PRECISION
ENGINEERING SOLUTIONS

ROWD DEWATERING SYSTEM
STRUCTURAL CALCULATIONS

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ROWD Dewatering System

Structural Calculations

Prepared by: Precision Engineering Solutions

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EXECUTIVE SUMMARY

The ROWD mobile dewatering sled is an alternative to conventional dewatering structures that are stationary. To determine the limits of the structural design an analysis of the critical components was performed. The structural analysis included evaluation of; the controlling vertical members, locking plate, and securing pins. In addition, 3D analysis of the long side gates, as a complete system, was conducted. For analysis the loading condition of the ROWD sled was evaluated completely full of water. Each structural component was observed to be within allowable stresses for A36 steel using ASD design methodology under the loading condition. Results indicate a minimum factor of safety equal to 1.5. The ROWD sled is safe to operate under conditions that are less than or equal to the extreme loading condition. Furthermore, these results are applicable regardless of ambient conditions the dewatering sled is exposed to.

OVERVIEW

The ROWD dewatering sled is a mobile device used to decrease environmental impacts and waste associated with traditional dewatering systems. Current dewatering systems are constructed at or near a job site using wooden posts and strawbales. This dewatering method is immobile and susceptible to failure. The ROWD system utilizes inner and outer walls on a movable base, the structure is filled with strawbales or other equivalent filter material to allow for proper filtration and flow. Its steel construction eliminates the chance of collapse under continued operating conditions. The easy transport and reusability of ROWD cuts down abandoned structures on project sites.

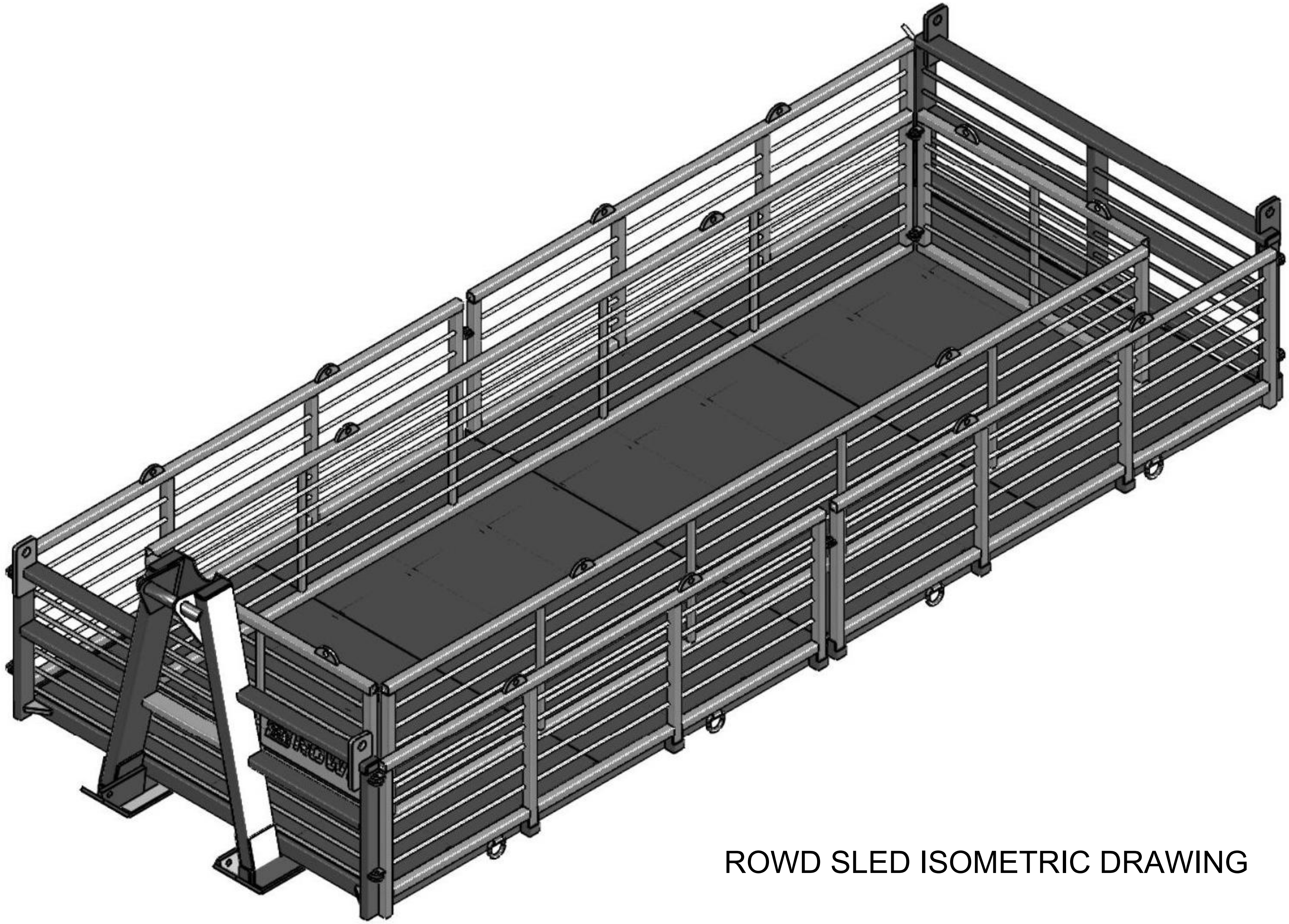
ENGINEERING APPROACH

This report includes structural calculations of individual members of the ROWD system. The ROWD sled is made up of several individual member-components that all contribute to its structural integrity. Based on initial inspection, certain structural members were targeted for detailed analysis based on their inherent characteristics. These members are analyzed for structural integrity during loading from hydraulic pressure exerted during the critical loading condition of the ROWD, the sled becoming completely full of water. To achieve this loading condition, the assumption is made that the drainage process has failed while water ingress is held constant. Structural members in the long sides of the ROWD sled are designed smaller for functionality but makes them less rigid than the members at each end. Therefore, attention was directed to the long side members. This report also includes a 3D structural analysis with an isometric diagram of the long side showing boundary conditions as well as a summary report of member forces, member stresses, joint reactions, and joint deflections.

Components subject to high stress were analyzed to ensure the structural integrity of the system. Shear calculations were conducted for locking pins, vertical frame supports (stakes), frame stake pockets, and locking plates due to the large amount of force they experience during use. (appendix II) All calculations were done assuming the ROWD system is completely full of pure water.

After the individual components were analyzed the outer frame was analyzed as a complete system to determine deflection and stability (appendices III & IV). Once again, all calculations were conducted assuming the ROWD system is filled with pure water.

APPENDIX I: 3D MODEL



ROWD SLED ISOMETRIC DRAWING

APPENDIX II:
STRUCTURAL CALCULATIONS

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Purpose:
Structural analysis of ROWD sled controlling limit states. Calculations intend to show structural integrity of the load path during the severe loading condition of the sled becoming completely full of water.

