July 25, 2013

Ms. Charlene Fitch, P.E.
Solid Waste Management Program
P.O. Box 176
Jefferson City, Missouri 65102-0176

Subject: Bridgeton Landfill (County Permit # 418, and MoDNR Permit #0118912)
Leachate Tank and Transport Disposal/Leachate Management
CEC Project 130-484

Dear Ms. Fitch:

The Bridgeton Landfill is continuing with their improvements to the leachate management system for the landfill in this phase of the project which is presented herein. Below please find the narrative description of this project along with attached associated drawings, specifications, and diagrams.

1.0 Introduction

The current leachate collection and management system at the Bridgeton Landfill consists of a 96,000 gallon tank and a recently constructed 316,000 gallon tank.

The next phase of the project will continue the improvements to this leachate collection and management system by providing additional permanent storage capacity. Four new tanks are being proposed in the central part of the landfill near the new 316,000 gallon tank to facilitate the current and future needs of the landfill. Consideration was given to site traffic circulation, efficiency and the future build-out of the area. An exhibit (Figure #1) has been included that outlines the planned build-out of the site including a future leachate pre-treatment plant building, plans for which will be provided in the near future.

2.0 Proposed Design

The proposed location of the new tanks has the following advantages:

- As with the 316,000 gallon tank, the new tanks are surrounded by the Bridgeton Landfill on the east and the Westlake Landfill on the south, west, and north which limits the visibility from the public right-of-way,

- There is efficient and safe traffic flow for tanker trucks for continued loadout disposal, and
- Addresses future considerations for the needs of the treatment plant.

This phase consists of the construction of four 1,000,000 gallon tanks for leachate storage and treatment. These tanks will be placed on a concrete foundation within a secondary containment area to be constructed of concrete to protect the surrounding areas from potential leaks or spills. The concrete pad constructed next to the 316,000 gallon tank will continue to serve as a load-out area for the alternate disposal options. This pad is sloped to a sump to contain potential spills. Piping will be installed to connect these tanks with the existing system.

The four new tanks will allow Bridgeton Landfill to reduce and eventually eliminate the need for the temporary tanks currently being used on site. The leachate will be stored and treated in these new tanks. In the long term, these tanks will be utilized in the treatment process in the proposed pre-treatment plant shown in Figure 1.

Included in this package are the following documents and drawings:

- Interim Leachate Plan (Attachment A)
  - This plan is an addendum to the Interim Leachate Plan submitted by Feezor in the previous phase. It provides updates and changes to incorporate the new tanks. Attachments have been updated as needed.

- CEC Plan Set (Attachment B)
  - These plans depict the site conditions, containment areas, tanks, etc. The items in bold shall be built for the interim condition. The items that have been screened back have been designed for the future treatment plant. Plans for the treatment plant phase will be provided at a later date as noted previously.

- Cady Aquastore – CST Tanks (Attachment C)
  - These documents provide calculations and drawings for the (4) 1 million gallon storage tanks.

- Electrical Schematic (Attachment D)
  - This drawing provides the electrical service layout for the tank systems.

3.0 Closing

The above project narrative and attached figures, plans, and documents were prepared at the request and on behalf of Bridgeton Landfill, LLC. If there are any questions please do not hesitate to contact us.

Sincerely,

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.

Kevin T. Kamp, P.E.
Missouri PE#2006019670
Senior Project Manager

STATE OF MISSOURI
KEVIN T. KAMP
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7/25/13
PROFESSIONAL ENGINEER

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Arizona PE#48595
Vice President

Attachments:

	Figure #1	Overall Future Site Build-out
	Attachment A	Revised Interim Leachate Management Plan
	Attachment B	CEC Plan Set
	Attachment C	Cady Aquastore/CST Tank Drawings and Calculations
	Attachment D	Electrical Plan

cc: Mr. Brian Power – Bridgeton Landfill
Ms. Laura Yates – St. Louis County Department of Health
Ms. Jessica Merrigan – Lathrop & Gage

FIGURE

NORTH

100610204
17550 ST CHARLES ROCK RD

DENOTES TRUCK CIRCULATION (TYP)

WATERMAIN FROM TRASH TRANSFER STATION

TANK SET 2
PROPOSED 1M
LEACHATE TANK

TANK SET 2
PROPOSED 1M
LEACHATE TANK

TANK SET 1
PROPOSED 1M
LEACHATE TANK

TANK SET 1
PROPOSED 1M
LEACHATE TANK

CONCRETE
CONTAINMENT

EXISTING BUFFER
TANK FARM

WATERMAIN CONTINUES NORTH

FUTURE LOADING AREA FOR
TRANSPORT DISPOSAL (IF NECESSARY)

EXISITING 316K
LEACHATE
STORAGE TANK

LOADOUT

FUTURE TREATMENT BUILDING

ASSUMED LOCATION OF U/G
GAS LINE TO NEW BLDG

SCALE IN FEET

0 70 140

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BRIDGETON LANDFILL LLC
BRIDGETON, MISSOURI

FUTURE SITE BUILD-OUT

DRAWN BY:	CAC	CHECKED BY:	DRAFT	APPROVED BY:	DRAFT	FIGURE NO.:
DATE:	JULY 2013	DWG SCALE:	1"=70'	PROJECT NO:	130-484	1

P:\2013\130-484\-CADD\Dwg\Phase\\130484-Figure 1 for DNR Ph II Submission_recover.dwg{CONCEPT 11X17} LS:(7/25/2013 - sbriggs) - LP: 7/25/2013 10:10 AM

ATTACHMENT A

REVISED INTERIM LEACHATE MANAGEMENT PLAN

ENGINEERING FOR A BETTER WORLD
FEEZOR
ENGINEERING, INC.

REVISED INTERIM LEACHATE MANAGEMENT PLAN

BRIDGETON LANDFILL

BRIDGETON, ST. LOUIS COUNTY, MISSOURI

Prepared For:

Bridgeton Landfill LLC
13570 St. Charles Rock Road
Bridgeton, Missouri 63044

July 2013

Prepared By:

Feezor Engineering, Inc.
406 East Walnut
Chatham, Illinois 62629

Revised Interim Leachate Management Plan

Bridgeton Landfill, LLC

Bridgeton Landfill is currently generating up to 240,000 gallons of liquids per day (leachate and landfill gas condensate). Hereinafter, the term leachate is used to describe the comingled mixture of landfill leachate and gas condensate. Chemical composition of the produced liquid typically includes a BOD concentration of approximately 20,000 mg/L (PPM) and 1,000-1,500 µg/L (PPB) total benzene. Due to previous BOD loadings to its system, the Metropolitan St. Louis Sewer District (MSD) initially suspended disposal of the liquids from the site via a direct discharge sewer connection. The MSD suspension resulted in the need for the Bridgeton Landfill to establish alternative disposal methods, under the auspices of an emergency Interim Leachate Management Plan. The narratives and attachments contained herein describe operations for the Interim Leachate Management Plan.

Currently, the leachate is being treated to reduce the total benzene by aeration methods. The Interim Leachate Management system was illustrated via flow charts submitted to the Missouri Department of Natural Resources (MDNR) in a previous submittal. There are a number of challenges with the processing system. Timing available storage, processing times, analytical requirements and testing, and coordinating multiple transportation outlets and disposal sites provide a complicated system that must be managed diligently.

The new 316,000 gallon tank helped to provide additional aeration capacity to the system. Bridgeton Landfill is currently designing and permitting a pre-treatment facility which will be tributary to the MSD Missouri River Wastewater Treatment Plant. This new pre-treatment plan will consist of 4 -1 million gallon capacity tanks which will serve in the treatment process. However, before this plant is operational, 2 of the 1 million gallon tanks will be used for additional storage and aeration.

Bridgeton Landfill has developed and implemented a short-term program to prepare, transport, and dispose of liquids at one or more off-site facilities. The Revised Interim Leachate Management necessitates liquids handling, which includes:

1) Leachate Collection - leachate collection from the landfill,

2) Storage - current storage of unprocessed or post-processed leachate,

3) Processing - treatment processes currently being used (or under development) to improve the chemical quality of the liquids,

4) Loading and Manifesting - logistical planning for transporting the processed leachate to the appropriate disposal facilities, and

5) Two – 1 Million Gallon Tanks Interim Use - modification to storage and processing when the new tanks become operational.

The Revised Interim Leachate Management Plan amends the original May 2013 Interim Management Plan. The Appendices A-H have not changed from the original document, and therefore, these appendices are not resubmitted. The Revised Interim Leachate Management Plan has 2 new figures. Figure 1 depicts the new Process Flow Schematic, which Figure 2 shows the million gallon tanks, and how they will be used in the Interim Leachate Management System.

1 LEACHATE COLLECTION

Leachate is pumped from vertical extraction wells, while landfill gas condensate and interceptor trench liquids are pumped from collection sumps into a series of fusion-welded High Density Polyethylene (HDPE) pipes. At the current time this report is authored, the following pumps contribute to the leachate flow at the Bridgeton Landfill:

- 4 Leachate Collection Sump (LCS) pumps,
- 12 Reinforced Concrete Pipe (RCP) pumps,
- 13 Gas Interceptor Well (GIW) pumps,
- 20 Header CT Pumps
- 8 Frac Tank – Phase Separator pumps,
- 41 Leachate Collection Sump pumps (Horizontal HZ, Lateral Sump LS, and various trench sumps),
- 25 Perimeter Sump Pumps, and
- 19 Vertical Gas Well pumps.

Leachate and condensate is pumped from the sanitary landfill permitted under 118912 (no leachate is pumped from the OU-1 Area). Pumping rates vary, but the combined flow has been measured as high as 240,000 gallons per day. The overall layout of the Interim Leachate Management System is depicted on a drawing in **Appendix A**.

Historically, the Interim Management System consisted of a series of tanks (portable and fixed) which are hydraulically connected by a series of pipes (rigid and flexible) to provide for Storage, Processing, and Loading to disposal facilities. For the purposes of this plan, liquid storage units are referred to as "tanks" or "frac tanks."

The Bridgeton Landfill is altering the interim management system by removing these frac tanks once they are empty and cleaned, and increasing the permanent tank storage. This revised interim leachate management plan explains the transition from the temporary frac tanks to the permanent tank system.

For purposes of any RCRA compliance, the units actually meet the definition of "containers" under 40 CFR 262 and 265 and are considered containers for the purposes of compliance with Missouri and federal hazardous waste management regulation.

2 STORAGE

The leachate is conveyed by piping to a series of "frac tanks." The pipe is typically PE 3408 HDPE with a Dimension Ratio (DR) of 17. While the diameters vary throughout the system, most pipe within the interim leachate management area is 4-inch (outer diameter). HDPE pipe specifications are included in **Appendix B**.

"Frac tank" is a generic term for mobile steel storage tanks used to hold liquids. Typically used for fracking wells in the oil and gas industry, a frac tank may also be used to store any liquids like run-off water, diesel fuel, glycol, oils, waste products, etc. They are usually 21,000 gallon single-wall steel tanks. These tanks have a single rear axle to be moved with a winch truck or tractor when empty.

Frac tanks were historically an integral part of the Bridgeton Landfill's liquids storage plan in the Phase 1 interim leachate management process. Historically, two hundred and thirty-six frac tanks were utilized at the Bridgeton Landfill. The frac tanks within this system have been provided by three separate vendors to the site, namely:

- Rain for Rent
- Adler Tank Rentals
- BakerCorp

Rain for Rent has supplied the site with the majority of the frac tanks for the liquids storage and processing system. Rain for Rent has two models of frac tanks with slight variations that provide approximately 21,000 gallons of storage per tank. Adler Tank Rentals has one primary configuration with slight variations that provides approximately 21,875 gallons of storage per tank. BakerCorp also has one primary configuration with slight variations that provides approximately 21,357 gallons of liquid storage.

Tanks from all vendors have very common features. They have an attached axle for jobsite mobility and a safety staircase for worker safety. All of the tanks have steel construction. They are also all designed so that liquid can be conveyed into the tanks from the top through liquid conveyance piping. Liquid is then removed from the tanks through conveyance piping that is plumbed to the bottom of the tanks. See **Appendix C** for Frac Tank Specifications.

The frac tank assembly within the interim leachate management area grew over time due to the necessity of emergency storage. Initially, condensate-only was stored in a series of frac tanks, hydraulically connected by "daisy chained" flexible 4-inch hoses. For operational reasons, these areas were provided a naming convention. This narrative describes the various storage facilities, as shown in **Appendix D.** The layout is shown on the **Appendix A** – "Interim Leachate Management Plan" in **Appendix A** illustrates the location of the named storage areas, and the Phase 2 Leachate Management System depicts the current status of the Interim Leachate Management System.

After the tanks are emptied in the aeration tanks and hauled to the proper disposal facilities, the frac tanks are cleaned, tested, and returned to the vendors. It is envisioned that the new 1 million gallon tank will be used for storage, and when they are constructed, tested, and operational.

For purposes of this plan, the term "hazardous" does not mean that the material is a RCRA Hazardous Waste. Samples of liquid that have been filtered and prepared using the procedures specified in 40 CFR 261.24 (Toxicity Characteristic Leaching Procedure (TCLP), test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846) have thus far not shown any of the material to be a hazardous waste. For this plan, "hazardous" indicates that the material contains a level of total benzene that the receiving facility has defined as "hazardous." These definitions are based on a total analysis of benzene, not TCLP analysis. This practice is common in the industry because it is more convenient and conservative than relying on TCLP analysis.

For example, most receiving facilities consider any liquid that is less than 300 ug/L total benzene to be non-hazardous. For some facilities, the threshold is 400 ug/L total benzene and others 500 ug/L total benzene. Any liquid that tests above these limits or that has not been tested is considered designated "hazardous" for tracking and handling purposes at the site. Furthermore, liquid that is defined as "hazardous" is shipped under Uniform Hazardous Waste Manifest along with Land Disposal Restriction documentation as a precaution.

Please note that the Interim Leachate Management System changes on a frequent basis. Therefore, portions of this discussion of tank configuration may be quickly outdated.

The newest permanent tank is the 316,000 gallon Auqastore tank with concrete dual containment. This 316,000 gallon Aboveground Storage Tank (AST) was constructed in early 2013. It is anticipated that this leachate tank will receive all of the landfill leachate and landfill gas condensate being generated by the Bridgeton Landfill. However, prior to the 316,000 gallon AST being connected directly to the final landfill system, it will be connected to the Interim Leachate Management System during the transition period between the Interim Leachate Management System and the Final Leachate Management System. This section describes the connections and operations for the 316,000 gallon AST.

The smaller AST is the 97,000 gallon above ground storage tank that is currently being used as a holding vessel to discharge treated leachate to the Metropolitan St. Louis Sewer District (MSD). The leachate is metered from this tank and discharges to the MSD pump station that eventually flows to the Missouri River Wastewater Treatment Plant.

The other tanks on site are temporary frac tanks. There are 29 frac tanks which are hydraulically connected to provide approximately 580,000 gallons of hazardous storage. This material is being processed by aeration, and sent to disposal facilities once the total benzene is deemed acceptable, as explained further in Section 3.

The "Buffer Tank Farm" currently consists of 24 frac tanks which are hydraulically connected using HDPE piping in a parallel network. The concept of the Buffer Tank Farm is to provide

a reservoir to receive comingled leachate and condensate from the landfill and to discharge (pump) to the process tanks. The Buffer Tank Farm provides approximately 504,000 gallons of storage.

Tank Battery 1, Tank Battery 2, Tank Battery 3, Tank Battery 4, Sparge 1, Sparge 2, Tank Battery 7 and Tank Battery 8 all consists of 4 frac tanks (32 frac tanks total) and are used in the aeration process described in the next section. These tank batteries are also hydraulically connected to provide load out to the approved disposal facilities. Tanks in the Sparges / Tank Batteries together provide approximately 670,000 gallons of storage.

Therefore the current available storage for leachate and condensate within the system provides 1,754,000 gallons of portable storage and 97,000 gallons of processed leachate within the existing smaller AST, and 316,000 gallons within the new AST.

3 PROCESSING

As described in the Storage section, several of the frac tanks have been retrofitted with aeration piping to allow the collected liquids to be aerated ("sparged") during the filling process. A Sparge system consists of four frac tanks with a 1"-diameter perforated pipe within the Sparge battery connected to two large air compressors (375 cubic feet per minute single axle, oil injected, rotary screw portable compressors). Air is sparged into the system at a pressure of 18 pounds per square inch during the aeration process. The aeration process occurs once the lower pipe is filled or is covered during the filling process and continues for a minimum of 5 hours after filing is complete (current convention).

Initially, the setup of the Interim Leachate Management system had two Sparge Batteries (Sparge 1 and Sparge 2) with four Tank Batteries (Tank Battery 1, Tank Battery 2, Tank Battery 3, and Tank Battery 4). However, over time, the facility required additional processing capacity. Therefore Tank Batteries 1 through 4 were all retrofitted with aeration systems (in essence becoming Sparge Batteries). However, the naming conventions of the converted tank batteries remained unaltered to avoid any confusion among field personnel. In addition, 2 addition Tank Batteries were added as sparges, Tank Battery 7 and Tank Battery 8, and these were dedicated to process the stored material down to benzene less than 300 ppb to be sent to the Heritage Covanta Incincerator (See Section 4).

During the aeration and filling process, the head space in the aeration frac tanks is under a vacuum which is then conveyed through an activated carbon system before ultimately venting. The vacuum is maintained by a 50 horsepower, 460 Volt, 3 Phase Centrifugal Blower (13,000 cubic feet per minute). The carbon unit is a SES Model VP-8208 20,000 lb. capacity Vapor Phase Carbon Filtration Vessel provided by Shrader Environmental Services, Inc. of Ithaca, Michigan.

After the aeration process has occurred a minimum of 5 hours, a sampling technician collects a sample and submits it for volatile organic analysis using EPA Method 8260. A mobile laboratory is used to provide the analysis (currently New Age Laboratories, Inc.).

The new 316,000 gallon AST is designed with an aeration unit. Currently, the aeration unit is a MTS Jet Mix System consisting of a Sultzer pump to recirculate the leachate and 2 Kaeser 433 CFM blowers attached to the aeration piping. The head space will be under a slight vacuum (1,000 cfm blower) and the air will be treated using a Pure Air Model PBS-605 activated carbon unit.

During the Interim Management period, the 316K AST is being used as a Sparge Battery. The 316K AST is loaded over a period of 4-5 hours, then aerated while loading and for a period of time following the filling process. The aeration time following filling is based upon the effectiveness of the aeration while loading. Then a sampling technician will collect a sample and submit it for volatile organic analysis using EPA Method 8260.

Current protocol dictates that the sample is acceptable for general "non-hazardous" disposal facilities if it is less than 300 parts per billion total benzene, with the exception of the Metropolitan St. Louis Sewer District (which requires 140 parts per billion total benzene)

and an Advanced Waste disposal site (Rockford IPC requires a 14 parts per billion total benzene). The testing phase will lasts a period of three hours.

This then allows 12 hours to accommodate the loading of the 316,000 gallon AST into tanker trucks. It is expected that 8 trucks can be loaded every hour, which allows the tank to be unloaded in a period of 8 hours. Then the process of reloading from the Buffer Tank Farm (or in the future the million gallon tank) will occur once again for the next cycle.

All the temporary equipment used in processing for the Interim Leachate Management System is included in **Appendix E**.

4 LOADING AND MANIFESTING

4.1 DISPOSAL FACILITIES

Once the leachate, condensate, or comingled leachate and condensate has been tested and approved for disposal, it is trucked to nonhazardous disposal facilities. Stored condensate that was not tested for total benzene is trucked to hazardous waste disposal facilities.

4.1.1 Hazardous Waste Disposal Facilities

4.1.1.1 Clean Harbors

At the current time no hazardous waste disposal sites are being used. Historically, leachate with total benzene concentrations over 500 ppb were delivered to four of their facilities, namely:

Clean Harbors Canada Inc.
4090 Telfer Road RR #1
Corunna, ON N0N 1G0

Clean Harbors Deer Park, LLC
2027 Independence Parkway South
La Porte, TX 77571

Clean Harbors Env. Services Inc.
2247 South Highway 71
Kimball, NE 69145

Clean Harbors of Baltimore, Inc.
1910 Russell Street
Baltimore, MD 21230

Clean Harbors only requires material be delivered using Hazardous Waste manifesting protocols.

4.1.2 Non – Hazardous Waste Disposal Facilities

The non-hazardous disposal options are currently being provided by Advanced Waste Services, Heritage Environmental, and Metropolitan St. Louis Sewer District. The American Bottoms Regional Wastewater Treatment Facility (Sauget, Illinois) has temporarily suspended accepting leachate from the facility.

4.1.2.1 Advanced Waste Services

Advanced Waste Services currently receives over half of the non-hazardous materials. They have a series of facilities which includes:

Advanced Waste Services of IA
640 63rd Avenue
Cedar Rapids, IA 52404

Advanced Waste Services of IL
Interstate Pollution Control
4430 Boeing Drive Rockford, IL 61109

Advanced Waste Services of IN
5625 Old Porter Road
Portage, IN 46368

Advanced Waste Services of PA
101 River Park Drive
New Castle, PA 16101

Advanced Waste Services, Inc.
3801L West McKinley Avenue
Milwaukee, WI 53214

Crystal Springs Treatment
10542 Donges Court
Milwaukee, WI 53224

Kankakee Metro Wastewater Utility
1600 West Brookmont Blvd.
Kankakee, IL 60901

Liquid Environmental Solutions
12123 South Stony Island Avenue
Chicago, IL 60633

Advanced Waste Services has several limitations depending on the facility. Advanced Waste Services of IL (Rockford) can only take 5-10 trucks per day and the total benzene must be below 14 ppb (non-detectable), if the zinc level is over 4.6 ppm. If the zinc is below 4.6 ppm, they can take up to 20 trucks per day. Crystal Springs Treatment can receive 5 trucks per day if the total benzene is less than 400 ppb. Advanced Waste Services, Inc. (Milwaukee) can receive 5 trucks per day if the total benzene is less than 400 ppb. Advanced Waste Services of IA can take 3 trucks per day, but they are limited by 400 ppb total benzene and have ammonia limits that make the 3 truck limit a maximum. Liquid Environmental Solutions can have higher zinc levels, but iron and FOG (fats oils and grease) limits the amount of material that can be disposed at this facility.

4.1.2.2 Heritage Environmental

Heritage Environmental has two facilities, both incinerators. They are:

Covanta Energy – Indianapolis
2320 S Harding St
Indianapolis, IN 46221

Covanta WBH, LLC
2122 S Yukon Ave
Tulsa, OK 74107-2701

Since both of these facilities are incinerators, they require no special considerations other than accepting nonhazardous materials (total benzene <500 ppb).

4.1.2.3 Metropolitan St. Louis Sewer District (MSD)

The Metropolitan St. Louis Sewer District (MSD) approved the Bridgeton Landfill to dispose of 145,000 gallons of comingled leachate and condensate under an April 24, 2014 emergency and conditional approval (See **Appendix F**). This approval allows leachate to be disposed at two of their facilities, namely:

MSD Bissel Point Wastewater Treatment Plant
10 East Grand Avenue
St. Louis, MO 63147

MSD Missouri River Wastewater Treatment Plant
3455 Creve Coeur Mill Road
Maryland Heights, MO 63043

This emergency order (and subsequent volume increases) allows for 125,000 gallons per day to be disposed at the MSD Bissel Point Wastewater Treatment Plant and 20,000 gallons per day to be directly discharged to the sewer at the MSD Missouri River Wastewater Treatment Plant. The Missouri River plant also has a maximum flow limitation of 1,500 gallons per hour.

At the time of this report, 20,000 gallons per day are pumped to the Missouri River treatment plant using a metering system from a 97,000 gallon above-ground storage tank, as described below. The other 125,000 gallons are loaded out of the tank batteries and sent to Bissell Point via tanker trucks.

The MSD processing occurs in the following fashion. Once the MSD sparge battery is filled) and after it is properly aerated, a confirmation benzene sample is taken. Once the total benzene sample has been deemed acceptable (140 parts per billion total benzene or less), the liquid in the battery is prepared for disposal. An additional confirmation sample is taken for each batch, consisting of the MSD analytical list (see the April 24, 2013 letter). Approximately 25,000 gallons of the batch are conveyed to the leachate tank, and the other 125,000 gallons is loaded into tanker trucks and sent to Bissell Point. The 20,000 gallons sent each day to Missouri River is metered out with a sophisticated monitoring system, which has a flow actuated gravity valve that discharges at a rate of approximately 830 gallons per hour into the wet well. Electronic controls help monitor this discharge to insure the two Missouri River criteria (maximum of 20,000 gallons per 24 hours and maximum of 1,500 gallons per hour) are met.

MSD also requires weekly and analytical reports be submitted per the April 24, 2013 letter.

4.2 Manifesting Procedures

For the processed leachate that is trucked from the Interim Leachate Management System, all loads are sent with a manifest. Hazardous loads also include a Land Disposal Restriction form. The manifest documents the generator of the waste, a generator identification number, the type and amount of waste, the date the delivery was sent from the facility, and the address of the disposal facility. Before the manifest leaves the facility, the generator's representative signs the manifest, as does a representative of the transportation company. A copy is kept on site. Once the transportation company delivers the load to the disposal company, the disposal facility signs to accept the waste and keeps a copy of the manifest.

The data for the Interim Leachate Management System are abundant. Daily decisions are made based upon this data. Therefore order and organization are imperative, and to achieve this, data throughout the process are collected and stored in a database. This includes the following information:

- Date,
- Volume processed that day,
- Number of batches,
- Start time / stop time of batch processing,
- Battery receiving the processed batch,
- Start time / stop time of batch transfer,
- Analytical testing results of batch,
- Company transferring the batch,
- Disposal facility to receive each load, and
- Manifests for the batch.

A facility manager coordinates and schedules liquid transportation efforts to deliver the wastewater to the disposal facilities. This includes, but is not limited to, coordinating the following:

- Communicating with the hauling companies' coordinators each day to schedule the following day's number of loads and designated disposal facilities,
- Completing, and signing on behalf of Bridgeton Landfill, LLC, all manifests related to hauling liquids to offsite disposal facilities,

- Reviewing the manifests prepared for each hazardous load prior to shipment off site, and
- Preparing and coordinating laboratory testing efforts for the following day.
-

5 MILLION GALLON TANK INTERIM USE

Bridgeton Landfill is currently designing and permitting a pre-treatment facility which will be tributary to the MSD Missouri River Wastewater Treatment Plant. This new pre-treatment plan will consist of 4 -1 million gallon capacity tanks which will serve in the treatment process. However, before this plant is operational, 2 of the 1 million gallon tanks will be used for additional storage and aeration.

5.1 HYDRAULIC CONNECTIONS TO THE MILLION GALLON AST FROM THE LANDFILL

The Million Gallon Above Ground Storage Tank (AST) will replace the temporary buffer tank farm. The landfill leachate and condensate will flow directly into the Million Gallon AST by 8 inch HDPE SDR-11 pipe, connected to the tank. Two 8 inch pipes will be connected to the bottom of the Million gallon tank, which will be connected to two temporary pumps, each capable of delivering 1,200 gallons per hour at 30 feet of hydraulic head. It is expected that these pumps will normally operate at 650 gallons per hour (combined for a total of 1,300 gallons per hour) to load the 316,000 AST from the Million Gallon AST in a period of 4 hours. If one of the pumps becomes inoperable and requires replacement, the single pump could be increased to load the 316,000 gallon AST in 5 hours. All HDPE Piping will be dual walled piping. Existing single walled pipe already installed will be unaltered in this interim period.

5.2 HYDRAULIC CONNECTIONS TO THE 97K AST FROM THE 316K AST

The 316,000 gallon AST is currently designed with a pump (Summit 6" ANSI Pump) to a dual loadout station. Another pump (Summit 6" ANSI Pump) will be installed to convey processed leachate to the 97,000 gallon AST which is currently being used as a discharge point to the MSD Missouri River Wastewater Treatment Plant. New dual contained HDPE piping will be installed between the tanks.

This interim process as described in this section is depicted graphically in **Appendix G** on a schematic entitled "Interim Leachate Management Process Flow Diagram." The modifications to the 316K gallon tank and how the piping will connect to the 97K tank and the Buffer Tank Farm are depicted by a drawing provided by Weaver Boos, Inc. in **Appendix H**.

Appendices (Previously Submitted)

Appendix A – Interim Leachate Management System Plan View Drawing

Appendix B – HDPE Pipe and Appurtenances Information

Appendix C – Frac Tank Information (Vendor Information)

Appendix D – Interim Management Plan Tank Inventory

Appendix E – Interim Leachate Management Plan Processing Equipment

Appendix F – The Metropolitan St. Louis Sewer District (MSD) - April 24, 2013 Emergency and Conditional Approval Letter

Appendix G – Interim Leachate Management Process Flow Diagram

Appendix H – New 1 Million Gallon Tank Layout with the Interim Leachate Management System

Figures

Figure 1 – Revised Interim Leachate Management Plan Processing Schematic

Figure 2 – Revised Interim Leachate Management Plan Tank Layout

Figure 1

Revised Interim Leachate Management Plan Processing Schematic

From Landfill

150,000 to 250,000 gpd

1 MIL GAL AST

1 MIL GAL AST

Use 1 of the Million Gallon tanks as a buffer tank

If additional storage is needed

Have 2 lines capable of loading 320,000 gallons per 4 hours - 1,300 gpm

Load in 4 hours

316K GAL AST

Lab 3 Hrs

Is Lab less than 140 ppb Benzene?

YES

NO

20,000 gpd max

97K GAL AST

Direct Discharge to MSD

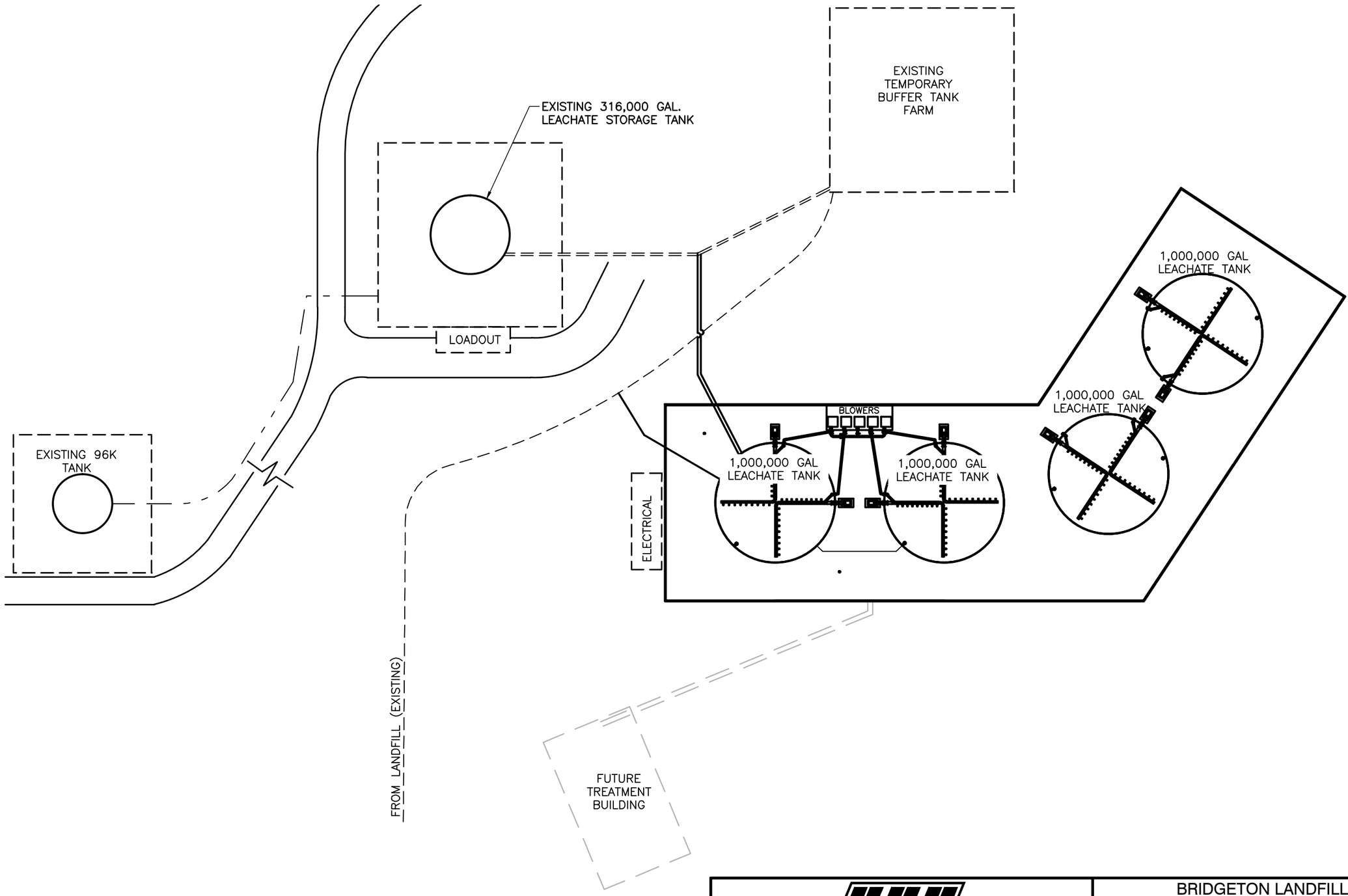
Load in 8 hrs

Haul to Disposal Sites

BRIDGETON LANDFILL, LLC 13570 ST. CHARLES ROCK ROAD BRIDGETON, MO 63044	BRIDGETON LANDFILL LIQUIDS MANAGEMENT	FEEZOR ENGINEERING, INC.	DATE: JULY 2013 DESIGNED BY: BJV APPROVED BY: DRF REVISION / DATE
REVISED INTERIM LEACHATE MANAGEMENT PLAN PROCESSING SCHEMATIC			FIGURE 1

Figure 2

Revised Interim Leachate Management Plan Tank Layout



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BRIDGETON LANDFILL, LCC
12976 ST. CHARLES ROCK ROAD
BERIDGETON, MO 63044
PHONE: (314) 744-8195

PIPING SCHEMATIC

DRAWN BY:	JKS	CHECKED BY:	DRAFT	APPROVED BY:	DRAFT	DRAWING NO.:	2
DATE:	JULY 2013	DWG SCALE:	NOT TO SCALE	PROJECT NO:	130-484		

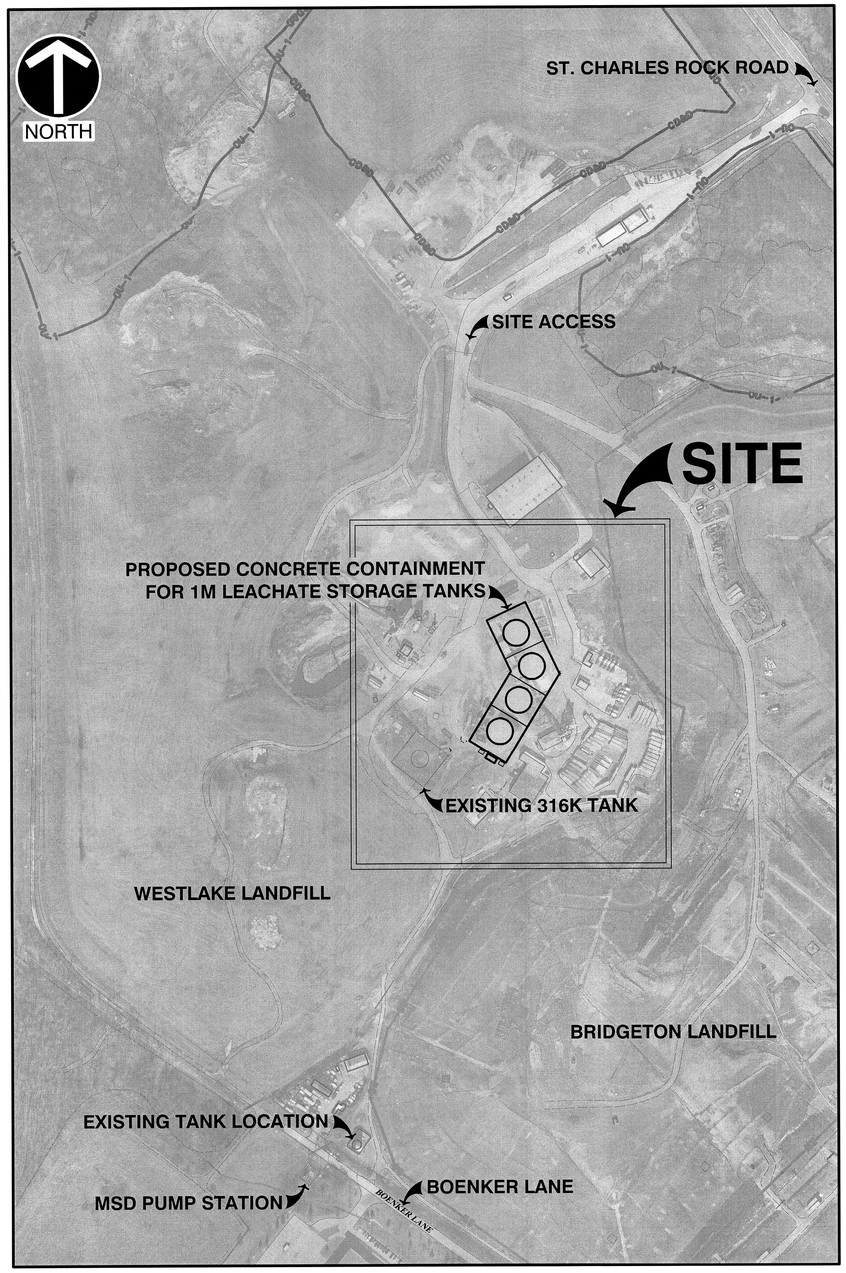
ATTACHMENT B

CEC PLAN SET

(4) 1M TANK AREA CONSTRUCTION PLANS FOR

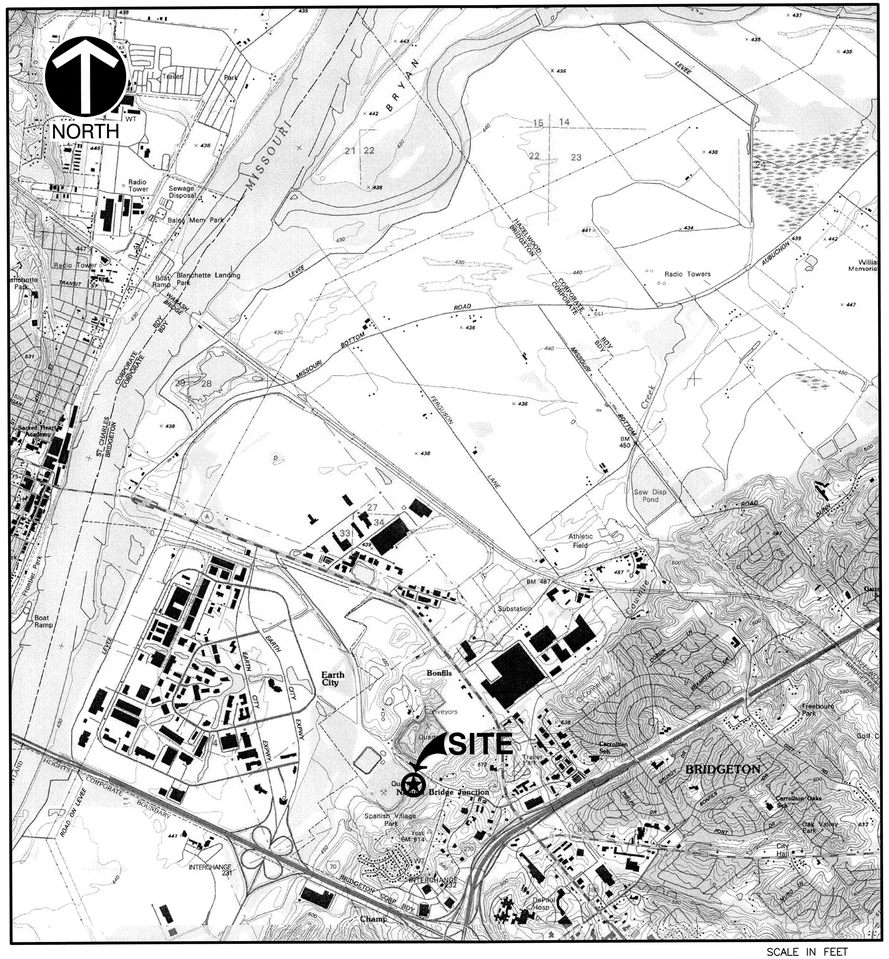
BRIDGETON LANDFILL

BRIDGETON, MISSOURI



REFERENCE

1. AERIAL IMAGERY PROVIDED BY EAST WEST GATEWAY COORDINATING COUNCIL OF MISSOURI AND ILLINOIS, COLLECTED IN LATE FEBRUARY AND EARLY MARCH OF 2012.



