DESIGN MANUAL: SEWAGE DISPOSAL SYSTEMS IN PRINCE GEORGE'S COUNTY – BAT *(Best Available Technology)* Units

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Preface

Prince Georges County utilizes septic tanks and BAT (Best Available Technology) units for onsite sewage disposal systems for residential and commercial properties. BAT units are required for new construction in the Chesapeake Bay and Atlantic Coastal Bay Critical Area (within 1000' of Tidal Water). However, a BAT system may be required outside the Critical Area in order to protect public health or the waters of the State. Commercial establishments having flows of 5,000 gallons per day or greater shall be reviewed and approved concurrently by the Maryland Department of the Environment (MDE) and this office.

This current manual supersedes all earlier versions

Introduction

This manual provides instructions for the design of on-site residential and commercial sewage disposal systems utilizing Best available Technology (BAT) units; and encompasses conventional gravity flow and effluent pump systems for new/existing residential and commercial establishments that are within the Chesapeake Bay and Atlantic Coastal Bay Critical Area (within 1000' of Tidal Water). Sand mound, low-pressure distribution systems, shared SDS, and non-conventional on-site SDS technologies are not addressed in this manual. *For sewage disposal systems using septic tanks, please use the design manual entitled Sewage Disposal Systems in Prince George's County – Septic Tank.* For the purposes of this manual it is assumed that the properties to be served have satisfactory percolation tests conducted on or after 1985 and have an adequate sewage disposal area (SDA). Percolation tests conducted prior to this date employed a different methodology and must be reviewed on a case by case basis to determine whether additional testing is necessary. The SDA shall be exclusive of buildings, easements, right-of-ways, pools, storm water infiltration devices or other structures that may damage the initial sewage disposal system (SDS) or limit the use of the remaining SDA. No grading shall occur within the SDA except for clearing activities necessary to install the initial SDS.

The information and requirements described in this manual complies with the Prince George's County Code, Subtitle 22, the Code of Maryland Regulations 26.04.02, and the Prince George's County policy guidelines. Commercial establishments having flows of 5,000 gallons per day or greater shall be reviewed and approved concurrently by the Maryland Department of the Environment (MDE) and this office. High strength wastewater must be pretreated and reduced to typical domestic septic tank effluent levels. For systems that have high strength wastewater, it is recommended that you contact this office or MDE to discuss specific design requirements. For these and all other questions you may have regarding the design of SDS's in Prince George's County, please contact the Division of Environmental Health's Environmental Protection/Policy Program at 301/883-7681 or the Health Review Section of the Department of Permitting, Inspections and Enforcement (DPIE) at 301/883-7621.

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Best Available Technology for Removal of Nitrogen (BAT) Tank Construction

As of January 1, 2013, COMAR 26.04.02.07 requires all onsite wastewater systems in Maryland (new construction commercial and residential) to utilize BAT tanks. A list of approved BAT vendors can be found on the MDE website at:

http://www.mde.state.md.us/programs/Water/BayRestorationFund/OnsiteDisposalSystems/Pages/Water/cbwrf/index.aspx

Note: BAT tanks with a capacity larger than 1,500 gallons per day (gpd) shall be individually engineered and must be reviewed/approved by MDE.

BAT Tank Capacity

Residential Systems

The tank size is determined by the number of bedrooms based on the minimum design flow of 150 gpd per bedroom. Contact the BAT manufacturer for the proper tank size for your system.

Commercial Systems

The capacity of the BAT tank(s) for commercial facilities shall be based on the retention of the expected daily sewage flow over a 48-hour period. The expected daily sewage flow can be calculated using the recommended wastewater flow figures established by MDE or obtained from actual flow figures of similar establishments. When calculating BAT tank capacity, the expected daily sewage flow is doubled. Commercial operations having highly variable daily sewage flows (i.e. a church), should calculate the daily sewage flow on the day of expected highest water use when determining tank capacity. Commercial systems that discharge high strength wastewater will be required to use adequately sized BAT systems to reduce the strength of waste. The system must be individually engineered, and meet all the criteria of MDE concerning 50% nitrogen removal, biological oxygen demand (BOD), total suspended solids, fats/oils/grease content, and alkalinity.

Grease Interceptors

All commercial operations producing fats, oils or grease shall discharge to an outside grease interceptor. This high strength wastewater shall be isolated from the building's gray and black water and be plumbed directly into the grease interceptor before entering the septic tank or pretreatment tank. The grease interceptor shall conform to all Washington Suburban Sanitary Commission (WSSC) design and construction standards.

Building Sewer

The building sewer shall be installed in accordance with all applicable WSSC regulations. A minimum 2% slope is required for the building sewer.

Header Line

The header line, which allows gravity flow from the tank to the distribution box, shall be four inches in diameter, have a minimum 1% slope and be constructed of Schedule 40 PVC or equivalent. Header lines installed 24 inches or deeper beneath driveways or right–of–ways that are subject to vehicular traffic, shall be laid in a two inch bed of ¾ inch gravel or sleeved in cast iron pipe or Schedule 80 PVC. Header lines installed less than 24 inches below grade shall be sleeved in cast iron pipe or Schedule 80 PVC.

Water Softener Backwash Line

The backwash line (2" PVC pipe) from the water softener unit must by-pass the BAT tank and be directly plumbed to the distribution box (gravity system) or separate pump chamber (pump system) prior to distribution box, whichever is applicable to your design.

Distribution Box

All BAT systems (whether gravity or pump) must use ten hole distribution boxes. The distribution box lid shall be constructed with an integral PVC fitting that will allow for the installation of a three or four-inch diameter inspection pipe.

Sewage Disposal System Trenches

Trenches shall be drawn on contour and be a maximum of 100 feet in length. When showing multiple trenches, the trenches shall be equal in length. The trenches should be installed through or adjacent to one or more percolation tests. It is always preferable to design the initial system in the uppermost elevations of the SDA as it will allow future trenches to be installed via gravity from the distribution box. Refer to the site plans on pages 25 and 26 that show both a gravity flow system and a pump system.

Deep trenches (greater than or equal to five feet deep) that are installed parallel shall be spaced at least twice the gravel depth apart, measured sidewall to sidewall. The distance between trenches may not be less than 10 feet nor more than 18 feet. Shallow trenches (two feet to four feet eleven inches deep) shall be constructed three feet wide and spaced at least nine feet apart or two feet wide and spaced six feet apart. Observation pipes, which extend from the bottom of the trench to finished grade, shall be installed at the end of every trench. Commercial SDS's require dual drain fields that utilize either a diversion valve or gate valves to divert effluent from one field to the other field. Valves are usually switched on a yearly basis.

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Sewage Disposal System Profile

A profile of the SDS must be included on the site plan. The profile shall accurately depict all components of the SDS, their associated elevations and slopes. Profiles for both gravity and effluent pump systems are shown on pages 24 and 27. When it is necessary to install a pump chamber greater than 24 inches below grade, the force main should be shown exiting the side of the riser of the pump chamber. This will allow the pump motor to be easily removed without entering the tank. Refer to pages 19-20.

Trench Length Calculations

Calculate the total length of trench for both residential and commercial systems by determining the sewage design flow (peak flow), the soil loading rate and the amount of absorptive soil in the percolation tests holes located in closest proximity to the proposed drain field trenches.

- Sewage Design Flow (peak flow)

  The peak flows for residential SDS's shall be derived by this equation:

  150 x the number of bedrooms

  For commercial systems, peak flows are calculated by doubling the projected average daily flow obtained from the MDE wastewater flow figures or from the actual flow figures of similar operations. When both methods are utilized, the method that produces the more conservative number will be used. The minimum commercial design flow is 400 gpd. It is recommended that you contact the Health Review Section of DPIE and/or the Environmental Health's Environmental Protection/Policy Program to determine the design flow for any commercial project.

- Soil Loading Rates

  The soil loading rates for shallow and deep percolation tests are found in Chart B. When one is confronted with varying percolation test rates within the area of the initial SDS design, normally the average of those rates is used in the design of the system. To design systems based on percolation tests having rates greater than 30 minutes per inch, please contact the Environmental Protection/Policy Program for additional instructions.

- Absorptive Soil Data

  The amount of absorptive soil identified in each percolation test is stated in the percolation test report, under absorptive soils (see page 22). For deep SDS's based on percolation tests five feet and deeper, only permeable soils found from 18 inches below grade to the bottom of the test hole shall be considered absorptive for the purpose of calculating trench length. For shallow SDS's, less than five feet in depth, only the bottom of the trench is considered in the treatment of wastewater. Therefore, when designing shallow SDS's, use the width of the trench, typically three feet, as the available absorptive soil factor in calculating total trench length.

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Residential Systems

The minimum size sewage drainfield systems required for residential buildings are shown in Chart A on page 15. Use the following equation to determine if the total trench length shall exceed the minimum requirements:

Trench Length = Design Flow (gal/day)/Loading Rate (gal/sq ft/day)/Absorptive Soil (ft) x % of length (determined by usable sidewall-see chart below)

Usable sidewall below the pipe (in feet)	Trench Width		
	1.5 feet	**2 feet**	**3 feet**
1	0.78	0.80	0.83
1.5	0.64	0.66	0.71
2	0.54	0.57	0.62
2.5	0.47	0.50	0.55
3	0.41	0.44	0.50
3.5	0.37	0.40	0.45
4	0.33	0.36	

Use chart to determine percentage of length (d)

For absorptive greater than 4' use this equation: w+2/w+1+2d (w is the width of trench and d is the amount of absorptive soil-under the pipe) to calculate percentage of length.

