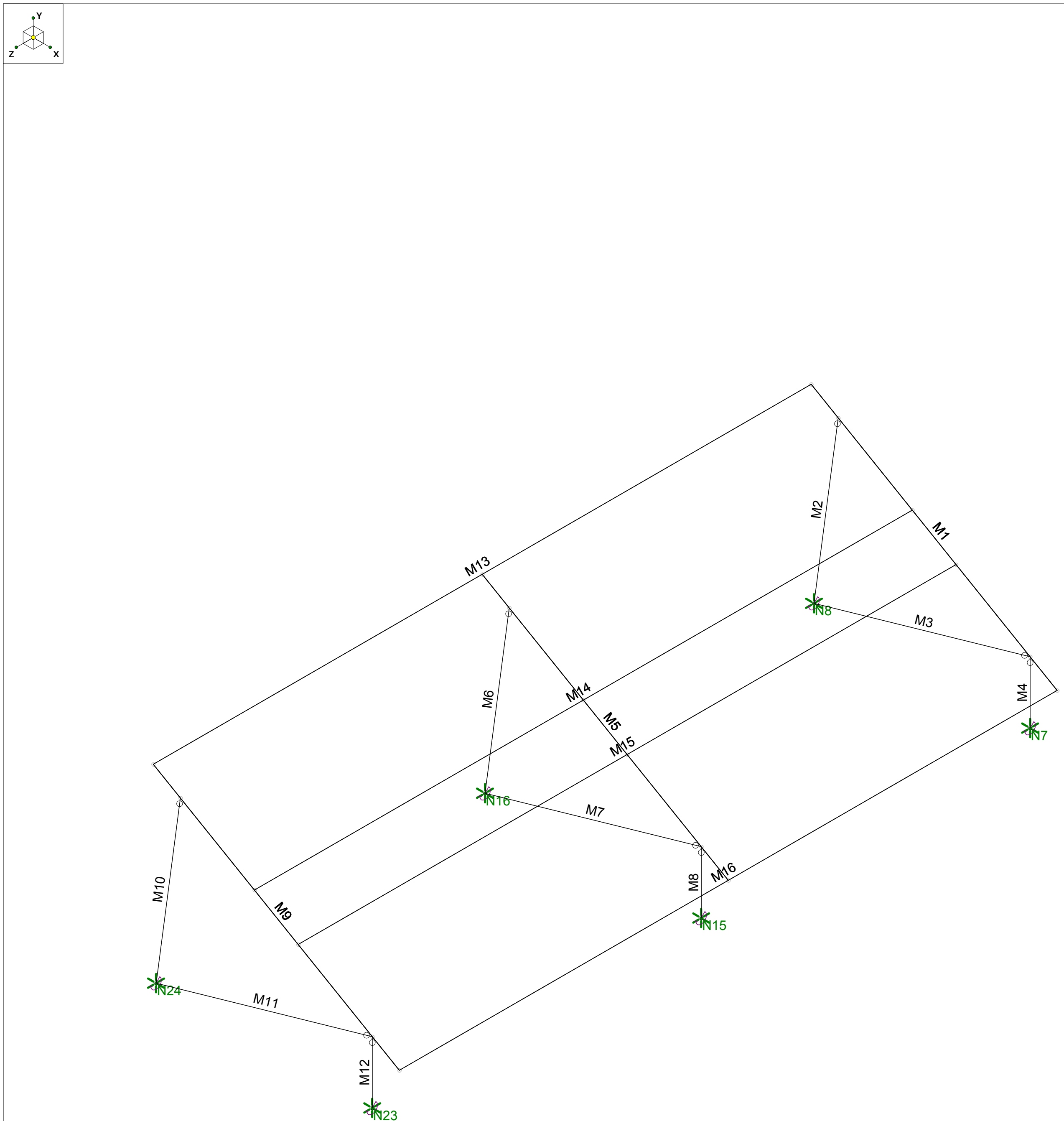


Schletter, Inc.	Standard PVMax Racking System	30° Tilt w/ Seismic Design
HCV	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

1.1 Project Description

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

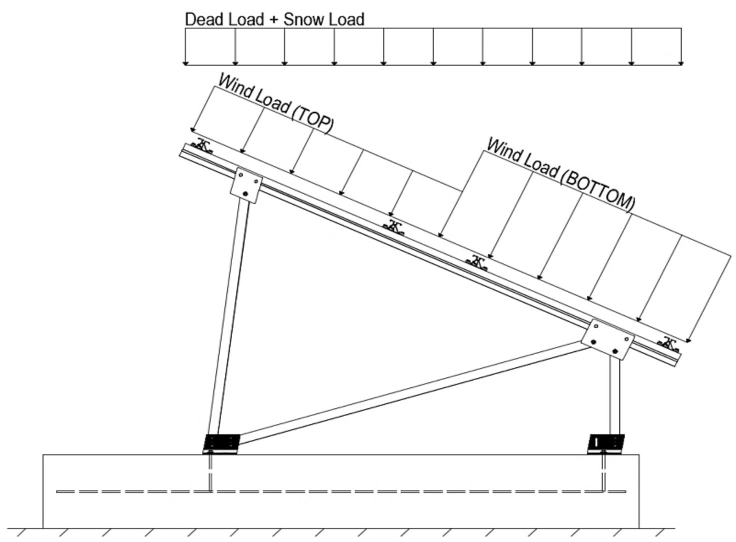
1.2 Construction

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 = 2
Module Tilt = 30°
Maximum Height Above Grade = 3 ft



Typical loading conditions of the module dead loads, snow loads, and wind loads are shown on the left.

1.3 Technical Codes

- ASCE 7-05 - Chapter 6, Wind Loads
- ASCE 7-05 - Chapter 7, Snow Loads
- ASCE 7-05 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2003, 2006, 2009
- Aluminum Design Manual, Eighth Edition, 2005

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} = 3.00 psf
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads

Ground Snow Load, P_g =	30.00 psf	
Sloped Roof Snow Load, P_s =	16.49 psf	*(ASCE 7-05, Eq. 7-2)*
I_s =	1.00	
C_s =	0.73	
C_e =	0.90	
C_t =	1.20	

2.3 Wind Loads

Design Wind Speed, V = 100 mph Exposure Category = C
Height < 15 ft Importance Category = II

Peak Velocity Pressure, q_z = 15.70 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.150	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.850	
$Cf-_{TOP, OUTER PURLIN}$	=	-2.600	
$Cf-_{TOP, INNER PURLIN}$	=	-2.000	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.100	

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 =	0.06	C_d =	1.25

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

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

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

Purlins	Location
M13	Top
M14	Mid-Top
M15	Mid-Bottom
M16	Bottom

Diagonal Struts	Location
M3	Outer
M7	Inner
M11	Outer

Front Reactions	Location
N7	Outer
N15	Inner
N23	Outer

Girders	Location
M1	Outer
M5	Inner
M9	Outer

Rear Struts	Location
M2	Outer
M6	Inner
M10	Outer

Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

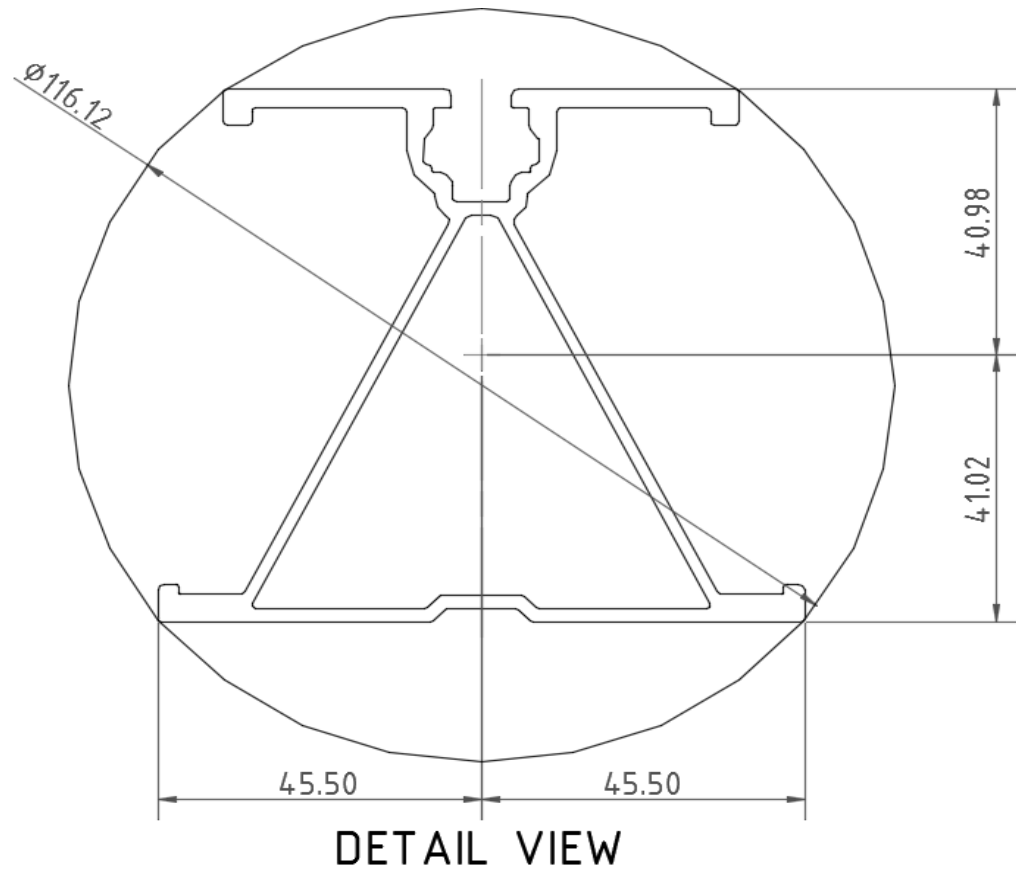
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

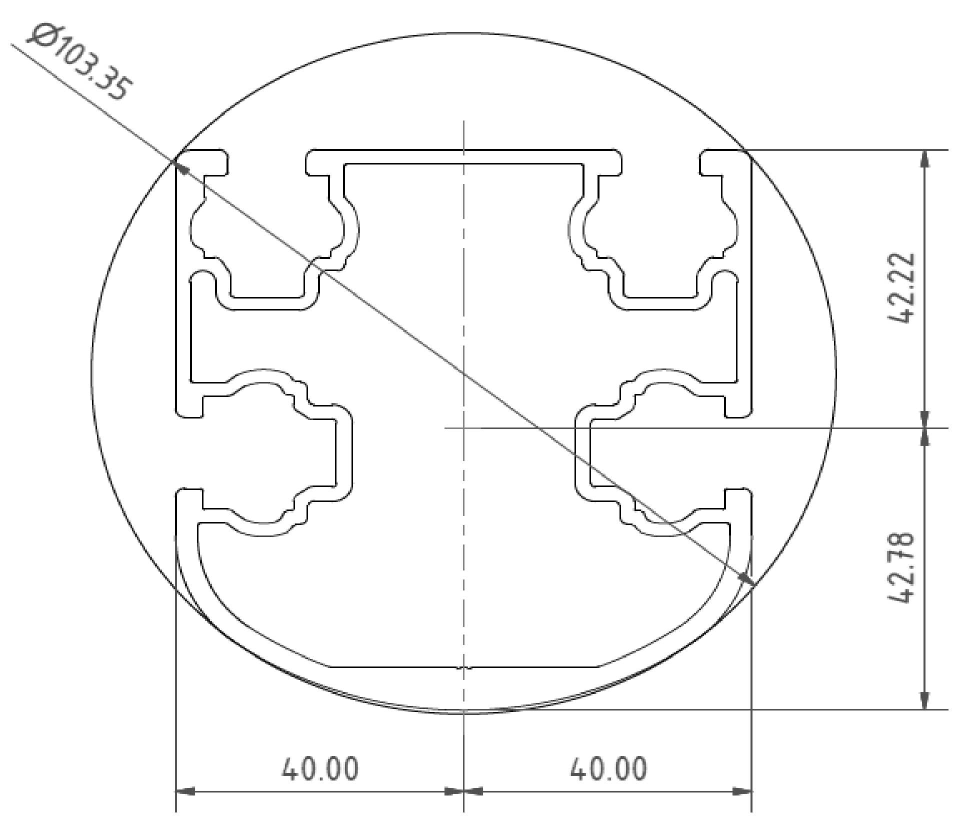
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	126	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.835	k-ft
M_z =	0.373	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	98%	



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).

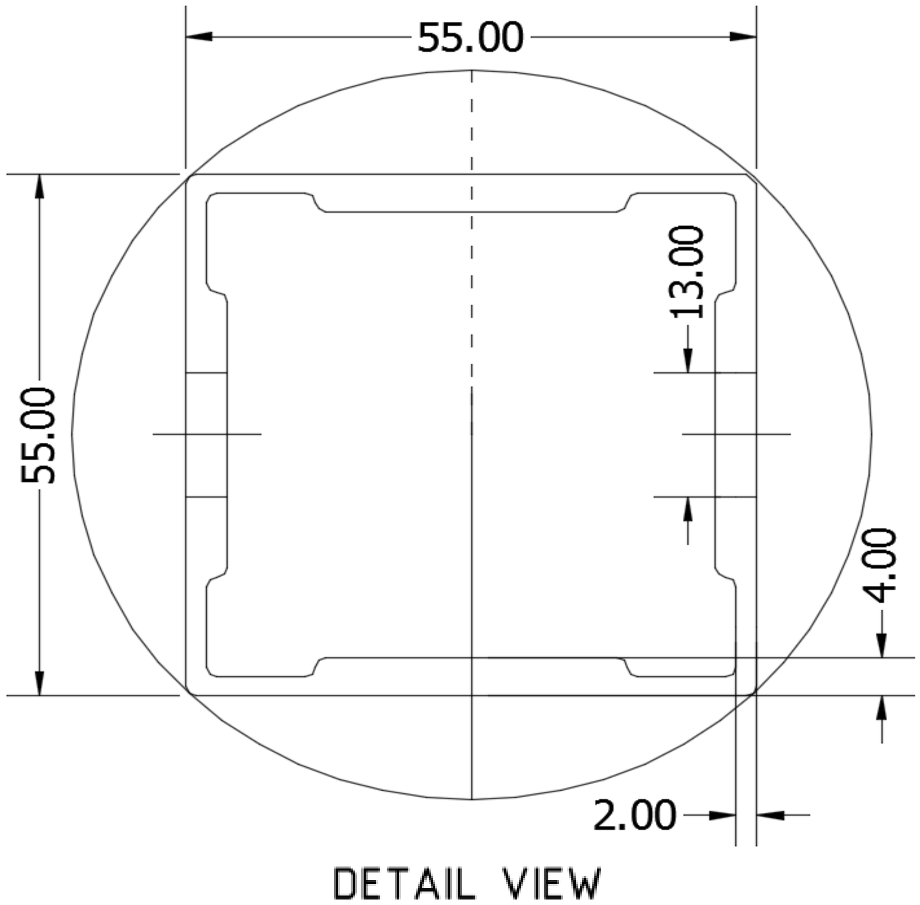
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.032	k-ft
M_z =	0.000	k-ft
P_n =	-0.853	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	89%	



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 M12 bolts at each end. See Appendix A.3 for detailed member calculations. Section units are in (mm).

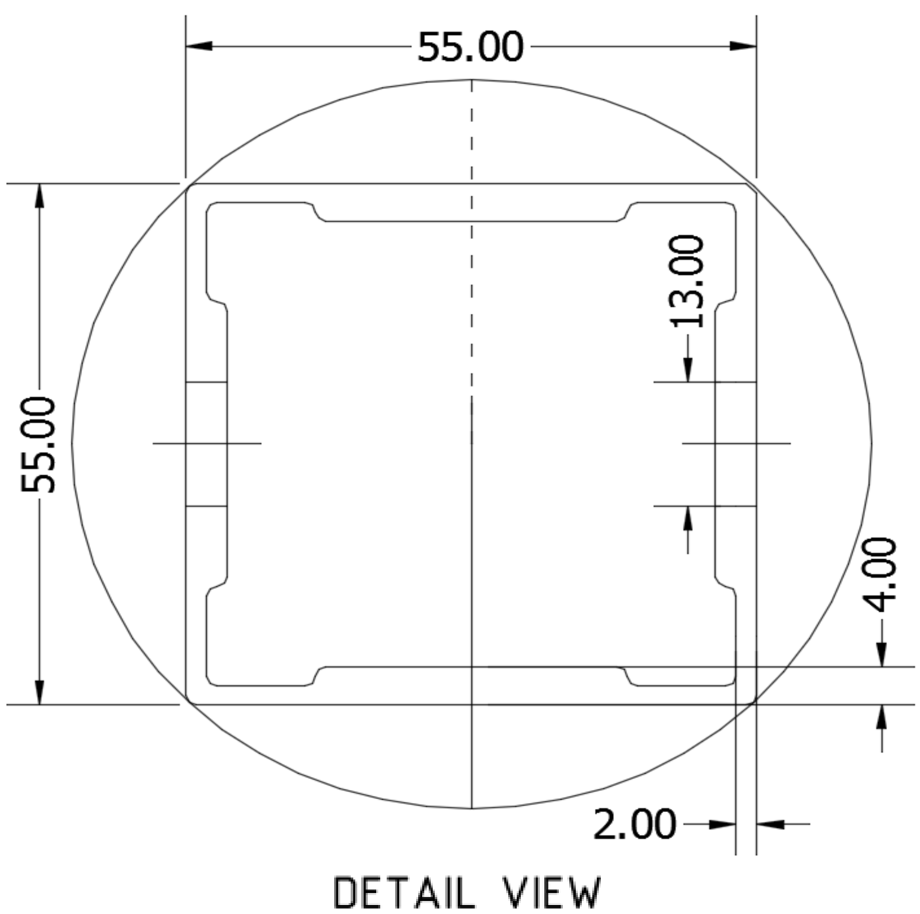
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.568	k-ft
P_n =	0.621	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	43%	



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 M12 bolts at each end. See Appendix A.4 for detailed member calculations. Section units are in (mm).

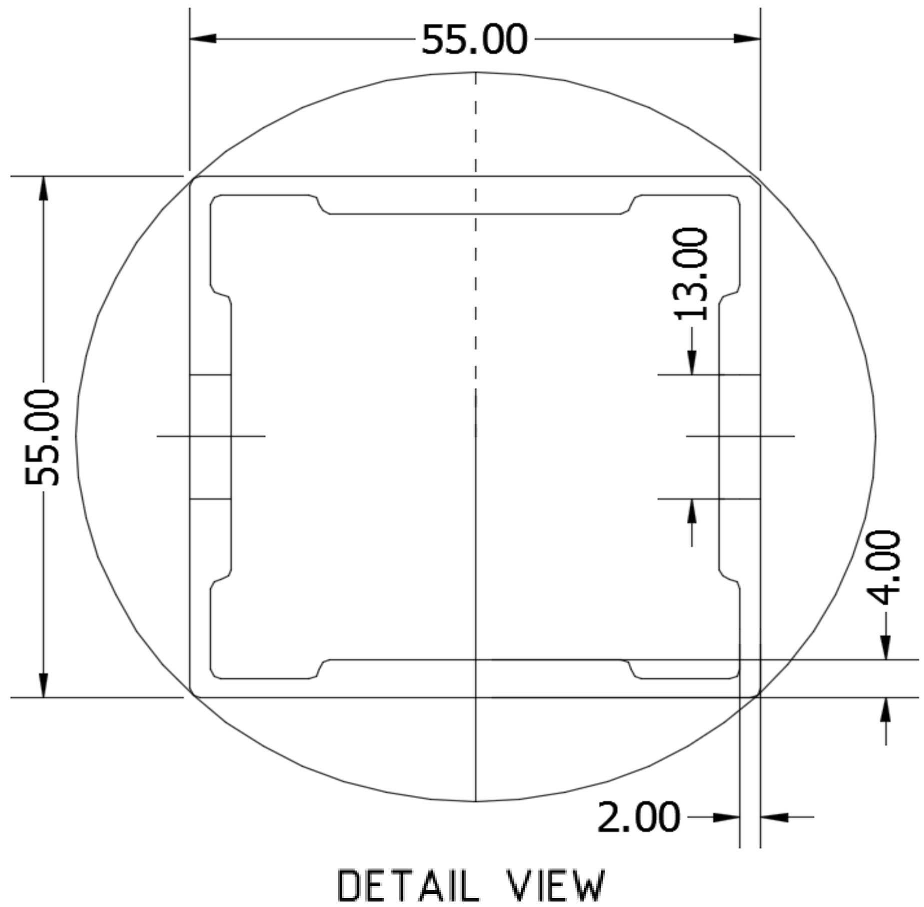
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.010	k-ft
M_z =	0.000	k-ft
P_n =	2.507	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	35%	



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 M12 bolts at each end. See Appendix A.5 for detailed member calculations. Section units are in (mm).

