

May 30, 2023

Ray Cockerham, CBO
City of Puyallup
333 S Meridian, 2nd Floor
Puyallup, WA 98731

Re: *Fire Construction Permit Application*
CUP Modification
Reuse of Storage Tank 5 & 6 for Used Oil

Dear Mr. Cockerham,

Ecolube Recovery is petitioning for a minor modification under Conditional Use Permit No. P-18-0154 to allow for the repurposing of Tanks 5 and 6 at the Ecolube Recovery terminal. Tanks 5 and 6 will be used in Used Motor Oil storage in an identical fashion as Tanks 1, 2, 3 & 4. The modification is being requested to provide for additional storage to contain the additional volume of oil being received at the facility associated with market growth, allow for segregation of oil to differentiate blends according to product specifications, and make transportation scheduling more efficient.

ChemE Consulting (ChemE) is pleased to present this information on behalf of Ecolube Recovery in support of the Application for Fire Code - Construction Permit for repurposing Tanks 5 and 6 for liquid storage and transfer operations located at 213 10th Street SE; Puyallup, WA 98731 for approval on or after February 24, 2024 consistent with the terms of the Conditional Use Permit.

Summary of Work

The proposed modification will add Tanks 5 and 6 to the existing tanks located at the proposed site. Tanks 5 and 6 were evaluated by a third party tank inspection firm, Mistras, to evaluate the condition of the tanks and found them to be in satisfactory condition, pending correction of mandatory recommendations.

Tanks 5 and 6 anchoring design was further evaluated by a structural engineer (Conlee Engineers) to verify the anchoring is consistent with the building code at the time of installation. The structural engineer's report shows that the anchoring requires the addition of eight 1-1/4" anchor bolts in adhesive anchors for stress as shown on the design calculations.

Tank inspection reports for Tanks 5 and 6 and structural engineer's calculations are attached at the end of this letter.

Detailed Scope of Work for Tanks 5 and 6

The following scope of work is intended for the development for Tanks 5 and 6 to address requirements of tank inspections, anchor evaluation, SPCC requirements and provisions for unloading and loading bulk used oil into trucks.

1. Tank Inspection and Mechanical Upgrades & Maintenance per Mistras Report

- Install new 10” Emergency vent assembly on top of tanks 5 and 6
- Install 4” gooseneck pipe vent on tanks 5 and 6
- Install eight anchor bolts per recommendation
- Install level transmitter 3” flange nozzle per Tank 5 and 6 Data Sheet Dwg
- Install new 2” flange and Float High Level Switch (LSHH) per dwgs. Tank 5 Data Sheet and Tank 6 Data Sheet
- Change out all flange gaskets
- Hydraulic fill test to verify that tank is liquid tight
- Install 3” pipe from unloading manifold pipe to top of Tanks 5 and 6
- Install 4” pipe from Tanks 5 and 6 to loading manifold pipe
- Repair coating wear on caged ladder rungs
- Install level monitoring, high level switch, and interlock for overfill protection, and field verify interlock.

Reference Documentation

The scope of work is supported by the following documentation located in attached appendices.

App 1: Tank Inspection

App 2: Tank Foundation Evaluations

App 3: Drawings

If you have any questions or comments with the permit application documentation, please contact me at 360-355-5513.

Sincerely,



David R. Ravander, P.E.
Principal Engineer



Appendix 1

Tank Inspection Report – Mistras



Prepared By:
7820 South 210th St.
Kent, WA 98032
206-764-8123
www.mistrasgroup.com

SP001 Formal Internal Inspection

CLIENT: EcoLube Recovery
TANK #: 005
LOCATION: PUYALLUP, WA
DATE: 2/2/2023

Client: EcoLube Recovery	Inspection Date: 2/2/2023
Location: Puyallup, WA	Page: 1 of 29
Tank: 005	Work Order.: T76981-41150867

Introduction

Mistras Group, Inc. has been contracted to perform an STI & SPFA JANUARY 2018 6th EDITION In-service Inspection. This inspection was performed in accordance with the current criteria set forth in STI & SPFA JANUARY 2018 6th EDITION.

This report documents the findings and provides an evaluation of the inspection results per the applicable criteria of. STANDARD FOR THE INSPECTION OF ABOVEGROUND STORAGE TANKS STI & SPFA JANUARY 2018 6th EDITION

Storage tanks include shop-fabricated tanks, field-erected tanks and portable containers as defined in this Standard, as well as their containment systems. The requirements for field-erected tanks are covered separately.

Job Location :	EcoLube Recovery	213 10th St SE, Puyallup	WA	98372
Customer Representative :	CharleeAnn Doumit	Customer Phone Number:	360-501-8068	
Report Number :	41112954-1			

Inspected By: 

Inspector Name:	Bobby Hogan
Certification:	STI SP001
Certification No.:	AC 44516

Reviewed By: 

Inspector Name:	George Roni
Certification:	API 653 Certified Inspector
Certification No.:	Certification No. 2042



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SUITABILITY FOR SERVICE

Tank 005 is suitable for service according to the applicable criteria of STI-SP001. As of 02/02/2023, all mandatory recommendations were implemented and inspected. Repairs were made in accordance with STI-SP031. Refer to recommendations in section 3 of this report for details.

Per STI SP001 the tank is classified as Category 1, which requires a Formal External Inspection every 20 years and Periodic inspections by the owner.

TABLE OF INSPECTION SCHEDULES

AST Type and Size (U.S. gallons)		Category 1	Category 2	Category 3
Shop-Fabricated ASTs	0 – 1100 (0-4164 liters)	P	P	P, E&L(10)
	1101 - 5,000 (4168-18,927 liters)	P	P, E&L(10)	[P, E&L(5), I(10)] or [P, L(2), E(5)]
	5,001 - 30,000 (18,931-113,562 liters)	P, E(20)	[P, E(10), I(20)] or [P, E(5), L(10)]	[P, E&L(5), I(10)] or [P, L(1), E(5)]
	30,001 - 50,000 (113,566-189,271 liters)	P, E(20)	P, E&L(5), I(15)	P, E&L(5), I(10)
Plastic Portable Containers		P	P	P**

Notes:

** Owner shall either discontinue use of portable container for storage or have the portable container DOT (Department of Transportation) tested and recertified per the following schedule (refer to Section 9.0):

Plastic portable container - every 7 years

Steel portable container - every 12 years

Stainless Steel portable container - every 17 years

Inspection Type designations:

P – Periodic AST inspection by owner's inspector

E – Formal External Inspection by Certified Inspector

I – Formal Internal Inspection by Certified Inspector

L – Leak test by owner or owner's designee

Numbers included in parentheses, for example (5), indicate the maximum inspection interval in years. Thus, E (5) indicates Formal External Inspection every 5 years.



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1. STI SP001 AST Record

Owner Information	Facility Information	Installer Information
Name: EcoLube Recovery	Name: EcoLube Recovery	Name: The Bishopric Products Co.
Number and Street: 213 10 th St SE	Number and Street: 213 10 th St SE	Number and Street: 4955 Spring Grove Ave
City, State, Zip Code: Puyallup, WA 98372	City, State, Zip Code: Puyallup, WA 98372	City, State, Zip Code: Cincinnati, OH 45232

General:										
Manufacturer:	The Bishopric Products Co.			Next Contents:	Used Oil	Construction Date:	1/1/1983			
Dimensions:	12' D X 60' H			Nom. Capacity:	41,600 Gal.	Last Change of Product Date:	Unknown			
Design:										
<input type="checkbox"/>	UL	142	<input type="checkbox"/>	SwRI	<input type="checkbox"/>	API	<input checked="" type="checkbox"/>	Other	Unknown	
<input type="checkbox"/>	Horizontal		<input checked="" type="checkbox"/>	Vertical		<input type="checkbox"/>	Rectangular			
Construction:										
<input type="checkbox"/>	Bare Steel		<input type="checkbox"/>	Cathodically Protected		<input type="checkbox"/>	Galvanic or		<input type="checkbox"/>	Impressed Current)
<input checked="" type="checkbox"/>	Coated Steel		<input type="checkbox"/>	Concrete encased steel		<input type="checkbox"/>	Stainless steel		<input type="checkbox"/>	Other
<input type="checkbox"/>	Double-Bottom		<input type="checkbox"/>	Double-Wall		<input checked="" type="checkbox"/>	Lined inside; Date installed:		1983 (Assumed)	
Spill Control:										
<input type="checkbox"/>	Earthen Dike		<input type="checkbox"/>	Steel Dike		<input checked="" type="checkbox"/>	Concrete Dike Containment			
<input type="checkbox"/>	None		<input type="checkbox"/>	Other						
CRDM:										
CRDM:	<input checked="" type="checkbox"/>	Yes		<input type="checkbox"/>	No					
If yes, type:	<input checked="" type="checkbox"/>	Release Prevention Barrier		<input type="checkbox"/>	Elevated tank		<input type="checkbox"/>	Double bottom tank		
	<input type="checkbox"/>	Double wall tank		<input type="checkbox"/>	CE-AST		<input type="checkbox"/>	Other		
Supports:										
Tank Elevated on Supports	<input checked="" type="checkbox"/>	Yes		<input type="checkbox"/>	No					
Support Material:	<input checked="" type="checkbox"/>	Steel		<input type="checkbox"/>	Concrete		<input type="checkbox"/>	Other		
Release Prevention Barrier:										
Release Prevention Barrier:	<input checked="" type="checkbox"/>	Yes		<input type="checkbox"/>	No		If yes, Date Installed:	Date.		
If yes, Type:	<input checked="" type="checkbox"/>	Concrete		<input type="checkbox"/>	Synthetic liner		<input type="checkbox"/>	Clay Liner		
	<input checked="" type="checkbox"/>	Steel		<input type="checkbox"/>	Other					
AST Category:										
Category:	<input checked="" type="checkbox"/>	Category 1			<input type="checkbox"/>	Category 2		<input type="checkbox"/>	Category 3	



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2. Inspection Summary

HISTORY

A Formal Internal Inspection (FII) was conducted on 02/02/2023 in accordance with STI-SP001. The tank was built in 1983 by The Bishopric Products Co. It rests within a concrete containment area and is elevated by a steel skirt and is equipped with four (4) anchor bolts. The tank shell and top head were insulated.

FOUNDATION

Tank 005 rests within a concrete containment area and is supported by four (4) anchor bolts and an elevated steel skirt. There were hairline cracks noted throughout the concrete containment area. The containment otherwise appeared to be acceptable condition. The steel leg supports, and skirt appeared to be in acceptable condition with no notable distortions, mechanical damage or other abnormal conditions observed.

BOTTOM

The tank bottom consisted of a 45-degree cone bottom. The external and internal cone bottom were coated at time of inspection. The external coating had areas of coating failure, but the cone bottom is in an enclosed area and not exposed to the elements. The interior coating was in acceptable condition. The cone bottom appeared to be in acceptable condition with no distortions, mechanical damage, or other abnormal conditions.

SHELL

Tank 005 was coated internally and externally. The coating inside the tank appeared to be in acceptable condition. The observable internal shell courses appeared to be in acceptable condition with no notable distortions, mechanical damage or other abnormal conditions. The external shell was insulated and could not be visually inspected. The insulation appeared to be in acceptable condition with no product stains, damage, or other abnormal conditions.

MANWAYS, NOZZLES & APPURTENANCES:

Observable nozzles and appurtenances appeared to be in acceptable condition. Nozzles appeared to be square, flanges were aligned properly, and no notable concerns were noted at time of inspection.



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Top Head

The tank top head was insulated and there was no access from the inside for a formal inspection. There appeared to be a 3" vent appurtenance on the top head but was plugged at time of inspection.

ACCESS

The tank shares a catwalk to the top head with tank 005. There is no stairway or tank side ladder associated with this tank.

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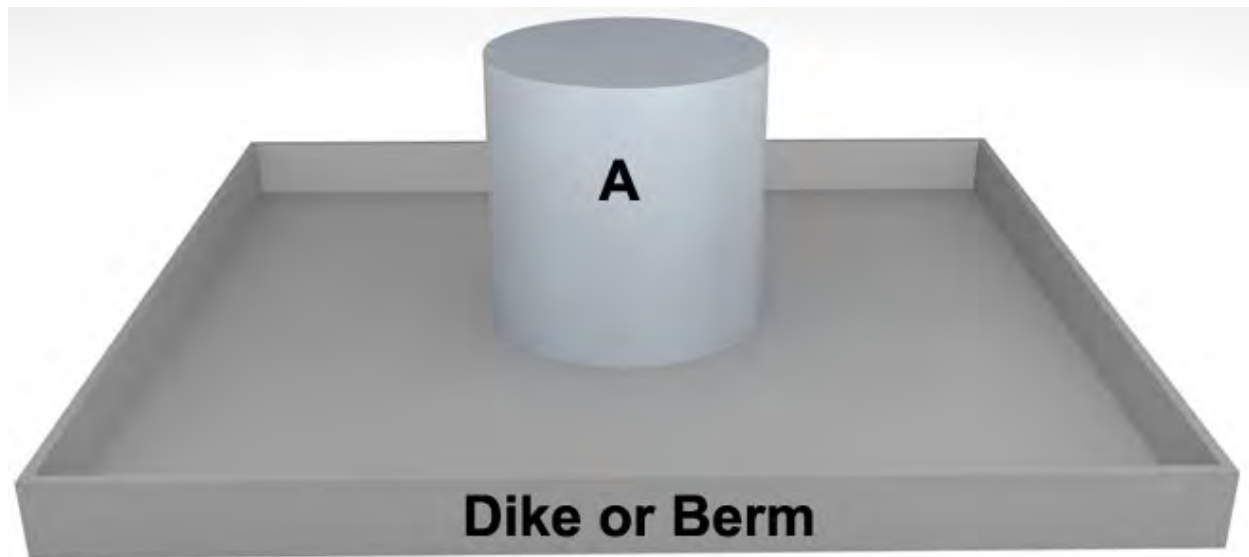
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3. Spill Prevention Assessment Vertical Tank

Dikes or firewall should be constructed to contain, at a minimum, the volume of the largest tank enclosed plus an allowance for rainwater (normally, 10 percent additional tank volume) for a total of 110%. The secondary containment area meets the required volume of 110%.




4. Inspection Recommendations

- 1) Tank has a 3-inch vent that was plugged at the time of inspection. Per UL-142, Aboveground Steel Tanks for Flammable & Combustible Liquids, for a tank of this size and capacity, a 4" vent is required. This is per Table 8.2 of UL-142. Therefore the recommendation is to install a 4" vent.
- 2) Also per UL-142, Table 8.1, an Emergency Vent (for use in case of a fire) of a size of 10" is required for a tank of this size and capacity. Since the tank does not have one, the installation of a 10" Emergency Vent is recommended.

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5. STI SP001 Monthly Inspection Checklist

General Inspection Information:			
Inspection Date: 2/2/2023	Prior Inspection Date: Unknown	Retain Until Date: 02/02/2026	
Inspector's Name (Print):	Bobby Hogan	Title:	API 653/ STI-SP001
Inspectors Signature:		Tanks Inspected ID:	005

Inspection Guidance:

- This checklist is intended as a model. Locally developed checklists are acceptable as long as they are substantially equivalent (as applicable). Inspections of multiple tanks may be captured on one form as long as the tanks are substantially the same.
- For equipment not included in this Standard, follow the manufacturer recommended inspection/testing schedules and procedures.
- The periodic AST Inspection is intended for monitoring the external AST condition and its containment structure. This visual inspection does not require a Certified Inspector. It shall be performed by an owner's inspector per paragraph 4.1.2 of the standard.
- Upon discovery of water in the primary tank, secondary containment area, interstice, or spill container, remove promptly or take other corrective action. Inspect the liquid for regulated products or other contaminants and dispose of properly.
- Non-conforming items important to tank or containment integrity require evaluation by an engineer experienced in AST design, a Certified Inspector, or a tank manufacturer who will determine the corrective action. Note the non-conformance and corresponding corrective action in the comment section.
- Retain the completed checklists for at least 36 months.
- After severe weather (snow, ice, windstorms) or maintenance (such as coating) that could affect the operation of critical components (normal and emergency vents, valves), an inspection of these components is required as soon as the equipment is safely accessible after the event.

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Tank and Piping

Item	Description	Yes	No	N/A	Comment
1	Is tank exterior (roof, shell, heads, bottom, connections, fittings, valves, etc.) free of visible leaks? Note: If "No", identify tank and describe leak and actions taken.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2	Is the tank liquid level gauge legible and in good working condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3	Is the area around the tank (concrete surfaces, ground, containment, etc.) free of visible signs of leakage?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4	Is the primary tank free of water or has another preventative measure been taken? NOTE: Refer to paragraphs 6.10 and 6.11 of the standard for alternatives for Category 1 tanks. N/A is only appropriate for these alternatives.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5	For double-wall or double bottom tanks or CE-ASTs, is interstitial monitoring equipment (where applicable) in good working condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
6	For double-wall tanks or double bottom tanks or CE-ASTs, is interstice free of liquid? Remove the liquid if it is found. If tank product is found, investigate possible leak.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Equipment on Tank

Item	Description	Yes	No	N/A	Comment
7	Is overfill prevention equipment in good working condition? If it is equipped with a mechanical test mechanism, actuate the mechanism to confirm operation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
8	Is the spill container (spill bucket) empty, free of visible leaks and in good working condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No spill bucket.
9	Are piping connections to the tank (valves, fittings, pumps, etc.) free of visible leaks? Note: If "No", identify location and describe.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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Equipment on Tank

Item	Description	Yes	No	N/A	Comment
10	Do the ladders/platforms/walkways appear to be secure with no sign of severe corrosion or damage?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Catwalk from tank 005 to 007. Acceptable condition

Containment (Diking/Impounding)


Item	Description	Yes	No	N/A	Comment
11	Is the containment free of excess liquid, debris, cracks, corrosion, erosion, fire hazards and other integrity issues?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Concrete dike containment.
12	Are dike drain valves closed and in good working condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13	Are containment egress pathways clear and any gates/doors operable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Concrete Exterior AST (CE-AST)


Item	Description	Yes	No	N/A	Comment
14	Inspect all sides for cracks in concrete. Are there any cracks in the concrete exterior larger than 1/16"?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not a CE-AST.
15	Inspect concrete exterior body of the tank for cleanliness, need of coating, or rusting where applicable. Tank exterior in acceptable condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not a CE-AST.
16	Visual inspect all tank top openings including nipples, manways, tank top overfill containers, and leak detection tubes. Is the sealant between all tank top openings and concrete intact and in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not a CE-AST.

