DESIGN SPECIFICATION

1.7 Compost Vegetated Cover - Temporary Seeding

filtrexx® SUSTAINABLE TECHNOLOGIES

PURPOSE & DESCRIPTION

Filtrexx® Compost Vegetated Cover (CVC)/Temporary Seeding is a **temporary vegetation and erosion control** practice used on hill slopes to stabilize disturbed soils on and around construction activities. CVC is generally used for rapid vegetation establishment on disturbed or erodable soils, and are not to be used as an erosion control blanket. CVC consists of a ½ in to ¾ in (12-20mm) deep layer of Filtrexx® GrowingMedia™ or 70 to 100 cubic yards/acre (135-193 cubic m/ha) mixed with a specified seed mix and applied to hill slopes with pneumatic blower trucks or similar equipment.

APPLICATION

CVC is generally used for temporary vegetation for erosion control on disturbed, bare, or highly erodable soils during land disturbing and construction activities. Stabilization using temporary vegetation is generally required for (Fifield, 2001):

- disturbed soils that will undergo future disturbance,
- cut and fill slopes under construction,
- soil storage areas and stockpiles,
- permanent vegetation establishment that requires a nurse crop,
- stabilization of temporary runoff diversion devices, dikes, and sediment containment systems,
- curbside buffers on residential construction lots prior to vertical construction.

Permanent stabilization practices, such as erosion control blankets, anchoring and sod are not typically used for these applications; however, they may be used selectively with temporary vegetation practices. CVC is best utilized on bare soils in excavated or fill areas immediately after temporary or final grading is finished. It should be noted that CVC provides little erosion control until vegetation is established, this should be considered in the planning and design process. Slopes greater than 4:1 should be vertically tracked to aid in catching and stabilizing CVC application prior to germination. Slopes greater than 3:1 should apply a tackifier with the CVC to increase stability. Slopes greater than 2:1 should utilize erosion control blankets or turf reinforcement mats (KY TC, 2006). Other erosion control practices should be utilized if soil erosion control/ slope stabilization is required prior to vegetation establishment.

ADVANTAGES AND DISADVANTAGES

Advantages

- CVC can be used to temporarily stabilize and prevent erosion on soil storage and stockpiles, cut and fill slopes under construction, disturbed soils that will undergo disturbance in the near future, areas that require nurse crops for permanent vegetation, and areas requiring stabilization of runoff diversion devices, dikes and sediment containment systems.
- CVC is easily applied and can establish vegetation in difficult areas.
- CVC can easily be spot applied or used in combination with rolled erosion control blankets (RECBs) and turf reinforcement mats (TRMs).
- CVC can dissipate the energy of rainfall impact, thereby reducing splash erosion.
- CVC can absorb rainfall and runoff water, thereby increasing infiltration, increasing germination, and reducing runoff and sheet erosion.
- CVC can slow runoff velocity, thereby reducing the erosive energy of runoff and the potential for soil erosion.
- Humus colloids and organic matter in temporary seeding provide physical structure for seed and establishing seedlings.
- Humus colloids and organic matter in temporary seeding provide increased water holding capacity and reduced water evaporation to aid in seed germination and the potential for reduced irrigation.
- CVC is a good option for arid and semiarid regions where germination, moisture management, and irrigation can be difficult.
- CVC provides organic nutrients that slow release for optimum efficiency to establishing vegetation.
- CVC provides organic nutrients that are less prone to runoff transport and pollution of surface waters relative to mineral nutrients supplied by fertilizers.
- CVC has the ability to bind and adsorb phosphorus, metals, and hydrocarbons that may be in stormwater runoff.
- Microorganisms in CVC have the ability to degrade organic pollutants and cycle captured nutrients in stormwater runoff.
- CVC is organic and can be left on site after permanent stabilization is complete, used in the landscape design, and/or seeded and planted with permanent vegetation.
- CVC can improve existing soil structure and stability as a soil amendment after construction activity is complete.
- CVC can increase soil organic matter which may reduce runoff and erosion, and increase plant sustainability through improved soil quality over the long term.
- CVC may assist in qualification for LEED® Green Building Rating and Certification credits under LEED Building Design & Construction (BD+C), New Construction v4. Awarded credits may be possible from the categories of Sustainable Sites, Water Efficiency, Materials & Resources, and Innovation. *Note: LEED is an independent program offered through the U.S. Green Building Council. LEED credits are determined on a per project basis by an independent auditing committee. Filtrexx neither guarantees nor assures LEED credits from the use of its products. LEED is a trademark of the U.S. Green Building Council.*

Disadvantages

- If CVC does not use Filtrexx® GrowingMedia™, performance may be diminished.

