Memorandum

Draft for Review

August 9, 2016

To:	Kim D. Tucker-Billingslea, GM	Ref. No.:	058505
From:	Glenn Turchan, Allan McMurray, GHD/kf/53		
cc:	Mauricio Barrera, Shannon Froiland, GHD		
Subject:	Stormwater Treatment Conceptual Design (30%) Memorandum Former GM Janesville Assembly Plant, Janesville, WI		

1. Introduction

GHD has prepared this memorandum to present the stormwater decommissioning strategy for the former General Motors LLC (GM) Assembly Plant (Plant) in Janesville Wisconsin (Site). GM has elected to renew the treatment of the stormwater as the Plant is undergoing decommissioning which is expected in the 3rd and 4th quarters of 2016 due to the plant's closure in November 2015.

Plan

1.1 Storm Sewer Cleaning

The wastewater from the storm sewer cleaning (containing mostly wash water and some sediment) will be collected and shipped off-Site. The cleaning operation will be completed by Veolia ES Industrial Services, Inc. (Veolia). Five 21,000 gallon frac tanks will be positioned near the Power House. They will then be connected together, effectively acting as a large 105,000 gallon tank. The storm sewer cleaning water will be collected by these frac tanks. Once collected, the sewer cleaning water will be trucked off-Site for off-Site disposal. All necessary characterization testing will be completed for potential treatment by the City of Janesville publically owned treatment works (POTW) and/or commercial water treatment facilities. The sediment materials will be independently managed by GHD and Waste Management Inc. on behalf of GM. It is noted that GM may elect to treat the water and recycle the water for future cleaning operations.

1.2 Temporary Stormwater Treatment Plant (SWTP)

GM has elected to renew the operation of the Stormwater Treatment Plant (SWTP) during planned decommissioning. This SWTP was "idled" in 2009 and will require renewal of some components. However, with the planned decommissioning during the 3rd and 4th quarter, GM will mobilize a temporary treatment plant until the SWTP has been recommissioned.

GHD has developed a tasked approach for the collection and treatment of stormwater. These tasks are:

- Task 1 – Mobilization of Temporary Treatment Facilities

  GHD will coordinate the rental and mobilization of the temporary treatment facility, and the provision for capture of stormwater volume equivalent to what is assumed to be the volume of a typical storm from previous SWTP design drawings (to deal with a "first" flush strategy). This includes mobilization of a 0.5 million gallon Modutank. The treatment facilities will be designed to remove suspended solids with expansion to treat dissolved organics if required by the Wisconsin Department of Natural Resources (WDNR).

- Task 2 – Mobilization of Increased Storage Capacity (as required)

  Following the installation of the treatment facility with a capacity for expected typical storm flowrates, stormwater flowrate data will be collected. If it is determined that the storm water flowrate exceeds the assumed typical flowrate, then equipment to increase the storage capacity will be mobilized.

- Task 3 – Recommissioning of Existing SWTP

  While Task 1 and 2 are taking place, condition assessments and maintenance activities will be undertaken to restart equipment within the existing SWTP. This includes grit chambers and wet well pumps. To ensure the system is capable of treating both suspended solids and dissolved contaminants, the existing system will potentially be augmented with the rental treatment equipment used for Tasks 1 and 2.

Details of each phase of the treatment strategy are discussed as follows:

1.2.1 Task 1 – Mobilization of Temporary Facilities

Task 1 of the water treatment strategy involves the mobilization of rental treatment equipment to immediately begin to treat collected stormwater. A process flow diagram of the proposed process is shown on Figure 1.1. The overall treatment concept (after storage) is for the removal of suspended solids by a 5 µm bag filter followed by the removal of dissolved organics by activated carbon contactors. The micron rating may be re-evaluated and potentially increased during operation if bar filter change out becomes problematic. Stormwater will be diverted from the existing diversion chamber to the grit chambers. The connection between the grit chambers and the existing wet well will be closed. Water will be removed from these grit chambers using a pair of diesel pumps located nearby the exiting SWTP at a flowrate of 1,000 gallons per minute (gpm). This flowrate was chosen to correspond to what was assumed to be a typical storm flowrate for the existing SWTP wet well pumps (from examination of the original design drawings). Water will be pumped to the existing 200,000 gallon tanks (combined volume of 600,000 gallons). Water will flow from the northernmost tank to the southernmost tank via the equalization overflow connections. A pipe connected to the 8-inch fill line on the southernmost tank will allow water to over flow into a temporary 500,000 gallon Modutank (TNK-01). This arrangement provides for 1.1 million gallons of stormwater storage.

When treating water, a pair of diesel pumps, piped to be able to draw water from all or each of the four storage tanks, will pump water through the treatment equipment at a maximum rate of 1,000 gpm. Treated water will be directed to a pair of interconnected 21,000 gallon frac tanks which provide carbon contactor

treatment. The overflow from these tanks will be directed by gravity through temporary piping to the diversion chamber, where it will flow into the Site Outfall 010 and into the Rock River.

The water will be sampled before and after treatment, as required. Any necessary additions to the treatment process will be evaluated after data receipt.

Backwashing of the carbon contactors will take place automatically, and backwash water will be diverted through a 21,000 frac tank acting as a settling tank prior to being returned to the Modutank for re-processing later. This settling tank is where suspended solids washed from the granular activated carbon (GAC) contactors will settle and be collected. This tank will be periodically pumped out by a local waste disposal company, thus providing solids removal for the system.

A proposed general arrangement of equipment and approximate routing of piping for this phase of operation is shown on Figure 1.2 using the City of Janesville Geographic Information System (GIS) information as a template.

Equipment cut sheets for proposed rental equipment are shown in Appendix A.

1.2.1.1 Tank Valving Connections

It is proposed that storm water storage capacity be accommodated using the three existing 200,000 gallon tanks originally used for the existing SWTP (on the basis of them passing a condition assessment), augmented with a 500,000 gallon temporary lined modular built tank (Modutank Inc – TNK-01). The Modutank has a working footprint of 132.25 by 132.25 feet and a wall height of approximately 4.75 feet. It is proposed that water will be extracted from the open grit chamber using a pair of diesel pumps at a combined flowrate of 1,000 gpm, and diverted by 8-inch piping to a temporary connection in the existing vertical 8-inch fill line in the northernmost existing tank. The fill line below this temporary connection, as well as the smaller fill lines will be isolated using temporarily installed valves. Water will flow from this tank to the next tank located to the south by means of the existing overflow/equalization pipe. As with the first tank, the vertical fill lines will be isolated using temporarily installed valves. Water will flow from this tank into the third (i.e., most southern) tank via the existing overflow/equalization connection. As with the other two tanks, isolation valves will be installed on the vertical fill lines to avoid tank overflow being returned through the existing SWTP feed pumps into the wet well. A temporary connection on the most southern tank vertical 8-inch fill line will be run to the Modutank, with an isolation valve installed on this connection. In this way, the sequence of filling will be the northern most existing tank, overflowing to the middle existing tank, overflowing to the southernmost existing tank, with that tank overflowing to the Modutank. This will allow the maximum amount of capacity to be used (approximately 1.1 million gallons). This will also provide the maximum amount of suspended particle settling out into the tanks.

To supply water to the treatment equipment, a temporary connection will be installed on all of the exiting tanks at the drain connection near the bottom of each of the tanks, as well as onto a specialized connection in the Modutank. These connections will be interconnected and routed to a common header, which will be routed to a pair of diesel pumps to be run at a flowrate of 1,000 gpm, which will feed the treatment equipment. Each of the connections running to the main pumping header will contain an isolation valve, and as such provide operator flexibility to treat all tanks at once or one at a time. Moreover, because the height of

the existing tanks are much higher than the Modutank, the operation for the treating of water from a full capacity will proceed from the full existing tanks until the level in these tanks reaches below the Modutank and then the Modutank will be interconnected into the flow path.

1.2.1.2 System Pipe Sizing

Hydraulic calculations have been carried out for the system influent pump and proposed piping networks. It was calculated assuming the piping to be used will be constructed of 8-inch high density polyethelene. Pumping curves for three different pump speeds (in revolutions per minute [RPM]) along with the calculated system curve is shown on Figure 1.3. Moreover, the 8-inch piping diameter is expected to provide adequate capacity in the event that the system is upgraded to operate at the determined ultimate design capacity of the existing system of 5,500 gpm. The pumping and system curves for this scenario (assuming five parallel diesel pumps) is shown on Figure 1.4.

