LIST OF NON-VESCH PROPRIETARY MEASURES

The following list of proprietary erosion and sediment control measures are approved for use when applied to meet the intent of the Virginia Erosion and Sediment Control Handbook (VESCH) measures.

All non-VESCH measures included in this appendix shall be installed and maintained per the manufacturer's recommendation or follow standard VESCH procedures otherwise. Proposed non-VESCH measures shall be detailed on the plans and described in the narrative to show the intent of the measure it is replacing.

Construction Entrance (Virginia State Minimum Standards and Specifications 3.02)

- AlturnaMats®
- VersaMats

Silt Fence (Virginia State Minimum Standards and Specifications 3.05)

- Erosion Eel™
- SiltSoxx™
- SMARTfence®36

Storm Drain Inlet Protection (Virginia State Minimum Standards and Specifications 3.07)

- Dandy Bag®
- Dandy Curb Bag™
- Dandy Sack™
- Dandy Curb Sack™
- Dandy Curb™
- Gutter Buddy™
- Gutter Eel™
- Silt Sack® (Regular Flow)
- SiltSoxx™
- The Grate Bag
- Curlex® Sediment Logs®

Dewatering Structure (Virginia State Minimum Standards and Specifications 3.26)

- Dandy Dewatering Bag™

CONSTRUCTION ENTRANCE (VESCH MINIMUM STANDARDS AND SPECIFICATIONS 3.02)

AlturnaMATS®

World's Toughest Ground Protection Mat

ALTURNAMATS Ground Protection Mats LIMITED LIFETIME GUARANTEE

AlturnaMATS *Built Tough!*

The Original Ground Protection Mats Featuring Maximum Traction Diamond Plate Tread Design

These rugged mats are made of 1/2" thick polyethylene so they are virtually indestructible. They withstand vehicles weighing up to 60 tons, bend but do not break and feature a Limited Lifetime Warranty. AlturnaMATS have been tested in record cold and heat. AlturnaMATS are an environmentally friendly mat as they are made from recycled plastic materials.

With AlturnaMATS, getting stuck is virtually eliminated. They are available smooth on one side or smooth on both sides, ideal for removing dirt or gravel.

- Easily supports 60 ton vehicles
- Rugged 1/2" thick polyethylene
- Bold cleat design for great traction
- Build a roadway or working platform in minutes
- Leave turf smooth, even in soft conditions
- No more splintered, warped, water logged plywood
- Simply hosing down leaves the mats clean
- Available in both black or white mats
- Mats can be locked together with Turn-A-Links forming a continuous roadway
- Limited Lifetime Warranty

Sizes to meet your needs

Black	White	Weight
4' x 8'	4' x 8'	86 lbs.
3' x 8'	3' x 8'	64.5 lbs.
3' x 6'	3' x 6'	51 lbs.
2' x 8'	2' x 8'	43 lbs.
2' x 6'	2' x 6'	32.25 lbs.
2' x 4'	2' x 4'	21.5 lbs.


Landscaping


Tree Care


Construction

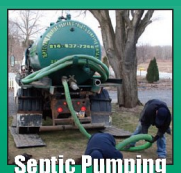

Concrete


Snow/Slush


Manufactured Housing


Recreation Areas & Events


Trenching


Septic Pumping


Utilities


Golf Courses

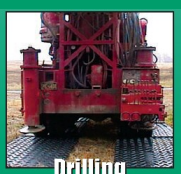
ATLANTIC DRILLING ADS SUPPLY, INC.

ATLANTIC SUPPLY

Largo, FL	800-752-9416
Riviera Beach, FL	800-535-7384
Orlando, FL	800-569-8950
Jacksonville, FL	888-260-5584
Montgomery, AL	866-917-3447

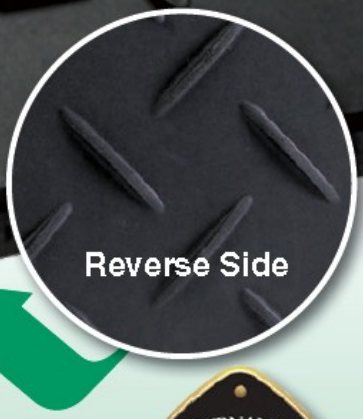
www.AtlanticSupply.com
www.ScalesForBusiness.com


Cemeteries


Drilling

VersaMATS

Most Versatile Mats in the Industry



ALTURNAMATS Ground Protection Mats LIMITED LIFETIME GUARANTEE

VersaMATS

Easy to Walk On - Safe to Work On - Great to Drive On
Featuring an Exclusive Slip-Resistant Tread Design

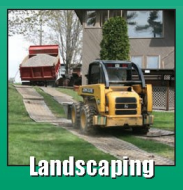
VersaMATS literally are the most versatile ground protection mats in the industry. The flat, slip-resistant tread permits pedestrians to walk safely on the mats, yet they are as rugged as the original AlturnaMATS. The reverse side has the same diamond plate tread as AlturnaMATS, providing great traction for vehicles.

VersaMATS are also available in white, making them ideal for safe use as long walkways even in darkened conditions. They are also available smooth on one side.

- Leaves turf smooth even in soft soil conditions
- Tough 1/2" thick polyethylene
- Two practical cleat designs... for walking and vehicle traffic
- Withstand 60-ton loads
- Build a temporary roadway or walkway in minutes
- Lock together with Turn-A-Links
- Limited Lifetime Warranty

Sizes to meet your needs

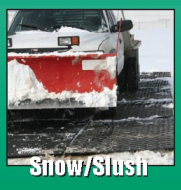
Black	White	Weight
4' x 8'	4' x 8'	86 lbs.
3' x 8'	3' x 8'	64.5 lbs.
2' x 8'	2' x 8'	43 lbs.

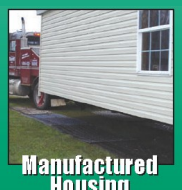

Landscaping

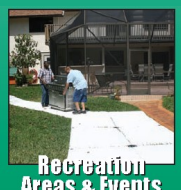

Tree Care

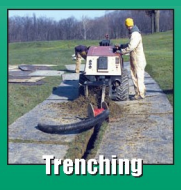

Construction


Concrete


Snow/Slush


Manufactured Housing


Recreation Areas & Events


Trenching


Septic Pumping


Utilities


Golf Courses

ATLANTIC DRILLING SUPPLY, INC. ADS

ATLANTIC SUPPLY

Largo, FL	800-752-9416
Riviera Beach, FL	800-535-7384
Orlando, FL	800-569-8950
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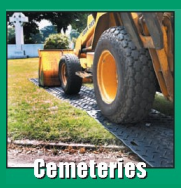
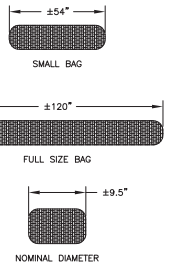

Cemeteries

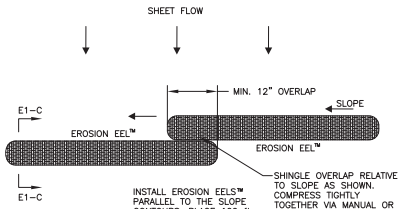

Drilling

SILT FENCE (VESCH MINIMUM STANDARDS AND SPECIFICATIONS 3.05)

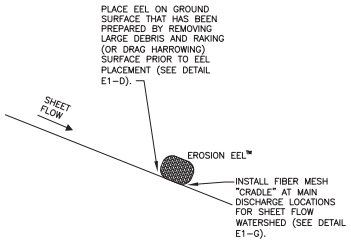


NOTE:
ALL EROSION EELS™ USED FOR PERIMETER CONTROL SHALL USE MIXTURE SPECIFICATIONS 1.1 AND 1.2.

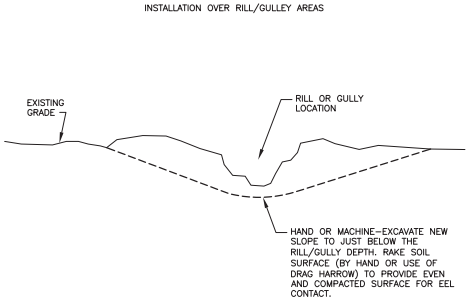
DETAIL E1–A: EROSION EELs™
N.T.S.



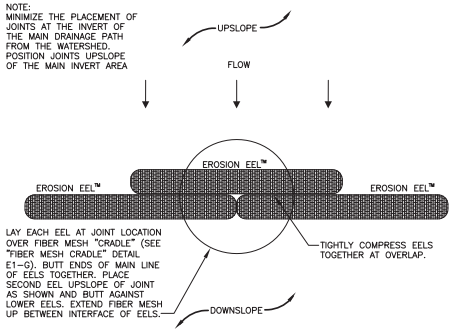
DETAIL E1–B: INTERCEPTING SHEET FLOW
PERPENDICULAR TO FLOW PATH – PLAN VIEW



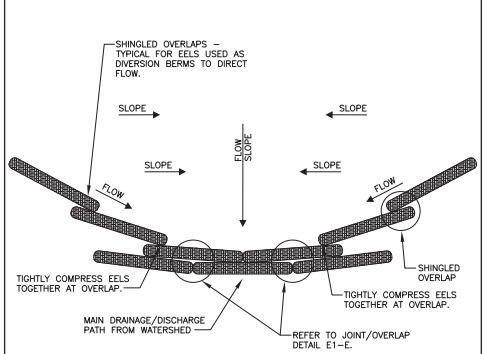
DETAIL E1–C: INTERCEPTING SHEET FLOW
PERPENDICULAR TO FLOW PATH – PLAN VIEW



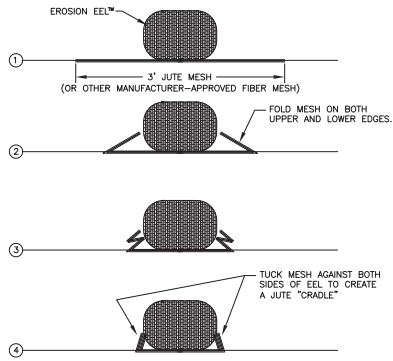
DETAIL E1–D: CROSS–SECTION VIEW
N.T.S.



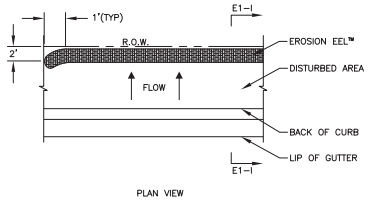
DETAIL E1–E: PLAN VIEW –
OVERLAP/JOINT DETAIL NEAR DISCHARGE POINTS FROM WATERSHED
N.T.S.



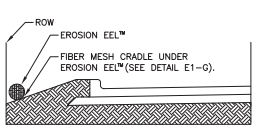
DETAIL E1–F: PLAN VIEW – TYPICAL
ARRANGEMENT OF EELS USED FOR PERIMETER CONTROL
N.T.S.



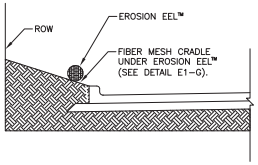
DETAIL E1–G: SECTION – FIBER MESH "CRADLE"
N.T.S.



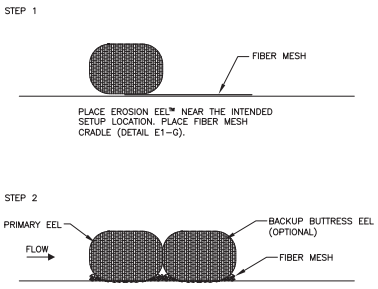
DETAIL E1–H: EROSION EEL™
PLACED AT EDGE OF ROADWAY RIGHT–OF–WAY
N.T.S.



DETAIL E1–I: SECTION
N.T.S.



DETAIL E1–J: SECTION
N.T.S.



DETAIL E1–K: STABILIZING PROCEDURE FOR
EROSION EEL PLACED OVER HARD SURFACE (PAVED, ROCK, ETC.)
N.T.S.

Spacing Recommendations for the Erosion Eel™ for Perimeter Controls and Intercepting Sheet Flow on Slopes

slope(%)	single eel spacing (ft)	*Stacked Dual eel spacing (ft)
0.5	300	N/A
1	200	N/A
2	160	N/A
3	80	N/A
4	50	N/A
5	40	N/A
6	35	N/A
8	30	N/A
10	25	N/A
15	17	N/A
20	12	25
25	7	15
33	N/A	10
50	N/A	6

* DUAL STACK REFERS TO TWO EELS STACKED ATOP ONE ANOTHER AND STABILIZED WITH T–POSTS. SEE DETAIL E2–E ON SHEET E–2.

GENERAL NOTES:

1. EROSION EELS™ USED IN PERIMETER CONTROL APPLICATIONS SHALL HAVE A SPECIFICATION MIXTURE 1.1 OR 1.2.
   a. MIXTURE SPECIFICATION 1.1. A FILTER MIXTURE COMPRISED OF 50% SHREDDED RUBBER AND 50% WOOD CHIP PARTICLES BY VOLUME. THE SHREDDED RUBBER SHALL BE WASHED AND PROCESSED TO REMOVE MOST, IF NOT ALL, METAL COMPONENTS. THE RUBBER SHALL BE DERIVED FROM RECYCLED TIRES AND SHALL BE SHREDDED TO PRODUCE A MAXIMUM PARTICLE SIZE OF +/– 3/4 INCH. THE WOOD CHIPS SHALL BE PRODUCED FROM HARDWOOD TREES AND SHALL CONFIRM TO AASHTO CERTIFICATION SPECIFICATION MP 9–03.
   b. MIXTURE SPECIFICATION 1.2. A FILTER MIXTURE COMPRISED OF 1/3 SHREDDED RUBBER, 1/3 WOOD CHIPS, AND 1/3 RECYCLED SYNTHETIC FIBERS. THE SHREDDED RUBBER SHALL BE WASHED AND PROCESSED TO REMOVE MOST, IF NOT ALL, METAL COMPONENTS. THE RUBBER SHALL BE DERIVED FROM RECYCLED TIRES AND SHALL BE SHREDDED TO PRODUCE A MAXIMUM PARTICLE SIZE OF +/– 3/4 INCH. THE WOOD CHIPS SHALL BE PRODUCED FROM HARDWOOD TREES AND SHALL CONFIRM TO AASHTO CERTIFICATION SPECIFICATION MP 9–03. THE SYNTHETIC FIBERS SHALL BE PRODUCED FROM RECYCLED, MANUFACTURED MATERIALS, SUCH AS, BUT NOT LIMITED TO, PRE–CONSUMER SCRAP CARPET, TIRE CHORD, AND TIRE FIBER MATERIALS.
2. EROSION EELS™ SHALL BE MANUFACTURED FROM A WOVEN GEOTEXTILE COVERING WITH INTERIOR FILTER MATERIALS SUCH AS 100% SHREDDED RUBBER (MIXTURE SPECIFICATION 1.0, 50% SHREDDED RUBBER/50% AASHTO–CERTIFIED WOOD CHIPS (MIXTURE SPECIFICATION 1.1), OR 1/3 SHREDDED RUBBER:1/3 AASHTO–CERTIFIED WOOD CHIPS:1/3 RECYCLED SYNTHETIC FIBERS (MIXTURE SPECIFICATION 1.2).
3. LENGTHS OF EROSION EELS™ SHALL BE EITHER A NOMINAL +/–10 FT. OR +/– 4.5 FT. NOMINAL DIAMETER SHALL BE +/–9.5 INCHES.
4. EROSION EELS™ CAN BE PLACED AT THE TOP, ON THE FACE, OR AT THE TOE OF SLOPES TO INTERCEPT RUNOFF, REDUCE FLOW VELOCITY, RELEASE THE RUNOFF AS SHEET FLOW AND PROVIDE REMOVAL OF SEDIMENT FROM THE RUNOFF.
5. EROSION EELS™ SHALL BE INSTALLED ALONG THE GROUND CONTOUR, AT THE TOE OF SLOPES, AT AN ANGLE TO THE CONTOUR TO DIRECT FLOW AS A DIVERSION BERM, AROUND INLET STRUCTURES, IN A DITCH AS A CHECK DAM TO HELP REDUCE SUSPENDED SOLIDS LOADING AND RETAIN SEDIMENT, OR AS A GENERAL FILTER FOR ANY DISTURBED SOIL AREA.
6. NO TRENCHING IS REQUIRED FOR INSTALLATION OF EROSION EELS™
7. PREPARE BED FOR EEL INSTALLATION BY REMOVING ANY LARGE DEBRIS INCLUDING ROCKS, SOIL CLODS, AND WOODY VEGETATION. EROSION EELS™ CAN ALSO BE PLACED OVER PAVED SURFACES INCLUDING CONCRETE AND ASPHALT WITH NO SURFACE PREPARATION REQUIRED.
8. RAKE BED AREA WITH A HAND RAKE OR BY DRAG HARROW.
9. DO NOT PLACE EEL DIRECTLY OVER RILL AND GULLIES UNTIL AREA HAS BEEN HAND–EXCAVATED AND RAKED TO PROVIDE A LEVEL BEDDING SURFACE. ALL SURFACES SHALL BE UNIFORMLY COMPACTED FOR MAXIMUM SEATING OF EELS IN PLACE.
10. FOR LOCATIONS WHERE EELS WILL BE PLACED IN CONCENTRATED FLOWS (SUCH AS CHECK DAMS, INLET PROTECTION) AND FOR PERIMETER CONTROLS AT PRIMARY DISCHARGE LOCATIONS, BED THE EELS IN A JUTE MESH CRADLE PER THE DETAILED DRAWINGS.
11. FOR DITCH APPLICATIONS, THE MAXIMUM DRAINAGE AREA SHALL BE 10 ACRES.
12. IF MORE THAN ONE EROSION EEL™ IS PLACED IN A ROW, THE EELS SHALL BE OVERLAPPED A MINIMUM OF 12 INCHES TO PREVENT FLOW AND SEDIMENT FROM PASSING THROUGH THE FIELD JOINT. COMPRESS THE TWO EELS OF THE OVERLAP TIGHTLY TOGETHER EITHER BY HAND OR MANUFACTURER–APPROVED MECHANIZED MEANS.
13. WHEN USED IN DITCHES AS A CHECK DAM, EROSION EELS™ SHALL BE INSTALLED PER MANUFACTURER'S DETAILS.
14. FOR CHECK DAM APPLICATIONS, EROSION EELS™ SHALL BE PLACED PERPENDICULAR TO THE FLOW OF THE WATER. EROSION EELS™ SHALL CONTINUE UP THE SIDES SLOPES A MINIMUM OF 3 FEET ABOVE THE DESIGN FLOW DEPTH.
15. EROSION EELS™ SHALL REMAIN IN PLACE UNTIL FULLY ESTABLISHED VEGETATION HAS COMPLETELY DEVELOPED OR UNTIL THE STORAGE CAPACITY/FUNCTIONAL LIFE OF THE EEL HAS BEEN EXHAUSTED (REQUIRING REPLACEMENT WITH NEW EELS).
16. ANCHORING POSTS FOR CHECK DAM APPLICATIONS SHALL HAVE A MINIMUM WEIGHT OF 1.25 LBS/FT STEEL T–POSTS (5 TO 7 FT. LENGTHS) ROLLED FROM HIGH CARBON STEEL. POSTS SHOULD BE HOT–DIP GALVANIZED OR COATED WITH A WEATHER–RESISTANT PAINT FOR STEEL APPLICATION. POSTS SHOULD BE EQUIPPED WITH A METAL ANCHOR PLATE. INSTALL PER DETAILS ON THIS SHEET.
17. PLACE T–POSTS THROUGH HANDLE OF BAGS. DO NOT DRIVE POSTS THROUGH EROSION EELS™. T–POSTS ARE TO BE EMBEDDED A MINIMUM OF 2 FT INTO GROUND.

SUBMITTAL & REVISION RECORD

NO	DATE	DESCRIPTION
1		
2		
3		
4		
5		

Authorized Use:
☐ Survey ☐ Design Dev. ☐ Permitting ☐ Bidding ☐ Construction ☐ -

ErosionEels.com
866-429-EELS
866-429-3357

FRIENDLY ENVIRONMENT
100 PRINCE STREET
SHELBYVILLE, TENNESSEE 37160
1–931–607–5953

PERIMETER CONTROL AND SHEET (INTER-RILL) FLOW INTERCEPTION FOR THE EROSION EEL™

SHEET: 6 OF
DWG NO: E-1
LAST EDIT DATE: JUNE 7, 2007
DWG SCALE: N.T.S.
PROJECT NO:
DRAWN BY: MJ
CHECKED BY: KW
DRAFT MANAGER APPROVAL: KW

filtrexx®
SUSTAINABLE TECHNOLOGIES

SECTION 1: CONSTRUCTION

Filtrexx® Sediment/Perimeter Control (SiltSoxx™)

PURPOSE & DESCRIPTION

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

APPLICATION

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

- 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

Perimeter control 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

Installation Method – Perimeter Control

> 4:1), around inlets, and in other disturbed areas of construction sites requiring sediment control. Perimeter control 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 perimeter control during construction (although not recommended), however, these areas should be immediately repaired by manually moving perimeter control back into place, if disturbed. Continued heavy construction traffic may destroy the fabric mesh, reduce the dimensions, and reduce the effectiveness of the perimeter control.