ADVANTAGES	LOW	MED	HIGH
Ease of Installation			✓
Erosion Control – Pre Vegetation	✓		
Erosion Control – w/Vegetation		✓	
Vegetation Establishment			✓
Runoff Control		✓	
Sediment Control	✓		

- If not installed correctly, maintained or used for a purpose or intention that does not meet specifications, performance may be diminished.
- CVC should not be the only form of site erosion and sediment control.
- CVC should never be used alone in areas of concentrated runoff flow.
- CVC should not be used alone on slopes greater than 4:1.
- CVC does not sufficiently cover soil surfaces prior to vegetation establishment, and therefore cannot be considered an erosion control blanket (which typically covers the soil completely prior to vegetation).
- CVC does not sufficiently cover soil surfaces prior to vegetation establishment, leaving the potential for high soil erosion rates prior to establishment.
- CVC may need to be reapplied if runoff occurs prior to vegetation establishment or where vegetation fails.
- CVC should not be used where rainfall, sheet runoff, or soil erosion rates may be high.

GROWINGMEDIA™ CHARACTERISTICS

Filtrexx® CVC uses only Filtrexx® GrowingMedia™ which is a composted material that is specifically designed for rapid establishment and sustainability of vegetation growth. GrowingMedia can be third party tested to meet minimum performance criteria defined by Filtrexx International. Performance parameters include: percent cover of vegetation, water holding capacity, pH, organic matter, soluble salts, moisture content, biological stability, maturity bioassay, percent inert material, bulk density and particle size distribution. For information on the physical, chemical, and biological properties of GrowingMedia™ refer to Filtrexx Design Manual, section 5.2.

PERFORMANCE

Conservative assumptions can be made regarding CVC in light of performance associated with slope protection, mulches, hydroseeding, and general use compost. For performance on these practices see Filtrexx® Compost Erosion Control Blanket and supporting technical reports and research in the Appendices. Note, CVC is specifically intended for seeding and temporary vegetation establishment as an alternative to hydroseeding or dry seeding. Although CVC may provide some erosion control benefit prior to vegetation establishment, it is not the intended use, and designing based on these criteria is at the discretion of the Engineer. Filtrexx International is undergoing research to quantify the performance of CVC to aid design professionals in the future. For a summary of current design specifications and performance testing results see Table 7.1.

Note: the Contractor is responsible for establishing a working erosion and sediment control system and may, with approval of the Engineer, work outside the minimum construction requirements as needed. Where the CVC deteriorates or fails, it shall be repaired or replaced with an effective alternative.

DESIGN CRITERIA

CVC is a temporary vegetation practice used for soil erosion control of disturbed, bare, and erodable soils, on cut and fill slopes, storage and stockpiles, areas that will be re-disturbed, areas requiring a nurse crop for permanent vegetation, and stabilization of temporary runoff diversion devices, dikes, and sediment containment systems.

Planning Considerations:

CVC should be used as one treatment in a treatment train approach to site erosion and sediment control. In some cases, seeding of CVC may transfer to providing permanent vegetation after final grading – if the correct seed is selected at the time of application. Runoff control and runoff diversion practices may be designed to help prevent seed washing and erosion control prior to vegetation establishment and to protect seedlings prior to mature establishment. Preconstruction meetings should be conducted to educate construction site personnel about the devices/practices used and acceptable traffic patterns that avoid running over CVC with vehicles and heavy equipment. Vehicular traffic and heavy equipment will reduce the effectiveness of CVC and contribute to soil compaction, which may increase runoff and erosion and reduce vegetation establishment.

