HOW ROWD SLED CAN HELP YOUR ORGANIZATION

ROWD

PORTABLE DEWATERING SLED

ROWD® Pat. No. 10,625,185

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ROWD
3314 56th Street, Eau Claire, WI 54703
O: (715) 874-4510 F: (715) 874-4511
ROWDsled.com

ROWD SLED: PRESENTATION

The ROWD Sled is a mobile dewatering structure that can be used over and over again.

- Saves Time
- Saves Money
- Decreases the Potential for Environmental Mishaps

VERSATILE

- Mobile: Easily Move from Site to Site
  - Often Multiple Water Holes in Different Locations Will Need to Be Pumped in a Single Day
  - ROWD Sled Moves to Each Location
  - One ROWD Replaces a Substantial Number of Conventional Straw Bale Dewatering Structures
- Filter Material: Easily Move from Site to Site

ECONOMICAL

- COST SAVINGS
  - ROWD Cuts Costs by 80%
  - One ROWD Will Replace All Five of These Conventional Straw Bale Structures
  - What is the cost of each conventional structure?
    - Labor to Build
    - Labor to Remove
    - Straw Bales
    - Filter Bag
    - Disposal
- ASSEMBLE
  - Assemble at Any Location and in Challenging Conditions
    - ROWD Sled Assembly Is Faster Than a Conventional Dewatering Structure
      - One Conventional Dewatering Structure Is Built to Pump One Water Hole; A Job That Will Take Less Than a Few Minutes
    - Easily Levels for Proper Function

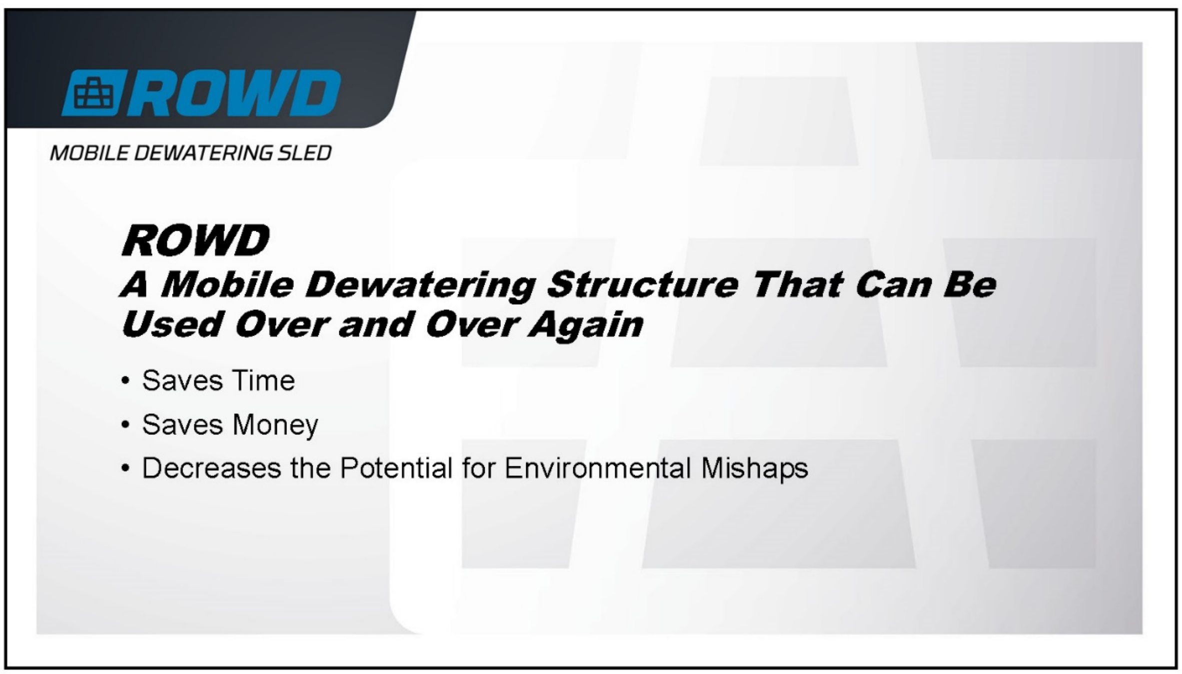
EFFICIENT

- QUICK & EASY SET UP
    - Pump and Relocate as Many Times as Necessary to Dewater an Entire Project
        - Assemble Anywhere Ahead of Time and Move to Dewatering Location
        - Safe and Fast Mobilization
        - Easily Connect to the Inlet With Quick-Connect Hose Fittings
        - Eliminates Crews Dedicated to Building Conventional Structures
- REUSABLE
    - Can Be Used Over and Over by Simply Replacing Filter Material as Needed
        - Assemble, Use and Move Until the Filter Material and Bag Function Is Exhausted
        - Reduces the Number of Filter Material and Filter Bags Needed on a Project
        - Quickly Change Filter Material and Filter Bags to Minimize Lost Time on the Job

