Subsurface Drain

A subsurface drain is a perforated pipe, tubing or tile installed below the ground surface to intercept and transport water to a satisfactory outlet. The subsurface drain can be connected to the storm sewer system or another infiltration-based practice.

Subsurface drains should be installed with infiltration based practices when the area is:

- When post-construction soil infiltration rates are not adequate.
- Located near sensitive infrastructure and potential for flooding is likely.
- Used for filtering storm flows from gas stations or other pollutant hotspots (requires an impermeable liner in the infiltration-based practice itself).

Recommended Guidelines

1. *Design Considerations*

   1.1. Slope

      1.1.1. Subsurface drains should be sloped at a minimum of 0.5 percent.

   1.2. Design flow

      1.2.1. The drain should be graded to achieve the minimum velocity required to prevent silting, 1.4 cubic feet per second.

   1.3. Post-construction soil

      1.3.1. The soil should have depth and sufficient permeability to permit installation of an effective drainage system at a depth of 2 to 6 feet.

2. *Construction Considerations*

   2.1. Subsurface drain

      2.1.1. The pipe diameter will depend on hydraulic capacity required - minimum diameter is 4 inches, with 4 to 8 inches being most common. The subsurface drain must carry the required capacity without pressure flow.

      2.1.2. The use of a perforated pipe to collect and transport excess runoff is optional.

   2.2. Aggregate

      2.2.1. The basic infiltration trench uses aggregate to promote filtration. The aggregate is normally 1 to 3 inches in diameter, which provides a void space of 40 percent.

2.2.2. The stone aggregate should be washed to remove dirt and fines before placement in the trench.

2.2.3. 3/8" to 1/2" pea gravel can be substituted as the aggregate in the top foot of the trench, as it improves sediment filtering and maximizes pollutant removal.

2.2.4. Where the subsurface drain will be in contact with soil, wrap the drain tile in filter fabric extending 2 feet on either side of the subsurface drain. The fabric should overlap each side of the trench in order to cover the top of the aggregate layer.

2.3. Outlet control

2.3.1. The subsurface drain can be connected to a downstream open conveyance (bioswale); another bioretention cell, daylighted to a dispersion area, or connected to a storm sewer system.

2.4. Observation well

2.4.1. A 6-inch rigid non-perforated observation pipe or other maintenance access should be connected to the subsurface drain every 250 to 300 feet to provide a clean-out port, as well as an observation well to monitor dewatering rates.

3. Maintenance Considerations

3.1. Drain outlets should be inspected periodically to verify they are in good working order.

Subsurface Drain Resources

- City of Tacoma, 2001, Volume II – Construction Stormwater Pollution Prevention
- Minnesota Stormwater Manual, March 2000, Chapter 4.11 Flow Controls: Subsurface Drains
- LID Technical Guidance Manual for Puget Sound, January 2005, Chapter 6.1 Bioretention Areas