Successful planning for any vegetation establishment project should consider climate, prevailing weather, temperature, sun exposure, available moisture/irrigation requirements, topography, soil type, soil pH, soil amendments, nutrient requirements, drought tolerance, time/coordination with construction phases, site preparation/ coordination with construction phases, protection from erosion and sedimentation, and seed mix/plant selection (Fifield, 2001).

Temporary vs. Permanent Vegetation:

Temporary vegetation is typically specified for the applications previously mentioned. Quick establishing annual grasses and legumes are normally specified for these applications.

Permanent vegetation is usually specified for slopes where erosion control blankets are required, drainage ditches and channels that require liners or turf reinforcement mats, and areas that have undergone final clearing and grading and require soil stabilization. Perennial grasses are typically specified and if possible native grasses should be utilized (Fifield, 2001).

Local Landscape Architects, NRCS, or cooperative extensions should be consulted and used as resources for temporary and/ or permanent vegetation establishment. Many state erosion and sediment control manuals have specifications for seed selection and application rates.

Preparation and Application:

Where possible, slopes should be vertically tracked to increase soil roughness, which will increase the CVC contact with the soil, increase vegetation establishment success, and reduce runoff velocity which may wash seeds prior to and during germination and/or stress young plants during establishment. Care should be given not to compact clay soils with tracking equipment. CVC *is not an erosion control blanket* and therefore does not cover the soil surface until *after* vegetation has completely established. CVC shall be applied to 100% of the area where temporary vegetation is required and applied at a depth of ½ to ¾ in (12-20mm) or 70 to 100 cubic yards/ac (135-193 cubic m/ha).

Establishing & Sustaining Vegetation:

Although CVC increases water holding capacity and reduces evaporation, irrigation may be required to ensure successful establishment. Runoff diversion devices may be utilized to prevent storm runoff from washing seed prior to germination and establishment and reduce erosion prior to temporary stabilization.

CVC can supply humus, organic matter, beneficial microbes, and slow release organic nutrients that can contribute to better soil quality and plant health. In arid and semi-arid regions or hot and dry weather regular irrigation may be required.

Runoff Conditions:
CVC should not be used in areas where concentrated flow exists or where runoff velocities will damage or undermine vegetation. For most grasses a maximum velocity of 4 ft/sec (1.2 m/sec) or a maximum hydraulic shear stress of 2 lbs/ft^2 (10 kg/m^2) is recommended (Maryland Storm Water Design Manual, 2000).

High Wind Conditions:
In regions or seasons prone to high velocity wind conditions (such as arid regions, mountainous regions, and regions with distinct hurricane seasons) it is recommended that Filtrexx® LockDown™ Netting is installed on top of the CVC to prevent wind erosion and movement of the CVC. For more information on LockDown™ Netting refer to Filtrexx Design Manual Section 5.4.

Mulch Function:
Although CVC application depths do not fully cover the soil surface they do provide limited beneficial affects characteristic to mulching, including: reduced raindrop impact and splash erosion, reduced runoff energy and sheet erosion, buffered soil temperature for plants, decreased moisture evaporation, increased moisture holding capacity at the soil surface, reduced runoff volume and velocity, and increased infiltration.

Soil Amendment Function:
CVC also amends the soil which can provide the following functional benefits: increased soil structure, increased soil aggregates, increased soil aeration, increased infiltration and percolation, increased moisture holding capacity, increased activity of beneficial microbes, increased availability of nutrients, decreased runoff volume and velocity, decreased erosion, and increased plant health and sustainability.

Organic vs. Fertilizer Nutrients:
Although most specification and design manuals include fertilizer recommendations or requirements for vegetation, mineral nutrients from fertilizers may not be preferable where vegetation sustainability and water quality are a concern. CVC provides organic nutrients which are slow release, provides plant micronutrients, and is less likely to be transported in storm runoff to receiving waters – which can lead to pollution and eutrophication of waterways (Faucette et al, 2005). In site sensitive areas where nutrient runoff is a concern, CVC may release up to 1/10 of the nutrient load compared to conventional hydroseeding and hydromulching (Faucette et al, 2005).

