

IEHA Wastewater Management Committee
Guidance Document
Septic System Design – 3/3/2006

In-Ground Systems (Gravity and Flood Dosed)

Compute the design flow and the trench area required, and then pick the type of system to be installed based on the soil loading rate and the depth of the limiting layer (Guidance Document “Septic System Selection,” parts II A, B, C, and D). For purposes of this document, the choices will be gravity-feed vs. dosed (alternating-field systems are a variation on these two types). Next, specify the components that will be used; each individual component must meet the requirements of Rule 410 IAC 6-8.1.

- I. Sewer pipes
 - A. Sewer pipes must meet the requirements for minimum and maximum slope (4 inches fall per 25 feet of run and 36 inches per 25 feet, respectively).
 - B. Since sewer pipes require more slope than connecting pipes further downstream in the system, in flat locations it is generally more successful to keep the septic tank near the house and thus keep the sewer pipe as short as possible. The septic tank must, however, be no less than 10' from the house.
- II. Septic tank
 - A. Pick the correct size tank(s) for the number of bedrooms and/or bedroom equivalents in the house (Table III of Rule). You can use two smaller tanks in series to replace a single large tank.
 - B. Make sure there is positive slope from the septic tank outlet to the next component in the system (D-box or dosing tank).
- III. Dosing tank and force main, if required
 - A. The dosing tank must hold the designed daily flow of the system plus any drainback from the force main. In addition, it must have sufficient capacity to keep the pump submerged and to allow space for the alarm float. In practical terms, this generally means it should be the same size as the septic tank or one size smaller.
 - B. The force main can be installed either uphill or downhill to the distribution box, but there should be no low spots in which water can stand after the pump shuts off.
 - C. The pump must be sized according to the total dose, the elevation head from the off float of the pump to the highest point in the force main, and the friction losses in the delivery pipe. Consult Tables VII and VIII of the Rule, noting that you have to pick a value for the discharge rate from Table VII before you can use Table VIII. You will need pump curves from the manufacturer to specify a particular model of pump
- IV. Distribution box(es) and header pipes
 - A. Except in the case of very large systems, a single distribution box should be used. Boxes are available with up to twelve outlets.
 - B. Header pipes must be designed and installed so that each pipe takes equal amounts of effluent from the distribution box. The pipes may have varying degrees of fall, but each pipe must have measurable positive slope.
 - C. Each header pipe must contain at least five feet of solid pipe before connecting to the perforated absorption field pipe.
- V. Absorption field – since the total field area has been calculated, design a set of trenches that will work on the site. Consider the following points:
 - A. There must be room for the trenches and subsurface drain in the area that was tested. All soil test borings within the field should be satisfactory.

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- B. The septic field area must not be in a drainageway or in an area that is prone to flooding.
- C. Make sure the field is a sufficient distance from wells, ponds, property lines, structures, etc. (See Table II, 410 IAC 6-8.1)
- D. Trenches must be at least 7.5 feet apart, measured on-center. Subsurface drains must be at least ten feet from the nearest trench, measured trench edge to trench edge. (25 feet for $slr \geq .75$)
- E. Trenches must be designed along contour lines, so the trench bottoms will remain at a constant depth relative to the ground elevation. Trench bottoms must be level.
- F. In general, design the system with as few trenches as possible, as long as no trench is longer than 100 feet. It is easier to install a small number of long trenches than a larger number of short trenches. Of course, the available area will determine how long the trenches can be.
- G. Each trench served by the same distribution box must have the same trench bottom area.
- H. Keeping the trenches as shallow as possible maximizes the depth of soil available for absorbing effluent. Trenches will need 12" – 24" soil cover over the top of the aggregate. Remember that no trench may be shallower than 10" or deeper than 36" under ideal soil conditions; however, note that trench depths in many soils will be more restrictive.

VI. Drainage

- A. The subsurface drain should be designed for installation two inches into any soil horizon with a soil loading rate less than $0.25 \text{ gpf}^2/\text{day}$, if present.
- B. If no compact till is found within 60" of the surface, the subsurface drain must lower the water table at least 24" below the bottom of the center of the absorption field.
- C. There must be an adequate outlet for the drain which is, of necessity, deeper than the deepest portion of subsurface drain. All subsurface drains must have a slope of no less than 0.2 feet per 100 feet.
- D. A surface diversion is required when the elevation of the ground surface adjacent to the soil absorption field site is higher and may be expected to drain water onto the soil absorption field site.

VII. Putting it all together

- A. Get, or make, a topographic map of the property, as appropriate for the design process.
- B. Determine the elevation of the absorption trenches and the elevation at which the sewer pipe leaves the house. These define the limits between which you must work. Note that perimeter drain outlet elevation may affect maximum absorption trench depth.
- C. Design the system: sewer pipe → septic tank → connecting pipe → (dosing tank, if used → force main) → distribution box → header pipes → absorption trenches. Design the perimeter drain, if required. Check elevations at each end of each component.
- D. A dosing tank and pump may be used to overcome differences in elevation on sites where soil loading rate and daily design flow allow gravity.