Commercial Systems

All commercial systems shall utilize a diversion valve system with alternating drainfields in both the initial system and the replacement system. To determine the total amount of trench required for the initial system, use the following equation:

$$\text{Total Trench Length of the Initial System} = \frac{2 \times \text{Daily Sewage Flow (gal/day)}}{\text{Loading Rate (gal/sq ft/day)} \times \text{Absorptive Soil (ft)}}$$

The above total length must be equally divided to produce two smaller alternating systems (trench length no greater than 100 feet) connected by a four-inch diversion valve or two gate valves. These two smaller alternating systems constitute the initial system. The minimum size commercial system shall consist of two 70-foot trenches.

Repeat the above calculations to determine the total trench length with two smaller alternating systems for the replacement system.

Sewage Effluent Pump Systems

New subdivisions have trended toward lots having reduced acreage and very substantial homes. These changes have diminished opportunities to install gravity flow SDS's and increased the need to install sewage effluent pump systems. Current sewage effluent pumps and alarm systems have proven to be both cost effective and extremely reliable. However, these technological improvements have not overcome problems associated with groundwater infiltration of the pump chamber which can lead to premature pump failure and soil saturation in the drainfields. Therefore, it is extremely important to review any water table or soil information that may be available (i.e. percolation test report, soil borings within the vicinity of the house) before setting the elevation of the pump chamber. The pump chamber should never be installed in the ground water table. High groundwater tables can be successfully overcome by raising the house elevation, using basement ejector pumps and employing creative grading schemes. Plans submitted to this office that present the BAT tank or pump chamber in the water table or the expected seasonally high groundwater table will be returned for revision.

For properties without high ground water tables, the tops of the tanks should be one to two feet below grade and no deeper than three feet (BAT tank) or four feet (pump chamber) below grade. A majority of the BAT manufacturers do not manufacture traffic/load-bearing tanks, and they highly recommend that the BAT tanks be installed between 12-24 inches below grade. Installations deeper than four feet create safety, installation and maintenance problems. All pump chambers set three feet or deeper or subject to vehicular traffic shall be traffic bearing in construction. A minimum 20-inch diameter riser, that extends at least six inches above grade, shall be installed over the pump chamber to access the pump motor and float controls. Ejector pumps shall be used to serve only the basement plumbing and be plumbed into the main sewer line that drains via gravity into the BAT tank.

NOTE: The following sections "Residential Pump Chambers" through "Presentation of Data" (pages 9-11) apply only to BAT systems that utilize a separate detached pump chamber.

Residential Pump Chambers

Residential pump chambers are designed to accommodate the daily sewage flow and provide an adequate reserve capacity in the event of pump failure. The typical pump chamber used in Prince George's County is a pre-cast concrete, top seam, single compartment septic tank, 1,000 or 1,500 gallons in capacity. The 1,000 gallon tank is adequate for most three or four bedroom homes. Homes with five or more bedrooms typically require a 1,500 gallon tank.

Commercial Pump Chambers

Pump chambers used to serve commercial facilities are usually the same pre-cast, top seam, concrete tanks used in residential applications. However, projected sewage flows exceeding 1,000 gallons per day will likely require larger cast in place concrete tanks or multiple pre-cast tanks placed in series, installed on a concrete slab.

Sewage Effluent Pumps

Sewage effluent pumps are generally rated from one-third to one horsepower. While a simplex pump system is satisfactory for residential buildings; commercial applications require a duplex pump system. The pump must be sized to overcome the total dynamic head of the system. The pump shall be capable of delivering the dose in two to five minutes, at a rate of 15 to 20 gallons per minute per trench and at a velocity of two to five feet per second through the force main. Pumps dosing three or more trenches may reduce the discharge rate to 10 to 15 gallons per minute per trench. Include the pump curve on the site plan.

Simplex Pump Piping Components

Simplex pump systems are approved for residential applications and typically consist of the following components:

- A sewage effluent pump placed on a six-inch concrete block.
- Approximately six feet of two-inch diameter schedule 40 PVC inside the tank, interlocked with a swing check valve, compression coupling and a 90-degree elbow.
- A two-inch diameter, schedule 40 PVC force main, which extends from the pump chamber to the distribution box. Large volume, commercial applications may require a three-inch diameter force main. The force main shall exit the outlet hole of the tank or through the side of the riser when the tank is buried more than 24 inches below grade. Refer to the pump chamber diagrams on pages 18 - 20.

Duplex Pump Piping Systems

All commercial facilities are required to utilize a duplex pump system. Duplex pump systems consist of two independent pumps, each having a swing check valve, compression coupling and a 90-degree bend installed prior to a common tee fitting. Refer to the pump chamber diagram on page 20.

Alarm System/Float Controls

Residential systems shall use a simplex controller with an alarm. Commercial systems employ a duplex controller with an alternator and an alarm. Both residential and commercial systems typically use a three-float, mercury control switch operation. A combination on/off float may be used if it can be adjusted to provide the proper dose. The floats shall be attached to a secured float tree or mounting bracket, independent of the force main that can be easily removed for adjustments and maintenance. A rain-tight, tamperproof junction box, used to connect the pump motor and float switches to the alarm box, shall be located outside the pump chamber. The alarm float and pump motor(s) shall be placed on separate electrical circuits.

Float Settings

- Off Float - Set the Off Float elevation at the top of the motor housing. Depending on the manufacturer, the Off Float will be set at least 19 inches above the inside bottom of the tank. All motors shall be placed on six-inch concrete blocks.
- On Float – Set the On Float at three inches above the Off Float, or at an elevation equal to the volume of the entire four-inch perforated pipe (drawdown number from Design Data on page 17) in the drainfields, whichever is greater. Do not include the volume of the force main as the swing check valve restricts any drainage of the force main back into the tank.
- Alarm Float – Set the Alarm Float six inches above the On Float but below the invert of the inlet pipe entering the pump chamber.

Reserve Capacity

The reserve capacity of the pump tank is the volume between the Alarm Float and the invert of the inlet pipe. In residential simplex pump systems, the minimum reserve volume shall be 100 gallons per bedroom. For commercial systems, the reserve capacity must be equal to at least the projected one-day sewage flow.

Total Dynamic Head (TDH)

To select the appropriate sewage effluent pump, calculate the TDH. The TDH is the sum of the friction and static head losses. Velocity head for residential and small commercial systems will be fractional and can be discounted when calculating TDH.

- Static Head Loss – The difference between the highest elevation of the force main, typically the invert of the distribution box, and the Off Float elevation.

- Friction Loss – Calculate the equivalent length of all the two-inch force main pipe fittings, using Table 1 on page 16. Add this value to the length of the force main and the six feet of pipe inside the tank. Multiply the total length of pipe by the friction loss coefficient that correlates to the discharge rate in gallons per minute and divide by 100. Refer to Table 2, on page 16. The discharge rate shall be maintained between 15 to 20 gallons per minute per trench. When dosing more than three trenches, the discharge rate may be reduced to 10 to 15 gallons per minute per trench.

- Total Dynamic Head – Add the static and friction head loss. Select an effluent pump that is capable of providing the required discharge rate (gal/min) against the TDH.

Presentation of Data

The pump system elevation and design data shall be included on the site plan. The information can be tabulated and presented as shown on page 27.

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Site Plan Checklist

The following checklist is a summary of the State and County requirements for properties to be developed on wells and/or SDS's. Compliance with these Health Department requirements shall ensure a timely building permit approval process. Refer to the sample site plans, sewage disposal profiles and pump chamber data included in this manual. Be advised that as of June 2011, all SDS's located within the Chesapeake Bay Critical Area require a variance from the Prince George's Planning Board prior to the installation of the system.

General Site Plan Information

1. Provide the owner's name, address and telephone number.
2. Indicate the property location: street, address, tax map, grid, and parcel or lot number.
3. Use a scale of between 1:10 to 1:50.
4. Provide one or two-foot contour elevations. Show the original and final grades.
5. Provide a footprint of the house, deck, driveway, and all other permanent structures that may impact the well and/or SDA.
6. Show the tree conservation area.
7. Show the Primary Management Area (PMA), when applicable.
8. Locate all utility lines and easements.
9. Show the well or water line serving the structure.
10. Show all wells located within 100 feet of the property lines.
11. Show all permanent and temporary storm water management control structures.
12. Show the limits of disturbance and proposed silt fence.

Sewage Disposal Area (SDA)

1. Locate all percolation test (PT) holes (passing and failing), and soil observation holes (SOH).
2. Locate all water table (WT) observation holes.
3. Notate WT depth and static water level (SWL) depth; PT depth, buffer, absorptive soil depth and perc rate; and SOH depth at each hole.
4. Maintain the following minimum distances from the SDA to:
    - Shallow Wells – 100 feet
    - Deep Wells – 50 feet
    - House and permanent structures – 20 feet
    - Property line and easements – 10 feet
    - Streams and waterways – 100 feet
    - Slopes greater than 25 percent – 25 feet
    - Pressure water line – 10 feet
    - Driveway – 10 feet
    - Drainage and spring seeps – 25 feet
    - Drainage ways and gullies (large swales) – 25 feet
5. Do not locate any permanent storm water infiltration devices (i.e. dry wells and bio-retention ponds) upslope of the SDA. Maintain a minimum 25 foot lateral and down slope separation between the SDA and these structures.
6. Do not include any swales, drainage areas, driveways or parking lots in the SDA. Parking lot drainage shall be diverted away from the SDA.
7. The SDA shall not be graded, filled, cut or otherwise disturbed.

