Mound System Pressure Distribution 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_______

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<u>Aggregate Bed and Basal Area Dimensions</u>

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Total aggregate bed area: 125ft^2 per bedroom X number of bedrooms____=________ft^2

Maximum Bed width is determined by formula in state rule. Refer to chart provided by ECHD. Max. Width=_______ft.

Total Agg bed area______ft^2 ÷ maximum width____ft = Agg bed length__________ft.

Minimum Basal Area: _______ft^2 per bedroom(from onsite form)x ____number of bedrooms=_______ft^2 total

Minimum Basal Width: *Choose Flat or Sloping site*

☐ Flat Site 0% to ½% Slope

Minimum Width: Basal area ______ ÷ Agg bed length _____ =_____ft **or** Agg bed width____ + 14 ft whichever is greater. Width=____ft

☐ Sloping site greater than ½% to 6% slope

Minimum Width: Basal area ______ ÷ Agg bed length _____ =_____ft **or** Agg bed width ____ + 9 ft whichever is greater. Width=____ft

Summary:

Aggregate Bed is ____ft wide x ____ft long

Basal Area is ____ft wide x ____ft long

Pressure Distribution Network

Laterals are spaced 18 inches in from the ends of aggregate bed and 12 to 18 inches in from sides of aggregate bed. Spacing between laterals is 24 to 36 inches, 36 is preferred.

Lateral diameter is based on the length of laterals:

25 feet or less = 1 inch

Over 25 feet up to 40 feet = 1 ¼ inches

Over 40 feet up to 55 feet = 1 ½ inches

Lateral diameter_____

Number of laterals____

Length of one lateral____

Total length of laterals____

Hole spacing is 3 feet on center

Hole size is ¼ inch

The last hole is drilled in the upper half of the end cap.

Number of holes per lateral = (lateral length-1.5)÷3 + X

X = 1 when the decimal is less than .5 and X =2 when the decimal is .5 or greater

Example 1: lateral length is 47 ft, so (47-1.5)÷3=15.17, .17 is less than .5 so the number of holes is 15+1 or 16 per lateral

Example 2: lateral length is 48 ft, so (48-1.5)÷3=15.5, the number of holes is 15+2 or 17 per lateral

Number of holes per lateral=____ x Number of laterals___ = _____ total holes

Total Holes ____ x 1.28 gpm through a ¼ inch hole=____ gpm flow rate(total discharge rate)

Delivery Line

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____

Length of delivery line____ *THIS VALUE IS USED AGAIN LATER IN THE DOSING CHAMBER SECTION*

Manifold Diameter

5 bedrooms (750 gpd) or less requires a 2 inch diameter manifold

Over 5 bedrooms the manifold must be the same diameter as the delivery line or 2 inches whichever is greater.

Manifold diameter you will be using______ Manifold length______

Fitting Schedule

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**
=>+6</-: 90^{o} elbow, standard sharp	2” - 3 3” - 1	2” = 8.6ft 3” = 11.1ft	3x8.6 = 25.8ft 1x11.1 = 11.1ft
90^{o} elbow, standard sharp			
90^{o} elbow long sweep radius			
45^{o} 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			
		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.	

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 in state rule. 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
C. System design head __3__ft
D. If using a pressure filter include head loss here_______ft
(Value supplied by Manufacturer) SimTech filter is 0.5 ft

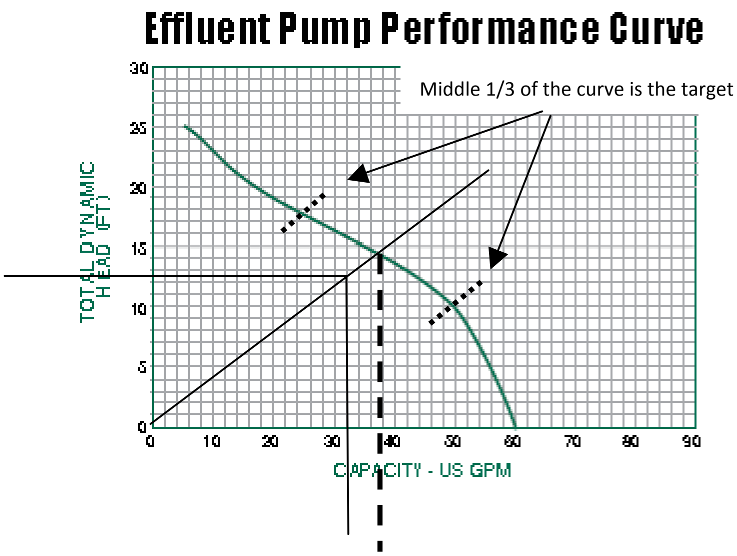
Total design head =A+B+C +D____ft

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).



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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 ☐

3@AB=?‰**Only effluent, sewage or grinder pumps may be used.**

Dosing Chamber

The dose volume for an elevated sand mound is ¼ of 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 in state rule)=______gallons drain back from delivery line.

Daily design flow_____÷4 + ______ 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.

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. ☐

Perimeter Drain

Depth of perimeter drain_____inches

Perimeter drain outfall

On lot to ground surface (elevations included on plan) ☐

To field tile discharging off lot (elevations and legal easements included) ☐

Plans

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

The four corners of the mound are staked/flagged and the mound and dispersal area is fenced and ready for a site review. ☐

Useful Tables from State Rule

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.							

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.						

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.

	MAXIMUM AGGREGATE BED WIDTH (BED LENGTH) All values calculated using formula in 410 IAC 6-8.3

NUMBER OF BEDROOMS	600 SQ. FT. PER BEDROOM	300 SQ. FT. PER BEDROOM	250 SQ. FT. PER BEDROOM
2	4 FT. (62.5 FT.)	5 FT. (50 FT.)	6 FT. (42 FT.)
3	5 FT. (75 FT.)	7 FT. (54 FT.)	7 FT. (54FT.)
4	5 FT. (100 FT.)	8 FT. (62.5 FT.)	9 FT. (55.5 FT.)
5	6 FT. (104 FT.)	9 FT. (70 FT.)	10 FT. (62.5 FT.)
6	7 FT. (107 FT.)	10 FT. (75 FT.)	11 FT. (69 FT.)