PRECISION
ENGINEERING SOLUTIONS

# ROWD DEWATERING SYSTEM
## STRUCTURAL CALCULATIONS

*ROWD® Pat. No. 10,625,185*

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# ROWD Dewatering System

## Structural Calculations

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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.

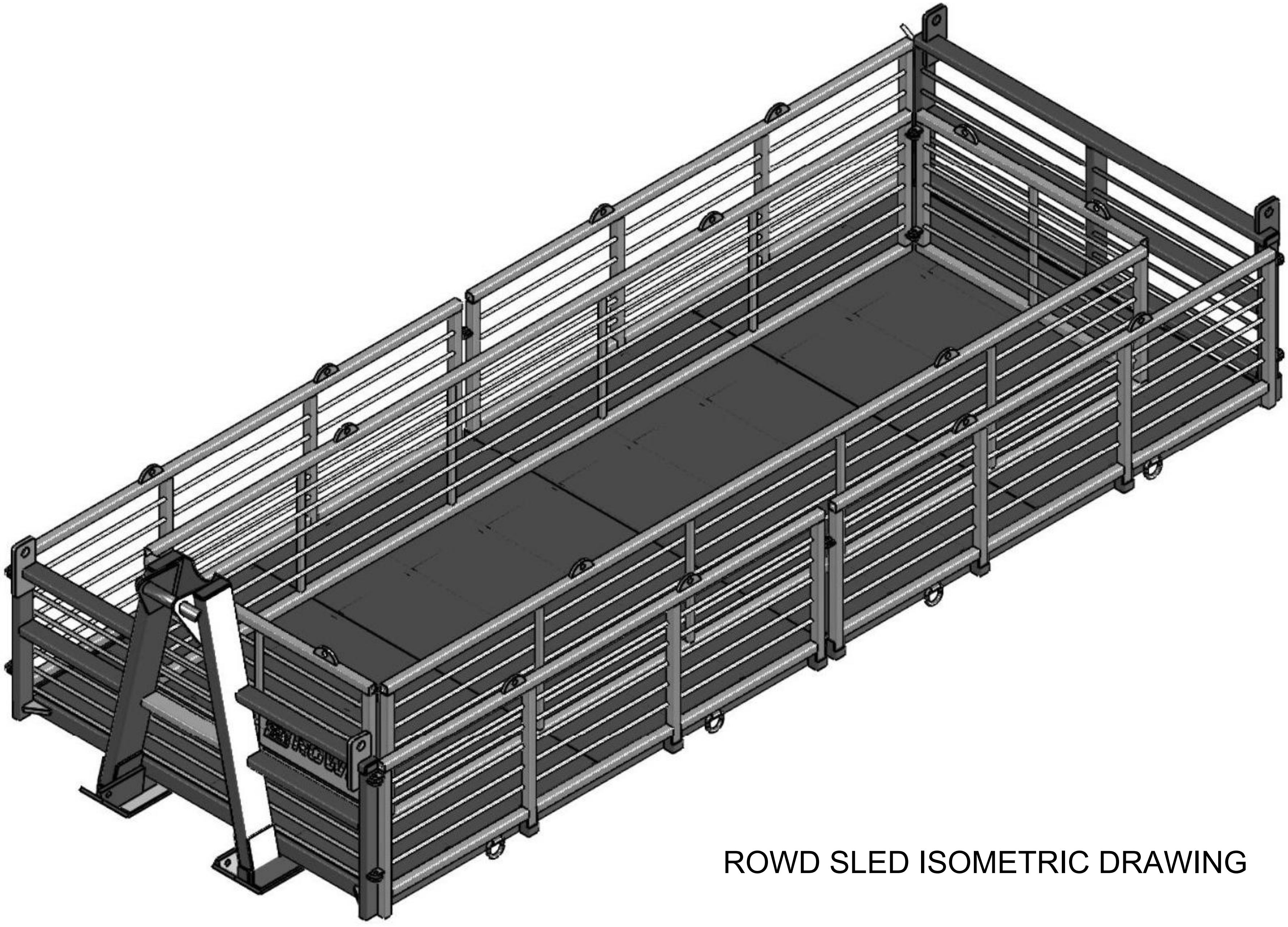
# ENGINEERING APPROACH

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

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

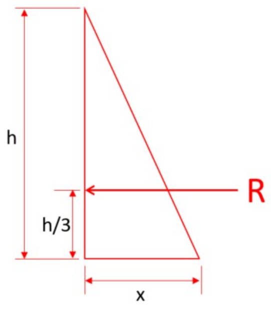


Figure 1

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

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

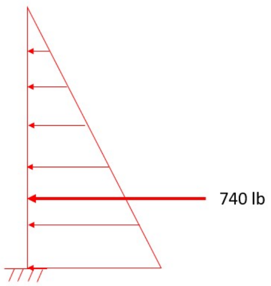


Figure 2

Determine allowable strength of vertical stakes:

Vertical stake section properties:

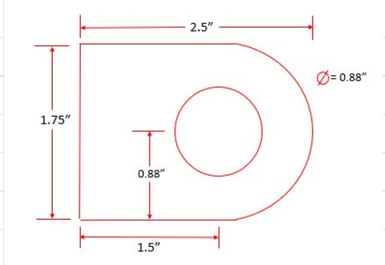


Figure 3

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

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

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

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

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

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

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

Determine bending moment in vertical stake:

