Stormwater Pollution Prevention Plan
Lincoln Lace & Braid Remediation Project
55-61 Ponagansett Street
Providence, Rhode Island

Prepared for

Providence Department of Parks and Recreation
Dalrymple Boathouse
Roger Williams Park
Providence, Rhode Island

Prepared by

EA Engineering, Science, and Technology, Inc.
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June 2010
EA Project No.: 61891.05

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Number	Title
1	Site Locus

1. INTRODUCTION

On behalf of the City of Providence, EA Engineering, Science, and Technology, Inc. (EA) has prepared this Stormwater Pollution Prevention Plan (SWPPP) for the Lincoln Lace & Braid Remediation Project in Providence, Rhode Island (the Site). This SWPPP is submitted to the Rhode Island Department of Environmental Management (RIDEM) Office of Water Resources Permitting Section as required by the Rhode Island Pollutant Discharge Elimination System General Permit Regulations for Construction Activities dated September 2008 (RIDEM 2008).

As detailed in the Revised Remedial Action Work Plan (Revised RAWP) submitted concurrently with this SWPPP submittal, remediation and construction activities at the Lincoln Lace & Braid Site will disturb approximately 4.41 acres of land, thereby requiring a Rhode Island Pollutant Discharge Elimination System (RIPDES) Stormwater Discharge Associated with Construction Activity. This SWPPP has been prepared, and a Notice of Intent (Appendix A) is attached to fulfill these requirements.

The scope of this SWPPP includes the remedial action at the Lincoln Lace & Braid Site. This remedial action, detailed in the Revised RAWP, will include the construction of an engineered cap using at least 12 in. of certified clean fill material over a geotextile filter fabric in all upland areas. Stormwater management following construction will be dominated by sheet flow and infiltration prior to being discharged into the Woonasquatucket River.

The objectives of this SWPPP are to protect the environmental surroundings of the Lincoln Lace & Braid Site during remediation and construction and to identify, minimize, and control the potential for release of pollutants into the nearby Woonasquatucket River.

2. SITE DESCRIPTION

The former Lincoln Lace & Braid complex is located at 55-61 Ponagansett Street in Providence, Rhode Island. The Site is located on approximately 6 acres of land adjacent to the Woonasquatucket River in the Hartford section of Providence, designated on the City of Providence Tax Assessor's Map as Plat 113, Lots 305 and 429. Figure 1 provides a Site Locus Map. Figure 2 provides an Existing Conditions Plan.

The lot slopes from south to north, towards the Woonasquatucket River. Access from Ponagansett Avenue to the west is via a steep asphalt driveway (circa 1950) that begins at the east end of the street, traverses the embankment on a south-north trajectory, and then swings sharply to the east across the now-filled headrace to reach the former building locations.

The embankment has been graded into three distinct terraces, with retaining walls constructed of random and split stone and concrete masonry that step, then slope, down from south to north. A stepped, course, split masonry, and concrete wall lines the east wall of the tailrace immediately south of the location of the former Wheel House. The remainder of the tailrace has earthen embankments that suggest its original appearance as a flood channel. No traces of other mill buildings remain except for rubble piles, concrete slabs, and large split rectangular blocks scattered across the lot.

The Woonasquatucket River's north-south trajectory defines the eastern edge of the mill site and holds the remains of the 1918 dam in its channel near the north end of the lot. Concrete and rubblestone masonry dam abutments are located on both riverbanks and retain cast imprints and wood fragments of the spillway's timber cribbing. Remains of both a late 19th century and an early 20th century railroad bridge are located in the river channel approximately 240 ft downstream of the dam remains.

The former Ponagansett Avenue Landfill abuts the west end of the Site and is accessed by the same driveway as the subject site. This facility has been remediated in preparation for its potential conversion to a public park (DEM Case No. 2001-024).

The primary contaminants of concern at the Site are the presence of elevated metal and polycyclic aromatic hydrocarbon (PAH) concentrations previously observed in soil and sediment samples throughout the Site above the RIDEM RDEC. Exceedances of the RDEC for arsenic, beryllium, lead, mercury, ethyl benzene, trichloroethene, tetrachloroethene, xylene, and total petroleum hydrocarbons (TPH) were found in some soil samples.

This RAWP includes details on the remedial objectives and a proposed remedy for the former Lincoln Lace & Braid Site. The implementation and completion of the remedial actions proposed in this RAWP will bring the Site into compliance with the RIDEM *Remediation Regulations*, as well as improve the aesthetic value of existing wetlands to provide valuable green space to the area.

2.1 GEOLOGY AND SOILS

Site soils are characterized as "Urban Land" by the Soil Survey of Rhode Island (US Department of Agriculture, July 1981). Urban Land areas consist mostly of properties for buildings, paved roads, and parking lots. Exposed soils have been extensively reworked and are generally non-native soils. Slopes are dominantly between 0 and 5 percent. There is no erosion (K) factor for Urban Land in the Soil Survey of Rhode Island (1981).

2.2 TOPOGRAPHY

The southern portion of the Site slopes north towards the north. Otherwise, the Site is generally flat, with a slight slope towards the Woonasquatucket River to the north.

2.3 WETLANDS

A sluiceway is located along the eastern side of the site. The sluiceway is a former tailrace from a turbine providing power for the historical mill operations at the Site. A previous attempt at remediating the sluiceway has left a riprap check dam at the downstream extent. The sluiceway is impacted with metals at concentrations exceeding the RIDEM Residential Direct Exposure Criteria (RDEC).

Wetlands are located along the sluiceway and along the Woonasquatucket River that abuts the Site to the north. This remediation effort includes restoration of the wetland areas in the form of soil excavation and replacement with certified clean gravel and loam and the installation of hundreds of plantings. Erosion controls discussed in Section 3.2.1 will be established to prevent stormwater runoff from the Site impacting the wetland resource.

2.4 SITE IMPROVEMENTS

The former mill buildings have been razed. Therefore, there are currently no Site improvements presently at the Site. A concrete pad from the former mill foundation remains, which will be removed during the proposed Site remediation.

2.5 DRAINAGE AREAS

Presently, the Site is predominantly unpaved surfaces. Approximately 35% of the total acreage is impervious surfaces that include the concrete pad from the former mill building foundation and some asphalt paved surfaces from former parking areas. Stormwater infiltrates through the surface soils with the exception of these areas. Currently, stormwater runoff is not a concern at the site, and there are no defined drainage areas.

2.6 PRE-CONSTRUCTION RUNOFF COEFFICIENTS

The soil properties, drainage area, and surface cover descriptions (i.e., paved, grassed, concrete) of the Site have been used to calculate pre-construction runoff coefficients. As the site exists prior to any construction or remediation activities, there are approximately 68,824 ft^2 (1.58 acres)

covered by impervious surfaces. Approximately 65 percent of the site is considered pervious, covered with grass or vegetation. Infiltration is the dominant stormwater pathway for the remainder of the site, through predominantly grassed or vegetated sands and gravel. Sheet 2, Existing Conditions of the Bid Plans, provided as Appendix B, depicts the current site conditions. Using these calculated areas of infiltrating and impervious surfaces, the peak runoff during a theoretical 25-year storm of 10-minute duration is 8.17 cubic feet per second (cfs). Appendix C provides the worksheet for this calculation.

3. PROJECT DESCRIPTION AND PURPOSE

3.1 NATURE OF PROJECT

The purpose of the remedial action at the Site is to construct an engineered cap over contaminated soil as necessary to comply with the RIDEM *Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases* (as amended February 2004). The primary concern at the Site is the presence of contaminants (metals, petroleum hydrocarbons, volatile organic compounds [VOCs] and PAHs) in soils above the RIDEM RDEC. The actions to be taken at the Site are in accordance with the Revised RAWP, prepared by EA and submitted to RIDEM concurrently with this submittal.

3.2 WORK DESCRIPTION

The actual sequence of activities at the site is detailed in the 2010 Revised RAWP for the Site. EA will be responsible for the environmental oversight during cap construction. The remediation and construction activities related to the Site are planned to be completed by the Fall of 2010. The main concerns during remediation are soil erosion and the resultant sediment transport caused by the soil erosion.

Post-construction/remediation stormwater management will be dominated by infiltration and sheet flow into the Woonasquatucket River. No point sources of stormwater flow into water bodies will be created.

3.2.1 Installation of Erosion Controls

Stormwater runoff will be managed through the use of Filtrexx SiltSoxx™ or approved equal erosion control device(s) during construction activities. The erosion control device(s) will be installed along all downgradient areas of the Site being capped to control runoff. Stakes shall be installed through the middle of the SiltSoxx™ on 10-ft (3m) centers, using 2-in. (50mm) by 2 in.-(50mm) by 3-ft (1m) wooden stakes. SiltSoxx™ used for perimeter control of sediment and soluble pollutants in storm runoff shall be 12-in. diameter and meet Filtrexx SiltSoxx™ Material Specifications and use Certified Filtrexx FilterMedia™. The layout plan of the SiltSoxx™ erosion control device is depicted on Sheet 6, Construction Management of the Bid Plans, provided in Appendix B. Construction activities will be coordinated so that there are no point sources of stormwater flow into the downgradient wetland or river.

