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Indianapolis



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AN OVERVIEW OF THE ONSITE TREATMENT TRAIN

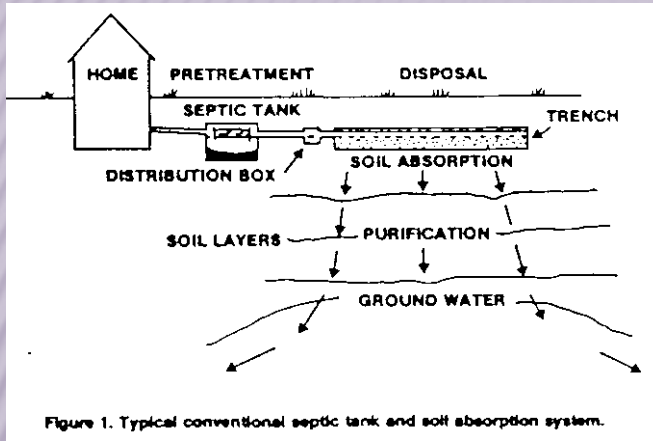
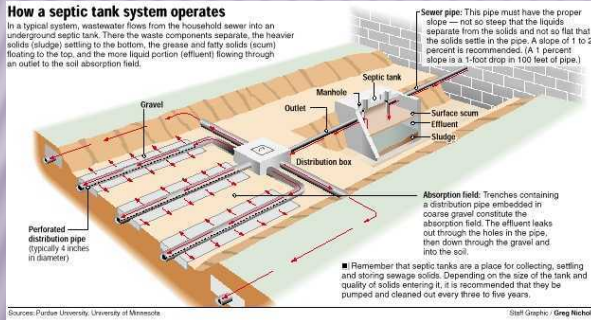


Figure 1. Typical conventional septic tank and soil absorption system.

How a septic tank system operates

In a typical system, wastewater flows from the household sewer into an underground septic tank. There the waste components separate: the heavier solids (sludge) settling to the bottom, the grease and fatty solids (scum) floating to the top, and the more liquid portion (effluent) flowing through an outlet to the soil absorption field.

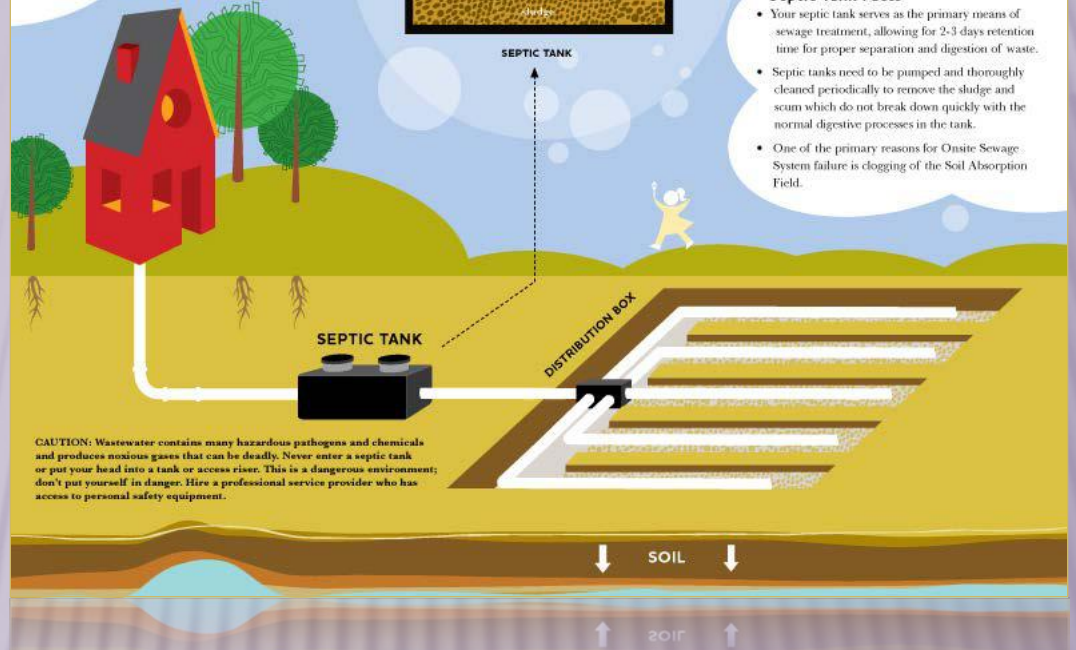


Sources: Purdue University, University of Minnesota

Still Graphs: Greg Nichols

Onsite Sewage System

An onsite sewage system is a complex system of tanks, pipes, and other components designed to take advantage of nature's biological processes to physically separate waste, distribute effluent to the soil, and remove harmful pathogens from wastewater prior to dispersing clean water back to the natural water cycle.



Septic Tank Facts

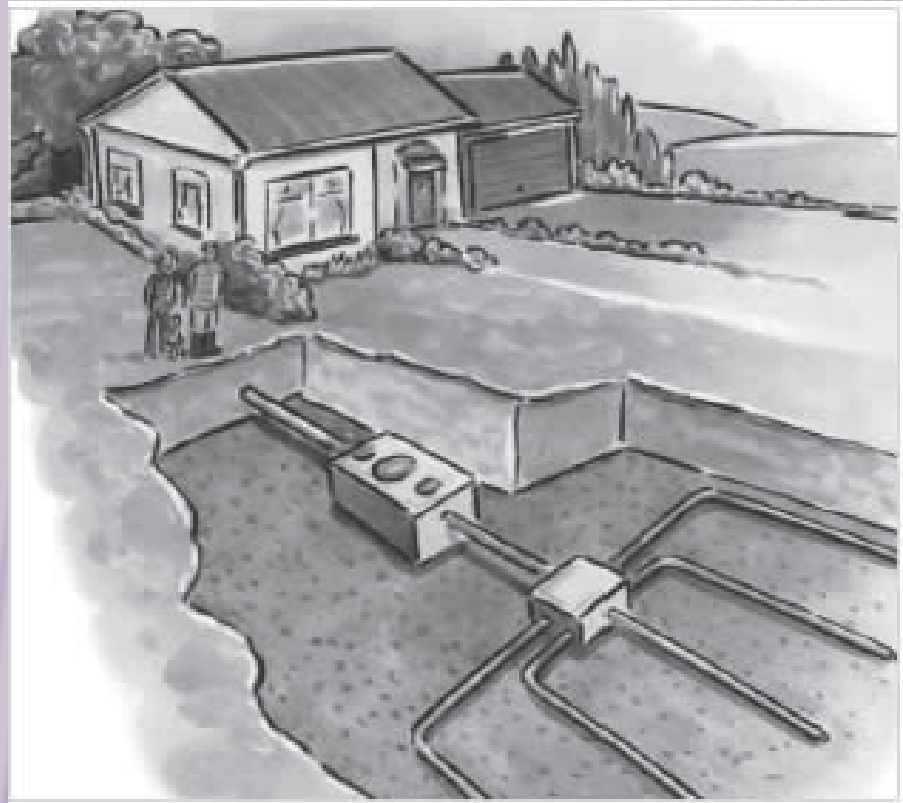
- Your septic tank serves as the primary means of sewage treatment, allowing for 2-3 days retention time for proper separation and digestion of waste.
- Septic tanks need to be pumped and thoroughly cleaned periodically to remove the sludge and scum which do not break down quickly with the normal digestive processes in the tank.
- One of the primary reasons for Onsite Sewage System failure is clogging of the Soil Absorption Field.

CAUTION: Wastewater contains many hazardous pathogens and chemicals and produces noxious gases that can be deadly. Never enter a septic tank or put your head into a tank or access riser. This is a dangerous environment; don't put yourself in danger. Hire a professional service provider who has access to personal safety equipment.

RESIDENTIAL ONSITE SEWAGE SYSTEM

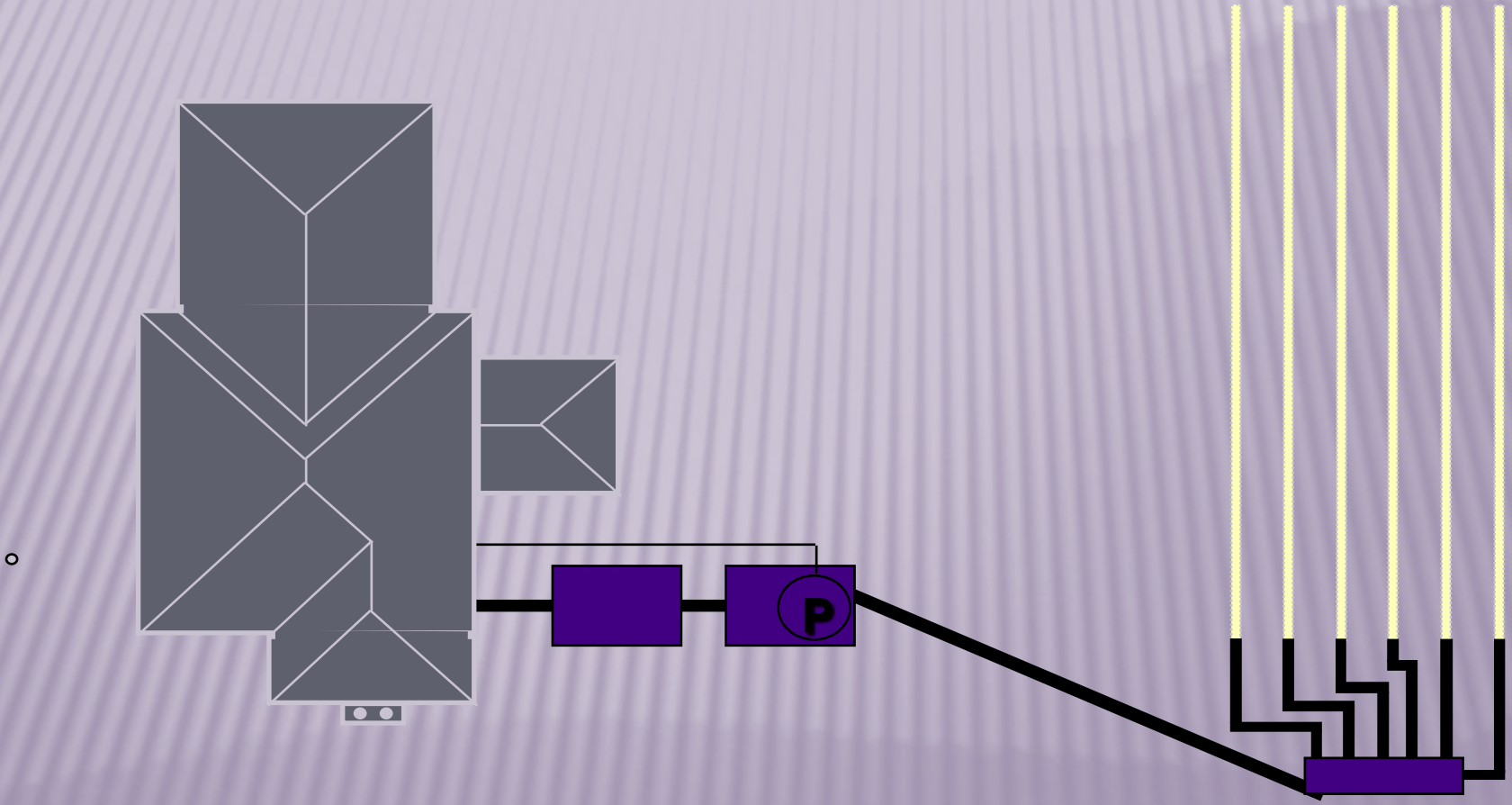
Component Description, Function and Material Specification

- Piping
- Septic Tank
- Dosing Tank
- Distribution Box
- Soil Absorption Field Technologies
- Alternate Methods & Technologies

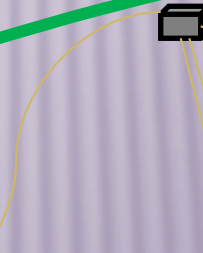
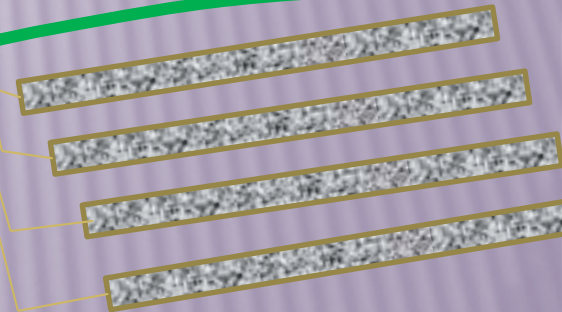
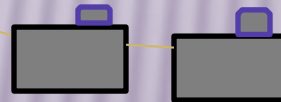


RESIDENTIAL ONSITE SEWAGE SYSTEM COMPONENTS

FLOOD DOSED: DOSING TANK

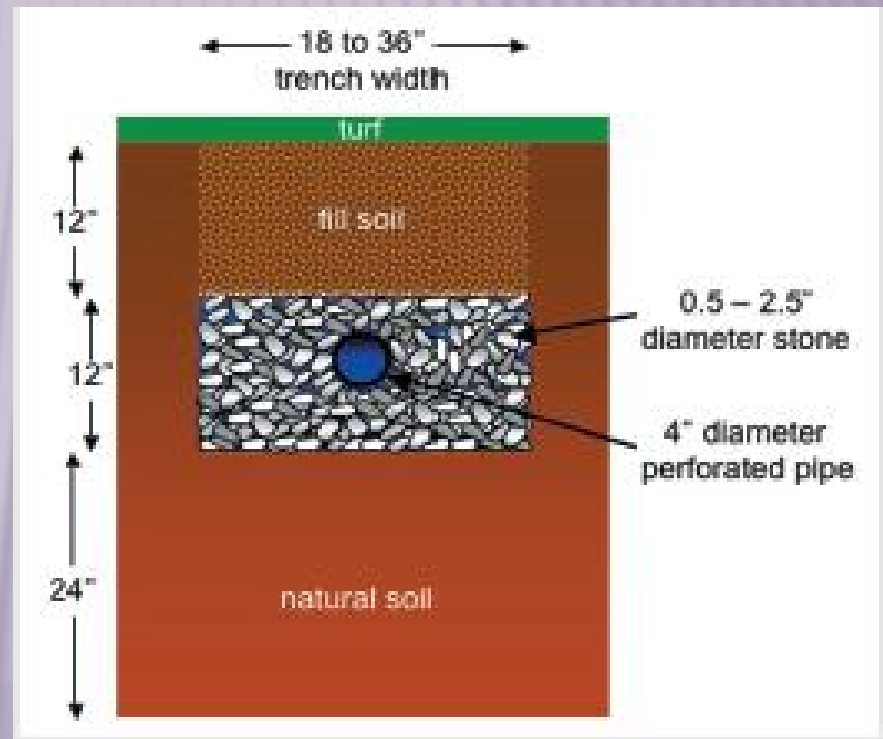


Pumping Uphill



SOIL ABSORPTION TRENCH

- ✘ Aggregate/Chambers
- ✘ Piping
- ✘ Barrier Material



PIPING-DESCRIPTION

- ✘ Gravity Sewer Pipe
- ✘ Gravity Effluent Sewer Pipe
- ✘ Pressure Sewer
- ✘ Effluent Force Main
- ✘ Manifold
- ✘ Pressure Distribution Laterals
- ✘ Gravity Distribution Laterals
- ✘ Subsurface Drainage



PIPING-FUNCTION

- ✘ Gravity Sewer Pipe
- ✘ Gravity Effluent Sewer Pipe
- ✘ Pressure Force Main
- ✘ Manifold
- ✘ Pressure Distribution Laterals
- ✘ Gravity Distribution Laterals
- ✘ Subsurface Drainage

Conveyance and Distribution



PIPING-SPECS

- Gravity Sewer
- Gravity Effluent Sewer

ASTM D 2665-12
(Schedule 40 PVC)



ABS:
ASTM D 2661-11



PIPING-SPECS

- Gravity Sewer
- Gravity Effluent Sewer



ASTM D 3034-08



PIPING-SPECS

- Gravity Sewer
- Gravity Effluent Sewer

ASTM D 3034-08
(w/ compression fittings)



PIPING-SPECS

- Pressure Sewer
- Effluent Force Main
- Manifold
- Pressure Distribution Laterals



**ASTM D 2241-09 (SDR 17) W
Compression Fittings**

PIPING-SPECS

- Soil Absorption System
- Gravity Distribution Laterals

ASTM D 2729-11



PIPING-SPECS

- Subsurface Drainage System Pipe (w/ geotextile wrapping and w/out)

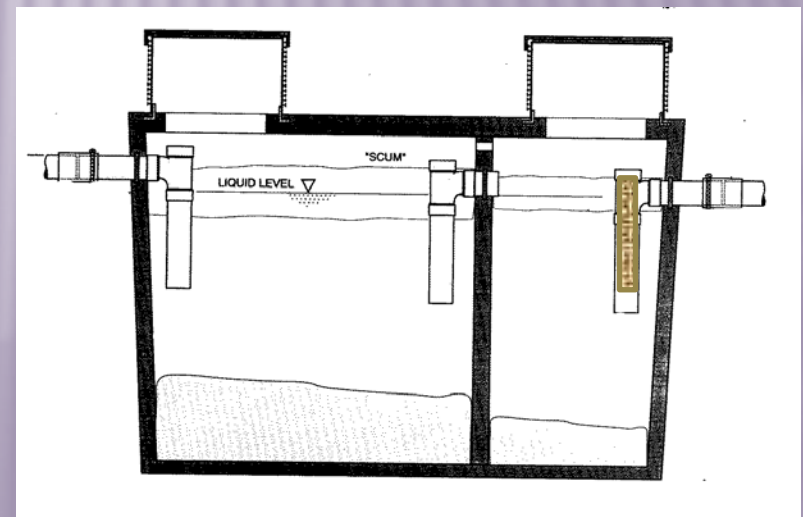
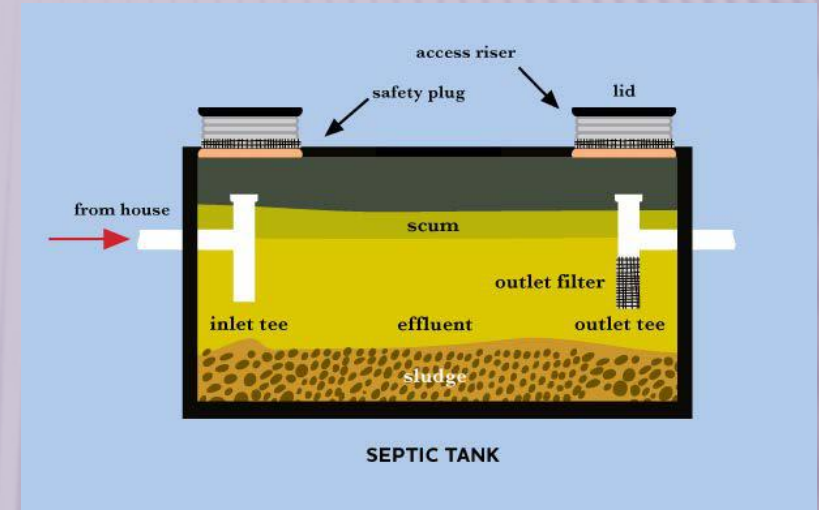
ASTM F 405-05