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

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

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

**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:

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

$\Sigma M$ 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

Determine Allowable Strength of locking plates:

Plate Section Properties:

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

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

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

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

Check nominal strength based on gross section yielding:

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

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

**Ta > Force on pin ∴ OK!**

Check strength based on net section rupture:

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

**Ta > Force on pin ∴ OK!**

Check allowable strength of pin:

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

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

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

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

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

**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

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

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

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

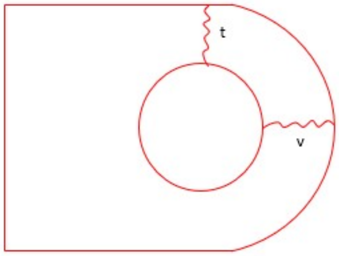


Figure 4

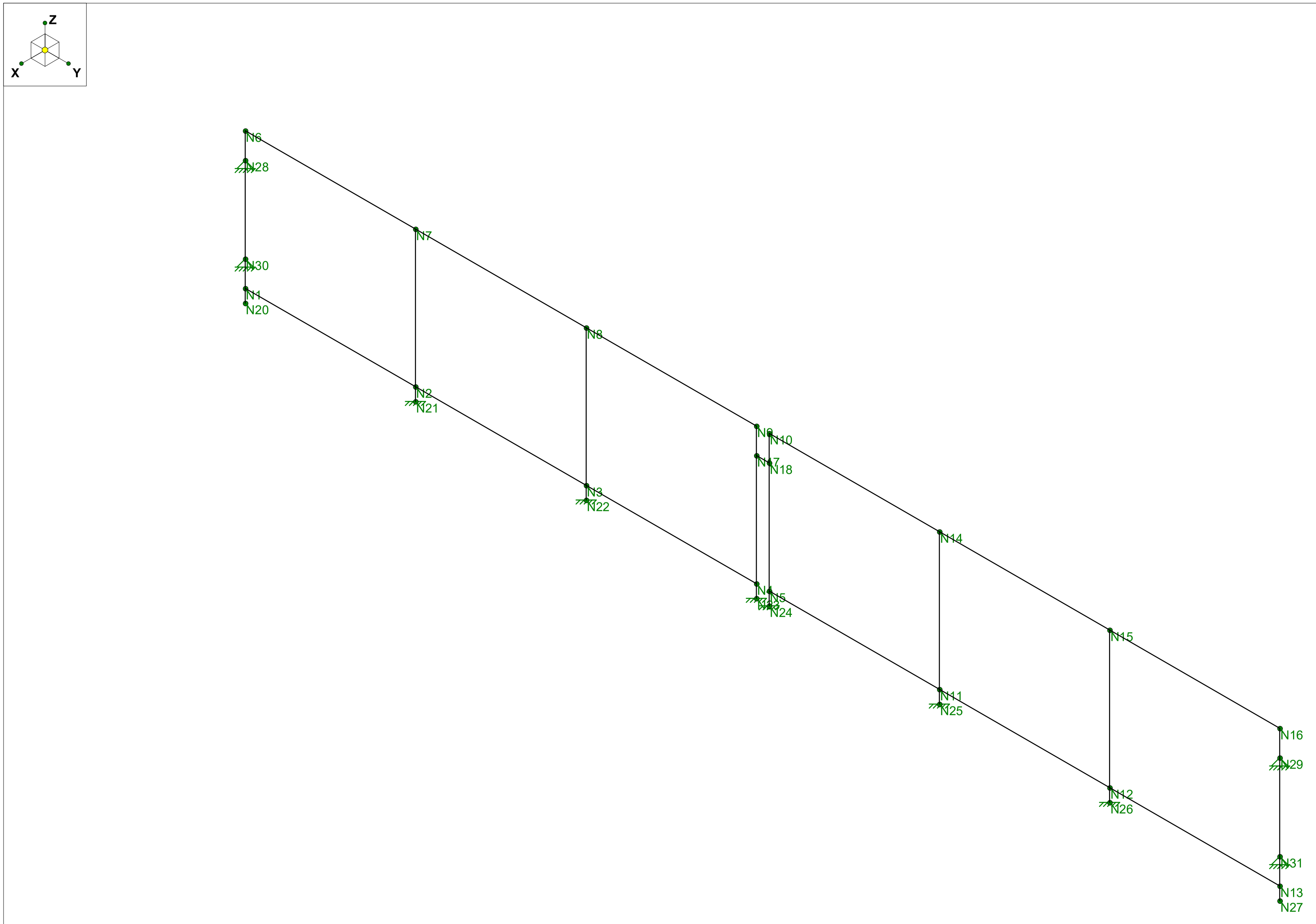
Check: $R_{n3} := 0.6 \cdot F_u \cdot A_v + 1.0 \cdot F_u \cdot A_t = \left(2.795 \cdot 10^4\right)\ lb$

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


Z
X
Y
N6
N28
N30
N1
N20
N7
N2
N21
N8
N3
N22
N9
N10
N17
N18
N4
N5
N23
N24
N14
N11
N25
N15
N12
N26
N16
N29
N31
N13
N27

Precision Engineering Solutions
TKJ

ROWD Sled Side Gates Structural Analysis

SK - 2
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 |