ADVANTAGES AND DISADVANTAGES

Advantages

- Tubular filtration matrix allows for better trapping and removal of sediment and soluble pollutants in stormwater runoff compared to planar constructed sediment control devices (i.e., silt fence).
- Greater surface area contact with soil than typical sediment control devices reduces 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.
- Perimeter control 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.
- Perimeter control is 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 perimeter control) have the ability to bind and adsorb phosphorus, metals, and hydrocarbons that may be in stormwater runoff.
- Microorganisms in FilterMedia have the ability to degrade organic pollutants and cycle captured nutrients in stormwater runoff.
- Soxx (the mesh netting containment system) allows perimeter control to be placed in areas of high sheet flow and low concentrated flow.
- Perimeter control 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 perimeter control can be left on site after construction activity and may eliminate the need for removal and labor and disposal costs.
- Perimeter control 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.
- Perimeter control is less likely to obstruct wildlife movement and migration than planar/silt fence sediment control practices.
- Perimeter control is available in 5 in. (125mm), 8 in.(200mm), 12 in. (300mm), 18 in. (450mm), 24 in. (600mm), and 32 in (800mm) diameters for customized applications and challenging situations.
- Perimeter control is available in up to 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.
- Perimeter control 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.*

ADVANTAGES			
	LOW	MED	HIGH
Installation Difficulty	✓		
Durability			✓
Sediment Control			✓
Soluble Pollutant Control		✓	
Runoff Flow Control		✓	
Life Cycle Cost	✓		

Disadvantages
- If filler material of perimeter control is not Filtrexx® 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 perimeter control may be diminished thereby adversely effecting performance.

MATERIAL SPECIFICATIONS

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

FILTERMEDIA™ CHARACTERISTICS

Specifications for perimeter control use only Filtrexx Certified FilterMedia which is a coarse composted material that is specifically designed for removal of solids and soluble pollutants from stormwater runoff. FilterMedia can be altered or customized to target specific pollutants in runoff as approved by the Engineer or Filtrexx International. All Filtrexx Certified 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 Filtrexx Certified FilterMedia refer to the Filtrexx Design Manual, section 5.1. Look for the Filtrexx Certified FilterMedia Seal from our international network of Filtrexx Certified Installers and Manufacturers.

PERFORMANCE

Performance testing and research on perimeter control has been extensive. Results from testing and research programs conducted on perimeter control include: hydraulic flow through rate, ponding rate and calculation (behind perimeter control), 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 Nutrient Agent), 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 1.1 and Table 1.2. For copies of full reports visit www.filtrexx.com.

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 perimeter control deteriorates or fails, it shall be repaired or replaced with an effective alternative.

DESIGN CRITERIA

The sediment and pollutant removal process characteristic to perimeter control combines both filtering and deposition from settling solids. This is different than methods that rely on ponding for deposition of solids for perimeter control (i.e., silt fence). Ponding occurs when water flowing to the perimeter control accumulates faster than the hydraulic flow through rate of the perimeter control. Typically, hydraulic flow-through rates for perimeter control 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, perimeter control does not blind as easily with small soil/sediment colloids, 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 1.1 and Table 1.2.

Filtering Water

For most standard perimeter control applications, a 12 in (300mm) diameter perimeter control can replace a 24 to 36 in (600 to 900mm) silt fence. See Table 1.3 and 1.4 and Figure 1.2 for standard design specifications for maximum allowable slope lengths. Note: In some low flow conditions, an 8 in (200mm) perimeter control 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 perimeter control. If overflow of the device is a possibility, larger diameter perimeter control should be constructed, other sediment control devices may be used, or management practices to reduce runoff should be installed. Alternatively, a second perimeter control 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 perimeter control should be used, correct spacing requirements, and what rainfall and site conditions can lead to runoff breaching of the perimeter control. For instructions and a copy of

Figure 1.3 Filtrexx® Sediment Control Design Tool for Sediment Control Applications.

Step 1: Choose units. ft or m		ft				
Step 2: Choose input: Tr or I		Tr				
	total rainfall	inches	1.5	storm duration	hours: 24	
Step 3: Choose input: A or W			W			
	width of area	ft	400.00	length of slope	ft: 250	43560
Step 4: Input slope		%	10			452.588
Step 5: Input reduction runoff percent		%	10			
			sediment control (8,12,16)	silt fence (24, 30)		
Step 6: Input effective length of filter		ft	400	400		
Step 7: Input diameter/height of filter		inches	12	36		

Step 8: Find time to overflow filter and total flow/ft the filter can handle

Step 9: On figure find for given flow expected time to overflow filter

Part A. Evaluation of q_l

I inches/hr	A acres	s percent	Q gpm	L_{ss} ft	q_l gpm/ft
0.063	2.2957	10	58.15	400	0.145

Part B. Predicted time and total flow to top filter.

	q_o gpm/hr	D inches	Effective D inches	Time Overflow hr	Total Flow gal/f	Filter OKAY time > tr
Sediment control (Coarse Material)	0.145	12	9.6	**99.1**	**865**	OKAY
Silt Fence	0.145	36	30.6	**97.5**	**851**	OKAY

Use on Ecologically Sensitive Sites

the Filtrexx Design Tool, refer to the Filtrexx Design Manual, Section 5.4 and 5.4a.

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

Runoff and Sediment Accumulation:
Where possible, perimeter control 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 perimeter control may be installed to increase ponding and sediment accumulation capacity. Steeper slopes allow less sediment storage behind the perimeter control device and may require larger perimeter control or shorter slope lengths.

End Around Flow:
In order to prevent water flowing around the ends of perimeter control, the ends of the perimeter control 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 Perimeter Control:
For permanent areas perimeter control 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 perimeter control 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 perimeter control.

Slope Spacing & Drainage Area:
Maximum drainage area to, and slope spacing between perimeter control is dependent on: rainfall intensity and duration used for specific design/plan, slope steepness, and width of area draining to the perimeter control. Refer to the Filtrexx Design Tool 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* and *Flow-Through Rates and Evaluation of Solids Separation of Compost FilterMedia™ vs. Silt Fence in Sediment Control Applications* (http://www.filtrexx.com/research-library/) 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. A specification for maximum slope lengths, based on a 1 in (25 mm)/24 hr rainfall event is provided in Table 1.3 and Figure 1.2; and for a 2 in (50 mm)/24 hr rainfall event is provided in Table 1.4.

INSTALLATION

1. Perimeter control used for control of sediment and soluble pollutants in storm runoff shall meet Filtrexx Soxx Material Specifications and use Filtrexx Certified FilterMedia.
2. Contractor is required to be Filtrexx Certified or use pre-filled Filtrexx® SiltSoxx™ products manufactured by a Filtrexx Certified Manufacturer as determined by Filtrexx International (call Filtrexx at 877-542-7699 for a current list of installers). Certification shall be considered current if appropriate identification is shown during time of bid or at time of application Look for the Filtrexx Certified Seal.
3. Perimeter control will be placed at locations indicated on plans and in a manner as directed by the Engineer or Manufacturer.
4. Perimeter control should be installed parallel to the base of the slope or other disturbed area.

In challenging conditions (i.e., 2:1 slopes), a second perimeter control shall be constructed at the top of the slope, or staking may be increased.

5. Effective Soxx height in the field should be as follows: 5" diameter Soxx = 4" high; 8" diameter Soxx = 6.5" high; 12" diameter Soxx = 9.5" high; 18" diameter Soxx = 14.5" high; 24" diameter Soxx = 19" high.
6. Stakes should be installed through the middle of the perimeter control on 10 ft (3m) centers, using 2 in (50mm) by 2 in (50mm) by 3 ft (1m) wooden stakes. 5" diameter Soxx may use 1" (25 mm) x 1" (25 mm) x 18 " (0.5 m) wooden stakes. In the event staking is not possible, i.e., when perimeter control is used on pavement, heavy concrete blocks shall be used behind the perimeter control to help stabilize during rainfall/ runoff events.
7. Staking depth for sand and silt loam soils shall be 12 in (300mm), and 8 in (200mm) for clay soils.
8. Loose compost may be backfilled along the upslope side of the perimeter control, filling the seam between the soil surface and the device, improving filtration and sediment retention.
9. If the perimeter control 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.
10. Perimeter control is not to be used in perennial, ephemeral, or intermittent streams.

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

INSPECTION

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

MAINTENANCE

1. The Contractor shall maintain the perimeter control in a functional condition at all times and it shall be routinely inspected.
2. If the perimeter control 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 perimeter control when accumulation has reached 1/2 of the effective height of the Soxx, or as directed by the Engineer. Alternatively, a new perimeter control can be placed on top of and slightly behind the original one creating more sediment storage capacity without soil disturbance.
4. Perimeter control 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, perimeter control 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

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

Close Up of Sediment Control

will be extracted from the FilterMedia and disposed of properly by the Contractor. The photodegradable mesh netting material (Soxx) may degrade if left on site. Biodegradable mesh netting material is available and may eliminate the need and cost of removal and disposal.

METHOD OF MEASUREMENT

Bid items shall show measurement as 5 (125), 8 (200), 12 (300), 18 (450), 24 (600), 32 (800) inch (mm) diameter Filtrexx® Sediment/Perimeter Control or 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.

ADDITIONAL INFORMATION

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

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Call for complete list of international installers.

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TABLES & FIGURES:

Table 1.1. Filtrexx® Soxx™ Material Specifications.

Material Type	Cotton BioSoxx™	5 mil High Density Polyethylene (HDPE)	5 mil High Density Polyethylene (HDPE)	Multi-Filament Polypropylene (MFPP, previously HDPP)	Multi-Filament Polypropylene SafteySoxx™	Multi-Filament Polypropylene DuraSoxx®	Multi-Filament Polypropylene DuraSoxx® (Heavy Duty)
Material Characteristic	Biodegradable	Oxo-degradable	Photodegradable	Photodegradable	Photodegradable	Photodegradable	Photodegradable
Design Diameters	8 in (200mm), 12 in (300mm)	8 in (200mm), 12 in (300mm), 18 in (400mm)	5 in (125mm), 8 in (200mm), 12 in (300mm), 18 in (400mm)	8 in (200mm), 12 in (300mm), 18 in (400mm), 24 in (600mm), 32 in (800mm)	8 in (200mm), 12 in (300mm), 18 in (400mm)	8 in (200mm), 12 in (300mm), 18 in (400mm), 24 in (600mm), 32 in (800mm)	5 in (125mm), 8 in (200mm), 12 in (300mm), 18 in (400mm)
Mesh Opening	1/8 in (3mm)	3/8 in (10mm)	3/8 in (10mm)	3/8 in (10mm)	1/8 in (3mm)	1/8 in (3mm)	1/8 in (3mm)
Tensile Strength	44 psi (3.09 kg/cm^2)	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)*	202 psi (14.2 kg/cm^2)	242 psi (16.99 kg/cm^2)
% Original Strength from Ultraviolet Exposure (ASTM G-155)	ND	ND	23% at 1000 hr	100% at 1000 hr	100% at 1000 hr	100% at 1000 hr	100% at 1000 hr
Functional Longevity/ Project Duration***	up to 12 months**	6 mo-3.5 yr	9 mo-4 yr	1-4 yr	2-5 yr	2-5 yr	2-5 yr

* Tested at Texas Transportation Institute/Texas A&M University (ASTM 5035-95).
** Data based on Caltrans research and specifications
*** Functional longevity ranges are estimates only. Site specific environmental conditions may result in significantly shorter or longer time periods.

Table 1.2. Filtrexx® Sediment Control Performance and Design Specifications Summary.

Design Diameter / **Design & Performance**	**5 in (125mm)**	**8 in (200mm)**	**12 in (300mm)**	**18 in (450mm)**	**24 in (600mm)**	**32 in (800mm)**	**Testing Lab/ Reference**	**Publication(s)**
Effective Height	4 in (100mm)	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	15 in (380mm)	25 in (630mm)	38 in (960mm)	57 in (1450mm)	75 in (1900mm)	100 in (2500mm)		
Density (when filled)	7.8 lbs (12 kg/m)	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%	20%	Soil Control Lab, Inc	
Maximum continuous length	unlimited	unlimited	unlimited	unlimited	unlimited	unlimited		
Staking Requirement	10 ft (3m)	10 ft (3m)	10 ft (3m)	10 ft (3m)	10 ft (3m)	10 ft (3m)		
Maintenance Requirement (sediment accumulation removal at X height)	2 in (50mm)	3.25 in (80mm)	4.75 in (120mm)	7.25 in (180mm)	9.5 in (240mm)	13 in (325mm)		

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Table 1.2. Filtrexx® Sediment Control Performance and Design Specifications Summary. (continued)

Design Diameter / Design & Performance	5 in (125mm)	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Initial Maintenance Requirement based on Rainfall-Runoff*	13 in (33 cm); 665 L/linear m	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**	6 mo – 5 yr	6 mo – 5 yr	6 mo – 5 yr	6 mo – 5 yr	6 mo – 5 yr	6 mo – 5 yr		
Maximum Slope Length (<2%)	360 ft (110m)	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	4.5 gpm/ft (56 L/min/m)	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	0.1-0.32	USDA ARS Environmental Quality Lab/ University of Georgia	American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Sediment Storage Capacity***	104 cu. in (1710cc)	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%	98%	Soil Control Lab, Inc	International Erosion Control Association, 2006
Total Suspended Solids Removal	78%	78%	78%	78%	78%	78%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006

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Table 1.2. Filtrexx® Sediment Control Performance and Design Specifications Summary. (continued)

Design Diameter / Design & Performance	5 in (125mm)	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Turbidity Reduction	63%	63%	63%	63%	63%	63%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Clay (<0.002mm) Removal	65%	65%	65%	65%	65%	65%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Silt (0.002-0.05mm) Removal	64%	64%	64%	64%	64%	64%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
TSS Removal w/PAM	97%	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/ Flocculent	97%	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%	98%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Turbidity Reduction w/ Flocculent	94%	94%	94%	94%	94%	94%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006

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Table 1.2. Filtrexx® Sediment Control Performance and Design Specifications Summary. (continued)

Design Diameter / Design & Performance	5 in (125mm)	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Total Phosphorus Removal	34%	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%	38%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Total Phosphorus Removal w/ Nutrient Agent	60%	60%	60%	60%	60%	60%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Reactive Phosphorus Removal w/ Nutrient Agent	99%	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%	25%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Ammonium-N Removal	15%	15%	15%	15%	15%	15%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Ammonium-N Removal w/ Nutrient Agent	33%	33%	33%	33%	33%	33%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Motor Oil Removal w/ Hydrocarbon Agent	99%	99%	99%	99%	99%	99%	USDA ARS Environmental Quality Lab	International Erosion Control Association, 2006
Diesel Fuel Removal w/ Hydrocarbon Agent	99%	99%	99%	99%	99%	99%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Gasoline Removal w/ Hydrocarbon Agent	54%	54%	54%	54%	54%	54%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link

(continued on next page)

Table 1.2. Filtrexx® Sediment Control Performance and Design Specifications Summary. (continued)

Design Diameter / Design & Performance	5 in (125mm)	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Cadmium (Cd) Removal w/ Heavy Metal Agent	73%	73%	73%	73%	73%	73%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Chromium (Cr) Removal w/ Heavy Metal Agent	47%	47%	47%	47%	47%	47%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Copper (Cu) Removal w/ Heavy Metal Agent	70%	70%	70%	70%	70%	70%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Nickel (Ni) Removal w/ Heavy Metal Agent	69%	69%	69%	69%	69%	69%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Lead (Pb) Removal w/ Heavy Metal Agent	73%	73%	73%	73%	73%	73%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Zinc (Zn) Removal w/ Heavy Metal Agent	53%	53%	53%	53%	53%	53%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Iron (Fe) Removal	22%	22%	22%	22%	22%	22%	Soil Control Lab, Inc	
Manganese (Mn) Removal	8%	8%	8%	8%	8%	8%	Soil Control Lab, Inc	
Total coliform Removal	67%	67%	67%	67%	67%	67%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
E. coli Removal	67%	67%	67%	67%	67%	67%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Enterococcus Removal	47%	47%	47%	47%	47%	47%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
E. coli Removal w/ Bacteria Agent	98%	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Fecal coliform Removal w/ Bacteria Agent	98%	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Enterococcus Removal w/ Bacteria Agent	91%	91%	91%	91%	91%	91%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Other Recommended Uses	Slope Interruption	Inlet Protection, Ditch Protection, Slope Interruption	Inlet protection, Ditch Protection, Concrete Washout, Filtration System, Slope Interruption	Ditch Protection, Concrete Washout, Filtration System	Ditch Protection, Concrete Washout, Filtration System	Ditch Protection, Concrete Washout, Filtration System		

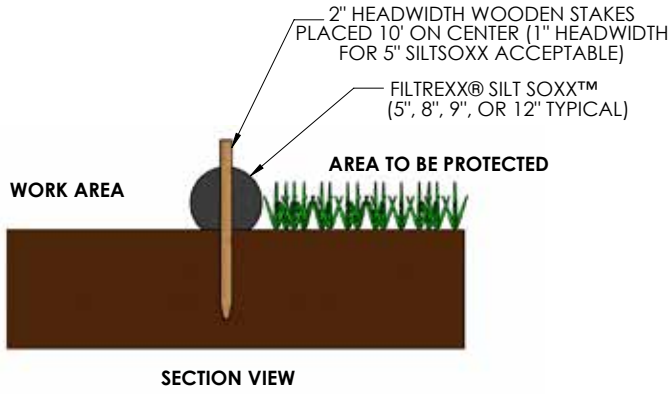
* Based on rainfall intensity of 12.5 cm (5 in)/hr applied to a bare clay loam soil at a 10% slope; runoff flow rate of 108 ml/sec/linear m (0.52 gpm/linear ft); and mean runoff volume of 230 L/m2 (6.3 g/ft2).

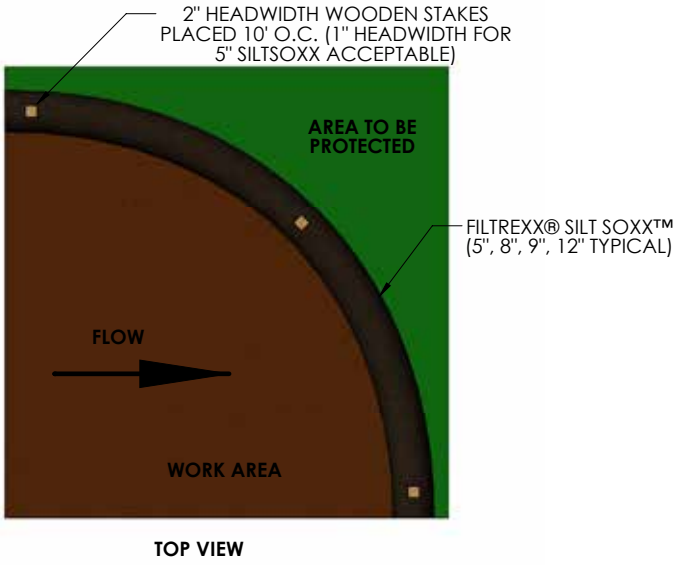
** Functional Longevity is dependent on mesh material type, UV exposure, freeze/thaw frequency, region of US/Canada, runoff-sediment frequency/durtion/ loading, and adherence to specified maintenance requirement. Functional longevity ranges are estimates only. Site specific environmental conditions may result in significantly shorter or longer time periods.