Weed Establishment:
The effects of mulching are known to suppress weed establishment. In addition, invasive weed growth has been more closely associated with mineral fertilizer than organic fertility practices (Faucette et al, 2004).

INSTALLATION

1. CVC used for temporary vegetation establishment and erosion control shall meet Filtrexx CVC and Filtrexx GrowingMedia Specifications.
2. Call Filtrexx at 877-542-7699 or visit www.filtrexx.com for a current list of installers and distributors of Filtrexx products.
3. CVC will be placed at locations indicated on plans as directed by the Engineer.
4. CVC shall be installed on and around unprotected and erodable soils for temporary vegetation and erosion control.
5. CVC shall be applied to 100% of the area where temporary vegetation is required.
6. CVC shall be applied at a depth of ½ to ¾ in (12-20mm) or 70 to 100 cubic yards/ac (135-293 cubic m/ha).
7. Seed shall be thoroughly mixed with the GrowingMedia™ prior to application or surface applied with GrowingMedia™ at time of application.
8. CVC shall not be installed in areas of concentrated runoff flow.
9. CVC installed on slopes: greater than 4:1 shall be vertically tracked; greater than 3:1 shall use tackifiers or slope stabilizers; greater than 2:1 shall use erosion control blankets or turf reinforcement mats.

INSPECTION

Routine inspection should be conducted within 24 hours of a run-off event or as designated by the regulating authority. If rilling occurs or vegetation does not establish, the area of application should be reapplied with CVC. If failure continues, the use of runoff diversion devices, compost erosion control blankets, rolled erosion control blankets, or soil stabilizers should be considered. CVC should be inspected until permanent vegetation or other erosion control practices are installed. Temporary vegetation practices should also be inspected for noxious or invasive weeds.

MAINTENANCE

1. The Contractor shall maintain the temporary seeding in a functional condition at all times and it shall be routinely inspected.
2. CVC shall be maintained until a minimum of 70% uniform cover of the applied area has been vegetated or as required by the jurisdictional agency.
3. CVC may need to be irrigated in hot and dry weather seasons, or arid and semi-arid climates to ensure vegetation establishment.
4. CVC shall be maintained until permanent vegetation is established or erosion control practices are installed.
5. Where CVC fails, rilling occurs, or vegetation does not establish the Contractor will repair or provide an approved and functioning alternative.
6. If CVC is damaged by stormwater runoff, runoff diversion devices installed above the CVC may be required.
7. Once vegetation is established, final seeding and/or permanent vegetation may not be required.
8. No additional fertilizer or lime is required for vegetation establishment and maintenance.
9. No disposal is required for this product/practice.

METHOD OF MEASUREMENT

Bid items shall show measurement as 'Filtrexx® Compost Vegetated Cover (CVC)/Temporary Seeding per square ft, per square yd, per square meter, per acre, or per hectare installed.

Engineer shall notify Filtrexx of location, description, and details of project prior to the bidding process so that Filtrexx can provide design aid and technical support.

FIELD APPLICATION PHOTO REFERENCES

Compost vegetated cover used to sustain long term vegetation

Vegetation Establishing in Temporary Seeding

Compost Vegetated Cover is generally used for rapid vegetation establishment.

Establish cover in difficult areas to prevent erosion and sediment discharge

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

Filtrexx International, Technical Support
877-542-7699 | www.filtrexx.com | info@filtrexx.com
Call for complete list of international installers and distributors.

REFERENCES CITED & ADDITIONAL RESOURCES

American Association of State Highway Transportation Officials. 2003. Standard Specification for Transportation Materials and Methods of Sampling and Testing, Designation M10-03, Compost for Erosion/Sediment Control. Washington, DC.

Demars, K., R. Long, and J. Ives. 2000. Use of Wood Waste Materials for Erosion Control. New England Transportation Consortium & Federal Highway Administration – NETCR 20. Conducted by University of Connecticut Department of Civil and Environmental Engineering.

Demars, K.R., and R.P. Long. 1998. Field Evaluation of Source Separated Compost and Coneg Model Procurement Specifications for Connecticut DOT Projects. University of Connecticut and Connecticut Department of Transportation. December, 1998. JHR 98-264.

