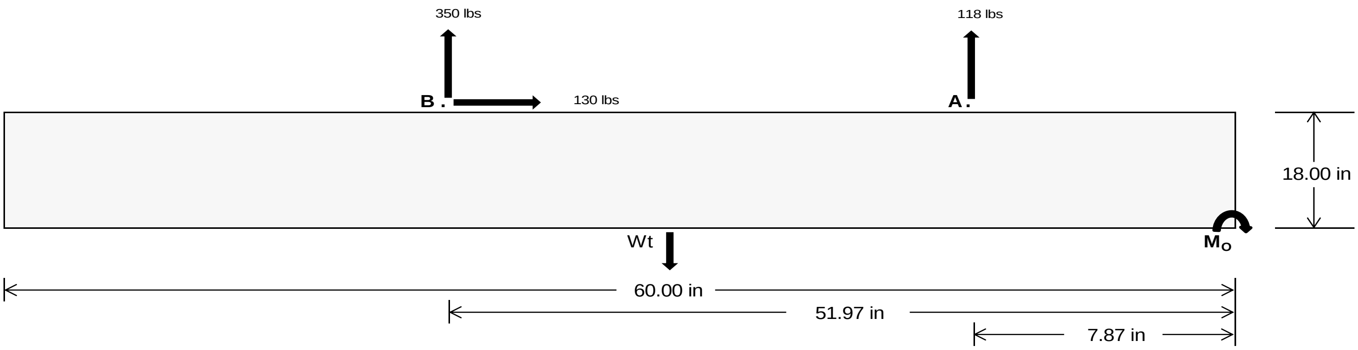
5.1 Helical Pile Foundations

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 =	516.14	1522.14	k
Compressive Load =	1633.46	1185.21	k
Lateral Load =	28.67	561.63	k
Moment (Weak Axis) =	0.05	0.00	k

5.2 Design of Ballast Foundations

Ballast foundations are used to secure the racking structure in place. The foundations are checked for potential overturning and sliding. Bearing pressures applied by the racking and ballast foundations are checked against the allowable bearing pressures provided by the IBC table 1806.2 (2012, 2015).



Concrete Properties		Footing Reinforcement	
Weight of Concrete =	145 pcf	*Use fiber reinforcing with (1) #5 rebar.*	
Compressive Strength =	2500 psi		
Yield Strength =	60000 psi		

Overturning Check

M_O =	21459.7 in-lbs	
Resisting Force Required =	715.32 lbs	*A minimum 60in long x 21in wide x 18in tall ballast foundation is required to resist overturning.*
S.F. =	1.67	
Weight Required =	1192.21 lbs	
Minimum Width =	21 in in	
Weight Provided =	1903.13 lbs	

Sliding

Force =	129.57 lbs	
Friction =	0.4	*Use a 60in long x 21in wide x 18in tall ballast foundation to resist sliding. Friction is OK.*
Weight Required =	323.92 lbs	
Resisting Weight =	1903.13 lbs	
Additional Weight Required =	0 lbs	

Cohesion

Sliding Force =	129.57 lbs	
Cohesion =	130 psf	
Area =	8.75 ft^2	*Use a 60in long x 21in wide x 18in tall ballast foundation. Cohesion is OK.*
Resisting =	951.56 lbs	
Additional Weight Required =	0 lbs	

Shear Key

Additional Force =	0 lbs	
Lateral Bearing Pressure =	200 psf/ft	
Required Depth =	0.00 ft	*Shear key is not required.*
f'_c =	2500 psi	
Length =	8 in	

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	549 lbs	549 lbs	549 lbs	549 lbs	567 lbs	567 lbs	567 lbs	567 lbs	799 lbs	799 lbs	799 lbs	799 lbs	-235 lbs	-235 lbs	-235 lbs	-235 lbs
F_B	400 lbs	400 lbs	400 lbs	400 lbs	410 lbs	410 lbs	410 lbs	410 lbs	579 lbs	579 lbs	579 lbs	579 lbs	-700 lbs	-700 lbs	-700 lbs	-700 lbs
F_V	34 lbs	34 lbs	34 lbs	34 lbs	227 lbs	227 lbs	227 lbs	227 lbs	194 lbs	194 lbs	194 lbs	194 lbs	-259 lbs	-259 lbs	-259 lbs	-259 lbs
P_{total}	2852 lbs	2943 lbs	3034 lbs	3124 lbs	2880 lbs	2970 lbs	3061 lbs	3152 lbs	3281 lbs	3371 lbs	3462 lbs	3553 lbs	206 lbs	260 lbs	315 lbs	369 lbs
M	330 lbs-ft	330 lbs-ft	330 lbs-ft	330 lbs-ft	636 lbs-ft	636 lbs-ft	636 lbs-ft	636 lbs-ft	704 lbs-ft	704 lbs-ft	704 lbs-ft	704 lbs-ft	460 lbs-ft	460 lbs-ft	460 lbs-ft	460 lbs-ft
e	0.12 ft	0.11 ft	0.11 ft	0.11 ft	0.22 ft	0.21 ft	0.21 ft	0.20 ft	0.21 ft	0.21 ft	0.20 ft	0.20 ft	2.23 ft	1.77 ft	1.46 ft	1.25 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}	280.7 psf	277.9 psf	275.2 psf	272.8 psf	241.9 psf	240.8 psf	239.8 psf	238.8 psf	278.4 psf	275.7 psf	273.1 psf	270.8 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	371.2 psf	364.3 psf	357.9 psf	352.0 psf	416.3 psf	407.3 psf	399.0 psf	391.5 psf	471.5 psf	459.9 psf	449.4 psf	439.7 psf	291.6 psf	128.9 psf	105.3 psf	98.1 psf

Maximum Bearing Pressure = 471 psf
Allowable Bearing Pressure = 1500 psf

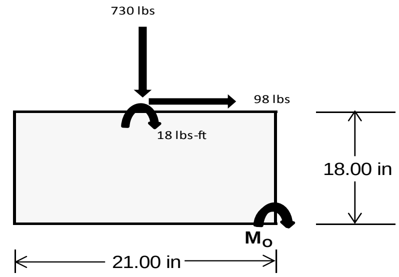
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 474.3 ft-lbs
Resisting Force Required = 542.01 lbs
S.F. = 1.67
Weight Required = 903.34 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	111 lbs	113 lbs	61 lbs	288 lbs	730 lbs	250 lbs	67 lbs	-4 lbs	20 lbs
F_V	16 lbs	130 lbs	16 lbs	11 lbs	98 lbs	12 lbs	16 lbs	130 lbs	16 lbs
P_{total}	2467 lbs	2469 lbs	2417 lbs	2531 lbs	2973 lbs	2493 lbs	756 lbs	685 lbs	709 lbs
M	46 lbs-ft	219 lbs-ft	47 lbs-ft	33 lbs-ft	165 lbs-ft	36 lbs-ft	46 lbs-ft	217 lbs-ft	47 lbs-ft
e	0.02 ft	0.09 ft	0.02 ft	0.01 ft	0.06 ft	0.01 ft	0.06 ft	0.32 ft	0.07 ft
L/6	0.29 ft	1.57 ft	1.71 ft	1.72 ft	1.64 ft	1.72 ft	1.63 ft	1.12 ft	1.62 ft
f_{min}	264.1 sqft	196.6 sqft	257.9 sqft	276.4 sqft	275.3 sqft	270.7 sqft	68.5 sqft	-6.9 sqft	62.7 sqft
f_{max}	299.8 psf	367.9 psf	294.6 psf	302.0 psf	404.3 psf	299.1 psf	104.3 psf	163.5 psf	99.4 psf

Maximum Bearing Pressure = 404 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

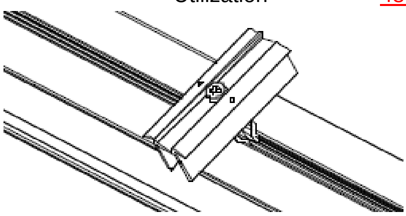
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

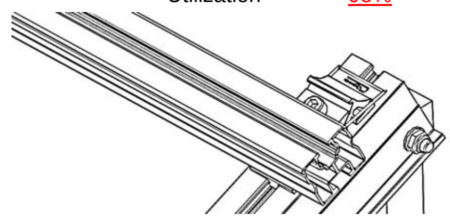
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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 =	0.588	k
Allowable Uplift =	1.214	k
Utilization =	48%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.093	k
Allowable Uplift =	1.116	k
Utilization =	98%	



6.2 Bolted Connections

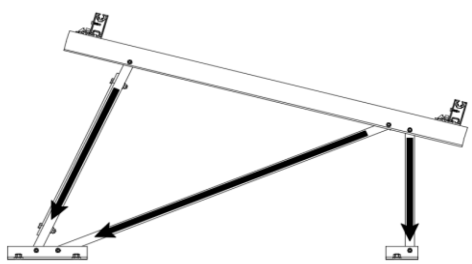
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are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

Front Strut		
Maximum Axial Load =	1.257	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	22%	

Rear Strut		
Maximum Axial Load =	1.165	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	20%	

Diagonal Strut		
Maximum Axial Load =	0.184	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	3%	

Bracing		
Maximum Axial Load =	0.186	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	2%	



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

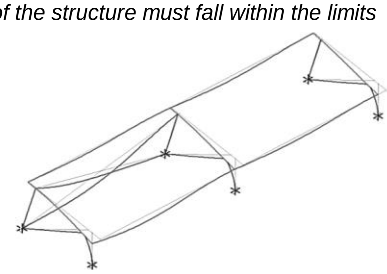
7.1 Seismic Drift

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} =	28.39	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.568	in
Max Drift, Δ_{MAX} =	0.073	in

$0.073 \leq 0.568$, OK.

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



APPENDIX A

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

Purlin = **ProfiPlus**

Strong Axis:

3.4.14

L_b = 63.00 in

J = 0.255

164.048

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.2 ksi

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

Weak Axis:

3.4.14

L_b = 63.00 in

J = 0.255

170.354

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.1

3.4.16

b/t = 23.9

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 23.9

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

S1 = 36.9
m = 0.65
C_0 = 30
Cc = 30

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L St$= 29.2 ksi
Ix = 250988 mm^4
0.603 in^4
y = 30 mm
Sx = 0.511 in^3
$M_{max}St$ = 1.243 k-ft

3.4.18

h/t = 7.4

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

S1 = 36.9
m = 0.65
C_0 = 20
Cc = 20

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L Wk$= 28.5 ksi
Iy = 120291 mm^4
0.289 in^4
x = 20 mm
Sy = 0.367 in^3
$M_{max}Wk$ = 0.871 k-ft

Compression

3.4.9

b/t = 7.4
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φyFcy
φF_L= 33.3 ksi

b/t = 23.9
S1 = 12.21
S2 = 32.70
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.5 ksi

3.4.10

Rb/t = 0.0

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

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

φF_L= 28.47 ksi
A = 578.06 mm^2
0.90 in^2
P_{max} = 25.51 kips

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 in³

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 in³

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

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

3.4.9

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

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

3.4.9.1

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in
J = 0.16
47.2194

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 31.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0
φF_L= 1.17φyFcy
φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9
m = 0.65
C_0 = 15
Cc = 15

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L St$= 31.2 ksi
Ix = 39958.2 mm^4
0.096 in^4
y = 15 mm
Sx = 0.163 in^3
$M_{max}St$ = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in
J = 0.16
47.2194

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 31.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9
m = 0.65
C_0 = 15
Cc = 15

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L Wk$= 31.2 ksi
Iy = 39958.2 mm^4
0.096 in^4
x = 15 mm
Sy = 0.163 in^3
$M_{max}Wk$ = 0.423 k-ft

<u>Compression</u>

3.4.7
λ = 0.77182
r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671
φcc = 0.83792
φF_L= φcc(Bc-Dc*λ)
φF_L= 24.5226 ksi

3.4.9
b/t = 7.75
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φyFcy
φF_L= 33.3 ksi

b/t = 7.75
S1 = 12.21
S2 = 32.70
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.10
Rb/t = 0.0

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

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

φF_L= 24.52 ksi
A = 323.87 mm^2
0.50 in^2
P_{max} = 12.31 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 29.96 in
J = 0.16
78.5957

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

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= 30.5 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= 30.5 ksi
Ix = 39958.2 mm^4
0.096 in^4
y = 15 mm
Sx = 0.163 in^3
M_{max}St = 0.413 k-ft

Weak Axis:

3.4.14

L_b = 29.96 in
J = 0.16
78.5957

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

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= 30.5

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

$\lambda =$ 1.28467

$r =$ 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.75985

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

$\varphi F_L =$ 16.1143 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

$\varphi F_L =$ 16.11 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 8.09 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	-63.248	-63.248	0	0
2	M16	Y	-63.248	-63.248	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	-85.82	-85.82	0	0
2	M16	y	-137.311	-137.311	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	175.072	175.072	0	0
2	M16	y	85.82	85.82	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	107.761	2	263.781	1	.035	9	0	1	0	1	0	1
2		min	-138.214	3	-358.08	3	-2.078	5	0	3	0	1	0	1
3	N7	max	0	5	416.951	1	-.032	10	0	10	0	1	0	1
4		min	-.117	2	-115.283	3	-21.615	4	-.034	4	0	1	0	1
5	N15	max	0	15	1256.506	1	.255	1	0	1	0	1	0	1
6		min	-1.268	2	-397.032	3	-22.05	5	-.035	4	0	1	0	1
7	N16	max	392.309	2	911.698	1	0	10	0	1	0	1	0	1
8		min	-432.026	3	-1170.877	3	-171.262	4	0	3	0	1	0	1
9	N23	max	0	15	416.991	1	1.148	1	.002	1	0	1	0	1
10		min	-.117	2	-114.929	3	-20.49	5	-.032	5	0	1	0	1
11	N24	max	107.812	2	267.311	1	42.605	3	0	4	0	1	0	1
12		min	-138.391	3	-356.387	3	-3.031	5	0	3	0	1	0	1
13	Totals:	max	606.381	2	3533.237	1	0	3						
14		min	-709	3	-2512.587	3	-239.725	5						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M2	1	max	300.767	1	.66	6	.917	4	0	10	0	3	0	1
2			min	-360.237	3	.153	15	-.107	3	0	4	0	2	0	1
3		2	max	300.863	1	.622	6	.83	4	0	10	0	4	0	15
4			min	-360.165	3	.145	15	-.107	3	0	4	0	10	0	6
5		3	max	300.96	1	.584	6	.743	4	0	10	0	4	0	15
6			min	-360.092	3	.136	15	-.107	3	0	4	0	3	0	6
7		4	max	301.056	1	.547	6	.655	4	0	10	0	4	0	15
8			min	-360.02	3	.127	15	-.107	3	0	4	0	3	0	6
9		5	max	301.152	1	.509	6	.568	4	0	10	0	4	0	15
10			min	-359.948	3	.118	15	-.107	3	0	4	0	3	0	6
11		6	max	301.249	1	.471	6	.481	4	0	10	0	4	0	15
12			min	-359.876	3	.109	15	-.107	3	0	4	0	3	0	6
13		7	max	301.345	1	.433	6	.393	4	0	10	0	4	0	15
14			min	-359.803	3	.1	15	-.107	3	0	4	0	3	0	6
15		8	max	301.442	1	.395	6	.333	1	0	10	0	4	0	15
16			min	-359.731	3	.091	15	-.107	3	0	4	0	3	0	6
17		9	max	301.538	1	.357	6	.333	1	0	10	0	4	0	15
18			min	-359.659	3	.082	15	-.107	3	0	4	0	3	0	6
19		10	max	301.634	1	.32	6	.333	1	0	10	0	4	0	15
20			min	-359.586	3	.073	15	-.107	3	0	4	0	3	0	6
21		11	max	301.731	1	.282	6	.333	1	0	10	0	4	0	15
22			min	-359.514	3	.065	15	-.107	3	0	4	0	3	0	6
23		12	max	301.827	1	.244	6	.333	1	0	10	0	4	0	15
24			min	-359.442	3	.056	15	-.119	5	0	4	0	3	0	6
25		13	max	301.923	1	.206	6	.333	1	0	10	0	4	0	15
26			min	-359.37	3	.047	15	-.206	5	0	4	0	3	0	6
27		14	max	302.02	1	.168	6	.333	1	0	10	0	4	0	15
28			min	-359.297	3	.038	15	-.293	5	0	4	0	3	0	6