Other Conditions

Item	Description	Yes	No	N/A	Comment
17	Is the system free of any other conditions that need to be addressed for continued safe operation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

STI-Vert-Full-Report		 MISTRAS <small>A World of NDT Solutions</small>		Services Division		In-Service Inspection	
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6. STI SP001 Annual Inspection Checklist

General Inspection Information:					
Inspection Date: 2/2/2023		Prior Inspection Date: Unknown		Retain Until Date: 02/02/2026	
Inspector's Name (Print):		Bobby Hogan		Title: API 653/ STI-SP001	
Inspectors Signature:				Tanks Inspected ID: 005	

Inspection Guidance:

- This checklist is intended as a model. Locally developed checklists are acceptable as long as they are substantially equivalent (as applicable).
- For equipment not included in this Standard, follow the manufacturer recommended inspection/testing schedules and procedures.
- The periodic AST Inspection is intended for monitoring the external AST condition and its containment structure. This visual inspection does not require a Certified Inspector. It shall be performed by an owner's inspector per paragraph 4.1.2 of the standard.
- Remove promptly standing water or liquid discovered in the primary tank, secondary containment area, interstice, or spill container. Before discharge to the environment, inspect the liquid for regulated products or other contaminants and disposed of it properly.
- In order to comply with EPA SPCC (Spill Prevention, Control and Countermeasure) rules, a facility should regularly test liquid level sensing devices to ensure proper operation (40 CFR 112.8(c)(8)(v)).
- Non-conforming items important to tank or containment integrity require evaluation by an engineer experienced in AST design, a Certified Inspector, or a tank manufacturer who will determine the corrective action. Note the non-conformance and corresponding corrective action in the comment section.
- Retain the completed checklists for at least 36 months.
- Complete this checklist on an annual basis, supplemental to the owner monthly performed inspection checklists.
- **Note: If a change has occurred to the tank system or containment that may affect the SPCC plan, the condition should be evaluated against the current plan requirement by a Professional Engineer knowledgeable in SPCC development and implementation.**

Tank Foundation/Supports						
Item	Description	Yes	No	N/A	Comment	



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1	Free of tank settlement or foundation washout?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2	Concrete pad or ring wall free of cracking and spalling?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concrete dike containment, some hairline cracks noted.
3	Tank supports in satisfactory condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4	Is water able to drain away from tank if tank is resting on a foundation or on the ground?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tank elevated on steel pad.
5	Is the grounding strap between the tank and foundation/supports in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Tank Shell, Heads and Roof

Item	Description	Yes	No	N/A	Comment
6	Free of visible signs of coating failure?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	External shell was insulated. Limited internal inspection.
7	Free of noticeable distortions, buckling, denting, or bulging?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	External shell was insulated. Limited internal inspection.
8	Free of standing water on roof?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	External shell was insulated. Limited internal inspection.
9	Are all labels and tags intact and legible?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	External shell was insulated. Limited internal inspection.

Tank Manways, Piping, and Equipment

Item	Description	Yes	No	N/A	Comment
10	Flanged connection bolts tight and fully engaged with no sign of wear or corrosion?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Tank Equipment

Item	Description	Yes	No	N/A	Comment
11	Normal and emergency vents free of obstructions?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12	Normal vent on tanks storing gasoline equipped with pressure/vacuum vent?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
13	Are flame arrestors free of corrosion and are air passages free of blockage?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No flame arrestor.
14	Is the emergency vent in good working condition and functional, as required by	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	One 3" vent that was plugged at time of inspection. No emergency vent.

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Tank Equipment

Item	Description	Yes	No	N/A	Comment
	manufacturer? Consult manufacturer's requirements. Verify that components are moving freely (including long-bolt manways).				
15	Is interstitial leak detection equipment in good condition? Are windows on sight gauges clear? Are wire connections intact? If equipment has a test function, does it activate to confirm operation?"	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
16	Are all valves free of leaks, corrosion and other damage? Follow manufacturers' instructions for regular maintenance of these items. Check the following and verify (as applicable):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/> Anti-siphon valve				
	<input type="checkbox"/> Check valve				
	<input type="checkbox"/> Gate valve				
	<input type="checkbox"/> Pressure regulator valve				
	<input type="checkbox"/> Expansion relief valve				
	<input type="checkbox"/> Solenoid valve				
<input type="checkbox"/> Fire valve					
<input type="checkbox"/> Shear valve					
17	Are strainers and filters clean and in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No strainers or filters.

Insulated Tanks

Item	Description	Yes	No	N/A	Comment
18	Free of missing insulation? Insulation free of visible signs of damage? Insulation adequately protected from water intrusion?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
19	Insulation free of noticeable areas of moisture?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
20	Insulation free of mold?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
21	Free of visible signs of coating failure?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



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Tank / Piping Release Detection

Item	Description	Yes	No	N/A	Comment
22	Is inventory control being performed and documented if required?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
23	Is release detection being performed and documented if required?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Other Equipment

Item	Description	Yes	No	N/A	Comment
24	Are electrical wiring and boxes in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Disconnected at time of inspection.
25	Has the cathodic protection system on the tank been tested as required by the designing engineer?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

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7. Shell CML Location Drops

Exterior Tank

Course 5	READING NO/ID	DROP 1 South
	1	0.260
	2	0.270

Interior Tank

Course 4	READING NO/ID	DROP 1 South
	1	
	2	

Course 3	READING NO/ID	DROP 1 South
	1	0.274
	2	0.257

Course 3	READING NO/ID	DROP 1 South
	1	
	2	

Course 2	READING NO/ID	DROP 1 South
	1	0.283
	2	0.280

Course 2	READING NO/ID	DROP 1 South
	1	
	2	

Course 1	READING NO/ID	DROP 1 South
	1	0.340
	2	0.327

Course 1	READING NO/ID	DROP 1 South
	1	
	2	

Client: EcoLube Recovery

Inspection Date: 2/2/2023

Location: Puyallup, WA

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8. Shell & Cone Bottom Minimum Thickness Calculations

Calculations for Shell & Cone-Shaped Tank Bottom - per API 620

Date of Inspection: 2/2/2023

Owner

Ecolube

Tank No.

5

Diameter, D

11.917 ft 143.00 inches

Shell Height, H

50.000 ft 600.00 inches

Fill Height

49.000 ft 588.00 inches

Original Shell thickness

0.375 inches

Measured Shell thickness, t_c

0.327 inches

Original Cone thickness

0.375 inches

Measured Cone thickness, t_h

0.383 inches

Specific Gravity of contents of tank, SG

0.940

Depth of Cone, d

63.00 inches 5.25 ft

S, allowable tensile stress of shell & cone

15,200 psi

Joint Efficiency cone-to-shell & long cone joints, E_1

0.85

Joint Efficiency shell vertical joints, E_2

0.85

Operating Pressure at top of tank, P_o

0.00 psi 0 psf

Note that per API 620 the max. operating pressure at top of tank is 15 psig.

O.D. of connection at bottom of cone

16.00 inches

(if none enter 0)

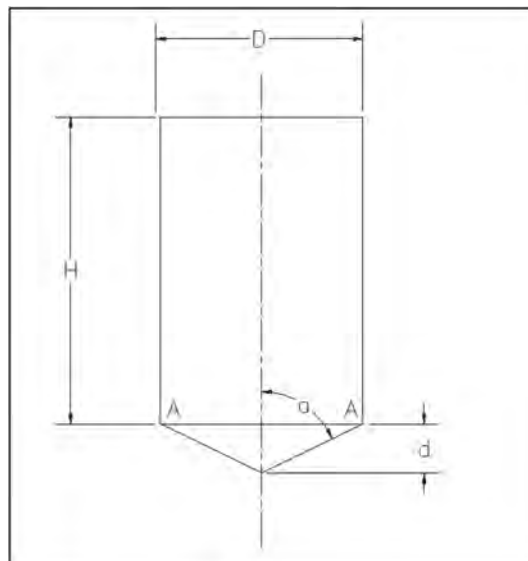
1/2 Apex angle, alpha = a

0.789351 radians 45.22646 degrees

Total Pressure, P at plane AA

2874.14 psf (includes hydrostatic head + P_o) 19.96 psi

Plane AA is at the Spring Line.



Client: EcoLube Recovery

Inspection Date: 2/2/2023

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Figure No. A1

1) Shell Unit Forces @ Plane AA, See Figure No. A2

$$\sum F_x = 0$$

$$2T_{2s} = PD$$

$$T_{2s} = PD/2$$

$$T_{2s} = 1427 \text{ lb/in}$$

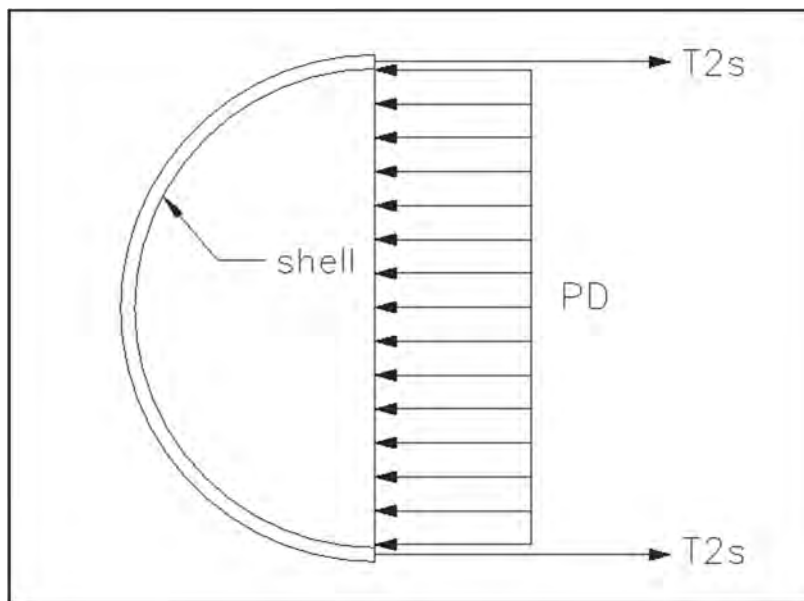


Figure No. A2

2) Cone unit force, T_2 , the latitudinal unit force. Also known as the circumferential unit force. See Figure No. A3

R_2 , radius of curvature of cone at A

$$R_2 = AB/\cos(a)$$

$$R_2 = 101.5183 \text{ inches}$$

Client: EcoLube Recovery

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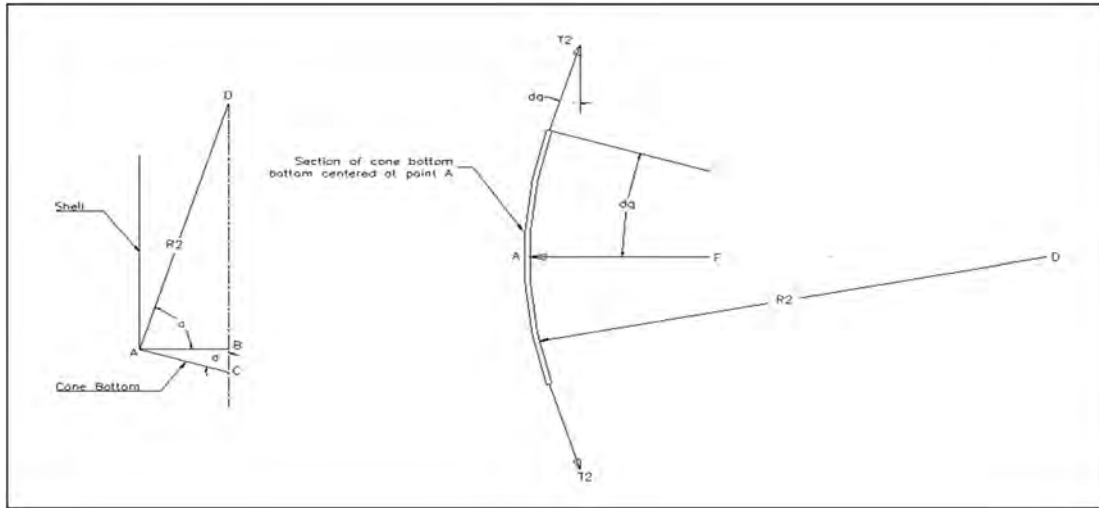


Figure No. A3

Sum of $F_x = 0$

F = the force on 1 inch wide section of cone at point A with an infinitesimal arc length = $2 \times dq$
 $F = P(1)(2)(dq)(R_2)$
 $F = 2Pd q R_2$

$F - 2T_2 \sin(dq) = 0$
 $2Pd q R_2 = 2T_2 \sin(dq)$ and for small dq , $\sin(dq) = dq$
 $PR_2 = T_2$
 $T_2 = PR_2$
 $T_2 = 2026 \text{ lb/in}$

3) Cone unit force, T_1 , the Meridional unit force. See Figure No. A4

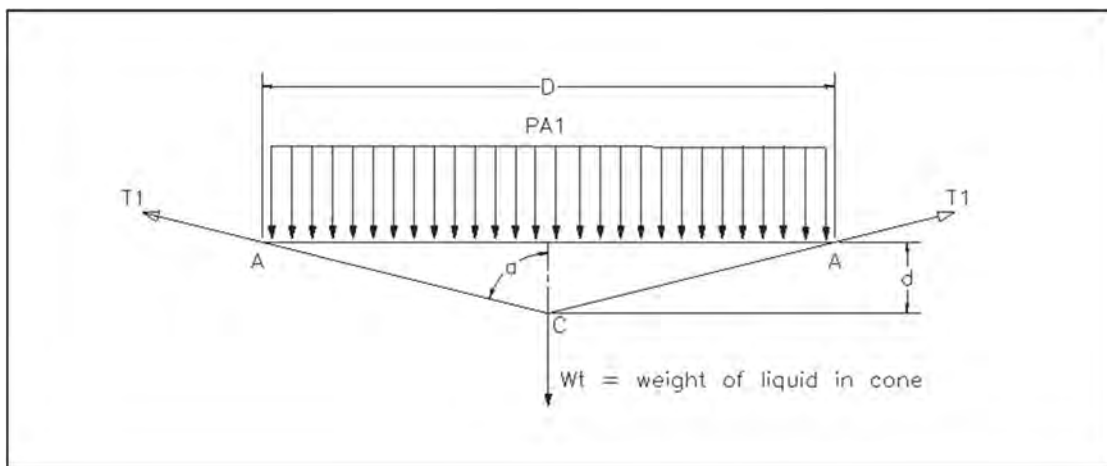


Figure No. A4

$A_1 = \frac{\pi}{4} \times D^2$

Client: EcoLube Recovery	Inspection Date: 2/2/2023
Location: Puyallup, WA	Page: 19 of 29
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$$A_1 = 16060.61 \text{ square inches} \quad 111.532 \text{ square feet}$$

$$V, \text{ Volume of Cone} = (\pi * D / 2 * D / 2 * d) / 3$$

$$V = 195.181 \text{ ft}^3$$

$$W_t = SG * 62.4 \text{ lb/ft}^3 * V$$

$$W_t = 11,449 \text{ lb}$$

$$\text{Sum } F_y = 0$$

$$T_1 \cos(a) \pi * D - W_t - PA_1 = 0$$

$$T_1 = (W_t + PA_1) / \cos(a) \pi * D$$

$$T_1 = 1049 \text{ lb/in}$$

4) Knuckle Region Reinforcement Check per API 620 3.12

The measured cone bottom thickness is defined as t_h here, $t_h = 0.383$ inches

The measured shell thickness is defined as t_c here, $t_c = 0.327$ inches

R_2 , radius of curvature of cone at A = 101.52 inches

R_c , radius of curvature shell = 71.5 inches

$$w_h = 0.6 * \sqrt{R_2 * t_h}$$

$$w_h = 3.741303 \text{ inches}$$

$$w_c = 0.6 * \sqrt{R_c * t_c}$$

$$w_c = 2.901203 \text{ inches}$$

Additional attached
reinforcement area A_d
 $A_d = 0.75$

$$\text{Available reinforcing area, } A_a = w_h * t_h + w_c * t_c + A_d$$

$$A_a = 3.131612 \text{ inches sq}$$

Extra area added for skirt

$$T_1 = 1049 \text{ lb/in}$$

$$T_{2s} = 1427 \text{ lb/in}$$

$$T_2 = 2026 \text{ lb/in}$$

Per API 620, the magnitude of the total circumferential force acting on any vertical cross section through the compression ring region shall be computed as follows:

$$Q = T_2 w_h + T_{2s} w_c - T_1 R_c \sin(a) \quad \text{Note that if } Q \text{ is negative, compression is indicated.}$$

$$Q = 7,581 + 4,140 - 53,260$$

$$Q = -41,539$$

$$A_c, \text{ the required compression ring reinforcing area} = Q / 15,000$$

$$A_c = 2.769264 \text{ sq. inches}$$

$$A_a > A_c$$

$$3.131612 > 2.769264 \quad \text{TRUE}$$



Client: EcoLube Recovery	Inspection Date: 2/2/2023
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and since Q is negative the following condition must be true also.

$$w_h \sin(a) > R_c$$

$$2.655936 > 1.0725 \quad \text{TRUE}$$

Since both conditions are true, knuckle region is adequately reinforced.

5) Check Measured Shell Thickness vs Required Shell Thickness

The required shell thickness is $t_{cr} = T_{2s}/SE_2$

$$0.110456 \quad \text{However, thickness must be at least 0.100" per API 653, so final required shell thickness is} \quad 0.110$$

$$t_c > t_{cr}$$

$$0.327 > 0.110 \quad \text{TRUE}$$

6) Check Measured Cone Bottom Thickness vs Required Cone Bottom Thickness at Plane A-A

The required cone thickness, t_{hr} , is the greater of the following 2 formulas

$$t_{hr} = T_1/SE_1 \quad \text{or} \quad t_{hr} = T_2/SE_1$$

$$t_{hr} = 0.081215 \quad t_{hr} = 0.15683$$

$$t_{hr} = 0.15683 \quad \text{However, thickness must be at least 0.100" per API 653, so final required cone bottom thickness is:} \quad t_{hr} = 0.157 \text{ inches}$$

$$t_h > t_{hr}$$

$$0.383 > 0.157 \quad \text{TRUE}$$

7) Tank Volume or Capacity Calculation

$V_{total} = \text{Volume of Cone} + \text{Volume of Shell}$

$$195.181 \text{ ft}^3 + (PI/4) * D^2 * H$$

$$195.181 + 5465.068$$

$$V_{total} = 5660 \text{ ft}^3 \quad \text{or} \quad 42,344 \text{ gallons}$$

Client: EcoLube Recovery

Inspection Date: 2/2/2023

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9. Shell Nozzle Table

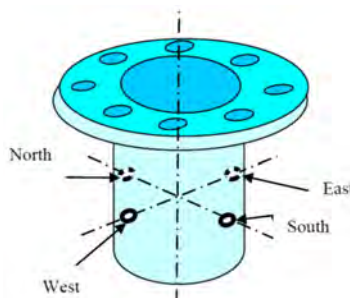
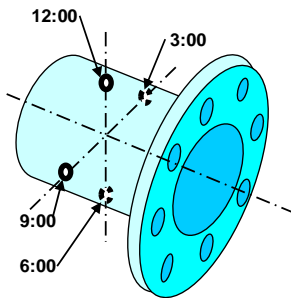
No appurtenance table was done as all the nozzles are on the top head and had limited access.
Refer to inspection summary on condition of appurtenances/nozzles.

10. Shell/Roof Nozzle UT Readings

No nozzle UT table was done as all the nozzles are on the top head and had limited access.
Refer to inspection summary on condition of appurtenances/nozzles.