REFERENCE

1. U.S.G.S. 7.5 TOPOGRAPHIC MAP, BRIDGETON QUADRANGLE, MISSOURI

LIST OF DRAWINGS

NUMBER	DESCRIPTION	TITLE
1	COVER SHEET	C000
2	SITE LAYOUT	C200
3	PRELIMINARY EQUIPMENT PLAN	C201
4	ELEVATION	C202
5	GRADING PLAN	C300
6	CONSTRUCTION DETAILS	C800
7	PIPING PLAN & DETAILS	EN-7
8	PIPING SECTIONS & DETAILS	EN-8
9	PIPING DETAILS	EN-9

STATE OF MISSOURI
KEVIN T. KAMP
NUMBER PE-2006019670
PROFESSIONAL ENGINEER

KEVIN KAMP, ENGINEER
PE - 2006019670
***HAND SIGNATURE ON INDIVIDUAL SHEETS**

REVISION RECORD

NO	DATE	DESCRIPTION
1	07/19/13	SUBMITTAL FOR SITE DISTURBANCE
2		
3		
4		
5		
6		
7		
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PHONE: (314) 744-8195
FAX: (314) 656-2107

BRIDGETON LANDFILL
13570 ST. CHARLES ROCK ROAD
(4) 1M TANK AREA CONSTRUCTION PLANS
COVER SHEET

DATE:	JUNE 2013
DWG SCALE:	(AS NOTED)
PROJECT NO:	130-484
APPROVED BY:	KTK (SIGNED & SEALED)*
DRAWN BY:	CAC
CHECKED BY:	KTK

DRAWING NO.:

C000

SHEET 1 OF 9

NORTH

PROPOSED DRAINAGE (TYP)

WATERMAIN FROM TRASH TRANSFER STATION

120.00'

222.58'

157.88'

TANK SET 2
PROPOSED 1M
LEACHATE TANK

TANK SET 2
PROPOSED 1M
LEACHATE TANK

TANK SET 1
PROPOSED 1M
LEACHATE TANK

TANK SET 1
PROPOSED 1M
LEACHATE TANK

1' HIGH DIVIDER WALL
(SEE STRUCTURAL FOR
FINAL DETAILS)

EDGE OF NEW
TRAVELD WAY

SET BOLLARDS TO PROTECT CONTAINMENT
TYPICAL (SEE DETAIL SHEET C800)

1' HIGH DIVIDER WALL
(SEE STRUCTURAL FOR
FINAL DETAILS)

SEE ELECTRIC PLAN BY KAY-BEE
ELECTRIC FOR CONTAINMENT
AREA DETAILS

1' HIGH DIVIDER WALL
(SEE STRUCTURAL FOR
FINAL DETAILS)

291.55'

LIMITS OF
DISTURBANCE

CONCRETE
CONTAINMENT

EXISTING WATERLINE WITHIN IMPROVEMENT
AREA TO BE REROUTED AROUND PROPOSED
IMPROVEMENTS AS SHOWN

GRAVEL SWALE (SEE
DETAIL SHEET C800)

REMOVE & REPLACE EXISTING BERMS FOR
BUFFER TANK FARM FOR PROPOSED SWALE

EXISTING BUFFER
TANK FARM

WATERMAIN CONTINUES NORTH

WATERLINE LINE PIPING, FITTINGS, AND
APPURTENANCES PER MISSOURI AMERICAN WATER SEE
MAW PIPELINE TECHNICAL SPECIFICATIONS MANUAL

PROPOSED 6" DUCTILE
IRON WATERLINE

226.92'

EXISTING 8" TEMPORARY LINES

RELOCATE TEMPORARY PUMPS

SET BOLLARDS TO PROTECT E.O.P.
TYPICAL (SEE DETAIL SHEET C800)

EXTEND GRAVEL ROAD (SEE
DETAIL SECTION SHEET C800)

8" TEMPORARY LINE

PROPOSED 2" DUCTILE IRON
WATERLINE TO PROPOSED
YARD HYDRANT AT 316K

UTILITY
TRANSFORMER
PAD #2

120.00'

POWER HOUSE BUILDING.
PROTECT W/ BOLLARDS (TYP).
SEE DETAIL SHEET C800

SET BOLLARDS TO PROTECT YARD
HYDRANT (SEE DETAIL SHEET C800)

835.33'

EXISTING 316K
LEACHATE
STORAGE TANK

UTILITY
TRANSFORMER
PAD #1

PROPOSED FIRE
HYDRANT

PROPOSED TEMPORARY DRAINAGE

REMOVE & REPLACE EXISTING
BERM TO STORANGE TANK AREA

UNDERGROUND ELECTRIC FEED TO METERED CT
ENCLOSURE(S) ON CONCRETE PAD PER AMERENUE.

ASSUMED LOCATION OF U/G
GAS LINE TO EX. BLDG.

PROPOSED 6" DUCTILE
IRON WATERLINE

4" PVC CONDUITS WITH HIGH
VOLTAGE UTILITY FEEDERS PER
ELECTRIC PLAN (BY KAY-BEE)

APPROXIMATE LOCATION OF
UTILITY TERMINATION POLES.

SEE ELECTRIC PLAN BY KAY-BEE ELECTRIC FOR
FURTHER DETAILS AND SPECIFICATIONS.
COORDINATE WITH AMEREN.

CONNECT TO EXISTING 6" WATERLINE

100610196
13015 BOENKER LN

*NOTE: DISTURBED AREAS SHALL BE RESTORED WITH GRAVEL AT THE DISCRETION OF OWNER.
DRIVE AISLES SHOULD BE RESTORED PER DETAIL FOR GRAVEL ROAD ON SHEET C800.

REFERENCE

1. TOPOGRAPHIC INFORMATION BASED UPON Bridgeton Landfill--DTM.dwg PROVIDED BY COOPER AERIAL SURVEYS CO., DATED FEB 2013. SURVEY FIELD SUPPLEMENTED BY WEAVER BOOS CONSULTANTS

SCALE IN FEET
0 30 60

KEVIN KAMP, ENGINEER
PE - 2006019670
*HAND SIGNATURE ON INDIVIDUAL SHEETS

STATE OF MISSOURI
KEVIN T. KAMP
NUMBER PE-2006019670
PROFESSIONAL ENGINEER
7/23/13

REVISION RECORD

NO	DATE	DESCRIPTION
1	07/08/13	SUBMITTAL TO MDNR/SWMP
2	—	—
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4	—	—
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PHONE: (314) 744-8195
FAX: (314) 656-2107

BRIDGETON LANDFILL
13570 ST. CHARLES ROCK ROAD
(4) 1M TANK AREA CONSTRUCTION PLANS
SITE LAYOUT

DATE:	JUNE 2013
DRAWN BY:	CAC
DWG SCALE:	1" = 30'
CHECKED BY:	KTK
PROJECT NO:	130-484
APPROVED BY:	KTK (SIGNED & SEALED)*

DRAWING NO.: C200

SHEET 2 OF 9

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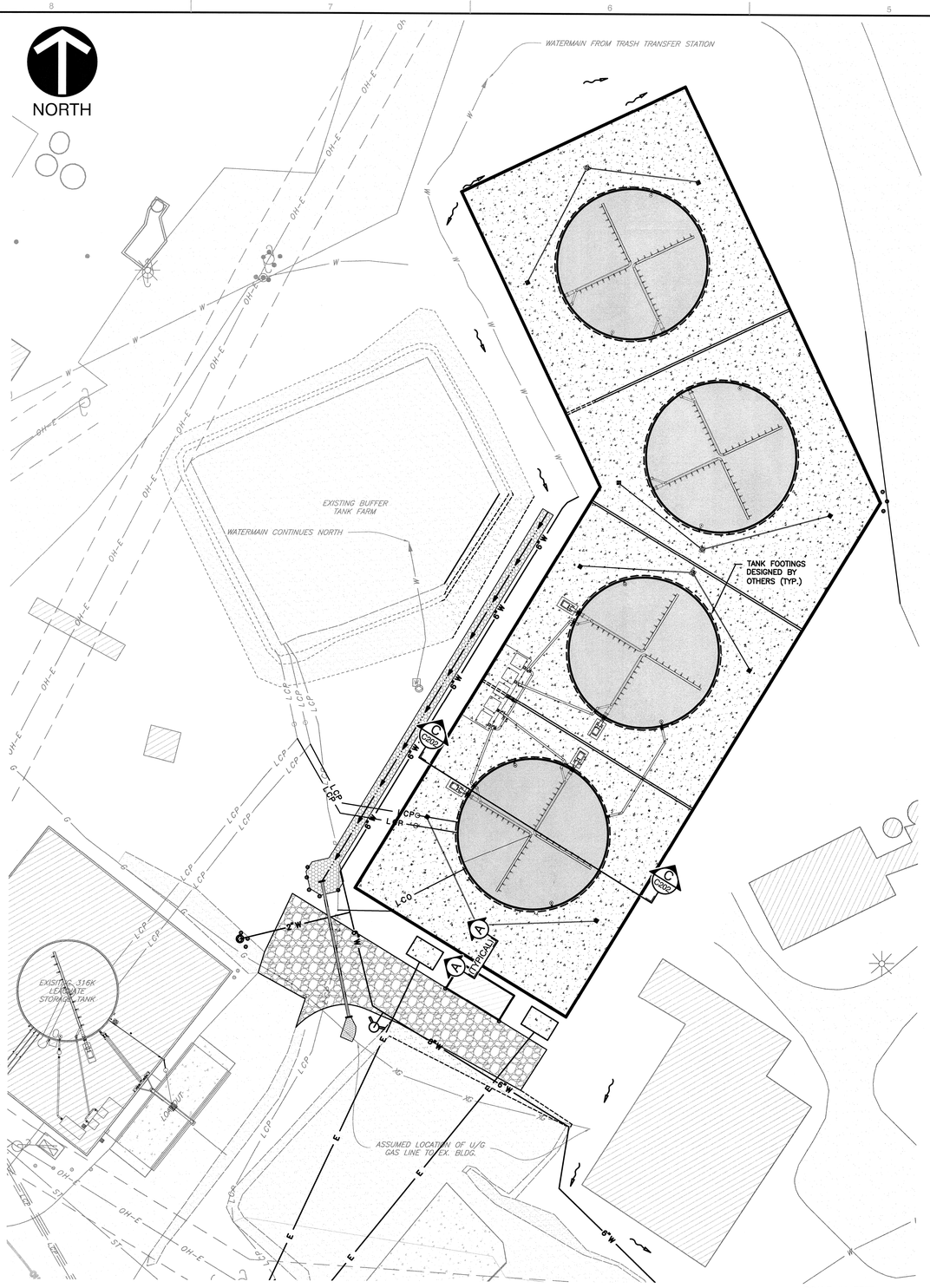
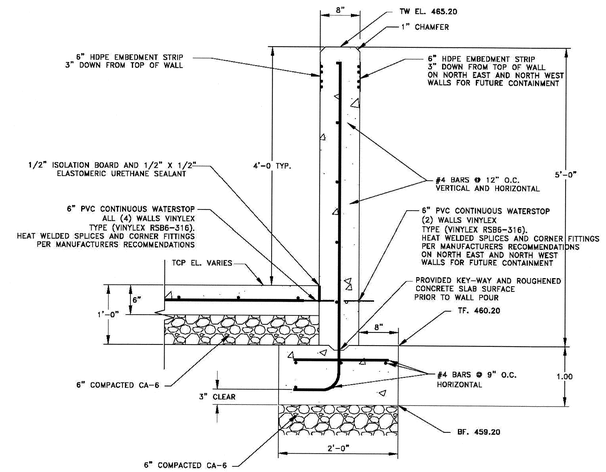


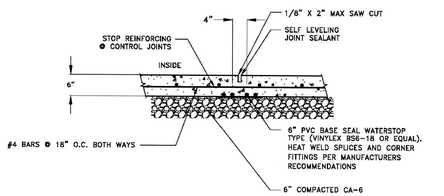
REFERENCE

1. TOPOGRAPHIC INFORMATION BASED UPON Bridgeton Landfill-DTM.dwg PROVIDED BY COOPER AERIAL SURVEYS CO., DATED FEB 2013. SURVEY FIELD SUPPLEMENTED BY WEAVER BOOS CONSULTANTS

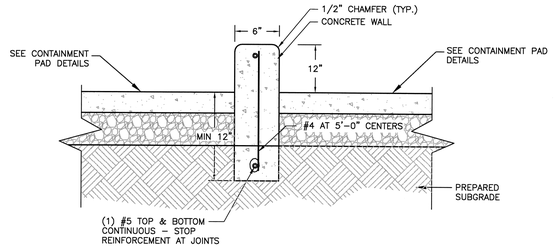
* DETAIL PROVIDED BY OTHERS



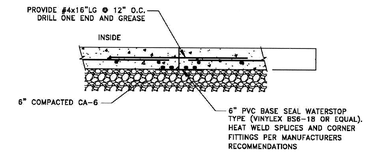
A **CONTAINMENT WALL SECTION DETAIL*** NOT TO SCALE



TYPICAL SLAB CONTROL JOINT DETAIL* NOT TO SCALE



1' TANK DIVIDER WALL
NOT TO SCALE



TYPICAL SLAB CONSTRUCTION JOINT DETAIL* NOT TO SCALE

KEVIN KAMP, ENGINEER
PE - 2006019670
***HAND SIGNATURE ON INDIVIDUAL SHEETS**

STATE OF MISSOURI
KEVIN T. KAMP
NUMBER PE-2006019670
PROFESSIONAL ENGINEER
1/25/13

REVISION RECORD

NO	DATE	DESCRIPTION
1	07/25/13	SUBMITTAL TO MDNR/USACE
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4	---	---
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6	---	---
7	---	---
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FAX: (314) 656-2107

BRIDGETON LANDFILL
13570 ST. CHARLES ROCK ROAD
(4) 1M TANK AREA CONSTRUCTION PLANS
EQUIPMENT PLAN

DATE:	JUNE 2013
DRAWN BY:	CAC
DWG SCALE:	(AS NOTED)
CHECKED BY:	KTK
PROJECT NO.	130-484
APPROVED BY:	KTK (SIGNED & SEALED)*

DRAWING NO.: **C201**

SHEET 3 OF 9

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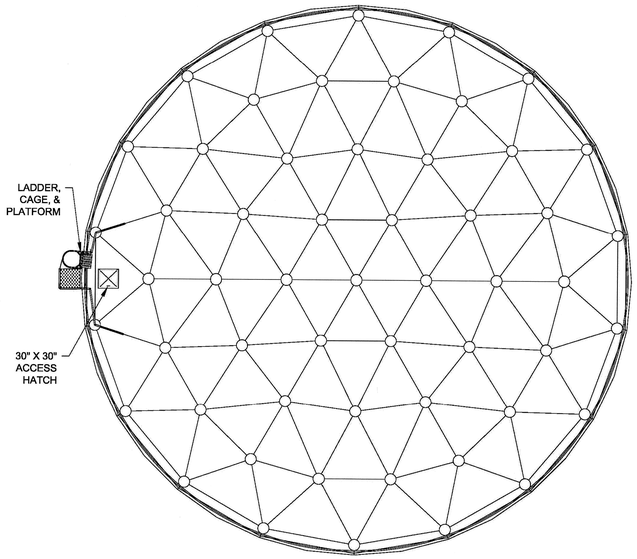
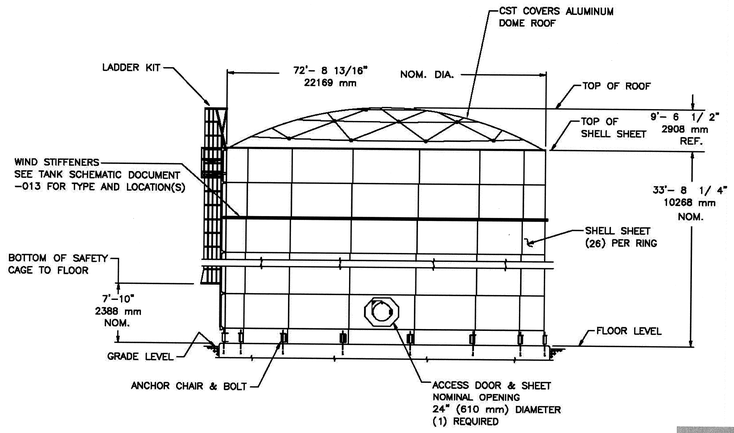


1M TANK - TOP VIEW NOT TO SCALE

PRODUCT INFO:

PRODUCT NAME-	73' PRESSURE DOME
WEB PAGE-	www.cadyaquastore.com
MANUFACTURER-	CADY AQUASTORE INC.
CONTACT NAME-	DAVE HEMAUER
	daveh@cadyaquastore.com
DRAWING NAME-	C-2114-121

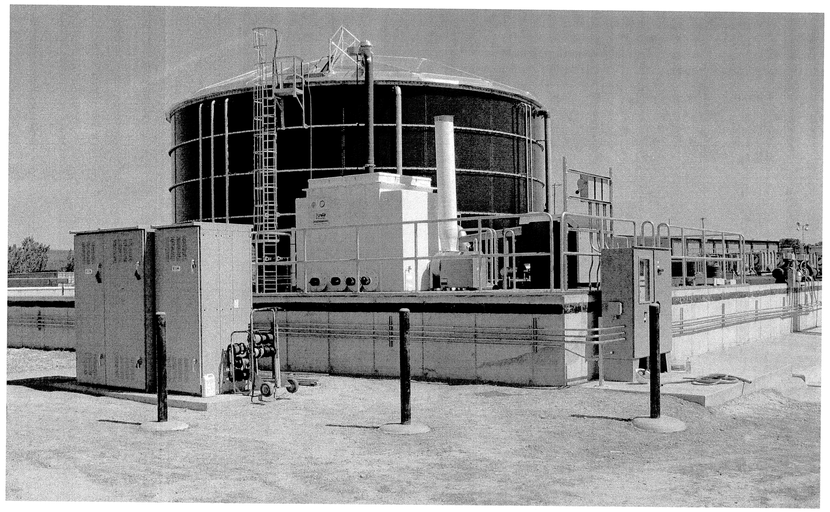


1M TANK - ELEVATION VIEW NOT TO SCALE

DETAIL INFO:

PROVIDED BY- CST STORAGE
345 HARVESTOR DRIVE
DEKALB, IL 60115-9607
815-756-1551

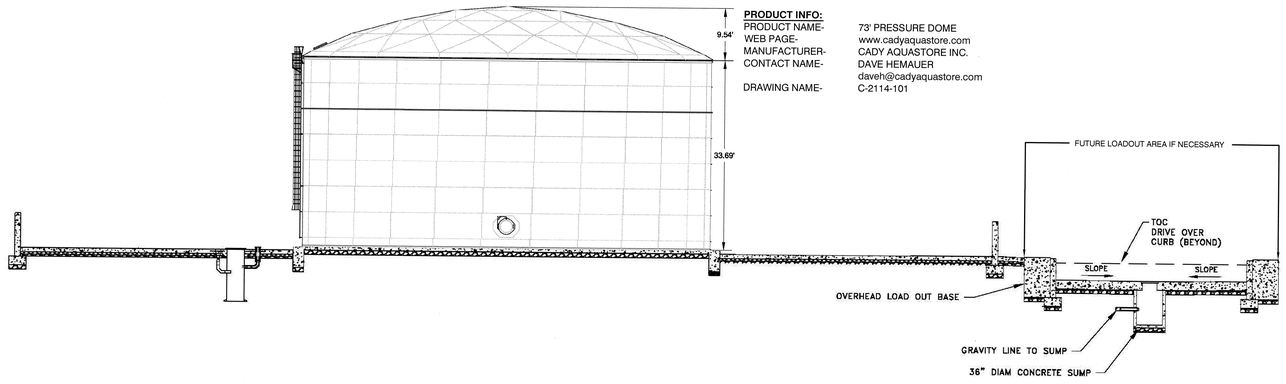
DRAWING NAME- 8131932/8139639-001



TYPICAL TANK CONFIGURATION
NOT TO SCALE

PRODUCT INFO:

PRODUCT NAME-	73' PRESSURE DOME
WEB PAGE-	www.cadyaquastore.com
MANUFACTURER-	CADY AQUASTORE INC.
CONTACT NAME-	DAVE HEMAUER
	daveh@cadyaquastore.com
DRAWING NAME-	C-2114-101



C201 **CONTAINMENT PROFILE VIEW*** NOT TO SCALE

* PROFILE VIEW DETAIL PROVIDED BY OTHERS

KEVIN KAMP, ENGINEER
PE - 2006019670
***HAND SIGNATURE ON INDIVIDUAL SHEETS**

STATE OF MISSOURI
KEVIN T. KAMP
NUMBER PE-2006019670
PROFESSIONAL ENGINEER
7/25/13

REVISION RECORD

NO	DATE	DESCRIPTION
1	07/25/13	SUBMITTAL TO MDNR-SWMP
2	—	—
3	—	—
4	—	—
5	—	—
6	—	—
7	—	—
8	—	—

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BRIDGETON, MO 63044
PHONE: (314) 744-8195
FAX: (314) 656-2107

BRIDGETON LANDFILL
13570 ST. CHARLES ROCK ROAD
(4) 1M TANK AREA CONSTRUCTION PLANS
ELEVATION

DATE:	JUNE 2013
DRAWN BY:	CAC
DWG SCALE:	NOT TO SCALE
CHECKED BY:	KTK
PROJECT NO:	130-484
APPROVED BY:	KTK (SIGNED & SEALED)*

DRAWING NO.:
C202
SHEET 4 OF 9

P:\130131\130-484\1-CAD\DWG\PHASE1\130484-C202.DWG LAST SAVED BY(COLTHORP) - 7/25/2013 12:32:16 PM, LAST PRINTED BY(COLTHORP, CNTHM) - 7/25/2013 12:37:06 PM

NORTH

WATERMAIN FROM TRASH TRANSFER STATION

PROPOSED DRAINAGE (TYP)

TS=459.43

TS@FND=460.00

TANK SET 2
PROPOSED 1M
LEACHATE TANK

CONTAINMENT PAD=460.00
(FINISHED ELEVATION)

LIMITS OF DISTURBANCE = 2.2 ACRES

6" WATER LINE TO BE RE-ROUTED

REMOVE & REPLACE EXISTING BERMS FOR BUFFER TANK FARM FOR PROPOSED SWALE

EXISTING BUFFER TANK FARM

WATERMAIN CONTINUES NORTH

TS=457.87

TANK SET 1
PROPOSED 1M
LEACHATE TANK

LIMITS OF DISTURBANCE = 2.2 ACRES

SILTATION CONTROL CHECK DAM
-SILT FENCE OR 18" WATTLE
(SEE DETAILS SHEET C800)

E.O.P.
INV OUT=456.62(201)

202

TS=459.15

TS=459.56

RIP-RAP AT END OF PIPE
(SEE DETAIL SHEET C800)

POWER BLDG

EXISTING TOP OF 6"
GAS LINE @ 454.7

TS=458.37

TS=459.64

TS=457.66

REMOVE & REPLACE EXISTING
BERM TO STORANGE TANK AREA

66.8 LF 12" STEEL @ 0.5%

TS=458.79

TS=458.61

TS=459.11

E.O.P.
INV IN=456.31(202)

201

TS=459.64

PROPOSED TEMPORARY DRAINAGE

TS=458.79

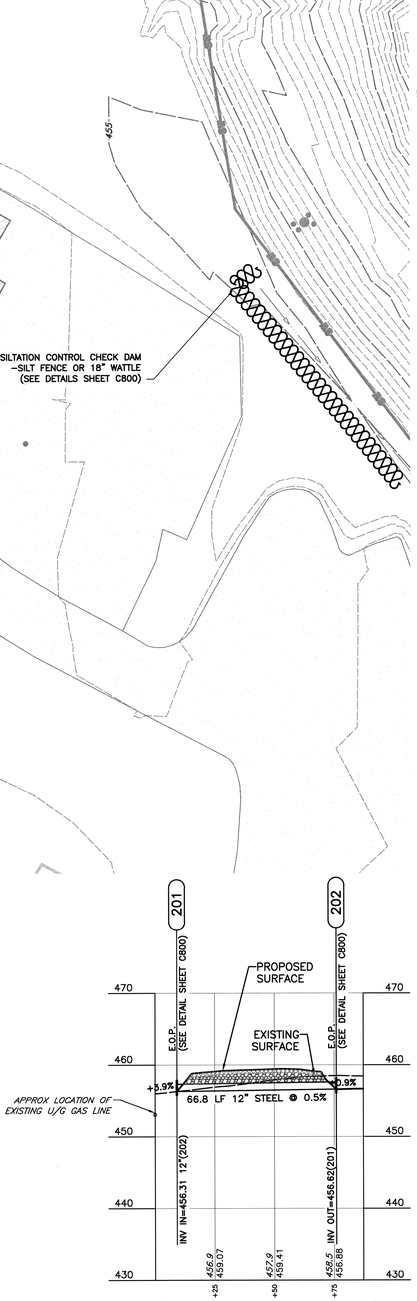
TS=457.37

SILTATION CONTROL CHECK DAM
-SILT FENCE OR 18" WATTLE
(SEE DETAILS SHEET C800)

APPROX. LOCATION OF
EXISTING 6" GAS. TOP OF
PIPE PRESSUMED @ 453.5
-FIELD VERIFY-

6" CONTINUES TO BOENKER LANE

SILTATION CONTROL CHECK DAM
-SILT FENCE OR 18" WATTLE
(SEE DETAILS SHEET C800)



(4) 1M STORM PIPE PROFILE

SCALE H:1"=30'; V:1"=10'

TANK SET 2
PROPOSED 1M
LEACHATE TANK

CONTAINMENT PAD=460.00
(FINISHED ELEVATION)

SUBGRADE TO BE MODIFIED PER GEOTECHNICAL RECOMMENDATIONS

EXISTING BUFFER TANK FARM

TANK SET 1
PROPOSED 1M
LEACHATE TANK

PROPOSED TEMPORARY DRAINAGE

SUBGRADE SHALL BE 12" BELOW CONTAINMENT FINISHED PAD ELEVATION

CUT-FILL MAP

1. DEPTHS SHOWN ARE SURFACE TO SURFACE AND DOES NOT ACCOUNT FOR SUBGRADE DEPTHS.

ELEVATIONS TABLE

NUMBER	MINIMUM ELEVATION	MAXIMUM ELEVATION	COLOR
1	-6.0	-4.0	
2	-4.0	-2.0	
3	-2.0	0.0	
4	0.0	2.0	
5	2.0	4.0	

REFERENCE

1. TOPOGRAPHIC INFORMATION BASED UPON Bridgeton Landfill-DTM.dwg PROVIDED BY COOPER AERIAL SURVEYS CO., DATED FEB 2013. SURVEY FIELD SUPPLEMENTED BY WEAVER BOOS CONSULTANTS

SCALE IN FEET
0 30 60

KEVIN KAMP, ENGINEER
PE - 2006019670
*HAND SIGNATURE ON INDIVIDUAL SHEETS

STATE OF MISSOURI
KEVIN T. KAMP
NUMBER PE-2006019670
PROFESSIONAL ENGINEER
11/25/13

REVISION RECORD

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BRIDGETON LANDFILL
13570 ST. CHARLES ROCK ROAD
(4) 1M TANK AREA CONSTRUCTION PLANS
GRADING PLAN

DATE:	JUNE 2013
DRAWN BY:	CAC
DWG SCALE:	(AS NOTED)
CHECKED BY:	KTK
PROJECT NO.	130-484
APPROVED BY:	KTK (SIGNED & SEALED)*

DRAWING NO.:
C300
SHEET 5 OF 9

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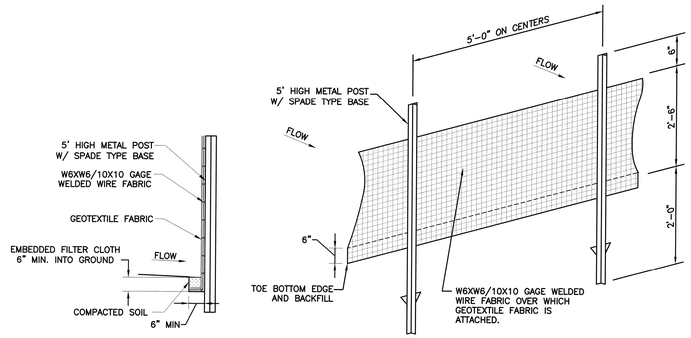
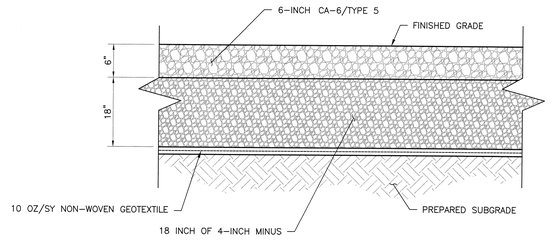


CONSTRUCTION SPECIFICATIONS

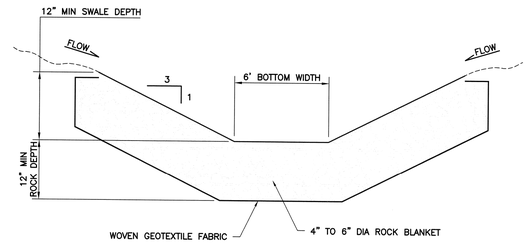
1. WIRE FENCING SHALL BE FASTENED SECURELY TO THE FENCE POSTS WITH WIRE TIES OR STAPLES.
2. FILTER CLOTH SHALL BE FASTENED SECURELY TO THE WIRE FENCING IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION.
3. FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
4. SHOULD THE FABRIC DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END OF THE EXPECTED USABLE LIFE AND THE BARRIER STILL BE NECESSARY, THE FABRIC SHALL BE REPLACED PROMPTLY.
5. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH STORM EVENT. THEY MUST BE REMOVED WHEN DEPOSITS REACH APPROXIMATELY HALF THE HEIGHT OF THE BARRIER.
6. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SILT FENCE OR FILTER BARRIER IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM WITH THE EXISTING GRADE, PREPARED AND SEEDED.

SILT FENCE
N.T.S.



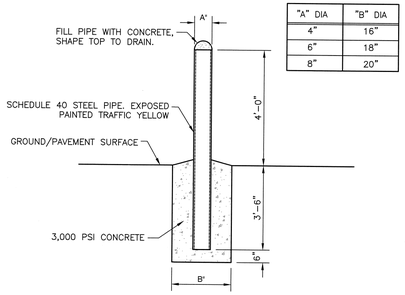
NOTES:
1. REFER TO GEOTECHNICAL REPORT FOR FURTHER SPECIFICATIONS AND/OR RECOMMENDATIONS.

GRAVEL ROAD (TYP)
NOT TO SCALE



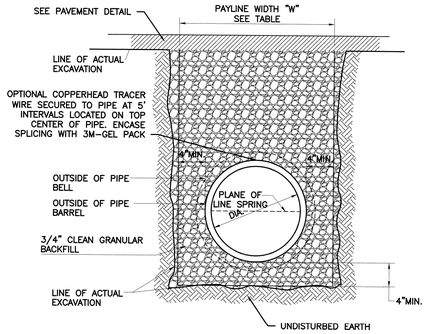
NOTES:
1. MINIMUM GRADE IN SWALE TO BE 0.50% TO PROPOSED STORM OUTLET PIPE.

GRAVEL SWALE
NOT TO SCALE

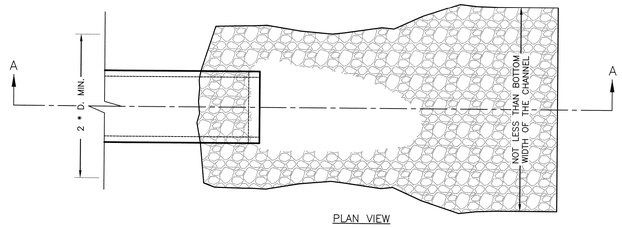


"A" DIA	"B" DIA
4"	16"
6"	18"
8"	20"

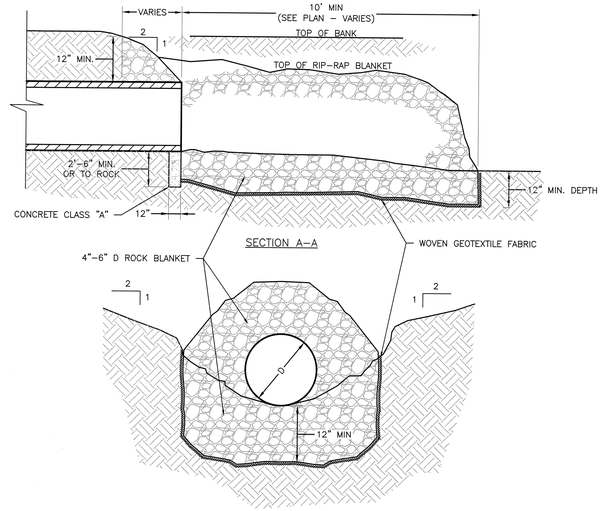
PIPE BOLLARD
NOT TO SCALE



DUCTILE IRON AND STEEL PIPE BEDDING
N.T.S.