System pipe sizing has also been calculated for the piping from each of the tanks to the influent pumping and into the treatment equipment. Using the proposed layout, a pipe diameter of 8-inch has been found to provide a net positive suction head at the flowrate indicated with a margin of approximately 128 percent assuming a static head of 4 feet in all tanks being withdrawn from (equal to the estimated working height in TNK-01).

1.2.2 Task 2 – Increased Storm Water Storage Capacity

Based on preliminary storm calculations, it is expected that the accumulation of 1-inch of rain over 4 hours throughout the entire Site (assumed to be 118 acres of hard surfaces) will result in a total runoff volume of approximately 2.9 million gallons. This assessment is based on the National Oceanic and Atmospheric Administration (NOAA) frequency precipitation database with a runoff coefficient of 0.9. This volume was chosen as a bounding design value. To accommodate for this volume of water, it is proposed that in Task 2, additional storm water storage capacity in the form of temporary tanks be added to the design described in Task 1 (as required). A process flow diagram is shown on Figure 1.5. A general arrangement of these extra tanks along with a proposed piping route is shown on Figure 1.6.

It is proposed that to minimize piping friction losses between the lake tanks (TNK-02 and TNK-03) and the Modutank that this piping be 8-inches in diameter. Moreover, it is proposed that a ramp be constructed as indicated on Figure 1.6 to allow vehicular traffic to access the southern portion of the Site, which includes fire hydrant service.

To allow for maximum volume capacity utilization of the tanks, it is proposed that the tanks be piped as follows: The piping from the influent pumps and the grit chamber to the existing tanks is to remain the same as described for Task 1. A connection between the fill line of the southernmost existing tank (going to the 500,000 gallon tank in Task 1) is to be run to the connection in TNK-02. An overflow connection is to run between TNK-02 and TNK-03. A connection between the overflow of TNK-03 is to run to the 500,000 gallon Modutank. As with Task 1, all tanks are to be connected via drain lines to a common pumping header to allow for maximum flexibility for treatment. Following this, the treatment of the water is to proceed just as indicated in Task 1.

System pipe sizing has also been calculated for the piping from each of the tanks to the influent pumping and into the treatment equipment. Using the proposed layout, a pipe diameter of 8-inches has been found to provide a net positive suction head at the flowrate indicated with a margin of approximately 71 percent assuming a static head of 4 feet in all tanks being withdrawn from (equal to the estimated working height in TNK-01).

It is recommended that this phase be pursued after operation for a number of months under the Task 1 scheme to determine if additional capacity is needed.

1.2.3 Winterization of Treatment System

The temporary system is expected to be operated in freezing conditions, and as such, must be winterized to avoid piping degradation and internal ice formation occurring in sub-zero temperatures. As such, once installed the system equipment and piping will be insulated and heat traced, to allow for continued operation during the winter months (as required).

1.2.4 Tank Positioning Geotechnical Assessment for Tasks 1 and 2

A review of the published geological information[1] shows that the GM plant is located in a 50 to 300 feet deep bedrock channel filled with glacial meltwater spillway deposits. Glacial spillway deposits are generally comprised of sand and gravel containing frequent cobbles and boulders. The groundwater table is expected to be generally shallow, consistent with and under the influence of the Rock River.

Three above grade tanks are proposed to be placed in the existing parking lot. The tank sizes are provided below:

- One 500,000 gallon square Modutank with a footprint of 132.25 feet x 132.25 feet and water depth of 4.5 feet
- Two circular lake tanks each 125 feet in diameter with water depths of 12 feet

Due to the uneven pavement surface it is proposed to use a 1.5 feet thick common fill compacted to 95 percent standard proctor maximum dry density (ASTM D698) as a levelling base for the proposed tanks.

The pressure exerted on the existing pavement surface by the tanks and the levelling 1.5 feet thick common fill is estimated to be in the order of 500 pounds per square foot (psf) to 1000 psf or 3.5 psi to 7 psi for the 4.5 feet and 12 feet high tanks, respectively.

Pavements are not designed for stationary loads but only for moving loads which are relatively very small footprint wheels loads, although with relatively high contact pressures ranging from 30 psi to 110 psi. Notwithstanding, assuming that the pavement structure is comprised of asphalt and granular base and is underlain by glacial spillway sand and gravel deposits, the tanks when supported on the existing pavement structure should provide adequate service for the duration of 2 to 3 years. The pipe joints etc. should be designed for settlements of 1-inch for the square 4.5 feet high tank and 2-inch for the 125 feet diameter, 12 feet high tanks.

[1] Geology and Groundwater Resources of Rock County Wisconsin, United States Printing Office (1963), p58

The pavement surface may need to be patched or replaced after the tank is removed due to the settlements under the tank loads relative to the surrounding paved areas.

1.2.5 Task 3 – Recommissioning of Existing SWTP

Task 3 involves the recommissioning of the existing SWTP facilities during or following decommissioning. In this task the existing storm water pumps, grit chambers, and manual bar screens will be rehabilitated and used as originally designed. This will negate the need for influent pumping from the grit chambers to the storage tanks. To ensure protection against possible dissolved contaminants present in the storm water, it is recommended that the GAC contactors remain in this phase, as required. Moreover, to protect the carbon from premature headloss buildup, it is recommended that the bag filters remain as well. Thus in this phase of the water treatment strategy, the system will operate as originally designed and be augmented with carbon adsorption, as required. GM will collect water influent and effluent samples routinely during the surface water treatment as decommissioning proceeds. It should be noted that the strategy is to complete the decommissioning so that no treatment is required.

2. Conclusions

GHD recommends a tasked approach for the treatment of the multiple sources of water at the former Janesville Assembly plant during decommissioning. The recommended tasks are:

- Storm Sewer Cleaning Water
- Power House Cleaning Water
- Temporary Storm Water Treatment Plant
  - Task 1 – Mobilization of Temporary Facilities
  - Task 2 – Increased Storm Water Storage Capacity
  - Task 3 – Recommissioning of Existing SWTP

In addition, a 30 percent design has been completed and detailed in this memorandum. This includes the treatment concept, preliminary piping design, pump and equipment sizing, and piping layouts. It is recommended that temporary equipment with a flowrate capacity of 1,000 gpm be used to remove solids from stormwater and granular activated carbon vessels to remove potential dissolved contaminants. It is recommended that the stormwater be collected from the existing grit chamber intakes and disposed of into the Rock River via the diversion chamber following treatment. GM will collect water influent and effluent samples routinely during the surface water treatment as decommissioning proceeds. It should be noted that the strategy is to complete the decommissioning so that no treatment is required.

