



# SWPPP Cut Sheet

Last Updated: 1-1-08

## Section 2: Storm Water Management – Post Construction

### 2.10 Filtrex GreenLoxx™

#### *Vegetated Mechanically Stabilized Earth (MSE) Technology*

#### PURPOSE & DESCRIPTION

GreenLoxx™ is a green alternative for retaining walls that offers higher aesthetic appeal than conventional block or concrete systems. GreenLoxx™ is a vegetated mechanically stabilized earth (MSE) system that is reinforced with vegetation and geotextile support to form a green wall that 'locks'. The locking system is created by the integration of geogrid, vegetation and a fascia made from Filtrex FilterSoxx™ filled with Filtrex GrowingMedia™. GreenLoxx™ relies on GrowingMedia™ to provide a fertile growing medium that encourages vegetation establishment and successfully assists in anchoring roots of the vegetation to the wall and site substrate.

#### APPLICATION

GreenLoxx™ are to be used where other retaining walls are specified. These include but are not limited to:

- Steep embankments
- Roadside slopes
- Road underpasses (culverts)
- Storm water outfalls
- Streambanks
- Shoreline slopes
- Residential retaining walls

GreenLoxx™ is comprised of 5 primary components: Filtrex Soxx™ used as vegetated fascia, filling the Soxx™ with Filtrex GrowingMedia™, geogrid wrapped around filled fascia Soxx™, backfill behind fascia, and vegetation throughout. Components work together to establish a system of Mechanically Stabilized Earth (MSE) with a vegetated fascia.

#### INSTALLATION

GreenLoxx™ to meet all Filtrex Specs & use Filtrex GrowingMedia™. Contractor required to be Filtrex Certified™ Installer determined by Filtrex International, LLC (440-926-2607; filtrex.com). Certification current if appropriate ID is shown at bid or at time of application (list at www.filtrex.com). Look for Filtrex Certified™ Installer Seal. **Excavation and Base Preparation:** Prior to construction of GreenLoxx™ the area of excavation shall follow plan specifications. The excavated area shall tightly fit the first layer of FilterSoxx™ to create a firm foundation. Excavation is a land disturbing activity and requires use of temporary sediment control devices. Compaction of area w/ plate compactor or equivalent is required before adding fill or first course of FilterSoxx™. No footings are required; however, a level base buried 10% of the wall may be necessary.

**Drainage:** Unlike hard-walls, a drainage zone behind the face of the GreenLoxx™ may not be required as the FilterSoxx™ fascia is highly permeable. This permeability greatly reduces hydrostatic pressure and facilitates hydration of the GrowingMedia™ and fascia vegetation. Where increased drainage is desired or is required for high-flow areas, stone may be added to the GrowingMedia™ in the first and/or second FilterSoxx™ course to enhance the movement of subsurface and/or runoff flow. As with other retaining walls, additional drainage systems may be installed behind the wall. Drainage requirements shall be addressed by geotechnical engineer and/or hydrologist. An optional drainage layer is advisable in some situations, using 8 in (300mm) dia. FilterSoxx™ filled w/ pea gravel, #8 limestone or aggregate of equivalent size. Material is stacked in a vertical layer between existing soil & GreenLoxx™ to facilitate drainage away from existing soil before entering structural fill, and to have area of emergency drain relief from runoff/subsurface flow. Benefits of using FilterSoxx™ include: accurate estimate of quantity of stone needed for drainage layer & keeping stone confined to permanent drainage layer.

**Installation of Base Course:** After initial excavation, fine-tuning of the base surface should commence. Use a laser-level to prepare the surface for the first course of FilterSoxx™. The surface should be free of roots and rocks that may interfere with the FilterSoxx™ or result in an uneven surface. The base surface should be level. After preparation of the base surface, place an 8 in (200mm) layer of granular material over the native material, including within any the trenched section. A layer of semi-porous geogrid may be necessary to separate the granular fill from the native soil. Application may be made manually, by excavator or by pneumatic blower. At courses where the construction drawings indicate that geogrid is required, the geogrid is laid down prior to placement of FilterSoxx™ and wrapped around the FilterSoxx™ fascia. After placing and compacting the base material the first course of geogrid should be installed. Place approved geogrid over granular material and fasten with sod staples or ½ ft (150mm) rebar stakes to temporarily anchor the geogrid while commencing work. Once geogrid is anchored, install FilterSoxx™ the required length horizontally & parallel to wall face. Fill Filtrex FilterSoxx™ in place; first course will be installed at base of wall, or if present, in the trench. When installing geogrid, ensure it is laid flat over backfill. Pull back on geogrid to ensure good connection w/ FilterSoxx™ fascia and to remove folds in material. Wooden 2 in x 2 in (50mm x 50mm) stakes or ½ in (12.5mm) rebar used to pin geogrid until backfill is placed over geogrid. Note: Geogrid type, strength and spacing will vary between manufacturers. Consult project engineer for requirements & specs. Place non-woven geotextile to separate native and structural backfill, apply structural backfill w/ excavator/pneumatic blower. Fill should be placed and compacted using 6-12 in (150-300mm) lifts. Apply native backfill w/ excavator/pneumatic blower. Note: typical compaction of fascia when using 12 in (300mm) and 18 in (450mm) dia. FilterSoxx™ will result in approx. 30% reduction in ht (8 in [200mm] and 12 in [300mm] lift, respectively). To reduce compaction, pressure can be exerted on geogrid to pull tight against fascia, reducing compaction and increasing ht.