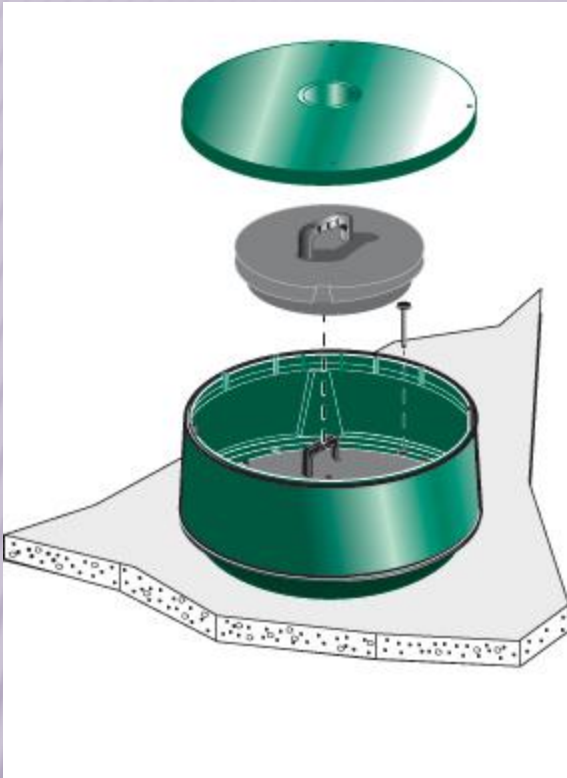


SEPTIC TANK

× Description

- + 1 or 2 compartment
- + ≥ 2 day detention time for tank capacity
- + All wastewater generated within the home directed to the ST
- + Accessible for maintenance
- + Watertight





SEPTIC TANK
Watertight



SEPTIC TANK

- ✘ Description
- ✘ Function
 - + Physical separation of sewage (FOG, Effluent & Sludge)
 - + Anaerobic decomposition
 - + Attenuate surges
 - + Ventilation
- ✘ Material Specs

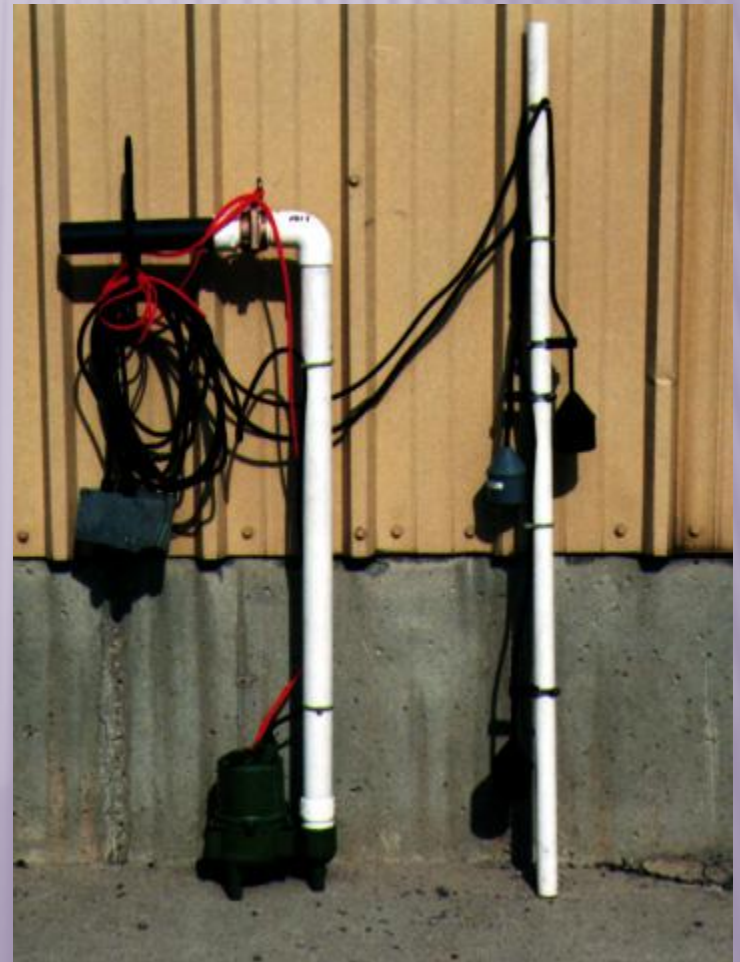




SEPTIC TANK- MATERIAL SPECS

Concrete, Fiberglass, Polyethylene or Polypropylene

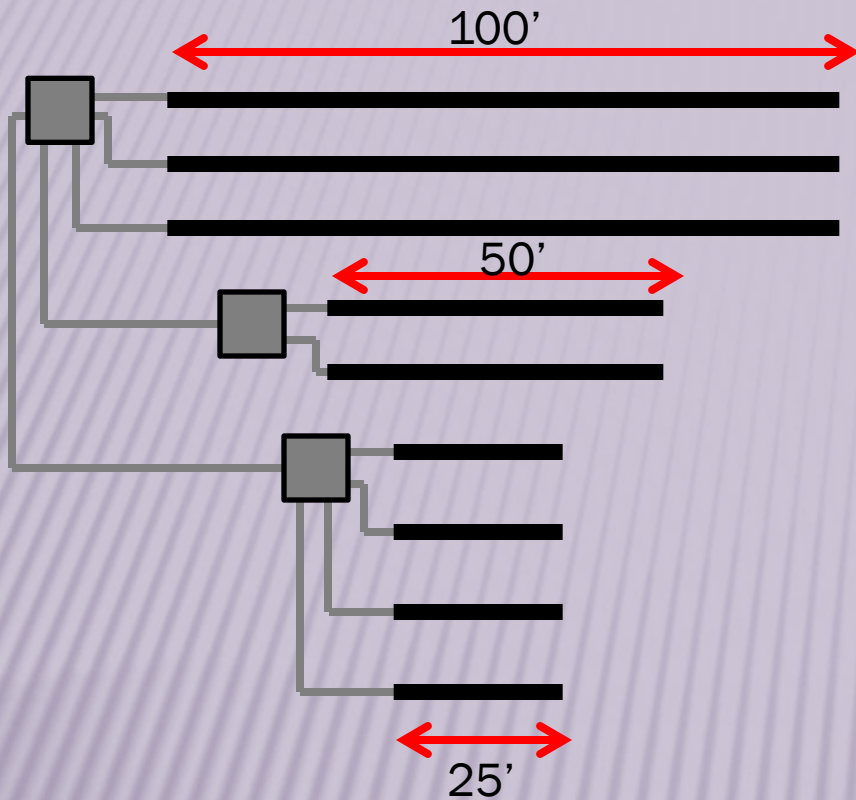
DOSING TANK - DESCRIPTION





DISTRIBUTION BOX- DESCRIPTION

Component used to provide proportionate loading of effluent to the soil absorption trenches.

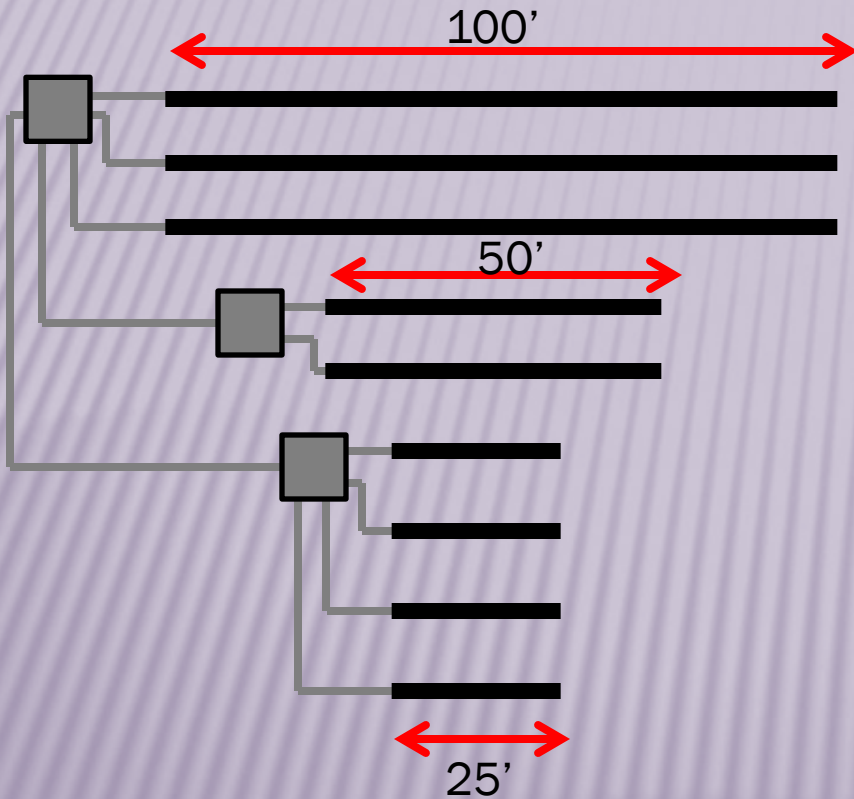


DISTRIBUTION BOX- FUNCTION

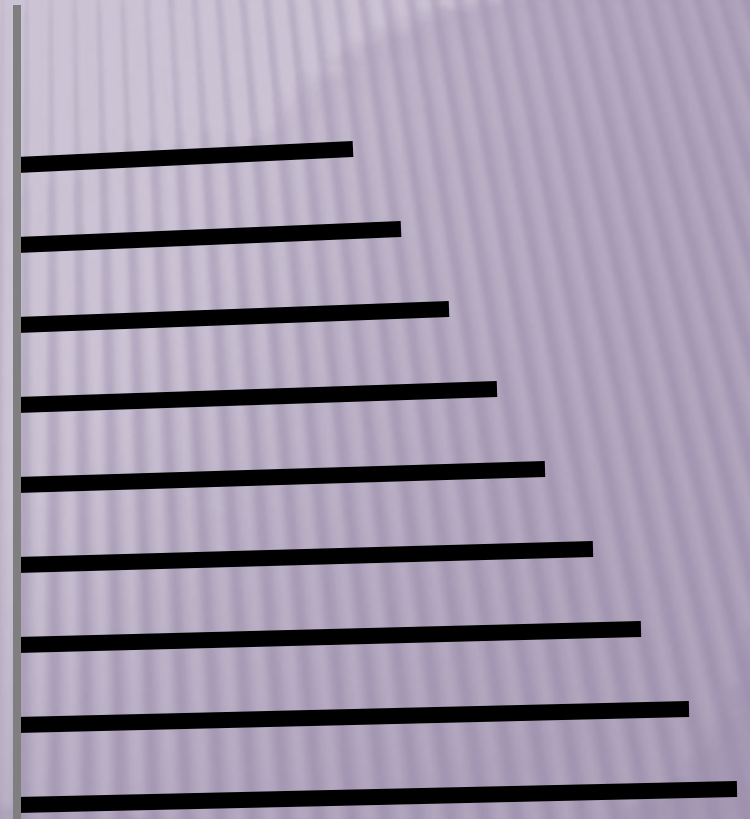
Proportionally split the flow to the soil absorption field trenches. Each trench must be directed connected to a d. box.

VARY TRENCH LENGTHS

MULTIPLE D-BOXES



SPIDER VALVE OR PRESSURE MANIFOLD

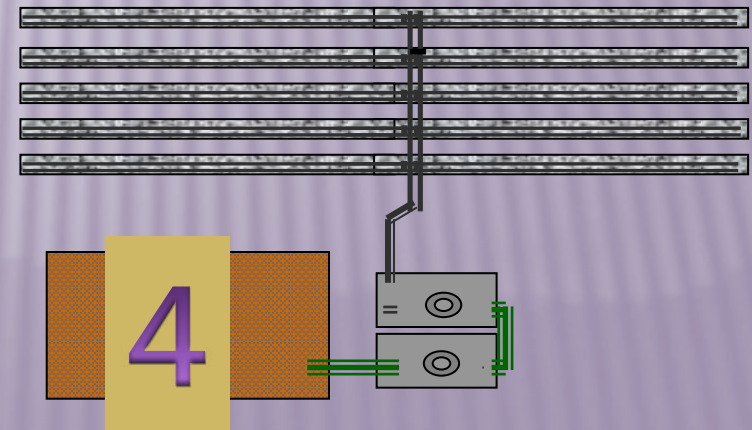
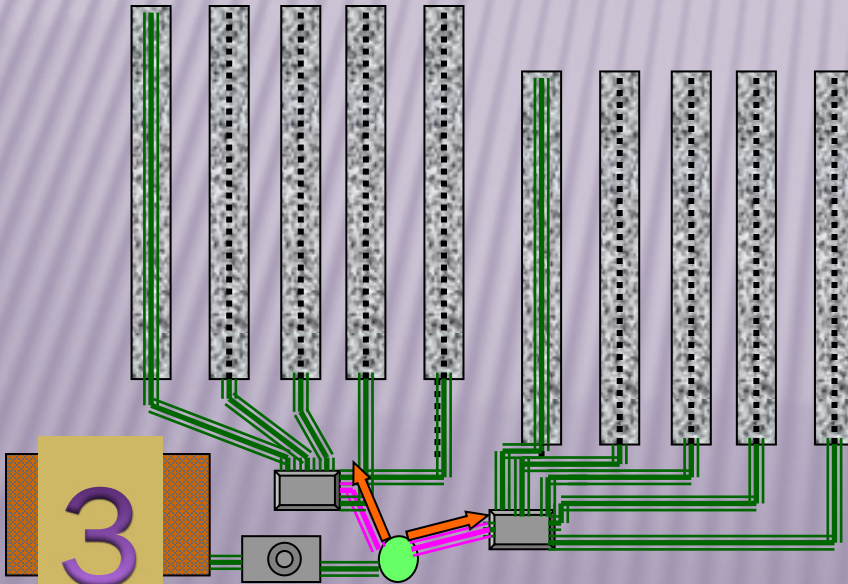
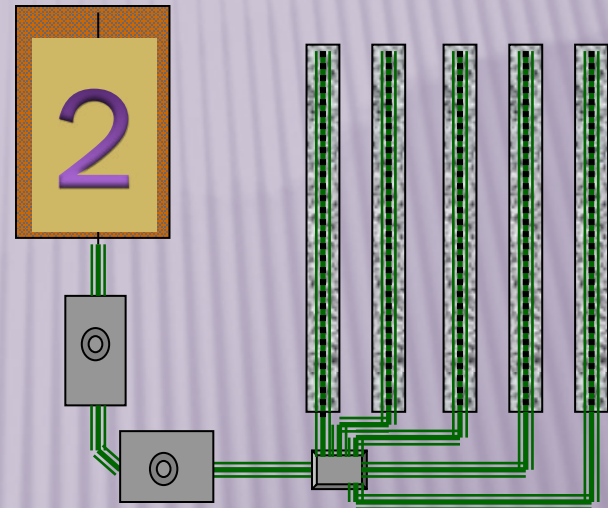
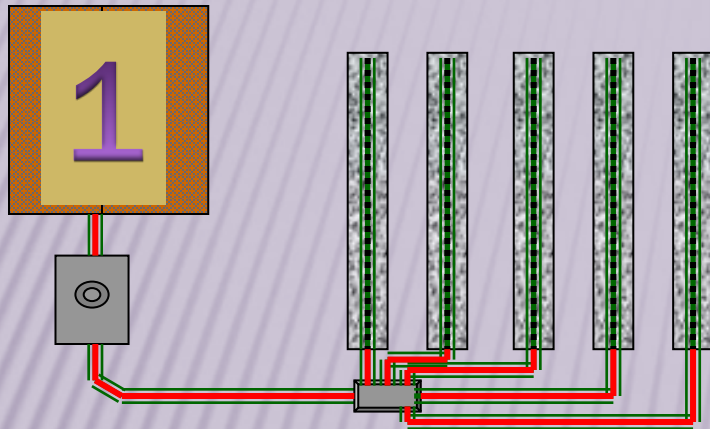




DISTRIBUTION BOX – MATERIAL SPECS

Concrete (Other approved materials)

SOIL ABSORPTION FIELD TECHNOLOGIES: SUBSURFACE TRENCHES



ONSITE SEWAGE SYSTEM SELECTION

- ✘ Table VI: OSS selection based on requirements of 410 IAC 6-8.3

410 IAC 6-8.3-73 Table for onsite sewage system selection

Sec. 73. Onsite sewage system selection may be summarized in Table VI as follows:

Table VI - Table for Onsite Sewage System Selection based on requirements of 410 IAC 6-8.3						
Site Requirements	Subsurface Trench Onsite Sewage Systems				Elevated Sand Mound Onsite Sewage Systems (Sec. 72)	
	Gravity Flow ¹ (Sec. 70, 71)	Flood Dosing or Alt. Fields ¹ (Sec. 70, 71)	Flood Dosing ¹ (Sec. 70, 71)	Pressure Dist. (Sec. 70, 71)		
Slope	≤ 15%	≤ 15%	≤ 15%	≤ 15%	≤ 6%	
Design Daily Flow	≥ 450 < 450	Any	Any	Any	Any	
Acceptable Loading Rate Range for determining system size	≥ 0.25 ≤ 0.75	≥ 0.25 ≤ 0.75	≥ 0.25 ≤ 0.75	≥ 0.25 ≤ 1.20	≥ 0.25 ≤ 1.20	
Distance from Trench Bottom (ground surface for mounds) to Layer with a Soil Loading Rate < 0.25 gpd/ft ²	≥ 30	≥ 24	≥ 24	≥ 24	≥ 20	
Distance from Trench Bottom (ground surface for mounds) to Layer with a Soil Loading Rate > 1.20 gpd/ft ²	≥ 24	≥ 24	≥ 24	≥ 24	≥ 20	
Distance from Trench Bottom (ground surface for mounds) to Layer with a Soil Loading Rate = 1.20 gpd/ft ²	≥ 24	≥ 24	≥ 24	Press. Dist. required for SLR = 1.20	≥ 0	
Distance from Trench Bottom (ground surface for mounds) to a Soil Horizon Developed from Wisconsin Glacial Till That Shows Effervescence ³	≥ 30	≥ 24	≥ 24	≥ 24	≥ 20	
Distance from Trench Bottom (ground surface for mounds) to Soil Horizon with < 20% Clay and > 35% Coarse Fragments by Volume	≥ 30	≥ 24	≥ 24	≥ 24	≥ 20	
Distance from Trench Bottom (ground surface for mounds) to Soil Horizon with > 20% Clay and > 60% Coarse Fragments by Volume	≥ 30	≥ 24	≥ 24	≥ 24	≥ 20	
Distance from Trench Bottom (ground surface for mounds) to Seasonal High Water Table ²	≥ 24	≥ 24	≥ 24	≥ 24	≥ 20	
Total Linear Feet of Trench	≤ 500	≤ 500	≤ 500 for Alt. Fields	Any	Any	N/A

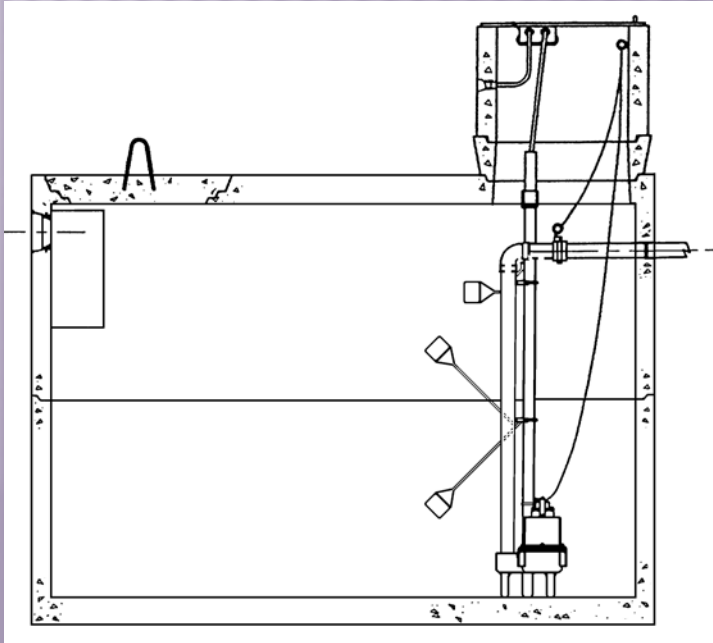
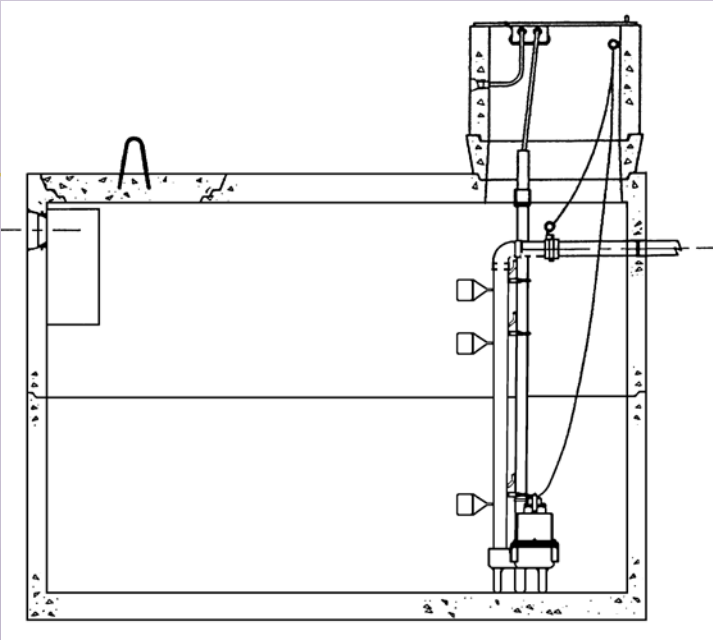
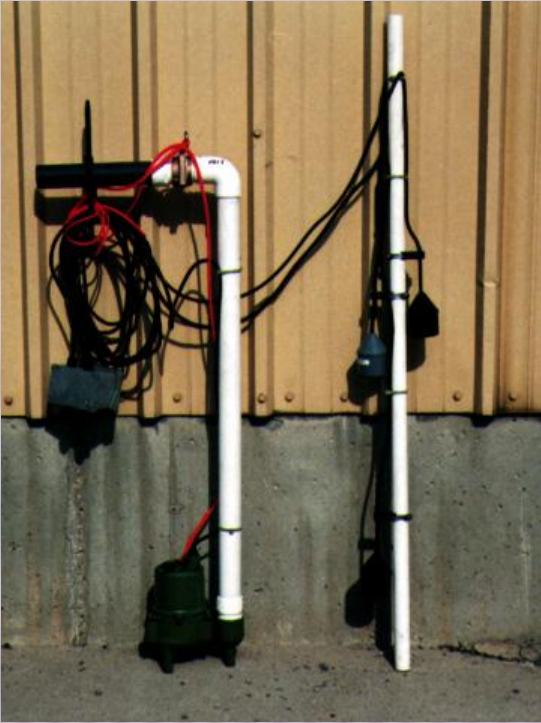
¹These conditions are also suitable for subsurface trench pressure distribution onsite sewage systems.

