HYDRO LOGISTICS

Large Volume Tank Design
And
Standard Operating Procedures

June 16, 2014

HYDRO LOGISTICS

Mission Statement:

The guiding vision of HyrdoLogistics is "Quality, Integrity, Dedication". Our goal is to provide quality water solutions through exceptional customer service. We believe in integrity in our relationships and in the products we provide. We are dedicated to the success of the company and the industry and to the satisfaction of our customers.

Guiding Principles:

We believe in faithful stewardship. We have a responsibility to serve and enhance wherever possible the communities in which we live and work, the lives of those we come into contact with, and the resources with which we have been entrusted.

Specifically, we commit to practicing strict honesty in all of our dealings with each other, our creditors and our customers.

We expect to bring satisfaction to our customers by providing them with personal expertise in our field and with products that have excellence in design. We will treat the customer as we would want to be treated as the customer.

On the job, our appearance, our behavior and our language will be appropriate and professional.

We will give back. We believe that the generous are prosperous.
(A percentage of net profits will be donated to charitable causes at the discretion of owners. Preference given to employees or customers affected by some tragic event)

We will honor the Sabbath barring emergencies. Sundays off will grow the business.

Steve Swinson, President | 435-705-8623 | steveswinson@yahoo.com | 102 W 1785 S Washington UT 84780

HYDRO LOGISTICS

The Tank

Tank Sizes:
42,000 bbl - 157' diameter
30,000 bbl - 135' diameter

The tank system is comprised of individual panels which are connected by a pin system and locked into place by a patent pending plate design. Our panel and patent pending plate design in conjunction with our engineered jig system allows us to set our tank with a tele-handler thus significantly decreasing set time, eliminating the need for a crane and improving overall safety.

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GENERAL NOTES:

DESIGN CODES:

1. AISC – MANUAL OF STEEL CONSTRUCTION. 14th EDITION, 2010.
2. ANSI/AWS D1.1 STRUCTURAL WELDING CODE – STEEL.

MATERIALS:

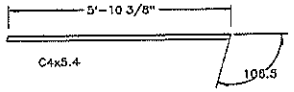
1. STRUCTURAL STEEL FABRICATION AND ERECTION SHALL BE IN ACCORDANCE WITH THE FOLLOWING,
   ANSI/AISC 360–10, SPECIFICATIONS FOR STRUCTURAL STEEL BULDINGS.
   AISC 303–05, CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES.
2. WELDING SHALL CONFORM TO AWS D1.1 STANDARDS AND THE FOLLOWING,
   PERFORMED BY AWS CERTIFIED WELDERS FOR ROD AND POSITIONS USING E70XX.
   USE PRE–QUALIFIED WELDS AS DEFINED IN AWS.
3. ALL STEEL SHALL BE IN ACCORDANCE WITH THE MATERIAL LIST ON THIS SHEET AND SHALL BE PAINTED (1) COAT SHOP PRIMER.

NOTES:

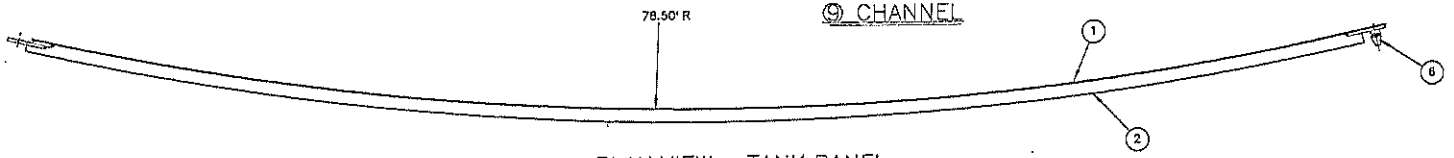
1. ALL PINS, JOINT WELDS AND JOINT CONNECTIONS SHALL BE INSPECTED AND DOCUMENTED AFTER EACH TANK ASSEMBLY AND BEFORE USE. ANY DAMAGE FOUND DURING INSPECTION OR ANY ABNORMAL DEFORMATIONS AFTER A WATER FILL SHALL BE REPAIRED TO CONFORM TO THE PLANS.
2. THE TANK SEGMENTS SHALL BE PICKED AND TRANSPORTED IN A MANNER THAT PREVENTS DAMAGE.