Typical Nozzle UT Data

Typical Nozzle UT Data



Shell Nozzles

4 UT wall thickness measurements. Start position at 12 o'clock position top side of nozzle.

Roof Nozzle

4 UT wall thickness measurements. Start position at North position top side of nozzle.

Any nozzle not measured or not accessible or insulated nozzles mark as N/A.

Client: EcoLube Recovery

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11. Inspection Schedule

AST CATEGORIES USED IN TABLE

Category 1 - ASTs with spill control, and with CRDM

Category 2 - ASTs with spill control and without CRDM

Category 3 - ASTs without spill control and without CRDM

shows some typical tank types and their corresponding AST category

EXAMPLE TANK CONFIGURATION AND AST CATEGORY

Tank Configuration	Tank has CRDM?	Tank has Spill Control?	AST Category
Single wall vertical AST in contact with ground and no spill control	No	No	3
Single wall vertical AST in contact with ground in an earthen dike	Yes	Yes	2
Single wall vertical AST in concrete dike with concrete floor. Concrete floor extends under tank completely	Yes	Yes	1
Single wall vertical AST in dike with elastomeric liner. Liner extends under tank completely	Yes	Yes	1
Single wall vertical AST installed on gravel and no spill control	No	No	3
Single wall vertical AST installed on gravel in an earthen dike	Yes	No	2
Elevated AST with spill control	Yes	Yes	1
Elevated AST without spill control	No	Yes	1
AST with double-bottom and spill control	Yes	Yes	1
Double-wall AST with overfill prevention	Yes	Yes	1
Double-wall AST without overfill prevention	No	Yes	3
Concrete exterior AST with overfill prevention	Yes	Yes	1
Concrete exterior AST without overfill prevention	No	Yes	3

USE THE FOLLOWING DESIGNATIONS:

P – Periodic AST inspection

E – Formal External Inspection by Certified Inspector

I – Formal Internal Inspection by Certified Inspector

L – leak test by owner or owner's designee

() indicates maximum inspection interval in years. For example, E (5) indicates Formal External Inspection every 5 years.



Client: EcoLube Recovery

Inspection Date: 2/2/2023

Location: Puyallup, WA

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Tank: 005

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TABLE OF INSPECTION SCHEDULES

AST Type and Size (U.S. gallons)		Category 1	Category 2	Category 3
Shop-Fabricated ASTs	0 – 1100 (0-4164 liters)	P	P	P, E&L(10)
	1101 - 5,000 (4168-18,927 liters)	P	P, E&L(10)	[P, E&L(5), I(10)] or [P, L(2), E(5)]
	5,001 - 30,000 (18,931-113,562 liters)	P, E(20)	[P, E(10), I(20)] or [P, E(5), L(10)]	[P, E&L(5), I(10)] or [P, L(1), E(5)]
	30,001 - 50,000 (113,566-189,271 liters)	P, E(20)	P, E&L(5), I(15)	P, E&L(5), I(10)
Portable Containers		P	P	P**

Notes:

** Owner shall either discontinue use of portable container for storage or have the portable container DOT (Department of Transportation) tested and recertified per the following schedule (refer to Section 9.0):

Plastic portable container - every 7 years

Steel portable container - every 12 years

Stainless Steel portable container - every 17 years

Client: EcoLube Recovery

Inspection Date: 2/2/2023

Location: Puyallup, WA

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Tank: 005

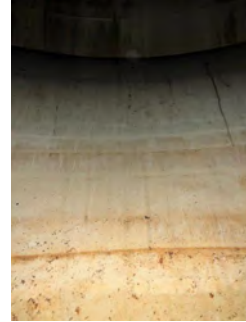
Work Order.: T76981-41150867

12. Photos

Tank Vent



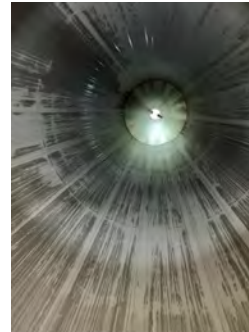
Interior Coating



Cone Bottom



Internal Overview



Data Plate



Anchor Bolt Example



Client: EcoLube Recovery

Inspection Date: 2/2/2023

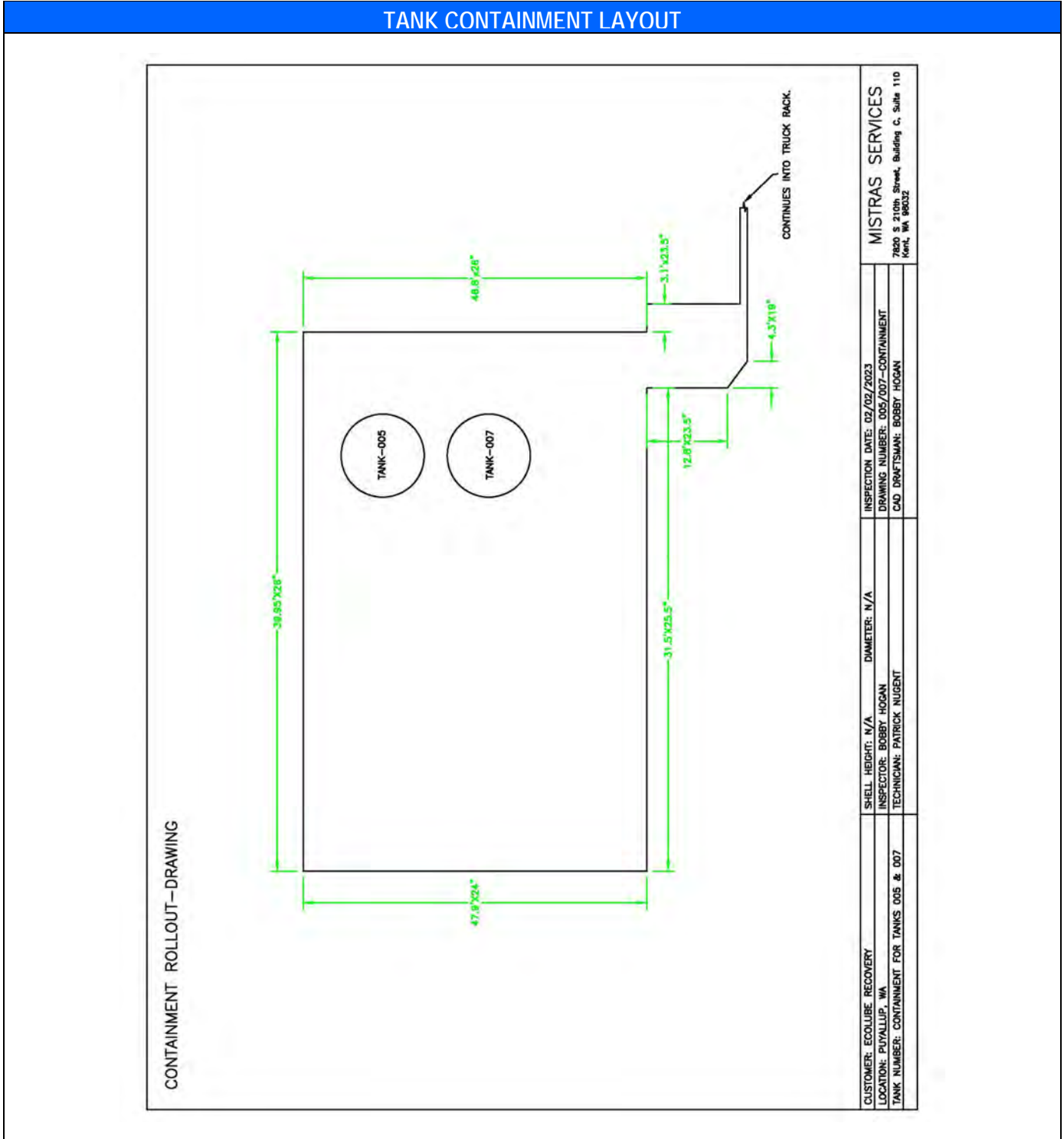
Location: Puyallup, WA

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13. Containment Layout



Client: EcoLube Recovery

Inspection Date: 2/2/2023

Location: Puyallup, WA

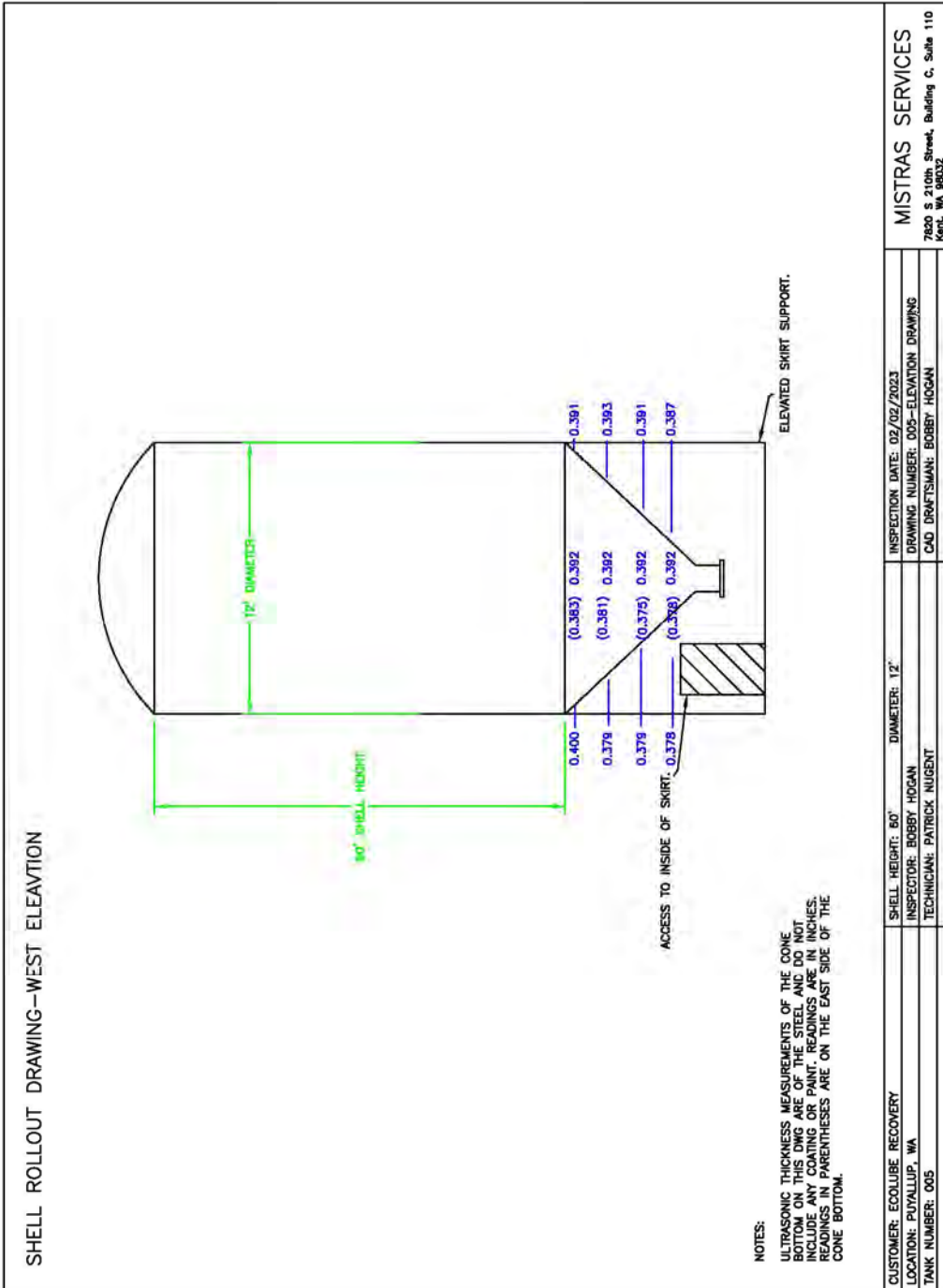
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14. Tank Shell Layout

TANK SHELL LAYOUT



Client: EcoLube Recovery	Inspection Date: 2/2/2023
Location: Puyallup, WA	Page: 27 of 29
Tank: 005	Work Order.: T76981-41150867

15. Ultrasonic Equipment

The UT equipment utilized for the inspection of shell and nozzle included the following:
 Flaw Detectors & Thickness Gauges

Manufacturer	Model Number	Serial Number	Calibration Date
Olympus	38DL Plus	130573601	Olympus

Transducers

Manufacturer	Model Number	Megahertz	Probe Diameter	Serial Number
Olympus	D790-SM	5.0	3/8"	865199

Client: EcoLube Recovery

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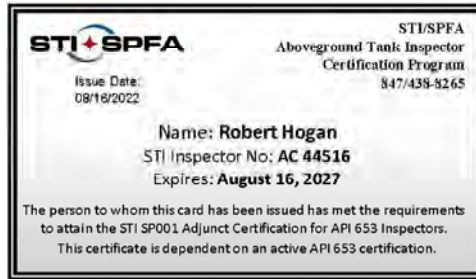
16. Inspector Certification

STI/SPFA

STI/SPFA is a leading provider of NDT services and solutions. We are committed to providing the highest quality of service to our clients.

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Client: EcoLube Recovery	Inspection Date: 2/2/2023
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Tank: 005	Work Order.: T76981-41150867

17. Warranty

Mistras Group Inc. Services, Inc. ("Company") has performed inspection services on equipment designated by Hancock Sandblast and has evaluated its condition based on observations and measurements made by Company's inspectors. While our evaluation accurately describes the condition of the equipment at the time of inspection, the owner/operator must independently assess the inspection information/report provided by Company and any conclusions reached by owner/operator and any action taken or omitted to be taken are the sole responsibility of the owner/operator. With respect to inspection and testing, Company warrants only that the services have been performed in accordance with accepted industry practice. If any such services fail to meet the foregoing warranty, Company shall re-perform the service to the same extent and on the same conditions as the original service.

Company makes no warranty, express or implied, with regard to goods or services provided by Company other than those warranties set forth herein. The preceding paragraph sets forth the exclusive remedy for claims based on failure or of defect in materials or services, whether such claim is made in contract or tort (including negligence) and however instituted, and, upon expiration of the warranty period, all such liability shall terminate. The foregoing warranty is exclusive and in lieu of all other warranties, whether written, oral, implied or statutory. **NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY**, nor shall Company be liable for any loss or damage whatsoever by reason of its failure to discover, report, repair or modify latent defects or defects inherent in the design of any equipment inspected. In no event, whether a result of breach of contract, warranty or tort (including negligence) shall Company be liable for any consequential or incidental damages including, but not limited to, loss of profit or revenues, loss of use of equipment tested or services by Company or any associated damage to facilities, down-time costs or claims of other damages.



Prepared By:
7820 South 210th St.
Kent, WA 98032
206-764-8123
www.mistrasgroup.com

SP001 Formal Internal Inspection

CLIENT: EcoLube Recovery
TANK #: 6
LOCATION: PUYALLUP, WA
DATE: 2/2/2023

Client: EcoLube Recovery	Inspection Date: 2/2/2023
Location: Puyallup, WA	Page: 1 of 29
Tank: 6	Work Order.: T76981-41150867

Introduction

Mistras Group, Inc. has been contracted to perform an STI & SPFA JANUARY 2018 6th EDITION In-service Inspection. This inspection was performed in accordance with the current criteria set forth in STI & SPFA JANUARY 2018 6th EDITION.

This report documents the findings and provides an evaluation of the inspection results per the applicable criteria of. STANDARD FOR THE INSPECTION OF ABOVEGROUND STORAGE TANKS STI & SPFA JANUARY 2018 6th EDITION

Storage tanks include shop-fabricated tanks, field-erected tanks and portable containers as defined in this Standard, as well as their containment systems. The requirements for field-erected tanks are covered separately.

Job Location :	EcoLube Recovery	213 10th St SE, Puyallup	WA	98372
Customer Representative :	CharleeAnn Doumit	Customer Phone Number:	360-501-8068	
Report Number :	41112954-1			

Inspected By: 

Inspector Name:	Bobby Hogan
Certification:	STI SP001
Certification No.:	AC 44516

Reviewed By: 

Inspector Name:	George Roni
Certification:	API 653 Certified Inspector
Certification No.:	Certification No. 2042



Client: EcoLube Recovery	Inspection Date: 2/2/2023
Location: Puyallup, WA	Page: 2 of 29
Tank: 6	Work Order.: T76981-41150867

SUITABILITY FOR SERVICE

Tank 6 is suitable for service according to the applicable criteria of STI-SP001. As of 02/02/2023, all mandatory recommendations were implemented and inspected. Repairs were made in accordance with STI-SP031. Refer to recommendations in section 3 of this report for details.

Per STI SP001 the tank is classified as Category 1, which requires a Formal External Inspection every 20 years and Periodic inspections by the owner.

TABLE OF INSPECTION SCHEDULES

AST Type and Size (U.S. gallons)		Category 1	Category 2	Category 3
Shop-Fabricated ASTs	0 – 1100 (0-4164 liters)	P	P	P, E&L(10)
	1101 - 5,000 (4168-18,927 liters)	P	P, E&L(10)	[P, E&L(5), I(10)] or [P, L(2), E(5)]
	5,001 - 30,000 (18,931-113,562 liters)	P, E(20)	[P, E(10), I(20)] or [P, E(5), L(10)]	[P, E&L(5), I(10)] or [P, L(1), E(5)]
	30,001 - 50,000 (113,566-189,271 liters)	P, E(20)	P, E&L(5), I(15)	P, E&L(5), I(10)
Plastic Portable Containers		P	P	P**

Notes:

** Owner shall either discontinue use of portable container for storage or have the portable container DOT (Department of Transportation) tested and recertified per the following schedule (refer to Section 9.0):

Plastic portable container - every 7 years

Steel portable container - every 12 years

Stainless Steel portable container - every 17 years

Inspection Type designations:

P – Periodic AST inspection by owner's inspector

E – Formal External Inspection by Certified Inspector

I – Formal Internal Inspection by Certified Inspector

L – Leak test by owner or owner's designee

Numbers included in parentheses, for example (5), indicate the maximum inspection interval in years. Thus, E (5) indicates Formal External Inspection every 5 years.