²For subsurface trench systems, if the distance from trench bottom to seasonal high water table is less than twenty-four (24) inches, drainage must be installed in accordance with section 59 of this rule. For elevated sand mound systems, if the depth of the seasonal high water table is less than twenty (20) inches below the ground surface, drainage must be installed in accordance with section 59 of this rule.

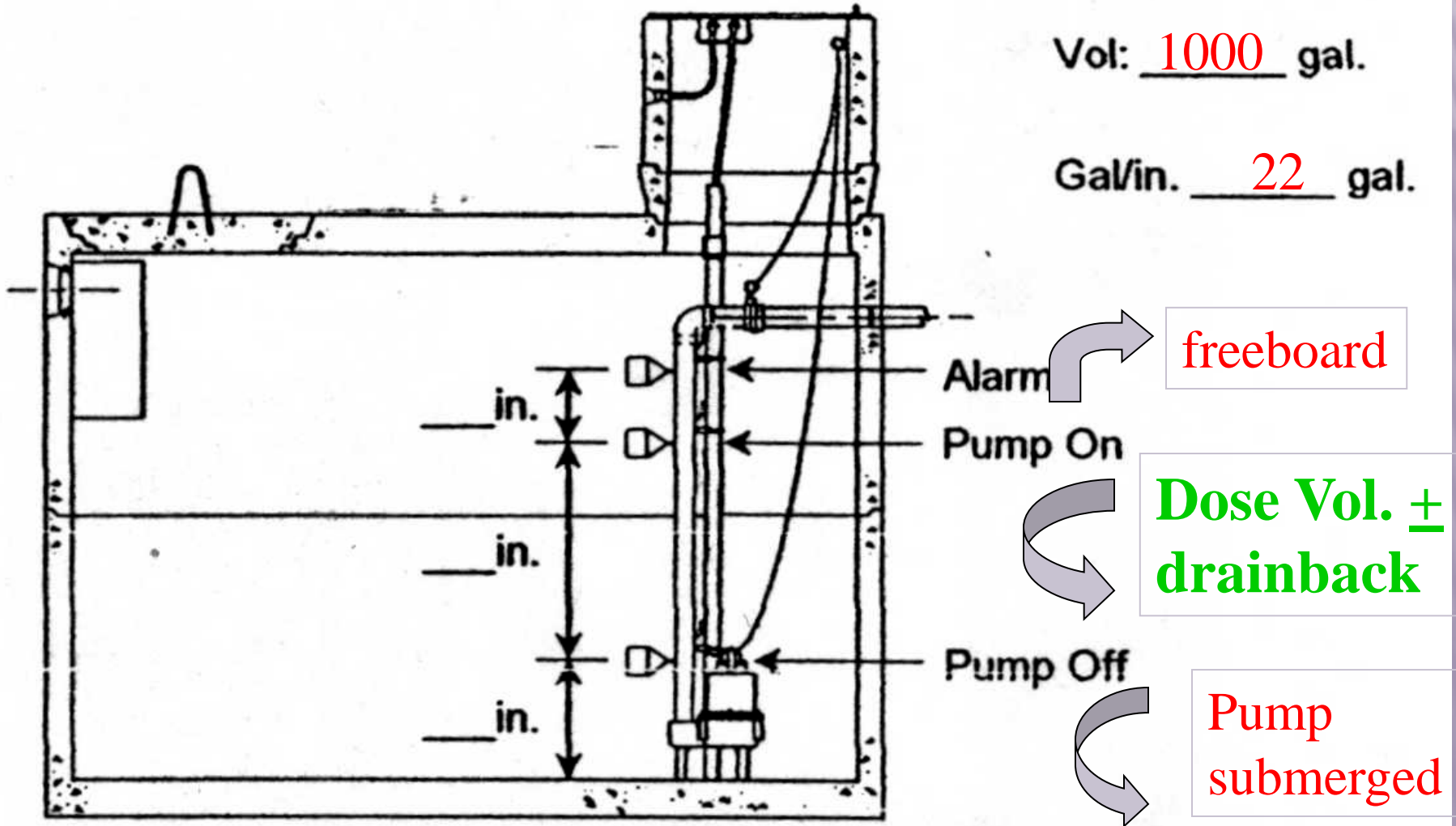
³See Sections 58(a)(2)(E), 70(b)(6), 71(b)(3)(B), 71(c)(3)(B), 71(d)(2)(B) and 72(b)(5).

This chart does not include considerations such as the specific landscape features that must be met, the size of the soil absorption system, the size of the area necessary for construction of the soil absorption system on the contour with necessary setback and

DOSING TANK



DOSING TANK



Dose Tank: Three Control Floats

PUMP SIZING: WHAT YOU NEED TO KNOW

- ✘ Number of bedrooms in home (DDF)
- ✘ Type of system (Flood Dosed or Pressure Dist)
- ✘ Length of effluent force main
- ✘ Diameter of effluent force main
- ✘ Elevation at “Pump Off” position
- ✘ Elevation at highest point in the effluent force main (D-Box? or Manifold?)

INFORMATION YOU NEED TO HAVE

- ✘ Friction Loss Chart (Table IX)
- ✘ Equivalent Length of Pipe Chart (Table X)
- ✘ Pump Information (from your pump supplier)
 - + Manufacturer
 - + Model
 - + Pump Performance Curve

WHAT DOES THE SYSTEM DEMAND?

Required Effluent Pump Discharge Rates For Flood Dosed Trench Systems

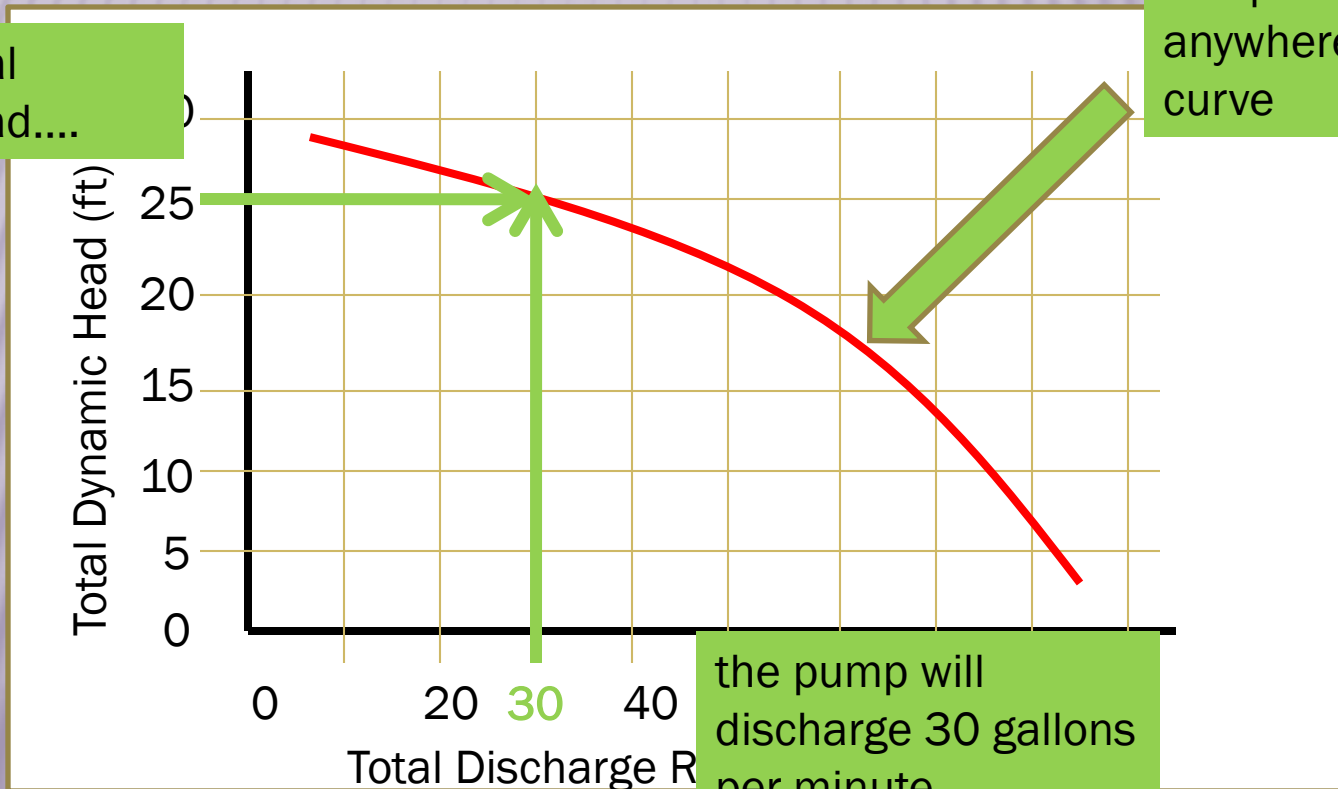
[Table VII in Rule 410 IAC 6-8.3-76(b)]

Table VII	
Required Effluent Pump Discharge Rates for Flood Dosed Systems	
Number of Bedrooms	Discharge Rate in gpm
1	30
2	30
3	30-45
4	30-60
5	38-75
6	45-90

UNDERSTANDING A PUMP CURVE

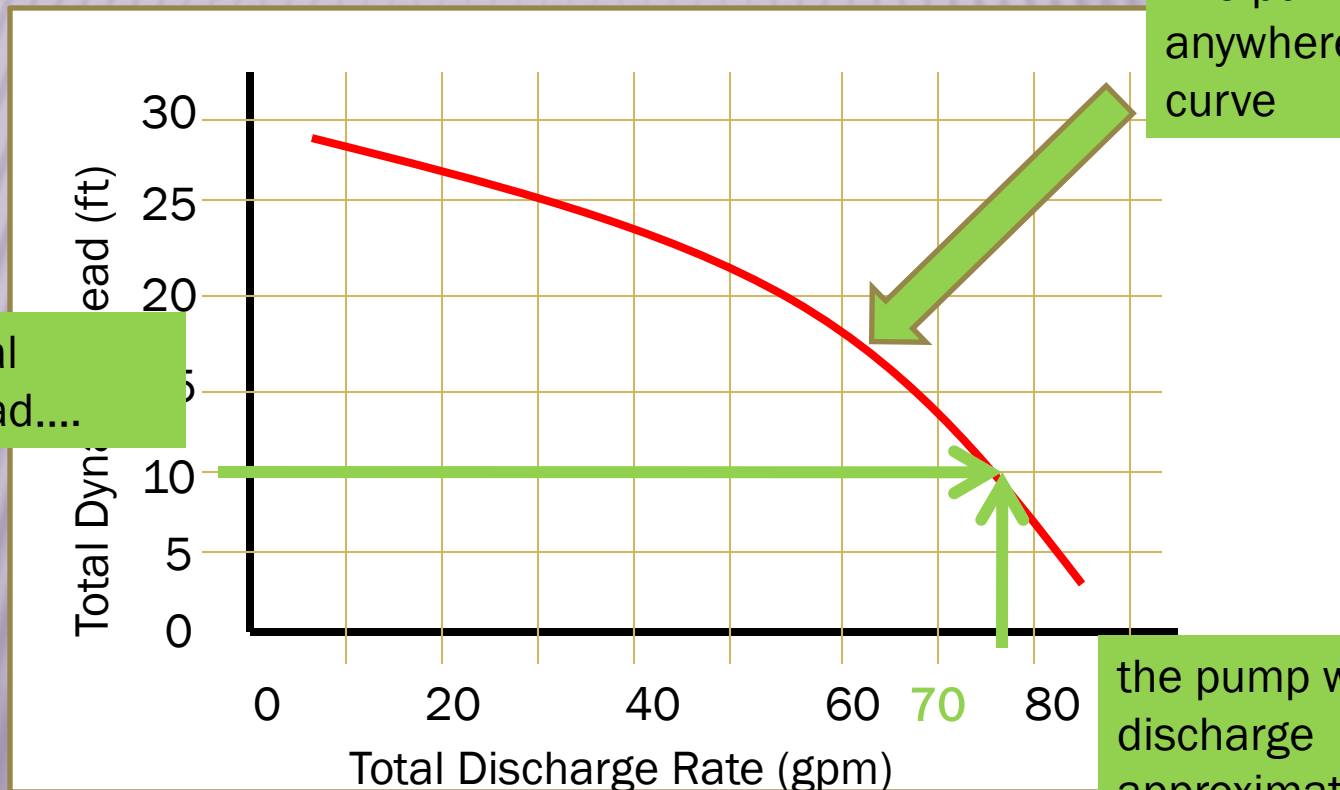
- AN ESTIMATE OF PUMP FUNCTION

At 25' of Total Dynamic Head....



UNDERSTANDING A PUMP CURVE

- AN ESTIMATE OF PUMP FUNCTION



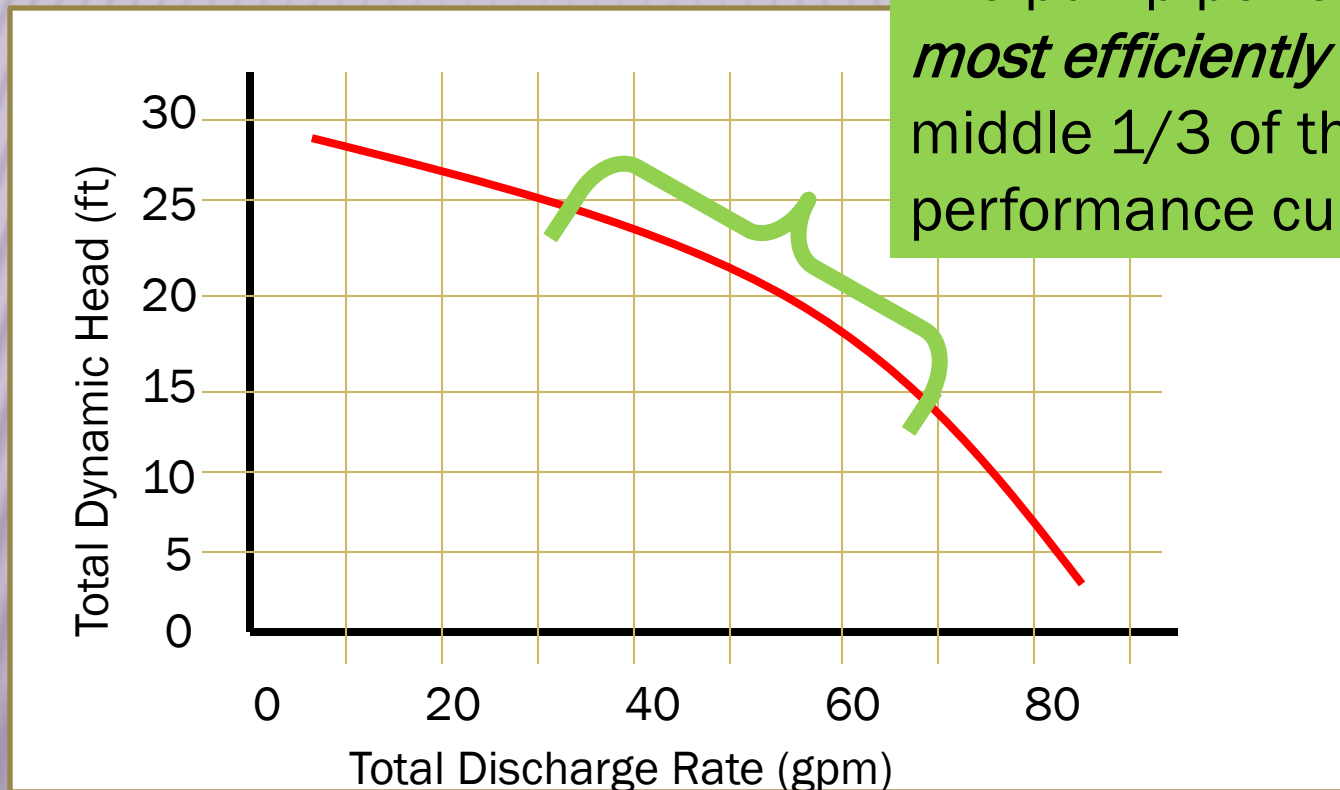
The pump performs anywhere along this curve

At 10' of Total Dynamic Head....

the pump will discharge approximately 76 gallons per minute.