ENVIRONMENTAL COMPLIANCE

- Eliminates Conventional Structures and Associated Failures
- Built of Sturdy Steel
- Filter Material Is Locked Into Place
- Flex Hose Uses a Metal End and Rigid Construction
- Clamps Can Be Used to Securely Lock the Filter Bag onto the Hose
- Easily Gain Approval for off Right-Of-Way Dewatering
    - ROWD Setup Has Less Impact off Right-Of-Way
    - ROWD Sled Returns to the Right-Of-Way as Soon as the Job Is Complete
    - Conventional Structures Require More Labor to Remove and Usually a Cleanup Crew

PRESENTATION SLIDES




ROWD


ROWD
VERSATILE
• Mobile
• Filter Material

ROWD
MOBILE DEWATERING SLED

VERSATILE: MOBILE
Easily Move From Site to Site

- Often Multiple Water Holes in Different Locations Will Need to Be Pumped in a Single Day
  - ROWD Sled Moves to Each Location
  - One ROWD Replaces a Substantial Number of Conventional Straw Bale Dewatering Structures

ROWD
MOBILE DEWATERING SLED

VERSATILE: FILTER MATERIAL

- Use Either Straw Bales or a Composite Filter Sock
- Compliant for States or Projects That Do Not Allow Straw Bales


ROWD
ECONOMICAL
• Cost Savings
• Assemble


ROWD
MOBILE DEWATERING SLED
ECONOMICAL: COST SAVINGS
ROWD Cuts Costs by 80%
• One ROWD Will Replace All Five of These Conventional Straw Bale Structures
• What is the cost of each conventional structure?
• Labor to Build
• Labor to Remove
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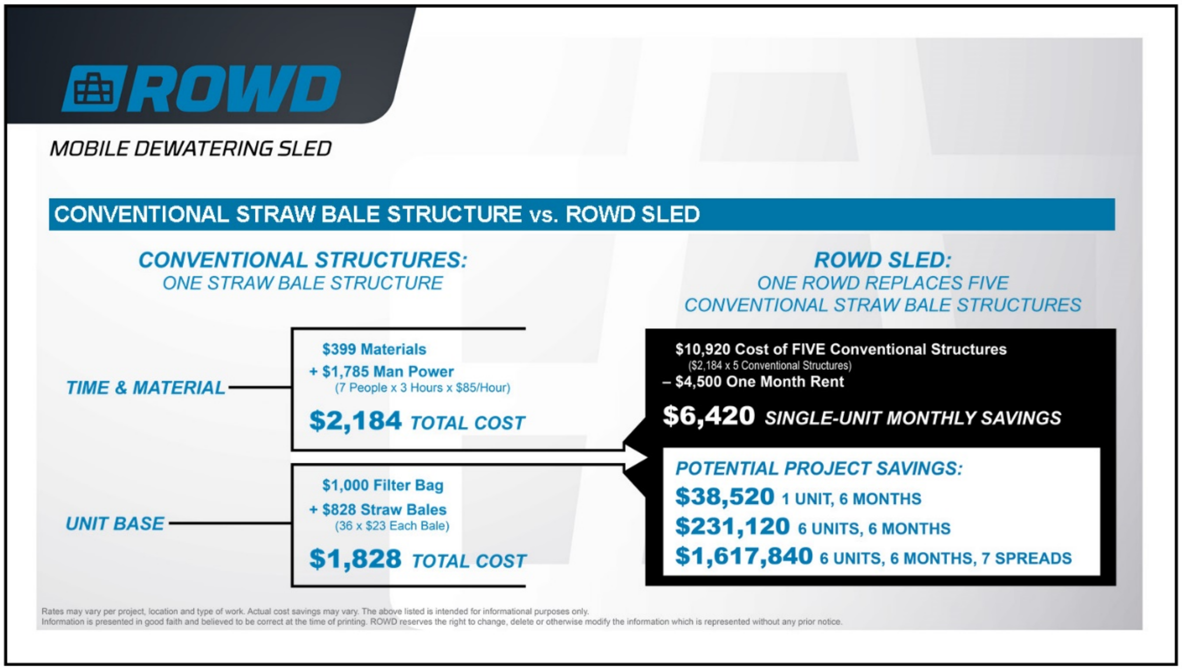
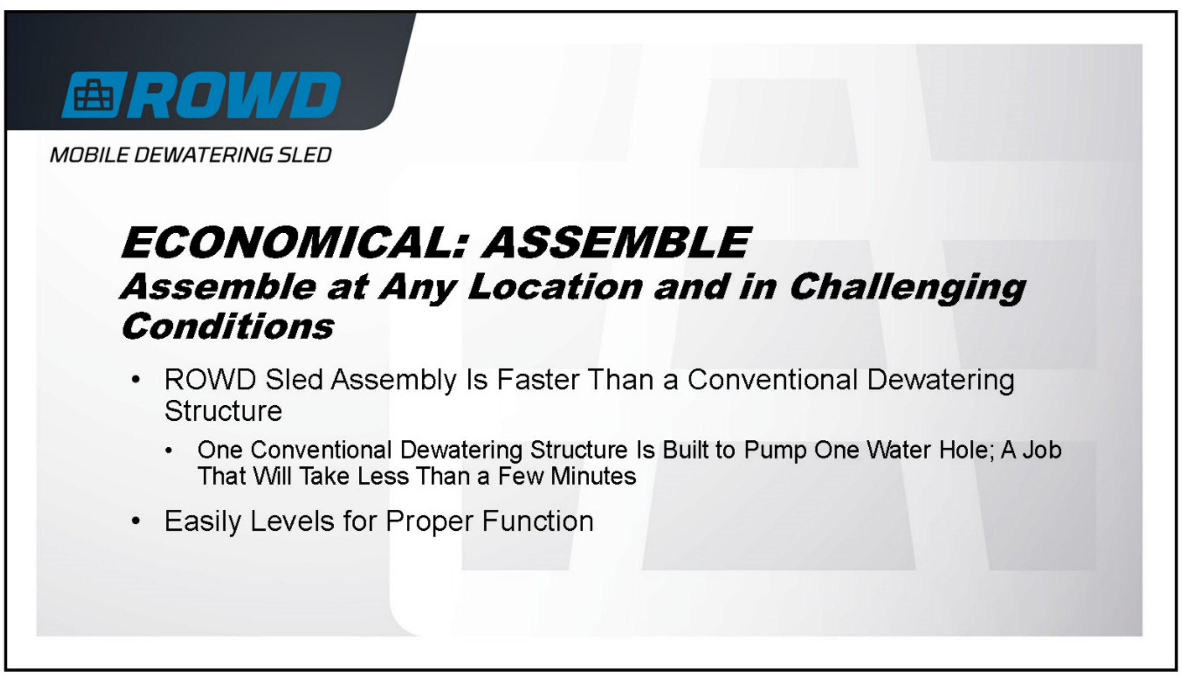
• Disposal