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
29		15	max	302.116	1	.131	6	.333	1	0	10	0	1	0	15
30			min	-359.225	3	.029	15	-.381	5	0	4	0	3	0	6
31		16	max	302.212	1	.093	6	.333	1	0	10	0	1	0	15
32			min	-359.153	3	.02	15	-.468	5	0	4	0	3	0	6
33		17	max	302.309	1	.061	2	.333	1	0	10	0	1	0	15
34			min	-359.081	3	.011	15	-.555	5	0	4	0	3	0	6
35		18	max	302.405	1	.032	2	.333	1	0	10	0	1	0	15
36			min	-359.008	3	-.005	9	-.643	5	0	4	0	3	0	6
37		19	max	302.502	1	.006	10	.333	1	0	10	0	1	0	15
38			min	-358.936	3	-.034	1	-.73	5	0	4	0	3	0	6
39	M3	1	max	41.85	2	1.811	6	-.014	10	0	5	0	1	0	6
40			min	-66.119	9	.425	15	-1.376	4	0	1	0	10	0	15
41		2	max	41.783	2	1.633	6	-.014	10	0	5	0	1	0	6
42			min	-66.175	9	.383	15	-1.243	4	0	1	0	10	0	15
43		3	max	41.716	2	1.455	6	-.014	10	0	5	0	1	0	2
44			min	-66.231	9	.341	15	-1.109	4	0	1	0	10	0	15
45		4	max	41.649	2	1.277	6	-.014	10	0	5	0	1	0	15
46			min	-66.287	9	.299	15	-.976	4	0	1	0	5	0	4
47		5	max	41.582	2	1.099	6	-.014	10	0	5	0	1	0	15
48			min	-66.343	9	.257	15	-.842	4	0	1	0	5	0	4
49		6	max	41.515	2	.921	6	-.014	10	0	5	0	1	0	15
50			min	-66.399	9	.215	15	-.708	4	0	1	0	5	0	4
51		7	max	41.447	2	.743	6	-.014	10	0	5	0	1	0	15
52			min	-66.454	9	.174	15	-.575	4	0	1	0	5	0	4
53		8	max	41.38	2	.565	6	-.014	10	0	5	0	1	0	15
54			min	-66.51	9	.132	15	-.441	4	0	1	0	5	0	4
55		9	max	41.313	2	.387	6	-.014	10	0	5	0	1	0	15
56			min	-66.566	9	.09	15	-.308	4	0	1	0	5	-.001	4
57		10	max	41.246	2	.209	6	-.014	10	0	5	0	1	0	15
58			min	-66.622	9	.048	15	-.271	1	0	1	0	5	-.001	4
59		11	max	41.179	2	.036	2	.014	5	0	5	0	1	0	15
60			min	-66.678	9	.006	15	-.271	1	0	1	0	5	-.001	4
61		12	max	41.112	2	-.036	15	.147	5	0	5	0	1	0	15
62			min	-66.734	9	-.147	4	-.271	1	0	1	0	5	-.001	4
63		13	max	41.045	2	-.078	15	.281	5	0	5	0	1	0	15
64			min	-66.79	9	-.325	4	-.271	1	0	1	0	5	-.001	4
65		14	max	40.978	2	-.119	15	.414	5	0	5	0	1	0	15
66			min	-66.846	9	-.503	4	-.271	1	0	1	0	5	-.001	4
67		15	max	40.911	2	-.161	15	.548	5	0	5	0	10	0	15
68			min	-66.902	9	-.681	4	-.271	1	0	1	0	4	0	4
69		16	max	40.844	2	-.203	15	.681	5	0	5	0	10	0	15
70			min	-66.958	9	-.859	4	-.271	1	0	1	0	4	0	4
71		17	max	40.777	2	-.245	15	.815	5	0	5	0	10	0	15
72			min	-67.014	9	-1.037	4	-.271	1	0	1	0	4	0	4
73		18	max	40.709	2	-.287	15	.949	5	0	5	0	10	0	15
74			min	-67.07	9	-1.215	4	-.271	1	0	1	0	1	0	4
75		19	max	40.642	2	-.329	15	1.082	5	0	5	0	5	0	1
76			min	-67.125	9	-1.393	4	-.271	1	0	1	0	1	0	1
77	M4	1	max	415.786	1	0	1	-.033	10	0	1	0	5	0	1
78			min	-116.157	3	0	1	-20.909	4	0	1	0	1	0	1
79		2	max	415.851	1	0	1	-.033	10	0	1	0	12	0	1
80			min	-116.108	3	0	1	-20.965	4	0	1	-.002	4	0	1
81		3	max	415.916	1	0	1	-.033	10	0	1	0	12	0	1
82			min	-116.06	3	0	1	-21.021	4	0	1	-.004	4	0	1
83		4	max	415.98	1	0	1	-.033	10	0	1	0	10	0	1
84			min	-116.011	3	0	1	-21.077	4	0	1	-.006	4	0	1
85		5	max	416.045	1	0	1	-.033	10	0	1	0	10	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
86			min	-115.963	3	0	1	-21.133	4	0	1	-.008	4	0	1
87		6	max	416.11	1	0	1	-.033	10	0	1	0	10	0	1
88			min	-115.914	3	0	1	-21.19	4	0	1	-.009	4	0	1
89		7	max	416.174	1	0	1	-.033	10	0	1	0	10	0	1
90			min	-115.866	3	0	1	-21.246	4	0	1	-.011	4	0	1
91		8	max	416.239	1	0	1	-.033	10	0	1	0	10	0	1
92			min	-115.817	3	0	1	-21.302	4	0	1	-.013	4	0	1
93		9	max	416.304	1	0	1	-.033	10	0	1	0	10	0	1
94			min	-115.769	3	0	1	-21.358	4	0	1	-.015	4	0	1
95		10	max	416.368	1	0	1	-.033	10	0	1	0	10	0	1
96			min	-115.72	3	0	1	-21.414	4	0	1	-.017	4	0	1
97		11	max	416.433	1	0	1	-.033	10	0	1	0	10	0	1
98			min	-115.672	3	0	1	-21.47	4	0	1	-.019	4	0	1
99		12	max	416.498	1	0	1	-.033	10	0	1	0	10	0	1
100			min	-115.623	3	0	1	-21.526	4	0	1	-.021	4	0	1
101		13	max	416.563	1	0	1	-.033	10	0	1	0	10	0	1
102			min	-115.574	3	0	1	-21.582	4	0	1	-.023	4	0	1
103		14	max	416.627	1	0	1	-.033	10	0	1	0	10	0	1
104			min	-115.526	3	0	1	-21.638	4	0	1	-.025	4	0	1
105		15	max	416.692	1	0	1	-.033	10	0	1	0	10	0	1
106			min	-115.477	3	0	1	-21.694	4	0	1	-.027	4	0	1
107		16	max	416.757	1	0	1	-.033	10	0	1	0	10	0	1
108			min	-115.429	3	0	1	-21.75	4	0	1	-.029	4	0	1
109		17	max	416.821	1	0	1	-.033	10	0	1	0	10	0	1
110			min	-115.38	3	0	1	-21.806	4	0	1	-.031	4	0	1
111		18	max	416.886	1	0	1	-.033	10	0	1	0	10	0	1
112			min	-115.332	3	0	1	-21.863	4	0	1	-.033	4	0	1
113		19	max	416.951	1	0	1	-.033	10	0	1	0	10	0	1
114			min	-115.283	3	0	1	-21.919	4	0	1	-.034	4	0	1
115	M6	1	max	971.573	1	.645	6	.907	4	0	3	0	3	0	1
116			min	-1165.28	3	.15	15	-.212	3	0	5	0	1	0	1
117		2	max	971.669	1	.607	6	.82	4	0	3	0	4	0	15
118			min	-1165.208	3	.141	15	-.212	3	0	5	0	2	0	6
119		3	max	971.766	1	.569	6	.732	4	0	3	0	4	0	15
120			min	-1165.136	3	.132	15	-.212	3	0	5	0	2	0	6
121		4	max	971.862	1	.532	6	.645	4	0	3	0	4	0	15
122			min	-1165.064	3	.123	15	-.212	3	0	5	0	3	0	6
123		5	max	971.958	1	.494	6	.558	4	0	3	0	4	0	15
124			min	-1164.991	3	.114	15	-.212	3	0	5	0	3	0	6
125		6	max	972.055	1	.456	6	.47	4	0	3	0	4	0	15
126			min	-1164.919	3	.105	15	-.212	3	0	5	0	3	0	6
127		7	max	972.151	1	.418	6	.383	4	0	3	0	4	0	15
128			min	-1164.847	3	.097	15	-.212	3	0	5	0	3	0	6
129		8	max	972.247	1	.38	6	.296	4	0	3	0	4	0	15
130			min	-1164.774	3	.088	15	-.212	3	0	5	0	3	0	6
131		9	max	972.344	1	.342	6	.208	4	0	3	0	4	0	15
132			min	-1164.702	3	.079	15	-.212	3	0	5	0	3	0	6
133		10	max	972.44	1	.305	6	.126	14	0	3	0	4	0	15
134			min	-1164.63	3	.07	15	-.212	3	0	5	0	3	0	6
135		11	max	972.536	1	.267	6	.121	1	0	3	0	4	0	15
136			min	-1164.558	3	.061	15	-.212	3	0	5	0	3	0	6
137		12	max	972.633	1	.229	6	.121	1	0	3	0	4	0	15
138			min	-1164.485	3	.052	15	-.212	3	0	5	0	3	0	6
139		13	max	972.729	1	.198	2	.121	1	0	3	0	4	0	15
140			min	-1164.413	3	.043	15	-.212	3	0	5	0	3	0	6
141		14	max	972.826	1	.169	2	.121	1	0	3	0	4	0	15
142			min	-1164.341	3	.034	15	-.263	5	0	5	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
143		15	max	972.922	1	.139	2	.121	1	0	3	0	4	0	15
144			min	-1164.269	3	.025	15	-.351	5	0	5	0	3	0	6
145		16	max	973.018	1	.11	2	.121	1	0	3	0	4	0	15
146			min	-1164.196	3	.014	9	-.438	5	0	5	0	3	0	6
147		17	max	973.115	1	.08	2	.121	1	0	3	0	4	0	15
148			min	-1164.124	3	-.011	9	-.525	5	0	5	0	3	0	6
149		18	max	973.211	1	.054	10	.121	1	0	3	0	4	0	15
150			min	-1164.052	3	-.035	9	-.613	5	0	5	0	3	0	6
151		19	max	973.307	1	.029	10	.121	1	0	3	0	4	0	15
152			min	-1163.979	3	-.061	1	-.7	5	0	5	0	3	0	6
153	M7	1	max	184.026	2	1.816	4	.004	9	0	1	0	4	0	4
154			min	-113.656	9	.431	15	-1.433	4	0	3	0	3	0	15
155		2	max	183.959	2	1.638	4	.004	9	0	1	0	4	0	2
156			min	-113.712	9	.389	15	-1.299	4	0	3	0	3	0	15
157		3	max	183.892	2	1.459	4	.004	9	0	1	0	4	0	2
158			min	-113.768	9	.347	15	-1.166	4	0	3	0	3	0	9
159		4	max	183.825	2	1.281	4	.004	9	0	1	0	1	0	15
160			min	-113.824	9	.305	15	-1.032	4	0	3	0	3	0	1
161		5	max	183.758	2	1.103	4	.004	9	0	1	0	1	0	15
162			min	-113.879	9	.263	15	-.899	4	0	3	0	5	0	6
163		6	max	183.691	2	.925	4	.004	9	0	1	0	1	0	15
164			min	-113.935	9	.221	15	-.765	4	0	3	0	5	0	6
165		7	max	183.624	2	.747	4	.004	9	0	1	0	1	0	15
166			min	-113.991	9	.179	15	-.631	4	0	3	0	5	0	6
167		8	max	183.556	2	.569	4	.004	9	0	1	0	1	0	15
168			min	-114.047	9	.138	15	-.498	4	0	3	0	5	0	6
169		9	max	183.489	2	.391	4	.004	9	0	1	0	1	0	15
170			min	-114.103	9	.096	15	-.364	4	0	3	0	5	-.001	6
171		10	max	183.422	2	.213	4	.004	9	0	1	0	1	0	15
172			min	-114.159	9	.054	15	-.231	4	0	3	0	5	-.001	6
173		11	max	183.355	2	.06	2	.004	9	0	1	0	1	0	15
174			min	-114.215	9	-.005	9	-.097	4	0	3	0	5	-.001	6
175		12	max	183.288	2	-.03	15	.038	5	0	1	0	1	0	15
176			min	-114.271	9	-.143	6	-.014	2	0	3	0	5	-.001	6
177		13	max	183.221	2	-.072	15	.171	5	0	1	0	1	0	15
178			min	-114.327	9	-.321	6	-.014	2	0	3	0	5	-.001	6
179		14	max	183.154	2	-.113	15	.305	5	0	1	0	1	0	15
180			min	-114.383	9	-.499	6	-.014	2	0	3	0	5	-.001	6
181		15	max	183.087	2	-.155	15	.438	5	0	1	0	1	0	15
182			min	-114.439	9	-.677	6	-.014	2	0	3	0	5	0	6
183		16	max	183.02	2	-.197	15	.572	5	0	1	0	1	0	15
184			min	-114.495	9	-.855	6	-.014	2	0	3	0	5	0	6
185		17	max	182.953	2	-.239	15	.705	5	0	1	0	1	0	15
186			min	-114.55	9	-1.033	6	-.014	2	0	3	0	5	0	6
187		18	max	182.885	2	-.281	15	.839	5	0	1	0	1	0	15
188			min	-114.606	9	-1.211	6	-.014	2	0	3	0	5	0	6
189		19	max	182.818	2	-.323	15	.972	5	0	1	0	1	0	1
190			min	-114.662	9	-1.389	6	-.014	2	0	3	0	3	0	1
191	M8	1	max	1255.341	1	0	1	.321	1	0	1	0	4	0	1
192			min	-397.905	3	0	1	-21.298	4	0	1	0	1	0	1
193		2	max	1255.406	1	0	1	.321	1	0	1	0	1	0	1
194			min	-397.857	3	0	1	-21.354	4	0	1	-.002	4	0	1
195		3	max	1255.47	1	0	1	.321	1	0	1	0	1	0	1
196			min	-397.808	3	0	1	-21.41	4	0	1	-.004	4	0	1
197		4	max	1255.535	1	0	1	.321	1	0	1	0	1	0	1
198			min	-397.76	3	0	1	-21.466	4	0	1	-.006	4	0	1
199		5	max	1255.6	1	0	1	.321	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	-397.711	3	0	1	-21.522	4	0	1	-.008	4	0	1
201		6	max	1255.665	1	0	1	.321	1	0	1	0	1	0	1
202			min	-397.662	3	0	1	-21.578	4	0	1	-.01	4	0	1
203		7	max	1255.729	1	0	1	.321	1	0	1	0	1	0	1
204			min	-397.614	3	0	1	-21.634	4	0	1	-.012	4	0	1
205		8	max	1255.794	1	0	1	.321	1	0	1	0	1	0	1
206			min	-397.565	3	0	1	-21.69	4	0	1	-.013	4	0	1
207		9	max	1255.859	1	0	1	.321	1	0	1	0	1	0	1
208			min	-397.517	3	0	1	-21.746	4	0	1	-.015	4	0	1
209		10	max	1255.923	1	0	1	.321	1	0	1	0	1	0	1
210			min	-397.468	3	0	1	-21.802	4	0	1	-.017	4	0	1
211		11	max	1255.988	1	0	1	.321	1	0	1	0	1	0	1
212			min	-397.42	3	0	1	-21.858	4	0	1	-.019	4	0	1
213		12	max	1256.053	1	0	1	.321	1	0	1	0	1	0	1
214			min	-397.371	3	0	1	-21.914	4	0	1	-.021	4	0	1
215		13	max	1256.118	1	0	1	.321	1	0	1	0	1	0	1
216			min	-397.323	3	0	1	-21.97	4	0	1	-.023	4	0	1
217		14	max	1256.182	1	0	1	.321	1	0	1	0	1	0	1
218			min	-397.274	3	0	1	-22.027	4	0	1	-.025	4	0	1
219		15	max	1256.247	1	0	1	.321	1	0	1	0	1	0	1
220			min	-397.226	3	0	1	-22.083	4	0	1	-.027	4	0	1
221		16	max	1256.312	1	0	1	.321	1	0	1	0	1	0	1
222			min	-397.177	3	0	1	-22.139	4	0	1	-.029	4	0	1
223		17	max	1256.376	1	0	1	.321	1	0	1	0	1	0	1
224			min	-397.129	3	0	1	-22.195	4	0	1	-.031	4	0	1
225		18	max	1256.441	1	0	1	.321	1	0	1	0	1	0	1
226			min	-397.08	3	0	1	-22.251	4	0	1	-.033	4	0	1
227		19	max	1256.506	1	0	1	.321	1	0	1	0	1	0	1
228			min	-397.032	3	0	1	-22.307	4	0	1	-.035	4	0	1
229	M10	1	max	302.815	1	.688	4	1.074	5	0	1	0	4	0	1
230			min	-339.003	3	.172	15	-.087	1	-.001	5	0	3	0	1
231		2	max	302.912	1	.65	4	.987	5	0	1	0	4	0	15
232			min	-338.931	3	.164	15	-.087	1	-.001	5	0	3	0	4
233		3	max	303.008	1	.612	4	.9	5	0	1	0	4	0	15
234			min	-338.858	3	.155	15	-.087	1	-.001	5	0	3	0	4
235		4	max	303.104	1	.574	4	.812	5	0	1	0	4	0	15
236			min	-338.786	3	.146	15	-.087	1	-.001	5	0	3	0	4
237		5	max	303.201	1	.537	4	.725	5	0	1	0	4	0	15
238			min	-338.714	3	.137	15	-.087	1	-.001	5	0	3	0	4
239		6	max	303.297	1	.499	4	.638	5	0	1	0	4	0	15
240			min	-338.641	3	.128	15	-.087	1	-.001	5	0	3	0	4
241		7	max	303.393	1	.461	4	.55	5	0	1	0	5	0	15
242			min	-338.569	3	.119	15	-.087	1	-.001	5	0	3	0	4
243		8	max	303.49	1	.423	4	.463	5	0	1	0	5	0	15
244			min	-338.497	3	.11	15	-.087	1	-.001	5	0	3	0	4
245		9	max	303.586	1	.385	4	.376	5	0	1	0	5	0	15
246			min	-338.425	3	.101	15	-.087	1	-.001	5	0	3	0	4
247		10	max	303.683	1	.347	4	.288	5	0	1	0	5	0	15
248			min	-338.352	3	.092	15	-.087	1	-.001	5	0	3	0	4
249		11	max	303.779	1	.31	4	.201	5	0	1	.001	5	0	15
250			min	-338.28	3	.083	15	-.087	1	-.001	5	0	3	0	4
251		12	max	303.875	1	.272	4	.114	5	0	1	.001	5	0	15
252			min	-338.208	3	.075	15	-.087	1	-.001	5	0	3	0	4
253		13	max	303.972	1	.234	4	.026	5	0	1	.001	5	0	15
254			min	-338.136	3	.066	15	-.087	1	-.001	5	0	3	0	4
255		14	max	304.068	1	.196	4	-.013	10	0	1	.001	5	0	15
256			min	-338.063	3	.057	15	-.087	1	-.001	5	0	3	0	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
257		15	max	304.164	1	.158	4	-.013	10	0	1	.001	5	0	15
258			min	-337.991	3	.048	15	-.154	4	-.001	5	0	3	0	4
259		16	max	304.261	1	.121	4	-.013	10	0	1	.001	5	0	15
260			min	-337.919	3	.039	15	-.241	4	-.001	5	0	3	0	4
261		17	max	304.357	1	.083	4	-.013	10	0	1	0	5	0	15
262			min	-337.846	3	.019	9	-.329	4	-.001	5	0	3	0	4
263		18	max	304.453	1	.059	3	-.013	10	0	1	0	5	0	15
264			min	-337.774	3	-.005	9	-.416	4	-.001	5	0	3	0	4
265		19	max	304.55	1	.036	3	-.013	10	0	1	0	5	0	15
266			min	-337.702	3	-.034	1	-.503	4	-.001	5	0	3	0	4
267	M11	1	max	41.406	2	1.81	6	.304	1	.001	4	.001	5	0	6
268			min	-66.147	9	.424	15	-1.196	5	0	10	0	1	0	15
269		2	max	41.339	2	1.632	6	.304	1	.001	4	0	5	0	6
270			min	-66.203	9	.382	15	-1.062	5	0	10	0	1	0	15
271		3	max	41.272	2	1.454	6	.304	1	.001	4	0	5	0	2
272			min	-66.259	9	.34	15	-.929	5	0	10	0	1	0	3
273		4	max	41.205	2	1.276	6	.304	1	.001	4	0	5	0	15
274			min	-66.315	9	.298	15	-.795	5	0	10	0	1	0	4
275		5	max	41.138	2	1.098	6	.304	1	.001	4	0	5	0	15
276			min	-66.371	9	.257	15	-.661	5	0	10	0	1	0	4
277		6	max	41.07	2	.92	6	.304	1	.001	4	0	3	0	15
278			min	-66.426	9	.215	15	-.528	5	0	10	0	1	0	4
279		7	max	41.003	2	.742	6	.304	1	.001	4	0	3	0	15
280			min	-66.482	9	.173	15	-.394	5	0	10	0	1	0	4
281		8	max	40.936	2	.564	6	.304	1	.001	4	0	3	0	15
282			min	-66.538	9	.131	15	-.261	5	0	10	0	1	0	4
283		9	max	40.869	2	.386	6	.304	1	.001	4	0	3	0	15
284			min	-66.594	9	.089	15	-.127	5	0	10	0	1	-.001	4
285		10	max	40.802	2	.208	6	.304	1	.001	4	0	3	0	15
286			min	-66.65	9	.047	15	-.007	3	0	10	0	1	-.001	4
287		11	max	40.735	2	.036	2	.304	1	.001	4	0	3	0	15
288			min	-66.706	9	0	3	-.007	3	0	10	0	1	-.001	4
289		12	max	40.668	2	-.036	15	.335	4	.001	4	0	3	0	15
290			min	-66.762	9	-.148	4	-.007	3	0	10	0	1	-.001	4
291		13	max	40.601	2	-.078	15	.468	4	.001	4	0	3	0	15
292			min	-66.818	9	-.326	4	-.007	3	0	10	0	2	-.001	4
293		14	max	40.534	2	-.12	15	.602	4	.001	4	0	3	0	15
294			min	-66.874	9	-.504	4	-.007	3	0	10	0	10	-.001	4
295		15	max	40.467	2	-.162	15	.735	4	.001	4	0	4	0	15
296			min	-66.93	9	-.682	4	-.007	3	0	10	0	10	0	4
297		16	max	40.399	2	-.204	15	.869	4	.001	4	0	4	0	15
298			min	-66.986	9	-.86	4	-.007	3	0	10	0	10	0	4
299		17	max	40.332	2	-.246	15	1.002	4	.001	4	0	4	0	15
300			min	-67.041	9	-1.038	4	-.007	3	0	10	0	10	0	4
301		18	max	40.265	2	-.287	15	1.136	4	.001	4	.001	4	0	15
302			min	-67.097	9	-1.216	4	-.007	3	0	10	0	10	0	4
303		19	max	40.198	2	-.329	15	1.269	4	.001	4	.001	4	0	1
304			min	-67.153	9	-1.394	4	-.007	3	0	10	0	10	0	1
305	M12	1	max	415.826	1	0	1	1.233	1	0	1	0	4	0	1
306			min	-115.802	3	0	1	-19.502	5	0	1	0	3	0	1
307		2	max	415.891	1	0	1	1.233	1	0	1	0	1	0	1
308			min	-115.754	3	0	1	-19.558	5	0	1	-.002	5	0	1
309		3	max	415.956	1	0	1	1.233	1	0	1	0	1	0	1
310			min	-115.705	3	0	1	-19.614	5	0	1	-.003	5	0	1
311		4	max	416.02	1	0	1	1.233	1	0	1	0	1	0	1
312			min	-115.657	3	0	1	-19.67	5	0	1	-.005	5	0	1
313		5	max	416.085	1	0	1	1.233	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
314			min	-115.608	3	0	1	-19.727	5	0	1	-.007	5	0	1
315		6	max	416.15	1	0	1	1.233	1	0	1	0	1	0	1
316			min	-115.56	3	0	1	-19.783	5	0	1	-.009	5	0	1
317		7	max	416.215	1	0	1	1.233	1	0	1	0	1	0	1
318			min	-115.511	3	0	1	-19.839	5	0	1	-.011	5	0	1
319		8	max	416.279	1	0	1	1.233	1	0	1	0	1	0	1
320			min	-115.462	3	0	1	-19.895	5	0	1	-.012	5	0	1
321		9	max	416.344	1	0	1	1.233	1	0	1	0	1	0	1
322			min	-115.414	3	0	1	-19.951	5	0	1	-.014	5	0	1
323		10	max	416.409	1	0	1	1.233	1	0	1	.001	1	0	1
324			min	-115.365	3	0	1	-20.007	5	0	1	-.016	5	0	1
325		11	max	416.473	1	0	1	1.233	1	0	1	.001	1	0	1
326			min	-115.317	3	0	1	-20.063	5	0	1	-.018	5	0	1
327		12	max	416.538	1	0	1	1.233	1	0	1	.001	1	0	1
328			min	-115.268	3	0	1	-20.119	5	0	1	-.019	5	0	1
329		13	max	416.603	1	0	1	1.233	1	0	1	.001	1	0	1
330			min	-115.22	3	0	1	-20.175	5	0	1	-.021	5	0	1
331		14	max	416.667	1	0	1	1.233	1	0	1	.001	1	0	1
332			min	-115.171	3	0	1	-20.231	5	0	1	-.023	5	0	1
333		15	max	416.732	1	0	1	1.233	1	0	1	.002	1	0	1
334			min	-115.123	3	0	1	-20.287	5	0	1	-.025	5	0	1
335		16	max	416.797	1	0	1	1.233	1	0	1	.002	1	0	1
336			min	-115.074	3	0	1	-20.343	5	0	1	-.027	5	0	1
337		17	max	416.862	1	0	1	1.233	1	0	1	.002	1	0	1
338			min	-115.026	3	0	1	-20.399	5	0	1	-.029	5	0	1
339		18	max	416.926	1	0	1	1.233	1	0	1	.002	1	0	1
340			min	-114.977	3	0	1	-20.456	5	0	1	-.03	5	0	1
341		19	max	416.991	1	0	1	1.233	1	0	1	.002	1	0	1
342			min	-114.929	3	0	1	-20.512	5	0	1	-.032	5	0	1
343	M1	1	max	71.078	1	338.776	3	-1.182	10	0	1	.049	1	0	1
344			min	3.307	12	-302.401	1	-25.192	1	0	3	.002	10	0	3
345		2	max	71.15	1	338.574	3	-1.182	10	0	1	.044	1	.066	1
346			min	3.343	12	-302.67	1	-25.192	1	0	3	.002	10	-.074	3
347		3	max	82.219	1	5.074	14	-1.17	10	0	5	.038	1	.13	1
348			min	-7.017	3	-21.676	3	-24.969	1	0	1	.002	10	-.146	3
349		4	max	82.292	1	4.809	14	-1.17	10	0	5	.033	1	.131	1
350			min	-6.962	3	-21.878	3	-24.969	1	0	1	.002	10	-.141	3
351		5	max	82.364	1	4.544	14	-1.17	10	0	5	.027	1	.131	1
352			min	-6.908	3	-22.081	3	-24.969	1	0	1	.001	10	-.136	3
353		6	max	82.436	1	4.279	14	-1.17	10	0	5	.022	1	.132	1
354			min	-6.854	3	-22.283	3	-24.969	1	0	1	.001	10	-.131	3
355		7	max	82.509	1	4.049	9	-1.17	10	0	5	.016	1	.133	1
356			min	-6.8	3	-22.485	3	-24.969	1	0	1	0	10	-.127	3
357		8	max	82.581	1	3.824	9	-1.17	10	0	5	.011	1	.133	1
358			min	-6.746	3	-22.687	3	-24.969	1	0	1	0	10	-.122	3
359		9	max	82.653	1	3.599	9	-1.17	10	0	5	.006	1	.134	1
360			min	-6.691	3	-22.89	3	-24.969	1	0	1	0	10	-.117	3
361		10	max	82.725	1	3.375	9	-1.17	10	0	5	.001	4	.135	1
362			min	-6.637	3	-23.092	3	-24.969	1	0	1	0	10	-.112	3
363		11	max	82.798	1	3.15	9	-1.17	10	0	5	0	3	.137	2
364			min	-6.583	3	-23.294	3	-24.969	1	0	1	-.005	1	-.107	3
365		12	max	82.87	1	2.925	9	-1.17	10	0	5	0	12	.14	2
366			min	-6.529	3	-23.497	3	-24.969	1	0	1	-.011	1	-.102	3
367		13	max	82.942	1	2.7	9	-1.17	10	0	5	0	12	.144	2
368			min	-6.475	3	-23.699	3	-24.969	1	0	1	-.016	1	-.096	3
369		14	max	83.014	1	2.476	9	-1.17	10	0	5	0	12	.148	2
370			min	-6.42	3	-23.901	3	-24.969	1	0	1	-.022	1	-.091	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	83.087	1	2.251	9	-1.17	10	0	5	-.001	12	.152	2
372			min	-6.366	3	-24.103	3	-24.969	1	0	1	-.027	1	-.086	3
373		16	max	67.475	2	12.725	10	-1.183	10	0	1	-.002	10	.155	2
374			min	-33.966	3	-49.173	3	-25.217	1	0	4	-.033	1	-.081	3
375		17	max	67.548	2	12.5	10	-1.183	10	0	1	-.002	10	.153	2
376			min	-33.911	3	-49.375	3	-25.217	1	0	4	-.038	1	-.07	3
377		18	max	-2.509	12	356.393	2	-1.215	10	0	3	-.002	10	.078	2
378			min	-71.117	1	-161.852	3	-33.324	4	0	2	-.044	1	-.035	3
379		19	max	-2.473	12	356.123	2	-1.215	10	0	3	-.002	10	0	2
380			min	-71.044	1	-162.054	3	-33.082	4	0	2	-.049	1	0	3
381	M5	1	max	163.858	1	1110.354	3	0	10	0	1	.035	4	0	3
382			min	1.326	15	-989.564	1	-38.078	3	0	5	0	10	0	1
383		2	max	163.93	1	1110.151	3	0	10	0	1	.03	4	.214	1
384			min	1.348	15	-989.834	1	-38.078	3	0	5	-.003	3	-.24	3
385		3	max	198.435	1	7.435	9	4.264	3	0	3	.025	4	.425	1
386			min	-37.633	3	-76.175	3	-19.223	4	0	4	-.011	3	-.476	3
387		4	max	198.507	1	7.21	9	4.264	3	0	3	.021	4	.429	1
388			min	-37.579	3	-76.377	3	-18.981	4	0	4	-.01	3	-.459	3
389		5	max	198.579	1	6.985	9	4.264	3	0	3	.017	4	.433	1
390			min	-37.525	3	-76.58	3	-18.739	4	0	4	-.009	3	-.443	3
391		6	max	198.652	1	6.76	9	4.264	3	0	3	.013	4	.437	1
392			min	-37.471	3	-76.782	3	-18.497	4	0	4	-.008	3	-.426	3
393		7	max	198.724	1	6.536	9	4.264	3	0	3	.009	4	.442	1
394			min	-37.416	3	-76.984	3	-18.255	4	0	4	-.008	3	-.41	3
395		8	max	198.796	1	6.311	9	4.264	3	0	3	.005	4	.446	1
396			min	-37.362	3	-77.187	3	-18.013	4	0	4	-.007	3	-.393	3
397		9	max	198.868	1	6.086	9	4.264	3	0	3	.001	5	.45	1
398			min	-37.308	3	-77.389	3	-17.771	4	0	4	-.006	3	-.376	3
399		10	max	198.941	1	5.861	9	4.264	3	0	3	0	2	.455	1
400			min	-37.254	3	-77.591	3	-17.529	4	0	4	-.005	3	-.359	3
401		11	max	199.013	1	5.637	9	4.264	3	0	3	0	2	.459	1
402			min	-37.2	3	-77.794	3	-17.287	4	0	4	-.007	4	-.342	3
403		12	max	199.085	1	5.412	9	4.264	3	0	3	0	10	.465	2
404			min	-37.145	3	-77.996	3	-17.045	4	0	4	-.01	4	-.325	3
405		13	max	199.158	1	5.187	9	4.264	3	0	3	0	10	.477	2
406			min	-37.091	3	-78.198	3	-16.803	4	0	4	-.014	4	-.309	3
407		14	max	199.23	1	4.962	9	4.264	3	0	3	0	10	.49	2
408			min	-37.037	3	-78.4	3	-16.561	4	0	4	-.018	4	-.292	3
409		15	max	199.302	1	4.737	9	4.264	3	0	3	0	10	.502	2
410			min	-36.983	3	-78.603	3	-16.319	4	0	4	-.021	4	-.275	3
411		16	max	232.442	2	63.398	2	4.237	3	0	3	0	3	.514	2
412			min	-108.361	3	-140.692	3	-15.111	4	0	4	-.025	4	-.257	3
413		17	max	232.514	2	63.129	2	4.237	3	0	3	.001	3	.5	2
414			min	-108.307	3	-140.894	3	-14.869	4	0	4	-.028	4	-.226	3
415		18	max	-3.822	12	1164.391	2	3.892	3	0	4	.002	3	.252	2
416			min	-164	1	-526.278	3	-35.356	5	0	1	-.036	4	-.114	3
417		19	max	-3.786	12	1164.122	2	3.892	3	0	4	.003	3	0	3
418			min	-163.928	1	-526.48	3	-35.114	5	0	1	-.043	4	0	2
419	M9	1	max	70.871	1	338.747	3	143.866	4	0	3	.001	5	0	1
420			min	.118	15	-302.399	1	1.182	10	0	1	-.049	1	0	3
421		2	max	70.943	1	338.544	3	144.108	4	0	3	.031	5	.066	1
422			min	.14	15	-302.669	1	1.182	10	0	1	-.043	1	-.074	3
423		3	max	82.439	1	4.931	9	24.396	1	0	1	.059	5	.13	1