UNDERSTANDING A PUMP CURVE

- AN ESTIMATE OF PUMP FUNCTION



The pump performs *most efficiently* in the middle 1/3 of the performance curve

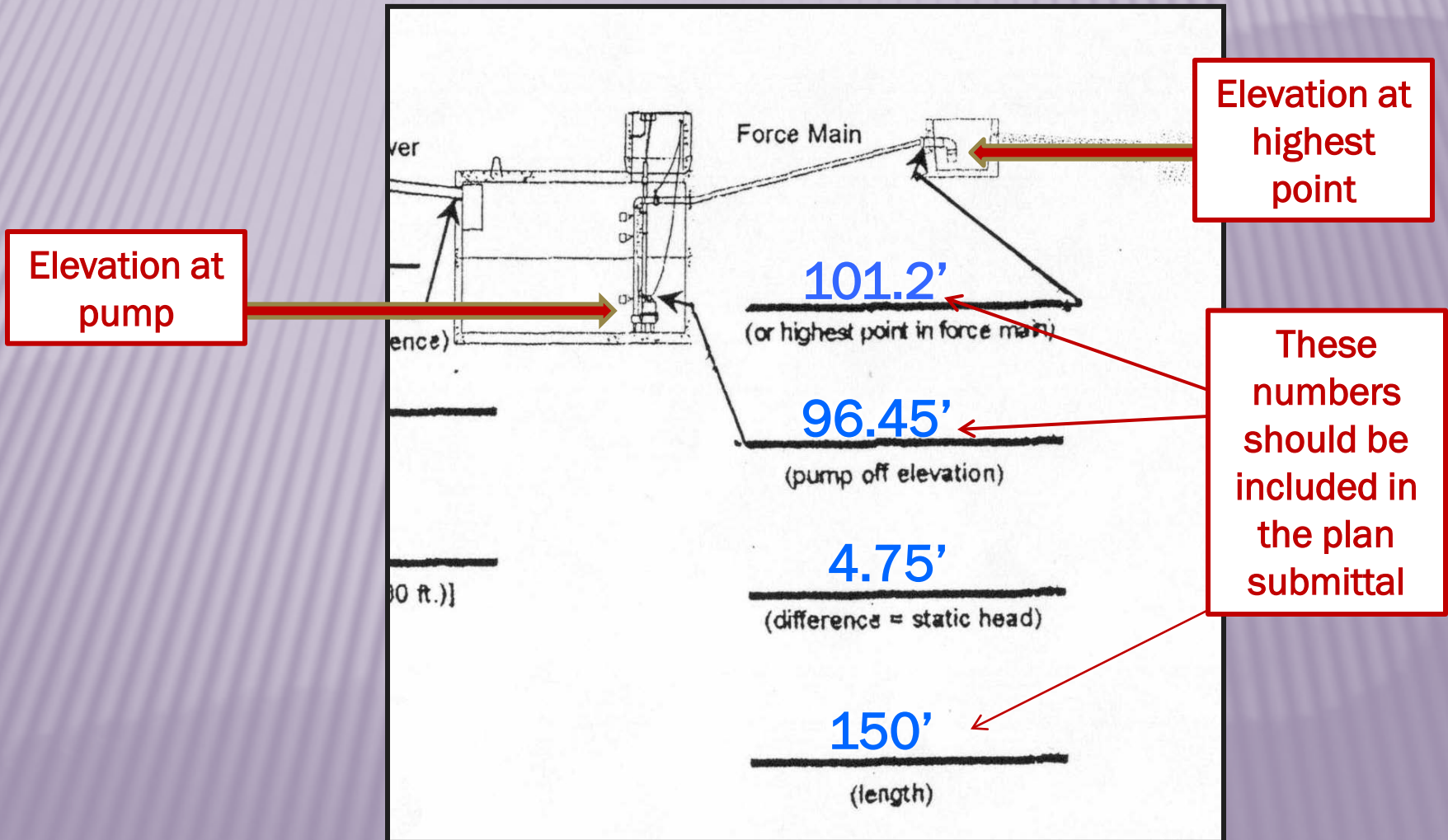
WHAT IS TOTAL DYNAMIC HEAD (TDH)

- ✘ It is the total force that works against the pump.
- ✘ It is a combination of 3 forces in an onsite sewage system
 - + Static Head (a.k.a. static lift, lift, change in elevation)
 - + Friction Loss Head
 - + Design Head (Inline or Inline Residual Pressure)

Elevations preferred

STATIC HEAD

- WHERE DO I GET THAT? From the Site Visit



FRICITION LOSS HEAD

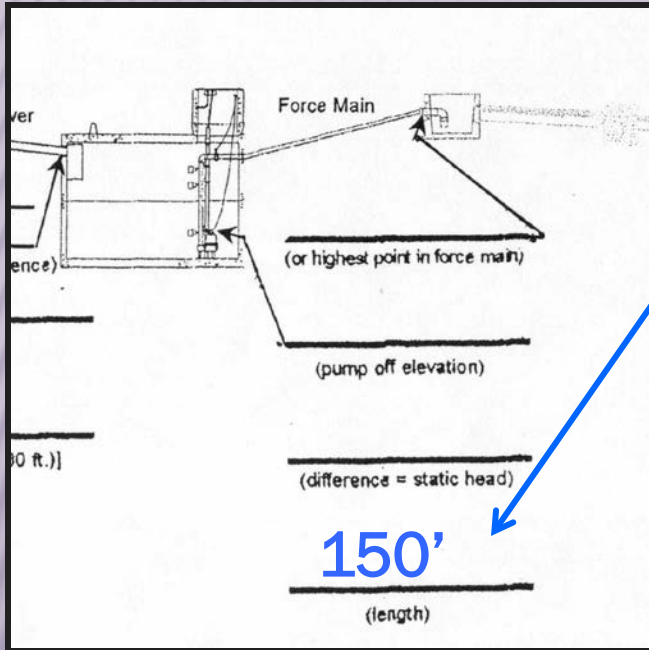
- ✘ The resistance to flow inside the pipe or resistance to a change in direction of flow.
- ✘ Or, the friction produced when the liquid flows through the pipe or around corners.
- ✘ The **larger** the pipe diameter, the **LESS** friction loss.
- ✘ The **smaller** the pipe diameter, the **GREATER** the friction loss.
- ✘ There is less resistance in a larger diameter pipe.

CALCULATING FRICTION LOSS

✘ You need

- + The length of the effluent force main
- + The number and types of fittings (couplings, elbows, etc.)
 - ✘ Equivalent Length of Pipe Chart (410 IAC 6-8.3 -76(h) Table X)
- + The diameter of the effluent force main
 - ✘ Friction Loss Chart (410 IAC 6-8.3 -76(h) Table IX)

THE “TOTAL” EFFLUENT FORCE MAIN LENGTH



The effluent force main length is in the plan submittal, but that is typically just from the outlet of the dosing tank to the distribution box.

That does **not** account for the total length of the effluent force main for calculating friction loss!

CALCULATING FRICTION LOSS

THAT'S NOT ALL!

- ✘ Every time there is a change in direction of flow (a.k.a. an elbow) or a coupling, there is an increase in friction loss!
- ✘ This is measured in “equivalent length of piping”.
- ✘ There are charts that help you calculate equivalent length of piping.

You must know...

- + The type of coupling or elbow
- + The diameter of the coupling or elbow

EQUIVALENT PIPING CHART

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.

TOTAL EFFLUENT FORCE MAIN LENGTH

- ✘ If you are using 2" pipe and the total effluent force main has one 90° elbow, you have to add 8.6' or 9' to the length of the effluent force main.

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 →	5.2	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.

TOTAL EFFLUENT FORCE MAIN LENGTH

- ✘ If you are using 3" pipe and the total effluent force main has one 90° elbow, you have to add 11.1' or 11' to the length of the effluent force main.

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.

FRICION LOSS CALCULATED

Our Example:

GPM: 30-45

TDH: 8.12'-11.91'

Static: 4.75'

Friction /100 ft:

30 gpm=1.81
 45 gpm=3.85 } X1.86=

3.37' to 7.16'

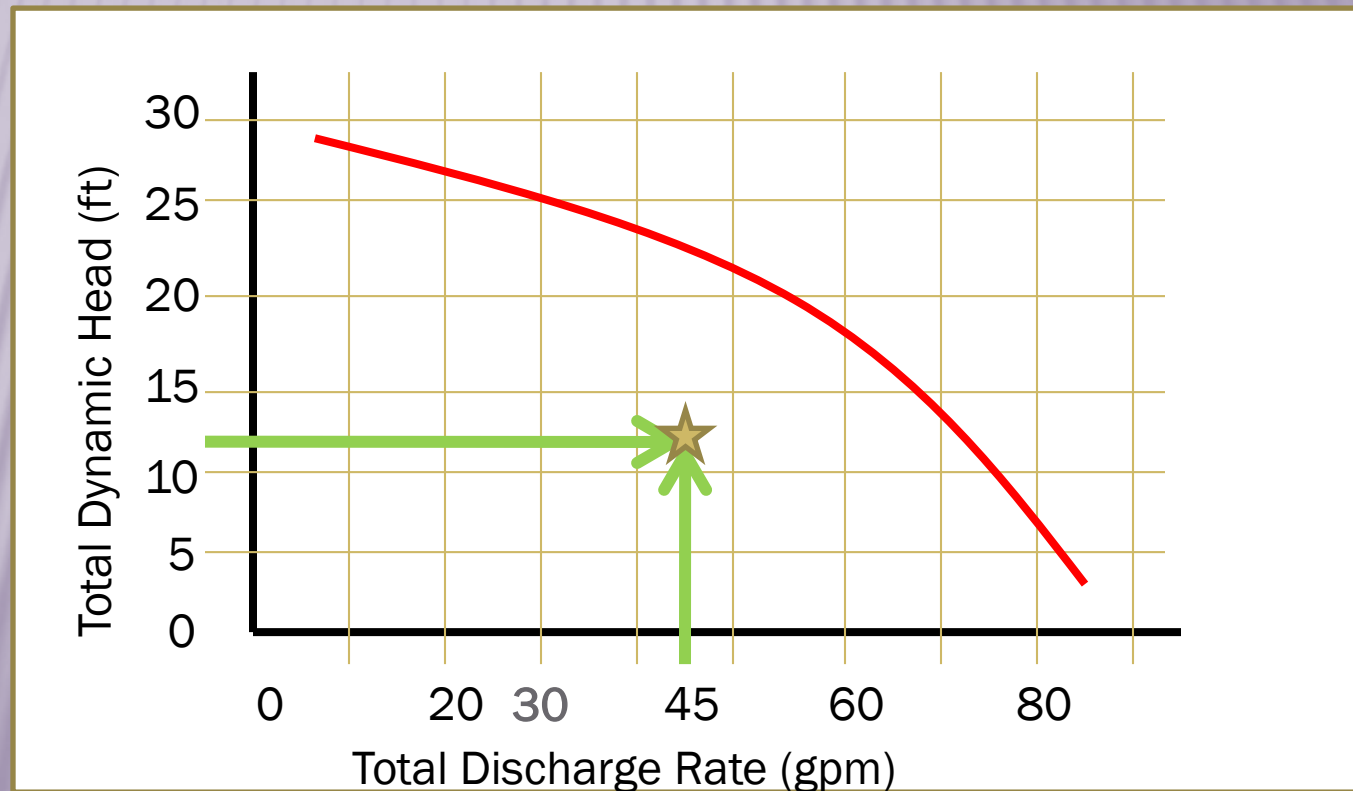
Table IX – Friction Losses in Plastic Pipe (per 100 feet of pipe)
 Pipe Diameter, Flow (gpm), Velocity (v)², and Friction Loss Head (H_f)¹

Flow (gpm)	1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
	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	0.42	1.01	0.22				
20	7.43	25.2	4.29	6.42	3.16	2.96	1.91	0.67	1.34	0.37	0.87	0.13		
25	9.28	38.6	5.37	9.74	3.94	4.46	2.39	1.00	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	13.3	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

SELECTING AN EFFLUENT PUMP

- ✘ GPM: 45 gallons per minute
- ✘ TDH: 12 feet of head.



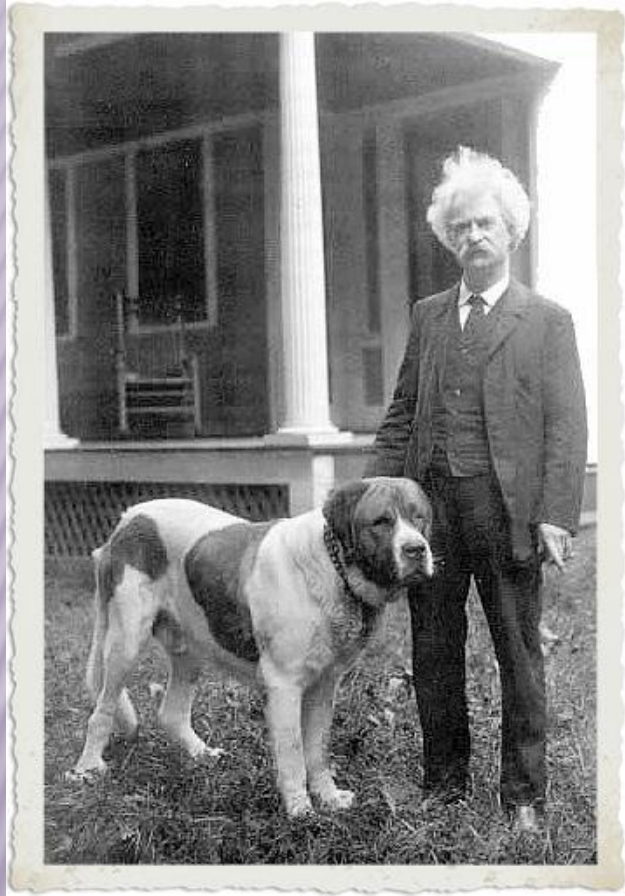
TRAINING MATERIALS

Indiana Environmental Health Association

- ✘ Wastewater Management Committee
<http://iehaind.org/WMCGuidance.htm>

*Residential Onsite Sewage Systems: Effluent Pump
and Dose Tank Sizing Guidance Document*

Includes design information for floats, pumps and
dose tanks.



It's not the size of the dog in the fight, it's the size of the fight in the dog.

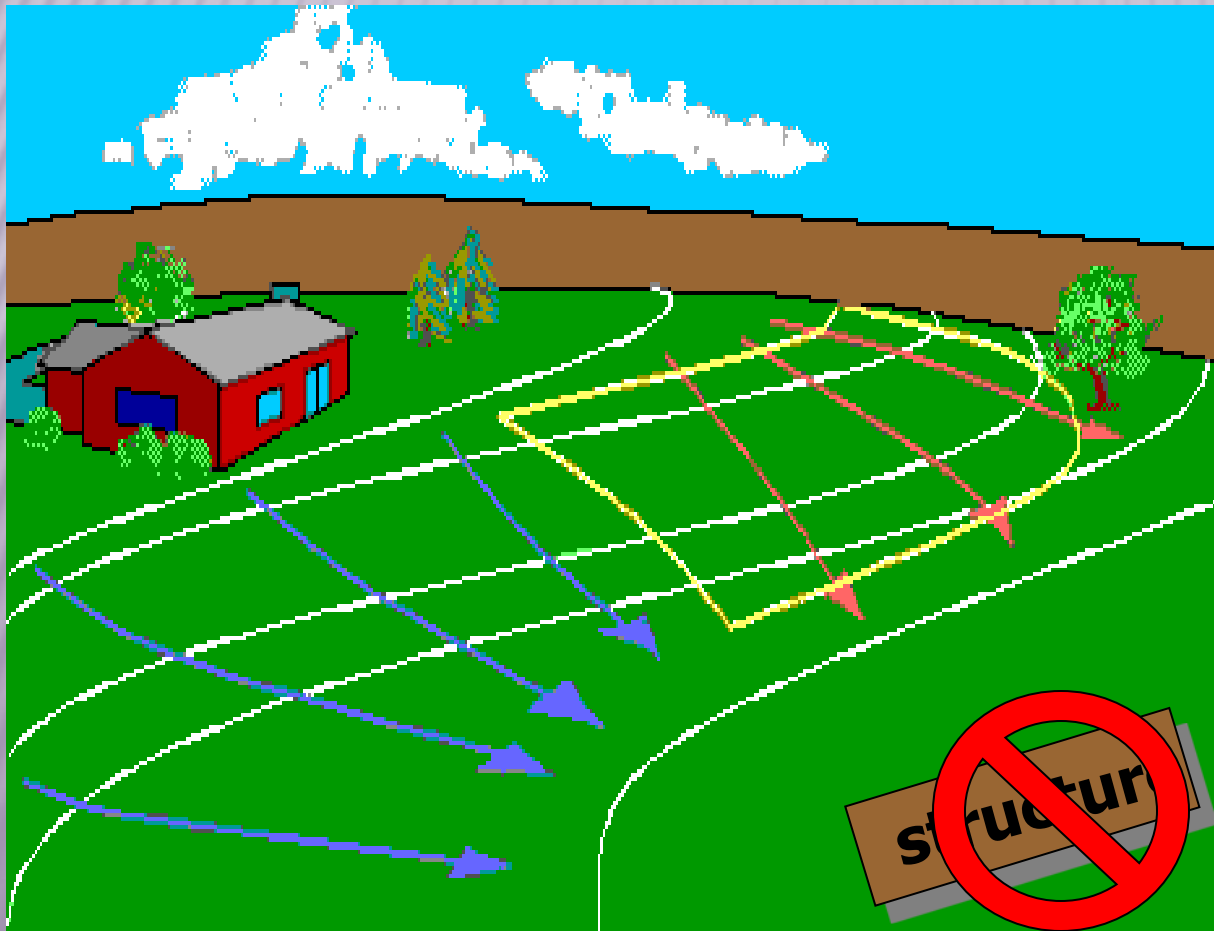
- Mark Twain

Remember:

1. Size the pump to the system.
Do not design the system around a pump.
2. Pumps are not sized by horsepower alone. All $\frac{1}{4}$ hp pumps are NOT created equal.
3. Extra capacity in a dose tank is a good thing!

DISPERSAL AREA

410 IAC 6-8.1



Area(s) beside or downslope of a soil absorption field for the dispersal of effluent away from the field

DISPERSAL AREA

✘ Required when

+ $SLR \leq 0.50$, or

+ Limiting conditions in top 60"

✘ bedrock;

✘ densic material;

✘ dense till;

✘ soil with fragic properties; or

✘ layers transitional to dense till

DISPERSAL AREA

Table II – Minimum Dispersal Areas¹ for Soil Absorption Systems

Slope $\leq 1/2$ % ² : Onsite sewage system without perimeter drain	One-fourth (1/4) width of soil absorption system ⁵
Slope $> 1/2$ % ³ : Onsite sewage system without perimeter drain	One-half (1/2) width of soil absorption system ⁵
Any slope: Onsite sewage system with perimeter drain ⁴	Ten (10) feet or the distance to the perimeter drain

¹No buildings, foundations, slabs, garages, patios, barns, aboveground and belowground swimming pools, retaining walls, roads, driveways, parking areas, or paved sidewalks are allowed in the dispersal area.

²Dispersal area is located on each side of the outside edge of the outer trench parallel to the length of the trench, or on each side of the outside edge of the sand area and parallel to the long axis of an elevated sand mound.

³Dispersal area is located on the downslope side of the soil absorption system.

⁴For onsite sewage systems with a subsurface perimeter drain without a seasonal high water table, the design and construction of the drain shall meet the requirements of section 59 of this rule.

⁵Dispersal area width shall not be less than ten (10) feet. A dispersal area width of more than twenty-five (25) feet is not required.