ROWD
MOBILE DEWATERING SLED
CONVENTIONAL STRAW BALE STRUCTURE vs. ROWD SLED
CONVENTIONAL STRUCTURES:
ONE STRAW BALE STRUCTURE
ROWD SLED:
ONE ROWD REPLACES FIVE
CONVENTIONAL STRAW BALE STRUCTURES
TIME & MATERIAL
$399 Materials
+ $1,785 Man Power
(7 People x 3 Hours x $85/Hour)
$2,184 TOTAL COST
UNIT BASE
$1,000 Filter Bag
+ $828 Straw Bales
(36 x $23 Each Bale)
$1,828 TOTAL COST
$10,920 Cost of FIVE Conventional Structures
($2,184 x 5 Conventional Structures)
– $4,500 One Month Rent
$6,420 SINGLE-UNIT MONTHLY SAVINGS
POTENTIAL PROJECT SAVINGS:
$38,520 1 UNIT, 6 MONTHS
$231,120 6 UNITS, 6 MONTHS
$1,617,840 6 UNITS, 6 MONTHS, 7 SPREADS
Rates may vary per project, location and type of work. Actual cost savings may vary. The above listed is intended for informational purposes only.
Information is presented in good faith and believed to be correct at the time of printing. ROWD reserves the right to change, delete or otherwise modify the information which is represented without any prior notice.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MOBILE DEWATERING SLED
ECONOMICAL: ASSEMBLE
Assemble at Any Location and in Challenging Conditions
• ROWD Sled Assembly Is Faster Than a Conventional Dewatering Structure
• One Conventional Dewatering Structure Is Built to Pump One Water Hole; A Job That Will Take Less Than a Few Minutes
• Easily Levels for Proper Function


ROWD
EFFICIENT
• Quick & Easy Set Up
• Reusable


ROWD
MOBILE DEWATERING SLED
EFFICIENT: QUICK & EASY SET UP
Pump and Relocate as Many Times as Necessary to Dewater an Entire Project
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MOBILE DEWATERING SLED

EFFICIENT: REUSABLE

Can Be Used Over and Over by Simply Replacing Filter Material as Needed

- Assemble, Use and Move Until the Filter Material and Bag Function Is Exhausted
- Reduces the Number of Filter Material and Filter Bags Needed on a Project
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MOBILE DEWATERING SLED

ENVIRONMENTAL COMPLIANCE

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  - Built of Sturdy Steel
  - Filter Material Is Locked Into Place
  - Flex Hose Uses a Metal End and Rigid Construction
  - Clamps Can Be Used to Securely Lock the Filter Bag onto the Hose

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MOBILE DEWATERING SLED

ENVIRONMENTAL COMPLIANCE, CONT.