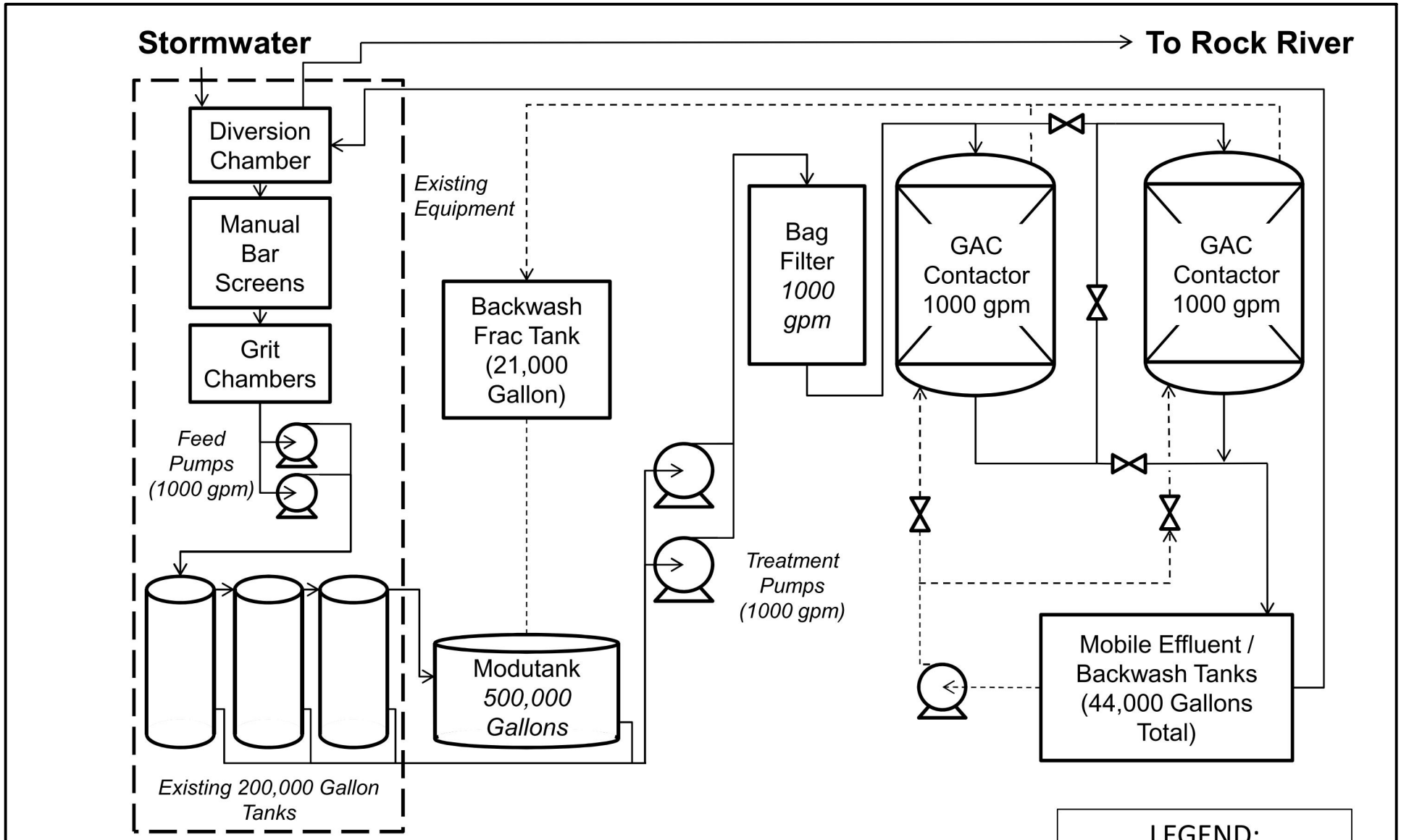

Figure 1.1
Task 1
Process Flow Diagram

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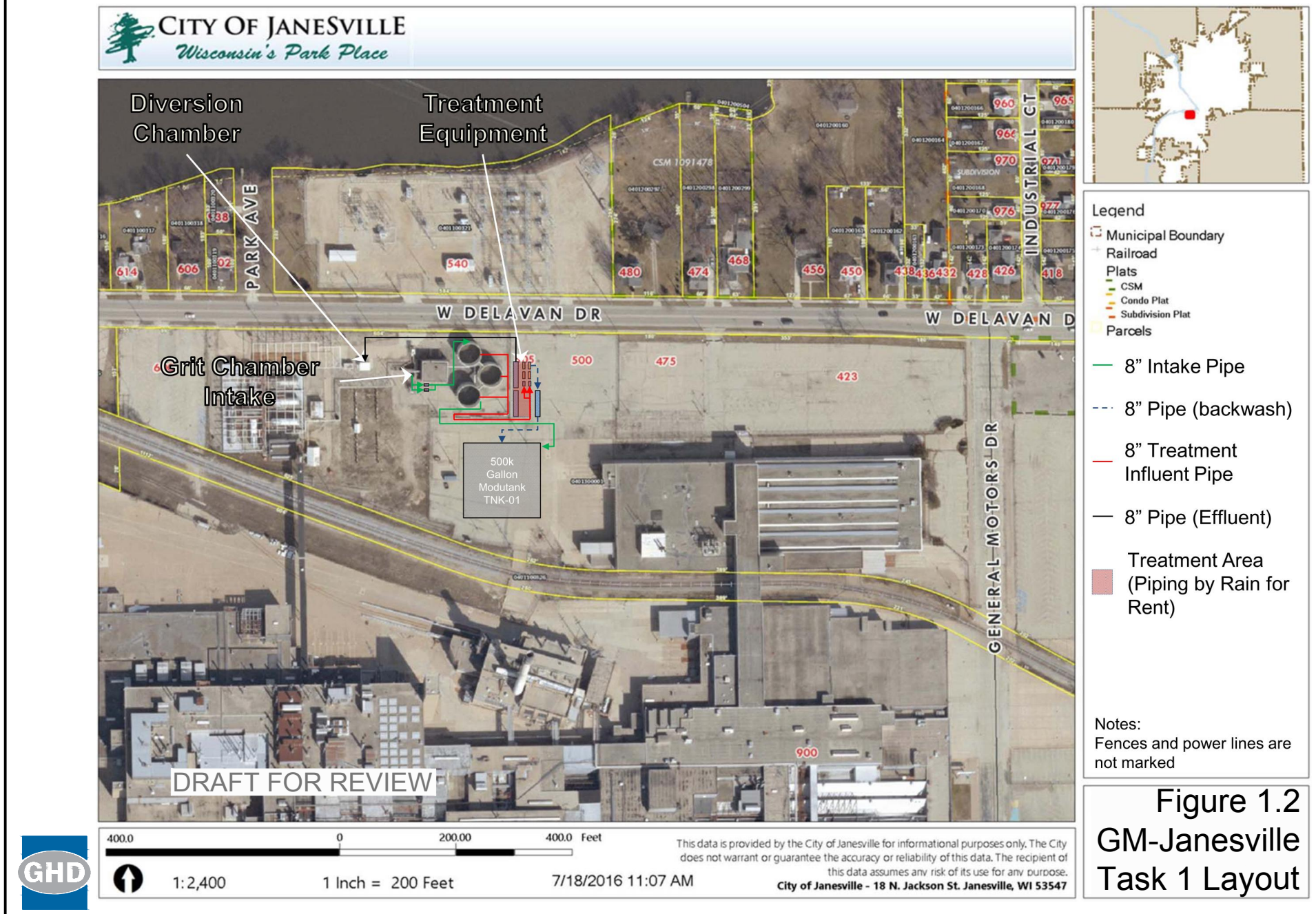