DISPERSAL AREA: $\leq 1\frac{1}{2}$ % & NO DRAINAGE

↑
Dispersal area 12'
↓



3'



} 7.5' o/c



↑
Dispersal area 12'
↓

DISPERSAL AREA
= $\frac{1}{4}$ WIDTH SAF

$$48' \times 0.25 = 12'$$

10' min - 25' max

DISPERSAL AREA: $> 1/2\%$ & NO DRAINAGE



} **7.5' o/c**

DISPERSAL AREA
= $1/2$ WIDTH SAF

$$33' \times 0.50 = 16.5'$$

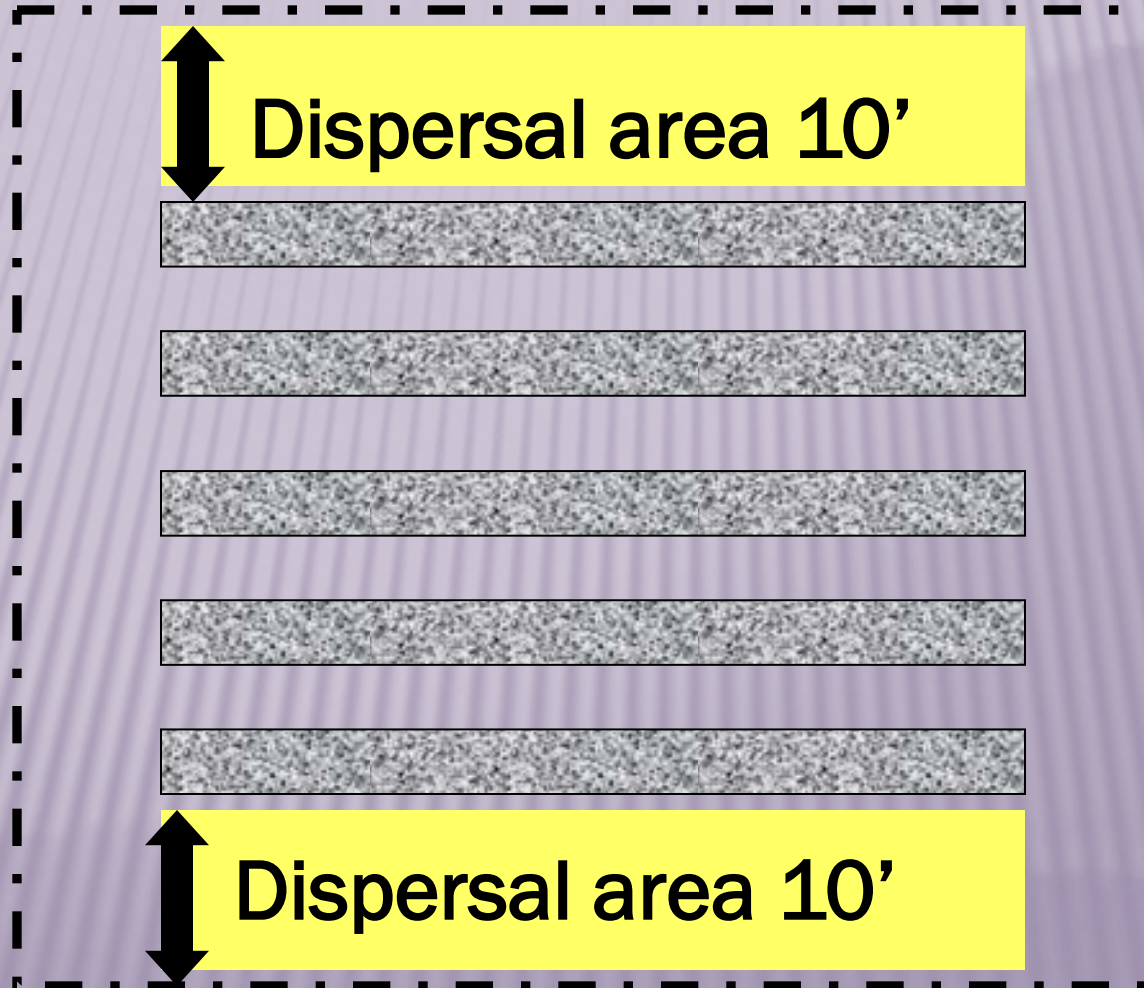
10' min – 25' max



Dispersal area

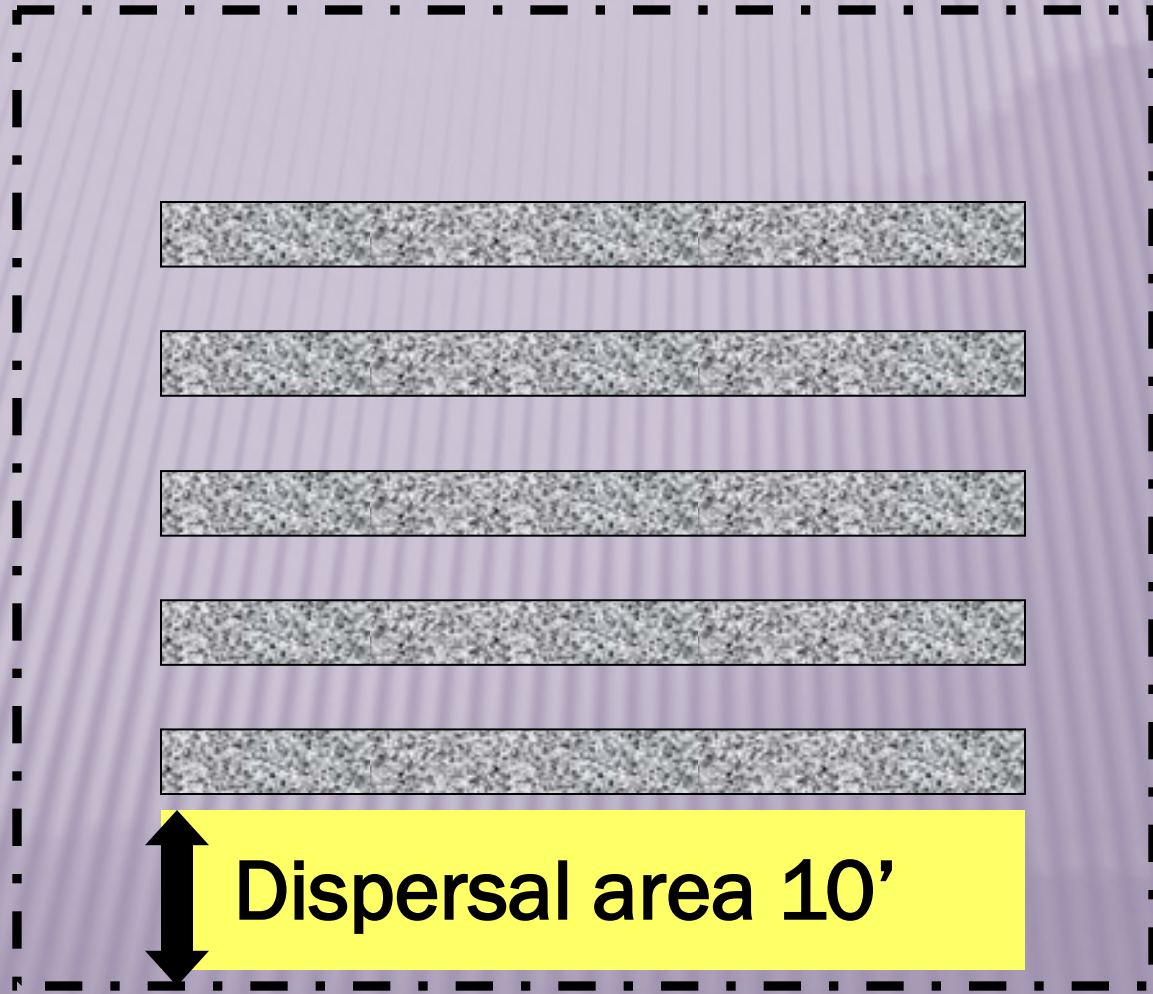
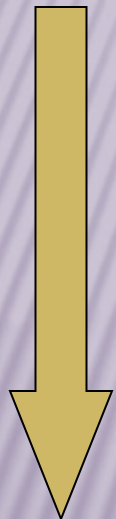
16.5'

DISPERSAL AREA: PERIMETER DRAIN $\leq 1/2\%$



DISPERSAL AREA: PERIMETER DRAIN $>1\frac{1}{2}\%$

slope

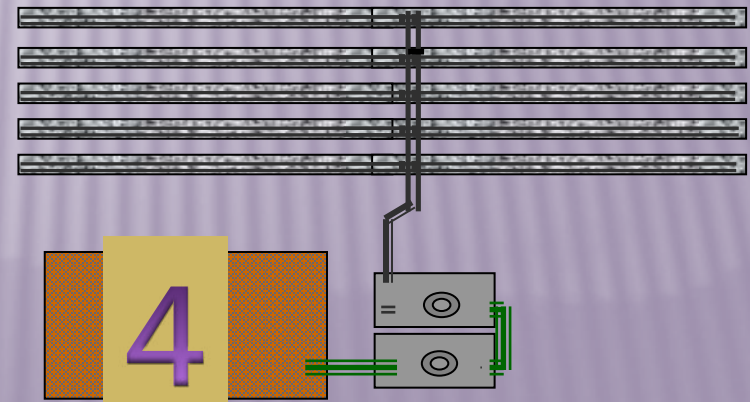
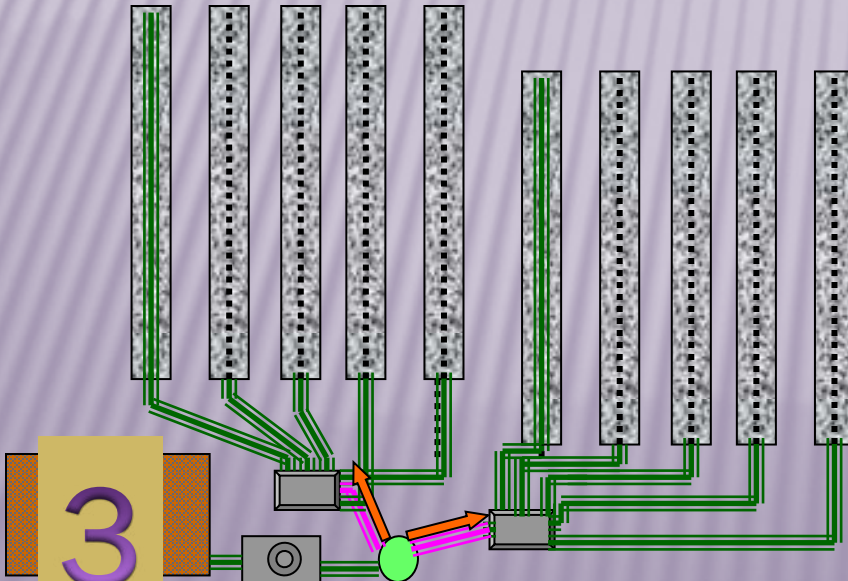
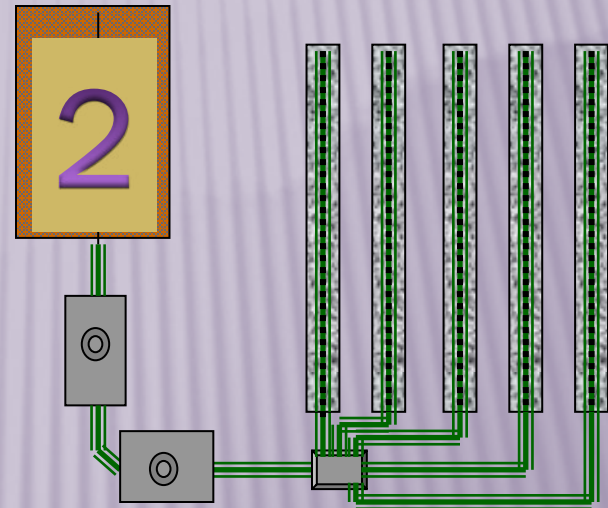
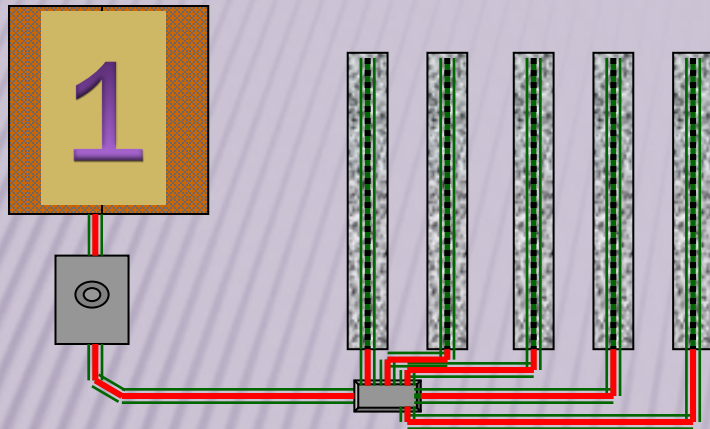


Dispersal area 10'

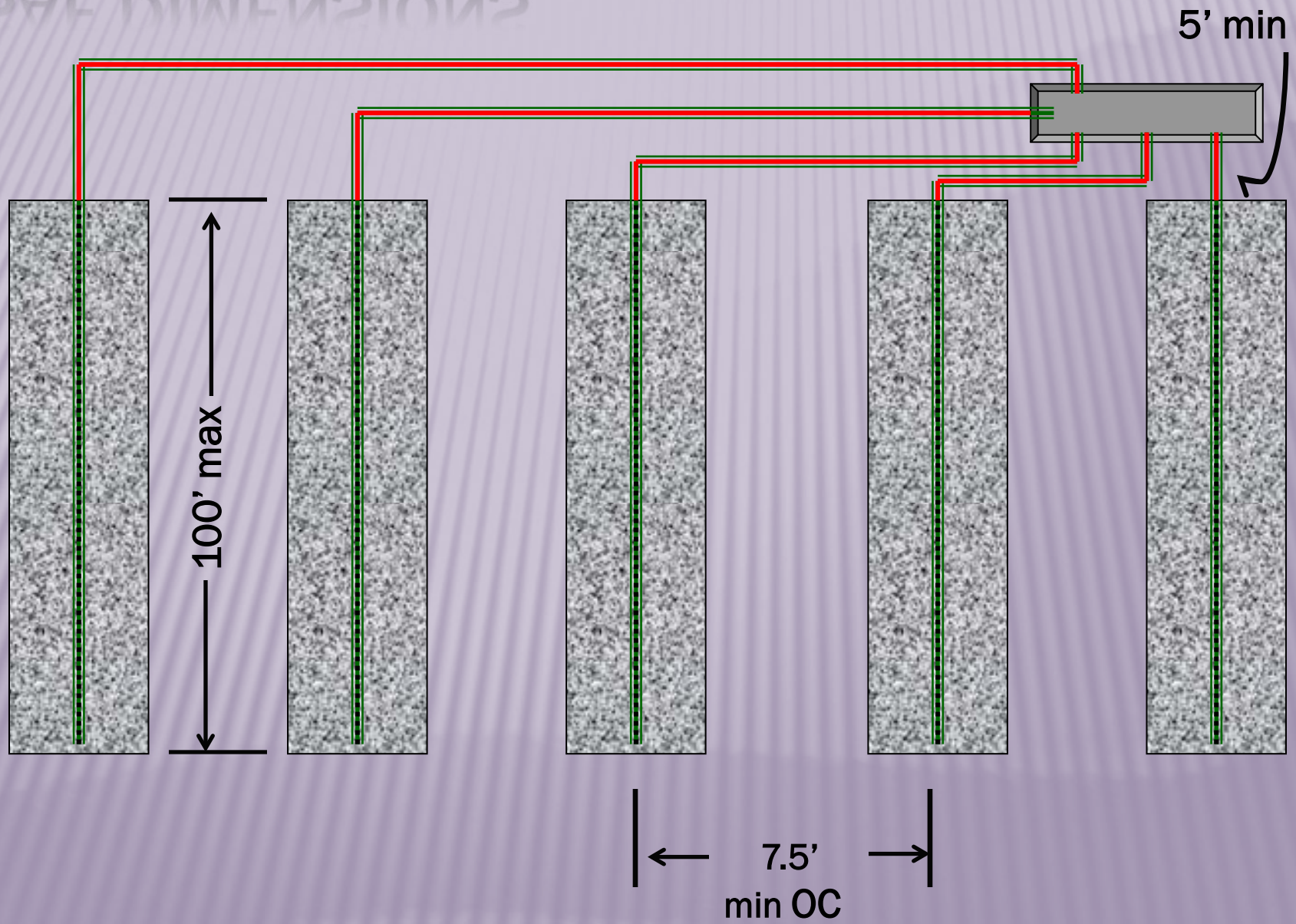
DISPERSAL AREA: NOTE

- ✘ SLR > 0.50 and no soil limitations:
- ✘ 10' minimum dispersal area

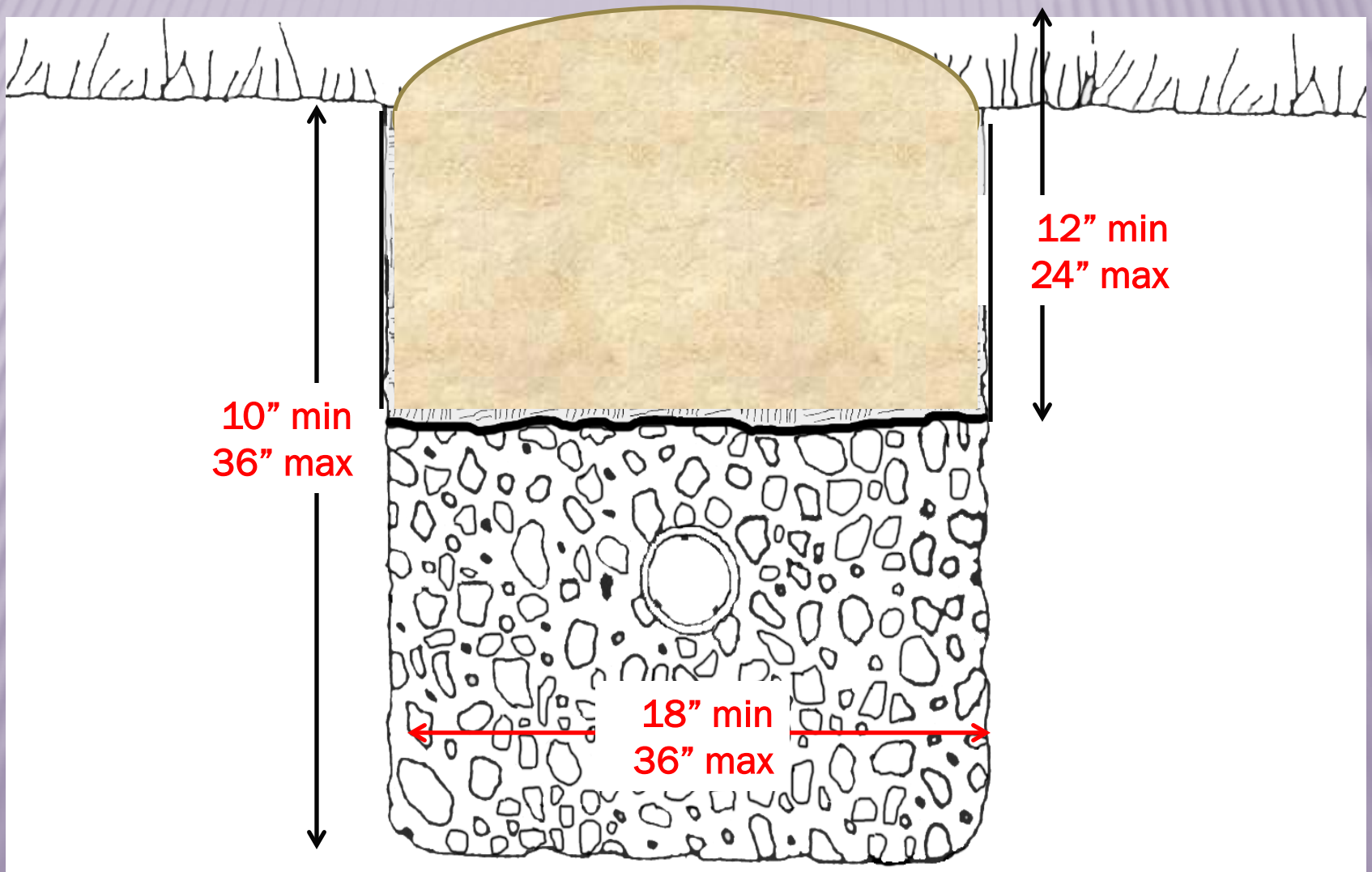
SOIL ABSORPTION FIELD TECHNOLOGIES: SUBSURFACE TRENCHES



SAF DIMENSIONS



TRENCH DIMENSIONS



SOIL ABSORPTION FIELD OPTIONS



Gravel
Tire chips
Chambers
EZFlow



09/21/2004

D-BOX – GRAVITY/FLOOD DOSE VS. TRENCH PRESSURE

4" PVC gravity effluent
sewer

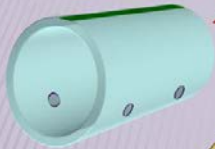


1 ½" to 4" PVC pressure
effluent sewer

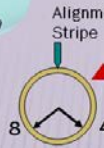


LEVEL IS THE KEY

Holes 120° apart



Two Hole Lateral Pipe...
Usually has a stripe at
The 12 O' clock position



Holes to be placed at 4 & 8
O' clock position



Three Hole Lateral Pipe...