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

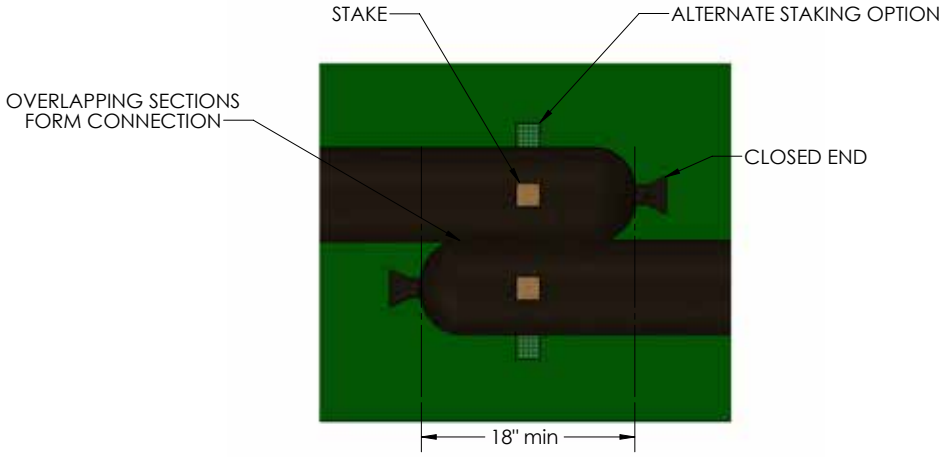
Figure 1.1. Engineering Design Drawing for Perimeter Control

FILTREXX® SILT SOXX™

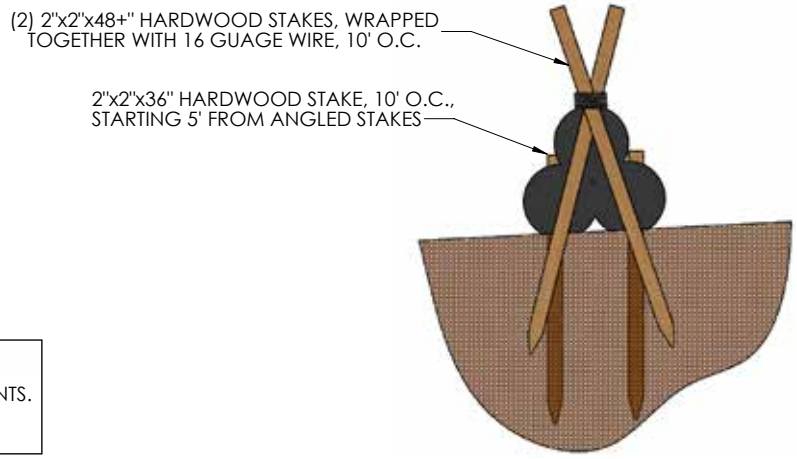




COMPOST SOCK CONNECTION/ATTACHMENT DETAIL



FILTREXX® PYRAMID STAKING DETAIL



NOTES:
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
2. SILT SOXX™ FILL TO MEET APPLICATION REQUIREMENTS.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

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

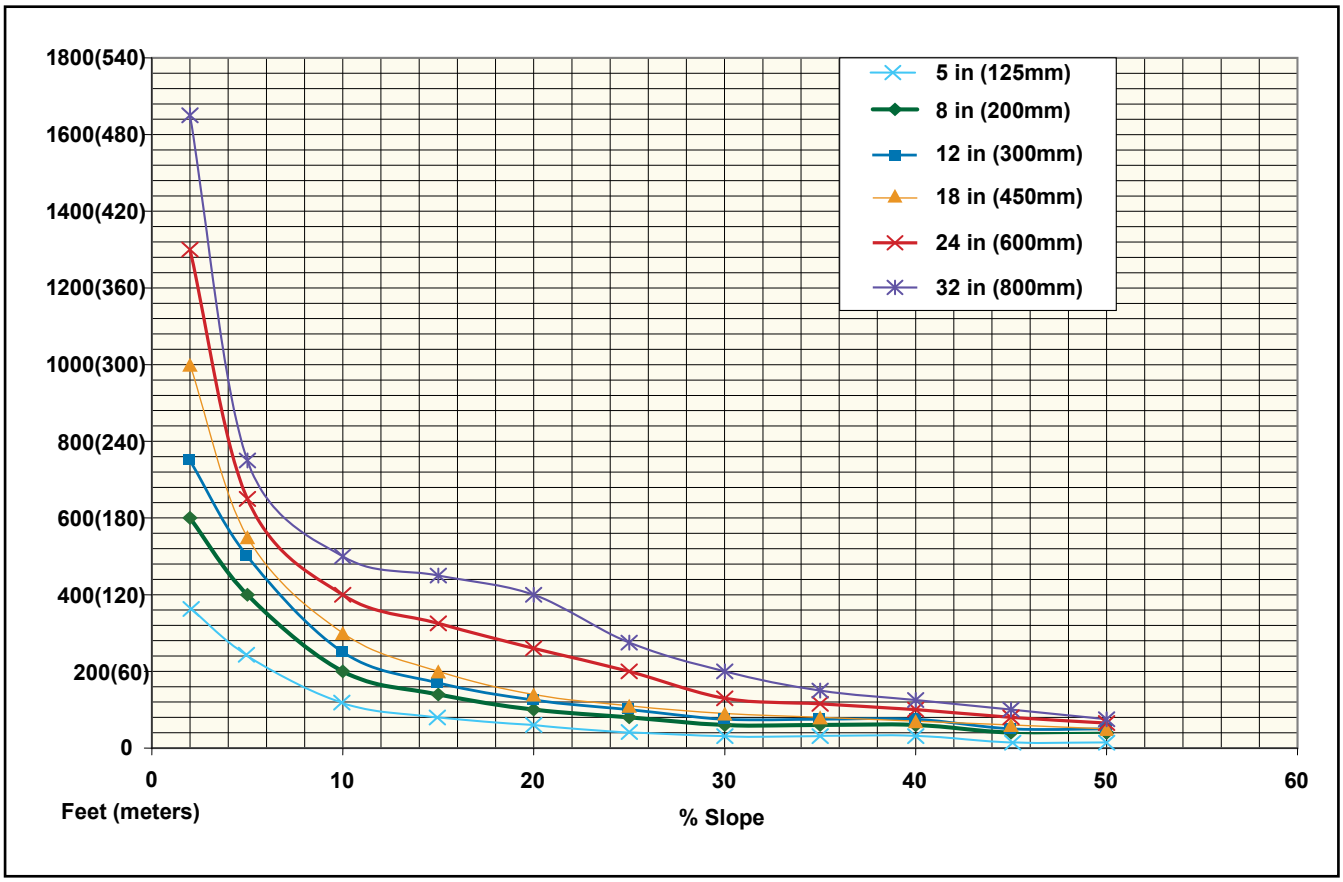


Table 1.3. Maximum Slope Lengths for Filtrexx® Perimeter Control Based on a 1 in (25 mm)/24 hr Rainfall Event.

Slope Percent	Maximum Slope Length Above Sediment Control in Feet (meters)*					
	5 in (125 mm) Sediment control	8 in (200 mm) Sediment control	12 in (300 mm) Sediment control	18 in (450 mm) Sediment control	24 in (600mm) Sediment control	32 in (800mm) Sediment control
	4 in (100 mm)**	6.5 in (160 mm)**	9.5 in (240 mm) **	14.5 in (360 mm) **	19 in (480 mm) **	26 in (650 mm) **
2 (or less)	360 (110)	600 (180)	750 (225)	1000 (300)	1300 (400)	1650 (500)
5	240 (73)	400 (120)	500 (150)	550 (165)	650 (200)	750 (225)
10	120 (37)	200 (60)	250 (75)	300 (90)	400 (120)	500 (150)
15	85 (26)	140 (40)	170 (50)	200 (60)	325 (100)	450 (140)
20	60 (18)	100 (30)	125 (38)	140 (42)	260 (80)	400 (120)
25	48 (15)	80 (24)	100 (30)	110 (33)	200 (60)	275 (85)
30	36 (11)	60 (18)	75 (23)	90 (27)	130 (40)	200 (60)
35	36 (11)	60 (18)	75 (23)	80 (24)	115 (35)	150 (45)
40	36 (11)	60 (18)	75 (23)	80 (24)	100 (30)	125 (38)
45	24 (7)	40 (12)	50 (15)	60 (18)	80 (24)	100 (30)
50	24 (7)	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 Sediment control after installation and with constant head from runoff as determined by Ohio State University.

Table. 1.4. Maximum Slope Lengths for Filtrexx® Perimeter Control Based on a 2 in (50 mm)/24 hr Rainfall Event.

Slope Percent	Maximum Slope Length Above Sediment Control in Feet (meters)*					
	5 in (125 mm) Sediment control	8 in (200 mm) Sediment control	12 in (300 mm) Sediment control	18 in (450 mm) Sediment control	24 in (600mm) Sediment control	32 in (800mm) Sediment control
	4 in (100 mm)**	6.5 in (160 mm) **	9.5 in (240 mm) **	14.5 in (360 mm) **	19 in (480 mm) **	26 in (650 mm) **
2 (or less)	180 (55)	300 (90)	375 (110)	500 (150)	650 (200)	850 (260)
5	120 (37)	200 (60)	250 (75)	275 (85)	325 (100)	400 (120)
10	60 (18)	100 (30)	125 (35)	150 (45)	200 (60)	275 (85)
15	42 (13)	70 (20)	85 (25)	100 (30)	160 (50)	225 (70)
20	30 (9)	50 (15)	65 (20)	70 (20)	130 (40)	180 (55)
25	24 (7)	40 (12)	50 (15)	55 (16)	100 (30)	150 (45)
30	18 (6)	30 (9)	40 (12)	45 (13)	65 (20)	100 (30)
35	18 (6)	30 (9)	40 (12)	45 (13)	55 (18)	75 (23)
40	18 (6)	30 (9)	40 (12)	45 (13)	50 (15)	60 (38)
45	12 (4)	20 (6)	25 (8)	30 (9)	40 (12)	50 (15)
50	12 (4)	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 Sediment control after installation and with constant head from runoff as determined by Ohio State University.

SEDIMENT & PERIMETER CONTROL

SMARTfence®36

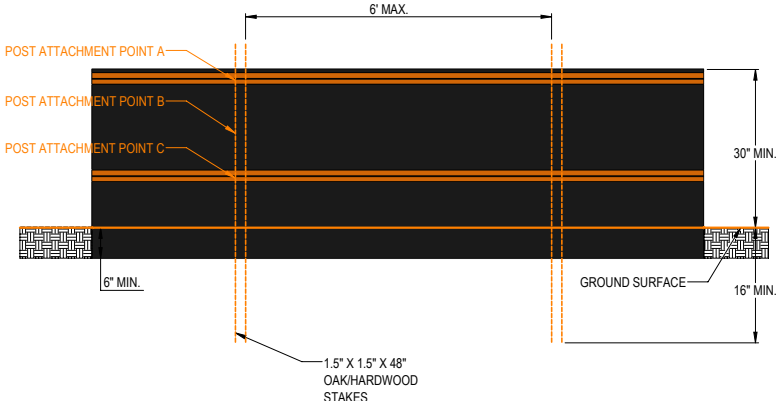
High-Tensile/High-Modulus Woven Geotextile Sediment Fence

SMARTfence® 36 is a heavy-duty, high-tensile/high-modulus, woven geotextile sediment fence. Designed using a value engineering approach, it is equivalent in strength and stiffness to that of wire or chain-link backed silt fence for less money, significantly lower carbon emissions and less material waste.

The woven geotextile fence is specifically designed and fabricated to withstand high-tensile stresses and to prevent excessive material elongation and strain. It is built to resist fence deflection and ultimate failure due to ripping, sagging, or overturning from forces associated with excessive backwater depths, debris flows and overtopping.

SMARTfence® 36 is a 100% American made product.

NTPEP Compliant | GTX-2018-01-188



ADVANTAGES

- No wire or chain-link backing necessary
- High-tensile / high-modulus - able to resist fence deflection and failure
- Reduced labor costs

For more information about Perimeter & Sediment Control,
contact our Inside Sales team at 800.448.3636 email at info@acfenv.com

The below table shows a comparison of 14-gauge wire-backing fence and 12.5 gauge chain-link fence structural characteristics versus Smartfence® 36. The Modulus of Elasticity is a measure of material stiffness.

Structural comparisons between wire and chain-link backing versus SMARTfence® 36

	14-GAUGE WIRE FENCE 2"x4" mesh	12.5 GAUGE CHAIN-LINK FENCE 2 3/8" mesh	SMARTfence® 36 (MARV)
Average Breaking Tensile Strength (lb/ft)	710 (Average)	1,930 (Average)	>4,300 (MARV)
Average Modulus of Elasticity (lb/ft)	2,600 lengthwise 19,400 widthwise	9,422 lengthwise 7,600 widthwise	>39,000 lengthwise >32,000 widthwise

PRODUCT SPECIFICATIONS

TEST METHOD	MINIMUM AVERAGE ROLE VALUES (MARV)	TEST METHOD	MINIMUM AVERAGE ROLE VALUES (MARV)
Wide Width Tensile Strength (ASTM D 4595)	>4,300 lbs/ft - MD x >2,900 lbs/ft - TD	Mullen Burst (ASTM D 3786)	>850 psi
Wide Width Test Elongation (ASTM D 4595)	<11% - MD x <9% - TD	Apparent Opening Size (ASTM D 4751)	Sieve No. 50
Grab Tensile Strength (ASTM D 4632)	>500 lbs - MD x >200 bs - TD	Water Flux (ASTM D 4491)	>50 gpm/sq ft
CBR Puncture (ASTM D 6241)	>1,800 lbs	UV Stability (ASTM D 4355)	>90% strength retained - MD
Trapezoidal Tear (ASTM D 4533)	>160 lbs - MD x >125 lbs - TD		

MD = Machine Direction
TD = Tranverse Direction
TEsting performed by TRI Environmental, Inc.

SMARTfence® 36 is NTPEP Compliant

GTX-2018-01-188

ACF ENVIRONMENTAL
LET'S GET IT DONE®
800.448.3636
acfenvironmental.com

STORM DRAIN INLET PROTECTION (VESCH MINIMUM STANDARDS AND SPECIFICATIONS 3.07)

DANDY BAG®
INLET PROTECTION SYSTEM GUIDE SPECIFICATION

PRODUCT:

DANDY BAG®

MANUFACTURER:

Dandy Products Inc.
P.O. Box 1980
Westerville, Ohio 43086
Phone: 800-591-2284
Fax: 740-881-2791
E mail dlc@dandyproducts.com
Web www.dandyproducts.com

1.0 **Description:**

1.1 Work covered under this item consists of installing a Dandy Bag® inlet protection system. The purpose is to keep silt, sediment and construction debris out of the storm water system.

2.0 **Material:**

2.1 The Dandy Bag® inlet protection unit shall be a **sewn in the U.S.A**. geotextile fabric unit fitted to the individual grate(s) and completely enclosing the grate(s).

2.2 The Dandy Bag® shall have lifting devises to allow manual inspection of the storm water system.

2.3 The Dandy Bag® unit shall utilize an orange monofilament fabric manufactured in the U.S.A. with the following characteristics:

PROPERTY	TEST METHOD	UNITS	TEST RESULTS
Grab Tensile Strength	ASTM D 4632	lbs	450 X 300
Elongation	ASTM D 4632	%	40% X 25%
Puncture Strength	ASTM D 4833	lbs	130
Mullen Burst Strength	ASTM D 3786	psi	600
Trapezoid Tear Strength	ASTM D 4533	lbs	165 x 150
% Open Area (POA)	COE - 22125-86	%	28
Apparent Opening Size	ASTM D 4751	US Std Sieve	30
Permittivity	ASTM D 4491	sec[1]	3.5
Permeability	ASTM 4491	cm/sec	0.25
Water Flow Rate	ASTM 4491	gal/min/ft^2	250
Ultraviolet Resistance	ASTM D 4355	%	70
Color			Orange[1]

[1]The color orange is a trademark of Dandy Products, Inc.
The property values listed above are effective October 2010 and are subject to change without notice.

3.**0 Installation:**

3.1 Place the empty Dandy Bag® over the grate as the grate stands on end.

3.2 For oil and sediment model; to install or replace absorbent, place absorbent pillow in pouch, on the bottom (below-grade side) of the unit.

3.3 Tuck the enclosure flap inside to completely enclose the grate.

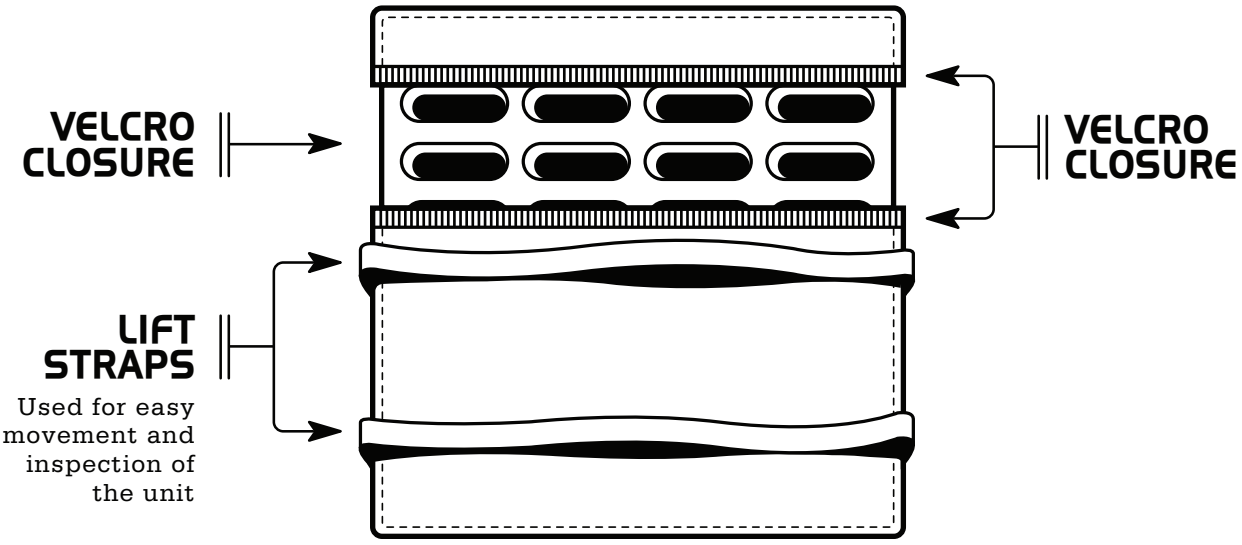
3.4 Holding the lifting devises, insert the grate into the inlet being careful not to damage the Dandy Bag® unit.

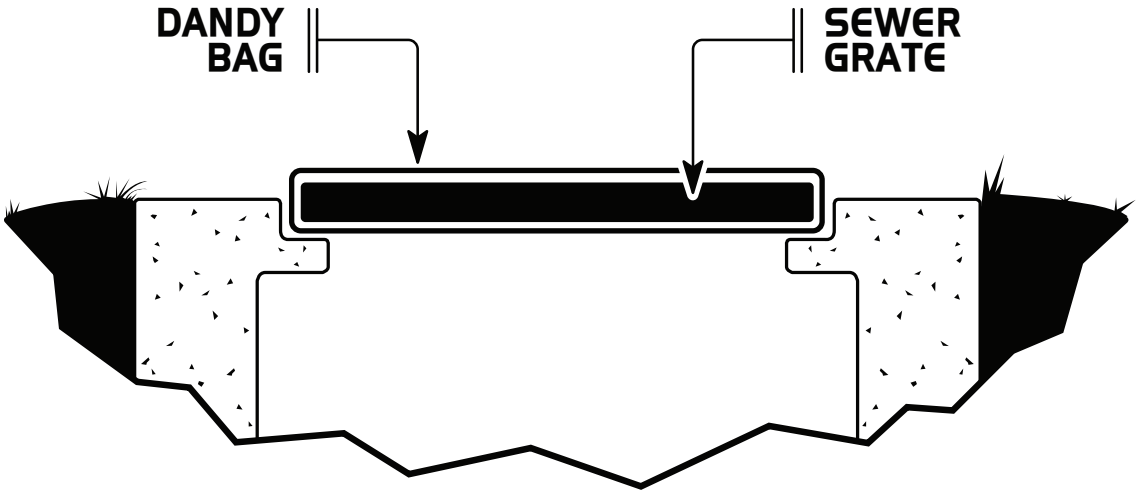
4.0 **Maintenance:**

4.1 The contractor shall remove all accumulated sediment and debris from surface and vicinity of unit after each rain event or as directed by engineer/inspector. Dispose of unit no longer in use at an appropriate recycling or solid waste facility.

4.2 *For oil and sediment model; remove and replace absorbent when near saturation.*

DANDY BAG®


VELCRO CLOSURE
VELCRO CLOSURE
LIFT STRAPS
Used for easy movement and inspection of the unit


DANDY BAG
SEWER GRATE

DANDY CURB BAG®
CURB AND GUTTER INLET/GRATE PROTECTION SYSTEM
GUIDE SPECIFICATION

PRODUCT:

DANDY CURB BAG®

MANUFACTURER:

Dandy Products, Inc.
P.O. Box 1980
Westerville, Ohio 43086
Phone: 800-591-2284
Fax: 740-881-2791
E-mail dlc@dandyproducts.com
Web www.dandyproducts.com

1.0 **Description:**

1.1 Work covered under this item consists of installing a Dandy Curb Bag® curb and gutter inlet protection system. The purpose is to keep silt, sediment and construction debris out of the storm water system.

2.0 **Material:**

2.1 The Dandy Curb Bag® curb and gutter inlet protection unit shall be a **sewn in the U.S.A.** geotextile fabric unit enclosing a porous structure in the form of a cylindrical tube placed in front of and extending beyond the inlet opening on both sides and have a geotextile fabric envelope fitted to the individual grate(s)on the street side of the sewn unit for grate(s) to be inserted and to completely enclose the grate(s).

2.2 The Dandy Curb Bag® shall have lifting devices to allow manual inspection of the storm water system.

2.3 The Dandy Curb Bag® unit shall utilize an orange monofilament fabric that is manufactured in the U.S.A. with the following characteristics:

PROPERTY	TEST METHOD	UNITS	TEST RESULTS
Grab Tensile Strength	ASTM D 4632	lbs	450 x 300
Grab Tensile Elongation	ASTM D 4632	%	40 x 25
Puncture Strength	ASTM D 4833	lbs	130
Mullen Burst Strength	ASTM D 3786	psi	600
Trapezoid Tear Strength	ASTM D 4533	lbs	165 x 150
% Open Area (POA)	COE - 22125-86	%	28
Apparent Opening Size	ASTM D 4751	US Std Sieve	30
Permittivity	ASTM D 4491	sec^{1}	3.5

Permeability	ASTM 4491	cm/sec	0.25
Water Flow Rate	ASTM 4491	gal/min/ft^2	250
Ultraviolet Resistance	ASTM D 4355	%	70
Color			Orange[1]

[1]The color orange is a trademark of Dandy Products, Inc.
The property values listed above are effective October 2010 and are subject to change without notice.

