

## Indiana Standards for Drainage Systems

Soils with shallow seasonal high water tables can often be drained to allow placement of the infiltrative surface of the soil absorption field (SAF) in unsaturated soils, at an appropriate invert elevation above saturated soil conditions. Subsurface drainage systems, often in conjunction with surface diversions, are used to accomplish the necessary drainage to render the site suitable for an on-site sewage system. 410 IAC 6-8.3-59, *Residential On-site Sewage Systems*, and 410 IAC 6-10.1-63, *Commercial On-site Sewage Systems*, set the minimum standards for these subsurface drainage systems

### I. Definitions

Several definitions are pertinent to subsurface drainage systems for on-site sewage systems.

- A. Interceptor drain: See 410 IAC 6-8.3-20 and 410 IAC 6-10.1-22 [Also see Figure 3 of this document]
- B. Main drain: Part of a subsurface drainage system that connects to an interceptor drain, perimeter drain, or segment drain to a point of surface discharge or to an existing or proposed subsurface drain that discharges to the surface. [See Figures 2, 3, & 4 of this document]
- C. Perimeter drain: See 410 IAC 6-8.3-27 and 410 IAC 6-10.1-29 [Also see Figures 2 & 5 of this document]
- D. Seasonal high water table: See 410 IAC 6-8.3-38 and 410 IAC 6-10.1-35
- E. Segment drain: See 410 IAC 6-8.3-39 and 410 IAC 6-10.1-36 [Also see Figure 4 of this document]
- F. Subsurface drainage system: See 410 IAC 6-8.3-49 and 410 IAC 6-10.1-46 [Also see Figures 2, 3, & 4 of this document]

### II. Surface diversions

A surface diversion is a natural or manmade channel/barrier that changes the course of overland flow of water around and away from a soil absorption field site.

A surface diversion is used to direct surface runoff away from a SAF. See 410 IAC 6-8.3-59(a) and 410 IAC 6-10.1-63(a) for requirements for surface diversions. When a surface diversion is constructed in combination with a subsurface drainage system, the lowest elevations of the surface diversion should be upslope of, or directly above, the subsurface drain trench. [See figure 1]

### III. Subsurface drainage systems

A subsurface drainage system is used to collect and divert subsurface water to lower a seasonal high water table, and to prevent movement of subsurface water into a SAF site. There are two types of subsurface drains used for this purpose: perimeter drains and interceptor drains. Each of these drains flow by gravity to a main drain. Either may also be used in conjunction with a segment drain, when necessary. Segment drains are installed in between two soil absorption fields in the same on-site sewage system. See 410 IAC 6-8.3-59(b) through (o) and 410 IAC 6-10.1-63(b) through (o) for requirements for subsurface drainage systems.

When the site slope is equal to or less than 2%, the subsurface drainage system must be a perimeter drain, surrounding the SAF on all four sides. If the site slope is greater than 2%, the subsurface drainage system may be an interceptor drain, constructed only on the upslope side(s) of

the SAF. However, for residential systems, the local health department may require the installation of a perimeter drain on sites with slopes equal to or greater than 2%. All commercial systems which require subsurface drainage must have a perimeter drain which completely surrounds the SAF.

Subsurface drain trenches installed upslope of the SAF must be backfilled with aggregate in interceptor and perimeter drains. Local health departments may require the subsurface drain trenches on the sides or downslope of the SAF, and segment drains, to be filled with aggregate. The aggregate used must meet the provisions of 410 IAC 6-8.3-68 or 410 IAC 6-10.1-76, whichever is applicable.

Subsurface water flows by gravity, i.e. it flows from higher to lower elevations in the landscape. If a subsurface drainage system is not properly located and constructed, it will allow subsurface water flowing from higher elevations to enter the soil absorption field site, defeating one of its purposes.

To provide an outfall for the drain, one or both ends of the pipe must be extended downslope to a point where it intercepts the ground surface or connects to another subsurface drain. If both ends of an interceptor drain cannot be extended to the ground surface, the upslope end should be extended some distance along the surface contour beyond the end of the SAF. If not done, ground water that flows around the end of the drain can make the drain ineffective. In a similar manner, if the side drain trenches of an interceptor drain or perimeter drain are not filled with aggregate, water moving from a higher elevation may flow into the SAF from the sides, depending on the topography of the site. Therefore, any portion of the subsurface drain trench that is upslope from any reference point in the soil absorption field should be backfilled with aggregate in accordance with 410 IAC 410 IAC 6-8.3-59(i) or 410 IAC 6-10.1-63(i), whichever is applicable.

