CASPER COLLEGE
BARN 4 SEPTIC UPGRADES
Design Report

Prepared by:

Morrison-Maierle

Casper Office
123 W 1st St., Ste. 640
Casper, WY 82601

AUTHORIZED BY AUTHORITY OF
Water Quality Rules and
Regulations, Chapter III
Director
Department of Environmental Quality

PERMIT NO 2022-227
DATE 8/23/2022
BY

Morrison Maierle
engineers · surveyors · planners · scientists

July 20, 2022

Wyoming Department of Environmental Quality
Water and Wastewater Division
152 N Durbin St.
Casper, WY 82601

RE: Casper College Barn 4 Septic Upgrades
Supplemental Information

EXISTING CONDITIONS

This project adds a septic tank system for an existing classroom building. The building has a single use bathroom (toilet and sink). It currently discharges to a waste pipe out of the west of the building into a small gravel area. A new septic tank with a pressure dosing system is being proposed.

NEW DOSING SEPTIC SYSTEM

Loading

The proposed new septic system will collect the wastewater from the existing classroom building. The classroom hosts, at max, around 30 students in classes that last several hours for a maximum of 60 students in a day. During the rodeo event days, about 60 individuals are present in the vicinity. Both of these cases have 60 people present on a maximum day. Using a value of 15 gallons/unit/day from Table 2 in the Water Quality Rules and Regulations, Chapter 25, for a classroom, this equates to a design flow rate of 900 gpd. To meet a 48-hr retention time, a 1,800-gallon tank is required.

System Description

The new system consists of a WYDEQ-approved Big Horn Precast 2,000-gallon concrete septic tank. This tank has two chambers, the first chamber is approximately 8'x'6'x5' (approximately 2,000 gallons). The second chamber which houses the effluent filter is approximately 4'x6'x5' (approximately 900 gallons) for a total of 2,900 gallons. The two chambers are separated by a concrete baffle.

The septic tank influent line will be a 4-inch SCH 40 PVC pipe. The effluent pipe will be a 4-inch SCH 40 PVC pipe. A 4-inch Orenco Systems FTS0444-36 Biotube Effluent Filter will be installed on the effluent line before exiting the septic tank and before entering the dosing tank, as indicated on Sheets C-1 and C-2.

The septic tank effluent will gravity flow to a new 5' diameter manhole to act as a dosing tank. A pump within the dosing tank will operate intermittently based on wastewater flows, controlled

by level switches within the dosing tank. The pump will turn on when water levels reach the high-water switch and turn the pump on; the pump will operate until the water level drops in the dosing tank and the low-level switch shuts the pump off. An alarm is present which will trigger if the gravity line were to ever plug or if the pump does not operate and the water level rises.

The proposed dosing pump will be a Pentair Shef40 or equivalent. This can drain the dosing tank within 10 minutes. The line between the dosing tank and the disposal area will drain back to the dosing tank when the pump is not operating to prevent freezing.

The absorption system will consist of 8 lateral pressure distribution lines. The replacement absorption field could be set south of the existing field or south of the building.

The calculations on the pump included 1/8 in. diameter orifices every 5 feet. The pump provides enough pressure for a 6.0 ft squirt height at the end of the laterals.

Groundwater Considerations

The groundwater in the area is only 3.5 feet from the surface. This will require a raised bed pressure dose system. A 6-inch cut is proposed (removal of existing topsoil) and filled with a 12-inches of sand import meeting ASTM C-33. The gravel bed will be placed on top of that for a 4-foot separation of the pressure dosing system and the existing groundwater.

To confirm buoyancy, the manufacturers were contacted to confirm weights to compare to buoyancy forces. The proposed septic tank uses 4.5 cubic yards of concrete and weights approximately 17,617 lbs empty. Based on the dimensions, the buoyancy force is approximately 15,000 lbs (if fully submerged). This neglects any soil or other surfacing on the tank.

The manhole dosing tank is approximately 15,340 lbs accounting for the manhole top, barrel section, and base. The buoyancy force on the manhole is approximately 4,900 lbs. This assumed groundwater at the recorded 3.5 ft depth.

Using the proposed concrete products, buoyancy should not be an issue.

Leach Field Location

Photos of the proposed Leach Field location are included below in Figure 1 and Figure 2.

Figure 1. Proposed Leach Field Location, South Side Facing North along the fence line.

Figure 2. Standing near dosing tank location, facing south-southeast towards proposed leach field location.

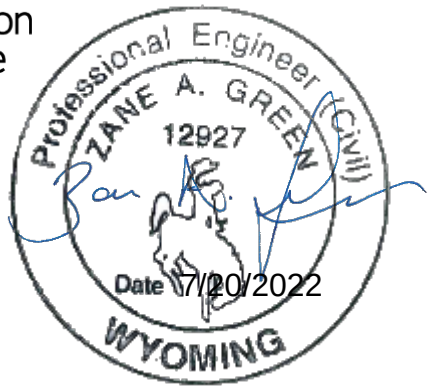
Additional Information

The following supplemental information is provided for reference:

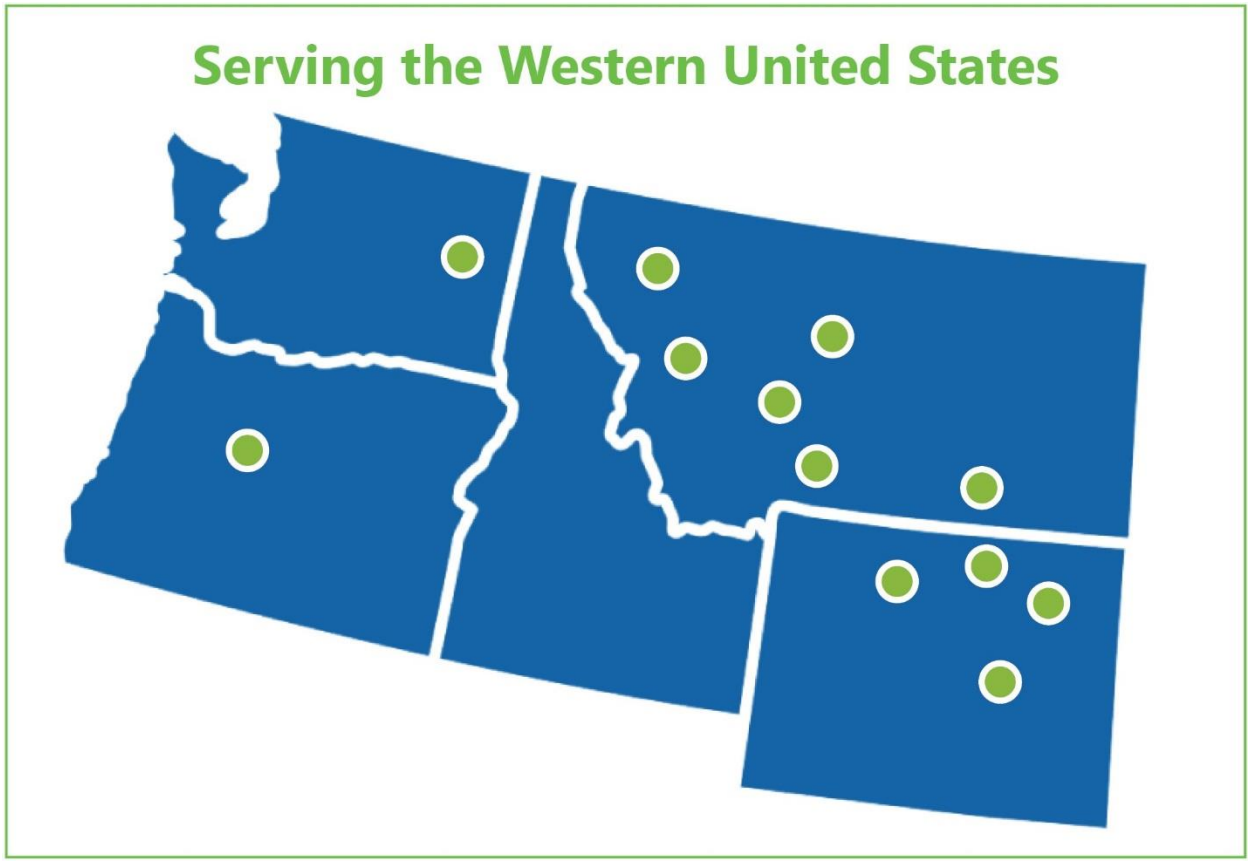
- Percolation Tests
- Hydraulic Calculations of Pump and Leach Field Design
- Pump Information – Pump Setpoint on curve identified
- Filter Information

If there are any questions or comments, please contact me.

Best Regards,



Zane Green, PE
Project Engineer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Percolation Test Data Sheet

Owner/Project Name: Casper College Date: 6/22/21

Test holes were pre-soaked for: 15 hours (hours/minutes) Time Interval: 15 min

Do not perform percolation test if ground is frozen or if groundwater is present in holes. Holes must be 12 inches in diameter and evenly spaced over the leachfield area. Roughen sides and bottoms of holes and place 2 inches of gravel in each hole.

		Hole #1 (Required)		Hole #2 (Required)		Hole #3 (Required)		Hole #4 (Optional)		Hole #5 (Optional)		Hole #6 (Optional)	
Depth of Hole:		4' 6"		3' 2"		4' 3"		3' 0"		4' 5"		3' 11"	
Time of Day	**Time (Min)**	**Measure to nearest 1/8 inch**		**Measure to nearest 1/8 inch**		**Measure to nearest 1/8 inch**		**Measure to nearest 1/8 inch**		**Measure to nearest 1/8 inch**		**Measure to nearest 1/8 inch**	
		Water Level	**Drop**	**Water Level**	**Drop**	**Water Level**	**Drop**	**Water Level**	**Drop**	**Water Level**	**Drop**	**Water Level**	**Drop**
Zero 8:45	0	10 3/4"	—	8 1/4"	—	7 1/2"	—	8 7/8"	—	10 1/4"	—	6 3/4"	—
1 9:00	15	Refill 10 3/4"	13 1/4 / 3.0	Refill 7 5/8"	8 3/4" / 0.5	Refill 7 1/2"	9 1/2" / 2.0	Refill 8 1/2"	9 3/8" / 0.5	Refill 10.0	13.0" / 2.75	Refill 6 7/8"	7 1/2" / 0.75
2 9:15	30	Refill 11.0"	13.0 / 2.75	Refill 7 3/8"	8 1/4" / 0.625	Refill 7 7/8"	9 3/8" / 1.875	Refill 8 1/8"	9.0" / 0.5	Refill 9 5/8"	12 1/8" / 2.125	Refill 6 1/4"	7 1/2" / 0.625
3 9:30	45	Refill 10 3/4"	12 7/8 / 1.875	Complete	7 7/8" / 0.5	Refill 7 5/8"	9 1/2" / 1.625	Complete	8 1/2" / 0.375	Refill 10.0	12 1/8" / 2.5	Refill 6.0"	7 1/8" / 0.875
4 9:45	60	Complete	12 5/8 / 1.875	/	/	Refill 7 3/4"	9 3/8" / 1.75			Refill 10 1/2"	12 1/2" / 2.5	Refill 5 1/2"	6 7/8" / 0.875
5 10:00	75	/	/	/	/	Complete	9.0 / 1.75			Refill 9 7/8"	12 5/8" / 2.125	Complete	6 3/8" / 0.875
6 10:15	90	/	/	/	/	/	/			Refill 9 7/8"	12 3/8" / 2.5		
7 10:30	105	/	/	/	/	/	/			Refill 9 5/8"	12 3/8" / 2.5		
8 10:45	120	/	/	/	/	/	/			Complete	12.0" / 2.375		
Time Interval (minutes)		15		15		15		15		15		15	
Final Interval Drop (inches)		1.875		0.5		1.75		0.375		2.375		0.875	
Perc Rate (min/inch)		8		30		8.57		40		6.32		17.14	
								Design Perc Rate (min/inch)		18.3 ≤ 18mpi			

To calculate drop: Subtract the water level measurement at the start of your time interval from the water level measurement at the end. The "Drop" is how far the water level went down during the stated time interval. Time intervals must be consistent for each hole throughout the test.