PLAN VIEW

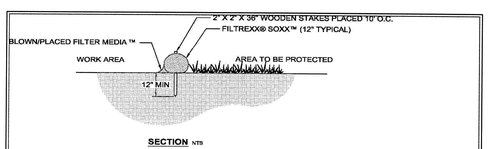


END VIEW

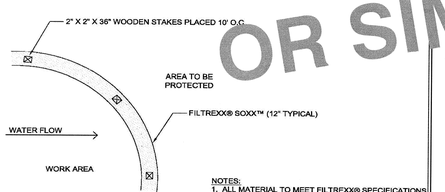
NOTES:
1. "D" = DIAMETER
2. GRADE OF ROCK BLANKET TO BE ADJUSTED ACCORDINGLY, TO BE USED AT INTAKE AND DISCHARGE END OF PIPE.

RIP-RAP AT PIPE END
NOT TO SCALE

WATTLE BAGS



SECTION NTS



PLAN NTS

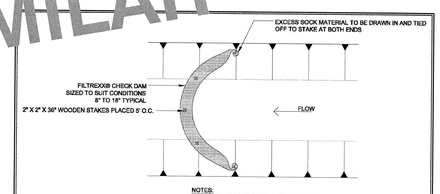
NOTES:
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
2. FILTER MEDIA™ FILL TO MEET APPLICATION REQUIREMENTS.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

FILTREXX® SEDIMENT CONTROL
NTS

Slope Percent	Maximum Slope Length Above Sediment Control in Feet (meters)*				
	8 in (200 mm) Sediment control	12 in (300 mm) Sediment control	18 in (450 mm) Sediment control	24 in (600mm) Sediment control	32 in (800mm) Sediment control
	6.5 in (160 mm)**	9.5 in (240 mm) **	14.5 in (360 mm) **	19 in (480 mm) **	26 in (650 mm) **
2 (or less)	600 (180)	750 (225)	1000 (300)	1300 (400)	1650 (500)
5	400 (120)	500 (150)	550 (165)	650 (200)	750 (225)
10	200 (60)	250 (75)	300 (90)	400 (120)	500 (150)
15	140 (40)	170 (50)	200 (60)	325 (100)	450 (140)
20	100 (30)	125 (38)	140 (42)	200 (60)	400 (120)
25	80 (24)	100 (30)	110 (33)	200 (60)	225 (65)
30	60 (18)	75 (23)	90 (27)	130 (40)	200 (60)
35	60 (18)	75 (23)	80 (24)	115 (35)	150 (45)
40	60 (18)	75 (23)	80 (24)	100 (30)	125 (38)
45	40 (12)	50 (15)	60 (18)	80 (24)	100 (30)
50	40 (12)	50 (15)	55 (17)	75 (20)	75 (23)

* Based on a failure point of 36 in (0.9 m) super silt fence (wire reinforced) at 1000 ft (300 m) of slope, watershed width equivalent to receiving length of sediment control device, 1 in/ 24 hr (25 mm/24 hr) rain event.
** Effective height of Sediment control after installation and minor sediment pool start head from runoff as determined by Ohio State University.

OR SIMILAR



NOTES:
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
2. CHECK DAM SHOULD BE USED IN AREAS THAT DRAIN 10 ACRES OR LESS.
3. SEDIMENT SHOULD BE REMOVED FROM BEHIND CHECK DAM ONCE THE ACCUMULATED HEIGHT HAS REACHED ½ THE HEIGHT OF THE CHECK DAM.
4. CHECK DAM CAN BE DIRECT SEEDED AT THE TIME OF INSTALLATION.
5. CONTRACTOR IS REQUIRED TO BE A FILTREXX CERTIFIED™ INSTALLER.

FILTREXX® CHECK DAM
NTS

ROUND PIPE				HORIZONTAL ELLIPTICAL PIPE			
Inside Diameter of Pipe (Inches)	"W" Payline Width of Trench (Inches)	"W" Payline Width of Trench (Feet)	Pay-volumes cu.ft. per ft. Concrete Encasement	Inside Diameter of Pipe (Inches)	"W" Payline Width of Trench (Inches)	"W" Payline Width of Trench (Feet)	Pay-volumes cu.ft. per ft. Concrete Encasement
4	28	2.33	3.20				
6	28	2.33	3.46				
8	28	2.33	3.70				
10	28	2.33	3.86				
12	28	2.33	3.98				
15	32	2.67	4.89				
18	35	2.92	5.63	14 X 23	41	3.42	5.94
21	39	3.25	6.61				
24	42	3.50	7.39	19 X 30	49	4.08	7.68
27	45	3.75	8.18	22 X 34	53	4.42	8.61
30	49	4.08	9.30	24 X 38	58	4.83	9.70
33	53	4.42	10.53	27 X 42	62	5.17	10.71
36	56	4.67	11.43	29 X 45	66	5.50	11.72
39	DISCONTINUED			32 X 49	71	5.92	13.14
42	63	5.25	13.38	34 X 53	75	6.25	14.05
48	70	5.83	15.67	38 X 60	83	6.92	16.18
54	77	6.42	18.15	43 X 68	92	7.67	18.81
60	84	7.00	20.73	48 X 76	101	8.42	21.59
66	91	7.58	23.45	53 X 83	109	9.08	24.35
72	98	8.17	26.37	58 X 91	118	9.83	27.45
78	105	8.75	29.39	63 X 98	126	10.50	30.50
84	112	9.33	32.57	68 X 106	135	11.25	33.91
90	119	9.92	35.90	72 X 113	143	11.92	36.99
96	126	10.50	39.37	77 X 121	152	12.67	40.69
102	133	11.08	42.99	82 X 128	160	13.33	44.45
108	140	11.67	46.75	87 X 136	168	14.00	47.79
114	147	12.25	50.66	92 X 143	176	14.67	51.70
120	154	12.83	54.72	97 X 151	185	15.42	56.01
126	161	13.42	58.92				
132	168	14.00	63.27	106 X 166	202	16.83	64.48
144	182	15.17	72.40	116 X 180	218	18.17	73.59

PAYLINE WIDTHS-TRENCH PAY QUANTITIES

KEVIN KAMP, ENGINEER
PE - 2006019670
*HAND SIGNATURE ON INDIVIDUAL SHEETS

STATE OF MISSOURI
KEVIN T. KAMP
NUMBER PE-2006019670
PROFESSIONAL ENGINEER

REVISION RECORD

NO	DATE	DESCRIPTION
1	07/18/13	SUBMITTAL FOR SITE DISTURBANCE
2		
3		
4		
5		
6		
7		
8		

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314-656-4566 · 866-250-3679
www.cecinc.com

BRIDGETON LANDFILL, LLC
12976 ST. CHARLES ROCK ROAD
BRIDGETON, MO 63044
PHONE: (314) 744-8195
FAX: (314) 656-2107

BRIDGETON LANDFILL
13570 ST. CHARLES ROCK ROAD

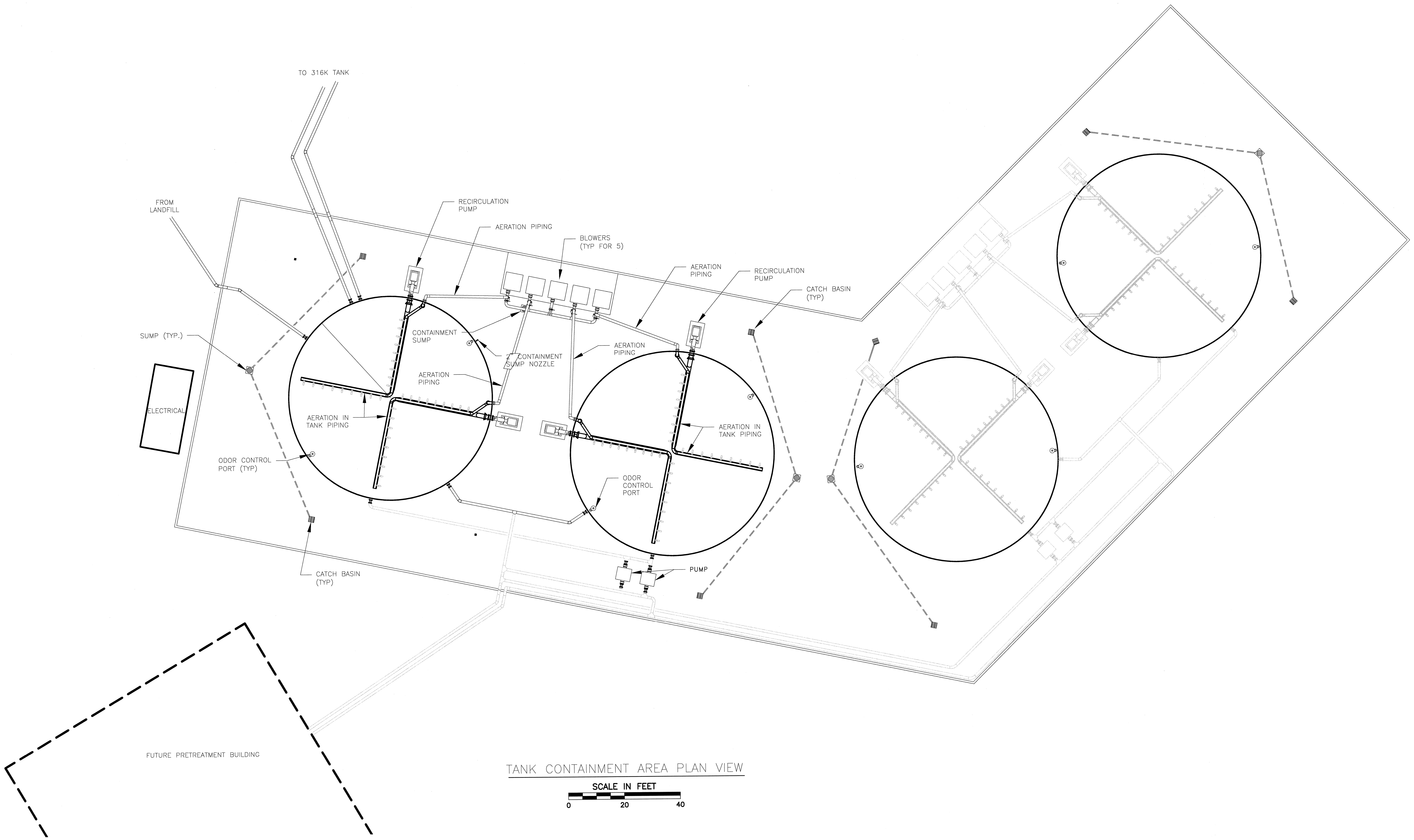
CONSTRUCTION DETAILS

DATE:	JUNE 2013
DRAWN BY:	CAC
DWG SCALE:	AS SHOWN
CHECKED BY:	DRAFT
PROJECT NO:	130-484
APPROVED BY:	KTK (SIGNED & SEALED)*

DRAWING NO.: C800
SHEET 6 OF 9

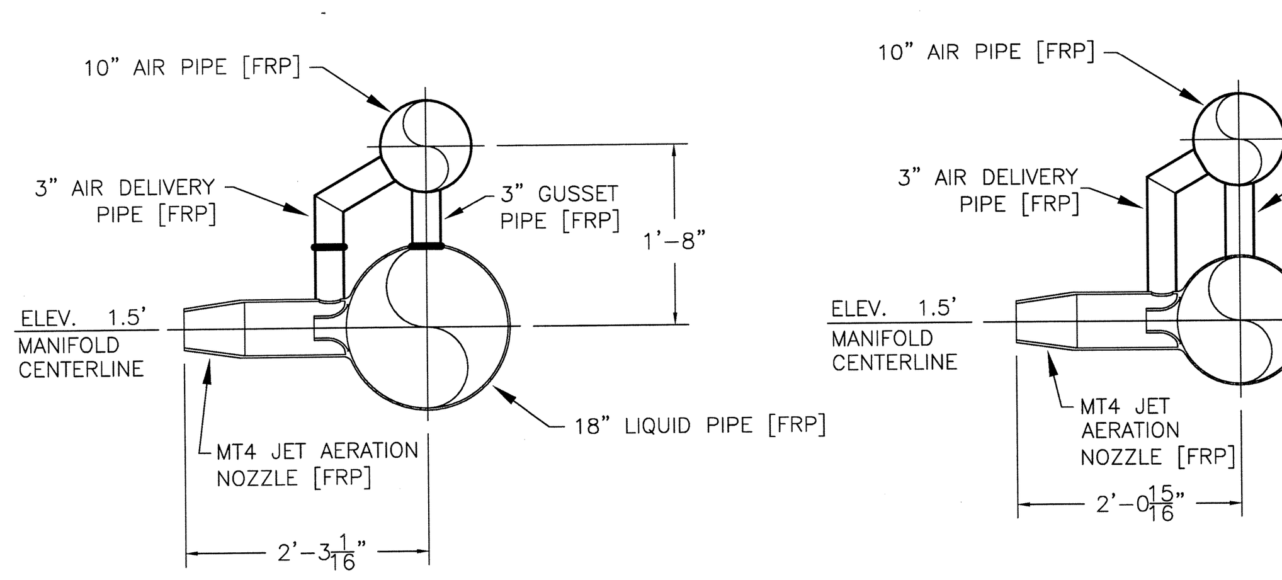
P:\2013\130-484\--CADD\DWG\PLANSET\130484-C800.DWG LAST SAVED BY:(COLTHORP) - 7/25/2013 12:35:18 PM, LAST PRINTED BY:(COLTHORP, CYNTHIA) - 7/25/2013 12:36:15 PM

NORTH



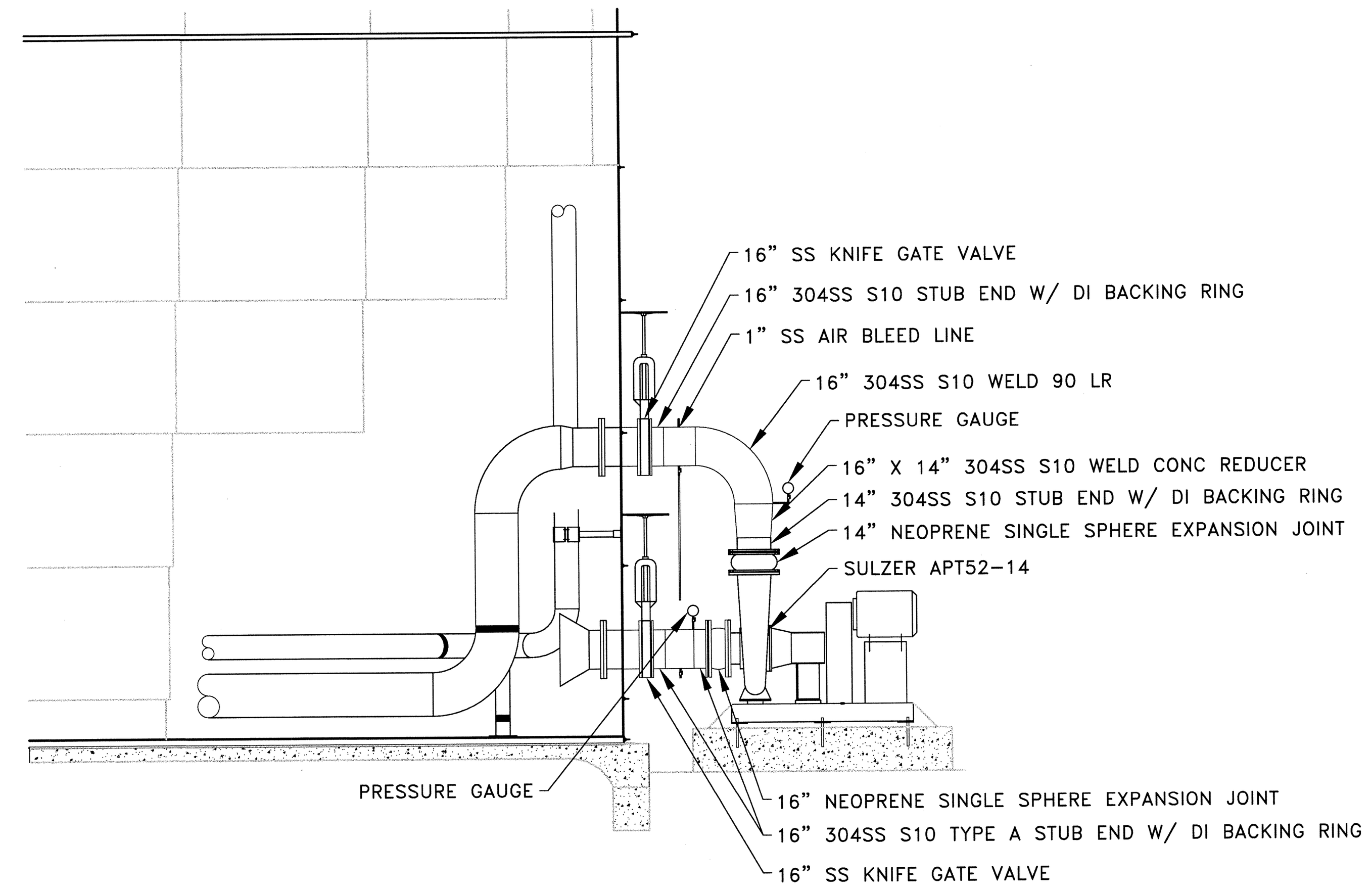
TANK CONTAINMENT AREA PLAN VIEW

SCALE IN FEET 0 20 40



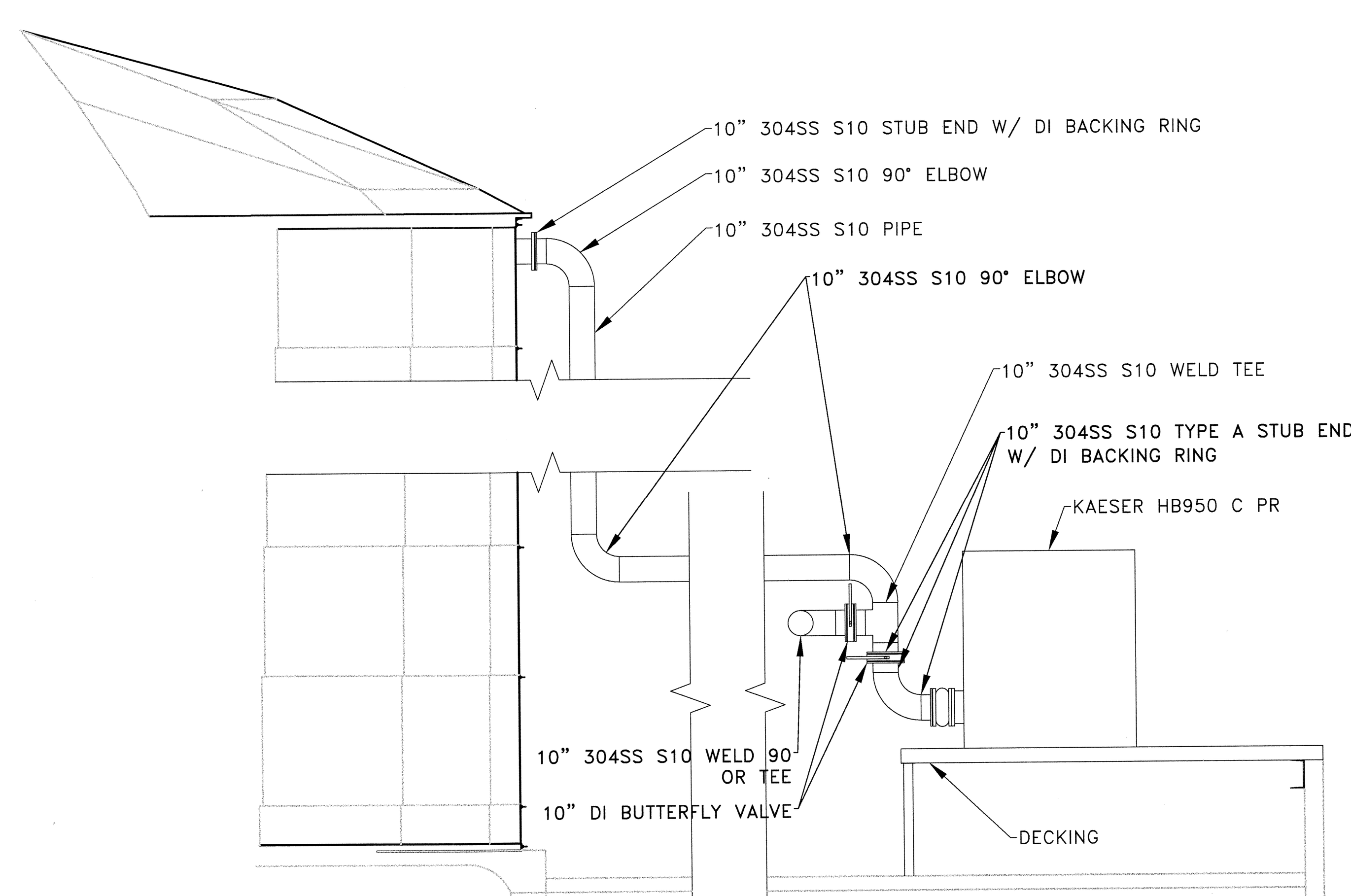
1 / 1 AERATION JET NOZZLE DETAIL

SCALE: 3/16"=1'



2 / 1 AERATION PIPING DETAIL

SCALE: 3/16"=1'



3 / 1 AERATION BLOWER PIPING DETAIL

SCALE: 3/16"=1'

REVISION RECORD

NO	DATE	DESCRIPTION

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BRIDGETON, MO 63044
PHONE: (314) 744-8195
FAX: (314) 656-2107

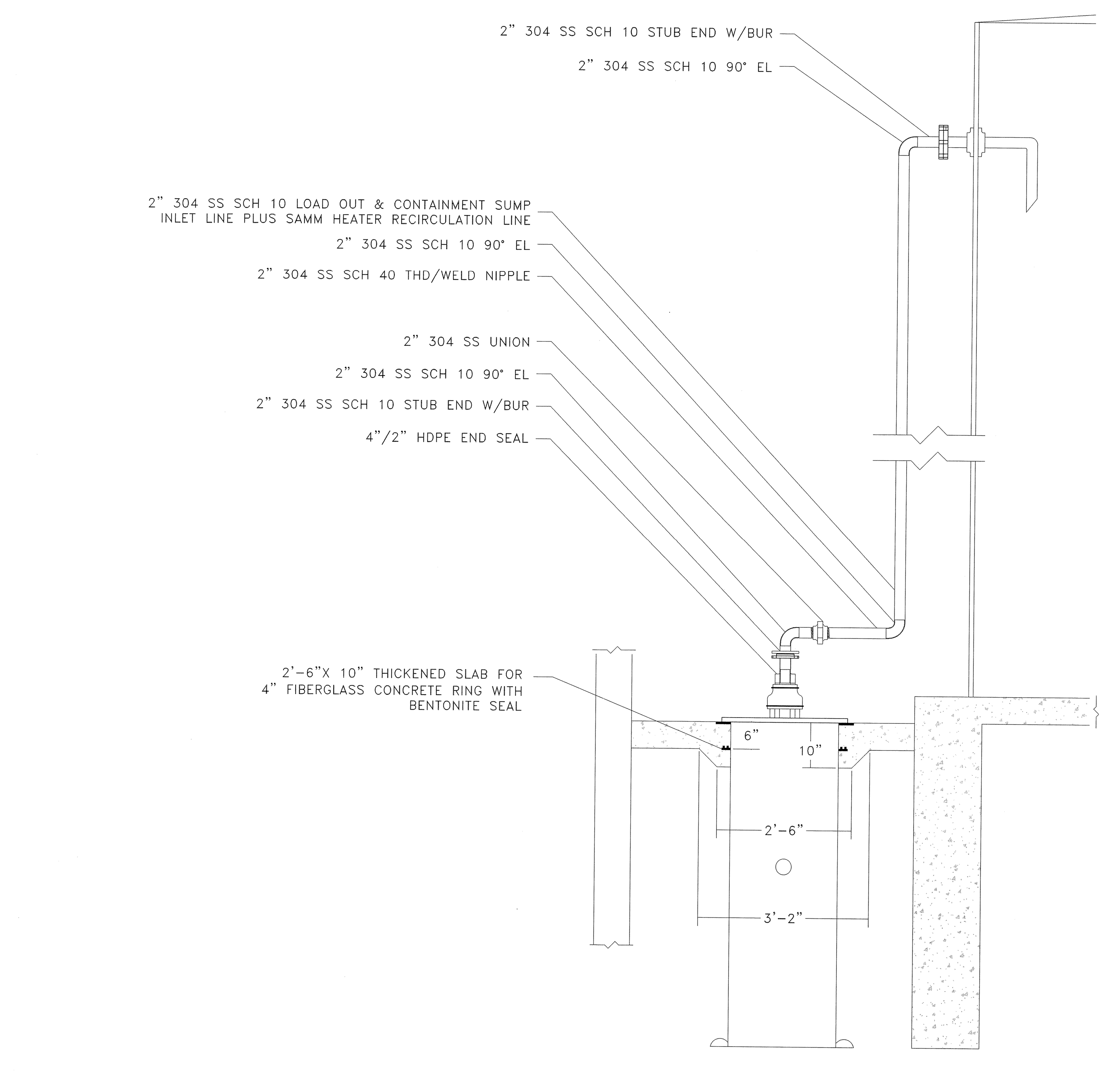
BRIDGETON LANDFILL
13570 ST. CHARLES ROCK ROAD
TANK CONTAINMENT AREA
PLAN AND DETAILS

DATE:	JULY 2013	DRAWN BY:	JKS
DWG SCALE:	AS NOTED	CHECKED BY:	IAC
PROJECT NO:			130-484
APPROVED BY:			KTK (SIGNED & SEALED)*

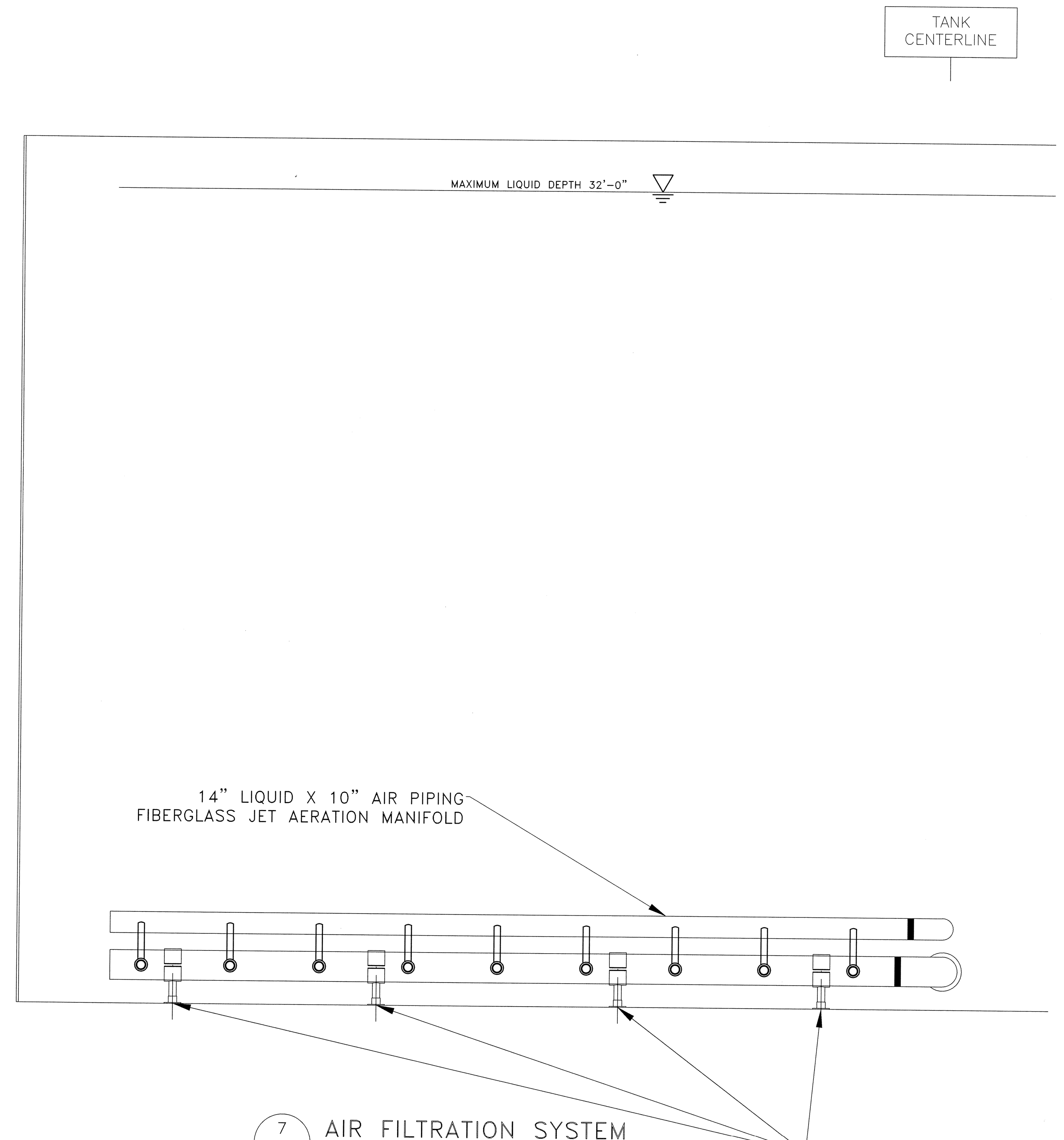
STATE OF MISSOURI
KEVIN T. KAMP
NUMBER PE-2006019670
PROFESSIONAL ENGINEER

DRAWING NO.: **EN-7**

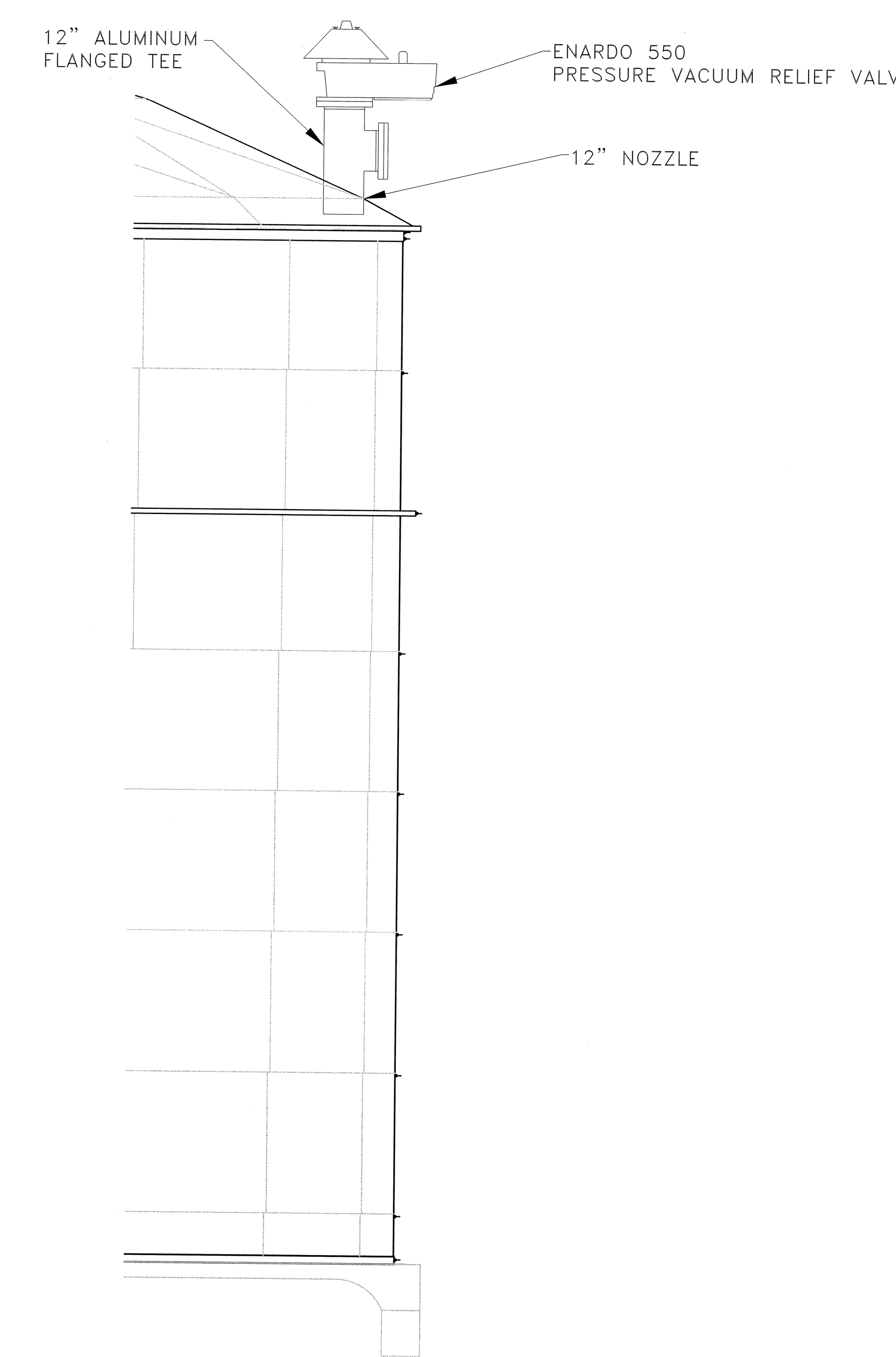
SHEET 7 OF 9



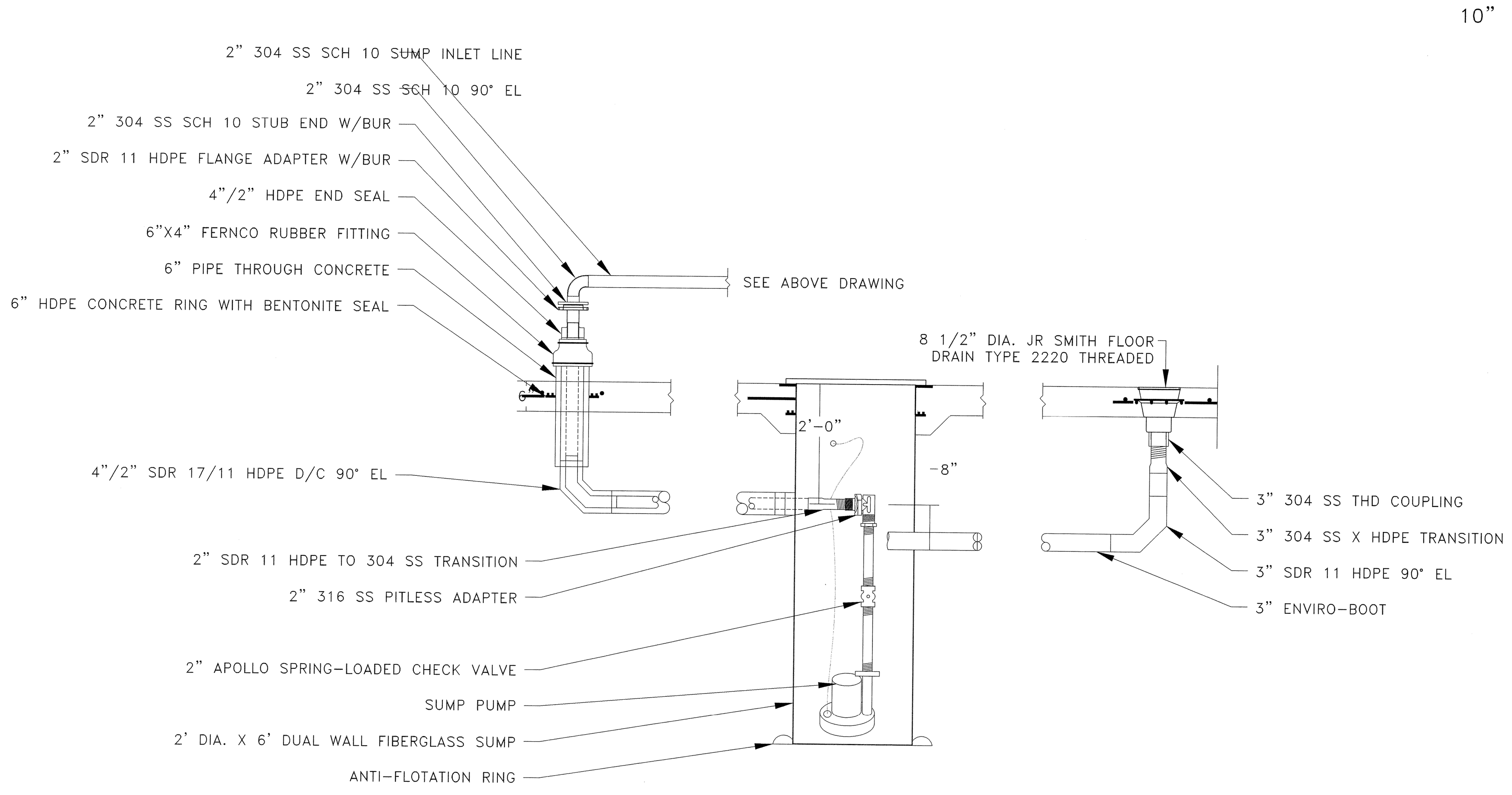
1/3 CONTAINMENT SUMP DETAIL
SCALE: N.T.S.



