BMP Testing
for Erosion and Sediment Control

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FINAL REPORT

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Georgia Soil and Water Conservation Commission (GSWCC)
PO Box 1665
Athens GA 30603

Attn: Lauren Zdunczyk
lzdunczyk@gaswcc.org

Submitted by:
TRI/Environmental, Inc.
9063 Bee Caves Road
Austin, TX 78733

C. Joel Sprague
Principle Investigator

James E. (Jay) Sprague
Laboratory Director, TRI's DDRF

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for the
GEORGIA SOIL AND WATER CONSERVATION COMMISSION (GSWCC)

1. Overview of the Project

1.1 Overview
The testing program is intended to characterize full-scale, installed performance of commonly used best management practices (BMPs) for sediment control. The specific BMPs are commonly referred to as sediment retention devices, SRDs. The SRDs to be tested include what the GSWCC refers to as sediment barriers and check dams and are to be exposed to conditions relevant to typical installations. This testing will serve as a "baseline" for qualification of future SRDs. Additionally, the "index properties" of the tested materials will be verified and documented along with their associated performance properties. This will facilitate efforts to correlate performance to certain easily measured properties of the SRD components, as well as, to "bench-mark" the performance of a given product to specific index properties.

The testing protocols will, as much as possible, conform to existing or currently proposed ASTM standardized procedures so that future SRDs can be subjected to the same protocols and can easily and reliably be compared to the results of this program.

1.2 Why ASTM Standard Test Procedures?
There is relatively little performance data available for most SRDs and the limited data that is available has generally been developed using widely differing protocols. Thus, it is rarely possible to accurately compare SRD performance data developed on different SRDs at different testing organizations. The solution to this is to define common, or standard, protocols that can be used by all testing organizations.

Additionally, most SRDs are comprised of components that may be easily changed by the manufacturer without understanding the affect the change may have on product performance. At very least, the manufacturer must perform regular quality control (QC) tests on the components used in SRD manufacture, and these QC tests must be consistently run and reported. These QC test results are often used as the basis for QPL listing and must, therefore, be independently verifiable. Thus, it is important that a common, or standard, protocol be used by manufacturer and regulator alike.

1.3 Objectives
The project team will accomplish the following objectives:

- Document easily measureable (index/QC) properties of SRDs for "bench-marking", or relating, the performance results to the component materials used in the SRDs tested.
- Document the actual performance of SRDs under application-specific simulations to provide "baseline" information to compare to performance tests on future products.
- Use test experience and results to recommend preferred test protocols for both QC and performance testing of SRDs used in sediment barrier and check dam applications.
- Assess project results in light of GADOT and GSWCC goals when using these BMPs.

2. Overview of Standard Test Procedures for SRDs

2.1 Basic Index Tests for QC and "Bench-marking" of Tested Products

All product manufacturers must perform a few tests on a very frequent basis so that they can prove that they are keeping their manufacturing processes within preset limits and thereby producing a consistent product. In the manufacturing of SRDs and SRD components, a few basic mechanical properties are routinely measured in the manufacturer's own QC lab.

2.1.1 *Basic Mechanical Index Properties*

2.1.1.1 Mass per Unit Area – The mass per unit area, also known as the "weight" per square yard of a sample, is an important quality control property. The most commonly used test for SRD components is ASTM D 5261, "Standard Test Method for Measuring Mass per Unit Area of Geosynthetics."

2.1.1.2 Thickness – Thickness is another important quality control property. To this end, the following standardized test method for SRD components is available: ASTM D 5199, "Standard Test Method for Measuring Thickness of Geosynthetics."

2.1.1.3 Tensile Strength – Tensile strength is the other primary quality control property measured on most SRD components. Arguably, tensile strength may also be important if an SRD is subject to the weight of sediments or the pressures associated with impounding runoff. The following standardized test method is most commonly used: ASTM D 4632, "Standard Test Method for Grab Breaking Load and Elongation of Geosynthetics."

2.1.1.4 3-Dimensional Structures – Many SRDs are 3-dimensional products (i.e. wattles, bales, etc.), thus non-standard procedures are currently used to measure such things as density (or unit weight per length) and circumference.

2.1.2 *Basic Hydraulic Index Properties*

The most unique thing about SRD's is that, typically, for them to be very effective in retaining sediment they must also impound most of the runoff. Conversely, for them to freely pass runoff, they have to be allowed to pass a significant amount of sediment. Neither of these extremes is usually preferred, so the user has to determine the proper balance of retaining sediment while permitting seepage. Thus, a basic knowledge of the hydraulic properties that characterize the openings and flow capacity of the SRD components is essential to product selection and to manufacturing consistency.

2.1.2.1 Permittivity (a.k.a. Water Flow Rate) – Permittivity is a geotextile term that relates to the vertical water flow capacity of the material. It is often reported as gallons per minute per square foot of material and uses clear water. The standard test method is ASTM D 4491, "Standard Test Methods for Water Permeability of Geotextiles by Permittivity".

2.1.2.2 Apparent Opening Size (AOS) – The measure of the approximate largest (d85) size opening in the fabric is called apparent opening size (AOS). The standard test method is ASTM D 4751, "Standard Test Method for Measuring the Apparent Opening Size of Geosynthetics".

2.1.2.3 Percent Open Area (POA) – While the AOS is a good indicator of a geotextile's ability to retain sediments when the geotextile has lots of varying sized openings – such as with a nonwoven geotextile – a woven geotextile can have a few larger openings and a lot of very small ones making it prone to clogging even though the AOS test may indicate that it has relatively large openings. To make sure it has enough openings, the overall percent of open area can be determined using a light box. Though this test is not standardized by ASTM for geotextiles, there is a Corps of Engineers protocol that has been successfully used for decades.

2.1.3 *Basic Durability Index Property* – UV Resistance

Another unique thing about SRD's is that, typically, they are exposed to the degrading effects of sunlight for extended periods. The ultraviolet portion of sunlight degrades plastics. Thus, since SRDs frequently are composed of polymeric materials, their ability to resist degradation when exposed to ultraviolet light is commonly documented via lab testing. The most common standard accelerated lab test, ASTM D 4355, which uses a Xenon Arc light source, includes 500 hrs or more of continuous exposure. Unfortunately, because of the length of time and associated costs associated with this testing, it is not practical as either a QC test or a "bench-mark" test.

2.2 Full-scale Performance Testing

As noted earlier, the actual performance of many SRDs is system or installation dependent. Therefore a large-scale test that can incorporate full-scale "as installed" conditions is the ideal evaluation procedure. Recently these needs have been addressed with the issuance of two large-scale standard test methods: ASTM D 7351 and ASTM D 7208.

2.2.1 *SRDs in Perimeter Control Applications*

The most common SRDs, including silt fences and wattles, are used as so-called "perimeter devices" around relative small building sites to intercept modest sheet flows when no obvious low point or ponding capacity exists on-site. Characterization testing associated with this application is described in work item, WK11340, now making its way through the ASTM process. Testing is a derivation of ASTM D 6459, Large-scale Slope Erosion Testing, but permits a flatter slope and calls for a lighter rainfall.

2.2.2 *SRDs as Check Structures*

SRDs have been used to slow, or "check", concentrated flows to make them less erosive until the associated channel can vegetate sufficiently to resist flow erosion. Critical elements of this protection are the ability of the temporary check structure to: (a.) slow and/or pond runoff to encourage sedimentation, thereby reducing soil particle transport downstream, (b.) trap soil particles upstream of a structure, and (c.) decrease soil erosion. ASTM D 7208, "*Determination of Temporary Ditch Check Performance in Protecting Earthen Channels from Stormwater-Induced Erosion"* has been developed to simulate this condition. It uses full-scale channel flow (up to 3 cubic feet per second) in a trapezoidal channel with check structure(s) installed.

3. Products Tested and Associated Index Properties

3.1 Participating Companies and Products

Table 1 presents the products used in testing along with the company and contact. Companies and products were randomly chosen from approved product listings of the GADOT and GSWCC.

3.2 Index Testing Results

Table 2 presents a summary of index testing results for the products used in testing. Detailed test reports are included in Appendix A.

Table 1. Participating Companies and Products

Test	Company / Product Identification	SRD Type	Test	Company / Product Identification	SRD Type
SB	Silt Saver / BSRF	Silt Fence – GSWCC C Alt.	SB	GeoFabrics / GFG-B	Silt Fence – GADOT Type B
SB	Belton / Beltech 1935	Silt Fence – GADOT Type A	SB	Belton / Beltech 1935	Silt Fence – GADOT Type B
SB	Willacoochee / 1215 or 1216	Silt Fence – GADOT Type A	SB	Filtrexx Filter Soxx	Silt Fence – GSWCC Alt.
SB	Propex / Geotex 111F	Silt Fence – GADOT Type C	SB	Straw Bales	GSWCC
SB	ThraceLinq / GRF-400EO	Silt Fence – GADOT Type C	CD	Filtrexx Filter Soxx	GSWCC Alt.
SB	Ten Cate / FW402	Silt Fence – GADOT Type C	CD	Straw Bales	GSWCC / GADOT
SB	Hanes / GASF-A	Silt Fence – GADOT Type A	CD	Stone Check Dam	GSWCC / GADOT
SB	DDDErosion / GA-CSA	Silt Fence – GADOT C-System	CD	Fabric on Posts	GADOT Type C
SB	ErosionTech / C-System	Silt Fence – GADOT C-System	Key: SB = sediment barrier test; CD = check dam test		

Table 2. Specifications and Index Testing Results

Type A Silt Fence				**A**	**1935**		**GASF-A**		**1215**	
Property	**Units**	**Spec**	**Test**	**Spec**	**Published**	**Tested**	**Published**	**Tested**	**Published**	**Tested**
Tensile	lb	min	D4632	120 x 100	140 x 130	175 x 157	124 x 124	167 x 127	175 x 130	173 x 119
Elong	%	max	D4632	40	20 x 14	31 x 20	15 x 15	25 x 22	8 x 8	26 x 23
AOS	mm	max size	D4751	0.6	0.85	0.539	0.6	0.579	0.6	0.607
Flow	gpm/ft^2	min	GDT 87	25	17.5	22.9	8	111	90	85
POA	%	-	-	-	-	3	-	16	-	8

Type B Silt Fence				B	**1935**		GFG-B	
Property	**Units**	**Spec**	**Test**	**Spec**	**Published**	**Tested**	**Published**	**Tested**
Tensile	lb	min	D4632	120 x 100	140 x 130	175 x 157	n/a	232 x 171
Elong	%	max	D4632	40	20 x 14	31 x 20	n/a	21 x 16
AOS	mm	max size	D4751	0.6	0.85	0.539	n/a	0.465
Flow	gpm/ft^2	min	GDT 87	25	17.5	23	n/a	169
POA	%	-	-	-	-	3	n/a	7

Type C Silt Fence				**C**	**FW402**		**111F**		**400EO**	
Property	**Units**	**Spec**	**Test**	**Spec**	**Published**	**Tested**	**Published**	**Tested**	**Published**	**Tested**
Tensile	lb	min	D4632	260 x 180	365 x 200	451 x 256	370 x 220	351 x 259	365 x 200	458 x 262
Elong	%	max	D4632	40	24 x 10	42 x 76	20 x 15	20 x 12	24 x 10	45 x 21
AOS	mm	max size	D4751	0.6	0.43	0.49	0.6	0.416	0.425	0.505
Flow	gpm/ft^2	min	GDT 87	70	145	394	115	131	145	585
POA	%	-	-	-	10	28	8	18	10	21

C-System Silt Fence				**C**	**GA-CSA**		**ET-GA-C**	
Property	**Units**	**Spec**	**Test**	**Spec**	**Published**	**Tested**	**Published**	**Tested**
Tensile	lb	min	D4632	260 x 180	n/a	364 x 201	268 x 180	296 x 181
Elong	%	max	D4632	40	n/a	21 x 15	40	19 x 14
AOS	mm	max size	D4751	0.6	n/a	0.416	0.425	0.417
Flow	gpm/ft^2	min	GDT 87	70	n/a	171	70	114
POA	%	-	-	-	n/a	30	n/a	14

GSWCC Alt Silt Fence				**C-Alt**	**BSRF**	
Property	**Units**	**Spec**	**Test**	**Spec**	**Prev. Test**	**Tested**
Tensile	lb	min	D4632	120 x 100	421 x 352	105 x 90
Elong	%	max	D4632	40	97 x 100	96 x 117
AOS	mm	max size	D4751	0.6	0.099	0.164
Flow	gpm/ft^2	min	GDT 87	25	78	112
POA	%	-	-	-	n/a	n/a

4. Sediment Barrier Performance Testing in accordance with ASTM's WK 11340

4.1 Testing Overview

Sediment Barriers were tested in accordance with ASTM's WK11340 (as of Feb 2012) except the slope of the test plots was modified to be 3:1, had a 40 ft slope length, and index tests were run on each material. The rainfall sequence for sediment barriers was run according to ASTM D 6459 - 2 in/hr, 4 in/hr, and 6 in/hr each for 20 minutes. The rain water was tested for turbidity. The P-Factor was calculated and reported in accordance with ASTM WK 11340. The test soil was classified as a Sandy Clay as shown on the USDA soil triangle. Index tests were run as follows:

- Index tests on 2-dimensional (geotextile-type) products will include mass/area, thickness, tensile strength, permittivity (flow), Apparent Opening Size, and Percent Open Area (of woven geotextiles;)
- Index tests on 3-dimensional (wattle-type) products will include mass/volume, circumference/perimeter, and relevant component properties like netting tensile strength.

4.1.1 *Test Setup*

The large-scale sediment barrier testing reported herein was performed in accordance with WK11340 modified as necessary to accommodate the selected products, on 3:1 slopes using sandy clay test plots measuring 27 ft long x 8 ft wide. The simulated rainfall was produced by "rain trees" arranged around the perimeter of each test slope. Each rain tree has four sprinkler heads atop a 15 ft riser pipe. The rainfall system has been calibrated prior to testing to determine the number of sprinkler heads and associated pressure settings necessary to achieve target rainfall intensities and drop sizes. The target rainfall intensities are 2, 4, and 6 in/hr and are applied in sequence for 20 minutes each. Three replicate test slopes with the perimeter SB installed at the bottom were tested. The sediment retention provided by the product tested is obtained by comparing the protected slope results to control (bare soil) results. Tables and graphs of rainfall versus soil loss are generated from the accumulated data.

Figure 1. Test Slopes (Control Setup)

Figure 2. "Rain Trees" around Test Slopes

4.1.2 *Test Soil*

The test soil used in the test plots had the following characteristics.

Table 3. TRI Sandy-Clay Characteristics

Soil Characteristic	Test Method	Value
% Gravel	ASTM D 422	0
% Sand		49.2
% Silt		12.6
% Clay		38.2
Liquid Limit, %	ASTM D 4318	50
Plasticity Index, %		26
Soil Classification	USDA	Sandy Clay
Soil Classification	USCS	Sandy Fat Clay
K-Factor	WK11340	0.03

4.1.3 *Preparation of the Test Slopes*

The initial slope soil veneer (12-inch thick minimum) is placed and compacted. Compaction is verified to be 90% (± 3%) of Proctor Standard density using ASTM D2937 (drive cylinder method). Subsequently, the test slopes undergo a "standard" preparation procedure prior to each slope test. First, any rills or depressions resulting from previous testing are filled in with test soil and subject to heavy compaction. The entire test plot is then tilled to a depth not less than four inches. The test slope is then raked to create a slope that is smooth both side-to-side and top-to-bottom. Finally, a steel drum roller is rolled down-and-up the slope 3 times proceeding from one side of the plot to the other. The submitted erosion control product is then installed using the technique acceptable to / recommended by the client. For this testing, TRI applied the product to the slopes.

4.1.4 *Installation of Sediment Barrier at the End of the Test Slopes*

Each sediment barrier was installed as directed by the client. For the tests reported herein, the sediment barrier installations were in accordance with the GSWCC's Manual for Erosion and Sediment Control in Georgia ("the Manual") or manufacturer's specifications. The products chosen for testing by the laboratory are listed in Table 1. The specific installations included:

1. Three Type A fabrics from GADOT QPL 36. (36-inch wide)
   - Install according to specifications in the Manual using wood posts
   - Wood posts shall be oak and 1.5" x 1.5" and 4ft in length.
2. Three Type C fabrics from GADOT QPL 36. (36-inch wide)
   - Install according to specifications in the Manual
3. Two C-Systems from GADOT QPL 36. (36-inch wide)
   - Install according to manufactures specifications
4. One Type C Silt Fence Alternative from the GSWCC Approved Products List.
   - Install according to manufactures specifications
5. Two Type B fabrics from GADOT QPL 36. (24-inch wide)
   - Install according to specifications in the Manual using wood posts
   - Wood posts shall be 2" x 2" soft wood or 1" x1" hardwood and 3ft in length.
6. One Type B Silt Fence Alternative from the GSWCC Approved Products List:
   - Compost Filter Sock install according to manufactures specifications (~12-inch diameter, 25 lbs/ft; approx. 9" high x 16" wide installed).
7. Straw bales – installed per the Manual (42"L x 18"H x 14"W @ 26.5 lbs = 4.3 lbs/ft^3).

4.1.5 *Specific Test Procedure*

Immediately prior to testing, rain gauges are placed at the quarter points (i.e. 10, 20, 30 ft) on the slope. The slope is then exposed to sequential 20-minute rainfalls having target intensities of 2, 4, and 6 inches per hour. All runoff is collected during the testing. Additionally, periodic sediment concentration grab samples are taken and runoff rate measurements are made. Between rainfall intensities, the rainfall is stopped and rainfall depth is read in the six rain gauges, valves are adjusted to facilitate the subsequent rainfall intensity, and empty collection vessels are positioned to collect subsequent runoff. After allowing for sediments to settle, water is decanted from the collected runoff. The remaining sediments are collected and dried to determine total soil loss. Pictures of prepared and end-of-test slopes are shown in Figures 3 through 8.

Figure 3. Typical Prepared Control Slope

Figure 4 Typical Prepared Slope & Sediment Barrier Installation

Figure 5. Control End-of-Test

Figure 6. Type A End-of-Test

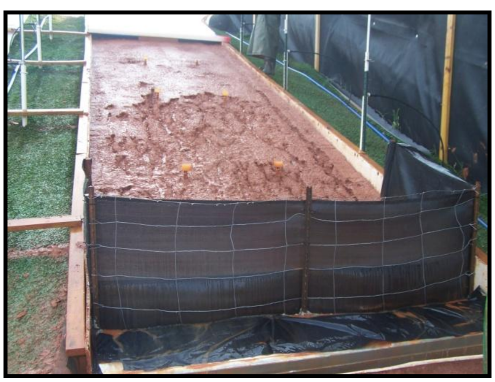


Figure 7. Type C End-of-Test

Figure 8. C-System End-of-Test

4.2 Test Results

The Practice Management (P) Factor from the Revised Universal Soil Loss Equation (RUSLE) of the USDA-ARS Agricultural handbook 703 is the reported performance measure for slopes determined from this testing. The A-Factor, R-Factor, and P-Factor reported herein are related through RUSLE by the following relationship:

A = R x K x LS x C x P

where: A = the computed soil loss in tons per acre (measured/calculated from test);
R = the rainfall erosion index (measured/calculated from test);
K = the erodibility of the soil (calculated from control tests);
LS = the topographic factor (2.02 for 8 x 27 ft slope);
C = the cover factor = (1.0 for all test slopes); and
P = the practice factor = ratio of protected slope sediment loss (via seepage through a sediment barrier) to control slope sediment loss (via runoff without sediment barrier). Note: P = 1.0 for the control slope.

Total sediment loss and the associated rainfall depth measured during the testing are the principle data used to determine the P-Factor. Based on the RUSLE, the following steps are followed to derive the P-Factor for the tested product:

1. Using the control test results, the K-Factor is derived by fitting a linear regression to the plot of cumulative "A" to cumulative "R" (see Figure 9). The slope of the regression line is used to calculate the "K", or characteristic erodibility, of the test soil. The regression equation is used to calculate the "A", or soil loss, at R = 231. This is the normalized cumulative R-Factor calculated for the target test events: 2 in/hr for 20 minutes + 4 in/hr for 20 minutes + 6 in/hr for 20 minutes based on the equation:

   R-Factor = [total kinetic energy of the storm (E)] x [the max 30-minute Intensity (I)]

2. Using the protected test results, a "best fit" regression line is fitted to a plot of cumulative "A" and cumulative "R". The "A", or soil loss, is calculated for R = 231 using the best fit regression equation.

3. The P-Factor at R = 231 is then calculated for the protected condition using the following equation:

   P-Factor = ["A" protected at R = 231] / ["A" control at R = 231]

The P-Factor thus calculated is the reported performance value. This facilitates product-to-product comparison of test results at a common point of the storm event. Additionally, using the regression equations for the protected and the control conditions, the users of the test report can evaluate performance at other points in the model storm by selecting the R factor (and the corresponding A-Factor) that may fit local conditions and calculating the ratio.

Table 4 summarizes the test data and associated P-Factor calculations for all the tests performed.

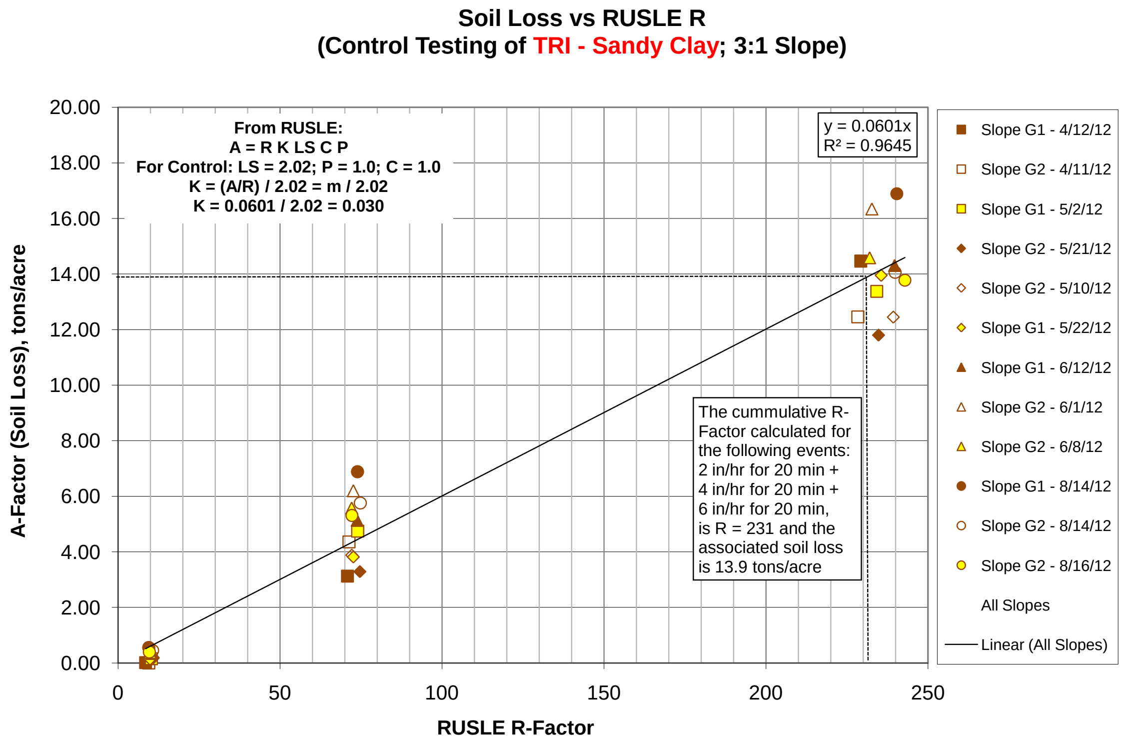


Figure 9. Cumulative Plot of Control Tests

4.3 Discussion

When the data in Table 4 is presented graphically, as shown in Figures 13 through 16, some relationships between fabric index properties and installed system performance measurements are suggested. In general, lower system seepage rates correlate with lower system sediment loss rates. Related to this, lower fabric permittivity rates parallel lower system seepage rates and thus lower sediment loss, and higher fabric percent open area (for woven fabrics) correlates with maintaining higher system seepage rates along with associated higher sediment loss rates.

Following are the specific correlations between fabric properties and system performance:

- Fabric Percent Open Area vs. System Seepage: $R^2 = 0.79$
- Fabric Permittivity vs. System Seepage: $R^2 = 0.97$
- Fabric Permittivity vs. System Soil Loss: $R^2 = 0.94$
- Fabric Apparent Opening Size vs. System Soil Loss: $R^2 = 0.16$
- Fabric Percent Open Area vs. System Soil Loss: $R^2 = 0.92$

It is not possible to make similar comparisons for non-fabric systems, since there are no standardized index tests for these 3-dimensional (3-D) materials. Still, it would be likely that these 3-D systems have lower open area and size (i.e. straight-thru open spaces) but as high or higher flow (similar to permittivity). This suggests that 3-D structures may be able to provide superior balance of properties (greater filtration and greater flow) as long as there is no piping, undermining, or overtopping. Testing of the Type B (shorter) systems suggests that these systems are more susceptible to piping, undermining, and/or overtopping.

Table 4. Summary Data Table – Protected Slopes

Product	Properties	Values	Rainfall Event	Test Slope 1			Test Slope 2			Test Slope 3			**Average All Slopes**				
				Sed. Conc. Losses	Sed. Loss	Runoff	Sed. Conc. Losses	Sed. Loss	Runoff	Sed. Conc. Losses	Sed. Loss	Runoff	**Sed. Conc. Losses, lbs**	**Sed. Loss, lbs**	**Runoff, gal**	**A-Factor**	**P-Factor**
Control			2	0.2	0.1	5	0.0	0.0	1	1.8	2.2	7					
			4	46.5	45.8	110	62.1	64.0	110	67.3	67.5	114					
			6	168.4	166.6	223	120.3	119.0	207	129.2	126.8	211					
	TOTAL			**215**	**213**	**338**	**182**	**183**	**318**	**198**	**197**	**332**	**199**	**197**	**329**	**13.880**	**1**
BSRF	AOS, µm	164	2	0.08	0.025	7	0.2	0.043	7	0.01	0.044	4					
	Permittivity, gpm/ft^2	112	4	0.71	0.489	51	0.76	0.597	56	0.87	0.709	68					
	POA, %	n/a	6	1.4	1.185	102	1.16	1.194	115	1.74	1.379	126					
	TOTAL			**2**	**2**	**160**	**2**	**2**	**178**	**3**	**2**	**198**	**2.3**	**1.9**	**179**	**0.126**	**0.009078**
GA-CSA	AOS, µm	416	2	0.13	0.13	4	0.21	0.21	9	0.26	0.26	5					
	Permittivity, gpm/ft^2	171	4	2.31	2.38	79	2.44	2.48	74	3.01	2.89	78					
	POA, %	22.8	6	4.74	4.53	140	4.71	4.89	146	4.7	4.63	145					
	TOTAL			**7**	**7**	**223**	**7**	**8**	**229**	**8**	**8**	**228**	**7.5**	**7.5**	**227**	**0.501**	**0.036095**
111F	AOS, µm	416	2	0.2	0.1	7	0	0.02	6	0.07	0.07	5					
	Permittivity, gpm/ft^2	131	4	2.49	2.18	72	2.15	2	67	1.8	2.05	71					
	POA, %	18.2	6	5.26	4.97	133	4.44	4.38	128	5.21	5.4	133					
	TOTAL			**8**	**7**	**212**	**7**	**6**	**201**	**7**	**8**	**209**	**7.2**	**7.1**	**207**	**0.478**	**0.034438**
Control			2	2.94	2.6	15	3.83	3.1	22	2	2	23					
			4	46.31	45.6	101	54.16	53.9	96	54.98	54	115					
			6	121.87	125.1	213	130.14	125.9	226	149.01	148.9	207					
	TOTAL			**171**	**173**	**329**	**188**	**183**	**344**	**206**	**205**	**345**	**188**	**187**	**339**	**13.880**	**1**
1935	AOS, µm	539	2	0.27	0.09	4	0	0.01	2	0.14	0.25	7					
	Permittivity, gpm/ft^2	22.9	4	0.76	1	57	1.17	0.96	60	1.68	1.48	63					
	POA, %	3.29	6	1.88	1.5	97	2.51	2.5	94	2.05	1.88	98					
	TOTAL			**3**	**3**	**158**	**4**	**3**	**156**	**4**	**4**	**168**	**3.5**	**3.2**	**161**	**0.215**	**0.01549**
FW402	AOS, µm	490	2	0.47	0.3	8	0.43	0.6	14	0.45	0.41	12					
	Permittivity, gpm/ft^2	394	4	2.88	2.7	76	3.74	3.8	83	2.92	2.7	76					
	POA, %	27.6	6	5.04	4.8	150	5.36	5.2	155	5.41	5.2	157					
	TOTAL			**8**	**8**	**234**	**10**	**10**	**252**	**9**	**8**	**245**	**8.9**	**8.6**	**244**	**0.569**	**0.040994**
GASF-A	AOS, µm	579	2	0.36	0.4	15	0.33	0.4	11	0.44	0.4	10					
	Permittivity, gpm/ft^2	111	4	2.29	2.2	66	2.49	2.3	67	2.34	2.1	66					
	POA, %	16.1	6	4.2	4.1	126	4.21	4.05	125	4.16	4.25	128					
	TOTAL			**7**	**7**	**207**	**7**	**7**	**203**	**7**	**7**	**204**	**6.9**	**6.7**	**205**	**0.443**	**0.031916**
Control			2	4.88	5.04	21	6.15	6.3	19	5.38	5.5	25					
			4	61.1	70.4	140	81.28	84.8	150	74.14	76.4	131					
			6	134.2	134.8	213	146.29	149	218	130.23	132.4	209					
	TOTAL			**200**	**210**	**374**	**234**	**240**	**387**	**210**	**214**	**365**	**215**	**222**	**375**	**13.880**	**1**
1215	AOS, µm	607	2	0.13	0.11	6	0.3	0.15	7	0.25	0.21	8					
	Permittivity, gpm/ft^2	85	4	1.22	1.45	65	1.76	1.75	70	2.39	2.1	72					
	POA, %	8	6	3.55	3.75	120	4.07	3.85	120	4.41	4.3	125					
	TOTAL			**5**	**5**	**191**	**6**	**6**	**197**	**7**	**7**	**205**	**6.0**	**5.9**	**198**	**0.393**	**0.028314**
ET-GA-C	AOS, µm	417	2	0.14	0.04	9	0.19	0.03	11	0.29	0.05	8					
	Permittivity, gpm/ft^2	114	4	2.75	1.9	70	1.79	1.95	71	2.12	2.2	69					
	POA, %	14	6	4.31	4.76	135	5.08	4.96	138	4.59	4.2	130					
	TOTAL			**7**	**7**	**214**	**7**	**7**	**220**	**7**	**6**	**207**	**7.1**	**6.7**	**214**	**0.441**	**0.031772**
400-EO	AOS, µm	505	2	0.12	0.02	7	0.23	0.18	11	0.24	0.27	9					
	Permittivity, gpm/ft^2	260	4	2.47	2.44	80	3.01	2.9	75	3.05	2.84	82					
	POA, %	21	6	5.42	5.2	151	5.76	5.4	148	5.93	5.81	152					
	TOTAL			**8**	**8**	**238**	**9**	**8**	**234**	**9**	**9**	**243**	**8.7**	**8.4**	**238**	**0.565**	**0.040706**

Table 4 (cont'd). Summary Data Table – Protected Slopes

Product	Properties	Values	Rainfall Event	Test Slope 1			Test Slope 2			Test Slope 3			**Average All Slopes**				
				Sed. Conc. Losses	Sed. Loss	Runoff	Sed. Conc. Losses	Sed. Loss	Runoff	Sed. Conc. Losses	Sed. Loss	Runoff	**Sed. Conc. Losses, lbs**	**Sed. Loss, lbs**	**Runoff, gal**	**A-Factor**	**P-Factor**
Control			2	8.74	8.12	28	7.18	6.6	23	5.56	5.8	20					
			4	96.95	93	123	78.77	78	119	74.56	72.2	129					
			6	148.12	147	217	124.54	122	188	127.54	124.4	224					
TOTAL				**254**	**248**	**368**	**210**	**207**	**330**	**208**	**202**	**373**	**224**	**219**	**357**	**13.880**	**1**
GFG-B (24-inch)	AOS, μm	465	2	0.18	0.2	6	0.11	0.11	5	0.12	0.1	6					
	Permittivity, gpm/ft^2	169	4	2.55	5.52	55	1.23	1.21	61	1.85	1.8	62					
	POA, %	7	6	3.66	3.7	153	2.97	2.98	149	2.8	2.5	144					
TOTAL				**6**	**9**	**214**	**4**	**4**	**215**	**5**	**4**	**212**	**5.2**	**6.0**	**214**	**0.372**	**0.026801**
1935 (24-inch)	AOS, μm	539	2	0.15	0.18	6	0.27	0.2	6	0.12	0.14	4					
	Permittivity, gpm/ft^2	23	4	1.11	0.99	60	0.7	0.8	62	0.89	1.1	57					
	POA, %	3	6	1.92	1.6	178	2.64	1.9	187	3.95	2.35	172					
TOTAL				**3**	**3**	**244**	**4**	**3**	**255**	**5**	**4**	**233**	**3.9**	**3.1**	**244**	**0.207**	**0.014914**
Straw Bales (18-inch)	AOS, μm	n/a	2	0.07	0.06	5	0.03	0.04	4	0.09	0.08	9					
	Permittivity, gpm/ft^2	n/a	4	2.15	1.8	80	2.69	2.7	81	2.67	2.42	87					
	POA, %	n/a	6	6.97	6.9	173	7.37	8.3	166	5.99	6.23	173					
TOTAL				**9**	**9**	**258**	**10**	**11**	**251**	**9**	**9**	**269**	**9.3**	**9.5**	**259**	**0.721**	**0.051945**
Compost Sock (12-inch)	AOS, μm	n/a	2	0.07	0.03	6	0.17	0.1	10	0.2	0.26	14					
	Permittivity, gpm/ft^2	n/a	4	1.21	0.76	74	1.12	0.83	76	1.99	1.65	110					
	POA, %	n/a	6	4.18	3.6	176	4.58	4.3	164	7.21	5.72	176					
TOTAL				**5**	**4**	**256**	**6**	**5**	**250**	**9**	**8**	**300**	**6.9**	**5.8**	**269**	**0.375**	**0.027017**