MATERIAL LIST

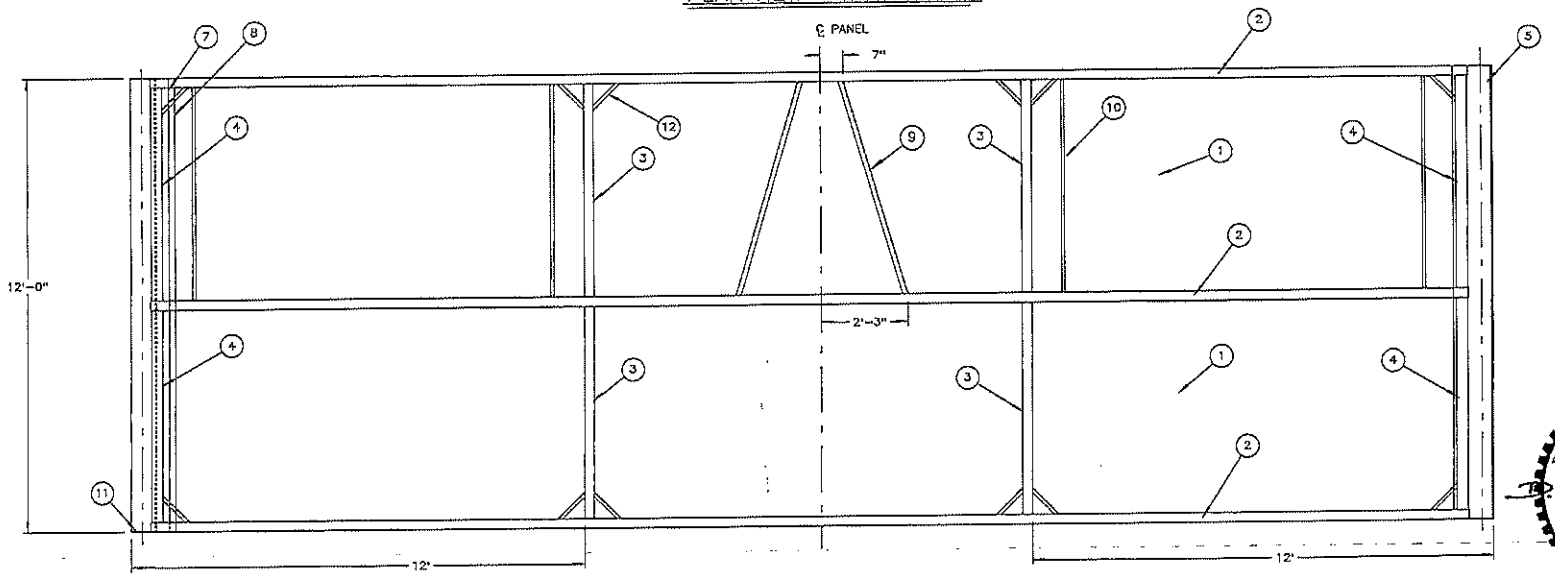
MK	QUAN	DESCRIPTION	SIZE	MATERIAL	WEIGHT
	1	TANK ASSEMBLY			6710
	14	TANK PANEL			4335
1	2	TANK SKIN	1/4" x 72" x 422.50"	ASTM A36	850
2	3	TANK RIB	HSS 3" x 4" x3/16" x 416.38"	ASTM A 500 GR. B	185
3	4	MID VERTICAL RIB	HSS 3" x 4" x 3/16" x 67.50"	ASTM A 500 GR. B	185
4	4	END VERTICAL RIB	HSS 3 1/2" SQ. 3/16" x 67.50"	ASTM A 500 GR. B	370
5	1	JOINT PLATE	.75" x 12" x 144"	ASTM A36	70
6	12	JOINT PIN	2.500" DIA. x 5.000"	ASTM A 1018 CR	370
7	1	JOINT PLATE	.75" x 12" x 144"	ASTM A36	185
8	1	JOINT PLATE	.75" x 6" x 144"	ASTM A36	66
9	2	CHANNEL	C4x5.4 x 71.00"	ASTM A572 GR. 50	60
10	4	SLIDER BAR	1" DIA. x 5' 7 1/2"	ASTM A36	1
11	1	GUSSET	.25" x 2.50" x 6 .25"	ASTM A36	34
12	12	GUSSET BAR	1" DIA. x 12"	ASTM A36	
13	1	LOCK BAR	.375" x 4.50" x 66.5"	ASTM A36	
14	1	LOCK BAR	.375" x 4.50" x 76.0"	ASTM A36	



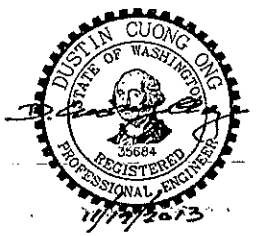
⑨ CHANNEL



PLAN VIEW – TANK PANEL



ELEVATION VIEW – TANK PANEL



11/18/2013

JCR FABRICATION
516 MULOCK STREET
ONTONAGON, MI. 49953
(906) 236-2683

FRACK TANK
MATERIAL LIST

DRAWN: GAH
DATE: 11/18/13

REV.
DATE:

SHEET 1 of 8

DWG. NO. 1

FRAC TANK
SKIN DETAIL

DRAWN: GAH	
DATE: 11/18/13	
REV.	
DATE:	
SHEET 2 of 8	
DWG. NO. 1	

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ONTONAGON, MI. 49953
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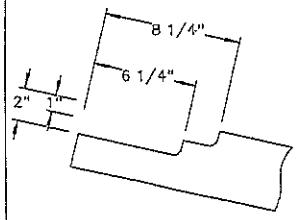
PLAN VIEW – ① TANK SKIN

ELEVATION VIEW – ① TANK SKIN



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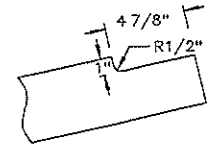
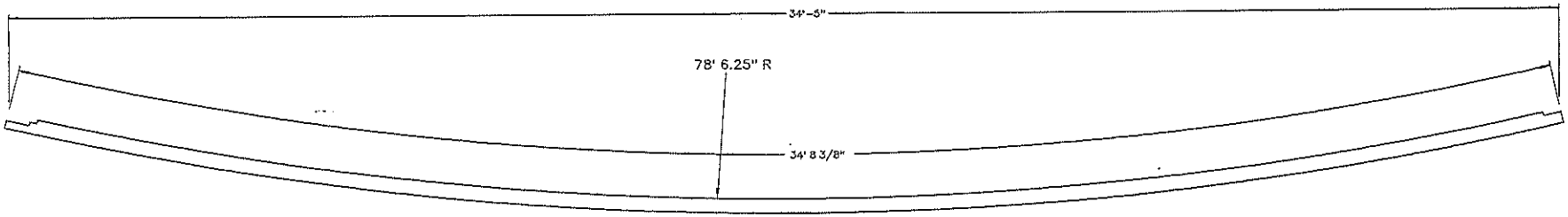