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	70.83	in
$\Phi F_{ty\ AXIAL}$ =	10.55	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.010	k-ft
M_z =	0.000	k-ft
P_n =	3.222	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	10.365	k
Utilization =	32%	



5. FOUNDATION DESIGN CALCULATIONS

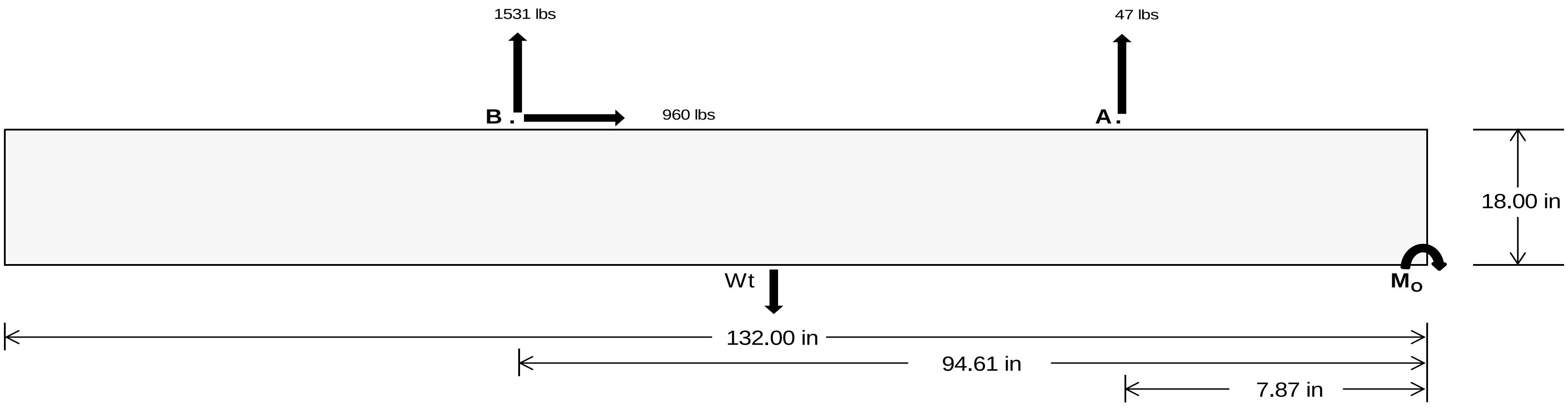
5.1 Helical Pile Foundations

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 =	210.24	6381.41	k
Compressive Load =	3602.80	5052.05	k
Lateral Load =	393.85	3993.62	k
Moment (Weak Axis) =	0.76	0.29	k

5.2 Design of Ballast Foundations

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



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

Footing Reinforcement
Use fiber reinforcing with (2) #5 rebar.

Overturning Check	
M_O =	162506.9 in-lbs
Resisting Force Required =	2462.23 lbs
S.F. =	1.67
Weight Required =	4103.71 lbs
Minimum Width =	33 in in
Weight Provided =	6579.38 lbs

A minimum 132in long x 33in wide x 18in tall ballast foundation is required to resist overturning.

Sliding	
Force =	959.69 lbs
Friction =	0.4
Weight Required =	2399.22 lbs
Resisting Weight =	6579.38 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 33in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion	
Sliding Force =	959.69 lbs
Cohesion =	130 psf
Area =	30.25 ft^2
Resisting =	3289.69 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 33in 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			
	33 in	34 in	35 in	36 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.75 ft) =	6579 lbs	6779 lbs	6978 lbs	7178 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	33 in	34 in	35 in	36 in	33 in	34 in	35 in	36 in	33 in	34 in	35 in	36 in	33 in	34 in	35 in	36 in
F_A	1287 lbs	1287 lbs	1287 lbs	1287 lbs	1302 lbs	1302 lbs	1302 lbs	1302 lbs	1805 lbs	1805 lbs	1805 lbs	1805 lbs	-94 lbs	-94 lbs	-94 lbs	-94 lbs
F_B	1226 lbs	1226 lbs	1226 lbs	1226 lbs	2191 lbs	2191 lbs	2191 lbs	2191 lbs	2433 lbs	2433 lbs	2433 lbs	2433 lbs	-3062 lbs	-3062 lbs	-3062 lbs	-3062 lbs
F_V	196 lbs	196 lbs	196 lbs	196 lbs	1745 lbs	1745 lbs	1745 lbs	1745 lbs	1437 lbs	1437 lbs	1437 lbs	1437 lbs	-1919 lbs	-1919 lbs	-1919 lbs	-1919 lbs
P_{total}	9092 lbs	9292 lbs	9491 lbs	9691 lbs	10072 lbs	10271 lbs	10471 lbs	10670 lbs	10818 lbs	11017 lbs	11217 lbs	11416 lbs	791 lbs	910 lbs	1030 lbs	1150 lbs
M	3603 lbs-ft	3603 lbs-ft	3603 lbs-ft	3603 lbs-ft	3702 lbs-ft	3702 lbs-ft	3702 lbs-ft	3702 lbs-ft	5097 lbs-ft	5097 lbs-ft	5097 lbs-ft	5097 lbs-ft	3964 lbs-ft	3964 lbs-ft	3964 lbs-ft	3964 lbs-ft
e	0.40 ft	0.39 ft	0.38 ft	0.37 ft	0.37 ft	0.36 ft	0.35 ft	0.35 ft	0.47 ft	0.46 ft	0.45 ft	0.45 ft	5.01 ft	4.35 ft	3.85 ft	3.45 ft
L/6	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	235.6 psf	235.1 psf	234.6 psf	234.1 psf	266.2 psf	264.8 psf	263.4 psf	262.1 psf	265.7 psf	264.3 psf	263.0 psf	261.7 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	365.6 psf	361.2 psf	357.1 psf	353.2 psf	399.7 psf	394.3 psf	389.3 psf	384.5 psf	449.5 psf	442.7 psf	436.3 psf	430.2 psf	393.2 psf	186.9 psf	142.5 psf	124.5 psf

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

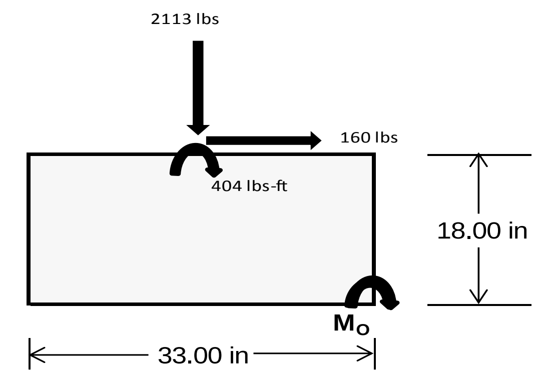
Use a 132in long x 33in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 2261.2 ft-lbs
Resisting Force Required = 1644.50 lbs
S.F. = 1.67
Weight Required = 2740.83 lbs
Minimum Width = 33 in in
Weight Provided = 6579.38 lbs

A minimum 132in long x 33in 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	33 in			33 in			33 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	305 lbs	658 lbs	214 lbs	794 lbs	2113 lbs	724 lbs	121 lbs	192 lbs	31 lbs
F_V	222 lbs	217 lbs	226 lbs	163 lbs	160 lbs	176 lbs	223 lbs	219 lbs	224 lbs
P_{total}	8450 lbs	8803 lbs	8359 lbs	8548 lbs	9867 lbs	8478 lbs	2503 lbs	2574 lbs	2412 lbs
M	862 lbs-ft	852 lbs-ft	875 lbs-ft	641 lbs-ft	644 lbs-ft	686 lbs-ft	862 lbs-ft	849 lbs-ft	867 lbs-ft
e	0.10 ft	0.10 ft	0.10 ft	0.07 ft	0.07 ft	0.08 ft	0.34 ft	0.33 ft	0.36 ft
L/6	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft
f_{min}	217.2 psf	229.6 psf	213.2 psf	236.3 psf	279.7 psf	230.8 psf	20.6 psf	23.9 psf	17.2 psf
f_{max}	341.5 psf	352.5 psf	339.5 psf	328.8 psf	372.6 psf	329.7 psf	144.9 psf	146.3 psf	142.3 psf

Maximum Bearing Pressure = 373 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 33in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 33in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

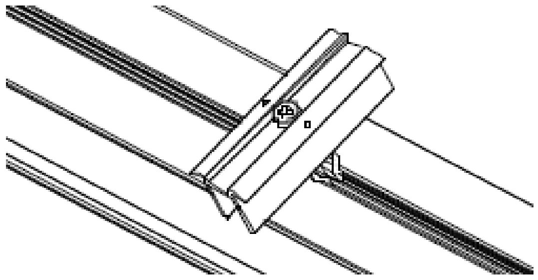
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

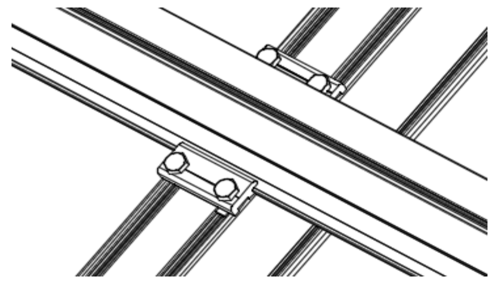
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

Modules are secured to the purlins with Schletter, Inc. Rapid2+ mounting clamps. Purlins are secured to the girders with the use of 80mm mounting clamps. The reliability of calculations is uncertain due to limited standards, therefore the strength of the clamp fasteners has been evaluated by load testing.

Fastening of Modules to Purlins	
Maximum Uplifting Force =	0.612 k
Allowable Uplift =	1.214 k
Utilization =	50%



Fastening of Purlins to Girders	
Maximum Uplifting Force =	2.291 k
Allowable Uplift =	4.357 k
Utilization =	53%



6.2 Strut Connections

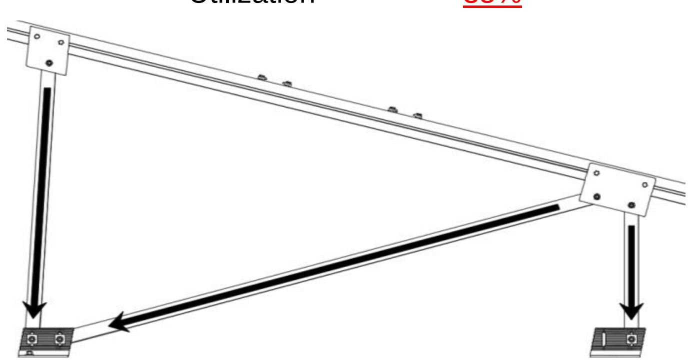
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Single M12 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are used.

Front Strut	
Maximum Axial Load =	2.771 k
M12 Bolt Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	37%

Rear Strut	
Maximum Axial Load =	4.252 k
M12 Bolt Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	57%

Diagonal Strut	
Maximum Axial Load =	2.580 k
M12 Bolt Shear Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	35%

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 M12 bolts are located at each end of the strut and are subjected to double shear.

7. SEISMIC DESIGN

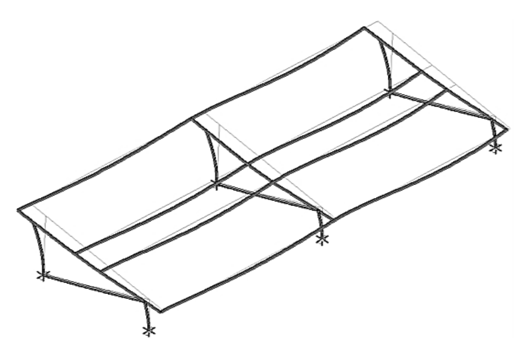
7.1 Seismic Drift

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} =	48.27 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$
	0.965 in
Max Drift, Δ_{MAX} =	0.709 in

$0.709 \le 0.965$, 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 = **S1.5**

Strong Axis:

3.4.14

L_b = 126 in

J = 0.432

348.575

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

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= 27.2 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

$\varphi F_L St$= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in^3

$M_{max}St$ = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 126

J = 0.432

221.673

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.5

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in^3

$M_{max}Wk$ = 1.152 k-ft

Compression

3.4.9

b/t = 32.195
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 25.1 ksi

b/t = 37.0588
S1 = 12.21
S2 = 32.70
$\varphi F_L = (\varphi ck2*\sqrt{(BpE)})/(1.6b/t)$
$\varphi F_L =$ 21.9 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

$\varphi F_L =$ 21.94 ksi
A = 1215.13 mm^2
1.88 in^2
$P_{max} =$ 41.32 kips

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

Girder = **BF0**

Strong Axis:
3.4.14

$L_b =$ 88.9 in
J = 1.08
152.913

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 29.4 ksi

3.4.16

b/t = 16.2

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

S1 = 12.2

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

S2 = 46.7
$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 31.6 ksi

Weak Axis:
3.4.14

$L_b =$ 88.9
J = 1.08
161.829

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 29.2

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 33.3 ksi

3.4.16.1	Used	**3.4.16.1**	
Rb/t =	18.1	N/A for Weak Direction	

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L = φb[Bt-Dt*√(Rb/t)]

φF_L = 31.1 ksi

3.4.18 (strong) / **3.4.18** (weak)

h/t =	7.4	h/t =	16.2

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

S1 =	35.2	S1 =	36.9
m =	0.68	m =	0.65
C_0 =	41.067	C_0 =	40
Cc =	43.717	Cc =	40

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

S2 =	73.8	S2 =	77.3
φF_L =	1.3φyFcy	φF_L =	1.3φyFcy
φF_L =	43.2 ksi	φF_L =	43.2 ksi
φF_LSt=	29.4 ksi	φF_LWk=	33.3 ksi
Ix =	984962 mm^4	Iy =	923544 mm^4
	2.366 in^4		2.219 in^4
y =	43.717 mm	x =	40 mm
Sx =	1.375 in^3	Sy =	1.409 in^3
M_{max}St =	3.363 k-ft	M_{max}Wk =	3.904 k-ft

Compression

3.4.9

b/t = 16.2
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L = φc[Bp-1.6Dp*b/t]
φF_L = 31.6 ksi

b/t = 7.4
S1 = 12.21
S2 = 32.70
φF_L = φyFcy
φF_L = 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87
S2 = 131.3
φF_L = φc[Bt-Dt*√(Rb/t)]
φF_L = 31.09 ksi

φF_L = 31.09 ksi
A = 1215.13 mm^2
1.88 in^2
P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

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= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 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

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

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= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 86.60 in

J = 0.942

135.148

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

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= 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

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= 29.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 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

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in³

M_{max}St = 1.460 k-ft

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in³

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 2.00335

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.86047

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 ksi

3.4.9

b/t = 24.5
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.2 ksi

b/t = 24.5
S1 = 12.21
S2 = 32.70
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.2 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= 7.50 ksi
A = 663.99 mm^2
1.03 in^2
P_{max} = 7.72 kips

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

Strut = **<u>55x55</u>**

<u>Strong Axis:</u>

3.4.14

L_b = 70.83 in
J = 0.942
110.537

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 30.0 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7
φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 28.2 ksi

<u>Weak Axis:</u>

3.4.14

L_b = 70.83
J = 0.942
110.537

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 30.0

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7
φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 28.2 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

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.63853

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.80939

φF_L= (φccFcy)/(λ²)

φF_L= 10.5516 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 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

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 10.55 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 10.86 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				4		
2	Dead Load, Min	DL		-1				4		
3	Snow Load	SL						4		
4	Wind Load - Pressure	WL						4		
5	Wind Load - Suction	WL						4		
6	Seismic - Lateral	EL			.8			8		