BARRIER MATERIAL



ALTERNATIVE METHODS/TECHNOLOGIES

- ✘ A.K.A. Technologies New to Indiana (TNI)
- ✘ Protocols for TNI established subsequent to:
 - + Residential - 410 IAC 6-8.3-52(h)
 - + Commercial - 410 IAC 6-10.1-49(h)



ALTERNATIVE METHODS/TECHNOLOGIES

- ✘ “Technology New to Indiana” defined:
 - + Onsite sewage treatment or disposal methods, processes, or equipment not described in the rules of the department that have been approved by the department in accordance with section 52(h) of the residential rule and/or section 49(h) of the commercial.

PROGRAM INFORMATION AND POLICIES

✘ Technologies New to Indiana

- **Components**

- Single item within the system

- **Secondary Treatment Units**

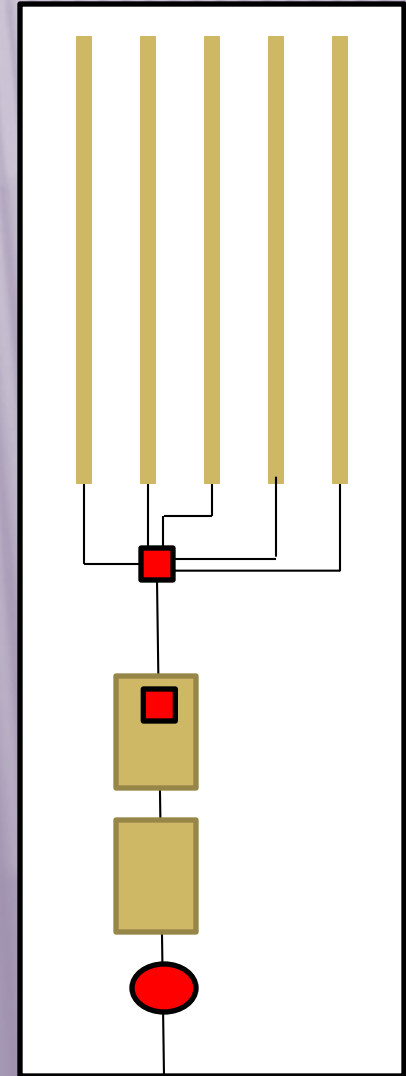
- After the septic tank, before SAF

- **Soil Absorption Fields**

- Method of distributing to the soil

- **Pre-treatment Devices**

- Prior to septic tank



TNI APPROVED BY ISDH

- ✘ **Secondary treatment units (ATUs)**
- ✘ **Recirculating media filter systems**
- ✘ **Subsurface flow constructed wetlands**
- ✘ Recirculating subsurface flow constructed wetlands
- ✘ Type 2 elevated sand mounds
- ✘ At-grade systems
- ✘ Pressure manifold systems
- ✘ **Presby Enviro-Septic**
- ✘ ADS GEO-flow
- ✘ Eljen Indrain
- ✘ Siphons

TNI APPROVED BY ISDH

- ✘ Gravel substitute soil absorption field systems
 - + **Chamber**
 - + Sock pipe
 - + Multi-pipe
 - + Subsurface PC drip systems
 - + Ezflow
 - + Tire chips
 - + Spider valves

PRETREATMENT OPTIONS



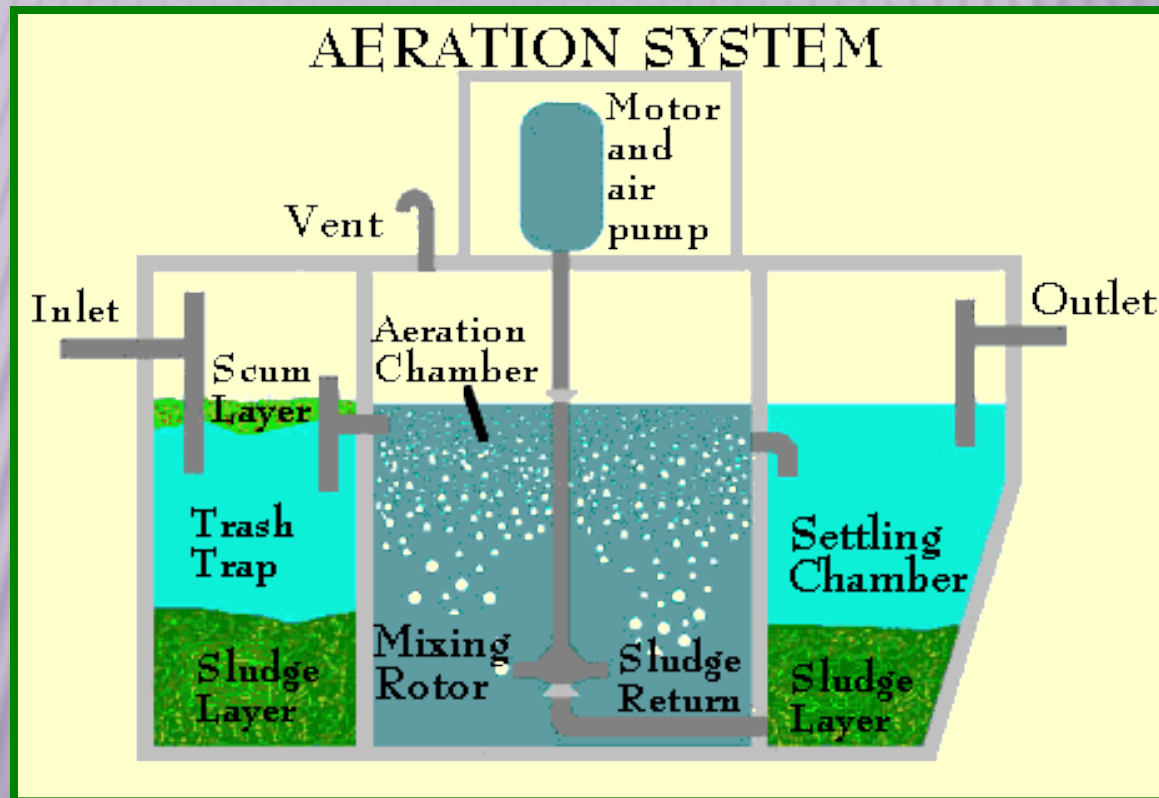
✘ Aerobic treatment unit

- + All proprietary systems
- + Provides aerobic treatment using artificial/mechanical aeration
- + Aerobic organisms digest food
- + Provides better quality effluent – organics & solids
- + Tend to be more sensitive to upset than septic tanks
- + High level of O&M required



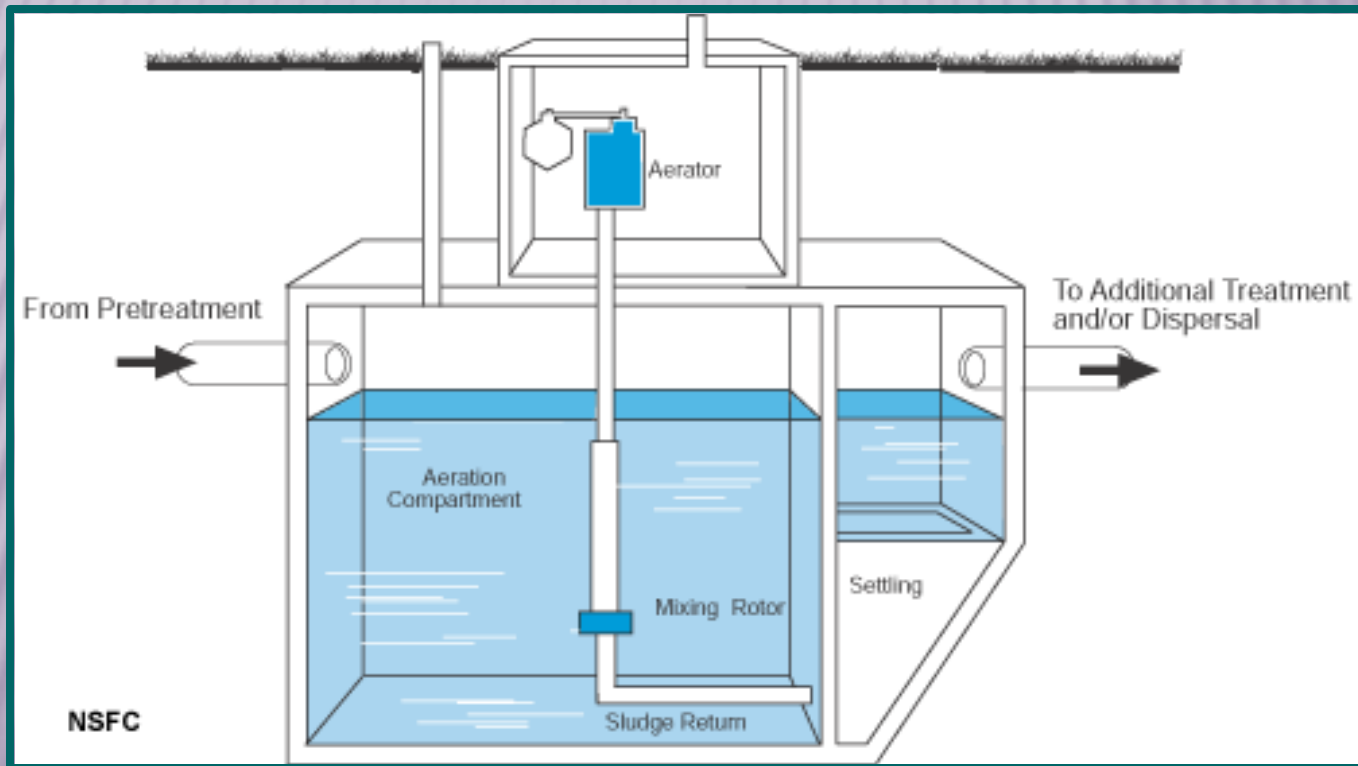
AEROBIC TREATMENT UNIT

✦ Typical components



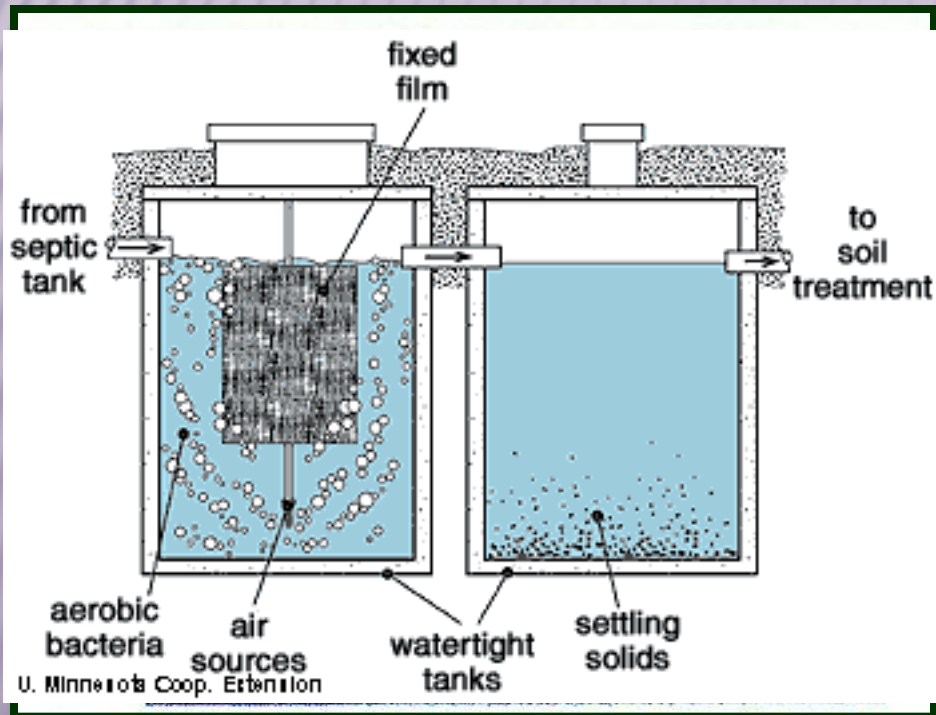
AEROBIC TREATMENT UNIT

× Suspended growth



AEROBIC TREATMENT UNIT

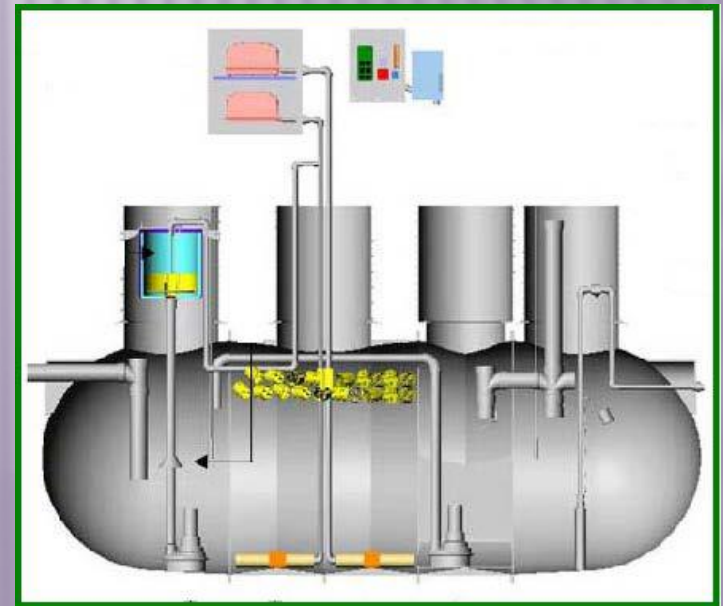
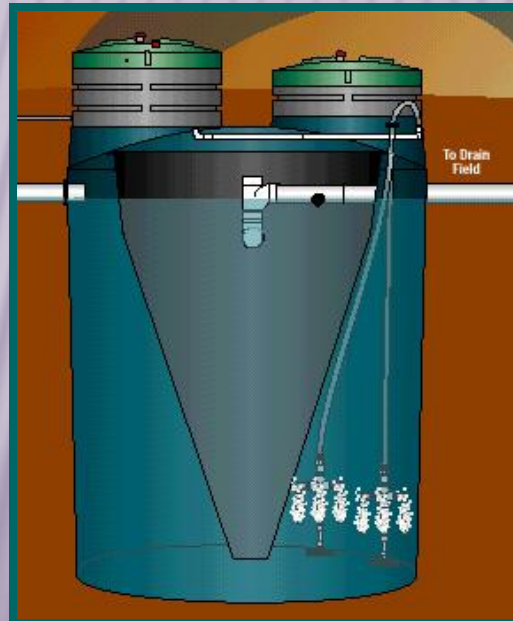
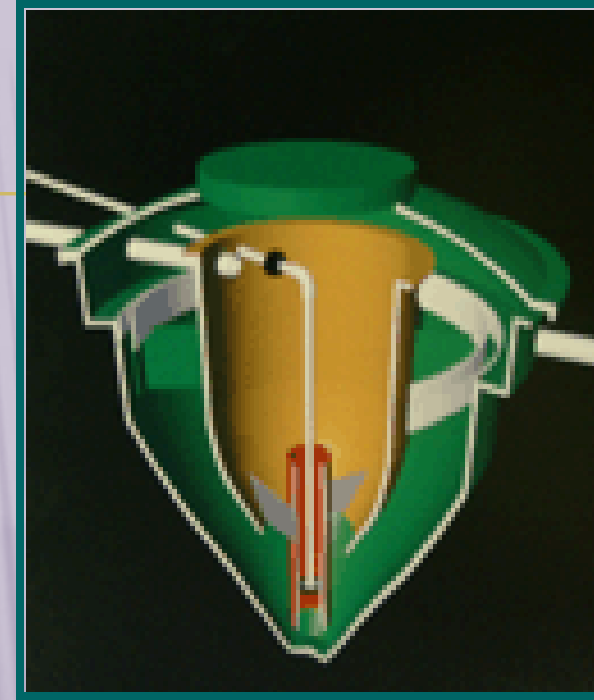
✘ Fixed/attached growth



Attached growth media

AEROBIC TREATMENT UNIT

- ✘ Variety of shapes & configurations



AEROBIC TREATMENT UNIT

- ✘ 410 IAC 6-8.3-58(e) & (f) – 410 IAC 6-10-1-68(h):
 - + NSF/ANSI Standard 40 tested and certified
 - + Preceded by a full sized septic tank in accordance with the rules
 - + Followed by a full sized soil absorption field in accordance with the rules



AEROBIC TREATMENT UNIT

- ✘ Indiana Standards for Secondary Treatment Units:

- + After the manufacturer has written approval from the department under the standard above:

- ✘ Trash tank instead of full sized septic tank

- ✘ Soil absorption field size reduction

- ★ Up to 1/3 for clay soils

- ★ Up to 1/2 for sand soils



AEROBIC TREATMENT UNIT

✘ Important considerations

+ Treatment efficiencies – some variability

BOD₅ - 5-60 mg/l

TSS - 5-60 mg/l

Fecal coliform - $<10^4/100$ ml

+ Solids generation

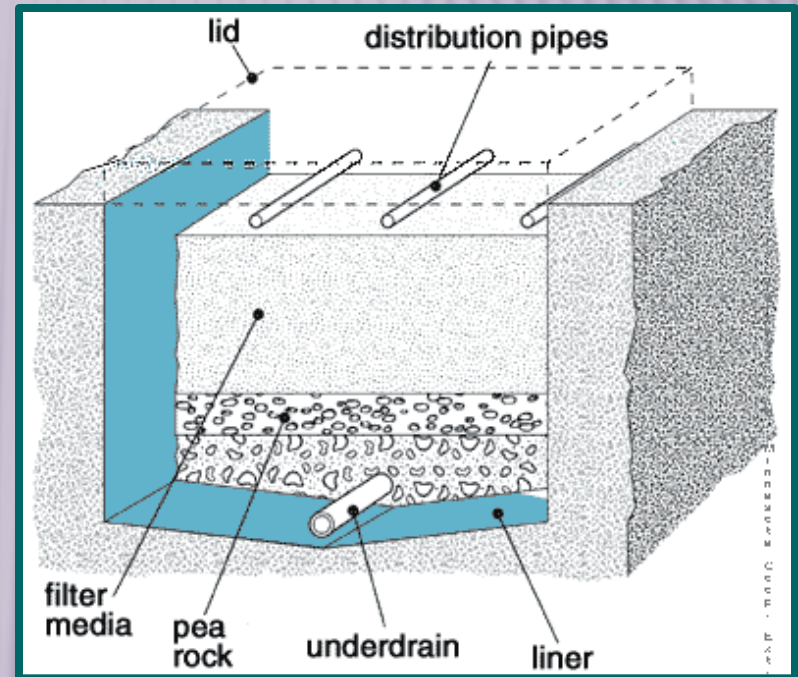
✘ Must be checked regularly

✘ May require pumping as often as every 7-9 months

MEDIA FILTER

✦ What is it?