Figure 10. Type B Silt Fence End-of-Test

Figure 11. Type B Compost Sock End-of-Test

Figure 12. Type B Straw Bales End-of-Test

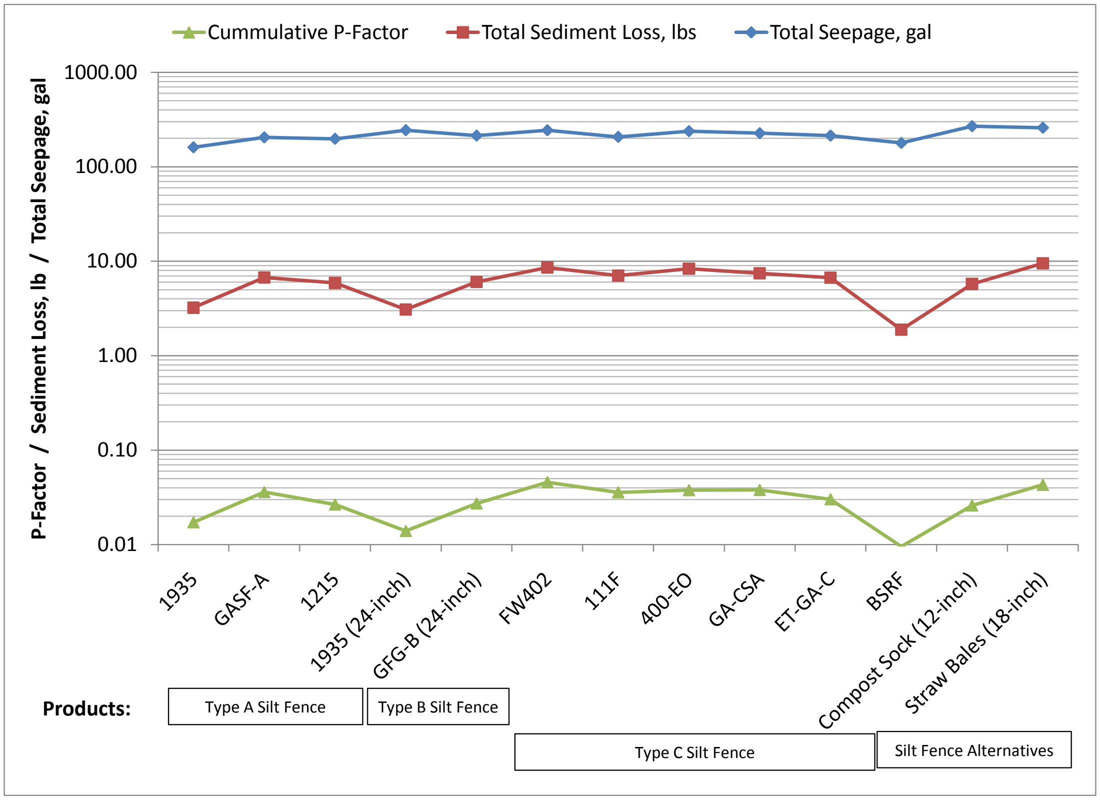


Figure 13. Seepage, Sediment Loss, and P-Factor for the Products Tested

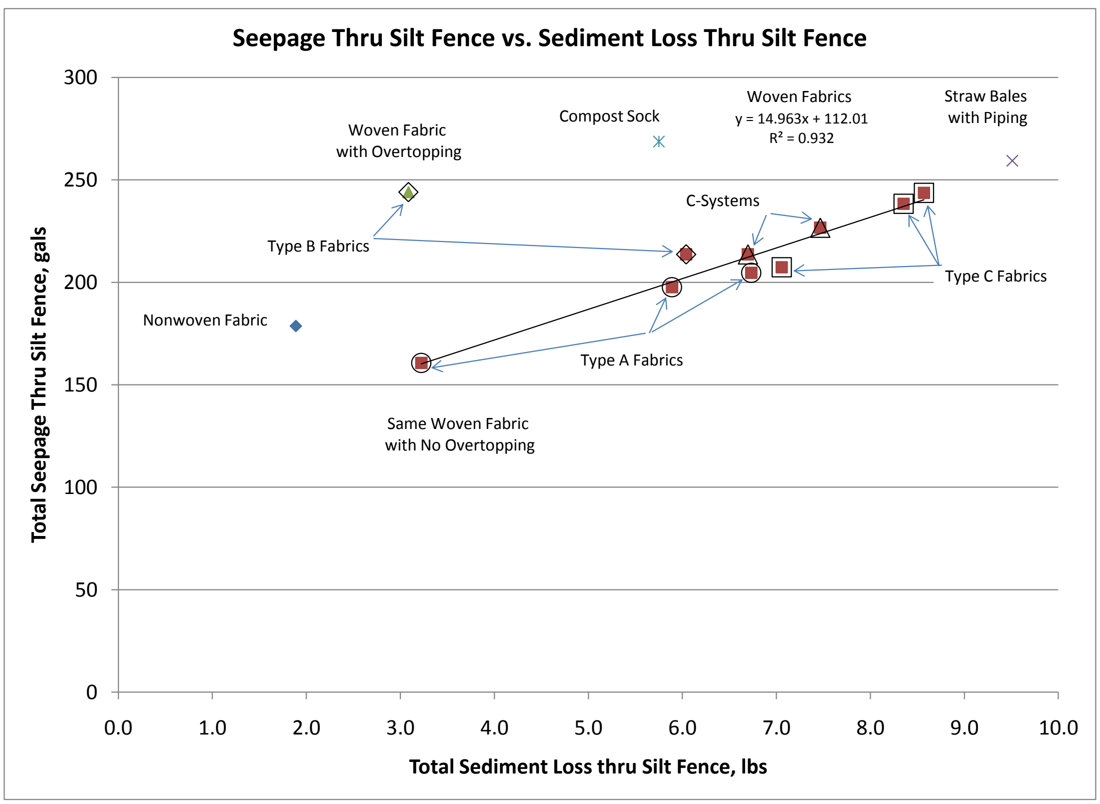


Figure 14. Seepage vs. Sediment Loss for All Tested Products

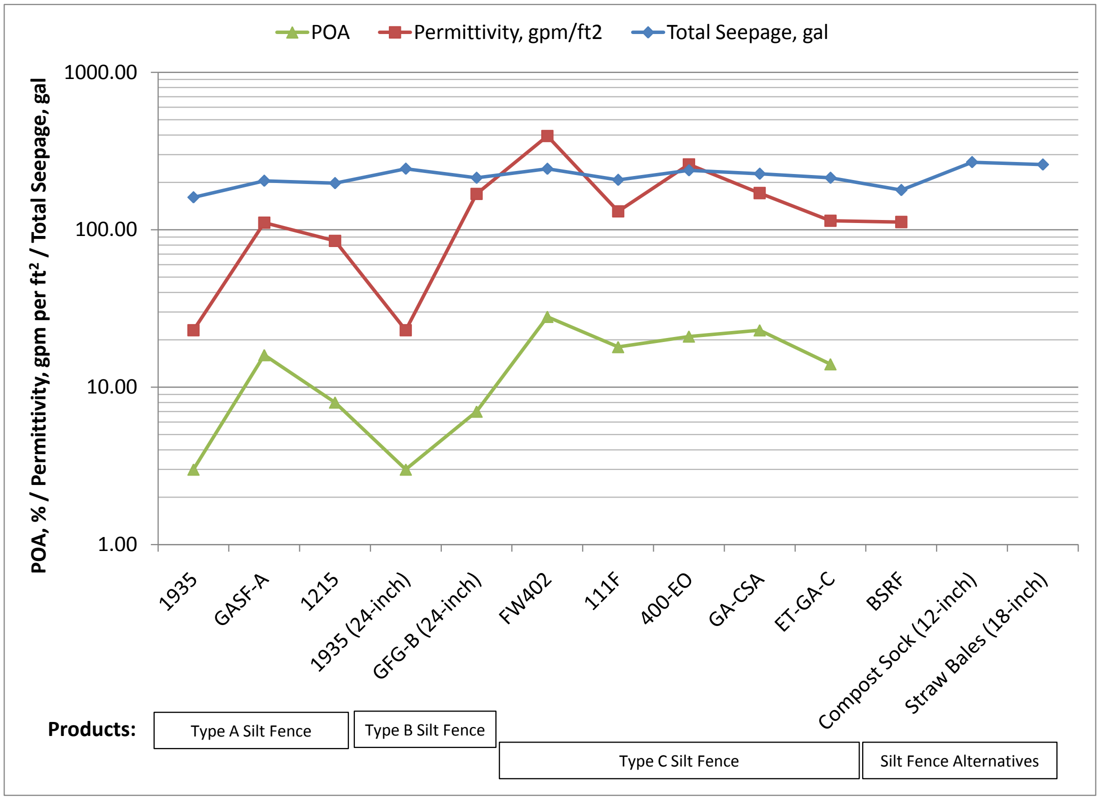


Figure 15. Seepage and Related Index Properties for the Tested Products

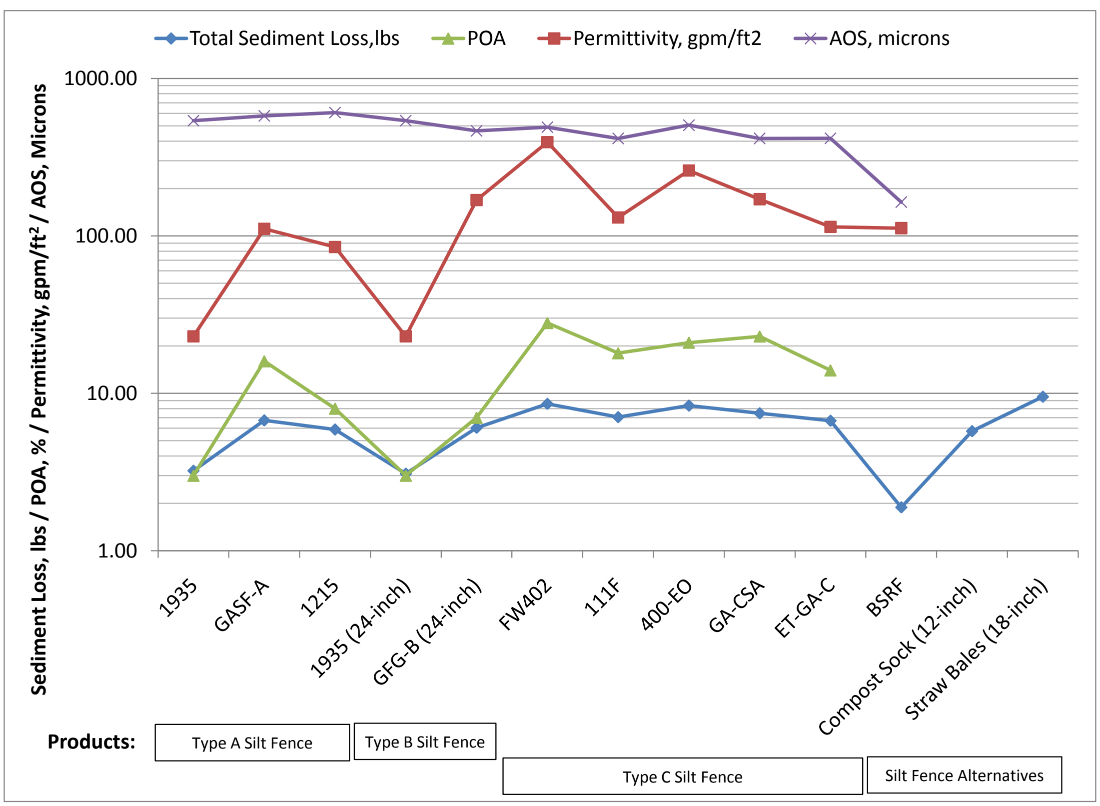


Figure 16. Sediment Loss and Related Index Properties for the Tested Products

5. Check Dam Testing in accordance with ASTM D7208

5.1 Testing Overview

Check Dams were tested in accordance with ASTM D 7208-06, except the test was run with one replicate each at 0.5, 1.0, and 2.0 cfs instead of 3 replicates at 3 cfs. In addition to testing compost socks, straw bales, and 2”-10” rock checks, a Type C silt fence check was tested. It was installed in a special configuration to control energy dissipation per the GaDOT detail Cd-F specifications. The test soil was classified as a Sandy Clay as shown on the USDA soil triangle. Index tests were run as follows:

- Index tests on 2-dimensional (geotextile-type) products will include mass/area, thickness, tensile strength, permittivity (flow), Apparent Opening Size, and Percent Open Area (of woven geotextiles;)
- Index tests on 3-dimensional (wattle-type) products will include mass/volume, circumference/perimeter, and relevant component properties like netting tensile strength.

5.1.1 *Test Setup*

The large-scale check dam testing reported herein was performed in accordance with ASTM D7208 modified as described above. The testing is performed in a trapezoidal shaped flume with a 2 ft wide bottom and 2:1 side slopes and a 5% bed slope. The concentrated flow is produced by opening a valve to allow gravity flow from an adjacent pond. Each test is run at a single predetermined flow rate for 30 minutes. The test channel is 60 ft long and includes a 40 ft test section along with a 10ft upstream and a 10 ft downstream transition section. Flow is metered into the channel via a calibrated sharp-crested weir. Nine (9) evenly spaced cross-sections are delineated within the test section and nine (9) evenly spaced measurement points are located at each cross-section. These measurement points enable before and after measurements of the soil surface. Tables and graphs of cross-sectional soil loss are generated from the accumulated data.

Figure 17. Flume Setup (typical control)

Figure 18. Flow into Channel at Weir

5.1.2 *Test Soil*

The test soil used was the same as used in the sediment barrier tests. See section 4.1.2.

5.1.3 *Preparation of the Test Channels*

The initial channel soil veneer (12-inch thick minimum) is placed and compacted. Compaction is verified to be 90% (± 3%) of Proctor Standard density using ASTM D2937 (drive cylinder method). The test channels undergo a "standard" preparation procedure prior to each test. First, any rills or depressions resulting from previous testing are filled in with test soil. The soil surface is replaced to a depth of 1 inch and groomed to create a channel bottom that is level side-to-side with smooth, compacted 2:1 side slopes and at a smooth 5% bed slope. Finally, a trapezoidal form with a vibrating plate compactor is run over the renewed channel surface. The submitted check dam system is then installed as directed by the client.

5.1.4 *Installation of Check Dams in the Test Channels*

As noted, each check dam was installed as directed by the client. For the tests reported herein, the check dam installations were in accordance with the GSWCC's Manual for Erosion and Sediment Control in Georgia ("the Manual"), except that the silt fence was installed in accordance with GADOT detail Cd-F. The specific installations included:

1. Stone check dams using graded size 2-10 inch stone – per the Manual (1.4 tons/yd^3);
2. Straw bales – installed per the Manual (42"L x 18"H x 14"W @ 26.5 lbs = 4.3 lbs/ft^3);
3. Compost Filter Socks – installed per manufacturer's requirements (~12-inch diameter, 25 lbs/ft; approx. 9" high x 16" wide installed);
4. Fabric from the Georgia Department of Transportation's (GA DOT) Qualified Product List 36. Installed per the GA DOT specifications for the check dam composed of synthetic fiber fabric with reinforced wire post and bracing placed in ditches in a special configuration which controls energy dissipation. GA DOT detail Cd-F

5.1.5 *Specific Test Procedure*

Immediately prior to testing, the initial soil surface elevation readings are made at predetermined cross-sections. The channel is then exposed to the predetermined flow rate for 30 minutes. During the testing, flow depth and corresponding flow velocity measurements are taken at the predetermined cross-section locations. At the end of 30 minutes, the flow is stopped and soil surface elevation measurements are made to facilitate calculation of soil loss. Pictures of channel preparation are shown in Figures 19 and 20. Pictures of typical channel flows are shown in Figures 21 thru 24.

Figure 19. Compaction of Veneer

Figure 20. Channel Forming (typical)

5.2 Test Results

Soil loss and the associated flow depth and velocity measurements made during the testing are the principle data used to determine the performance of the product tested. This data is entered into a spreadsheet that transforms the soil gain/loss measurements into related soil accretion and loss volumes using cut/fill calculations based on the Simpson Rule. From this data a Soil Accretion Index (SAI) and a Clopper Soil Loss Index (CSLI) are determined. Data and calculations are summarized for each test in Table 5.

Figure 21. Compost Sock Check Structure

Figure 22. Rock Check Structure

Figure 23. Straw Bale (NRCS) Check Structure

Figure 24. Silt Fence Check Structure

5.3 Discussion

When the data in Table 5 is presented graphically, as shown in Figures 25 and 26, some relationships between check dam types and installed system performance measurements are suggested. In general, as a check dam gets taller it may be able to increasingly reduce channel soil loss by creating greater ponding and, thus, greater slowing of water. Yet, in the process, the check dam must provide greater structural integrity and adjacent scour resistance. The original straw bale system and the silt fence system both offered taller damming, but even at the lowest flow level they provide insufficient structure integrity and scour resistance to function effectively. Conversely, the compost sock, rock check, and the enhanced (NRCS) straw bale systems provided the necessary balance between damming and scour resistance to perform effectively under all flow levels.

Table 5. Summary Data Table – ASTM D7208 Channel Tests

Tested System (0.5 cfs)	Total Soil Gain, ft^3	Total Soil Loss, ft^3	Total Wetted Area, ft^2	SAI	CSLI	Net	Net % of Unchecked	Obser-vations	Approx. Installation Time, min.
Control (Unchecked Channel)	0.00	-2.53	~~3.84~~ 95.22	~~0.000~~ 0.00	~~-65.86~~ -2.65	~~-65.86~~ -2.65	~~100~~ 100		0
Straw Bales (14" High / GSWCC Install.)	2.99	-9.68	~~12.60~~ 134.15	~~23.726~~ 2.23	~~-76.83~~ -7.22	~~-53.10~~ -4.99	~~81~~ 188	Blowout	30
Straw Bales (14" High / GSWCC Install. - Retest)	3.74	-6.24	~~11.07~~ 127.94	~~33.802~~ 2.93	~~-56.40~~ -4.88	~~-22.59~~ -1.96	~~34~~ 74	Blowout	30
Straw Bales (14" High / NRCS Install.)	2.33	-2.34	~~16.62~~ 152.30	~~14.034~~ 1.53	~~-14.10~~ -1.54	~~-0.07~~ -0.01	~~0~~ 0		60
Compost Sock (9" High)	0.28	-1.21	~~9.01~~ 118.20	~~3.083~~ 0.24	~~-13.39~~ -1.02	~~-10.31~~ -0.79	~~16~~ 30		10
Rock + Geotextile (15" High)	0.97	-1.55	~~9.24~~ 118.92	~~10.509~~ 0.82	~~-16.81~~ -1.31	~~-6.31~~ -0.49	~~10~~ 18		60
Type C Silt Fence (21" High / GSWCC Install.)	0.77	-4.14	~~8.60~~ 116.02	~~9.001~~ 0.67	~~-48.14~~ -3.57	~~-39.14~~ -2.90	~~59~~ 109	Blowout	240
Type C Silt Fence (21" High / Retest)	2.90	-4.78	~~11.02~~ 128.42	~~26.35~~ 2.26	~~-43.40~~ -3.73	~~-17.05~~ -1.46	~~26~~ 55	Blowout	240

Tested System (1.0 cfs)	Total Soil Gain, ft^3	Total Soil Loss, ft^3	Total Wetted Area, ft^2	SAI	CSLI	Net	Net % of Unchecked	Obser-vations	Approx. Installation Time, min.
Control	0.00	-4.07	~~5.63~~ 102.27	~~0.000~~ 0.00	~~-72.27~~ -3.98	~~-72.27~~ -3.98	~~100~~ 100		0
Straw Bales (14" High / NRCS Install.)	2.93	-2.54	~~21.33~~ 172.44	~~13.718~~ 1.70	~~-11.92~~ -1.47	~~1.79~~ 0.22	~~-2~~ -6		60
Compost Sock (9" High)	0.62	-1.55	~~10.01~~ 121.93	~~6.230~~ 0.51	~~-15.52~~ -1.27	~~-9.29~~ -0.76	~~13~~ 19		10
Rock + Geotextile (15" High)	2.87	-2.94	~~12.94~~ 134.62	~~22.180~~ 2.13	~~-22.70~~ -2.18	~~-0.52~~ -0.05	~~1~~ 1		60

Tested System (2.0 cfs)	Total Soil Gain, ft^3	Total Soil Loss, ft^3	Total Wetted Area, ft^2	SAI	CSLI	Net	Net % of Unchecked	Obser-vations	Approx. Installation Time, min.
Control	0.00	-6.79	~~8.15~~ 112.43	~~0.045~~ 0.00	~~-83.26~~ -6.04	~~-83.21~~ -6.03	~~100~~ 100		0
Straw Bales (14" High / NRCS Install.)	2.91	-5.13	~~26.92~~ 196.46	~~10.827~~ 1.48	~~-19.04~~ -2.61	~~-8.22~~ -1.13	~~10~~ 19		60
Compost Sock (9" High)	2.19	-3.90	~~11.20~~ 126.12	~~19.535~~ 1.73	~~-34.85~~ -3.09	~~-15.32~~ -1.36	~~18~~ 23		10
Rock + Geotextile (15" High)	2.22	-3.66	~~15.27~~ 143.53	~~14.518~~ 1.54	~~-23.97~~ -2.55	~~-9.45~~ -1.01	~~11~~ 17		60

Striked-through values revised 8/21/14.

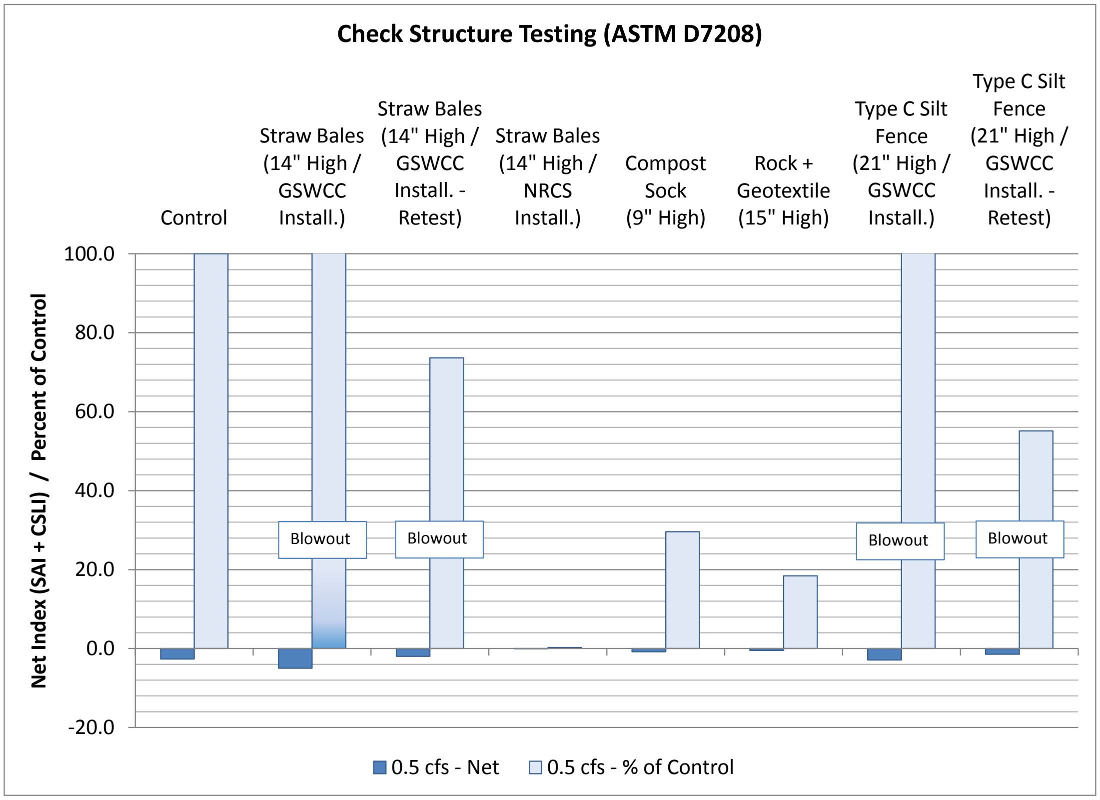


Figure 25. Summary of All 0.5cfs Tests <u>(Revised 8/21/14)</u>

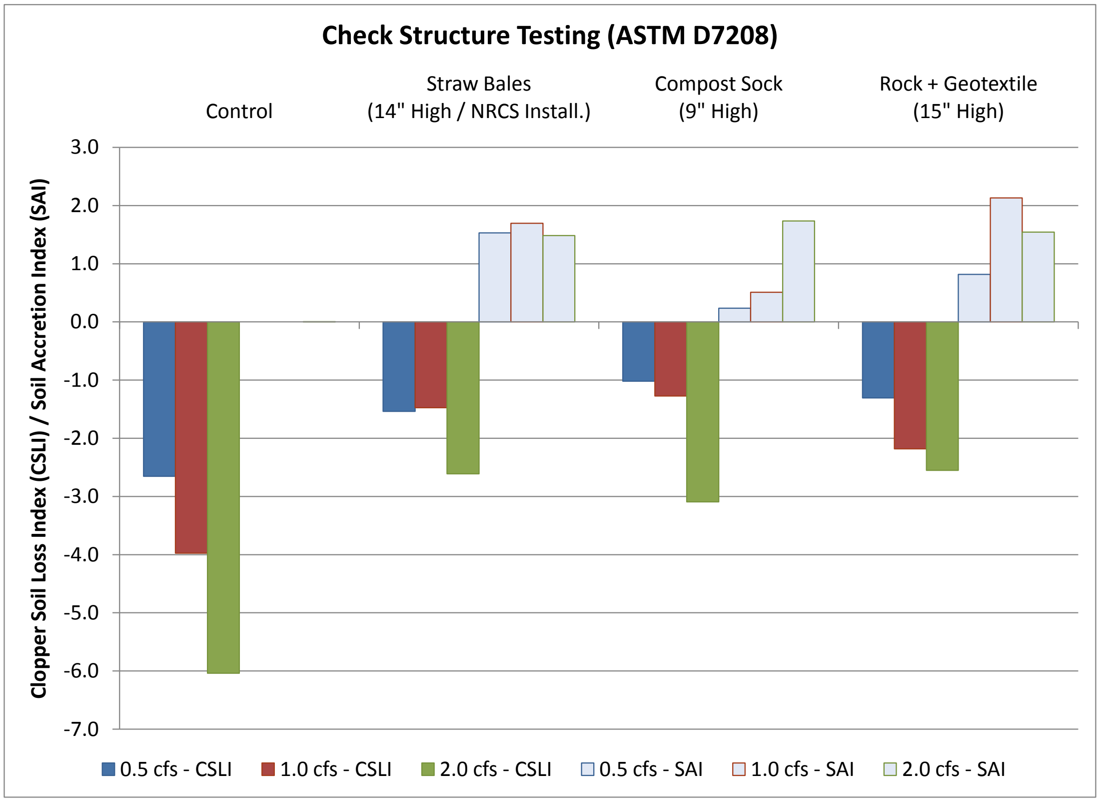


Figure 26. Net Soil Loss/Accretion & Percent of Control <u>(Revised 8/21/14)</u>

6. Conclusions and Recommendations

6.1 Sediment Barrier Performance Testing in accordance with ASTM's WK 11340

Figure 27 summarizes the results of all sediment barrier testing. The figure is similar to Figure 14, but instead of plotting system seepage vs. sediment loss, it relates seepage to P-Factor which is the sediment loss for the protected condition divided by the sediment loss from the control condition. This is the reported performance value. Figure 27 also shows suggested performance envelopes for "High Retention" and "High Flow" systems, respectively. Clearly, a lower P-Factor is generally associated with the High Retention systems, while High Flow systems typically have higher seepage rates. Table 6 shows how these performance limits could be incorporated into the existing GADOT specifications for silt fence fabrics. Straw bales are not recommended as sediment barriers for slopes greater than or equal to 3:1. Generally, the test results agree with the GADOT and GSWCC goals of specifying high retention systems for applications that can accommodate the associated ponding and high flow systems where ponding would create a hazard or exceed the available area.

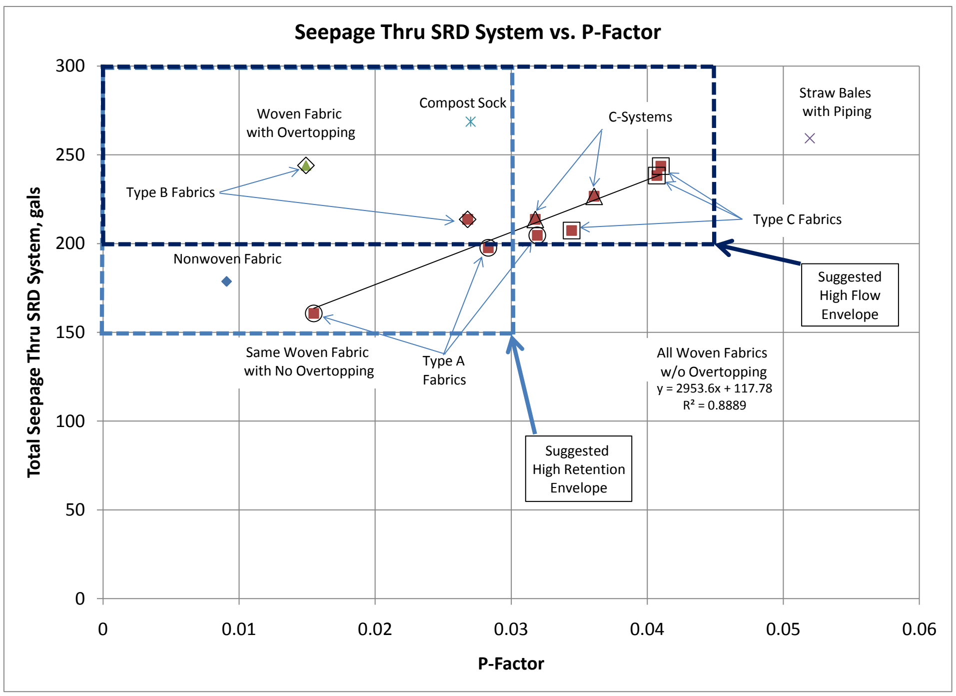


Figure 27. Seepage vs. P-Factor for All Tested Products

Table 6. Recommended Revised Material Specifications

Property	Units	Spec	Test	Type A & B	Type C	Alt. Systems
Tensile	lb	min	D4632	120 x 100	260 x 180	Properties and Installation Guidelines To Be Provided By Manufacturer
Elong	%	max	D4632	40	40	
AOS	mm	max size	D4751	0.6	0.6	
Flow	gpm/ft^2	min	D4491	25	70	
POA	%	min	Light Projection	-	10	
Large-scale Performance	P-Factor	max	WK11340	0.03	0.045	TBD
	gals	min		150	200	TBD

6.2 Check Dam Testing in accordance with ASTM D7208 (modified)

Figure 28 summarizes the results of check dam testing associated with systems that did not experience some type of failure during testing. Both the single-row straw bale and "zig-zag" silt fence installations experienced significant undermining under the lowest flow events, and thus are considered undesirable alternatives. Figure 28 presents the "net" of soil accretion and soil loss in the test section and the percent of the control soil loss that this represents. Superimposed on Figure 28 is the suggested performance level (~~20~~*30% of control) for acceptable check dam systems. Table 7 shows how this performance limit could be incorporated into the existing GADOT specifications for check dams. Generally, the test results agree with the GADOT and GSWCC goals of specifying check structure systems that provide the structural capacity to resist concentrated flows, ease of installation, and resistance to downstream scour.

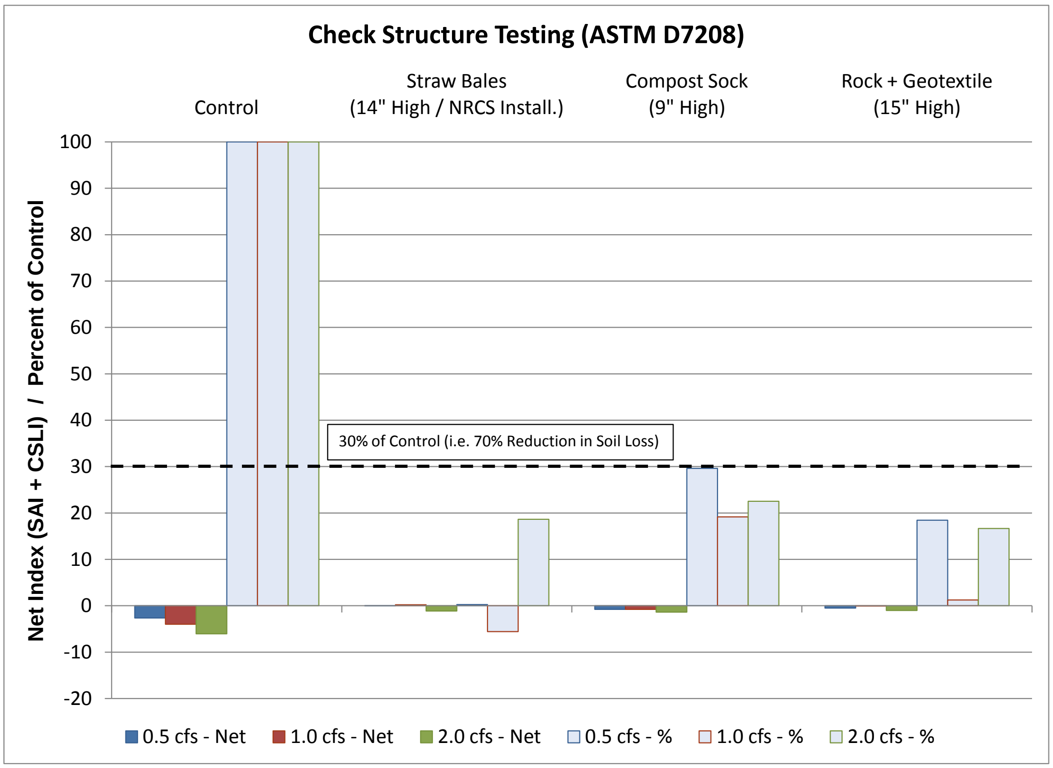


Figure 28. Net Soil Loss/Accretion & Percent of Control (Revised 8/21/14)*

Table 7. Recommended Revised Specifications

Property	Units	Spec	ASTM Test	Straw Bales (NRCS 2-row Installation)	Compost Socks	Rock over Geotextile
Material	-	-	-	Straw	Compost	2 – 10 inch
Density	pcf	min	-	4.3 lb/ft^3	25 lb/ft	1.4 tons/yd^3
Installed Height	in	max	-	14	9	15
Staking / Underlayment	-	min	-	2"x2" wood at 12" c-c	2"x2" wood at 12" c-c	8 oz/sy nonwoven geotextile
Large-scale Performance	%	max	D7208	~~20~~ 30	~~20~~ 30	~~20~~ 30

Values in shaded boxes revised 8/21/14

APPENDIX A –SEDIMENT BARRIER TEST REPORTS

ASTM Proposed - WK11340
STANDARD TEST METHOD FOR DETERMINATION OF SEDIMENT RETENTION DEVICES (SRDs) PERFORMANCE IN REDUCING SOIL LOSS FROM RAINFALL-INDUCED EROSION DURING PERIMETER CONTROL APPLICATIONS

Client: GSWCC
Test Dates: 27-Jul-12 31-Jul-12 31-Jul-12
Rainfall Rates: 2,4,6 in/hr (target)
Bed Slope: 3 to 1
Event: 20 minutes at each intensity (60 min. total)
Product: 1935-B

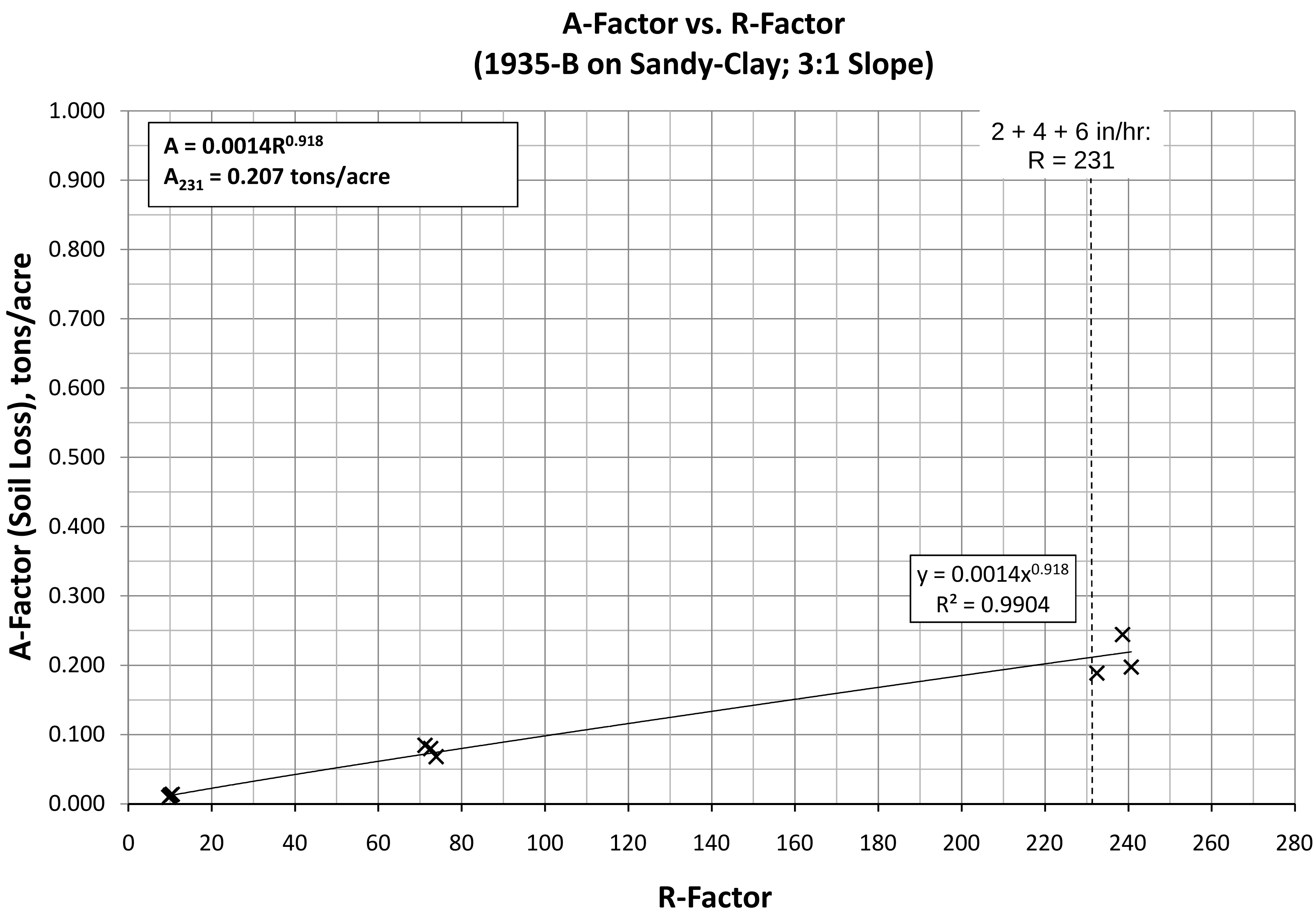
Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 1	2.09	6.09	10.09	0.180	0.012	0.02022
	3.98	60.17	72.51	0.992	0.080	0.01830
	6.00	178.23	232.44	1.600	0.189	0.01351
Bare Soil Controls			10.09		0.606	
			72.51		4.358	
			232.44		13.970	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 2	2.13	6.23	10.50	0.200	0.014	0.02159
	4.00	61.99	73.86	0.800	0.068	0.01533
	6.14	186.62	240.69	1.900	0.197	0.01365
Bare Soil Controls			10.50		0.631	
			73.86		4.439	
			240.69		14.466	

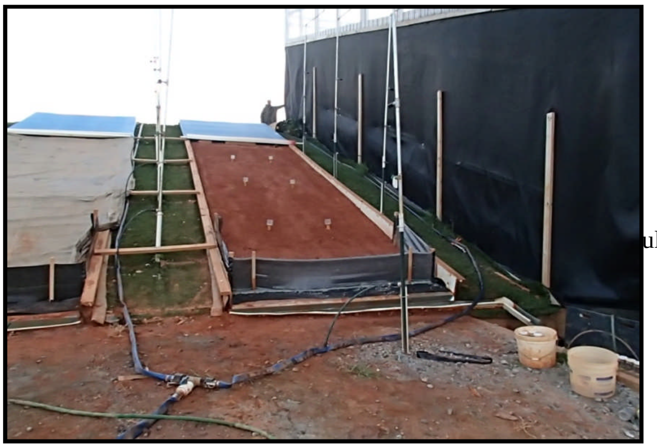
Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 3	2.05	3.57	9.68	0.140	0.010	0.01640
	3.96	57.05	71.18	1.100	0.084	0.01973
	6.16	172.18	238.58	2.350	0.244	0.01704
Bare Soil Controls			9.68		0.582	
			71.18		4.278	
			238.58		14.339	

Note: The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose

CJS 7/31/12
Quality Review / Date


A-Factor vs. R-Factor
(1935-B on Sandy-Clay; 3:1 Slope)
A = 0.0014R^0.918
A231 = 0.207 tons/acre
2 + 4 + 6 in/hr:
R = 231
y = 0.0014x^0.918
R² = 0.9904
A-Factor (Soil Loss), tons/acre
R-Factor
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280

