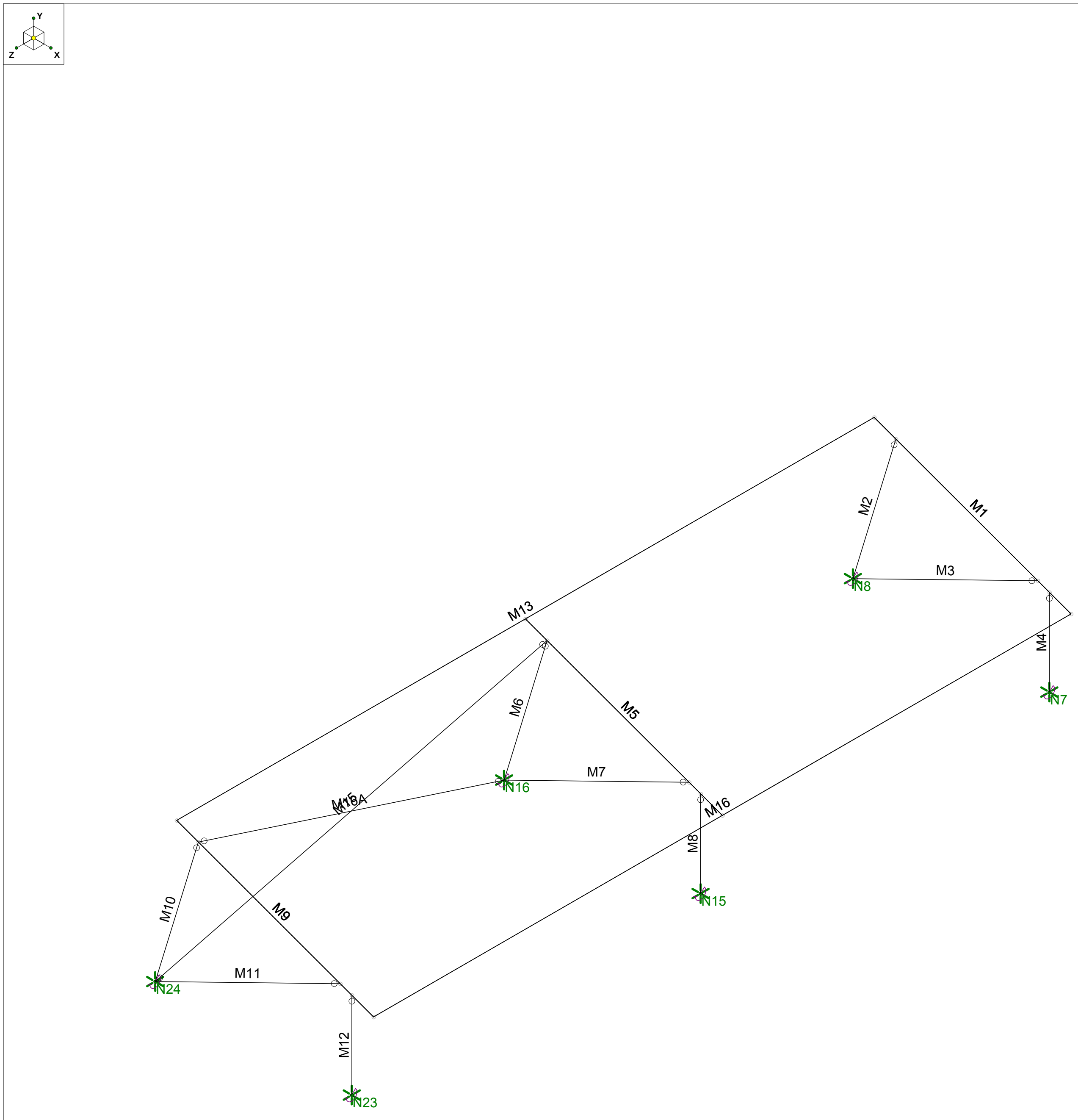


Schletter, Inc.		20° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

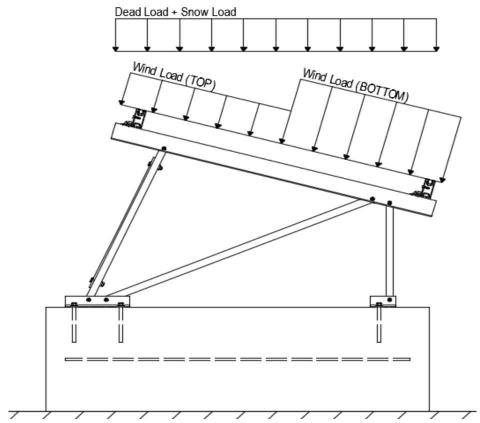
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 1
Module Tilt = 20°
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 = 20.62 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.91
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 115 mph
Height ≤ 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 20.76 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.05	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.65	
$Cf-_{TOP}$	=	-2.12	*(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.

<u>Strength Design, LRFD</u>

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)

<u>Allowable Stress Design, ASD</u>

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

1.0D + 1.0S
1.0D + 0.6W
1.0D + 0.75L + 0.45W + 0.75S
0.6D + 0.6W [M]
1.238D + 0.875E [O]
1.1785D + 0.65625E + 0.75S [O]
0.362D + 0.875E [O]

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

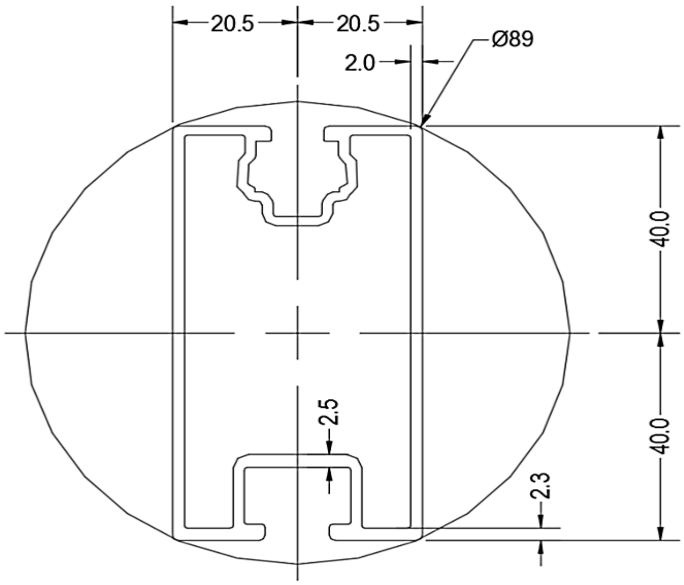
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

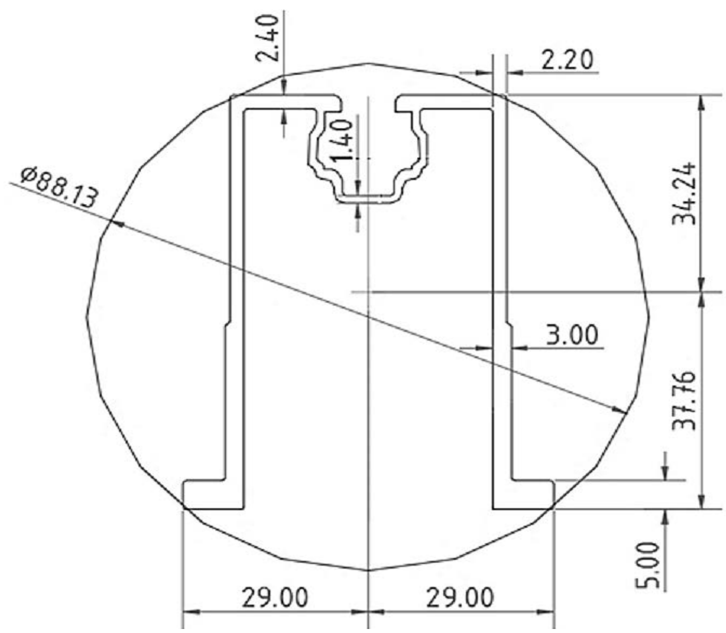
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	93	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.83	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	1.065	k-ft
M_z =	0.197	k-ft
$M_{y\ allowable}$ =	1.791	k-ft
$M_{z\ allowable}$ =	0.838	k-ft
Utilization =	83%	



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).

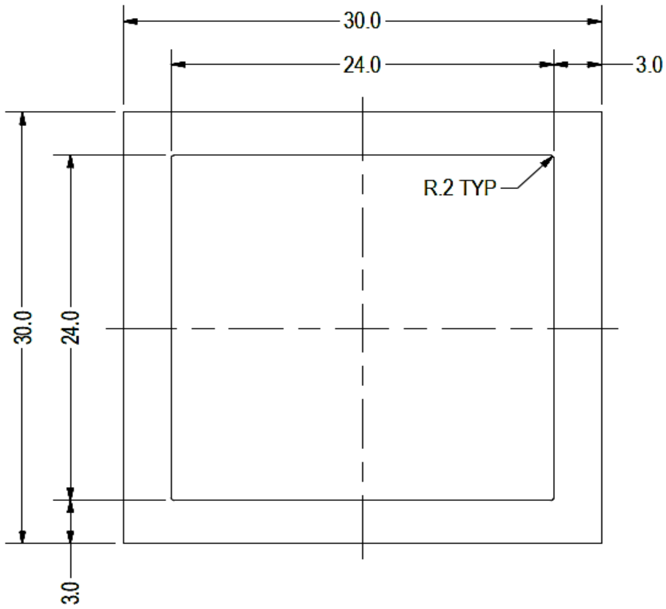
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.73	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.563	k-ft
M_z =	0.000	k-ft
P_n =	0.294	k
$M_{y\ allowable}$ =	1.459	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	41%	



4.3 Front Strut Design

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

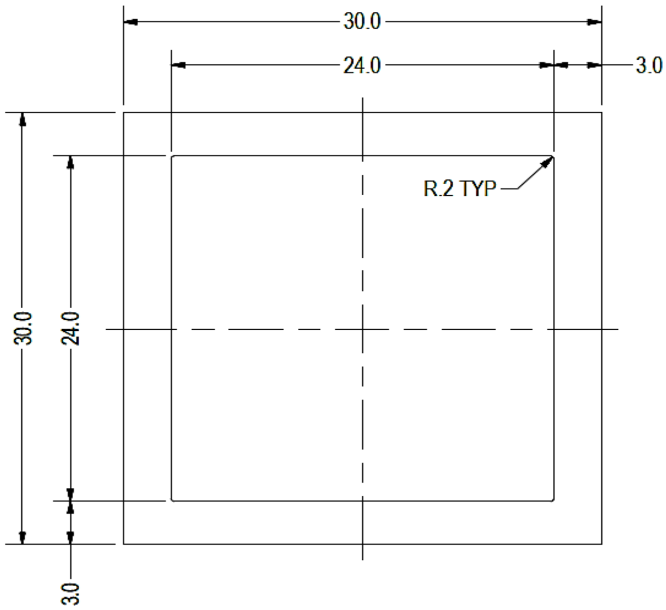
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.053	k-ft
P_n =	0.293	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	15%	



4.4 Diagonal Strut Design

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

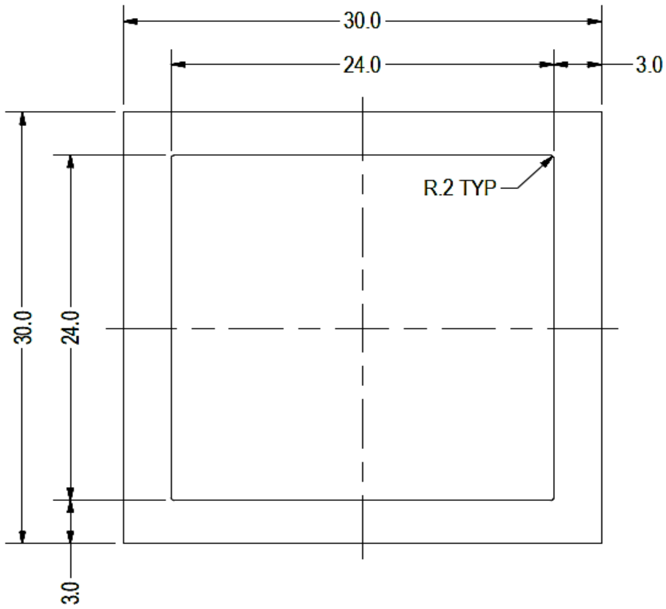
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.331	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	9%	



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).

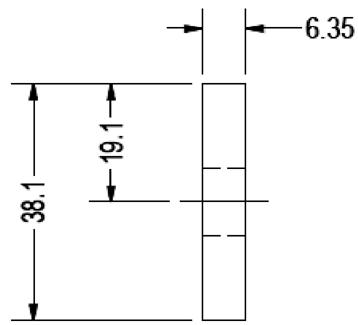
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.07	in
$\Phi F_{ty\ AXIAL}$ =	13.55	ksi
$\Phi F_{ty\ BENDING}$ =	30.37	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.225	k
$M_{y\ allowable}$ =	0.411	k-ft
$M_{z\ allowable}$ =	0.411	k-ft
$P_{n\ allowable}$ =	6.803	k
Utilization =	18%	



4.6 Cross Brace Design

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

Brace Type =	**1.5x0.25**	
Aluminum Type =	6061-T6	
F_{ty} =	35	ksi
Φ =	0.90	
S_y =	0.02	in^3
E =	10100	ksi
I_y =	33.25	in^4
A =	0.38	in^2
g =	0.45	lbs/ft
M_y =	0.007	k-ft
P_n =	0.255	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	18%	



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

5. FOUNDATION DESIGN CALCULATIONS

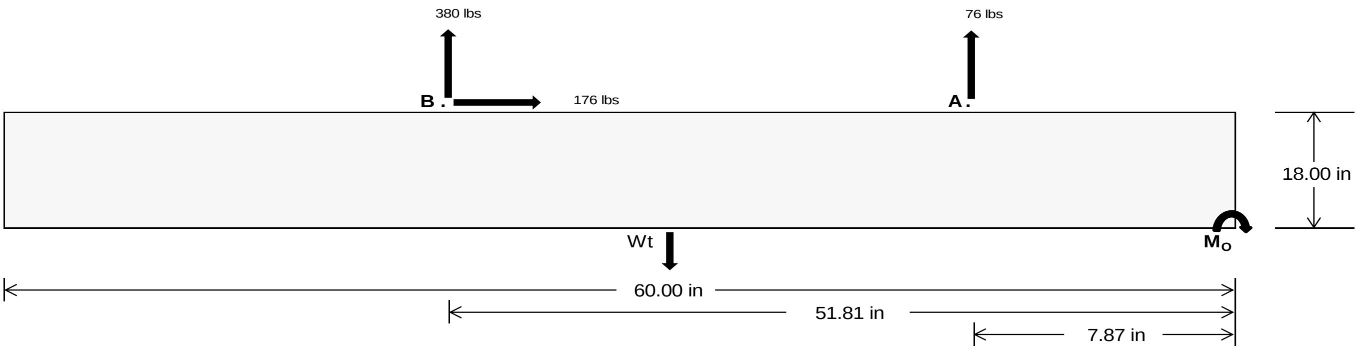
5.1 Helical Pile Foundations

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

Maximum	Front	Rear	
Tensile Load =	338.76	1651.36	k
Compressive Load =	1962.83	1523.45	k
Lateral Load =	42.87	764.86	k
Moment (Weak Axis) =	0.07	0.00	k

5.2 Design of Ballast Foundations

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



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

Footing Reinforcement
Use fiber reinforcing with (1) #5 rebar.

Overturning Check
M_O = 23441.2 in-lbs
Resisting Force Required = 781.37 lbs
S.F. = 1.67
Weight Required = 1302.29 lbs
Minimum Width = 22 in in
Weight Provided = 1993.75 lbs

A minimum 60in long x 22in wide x 18in tall ballast foundation is required to resist overturning.

Sliding
Force = 176.37 lbs
Friction = 0.4
Weight Required = 440.94 lbs
Resisting Weight = 1993.75 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 22in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion
Sliding Force = 176.37 lbs
Cohesion = 130 psf
Area = 9.17 ft^2
Resisting = 996.88 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 22in wide x 18in tall ballast foundation. Cohesion is OK.

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

Shear key is not required.

Bearing Pressure

	Ballast Width			
	22 in	23 in	24 in	25 in
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.83 ft) =	1994 lbs	2084 lbs	2175 lbs	2266 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in
F_A	740 lbs	740 lbs	740 lbs	740 lbs	555 lbs	555 lbs	555 lbs	555 lbs	916 lbs	916 lbs	916 lbs	916 lbs	-152 lbs	-152 lbs	-152 lbs	-152 lbs
F_B	541 lbs	541 lbs	541 lbs	541 lbs	489 lbs	489 lbs	489 lbs	489 lbs	731 lbs	731 lbs	731 lbs	731 lbs	-759 lbs	-759 lbs	-759 lbs	-759 lbs
F_V	65 lbs	65 lbs	65 lbs	65 lbs	318 lbs	318 lbs	318 lbs	318 lbs	283 lbs	283 lbs	283 lbs	283 lbs	-353 lbs	-353 lbs	-353 lbs	-353 lbs
P_{total}	3275 lbs	3366 lbs	3456 lbs	3547 lbs	3037 lbs	3128 lbs	3219 lbs	3309 lbs	3641 lbs	3732 lbs	3822 lbs	3913 lbs	285 lbs	339 lbs	394 lbs	448 lbs
M	479 lbs-ft	479 lbs-ft	479 lbs-ft	479 lbs-ft	611 lbs-ft	611 lbs-ft	611 lbs-ft	611 lbs-ft	785 lbs-ft	785 lbs-ft	785 lbs-ft	785 lbs-ft	570 lbs-ft	570 lbs-ft	570 lbs-ft	570 lbs-ft
e	0.15 ft	0.14 ft	0.14 ft	0.13 ft	0.20 ft	0.20 ft	0.19 ft	0.18 ft	0.22 ft	0.21 ft	0.21 ft	0.20 ft	2.00 ft	1.68 ft	1.45 ft	1.27 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}	294.6 psf	291.3 psf	288.2 psf	285.4 psf	251.4 psf	249.9 psf	248.6 psf	247.3 psf	294.5 psf	291.1 psf	288.1 psf	285.3 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	419.9 psf	411.1 psf	403.1 psf	395.6 psf	411.3 psf	402.9 psf	395.2 psf	388.1 psf	499.9 psf	487.6 psf	476.4 psf	466.0 psf	207.8 psf	144.0 psf	124.8 psf	116.8 psf

Maximum Bearing Pressure = 500 psf
Allowable Bearing Pressure = 1500 psf

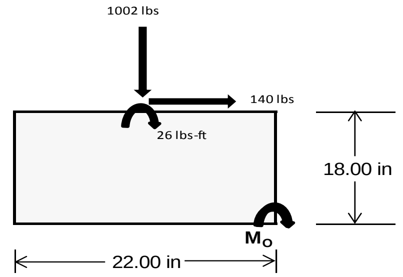
Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 682.3 ft-lbs
Resisting Force Required = 744.31 lbs
S.F. = 1.67
Weight Required = 1240.52 lbs
Minimum Width = 22 in in
Weight Provided = 1993.75 lbs

A minimum 60in long x 22in wide x 18in tall ballast foundation is required to resist overturning.