3.0 **Installation:**

3.1 Place the empty Dandy Curb Bag® unit over the grate as the grate stands on end.

3.2 *For oil and sediment model; to install or replace absorbent, place absorbent pillow in pouch, on the bottom (below-grade side) of the unit.*

3.3 Tuck the enclosure flap inside to completely enclose the grate.

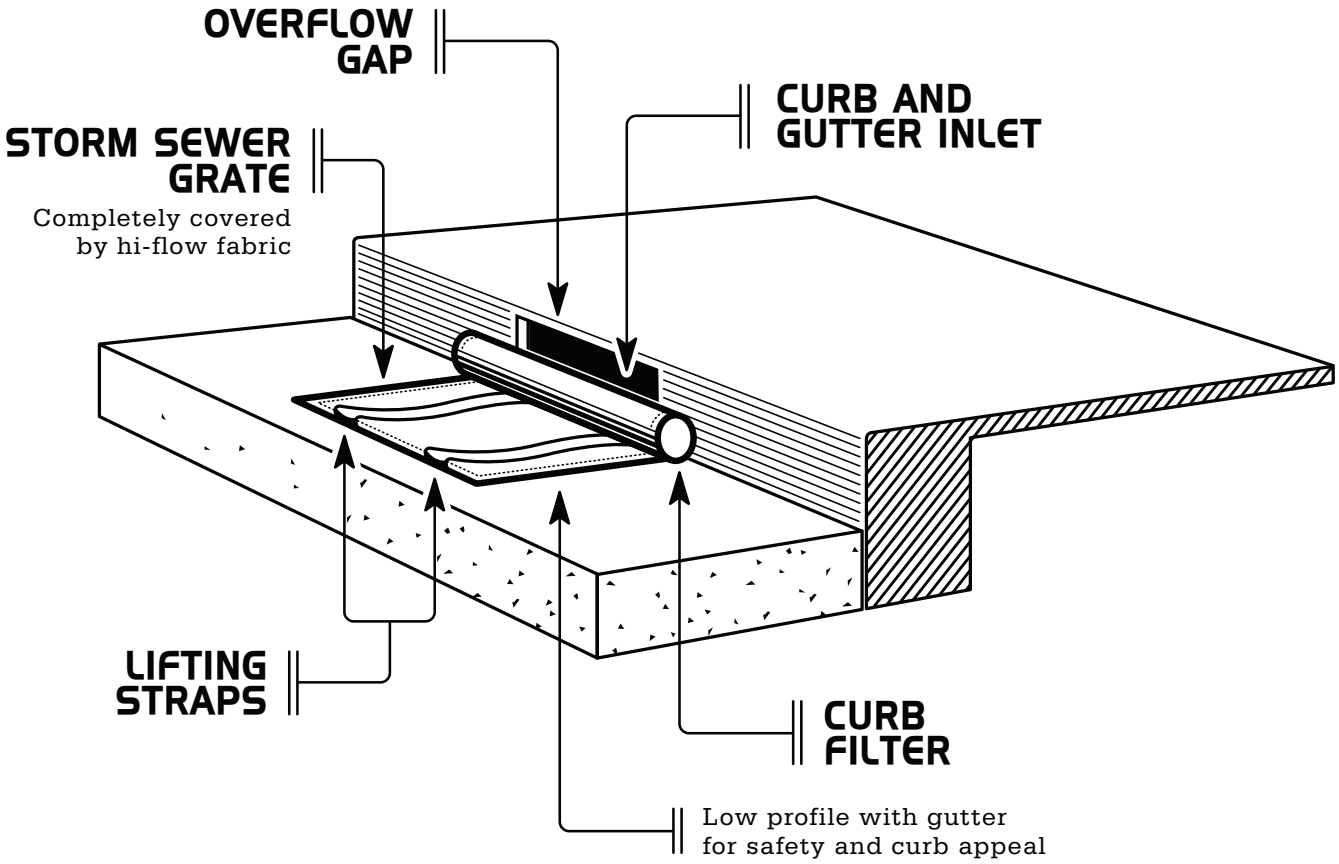
3.4 Holding the lifting devices, being careful not to damage the sewn fabric unit, insert the grate into its frame, street side edge first, then lower back edge with cylindrical tube into place. The cylindrical tube should be partially blocking the curb hood opening when installed properly.

4.0 **Maintenance:**

4.1 The contractor shall remove all accumulated sediment and debris from surface and vicinity of unit after each rain event or as directed by engineer/inspector. Dispose of unit no longer in use at an appropriate recycling or solid waste facility.

4.2 *For oil and sediment model; remove and replace absorbent when near saturation.*

DANDY CURB BAG™



DANDY SACK®
INLET PROTECTION SYSTEM GUIDE SPECIFICATION

PRODUCT:

DANDY SACK®

MANUFACTURER:

Dandy Products Inc.
P.O. Box 1980
Westerville, Ohio 43086
Phone: 800-591-2284
Fax: 740-881-2791
E mail dlc@dandyproducts.com
Web www.dandyproducts.com

1.0 **Description:**

1.1 Work covered under this item consists of installing a Dandy Sack® inlet protection system. The purpose is to keep silt, sediment and construction debris out of the storm water system.

2.0 **Material:**

2.1 The Dandy Sack® inlet protection unit shall be a **sewn in the U.S.A.** geotextile fabric unit.

2.2 The Dandy Sack® shall have lifting straps to allow removal of the unit and manual inspection of the storm water system.

2.3 The Dandy Sack® unit shall utilize an orange monofilament fabric that is manufactured in the U.S.A. with the following characteristics:

PROPERTY	TEST METHOD	UNITS	TEST RESULTS
Grab Tensile Strength	ASTM D 4632	lbs	450 x 300
Grab Tensile Elongation	ASTM D 4632	%	40 x 25
Puncture Strength	ASTM D 4833	lbs	130
Mullen Burst Strength	ASTM D 3786	psi	600
Trapezoid Tear Strength	ASTM D 4533	lbs	165 x 150
% Open Area (POA)	COE - 22125-86	%	28
Apparent Opening Size	ASTM D 4751	US Std Sieve	30
Permittivity	ASTM D 4491	sec[1]	3.5
Permeability	ASTM 4491	cm/sec	0.25
Water Flow Rate	ASTM 4491	gal/min/ft^2	250
Ultraviolet Resistance	ASTM D 4355	%	70
Color			Orange[1]

[1]The color orange is a trademark of Dandy Products, Inc.
The property values listed above are effective October 2010 and are subject to change without notice.

3.0 **Installation:**

3.1 Remove the grate from the catch basin.

3.2 For Oil and Sediment Model; to install or replace absorbent, place absorbent pillow in unit, on the bottom (below-grade side) of the unit.

3.3 Stand the grate on end. Move the top lifting straps out of the way and place the grate into the Dandy Sack® unit so that the grate is below the top straps and above the lower straps. The grate should be cradled between the upper and lower straps.

3.4 Holding the lifting devices, insert the grate into the inlet, being careful that the grate remains in place and being careful not to damage the Dandy Sack® unit.

4.0 **Maintenance:**

4.1 Remove all accumulated sediment and debris from vicinity of unit after each storm event.

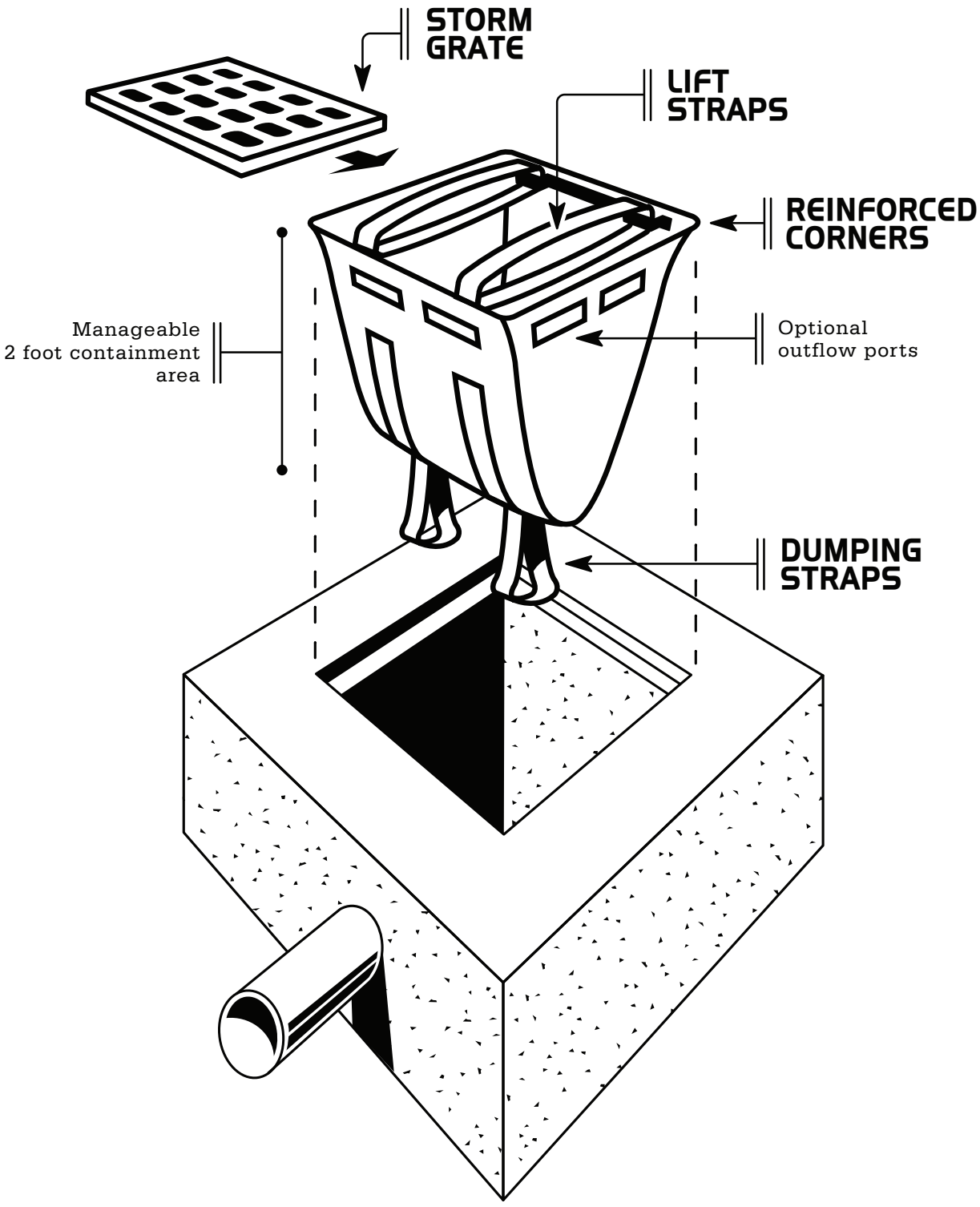
4.2 After each storm event and at regular intervals, look into the Dandy Sack® unit. If the unit is more than 1/3 full of accumulated sediment, the unit must be emptied.

4.3 To empty the unit, using the lifting straps lift the unit out of the inlet and remove the grate. Transport the unit to an appropriate location for removal of the contents. Holding the dumping straps on the outside at the bottom of the unit, turn the unit upside down, emptying the contents. Reinstall unit as above.

4.4 *For Oil and Sediment Model; remove and replace absorbent when near saturation.*

4.5 Dispose of unit and/or absorbent in accord with applicable Federal, state and local environmental laws and regulations.

DANDY SACK™


STORM GRATE
LIFT STRAPS
REINFORCED CORNERS
Manageable 2 foot containment area
Optional outflow ports
DUMPING STRAPS

DANDY CURB SACK®
CURB AND GUTTER INLET PROTECTION SYSTEM GUIDE SPECIFICATION

PRODUCT:

DANDY CURB SACK®

MANUFACTURER:

Dandy Products Inc.
P.O. Box 1980
Westerville, Ohio 43086
Phone: 800-591-2284
Fax: 740-881-2791
E mail dlc@dandyproducts.com
Web www.dandyproducts.com

1.0 **Description:**

1.1 Work covered under this item consists of installing a Dandy Curb Sack® curb and gutter inlet protection system. The purpose is to keep silt, sediment and construction debris out of the storm water system.

2.0 **Material:**

2.1 The Dandy Curb Sack® curb and gutter inlet protection unit shall be a sewn geotextile fabric unit **made in the U.S.A.** enclosing a porous structure in the form of a cylindrical tub placed in front and extending beyond the inlet opening on both sides and have a geotextile fabric sack attached designed to fit the opening of the catch basin or drop inlet and to hang underneath the grate and into the catch basin.

2.2 The Dandy Curb Sack® shall have lifting straps to allow removal of the unit and manual inspection of the storm water system.

2.3 The Dandy Curb Sack® unit shall utilize an orange monofilament fabric that is manufactured in the U.S.A with the following characteristics:

PROPERTY	TEST METHOD	UNITS	TEST RESULTS
Grab Tensile Strength	ASTM D 4632	lbs	450 x 300
Grab Tensile Elongation	ASTM D 4632	%	40 x 25
Puncture Strength	ASTM D 4833	lbs	130
Mullen Burst Strength	ASTM D 3786	psi	600
Trapezoid Tear Strength	ASTM D 4533	lbs	165 x 150
% Open Area (POA)	COE - 22125-86	%	28
Apparent Opening Size	ASTM D 4751	US Std Sieve	30
Permittivity	ASTM D 4491	sec^{1}	3.5
Permeability	ASTM 4491	cm/sec	0.25

Water Flow Rate	ASTM 4491	gal/min/ft^2	250
Ultraviolet Resistance	ASTM D 4355	%	70
Color			Orange[1]

[1]The color orange is a trademark of Dandy Products, Inc.
The property values listed above are effective October 2010 and are subject to change without notice.

3.0 **Installation:**

3.1 Remove the grate from the catch basin.

3.2 For Oil and Sediment Model; to install or replace absorbent, place absorbent pillow in unit, on the bottom (below-grade side) of the unit.

3.3 Stand the grate on end. Move the top lifting straps out of the way and place the grate into the Dandy Curb Sack® unit so that the grate is below the top straps and above the lower straps. The grate should be cradled between the upper and lower straps.

3.4 Holding the lifting devices, insert the grate into the inlet, then lower back edge with cylindrical tube into place, being careful that the grate remains in place and being careful not to damage the Dandy Curb Sack® unit. The cylindrical tube should partially block the curb hood opening when installed properly.

4.0 **Maintenance:**

4.1 Remove all accumulated sediment and debris from vicinity of unit after each storm event.

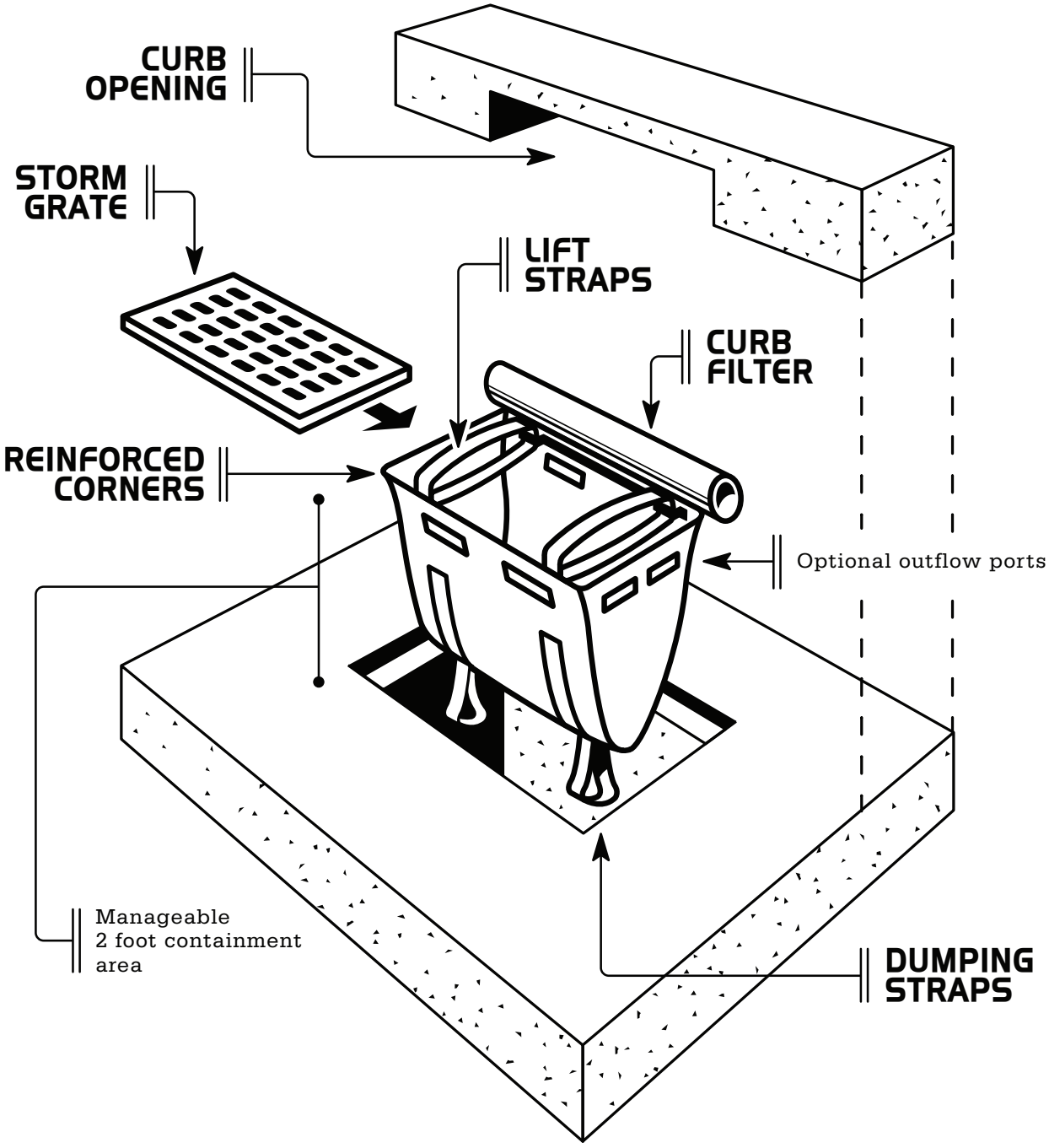
4.2 After each storm event and at regular intervals, look into the Dandy Curb Sack® unit. If the unit is more than 1/3 full of accumulated sediment, the unit must be emptied.

4.3 To empty the unit, using the lifting straps lift the unit out of the inlet and remove the grate. Transport the unit to an appropriate location for removal of the contents. Holding the dumping straps on the outside at the bottom of the unit, turn the unit upside down, emptying the contents. Reinstall unit as above.

4.4 *For Oil and Sediment Model; remove and replace absorbent when near saturation.*

4.5 Dispose of unit and/or absorbent in accord with applicable Federal, state and local environmental laws and regulations.

DANDY CURB SACK™



DANDY CURB®
GRATELESS CURB INLET AND MEDIAN BARRIER INLET PROTECTION SYSTEM GUIDE SPECIFICATION

PRODUCT:

DANDY CURB®

MANUFACTURER:

Dandy Products Inc.
P.O. Box 1980
Westerville, Ohio 43086
Phone: 800-591-2284
Fax: 740-881-2791
E mail dlc@dandyproducts.com
Web www.dandyproducts.com

1.0 **Description:**

1.1 Work covered under this item consists of installing a Dandy Curb® inlet protection system for inlets and median barrier inlets without grates. The purpose is to keep silt, sediment and construction debris out of the storm system.

2.0 **Material:**

2.1 The Dandy Curb® inlet protection system shall be a **sewn in the U.S.A**. fabric unit enclosing a porous structure in the form of a cylindrical tube placed in front of and extending beyond the inlet opening on both sides.

2.2 The Dandy Curb® inlet protection system shall have a pouch on the street side of the sewn unit for aggregate or other material to hold the unit in place.

2.3 The Dandy Curb® unit shall utilize an orange monofilament fabric that is manufactured in the U.S.A. with the following characteristics:

PROPERTY	TEST METHOD	UNITS	TEST RESULTS
Grab Tensile Strength	ASTM D 4632	lbs	450 x 300
Grab Tensile Elongation	ASTM D 4632	%	40 x 25
Puncture Strength	ASTM D 4833	lbs	130
Mullen Burst Strength	ASTM D 3786	psi	600
Trapezoid Tear Strength	ASTM D 4533	lbs	165 x 150
% Open Area (POA)	COE - 22125-86	%	28
Apparent Opening Size	ASTM D 4751	US Std Sieve	30
Permittivity	ASTM D 4491	sec^{1}	3.5
Permeability	ASTM 4491	cm/sec	0.25
Water Flow Rate	ASTM 4491	$gal/min/ft^{2}$	250
Ultraviolet Resistance	ASTM D 4355	%	70

Color			Orange[1]

[1]The color orange is a trademark of Dandy Products, Inc.
The property values listed above are effective October 2010 and are subject to change without notice.

3.0 Installation:

3.1 Place Dandy Curb® inlet protection unit on ground with aggregate pouch on street side near inlet it will be installed on.

3.2 For oil and sediment model, to install or replace absorbent, place absorbent sock in pouch.

3.3 Fill pouch with aggregate such as #5-7, 8's or similar to a level (at least ½ full) that will keep unit in place during a rain event and create a seal between the Dandy Curb® and the surface of the street. Reseal Velcro access.