RIB END DETAIL



PLAN VIEW – ② RIB

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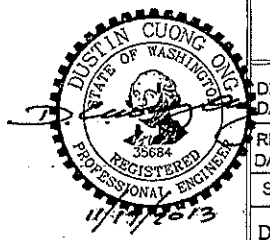
(906) 235-2683

FRAC TANK
RIB DETAIL



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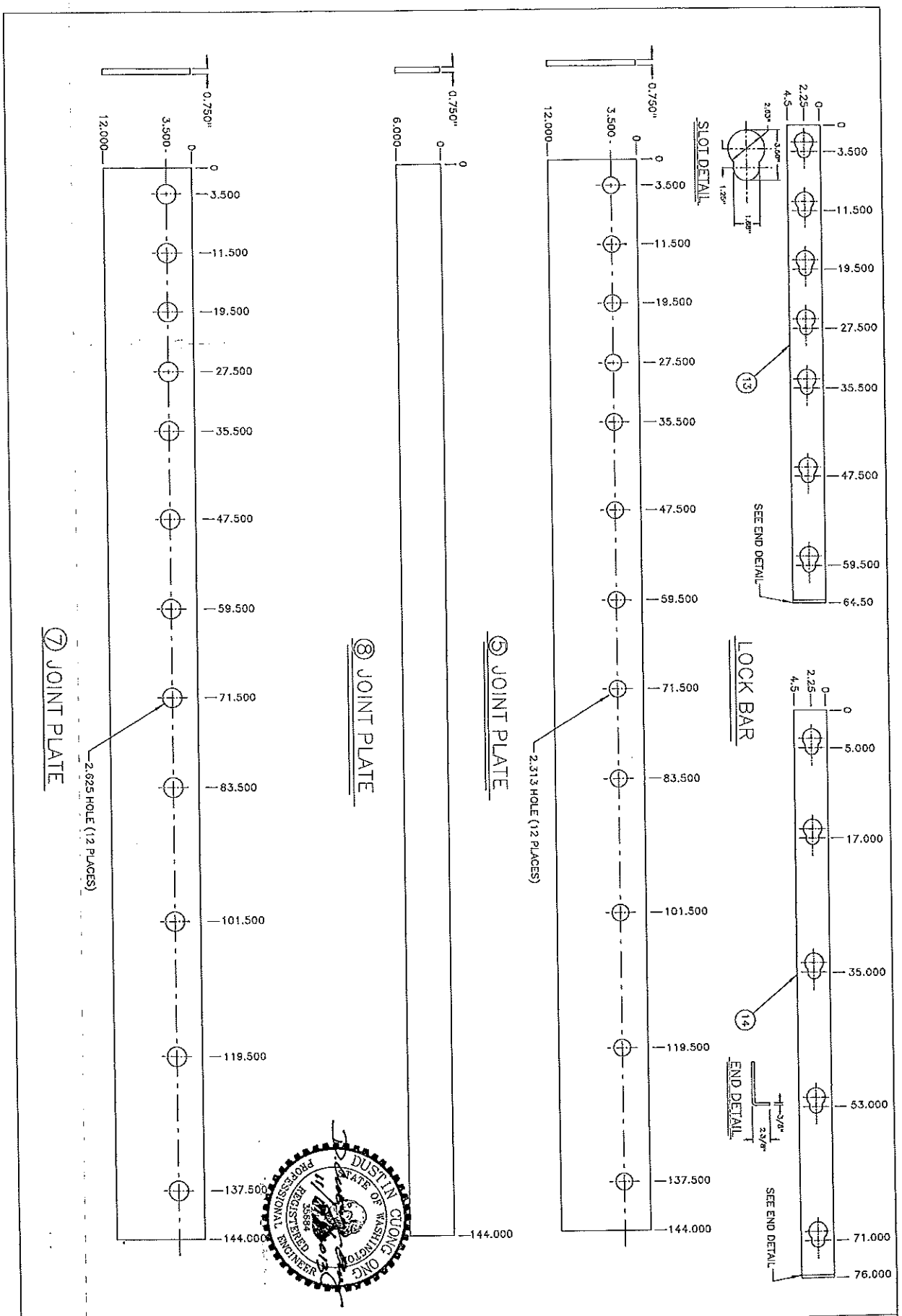
DATE: 11/18/13
REV.
DATE:
SHEET 3 of 8
DWG. NO. 1