- Easily Gain Approval for off Right-Of-Way Dewatering
  - ROWD Setup Has Less Impact off Right-Of-Way
  - ROWD Sled Returns to the Right-Of-Way as Soon as the Job Is Complete
  - Conventional Structures Require More Labor to Remove and Usually a Cleanup Crew


ROWD
QUESTIONS?

ROWD SLED: PHOTOS


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ROWD SLED: DESCRIPTION AND DETAILS

INTRODUCTION

The ROWD sled is a reusable, mobile dewatering structure that takes any dewatering job from start to finish, economically, efficiently and environmentally. This structure is designed to hold straw bales, coir logs or a filter sock (filter material) in place, creating a complete dewatering system. The ROWD sled's design and solid steel frame provides a properly built structure for use in even the most challenging locations. Already constructed upon delivery, the ROWD sled can replace a substantial amount of conventional dewatering structures by eliminating the single-location constraints, saving significant time and money, reducing the risk of environmental compliance issues and simplifying the entire dewatering process. There are two sizes of ROWD sleds available and additional sizes with increased flow rates currently in development.

DESCRIPTION

The ROWD sled is constructed with a sturdy frame and solid steel deck, surrounded by four interior walls and four exterior walls. The solid steel deck prevents water from flowing down, forcing all water to flow out through the filter material. The four inner walls and four outer walls form concentric rectangles that hold the filter material in place. Similar to a typical dewatering structure, a layer of geotech or filter fabric is placed on the steel deck and over the first row of filter material. A second row of filter material is added over the filter fabric. The ROWD sled is designed for straw bales that are 34 inches long, 16 inches wide, and 14 inches high; or, alternatively, an 18-inch filter sock.

The Original ROWD sled accepts filter bags up to 15 feet long and 4.5 feet wide. This allows the filter bag to expand and not touch the filter material. The Large ROWD sled accepts filter bags up to 15 feet long and 7.3 feet wide, also allowing the bag to expand and not touch the side walls of the structure. The concentric rectangles lock the filter material and filter bag in place, preventing it from shifting.

A quick-connect piping inlet has been designed with a valve to connect the pump discharge hose to the filter bag inside the ROWD sled. This piping allows for a secure connection between the end of the hose and the filter bag. The hose is a flexible but rigid hose that can withstand a tight clamp without being crushed. When not in use, such as when moving from site to site, the valve can be closed to prevent the sediment trapped inside the filter bag from escaping.

BENEFITS

1. ***The ROWD sled eliminates the assembly of conventional dewatering structures, which can be set up improperly.*** A conventional dewatering structure is built of straw bales and wooden posts, assembled on-site and intended to be used only at that site. Conventional dewatering structures will fail if an insufficient amount of posts are used, if weak posts are used or if the posts are not driven deep enough into the ground due to frozen terrain, laziness, rocks or mats. With a sturdy steel frame, the ROWD sled eliminates these potential failures. Once set up, the filter material is locked between the concentric rectangles, preventing it from shifting.

2. ***The ROWD sled can be set in place with minimal ground disturbance.*** Transferring materials and assembly of a conventional dewatering structure takes equipment or multiple trips by several employees to the dewatering location. The ROWD sled is easily assembled in the yard and loaded with straw bales and a filter bag prior to use. The ROWD sled can then be moved to the dewatering location, arriving ready to use.

3. ***The ROWD sled allows a properly built structure to be used in a not-so-perfect situation.*** For a dewatering structure to function properly, it needs to be positioned level. If not leveled, the water will flow to one side and cause the dewatering structure to fail, resulting in water overflow and low pumping volumes. With the sturdy frame and solid steel construction, ROWD sleds can easily be leveled on uneven ground, used on timber mats where conventional structures can't be built and even used on frozen ground where conventional structure stakes can't be driven.

4. ***The ROWD sled is designed for crews to easily move the structure for use over and over.*** Once dewatering is complete, the ROWD sled is easily disassembled and taken to a new location. This prevents structures from sitting for days, weeks or even months after dewatering is complete. This also cuts down on the number of conventional structures on a project.