Figure 1.2
GM-Janesville
Task 1 Layout

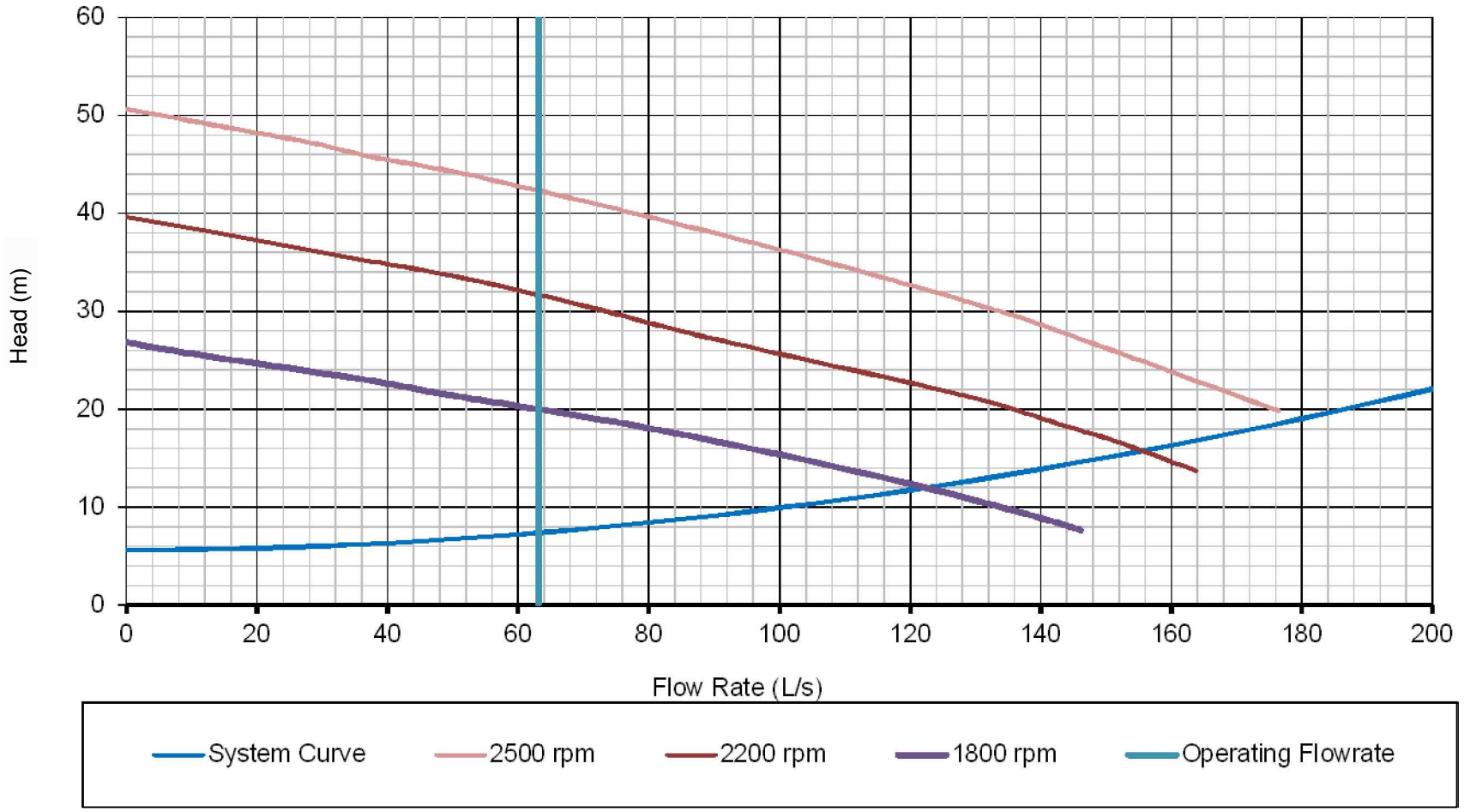

Figure 1.3
System Curve
For Task 1

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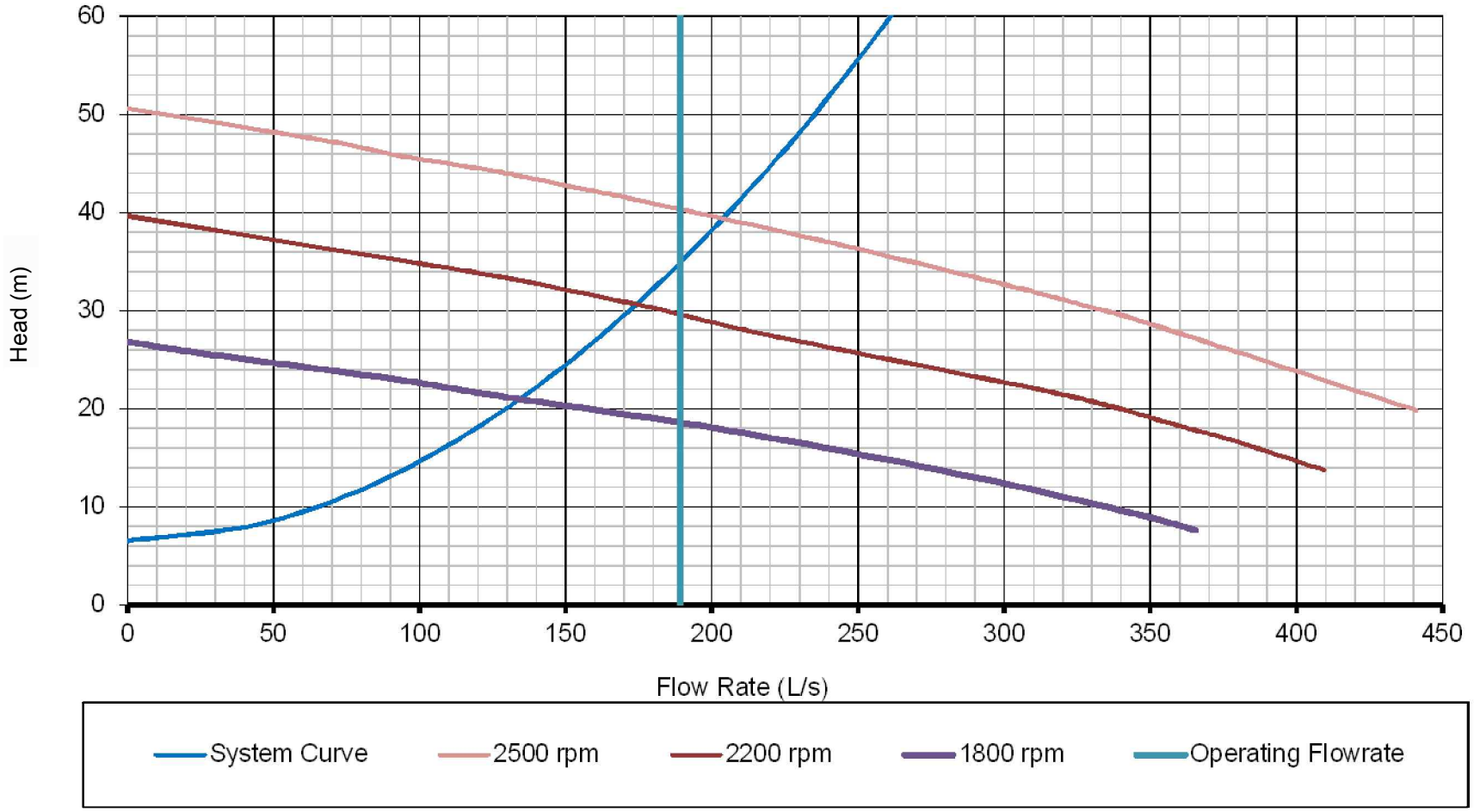

Figure 1.4
System Curve For 5 Parallel Pumps For Task 2

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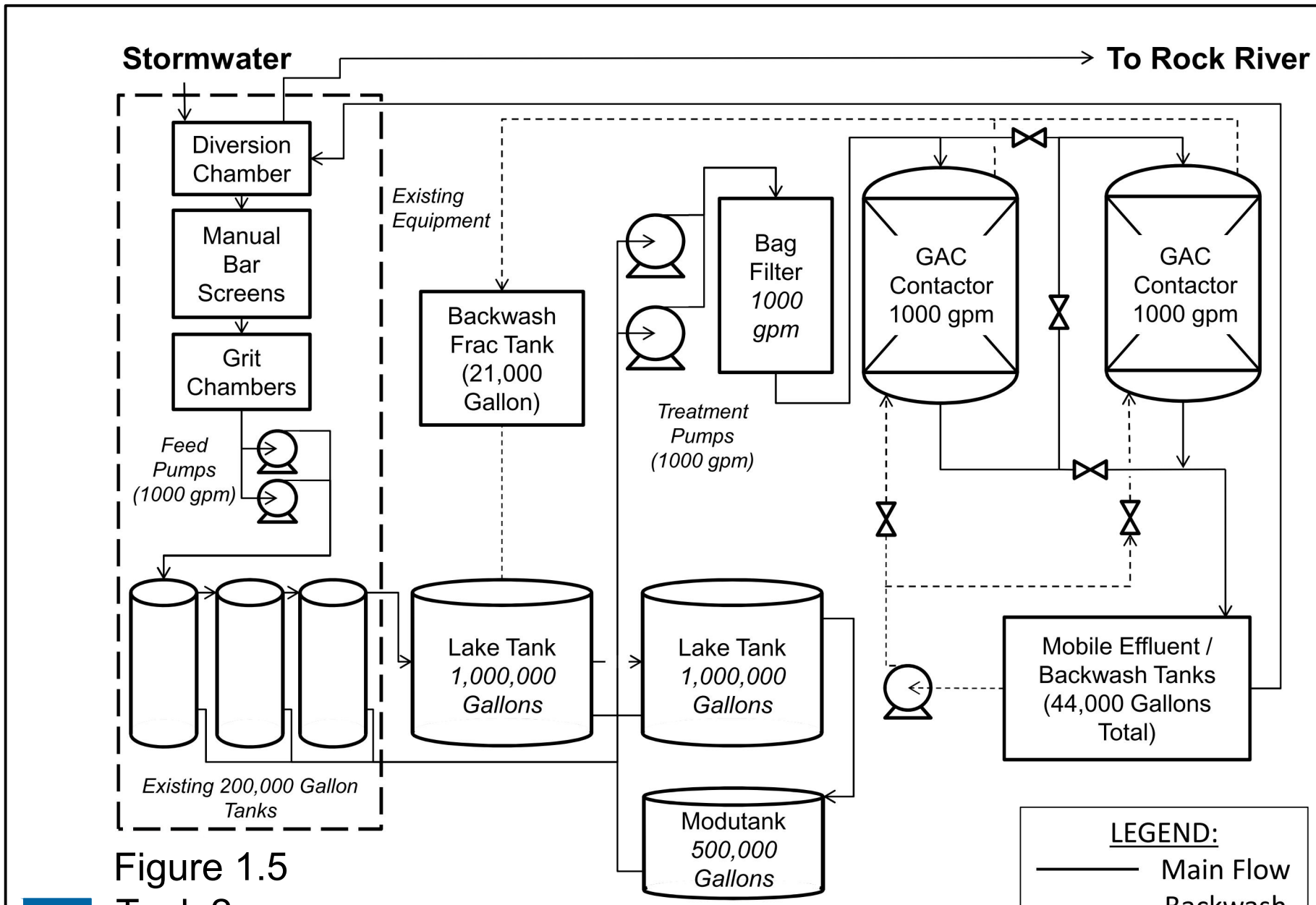