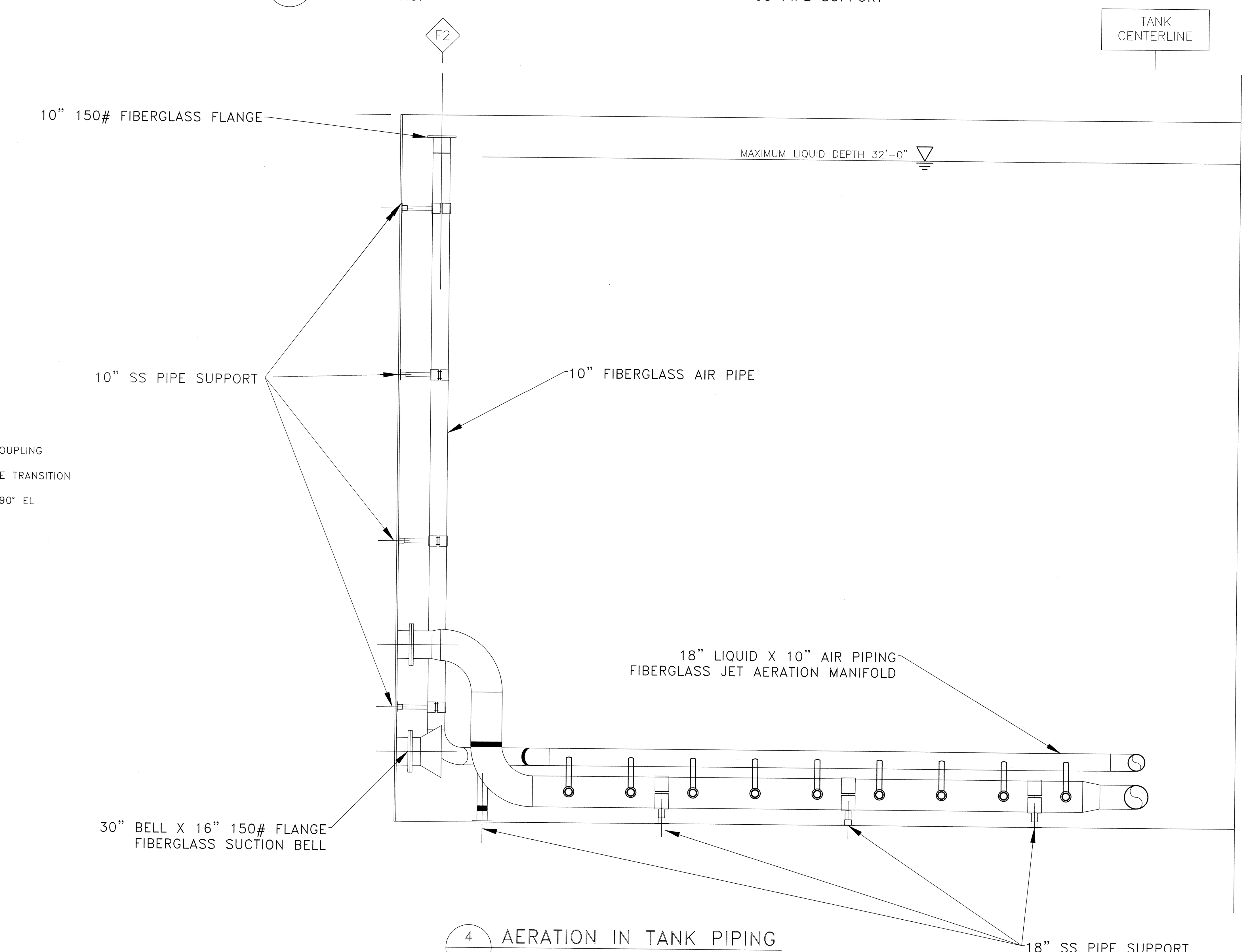
7/6 AIR FILTRATION SYSTEM
SCALE: N.T.S.



3/6 AERATION NOZZLE DETAIL
SCALE: N.T.S.



2/3 CONTAINMENT SUMP DETAIL
SCALE: N.T.S.



4/6 AERATION IN TANK PIPING
SCALE: N.T.S.

REVISION RECORD

NO	DATE	DESCRIPTION
1	07/25/13	SUBMITTAL TO MDNR-SWMP
#	####	####
#	####	####
#	####	####
#	####	####
#	####	####
#	####	####
#	####	####
#	####	####

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FAX: (314) 656-2107

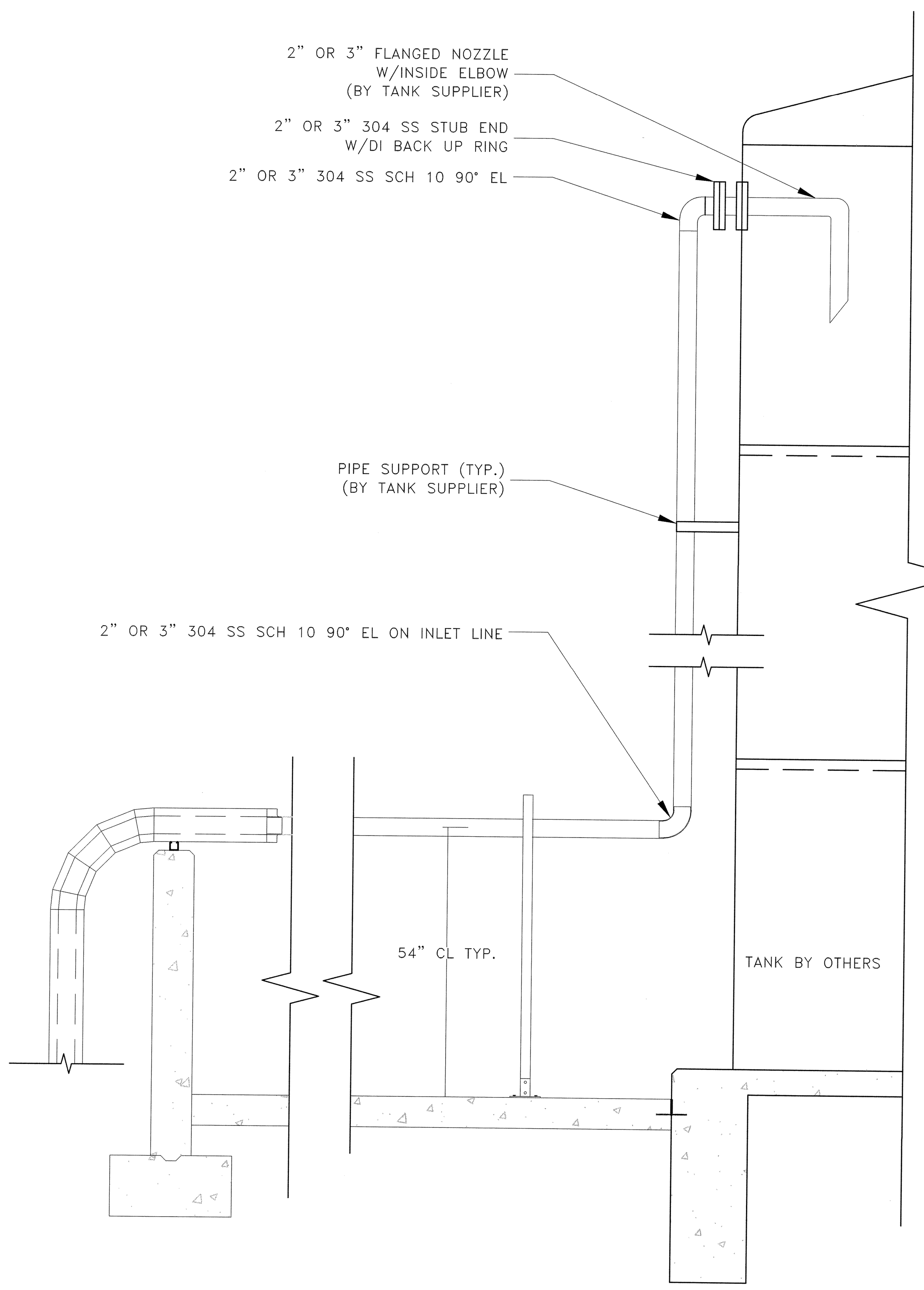
BRIDGETON LANDFILL
13570 ST. CHARLES ROCK ROAD
TANK AERATION SYSTEM
SECTIONS AND DETAILS

DATE:	JULY 2013	DRAWN BY:	JKS
DWG SCALE:	AS NOTED	CHECKED BY:	IAC
PROJECT NO:	130-484		
APPROVED BY:	KTK (SIGNED & SEALED)*		

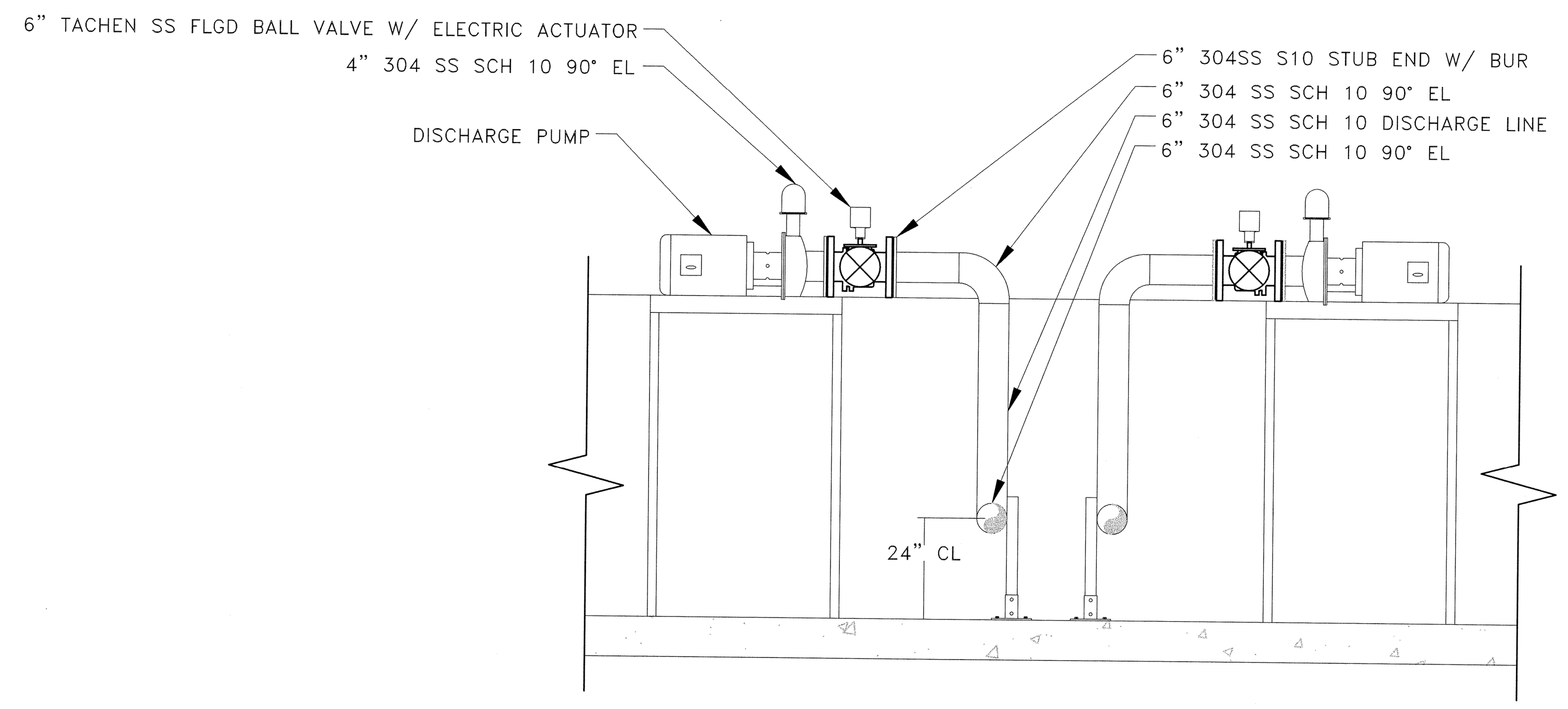
STATE OF MISSOURI — KEVIN T. KAMP — NUMBER PE-2006019670 — PROFESSIONAL ENGINEER

DRAWING NO.: **EN-8**

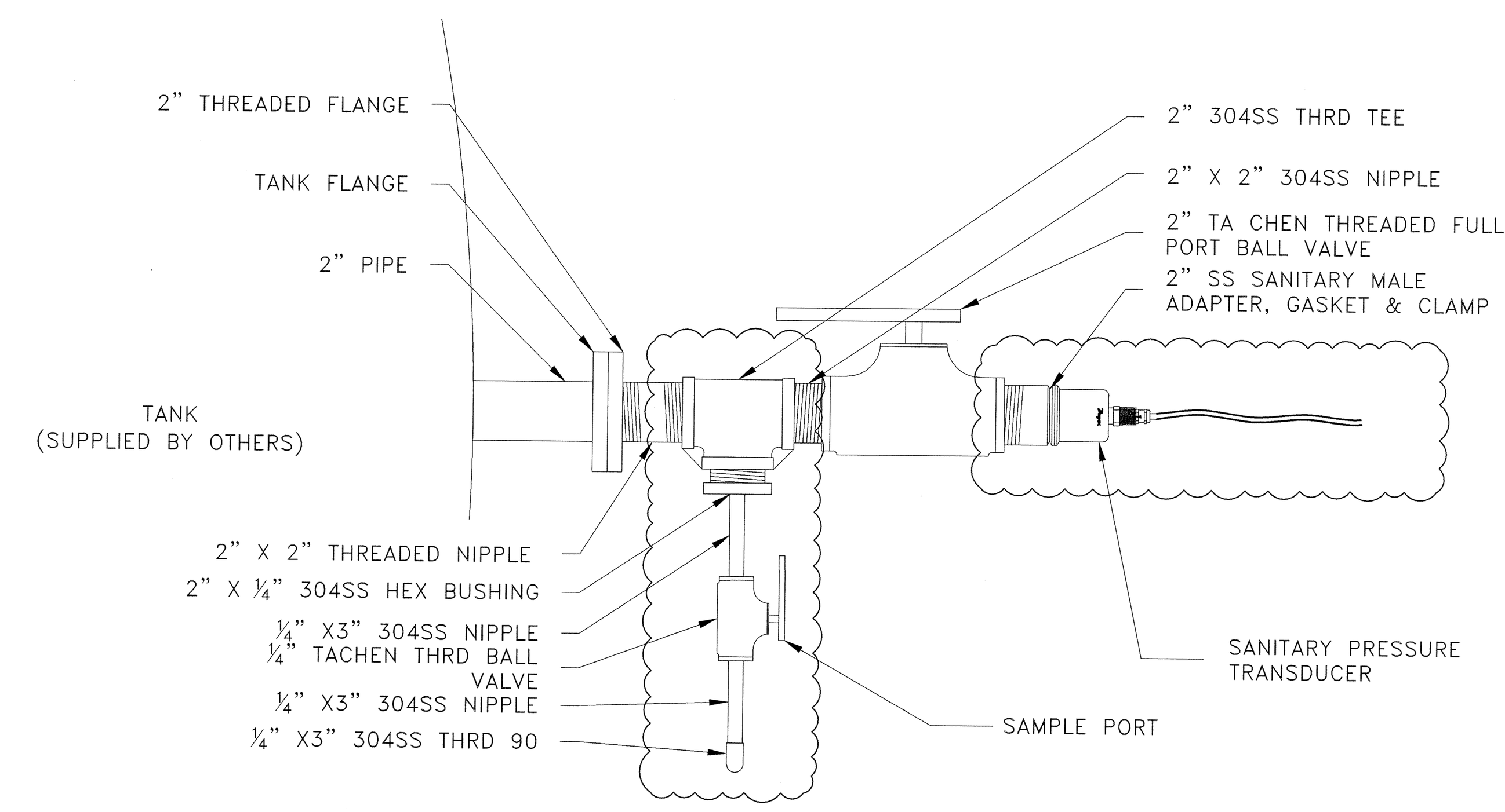
SHEET 8 OF 9



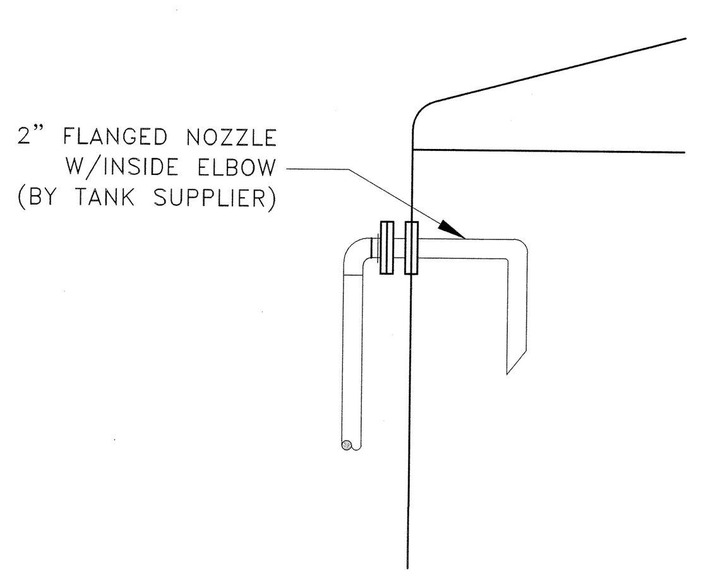
6/5 INLET PIPE DETAIL
SCALE: N.T.S.



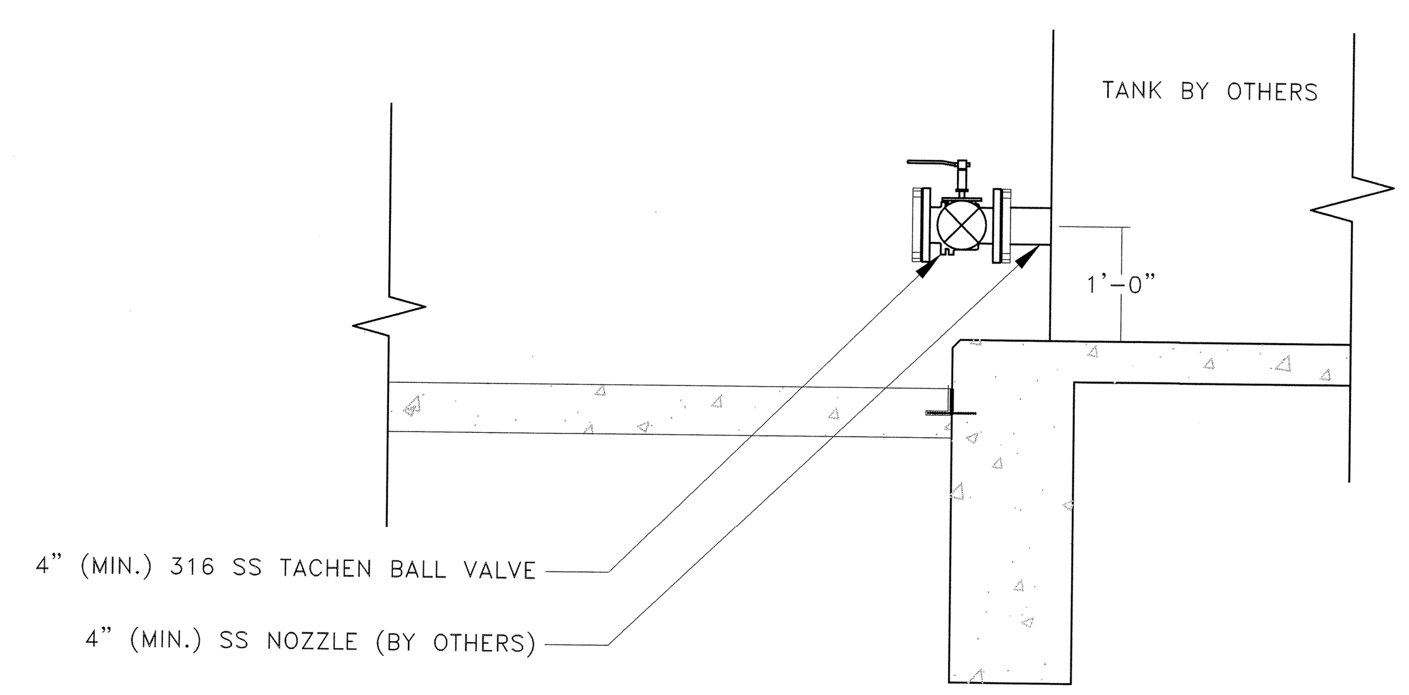
4/5 DISCHARGE PUMP DETAIL
SCALE: N.T.S.



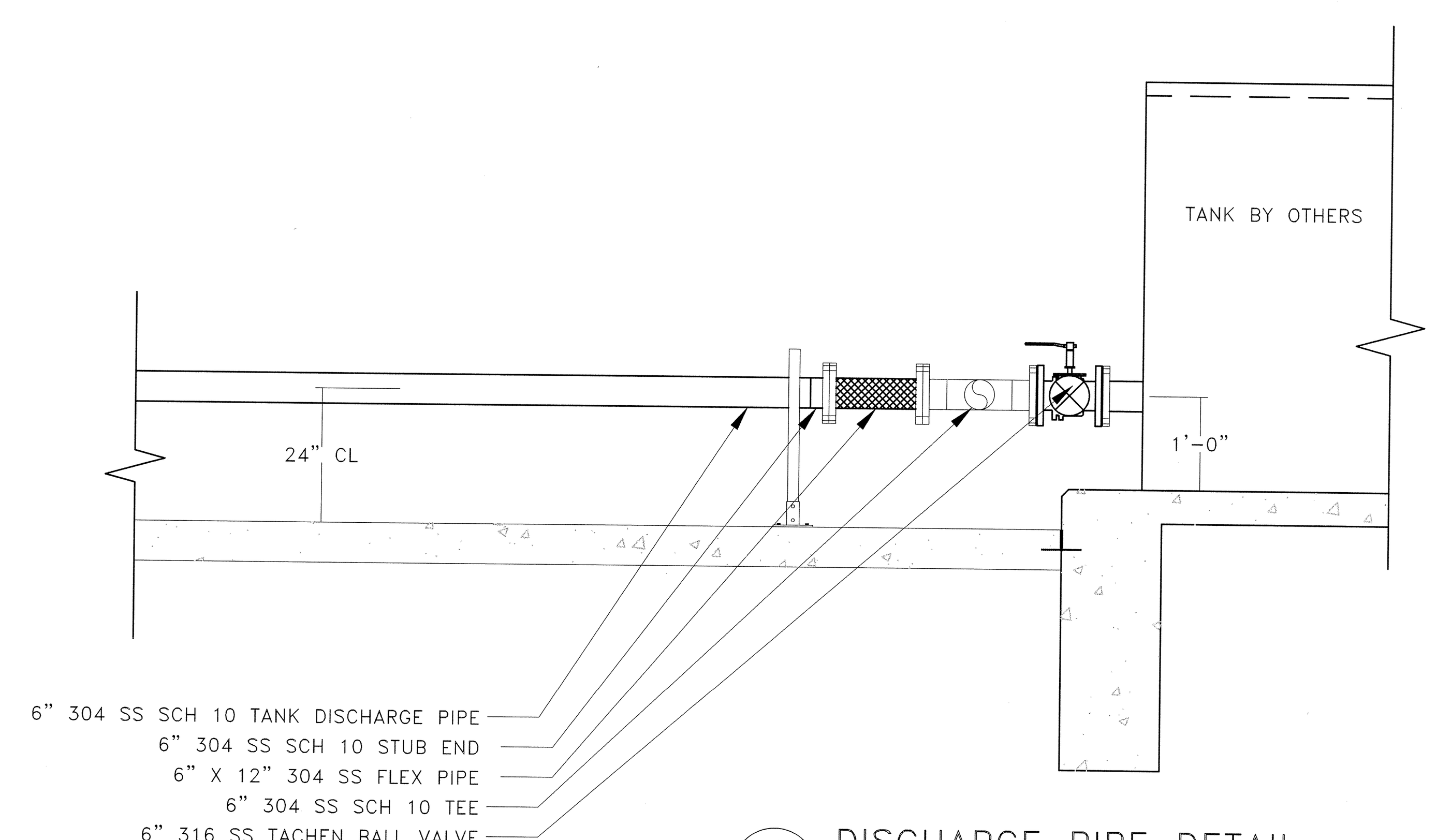
5/5 PRESSURE TRANSDUCER DETAIL
SCALE: N.T.S.



2/5 2" SUMP INLET DETAIL
SCALE: N.T.S.



7/5 NOZZLE DETAIL FOR FUTURE DISCHARGE
SCALE: N.T.S.



3/5 DISCHARGE PIPE DETAIL
SCALE: N.T.S.

REVISION RECORD

NO	DATE	DESCRIPTION
1	07/25/13	SUBMITTAL TO MDNR-SWMP

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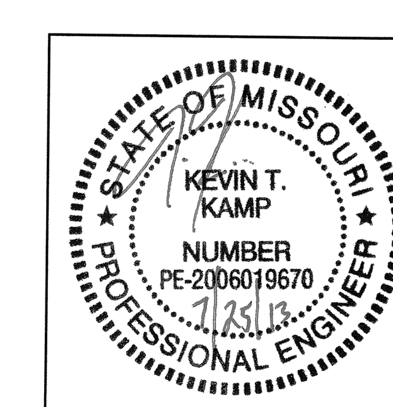
BRIDGETON, MO 63044
PHONE: (314) 744-8195
FAX: (314) 656-2107

BRIDGETON LANDFILL
13570 ST. CHARLES ROCK ROAD
TANK CONTAINMENT AREA
PLAN AND DETAILS

DATE:	JULY 2013	DRAWN BY:	JKS
DWG SCALE:	AS NOTED	CHECKED BY:	IAC
PROJECT NO:	130-484		
APPROVED BY:	KTK (SIGNED & SEALED)*		



DRAWING NO.: EN-9
SHEET 9 OF 9

ATTACHMENT C

CADY AQUASTORE/CST TANK DRAWINGS AND CALCULATIONS

CST STORAGE
345 Harvestore Drive
Dekalb, IL 60115-9607 U.S.A.
815-756-1551 Phone, 815-756-7821 Fax

QMS REGISTERED
0534
ISO9001 CERTIFIED

Project Name: ***Bridgeton Landfill II***

Project Location: ***Bridgeton, Missouri***

Dealer: ***Cady Aquastore***
920G Prairie Drive
Sycamore, Illinois, 60178
Phone: (815) 899-5678 Fax: (815) 899-5681

Project Number: ***8131932/8139639***

Submittal Release.No.: ***1***

Aquastore Glass Fused to Steel Bolted Storage Tank

73' diameter (nom.) x 34' high (nom.) Model 7334
Steel Floor Foundation

Shell interior coating:

Vitrium fused glass with Edgecoat process

Shell exterior coating:

Fused glass

Shell Exterior Color: ***Cobalt Blue***

Roof Exterior Color: ***N/A***

Date: May 22, 2013

MADE IN AMERICA WITH AMERICAN ★ STEEL ★

EQuote # 8131932 rev. 1

Construction Method: Jack

This document consists of 25 pages.

Submitted by:	Date: 5/29/2013	Date:	Expires:
Date:	STATE OF MISSOURI JOHN J. SWEENEY E-26360 REGISTERED PROFESSIONAL ENGINEER		

Tank Project Drawing Index

Document Number	Document Title
8131932/8139639-001	Tank Drawing
8131932/8139639-010	Tank Calculations & Design Formulas
8131932/8139639-011	Tank General Notes
8131932/8139639-012	Tank Fastener Schedule
8131932/8139639-013	Tank Schematic
8131932/8139639-014	Tank Parts List

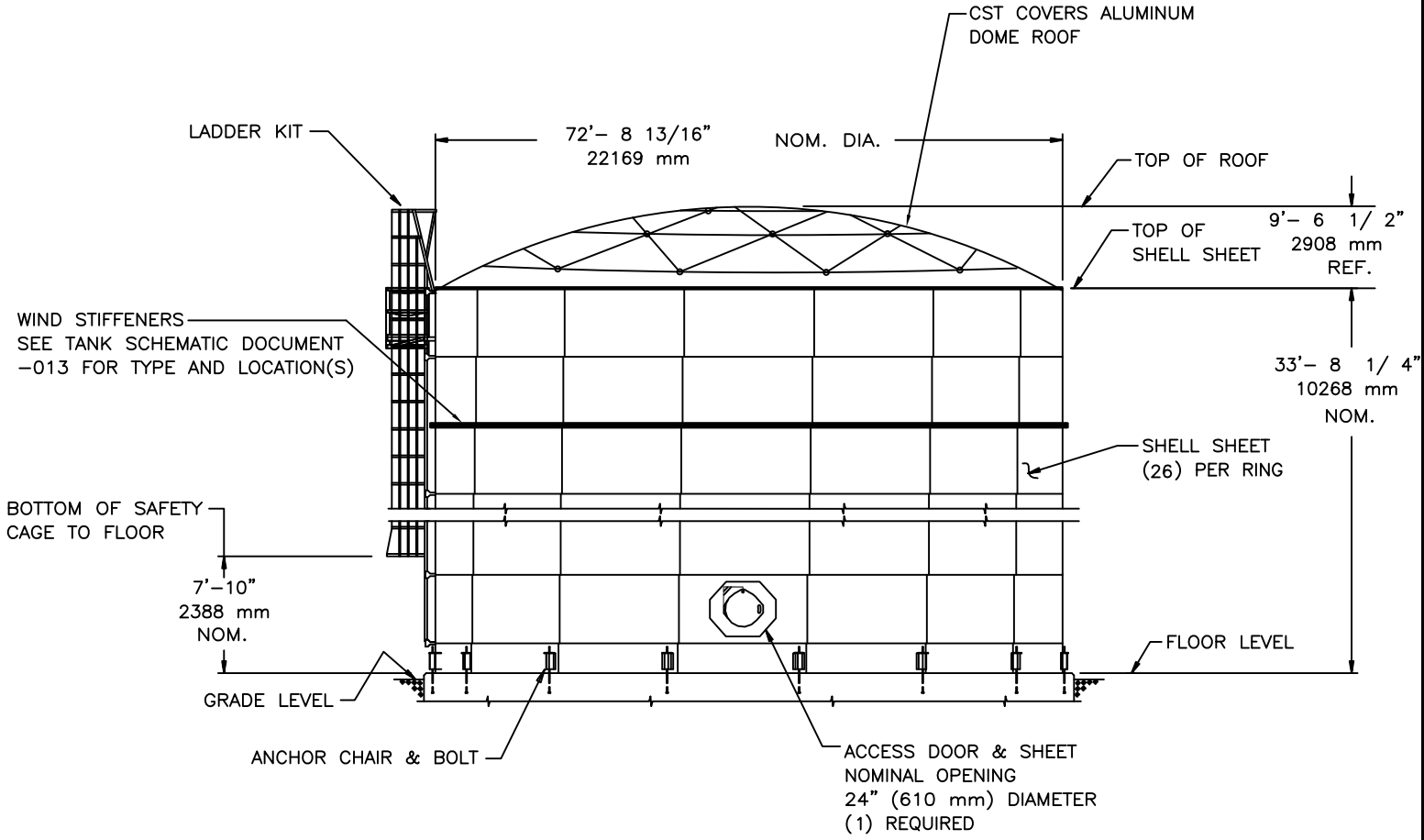
Foundation Project Index

8131932/8139639-002	SF Foundation Drawing
8131932/8139639-003	Anchor Bolt Placement
8131932/8139639-020	Foundation Calculations
8131932/8139639-021	Foundation General Notes
8131932/8139639-022	Foundation Materials Schedule
8131932/8139639-023	Foundation Parts List
8131932/8139639-024	Foundation Fastener Schedule
8131932/8139639-025	Manufacturers Warranty

NOTES:
1. THIS DRAWING IS NOT TO SCALE.
2. REFER TO TANK SCHEMATIC DOCUMENT −013 FOR NUMBER OF RINGS IN TANK AND RESPECTIVE SHEET THICKNESSES.
3. THIS TANK AND FLOOR ARE NOT DESIGNED FOR ANY EXTERNAL HYDROSTATIC LOADING.