TYPICAL TESTING PICTURES



Test Slope Prepared and Fence Installed

After 2 in/hr Event

After 4 in/hr Event

After 6 in/hr Event

Typical Control Run - Before and After

ASTM Proposed - WK11340
STANDARD TEST METHOD FOR DETERMINATION OF SEDIMENT RETENTION DEVICES (SRDs) PERFORMANCE IN REDUCING SOIL LOSS FROM RAINFALL-INDUCED EROSION DURING PERIMETER CONTROL APPLICATIONS

Client: GSWCC
Test Dates: 30-May-12 24-May-12 30-May-12
Rainfall Rates: 2,4,6 in/hr (target)
Bed Slope: 3 to 1
Event: 20 minutes at each intensity (60 min. total)
Product: 1215

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 1	2.20	6.32	11.35	0.110	0.007	0.01098
	4.04	64.83	76.58	1.450	0.106	0.02307
	6.04	119.60	238.92	3.750	0.361	0.02517
Bare Soil Controls			11.35		0.682	
			76.58		4.603	
			238.92		14.359	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 2	2.28	6.55	12.23	0.150	0.010	0.01391
	4.04	69.55	78.25	1.750	0.129	0.02750
	6.08	119.60	242.53	3.850	0.391	0.02685
Bare Soil Controls			12.23		0.735	
			78.25		4.703	
			242.53		14.576	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 3	2.20	7.57	11.35	0.210	0.014	0.02097
	4.02	71.98	76.04	2.100	0.157	0.03440
	6.16	124.91	244.06	4.300	0.450	0.03067
Bare Soil Controls			11.35		0.682	
			76.04		4.570	
			244.06		14.668	

Note: The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose

CJS 6/30/12
Quality Review / Date

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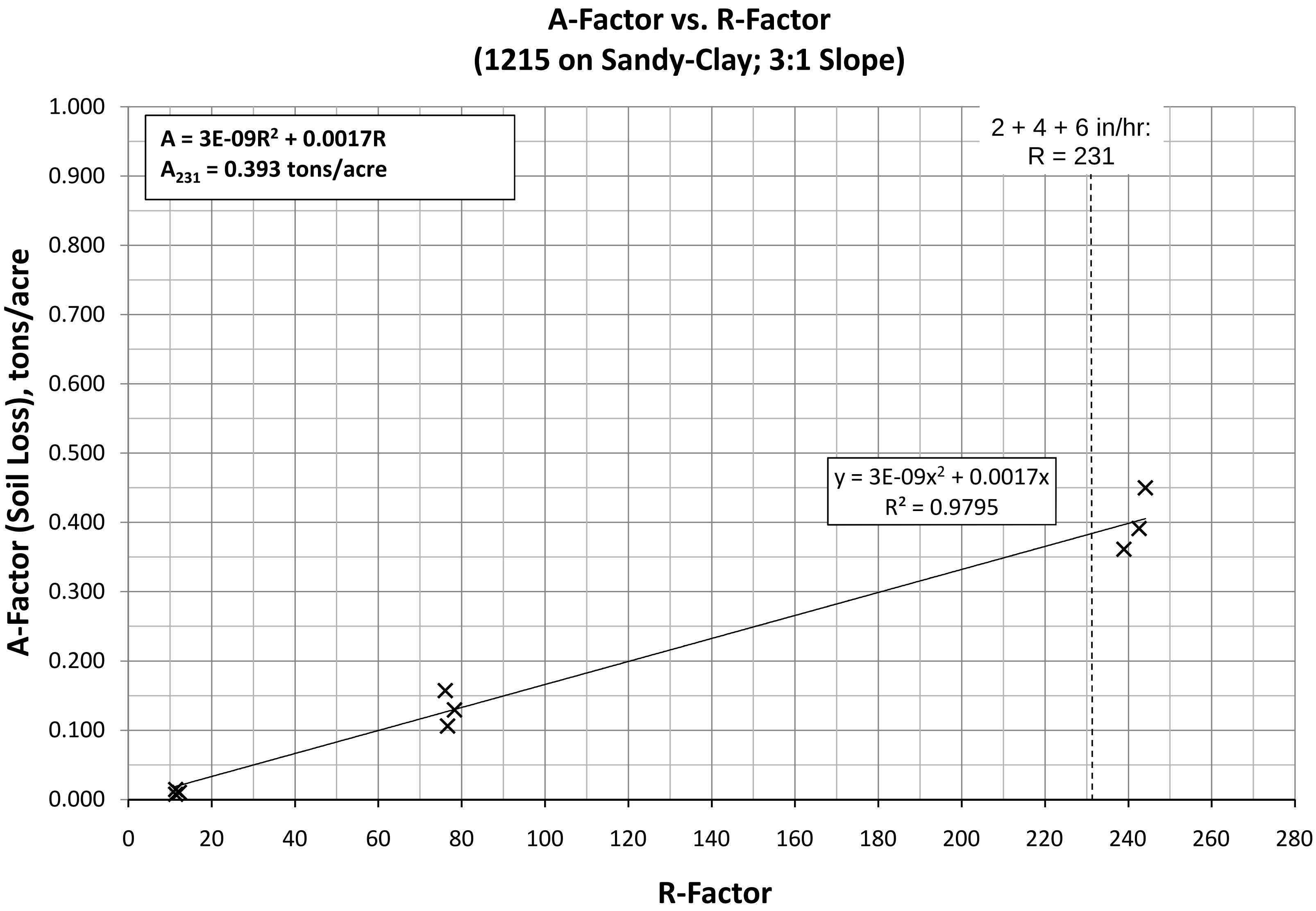


TYPICAL TESTING PICTURES

Test Slope Prepared and Fence Installed

After 2 in/hr Event

After 4 in/hr Event

After 6 in/hr Event

Typical Control Run - Before and After

ASTM Proposed - WK11340
STANDARD TEST METHOD FOR DETERMINATION OF SEDIMENT RETENTION DEVICES (SRDs) PERFORMANCE IN REDUCING SOIL LOSS FROM RAINFALL-INDUCED EROSION DURING PERIMETER CONTROL APPLICATIONS

Client: GSWCC
Test Dates: 6-Jun-12 7-Jun-12 1-Jun-12
Rainfall Rates: 2,4,6 in/hr (target)
Bed Slope: 3 to 1
Event: 20 minutes at each intensity (60 min. total)
Product: ET-GA-CSystem

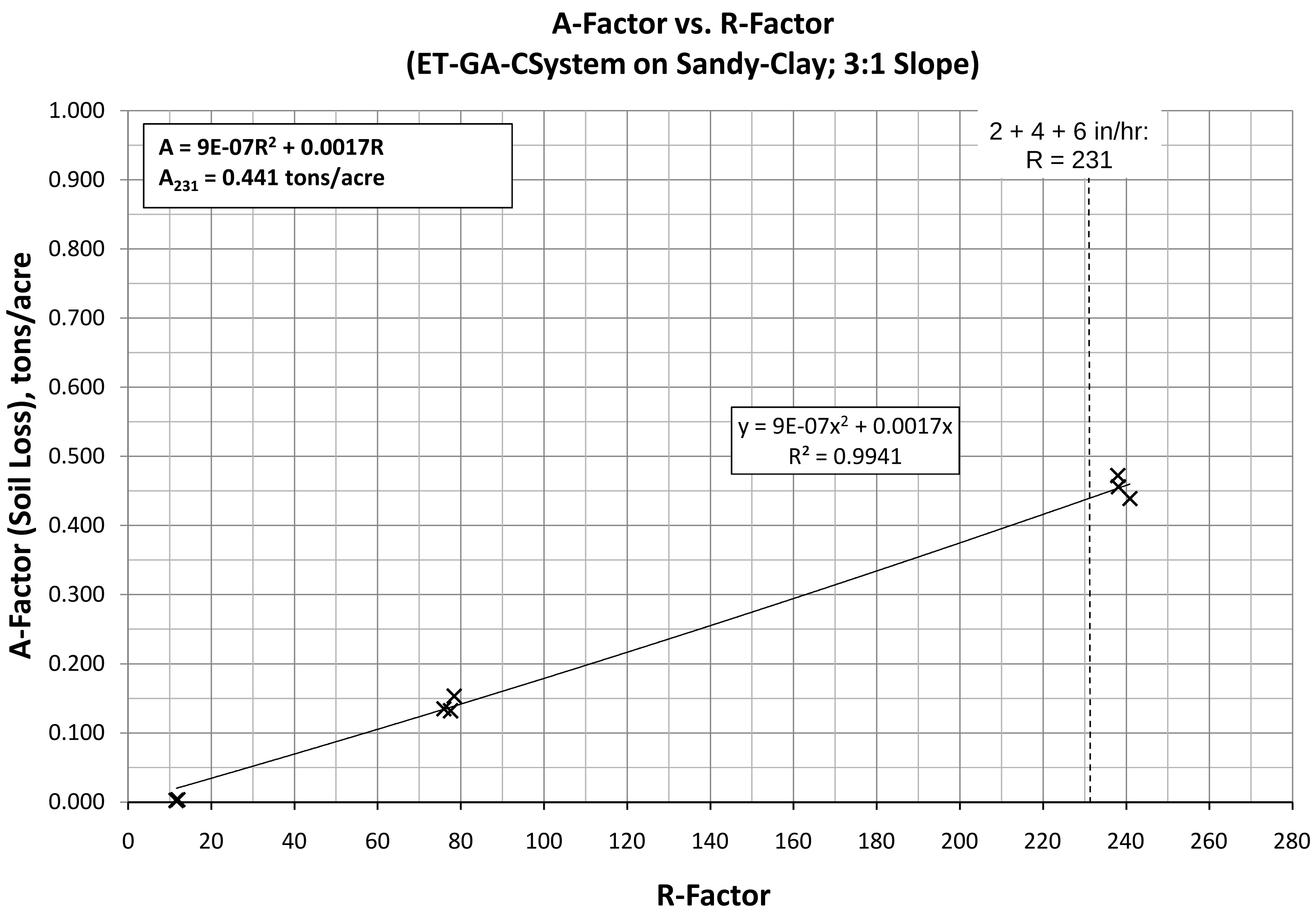
Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 1	2.22	8.57	11.56	0.040	0.003	0.00393
	4.06	70.29	77.54	1.900	0.132	0.02833
	6.00	134.53	238.10	4.760	0.456	0.03187
Bare Soil Controls			11.56		0.695	
			77.54		4.660	
			238.10		14.310	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 2	2.22	10.79	11.56	0.030	0.002	0.00294
	4.00	70.96	75.92	1.950	0.135	0.02954
	6.04	137.59	237.96	4.960	0.472	0.03303
Bare Soil Controls			11.56		0.695	
			75.92		4.563	
			237.96		14.301	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 3	2.26	7.98	12.00	0.050	0.003	0.00472
	4.06	68.67	78.38	2.200	0.153	0.03251
	6.04	130.16	240.87	4.200	0.439	0.03033
Bare Soil Controls			12.00		0.721	
			78.38		4.711	
			240.87		14.476	

Note: The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose

CJS 6/30/12
Quality Review / Date


A-Factor vs. R-Factor
(ET-GA-CSystem on Sandy-Clay; 3:1 Slope)
A = 9E-07R² + 0.0017R
A231 = 0.441 tons/acre
2 + 4 + 6 in/hr:
R = 231
y = 9E-07x² + 0.0017x
R² = 0.9941
A-Factor (Soil Loss), tons/acre
R-Factor
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280

TYPICAL TESTING PICTURES

Test Slope Prepared and Fence Installed

After 2 in/hr Event

After 4 in/hr Event

After 6 in/hr Event

Typical Control Run - Before and After

ASTM Proposed - WK11340

STANDARD TEST METHOD FOR DETERMINATION OF SEDIMENT RETENTION DEVICES (SRDs) PERFORMANCE IN REDUCING SOIL LOSS FROM RAINFALL-INDUCED EROSION DURING PERIMETER CONTROL APPLICATIONS

Client: GSWCC
Test Dates: 18-Jun-12 18-Jun-12 20-Jun-12
Rainfall Rates: 2,4,6 in/hr (target)
Bed Slope: 3 to 1
Event: 20 minutes at each intensity (60 min. total)
Product: GTF 400EO

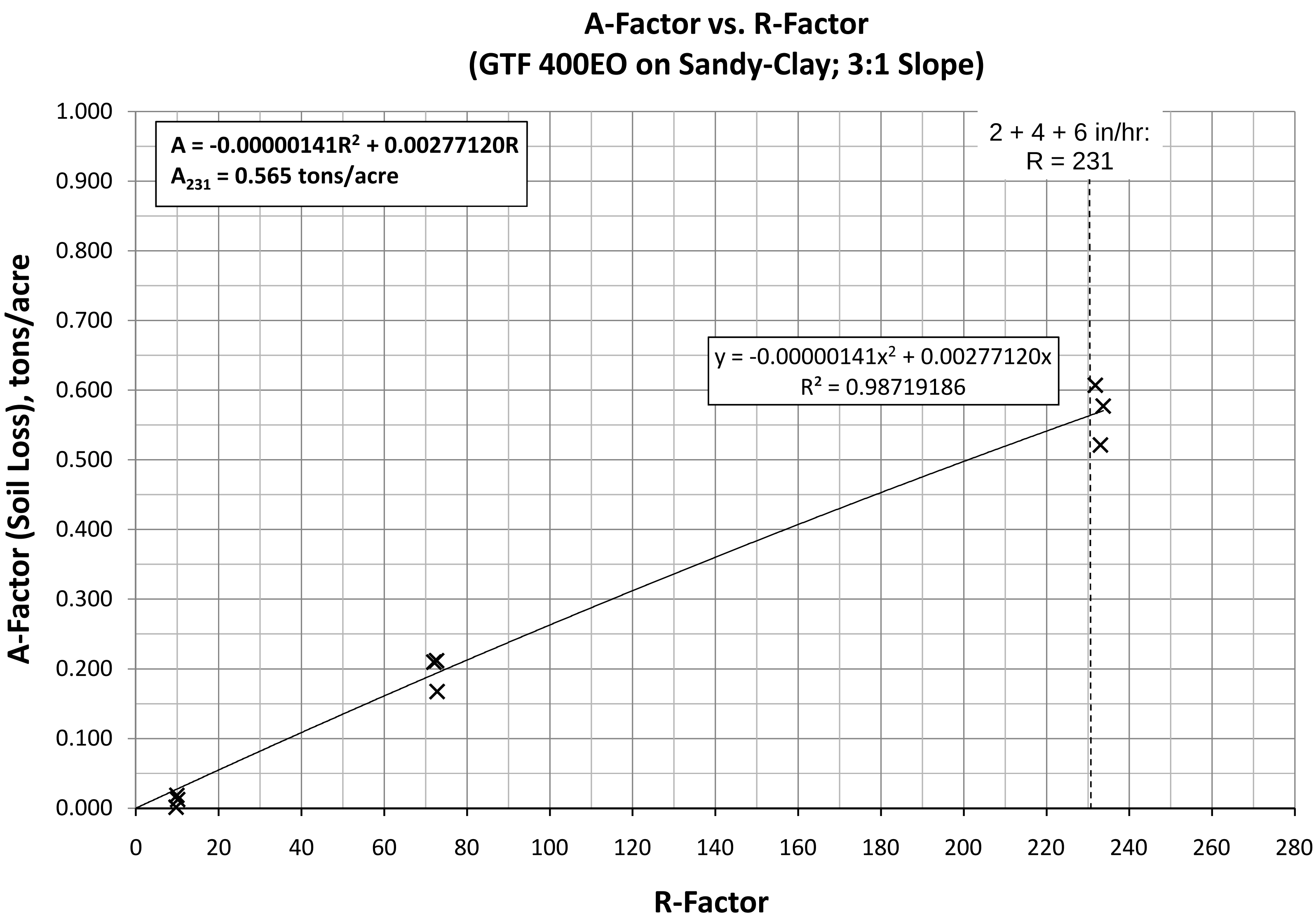
Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average C Factor
Slope 1	2.05	7.38	9.68	0.020	0.001	0.00235
	4.02	79.98	72.76	2.440	0.167	0.03829
	6.00	151.06	232.98	5.200	0.521	0.03724
Bare Soil Controls			9.68		0.582	
			72.76		4.373	
			232.98		14.002	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average C Factor
Slope 2	2.09	10.67	10.09	0.180	0.012	0.02022
	3.96	75.15	71.99	2.900	0.210	0.04845
	6.04	147.57	233.67	5.400	0.577	0.04110
Bare Soil Controls			10.09		0.606	
			71.99		4.326	
			233.67		14.043	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average C Factor
Slope 3	2.07	9.27	9.89	0.270	0.018	0.03096
	4.00	81.69	72.63	2.840	0.212	0.04849
	5.98	152.01	231.76	5.810	0.607	0.04359
Bare Soil Controls			9.89		0.594	
			72.63		4.365	
			231.76		13.929	

Note: The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose.

CJS 6/30/12
Quality Review / Date

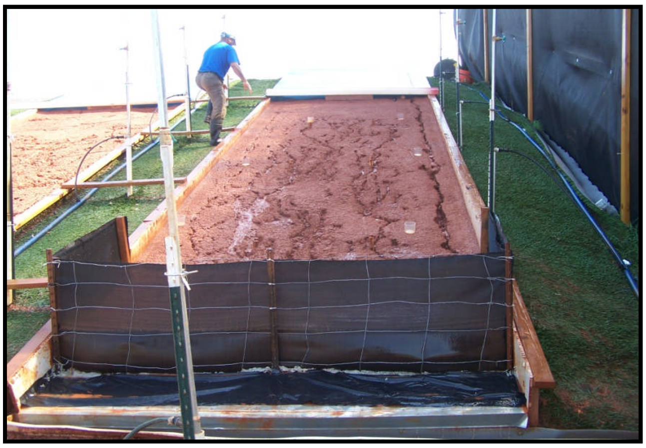

A-Factor vs. R-Factor
(GTF 400EO on Sandy-Clay; 3:1 Slope)
A = -0.00000141R² + 0.00277120R
A231 = 0.565 tons/acre
2 + 4 + 6 in/hr:
R = 231
y = -0.00000141x² + 0.00277120x
R² = 0.98719186
A-Factor (Soil Loss), tons/acre
R-Factor
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280

TYPICAL TESTING PICTURES

Test Slope Prepared and Fence Installed

After 2 in/hr Event

After 4 in/hr Event



After 6 in/hr Event

Typical Control Run - Before and After

ASTM Proposed - WK11340

STANDARD TEST METHOD FOR DETERMINATION OF SEDIMENT RETENTION DEVICES (SRDs) PERFORMANCE IN REDUCING SOIL LOSS FROM RAINFALL-INDUCED EROSION DURING PERIMETER CONTROL APPLICATIONS

Client: GSWCC
Test Dates: 16-May-12 18-May-12 9-May-12
Rainfall Rates: 2,4,6 in/hr (target)
Bed Slope: 3 to 1
Event: 20 minutes at each intensity (60 min. total)
Product: FW402

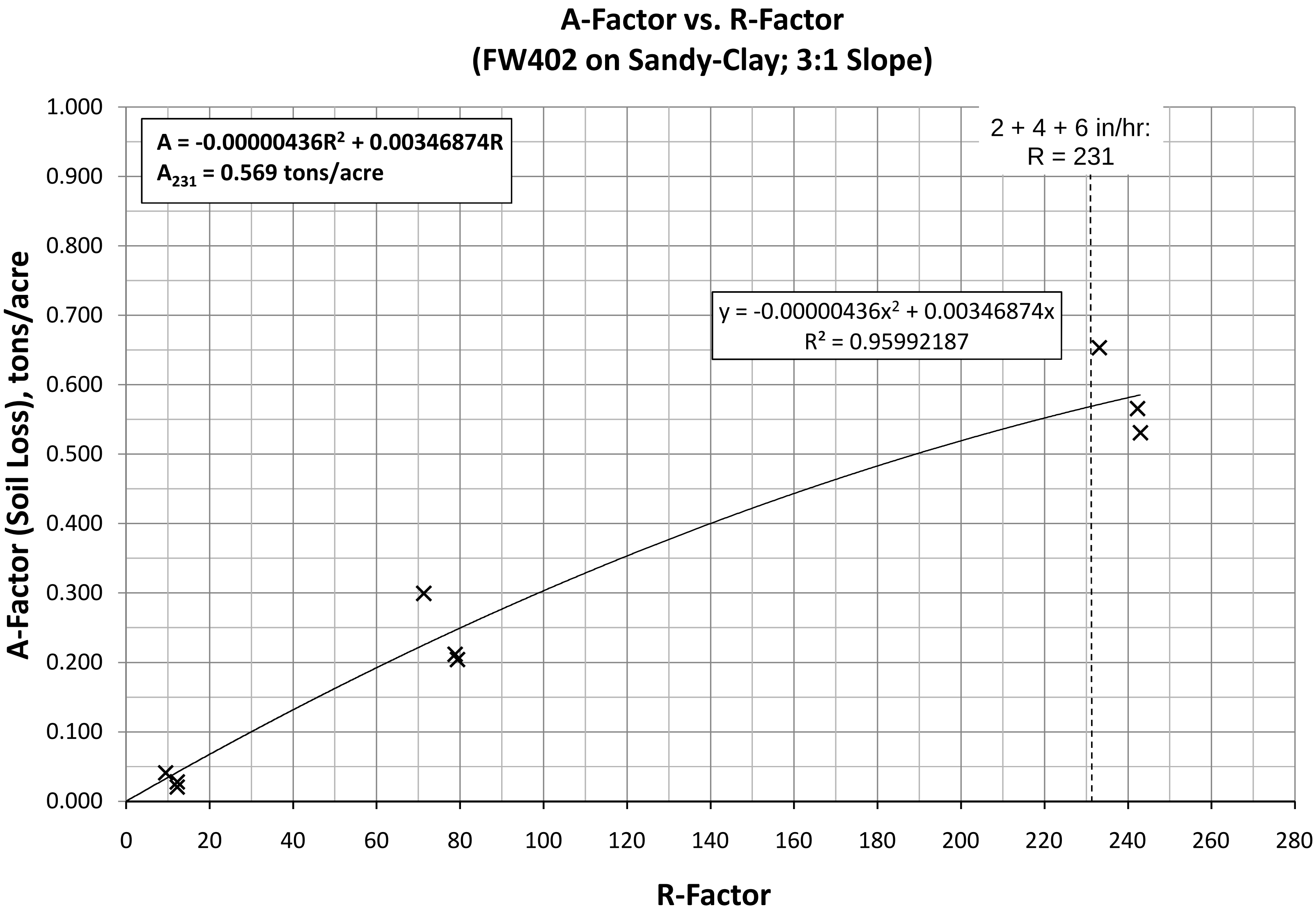
Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 1	2.28	7.59	12.23	0.300	0.020	0.02781
	4.07	75.97	79.35	2.700	0.204	0.04282
	6.06	149.89	242.95	4.800	0.531	0.03636
Bare Soil Controls			12.23		0.735	
			79.35		4.769	
			242.95		14.601	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 2	2.03	14.21	9.49	0.600	0.041	0.07170
	3.98	83.32	71.30	3.800	0.299	0.06989
	6.04	155.29	233.10	5.200	0.653	0.04664
Bare Soil Controls			9.49		0.570	
			71.30		4.285	
			233.10		14.009	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 3	2.28	12.22	12.23	0.410	0.028	0.03801
	4.06	75.89	78.80	2.700	0.212	0.04470
	6.06	156.79	242.26	5.200	0.566	0.03885
Bare Soil Controls			12.23		0.735	
			78.80		4.736	
			242.26		14.560	

Note: The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose

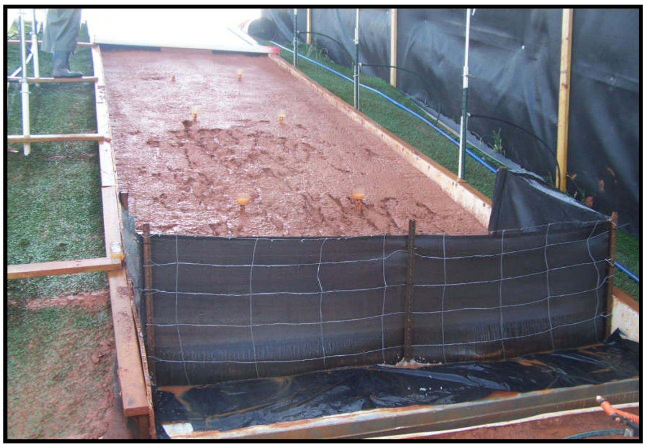
CJS 5/31/12
Quality Review / Date


A-Factor vs. R-Factor
(FW402 on Sandy-Clay; 3:1 Slope)
A = -0.00000436R² + 0.00346874R
A231 = 0.569 tons/acre
2 + 4 + 6 in/hr:
R = 231
y = -0.00000436x² + 0.00346874x
R² = 0.95992187
A-Factor (Soil Loss), tons/acre
R-Factor
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280

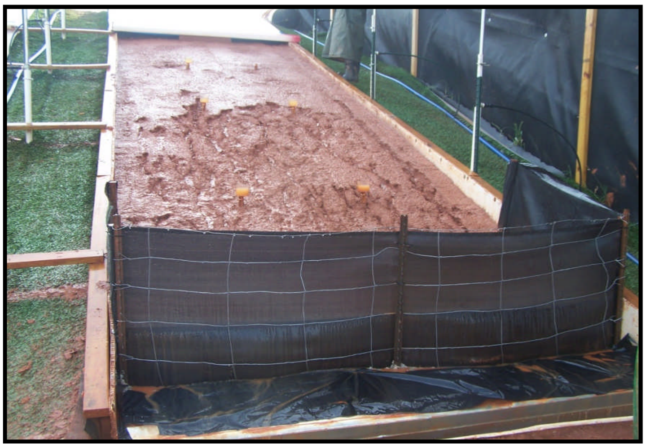
TYPICAL TESTING PICTURES

Test Slope Prepared and Fence Installed

After 2 in/hr Event



After 4 in/hr Event



After 6 in/hr Event

Typical Control Run - Before and After

ASTM Proposed - WK11340
STANDARD TEST METHOD FOR DETERMINATION OF SEDIMENT RETENTION DEVICES (SRDs) PERFORMANCE IN REDUCING SOIL LOSS FROM RAINFALL-INDUCED EROSION DURING PERIMETER CONTROL APPLICATIONS

Client: GSWCC
Test Dates: 13-Apr-12 17-Apr-12 20-Apr-12
Rainfall Rates: 2,4,6 in/hr (target)
Bed Slope: 3 to 1
Event: 20 minutes at each intensity (60 min. total)
Product: GA-CSA

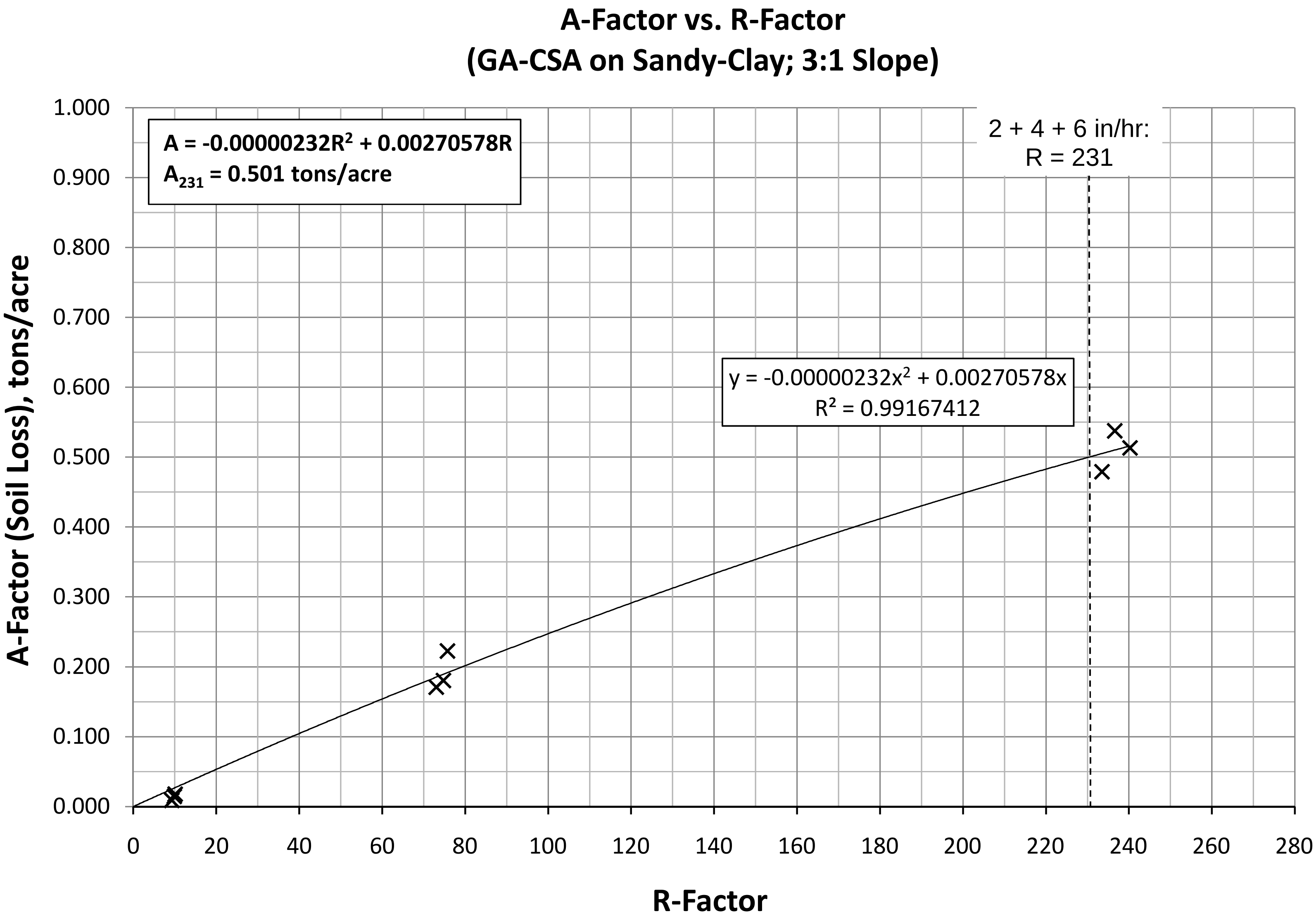
Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average C Factor
Slope 1	2.01	4.26	9.29	0.130	0.009	0.01586
	4.06	78.96	73.00	2.380	0.171	0.03894
	6.00	139.78	233.51	4.530	0.479	0.03414
Bare Soil Controls			9.29		0.558	
			73.00		4.387	
			233.51		14.034	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average C Factor
Slope 2	2.07	9.28	9.89	0.210	0.014	0.02407
	4.07	73.64	74.76	2.440	0.180	0.04014
	6.10	146.29	240.27	4.890	0.513	0.03554
Bare Soil Controls			9.89		0.594	
			74.76		4.493	
			240.27		14.440	

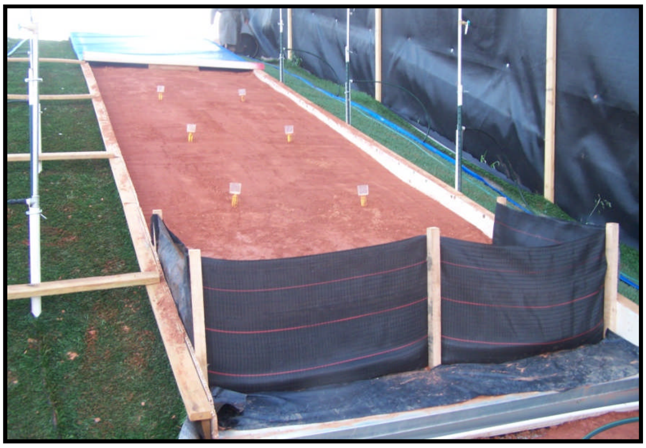
Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average C Factor
Slope 3	2.09	4.50	10.09	0.260	0.018	0.02920
	4.09	77.94	75.71	3.010	0.223	0.04891
	6.00	145.25	236.56	4.630	0.538	0.03782
Bare Soil Controls			10.09		0.606	
			75.71		4.550	
			236.56		14.217	

Note: The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose.

CJS 5/31/12
Quality Review / Date


A-Factor vs. R-Factor
(GA-CSA on Sandy-Clay; 3:1 Slope)
A = -0.00000232R² + 0.00270578R
A231 = 0.501 tons/acre
2 + 4 + 6 in/hr:
R = 231
y = -0.00000232x² + 0.00270578x
R² = 0.99167412
A-Factor (Soil Loss), tons/acre
R-Factor
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280

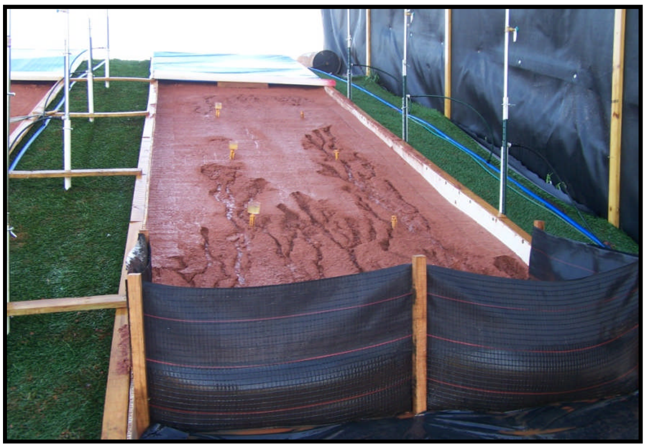
TYPICAL TESTING PICTURES



Test Slope Prepared and Fence Installed

After 2 in/hr Event

After 4 in/hr Event



After 6 in/hr Event

Typical Control Run - Before and After

ASTM Proposed - WK11340

STANDARD TEST METHOD FOR DETERMINATION OF SEDIMENT RETENTION DEVICES (SRDs) PERFORMANCE IN REDUCING SOIL LOSS FROM RAINFALL-INDUCED EROSION DURING PERIMETER CONTROL APPLICATIONS

Client: GSWCC
Test Dates: 7-May-12 4-May-12 9-May-12
Rainfall Rates: 2,4,6 in/hr (target)
Bed Slope: 3 to 1
Event: 20 minutes at each intensity (60 min. total)
Product: Beltech 1935

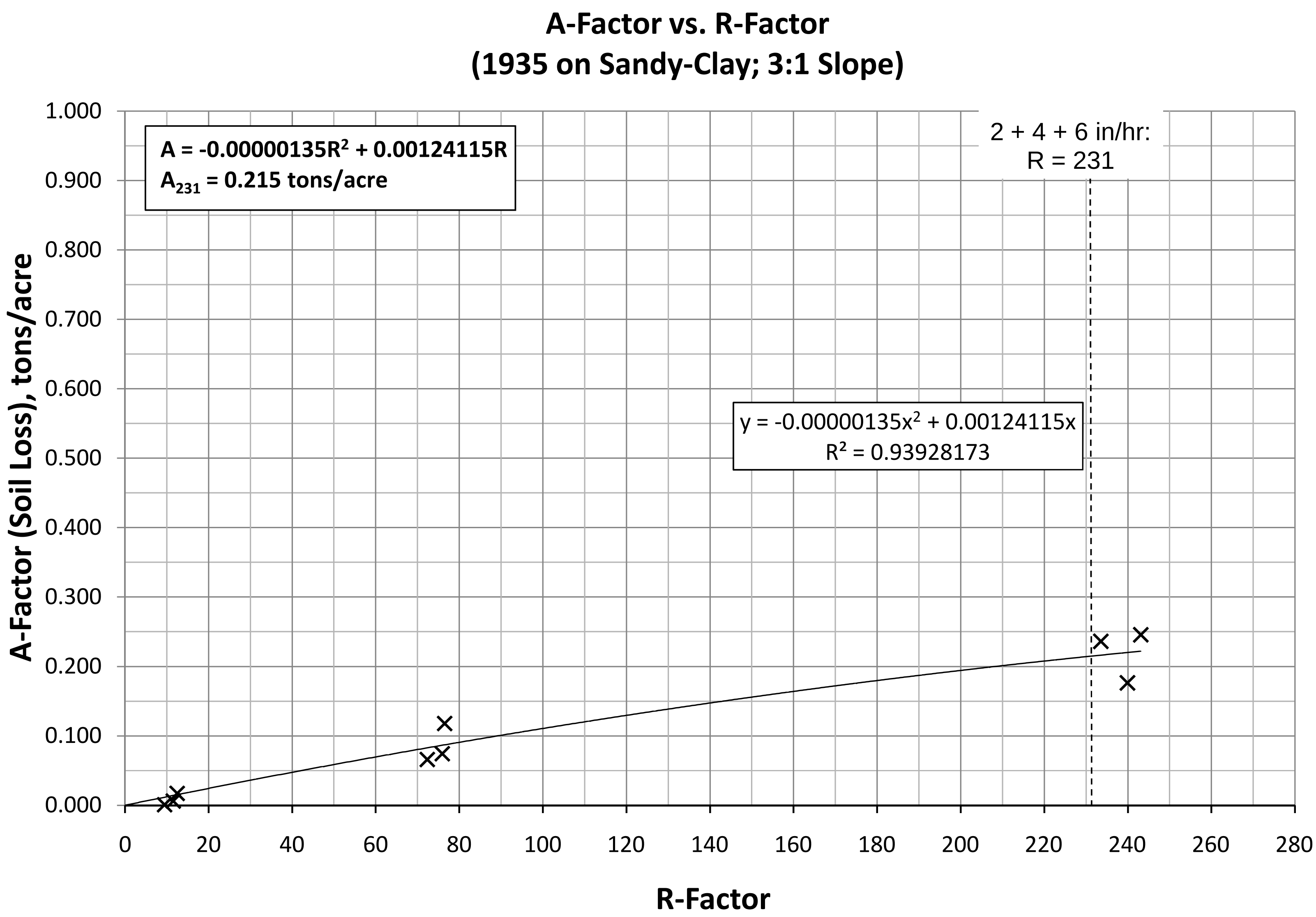
Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 1	2.22	4.01	11.56	0.090	0.006	0.00883
	4.00	56.91	75.92	1.000	0.074	0.01626
	6.08	96.81	239.89	1.500	0.176	0.01223
Bare Soil Controls			11.56		0.695	
			75.92		4.563	
			239.89		14.417	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 2	2.03	1.70	9.49	0.010	0.001	0.00118
	4.02	60.46	72.35	0.960	0.066	0.01518
	6.02	93.76	233.51	2.500	0.236	0.01683
Bare Soil Controls			9.49		0.570	
			72.35		4.348	
			233.51		14.034	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 3	2.30	7.29	12.45	0.250	0.017	0.02276
	3.96	62.76	76.49	1.480	0.118	0.02561
	6.14	98.05	243.09	1.880	0.246	0.01682
Bare Soil Controls			12.45		0.748	
			76.49		4.597	
			243.09		14.609	