- + A container or lined excavation containing a specific media through which wastewater flows
- + An aerobic, fixed-film bioreactor
- + Treatment occurs in an unsaturated flow



MEDIA FILTER

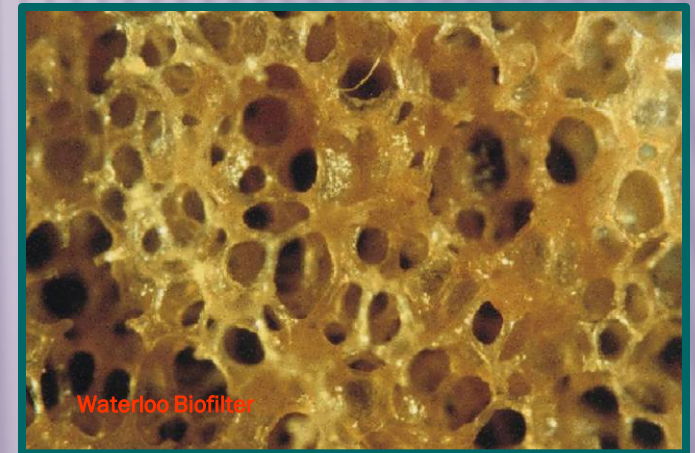
× How does it work?

- + Slow, **unsaturated** flow down through media
 - × Must be sufficient retention time
 - × Time between doses must allow sufficient re-aeration
- + Treatment occurs due to physical, chemical and biological processes
- + Flow options used
 - × Single pass
 - × Multiple pass

MEDIA FILTER

× Media used

- + Washed, graded sand
- + Gravel
- + Foam cubes
- + Peat
- + Synthetic textile materials



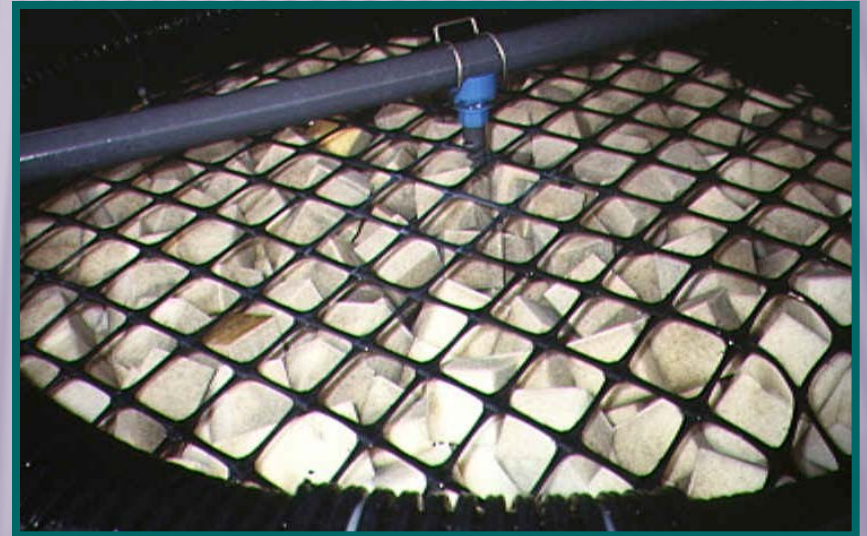
MEDIA FILTER

× Sand



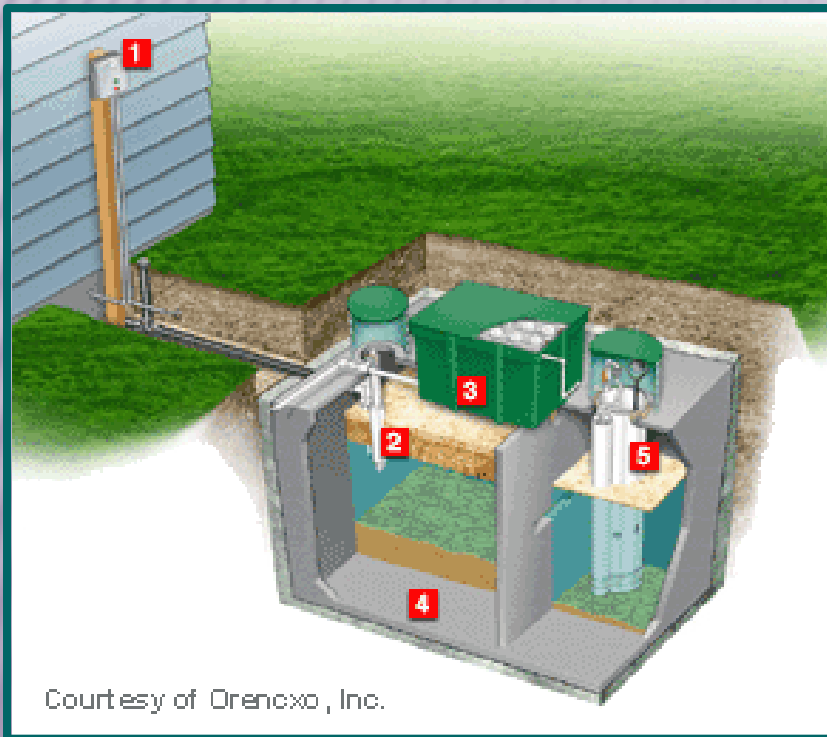
MEDIA FILTER

× Foam cubes



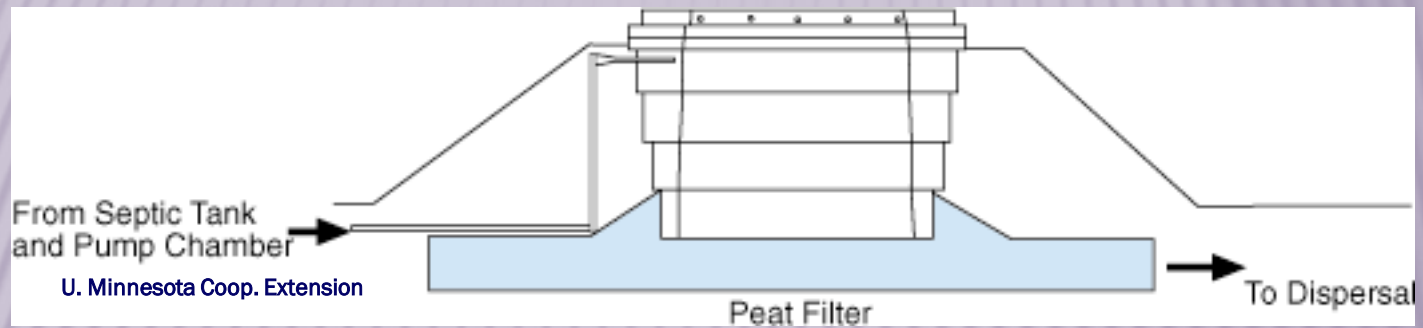
MEDIA FILTER

× Textile sheets/chips



MEDIA FILTER

× Peat

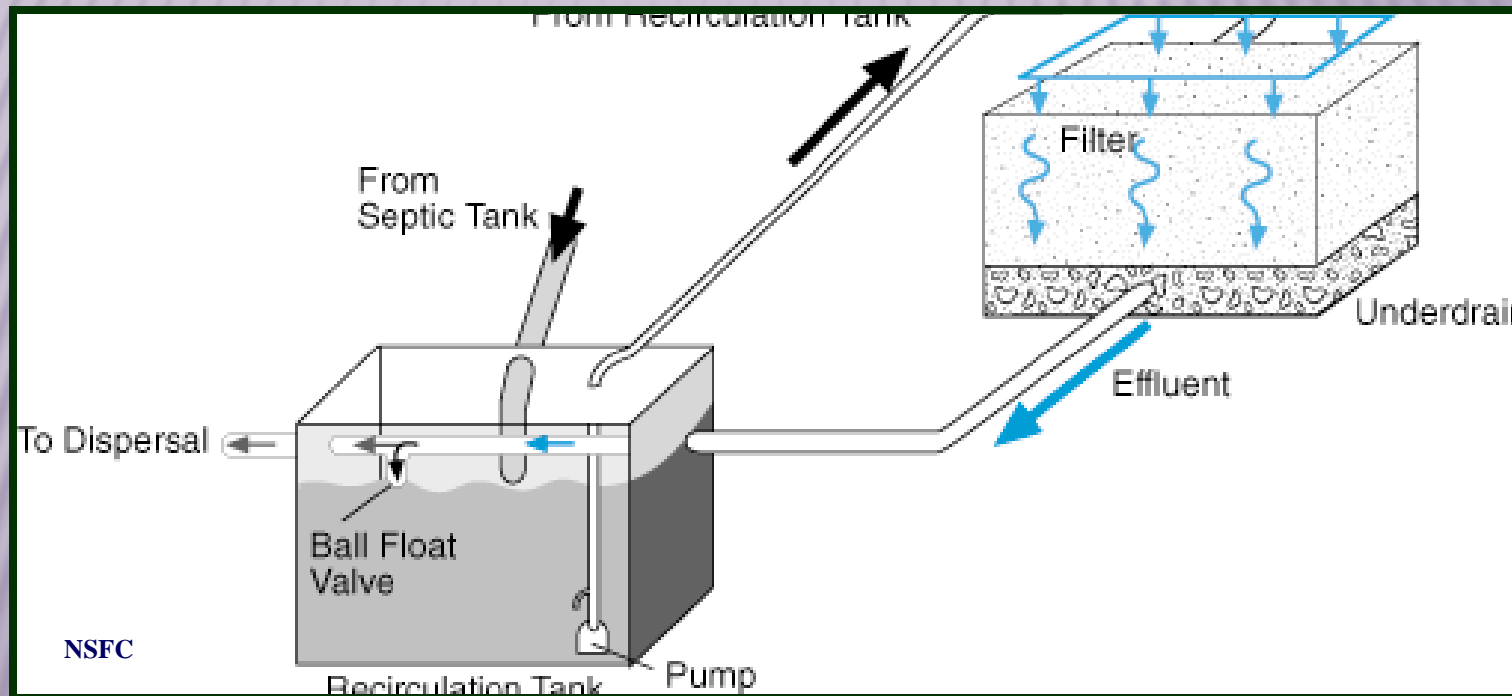


NSFC



MEDIA FILTER

✘ Design option - Multiple-pass



MEDIA FILTER

× Pertinent information

- + Timer-controlled dosing is being used
- + Typical loading rates for multiple-pass filters: up to 5 gal/ft²/day
- + Multiple-pass gravel filters are primarily used for size, reliability and O/M simplicity
- + Many media filter types are proprietary
- + Typical sand & gravel filters are public domain

MEDIA FILTER

× Expected treatment efficiencies

+ Single-pass

× BOD ₅	-	<10mg/l
× TSS	-	<10mg/l
× Fecal coliform	-	99 - 99.99% reduction

+ Multiple-pass

× BOD ₅	-	<10mg/l
× TSS	-	<10 mg/l
× Fecal coliform	-	99 - 99.9 % reduction

PRETREATMENT OPTIONS

- ✘ Constructed wetlands – subsurface flow



CONSTRUCTED WETLAND

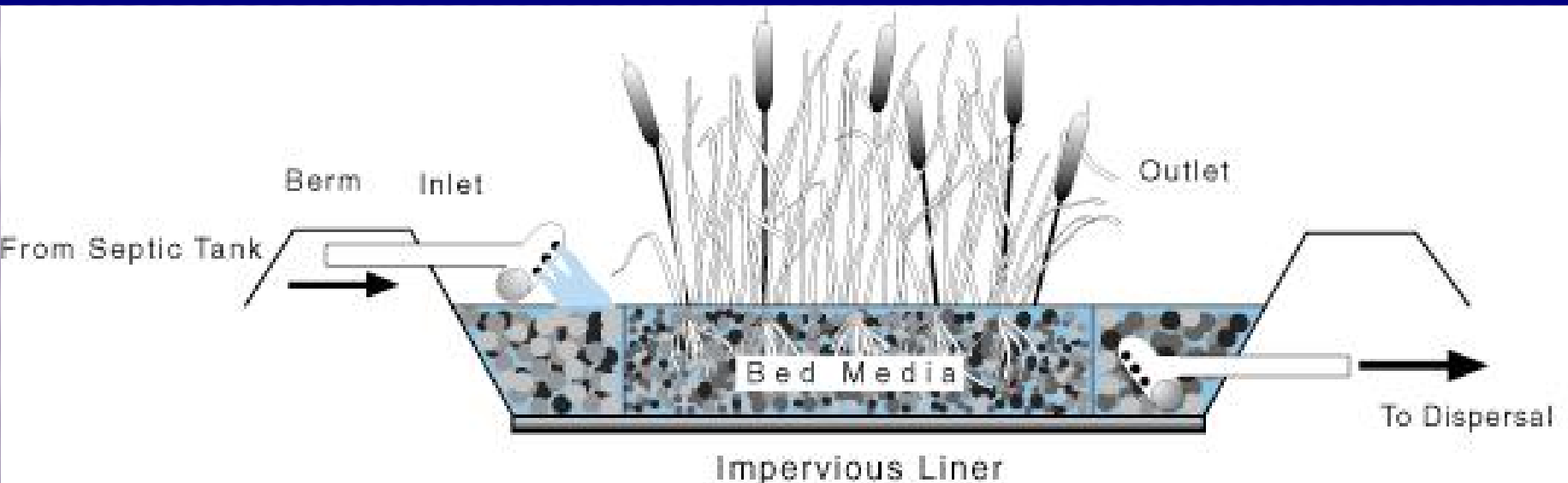
✘ What is it?

- + Largely anaerobic reactor unless air is artificially injected
- + Contained in a lined cell
- + Cell is filled with 20-24 inches of solid media, usually gravel
- + Appropriate wetland vegetation is planted
- + Liquid surface is 3 or more inches below the surface
- + Typical minimum cell length for single family home - 15 yards

CONSTRUCTED WETLAND

× How does it work?

- + Wastewater moves horizontally through the gravel
- + Physical processes of filtration and sedimentation are predominant removal mechanisms
- + Typically, have high hydraulic retention times – desire 2 to 3 days



CONSTRUCTED WETLAND

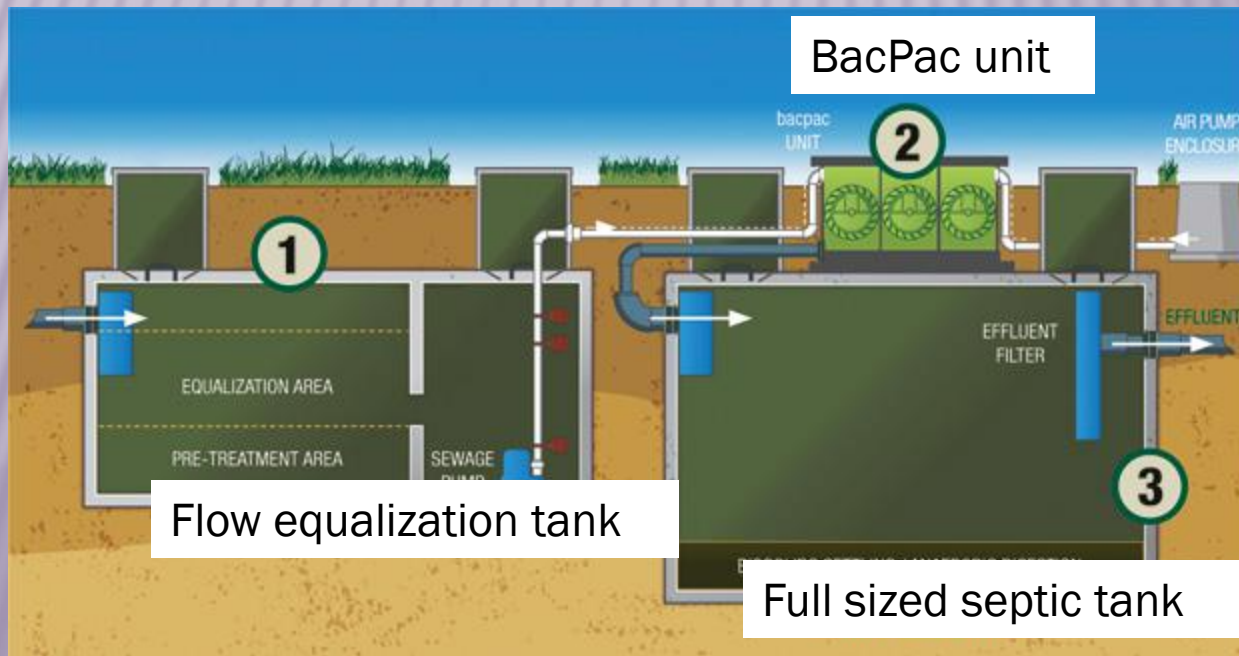
✘ Other pertinent information

- + In cold climates, the liquid depth may be lowered
- + In cold climate areas vegetation may appear to be dead on the surface
- + Expected treatment efficiencies:

BOD ₅	-	< 30 mg/l
TSS	-	<30mg/l
Fecal coliform	-	99 – 99.9 % reduction
Nitrogen	-	Insignificant

TNI PRETREATMENT DEVICES

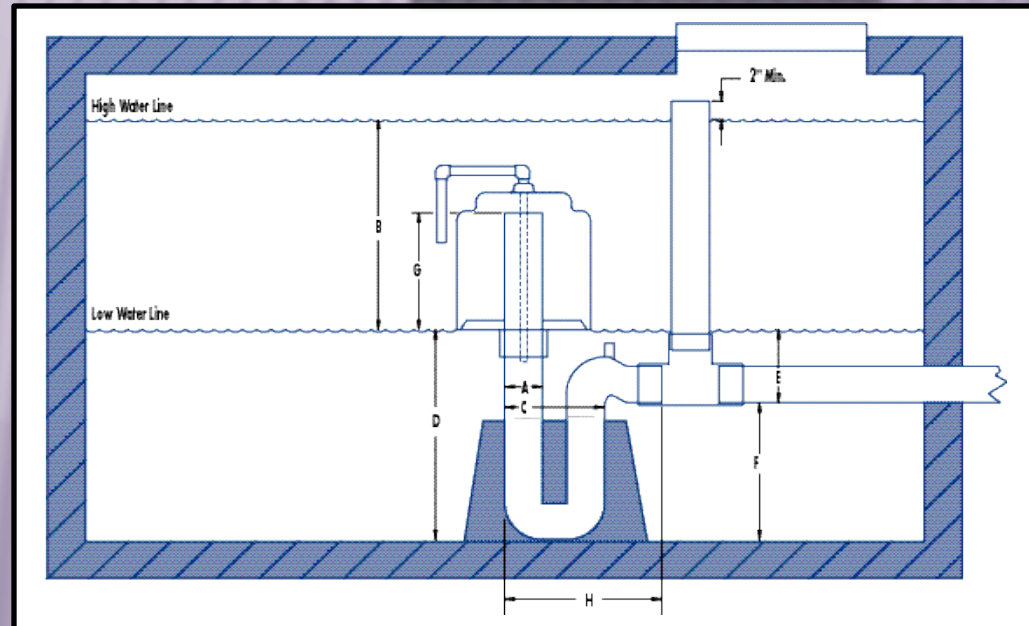
- ✘ Algaewheel Inc. – BacPac Unit
 - + Conditional Approval
 - + Limited number of systems may be installed with ISDH approval
 - + Single pass pretreatment system where algal colonies provide treatment and filtration



To full sized soil absorption field

TNI COMPONENTS

- ✘ Fluid Dynamic Siphons, Inc.
 - + Replaces the effluent pump in flood dose systems
 - + Project by project approval
 - + Must have negative static head to the field



SECONDARY TREATMENT DEVICES

- ✘ O&M programs are required for all systems which include:
 - + Secondary treatment devices
 - + Treatment devices for high strength waste

SYSTEM SELECTION STRATEGIES

- ✘ Options for distribution media



OPTIONS FOR DISTRIBUTION MEDIA

✘ Gravel/Rock

+ Functions:

- ✘ Supports distribution pipe
- ✘ Transfers effluent from pipe to infiltrative surface
- ✘ Provides storage of peak flows
- ✘ Dissipates energy of surges
- ✘ Supports sidewall and overlying soil



OPTIONS FOR DISTRIBUTION MEDIA

✘ Gravelless technologies

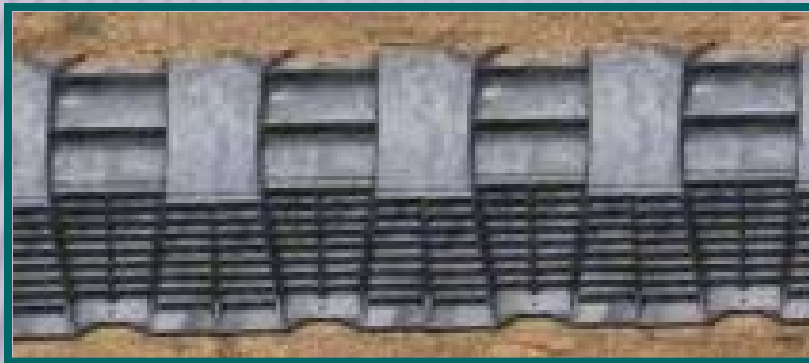
- + Can be used for both gravity and dosed flow networks
- + Can be used where gravel is used
- + Avoids many of the installation problems of aggregate
- + Have unique sizing and installation requirements
- + Have their own unique precautions

GRAVELLESS TECHNOLOGIES

- × Currently, two options:
 - + Aggregate-free technologies
 - + Non-gravel porous media

GRAVELLESS TECHNOLOGIES

- ✘ Aggregate-free technologies - chambers



TNI – SOIL ABSORPTION FIELD

✘ Chambers

- + Subsurface trench systems only
 - ✘ Gravity flow
 - ✘ Alternating field gravity flow
 - ✘ Flood dose distribution
 - ✘ Pressure distribution
- + May allow up to a 25% reduction in the size of the soil absorption field
- + Size reductions may not be combined with size reductions allowed for other treatment options.