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	22 in			22 in			22 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	139 lbs	184 lbs	86 lbs	383 lbs	1002 lbs	341 lbs	77 lbs	15 lbs	28 lbs
F_V	23 lbs	185 lbs	23 lbs	15 lbs	140 lbs	18 lbs	23 lbs	185 lbs	23 lbs
P_{total}	2607 lbs	2652 lbs	2554 lbs	2732 lbs	3352 lbs	2691 lbs	799 lbs	736 lbs	749 lbs
M	65 lbs-ft	314 lbs-ft	70 lbs-ft	43 lbs-ft	236 lbs-ft	55 lbs-ft	67 lbs-ft	312 lbs-ft	70 lbs-ft
e	0.02 ft	0.12 ft	0.03 ft	0.02 ft	0.07 ft	0.02 ft	0.08 ft	0.42 ft	0.09 ft
L/6	0.31 ft	1.60 ft	1.78 ft	1.80 ft	1.69 ft	1.79 ft	1.66 ft	0.99 ft	1.65 ft
f_{min}	261.2 sqft	177.4 sqft	253.6 sqft	282.9 sqft	281.3 sqft	273.9 sqft	63.1 sqft	-31.1 sqft	56.8 sqft
f_{max}	307.6 psf	401.3 psf	303.6 psf	313.2 psf	450.0 psf	313.2 psf	111.2 psf	191.8 psf	106.7 psf

Maximum Bearing Pressure = 450 psf
Allowable Bearing Pressure = 1500 psf

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

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

5.3 Foundation Anchors

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

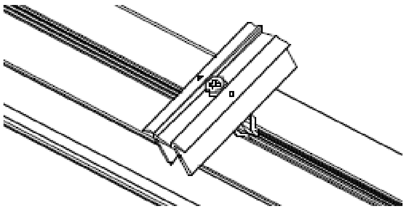
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

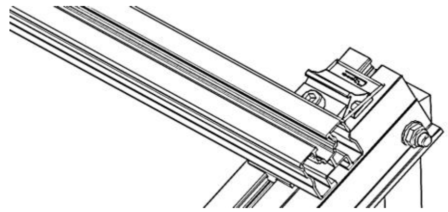
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.408	k
Allowable Uplift =	1.214	k
Utilization =	34%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	1.109	k
Allowable Uplift =	1.116	k
Utilization =	99%	



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 =	1.510	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	27%	

Rear Strut

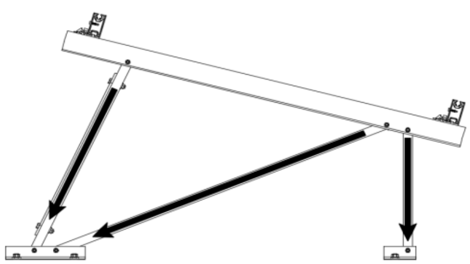
Maximum Axial Load =	1.225	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	22%	

Diagonal Strut

Maximum Axial Load =	0.331	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	6%	

Bracing

Maximum Axial Load =	0.255	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	3%	



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

7. SEISMIC DESIGN

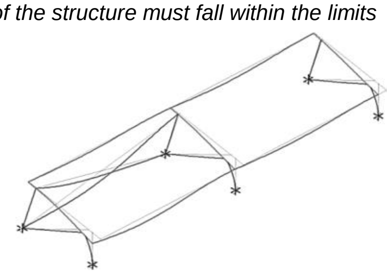
7.1 Seismic Drift

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

Mean Height, h_{sx} =	29.57	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.591	in
Max Drift, Δ_{MAX} =	0.111	in

$0.111 \leq 0.591$, 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 = **<u>ProfiPlus XT</u>**

<u>Strong Axis:</u>

3.4.14

L_b = 93.00 in

J = 0.427

193.965

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.8 ksi

3.4.16

b/t = 6.6

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 <u>Not Used</u>

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

<u>Weak Axis:</u>

3.4.14

L_b = 93.00 in

J = 0.427

210.771

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.6

3.4.16

b/t = 37.95

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 22.7 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 37.95

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

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

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

S2 = 79.7
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

φF_LSt= 28.8 ksi
Ix = 498305 mm^4
1.197 in^4
y = 40.784 mm
Sx = 0.746 in^3
M_{max}St = 1.791 k-ft

3.4.18

h/t = 6.6

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

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

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

A.2 Design of Aluminum Girders - Aluminum Design Manual, 2005 Edition

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.30

21.5728

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.7 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 = 1.30

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= 29.7 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= 29.7 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.459 k-ft

3.4.18

h/t = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

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

3.4.9

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

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

3.4.9.1

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

λ = 0.77182

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83792

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

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)

$\varphi F_L = \varphi yFcy$

φF_L = 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

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

$\varphi F_L = \varphi yFcy$

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 = 33.07 in

J = 0.16

86.7548

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

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= 30.4 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= 30.4 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.411 k-ft

Weak Axis:

3.4.14

L_b = 33.07 in

J = 0.16

86.7548

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

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= 30.4

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

$\lambda =$ 1.41804

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.77853

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

$\varphi F_L =$ 13.5508 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

$\varphi F_L =$ 13.55 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 6.80 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	-57.498	-57.498	0	0
2	M16	Y	-57.498	-57.498	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	-60.802	-60.802	0	0
2	M16	y	-95.545	-95.545	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	122.761	122.761	0	0
2	M16	y	57.906	57.906	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	138.276	2	322.151	1	-.003	2	0	14	0	1	0	1
2		min	-184.518	3	-387.256	3	-2.147	5	0	3	0	1	0	1
3	N7	max	0	5	527.602	1	-.138	12	0	12	0	1	0	1
4		min	-.184	1	-70.784	3	-32.597	4	-.053	4	0	1	0	1
5	N15	max	0	15	1509.873	1	.579	1	.001	1	0	1	0	1
6		min	-1.917	1	-260.584	3	-32.974	5	-.053	4	0	1	0	1
7	N16	max	553.88	2	1171.888	1	-.183	10	0	1	0	1	0	1
8		min	-588.35	3	-1270.279	3	-243.318	4	0	3	0	1	0	1
9	N23	max	0	15	527.371	1	3.385	1	.006	1	0	1	0	1
10		min	-.184	1	-70.349	3	-30.59	5	-.049	5	0	1	0	1
11	N24	max	138.742	2	327.591	1	33.408	3	.002	1	0	1	0	1
12		min	-184.595	3	-384.491	3	-3.517	5	0	3	0	1	0	1
13	Totals:	max	828.844	2	4386.477	1	0	1						
14		min	-957.772	3	-2443.744	3	-343.174	4						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M2	1	max	373.974	1	.64	6	1.158	4	0	12	0	3	0	1
2			min	-366.873	3	.15	15	-.046	3	-.001	1	0	1	0	1
3		2	max	374.08	1	.598	6	1.062	4	0	12	0	4	0	15
4			min	-366.793	3	.14	15	-.046	3	-.001	1	0	10	0	6
5		3	max	374.187	1	.557	6	.965	4	0	12	0	4	0	15
6			min	-366.713	3	.13	15	-.046	3	-.001	1	0	3	0	6
7		4	max	374.293	1	.516	6	.869	4	0	12	0	4	0	15
8			min	-366.634	3	.12	15	-.046	3	-.001	1	0	3	0	6
9		5	max	374.4	1	.475	6	.772	4	0	12	0	4	0	15
10			min	-366.554	3	.111	15	-.046	3	-.001	1	0	3	0	6
11		6	max	374.506	1	.433	6	.728	1	0	12	0	4	0	15
12			min	-366.474	3	.101	15	-.046	3	-.001	1	0	3	0	6
13		7	max	374.613	1	.392	6	.728	1	0	12	0	4	0	15
14			min	-366.394	3	.091	15	-.046	3	-.001	1	0	3	0	6
15		8	max	374.719	1	.351	6	.728	1	0	12	0	4	0	15
16			min	-366.314	3	.082	15	-.046	3	-.001	1	0	3	0	6
17		9	max	374.826	1	.309	6	.728	1	0	12	0	4	0	15
18			min	-366.234	3	.072	15	-.046	3	-.001	1	0	3	0	6
19		10	max	374.932	1	.268	6	.728	1	0	12	0	4	0	15
20			min	-366.154	3	.062	15	-.046	3	-.001	1	0	3	0	6
21		11	max	375.039	1	.227	6	.728	1	0	12	.001	1	0	15
22			min	-366.074	3	.053	15	-.046	3	-.001	1	0	3	0	6
23		12	max	375.145	1	.186	6	.728	1	0	12	.001	1	0	15
24			min	-365.994	3	.043	15	-.083	5	-.001	1	0	3	0	6
25		13	max	375.252	1	.144	6	.728	1	0	12	.001	1	0	15
26			min	-365.914	3	.033	15	-.179	5	-.001	1	0	3	0	6
27		14	max	375.359	1	.105	2	.728	1	0	12	.001	1	0	15
28			min	-365.834	3	.023	15	-.276	5	-.001	1	0	3	0	6