Assumptions:
1. The load path is generated by outward hydraulic pressure on vertical stakes spaced at 40 inches on center.
2. The long side of the sled is considered to be controlling since the short sides are made up of thicker steel elements with tighter spacing.
3. Each stake takes up the tributary hydraulic pressure (40 inches) in bending and transmits through shear and bending of the stake pockets.
4. Each end of the long side is hinged allowing for open swing of gates.
5. The hinge pins are analyzed for shear from the resisting moment couple in the hinges.
6. Vertical stakes consist of TS2x2x.125
7. All steel is A36

Knowns: (refer to Figure 1)

Vertical Stake Height: $h := \dfrac{32\ in}{12\ \dfrac{in}{ft}} = 2.667\ ft$

Water Density: $\delta := 62.4\ \dfrac{lb}{ft^3}$

Base Pressure: $x := h \cdot \delta = 166.4\ \dfrac{lb}{ft^2}$

Resultant Pressure: $R := \dfrac{1}{2}\ x \cdot h = 221.867\ \dfrac{lb}{ft}$

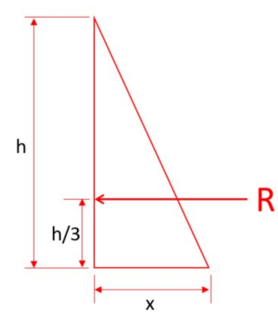

Figure 1

Calculate force on TS2x2x.125 post at 40 inches on center:

$$F := R \cdot \dfrac{40\ in}{12\ \dfrac{in}{ft}} = 739.556\ lb$$

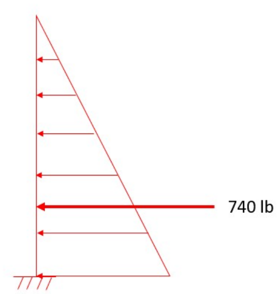

Figure 2

Determine allowable strength of vertical stakes:

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Vertical stake section properties:

$t_{stake} := .116\ in$

$I := .486 \cdot in^4$

$A_g := .84 \cdot in^2$

$S := .486 \cdot in^3$

$F_y := 36000\ \frac{lb}{in^2}$

$Z := .584 \cdot in^3$

$F_u := 58000\ \frac{lb}{in^2}$

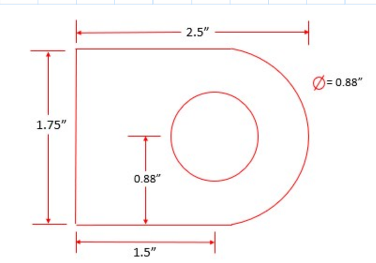

Figure 3

Determine bending moment in vertical stake:

From Risa: $M_b := 740 \cdot lb \cdot ft$

$$f_b := \frac{M_b \cdot 12\ \frac{in}{ft}}{S} = \left(1.827 \cdot 10^4\right)\ \frac{lb}{in^2}$$

$$F_b := f_b \cdot \Omega_b = \left(3.051 \cdot 10^4\right)\ \frac{lb}{in^2}$$

Fb < Fy ∴ OK!

Check allowable shear:

$$V_n := 0.6 \cdot F_y \cdot A_g = \left(1.814 \cdot 10^4\right)\ lb$$

Vn > F ∴ OK!

Check Deflection:

$$\Delta_{max} := \frac{F \cdot \left(h \cdot 12\ \frac{in}{ft}\right)^3}{15 \cdot 29000000\ \frac{lb}{in^2} \cdot I} = 0.115\ in$$

ΣM about the hinge axis resolves to tension force in one pin and compression force in the other pin.

Detemine resistant moment couple at gate hinge:

From Risa:

Force on upper pin = 287 lb
Force on lower pin = 479 lb

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Determine Allowable Strength of locking plates:

Plate Section Properties:

$t \equiv \frac{5}{8}\ in$ $\quad l := 2.5\ in$ $\quad w := 1.75\ in$

$A_g := t \cdot w = 1.094\ in^2$ $\quad F_y := 36000\ \frac{lb}{in^2}$

$Dia_{pinhole} \equiv 0.88\ in$ $\quad F_u := 58000\ \frac{lb}{in^2}$

$A_{net} := A_g - t \cdot Dia_{pinhole} = 0.544\ in^2$

Check nominal strength based on gross section yielding:

$T_n := F_y \cdot A_g = \left(3.938 \cdot 10^4\right)\ lb$ $\quad \Omega_b \equiv 1.67$ $\quad \Omega_{rupt} \equiv 2$

$T_a := \frac{T_n}{\Omega_b} = \left(2.358 \cdot 10^4\right)\ lb$ $\quad \Omega_V \equiv 1.5$

Ta > Force on pin ∴ OK!

Check strength based on net section rupture:

$T_n := F_u \cdot A_{net} = \left(3.154 \cdot 10^4\right)\ lb$ $\quad T_a := \frac{T_n}{\Omega_{rupt}} = \left(1.577 \cdot 10^4\right)\ lb$

Ta > Force on pin ∴ OK!

Check allowable strength of pin:

$Dia_{pin} \equiv .75 \cdot in$

$A_{pin} := \frac{\pi}{4} \cdot \left(Dia_{pin}\right)^2 = 0.442\ in^2$

$F_{nv} := 24000 \cdot \frac{lb}{in^2}$ $\quad \Omega \equiv 2$

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$$T_n := F_{nv} \cdot A_{pin} = \left(1.06 \cdot 10^4\right)\ lb$$

$$T_a := \frac{T_n}{\Omega} = \left(5.301 \cdot 10^3\right)\ lb$$

Ta > Force on pin ∴ OK!

Check allowable strength of pin in single shear:

$$R_{av} := 0.6\ F_y \cdot \frac{A_{pin}}{\Omega_V} = \left(6.362 \cdot 10^3\right)\ lb$$

$$R_{au} := 0.6\ F_u \cdot \frac{A_{pin}}{\Omega} = \left(7.687 \cdot 10^3\right)\ lb$$

Check allowable strength of pin bearing on locking plate:
(based on edge distance) Le = 0.56"

$$L_e := .56 \cdot in$$

$$R_{n1} := 1.2 \cdot L_e \cdot t \cdot F_u = \left(2.436 \cdot 10^4\right)\ lb$$ ∴ Controls

$$R_{n2} := 2.4 \cdot Dia_{pin} \cdot t \cdot F_u = \left(6.525 \cdot 10^4\right)\ lb$$

$$R_a := \frac{R_{n1}}{\Omega} = \left(1.218 \cdot 10^4\right)\ lb$$

Ra > Force on pin ∴ OK!