Client: EcoLube Recovery	Inspection Date: 2/2/2023
Location: Puyallup, WA	Page: 3 of 29
Tank: 6	Work Order.: T76981-41150867

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1. STI SP001 AST Record



Client: EcoLube Recovery	Inspection Date: 2/2/2023
Location: Puyallup, WA	Page: 4 of 29
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Owner Information	Facility Information	Installer Information
Name: EcoLube Recovery	Name: EcoLube Recovery	Name: The Bishopric Products Co.
Number and Street: 213 10 th St SE	Number and Street: 213 10 th St SE	Number and Street: 4955 Spring Grove Ave
City, State, Zip Code: Puyallup, WA 98372	City, State, Zip Code: Puyallup, WA 98372	City, State, Zip Code: Cincinnati, OH 45232

General:													
Manufacturer:	The Bishopric Products Co.			Next Contents:	Used Oil	Construction Date:	1/1/1983						
Dimensions:	12' D X 60' H			Nom. Capacity:	41,600 Gal	Last Change of Product Date:	Unknown						
Design:													
<input type="checkbox"/>	UL	142	<input type="checkbox"/>	SwRI	<input type="checkbox"/>	API	<input checked="" type="checkbox"/>	Other	Unknown				
<input type="checkbox"/>	Horizontal		<input checked="" type="checkbox"/>	Vertical		<input type="checkbox"/>	Rectangular						
Construction:													
<input type="checkbox"/>	Bare Steel		<input type="checkbox"/>	Cathodically Protected		<input type="checkbox"/>	Galvanic or		<input type="checkbox"/>	Impressed Current)			
<input checked="" type="checkbox"/>	Coated Steel		<input type="checkbox"/>	Concrete encased steel		<input type="checkbox"/>	Stainless steel		<input type="checkbox"/>	Other			
<input type="checkbox"/>	Double-Bottom		<input type="checkbox"/>	Double-Wall		<input checked="" type="checkbox"/>	Lined inside; Date installed:		1983 (Assumed)				
Spill Control:													
<input type="checkbox"/>	Earthen Dike		<input type="checkbox"/>	Steel Dike		<input checked="" type="checkbox"/>	Concrete Dike Containment						
<input type="checkbox"/>	None		<input type="checkbox"/>	Other									
CRDM:													
CRDM:	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No									
If yes, type:	<input checked="" type="checkbox"/>	Release Prevention Barrier			<input type="checkbox"/>	Elevated tank		<input type="checkbox"/>	Double bottom tank				
	<input type="checkbox"/>	Double wall tank			<input type="checkbox"/>	CE-AST		<input type="checkbox"/>	Other				
Supports:													
Tank Elevated on Supports	<input checked="" type="checkbox"/>	Yes			<input type="checkbox"/>	No							
Support Material:	<input checked="" type="checkbox"/>	Steel			<input type="checkbox"/>	Concrete		<input type="checkbox"/>	Other				
Release Prevention Barrier:													
Release Prevention Barrier:	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No		If yes, Date Installed:	Date.						
If yes, Type:	<input checked="" type="checkbox"/>	Concrete	<input type="checkbox"/>	Synthetic liner		<input type="checkbox"/>	Clay Liner		<input checked="" type="checkbox"/>	Steel	<input type="checkbox"/>	Other	
AST Category:													
Category:	<input checked="" type="checkbox"/>	Category 1			<input type="checkbox"/>	Category 2		<input type="checkbox"/>	Category 3				

2. Inspection Summary



Client: EcoLube Recovery	Inspection Date: 2/2/2023
Location: Puyallup, WA	Page: 5 of 29
Tank: 6	Work Order.: T76981-41150867

HISTORY

A Formal Internal Inspection (FII) was conducted on 02/02/2023 in accordance with STI-SP001. The tank was built in 1983 by The Bishopric Products Co. It rests within a concrete containment area and is elevated by a steel skirt and is equipped with four (4) anchor bolts. The tank shell and top head were insulated.

FOUNDATION

Tank 6 rests within a concrete containment area and is supported by four (4) anchor bolts and an elevated steel skirt. There were hairline cracks noted throughout the concrete containment area. The containment otherwise appeared to be acceptable condition. The steel leg supports, and skirt appeared to be in acceptable condition with no notable distortions, mechanical damage or other abnormal conditions observed.

BOTTOM

The tank bottom consisted of a 45-degree cone bottom. The external and internal cone bottom were coated at time of inspection. The external coating had areas of coating failure, but the cone bottom is in an enclosed area and not exposed to the elements. The interior coating was in acceptable condition. The cone bottom appeared to be in acceptable condition with no distortions, mechanical damage, or other abnormal conditions.

SHELL

Tank 6 was coated internally and externally. The coating inside the tank appeared to be in acceptable condition. The observable internal shell courses appeared to be in acceptable condition with no notable distortions, mechanical damage or other abnormal conditions. The external shell was insulated and could not be visually inspected. The insulation appeared to be in acceptable condition with no product stains, damage, or other abnormal conditions.

MANWAYS, NOZZLES & APPURTENANCES:

Observable nozzles and appurtenances appeared to be in acceptable condition. Nozzles appeared to be square, flanges were aligned properly, and no notable concerns were noted at time of inspection.

Top Head



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The tank top head was insulated and there was no access from the inside for a formal inspection. There appeared to be a 3" vent appurtenance on the top head but was plugged at time of inspection.

ACCESS

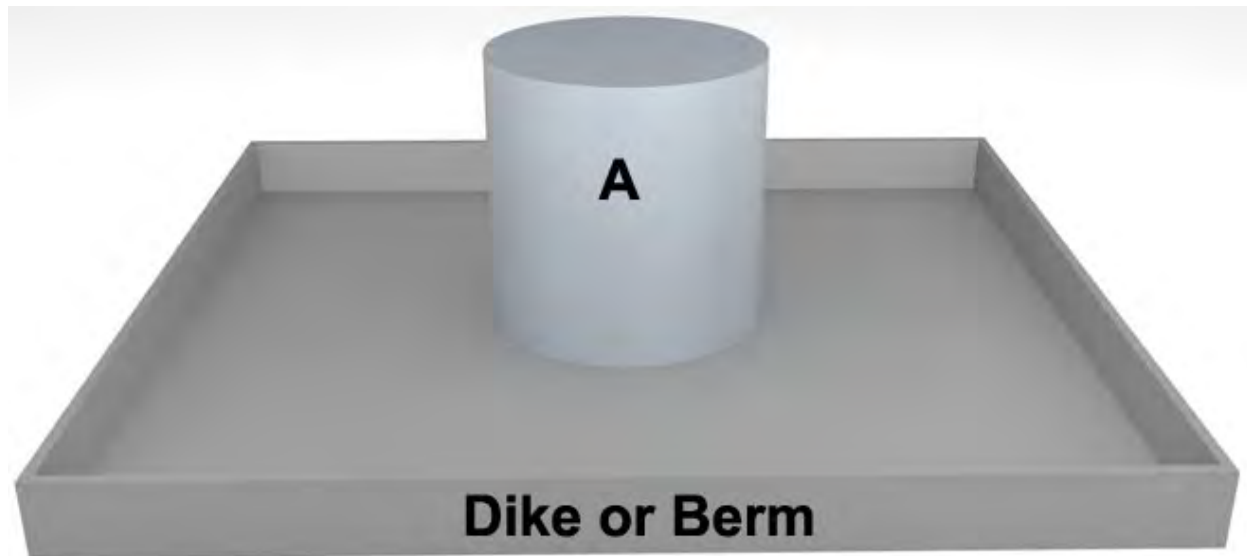
The tank shares a catwalk to the top head with tank 005. There is no stairway or tank side ladder associated with this tank.

3. Spill Prevention Assessment Vertical Tank



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Dikes or firewall should be constructed to contain, at a minimum, the volume of the largest tank enclosed plus an allowance for rainwater (normally, 10 percent additional tank volume) for a total of 110%. The secondary containment area meets the required volume of 110%.



4. Inspection Recommendations


- 1) Tank has a 3-inch vent that was plugged at the time of inspection. Per UL-142, Aboveground Steel Tanks for Flammable & Combustible Liquids, for a tank of this size and capacity, a 4" vent is required. This is per Table 8.2 of UL-142. Therefore the recommendation is to install a 4" vent.
- 2) Also per UL-142, Table 8.1, an Emergency Vent (for use in case of a fire) of a size of 10" is required for a tank of this size and capacity. Since the tank does not have one, the installation of a 10" Emergency Vent is recommended.

5. STI SP001 Monthly Inspection Checklist



Client: EcoLube Recovery	Inspection Date: 2/2/2023
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General Inspection Information:

Inspection Date: 2/2/2023	Prior Inspection Date: Unknown	Retain Until Date: 02/02/2026
Inspector's Name (Print): Bobby Hogan	Title: API 653/ STI-SP001	
Inspectors Signature: 	Tanks Inspected ID: 007	

Inspection Guidance:

- This checklist is intended as a model. Locally developed checklists are acceptable as long as they are substantially equivalent (as applicable). Inspections of multiple tanks may be captured on one form as long as the tanks are substantially the same.
- For equipment not included in this Standard, follow the manufacturer recommended inspection/testing schedules and procedures.
- The periodic AST Inspection is intended for monitoring the external AST condition and its containment structure. This visual inspection does not require a Certified Inspector. It shall be performed by an owner's inspector per paragraph 4.1.2 of the standard.
- Upon discovery of water in the primary tank, secondary containment area, interstice, or spill container, remove promptly or take other corrective action. Inspect the liquid for regulated products or other contaminants and dispose of properly.
- Non-conforming items important to tank or containment integrity require evaluation by an engineer experienced in AST design, a Certified Inspector, or a tank manufacturer who will determine the corrective action. Note the non-conformance and corresponding corrective action in the comment section.
- Retain the completed checklists for at least 36 months.
- After severe weather (snow, ice, windstorms) or maintenance (such as coating) that could affect the operation of critical components (normal and emergency vents, valves), an inspection of these components is required as soon as the equipment is safely accessible after the event.

Tank and Piping

Item	Description	Yes	No	N/A	Comment
------	-------------	-----	----	-----	---------



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Inspection Date: 2/2/2023

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Tank and Piping

Item	Description	Yes	No	N/A	Comment
1	Is tank exterior (roof, shell, heads, bottom, connections, fittings, valves, etc.) free of visible leaks? Note: If "No", identify tank and describe leak and actions taken.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2	Is the tank liquid level gauge legible and in good working condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3	Is the area around the tank (concrete surfaces, ground, containment, etc.) free of visible signs of leakage?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4	Is the primary tank free of water or has another preventative measure been taken? NOTE: Refer to paragraphs 6.10 and 6.11 of the standard for alternatives for Category 1 tanks. N/A is only appropriate for these alternatives.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5	For double-wall or double bottom tanks or CE-ASTs, is interstitial monitoring equipment (where applicable) in good working condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
6	For double-wall tanks or double bottom tanks or CE-ASTs, is interstice free of liquid? Remove the liquid if it is found. If tank product is found, investigate possible leak.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Equipment on Tank

Item	Description	Yes	No	N/A	Comment
7	Is overfill prevention equipment in good working condition? If it is equipped with a mechanical test mechanism, actuate the mechanism to confirm operation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
8	Is the spill container (spill bucket) empty, free of visible leaks and in good working condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No spill bucket.
9	Are piping connections to the tank (valves, fittings, pumps, etc.) free of visible leaks? Note: If "No", identify location and describe.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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Equipment on Tank

Item	Description	Yes	No	N/A	Comment
10	Do the ladders/platforms/walkways appear to be secure with no sign of severe corrosion or damage?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Catwalk from tank 005 to 007. Acceptable condition

Containment (Diking/Impounding)

Item	Description	Yes	No	N/A	Comment
11	Is the containment free of excess liquid, debris, cracks, corrosion, erosion, fire hazards and other integrity issues?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Concrete dike containment.
12	Are dike drain valves closed and in good working condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13	Are containment egress pathways clear and any gates/doors operable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Concrete Exterior AST (CE-AST)


Item	Description	Yes	No	N/A	Comment
14	Inspect all sides for cracks in concrete. Are there any cracks in the concrete exterior larger than 1/16"?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not a CE-AST.
15	Inspect concrete exterior body of the tank for cleanliness, need of coating, or rusting where applicable. Tank exterior in acceptable condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not a CE-AST.
16	Visual inspect all tank top openings including nipples, manways, tank top overfill containers, and leak detection tubes. Is the sealant between all tank top openings and concrete intact and in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not a CE-AST.

Other Conditions

Item	Description	Yes	No	N/A	Comment
17	Is the system free of any other conditions that need to be addressed for continued safe operation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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6. STI SP001 Annual Inspection Checklist

General Inspection Information:			
Inspection Date: 2/2/2023	Prior Inspection Date: Unknown	Retain Until Date: 02/02/2026	
Inspector's Name (Print):	Bobby Hogan	Title:	API 653/ STI-SP001
Inspectors Signature:		Tanks Inspected ID:	6

Inspection Guidance:

- This checklist is intended as a model. Locally developed checklists are acceptable as long as they are substantially equivalent (as applicable).
- For equipment not included in this Standard, follow the manufacturer recommended inspection/testing schedules and procedures.
- The periodic AST Inspection is intended for monitoring the external AST condition and its containment structure. This visual inspection does not require a Certified Inspector. It shall be performed by an owner's inspector per paragraph 4.1.2 of the standard.
- Remove promptly standing water or liquid discovered in the primary tank, secondary containment area, interstice, or spill container. Before discharge to the environment, inspect the liquid for regulated products or other contaminants and disposed of it properly.
- In order to comply with EPA SPCC (Spill Prevention, Control and Countermeasure) rules, a facility should regularly test liquid level sensing devices to ensure proper operation (40 CFR 112.8(c)(8)(v)).
- Non-conforming items important to tank or containment integrity require evaluation by an engineer experienced in AST design, a Certified Inspector, or a tank manufacturer who will determine the corrective action. Note the non-conformance and corresponding corrective action in the comment section.
- Retain the completed checklists for at least 36 months.
- Complete this checklist on an annual basis, supplemental to the owner monthly performed inspection checklists.
- **Note: If a change has occurred to the tank system or containment that may affect the SPCC plan, the condition should be evaluated against the current plan requirement by a Professional Engineer knowledgeable in SPCC development and implementation.**

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Tank Foundation/Supports

Item	Description	Yes	No	N/A	Comment
1	Free of tank settlement or foundation washout?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2	Concrete pad or ring wall free of cracking and spalling?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concrete dike containment, some hairline cracks noted.
3	Tank supports in satisfactory condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4	Is water able to drain away from tank if tank is resting on a foundation or on the ground?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tank elevated on steel pad.
5	Is the grounding strap between the tank and foundation/supports in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Tank Shell, Heads and Roof

Item	Description	Yes	No	N/A	Comment
6	Free of visible signs of coating failure?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	External shell was insulated. Limited internal inspection.
7	Free of noticeable distortions, buckling, denting, or bulging?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	External shell was insulated. Limited internal inspection.
8	Free of standing water on roof?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	External shell was insulated. Limited internal inspection.
9	Are all labels and tags intact and legible?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	External shell was insulated. Limited internal inspection.

Tank Manways, Piping, and Equipment

Item	Description	Yes	No	N/A	Comment
10	Flanged connection bolts tight and fully engaged with no sign of wear or corrosion?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Tank Equipment

Item	Description	Yes	No	N/A	Comment
11	Normal and emergency vents free of obstructions?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12	Normal vent on tanks storing gasoline equipped with pressure/vacuum vent?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
13	Are flame arrestors free of corrosion and are air passages free of blockage?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No flame arrestor.

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Tank Equipment

Item	Description	Yes	No	N/A	Comment
14	Is the emergency vent in good working condition and functional, as required by manufacturer? Consult manufacturer's requirements. Verify that components are moving freely (including long-bolt manways).	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	One 3" vent that was plugged at time of inspection. No emergency vent.
15	Is interstitial leak detection equipment in good condition? Are windows on sight gauges clear? Are wire connections intact? If equipment has a test function, does it activate to confirm operation?"	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
16	Are all valves free of leaks, corrosion and other damage? Follow manufacturers' instructions for regular maintenance of these items. Check the following and verify (as applicable):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/> Anti-siphon valve				
	<input type="checkbox"/> Check valve				
	<input type="checkbox"/> Gate valve				
	<input type="checkbox"/> Pressure regulator valve				
	<input type="checkbox"/> Expansion relief valve				
	<input type="checkbox"/> Solenoid valve				
	<input type="checkbox"/> Fire valve				
<input type="checkbox"/> Shear valve					
17	Are strainers and filters clean and in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No strainers or filters.

Insulated Tanks

Item	Description	Yes	No	N/A	Comment
18	Free of missing insulation? Insulation free of visible signs of damage? Insulation adequately protected from water intrusion?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
19	Insulation free of noticeable areas of moisture?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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Insulated Tanks

Item	Description	Yes	No	N/A	Comment
20	Insulation free of mold?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
21	Free of visible signs of coating failure?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Tank / Piping Release Detection

Item	Description	Yes	No	N/A	Comment
22	Is inventory control being performed and documented if required?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
23	Is release detection being performed and documented if required?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Other Equipment

Item	Description	Yes	No	N/A	Comment
24	Are electrical wiring and boxes in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Disconnected at time of inspection.
25	Has the cathodic protection system on the tank been tested as required by the designing engineer?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

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7. Shell CML Location Drops

Interior Tank

Course 4	READING NO/ID	DROP 1 South
	1	0.26
	2	0.265
	3	0.248
	4	0.250

Exterior Tank

Course 4	READING NO/ID	DROP 1 South
	1	
	2	
	3	
	4	

Course 3	READING NO/ID	DROP 1 South
	1	0.268
	2	0.260
	3	0.258
	4	0.260

Course 3	READING NO/ID	DROP 1 South
	1	
	2	
	3	
	4	

Course 2	READING NO/ID	DROP 1 South
	1	0.249
	2	0.260
	3	0.253
	4	0.254

Course 2	READING NO/ID	DROP 1 South
	1	
	2	
	3	
	4	

Course 1	READING NO/ID	DROP 1 South
	1	0.302
	2	0.302
	3	0.303
	4	0.304

Course 1	READING NO/ID	DROP 1 South
	1	
	2	
	3	
	4	

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8. Shell & Cone Bottom Minimum Thickness Calculations

Calculations for Shell & Cone-Shaped Tank Bottom - per API 620

Date of Inspection: 2/2/2023

Owner

Ecolube

Tank No.

6

Diameter, D

11.917 ft 143.00 inches

Shell Height, H

50.000 ft 600.00 inches

Fill Height

49.000 ft 588.00 inches

Original Shell thickness

0.375 inches

Measured Shell thickness, t_c

0.304 inches

Original Cone thickness

0.375 inches

Measured Cone thickness, t_h

0.381 inches

Specific Gravity of contents of tank, SG

0.940

Depth of Cone, d

63.00 inches 5.25 ft

S, allowable tensile stress of shell & cone

15,200 psi

Joint Efficiency cone-to-shell & long cone joints, E_1

0.85

Joint Efficiency shell vertical joints, E_2

0.85

Operating Pressure at top of tank, P_o

0.00 psi 0 psf

Note that per API 620 the max. operating pressure at top of tank is 15 psig.

O.D. of connection at bottom of cone

16.00 inches

(if none enter 0)

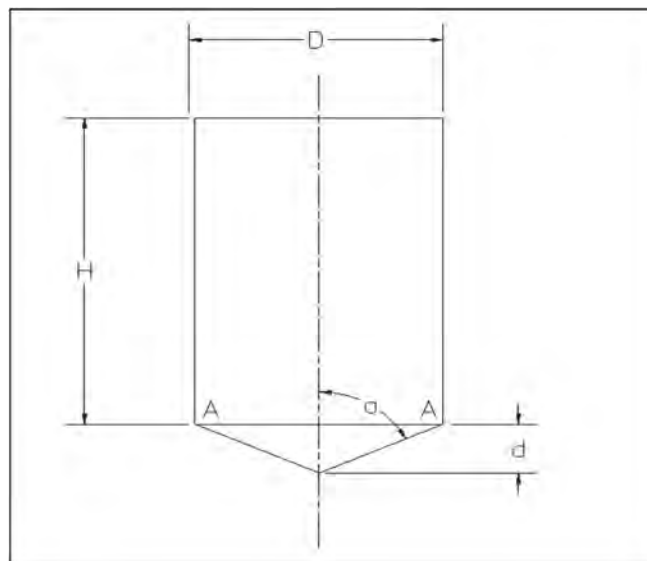
1/2 Apex angle, $\alpha = a$

0.789351 radians 45.22646 degrees

Total Pressure, P at plane AA

2874.14 psf (includes hydrostatic head + P_o) 19.96 psi

Plane AA is at the Spring Line.