**Installation of Succeeding Courses:** Successive courses will be set upon previous courses in a batter prescribed by the site engineer. Continue placing FilterSoxx™, aggregate and native soil or backfill as needed. Hand compaction and weight of successive layers will compact the FilterSoxx™. Estimate of fascia compaction is 30% but may be adjusted by the project engineer. Filtrex Certified™ Installers are trained to account for compaction in order to achieve specified wall height.

**Backfill Compaction:** A Professional Engineer shall specify the backfill type and proctor tests should be conducted using standard ASTM testing procedures or equivalent field procedures as directed by the Engineer. Compaction of materials will vary with soil type but typically, smaller lifts of material (less than 12 in [300mm]) will be easier to compact.

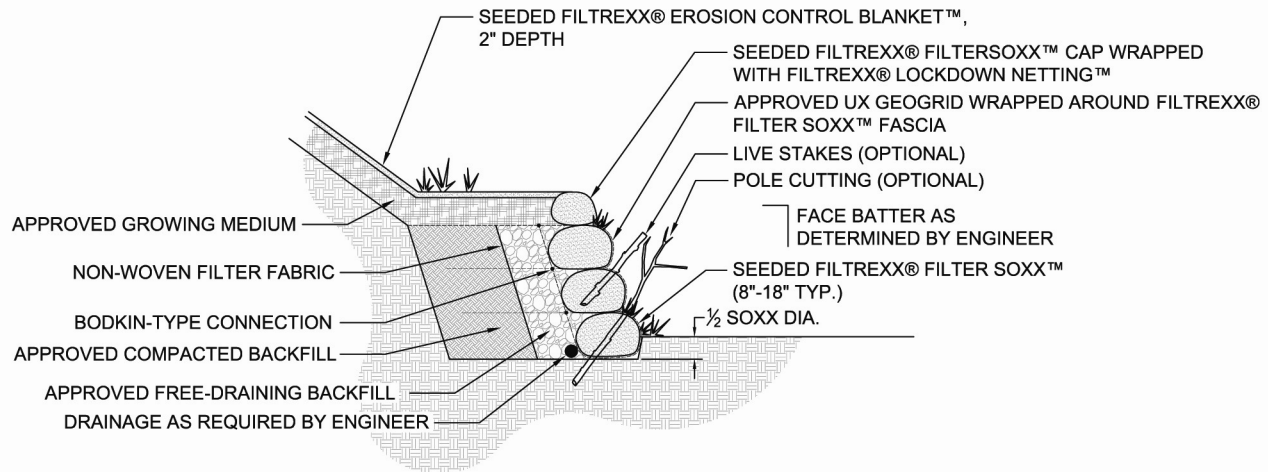
**Final Seeding – CAP:** The top of the wall or 'cap' requires a CVC™ or CSWB™. For specifications and design for CVC™ and CSWB™ see sections 1.7 and 2.1, respectively. Each of these applications will effectively join the GreenLoxx™ system with any existing vegetation or terrain. Prior to seeding the top of GreenLoxx™, be sure that the upper layer of geogrid is buried to a minimum of 6 in (150mm). FilterSoxx™ can be used to complete the cap in combination with final seeding.

#### INSPECTION and MAINTENANCE

Regular inspections should be conducted that are within local, state and federal guidelines for water quality regulations. A minimum of 70% uniform cover for vegetation within 2 seasons should be targeted. Areas that lack vegetation should be spot seeded using a compost/seed mixture. After six months if 70% uniform cover of nurse crop has not occurred it is recommended that reseeded or remedial planting be preformed.