Check block shear rupture (ASD):

Anv = Agv = Av
Ant = Agt = At

$$W_{tens} := \frac{w - Dia_{pinhole}}{2} = 0.435\ in$$

$$A_v := t \cdot L_e = 0.35\ in^2$$

$$A_t := W_{tens} \cdot t = 0.272\ in^2$$

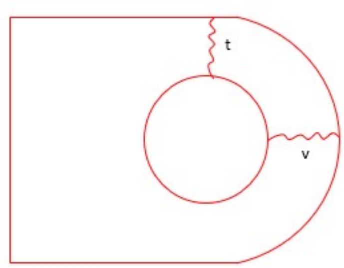

Figure 4

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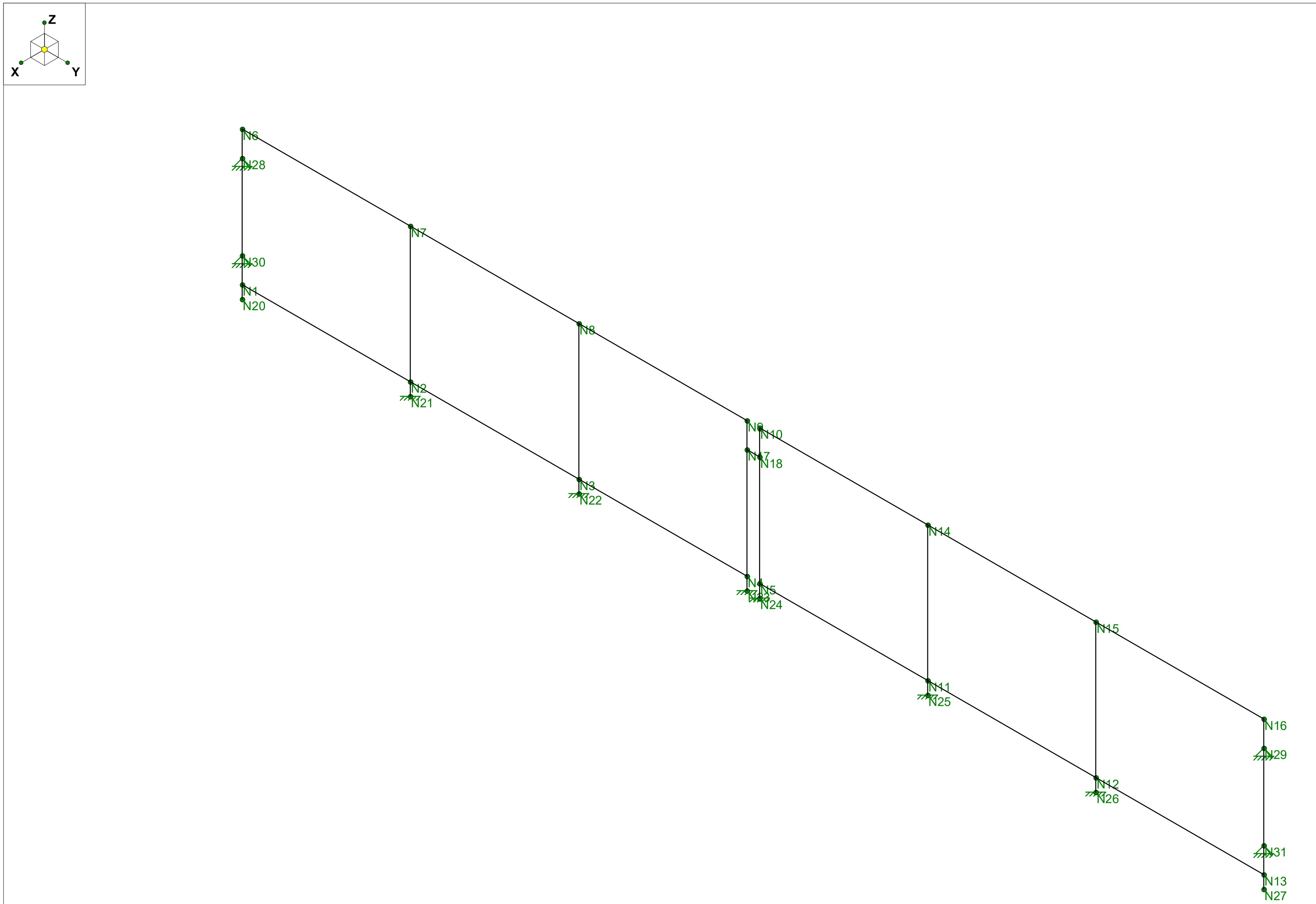
Check: $R_{n3} := 0.6 \cdot F_u \cdot A_v + 1.0 \cdot F_u \cdot A_t = \left(2.795 \cdot 10^4\right)\ lb$

$R_{n4} := 0.6 \cdot F_y \cdot A_v + 1.0 \cdot F_u \cdot A_t = \left(2.333 \cdot 10^4\right)\ lb$ $\therefore$ Controls

$R_a := \frac{R_{n4}}{\Omega} = \left(1.166 \cdot 10^4\right)\ lb$ **Ra > Force on pin $\therefore$ OK!**

APPENDIX III:
RISA 3D GRAPHIC



Precision Engineering Solutions	ROWD Sled Side Gates Structural Analysis	SK - 2
TKJ		May 31, 2019 at 10:32 AM
		Risa Check.r3d

APPENDIX IV:
RISA 3D REPORT

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E...	Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2
7	A1085	29000	11154	.3	.65	.49	50	1.4	65	1.3

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	TS	W10x33	Beam	None	A992	Typical	9.71	36.6	171	.583

Design Size and Code Check Parameters

	Label	Max Depth[in]	Min Depth[in]	Max Width[in]	Min Width[in]	Max Bending Chk	Max Shear Chk
1	Typical					1	1
2	DR1					1	1

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	0	3.33	0	0	
3	N3	0	6.67	0	0	
4	N4	0	10	0	0	
5	N5	0	10.25	0	0	
6	N6	0	0	2.67	0	
7	N7	0	3.33	2.67	0	
8	N8	0	6.67	2.67	0	
9	N9	0	10	2.67	0	
10	N10	0	10.25	2.67	0	
11	N11	0	13.58	0	0	
12	N12	0	16.91	0	0	
13	N13	0	20.24	0	0	
14	N14	0	13.58	2.67	0	
15	N15	0	16.91	2.67	0	
16	N16	0	20.24	2.67	0	
17	N17	0	10	2.17	0	
18	N18	0	10.25	2.17	0	
19	N20	0	0	-.25	0	
20	N21	0	3.33	-.25	0	
21	N22	0	6.67	-.25	0	
22	N23	0	10	-.25	0	
23	N24	0	10.25	-.25	0	
24	N25	0	13.58	-.25	0	
25	N26	0	16.91	-.25	0	
26	N27	0	20.24	-.25	0	
27	N28	0	0	2.17	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
28	N29	0	20.24	2.17	0	
29	N30	0	0	.5	0	
30	N31	0	20.24	.5	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N13						
2	N16						
3	N1						
4	N6						
5	N2						
6	N3						
7	N4						
8	N5						
9	N11						
10	N12						
11	N18						
12	N17						
13	N20						
14	N21	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
15	N22	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
16	N23	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
17	N24	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
18	N25	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
19	N26	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
20	N27						
21	N28	Reaction	Reaction	Reaction			
22	N29	Reaction	Reaction	Reaction			
23	N30	Reaction	Reaction	Reaction			
24	N31	Reaction	Reaction	Reaction			