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Figure No. A1

1) Shell Unit Forces @ Plane AA, See Figure No. A2

$$\sum F_x = 0$$

$$2T_{2s} = PD$$

$$T_{2s} = PD/2$$

$$T_{2s} = 1427 \text{ lb/in}$$

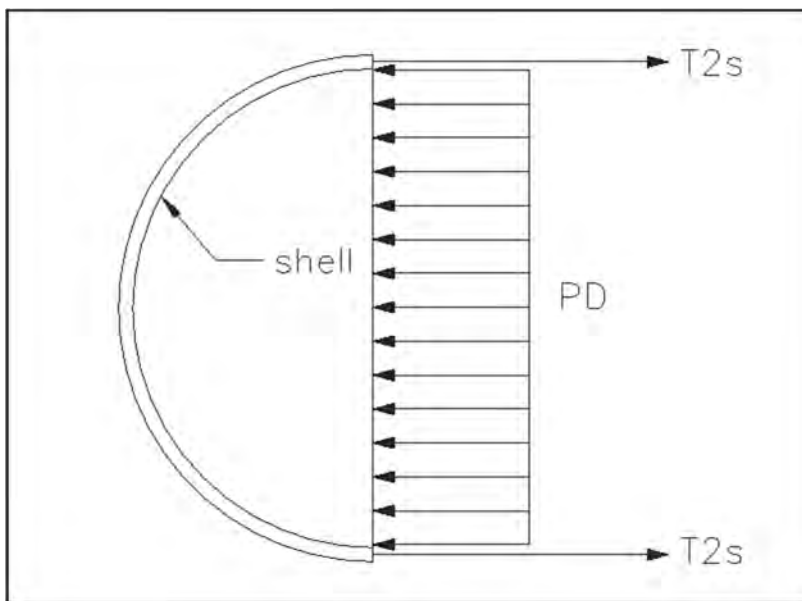


Figure No. A2

2) Cone unit force, T_2 , the latitudinal unit force. Also known as the circumferential unit force. See Figure No. A3

R_2 , radius of curvature of cone at A

$$R_2 = AB/\cos(a)$$

$$R_2 = 101.5183 \text{ inches}$$

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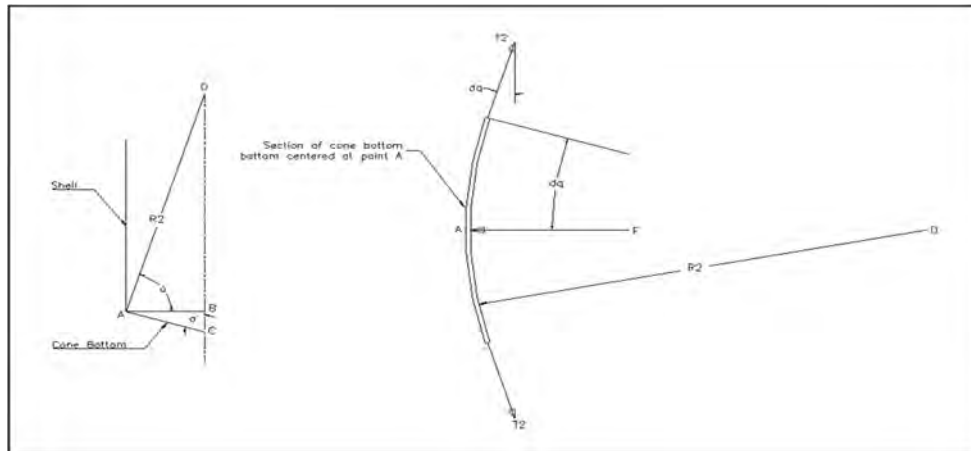


Figure No. A3

$$\text{Sum of } F_x = 0$$

F = the force on 1 inch wide section
 of cone at point A with an infinitesimal
 arc length = $2 \times dq$
 $F = P(1)(2)(dq)(R_2)$
 $F = 2Pdqr_2$

$$F - 2T_2 \sin(dq) = 0$$

$$2Pdqr_2 = 2T_2 \sin(dq) \text{ and for small } dq, \sin(dq) = dq$$

$$PR_2 = T_2$$

$$T_2 = PR_2$$

$$T_2 = \quad \quad \quad 2026 \text{ lb/in}$$

3) Cone unit force, T_1 , the Meridional unit force. See Figure No. A4

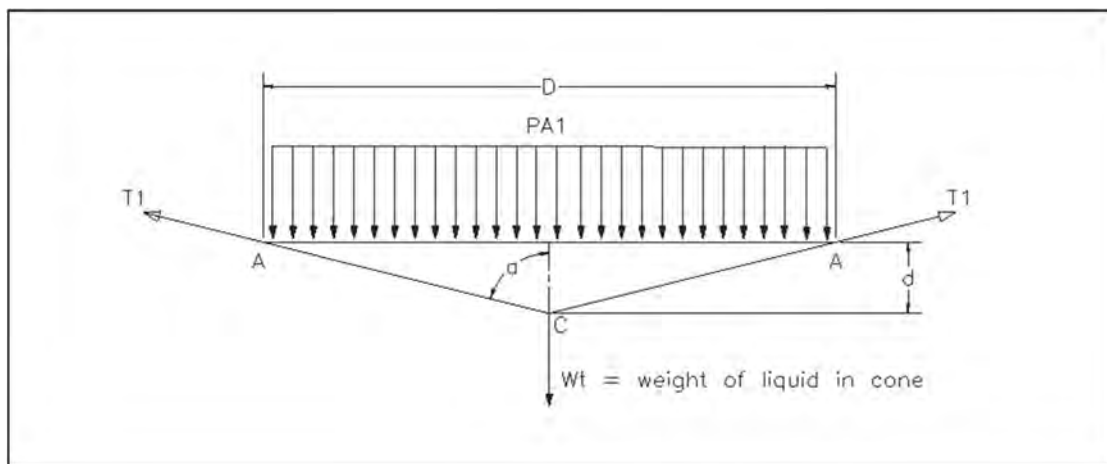


Figure No. A4

$$A_1 = \frac{\pi}{4} * D^2$$

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$$A_1 = 16060.61 \text{ square inches} \quad 111.532 \text{ square feet}$$

$$V, \text{ Volume of Cone} = (\pi D^2 d / 2) / 3$$

$$V = 195.181 \text{ ft}^3$$

$$W_t = SG * 62.4 \text{ lb/ft}^3 * V$$

$$W_t = 11,449 \text{ lb}$$

$$\text{Sum } F_y = 0$$

$$T_1 \cos(a) \pi D - W_t - PA_1 = 0$$

$$T_1 = (W_t + PA_1) / \cos(a) \pi D$$

$$T_1 = 1049 \text{ lb/in}$$

4) Knuckle Region Reinforcement Check per API 620 3.12

The measured cone bottom thickness is defined as t_h here, $t_h = 0.381$ inches

The measured shell thickness is defined as t_c here, $t_c = 0.304$ inches

R_2 , radius of curvature of cone at A = 101.52 inches

R_c , radius of curvature shell = 71.5 inches

$$w_h = 0.6 * \sqrt{R_2 * t_h} \quad w_c = 0.6 * \sqrt{R_c * t_c} \quad \text{Additional attached}$$

$$w_h = 3.731521 \text{ inches} \quad w_c = 2.797313 \text{ inches} \quad \text{reinforcement area } A_d$$

$$A_d = 0.75$$

Available reinforcing area, $A_a = w_h * t_h + w_c * t_c + A_d$ Extra area added for skirt

$$A_a = 3.022093 \text{ inches}^2$$

$$T_1 = 1049 \text{ lb/in}$$

$$T_{2s} = 1427 \text{ lb/in}$$

$$T_2 = 2026 \text{ lb/in}$$

Per API 620, the magnitude of the total circumferential force acting on any vertical cross section through the compression ring region shall be computed as follows:

$$Q = T_2 w_h + T_{2s} w_c - T_1 R_c \sin(a) \quad \text{Note that if } Q \text{ is negative, compression is indicated.}$$

$$Q = 7,561 + 3,992 - 53,260$$

$$Q = -41,707$$

$$A_c, \text{ the required compression ring reinforcing area} = Q / 15,000$$

$$A_c = 2.780469 \text{ sq. inches}$$

$$A_a > A_c$$

$$3.022093 > 2.780469 \quad \text{TRUE}$$



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and since Q is negative the following condition must be true also.

$$w_h \sin(a) > R_c$$

$$2.648993 > 1.0725 \quad \text{TRUE}$$

Since both conditions are true, knuckle region is adequately reinforced.

5) Check Measured Shell Thickness vs Required Shell Thickness

The required shell thickness is $t_{cr} = T_{2s}/SE_2$

$$0.110456 \quad \text{However, thickness must be at least 0.100" per API 653, so final required shell thickness is} \quad 0.110$$

$$t_c > t_{cr}$$

$$0.304 > 0.110 \quad \text{TRUE}$$

6) Check Measured Cone Bottom Thickness vs Required Cone Bottom Thickness at Plane A-A

The required cone thickness, t_{hr} , is the greater of the following 2 formulas

$$t_{hr} = T_1/SE_1 \quad \text{or} \quad t_{hr} = T_2/SE_1$$

$$t_{hr} = 0.081215 \quad t_{hr} = 0.15683$$

$$t_{hr} = 0.15683 \quad \text{However, thickness must be at least 0.100" per API 653, so final required cone bottom thickness is:} \quad t_{hr} = 0.157 \text{ inches}$$

$$t_h > t_{hr}$$

$$0.381 > 0.157 \quad \text{TRUE}$$

7) Tank Volume or Capacity Calculation

$V_{total} = \text{Volume of Cone} + \text{Volume of Shell}$

$$195.181 \text{ ft}^3 + (PI/4) * D^2 * H$$

$$195.181 + 5465.068$$

$$V_{total} = 5660 \text{ ft}^3 \quad \text{or} \quad 42,344 \text{ gallons}$$

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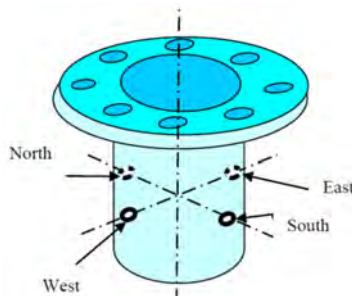
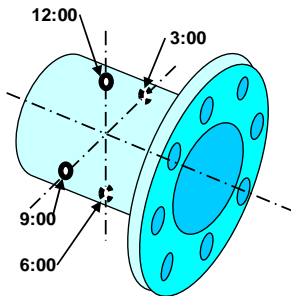
9. Shell Nozzle Table

No appurtenance table was done as all the nozzles are on the top head and had limited access.
Refer to inspection summary on condition of appurtenances/nozzles.

10. Shell/Roof Nozzle UT Readings

No nozzle UT table was done as all the nozzles are on the top head and had limited access.
Refer to inspection summary on condition of appurtenances/nozzles.

Typical Nozzle UT Data



Typical Nozzle UT Data

Shell Nozzles

4 UT wall thickness measurements. Start position at 12 o'clock position top side of nozzle.

Roof Nozzle

4 UT wall thickness measurements. Start position at North position top side of nozzle.

Any nozzle not measured or not accessible or insulated nozzles mark as N/A.

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11. Inspection Schedule

AST CATEGORIES USED IN TABLE

Category 1 - ASTs with spill control, and with CRDM

Category 2 - ASTs with spill control and without CRDM

Category 3 - ASTs without spill control and without CRDM

shows some typical tank types and their corresponding AST category

EXAMPLE TANK CONFIGURATION AND AST CATEGORY

Tank Configuration	Tank has CRDM?	Tank has Spill Control?	AST Category
Single wall vertical AST in contact with ground and no spill control	No	No	3
Single wall vertical AST in contact with ground in an earthen dike	Yes	Yes	2
Single wall vertical AST in concrete dike with concrete floor. Concrete floor extends under tank completely	Yes	Yes	1
Single wall vertical AST in dike with elastomeric liner. Liner extends under tank completely	Yes	Yes	1
Single wall vertical AST installed on gravel and no spill control	No	No	3
Single wall vertical AST installed on gravel in an earthen dike	Yes	No	2
Elevated AST with spill control	Yes	Yes	1
Elevated AST without spill control	No	Yes	1
AST with double-bottom and spill control	Yes	Yes	1
Double-wall AST with overfill prevention	Yes	Yes	1
Double-wall AST without overfill prevention	No	Yes	3
Concrete exterior AST with overfill prevention	Yes	Yes	1
Concrete exterior AST without overfill prevention	No	Yes	3

USE THE FOLLOWING DESIGNATIONS:

P – Periodic AST inspection

E – Formal External Inspection by Certified Inspector

I – Formal Internal Inspection by Certified Inspector

L – leak test by owner or owner's designee

() indicates maximum inspection interval in years. For example, E (5) indicates Formal External Inspection every 5 years.



Client: EcoLube Recovery

Inspection Date: 2/2/2023

Location: Puyallup, WA

Page: 23 of 29

Tank: 6

Work Order.: T76981-41150867

TABLE OF INSPECTION SCHEDULES

AST Type and Size (U.S. gallons)		Category 1	Category 2	Category 3
Shop-Fabricated ASTs	0 – 1100 (0-4164 liters)	P	P	P, E&L(10)
	1101 - 5,000 (4168-18,927 liters)	P	P, E&L(10)	[P, E&L(5), I(10)] or [P, L(2), E(5)]
	5,001 - 30,000 (18,931-113,562 liters)	P, E(20)	[P, E(10), I(20)] or [P, E(5), L(10)]	[P, E&L(5), I(10)] or [P, L(1), E(5)]
	30,001 - 50,000 (113,566-189,271 liters)	P, E(20)	P, E&L(5), I(15)	P, E&L(5), I(10)
Portable Containers		P	P	P**

Notes:

** Owner shall either discontinue use of portable container for storage or have the portable container DOT (Department of Transportation) tested and recertified per the following schedule (refer to Section 9.0):