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
29		15	max	375.465	1	.073	2	.728	1	0	12	.001	1	0	15
30			min	-365.755	3	.014	15	-.372	5	-.001	1	0	3	0	6
31		16	max	375.572	1	.041	2	.728	1	0	12	.002	1	0	15
32			min	-365.675	3	-.005	3	-.469	5	-.001	1	0	3	0	6
33		17	max	375.678	1	.009	10	.728	1	0	12	.002	1	0	15
34			min	-365.595	3	-.03	1	-.565	5	-.001	1	0	3	0	6
35		18	max	375.785	1	-.015	15	.728	1	0	12	.002	1	0	15
36			min	-365.515	3	-.062	1	-.662	5	-.001	1	0	3	0	6
37		19	max	375.891	1	-.025	15	.728	1	0	12	.002	1	0	15
38			min	-365.435	3	-.103	4	-.758	5	-.001	1	0	3	0	6
39	M3	1	max	66.398	2	1.792	6	-.033	12	0	5	.002	1	0	6
40			min	-98.261	9	.421	15	-1.485	4	0	1	0	12	0	15
41		2	max	66.33	2	1.615	6	-.033	12	0	5	.002	1	0	6
42			min	-98.317	9	.379	15	-1.352	4	0	1	0	12	0	15
43		3	max	66.262	2	1.437	6	-.033	12	0	5	.002	1	0	2
44			min	-98.374	9	.337	15	-1.218	4	0	1	0	12	0	3
45		4	max	66.194	2	1.26	6	-.033	12	0	5	.002	1	0	15
46			min	-98.43	9	.296	15	-1.085	4	0	1	0	5	0	4
47		5	max	66.127	2	1.082	6	-.033	12	0	5	.001	1	0	15
48			min	-98.487	9	.254	15	-.951	4	0	1	0	5	0	4
49		6	max	66.059	2	.904	6	-.033	12	0	5	.001	1	0	15
50			min	-98.543	9	.212	15	-.817	4	0	1	0	5	0	4
51		7	max	65.991	2	.727	6	-.033	12	0	5	.001	1	0	15
52			min	-98.6	9	.17	15	-.687	1	0	1	0	5	0	4
53		8	max	65.923	2	.549	6	-.033	12	0	5	.001	1	0	15
54			min	-98.657	9	.128	15	-.687	1	0	1	0	5	-.001	4
55		9	max	65.855	2	.371	6	-.033	12	0	5	0	1	0	15
56			min	-98.713	9	.087	15	-.687	1	0	1	0	5	-.001	4
57		10	max	65.787	2	.194	6	-.033	12	0	5	0	1	0	15
58			min	-98.77	9	.045	15	-.687	1	0	1	0	5	-.001	4
59		11	max	65.719	2	.03	2	-.007	15	0	5	0	1	0	15
60			min	-98.826	9	-.003	3	-.687	1	0	1	0	5	-.001	4
61		12	max	65.652	2	-.039	15	.122	5	0	5	0	1	0	15
62			min	-98.883	9	-.162	4	-.687	1	0	1	0	5	-.001	4
63		13	max	65.584	2	-.08	15	.255	5	0	5	0	1	0	15
64			min	-98.939	9	-.339	4	-.687	1	0	1	0	5	-.001	4
65		14	max	65.516	2	-.122	15	.389	5	0	5	0	1	0	15
66			min	-98.996	9	-.517	4	-.687	1	0	1	0	5	-.001	4
67		15	max	65.448	2	-.164	15	.523	5	0	5	0	1	0	15
68			min	-99.052	9	-.695	4	-.687	1	0	1	0	5	0	4
69		16	max	65.38	2	-.206	15	.656	5	0	5	0	12	0	15
70			min	-99.109	9	-.872	4	-.687	1	0	1	0	4	0	4
71		17	max	65.312	2	-.247	15	.79	5	0	5	0	12	0	15
72			min	-99.166	9	-1.05	4	-.687	1	0	1	0	4	0	4
73		18	max	65.244	2	-.289	15	.923	5	0	5	0	12	0	15
74			min	-99.222	9	-1.228	4	-.687	1	0	1	0	1	0	4
75		19	max	65.176	2	-.331	15	1.057	5	0	5	0	5	0	1
76			min	-99.279	9	-1.405	4	-.687	1	0	1	0	1	0	1
77	M4	1	max	526.437	1	0	1	-.137	12	0	1	0	5	0	1
78			min	-71.658	3	0	1	-32.236	4	0	1	0	1	0	1
79		2	max	526.502	1	0	1	-.137	12	0	1	0	12	0	1
80			min	-71.609	3	0	1	-32.292	4	0	1	-.003	4	0	1
81		3	max	526.567	1	0	1	-.137	12	0	1	0	12	0	1
82			min	-71.561	3	0	1	-32.348	4	0	1	-.006	4	0	1
83		4	max	526.632	1	0	1	-.137	12	0	1	0	12	0	1
84			min	-71.512	3	0	1	-32.404	4	0	1	-.009	4	0	1
85		5	max	526.696	1	0	1	-.137	12	0	1	0	12	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
86			min	-71.464	3	0	1	-32.46	4	0	1	-.012	4	0	1
87		6	max	526.761	1	0	1	-.137	12	0	1	0	12	0	1
88			min	-71.415	3	0	1	-32.516	4	0	1	-.014	4	0	1
89		7	max	526.826	1	0	1	-.137	12	0	1	0	12	0	1
90			min	-71.366	3	0	1	-32.572	4	0	1	-.017	4	0	1
91		8	max	526.89	1	0	1	-.137	12	0	1	0	12	0	1
92			min	-71.318	3	0	1	-32.628	4	0	1	-.02	4	0	1
93		9	max	526.955	1	0	1	-.137	12	0	1	0	12	0	1
94			min	-71.269	3	0	1	-32.684	4	0	1	-.023	4	0	1
95		10	max	527.02	1	0	1	-.137	12	0	1	0	12	0	1
96			min	-71.221	3	0	1	-32.74	4	0	1	-.026	4	0	1
97		11	max	527.085	1	0	1	-.137	12	0	1	0	12	0	1
98			min	-71.172	3	0	1	-32.796	4	0	1	-.029	4	0	1
99		12	max	527.149	1	0	1	-.137	12	0	1	0	12	0	1
100			min	-71.124	3	0	1	-32.852	4	0	1	-.032	4	0	1
101		13	max	527.214	1	0	1	-.137	12	0	1	0	12	0	1
102			min	-71.075	3	0	1	-32.909	4	0	1	-.035	4	0	1
103		14	max	527.279	1	0	1	-.137	12	0	1	0	12	0	1
104			min	-71.027	3	0	1	-32.965	4	0	1	-.038	4	0	1
105		15	max	527.343	1	0	1	-.137	12	0	1	0	12	0	1
106			min	-70.978	3	0	1	-33.021	4	0	1	-.041	4	0	1
107		16	max	527.408	1	0	1	-.137	12	0	1	0	12	0	1
108			min	-70.93	3	0	1	-33.077	4	0	1	-.044	4	0	1
109		17	max	527.473	1	0	1	-.137	12	0	1	0	12	0	1
110			min	-70.881	3	0	1	-33.133	4	0	1	-.047	4	0	1
111		18	max	527.537	1	0	1	-.137	12	0	1	0	12	0	1
112			min	-70.833	3	0	1	-33.189	4	0	1	-.05	4	0	1
113		19	max	527.602	1	0	1	-.137	12	0	1	0	12	0	1
114			min	-70.784	3	0	1	-33.245	4	0	1	-.053	4	0	1
115	M6	1	max	1223.049	1	.627	6	1.079	4	0	1	0	4	0	1
116			min	-1197.667	3	.144	15	-.127	3	0	5	0	1	0	1
117		2	max	1223.155	1	.585	6	.982	4	0	1	0	4	0	15
118			min	-1197.587	3	.134	15	-.127	3	0	5	0	11	0	6
119		3	max	1223.262	1	.544	6	.886	4	0	1	0	4	0	15
120			min	-1197.507	3	.124	15	-.127	3	0	5	0	10	0	6
121		4	max	1223.368	1	.503	6	.789	4	0	1	0	4	0	15
122			min	-1197.427	3	.114	15	-.127	3	0	5	0	12	0	6
123		5	max	1223.475	1	.462	6	.693	4	0	1	0	4	0	15
124			min	-1197.347	3	.105	15	-.127	3	0	5	0	3	0	6
125		6	max	1223.581	1	.42	6	.597	4	0	1	0	4	0	15
126			min	-1197.267	3	.095	15	-.127	3	0	5	0	3	0	6
127		7	max	1223.688	1	.38	2	.5	4	0	1	0	4	0	15
128			min	-1197.187	3	.085	15	-.127	3	0	5	0	3	0	6
129		8	max	1223.794	1	.348	2	.404	4	0	1	0	4	0	15
130			min	-1197.107	3	.076	15	-.127	3	0	5	0	3	0	6
131		9	max	1223.901	1	.316	2	.313	14	0	1	0	4	0	15
132			min	-1197.028	3	.066	15	-.127	3	0	5	0	3	0	6
133		10	max	1224.007	1	.284	2	.264	14	0	1	0	4	0	15
134			min	-1196.948	3	.056	15	-.127	3	0	5	0	3	0	6
135		11	max	1224.114	1	.252	2	.264	1	0	1	0	4	0	15
136			min	-1196.868	3	.047	15	-.127	3	0	5	0	3	0	6
137		12	max	1224.221	1	.219	2	.264	1	0	1	0	4	0	15
138			min	-1196.788	3	.036	12	-.127	3	0	5	0	3	0	6
139		13	max	1224.327	1	.187	2	.264	1	0	1	0	4	0	15
140			min	-1196.708	3	.02	12	-.166	5	0	5	0	3	0	2
141		14	max	1224.434	1	.155	2	.264	1	0	1	0	4	0	15
142			min	-1196.628	3	0	3	-.262	5	0	5	0	3	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
143		15	max	1224.54	1	.123	2	.264	1	0	1	0	4	0	15
144			min	-1196.548	3	-.025	3	-.359	5	0	5	0	3	0	2
145		16	max	1224.647	1	.091	2	.264	1	0	1	0	4	0	15
146			min	-1196.468	3	-.049	3	-.455	5	0	5	0	3	0	2
147		17	max	1224.753	1	.059	2	.264	1	0	1	0	4	0	15
148			min	-1196.388	3	-.073	3	-.552	5	0	5	0	3	0	2
149		18	max	1224.86	1	.026	2	.264	1	0	1	0	14	0	15
150			min	-1196.308	3	-.097	3	-.648	5	0	5	0	3	0	2
151		19	max	1224.966	1	-.006	2	.264	1	0	1	0	14	0	15
152			min	-1196.228	3	-.121	3	-.745	5	0	5	0	3	0	2
153	M7	1	max	330.663	2	1.801	4	.014	1	0	2	0	4	0	2
154			min	-265.128	3	.428	15	-1.443	5	0	5	0	3	0	12
155		2	max	330.595	2	1.624	4	.014	1	0	2	0	4	0	2
156			min	-265.179	3	.386	15	-1.309	5	0	5	0	3	0	3
157		3	max	330.528	2	1.446	4	.014	1	0	2	0	4	0	2
158			min	-265.229	3	.344	15	-1.175	5	0	5	0	3	0	3
159		4	max	330.46	2	1.268	4	.014	1	0	2	0	2	0	2
160			min	-265.28	3	.302	15	-1.042	5	0	5	0	3	0	3
161		5	max	330.392	2	1.091	4	.014	1	0	2	0	2	0	15
162			min	-265.331	3	.261	15	-.908	5	0	5	0	5	0	6
163		6	max	330.324	2	.913	4	.014	1	0	2	0	2	0	15
164			min	-265.382	3	.219	15	-.775	5	0	5	0	5	0	6
165		7	max	330.256	2	.735	4	.014	1	0	2	0	2	0	15
166			min	-265.433	3	.177	15	-.641	5	0	5	0	5	0	6
167		8	max	330.188	2	.558	4	.014	1	0	2	0	2	0	15
168			min	-265.484	3	.135	15	-.507	5	0	5	0	5	0	6
169		9	max	330.12	2	.38	4	.014	1	0	2	0	2	0	15
170			min	-265.535	3	.093	15	-.374	5	0	5	0	5	-.001	6
171		10	max	330.052	2	.217	2	.014	1	0	2	0	2	0	15
172			min	-265.586	3	.043	12	-.24	5	0	5	0	5	-.001	6
173		11	max	329.985	2	.078	2	.014	1	0	2	0	2	0	15
174			min	-265.637	3	-.045	3	-.106	5	0	5	0	5	-.001	6
175		12	max	329.917	2	-.032	15	.03	4	0	2	0	2	0	15
176			min	-265.688	3	-.153	6	-.003	10	0	5	0	5	-.001	6
177		13	max	329.849	2	-.074	15	.164	4	0	2	0	2	0	15
178			min	-265.738	3	-.331	6	-.003	10	0	5	0	5	-.001	6
179		14	max	329.781	2	-.115	15	.297	4	0	2	0	2	0	15
180			min	-265.789	3	-.508	6	-.003	10	0	5	0	5	-.001	6
181		15	max	329.713	2	-.157	15	.431	4	0	2	0	2	0	15
182			min	-265.84	3	-.686	6	-.003	10	0	5	0	5	0	6
183		16	max	329.645	2	-.199	15	.565	4	0	2	0	2	0	15
184			min	-265.891	3	-.864	6	-.003	10	0	5	0	5	0	6
185		17	max	329.577	2	-.241	15	.698	4	0	2	0	2	0	15
186			min	-265.942	3	-1.041	6	-.003	10	0	5	0	5	0	6
187		18	max	329.51	2	-.282	15	.832	4	0	2	0	2	0	15
188			min	-265.993	3	-1.219	6	-.003	10	0	5	0	5	0	6
189		19	max	329.442	2	-.324	15	.965	4	0	2	0	2	0	1
190			min	-266.044	3	-1.397	6	-.003	10	0	5	0	3	0	1
191	M8	1	max	1508.708	1	0	1	.768	1	0	1	0	4	0	1
192			min	-261.458	3	0	1	-32.467	4	0	1	0	1	0	1
193		2	max	1508.773	1	0	1	.768	1	0	1	0	1	0	1
194			min	-261.409	3	0	1	-32.523	4	0	1	-.003	4	0	1
195		3	max	1508.838	1	0	1	.768	1	0	1	0	1	0	1
196			min	-261.361	3	0	1	-32.579	4	0	1	-.006	4	0	1
197		4	max	1508.902	1	0	1	.768	1	0	1	0	1	0	1
198			min	-261.312	3	0	1	-32.636	4	0	1	-.009	4	0	1
199		5	max	1508.967	1	0	1	.768	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	-261.264	3	0	1	-32.692	4	0	1	-.012	4	0	1
201		6	max	1509.032	1	0	1	.768	1	0	1	0	1	0	1
202			min	-261.215	3	0	1	-32.748	4	0	1	-.015	4	0	1
203		7	max	1509.097	1	0	1	.768	1	0	1	0	1	0	1
204			min	-261.166	3	0	1	-32.804	4	0	1	-.017	4	0	1
205		8	max	1509.161	1	0	1	.768	1	0	1	0	1	0	1
206			min	-261.118	3	0	1	-32.86	4	0	1	-.02	4	0	1
207		9	max	1509.226	1	0	1	.768	1	0	1	0	1	0	1
208			min	-261.069	3	0	1	-32.916	4	0	1	-.023	4	0	1
209		10	max	1509.291	1	0	1	.768	1	0	1	0	1	0	1
210			min	-261.021	3	0	1	-32.972	4	0	1	-.026	4	0	1
211		11	max	1509.355	1	0	1	.768	1	0	1	0	1	0	1
212			min	-260.972	3	0	1	-33.028	4	0	1	-.029	4	0	1
213		12	max	1509.42	1	0	1	.768	1	0	1	0	1	0	1
214			min	-260.924	3	0	1	-33.084	4	0	1	-.032	4	0	1
215		13	max	1509.485	1	0	1	.768	1	0	1	0	1	0	1
216			min	-260.875	3	0	1	-33.14	4	0	1	-.035	4	0	1
217		14	max	1509.55	1	0	1	.768	1	0	1	0	1	0	1
218			min	-260.827	3	0	1	-33.196	4	0	1	-.038	4	0	1
219		15	max	1509.614	1	0	1	.768	1	0	1	0	1	0	1
220			min	-260.778	3	0	1	-33.252	4	0	1	-.041	4	0	1
221		16	max	1509.679	1	0	1	.768	1	0	1	.001	1	0	1
222			min	-260.73	3	0	1	-33.308	4	0	1	-.044	4	0	1
223		17	max	1509.744	1	0	1	.768	1	0	1	.001	1	0	1
224			min	-260.681	3	0	1	-33.365	4	0	1	-.047	4	0	1
225		18	max	1509.808	1	0	1	.768	1	0	1	.001	1	0	1
226			min	-260.633	3	0	1	-33.421	4	0	1	-.05	4	0	1
227		19	max	1509.873	1	0	1	.768	1	0	1	.001	1	0	1
228			min	-260.584	3	0	1	-33.477	4	0	1	-.053	4	0	1
229	M10	1	max	385.402	1	.666	4	1.281	5	.001	1	0	1	0	1
230			min	-353.465	3	.167	15	-.152	1	-.002	5	0	3	0	1
231		2	max	385.509	1	.625	4	1.184	5	.001	1	0	4	0	15
232			min	-353.385	3	.158	15	-.152	1	-.002	5	0	3	0	4
233		3	max	385.615	1	.583	4	1.088	5	.001	1	0	4	0	15
234			min	-353.305	3	.148	15	-.152	1	-.002	5	0	3	0	4
235		4	max	385.722	1	.542	4	.991	5	.001	1	0	4	0	15
236			min	-353.225	3	.138	15	-.152	1	-.002	5	0	3	0	4
237		5	max	385.828	1	.501	4	.895	5	.001	1	0	4	0	15
238			min	-353.145	3	.128	15	-.152	1	-.002	5	0	3	0	4
239		6	max	385.935	1	.459	4	.799	5	.001	1	0	4	0	15
240			min	-353.066	3	.119	15	-.152	1	-.002	5	0	3	0	4
241		7	max	386.041	1	.418	4	.702	5	.001	1	0	4	0	15
242			min	-352.986	3	.109	15	-.152	1	-.002	5	0	3	0	4
243		8	max	386.148	1	.377	4	.606	5	.001	1	.001	4	0	15
244			min	-352.906	3	.099	15	-.152	1	-.002	5	0	3	0	4
245		9	max	386.255	1	.336	4	.509	5	.001	1	.001	4	0	15
246			min	-352.826	3	.09	15	-.152	1	-.002	5	0	3	0	4
247		10	max	386.361	1	.294	4	.413	5	.001	1	.001	4	0	15
248			min	-352.746	3	.08	15	-.152	1	-.002	5	0	3	0	4
249		11	max	386.468	1	.253	4	.316	5	.001	1	.001	4	0	15
250			min	-352.666	3	.07	15	-.152	1	-.002	5	0	1	0	4
251		12	max	386.574	1	.212	4	.22	5	.001	1	.001	4	0	15
252			min	-352.586	3	.061	15	-.152	1	-.002	5	0	1	0	4
253		13	max	386.681	1	.171	4	.123	5	.001	1	.001	4	0	15
254			min	-352.506	3	.051	15	-.152	1	-.002	5	0	1	0	4
255		14	max	386.787	1	.129	4	.027	5	.001	1	.001	4	0	15
256			min	-352.426	3	.019	1	-.152	1	-.002	5	0	1	0	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
257		15	max	386.894	1	.088	4	-.02	12	.001	1	.001	4	0	15
258			min	-352.346	3	-.013	1	-.152	1	-.002	5	0	1	0	4
259		16	max	387	1	.047	4	-.02	12	.001	1	.001	4	0	15
260			min	-352.266	3	-.045	1	-.173	4	-.002	5	0	1	0	4
261		17	max	387.107	1	.018	5	-.02	12	.001	1	.001	4	0	15
262			min	-352.187	3	-.077	1	-.269	4	-.002	5	0	1	0	4
263		18	max	387.213	1	.003	5	-.02	12	.001	1	.001	4	0	15
264			min	-352.107	3	-.11	1	-.366	4	-.002	5	0	1	0	4
265		19	max	387.32	1	-.007	15	-.02	12	.001	1	.001	4	0	15
266			min	-352.027	3	-.142	1	-.462	4	-.002	5	0	1	0	4
267	M11	1	max	66.1	2	1.789	6	.805	1	.002	4	.001	5	0	6
268			min	-98.158	9	.418	15	-1.167	5	0	10	-.002	1	0	15
269		2	max	66.033	2	1.611	6	.805	1	.002	4	.001	5	0	6
270			min	-98.215	9	.377	15	-1.033	5	0	10	-.002	1	0	15
271		3	max	65.965	2	1.434	6	.805	1	.002	4	0	5	0	2
272			min	-98.271	9	.335	15	-.9	5	0	10	-.002	1	0	3
273		4	max	65.897	2	1.256	6	.805	1	.002	4	0	5	0	15
274			min	-98.328	9	.293	15	-.766	5	0	10	-.002	1	0	4
275		5	max	65.829	2	1.078	6	.805	1	.002	4	0	5	0	15
276			min	-98.384	9	.251	15	-.632	5	0	10	-.001	1	0	4
277		6	max	65.761	2	.901	6	.805	1	.002	4	0	5	0	15
278			min	-98.441	9	.21	15	-.499	5	0	10	-.001	1	0	4
279		7	max	65.693	2	.723	6	.805	1	.002	4	0	5	0	15
280			min	-98.497	9	.168	15	-.365	5	0	10	-.001	1	0	4
281		8	max	65.625	2	.545	6	.805	1	.002	4	0	5	0	15
282			min	-98.554	9	.126	15	-.232	5	0	10	0	1	-.001	4
283		9	max	65.558	2	.368	6	.805	1	.002	4	0	5	0	15
284			min	-98.61	9	.084	15	-.098	5	0	10	0	1	-.001	4
285		10	max	65.49	2	.19	6	.805	1	.002	4	0	5	0	15
286			min	-98.667	9	.042	15	.016	12	0	10	0	1	-.001	4
287		11	max	65.422	2	.03	2	.805	1	.002	4	0	5	0	15
288			min	-98.724	9	-.021	3	.016	12	0	10	0	1	-.001	4
289		12	max	65.354	2	-.041	15	.805	1	.002	4	0	5	0	15
290			min	-98.78	9	-.165	4	.016	12	0	10	0	1	-.001	4
291		13	max	65.286	2	-.083	15	.805	1	.002	4	0	5	0	15
292			min	-98.837	9	-.343	4	.016	12	0	10	0	2	-.001	4
293		14	max	65.218	2	-.125	15	.805	1	.002	4	0	4	0	15
294			min	-98.893	9	-.521	4	.016	12	0	10	0	10	-.001	4
295		15	max	65.15	2	-.166	15	.862	4	.002	4	0	4	0	15
296			min	-98.95	9	-.698	4	.016	12	0	10	0	10	0	4
297		16	max	65.083	2	-.208	15	.996	4	.002	4	0	4	0	15
298			min	-99.006	9	-.876	4	.016	12	0	10	0	10	0	4
299		17	max	65.015	2	-.25	15	1.129	4	.002	4	.001	4	0	15
300			min	-99.063	9	-1.054	4	.016	12	0	10	0	10	0	4
301		18	max	64.947	2	-.292	15	1.263	4	.002	4	.001	4	0	15
302			min	-99.119	9	-1.231	4	.016	12	0	10	0	10	0	4
303		19	max	64.879	2	-.333	15	1.396	4	.002	4	.002	4	0	1
304			min	-99.176	9	-1.409	4	.016	12	0	10	0	10	0	1
305	M12	1	max	526.206	1	0	1	3.707	1	0	1	0	4	0	1
306			min	-71.223	3	0	1	-29.65	5	0	1	0	3	0	1
307		2	max	526.271	1	0	1	3.707	1	0	1	0	1	0	1
308			min	-71.174	3	0	1	-29.706	5	0	1	-.003	5	0	1
309		3	max	526.335	1	0	1	3.707	1	0	1	0	1	0	1
310			min	-71.126	3	0	1	-29.762	5	0	1	-.005	5	0	1
311		4	max	526.4	1	0	1	3.707	1	0	1	.001	1	0	1
312			min	-71.077	3	0	1	-29.819	5	0	1	-.008	5	0	1
313		5	max	526.465	1	0	1	3.707	1	0	1	.001	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
314			min	-71.029	3	0	1	-29.875	5	0	1	-.011	5	0	1
315		6	max	526.53	1	0	1	3.707	1	0	1	.002	1	0	1
316			min	-70.98	3	0	1	-29.931	5	0	1	-.013	5	0	1
317		7	max	526.594	1	0	1	3.707	1	0	1	.002	1	0	1
318			min	-70.932	3	0	1	-29.987	5	0	1	-.016	5	0	1
319		8	max	526.659	1	0	1	3.707	1	0	1	.002	1	0	1
320			min	-70.883	3	0	1	-30.043	5	0	1	-.019	5	0	1
321		9	max	526.724	1	0	1	3.707	1	0	1	.003	1	0	1
322			min	-70.835	3	0	1	-30.099	5	0	1	-.021	5	0	1
323		10	max	526.788	1	0	1	3.707	1	0	1	.003	1	0	1
324			min	-70.786	3	0	1	-30.155	5	0	1	-.024	5	0	1
325		11	max	526.853	1	0	1	3.707	1	0	1	.003	1	0	1
326			min	-70.738	3	0	1	-30.211	5	0	1	-.027	5	0	1
327		12	max	526.918	1	0	1	3.707	1	0	1	.004	1	0	1
328			min	-70.689	3	0	1	-30.267	5	0	1	-.029	5	0	1
329		13	max	526.982	1	0	1	3.707	1	0	1	.004	1	0	1
330			min	-70.64	3	0	1	-30.323	5	0	1	-.032	5	0	1
331		14	max	527.047	1	0	1	3.707	1	0	1	.004	1	0	1
332			min	-70.592	3	0	1	-30.379	5	0	1	-.035	5	0	1
333		15	max	527.112	1	0	1	3.707	1	0	1	.005	1	0	1
334			min	-70.543	3	0	1	-30.435	5	0	1	-.038	5	0	1
335		16	max	527.177	1	0	1	3.707	1	0	1	.005	1	0	1
336			min	-70.495	3	0	1	-30.491	5	0	1	-.04	5	0	1
337		17	max	527.241	1	0	1	3.707	1	0	1	.005	1	0	1
338			min	-70.446	3	0	1	-30.548	5	0	1	-.043	5	0	1
339		18	max	527.306	1	0	1	3.707	1	0	1	.006	1	0	1
340			min	-70.398	3	0	1	-30.604	5	0	1	-.046	5	0	1
341		19	max	527.371	1	0	1	3.707	1	0	1	.006	1	0	1
342			min	-70.349	3	0	1	-30.66	5	0	1	-.049	5	0	1
343	M1	1	max	130.459	1	345.226	3	-2.917	12	0	1	.143	1	.014	1
344			min	4.818	12	-374.1	1	-72.262	1	0	3	.006	12	-.011	3
345		2	max	130.555	1	345.029	3	-2.917	12	0	1	.127	1	.095	1
346			min	4.866	12	-374.363	1	-72.262	1	0	3	.006	12	-.086	3
347		3	max	110.168	1	7.025	9	-2.944	12	0	15	.11	1	.175	1
348			min	5.342	10	-21.474	3	-71.985	1	0	1	.005	12	-.159	3
349		4	max	110.263	1	6.806	9	-2.944	12	0	15	.094	1	.175	1
350			min	5.422	10	-21.67	3	-71.985	1	0	1	.004	12	-.154	3
351		5	max	110.359	1	6.587	9	-2.944	12	0	15	.079	1	.175	1
352			min	5.501	10	-21.867	3	-71.985	1	0	1	.004	12	-.15	3
353		6	max	110.454	1	6.369	9	-2.944	12	0	15	.063	1	.175	1
354			min	5.581	10	-22.064	3	-71.985	1	0	1	.003	12	-.145	3
355		7	max	110.55	1	6.15	9	-2.944	12	0	15	.048	1	.176	1
356			min	5.66	10	-22.261	3	-71.985	1	0	1	.002	12	-.14	3
357		8	max	110.645	1	5.931	9	-2.944	12	0	15	.032	1	.176	1
358			min	5.74	10	-22.458	3	-71.985	1	0	1	.002	12	-.135	3
359		9	max	110.741	1	5.713	9	-2.944	12	0	15	.016	1	.177	1
360			min	5.819	10	-22.654	3	-71.985	1	0	1	.001	12	-.13	3
361		10	max	110.836	1	5.494	9	-2.944	12	0	15	.003	4	.177	1
362			min	5.899	10	-22.851	3	-71.985	1	0	1	0	10	-.125	3
363		11	max	110.932	1	5.275	9	-2.944	12	0	15	0	12	.178	1
364			min	5.979	10	-23.048	3	-71.985	1	0	1	-.015	1	-.12	3
365		12	max	111.027	1	5.057	9	-2.944	12	0	15	0	12	.178	1
366			min	6.058	10	-23.245	3	-71.985	1	0	1	-.03	1	-.115	3
367		13	max	111.123	1	4.838	9	-2.944	12	0	15	-.001	12	.179	1
368			min	6.138	10	-23.442	3	-71.985	1	0	1	-.046	1	-.11	3
369		14	max	111.218	1	4.619	9	-2.944	12	0	15	-.002	12	.18	1
370			min	6.217	10	-23.638	3	-71.985	1	0	1	-.062	1	-.105	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	111.314	1	4.401	9	-2.944	12	0	15	-.003	12	.183	2
372			min	6.297	10	-23.835	3	-71.985	1	0	1	-.077	1	-.1	3
373		16	max	82.653	2	29.032	10	-2.978	12	0	1	-.003	12	.187	2
374			min	-31.322	3	-88.051	3	-72.586	1	0	5	-.094	1	-.094	3
375		17	max	82.748	2	28.813	10	-2.978	12	0	1	-.004	12	.197	1
376			min	-31.25	3	-88.248	3	-72.586	1	0	5	-.109	1	-.075	3
377		18	max	-4.445	12	423.966	1	-3.116	12	0	5	-.005	12	.107	1
378			min	-130.051	1	-155.852	3	-74.334	1	0	1	-.126	1	-.042	3
379		19	max	-4.397	12	423.704	1	-3.116	12	0	5	-.005	12	.015	1
380			min	-129.956	1	-156.048	3	-74.334	1	0	1	-.142	1	-.008	3
381	M5	1	max	287.955	1	1139.088	3	-.067	10	0	1	.047	4	.022	3
382			min	6.485	15	-1234.801	1	-29.812	3	0	5	0	10	-.028	1
383		2	max	288.051	1	1138.891	3	-.067	10	0	1	.041	4	.24	1
384			min	6.514	15	-1235.064	1	-29.812	3	0	5	-.003	3	-.225	3
385		3	max	220.713	1	8.766	9	3.391	3	0	3	.034	4	.503	1
386			min	5.069	15	-70.687	3	-25.505	4	0	4	-.009	3	-.467	3
387		4	max	220.809	1	8.547	9	3.391	3	0	3	.029	4	.507	1
388			min	5.098	15	-70.883	3	-25.263	4	0	4	-.008	3	-.452	3
389		5	max	220.904	1	8.328	9	3.391	3	0	3	.023	4	.512	1
390			min	5.127	15	-71.08	3	-25.021	4	0	4	-.008	3	-.437	3
391		6	max	221	1	8.11	9	3.391	3	0	3	.018	4	.517	1
392			min	5.156	15	-71.277	3	-24.779	4	0	4	-.007	3	-.421	3
393		7	max	221.095	1	7.891	9	3.391	3	0	3	.013	4	.521	1
394			min	5.185	15	-71.474	3	-24.537	4	0	4	-.006	3	-.406	3
395		8	max	221.191	1	7.672	9	3.391	3	0	3	.007	4	.526	1
396			min	5.213	15	-71.671	3	-24.295	4	0	4	-.005	3	-.39	3
397		9	max	221.286	1	7.454	9	3.391	3	0	3	.002	5	.531	1
398			min	5.242	15	-71.867	3	-24.053	4	0	4	-.005	3	-.375	3
399		10	max	221.382	1	7.235	9	3.391	3	0	3	0	10	.536	1
400			min	5.271	15	-72.064	3	-23.811	4	0	4	-.004	3	-.359	3
401		11	max	221.477	1	7.016	9	3.391	3	0	3	0	10	.54	1
402			min	5.3	15	-72.261	3	-23.569	4	0	4	-.008	4	-.343	3
403		12	max	221.573	1	6.798	9	3.391	3	0	3	0	10	.545	1
404			min	5.329	15	-72.458	3	-23.327	4	0	4	-.013	4	-.328	3
405		13	max	221.668	1	6.579	9	3.391	3	0	3	0	10	.55	1
406			min	5.357	15	-72.655	3	-23.085	4	0	4	-.018	4	-.312	3
407		14	max	221.764	1	6.36	9	3.391	3	0	3	0	10	.556	1
408			min	5.386	15	-72.851	3	-22.843	4	0	4	-.023	4	-.296	3
409		15	max	221.859	1	6.142	9	3.391	3	0	3	0	10	.561	1
410			min	5.415	15	-73.048	3	-22.601	4	0	4	-.028	4	-.28	3
411		16	max	294.178	2	175.309	2	3.365	3	0	1	0	3	.566	1
412			min	-102.649	3	-264.805	3	-21.406	4	0	4	-.033	4	-.263	3
413		17	max	294.274	2	175.047	2	3.365	3	0	1	0	3	.569	1
414			min	-102.577	3	-265.002	3	-21.164	4	0	4	-.038	4	-.205	3
415		18	max	-8.937	12	1393.921	1	3.093	3	0	4	.002	3	.272	1
416			min	-288.735	1	-511.63	3	-52.133	5	0	1	-.049	4	-.095	3
417		19	max	-8.889	12	1393.659	1	3.093	3	0	4	.002	3	.016	3
418			min	-288.639	1	-511.827	3	-51.891	5	0	1	-.06	4	-.03	1
419	M9	1	max	129.854	1	345.21	3	216.348	4	0	3	-.001	15	.014	1
420			min	2.401	15	-374.084	1	6.093	10	0	1	-.142	1	-.011	3
421		2	max	129.949	1	345.013	3	216.59	4	0	3	.042	5	.095	1
422			min	2.43	15	-374.346	1	6.093	10	0	1	-.122	1	-.086	3
423		3	max	110.141	1	6.999	9	68.024	1	0	1	.083	5	.175	1
424			min	2.244	15	-21.416	3	-33.191	5	0	12	-.1	1	-.159	3
425		4	max	110.236	1	6.78	9	68.024	1	0	1	.075	5	.175	1
426			min	2.273	15	-21.613	3	-32.949	5	0	12	-.085	1	-.154	3