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N6			GenTS	None	None	gen_Steel	DR1
2	M2	N6	N7			GenTS	None	None	gen_Steel	DR1
3	M3	N7	N8			GenTS	None	None	gen_Steel	DR1
4	M4	N8	N9			GenTS	None	None	gen_Steel	DR1
5	M5	N9	N4			GenTS	None	None	gen_Steel	DR1
6	M6	N4	N3			GenTS	None	None	gen_Steel	DR1
7	M7	N3	N2			GenTS	None	None	gen_Steel	DR1
8	M8	N2	N1			GenTS	None	None	gen_Steel	DR1
9	M9	N2	N7			GenTS	None	None	gen_Steel	DR1
10	M10	N3	N8			GenTS	None	None	gen_Steel	DR1
11	M11	N10	N14			GenTS	None	None	gen_Steel	DR1
12	M12	N14	N15			GenTS	None	None	gen_Steel	DR1
13	M13	N15	N16			GenTS	None	None	gen_Steel	DR1
14	M14	N16	N13			GenTS	None	None	gen_Steel	DR1
15	M15	N13	N12			GenTS	None	None	gen_Steel	DR1
16	M16	N12	N11			GenTS	None	None	gen_Steel	DR1

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
17	M17	N11	N5			GenTS	None	None	gen_Steel	DR1
18	M18	N5	N10			GenTS	None	None	gen_Steel	DR1
19	M19	N14	N11			GenTS	None	None	gen_Steel	DR1
20	M20	N12	N15			GenTS	None	None	gen_Steel	DR1
21	M23	N1	N20			GenTS	None	None	gen_Steel	DR1
22	M24	N2	N21			GenTS	None	None	gen_Steel	DR1
23	M25	N3	N22			GenTS	None	None	gen_Steel	DR1
24	M26	N4	N23			GenTS	None	None	gen_Steel	DR1
25	M27	N5	N24			GenTS	None	None	gen_Steel	DR1
26	M28	N11	N25			GenTS	None	None	gen_Steel	DR1
27	M29	N12	N26			GenTS	None	None	gen_Steel	DR1
28	M30	N13	N27			GenTS	None	None	gen_Steel	DR1
29	M29A	N17	N18			GenTS	None	None	gen_Steel	DR1

Hot Rolled Steel Design Parameters

Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
No Data to Print ...											

Joint Loads and Enforced Displacements

Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
No Data to Print ...			

Member Point Loads

Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
No Data to Print ...			

Member Distributed Loads (BLC 1 : self)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.555	0	0	0
2	M9	X	.555	0	0	0
3	M10	X	.555	0	0	0
4	M19	X	0	.555	0	0
5	M14	X	0	.555	0	0
6	M20	X	.555	0	0	0
7	M18	X	.277	0	0	0
8	M5	X	0	.277	0	0

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribu...	Area(M...	Surface...
1	self	DL			-1			8		
2	Water	LL								

Load Combinations

	Descrip...	Solve	PDelta	SRSS	BLC	Fa...	B...	Fa...	BLC	Fa...	B...	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	water	Yes	Y		DL	1	LL	1																

Load Combination Design

	Description	ASIF	CD	Service	Hot Rolled	Cold For...	Wood	Concrete	Masonry	Aluminum	Stainless	Connection
1	water				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	N21	-.71	.003	.028	0	-.65	.014
2	1	N22	-.718	.002	.028	0	-.738	-.004
3	1	N23	-.399	-.002	.018	-.001	-.514	-.003
4	1	N24	-.399	.002	.018	.001	-.514	.003
5	1	N25	-.718	-.002	.028	0	-.738	.004
6	1	N26	-.71	-.003	.028	0	-.65	-.014
7	1	N28	-.287	.004	.008	0	0	0
8	1	N29	-.287	-.004	.008	0	0	0
9	1	N30	-.479	-.004	.009	0	0	0
10	1	N31	-.479	.004	.009	0	0	0
11	1	Totals:	-5.185	0	.182			
12	1	COG (ft):	X: 0	Y: 10.121	Z: 1.292			

Joint Reactions - Overstrength

LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
No Data to Print ...							

Joint Deflections

	LC	Joint Label	X [in]	Y [in]	Z [in]	X Rotation [rad]	Y Rotation [rad]	Z Rotation [rad]
1	1	N1	0	0	0	-5.502e-06	2.015e-04	-5.401e-04
2	1	N2	.002	0	0	7.675e-07	1.433e-03	-5.579e-05
3	1	N3	.003	0	0	1.854e-07	1.655e-03	1.723e-05
4	1	N4	.002	0	0	3.433e-06	1.187e-03	1.066e-05
5	1	N5	.002	0	0	-3.432e-06	1.187e-03	-1.066e-05
6	1	N6	.001	0	0	-5.866e-06	3.666e-04	-2.765e-03
7	1	N7	.111	0	0	4.752e-07	3.244e-03	-1.818e-03
8	1	N8	.142	0	0	-8.078e-07	4.588e-03	1.64e-04
9	1	N9	.121	0	0	5.47e-06	4.502e-03	3.794e-04
10	1	N10	.121	0	0	-5.479e-06	4.502e-03	-3.791e-04
11	1	N11	.003	0	0	-1.714e-07	1.655e-03	-1.712e-05
12	1	N12	.002	0	0	-7.81e-07	1.433e-03	5.573e-05
13	1	N13	0	0	0	5.505e-06	2.015e-04	5.401e-04
14	1	N14	.142	0	0	8.567e-07	4.587e-03	-1.62e-04
15	1	N15	.111	0	0	-5.23e-07	3.244e-03	1.818e-03
16	1	N16	.001	0	0	5.876e-06	3.668e-04	2.765e-03
17	1	N17	.094	0	0	-2.218e-07	4.455e-03	5.048e-05
18	1	N18	.094	0	0	2.198e-07	4.455e-03	-5.024e-05

Joint Deflections (Continued)

	LC	Joint Label	X [in]	Y [in]	Z [in]	X Rotation [rad]	Y Rotation [rad]	Z Rotation [rad]
19	1	N20	-.002	0	0	-5.502e-06	2.015e-04	-5.401e-04
20	1	N21	0	0	0	0	0	0
21	1	N22	0	0	0	0	0	0
22	1	N23	0	0	0	0	0	0
23	1	N24	0	0	0	0	0	0
24	1	N25	0	0	0	0	0	0
25	1	N26	0	0	0	0	0	0
26	1	N27	-.002	0	0	5.505e-06	2.015e-04	5.401e-04
27	1	N28	0	0	0	-3.449e-07	2.825e-05	-2.348e-03
28	1	N29	0	0	0	3.485e-07	2.833e-05	2.349e-03
29	1	N30	0	0	0	-1.031e-07	1.691e-04	-9.567e-04
30	1	N31	0	0	0	1.036e-07	1.691e-04	9.568e-04