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	M14	Y	-8.366	-8.366	0	0
3	M15	Y	-8.366	-8.366	0	0
4	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	M14	Y	-4.45	-4.45	0	0
3	M15	Y	-4.45	-4.45	0	0
4	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	-39.836	-39.836	0	0
2	M14	Y	-39.836	-39.836	0	0
3	M15	Y	-39.836	-39.836	0	0
4	M16	Y	-39.836	-39.836	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	-50.353	-50.353	0	0
2	M14	y	-50.353	-50.353	0	0
3	M15	y	-81.003	-81.003	0	0
4	M16	y	-81.003	-81.003	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	113.842	113.842	0	0
2	M14	y	87.571	87.571	0	0
3	M15	y	48.164	48.164	0	0
4	M16	y	48.164	48.164	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	M14	Z	6.693	6.693	0	0
3	M15	Z	6.693	6.693	0	0
4	M16	Z	6.693	6.693	0	0
5	M13	Z	0	0	0	0
6	M14	Z	0	0	0	0
7	M15	Z	0	0	0	0
8	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 + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8														
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6														
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																
10	ASD 1.0D + 1.0W	Yes	Y		1	1			4	1														
11	ASD 1.0D + 0.75L + 0.75W + 0....	Yes	Y		1	1	3	.75	4	.75														
12	ASD 0.6D + 1.0W	Yes	Y		2	.6					5	1												
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875												
14	LATERAL - ASD 1.1785D + 0.65...	Yes	Y		1	1.1...	3	.75			6	.656												
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	780.033	2	1185.12	2	.722	1	.003	1	0	1	0	1
2		min	-964.934	3	-1498.781	3	-36.378	5	-.218	4	0	1	0	1
3	N7	max	.04	9	1073.693	1	-.73	12	-.001	12	0	1	0	1
4		min	-.188	2	-31.165	5	-302.96	4	-.588	4	0	1	0	1
5	N15	max	.033	9	2771.388	1	0	10	0	10	0	1	0	1
6		min	-2.092	2	-161.725	3	-288.574	4	-.568	4	0	1	0	1
7	N16	max	2855.963	2	3886.189	2	0	2	0	1	0	1	0	1
8		min	-3072.016	3	-4908.778	3	-36.192	5	-.22	4	0	1	0	1
9	N23	max	.044	14	1073.693	1	12.695	1	.025	1	0	1	0	1
10		min	-.188	2	-18.072	3	-293.655	5	-.573	4	0	1	0	1
11	N24	max	780.033	2	1185.12	2	-.049	12	0	12	0	1	0	1
12		min	-964.934	3	-1498.781	3	-37.062	5	-.22	4	0	1	0	1
13	Totals:	max	4413.562	2	10458.462	2	0	10						
14		min	-5002.049	3	-8104.209	3	-988.765	5						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	123.485	1	420.902	2	-9.722	12	.001	3	.295	1	0	4
2			min	7.283	12	-699.017	3	-190.864	1	-.013	2	.017	12	0	3
3		2	max	123.485	1	294.819	2	-7.638	12	.001	3	.132	4	.695	3
4			min	7.283	12	-491.927	3	-146.775	1	-.013	2	.007	12	-.417	2
5		3	max	123.485	1	168.736	2	-5.554	12	.001	3	.069	5	1.148	3
6			min	7.283	12	-284.836	3	-102.687	1	-.013	2	-.047	1	-.688	2
7		4	max	123.485	1	42.652	2	-3.47	12	.001	3	.035	5	1.359	3
8			min	7.283	12	-77.745	3	-58.598	1	-.013	2	-.141	1	-.811	2
9		5	max	123.485	1	129.346	3	-1.386	12	.001	3	.004	5	1.329	3
10			min	7.283	12	-83.431	2	-28.293	4	-.013	2	-.184	1	-.787	2
11		6	max	123.485	1	336.437	3	29.58	1	.001	3	-.009	12	1.058	3
12			min	3.232	15	-209.514	2	-21.167	5	-.013	2	-.175	1	-.617	2
13		7	max	123.485	1	543.527	3	73.669	1	.001	3	-.007	12	.544	3
14			min	-6.81	5	-335.598	2	-17.942	5	-.013	2	-.115	1	-.299	2
15		8	max	123.485	1	750.618	3	117.758	1	.001	3	.001	10	.167	2
16			min	-18.786	5	-461.681	2	-14.718	5	-.013	2	-.066	4	-.211	3
17		9	max	123.485	1	957.709	3	161.847	1	.001	3	.16	1	.779	2
18			min	-30.762	5	-587.764	2	-11.494	5	-.013	2	-.079	5	-1.207	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
19		10	max	123.485	1	1164.8	3	205.936	1	.013	2	.374	1	1.538	2
20			min	7.283	12	-713.848	2	-125.062	14	-.001	3	.014	12	-2.445	3
21		11	max	123.485	1	587.764	2	-6.95	12	.013	2	.16	1	.779	2
22			min	7.283	12	-957.709	3	-161.847	1	-.001	3	.005	12	-1.207	3
23		12	max	123.485	1	461.681	2	-4.866	12	.013	2	.063	4	.167	2
24			min	7.283	12	-750.618	3	-117.758	1	-.001	3	-.004	3	-.211	3
25		13	max	123.485	1	335.598	2	-2.782	12	.013	2	.028	5	.544	3
26			min	7.283	12	-543.527	3	-73.669	1	-.001	3	-.115	1	-.299	2
27		14	max	123.485	1	209.514	2	-.698	12	.013	2	-.002	15	1.058	3
28			min	7.283	12	-336.437	3	-32.658	4	-.001	3	-.175	1	-.617	2
29		15	max	123.485	1	83.431	2	14.509	1	.013	2	-.008	12	1.329	3
30			min	.382	15	-129.346	3	-22.208	5	-.001	3	-.184	1	-.787	2
31		16	max	123.485	1	77.745	3	58.598	1	.013	2	-.006	12	1.359	3
32			min	-11.113	5	-42.652	2	-18.984	5	-.001	3	-.141	1	-.811	2
33		17	max	123.485	1	284.836	3	102.687	1	.013	2	0	3	1.148	3
34			min	-23.089	5	-168.736	2	-15.76	5	-.001	3	-.088	4	-.688	2
35		18	max	123.485	1	491.927	3	146.775	1	.013	2	.098	1	.695	3
36			min	-35.065	5	-294.819	2	-12.535	5	-.001	3	-.092	5	-.417	2
37		19	max	123.485	1	699.017	3	190.864	1	.013	2	.295	1	0	1
38			min	-47.041	5	-420.902	2	-9.311	5	-.001	3	-.105	5	0	3
39	M14	1	max	61.857	4	445.332	2	-9.978	12	.008	3	.335	1	0	4
40			min	3.035	12	-547.817	3	-196.55	1	-.01	2	.019	12	0	3
41		2	max	55.599	1	319.249	2	-7.894	12	.008	3	.187	4	.547	3
42			min	3.035	12	-389.766	3	-152.462	1	-.01	2	.009	12	-.446	2
43		3	max	55.599	1	193.165	2	-5.81	12	.008	3	.101	5	.909	3
44			min	3.035	12	-231.714	3	-108.373	1	-.01	2	-.021	1	-.745	2
45		4	max	55.599	1	67.082	2	-3.727	12	.008	3	.053	5	1.088	3
46			min	3.035	12	-73.663	3	-64.284	1	-.01	2	-.121	1	-.897	2
47		5	max	55.599	1	84.389	3	-1.643	12	.008	3	.009	5	1.081	3
48			min	.584	15	-59.202	1	-41.666	4	-.01	2	-.171	1	-.901	2
49		6	max	55.599	1	242.441	3	23.894	1	.008	3	-.008	12	.891	3
50			min	-11.038	5	-185.085	2	-32.988	5	-.01	2	-.169	1	-.759	2
51		7	max	55.599	1	400.492	3	67.983	1	.008	3	-.007	12	.516	3
52			min	-23.015	5	-311.168	2	-29.764	5	-.01	2	-.115	1	-.47	2
53		8	max	55.599	1	558.544	3	112.072	1	.008	3	0	10	0	15
54			min	-34.991	5	-437.251	2	-26.54	5	-.01	2	-.105	4	-.044	3
55		9	max	55.599	1	716.595	3	156.161	1	.008	3	.147	1	.553	1
56			min	-46.967	5	-563.335	2	-23.316	5	-.01	2	-.13	5	-.788	3
57		10	max	79.751	4	874.647	3	200.25	1	.01	2	.354	1	1.281	2
58			min	3.035	12	-689.418	2	-127.918	14	-.008	3	.013	12	-1.716	3
59		11	max	67.775	4	563.335	2	-6.693	12	.01	2	.187	4	.553	1
60			min	3.035	12	-716.595	3	-156.161	1	-.008	3	.004	12	-.788	3
61		12	max	55.799	4	437.251	2	-4.609	12	.01	2	.099	5	0	15
62			min	3.035	12	-558.544	3	-112.072	1	-.008	3	-.01	1	-.044	3
63		13	max	55.599	1	311.168	2	-2.525	12	.01	2	.051	5	.516	3
64			min	3.035	12	-400.492	3	-67.983	1	-.008	3	-.115	1	-.47	2
65		14	max	55.599	1	185.085	2	-.441	12	.01	2	.007	5	.891	3
66			min	3.035	12	-242.441	3	-42.543	4	-.008	3	-.169	1	-.759	2
67		15	max	55.599	1	59.202	1	20.195	1	.01	2	-.008	12	1.081	3
68			min	3.035	12	-84.389	3	-33.198	5	-.008	3	-.171	1	-.901	2
69		16	max	55.599	1	73.663	3	64.284	1	.01	2	-.005	12	1.088	3
70			min	-5.224	5	-67.082	2	-29.974	5	-.008	3	-.121	1	-.897	2
71		17	max	55.599	1	231.714	3	108.373	1	.01	2	.002	3	.909	3
72			min	-17.2	5	-193.165	2	-26.75	5	-.008	3	-.11	4	-.745	2
73		18	max	55.599	1	389.766	3	152.462	1	.01	2	.131	1	.547	3
74			min	-29.176	5	-319.249	2	-23.525	5	-.008	3	-.133	5	-.446	2
75		19	max	55.599	1	547.817	3	196.55	1	.01	2	.335	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
76			min	-41.152	5	-445.332	2	-20.301	5	-.008	3	-.159	5	0	3
77	M15	1	max	88.34	5	638.447	2	-9.924	12	.011	2	.339	4	0	2
78			min	-58.528	1	-299.711	3	-196.523	1	-.007	3	.019	12	0	3
79		2	max	76.364	5	455.151	2	-7.84	12	.011	2	.225	4	.3	3
80			min	-58.528	1	-215.219	3	-152.434	1	-.007	3	.009	12	-.638	2
81		3	max	64.388	5	271.854	2	-5.756	12	.011	2	.129	5	.502	3
82			min	-58.528	1	-130.727	3	-108.345	1	-.007	3	-.021	1	-1.062	2
83		4	max	52.412	5	88.557	2	-3.672	12	.011	2	.07	5	.605	3
84			min	-58.528	1	-46.235	3	-64.398	4	-.007	3	-.122	1	-1.272	2
85		5	max	40.435	5	38.257	3	-1.588	12	.011	2	.015	5	.61	3
86			min	-58.528	1	-94.739	2	-50.884	4	-.007	3	-.171	1	-1.269	2
87		6	max	28.459	5	122.749	3	23.922	1	.011	2	-.008	12	.516	3
88			min	-58.528	1	-278.036	2	-42.168	5	-.007	3	-.169	1	-1.051	2
89		7	max	16.483	5	207.24	3	68.011	1	.011	2	-.007	12	.324	3
90			min	-58.528	1	-461.333	2	-38.943	5	-.007	3	-.115	1	-.62	2
91		8	max	4.507	5	291.732	3	112.099	1	.011	2	0	10	.033	3
92			min	-58.528	1	-644.629	2	-35.719	5	-.007	3	-.131	4	-.003	9
93		9	max	-3.541	12	376.224	3	156.188	1	.011	2	.147	1	.884	2
94			min	-58.528	1	-827.926	2	-32.495	5	-.007	3	-.167	5	-.357	3
95		10	max	-3.541	12	460.716	3	200.277	1	.007	3	.354	1	1.957	2
96			min	-58.528	1	-1011.223	2	-132.629	14	-.011	2	.013	12	-.845	3
97		11	max	-.892	15	827.926	2	-6.747	12	.007	3	.224	4	.884	2
98			min	-58.528	1	-376.224	3	-156.188	1	-.011	2	.004	12	-.357	3
99		12	max	-3.541	12	644.629	2	-4.664	12	.007	3	.125	5	.033	3
100			min	-58.528	1	-291.732	3	-112.099	1	-.011	2	-.01	1	-.003	9
101		13	max	-3.541	12	461.333	2	-2.58	12	.007	3	.066	5	.324	3
102			min	-58.528	1	-207.24	3	-68.011	1	-.011	2	-.115	1	-.62	2
103		14	max	-3.541	12	278.036	2	-.496	12	.007	3	.011	5	.516	3
104			min	-58.528	1	-122.749	3	-51.79	4	-.011	2	-.169	1	-1.051	2
105		15	max	-3.541	12	94.739	2	20.167	1	.007	3	-.008	12	.61	3
106			min	-63.966	4	-38.257	3	-42.382	5	-.011	2	-.171	1	-1.269	2
107		16	max	-3.541	12	46.235	3	64.256	1	.007	3	-.005	12	.605	3
108			min	-75.942	4	-88.557	2	-39.158	5	-.011	2	-.122	1	-1.272	2
109		17	max	-3.541	12	130.727	3	108.345	1	.007	3	.001	3	.502	3
110			min	-87.918	4	-271.854	2	-35.933	5	-.011	2	-.138	4	-1.062	2
111		18	max	-3.541	12	215.219	3	152.434	1	.007	3	.131	1	.3	3
112			min	-99.894	4	-455.151	2	-32.709	5	-.011	2	-.172	5	-.638	2
113		19	max	-3.541	12	299.711	3	196.523	1	.007	3	.335	1	0	2
114			min	-111.87	4	-638.447	2	-29.485	5	-.011	2	-.208	5	0	5
115	M16	1	max	86.326	5	614.864	2	-9.543	12	.01	2	.297	1	0	2
116			min	-132.529	1	-281.164	3	-191.118	1	-.011	3	.017	12	0	3
117		2	max	74.35	5	431.568	2	-7.459	12	.01	2	.173	4	.279	3
118			min	-132.529	1	-196.672	3	-147.03	1	-.011	3	.007	12	-.61	2
119		3	max	62.374	5	248.271	2	-5.375	12	.01	2	.098	5	.459	3
120			min	-132.529	1	-112.18	3	-102.941	1	-.011	3	-.046	1	-1.007	2
121		4	max	50.398	5	64.974	2	-3.291	12	.01	2	.053	5	.54	3
122			min	-132.529	1	-27.688	3	-58.852	1	-.011	3	-.141	1	-1.19	2
123		5	max	38.422	5	56.804	3	-1.207	12	.01	2	.012	5	.524	3
124			min	-132.529	1	-118.322	2	-37.889	4	-.011	3	-.184	1	-1.159	2
125		6	max	26.446	5	141.296	3	29.326	1	.01	2	-.009	12	.408	3
126			min	-132.529	1	-301.619	2	-30.621	5	-.011	3	-.175	1	-.914	2
127		7	max	14.47	5	225.788	3	73.415	1	.01	2	-.006	12	.194	3
128			min	-132.529	1	-484.916	2	-27.397	5	-.011	3	-.115	1	-.455	2
129		8	max	2.494	5	310.279	3	117.504	1	.01	2	0	10	.218	2
130			min	-132.529	1	-668.212	2	-24.173	5	-.011	3	-.093	4	-.119	3
131		9	max	-6.188	15	394.771	3	161.593	1	.01	2	.159	1	1.104	2
132			min	-132.529	1	-851.509	2	-20.949	5	-.011	3	-.116	5	-.53	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
133		10	max	-7.46	12	479.263	3	205.682	1	.011	3	.373	1	2.205	2
134			min	-132.529	1	-1034.806	2	-129.836	14	-.01	2	.015	12	-1.04	3
135		11	max	-6.445	15	851.509	2	-7.129	12	.011	3	.178	4	1.104	2
136			min	-132.529	1	-394.771	3	-161.593	1	-.01	2	.005	12	-.53	3
137		12	max	-7.46	12	668.212	2	-5.045	12	.011	3	.09	4	.218	2
138			min	-132.529	1	-310.279	3	-117.504	1	-.01	2	-.004	1	-.119	3
139		13	max	-7.46	12	484.916	2	-2.961	12	.011	3	.043	5	.194	3
140			min	-132.529	1	-225.788	3	-73.415	1	-.01	2	-.115	1	-.455	2
141		14	max	-7.46	12	301.619	2	-.877	12	.011	3	0	15	.408	3
142			min	-132.529	1	-141.296	3	-42.154	4	-.01	2	-.175	1	-.914	2
143		15	max	-7.46	12	118.322	2	14.763	1	.011	3	-.008	12	.524	3
144			min	-132.529	1	-56.804	3	-31.644	5	-.01	2	-.184	1	-1.159	2
145		16	max	-7.46	12	27.688	3	58.852	1	.011	3	-.006	12	.54	3
146			min	-132.529	1	-64.974	2	-28.419	5	-.01	2	-.141	1	-1.19	2
147		17	max	-7.46	12	112.18	3	102.941	1	.011	3	0	12	.459	3
148			min	-132.529	1	-248.271	2	-25.195	5	-.01	2	-.117	4	-1.007	2
149		18	max	-7.46	12	196.672	3	147.03	1	.011	3	.1	1	.279	3
150			min	-132.529	1	-431.568	2	-21.971	5	-.01	2	-.132	5	-.61	2
151		19	max	-7.46	12	281.164	3	191.118	1	.011	3	.297	1	0	2
152			min	-137.894	4	-614.864	2	-18.747	5	-.01	2	-.156	5	0	3
153	M2	1	max	996.836	2	1.957	4	.57	1	0	12	0	3	0	1
154			min	-1297.662	3	.473	15	-35.573	4	0	4	0	2	0	1
155		2	max	997.311	2	1.872	4	.57	1	0	12	0	1	0	15
156			min	-1297.305	3	.453	15	-35.99	4	0	4	-.012	4	0	4
157		3	max	997.787	2	1.786	4	.57	1	0	12	0	1	0	15
158			min	-1296.949	3	.433	15	-36.406	4	0	4	-.023	4	-.001	4
159		4	max	998.263	2	1.701	4	.57	1	0	12	0	1	0	15
160			min	-1296.592	3	.413	15	-36.822	4	0	4	-.035	4	-.002	4
161		5	max	998.739	2	1.615	4	.57	1	0	12	0	1	0	15
162			min	-1296.235	3	.393	15	-37.239	4	0	4	-.047	4	-.002	4
163		6	max	999.214	2	1.529	4	.57	1	0	12	0	1	0	15
164			min	-1295.878	3	.372	15	-37.655	4	0	4	-.059	4	-.003	4
165		7	max	999.69	2	1.444	4	.57	1	0	12	.001	1	0	15
166			min	-1295.521	3	.352	15	-38.071	4	0	4	-.072	4	-.003	4
167		8	max	1000.166	2	1.358	4	.57	1	0	12	.001	1	0	15
168			min	-1295.165	3	.332	15	-38.488	4	0	4	-.084	4	-.004	4
169		9	max	1000.642	2	1.273	4	.57	1	0	12	.001	1	-.001	15
170			min	-1294.808	3	.302	12	-38.904	4	0	4	-.096	4	-.004	4
171		10	max	1001.117	2	1.187	4	.57	1	0	12	.002	1	-.001	15
172			min	-1294.451	3	.268	12	-39.32	4	0	4	-.109	4	-.005	4
173		11	max	1001.593	2	1.101	4	.57	1	0	12	.002	1	-.001	15
174			min	-1294.094	3	.235	12	-39.737	4	0	4	-.122	4	-.005	4
175		12	max	1002.069	2	1.016	4	.57	1	0	12	.002	1	-.001	15
176			min	-1293.737	3	.202	12	-40.153	4	0	4	-.135	4	-.005	4
177		13	max	1002.545	2	.93	4	.57	1	0	12	.002	1	-.001	15
178			min	-1293.38	3	.168	12	-40.569	4	0	4	-.148	4	-.006	4
179		14	max	1003.02	2	.85	2	.57	1	0	12	.002	1	-.001	15
180			min	-1293.024	3	.135	12	-40.986	4	0	4	-.161	4	-.006	4
181		15	max	1003.496	2	.784	2	.57	1	0	12	.003	1	-.002	15
182			min	-1292.667	3	.102	12	-41.402	4	0	4	-.174	4	-.006	4
183		16	max	1003.972	2	.717	2	.57	1	0	12	.003	1	-.002	12
184			min	-1292.31	3	.068	12	-41.819	4	0	4	-.188	4	-.006	4
185		17	max	1004.448	2	.65	2	.57	1	0	12	.003	1	-.002	12
186			min	-1291.953	3	.034	3	-42.235	4	0	4	-.202	4	-.007	4
187		18	max	1004.923	2	.584	2	.57	1	0	12	.003	1	-.002	12
188			min	-1291.596	3	-.016	3	-42.651	4	0	4	-.215	4	-.007	4
189		19	max	1005.399	2	.517	2	.57	1	0	12	.003	1	-.002	12