427		5	max	110.332	1	6.561	9	68.024	1	0	1	.068	5	.175	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	2.302	15	-21.81	3	-32.707	5	0	12	-.07	1	-.15	3
429		6	max	110.427	1	6.343	9	68.024	1	0	1	.061	5	.175	1
430			min	2.331	15	-22.006	3	-32.465	5	0	12	-.056	1	-.145	3
431		7	max	110.523	1	6.124	9	68.024	1	0	1	.054	5	.176	1
432			min	2.36	15	-22.203	3	-32.223	5	0	12	-.041	1	-.14	3
433		8	max	110.618	1	5.905	9	68.024	1	0	1	.047	5	.176	1
434			min	2.388	15	-22.4	3	-31.981	5	0	12	-.026	1	-.135	3
435		9	max	110.714	1	5.687	9	68.024	1	0	1	.04	5	.177	1
436			min	2.417	15	-22.597	3	-31.739	5	0	12	-.011	1	-.13	3
437		10	max	110.809	1	5.468	9	68.024	1	0	1	.034	4	.177	1
438			min	2.446	15	-22.794	3	-31.497	5	0	12	0	2	-.125	3
439		11	max	110.905	1	5.249	9	68.024	1	0	1	.03	4	.178	1
440			min	2.475	15	-22.99	3	-31.255	5	0	12	.001	10	-.12	3
441		12	max	111	1	5.031	9	68.024	1	0	1	.033	1	.178	1
442			min	2.504	15	-23.187	3	-31.013	5	0	12	.003	10	-.115	3
443		13	max	111.096	1	4.812	9	68.024	1	0	1	.048	1	.179	1
444			min	2.533	15	-23.384	3	-30.771	5	0	12	.004	12	-.11	3
445		14	max	111.191	1	4.593	9	68.024	1	0	1	.062	1	.18	1
446			min	2.561	15	-23.581	3	-30.529	5	0	12	.004	12	-.105	3
447		15	max	111.287	1	4.375	9	68.024	1	0	1	.077	1	.183	2
448			min	2.59	15	-23.778	3	-30.287	5	0	12	0	15	-.1	3
449		16	max	82.905	2	28.679	10	68.76	1	0	10	.093	1	.187	2
450			min	-31.416	3	-88.458	3	-28.813	5	0	4	-.004	5	-.094	3
451		17	max	83	2	28.461	10	68.76	1	0	10	.108	1	.197	1
452			min	-31.344	3	-88.655	3	-28.571	5	0	4	-.011	5	-.075	3
453		18	max	2.976	5	423.967	1	72.436	1	0	1	.124	1	.107	1
454			min	-129.769	1	-155.85	3	-57.894	5	0	3	-.023	5	-.042	3
455		19	max	3.02	5	423.704	1	72.436	1	0	1	.14	1	.015	1
456			min	-129.673	1	-156.047	3	-57.652	5	0	3	-.036	5	-.008	3
457	M13	1	max	216.357	4	373.509	1	-2.401	15	.014	1	.142	1	0	1
458			min	6.094	10	-345.199	3	-129.839	1	-.011	3	.001	15	0	3
459		2	max	207.831	4	263.644	1	-1.386	15	.014	1	.043	1	.253	3
460			min	6.094	10	-243.57	3	-99.38	1	-.011	3	0	5	-.274	1
461		3	max	199.304	4	153.779	1	-.37	15	.014	1	.002	3	.419	3
462			min	6.094	10	-141.94	3	-68.92	1	-.011	3	-.029	1	-.454	1
463		4	max	190.778	4	43.914	1	.887	5	.014	1	0	12	.498	3
464			min	6.094	10	-40.311	3	-38.461	1	-.011	3	-.075	1	-.539	1
465		5	max	182.252	4	61.318	3	2.457	5	.014	1	0	15	.489	3
466			min	6.094	10	-65.951	1	-8.002	1	-.011	3	-.095	1	-.53	1
467		6	max	173.725	4	162.947	3	22.458	1	.014	1	.002	5	.392	3
468			min	6.094	10	-175.817	1	.252	12	-.011	3	-.089	1	-.426	1
469		7	max	165.199	4	264.577	3	52.917	1	.014	1	.006	5	.208	3
470			min	6.094	10	-285.682	1	1.242	12	-.011	3	-.057	1	-.227	1
471		8	max	156.672	4	366.206	3	83.377	1	.014	1	.012	4	.066	1
472			min	6.094	10	-395.547	1	2.232	12	-.011	3	0	3	-.063	3
473		9	max	148.146	4	467.835	3	113.836	1	.014	1	.087	1	.454	1
474			min	6.094	10	-505.412	1	3.223	12	-.011	3	.002	12	-.422	3
475		10	max	139.62	4	569.465	3	144.295	1	.012	2	.198	1	.937	1
476			min	6.094	10	-615.277	1	4.213	12	-.014	1	.006	12	-.869	3
477		11	max	102.113	4	505.412	1	1.658	5	.011	3	.083	1	.454	1
478			min	2.918	12	-467.835	3	-113.227	1	-.014	1	-.018	5	-.422	3
479		12	max	93.586	4	395.547	1	3.229	5	.011	3	.001	2	.066	1
480			min	2.918	12	-366.206	3	-82.768	1	-.014	1	-.016	4	-.063	3
481		13	max	85.06	4	285.682	1	4.799	5	.011	3	-.003	12	.208	3
482			min	2.918	12	-264.577	3	-52.308	1	-.014	1	-.059	1	-.227	1
483		14	max	76.534	4	175.817	1	6.369	5	.011	3	-.004	12	.392	3
484			min	2.918	12	-162.947	3	-21.849	1	-.014	1	-.091	1	-.426	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	72.49	1	65.951	1	9.801	4	.011	3	0	15	.489	3
486			min	2.918	12	-61.318	3	.419	10	-.014	1	-.097	1	-.53	1
487		16	max	72.49	1	40.311	3	39.07	1	.011	3	.006	5	.498	3
488			min	2.918	12	-43.914	1	1.847	12	-.014	1	-.076	1	-.539	1
489		17	max	72.49	1	141.94	3	69.529	1	.011	3	.015	5	.419	3
490			min	2.918	12	-153.779	1	2.837	12	-.014	1	-.03	1	-.454	1
491		18	max	72.49	1	243.57	3	99.989	1	.011	3	.043	1	.253	3
492			min	2.918	12	-263.644	1	3.828	12	-.014	1	.003	12	-.274	1
493		19	max	72.49	1	345.199	3	130.448	1	.011	3	.143	1	0	1
494			min	2.918	12	-373.509	1	4.818	12	-.014	1	.006	12	0	3
495	M16	1	max	57.643	5	424.316	1	3.02	5	.008	3	.14	1	0	1
496			min	-72.189	1	-156.067	3	-129.685	1	-.015	1	-.036	5	0	3
497		2	max	49.117	5	299.492	1	4.591	5	.008	3	.041	1	.115	3
498			min	-72.189	1	-110.285	3	-99.226	1	-.015	1	-.032	5	-.312	1
499		3	max	40.59	5	174.668	1	6.161	5	.008	3	0	12	.19	3
500			min	-72.189	1	-64.503	3	-68.766	1	-.015	1	-.034	4	-.516	1
501		4	max	32.064	5	49.844	1	7.731	5	.008	3	-.003	12	.226	3
502			min	-72.189	1	-18.721	3	-38.307	1	-.015	1	-.077	1	-.612	1
503		5	max	23.538	5	27.061	3	9.301	5	.008	3	-.004	12	.222	3
504			min	-72.189	1	-74.98	1	-7.847	1	-.015	1	-.097	1	-.602	1
505		6	max	15.011	5	72.843	3	22.612	1	.008	3	-.004	15	.179	3
506			min	-72.189	1	-199.804	1	.411	12	-.015	1	-.091	1	-.483	1
507		7	max	6.485	5	118.625	3	53.071	1	.008	3	.004	5	.097	3
508			min	-72.189	1	-324.628	1	1.401	12	-.015	1	-.058	1	-.258	1
509		8	max	-1.248	12	164.407	3	83.531	1	.008	3	.016	4	.076	1
510			min	-72.189	1	-449.452	1	2.391	12	-.015	1	-.002	3	-.025	3
511		9	max	-1.248	12	210.189	3	113.99	1	.008	3	.086	1	.517	1
512			min	-72.189	1	-574.276	1	3.382	12	-.015	1	.001	12	-.186	3
513		10	max	32.822	5	-15.614	15	144.45	1	.005	14	.197	1	1.065	1
514			min	-74.115	1	-699.1	1	-6.749	3	-.015	1	.006	12	-.387	3
515		11	max	24.296	5	574.276	1	1.632	5	.015	1	.086	1	.517	1
516			min	-74.115	1	-210.189	3	-113.707	1	-.008	3	-.016	5	-.186	3
517		12	max	15.769	5	449.452	1	3.202	5	.015	1	.001	2	.076	1
518			min	-74.115	1	-164.407	3	-83.248	1	-.008	3	-.014	4	-.025	3
519		13	max	7.243	5	324.628	1	4.772	5	.015	1	-.002	12	.097	3
520			min	-74.115	1	-118.625	3	-52.788	1	-.008	3	-.058	1	-.258	1
521		14	max	-.76	15	199.804	1	6.342	5	.015	1	-.003	12	.179	3
522			min	-74.115	1	-72.843	3	-22.329	1	-.008	3	-.09	1	-.483	1
523		15	max	-3.115	12	74.98	1	9.746	4	.015	1	0	5	.222	3
524			min	-74.115	1	-27.061	3	.42	10	-.008	3	-.096	1	-.602	1
525		16	max	-3.115	12	18.721	3	38.59	1	.015	1	.008	5	.226	3
526			min	-74.115	1	-49.844	1	1.425	12	-.008	3	-.076	1	-.612	1
527		17	max	-3.115	12	64.503	3	69.049	1	.015	1	.017	5	.19	3
528			min	-74.115	1	-174.668	1	2.416	12	-.008	3	-.03	1	-.516	1
529		18	max	-3.115	12	110.285	3	99.509	1	.015	1	.043	1	.115	3
530			min	-74.115	1	-299.492	1	3.406	12	-.008	3	.002	12	-.312	1
531		19	max	-3.115	12	156.067	3	129.968	1	.015	1	.142	1	0	1
532			min	-74.115	1	-424.316	1	4.397	12	-.008	3	.005	12	0	5
533	M15	1	max	0	2	2.104	1	.029	3	0	1	0	1	0	1
534			min	-34.946	3	0	2	-.034	1	0	3	0	3	0	1
535		2	max	0	2	1.87	1	.029	3	0	1	0	1	0	2
536			min	-35.006	3	0	2	-.034	1	0	3	0	3	0	1
537		3	max	0	2	1.636	1	.029	3	0	1	0	1	0	2
538			min	-35.066	3	0	2	-.034	1	0	3	0	3	-.002	1
539		4	max	0	2	1.402	1	.029	3	0	1	0	1	0	2
540			min	-35.125	3	0	2	-.034	1	0	3	0	3	-.002	1
541		5	max	0	2	1.169	1	.029	3	0	1	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
542			min	-35.185	3	0	2	-.034	1	0	3	0	3	-.003	1
543		6	max	0	2	.935	1	.029	3	0	1	0	1	0	2
544			min	-35.245	3	0	2	-.034	1	0	3	0	3	-.003	1
545		7	max	0	2	.701	1	.029	3	0	1	0	3	0	2
546			min	-35.304	3	0	2	-.034	1	0	3	0	1	-.004	1
547		8	max	0	2	.467	1	.029	3	0	1	0	3	0	2
548			min	-35.364	3	0	2	-.034	1	0	3	0	1	-.004	1
549		9	max	0	2	.234	1	.029	3	0	1	0	3	0	2
550			min	-35.424	3	0	2	-.034	1	0	3	0	1	-.004	1
551		10	max	0	2	0	1	.029	3	0	1	0	3	0	2
552			min	-35.483	3	0	1	-.034	1	0	3	0	1	-.004	1
553		11	max	0	2	0	2	.029	3	0	1	0	3	0	2
554			min	-35.543	3	-.234	1	-.034	1	0	3	0	1	-.004	1
555		12	max	0	2	0	2	.029	3	0	1	0	3	0	2
556			min	-35.603	3	-.467	1	-.034	1	0	3	0	1	-.004	1
557		13	max	0	2	0	2	.029	3	0	1	0	3	0	2
558			min	-35.662	3	-.701	1	-.034	1	0	3	0	1	-.004	1
559		14	max	0	2	0	2	.029	3	0	1	0	3	0	2
560			min	-35.722	3	-.935	1	-.034	1	0	3	0	1	-.003	1
561		15	max	0	2	0	2	.029	3	0	1	0	3	0	2
562			min	-35.782	3	-1.169	1	-.034	1	0	3	0	1	-.003	1
563		16	max	0	2	0	2	.029	3	0	1	0	3	0	2
564			min	-35.841	3	-1.402	1	-.034	1	0	3	0	1	-.002	1
565		17	max	0	2	0	2	.029	3	0	1	0	3	0	2
566			min	-35.901	3	-1.636	1	-.034	1	0	3	0	1	-.002	1
567		18	max	0	2	0	2	.029	3	0	1	0	3	0	2
568			min	-35.961	3	-1.87	1	-.034	1	0	3	0	1	0	1
569		19	max	0	2	0	2	.029	3	0	1	0	3	0	1
570			min	-36.02	3	-2.104	1	-.034	1	0	3	0	1	0	1
571	M16A	1	max	-.797	10	3.317	4	.228	4	0	3	0	3	0	1
572			min	-253.248	4	1.05	15	-.012	3	0	1	0	4	0	1
573		2	max	-.731	10	2.948	4	.206	4	0	3	0	3	0	15
574			min	-253.348	4	.933	15	-.012	3	0	1	0	4	-.001	4
575		3	max	-.665	10	2.58	4	.184	4	0	3	0	3	0	15
576			min	-253.447	4	.817	15	-.012	3	0	1	0	4	-.003	4
577		4	max	-.598	10	2.211	4	.162	4	0	3	0	3	-.001	15
578			min	-253.546	4	.7	15	-.012	3	0	1	0	4	-.004	4
579		5	max	-.532	10	1.843	4	.14	4	0	3	0	3	-.001	15
580			min	-253.646	4	.583	15	-.012	3	0	1	0	1	-.005	4
581		6	max	-.466	10	1.474	4	.118	4	0	3	0	3	-.002	15
582			min	-253.745	4	.467	15	-.012	3	0	1	0	1	-.005	4
583		7	max	-.4	10	1.106	4	.096	4	0	3	0	5	-.002	15
584			min	-253.845	4	.35	15	-.012	3	0	1	0	1	-.006	4
585		8	max	-.333	10	.737	4	.074	4	0	3	0	5	-.002	15
586			min	-253.944	4	.233	15	-.012	3	0	1	0	1	-.006	4
587		9	max	-.267	10	.369	4	.052	4	0	3	0	5	-.002	15
588			min	-254.043	4	.117	15	-.012	3	0	1	0	1	-.007	4
589		10	max	-.201	10	0	1	.03	4	0	3	0	5	-.002	15
590			min	-254.143	4	0	1	-.012	3	0	1	0	1	-.007	4
591		11	max	-.134	10	-.117	15	.022	1	0	3	0	5	-.002	15
592			min	-254.242	4	-.369	4	-.012	3	0	1	0	1	-.007	4
593		12	max	-.068	10	-.233	15	.022	1	0	3	0	5	-.002	15
594			min	-254.342	4	-.737	4	-.018	5	0	1	0	1	-.006	4
595		13	max	-.002	10	-.35	15	.022	1	0	3	0	5	-.002	15
596			min	-254.441	4	-1.106	4	-.04	5	0	1	0	3	-.006	4
597		14	max	.065	10	-.467	15	.022	1	0	3	0	4	-.002	15
598			min	-254.54	4	-1.474	4	-.062	5	0	1	0	3	-.005	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
599		15	max	.131	10	-.583	15	.022	1	0	3	0	4	-.001	15
600			min	-254.64	4	-1.843	4	-.084	5	0	1	0	3	-.005	4
601		16	max	.197	10	-.7	15	.022	1	0	3	0	4	-.001	15
602			min	-254.739	4	-2.211	4	-.106	5	0	1	0	3	-.004	4
603		17	max	.263	10	-.817	15	.022	1	0	3	0	1	0	15
604			min	-254.839	4	-2.58	4	-.128	5	0	1	0	3	-.003	4
605		18	max	.33	10	-.933	15	.022	1	0	3	0	1	0	15
606			min	-254.938	4	-2.948	4	-.15	5	0	1	0	5	-.001	4
607		19	max	.396	10	-1.05	15	.022	1	0	3	0	1	0	1
608			min	-255.037	4	-3.317	4	-.172	5	0	1	0	5	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.003	1	.008	2	.014	1	1.821e-3	5	NC	3	NC	3
2			min	-.003	3	-.007	3	-.018	5	-1.086e-3	1	4394.829	2	2424.162	1
3		2	max	.003	1	.007	2	.013	1	1.847e-3	5	NC	3	NC	3
4			min	-.003	3	-.006	3	-.017	5	-1.042e-3	1	4763.78	2	2623.705	1
5		3	max	.003	1	.006	2	.012	1	1.873e-3	5	NC	3	NC	3
6			min	-.003	3	-.006	3	-.017	5	-9.976e-4	1	5197.02	2	2858.688	1
7		4	max	.003	1	.006	2	.011	1	1.899e-3	5	NC	3	NC	3
8			min	-.002	3	-.006	3	-.016	5	-9.532e-4	1	5709.119	2	3137.713	1
9		5	max	.002	1	.005	2	.01	1	1.925e-3	5	NC	3	NC	3
10			min	-.002	3	-.005	3	-.015	5	-9.088e-4	1	6319.237	2	3472.264	1
11		6	max	.002	1	.005	2	.009	1	1.952e-3	5	NC	1	NC	3
12			min	-.002	3	-.005	3	-.014	5	-8.645e-4	1	7052.973	2	3877.947	1
13		7	max	.002	1	.004	2	.008	1	1.978e-3	5	NC	1	NC	2
14			min	-.002	3	-.005	3	-.013	5	-8.201e-4	1	7945.163	2	4376.419	1
15		8	max	.002	1	.004	2	.007	1	2.004e-3	5	NC	1	NC	2
16			min	-.002	3	-.005	3	-.012	5	-7.757e-4	1	9044.26	2	4998.461	1
17		9	max	.002	1	.003	2	.006	1	2.03e-3	5	NC	1	NC	2
18			min	-.002	3	-.004	3	-.011	5	-7.313e-4	1	NC	1	5789.062	1
19		10	max	.002	1	.003	2	.005	1	2.056e-3	5	NC	1	NC	2
20			min	-.001	3	-.004	3	-.01	5	-6.87e-4	1	NC	1	6816.191	1
21		11	max	.001	1	.002	2	.004	1	2.083e-3	5	NC	1	NC	2
22			min	-.001	3	-.004	3	-.009	5	-6.426e-4	1	NC	1	8186.671	1
23		12	max	.001	1	.002	2	.003	1	2.109e-3	5	NC	1	NC	1
24			min	-.001	3	-.003	3	-.008	5	-5.982e-4	1	NC	1	NC	1
25		13	max	.001	1	.002	2	.003	1	2.135e-3	5	NC	1	NC	1
26			min	0	3	-.003	3	-.007	5	-5.539e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	2.161e-3	5	NC	1	NC	1
28			min	0	3	-.002	3	-.006	5	-5.095e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.001	1	2.187e-3	5	NC	1	NC	1
30			min	0	3	-.002	3	-.005	5	-4.651e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	2.214e-3	5	NC	1	NC	1
32			min	0	3	-.002	3	-.004	5	-4.207e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	2.24e-3	5	NC	1	NC	1
34			min	0	3	-.001	3	-.003	5	-3.764e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	2.266e-3	5	NC	1	NC	1
36			min	0	3	0	3	-.001	5	-3.32e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	2.292e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-2.876e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.322e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	-1.054e-3	5	NC	1	NC	1
41		2	max	0	9	0	2	.006	5	1.663e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	-1.061e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
43		3	max	0	9	0	2	.011	5	2.003e-4	1	NC	1	NC	1
44			min	0	2	-.002	3	0	1	-1.068e-3	5	NC	1	8832.316	14
45		4	max	0	9	0	2	.017	5	2.344e-4	1	NC	1	NC	1
46			min	0	2	-.002	3	-.001	1	-1.074e-3	5	NC	1	5769.916	14
47		5	max	0	9	0	2	.022	5	2.685e-4	1	NC	1	NC	1
48			min	0	2	-.003	3	-.001	1	-1.081e-3	5	NC	1	4252.029	14
49		6	max	0	9	0	2	.028	4	3.026e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	-.001	1	-1.088e-3	5	NC	1	3350.542	14
51		7	max	0	9	.001	2	.034	4	3.367e-4	1	NC	1	NC	1
52			min	0	2	-.004	3	0	1	-1.095e-3	5	NC	1	2756.28	14
53		8	max	0	9	.001	2	.039	4	3.708e-4	1	NC	1	NC	1
54			min	0	2	-.005	3	0	1	-1.102e-3	5	NC	1	2336.871	14
55		9	max	0	9	.002	2	.045	4	4.048e-4	1	NC	1	NC	1
56			min	0	2	-.006	3	0	1	-1.109e-3	5	NC	1	2026.22	14
57		10	max	0	9	.002	2	.05	4	4.389e-4	1	NC	1	NC	1
58			min	0	2	-.006	3	0	10	-1.115e-3	5	NC	1	1787.669	14
59		11	max	0	9	.003	2	.056	4	4.73e-4	1	NC	1	NC	1
60			min	0	2	-.007	3	0	10	-1.122e-3	5	NC	1	1599.268	14
61		12	max	0	9	.003	2	.061	4	5.071e-4	1	NC	1	NC	1
62			min	0	2	-.007	3	0	12	-1.129e-3	5	NC	1	1447.081	14
63		13	max	0	9	.004	2	.066	4	5.412e-4	1	NC	1	NC	1
64			min	0	2	-.007	3	0	12	-1.136e-3	5	NC	1	1321.839	14
65		14	max	0	9	.005	2	.072	4	5.753e-4	1	NC	1	NC	1
66			min	0	2	-.007	3	0	12	-1.143e-3	5	9570.672	2	1217.142	14
67		15	max	0	9	.006	2	.077	4	6.093e-4	1	NC	3	NC	1
68			min	0	2	-.008	3	0	12	-1.15e-3	5	8086.666	2	1128.428	14
69		16	max	0	9	.007	2	.082	4	6.434e-4	1	NC	3	NC	2
70			min	0	2	-.008	3	0	12	-1.156e-3	5	6928.368	2	1052.36	14
71		17	max	0	9	.008	2	.087	4	6.775e-4	1	NC	3	NC	2
72			min	0	2	-.008	3	0	12	-1.163e-3	5	6015.812	2	986.439	14
73		18	max	.001	9	.009	2	.092	4	7.116e-4	1	NC	3	NC	2
74			min	0	2	-.008	3	0	12	-1.17e-3	5	5291.002	2	928.76	14
75		19	max	.001	9	.01	2	.097	4	7.457e-4	1	NC	3	NC	2
76			min	0	2	-.008	3	0	12	-1.177e-3	5	4711.647	2	877.838	14
77	M4	1	max	.003	1	.009	2	0	12	5.001e-3	5	NC	1	NC	2
78			min	0	3	-.007	3	-.103	4	-9.085e-4	1	NC	1	187.768	4
79		2	max	.002	1	.008	2	0	12	5.001e-3	5	NC	1	NC	2
80			min	0	3	-.006	3	-.094	4	-9.085e-4	1	NC	1	204.695	4
81		3	max	.002	1	.008	2	0	12	5.001e-3	5	NC	1	NC	2
82			min	0	3	-.006	3	-.086	4	-9.085e-4	1	NC	1	224.843	4
83		4	max	.002	1	.007	2	0	12	5.001e-3	5	NC	1	NC	2
84			min	0	3	-.006	3	-.078	4	-9.085e-4	1	NC	1	249.059	4
85		5	max	.002	1	.007	2	0	12	5.001e-3	5	NC	1	NC	2
86			min	0	3	-.005	3	-.069	4	-9.085e-4	1	NC	1	278.501	4
87		6	max	.002	1	.006	2	0	12	5.001e-3	5	NC	1	NC	2
88			min	0	3	-.005	3	-.061	4	-9.085e-4	1	NC	1	314.774	4
89		7	max	.002	1	.006	2	0	12	5.001e-3	5	NC	1	NC	2
90			min	0	3	-.005	3	-.054	4	-9.085e-4	1	NC	1	360.168	4
91		8	max	.002	1	.005	2	0	12	5.001e-3	5	NC	1	NC	2
92			min	0	3	-.004	3	-.046	4	-9.085e-4	1	NC	1	418.034	4
93		9	max	.001	1	.005	2	0	12	5.001e-3	5	NC	1	NC	2
94			min	0	3	-.004	3	-.039	4	-9.085e-4	1	NC	1	493.443	4
95		10	max	.001	1	.004	2	0	12	5.001e-3	5	NC	1	NC	1
96			min	0	3	-.003	3	-.033	4	-9.085e-4	1	NC	1	594.363	4
97		11	max	.001	1	.004	2	0	12	5.001e-3	5	NC	1	NC	1
98			min	0	3	-.003	3	-.026	4	-9.085e-4	1	NC	1	733.92	4
99		12	max	0	1	.003	2	0	12	5.001e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
100			min	0	3	-.003	3	-.021	4	-9.085e-4	1	NC	1	935.008	4
101		13	max	0	1	.003	2	0	12	5.001e-3	5	NC	1	NC	1
102			min	0	3	-.002	3	-.016	4	-9.085e-4	1	NC	1	1240.575	4
103		14	max	0	1	.002	2	0	12	5.001e-3	5	NC	1	NC	1
104			min	0	3	-.002	3	-.011	4	-9.085e-4	1	NC	1	1739.203	4
105		15	max	0	1	.002	2	0	12	5.001e-3	5	NC	1	NC	1
106			min	0	3	-.002	3	-.007	4	-9.085e-4	1	NC	1	2639.014	4
107		16	max	0	1	.001	2	0	12	5.001e-3	5	NC	1	NC	1
108			min	0	3	-.001	3	-.004	4	-9.085e-4	1	NC	1	4531.65	4
109		17	max	0	1	0	2	0	12	5.001e-3	5	NC	1	NC	1
110			min	0	3	0	3	-.002	4	-9.085e-4	1	NC	1	9714.944	4
111		18	max	0	1	0	2	0	12	5.001e-3	5	NC	1	NC	1
112			min	0	3	0	3	0	4	-9.085e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	5.001e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-9.085e-4	1	NC	1	NC	1
115	M6	1	max	.01	1	.024	2	.004	1	2.005e-3	4	NC	3	NC	2
116			min	-.01	3	-.019	3	-.018	5	2.554e-6	10	1372.28	2	7794.929	1
117		2	max	.009	1	.023	2	.004	1	2.027e-3	4	NC	3	NC	2
118			min	-.009	3	-.018	3	-.017	5	1.846e-6	10	1465.013	2	8452.291	1
119		3	max	.009	1	.021	2	.004	1	2.049e-3	4	NC	3	NC	2
120			min	-.009	3	-.017	3	-.017	5	1.137e-6	10	1570.853	2	9231.51	1
121		4	max	.008	1	.02	2	.003	1	2.071e-3	4	NC	3	NC	1
122			min	-.008	3	-.016	3	-.016	5	4.291e-7	10	1692.419	2	NC	1
123		5	max	.008	1	.018	2	.003	1	2.093e-3	4	NC	3	NC	1
124			min	-.008	3	-.015	3	-.015	5	-2.792e-7	10	1833.084	2	NC	1
125		6	max	.007	1	.017	2	.003	1	2.115e-3	4	NC	3	NC	1
126			min	-.007	3	-.014	3	-.014	5	-9.874e-7	10	1997.264	2	NC	1
127		7	max	.007	1	.015	2	.002	1	2.137e-3	4	NC	3	NC	1
128			min	-.007	3	-.013	3	-.013	5	-3.539e-6	2	2190.85	2	NC	1
129		8	max	.006	1	.014	2	.002	1	2.159e-3	4	NC	3	NC	1
130			min	-.006	3	-.012	3	-.013	5	-7.177e-6	2	2421.88	2	NC	1
131		9	max	.006	1	.012	2	.002	1	2.181e-3	4	NC	3	NC	1
132			min	-.005	3	-.011	3	-.012	5	-1.082e-5	2	2701.608	2	NC	1
133		10	max	.005	1	.011	2	.001	1	2.203e-3	4	NC	3	NC	1
134			min	-.005	3	-.01	3	-.011	5	-1.445e-5	2	3046.296	2	NC	1
135		11	max	.004	1	.01	2	.001	1	2.225e-3	4	NC	3	NC	1
136			min	-.004	3	-.009	3	-.01	5	-1.809e-5	2	3480.333	2	NC	1
137		12	max	.004	1	.008	2	0	1	2.248e-3	4	NC	3	NC	1
138			min	-.004	3	-.008	3	-.009	5	-2.173e-5	2	4042.049	2	NC	1
139		13	max	.003	1	.007	2	0	1	2.27e-3	4	NC	3	NC	1
140			min	-.003	3	-.007	3	-.007	5	-2.537e-5	2	4795.323	2	NC	1
141		14	max	.003	1	.006	2	0	1	2.292e-3	4	NC	3	NC	1
142			min	-.003	3	-.006	3	-.006	5	-2.901e-5	2	5855.131	2	NC	1
143		15	max	.002	1	.004	2	0	1	2.314e-3	4	NC	3	NC	1
144			min	-.002	3	-.005	3	-.005	5	-3.265e-5	2	7451.412	2	NC	1
145		16	max	.002	1	.003	2	0	1	2.336e-3	4	NC	1	NC	1
146			min	-.002	3	-.003	3	-.004	5	-3.629e-5	2	NC	1	NC	1
147		17	max	.001	1	.002	2	0	1	2.358e-3	4	NC	1	NC	1
148			min	-.001	3	-.002	3	-.003	5	-3.993e-5	2	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	2.38e-3	4	NC	1	NC	1
150			min	0	3	-.001	3	-.001	5	-4.356e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	2.402e-3	4	NC	1	NC	1
152			min	0	1	0	1	0	1	-4.72e-5	2	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.146e-5	2	NC	1	NC	1
154			min	0	1	0	1	0	1	-1.104e-3	4	NC	1	NC	1
155		2	max	0	3	.001	2	.006	4	1.933e-5	1	NC	1	NC	1
156			min	0	2	-.002	3	0	1	-1.093e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
157		3	max	0	3	.003	2	.012	4	1.836e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	1	-1.082e-3	4	NC	1	NC	1
159		4	max	0	3	.004	2	.018	4	1.738e-5	1	NC	1	NC	1
160			min	0	2	-.005	3	0	1	-1.071e-3	4	NC	1	NC	1
161		5	max	0	3	.005	2	.023	4	1.64e-5	1	NC	3	NC	1
162			min	0	2	-.006	3	0	1	-1.059e-3	4	8607.816	2	NC	1
163		6	max	0	3	.007	2	.029	4	1.542e-5	1	NC	3	NC	1
164			min	-.001	2	-.008	3	0	1	-1.048e-3	4	6898.406	2	NC	1
165		7	max	.001	3	.008	2	.035	4	2.226e-5	3	NC	3	NC	1
166			min	-.001	2	-.009	3	0	1	-1.037e-3	4	5729.571	2	NC	1
167		8	max	.001	3	.009	2	.041	4	3.372e-5	3	NC	3	NC	1
168			min	-.001	2	-.011	3	0	1	-1.026e-3	4	4872.834	2	NC	1
169		9	max	.001	3	.011	2	.046	4	4.519e-5	3	NC	3	NC	1
170			min	-.002	2	-.012	3	0	1	-1.014e-3	4	4214.353	2	NC	1
171		10	max	.002	3	.012	2	.052	4	5.665e-5	3	NC	3	NC	1
172			min	-.002	2	-.013	3	-.001	1	-1.003e-3	4	3691.025	2	NC	1
173		11	max	.002	3	.014	2	.057	4	6.812e-5	3	NC	3	NC	1
174			min	-.002	2	-.015	3	-.001	1	-9.92e-4	4	3264.953	2	NC	1
175		12	max	.002	3	.016	2	.063	4	7.958e-5	3	NC	3	NC	1
176			min	-.002	2	-.016	3	-.001	1	-9.807e-4	4	2911.88	2	NC	1
177		13	max	.002	3	.018	2	.068	4	9.105e-5	3	NC	3	NC	1
178			min	-.002	2	-.017	3	-.002	1	-9.695e-4	4	2615.442	2	NC	1
179		14	max	.002	3	.019	2	.073	4	1.025e-4	3	NC	3	NC	1
180			min	-.003	2	-.018	3	-.002	1	-9.583e-4	4	2364.1	2	NC	1
181		15	max	.002	3	.021	2	.079	4	1.14e-4	3	NC	3	NC	1
182			min	-.003	2	-.019	3	-.002	1	-9.47e-4	4	2149.415	2	NC	1
183		16	max	.003	3	.023	2	.084	4	1.254e-4	3	NC	3	NC	1
184			min	-.003	2	-.019	3	-.002	1	-9.358e-4	4	1965.021	2	NC	1
185		17	max	.003	3	.025	2	.089	4	1.369e-4	3	NC	3	NC	1
186			min	-.003	2	-.02	3	-.002	1	-9.246e-4	4	1805.997	2	NC	1
187		18	max	.003	3	.028	2	.094	4	1.484e-4	3	NC	3	NC	1
188			min	-.004	2	-.021	3	-.002	1	-9.133e-4	4	1668.466	2	NC	1
189		19	max	.003	3	.03	2	.098	4	1.598e-4	3	NC	3	NC	1
190			min	-.004	2	-.022	3	-.002	1	-9.021e-4	4	1549.328	2	NC	1
191	M8	1	max	.007	1	.028	2	.002	1	4.762e-3	4	NC	1	NC	2
192			min	-.001	3	-.019	3	-.104	4	-1.256e-4	3	NC	1	186.466	4
193		2	max	.007	1	.026	2	.002	1	4.762e-3	4	NC	1	NC	2