TANK DESIGN FREEBOARD	18 in 457 mm
MAX. ROOF LOAD PER ATTACHMENT POINT (FIXED TYPE CONNECTION)	7100 lb 3221 kg

REL	DESCRIPTION
1	REL PER MIP 8131932 05/22/13



ELEVATION

PANEL INTERIOR COATING:
VITRIUM FUSED GLASS WITH EDGECOAT PROCESS
PANEL EXTERIOR COATING:
FUSED GLASS
SHELL COLOR: COBALT BLUE

CST STORAGE
DEKALB, ILLINOIS 60115

FILE: 8131932A

DRAWN BY DRT
DATE 05/22/13

7334 SFTT
SZ AWWA D103−09
BRIDGETON LANDFILL II
BRIDGETON
MISSOURI

DRWG NO. 8131932/8139639−001

REL.: 1

DATE: May 22, 2013

BY: TM

SUMMARY OF TANK DESIGN INPUT DATA

STRUCTURE MODEL	73 34	
FOUNDATION TYPE	Steel Floor	
SPECIFIC GRAVITY	1.000	
H/V PRESSURE RATIO	1.000	
FREEBOARD	18.000 in	457.200 mm
ROOF TYPE	CST Covers Aluminum Dome	
ROOF WEIGHT	2.200 psf	10.740 kg/m2
SC ROOF HEIGHT	0.000 in	0.000 mm
DC ROOF PROJ AREA	479.600 sq ft	44.556 sq m
DC ROOF CENTROID	46.100 in	1170.940 mm
TOTAL ROOF HEIGHT	114.504 in	2908.402 mm
ROOF SNOW LOAD	25.000 psf	1.198 kPa
WIND DESIGN	ASCE 7-05*(10.00 psf)*	
EXPOSURE FACTOR	B	
IMPORTANCE FACTOR	1.000	
WIND SPEED	100.000 mph	45.000 m/s
WIND STIFFENER ANALYSIS	ASCE 7-05*(10.00 psf)*	
SEISMIC DESIGN	AWWA D103-09/IBC 2006	
Ss	0.495	
S1	0.151	
TL	12.0	
SEISMIC IMPORTANCE FACTOR	1.000	
SDs	0.330	
SD1	0.101	
SITE CLASS	B	
FLAT BOTTOM GROUND SUPPORTED ANCHORED TANK.		
DESIGN BASE SHEAR	V =0.039 W	
ANALYSIS PROCEDURE	AWWA D103-09	
ALLOWABLES USED	AISC	
FLOOR O.D	72.875 ft	22212.300 mm

SUMMARY OF INTERNALLY ASSIGNED PARAMETERS

BOLT DIAMETER	0.500 in	12.700 mm
HOLE DIAMETER	0.562 in	14.288 mm
TOP COURSE EDGE DIST	1.000 in	25.400 mm
STEEL FLOOR IN FNDN	0.094 in	2.388 mm
DIST T/FTG TO B/FLR	0.000 in	0.000 mm
TOTAL FNDN THICKNESS	0.094 in	2.388 mm
SHEET DENSITY	590.000 pcf	9451 kg/m3
STEEL ELASTIC MODULUS	30000000 psi	206843 MPa
STEEL FLOOR DENSITY	590 pcf	9451 kg/m3
NET SHEET WIDTH	105.462 in	2679.000 mm
NET STANDARD SHEET HT.	54.990 in	1397.000 mm
STARTER PANEL HEIGHT	18.308 in	465.000 mm
INVENTORY USED	wssf(1311)	

73 34 AQUASTORE STRUCTURE DESIGN SUMMARY (26 FULL LENGTH SHEETS PER RING/COURSE)

COURSE NUMBER	THICK In.	THICK mm	GEOM CODE	MAT CODE	LIMITING FACTOR(S)
1	0.132	3.4	1201	2	
2	0.132	3.4	1201	2	
3	0.132	3.4	1201	2	
4	0.164	4.2	1201	2	[15]
5	0.197	5.0	1201	2	[15]
6	0.228	5.8	1301	2	[15]
7	0.262	6.7	1301	2	[15]
FND	0.322	8.2	6321	2	[15]

WIND STIFFENERS REQUIRED:

STIFFENER AT BOTTOM OF COURSE 2	=	2.718cu in	5.5 short Web Truss
ANCHORS REQUIRED:		(1)0.75in. ANCHORS REQUIRED PER SHEET.	
STRUCTURE DIAMETER	=	72.73 ft	22169.36 mm
HEIGHT OF STRUCTURE TO EAVE	=	33.69 ft	10267.65 mm
SLOSHING WAVE HEIGHT	=	0.84 ft	255.80 mm
MINIMUM FREEBOARD	=	0.00 ft	0.00 mm
VOLUME OF STRUCTURE TO EAVE	=	139966 cu ft	3963 m3
VOLUME OF CONTENTS	=	133733 cu ft	3787 m3
VOLUME OF CONTENTS	=	1000396 gal	3786910 L
VOLUME OF STEEL FLOOR FND.	=	33 cu ft	1 m3
WEIGHT OF EMPTY CYLINDER ABOVE FLOOR	=	69718 lb	31624 kg
WEIGHT OF ROOF	=	9141 lb	4146 kg
SNOW (LIVE) LOAD	=	103874 lb	47116 kg
WEIGHT OF CONTENTS	=	8344968 lb	3785211 kg
STEEL FLOOR WEIGHT	=	19277 lb	8744 kg
TOTAL WEIGHT ON FOOTING	=	8546978 lb	3876841 kg
WIND SHEAR AT TOP OF FOOTING	=	29298 lb	130322 N
WIND MOMENT AT TOP OF FOOTING	=	592901 ft-lb	804 kN-m
SEISMIC SHEAR AT TOP OF FOOTING	=	332941 lb	1480997 N
SEISMIC MOMENT AT TOP OF FOOTING	=	4126827 ft-lb	5596 kN-m

HOOP STRESS ANALYSIS

---- STRESS-PSI ----

Course Number	Depth (ft)	Press (PSI)	Net Tensile	Allowable Tensile	Hole Bearing	Allowable Bearing	Bolt Shear	Allowable Shear
1	3.2	1.4	6179	28721	9593	67500	3224	30000
2	7.7	3.4	15123	28721	23478	67500	7892	30000
3	12.3	5.3	24066	28721	37363	67500	12559	30000
4	16.9	7.3	26569	28721	41248	67500	17226	30000
5	21.5	9.3	28111	28721	43643	67500	21894	30000
6	26.1	11.3	26511	28191	38369	67500	22277	30000
7	30.7	13.3	27125	28191	39257	67500	26191	30000
FND	32.2	13.9	23169	28191	33531	67500	27495	37500

AXIAL STRESS ANALYSIS

---- STRESS-PSI ----

Course Number	Axial Compressive	Allowable Compressive	Hole Bearing	Allowable Bearing	Bolt Shear	Allowable Shear
1	331	599	3325	67500	1118	30000
2	350	599	3513	67500	1181	30000
3	369	599	3702	67500	1244	30000
4	315	742	3168	67500	1323	30000
5	281	889	2826	67500	1418	30000
6	262	1027	2630	67500	1527	30000
7	247	1177	2478	67500	1653	30000
FND	207	1439	1039	67500	852	37500

WIND STRESS ANALYSIS

---- STRESS-PSI ----

Course Number	Axial Comp	Wind Bending	Total Comp	Allowable Comp	Hole Bearing	Allowable Bearing	Bolt Shear	Allowable Shear
1	44	7	51	798	517	90000	174	40000
2	63	14	77	798	774	90000	260	40000
3	82	23	105	798	1055	90000	355	40000
4	84	28	113	990	1131	90000	472	40000
5	89	33	122	1186	1223	90000	613	40000
6	96	38	133	1369	1339	90000	777	40000
7	102	42	144	1569	1447	90000	966	40000
FND	89	37	126	1919	634	90000	520	50000

SEISMIC STRESS ANALYSIS

---- STRESS-PSI ----

Course Number	Axial Comp	Seismic Bending	Total Comp	Allowable Comp	Hole Bearing	Allowable Bearing	Bolt Shear	Allowable Shear
1	44	51	95	798	957	90000	322	40000
2	63	100	163	798	1635	90000	550	40000
3	82	173	255	798	2561	90000	861	40000
4	84	223	307	990	3087	90000	1289	40000
5	89	276	365	1186	3662	90000	1837	40000
6	96	334	430	1369	4315	90000	2506	40000
7	102	390	492	1569	4943	90000	3298	40000
FND	89	348	437	1919	2196	90000	1801	50000

SEISMIC STRESS ANALYSIS CONTINUED

Course Number	---- STRESS-PSI ---- Hydro-Dynamic Hoop	Total Hoop	Allowable Tensile
1	631	6810	38295
2	1397	16520	38295
3	2052	26118	38295
4	2092	28661	38295
5	2039	30150	38295
6	1960	28471	37588
7	1830	28955	37588
FND	1515	24684	37588

TANK DESIGN SPECIFICATIONS

This tank is designed in accordance with **ANSI/AISC 360-05,**
Specification for Structural Steel Buildings - Allowable Stress Design.
See page 1 of Document 8131932/8139639-010 for Summary of Tank Design Input Data.

COATINGS SPECIFICATIONS

Coatings used on components of this tank are in compliance with the appropriate sections of AWWA Standard D103.

STRUCTURE BOLT SPECIFICATIONS

Structure bolts are carbon steel, zinc mechanically deposited per the latest revision of ASTM B695, class 50,type 1;with 1/2"-13 UNC-2A thread, and conform to AWWA D103,Section 2.2.1 as noted below.
A. 1 inch long and 1-1/4 inch long bolts conform to the mechanical properties of SAEJ429, Grade 5 - equivalent to the mechanical properties of ASTM A325.
B. 1-1/2 inch long and longer bolts conform to the mechanical properties of SAEJ429, Grade 8 - equivalent to the mechanical properties of ASTM A490.
Unless noted, all tank structure connections are bearing type connections, snug-tight condition, per ANSI/AISC 360-05. Tank manufacturer does not require special inspection per IBC, Section 1704.

APPURTENANCE AND PIPING ORIENTATION

Orientation of all appurtenances and piping connections shall be established in the field.

THROUGH-THE-SHEET PENETRATIONS

All openings through the tank side wall greater than 4 inches (102mm) in diameter shall be reinforced in accordance with AWWA D103, Section 3.11. All openings through sheets having less than 24 inches (610 mm) between horizontal bolt lines, or having less than 24 inches (610 mm) of available sheet space from the floor surface up to the first horizontal bolt line shall not exceed a diameter of 4 inches (102 mm). These openings of 4 inches (102 mm) and less shall be reinforced in accordance with AWWA D103, Section 3.11.

LADDER SPECIFICATIONS

The ladder system is manufactured in compliance with AWWA Standard D103 Section 5.4 and meets minimum OSHA requirements. In addition, the tank ladder side rails are fabricated from 6061-T6 aluminum while the ladder rungs are fabricated from 6061-T4 aluminum.

LANDFILL LEACHATE WASTE WATER

The coatings and sealants of this tank have been specified based upon the provided leachate analysis and any additional information provided regarding the proposed contents of the tank. CST Storage considers the tank coatings and sealants to be compatible with the proposed contents with the following limitations: the contents shall have a pH within the range of 4 and 11, at ambient temperature, a total concentration of fats, oils and greases not to exceed 10,000 ppm and a total volatiles concentration not to exceed 500 parts per million (ppm). Volatiles may include, but are not limited to, benzene, acetone, xylene, methylene chloride, and similar organic compounds. If the contents exceed the values noted above, the tank coatings and/or sealants may become compromised and the warranty voided.

CATHODIC PROTECTION SPECIFICATIONS

This tank is equipped with a cathodic protection system conforming to NACE SP0196-2011. This system is designed to protect the items described below.
Entire submerged portion of tank sidewall and floor area including appurtenances supplied by the tank manufacturer. Submerged uncoated metal objects not supplied by the tank manufacturer totaling: 0 sq. ft.
Submerged coated metal objects not supplied by the tank manufacturer totaling: 0 sq. ft.
This system is suitable for use in liquid having a resistivity of 1000 - 1100 ohm-centimeters.
Field verification of liquid resistivity is required after the tank is placed into service.
The performance of the cathodic protection system may be adversely affected if the system is operated outside the resistivity range above.
The presence of submerged uncoated metallic items, for which cathodic protection has not been provided by the tank supplier, may also adversely affect the performance of the cathodic protection system.
Electrical isolation and/or the determination of the cathodic protection requirements for such submerged items shall be the responsibility of the owner or the owner's designated agent.
Tank warranty issues may also be affected.
For further information, refer to the instructions provided with the cathodic protection system.

Structure bolt quantities at (H)orizontal and (V)ertical seams

	Thru the sheet fasteners							Truss Fasteners			
BOLT LENGTHS:	1" 25.40	1 1/4" 31.75	1 1/2" 38.10	1 3/4" 44.45	2" 50.80	2 1/4" 57.15	2 1/2" 63.50	1 1/4" 31.75 C.S.	2 1/4" 57.17 C.S.	3" 76.20 C.S.	3 1/2" 88.90 C.S.
SEAM Wide H 1	0	385	83	312	0	0	0	0	0	0	0
SEAM V 1	1274	0	0	0	0	0	0	0	0	0	0
SEAM Wide H 2	516	56	0	0	0	0	0	0	0	0	0
SEAM V 2	1326	0	0	0	0	0	0	0	0	0	0
SEAM Wide H 3	338	52	182	0	0	0	0	0	182	0	0
SEAM V 3	1326	0	0	0	0	0	0	0	0	0	0
SEAM Wide H 4	0	572	0	0	0	0	0	0	0	0	0
SEAM V 4	0	1326	0	0	0	0	0	0	0	0	0
SEAM Wide H 5	0	518	54	0	0	0	0	0	0	0	0
SEAM V 5	0	1326	0	0	0	0	0	0	0	0	0
SEAM Wide H 6	0	518	54	0	0	0	0	0	0	0	0
SEAM V 6	0	1534	0	0	0	0	0	0	0	0	0
SEAM Wide H 7	0	518	54	0	0	0	0	0	0	0	0
SEAM V 7	0	1534	0	0	0	0	0	0	0	0	0
SEAM Fnd. H 8	0	0	1038	54	0	0	0	0	0	0	0
ACCESS DOOR	0	0	0	30	0	0	0	0	0	0	0
REINF. PLT.	0	0	90	0	0	0	0	0	0	0	0
Total:	4780	8339	1555	396	0	0	0	0	182	0	0

Note: All brackets located at top of specified ring.

Ring are identified from top of tank to foundation

Ring #	Sheet Thick.	Bracket Type	Bracket Quantity	Vertical Bolt Line	Shell Sheet Part No.
Use tapered spacer at top horizontal seam					
RING # : 1	0.132" (3.4mm)	BRKT	4	2V	260690-1200
RING # : 2	0.132" (3.4mm)	BRKT	4	2V	256050-1200
-----(TYPE 5.5 short Web Truss #257553)					
RING # : 3	0.132" (3.4mm)	NONE	0	2V	256050-1200
RING # : 4	0.164" (4.2mm)	BRKT	4	2V	256050-0500
RING # : 5	0.197" (5.0mm)	BRKT	2	2V	256050-1300
RING # : 6	0.228" (5.8mm)	BRKT	2	3V	261016-1400
RING # : 7	0.262" (6.7mm)	BRKT	2	3V	261016-1000
Use 26 tapered insert(s) at this horizontal seam					
FND. :	0.322" (8.2mm)	BRKT	2	3V	See fnd. parts list

Item	Quantity	Part No.	Description
-	1	8131932-001	TANK ASSEMBLY
1	1	8131932-002	FOUNDATION ASSEMBLY
2			
3			
4			
5			
6			
7			
8			
9			
10			
11	1	264391-000	MANWAY PLATFORM ASSEMBLY
12			
13			
14	960	258960-000	SILICONE SEALANT (BLACK)
15			
16	1	264082-000	SHORT LADDER ASSEMBLY
17	1	258446-000	LADDER W/CAGE, W/PLATFORM
18			
19			
20			
21	1	277650-000	GASKET, 24"
22	2	266214-1300	REINFORCING PLATE, .197"
23			
24			
25			
26			
27	26	261256-073	STIFFENER ANGLE
28	26	260577-004	SPLICE ANGLE
29	26	084373-000	TAPERED SPACER
30	26	084374-000	TAPERED INSERT
31			
32	182	257553-000	WEB TRUSS, 5.5", SHORT
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44	4780	262000-001	STRUCTURE BOLT, 1"
45	8339	262000-002	STRUCTURE BOLT, 1 1/4"
46	1555	262000-003	STRUCTURE BOLT, 1 1/2"
47	396	262000-004	STRUCTURE BOLT, 1 3/4"
48			
49			
50			
51			
52	182	262415-002	HHCS 1/2 X 2 1/4" SPCL. FNSH.
53			
54			
55	364	261974-000	WASHER, SPECIAL
56	15252	252275-000	WASHER, 1/2"
57	15070	262416-001	HEX. NUT, 1/2" HDZ
58	182	263525-001	HEX. NUT, 1/2" MDZ

Item	Quantity	Part No.	Description
59			
60	7	264913-000	BUSS BAR
61	1	276534-000	AQUASTORE CP LIT. PACK
62			
63	3	266680-300	CATHODIC PROT. SYSTEM - ZINC
64			
65	3	255495-000	INSTRUCTION DECAL
66	3	262778-000	DANGER DECAL
67			
68	1	266182-000	NAMEPLATE
69	1	271220-000	OPERATORS MANUAL
70	3	262166-000	IMPORTANT DECAL
71	3	260581-000	TANK MOD. WARNING DECAL
72			
73	10	268364-000	LADDER BRACKET ASSY. (LONG)
74			
75			
76			
77			
78			
79			
80			
81	1	266216-1012	24" ROUND ACCESS DOOR SHEET
82	26	260690-1200	TOP RING SHEET
83	1	280516-076	24" ACCESS DOOR, NORMAL DUTY, STANDARD (GALV)
84			
85			
86			
87			
88			
89	52	256050-1200	SHELL SHEET 0.132" HSLA
90	26	256050-0500	SHELL SHEET 0.164" HSLA
91	26	256050-1300	SHELL SHEET 0.197" HSLA
92	26	261016-1400	SHELL SHEET 0.228" HSLA
93	25	261016-1000	SHELL SHEET 0.262" HSLA
94			
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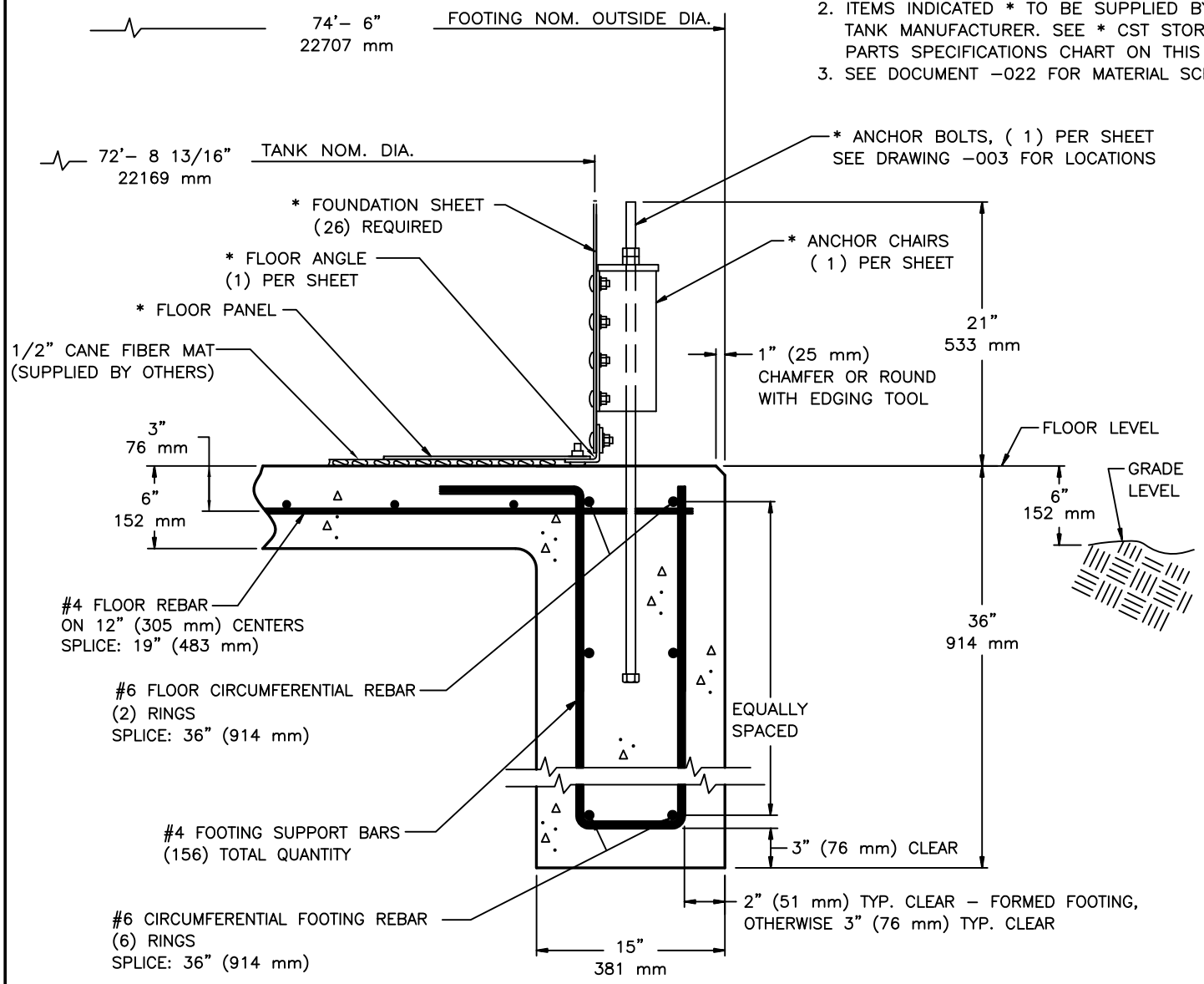
NOTES:
1. THIS DRAWING IS NOT TO SCALE.
2. ITEMS INDICATED * TO BE SUPPLIED BY THE TANK MANUFACTURER. SEE * CST STORAGE PARTS SPECIFICATIONS CHART ON THIS DRAWING.
3. SEE DOCUMENT –022 FOR MATERIAL SCHEDULE.



SECTION THROUGH FOUNDATION

REL	DESCRIPTION
1	REL PER MIP 8131932 05/22/13

* CST STORAGE PARTS SPECIFICATIONS		
FLOOR ANGLES	IN.	3 X 3 X 1/4
	mm	76 X 76 X 6
ANCHOR CHAIRS	IN.	1/4 FORMED PLATE
	mm	6 FORMED PLATE
ANCHOR BOLTS	IN.	3/4 DIA X 36 LG.
	mm	19 DIA X 915 LG.

CST STORAGE

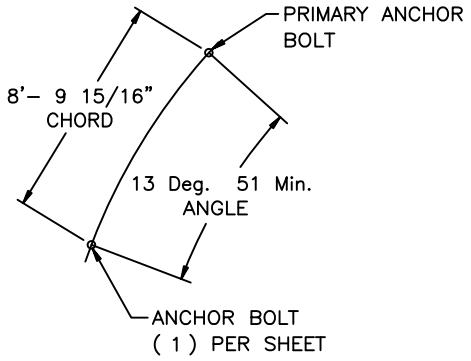
DEKALB, ILLINOIS 60115

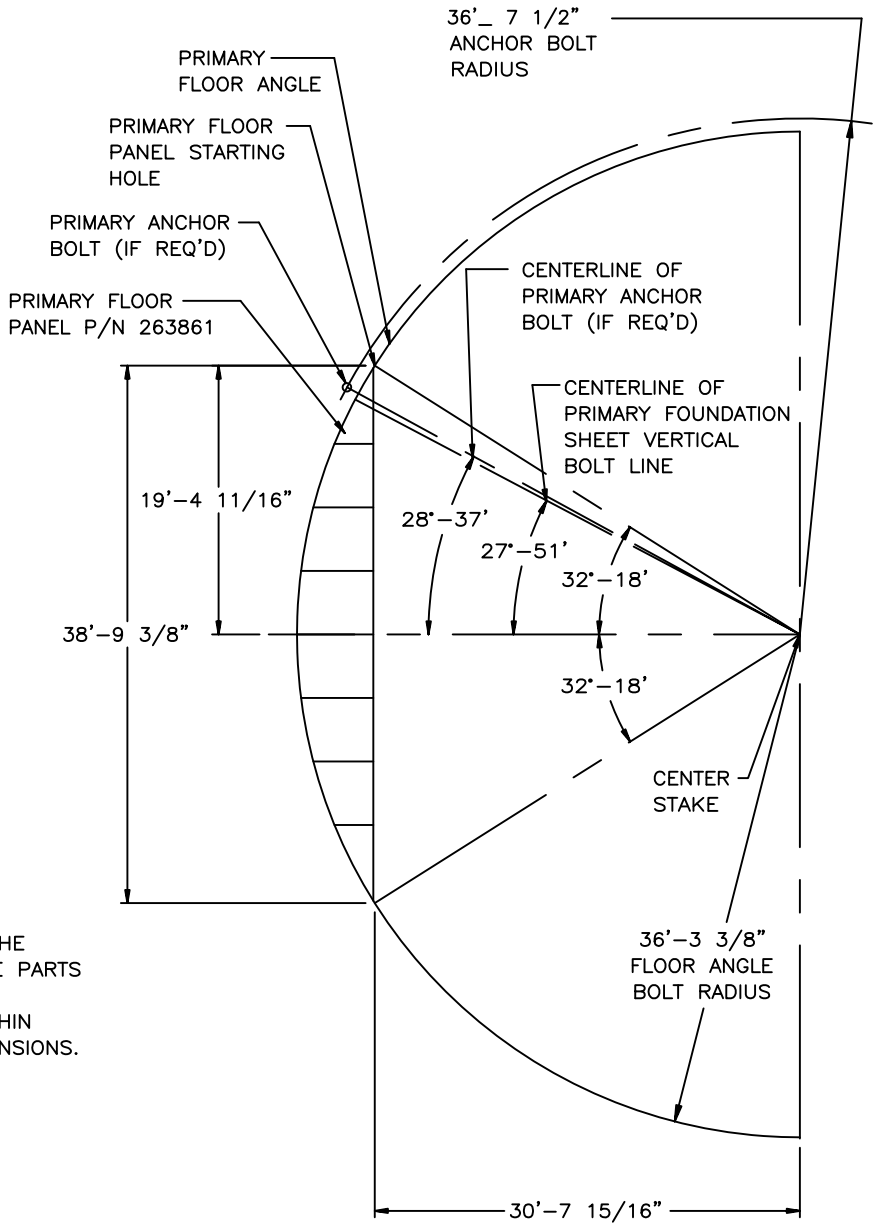
FILE: 8131932B

DRAWN BY DRT
DATE 05/22/13

73' STEEL FLOOR FND.
SZ AWWA D103–09
BRIDGETON LANDFILL II
BRIDGETON
MISSOURI

DRWG NO. 8131932/8139639–002





NOTES:
1. THIS DRAWING IS NOT TO SCALE.
2. ITEMS INDICATED * TO BE SUPPLIED BY THE TANK MANUFACTURER. SEE * CST STORAGE PARTS SPECIFICATIONS CHART ON DRAWING –002.
3. PLACEMENT OF ANCHOR BOLTS TO BE WITHIN 1/2" (13 mm) OF INDICATED CHORD DIMENSIONS.

REL	DESCRIPTION
1	REL PER MIP 8131932 05/22/13

CST STORAGE

DEKALB, ILLINOIS 60115

FILE: 8131932C

DRAWN BY DRT
DATE 05/22/13

73' STEEL FLOOR FND.
SZ AWWA D103–09
BRIDGETON LANDFILL II
BRIDGETON
MISSOURI

DRWG NO. 8131932/8139639–003

TANK DESIGNATION:	**8131932/8139639 Rel 1**	Engineer: TSM	5/22/2013
INPUT:			

Tank Diameter (ft):	72.73	Design per:	ACI 318-05
Contents Height (ft):	32.19	Tank Type:	Anchored
Slab Thickness (in):	6		
Slab O.D. (ft):	74.50		
Foundation Depth (in):	6		
Footer Depth (in):	30		
Footer Width (in):	15	Self or Center Supported Roof :	Self
Allowable soil pressure (psf)	2,500	Specific Gravity of Contents:	1.00
Wind Shear (lbs):	29298	Subgrade Modulus - ks (pci):	69
Wind Moment (ft-lb):	592,901	Coeff. Active pressure - K_a:	0.3
Seismic Shear (lbs):	332941	Concrete strength - f'_c (psi):	6,000
Seismic Moment (ft-lb):	4,126,827	Yield strength of steel - f_y (ksi):	60
Sloshing Wave Height (ft):	0.84		
Weight of Tank (lbs):	69,718		
Weight of Roof (lbs):	9,141		
Snow Load (psf):	25		

TANK DESIGNATION: **8131932/8139639 Rel 1** Engineer: TSM 5/22/2013

RESULTS:

Soil Pressure:				
dead plus live load:	2204 psf	<=	2500 psf	(Allowable)
dead plus live plus wind load:	2241 psf	<=	3333 psf	(4/3 * Allowable)
dead plus live plus seismic load:	2419 psf	<=	3333 psf	(4/3 * Allowable)
dead minus wind load:	216 psf		No Uplift	
dead plus live minus seismic load:	1854 psf		No Uplift	
Shear stress at inside of footer =	84 psi	<=	116 psi	Shear Strength
F.S .Overturning - Seismic w/ 45° line:	4.39	>=	1	Required
F.S. Overturning - Seismic (AWWA):	2.77	>=	1	Required
F.S. Overturning - Wind:	30.43	>=	1.5	Required

A_s - foundation (both ways) layer at mid-height:	0.14	sq.in./ft	[# 4 @ 12" o.c.]
A_s - curb area:	0.72	sq.in.	[2 - # 6]
A_s - footer bottom layer:	0.72	sq.in.	[2 - # 6]
A_s - hoop steel:	1.71	sq.in.	[4 - # 6]
A_s - vertical tie bars (2 legs):	0.27	sq.in./ft	[# 4 @ 17.5" o.c.]

Minimum guidelines and specifications are given below. The owner or the owner's designated agent may amend or modify these guidelines and specifications, but in no case shall the requirements be less than those given below

FOUNDATION DESIGN

See Tank Foundation Design Input Data Sheet for foundation design data.

SITEWORK

1. Clear the site of all vegetation, organic materials, rubbish, debris, and other foreign or objectionable materials above the ground surface. Remove all stumps, large roots, buried logs, and other objectionable materials below the ground surface.

2. Soil beneath the entire tank shall have a minimum bearing capacity of 2500 PSF (119701 Pa) and shall be suitable in all respects to properly support the tank as determined by a qualified professional retained by the owner or the owner's designated agent.

3. Compact the subsoil to site specifications.

4. Orientation of connecting piping shall be established in the field.

5. Place all underground piping. Backfill and compact to site specifications. Inlet/outlet piping may penetrate ring walls provided the hole size is less than or equal to one half the wall height; all details of reinforcement cushioning needs, thrust blocks, and encasement shall be provided by others. Otherwise, all piping must pass beneath the footing unless the footing/foundation system has been designed and fully detailed by others to accommodate both a pipe passing through it and the proper transfer of tank loads to the supporting soil.

6. If conditions exist which require footing and/or floor design details differing from those shown on the drawings herein, such new design and details shall be provided by the owner or the owner's designated agent. CST Storage can not
show details on its drawings other than those derived as a result of the design efforts of its own Engineering Department.

CONCRETE WORK

Concrete work shall conform to the requirements of ACI 301-05, published by the American Concrete Institute, Farmington Hills, Michigan, except as modified by the supplemental requirements noted below.

1. Concrete shall attain an ultimate 28 day compressive strength of 6000 PSI (41369 KPa).

2. Reinforcing bars shall conform to ASTM A615, grade 60. Welding of bars is not permitted. Field bending of partially embedded reinforcing bars shall conform to Section 3.3.2.8.

3. Cement shall conform to ASTM C150, Type I or Type II with air entraining admixture per ASTM C260 added at the mixer to achieve 4-6% by volume of entrained air at the point of concrete placement.

4. Maximum aggregate size shall be 1 1/2" (38 mm). Fine and coarse aggregate shall conform to ASTM C33, and the restrictions on reactive materials specified in ASTM C33, paragraphs 7.3 and 11.2, shall apply.

5. Ready mixed concrete shall conform to ASTM C94, Option A. The supplier shall be responsible for determining the proportions used in the concrete mix.

6. Earth cuts may be used as formwork for footings only, provided the footing depth does not exceed 48" (1219 mm).

7. Finished surfaces
   A. Rough form finish is acceptable for vertical surfaces.
   B. Floated finish is required for the floor surface.

8. The following sections of ACI 301-05 do not apply:
   6 - Architectural Concrete
   7 - Lightweight Concrete
   8 - Mass Concrete
   9 - Prestressed Concrete
   10 - Shrinkage-compensating Concrete

These materials are to be furnished by the builder. Quantities are estimated.

CONCRETE AND GRAVEL REQUIREMENTS:

CONCRETE IN FLOOR:-		
Per 6" depth (152 mm)	80.7 cu. yds	61.7 m3
CONCRETE IN FOOTING:-		
Per 1" depth (25.4 mm)	0.9 cu. yds	0.7 m3

Item	Quantity	Part No.	Description
-	1	8131932-002	S.F. FOUNDATION ASSY.
1	26	261713-1600	0.322" FND. SHT. HSLA
2	1	263847K0100	73.0 FT. DIA. FLOOR ASSEMBLY
3			
4			
5			
6			
7			
8	52	261067-001	TAPERED SPACER
9			
10	26	265621-006	ANCHOR BOLT ASSY., 3/4"
11	26	261424-000	ANCHOR BOLT CHAIR
12			
13	26	261725-006	WASHER, PLATE, 3/4"
14			
15			
16			
17			
18	400	258960-000	SILICONE SEALANT
19	2	261287-000	SEALER PRIMER
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37	849	262000-002	STRUCTURE BOLT 1 1/4"
38	598	262000-003	STRUCTURE BOLT 1 1/2"
39	156	262000-004	STRUCTURE BOLT 1 3/4"
40			
41	1603	262416-001	HEX NUT, 1/2" HDZ
42	1618	252275-000	WASHER, 1/2"
43			
44			
45			
46			
47			
48			
49			

BOLT LENGTHS:	1" 25.40	1 1/4" 31.75	1 1/2" 38.10	1 3/4" 44.45	2" 50.80	ANCHOR RODS
ANCH. CHAIR	0	0	104	104	0	
VERTICAL	0	0	338	0	0	
HORIZONTAL	0	849	156	52	0	

MANUFACTURER'S LIMITED WARRANTY

Five-Year Warranty

CST Storage warrants that an Aquastore® brand liquid storage tank will be free from defects in workmanship and materials, under normal and proper use, maintenance and operation, during the period expiring on the earlier of (i) five years after liquid is first introduced into the tank or (ii) 62 months after shipment from the factory, if the tank is purchased with an Aquastore brand cathodic protection system.

Limitations and Conditions

The CST Storage Limited Warranty is subject to the following limitations and conditions:

a. The CST Storage Limited Warranty shall remain in effect only as long as the tank is used for the storage of municipal potable water or municipal sewage waste water. The CST Storage Limited Warranties shall become void and terminate should the tank be used for storage of any other liquid.

b. The CST Storage Limited Warranty does not cover damage caused by shipping, handling or tank erection, or damage caused by operating or maintenance activities. CST Storage makes no warranty about and shall not be responsible for any defects in erection or installation of a tank.

c. The CST Storage Limited Warranty shall become void and terminate if any alterations are made to the tank without the prior written approval of CST Storage.

d. The CST Storage Limited Warranty shall become void and terminate if the tank is not used, operated and maintained in accordance with the requirements stated in the CST Storage Operating Manual(s) supplied with the tank, or if the tank is damaged or subject to any abuse, misuse or vandalism.

Limitation of Remedies

In the event of any failure of any Aquastore brand liquid storage tank to perform as warranted in the Limited Warranty, the sole and exclusive obligation of CST Storage shall be, at its sole option, either to repair the tank or repair or replace (FOB factory) any part of the tank which is defective.

IN NO EVENT SHALL CST STORAGE BE LIABLE (WHETHER FOR BREACH OF WARRANTY OR CONTRACT, FOR STRICT LIABILITY OR NEGLIGENCE, OR OTHERWISE) FOR ANY SPECIAL, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF CONTENTS OR LOSS OF PROFITS, OR FOR THE CONDITION OR QUALITY OF LIQUID STORED IN THE TANK, OR FOR ANY INABILITY OF OWNER TO PROVIDE PRODUCT OR SERVICE TO ANY CUSTOMER OF OWNER.

Any action against CST Storage for breach of warranty or contract , or for strict liability, negligence or otherwise relating to a tank, must be commenced within one year after such cause of action accrues.

Any Warranty claim shall be made to CST Storage in writing. Once a claim has been made, CST Storage shall have the right to perform on-site inspections of the tank. If CST Storage chooses to do repair work (which, for purposes of this paragraph, shall include repairing or replacing defective parts) on the tank, CST Storage shall be granted permission to perform such work with its own service personnel or personnel of others, and under nonunion conditions unless CST Storage otherwise agrees. Any repairs made to a tank before CST Storage is notified of a claim shall be at the Owner's expense. Preparation for inspection or repair of a tank (such as removing the contents and obstructive equipment in the tank) shall be the sole responsibility and expense of Owner. Preparation of the tank for use after repair shall be the sole responsibility and expense of the Owner.

Disclaimers

EXCEPT FOR THE LIMITED WARRANTY SET FORTH ABOVE, THERE ARE NO UNDERSTANDINGS, AGREEMENTS, REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, RESPECTING THE AQUASTORE BRAND LIQUID STORAGE TANK CST STORAGE EXPRESSLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The CST Storage Authorized Dealers are independent contractors and are not agents or employees of CST Storage. No statement by any CST Storage Authorized Dealer or any CST Storage employee shall constitute an understanding, agreement, representation or warranty by CST Storage. CST Storage makes no warranty with respect to goods manufactured by others, even if sold by a CST Storage Authorized Dealer.

This Limited Warranty and related limitations and disclaimers cannot be modified or amended by a CST Storage Authorized Dealer, and can be modified or amended only by written document signed by an authorized CST Storage employee.

345 Harvestore Drive
DeKalb, Illinois 60115-9607 U.S.A.
815-756-1551 Phone, 815-756-7821 Fax

CST P/N 267233-000 Rel. 3 ECN 11005

CST STORAGE™

May 24, 2013

RE: Aquastore® tank – (1) 73x34 SFTT
MIP # 8131932 & 8139639
Manufacturer's Extended Warranty
Bridgeton Landfill II – Bridgeton, MO

To Whom It May Concern:

The above referenced tank with Aquastore brand Cathodic protection system, has been approved to receive a (5) five year warranty and that warranty shall be as stated on the enclosed Manufacturer's Limited Warranty (P/N 267233-000 Rel. 3 ECN 11005) with the exception of paragraph **"a"** in **Limitations and Conditions**. That paragraph is to be stated as follows:

"CST Storage Limited Warranty shall remain in effect only as long as the tank is used for the storage of municipal potable water, municipal sewage wastewater or municipal landfill leachate. CST Storage Limited Warranties shall become void and terminate should the tank be used for storage of any other liquid."

***Note:* Liquid product stored to maintain a pH range of 4 minimum and 11 maximum. CST-Storage suggests that bimonthly liquid samples be taken to insure pH range is maintained.**

Please accept this letter and associated Manufacturer's Limited Warranty attached as your official extended warranty. A copy of this letter and warranty will be held in the project file, located in our DeKalb, IL facility.

Should you need additional information, please call.