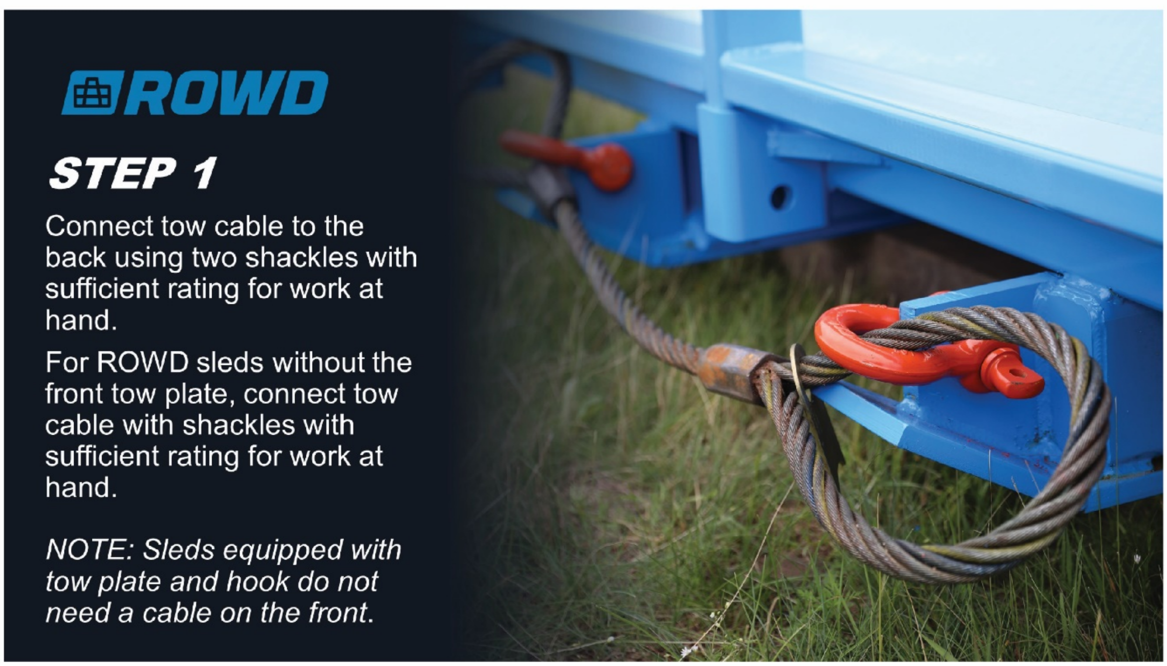
5. ***There are many benefits to using a ROWD sled both on or off the right-of-way.*** The ROWD sleds' mobility significantly reduces ground disturbance and other environmental impacts to the land used for dewatering.

    a. ***Dewatering on the right-of-way***: If dewatering is being done on the right-of-way, the ROWD sled can simply be moved out of the way after dewatering is complete; allowing the other construction activities to continue with minimal down time.

    b. ***Dewatering off the right-of-way:*** Conventional dewatering structures are often abandoned after dewatering is complete causing them to be buried in vegetation and making them invisible to the unknowing eye. The ROWD sleds' mobility eliminates the chance of this happening, which also eliminates potential hazards and damage to landowner equipment.

6. ***The ROWD sled is designed to be used multiple times, in numerous locations.*** Typically, conventional dewatering structures are built for single-site use, often dewatering just one location. One crew may dewater multiple locations in a day requiring numerous conventional dewatering structures. A ROWD sled allows a crew to move from one location to the next using the same structure, therefore reducing manpower, material and disposal cost.

ROWD SLED INSTRUCTIONS



STEP 2a

Insert back gate panel into stake pockets and bolt in place. Then insert side panels into stake pockets and pin in corners.

NOTE: Side panels have location marked on the top corner by pin ear.

STEP 2b

Pin corners and secure pins with hitch pin.

ROWD

STEP 3

Open two gate panels on one side to access the inside of ROWD.

Install a single bottom row of straw bales on three sides and add filter fabric across the base of the sled and over the row of straw bales.

NOTE: Filter fabric or Geo-tech can be used.

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TIP:

Make sure filter fabric is over the bottom row of straw bales and is tucked into the bottom corners. Leave enough extra filter fabric so that when the inner ring panels are installed, they do not rip the filter fabric.


ROWD
TUCK FILTER FABRIC OVER BOTTOM ROW OF STRAW BALES


ROWD
STEP 4a
Insert inner ring panels to secure filter material in place.
NOTE: Inner ring panels set on top of the filter fabric liner.


ROWD
STEP 4b
Pin corners and secure pins with hitch pin.


ROWD
STEP 5
Complete bottom row of bales on the side with open gates, folding filter fabric over the top when complete. Close gates.
NOTE: At this time, the inner and outer rings should be in place with a single row of straw bales around the perimeter, and filter fabric under the inner ring and over the bottom row of bales.


ROWD
STEP 6
Install top row of straw bales above filter fabric and bottom row of bales.
Unit is now ready for a filter bag.


ROWD
STEP 7
Put filter bag remover in center of inner ring and lay filter bag on top of filter bag remover.