194			min	-.001	3	-.018	3	-.095	4	-1.256e-4	3	NC	1	203.275	4
195		3	max	.006	1	.025	2	.002	1	4.762e-3	4	NC	1	NC	2
196			min	-.001	3	-.017	3	-.087	4	-1.256e-4	3	NC	1	223.283	4
197		4	max	.006	1	.023	2	.002	1	4.762e-3	4	NC	1	NC	1
198			min	-.001	3	-.016	3	-.078	4	-1.256e-4	3	NC	1	247.331	4
199		5	max	.006	1	.022	2	.002	1	4.762e-3	4	NC	1	NC	1
200			min	0	3	-.015	3	-.07	4	-1.256e-4	3	NC	1	276.568	4
201		6	max	.005	1	.02	2	.001	1	4.762e-3	4	NC	1	NC	1
202			min	0	3	-.014	3	-.062	4	-1.256e-4	3	NC	1	312.589	4
203		7	max	.005	1	.018	2	.001	1	4.762e-3	4	NC	1	NC	1
204			min	0	3	-.013	3	-.054	4	-1.256e-4	3	NC	1	357.667	4
205		8	max	.004	1	.017	2	.001	1	4.762e-3	4	NC	1	NC	1
206			min	0	3	-.012	3	-.047	4	-1.256e-4	3	NC	1	415.132	4
207		9	max	.004	1	.015	2	0	1	4.762e-3	4	NC	1	NC	1
208			min	0	3	-.011	3	-.039	4	-1.256e-4	3	NC	1	490.016	4
209		10	max	.004	1	.014	2	0	1	4.762e-3	4	NC	1	NC	1
210			min	0	3	-.01	3	-.033	4	-1.256e-4	3	NC	1	590.235	4
211		11	max	.003	1	.012	2	0	1	4.762e-3	4	NC	1	NC	1
212			min	0	3	-.009	3	-.027	4	-1.256e-4	3	NC	1	728.822	4
213		12	max	.003	1	.011	2	0	1	4.762e-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	-.007	3	-.021	4	-1.256e-4	3	NC	1	928.513	4
215		13	max	.002	1	.009	2	0	1	4.762e-3	4	NC	1	NC	1
216			min	0	3	-.006	3	-.016	4	-1.256e-4	3	NC	1	1231.956	4
217		14	max	.002	1	.008	2	0	1	4.762e-3	4	NC	1	NC	1
218			min	0	3	-.005	3	-.011	4	-1.256e-4	3	NC	1	1727.121	4
219		15	max	.002	1	.006	2	0	1	4.762e-3	4	NC	1	NC	1
220			min	0	3	-.004	3	-.007	4	-1.256e-4	3	NC	1	2620.679	4
221		16	max	.001	1	.005	2	0	1	4.762e-3	4	NC	1	NC	1
222			min	0	3	-.003	3	-.004	4	-1.256e-4	3	NC	1	4500.165	4
223		17	max	0	1	.003	2	0	1	4.762e-3	4	NC	1	NC	1
224			min	0	3	-.002	3	-.002	4	-1.256e-4	3	NC	1	9647.438	4
225		18	max	0	1	.002	2	0	1	4.762e-3	4	NC	1	NC	1
226			min	0	3	-.001	3	0	4	-1.256e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	4.762e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.256e-4	3	NC	1	NC	1
229	M10	1	max	.003	1	.008	2	0	3	9.488e-4	1	NC	3	NC	1
230			min	-.003	3	-.007	3	-.008	4	-2.053e-4	3	4400.19	2	NC	1
231		2	max	.003	1	.007	2	0	3	8.999e-4	1	NC	3	NC	1
232			min	-.003	3	-.006	3	-.007	4	-1.995e-4	3	4769.706	2	NC	1
233		3	max	.003	1	.006	2	0	3	8.509e-4	1	NC	3	NC	1
234			min	-.003	3	-.006	3	-.007	4	-1.937e-4	3	5203.63	2	NC	1
235		4	max	.003	1	.006	2	0	3	8.02e-4	1	NC	3	NC	1
236			min	-.002	3	-.006	3	-.007	4	-1.879e-4	3	5716.562	2	NC	1
237		5	max	.002	1	.005	2	0	3	8.311e-4	4	NC	3	NC	1
238			min	-.002	3	-.006	3	-.007	4	-1.821e-4	3	6327.705	2	NC	1
239		6	max	.002	1	.005	2	0	3	8.988e-4	4	NC	1	NC	1
240			min	-.002	3	-.005	3	-.007	4	-1.763e-4	3	7062.713	2	NC	1
241		7	max	.002	1	.004	2	0	3	9.664e-4	4	NC	1	NC	1
242			min	-.002	3	-.005	3	-.007	4	-1.705e-4	3	7956.505	2	NC	1
243		8	max	.002	1	.004	2	0	3	1.034e-3	4	NC	1	NC	1
244			min	-.002	3	-.005	3	-.007	4	-1.647e-4	3	9057.645	2	NC	1
245		9	max	.002	1	.003	2	0	3	1.102e-3	4	NC	1	NC	1
246			min	-.002	3	-.004	3	-.006	4	-1.59e-4	3	NC	1	NC	1
247		10	max	.002	1	.003	2	0	3	1.169e-3	4	NC	1	NC	1
248			min	-.001	3	-.004	3	-.006	4	-1.532e-4	3	NC	1	NC	1
249		11	max	.001	1	.002	2	0	3	1.237e-3	4	NC	1	NC	1
250			min	-.001	3	-.004	3	-.006	4	-1.474e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	1.304e-3	4	NC	1	NC	1
252			min	-.001	3	-.003	3	-.005	4	-1.416e-4	3	NC	1	NC	1
253		13	max	.001	1	.002	2	0	3	1.372e-3	4	NC	1	NC	1
254			min	0	3	-.003	3	-.005	4	-1.358e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	1.44e-3	4	NC	1	NC	1
256			min	0	3	-.002	3	-.004	4	-1.3e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	1.507e-3	4	NC	1	NC	1
258			min	0	3	-.002	3	-.003	4	-1.242e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.575e-3	4	NC	1	NC	1
260			min	0	3	-.002	3	-.003	4	-1.184e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.643e-3	4	NC	1	NC	1
262			min	0	3	-.001	3	-.002	4	-1.126e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.71e-3	4	NC	1	NC	1
264			min	0	3	0	3	0	4	-1.069e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.778e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.011e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	4.65e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-8.186e-4	4	NC	1	NC	1
269		2	max	0	9	0	2	.004	4	3.327e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-9.188e-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	.009	4	2.003e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.019e-3	4	NC	1	5295.59	4
273		4	max	0	9	0	2	.013	4	6.8e-6	3	NC	1	NC	1
274			min	0	2	-.002	3	0	3	-1.119e-3	4	NC	1	3503.197	4
275		5	max	0	9	0	2	.018	4	-4.778e-6	12	NC	1	NC	1
276			min	0	2	-.003	3	0	1	-1.219e-3	4	NC	1	2610.332	4
277		6	max	0	9	0	2	.022	4	-1.292e-5	12	NC	1	NC	1
278			min	0	2	-.004	3	-.001	1	-1.32e-3	4	NC	1	2076.841	4
279		7	max	0	9	.001	2	.027	5	-2.107e-5	12	NC	1	NC	1
280			min	0	2	-.005	3	-.002	1	-1.42e-3	4	NC	1	1717.753	5
281		8	max	0	9	.001	2	.031	5	-2.921e-5	12	NC	1	NC	1
282			min	0	2	-.005	3	-.003	1	-1.52e-3	4	NC	1	1462.244	5
283		9	max	0	9	.002	2	.036	5	-3.736e-5	12	NC	1	NC	1
284			min	0	2	-.006	3	-.004	1	-1.62e-3	4	NC	1	1271.676	5
285		10	max	0	9	.002	2	.041	5	-4.267e-5	10	NC	1	NC	2
286			min	0	2	-.006	3	-.005	1	-1.72e-3	4	NC	1	1124.19	5
287		11	max	0	9	.003	2	.046	5	-4.684e-5	10	NC	1	NC	2
288			min	0	2	-.007	3	-.006	1	-1.821e-3	4	NC	1	1006.682	5
289		12	max	0	9	.003	2	.051	5	-5.1e-5	10	NC	1	NC	2
290			min	0	2	-.007	3	-.007	1	-1.921e-3	4	NC	1	910.821	5
291		13	max	0	9	.004	2	.055	5	-5.516e-5	10	NC	1	NC	2
292			min	0	2	-.007	3	-.008	1	-2.021e-3	4	NC	1	831.058	5
293		14	max	0	9	.005	2	.06	5	-5.933e-5	10	NC	1	NC	2
294			min	0	2	-.007	3	-.009	1	-2.121e-3	4	9583.857	2	763.557	5
295		15	max	0	9	.006	2	.065	5	-6.349e-5	10	NC	3	NC	2
296			min	0	2	-.008	3	-.01	1	-2.221e-3	4	8096.695	2	705.581	5
297		16	max	0	9	.007	2	.07	5	-6.766e-5	10	NC	3	NC	2
298			min	0	2	-.008	3	-.011	1	-2.322e-3	4	6936.177	2	655.128	5
299		17	max	0	9	.008	2	.075	5	-7.182e-5	10	NC	3	NC	2
300			min	0	2	-.008	3	-.012	1	-2.422e-3	4	6022.033	2	610.7	5
301		18	max	.001	9	.009	2	.081	5	-7.599e-5	10	NC	3	NC	3
302			min	0	2	-.008	3	-.013	1	-2.522e-3	4	5296.071	2	571.157	5
303		19	max	.001	9	.01	2	.086	5	-8.015e-5	10	NC	3	NC	3
304			min	0	2	-.008	3	-.014	1	-2.622e-3	4	4715.871	2	535.615	5
305	M12	1	max	.003	1	.009	2	.012	1	6.244e-3	4	NC	1	NC	3
306			min	0	3	-.007	3	-.095	5	7.348e-5	10	NC	1	203.995	5
307		2	max	.002	1	.008	2	.011	1	6.244e-3	4	NC	1	NC	3
308			min	0	3	-.006	3	-.087	5	7.348e-5	10	NC	1	222.38	5
309		3	max	.002	1	.008	2	.01	1	6.244e-3	4	NC	1	NC	3
310			min	0	3	-.006	3	-.079	5	7.348e-5	10	NC	1	244.264	5
311		4	max	.002	1	.007	2	.009	1	6.244e-3	4	NC	1	NC	3
312			min	0	3	-.006	3	-.071	5	7.348e-5	10	NC	1	270.567	5
313		5	max	.002	1	.007	2	.008	1	6.244e-3	4	NC	1	NC	3
314			min	0	3	-.005	3	-.064	5	7.348e-5	10	NC	1	302.545	5
315		6	max	.002	1	.006	2	.007	1	6.244e-3	4	NC	1	NC	3
316			min	0	3	-.005	3	-.057	5	7.348e-5	10	NC	1	341.942	5
317		7	max	.002	1	.006	2	.006	1	6.244e-3	4	NC	1	NC	3
318			min	0	3	-.005	3	-.049	5	7.348e-5	10	NC	1	391.245	5
319		8	max	.002	1	.005	2	.005	1	6.244e-3	4	NC	1	NC	3
320			min	0	3	-.004	3	-.043	5	7.348e-5	10	NC	1	454.094	5
321		9	max	.001	1	.005	2	.004	1	6.244e-3	4	NC	1	NC	2
322			min	0	3	-.004	3	-.036	5	7.348e-5	10	NC	1	535.995	5
323		10	max	.001	1	.004	2	.004	1	6.244e-3	4	NC	1	NC	2
324			min	0	3	-.003	3	-.03	5	7.348e-5	10	NC	1	645.602	5
325		11	max	.001	1	.004	2	.003	1	6.244e-3	4	NC	1	NC	2
326			min	0	3	-.003	3	-.024	5	7.348e-5	10	NC	1	797.169	5
327		12	max	0	1	.003	2	.002	1	6.244e-3	4	NC	1	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
328			min	0	3	-.003	3	-.019	5	7.348e-5	10	NC	1	1015.562	5
329		13	max	0	1	.003	2	.002	1	6.244e-3	4	NC	1	NC	1
330			min	0	3	-.002	3	-.014	5	7.348e-5	10	NC	1	1347.418	5
331		14	max	0	1	.002	2	.001	1	6.244e-3	4	NC	1	NC	1
332			min	0	3	-.002	3	-.01	5	7.348e-5	10	NC	1	1888.94	5
333		15	max	0	1	.002	2	0	1	6.244e-3	4	NC	1	NC	1
334			min	0	3	-.002	3	-.007	5	7.348e-5	10	NC	1	2866.142	5
335		16	max	0	1	.001	2	0	1	6.244e-3	4	NC	1	NC	1
336			min	0	3	-.001	3	-.004	5	7.348e-5	10	NC	1	4921.53	5
337		17	max	0	1	0	2	0	1	6.244e-3	4	NC	1	NC	1
338			min	0	3	0	3	-.002	5	7.348e-5	10	NC	1	NC	1
339		18	max	0	1	0	2	0	1	6.244e-3	4	NC	1	NC	1
340			min	0	3	0	3	0	5	7.348e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	6.244e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	7.348e-5	10	NC	1	NC	1
343	M1	1	max	.006	3	.023	3	.01	5	1.567e-2	1	NC	1	NC	1
344			min	-.007	2	-.028	1	-.005	1	-1.438e-2	3	NC	1	NC	1
345		2	max	.006	3	.013	3	.014	5	7.446e-3	1	NC	4	NC	2
346			min	-.007	2	-.015	1	-.01	1	-7.115e-3	3	3541.86	1	8396.051	1
347		3	max	.006	3	.003	3	.018	5	5.263e-4	5	NC	4	NC	2
348			min	-.007	2	-.003	1	-.014	1	-6.212e-4	1	1831.876	1	5090.975	1
349		4	max	.006	3	.007	1	.023	5	5.287e-4	5	NC	5	NC	2
350			min	-.007	2	-.005	3	-.016	1	-5.189e-4	1	1295.784	1	3518.587	5
351		5	max	.006	3	.016	1	.028	5	5.311e-4	5	NC	5	NC	2
352			min	-.007	2	-.012	3	-.016	1	-4.166e-4	1	1038.123	1	2521.235	5
353		6	max	.006	3	.023	1	.034	5	5.335e-4	5	NC	5	NC	2
354			min	-.007	2	-.017	3	-.015	1	-3.143e-4	1	892.513	1	1938.749	5
355		7	max	.006	3	.029	1	.04	5	5.359e-4	5	NC	5	NC	2
356			min	-.007	2	-.021	3	-.013	1	-2.12e-4	1	804.383	1	1561.31	5
357		8	max	.006	3	.033	1	.046	5	5.383e-4	5	NC	5	NC	2
358			min	-.007	2	-.024	3	-.011	1	-1.097e-4	1	751.042	1	1299.513	5
359		9	max	.006	3	.035	1	.052	5	5.406e-4	5	NC	5	NC	1
360			min	-.007	2	-.025	3	-.008	1	-9.31e-6	2	721.897	1	1103.53	4
361		10	max	.006	3	.036	1	.058	5	5.572e-4	4	NC	5	NC	1
362			min	-.007	2	-.025	3	-.005	1	1.231e-5	10	712.063	1	946.105	4
363		11	max	.006	3	.035	1	.065	4	5.819e-4	4	NC	5	NC	1
364			min	-.008	2	-.024	3	-.001	1	2.062e-5	10	720.059	1	827.368	4
365		12	max	.006	3	.033	1	.072	4	6.065e-4	4	NC	5	NC	2
366			min	-.008	2	-.022	3	0	10	2.762e-5	12	747.19	1	735.8	4
367		13	max	.006	3	.029	1	.079	4	6.311e-4	4	NC	5	NC	2
368			min	-.008	2	-.019	3	0	12	2.987e-5	12	798.107	1	663.99	4
369		14	max	.006	3	.023	1	.086	4	6.558e-4	4	NC	5	NC	2
370			min	-.008	2	-.015	3	0	12	3.211e-5	12	883.006	1	606.998	4
371		15	max	.006	3	.015	1	.092	4	6.804e-4	4	NC	5	NC	2
372			min	-.008	2	-.01	3	0	12	3.436e-5	12	1023.756	1	561.432	4
373		16	max	.006	3	.006	1	.098	4	1.024e-3	4	NC	5	NC	2
374			min	-.008	2	-.004	3	0	12	3.582e-5	12	1272.541	1	524.911	4
375		17	max	.006	3	.002	3	.103	4	8.947e-3	4	NC	4	NC	2
376			min	-.008	2	-.005	2	0	12	1.345e-5	10	1786.465	1	495.771	4
377		18	max	.006	3	.01	3	.107	4	8.845e-3	1	NC	4	NC	2
378			min	-.008	2	-.017	1	0	10	-3.293e-3	3	3443.067	1	472.748	4
379		19	max	.006	3	.018	3	.111	4	1.778e-2	1	NC	1	NC	1
380			min	-.008	2	-.031	1	-.003	1	-6.679e-3	3	NC	1	455.49	4
381	M5	1	max	.018	3	.069	3	.009	5	5.46e-6	4	NC	1	NC	1
382			min	-.024	2	-.085	1	-.005	1	5.24e-8	10	NC	1	NC	1
383		2	max	.018	3	.039	3	.013	5	2.578e-4	5	NC	5	NC	1
384			min	-.024	2	-.047	1	-.005	1	-8.444e-5	1	1200.261	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	.018	3	.01	3	.018	5	5.06e-4	5	NC	5	NC	1
386			min	-.024	2	-.011	1	-.004	1	-1.677e-4	1	617.77	1	NC	1
387		4	max	.018	3	.021	1	.024	5	5.26e-4	5	NC	5	NC	1
388			min	-.024	2	-.013	3	-.004	1	-1.574e-4	1	435.844	1	NC	1
389		5	max	.018	3	.047	1	.029	5	5.459e-4	5	NC	15	NC	1
390			min	-.024	2	-.033	3	-.003	1	-1.472e-4	1	348.364	1	NC	1
391		6	max	.018	3	.069	1	.035	5	5.659e-4	5	NC	15	NC	1
392			min	-.024	2	-.048	3	-.003	1	-1.369e-4	1	298.846	1	NC	1
393		7	max	.018	3	.086	1	.042	5	5.859e-4	5	NC	15	NC	1
394			min	-.024	2	-.059	3	-.003	1	-1.267e-4	1	268.778	1	NC	1
395		8	max	.018	3	.098	1	.048	5	6.059e-4	5	NC	15	NC	1
396			min	-.024	2	-.067	3	-.003	1	-1.164e-4	1	250.459	1	NC	1
397		9	max	.018	3	.106	1	.055	5	6.258e-4	5	NC	15	NC	1
398			min	-.024	2	-.071	3	-.002	1	-1.062e-4	1	240.289	1	NC	1
399		10	max	.018	3	.108	1	.062	5	6.458e-4	5	NC	15	NC	1
400			min	-.024	2	-.072	3	-.002	1	-9.592e-5	1	236.6	1	NC	1
401		11	max	.018	3	.106	1	.068	5	6.658e-4	5	NC	15	NC	1
402			min	-.024	2	-.069	3	-.002	1	-8.568e-5	1	238.868	1	NC	1
403		12	max	.018	3	.098	1	.075	5	6.857e-4	5	NC	15	NC	1
404			min	-.024	2	-.064	3	-.002	1	-7.543e-5	1	247.507	1	NC	1
405		13	max	.018	3	.086	1	.081	4	7.057e-4	5	NC	15	NC	1
406			min	-.024	2	-.055	3	-.002	1	-6.518e-5	1	264.047	1	NC	1
407		14	max	.018	3	.069	1	.087	4	7.257e-4	5	NC	15	NC	1
408			min	-.024	2	-.043	3	-.002	1	-5.493e-5	1	291.872	1	9572.458	4
409		15	max	.018	3	.046	1	.093	4	7.456e-4	5	NC	15	NC	1
410			min	-.024	2	-.029	3	-.002	1	-4.468e-5	1	338.273	1	9449.865	4
411		16	max	.018	3	.018	1	.099	4	1.08e-3	5	NC	5	NC	1
412			min	-.024	2	-.012	3	-.002	1	-4.168e-5	1	420.788	1	NC	1
413		17	max	.018	3	.007	3	.104	4	8.959e-3	4	NC	5	NC	1
414			min	-.024	2	-.014	1	-.002	1	-2.112e-4	1	593.283	1	NC	1
415		18	max	.018	3	.029	3	.108	4	4.596e-3	4	NC	5	NC	1
416			min	-.024	2	-.053	1	-.003	1	-1.082e-4	1	1149.835	1	NC	1
417		19	max	.018	3	.051	3	.111	4	1.893e-6	5	NC	1	NC	1
418			min	-.024	2	-.094	1	-.003	1	-1.308e-7	3	NC	1	NC	1
419	M9	1	max	.006	3	.023	3	.008	5	1.438e-2	3	NC	1	NC	1
420			min	-.007	2	-.029	1	-.006	1	-1.567e-2	1	NC	1	NC	1
421		2	max	.006	3	.013	3	.007	5	7.128e-3	3	NC	4	NC	2
422			min	-.007	2	-.015	1	-.001	1	-7.703e-3	1	3542.729	1	9713.806	1
423		3	max	.006	3	.003	3	.008	4	1.109e-4	1	NC	4	NC	2
424			min	-.007	2	-.003	1	0	3	4.697e-6	12	1832.337	1	6029.749	1
425		4	max	.006	3	.007	1	.01	4	2.499e-5	1	NC	5	NC	2
426			min	-.007	2	-.005	3	0	3	-1.699e-6	3	1296.107	1	5106.978	1
427		5	max	.006	3	.016	1	.012	4	5.603e-6	5	NC	5	NC	2
428			min	-.007	2	-.012	3	-.001	3	-6.097e-5	1	1038.368	1	5057.824	1
429		6	max	.006	3	.023	1	.016	4	-4.261e-6	10	NC	5	NC	2
430			min	-.007	2	-.017	3	-.001	3	-1.469e-4	1	892.708	1	4656.171	4
431		7	max	.006	3	.029	1	.02	4	-1.131e-5	10	NC	5	NC	2
432			min	-.007	2	-.021	3	-.002	3	-2.329e-4	1	804.543	1	3234.183	4
433		8	max	.006	3	.033	1	.026	4	-1.836e-5	10	NC	5	NC	1
434			min	-.007	2	-.024	3	-.002	3	-3.189e-4	1	751.175	1	2389.16	4
435		9	max	.006	3	.035	1	.031	5	-2.542e-5	10	NC	5	NC	1
436			min	-.007	2	-.025	3	-.003	1	-4.048e-4	1	722.01	1	1846.554	4
437		10	max	.006	3	.036	1	.038	5	-3.247e-5	10	NC	5	NC	1
438			min	-.007	2	-.025	3	-.006	1	-4.908e-4	1	712.159	1	1477.343	4
439		11	max	.006	3	.035	1	.046	5	-3.952e-5	10	NC	5	NC	2
440			min	-.008	2	-.025	3	-.009	1	-5.767e-4	1	720.14	1	1214.599	4
441		12	max	.006	3	.033	1	.053	5	-4.575e-5	12	NC	5	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
442			min	-.008	2	-.023	3	-.011	1	-6.627e-4	1	747.258	1	1020.846	4
443		13	max	.006	3	.029	1	.061	5	-5.136e-5	12	NC	5	NC	2
444			min	-.008	2	-.019	3	-.013	1	-7.487e-4	1	798.164	1	873.633	5
445		14	max	.006	3	.023	1	.07	5	-5.696e-5	12	NC	5	NC	2
446			min	-.008	2	-.015	3	-.015	1	-8.346e-4	1	883.051	1	757.014	5
447		15	max	.006	3	.015	1	.078	5	-6.257e-5	12	NC	5	NC	2
448			min	-.008	2	-.01	3	-.015	1	-9.206e-4	1	1023.79	1	666.887	5
449		16	max	.006	3	.006	1	.086	5	2.131e-4	5	NC	5	NC	2
450			min	-.008	2	-.004	3	-.014	1	-9.847e-4	1	1272.565	1	595.724	4
451		17	max	.006	3	.003	3	.095	5	8.725e-3	5	NC	4	NC	2
452			min	-.008	2	-.005	2	-.012	1	-5.293e-4	1	1786.499	1	535.8	4
453		18	max	.006	3	.01	3	.103	5	4.179e-3	5	NC	4	NC	2
454			min	-.008	2	-.017	1	-.008	1	-9.071e-3	1	3443.126	1	485.94	4
455		19	max	.006	3	.018	3	.111	4	6.679e-3	3	NC	1	NC	1
456			min	-.008	2	-.031	1	-.002	1	-1.778e-2	1	NC	1	444.452	4
457	M13	1	max	.006	1	.023	3	.006	3	4.003e-3	3	NC	1	NC	1
458			min	-.008	5	-.029	1	-.007	2	-4.991e-3	1	NC	1	NC	1
459		2	max	.006	1	.167	3	.039	1	4.831e-3	3	NC	5	NC	2
460			min	-.008	5	-.185	1	-.002	5	-6.053e-3	1	1190.053	1	4274.732	1
461		3	max	.006	1	.284	3	.098	1	5.66e-3	3	NC	5	NC	3
462			min	-.008	5	-.313	1	-.004	5	-7.114e-3	1	653.951	1	1802.279	1
463		4	max	.006	1	.358	3	.148	1	6.489e-3	3	NC	5	NC	3
464			min	-.008	5	-.394	1	-.006	5	-8.176e-3	1	509.049	1	1213.125	1
465		5	max	.006	1	.38	3	.172	1	7.317e-3	3	NC	5	NC	3
466			min	-.008	5	-.419	1	-.01	5	-9.238e-3	1	476.698	1	1048.226	1
467		6	max	.006	1	.351	3	.163	1	8.146e-3	3	NC	5	NC	3
468			min	-.009	5	-.388	1	-.013	5	-1.03e-2	1	516.928	1	1104.167	1
469		7	max	.006	1	.281	3	.124	1	8.974e-3	3	NC	5	NC	3
470			min	-.009	5	-.314	1	-.015	5	-1.136e-2	1	651.957	1	1446.737	1
471		8	max	.006	1	.191	3	.064	1	9.803e-3	3	NC	5	NC	2
472			min	-.009	5	-.216	1	-.016	5	-1.242e-2	1	991.36	1	2683.504	1
473		9	max	.005	1	.107	3	.017	3	1.063e-2	3	NC	4	NC	1
474			min	-.009	5	-.126	1	-.013	2	-1.348e-2	1	1901.743	1	NC	1
475		10	max	.005	1	.069	3	.018	3	1.146e-2	3	NC	4	NC	1
476			min	-.009	5	-.085	1	-.024	2	-1.455e-2	1	3271.358	1	NC	1
477		11	max	.005	1	.107	3	.021	3	1.063e-2	3	NC	4	NC	1
478			min	-.009	5	-.126	1	-.012	2	-1.348e-2	1	1901.744	1	NC	1
479		12	max	.005	1	.191	3	.07	1	9.804e-3	3	NC	5	NC	3
480			min	-.009	5	-.216	1	-.004	10	-1.242e-2	1	991.36	1	2476.965	1
481		13	max	.005	1	.281	3	.13	1	8.976e-3	3	NC	5	NC	5
482			min	-.009	5	-.314	1	.002	10	-1.136e-2	1	651.957	1	1373.333	1
483		14	max	.005	1	.351	3	.17	1	8.147e-3	3	NC	5	NC	5
484			min	-.009	5	-.388	1	.007	10	-1.03e-2	1	516.928	1	1060.029	1
485		15	max	.005	1	.38	3	.179	1	7.319e-3	3	NC	5	NC	3
486			min	-.01	5	-.419	1	.003	15	-9.237e-3	1	476.699	1	1011.773	1
487		16	max	.005	1	.358	3	.154	1	6.491e-3	3	NC	5	NC	3
488			min	-.01	5	-.394	1	-.003	5	-8.175e-3	1	509.05	1	1173.371	1
489		17	max	.005	1	.284	3	.102	1	5.663e-3	3	NC	5	NC	3
490			min	-.01	5	-.313	1	-.008	5	-7.114e-3	1	653.952	1	1741.441	1
491		18	max	.005	1	.167	3	.04	1	4.834e-3	3	NC	5	NC	2
492			min	-.01	5	-.185	1	-.008	5	-6.052e-3	1	1190.054	1	4103.852	1
493		19	max	.005	1	.023	3	.006	3	4.006e-3	3	NC	1	NC	1
494			min	-.01	5	-.028	1	-.007	2	-4.99e-3	1	NC	1	NC	1
495	M16	1	max	.002	1	.018	3	.006	3	5.234e-3	1	NC	1	NC	1
496			min	-.111	4	-.031	1	-.008	2	-3.048e-3	3	NC	1	NC	1
497		2	max	.002	1	.085	3	.041	1	6.382e-3	1	NC	5	NC	2
498			min	-.111	4	-.208	1	0	10	-3.648e-3	3	1048.492	1	4019.433	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
499		3	max	.002	1	.14	3	.102	1	7.529e-3	1	NC	5	NC	3
500			min	-.111	4	-.354	1	.004	10	-4.248e-3	3	576.211	1	1723.564	1
501		4	max	.002	1	.175	3	.154	1	8.677e-3	1	NC	5	NC	3
502			min	-.111	4	-.446	1	.008	10	-4.849e-3	3	448.605	1	1168.203	1
503		5	max	.002	1	.186	3	.178	1	9.824e-3	1	NC	5	NC	3
504			min	-.111	4	-.474	1	.009	10	-5.449e-3	3	420.207	1	1011.96	1
505		6	max	.002	1	.175	3	.169	1	1.097e-2	1	NC	5	NC	10
506			min	-.111	4	-.439	1	.007	10	-6.049e-3	3	455.877	1	1065.278	1
507		7	max	.002	1	.145	3	.128	1	1.212e-2	1	NC	5	NC	3
508			min	-.111	4	-.354	1	.002	10	-6.649e-3	3	575.455	1	1389.304	1
509		8	max	.003	1	.105	3	.068	1	1.327e-2	1	NC	5	NC	2
510			min	-.111	4	-.243	1	-.004	10	-7.249e-3	3	876.681	1	2540.478	1
511		9	max	.003	1	.068	3	.02	3	1.441e-2	1	NC	5	NC	1
512			min	-.111	4	-.141	1	-.013	2	-7.849e-3	3	1689.926	1	NC	1
513		10	max	.003	1	.051	3	.018	3	1.556e-2	1	NC	4	NC	1
514			min	-.111	4	-.094	1	-.024	2	-8.449e-3	3	2928.143	1	NC	1
515		11	max	.003	1	.068	3	.018	3	1.441e-2	1	NC	5	NC	1
516			min	-.111	4	-.141	1	-.013	2	-7.849e-3	3	1689.926	1	NC	1
517		12	max	.003	1	.105	3	.066	1	1.327e-2	1	NC	5	NC	3
518			min	-.111	4	-.243	1	-.004	10	-7.248e-3	3	876.681	1	2612.045	1
519		13	max	.003	1	.145	3	.126	1	1.212e-2	1	NC	5	NC	3
520			min	-.111	4	-.354	1	.002	10	-6.648e-3	3	575.455	1	1419.404	1
521		14	max	.003	1	.175	3	.166	1	1.097e-2	1	NC	5	NC	3
522			min	-.111	4	-.439	1	.003	15	-6.047e-3	3	455.877	1	1086.709	1
523		15	max	.003	1	.186	3	.175	1	9.826e-3	1	NC	5	NC	3
524			min	-.111	4	-.474	1	-.002	5	-5.447e-3	3	420.207	1	1032.935	1
525		16	max	.003	1	.175	3	.15	1	8.678e-3	1	NC	5	NC	3
526			min	-.111	4	-.446	1	-.009	5	-4.846e-3	3	448.605	1	1195.372	1
527		17	max	.003	1	.14	3	.099	1	7.531e-3	1	NC	5	NC	3
528			min	-.111	4	-.354	1	-.013	5	-4.245e-3	3	576.212	1	1773.133	1
529		18	max	.003	1	.085	3	.039	1	6.384e-3	1	NC	5	NC	2
530			min	-.111	4	-.208	1	-.011	5	-3.645e-3	3	1048.493	1	4185.822	1
531		19	max	.003	1	.018	3	.006	3	5.237e-3	1	NC	1	NC	1
532			min	-.111	4	-.031	1	-.008	2	-3.044e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.215e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-5.241e-4	5	NC	1	NC	1
535		2	max	0	3	-.002	15	.011	4	8.178e-4	3	NC	5	NC	1
536			min	0	5	-.017	1	0	3	-7.461e-4	1	6009.63	6	8696.984	4
537		3	max	0	3	-.003	15	.024	4	1.314e-3	3	NC	5	NC	1
538			min	-.002	5	-.033	1	-.003	3	-1.42e-3	1	3058.096	6	4055.457	4
539		4	max	0	3	-.004	15	.037	4	1.81e-3	3	NC	5	NC	3
540			min	-.003	5	-.048	1	-.006	3	-2.093e-3	1	2098.032	6	2628.758	4
541		5	max	0	3	-.005	15	.05	4	2.307e-3	3	NC	15	NC	9
542			min	-.004	5	-.061	1	-.01	3	-2.767e-3	1	1637.116	6	1982.544	4
543		6	max	0	3	-.006	15	.06	4	2.803e-3	3	NC	15	9290.468	10
544			min	-.005	5	-.073	1	-.015	3	-3.44e-3	1	1377.806	6	1642.479	4
545		7	max	0	3	-.007	15	.067	4	3.299e-3	3	NC	15	7319.471	10
546			min	-.006	5	-.082	1	-.019	3	-4.114e-3	1	1221.865	6	1457.069	4
547		8	max	0	3	-.008	15	.072	4	3.796e-3	3	NC	15	6071.263	10
548			min	-.007	5	-.089	1	-.024	3	-4.787e-3	1	1128.278	6	1366.583	4
549		9	max	0	3	-.008	15	.073	4	4.292e-3	3	NC	15	5250.633	10
550			min	-.008	5	-.093	1	-.028	3	-5.461e-3	1	1077.903	6	1346.936	4
551		10	max	0	3	-.008	15	.07	4	4.788e-3	3	NC	15	4708.076	10
552			min	-.009	5	-.095	1	-.031	3	-6.134e-3	1	1061.967	6	1392.913	4
553		11	max	0	3	-.007	15	.065	4	5.284e-3	3	NC	15	4364.824	10
554			min	-.01	5	-.094	1	-.034	3	-6.808e-3	1	1077.903	6	1514.796	4
555		12	max	0	3	-.007	15	.056	4	5.781e-3	3	NC	15	4182.11	10