The erosion control device(s) will be field inspected and repaired as necessary prior to initiating remediation activities, and on a daily basis during project field activities.

3.2.2 Clearing, Grubbing, and Site Preparation

Erosion controls will be installed prior to clearing and grubbing activities. The tree line in the southern portion of the Site will be maintained for aesthetic purposes as well as to assist in the

control of stormwater flow onto the Site. All cleared vegetation will be chipped and stockpiled for later use.

3.2.3 Rough Grading and Stabilization

Prior to construction of the engineered cap, existing Site soils will be redistributed to establish proper stormwater drainage and to prevent volume loss within the 100-year floodplain. Following grading of the existing material, the engineered cap will be installed as depicted on the Sheet 3, Proposed Conditions of the Bid Plans, provided in Appendix B.

The cap will consist of 1 ft of certified clean fill material above a geotextile fabric. It is expected that this 1 ft of fill will consist of 8 in. of gravel/fill and 4 in. of plantable loam.

3.2.4 Paving and Revegetation

The capped area will be seeded or planted and covered with coconut fiber erosion control matting following the installation of clean fill. Grass seeding will be conducted through hydroseeding to accelerate the time for the grass to be established and stabilize the installed clean fill.

3.2.5 Cleanup and Maintenance

Once soil at the site is permanently stabilized by the engineered cap, all remaining stormwater erosion controls will be removed. Vegetation will be established as depicted on Sheet 7, Proposed Planting Plan of the Bid Plans, provided in Appendix B.

3.3 POST-CONSTRUCTION RUNOFF COEFFICIENTS

The overall Site pervious area will increase due to the construction of the engineered cap that will replace all pervious concrete and asphalt with grassed areas or plantings under the proposed future conditions. All surfaces will either be grass-covered or planted. Therefore, the peak runoff during a theoretical 25-year storm of 10-minute duration is 2.25 cfs. This represents a 72 percent reduction in stormwater runoff during the selected storm. Appendix C provides a detailed worksheet of this calculation.

4. CONTROLS AND MEASURES

Erosion and sedimentation controls were fully considered in the planning for this project. These controls are discussed in the Revised RAWP and illustrated on Sheet 6, Construction Management of the Bid Plans, provided in Appendix B. Measures to control erosion and sedimentation during the construction project are divided into non-structural stabilization and structural measures. Non-structural stabilization measures include preserving key existing vegetation and revegetation or shielding exposed sediments from erosive forces. Structural stabilization measures convey flows away from exposed areas and direct runoff and prevent sediment from moving offsite.

4.1 EROSION AND SEDIMENTATION CONTROLS

The objectives of the identified measures are to prevent offsite sedimentation and protect water quality during and following remediation and construction activities. The measures developed were designed in accordance with the procedures and guidelines established in *Stormwater Management for Construction Activities: Developing Stormwater Pollution Prevention Plans and Best Management Practices* (U.S. EPA 1992) and the Rhode Island Soil Survey (USDA SCS 1977).

4.1.1 Stabilization Practices

Soil stabilization practices include both temporary and permanent measures to reestablish vegetative cover on all areas disturbed during grading and cap construction activities. These measures will be practiced during and following excavation and construction. The following vegetative practices have been identified and are included in this SWPPP:

- Permanent seeding and planting

The key stabilization process to be employed at the site is permanent seeding of grass and urban mix and the planting of shrubs and cattails.

Following cap construction activities, unpaved portions of the site will be permanently stabilized with perennial seeding. This vegetation will decrease sediment yields from disturbed areas, reduce the velocity of overland stormwater flow, and protect bare soil from raindrop impacts (U.S. EPA 1992). The vegetation will be observed during routine cap inspections, and bare areas will be reseeded as necessary. The U.S. Environmental Protection Agency (U.S. EPA) (1992) indicates perennial vegetation removes an average of 90 percent of total suspended solids.

4.1.2 Structural Erosion and Sedimentation Controls

Filtrexx SiltSoxx™ will be installed along the limit of disturbance, as depicted on Sheet 6, Construction Management of the Bid Plans, provided in Appendix B. These controls will minimize the potential for sediment to reach the downgradient wetland and river. These erosion control measures will be inspected visually each day during site activities by onsite personnel to

ensure the integrity of the structures. If accumulated sediments along the barrier exceed one-third of the barrier height, these sediments will be removed. Additional information regarding Filtrexx SiltSoxx™ is provided in Appendix D.

5. POST-CONSTRUCTION STORMWATER MANAGEMENT

The dominant method for stormwater management following construction will be infiltration and sheet flow into the Woonasquatucket River. Following completion of the engineered cap construction, disturbed areas will be hydroseeded or planted with shrubs or cattails, as depicted on Sheet 7, Proposed Planting Plan of the Bid Plans, provided in Appendix B.

6. OTHER CONTROLS AND MEASURES

This section describes other controls and measures that will be utilized to prevent contact of stormwater and potential non-sediment sources of pollution during construction.

6.1 BEST MANAGEMENT PRACTICES

Throughout the project, Best Management Practices will be employed at the Site to maintain a clean, orderly construction site. These practices include:

- Neat and orderly storage of materials, if any
- Regular garbage, construction waste, sanitary waste, and rubbish disposal, if any
- Prompt cleanup of any spills, including solid and liquid materials, if any
- Installation of erosion controls along the perimeter of the Site.

The Site shall have graveled access entrance and exit drives and parking areas to reduce the tracking of sediment onto public roads

6.2 WASTE MATERIALS AND DISPOSAL

All waste generated at the site will be disposed of in a manner consistent with state and federal rules and regulations.

6.2.1 Hazardous Materials and Petroleum Products

The following practices will be used to reduce the risks associated with hazardous materials and petroleum products to site personnel and environmental resources:

- Hazardous materials and petroleum products will be stored in approved locations
- Refueling of machinery will occur only in designated areas and is prohibited in or within 50 ft of any wetland or water body
- Hazardous products will be kept in their original containers
- Original labels and material safety data sheets will be retained and kept onsite.

6.3 ALLOWABLE NON-STORMWATER DISCHARGES

Only the following sources of non-stormwater discharges may occur on the Site:

- Discharges that result from the washdown of vehicles where no detergents are used
- The use of water to control dust
- Lawn watering.

7. INSPECTION

Erosion and sedimentation control measures at the site will be visually inspected at least once every working day and also within 24 hours of a significant storm event. Required repairs or replacements will be made immediately and documented.

Inspection reports will be prepared by EA's Project Field Representative during weeks that inspections are made. This information, including any necessary repairs made since the previous inspection and any requests for required maintenance or repair of pollution prevention measures, will be included in the field inspection reports.

8. MAINTENANCE

Maintenance involves the upkeep and repair of all measures installed to reduce the risk of a release of pollutants into the adjacent wetland. Erosion and sedimentation controls and measures will be maintained in an effective condition throughout construction. The contractor will maintain a suitable reserve of materials to prepare for the possible replacement of deteriorating or breached measures on short notice.

Erosion controls may only be removed after upgradient locations have been stabilized and capping activities have ceased. Accumulated sediment will be removed and disposed of appropriately prior to Filtrexx SiltSoxx™ removal.

9. RECORDKEEPING

Inspection of pollution control measures will be documented by the EA Field Representative on field logs and inspection reporting forms. These records may be used to request maintenance or to verify that inspection and maintenance tasks are being performed. All completed field logs and inspection reporting forms will be maintained by EA in chronological order.

10. SEQUENCING

Site preparations, including the establishment of erosion and sedimentation controls and clearing and grubbing, are scheduled to begin immediately upon receipt of RIDEM verbal approval. Remediation activities will commence upon completion of the competitive bidding process, in general accordance with the schedule below.

Activity	*Estimated Duration*
Establish Sediment and Erosion Controls	July 2010
Clearing and Grubbing	July 2010
Debris Removal	July 2010
Grading	July - September 2010
Loaming, Seeding, and Planting	September - October 2010

11. STORMWATER POLLUTION PREVENTION PLAN CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based upon my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

STEPHEN C. MASON
No. 9318
REGISTERED
PROFESSIONAL ENGINEER
CIVIL 6/4/10

6/4/10

Stephen C. Mason, P.E.
Project Engineer
EA Engineering, Science, and Technology, Inc.

Date

6/4/10

Frank B. Postma, LSP, LEP, P.G.
Senior Project Manager
EA Engineering, Science, and Technology, Inc.