Member Section Forces

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1	1	M1	1	-.005	-.004	-.022	.051	-.023	-.002
2			2	.002	0	-.177	.051	-.005	0
3			3	0	0	.054	.051	-.041	0
4			4	-.002	0	.193	.051	.047	0
5			5	.005	-.004	-.048	.051	.053	.002
6	1	M2	1	.004	.005	-.048	-.053	.051	.002
7			2	.004	.002	-.048	-.053	.012	0
8			3	.004	0	-.048	-.053	-.028	-.002
9			4	.004	-.003	-.048	-.053	-.067	0
10			5	.004	-.005	-.048	-.053	-.107	.003
11	1	M3	1	.004	.005	.005	-.025	-.066	.003
12			2	.004	.002	.005	-.025	-.062	0
13			3	.004	0	.005	-.025	-.058	-.001
14			4	.004	-.002	.005	-.025	-.054	0
15			5	.004	-.005	.005	-.025	-.05	.003
16	1	M4	1	.004	.005	.028	.002	-.053	.003
17			2	.004	.003	.028	.002	-.03	0
18			3	.004	0	.028	.002	-.006	-.002
19			4	.004	-.002	.028	.002	.017	0
20			5	.004	-.005	.028	.002	.041	.002
21	1	M5	1	.005	-.004	-.028	-.041	-.002	-.002
22			2	.007	0	-.051	-.001	-.026	0
23			3	.009	0	-.121	-.001	-.08	0
24			4	.011	0	-.236	-.001	-.197	0
25			5	.013	0	-.398	-.001	-.406	0
26	1	M6	1	.002	.005	0	.009	-.001	.002
27			2	.002	.002	0	.009	0	0
28			3	.002	0	0	.009	0	-.001
29			4	.002	-.003	0	.009	0	0
30			5	.002	-.005	0	.009	.001	.003
31	1	M7	1	0	.005	.001	-.004	0	.003
32			2	0	.002	.001	-.004	.001	0
33			3	0	0	.001	-.004	.002	-.001
34			4	0	-.002	.001	-.004	.003	0
35			5	0	-.005	.001	-.004	.004	.003

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
36	1	M8	1	-.004	.005	.022	-.023	-.023	.003
37			2	-.004	.003	.022	-.023	-.004	0
38			3	-.004	0	.022	-.023	.014	-.002
39			4	-.004	-.002	.022	-.023	.033	0
40			5	-.004	-.005	.022	-.023	.051	.002
41	1	M9	1	.017	0	-.688	.041	.491	0
42			2	.015	0	-.364	.041	.145	0
43			3	.014	0	-.133	.041	-.016	0
44			4	.012	0	.006	.041	-.053	0
45			5	.01	0	.052	.041	-.028	0
46	1	M10	1	.017	0	-.718	-.003	.571	0
47			2	.015	0	-.394	-.003	.205	0
48			3	.014	0	-.162	-.003	.025	0
49			4	.012	0	-.023	-.003	-.032	0
50			5	.01	0	.023	-.003	-.026	0
51	1	M11	1	.004	.005	-.028	-.002	.041	.002
52			2	.004	.002	-.028	-.002	.017	0
53			3	.004	0	-.028	-.002	-.006	-.002
54			4	.004	-.003	-.028	-.002	-.03	0
55			5	.004	-.005	-.028	-.002	-.053	.003
56	1	M12	1	.004	.005	-.005	.025	-.05	.003
57			2	.004	.002	-.005	.025	-.054	0
58			3	.004	0	-.005	.025	-.058	-.001
59			4	.004	-.002	-.005	.025	-.062	0
60			5	.004	-.005	-.005	.025	-.066	.003
61	1	M13	1	.004	.005	.048	.053	-.107	.003
62			2	.004	.003	.048	.053	-.067	0
63			3	.004	0	.048	.053	-.028	-.002
64			4	.004	-.002	.048	.053	.012	0
65			5	.004	-.005	.048	.053	.051	.002
66	1	M14	1	.005	-.004	-.048	-.051	-.053	-.002
67			2	-.002	0	.193	-.051	-.047	0
68			3	0	0	.054	-.051	.04	0
69			4	.002	0	-.177	-.051	.005	0
70			5	-.005	-.004	-.022	-.051	.023	.002
71	1	M15	1	-.004	.005	-.022	.023	.051	.002
72			2	-.004	.002	-.022	.023	.033	0
73			3	-.004	0	-.022	.023	.014	-.002
74			4	-.004	-.003	-.022	.023	-.004	0
75			5	-.004	-.005	-.022	.023	-.023	.003
76	1	M16	1	0	.005	-.001	.004	.004	.003
77			2	0	.002	-.001	.004	.003	0
78			3	0	0	-.001	.004	.002	-.001
79			4	0	-.002	-.001	.004	.001	0
80			5	0	-.005	-.001	.004	0	.003
81	1	M17	1	.002	.005	0	-.009	.001	.003
82			2	.002	.003	0	-.009	0	0
83			3	.002	0	0	-.009	0	-.001
84			4	.002	-.002	0	-.009	0	0
85			5	.002	-.005	0	-.009	-.002	.002
86	1	M18	1	.013	0	-.398	.001	.406	0
87			2	.011	0	-.236	.001	.197	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
88			3	.009	0	-.121	.001	.08	0
89			4	.007	0	-.051	.001	.026	0
90			5	.005	-.004	-.028	.041	.002	.002
91	1	M19	1	.01	0	.023	.003	.026	0
92			2	.012	0	-.023	.003	.032	0
93			3	.014	0	-.162	.003	-.025	0
94			4	.015	0	-.394	.003	-.205	0
95			5	.017	0	-.718	.003	-.571	0
96	1	M20	1	.017	0	-.688	-.041	.491	0
97			2	.015	0	-.364	-.041	.145	0
98			3	.014	0	-.133	-.041	-.016	0
99			4	.012	0	.006	-.041	-.053	0
100			5	.01	0	.052	-.041	-.028	0
101	1	M23	1	0	0	0	0	0	0
102			2	0	0	0	0	0	0
103			3	0	0	0	0	0	0
104			4	0	0	0	0	0	0
105			5	0	0	0	0	0	0
106	1	M24	1	.027	.003	-.71	.014	-.472	0
107			2	.027	.003	-.71	.014	-.517	0
108			3	.028	.003	-.71	.014	-.561	0
109			4	.028	.003	-.71	.014	-.605	0
110			5	.028	.003	-.71	.014	-.65	0
111	1	M25	1	.027	.002	-.718	-.004	-.558	0
112			2	.027	.002	-.718	-.004	-.603	0
113			3	.027	.002	-.718	-.004	-.648	0
114			4	.028	.002	-.718	-.004	-.693	0
115			5	.028	.002	-.718	-.004	-.738	0
116	1	M26	1	.017	-.002	-.399	-.003	-.415	-.002
117			2	.017	-.002	-.399	-.003	-.44	-.001
118			3	.017	-.002	-.399	-.003	-.465	-.001
119			4	.018	-.002	-.399	-.003	-.489	-.001
120			5	.018	-.002	-.399	-.003	-.514	-.001
121	1	M27	1	.017	.002	-.399	.003	-.415	.002
122			2	.017	.002	-.399	.003	-.44	.001
123			3	.017	.002	-.399	.003	-.465	.001
124			4	.018	.002	-.399	.003	-.489	.001
125			5	.018	.002	-.399	.003	-.514	.001
126	1	M28	1	.027	-.002	-.718	.004	-.558	0
127			2	.027	-.002	-.718	.004	-.603	0
128			3	.027	-.002	-.718	.004	-.648	0
129			4	.028	-.002	-.718	.004	-.693	0
130			5	.028	-.002	-.718	.004	-.738	0
131	1	M29	1	.027	-.003	-.71	-.014	-.472	0
132			2	.027	-.003	-.71	-.014	-.517	0
133			3	.028	-.003	-.71	-.014	-.561	0
134			4	.028	-.003	-.71	-.014	-.605	0
135			5	.028	-.003	-.71	-.014	-.65	0
136	1	M30	1	0	0	0	0	0	0
137			2	0	0	0	0	0	0
138			3	0	0	0	0	0	0
139			4	0	0	0	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
140			5	0	0	0	0	0	0
141	1	M29A	1	.003	0	0	0	.039	0
142			2	.003	0	0	0	.039	0
143			3	.003	0	0	0	.039	0
144			4	.003	0	0	0	.039	0
145			5	.003	0	0	0	.039	0