Leachfield percolation (Perc) rate: If 3 to 5 holes were tested, use the slowest (highest number) rate of the holes tested. If six or more holes were tested, use the average rate.

Helpful Conversions: 1/8 = 0.125 1/4 = 0.25 3/8 = 0.375 1/2 = 0.50 5/8 = 0.625 3/4 = 0.75 7/8 = 0.875

To calculate perc rate (minutes per inch): Time Interval (min) ÷ Final Interval Drop (in)

$$Example\ Perc\ Rate = \frac{Time\ Interval\ (min)}{Final\ Interval\ Drop\ (in)} = \frac{10\ min}{1\ \frac{1}{8}\ in} = 8.9\ \frac{min}{in}$$

I certify that this perc test was done in accordance with WQRR Chapter 25, Appendix A and the instructions on the previous page.

Test Performed by: W. Eric Nunn **Signature:** W. Eric Nunn

LOG OF TEST BORE No. B-1

Job No.: 22057-CE
Client: Morrison Maierle/Casper College
Project: Barn 4 Septic System

Location.: Casper, WY
N 42.85331° W106.43853°
Surface El. (Ft):
Bench Mark/Datum (Ft):

Depth	Type	No.	Depth Ft.	Rec.	N Blows/Ft	Soil Description	Notes
0.0'						Surface	
	SS	1	0-1.5'	10"	6-12-15	Dry. Very Stiff. Brown. Fine Sandy SILT	Topsoil Top 1"
							Harder Drilling @ 2.0' (Hard Pan)
2.5'	SS	2	2.5-4	10"	3-2-2	Moist to Wet. Very Loose. Tan-White Clayey Med Fine Sand ▽ 3.5	
5.0'	SS	3	5-6.5	14"	4-8-11	Wet. Med Dense. Tan. Fine Sand	
							END 6.2'
7.5'							
10.0'							
12.5'							
15.0'							
17.5'							
20.0'							

Water Level Observations

Initial Occurence While Drilling (Ft.): 3.5
Time After Drilling 0.0
Depth To Water (Ft.): N/A
Depth To Cave-in (Ft.): 3.9

Drilling Notes

Date Begun: 6/18/21 Comp. 6/18/21
Crew: WEN, DL, EPP Rig CME 55
Method: 3 1/4" HSA
Termination Depth (Ft.): 6.2

DRAWN: ARC
REVISED: 7-20-09

INBERG-MILLER ENGINEERS
124 East Main Street, Riverton, WY 82501, 307-856-8136
1120 East C Street, Casper, WY 82601, 307-577-0806
350 Parsley Boulevard, Cheyenne, WY 82007, 307-635-6827
428 Alan Road, Powell, WY 82435, 307-754-7170
193 West Flaming Gorge Way, Green River, WY 82935, 307-875-4394

BORE LOG.DWG

INBERG-MILLER ENGINEERS- Soil Description Form | Page: 1 of 1

Weather: 85°F Partly Cloudy | Client: Morrison-Maierle

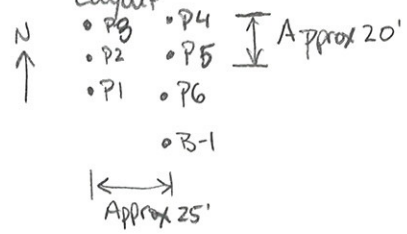
Personnel: WEN, DL, EPP | Project No: 22057-CE

Sampling Equip: 3¼" HSA, Auger Cuttings | Date: 6/18/21

Comments: Hole Diameter 7¼" ID

Hole	Depth (ft)	Description	Remarks
P1	0-3' 3-4' 4-5'	Topsoil Top 1". 0-3' Dry to Moist. Red-Brown. Silty Sand 3-4' Grades Clayey 4-5' Wet. Tan/White. Med Fine Sand with Some Silt	Termination Depth (TD) = 5' Cave In = 4.5' 6/21 Muck Out 4.5' ✓
P2	0-3'	Topsoil Top 1". 0-3' Dry to Moist. Red Brown. Silty SAND	TD = 3' Cave In = 2.8' 6/21 Muck Out 3.1 ✓
P3	0-3' 3-5'	Topsoil Top 1" 0-3 Dry to Moist. Red Brown Sandy SILT 3-5 Moist to wet. Tan/White. Med Fine SAND	Hard Pan 0.5-1.5' TD = 5' Cave In = 4.6 6/21 Muck Out 4.7 ✓
P4	0-2.5' 2.5-3'	Topsoil Top 1" with Grass Roots to 3" 0-2.5' Dry to Moist. Brown. Sandy SILT 2.5-3' Moist. Tan/white. Clayey Fine Sand	Hard Pan 0-2' TD = 3' Cave In = 2.6' 6/21 Muck Out 3.0 ✓
P5	0-3' 3-5'	Topsoil Top 2" with Grass Roots to 4" 0-3'. Dry to Moist. Brown Sandy SILT 3-5' Wet. Tan/white. Clayey Med Fine SAND	Hard Pan 0-2' TD = 5' Cave In = 4.3' 6/21 Muck out 4.4 ✓
P6	0-3' 3-4'	Topsoil Top 2" with Grass Roots to 4" 0-3 Dry to Moist. Brown. Sandy SILT 3-4 Wet. Tan/white. Clayey Med Fine SAND	Hard Pan 0-2 TD = 4' Cave In = 3.9 6/21 Muck out 3.9 ✓

Layout



P1 N42.85335° W106.43862°
P2 N42.85340° W106.43861°
P3 N42.85344° W106.43861°
P4 N42.85345° W106.43854°
P5 N42.85340° W106.43853°
P6 N42.85336° W106.43853°

- Presoak Holes on 6/21 Mucked out Cave-In Sediment to get back to original Cave-In Depth.
- Mucked out again after Presoak + Scarified Borehole wall on 6/22.