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
190			min	-1291.24	3	-.066	3	-43.068	4	0	4	-.229	4	-.007	4
191	M3	1	max	667.495	2	7.8	4	5.696	4	0	12	0	1	.007	4
192			min	-815.619	3	1.844	15	.015	12	0	4	-.033	4	.002	12
193		2	max	667.325	2	7.036	4	6.233	4	0	12	0	1	.004	2
194			min	-815.747	3	1.664	15	.015	12	0	4	-.031	4	0	12
195		3	max	667.154	2	6.272	4	6.77	4	0	12	0	1	.002	2
196			min	-815.875	3	1.484	15	.015	12	0	4	-.028	4	0	3
197		4	max	666.984	2	5.507	4	7.307	4	0	12	0	1	0	2
198			min	-816.002	3	1.305	15	.015	12	0	4	-.025	4	-.002	3
199		5	max	666.814	2	4.743	4	7.844	4	0	12	0	1	0	15
200			min	-816.13	3	1.125	15	.015	12	0	4	-.022	4	-.004	6
201		6	max	666.643	2	3.978	4	8.381	4	0	12	.001	1	-.001	15
202			min	-816.258	3	.945	15	.015	12	0	4	-.018	5	-.005	6
203		7	max	666.473	2	3.214	4	8.918	4	0	12	.001	1	-.002	15
204			min	-816.386	3	.765	15	.015	12	0	4	-.015	5	-.007	6
205		8	max	666.303	2	2.449	4	9.455	4	0	12	.001	1	-.002	15
206			min	-816.513	3	.586	15	.015	12	0	4	-.011	5	-.008	6
207		9	max	666.132	2	1.685	4	9.992	4	0	12	.001	1	-.002	15
208			min	-816.641	3	.406	15	.015	12	0	4	-.007	5	-.009	6
209		10	max	665.962	2	.92	4	10.529	4	0	12	.001	1	-.002	15
210			min	-816.769	3	.208	12	.015	12	0	4	-.003	5	-.009	6
211		11	max	665.792	2	.271	2	11.066	4	0	12	.002	4	-.002	15
212			min	-816.897	3	-.149	3	.015	12	0	4	0	12	-.01	6
213		12	max	665.621	2	-.133	15	11.603	4	0	12	.007	4	-.002	15
214			min	-817.024	3	-.609	6	.015	12	0	4	0	12	-.01	6
215		13	max	665.451	2	-.313	15	12.139	4	0	12	.012	4	-.002	15
216			min	-817.152	3	-1.374	6	.015	12	0	4	0	12	-.009	6
217		14	max	665.281	2	-.492	15	12.676	4	0	12	.017	4	-.002	15
218			min	-817.28	3	-2.138	6	.015	12	0	4	0	12	-.008	6
219		15	max	665.11	2	-.672	15	13.213	4	0	12	.022	4	-.002	15
220			min	-817.408	3	-2.903	6	.015	12	0	4	0	12	-.007	6
221		16	max	664.94	2	-.852	15	13.75	4	0	12	.028	4	-.001	15
222			min	-817.535	3	-3.667	6	.015	12	0	4	0	12	-.006	6
223		17	max	664.77	2	-1.031	15	14.287	4	0	12	.034	4	-.001	15
224			min	-817.663	3	-4.432	6	.015	12	0	4	0	12	-.004	6
225		18	max	664.599	2	-1.211	15	14.824	4	0	12	.04	4	0	15
226			min	-817.791	3	-5.196	6	.015	12	0	4	0	12	-.002	6
227		19	max	664.429	2	-1.391	15	15.361	4	0	12	.046	4	0	1
228			min	-817.919	3	-5.96	6	.015	12	0	4	0	12	0	1
229	M4	1	max	1070.627	1	0	1	-.73	12	0	1	.038	4	0	1
230			min	-32.596	5	0	1	-301.787	4	0	1	0	12	0	1
231		2	max	1070.797	1	0	1	-.73	12	0	1	.004	4	0	1
232			min	-32.516	5	0	1	-301.934	4	0	1	0	12	0	1
233		3	max	1070.967	1	0	1	-.73	12	0	1	0	12	0	1
234			min	-32.437	5	0	1	-302.082	4	0	1	-.031	4	0	1
235		4	max	1071.138	1	0	1	-.73	12	0	1	0	12	0	1
236			min	-32.357	5	0	1	-302.23	4	0	1	-.066	4	0	1
237		5	max	1071.308	1	0	1	-.73	12	0	1	0	12	0	1
238			min	-32.278	5	0	1	-302.377	4	0	1	-.101	4	0	1
239		6	max	1071.478	1	0	1	-.73	12	0	1	0	12	0	1
240			min	-32.198	5	0	1	-302.525	4	0	1	-.135	4	0	1
241		7	max	1071.649	1	0	1	-.73	12	0	1	0	12	0	1
242			min	-32.119	5	0	1	-302.672	4	0	1	-.17	4	0	1
243		8	max	1071.819	1	0	1	-.73	12	0	1	0	12	0	1
244			min	-32.039	5	0	1	-302.82	4	0	1	-.205	4	0	1
245		9	max	1071.989	1	0	1	-.73	12	0	1	0	12	0	1
246			min	-31.96	5	0	1	-302.968	4	0	1	-.24	4	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
247		10	max	1072.16	1	0	1	-.73	12	0	1	0	12	0	1
248			min	-31.88	5	0	1	-303.115	4	0	1	-.274	4	0	1
249		11	max	1072.33	1	0	1	-.73	12	0	1	0	12	0	1
250			min	-31.801	5	0	1	-303.263	4	0	1	-.309	4	0	1
251		12	max	1072.5	1	0	1	-.73	12	0	1	0	12	0	1
252			min	-31.721	5	0	1	-303.411	4	0	1	-.344	4	0	1
253		13	max	1072.671	1	0	1	-.73	12	0	1	0	12	0	1
254			min	-31.642	5	0	1	-303.558	4	0	1	-.379	4	0	1
255		14	max	1072.841	1	0	1	-.73	12	0	1	0	12	0	1
256			min	-31.562	5	0	1	-303.706	4	0	1	-.414	4	0	1
257		15	max	1073.011	1	0	1	-.73	12	0	1	-.001	12	0	1
258			min	-31.483	5	0	1	-303.854	4	0	1	-.449	4	0	1
259		16	max	1073.182	1	0	1	-.73	12	0	1	-.001	12	0	1
260			min	-31.403	5	0	1	-304.001	4	0	1	-.483	4	0	1
261		17	max	1073.352	1	0	1	-.73	12	0	1	-.001	12	0	1
262			min	-31.324	5	0	1	-304.149	4	0	1	-.518	4	0	1
263		18	max	1073.522	1	0	1	-.73	12	0	1	-.001	12	0	1
264			min	-31.244	5	0	1	-304.296	4	0	1	-.553	4	0	1
265		19	max	1073.693	1	0	1	-.73	12	0	1	-.001	12	0	1
266			min	-31.165	5	0	1	-304.444	4	0	1	-.588	4	0	1
267	M6	1	max	3212.938	2	2.268	2	0	1	0	1	0	4	0	1
268			min	-4251.842	3	.161	12	-35.957	4	0	4	0	1	0	1
269		2	max	3213.414	2	2.202	2	0	1	0	1	0	1	0	12
270			min	-4251.485	3	.127	12	-36.374	4	0	4	-.012	4	0	2
271		3	max	3213.89	2	2.135	2	0	1	0	1	0	1	0	12
272			min	-4251.129	3	.082	3	-36.79	4	0	4	-.024	4	-.001	2
273		4	max	3214.366	2	2.068	2	0	1	0	1	0	1	0	3
274			min	-4250.772	3	.032	3	-37.206	4	0	4	-.036	4	-.002	2
275		5	max	3214.841	2	2.002	2	0	1	0	1	0	1	0	3
276			min	-4250.415	3	-.018	3	-37.623	4	0	4	-.048	4	-.003	2
277		6	max	3215.317	2	1.935	2	0	1	0	1	0	1	0	3
278			min	-4250.058	3	-.068	3	-38.039	4	0	4	-.06	4	-.003	2
279		7	max	3215.793	2	1.868	2	0	1	0	1	0	1	0	3
280			min	-4249.701	3	-.118	3	-38.456	4	0	4	-.072	4	-.004	2
281		8	max	3216.269	2	1.802	2	0	1	0	1	0	1	0	3
282			min	-4249.345	3	-.168	3	-38.872	4	0	4	-.085	4	-.005	2
283		9	max	3216.744	2	1.735	2	0	1	0	1	0	1	0	3
284			min	-4248.988	3	-.218	3	-39.288	4	0	4	-.097	4	-.005	2
285		10	max	3217.22	2	1.668	2	0	1	0	1	0	1	0	3
286			min	-4248.631	3	-.268	3	-39.705	4	0	4	-.11	4	-.006	2
287		11	max	3217.696	2	1.601	2	0	1	0	1	0	1	0	3
288			min	-4248.274	3	-.318	3	-40.121	4	0	4	-.123	4	-.006	2
289		12	max	3218.172	2	1.535	2	0	1	0	1	0	1	0	3
290			min	-4247.917	3	-.368	3	-40.537	4	0	4	-.136	4	-.007	2
291		13	max	3218.647	2	1.468	2	0	1	0	1	0	1	0	3
292			min	-4247.56	3	-.418	3	-40.954	4	0	4	-.149	4	-.007	2
293		14	max	3219.123	2	1.401	2	0	1	0	1	0	1	0	3
294			min	-4247.204	3	-.469	3	-41.37	4	0	4	-.163	4	-.008	2
295		15	max	3219.599	2	1.335	2	0	1	0	1	0	1	0	3
296			min	-4246.847	3	-.519	3	-41.786	4	0	4	-.176	4	-.008	2
297		16	max	3220.075	2	1.268	2	0	1	0	1	0	1	0	3
298			min	-4246.49	3	-.569	3	-42.203	4	0	4	-.19	4	-.009	2
299		17	max	3220.55	2	1.201	2	0	1	0	1	0	1	.001	3
300			min	-4246.133	3	-.619	3	-42.619	4	0	4	-.204	4	-.009	2
301		18	max	3221.026	2	1.135	2	0	1	0	1	0	1	.001	3
302			min	-4245.776	3	-.669	3	-43.035	4	0	4	-.217	4	-.009	2
303		19	max	3221.502	2	1.068	2	0	1	0	1	0	1	.002	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
304			min	-4245.42	3	-.719	3	-43.452	4	0	4	-.231	4	-.01	2
305	M7	1	max	2507.499	2	7.812	6	5.378	4	0	1	0	1	.01	2
306			min	-2577.709	3	1.834	15	0	1	0	4	-.033	4	-.002	3
307		2	max	2507.329	2	7.048	6	5.915	4	0	1	0	1	.007	2
308			min	-2577.836	3	1.654	15	0	1	0	4	-.031	4	-.003	3
309		3	max	2507.158	2	6.283	6	6.452	4	0	1	0	1	.005	2
310			min	-2577.964	3	1.475	15	0	1	0	4	-.028	4	-.004	3
311		4	max	2506.988	2	5.519	6	6.989	4	0	1	0	1	.003	2
312			min	-2578.092	3	1.295	15	0	1	0	4	-.026	4	-.006	3
313		5	max	2506.818	2	4.755	6	7.526	4	0	1	0	1	0	2
314			min	-2578.22	3	1.115	15	0	1	0	4	-.023	4	-.006	3
315		6	max	2506.647	2	3.99	6	8.063	4	0	1	0	1	-.001	2
316			min	-2578.347	3	.936	15	0	1	0	4	-.019	4	-.007	3
317		7	max	2506.477	2	3.226	6	8.599	4	0	1	0	1	-.002	15
318			min	-2578.475	3	.756	15	0	1	0	4	-.016	4	-.008	3
319		8	max	2506.307	2	2.485	2	9.136	4	0	1	0	1	-.002	15
320			min	-2578.603	3	.488	12	0	1	0	4	-.012	4	-.008	3
321		9	max	2506.136	2	1.889	2	9.673	4	0	1	0	1	-.002	15
322			min	-2578.731	3	.19	12	0	1	0	4	-.008	4	-.009	4
323		10	max	2505.966	2	1.293	2	10.21	4	0	1	0	1	-.002	15
324			min	-2578.858	3	-.208	3	0	1	0	4	-.004	4	-.009	4
325		11	max	2505.796	2	.698	2	10.747	4	0	1	0	4	-.002	15
326			min	-2578.986	3	-.655	3	0	1	0	4	0	1	-.01	4
327		12	max	2505.625	2	.102	2	11.284	4	0	1	.005	4	-.002	15
328			min	-2579.114	3	-1.102	3	0	1	0	4	0	1	-.01	4
329		13	max	2505.455	2	-.322	15	11.821	4	0	1	.01	4	-.002	15
330			min	-2579.242	3	-1.548	3	0	1	0	4	0	1	-.009	4
331		14	max	2505.285	2	-.502	15	12.358	4	0	1	.015	4	-.002	15
332			min	-2579.37	3	-2.125	4	0	1	0	4	0	1	-.008	4
333		15	max	2505.114	2	-.682	15	12.895	4	0	1	.02	4	-.002	15
334			min	-2579.497	3	-2.89	4	0	1	0	4	0	1	-.007	4
335		16	max	2504.944	2	-.861	15	13.432	4	0	1	.026	4	-.001	15
336			min	-2579.625	3	-3.654	4	0	1	0	4	0	1	-.006	4
337		17	max	2504.774	2	-1.041	15	13.969	4	0	1	.031	4	-.001	15
338			min	-2579.753	3	-4.419	4	0	1	0	4	0	1	-.004	4
339		18	max	2504.603	2	-1.221	15	14.506	4	0	1	.037	4	0	15
340			min	-2579.881	3	-5.183	4	0	1	0	4	0	1	-.002	4
341		19	max	2504.433	2	-1.4	15	15.043	4	0	1	.043	4	0	1
342			min	-2580.008	3	-5.948	4	0	1	0	4	0	1	0	1
343	M8	1	max	2768.321	1	0	1	0	1	0	1	.036	4	0	1
344			min	-164.025	3	0	1	-291.109	4	0	1	0	1	0	1
345		2	max	2768.492	1	0	1	0	1	0	1	.003	5	0	1
346			min	-163.897	3	0	1	-291.256	4	0	1	0	1	0	1
347		3	max	2768.662	1	0	1	0	1	0	1	0	1	0	1
348			min	-163.769	3	0	1	-291.404	4	0	1	-.031	4	0	1
349		4	max	2768.832	1	0	1	0	1	0	1	0	1	0	1
350			min	-163.642	3	0	1	-291.552	4	0	1	-.064	4	0	1
351		5	max	2769.003	1	0	1	0	1	0	1	0	1	0	1
352			min	-163.514	3	0	1	-291.699	4	0	1	-.098	4	0	1
353		6	max	2769.173	1	0	1	0	1	0	1	0	1	0	1
354			min	-163.386	3	0	1	-291.847	4	0	1	-.131	4	0	1
355		7	max	2769.343	1	0	1	0	1	0	1	0	1	0	1
356			min	-163.258	3	0	1	-291.994	4	0	1	-.165	4	0	1
357		8	max	2769.514	1	0	1	0	1	0	1	0	1	0	1
358			min	-163.131	3	0	1	-292.142	4	0	1	-.198	4	0	1
359		9	max	2769.684	1	0	1	0	1	0	1	0	1	0	1
360			min	-163.003	3	0	1	-292.29	4	0	1	-.232	4	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
361		10	max	2769.854	1	0	1	0	1	0	1	0	1	0	1
362			min	-162.875	3	0	1	-292.437	4	0	1	-.266	4	0	1
363		11	max	2770.025	1	0	1	0	1	0	1	0	1	0	1
364			min	-162.747	3	0	1	-292.585	4	0	1	-.299	4	0	1
365		12	max	2770.195	1	0	1	0	1	0	1	0	1	0	1
366			min	-162.62	3	0	1	-292.733	4	0	1	-.333	4	0	1
367		13	max	2770.365	1	0	1	0	1	0	1	0	1	0	1
368			min	-162.492	3	0	1	-292.88	4	0	1	-.366	4	0	1
369		14	max	2770.536	1	0	1	0	1	0	1	0	1	0	1
370			min	-162.364	3	0	1	-293.028	4	0	1	-.4	4	0	1
371		15	max	2770.706	1	0	1	0	1	0	1	0	1	0	1
372			min	-162.236	3	0	1	-293.176	4	0	1	-.434	4	0	1
373		16	max	2770.877	1	0	1	0	1	0	1	0	1	0	1
374			min	-162.109	3	0	1	-293.323	4	0	1	-.467	4	0	1
375		17	max	2771.047	1	0	1	0	1	0	1	0	1	0	1
376			min	-161.981	3	0	1	-293.471	4	0	1	-.501	4	0	1
377		18	max	2771.217	1	0	1	0	1	0	1	0	1	0	1
378			min	-161.853	3	0	1	-293.618	4	0	1	-.535	4	0	1
379		19	max	2771.388	1	0	1	0	1	0	1	0	1	0	1
380			min	-161.725	3	0	1	-293.766	4	0	1	-.568	4	0	1
381	M10	1	max	996.836	2	1.901	6	-.03	12	0	1	0	2	0	1
382			min	-1297.662	3	.435	15	-35.924	4	0	5	0	3	0	1
383		2	max	997.311	2	1.815	6	-.03	12	0	1	0	10	0	15
384			min	-1297.305	3	.415	15	-36.34	4	0	5	-.012	4	0	6
385		3	max	997.787	2	1.729	6	-.03	12	0	1	0	12	0	15
386			min	-1296.949	3	.395	15	-36.757	4	0	5	-.024	4	-.001	6
387		4	max	998.263	2	1.644	6	-.03	12	0	1	0	12	0	15
388			min	-1296.592	3	.374	15	-37.173	4	0	5	-.035	4	-.002	6
389		5	max	998.739	2	1.558	6	-.03	12	0	1	0	12	0	15
390			min	-1296.235	3	.354	15	-37.59	4	0	5	-.048	4	-.002	6
391		6	max	999.214	2	1.473	6	-.03	12	0	1	0	12	0	15
392			min	-1295.878	3	.334	15	-38.006	4	0	5	-.06	4	-.003	6
393		7	max	999.69	2	1.387	6	-.03	12	0	1	0	12	0	15
394			min	-1295.521	3	.314	15	-38.422	4	0	5	-.072	4	-.003	6
395		8	max	1000.166	2	1.301	6	-.03	12	0	1	0	12	0	15
396			min	-1295.165	3	.294	15	-38.839	4	0	5	-.085	4	-.004	6
397		9	max	1000.642	2	1.216	6	-.03	12	0	1	0	12	0	15
398			min	-1294.808	3	.274	15	-39.255	4	0	5	-.097	4	-.004	6
399		10	max	1001.117	2	1.13	6	-.03	12	0	1	0	12	-.001	15
400			min	-1294.451	3	.254	15	-39.671	4	0	5	-.11	4	-.004	6
401		11	max	1001.593	2	1.051	2	-.03	12	0	1	0	12	-.001	15
402			min	-1294.094	3	.234	15	-40.088	4	0	5	-.123	4	-.005	6
403		12	max	1002.069	2	.984	2	-.03	12	0	1	0	12	-.001	15
404			min	-1293.737	3	.202	12	-40.504	4	0	5	-.136	4	-.005	6
405		13	max	1002.545	2	.917	2	-.03	12	0	1	0	12	-.001	15
406			min	-1293.38	3	.168	12	-40.92	4	0	5	-.149	4	-.005	6
407		14	max	1003.02	2	.85	2	-.03	12	0	1	0	12	-.001	15
408			min	-1293.024	3	.135	12	-41.337	4	0	5	-.163	4	-.006	6
409		15	max	1003.496	2	.784	2	-.03	12	0	1	0	12	-.001	15
410			min	-1292.667	3	.102	12	-41.753	4	0	5	-.176	4	-.006	6
411		16	max	1003.972	2	.717	2	-.03	12	0	1	0	12	-.001	15
412			min	-1292.31	3	.068	12	-42.169	4	0	5	-.19	4	-.006	6
413		17	max	1004.448	2	.65	2	-.03	12	0	1	0	12	-.001	15
414			min	-1291.953	3	.034	3	-42.586	4	0	5	-.203	4	-.006	6
415		18	max	1004.923	2	.584	2	-.03	12	0	1	0	12	-.001	15
416			min	-1291.596	3	-.016	3	-43.002	4	0	5	-.217	4	-.006	6
417		19	max	1005.399	2	.517	2	-.03	12	0	1	0	12	-.001	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
418			min	-1291.24	3	-.066	3	-43.418	4	0	5	-.231	4	-.007	6
419	M11	1	max	667.495	2	7.756	6	5.531	4	0	1	0	12	.007	6
420			min	-815.619	3	1.814	15	-.269	1	0	4	-.033	4	.001	15
421		2	max	667.325	2	6.992	6	6.068	4	0	1	0	12	.004	2
422			min	-815.747	3	1.634	15	-.269	1	0	4	-.031	4	0	12
423		3	max	667.154	2	6.228	6	6.605	4	0	1	0	12	.002	2
424			min	-815.875	3	1.455	15	-.269	1	0	4	-.028	4	0	3
425		4	max	666.984	2	5.463	6	7.142	4	0	1	0	12	0	2
426			min	-816.002	3	1.275	15	-.269	1	0	4	-.025	4	-.002	3
427		5	max	666.814	2	4.699	6	7.679	4	0	1	0	12	0	15
428			min	-816.13	3	1.095	15	-.269	1	0	4	-.022	4	-.004	4
429		6	max	666.643	2	3.934	6	8.216	4	0	1	0	12	-.001	15
430			min	-816.258	3	.915	15	-.269	1	0	4	-.019	4	-.006	4
431		7	max	666.473	2	3.17	6	8.753	4	0	1	0	12	-.002	15
432			min	-816.386	3	.736	15	-.269	1	0	4	-.015	4	-.007	4
433		8	max	666.303	2	2.405	6	9.289	4	0	1	0	12	-.002	15
434			min	-816.513	3	.556	15	-.269	1	0	4	-.012	4	-.008	4
435		9	max	666.132	2	1.641	6	9.826	4	0	1	0	12	-.002	15
436			min	-816.641	3	.376	15	-.269	1	0	4	-.008	4	-.009	4
437		10	max	665.962	2	.876	6	10.363	4	0	1	0	12	-.002	15
438			min	-816.769	3	.197	15	-.269	1	0	4	-.004	4	-.01	4
439		11	max	665.792	2	.271	2	10.9	4	0	1	.001	5	-.002	15
440			min	-816.897	3	-.149	3	-.269	1	0	4	-.002	1	-.01	4
441		12	max	665.621	2	-.163	15	11.437	4	0	1	.006	5	-.002	15
442			min	-817.024	3	-.653	4	-.269	1	0	4	-.002	1	-.01	4
443		13	max	665.451	2	-.342	15	11.974	4	0	1	.011	5	-.002	15
444			min	-817.152	3	-1.418	4	-.269	1	0	4	-.002	1	-.009	4
445		14	max	665.281	2	-.522	15	12.511	4	0	1	.016	5	-.002	15
446			min	-817.28	3	-2.182	4	-.269	1	0	4	-.002	1	-.009	4
447		15	max	665.11	2	-.702	15	13.048	4	0	1	.021	5	-.002	15
448			min	-817.408	3	-2.947	4	-.269	1	0	4	-.002	1	-.007	4
449		16	max	664.94	2	-.881	15	13.585	4	0	1	.027	5	-.001	15
450			min	-817.535	3	-3.711	4	-.269	1	0	4	-.002	1	-.006	4
451		17	max	664.77	2	-1.061	15	14.122	4	0	1	.032	5	-.001	15
452			min	-817.663	3	-4.476	4	-.269	1	0	4	-.002	1	-.004	4
453		18	max	664.599	2	-1.241	15	14.659	4	0	1	.038	5	0	15
454			min	-817.791	3	-5.24	4	-.269	1	0	4	-.002	1	-.002	4
455		19	max	664.429	2	-1.421	15	15.196	4	0	1	.045	5	0	1
456			min	-817.919	3	-6.004	4	-.269	1	0	4	-.002	1	0	1
457	M12	1	max	1070.627	1	0	1	13.088	1	0	1	.037	5	0	1
458			min	-20.372	3	0	1	-293.702	4	0	1	-.002	1	0	1
459		2	max	1070.797	1	0	1	13.088	1	0	1	.003	5	0	1
460			min	-20.244	3	0	1	-293.85	4	0	1	0	1	0	1
461		3	max	1070.967	1	0	1	13.088	1	0	1	0	1	0	1
462			min	-20.116	3	0	1	-293.997	4	0	1	-.031	4	0	1
463		4	max	1071.138	1	0	1	13.088	1	0	1	.002	1	0	1
464			min	-19.989	3	0	1	-294.145	4	0	1	-.064	4	0	1
465		5	max	1071.308	1	0	1	13.088	1	0	1	.004	1	0	1
466			min	-19.861	3	0	1	-294.293	4	0	1	-.098	4	0	1
467		6	max	1071.478	1	0	1	13.088	1	0	1	.005	1	0	1
468			min	-19.733	3	0	1	-294.44	4	0	1	-.132	4	0	1
469		7	max	1071.649	1	0	1	13.088	1	0	1	.007	1	0	1
470			min	-19.605	3	0	1	-294.588	4	0	1	-.166	4	0	1
471		8	max	1071.819	1	0	1	13.088	1	0	1	.008	1	0	1
472			min	-19.477	3	0	1	-294.736	4	0	1	-.2	4	0	1
473		9	max	1071.989	1	0	1	13.088	1	0	1	.01	1	0	1
474			min	-19.35	3	0	1	-294.883	4	0	1	-.233	4	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
475		10	max	1072.16	1	0	1	13.088	1	0	1	.011	1	0	1
476			min	-19.222	3	0	1	-295.031	4	0	1	-.267	4	0	1
477		11	max	1072.33	1	0	1	13.088	1	0	1	.013	1	0	1
478			min	-19.094	3	0	1	-295.179	4	0	1	-.301	4	0	1
479		12	max	1072.5	1	0	1	13.088	1	0	1	.014	1	0	1
480			min	-18.966	3	0	1	-295.326	4	0	1	-.335	4	0	1
481		13	max	1072.671	1	0	1	13.088	1	0	1	.016	1	0	1
482			min	-18.839	3	0	1	-295.474	4	0	1	-.369	4	0	1
483		14	max	1072.841	1	0	1	13.088	1	0	1	.017	1	0	1
484			min	-18.711	3	0	1	-295.621	4	0	1	-.403	4	0	1
485		15	max	1073.011	1	0	1	13.088	1	0	1	.019	1	0	1
486			min	-18.583	3	0	1	-295.769	4	0	1	-.437	4	0	1
487		16	max	1073.182	1	0	1	13.088	1	0	1	.02	1	0	1
488			min	-18.455	3	0	1	-295.917	4	0	1	-.471	4	0	1
489		17	max	1073.352	1	0	1	13.088	1	0	1	.022	1	0	1
490			min	-18.328	3	0	1	-296.064	4	0	1	-.505	4	0	1
491		18	max	1073.522	1	0	1	13.088	1	0	1	.023	1	0	1
492			min	-18.2	3	0	1	-296.212	4	0	1	-.539	4	0	1
493		19	max	1073.693	1	0	1	13.088	1	0	1	.025	1	0	1
494			min	-18.072	3	0	1	-296.36	4	0	1	-.573	4	0	1
495	M1	1	max	190.872	1	698.983	3	47.009	5	0	1	.295	1	.001	3
496			min	-9.311	5	-420.234	2	-123.32	1	0	3	-.105	5	-.013	2
497		2	max	191.588	1	698.052	3	48.25	5	0	1	.23	1	.209	2
498			min	-8.977	5	-421.474	2	-123.32	1	0	3	-.08	5	-.367	3
499		3	max	502.81	3	498.486	2	14.811	5	0	3	.165	1	.42	2
500			min	-291.265	2	-508.667	3	-122.999	1	0	2	-.054	5	-.721	3
501		4	max	503.347	3	497.246	2	16.053	5	0	3	.1	1	.167	1
502			min	-290.549	2	-509.597	3	-122.999	1	0	2	-.046	5	-.452	3
503		5	max	503.884	3	496.005	2	17.294	5	0	3	.035	1	-.003	15
504			min	-289.833	2	-510.528	3	-122.999	1	0	2	-.037	5	-.183	3
505		6	max	504.421	3	494.765	2	18.536	5	0	3	-.002	12	.086	3
506			min	-289.116	2	-511.458	3	-122.999	1	0	2	-.035	4	-.366	2
507		7	max	504.959	3	493.524	2	19.777	5	0	3	-.006	12	.357	3
508			min	-288.4	2	-512.388	3	-122.999	1	0	2	-.094	1	-.627	2
509		8	max	505.496	3	492.284	2	21.018	5	0	3	-.005	15	.627	3
510			min	-287.684	2	-513.319	3	-122.999	1	0	2	-.159	1	-.887	2
511		9	max	521.066	3	48.622	2	63.295	5	0	9	.093	1	.732	3
512			min	-205.031	2	.375	15	-178.643	1	0	3	-.142	5	-1.016	2
513		10	max	521.603	3	47.382	2	64.536	5	0	9	0	12	.713	3
514			min	-204.315	2	0	5	-178.643	1	0	3	-.109	4	-1.041	2
515		11	max	522.14	3	46.141	2	65.777	5	0	9	-.006	12	.694	3
516			min	-203.599	2	-1.532	4	-178.643	1	0	3	-.096	4	-1.066	2
517		12	max	537.625	3	337.003	3	164.225	5	0	2	.157	1	.605	3
518			min	-123.778	10	-592.505	2	-120.184	1	0	3	-.226	5	-.945	2
519		13	max	538.162	3	336.072	3	165.467	5	0	2	.094	1	.428	3
520			min	-123.181	10	-593.745	2	-120.184	1	0	3	-.139	5	-.632	2
521		14	max	538.699	3	335.142	3	166.708	5	0	2	.031	1	.251	3
522			min	-122.585	10	-594.986	2	-120.184	1	0	3	-.051	5	-.318	2
523		15	max	539.236	3	334.211	3	167.95	5	0	2	.037	5	.074	3
524			min	-121.988	10	-596.227	2	-120.184	1	0	3	-.033	1	-.027	1
525		16	max	539.774	3	333.281	3	169.191	5	0	2	.126	5	.311	2
526			min	-121.391	10	-597.467	2	-120.184	1	0	3	-.096	1	-.102	3
527		17	max	540.311	3	332.351	3	170.433	5	0	2	.216	5	.626	2
528			min	-120.794	10	-598.708	2	-120.184	1	0	3	-.16	1	-.278	3
529		18	max	18.412	5	616.675	2	-7.46	12	0	3	.212	5	.315	2
530			min	-191.829	1	-280.313	3	-139.279	4	0	2	-.227	1	-.137	3
531		19	max	18.746	5	615.435	2	-7.46	12	0	3	.156	5	.011	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
532			min	-191.112	1	-281.243	3	-138.037	4	0	2	-.297	1	-.01	2
533	M5	1	max	411.857	1	2329.464	3	103.58	5	0	1	0	1	.027	2
534			min	18.069	12	-1423.651	2	0	1	0	4	-.24	4	-.002	3
535		2	max	412.573	1	2328.534	3	104.822	5	0	1	0	1	.778	2
536			min	18.427	12	-1424.892	2	0	1	0	4	-.185	4	-1.231	3
537		3	max	1620.045	3	1521.584	2	74.762	4	0	4	0	1	1.495	2
538			min	-1027.978	2	-1643.843	3	0	1	0	1	-.13	4	-2.412	3
539		4	max	1620.582	3	1520.343	2	76.003	4	0	4	0	1	.702	1
540			min	-1027.262	2	-1644.773	3	0	1	0	1	-.091	4	-1.544	3
541		5	max	1621.119	3	1519.103	2	77.245	4	0	4	0	1	.004	9
542			min	-1026.546	2	-1645.704	3	0	1	0	1	-.05	4	-.676	3
543		6	max	1621.656	3	1517.862	2	78.486	4	0	4	0	1	.193	3
544			min	-1025.829	2	-1646.634	3	0	1	0	1	-.009	5	-.911	2
545		7	max	1622.194	3	1516.622	2	79.728	4	0	4	.033	4	1.062	3
546			min	-1025.113	2	-1647.565	3	0	1	0	1	0	1	-1.711	2
547		8	max	1622.731	3	1515.381	2	80.969	4	0	4	.075	4	1.931	3
548			min	-1024.397	2	-1648.495	3	0	1	0	1	0	1	-2.511	2
549		9	max	1649.469	3	162.428	2	208.476	4	0	1	0	1	2.221	3
550			min	-854.054	2	.376	15	0	1	0	1	-.21	4	-2.862	2
551		10	max	1650.006	3	161.188	2	209.717	4	0	1	0	1	2.154	3
552			min	-853.337	2	.002	15	0	1	0	1	-.1	4	-2.947	2
553		11	max	1650.543	3	159.947	2	210.959	4	0	1	.011	4	2.087	3
554			min	-852.621	2	-1.348	6	0	1	0	1	0	1	-3.032	2
555		12	max	1677.452	3	1079.609	3	241.651	4	0	1	0	1	1.834	3
556			min	-682.318	2	-1845.243	2	0	1	0	4	-.335	4	-2.715	2
557		13	max	1677.989	3	1078.678	3	242.893	4	0	1	0	1	1.265	3
558			min	-681.602	2	-1846.484	2	0	1	0	4	-.207	4	-1.741	2
559		14	max	1678.526	3	1077.748	3	244.134	4	0	1	0	1	.696	3
560			min	-680.886	2	-1847.724	2	0	1	0	4	-.079	4	-.767	2
561		15	max	1679.063	3	1076.817	3	245.376	4	0	1	.051	4	.209	2
562			min	-680.17	2	-1848.965	2	0	1	0	4	0	1	-.004	13
563		16	max	1679.6	3	1075.887	3	246.617	4	0	1	.18	4	1.185	2
564			min	-679.453	2	-1850.205	2	0	1	0	4	0	1	-.441	3
565		17	max	1680.137	3	1074.957	3	247.858	4	0	1	.311	4	2.161	2
566			min	-678.737	2	-1851.446	2	0	1	0	4	0	1	-1.008	3
567		18	max	-18.783	12	2074.145	2	0	1	0	4	.35	4	1.114	2
568			min	-412.092	1	-958.088	3	-24.764	5	0	1	0	1	-.527	3
569		19	max	-18.424	12	2072.904	2	0	1	0	4	.337	4	.02	2
570			min	-411.375	1	-959.018	3	-23.522	5	0	1	0	1	-.021	3
571	M9	1	max	190.872	1	698.983	3	123.32	1	0	3	-.017	12	.001	3
572			min	9.721	12	-420.234	2	7.283	12	0	4	-.295	1	-.013	2
573		2	max	191.588	1	698.052	3	123.32	1	0	3	-.014	12	.209	2
574			min	10.079	12	-421.474	2	7.283	12	0	4	-.23	1	-.367	3
575		3	max	502.81	3	498.486	2	122.999	1	0	2	-.01	12	.42	2
576			min	-291.265	2	-508.667	3	7.253	12	0	3	-.165	1	-.721	3
577		4	max	503.347	3	497.246	2	122.999	1	0	2	-.006	12	.167	1
578			min	-290.549	2	-509.597	3	7.253	12	0	3	-.1	1	-.452	3
579		5	max	503.884	3	496.005	2	122.999	1	0	2	-.002	12	-.003	15
580			min	-289.833	2	-510.528	3	7.253	12	0	3	-.052	4	-.183	3
581		6	max	504.421	3	494.765	2	122.999	1	0	2	.03	1	.086	3
582			min	-289.116	2	-511.458	3	7.253	12	0	3	-.024	5	-.366	2
583		7	max	504.959	3	493.524	2	122.999	1	0	2	.094	1	.357	3
584			min	-288.4	2	-512.388	3	7.253	12	0	3	-.004	5	-.627	2
585		8	max	505.496	3	492.284	2	122.999	1	0	2	.159	1	.627	3
586			min	-287.684	2	-513.319	3	7.253	12	0	3	.009	12	-.887	2
587		9	max	521.066	3	48.622	2	178.643	1	0	3	-.005	12	.732	3
588			min	-205.031	2	.382	15	10.281	12	0	9	-.179	4	-1.016	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
589		10	max	521.603	3	47.382	2	178.643	1	0	3	.001	1	.713	3
590			min	-204.315	2	.008	15	10.281	12	0	9	-.108	4	-1.041	2
591		11	max	522.14	3	46.141	2	178.643	1	0	3	.095	1	.694	3
592			min	-203.599	2	-1.481	6	10.281	12	0	9	-.06	5	-1.066	2
593		12	max	537.625	3	337.003	3	212.602	4	0	3	-.009	12	.605	3
594			min	-123.778	10	-592.505	2	6.747	12	0	2	-.289	4	-.945	2
595		13	max	538.162	3	336.072	3	213.843	4	0	3	-.005	12	.428	3
596			min	-123.181	10	-593.745	2	6.747	12	0	2	-.176	4	-.632	2
597		14	max	538.699	3	335.142	3	215.085	4	0	3	-.002	12	.251	3
598			min	-122.585	10	-594.986	2	6.747	12	0	2	-.063	4	-.318	2
599		15	max	539.236	3	334.211	3	216.326	4	0	3	.051	4	.074	3
600			min	-121.988	10	-596.227	2	6.747	12	0	2	.002	12	-.027	1
601		16	max	539.774	3	333.281	3	217.568	4	0	3	.165	4	.311	2
602			min	-121.391	10	-597.467	2	6.747	12	0	2	.005	12	-.102	3
603		17	max	540.311	3	332.351	3	218.809	4	0	3	.28	4	.626	2
604			min	-120.794	10	-598.708	2	6.747	12	0	2	.009	12	-.278	3
605		18	max	-9.901	12	616.675	2	132.688	1	0	2	.302	4	.315	2
606			min	-191.829	1	-280.313	3	-87.806	5	0	3	.013	12	-.137	3
607		19	max	-9.543	12	615.435	2	132.688	1	0	2	.297	1	.011	3
608			min	-191.112	1	-281.243	3	-86.564	5	0	3	.017	12	-.01	2