Note: The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose

CJS 5/31/12
Quality Review / Date


A-Factor vs. R-Factor
(1935 on Sandy-Clay; 3:1 Slope)
A = -0.00000135R² + 0.00124115R
A231 = 0.215 tons/acre
2 + 4 + 6 in/hr:
R = 231
y = -0.00000135x² + 0.00124115x
R² = 0.93928173
A-Factor (Soil Loss), tons/acre
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
R-Factor

TYPICAL TESTING PICTURES

Test Slope Prepared and Fence Installed

After 2 in/hr Event

After 4 in/hr Event

After 6 in/hr Event

Typical Control Run - Before and After

ASTM Proposed - WK11340
STANDARD TEST METHOD FOR DETERMINATION OF SEDIMENT RETENTION DEVICES (SRDs) PERFORMANCE IN REDUCING SOIL LOSS FROM RAINFALL-INDUCED EROSION DURING PERIMETER CONTROL APPLICATIONS

Client: GSWCC
Test Dates: 18-Apr-12 12-Apr-12 20-Apr-12
Rainfall Rates: 2,4,6 in/hr (target)
Bed Slope: 3 to 1
Event: 20 minutes at each intensity (60 min. total)
Product: BSRF

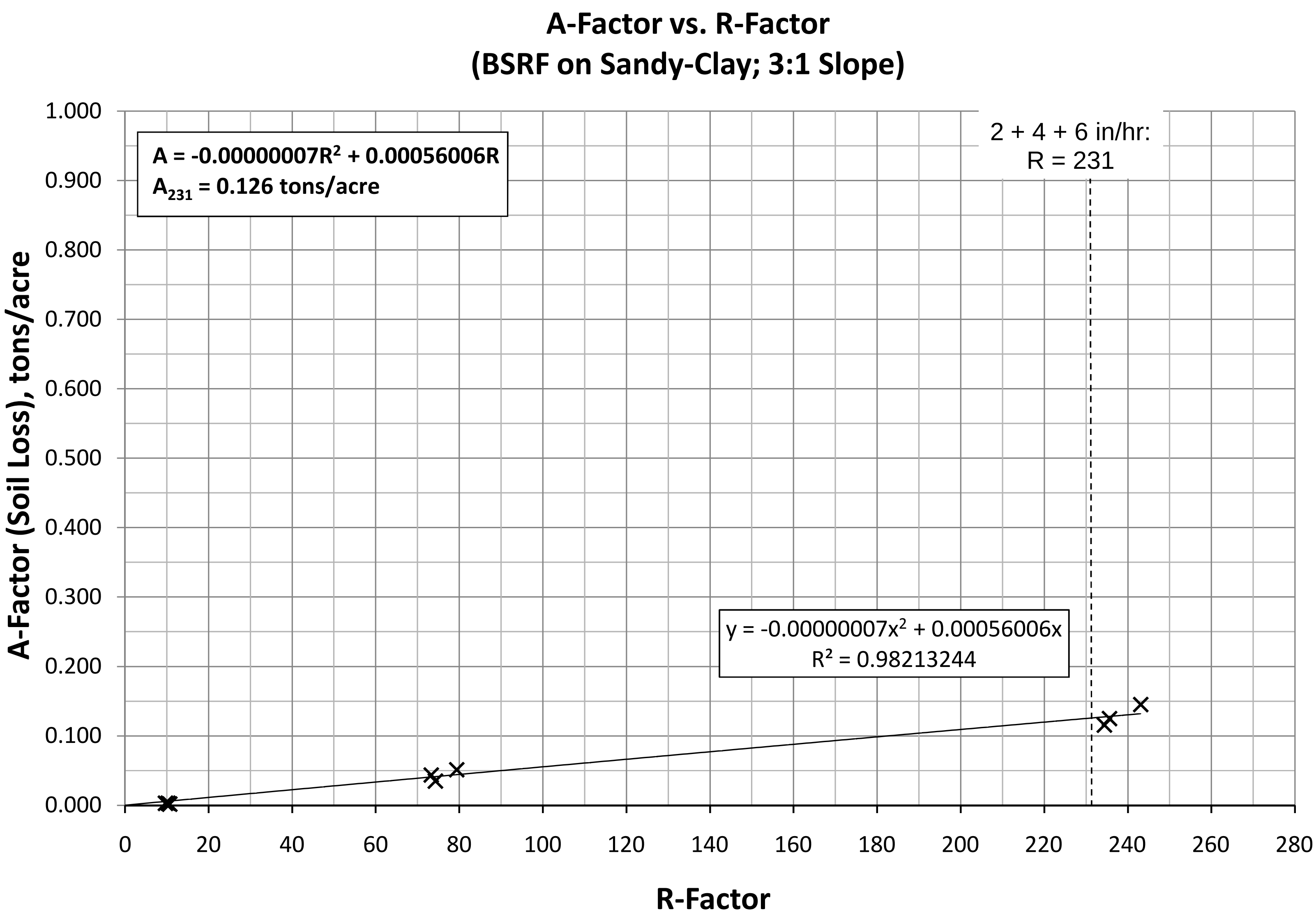
Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 1	2.15	7.34	10.71	0.025	0.002	0.00261
	4.00	50.93	74.27	0.489	0.035	0.00783
	6.00	102.15	234.37	1.185	0.116	0.00821
Bare Soil Controls			10.71		0.644	
			74.27		4.464	
			234.37		14.086	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 2	2.05	6.51	9.68	0.043	0.003	0.00503
	4.04	55.61	73.28	0.597	0.044	0.00989
	6.04	114.99	235.58	1.194	0.125	0.00882
Bare Soil Controls			9.68		0.582	
			73.28		4.404	
			235.58		14.158	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 3	2.11	3.69	10.29	0.044	0.003	0.00483
	4.21	67.86	79.40	0.709	0.051	0.01074
	6.04	125.84	243.07	1.379	0.145	0.00993
Bare Soil Controls			10.29		0.619	
			79.40		4.772	
			243.07		14.609	

Note: The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose

CJS 5/31/12
Quality Review / Date

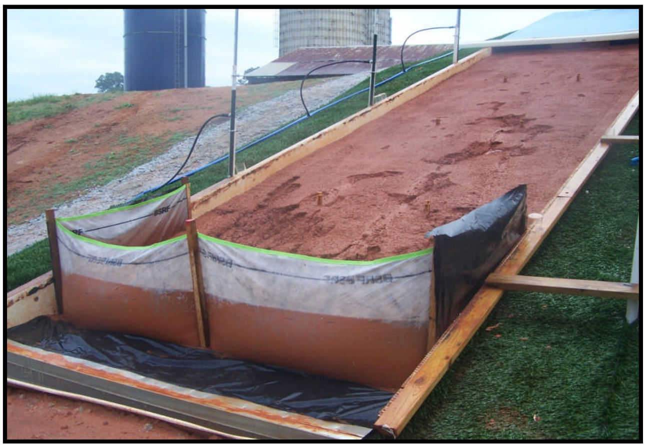

A-Factor vs. R-Factor
(BSRF on Sandy-Clay; 3:1 Slope)
A = -0.00000007R² + 0.00056006R
A231 = 0.126 tons/acre
2 + 4 + 6 in/hr:
R = 231
y = -0.00000007x² + 0.00056006x
R² = 0.98213244
A-Factor (Soil Loss), tons/acre
R-Factor
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280

TYPICAL TESTING PICTURES

Test Slope Prepared and Fence Installed

After 2 in/hr Event

After 4 in/hr Event



After 6 in/hr Event

Typical Control Run - Before and After

ASTM Proposed - WK11340
STANDARD TEST METHOD FOR DETERMINATION OF SEDIMENT RETENTION DEVICES (SRDs) PERFORMANCE IN REDUCING SOIL LOSS FROM RAINFALL-INDUCED EROSION DURING PERIMETER CONTROL APPLICATIONS

Client: GSWCC
Test Dates: 15-May-12 23-May-12 24-May-12
Rainfall Rates: 2,4,6 in/hr (target)
Bed Slope: 3 to 1
Event: 20 minutes at each intensity (60 min. total)
Product: GASF-A

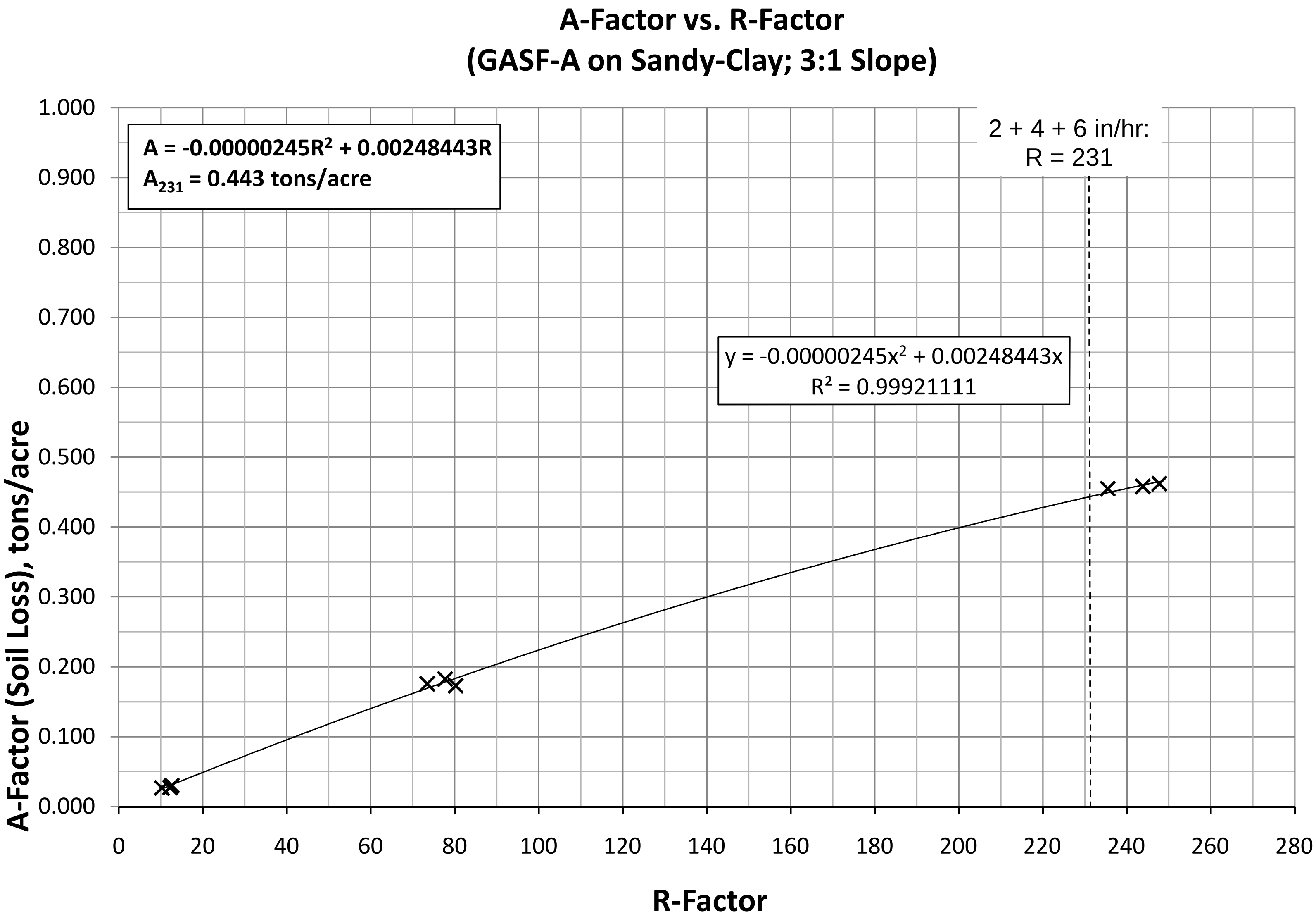
Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 1	2.11	15.38	10.29	0.390	0.027	0.04291
	4.00	66.05	73.45	2.191	0.176	0.03979
	6.04	125.59	235.46	4.103	0.455	0.03215
Bare Soil Controls			10.29		0.619	
			73.45		4.414	
			235.46		14.151	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 2	2.28	11.40	12.23	0.400	0.027	0.03709
	4.02	66.91	77.71	2.280	0.182	0.03906
	6.12	124.80	243.79	4.050	0.458	0.03126
Bare Soil Controls			12.23		0.735	
			77.71		4.670	
			243.79		14.652	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 3	2.32	10.15	12.68	0.440	0.030	0.03935
	4.07	66.41	80.20	2.100	0.173	0.03587
	6.14	127.66	247.71	4.250	0.462	0.03104
Bare Soil Controls			12.68		0.762	
			80.20		4.820	
			247.71		14.887	

<u>Note</u>: The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose

CJS 5/31/12
Quality Review / Date


A-Factor vs. R-Factor
(GASF-A on Sandy-Clay; 3:1 Slope)
A = -0.00000245R² + 0.00248443R
A231 = 0.443 tons/acre
2 + 4 + 6 in/hr:
R = 231
y = -0.00000245x² + 0.00248443x
R² = 0.99921111
A-Factor (Soil Loss), tons/acre
R-Factor
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280

TYPICAL TESTING PICTURES

Test Slope Prepared and Fence Installed


After 2 in/hr Event

After 4 in/hr Event

After 6 in/hr Event

Note: The testi

Typical Control Run - Before and After

ASTM Proposed - WK11340
STANDARD TEST METHOD FOR DETERMINATION OF SEDIMENT RETENTION DEVICES (SRDs) PERFORMANCE IN REDUCING SOIL LOSS FROM RAINFALL-INDUCED EROSION DURING PERIMETER CONTROL APPLICATIONS

Client: GSWCC
Test Dates: 25-Jul-12 24-Jul-12 27-Jul-12
Rainfall Rates: 2,4,6 in/hr (target)
Bed Slope: 3 to 1
Event: 20 minutes at each intensity (60 min. total)
Product: GFG-B

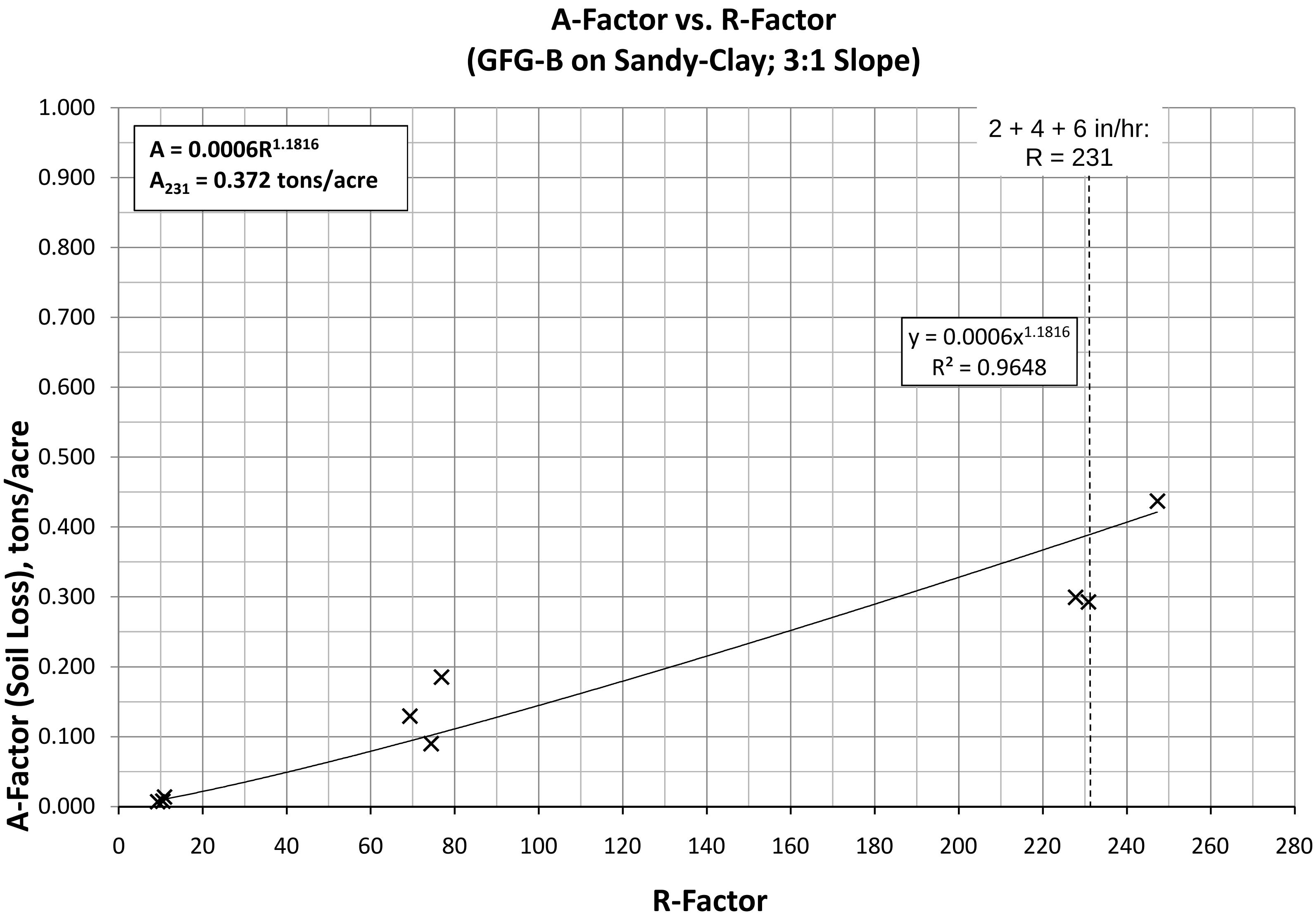
Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 1	2.17	5.88	10.92	0.200	0.014	0.02076
	4.07	54.72	76.84	2.521	0.185	0.04011
	6.20	152.88	247.27	3.700	0.437	0.02941
Bare Soil Controls			10.92		0.656	
			76.84		4.618	
			247.27		14.861	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 2	2.13	4.57	10.50	0.113	0.008	0.01220
	4.02	60.55	74.39	1.210	0.090	0.02014
	5.93	148.72	230.83	2.980	0.293	0.02111
Bare Soil Controls			10.50		0.631	
			74.39		4.471	
			230.83		13.873	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 3	2.01	5.67	9.29	0.100	0.007	0.01220
	3.92	61.95	69.34	1.800	0.129	0.03103
	5.98	143.61	227.80	2.500	0.299	0.02188
Bare Soil Controls			9.29		0.558	
			69.34		4.167	
			227.80		13.691	

Note: The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose

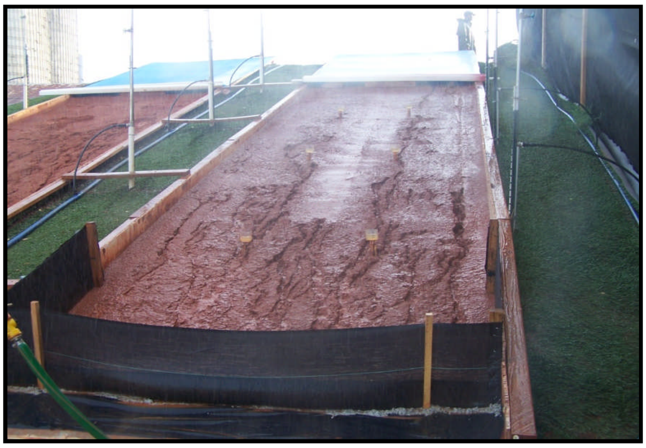
CJS 8/23/12
Quality Review / Date


A-Factor vs. R-Factor
(GFG-B on Sandy-Clay; 3:1 Slope)
A = 0.0006R^1.1816
A231 = 0.372 tons/acre
2 + 4 + 6 in/hr:
R = 231
y = 0.0006x^1.1816
R² = 0.9648
A-Factor (Soil Loss), tons/acre
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
R-Factor

TYPICAL TESTING PICTURES

Test Slope Prepared and Fence Installed

After 2 in/hr Event



After 4 in/hr Event

After 6 in/hr Event

Typical Control Run - Before and After

9063 Bee Caves Road / Austin, Texas 78733 / ph: 512 263 2101 / fax: 512 263 2558 / www.GeosyntheticTesting.com

ASTM Proposed - WK11340
STANDARD TEST METHOD FOR DETERMINATION OF SEDIMENT RETENTION DEVICES (SRDs) PERFORMANCE IN REDUCING SOIL LOSS FROM RAINFALL-INDUCED EROSION DURING PERIMETER CONTROL APPLICATIONS

Client: GSWCC
Test Dates: 25-Apr-12 25-Apr-12 1-May-12
Rainfall Rates: 2,4,6 in/hr (target)
Bed Slope: 3 to 1
Event: 20 minutes at each intensity (60 min. total)
Product: 111F

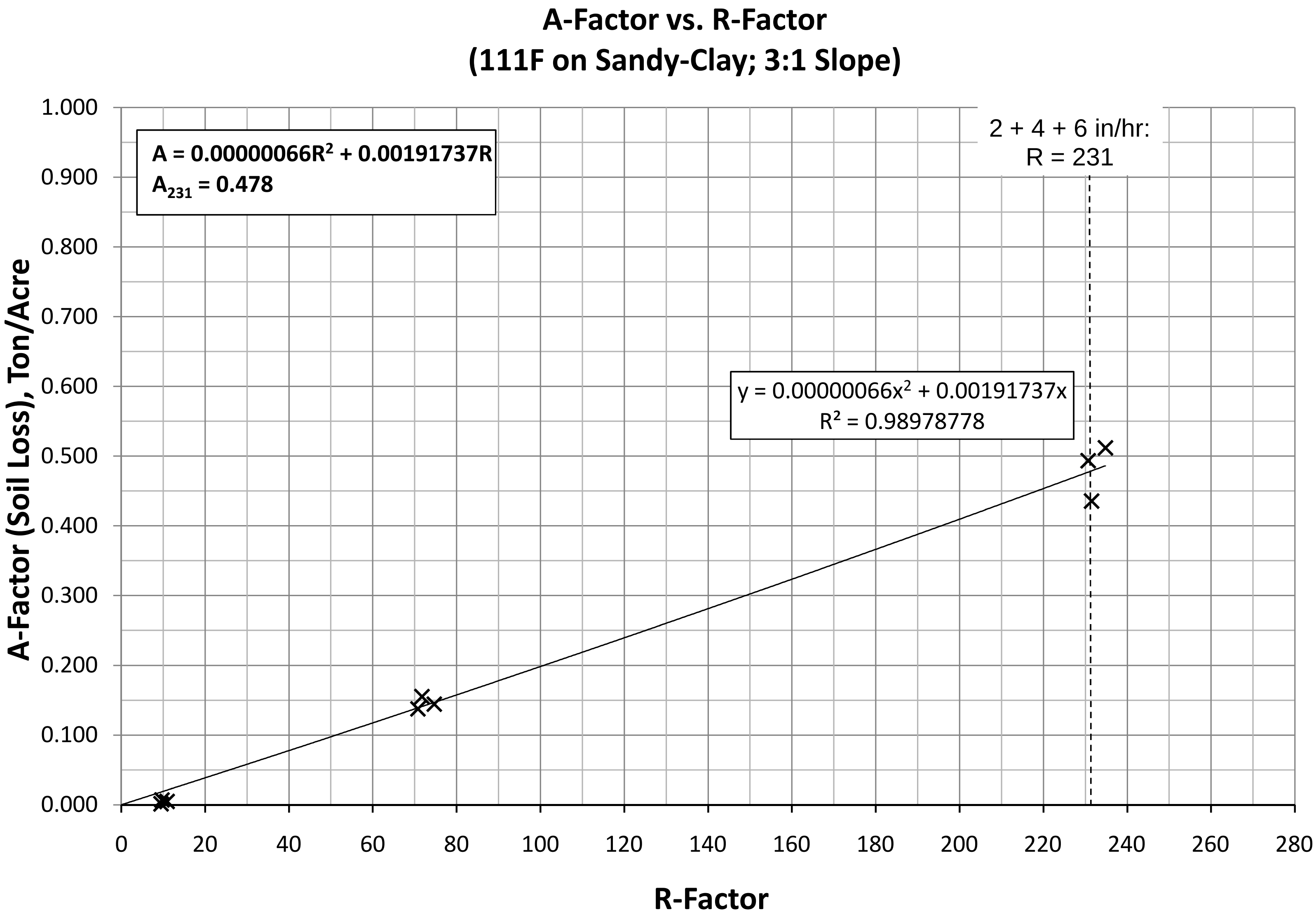
Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average C Factor
Slope 1	2.05	6.71	9.68	0.100	0.007	0.01165
	3.98	72.07	71.70	2.180	0.155	0.03600
	5.98	132.77	230.66	4.970	0.493	0.03559
Bare Soil Controls			9.68		0.582	
			71.70		4.309	
			230.66		13.863	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average C Factor
Slope 2	2.03	6.35	9.49	0.020	0.001	0.00240
	3.96	67.19	70.78	2.000	0.137	0.03232
	6.02	128.21	231.46	4.380	0.436	0.03131
Bare Soil Controls			9.49		0.570	
			70.78		4.254	
			231.46		13.911	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average C Factor
Slope 3	2.17	4.52	10.92	0.070	0.005	0.00727
	4.00	71.39	74.68	2.050	0.144	0.03215
	6.00	132.84	234.79	5.400	0.512	0.03627
Bare Soil Controls			10.92		0.656	
			74.68		4.488	
			234.79		14.111	

Note: The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose

CJS 5/31/12
Quality Review / Date


A-Factor vs. R-Factor
(111F on Sandy-Clay; 3:1 Slope)
A = 0.00000066R² + 0.00191737R
A231 = 0.478
2 + 4 + 6 in/hr:
R = 231
y = 0.00000066x² + 0.00191737x
R² = 0.98978778
A-Factor (Soil Loss), Ton/Acre
R-Factor
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280

TYPICAL TESTING PICTURES

Test Slope Prepared and Fence Installed

After 2 in/hr Event

After 4 in/hr Event

After 6 in/hr Event

Typical Control Run - Before and After

ASTM Proposed - WK11340
STANDARD TEST METHOD FOR DETERMINATION OF SEDIMENT RETENTION DEVICES (SRDs) PERFORMANCE IN REDUCING SOIL LOSS FROM RAINFALL-INDUCED EROSION DURING PERIMETER CONTROL APPLICATIONS

Client: GSWCC
Test Dates: 8-Aug-12 10-Aug-12 16-Aug-12
Rainfall Rates: 2,4,6 in/hr (target)
Bed Slope: 3 to 1
Event: 20 minutes at each intensity (60 min. total)
Product: Compost Sock

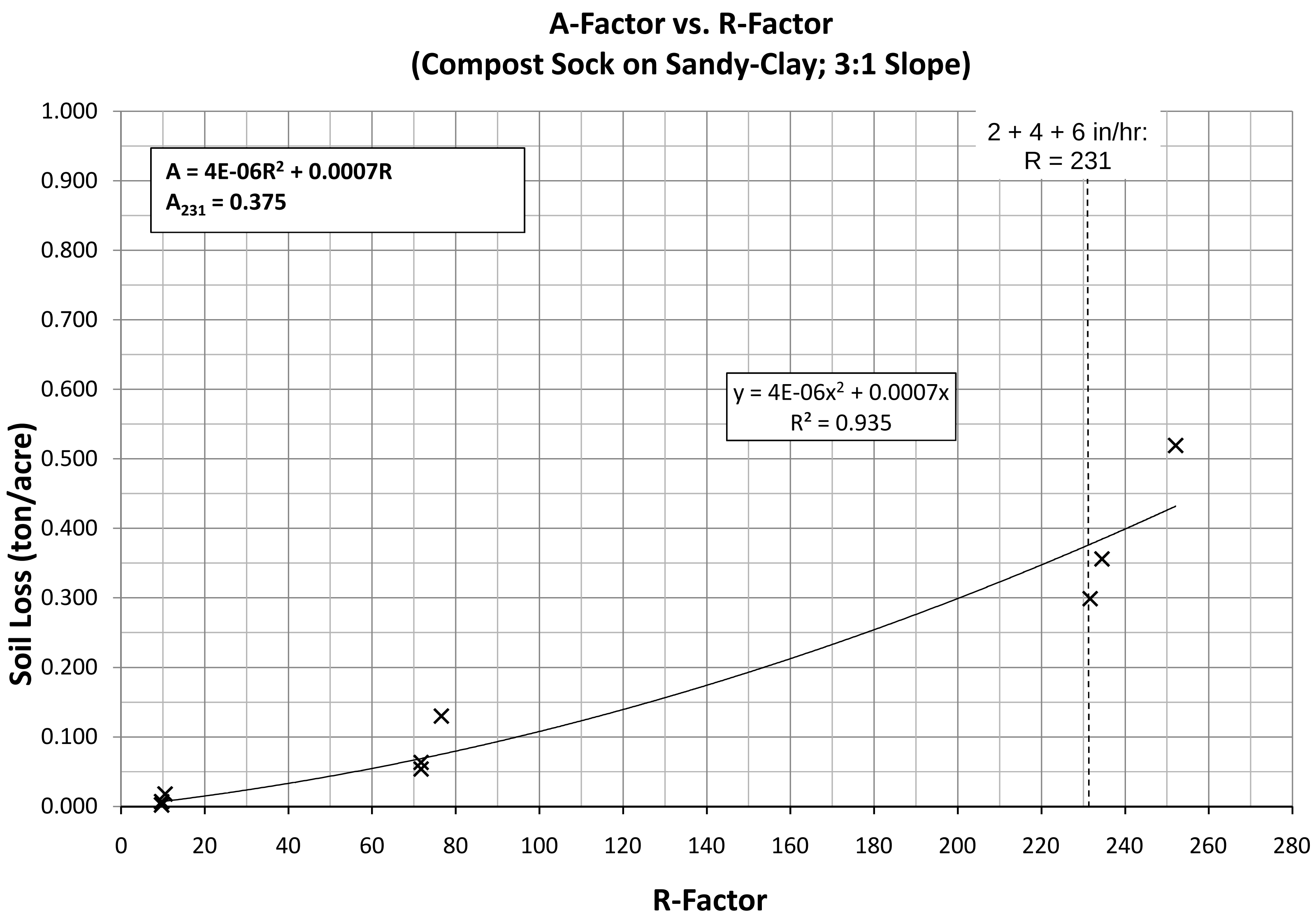
Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 1	2.05	5.51	9.68	0.030	0.002	0.00351
	3.98	74.37	71.70	0.760	0.054	0.01248
	6.00	176.40	231.61	3.600	0.299	0.02147
Bare Soil Controls			9.68		0.582	
			71.70		4.309	
			231.61		13.920	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 2	2.05	9.65	9.68	0.100	0.007	0.01170
	3.98	75.80	71.70	0.830	0.063	0.01469
	6.06	164.47	234.47	4.300	0.356	0.02526
Bare Soil Controls			9.68		0.582	
			71.70		4.309	
			234.47		14.092	

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R Factor	Soil Loss (lbs/plot/event	Cumm. Soil Loss (T/A)	Average P Factor
Slope 3	2.13	14.06	10.50	0.260	0.018	0.02808
	4.09	110.35	76.54	1.650	0.130	0.02826
	6.30	176.44	252.05	5.720	0.519	0.03428
Bare Soil Controls			10.50		0.631	
			76.54		4.600	
			252.05		15.148	

Note: The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose

CJS 8/23/12
Quality Review / Date


A-Factor vs. R-Factor
(Compost Sock on Sandy-Clay; 3:1 Slope)
A = 4E-06R² + 0.0007R
A231 = 0.375
2 + 4 + 6 in/hr:
R = 231
y = 4E-06x² + 0.0007x
R² = 0.935
Soil Loss (ton/acre)
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
R-Factor

TYPICAL TESTING PICTURES


Slope Prepared and Compost Sock Installed


After 2 in/hr Event


After 4 in/hr Event


After 6 in/hr Event



Typical Control Run - Before and After

APPENDIX B –CHECK DAM TEST REPORTS

Project: ASTM D 7208: Standard Test Method for Determination of Temporary Ditch Check Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.

Test Setup: Trapezoid with 2-ft wide bottom and 2:1 side slopes x 40-ft long; 5% Bed Slope;

Client: GSWCC **Product:** Straw Bales with Wooden Stakes

Flow: 0.5 cfs for 30 minutes **Test Date:** 5/14/2012

14" High GADOT Check Location

Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft^2	Soil Loss, ft^2	Flow Depth, in	Wetted Area, ft^2	Flow Velocity, ft/s	Shear, psf
0	0.07	-0.31	0.03	-0.115	1.00	5.93	2.96	0.26
5	0.01	-0.47	0.00	-0.189	1.13	12.10	3.08	0.29
10	0.07	-0.51	0.02	-0.201	1.25	12.33	2.37	0.32
15	0.01	-0.36	0.00	-0.127	4.00	17.45	0.23	1.04
20	1.49	-0.44	0.23	-0.201	7.25	23.51	0.10	1.88
25	1.42	-0.14	0.52	-0.017	7.50	23.98	0.10	1.95
30	0.21	-1.28	0.09	-0.517	4.00	17.45	0.30	1.04
35	0.07	-1.07	0.01	-0.403	2.75	15.12	2.65	0.71
40	0.07	-2.64	0.02	-0.981	1.37	6.28	3.07	0.36
			Total Soil Gain, ft^3	Total Soil Loss, ft^3		Total Wetted Area, ft^2	SAI - Soil Accretion Index	CSLI - Clopper Soil Loss Index
			2.99	**-9.68**		**134.15**	**2.23**	**-7.22**

BLOWOUT UNDER CHECK STRUCTURE & ACCELERATED SCOUR DOWNSTREAM OF CHECK

Flow: 0.5 cfs for 30 minutes **Test Date:** 6/7/2012

RETEST: 14" High GADOT Check Location

Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft^2	Soil Loss, ft^2	Flow Depth, in	Wetted Area, ft^2	Flow Velocity, ft/s	Shear, psf
0	0.02	-0.29	0.00	-0.115	0.94	5.88	2.98	0.25
5	0.05	-0.18	0.01	-0.079	3.15	15.87	2.43	0.82
10	0.75	-0.54	0.23	-0.191	4.41	18.22	1.85	1.15
15	0.30	-0.40	0.11	-0.150	6.81	22.69	1.80	1.77
20	1.00	-0.03	0.38	-0.014	6.34	21.81	0.41	1.65
25	0.06	-0.84	0.01	-0.290	1.14	12.13	1.43	0.30
30	0.05	-0.74	0.02	-0.247	1.26	12.35	1.06	0.33
35	0.02	-0.92	0.01	-0.348	1.77	13.30	1.81	0.46
40	0.01	-0.72	0.00	-0.280	0.75	5.70	2.71	0.19
			Total Soil Gain, ft^3	Total Soil Loss, ft^3		Total Wetted Area, ft^2	SAI - Soil Accretion Index	CSLI - Clopper Soil Loss Index
			3.74	**-6.24**		**127.94**	**2.93**	**-4.88**

BLOWOUT UNDER CHECK STRUCTURE & ACCELERATED SCOUR DOWNSTREAM OF CHECK

Flow: 0.5 cfs for 30 minutes **Test Date:** 7/3/2012

14" High NRCS Check Location

Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft^2	Soil Loss, ft^2	Flow Depth, in	Wetted Area, ft^2	Flow Velocity, ft/s	Shear, psf
0	0.00	-0.11	0.00	-0.036	0.98	5.92	3.00	0.26
5	0.00	-0.12	0.00	-0.050	0.98	11.83	3.10	0.26
10	0.10	-0.19	0.03	-0.056	5.31	19.90	1.61	1.38
15	0.43	-0.40	0.15	-0.147	6.38	21.88	0.78	1.66
20	0.47	-0.04	0.16	-0.007	10.16	28.93	0.16	2.64
25	0.61	-0.07	0.23	-0.009	11.46	31.35	0.01	2.98
30	0.00	-0.28	0.00	-0.098	1.85	13.45	2.40	0.48
35	0.00	-0.26	0.00	-0.095	1.57	12.93	2.90	0.41
40	0.00	-0.23	0.00	-0.084	1.18	6.10	2.80	0.31
			Total Soil Gain, ft^3	Total Soil Loss, ft^3		Total Wetted Area, ft^2	SAI - Soil Accretion Index	CSLI - Clopper Soil Loss Index
			2.33	**-2.34**		**152.30**	**1.53**	**-1.54**

CJS 7/5/2012 (Rev. 8/21/14)
Quality Review / Date

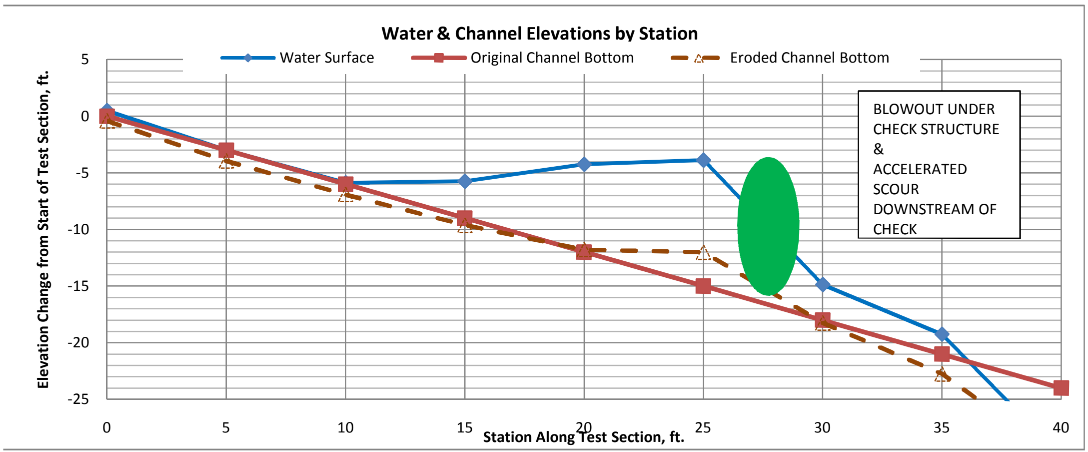
TRI/Environmental, Inc.
A Texas Research International Company

Project: ASTM D 7208: Standard Test Method for Determination of Temporary Ditch Check Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.