ROWD
STEP 8
Put piping inlet on ROWD and connect hose to filter bag.
NOTE: Make sure filter bag is securely connected to hose.
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ROWD


ROWD
PIPING INLET ON SLED

FILTER BAG CONNECTED TO HOSE

HAUL ASSEMBLED ROWD ON A SKID TUCK OR A FLATBED TRAILER


ROWD
READY TO DEWATER


ROWD

ROWD SLED: DATA

FLOW TEST: STANDARD SIZE ROWD WITH 6-INCH PUMP

INTRODUCTION

On June 19, 2019, a ROWD flow test was performed on a standard size unit using water appropriated from the Chippewa River. Flow tests were performed on 2 degree and 5 degree slopes with a 3-inch trash pump and a 6-inch trash pump. The purpose of this test was to try and identify the max flow rate of a standard size ROWD sled on different slopes.

A ROWD sled on level terrain has a maximum holding capacity of 1,816 gallons. This is the volume of water the unit will hold up to the middle of the upper rail (32 inches of water). This allows for a few inches of free board before the unit would overflow.

EQUIPMENT

The pumps used were a Honda 3-inch gas trash pump with a max flow rate of 370 GPM and a diesel power prime 6-inch trash pump capable of 2,775 GPM.

The ROWD sled used was a standard size 8-foot 6-inches by 20-feet 6-inches. The filter material used in the test were straw bales sourced from the local farm and ranch store. Bales measured 34-inches by 14-inches by 16-inches. The filter bag used was a 4-foot 6-inches by 15-feet, 8-pound nonwoven filter bag. The fabric liner used was 8-pound non-woven filter fabric.

TEST

Test were first run with a 3-inch trash pump at 2 percent grade. While the pump was running the water level in the ROWD sled was monitored and documented on 30 second intervals. The 3-inch pump was allowed to idle two minutes before being turned to full throttle. The pump was allowed to run for 25 minutes before being shut off. During this time the water depth slowly increased to about five and one tenth inches. Every few minutes the water rose about a tenth of an inch.

Once the 3-inch pump was shut off the sled was given time to drain while the 6-inch pump was being rigged up. The 6-inch pump was allowed to run at half throttle for 5 minutes then three quarters throttle for 5 minutes then full throttle for 12 minutes. The water level was monitored and recorded. At full throttle the water level was 14.5 inches after five minutes.

The pump was shut off and the sled was allowed to drain before being positioned on a 5-degree slope. The test with the 6-inch pump was repeated on the 5-degree angle. The pump was allowed to run for six minutes on three quarters throttle before being turned up to full throttle for 9 minutes. For the last six minutes the water was a constant 22 inches deep at the deepest part of the sled.

RESULTS

The ROWD sled was more than capable of handling the flow rate with the 3 inch and 6-inch pump both on a 2-degree slope and a 5-degree slope. The highest water level observed was with the 6-inch pump on the 5-degree slope. Based on this observation using this water source and filter material the ROWD sled could have handled a higher flow rate or could be operated on a steeper slope. On the two degree slope the ROWD sled was less than half full when using the 6-inch pump on full throttle.

Using different filter material, water sources and flow rates could cause different results. As filter material begins to trap sediment results could vary.

ROWD SLED: STRUCTURAL ANALYSIS

Prepared by Precision Engineering Solutions, LLC

May 31, 2019

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.

