

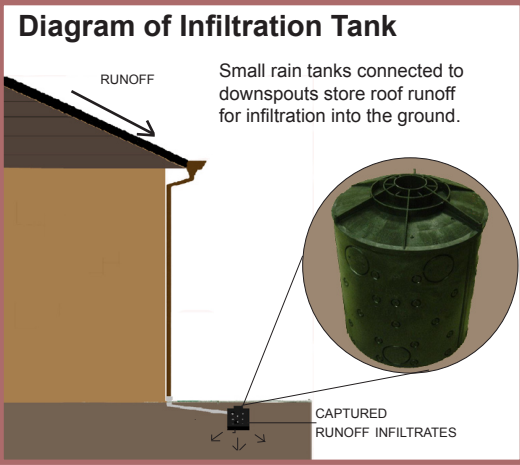
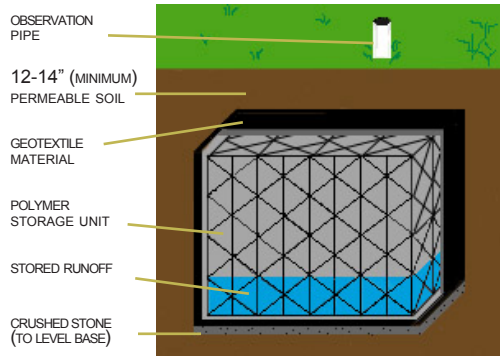
Sub-Surface Infiltration Areas

PURPOSE: Sub-surface infiltration areas reduce the volume of stormwater runoff leaving a site by capturing runoff for storage underground. Over time, the stored runoff percolates down through the soil to recharge the groundwater supply.

Sub-surface infiltration applications range from simple tanks that are suited to individual house sites to large-scale, high-tech commercial and industrial installations. Some of the products and materials used for underground stormwater storage are manufactured polymer cells and tanks, arched chambers, pipes, and stone. Storage capacities for these products range from 95% of the total storage area for polymer units to 40% or less for crushed stone.

Construction consists of excavating a trench or pit, placing the storage media, then covering the storage area with soil. Polymer cell units are wrapped with geotextile material to keep dirt from filling in the storage area. Stormwater can be directed to the infiltration area from roofs, paved areas, or any other impermeable surface. Infiltration rates vary from site to site, dependent upon soils, depth to groundwater, and other site conditions.

Diagram of Infiltration Area using Polymer Storage Cells



Benefits and Uses

- Recharges groundwater supply
- Reduces peak velocity and volume of stormwater runoff to streams and storm sewer systems
- Alleviates flooding and erosion downstream
- Reduces space required for stormwater detention/retention basins
- Minimal to moderate cost to install and maintain
- Space above infiltration bed is usable as lawn, landscaped area, courtyard, etc.
- Applicable to all types of sites (residential/commercial/industrial)
- Small tank units (featured above) are easily adapted to most existing individual home sites

Additional Resources

PA Department of Environmental Protection
www.depweb.state.pa.us - search for Pennsylvania Stormwater Best Management Practices Manual

US Environmental Protection Agency
www.epa.gov

Cahill Associates
www.thcahill.com - click on "Technologies" for project examples and general information

Low Impact Development Center
www.lowimpactdevelopment.org

Stormwater Manager's Resource Center
www.stormwatercenter.net

Metropolitan Council Environmental Services
www.metrocouncil.org - click on "Environmental Services" to find the link to the *Urban Small Sites BMP Manual*

General Design Considerations

- Excavate bottom of infiltration bed level to slope of less than 1%
- Sub-grade should not be compacted to permit maximum infiltration
- Soil should consist of less than 20% clay content, and less than 40% clay/silt content
- Infiltration areas work best in porous soils, and do not function as efficiently in areas of dense clay soils, as they are prone to clogging
- Allow three feet of vertical buffer between the bed bottom and seasonal high-water table to prevent contamination of groundwater; allow two feet of vertical buffer above bedrock
- Design should include overflow drainage to remove excess stormwater
- Large residential/commercial/industrial site installations should be designed by a design professional
- A homeowner doing a single retrofit installation would not need to hire a design professional as long as overflow drainage is included
- Do not install infiltration bed within 10 feet of basement walls or where sub-surface drainage may run toward a basement
- Space above the infiltration bed can be paved or planted with vegetation
- Regular maintenance is required to prevent the system from clogging