

6.2.3 Engineered Soil

PURPOSE & DESCRIPTION

Filtrex® Engineered Soil is a **permanent storm water infiltration practice** used to reduce storm runoff volume and loading of sediment and soluble pollutants, such as nutrients, heavy metals, and petroleum hydrocarbons, from a contributing watershed or drainage area. Engineered soil is manufactured on site using Filtrex® GrowingMedia™ and native soil. Engineered soils manage storm water by:

- Reducing runoff volume through increased soil water holding capacity, and infiltration,
- Increasing infiltration by reducing runoff velocity,
- Reducing pollutant loads by reducing runoff volume,
- Chemical adsorption of nutrients and metals to humus colloids,
- Recycling nutrients and metals by plant uptake and microbial decomposition and uptake.

APPLICATION

Engineered soils are used in post-construction applications with permanent vegetation to increase infiltration and reduce sediment and soluble pollutant loading to receiving waters. Typically engineered soils are constructed for vegetated storm water collection systems; however, engineered soils can be used in any landscape where overland sheet flow and subsurface flow (interflow) exists.

Applications where engineered soils may be required include:

- Bioretention ponds and rain gardens,
- Storm water and sediment retention ponds,
- Parking lot infiltration islands,
- Vegetated (green) roof systems,
- Upslope from storm water receiving or conveyance systems, including channels, ditches, streams, rivers, lakes, and wetlands,
- Runoff receiving areas from impervious surfaces, hardscapes, and source pollutant landscapes, including roads, highways, parking lots, and land disturbing activities.

Engineered soil can also be used to reduce runoff velocity leaving or entering locations described above. Reducing runoff velocity will increase infiltration of storm runoff, thereby reducing runoff volume and pollutant loading (by increasing the propensity for sediment deposition and decreasing the propensity for pollutant transport).

Engineered soils are generally used in permanent, post-construction applications where a variety of plant material including legumes, grasses, shrubs and trees can be utilized.

INSTALLATION

1. Engineered soils shall meet Filtrex Engineered Soil and Filtrex Certified GrowingMedia Specifications.
2. Call Filtrex at 877-542-7699 or visit www.filtrex.com for a current list of installers and distributors of Filtrex products.
3. Engineered soils will be placed at locations indicated on plans as directed by the Engineer.
4. Engineered soils shall be installed down slope and around areas contributing overland and subsurface storm water flows.
5. Engineered soils shall not be installed in areas of concentrated runoff flow without soil stabilization or armoring devices.
6. Engineered soils shall not be installed on slopes greater than 3:1.
7. Engineered soils installed on slopes greater than 4:1 may include slope stabilization practices.
8. Engineered soils should not be installed in wet or frozen soils or prior to seasons where growing vegetation is difficult.

9. Care should be given to existing root systems of trees and shrubs during construction of Engineered soil.
10. Seed shall be thoroughly mixed with the GrowingMedia prior to construction of Engineered soil or surface applied with GrowingMedia at time of application.
11. Engineered soils shall be applied evenly to 100% of the area where Engineered soil is required.
12. Land surface shall be cleared of debris, including rocks, roots, large clods, and sticks prior to Engineered soil installation or tillage.
13. Soil may be prepared prior to GrowingMedia application by roto-tilling the native soil.
14. If soil is too dense for roto-tiller soil ripping may be used as a prerequisite.
15. Subsoil may be scarified to a depth of 4 in. (100mm) prior to GrowingMedia application.
16. GrowingMedia shall be evenly applied to the soil surface at a depth of 2-4 in (50-100mm) or 270-540 cubic yards/ac (513-1026 cubic meters/ha) using a pneumatic blower, spreader, or similar device (small installations may be done manually) and thoroughly roto-tilled into the native soil (several passes may be required); or
17. GrowingMedia shall be mixed with native soil prior to construction using a loader, soil mixer, or similar equipment.
18. Soil incorporation and tillage shall be to a minimum of 6 in (150mm) (unless restricted by tree roots or other natural constraints) and a maximum of 12 in (300mm); or
19. If subsoil is scarified to 4 in (100mm), soil incorporation should be 6-8 in (150-200mm).
20. Engineered soil shall be thoroughly watered after installation and allowed to settle for 1 week.
21. Fine grading and hand rolling of engineered soil may be required after installation.

INSPECTION & MAINTENANCE

Routine inspection should be conducted within 24 hrs of a runoff event for the first year after installation, until permanent vegetation has established, or as designated by the regulating authority. If rilling occurs or vegetation does not establish, the area of application should be reapplied with an Engineered soil. If failure continues, the use of runoff diversion devices, compost erosion control blankets, rolled erosion control blankets, or soil stabilizers should be considered until vegetation has been established. Vegetation practices should always be inspected for noxious or invasive weeds. Periodic infiltration rate tests may be performed to ensure the system is performing correctly. If sediment accumulation is 25% of the height of the vegetation, sediment removal is recommended.

1. The Contractor shall maintain the engineered soil in a functional condition at all times and it shall be routinely inspected.
2. Heavy equipment should be limited on and near the engineered soil to prevent compaction that will reduce infiltration and permeability.
3. If soil complex becomes compacted, or infiltration and permeability rates diminish significantly, engineered soil shall be reinstalled or replaced with a functioning alternative.
4. Engineered soil shall be maintained until a minimum uniform cover of 70% of the applied area has been vegetated, permanent vegetation has established, or as required by the jurisdictional agency.
5. Engineered soils may need to be irrigated in hot and dry weather

- and seasons, or arid and semi-arid climates to ensure vegetation establishment.
6. Where engineered soil fails, rilling occurs, or vegetation does not establish the Contractor will repair or provide an approved and functioning alternative.
 7. If Engineered soil is damaged by storm water runoff prior to vegetation establishment, temporary runoff diversion devices installed above the engineered soil may be required.
 8. No additional fertilizer or lime is required for vegetation establishment and maintenance.
 9. No disposal is required for this product/practice.
 10. Regular mowing of grass vegetation on Engineered soil to a minimum height of 4 in (100mm) and a maximum height of 10 in (250mm) will deter invasive weeds, allow sunlight to kill captured pathogens, and provide maximum sediment removal efficiency and sediment storage capacity in the vegetation.
 11. Organic debris and clippings should be left on-site to maintain soil organic content.
 12. Sediment shall be removed if it reaches 25% of the height of the vegetation (mowed) to prevent diversion of storm runoff and reduction of vegetation health and cover.

ADDITIONAL INFORMATION

For other references on this topic, including additional research reports and trade magazine and press coverage, visit the Filtrexx website at filtrexx.com

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Call for complete list of international installers and distributors.

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Figure 3.1. Engineering Design Drawing for Filtrexx® Engineered Soil