Faucette, L.B., and A. Vick. 2006. LEED Green Building Credits using Filtrexx® Organic BMPs. Filtrexx® Tech Link #3301
Faucette, L.B. A. Vick, and K. Kerchner. 2006. Filtrexx®, Compost, Low Impact Development (LID), and Design Considerations for Storm Water Management. Filtrexx® Tech Link #3306

Faucette, B. 2006. How Important is Particle Size in Specifications for Compost Erosion Control Blankets. Filtrexx® Tech Link #3310

Faucette, B. 2006. C Factors for Compost and Rolled Erosion Control Blankets. Filtrexx® Tech Link #3303

Faucette, B., K. Kerchner, and A. Vick. 2006. Determining Runoff Curve Numbers for Compost Erosion Control Blankets. Filtrexx® Tech Link #3305

Faucette, L.B., J. Governo, C.F. Jordan, B.G. Lockaby, and H.F. Carino. 2006. Storm Water Quality, C Factors, and Particle Size Specifications for Compost and Mulch Blankets Relative to Straw Blankets with PAM used for Erosion Control. Under Peer Review. Filtrexx® Library #702.

Faucette L.B., C.F. Jordan, L.M. Risse, M. Cabrera, D.C. Coleman, and L.T. West. 2006. Vegetation and soil quality effects from hydroseed and compost blankets used for erosion control in construction activities. Journal of Soil and Water Conservation, to be published Nov/Dec 2006. Filtrexx® Library #701.

Faucette, L.B., N. Strazar, and A. Marks. 2006. Filtrexx® Polymer and Flocculent Guide. Filtrexx® Library #601.

Faucette, L.B., C.F. Jordan, L.M. Risse, M. Cabrera, D.C. Coleman, and L.T. West. 2005.
Evaluation of storm water from compost and conventional erosion control practices in construction activities. Journal of Soil and Water Conservation. 60:6:288-297.

Faucette, L.B., C.F. Jordan, L.M. Risse, M. Cabrera, D.C. Coleman, and L.T. West. 2004. Evaluation of Environmental Benefits and Impacts of Compost and Industry Standard Erosion and Sediment Control Measures used in Construction Activities. Doctoral Dissertation, Institute of Ecology, University of Georgia, Athens, GA. Filtrexx® Library #112.

Faucette, L.B., M. Risse, M.A. Nearing, J. Gaskin, and L. West. 2004. Runoff, erosion, and nutrient losses from compost and mulch blankets under simulated rainfall. Journal of Soil and Water Conservation. 59:4: 154-160.

Fifield, J. 2001. Designing for Effective Sediment and Erosion Control on Construction Sites. Forester Press, Santa Barbara, CA.

Hallock, B., A. Power, S. Rein, M. Curto, and M. Scharff. 2006. Analysis of compost treatments to establish shrubs and improve water quality. 2006 International Erosion Control Conference Proceedings, Long Beach, CA.

Kirchhoff, C.J., J. Malina, and M. Barrett. 2003**.** Characteristics of Composts: Moisture Holding
and Water Quality Improvement. University of Texas: Austin, Federal Highway Administration, and Texas Department of Transportation. TX DOT – 04/0-4403-2.

KY TC, 2006. Kentucky Erosion Prevention and Sediment Control Field Guide. Kentucky Transportation Cabinet.

Marks, A., R. Tyler, and B. Faucette. 2005. The Filtrexx® Library. Digital publication of support tools for the erosion control industry. www.filtrexx.com.

Marks, A., and R. Tyler. 2003. Filtrexx® International Company Website. Specifications, CAD drawings, case histories. www.filtrexx.com

Maryland Storm Water Design Manual Vol I and II. 2000. Appendix D.12. Critical erosive velocity for grasses and soil. Maryland Department of Environment and the Center for Watershed Protection.

Mukhtar, S., M. McFarland, C. Gerngross, and F. Mazac. 2004. Efficacy of using dairy manure compost as erosion control and revegetation material. 2004 American Society of Agricultural Engineers/Canadian Society of Agricultural Engineers Annual International Meeting, Ontario, CA. Paper # 44079.