Sincerely,

Chris Forbes
Manager of Inside Sales
CST-Storage

p.c.: Cust. Service, & Engr. MIP File

CST COVERS

Phone: (310)353-5100 Fax: (310)523-2380

879 West 190th Street, Gardena, California 90248 USA

STRUCTURAL ANALYSIS AND DESIGN SUMMARY CST COVERS ALUMINUM DOME FOR (1) 73' (72.73') DIAMETER AQUASTORE TANK BRIDGETON, MO

(CST COVERS JOB No. 213174)

FOR APPROVAL

JUN 5 2013

ENGR MAA **CHCKD** GKO **DATE** JUNE 05, 2013

PAGES 1 **THROUGH** 37

STATE OF MISSOURI
GERALD K. ORRISON
NUMBER E-13925
REGISTERED PROFESSIONAL ENGINEER
6/5/13

TEMCOR CONSERVATEK

NOTATION

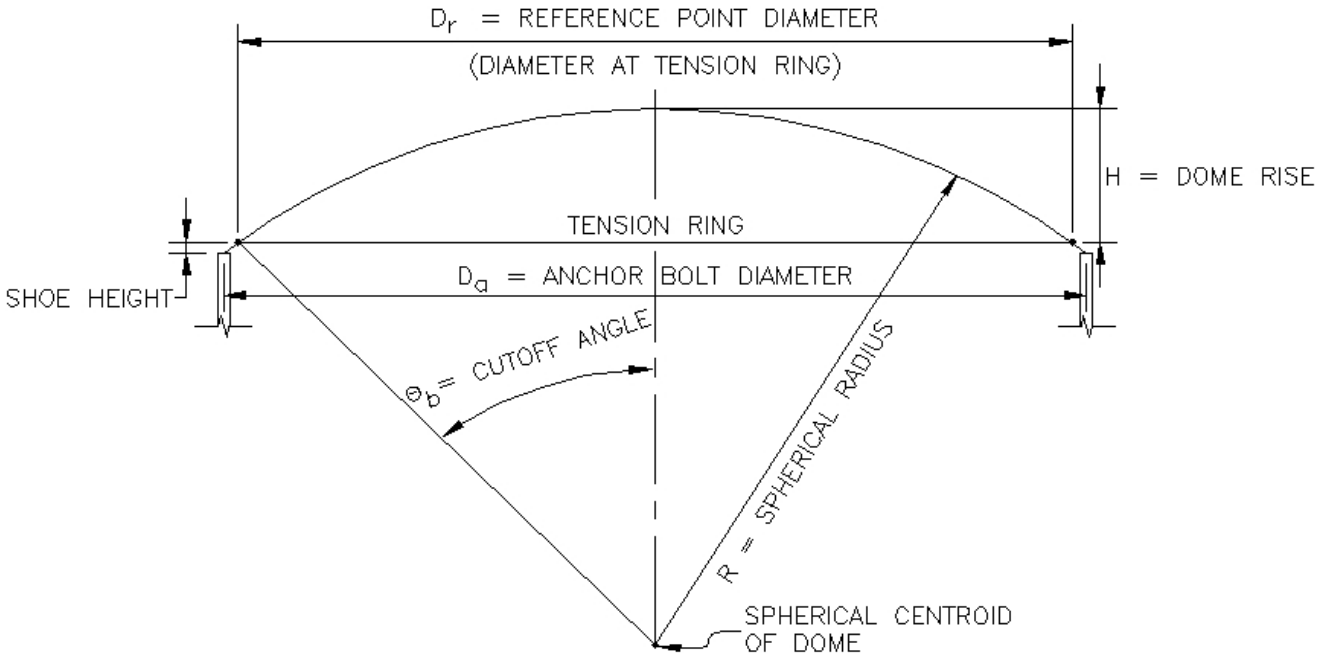
f	=	Maximum member stress.
F	=	Member allowable stress.
F-X,F-Y,F-Z	=	Reaction forces acting in the indicated direction, in the global or local coordinate system.
C-s	=	Roof slope factor.
P-s	=	Sloped roof snow load.
P-f	=	Flat roof snow load.
K-z	=	Velocity pressure exposure coefficient.
Q-z	=	Velocity pressure.
G-h	=	Gust response factor.
Y-BAR	=	Distance from the bottom flange to the neutral axis
Rv	=	Maximum vertical (downward) reaction at the shoe.
Rd	=	Maximum lateral reaction at the shoe.
Rl	=	Maximum vertical (upward) reaction at the shoe.

ANALYSIS PROCEDURE

This structure was analyzed on CST Covers' proprietary dome analysis program using the stiffness method of analysis. The dome struts are modeled using three dimensional beam elements which consider torsion, bending about two axes, axial and shear deformation. Panel loads are transformed into triangular beam loads equal to the load times one third the adjacent panel area normal to the load. These beam loads are then transformed into components parallel and perpendicular to the plane of the beam web. Member dead load is applied as a uniform beam load along the length of the member using the strut area times the density of the specified material times a factor which accounts for the batten. Panel dead load is treated as another panel load. In addition to the beam loads, loads may be applied to the nodes if required. The program will handle multiple load combinations with each combination composed of multiple load types.

The maximum member stresses have been calculated from individual member equilibrium equations using the member end forces obtained from the stiffness analysis procedure and the applied beam loads. Each beam is divided into 20 increments and forces and corresponding stress are calculated for each increment. Member allowable stresses are also calculated at each increment and compared to the computed stresses. Allowable stresses are computed in accordance with the formulas specified by the **"Specifications for Aluminum Structures - Allowable Stress Design"** (Sixth Edition, October 1994) as published by the Aluminum Association, Inc., Washington, D.C..

All the dome frame struts, tension ring and gussets are aluminum alloy 6061-T6 unless otherwise noted. All fasteners are either aluminum or stainless steel as specified.



DESIGN PARAMETER

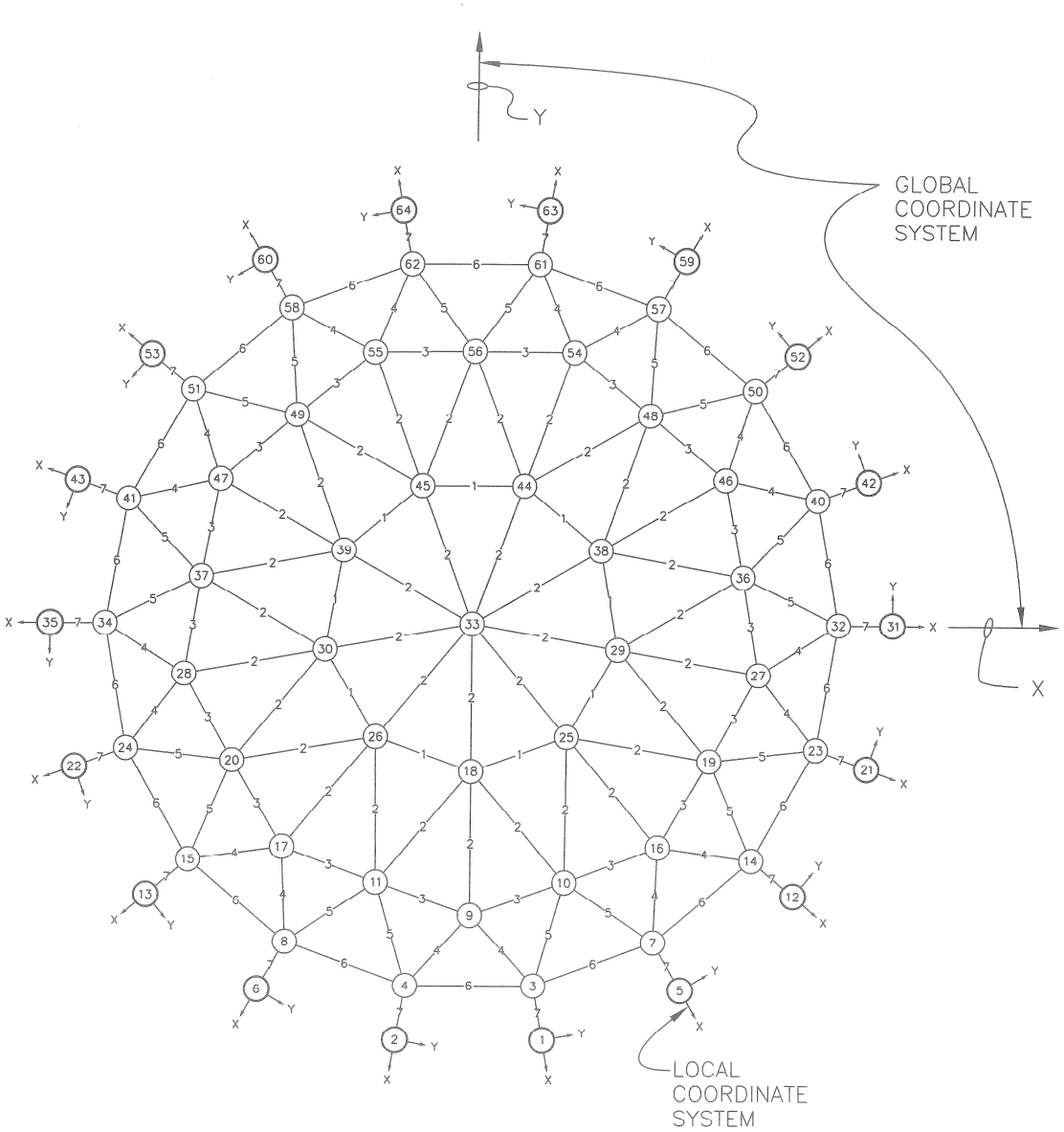
REF. POINT DIAMETER	:	71.70 feet	(D_r)
ANCHOR BOLT DIAMETER	:	73.11 feet	(D_a)
DOME RISE	:	8.60 feet	(H)
CUTOFF ANGLE	:	26.99 degrees	(θ_b)
SPHERICAL RADIUS	:	78.99 feet	(R)
NUMBER OF DOME SHOES	:	18	

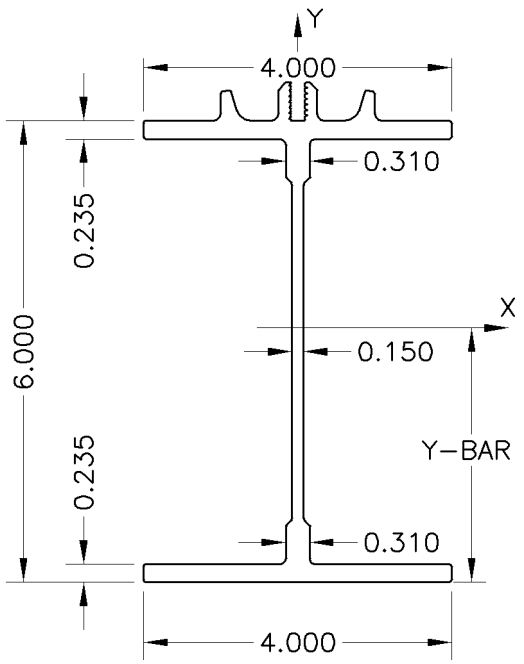
DESIGN LOADS

DESIGN CODE	:	AWWA D103-09 & ASCE7-05
DEAD LOAD	:	2.422 PSF
SNOW LOAD	:	25.0 PSF
WIND VELOCITY	:	100.0 MPH
INTERNAL PRESSURE	:	2.0" WC
VACUUM	:	2.0" WC

In addition to the applied loads listed above, seismic effects have also been considered in the structural analysis. The degree to which seismic effects have an impact upon a structure's design depends most significantly on the structure's density. Due to the low mass to volume ratio of the aluminum dome, seismic effects do not control the dome design, nor the base shear reactions. Rather, applied wind loading on the large surface area on the dome results in the largest horizontal shear reactions. Therefore, wind load cases are presented in these Design Calculations. Other applied load cases and load combinations have been considered in the design; however, only the controlling load combinations are included in the following Design Calculations.

GEOMETRY: 18-9N-120





EXTRUSION SECTION PROPERTIES

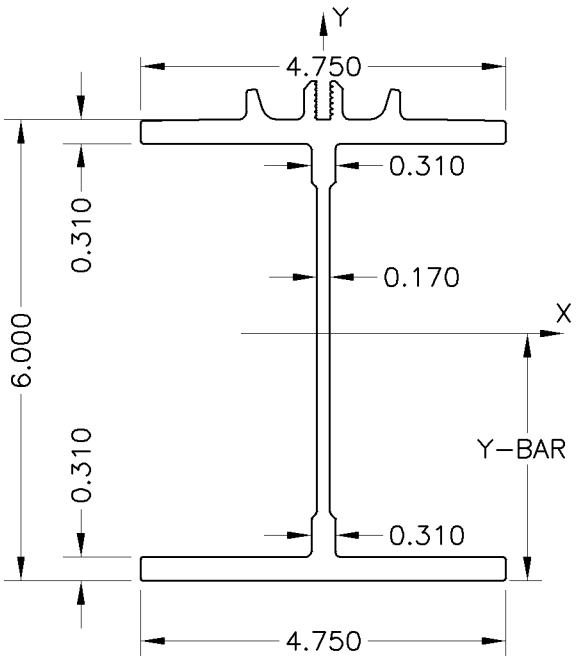
E-636 : DOME STRUT #1 through #3 PERIM DIAG #4
PERIM DIAG #5 SHOE STRUT #7

1. GEOMETRIC PROPERTIES

CROSS SECTIONAL AREA	=	3.193 in^2
Y-BAR	=	3.308 in
DEPTH	=	6.000 in
TOP FLANGE DIMENSIONS	=	0.235 X 4.000 (in)
BOT FLANGE DIMENSIONS	=	0.235 X 4.000 (in)
WEB DIMENSIONS	=	5.530 X 0.150 (in)

2. ELASTIC PROPERTIES

TORSIONAL MOMENT OF INERTIA	=	0.041 in^4
Y AXIS MOMENT OF INERTIA	=	2.637 in^4
X AXIS MOMENT OF INERTIA	=	21.686 in^4



EXTRUSION SECTION PROPERTIES

E-607 : TENS STRUT #6

1. GEOMETRIC PROPERTIES

CROSS SECTIONAL AREA	=	4.307 in^2
Y-BAR	=	3.219 in
DEPTH	=	6.000 in
TOP FLANGE DIMENSIONS	=	0.310 X 4.750 (in)
BOT FLANGE DIMENSIONS	=	0.310 X 4.750 (in)
WEB DIMENSIONS	=	5.380 X 0.170 (in)

2. ELASTIC PROPERTIES

TORSIONAL MOMENT OF INERTIA	=	0.103 in^4
Y AXIS MOMENT OF INERTIA	=	5.610 in^4
X AXIS MOMENT OF INERTIA	=	29.789 in^4

FASTENER INFORMATION

	FASTENER TYPE	NOMINAL SIZE	BODY DIAMETER	TENSION (kips)	SHEAR (kips)
STANDARD	300 series CW stainless steel				
	(100 ksi minimum F_{tu})	3/8 - 16	0.375	3.31	2.83
BOLTS	(Ft = 42.7 ksi)	1/2 - 13	0.50	6.06	5.03
	(Fv = 25.6 ksi)	5/8 - 11	0.625	9.65	7.85
AND	(85 ksi minimum F_{tu})	3/4 - 10	0.75	12.12	9.63
	(Ft = 36.3 ksi)	7/8 - 9	0.875	16.77	13.11
NUTS	(Fv = 21.8 ksi)	1 - 8	1.000	22.00	17.12
	305 stainless steel (C6LBHS-U12/3LC-F12)	3/8	0.382	3.00	4.00
LOCK	316 stainless steel (C6LB316-U12/3LC-F12)	3/8	0.382	2.10	3.00
BOLTS	7075-T73 aluminum (C6LB-E12/3LC-F12)	3/8	0.382	1.80	2.00
	DRIVE RIVETS Aluminum body - 5056 Pin - 2117	3/8	0.370	0.60	1.00
SPECIAL FASTENER	MAGNA-TITE Aluminum body - 5056 Pin - 2024	3/16	0.199	0.45	0.63
		DIA × L	EMBEDMENT	PULL OUT	SHEAR
	300 series stainless steel	1/4 × 2.25	1.5	0.47	0.47
WEDGE	Note:	3/8 × 3.75	3	1.33	0.92
	Allowable loads assume no	1/2 × 5.5	4	2.04	1.67
ANCHORS	reductions required due to	5/8 × 8.5	6	3.22	2.69
	edge distance or anchor	3/4 × 10	8	4.92	3.97
	Spacing	1 × 12	9	7.55	7.42

NOTES:

1. Shear strengths are based on the threads outside of the shear plane
2. Lockbolt values are based on the manufacturers guaranteed minimum values.
3. Wedge anchors are based on the manufacturers test data for 3000 psi concrete.
4. Safety factors are:
   - = 2.34 for bolt tension
   - = 2.34 for bolt shear
   - = 4.00 for wedge anchor pullout
   - = 4.00 for wedge anchor shear

BASIC LOAD CASE NO. 1

DEAD LOAD

	X DIRECTION	Y DIRECTION	Z DIRECTION	
FRACTION OF GRAVITY	0.000	0.000	-1.240	
PANEL DEAD LOAD	0.000	0.000	-0.730	(psf)
FULL DOME LIVE LOAD	0.000	0.000	0.000	(psf)
HALF DOME LIVE LOAD	0.000	0.000	0.000	(psf)
GROUND SNOW LOAD - TOTAL DOME			= 0.000	(psf)
GROUND SNOW LOAD - DRIFT			= 0.000	(psf)
WIND LOAD - DYNAMIC PRESSURE			= 0.000	(psf)
INTERNAL PRESSURE LOAD			= 0.000	(psf)
TEMPERATURE CHANGE - TOP FLANGE			= 0.000	(Deg. F.)
TEMPERATURE CHANGE - BTM FLANGE			= 0.000	(Deg. F.)

ALLOWABLE STRESS FACTOR 1.000

BASIC LOAD CASE NO. 2

DEAD + 25 PSF SNOW
PER AWWA D103-09

	X DIRECTION	Y DIRECTION	Z DIRECTION	
FRACTION OF GRAVITY	0.000	0.000	-1.240	
PANEL DEAD LOAD	0.000	0.000	-0.730	(psf)
FULL DOME LIVE LOAD	0.000	0.000	0.000	(psf)
HALF DOME LIVE LOAD	0.000	0.000	0.000	(psf)
GROUND SNOW LOAD - TOTAL DOME			= 25.000	(psf)
GROUND SNOW LOAD - DRIFT			= 0.000	(psf)
WIND LOAD - DYNAMIC PRESSURE			= 0.000	(psf)
INTERNAL PRESSURE LOAD			= -10.404	(psf)
TEMPERATURE CHANGE - TOP FLANGE			= 0.000	(Deg. F.)
TEMPERATURE CHANGE - BTM FLANGE			= 0.000	(Deg. F.)

ALLOWABLE STRESS FACTOR 1.000

(AWWA D103-09 SNOW LOAD)

BASIC LOAD CASE NO. 3

DEAD + 25 PSF SNOW
GROUND LOAD PER ASCE7-05

	X DIRECTION	Y DIRECTION	Z DIRECTION	
FRACTION OF GRAVITY	0.000	0.000	-1.240	
PANEL DEAD LOAD	0.000	0.000	-0.730	(psf)
FULL DOME LIVE LOAD	0.000	0.000	0.000	(psf)
HALF DOME LIVE LOAD	0.000	0.000	0.000	(psf)
GROUND SNOW LOAD - TOTAL DOME			= 25.000	(psf)
GROUND SNOW LOAD - DRIFT			= 0.000	(psf)
WIND LOAD - DYNAMIC PRESSURE			= 0.000	(psf)
INTERNAL PRESSURE LOAD			= -10.404	(psf)
TEMPERATURE CHANGE - TOP FLANGE			= 0.000	(Deg. F.)
TEMPERATURE CHANGE - BTM FLANGE			= 0.000	(Deg. F.)

ALLOWABLE STRESS FACTOR 1.000

SNOW LOAD FACTORS: (ASCE7-05)

IMPORTANCE FACTOR:	1.100		
EXPOSURE FACTOR:	1.000		
THERMAL FACTOR:	1.200		
P-f :	23.100	(psf)	
Ps @ 15.0 degrees:	23.100	(psf)	Cs_15.0: 1.000
Ps @ eave :	18.064	(psf)	Cs_eave: 0.782

(COLD ROOF, NON-OBSTRUCTED SLIPPERY SURFACE)

BASIC LOAD CASE NO. 4

DEAD + 25 PSF SNOW DRIFT
GROUND LOAD PER ASCE7-05

	X DIRECTION	Y DIRECTION	Z DIRECTION	
FRACTION OF GRAVITY	0.000	0.000	-1.240	
PANEL DEAD LOAD	0.000	0.000	-0.730	(psf)
FULL DOME LIVE LOAD	0.000	0.000	0.000	(psf)
HALF DOME LIVE LOAD	0.000	0.000	0.000	(psf)
GROUND SNOW LOAD - TOTAL DOME			= 0.000	(psf)
GROUND SNOW LOAD - DRIFT CENTERED @ 90.0 DEG			= 25.000	(psf)
WIND LOAD - DYNAMIC PRESSURE			= 0.000	(psf)
INTERNAL PRESSURE LOAD			= -10.404	(psf)
TEMPERATURE CHANGE - TOP FLANGE			= 0.000	(Deg. F.)
TEMPERATURE CHANGE - BTM FLANGE			= 0.000	(Deg. F.)

ALLOWABLE STRESS FACTOR 1.000

DRIFT LOAD FACTORS: (ASCE7-05)

IMPORTANCE FACTOR:	1.100		
EXPOSURE FACTOR:	1.000		
THERMAL FACTOR:	1.200		
P-f :	23.100	(psf)	
Ps @ 0.0 degrees:	11.550	(psf)	Cs 0.0 : 1.000
Ps @ eave :	33.600	(psf)	Cs eave: 0.782
MAX. DRIFT LOAD:	33.600	psf at 26.991 degrees	

(COLD ROOF, NON-OBSTRUCTED SLIPPERY SURFACE)

BASIC LOAD CASE NO. 5

DEAD + 16.045 PSF WIND PRESSURE
PER AWWA D103-09

	X DIRECTION	Y DIRECTION	Z DIRECTION		
FRACTION OF GRAVITY	0.000	0.000	-1.240		
PANEL DEAD LOAD	0.000	0.000	-0.730	(psf)	
FULL DOME LIVE LOAD	0.000	0.000	0.000	(psf)	
HALF DOME LIVE LOAD @ 90.0 DEG	0.000	-16.045	0.000	(psf)	
GROUND SNOW LOAD - TOTAL DOME			= 0.000	(psf)	
GROUND SNOW LOAD - DRIFT			= 0.000	(psf)	
WIND LOAD - DYNAMIC PRESSURE			= 0.000	(psf)	
INTERNAL PRESSURE LOAD			= 10.404	(psf)	
TEMPERATURE CHANGE - TOP FLANGE			= 0.000	(Deg. F.)	
TEMPERATURE CHANGE - BTM FLANGE			= 0.000	(Deg. F.)	

ALLOWABLE STRESS FACTOR 1.000

BASIC LOAD CASE NO. 6

DEAD + WIND VELOCITY
100 MPH PER ASCE 7-05, CASE A

	X DIRECTION	Y DIRECTION	Z DIRECTION	
FRACTION OF GRAVITY	0.000	0.000	-1.240	
PANEL DEAD LOAD	0.000	0.000	-0.730	(psf)
FULL DOME LIVE LOAD	0.000	0.000	0.000	(psf)
HALF DOME LIVE LOAD	0.000	0.000	0.000	(psf)
GROUND SNOW LOAD - TOTAL DOME			= 0.000	(psf)
GROUND SNOW LOAD - DRIFT			= 0.000	(psf)
WIND LOAD - DYNAMIC PRESSURE FROM 270.0 DEG			= 25.140	(psf)
INTERNAL PRESSURE LOAD			= 10.404	(psf)
TEMPERATURE CHANGE - TOP FLANGE			= 0.000	(Deg. F.)
TEMPERATURE CHANGE - BTM FLANGE			= 0.000	(Deg. F.)

ALLOWABLE STRESS FACTOR 1.000

WIND LOAD FACTORS: (ASCE7-05, CASE A)

(INPUT)		
VELOCITY	: 100.000	(mph)
IMPORTANCE FACTOR	: 1.150	
EXPOSURE CATEGORY C		
CURB HEIGHT	: 34.000	(feet)
TANK HEIGHT	: 34.000	(feet)
TOPOGRAPHIC FACTOR Kzt	: 1.000	
DIRECTIONALITY FACTOR Kd	: 0.950	
(CALCULATED)		
DOME RISE-TO-SPAN RATIO	: 0.120	
APEX ROOF HEIGHT	: 42.604	(feet)
TANK HEIGHT / DIAMETER RATIO	: 0.474	
POWER LAW CONSTANT ALPHA	: 9.500	
GRADIENT HEIGHT Z-g	: 900.000	(feet)
K-z	: 1.058	
Q-z	: 29.577	(psf)
GUST RESPONSE FACTOR G-h	: 0.850	(Maximum)
GUST RESPONSE FACTOR G-h	: 0.870	(Eq. 6-2)
TURBULENCE INTENSITY I-z	: 0.209	(Eq. 6-3)
BACKGROUND RESPONSE Q	: 0.892	(Eq. 6-4)
BUILDING LENGTH B	: 71.700	(feet)
LENGTH SCALE OF TURBULENCE L-z	: 475.103	(feet) (Eq. 6-5)
INTEGRAL LENGTH SCALE FACTOR l	: 500.000	(feet)
INTEGRAL LENGTH SCALE POWER EXP.	: 1/5.0	
EQUIVALENT STRUCTURE HT. Z_bar	: 25.562	(feet)
MINIMUM HEIGHT Z_min	: 15.000	(feet)
CONSTANT A (Figure 6-7)	: -1.24179	
CONSTANT B (Figure 6-7)	: -0.82982	
CONSTANT C (Figure 6-7)	: -0.47420	
THETA-25	: 11.139	Degrees

BASIC LOAD CASE NO. 7

DEAD + WIND VELOCITY
100 MPH PER ASCE 7-05, CASE B

	X DIRECTION	Y DIRECTION	Z DIRECTION	
FRACTION OF GRAVITY	0.000	0.000	-1.240	
PANEL DEAD LOAD	0.000	0.000	-0.730	(psf)
FULL DOME LIVE LOAD	0.000	0.000	0.000	(psf)
HALF DOME LIVE LOAD	0.000	0.000	0.000	(psf)
GROUND SNOW LOAD - TOTAL DOME			= 0.000	(psf)
GROUND SNOW LOAD - DRIFT			= 0.000	(psf)
WIND LOAD - DYNAMIC PRESSURE FROM 270.0 DEG			= 25.140	(psf)
INTERNAL PRESSURE LOAD			= 10.404	(psf)
TEMPERATURE CHANGE - TOP FLANGE			= 0.000	(Deg. F.)
TEMPERATURE CHANGE - BTM FLANGE			= 0.000	(Deg. F.)

ALLOWABLE STRESS FACTOR 1.000

WIND LOAD FACTORS: (ASCE7-05, CASE B)

(INPUT)		
VELOCITY	: 100.000	(mph)
IMPORTANCE FACTOR	: 1.150	
EXPOSURE CATEGORY C		
CURB HEIGHT	: 34.000	(feet)
TANK HEIGHT	: 34.000	(feet)
TOPOGRAPHIC FACTOR Kzt	: 1.000	
DIRECTIONALITY FACTOR Kd	: 0.950	
(CALCULATED)		
DOME RISE-TO-SPAN RATIO	: 0.120	
APEX ROOF HEIGHT	: 42.604	(feet)
TANK HEIGHT / DIAMETER RATIO	: 0.474	
POWER LAW CONSTANT ALPHA	: 9.500	
GRADIENT HEIGHT Z-g	: 900.000	(feet)
K-z	: 1.058	
Q-z	: 29.577	(psf)
GUST RESPONSE FACTOR G-h	: 0.850	(Maximum)
GUST RESPONSE FACTOR G-h	: 0.870	(Eq. 6-2)
TURBULENCE INTENSITY I-z	: 0.209	(Eq. 6-3)
BACKGROUND RESPONSE Q	: 0.892	(Eq. 6-4)
BUILDING LENGTH B	: 71.700	(feet)
LENGTH SCALE OF TURBULENCE L-z	: 475.103	(feet) (Eq. 6-5)
INTEGRAL LENGTH SCALE FACTOR l	: 500.000	(feet)
INTEGRAL LENGTH SCALE POWER EXP.	: 1/5.0	
EQUIVALENT STRUCTURE HT. Z_bar	: 25.562	(feet)
MINIMUM HEIGHT Z_min	: 15.000	(feet)
CONSTANT A (Figure 6-7)	: -1.24179	
CONSTANT B (Figure 6-7)	: -0.82982	
CONSTANT C (Figure 6-7)	: -0.47420	
THETA-25	: 11.139	Degrees

R E A C T I O N S U M M A R Y

BASIC LOAD CASE No 1
DEAD LOAD

MAXIMUM AND MINIMUM REACTIONS:

RADIAL (kips)	TANGENTIAL (kips)	VERTICAL (kips)	DIRECTION
0.0	0.0	0.6	x-max
0.0	0.0	0.6	x-min
0.0	0.0	0.6	y-max
0.0	0.0	0.6	y-min
0.0	0.0	0.6	z-max
0.0	0.0	0.6	z-min

TOTAL MODEL REACTIONS:

GLOBAL-X (kips)	GLOBAL-Y (kips)	GLOBAL-Z (kips)
0.0	0.0	10.2

R E A C T I O N S U M M A R Y

BASIC LOAD CASE No 2
DEAD + 25 PSF SNOW
PER AWWA D103-09

MAXIMUM AND MINIMUM REACTIONS:

RADIAL (kips)	TANGENTIAL (kips)	VERTICAL (kips)	DIRECTION
0.0	0.0	8.3	x-max
0.0	0.0	8.3	x-min
0.0	0.0	8.3	y-max
0.0	0.0	8.3	y-min
0.0	0.0	8.3	z-max
0.0	0.0	8.3	z-min

TOTAL MODEL REACTIONS:

GLOBAL-X (kips)	GLOBAL-Y (kips)	GLOBAL-Z (kips)
0.0	0.0	150.2

R E A C T I O N S U M M A R Y

BASIC LOAD CASE No 3
DEAD + 25 PSF SNOW
GROUND LOAD PER ASCE7-05

MAXIMUM AND MINIMUM REACTIONS:

RADIAL (kips)	TANGENTIAL (kips)	VERTICAL (kips)	DIRECTION
0.0	0.0	7.5	x-max
0.0	0.0	7.5	x-min
0.0	0.0	7.5	y-max
0.0	0.0	7.5	y-min
0.0	0.0	7.5	z-max
0.0	0.0	7.5	z-min

TOTAL MODEL REACTIONS:

GLOBAL-X (kips)	GLOBAL-Y (kips)	GLOBAL-Z (kips)
0.0	0.0	135.9

R E A C T I O N S U M M A R Y

BASIC LOAD CASE No 4
DEAD + 25 PSF SNOW DRIFT
GROUND LOAD PER ASCE7-05

MAXIMUM AND MINIMUM REACTIONS:

RADIAL (kips)	TANGENTIAL (kips)	VERTICAL (kips)	DIRECTION
0.0	-0.1	3.2	x-max
0.0	-0.1	7.2	x-min
0.0	0.5	6.0	y-max
0.0	-0.5	6.0	y-min
0.0	0.1	7.2	z-max
0.0	-0.1	3.2	z-min

TOTAL MODEL REACTIONS:

GLOBAL-X (kips)	GLOBAL-Y (kips)	GLOBAL-Z (kips)
0.0	0.0	83.6

R E A C T I O N S U M M A R Y

BASIC LOAD CASE No 5
DEAD + 16.045 PSF WIND PRESSURE
PER AWWA D103-09

MAXIMUM AND MINIMUM REACTIONS:

RADIAL (kips)	TANGENTIAL (kips)	VERTICAL (kips)	DIRECTION
0.0	-0.1	-1.7	x-max
0.0	0.1	-1.6	x-min
0.0	0.7	-1.8	y-max
0.0	-0.7	-1.8	y-min
0.0	-0.1	-1.6	z-max
0.0	-0.7	-1.8	z-min

TOTAL MODEL REACTIONS:

GLOBAL-X (kips)	GLOBAL-Y (kips)	GLOBAL-Z (kips)
0.0	6.4	-31.0

R E A C T I O N S U M M A R Y

BASIC LOAD CASE No 6
DEAD + WIND VELOCITY
100 MPH PER ASCE 7-05, CASE A

MAXIMUM AND MINIMUM REACTIONS:

RADIAL (kips)	TANGENTIAL (kips)	VERTICAL (kips)	DIRECTION
0.0	-0.1	-7.6	x-max
0.0	0.1	-5.2	x-min
0.0	0.8	-6.4	y-max
0.0	-0.8	-6.4	y-min
0.0	0.1	-5.2	z-max
0.0	-0.1	-7.6	z-min

TOTAL MODEL REACTIONS:

GLOBAL-X (kips)	GLOBAL-Y (kips)	GLOBAL-Z (kips)
0.0	6.1	-115.3

R E A C T I O N S U M M A R Y

BASIC LOAD CASE No 7
DEAD + WIND VELOCITY
100 MPH PER ASCE 7-05, CASE B

MAXIMUM AND MINIMUM REACTIONS:

RADIAL (kips)	TANGENTIAL (kips)	VERTICAL (kips)	DIRECTION
0.0	-0.1	-7.8	x-max
0.0	0.1	-5.3	x-min
0.0	0.9	-6.6	y-max
0.0	-0.9	-6.6	y-min
0.0	-0.1	-5.3	z-max
0.0	-0.1	-7.8	z-min

TOTAL MODEL REACTIONS:

GLOBAL-X (kips)	GLOBAL-Y (kips)	GLOBAL-Z (kips)
0.0	6.7	-118.5

S T R E S S S U M M A R Y

BASIC LOAD CASE No: 1
DEAD LOAD

CONTROLLING MEMBER STRESSES(ksi) AND FORCES(kips, in-kips)							
EXTRUSION	TYPE	AXIAL	BENDING				COMBINED STRESS RATIO
			(+)MOMENT		(-)MOMENT		
			COMP	TENS	COMP	TENS	
E-636	(Struts 1 through 3)						
	FORCE	1.58	2.13	2.13	-0.41	-0.41	0.05
	STRSS	0.49	0.32	-0.26	0.05	-0.06	
	ALLOW	16.18	21.04	19.49	21.21	19.49	
	f/F	0.03	0.02	0.01	0.00	0.00	
E-636	(Struts 4 through 4)						
	FORCE	0.98	0.11	0.11	-3.57	-3.57	0.04
	STRSS	0.31	0.02	-0.01	0.44	-0.54	
	ALLOW	14.51	21.04	19.49	21.21	19.49	
	f/F	0.02	0.00	0.00	0.02	0.03	
E-636	(Struts 5 through 5)						
	FORCE	0.98	0.66	0.66	-3.96	-3.96	0.04
	STRSS	0.31	0.10	-0.08	0.49	-0.60	
	ALLOW	13.71	21.04	19.49	21.21	19.49	
	f/F	0.02	0.00	0.00	0.02	0.03	
E-607	(Struts 6 through 6)						
	FORCE	-3.05	0.00	0.00	-2.26	-2.26	0.06
	STRSS	-0.71	0.00	0.00	0.21	-0.24	
	ALLOW	19.49	0.00	0.00	21.21	19.49	
	f/F	0.04	0.00	0.00	0.01	0.01	
E-636	(Struts 7 through 7)						
	FORCE	0.35	0.00	0.00	-3.73	-3.73	0.03
	STRSS	0.11	0.00	0.00	0.46	-0.57	
	ALLOW	17.41	0.00	0.00	21.21	19.49	
	f/F	0.01	0.00	0.00	0.02	0.03	

S T R E S S S U M M A R Y

BASIC LOAD CASE No: 2
DEAD + 25 PSF SNOW
PER AWWA D103-09

CONTROLLING MEMBER STRESSES(ksi) AND FORCES(kips, in-kips)

EXTRUSION	TYPE	AXIAL	BENDING (+)MOMENT COMP	BENDING (+)MOMENT TENS	BENDING (-)MOMENT COMP	BENDING (-)MOMENT TENS	COMBINED STRESS RATIO
E-636	(Struts 1 through 3)						
	FORCE	25.29	37.34	37.34	-9.74	-9.74	0.77
	STRSS	7.92	5.70	-4.64	1.21	-1.49	
	ALLOW	16.18	21.04	19.49	21.21	19.49	
	f/F	0.49	0.27	0.24	0.06	0.08	
E-636	(Struts 4 through 4)						
	FORCE	14.90	2.97	2.97	-52.88	-52.88	0.65
	STRSS	4.67	0.45	-0.37	6.56	-8.07	
	ALLOW	14.51	21.04	19.49	21.21	19.49	
	f/F	0.32	0.02	0.02	0.31	0.41	
E-636	(Struts 5 through 5)						
	FORCE	15.18	11.54	11.54	-59.16	-59.16	0.75
	STRSS	4.75	1.76	-1.43	7.34	-9.02	
	ALLOW	13.71	21.04	19.49	21.21	19.49	
	f/F	0.35	0.08	0.07	0.35	0.46	
E-607	(Struts 6 through 6)						
	FORCE	-49.80	0.00	0.00	-31.91	-31.91	0.87
	STRSS	-11.56	0.00	0.00	2.98	-3.45	
	ALLOW	19.49	0.00	0.00	21.21	19.49	
	f/F	0.59	0.00	0.00	0.14	0.18	
E-636	(Struts 7 through 7)						
	FORCE	5.25	0.00	0.00	-55.24	-55.24	0.45
	STRSS	1.64	0.00	0.00	6.86	-8.43	
	ALLOW	17.41	0.00	0.00	21.21	19.49	
	f/F	0.09	0.00	0.00	0.32	0.43	

