6.7 Infiltration Trench

Figure 6-27. Infiltration Trench. Source: CASQA, 2003

Best Uses

- Limited space
- Adjacent to roadways
- Landscape buffers
- A landscape design element

Advantages

- Increases groundwater recharge
- Removes suspended solids
- Used with other BMPs
- No surface outfalls
- Aesthetic and unobtrusive

Limitations

- Fails with no maintenance
- Stable soils must be used
- No high water tables
- No type C and D soils
- No steep slopes

Infiltration trenches are appropriate only in areas with well-drained (Type A or B) native soils. Project applicants may wish to consult with Mosquito Abatement District staff for guidance regarding mosquito controls. An infiltration trench is a long, narrow, excavated trench backfilled with a stone aggregate, and lined with a filter fabric. Runoff is stored in the void space between the stones and infiltrates through the bottom and into the soil matrix. Infiltration trenches perform well for removal of fine sediment and associated pollutants. Pretreatment using buffer strips, swales, or detention basins is important for limiting amounts of coarse sediment entering the trench, which can clog and render the trench ineffective. Infiltration practices, such as infiltration trenches, remove suspended solids, particulate pollutants, coliform bacteria, organics, and some soluble forms of metals and nutrients from stormwater runoff. The infiltration trench treats the design volume of runoff either underground or at grade. Pollutants are filtered out of the runoff as it infiltrates the surrounding soils. Infiltration trenches also provide groundwater recharge and preserve base flow in nearby streams.

Design and Sizing Guidelines

- The infiltration trench shall be sized to store the full 48-hour water quality volume.
- In-situ / undisturbed soils shall have a low silt and clay content and have percolation rates greater than 0.5 inches per hour. Acceptable soil texture classes include sand, loamy sand, sandy loam and loam. These soils are within the A or B hydrologic group. Soils in the C or D hydrologic groups shall be avoided. In-situ testing is required to confirm percolation rate of trench site.
- The water table shall be at least 10 feet below the trench to prevent potential ground water contamination. Trenches shall also be located at least 100 feet upgradient from water supply wells. A set back of 100 feet from building foundations is recommended unless a shorter distance is approved by geotechnical engineer and local standards.

- When the drainage area exceeds 5 acres, other treatment measures shall be considered.
- The drainage area must be fully developed and stabilized with vegetation before constructing an infiltration trench. High sediment loads from unstabilized areas will quickly clog the infiltration trench. Runoff from unstabilized areas shall be diverted away from the trench into a construction period sedimentation control BMP until vegetation is established.
- Infiltration trenches work best when the upgradient drainage area slope is less than 5 percent. The downgradient slope shall be no greater than 20 percent to minimize slope failure and seepage.
- The trench surface may consist of stone or vegetation with inlets to evenly distribute the runoff entering the trench. Runoff can be captured by depressing the trench surface or by placing a berm at the down gradient side of the trench. The basic infiltration trench design utilizes stone aggregate in the top of the trench to promote filtration; however, this design can be modified by substituting pea gravel for stone aggregate in the top 1-foot of the trench. Typically, there is about 35 to 40% void space within the rock.
- Use trench rock that is 1.5 to 2.5 inches in diameter or pea gravel to improve sediment filtering and maximize the pollutant removal in the top 1 foot of the trench.
- Infiltration trenches can also be modified by adding a layer of organic material (peat) or loam to the trench subsoil. This modification enhances the removal of metals and nutrients through adsorption. The modified trenches are then covered with a permeable geotextile membrane overlain with topsoil and grass or stones.
- A vegetated buffer strip at least 5-feet wide, swale or detention basin shall be established adjacent to the infiltration trench to capture large sediment particles in the runoff. If a buffer strip or swale is used, installation should occur immediately after trench construction using sod instead of hydroseeding. The buffer strip shall be graded with a slope between 0.5 and 15 percent so that runoff enters the trench as sheet flow. The vegetated swale or detention basin shall be sized according to Sections 6.1 and 6.8, respectively.
- If runoff is piped or channeled to the trench, a level spreader shall be installed to create sheet flow.
- Remove any smeared soiled surfaces and provide a natural soil interface into which water may percolate. Place permeable filter fabric around the walls and bottom of the trench and 1 foot below the trench surface. The filter fabric shall overlap each side of the trench in order to cover the top of the stone aggregate layer. The filter fabric prevents sediment in the runoff and soil particles from the sides of the trench from clogging the aggregate. Filter fabric that is placed 1 foot below the trench surface will maximize pollutant removal within the top layer of the trench and decrease the pollutant loading to the trench bottom, reducing frequency of maintenance.
- The required trench volume can be determined by several methods. One method calculates the removed volume based on capture of the treatment event, which is defined in Table 5-1 in Chapter 5. Trench depths are usually between 3 and 8 feet, with a depth of 8 feet most commonly used.
- A site-specific trench depth can be calculated based on the soil infiltration rate, aggregate void space, and the trench storage time. The stone aggregate used in the trench is normally 1.5 to 2.5 inches in diameter, which provides a void space of 35 to 40 percent. A minimum drainage time of 6 hours shall be provided to ensure satisfactory

pollutant removal in the infiltration trench. Trenches may be designed to provide temporary storage of storm water.