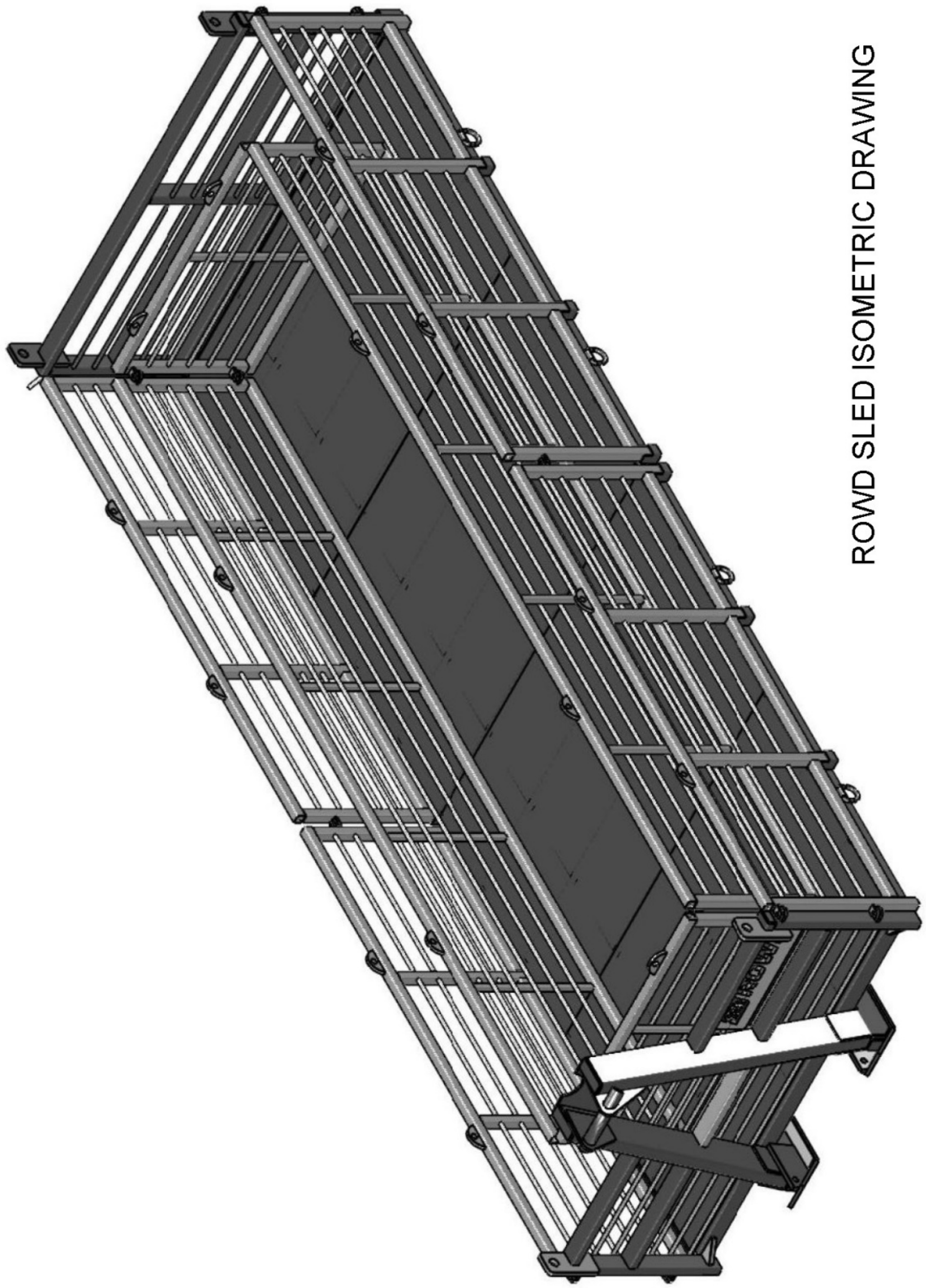
These members are analyzed for structural integrity during loading from hydraulic pressure exerted during the critical loading condition of the ROWD, the sled becoming completely full of water. To achieve this loading condition, the assumption is made that the drainage process has failed while water 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: $h := \frac{32\ in}{12\ \frac{in}{ft}} = 2.667\ ft$

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

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

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

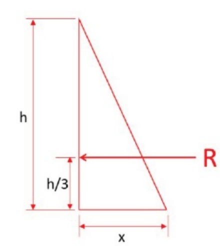


Figure 1

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

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

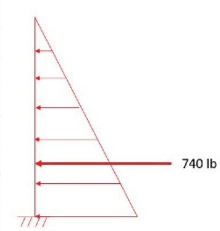


Figure 2

Determine allowable strength of vertical stakes:

Vertical stake section properties:

$t_{stake} := .116\ in$ $\quad I := .486 \cdot in^4$

$A_g := .84 \cdot in^2$ $\quad S := .486 \cdot in^3$

$F_y := 36000\ \frac{lb}{in^2}$ $\quad Z := .584 \cdot in^3$

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

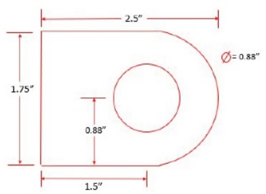


Figure 3

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

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:

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

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

Ta > Force on pin ∴ OK!

Check strength based on net section rupture:

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

Ta > Force on pin ∴ OK!

Check allowable strength of pin:

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

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

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

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

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

Ta > Force on pin ∴ OK!

Check allowable strength of pin in single shear:

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

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

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

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

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

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

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

Ra > Force on pin ∴ OK!