Figure 1.5
Task 2
Process Flow Diagram

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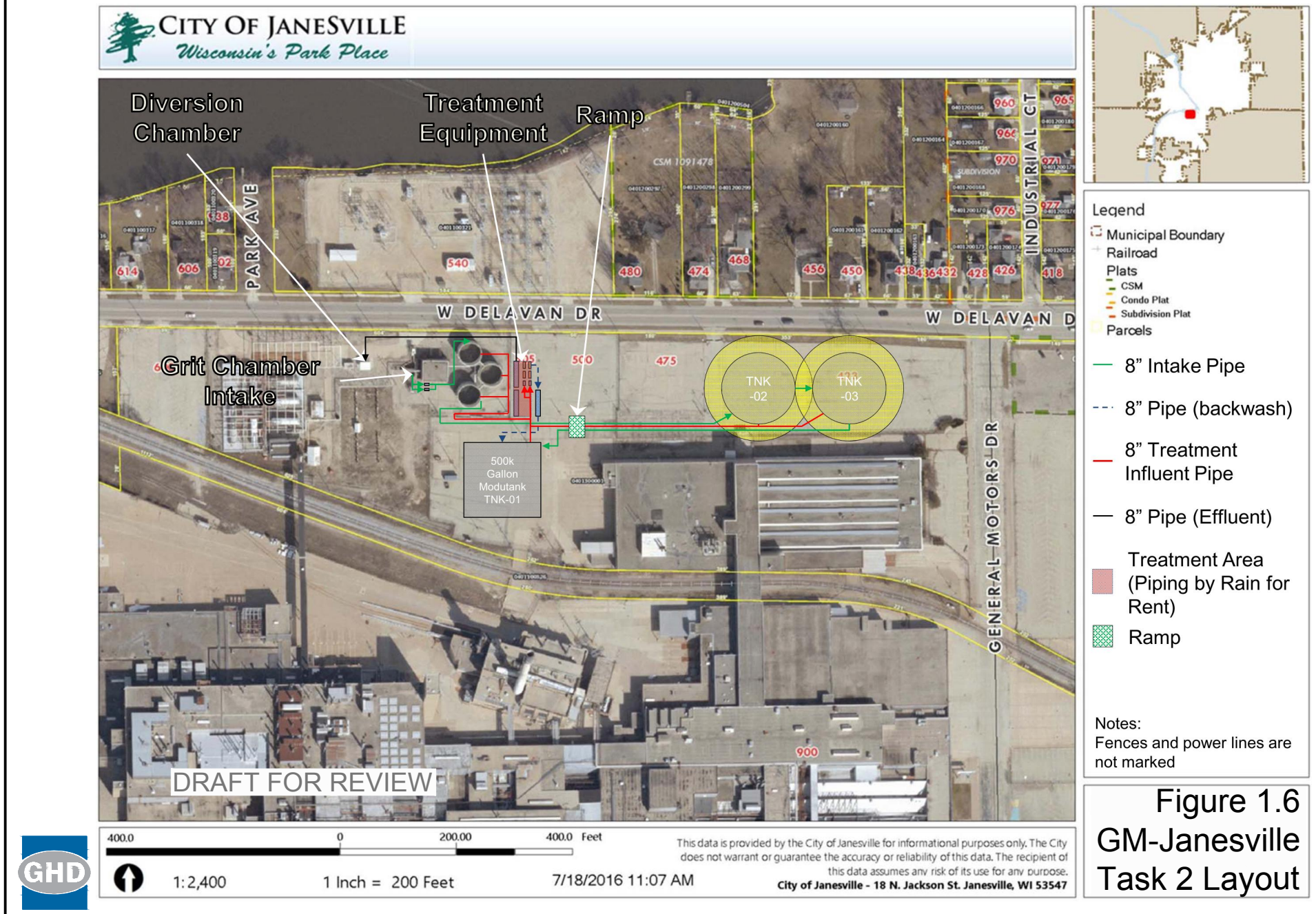


Figure 1.6
GM-Janesville
Task 2 Layout

Appendix A
Equipment Specifications

Bag Filter

BF1000

ASME

Overview:

The BF1000 bag filter unit features one bag filter tank and utilizes eight 7” x 30” bag filters for superior filtration from 100 to 1 micron for flows up to 1000 GPM.

Features:

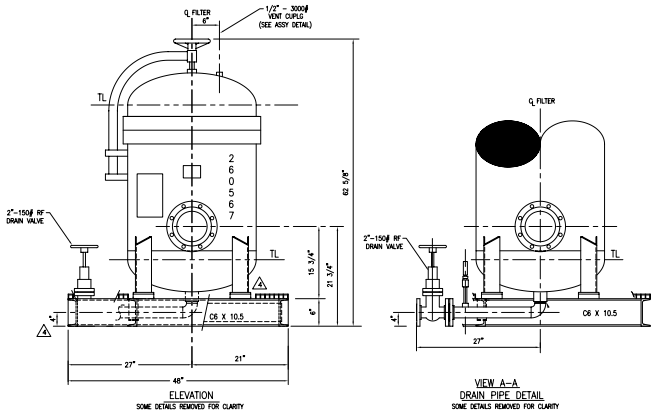
- No moving parts
- Skid mounted
- Fitted with bleed valves and pressure gauges
- Chambers constructed of 304 Stainless Steel
- Stainless Steel inlet and outlet manifolds

Specs:

Max Flow	1000 GPM
Material	Stainless Steel
Max PSI	125 PSI
Dry weight	2000 lbs.
Footprint:	48” x 48”
Inlet x outlet	6” x 6” Flange

Accessories:

- Spillguard
- Suction and Discharge Hoses



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Sewage and Trash Pump DV100c

Overview:

The 6” suction x 4” discharge self-priming centrifugal DV100c trash pump provides up to a maximum of 1,450 gallons per minute pumping and up to 165 feet of head. This pump is usually mounted on a trailer and features the standard PowerPrime Clean Prime Venturi priming system which allows it to run continuously, unattended and even run dry.

The DV100c is also available sound attenuated.

Features:

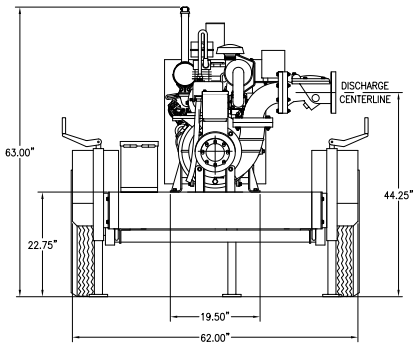
- Continuous self-priming
- Runs dry unattended
- 12 volt, eletric start with auto-start capable control panel
- Flex coupled to diesel engine
- 24-hour minimum capacity fuel tank
- Compressor/venturi automatic priming system
- Cast iron wet end with open impellers
- Replaceable wear plates
- SAE Mounted

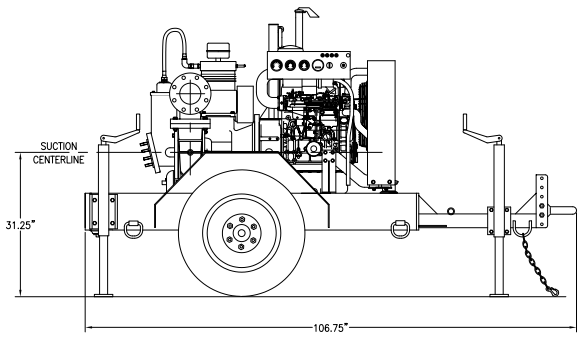
Specs:

Maximum Flow	1,450 GPM
Maximum Head	165 feet
Pump Size	6” x 4”
Maximum Solids Handling	3 inches
Dry weight	2,400lbs.
Footprint: Trailer mounted model	106.75” x 62”
Fuel tank	40 or 60 gallon
Fuel consumption	1.9 gph @ 2,500 RPM

Accessories:

