



Infiltration Trench

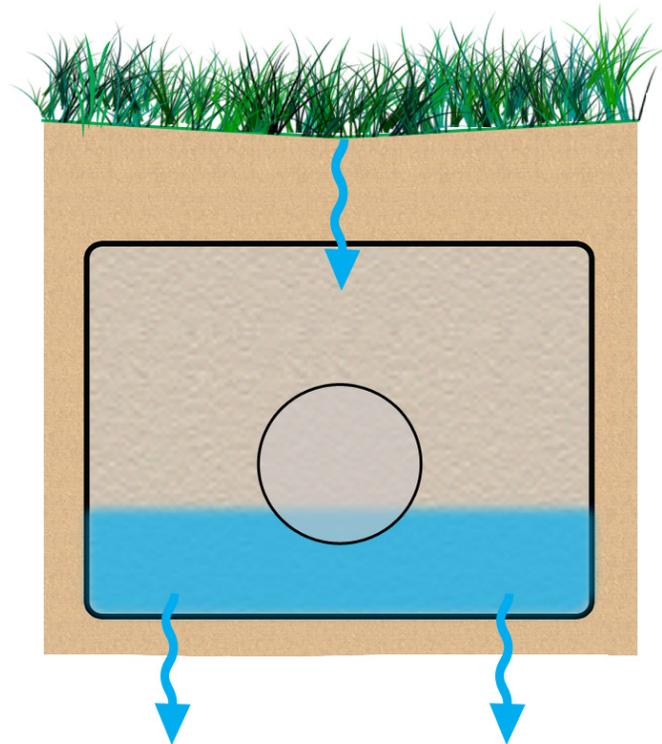


Image: Cahill Associates, Inc.

An Infiltration Trench is a linear infiltration system, designed like an infiltration basin, yet shaped like a trench (long and thin). The Trench is topped with vegetation (buried beneath soil and/or plantings) or with hardscaping materials, such as brick or pavers.

Important components of an Infiltration Trenches include:

- Roof leader or **Downspout** connection,
- a minimally sloping, continuously-**perforated pipe** (to distribute stormwater, allowing it to infiltrate into the trench),
- a **stone**-filled trench (No. 3 stone), and
- wrapped in **geotextile** fabric (to keep soil from moving into the cavities in the stone, eventually filling up the Trench and reducing its ability to absorb runoff volumes in a storm)

Infiltration Trenches may be constructed at edges of impervious areas, receiving surface runoff from impervious areas (drives, turnarounds, parking areas, even rooflines if not guttered). The bottom of the Trench must be reasonably level so that runoff entering the Trench does not move rapidly, reducing chances of soaking into the ground; sloping trench bottoms create potential for erosion in the Trench.

To deal with larger storm events, however, the Infiltration Trench should be designed with some sort of **positive overflow** - some way to let larger runoff volumes from the larger storms be safely discharged.



An Infiltration Trench can be constructed by a team of professionals depending on your stormwater storage needs

Images: Cahill Associates, Inc.

Infiltration Trenches should be designed in accordance with the *Guidelines for Infiltration Systems* described in the *Pennsylvania Stormwater BMP Manual*. The width and depth can vary; it is recommended that Infiltration Trenches be limited in depth to not more than six (6) feet of stone and can be 2 or 3 feet deep (preferably below the frost line, guaranteeing infiltration even in cold winter months). An infiltration trench can certainly be hand dug.

Benefits



Benefits

There are many benefits to an infiltration trench, similar to other infiltration BMPs discussed in this document, including:

- improved water quality
- reduced runoff volume and rate
- increased groundwater recharge
- aesthetic enhancement
- more cost-effective than piping
- significantly slower rate of runoff conveyance compared to piping



An Infiltration Trench can be constructed by a homeowner with minimal expense and a lot of sweat!



Images: Cahill Associates, Inc.