410 IAC 6-8.3-59(d) and (e) and 410 IAC 6-10.1-63(d) and (e) prescribe the drain depths for subsurface trench systems and elevated sand mound systems when the drain cannot be constructed at least 2 inches into massive clay, glacial till, or fragipan. Figures 5 and 6 show schematics for drain depths for subsurface soil absorption fields, to show the influence that slope has on drain depth. The drain depth for elevated sand mounds is a set depth from the ground surface – therefore, slope will not have the same impact on drain depth.

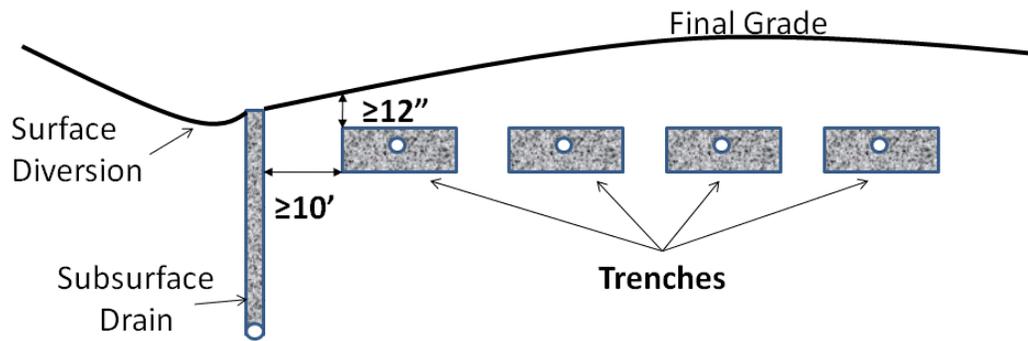
Both the residential and commercial rules allow the use of drainage calculations to show that a drain at a different depth will accomplish the necessary drawdown of the seasonal high water table. Calculations may also be used to determine drain trench depth and/or spacing if the drains parallel to the long axis of a SAF are more than 65 feet [410 IAC 6-8.3-59(f)(3) and 410 IAC 6-10.1-63(f)(3)].

#### **IV. Disruption of Existing Subsurface Drains**

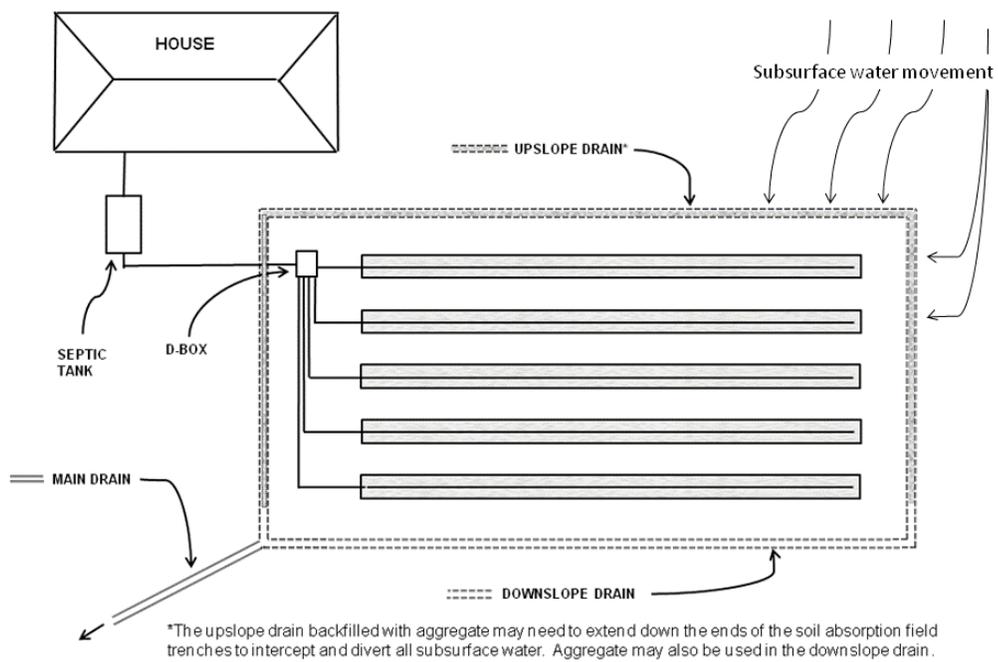
Although not addressed in 410 IAC 6-8.3 or 410 IAC 6-10.1, the presence of existing subsurface drains must be recognized and dealt with. Therefore, the following procedure should be implemented to deal with pre-existing drains.