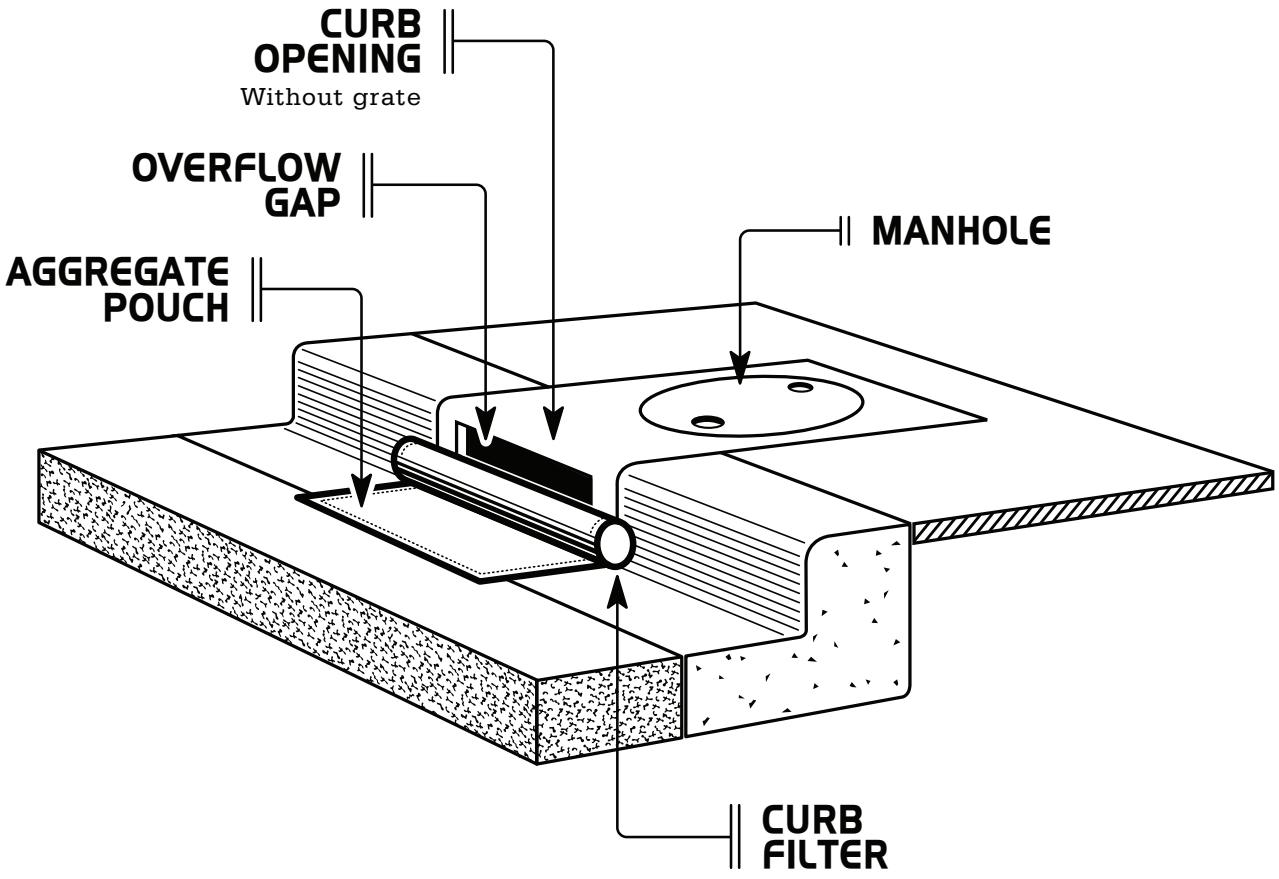
3.4 Center the unit against curb or median inlet opening so that the curb side of the unit creates a seal with the curb or median barrier and inlet structure. There will be approximately twelve (12) inches of the inlet protection unit overhanging on each side of the opening. If the unit is not installed in this manner, it will not function properly.

4.0 Maintenance:

4.1 The contractor shall remove all accumulated sediment and debris from surface and vicinity of unit after each rain event or as directed by engineer/inspector. Dispose of unit no longer in use at an appropriate recycling or solid waste facility.

4.2 *For oil and sediment model; remove and replace absorbent when near saturation.*

DANDY CURB™


CURB OPENING
Without grate
OVERFLOW GAP
AGGREGATE POUCH
MANHOLE
CURB FILTER

GUTTERBUDDY™

CURB INLET DRAIN FILTER

INLET PROTECTION

Prevents sediment, debris and other pollutants from entering stormwater systems.

GutterBuddy™ is designed for curb inlets without grates where water flow is critical. The filtering action lets water freely flow through the fiberous material while stopping sediment and debris. Built-in overflows drain water even more quickly during extreme events.

Long lasting GutterBuddy™ Curb Inlet Filters are flexible enough to conform to any curb radius, allowing for quick and easy installation. These inlet filters are 9" in diameter and can be purchased in the following lengths:

- 4'
- 6'
- 8'
- 10'
- 12'
- 14'
- 16'

ADVANTAGES:

- Lightweight and easy to install
- Easy to maintain and reusable
- Available in 4' - 16' lengths (Should be 2' longer than curb opening)
- Keeps out sand, asphalt millings and other fine sediment
- Washable and reusable

12.18

For more information about Inlet Protection, contact Inside Sales at 800.448.3636
email at info@acfenv.com

ACF ENVIRONMENTAL

Special Specification

Erosion Eel® (Gutter Eel)
Weighted Sediment Tubes

1. Description. Furnish, install, maintain, and remove Weighted Sediment Tubes as shown on plans or as directed.

2. Materials

a) Tube Weight. Weighted Sediment Tubes shall have a dry unit weight of 15.5 lbs. /ft. length (+/15%).

b) Core Material. Weighted Sediment Tubes shall consist of core, internal filter materials comprised of the following mixture:

i. Mixture Specification- A filter mixture comprised of 100% recycled shredded rubber. The material shall be derived from recycled tires and shall be shredded to produce a maximum particle size of 2-inches (+/- 25%).

c) **Containment Geotextile Material.**

i. **Material-** The containment material for the filter core particles shall be a woven, polypropylene monofilament geotextile with UV-stabilizers and inert to biological decay and chemically resistant to naturally occurring chemicals, alkalis, and acids.

d) **Size.** Weighted Tubes shall be produced with a nominal diameter of 9.5 inches (+/- 5%) and standard length of 10 feet (+/-10%).

e) **Handles.** Four handles required (1.25 inch x 15 inch (7.5 inches looped) handle) per 10 ft. tube length spaced 32 inches apart with initial handles placed 12 inches from the ends of the tubes. Handles shall be stitched with black nylon with 7 stiches per inch.

f) **Material Strength Properties** – 350 x 200 lbs. grab tensile strength (ASTM D 4632); 800 lbs. CBR puncture strength (ASTM D 6241); 100 x 70 lbs. trap tear (ASTM D 4533). Minimum fabric permittivity shall be equal to or greater than 0.5/sec per ASTM D 4491. Minimum strength retained relative to UV exposure shall be 90% when tested per ASTM D 4355 for 500 hours.

3. Construction. Install Weighted Sediment Tubes near the downstream perimeter of a disturbed area to intercept sediment from sheet flow. Install, align, and locate the Weighted Sediment Tubes as specified below.

A. Stabilizing/Securing. Secure Weighted Sediment Tubes in a method adequate to prevent displacement as a result of normal rain events and such that flow is not allowed under the bags.

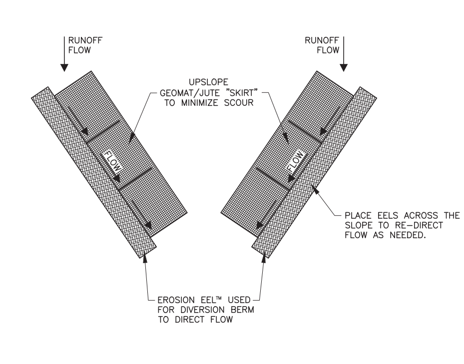
B. Maintenance. Inspect and maintain the Weighted Sediment Tubes in good condition. Maintain the integrity of the control, including keeping the bags free of accumulated silt, debris, etc., until permanent erosion control features are in place, or the disturbed area has been adequately stabilized. Stabilize the areas damaged by the removal process using appropriate methods as approved. Repair or replace damaged Weighted Sediment Tubes as required and as directed. Temporarily remove and replace Weighted Sediment Tubes as required to facilitate work. Remove sediment and debris when accumulation reaches 50% of the storage height behind the single or stacked tube arrangement. Dispose of sediment and debris at an approved site in a manner that will not contribute to additional siltation.

C. Removal. Remove and reuse Weighted Sediment Tubes when directed.

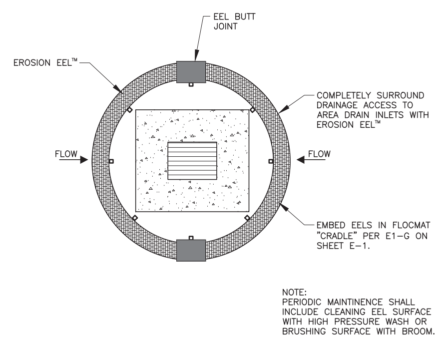
4. **Measurement.** This item will be measured by the linear foot along the centerline of the top of the control bags.

5. **Payment.** The work performed and materials furnished in accordance with this item and measured as provided under "Measurement" will be paid for a the unit price bid for "Weighted Sediment Tube**"** of the size specified. This price is full compensation for furnishing, placing, maintaining, temporarily removing and replacing as required to facilitate construction operations, and removing of the bags and for all other materials, labor, tools, equipment, and incidentals.

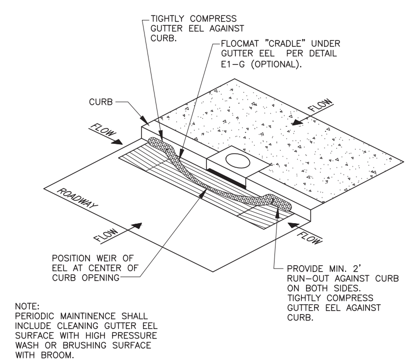
End-of Section



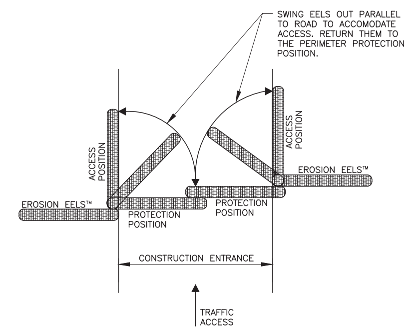
DETAIL E3-A: PLAN VIEW – EELS USED AS DIVERSION BERMS
N.T.S.


EEL BUTT JOINT
EROSION EEL™
COMPLETELY SURROUND DRAINAGE ACCESS TO AREA DRAIN INLETS WITH EROSION EEL™
FLOW
FLOW
EMBED EELS IN FLOCMAT "CRADLE" PER E1-G ON SHEET E-1.
NOTE: PERIODIC MAINTINENCE SHALL INCLUDE CLEANING EEL SURFACE WITH HIGH PRESSURE WASH OR BRUSHING SURFACE WITH BROOM.

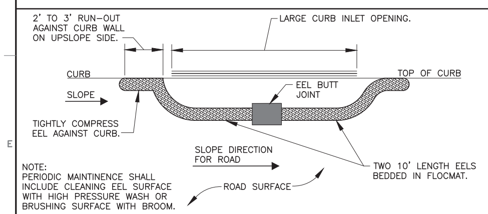
DETAIL E3-B: INLET SEDIMENT TRAP
N.T.S.


TIGHTLY COMPRESS GUTTER EEL AGAINST CURB.
FLOCMAT "CRADLE" UNDER GUTTER EEL PER DETAIL E1-G (OPTIONAL).
CURB
FLOW
FLOW
ROADWAY
FLOW
FLOW
POSITION WEIR OF EEL AT CENTER OF CURB OPENING
PROVIDE MIN. 2' RUN-OUT AGAINST CURB ON BOTH SIDES. TIGHTLY COMPRESS GUTTER EEL AGAINST CURB.
NOTE: PERIODIC MAINTINENCE SHALL INCLUDE CLEANING GUTTER EEL SURFACE WITH HIGH PRESSURE WASH OR BRUSHING SURFACE WITH BROOM.

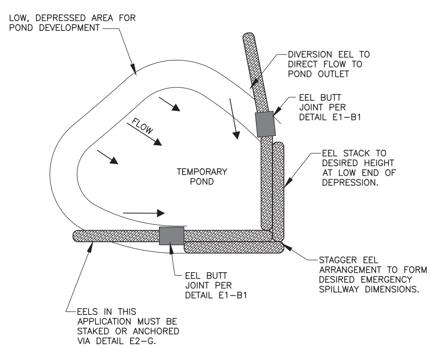
ISOMETRIC DETAIL E3-C: SMALL CURB INLET SEDIMENT TRAP – GUTTER EEL
N.T.S.


SWING EELS OUT PARALLEL TO ROAD TO ACCOMODATE ACCESS. RETURN THEM TO THE PERIMETER PROTECTION POSITION.
ACCESS POSITION
ACCESS POSITION
EROSION EELS™
EROSION EELS™
PROTECTION POSITION
PROTECTION POSITION
CONSTRUCTION ENTRANCE
TRAFFIC ACCESS

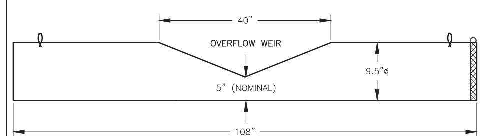
DETAIL E3-D: PLAN VIEW – TEMPORARY CONSTRUCTION ACCESS
N.T.S.


2' TO 3' RUN-OUT AGAINST CURB WALL ON UPSLOPE SIDE.
LARGE CURB INLET OPENING.
CURB
TOP OF CURB
EEL BUTT JOINT
SLOPE
TIGHTLY COMPRESS EEL AGAINST CURB.
SLOPE DIRECTION FOR ROAD
TWO 10' LENGTH EELS BEDDED IN FLOCMAT.
ROAD SURFACE
NOTE: PERIODIC MAINTINENCE SHALL INCLUDE CLEANING EEL SURFACE WITH HIGH PRESSURE WASH OR BRUSHING SURFACE WITH BROOM.

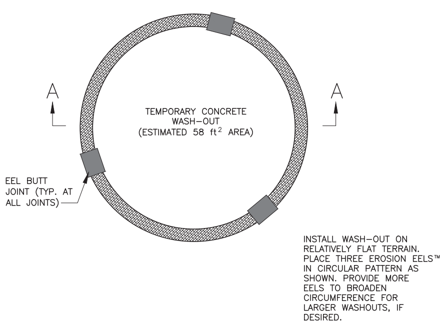
DETAIL E3-E: PLAN VIEW – LARGE CURB INLET (GUTTER EEL)
N.T.S.


LOW, DEPRESSED AREA FOR POND DEVELOPMENT
DIVERSION EEL TO DIRECT FLOW TO POND OUTLET
EEL BUTT JOINT PER DETAIL E1-B1
FLOW
TEMPORARY POND
EEL STACK TO DESIRED HEIGHT AT LOW END OF DEPRESSION.
STAGGER EEL ARRANGEMENT TO FORM DESIRED EMERGENCY SPILLWAY DIMENSIONS.
EEL BUTT JOINT PER DETAIL E1-B1
EELS IN THIS APPLICATION MUST BE STAKED OR ANCHORED VIA DETAIL E2-G.

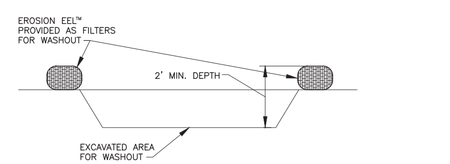
DETAIL E3-F: PLAN VIEW – TEMPORARY DETENTION POND
N.T.S.



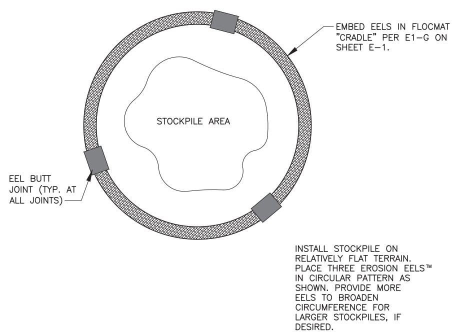
GUTTER EEL
N.T.S.


A
A
TEMPORARY CONCRETE WASH-OUT (ESTIMATED 58 ft² AREA)
EEL BUTT JOINT (TYP. AT ALL JOINTS)
INSTALL WASH-OUT ON RELATIVELY FLAT TERRAIN. PLACE THREE EROSION EELS™ IN CIRCULAR PATTERN AS SHOWN. PROVIDE MORE EELS TO BROADEN CIRCUMFERENCE FOR LARGER WASHOUTS, IF DESIRED.

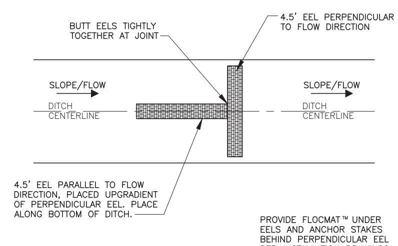
DETAIL E3-G: PLAN VIEW – TEMPORARY CONCRETE WASH-OUT
N.T.S.



SECTION A FOR DETAIL E3-H: TEMPORARY CONCRETE WASHOUT
N.T.S.


EMBED EELS IN FLOCMAT "CRADLE" PER E1-G ON SHEET E-1.
STOCKPILE AREA
EEL BUTT JOINT (TYP. AT ALL JOINTS)
INSTALL STOCKPILE ON RELATIVELY FLAT TERRAIN. PLACE THREE EROSION EELS™ IN CIRCULAR PATTERN AS SHOWN. PROVIDE MORE EELS TO BROADEN CIRCUMFERENCE FOR LARGER STOCKPILES, IF DESIRED.

DETAIL E3-I: PLAN VIEW – TEMPORARY STOCKPILE AREAS
N.T.S.


BUTT EELS TIGHTLY TOGETHER AT JOINT
4.5' EEL PERPENDICULAR TO FLOW DIRECTION
SLOPE/FLOW
SLOPE/FLOW
DITCH CENTERLINE
DITCH CENTERLINE
4.5' EEL PARALLEL TO FLOW DIRECTION, PLACED UPGRADIENT OF PERPENDICULAR EEL. PLACE ALONG BOTTOM OF DITCH.
PROVIDE FLOCMAT™ UNDER EELS AND ANCHOR STAKES BEHIND PERPENDICULAR EEL PER INSTALLATION DRAWINGS.

DETAIL E3-J: PLAN VIEW – "CROSS-CHECK" DAM ARRANGEMENT FOR SMALL V-DITCH APPLICATIONS
N.T.S.

GENERAL NOTES

1. EROSION EELS™ SHALL BE MANUFACTURED FROM A WOVEN GEOTEXTILE COVERING WITH INTERIOR FILTER MATERIALS.
2. LENGTHS OF EROSION EELS™ SHALL BE EITHER A NOMINAL +/-10 FT. OR +/- 4.5 FT. NOMINAL DIAMETER SHALL BE +/-9.5 INCHES OR +/- 20 INCHES.
3. EROSION EELS™ CAN BE PLACED AT THE TOP, ON THE FACE, OR AT THE TOE OF SLOPES TO INTERCEPT RUNOFF, REDUCE FLOW VELOCITY, RELEASE THE RUNOFF AS SHEET FLOW AND PROVIDE REMOVAL OF SEDIMENT FROM THE RUNOFF.
4. EROSION EELS™ SHALL BE INSTALLED ALONG THE GROUND CONTOUR, AT THE TOE OF SLOPES, AT AN ANGLE TO THE CONTOUR TO DIRECT FLOW AS A DIVERSION BERM, AROUND INLET STRUCTURES, IN A DITCH AS A CHECK DAM TO HELP REDUCE SUSPENDED SOLIDS LOADING AND RETAIN SEDIMENT, OR AS A GENERAL FILTER FOR ANY DISTURBED SOIL AREA.
5. NO TRENCHING IS REQUIRED FOR INSTALLATION OF EROSION EELS™.
6. PREPARE BED FOR EEL INSTALLATION BY REMOVING ANY LARGE DEBRIS INCLUDING ROCKS, SOIL CLODS, AND WOODY VEGETATION. EROSION ELLS™ CAN ALSO BE PLACED OVER PAVED SURFACES INCLUDING CONCRETE AND ASPHALT WITH NO SURFACE PREPARATION REQUIRED.
7. RAKE BED AREA WITH A HAND RAKE OR BY DRAG HARROW.
8. DO NOT PLACE EEL DIRECTLY OVER RILL AND GULLIES UNTIL AREA HAS BEEN HAND-EXCAVATED AND RAKED TO PROVIDE A LEVEL BEDDING SURFACE. ALL SURFACES SHALL BE UNIFORMLY COMPACTED FOR MAXIMUM SEATING OF EELS IN PLACE.
9. FOR LOCATIONS WHERE EELS WILL BE PLACED IN CONCENTRATED FLOWS (SUCH AS CHECK DAMS, INLET PROTECTION) AND FOR PERIMETER CONTROLS AT PRIMARY DISCHARGE LOCATIONS, BED THE EELS IN A JUTE MESH CRADLE PER THE DETAILED DRAWINGS.
10. IF MORE THAN ONE EROSION EEL™ IS PLACED IN A ROW, THE EELS SHALL BE JOINED PER DETAIL E1-B1.
11. FOR CHECK DAM APPLICATIONS, EROSION EELS™ SHALL BE PLACED PERPENDICULAR TO THE FLOW OF THE WATER. EROSION EELS™ SHALL CONTINUE UP THE SIDES SLOPES A MINIMUM OF 3 FEET ABOVE THE DESIGN FLOW DEPTH.
12. EROSION EELS™ SHALL REMAIN IN PLACE UNTIL FULLY ESTABLISHED VEGETATION HAS COMPLETELY DEVELOPED OR UNTIL THE STORAGE CAPACITY/FUNCTIONAL LIFE OF THE EEL HAS BEEN EXHAUSTED (REQUIRING REPLACEMENT WITH NEW EELS).
13. ANCHORING POSTS FOR CHECK DAM APPLICATIONS SHALL HAVE A MINIMUM WEIGHT OF 1.25 LBS/FT STEEL T-POSTS (5 TO 7 FT. LENGTHS) ROLLED FROM HIGH CARBON STEEL. POSTS SHOULD BE HOT-DIP GALVANIZED OR COATED WITH A WEATHER-RESISTANT PAINT FOR STEEL APPLICATION. POSTS SHOULD BE EQUIPPED WITH A METAL ANCHOR PLATE. INSTALL PER DETAILS ON THIS SHEET.
14. PLACE T-POSTS BEHIND EELS. DO NOT DRIVE POSTS THROUGH EROSION EELS™. T-POSTS ARE TO BE EMBEDDED A MINIMUM OF 2FT. TO 3 FT. INTO GROUND.