22057CE Site Sketch
486 6 mile Road

Flow Control Orifice Sizing Chart - 1/8" Diameter Orifice

1/8" Diameter Orifice

Casper College
Barn 4 Septic

Drainfield cross-slope (ft/ft) =	0.015	1.50%
# Laterals/zone =	8	
FLOW / LATERAL =	3.792	(see highlight below)
Dist. Between Laterals (ft) =	3	
Hazen-Williams Coef. =	160	PVC
Inside Dia. Manifold Line (in) =	1.61	
Highest Squirt Height of Lateral (ft) =	6.012	(see highlight below)
Inside Dia. Lateral Line (in) =	1.61	

	C
Orifice Coefficient =	0.60

JUNCTION #	ELEVATION JUNCTION (ft)	LATERAL FLOW (gpm)	MANIFOLD FLOW (gpm)	SEGMENT H-LOSS (ft)	MANIFOLD HGL (ft)	LATERAL HGL (ft)	H, PRESSURE DIFF. (ft))	C, COEF.	D, DIAMETER ORIFICE (in)
1*	0.315	3.792	30.334	0.000	6.327	6.327	0.000	0.6	**NO ORIFICE NEEDED**
2	0.270	3.792	26.542	0.112	6.215	6.282	-0.067	0.6	**NO ORIFICE NEEDED**
3	0.225	3.792	22.750	0.084	6.130	6.237	-0.107	0.6	**NO ORIFICE NEEDED**
4	0.180	3.792	18.959	0.060	6.070	6.192	-0.122	0.6	**NO ORIFICE NEEDED**
5	0.135	3.792	15.167	0.040	6.030	6.147	-0.117	0.6	**NO ORIFICE NEEDED**
6	0.090	3.792	11.375	0.023	6.007	6.102	-0.095	0.6	**NO ORIFICE NEEDED**
7	0.045	3.792	7.583	0.011	5.996	6.057	-0.061	0.6	**NO ORIFICE NEEDED**
8	0.000	3.792	3.792	0.003	5.993	6.012	-0.019	0.6	**NO ORIFICE NEEDED**
Total		30.33		0.334					

Drainfield Lateral Analysis

Pipe Size/Type=	1.5" SCH 40 PVC	Appl. Rate=	0.40 gpd/sq. ft.	Daily Flow (Q)=	900	DF Area=	2368
Actual Pipe ID (in)=	1.61	Trench w=	3				
Hazen-Williams C=	160						
Orifice Size 1/8 (in)=	0.125	Min Lat.(LF)=	265	Lat. # (N)=	8	Min. Lat Length(LF)=	33.13
Distance Between Orifices (ft)=	5	Tot Manifold=	30	#Zones=	1	Actual Lat Length (LF)=	35.00
Pressure at Last Orifice (ft)=	6			Dosing Freq=	-	Vol. Of Zone(gal)=	29.61
Loading Rate (gpd)=	900					Vol. Of Manifold(gal)=	3.17
Dosing Time (<15 min) (gal)=	n/a					Min. Dose Vol(gal)=	169
						Max. Dose Vol(gal)=	317

Eq. lengths of all fittings (ft)=	14.8
Transport Line ID (in)=	1.610
Transport Line Length (ft)	165.0
Total H-Loss (ft)=	8.9
Elevation Difference (ft)=	5.0
Volume of Transport (gal)	17.45
Pump Head Requirement (ft)	20.0
Pump Flow Requirement (gpm)	30.3

ORIFICE NUMBER	RESIDUAL PRESSURE (FT)	FLOW PER ORIFICE (GPM)	SEGMENT VELOCITY (FPS)	SEGMENT HEADLOSS (FT)	SUM OF LATERAL LENGTH (FT)	SUM OF HEADLOSS (FT)	% DIFF IN FLOW (Q1/Qn)	TOTAL FLOW PER LATERAL (GPM)
1	6.000	0.474	0.075	0.000	5	0.000	0.000%	0.474
2	6.000	0.474	0.075	0.000	10	0.000	0.001%	0.948
3	6.000	0.474	0.075	0.001	15	0.001	0.004%	1.421
4	6.001	0.474	0.075	0.001	20	0.003	0.011%	1.895
5	6.003	0.474	0.075	0.002	25	0.005	0.023%	2.369
6	6.005	0.474	0.075	0.003	30	0.008	0.040%	2.843
7	6.008	0.474	0.075	0.004	35	0.012	0.065%	3.317
8	6.012	0.474	0.075	0.005	40	0.017	0.098%	3.792
9	6.017	0.474	0.075	0.006	45	0.023	**0.140%**	4.266