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
556			min	-.011	5	-.09	1	-.035	3	-7.481e-3	1	1128.278	6	1738.77	1
557		13	max	0	3	-.006	15	.045	4	6.277e-3	3	NC	15	4149.724	10
558			min	-.011	5	-.084	1	-.034	3	-8.155e-3	1	1221.865	6	1721.082	1
559		14	max	0	3	-.005	15	.039	1	6.773e-3	3	NC	15	5786.957	15
560			min	-.012	5	-.075	1	-.032	3	-8.828e-3	1	1377.806	6	1774.335	1
561		15	max	0	3	-.003	15	.034	1	7.27e-3	3	NC	15	NC	15
562			min	-.013	5	-.063	1	-.027	3	-9.502e-3	1	1637.116	6	1926.043	1
563		16	max	0	3	-.002	15	.025	1	7.766e-3	3	NC	5	NC	5
564			min	-.014	5	-.05	1	-.019	3	-1.018e-2	1	2098.032	6	2250.992	1
565		17	max	0	3	0	15	.013	1	8.262e-3	3	NC	5	NC	4
566			min	-.015	5	-.036	1	-.009	3	-1.085e-2	1	3058.096	6	2983.872	1
567		18	max	0	3	.002	5	.004	3	8.759e-3	3	NC	5	NC	4
568			min	-.016	5	-.02	1	-.008	2	-1.152e-2	1	6009.63	6	5311.981	1
569		19	max	0	3	.006	5	.021	3	9.255e-3	3	NC	1	NC	1
570			min	-.017	5	-.004	1	-.025	2	-1.22e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	3	.007	3	3.14e-3	3	NC	1	NC	1
572			min	-.007	4	-.003	4	-.008	2	-3.76e-3	1	NC	1	NC	1
573		2	max	0	10	-.008	12	.005	1	3.001e-3	3	NC	12	NC	2
574			min	-.006	4	-.029	4	-.003	5	-3.577e-3	1	3815.926	4	9202.613	1
575		3	max	0	10	-.016	12	.014	1	2.861e-3	3	6133.728	15	NC	4
576			min	-.006	4	-.054	4	-.011	5	-3.394e-3	1	1941.794	4	5201.746	1
577		4	max	0	10	-.023	12	.02	1	2.721e-3	3	4208.096	15	NC	10
578			min	-.006	4	-.077	4	-.022	5	-3.211e-3	1	1332.184	4	3951.916	1
579		5	max	0	10	-.03	12	.024	1	2.582e-3	3	3283.62	15	NC	10
580			min	-.005	4	-.098	4	-.036	5	-3.028e-3	1	1039.517	4	2849.653	5
581		6	max	0	10	-.036	12	.027	1	2.442e-3	3	2763.513	15	NC	10
582			min	-.005	4	-.115	4	-.05	5	-2.845e-3	1	874.863	4	2024.795	5
583		7	max	0	10	-.04	12	.028	1	2.302e-3	3	2450.738	15	NC	10
584			min	-.004	4	-.13	4	-.063	5	-2.662e-3	1	775.846	4	1589.911	5
585		8	max	0	10	-.043	12	.027	1	2.163e-3	3	2263.025	15	NC	10
586			min	-.004	4	-.14	4	-.074	5	-2.479e-3	1	716.421	4	1341.771	5
587		9	max	0	10	-.046	12	.026	1	2.023e-3	3	2161.987	15	NC	10
588			min	-.004	4	-.146	4	-.083	5	-2.296e-3	1	684.434	4	1198.671	5
589		10	max	0	10	-.046	12	.023	1	1.883e-3	3	2130.024	15	NC	10
590			min	-.003	4	-.148	4	-.089	5	-2.113e-3	1	674.316	4	1124.044	5
591		11	max	0	10	-.046	12	.02	1	1.744e-3	3	2161.987	15	NC	10
592			min	-.003	4	-.146	4	-.09	5	-1.93e-3	1	684.434	4	1101.889	5
593		12	max	0	10	-.044	12	.017	1	1.604e-3	3	2263.025	15	NC	10
594			min	-.003	4	-.139	4	-.088	5	-1.747e-3	1	716.421	4	1128.237	5
595		13	max	0	10	-.04	12	.013	1	1.464e-3	3	2450.738	15	NC	3
596			min	-.002	4	-.128	4	-.082	5	-1.564e-3	1	775.846	4	1209.468	5
597		14	max	0	10	-.036	12	.01	1	1.325e-3	3	2763.513	15	NC	2
598			min	-.002	4	-.114	4	-.073	5	-1.381e-3	1	874.863	4	1366.078	5
599		15	max	0	10	-.03	12	.006	1	1.185e-3	3	3283.62	15	NC	1
600			min	-.001	4	-.096	4	-.06	5	-1.198e-3	1	1039.517	4	1646.405	5
601		16	max	0	10	-.023	12	.003	1	1.045e-3	3	4208.096	15	NC	1
602			min	-.001	4	-.075	4	-.046	5	-1.016e-3	2	1332.184	4	2170.935	5
603		17	max	0	10	-.016	12	.001	1	9.055e-4	3	6133.728	15	NC	1
604			min	0	4	-.051	4	-.03	5	-8.578e-4	2	1941.794	4	3313.123	5
605		18	max	0	10	-.008	12	0	9	8.137e-4	4	NC	12	NC	1
606			min	0	4	-.026	4	-.014	5	-6.999e-4	2	3815.926	4	6974.595	5
607		19	max	0	1	0	1	0	1	8.936e-4	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.421e-4	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