SUBMITTAL & REVISION RECORD

NO	DATE	DESCRIPTION

Authorized Use:
- ☐ Survey
- ☐ Design Dev.
- ☐ Permitting
- ☐ Bidding
- ☐ Construction
- ☐ -

FRIENDLY ENVIRONMENT
100 PRINCE STREET
SHELBYVILLE, TENNESSEE 37160
1-931-607-5953

CHECK DAMS (CONTINUED), DIVERSION BERM, INLET PROTECTION, PONDS, AND CONCRETE WASHOUT DETAILS FOR THE EROSION EEL™

NOTE: DRAWINGS SUBJECT TO REVISIONS AT DISCRETION OF MANUFACTURER

SHEET	OF	LAST EDIT DATE: June 03, 2013	DRAWN BY: LM
DWG NO.: E-3		DWG SCALE: N.T.S.	CHECKED BY: KW
		PROJECT NO: 060-925	
		QUALITY MANAGER APPROVAL:	

SILTSACK®
SEDIMENT CAPTURE DEVICE

INLET PROTECTION

PROTECTS CATCH BASINS FROM CONSTRUCTION RUNOFF

Siltsack® is a temporary catch basin filter that removes sediment, trash and debris from entering a catch basin. Available in both high flow and regular flow, Siltsack can be manufactured with built-in curb deflectors and overflow holes.

Routine inspection of Siltsack's collected sediment level is important to prevent ponding around catch basins.

FEATURES:

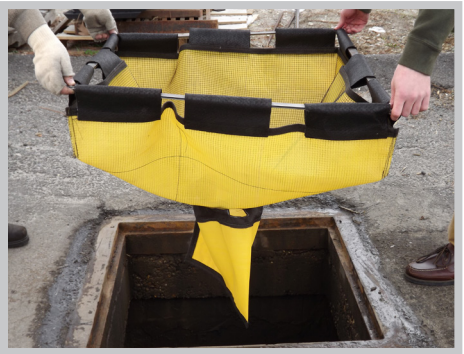
- Two dump straps attached at the bottom to facilitate emptying
- Lifting loops to remove sack from basin
- Restraint cord to keep sides away from basin walls
- Multiple types of Siltsack available
  - **Type A**: Original Siltsack
  - **Type B**: Siltsack with curb deflector
  - **Type C**: Siltsack with adjustable frame

ADVANTAGES:

- Made to fit any size inlet
- Easy to install and economical
- US patented
- Custom sizes available
- Undergrate design so it is not easily disturbed
- Type C has adjustable frame

TYPE A

TYPE C



TYPE C

1.19

For more information about Inlet Protection, contact Inside Sales at 800.448.3636
email at info@acfenv.com

ACF ENVIRONMENTAL

SPECIFICATIONS

Siltsack is manufactured from woven polypropylene geotextile and fits the opening of a catch basin or drop inlet.

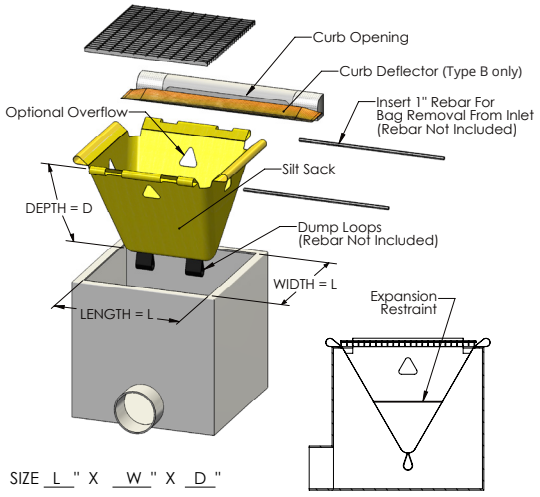
Specs for Siltsack Regular Flow

PROPERTY	TEST METHOD	UNITS	TEST RESULTS
Grab Tensile	ASTM D4632	lbs	281 x 170
Grab Elongation	ASTM D4632	%	16 x 7
Puncture	ASTM D6241	lbs	1005
Trapezoid Tear	ASTM D4533	lbs	85 x 61
AOS	ASTM D4751	US Sieve	30
Flow Rate	ASTM D4491	gal/min/ft ^{2}	38.5
Permittivity	ASTM D4491	sec $^{-1}$	0.51

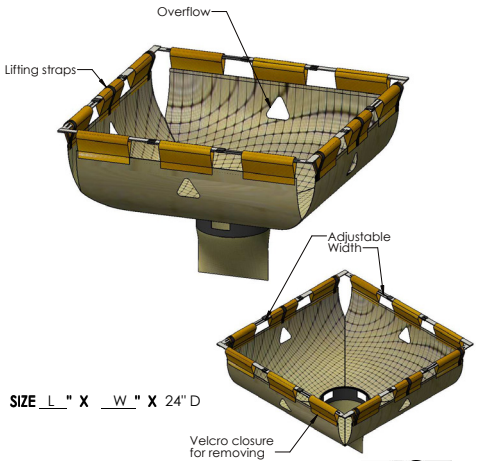
Specs for Siltsack High Flow

PROPERTY	TEST METHOD	UNITS	TEST RESULTS
Grab Tensile	ASTM D4632	lbs	274 x 237
Grab Elongation	ASTM D4632	%	27 x 12
Puncture	ASTM D6241	lbs	754
Trapezoid Tear	ASTM D4533	lbs	63 x 56
AOS	ASTM D4751	US Sieve	20
Flow Rate	ASTM D4491	gal/min/ft ^{2}	250
Permittivity	ASTM D4491	sec $^{-1}$	3.45

TYPE A AND B



TYPE C



ACF ENVIRONMENTAL
LET'S GET IT DONE®
800.448.3636
acfenvironmental.com

1-2

filtrexx®
SUSTAINABLE TECHNOLOGIES

SECTION 1: CONSTRUCTION

SWPPP CUT SHEET

Filtrexx® Inlet Protection (SiltSoxx™)

PURPOSE & DESCRIPTION

Filtrexx® SiltSoxx™ is a three-dimensional tubular sediment control and stormwater runoff filtration device typically used for storm drain **Inlet Protection** of sediment and soluble pollutants (such as phosphorus and petroleum hydrocarbons) on and around construction activities.

APPLICATION

Drain inlets are located in areas that receive runoff from surrounding lands, often exposed and disturbed soils, and are located at a low point, or in a sump. Inlet protection used around drain inlets (or *rain* inlet protection) should completely enclose the circumference of the drain and where possible should not be placed on a grade or slope. Inlet protection used around drain inlets should never be the only form of site sediment control and should be accompanied by erosion control/slope stabilization practices, such as compost erosion control blankets or rolled erosion control blankets. Inlet protection should never be placed where they divert runoff flow from the drain inlet, or on top of the inlet, which can cause flooding. Under high runoff and sediment loading conditions placement of 1-2 in (25-50 mm) diameter rock (AASHTO #2) may be placed around the outer circumference of the inlet protection up to ½ the height of the inlet protection. This will help slow runoff velocity as it contacts the inlet protection and will reduce sediment build-up and clogging of the inlet protection.

Curb inlets are generally located on paved surfaces and are designed to rapidly drain storm runoff from roadways to prevent flooding that poses a hazard to vehicular traffic. Inlet protection devices should be placed in a manner which intercepts runoff prior to entering the inlet, but does not block or divert runoff from the inlet. To prevent diversion of runoff, inlet protection used around curbs (or *curb* inlet protection) should be used in low points, or sumps, and minor slopes or grades. Inlet protection should never be placed in or on the curb inlet drain, or placed in a manner that obstructs vehicular traffic. Inlet protection height should be at least 1 in (25 mm) lower than top of curb inlet to allow for overflow into the drain and not over the curb. Maximum sediment removal efficiency occurs when minor ponding exists behind inlet protection but should never lead to flooding.

Curb sediment containment systems are used to reduce the sediment and pollutant load flowing to a curb inlet. They are generally placed on paved surfaces perpendicular to runoff flow and should be lower than the height of the curb. Curb sediment containment systems should never cause flooding or placed where they are a hazard to vehicular traffic. Inlet protection used for curb sediment containment (or *curb sediment containment* inlet protection) can be placed on a grade but should never be placed directly upslope from curb inlet where it may inadvertently divert runoff from entering curb inlet.

INSTALLATION

1. Inlet protection used to reduce sediment and soluble pollutants entering storm drains shall meet Filtrexx® Soxx™ Material specifications and use Filtrexx® Certified℠ FilterMedia™.
2. Contractor is required to be a Filtrexx Certified Installer as determined by Filtrexx International. Certification shall be considered current if appropriate identification is shown during time of bid or at time of application (Call Filtrexx at 877-542-7699 for a current list of installers). Look for the Filtrexx Certified Installer Seal.
3. Inlet protection shall be placed at locations indicated on plans as directed by the Engineer. Inlet protection should be installed in a pattern that allows complete protection of the inlet area.
4. Installation of curb inlet protection will ensure a minimal overlap of at least 1 ft (300mm) on either side of the opening being protected. Inlet protection will be anchored to the soil behind the curb using staples, stakes or other devices capable of holding the inlet protection in place.
5. Standard inlet protection for curb inlet protection and curb sediment containment will use 8 in

(200mm) diameter inlet protection, and drain inlets on soil will use 12 in (300mm) or 18 in (450mm) diameter inlet protection. In severe flow situations, larger inlet protection may be specified by the Engineer. During curb installation, inlet protection shall be compacted to be slightly shorter than curb height.

6. If inlet protection becomes clogged with debris and sediment, they shall be maintained so as to assure proper drainage and water flow into the storm drain. In severe storm events, overflow of the inlet protection may be acceptable in order to keep the area from flooding.
7. Curb and drain inlet protection shall be positioned so as to provide a permeable physical barrier to the drain itself, allowing sediment to collect on the outside of the inlet protection.
8. For drains and inlets that have only curb cuts, without street grates, a spacer is required in order to keep the inlet protection away from the drain opening. This spacer should be a hog wire screen bent to overlap the grate opening and keep the sock from falling into the opening. Use at least one spacer for every 4 ft (1.2m) of curb drain opening. The wire grid also prevents other floatable waste from passing over the inlet protection.
9. Stakes shall be installed through the middle of the drain inlet protection on 5 ft (1.5m) centers, using 2 in (50mm) by 2 in (50mm) by 3 ft (1m) wooden stakes.
10. Staking depth for sand and silt loam soils shall be 12 in (300mm), and 8 in (200mm) for clay soils.

INSPECTION AND MAINTENANCE

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

1. The Contractor shall maintain the inlet protection in a functional condition at all times and it shall be routinely inspected.
2. If the inlet protection 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 inlet protection when accumulation has reached 1/2 of the effective height of the inlet protection, or as directed by the Engineer. Alternatively, for drain inlet protection, a new Soxx may be placed on top of the original increasing the sediment storage capacity without soil distbance.
4. Inlet protection shall be maintained until disturbed area above or around the device has been permanently stabilized and construction activity has ceased.
5. Regular maintenance includes lifting the inlet protection and cleaning around and under them as sediment collects.
6. The FilterMedia will be removed from paved areas or dispersed on site soil or behind curb once disturbed area has been permanently stabilized, construction activity has ceased, or as determined by the Engineer.
7. Permanent vegetated filter strips will be left intact.

ADDITIONAL INFORMATION

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

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www.filtrexx.com | info@filtrexx.com

Call for complete list of international installers.

Table 2.4 Spacing for Curb Sediment Containment Systems.

Grade (%)	Spacing (ft)	Spacing (mm)
0.5	100	30
1.0	50	15
2.0	25	8
3.0	16	5
4.0	13	4
5.0	10	3

Source: Fifield, 2001.

Figure 2.1. Engineering Design Drawing for Curb and Drain Inlet Protection

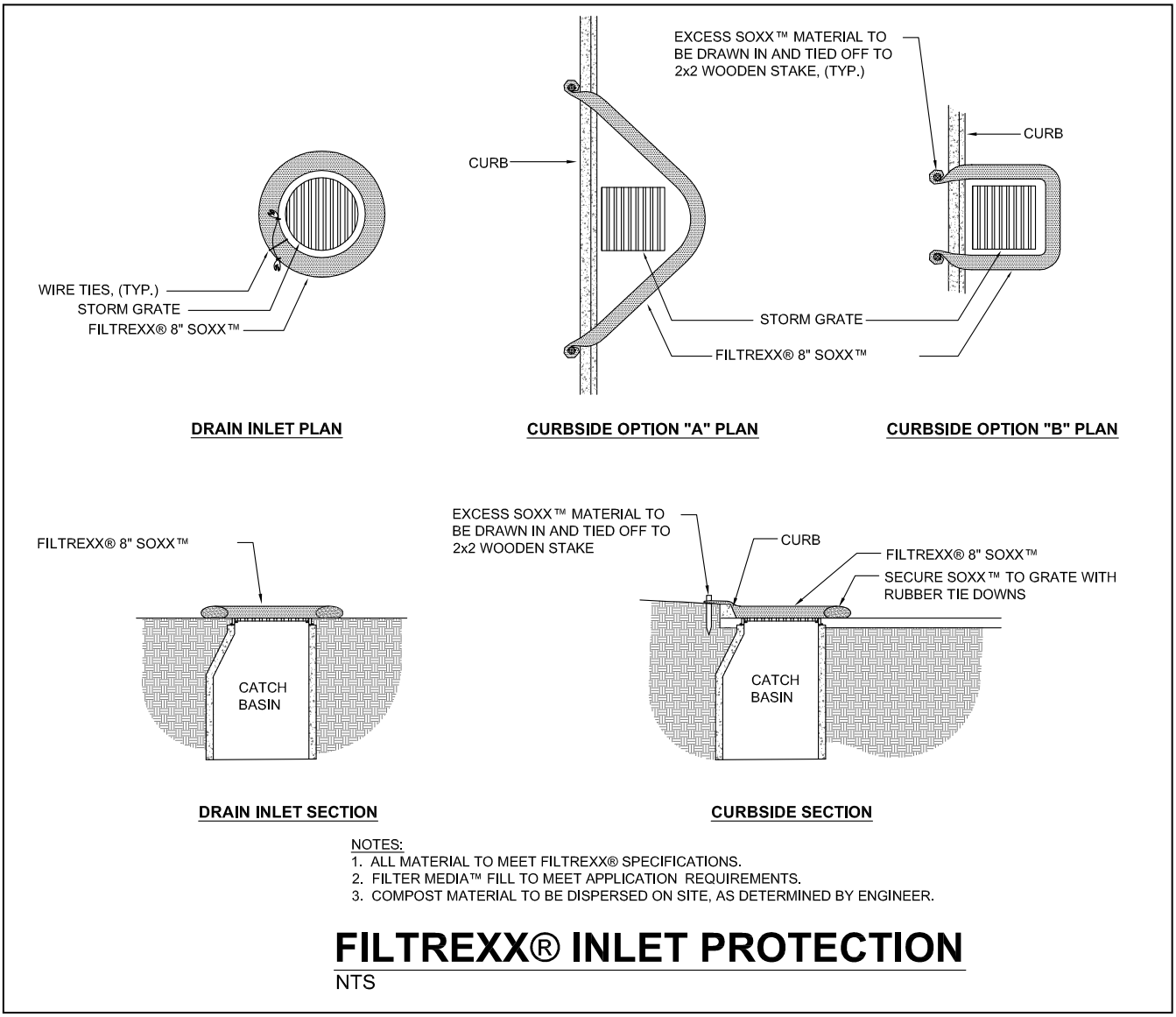
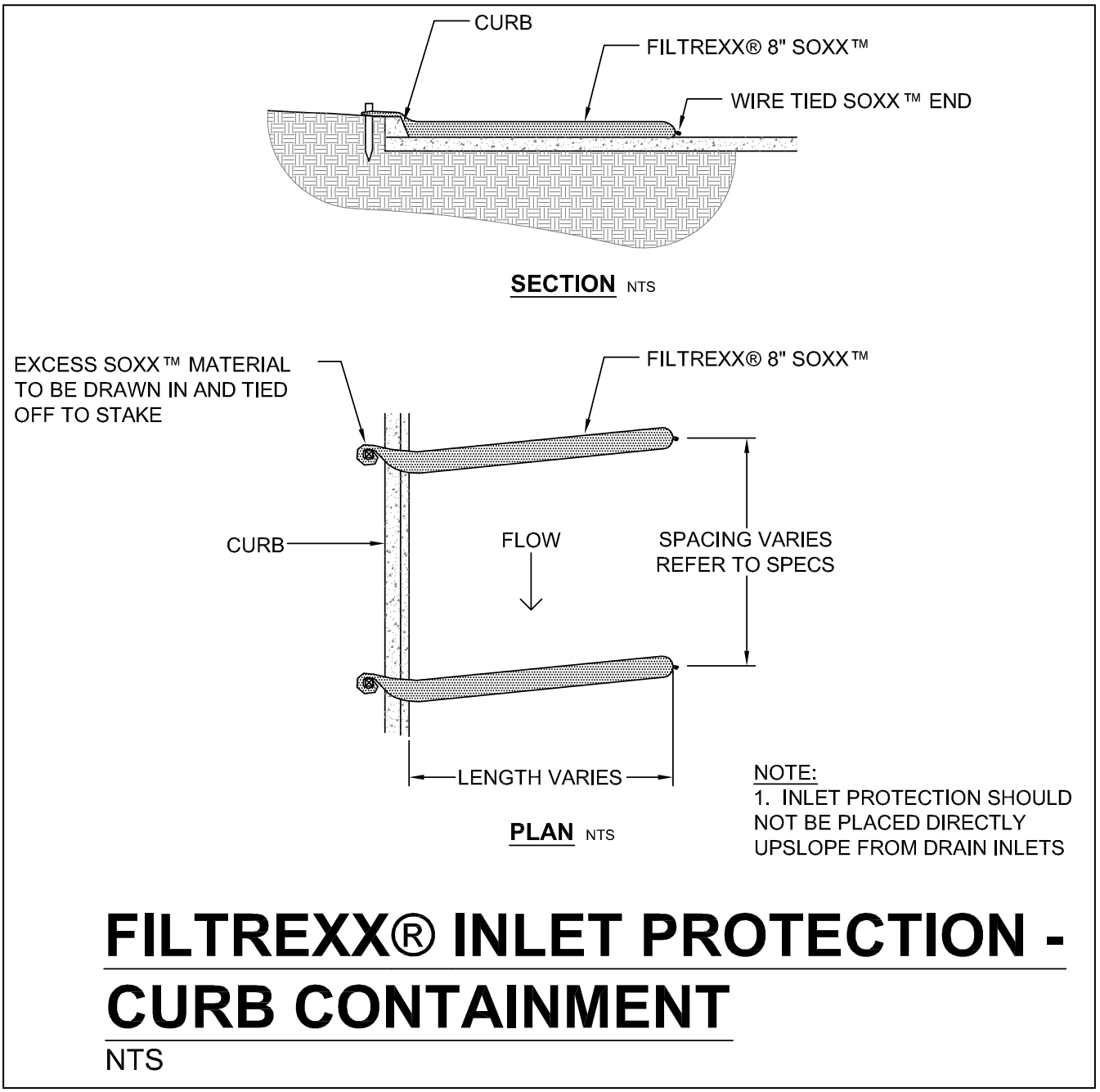


Figure 2.2. Engineering Design Drawing for Curb Sediment Containment Inlet Protection



1.2

filtrexx®
SUSTAINABLE TECHNOLOGIES

SECTION 1: CONSTRUCTION

Filtrexx® Inlet Protection (SiltSoxx™)

PURPOSE & DESCRIPTION

Filtrexx® SiltSoxx™ is a three-dimensional tubular sediment control and stormwater runoff filtration device typically used for storm drain **Inlet Protection** of sediment and soluble pollutants (such as phosphorus and petroleum hydrocarbons) on and around construction activities. Inlet Protection traps sediment and soluble pollutants by *filtering* runoff water as it passes through the matrix of the Soxx™ *and* by allowing water to temporarily pond behind the Soxx, allowing *deposition* of suspended solids.

APPLICATION

Inlet protection has three distinct applications:

- around *drain inlets*,
- in front of *curb inlets*,
- as *curb sediment containment* systems

These applications are described in detail below and shown graphically in Figure 2.1 and 2.2.

Drain inlets are located in areas that receive runoff from surrounding lands, often exposed and disturbed soils, and are located at a low point, or in a sump. Inlet protection used around drain inlets (or *rain* inlet protection) should completely enclose the circumference of the drain and where possible should not be placed on a grade or slope. Inlet protection used around drain inlets should never be the only form of site sediment control and should be accompanied by erosion control/slope stabilization practices, such as compost erosion control blankets or rolled erosion control blankets. Inlet protection should never be placed where they divert runoff flow from the drain inlet, or on top of the inlet, which can cause flooding. Under high runoff and sediment loading conditions placement of 1-2 in (25-50 mm) diameter rock (AASHTO #2) may be placed around the outer circumference of the inlet protection up to ½ the height of the inlet protection. This will help slow runoff velocity as it contacts the inlet protection and will reduce sediment build-up and clogging of the inlet protection.