Date

Appendix A

NOTICE OF INTENT

RHODE ISLAND POLLUTANT DISCHARGE ELIMINATION SYSTEM (RIPDES)
NOTICE OF INTENT (NOI)
STORM WATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY
(Revised 8/08)

DEM USE ONLY
Date NOI Received _____
Date Fee Received _____
RIPDES# RIR _____

MARK ONLY ONE ITEM	Re-Application Amendment Previous RIPDES Authorization No. RIR _____	New Authorization	

I. OWNER

Name: City of Providence Parks Department			
Mailing Address: Dalrymple Boat House, Roger Williams Park			
City: Providence	State: RI	Zip: 02905	Phone: (401) 785-9450
Contact Person: Robert McMahon	Title: Director		
Billing Address (if different than above):			
City:	State:	Zip:	

Ownership (please circle one):
PRI - Private PUB - Public BPP - Public/Private STA - State FED - Federal
Other (please specify):

II. OPERATOR (if different from Owner)

Name: City of Providence Department of Public Parks			
Local Mailing Address: Dalrymple Boat House, Roger Williams Park			
City: Providence	State: RI	Zip: 02905	Phone: (401) 785-9450
Contact Person: Robert McMahon	Title: Director		

III. CONSTRUCTION SITE INFORMATION

Site's Official or Legal Name: Former Lincoln Lace and Braid			
Street Address: 55-61 Ponagansett Avenue			
City: Providence	State: RI	Zip: 02909	Phone:
Latitude (to nearest 15 sec.) Deg. 41 Min. 49 Sec. 15.79	Longitude (to nearest 15 sec.) Deg. 71 Min. 27 Sec. 27.		
Nearest Utility Pole Number:	Assessors Plat: 113	Lot: 305 &429	

Is the construction site part of a larger common plan of development or sale? NO
If YES, you must include the following information:

All Names of Development: _____

Projected **Total Disturbed Area of larger common plan:** _____ **Acres**

If the construction project is part of a larger common plan and the total disturbed area of the larger common plan is 5 acres or more then submission of the Storm Water Pollution Prevention Plan and Full Set of Plans is required.

Projected or Actual Construction Commencement 7/1/2010
Projected Construction Completion 10/30/2010 MO/DY/YR

Area of Site:	Total area of Impervious Surface:	Runoff Coefficient or Curve Number:
Total 6.0 Acres	Pre-Construction 1.58 Acres	Pre-Construction 8.17
Disturbed 4.1 Acres	Post-Construction 0.0 Acres	Post-Construction 2.25

IV. RECEIVING WATER INFORMATION (For an NOI to be considered complete the name of the receiving surface water must be included)

NOTE: If Storm Water from the site discharges to a Combined Sewer Overflow a RIPDES authorization for the construction activity is not necessary, please confirm with the appropriate sewer authority.

Separate Storm Sewer System (MS4) Name: _____

Receiving Surface Water Name: Woonasquatucket River Water Body ID#: RI0002007R-10D

Unnamed stream or wetlands connected to named surface water. Name: Sluiceway

Unnamed stream or wetlands not connected to named surface water.

Is the Receiving Surface Water an Impaired Water Body? NO

Watershed Code: 2 Name of Watershed: Woonasquatucket

V. NATURAL HERITAGE AREA (NHA) INFORMATION

Is the site within or directly discharging to a Natural Heritage Area (NHA)?
YES (NO)

If the site is within or directly discharging to a NHA, do you have previous approval from DEM Fish and Wildlife?
YES NO If yes, include a copy of the approval letter

Projects that propose a storm water or allowable non-storm water discharge to a NHA, or has discharge related activities that potentially affect a listed or proposed to be listed endangered or threatened species or its critical habitat, must submit a map showing the location of the construction sites, including the street, nearest utility pole number, and Assessor's plat and lot, total area of the site, and the limits of disturbance.

VI. CONSTRUCTION TYPE (check all that apply)

Type of Construction:
New Development Redevelopment
Residential Commercial Industrial (Restoration (i.e. wetlands)
MS4 Capital Improvements, specify (municipal, State, private institutional): _____
Utility Other (please list):

Types of Materials Handled and/or Stored Outdoors:
Solvents Paints Petroleum Products Metal
Plated Products Asphal t/Concrete Hazardous Substances Wood Treated Products
Other (please list): _____

Types of Storm Water Management Controls:
Oil/Water Separator (Erosion Controls) (Sedimentation Controls) Overhead Coverage
Detention/Desiltation Pond Chemical Treatment Other (please specify):

VII. REGULATORY INFORMATION | if applicable, please attach plan or approval documentation)

Is the site subject to Coastal Resources Management Council (CRMC) review and approval?
YES (NO) Application Number: _____
Water Quality Certification Application Number: _____

If Yes, for construction activities that disturb an area of five (5) or more acres, authorization to discharge under this permit will be automatically granted upon departmental receipt of the CRMC approval, RIDEM Water Quality Certification (if applicable), and a complete and certified NOI.

Note: all construction activities regulated by the RIPDES Program, which are also under CRMC review, are required to file an application for a Water Quality Certification.

Is the site subject to Qualifying Local Program (QLP) review and approval?
YES (NO) Name: _____
Water Quality Certification Application Number (if applicable): _____

If Yes, for construction activities that disturb an area of five (5) or more acres, authorization to discharge under this permit will be automatically granted upon departmental receipt of the QLP approval, RIDEM Water Quality Certification (if applicable), and a complete and certified NOI.

VIII. OWNER/OPERATOR CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under the direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that if review of the Storm Water Pollution Prevention Plan is performed by the Permitting Program, Wetlands Section, Coastal Resources Management Council, or by a city/town which has adopted a DEM approved Soil Erosion and Sediment Control Ordinance, then a Storm Water Permit from this office is contingent upon approval from the reviewing agency. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I am aware that it is the responsibility of the owner/operator to implement and amend the SWPPP as appropriate in accordance with the requirements of the General Permit.

Print Owner Name: Robert McMahon

Print Owner Title: Director of Providence Parks Department

Signature: Robert F. McMahon Date: 6/7/10

Print Operator Name*: Robert McMahon

Print Operator Title: Director of Providence Parks Department

Signature: Robert F. McMahon Date: 6/7/10

*This part needs to be filled out by the entity or the individuals that will have an ongoing role in the management and operation of the system during construction.

IX. PROFESSIONAL CERTIFICATION - NATURAL HERITAGE AREAS

I certify under penalty of law that the Natural Heritage Area Information under Section V of this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete at the time this application is made. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

STEPHEN C. MASON
No. 9318
REGISTERED PROFESSIONAL ENGINEER
CIVIL

Print Name of Professional: Stephen C. Mason, P.E.

Print Professionals Title*: Professional Engineer

Registration or License Number: 9318

Signature: _____ Date: 6/4/10

*Must be signed by a Registered Professional Engineer, a Certified Professional in Erosion and Sediment Control (CPESC), a Certified Professional in Storm Water Quality (CPSWQ), or a Registered Landscape Architect.

X. PROFESSIONAL CERTIFICATION - SWPPP DEVELOPMENT

Note: This section needs to be filled out for construction activities that are not required to submit a SWPPP to the RIPDES Program (refer to Part III.A.9 of the General Permit). The purpose of this certification is to document that a site specific SWPPP was prepared consistent with the requirements of the General Permit prior to filing the NOI. This certification by a professional does not alleviate or in any way limit the liability and sole responsibility of the Owner/Operator to properly implement the SWPPP and to amend the SWPPP as site conditions may require, so as to effectively control storm water discharges leaving the site during the construction period.

I certify under penalty of law that a site specific SWPPP was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for developing the SWPPP, the SWPPP is, to the best of my knowledge and belief, true, accurate, and complete at the time this certification is made and has been developed in accordance to the requirements of the Permit as well as all applicable guidelines of the Soil Erosion and Sediment Control Handbook and the Storm Water Design and Installation Standards Manual. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

STEPHEN C. MASON
No. 9318
REGISTERED PROFESSIONAL ENGINEER
CIVIL

Print Name of Professional: Stephen C. Mason, P.E.

Print Professionals Title*: Professional Engineer

Registration or License Number: 9318

Signature: _____ Date: 6/4/10

*Must be signed by a Registered Professional Engineer, a Certified Professional in Erosion and Sediment Control (CPESC), a Certified Professional in Storm Water Quality (CPSWQ), or a Registered Landscape Architect. If the SWPPP requires the practice of engineering, this must be signed by a Registered Professional Engineer.

Note: Upon completion of the permitted project, the DEM must be notified via a Notice of Termination (NOT) form. In accordance with Construction Activity General Permit Part V.L., this permit is not transferable to any person or group except after due notice to the Director. If no such notice is given, the named owner will be held liable for all fees and expenses levied to this permit.

Appendix B

BID PLANS

Appendix C

RUNOFF CALCULATION WORKSHEETS

EA Engineering, Science, and Technology, Inc.