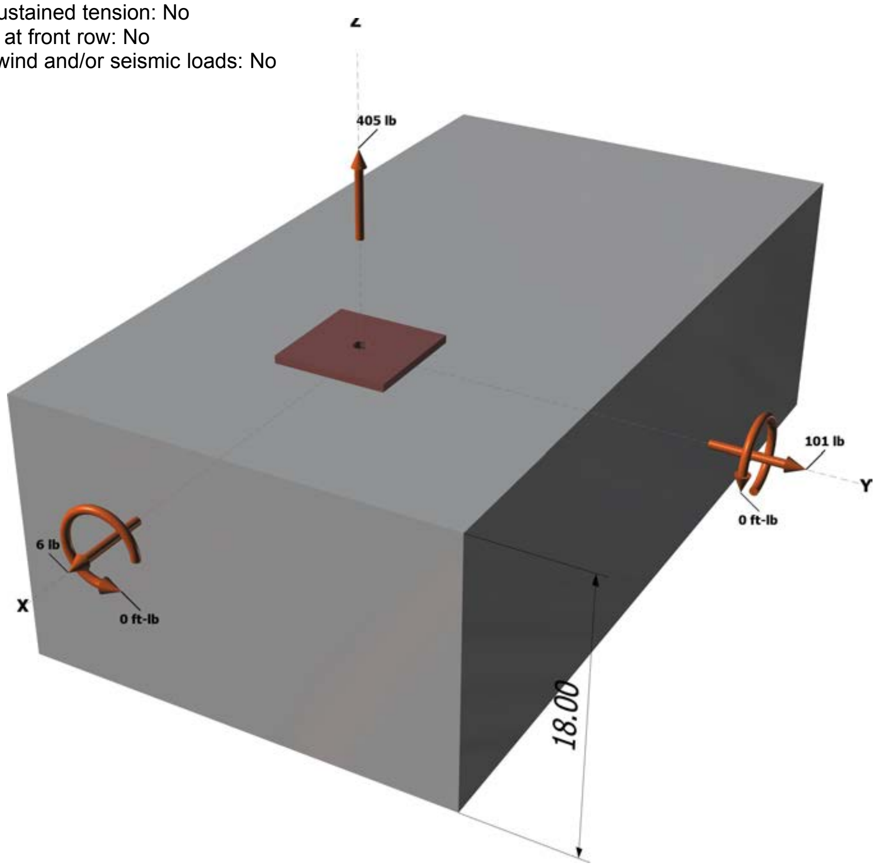
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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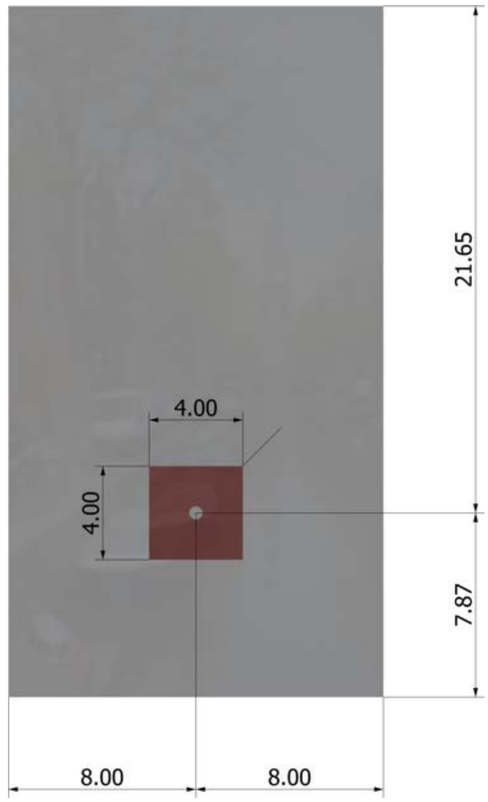


