Flood Dosed System Worksheet

Number of bedrooms _____

Septic tank size _____ Minimum 1000 gallons

Dosing tank size _____ Minimum 800 gallons or 1 bedroom smaller than septic tank size whichever is larger

Filter: gravity(in septic tank)____ or pressure(on delivery line)___ Make_____ Model_____

A/V alarms are required for filters. Use of a gravity filter will require a filter alarm in addition to the pump alarm.

Discharge Rate:

Table VII – Required Effluent Pump Discharge Rates for Subsurface Trench Flood Dosed Onsite Sewage Systems	
Number of Bedrooms	Discharge Rate in Gallons per Minute
1	30
2	30
3	30-45
4	30-60
5	38-75
6	45-90

Select a discharge rate from the chart. _____GPM

Delivery Line & Friction Loss:

Delivery line diameter is selected using the friction loss chart in the state rule. The chart lists velocity (v) and friction loss head (H_f) for a given flow (gpm) in each diameter of pipe in the chart. **You must use a diameter pipe that produces a velocity of at least 2 fps for your flow rate.** This velocity provides scouring action to help keep the delivery line clean. Velocities above 5 fps should be avoided.

Diameter of delivery line____

Use the fitting schedule and fitting friction loss chart on the following pages to determine the equivalent length of pipe added to the actual delivery line length to compensate for friction loss due to fittings.

Fitting	**A.** Quantity of each type and size used.	**B.** Equivalent Pipe Length from chart in state rule or manufacturer specs	**C.** Total equivalent pipe length for each fitting type and size. Multiply **A x B**
Example: 90° elbow, standard sharp	2" - 3 3" - 1	2" = 8.6ft 3" = 11.1ft	3x8.6 = 25.8ft 1x11.1 = 11.1ft
90° elbow, standard sharp			
90° elbow long sweep radius			
45° elbow standard			
Tee – use branch flow value			Multiply **A x B x** 2 to account for both branches of Tee
Gate Valve			
Male/female adapter			
Check valve			
Union/cam lock			
Pressure filter			

	Grand Total of column **C** This is the equivalent length of pipe added on the delivery line length due to the friction loss of the fittings.	

Table X - Plastic Pipe Fittings: Friction Loss - Equivalent Length of Straight Pipe (ft.)*							
Fitting:	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
90° elbow, standard sharp, inside radius	5.3	6.7	7.5	8.6	9.3	11.1	13.1
90° elbow, long sweep radius	2.5	3.8	4.0	5.7	6.9	7.9	12.0
45° elbow, standard	1.4	1.8	2.1	2.6	3.1	4.0	5.1
Tee Flow (run flow)	1.7	2.3	2.7	4.3	5.1	6.2	8.3
Tee Flow (branch flow)	6.0	7.0	8.0	12.0	15.0	16.0	22.0
Gate Valve	0.6	0.8	1.0	1.5	1.6	2.0	3.0
Male/Female adapter	2.0	2.8	3.5	4.5	5.5	6.5	9.0
*Assigned values. Other values for friction loss may be used if documentation from the pipe manufacturer is provided with the plan submittal.							

Add the grand total of equivalent pipe length to the actual length of the delivery line to calculate total friction loss.

Delivery line length_____ft + equivalent length____ft =_____ft of pipe total

Find friction loss factor in chart from state rule. See page 6. H_f =_____

Total ft of pipe____÷100 x H_f____=_____ feet of friction loss in the delivery line.

Total Design Head

A. Friction loss in delivery line_____ft
B. Elevation difference (pump to manifold)____ft

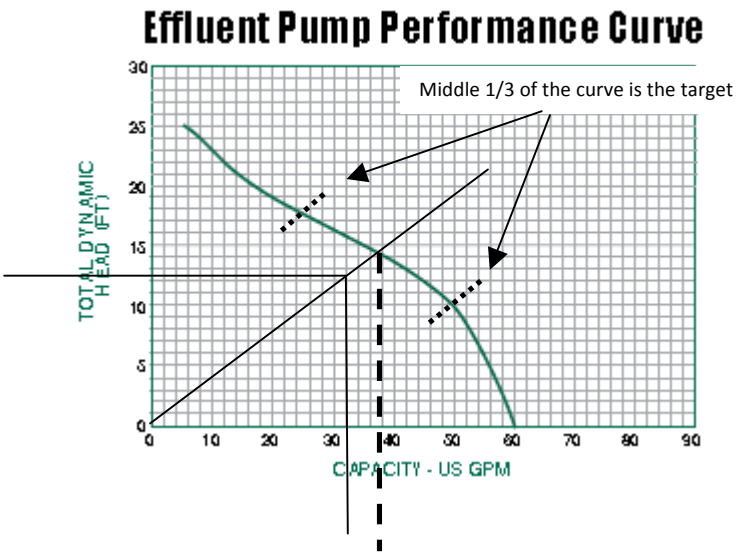
Total design head =A+B ____ft

Pump Sizing

Pump sizing criteria

1. Total design head_____ft
2. Total discharge rate____gpm

Plot this design point on the pump curve. It must be below (to the left of the curve). See the example on the next page.