Project: Lincoln Lace and Braid
Project #: 61891.05
Phase: 1001
Calculated: RGM Date: 5/25/2010
Checked: SCM Date: 5/25/2010

RATIONAL EQUATION WORKSHEET #1: RUNOFF COEFFICIENTS AND RUNOFF

Stage of Development: Existing Conditions

Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	C Table 21-16	Area (acres)	C*Area
Grass	0.1	2.83	0.28
Concrete Pad	0.85	1.08	0.92
Asphalt parking area	0.80	0.5	0.40
	Totals	4.41	1.60
	Use C =	**0.36**	

Rational Equation (Q = CIA)		
Q	Peak runoff rate	
C	Runoff Coefficients	0.36
i	Average Intensity[b] (in/hour)	5.1
A	Area (acres)	4.41

	Storm #1
Frequency (years)	25
Intensity (in/hour) (T_c = 10 min)	5.1
Peak rate of runoff (cubic feet/second)	**8.17**

(a) Equation and tables from Standard Handbook for Civil Engineers, Merritt (1968).
(b) Intensity is the maximum intensity rate for the 25-year storm taken from the Department of Commerce Technical Paqper No. 40 and NOAA Technical Memorandum NWS HYDRO-35.

EA Engineering, Science, and Technology, Inc.

Project: Linocln Lace and Braid
Project #: 61891.05
Phase: 1001
Calculated: RGM Date: 5/25/2010
Checked: SCM Date: 5/25/2010

RATIONAL EQUATION WORKSHEET #2: RUNOFF COEFFICIENTS AND RUNOFF

Stage of Development: Final Conditions

Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	C Table 21-16[a]	Area (acres)	C*Area
Grass	0.10	4.41	0.44
	Totals	4.41	0.44
	Use C =	**0.10**	

Rational Equation (Q = CiA)		
Q	Peak runoff rate	
C	Runoff Coefficient	0.10
i	Intensity[b] (in/hour)	5.1
A	Area (acres)	4.41

	Storm #1
Frequency (years)	25
Intensity (in/hour) (T_c = 10 min)	5.1
Peak rate of runoff (cubic feet/second)	**2.25**

(a) Equation and tables from Standard Handbook for Civil Engineers, Merritt (1968).

(b) Intensity is the maximum intensity rate for the 25-year storm taken from the Department of Commerce Technical Paqper No. 40 and NOAA Technical Memorandum NWS HYDRO-35.

Appendix D

Filtrexx SiltSoxx™ Information

Section 1: Erosion and Sediment Control – Construction Activities

1.1 Filtrexx SiltSoxx™

Sediment & Perimeter Control Technology

PURPOSE & DESCRIPTION

Filtrexx SiltSoxx™ are a three-dimensional tubular sediment control and storm water runoff filtration device typically used for **perimeter control** of sediment and soluble pollutants (such as phosphorus and petroleum hydrocarbons), on and around construction activities. Filtrexx SiltSoxx™ trap sediment and soluble pollutants by *filtering* runoff water as it passes through the matrix of the SiltSoxx™ *and* by allowing water to temporarily pond behind the SiltSoxx™, allowing *deposition* of suspended solids. SiltSoxx™ are also used to reduce runoff flow velocities on sloped surfaces.

ADVANTAGES

	Low	Med	High
Installation Difficulty	■		
Durability			■
Sediment Control			■
Soluble Pollutant Control		■	
Runoff Flow Control		■	
Life Cycle Cost	■		
AASHTO & USEPA NPDES Phase II Approved	YES		

APPLICATION

Filtrexx SiltSoxx™ are to be installed down slope of any disturbed area requiring erosion and sediment control and filtration of soluble pollutants from runoff. SiltSoxx™ are effective when installed perpendicular to sheet or low concentrated flow, and in areas that silt fence is normally considered appropriate. Acceptable applications include (Fifield, 2001):

- Site perimeters
- Above and below disturbed areas subject to sheet runoff, interrill and rill erosion
- Above and below exposed and erodable slopes
- Along the toe of stream and channel banks
- Around area drains or inlets located in a 'sump'
- On compacted soils where trenching of silt fence is difficult or impossible
- Around sensitive trees where trenching of silt fence is not beneficial for tree survival or may unnecessarily disturb established vegetation.
- On frozen ground where trenching of silt fence is impossible.
- On paved surfaces where trenching of silt fence is impossible.

SiltSoxx™ can be applied to areas of high sheet runoff and erosion, on slopes up to a 1:1 grade (should be used in conjunction with slope stabilization/erosion control technology on slopes > 4:1), around inlets, and in other disturbed areas of construction sites requiring sediment control. SiltSoxx™ may also be used in sensitive environmental areas, where migration of wildlife may be impeded by the use of fences or trenching may damage roots.

It is possible to drive over SiltSoxx™ during construction (although not recommended), however, these areas should be immediately repaired by manually moving SiltSoxx™ back into place, if disturbed. Continued heavy construction traffic may destroy the fabric mesh, reduce the dimensions, and reduce the effectiveness of the SiltSoxx™.

ADVANTAGES AND DISADVANTAGES

Advantages

- Tubular filtration matrix allows for better trapping and removal of sediment and soluble pollutants in storm water runoff compared to planar constructed sediment control devices (i.e., silt fence).
- Greater surface area contact with soil than typical sediment control devices, reducing potential for runoff to create rills under the device leading to unfiltered sediment.
- No trenching is required; therefore soil is not disturbed upon installation or removal.
- SiltSoxx™ can be installed year-round in difficult soil conditions such as frozen or wet ground, and dense and compacted soils, as long as stakes can be driven.
- SiltSoxx™ are easily implemented as a treatment in a greater treatment train approach to erosion and sediment control.
- Organic matter and humus colloids in FilterMedia™ (filler material in SiltSoxx™) have the ability to bind and adsorb phosphorus, metals, and hydrocarbons that may be in storm water runoff.
- Microorganisms in FilterMedia™ have the ability to degrade organic pollutants and cycle captured nutrients in storm water runoff.
- Soxx™ (the mesh netting containment system) allows SiltSoxx™ to be placed in areas of high sheet flow and low concentrated flow.
- SiltSoxx™ can be direct seeded at time of application to provide greater stability and filtration capability once vegetation is established.
- FilterMedia™ is organic and can be left on site after permanent stabilization is complete, to be used in landscape design and/or seeded and planted with permanent vegetation.
- FilterMedia™ improves existing soil structure if spread out and used as a soil amendment after construction activity is complete.
- Biodegradable or photodegradable SiltSoxx™ can be left on site after construction activity eliminating the need for removal and labor and disposal costs.
- SiltSoxx™ can be used on slopes to slow down runoff velocity, disperse concentrated runoff, and reduce effective slope lengths, reducing the erosive potential of stormwater runoff.
- SiltSoxx™ are less likely to obstruct wildlife movement and migration than planar/silt fence sediment control practices.
- SiltSoxx™ are available in 8 in.(200mm), 12 in. (300mm), 18 in. (450mm), 24 in. (600mm), and 32 in (800mm) diameters for customized applications and challenging situations.
- SiltSoxx™ are available in 200 ft (61m). continuous lengths to prevent weak sections and creation of concentrated flow situations typical to low points in runs of other sediment control devices. End points are sleeved together to form continuous runs of unlimited lengths without low or break points.
- SiltSoxx™ may assist in qualification for LEED® Green Building Rating and Certification credits under LEED® New Construction 2.2. Awarded credits may be possible from SS Prerequisite 1, SS Credit 5.1, SS Credit 6.2, WE Credit 2, MR Credit 4.1, MR Credit 4.2, MR Credit 5.1, MR Credit 5.2, and MR Credit 6. Note: LEED® is an independent program offered through the US 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.

Disadvantages

- If filler material of SiltSoxx™ is not Certified FilterMedia™, performance may be diminished.
- If not installed correctly, maintained or used for a purpose or intention that does not meet specifications performance may be diminished.
- If land surface is extremely bumpy, rocky, or changes elevation abruptly ground surface contact to SiltSoxx™ may be diminished thereby adversely effecting performance.

MATERIAL SPECIFICATIONS

SiltSoxx™ use only photodegradable or biodegradable Soxx™ netting materials available from Filtrexx International, LLC and are the only mesh materials accepted in creating SiltSoxx™ for any purpose. For Soxx™ tubular mesh material specifications see Table 1.1.

FILTERMEDIA™ CHARACTERISTICS

Specifications for SiltSoxx™ use only Certified Filtrexx FilterMedia™ which is a coarse composted material that is specifically designed for removal of solids and soluble pollutants from storm water runoff. *FilterMedia™ can be altered or customized to target specific pollutants in runoff as approved by the Engineer or Filtrexx*

International. All Certified Filtrexx FilterMedia™ has been third party tested and certified to meet minimum performance criteria defined by Filtrexx International. Performance parameters include; hydraulic flow through rate, total solids removal efficiency, total suspended solids removal efficiency, turbidity reduction, nutrient removal efficiency, metals removal efficiency, and motor oil removal efficiency. For information on the physical and chemical properties of Certified FilterMedia™ refer to Certified FilterMedia™ Specifications in Appendix 5.25. Look for the Filtrexx Certified™ FilterMedia™ Seal from our international network of Filtrexx Certified™ Installers.