- Spillguard
- Suction and Discharge Hoses
- Fuel Nurse Tank





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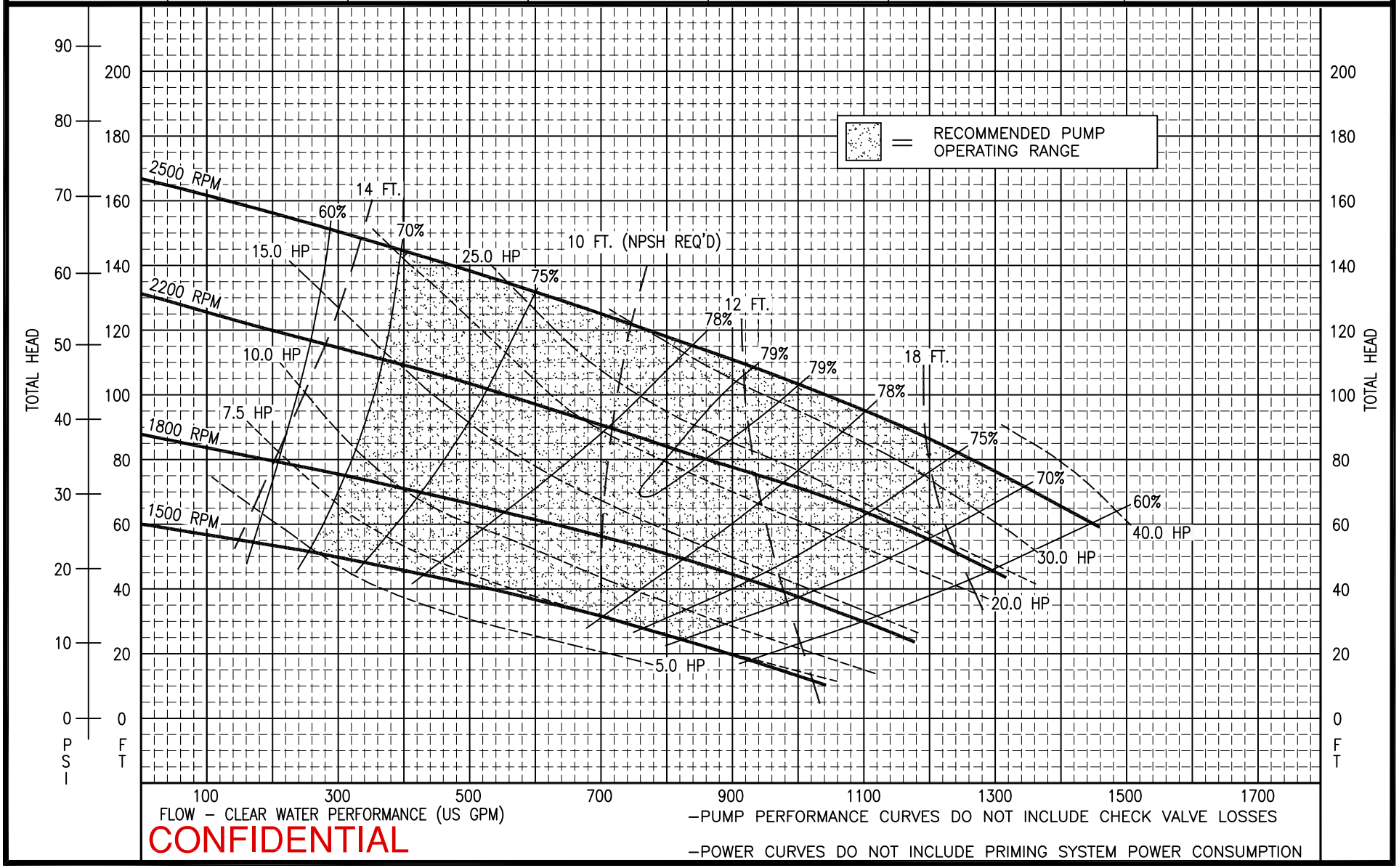
CURVE: 01-0133-02-20

PUMP : DV-100c

SUCTION	DISCHARGE	MAX. SPHERE	IMPELLER	IMPELLER	IMPELLER & WEAR RINGS
6"	4"	3"	ENCLOSED	8.25"	CAST IRON



CONFIDENTIAL

-PUMP PERFORMANCE CURVES DO NOT INCLUDE CHECK VALVE LOSSES

-POWER CURVES DO NOT INCLUDE PRIMING SYSTEM POWER CONSUMPTION

LakeTank™

B-24

Overview:

Contain more than 3 acre feet (1.03 million gallons) of water with just one tank. The LakeTank™ B-24 reduces traffic and carbon footprint on your jobsite, by replacing 49 traditional 500 BBL frac tanks and minimizes manifolding time.

Features:

- Specially designed panel handling system for safe, rapid deployment
- Two OSHA compliant access/egress ladders
- One stairway observation platform
- Four 4" fill lines, Three 4" circulation lines
- One 12" low suction line for high volume pumping applications
- Heavy duty connecting plates and pins for safe reliable containment
- Six temporary panel supports to ensure safety during installation
- No easy access to the liner from outside the tank
- Standard liner is 40mil LLDPE
- Standard underlayment is 100Z Geotextile Ground Pad
- Reduced transportation costs: Complete tank structure is delivered on three trucks (6 truck trips vs. 98 for conventional 500bbl frac tanks)
- Reduced labor costs during manifolding and operation
- Reduced heating costs
- Reduced site preparation costs (smaller footprint compared to 500bbl frac tanks)

Specs:

Structure Diameter	125 ft.
Working Clearance	185 ft.
Capacity with 8" free board	24,590 BBL
Number of Panels	15
Number of Trucks to transport	3
Size of each Panel	12x26 ft.
Panel Weight (w/o insulation)	6,100 lb.
Liner Dimensions	155x155 ft.
Liner Weight = 0.19 lb./sq. ft.	3,353 lb.

Accessories:

- FreezeSentry™ Heating equipment
- Tank Sidewall Insulation
- Floating Insulated Covers
- Bird Netting
- Filtration Equipment
- Temperature and Level Indicators/Alarms/Telemetry
- Various Liner Materials & Thicknesses
- Additional Suction or Fill Lines

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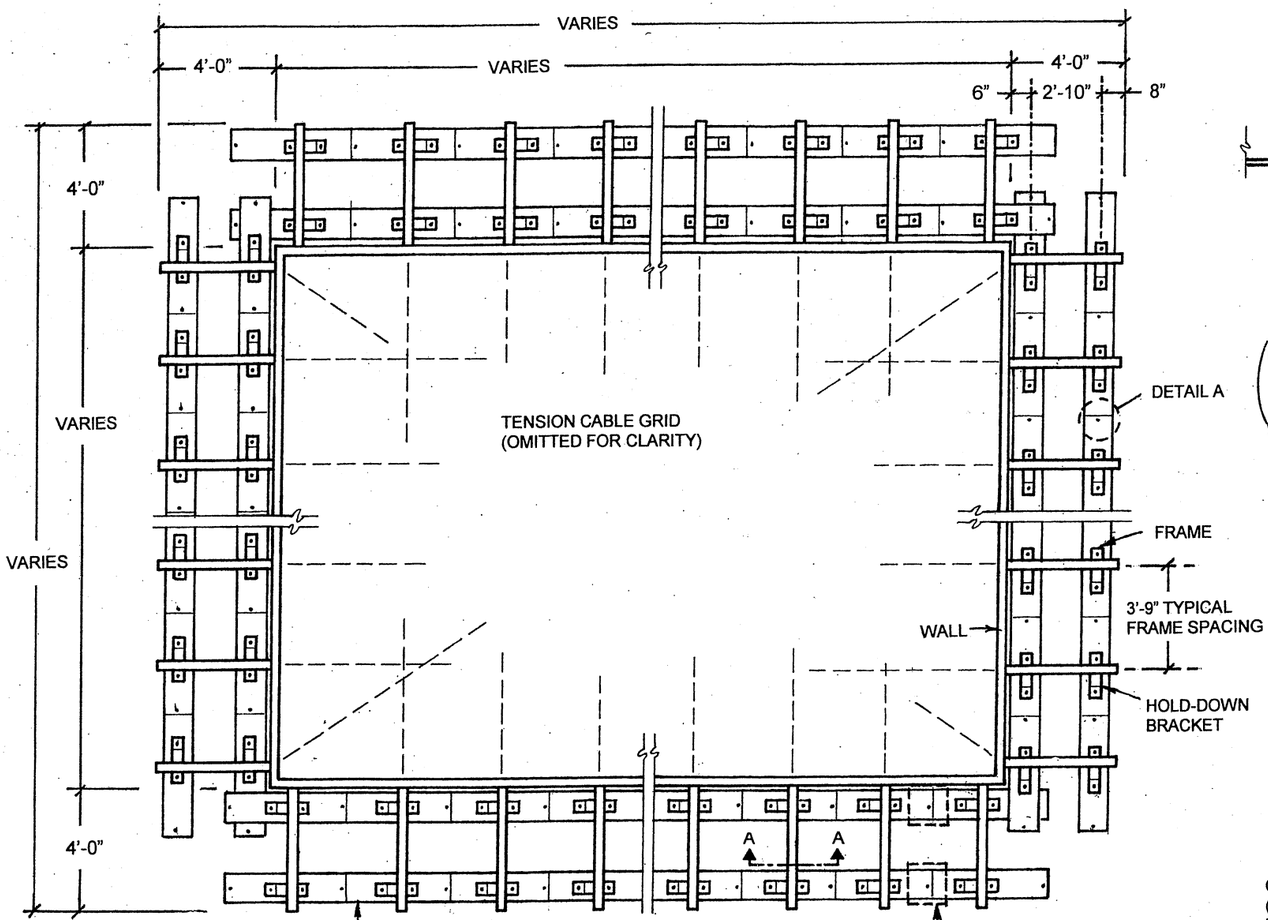
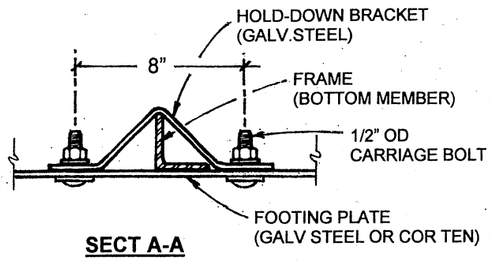
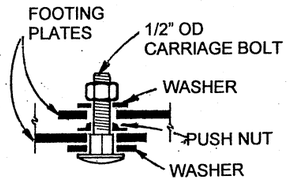