FRAC TANK
END PLATE DETAILS

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DRAWN: GAH
DATE: 11/18/13
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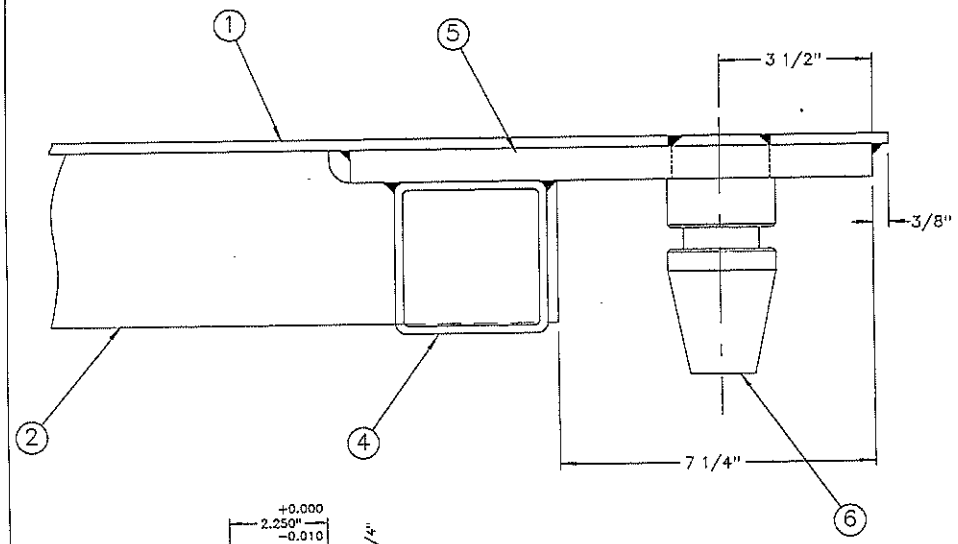
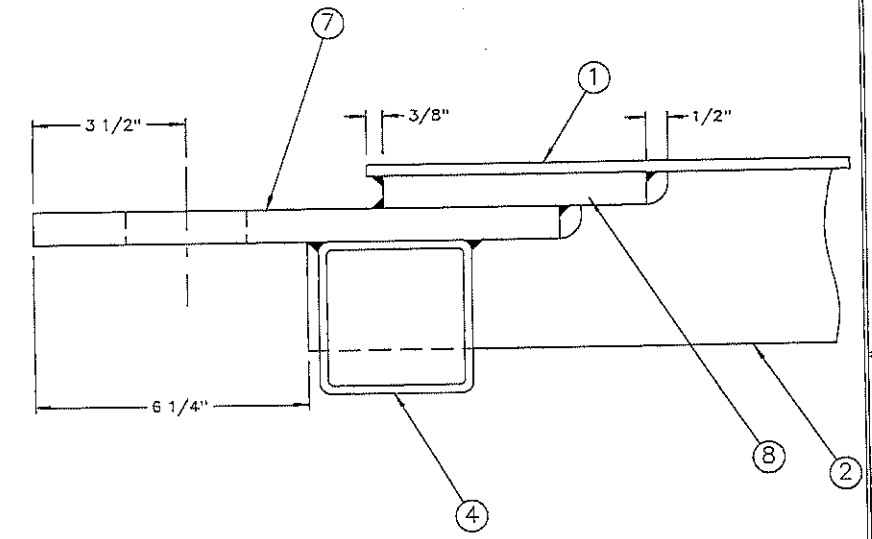
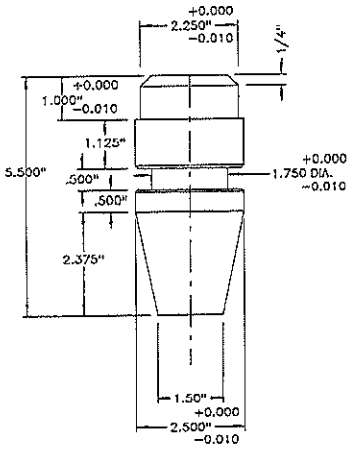
DATE:
SHEET 4 of 8
DWG. NO. 1