8. Shallow trenches, two feet to two feet eleven inches, may be installed on slopes up to 10%.
9. Shallow trenches, three feet to four feet eleven inches, may be installed on slopes up to 15%.
10. Deep trenches, five feet or greater, shall be installed on slopes less than or equal to 25%.
11. For properties recorded prior to November 18, 1985, the SDA shall contain sufficient area to install the initial SDS and one replacement system, unless the property was a subdivision approved by the Health Department requiring a minimum 10,000 square foot SDA and adequate area to install an initial and two replacement systems. Most subdivisions tested by the Health Department after March 3, 1972 fall into this category.
12. All properties recorded on or after November 18, 1985, shall contain sufficient area to install the initial SDS and two replacement systems or 10,000 square feet, whichever is greater.

Sewage Disposal Design

1. The BAT tank(s) shall be located at least 15 feet from the house and all other permanent structures.
2. The drainfields shall be drawn on contour and be a maximum of 100 feet in length. An observation pipe shall be located at the end of each trench.
3. Indicate that all drainfields connected to a common distribution box shall be equal in length.
4. All deep trenches are constructed 18 inches wide and spaced twice the gravel depth apart to be not less than 10 feet nor more than 20 feet.
5. Shallow trenches are usually constructed three feet wide spaced a minimum of nine feet apart.
6. Install the initial system through or near a percolation test(s).
7. Indicate the 2" backwash line from water softener to by-pass BAT tank. (See page 6)

Sewage Disposal Profile

1. Provide a minimum 2% slope on the building sewer line and minimum 1% slope on the header line between the tank and the distribution box or the tank and pump chamber.
2. Indicate the sewer line invert elevations at the house, inlet and outlets of the tank(s) and at the distribution box.
3. Show the original and proposed grade elevations at the house, tank(s), distribution box and trenches.
4. Provide the total trench depth and gravel depth below the perforated drainpipe. Show observation ports at the end of the drainfield that extends to the bottom of the trench.
5. Indicate the name of the manufacturer, model number and specification sheet/detail of the proposed BAT tank.
6. If your BAT system utilizes a trash tank, specify top seam, two compartment sewage tanks with 24-inch diameter risers to within 12 inches of grade. The riser lids shall have an integral coupling to install a location pipe to grade.
7. Specify traffic bearing tank when the pump chamber is buried three feet or more below grade.
8. Indicate that the invert elevation of the sewer line at the distribution box shall be exactly 18 inches below grade. The distribution box lid shall be equipped with an integral PVC fitting and observation pipe to grade.

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Sewage Disposal System Pump Plans

1. Indicate both the dimensions and capacity of the pump chamber.
2. Provide the pump chamber elevation and design data calculations (see page 17) and include the results on the site plan when the pump chamber is separate of BAT tank.
3. Indicate the horsepower (hp) of the pump located in the pump chamber compartment integral to the BAT tank.
4. Show the effluent pump curve on the site plan.
5. Include the pump chamber installation procedures on the site plan (see page 21) when the pump chamber is separate of the BAT tank.
6. Specify a 10-hole distribution box.
7. Install the initial system at or slightly above the elevation of the uppermost percolation test.

Well Location

1. Locate the well at an elevation above the SDA. Exceptions will be considered on a case-by-case basis.
2. Locate the well on slopes of 12% or less.
3. Do not locate the well in an area that has been filled and graded.
4. Locate the well as far as practical from the SDA or other components of the SDS.
5. The well shall meet all the following minimum distance requirements
   - To house – 30 feet
   - To property line – 10 feet
   - To all components of the SDS or any other source of contamination – 50 feet
   - To right-of-ways – 15 feet
   - To driveways – 10 feet
   - To bio-retention ponds, dry wells and other permanent surface water infiltration devices – 50 feet

Applications (Refer to Pages 29-31)

1. Submit the Sewage Disposal Permit application along with the required fee.
2. Submit the Bay Restoration Fund Grant application, if seeking financial assistance.

Chart A: BAT Unit / Drainfield Criteria

Number of Bedrooms	Minimum Aerobic Tank Capacity	Minimum Drainfield length
3 or less	**500 GPD**	**120'**
4	**500/600 GPD**	**130'**
For each additional bedroom, add 250 gallons	**1000 GPD**	**130'**

Chart B: Soil Loading Rates (gal/day/sq ft)

Percolation Test Rate (min/inch)	Loading Rates	
	For design flows less than 5,000 gallons per day	For design flows more than 5,000 gallons per day
2-5	1.2	0.8
6-15	0.8	0.6
16-30	0.6	0.4

Table 1 – Equivalent Length of Force Main Fittings

Size Of Fittings, Inches	½"	¾"	1"	1¼"	1½"	2"	2½"	3"	4"	5"	6"	8"	10"
90° Ell	1.5	2.0	2.7	3.5	4.3	5.5	6.5	8.0	10.0	14.0	15	20	25
45° Ell	0.8	1.0	1.3	1.7	2.0	2.5	3.0	3.8	5.0	6.3	7.1	9.4	12
Long Sweep Ell	1.0	1.4	1.7	2.3	2.7	3.5	4.2	5.2	7.0	9.0	11.0	14.0	
Close Return Bend	3.6	5.0	6.0	8.3	10.0	13.0	15.0	18.0	24.0	31.0	37.0	39.0	
Tee - Straight Run	1	2	2	3	3	4	5						
Tee - Side Inlet or Outlet or Pitless Adapter	3.3	4.5	5.7	7.6	9.0	12.0	14.0	17.0	22.0	27.0	31.0	40.0	
Ball or Globe Valve Open	17.0	22.0	27.0	36.0	43.0	55.0	67.0	82.0	110.0	140.0	160.0	220.0	
Angle Valve Open	8.4	12.0	15.0	18.0	22.0	28.0	33.0	42.0	58.0	70.0	83.0	110.0	
Gate Valve-Fully Open	0.4	0.5	0.6	0.8	1.0	1.2	1.4	1.7	2.3	2.9	3.5.	4.5	
Check Valve (Swing)	4	5	7	9	11	13	16	20	26	33	39	52	65
In Line Check Valve (Spring) or Foot Valve	4	6	8	12	14	19	23	32	43	58			

Table 2 – Friction Loss Coefficient

GPM	2"		2½"		3"	
	Plastic	Steel	Plastic	Steel	Plastic	Steel
20	0.9	0.9				
25	1.3	1.3				
30	1.8	1.8	0.6	0.8		
35	2.4	2.4	0.8	1.0		
40	3.1	3.1	1.0	1.3		
45	3.8	3.8	1.3	1.6	0.5	0.6
50	4.7	4.7	1.6	1.9	0.7	0.7
60	6.5	6.6	2.2	2.7	0.9	0.9
70	8.6	8.8	2.9	3.6	1.2	1.2
80	11.1	11.4	3.7	4.6	1.5	1.6
90	13.8	14.3	4.6	5.8	1.9	2.0
100	16.8	17.5	5.6	7.1	2.3	2:4
125			8.3	10.9	3.6	3.6
150			12.0	15.5	4.9	5.1
175			16.4	20.9	6.4	6.9
200					8.4	8.9
225					10.5	11.2

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Design Data Form

_____ Linear feet of drainfield
_____ Volume of 4 inch drainpipe in gallons (0.65 x linear feet)
_____ Diameter of force main (inches)
_____ Linear feet of force main pipe
_____ Equivalent length of force main pipe (add for elbows, swing check valve, tees and 6 feet of pipe in tank…24.5 for simplex and 49 for duplex plus all the bends in the force main)
_____ Total pipe length (linear + equivalent)
_____ Gallons per inch drawdown: tank capacity divided by [(outlet elev. – inside tank elev.) x 12] (Only use the "12" if numbers are in feet)
_____ Gallons pumped per cycle (volume of drainfield pipe or the equivalent to a three inch drawdown, whichever is greater)
_____ Inches drawdown per pump cycle (gals. pumped per cycle divided by gals. per inch drawdown)
_____ Drawdown in feet (inches / 12)
_____ Gallons pumped per minute (15-20 gallons/lateral/minute)
_____ Frictional loss per 100 feet of pipe (minimum velocity of 2 feet per second)
_____ Frictional loss for system (total pipe length x frictional loss per 100 feet of pipe)
_____ Static head loss (highest force main elevation – pump off elevation)
_____ Total head loss (frictional loss + static head loss)
_____ Gallons of reserve capacity (inlet elev. – alarm elev.) x 12 x gallons/inch drawdown
_____ Required pump size (horsepower)
_____ Drawdown time (gals. pumped per cycle divided by gals. pumped per min.): _____ minutes _____ seconds @ _____ gal/min.

Recommended make and model pump _____
Recommended make and model control panel _____

(A single sewage effluent pump and simplex control panel with alarm is appropriate for residential applications, commercial projects shall use a duplex pump system.)