S T R E S S S U M M A R Y

BASIC LOAD CASE No: 3
DEAD + 25 PSF SNOW
GROUND LOAD PER ASCE7-05

CONTROLLING MEMBER STRESSES(ksi) AND FORCES(kips, in-kips)

EXTRUSION	TYPE	AXIAL	BENDING (+)MOMENT COMP	BENDING (+)MOMENT TENS	BENDING (-)MOMENT COMP	BENDING (-)MOMENT TENS	COMBINED STRESS RATIO
E-636	(Struts 1 through 3)						
	FORCE	23.86	35.16	35.16	-9.81	-9.81	0.72
	STRSS	7.47	5.36	-4.36	1.22	-1.50	
	ALLOW	16.18	21.04	19.49	21.21	19.49	
	f/F	0.46	0.25	0.22	0.06	0.08	
E-636	(Struts 4 through 4)						
	FORCE	13.46	3.53	3.53	-46.72	-46.72	0.58
	STRSS	4.22	0.54	-0.44	5.80	-7.13	
	ALLOW	14.51	21.04	19.49	21.21	19.49	
	f/F	0.29	0.03	0.02	0.27	0.37	
E-636	(Struts 5 through 5)						
	FORCE	13.96	11.40	11.40	-52.27	-52.27	0.66
	STRSS	4.37	1.74	-1.42	6.49	-7.97	
	ALLOW	13.71	21.04	19.49	21.21	19.49	
	f/F	0.32	0.08	0.07	0.31	0.41	
E-607	(Struts 6 through 6)						
	FORCE	-45.75	0.00	0.00	-28.34	-28.34	0.80
	STRSS	-10.62	0.00	0.00	2.65	-3.06	
	ALLOW	19.49	0.00	0.00	21.21	19.49	
	f/F	0.55	0.00	0.00	0.12	0.16	
E-636	(Struts 7 through 7)						
	FORCE	4.75	0.00	0.00	-49.97	-49.97	0.39
	STRSS	1.49	0.00	0.00	6.20	-7.62	
	ALLOW	17.41	0.00	0.00	21.21	19.49	
	f/F	0.09	0.00	0.00	0.29	0.39	

S T R E S S S U M M A R Y

BASIC LOAD CASE No: 4
DEAD + 25 PSF SNOW DRIFT
GROUND LOAD PER ASCE7-05

CONTROLLING MEMBER STRESSES(ksi) AND FORCES(kips, in-kips)

EXTRUSION	TYPE	AXIAL	BENDING (+)MOMENT COMP	BENDING (+)MOMENT TENS	BENDING (-)MOMENT COMP	BENDING (-)MOMENT TENS	COMBINED STRESS RATIO
E-636	(Struts 1 through 3)						
	FORCE	26.52	31.64	31.64	-9.71	-9.71	0.76
	STRSS	8.31	4.83	-3.93	1.21	-1.48	
	ALLOW	16.18	21.04	19.49	21.21	19.49	
	f/F	0.51	0.23	0.20	0.06	0.08	
E-636	(Struts 4 through 4)						
	FORCE	17.67	5.47	5.47	-50.43	-50.43	0.71
	STRSS	5.53	0.83	-0.68	6.26	-7.69	
	ALLOW	14.51	21.04	19.49	21.21	19.49	
	f/F	0.38	0.04	0.03	0.30	0.39	
E-636	(Struts 5 through 5)						
	FORCE	18.42	15.39	15.39	-46.98	-46.98	0.77
	STRSS	5.77	2.35	-1.91	5.83	-7.17	
	ALLOW	13.71	21.04	19.49	21.21	19.49	
	f/F	0.42	0.11	0.10	0.27	0.37	
E-607	(Struts 6 through 6)						
	FORCE	-39.67	0.00	0.00	-32.50	-32.50	0.76
	STRSS	-9.21	0.00	0.00	3.03	-3.51	
	ALLOW	19.49	0.00	0.00	21.21	19.49	
	f/F	0.47	0.00	0.00	0.14	0.18	
E-636	(Struts 7 through 7)						
	FORCE	4.42	0.00	0.00	-46.53	-46.53	0.43
	STRSS	1.39	0.00	0.00	5.78	-7.10	
	ALLOW	17.41	0.00	0.00	21.21	19.49	
	f/F	0.08	0.00	0.00	0.27	0.36	

S T R E S S S U M M A R Y

BASIC LOAD CASE No: 5
DEAD + 16.045 PSF WIND PRESSURE
PER AWWA D103-09

CONTROLLING MEMBER STRESSES(ksi) AND FORCES(kips, in-kips)							
EXTRUSION	TYPE	AXIAL	BENDING				COMBINED STRESS RATIO
			(+)MOMENT		(-)MOMENT		
			COMP	TENS	COMP	TENS	
E-636	(Struts 1 through 3)						
	FORCE	-0.59	0.66	0.66	-3.59	-3.59	0.04
	STRSS	-0.18	0.10	-0.08	0.45	-0.55	
	ALLOW	19.49	21.04	19.49	21.21	19.49	
	f/F	0.01	0.00	0.00	0.02	0.03	
E-636	(Struts 4 through 4)						
	FORCE	-0.71	7.39	7.39	0.00	0.00	0.06
	STRSS	-0.22	1.13	-0.92	0.00	0.00	
	ALLOW	19.49	21.04	19.49	0.00	0.00	
	f/F	0.01	0.05	0.05	0.00	0.00	
E-636	(Struts 5 through 5)						
	FORCE	-1.13	7.33	7.33	0.00	0.00	0.07
	STRSS	-0.35	1.12	-0.91	0.00	0.00	
	ALLOW	19.49	21.04	19.49	0.00	0.00	
	f/F	0.02	0.05	0.05	0.00	0.00	
E-607	(Struts 6 through 6)						
	FORCE	10.94	3.68	3.68	0.00	0.00	0.27
	STRSS	2.54	0.40	-0.34	0.00	0.00	
	ALLOW	15.19	21.21	19.49	0.00	0.00	
	f/F	0.17	0.02	0.02	0.00	0.00	
E-636	(Struts 7 through 7)						
	FORCE	-1.14	11.95	11.95	0.00	0.00	0.26
	STRSS	-0.36	1.82	-1.48	0.00	0.00	
	ALLOW	19.49	21.04	19.49	0.00	0.00	
	f/F	0.02	0.09	0.08	0.00	0.00	

S T R E S S S U M M A R Y

BASIC LOAD CASE No: 6
DEAD + WIND VELOCITY
100 MPH PER ASCE 7-05, CASE A

CONTROLLING MEMBER STRESSES(ksi) AND FORCES(kips, in-kips)

EXTRUSION	TYPE	AXIAL	BENDING				COMBINED
			(+)MOMENT		(-)MOMENT		STRESS
			COMP	TENS	COMP	TENS	RATIO
E-636	(Struts 1 through 3)						
	FORCE	-10.59	0.07	0.07	-10.24	-10.24	0.25
	STRSS	-3.32	0.01	-0.01	1.27	-1.56	
	ALLOW	19.49	21.04	19.49	21.21	19.49	
	f/F	0.17	0.00	0.00	0.06	0.08	
E-636	(Struts 4 through 4)						
	FORCE	-6.35	33.12	33.12	0.00	0.00	0.32
	STRSS	-1.99	5.05	-4.11	0.00	0.00	
	ALLOW	19.49	21.04	19.49	0.00	0.00	
	f/F	0.10	0.24	0.21	0.00	0.00	
E-636	(Struts 5 through 5)						
	FORCE	-7.03	33.74	33.74	0.00	0.00	0.33
	STRSS	-2.20	5.15	-4.19	0.00	0.00	
	ALLOW	19.49	21.04	19.49	0.00	0.00	
	f/F	0.11	0.24	0.21	0.00	0.00	
E-607	(Struts 6 through 6)						
	FORCE	43.09	20.05	20.05	0.00	0.00	0.95
	STRSS	10.00	2.17	-1.87	0.00	0.00	
	ALLOW	15.19	21.21	19.49	0.00	0.00	
	f/F	0.66	0.10	0.10	0.00	0.00	
E-636	(Struts 7 through 7)						
	FORCE	-4.38	46.11	46.11	0.00	0.00	0.53
	STRSS	-1.37	7.03	-5.72	0.00	0.00	
	ALLOW	19.49	21.04	19.49	0.00	0.00	
	f/F	0.07	0.33	0.29	0.00	0.00	

S T R E S S S U M M A R Y

BASIC LOAD CASE No: 7
DEAD + WIND VELOCITY
100 MPH PER ASCE 7-05, CASE B

CONTROLLING MEMBER STRESSES(ksi) AND FORCES(kips, in-kips)

EXTRUSION	TYPE	AXIAL	BENDING				COMBINED
			(+)MOMENT		(-)MOMENT		STRESS
			COMP	TENS	COMP	TENS	RATIO
E-636	(Struts 1 through 3)						
	FORCE	-11.63	0.38	0.38	-11.02	-11.02	0.28
	STRSS	-3.64	0.06	-0.05	1.37	-1.68	
	ALLOW	19.49	21.04	19.49	21.21	19.49	
	f/F	0.19	0.00	0.00	0.06	0.09	
E-636	(Struts 4 through 4)						
	FORCE	-6.75	34.84	34.84	0.00	0.00	0.33
	STRSS	-2.11	5.32	-4.33	0.00	0.00	
	ALLOW	19.49	21.04	19.49	0.00	0.00	
	f/F	0.11	0.25	0.22	0.00	0.00	
E-636	(Struts 5 through 5)						
	FORCE	-7.70	35.42	35.42	0.00	0.00	0.35
	STRSS	-2.41	5.40	-4.40	0.00	0.00	
	ALLOW	19.49	21.04	19.49	0.00	0.00	
	f/F	0.12	0.26	0.23	0.00	0.00	
E-607	(Struts 6 through 6)						
	FORCE	44.76	20.66	20.66	0.00	0.00	0.99
	STRSS	10.39	2.23	-1.93	0.00	0.00	
	ALLOW	15.19	21.21	19.49	0.00	0.00	
	f/F	0.68	0.11	0.10	0.00	0.00	
E-636	(Struts 7 through 7)						
	FORCE	-4.58	48.11	48.11	0.00	0.00	0.56
	STRSS	-1.43	7.34	-5.97	0.00	0.00	
	ALLOW	19.49	21.04	19.49	0.00	0.00	
	f/F	0.07	0.35	0.31	0.00	0.00	

C O N S O L I D A T E D S T R E S S S U M M A R Y

CONTROLLING MEMBER STRESSES(ksi) AND FORCES(kips, in-kips)

EXTRUSION	TYPE	AXIAL	BENDING				COMBINED STRESS RATIO
			(+)MOMENT		(-)MOMENT		
			COMP	TENS	COMP	TENS	
E-636	(Struts 1 through 3)						
	FORCE	25.29	37.34	37.34	-9.74	-9.74	0.77
	STRSS	7.92	5.70	-4.64	1.21	-1.49	
	ALLOW	16.18	21.04	19.49	21.21	19.49	
	f/F	0.49	0.27	0.24	0.06	0.08	
E-636	(Struts 4 through 4)						
	FORCE	17.67	5.47	5.47	-50.43	-50.43	0.71
	STRSS	5.53	0.83	-0.68	6.26	-7.69	
	ALLOW	14.51	21.04	19.49	21.21	19.49	
	f/F	0.38	0.04	0.03	0.30	0.39	
E-636	(Struts 5 through 5)						
	FORCE	18.42	15.39	15.39	-46.98	-46.98	0.77
	STRSS	5.77	2.35	-1.91	5.83	-7.17	
	ALLOW	13.71	21.04	19.49	21.21	19.49	
	f/F	0.42	0.11	0.10	0.27	0.37	
E-607	(Struts 6 through 6)						
	FORCE	44.76	20.66	20.66	0.00	0.00	0.99
	STRSS	10.39	2.23	-1.93	0.00	0.00	
	ALLOW	15.19	21.21	19.49	0.00	0.00	
	f/F	0.68	0.11	0.10	0.00	0.00	
E-636	(Struts 7 through 7)						
	FORCE	-4.58	48.11	48.11	0.00	0.00	0.56
	STRSS	-1.43	7.34	-5.97	0.00	0.00	
	ALLOW	19.49	21.04	19.49	0.00	0.00	
	f/F	0.07	0.35	0.31	0.00	0.00	

C O N N E C T I O N F O R C E S U M M A R Y

BASIC LOAD CASE No. 1
DEAD LOAD

MAXIMUM CONNECTION FORCES (kips) AND MOMENTS (in-k)					
EXTRUSION	TYPE	TOP FLANGE		BOTTOM FLANGE	
		COMP	TENS	COMP	TENS
E-636	(Struts 1 through 3)				
	AXIAL FORCE	1.35	0.85	1.58	--
	END MOMENT	0.30	2.87	2.13	--
	CNCTN FORCE	0.70	-0.01	1.06	--
E-636	(Struts 4 through 4)				
	AXIAL FORCE	0.98	--	0.96	0.98
	END MOMENT	-3.25	--	0.11	-3.25
	CNCTN FORCE	1.08	--	0.45	-0.10
E-636	(Struts 5 through 5)				
	AXIAL FORCE	0.98	--	0.95	0.98
	END MOMENT	-3.63	--	0.66	-3.63
	CNCTN FORCE	1.14	--	0.54	-0.16
E-607	(Struts 6 through 6)				
	AXIAL FORCE	--	-3.14	--	-3.14
	END MOMENT	--	-0.19	--	-0.19
	CNCTN FORCE	--	-1.65	--	-1.49
E-636	(Struts 7 through 7)				
	AXIAL FORCE	0.35	--	--	0.35
	END MOMENT	-3.73	--	--	-3.73
	CNCTN FORCE	0.82	--	--	-0.46

C O N N E C T I O N F O R C E S U M M A R Y

BASIC LOAD CASE No. 2
DEAD + 25 PSF SNOW
PER AWWA D103-09

MAXIMUM CONNECTION FORCES (kips) AND MOMENTS (in-k)					
EXTRUSION	TYPE	TOP FLANGE		BOTTOM FLANGE	
		COMP	TENS	COMP	TENS
E-636	(Struts 1 through 3)				
	AXIAL FORCE	20.27	13.24	25.29	--
	END MOMENT	5.67	48.89	37.34	--
	CNCTN FORCE	10.23	-0.85	17.57	--
E-636	(Struts 4 through 4)				
	AXIAL FORCE	14.90	--	14.65	14.90
	END MOMENT	-45.97	--	2.97	-45.97
	CNCTN FORCE	15.88	--	7.07	-0.97
E-636	(Struts 5 through 5)				
	AXIAL FORCE	15.18	--	14.88	15.18
	END MOMENT	-51.77	--	11.54	-51.77
	CNCTN FORCE	17.00	--	8.60	-1.82
E-607	(Struts 6 through 6)				
	AXIAL FORCE	--	-51.12	--	-51.12
	END MOMENT	--	-9.18	--	-9.18
	CNCTN FORCE	--	-25.90	--	-25.22
E-636	(Struts 7 through 7)				
	AXIAL FORCE	5.25	--	--	5.25
	END MOMENT	-55.24	--	--	-55.24
	CNCTN FORCE	12.10	--	--	-6.85

C O N N E C T I O N F O R C E S U M M A R Y

BASIC LOAD CASE No. 3
DEAD + 25 PSF SNOW
GROUND LOAD PER ASCE7-05

MAXIMUM CONNECTION FORCES (kips) AND MOMENTS (in-k)					
EXTRUSION	TYPE	TOP FLANGE		BOTTOM FLANGE	
		COMP	TENS	COMP	TENS
E-636	(Struts 1 through 3)				
	AXIAL FORCE	18.02	12.71	23.86	--
	END MOMENT	4.80	46.72	35.16	--
	CNCTN FORCE	9.14	-0.78	16.57	--
E-636	(Struts 4 through 4)				
	AXIAL FORCE	13.46	--	13.26	13.46
	END MOMENT	-41.32	--	3.53	-41.32
	CNCTN FORCE	14.31	--	6.54	-0.85
E-636	(Struts 5 through 5)				
	AXIAL FORCE	13.96	--	13.72	13.96
	END MOMENT	-46.69	--	11.40	-46.69
	CNCTN FORCE	15.48	--	8.06	-1.52
E-607	(Struts 6 through 6)				
	AXIAL FORCE	--	-46.84	--	-46.84
	END MOMENT	--	-8.58	--	-8.58
	CNCTN FORCE	--	-23.70	--	-23.14
E-636	(Struts 7 through 7)				
	AXIAL FORCE	4.75	--	--	4.75
	END MOMENT	-49.97	--	--	-49.97
	CNCTN FORCE	10.95	--	--	-6.20

C O N N E C T I O N F O R C E S U M M A R Y

BASIC LOAD CASE No. 4
DEAD + 25 PSF SNOW DRIFT
GROUND LOAD PER ASCE7-05

MAXIMUM CONNECTION FORCES (kips) AND MOMENTS (in-k)

EXTRUSION	TYPE	TOP FLANGE		BOTTOM FLANGE	
		COMP	TENS	COMP	TENS
E-636	(Struts 1 through 3)				
	AXIAL FORCE	26.82	-0.19	26.52	--
	END MOMENT	7.91	10.94	31.64	--
	CNCTN FORCE	13.47	-1.93	17.17	--
E-636	(Struts 4 through 4)				
	AXIAL FORCE	17.67	--	17.36	3.68
	END MOMENT	-38.93	--	5.47	-41.31
	CNCTN FORCE	16.23	--	8.70	-5.23
E-636	(Struts 5 through 5)				
	AXIAL FORCE	18.42	--	18.09	1.87
	END MOMENT	-32.65	--	15.39	-32.16
	CNCTN FORCE	15.60	--	10.68	-4.52
E-607	(Struts 6 through 6)				
	AXIAL FORCE	--	-40.87	--	-40.87
	END MOMENT	--	-6.40	--	-6.43
	CNCTN FORCE	--	-20.86	--	-20.02
E-636	(Struts 7 through 7)				
	AXIAL FORCE	4.55	--	--	4.55
	END MOMENT	-47.92	--	--	-47.92
	CNCTN FORCE	10.50	--	--	-5.94

C O N N E C T I O N F O R C E S U M M A R Y

BASIC LOAD CASE No. 5
DEAD + 16.045 PSF WIND PRESSURE
PER AWWA D103-09

MAXIMUM CONNECTION FORCES (kips) AND MOMENTS (in-k)

EXTRUSION	TYPE	TOP FLANGE		BOTTOM FLANGE	
		COMP	TENS	COMP	TENS
E-636	(Struts 1 through 3)				
	AXIAL FORCE	0.29	-0.42	0.30	-0.58
	END MOMENT	-3.30	2.89	2.46	-3.59
	CNCTN FORCE	0.71	-0.71	0.54	-0.86
E-636	(Struts 4 through 4)				
	AXIAL FORCE	--	-0.83	0.07	--
	END MOMENT	--	7.26	7.75	--
	CNCTN FORCE	--	-1.67	1.32	--
E-636	(Struts 5 through 5)				
	AXIAL FORCE	--	-1.13	-0.38	-0.99
	END MOMENT	--	7.33	7.96	2.30
	CNCTN FORCE	--	-1.84	1.16	-0.06
E-607	(Struts 6 through 6)				
	AXIAL FORCE	11.25	--	11.31	--
	END MOMENT	2.32	--	3.60	--
	CNCTN FORCE	5.65	--	5.84	--
E-636	(Struts 7 through 7)				
	AXIAL FORCE	--	-1.14	-1.14	--
	END MOMENT	--	11.95	11.95	--
	CNCTN FORCE	--	-2.62	1.48	--

C O N N E C T I O N F O R C E S U M M A R Y

BASIC LOAD CASE No. 6
DEAD + WIND VELOCITY
100 MPH PER ASCE 7-05, CASE A

MAXIMUM CONNECTION FORCES (kips) AND MOMENTS (in-k)

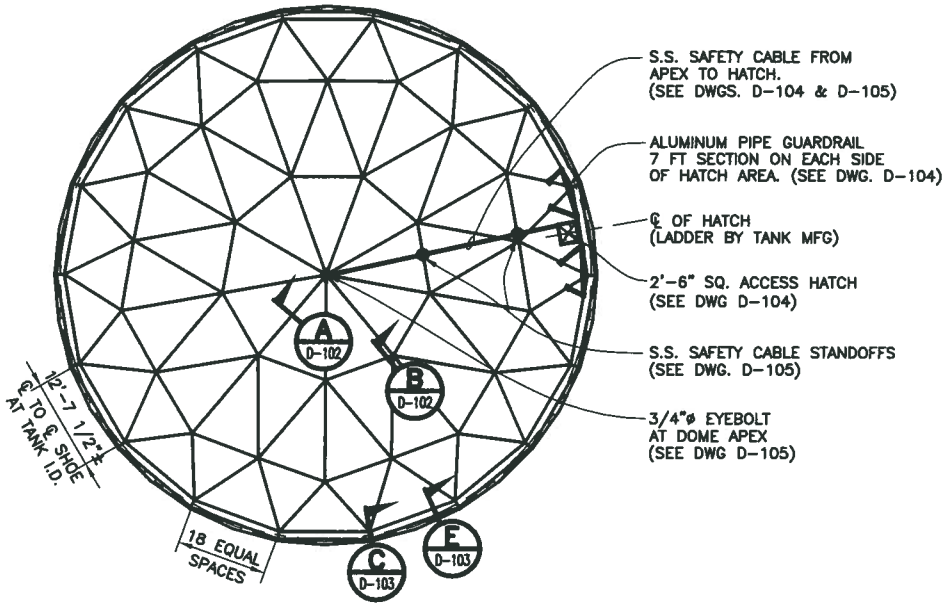
EXTRUSION	TYPE	TOP FLANGE		BOTTOM FLANGE	
		COMP	TENS	COMP	TENS
E-636	(Struts 1 through 3)				
	AXIAL FORCE	-2.30	-9.52	-0.86	-10.59
	END MOMENT	-23.07	0.74	7.65	-10.24
	CNCTN FORCE	2.58	-5.37	0.89	-6.46
E-636	(Struts 4 through 4)				
	AXIAL FORCE	--	-6.32	-1.00	-7.24
	END MOMENT	--	32.73	33.67	5.92
	CNCTN FORCE	--	-8.94	5.16	-2.26
E-636	(Struts 5 through 5)				
	AXIAL FORCE	--	-7.00	-1.00	-7.03
	END MOMENT	--	30.93	32.20	2.95
	CNCTN FORCE	--	-9.02	4.92	-2.66
E-607	(Struts 6 through 6)				
	AXIAL FORCE	43.62	--	43.09	--
	END MOMENT	7.33	--	10.24	--
	CNCTN FORCE	22.18	--	21.68	--
E-636	(Struts 7 through 7)				
	AXIAL FORCE	--	-4.79	-4.79	--
	END MOMENT	--	50.34	50.34	--
	CNCTN FORCE	--	-11.03	6.24	--

C O N N E C T I O N F O R C E S U M M A R Y

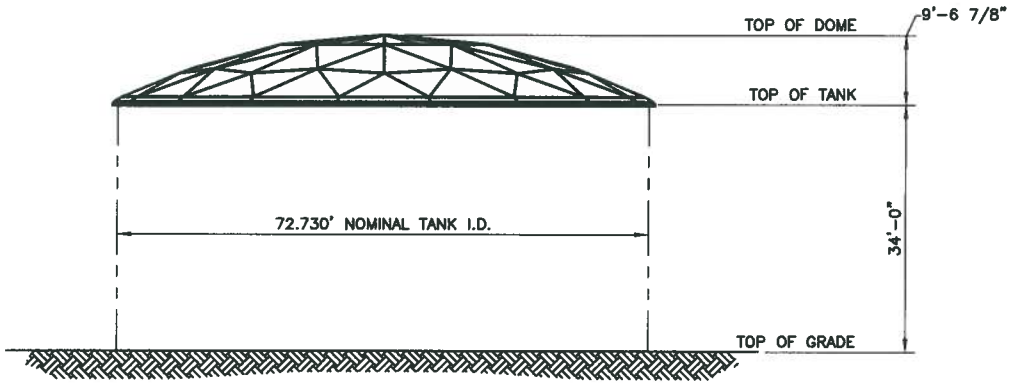
BASIC LOAD CASE No. 7
DEAD + WIND VELOCITY
100 MPH PER ASCE 7-05, CASE B

MAXIMUM CONNECTION FORCES (kips) AND MOMENTS (in-k)

EXTRUSION	TYPE	TOP FLANGE		BOTTOM FLANGE	
		COMP	TENS	COMP	TENS
E-636	(Struts 1 through 3)				
	AXIAL FORCE	-2.10	-10.17	-0.80	-11.63
	END MOMENT	-23.81	0.84	7.44	-11.02
	CNCTN FORCE	2.81	-5.75	0.88	-7.06
E-636	(Struts 4 through 4)				
	AXIAL FORCE	--	-6.73	-0.62	-8.00
	END MOMENT	--	34.43	35.50	5.75
	CNCTN FORCE	--	-9.45	5.64	-2.63
E-636	(Struts 5 through 5)				
	AXIAL FORCE	--	-7.67	-0.64	-7.70
	END MOMENT	--	32.06	33.49	2.64
	CNCTN FORCE	--	-9.57	5.29	-3.01
E-607	(Struts 6 through 6)				
	AXIAL FORCE	45.26	--	44.76	--
	END MOMENT	7.65	--	10.71	--
	CNCTN FORCE	23.01	--	22.53	--
E-636	(Struts 7 through 7)				
	AXIAL FORCE	--	-4.94	-4.94	--
	END MOMENT	--	51.93	51.93	--
	CNCTN FORCE	--	-11.38	6.44	--



PLAN



ELEVATION

STATE OF MISSOURI
GERALD K. ORRISON
NUMBER E-13925
REGISTERED PROFESSIONAL ENGINEER
6/5/13

FOR APPROVAL

JUN 05 2013

DESIGN LOADS
(PER AWWA D103-09 & ASCE7-D5)

SNOW LOAD:	25 PSF
INTERNAL PRESSURE:	2" WC
VACUUM LOAD:	2" WC
WIND SPEED:	100 MPH

PRESSURE REGULATION DEVICES AND PRESSURE RELIEF VALVE SET AT A MAXIMUM OF 2" W.C. ARE TO BE PROVIDED, INSTALLED & MONITORED BY OTHERS.

CST COVERS TENCOR CONSERVATEK GARDENA, CA CONROE, TX

REV.	DATE:	DRWN BY	CHKD BY	DESCRIPTION
0	06/05/13	MAA	GKO	FOR APPROVAL

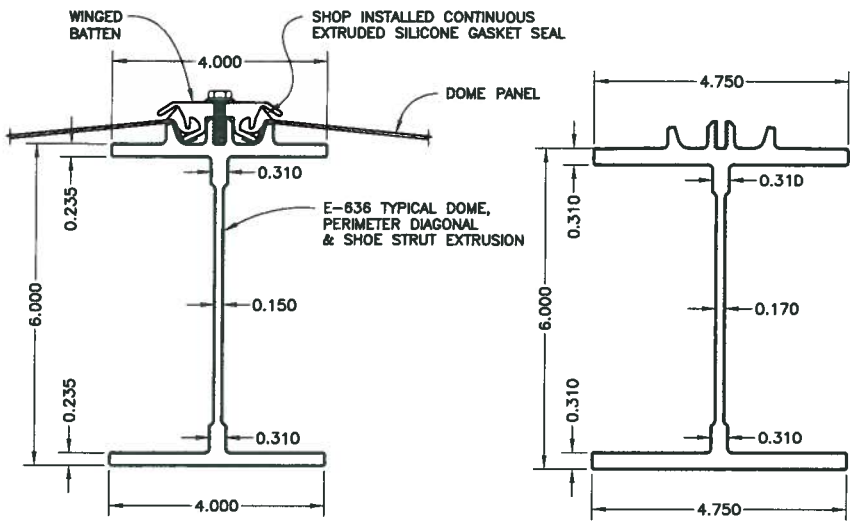
CUSTOMER CADY AQUASTORE

DWG. TITLE DOME PLAN AND ELEVATION

PROJECT DESCRIPTION (1) DOME FOR 73'± I.D. AQUASTORE TANK BRIDGETON, MO

JOB NO.	DRAWING NO.	REVISION	CUST. CONTR. NO.
213174	D-101	0	1768

18-9N-120

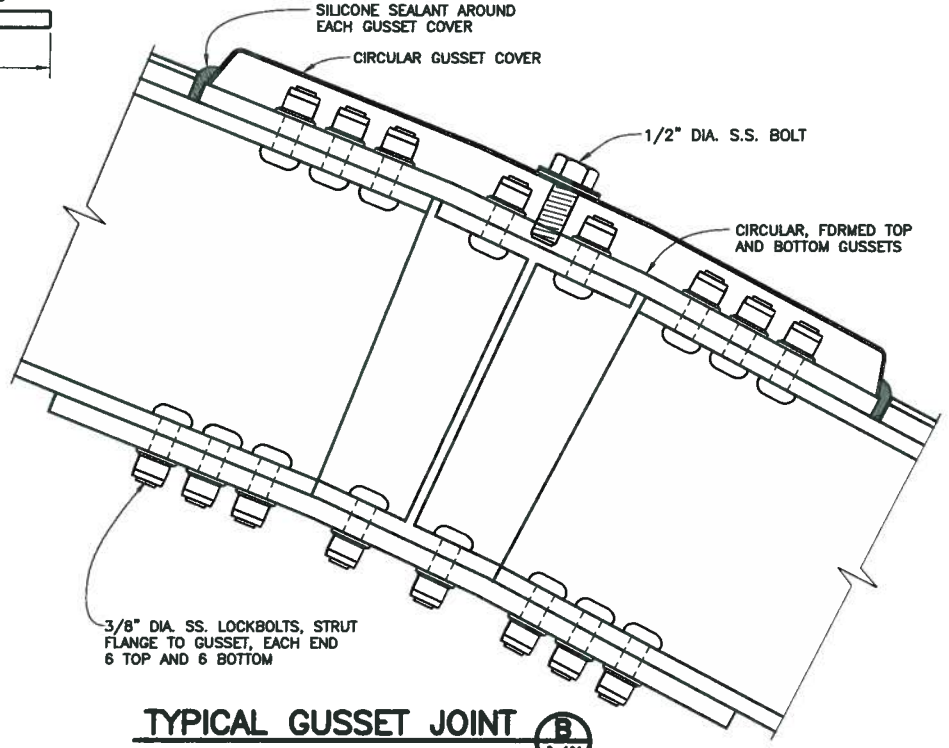


E-607
TENSION RING
STRUT EXTRUSION

TYPICAL DOME STRUT (A D-101)

NOTES:

1. ALL MATERIAL EXCEPT AS OTHERWISE NOTED IS MILL FINISH ALUMINUM AS FOLLOWS:
   - STRUTS, GUSSETS AND PLATES — 6061-T6
   - PANELS, FLASHING, AND GUSSET COVERS — 3003-H16
   - BATTENS — 6061-T6 OR 6063-T6
2. MATERIAL SIZE:
   - STRUT — AS NOTED
   - TYPICAL TOP GUSSET — 3/8" x 14" DIA.
   - TYPICAL BOTTOM GUSSET — 3/8" x 14" DIA.
   - SHOE TOP GUSSET — 3/8" x 14" DIA.
   - SHOE BOTTOM GUSSET — 3/8" x 11 3/4" x 14" DIA.
   - PANEL AND FLASHING — 0.05" THICK
3. FASTENERS:
   LOCKBOLTS - ALUMINUM (7075-T73) OR S.S. (300 SERIES) AS NOTED. (AL. LOCKBOLTS CLEAR ANODIZED 204)
   LOCKBOLT COLLARS - ALUMINUM (6061 HEAT TREATED)
   GUSSET COVER BOLTS - S.S. (300 SERIES)
   BATTEN SCREWS - #14 DIA. S.S. (302)
4. SEALANT
   PECORA SILICONE SEALANT MEETING FEDERAL SPEC TT-S-001543A AND TT-S-00230C.
5. ALL DIMENSIONS SHOWN ARE NOMINAL AND IN INCHES, UNLESS NOTED OTHERWISE.



TYPICAL GUSSET JOINT (B D-101)

STATE OF MISSOURI
GERALD K. ORRISON
NUMBER E-13925
REGISTERED PROFESSIONAL ENGINEER
6/5/13

FOR APPROVAL

JUN 05 2013

CST COVERS TENCOR CONSERVATEK
GARDENA, CA CONROE, TX

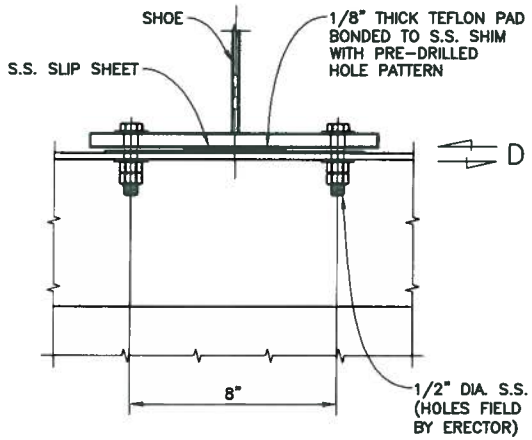
REV.	DATE:	DRWN BY	CHKD BY	DESCRIPTION
0	06/05/13	MAA	GKO	FOR APPROVAL

CUSTOMER: CADY AQUASTORE

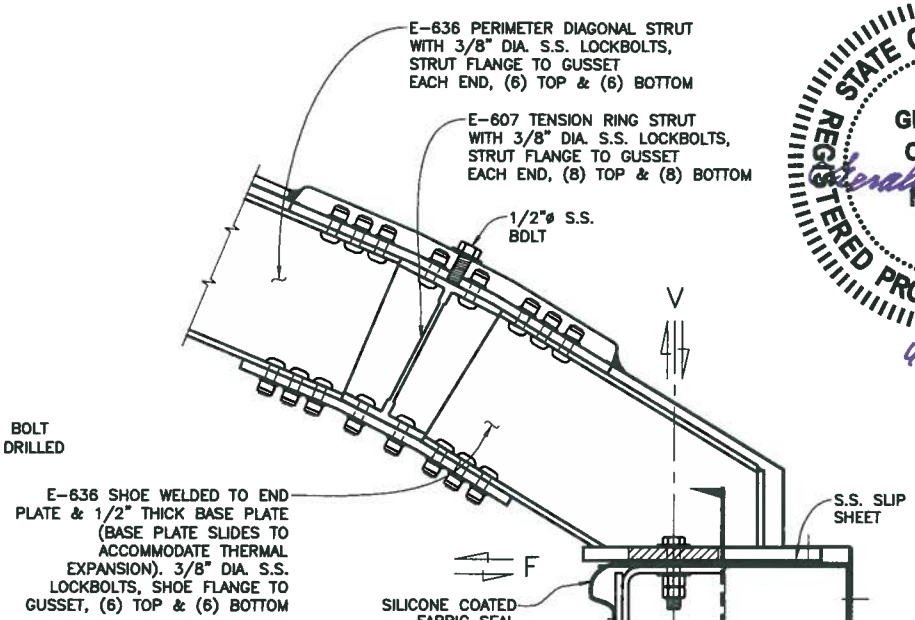
DWG. TITLE: TYPICAL STRUT & GUSSET JOINT DETAIL

PROJECT DESCRIPTION: (1) DOME FOR 73'± I.D. AQUASTORE TANK BRIDGETON, MO

JOB NO.	DRAWING NO.	REVISION	CUST. CONTR. NO.
213174	D-102	0	1768



SECTION D (D-103) N.T.S.



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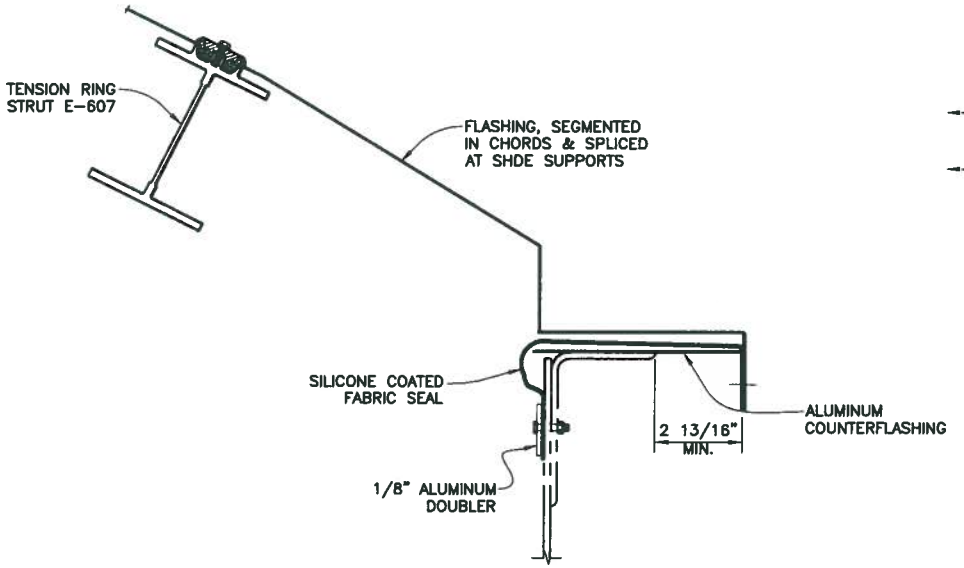


SECTION E (D-101) N.T.S.