Costs



Cost Considerations

The construction cost of Infiltration Trenches can vary greatly depending on the configuration, location, site-specific conditions, etc. Cost data typically assume that the Infiltration Trench has been professionally installed and not installed by the homeowner, possibly even hand dug. Typical construction costs in 2003 dollars range from \$4 - \$9 per cubic foot of storage provided (SWRPC, 1991; Brown and Schueler, 1997). Annual maintenance costs have been reported to be approximately 5 to 10 percent of the capital costs (Schueler, 1987). If installed by the homeowner, costs can be dramatically reduced.

Ease of Development/Construction

Most Trenches require a continuously perforated pipe, extending the length of the Trench, with a positive flow connection designed to allow higher runoff flows to be conveyed safely through the Infiltration Trench. The slope of the Infiltration Trench bottom should be level or with a slope no greater than 1%. A level bottom assures even water distribution and infiltration. Depending upon expected "dirtiness" of the runoff, cleanouts or inlets should be installed at both ends of the Infiltration Trench and at appropriate intervals to allow access to the perforated pipe. Because roof runoff tends to be relatively "clean" and generally has lower sediment levels, roof runoff often is ideally suited for discharge into an Infiltration Trench.

A cleanout with sediment sump between the building and Infiltration Trench should be considered, dependent upon size of roof area, its quality, etc. If runoff entering the Infiltration Trench is expected to be "loaded" with sediment or other pollutants which may cause clogging of the Trench, some sort of filtering device (e.g., Water Quality Inlet or Catch Basin with Sump as described in the Pennsylvania Stormwater BMP Manual) has to be provided.

An Infiltration Trench can be constructed in a woodland (with care not to disturb roots), helping to nourish the existing vegetation.



Image: Cahill Associates, Inc.

Aesthetics



Aesthetics

Infiltration Trenches, when installed below the ground surface, are invisible and have no aesthetic impact. When covered with turf or planted with some other appropriate vegetation, Infiltration Trenches can be attractive, integrated into the landscape.

Township Review

In most cases, there should be no need for special Township review, permitting actions, and so forth when Infiltration Trenches are developed - unless the area being disturbed was quite large, thereby qualifying as an action which triggers related permits, reviews, approvals. The homeowner may want to consult with both the Township Engineer and an engineering design professional to aid the homeowner in the design and construction of the Infiltration Trench.

Site Constraints

As with all infiltration BMPs, runoff will only be infiltrated if there is an adequate thickness of soil present before reaching bedrock, if there is no seasonally high water table, and if the soil itself drains reasonably well. Determining all of these constraints is set forth in some detail in the *Pennsylvania Stormwater BMP Manual* (Protocols 1 and 2), although the observant homeowner may be able to make these judgments herself/himself, after years of experience at the site. These Protocols also set forth recommended guidelines for setbacks from septic system disposal areas, from wellheads, from basements and strongly argue that loading rates of runoff not be excessive (i.e., large areas of impervious areas draining into any sort of infiltration device with a much smaller infiltration base).



Image: Cahill Associates, Inc.

Variations

If Infiltration Trenches are located between impervious driveways or impervious paved areas, make sure the sub-surface drainage direction is to the downhill side (i.e., away from sub-base of the conventional pavement), or located lower than the impervious sub-base layer. Proper measures must be taken to prevent water infiltrating into the sub-base of impervious pavement. Infiltration Trenches may also be located down a mild slope by "stepping" the sections down the slope, on or parallel to contour constructed as a series of "steps," if necessary. A level or nearly level bottom is recommended for an even and gradual distribution and infiltration of the runoff.



Image: PA Stormwater BMP Manual

Maintenance



Maintenance

Vegetation on the surface of the Infiltration Trench should be maintained in good condition, and any bare spots re-vegetated as soon as possible. Vehicles should not be parked or driven on a vegetated Infiltration Trench, and care should be taken to avoid excessive compaction by mowers. If catch basins and inlets have been included in the design, they should be inspected and cleaned at least 2 times per year.