TANK JOINT DETAIL





⑥PIN DETAIL

DUSTIN CUONG ONG
STATE OF WASHINGTON
35684
REGISTERED
PROFESSIONAL ENGINEER
11/19/2013

JCR FABRICATION
516 MULOCK STREET
ONTONAGON, MI. 49953
(906) 235-2683

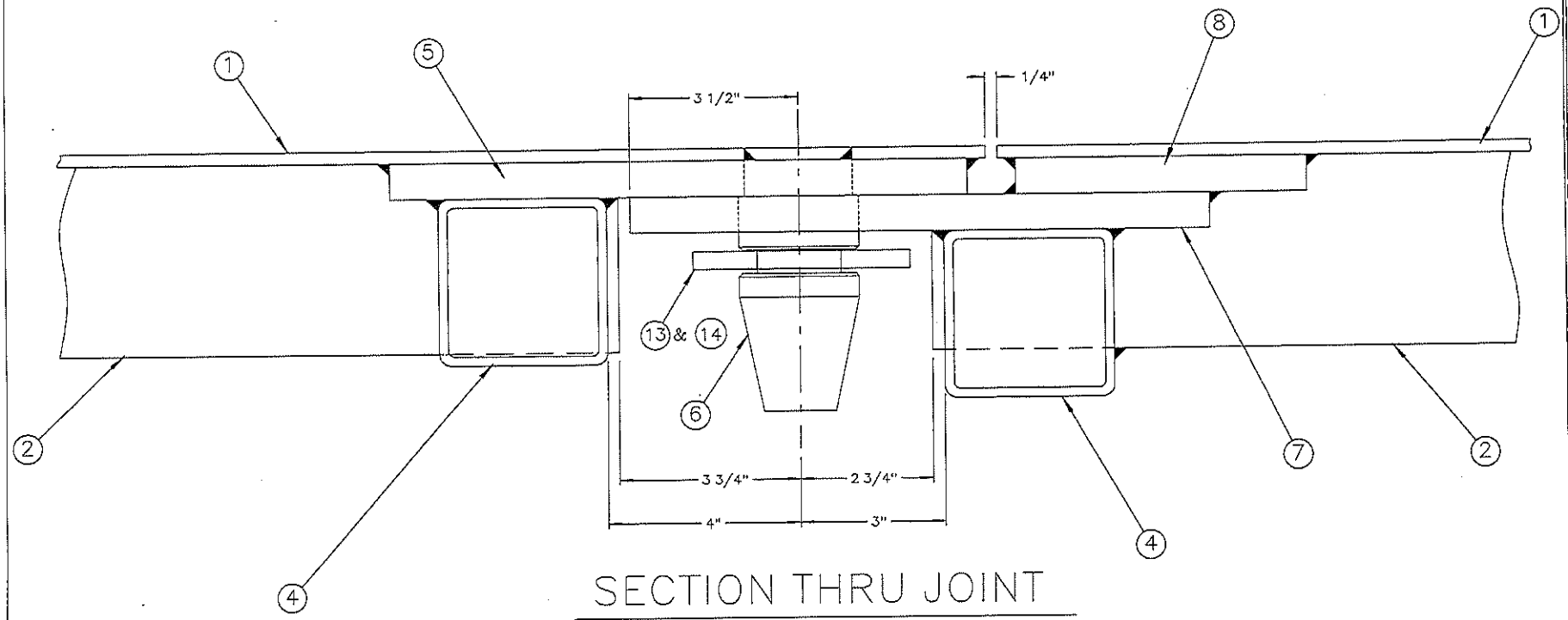
FRAC TANK
JOINT DETAILS

DRAWN: GAH
DATE: 11/18/13

REV.
DATE:

SHEET 5 of 8

DWG. NO. 1



SECTION THRU JOINT

JCR FABRICATION
516 MULOCK STREET
ONTONAGON, MI. 49953
(906) 235-2683

FRAC TANK
JOINT DETAILS

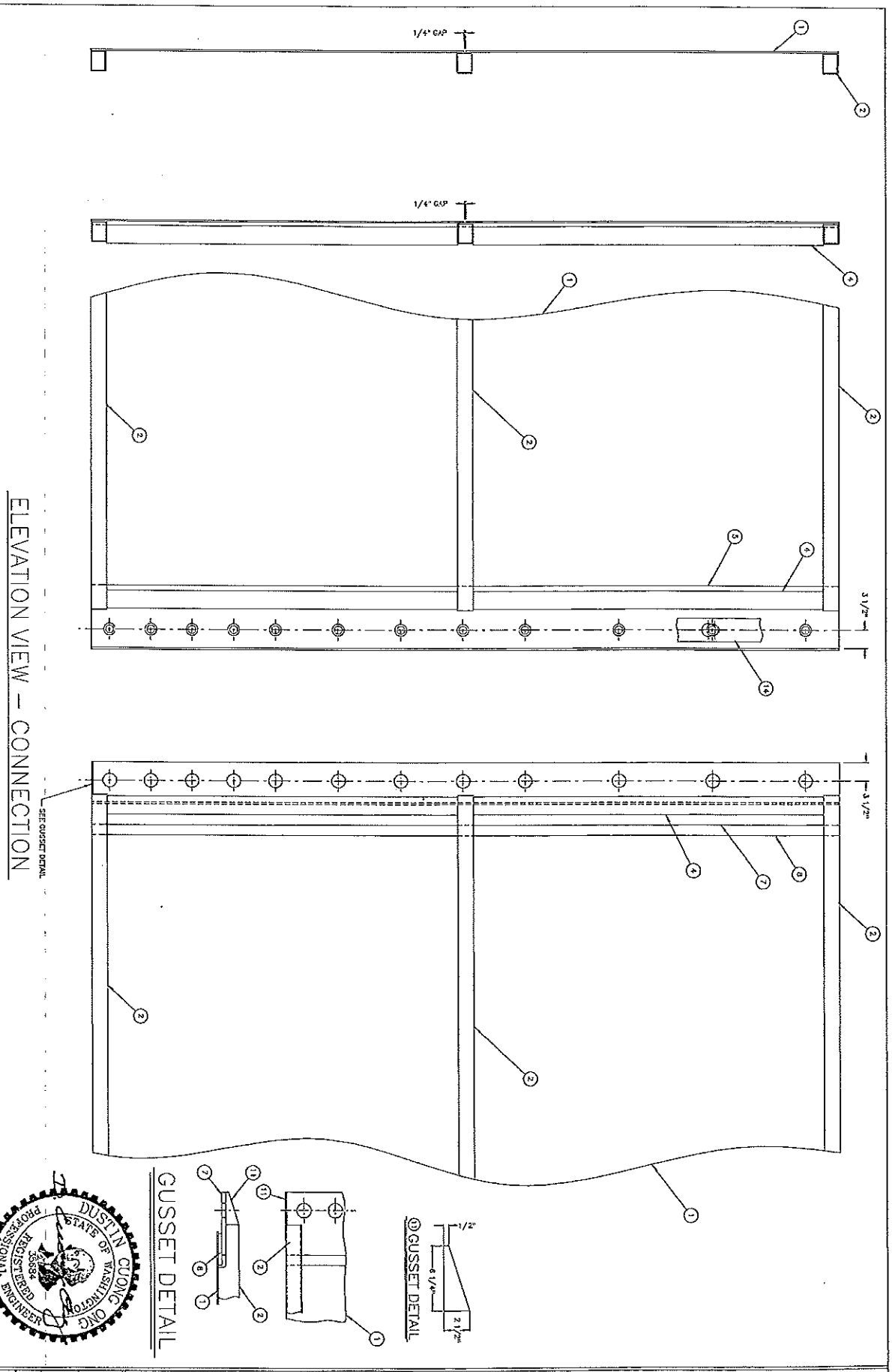
DUSTIN CUONG ONG
STATE OF WASHINGTON
35684
REGISTERED
PROFESSIONAL ENGINEER
11/19/2013