Maximum Member Section Forces

	LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-...	Loc[ft]	y-y Moment[...	Loc[ft]	z-z Moment[...	Loc[ft]
1	1	M1	max	.006	2.197	0	.501	.217	.473	.051	0	.081	2.169	.002	2.67
2			min	-.007	.473	-.004	0	-.25	.501	.051	0	-.046	1.14	-.002	0
3	1	M2	max	.004	0	.005	0	-.048	0	-.053	0	.051	0	.003	3.33
4			min	.004	0	-.005	3.33	-.048	0	-.053	0	-.107	3.33	-.002	1.596
5	1	M3	max	.004	0	.005	0	.005	0	-.025	0	-.05	3.34	.003	3.34
6			min	.004	0	-.005	3.34	.005	0	-.025	0	-.066	0	-.001	1.67
7	1	M4	max	.004	0	.005	0	.028	0	.002	0	.041	3.33	.003	0
8			min	.004	0	-.005	3.33	.028	0	.002	0	-.053	0	-.002	1.734
9	1	M5	max	.013	2.67	0	.501	-.028	0	-.001	.501	-.002	0	0	2.67
10			min	.005	0	-.004	0	-.398	2.67	-.041	0	-.406	2.67	-.002	0
11	1	M6	max	.002	0	.005	0	0	0	.009	0	.001	3.33	.003	3.33
12			min	.002	0	-.005	3.33	0	0	.009	0	-.001	0	-.001	1.596
13	1	M7	max	0	0	.005	0	.001	0	-.004	0	.004	3.34	.003	3.34
14			min	0	0	-.005	3.34	.001	0	-.004	0	0	0	-.001	1.635
15	1	M8	max	-.004	0	.005	0	.022	0	-.023	0	.051	3.33	.003	0
16			min	-.004	0	-.005	3.33	.022	0	-.023	0	-.023	0	-.002	1.734
17	1	M9	max	.017	0	0	0	.052	2.67	.041	0	.491	0	0	0
18			min	.01	2.67	0	0	-.688	0	.041	0	-.053	1.947	0	2.67
19	1	M10	max	.017	0	0	0	.023	2.67	-.003	0	.571	0	0	2.67
20			min	.01	2.67	0	0	-.718	0	-.003	0	-.034	2.197	0	0
21	1	M11	max	.004	0	.005	0	-.028	0	-.002	0	.041	0	.003	3.33
22			min	.004	0	-.005	3.33	-.028	0	-.002	0	-.053	3.33	-.002	1.596
23	1	M12	max	.004	0	.005	0	-.005	0	.025	0	-.05	0	.003	0
24			min	.004	0	-.005	3.33	-.005	0	.025	0	-.066	3.33	-.001	1.665
25	1	M13	max	.004	0	.005	0	.048	0	.053	0	.051	3.33	.003	0
26			min	.004	0	-.005	3.33	.048	0	.053	0	-.107	0	-.002	1.734
27	1	M14	max	.006	.473	0	.501	.217	2.197	-.051	0	.046	1.53	.002	2.67
28			min	-.007	2.197	-.004	2.197	-.25	2.169	-.051	0	-.081	.501	-.002	0
29	1	M15	max	-.004	0	.005	0	-.022	0	.023	0	.051	0	.003	3.33
30			min	-.004	0	-.005	3.33	-.022	0	.023	0	-.023	3.33	-.002	1.596
31	1	M16	max	0	0	.005	0	-.001	0	.004	0	.004	0	.003	0
32			min	0	0	-.005	3.33	-.001	0	.004	0	0	3.33	-.001	1.665
33	1	M17	max	.002	0	.005	0	0	0	-.009	0	.001	0	.003	0
34			min	.002	0	-.005	3.33	0	0	-.009	0	-.002	3.33	-.001	1.734
35	1	M18	max	.013	0	0	0	-.028	2.67	.041	2.197	.406	0	.002	2.67
36			min	.005	2.67	-.004	2.197	-.398	0	.001	0	.002	2.67	0	0
37	1	M19	max	.017	2.67	0	0	.023	0	.003	0	.034	.473	0	2.67
38			min	.01	0	0	0	-.718	2.67	.003	0	-.571	2.67	0	0
39	1	M20	max	.017	0	0	0	.052	2.67	-.041	0	.491	0	0	2.67
40			min	.01	2.67	0	0	-.688	0	-.041	0	-.053	1.947	0	0
41	1	M23	max	0	.25	0	0	0	0	0	0	0	.141	0	0

Maximum Member Section Forces (Continued)

	LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-...	Loc[ft]	y-y Moment[...	Loc[ft]	z-z Moment[...	Loc[ft]
42			min	0	0	0	0	0	0	0	0	0	0	0	0
43	1	M24	max	.028	.25	.003	0	-.71	0	.014	0	-.472	0	0	0
44			min	.027	0	.003	0	-.71	0	.014	0	-.65	.25	0	.25
45	1	M25	max	.028	.25	.002	0	-.718	0	-.004	0	-.558	0	0	0
46			min	.027	0	.002	0	-.718	0	-.004	0	-.738	.25	0	.25
47	1	M26	max	.018	.25	-.002	0	-.399	0	-.003	0	-.415	0	-.001	.25
48			min	.017	0	-.002	0	-.399	0	-.003	0	-.514	.25	-.002	0
49	1	M27	max	.018	.25	.002	0	-.399	0	.003	0	-.415	0	.002	0
50			min	.017	0	.002	0	-.399	0	.003	0	-.514	.25	.001	.25
51	1	M28	max	.028	.25	-.002	0	-.718	0	.004	0	-.558	0	0	.25
52			min	.027	0	-.002	0	-.718	0	.004	0	-.738	.25	0	0
53	1	M29	max	.028	.25	-.003	0	-.71	0	-.014	0	-.472	0	0	.25
54			min	.027	0	-.003	0	-.71	0	-.014	0	-.65	.25	0	0
55	1	M30	max	0	.25	0	0	0	0	0	0	0	.141	0	0
56			min	0	0	0	0	0	0	0	0	0	0	0	0
57	1	M29A	max	.003	0	0	0	0	0	0	0	.039	0	0	.25
58			min	.003	0	0	.25	0	0	0	0	.039	.25	0	.122

Member End Reactions

	LC	Member Label	Me...	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1	1	M1	I	-.005	-.004	-.022	.051	-.023	-.002
2			J	.005	-.004	-.048	.051	.053	.002
3	1	M2	I	.004	.005	-.048	-.053	.051	.002
4			J	.004	-.005	-.048	-.053	-.107	.003
5	1	M3	I	.004	.005	.005	-.025	-.066	.003
6			J	.004	-.005	.005	-.025	-.05	.003
7	1	M4	I	.004	.005	.028	.002	-.053	.003
8			J	.004	-.005	.028	.002	.041	.002
9	1	M5	I	.005	-.004	-.028	-.041	-.002	-.002
10			J	.013	0	-.398	-.001	-.406	0
11	1	M6	I	.002	.005	0	.009	-.001	.002
12			J	.002	-.005	0	.009	.001	.003
13	1	M7	I	0	.005	.001	-.004	0	.003
14			J	0	-.005	.001	-.004	.004	.003
15	1	M8	I	-.004	.005	.022	-.023	-.023	.003
16			J	-.004	-.005	.022	-.023	.051	.002
17	1	M9	I	.017	0	-.688	.041	.491	0
18			J	.01	0	.052	.041	-.028	0
19	1	M10	I	.017	0	-.718	-.003	.571	0
20			J	.01	0	.023	-.003	-.026	0
21	1	M11	I	.004	.005	-.028	-.002	.041	.002
22			J	.004	-.005	-.028	-.002	-.053	.003
23	1	M12	I	.004	.005	-.005	.025	-.05	.003
24			J	.004	-.005	-.005	.025	-.066	.003
25	1	M13	I	.004	.005	.048	.053	-.107	.003
26			J	.004	-.005	.048	.053	.051	.002
27	1	M14	I	.005	-.004	-.048	-.051	-.053	-.002
28			J	-.005	-.004	-.022	-.051	.023	.002
29	1	M15	I	-.004	.005	-.022	.023	.051	.002
30			J	-.004	-.005	-.022	.023	-.023	.003

Member End Reactions (Continued)

	LC	Member Label	Me...	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
31	1	M16	I	0	.005	-.001	.004	.004	.003
32			J	0	-.005	-.001	.004	0	.003
33	1	M17	I	.002	.005	0	-.009	.001	.003
34			J	.002	-.005	0	-.009	-.002	.002
35	1	M18	I	.013	0	-.398	.001	.406	0
36			J	.005	-.004	-.028	.041	.002	.002
37	1	M19	I	.01	0	.023	.003	.026	0
38			J	.017	0	-.718	.003	-.571	0
39	1	M20	I	.017	0	-.688	-.041	.491	0
40			J	.01	0	.052	-.041	-.028	0
41	1	M23	I	0	0	0	0	0	0
42			J	0	0	0	0	0	0
43	1	M24	I	.027	.003	-.71	.014	-.472	0
44			J	.028	.003	-.71	.014	-.65	0
45	1	M25	I	.027	.002	-.718	-.004	-.558	0
46			J	.028	.002	-.718	-.004	-.738	0
47	1	M26	I	.017	-.002	-.399	-.003	-.415	-.002
48			J	.018	-.002	-.399	-.003	-.514	-.001
49	1	M27	I	.017	.002	-.399	.003	-.415	.002
50			J	.018	.002	-.399	.003	-.514	.001
51	1	M28	I	.027	-.002	-.718	.004	-.558	0
52			J	.028	-.002	-.718	.004	-.738	0
53	1	M29	I	.027	-.003	-.71	-.014	-.472	0
54			J	.028	-.003	-.71	-.014	-.65	0
55	1	M30	I	0	0	0	0	0	0
56			J	0	0	0	0	0	0
57	1	M29A	I	.003	0	0	0	.039	0
58			J	.003	0	0	0	.039	0

Member Section Stresses

	LC	Member La...	Sec	Axial[...	y Shear[ksi]	z Shear[ksi]	y top Bending[...	y bot Bendi...	z top Bending[ksi]	z bot Bending[ksi]
1	1	M1	1	-.006	0	0	0	0	0	0
2			2	.002	0	0	0	0	0	0
3			3	0	0	0	0	0	0	0
4			4	-.002	0	0	0	0	0	0
5			5	.005	0	0	0	0	0	0
6	1	M2	1	.005	0	0	0	0	0	0
7			2	.005	0	0	0	0	0	0
8			3	.005	0	0	0	0	0	0
9			4	.005	0	0	0	0	0	0
10			5	.005	0	0	0	0	0	0
11	1	M3	1	.005	0	0	0	0	0	0
12			2	.005	0	0	0	0	0	0
13			3	.005	0	0	0	0	0	0
14			4	.005	0	0	0	0	0	0
15			5	.005	0	0	0	0	0	0
16	1	M4	1	.005	0	0	0	0	0	0
17			2	.005	0	0	0	0	0	0
18			3	.005	0	0	0	0	0	0
19			4	.005	0	0	0	0	0	0

Member Section Stresses (Continued)