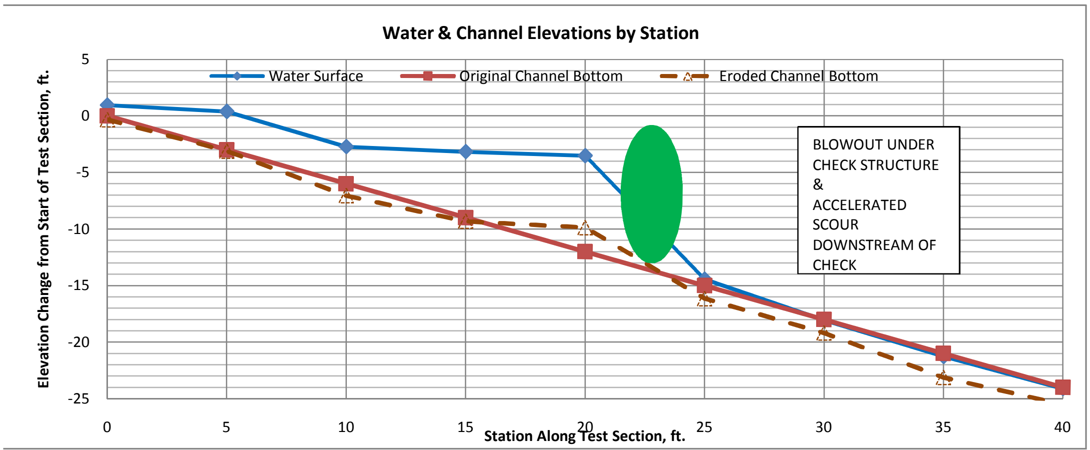
Test Setup: Trapezoid with 2-ft wide bottom and 2:1 side slopes x 40-ft long; 5% Bed Slope;

Client: GSWCC **Product:** Straw Bales

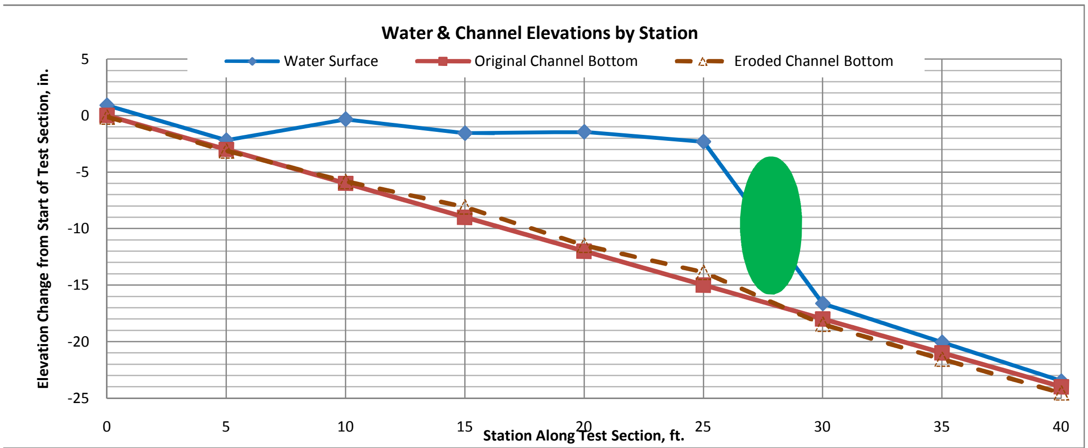
Flow: 0.5 cfs for 30 minutes **Test Date:** 5/14/2012



Flow: 0.5 cfs for 30 minutes **Test Date:** 6/7/2012



Flow: 0.5 cfs for 30 minutes **Test Date:** 7/3/2012



ASTM D7208	Date: 5/14/12		Start Time:	3:58 PM	End Time:	4:28 PM
	Soil: Sandy Clay		Target Flow (cfs):	0.50	Slope:	5%
60 ft long flume; 40 ft test section	SRD: Straw Bales	Installation: Wooden Stakes				
2 ft wide flume	TEST DATA					

Weir width (ft) = 2

1 2 3

FLOW

0 ft C D E F G H

Outlet Weir								Weir						Channel Targets	
Water Depth, in								0.00						0.00	
Water Velocity, ft/s								0.00						0.00	
Flow Rate, cfs	0.00							0.00	0.00					0.00	

Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	7.510	7.781	8.031	8.042	8.042	8.052	8.031	7.844	7.583	31.696			2.96		8.0
To eroded Surface Elev, ft	7.510	7.729	8.073	8.063	8.083	8.094	8.063	7.896	7.583	31.776		Vavg (fps) =	2.96	Bed Max Shear Stress (psf)	
Soil Gain, ft	0.000	0.052	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.035	0.104	navg =	0.021		Water Depth (ft)
Clopper Soil Loss, ft	0.000	0.000	-0.042	-0.021	-0.042	-0.042	-0.031	-0.052	0.000	-0.115	-0.344	Flow (cfs) =	0.50	0.26	0.08
		Avg Bottom Gain, ft		0.01	Avg Clopper Soil Loss, ft			-0.03							

5 ft

Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	7.865	8.063	8.292	8.302	8.313	8.292	8.250	7.948	7.740	32.622			3.08		8.3
To eroded Surface Elev, ft	7.875	8.073	8.292	8.396	8.406	8.344	8.281	8.010	7.729	32.809		Vavg (fps) =	3.08	Bed Max Shear Stress (psf)	
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.002	0.005	navg =	0.022		Water Depth (ft)
Clopper Soil Loss, ft	-0.010	-0.010	0.000	-0.094	-0.094	-0.052	-0.031	-0.062	0.000	-0.189	-0.568	Flow (cfs) =	0.50	0.29	0.09
		Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.04							

10 ft

Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	8.104	8.365	8.542	8.583	8.594	8.573	8.542	8.260	8.031	33.769			2.37		8.6
To eroded Surface Elev, ft	8.083	8.344	8.594	8.667	8.688	8.625	8.563	8.344	8.021	33.951		Vavg (fps) =	2.37	Bed Max Shear Stress (psf)	
Soil Gain, ft	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.019	0.057	navg =	0.031		Water Depth (ft)
Clopper Soil Loss, ft	0.000	0.000	-0.052	-0.083	-0.094	-0.052	-0.021	-0.083	0.000	-0.201	-0.604	Flow (cfs) =	0.50	0.32	0.10
		Avg Bottom Gain, ft		0.01	Avg Clopper Soil Loss, ft			-0.04							

15 ft

Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	8.427	8.677	8.917	8.958	8.958	8.938	8.917	8.688	8.396	35.241			0.23		8.7
To eroded Surface Elev, ft	8.417	8.698	8.979	9.021	9.021	8.969	8.938	8.688	8.406	35.366		Vavg (fps) =	0.23	Bed Max Shear Stress (psf)	
Soil Gain, ft	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005	navg =	0.695		Water Depth (ft)
Clopper Soil Loss, ft	0.000	-0.021	-0.063	-0.063	-0.063	-0.031	-0.021	0.000	-0.010	-0.127	-0.380	Flow (cfs) =	0.50	1.04	0.33
		Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.03							

20 ft

Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	8.740	9.010	9.240	9.271	9.313	9.281	9.260	9.083	9.802	36.792			0.1		8.7
To eroded Surface Elev, ft	8.760	9.229	9.271	9.302	9.271	9.240	9.146	9.115	8.885	36.760		Vavg (fps) =	0.10	Bed Max Shear Stress (psf)	
Soil Gain, ft	0.000	0.000	0.000	0.000	0.042	0.042	0.115	0.000	0.917	0.233	0.698	navg =	2.375		Water Depth (ft)
Clopper Soil Loss, ft	-0.021	-0.219	-0.031	-0.031	0.000	0.000	0.000	-0.031	0.000	-0.201	-0.604	Flow (cfs) =	0.50	1.88	0.60
		Avg Bottom Gain, ft		0.12	Avg Clopper Soil Loss, ft			-0.04							

25 ft

Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	8.938	9.188	9.469	9.500	9.510	9.500	9.490	9.323	9.031	37.491			0.1		8.6
To eroded Surface Elev, ft	8.979	9.177	9.438	9.208	9.208	9.344	9.271	9.271	9.094	36.984		Vavg (fps) =	0.10	Bed Max Shear Stress (psf)	
Soil Gain, ft	0.000	0.010	0.031	0.292	0.302	0.156	0.219	0.052	0.000	0.524	1.573	navg =	2.429		Water Depth (ft)
Clopper Soil Loss, ft	-0.042	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.063	-0.017	-0.052	Flow (cfs) =	0.13	1.95	0.63
		Avg Bottom Gain, ft		0.12	Avg Clopper Soil Loss, ft			-0.01							

30 ft

Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	9.125	9.365	9.573	9.646	9.677	9.823	9.646	9.458	9.198	38.214			0.3		9.4
To eroded Surface Elev, ft	9.188	9.813	9.771	9.750	9.750	9.708	9.604	9.531	9.198	38.641		Vavg (fps) =	0.30	Bed Max Shear Stress (psf)	
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.115	0.042	0.000	0.000	0.090	0.271	navg =	0.532		Water Depth (ft)
Clopper Soil Loss, ft	-0.063	-0.448	-0.198	-0.104	-0.073	0.000	0.000	-0.073	0.000	-0.517	-1.552	Flow (cfs) =	0.20	1.04	0.33
		Avg Bottom Gain, ft		0.02	Avg Clopper Soil Loss, ft			-0.11							

35 ft

Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	9.302	9.521	9.792	9.833	9.854	9.823	9.802	9.625	9.375	38.797			2.65		9.7
To eroded Surface Elev, ft	9.292	9.531	10.104	10.094	9.938	9.917	9.802	9.667	9.333	39.191		Vavg (fps) =	2.65	Bed Max Shear Stress (psf)	
Soil Gain, ft	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.042	0.009	0.026	navg =	0.047		Water Depth (ft)
Clopper Soil Loss, ft	0.000	-0.010	-0.313	-0.260	-0.083	-0.094	0.000	-0.042	0.000	-0.403	-1.208	Flow (cfs) =	1.21	0.71	0.23
		Avg Bottom Gain, ft		0.01	Avg Clopper Soil Loss, ft			-0.09							

40 ft

Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	9.604	9.833	10.094	10.146	10.208	10.167	10.104	9.906	9.667	40.049			3.07		10.7
To eroded Surface Elev, ft	9.615	9.823	10.198	10.448	10.823	10.833	10.385	9.896	9.635	41.010		Vavg (fps) =	3.07	Bed Max Shear Stress (psf)	
Soil Gain, ft	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.010	0.031	0.019	0.057	navg =	0.026		Water Depth (ft)
Clopper Soil Loss, ft	-0.010	0.000	-0.104	-0.302	-0.615	-0.667	-0.281	0.000	0.000	-0.981	-2.943	Flow (cfs) =	0.70	0.36	0.11
		Avg Bottom Gain, ft		0.01	Avg Clopper Soil Loss, ft			-0.22							

	A	B	C	D	E	F	G	H	I	Volume		
Soil Gain, in	0.002	0.005	0.000	0.000	0.002	0.002	0.006	0.001	0.057			Avg Bottom Gain per Xsection, ft = **0.006**
Clopper Soil Loss, in	-0.002	-0.015	-0.034	-0.048	-0.056	-0.053	-0.022	-0.015	-0.001	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft = **-0.220**

Trapezoidal Analysis									
Original Surface Elev	865.087	**1 thru 6:**	X-Section Spacing, ft = 5	Original Surface Elev	389.640		**7 thru 9:**	X-Section Spacing, ft = 5
Eroded Surface Elev	866.337		Test Section Length, ft = 40	Eroded Surface Elev	395.082			Test Section Length, ft = 40
Soil Gain	2.674	0.201	gauge spacing, ft = 0.5	Soil Gain	0.317	0.024		gauge spacing, ft = 0.5
CSLI	-3.924	-0.294	channel width measured, ft = 4	CSLI	-5.760	-0.432		channel width measured, ft = 4

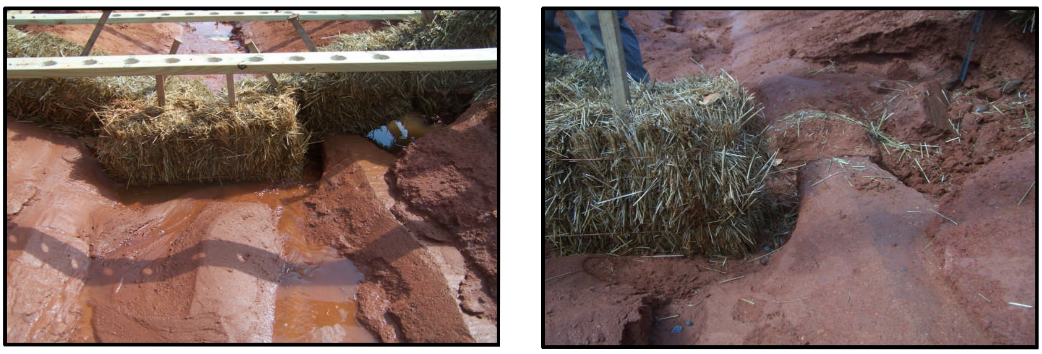
TYPICAL TEST PICTURES

0.5 cfs Flow

Check Structure Installation over Bare Soil

Initial Flow & Upstream Ponding with Some Underflow

Increased Ponding, Start Overtopping, Increased Underflow



End-of-test and Post-test With Undermined Bale Removed

ASTM D7208	Date: 6/7/12	Start Time:	3:58 PM	End Time:	4:28 PM
	Soil: Sandy Clay	Target Flow (cfs):	0.50	Slope:	5%
60 ft long flume, 40 ft test section	SRD: Straw Bales	Installation: Wooden Stakes			
2 ft wide flume					

1 2 3

FLOW

eir width (ft) = 2

0 ft C D E FG H

TEST DATA

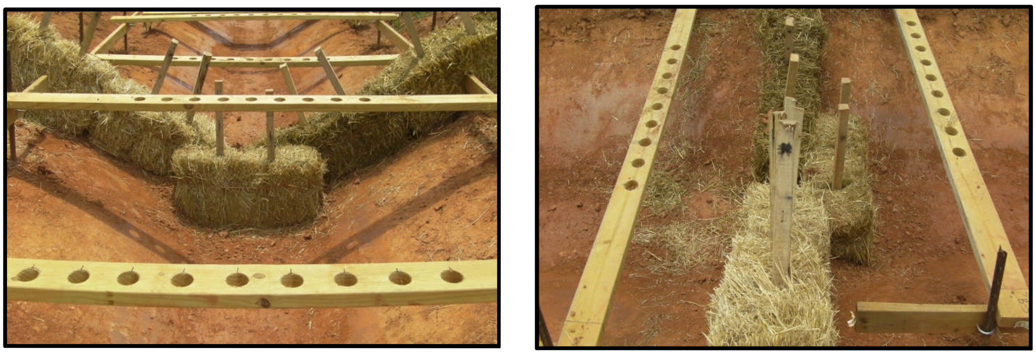
Outlet Weir								Weir						Channel Targets	
Water Depth, in								0.00						0.00	
Water Velocity, ft/s								0.00						0.00	
Flow Rate, cfs	0.00							0.00	0.00					0.00	

	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.873	2.077	2.333	2.356	2.362	2.339	2.283	2.047	1.808	8.819			2.98		2.3
To eroded Surface Elev, ft	1.864	2.113	2.388	2.369	2.362	2.411	2.323	2.051	1.801	8.931		Vavg (fps) =	2.98		
Soil Gain, ft	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.003	0.008	navg =	0.020	Bed Max Shear Stress (psf)	Water Depth (ft)
Clopper Soil Loss, ft	0.000	-0.036	-0.056	-0.013	0.000	-0.072	-0.039	-0.003	0.000	-0.115	-0.344	Flow (cfs) =	0.50	0.25	0.08
5 ft			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.02							
Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.969	2.185	2.454	2.503	2.552	2.451	2.421	2.149	1.942	9.320			2.43		2.3
To eroded Surface Elev, ft	1.978	2.211	2.470	2.513	2.533	2.487	2.408	2.185	1.939	9.388		Vavg (fps) =	2.43		
Soil Gain, ft	0.000	0.000	0.000	0.000	0.020	0.000	0.013	0.000	0.003	0.011	0.034	navg =	0.056	Bed Max Shear Stress (psf)	Water Depth (ft)
Clopper Soil Loss, ft	-0.010	-0.026	-0.016	-0.010	0.000	-0.036	0.000	-0.036	0.000	-0.079	-0.238	Flow (cfs) =	0.50	0.82	0.26
10 ft			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.01							
Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	2.274	2.507	2.530	2.546	2.539	2.493	2.267	2.231	2.021	9.679			1.85		2.3
To eroded Surface Elev, ft	1.991	2.247	2.516	2.618	2.635	2.589	2.411	2.231	2.014	9.645		Vavg (fps) =	1.85		
Soil Gain, ft	0.282	0.259	0.013	0.000	0.000	0.000	0.000	0.000	0.007	0.225	0.676	navg =	0.092	Bed Max Shear Stress (psf)	Water Depth (ft)
Clopper Soil Loss, ft	0.000	0.000	0.000	-0.072	-0.095	-0.095	-0.144	0.000	0.000	-0.191	-0.574	Flow (cfs) =	1.36	1.15	0.37
15 ft			Avg Bottom Gain, ft	0.06			Avg Clopper Soil Loss, ft	-0.05							
Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.785	2.024	2.280	2.323	2.333	2.306	2.283	2.054	1.781	8.698			1.8		1.8
To eroded Surface Elev, ft	1.765	2.087	2.316	2.421	2.415	2.205	2.182	2.051	1.801	8.741		Vavg (fps) =	1.80		
Soil Gain, ft	0.020	0.000	0.000	0.000	0.000	0.102	0.102	0.003	0.000	0.107	0.322	navg =	0.127	Bed Max Shear Stress (psf)	Water Depth (ft)
Clopper Soil Loss, ft	0.000	-0.062	-0.036	-0.098	-0.082	0.000	0.000	0.000	-0.020	-0.150	-0.449	Flow (cfs) =	2.04	1.77	0.57
20 ft			Avg Bottom Gain, ft	0.03			Avg Clopper Soil Loss, ft	-0.03							
Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.988	2.264	2.500	2.572	2.592	2.566	2.549	2.343	2.093	9.723			0.41		1.9
To eroded Surface Elev, ft	1.995	2.283	2.493	2.421	2.415	2.362	2.398	2.303	2.073	9.360		Vavg (fps) =	0.41		
Soil Gain, ft	0.000	0.000	0.007	0.151	0.177	0.203	0.151	0.039	0.020	0.377	1.132	navg =	0.530	Bed Max Shear Stress (psf)	Water Depth (ft)
Clopper Soil Loss, ft	-0.007	-0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.014	-0.043	Flow (cfs) =	0.43	1.65	0.53
25 ft			Avg Bottom Gain, ft	0.08			Avg Clopper Soil Loss, ft	0.00							
Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.788	1.975	2.123	2.270	2.323	2.333	2.316	2.080	1.860	8.634			1.43		2.3
To eroded Surface Elev, ft	1.755	1.962	2.402	2.425	2.372	2.418	2.375	2.080	1.867	8.910		Vavg (fps) =	1.43		
Soil Gain, ft	0.033	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.043	navg =	0.048	Bed Max Shear Stress (psf)	Water Depth (ft)
Clopper Soil Loss, ft	0.000	0.000	-0.279	-0.154	-0.049	-0.085	-0.059	0.000	-0.007	-0.290	-0.869	Flow (cfs) =	0.27	0.30	0.10
30 ft			Avg Bottom Gain, ft	0.01			Avg Clopper Soil Loss, ft	-0.07							
Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	2.087	2.372	2.589	2.664	2.667	2.664	2.621	2.375	2.129	10.045			1.06		2.7
To eroded Surface Elev, ft	2.083	2.365	2.776	2.789	2.779	2.726	2.690	2.356	2.123	10.273		Vavg (fps) =	1.06		
Soil Gain, ft	0.003	0.007	0.000	0.000	0.000	0.000	0.000	0.020	0.007	0.019	0.057	navg =	0.070	Bed Max Shear Stress (psf)	Water Depth (ft)
Clopper Soil Loss, ft	0.000	0.000	-0.187	-0.125	-0.112	-0.062	-0.069	0.000	0.000	-0.247	-0.741	Flow (cfs) =	0.22	0.33	0.10
35 ft			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.06							
Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.604	1.854	2.123	2.165	2.198	2.195	2.156	1.932	1.677	8.136			1.81		2.2
To eroded Surface Elev, ft	1.598	1.844	2.136	2.408	2.369	2.313	2.290	1.932	1.686	8.477		Vavg (fps) =	1.81		
Soil Gain, ft	0.007	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.023	navg =	0.051	Bed Max Shear Stress (psf)	Water Depth (ft)
Clopper Soil Loss, ft	0.000	0.000	-0.013	-0.243	-0.171	-0.118	-0.135	0.000	-0.010	-0.348	-1.045	Flow (cfs) =	0.53	0.46	0.15
40 ft			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.08							
Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.916	2.165	2.418	2.454	2.477	2.464	2.461	2.215	1.965	9.297			2.71		2.5
To eroded Surface Elev, ft	1.919	2.169	2.408	2.592	2.549	2.628	2.612	2.215	1.975	9.574		Vavg (fps) =	2.71		
Soil Gain, ft	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.010	navg =	0.019	Bed Max Shear Stress (psf)	Water Depth (ft)
Clopper Soil Loss, ft	-0.003	-0.003	0.000	-0.138	-0.072	-0.164	-0.151	0.000	-0.010	-0.280	-0.840	Flow (cfs) =	0.34	0.19	0.06
			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.06							
Soil Gain, in	0.018	0.015	0.002	0.008	0.011	0.017	0.015	0.002	0.002	Volume		Avg Bottom Gain per Xsection, ft =		**0.001**	
Clopper Soil Loss, in	-0.001	-0.008	-0.007	-0.032	-0.024	-0.027	-0.026	-0.002	-0.002	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft =		**-0.060**	

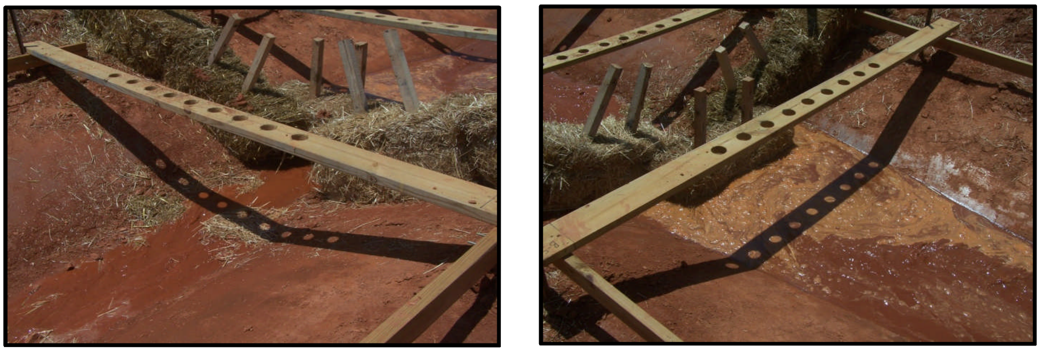
Trapezoidal Analysis											
	Original Surface Elev	230.733	**1 thru 6:**	X-Section Spacing, ft =	5	Original Surface Elev	89.039		**7 thru 9:**	X-Section Spacing, ft =	5
	Eroded Surface Elev	230.270		Test Section Length, ft =	40	Eroded Surface Elev	92.004			Test Section Length, ft =	40
	Soil Gain	3.649	0.274	gauge spacing, ft =	0.5	Soil Gain	0.094	0.007		gauge spacing, ft =	0.5
	CSLI	-3.185	-0.239	hannel width measured, ft =	4	CSLI	-3.059	-0.229		channel width measured, ft =	4

TYPICAL TEST PICTURES

0.5 cfs Flow (Retest)

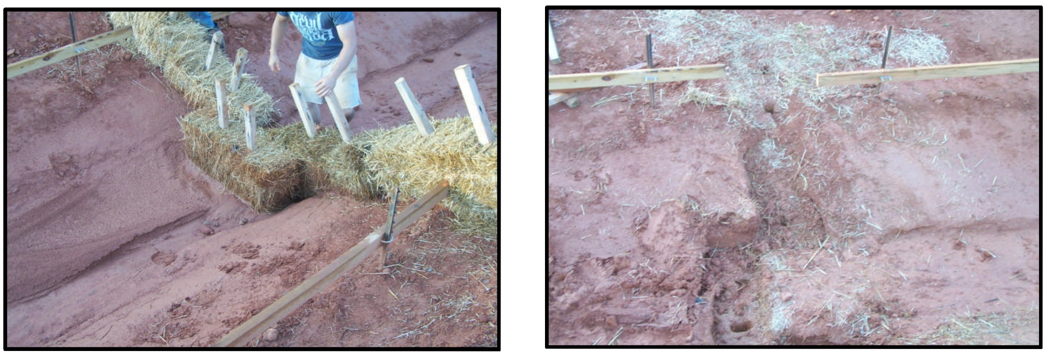


Check Structure Installation over Bare Soil



Initial Flow & Upstream Ponding

Increased Ponding and Undermining



End-of-test and Post-test condition.

ASTM D7208	Date: 7/3/12	Start Time:	4:30 PM	End Time:	5:00 PM
	Soil: Sandy Clay	Target Flow (cfs):	0.50	Slope:	5%
60 ft long flume / 40 ft test section	**SRD:** Straw Bales	**Installation:** Wooden Stakes / NRCS Install			
2 ft wide flume	**TEST DATA**				

1 2 3

FLOW

eir width (ft) = 2

0 ft C D E FG H

5 ft, 10 ft, 15 ft, 20 ft, 25 ft, 30 ft, 35 ft, 40 ft

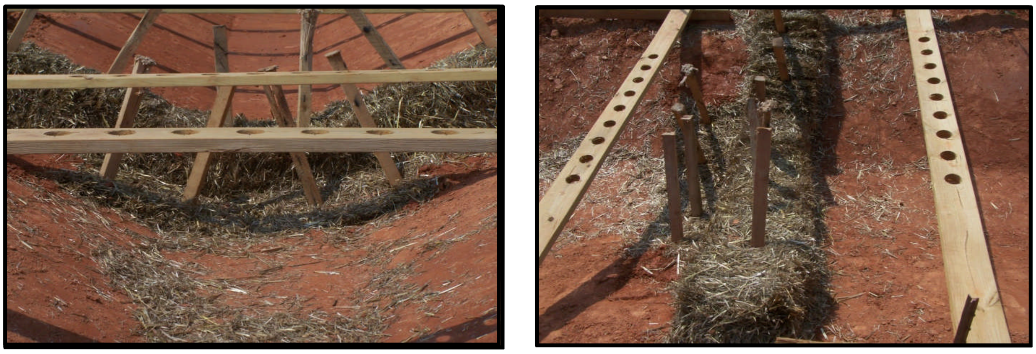
	A	B	C	D	E	F	G	H	I						
Outlet Weir								Weir						Channel Targets	
Water Depth, in								1.50						0.00	
Water Velocity, ft/s								0.00						0.00	
Flow Rate, cfs	0.00							0.00	0.00					0.00	

Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.880	2.149	2.352	2.382	2.379	2.359	2.326	2.139	1.854	8.994			3		2.3
To eroded Surface Elev, ft	1.880	2.149	2.392	2.402	2.385	2.362	2.343	2.139	1.854	9.030		Vavg (fps) =	3.00	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.021		
Clopper Soil Loss, ft	0.000	0.000	-0.039	-0.020	-0.007	-0.003	-0.016	0.000	0.000	-0.036	-0.108	Flow (cfs) =	0.50	0.26	0.08
	Avg Bottom Gain, ft			0.00	Avg Clopper Soil Loss, ft			-0.01							
Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	2.123	2.343	2.595	2.612	2.631	2.618	2.608	2.359	2.149	9.944			3.1		2.6
To eroded Surface Elev, ft	2.123	2.365	2.602	2.621	2.644	2.625	2.615	2.382	2.149	9.995		Vavg (fps) =	3.10	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.020		
Clopper Soil Loss, ft	0.000	-0.023	-0.007	-0.010	-0.013	-0.007	-0.007	-0.023	0.000	-0.050	-0.151	Flow (cfs) =	0.50	0.26	0.08
	Avg Bottom Gain, ft			0.00	Avg Clopper Soil Loss, ft			-0.01							
Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.946	2.215	2.398	2.428	2.454	2.448	2.431	2.208	1.942	9.274			1.61		2.0
To eroded Surface Elev, ft	1.969	2.247	2.375	2.402	2.425	2.461	2.484	2.208	1.965	9.295		Vavg (fps) =	1.61	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.023	0.026	0.030	0.000	0.000	0.000	0.000	0.035	0.105	navg =	0.120		
Clopper Soil Loss, ft	-0.023	-0.033	0.000	0.000	0.000	-0.013	-0.052	0.000	-0.023	-0.056	-0.167	Flow (cfs) =	0.50	1.38	0.44
	Avg Bottom Gain, ft			0.01	Avg Clopper Soil Loss, ft			-0.02							
Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.988	2.238	2.454	2.500	2.520	2.513	2.497	2.270	2.037	9.508			0.78		1.9
To eroded Surface Elev, ft	2.073	2.352	2.398	2.470	2.431	2.402	2.461	2.349	2.060	9.501		Vavg (fps) =	0.78	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.056	0.030	0.089	0.112	0.036	0.000	0.000	0.154	0.463	navg =	0.280		
Clopper Soil Loss, ft	-0.085	-0.115	0.000	0.000	0.000	0.000	0.000	-0.079	-0.023	-0.147	-0.441	Flow (cfs) =	0.50	1.66	0.53
	Avg Bottom Gain, ft			0.04	Avg Clopper Soil Loss, ft			-0.03							
Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.683	1.919	2.152	2.198	2.228	2.228	2.215	1.975	1.775	8.321			0.16		1.3
To eroded Surface Elev, ft	1.686	1.923	2.103	2.156	2.195	2.172	2.077	1.939	1.798	8.165		Vavg (fps) =	0.16	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.049	0.043	0.033	0.056	0.138	0.036	0.000	0.163	0.489	navg =	1.858		
Clopper Soil Loss, ft	-0.003	-0.003	0.000	0.000	0.000	0.000	0.000	0.000	-0.023	-0.007	-0.020	Flow (cfs) =	0.50	2.64	0.85
	Avg Bottom Gain, ft			0.04	Avg Clopper Soil Loss, ft			0.00							
Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.785	2.054	2.306	2.336	2.369	2.339	2.280	2.093	1.844	8.805			0		1.3
To eroded Surface Elev, ft	1.834	2.047	2.241	2.254	2.267	2.241	2.215	2.054	1.847	8.585		Vavg (fps) =	0.00	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.007	0.066	0.082	0.102	0.098	0.066	0.039	0.000	0.229	0.686	navg =	#DIV/0!		
Clopper Soil Loss, ft	-0.049	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.003	-0.009	-0.026	Flow (cfs) =	#DIV/0!	2.98	0.95
	Avg Bottom Gain, ft			0.05	Avg Clopper Soil Loss, ft			-0.01							
Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.608	1.860	2.083	2.159	2.208	2.205	2.159	1.975	1.742	8.174			2.4		2.1
To eroded Surface Elev, ft	1.608	1.864	2.126	2.205	2.247	2.238	2.208	1.975	1.742	8.273		Vavg (fps) =	2.40	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.040		
Clopper Soil Loss, ft	0.000	-0.003	-0.043	-0.046	-0.039	-0.033	-0.049	0.000	0.000	-0.098	-0.295	Flow (cfs) =	0.74	0.48	0.15
	Avg Bottom Gain, ft			0.00	Avg Clopper Soil Loss, ft			-0.02							
Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.939	2.215	2.408	2.467	2.487	2.470	2.421	2.159	1.932	9.291			2.9		2.4
To eroded Surface Elev, ft	1.939	2.215	2.464	2.530	2.539	2.497	2.421	2.159	1.932	9.386		Vavg (fps) =	2.90	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.030		
Clopper Soil Loss, ft	0.000	0.000	-0.056	-0.062	-0.052	-0.026	0.000	0.000	0.000	-0.095	-0.285	Flow (cfs) =	0.76	0.41	0.13
	Avg Bottom Gain, ft			0.00	Avg Clopper Soil Loss, ft			-0.02							
Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.854	2.087	2.316	2.346	2.339	2.316	2.270	2.018	1.775	8.758			2.8		2.3
To eroded Surface Elev, ft	1.854	2.087	2.333	2.398	2.395	2.346	2.287	2.018	1.775	8.842		Vavg (fps) =	2.80	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.025		
Clopper Soil Loss, ft	0.000	0.000	-0.016	-0.052	-0.056	-0.030	-0.016	0.000	0.000	-0.084	-0.253	Flow (cfs) =	0.55	0.31	0.10
	Avg Bottom Gain, ft			0.00	Avg Clopper Soil Loss, ft			-0.02							
Soil Gain, in	0.000	0.000	0.007	0.006	0.008	0.009	0.010	0.002	0.000	**Volume**		Avg Bottom Gain per Xsection, ft = **0.000**			
Clopper Soil Loss, in	-0.006	-0.010	-0.007	-0.008	-0.007	-0.004	-0.005	-0.006	-0.004	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft = **-0.019**			

Trapezoidal Analysis											
	Original Surface Elev	229.738	**1 thru 6:**	X-Section Spacing, ft =	5	Original Surface Elev	88.786		**7 thru 9:**	X-Section Spacing, ft =	5
	Eroded Surface Elev	228.817		Test Section Length, ft =	40	Eroded Surface Elev	89.719			Test Section Length, ft =	40
	Soil Gain	2.332	0.175	gauge spacing, ft =	0.5	Soil Gain	0.000	0.000		gauge spacing, ft =	0.5
	CSLI	-1.411	-0.106	hannel width measured, ft =	4	CSLI	-0.932	-0.070		channel width measured, ft =	4

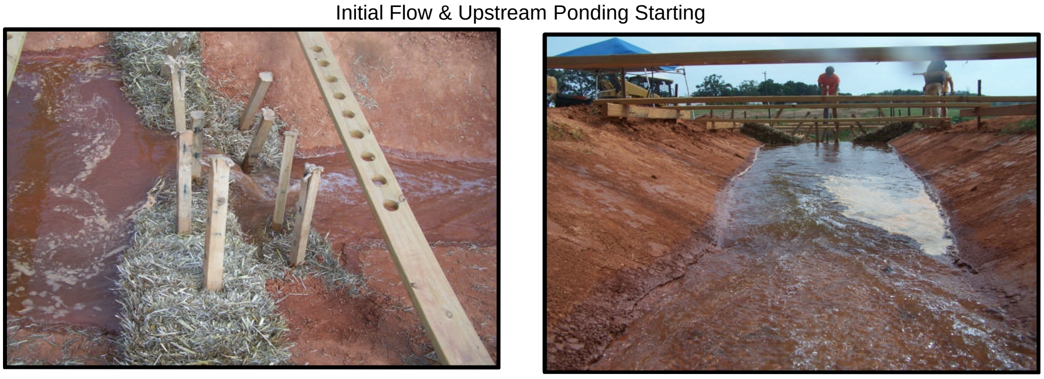
TYPICAL TEST PICTURES

0.5 cfs Flow (Enhanced NRCS Installation)



Check Structure Installation over Bare Soil

Initial Flow & Upstream Ponding Starting



Increased Ponding and Overtopping. No Apparent Underflow

End-of-test and Post-test With Upstream Sediment Deposition and Modest Downstream Scour

Project: ASTM D 7208: Standard Test Method for Determination of Temporary Ditch Check Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.