Plastic portable container - every 7 years

Steel portable container - every 12 years

Stainless Steel portable container - every 17 years

Client: EcoLube Recovery

Inspection Date: 2/2/2023

Location: Puyallup, WA

Page: 24 of 29

Tank: 6

Work Order.: T76981-41150867

12. Photos

002 Shell West Overview



Top Head Appurtenance



Cone Bottom



Internal Overview



Data Plate



Hairline Crack in Concrete



Client: EcoLube Recovery

Inspection Date: 2/2/2023

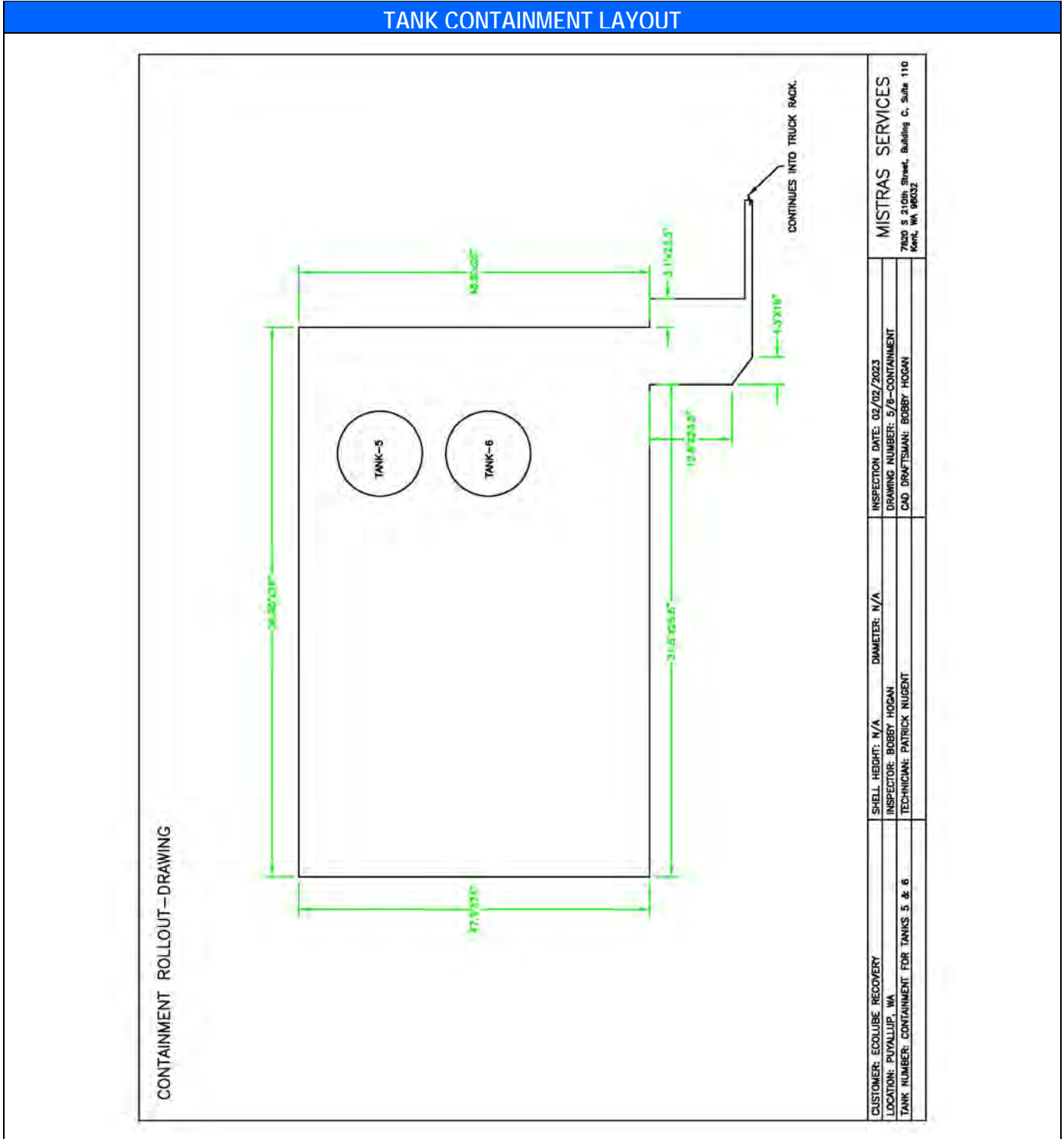
Location: Puyallup, WA

Page: 25 of 29

Tank: 6

Work Order.: T76981-41150867

13. Containment Layout



Client: EcoLube Recovery

Inspection Date: 2/2/2023

Location: Puyallup, WA

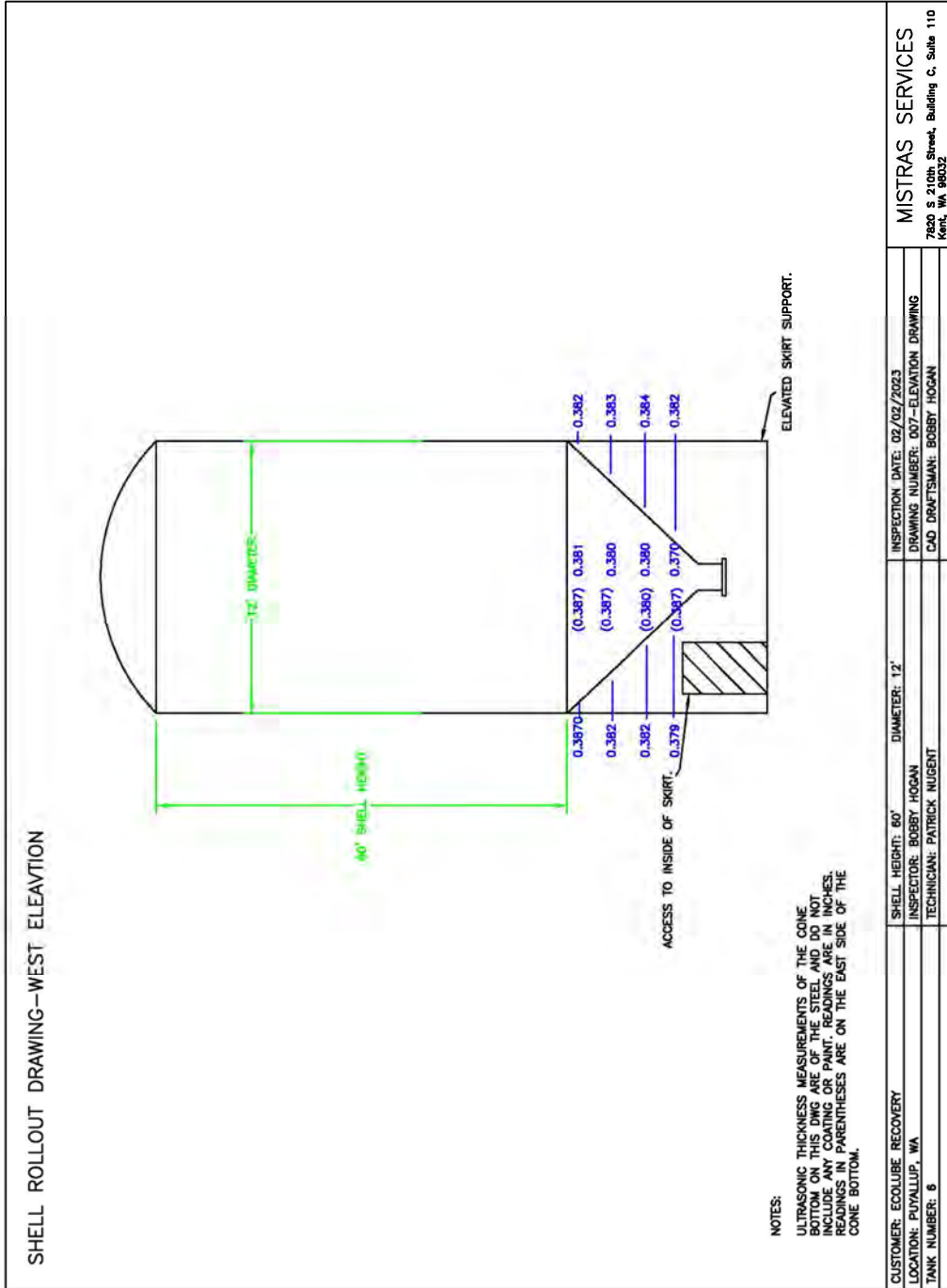
Page: 26 of 29

Tank: 6

Work Order.: T76981-41150867

14. Tank Shell Layout

TANK SHELL LAYOUT



Client: EcoLube Recovery	Inspection Date: 2/2/2023
Location: Puyallup, WA	Page: 27 of 29
Tank: 6	Work Order.: T76981-41150867

15. Ultrasonic Equipment

The UT equipment utilized for the inspection of shell and nozzle included the following:
 Flaw Detectors & Thickness Gauges

Manufacturer	Model Number	Serial Number	Calibration Date
Olympus	38DL Plus	130573601	Olympus

Transducers

Manufacturer	Model Number	Megahertz	Probe Diameter	Serial Number
Olympus	D790-SM	5.0	3/8"	865199

Client: EcoLube Recovery

Inspection Date: 2/2/2023

Location: Puyallup, WA


Page: 28 of 29

Tank: 6

Work Order.: T76981-41150867

16. Inspector Certification

STI/SPFA
 Welcome to the STI/SPFA Aboveground Tank Inspector Certification Program. We appreciate your participation and support.
 • This is a new program and we are still in the process of finalizing the program.
 • This program is a new program and we are still in the process of finalizing the program.
 STI/SPFA
 Welcome to the STI/SPFA Aboveground Tank Inspector Certification Program. We appreciate your participation and support.

	STI/SPFA Aboveground Tank Inspector Certification Program 847/438-5265
	Issue Date: 08/16/2022
Name: Robert Hogan STI Inspector No: AC 44516 Expires: August 16, 2027	
The person to whom this card has been issued has met the requirements to attain the STI SP001 Adjunct Certification for API 653 Inspectors. This certificate is dependent on an active API 653 certification.	

CERTIFICATION

Steel Tank Institute

Robert Hogan

STI Inspector No: **AC 44516**

Expires: **August 16, 2027**

The person whose name appears on this certificate has met all of the requirements to attain the STI SP001 Adjunct Certification for API 653 Inspectors. This certification is dependent on an active API 653 certification.

6 PDHs Awarded



 Joseph Mentzer, P.E.
 Steel Tank Institute



The official status of this certificate can be verified at www.steeltank.com.

Issue Date: 08/16/2022



Client: EcoLube Recovery	Inspection Date: 2/2/2023
Location: Puyallup, WA	Page: 29 of 29
Tank: 6	Work Order.: T76981-41150867

17. Warranty

Mistras Group Inc. Services, Inc. ("Company") has performed inspection services on equipment designated by Hancock Sandblast and has evaluated its condition based on observations and measurements made by Company's inspectors. While our evaluation accurately describes the condition of the equipment at the time of inspection, the owner/operator must independently assess the inspection information/report provided by Company and any conclusions reached by owner/operator and any action taken or omitted to be taken are the sole responsibility of the owner/operator. With respect to inspection and testing, Company warrants only that the services have been performed in accordance with accepted industry practice. If any such services fail to meet the foregoing warranty, Company shall re-perform the service to the same extent and on the same conditions as the original service.

Company makes no warranty, express or implied, with regard to goods or services provided by Company other than those warranties set forth herein. The preceding paragraph sets forth the exclusive remedy for claims based on failure or of defect in materials or services, whether such claim is made in contract or tort (including negligence) and however instituted, and, upon expiration of the warranty period, all such liability shall terminate. The foregoing warranty is exclusive and in lieu of all other warranties, whether written, oral, implied or statutory. **NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY**, nor shall Company be liable for any loss or damage whatsoever by reason of its failure to discover, report, repair or modify latent defects or defects inherent in the design of any equipment inspected. In no event, whether a result of breach of contract, warranty or tort (including negligence) shall Company be liable for any consequential or incidental damages including, but not limited to, loss of profit or revenues, loss of use of equipment tested or services by Company or any associated damage to facilities, down-time costs or claims of other damages.



ChemE Consulting, LLC

9021 Willow Grove Rd

Longview, WA 98632

David@Chemeconsulting.com / 360-355-5513

Appendix 2

Structural Anchor Review – Conlee Engineers

CK. TANKS 5 & 6 ANCHOR. 11-11" φ, 29,000 GAL OIL

CL. PER 1982 UBC 2 Z-S4, Cp = .3

$$H_E = .75(.3)W = .23 W_p$$

$$H_U = 1.4 H_E = .32 W_p$$

233.3 k

LOADING

TANK @ $\frac{27.87^k}{3377.94}$

OIL @ $\frac{29,000 \text{ GAL} \cdot (.85) 62.0}{7.48 \text{ GAL/ft}^3} = 205.67^k$
 $\frac{205.67^k}{2} = 233.5^k$

$$h_{OIL} = \frac{3377.94^k(4)}{\pi(11.92)^2} = 34.7'$$

$$h_{CL} = \frac{34.7 + 6.85}{2} = 24.2'$$

$$H_E = .32(233.5^k) = 75.2^k$$

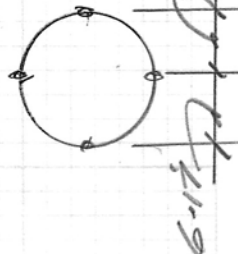
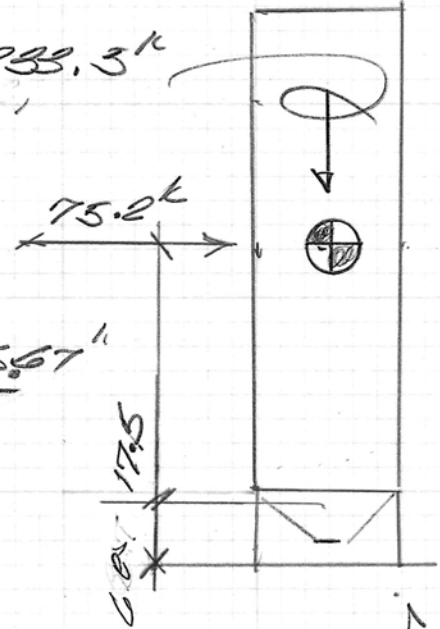
$$M_F = 75.2(24.2) = 1820 \text{ ft-k}$$

CK. 4-1 1/2" φ ANCH ON 1234" BOLT CIRCLE

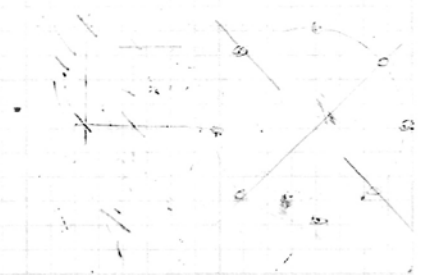
$$P_A = \frac{.9 D + E}{4 \text{ BOLTS}} = \frac{.9(233.5^k)}{4} = 52.54^k$$

$$T = \frac{1820}{1234} = \pm 1.47, 45$$

-94.9 k \rightarrow T_{CAP} N.G



CL. PER 1982 UBC



CL
TANK 596 (CONT)

CL ANCH. W/ 8 - 1 1/4" Ø A.B., EMBED 12"

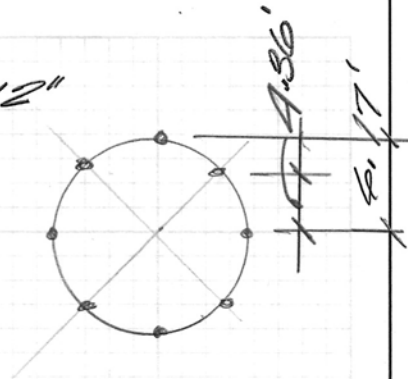
$$I_{A.B} = 2(6.17)^2 + 4(4.56)^2 = 152.8$$

$$\sqrt{A.B} = \frac{75.2^k}{8 \text{ B.O.L.T.S}} = 9.38^k$$

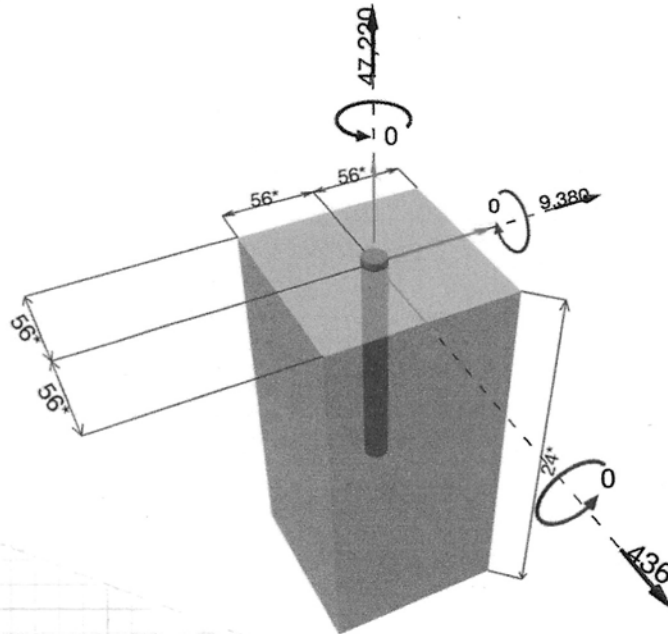
$$T_E = \frac{1820^{lb} (6.17')}{152.8 \text{ in}^2} = 73.49^k$$

$$C_D = 0.9 (233.5) = 209.85^k$$

$$T_{O.K.} = 47.22^k$$



Geometry [in.] & Loading [lb, in.lb]



5 Combined tension and shear loads, per ACI 318-19 section 17.8

β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
1.256	0.428	1.000	141	not recommended

W.R. 7100% 60 NOT GOOD

CHECK 596 (CONT)

CK w/ 12-1 1/4" φ

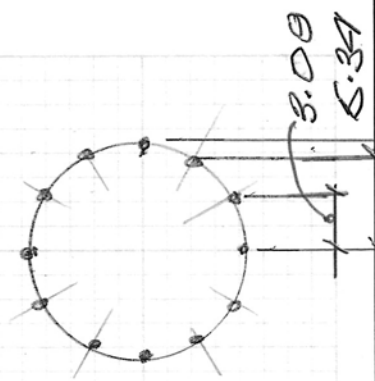
$$I = 2(6.17)^2 + 4(5.34)^2 + 4(3.09)^2 = 228$$

$$\sqrt{f_{AB}} = \frac{75.2^2}{12 f_{AB}} = 6.267^2$$

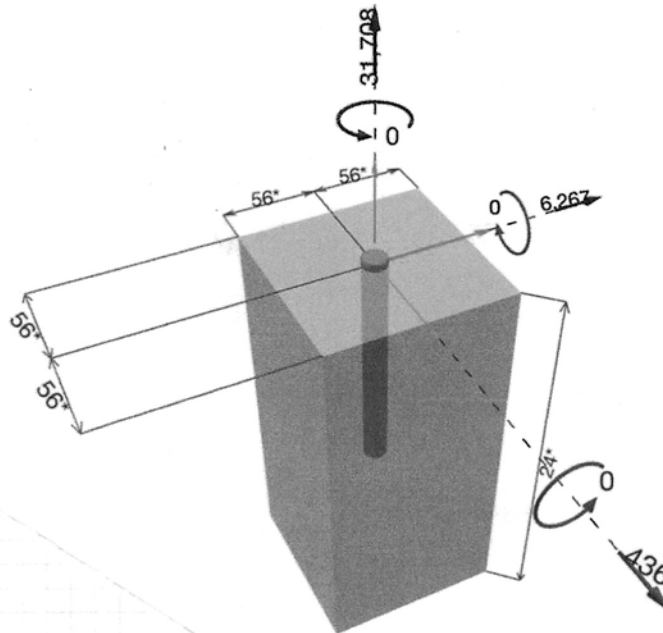
$$T_{FAB} = \frac{1820^{1-k} (6.17)}{228} = -19.22^k$$

$$C_{FAB} = \frac{0.9(283.5)}{12} = 17.51$$

$$T_{OFS} = 31.709^k$$



Geometry [in.] & Loading [lb, in.lb]



5 Combined tension and shear loads, per ACI 318-19 section 17.8

β_N	β_V	ζ	Utilization β_{NV} [%]	Status
0.844	0.287	5/3	88	OK

$$\beta_{NV} = \beta_N^{\zeta} + \beta_V^{\zeta} \leq 1$$

CONCLUDE: ADD 3-1 1/4" φ F.A.B. IN FINCH FINCH



ChemE Consulting, LLC

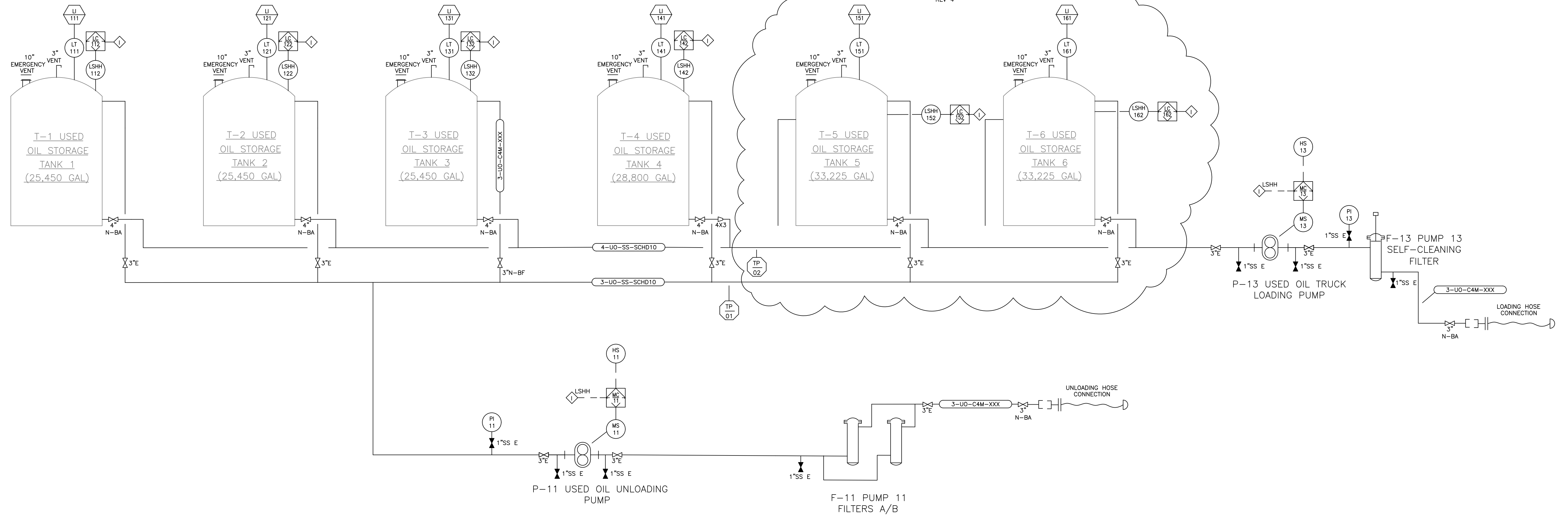
9021 Willow Grove Rd

Longview, WA 98632

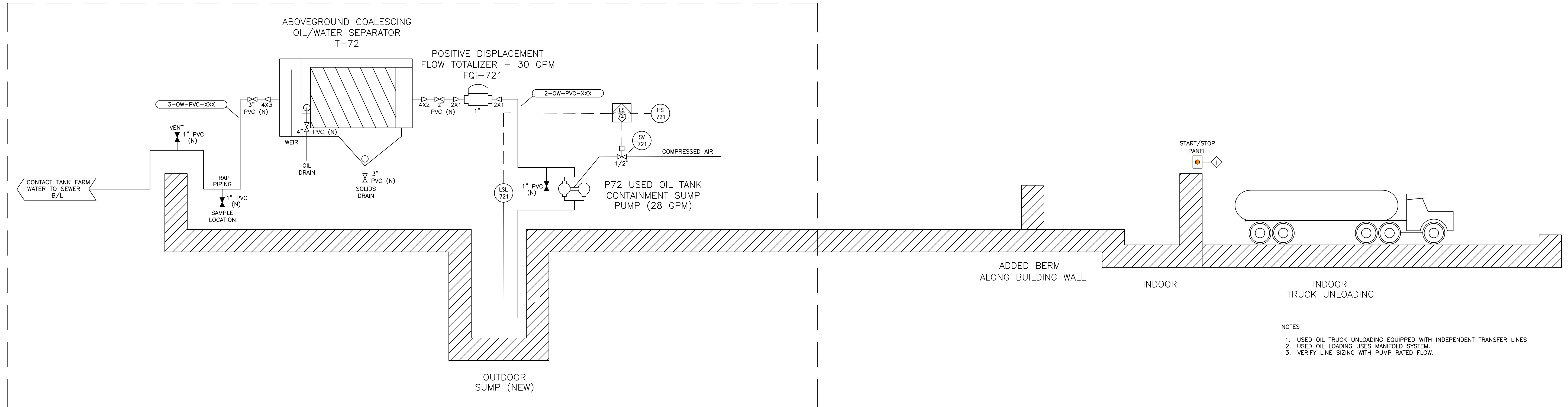
David@Chemeconsulting.com / 360-355-5513