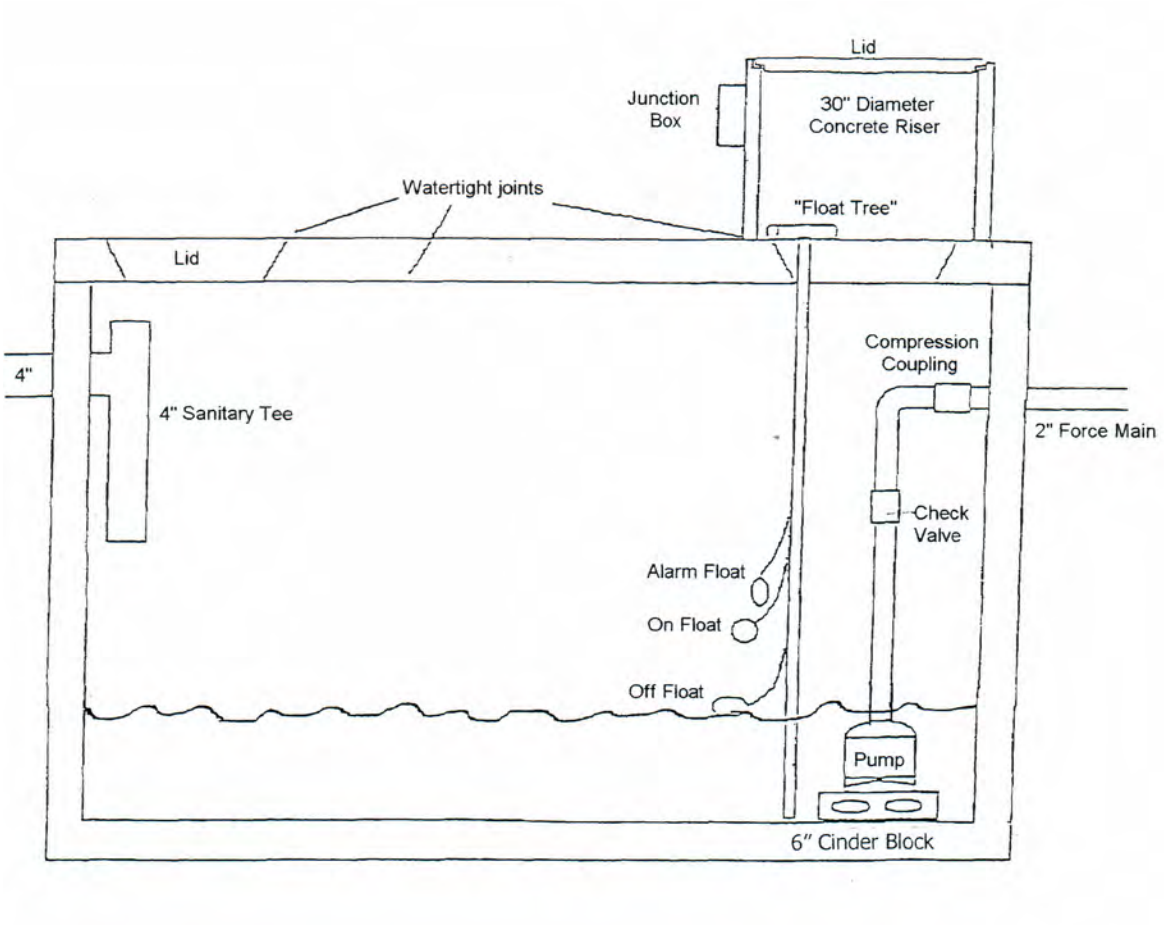
Elevation Data Form (feet)

_____ Inlet invert
_____ Outlet invert
_____ Top of tank
_____ Tank bottom (outside)
_____ Tank bottom (inside)
_____ Pump off float (19" above inside tank bottom)
_____ Pump on float (Drawdown per pump Cycle in feet added to "Off Float")
_____ Alarm float (6" above "On Float")

Simplex Pump Chamber #1

_____ Gallon Pump Chamber – Top Seam Tank

Outside Dimensions: Length _____ Width _____ Height _____



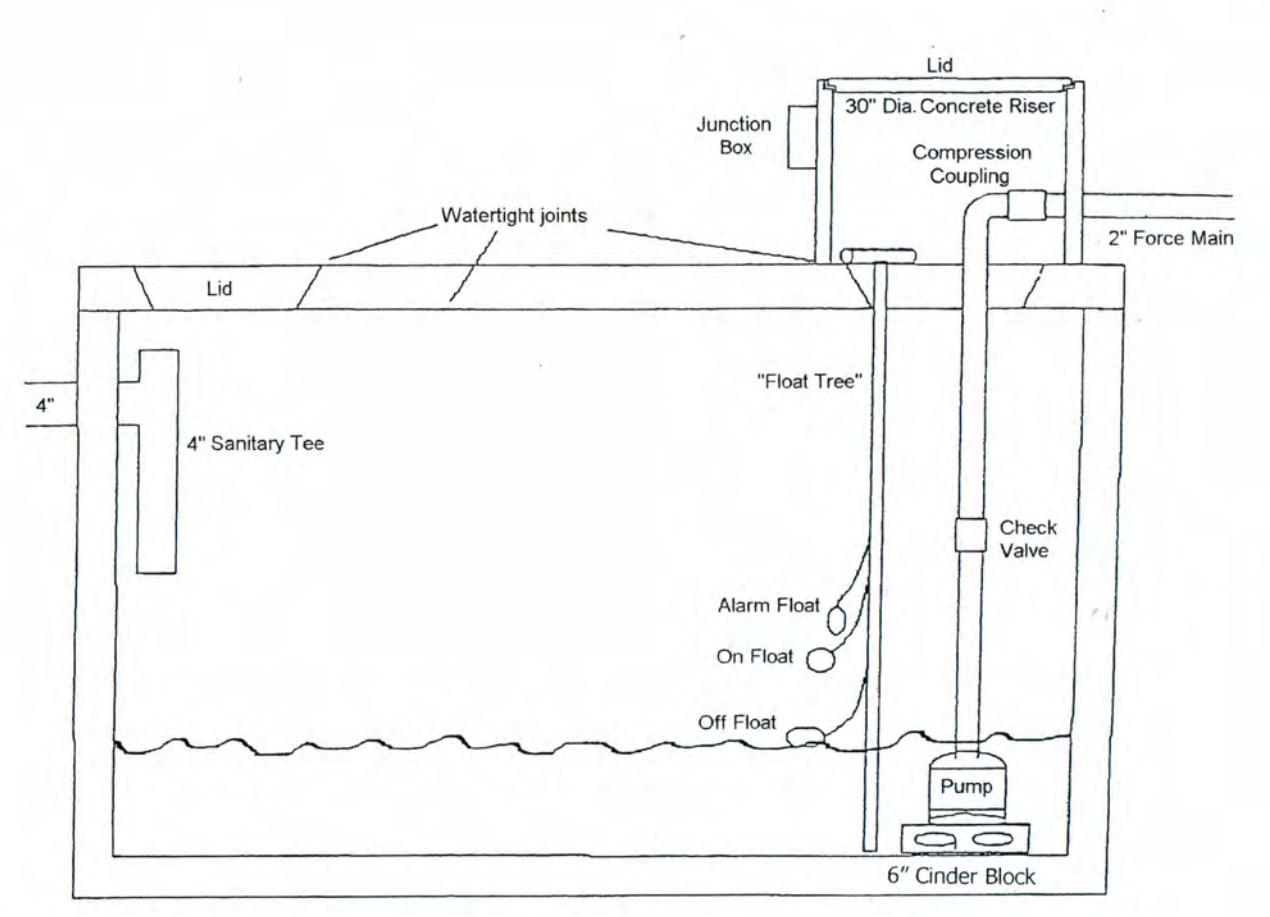
Elevation Data (feet)

_____ Inlet Invert
_____ Outlet Invert
_____ Tank Bottom (inside)
_____ Tank Bottom (outside)
_____ Top of Tank
_____ Pump-Off Float
_____ Pump-On Float
_____ Alarm Float