Test Setup: Trapezoid with 2-ft wide bottom and 2:1 side slopes x 40-ft long; 5% Bed Slope;

Client: GSWCC **Product:** Straw Bales Wooden Stakes / NRCS Install

Flow: 0.5 cfs for 30 minutes **Test Date:** 7/3/2012

14" High Check Location (between Stations 20–30)

Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft^2	Soil Loss, ft^2	Flow Depth, in	Wetted Area, ft^2	Flow Velocity, ft/s	Shear, psf
0	0.00	-0.11	0.00	-0.036	0.98	5.92	3.00	0.26
5	0.00	-0.12	0.00	-0.050	0.98	11.83	3.10	0.26
10	0.10	-0.19	0.03	-0.056	5.31	19.90	1.61	1.38
15	0.43	-0.40	0.15	-0.147	6.38	21.88	0.78	1.66
20	0.47	-0.04	0.16	-0.007	10.16	28.93	0.16	2.64
25	0.61	-0.07	0.23	-0.009	11.46	31.35	0.00	2.98
30	0.00	-0.28	0.00	-0.098	1.85	13.45	2.40	0.48
35	0.00	-0.26	0.00	-0.095	1.57	12.93	2.90	0.41
40	0.00	-0.23	0.00	-0.084	1.18	6.10	2.80	0.31
			Total Soil Gain, ft^3	Total Soil Loss, ft^3		Total Wetted Area, ft^2	SAI - Soil Accretion Index	CSLI - Clopper Soil Loss Index
			2.33	**-2.34**		**152.30**	**1.53**	**-1.54**

Flow: 1.0 cfs for 30 minutes **Test Date:** 7/5/2012

14" High Check Location (between Stations 20–30)

Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft^2	Soil Loss, ft^2	Flow Depth, in	Wetted Area, ft^2	Flow Velocity, ft/s	Shear, psf
0	0.00	-0.27	0.00	-0.102	1.73	6.61	3.83	0.45
5	0.00	-0.25	0.00	-0.072	2.52	14.70	3.14	0.65
10	0.00	-0.28	0.00	-0.090	6.46	22.03	2.04	1.68
15	0.43	-0.39	0.14	-0.133	8.27	25.41	1.81	2.15
20	0.63	-0.07	0.24	-0.008	12.44	33.18	0.51	3.23
25	1.08	-0.02	0.40	-0.008	13.62	35.38	0.10	3.54
30	0.00	-0.24	0.00	-0.080	2.83	15.28	3.36	0.74
35	0.00	-0.21	0.00	-0.067	1.89	13.52	3.71	0.49
40	0.00	-0.24	0.00	-0.087	1.42	6.32	4.04	0.37
			Total Soil Gain, ft^3	Total Soil Loss, ft^3		Total Wetted Area, ft^2	SAI - Soil Accretion Index	CSLI - Clopper Soil Loss Index
			2.93	**-2.54**		**172.44**	**1.70**	**-1.47**

Flow: 2.0 cfs for 30 minutes **Test Date:** 7/16/2012

14" High Check Location (between Stations 20–30)

Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft^2	Soil Loss, ft^2	Flow Depth, in	Wetted Area, ft^2	Flow Velocity, ft/s	Shear, psf
0	0.00	-0.39	0.00	-0.147	2.01	6.87	5.10	0.52
5	0.00	-0.41	0.00	-0.160	6.85	22.76	3.63	1.78
10	0.03	-0.22	0.01	-0.082	9.13	27.02	1.46	2.37
15	0.20	-0.34	0.09	-0.121	11.02	30.54	0.34	2.86
20	0.74	-0.47	0.32	-0.188	12.13	32.60	0.33	3.15
25	0.77	-0.21	0.31	-0.062	14.49	37.00	0.25	3.77
30	0.00	-0.45	0.00	-0.163	4.72	18.80	3.66	1.23
35	0.00	-0.51	0.00	-0.197	2.05	13.81	4.54	0.53
40	0.00	-0.49	0.00	-0.183	2.20	7.05	6.26	0.57
			Total Soil Gain, ft^3	Total Soil Loss, ft^3		Total Wetted Area, ft^2	SAI - Soil Accretion Index	CSLI - Clopper Soil Loss Index
			2.91	**-5.13**		**196.46**	**1.48**	**-2.61**

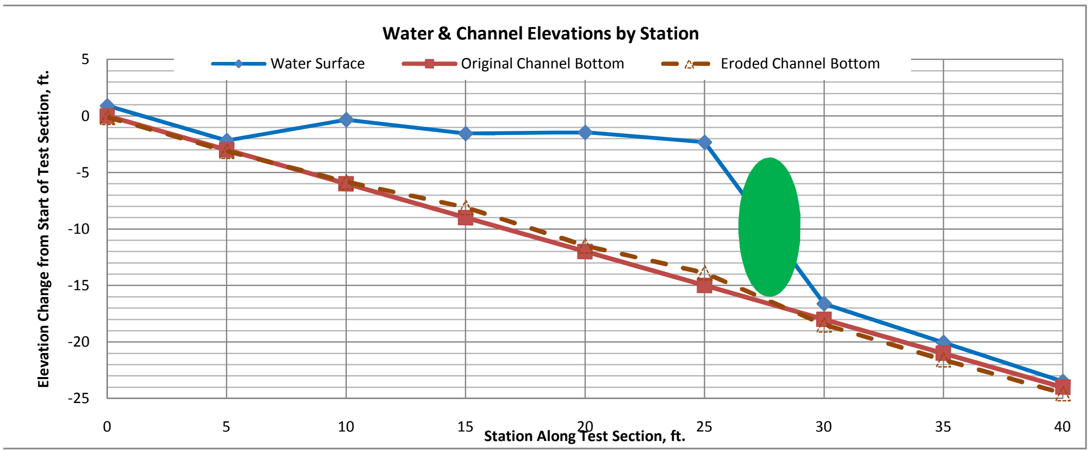
CJS 7/19/2012 (Rev. 8/21/14)
Quality Review / Date

Project: ASTM D 7208: Standard Test Method for Determination of Temporary Ditch Check Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.

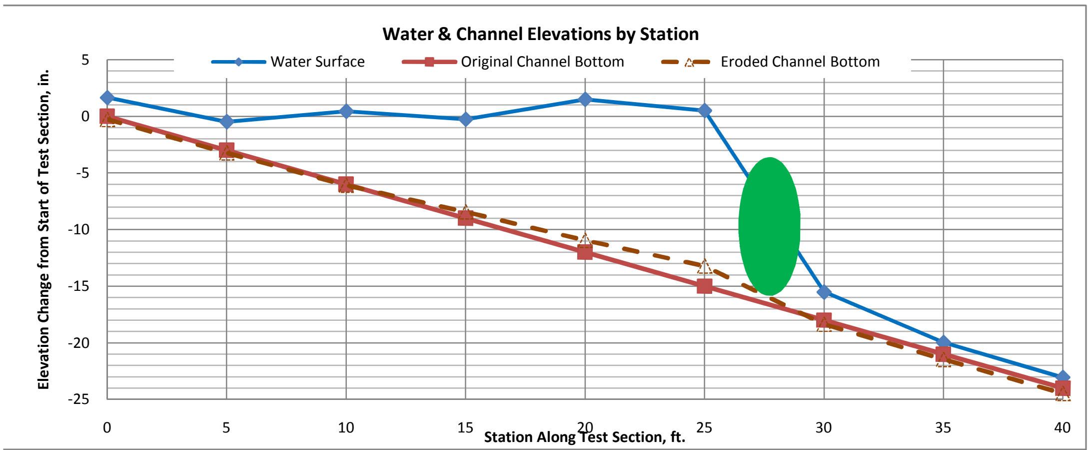
Test Setup: Trapezoid with 2-ft wide bottom and 2:1 side slopes x 40-ft long; 5% Bed Slope;

Client: GSWCC **Product:** Straw Bales Wooden Stakes / NRCS Install

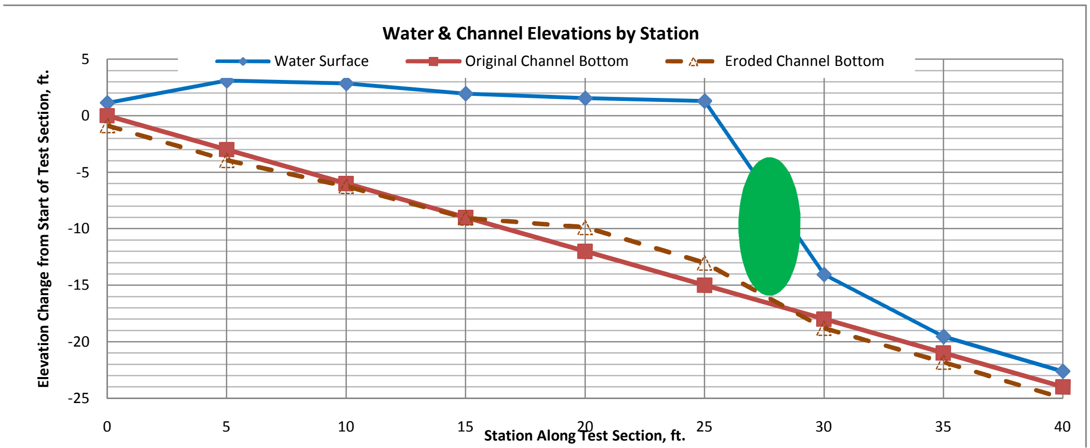
Flow: 0.5 cfs for 30 minutes **Test Date:** 7/3/2012



Flow: 1.0 cfs for 30 minutes **Test Date:** 7/5/2012



Flow: 2.0 cfs for 30 minutes **Test Date:** 7/16/2012



ASTM D7208	Date: 7/3/12	Start Time:	4:30 PM	End Time:	5:00 PM
	Soil: Sandy Clay	Target Flow (cfs):	0.50	Slope:	5%
60 ft long flume, 40 ft test section	SRD: Straw Bales	Installation: Wooden Stakes / NRCS Install			
2 ft wide flume					

TEST DATA

Outlet Weir	A	B	C	D	E	F	G	H	I						
								Weir						Channel Targets	
Water Depth, in								1.50						0.00	
Water Velocity, ft/s								0.00						0.00	
Flow Rate, cfs	0.00							0.00	0.00					0.00	

1 2 3 — FLOW — eir width (ft) = 2 — 0 ft C D E F G H

Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
Surface Elev, ft	1.880	2.149	2.352	2.382	2.379	2.359	2.326	2.139	1.854	8.994			3		2.3
To eroded Surface Elev, ft	1.880	2.149	2.392	2.402	2.385	2.362	2.343	2.139	1.854	9.030		Vavg (fps) =	3.00	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.021		
Clopper Soil Loss, ft	0.000	0.000	-0.039	-0.020	-0.007	-0.003	-0.016	0.000	0.000	-0.036	-0.108	Flow (cfs) =	0.50	0.26	0.08
5 ft		Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							

Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	2.123	2.343	2.595	2.612	2.631	2.618	2.608	2.359	2.149	9.944			3.1		2.6
To eroded Surface Elev, ft	2.123	2.365	2.602	2.621	2.644	2.625	2.615	2.382	2.149	9.995		Vavg (fps) =	3.10	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.020		
Clopper Soil Loss, ft	0.000	-0.023	-0.007	-0.010	-0.013	-0.007	-0.007	-0.023	0.000	-0.050	-0.151	Flow (cfs) =	0.50	0.26	0.08
10 ft		Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							

Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.946	2.215	2.398	2.428	2.454	2.448	2.431	2.208	1.942	9.274			1.61		2.0
To eroded Surface Elev, ft	1.969	2.247	2.375	2.402	2.425	2.461	2.484	2.208	1.965	9.295		Vavg (fps) =	1.61	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.023	0.026	0.030	0.000	0.000	0.000	0.000	0.035	0.105	navg =	0.120		
Clopper Soil Loss, ft	-0.023	-0.033	0.000	0.000	0.000	-0.013	-0.052	0.000	-0.023	-0.056	-0.167	Flow (cfs) =	0.50	1.38	0.44
15 ft		Avg Bottom Gain, ft		0.01	Avg Clopper Soil Loss, ft			-0.02							

Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.988	2.238	2.454	2.500	2.520	2.513	2.497	2.270	2.037	9.508			0.78		1.9
To eroded Surface Elev, ft	2.073	2.352	2.398	2.470	2.431	2.402	2.461	2.349	2.060	9.501		Vavg (fps) =	0.78	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.056	0.030	0.089	0.112	0.036	0.000	0.000	0.154	0.463	navg =	0.280		
Clopper Soil Loss, ft	-0.085	-0.115	0.000	0.000	0.000	0.000	0.000	-0.079	-0.023	-0.147	-0.441	Flow (cfs) =	0.50	1.66	0.53
20 ft		Avg Bottom Gain, ft		0.04	Avg Clopper Soil Loss, ft			-0.03							

Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.683	1.919	2.152	2.198	2.228	2.228	2.215	1.975	1.775	8.321			0.16		1.3
To eroded Surface Elev, ft	1.686	1.923	2.103	2.156	2.195	2.172	2.077	1.939	1.798	8.165		Vavg (fps) =	0.16	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.049	0.043	0.033	0.056	0.138	0.036	0.000	0.163	0.489	navg =	1.858		
Clopper Soil Loss, ft	-0.003	-0.003	0.000	0.000	0.000	0.000	0.000	0.000	-0.023	-0.007	-0.020	Flow (cfs) =	0.50	2.64	0.85
25 ft		Avg Bottom Gain, ft		0.04	Avg Clopper Soil Loss, ft			0.00							

Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.785	2.054	2.306	2.336	2.369	2.339	2.280	2.093	1.844	8.805			0.001		1.3
To eroded Surface Elev, ft	1.834	2.047	2.241	2.254	2.267	2.241	2.215	2.054	1.847	8.585		Vavg (fps) =	0.00	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.007	0.066	0.082	0.102	0.098	0.066	0.039	0.000	0.229	0.686	navg =	322.173		
Clopper Soil Loss, ft	-0.049	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.003	-0.009	-0.026	Flow (cfs) =	0.00	2.98	0.95
30 ft		Avg Bottom Gain, ft		0.05	Avg Clopper Soil Loss, ft			-0.01							

Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.608	1.860	2.083	2.159	2.208	2.205	2.159	1.975	1.742	8.174			2.4		2.1
To eroded Surface Elev, ft	1.608	1.864	2.126	2.205	2.247	2.238	2.208	1.975	1.742	8.273		Vavg (fps) =	2.40	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.040		
Clopper Soil Loss, ft	0.000	-0.003	-0.043	-0.046	-0.039	-0.033	-0.049	0.000	0.000	-0.098	-0.295	Flow (cfs) =	0.74	0.48	0.15
35 ft		Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.02							

Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.939	2.215	2.408	2.467	2.487	2.470	2.421	2.159	1.932	9.291			2.9		2.4
To eroded Surface Elev, ft	1.939	2.215	2.464	2.530	2.539	2.497	2.421	2.159	1.932	9.386		Vavg (fps) =	2.90	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.030		
Clopper Soil Loss, ft	0.000	0.000	-0.056	-0.062	-0.052	-0.026	0.000	0.000	0.000	-0.095	-0.285	Flow (cfs) =	0.76	0.41	0.13
40 ft		Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.02							

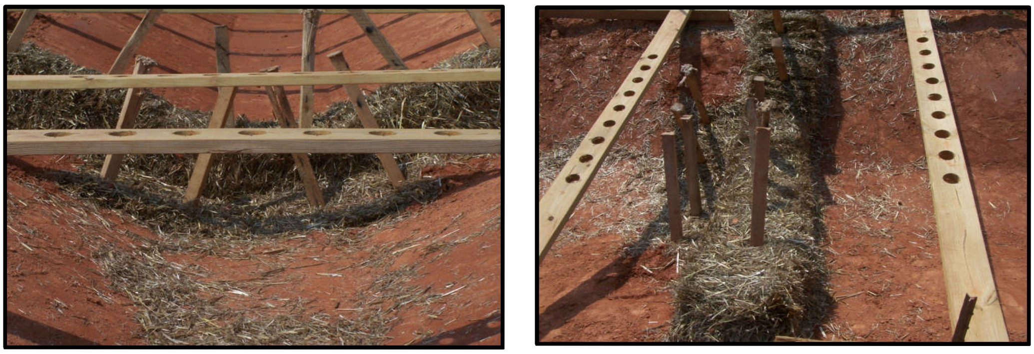
Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.854	2.087	2.316	2.346	2.339	2.316	2.270	2.018	1.775	8.758			2.8		2.3
To eroded Surface Elev, ft	1.854	2.087	2.333	2.398	2.395	2.346	2.287	2.018	1.775	8.842		Vavg (fps) =	2.80	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.025		
Clopper Soil Loss, ft	0.000	0.000	-0.016	-0.052	-0.056	-0.030	-0.016	0.000	0.000	-0.084	-0.253	Flow (cfs) =	0.55	0.31	0.10
		Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.02							

	A	B	C	D	E	F	G	H	I			
Avg Soil Gain, ft	0.000	0.000	0.018	0.014	0.022	0.024	0.025	0.005	0.000	Volume		Avg Bottom Gain per Xsection, ft = **0.000**
Avg Clopper Soil Loss, ft	-0.016	-0.025	-0.017	-0.021	-0.018	-0.011	-0.013	-0.015	-0.010	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft = **-0.009**

Trapezoidal Analysis										
	Original Surface Elev	229.738	**1 thru 6:**	X-Section Spacing, ft = 5	Original Surface Elev	88.786		**7 thru 9:**	X-Section Spacing, ft = 5	
	Eroded Surface Elev	228.817		Test Section Length, ft = 40	Eroded Surface Elev	89.719			Test Section Length, ft = 40	
	Soil Gain	2.332	0.175	gauge spacing, ft = 0.5	Soil Gain	0.000	0.000		gauge spacing, ft = 0.5	
	CSLI	-1.411	-0.106	hannel width measured, ft = 4	CSLI	-0.932	-0.070		channel width measured, ft = 4	

TYPICAL TEST PICTURES

0.5 cfs Flow (Enhanced Installation)



Check Structure Installation over Bare Soil

Initial Flow & Upstream Ponding Starting

Increased Ponding and Overtopping. No Apparent Underflow

End-of-test and Post-test With Upstream Sediment Deposition and Modest Downstream Scour

ASTM D7208	Date: 7/5/12	Start Time: 2:07 PM	End Time: 2:37 PM
	Soil: Sandy Clay	Target Flow (cfs): 0.50	Slope: 5%
60 ft long flume, 40 ft test section	SRD: Straw Bales	Installation: Wooden Stakes / NRCS Install	
2 ft wide flume	TEST DATA		

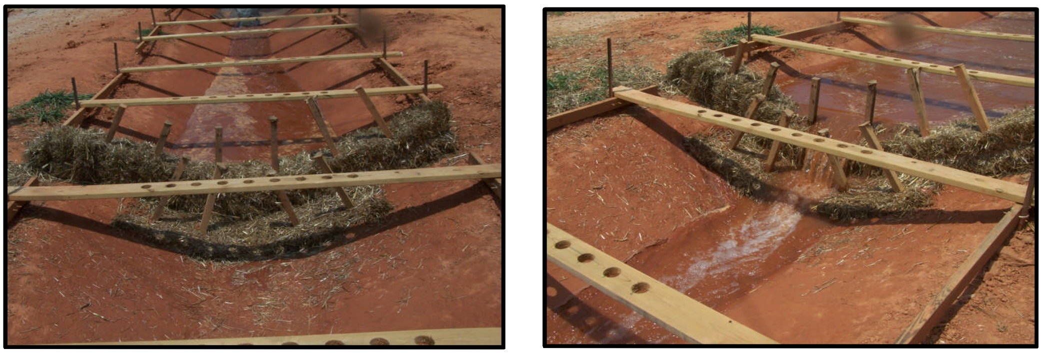
		A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
1 2 3	Outlet Weir								Weir						Channel Targets	
FLOW	Water Depth, in								2.25						1.50	
Weir width (ft) = 2	Water Velocity, ft/s								0.00						4.00	
0 ft C D E F G H	Flow Rate, cfs	0.00							0.00	0.00					0.00	
	Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	Surface Elev, ft	1.864	2.093	2.346	2.392	2.418	2.379	2.352	2.152	1.883	9.007			3.83		2.3
	To eroded Surface Elev, ft	1.864	2.106	2.395	2.428	2.425	2.405	2.372	2.188	1.896	9.109		Vavg (fps) =	3.83	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.024		
	Clopper Soil Loss, ft	0.000	-0.013	-0.049	-0.036	-0.007	-0.026	-0.020	-0.036	-0.013	-0.102	-0.305	Flow (cfs) =	0.50	0.45	0.14
5 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.02							
	Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	2.110	2.372	2.579	2.605	2.621	2.605	2.598	2.313	2.080	9.894			3.14		2.4
	To eroded Surface Elev, ft	2.192	2.379	2.598	2.644	2.621	2.621	2.615	2.320	2.083	9.967		Vavg (fps) =	3.14	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.037		
	Clopper Soil Loss, ft	-0.082	-0.007	-0.020	-0.039	0.000	-0.016	-0.016	-0.007	-0.003	-0.072	-0.217	Flow (cfs) =	0.50	0.65	0.21
10 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.02							
	Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.834	2.083	2.310	2.323	2.343	2.336	2.303	2.057	1.804	8.791			2.04		1.8
	To eroded Surface Elev, ft	1.867	2.106	2.320	2.329	2.343	2.349	2.352	2.106	1.827	8.881		Vavg (fps) =	2.04	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.108		
	Clopper Soil Loss, ft	-0.033	-0.023	-0.010	-0.007	0.000	-0.013	-0.049	-0.049	-0.023	-0.090	-0.271	Flow (cfs) =	0.50	1.68	0.54
15 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.02							
	Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.991	2.218	2.451	2.493	2.500	2.493	2.484	2.228	1.982	9.429			1.81		1.8
	To eroded Surface Elev, ft	2.054	2.280	2.359	2.434	2.461	2.451	2.392	2.333	2.047	9.419		Vavg (fps) =	1.81	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.092	0.059	0.039	0.043	0.092	0.000	0.000	0.142	0.427	navg =	0.143		
	Clopper Soil Loss, ft	-0.062	-0.062	0.000	0.000	0.000	0.000	0.000	-0.105	-0.066	-0.133	-0.399	Flow (cfs) =	0.50	2.15	0.69
20 ft				Avg Bottom Gain, ft	0.04			Avg Clopper Soil Loss, ft	-0.03							
	Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.844	1.991	2.208	2.238	2.274	2.257	2.241	2.011	1.772	8.508			0.51		1.1
	To eroded Surface Elev, ft	1.844	1.962	2.156	2.165	2.185	2.156	2.159	1.962	1.821	8.274		Vavg (fps) =	0.51	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.030	0.052	0.072	0.089	0.102	0.082	0.049	0.000	0.243	0.728	navg =	0.667		
	Clopper Soil Loss, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.049	-0.008	-0.025	Flow (cfs) =	0.50	3.23	1.04
25 ft				Avg Bottom Gain, ft	0.05			Avg Clopper Soil Loss, ft	-0.01							
	Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.831	2.070	2.297	2.356	2.382	2.359	2.326	2.110	1.877	8.882			0.1		1.1
	To eroded Surface Elev, ft	1.837	2.080	2.192	2.208	2.224	2.218	2.169	2.008	1.877	8.490		Vavg (fps) =	0.10	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.105	0.148	0.157	0.141	0.157	0.102	0.000	0.400	1.201	navg =	3.616		
	Clopper Soil Loss, ft	-0.007	-0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.008	-0.023	Flow (cfs) =	0.23	3.54	1.14
30 ft				Avg Bottom Gain, ft	0.09			Avg Clopper Soil Loss, ft	0.00							
	Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.644	1.913	2.142	2.195	2.208	2.195	2.172	1.975	1.739	8.256			3.36		2.0
	To eroded Surface Elev, ft	1.644	1.913	2.165	2.221	2.238	2.231	2.234	1.975	1.739	8.336		Vavg (fps) =	3.36	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.038		
	Clopper Soil Loss, ft	0.000	0.000	-0.023	-0.026	-0.030	-0.036	-0.062	0.000	0.000	-0.080	-0.240	Flow (cfs) =	1.59	0.74	0.24
35 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.02							
	Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.909	2.201	2.428	2.457	2.464	2.448	2.425	2.175	1.923	9.265			3.71		2.4
	To eroded Surface Elev, ft	1.909	2.201	2.444	2.477	2.536	2.470	2.451	2.175	1.923	9.332		Vavg (fps) =	3.71	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.026		
	Clopper Soil Loss, ft	0.000	0.000	-0.016	-0.020	-0.072	-0.023	-0.026	0.000	0.000	-0.067	-0.200	Flow (cfs) =	1.17	0.49	0.16
40 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.02							
	Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.844	2.057	2.297	2.382	2.375	2.365	2.329	2.073	1.844	8.867			4.04		2.3
	To eroded Surface Elev, ft	1.844	2.057	2.326	2.421	2.415	2.405	2.365	2.073	1.844	8.955		Vavg (fps) =	4.04	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.020		
	Clopper Soil Loss, ft	0.000	0.000	-0.030	-0.039	-0.039	-0.039	-0.036	0.000	0.000	-0.087	-0.262	Flow (cfs) =	0.95	0.37	0.12
				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.02							
	Avg Soil Gain, ft	0.000	0.004	0.021	0.019	0.018	0.021	0.025	0.007	0.000	Volume		Avg Bottom Gain per Xsection, ft = 0.000			
	Avg Clopper Soil Loss, ft	-0.025	-0.015	-0.018	-0.020	-0.017	-0.017	-0.021	-0.028	-0.022	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft = -0.020			

Trapezoidal Analysis									
	Original Surface Elev	227.835	1 thru 6:	X-Section Spacing, ft = 5	Original Surface Elev	89.134		7 thru 9:	X-Section Spacing, ft = 5
	Eroded Surface Elev	226.701		Test Section Length, ft = 40	Eroded Surface Elev	89.885			Test Section Length, ft = 40
	Soil Gain	2.925	0.219	gauge spacing, ft = 0.5	Soil Gain	0.000	0.000		gauge spacing, ft = 0.5
	CSLI	-1.791	-0.134	channel width measured, ft = 4	CSLI	-0.752	-0.056		channel width measured, ft = 4

TYPICAL TEST PICTURES

1.0 cfs Flow

Check Structure Installation over Bare Soil



Initial Flow & Upstream Ponding

Increased Ponding & Overtopping

End-of-test and Post-test

ASTM D7208	Date: 7/16/12	Start Time:	4:49 PM	End Time:	5:19 PM
	Soil: Sandy Clay	Target Flow (cfs):	2.00	Slope:	5%
60 ft long flume, 40 ft test section	SRD: Straw Bales	Installation: Wooden Stakes / NRCS Install			

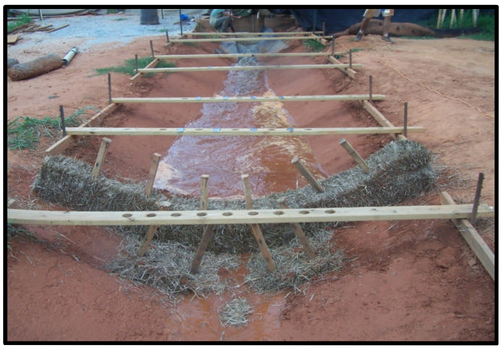
		A	B	C	D	E	F	G	H	I						
2 ft wide flume								TEST DATA								
1 2 3	**Outlet Weir**								Weir						Channel Targets	
FLOW	Water Depth, in								1.50						0.00	
eir width (ft) = 2	Water Velocity, ft/s								0.00						0.00	
0 ft C D E F G H	Flow Rate, cfs	0.00							0.00	0.00					0.00	
	Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	l Surface Elev, ft	1.037	1.460	1.932	2.379	2.405	2.343	1.873	1.375	0.889	7.428			5.1		2.3
	To eroded Surface Elev, ft	1.037	1.460	1.962	2.451	2.477	2.415	1.916	1.378	0.889	7.575		Vavg (fps) =	5.10	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.020		
	Clopper Soil Loss, ft	0.000	0.000	-0.030	-0.072	-0.072	-0.072	-0.043	-0.003	0.000	-0.147	-0.440	Flow (cfs) =	2.00	0.52	0.17
5 ft				Avg Bottom Gain, ft	0.00				Avg Clopper Soil Loss, ft	-0.03						
	Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.076	1.522	2.116	2.582	2.654	2.615	2.149	1.686	1.155	8.282			3.63		2.1
	To eroded Surface Elev, ft	1.076	1.522	2.159	2.654	2.717	2.717	2.175	1.686	1.155	8.442		Vavg (fps) =	3.63	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.063		
	Clopper Soil Loss, ft	0.000	0.000	-0.043	-0.072	-0.062	-0.102	-0.026	0.000	0.000	-0.160	-0.479	Flow (cfs) =	2.00	1.78	0.57
10 ft				Avg Bottom Gain, ft	0.00				Avg Clopper Soil Loss, ft	-0.03						
	Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	0.889	1.322	1.864	2.316	2.369	2.336	1.880	1.401	0.928	7.257			1.46		1.6
	To eroded Surface Elev, ft	0.889	1.342	1.883	2.297	2.392	2.395	1.926	1.401	0.928	7.326		Vavg (fps) =	1.46	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.020	0.000	0.000	0.000	0.000	0.000	0.013	0.039	navg =	0.190		
	Clopper Soil Loss, ft	0.000	-0.020	-0.020	0.000	-0.023	-0.059	-0.046	0.000	0.000	-0.082	-0.246	Flow (cfs) =	2.22	2.37	0.76
15 ft				Avg Bottom Gain, ft	0.00				Avg Clopper Soil Loss, ft	-0.02						
	Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.033	1.506	2.018	2.480	2.536	2.464	1.975	1.486	1.001	7.806			0.34		1.6
	To eroded Surface Elev, ft	1.033	1.480	2.001	2.375	2.543	2.575	2.110	1.486	1.001	7.835		Vavg (fps) =	0.34	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.026	0.016	0.105	0.000	0.000	0.000	0.000	0.000	0.093	0.279	navg =	0.924		
	Clopper Soil Loss, ft	0.000	0.000	0.000	0.000	-0.007	-0.112	-0.135	0.000	0.000	-0.121	-0.364	Flow (cfs) =	0.62	2.86	0.92
20 ft				Avg Bottom Gain, ft	0.02				Avg Clopper Soil Loss, ft	-0.03						
	Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	0.689	1.132	1.614	2.106	2.119	2.080	1.594	1.125	0.640	6.293			0.33		1.0
	To eroded Surface Elev, ft	0.689	1.194	1.585	1.896	2.001	1.880	1.732	1.276	0.640	6.159		Vavg (fps) =	0.33	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.030	0.210	0.118	0.200	0.000	0.000	0.000	0.323	0.968	navg =	1.014		
	Clopper Soil Loss, ft	0.000	-0.062	0.000	0.000	0.000	0.000	-0.138	-0.151	0.000	-0.188	-0.564	Flow (cfs) =	0.67	3.15	1.01
25 ft				Avg Bottom Gain, ft	0.06				Avg Clopper Soil Loss, ft	-0.04						
	Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	0.965	1.378	1.962	2.385	2.438	2.352	1.906	1.450	0.988	7.471			0.25		1.1
	To eroded Surface Elev, ft	0.981	1.414	1.877	2.093	2.287	2.300	1.995	1.457	0.994	7.224		Vavg (fps) =	0.25	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.085	0.292	0.151	0.052	0.000	0.000	0.000	0.308	0.925	navg =	1.507		
	Clopper Soil Loss, ft	-0.016	-0.036	0.000	0.000	0.000	0.000	-0.089	-0.007	-0.007	-0.062	-0.185	Flow (cfs) =	0.60	3.77	1.21
30 ft				Avg Bottom Gain, ft	0.06				Avg Clopper Soil Loss, ft	-0.02						
	Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.755	2.008	2.152	2.224	2.254	2.228	2.175	1.929	1.654	8.355			3.66		1.9
	To eroded Surface Elev, ft	1.759	2.008	2.247	2.274	2.320	2.313	2.201	1.946	1.654	8.518		Vavg (fps) =	3.66	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.049		
	Clopper Soil Loss, ft	-0.003	0.000	-0.095	-0.049	-0.066	-0.085	-0.026	-0.016	0.000	-0.163	-0.490	Flow (cfs) =	2.88	1.23	0.39
35 ft				Avg Bottom Gain, ft	0.00				Avg Clopper Soil Loss, ft	-0.04						
	Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.867	2.044	2.280	2.320	2.316	2.283	2.224	1.952	1.716	8.603			4.54		2.2
	To eroded Surface Elev, ft	1.867	2.093	2.346	2.369	2.365	2.385	2.280	1.962	1.716	8.800		Vavg (fps) =	4.54	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.023		
	Clopper Soil Loss, ft	0.000	-0.049	-0.066	-0.049	-0.049	-0.102	-0.056	-0.010	0.000	-0.197	-0.591	Flow (cfs) =	1.55	0.53	0.17
40 ft				Avg Bottom Gain, ft	0.00				Avg Clopper Soil Loss, ft	-0.04						
	Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.890	2.136	2.365	2.392	2.379	2.323	2.290	2.057	1.749	8.889			6.26		2.3
	To eroded Surface Elev, ft	1.890	2.136	2.418	2.448	2.448	2.451	2.349	2.057	1.749	9.072		Vavg (fps) =	6.26	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.017		
	Clopper Soil Loss, ft	0.000	0.000	-0.052	-0.056	-0.069	-0.128	-0.059	0.000	0.000	-0.183	-0.548	Flow (cfs) =	2.30	0.57	0.18
				Avg Bottom Gain, ft	0.00				Avg Clopper Soil Loss, ft	-0.04						
	Avg Soil Gain, ft	0.000	0.004	0.007	0.048	0.017	0.029	0.000	0.000	0.000	Volume		Avg BottomGain per Xsection, ft =	**0.000**		
	Avg Clopper Soil Loss, ft	0.000	-0.019	-0.030	-0.036	-0.040	-0.082	-0.072	-0.023	0.000	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft =	**-0.032**		

Trapezoidal Analysis	Original Surface Elev	185.441	1 thru 6:	X-Section Spacing, ft =	5	Original Surface Elev	86.128		7 thru 9:	X-Section Spacing, ft =	5
	Eroded Surface Elev	185.804		Test Section Length, ft =	40	Eroded Surface Elev	87.977			Test Section Length, ft =	40
	Soil Gain	2.914	0.219	gauge spacing, ft =	0.5	Soil Gain	0.000	0.000		gauge spacing, ft =	0.5
	CSLI	-3.277	-0.246	hannel width measured, ft =	4	CSLI	-1.850	-0.139		channel width measured, ft =	4

TYPICAL TEST PICTURES

2.0 cfs Flow


Check Structure Installation over Bare Soil

Initial Flow & Upstream Ponding


Increased Ponding and Overtopping


End-of-test and Post-test condition.

Project: ASTM D 7208: Standard Test Method for Determination of Temporary Ditch Check Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.

Test Setup: Trapezoid with 2-ft wide bottom and 2:1 side slopes x 40-ft long; 5% Bed Slope;

Client: GSWCC **Product:** Filtrexx Compost Sock

Flow: 0.5 cfs for 30 minutes **Test Date:** 5/15/2012

	Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft^2	Soil Loss, ft^2	Flow Depth, in	Wetted Area, ft^2	Flow Velocity, ft/s	Shear, psf
	0	0.00	-0.08	0.00	-0.038	1.25	6.16	2.80	0.32
	5	0.00	-0.04	0.00	-0.017	1.00	11.86	3.00	0.26
	10	0.00	-0.10	0.00	-0.042	1.25	12.33	2.90	0.32
	15	0.00	-0.04	0.00	-0.017	3.50	16.52	0.23	0.91
9" High	20	0.10	-0.03	0.03	-0.010	4.88	19.08	0.19	1.27
Check	25	0.11	0.00	0.04	0.000	6.00	21.18	0.60	1.56
Location	30	0.00	-0.12	0.00	-0.049	1.38	12.56	1.95	0.36
	35	0.01	-0.17	0.00	-0.066	1.37	12.56	2.50	0.36
	40	0.00	-0.24	0.00	-0.090	1.00	5.93	3.00	0.26
				Total Soil Gain, ft^3	Total Soil Loss, ft^3		Total Wetted Area, ft^2	SAI - Soil Accretion Index	CSLI - Clopper Soil Loss Index
				0.28	-1.21		118.20	0.24	-1.02

Flow: 1.0 cfs for 30 minutes **Test Date:** 6/13/2012

	Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft^2	Soil Loss, ft^2	Flow Depth, in	Wetted Area, ft^2	Flow Velocity, ft/s	Shear, psf
	0	0.00	-0.09	0.00	-0.038	1.50	6.39	3.20	0.39
	5	0.00	-0.11	0.00	-0.039	1.50	12.79	3.40	0.39
	10	0.00	-0.16	0.00	-0.057	1.54	12.86	3.00	0.40
	15	0.00	-0.01	0.00	-0.004	3.66	16.82	0.30	0.95
9" High	20	0.13	-0.03	0.06	-0.008	5.12	19.54	0.21	1.33
Check	25	0.35	-0.03	0.13	-0.015	5.75	20.71	0.61	1.49
Location	30	0.00	-0.19	0.00	-0.068	1.81	13.37	2.59	0.47
	35	0.00	-0.23	0.00	-0.074	1.61	13.01	3.00	0.42
	40	0.00	-0.34	0.00	-0.135	1.54	6.43	3.42	0.40
				Total Soil Gain, ft^3	Total Soil Loss, ft^3		Total Wetted Area, ft^2	SAI - Soil Accretion Index	CSLI - Clopper Soil Loss Index
				0.62	-1.55		121.93	0.51	-1.27

Flow: 2.0 cfs for 30 minutes **Test Date:** 5/22/2012

	Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft^2	Soil Loss, ft^2	Flow Depth, in	Wetted Area, ft^2	Flow Velocity, ft/s	Shear, psf
	0	0.00	-0.14	0.00	-0.056	2.13	6.98	4.60	0.55
	5	0.00	-0.28	0.00	-0.094	2.00	13.73	4.80	0.52
	10	0.00	-0.14	0.00	-0.042	2.13	13.96	4.50	0.55
	15	0.01	-0.32	0.00	-0.118	4.63	18.62	0.39	1.20
9" High	20	0.43	-0.64	0.18	-0.200	5.25	19.78	0.23	1.36
Check	25	1.29	-0.93	0.51	-0.217	3.25	16.06	0.65	0.84
Location	30	0.00	-0.26	0.00	-0.106	3.12	15.82	3.30	0.81
	35	0.00	-0.18	0.00	-0.069	2.25	14.19	4.40	0.58
	40	0.00	-0.34	0.00	-0.138	2.13	6.98	4.70	0.55
				Total Soil Gain, ft^3	Total Soil Loss, ft^3		Total Wetted Area, ft^2	SAI - Soil Accretion Index	CSLI - Clopper Soil Loss Index
				2.19	-3.90		126.12	1.73	-3.09

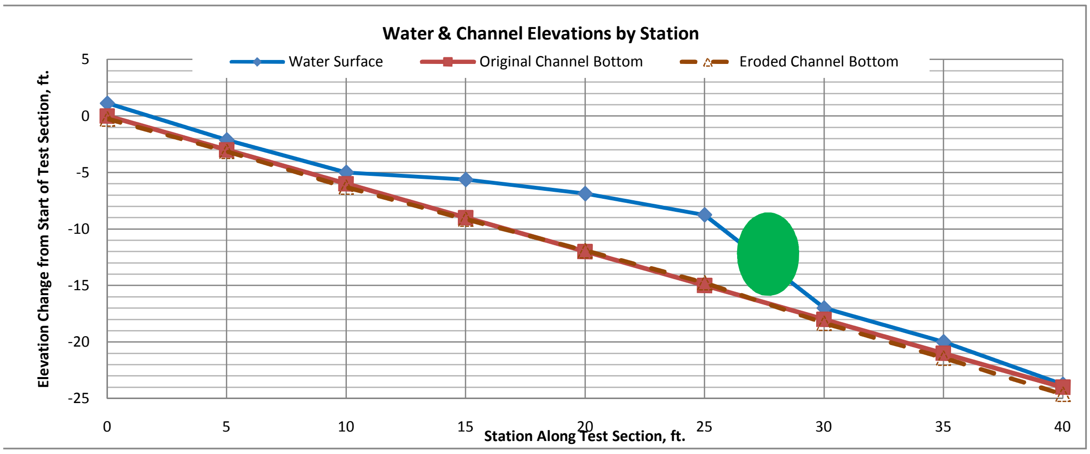
CJS 6/30/2012 (Rev. 8/21/14)
Quality Review / Date

Project: ASTM D 7208: Standard Test Method for Determination of Temporary Ditch Check Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.