- A. The flow from an existing subsurface drain must not cross a SAF.
- B. Existing subsurface drain pipe must be:
  1. Routed around the SAF, or
  2. Connected to an existing subsurface drain that does not cross the SAF.
- C. Drain pipe disturbed during installation of a SAF or subsurface drain must be abandoned in a manner that will not permit migration of effluent through or along the drain pipe.
- D. The location of all drain pipes disturbed during installation of a SAF, and the method of compliance with the requirements of this section, must be documented in the permit file for the on-site system.

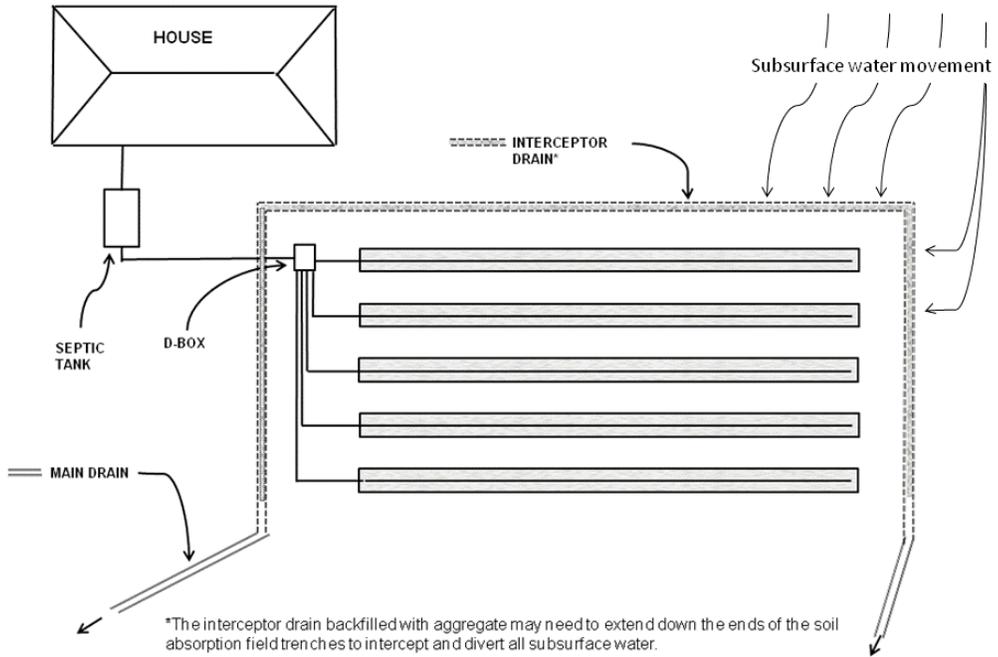
**Figure 1: Surface Diversion in Conjunction with a Subsurface Drain**



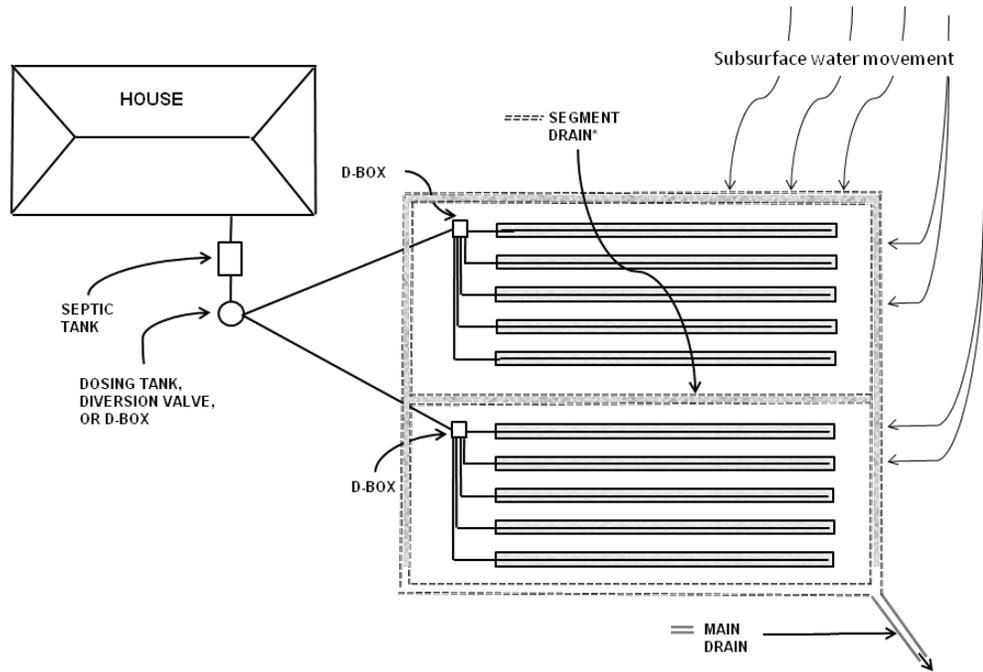
**Figure 2: Subsurface Perimeter Drain on a Sloping Site**