- The infiltration trench shall drain within 5 days to avoid vector generation.
- An observation well is recommended to monitor water levels in the trench. The well can be 4 to 6-inch diameter PVC pipe, which is anchored vertically to a foot plate at the bottom of the trench.

MAINTENANCE

- A maintenance agreement shall be provided.
- The maintenance agreement shall state the parties' responsibility for maintenance and upkeep.
- Routine inspection and maintenance shall be designed into the life performance of the facility. Maintenance shall be performed based on the results of these routine inspections. The principal maintenance objective is to prevent clogging, which may lead to trench failure.
- Infiltration trenches shall be inspected after large storm events and any accumulated debris or material removed. A more thorough inspection of the trench shall be conducted annually. Annual inspection shall include monitoring of the observation well to confirm that the trench is draining within the specified time.
- Trenches with filter fabric shall be inspected for sediment deposits by removing a small section of the top layer.
- If inspection indicates that the trench is partially or completely clogged, it shall be restored to its design condition.
- Trash, grass clippings and other debris shall be removed from the trench perimeter and be disposed properly. Trees and other large vegetation adjacent to the trench shall also be removed to prevent damage to the trench.

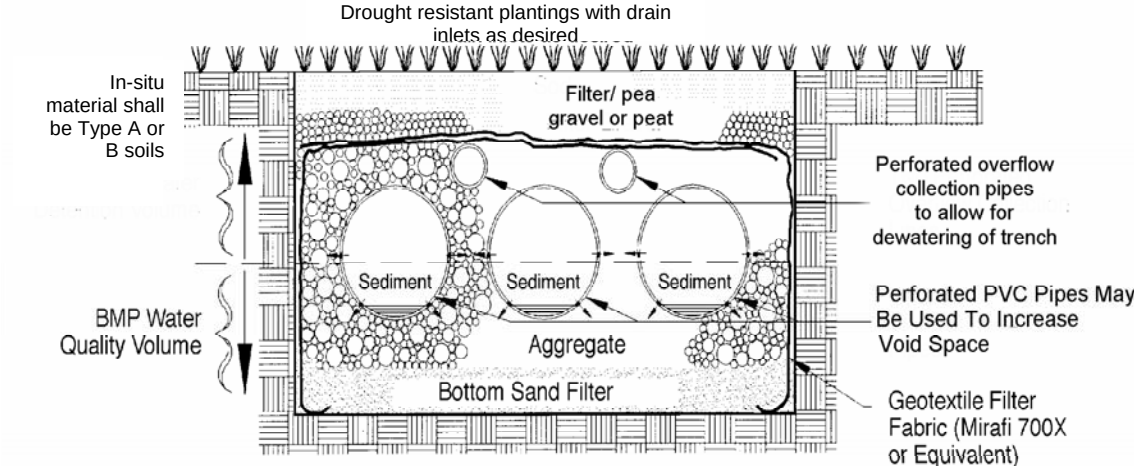

Figure 6-28. Cross-Section, Infiltration Trench.

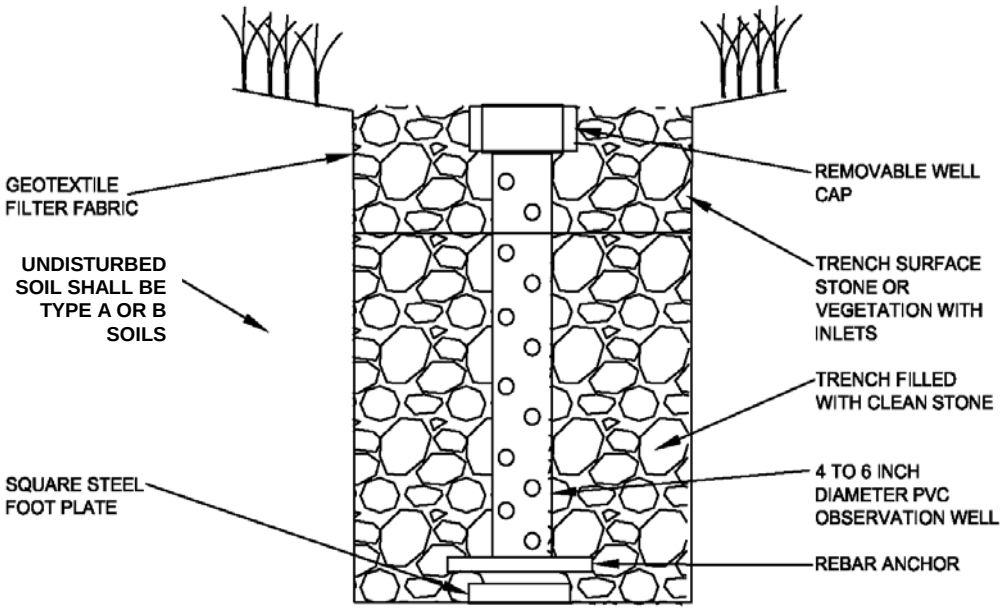

Figure 6-29: Cutaway view: Infiltration Trench with Observation Well