Persyn, R. T. Glanville, T. Richard, J. Laflen, and P. Dixon. 2004. Environmental Effects to
Applying Composted Organics to New Highway Embankments, Part 1: Interrill Runoff and Erosion. Transactions of the ASAE. American Society of Agricultural Engineers. 47:2: 463-469.

Tyler, R.W., and A. Marks. 2004. Erosion Control Toolbox CD Kit. A Guide to Filtrexx® Products, Educational Supplement, and Project Videos. 3 CD set for Specifications and Design Considerations for Filtrexx® Products.

Tyler, R.W., J. Hoeck, and J. Giles. 2004. Keys to understanding how to use compost and organic matter. IECA Annual Meeting Presentations published as IECA Digital Education Library, Copyright 2004 Blue Sky Broadcast.

Tyler, R.W. 2004. International PCT Patent Publication #: WO 2004/002834 A2. Containment Systems, Methods and Devices for Controlling Erosion.

Tyler, R.W., A. Marks. 2003. Filtrexx® Product Installation Guide. Grafton, Ohio.

Tyler, R.W. 2003. International PCT Application #: PCTUS2003/020022. Containment Systems, Methods and Devices for Controlling Erosion.

Tyler, R.W. and A. Marks. 2003. A Guide to Filtrexx® Products. Product Descriptions and Specifications for Filtrexx® Products.

Tyler, R.W. 2001. Filtrexx® Product Manual. Specifications and Design Considerations for Filtrexx® Products, Grafton, OH.

Tyler, R.W. 1996. Winning the Organics Game – The Compost Marketers Handbook. ASHS Press, ISBN # 0-9615027-2-x..

US EPA NPDES Phase II. 2006. Compost Blankets: Construction Site Storm Water Runoff Control. National Menu of Best Management Practices for Construction Sites. http://cfpub.epa.gov/npdes/stromwater/menuofbmps/con_site.cfm

Woods End Research Lab, Inc. 2003. Stormwater Monitoring, Collection and Analysis of Test Plot Runoff: Kents Hill School Project 319. Maine Department of Transportation.

Table 7.1. Temporary Seeding Performance and Design Specifications Summary.

Rainfall Total/Intensity Design & Performance	4.4 in/1.85 in hr (112mm/47mm hr)	1.06 in/0.71 in hr (27mm/18mm hr)	0.38 in/1.54 in hr (10mm/39mm hr)
C Factor*	0.0032	0.0098	0.0138
Soil Loss Reduction	99%	99%	99%
Runoff Volume Reduction	0%	24%	92%
Soil Type	Silty sand	Silty sand	Silty sand
Slope	2:1	2:1	2:1
Test Plot Size	30 ft wide x 5 ft long (9m x 1.5m)	30 ft wide x 5 ft long (9m x 1.5m)	30 ft wide x 5 ft long (9m x 1.5m)
Depth of Temporary Seeding	¾ in (20 mm)	¾ in (20 mm)	¾ in (20 mm)
Seeding Rate	Determined by Engineer/Landscape Architect/ State Design Manual	Determined by Engineer/Landscape Architect/ State Design Manual	Determined by Engineer/Landscape Architect/ State Design Manual
Vegetation Type	Determined by Engineer/Landscape Architect/ State Design Manual	Determined by Engineer/Landscape Architect/ State Design Manual	Determined by Engineer/Landscape Architect/ State Design Manual
Reference	New England Transportation Consortium; Federal Highway Administration	New England Transportation Consortium; Federal Highway Administration	New England Transportation Consortium; Federal Highway Administration
Test/Research Facility	University of Connecticut Department of Civil & Environmental Engineering	University of Connecticut Department of Civil & Environmental Engineering	University of Connecticut Department of Civil & Environmental Engineering
Authors	Demars et al., 2000	Demars et al., 2000	Demars et al., 2000

* Cover-Management Factor: A C Factor of .02 indicates that erosion is reduced to 2% of what would occur under fallow conditions.

Figure 7.1. Engineering Design Drawing for Temporary Seeding