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	M13	1	max	.001	1	.104	2	.009	3	8.702e-3	2	NC	1	NC	1
2			min	-.736	4	-.016	3	-.005	2	-1.645e-3	3	NC	1	NC	1
3		2	max	.001	1	.367	3	.05	1	1.007e-2	2	NC	5	NC	2
4			min	-.736	4	-.114	1	-.026	5	-1.763e-3	3	658.865	3	5188.3	1
5		3	max	0	1	.676	3	.121	1	1.144e-2	2	NC	5	NC	3
6			min	-.736	4	-.279	1	-.031	5	-1.881e-3	3	364.114	3	2110.367	1
7		4	max	0	1	.864	3	.182	1	1.281e-2	2	NC	5	NC	3
8			min	-.736	4	-.371	1	-.02	5	-1.998e-3	3	286.395	3	1392.748	1
9		5	max	0	1	.907	3	.214	1	1.418e-2	2	NC	5	NC	3
10			min	-.736	4	-.379	1	-.002	5	-2.116e-3	3	273.001	3	1184.586	1
11		6	max	0	1	.809	3	.207	1	1.555e-2	2	NC	5	NC	5
12			min	-.736	4	-.305	1	.011	15	-2.234e-3	3	305.512	3	1226.032	1
13		7	max	0	1	.599	3	.162	1	1.691e-2	2	NC	5	NC	10
14			min	-.737	4	-.167	1	.012	10	-2.352e-3	3	410.043	3	1562.587	1
15		8	max	0	1	.332	3	.094	1	1.828e-2	2	NC	4	NC	3
16			min	-.737	4	-.009	9	.002	10	-2.469e-3	3	724.785	3	2709.864	1
17		9	max	0	1	.181	2	.036	4	1.965e-2	2	NC	4	NC	1
18			min	-.737	4	.004	15	-.008	10	-2.587e-3	3	2383.112	3	7084.404	4
19		10	max	0	1	.25	2	.028	3	2.102e-2	2	NC	3	NC	1
20			min	-.737	4	-.019	3	-.019	2	-2.705e-3	3	1729.833	2	NC	1
21		11	max	0	12	.181	2	.029	3	1.965e-2	2	NC	4	NC	1
22			min	-.737	4	.004	15	-.021	5	-2.587e-3	3	2383.112	3	NC	1
23		12	max	0	12	.332	3	.094	1	1.828e-2	2	NC	4	NC	3
24			min	-.737	4	-.009	9	-.021	5	-2.469e-3	3	724.785	3	2709.864	1
25		13	max	0	12	.599	3	.162	1	1.691e-2	2	NC	5	NC	5
26			min	-.737	4	-.167	1	-.006	5	-2.352e-3	3	410.043	3	1562.587	1
27		14	max	0	12	.809	3	.207	1	1.555e-2	2	NC	5	NC	5
28			min	-.737	4	-.305	1	.009	15	-2.234e-3	3	305.512	3	1226.032	1
29		15	max	0	12	.907	3	.214	1	1.418e-2	2	NC	5	NC	3
30			min	-.737	4	-.379	1	.021	10	-2.116e-3	3	273.001	3	1184.586	1
31		16	max	0	12	.864	3	.182	1	1.281e-2	2	NC	5	NC	3
32			min	-.737	4	-.371	1	.018	12	-1.998e-3	3	286.395	3	1392.748	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
33		17	max	0	12	.676	3	.121	1	1.144e-2	2	NC	5	NC	3
34			min	-.737	4	-.279	1	.011	10	-1.881e-3	3	364.114	3	2110.367	1
35		18	max	0	12	.367	3	.05	1	1.007e-2	2	NC	5	NC	2
36			min	-.737	4	-.114	1	.003	10	-1.763e-3	3	658.865	3	5188.3	1
37		19	max	0	12	.104	2	.009	3	8.702e-3	2	NC	1	NC	1
38			min	-.737	4	-.016	3	-.005	2	-1.645e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.22	3	.008	3	5.14e-3	2	NC	1	NC	1
40			min	-.544	4	-.341	2	-.004	2	-3.861e-3	3	NC	1	NC	1
41		2	max	0	1	.585	3	.035	1	6.184e-3	2	NC	5	NC	2
42			min	-.544	4	-.674	2	-.038	5	-4.724e-3	3	690.844	3	6339.662	5
43		3	max	0	1	.892	3	.097	1	7.227e-3	2	NC	15	NC	3
44			min	-.544	4	-.96	2	-.045	5	-5.587e-3	3	374.928	3	2619.008	1
45		4	max	0	1	1.103	3	.157	1	8.271e-3	2	NC	15	NC	3
46			min	-.544	4	-1.168	2	-.029	5	-6.45e-3	3	285.417	3	1620.767	1
47		5	max	0	1	1.198	3	.191	1	9.314e-3	2	NC	15	NC	3
48			min	-.544	4	-1.279	2	-.002	5	-7.313e-3	3	257.696	3	1331.124	1
49		6	max	0	1	1.178	3	.188	1	1.036e-2	2	9991.065	15	NC	3
50			min	-.544	4	-1.295	2	.017	10	-8.176e-3	3	263.12	3	1347.449	1
51		7	max	0	1	1.063	3	.15	1	1.14e-2	2	NC	15	NC	3
52			min	-.544	4	-1.23	2	.011	10	-9.039e-3	3	283.247	2	1690.489	1
53		8	max	0	1	.895	3	.088	1	1.244e-2	2	NC	15	NC	3
54			min	-.544	4	-1.116	2	.002	10	-9.902e-3	3	325.006	2	2893.461	1
55		9	max	0	1	.732	3	.051	4	1.349e-2	2	NC	5	NC	1
56			min	-.544	4	-.999	2	-.007	10	-1.077e-2	3	382.503	2	5056.371	4
57		10	max	0	1	.657	3	.025	3	1.453e-2	2	NC	5	NC	1
58			min	-.544	4	-.944	2	-.017	2	-1.163e-2	3	417.862	2	NC	1
59		11	max	0	12	.732	3	.026	3	1.349e-2	2	NC	5	NC	1
60			min	-.544	4	-.999	2	-.037	5	-1.077e-2	3	382.503	2	6703.716	5
61		12	max	0	12	.895	3	.088	1	1.244e-2	2	NC	15	NC	3
62			min	-.544	4	-1.116	2	-.042	5	-9.902e-3	3	325.006	2	2893.461	1
63		13	max	0	12	1.063	3	.15	1	1.14e-2	2	NC	15	NC	3
64			min	-.544	4	-1.23	2	-.026	5	-9.039e-3	3	283.247	2	1690.489	1
65		14	max	0	12	1.178	3	.188	1	1.036e-2	2	9990.68	15	NC	3
66			min	-.545	4	-1.295	2	.001	15	-8.176e-3	3	263.12	3	1347.449	1
67		15	max	0	12	1.198	3	.191	1	9.314e-3	2	NC	15	NC	3
68			min	-.545	4	-1.279	2	.018	12	-7.313e-3	3	257.696	3	1331.124	1
69		16	max	0	12	1.103	3	.157	1	8.271e-3	2	NC	15	NC	3
70			min	-.545	4	-1.168	2	.015	12	-6.45e-3	3	285.417	3	1620.767	1
71		17	max	0	12	.892	3	.097	1	7.227e-3	2	NC	15	NC	3
72			min	-.545	4	-.96	2	.008	10	-5.587e-3	3	374.928	3	2619.008	1
73		18	max	0	12	.585	3	.053	4	6.184e-3	2	NC	5	NC	2
74			min	-.545	4	-.674	2	0	10	-4.724e-3	3	690.844	3	4729.26	4
75		19	max	0	12	.22	3	.008	3	5.14e-3	2	NC	1	NC	1
76			min	-.545	4	-.341	2	-.004	2	-3.861e-3	3	NC	1	NC	1
77	M15	1	max	0	12	.224	3	.007	3	3.342e-3	3	NC	1	NC	1
78			min	-.44	4	-.34	2	-.004	2	-5.374e-3	2	NC	1	NC	1
79		2	max	0	12	.454	3	.035	1	4.096e-3	3	NC	5	NC	2
80			min	-.44	4	-.779	2	-.05	5	-6.469e-3	2	574.102	2	4926.521	5
81		3	max	0	12	.653	3	.098	1	4.85e-3	3	NC	15	NC	3
82			min	-.44	4	-1.151	2	-.059	5	-7.564e-3	2	310.76	2	2611.691	1
83		4	max	0	12	.798	3	.157	1	5.603e-3	3	NC	15	NC	3
84			min	-.44	4	-1.41	2	-.041	5	-8.66e-3	2	235.492	2	1617.186	1
85		5	max	0	12	.878	3	.191	1	6.357e-3	3	NC	15	NC	3
86			min	-.44	4	-1.533	2	-.008	5	-9.755e-3	2	211.091	2	1328.399	1
87		6	max	0	12	.894	3	.189	1	7.111e-3	3	NC	15	NC	3
88			min	-.44	4	-1.522	2	.017	10	-1.085e-2	2	213.128	2	1344.51	1
89		7	max	0	12	.854	3	.151	1	7.865e-3	3	NC	15	NC	3