1. The Contractor shall maintain the GreenLoxx™ in a functional condition at all times and it shall be routinely inspected.
2. Seeded GreenLoxx™ shall be maintained until a minimum uniform 70% cover of the applied area has been vegetated or permanent vegetation has established.
3. Seeded GreenLoxx™ may need to be irrigated in hot and dry weather and seasons, or arid and semi-arid climates to ensure vegetation establishment.
4. Where GreenLoxx™ fail/become dislodged, the Contractor will ensure the product is in good contact with the soil and backfill, repair, and use additional staking if necessary.
5. Where bank or shoreline erosion occurs, the Contractor will regrade the soil if necessary and repair or replace the GreenLoxx™
6. Where vegetation does not establish the Contractor will reseed, replant, replace live stakes, or provide an approved and functioning alternative.
7. If GreenLoxx™ is only seeded at time of installation live stakes may be added to increase stability, aesthetics, wildlife habitat, and ecological succession.
8. No additional fertilizer or lime is required for vegetation establishment and maintenance.
9. Regular mowing of grass vegetation on seeded GreenLoxx™ 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 from storm water, and provide maximum sediment removal efficiency and sediment storage capacity in the vegetation.
10. Storm debris and trash deposited on GreenLoxx™ should be removed immediately.
11. 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.
12. If drip tape irrigation system is installed, once vegetation is established, connections to drip tape irrigation system may be removed, leaving drip tape inside FilterSoxx™.

**Figure 10.1.** Engineering Design Drawing for Filtrexx MSE GreenLoxx™

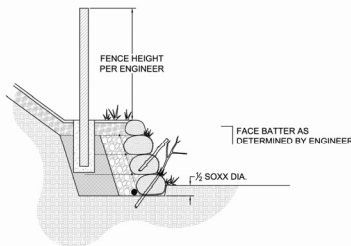


- NOTES:**
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
  2. FILTERSOXX™ FILL TO MEET APPLICATION REQUIREMENTS.
  3. ALL FILTERSOXX™ TO BE SEEDDED PER LANDSCAPE ARCHITECT'S SPECIFICATIONS.
  4. BACKFILL TO BE PLACED PER ENGINEER'S REQUIREMENTS.
  5. GEOGRID STRENGTH, LENGTH AND HORIZONTAL SPACING TO BE DETERMINED BY ENGINEER.
  6. NATIVE AND DRAINAGE BACKFILL TO BE SEPARATED BY NON-WOVEN FILTER FABRIC.

## FILTREXX® MSE GREENLOXX™

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**Figure 10.2.** Engineering Design Drawing for Filtrexx MSE GreenLoxx™ Fence Detail

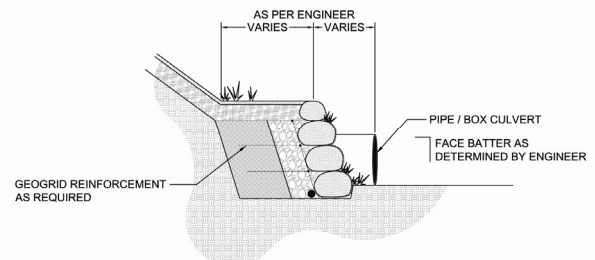


- NOTES:**
1. REFER TO FILTREXX® MSE GREENLOXX™ DETAIL FOR ADDITIONAL INFORMATION.
  2. POST FOOTING OPTION 1: PLACE SONOTUBE BEHIND DURING CONSTRUCTION AS REQUIRED.
  3. POST FOOTING OPTION 2: AUGER HOLES THROUGH GEOGRID AFTER CONSTRUCTION AS REQUIRED.
  4. ALL FOOTINGS TO BE APPROVED BY ENGINEER.
  5. POST BACKFILL TO BE APPROVED BY ENGINEER AND COMPACTED AS REQUIRED.
  6. FINAL FENCE DESIGN TO TAKE WIND LOADING CONDITIONS INTO ACCOUNT.

## FILTREXX® MSE GREENLOXX™ FENCE PLACEMENT

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**Figure 10.3.** Engineering Design Drawing for Filtrexx MSE GreenLoxx™ Headwall Application



- NOTES:**
1. REFER TO FILTREXX® MSE GREENLOXX™ DETAIL FOR ADDITIONAL INFORMATION.
  2. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
  3. FILTERSOXX™ TO BE FILLED AS REQUIRED TO CONFORM TO PIPE DIMENSIONS.
  4. ALL FILTERSOXX™ TO BE SEEDDED PER LANDSCAPE ARCHITECT'S SPECIFICATIONS.

## FILTREXX® MSE GREENLOXX™ HEADWALL

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