PERFORMANCE

Performance testing and research on SiltSoxx™ has been extensive. Results from testing and research programs conducted on SiltSoxx™ include: hydraulic flow through rate, ponding rate and calculation (behind SiltSoxx™), sediment storage capacity (inside + behind tool), total solids removal efficiency, suspended solids removal efficiency (with and w/out biopolymer and polymer flocculants), turbidity reduction (with and w/out biopolymer and polymer flocculants), nitrate-N removal efficiency, total P removal efficiency, soluble reactive P removal efficiency (with and w/out PhosLoxx™), petroleum hydrocarbon (motor oil) removal efficiency, and heavy metals (Cu, Fe, Mn, Zn) removal efficiency. For a summary of performance testing, research results, and design specifications see Table 1.2 and Table 1.3. For copies of full reports contact Filtrexx International, LLC.

Successful bidders will furnish adequate research support showing their manufactured product meets or exceeds performance and design criteria outlined in this standard specification. Research or performance testing will be accepted if it meets the following criteria: conducted by a neutral third party, utilizes standard test methods reported by ASTM or referenced in a peer reviewed scientific journal, product and control treatments are tested in triplicate, performance results are reported for product and control (control should be a bare soil under the same set of environmental and experimental conditions), results are peer reviewed, results indicate a minimum 60% TSS removal efficiency and a minimum hydraulic flow through rate of 5 gpm/ft^2. Bidders shall attach a copy of the research report indicating test methodologies utilized and results.

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 SiltSoxx™ deteriorates or fails, it shall be repaired or replaced with an effective alternative.

DESIGN CRITERIA

The sediment and pollutant removal process characteristic to SiltSoxx™ combines both filtering and deposition from settling solids. This is different than methods that rely on ponding for deposition of solids for sediment control (i.e., silt fence). Ponding occurs when water flowing to the SiltSoxx™ accumulates faster than the hydraulic flow through rate of the SiltSoxx™. Typically, hydraulic flow-through rates for SiltSoxx™ are **50% greater** than geotextile filter fabric (silt fence). *Greater hydraulic flow-through rates reduce ponding, therefore reducing the need for taller sediment control structural design height.* Additionally, SiltSoxx™ do not blind as easily with small soil/sediment colloids, such as clay soils, as do planar geotextile sediment control barriers (such as silt fence). However, installation and maintenance is especially important for proper function and performance. For engineering design details see Figure 1.1. For a summary of specifications for product/practice use, performance and design see Table 1.2 and Table 1.3.

For most standard perimeter control applications, a 12 in (300mm) diameter SiltSoxx™ can replace a 24 to 36 in (600 to 900mm) silt fence. See Table 1.4 and 1.5 and Figure 1.2 for standard design specifications for maximum allowable slope lengths. Note: In some low flow conditions, an 8 in (200mm) SiltSoxx™ may replace a 24 in (600mm) silt fence. Design consideration should be given to the duration of the project, total area of

disturbance, rainfall/runoff potential, soil erosion potential, and sediment loading.

Runoff Flow:
Sheet runoff flow and ponding depth should not exceed the height of the SiltSoxx™. If overflow of the device is a possibility, larger diameter SiltSoxx™ should be constructed, other sediment control devices may be used, or management practices to reduce runoff should be installed. Alternatively, a second SiltSoxx™ may be constructed or used in combination with compost erosion control blankets or rolled erosion control blankets to slow runoff and reduce erosion. The Filtrexx Design Tool™ can assist in planning and designing what diameter SiltSoxx™ should be used, correct spacing requirements, and what rainfall and site conditions can lead to runoff breaching of the SiltSoxx™. For a copy of the Filtrexx Design Tool contact Filtrexx Technical Support at 440-926-2607.

Level Contour:
SiltSoxx™ should be placed on level contours to assist in dissipating low concentrated flow into sheet flow and reducing runoff flow velocity. Do not construct SiltSoxx™ to concentrate runoff or channel water. Sheet flow of water should be perpendicular to the SiltSoxx™ at impact and relatively un-concentrated. Placing SiltSoxx™ on undisturbed soil will reduce the potential for undermining.

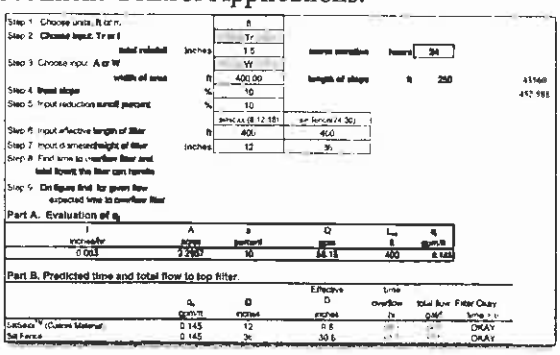
Runoff and Sediment Accumulation:
Where possible, SiltSoxx™ should be placed at a 5 ft (1.5m) or greater distance away from the toe of the slope to allow for proper runoff accumulation for sediment deposition and to allow for maximum sediment storage capacity behind the device. If a 5 ft (1.5m) distance is not available, due to construction restrictions, a second SiltSoxx™ may be installed to increase ponding and sediment accumulation capacity. Steeper slopes allow less sediment storage behind the sediment control device and may require larger SiltSoxx™ or shorter slope lengths.

End Around Flow:
In order to prevent water flowing around the ends of SiltSoxx™, the ends of the SiltSoxx™ must be constructed pointing upslope so the ends are at a higher elevation. A minimum of 10 linear ft (3m) per end each placed at a 30 degree angle is recommended.

Vegetated SiltSoxx™ :
For permanent areas SiltSoxx™ can be direct-seeded to allow vegetation established directly in the device, and may be expanded to 5 ft (1.5m) upslope and downslope from the device, for added performance. Vegetation on and around the SiltSoxx™ will assist in slowing runoff velocity for increased deposition and filtration of pollutants. The option of adding vegetation will be at the discretion of the Engineer. No additional soil amendments or fertilizer are required for vegetation establishment in the SiltSoxx™.

Slope Spacing & Drainage Area:
Maximum drainage area to, and slope spacing between SiltSoxx™ is dependent on: rainfall intensity and duration used for specific design/plan, slope steepness, and width of area draining to the SiltSoxx™. Refer to the Filtrexx Design Tool™ (Filtrexx Library #301) developed by The Ohio State University to accurately design a plan based on your site and climate conditions. See *Design Capacity Prediction Tool for SiltSoxx™ and Silt Fence* (Filtrexx Library #3313) and *Flow-Through Rates and Evaluation of Solids Separation of Compost FilterMedia™ vs. Silt Fence in Sediment Control Applications* (Filtrexx Library #104) for more information on the Design Tool or the research project and results used to create the tool. Figure 1.3 provides an example of the user interface for the Design Tool. For a free copy of the Design Tool contact Filtrexx Technical Support. A specification for maximum slope lengths, based on a 1 in (25 mm)/24 hr rainfall event is provided in Table 1.4 and Figure 1.2; and for a 2 in (50 mm)/24 hr rainfall event is provided in Table 1.5.

Figure 1.3 Filtrexx SiltSoxx™ Design Tool for Sediment Control Applications.



INSTALLATION

1. SiltSoxx™ used for perimeter control of sediment and soluble pollutants in storm runoff shall meet Filtrexx Soxx™ Material Specifications and use Certified Filtrexx FilterMedia™.
2. Contractor is required to be a Filtrexx Certified™ Installer as determined by Filtrexx International, LLC (440-926-2607 or visit website at Filtrexx.com). Certification shall be considered current if appropriate identification is shown during time of bid or at time of application (current listing can be found at www.filtrexx.com). Look for the Filtrexx Certified™ Installer Seal.

3. SiltSoxx™ will be placed at locations indicated on plans as directed by the Engineer.
4. SiltSoxx™ should be installed parallel to the base of the slope or other disturbed area. In extreme conditions (i.e., 2:1 slopes), a second SiltSoxx™ shall be constructed at the top of the slope.
5. Stakes shall be installed through the middle of the SiltSoxx™ on 10 ft (3m) centers, using 2 in (50mm) by 2 in (50mm) by 3 ft (1m) wooden stakes. In the event staking is not possible, i.e., when SiltSoxx™ are used on pavement, heavy concrete blocks shall be used behind the SiltSoxx™ to help stabilize during rainfall/runoff events.
6. Staking depth for sand and silt loam soils shall be 12 in (300mm), and 8 in (200mm) for clay soils.
7. Loose compost may be backfilled along the upslope side of the SiltSoxx™, filling the seam between the soil surface and the device, improving filtration and sediment retention.
8. If the SiltSoxx™ is to be left as a permanent filter or part of the natural landscape, it may be seeded at time of installation for establishment of permanent vegetation. The Engineer will specify seed requirements.
9. Filtrexx SiltSoxx™ are not to be used in perennial, ephemeral, or intermittent streams.

See design drawing schematic for correct Filtrexx SiltSoxx™ installation (Figure 1.1).