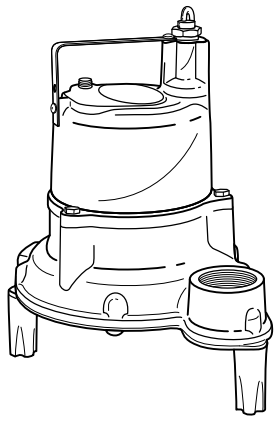
HYDROMATIC®

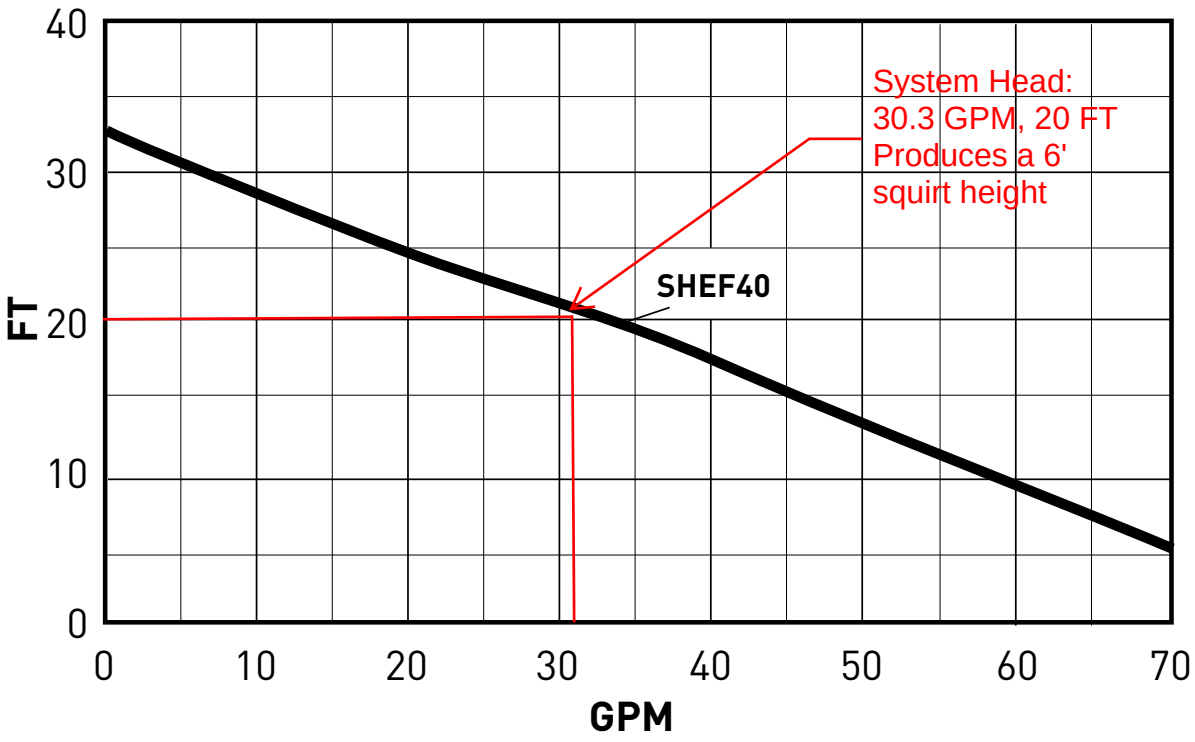
PERFORMANCE DATA

SHEF40

SUBMERSIBLE HIGH HEAD EFFLUENT

Wholesale Products Page: 6680-1
Dated: April 2002
Supersedes: January 2001
RPM: **1550** Discharge: **1 ½"** Solids: **¾"**





The curves reflect maximum performance characteristics without exceeding full load (Nameplate) horsepower. All pumps have a service factor of 1.2. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F. and 1280 feet site elevation.

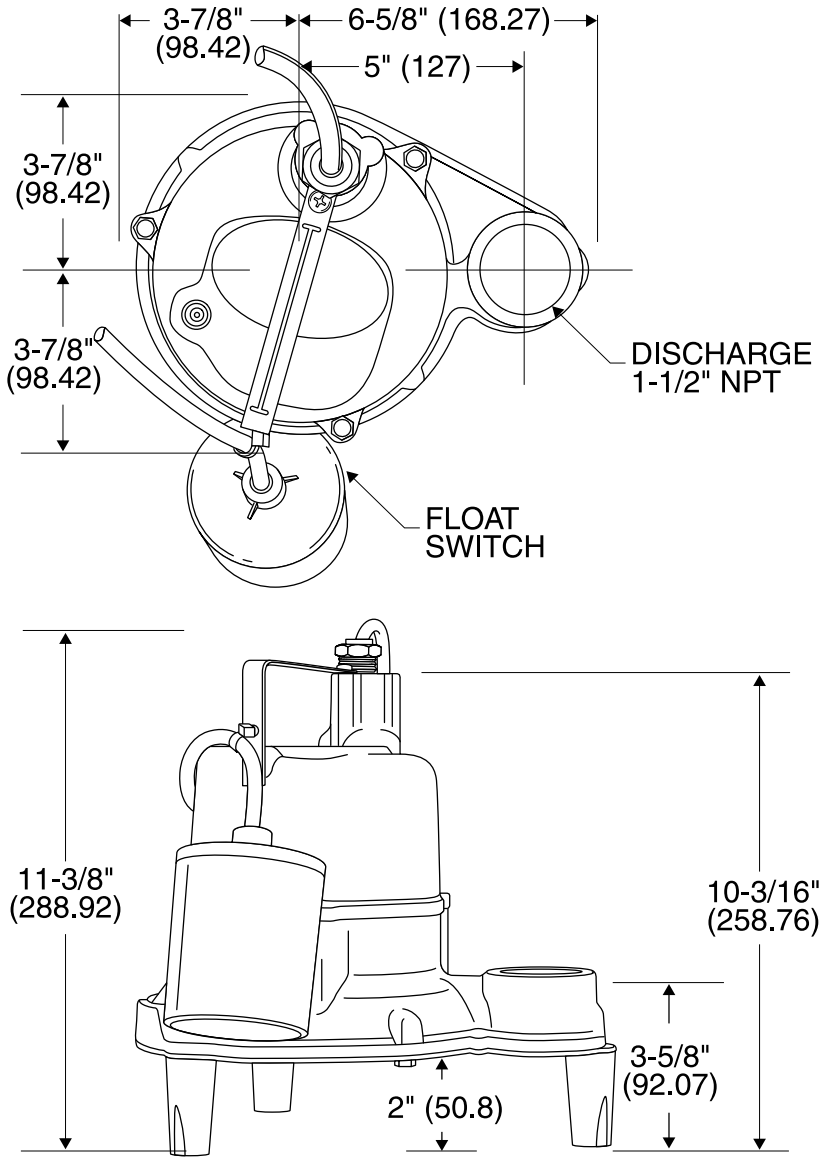
PENTAIR

Conditions of Service:

GPM:_____ **TDH**:_____

HYDROMATIC®
SHEF40
SUBMERSIBLE HIGH HEAD EFFLUENT

Wholesale Products Page: 6680-2
Dated: January 2001



All dimensions in inches. Metric for international use. Component dimensions may vary ± 1/8 inch. Dimensional data not for construction purpose unless certified. Dimensions and weights are approximate. On/Off level adjustable. We reserve the right to make revisions to our product (s) and the product (s) specifications without notice.

HYDROMATIC®

SHEF40

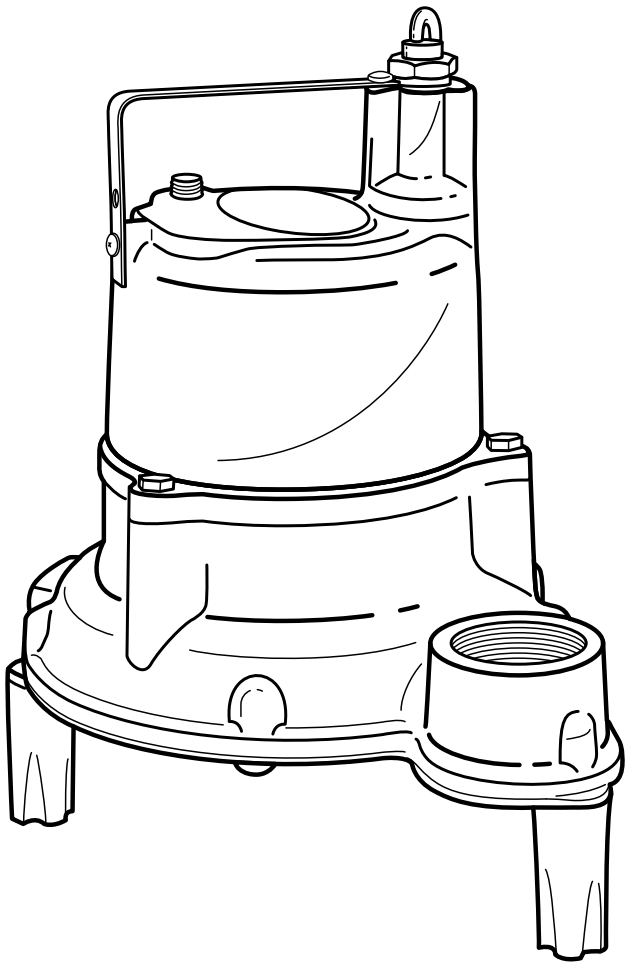
SUBMERSIBLE HIGH HEAD EFFLUENT

Wholesale Products Page: 6680-3
Dated: January 2001

MODEL: SHEF40

R.P.M.	1550
MOTOR TYPE	SHADED POLE WITH THERMAL OVERLOAD, OIL FILLED
MOTOR PROTECTION	AUTOMATIC RESET / OVERLOAD PROTECTED

HP	VOLTAGE	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS
4	115	1	-	1	12.0
	230				6.5



HYDROMATIC®
SHEF40
SUBMERSIBLE HIGH HEAD EFFLUENT

Wholesale Products Page: 6680-4
Dated: January 2001

MODEL: SHEF40

Physical Data

DISCHARGE SIZE	1 ½" NPT
SOLIDS SIZE	¾"
IMPELLER TYPE	VORTEX
CABLE LENGTH	10' STANDARD 20' OPTIONAL
PAINT	PAINTED AFTER ASSEMBLY, DARK GREEN, WATER REDUCIBLE ENAMEL, ONE COAT, AIR DRIED.

Temperature

MAXIMUM LIQUID	140°F
MAXIMUM STATOR	-
OIL FLASH POINT	-

Technical Data

POWER CORD TYPE		SJTW
MATERIALS OF CONSTRUCTION	MOTOR HOUSING	CAST IRON
	CASING	CAST IRON
	IMPELLER	THERMOPLASTIC
	MOTOR SHAFT	STEEL
	HARDWARE	STAINLESS STEEL
	"O" RINGS	BUNA-N
MECHANICAL SEALS Standard:		CARBON / CERAMIC
UPPER BEARING		N/A
LOWER BEARING		SINGLE ROW-BALL

SHEF40
SUBMERSIBLE HIGH HEAD EFFLUENT

Wholesale Products Page: 6680-5
Dated: January 2001

MODEL: SHEF40

1.01 **GENERAL**

Contractor shall furnish all labor, materials, equipment and incidentals required to provide _____ (Qty.) submersible centrifugal high head effluent pump(s) as specified herein. The pump model covered in this specification is the SHEF40. The pump furnished for this application shall be MODEL _____ as manufactured by Hydromatic Pumps.

2.01 **DESIGN CONDITIONS**

Each pump shall be rated _____ H.P., _____ volts, _____ phase, _____ hertz and operate at _____ RPM.

3.01 **OPERATING CONDITIONS**

The pump shall deliver _____ U.S. GPM/LPS at feet/meters TDH, and handle a _____ inch solid. The curve submitted for approval shall state, in addition to head and capacity performance, solid handling capability, amp rating, and design impeller diameter.