	LC	Member La...	Sec	Axial[...	y Shear[ksi]	z Shear[ksi]	y top Bending[...	y bot Bendi...	z top Bending[ksi]	z bot Bending[ksi]
20			5	.005	0	0	0	0	0	0
21	1	M5	1	.005	0	0	0	0	0	0
22			2	.008	0	0	0	0	0	0
23			3	.01	0	0	0	0	0	0
24			4	.013	0	0	0	0	0	0
25			5	.015	0	0	0	0	0	0
26	1	M6	1	.002	0	0	0	0	0	0
27			2	.002	0	0	0	0	0	0
28			3	.002	0	0	0	0	0	0
29			4	.002	0	0	0	0	0	0
30			5	.002	0	0	0	0	0	0
31	1	M7	1	0	0	0	0	0	0	0
32			2	0	0	0	0	0	0	0
33			3	0	0	0	0	0	0	0
34			4	0	0	0	0	0	0	0
35			5	0	0	0	0	0	0	0
36	1	M8	1	-.005	0	0	0	0	0	0
37			2	-.005	0	0	0	0	0	0
38			3	-.005	0	0	0	0	0	0
39			4	-.005	0	0	0	0	0	0
40			5	-.005	0	0	0	0	0	0
41	1	M9	1	.021	0	0	0	0	0	0
42			2	.018	0	0	0	0	0	0
43			3	.016	0	0	0	0	0	0
44			4	.014	0	0	0	0	0	0
45			5	.012	0	0	0	0	0	0
46	1	M10	1	.021	0	0	0	0	0	0
47			2	.018	0	0	0	0	0	0
48			3	.016	0	0	0	0	0	0
49			4	.014	0	0	0	0	0	0
50			5	.012	0	0	0	0	0	0
51	1	M11	1	.005	0	0	0	0	0	0
52			2	.005	0	0	0	0	0	0
53			3	.005	0	0	0	0	0	0
54			4	.005	0	0	0	0	0	0
55			5	.005	0	0	0	0	0	0
56	1	M12	1	.005	0	0	0	0	0	0
57			2	.005	0	0	0	0	0	0
58			3	.005	0	0	0	0	0	0
59			4	.005	0	0	0	0	0	0
60			5	.005	0	0	0	0	0	0
61	1	M13	1	.005	0	0	0	0	0	0
62			2	.005	0	0	0	0	0	0
63			3	.005	0	0	0	0	0	0
64			4	.005	0	0	0	0	0	0
65			5	.005	0	0	0	0	0	0
66	1	M14	1	.005	0	0	0	0	0	0
67			2	-.002	0	0	0	0	0	0
68			3	0	0	0	0	0	0	0
69			4	.002	0	0	0	0	0	0
70			5	-.006	0	0	0	0	0	0
71	1	M15	1	-.005	0	0	0	0	0	0

Member Section Stresses (Continued)

	LC	Member La...	Sec	Axial[...	y Shear[ksi]	z Shear[ksi]	y top Bending[...	y bot Bendi...	z top Bending[ksi]	z bot Bending[ksi]
72			2	-.005	0	0	0	0	0	0
73			3	-.005	0	0	0	0	0	0
74			4	-.005	0	0	0	0	0	0
75			5	-.005	0	0	0	0	0	0
76	1	M16	1	0	0	0	0	0	0	0
77			2	0	0	0	0	0	0	0
78			3	0	0	0	0	0	0	0
79			4	0	0	0	0	0	0	0
80			5	0	0	0	0	0	0	0
81	1	M17	1	.002	0	0	0	0	0	0
82			2	.002	0	0	0	0	0	0
83			3	.002	0	0	0	0	0	0
84			4	.002	0	0	0	0	0	0
85			5	.002	0	0	0	0	0	0
86	1	M18	1	.015	0	0	0	0	0	0
87			2	.013	0	0	0	0	0	0
88			3	.01	0	0	0	0	0	0
89			4	.008	0	0	0	0	0	0
90			5	.005	0	0	0	0	0	0
91	1	M19	1	.012	0	0	0	0	0	0
92			2	.014	0	0	0	0	0	0
93			3	.016	0	0	0	0	0	0
94			4	.018	0	0	0	0	0	0
95			5	.021	0	0	0	0	0	0
96	1	M20	1	.021	0	0	0	0	0	0
97			2	.018	0	0	0	0	0	0
98			3	.016	0	0	0	0	0	0
99			4	.014	0	0	0	0	0	0
100			5	.012	0	0	0	0	0	0
101	1	M23	1	0	0	0	0	0	0	0
102			2	0	0	0	0	0	0	0
103			3	0	0	0	0	0	0	0
104			4	0	0	0	0	0	0	0
105			5	0	0	0	0	0	0	0
106	1	M24	1	.032	0	0	0	0	0	0
107			2	.033	0	0	0	0	0	0
108			3	.033	0	0	0	0	0	0
109			4	.033	0	0	0	0	0	0
110			5	.033	0	0	0	0	0	0
111	1	M25	1	.032	0	0	0	0	0	0
112			2	.032	0	0	0	0	0	0
113			3	.033	0	0	0	0	0	0
114			4	.033	0	0	0	0	0	0
115			5	.033	0	0	0	0	0	0
116	1	M26	1	.02	0	0	0	0	0	0
117			2	.021	0	0	0	0	0	0
118			3	.021	0	0	0	0	0	0
119			4	.021	0	0	0	0	0	0
120			5	.021	0	0	0	0	0	0
121	1	M27	1	.02	0	0	0	0	0	0
122			2	.021	0	0	0	0	0	0
123			3	.021	0	0	0	0	0	0

Member Section Stresses (Continued)

	LC	Member La...	Sec	Axial[...	y Shear[ksi]	z Shear[ksi]	y top Bending[...	y bot Bendi...	z top Bending[ksi]	z bot Bending[ksi]
124			4	.021	0	0	0	0	0	0
125			5	.021	0	0	0	0	0	0
126	1	M28	1	.032	0	0	0	0	0	0
127			2	.032	0	0	0	0	0	0
128			3	.033	0	0	0	0	0	0
129			4	.033	0	0	0	0	0	0
130			5	.033	0	0	0	0	0	0
131	1	M29	1	.032	0	0	0	0	0	0
132			2	.033	0	0	0	0	0	0
133			3	.033	0	0	0	0	0	0
134			4	.033	0	0	0	0	0	0
135			5	.033	0	0	0	0	0	0
136	1	M30	1	0	0	0	0	0	0	0
137			2	0	0	0	0	0	0	0
138			3	0	0	0	0	0	0	0
139			4	0	0	0	0	0	0	0
140			5	0	0	0	0	0	0	0
141	1	M29A	1	.004	0	0	0	0	0	0
142			2	.004	0	0	0	0	0	0
143			3	.004	0	0	0	0	0	0
144			4	.004	0	0	0	0	0	0
145			5	.004	0	0	0	0	0	0

Member Section Deflections Service

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
No Data to Print ...								

Member AISC 14th(360-10): ASD Steel Code Checks

LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om...	Mnzz/om...	Cb	Eqn
No Data to Print ...													

Material Takeoff

	Material	Size	Pieces	Length[ft]	Weight[K]
1	General				
2	gen_Steel		29	63.6	.2
3	Total General		29	63.6	.2