Simplex Pump Chamber #2

_____ Gallon Pump Chamber – Top Seam Tank

Outside Dimensions: Length _____ Width _____ Height _____



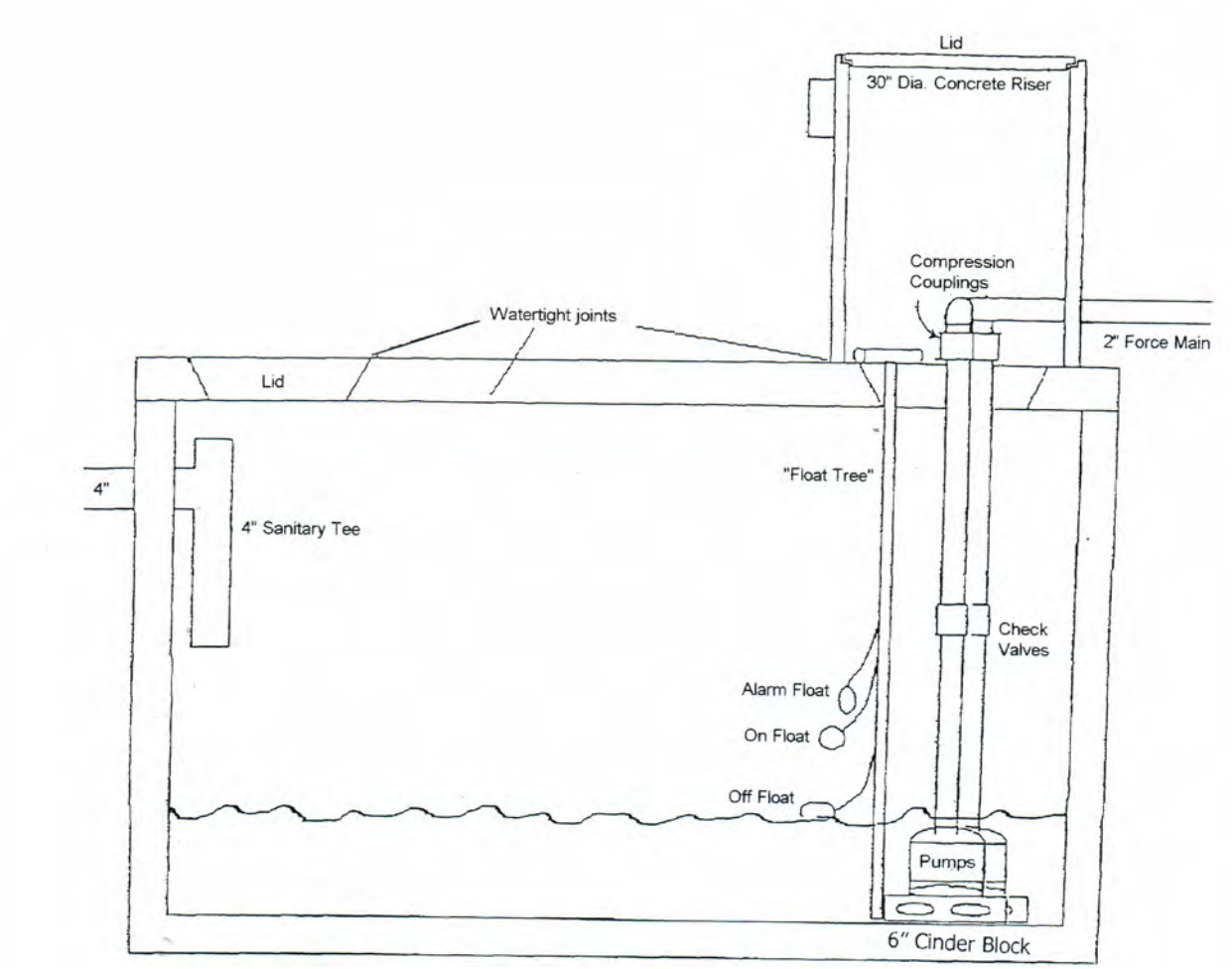
Elevation Data (feet)

_____ Inlet Invert
_____ Outlet Invert
_____ Tank Bottom (inside)
_____ Tank Bottom (outside)
_____ Top of Tank
_____ Pump-Off Float
_____ Pump-On Float
_____ Alarm Float

Duplex Pump Chamber

_____ Gallon Pump Chamber – Top Seam Tank

Outside Dimensions: Length _____ Width _____ Height _____



Elevation Data (feet)

_____ Inlet Invert

_____ Outlet Invert

_____ Tank Bottom (inside)

_____ Tank Bottom (outside)

_____ Top of Tank

_____ Pump-Off Float

_____ Pump-On Float

_____ Alarm Float

Pump Chamber Installation Procedures

An electrical permit is required to install the effluent pump motor, alarm box and associated wiring. A copy of the electrical permit displaying approval by the electrical inspector must be on site for Health Department review. The Health Department shall not conduct the pump system test until the electrical inspector has approved the electrical components of the pump system.

1. **The Health Department must approve any changes to the approved sewage disposal system plans. Contact the Health Department prior to purchasing or installing any components not specified on the approved plans.**
2. If ground water is observed during the excavation for the BAT tank or pump chamber, stop digging and contact the Health Department. Do not install a tank in the groundwater until the Environmental Health Specialist has evaluated the site and given permission to proceed with the installation.
3. The electrical junction box serving the pump motor and floats must be located outside the tank chamber and be a minimum of six inches above finished grade. The pump and alarm floats must be placed on separate electrical circuits.
4. All BAT tank, pump chamber and access ring seams shall be made watertight. The force main shall be constructed of solvent welded schedule 40 PVC or equivalent. The pump chamber riser must be at least 24 inches in diameter and extend no less than six inches above final grade.
5. Attach the floats to a schedule 40 PVC float tree that can be easily removed for service or adjustment. Do not attach the floats to the force main.
6. The Health Department shall observe the pump system operate through a normal operating cycle. Have the system fully checked and run through several cycles prior to requesting a final Health Department inspection. Testing the system without water is not acceptable.
7. Inspection for leakage of the force main fittings will be made during the pump test procedure.
8. Contact the Health Department Environmental Protection/Policy Program (301-883-7681) if you have any questions concerning the above requirements.

Percolation Test Report (Gravity System)

Percolation Test Report (Gravity System)

PERCOLATION TEST REPORT

Prince George's County Health Department
Division of Environmental Health

Property Description: RaceTrack Road 29/E+F2/P53+216 Case No. 4020-2006
Owner/Agent: Michael Sullivan/RaceTrack Rd LLC T/A No. 1613694
Test performed by: Charles Gwynn Page 1 of 15

Water Table Data

Water Table # 1-1
Date 3/13/06 Time 9:45am
Depth 18' (Wet) Dry
Date 3/14/06 Time 10:00am
Depth 18' SWL 18' (muddy)

Water Table # 2-1
Date 3/13/06 Time 10:30 am
Depth 16'6" (Wet) Dry
Date 3/14/06 Time 10:30 AM
Depth 16'6" SWL 14'2"

Percolation Test(s) No.	1-1	1-2	1-3
Date 2006	3/14	3/14	3/14
Diameter	8"	8"	8"
Total Depth	13'	13'	13'
Required Buffer	4'	4'	4'
Water Table Depth (SWL) Dry	18'	18'	18'
Absorptive Layer	7½'-13'	7½'-13	7'-13'
Height of Water in Test Hole	4	4	4'
Pre-Wet #1 Start time	10:58	11:11	12:31
End time	11:00	11:20	12:33
Elapsed Time (mins.)	2	9	2
Drop in Inches	8	8	8
Pre-Wet #2 Start time			
End time			
Elapsed Time (mins.)			
Drop in Inches			
Pre-Wet #3 Start time			
End time			
Elapsed Time (mins.)			
Drop in Inches			
Perc Test Start time	11:01	11:21	12:34
End time	11:04	11:41	12:38
Elapsed Time (mins.)	3	20	4
Drop in Inches	8	8	8
State Equivalent Rate (mins/in)	3	20	4

Soil Profile

WT 1-1 (Proposed Lot 1)
0 - firm, orange SCL
7' - firm, gray SL
9' - tan, soft + VSL
15½' - loose sand + gravel
18' - water

WT 2-1 (proposed lot 2)
0 - brown, firm SiL
5' - firm, heavy orange SL
6' - damp, brown, SL
7' - orange VSL w/ some gravel
15' - tight, pale clay
16' - water

Pt 1-1
0 - firm, heavy SCL
7' - firm, friable SL
7½' - orange, friable SL
8½'-13 - pale, soft VSL

PT 1-2 0 - firm heavy SCL
7' - firm, friable SL
7½'-13' - less firm, friable, orange SL