GRAVELLESS TECHNOLOGIES

- ✘ Aggregate-free technologies – gravelless pipe



TNI SOIL ABSORPTION FIELD

✘ Gravelless Pipe

+ Subsurface gravity systems only

+ 10" gravelless pipe

✘ 1 lineal foot = 1 lineal foot of 3 ft. wide stone and pipe trench

✘ Installed in 20" trench

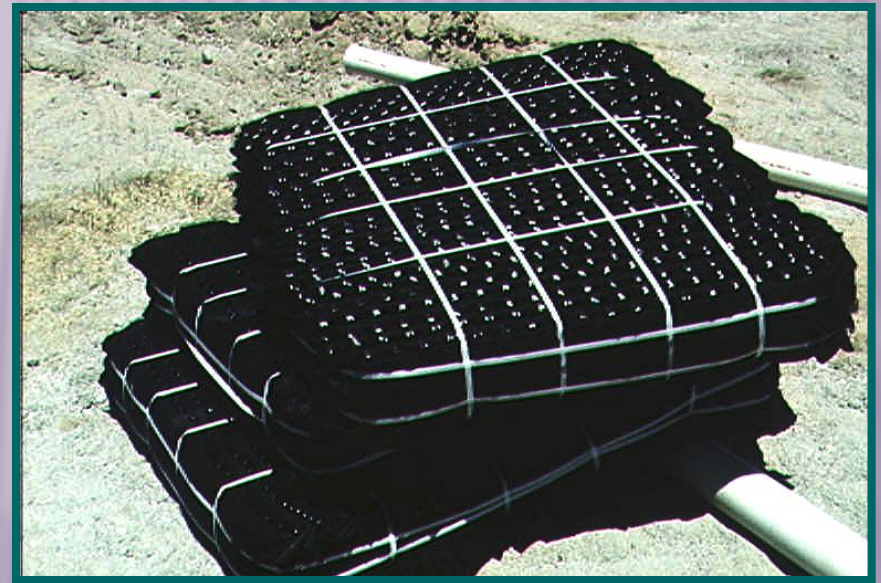
+ 8" gravelless pipe

✘ 1 lineal foot = 1 lineal foot of 2 ft. wide stone and pipe trench

✘ Installed in 16" trench

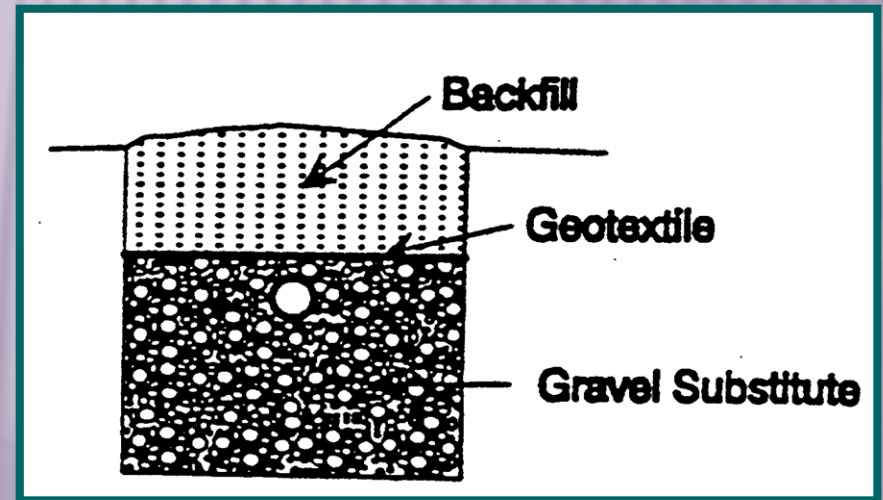
GRAVELLESS TECHNOLOGIES

- ✘ Other aggregate-free technologies



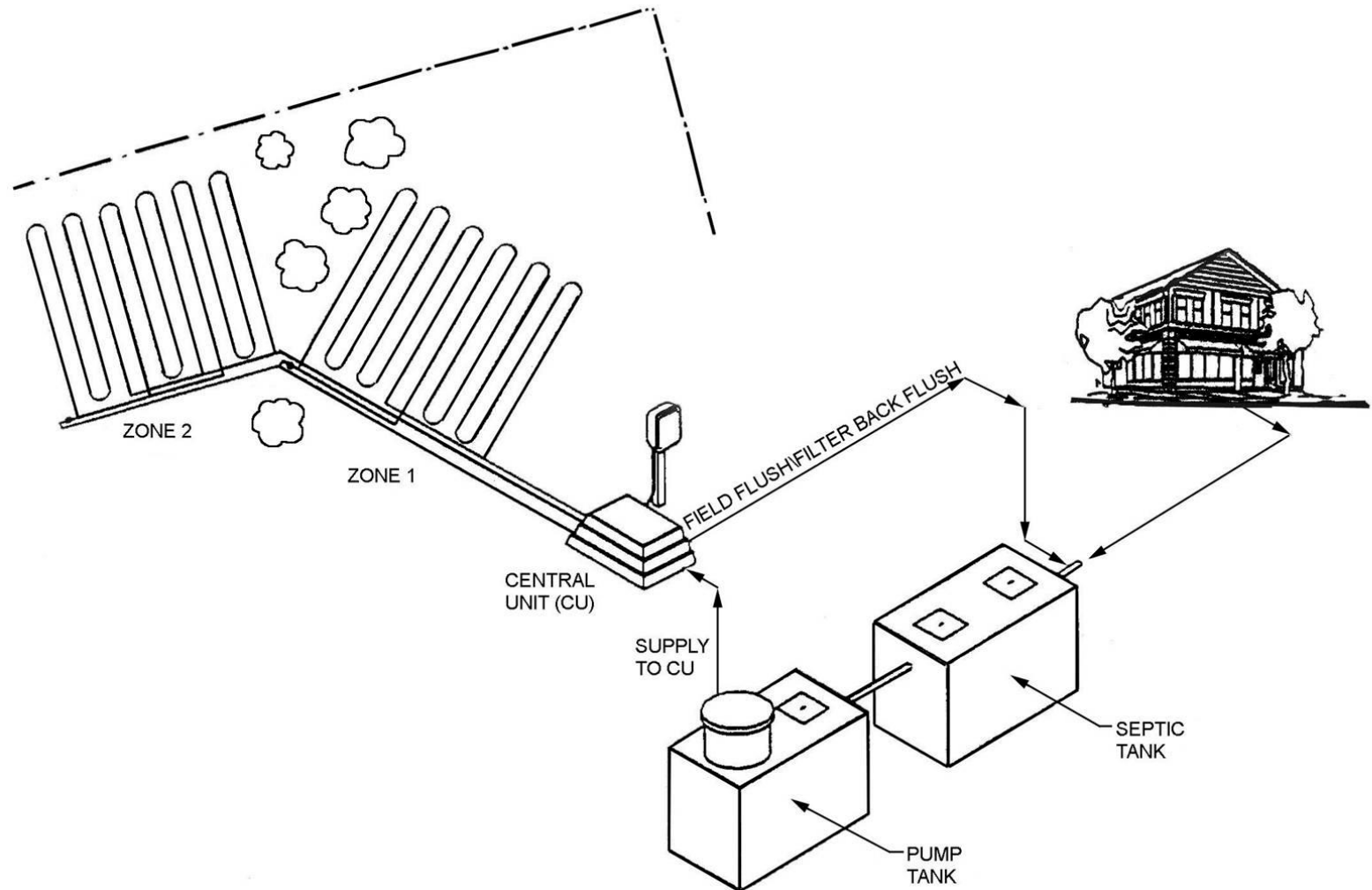
GRAVELLESS TECHNOLOGIES

× Non-gravel porous media



Courtesy of Washington Dept. of Health

SUBSURFACE DRIP IRRIGATION



SUBSURFACE DRIP IRRIGATION

+ Point of application - from pipe directly into soil



SUBSURFACE DRIP IRRIGATION

- ✘ The system is composed of:
 - + Wastewater source
 - + Pretreatment device(s)
 - + Pump tank
 - + Controller
 - + Filtering device
 - + Drip dispersal field(s)

SUBSURFACE DRIP IRRIGATION

- ✘ Drip Field Components
 - ✘ Supply line
 - ✘ Water distribution devices (flow splitting)
 - ✘ Zones
 - ✘ Supply manifold
 - ✘ Drip laterals
 - ✘ Return manifold
 - ✘ Air relief/Vacuum breaker

SUBSURFACE DRIP IRRIGATION

- ✘ Uniform Dispersal
- ✘ Controlled Application Rate
- ✘ Emitters control water flow rate
- ✘ Small doses of wastewater into the soil.
- ✘ Wastewater moves through soil under unsaturated flow conditions, thus effectively treating the wastewater.
- ✘ Wastewater can be dosed into the active surface layer of the soil.
- ✘ Facilitates reuse of nutrients and water.

SUBSURFACE DRIP IRRIGATION

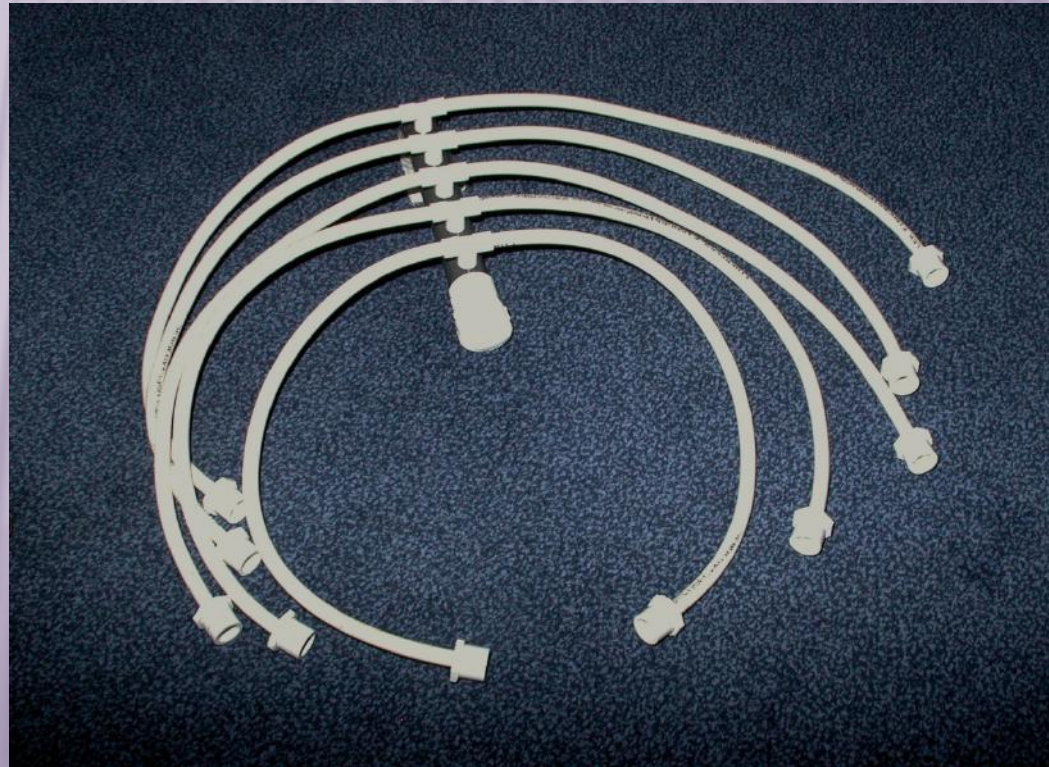
✘ Installation requirements

- + Drip lines buried to at least 6 inches in depth. Depth typically ranges from 6 to 12 inches.
- + Typical emitter spacing is 24 inches.
- + Typical drip lateral spacing is 24 inches.
- + Absorption area per emitter is typically four square feet.
- + Must meet separation distances.

SUBSURFACE DRIP IRRIGATION



SPIDER VALVE (HYDROSPLITTER)



TECHNOLOGIES NEW TO INDIANA

✘ Summary

- + Too much to provide detail design information
- + Many require ongoing operation and maintenance (O & M contract)
- + For many, training and certification required by the manufacturer:
 - ✘ ATUs
 - ✘ ADS-Geoflow
 - ✘ Eljen
 - ✘ Presby

TECHNOLOGIES NEW TO INDIANA

IN.gov

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ISDH

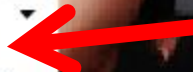
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Healthcare Professionals	Consumers	Local Health Departments
<ul style="list-style-type: none">Birth and Death Registration SystemsDisease and ConditionsImmunizationsMedical Errors Reporting SystemMore	<ul style="list-style-type: none">Birth and Death CertificatesConsumer ReportsIndiana Tobacco QuitlineMyVaxIndianaMore	<ul style="list-style-type: none">Find a local health departmentIndiana Code for LHD'sLHD Outreach OfficeLocal health department services

Online Services

FIRST IN LINE EVERY TIME

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- Indiana Immunization Registry
- Food Protection Complaint Form
- MyVaxIndiana
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and Licensing Program

Onsite Sewage Systems Program

Plan Review Status

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Recreational Vehicle Camp
Inspection and Approval Program

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Youth Camp Inspection and

Welcome to the Environmental Public Health Web Site

The Environmental Public Health Division mission is the prevention and control of environmentally related injuries and communicable diseases through the minimization of exposure to environmental health and safety hazards.

Program Overview

The Environmental Public Health Division is in the Public Health and Preparedness Commission, Indiana State Department of Health. The Environmental Public Health Division inspects and licenses mobile home parks and agricultural labor camps. They also inspect campgrounds, youth camps, and schools. The staff consults and provides technical assistance to local health departments on a variety of environmental health issues, including swimming pool sanitation. And they assist county sheriffs with licensing pursuant to the Mass Gathering Licensing Law, [IC 16-41.22](#).

The Environmental Health Division also includes the onsite sewage program and the water fluoridation program. The onsite sewage program sets minimum State-wide standards for residential onsite sewage disposal systems. The staff also conducts workshops and seminars on soils analysis and residential sewage disposal, and provides consultation and technical assistance to local health departments on the operation of their sewage disposal programs. The onsite sewage program also reviews and approves plans and specifications for commercial onsite sewage disposal systems.

When tornadoes, flooding or other disaster strikes a community, Environmental Public Health staff provides direct assistance to local health departments upon request. We disseminate information about disinfection of wells and drinking water, and how to handle food, furniture, etc., that has been inundated during flooding. Our engineers also cooperate with State and federal emergency management agencies to assess the cost of repairs to any public works that might qualify for federal disaster assistance.

Online Services FIRST IN LINE EVERY TIME

- + Indiana Death Registration System (IDRS)
- + Indiana Immunization Registry
- + Food Protection Complaint Form
- + MyVaxIndiana
- + Nurse Aide Registry
- + Radiography License Renewal
- + Forms.IN.gov

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Top FAQs

I Want To...

1. Apply for a Birth/Death Certificate
2. Register for the IDRS
3. Quit smoking
4. Find information on recent food recalls
5. Get a Flu Shot

? DID YOU KNOW



TECHNOLOGIES NEW TO INDIANA

Indiana State
Department of Health

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Technology New to Indiana

Program Overview

The Indiana State Department of Health (department) may approve the installation or construction of technology new to Indiana (TNI). TNI are sewage treatment or disposal methods, processes or equipment, not described in the residential or commercial rules ([410 IAC 6-8.2](#)  and [410 IAC 6-10](#), respectively), for which research or documented field performance demonstrates that the technology meets or exceeds the requirements of the rules. The department also establishes standards and best practices that describe performance, design, installation, or operation and maintenance (O&M) of TNI.

An applicant proposing a TNI for use in Indiana must comply with applicable requirements contained in [410 IAC 6-8.2](#) , [410 IAC 6-10](#), and applicable interpretations, standards, best practices and guidelines of the department.

[Information Form for Technology New to Indiana](#) 

[Information Necessary for Review of Technology New to Indiana](#) 

[Technology New to Indiana Review and Approval Process](#) 

[Approved Technologies New to Indiana](#)

[Indiana Standards for Secondary Treatment Systems](#) 

[Indiana Standards for Subsurface Drip Systems](#) 

[Indiana Interpretation of 410 IAC 6-8.2: Tanks Fitted with Aeration Units for Aerobic Digestion](#) 

Directories

[City and County Health Departments](#)

Online Services

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- ◆ Indiana Death Registration System (IDRS)
- ◆ Indiana Immunization Registry
- ◆ Food Protection Complaint Form
- ◆ Public Health Training for Providers (CMEs)
- ◆ Nurse Aide Registry
- ◆ Radiography License Renewal
- ◆ Forms.IN.gov

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Top FAQs

[I Want To...](#)

1. Where do I obtain a copy of an Indiana birth or death certificate?
2. As an adopted child, how do I get information about my birth parents?
3. What is INShape Indiana?
4. What is Living a Healthy Life with Chronic Conditions?
5. Is there an INShape Indiana representative in my county?

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Chemicals/Environmental Epidemiology

Contact Information

Disaster Information

Health Nuisances, Public Nuisances & Property Nuisances

Local Health Departments - Indiana

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[Environmental Public Health Home](#) > [Technology New to Indiana](#) > [Approved Technologies](#)

Approved Technologies

The department maintains the list below of TNI that have been approved. With each technology that has been approved, a link is provided to the department standards for that technology. These standards are the basis for plan review, construction approvals, training, design and installation, and operation and maintenance (O&M), if applicable.

Information is grouped under four technology categories: "[Components](#)," "[Secondary Treatment Units](#)," "[Soil Absorption Fields](#)," and "[Pretreatment Devices](#),"

Each listing includes the following:

- Manufacturer information (listed alphabetically by manufacturer's name);
- The name of the technology;
- Its status: general approval, conditional approval, and project-by-project approval;
- Date of approval;
- Description of the technology;
- Brief comments regarding the approval; and
- A link to the standards that are the basis for plan review, construction approvals, training, design and installation, and operation and maintenance (O&M), when applicable.

Components

Onsite system components are evaluated on a case-by-case basis. Components may include distribution boxes, distribution devices, siphons, pressure manifolds, etc.

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Web sites for today's materials and additional resources:

www.eph.isdh.in.gov (Indiana State Dept of Health)

www.iehaind.org (Wastewater Management Committee)

www.iowpa.org (Indiana Onsite Wastewater Professional Assoc.)

(Jan. 28-29, 2013-Camp Camby)

www.extension.purdue.edu/NENV (Purdue University)

www.pumpershow.com (Feb. 25-28, 2013-Indy)