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
90			min	-.44	4	-1.399	2	.011	10	-1.195e-2	2	237.879	2	1685.825	1
91		8	max	0	12	.781	3	.093	4	8.618e-3	3	NC	15	NC	3
92			min	-.44	4	-1.211	2	.002	10	-1.304e-2	2	289.219	2	2763.536	4
93		9	max	0	12	.705	3	.062	4	9.372e-3	3	NC	5	NC	1
94			min	-.44	4	-1.028	2	-.007	10	-1.414e-2	2	366.327	2	4188.08	4
95		10	max	0	1	.668	3	.023	3	1.013e-2	3	NC	5	NC	1
96			min	-.44	4	-.942	2	-.016	2	-1.523e-2	2	418.645	2	NC	1
97		11	max	0	1	.705	3	.025	1	9.372e-3	3	NC	5	NC	1
98			min	-.44	4	-1.028	2	-.048	5	-1.414e-2	2	366.327	2	5263.727	5
99		12	max	0	1	.781	3	.089	1	8.618e-3	3	NC	15	NC	3
100			min	-.44	4	-1.211	2	-.055	5	-1.304e-2	2	289.219	2	2880.025	1
101		13	max	0	1	.854	3	.151	1	7.865e-3	3	NC	15	NC	3
102			min	-.44	4	-1.399	2	-.035	5	-1.195e-2	2	237.879	2	1685.825	1
103		14	max	0	1	.894	3	.189	1	7.111e-3	3	NC	15	NC	3
104			min	-.44	4	-1.522	2	0	15	-1.085e-2	2	213.128	2	1344.51	1
105		15	max	0	1	.878	3	.191	1	6.357e-3	3	NC	15	NC	3
106			min	-.44	4	-1.533	2	.018	12	-9.755e-3	2	211.091	2	1328.399	1
107		16	max	0	1	.798	3	.157	1	5.603e-3	3	NC	15	NC	3
108			min	-.44	4	-1.41	2	.015	12	-8.66e-3	2	235.492	2	1617.186	1
109		17	max	0	1	.653	3	.099	4	4.85e-3	3	NC	15	NC	3
110			min	-.44	4	-1.151	2	.009	10	-7.564e-3	2	310.76	2	2549.787	4
111		18	max	0	1	.454	3	.065	4	4.096e-3	3	NC	5	NC	2
112			min	-.44	4	-.779	2	.001	10	-6.469e-3	2	574.102	2	3886.827	4
113		19	max	0	1	.224	3	.007	3	3.342e-3	3	NC	1	NC	1
114			min	-.44	4	-.34	2	-.004	2	-5.374e-3	2	NC	1	NC	1
115	M16	1	max	0	12	.092	2	.006	3	5.849e-3	3	NC	1	NC	1
116			min	-.148	4	-.072	3	-.004	2	-7.187e-3	2	NC	1	NC	1
117		2	max	0	12	.063	3	.049	1	6.949e-3	3	NC	5	NC	2
118			min	-.148	4	-.227	2	-.039	5	-8.195e-3	2	789.936	2	5223.285	1
119		3	max	0	12	.169	3	.12	1	8.049e-3	3	NC	5	NC	3
120			min	-.148	4	-.482	2	-.047	5	-9.203e-3	2	439.009	2	2116.95	1
121		4	max	0	12	.227	3	.182	1	9.149e-3	3	NC	5	NC	3
122			min	-.148	4	-.63	2	-.034	5	-1.021e-2	2	348.939	2	1394.307	1
123		5	max	0	12	.227	3	.214	1	1.025e-2	3	NC	5	NC	3
124			min	-.148	4	-.651	2	-.01	5	-1.122e-2	2	338.809	2	1183.933	1
125		6	max	0	12	.172	3	.207	1	1.135e-2	3	NC	5	NC	3
126			min	-.148	4	-.55	2	.011	15	-1.223e-2	2	392.427	2	1222.919	1
127		7	max	0	12	.073	3	.163	1	1.245e-2	3	NC	5	NC	3
128			min	-.148	4	-.351	2	.014	10	-1.323e-2	2	567.849	2	1553.426	1
129		8	max	0	12	.002	13	.095	1	1.355e-2	3	NC	4	NC	3
130			min	-.148	4	-.106	2	.004	10	-1.424e-2	2	1271.43	2	2671.467	1
131		9	max	0	12	.127	1	.045	4	1.465e-2	3	NC	2	NC	2
132			min	-.148	4	-.151	3	-.005	10	-1.525e-2	2	3222.785	3	5562.431	4
133		10	max	0	1	.213	2	.02	3	1.575e-2	3	NC	4	NC	1
134			min	-.148	4	-.197	3	-.015	2	-1.626e-2	2	2015.502	3	NC	1
135		11	max	0	1	.127	1	.027	1	1.465e-2	3	NC	2	NC	2
136			min	-.148	4	-.151	3	-.031	5	-1.525e-2	2	3222.785	3	8064.164	5
137		12	max	0	1	.001	13	.095	1	1.355e-2	3	NC	4	NC	3
138			min	-.148	4	-.106	2	-.032	5	-1.424e-2	2	1271.43	2	2671.467	1
139		13	max	0	1	.073	3	.163	1	1.245e-2	3	NC	5	NC	3
140			min	-.147	4	-.351	2	-.014	5	-1.323e-2	2	567.849	2	1553.426	1
141		14	max	0	1	.172	3	.207	1	1.135e-2	3	NC	5	NC	3
142			min	-.147	4	-.55	2	.009	15	-1.223e-2	2	392.427	2	1222.919	1
143		15	max	0	1	.227	3	.214	1	1.025e-2	3	NC	5	NC	3
144			min	-.147	4	-.651	2	.018	12	-1.122e-2	2	338.809	2	1183.933	1
145		16	max	0	1	.227	3	.182	1	9.149e-3	3	NC	5	NC	3
146			min	-.147	4	-.63	2	.015	12	-1.021e-2	2	348.939	2	1394.307	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
147		17	max	.001	1	.169	3	.12	1	8.049e-3	3	NC	5	NC	3
148			min	-.147	4	-.482	2	.011	12	-9.203e-3	2	439.009	2	2116.95	1
149		18	max	.001	1	.063	3	.059	4	6.949e-3	3	NC	5	NC	2
150			min	-.147	4	-.227	2	.003	10	-8.195e-3	2	789.936	2	4238.353	4
151		19	max	.001	1	.092	2	.006	3	5.849e-3	3	NC	1	NC	1
152			min	-.147	4	-.072	3	-.004	2	-7.187e-3	2	NC	1	NC	1
153	M2	1	max	.007	2	.008	2	.01	1	1.604e-3	5	NC	1	NC	2
154			min	-.009	3	-.013	3	-.689	4	-2.726e-4	1	9062.665	2	101.569	4
155		2	max	.006	2	.007	2	.009	1	1.705e-3	5	NC	1	NC	2
156			min	-.008	3	-.013	3	-.633	4	-2.569e-4	1	NC	1	110.514	4
157		3	max	.006	2	.006	2	.008	1	1.806e-3	5	NC	1	NC	2
158			min	-.008	3	-.012	3	-.578	4	-2.412e-4	1	NC	1	121.122	4
159		4	max	.006	2	.005	2	.007	1	1.907e-3	5	NC	1	NC	2
160			min	-.007	3	-.012	3	-.523	4	-2.256e-4	1	NC	1	133.822	4
161		5	max	.005	2	.004	2	.006	1	2.007e-3	5	NC	1	NC	1
162			min	-.007	3	-.011	3	-.469	4	-2.099e-4	1	NC	1	149.198	4
163		6	max	.005	2	.003	2	.006	1	2.108e-3	5	NC	1	NC	1
164			min	-.006	3	-.011	3	-.416	4	-1.942e-4	1	NC	1	168.054	4
165		7	max	.004	2	.002	2	.005	1	2.209e-3	5	NC	1	NC	1
166			min	-.006	3	-.01	3	-.365	4	-1.785e-4	1	NC	1	191.528	4
167		8	max	.004	2	0	2	.004	1	2.31e-3	5	NC	1	NC	1
168			min	-.005	3	-.01	3	-.316	4	-1.629e-4	1	NC	1	221.277	4
169		9	max	.004	2	0	2	.004	1	2.411e-3	5	NC	1	NC	1
170			min	-.005	3	-.009	3	-.269	4	-1.472e-4	1	NC	1	259.779	4
171		10	max	.003	2	0	2	.003	1	2.512e-3	4	NC	1	NC	1
172			min	-.004	3	-.008	3	-.225	4	-1.315e-4	1	NC	1	310.891	4
173		11	max	.003	2	0	15	.002	1	2.618e-3	4	NC	1	NC	1
174			min	-.004	3	-.008	3	-.184	4	-1.158e-4	1	NC	1	380.883	4
175		12	max	.003	2	0	15	.002	1	2.725e-3	4	NC	1	NC	1
176			min	-.003	3	-.007	3	-.146	4	-1.002e-4	1	NC	1	480.519	4
177		13	max	.002	2	0	15	.001	1	2.831e-3	4	NC	1	NC	1
178			min	-.003	3	-.006	3	-.111	4	-8.45e-5	1	NC	1	629.594	4
179		14	max	.002	2	0	15	.001	1	2.938e-3	4	NC	1	NC	1
180			min	-.002	3	-.005	3	-.081	4	-6.883e-5	1	NC	1	867.897	4
181		15	max	.001	2	0	15	0	1	3.044e-3	4	NC	1	NC	1
182			min	-.002	3	-.004	3	-.054	4	-5.316e-5	1	NC	1	1285.693	4
183		16	max	.001	2	0	15	0	1	3.151e-3	4	NC	1	NC	1
184			min	-.001	3	-.003	3	-.033	4	-3.749e-5	1	NC	1	2126.865	4
185		17	max	0	2	0	15	0	1	3.257e-3	4	NC	1	NC	1
186			min	0	3	-.002	3	-.016	4	-2.181e-5	1	NC	1	4263.97	4
187		18	max	0	2	0	15	0	1	3.364e-3	4	NC	1	NC	1
188			min	0	3	-.001	6	-.005	4	-6.141e-6	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	3.47e-3	4	NC	1	NC	1
190			min	0	1	0	1	0	1	3.783e-7	12	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-1.792e-7	12	NC	1	NC	1
192			min	0	1	0	1	0	1	-8.734e-4	4	NC	1	NC	1
193		2	max	0	3	0	15	.016	4	2.216e-5	1	NC	1	NC	1
194			min	0	2	-.002	6	0	12	-1.706e-4	5	NC	1	NC	1
195		3	max	0	3	0	15	.031	4	5.392e-4	4	NC	1	NC	1
196			min	0	2	-.004	6	0	12	2.676e-6	12	NC	1	5607.561	14
197		4	max	.001	3	-.001	15	.045	4	1.245e-3	4	NC	1	NC	1
198			min	0	2	-.006	6	0	12	4.104e-6	12	NC	1	3894.37	14
199		5	max	.002	3	-.002	15	.058	4	1.952e-3	4	NC	1	NC	1
200			min	-.001	2	-.008	6	0	12	5.532e-6	12	NC	1	3038.637	14
201		6	max	.002	3	-.002	15	.069	4	2.658e-3	4	NC	1	NC	1
202			min	-.002	2	-.009	6	0	12	6.96e-6	12	9766.913	6	2524.63	14
203		7	max	.002	3	-.002	15	.08	4	3.364e-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
204			min	-.002	2	-.011	6	0	12	8.388e-6	12	8403.479	6	2180.217	14
205		8	max	.003	3	-.003	15	.09	4	4.071e-3	4	NC	1	NC	1
206			min	-.002	2	-.012	6	0	12	9.815e-6	12	7562.914	6	1931.438	14
207		9	max	.003	3	-.003	15	.1	4	4.777e-3	4	NC	2	NC	1
208			min	-.003	2	-.013	6	0	12	1.124e-5	12	7068.123	6	1741.168	14
209		10	max	.004	3	-.003	15	.11	4	5.483e-3	4	NC	5	NC	1
210			min	-.003	2	-.013	6	0	12	1.267e-5	12	6833.372	6	1588.681	14
211		11	max	.004	3	-.003	15	.119	4	6.19e-3	4	NC	5	NC	1
212			min	-.003	2	-.013	6	0	12	1.41e-5	12	6824.225	6	1461.494	14
213		12	max	.004	3	-.003	15	.128	4	6.896e-3	4	NC	3	NC	1
214			min	-.004	2	-.013	6	0	12	1.553e-5	12	7044.34	6	1351.677	14
215		13	max	.005	3	-.003	15	.138	4	7.602e-3	4	NC	2	NC	1
216			min	-.004	2	-.012	6	0	12	1.695e-5	12	7538.584	6	1254.011	14
217		14	max	.005	3	-.002	15	.148	4	8.308e-3	4	NC	1	NC	1
218			min	-.004	2	-.011	6	0	12	1.838e-5	12	8416.081	6	1165.01	14
219		15	max	.006	3	-.002	15	.159	4	9.015e-3	4	NC	1	NC	1
220			min	-.004	2	-.009	6	0	12	1.981e-5	12	9917.906	6	1082.356	14
221		16	max	.006	3	-.001	15	.171	4	9.721e-3	4	NC	1	NC	1
222			min	-.005	2	-.007	6	0	12	2.124e-5	12	NC	1	1004.549	14
223		17	max	.006	3	0	15	.184	4	1.043e-2	4	NC	1	NC	1
224			min	-.005	2	-.006	1	0	12	2.267e-5	12	NC	1	930.678	14
225		18	max	.007	3	0	15	.199	4	1.113e-2	4	NC	1	NC	1
226			min	-.005	2	-.004	1	0	12	2.409e-5	12	NC	1	860.254	14
227		19	max	.007	3	0	5	.215	4	1.184e-2	4	NC	1	NC	2
228			min	-.006	2	-.002	1	0	12	2.552e-5	12	NC	1	793.08	14
229	M4	1	max	.003	1	.005	2	0	12	1.09e-4	1	NC	1	NC	3
230			min	0	5	-.007	3	-.215	4	6.272e-6	12	NC	1	115.264	4
231		2	max	.002	1	.005	2	0	12	1.09e-4	1	NC	1	NC	3
232			min	0	5	-.007	3	-.198	4	6.272e-6	12	NC	1	125.249	4
233		3	max	.002	1	.005	2	0	12	1.09e-4	1	NC	1	NC	3
234			min	0	5	-.007	3	-.181	4	6.272e-6	12	NC	1	137.138	4
235		4	max	.002	1	.005	2	0	12	1.09e-4	1	NC	1	NC	3
236			min	0	5	-.006	3	-.164	4	6.272e-6	12	NC	1	151.424	4
237		5	max	.002	1	.004	2	0	12	1.09e-4	1	NC	1	NC	3
238			min	0	5	-.006	3	-.147	4	6.272e-6	12	NC	1	168.777	4
239		6	max	.002	1	.004	2	0	12	1.09e-4	1	NC	1	NC	2
240			min	0	5	-.005	3	-.13	4	6.272e-6	12	NC	1	190.128	4
241		7	max	.002	1	.004	2	0	12	1.09e-4	1	NC	1	NC	2
242			min	0	5	-.005	3	-.114	4	6.272e-6	12	NC	1	216.796	4
243		8	max	.002	1	.003	2	0	12	1.09e-4	1	NC	1	NC	2
244			min	0	5	-.004	3	-.099	4	6.272e-6	12	NC	1	250.708	4
245		9	max	.001	1	.003	2	0	12	1.09e-4	1	NC	1	NC	2
246			min	0	5	-.004	3	-.084	4	6.272e-6	12	NC	1	294.761	4
247		10	max	.001	1	.003	2	0	12	1.09e-4	1	NC	1	NC	2
248			min	0	5	-.004	3	-.07	4	6.272e-6	12	NC	1	353.486	4
249		11	max	.001	1	.002	2	0	12	1.09e-4	1	NC	1	NC	1
250			min	0	5	-.003	3	-.057	4	6.272e-6	12	NC	1	434.291	4
251		12	max	0	1	.002	2	0	12	1.09e-4	1	NC	1	NC	1
252			min	0	5	-.003	3	-.045	4	6.272e-6	12	NC	1	549.994	4
253		13	max	0	1	.002	2	0	12	1.09e-4	1	NC	1	NC	1
254			min	0	5	-.002	3	-.034	4	6.272e-6	12	NC	1	724.375	4
255		14	max	0	1	.002	2	0	12	1.09e-4	1	NC	1	NC	1
256			min	0	5	-.002	3	-.025	4	6.272e-6	12	NC	1	1005.807	4
257		15	max	0	1	.001	2	0	12	1.09e-4	1	NC	1	NC	1
258			min	0	5	-.002	3	-.016	4	6.272e-6	12	NC	1	1505.77	4
259		16	max	0	1	0	2	0	12	1.09e-4	1	NC	1	NC	1
260			min	0	5	-.001	3	-.01	4	6.272e-6	12	NC	1	2532.33	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
261		17	max	0	1	0	2	0	12	1.09e-4	1	NC	1	NC	1
262			min	0	5	0	3	-.005	4	6.272e-6	12	NC	1	5227.175	4
263		18	max	0	1	0	2	0	12	1.09e-4	1	NC	1	NC	1
264			min	0	5	0	3	-.001	4	6.272e-6	12	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.09e-4	1	NC	1	NC	1
266			min	0	1	0	1	0	1	6.272e-6	12	NC	1	NC	1
267	M6	1	max	.022	2	.029	2	0	1	1.708e-3	4	NC	4	NC	1
268			min	-.029	3	-.041	3	-.695	4	0	1	1692.698	3	100.599	4
269		2	max	.02	2	.027	2	0	1	1.806e-3	4	NC	4	NC	1
270			min	-.027	3	-.039	3	-.639	4	0	1	1793.212	3	109.46	4
271		3	max	.019	2	.024	2	0	1	1.905e-3	4	NC	4	NC	1
272			min	-.025	3	-.037	3	-.583	4	0	1	1906.487	3	119.969	4
273		4	max	.018	2	.022	2	0	1	2.003e-3	4	NC	4	NC	1
274			min	-.024	3	-.034	3	-.528	4	0	1	2035.17	3	132.551	4
275		5	max	.017	2	.019	2	0	1	2.102e-3	4	NC	4	NC	1
276			min	-.022	3	-.032	3	-.473	4	0	1	2182.668	3	147.784	4
277		6	max	.016	2	.017	2	0	1	2.2e-3	4	NC	4	NC	1
278			min	-.021	3	-.03	3	-.42	4	0	1	2353.439	3	166.465	4
279		7	max	.014	2	.015	2	0	1	2.299e-3	4	NC	1	NC	1
280			min	-.019	3	-.027	3	-.369	4	0	1	2553.425	3	189.724	4
281		8	max	.013	2	.013	2	0	1	2.397e-3	4	NC	1	NC	1
282			min	-.017	3	-.025	3	-.319	4	0	1	2790.736	3	219.201	4
283		9	max	.012	2	.011	2	0	1	2.496e-3	4	NC	1	NC	1
284			min	-.016	3	-.023	3	-.272	4	0	1	3076.726	3	257.352	4
285		10	max	.011	2	.009	2	0	1	2.594e-3	4	NC	1	NC	1
286			min	-.014	3	-.02	3	-.227	4	0	1	3427.804	3	308.002	4
287		11	max	.01	2	.007	2	0	1	2.693e-3	4	NC	1	NC	1
288			min	-.013	3	-.018	3	-.185	4	0	1	3868.593	3	377.364	4
289		12	max	.008	2	.005	2	0	1	2.791e-3	4	NC	1	NC	1
290			min	-.011	3	-.016	3	-.147	4	0	1	4437.794	3	476.113	4
291		13	max	.007	2	.004	2	0	1	2.89e-3	4	NC	1	NC	1
292			min	-.01	3	-.013	3	-.112	4	0	1	5199.929	3	623.876	4
293		14	max	.006	2	.003	2	0	1	2.988e-3	4	NC	1	NC	1
294			min	-.008	3	-.011	3	-.081	4	0	1	6271.163	3	860.113	4
295		15	max	.005	2	.002	2	0	1	3.087e-3	4	NC	1	NC	1
296			min	-.006	3	-.009	3	-.055	4	0	1	7883.858	3	1274.361	4
297		16	max	.004	2	0	2	0	1	3.186e-3	4	NC	1	NC	1
298			min	-.005	3	-.007	3	-.033	4	0	1	NC	1	2108.613	4
299		17	max	.002	2	0	2	0	1	3.284e-3	4	NC	1	NC	1
300			min	-.003	3	-.004	3	-.017	4	0	1	NC	1	4229.05	4
301		18	max	.001	2	0	2	0	1	3.383e-3	4	NC	1	NC	1
302			min	-.002	3	-.002	3	-.005	4	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	3.481e-3	4	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	-8.756e-4	4	NC	1	NC	1
307		2	max	.001	3	0	2	.016	4	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	-1.883e-4	4	NC	1	NC	1
309		3	max	.002	3	0	15	.031	4	4.99e-4	4	NC	1	NC	1
310			min	-.002	2	-.005	3	0	1	0	1	NC	1	NC	1
311		4	max	.004	3	-.001	15	.045	4	1.186e-3	4	NC	1	NC	1
312			min	-.004	2	-.008	3	0	1	0	1	NC	1	8604.597	4
313		5	max	.005	3	-.002	15	.058	4	1.874e-3	4	NC	1	NC	1
314			min	-.005	2	-.01	3	0	1	0	1	NC	1	7823.661	4
315		6	max	.006	3	-.002	15	.069	4	2.561e-3	4	NC	1	NC	1
316			min	-.006	2	-.012	3	0	1	0	1	8971.334	3	7797.252	4
317		7	max	.007	3	-.003	15	.08	4	3.248e-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
318			min	-.007	2	-.013	3	0	1	0	1	8007.068	3	8394.696	4
319		8	max	.009	3	-.003	15	.09	4	3.935e-3	4	NC	1	NC	1
320			min	-.008	2	-.014	3	0	1	0	1	7435.525	3	9789.26	4
321		9	max	.01	3	-.003	15	.1	4	4.623e-3	4	NC	1	NC	1
322			min	-.01	2	-.015	3	0	1	0	1	7117.364	4	NC	1
323		10	max	.011	3	-.003	15	.109	4	5.31e-3	4	NC	1	NC	1
324			min	-.011	2	-.016	3	0	1	0	1	6878.291	4	NC	1
325		11	max	.012	3	-.003	15	.118	4	5.997e-3	4	NC	1	NC	1
326			min	-.012	2	-.016	3	0	1	0	1	6866.817	4	NC	1
327		12	max	.014	3	-.003	15	.127	4	6.684e-3	4	NC	1	NC	1
328			min	-.013	2	-.016	3	0	1	0	1	7086.331	4	NC	1
329		13	max	.015	3	-.003	15	.136	4	7.372e-3	4	NC	1	NC	1
330			min	-.015	2	-.015	3	0	1	0	1	7581.742	4	NC	1
331		14	max	.016	3	-.003	15	.145	4	8.059e-3	4	NC	1	NC	1
332			min	-.016	2	-.014	3	0	1	0	1	8462.609	4	NC	1
333		15	max	.017	3	-.002	15	.156	4	8.746e-3	4	NC	1	NC	1
334			min	-.017	2	-.013	3	0	1	0	1	9971.146	4	NC	1
335		16	max	.019	3	-.002	15	.167	4	9.433e-3	4	NC	1	NC	1
336			min	-.018	2	-.011	3	0	1	0	1	NC	1	NC	1
337		17	max	.02	3	-.001	15	.179	4	1.012e-2	4	NC	1	NC	1
338			min	-.019	2	-.01	3	0	1	0	1	NC	1	NC	1
339		18	max	.021	3	0	10	.193	4	1.081e-2	4	NC	1	NC	1
340			min	-.021	2	-.008	3	0	1	0	1	NC	1	NC	1
341		19	max	.022	3	0	10	.208	4	1.15e-2	4	NC	1	NC	1
342			min	-.022	2	-.006	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.007	1	.021	2	0	1	0	1	NC	1	NC	1
344			min	0	3	-.023	3	-.208	4	-4.042e-5	4	NC	1	119.188	4
345		2	max	.006	1	.02	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.022	3	-.191	4	-4.042e-5	4	NC	1	129.523	4
347		3	max	.006	1	.019	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.021	3	-.175	4	-4.042e-5	4	NC	1	141.827	4
349		4	max	.006	1	.017	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.019	3	-.158	4	-4.042e-5	4	NC	1	156.611	4
351		5	max	.005	1	.016	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.018	3	-.142	4	-4.042e-5	4	NC	1	174.569	4
353		6	max	.005	1	.015	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.017	3	-.126	4	-4.042e-5	4	NC	1	196.663	4
355		7	max	.004	1	.014	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.015	3	-.111	4	-4.042e-5	4	NC	1	224.26	4
357		8	max	.004	1	.013	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.014	3	-.096	4	-4.042e-5	4	NC	1	259.353	4
359		9	max	.004	1	.012	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.013	3	-.081	4	-4.042e-5	4	NC	1	304.939	4
361		10	max	.003	1	.01	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.012	3	-.068	4	-4.042e-5	4	NC	1	365.708	4
363		11	max	.003	1	.009	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.01	3	-.055	4	-4.042e-5	4	NC	1	449.327	4
365		12	max	.003	1	.008	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.009	3	-.044	4	-4.042e-5	4	NC	1	569.06	4
367		13	max	.002	1	.007	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.008	3	-.033	4	-4.042e-5	4	NC	1	749.517	4
369		14	max	.002	1	.006	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.006	3	-.024	4	-4.042e-5	4	NC	1	1040.759	4
371		15	max	.001	1	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.005	3	-.016	4	-4.042e-5	4	NC	1	1558.16	4
373		16	max	.001	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.004	3	-.009	4	-4.042e-5	4	NC	1	2620.55	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.003	3	-.005	4	-4.042e-5	4	NC	1	5409.548	4
377		18	max	0	1	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	-.001	4	-4.042e-5	4	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	-4.042e-5	4	NC	1	NC	1
381	M10	1	max	.007	2	.008	2	0	12	1.722e-3	4	NC	1	NC	2
382			min	-.009	3	-.013	3	-.695	4	1.682e-5	12	9062.665	2	100.707	4
383		2	max	.006	2	.007	2	0	12	1.819e-3	4	NC	1	NC	2
384			min	-.008	3	-.013	3	-.638	4	1.586e-5	12	NC	1	109.578	4
385		3	max	.006	2	.006	2	0	12	1.915e-3	4	NC	1	NC	2
386			min	-.008	3	-.012	3	-.582	4	1.491e-5	12	NC	1	120.099	4
387		4	max	.006	2	.005	2	0	12	2.012e-3	4	NC	1	NC	2
388			min	-.007	3	-.012	3	-.527	4	1.395e-5	12	NC	1	132.696	4
389		5	max	.005	2	.004	2	0	12	2.109e-3	4	NC	1	NC	1
390			min	-.007	3	-.011	3	-.473	4	1.3e-5	12	NC	1	147.946	4
391		6	max	.005	2	.003	2	0	12	2.206e-3	4	NC	1	NC	1
392			min	-.006	3	-.011	3	-.42	4	1.204e-5	12	NC	1	166.65	4
393		7	max	.004	2	.002	2	0	12	2.303e-3	4	NC	1	NC	1
394			min	-.006	3	-.01	3	-.368	4	1.109e-5	12	NC	1	189.937	4
395		8	max	.004	2	0	2	0	12	2.399e-3	4	NC	1	NC	1
396			min	-.005	3	-.01	3	-.319	4	1.013e-5	12	NC	1	219.449	4
397		9	max	.004	2	0	2	0	12	2.496e-3	4	NC	1	NC	1
398			min	-.005	3	-.009	3	-.271	4	9.176e-6	12	NC	1	257.648	4
399		10	max	.003	2	0	2	0	12	2.593e-3	4	NC	1	NC	1
400			min	-.004	3	-.008	3	-.227	4	8.221e-6	12	NC	1	308.362	4
401		11	max	.003	2	0	2	0	12	2.69e-3	4	NC	1	NC	1
402			min	-.004	3	-.008	3	-.185	4	7.265e-6	12	NC	1	377.815	4
403		12	max	.003	2	-.001	2	0	12	2.787e-3	4	NC	1	NC	1
404			min	-.003	3	-.007	3	-.147	4	6.31e-6	12	NC	1	476.697	4
405		13	max	.002	2	-.001	15	0	12	2.883e-3	4	NC	1	NC	1
406			min	-.003	3	-.006	3	-.112	4	5.354e-6	12	NC	1	624.668	4
407		14	max	.002	2	-.001	15	0	12	2.98e-3	4	NC	1	NC	1
408			min	-.002	3	-.005	3	-.081	4	4.399e-6	12	NC	1	861.256	4
409		15	max	.001	2	-.001	15	0	12	3.077e-3	4	NC	1	NC	1
410			min	-.002	3	-.004	3	-.055	4	3.443e-6	12	NC	1	1276.164	4
411		16	max	.001	2	0	15	0	12	3.174e-3	4	NC	1	NC	1
412			min	-.001	3	-.003	4	-.033	4	2.488e-6	12	NC	1	2111.877	4
413		17	max	0	2	0	15	0	12	3.271e-3	4	NC	1	NC	1
414			min	0	3	-.002	4	-.017	4	1.533e-6	12	NC	1	4236.577	4
415		18	max	0	2	0	15	0	12	3.367e-3	4	NC	1	NC	1
416			min	0	3	-.001	4	-.005	4	5.771e-7	12	NC	1	NC	1
417		19	max	0	1	0	1	0	1	3.464e-3	4	NC	1	NC	1
418			min	0	1	0	1	0	1	-9.531e-6	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	3.944e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	-8.709e-4	4	NC	1	NC	1
421		2	max	0	3	0	15	.016	4	-1.249e-6	12	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-1.808e-4	4	NC	1	NC	1
423		3	max	0	3	0	15	.031	4	5.121e-4	5	NC	1	NC	1
424			min	0	2	-.004	4	0	1	-4.827e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	.045	4	1.2e-3	4	NC	1	NC	1
426			min	0	2	-.006	4	0	1	-7.437e-5	1	NC	1	9014.716	4
427		5	max	.002	3	-.002	15	.057	4	1.89e-3	4	NC	1	NC	1
428			min	-.001	2	-.008	4	0	1	-1.005e-4	1	NC	1	8268.347	4
429		6	max	.002	3	-.002	15	.069	4	2.58e-3	4	NC	1	NC	1
430			min	-.002	2	-.01	4	0	1	-1.266e-4	1	9484.47	4	8338.243	4
431		7	max	.002	3	-.003	15	.08	4	3.27e-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
432			min	-.002	2	-.012	4	0	1	-1.527e-4	1	8178.838	4	9130.171	4
433		8	max	.003	3	-.003	15	.09	4	3.96e-3	4	NC	1	NC	1
434			min	-.002	2	-.013	4	-.001	1	-1.788e-4	1	7374.466	4	NC	1
435		9	max	.003	3	-.003	15	.099	4	4.65e-3	4	NC	2	NC	1
436			min	-.003	2	-.014	4	-.001	1	-2.049e-4	1	6902.752	4	NC	1
437		10	max	.004	3	-.003	15	.108	4	5.341e-3	4	NC	5	NC	1
438			min	-.003	2	-.014	4	-.002	1	-2.31e-4	1	6682.263	4	NC	1
439		11	max	.004	3	-.004	15	.117	4	6.031e-3	4	NC	5	NC	1
440			min	-.003	2	-.014	4	-.002	1	-2.571e-4	1	6680.734	4	NC	1
441		12	max	.004	3	-.003	15	.126	4	6.721e-3	4	NC	3	NC	1
442			min	-.004	2	-.014	4	-.003	1	-2.832e-4	1	6902.704	4	NC	1
443		13	max	.005	3	-.003	15	.136	4	7.411e-3	4	NC	2	NC	1
444			min	-.004	2	-.013	4	-.003	1	-3.093e-4	1	7392.86	4	NC	1
445		14	max	.005	3	-.003	15	.145	4	8.101e-3	4	NC	1	NC	1
446			min	-.004	2	-.012	4	-.004	1	-3.354e-4	1	8258.844	4	NC	1
447		15	max	.006	3	-.003	15	.156	4	8.791e-3	4	NC	1	NC	1
448			min	-.004	2	-.01	4	-.005	1	-3.615e-4	1	9737.862	4	NC	1
449		16	max	.006	3	-.002	15	.167	4	9.482e-3	4	NC	1	NC	1
450			min	-.005	2	-.008	4	-.006	1	-3.876e-4	1	NC	1	NC	1
451		17	max	.006	3	-.002	15	.18	4	1.017e-2	4	NC	1	NC	1
452			min	-.005	2	-.006	4	-.007	1	-4.138e-4	1	NC	1	NC	1
453		18	max	.007	3	-.001	15	.194	4	1.086e-2	4	NC	1	NC	1
454			min	-.005	2	-.004	1	-.008	1	-4.399e-4	1	NC	1	NC	1
455		19	max	.007	3	0	10	.21	4	1.155e-2	4	NC	1	NC	2
456			min	-.006	2	-.002	1	-.009	1	-4.66e-4	1	NC	1	9936.909	1
457	M12	1	max	.003	1	.005	2	.009	1	4.536e-5	5	NC	1	NC	3
458			min	0	3	-.007	3	-.21	4	-1.09e-4	1	NC	1	118.347	4
459		2	max	.002	1	.005	2	.008	1	4.536e-5	5	NC	1	NC	3
460			min	0	3	-.007	3	-.193	4	-1.09e-4	1	NC	1	128.602	4
461		3	max	.002	1	.005	2	.008	1	4.536e-5	5	NC	1	NC	3
462			min	0	3	-.007	3	-.176	4	-1.09e-4	1	NC	1	140.812	4
463		4	max	.002	1	.005	2	.007	1	4.536e-5	5	NC	1	NC	3
464			min	0	3	-.006	3	-.16	4	-1.09e-4	1	NC	1	155.483	4
465		5	max	.002	1	.004	2	.006	1	4.536e-5	5	NC	1	NC	3
466			min	0	3	-.006	3	-.143	4	-1.09e-4	1	NC	1	173.304	4
467		6	max	.002	1	.004	2	.006	1	4.536e-5	5	NC	1	NC	2
468			min	0	3	-.005	3	-.127	4	-1.09e-4	1	NC	1	195.23	4
469		7	max	.002	1	.004	2	.005	1	4.536e-5	5	NC	1	NC	2
470			min	0	3	-.005	3	-.111	4	-1.09e-4	1	NC	1	222.617	4
471		8	max	.002	1	.003	2	.004	1	4.536e-5	5	NC	1	NC	2
472			min	0	3	-.004	3	-.096	4	-1.09e-4	1	NC	1	257.443	4
473		9	max	.001	1	.003	2	.004	1	4.536e-5	5	NC	1	NC	2
474			min	0	3	-.004	3	-.082	4	-1.09e-4	1	NC	1	302.683	4
475		10	max	.001	1	.003	2	.003	1	4.536e-5	5	NC	1	NC	2
476			min	0	3	-.004	3	-.068	4	-1.09e-4	1	NC	1	362.99	4
477		11	max	.001	1	.002	2	.002	1	4.536e-5	5	NC	1	NC	1
478			min	0	3	-.003	3	-.056	4	-1.09e-4	1	NC	1	445.973	4
479		12	max	0	1	.002	2	.002	1	4.536e-5	5	NC	1	NC	1
480			min	0	3	-.003	3	-.044	4	-1.09e-4	1	NC	1	564.794	4
481		13	max	0	1	.002	2	.001	1	4.536e-5	5	NC	1	NC	1
482			min	0	3	-.002	3	-.033	4	-1.09e-4	1	NC	1	743.875	4
483		14	max	0	1	.002	2	.001	1	4.536e-5	5	NC	1	NC	1
484			min	0	3	-.002	3	-.024	4	-1.09e-4	1	NC	1	1032.893	4
485		15	max	0	1	.001	2	0	1	4.536e-5	5	NC	1	NC	1
486			min	0	3	-.002	3	-.016	4	-1.09e-4	1	NC	1	1546.336	4
487		16	max	0	1	0	2	0	1	4.536e-5	5	NC	1	NC	1
488			min	0	3	-.001	3	-.01	4	-1.09e-4	1	NC	1	2600.578	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
489		17	max	0	1	0	2	0	1	4.536e-5	5	NC	1	NC	1
490			min	0	3	0	3	-.005	4	-1.09e-4	1	NC	1	5368.117	4
491		18	max	0	1	0	2	0	1	4.536e-5	5	NC	1	NC	1
492			min	0	3	0	3	-.001	4	-1.09e-4	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	4.536e-5	5	NC	1	NC	1
494			min	0	1	0	1	0	1	-1.09e-4	1	NC	1	NC	1
495	M1	1	max	.009	3	.104	2	.737	4	1.555e-2	2	NC	1	NC	1
496			min	-.005	2	-.016	3	0	12	-2.834e-2	3	NC	1	NC	1
497		2	max	.009	3	.049	2	.713	4	8.482e-3	4	NC	4	NC	1
498			min	-.005	2	-.005	3	-.007	1	-1.402e-2	3	2084.604	2	NC	1
499		3	max	.009	3	.014	3	.688	4	1.384e-2	4	NC	5	NC	1
500			min	-.005	2	-.011	2	-.01	1	-1.918e-4	1	1003.82	2	6025.755	5
501		4	max	.009	3	.045	3	.663	4	1.208e-2	4	NC	5	NC	1
502			min	-.005	2	-.078	2	-.009	1	-5.088e-3	3	632.899	2	4330.859	5
503		5	max	.008	3	.086	3	.637	4	1.032e-2	4	NC	5	NC	1
504			min	-.004	2	-.148	2	-.006	1	-1.004e-2	3	456.303	2	3482.542	5
505		6	max	.008	3	.131	3	.611	4	1.358e-2	2	NC	15	NC	1
506			min	-.004	2	-.216	2	-.003	1	-1.498e-2	3	359.099	2	2973.011	5
507		7	max	.008	3	.174	3	.584	4	1.811e-2	2	NC	15	NC	1
508			min	-.004	2	-.277	2	0	12	-1.993e-2	3	301.763	2	2612.803	4
509		8	max	.008	3	.209	3	.556	4	2.265e-2	2	9331.948	15	NC	1
510			min	-.004	2	-.326	2	0	12	-2.488e-2	3	267.868	2	2349.668	4
511		9	max	.008	3	.232	3	.527	4	2.592e-2	2	8719.14	15	NC	1
512			min	-.004	2	-.356	2	0	1	-2.498e-2	3	250.232	2	2186.276	4
513		10	max	.008	3	.241	3	.495	4	2.837e-2	2	8532.555	15	NC	1
514			min	-.004	2	-.367	2	0	12	-2.185e-2	3	245.067	2	2138.808	4
515		11	max	.007	3	.235	3	.461	4	3.081e-2	2	8718.811	15	NC	1
516			min	-.004	2	-.356	2	0	12	-1.873e-2	3	251.113	2	2187.331	4
517		12	max	.007	3	.215	3	.425	4	2.992e-2	2	9331.201	15	NC	1
518			min	-.004	2	-.324	2	-.001	1	-1.561e-2	3	270.566	2	2344.833	4
519		13	max	.007	3	.183	3	.385	4	2.401e-2	2	NC	15	NC	1
520			min	-.004	2	-.273	2	0	1	-1.249e-2	3	308.363	2	2746.904	4
521		14	max	.007	3	.142	3	.343	4	1.809e-2	2	NC	15	NC	1
522			min	-.004	2	-.21	2	0	12	-9.378e-3	3	373.256	2	3580.097	4
523		15	max	.007	3	.097	3	.299	4	1.217e-2	2	NC	5	NC	1
524			min	-.004	2	-.14	2	0	12	-6.262e-3	3	485.552	2	5369.46	4
525		16	max	.007	3	.05	3	.257	4	9.52e-3	4	NC	5	NC	1
526			min	-.004	2	-.07	2	0	12	-3.146e-3	3	694.846	2	NC	1
527		17	max	.006	3	.005	3	.216	4	1.07e-2	4	NC	5	NC	1
528			min	-.004	2	-.006	2	0	12	-2.914e-5	3	1145.04	2	NC	1
529		18	max	.006	3	.046	2	.18	4	1.181e-2	2	NC	4	NC	1
530			min	-.004	2	-.035	3	0	12	-4.967e-3	3	2445.523	2	NC	1
531		19	max	.006	3	.092	2	.147	4	2.368e-2	2	NC	1	NC	1
532			min	-.004	2	-.072	3	-.001	1	-1.009e-2	3	NC	1	NC	1
533	M5	1	max	.028	3	.25	2	.737	4	0	1	NC	1	NC	1
534			min	-.019	2	-.019	3	0	1	-5.202e-6	4	NC	1	NC	1
535		2	max	.028	3	.115	2	.718	4	7.114e-3	4	NC	5	NC	1
536			min	-.019	2	0	3	0	1	0	1	859.767	2	8284.025	4
537		3	max	.028	3	.044	3	.695	4	1.401e-2	4	NC	5	NC	1
538			min	-.019	2	-.035	2	0	1	0	1	405.974	2	4842.148	4
539		4	max	.027	3	.132	3	.669	4	1.142e-2	4	9895.301	15	NC	1
540			min	-.019	2	-.213	2	0	1	0	1	249.681	2	3737.841	4
541		5	max	.026	3	.252	3	.641	4	8.821e-3	4	6928.221	15	NC	1
542			min	-.018	2	-.404	2	0	1	0	1	176.415	2	3210.316	4
543		6	max	.026	3	.386	3	.613	4	6.225e-3	4	5335.974	15	NC	1
544			min	-.018	2	-.594	2	0	1	0	1	136.751	2	2889.831	4
545		7	max	.025	3	.515	3	.584	4	3.628e-3	4	4416.068	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
546			min	-.018	2	-.765	2	0	1	0	1	113.674	2	2639.22	4
547		8	max	.025	3	.623	3	.555	4	1.032e-3	4	3881.023	15	NC	1
548			min	-.017	2	-.902	2	0	1	0	1	100.184	2	2392.701	4
549		9	max	.024	3	.693	3	.527	4	0	1	3606.577	15	NC	1
550			min	-.017	2	-.989	2	0	1	-3.68e-6	5	93.238	2	2181.349	4
551		10	max	.024	3	.717	3	.495	4	0	1	3523.891	15	NC	1
552			min	-.017	2	-1.018	2	0	1	-3.568e-6	5	91.208	2	2152.326	4
553		11	max	.023	3	.699	3	.461	4	0	1	3606.688	15	NC	1
554			min	-.017	2	-.988	2	0	1	-3.455e-6	5	93.578	2	2212.36	4
555		12	max	.023	3	.639	3	.426	4	7.57e-4	4	3881.288	15	NC	1
556			min	-.016	2	-.898	2	0	1	0	1	101.291	2	2301.722	4
557		13	max	.022	3	.542	3	.386	4	2.662e-3	4	4416.619	15	NC	1
558			min	-.016	2	-.753	2	0	1	0	1	116.533	2	2705.566	4
559		14	max	.022	3	.42	3	.342	4	4.566e-3	4	5337.067	15	NC	1
560			min	-.016	2	-.573	2	0	1	0	1	143.168	2	3762.741	4
561		15	max	.021	3	.283	3	.295	4	6.471e-3	4	6930.402	15	NC	1
562			min	-.016	2	-.377	2	0	1	0	1	190.331	2	6796.619	4
563		16	max	.02	3	.145	3	.25	4	8.376e-3	4	9899.893	15	NC	1
564			min	-.015	2	-.186	2	0	1	0	1	280.919	2	NC	1
565		17	max	.02	3	.015	3	.209	4	1.028e-2	4	NC	5	NC	1
566			min	-.015	2	-.019	2	0	1	0	1	482.331	2	NC	1
567		18	max	.02	3	.108	2	.175	4	5.22e-3	4	NC	5	NC	1
568			min	-.015	2	-.097	3	0	1	0	1	1065.393	2	NC	1
569		19	max	.02	3	.213	2	.148	4	0	1	NC	1	NC	1
570			min	-.015	2	-.197	3	0	1	-3.091e-6	4	NC	1	NC	1
571	M9	1	max	.009	3	.104	2	.736	4	2.834e-2	3	NC	1	NC	1
572			min	-.005	2	-.016	3	-.001	1	-1.555e-2	2	NC	1	NC	1
573		2	max	.009	3	.049	2	.717	4	1.402e-2	3	NC	4	NC	1
574			min	-.005	2	-.005	3	0	12	-7.624e-3	2	2084.604	2	8505.559	4
575		3	max	.009	3	.014	3	.694	4	1.399e-2	4	NC	5	NC	1
576			min	-.005	2	-.011	2	0	12	-2.151e-5	10	1003.82	2	4922.128	4
577		4	max	.009	3	.045	3	.668	4	1.098e-2	5	NC	5	NC	1
578			min	-.005	2	-.078	2	0	12	-4.517e-3	2	632.899	2	3759.206	4
579		5	max	.008	3	.086	3	.641	4	1.004e-2	3	NC	5	NC	1
580			min	-.004	2	-.148	2	0	12	-9.049e-3	2	456.303	2	3197.831	4
581		6	max	.008	3	.131	3	.613	4	1.498e-2	3	NC	15	NC	1
582			min	-.004	2	-.216	2	0	12	-1.358e-2	2	359.099	2	2859.422	4
583		7	max	.008	3	.174	3	.584	4	1.993e-2	3	NC	15	NC	1
584			min	-.004	2	-.277	2	0	1	-1.811e-2	2	301.763	2	2606.899	4
585		8	max	.008	3	.209	3	.555	4	2.488e-2	3	9310.22	15	NC	1
586			min	-.004	2	-.326	2	-.001	1	-2.265e-2	2	267.868	2	2375.107	4
587		9	max	.008	3	.232	3	.527	4	2.498e-2	3	8699.111	15	NC	1
588			min	-.004	2	-.356	2	0	12	-2.592e-2	2	250.232	2	2179.31	4
589		10	max	.008	3	.241	3	.495	4	2.185e-2	3	8513.025	15	NC	1
590			min	-.004	2	-.367	2	0	1	-2.837e-2	2	245.067	2	2140.164	4
591		11	max	.007	3	.235	3	.461	4	1.873e-2	3	8698.8	15	NC	1
592			min	-.004	2	-.356	2	0	1	-3.081e-2	2	251.113	2	2196.575	4
593		12	max	.007	3	.215	3	.426	4	1.561e-2	3	9309.627	15	NC	1
594			min	-.004	2	-.324	2	0	12	-2.992e-2	2	270.566	2	2320.38	4
595		13	max	.007	3	.183	3	.385	4	1.249e-2	3	NC	15	NC	1
596			min	-.004	2	-.273	2	0	12	-2.401e-2	2	308.363	2	2749.214	4
597		14	max	.007	3	.142	3	.341	4	9.378e-3	3	NC	15	NC	1
598			min	-.004	2	-.21	2	-.002	1	-1.809e-2	2	373.256	2	3732.342	5
599		15	max	.007	3	.097	3	.296	4	6.262e-3	3	NC	5	NC	1
600			min	-.004	2	-.14	2	-.006	1	-1.217e-2	2	485.552	2	6100.67	5
601		16	max	.007	3	.05	3	.251	4	8.228e-3	5	NC	5	NC	1
602			min	-.004	2	-.07	2	-.008	1	-6.257e-3	2	694.846	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
603		17	max	.006	3	.005	3	.21	4	1.036e-2	4	NC	5	NC	1
604			min	-.004	2	-.006	2	-.009	1	-6.138e-4	1	1145.04	2	NC	1
605		18	max	.006	3	.046	2	.176	4	4.967e-3	3	NC	4	NC	1
606			min	-.004	2	-.035	3	-.006	1	-1.181e-2	2	2445.523	2	NC	1
607		19	max	.006	3	.092	2	.148	4	1.009e-2	3	NC	1	NC	1
608			min	-.004	2	-.072	3	0	12	-2.368e-2	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