Pt 1-3
0 - sticky, firm SCL
7 - friable SL
10-13' - orange, friable VSL

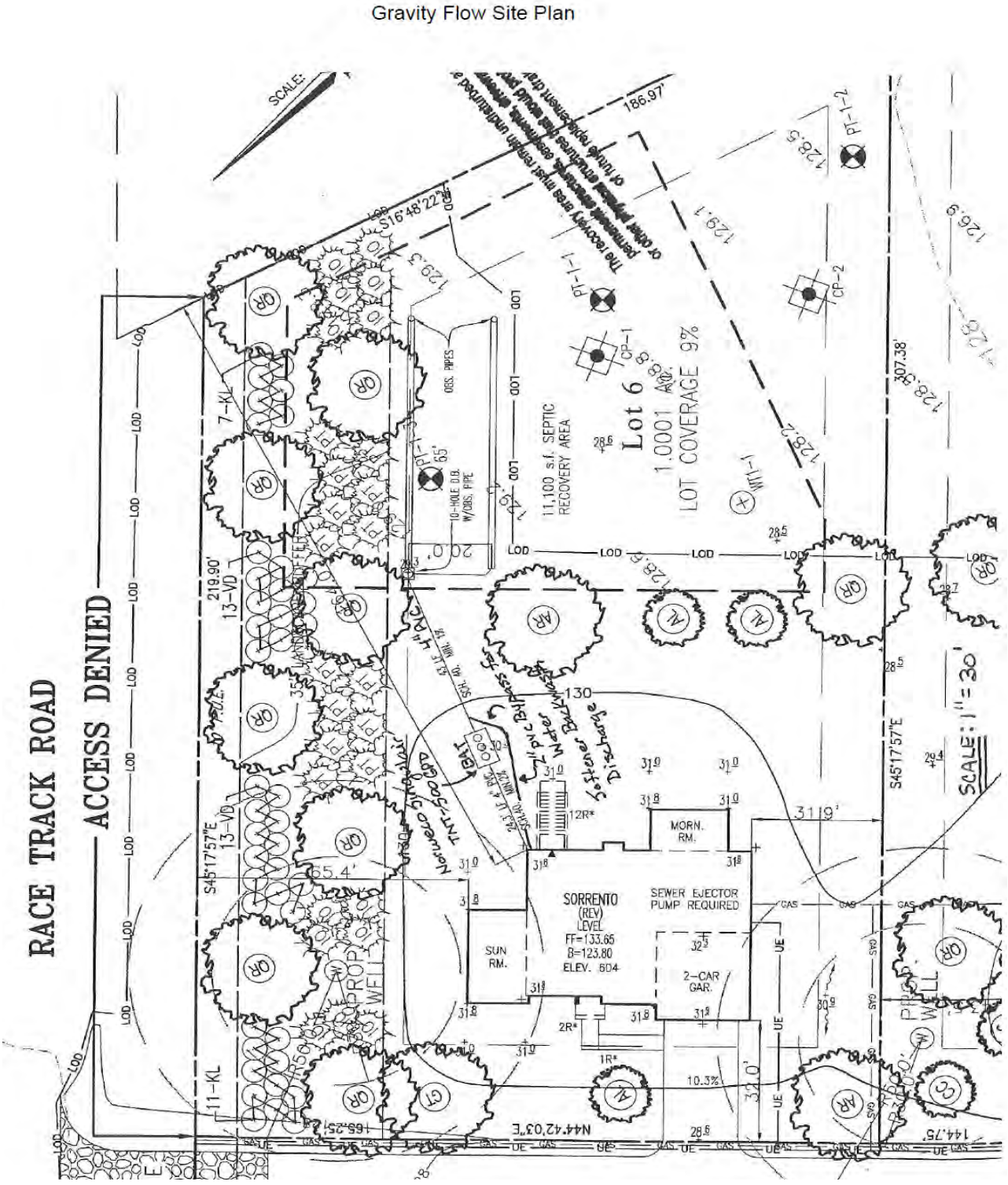
Comment/Key

Bk = Blocky Gran = Granular G = Gravel
F = Fine VF = Very fine M = Medium
Si = Silt S = Sand C = Clay L = Loam
P = Platy Sub = Subangular Blocky

Test Witnessed by: Chas Cohl Date 5/3/06
Health Department Sanitarian

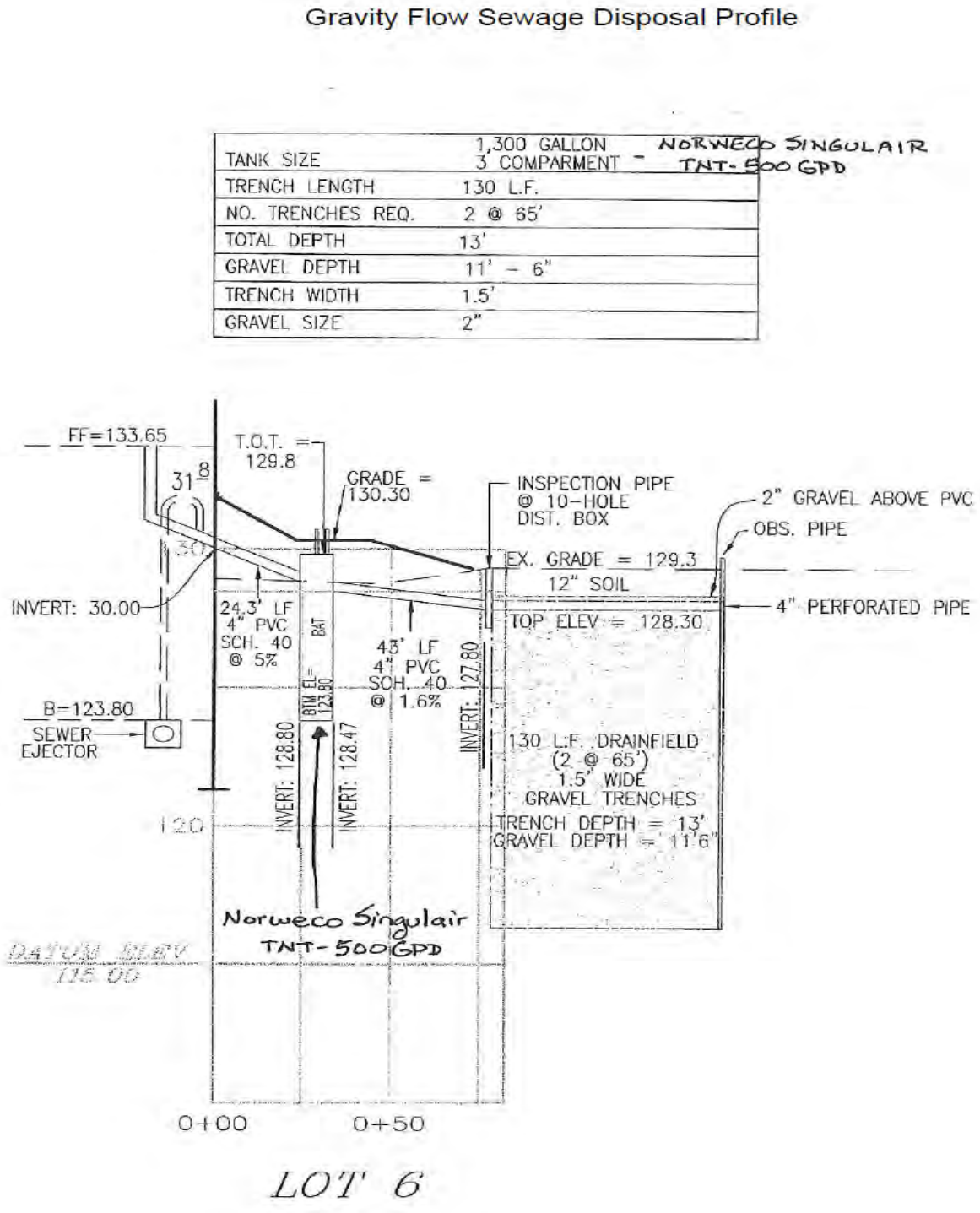
EH-EEP 199 (rev. 2/03)

Gravity Flow Site Plan



DESIGN MANUAL: SEWAGE DISPOSAL SYSTEMS IN PRINCE GEORGE'S COUNTY – BAT *(Best Available Technology)* Units

Gravity Flow Sewage Disposal Profile



Percolation Test Report (Effluent Pump System)

Percolation Test Report (Effluent Pump System)

PERCOLATION TEST REPORT

Prince George's County Health Department
Division of Environmental Health

LOT 12

Property Description: TAX MAP 93 GRID D3, PARCEL 45 File No. 16827-2003

Owner/Agent: Page 1 of 2

Test performed by: CHARLES GUYUN INC.

Water Table Data

Water Table # 1
Date 7/14/03 Time 1:05 PM
Depth 16' Wet/Dry
Date 7/17/03 Time 10:00 AM
Depth 16' SWL DRY

Water Table #
Date Time
Depth Wet/Dry
Date Time
Depth SWL

Percolation Test(s) No.	1	2		
Date	7/14	7/14		
Diameter	8"	8"		
Total Depth	6'	6'		
Required Buffer	5'	5'		
Water Table Depth (SWL/Dry)	16'	16'		
Absorptive Layer	ALL	ALL		
Height of Water in Test Hole	4'	4'		
Pre-Wet #1 Start time	1:18	1:38		
End time	1:19	1:40		
Elapsed Time (mins.)	1	2		
Drop in Inches	8	8		
Pre-Wet #2 Start time				
End time				
Elapsed Time (mins.)				
Drop in Inches				
Pre-Wet #3 Start time				
End time				
Elapsed Time (mins.)				
Drop in Inches				
Perc Test Start time	1:19	1:40		
End time	1:21	1:43		
Elapsed Time (mins.)	2	3		
Drop in Inches	8	8		
State Equivalent Rate (mins/in.)	2	3		

Soil Profile

WT 1 0-9" BROWN TOPSOIL
9"-2'9" DARK BROWN SANDY LOAM
2'9"-4'7" BROWN SANDY LOAM
4'7"-8'3" GRAY SAND
8'3"-16' YELLOWISH / GRAY SANDY LOAM