424			min	-6.954	3	-21.607	3	-25.775	5	0	10	-.037	1	-.146	3
425		4	max	82.512	1	4.707	9	24.396	1	0	1	.054	5	.131	1
426			min	-6.9	3	-21.81	3	-25.533	5	0	10	-.032	1	-.141	3
427		5	max	82.584	1	4.482	9	24.396	1	0	1	.048	5	.131	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	-6.845	3	-22.012	3	-25.291	5	0	10	-.027	1	-.136	3
429		6	max	82.656	1	4.257	9	24.396	1	0	1	.043	5	.132	1
430			min	-6.791	3	-22.214	3	-25.049	5	0	10	-.021	1	-.131	3
431		7	max	82.729	1	4.032	9	24.396	1	0	1	.037	5	.133	1
432			min	-6.737	3	-22.417	3	-24.807	5	0	10	-.016	1	-.126	3
433		8	max	82.801	1	3.808	9	24.396	1	0	1	.032	5	.133	1
434			min	-6.683	3	-22.619	3	-24.565	5	0	10	-.011	1	-.122	3
435		9	max	82.873	1	3.583	9	24.396	1	0	1	.027	5	.134	1
436			min	-6.629	3	-22.821	3	-24.323	5	0	10	-.005	1	-.117	3
437		10	max	82.945	1	3.358	9	24.396	1	0	1	.022	4	.135	1
438			min	-6.574	3	-23.023	3	-24.081	5	0	10	0	1	-.112	3
439		11	max	83.018	1	3.133	9	24.396	1	0	1	.017	4	.137	2
440			min	-6.52	3	-23.226	3	-23.839	5	0	10	0	10	-.107	3
441		12	max	83.09	1	2.908	9	24.396	1	0	1	.013	4	.14	2
442			min	-6.466	3	-23.428	3	-23.597	5	0	10	0	10	-.102	3
443		13	max	83.162	1	2.684	9	24.396	1	0	1	.016	1	.144	2
444			min	-6.412	3	-23.63	3	-23.355	5	0	10	0	10	-.096	3
445		14	max	83.234	1	2.459	9	24.396	1	0	1	.021	1	.148	2
446			min	-6.357	3	-23.833	3	-23.113	5	0	10	0	15	-.091	3
447		15	max	83.307	1	2.234	9	24.396	1	0	1	.026	1	.151	2
448			min	-6.303	3	-24.035	3	-22.871	5	0	10	-.004	5	-.086	3
449		16	max	67.568	2	12.472	10	24.683	1	0	10	.032	1	.155	2
450			min	-34.346	3	-49.512	3	-21.425	5	0	4	-.007	5	-.081	3
451		17	max	67.64	2	12.248	10	24.683	1	0	10	.038	1	.153	2
452			min	-34.292	3	-49.714	3	-21.183	5	0	4	-.012	5	-.07	3
453		18	max	7.154	5	356.393	2	25.884	1	0	2	.043	1	.078	2
454			min	-70.906	1	-161.848	3	-40.417	5	0	3	-.021	5	-.035	3
455		19	max	7.188	5	356.123	2	25.884	1	0	2	.049	1	0	2
456			min	-70.834	1	-162.051	3	-40.175	5	0	3	-.029	5	0	3
457	M13	1	max	143.866	4	302.159	1	-.118	15	0	1	.049	1	0	1
458			min	1.182	10	-338.759	3	-70.866	1	0	3	-.001	5	0	3
459		2	max	138.137	4	213.723	1	.496	5	0	1	.012	1	.169	3
460			min	1.182	10	-239.437	3	-53.877	1	0	3	-.001	5	-.15	1
461		3	max	132.407	4	125.287	1	1.295	5	0	1	.004	3	.279	3
462			min	1.182	10	-140.115	3	-36.888	1	0	3	-.014	1	-.249	1
463		4	max	126.678	4	36.852	1	2.093	5	0	1	.002	3	.332	3
464			min	1.182	10	-40.793	3	-19.898	1	0	3	-.031	1	-.297	1
465		5	max	120.949	4	58.529	3	2.892	5	0	1	.002	5	.327	3
466			min	1.182	10	-51.584	1	-2.909	1	0	3	-.037	1	-.292	1
467		6	max	115.22	4	157.852	3	14.08	1	0	1	.004	5	.264	3
468			min	1.182	10	-140.02	1	-1.051	3	0	3	-.034	1	-.236	1
469		7	max	109.49	4	257.174	3	31.07	1	0	1	.006	5	.143	3
470			min	1.182	10	-228.455	1	-.3	3	0	3	-.021	1	-.129	1
471		8	max	103.761	4	356.496	3	48.059	1	0	1	.009	4	.03	1
472			min	1.182	10	-316.891	1	.41	12	0	3	0	12	-.036	3
473		9	max	98.032	4	455.818	3	65.048	1	0	1	.035	1	.241	1
474			min	1.182	10	-405.327	1	.911	12	0	3	0	12	-.273	3
475		10	max	92.302	4	555.14	3	82.037	1	0	1	.078	1	.503	1
476			min	1.182	10	-493.763	1	1.412	12	0	3	-.018	5	-.568	3
477		11	max	64.6	4	405.327	1	5.411	5	0	3	.035	1	.241	1
478			min	1.182	10	-455.818	3	-64.841	1	0	1	-.015	5	-.273	3
479		12	max	58.871	4	316.891	1	6.209	5	0	3	.003	2	.03	1
480			min	1.182	10	-356.496	3	-47.851	1	0	1	-.012	5	-.036	3
481		13	max	53.142	4	228.455	1	7.007	5	0	3	0	10	.143	3
482			min	1.182	10	-257.174	3	-30.862	1	0	1	-.021	1	-.129	1
483		14	max	47.412	4	140.02	1	7.806	5	0	3	-.002	12	.264	3
484			min	1.182	10	-157.852	3	-13.873	1	0	1	-.034	1	-.236	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	41.683	4	51.584	1	9.426	4	0	3	0	5	.327	3
486			min	1.182	10	-58.529	3	-.477	10	0	1	-.037	1	-.292	1
487		16	max	35.954	4	40.793	3	20.106	1	0	3	.006	5	.332	3
488			min	1.182	10	-36.852	1	.949	10	0	1	-.03	1	-.297	1
489		17	max	30.224	4	140.115	3	37.095	1	0	3	.012	5	.279	3
490			min	1.182	10	-125.287	1	2.306	12	0	1	-.014	1	-.249	1
491		18	max	25.235	1	239.437	3	54.084	1	0	3	.021	4	.169	3
492			min	1.182	10	-213.723	1	2.807	12	0	1	0	10	-.15	1
493		19	max	25.235	1	338.759	3	71.074	1	0	3	.049	1	0	1
494			min	1.182	10	-302.159	1	3.307	12	0	1	.002	10	0	3
495	M16	1	max	40.161	5	356.22	2	7.188	5	0	3	.049	1	0	2
496			min	-25.841	1	-162.063	3	-70.839	1	0	2	-.029	5	0	3
497		2	max	34.432	5	251.918	2	7.987	5	0	3	.012	1	.081	3
498			min	-25.841	1	-114.804	3	-53.849	1	0	2	-.025	5	-.177	2
499		3	max	28.703	5	147.616	2	8.785	5	0	3	0	12	.134	3
500			min	-25.841	1	-67.546	3	-36.86	1	0	2	-.023	4	-.294	2
501		4	max	22.974	5	43.314	2	9.583	5	0	3	-.001	12	.16	3
502			min	-25.841	1	-20.287	3	-19.871	1	0	2	-.031	1	-.35	2
503		5	max	17.244	5	26.972	3	10.382	5	0	3	-.002	12	.158	3
504			min	-25.841	1	-60.988	2	-2.882	1	0	2	-.037	1	-.344	2
505		6	max	11.515	5	74.23	3	14.108	1	0	3	-.002	15	.128	3
506			min	-25.841	1	-165.29	2	-.484	3	0	2	-.034	1	-.278	2
507		7	max	5.786	5	121.489	3	31.097	1	0	3	.004	5	.071	3
508			min	-25.841	1	-269.592	2	.25	12	0	2	-.021	1	-.152	2
509		8	max	1.145	3	168.747	3	48.086	1	0	3	.012	4	.036	2
510			min	-25.841	1	-373.894	2	.75	12	0	2	-.003	3	-.014	3
511		9	max	1.145	3	216.006	3	65.075	1	0	3	.035	1	.285	2
512			min	-25.841	1	-478.196	2	1.251	12	0	2	-.002	3	-.126	3
513		10	max	23.721	5	-10.749	15	82.065	1	0	14	.078	1	.594	2
514			min	-25.841	1	-582.498	2	-2.993	3	0	2	.002	12	-.266	3
515		11	max	17.992	5	478.196	2	5.006	5	0	2	.035	1	.285	2
516			min	-25.761	1	-216.006	3	-64.865	1	0	3	-.013	5	-.126	3
517		12	max	12.262	5	373.894	2	5.805	5	0	2	.003	2	.036	2
518			min	-25.761	1	-168.747	3	-47.875	1	0	3	-.01	5	-.014	3
519		13	max	6.533	5	269.592	2	6.603	5	0	2	0	12	.071	3
520			min	-25.761	1	-121.489	3	-30.886	1	0	3	-.021	1	-.152	2
521		14	max	.804	5	165.29	2	7.402	5	0	2	0	12	.128	3
522			min	-25.761	1	-74.23	3	-13.897	1	0	3	-.034	1	-.278	2
523		15	max	-1.215	10	60.988	2	8.997	4	0	2	.002	5	.158	3
524			min	-25.761	1	-26.972	3	-.485	10	0	3	-.037	1	-.344	2
525		16	max	-1.215	10	20.287	3	20.082	1	0	2	.007	5	.16	3
526			min	-25.761	1	-43.314	2	.941	10	0	3	-.03	1	-.35	2
527		17	max	-1.215	10	67.546	3	37.071	1	0	2	.013	5	.134	3
528			min	-25.761	1	-147.616	2	1.471	12	0	3	-.014	1	-.294	2
529		18	max	-1.215	10	114.804	3	54.06	1	0	2	.022	4	.081	3
530			min	-27.382	4	-251.918	2	1.972	12	0	3	0	10	-.177	2
531		19	max	-1.215	10	162.063	3	71.05	1	0	2	.049	1	0	2
532			min	-33.111	4	-356.22	2	2.473	12	0	3	.002	10	0	3
533	M15	1	max	0	1	1.073	3	.074	3	0	1	0	1	0	1
534			min	-46.802	3	0	1	0	1	0	3	0	3	0	1
535		2	max	0	1	.954	3	.074	3	0	1	0	1	0	1
536			min	-46.856	3	0	1	0	1	0	3	0	3	0	3
537		3	max	0	1	.835	3	.074	3	0	1	0	1	0	1
538			min	-46.91	3	0	1	0	1	0	3	0	3	0	3
539		4	max	0	1	.716	3	.074	3	0	1	0	1	0	1
540			min	-46.964	3	0	1	0	1	0	3	0	3	0	3
541		5	max	0	1	.596	3	.074	3	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
542			min	-47.018	3	0	1	0	1	0	3	0	3	-.001	3
543		6	max	0	1	.477	3	.074	3	0	1	0	1	0	1
544			min	-47.072	3	0	1	0	1	0	3	0	3	-.001	3
545		7	max	0	1	.358	3	.074	3	0	1	0	3	0	1
546			min	-47.126	3	0	1	0	1	0	3	0	1	-.001	3
547		8	max	0	1	.239	3	.074	3	0	1	0	3	0	1
548			min	-47.18	3	0	1	0	1	0	3	0	1	-.001	3
549		9	max	0	1	.119	3	.074	3	0	1	0	3	0	1
550			min	-47.234	3	0	1	0	1	0	3	0	1	-.002	3
551		10	max	0	1	0	1	.074	3	0	1	0	3	0	1
552			min	-47.288	3	0	1	0	1	0	3	0	1	-.002	3
553		11	max	0	1	0	1	.074	3	0	1	0	3	0	1
554			min	-47.342	3	-.119	3	0	1	0	3	0	1	-.002	3
555		12	max	0	1	0	1	.074	3	0	1	0	3	0	1
556			min	-47.396	3	-.239	3	0	1	0	3	0	1	-.001	3
557		13	max	0	1	0	1	.074	3	0	1	0	3	0	1
558			min	-47.45	3	-.358	3	0	1	0	3	0	1	-.001	3
559		14	max	0	1	0	1	.074	3	0	1	0	3	0	1
560			min	-47.504	3	-.477	3	0	1	0	3	0	1	-.001	3
561		15	max	0	1	0	1	.074	3	0	1	0	3	0	1
562			min	-47.558	3	-.596	3	0	1	0	3	0	1	-.001	3
563		16	max	0	1	0	1	.074	3	0	1	0	3	0	1
564			min	-47.612	3	-.716	3	0	1	0	3	0	1	0	3
565		17	max	0	1	0	1	.074	3	0	1	0	3	0	1
566			min	-47.666	3	-.835	3	0	1	0	3	0	1	0	3
567		18	max	0	1	0	1	.074	3	0	1	0	3	0	1
568			min	-47.72	3	-.954	3	0	1	0	3	0	1	0	3
569		19	max	0	1	0	1	.074	3	0	1	0	3	0	1
570			min	-47.774	3	-1.073	3	0	1	0	3	0	1	0	1
571	M16A	1	max	0	10	2.393	4	.226	4	0	3	0	3	0	1
572			min	-185.583	4	0	10	-.028	3	0	1	0	4	0	1
573		2	max	0	10	2.127	4	.205	4	0	3	0	3	0	10
574			min	-185.627	4	0	10	-.028	3	0	1	0	4	0	4
575		3	max	0	10	1.861	4	.184	4	0	3	0	3	0	10
576			min	-185.671	4	0	10	-.028	3	0	1	0	4	-.001	4
577		4	max	0	10	1.595	4	.163	4	0	3	0	3	0	10
578			min	-185.715	4	0	10	-.028	3	0	1	0	1	-.002	4
579		5	max	0	10	1.329	4	.142	4	0	3	0	3	0	10
580			min	-185.759	4	0	10	-.028	3	0	1	0	1	-.002	4
581		6	max	0	10	1.063	4	.121	4	0	3	0	3	0	10
582			min	-185.803	4	0	10	-.028	3	0	1	0	1	-.003	4
583		7	max	0	10	.798	4	.1	4	0	3	0	5	0	10
584			min	-185.847	4	0	10	-.028	3	0	1	0	1	-.003	4
585		8	max	0	10	.532	4	.079	4	0	3	0	5	0	10
586			min	-185.892	4	0	10	-.028	3	0	1	0	1	-.003	4
587		9	max	0	10	.266	4	.058	4	0	3	0	5	0	10
588			min	-185.936	4	0	10	-.028	3	0	1	0	1	-.003	4
589		10	max	0	10	0	1	.037	4	0	3	0	5	0	10
590			min	-185.98	4	0	1	-.028	3	0	1	0	1	-.003	4
591		11	max	.009	2	0	10	.033	1	0	3	0	5	0	10
592			min	-186.024	4	-.266	4	-.028	3	0	1	0	1	-.003	4
593		12	max	.081	2	0	10	.033	1	0	3	0	5	0	10
594			min	-186.068	4	-.532	4	-.028	3	0	1	0	1	-.003	4
595		13	max	.152	2	0	10	.033	1	0	3	0	5	0	10
596			min	-186.112	4	-.798	4	-.03	5	0	1	0	3	-.003	4
597		14	max	.224	2	0	10	.033	1	0	3	0	4	0	10
598			min	-186.157	4	-1.063	4	-.051	5	0	1	0	3	-.003	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
599		15	max	.296	2	0	10	.033	1	0	3	0	4	0	10
600			min	-186.201	4	-1.329	4	-.072	5	0	1	0	3	-.002	4
601		16	max	.368	2	0	10	.033	1	0	3	0	4	0	10
602			min	-186.245	4	-1.595	4	-.093	5	0	1	0	3	-.002	4
603		17	max	.44	2	0	10	.033	1	0	3	0	1	0	10
604			min	-186.289	4	-1.861	4	-.113	5	0	1	0	3	-.001	4
605		18	max	.512	2	0	10	.033	1	0	3	0	1	0	10
606			min	-186.333	4	-2.127	4	-.134	5	0	1	0	3	0	4
607		19	max	.584	2	0	10	.033	1	0	3	0	1	0	1
608			min	-186.377	4	-2.393	4	-.155	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	.002	1	.005	2	.005	1	1.203e-3	5	NC	3	NC	2
2			min	-.003	3	-.004	3	-.011	5	-3.491e-4	1	5606.292	2	6225.119	1
3		2	max	.002	1	.005	2	.004	1	1.224e-3	5	NC	3	NC	2
4			min	-.003	3	-.004	3	-.011	5	-3.355e-4	1	6092.328	2	6748.401	1
5		3	max	.002	1	.005	2	.004	1	1.244e-3	5	NC	1	NC	2
6			min	-.002	3	-.004	3	-.01	5	-3.218e-4	1	6666.034	2	7364.515	1
7		4	max	.002	1	.004	2	.004	1	1.264e-3	5	NC	1	NC	2
8			min	-.002	3	-.004	3	-.01	5	-3.081e-4	1	7348.12	2	8096.158	1
9		5	max	.002	1	.004	2	.003	1	1.285e-3	5	NC	1	NC	2
10			min	-.002	3	-.004	3	-.009	5	-2.945e-4	1	8166.065	2	8973.651	1
11		6	max	.002	1	.003	2	.003	1	1.305e-3	5	NC	1	NC	1
12			min	-.002	3	-.004	3	-.009	5	-2.808e-4	1	9156.937	2	NC	1
13		7	max	.001	1	.003	2	.003	1	1.325e-3	5	NC	1	NC	1
14			min	-.002	3	-.003	3	-.008	5	-2.671e-4	1	NC	1	NC	1
15		8	max	.001	1	.003	2	.002	1	1.345e-3	5	NC	1	NC	1
16			min	-.002	3	-.003	3	-.008	5	-2.534e-4	1	NC	1	NC	1
17		9	max	.001	1	.002	2	.002	1	1.366e-3	5	NC	1	NC	1
18			min	-.001	3	-.003	3	-.007	5	-2.398e-4	1	NC	1	NC	1
19		10	max	.001	1	.002	2	.002	1	1.386e-3	5	NC	1	NC	1
20			min	-.001	3	-.003	3	-.007	5	-2.261e-4	1	NC	1	NC	1
21		11	max	0	1	.002	2	.001	1	1.406e-3	5	NC	1	NC	1
22			min	-.001	3	-.003	3	-.006	5	-2.124e-4	1	NC	1	NC	1
23		12	max	0	1	.001	2	.001	1	1.427e-3	5	NC	1	NC	1
24			min	-.001	3	-.002	3	-.005	5	-1.988e-4	1	NC	1	NC	1
25		13	max	0	1	0	2	0	1	1.447e-3	5	NC	1	NC	1
26			min	0	3	-.002	3	-.005	5	-1.851e-4	1	NC	1	NC	1
27		14	max	0	1	0	2	0	1	1.467e-3	5	NC	1	NC	1
28			min	0	3	-.002	3	-.004	5	-1.714e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	0	1	1.487e-3	5	NC	1	NC	1
30			min	0	3	-.001	3	-.003	5	-1.578e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	1.508e-3	5	NC	1	NC	1
32			min	0	3	-.001	3	-.002	5	-1.441e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	1.528e-3	5	NC	1	NC	1
34			min	0	3	0	3	-.002	5	-1.304e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	1.548e-3	5	NC	1	NC	1
36			min	0	3	0	3	0	5	-1.168e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	1.568e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-1.031e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	4.684e-5	1	NC	1	NC	1
40			min	0	1	0	1	0	1	-7.141e-4	5	NC	1	NC	1
41		2	max	0	9	0	2	.004	5	6.005e-5	1	NC	1	NC	1
42			min	0	2	0	3	0	1	-7.191e-4	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
43		3	max	0	9	0	2	.008	5	7.325e-5	1	NC	1	NC	1
44			min	0	2	-.001	3	0	1	-7.242e-4	5	NC	1	NC	1
45		4	max	0	9	0	2	.011	5	8.646e-5	1	NC	1	NC	1
46			min	0	2	-.002	3	0	1	-7.293e-4	5	NC	1	NC	1
47		5	max	0	9	0	2	.015	4	9.967e-5	1	NC	1	NC	1
48			min	0	2	-.003	3	0	1	-7.344e-4	5	NC	1	NC	1
49		6	max	0	9	0	2	.019	4	1.129e-4	1	NC	1	NC	1
50			min	0	2	-.003	3	0	1	-7.395e-4	5	NC	1	NC	1
51		7	max	0	9	0	2	.023	4	1.261e-4	1	NC	1	NC	1
52			min	0	2	-.004	3	0	1	-7.446e-4	5	NC	1	NC	1
53		8	max	0	9	0	2	.027	4	1.393e-4	1	NC	1	NC	1
54			min	0	2	-.004	3	0	1	-7.496e-4	5	NC	1	NC	1
55		9	max	0	9	0	2	.03	4	1.525e-4	1	NC	1	NC	1
56			min	0	2	-.005	3	0	9	-7.547e-4	5	NC	1	NC	1
57		10	max	0	9	.001	2	.034	4	1.657e-4	1	NC	1	NC	1
58			min	0	2	-.005	3	0	10	-7.598e-4	5	NC	1	NC	1
59		11	max	0	9	.002	2	.038	4	1.789e-4	1	NC	1	NC	1
60			min	0	2	-.006	3	0	10	-7.649e-4	5	NC	1	NC	1
61		12	max	0	9	.002	2	.041	4	1.921e-4	1	NC	1	NC	1
62			min	0	2	-.006	3	0	10	-7.7e-4	5	NC	1	NC	1
63		13	max	0	9	.003	2	.044	4	2.053e-4	1	NC	1	NC	1
64			min	0	2	-.006	3	0	10	-7.751e-4	5	NC	1	NC	1
65		14	max	0	9	.004	2	.048	4	2.185e-4	1	NC	1	NC	1
66			min	0	2	-.006	3	0	10	-7.801e-4	5	NC	1	NC	1
67		15	max	0	9	.004	2	.051	4	2.317e-4	1	NC	1	NC	1
68			min	0	2	-.006	3	0	10	-7.852e-4	5	NC	1	NC	1
69		16	max	0	9	.005	2	.054	4	2.449e-4	1	NC	1	NC	1
70			min	0	2	-.006	3	0	10	-7.903e-4	5	8918.203	2	NC	1
71		17	max	0	9	.006	2	.057	4	2.582e-4	1	NC	3	NC	1
72			min	0	2	-.006	3	0	10	-7.954e-4	5	7591.91	2	NC	1
73		18	max	0	9	.007	2	.06	4	2.714e-4	1	NC	3	NC	1
74			min	0	2	-.006	3	0	10	-8.005e-4	5	6571.146	2	NC	1
75		19	max	0	9	.008	2	.063	4	2.846e-4	1	NC	3	NC	1
76			min	0	2	-.006	3	0	10	-8.056e-4	5	5776.747	2	NC	1
77	M4	1	max	.002	1	.006	2	0	10	2.753e-3	5	NC	1	NC	1
78			min	0	3	-.005	3	-.067	4	-3.188e-4	1	NC	1	287.649	4
79		2	max	.002	1	.006	2	0	10	2.753e-3	5	NC	1	NC	1
80			min	0	3	-.005	3	-.062	4	-3.188e-4	1	NC	1	313.561	4
81		3	max	.002	1	.006	2	0	10	2.753e-3	5	NC	1	NC	1
82			min	0	3	-.004	3	-.056	4	-3.188e-4	1	NC	1	344.4	4
83		4	max	.002	1	.005	2	0	10	2.753e-3	5	NC	1	NC	1
84			min	0	3	-.004	3	-.051	4	-3.188e-4	1	NC	1	381.464	4
85		5	max	.002	1	.005	2	0	10	2.753e-3	5	NC	1	NC	1
86			min	0	3	-.004	3	-.045	4	-3.188e-4	1	NC	1	426.521	4
87		6	max	.001	1	.005	2	0	10	2.753e-3	5	NC	1	NC	1
88			min	0	3	-.003	3	-.04	4	-3.188e-4	1	NC	1	482.029	4
89		7	max	.001	1	.004	2	0	10	2.753e-3	5	NC	1	NC	1
90			min	0	3	-.003	3	-.035	4	-3.188e-4	1	NC	1	551.489	4
91		8	max	.001	1	.004	2	0	10	2.753e-3	5	NC	1	NC	1
92			min	0	3	-.003	3	-.03	4	-3.188e-4	1	NC	1	640.028	4
93		9	max	.001	1	.003	2	0	10	2.753e-3	5	NC	1	NC	1
94			min	0	3	-.003	3	-.026	4	-3.188e-4	1	NC	1	755.398	4
95		10	max	0	1	.003	2	0	10	2.753e-3	5	NC	1	NC	1
96			min	0	3	-.002	3	-.021	4	-3.188e-4	1	NC	1	909.79	4
97		11	max	0	1	.003	2	0	10	2.753e-3	5	NC	1	NC	1
98			min	0	3	-.002	3	-.017	4	-3.188e-4	1	NC	1	1123.274	4
99		12	max	0	1	.002	2	0	10	2.753e-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	-.002	3	-.014	4	-3.188e-4	1	NC	1	1430.866	4
101		13	max	0	1	.002	2	0	10	2.753e-3	5	NC	1	NC	1
102			min	0	3	-.002	3	-.01	4	-3.188e-4	1	NC	1	1898.238	4
103		14	max	0	1	.002	2	0	10	2.753e-3	5	NC	1	NC	1
104			min	0	3	-.001	3	-.007	4	-3.188e-4	1	NC	1	2660.852	4
105		15	max	0	1	.001	2	0	10	2.753e-3	5	NC	1	NC	1
106			min	0	3	-.001	3	-.005	4	-3.188e-4	1	NC	1	4036.947	4
107		16	max	0	1	.001	2	0	10	2.753e-3	5	NC	1	NC	1
108			min	0	3	0	3	-.003	4	-3.188e-4	1	NC	1	6931.184	4
109		17	max	0	1	0	2	0	10	2.753e-3	5	NC	1	NC	1
110			min	0	3	0	3	-.001	4	-3.188e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	10	2.753e-3	5	NC	1	NC	1
112			min	0	3	0	3	0	4	-3.188e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	2.753e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-3.188e-4	1	NC	1	NC	1
115	M6	1	max	.007	1	.019	2	.002	1	1.29e-3	4	NC	3	NC	1
116			min	-.009	3	-.014	3	-.011	5	-6.65e-8	10	1613.813	2	9521.374	3
117		2	max	.007	1	.017	2	.002	1	1.31e-3	4	NC	3	NC	1
118			min	-.008	3	-.013	3	-.011	5	-4.874e-7	2	1722.063	2	NC	1
119		3	max	.006	1	.016	2	.002	1	1.329e-3	4	NC	3	NC	1
120			min	-.008	3	-.012	3	-.01	5	-1.46e-6	2	1845.514	2	NC	1
121		4	max	.006	1	.015	2	.001	1	1.348e-3	4	NC	3	NC	1
122			min	-.007	3	-.012	3	-.01	5	-2.434e-6	2	1987.205	2	NC	1
123		5	max	.006	1	.014	2	.001	1	1.367e-3	4	NC	3	NC	1
124			min	-.007	3	-.011	3	-.009	5	-3.407e-6	2	2151.049	2	NC	1
125		6	max	.005	1	.013	2	.001	1	1.386e-3	4	NC	3	NC	1
126			min	-.006	3	-.01	3	-.009	5	-4.38e-6	2	2342.168	2	NC	1
127		7	max	.005	1	.012	2	.001	1	1.406e-3	4	NC	3	NC	1
128			min	-.006	3	-.01	3	-.008	5	-5.353e-6	2	2567.395	2	NC	1
129		8	max	.004	1	.011	2	0	1	1.425e-3	4	NC	3	NC	1
130			min	-.005	3	-.009	3	-.008	5	-6.326e-6	2	2836.054	2	NC	1
131		9	max	.004	1	.01	2	0	1	1.444e-3	4	NC	3	NC	1
132			min	-.005	3	-.008	3	-.007	5	-1.012e-5	1	3161.201	2	NC	1
133		10	max	.004	1	.008	2	0	1	1.463e-3	4	NC	3	NC	1
134			min	-.004	3	-.007	3	-.007	5	-1.393e-5	1	3561.7	2	NC	1
135		11	max	.003	1	.007	2	0	1	1.482e-3	4	NC	3	NC	1
136			min	-.004	3	-.007	3	-.006	5	-1.773e-5	1	4065.848	2	NC	1
137		12	max	.003	1	.006	2	0	1	1.502e-3	4	NC	3	NC	1
138			min	-.003	3	-.006	3	-.005	5	-2.154e-5	1	4718.114	2	NC	1
139		13	max	.002	1	.005	2	0	1	1.521e-3	4	NC	3	NC	1
140			min	-.003	3	-.005	3	-.005	5	-2.534e-5	1	5592.613	2	NC	1
141		14	max	.002	1	.004	2	0	1	1.54e-3	4	NC	3	NC	1
142			min	-.002	3	-.004	3	-.004	5	-2.915e-5	1	6822.751	2	NC	1
143		15	max	.002	1	.003	2	0	1	1.559e-3	4	NC	1	NC	1
144			min	-.002	3	-.003	3	-.003	5	-3.295e-5	1	8675.332	2	NC	1
145		16	max	.001	1	.003	2	0	1	1.578e-3	4	NC	1	NC	1
146			min	-.001	3	-.003	3	-.002	5	-3.676e-5	1	NC	1	NC	1
147		17	max	0	1	.002	2	0	1	1.598e-3	4	NC	1	NC	1
148			min	0	3	-.002	3	-.002	5	-4.056e-5	1	NC	1	NC	1
149		18	max	0	1	0	2	0	1	1.617e-3	4	NC	1	NC	1
150			min	0	3	0	3	0	5	-4.437e-5	1	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.636e-3	4	NC	1	NC	1
152			min	0	1	0	1	0	1	-4.817e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.171e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-7.447e-4	4	NC	1	NC	1
155		2	max	0	9	.001	2	.004	4	1.891e-5	1	NC	1	NC	1
156			min	0	2	-.001	3	0	1	-7.35e-4	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
157		3	max	0	9	.002	2	.008	4	1.61e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	1	-7.254e-4	4	NC	1	NC	1
159		4	max	0	9	.003	2	.012	4	1.33e-5	1	NC	1	NC	1
160			min	0	2	-.004	3	0	1	-7.157e-4	4	NC	1	NC	1
161		5	max	0	9	.005	2	.016	4	1.05e-5	1	NC	1	NC	1
162			min	0	2	-.006	3	0	1	-7.06e-4	4	9981.471	2	NC	1
163		6	max	0	9	.006	2	.02	4	7.762e-6	3	NC	3	NC	1
164			min	0	2	-.007	3	0	1	-6.963e-4	4	7980.193	2	NC	1
165		7	max	0	9	.007	2	.024	4	2.168e-5	3	NC	3	NC	1
166			min	0	2	-.009	3	0	1	-6.867e-4	4	6607.807	2	NC	1
167		8	max	0	9	.008	2	.028	4	3.56e-5	3	NC	3	NC	1
168			min	0	2	-.01	3	0	1	-6.77e-4	4	5599.596	2	NC	1
169		9	max	0	9	.01	2	.032	4	4.952e-5	3	NC	3	NC	1
170			min	0	2	-.011	3	0	1	-6.673e-4	4	4823.679	2	NC	1
171		10	max	0	9	.011	2	.035	4	6.344e-5	3	NC	3	NC	1
172			min	-.001	2	-.012	3	0	1	-6.577e-4	4	4206.879	2	NC	1
173		11	max	0	9	.012	2	.039	4	7.736e-5	3	NC	3	NC	1
174			min	-.001	2	-.013	3	0	1	-6.48e-4	4	3705.134	2	NC	1
175		12	max	0	9	.014	2	.043	4	9.128e-5	3	NC	3	NC	1
176			min	-.001	2	-.014	3	0	1	-6.383e-4	4	3290.116	2	NC	1
177		13	max	0	9	.016	2	.046	4	1.052e-4	3	NC	3	NC	1
178			min	-.001	2	-.015	3	0	1	-6.286e-4	4	2942.596	2	NC	1
179		14	max	0	9	.017	2	.049	4	1.191e-4	3	NC	3	NC	1
180			min	-.002	2	-.016	3	0	1	-6.19e-4	4	2648.922	2	NC	1
181		15	max	.001	9	.019	2	.053	4	1.33e-4	3	NC	3	NC	1
182			min	-.002	2	-.017	3	0	1	-6.093e-4	4	2399.037	2	NC	1
183		16	max	.001	9	.021	2	.056	4	1.47e-4	3	NC	3	NC	1
184			min	-.002	2	-.018	3	-.001	1	-5.996e-4	4	2185.306	2	NC	1
185		17	max	.001	9	.023	2	.059	4	1.609e-4	3	NC	3	NC	1
186			min	-.002	2	-.019	3	-.001	1	-5.899e-4	4	2001.801	2	NC	1
187		18	max	.001	9	.025	2	.062	4	1.748e-4	3	NC	3	NC	1
188			min	-.002	2	-.02	3	-.001	1	-5.803e-4	4	1843.831	2	NC	1
189		19	max	.001	9	.027	2	.065	4	1.887e-4	3	NC	3	NC	1
190			min	-.002	2	-.02	3	-.001	1	-5.706e-4	4	1707.641	2	NC	1
191	M8	1	max	.006	1	.021	2	.001	1	2.548e-3	4	NC	1	NC	1
192			min	-.002	3	-.015	3	-.068	4	-1.505e-4	3	NC	1	282.527	4
193		2	max	.006	1	.02	2	0	1	2.548e-3	4	NC	1	NC	1
194			min	-.002	3	-.014	3	-.063	4	-1.505e-4	3	NC	1	307.978	4
195		3	max	.005	1	.019	2	0	1	2.548e-3	4	NC	1	NC	1
196			min	-.002	3	-.013	3	-.057	4	-1.505e-4	3	NC	1	338.268	4
197		4	max	.005	1	.018	2	0	1	2.548e-3	4	NC	1	NC	1
198			min	-.002	3	-.013	3	-.052	4	-1.505e-4	3	NC	1	374.673	4