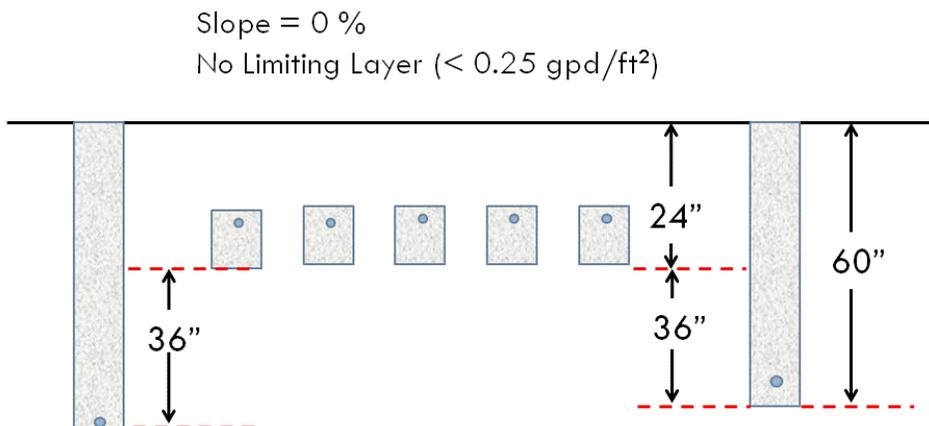
**Figure 3: Subsurface Interceptor Drain on a Sloping Site**



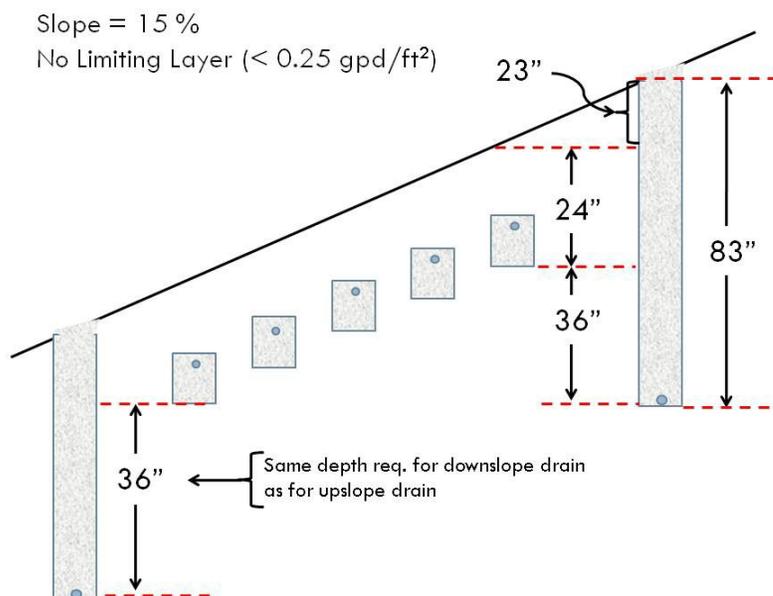
**Figure 4: Subsurface Perimeter Drain with a Segment Drain on a Sloping Site**



**Figure 5: Perimeter Drain Depth for a SAF on a Level Site**



**Figure 6: Perimeter Drain Depth for a SAF on a Sloping Site**



Approved: January 3, 2011  
Effective: January 1, 2011  
Revised: November 19, 2012

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