Curb inlets are generally located on paved surfaces and are designed to rapidly drain storm runoff from roadways to prevent flooding that poses a hazard to vehicular traffic. Inlet protection devices should be placed in a manner which intercepts runoff prior to entering the inlet, but does not block or divert runoff from the inlet. To prevent diversion of runoff, inlet protection used around curbs (or *curb* inlet protection) should be used in low points, or sumps, and minor slopes or grades. Inlet protection should never be placed in or on the curb inlet drain, or placed in a manner that obstructs vehicular traffic. Inlet protection height should be at least 1 in (25 mm) lower than top of curb inlet to allow for overflow into the drain and not over the curb. Maximum sediment removal efficiency occurs when minor ponding exists behind inlet protection but should never lead to flooding.

Curb sediment containment systems are used to reduce the sediment and pollutant load flowing to a curb inlet. They are generally placed on paved surfaces perpendicular to runoff flow and should be lower than the height of the curb. Curb sediment containment systems should never cause flooding or placed where they are a hazard to vehicular traffic. Inlet protection used for curb sediment containment (or *curb sediment containment* inlet protection) can be

Curb Inlet Protection – Fine Silts Filtration

placed on a grade but should never be placed directly upslope from curb inlet where it may inadvertently divert runoff from entering curb inlet.

ADVANTAGES AND DISADVANTAGES

Advantages

- Tubular filtration matrix allows for better trapping and removal of sediment and soluble pollutants in stormwater runoff compared to planar constructed sediment control devices, such as silt fences.
- Inlet protection can be installed on soil or paved surface conditions.
- Greater surface area contact with soil or pavement than typical sediment control devices, reducing potential for runoff to undercut the device leading to unfiltered sediment.
- No trenching is required; therefore soil is not disturbed upon installation.
- Drain inlet protection 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.
- Inlet protection is easily implemented as a treatment in a greater treatment train approach to erosion and sediment control.
- Organic matter and humus colloids in FilterMedia have the ability to bind and adsorb phosphorus, metals, and hydrocarbons that may be in stormwater runoff.
- Microorganisms in compost FilterMedia have the ability to degrade organic pollutants and cycle captured nutrients in stormwater runoff.
- Soxx (mesh netting containment system) allows inlet protection to be placed in areas of high sheet flow and low concentrated flow.

ADVANTAGES			
	LOW	MED	HIGH
Installation Difficulty	✓		
Sediment Control			✓
Soluble Pollutant Control		✓	
Runoff Flow Control		✓	
Life Cycle Cost	✓		

- Drain inlet protection can be direct seeded at time of application to provide greater stability and filtration capability once vegetation is established, if used on soil surface.
- FilterMedia is organic and can be left on site soil 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 inlet protection can be left on site after construction activity and may eliminate the need for removal and labor and disposal costs.
- Inlet protection is available in 8 in (200mm), 12 in (300mm), 18 in (450mm), 24 in (600mm), and 32 in (800mm) diameters.
- Inlet protection 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 filler material of inlet protection is not Filtrexx® Certified℠ FilterMedia™, hydraulic flow rate and and/or sediment and pollutant removal 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 or rocky ground surface contact to drain inlet protection may be diminished thereby adversely effecting performance.
- If inlet protection is installed on a grade or slope, runoff may be diverted from drain or inlet, causing flooding downstream.
- If runoff breaches inlet protection sediment retention will be minimal.
- Incorrect installation or application may cause flooding or pose a hazard to vehicular traffic.
- Inlet protection should never be the only form of

site sediment control.
- Inlet protection should only be used in small drainage areas.

MATERIAL SPECIFICATIONS

Inlet protection use only high wear heavy duty netting materials available from Filtrexx International and are the only mesh materials accepted in creating inlet protection for any application. For Soxx™ Material Specifications see Table 2.1.

FILTERMEDIA™ CHARACTERISTICS

Inlet protection use only Filtrexx Certified FilterMedia which is a coarse composted material that is specifically designed for removal of solids and soluble pollutants from stormwater runoff. *FilterMedia can be altered or customized to target specific pollutants in runoff as approved by the Engineer or Filtrexx International.* All Filtrexx Certified 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 the Filtrexx Design Manual, Section 5.1. Look for the Filtrexx Certified FilterMedia Seal from our international network of Filtrexx Certified Installers and Manufacturers.

PERFORMANCE

Performance testing and research on sediment control has been extensive. For a summary of performance testing, research results, and design specifications see Table 2.2. For copies of publications, full reports, or Tech Link summaries contact Filtrexx International.

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 inlet protection deteriorates or fails, it shall be repaired or replaced with an effective alternative.

DESIGN CRITERIA

Inlet protection is used for curb inlet protection and curb sediment containment on paved surfaces by providing a physical barrier that reduces the rate at which sediment-laden runoff water can enter a storm drain. Inlet protection is also used around storm runoff drain inlets on soil surfaces where construction activities are ongoing and soil stabilization and erosion control measures are also employed. Inlet protection allows construction to continue while protecting storm systems from sediment overload. Inlets are normally protected until final vegetation and stabilization is complete, thereby reducing the amount of sediment reaching the storm inlets.

For most standard curb inlet protection applications, an 8 in (200mm) diameter inlet protection is recommended; for drainage inlets receiving runoff where soils are not stabilized a 12 in (300mm) or 18 in (450mm) drain inlet protection may be specified.

For engineering design details of inlet protection see Figure 2.1 and 2.2. For a summary of specifications for product/practice use, performance and design see Table 2.1 and Table 2.2.

Drain Inlet Protection

Planning:
Inlet protection should not be considered the only form of site sediment control and should be used within an overall integrated Erosion and Sediment Control or StormWater Pollution Prevention Plan. The blocking of storm drains by the use of inlet protection should be considered in the overall site planning, especially where ponding water will create disturbances.

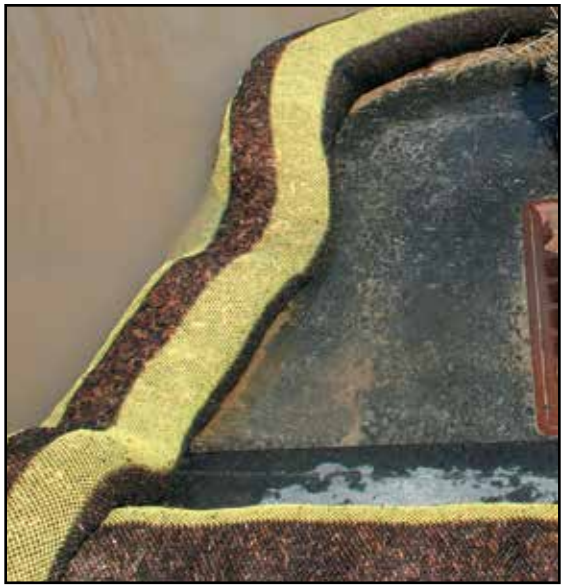
Preconstruction meetings should be conducted to educate construction site personnel about the E&SC devices used and acceptable traffic patterns that avoid running over inlet protection with heavy equipment.

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

Device Function:
The sediment and pollutant removal process characteristic to inlet protection combines both filtering and deposition of solids. This is different than methods that rely solely on ponding for deposition of solids for sediment control. Ponding occurs when water flowing to the inlet protection accumulates faster than the hydraulic flow through rate of the inlet protection. Typically, hydraulic flow-through rates for inlet protection 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*. However, installation and maintenance is especially important for proper function and performance.

Pollutant Removal:
Unlike most inlet protection devices, inlet protection has been shown to remove pollutants other than total and suspended solids from stormwater. Inlet protection has the ability to remove soluble pollutants, such as phosphorus and petroleum hydrocarbons (e.g. motor oil) from entering storm drains. Additional Filtrexx products can be added to the inlet protection to increase removal efficiency of target pollutants such as turbidity, TSS, and soluble phosphorus.

It should be noted that sediment removal efficiency can be near 100% unless runoff breaches the inlet protection, at which point the effectiveness may be greatly diminished.



Before and After Filtration

Runoff Flow:
Sheet and/or concentrated runoff flow should not exceed the hydraulic flow-through capacity, and ponding depth should not exceed the height, of the inlet protection. If overflow of the device is a possibility, larger diameter inlet protection should be specified, other sediment control devices may be used, or management practices to reduce runoff should be implemented. For curb inlets, inlet protection should not exceed the height of the intake opening. For curb sediment containment, inlet protection should not exceed the height of the curb.

Level Contour:
Place inlet protection on level contours to prevent diversion of runoff from storm inlets. Sheet flow of water should be perpendicular to the inlet protection at impact. If inlet protection is to be placed on a grade, care should be taken not to divert runoff from storm inlet.

Runoff and Sediment Accumulation:
Where possible, inlet protection used for drain inlets 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 inlet protection may be installed to increase ponding and sediment accumulation capacity.

Vegetated Filter:
For permanent drain inlet applications inlet protection can be direct-seeded to allow vegetation establishment directly in the device. Vegetation on and around the inlet protection will assist in slowing runoff velocity which can increase 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 drain inlet protection. The appropriate seed mix shall be determined by the Engineer. This option is not normally available when using the tool on paved areas.

Drainage Area and Spacing:
Maximum drainage area contributing runoff to drain inlet protection should be no more than 3 acres (1.2 ha). Drainage areas greater than 3 acres (1.2 ha) should implement sediment traps, sediment basins, or runoff reduction practices (KY TC, 2006).

Spacing between inlet protection used for sediment containment along curbs is dependent on the grade of the roadway and can have an effect on the total sediment load reaching the curb inlet.

INSTALLATION

1. Inlet protection used to reduce sediment and soluble pollutants entering storm drains shall meet Filtrexx Soxx Material specifications and use Filtrexx Certified FilterMedia.
2. Contractor is required to be a Filtrexx Certified Installer as determined by Filtrexx International. Certification shall be considered current if appropriate identification is shown during time of bid or at time of application (Call Filtrexx at 877-542-7699 for a current list of installers). Look for the Filtrexx Certified Installer Seal.
3. Inlet protection shall be placed at locations indicated on plans as directed by the Engineer. Inlet protection should be installed in a pattern that allows complete protection of the inlet area.
4. Installation of curb inlet protection will ensure a minimal overlap of at least 1 ft (300mm) on either side of the opening being protected. Inlet protection will be anchored to the soil behind the curb using staples, stakes or other devices capable of holding the inlet protection in place.
5. Standard inlet protection for curb inlet protection and curb sediment containment will use 8 in (200mm) diameter inlet protection, and drain inlets on soil will use 12 in (300mm) or 18 in (450mm) diameter inlet protection. In severe flow situations, larger inlet protection may be specified by the Engineer. During curb installation, inlet protection shall be compacted to be slightly shorter than curb height.
6. If inlet protection becomes clogged with debris and sediment, they shall be maintained so as to assure proper drainage and water flow into the storm drain. In severe storm events, overflow of the inlet protection may be acceptable in order to keep the area from flooding.
7. Curb and drain inlet protection shall be positioned so as to provide a permeable physical barrier to the drain itself, allowing sediment to collect on the outside of the inlet protection.
8. For drains and inlets that have only curb cuts, without street grates, a spacer is required in order to keep the inlet protection away from the drain opening. This spacer should be a hog wire screen bent to overlap the grate opening and keep the sock from falling into the opening. Use at least one spacer for every 4 ft (1.2m) of curb drain opening. The wire grid also prevents other floatable waste from passing over the inlet protection.
9. Stakes shall be installed through the middle of the drain inlet protection on 5 ft (1.5m) centers, using 2 in (50mm) by 2 in (50mm) by 3 ft (1m) wooden stakes.
10. Staking depth for sand and silt loam soils shall be 12 in (300mm), and 8 in (200mm) for clay soils.

INSPECTION

Routine inspection should be conducted within 24 hrs of a runoff event or as designated by the regulating authority. Inlet protection should be

Table 2.3 Spacing for Curb Sediment Containment Systems.

Grade (%)	Spacing (ft)	Spacing (mm)
0.5	100	30
1.0	50	15
2.0	25	8
3.0	16	5
4.0	13	4
5.0	10	3

Source: Fifield, 2001.

regularly inspected to make sure they maintain their shape and are producing adequate hydraulic flow-through. If ponding becomes excessive, additional inlet protection may be required or sediment removal may be necessary. Inlet protection shall be inspected until contributing drainage area has been permanently stabilized and construction activity has ceased.

MAINTENANCE

1. The Contractor shall maintain the inlet protection in a functional condition at all times and it shall be routinely inspected.
2. If the inlet protection 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 inlet protection when accumulation has reached 1/2 of the effective height of the inlet protection, or as directed by the Engineer. Alternatively, for drain inlet protection, a new Soxx may be placed on top of the original increasing the sediment storage capacity without soil distbance.
4. Inlet protection shall be maintained until disturbed area above or around the device has been permanently stabilized and construction activity has ceased.
5. Regular maintenance includes lifting the inlet protection and cleaning around and under them as sediment collects.
6. The FilterMedia will be removed from paved areas or dispersed on site soil or behind curb once disturbed area has been permanently stabilized, construction activity has ceased, or as determined by the Engineer.
7. Permanent vegetated filter strips will be left intact.

DISPOSAL/RECYCLING

FilterMedia is an organic, composted product 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 (Soxx) may degrade if left on site. Biodegradable mesh netting material is available and may eliminate the need and cost of removal and disposal.

METHOD OF MEASUREMENT

Bid items shall show measurement as 'X in (X mm) Filtrexx® Inlet Protection/SiltSoxx™/InletSoxx™ per linear ft (linear meter) installed, per inlet, or as specified by the Engineer. 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.

ADDITIONAL INFORMATION

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

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TABLES & FIGURES:

Table 2.1. Filtrexx® Soxx™ Material Specifications.

Material Type	Cotton BioSoxx™	5 mil High Density Polyethylene (HDPE)	5 mil High Density Polyethylene (HDPE)	Multi-Filament Polypropylene (MFPP, previously HDPP)	Multi-Filament Polypropylene SafteySoxx™	Multi-Filament Polypropylene DuraSoxx®	Multi-Filament Polypropylene DuraSoxx® (Heavy Duty)
Material Characteristic	Biodegradable	Oxo-degradable	Photodegradable	Photodegradable	Photodegradable	Photodegradable	Photodegradable
Design Diameters	8 in (200mm), 12 in (300mm)	8 in (200mm), 12 in (300mm), 18 in (400mm)	5 in (125mm), 8 in (200mm), 12 in (300mm), 18 in (400mm)	8 in (200mm), 12 in (300mm), 18 in (400mm), 24 in (600mm), 32 in (800mm)	8 in (200mm), 12 in (300mm), 18 in (400mm)	8 in (200mm), 12 in (300mm), 18 in (400mm), 24 in (600mm), 32 in (800mm)	5 in (125mm), 8 in (200mm), 12 in (300mm), 18 in (400mm)
Mesh Opening	1/8 in (3mm)	3/8 in (10mm)	3/8 in (10mm)	3/8 in (10mm)	1/8 in (3mm)	1/8 in (3mm)	1/8 in (3mm)
Tensile Strength	44 psi (3.09 kg/cm^2)	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)*	202 psi (14.2 kg/cm^2)	242 psi (16.99 kg/cm^2)
% Original Strength from Ultraviolet Exposure (ASTM G-155)	ND	ND	23% at 1000 hr	100% at 1000 hr	100% at 1000 hr	100% at 1000 hr	100% at 1000 hr
Functional Longevity/ Project Duration***	up to 12 months**	6 mo-3.5 yr	9 mo-4 yr	1-4 yr	2-5 yr	2-5 yr	2-5 yr

*Tested at Texas Transportation Institute/Texas A&M University (ASTM 5035-95).
** Data based on Caltrans research and specifications
*** Functional longevity ranges are estimates only. Site specific environmental conditions may result in significantly shorter or longer time periods.

Table 2.2. Filtrexx® Inlet Protection 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)		

(continued on next page)

Table 2.2. Filtrexx® Inlet Protection Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
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**	6 mo – 5 yr	6 mo – 5 yr	6 mo – 5 yr	6 mo – 5 yr	6 mo – 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

Table 2.2. Filtrexx® Inlet Protectio Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
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
Clay (<0.002mm) Removal	65%	65%	65%	65%	65%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Silt (0.002-0.05mm) Removal	64%	64%	64%	64%	64%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
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/ Flocculent	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/ Flocculent	94%	94%	94%	94%	94%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006

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Table 2.2. Filtrexx® Inlet Protection Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
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/ Nutrient Agent	60%	60%	60%	60%	60%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings , 2006
Reactive Phosphorus Removal w/ Nutrient Agent	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	Filtrexx® Tech Link
Ammonium-N Removal w/ Nutrient Agent	33%	33%	33%	33%	33%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Motor Oil Removal w/ Hydrocarbon Agent	99%	99%	99%	99%	99%	USDA ARS Environmental Quality Lab	International Erosion Control Association, 2006
Diesel Fuel Removal w/ Hydrocarbon Agent	99%	99%	99%	99%	99%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Gasoline Removal w/ Hydrocarbon Agent	54%	54%	54%	54%	54%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link

Table 2.2. Filtrexx® Inlet Protection Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Cadmium (Cd) Removal w/ Heavy Metal Agent	73%	73%	73%	73%	73%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Chromium (Cr) Removal w/ Heavy Metal Agent	47%	47%	47%	47%	47%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Copper (Cu) Removal w/ Heavy Metal Agent	70%	70%	70%	70%	70%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Nickel (Ni) Removal w/ Heavy Metal Agent	69%	69%	69%	69%	69%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Lead (Pb) Removal w/ Heavy Metal Agent	73%	73%	73%	73%	73%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Zinc (Zn) Removal w/ Heavy Metal Agent	53%	53%	53%	53%	53%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Iron (Fe) Removal	22%	22%	22%	22%	22%	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	Filtrexx® Tech Link
E. coli Removal	67%	67%	67%	67%	67%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Enterococcus Removal	47%	47%	47%	47%	47%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
E. coli Removal w/ Bacteria Agent	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Fecal coliform Removal w/ Bacteria Agent	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Enterococcus Removal w/ Bacteria Agent	91%	91%	91%	91%	91%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Other Recommended Uses	Inlet Protection, Check Dams, Slope Interruption	Inlet protection, Check Dams, Concrete Washout, Filtration System, Slope Interruption	Check Dams, Concrete Washout, Filtration System	Check Dams, Concrete Washout, Filtration System	Check Dams, Concrete Washout, Filtration System		

* 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/m2 (6.3 g/ft2).

** Functional Longevity is dependent on mesh material type, UV exposure, freeze/thaw frequency, region of US/Canada, runoff-sediment frequency/ duration/loading, and adherence to specified maintenance requirement. Functional longevity ranges are estimates only. Site specific environmental conditions may result in significantly shorter or longer time periods.