199		5	max	.005	1	.017	2	0	1	2.548e-3	4	NC	1	NC	1
200			min	-.001	3	-.012	3	-.046	4	-1.505e-4	3	NC	1	418.929	4
201		6	max	.004	1	.015	2	0	1	2.548e-3	4	NC	1	NC	1
202			min	-.001	3	-.011	3	-.041	4	-1.505e-4	3	NC	1	473.449	4
203		7	max	.004	1	.014	2	0	1	2.548e-3	4	NC	1	NC	1
204			min	-.001	3	-.01	3	-.036	4	-1.505e-4	3	NC	1	541.675	4
205		8	max	.004	1	.013	2	0	1	2.548e-3	4	NC	1	NC	1
206			min	-.001	3	-.009	3	-.031	4	-1.505e-4	3	NC	1	628.639	4
207		9	max	.003	1	.012	2	0	1	2.548e-3	4	NC	1	NC	1
208			min	-.001	3	-.008	3	-.026	4	-1.505e-4	3	NC	1	741.96	4
209		10	max	.003	1	.011	2	0	1	2.548e-3	4	NC	1	NC	1
210			min	0	3	-.008	3	-.022	4	-1.505e-4	3	NC	1	893.608	4
211		11	max	.003	1	.01	2	0	1	2.548e-3	4	NC	1	NC	1
212			min	0	3	-.007	3	-.018	4	-1.505e-4	3	NC	1	1103.3	4
213		12	max	.002	1	.008	2	0	1	2.548e-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	-.006	3	-.014	4	-1.505e-4	3	NC	1	1405.428	4
215		13	max	.002	1	.007	2	0	1	2.548e-3	4	NC	1	NC	1
216			min	0	3	-.005	3	-.01	4	-1.505e-4	3	NC	1	1864.5	4
217		14	max	.002	1	.006	2	0	1	2.548e-3	4	NC	1	NC	1
218			min	0	3	-.004	3	-.007	4	-1.505e-4	3	NC	1	2613.573	4
219		15	max	.001	1	.005	2	0	1	2.548e-3	4	NC	1	NC	1
220			min	0	3	-.003	3	-.005	4	-1.505e-4	3	NC	1	3965.238	4
221		16	max	0	1	.004	2	0	1	2.548e-3	4	NC	1	NC	1
222			min	0	3	-.003	3	-.003	4	-1.505e-4	3	NC	1	6808.099	4
223		17	max	0	1	.002	2	0	1	2.548e-3	4	NC	1	NC	1
224			min	0	3	-.002	3	-.001	4	-1.505e-4	3	NC	1	NC	1
225		18	max	0	1	.001	2	0	1	2.548e-3	4	NC	1	NC	1
226			min	0	3	0	3	0	4	-1.505e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	2.548e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.505e-4	3	NC	1	NC	1
229	M10	1	max	.002	1	.005	2	0	3	3.859e-4	1	NC	3	NC	1
230			min	-.003	3	-.004	3	-.004	4	-3.e-4	3	5619.739	2	NC	1
231		2	max	.002	1	.005	2	0	3	3.666e-4	1	NC	3	NC	1
232			min	-.002	3	-.004	3	-.004	4	-2.916e-4	3	6107.247	2	NC	1
233		3	max	.002	1	.005	2	0	3	3.659e-4	4	NC	1	NC	1
234			min	-.002	3	-.004	3	-.004	4	-2.831e-4	3	6682.747	2	NC	1
235		4	max	.002	1	.004	2	0	3	4.168e-4	4	NC	1	NC	1
236			min	-.002	3	-.004	3	-.004	4	-2.747e-4	3	7367.039	2	NC	1
237		5	max	.002	1	.004	2	0	3	4.678e-4	4	NC	1	NC	1
238			min	-.002	3	-.004	3	-.004	4	-2.663e-4	3	8187.72	2	NC	1
239		6	max	.002	1	.003	2	0	3	5.188e-4	4	NC	1	NC	1
240			min	-.002	3	-.004	3	-.004	4	-2.578e-4	3	9182.03	2	NC	1
241		7	max	.002	1	.003	2	0	3	5.697e-4	4	NC	1	NC	1
242			min	-.002	3	-.004	3	-.004	4	-2.494e-4	3	NC	1	NC	1
243		8	max	.001	1	.003	2	0	3	6.207e-4	4	NC	1	NC	1
244			min	-.002	3	-.003	3	-.004	4	-2.409e-4	3	NC	1	NC	1
245		9	max	.001	1	.002	2	0	3	6.716e-4	4	NC	1	NC	1
246			min	-.001	3	-.003	3	-.004	4	-2.325e-4	3	NC	1	NC	1
247		10	max	.001	1	.002	2	0	3	7.226e-4	4	NC	1	NC	1
248			min	-.001	3	-.003	3	-.004	4	-2.24e-4	3	NC	1	NC	1
249		11	max	.001	1	.002	2	0	3	7.735e-4	4	NC	1	NC	1
250			min	-.001	3	-.003	3	-.003	4	-2.156e-4	3	NC	1	NC	1
251		12	max	0	1	.001	2	0	3	8.245e-4	4	NC	1	NC	1
252			min	0	3	-.002	3	-.003	4	-2.072e-4	3	NC	1	NC	1
253		13	max	0	1	0	2	0	3	8.755e-4	4	NC	1	NC	1
254			min	0	3	-.002	3	-.003	4	-1.987e-4	3	NC	1	NC	1
255		14	max	0	1	0	2	0	3	9.264e-4	4	NC	1	NC	1
256			min	0	3	-.002	3	-.003	4	-1.903e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	9.774e-4	4	NC	1	NC	1
258			min	0	3	-.002	3	-.002	4	-1.818e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.028e-3	4	NC	1	NC	1
260			min	0	3	-.001	3	-.002	4	-1.734e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.079e-3	4	NC	1	NC	1
262			min	0	3	0	3	-.001	4	-1.65e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.13e-3	4	NC	1	NC	1
264			min	0	3	0	3	0	4	-1.565e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.181e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.481e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	6.757e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-5.385e-4	4	NC	1	NC	1
269		2	max	0	9	0	2	.003	4	5.357e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-6.001e-4	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
271		3	max	0	9	0	2	.006	4	3.957e-5	3	NC	1	NC	1
272			min	0	2	-.001	3	0	3	-6.617e-4	4	NC	1	7856.373	4
273		4	max	0	9	0	2	.009	4	2.557e-5	3	NC	1	NC	1
274			min	0	2	-.002	3	0	3	-7.233e-4	4	NC	1	5178.633	4
275		5	max	0	9	0	2	.012	4	1.157e-5	3	NC	1	NC	1
276			min	0	2	-.003	3	-.001	3	-7.849e-4	4	NC	1	3848.464	4
277		6	max	0	9	0	2	.015	4	-1.867e-6	12	NC	1	NC	1
278			min	0	2	-.003	3	-.001	3	-8.465e-4	4	NC	1	3056.231	4
279		7	max	0	9	0	2	.018	4	-6.124e-6	10	NC	1	NC	1
280			min	0	2	-.004	3	-.002	3	-9.082e-4	4	NC	1	2532.158	4
281		8	max	0	9	0	2	.021	5	-6.864e-6	10	NC	1	NC	1
282			min	0	2	-.005	3	-.002	3	-9.698e-4	4	NC	1	2158.888	5
283		9	max	0	9	0	2	.024	5	-7.604e-6	10	NC	1	NC	1
284			min	0	2	-.005	3	-.002	3	-1.031e-3	4	NC	1	1879.896	5
285		10	max	0	9	.001	2	.028	5	-8.344e-6	10	NC	1	NC	1
286			min	0	2	-.005	3	-.002	3	-1.093e-3	4	NC	1	1664.518	5
287		11	max	0	9	.002	2	.031	5	-9.084e-6	10	NC	1	NC	1
288			min	0	2	-.006	3	-.002	3	-1.155e-3	4	NC	1	1493.286	5
289		12	max	0	9	.002	2	.034	5	-9.824e-6	10	NC	1	NC	1
290			min	0	2	-.006	3	-.002	1	-1.216e-3	4	NC	1	1353.828	5
291		13	max	0	9	.003	2	.037	5	-1.056e-5	10	NC	1	NC	1
292			min	0	2	-.006	3	-.003	1	-1.278e-3	4	NC	1	1237.901	5
293		14	max	0	9	.004	2	.04	5	-1.13e-5	10	NC	1	NC	1
294			min	0	2	-.006	3	-.003	1	-1.339e-3	4	NC	1	1139.807	5
295		15	max	0	9	.004	2	.044	5	-1.204e-5	10	NC	1	NC	1
296			min	0	2	-.007	3	-.003	1	-1.401e-3	4	NC	1	1055.479	5
297		16	max	0	9	.005	2	.047	5	-1.278e-5	10	NC	1	NC	1
298			min	0	2	-.007	3	-.004	1	-1.463e-3	4	8934.452	2	981.943	5
299		17	max	0	9	.006	2	.05	5	-1.352e-5	10	NC	3	NC	1
300			min	0	2	-.007	3	-.004	1	-1.524e-3	4	7604.256	2	916.971	5
301		18	max	0	9	.007	2	.054	5	-1.426e-5	10	NC	3	NC	1
302			min	0	2	-.006	3	-.004	1	-1.586e-3	4	6580.816	2	858.871	5
303		19	max	0	9	.008	2	.057	5	-1.5e-5	10	NC	3	NC	2
304			min	0	2	-.006	3	-.005	1	-1.648e-3	4	5784.545	2	806.334	5
305	M12	1	max	.002	1	.006	2	.004	1	3.462e-3	4	NC	1	NC	2
306			min	0	3	-.005	3	-.063	5	1.433e-5	10	NC	1	308.088	5
307		2	max	.002	1	.006	2	.004	1	3.462e-3	4	NC	1	NC	2
308			min	0	3	-.005	3	-.058	5	1.433e-5	10	NC	1	335.834	5
309		3	max	.002	1	.006	2	.003	1	3.462e-3	4	NC	1	NC	2
310			min	0	3	-.004	3	-.052	5	1.433e-5	10	NC	1	368.856	5
311		4	max	.002	1	.005	2	.003	1	3.462e-3	4	NC	1	NC	2
312			min	0	3	-.004	3	-.047	5	1.433e-5	10	NC	1	408.543	5
313		5	max	.002	1	.005	2	.003	1	3.462e-3	4	NC	1	NC	2
314			min	0	3	-.004	3	-.042	5	1.433e-5	10	NC	1	456.788	5
315		6	max	.001	1	.004	2	.002	1	3.462e-3	4	NC	1	NC	2
316			min	0	3	-.003	3	-.037	5	1.433e-5	10	NC	1	516.221	5
317		7	max	.001	1	.004	2	.002	1	3.462e-3	4	NC	1	NC	2
318			min	0	3	-.003	3	-.033	5	1.433e-5	10	NC	1	590.593	5
319		8	max	.001	1	.004	2	.002	1	3.462e-3	4	NC	1	NC	1
320			min	0	3	-.003	3	-.028	5	1.433e-5	10	NC	1	685.391	5
321		9	max	.001	1	.003	2	.001	1	3.462e-3	4	NC	1	NC	1
322			min	0	3	-.003	3	-.024	5	1.433e-5	10	NC	1	808.916	5
323		10	max	0	1	.003	2	.001	1	3.462e-3	4	NC	1	NC	1
324			min	0	3	-.002	3	-.02	5	1.433e-5	10	NC	1	974.218	5
325		11	max	0	1	.003	2	.001	1	3.462e-3	4	NC	1	NC	1
326			min	0	3	-.002	3	-.016	5	1.433e-5	10	NC	1	1202.785	5
327		12	max	0	1	.002	2	0	1	3.462e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
328			min	0	3	-.002	3	-.013	5	1.433e-5	10	NC	1	1532.103	5
329		13	max	0	1	.002	2	0	1	3.462e-3	4	NC	1	NC	1
330			min	0	3	-.002	3	-.01	5	1.433e-5	10	NC	1	2032.48	5
331		14	max	0	1	.002	2	0	1	3.462e-3	4	NC	1	NC	1
332			min	0	3	-.001	3	-.007	5	1.433e-5	10	NC	1	2848.935	5
333		15	max	0	1	.001	2	0	1	3.462e-3	4	NC	1	NC	1
334			min	0	3	-.001	3	-.004	5	1.433e-5	10	NC	1	4322.159	5
335		16	max	0	1	.001	2	0	1	3.462e-3	4	NC	1	NC	1
336			min	0	3	0	3	-.003	5	1.433e-5	10	NC	1	7420.628	5
337		17	max	0	1	0	2	0	1	3.462e-3	4	NC	1	NC	1
338			min	0	3	0	3	-.001	5	1.433e-5	10	NC	1	NC	1
339		18	max	0	1	0	2	0	1	3.462e-3	4	NC	1	NC	1
340			min	0	3	0	3	0	5	1.433e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	3.462e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	1.433e-5	10	NC	1	NC	1
343	M1	1	max	.004	3	.021	3	.006	5	1.199e-2	1	NC	1	NC	1
344			min	-.005	2	-.021	1	-.002	1	-1.327e-2	3	NC	1	NC	1
345		2	max	.004	3	.011	3	.008	5	5.83e-3	1	NC	4	NC	1
346			min	-.005	2	-.011	1	-.004	1	-6.544e-3	3	4696.25	1	NC	1
347		3	max	.004	3	.002	3	.011	5	2.425e-4	5	NC	4	NC	1
348			min	-.005	2	-.002	1	-.005	1	-2.109e-4	1	2422.296	1	8219.749	5
349		4	max	.004	3	.006	2	.015	5	2.363e-4	5	NC	4	NC	1
350			min	-.005	2	-.005	3	-.005	1	-1.739e-4	1	1711.146	1	5202.838	5
351		5	max	.004	3	.013	1	.018	5	2.302e-4	5	NC	5	NC	1
352			min	-.005	2	-.011	3	-.006	1	-1.369e-4	1	1369.273	1	3731.971	5
353		6	max	.004	3	.018	1	.022	5	2.241e-4	5	NC	5	NC	1
354			min	-.005	2	-.016	3	-.005	1	-9.988e-5	1	1175.883	1	2872.985	5
355		7	max	.004	3	.022	1	.026	5	2.179e-4	5	NC	5	NC	1
356			min	-.005	2	-.019	3	-.005	1	-6.286e-5	1	1058.597	1	2316.37	5
357		8	max	.004	3	.026	1	.03	5	2.118e-4	5	NC	5	NC	1
358			min	-.005	2	-.022	3	-.004	1	-2.584e-5	1	987.312	1	1930.278	5
359		9	max	.004	3	.027	1	.034	5	2.076e-4	4	NC	5	NC	1
360			min	-.005	2	-.023	3	-.003	1	1.045e-6	9	947.961	1	1643.074	4
361		10	max	.004	3	.028	1	.038	5	2.093e-4	4	NC	5	NC	1
362			min	-.006	2	-.023	3	-.002	1	5.412e-6	10	934.033	1	1420.763	4
363		11	max	.004	3	.027	1	.043	4	2.11e-4	4	NC	5	NC	1
364			min	-.006	2	-.022	3	0	1	6.911e-6	10	943.506	1	1250.843	4
365		12	max	.004	3	.026	2	.047	4	2.127e-4	4	NC	5	NC	1
366			min	-.006	2	-.02	3	0	10	8.409e-6	10	978.023	1	1118.138	4
367		13	max	.004	3	.023	2	.052	4	2.144e-4	4	NC	5	NC	1
368			min	-.006	2	-.018	3	0	10	9.907e-6	10	1043.6	1	1012.758	4
369		14	max	.005	3	.018	2	.056	4	2.161e-4	4	NC	5	NC	1
370			min	-.006	2	-.014	3	0	10	1.141e-5	10	1148.116	2	928.023	4
371		15	max	.005	3	.012	2	.06	4	2.333e-4	1	NC	4	NC	1
372			min	-.006	2	-.01	3	0	10	1.29e-5	10	1323.837	2	859.287	4
373		16	max	.005	3	.005	2	.064	4	4.275e-4	4	NC	4	NC	1
374			min	-.006	2	-.004	3	0	10	1.407e-5	10	1639.082	2	803.239	4
375		17	max	.005	3	.002	3	.067	4	5.585e-3	4	NC	4	NC	1
376			min	-.006	2	-.003	2	0	10	7.255e-6	10	2303.657	2	757.515	4
377		18	max	.005	3	.008	3	.07	4	6.998e-3	2	NC	4	NC	1
378			min	-.006	2	-.013	2	0	10	-3.253e-3	3	4450.3	2	720.246	4
379		19	max	.005	3	.015	3	.073	4	1.409e-2	2	NC	1	NC	1
380			min	-.006	2	-.024	2	-.001	1	-6.599e-3	3	NC	1	690.877	4
381	M5	1	max	.014	3	.067	3	.005	5	6.693e-6	4	NC	1	NC	1
382			min	-.019	2	-.07	1	-.002	1	0	2	NC	1	NC	1
383		2	max	.014	3	.036	3	.008	5	1.131e-4	5	NC	5	NC	1
384			min	-.019	2	-.037	1	-.002	1	-4.288e-5	1	1411.518	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	.014	3	.008	3	.011	5	2.178e-4	5	NC	5	NC	1
386			min	-.019	2	-.006	1	-.002	1	-8.494e-5	1	727.522	1	NC	1
387		4	max	.014	3	.02	1	.015	5	2.274e-4	5	NC	5	NC	1
388			min	-.019	2	-.016	3	-.002	1	-8.014e-5	1	513.274	1	NC	1
389		5	max	.014	3	.043	1	.019	5	2.369e-4	5	NC	5	NC	1
390			min	-.019	2	-.035	3	-.002	1	-7.534e-5	1	410.193	1	NC	1
391		6	max	.014	3	.061	1	.023	5	2.465e-4	5	NC	5	NC	1
392			min	-.019	2	-.051	3	-.002	1	-7.055e-5	1	351.814	1	NC	1
393		7	max	.014	3	.076	1	.027	5	2.561e-4	5	NC	5	NC	1
394			min	-.019	2	-.062	3	-.002	1	-6.575e-5	1	316.341	1	NC	1
395		8	max	.014	3	.086	1	.032	5	2.656e-4	5	NC	15	NC	1
396			min	-.019	2	-.07	3	-.002	1	-6.096e-5	1	294.702	1	NC	1
397		9	max	.014	3	.092	1	.036	5	2.752e-4	5	NC	15	NC	1
398			min	-.019	2	-.074	3	-.001	1	-5.616e-5	1	282.655	1	NC	1
399		10	max	.014	3	.094	1	.041	4	2.848e-4	5	NC	15	NC	1
400			min	-.019	2	-.074	3	-.001	1	-5.136e-5	1	278.229	1	NC	1
401		11	max	.014	3	.092	1	.045	4	2.943e-4	5	NC	15	NC	1
402			min	-.019	2	-.072	3	-.001	1	-4.657e-5	1	280.802	1	NC	1
403		12	max	.014	3	.086	1	.05	4	3.039e-4	5	NC	15	NC	1
404			min	-.019	2	-.066	3	-.001	1	-4.177e-5	1	290.851	1	NC	1
405		13	max	.014	3	.076	1	.054	4	3.135e-4	5	NC	5	NC	1
406			min	-.019	2	-.057	3	-.001	1	-3.697e-5	1	310.159	1	NC	1
407		14	max	.014	3	.061	1	.058	4	3.231e-4	5	NC	5	NC	1
408			min	-.019	2	-.045	3	-.001	1	-3.218e-5	1	342.676	1	NC	1
409		15	max	.014	3	.042	1	.062	4	3.326e-4	5	NC	5	NC	1
410			min	-.019	2	-.031	3	-.001	1	-2.738e-5	1	396.914	1	NC	1
411		16	max	.014	3	.018	1	.065	4	5.47e-4	4	NC	5	NC	1
412			min	-.019	2	-.014	3	-.001	1	-2.483e-5	1	493.31	1	NC	1
413		17	max	.014	3	.005	3	.068	4	5.634e-3	4	NC	5	NC	1
414			min	-.019	2	-.01	2	-.001	1	-7.563e-5	1	694.369	1	NC	1
415		18	max	.014	3	.027	3	.071	4	2.892e-3	4	NC	5	NC	1
416			min	-.019	2	-.044	2	0	1	-3.867e-5	1	1342.756	1	NC	1
417		19	max	.014	3	.049	3	.073	4	2.787e-6	5	NC	1	NC	1
418			min	-.019	2	-.079	2	0	1	-2.204e-7	3	NC	1	NC	1
419	M9	1	max	.005	3	.02	3	.005	5	1.327e-2	3	NC	1	NC	1
420			min	-.005	2	-.021	1	-.002	1	-1.199e-2	1	NC	1	NC	1
421		2	max	.004	3	.011	3	.004	5	6.586e-3	3	NC	4	NC	1
422			min	-.005	2	-.011	1	0	9	-5.921e-3	1	4698.555	1	NC	1
423		3	max	.004	3	.002	3	.004	4	3.088e-5	1	NC	4	NC	1
424			min	-.005	2	-.002	1	0	3	-3.221e-5	5	2423.522	1	NC	1
425		4	max	.004	3	.006	2	.005	4	2.001e-5	2	NC	4	NC	1
426			min	-.005	2	-.005	3	0	3	-5.341e-5	4	1712.027	1	NC	1
427		5	max	.005	3	.013	1	.007	4	9.711e-6	2	NC	5	NC	1
428			min	-.005	2	-.011	3	-.002	3	-7.778e-5	4	1369.968	1	NC	1
429		6	max	.005	3	.018	1	.01	4	7.198e-7	10	NC	5	NC	1
430			min	-.005	2	-.016	3	-.002	3	-1.022e-4	4	1176.465	1	8347.761	4
431		7	max	.005	3	.022	1	.013	4	-7.861e-7	10	NC	5	NC	1
432			min	-.005	2	-.019	3	-.002	3	-1.265e-4	4	1059.103	1	5374.011	4
433		8	max	.005	3	.026	1	.017	4	-2.292e-6	10	NC	5	NC	1
434			min	-.005	2	-.022	3	-.003	3	-1.509e-4	4	987.766	1	3792.361	4
435		9	max	.005	3	.027	1	.021	4	-3.798e-6	10	NC	5	NC	1
436			min	-.005	2	-.023	3	-.003	3	-1.753e-4	4	948.379	1	2847.455	4
437		10	max	.005	3	.028	1	.025	5	-5.304e-6	10	NC	5	NC	1
438			min	-.005	2	-.023	3	-.003	3	-1.996e-4	4	934.427	1	2236.223	4
439		11	max	.005	3	.027	1	.03	5	-6.81e-6	10	NC	5	NC	1
440			min	-.005	2	-.022	3	-.003	3	-2.24e-4	4	943.885	1	1817.274	4
441		12	max	.005	3	.026	2	.035	5	-8.316e-6	10	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
442			min	-.006	2	-.021	3	-.003	1	-2.484e-4	4	978.396	1	1517.232	4
443		13	max	.005	3	.023	2	.041	5	-9.822e-6	10	NC	5	NC	1
444			min	-.006	2	-.018	3	-.004	1	-2.727e-4	4	1043.976	1	1294.852	4
445		14	max	.005	3	.018	2	.046	5	-1.133e-5	10	NC	5	NC	1
446			min	-.006	2	-.014	3	-.005	1	-2.971e-4	4	1148.757	2	1124.513	5
447		15	max	.005	3	.012	2	.052	5	-1.283e-5	10	NC	5	NC	1
448			min	-.006	2	-.01	3	-.005	1	-3.215e-4	4	1324.554	2	992.878	5
449		16	max	.005	3	.005	2	.057	5	-1.401e-5	10	NC	4	NC	1
450			min	-.006	2	-.004	3	-.005	1	-3.381e-4	1	1639.935	2	889.026	4
451		17	max	.005	3	.002	3	.063	5	5.42e-3	4	NC	4	NC	1
452			min	-.006	2	-.003	2	-.004	1	-2.163e-4	1	2304.771	2	804.775	4
453		18	max	.005	3	.008	3	.068	4	3.259e-3	3	NC	4	NC	1
454			min	-.006	2	-.013	2	-.003	1	-7.033e-3	1	4452.376	2	735.874	4
455		19	max	.005	3	.015	3	.073	4	6.598e-3	3	NC	1	NC	1
456			min	-.006	2	-.024	2	0	1	-1.409e-2	2	NC	1	679.68	4
457	M13	1	max	.002	1	.02	3	.005	3	3.581e-3	3	NC	1	NC	1
458			min	-.005	5	-.021	1	-.005	2	-3.733e-3	1	NC	1	NC	1
459		2	max	.002	1	.11	3	.006	1	4.474e-3	3	NC	5	NC	1
460			min	-.005	5	-.102	1	-.003	10	-4.696e-3	1	1404.517	3	NC	1
461		3	max	.002	1	.184	3	.019	1	5.368e-3	3	NC	5	NC	2
462			min	-.005	5	-.169	1	-.003	5	-5.659e-3	1	770.013	3	5620.952	1
463		4	max	.002	1	.232	3	.029	1	6.261e-3	3	NC	5	NC	2
464			min	-.005	5	-.213	1	-.005	5	-6.622e-3	1	596.877	3	3901.057	1
465		5	max	.002	1	.248	3	.033	1	7.155e-3	3	NC	5	NC	2
466			min	-.005	5	-.228	1	-.007	5	-7.585e-3	1	555.017	3	3482.188	1
467		6	max	.002	1	.232	3	.029	1	8.049e-3	3	NC	5	NC	2
468			min	-.005	5	-.215	1	-.008	5	-8.547e-3	1	594.63	3	3849.477	1
469		7	max	.002	1	.192	3	.019	1	8.942e-3	3	NC	5	NC	2
470			min	-.005	5	-.18	1	-.009	5	-9.51e-3	1	733.365	3	5575.711	1
471		8	max	.002	1	.139	3	.01	3	9.836e-3	3	NC	5	NC	1
472			min	-.005	5	-.133	1	-.01	2	-1.047e-2	1	1063.913	3	NC	1
473		9	max	.002	1	.09	3	.012	3	1.073e-2	3	NC	4	NC	1
474			min	-.005	5	-.09	1	-.016	2	-1.144e-2	1	1825.866	3	NC	1
475		10	max	.002	1	.067	3	.014	3	1.162e-2	3	NC	4	NC	1
476			min	-.005	5	-.07	1	-.019	2	-1.24e-2	1	2595.428	1	9404.617	2
477		11	max	.002	1	.09	3	.015	3	1.073e-2	3	NC	4	NC	1
478			min	-.005	5	-.09	1	-.016	2	-1.144e-2	1	1825.866	3	NC	1
479		12	max	.002	1	.139	3	.016	3	9.837e-3	3	NC	5	NC	1
480			min	-.005	5	-.133	1	-.01	2	-1.047e-2	1	1063.913	3	NC	1
481		13	max	.002	1	.192	3	.019	1	8.944e-3	3	NC	5	NC	2
482			min	-.006	5	-.18	1	-.006	10	-9.511e-3	1	733.365	3	5547.604	1
483		14	max	.002	1	.232	3	.029	1	8.051e-3	3	NC	5	NC	2
484			min	-.006	5	-.215	1	-.004	10	-8.548e-3	1	594.63	3	3844.079	1
485		15	max	.002	1	.248	3	.033	1	7.158e-3	3	NC	5	NC	2
486			min	-.006	5	-.228	1	-.003	10	-7.585e-3	1	555.017	3	3485.587	1
487		16	max	.002	1	.232	3	.029	1	6.265e-3	3	NC	5	NC	2
488			min	-.006	5	-.212	1	-.003	5	-6.623e-3	1	596.877	3	3913.766	1
489		17	max	.002	1	.184	3	.019	1	5.372e-3	3	NC	5	NC	2
490			min	-.006	5	-.169	1	-.005	5	-5.66e-3	1	770.013	3	5655.885	1
491		18	max	.002	1	.11	3	.006	1	4.479e-3	3	NC	5	NC	1
492			min	-.006	5	-.102	1	-.004	5	-4.697e-3	1	1404.517	3	NC	1
493		19	max	.002	1	.021	3	.004	3	3.586e-3	3	NC	1	NC	1
494			min	-.006	5	-.021	1	-.005	2	-3.735e-3	1	NC	1	NC	1
495	M16	1	max	0	1	.015	3	.005	3	4.089e-3	2	NC	1	NC	1
496			min	-.073	4	-.024	2	-.006	2	-2.68e-3	3	NC	1	NC	1
497		2	max	0	1	.06	3	.011	4	5.135e-3	2	NC	5	NC	1
498			min	-.073	4	-.119	2	-.003	10	-3.336e-3	3	1322.295	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
499		3	max	0	1	.097	3	.018	1	6.18e-3	2	NC	5	NC	2
500			min	-.073	4	-.198	2	-.002	10	-3.993e-3	3	724.255	2	5646.877	1
501		4	max	0	1	.122	3	.028	1	7.226e-3	2	NC	5	NC	2
502			min	-.073	4	-.249	2	-.002	10	-4.649e-3	3	560.456	2	3921.028	1
503		5	max	0	1	.131	3	.032	1	8.272e-3	2	NC	5	NC	2
504			min	-.073	4	-.266	2	-.003	10	-5.306e-3	3	519.68	2	3504.324	1
505		6	max	0	1	.125	3	.029	1	9.318e-3	2	NC	5	NC	2
506			min	-.073	4	-.251	2	-.004	10	-5.962e-3	3	554.12	2	3884.111	1
507		7	max	0	1	.107	3	.018	1	1.036e-2	2	NC	5	NC	2
508			min	-.073	4	-.21	2	-.006	10	-6.619e-3	3	677.524	2	5663.731	1
509		8	max	0	1	.083	3	.015	3	1.141e-2	2	NC	5	NC	1
510			min	-.073	4	-.154	2	-.011	2	-7.276e-3	3	966.011	2	NC	1
511		9	max	0	1	.06	3	.015	3	1.245e-2	2	NC	4	NC	1
512			min	-.073	4	-.103	2	-.017	2	-7.932e-3	3	1597.687	2	NC	1
513		10	max	0	1	.049	3	.014	3	1.35e-2	2	NC	4	NC	1
514			min	-.073	4	-.079	2	-.019	2	-8.589e-3	3	2281.858	2	9222.42	2
515		11	max	0	1	.06	3	.013	3	1.245e-2	2	NC	4	NC	1
516			min	-.073	4	-.103	2	-.017	2	-7.932e-3	3	1597.687	2	NC	1
517		12	max	0	1	.083	3	.013	3	1.141e-2	2	NC	5	NC	1
518			min	-.073	4	-.154	2	-.011	2	-7.275e-3	3	966.011	2	NC	1
519		13	max	.001	1	.107	3	.018	1	1.036e-2	2	NC	5	NC	2
520			min	-.073	4	-.21	2	-.006	10	-6.617e-3	3	677.524	2	5655.958	1
521		14	max	.001	1	.125	3	.029	1	9.318e-3	2	NC	5	NC	2
522			min	-.073	4	-.251	2	-.004	10	-5.96e-3	3	554.12	2	3889.936	1
523		15	max	.001	1	.131	3	.032	1	8.273e-3	2	NC	5	NC	2
524			min	-.073	4	-.266	2	-.003	5	-5.303e-3	3	519.68	2	3517.15	1
525		16	max	.001	1	.122	3	.028	1	7.228e-3	2	NC	5	NC	2
526			min	-.073	4	-.249	2	-.006	5	-4.646e-3	3	560.456	2	3944.633	1
527		17	max	.001	1	.097	3	.018	1	6.182e-3	2	NC	5	NC	2
528			min	-.073	4	-.198	2	-.007	5	-3.989e-3	3	724.255	2	5699.842	1
529		18	max	.001	1	.06	3	.006	1	5.137e-3	2	NC	5	NC	1
530			min	-.073	4	-.119	2	-.005	5	-3.332e-3	3	1322.295	2	NC	1
531		19	max	.001	1	.015	3	.005	3	4.091e-3	2	NC	1	NC	1
532			min	-.073	4	-.024	2	-.006	2	-2.675e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	2.968e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-4.481e-4	5	NC	1	NC	1
535		2	max	0	3	0	15	.005	4	7.74e-4	3	NC	1	NC	1
536			min	0	4	-.004	1	0	3	-5.638e-4	1	NC	1	NC	1
537		3	max	0	3	0	15	.01	4	1.251e-3	3	NC	3	NC	1
538			min	-.001	4	-.008	1	-.003	3	-1.11e-3	1	9003.755	2	6804.256	4
539		4	max	0	3	0	15	.015	4	1.728e-3	3	NC	5	NC	9
540			min	-.002	4	-.012	1	-.006	3	-1.657e-3	1	6177.102	2	4529.018	4
541		5	max	0	3	0	15	.02	4	2.206e-3	3	NC	5	NC	9
542			min	-.002	4	-.015	1	-.01	3	-2.204e-3	1	4820.055	2	3482.195	4
543		6	max	0	3	0	15	.024	4	2.683e-3	3	NC	5	8240.64	9
544			min	-.003	4	-.018	1	-.014	3	-2.75e-3	1	4056.586	2	2926.388	4
545		7	max	0	3	0	15	.026	4	3.16e-3	3	NC	5	6425.662	9
546			min	-.003	4	-.02	1	-.019	3	-3.297e-3	1	3597.46	2	2623.587	4
547		8	max	0	3	0	15	.028	4	3.637e-3	3	NC	5	5287.819	9
548			min	-.004	4	-.022	1	-.023	3	-3.844e-3	1	3321.915	2	2323.722	1
549		9	max	0	3	0	15	.028	4	4.114e-3	3	NC	5	4544.502	9
550			min	-.005	4	-.023	1	-.027	3	-4.391e-3	1	3173.601	2	1994.22	1
551		10	max	0	3	0	15	.031	1	4.591e-3	3	NC	5	4719.986	15
552			min	-.005	4	-.023	1	-.03	3	-4.937e-3	1	3126.681	2	1777.035	1
553		11	max	0	3	0	15	.034	1	5.069e-3	3	NC	5	5346.926	15
554			min	-.006	4	-.023	1	-.032	3	-5.484e-3	1	3173.601	2	1639.004	1
555		12	max	0	3	.001	5	.035	1	5.546e-3	3	NC	5	6500.792	15