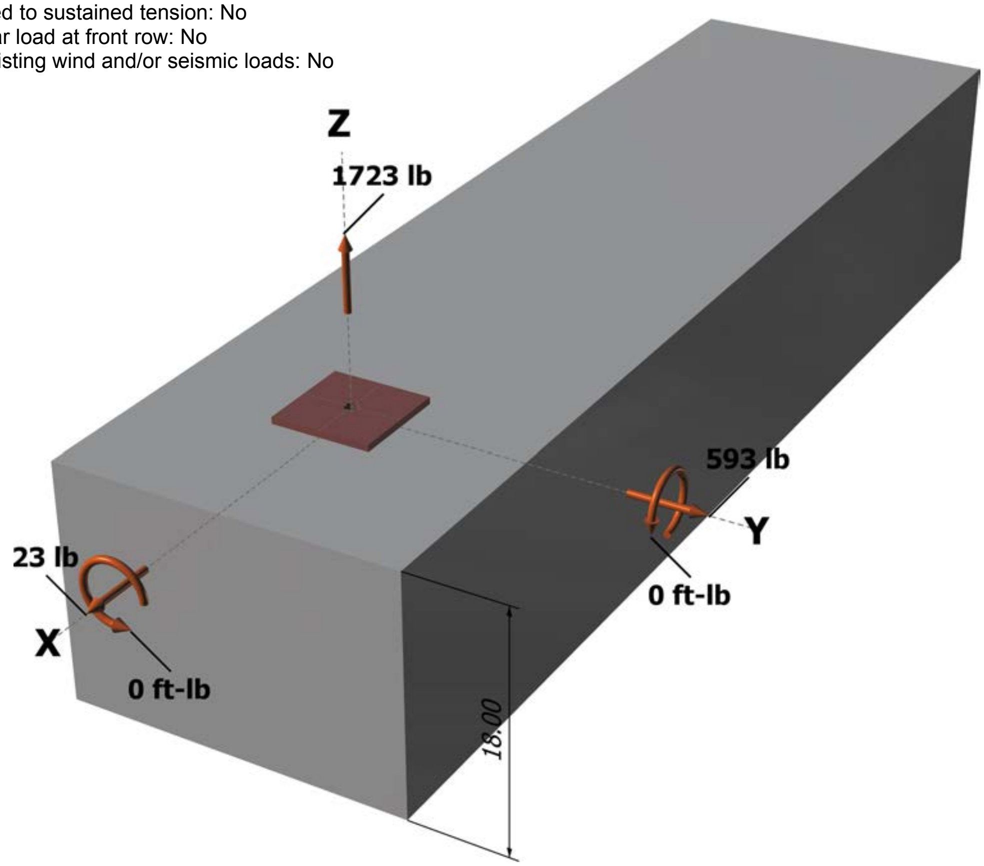
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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