DRAWN: GAH
DATE: 11/18/13

REV.
DATE:

SHEET 6 of 8

DWG. NO. 1



DUSTIN CUONG NGUYEN
STATE OF WASHINGTON
35684
REGISTERED PROFESSIONAL ENGINEER

FRAC TANK
JOINT DETAILS

DRAWN: GAH
DATE: 11/18/13

REV.
DATE:

SHEET 7 of 8

DWG. NO. 1

JCR FABRICATION
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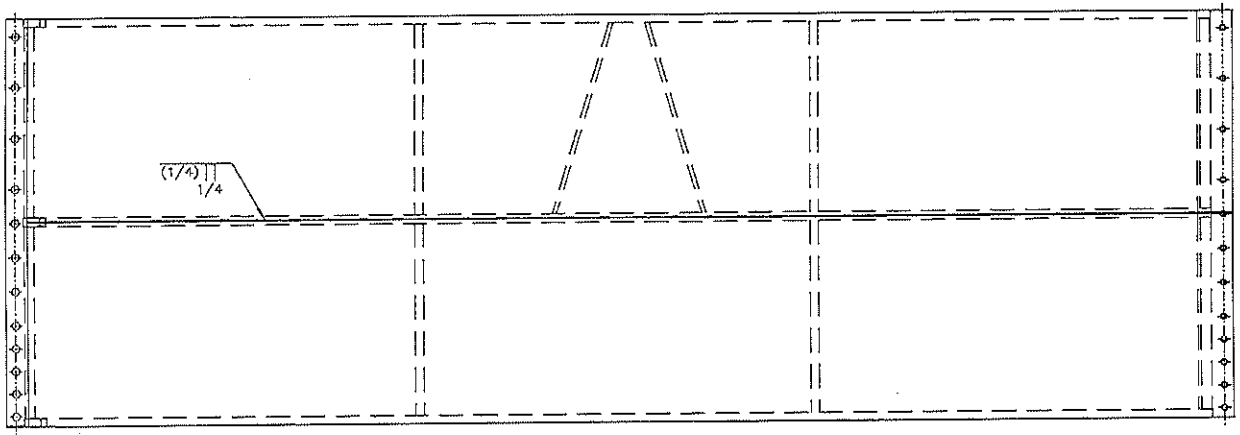
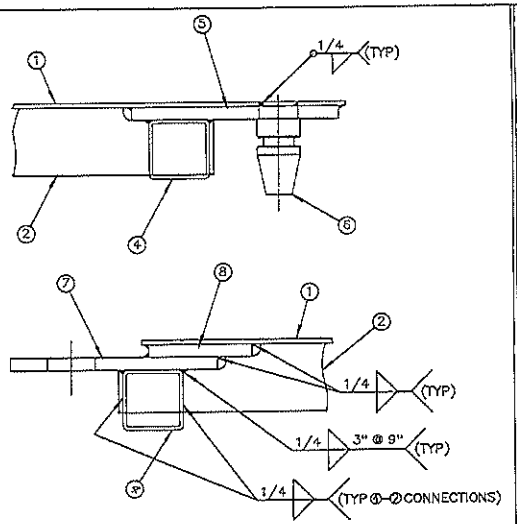
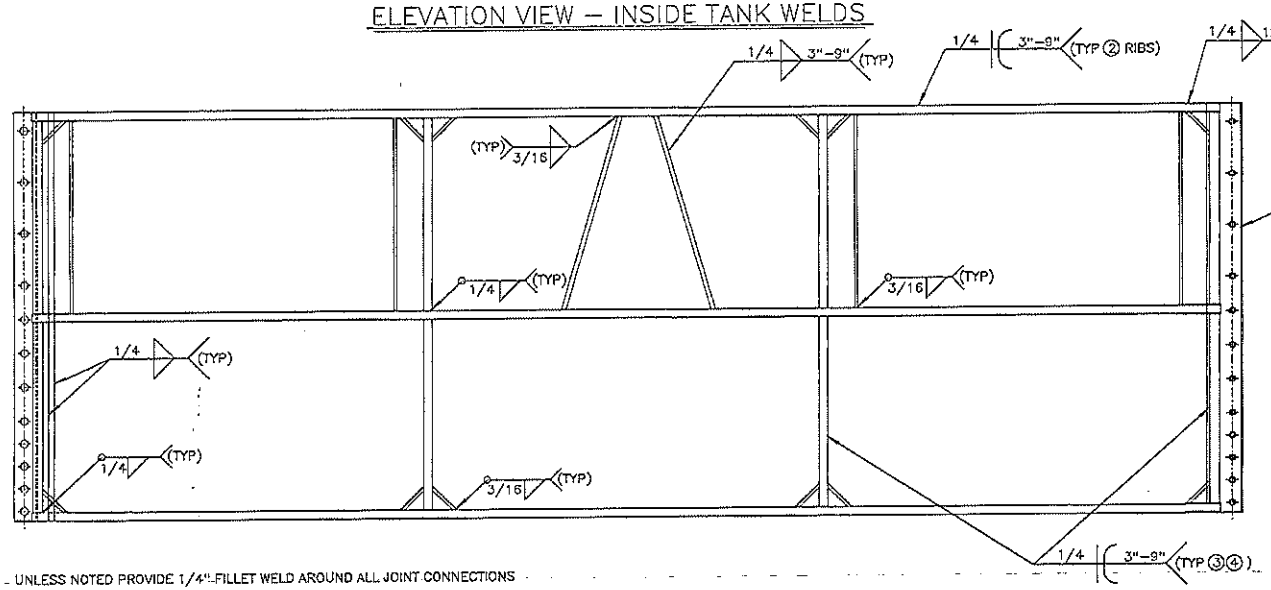
ONTONAGON, MI. 49953
(906) 235-2683