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	-.006	4	-.022	1	-.033	3	-6.031e-3	1	3321.915	2	1563.605	1
557		13	max	0	3	.001	5	.034	1	6.023e-3	3	NC	5	8704.937	15
558			min	-.007	4	-.021	1	-.033	3	-6.577e-3	1	3597.46	2	1545.778	1
559		14	max	0	3	.002	5	.032	1	6.5e-3	3	NC	5	NC	15
560			min	-.007	4	-.019	1	-.031	3	-7.124e-3	1	4056.586	2	1591.905	1
561		15	max	0	3	.002	5	.028	1	6.977e-3	3	NC	5	NC	5
562			min	-.008	4	-.016	1	-.027	3	-7.671e-3	1	4820.055	2	1726.41	1
563		16	max	0	3	.003	5	.021	1	7.454e-3	3	NC	5	NC	4
564			min	-.009	4	-.013	1	-.02	3	-8.217e-3	1	6177.102	2	2016.034	1
565		17	max	0	3	.003	5	.012	1	7.932e-3	3	NC	3	NC	4
566			min	-.009	4	-.01	1	-.011	3	-8.764e-3	1	9003.755	2	2670.489	1
567		18	max	0	3	.004	5	.001	9	8.409e-3	3	NC	1	NC	4
568			min	-.01	4	-.006	1	-.005	2	-9.311e-3	1	NC	1	4751.033	1
569		19	max	0	3	.004	5	.016	3	8.886e-3	3	NC	1	NC	1
570			min	-.01	4	-.002	1	-.019	2	-9.857e-3	1	NC	1	NC	1
571	M16A	1	max	0	10	0	3	.005	3	2.641e-3	3	NC	1	NC	1
572			min	-.003	4	-.003	4	-.006	2	-2.79e-3	1	NC	1	NC	1
573		2	max	0	10	-.002	12	.002	9	2.525e-3	3	NC	1	NC	1
574			min	-.003	4	-.009	4	-.002	5	-2.655e-3	1	NC	1	NC	1
575		3	max	0	10	-.003	12	.006	1	2.409e-3	3	NC	3	NC	4
576			min	-.003	4	-.015	4	-.004	3	-2.521e-3	1	5385.971	4	7048.733	1
577		4	max	0	10	-.005	12	.01	1	2.293e-3	3	NC	12	NC	4
578			min	-.003	4	-.021	4	-.008	5	-2.386e-3	1	3695.091	4	5359.558	1
579		5	max	0	10	-.007	12	.012	1	2.177e-3	3	9640.11	12	NC	10
580			min	-.003	4	-.026	4	-.013	5	-2.252e-3	1	2883.317	4	4627.237	1
581		6	max	0	10	-.008	12	.013	1	2.061e-3	3	8113.172	12	NC	10
582			min	-.002	4	-.031	4	-.018	5	-2.117e-3	1	2426.616	4	3933.087	5
583		7	max	0	10	-.009	12	.014	1	1.945e-3	3	7194.919	12	NC	10
584			min	-.002	4	-.034	4	-.023	5	-1.983e-3	1	2151.97	4	3067.949	5
585		8	max	0	10	-.01	12	.014	1	1.829e-3	3	6643.83	12	NC	10
586			min	-.002	4	-.037	4	-.028	5	-1.848e-3	1	1987.142	4	2571.596	5
587		9	max	0	10	-.011	12	.013	1	1.713e-3	3	6347.201	12	NC	10
588			min	-.002	4	-.038	4	-.031	5	-1.714e-3	1	1898.421	4	2280.674	5
589		10	max	0	10	-.011	12	.012	1	1.597e-3	3	6253.362	12	NC	10
590			min	-.002	4	-.039	4	-.033	5	-1.579e-3	1	1870.354	4	2121.587	5
591		11	max	0	10	-.011	12	.01	1	1.481e-3	3	6347.201	12	NC	9
592			min	-.002	4	-.038	4	-.034	5	-1.445e-3	2	1898.421	4	2061.042	5
593		12	max	0	10	-.01	12	.008	1	1.365e-3	3	6643.83	12	NC	9
594			min	-.001	4	-.036	4	-.034	5	-1.32e-3	2	1987.142	4	2088.519	5
595		13	max	0	10	-.01	12	.006	1	1.249e-3	3	7194.919	12	NC	2
596			min	-.001	4	-.033	4	-.032	5	-1.194e-3	2	2151.97	4	2211.866	5
597		14	max	0	10	-.008	12	.005	1	1.133e-3	3	8113.172	12	NC	1
598			min	0	4	-.029	4	-.029	5	-1.069e-3	2	2426.616	4	2462.399	5
599		15	max	0	10	-.007	12	.003	1	1.017e-3	3	9640.11	12	NC	1
600			min	0	4	-.025	4	-.024	5	-9.434e-4	2	2883.317	4	2915.954	5
601		16	max	0	10	-.006	12	.002	1	9.013e-4	3	NC	12	NC	1
602			min	0	4	-.019	4	-.019	5	-8.18e-4	2	3695.091	4	3761.599	5
603		17	max	0	10	-.004	12	0	9	7.853e-4	3	NC	3	NC	1
604			min	0	4	-.013	4	-.013	5	-6.926e-4	2	5385.971	4	5581.415	5
605		18	max	0	10	-.002	12	0	9	7.309e-4	4	NC	1	NC	1
606			min	0	4	-.007	4	-.006	5	-5.672e-4	2	NC	1	NC	1
607		19	max	0	1	0	1	0	1	7.951e-4	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-4.418e-4	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