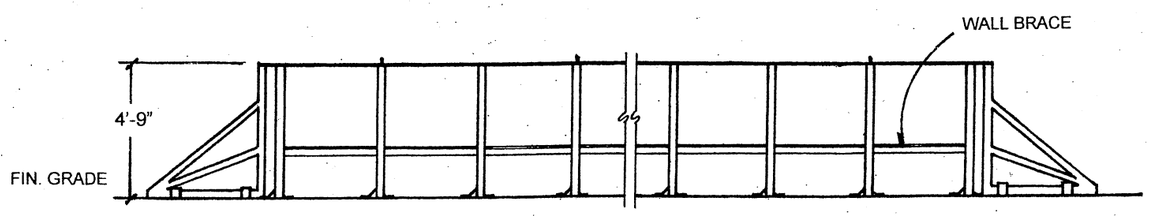
PLAN
NOT TO SCALE



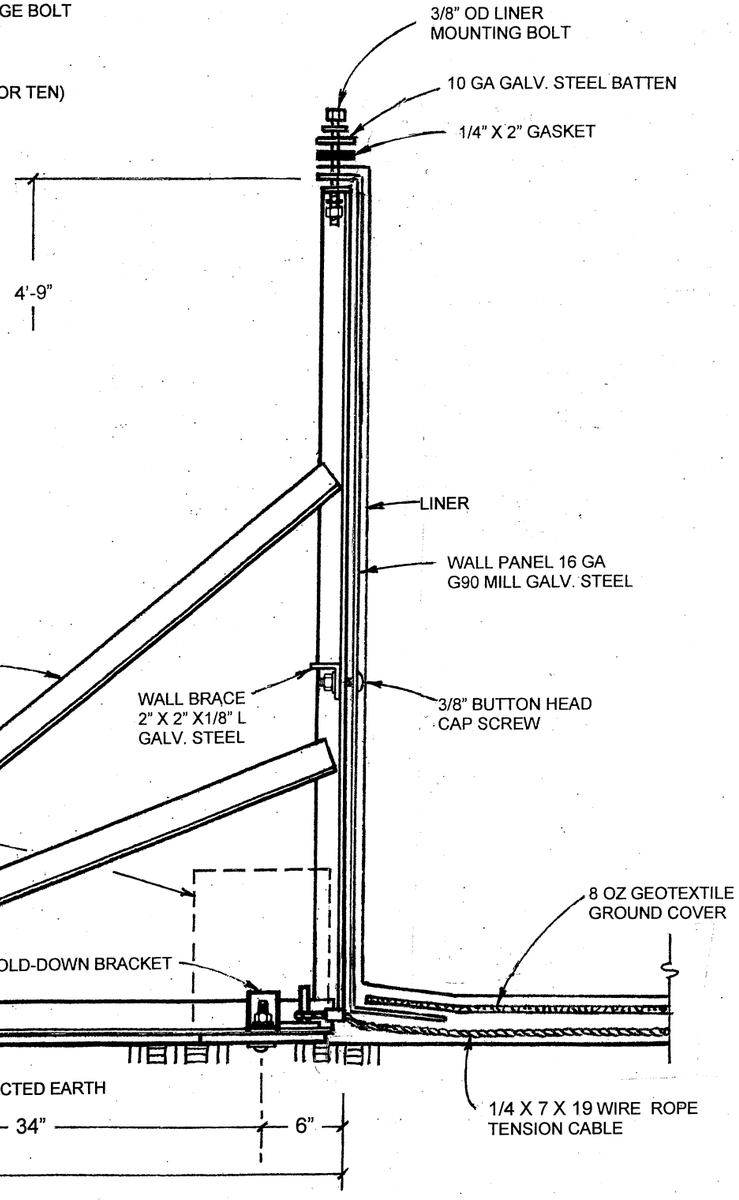
SECT A-A



DETAIL A



ELEVATION



SECT. AT FRAME

NOTE:

1. A soil investigation and formal foundation design should be performed by a qualified engineering firm.
2. Site should be as level as possible and compacted to 95% proctor.
3. Place ballast weights (conc. blocks, sand bags or equivalent) on footing plates between each frame to anchor empty tanks against wind load.
BALLAST EXAMPLES:
95 mph wind—287 lbs. ea (front and rear footing plates)
60 mph wind—115 lbs. ea (front and rear footing plates)
4. Place sand bags on liner during installation to prevent displacement by wind. Fill tank with at least 6" of water to anchor tank.

GENERAL ARRANGEMENT- ECONOTANK WITH SINGLE LINER, FOOTING PLATES					REVISED
					REVISED
DWN. BY TC	CHECKED BY RM	SCALE NONE	PART NO.	DWG. NO.	DATE	REVISED