4.01 **CONSTRUCTION**

Each pump shall be of the sealed submersible type, incorporating features normally found in pumps furnished for the residential market.

These features include:

1. The pump volute, motor, and seal housing shall be high quality gray cast iron, ASTM A-48, Class 30.
2. The pump inlet shall be open and clear, without screening to provide access for effluent and septic tank solids.
3. All external mating parts shall be machined and Buna N, O-Ring sealed.
4. All fasteners exposed to the pumped liquid shall be 300 series stainless steel.
5. All power cords shall be water resistant UL or CSA approved, with double insulation, and sized as a function of Amp. draw.

5.01 **MOTOR AND SHAFT**

The stator, rotor and bearings shall be mounted in a sealed submersible type housing. Single phase motors shall be shaded pole (SHEF40). Three phase motors shall be Polyphase. Full Load and Locked Rotor Amps as well as Start and Run winding resistance shall be tabulated for each pump.

6.01 **BEARINGS, SHAFT AND MECHANICAL SEAL**

An upper radial and lower thrust bearing shall be required. The upper bearing shall be brass (SHEF40), while the lower bearing is a single row ball. The bearings will be permanently and continuously lubricated and cooled by the dielectric oil which fills the motor housing. The motor shaft shall be corrosion resistant steel and sealed from the pumped liquid with a carbon ceramic mechanical seal.

SHEF40
SUBMERSIBLE HIGH HEAD EFFLUENT

7.01 **IMPELLER**

The Impeller in the SHEF40 shall be high capacity, two vane, high head design.

8.01 **AUTOMATIC CONTROL**

All single phase pumps should be capable of automatic operation.

9.01 **FLOAT SWITCH**

The SHEF40 pump is supplied with a tilt sensitive wide-angle float switch which is sealed in a non-corrosive PVC enclosure. The switch is UL listed for water and sewage and CSA certified. The float switch shall also be fitted with a piggy-back plug that allows the pump to be operated manually without removal from the sump.

10.01 **PAINTING**

All cast iron parts shall be painted before assembly with a water reducible alkyd air dried enamel. The paint shall be applied in one coat with a minimum thickness of 3 to 4 mils.

11.01 **TESTING**

All pumps shall be individually tested to include the following:

1. The pump and power cord shall be visually inspected for imperfections, cuts or nicks.
2. The pump shall have a ground continuity check and the motor chamber shall be Hi-potted to test for moisture content and/or insulation defects.
3. The motor and volute housing shall be pressurized and a 10 second air leak decay test run.
4. Oil is added, and the pump is run. Voltage and current are monitored visually, electronically, and the tester listens for any noise or malfunction.

PENTAIR

USA
293 WRIGHT STREET, DELAVAN, WI 53115 WWW.HYDROMATIC.COM
PH: 888-957-8677 ORDERS FAX: 800-426-9446

CANADA
269 TRILLIUM DRIVE, KITCHENER, ONTARIO, CANADA N2G 4W5
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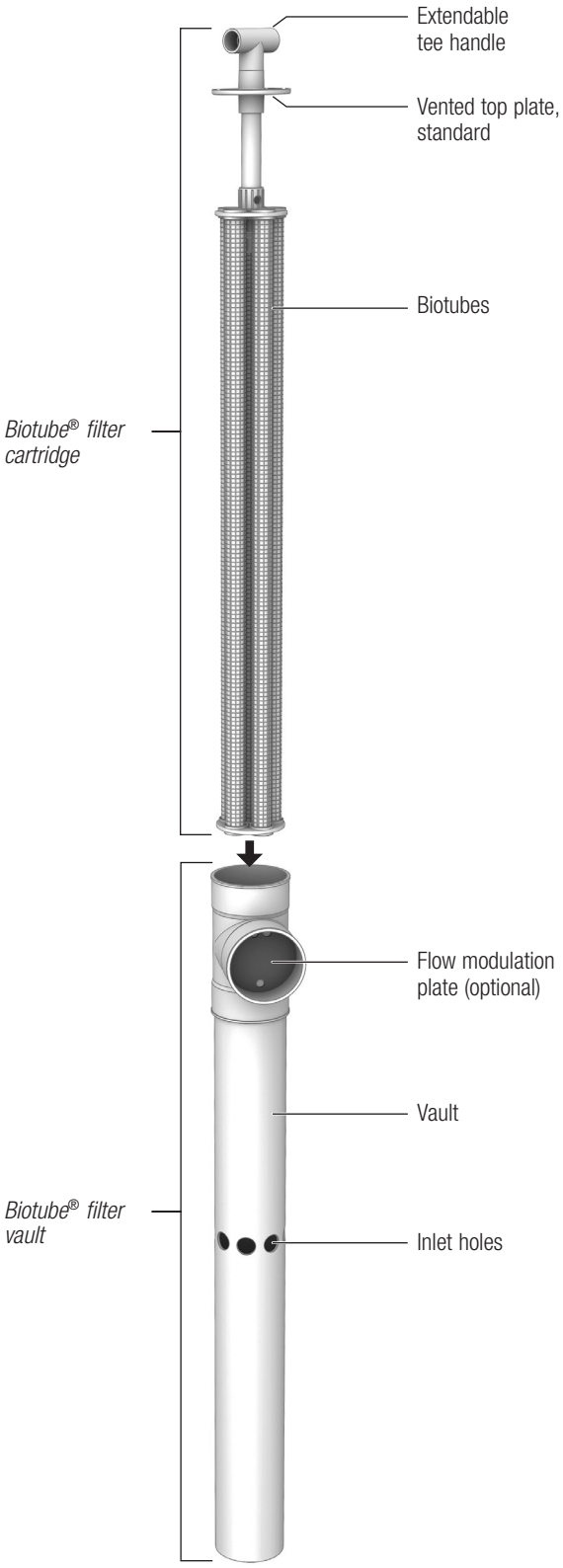
Orenco SYSTEMS

Technical Data Sheet

4-in. (100-mm) Biotube® Effluent Filters



Applications

Orenco® 4-inch Biotube® Effluent Filters are designed to remove solids from effluent leaving residential septic tanks. They can be used in new and existing tanks at flows of up to 1200 gpd.