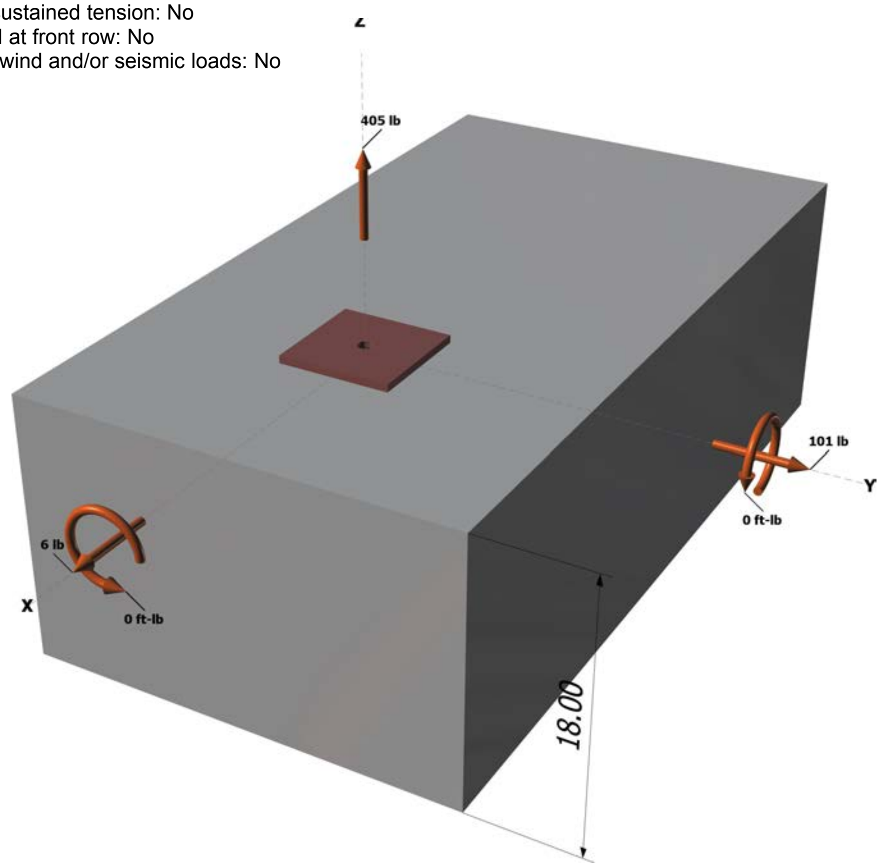
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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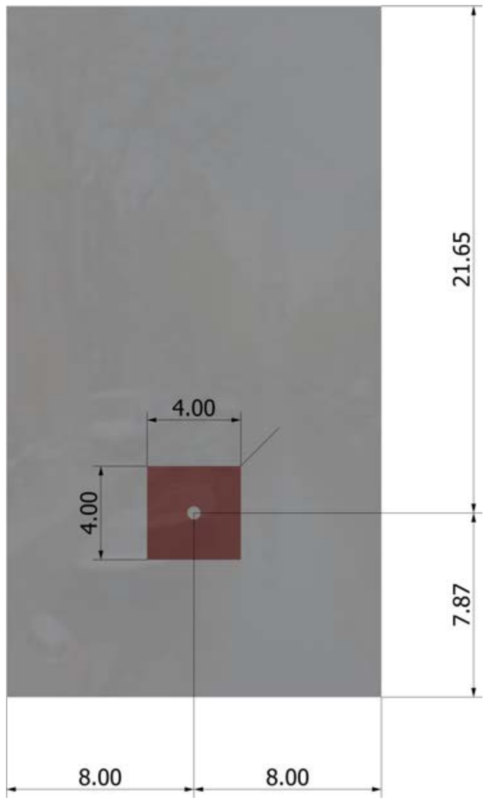