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

Figure 2.1. Engineering Design Drawing for Curb and Drain Inlet Protection

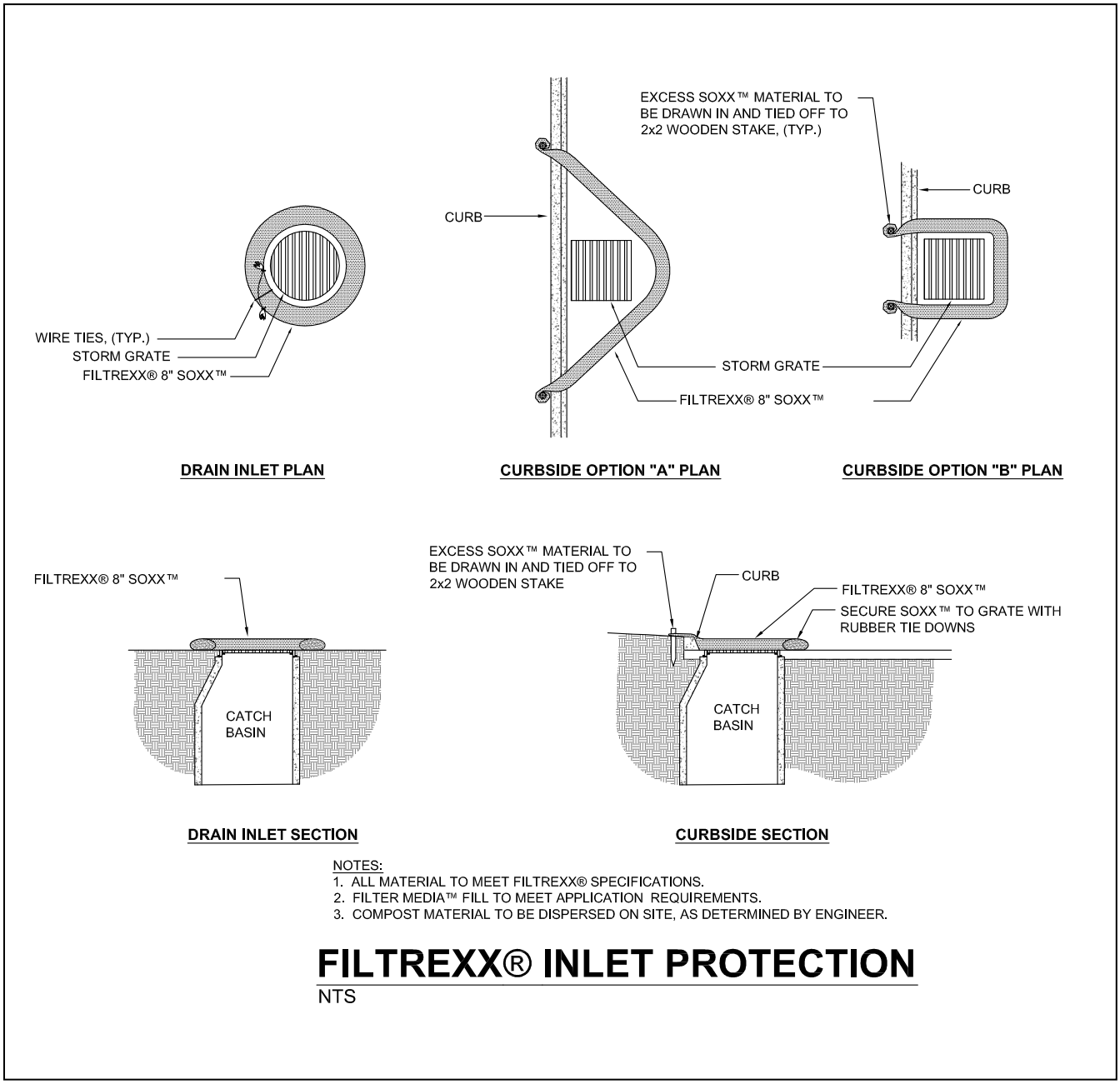
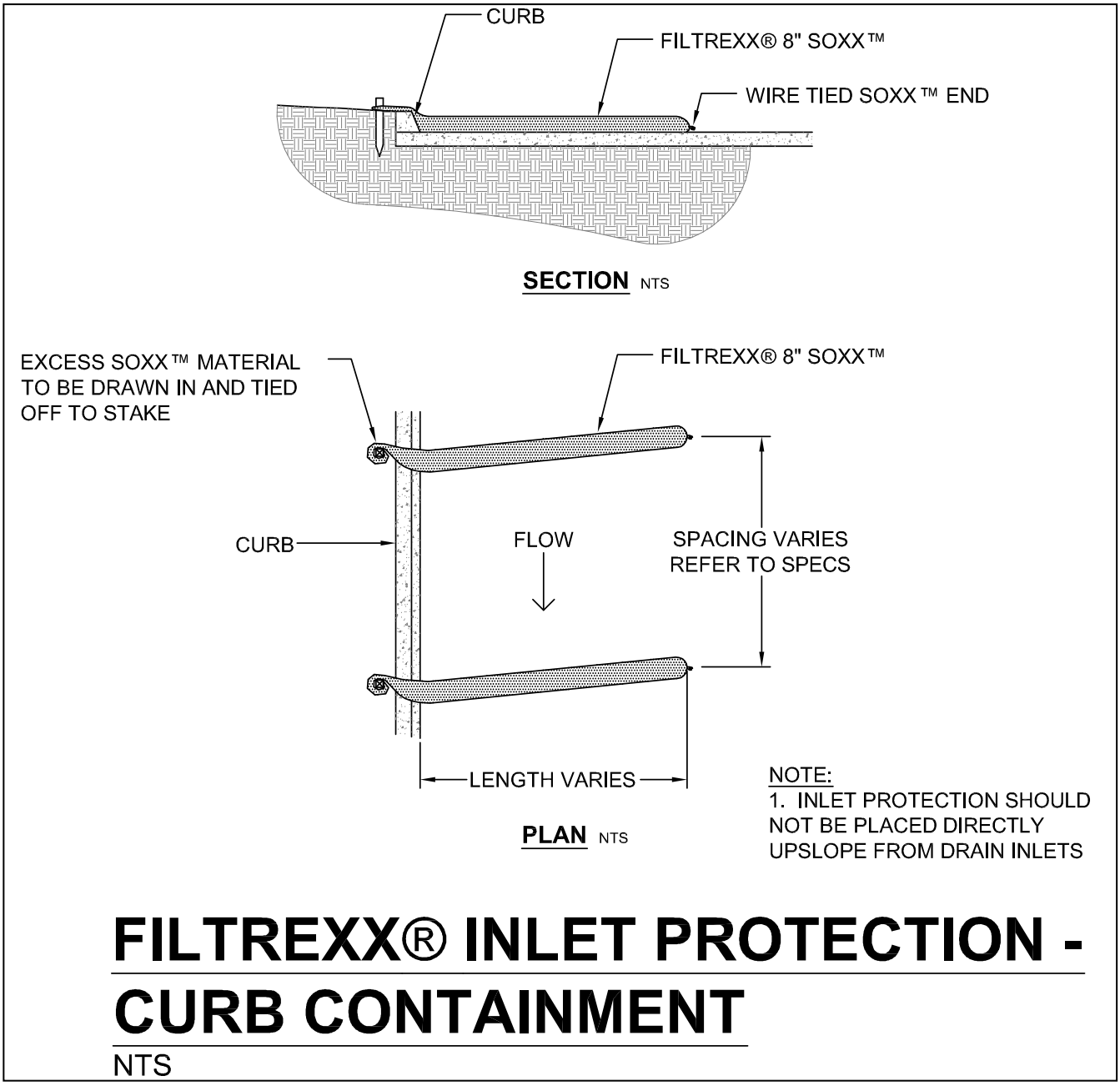


Figure 2.2. Engineering Design Drawing for Curb Sediment Containment Inlet Protection



The Grate Bag

The Grate Bag traps sand, debris, and most silt particles before they enter the sump or pipes. Costly basin and pipe system cleaning is reduced. Best of all, **The Grate Bag** can be reused.

Note: Color of material may vary

Property	Test Method	Units	MARV
Grab Tensile	ASTM D4632	lbs	255x275
Grab Elongation	ASTM D4632	%	20x15
Trapezoidal Tear	ASTM D4533	lbs	40x50
Puncture	ASTM D4833	lbs	135
Mullen Burst	ASTM D3786	psi	420
Permittivity	ASTM D4491	sec-1	1.5
Water Flow	ASTM D4491	gpm/sq ft	200
AOS	ASTM D4751	U.S. Std	20
UV Resistance	ASTM D4355	%/hrs	90/500

The Grate Bag is a Best Management Practice, which is normally used in conjunction with other BMP's to reduce the impact of sedimentation. Use of **The Grate Bag** as the sole BMP should be limited to those applications where sediment loading within the storm-runoff is minimal. Bags are constructed with tension cable as well as overflow holes that are placed one foot from bottom of bag. **The Grate Bag** is an excellent "final filter" in a well-designed and implemented erosion control system

L & M Supply Co., Inc. P. O. Box 640 Willacoochee, GA 31650
Direct Phone: 912-534-6071 - Toll Free: 800-948-7870 - Fax: 912-534-6254
Website: www.landmsupplyco.com

Curlex® Sediment Logs®

Excelsior Sediment Control Device

Product Description

Curlex Sediment Logs use excelsior fibers to reduce hydraulic energy & filter sediment-laden runoff. Tired of straw and hay bale checks being blown out and the fibers washed downstream to clog the nearest outlet? Fed up with spending all of your time and effort installing silt fence only to see it get knocked down when it rains or a good wind comes along? How about when you have to go back and pick up the loose fibers and/or remove those worn out silt fences and take them to the landfill? Next time, consider giving our Bioengineered Sediment Logs a try. Water filters through (not underneath) the diameter of the porous, interlocked fiber log matrix. As it does, velocity is naturally reduced and sediment is collected on the upstream side of the excelsior fiber log. Install Curlex Sediment Logs over bare soil, over rolled erosion control products, on steep slopes, around inlets and outlets, or around jobsites for perimeter control.

Material Characteristics

Sediment Logs are versatile excelsior logs comprised of an outside containment fabric that is filled with unique Curlex fibers. Curlex fibers are made of Great Lakes Aspen excelsior fibers. The fibers are curled with soft interlocking barbs and 80% will be six inches in length or longer. The outside, open weave containment fabric is degradable, thus Sediment Logs will degrade in place if not removed. Sediment Logs are porous, allowing water to pass through the excelsior matrix, progressively slowing velocity and filtering sediment as it passes through the log diameter. Sediment Logs are extremely flexible and contour to the terrain to maintain intimate contact with the subgrade. In addition, they come with five other benefits; lightweight, no trenching, no seeds, no disposal hassle, and they may be reusable depending on the application.

Performance Capabilities

Product Names / Nominal Diameters

Type I - (20 in) energy dissipation in heavy duty concentrated flow areas, slope interruption, inlet protection, perimeter control
Type II - (12 in) energy dissipation in mild to medium concentrated flow areas, slope interruption, inlet protection, perimeter control
Type III - (9 in) energy dissipation in mild concentrated flow areas, slope interruption, inlet protection, perimeter control
Type IV - (6 in) energy dissipation in low concentrated flow areas, slope interruption, inlet protection, perimeter control

Typical Applications

- Ditch bottoms, swales, and waterways
- Over bare soils and/or temporary & turf reinforcement blankets
- Drop structures and let down structures
- 360 degree protection around catch basins & drop inlet structures
- Curb & drainage outlets
- Project ingress & egress termination points
- As wattles on steep slopes
- Site perimeter control
- Use in place of bales, silt fence, reinforced silt fence, and rock checks

American Excelsior Company®
Earth Science Division
Arlington, Texas (800) 777-SOIL • www.curlex.com

MADE IN THE U.S.A.

American Excelsior Company®
Earth Science Division

Curlex® Sediment Log®

Excelsior Sediment Control Device

SUGGESTED SPECIFICATIONS

General

Sediment Log consists of an outside, open weave, containment fabric filled with Great Lakes Aspen curled excelsior fibers. Its purpose is to provide a flexible, lightweight, porous, sediment control device demonstrating the ability to conform to terrain details, dissipate water velocity, and filter contaminated flows.

Product

Sediment Control Device shall be Curlex Sediment Log, as manufactured by American Excelsior Company. Curlex Sediment Logs shall be made of Great Lakes Aspen Excelsior fibers encased in an outside, open weave containment fabric secured on each end. Fibers shall be curled with soft, interlocking barbs to form a strong, organic filtration matrix. A minimum of 80 percent of the fibers shall be 15 cm (6 in) or greater in length. Fibers shall be evenly distributed throughout the diameter and length of the Sediment Log. Excelsior fibers shall be seed free. Density of sediment logs shall not exceed 2.6 lb/ft^3 to ensure necessary flow rates for filtering. Curlex Sediment Log shall be manufactured in the U.S.A. at company locations where QA/QC is implemented and managed by the manufacturer. Field fabricated products and products made by anyone other than the manufacturer (i.e. distributors, dealers, etc.) shall not be accepted.

	TYPE I*	TYPE II*	TYPE III*	TYPE IV*
Product Name/Nominal Diameter	20 in	12 in	9 in	6 in
Length (±10%)	3.05 m (10 ft)	3.05 m (10 ft)	7.62 m (25 ft)	7.62 m (25 ft)
Weight (±10%)**	13.62 kg (30 lb)	9.02 kg (20 lb)	11.35 kg (25 lb)	5.45 kg (12 lb)
Net opening (hexagonal-shaped)	3.2 cm (1.3 in)	2.5 cm (1 in)	1.9 cm (.75 in)	1.3 cm (.5 in)

*Custom sizes available

**Weight is based on a dry fiber weight basis at time of manufacture. Baseline moisture content of Great Lakes Aspen Excelsior is 22%.

Performance Requirements

Slope Erosion*:	Reduce by a minimum of 70% of bare soil slopes
Channel Erosion**:	Reduce by a minimum of 50% of bare soil channels
pH Absorption***:	Ending pH shall not exceed 8.3
Functional Longevity****:	⩽ 24 months
Oil Sorbent Material:	U.S. E.P.A. documentation for preapproval

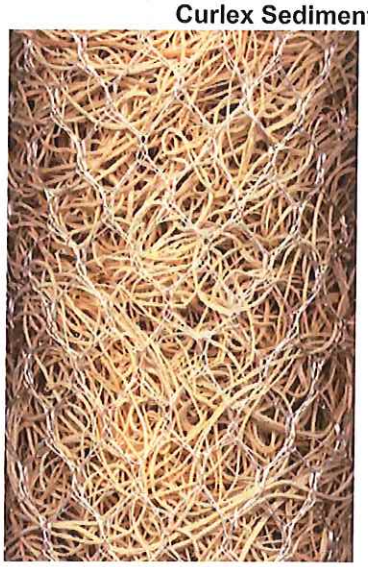
*Based on large-scale rainfall testing as outlined in Kelsey, K., T. Johnson, and R. Vavra. 2006. "Needed Information: Testing, Analyses, and Performance Values for Slope Interruption and Perimeter Control BMPs." IECA Conference Proceedings. P. 171-181.

**Based on ASTM D7208

***Based on ASTM D1117, modified

****Functional Longevity varies from region to region because of differences in climatic conditions.

Curlex Sediment Logs Design Values With Comparisons To Typical Straw Wattles



	Channel Design			Slope Design	
Product Name/ Nominal Diameter	Density* (lb/ft3)	GPM/ft2**	GPM/linear ft of installed product	P Factor*** (event-based)	% Soil Retained
6" Curlex Sediment Log	2.4	42.5	19.5	0.461	53.9
9" Straw Wattle	4.5	7.5	5.6	0.676	32.4
9" Curlex Sediment Log	2.3	42.5	29.0	0.461	53.9
12" Straw Wattle	3.8	8.0	8.0	0.828	17.2
12" Curlex Sediment Log	2.5	40.0	36.7	0.297	70.3
20" Curlex Sediment Log	1.4	37.5	46.9	0.297	70.3

*Weight is based on a dry fiber weight basis at time of manufacture. Baseline moisture content of Great Lakes Aspen excelsior, AEC Premier Straw, and AEC Premier Coconut fibers are 22%, 15%, and 20%, respectively.

**Based on ASTM D5141.

***Based on large-scale simulated rainfall testing.

MADE IN THE U.S.A.

If you would like to receive more information or consult with one of our Customer Care Center Specialists, please call us toll free at (888-352-9582)

PDF download specifications available in the Technical Support Library at www.curlex.com

DEWATERING STRUCTURE (VESCH MINIMUM STANDARDS AND SPECIFICATIONS 3.26)

DANDY DEWATERING BAG ™
PUMPED WATER SEDIMENT CONTROL SYSTEM GUIDE SPECIFICATIONS

PRODUCT:

DANDY DEWATERING BAG™

MANUFACTURER:

Dandy Products Inc.
P.O. Box 1980
Westerville, Ohio 43086
Phone: 800-591-2284
Fax: 740-881-2791
E Mail dlc@dandyproducts.com
Web www.dandyproducts.com

1.0 **Description:**

1.1 Work covered under this consists of furnishing, installing, maintaining, and removal of the Dandy Dewatering Bag ™ The purpose is to control sediment discharge in any dewatering or pumped water application.

2.0 **Material:**

2.1 The Dandy Dewatering Bag™ shall be a bag sewn of nonwoven fabric **in the U.S.A.** using a double needle machine and a high strength thread.

2.2 The Dandy Dewatering Bag™ shall have a spout opening large enough to accommodate at least a four (4) inch pump discharge hose with an attached strap to tie unit closed.

2.3 The Dandy Dewatering Bag™ Seams shall be a double stitched "J" type seam with an average wide width strength per ASTM D-4884 of 60lb/in for a 8 oz. fabric manufactured in the U.S.A. with the following characteristics:

PROPERTY	TEST METHOD	UNITS	MARV
Grab Tensile Strength	ASTM D 4632	kN (lbs)	0.9 (205)
Grab Tensile Elongation	ASTM D 4632	%	50
Puncture Strength	ASTM D 4833	kN (lbs)	0.58 (130)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	2618 (380)
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.36 (80)
% Open Area	COE - 22125-86	%	N/A
Apparent Opening Size	ASTM D 4751	mm (US Std Sieve)	.0180 (80)

Permittivity	ASTM D 4491	sec^{1}	1.2
Permeability	ASTM 4491	cm/sec	0.21
Water Flow Rate	ASTM 4491	$l/min/m^2$ ($gal/min/ft^2$)	3866 (95)
Ultraviolet Resistance	ASTM D 4355	%	70
Color			Black

3.0 **Installation:**

3.1 Lifting straps (not included) should be placed under the unit to facilitate removal after use.

3.2 Unfold Dandy Dewatering Bag™ on a stabilized area over dense vegetation, straw, or gravel (if an increased drainage surface is needed) or as detailed in plans.

3.3 Insert discharge hose from pump into Dandy Dewatering Bag™ a minimum of six (6) inches and tightly secure with attached strap to prevent water from flowing out of the unit without being filtered.

4.0 **Maintenance:**

4.1 Replace the unit when ½ full of sediment or when sediment has reduced the flow rate of the pump discharge to an impractical rate.

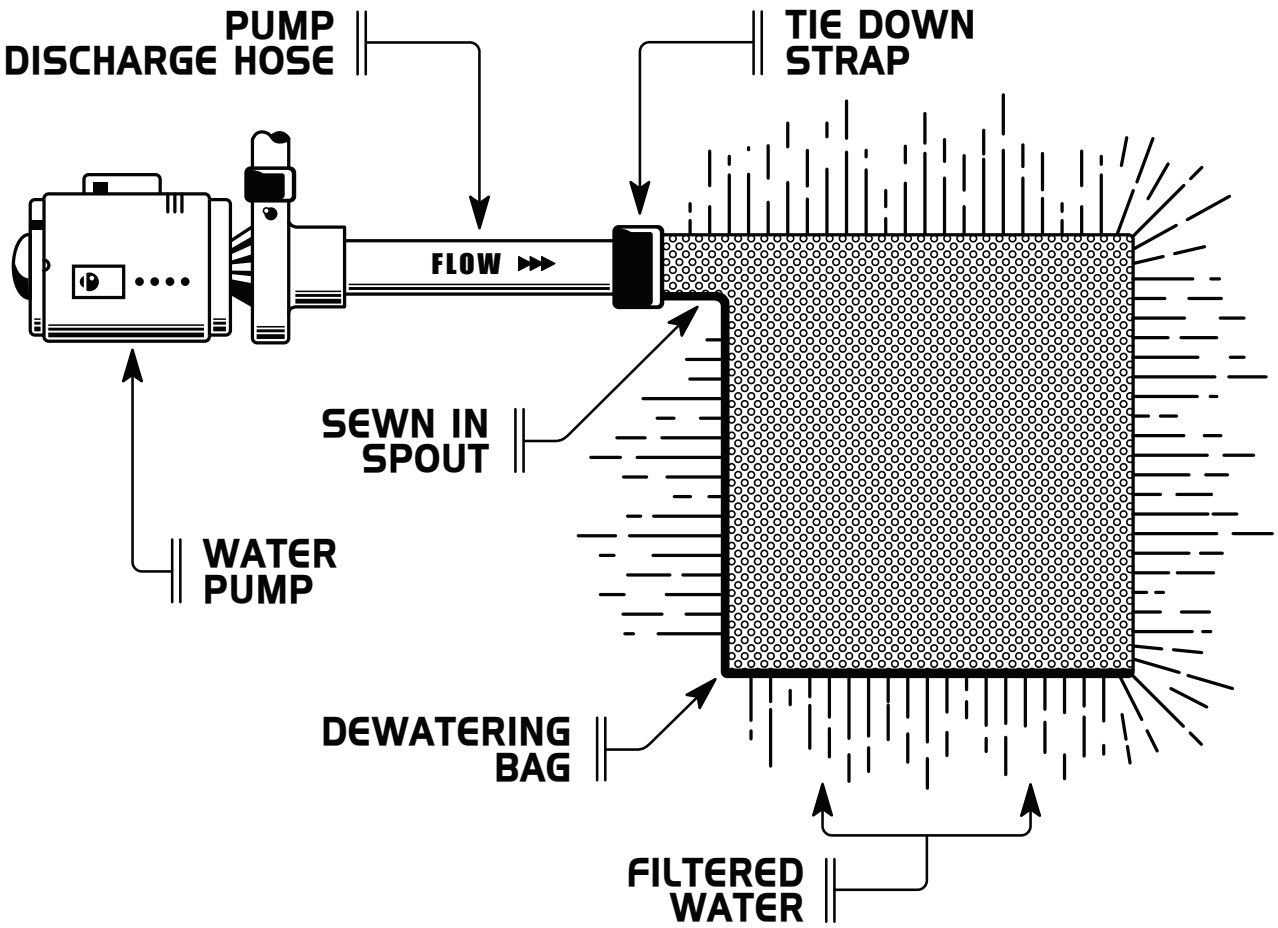
4.2 Remove and dispose of the sediment in a manner satisfactory to the engineer/inspector or in one of the following ways:

A) Remove the unit and sediment from environmentally sensitive areas and waterways. At the approved disposal site, slit the unit; remove the sediment and grade smoothly into the existing topography. Dispose of unit no longer in use at an appropriate recycling or solid waste facility.

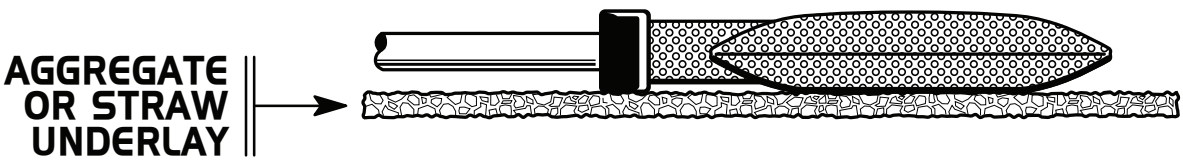
B) Bury unit on site; remove any visible fabric and seed.

DANDY DEWATERING BAG™

TOP VIEW



SIDE VIEW



{For added flow}