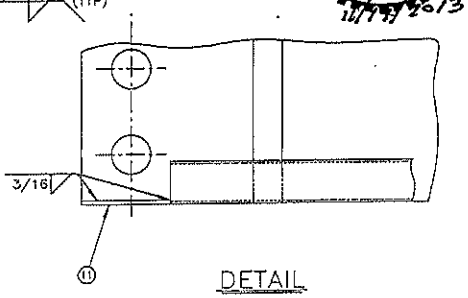
ELEVATION VIEW – INSIDE TANK WELDS



TANK JOINT DETAIL



ELEVATION VIEW – OUTSIDE TANK WELDS



DETAIL

DUSTIN CUONG ONG
STATE OF WASHINGTON
35654
REGISTERED
PROFESSIONAL ENGINEER
11/19/2013

UNLESS NOTED PROVIDE 1/4"-FILLET WELD AROUND ALL JOINT CONNECTIONS

JCR FABRICATION
516 MULOCK STREET
ONTONAGON, MI. 49953
(906) 235-2683

FRAC TANK
WELD LOCATIONS

DRAWN: GAH
DATE: 11/18/13

REV.
DATE:

SHEET 8 of 8

DWG. NO. 1

HYDRO LOGISTICS

Site Preparation for Tank Installation

1. Prior to any work being performed on location a HydroLogistics supervisor will ensure all safety equipment and Personal Protective Equipment is provided and utilized by all personnel during tank set up and tear down.
2. Recommended pad size for a 42,000bbl tank is 200' X 200'. For a 30,000bbl tank 175' X 175'
3. The pad is to be level to within 5 degrees to an area at least 5 feet outside of the tank "footprint."
4. Pad is to be free of rocks, debris and sharp protruding objects. A compactor may be required in some cases if the tank is placed over a recent fill or if the substrate is particularly rough.
5. Pad is to have a 92% or greater percent compaction. If compaction is in question a compaction test should be performed in general accordance with applicable ASTM, AASHTO, or DOT methods.
6. Once the site is prepared, a trench approximately 20' in length and 18" in depth should be dug where the suction pipe will be placed.

Steve Swinson, President | 435-705-8623 | steveswinson@yahoo.com | 102 W 1785 S Washington UT 84780

HYDRO LOGISTICS

The Liner

1. The liner is to be obtained from a reputable liner manufacturer. Liners must be welded and tested in accordance with all applicable ASTM international standards.

2. Minimal thickness requirement is 30 mil.

3. Recommended materials are Reinforced Polyethlene (rPE) or Linear Low Density Polyethylene (LLDPE) - Two sample spec sheets are attached.

4. Geotextile (underlayment) should be 8oz. or 10oz. depending on surface type.

5. The liner should not be pulled out in winds geater than 20 mph as this makes maintaining control of the liner difficult and potentially hazardous.

   Note – See tank assembly SOP for geotextile and liner installation

Steve Swinson, President | 435-705-8623 | steveswinson@yahoo.com | 102 W 1785 S Washington UT 84780

WATERSAVER

30mil LLDPE

GEOMEMBRANE LINER
ENGINEERING SPECIFICATION

Linear Low Density Grey Polyethylene

For containment of drilling fluids and chemicals associated with hydraulic fracturing operations
Made from 100% virgin polymer

PROPERTY	TEST METHOD	SPECIFIED VALUES	
		Imperial	Metric
Thickness	ASTM D5199	30 mil	0.75 mm
Tensile Strength at Break	ASTM D638	114 ppi	21 N/mm
Elongation	ASTM 638	800%	
Tear Resistance	ASTM D1004	16 lbs	71 N
Puncture Resistance	ASTM 4833	45 lbs	200 N
Low Temperature Impact Resistance	ASTM D1790	-40°F	-40°C
Dimensional Stability	ASTM D1204 Max Chng	<2.0%	
Shop Seam Strengths			
Heat Bonded Seam Strength	ASTM D6392 25.4 mm (1") Strip	36 ppi	6.3 N/mm
Heat Bonded Peel Adhesion Strength	ASTM D6392 25.4 mm (2") Strip	FTB 29 ppi	5.1 N/mm
Field Seam Strengths			
Heat Bonded Seam Strength	ASTM D6392 25.4 mm (1") Strip	FTB 29 ppi	5.1 N/mm
Heat Bonded Peel Adhesion Strength	ASTM D6392 25.4 mm (2") Strip	FTB 25 ppi	4.4 N/mm

www.watersaver.com
5870 E 56th Avenue • Commerce City, CO 80022 • 303-289-1818 • Fax 303-287-3136