<Figure 2>

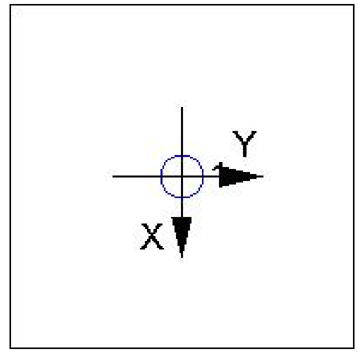
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	1723.0	23.0	593.0	593.4
Sum	1723.0	23.0	593.0	593.4

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1723
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	5.247	10215

$\phi N_{cb} = \phi\, (A_{Nc} / A_{Nco})\, \Psi_{ed,N}\, \Psi_{c,N}\, \Psi_{cp,N} N_b$ (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)
220.36	247.75	0.967	1.00	1.000	10215	0.65	5710

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	7.00	6947

$\phi V_{cby} = \phi\,(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
192.89	220.50	0.925	1.000	1.000	6947	0.70	3934

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)
165.27	278.72	0.878	1.000	1.000	8282	0.70	3018

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	7.00	6947

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
192.89	220.50	1.000	1.000	1.000	6947	0.70	8508

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)
165.27	278.72	1.000	1.000	1.000	8282	0.70	6875

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)
220.36	247.75	0.967	1.000	1.000	10215	8785	0.70	12298

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	1723	6071	0.28	Pass
Concrete breakout	1723	5710	0.30	Pass
Adhesive	**1723**	**5365**	**0.32**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**593**	**3156**	**0.19**	**Pass (Governs)**
T Concrete breakout y+	593	3934	0.15	Pass
T Concrete breakout x+	23	3018	0.01	Pass
|| Concrete breakout y+	23	8508	0.00	Pass
|| Concrete breakout x+	593	6875	0.09	Pass
Concrete breakout, combined	-	-	0.15	Pass
Pryout	593	12298	0.05	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.32	0.00	32.1 %	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.

Company:	Schletter, Inc.	Date:	11/17/2015
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 31-33 Inch Width		
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

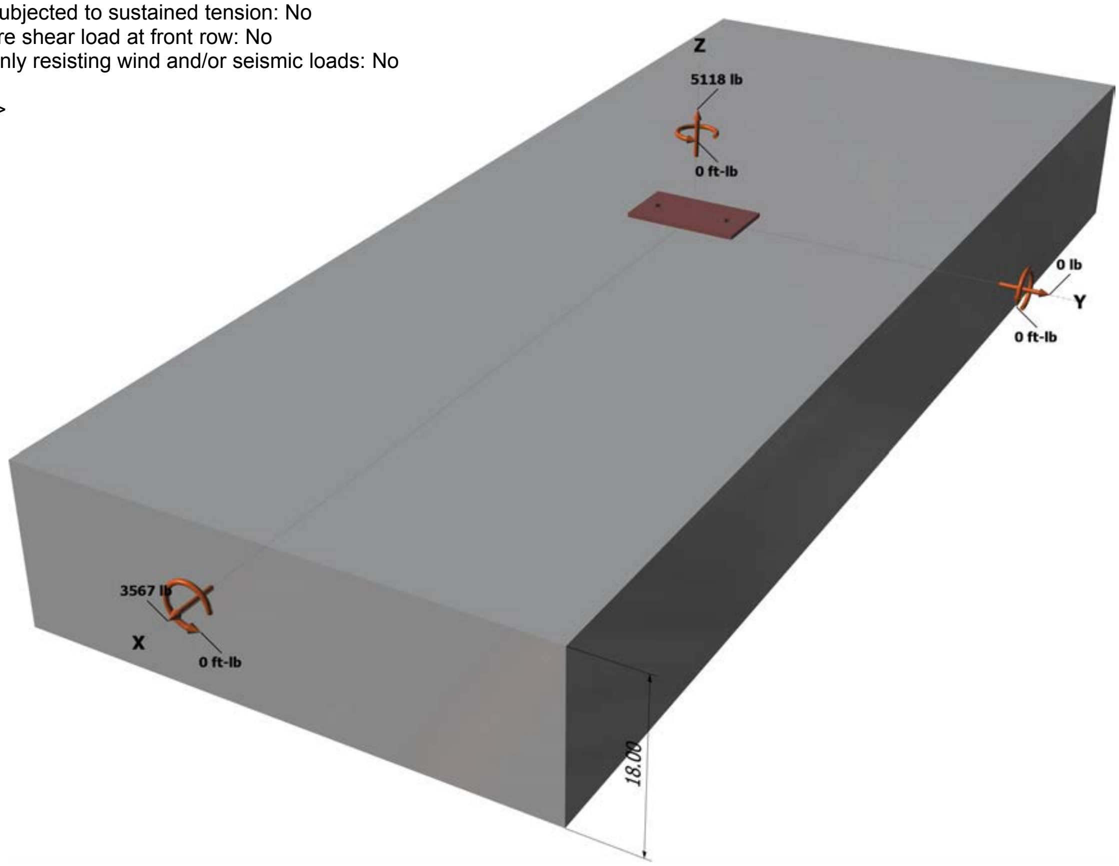
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

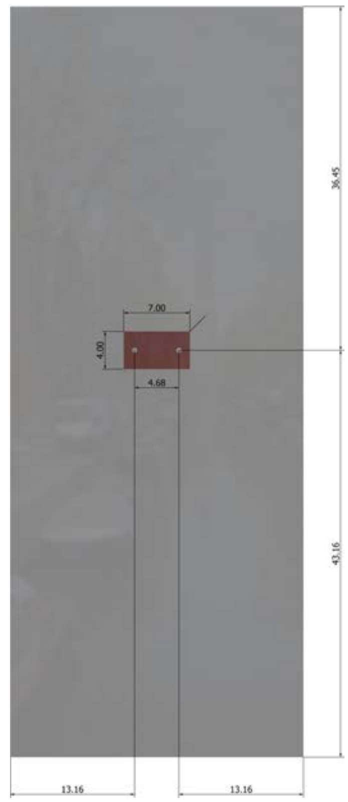
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'$_c$ (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

Base Plate
Length x Width x Thickness (inch): 4.00 x 7.00 x 0.28

<Figure 1>



<Figure 2>



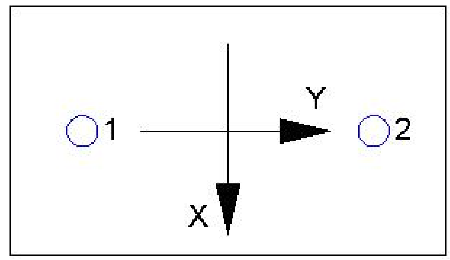
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2559.0	1783.5	0.0	1783.5
2	2559.0	1783.5	0.0	1783.5
Sum	5118.0	3567.0	0.0	3567.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5118
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	6.000	12492

$\phi N_{cbg} = \phi\,(A_{Nc}/A_{Nco})\,\Psi_{ec,N}\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N} N_b$ (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)
408.24	324.00	1.000	1.000	1.00	1.000	12492	0.65	10231

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)
158.66	109.66	1.000	1.043	1.000	1.000	9755	0.55	8093

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
558.00	648.00	1.000	0.919	1.000	1.000	15593	0.70	8641

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	13.16	17908

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}V_{by}$ (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)
710.64	779.34	1.000	1.000	1.000	17908	0.70	22862

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

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

k_{cp}	A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	158.66	109.66	1.000	1.043	1.000	1.000	9755	14715

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
408.24	324.00	1.000	1.000	1.000	1.000	12492	15740	0.70

ϕV_{cpg} (lb)
20601

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	2559	6071	0.42	Pass
Concrete breakout	5118	10231	0.50	Pass
Adhesive	**5118**	**8093**	**0.63**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	**1784**	**3156**	**0.57**	**Pass (Governs)**
T Concrete breakout x+	3567	8641	0.41	Pass
|| Concrete breakout y-	1784	22862	0.08	Pass
Pryout	3567	20601	0.17	Pass

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

Sec. D.7.3	0.63	0.57	119.8 %	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.