INSPECTION

Routine inspection should be conducted within 24 hrs of a runoff event or as designated by the regulating authority. SiltSoxx™ should be regularly inspected to make sure they maintain their shape and are producing adequate hydraulic flow-through. If ponding becomes excessive, additional SiltSoxx™ may be required to reduce effective slope length or sediment removal may be necessary. SiltSoxx™ shall be inspected until area above has been permanently stabilized and construction activity has ceased

MAINTENANCE

1. The Contractor shall maintain the SiltSoxx™ in a functional condition at all times and it shall be routinely inspected.
2. If the SiltSoxx™ has been damaged, it shall be repaired, or replaced if beyond repair.
3. The Contractor shall remove sediment at the base of the upslope side of the SiltSoxx™ when accumulation has reached 1/2 of the effective height of the SiltSoxx™, or as directed by the Engineer. Alternatively, a new SiltSoxx™ can be placed on top of and slightly behind the original one creating more sediment storage capacity without soil disturbance.
4. SiltSoxx™ shall be maintained until disturbed area above the device has been permanently stabilized and construction activity has ceased.
5. The FilterMedia™ will be dispersed on site once disturbed area has been permanently stabilized, construction activity has ceased, or as determined by the Engineer.
6. For long-term sediment and pollution control applications, SiltSoxx™ can be seeded at the time of installation to create a vegetative filtering system for prolonged and increased filtration of sediment and soluble pollutants (contained vegetative filter strip). The appropriate seed mix shall be determined by the Engineer.

DISPOSAL/RECYCLING

Filtrexx FilterMedia™ is a composted organic product recycled and manufactured from locally generated organic, natural, and biologically based materials. Once all soil has been stabilized and construction activity has been completed, the

FilterMedia™ may be dispersed with a loader, rake, bulldozer or similar device and may be incorporated into the soil as an amendment or left on the soil surface to aid in permanent seeding or landscaping. Leaving the FilterMedia™ on site reduces removal and disposal costs compared to other sediment control devices. The mesh netting material will be extracted from the FilterMedia™ and disposed of properly by the Contractor. The photodegradable mesh netting material (FilterSoxx™) will degrade in 2 to 5 years if left on site. Biodegradable mesh netting material is available and does not need to be extracted and disposed of, as it will completely decompose in approximately 6 to 12 months. Using biodegradable SiltSoxx™ completely eliminates the need and cost of removal and disposal.

METHOD OF MEASUREMENT

Bid items shall show measurement as 8 (200), 12 (300), 18 (450), 24 (600), 32 (800) inch (mm) diameter Filtrexx SiltSoxx™, per linear foot (or linear meter), 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.

Table 1.1. Filtrexx Soxx™ Material Specifications.

Material Type	3 mil HDPE	5 mil HDPE	5 mil HDPE	Multi-Filament Polypropylene (MFPP)	Multi-Filament Polypropylene "SafetySoxx™"
Material Characteristic	Photodegradable	Photodegradable	Biodegradable	Photodegradable	Photodegradable
Design Diameters	5 in (125mm), 8 in (200mm), 12 in (300mm), 18 in (400mm)	5 in (125mm), 8 in (200mm), 12 in (300mm), 18 in (400mm), 24 in (600mm), 32 in (800mm)	8 in (200mm), 12 in (300mm), 18 in (400mm), 24 in (600mm), 32 in (800mm)	8 in (200mm), 12 in (300mm), 18 in (400mm), 24 in (600mm), 32 in (800mm)	8 in (200mm), 12 in (300mm), 18 in (400mm), 24 in (600mm), 32 in (800mm)
Mesh Opening	3/8 in (10mm)	3/8 in (10mm)	3/8 in (10mm)	3/8 in (10mm)	1/8 in (3mm)
Tensile Strength	ND	26 psi (1.83 kg/cm^2)	26 psi (1.83 kg/cm^2)	44 psi (3.09 kg/cm^2)	202 psi (14.2 kg/cm^2)*
% Original Strength from Ultraviolet Exposure (ASTM G-155)	23% at 1000 hr	23% at 1000 hr	ND	100% at 1000 hr	100% at 1000 hr
Functional Longevity/ Project Duration	6 mo-2 yr	9 mo-3 yr	6-12 months	1-4 yr	2-5 yr

*Tested at Texas Transportation Institute/Texas A&M University (ASTM 5035-95).

Table 1.2. Filtrexx Pollution Control Practices Use Specifications.

Pollution Control Practice	SiltSoxx™	InletSoxx™	DitchChexx™	Slope Interruption Soxx™	FilterRing™	Filter Cell Filter Baffle™	Runoff Diversion Soxx™
Material Type	5 mil HDPE, MFPP, SafetySoxx™	SafetySoxx™	5 mil HDPE, MFPP, SafetySoxx™	5 mil HDPE	SafetySoxx™	5 mil HDPE, MFPP, SafetySoxx™	5 mil HDPE, MFPP, SafetySoxx™
Design Diameter	8 in (200mm), 12 in (300mm	8 in (200mm), 12 in (300mm	8 in (200mm), 12 in (300mm), 18 in (400mm), 24 in (600mm)	8 in (200mm)	12 in (300mm), 18 in (400mm), 24 in (600mm)	8 in (200mm), 12 in (300mm), 18 in (400mm)	12 in (300mm), 18 in (400mm),
Media Specification	FilterMedia™	FilterMedia™	FilterMedia™	FilterMedia™	FilterMedia™	FilterMedia™	GrowingMedia™

Table 1.3. Filtrexx SiltSoxx™ Performance and Design Specifications Summary.

Design Diameter / Design & Performance	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Effective Height	6.5 in (160mm)	9.5 in (240mm)	14.5 in (360mm)	19 in (480mm)	26 in (650mm)	The Ohio State University, Ohio Agricultural Research and Development Center	Transactions of the American Society of Agricultural & Biological Engineers, 2006
Effective Circumference	25 in (630mm)	38 in (960mm)	57 in (1450mm)	75 in (1900mm)	100 in (2500mm)		
Density (when filled)	13 lbs/ft (20 kg/m)	32 lbs/ft (50 kg/m)	67 lbs/ft (100 kg/m)	133 lbs/ft (200 kg/m)	200 lbs/ft (300 kg/m)	Soil Control Lab, Inc	
Air Space	20%	20%	20%	20%	20%	Soil Control Lab, Inc	
Maximum continuous length	unlimited	unlimited	unlimited	unlimited	unlimited		
Staking Requirement	10 ft (3m)	10 ft (3m)	10 ft (3m)	10 ft (3m)	10 ft (3m)		
Maintenance Requirement (sediment accumulation removal at X height)	3.25 in (80mm)	4.75 in (120mm)	7.25 in (180mm)	9.5 in (240mm)	13 in (325mm)		
Initial Maintenance Requirement based on Rainfall-Runoff*	22 in (55 cm); 1109 L/linear m	32 in (80 cm); 1388 L/linear m	42 in (105 cm); 1825 L/linear m	64 in (160 cm); 2776 L/linear m	86 in (215 cm); 3885 L/linear m	The University of Georgia & Auburn University	
Functional Longevity**	2 – 5 yr	2 – 5 yr	2 – 5 yr	2 – 5 yr	2 – 5 yr		
Maximum Slope Length (<2%)	600 ft (183m)	750 ft (229m)	1000 ft (305m)	1300 ft (396m)	1650 ft (500m)	The Ohio State University, Ohio Agricultural Research and Development Center	Filtrexx Design Tool™, Filtrexx Library #301, Filtrexx Tech Link #3304 & #3311
Hydraulic Flow Through Rate	7.5 gpm/ft (94 L/min/m)	11.3 gpm/ft (141 L/min/m)	15.0 gpm/ft (188 L/min/m)	22.5 gpm/ft (281 L/min/m)	30.0 gpm/ft (374 L/min/m)	The Ohio State University, Ohio Agricultural Research and Development Center; University of Guelph, School of Engineering/ Watershed Research Group	Filtrexx Tech Link #3311 & #3313, #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006, Second Interagency Conference on Research in Watersheds, 2006
P Factor (RUSLE)	0.1-0.32	0.1-0.32	0.1-0.32	0.1-0.32	0.1-0.32	USDA ARS Environmental Quality Lab/University of Georgia	American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Sediment Storage Capacity***	174 cu. in (2850cc)	396 cu. in (6490cc)	857 cu. in (14040cc)	1631 cu. in (26840cc)	2647 cu. in (43377 cc)		Filtrexx Tech Link #3314
Total Solids Removal	98%	98%	98%	98%	98%	Soil Control Lab, Inc	International Erosion Control Association, 2006
Total Suspended Solids Removal	78%	78%	78%	78%	78%	USDA ARS Environmental Quality Lab	Filtrexx Tech Link #3308; American Society of Agricultural &