WATERSAVER

rPE 36

GEOMEMBRANE LINER
ENGINEERING SPECIFICATION GUIDE

36 mil Reinforced Polyethylene

Linear Low Density
Scrim Reinforced Polyethylene

PROPERTY	TEST METHOD	SPECIFIED VALUES	
		Minimum Roll Averages	Typical Roll Averages
Appearance		Black	
Thickness, nominal		32 mil	36 mil
Weight LBS/MSF, (oz/yd^2)		136 lbs (19.6)	155 lbs (22.3)
Construction	Dense scrim reinforced polyethylene		
* Ply Adhesion lbf/in	ASTM D6636	21 lbs or FTB	28 lbs or FTB
Tensile Strength	ASTM D7003	170 lbf MD 166 lbf TD	186 lbf MD 175 lbf TD
Tensile Elongation at Break % (film break)	ASTM D7003	500 MD 500 MD	575 MD 520 TD
Tensile Elongation at Break % (scrim break)	ASTM D7003	32 MD 32 TD	35 MD 35 TD
Tongue Tear Strength	ASTM D5884	160 lbf MD 120 lbf TD	180 lbf MD 140 lbf TD
Grab Tensile (scrim break)	ASTM D7004	280 lbf MD 270 lbf TD	300 lbf MD 290 lbf TD
Grab Tensile Elongation at Break % (Scrim Break)	ASTM D7004	25%	32%
HPOIT	ASTM D 5885	1000 min	2400 min
Puncture Resistance	ASTM D4833	110 lbf	120 lbf
Maximum Use Temperature			180° F
Minimum Use Temperature			-70°F

* manufacturer modified QC procedure

rPE 36 is a linear low density polyethylene geomembrane reinforced with a heavy dense scrim reinforcement. In addition to excellent dimensional stability, the reinforcement provides unmatched tear and tensile strength. rPE 36 is formulated with thermal and UV stabilizers to assure a long service life.

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HYDRO LOGISTICS

Tank Assembly Procedures

1. Once the site has been properly prepared, the center of the tank should be marked and a circle painted on the ground (157' in diameter for the 42,000bbl tank and 135' in diameter for a 30,000bbl tank). Pull points for the liner should also be marked at 98.5'/87.5' from center in four directions.

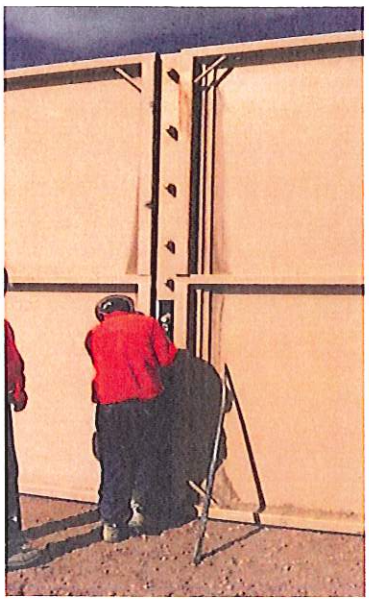
2. Unfold the geotxtile material and spread out over tank layout.

3. Unfold the liner material off the pallet and spread liner to pull points. Visually inspect liner for holes.

4. Pull the liner back in towards the center of the tank exposing the previously marked tank circle.

Two or three loads of water or several sand bags are put on the liner at this time to hold the liner down in windy conditions.

5. Set the first panel using the jig system and hold in place. With the second jig, set the second panel by moving the male pins into the female openings on the adjacent panel. Attach the lower plate followed by the upper and twist plate locking mechanism into the upright position.



6. Place a two foot piece of geotextile down the inside of the tank and secure on the top plate and under tank to protect the liner along the inner tank seam. The extra ground geotextile should be placed at the bottom of the panel to protect the liner at the transition from the ground to panel wall. Continue this process until panels are set.

7. Using a rope attached to the liner, pull liner up and over wall, making sure liner is pulled up straight and not at an angle. Laborer in the tank should make sure liner is up against the wall at the bottom of the panel. Continue to pull liner, placing a clamp approximately every two feet along the top of the wall.

8. Tank accessories can be placed at this time. The 10 in. suction pipe, the ladder stand and the platform ladder. Install interior ladder. Candy canes are set in desired locations for tank filling if required. Circulator is set in desired location if required. Make sure to use a tag line to control suspended loads.

9. Throughout the setup of the tank, the HydroLogistics supervisor should be visually inspecting the tank and surrounding area for any integrity deficiencies. He should also be observing for any potential leaks during the filling process. If any leaks are observed, filling ceases and the leak repaired. Site should be left clean with all debris disposed of properly.

10. Supervisor fills out certification form stating that the site was prepared and the tank set in accordance with the SOP and is being used for its intended purpose and given to the Operator.

HYDRO LOGISTICS

Periodic Inspection Guidelines

1. HydroLogistics will magnaflux and inspect each tank at or before its fiftieth set up to insure the integrity of the tank and its welds. Records of these inspections and any action items will be maintained by HydroLogistics for five years.

2. The HydroLogistics supervisor will perform a visual inspection of the tank during each set up and tear down.

3. Following each tank set up a Site Preparation and Installation Verifiation Form, certifying that the site was prepared and the tank was installed in accordance with the tank design and associated SOPs and that the tank is being used for its intended purpose will be completed by the HydroLogistics supervisor and provided to the Operator. A copy will also be kept by HydroLogistics.

Steve Swinson, President | 435-705-8623 | steveswinson@yahoo.com | 102 W 1785 S Washington UT 84780

HYDRO LOGISTICS

Site Preparation and Installation Verification Form

Date:_____
Operator:_____
Location:_____

HydroLogistics certifies that this site was prepared and the tank was installed in accordance with specifications and associated SOPs, and that this tank is being used for its intended purpose.

By:_____
Field Supervisor

Steve Swinson, President | 435-705-8623 | steveswinson@yahoo.com | 102 W 1785 S Washington UT 84780