Appendix 3

Drawings



WASTEWATER TREATMENT SYSTEM

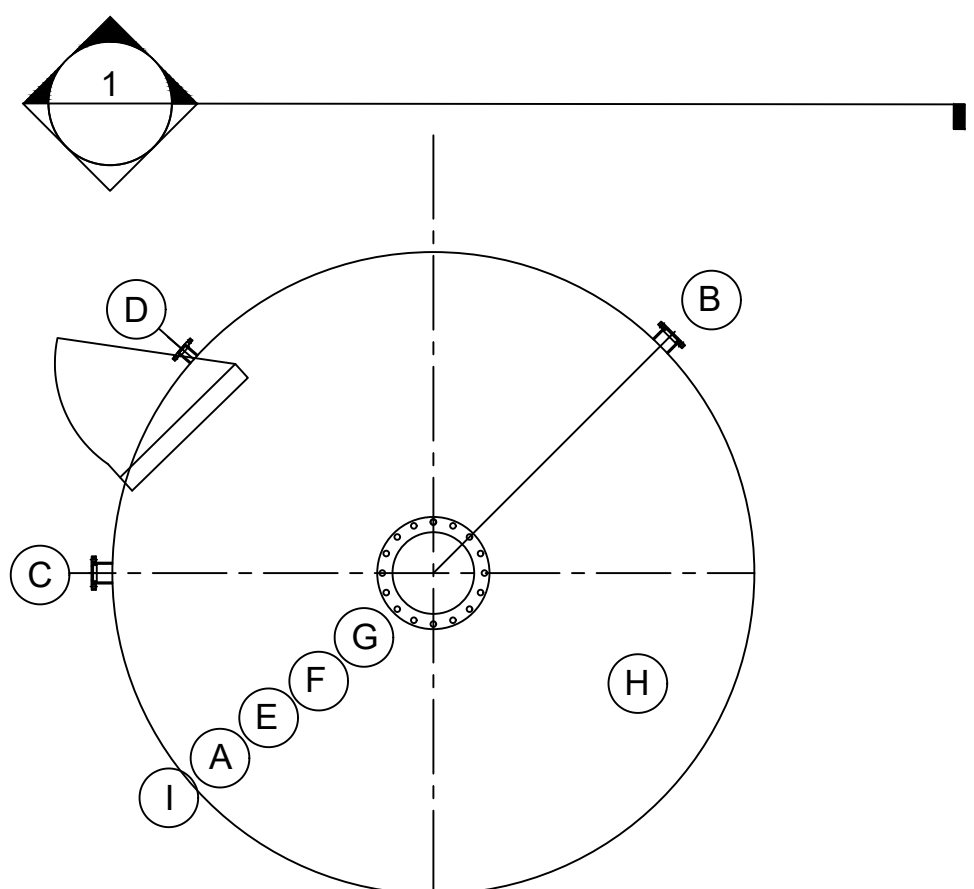
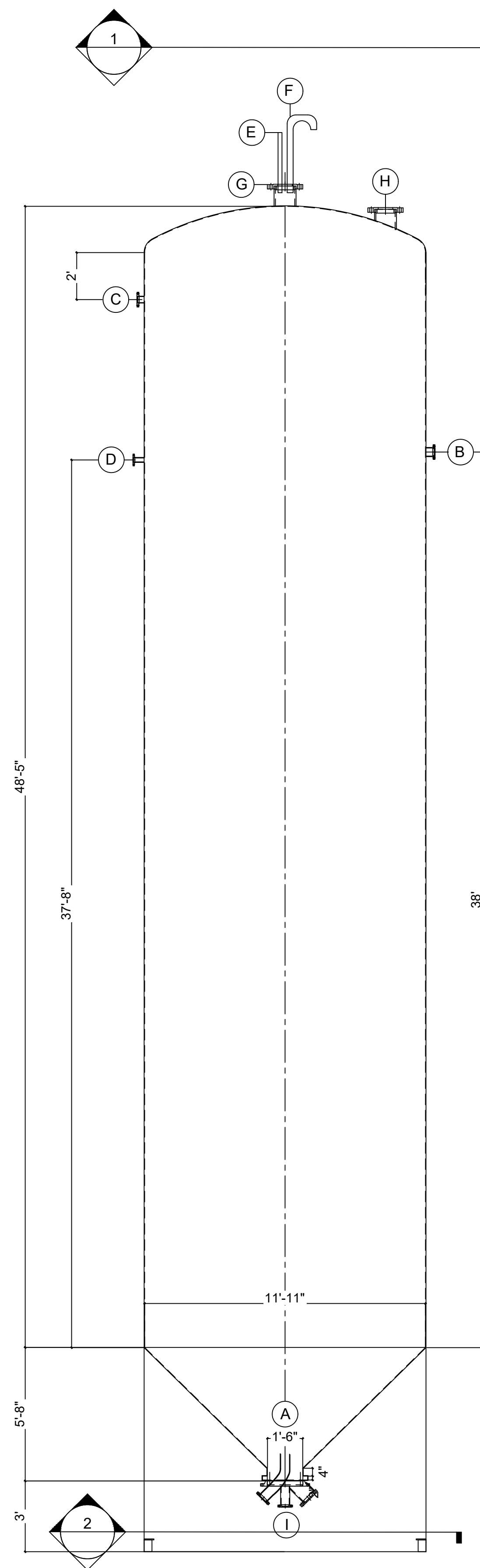


- NOTES
1. USED OIL TRUCK UNLOADING EQUIPPED WITH INDEPENDENT TRANSFER LINES
 2. USED OIL LOADING USES MANIFOLD SYSTEM.
 3. VERIFY LINE SIZING WITH PUMP RATED FLOW.

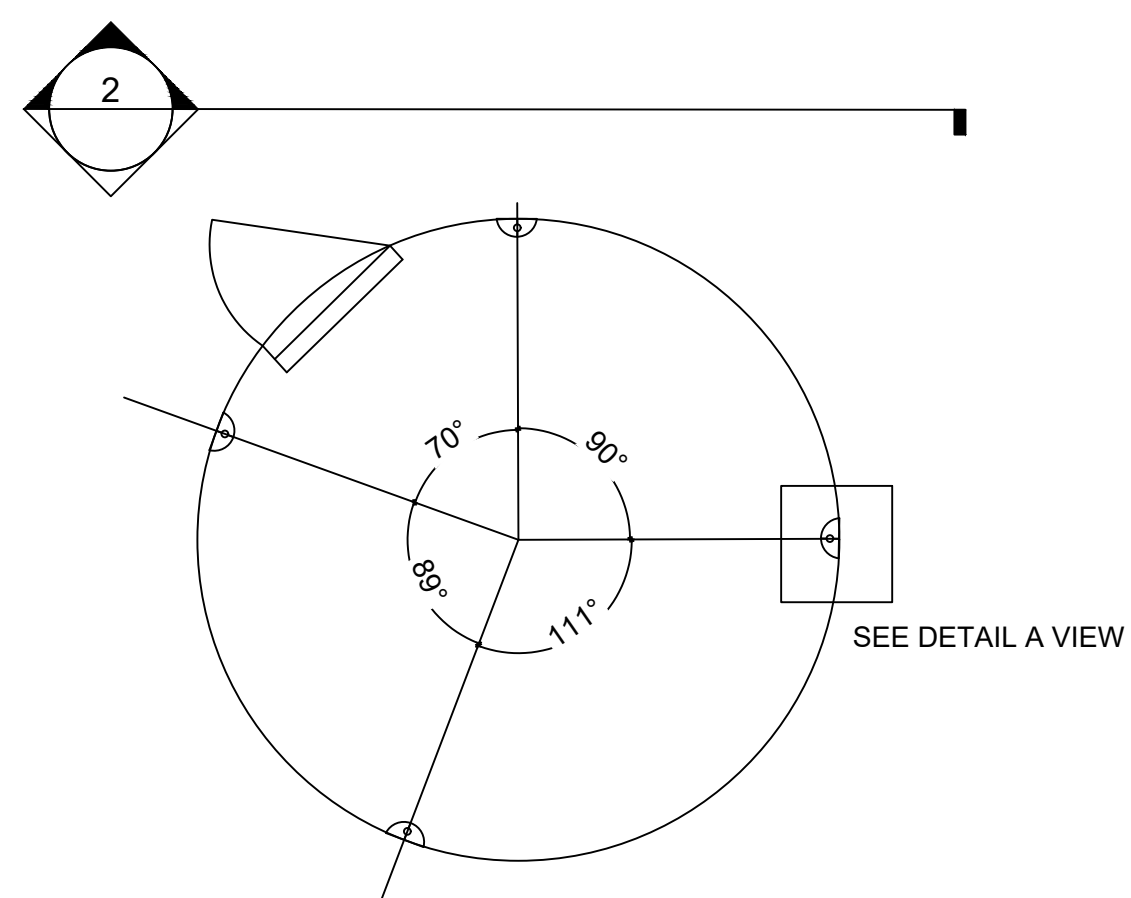
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							06/11/23	PERMIT CUP TO ADD TANKS 5 & 6	CD.	DR.	DR.												
							05/27/21	MODIFICATIONS FOR TANK 3 ADDITION	DR.	BB.	DR.												
							01/10/21	PIPING DESIGN REVIEW UPDATES	DR.	BB.	DR.												
							11/28/20	PIPING CONSOLIDATION	DR.	BB.	DR.												
							10/18/20	FIRE PERMIT SUBMITTAL	DR.	BB.	DR.												

No.	DRAWING	REFERENCE	No.	DRAWING	REFERENCE	No.	DATE	REVISION	DR.	CH.	AP.	No.	DATE	REVISION	DR.	CH.	AP.	No.	DATE	REVISION	DR.	CH.	AP.

		ECOLUBE RECOVERY 213 10th ST SE PUYALLUP, WA 98731	PUYALLUP SITE UO TRANSFER AND WASTEWATER P & ID
DRAWN: DR	SCALE: N/A	UN: UNI	DWG. No. PID-11
CHECKED: BB	APPROVED: DR	DATE: 11/10/20	REV. 4

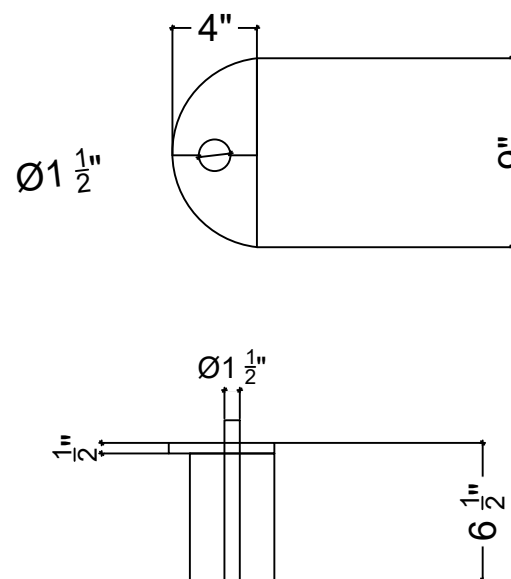


TANK 5



MECHANICAL DATA TANK 5	
TANK DIMENSION	11'-11" ID X 54'-2" LENGTH
MAX FILL	29,000 GAL OVERFLOW
SERVICE	LUBE OIL
SG	0.85
CODE	
DESIGN PRESSURE	
DESIGN TEMP	
TANK MATERIAL	SHELL: SA 240-316L SS / HEAD: SA 240-316L SS
SHELL/CONE THICKNESS	0.327"/0.383"
FLANGES	RFSO 150# FLANGE SCHD 40
EMPTY WEIGHT	27,867 LB

DETAIL A:
4 X TANK SUPPORTS



BLOWN UP VIEW

- GENERAL NOTES:**
 1. 6" NOZZLE PROJECTION UNLESS NOTED OTHERWISE
 2. NOZZLES TO HAVE 150# DRILLED RAISED FACE FLANGE PER ANSI B-16.5
 3. NAMEPLATE TO RECORD MANUFACTURER AND DESIGN STANDARDS
 4. ALL STEEL PARTS TO BE HOT DIP ZINC GALVANIZED.

NOZZLE SCHEDULE				
ID	SIZE (IN)	RATING	TYPE	DESCRIPTION
A	18	150#	RFSO	MANWAY
B	4	150#	RFSO	29000 GAL OVERFLOW
C	3	150#	RFSO	INLET
D	2	150#	RFSO	L.S.H.H.
E	2	150#	NPT	LT (SKYBITE)
F	4	150#	NPT	TANK VENT
G	10	150#	RFSO	EXISTING TOP MANWAY
H	10	150#	NPT	EMERGENCY HATCH
I	4	150#	RFSO	DRAIN

NO	REVISION	BY	DATE

NO	DATE	BY	APR	REVISION

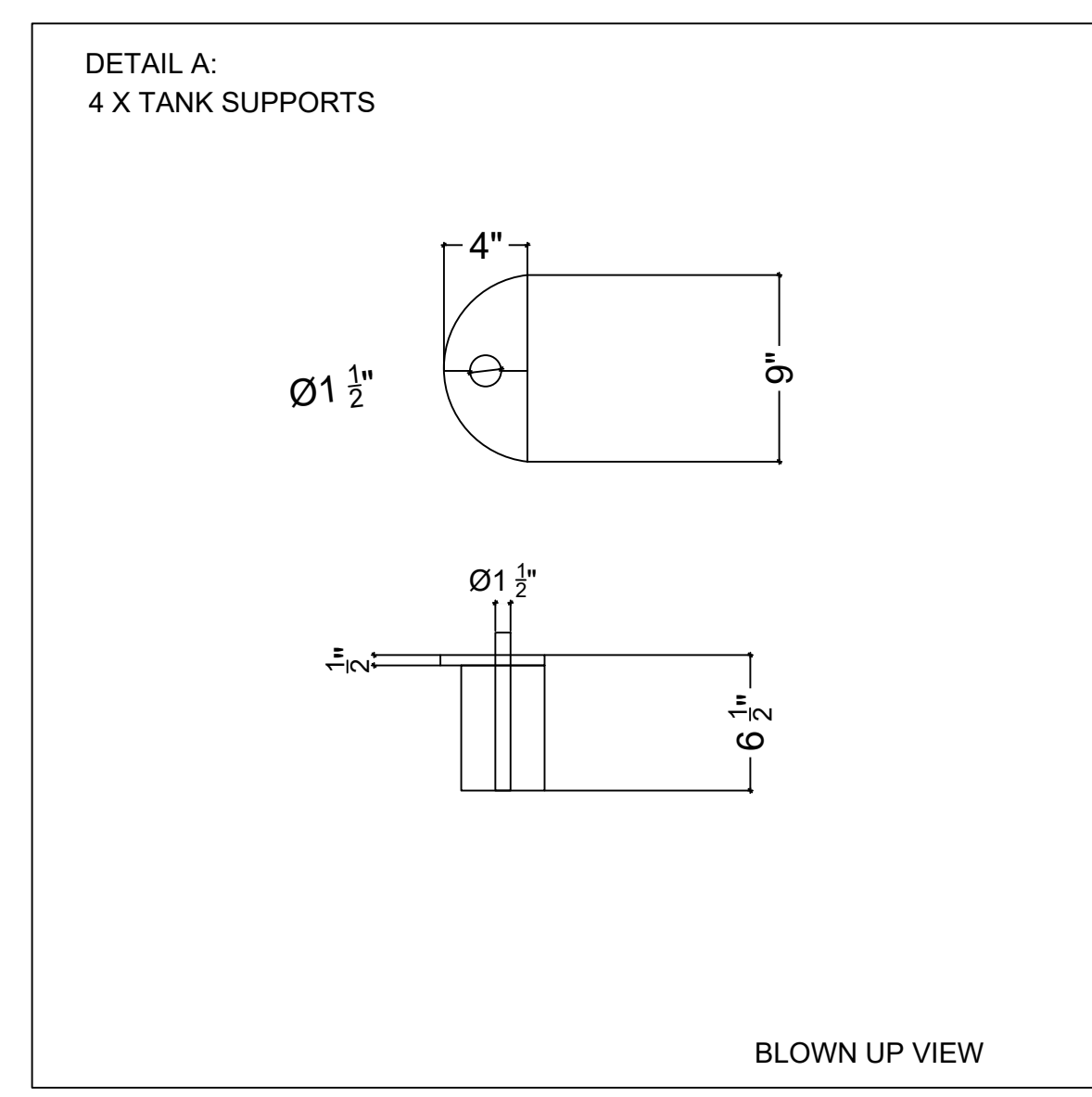
ECOLUBE
 TANK 6 PUYALLUP
 PROJECT 2019
 MECHANICAL DATA SHEET
 TANK 6

PROJECT NO.: 2019
 DATE: 5/11/23
 SCALE: N/A
 DRAWN BY: CMD
 DRAWING NO.