PT 1 0-6" BROWN TOPSOIL
6"-5' BROWN SANDY LOAM
5'-6' WHITE SAND

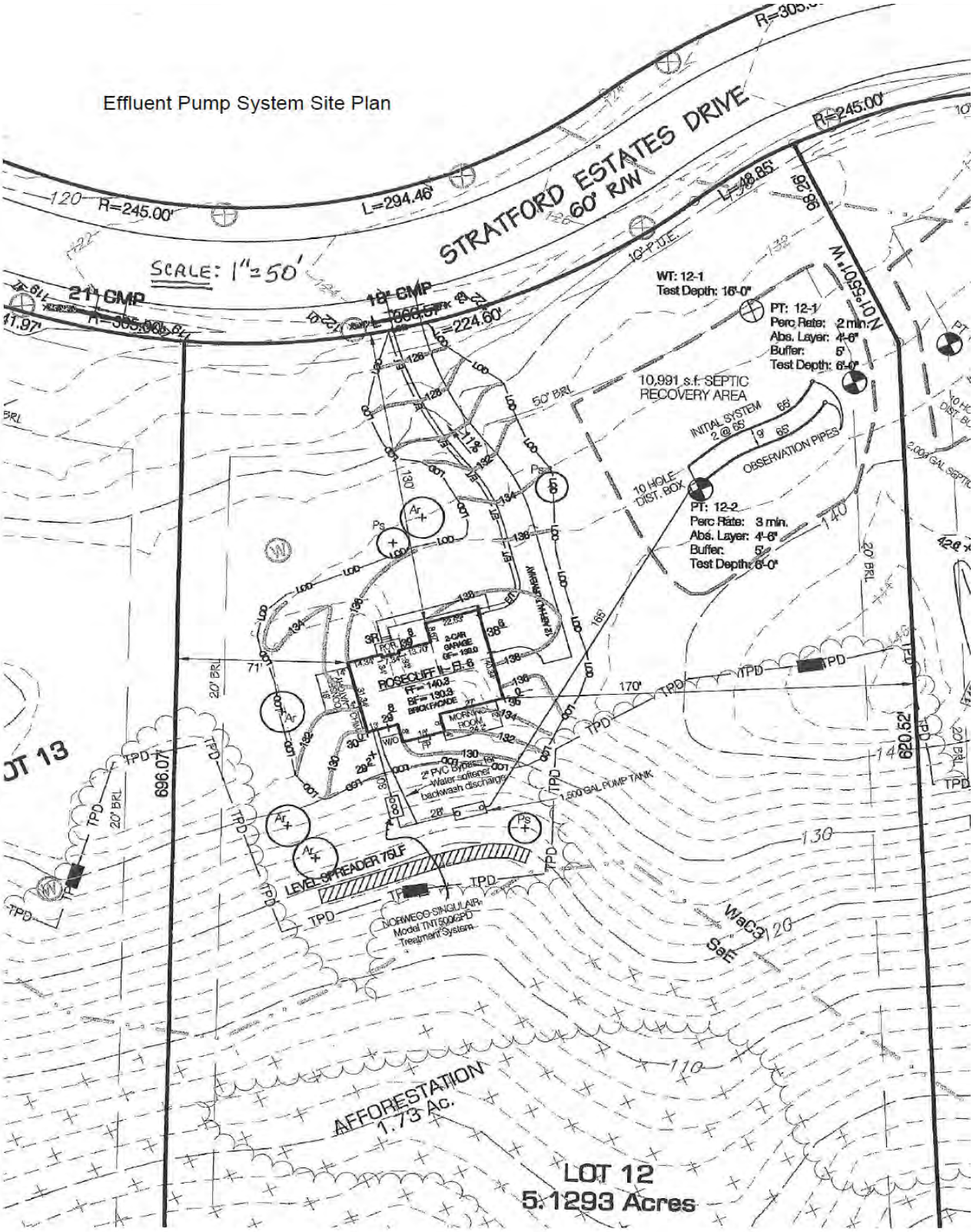
PT 2 0-6" BROWN TOPSOIL
6"-2'8" BROWN SANDY LOAM
2'8"-4' LIGHT BROWN SANDY LOAM
4'-6' TAN SAND

Comments

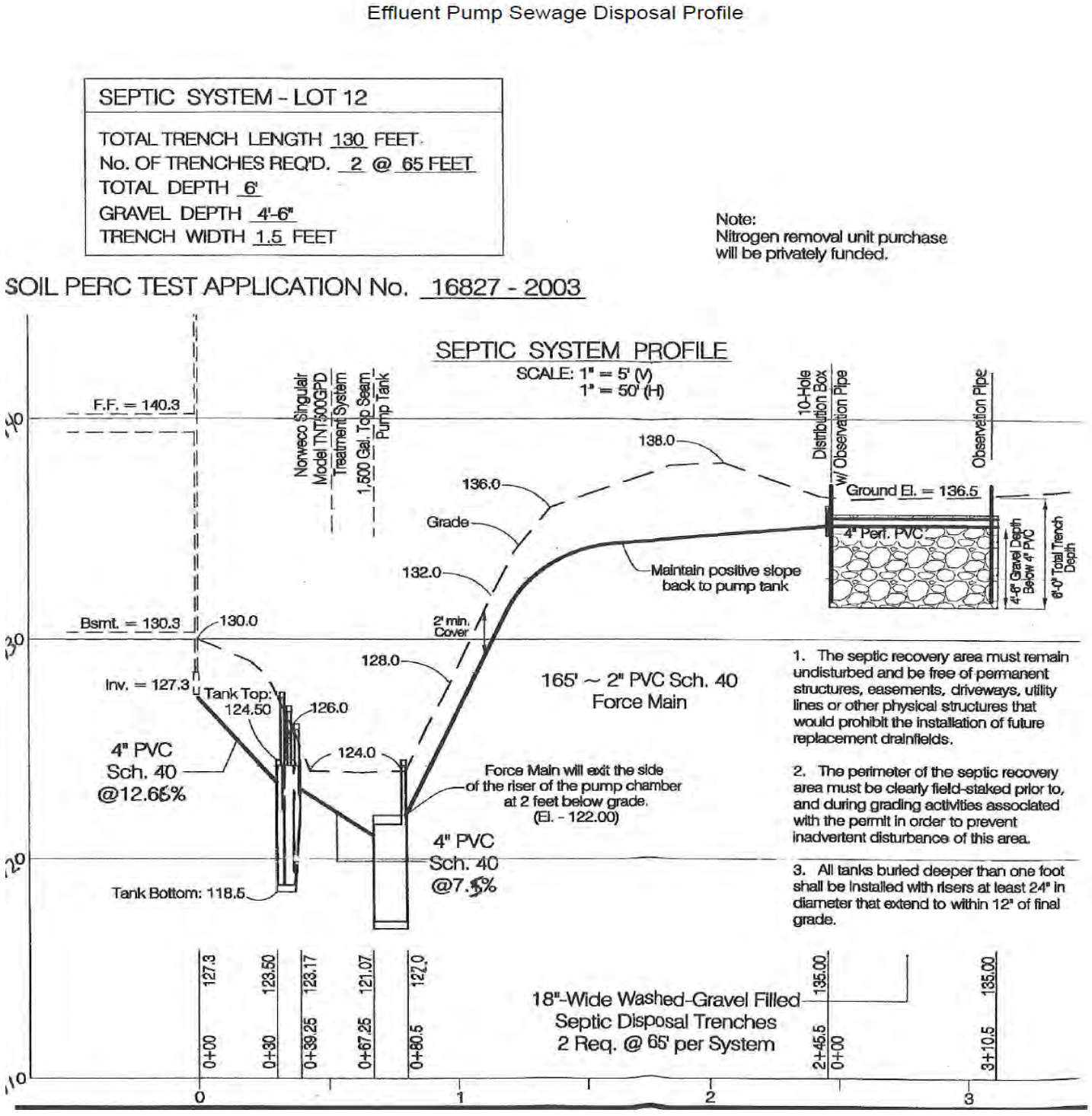
Test Witnessed by: Date 7/17/03
Health Department Sanitarian

EH-EEP 192 (rev. 7/98)