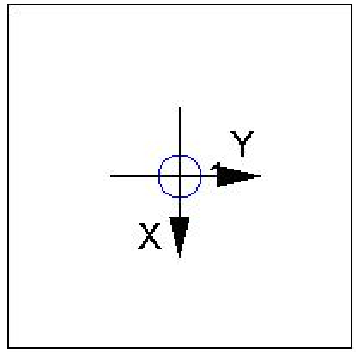
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

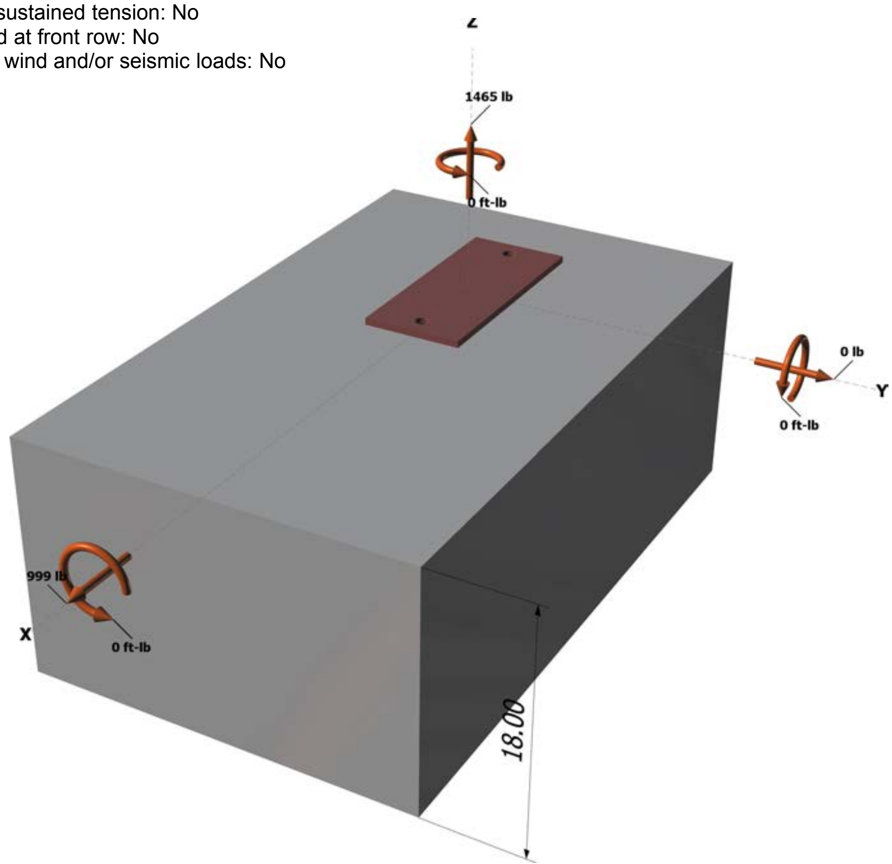
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