Check block shear rupture (ASD):

Anv = Agv = Av
Ant = Agt = At

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

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

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

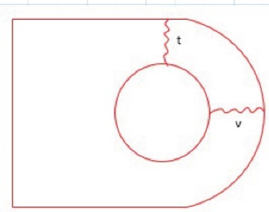


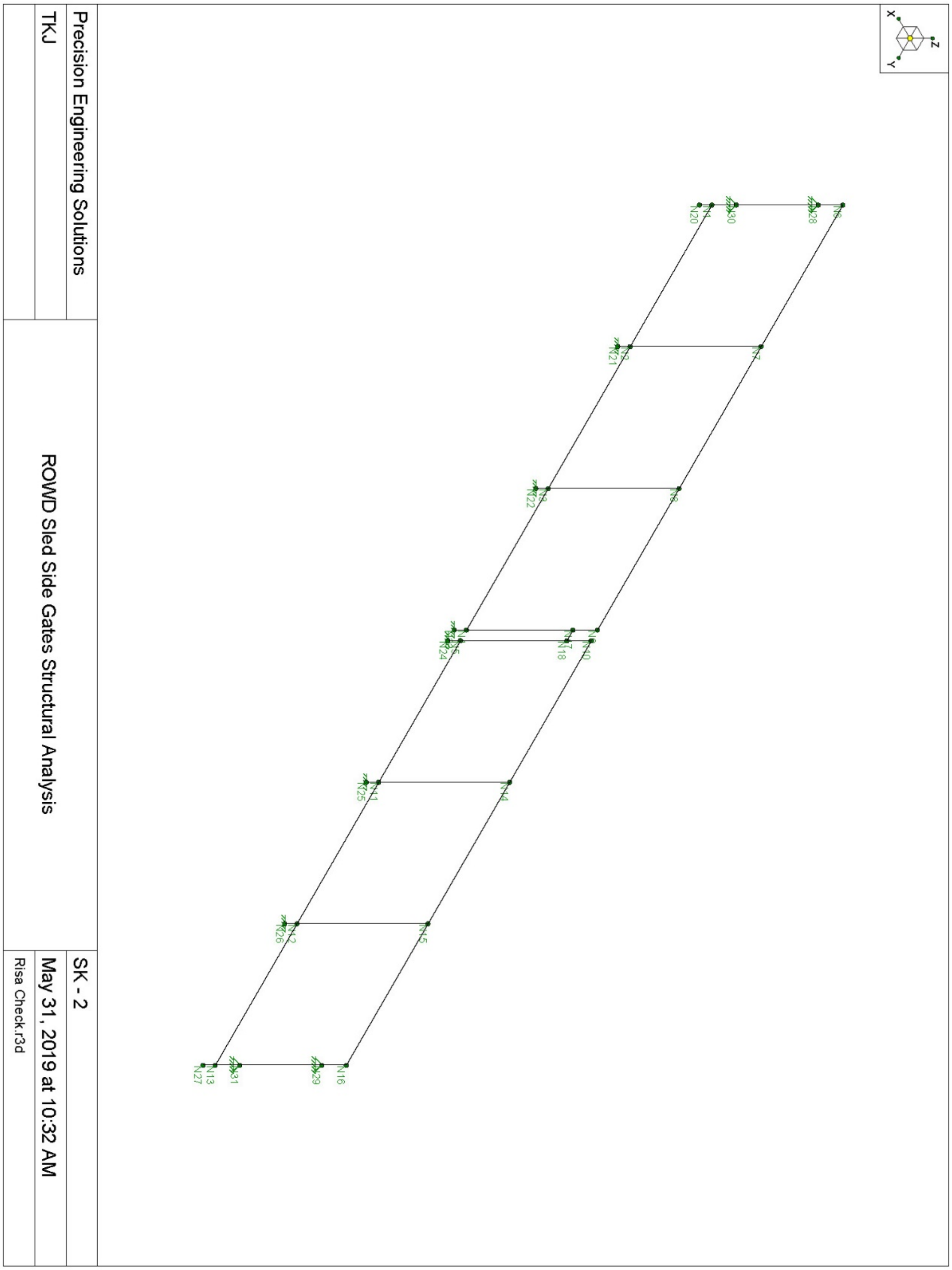
Figure 4

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

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

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

APPENDIX III: RISA 3D GRAPHIC



APPENDIX IV: RISA 3D REPORT

RISA
A NEMETSCHEK COMPANY

Company : Precision Engineering Solutions
Designer : TKJ
Job Number :
Model Name :

May 29, 2019
2:00 PM
Checked By:_____

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	

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Company : Precision Engineering Solutions		May 29, 2019
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Job Number :		Checked By:_____
Model Name :		

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

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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								

RISA A NEMETSCHEK COMPANY

Company	:	Precision Engineering Solutions
Designer	:	TKJ
Job Number	:	
Model Name	:	

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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

Company	: Precision Engineering Solutions
Designer	: TKJ
Job Number	:
Model Name	:

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Checked By:_____

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

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Company	: Precision Engineering Solutions
Designer	: TKJ
Job Number	:
Model Name	:

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2:00 PM
Checked By:_____

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

Company	: Precision Engineering Solutions	May 29, 2019
Designer	: TKJ	2:00 PM
Job Number	:	Checked By:_____
Model Name	:	

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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

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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

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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

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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

NOTES