ModuTank Inc.
41-04 35th Ave., Long Island City, NY 11101
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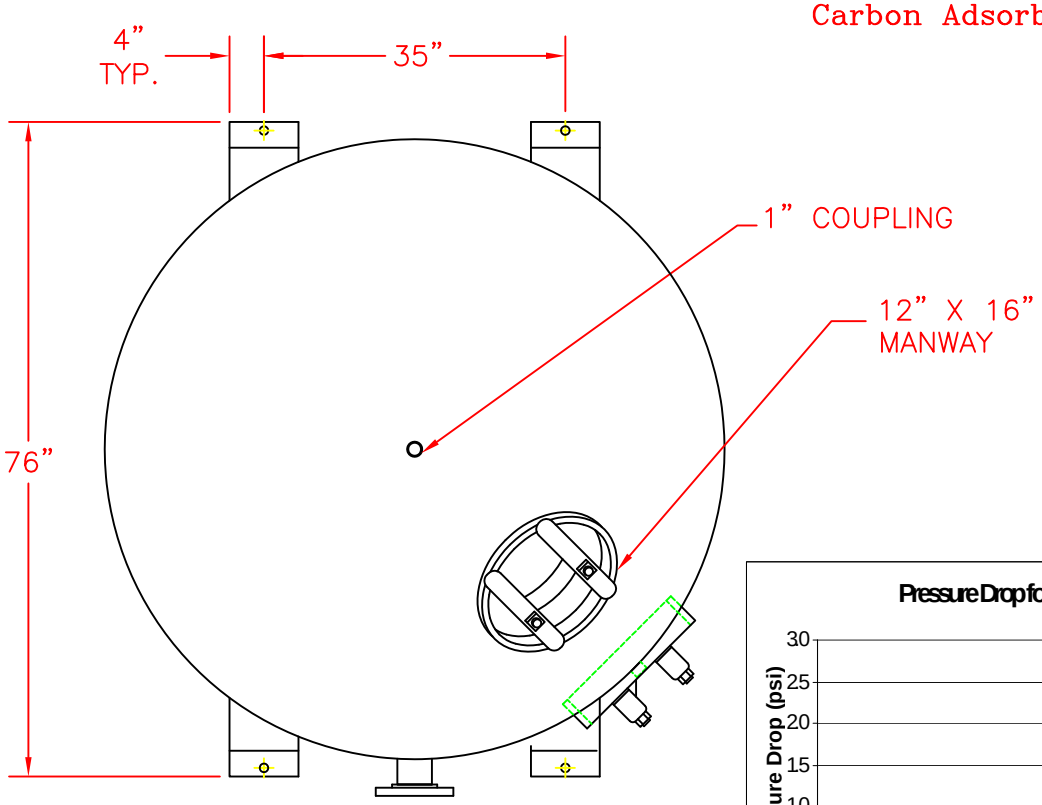
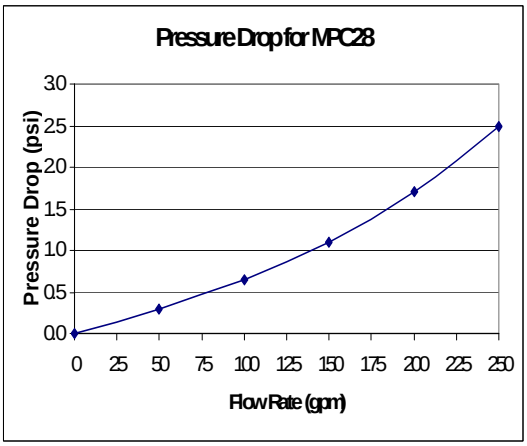
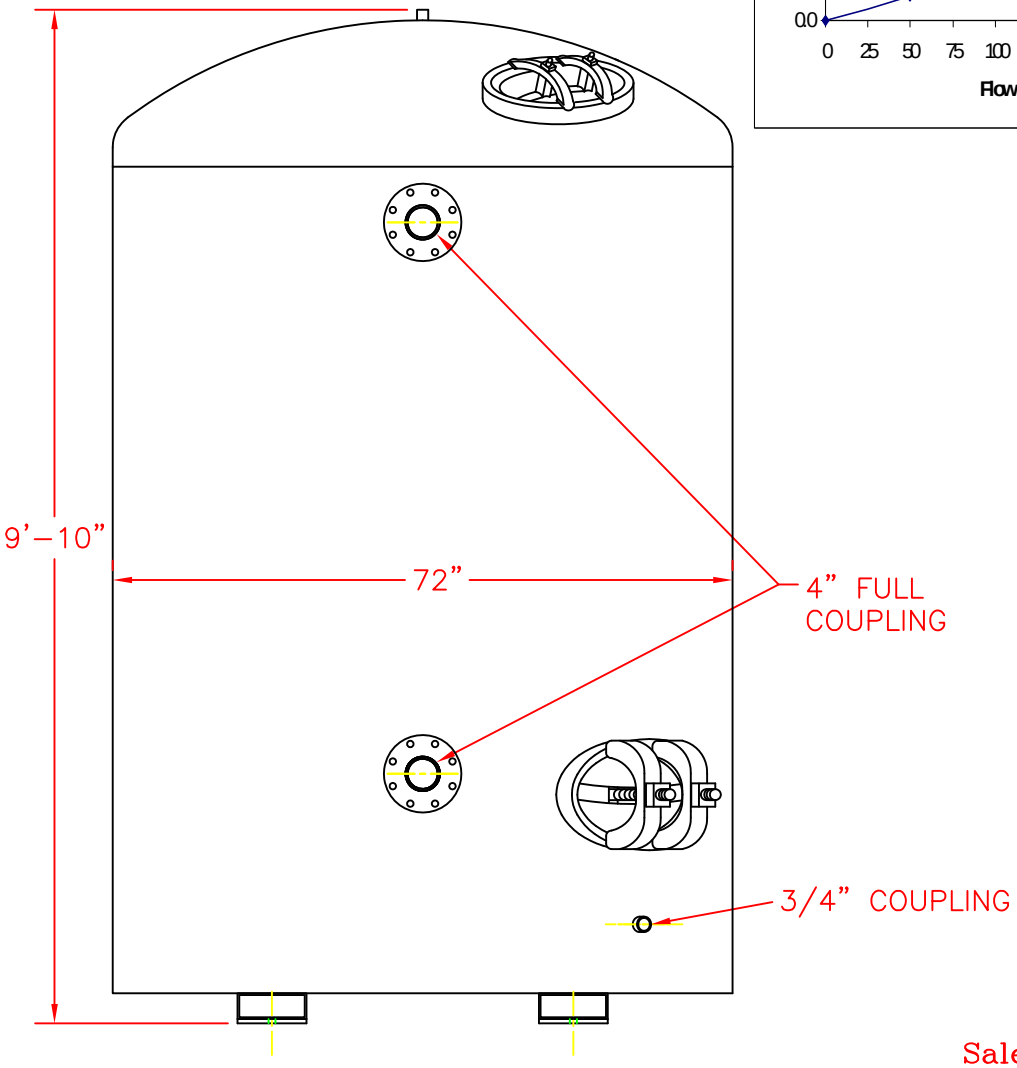
www.modutank.com, email: info@modutank.com

Carbon Adsorber – Liquid Phase
MPC 28







Sales Drawing #230134
3/5/05

Steel Tank

Flat Top Corrugated Wall Tank

Overview:

Store liquids with confidence with Rain for Rent's 21,000-gallon Flat Top Corrugated Wall tank. Permanently attached axles, for maximum maneuverability, allows this tank to be moved with ease on the jobsite. The staircase ensures proper protection for workers on site. The tank also offers optional epoxy coating, which offers chemical resistance and additional cleanliness for sensitive environmental applications.

Features:

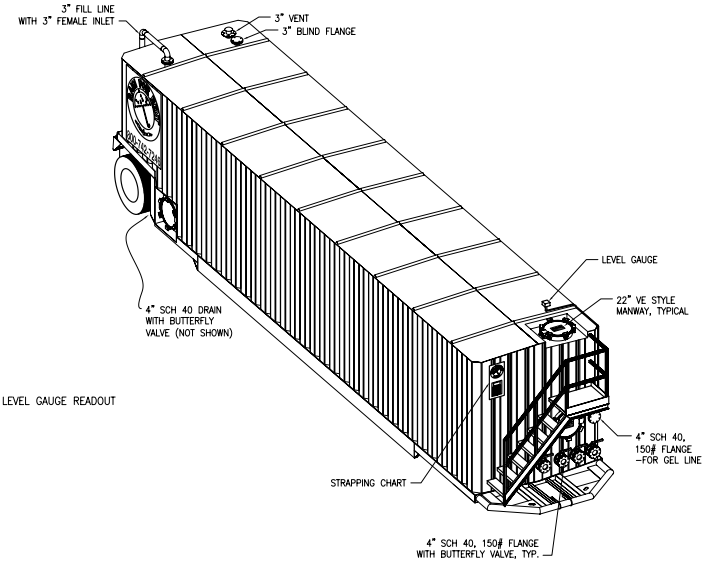
- Vapor Tight Tanks: rated to 16oz/in^2 of pressure and 0.4oz/in^2 of vacuum
- V-drain floor with front and rear 4" 150-lb flanges with valves
- OSHA Compliant Stairway
- 1.5" SCH80 level gauge port
- 8" External manifold or internal manifold
- Rear 3" or 6" SCH40 fill line
- Optional: Epoxy Coating - chemical resistance for a wide variety of chemical compatibility and keeps stored product within the tank cleaner
- Optional: Steam Coils

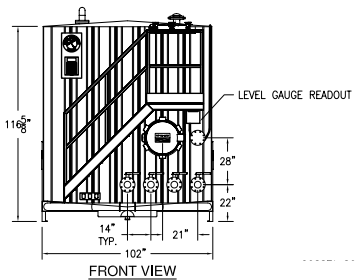
Accessories:

- E-CONTAIN® Spillguards
- SolidGround® Traction Mats
- Radar Level Gauge
- Mechanical Level Gauge
- PipeStax®
- HoseTrax®
- Suction and Discharge Hose

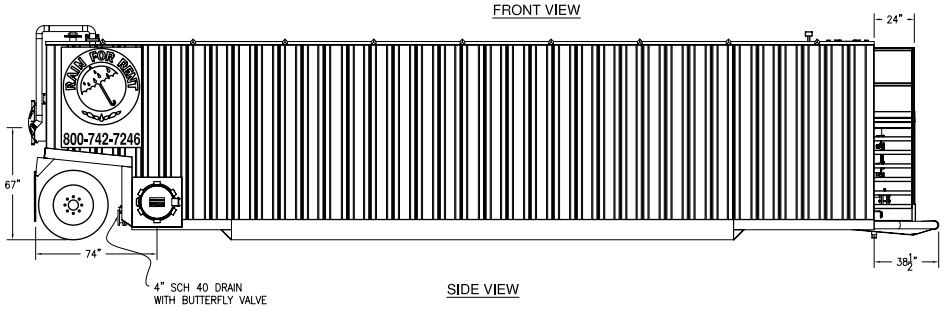
Specs:

Material	Steel, Epoxy Coated (Option)
Capacity	21,000 gallons
Manways	Four 22" hatches
Dry weight	27,000 lbs.
Footprint (LxWxH):	560" x 102" x 120"





FRONT VIEW



SIDE VIEW

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