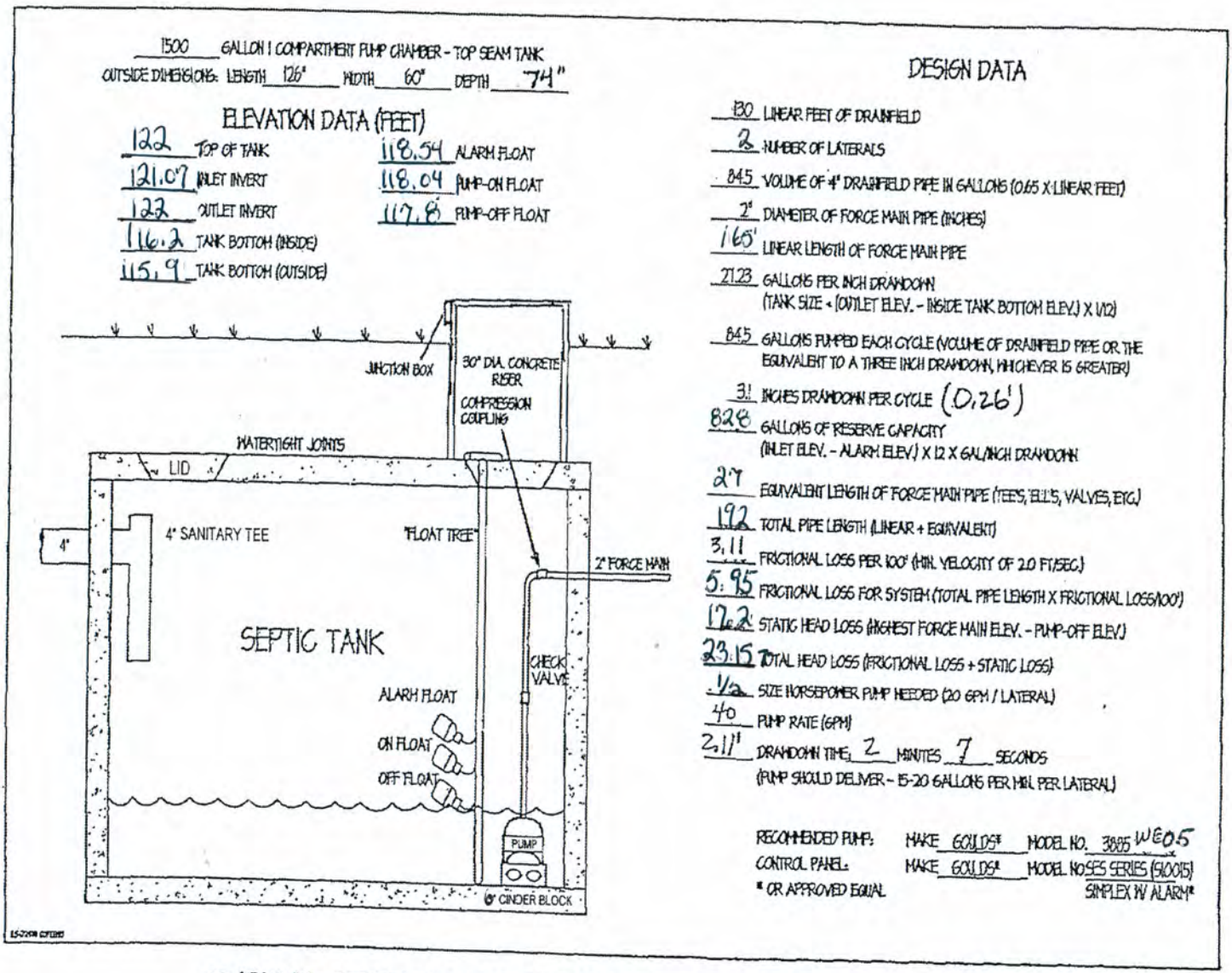
Effluent Pump System Site Plan



Effluent Pump Sewage Disposal Profile



Effluent Pump System Design and Elevation Data



TYPICAL SECTION SEPTIC TANK EFFLUENT PUMP SYSTEM DETAIL

SEWAGE DISPOSAL PERMIT APPLICATION

PRINCE GEORGE'S CO. DEPARTMENT OF
PERMITTING, INSPECTIONS & ENFORCEMENT
Health Department - Environmental Engineering Program
9400 Peppercorn Place - 1st Floor, Largo, Maryland 20774
(301) 883-7606

Case No. _____

Application fee: $472.50* per lot - for new construciton, remodel or upgrade
(Please make checks payable to "Prince George's County") * includes 5% technology fee

(Check) New System_____ Remodel _____ Upgrade_____

Applicant: _____
Address: _____
_____
Telephone: ( ) _____
E-mail address: _____
Owner: _____
Address: _____
_____
Telephone: ( ) _____

Building use: _____
Are there any easements on the property? Yes No

Septic System
Contractor: _____

Subdivision Name: _____
Tax Map: _____ Grid: _____
Parcel: _____ Lot: _____ Block: _____
Tax Acct. No. (required) _____
Property Address: _____

Date of Recordation: _____
Sewer Service Area (circle): 6 5 4 3
If yes, show the location(s) on the site plan.

WATER SUPPLY (Circle): Deep well Shallow well Public water
Is public water available to the property? Yes No
Are there any wells within 100 feet of the property lines? Yes No

RESIDENTIAL STRUCTURES
Number of bedrooms: _____
Square footage of house:
1st Floor: _____ 2nd Floor: _____ Basement: _____ Total: _____
Is there now or will there be basement plumbing? Yes No

COMMERCIAL STRUCTURES
Type of business: _____
Total square footage of building(s): _____
Est. number of employees and visitors per day: _____
Will there be any food service? Yes No

Attach two (2) sets of site plans showing the following: (Six sets will be required for final approval.)

A. Location and elevation of the proposed structure
B. Design and location of the proposed sewage disposal system. (A licensed contractor/engineer can do this for you.)
C. Profile of the proposed sewage disposal system showing all elevations.
D. Location and elevation of all underground utilities.
E. Location of all wells within 100 feet of the sewage disposal system.
F. Location of all easements on the property.
G. Location of streams within 200 feet of the sewage disposal system.
H. Original and final contours of the property at 1 foot or 2 foot intervals, showing the original and final grading.

I have carefully examined and read the above application and know the same to be true and correct.
All provisions of the Prince George's County Code and laws of the State of Maryland will be complied with.

Signature: _____ Date: _____

WORKERS COMPENSATION INSURANCE INFORMATION
Name of Insurance Company: _____ Policy # _____
(If a waiver or an exemption has been received or if you are self-insured, attach a copy of the appropriate certificate.)

For Office Use Only

Receipt No.	Date:	Amount:	Received by:

DPIE/EH-EEP-206 (5/2014)

Rushern L. Baker, III
County Executive

BAY RESTORATION FUND GRANT APPLICATION

PRINCE GEORGE'S COUNTY
Largo Government Center
9201 Basil Court, Suite 318, Largo MD 20774
Phone: (301) 883-7605

Prince George's County Bay Restoration Fund – Onsite Sewage Disposal System (OSDS) Application for Financial Assistance

General Information:

The Bay Restoration Fund grant is available to owners of property in Prince George's County. Priority will be given to those with OSDS within the Critical Area *(that area within 1,000 feet of the tidal waters of the Chesapeake Bay, its tributaries and tidal wetlands)* where the septic system has failed or is failing. Subsequent priority is given to failing systems not in the Critical Area, non-failing systems in the Critical Area, and finally non-failing systems outside the Critical Area.

Applicant Name: _____

Mailing Address: Street: _____

City / State: _____ Zip: _____

Applicant Phone Number: _____ Email: _____

Project Street Address: (if different than mailing address) Street: _____

City / State _____ Zip: _____

Project Location: Maryland State Tax Acct. #: _____ Tax Map #: _____ Grid: _____

Section: _____ Block: _____ Lot(s): _____ Parcel: _____

Facility Type: Individual Residential - ❑ Yes or ❑ No

Dwelling Use/Features: Full-time Principal Residence - ❑ Yes or ❑ No ____ Number of Bedrooms

Other Information: **Current septic tank** is: ❑ Metal ❑ Concrete ❑ Unknown

- Project is to repair or replace a failing or failed system ❑ Yes ❑ No
- This property is located within the **Chesapeake Bay Critical Area** ❑ Yes ❑ No
- Project is to upgrade an existing system ❑ Yes ❑ No

Access Approval: ❑ Property Owner grants Health Department and County/State staff and approved contractors the right to enter onto the property to perform site assessments, to inspect the work permitted and to perform 5-year maintenance and sampling.

Note to Applicant: Costs pertain only to the cost of the engineering, inspection, maintenance contract, and costs of adding a nitrogen removal system. All other necessary sewage disposal system costs including conventional tank, distribution network, or effluent dispersal method replacements encountered or required by the local approving authority during the unit installation are to be paid by the property owner/applicant. Post-installation landscaping restoration is the responsibility of the property owner.

Property Owner Signature _____ **Date:** _____

***Please note, this is an Application and the completion of this form does not guarantee the availability of funds to the applicant or commit the applicant to receiving a nitrogen-removing OSDS. Funds are contingent upon grant funding.**

Office Use Only: Date Received: _____

Verified: Prince George's County Health Dept: _____ Date: _____

(EH-BRF-01)

Application Instructions for the Bay Restoration Fund Grant – PRINCE GEORGE'S COUNTY –

The following are instructions for completing the **"Bay Restoration Fund – Onsite Sewage Disposal System (OSDS) Application for Financial Assistance"** form. The information below corresponds to the items listed on the application:

Applicant Name: Last name and first name of the legal owner of the property. Use the name listed on the tax records.

Mailing Address: Provide the mailing address, including the street, city, state and zip code information of the property owner.

Applicant Phone: The best phone number to contact the owner or applicant.

Project Address: Street or Premise address as indicated on the tax records; include street address number, city, state and zip code.

Project Location: Provide the Maryland State seven digit tax account identification number. Provide the Tax Map number; Grid number, Parcel number, and Section, Block and Lot number(s) (if applicable).

Facility Type: If the house is a single family house, yes or no. If the house is for multiple families, check no.

Dwelling Use: Is the house your primary residence? Is it occupied full-time or only used primarily on weekends or for short terms (summer, weekend etc)? This will be confirmed with tax record information. Indicate the number of bedrooms.

Other Information: What type of septic system currently exists: a metal or concrete tank; you may also have a fiberglass or other tank. If the application is to replace or repair an existing failed or failing system, check yes, otherwise, check no. Confirm that the property is in the Critical Area – check yes or no.

Access Approval: Check the box that will allow access on to your property so it can be evaluated.

Signature: Finally, the property owner or designated contact must sign and return the form. This will be the first step in being considered for the grant.

Sign & Mail the Application to:

Prince George's County Health Department
Division of Environmental Health
Attn: Bay Restoration Fund Grant
Largo Government Center
9201 Basil Court, Suite 318
Largo MD 20774

After the application has been received by the Prince George's County Health Department, it will be reviewed for accuracy and verified as consistent with the requirements of the Bay Restoration Fund grant. Upon acceptance, the County grant manager will contact the property owner and provide details of the grant.

Not all properties will be funded. Submitting an application does not ensure or guarantee that your property will be awarded the grant. The program is highly competitive.

Funding for this project is provided through a grant from the Maryland Department of the Environment / Water Management Administration and the Bay Restoration Fund.