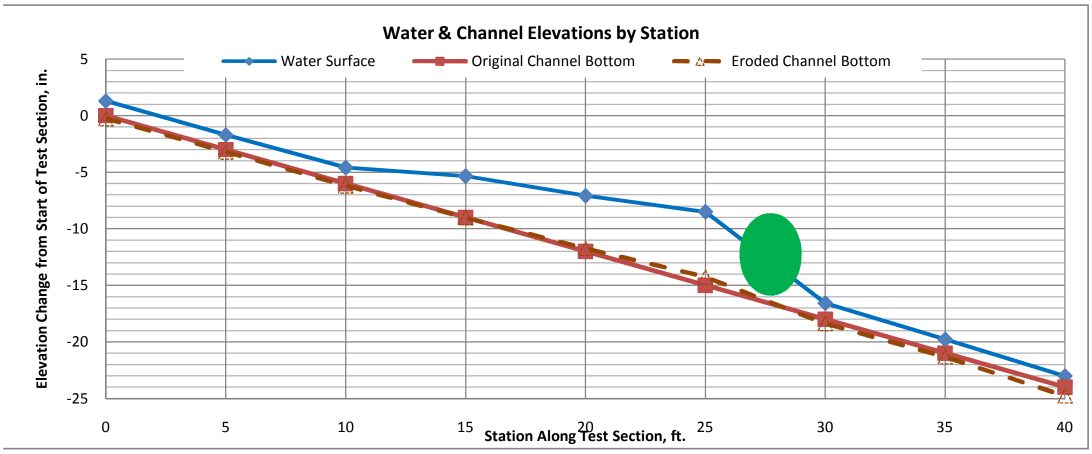
Test Setup: Trapezoid with 2-ft wide bottom and 2:1 side slopes x 40-ft long; 5% Bed Slope;

Client: GSWCC **Product:** Filtrexx Compost Sock

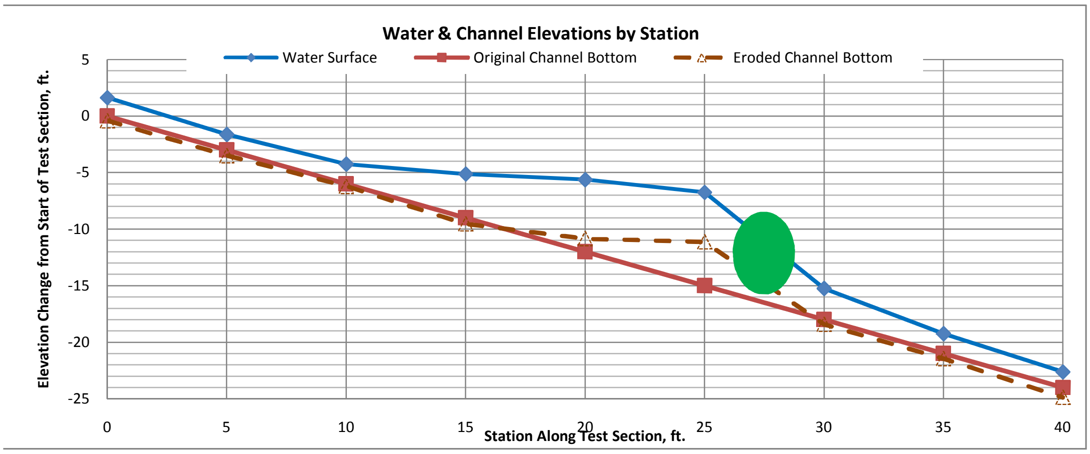
Flow: 0.5 cfs for 30 minutes **Test Date:** 5/15/2012



Flow: 1.0 cfs for 30 minutes **Test Date:** 6/13/2012



Flow: 2.0 cfs for 30 minutes **Test Date:** 5/22/2012



ASTM D7208	Date: 5/15/12	Start Time:	11:38 AM	End Time:	12:08 PM
	Soil: Sandy Clay	Target Flow (cfs):	0.50	Slope:	5%
60 ft long flume	40 ft test section	**SRD:** Filtrexx Sock	**Installation:** Wooden Stakes		
2 ft wide flume		**TEST DATA**			

	Label	A	B	C	D	E	F	G	H	I						
1 2 3	**Outlet Weir**								Weir						Channel Targets	
FLOW	Water Depth, in								0.00						0.00	
eir width (ft) = 2	Water Velocity, ft/s								0.00						0.00	
0 ft C D E F G H	Flow Rate, cfs	0.00							0.00	0.00					0.00	
	Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	6.635	6.802	7.010	7.031	7.010	6.969	6.938	6.917	6.792	27.703			2.8		6.9
	To eroded Surface Elev, ft	6.635	6.802	7.010	7.052	7.021	7.000	6.938	6.917	6.792	27.741		Vavg (fps) =	2.80	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.026		
	Clopper Soil Loss, ft	0.000	0.000	0.000	-0.021	-0.010	-0.031	0.000	0.000	0.000	-0.038	-0.115	Flow (cfs) =	0.50	0.32	0.10
5 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							
	Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	6.719	6.958	7.188	7.344	7.344	7.344	7.271	7.104	6.865	28.698			3		7.3
	To eroded Surface Elev, ft	6.719	6.958	7.188	7.354	7.354	7.354	7.271	7.104	6.865	28.715		Vavg (fps) =	3.00	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.021		
	Clopper Soil Loss, ft	0.000	0.000	0.000	-0.010	-0.010	-0.010	0.000	0.000	0.000	-0.017	-0.052	Flow (cfs) =	0.50	0.26	0.08
10 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			0.00							
	Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	6.979	7.250	7.490	7.583	7.583	7.583	7.563	7.427	7.198	29.804			2.9		7.5
	To eroded Surface Elev, ft	6.979	7.250	7.490	7.615	7.604	7.604	7.563	7.427	7.198	29.845		Vavg (fps) =	2.90	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.025		
	Clopper Soil Loss, ft	0.000	0.000	0.000	-0.031	-0.021	-0.021	0.000	0.000	0.000	-0.042	-0.125	Flow (cfs) =	0.50	0.32	0.10
15 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							
	Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	7.208	7.438	7.677	7.771	7.823	7.823	7.781	7.615	7.375	30.622			0.23		7.5
	To eroded Surface Elev, ft	7.208	7.438	7.677	7.781	7.833	7.833	7.781	7.615	7.375	30.639		Vavg (fps) =	0.23	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.635		
	Clopper Soil Loss, ft	0.000	0.000	0.000	-0.010	-0.010	-0.010	0.000	0.000	0.000	-0.017	-0.052	Flow (cfs) =	0.50	0.91	0.29
20 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			0.00							
	Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	7.396	7.594	7.844	7.969	8.021	8.021	7.917	7.875	7.646	31.406			0.19		7.6
	To eroded Surface Elev, ft	7.396	7.594	7.854	7.979	8.000	8.010	7.885	7.865	7.646	31.385		Vavg (fps) =	0.19	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.021	0.010	0.031	0.010	0.000	0.031	0.094	navg =	0.959		
	Clopper Soil Loss, ft	0.000	0.000	-0.010	-0.010	0.000	0.000	0.000	0.000	0.000	-0.010	-0.031	Flow (cfs) =	0.50	1.27	0.41
25 ft			Avg Bottom Gain, ft		0.01	Avg Clopper Soil Loss, ft			0.00							
	Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	7.594	7.844	8.104	8.219	8.250	8.219	8.198	8.010	7.771	32.273			0.6		7.7
	To eroded Surface Elev, ft	7.594	7.844	8.094	8.198	8.229	8.198	8.188	8.010	7.771	32.231		Vavg (fps) =	0.60	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.010	0.021	0.021	0.021	0.010	0.000	0.000	0.042	0.125	navg =	0.349		
	Clopper Soil Loss, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Flow (cfs) =	0.60	1.56	0.50
30 ft			Avg Bottom Gain, ft		0.01	Avg Clopper Soil Loss, ft			0.00							
	Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	7.948	8.135	8.365	8.479	8.490	8.490	8.458	8.302	8.063	33.377			1.95		8.4
	To eroded Surface Elev, ft	7.948	8.135	8.365	8.510	8.521	8.510	8.469	8.302	8.063	33.425		Vavg (fps) =	1.95	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.040		
	Clopper Soil Loss, ft	0.000	0.000	0.000	-0.031	-0.031	-0.021	-0.010	0.000	0.000	-0.049	-0.146	Flow (cfs) =	0.45	0.36	0.11
35 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							
	Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	8.156	8.375	8.615	8.688	8.698	8.688	8.635	8.469	8.177	34.184			2.5		8.6
	To eroded Surface Elev, ft	8.156	8.375	8.604	8.729	8.729	8.719	8.656	8.469	8.177	34.247		Vavg (fps) =	2.50	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.010	navg =	0.031		
	Clopper Soil Loss, ft	0.000	0.000	0.000	-0.042	-0.031	-0.031	-0.021	0.000	0.000	-0.066	-0.198	Flow (cfs) =	0.57	0.36	0.11
40 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							
	Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	8.365	8.594	8.823	8.969	9.021	9.021	8.979	8.885	8.635	35.420			3		9.0
	To eroded Surface Elev, ft	8.365	8.594	8.823	9.000	9.083	9.083	9.000	8.885	8.635	35.510		Vavg (fps) =	3.00	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.021		
	Clopper Soil Loss, ft	0.000	0.000	0.000	-0.031	-0.063	-0.063	-0.021	0.000	0.000	-0.090	-0.271	Flow (cfs) =	0.50	0.26	0.08
			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.02							
	Soil Gain, in	0.000	0.000	0.001	0.000	0.001	0.001	0.002	0.001	0.000	**Volume**		Avg Bottom Gain per Xsection, ft =		0.000	
	Clopper Soil Loss, in	0.000	0.000	-0.001	-0.009	-0.008	-0.009	-0.002	0.000	0.000	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft =		-0.007	

Trapezoidal Analysis	Original Surface Elev	752.587	**1 thru 6:**	X-Section Spacing, ft =	5	Original Surface Elev	342.912		**7 thru 9:**	X-Section Spacing, ft =	5
	Eroded Surface Elev	752.856		Test Section Length, ft =	40	Eroded Surface Elev	343.572			Test Section Length, ft =	40
	Soil Gain	0.260	0.020	gauge spacing, ft =	0.5	Soil Gain	0.017	0.001		gauge spacing, ft =	0.5
	CSLI	-0.530	-0.040	hannel width measured, ft =	4	CSLI	-0.677	-0.051		channel width measured, ft =	4

TYPICAL TEST PICTURES

0.5 cfs Flow


Check Structure Installation over Bare Soil


Initial Flow & Upstream Ponding


Increased Ponding and Overtopping


End-of-test and Post-test condition.

ASTM D7208	Date: 6/13/12				Start Time: 3:58 PM		End Time: 4:28 PM
	Soil: Sandy Clay				Target Flow (cfs): 1.00		Slope: 5%
60 ft long flume	40 ft test section	SRD: Filtrexx Sock		Installation: Wooden Stakes			
	2 ft wide flume			TEST DATA			
1 2 3							
FLOW							
Weir width (ft) = 2							
0 ft C D E F G H							

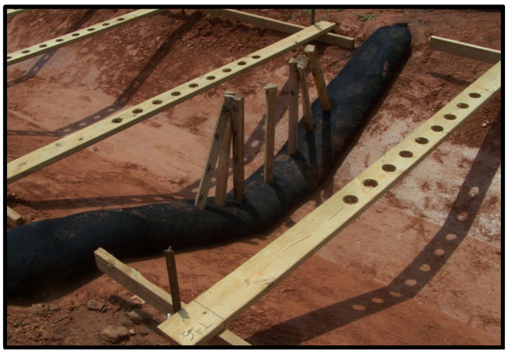
	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
Outlet Weir								Weir						Channel Targets	
Water Depth, in								2.13						0.00	
Water Velocity, ft/s								0.00						0.00	
Flow Rate, cfs	0.00							0.00	0.00					0.00	
Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.857	2.123	2.359	2.415	2.421	2.434	2.434	2.274	2.008	9.213			3.2		2.3
To eroded Surface Elev, ft	1.857	2.123	2.359	2.428	2.438	2.470	2.434	2.274	2.008	9.251		Vavg (fps) =	3.20	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.026		
Clopper Soil Loss, ft	0.000	0.000	0.000	-0.013	-0.016	-0.036	0.000	0.000	0.000	-0.038	-0.115	Flow (cfs) =	1.00	0.39	0.12
5 ft		Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							
Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	2.087	2.313	2.582	2.638	2.651	2.657	2.641	2.477	2.224	10.067			3.4		2.5
To eroded Surface Elev, ft	2.087	2.313	2.595	2.648	2.667	2.684	2.657	2.477	2.224	10.106		Vavg (fps) =	3.40	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.024		
Clopper Soil Loss, ft	0.000	0.000	-0.013	-0.010	-0.016	-0.026	-0.016	0.000	0.000	-0.039	-0.118	Flow (cfs) =	1.00	0.39	0.12
10 ft		Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							
Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.791	2.060	2.326	2.362	2.382	2.385	2.382	2.215	1.985	9.008			3		2.3
To eroded Surface Elev, ft	1.791	2.060	2.333	2.392	2.392	2.395	2.431	2.228	1.985	9.064		Vavg (fps) =	3.00	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.028		
Clopper Soil Loss, ft	0.000	0.000	-0.007	-0.030	-0.010	-0.010	-0.049	-0.013	0.000	-0.057	-0.171	Flow (cfs) =	1.00	0.40	0.13
15 ft		Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							
Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.959	2.215	2.444	2.493	2.503	2.493	2.497	2.323	2.139	9.514			0.3		2.2
To eroded Surface Elev, ft	1.959	2.215	2.451	2.493	2.503	2.497	2.497	2.323	2.139	9.518		Vavg (fps) =	0.30	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.502		
Clopper Soil Loss, ft	0.000	0.000	-0.007	0.000	0.000	-0.003	0.000	0.000	0.000	-0.004	-0.013	Flow (cfs) =	1.00	0.95	0.31
20 ft		Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			0.00							
Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.634	1.903	2.159	2.254	2.297	2.306	2.339	2.172	1.939	8.617			0.21		1.9
To eroded Surface Elev, ft	1.634	1.906	2.142	2.185	2.313	2.293	2.339	2.172	1.939	8.565		Vavg (fps) =	0.21	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.016	0.069	0.000	0.013	0.000	0.000	0.000	0.060	0.180	navg =	0.897		
Clopper Soil Loss, ft	0.000	-0.003	0.000	0.000	-0.016	0.000	0.000	0.000	0.000	-0.008	-0.023	Flow (cfs) =	1.00	1.33	0.43
25 ft		Avg Bottom Gain, ft		0.01	Avg Clopper Soil Loss, ft			0.00							
Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.827	2.073	2.320	2.336	2.346	2.359	2.316	2.195	1.978	8.937			0.61		1.8
To eroded Surface Elev, ft	1.827	2.096	2.287	2.260	2.283	2.313	2.274	2.192	1.978	8.823		Vavg (fps) =	0.61	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.033	0.075	0.062	0.046	0.043	0.003	0.000	0.129	0.387	navg =	0.333		
Clopper Soil Loss, ft	0.000	-0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.015	-0.046	Flow (cfs) =	0.58	1.49	0.48
30 ft		Avg Bottom Gain, ft		0.03	Avg Clopper Soil Loss, ft			0.00							
Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.637	1.886	2.126	2.169	2.169	2.169	2.103	2.067	1.824	8.237			2.59		2.1
To eroded Surface Elev, ft	1.637	1.886	2.126	2.195	2.201	2.205	2.149	2.067	1.824	8.304		Vavg (fps) =	2.59	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.036		
Clopper Soil Loss, ft	0.000	0.000	0.000	-0.026	-0.033	-0.036	-0.046	0.000	0.000	-0.068	-0.203	Flow (cfs) =	0.78	0.47	0.15
35 ft		Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.02							
Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.867	2.116	2.329	2.372	2.382	2.385	2.375	2.175	1.936	9.028			3		2.3
To eroded Surface Elev, ft	1.867	2.116	2.372	2.402	2.415	2.405	2.425	2.175	1.936	9.103		Vavg (fps) =	3.00	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.029		
Clopper Soil Loss, ft	0.000	0.000	-0.043	-0.030	-0.033	-0.020	-0.049	0.000	0.000	-0.074	-0.223	Flow (cfs) =	0.81	0.42	0.13
40 ft		Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.02							
Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.742	1.978	2.195	2.306	2.346	2.326	2.283	2.096	1.854	8.679			3.42		2.3
To eroded Surface Elev, ft	1.742	1.978	2.195	2.372	2.392	2.408	2.346	2.096	1.854	8.813		Vavg (fps) =	3.42	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.025		
Clopper Soil Loss, ft	0.000	0.000	0.000	-0.066	-0.046	-0.082	-0.062	0.000	0.000	-0.135	-0.404	Flow (cfs) =	0.88	0.40	0.13
		Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.03							
Soil Gain, in	0.000	0.000	0.001	0.004	0.000	0.001	0.000	0.000	0.000	Volume		Avg Bottom Gain per Xsection, ft = 0.000			
Clopper Soil Loss, in	0.000	0.000	-0.004	-0.008	-0.008	-0.010	-0.010	-0.001	0.000	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft = -0.007			

Straw Bales

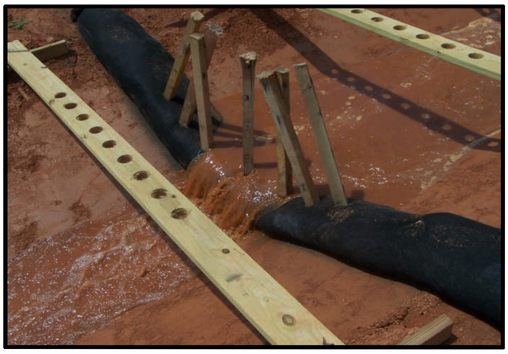
Trapezoidal Analysis										
Original Surface Elev	231.400	1 thru 6:	X-Section Spacing, ft =	5	Original Surface Elev	87.430		7 thru 9:	X-Section Spacing, ft =	5
Eroded Surface Elev	231.452		Test Section Length, ft =	40	Eroded Surface Elev	88.308			Test Section Length, ft =	40
Soil Gain	0.623	0.047	gauge spacing, ft =	0.5	Soil Gain	0.000	0.000		gauge spacing, ft =	0.5
CSLI	-0.675	-0.051	channel width measured, ft =	4	CSLI	-0.878	-0.066		channel width measured, ft =	4

TYPICAL TEST PICTURES

1.0 cfs Flow




Check Structure Installation over Bare Soil




Initial Flow & Upstream Ponding with Overtopping


Increased Ponding and Overtopping. No Apparent Underflow

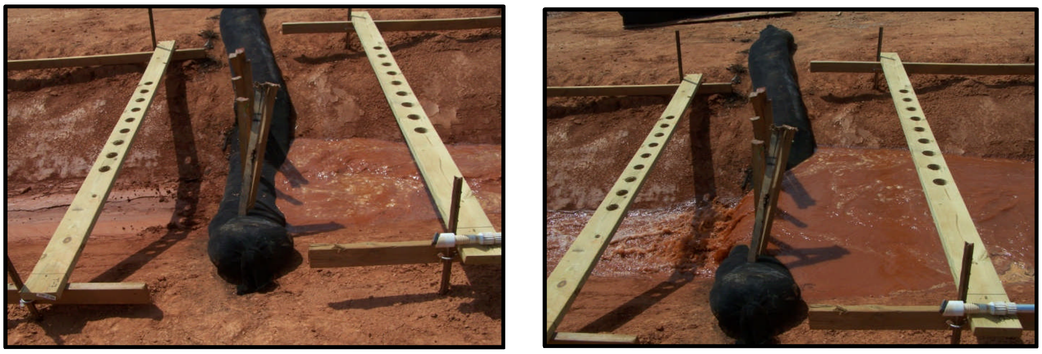

End-of-test and Post-test With Upstream Sediment Deposition

ASTM D7208	Date: 5/22/12								Start Time:	3:21 AM			End Time:	3:51 PM	
	Soil: Sandy Clay								Target Flow (cfs):	2.00			Slope:	5%	
60 ft long flume 40 ft test section	**RECP:** Filtrexx Sock				**Anchorage:** Wooden Stakes										
2 ft wide flume	**TEST DATA**														
1 2 3 **Outlet Weir**								Weir						Channel Targets	
FLOW Water Depth, in								0.00						0.00	
Weir width (ft) = 2 Water Velocity, ft/s								0.00						0.00	
0 ft C D E F G H Flow Rate, cfs	0.00							0.00	0.00					0.00	
Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	4.906	5.198	5.344	5.417	5.458	5.417	5.354	5.208	5.063	21.207			4.6		5.3
To eroded Surface Elev, ft	4.906	5.198	5.344	5.458	5.500	5.438	5.354	5.208	5.063	21.262		Vavg (fps) =	4.60	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.023		
Clopper Soil Loss, ft	0.000	0.000	0.000	-0.042	-0.042	-0.021	0.000	0.000	0.000	-0.056	-0.167	Flow (cfs) =	2.00	0.55	0.18
5 ft	Avg Bottom Gain, ft			0.00	Avg Clopper Soil Loss, ft			-0.01							
Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	4.990	5.292	5.500	5.625	5.667	5.625	5.583	5.458	5.188	21.946			4.8		5.6
To eroded Surface Elev, ft	4.990	5.292	5.500	5.625	5.719	5.698	5.667	5.458	5.188	22.040		Vavg (fps) =	4.80	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.021		
Clopper Soil Loss, ft	0.000	0.000	0.000	0.000	-0.052	-0.073	-0.083	0.000	0.000	-0.094	-0.281	Flow (cfs) =	2.00	0.52	0.17
10 ft	Avg Bottom Gain, ft			0.00	Avg Clopper Soil Loss, ft			-0.02							
Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	5.302	5.573	5.813	5.917	5.938	5.938	5.896	5.740	5.500	23.127			4.5		5.8
To eroded Surface Elev, ft	5.302	5.573	5.833	5.917	5.969	5.958	5.927	5.740	5.500	23.168		Vavg (fps) =	4.50	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.023		
Clopper Soil Loss, ft	0.000	0.000	-0.021	0.000	-0.031	-0.021	-0.031	0.000	0.000	-0.042	-0.125	Flow (cfs) =	1.59	0.55	0.18
15 ft	Avg Bottom Gain, ft			0.00	Avg Clopper Soil Loss, ft			-0.01							
Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	5.458	5.708	5.990	6.063	6.104	6.125	6.083	5.906	5.688	23.785			0.39		5.8
To eroded Surface Elev, ft	5.458	5.750	5.979	6.104	6.167	6.156	6.146	5.906	5.688	23.899		Vavg (fps) =	0.39	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.010	navg =	0.451		
Clopper Soil Loss, ft	0.000	-0.042	0.000	-0.042	-0.063	-0.031	-0.063	0.000	0.000	-0.118	-0.354	Flow (cfs) =	0.30	1.20	0.39
20 ft	Avg Bottom Gain, ft			0.00	Avg Clopper Soil Loss, ft			-0.03							
Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	5.615	5.896	6.146	6.281	6.313	6.323	6.323	6.229	6.010	24.684			0.23		5.8
To eroded Surface Elev, ft	5.708	6.125	6.177	6.115	6.219	6.292	6.313	6.208	6.135	24.703		Vavg (fps) =	0.23	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.167	0.094	0.031	0.010	0.021	0.000	0.181	0.542	navg =	0.833		
Clopper Soil Loss, ft	-0.094	-0.229	-0.031	0.000	0.000	0.000	0.000	0.000	-0.125	-0.200	-0.599	Flow (cfs) =	0.20	1.36	0.44
25 ft	Avg Bottom Gain, ft			0.04	Avg Clopper Soil Loss, ft			-0.05							
Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	5.823	6.104	6.333	6.479	6.563	6.521	6.490	6.365	6.083	25.425			0.65		5.9
To eroded Surface Elev, ft	6.063	6.240	6.375	6.146	6.146	6.302	6.521	6.406	6.292	25.135		Vavg (fps) =	0.65	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.333	0.417	0.219	0.000	0.000	0.000	0.507	1.521	navg =	0.214		
Clopper Soil Loss, ft	-0.240	-0.135	-0.042	0.000	0.000	0.000	-0.031	-0.042	-0.208	-0.217	-0.651	Flow (cfs) =	0.35	0.84	0.27
30 ft	Avg Bottom Gain, ft			0.11	Avg Clopper Soil Loss, ft			-0.08							
Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	6.146	6.396	6.656	6.771	6.802	6.813	6.792	6.646	6.396	26.590			3.3		6.6
To eroded Surface Elev, ft	6.156	6.406	6.656	6.802	6.833	6.854	6.823	6.688	6.396	26.696		Vavg (fps) =	3.30	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.041		
Clopper Soil Loss, ft	-0.010	-0.010	0.000	-0.031	-0.031	-0.042	-0.031	-0.042	0.000	-0.106	-0.318	Flow (cfs) =	1.72	0.81	0.26
35 ft	Avg Bottom Gain, ft			0.00	Avg Clopper Soil Loss, ft			-0.02							
Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	6.438	6.698	6.948	7.021	7.021	7.010	6.958	6.771	6.427	27.453			4.4		6.9
To eroded Surface Elev, ft	6.438	6.698	6.958	7.042	7.063	7.063	6.969	6.771	6.427	27.523		Vavg (fps) =	4.40	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.025		
Clopper Soil Loss, ft	0.000	0.000	-0.010	-0.021	-0.042	-0.052	-0.010	0.000	0.000	-0.069	-0.208	Flow (cfs) =	1.65	0.58	0.19
40 ft	Avg Bottom Gain, ft			0.00	Avg Clopper Soil Loss, ft			-0.02							
Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	6.740	6.979	7.229	7.292	7.396	7.333	7.281	7.094	6.854	28.700			4.7		7.3
To eroded Surface Elev, ft	6.740	6.979	7.235	7.365	7.458	7.417	7.313	7.094	6.854	28.837		Vavg (fps) =	4.70	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.022		
Clopper Soil Loss, ft	0.000	0.000	-0.006	-0.073	-0.063	-0.083	-0.031	0.000	0.000	-0.138	-0.413	Flow (cfs) =	1.66	0.55	0.18
	Avg Bottom Gain, ft			0.00	Avg Clopper Soil Loss, ft			-0.03							
Soil Gain, in	0.000	0.000	0.001	0.009	0.005	0.002	0.001	0.001	0.000	**Volume**		Avg Bottom Gain per Xsection, ft = 0.000			
Clopper Soil Loss, in	-0.005	-0.015	-0.004	-0.010	-0.016	-0.016	-0.012	0.000	-0.007	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft = -0.012			
Trapezoidal Analysis — Original Surface Elev	584.288	**1 thru 6:**	X-Section Spacing, ft = 5			Original Surface Elev				275.490		**7 thru 9:**	X-Section Spacing, ft = 5		
Eroded Surface Elev	585.048		Test Section Length, ft = 40			Eroded Surface Elev				276.446			Test Section Length, ft = 40		
Soil Gain	2.188	0.164	gauge spacing, ft = 0.5			Soil Gain				0.000	0.000		gauge spacing, ft = 0.5		
CSLI	-2.947	-0.221	channel width measured, ft = 4			CSLI				-0.956	-0.072		channel width measured, ft = 4		

TYPICAL TEST PICTURES

2.0 cfs Flow

Check Structure Installation over Bare Soil



Initial Flow & Upstream Ponding

Increased Ponding and Overtopping

End-of-test and Post-test condition.

Project: ASTM D 7208: Standard Test Method for Determination of Temporary Ditch Check Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.

Test Setup: Trapezoid with 2-ft wide bottom and 2:1 side slopes x 40-ft long; 5% Bed Slope;

Client: GSWCC **Product:** Rock Check over Geotextile

Flow: 0.5 cfs for 30 minutes **Test Date:** 6/8/2012

	Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft²	Soil Loss, ft²	Flow Depth, in	Wetted Area, ft²	Flow Velocity, ft/s	Shear, psf
	0	0.00	-0.09	0.00	-0.034	1.46	6.36	2.80	0.38
	5	0.00	-0.11	0.00	-0.044	1.06	11.98	3.00	0.28
	10	0.00	-0.09	0.00	-0.035	1.50	12.79	2.69	0.39
	15	0.00	-0.09	0.00	-0.042	3.19	15.94	1.72	0.83
15" High	20	0.00	-0.10	0.00	-0.021	5.39	20.05	1.65	1.40
Check	25	1.02	-0.05	0.39	-0.026	5.24	19.76	0.50	1.36
Location	30	0.00	-0.08	0.00	-0.027	1.81	13.37	2.20	0.47
	35	0.00	-0.26	0.00	-0.086	1.42	12.64	2.68	0.37
	40	0.00	-0.21	0.00	-0.079	1.10	6.03	3.10	0.29
				Total Soil Gain, ft³	Total Soil Loss, ft³		Total Wetted Area, ft²	SAI - Soil Accretion Index	CSLI - Clopper Soil Loss Index
				0.97	**-1.55**		**118.92**	**0.82**	**-1.31**

Flow: 1.0 cfs for 30 minutes **Test Date:** 6/19/2012

	Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft²	Soil Loss, ft²	Flow Depth, in	Wetted Area, ft²	Flow Velocity, ft/s	Shear, psf
	0	0.00	-0.22	0.00	-0.087	1.97	6.83	3.71	0.51
	5	0.00	-0.29	0.00	-0.108	1.57	12.93	3.98	0.41
	10	0.00	-0.30	0.00	-0.106	1.73	13.23	3.87	0.45
	15	0.22	-0.24	0.08	-0.078	5.75	20.71	2.35	1.49
15" High	20	0.86	-0.32	0.32	-0.121	6.38	21.88	1.28	1.66
Check	25	0.90	-0.14	0.35	-0.018	8.35	25.55	0.37	2.17
Location	30	0.00	-0.10	0.00	-0.039	2.09	13.89	2.04	0.54
	35	0.00	-0.15	0.00	-0.043	1.69	13.15	3.10	0.44
	40	0.00	-0.34	0.00	-0.118	1.54	6.43	3.43	0.40
				Total Soil Gain, ft³	Total Soil Loss, ft³		Total Wetted Area, ft²	SAI - Soil Accretion Index	CSLI - Clopper Soil Loss Index
				2.87	**-2.94**		**134.62**	**2.13**	**-2.18**

Flow: 2.0 cfs for 30 minutes **Test Date:** 6/19/2012

	Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft²	Soil Loss, ft²	Flow Depth, in	Wetted Area, ft²	Flow Velocity, ft/s	Shear, psf
	0	0.00	-0.26	0.00	-0.102	3.03	7.82	4.37	0.79
	5	0.00	-0.26	0.00	-0.094	1.97	13.67	5.05	0.51
	10	0.00	-0.27	0.00	-0.094	2.17	14.03	4.95	0.56
	15	0.17	-0.21	0.06	-0.068	5.47	20.20	3.84	1.42
15" High	20	0.48	-0.31	0.18	-0.102	7.56	24.09	1.80	1.96
Check	25	1.14	-0.49	0.42	-0.119	9.45	27.61	0.86	2.46
Location	30	0.00	-0.06	0.00	-0.019	2.76	15.14	3.60	0.72
	35	0.00	-0.52	0.00	-0.167	2.17	14.03	4.42	0.56
	40	0.00	-0.46	0.00	-0.175	2.09	6.94	4.80	0.54
				Total Soil Gain, ft³	Total Soil Loss, ft³		Total Wetted Area, ft²	SAI - Soil Accretion Index	CSLI - Clopper Soil Loss Index
				2.22	**-3.66**		**143.53**	**1.54**	**-2.55**

CJS 6/30/2012 (Rev. 8/21/14)
Quality Review / Date

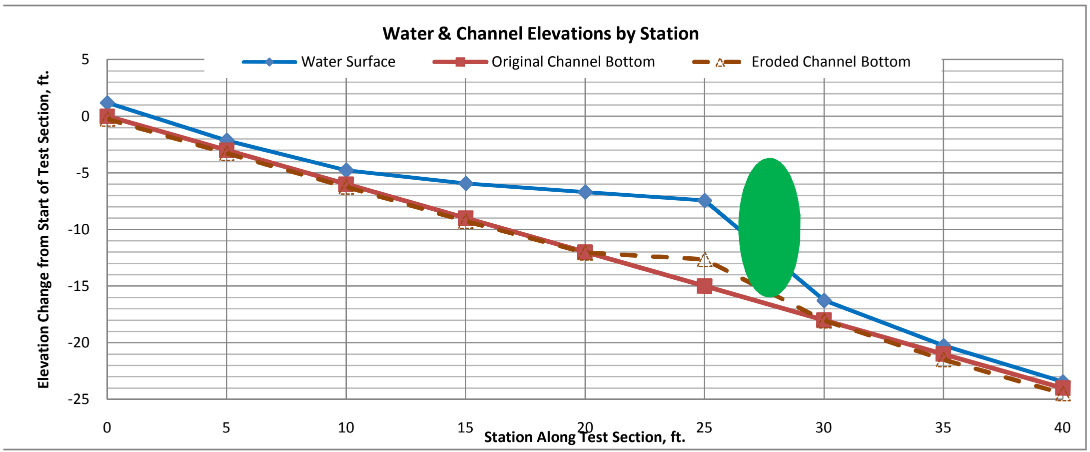
TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

Project: ASTM D 7208: Standard Test Method for Determination of Temporary Ditch Check Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.