TK 6 DATA SHT

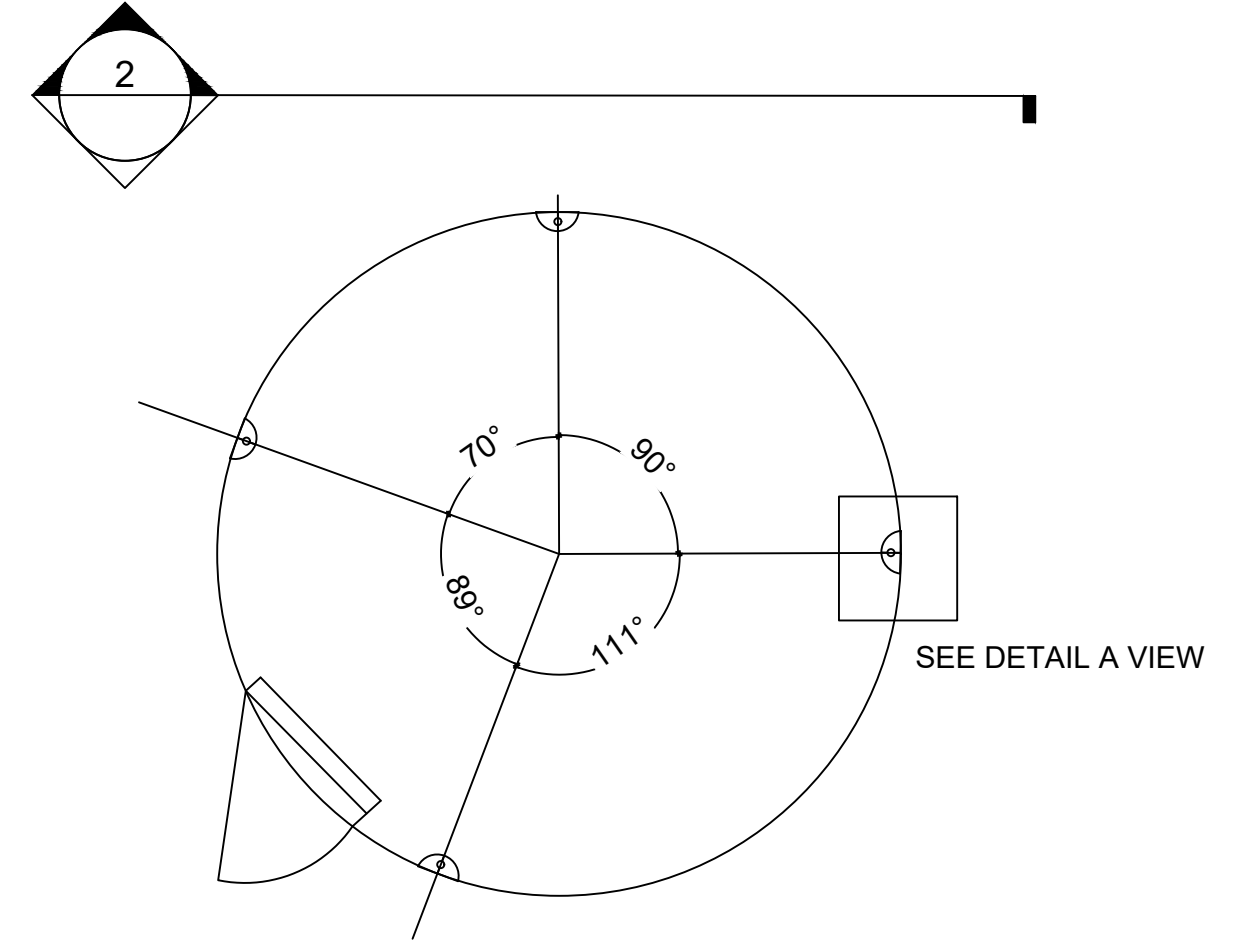
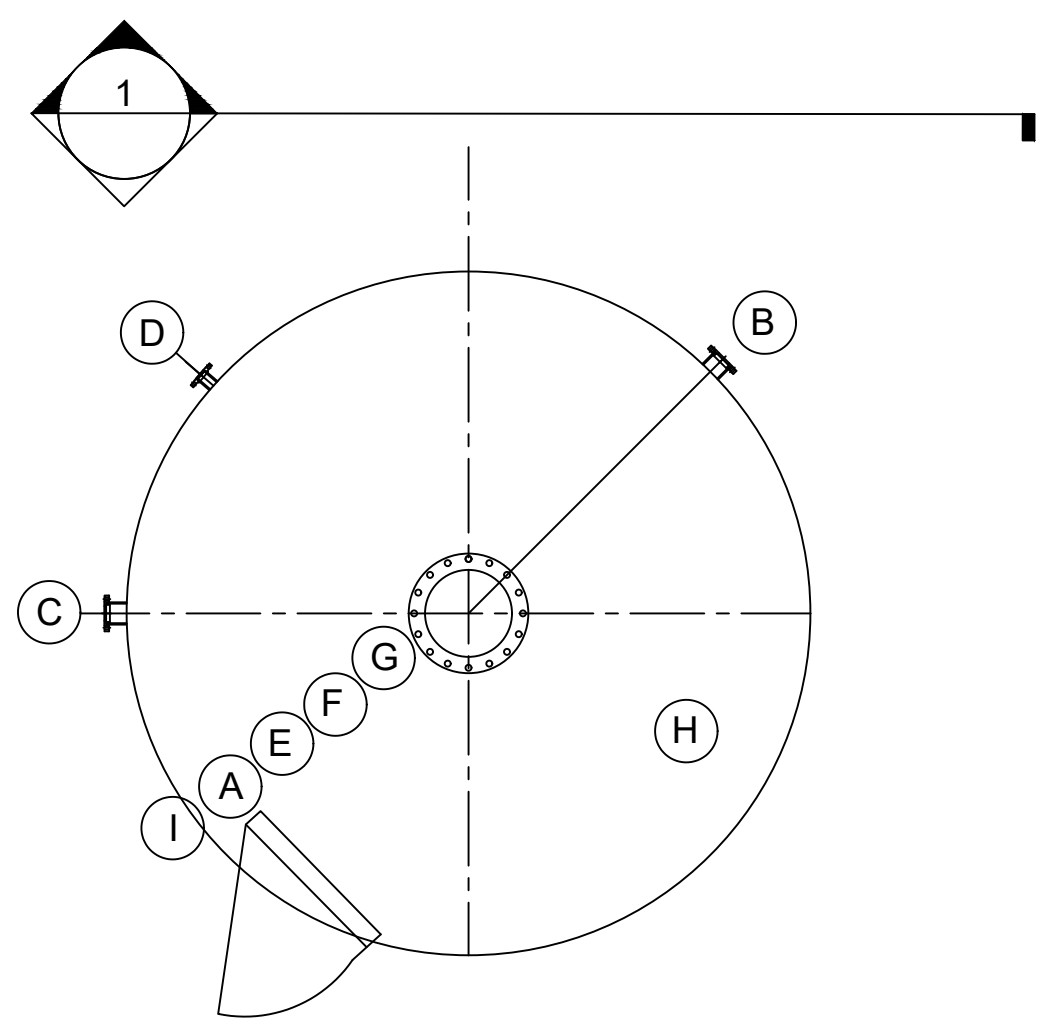
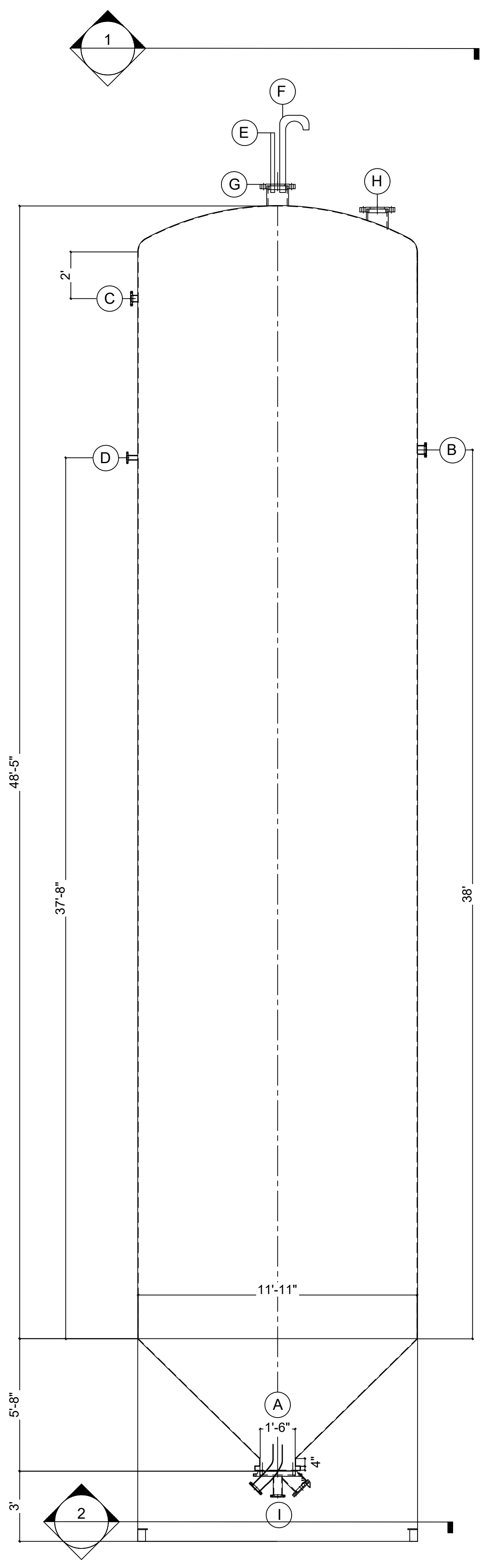
MECHANICAL DATA TANK 6	
TANK DIMENSION	11'-11" ID X 54'-2" LENGTH
MAX FILL	29,000 GAL OVERFLOW
SERVICE	LUBE OIL
SG	0.85
CODE	
DESIGN PRESSURE	
DESIGN TEMP	
TANK MATERIAL	SHELL: SA 240-316L SS / HEAD: SA 240-316L SS
SHELL/CONE THICKNESS	0.327"/0.383"
FLANGES	RFSO 150# FLANGE SCHD 40
EMPTY WEIGHT	27,867 LB

TANK 6



- GENERAL NOTES:**
- 6" NOZZLE PROJECTION UNLESS NOTED OTHERWISE
 - NOZZLES TO HAVE 150# DRILLED RAISED FACE FLANGE PER ANSI B-16.5
 - NAMEPLATE TO RECORD MANUFACTURER AND DESIGN STANDARDS
 - ALL STEEL PARTS TO BE HOT DIP ZINC GALVANIZED.

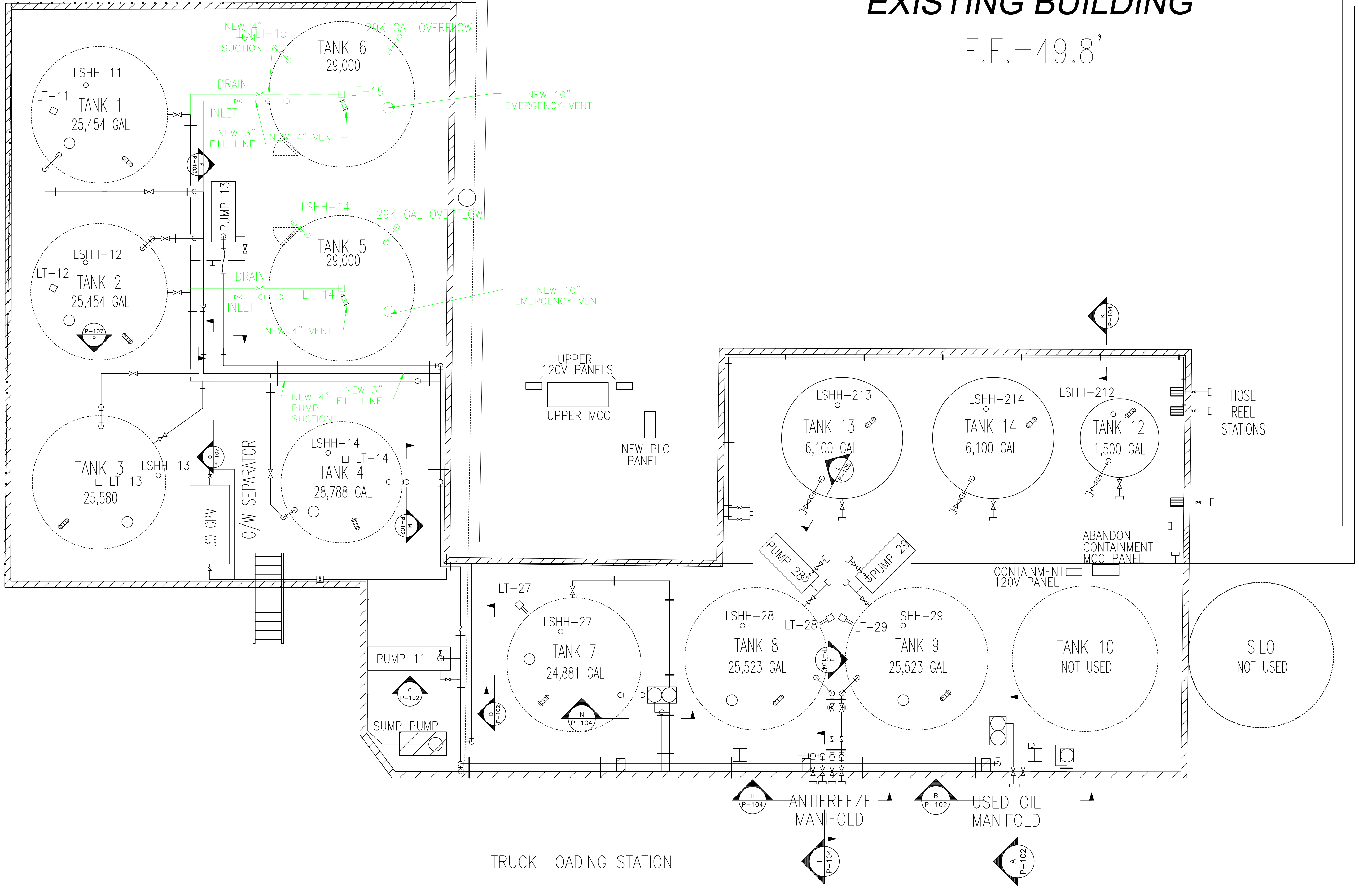
NOZZLE SCHEDULE				
ID	SIZE (IN)	RATING	TYPE	DESCRIPTION
A	18	150#	RFSO	MANWAY
B	4	150#	RFSO	29000 GAL OVERFLOW
C	3	150#	RFSO	INLET
D	2	150#	RFSO	L.S.H.H.
E	2	150#	NPT	LT (SKYBITE)
F	4	150#	NPT	TANK VENT
G	10	150#	RFSO	EXISTING TOP MANWAY
H	10	150#	NPT	EMERGENCY HATCH
I	4	150#	RFSO	DRAIN



120V PANEL
MAIN SWITCHGEAR / MCC

EXISTING BUILDING

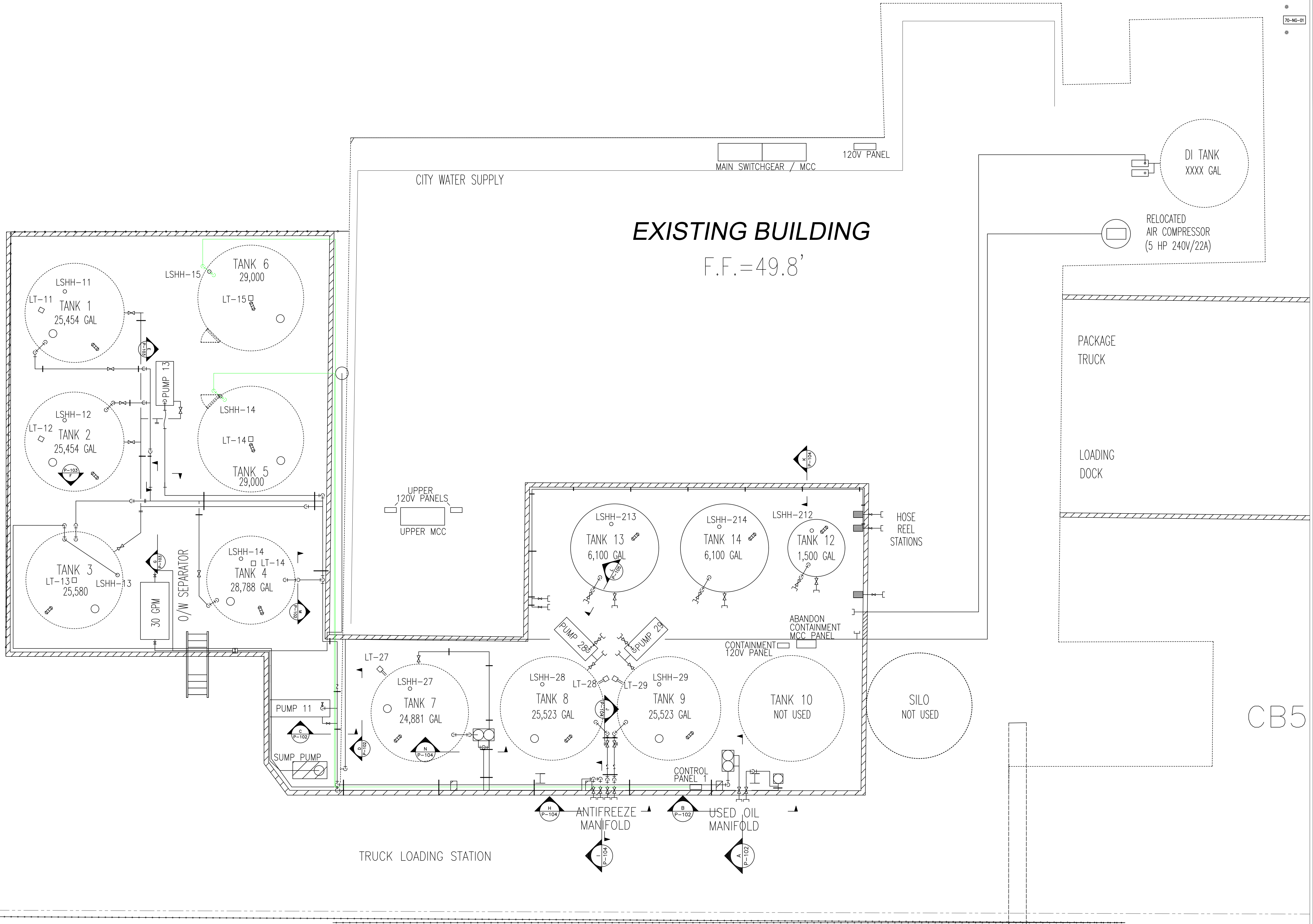
F.F. = 49.8'



NO	DATE	BY	APR	CD	DR	DRAFT	FEASIBILITY	REVISION
A	4/27/23	CD						REVIEW

ECOLUBE RECOVERY
 PUYALLUP
 213 10TH ST SE
 PUYALLUP, WA
 98372

PROJECT NO.: 2019
 DATE: 5/16/23
 SCALE: N/A
 DRAWN BY: CD
 DRAWING NO.:
PIPING
TANK 5 & 6



NO	DATE	BY	CD	DR	APR	REVISION
A	4/27/23					DRAFT FEASIBILITY REVIEW

ECOLUBE RECOVERY
 PUYALLUP
 213 10TH ST SE
 PUYALLUP, WA
 98372

PROJECT NO.: 2019
 DATE: 4/27/2023
 SCALE: N/A
 DRAWN BY: CD
 DRAWING NO.
ELECTRICAL
TANK 5 & 6