							Biological Engineers Meeting Proceedings , 2006
Turbidity Reduction	63%	63%	63%	63%	63%	USDA ARS Environmental Quality Lab	Filtrexx Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
TSS Removal w/PAM	97%	97%	97%	97%	97%	USDA ARS Environmental Quality Lab	Filtrexx Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
TSS Removal w/Bio-Floxx™	97%	97%	97%	97%	97%	USDA ARS Environmental Quality Lab	Filtrexx Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Turbidity Reduction w/PAM	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	Filtrexx Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Turbidity Reduction w/ Bio-Floxx™	94%	94%	94%	94%	94%	USDA ARS Environmental Quality Lab	Filtrexx Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Total Phosphorus Removal	34%	34%	34%	34%	34%	USDA ARS Environmental Quality Lab	Filtrexx Tech Link #3308, American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Reactive Phosphorus Removal	38%	38%	38%	38%	38%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Total Phosphorus Removal w/ PhosLoxx™	60%	60%	60%	60%	60%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Reactive Phosphorus Removal w/ PhosLoxx™	99%	99%	99%	99%	99%	USDA ARS Environmental Quality Lab	Filtrexx Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Nitrate-N Removal	25%	25%	25%	25%	25%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Ammonium-N Removal	15%	15%	15%	15%	15%	USDA ARS Environmental Quality Lab	

Ammonium-N Removal w/NitroLoxx™	33%	33%	33%	33%	33%	USDA ARS Environmental Quality Lab	
Motor Oil Removal	96%	96%	96%	96%	96%	Soil Control Lab, Inc	International Erosion Control Association, 2006
Diesel Fuel Removal	Testing in Progress	Testing in Progress	Testing in Progress	Testing in Progress	Testing in Progress	Soil Control Lab, Inc	
Gasoline Removal	Testing in Progress	Testing in Progress	Testing in Progress	Testing in Progress	Testing in Progress	Soil Control Lab, Inc	
Iron (Fe) Removal	22%	22%	22%	22%	22%	Soil Control Lab, Inc	
Zinc (Zn) Removal	9%	9%	9%	9%	9%	Soil Control Lab, Inc	
Manganese (Mn) Removal	8%	8%	8%	8%	8%	Soil Control Lab, Inc	
Total coliform Removal^	67%	67%	67%	67%	67%	USDA ARS Environmental Quality Lab	
E. coli Removal^	67%	67%	67%	67%	67%	USDA ARS Environmental Quality Lab	
Enterococcus Removal^	47%	47%	47%	47%	47%	USDA ARS Environmental Quality Lab	
E. coli Removal w/ BactoLoxx™^	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	
Fecal coliform Removal w/ BactoLoxx™^	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	
Enterococcus Removal w/ BactoLoxx™^	91%	91%	91%	91%	91%	USDA ARS Environmental Quality Lab	
Clay (<0.002mm) Removal#	65%	65%	65%	65%	65%	USDA ARS Environmental Quality Lab	
Silt (0.002-0.05mm) Removal#	64%	64%	64%	64%	64%	USDA ARS Environmental Quality Lab	
Other Recommended Uses	Inlet Soxx™, DitchChexx™, Slope Interruption Soxx™	Inlet Soxx™, DitchChexx™, FilterRing™, Filter Cell Filtration Baffle™, Slope Interruption Soxx™	DitchChexx™, FilterRing™, FilterCell™ Filtration Baffle™	DitchChexx™, FilterRing™, FilterCell™ Filtration Baffle™	DitchChexx™, FilterRing™, FilterCell™ Filtration Baffle™		

*Based on rainfall intensity of 12.5 cm (5 in)/hr applied to a bare clay loam soil at a 10% slope; runoff flow rate of 108 ml/sec/linear m (0.52 gpm/linear ft); and mean runoff volume of 230 L/m^2 (6.3 g/ft^2).

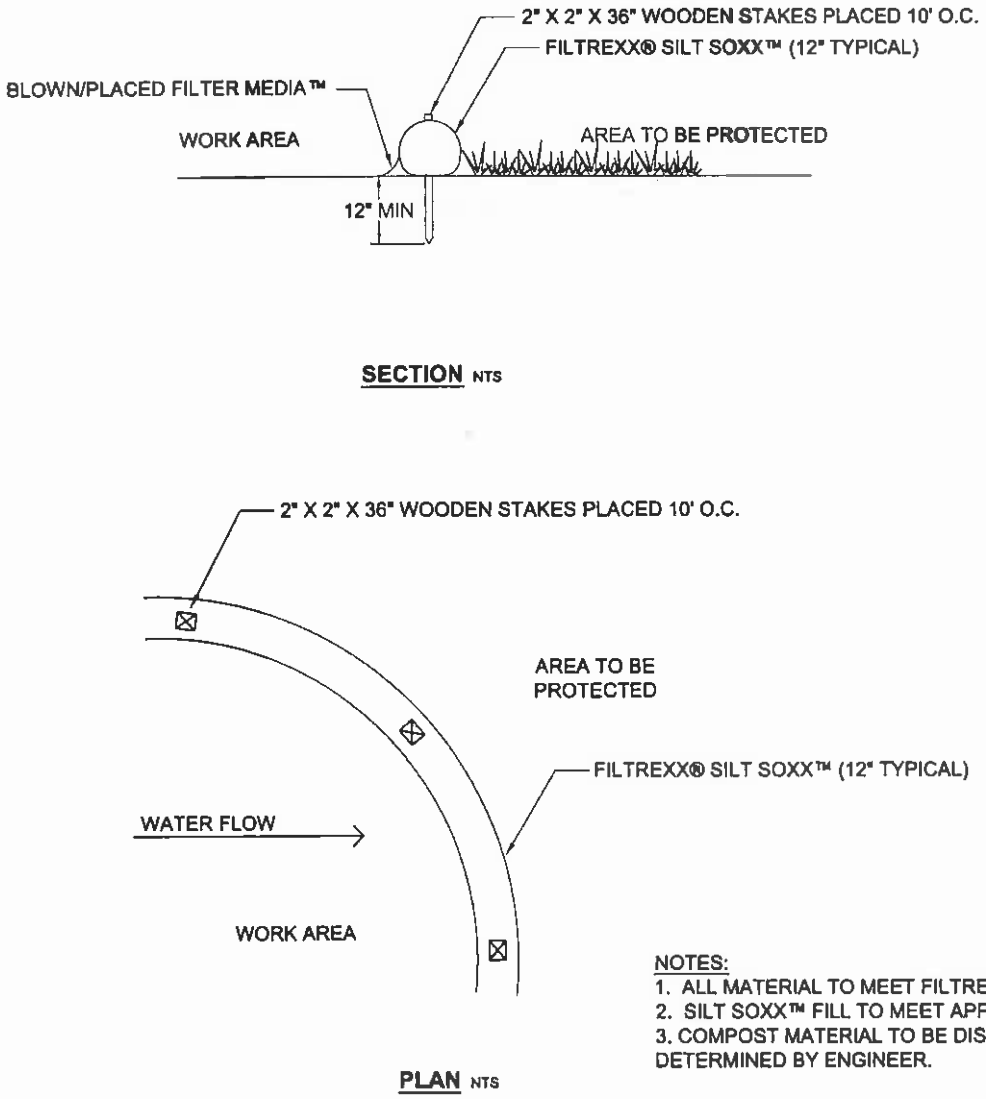
**Functional Longevity is dependent on UV exposure, freeze/thaw frequency, region of US/Canada, runoff-sediment frequency/duration/loading, and adherence to specified maintenance requirement.

***Sediment Storage Capacity = sediment accumulation behind (directly upslope) + within the device.

^Based on manure treated soils where bare soil control exhibited an average MPN for total coliform = 2.02X10^8/100 mL, E. coli. = 1.72X10^8/100 mL, Enterococcus = 1.43X10^6/100 mL .

#Based on average runoff-sediment concentrations on 2500 mg/L on a silt loam soil.

Figure 1.1. Engineering Design Drawing for SiltSoxx™



FILTREXX® SILT SOXX™

NTS

Figure 1.2. Maximum Slope Lengths of Filtrexx SiltSoxx™ Based on a 1 in (25 mm)/24 hr Rainfall Event.