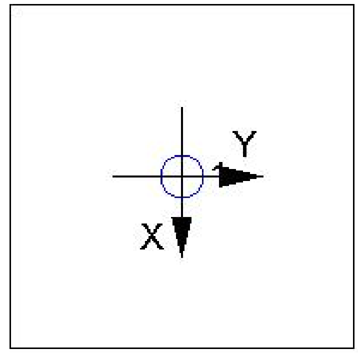
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

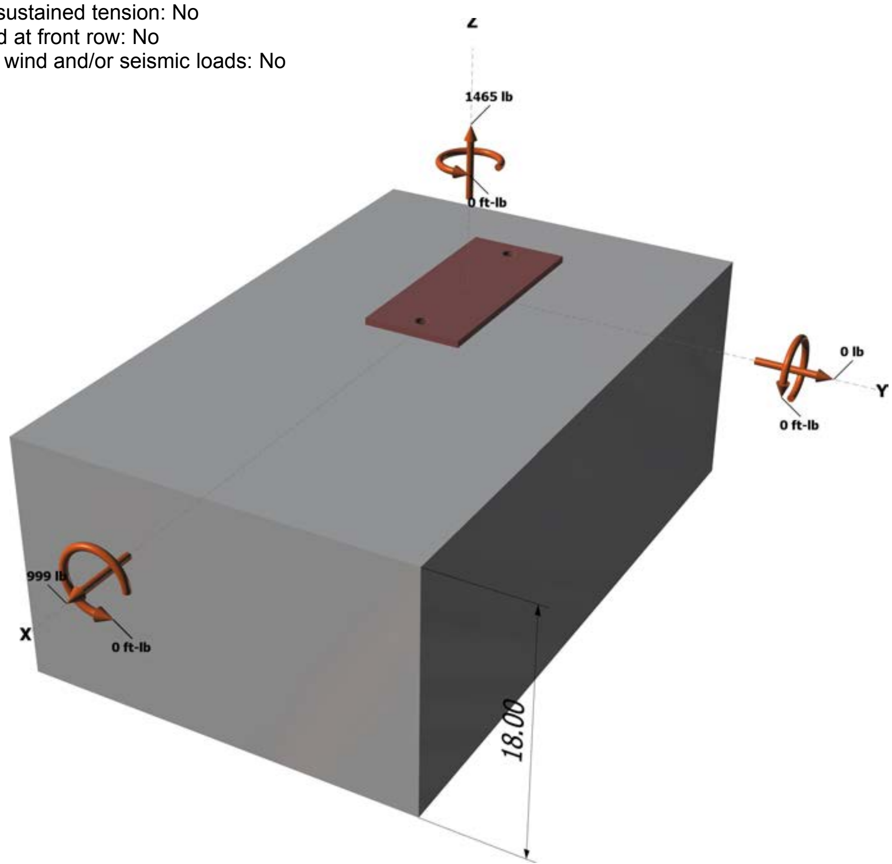
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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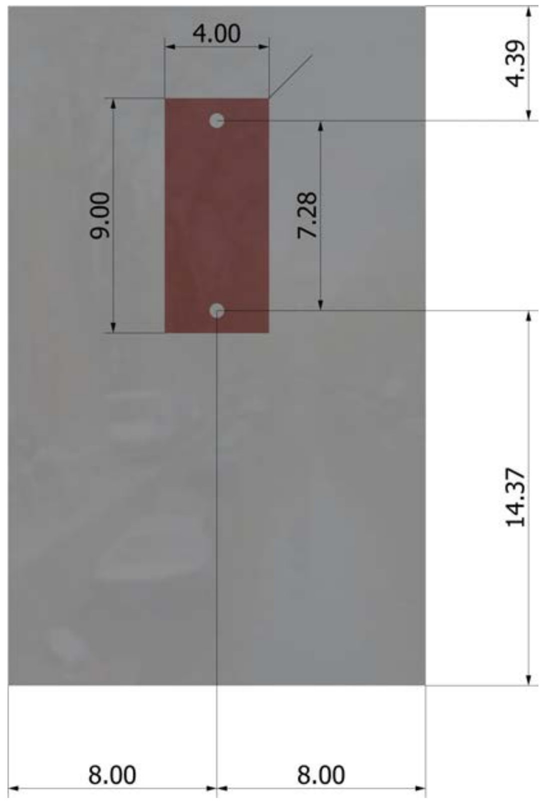


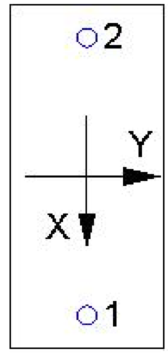
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

A_{Vc} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	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} (in²)	A_{Vco} (in²)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	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} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	177.03	109.66	0.952	1.021	1.000	1.000	9755	15305

A_{Nc} (in²)	A_{Nco} (in²)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
314.72	256.00	1.000	0.865	1.000	1.000	10469	11128	0.70

ϕV_{cpg} (lb)
15580

11. Results

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

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

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

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

12. Warnings

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

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

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