NOTE:
FLASHING OVERHANG DIMENSIONS BASED ON NOMINAL TANK DIAMETER WITH NO VARIANCE. ACTUAL MAX & MIN TO VARY BASED ON ACTUAL TANK DIMENSIONS.

DOME FORCES AT SHOE:

SNOW LOAD	V ↓	= 8.3 KIPS
WIND LOAD	V ↓	= 7.8 KIPS
WIND DRAG	D	= 0.9 KIPS
RADIAL FRICTION	F	= 0.5 KIPS

(NOTE: ALL LOADS INCLUDE DOME DEAD WEIGHT)

STATE OF MISSOURI
GERALD K. ORRISON
NUMBER E-13925
REGISTERED PROFESSIONAL ENGINEER
Gerald K Orrison
4/5/13

JUN 05 2013

FOR APPROVAL

REV.	DATE:	DRWN BY	CHKD BY	DESCRIPTION
0	06/05/13	MAA	GKO	FOR APPROVAL

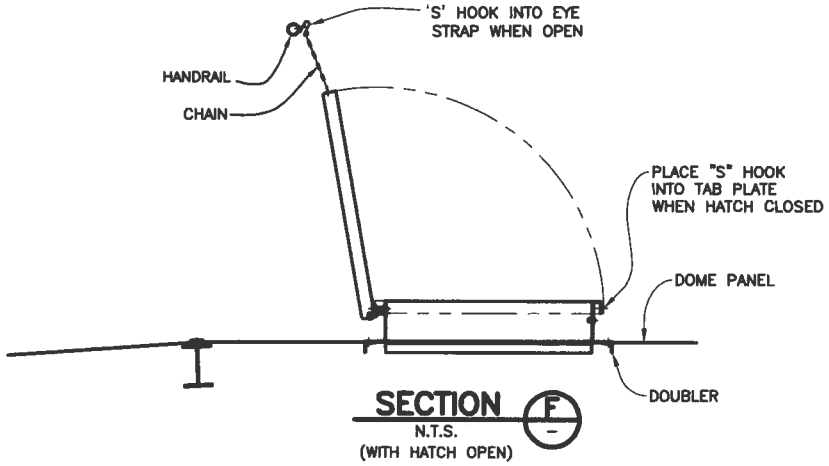
CUSTOMER: CADY AQUASTORE

CST COVERS TENCATE GEOSYNTHETICS GARDENA, CA CONROE, TX

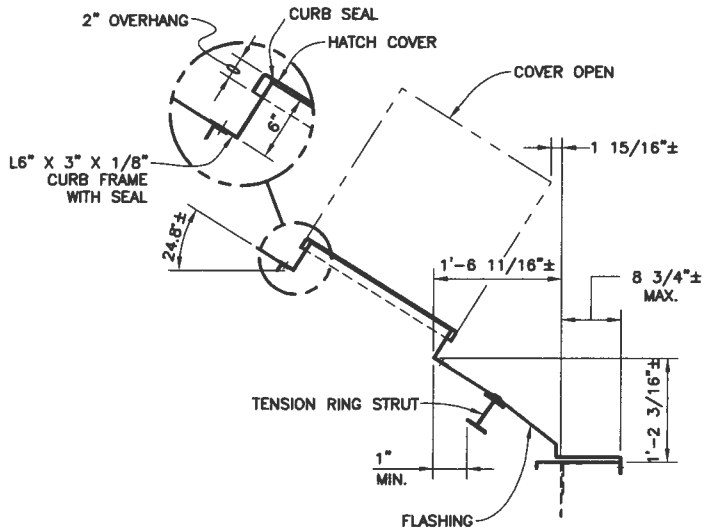
DWG. TITLE: SHOE, TENSION RING & FLASHING

PROJECT DESCRIPTION: (1) DOME FOR 73'± I.D. AQUASTORE TANK BRIDGETON, MO

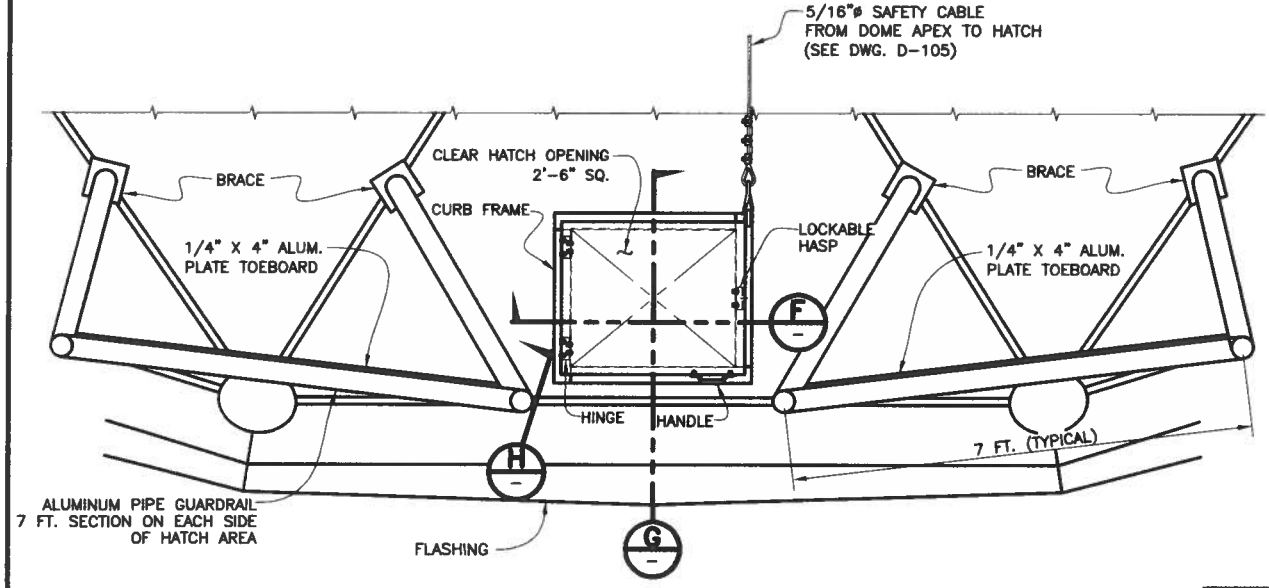
JOB NO.	DRAWING NO.	REVISION	CUST. CONTR. NO.
213174	D-103	0	1768



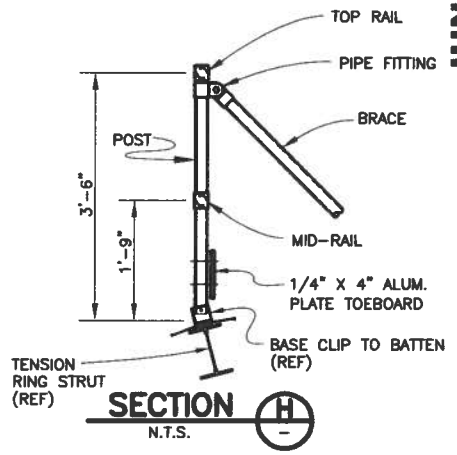
SECTION F (–)
N.T.S.
(WITH HATCH OPEN)



SECTION G (–)
N.T.S.



HATCH PLAN
N.T.S.



SECTION H (–)
N.T.S.

NOTES:
- HATCH FRAME AND COVER ARE ALL ALUMINUM CONSTRUCTION
- FLASHING NOT TO BE STEPPED ON

FOR APPROVAL
JUN 05 2013

CST COVERS TAYLOR CONSERVATEK
GARDENA, CA CONROE, TX

REV.	DATE:	DRWN BY	CHKD BY	DESCRIPTION
0	06/05/13	MAA	GKO	FOR APPROVAL

CUSTOMER: CADY AQUASTORE

DWG. TITLE: HATCH, SAFETY LINE & GUARDRAIL DETAIL

PROJECT DESCRIPTION: (1) DOME FOR 73'± I.D. AQUASTORE TANK BRIDGETON, MO

JOB NO.	DRAWING NO.	REVISION	CUST. CONTR. NO.
213174	D-104	0	1768

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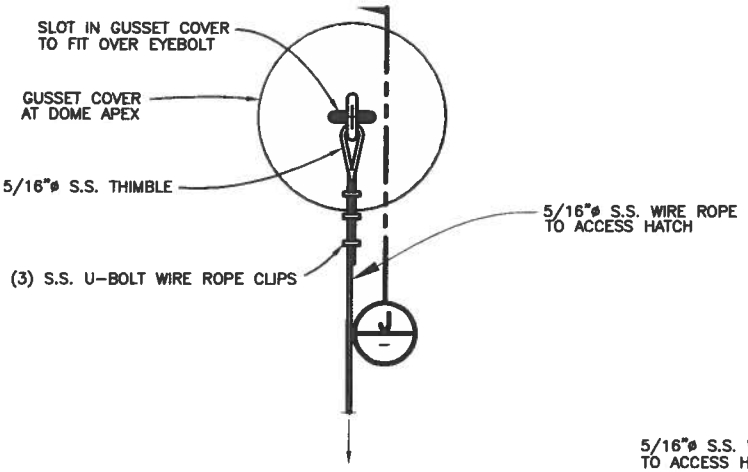
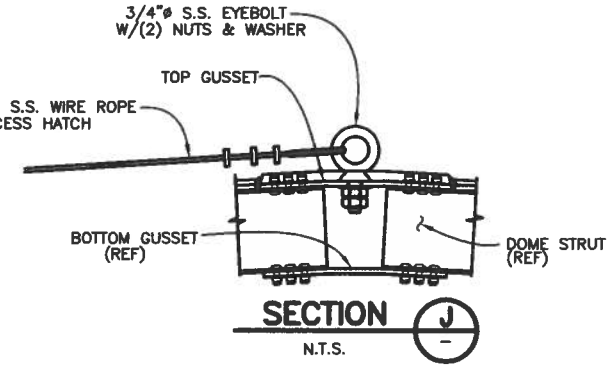


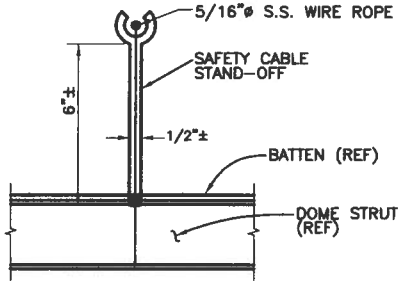
CABLE AND EYEBOLT AT DOME APEX

N.T.S.



SECTION

N.T.S.



SAFETY CABLE STANDOFF

N.T.S.

NOTE:
EYEBOLT FOR DOME ACCESS MAINTENANCE ONLY BY QUALIFIED PERSONNEL. EYEBOLT RATED FOR OSHA FALL PROTECTION – MUST BE INSPECTED OR REPLACED AFTER FALL OR OTHER SHOCK LOADING. REMOVE ANY TEMPORARY SAFETY LINE IMMEDIATELY AFTER USE.

FOR APPROVAL

JUN 05 2013

CST COVERS TENCOR CONSERVATEX GARDENA, CA CONROE, TX

REV.	DATE:	DRWN BY	CHKD BY	DESCRIPTION
0	06/05/13	MAA	GKO	FOR APPROVAL

CUSTOMER: CADY AQUASTORE

DWG. TITLE: EYEBOLT AT APEX & SAFETY LINE

PROJECT DESCRIPTION: (1) DOME FOR 73'± I.D. AQUASTORE TANK BRIDGETON, MO

JOB NO.	DRAWING NO.	REVISION	CUST. CONTR. NO.
213174	D-105	0	1768

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ATTACHMENT D

ELECTRICAL PLAN

Electrical Drawing List			
Drawing	Title	Revision	Date
E-1.01	COVER SHEET, SYMBOLS, ONE LINE DIAGRAM	0	7/22/2013
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–

1 / 1.01 DRAWING LIST
NO SCALE

ELECTRICAL SYMBOLS

LIGHTING FIXTURES

- B — TYPE DESIGNATION; 2 — SWITCH REFERENCE; CIRCUIT NUMBER
- EXIT LIGHT WITH DIRECTIONAL ARROW(S) DARKENED AREA INDICATES NUMBER AND ORIENTATION OF FACES
- INDICATES WALL MOUNTED (TYPICAL)
- SURFACE FIXTURE
- RECESSED FIXTURE (1X4, 2X4, NIL)
- RECESSED NIGHT LIGHT FIXTURE
- PENDANT MOUNTED FIXTURE
- WALL MOUNTED FIXTURE
- STRIP FIXTURE
- TRACK LIGHTING (TRIANGLES INDICATE THE NUMBER OF LIGHTS)
- EMERGENCY LIGHT FIXTURE
- SINGLE HEAD POLE FIXTURE
- DOUBLE HEAD POLE FIXTURE@ 180°
- WALLPACK
- CEILING FAN
- BOLLARD
- SPOT LIGHT
- COMBO EXIT/EMERGENCY FIXTURE
- COMBO EXIT/EMERGENCY FIXTURE

DEVICES

- RECEPTACLE SINGLE
- DUPLEX RECEPTACLE
- SPLIT WIRED DUPLEX RECEPTACLE
- DOUBLE DUPLEX RECEPTACLE
- GFI — RECEPTACLE GROUND FAULT PROTECTED
- IG — RECEPTACLE ISOLATED GROUND
- WP — RECEPTACLE WEATHER PROOF
- TELE–POWER POLE
- FLOOR BOX
- S_{1B} — SWITCH SINGLE POLE; b — SWITCH LABEL IF APPLICABLE
- S_{2b} — SWITCH TWO POLE; b — SWITCH LABEL IF APPLICABLE
- S_{3b} — SWITCH 3–WAY; b — SWITCH LABEL IF APPLICABLE
- S_{4b} — SWITCH 4–WAY; b — SWITCH LABEL IF APPLICABLE
- DIMMER SWITCH
- S_K — KEY OPERATED SWITCH
- S_P — PILOT LIGHT SWITCH
- PUSHBUTTON SWITCH
- J — JUNCTION BOX

SYSTEMS

- SYSTEM CONTROL CABINET (TOP OF CAB @ 6'–0")
- F — FIRE ALARM PULL STATION
- H — FIRE ALARM HEAT DETECTOR
- S — FIRE ALARM SMOKE DETECTOR
- DUCT SMOKE DETECTOR
- FIRE ALARM HORN
- FIRE ALARM AUDIBLE/VISUAL DEVICE
- FIRE ALARM STROBE
- F — SPRINKLER FLOW SWITCH
- T — SPRINKLER TAMPER SWITCH
- FF — FIREMAN'S PHONE JACK
- DH — MAGNETIC DOOR HOLDER
- CLOCK
- COMPUTER OUTLET
- M — MICROPHONE JACK
- S — SPEAKER
- TELEVISION OUTLET
- TELEPHONE OUTLET WITH (1) PHONE CABLE
- DATA OUTLET WITH (1) DATA CABLE
- VOICE/DATA OUTLET WITH (1) PHONE CABLE AND (1) DATA CABLE
- EMERGENCY STATION
- I — INTERCOM OUTLET
- CAMERA

POWER DISTRIBUTION

- FLUSH MOUNTED PANEL (TOP OF PNL @ 6'–0")
- SURFACE MOUNTED PANEL (TOP OF PNL @ 6'–0")
- T — TRANSFORMER
- G — GENERATOR

MOTOR AND EQUIPMENT

- MOTOR CONNECTION (NO. REFERS TO M&E SCH)
- EQUIPMENT CONNECTION (NO. REFERS TO M&E SCH)
- DISCONNECT SWITCH
- MOTOR STARTER
- COMBINATION STARTER/DISCONNECT SWITCH
- S_M — MOTOR STARTER SWITCH
- THERMOSTAT
- EXHAUST FAN

2 / 1.01 SYMBOLS
NO SCALE

PROJECT NAME: THE VILLAGE AT MACKENZIE PLACE, 31 UNIT BLDG

12/1/05 Attachment "B" of St. Louis County Rules & Regulations
Seismic Code Block on 1st Sheet of Electrical Plans
Electrical System Components / Earthquake Load Resistance

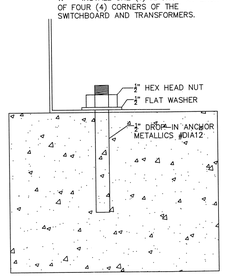
Seismic Use Group: (1) — Seismic Design Category (B)

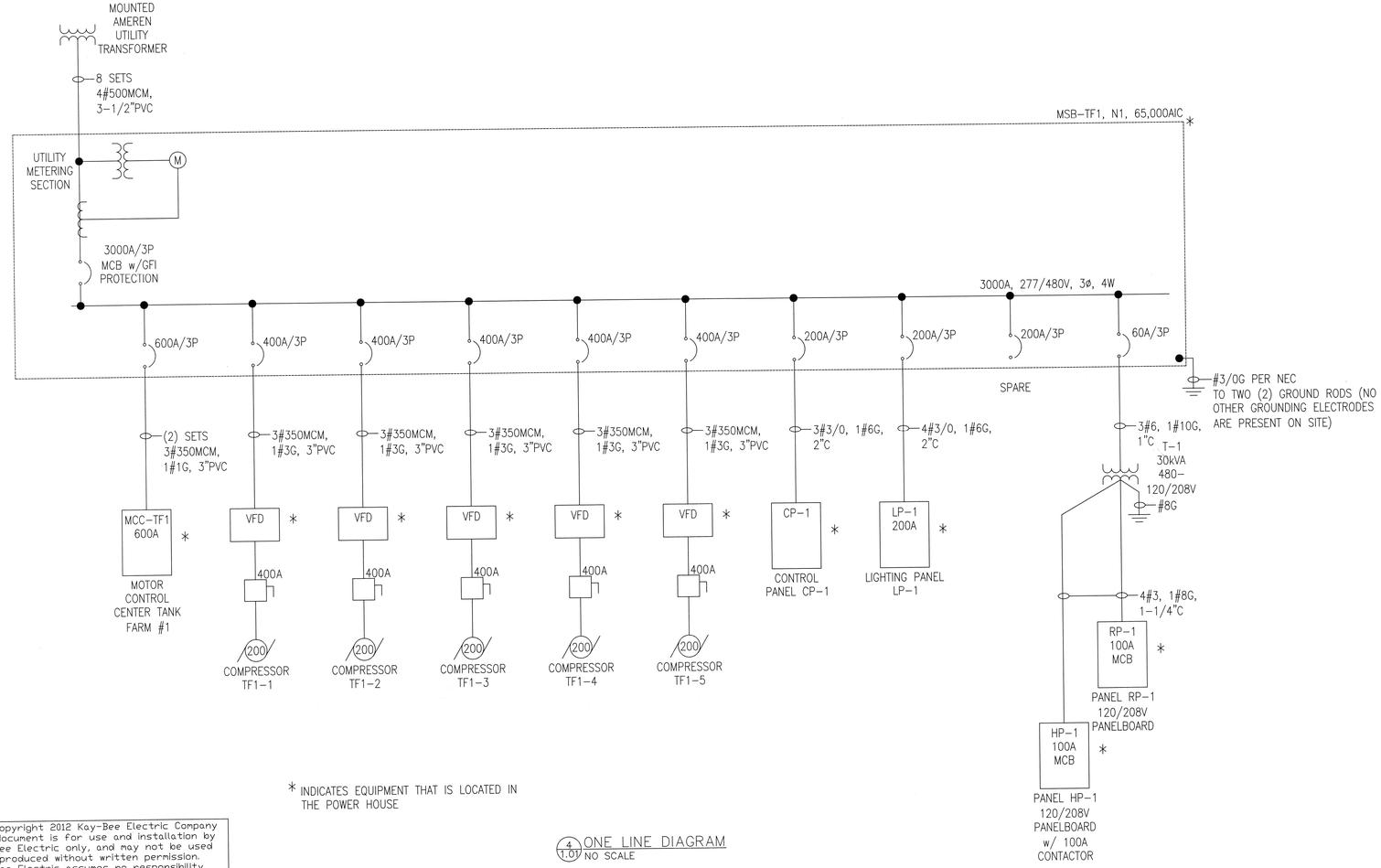
Listing of Equipment and System Components	Anchorage to Floors, Roofs, Etc.		Sway Bracing		Location of Professionally Sealed Anchorage and Sway Bracing Details On Const. Documents			Comments
					Subsequent Submittal			
	Not Provided	Provided	Not Provided	Provided	Drawing No./ Spec Section	Shop Drawings	Separate Permit & Plans	
Fire Protection, Detection and Alarm Equipment, and System Components *"See Attachment "C" Table 200* (List items such as fire alarm panels, electric conductors powering fire protection equipment, etc.)	X		X					Not Applicable
Emergency or Standby Equipment and System Components *"See Attachment "C" Table 200* (List items such as emergency generators, panel boards, single hanger and trapeze supported system components, bus ducts, primary cable systems, motors control centers and devices, switch gears, transformers, unit substations, cable tray, conduit, lighting fixtures, etc.)	X		X					Not Applicable
Other Equipment & System Components *"See Attachment "C" Table 200* Needed for Continued Operation of Seismic Use Group III Facilities or Whose Failure Could Impair Their Continued Operation. (List items)	X		X					Not Applicable
Other General Equipment & System Components (List items such as panel boards, single hanger and trapeze supported system components, communication systems, electrical bus ducts, primary cable systems, electrical motor control centers, motor control devices, switchgear, transformers, unit substations, cable tray, conduit, lighting fixtures, etc.)		X		X				See General Notes #1, #3, #4 on this drawing.

GENERAL NOTES – ELECTRICAL:
1. ALL CONDUIT IS ROUTED IN TRENCH BELOW GRADE.
2. NOT USED
3. ELECTRICAL INSTALLATION SHALL FOLLOW THE 2008 EDITION OF THE NEC.
4. MOUNT SWITCHBOARDS, PANELBOARDS, AND DRY TYPE TRANSFORMERS TO STRUCTURE PER MANUFACTURER'S INSTRUCTIONS.

3 / 1.01 SEISMIC CODE BLOCK
NO SCALE

DETAIL NOTES:
1. INSTALL ONE (1) ANCHOR AT EACH OF FOUR (4) CORNERS OF THE SWITCHBOARD AND TRANSFORMERS.





* INDICATES EQUIPMENT THAT IS LOCATED IN THE POWER HOUSE

4 / 1.01 ONE LINE DIAGRAM
NO SCALE

MCC–TF1
600A, 480V, 3ø, 3W

1 FVNR SIZE 3	4 FVNR SIZE 3	9 FVNR SIZE 1
		10 FVNR SIZE 1
2 FVNR SIZE 3	5 FVNR SIZE 2	
	6 FVNR SIZE 2	11 FVNR SIZE 1
3 FVNR SIZE 3		12 FVNR SIZE 1
	7 FVNR SIZE 1	
600A MLO	8 FVNR SIZE 1	13 FVNR SIZE 1
		SPARE

MCC–TF1			
POSITION	ITEM	HP	FEEDER
1	PUMP TF1–1	50	3#4, 1#1G, 1–1/4"C
2	PUMP TF1–2	50	3#4, 1#1G, 1–1/4"C
3	PUMP TF1–3	50	3#4, 1#1G, 1–1/4"C
4	PUMP TF1–4	50	3#4, 1#1G, 1–1/4"C
5	ANSI PUMP TF1–1	25	3#8, 1#10G, 1"C
6	ANSI PUMP TF1–2	25	3#8, 1#10G, 1"C
7	SUMP PUMP TF1–1	3	3#10, 1#10G, 1"C
8	SUMP PUMP TF1–2	3	3#10, 1#10G, 1"C
9	COMP FAN TF1–1	1	3#10, 1#10G, **
10	COMP FAN TF1–2	1	3#10, 1#10G, **
11	COMP FAN TF1–3	1	3#10, 1#10G, **
12	COMP FAN TF1–4	1	3#10, 1#10G, **
13	COMP FAN TF1–5	1	3#10, 1#10G, **

**COMBINE THESE FIVE LOADS IN ONE (1) 1–1/4"C

5 / 1.01 MCC–TF1 ARRANGEMENT
NO SCALE

STATE OF MISSOURI — JOHN J. HANNEN — NUMBER E-22481 — REGISTERED PROFESSIONAL ENGINEER

REPUBLIC SERVICES, INC.
TANK FARM #1

KAY-BEE ELECTRIC
250 RUE ST. FRANCOIS
FLORISSANT, MO 63031
(314) 837-3308
(314) 837-3924 FAX

DRAWN BY: JGB
CHECKED BY: BJK
DATE: 07/22/13
SCALE: NONE
FILE NAME:
REVISIONS: 07/22/13 PERMIT

E-1.01

Electrical Drawing List			
Drawing	Title	Revision	Date
E-1.02	COVER SHEET, SYMBOLS, ONE LINE DIAGRAM	0	7/22/2013
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–

1 / 1.02 DRAWING LIST
NO SCALE

ELECTRICAL SYMBOLS

LIGHTING FIXTURES

- B — TYPE DESIGNATION; 2 — SWITCH REFERENCE; CIRCUIT NUMBER
- EXIT LIGHT WITH DIRECTIONAL ARROW(S) DARKENED AREA INDICATES NUMBER AND ORIENTATION OF FACES
- INDICATES WALL MOUNTED (TYPICAL)
- SURFACE FIXTURE
- 1X4 / 2X4 RECESSED FIXTURE
- RECESSED NIGHT LIGHT FIXTURE
- EMERGENCY
- PENDANT MOUNTED FIXTURE
- WALL MOUNTED FIXTURE
- STRIP FIXTURE
- TRACK LIGHTING (TRIANGLES INDICATE THE NUMBER OF LIGHTS)
- EMERGENCY LIGHT FIXTURE
- SINGLE HEAD POLE FIXTURE
- DOUBLE HEAD POLE FIXTURE@ 180°
- WALLPACK
- CEILING FAN
- BOLLARD
- SPOT LIGHT
- COMBO EXIT/EMERGENCY FIXTURE
- COMBO EXIT/EMERGENCY FIXTURE

DEVICES

- RECEPTACLE SINGLE
- DUPLEX RECEPTACLE
- SPLIT WIRED DUPLEX RECEPTACLE
- DOUBLE DUPLEX RECEPTACLE
- GFI RECEPTACLE GROUND FAULT PROTECTED
- IG RECEPTACLE ISOLATED GROUND
- WP RECEPTACLE WEATHER PROOF
- TELE-POWER POLE
- FLOOR BOX
- SWITCH, SINGLE POLE; b — SWITCH LABEL IF APPLICABLE
- SWITCH TWO POLE; b — SWITCH LABEL IF APPLICABLE
- 3 SWITCH 3-WAY; b — SWITCH LABEL IF APPLICABLE
- 4 SWITCH 4-WAY; b — SWITCH LABEL IF APPLICABLE
- DIMMER SWITCH
- KEY OPERATED SWITCH
- P PILOT LIGHT SWITCH
- PUSHBUTTON SWITCH
- J JUNCTION BOX

SYSTEMS

- SYSTEM CONTROL CABINET (TOP OF CAB @ 6'-0")
- F FIRE ALARM PULL STATION
- H FIRE ALARM HEAT DETECTOR
- S FIRE ALARM SMOKE DETECTOR
- DUCT SMOKE DETECTOR
- FIRE ALARM HORN
- FIRE ALARM AUDIBLE/VISUAL DEVICE
- FIRE ALARM STROBE
- F SPRINKLER FLOW SWITCH
- T SPRINKLER TAMPER SWITCH
- FP FIREMAN'S PHONE JACK
- DH MAGNETIC DOOR HOLDER
- CLOCK
- COMPUTER OUTLET
- M MICROPHONE JACK
- S SPEAKER
- TELEVISION OUTLET
- TELEPHONE OUTLET WITH (1) PHONE CABLE
- DATA OUTLET WITH (1) DATA CABLE
- VOICE/DATA OUTLET WITH (1) PHONE CABLE AND (1) DATA CABLE
- EMERGENCY STATION
- I INTERCOM OUTLET
- CAMERA

POWER DISTRIBUTION

- FLUSH MOUNTED PANEL (TOP OF PNL @ 6'-0")
- SURFACE MOUNTED PANEL (TOP OF PNL @ 6'-0")
- T TRANSFORMER
- G GENERATOR

MOTOR AND EQUIPMENT

- MOTOR CONNECTION (NO. REFERS TO M&E SCH)
- EQUIPMENT CONNECTION (NO. REFERS TO M&E SCH)
- DISCONNECT SWITCH
- MOTOR STARTER
- COMBINATION STARTER/DISCONNECT SWITCH
- MOTOR STARTER SWITCH
- THERMOSTAT
- EXHAUST FAN

2 / 1.02 SYMBOLS
NO SCALE

PROJECT NAME: THE VILLAGE AT MACKENZIE PLACE, 31 UNIT BLDG

12/1/05 Attachment "B" of St. Louis County Rules & Regulations
Seismic Code Block on 1st Sheet of Electrical Plans
Electrical System Components / Earthquake Load Resistance

Seismic Use Group (1) — Seismic Design Category (B)

Listing of Equipment and System Components	Anchorage to Floors, Roofs, Etc.		Sway Bracing		Location of Professionally Sealed Anchorage and Sway Bracing Details On Const. Documents			Comments
					Subsequent Submittal			
	Not Provided	Provided	Not Provided	Provided	Drawing No./ Spec Section	Shop Drawings	Separate Permit & Plans	
Fire Protection, Detection and Alarm Equipment, and System Components *See Attachment "C" Table 200 (List items such as fire alarm panels, electric conductors powering fire protection equipment, etc.)*	X		X					Not Applicable
Emergency or Standby Equipment and System Components *See Attachment "C" Table 200 (List items such as emergency generators, panel boards, single hanger and trapeze supported system components, bus ducts, primary cable systems, motors control centers and devices, switch gears, transformers, unit substations, cable tray, conduit, lighting, fixtures, etc.)*	X		X					Not Applicable
Other Equipment & System Components *See Attachment "C" Table 200 Needed for Continued Operation of Seismic Use Group III Facilities or Whose Failure Could Impair Their Continued Operation (List Items)*	X		X					Not Applicable
Other General Equipment & System Components (List items such as panel boards, single hanger and trapeze supported system components, communication systems, electrical bus ducts, primary cable systems, electrical motor control centers, motor control devices, switchgear, transformers, unit substations, cable tray, conduit, lighting fixtures, etc.)		X		X				See General Notes #1, #3, #4 on this drawing

GENERAL NOTES – ELECTRICAL:
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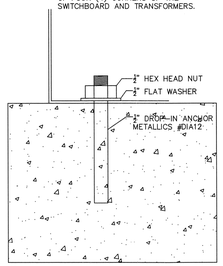
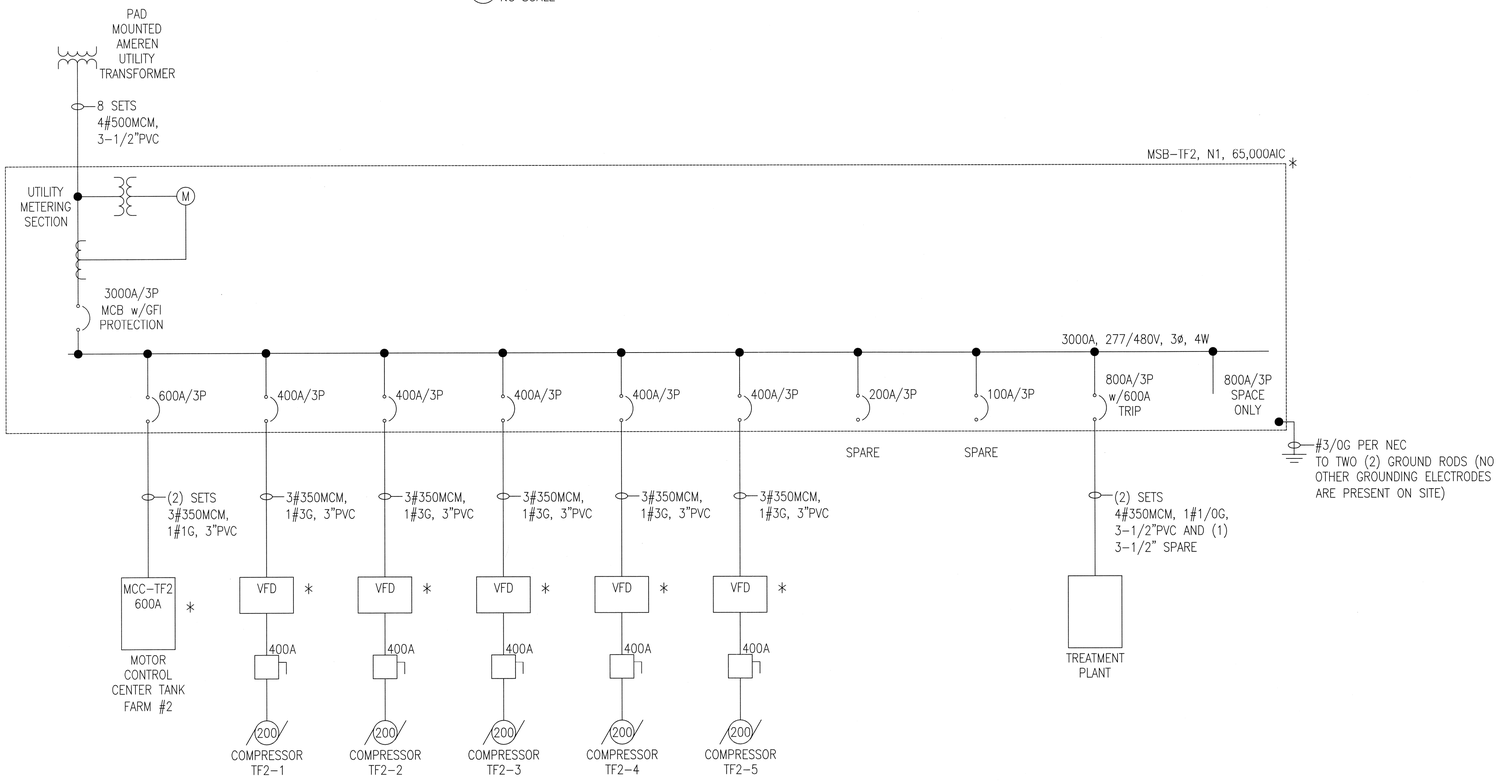
3 / 1.02 SEISMIC CODE BLOCK
NO SCALE

DETAIL NOTES:
1. INSTALL ONE (1) ANCHOR AT EACH OF FOUR (4) CORNERS OF THE SWITCHBOARD AND TRANSFORMERS.





* INDICATES EQUIPMENT THAT IS LOCATED IN THE POWER HOUSE

4 / 1.02 ONE LINE DIAGRAM
NO SCALE

MCC-TF2
600A, 480V, 3ø, 3W

1 FVNR SIZE 3	4 FVNR SIZE 3	9 FVNR SIZE 1
		10 FVNR SIZE 1
2 FVNR SIZE 3	5 FVNR SIZE 2	11 FVNR SIZE 1
	6 FVNR SIZE 2	
3 FVNR SIZE 3	7 FVNR SIZE 1	12 FVNR SIZE 1
		13 FVNR SIZE 1
600A MLO	8 FVNR SIZE 1	SPARE

MCC-TF2			
POSITION	ITEM	HP	FEEDER
1	PUMP TF2-1	50	3#4, 1#1G, 1-1/4"C
2	PUMP TF2-2	50	3#4, 1#1G, 1-1/4"C
3	PUMP TF2-3	50	3#4, 1#1G, 1-1/4"C
4	PUMP TF2-4	50	3#4, 1#1G, 1-1/4"C
5	ANSI PUMP TF2-1	25	3#8, 1#10G, 1"C
6	ANSI PUMP TF2-2	25	3#8, 1#10G, 1"C
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8	SUMP PUMP TF2-2	3	3#10, 1#10G, 1"C
9	COMP FAN TF2-1	1	3#10, 1#10G, **
10	COMP FAN TF2-2	1	3#10, 1#10G, **
11	COMP FAN TF2-3	1	3#10, 1#10G, **
12	COMP FAN TF2-4	1	3#10, 1#10G, **
13	COMP FAN TF2-5	1	3#10, 1#10G, **

** COMBINE THESE FIVE LOADS IN ONE (1) 1-1/4"C

5 / 1.02 MCC-TF2 ARRANGEMENT
NO SCALE

REPUBLIC SERVICES, INC.
TANK FARM #2

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DRAWN BY: JGB
CHECKED BY: BJK
DATE: 07/22/13
SCALE: NONE
FILE NAME:
REVISIONS: 07/22/13 PERMIT

E-1.02