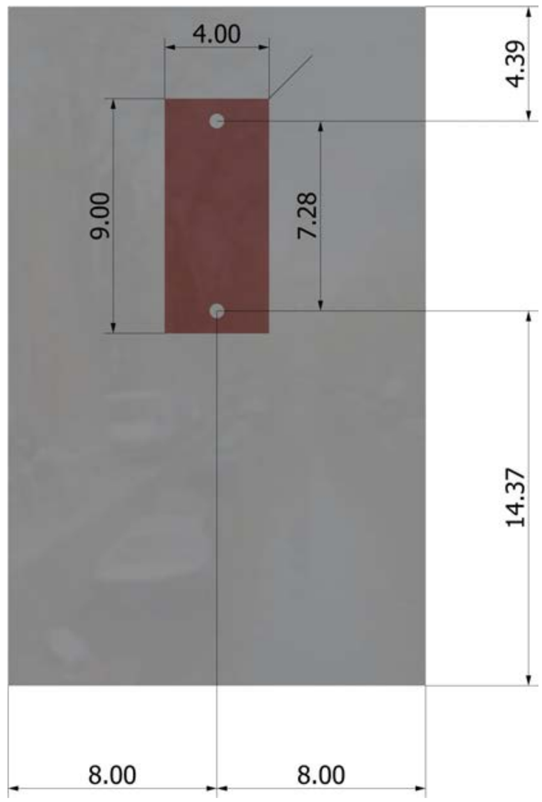
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



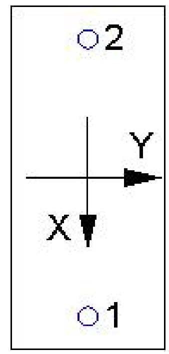
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
15580

11. Results

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

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

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

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

12. Warnings

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

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

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