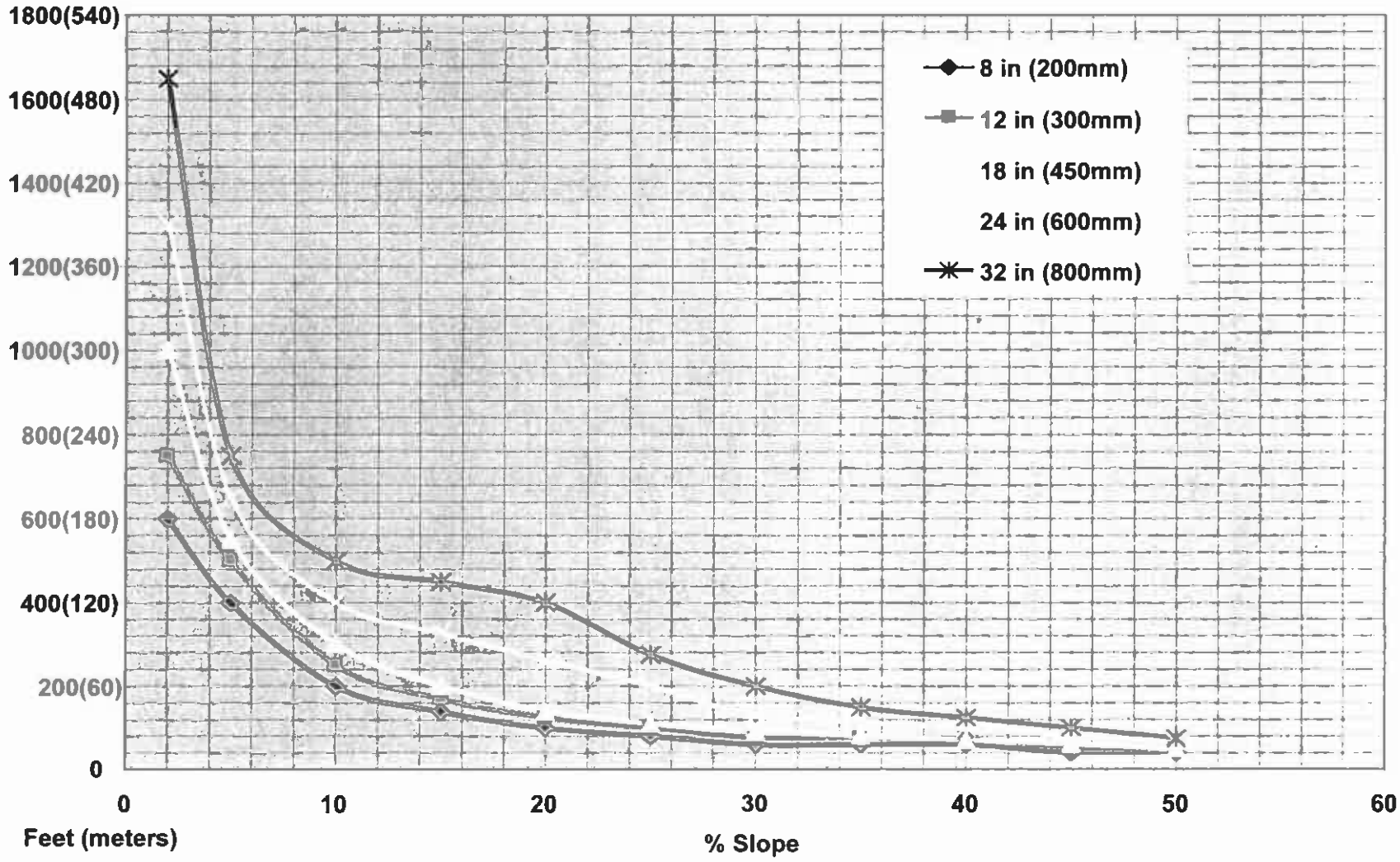


Table 1.4. Maximum Slope Lengths for Filtrexx Silt Soxx™ Based on a 1 in (25 mm)/24 hr Rainfall Event.

Slope Percent	Maximum Slope Length Above SiltSoxx™ in Feet (meters)*				
	8 in (200 mm) SiltSoxx™	12 in (300 mm) SiltSoxx™	18 in (450 mm) SiltSoxx™	24 in (600mm) SiltSoxx™	32 in (800mm) SiltSoxx™
	7 in (175 mm)**	10 in (250 mm) **	15 in (375 mm) **	20 in (500 mm) **	26 in (650 mm) **
2 (or less)	600 (180)	750 (225)	1000 (300)	1300 (400)	1650 (500)
5	400 (120)	500 (150)	550 (165)	650 (200)	750 (225)
10	200 (60)	250 (75)	300 (90)	400 (120)	500 (150)
15	140 (40)	170 (50)	200 (60)	325 (100)	450 (140)
20	100 (30)	125 (38)	140 (42)	260 (80)	400 (120)
25	80 (24)	100 (30)	110 (33)	200 (60)	275 (85)
30	60 (18)	75 (23)	90 (27)	130 (40)	200 (60)
35	60 (18)	75 (23)	80 (24)	115 (35)	150 (45)
40	60 (18)	75 (23)	80 (24)	100 (30)	125 (38)
45	40 (12)	50 (15)	60 (18)	80 (24)	100 (30)
50	40 (12)	50 (15)	55 (17)	65 (20)	75 (23)

*Based on a failure point of 36 in (0.9 m) super silt fence (wire reinforced) at 1000 ft (303 m) of slope, watershed width equivalent to receiving length of sediment control device, 1 in/ 24 hr (25 mm/24 hr) rain event. **Effective height of Silt Soxx™ after installation and with constant head from runoff as determined by Ohio State University.

Table. 1.5 Maximum Slope Lengths for Filtrexx SiltSoxx™ Based on a 2 in (50 mm)/24 hr Rainfall Event.

Slope Percent	Maximum Slope Length Above SiltSoxx™ in Feet (meters)*				
	8 in (200 mm) SiltSoxx™	12 in (300 mm) SiltSoxx™	18 in (450 mm) SiltSoxx™	24 in (600 mm) SiltSoxx™	32 in (800mm) SiltSoxx™
	7 in (175 mm)**	10 in (250 mm) **	15 in (375 mm) **	20 in (500 mm) **	26 in (650 mm) **
2 (or less)	300 (90)	375 (110)	500 (150)	650 (200)	850 (260)
5	200 (60)	250 (75)	275 (85)	325 (100)	400 (120)
10	100 (30)	125 (35)	150 (45)	200 (60)	275 (85)
15	70 (20)	85 (25)	100 (30)	160 (50)	225 (70)
20	50 (15)	65 (20)	70 (20)	130 (40)	180 (55)
25	40 (12)	50 (15)	55 (16)	100 (30)	150 (45)
30	30 (9)	40 (12)	45 (13)	65 (20)	100 (30)
35	30 (9)	40 (12)	45 (13)	55 (18)	75 (23)
40	30 (9)	40 (12)	45 (13)	50 (15)	60 (38)
45	20 (6)	25 (8)	30 (9)	40 (12)	50 (15)
50	20 (6)	25 (8)	30 (9)	35 (10)	40 (12)

*Based on a failure point of 36 in (0.9 m) super silt fence (wire reinforced) at 1000 ft (303 m) of slope, watershed width equivalent to receiving length of sediment control device, 2 in/ 24 hr (50 mm/24 hr) rain event. **Effective height of Silt Soxx™ after installation and with constant head from runoff as determined by Ohio State University.

Figure 1.4. Filtrexx SiltSoxx™ Applications

1 Installation Method – Perimeter Control

2 Continuous Sections - No Breaks

3 No Soil Disturbance

4 Individual Lot Wrapping

5 High Visibility Options

6 Use on Ecologically Sensitive Sites

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
235 Promenade Street, Providence, RI 02908-5767 TDD 401-222-4462

February 20, 2009

Alan M. Muoio
New England Mulching Services
460 Natick Avenue
Cranston, RI 02921

Subject: Filter Berm Technology

Dear Mr. Muoio:

Filter berm technology is recognized by several states and RIDOT as an alternative erosion and sediment control technology. The technology employs a filtering device consisting of a permeable fabric that is filled with a select compost product. ASSHTO Standard MP 9-03 contains a specification for compost material used in filter berms. The RIDEM Office of Water Resources has found filter berm technology to be an acceptable erosion and sediment control device when properly designed and specified for the anticipated field conditions in accordance with the manufacturer's product literature and when clearly depicted on plans submitted to the office for review and approval. As with any erosion and sediment control technology, it is the applicant's responsibility to select, design, install and effectively maintain any erosion and sediment control device employed so as to acceptably avoid and mitigate soil disturbance impacts.

Sincerely,

Russell J. Chateauneuf, P.E., Chief
Groundwater & Wetlands Protection

xc: W. Michael Sullivan, Director RIDEM
Nicholas. Pisani, RIDEM Wetlands Program
Chuck Horbert, RIDEM Wetlands Program
Martin. Wencek, RIDEM Wetlands Program
Alisa. Richardson, RIDEM WQC Program
Eric Beck, RIDEM RIPDES Program

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Transportation
RESEARCH AND TECHNOLOGY DEVELOPMENT
Two Capitol Hill, Room 013
Providence, RI 02903-1124

OFFICE (401) 222-3030
FAX (401) 222-4573
TDD (401) 222-4971

March 31, 2008

ALEX MARKS
FILTREXX INTERNATIONAL ✓
35481 GRAFTON EASTERN RD
GRAFTON OH 44044

Subject: *Filter Berm*

Filtrexx International's **Filtersoxx** is an acceptable alternative erosion and sediment control material for use on Rhode Island Department of Transportation highway construction projects where field conditions permit. This acceptance will continue with satisfactory performance.

Please inform us of any changes to this material.

Sincerely,

Deborah Munroe

Deborah Munroe

c: Environmental Resources
B. Murio, NE Mulching
pefile ✓