Example:

The design point is 12 feet of head and a total discharge rate of 32 gpm. Draw a line from the origin (0,0) through the design point to the pump curve. The line should cross the curve in the **middle 1/3** for optimum efficiency and pump life. Draw a line straight down from the point where this line crosses the curve (represented by the dotted line). The difference between the dotted line and total discharge rate of the system should be at least a 10% difference, but not more than 20 gpm.

Pump's make, model_____

Pump performance curve included with plan ☐

***NOTE:* Only effluent, sewage or grinder pumps may be used.**

Dosing Chamber

The dose volume for a flood dosed system is the daily design flow plus the drain back volume from the delivery line, if it drains back to the tank.

Daily design flow equals the number of bedrooms____ x 150 gallons per day=_____gpd

Length of delivery line_____ft x _____gallons per foot of pipe (found in chart from state rule, located on the next page)=_____gallons drain back from delivery line.

Daily design flow_____ + _____ drain back=_____ total dose volume

You must know the gallons per inch in the dosing chamber (from manufacturer) to calculate how many inches the pump float must travel from the on to off positions to dose the correct volume.

Total dose volume____÷_____ gallons per inch in dosing chamber = _____ inches travel from pump on to pump off.

Table XII – Pipe Volume for Various Diameter Pipes (gal/ft)						
Pipe Diameter (in)	1	1 1/4	1 1/2	2*	3*	4*
Volume (gal/ft)	.045	.078	.106	.174	.384	.650
*These diameters and pipe volumes are for calculating the total volume of the effluent force main. They are not used for calculating volumes of pressure distribution laterals.						

All electrical connections will be made in a NEMA 4X junction box. ☐

It is preferred that the junction box be outside the riser and that it is not directly connected to any conduit that extends into the riser. All openings into riser must be made gas and moisture tight.

Dosing chamber will have a riser to surface. ☐

Dosing Chamber will have audio and visual alarm. ☐

Plans

A scale drawing of the proposed system including all applicable worksheet items, bird's eye view, cross sectional view, and required ground surface elevations is included. ☐

The system is staked/flagged and the system area is fenced(if required by ECHD) and ready for a site review. ☐

Table IX – Friction Losses in Plastic Pipe (per 100 feet of pipe)
Pipe Diameter, Flow (gpm), Velocity (v)[2], and Friction Loss Head (H_f)[1]

Flow (gpm)	1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
Q	v	H_f	v	H_f	v	H_f	v	H_f	v	H_f	v	H_f	v	H_f
1	0.37	0.11												
2	0.74	0.38	0.43	0.10										
3	1.11	0.78	0.64	0.21	0.47	0.10								
4	1.49	1.31	0.86	0.35	0.63	0.16								
5	1.86	1.92	1.07	0.52	0.79	0.24								
6	2.23	2.70	1.29	0.71	0.95	0.33	0.57	0.10						
8	2.97	4.59	1.72	1.19	1.26	0.56	0.77	0.17						
10	3.71	6.90	2.15	1.78	1.58	0.83	0.96	0.25	0.67	0.11				
15	5.57	14.7	3.22	3.76	2.37	1.74	1.43	0.52	1.01	0.22				
20	7.43	25.2	4.29	6.42	3.16	2.96	1.91	.87	1.34	0.37	0.87	0.13		
25	9.28	38.6	5.37	9.74	3.94	4.46	2.39	1.29	1.68	0.54	1.09	0.19		
30			6.44	13.6	4.73	6.27	2.87	1.81	2.01	0.76	1.30	0.26		
35			7.51	18.2	5.52	8.40	3.35	2.42	2.35	1.01	1.52	0.35	0.88	0.10
40			8.59	23.6	6.30	10.7	3.83	3.12	2.68	1.28	1.74	0.44	1.01	0.12
45					7.09	13.5	4.30	3.85	3.02	1.54	1.95	0.55	1.13	0.15
50					7.88	16.5	4.78	4.68	3.35	1.93	2.17	0.67	1.26	0.18
60					9.47	23.6	5.74	6.62	4.02	2.72	2.60	0.94	1.51	0.25
70							6.70	8.86	4.69	3.67	3.04	1.25	1.76	0.33
80							7.65	11.5	5.36	4.69	3.47	1.59	2.02	0.42
90							8.60	14.3	6.03	5.83	3.91	1.99	2.27	0.52
100									6.70	7.13	4.34	2.42	2.52	0.63
125									8.38	10.9	5.43	3.72	3.15	0.96
150											6.51	5.16	3.78	1.34
175											7.60	6.90	4.41	1.79
200											8.68	8.93	5.04	2.27
225													5.67	2.84
250													6.30	3.37
275													6.93	4.13
300													7.56	4.87
325													8.19	5.70

[1] This figure is based on flows for PVC Schedule 40 pipe (flow coefficient: C-150). Other values for friction loss may be used if documentation from the pipe manufacturer is provided with the plan submittal. Calculations using the Hazen-Williams equation may be used if provided with the plan submittal.

[2] Flow velocity must be at least 2 fps; flow velocities above 5 fps should be avoided.