General

Orenco 4-inch Biotube Effluent Filters (U.S. Patents No. 4,439,323 and 5,492,635) are used to improve the quality of effluent exiting a septic tank in a residential septic system. Increased effluent quality improves system performance and extends drainfield life.

The Biotube cartridge fits tightly in the vault and is removable for maintenance. The tee handle can be extended for easy removal of the cartridge.

Standard Models

FTS0444-36, FTS0444-36M, FTW0436-28, FTW0436-28M

FTW0444-36, FTW0444-36M

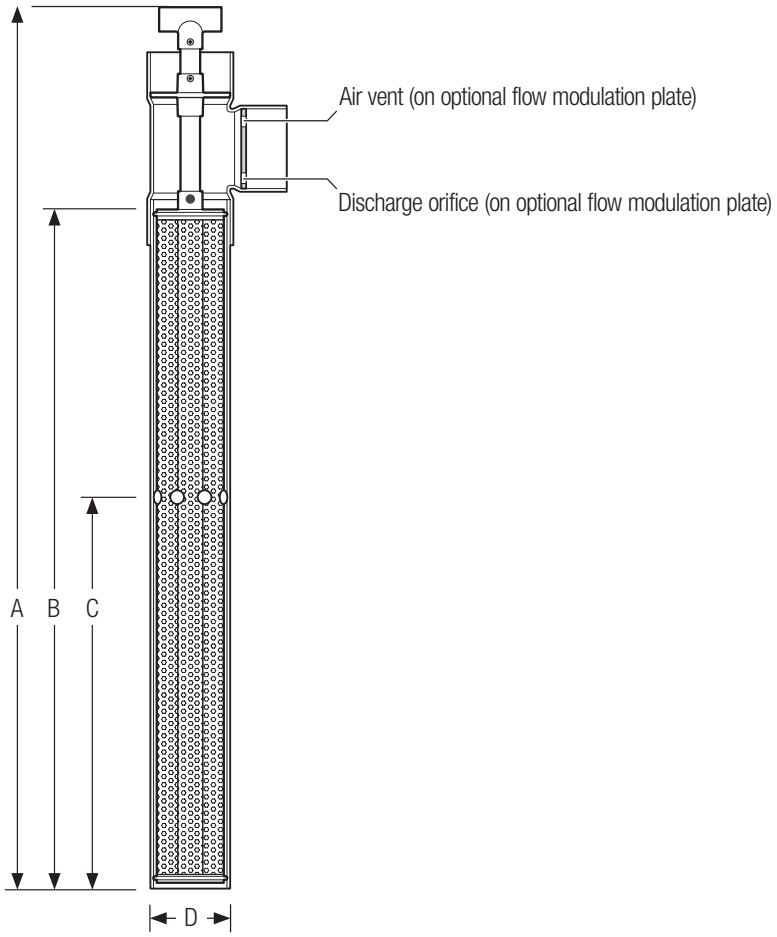
Product Code Diagram

FT [ ] [S] **04** [44] - [36] - [ ]

- Flow modulator and float switch bracket options:
  - Blank = no options selected
  - M = flow modulation plate installed
  - A = float switch bracket installed
- Cartridge height, in. (mm):
  - 28 = 28 (711), standard
  - 36 = 36 (914), standard
- Filter housing height, in. (mm):
  - 36 = 36 (914), standard
  - 44 = 44 (1118), standard
- 4-in. (100-mm) filter diameter
- Outlet tee:
  - W = fits Type 3034 outlet tee
  - S = fits Schedule 40 outlet tee
- Filter mesh option:
  - Blank = ⅛-in. (3-mm) filter mesh
  - P = 1/16-in. (1.6-mm) filter mesh
- Biotube® effluent filter

Materials of Construction

Vault	PVC
Biotube® cartridge	Polypropylene and polyethylene
Handle components	PVC, polyethylene, stainless steel



Specifications

Model	FTS0444-36, FTW0444-36	FTS0436-28, FTW0436-28
A - Vault height, in. (mm)	44.00 (1118)	36.00 (914)
B - Cartridge height, in. (mm)	36.00 (915)	28.00 (710)
C - Inlet hole height,* in. (mm)	21.25 (540)	19.25 (489)
D - Nominal diameter, in. (mm)	4.00 (100)	4.00 (100)
Number of inlet holes	8	8
Inlet hole diameter, in. (mm)	1.13 (29)	1.13 (29)
Discharge orifice diameter, in. (mm)	4.00 (100)	4.00 (100)
Discharge coupling diameter, in. (mm)	4.00 (100)	4.00 (100)
Filter surface area,† ft^2 (m^2)	5.1 (0.50)	3.9 (0.40)
Flow area,** ft^2 (m^2)	1.5 (0.15)	1.2 (0.12)
Flow Modulation Plate (Optional)		
Number of discharge orifices	2	
Discharge orifice diameter, in. (mm)	0.50 (12.7)	
Number of air vents	1	
Air vent diameter, in. (mm)	0.50 (13)	

** Inlet hole height can vary depending on the configuration of the tank. Optimum hole height is 70% of the minimum liquid level.*

† Filter area is defined as the total surface area of all individual Biotubes® within the filter cartridge.

*** Flow area is defined as the total open area (or area of the mesh openings) of all the individual Biotubes within the filter cartridge.*

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