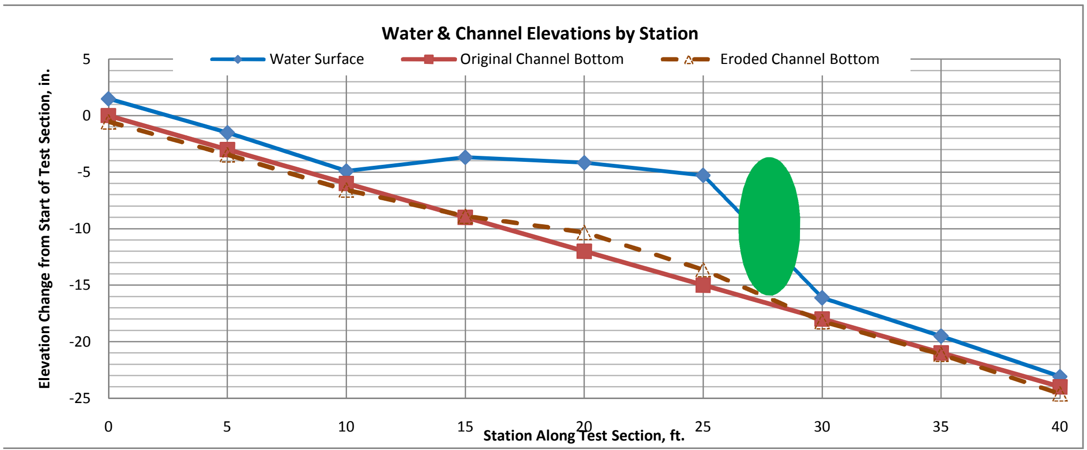
Test Setup: Trapezoid with 2-ft wide bottom and 2:1 side slopes x 40-ft long; 5% Bed Slope;

Client: GSWCC **Product:** Rock Check over Geotextile

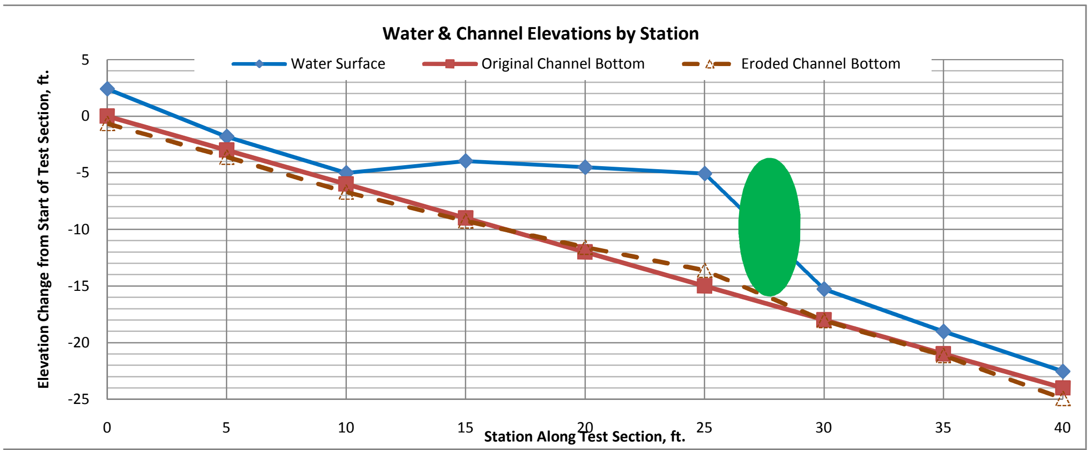
Flow: 0.5 cfs for 30 minutes **Test Date:** 6/8/2012



Flow: 1.0 cfs for 30 minutes **Test Date:** 6/19/2012



Flow: 2.0 cfs for 30 minutes **Test Date:** 6/19/2012



ASTM D7208	Date: 6/8/12	Start Time: 3:58 PM	End Time: 4:28 PM
	Soil: Sandy Clay	Target Flow (cfs): 0.50	Slope: 5%
60 ft long flume, 40 ft test section	SRD: Rock Check	Installation: over Geotextile	
2 ft wide flume	TEST DATA		

	A	B	C	D	E	F	G	H	I					V @ 0.8d	
Outlet Weir								Weir						Channel Targets	
Water Depth, in								2.25						1.00	
Water Velocity, ft/s								0.00						3 - 4	
Flow Rate, cfs	0.00							0.00	0.00					0.50	

1 2 3

FLOW

Weir width (ft) = 2

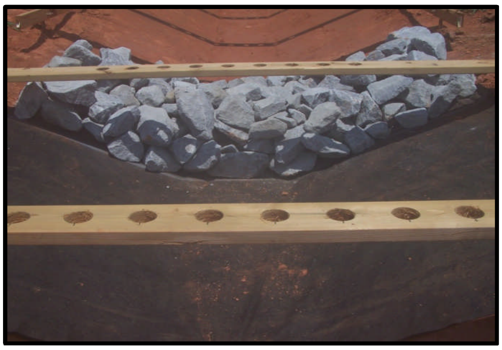
0 ft C D E F G H

Station		A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.873	2.139	2.349	2.431	2.444	2.461	2.438	2.260	2.021	9.254			2.8		2.3
	To eroded Surface Elev, ft	1.873	2.139	2.352	2.451	2.467	2.477	2.441	2.260	2.021	9.288		Vavg (fps) =	2.80	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.029		
	Clopper Soil Loss, ft	0.000	0.000	-0.003	-0.020	-0.023	-0.016	-0.003	0.000	0.000	-0.034	-0.102	Flow (cfs) =	0.50	0.38	0.12
5 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							
	Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	2.073	2.326	2.579	2.677	2.684	2.677	2.671	2.474	2.241	10.133			3		2.6
	To eroded Surface Elev, ft	2.073	2.326	2.579	2.687	2.700	2.717	2.687	2.474	2.241	10.177		Vavg (fps) =	3.00	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.022		
	Clopper Soil Loss, ft	0.000	0.000	0.000	-0.010	-0.016	-0.039	-0.016	0.000	0.000	-0.044	-0.131	Flow (cfs) =	0.50	0.28	0.09
10 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							
	Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.824	2.087	2.349	2.444	2.461	2.470	2.457	2.277	2.044	9.253			2.69		2.4
	To eroded Surface Elev, ft	1.824	2.087	2.356	2.461	2.484	2.490	2.461	2.277	2.044	9.288		Vavg (fps) =	2.69	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.031		
	Clopper Soil Loss, ft	0.000	0.000	-0.007	-0.016	-0.023	-0.020	-0.003	0.000	0.000	-0.035	-0.105	Flow (cfs) =	0.50	0.39	0.12
15 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							
	Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.932	2.185	2.441	2.559	2.569	2.592	2.569	2.388	2.152	9.690			1.72		2.3
	To eroded Surface Elev, ft	1.932	2.185	2.441	2.572	2.579	2.635	2.572	2.388	2.152	9.732		Vavg (fps) =	1.72	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.080		
	Clopper Soil Loss, ft	0.000	0.000	0.000	-0.013	-0.010	-0.043	-0.003	0.000	0.000	-0.042	-0.125	Flow (cfs) =	0.50	0.83	0.27
20 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							
	Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.637	1.919	2.142	2.280	2.303	2.326	2.280	2.159	1.939	8.628			1.65		1.9
	To eroded Surface Elev, ft	1.637	1.919	2.156	2.283	2.310	2.329	2.290	2.159	1.978	8.648		Vavg (fps) =	1.65	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.118		
	Clopper Soil Loss, ft	0.000	0.000	-0.013	-0.003	-0.007	-0.003	-0.010	0.000	-0.039	-0.021	-0.062	Flow (cfs) =	0.50	1.40	0.45
25 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							
	Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.857	2.087	2.339	2.421	2.434	2.425	2.434	2.218	1.995	9.145			0.5		1.8
	To eroded Surface Elev, ft	1.837	2.077	2.270	2.270	2.241	2.178	2.356	2.257	1.995	8.783		Vavg (fps) =	0.50	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.020	0.010	0.069	0.151	0.194	0.246	0.079	0.000	0.000	0.388	1.165	navg =	0.382		
	Clopper Soil Loss, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.039	0.000	-0.026	-0.079	Flow (cfs) =	0.44	1.36	0.44
30 ft			Avg Bottom Gain, ft		0.09	Avg Clopper Soil Loss, ft			0.00							
	Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.617	1.873	2.100	2.211	2.238	2.238	2.215	2.037	1.827	8.331			2.2		2.1
	To eroded Surface Elev, ft	1.617	1.873	2.110	2.215	2.244	2.241	2.234	2.054	1.827	8.358		Vavg (fps) =	2.20	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.043		
	Clopper Soil Loss, ft	0.000	0.000	-0.010	-0.003	-0.007	-0.003	-0.020	-0.016	0.000	-0.027	-0.082	Flow (cfs) =	0.66	0.47	0.15
35 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							
	Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.847	2.110	2.346	2.425	2.444	2.434	2.408	2.192	1.939	9.137			2.68		2.4
	To eroded Surface Elev, ft	1.847	2.110	2.379	2.470	2.500	2.454	2.448	2.192	1.939	9.224		Vavg (fps) =	2.68	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.030		
	Clopper Soil Loss, ft	0.000	0.000	-0.033	-0.046	-0.056	-0.020	-0.039	0.000	0.000	-0.086	-0.259	Flow (cfs) =	0.63	0.37	0.12
40 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.02							
	Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.765	1.995	2.185	2.323	2.326	2.306	2.297	2.073	1.818	8.665			3.1		2.3
	To eroded Surface Elev, ft	1.765	1.995	2.208	2.362	2.372	2.343	2.313	2.073	1.818	8.743		Vavg (fps) =	3.10	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.022		
	Clopper Soil Loss, ft	0.000	0.000	-0.023	-0.039	-0.046	-0.036	-0.016	0.000	0.000	-0.079	-0.236	Flow (cfs) =	0.57	0.29	0.09
			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.02							
	Soil Loss / Gain, in	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Volume		Avg Bottom Gain per Xsection, ft = 0.000			
	Clopper Soil Loss, in	0.000	0.000	-0.004	-0.008	-0.010	-0.010	-0.005	0.000	-0.002	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft = -0.022			

Trapezoidal Analysis									
Original Surface Elev	234.510	1 thru 6:	X-Section Spacing, ft = 5	Original Surface Elev	88.175		7 thru 9:	X-Section Spacing, ft = 5
Eroded Surface Elev	234.396		Test Section Length, ft = 40	Eroded Surface Elev	88.872			Test Section Length, ft = 40
Soil Gain	0.971	0.073	gauge spacing, ft = 0.5	Soil Gain	0.000	0.000		gauge spacing, ft = 0.5
CSLI	-0.856	-0.064	channel width measured, ft = 4	CSLI	-0.697	-0.052		channel width measured, ft = 4

TYPICAL TEST PICTURES

0.5 cfs Flow

Check Structure Installation over Bare Soil


Initial Flow & Upstream Ponding


Increased Ponding and Seepage


End-of-test and Post-test condition.

ASTM D7208	Date: 6/19/12	Start Time: 2:58 AM	End Time: 3:28 PM
	Soil: Sandy Clay	Target Flow (cfs): 1.00	Slope: 5%
60 ft long flume, 40 ft test section	RECP: Rock Check	Anchorage: over Geotextile	
2 ft wide flume		TEST DATA	

		A	B	C	D	E	F	G	H	I						
1 2 3	Outlet Weir								Weir						Channel Targets	
FLOW	Water Depth, in								2.25						1.50	
Weir width (ft) = 2	Water Velocity, ft/s								0.00						4 - 5	
0 ft C D E F G H	Flow Rate, cfs	0.00							0.00	0.00					1.00	
	Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.752	1.972	2.211	2.323	2.333	2.326	2.320	2.175	1.939	8.767			3.71		2.2
	To eroded Surface Elev, ft	1.752	1.972	2.221	2.369	2.372	2.375	2.343	2.175	1.939	8.854		Vavg (fps) =	3.71	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.027		
	Clopper Soil Loss, ft	0.000	0.000	-0.010	-0.046	-0.039	-0.049	-0.023	0.000	0.000	-0.087	-0.262	Flow (cfs) =	1.00	0.51	0.16
5 ft	Straw Bales			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.02							
	Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.959	2.228	2.461	2.487	2.500	2.493	2.441	2.188	1.985	9.389			3.98		2.4
	To eroded Surface Elev, ft	1.959	2.228	2.493	2.549	2.507	2.539	2.510	2.188	1.985	9.497		Vavg (fps) =	3.98	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.022		
	Clopper Soil Loss, ft	0.000	0.000	-0.033	-0.062	-0.007	-0.046	-0.069	0.000	0.000	-0.108	-0.325	Flow (cfs) =	1.00	0.41	0.13
10 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.02							
	Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.824	2.051	2.274	2.329	2.346	2.320	2.283	2.031	1.811	8.727			3.87		2.3
	To eroded Surface Elev, ft	1.824	2.051	2.310	2.369	2.398	2.372	2.329	2.031	1.811	8.833		Vavg (fps) =	3.87	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.024		
	Clopper Soil Loss, ft	0.000	0.000	-0.036	-0.039	-0.052	-0.052	-0.046	0.000	0.000	-0.106	-0.318	Flow (cfs) =	1.00	0.45	0.14
15 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.03							
	Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	2.067	2.320	2.510	2.549	2.566	2.552	2.484	2.247	2.014	9.646			2.35		2.1
	To eroded Surface Elev, ft	2.067	2.362	2.595	2.562	2.602	2.474	2.408	2.244	2.008	9.642		Vavg (fps) =	2.35	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.079	0.075	0.003	0.007	0.081	0.243	navg =	0.087		
	Clopper Soil Loss, ft	0.000	-0.043	-0.085	-0.013	-0.036	0.000	0.000	0.000	0.000	-0.078	-0.233	Flow (cfs) =	1.00	1.49	0.48
20 ft				Avg Bottom Gain, ft	0.02			Avg Clopper Soil Loss, ft	-0.02							
	Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.883	2.136	2.270	2.287	2.326	2.297	2.254	2.060	1.808	8.752			1.28		1.7
	To eroded Surface Elev, ft	1.916	2.297	2.274	2.162	2.205	2.126	2.041	2.047	1.854	8.556		Vavg (fps) =	1.28	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.125	0.121	0.171	0.213	0.013	0.000	0.317	0.951	navg =	0.170		
	Clopper Soil Loss, ft	-0.033	-0.161	-0.003	0.000	0.000	0.000	0.000	0.000	-0.046	-0.121	-0.364	Flow (cfs) =	1.00	1.66	0.53
25 ft				Avg Bottom Gain, ft	0.07			Avg Clopper Soil Loss, ft	-0.03							
	Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.978	2.221	2.451	2.474	2.497	2.490	2.408	2.211	1.995	9.378			0.37		1.7
	To eroded Surface Elev, ft	2.087	2.178	2.405	2.372	2.382	2.362	2.303	2.093	1.975	9.044		Vavg (fps) =	0.37	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.043	0.046	0.102	0.115	0.128	0.105	0.118	0.020	0.352	1.056	navg =	0.705		
	Clopper Soil Loss, ft	-0.108	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.018	-0.054	Flow (cfs) =	0.51	2.17	0.70
30 ft				Avg Bottom Gain, ft	0.08			Avg Clopper Soil Loss, ft	-0.01							
	Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.601	1.886	2.142	2.172	2.149	2.159	2.119	1.873	1.627	8.069			2.04		2.0
	To eroded Surface Elev, ft	1.601	1.886	2.162	2.195	2.165	2.175	2.123	1.873	1.627	8.108		Vavg (fps) =	2.04	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.051		
	Clopper Soil Loss, ft	0.000	0.000	-0.020	-0.023	-0.016	-0.016	-0.003	0.000	0.000	-0.039	-0.118	Flow (cfs) =	0.71	0.54	0.17
35 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.01							
	Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.873	2.123	2.283	2.411	2.438	2.441	2.411	2.182	1.972	9.123			3.1		2.3
	To eroded Surface Elev, ft	1.873	2.123	2.359	2.418	2.454	2.448	2.421	2.182	1.972	9.166		Vavg (fps) =	3.10	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.029		
	Clopper Soil Loss, ft	0.000	0.000	-0.075	-0.007	-0.016	-0.007	-0.010	0.000	0.000	-0.043	-0.128	Flow (cfs) =	0.87	0.44	0.14
40 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.01							
	Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.860	2.093	2.349	2.388	2.392	2.365	2.320	2.060	1.808	8.903			3.43		2.3
	To eroded Surface Elev, ft	1.860	2.093	2.392	2.434	2.444	2.421	2.375	2.060	1.808	9.021		Vavg (fps) =	3.43	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.025		
	Clopper Soil Loss, ft	0.000	0.000	-0.043	-0.046	-0.052	-0.056	-0.056	0.000	0.000	-0.118	-0.354	Flow (cfs) =	0.88	0.40	0.13
				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft	-0.03							
	Soil Loss / Gain, in	0.000	0.000	0.000	0.007	0.007	0.014	0.016	0.001	0.000	Volume		Avg Bottom Gain per Xsection, ft = 0.000			
	Clopper Soil Loss, in	-0.002	-0.011	-0.016	-0.012	-0.011	-0.012	-0.011	0.000	-0.003	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft = -0.013			

Trapezoidal Analysis	Original Surface Elev	227.928	1 thru 6:	X-Section Spacing, ft = 5	Original Surface Elev	88.044		7 thru 9:	X-Section Spacing, ft = 5	
	Eroded Surface Elev	227.388		Test Section Length, ft = 40	Eroded Surface Elev	88.651			Test Section Length, ft = 40	
	Soil Gain	2.871	0.215	gauge spacing, ft = 0.5	Soil Gain	0.000	0.000		gauge spacing, ft = 0.5	
	CSLI	-2.331	-0.175	hannel width measured, ft = 4	CSLI	-0.607	-0.046		channel width measured, ft = 4	

TYPICAL TEST PICTURES

1.0 cfs Flow


Check Structure Installation over Bare Soil


Initial Flow & Upstream Ponding


Increased Pondin & Overtopping


End-of-test and Post-test

ASTM D7208	Date: 6/19/12	Start Time: 4:44 AM	End Time: 5:14 PM
	Soil: Sandy Clay	Target Flow (cfs): 2.00	Slope: 5%
60 ft long flume, 40 ft test section	RECP: Rock Check	Anchorage: over Geotextile	
2 ft wide flume		TEST DATA	

1 2 3

FLOW

Weir width (ft) = 2

0 ft C D E F G H

Outlet Weir								Weir					Channel Targets	
Water Depth, in								2.75					1.50	
Water Velocity, ft/s								0.00					5 - 6	
Flow Rate, cfs	0.00							0.00	0.00				2.00	

Station	Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.837	2.054	2.320	2.385	2.388	2.379	2.444	2.274	1.939	9.074			4.37		2.2
	To eroded Surface Elev, ft	1.837	2.054	2.320	2.411	2.441	2.464	2.474	2.274	1.939	9.176		Vavg (fps) =	4.37	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.030		
	Clopper Soil Loss, ft	0.000	0.000	0.000	-0.026	-0.052	-0.085	-0.030	0.000	0.000	-0.102	-0.305	Flow (cfs) =	2.00	0.79	0.25
5 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.02							

Station	Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	2.041	2.280	2.543	2.602	2.625	2.615	2.615	2.441	2.201	9.926			5.05		2.5
	To eroded Surface Elev, ft	2.041	2.280	2.559	2.625	2.690	2.680	2.638	2.441	2.198	10.020		Vavg (fps) =	5.05	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001	0.002	navg =	0.020		
	Clopper Soil Loss, ft	0.000	0.000	-0.016	-0.023	-0.066	-0.066	-0.023	0.000	0.000	-0.094	-0.282	Flow (cfs) =	2.00	0.51	0.16
10 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.02							

Station	Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.729	1.988	2.280	2.346	2.346	2.349	2.388	2.172	1.962	8.857			4.95		2.3
	To eroded Surface Elev, ft	1.729	1.988	2.287	2.408	2.444	2.369	2.402	2.172	1.962	8.951		Vavg (fps) =	4.95	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.021		
	Clopper Soil Loss, ft	0.000	0.000	-0.007	-0.062	-0.098	-0.020	-0.013	0.000	0.000	-0.094	-0.282	Flow (cfs) =	1.79	0.56	0.18
15 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.02							

Station	Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.909	2.182	2.438	2.490	2.520	2.526	2.516	2.343	2.116	9.523			3.84		2.1
	To eroded Surface Elev, ft	1.909	2.182	2.444	2.559	2.556	2.484	2.431	2.343	2.162	9.534		Vavg (fps) =	3.84	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.043	0.085	0.000	0.000	0.057	0.171	navg =	0.051		
	Clopper Soil Loss, ft	0.000	0.000	-0.007	-0.069	-0.036	0.000	0.000	0.000	-0.046	-0.068	-0.203	Flow (cfs) =	3.50	1.42	0.46
20 ft			Avg Bottom Gain, ft		0.01	Avg Clopper Soil Loss, ft			-0.02							

Station	Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.578	1.854	2.103	2.201	2.224	2.254	2.234	2.123	1.886	8.386			1.8		1.6
	To eroded Surface Elev, ft	1.578	1.877	2.188	2.264	2.231	2.080	2.051	2.133	1.932	8.310		Vavg (fps) =	1.80	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.174	0.184	0.000	0.000	0.177	0.531	navg =	0.136		
	Clopper Soil Loss, ft	0.000	-0.023	-0.085	-0.062	-0.007	0.000	0.000	-0.010	-0.046	-0.102	-0.305	Flow (cfs) =	2.27	1.96	0.63
25 ft			Avg Bottom Gain, ft		0.04	Avg Clopper Soil Loss, ft			-0.03							

Station	Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.736	1.975	2.224	2.343	2.352	2.349	2.303	2.172	1.962	8.802			0.86		1.5
	To eroded Surface Elev, ft	1.818	2.070	2.287	2.339	2.313	2.047	1.883	2.080	2.090	8.503		Vavg (fps) =	0.86	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.003	0.039	0.302	0.420	0.092	0.000	0.418	1.253	navg =	0.329		
	Clopper Soil Loss, ft	-0.082	-0.095	-0.062	0.000	0.000	0.000	0.000	0.000	-0.128	-0.119	-0.358	Flow (cfs) =	1.35	2.46	0.79
30 ft			Avg Bottom Gain, ft		0.10	Avg Clopper Soil Loss, ft			-0.04							

Station	Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.608	1.886	2.087	2.221	2.205	2.208	2.244	2.051	1.831	8.329			3.6		2.0
	To eroded Surface Elev, ft	1.614	1.886	2.106	2.221	2.208	2.221	2.247	2.051	1.831	8.348		Vavg (fps) =	3.60	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.035		
	Clopper Soil Loss, ft	-0.007	0.000	-0.020	0.000	-0.003	-0.013	-0.003	0.000	0.000	-0.019	-0.056	Flow (cfs) =	1.65	0.72	0.23
35 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.01							

Station	Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.811	2.057	2.251	2.382	2.388	2.379	2.195	2.073	1.867	8.818			4.42		2.2
	To eroded Surface Elev, ft	1.811	2.057	2.320	2.382	2.405	2.398	2.388	2.165	1.867	8.986		Vavg (fps) =	4.42	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.024		
	Clopper Soil Loss, ft	0.000	0.000	-0.069	0.000	-0.016	-0.020	-0.194	-0.092	0.000	-0.167	-0.502	Flow (cfs) =	1.60	0.56	0.18
40 ft			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.04							

Station	Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.703	1.946	2.165	2.277	2.303	2.290	2.267	2.083	1.850	8.568			4.8		2.2
	To eroded Surface Elev, ft	1.703	1.946	2.218	2.346	2.356	2.402	2.326	2.083	1.850	8.743		Vavg (fps) =	4.80	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.022		
	Clopper Soil Loss, ft	0.000	0.000	-0.052	-0.069	-0.052	-0.112	-0.059	0.000	0.000	-0.175	-0.525	Flow (cfs) =	1.67	0.54	0.17
			Avg Bottom Gain, ft		0.00	Avg Clopper Soil Loss, ft			-0.04							

	A	B	C	D	E	F	G	H	I			
Soil Loss / Gain, in	0.000	0.000	0.000	0.000	0.000	0.012	0.015	0.000	0.000	Volume		Avg Bottom Gain per Xsection, ft = 0.000
Clopper Soil Loss, in	0.000	-0.001	-0.013	-0.018	-0.018	-0.017	-0.018	-0.006	-0.005	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft = -0.043

Trapezoidal Analysis									
	Original Surface Elev	228.147	1 thru 6:	X-Section Spacing, ft = 5	Original Surface Elev	86.334		7 thru 9:	X-Section Spacing, ft = 5
	Eroded Surface Elev	228.270		Test Section Length, ft = 40	Eroded Surface Elev	87.654			Test Section Length, ft = 40
	Soil Gain	2.217	0.166	gauge spacing, ft = 0.5	Soil Gain	0.000	0.000		gauge spacing, ft = 0.5
	CSLI	-2.340	-0.176	hannel width measured, ft = 4	CSLI	-1.321	-0.099		channel width measured, ft = 4

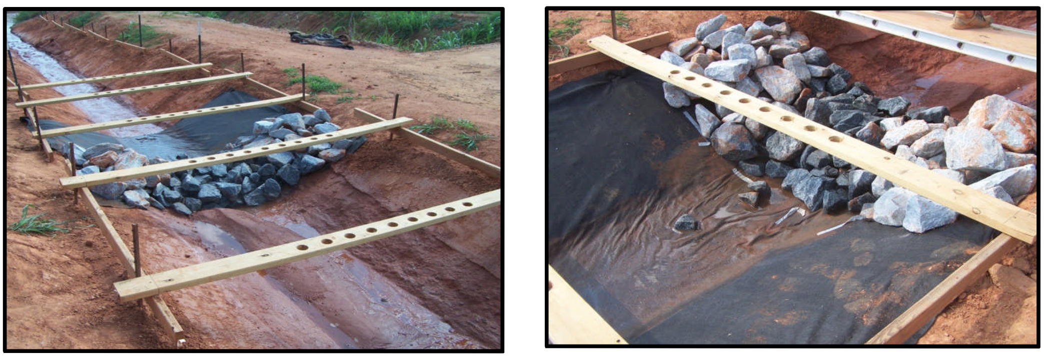
TYPICAL TEST PICTURES

2.0 cfs Flow

Check Structure Installation over Bare Soil

Initial Flow & Upstream Ponding

Increased Ponding and Overtopping



End-of-test and Post-test condition.

Project: ASTM D 7208: Standard Test Method for Determination of Temporary Ditch Check Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.

Test Setup: Trapezoid with 2-ft wide bottom and 2:1 side slopes x 40-ft long; 5% Bed Slope;

Client: GSWCC **Product:** Silt Fence + Steel Posts & Wire Fence

Flow: 0.5 cfs for 30 minutes **Test Date:** 7/18/2012

	Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft^2	Soil Loss, ft^2	Flow Depth, in	Wetted Area, ft^2	Flow Velocity, ft/s	Shear, psf
	0	0.00	-0.17	0.00	-0.078	0.91	5.84	3.03	0.24
	5	0.02	-0.08	0.01	-0.037	1.54	12.86	2.13	0.40
	10	0.00	-0.41	0.00	-0.161	1.77	13.30	1.82	0.46
	15	0.00	-0.28	0.00	-0.105	1.57	12.93	1.63	0.41
21" High	20	0.03	-0.24	0.01	-0.087	3.07	15.72	1.87	0.80
Check	25	0.10	-0.08	0.03	-0.035	4.88	19.10	0.39	1.27
Location	30	0.35	-0.43	0.13	-0.207	1.93	13.59	2.75	0.50
	35	0.11	-0.51	0.06	-0.181	3.27	16.09	2.86	0.85
	40	0.01	-0.44	0.00	-0.193	1.69	6.58	2.98	0.44
				Total Soil Gain, ft^3	**Total Soil Loss, ft^3**		**Total Wetted Area, ft^2**	**SAI - Soil Accretion Index**	**CSLI - Clopper Soil Loss Index**
				0.77	**-4.14**		**116.02**	**0.67**	**-3.57**

Flow: 0.5 cfs for 30 minutes **Test Date:** 7/20/2012

	Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft^2	Soil Loss, ft^2	Flow Depth, in	Wetted Area, ft^2	Flow Velocity, ft/s	Shear, psf
	0	0.00	-0.36	0.00	-0.163	1.18	6.10	2.96	0.31
	5	0.00	-0.41	0.00	-0.177	1.89	13.52	2.91	0.49
	10	0.00	-0.45	0.00	-0.173	1.77	13.30	2.81	0.46
	15	0.19	-0.22	0.09	-0.086	4.06	17.56	2.99	1.05
21" High	20	0.30	-0.22	0.15	-0.068	5.04	19.39	0.78	1.31
Check	25	0.37	-0.12	0.18	-0.031	6.69	22.47	0.72	1.74
Location	30	0.07	-1.42	0.01	-0.432	3.98	17.41	2.75	1.03
	35	0.52	-0.37	0.13	-0.119	1.93	13.59	3.07	0.50
	40	0.58	-0.08	0.22	-0.042	-0.08	5.07	3.06	-0.02
				Total Soil Gain, ft^3	**Total Soil Loss, ft^3**		**Total Wetted Area, ft^2**	**SAI - Soil Accretion Index**	**CSLI - Clopper Soil Loss Index**
				2.90	**-4.78**		**128.42**	**2.26**	**-3.73**

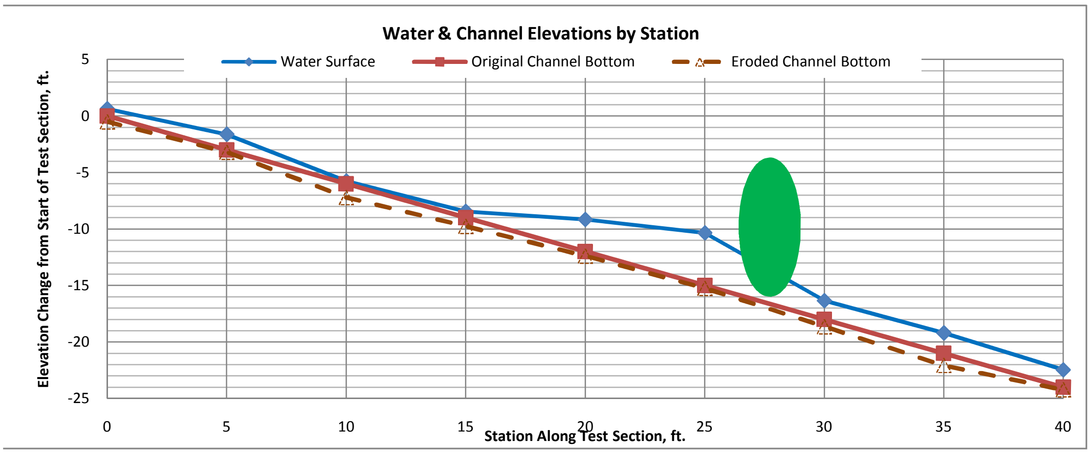
CJS 7/23/2012 (Rev. 8/21/14)
Quality Review / Date

Project: ASTM D 7208: Standard Test Method for Determination of Temporary Ditch Check Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.

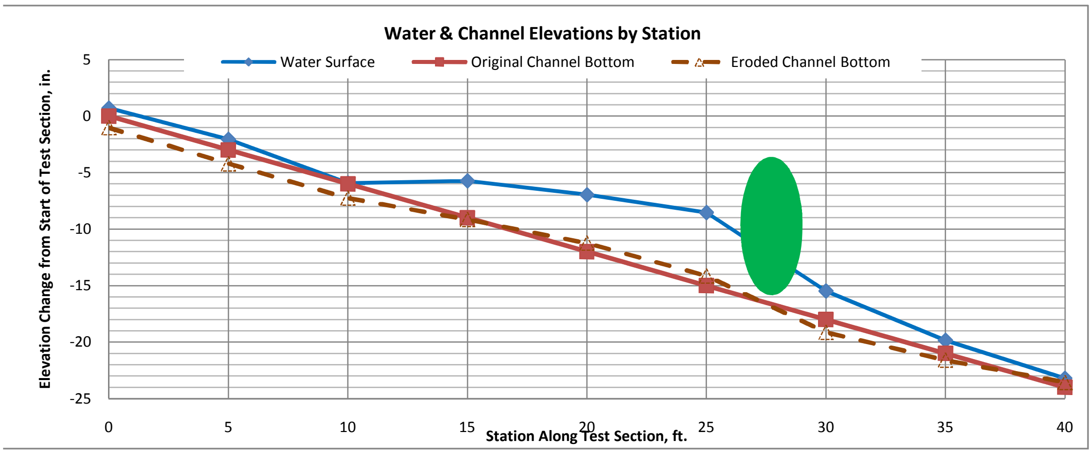
Test Setup: Trapezoid with 2-ft wide bottom and 2:1 side slopes x 40-ft long; 5% Bed Slope;

Client: GSWCC **Product:** Silt Fence + Steel Posts & Wire Fence

Flow: 0.5 cfs for 30 minutes **Test Date:** 7/18/2012



Flow: 0.5 cfs for 30 minutes **Test Date:** 7/20/2012



ASTM D7208			
Date: 7/18/12	Start Time: 5:00 PM	End Time: 5:30 PM	
Soil: Sandy Clay	Target Flow (cfs): 0.50	Slope: 5%	
60 ft long flume, 40 ft test section	SRD: Silt Fence +	Installation: Steel Posts & Wire Fence	
2 ft wide flume	TEST DATA		

1 2 3

FLOW

eir width (ft) = 2

0 ft C D E F G H

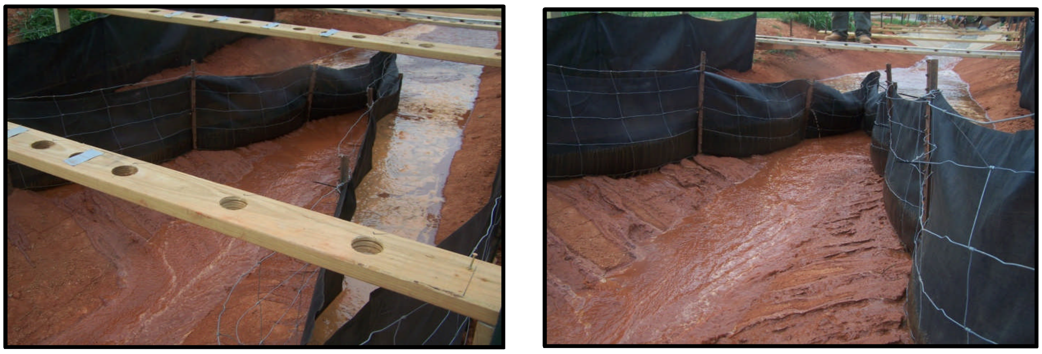
	A	B	C	D	E	F	G	H	I						
Outlet Weir								Weir						Channel Targets	
Water Depth, in								1.50						1.00	
Water Velocity, ft/s								0.00						0.00	
Flow Rate, cfs	0.00							0.00	0.00					0.00	
Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.010	1.506	2.034	2.457	2.493	2.457	1.978	1.467	0.991	7.760			3.03		2.4
To eroded Surface Elev, ft	1.010	1.506	2.034	2.520	2.516	2.500	1.978	1.467	0.991	7.838		Vavg (fps) =	3.03	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.020		
Clopper Soil Loss, ft	0.000	0.000	0.000	-0.062	-0.023	-0.043	0.000	0.000	0.000	-0.078	-0.233	Flow (cfs) =	0.50	0.24	0.08
5 ft		Avg Bottom Gain, ft		0.00		Avg Clopper Soil Loss, ft			-0.01						
Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	0.968	1.509	2.005	2.467	2.510	2.421	1.991	1.555	1.119	7.818			2.13		2.4
To eroded Surface Elev, ft	0.968	1.509	2.005	2.516	2.523	2.408	1.991	1.555	1.119	7.847		Vavg (fps) =	2.13	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.000	0.000	0.009	0.026	navg =	0.040		
Clopper Soil Loss, ft	0.000	0.000	0.000	-0.049	-0.013	0.000	0.000	0.000	0.000	-0.037	-0.112	Flow (cfs) =	0.50	0.40	0.13
10 ft		Avg Bottom Gain, ft		0.00		Avg Clopper Soil Loss, ft			-0.01						
Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	0.892	1.348	1.834	2.290	2.336	2.329	1.804	1.316	0.794	7.128			1.82		2.3
To eroded Surface Elev, ft	0.892	1.348	1.834	2.444	2.464	2.352	1.804	1.316	0.794	7.289		Vavg (fps) =	1.82	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.051		
Clopper Soil Loss, ft	0.000	0.000	0.000	-0.154	-0.128	-0.023	0.000	0.000	0.000	-0.161	-0.482	Flow (cfs) =	0.50	0.46	0.15
15 ft		Avg Bottom Gain, ft		0.00		Avg Clopper Soil Loss, ft			-0.03						
Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.129	1.617	2.090	2.556	2.612	2.539	2.047	1.591	1.112	8.159			1.63		2.6
To eroded Surface Elev, ft	1.129	1.617	2.096	2.644	2.697	2.556	2.060	1.591	1.112	8.264		Vavg (fps) =	1.63	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.053		
Clopper Soil Loss, ft	0.000	0.000	-0.007	-0.089	-0.085	-0.016	-0.013	0.000	0.000	-0.105	-0.315	Flow (cfs) =	0.50	0.41	0.13
20 ft		Avg Bottom Gain, ft		0.00		Avg Clopper Soil Loss, ft			-0.02						
Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	0.797	1.237	1.752	2.208	2.297	2.244	1.781	1.302	0.830	6.876			1.87		2.1
To eroded Surface Elev, ft	0.797	1.237	1.837	2.270	2.316	2.260	1.755	1.302	0.830	6.954		Vavg (fps) =	1.87	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.026	0.000	0.000	0.009	0.026	navg =	0.072		
Clopper Soil Loss, ft	0.000	0.000	-0.085	-0.062	-0.020	-0.016	0.000	0.000	0.000	-0.087	-0.262	Flow (cfs) =	0.50	0.80	0.26
25 ft		Avg Bottom Gain, ft		0.00		Avg Clopper Soil Loss, ft			-0.02						
Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.017	1.460	1.923	2.392	2.520	2.490	2.047	1.588	1.109	7.804			0.39		2.1
To eroded Surface Elev, ft	1.017	1.460	1.903	2.434	2.539	2.490	1.998	1.581	1.109	7.812		Vavg (fps) =	0.39	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.000	0.020	0.000	0.000	0.000	0.049	0.007	0.000	0.027	0.082	navg =	0.468		
Clopper Soil Loss, ft	0.000	0.000	0.000	-0.043	-0.020	0.000	0.000	0.000	0.000	-0.035	-0.105	Flow (cfs) =	0.32	1.27	0.41
30 ft		Avg Bottom Gain, ft		0.01		Avg Clopper Soil Loss, ft			-0.01						
Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	2.569	2.897	3.419	3.835	3.878	3.868	3.455	2.927	2.457	13.439			2.75		3.7
To eroded Surface Elev, ft	2.569	2.877	3.389	3.720	3.901	4.121	3.360	2.972	2.457	13.515		Vavg (fps) =	2.75	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.020	0.030	0.115	0.000	0.000	0.095	0.000	0.000	0.131	0.394	navg =	0.036		
Clopper Soil Loss, ft	0.000	0.000	0.000	0.000	-0.023	-0.253	0.000	-0.046	0.000	-0.207	-0.620	Flow (cfs) =	0.88	0.50	0.16
35 ft		Avg Bottom Gain, ft		0.03		Avg Clopper Soil Loss, ft			-0.04						
Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	2.654	2.956	3.494	3.835	4.016	4.029	3.655	3.268	2.799	14.022			2.86		3.9
To eroded Surface Elev, ft	2.654	2.976	3.537	3.911	4.137	4.101	3.694	3.182	2.808	14.146		Vavg (fps) =	2.86	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.085	0.000	0.057	0.171	navg =	0.049		
Clopper Soil Loss, ft	0.000	-0.020	-0.043	-0.075	-0.121	-0.072	-0.039	0.000	-0.010	-0.181	-0.543	Flow (cfs) =	1.56	0.85	0.27
40 ft		Avg Bottom Gain, ft		0.01		Avg Clopper Soil Loss, ft			-0.04						
Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	2.530	2.871	3.353	3.835	4.022	4.009	3.652	3.097	2.680	13.752			2.98		3.9
To eroded Surface Elev, ft	2.539	2.969	3.360	3.858	4.035	4.029	3.645	3.225	2.713	13.943		Vavg (fps) =	2.98	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.002	0.007	navg =	0.030		
Clopper Soil Loss, ft	-0.010	-0.098	-0.007	-0.023	-0.013	-0.020	0.000	-0.128	-0.033	-0.193	-0.579	Flow (cfs) =	0.84	0.44	0.14
		Avg Bottom Gain, ft		0.00		Avg Clopper Soil Loss, ft			-0.04						
Soil Gain, in	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.005	0.000	**Volume**		Avg Bottom Gain per Xsection, ft = 0.001			
Clopper Soil Loss, in	-0.001	-0.007	-0.008	-0.029	-0.023	-0.011	-0.003	-0.007	-0.002	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft = -0.037			

Trapezoidal Analysis									
Original Surface Elev	188.815	**1 thru 6:**	X-Section Spacing, ft = 5	Original Surface Elev	138.091		**7 thru 9:**	X-Section Spacing, ft = 5	
Eroded Surface Elev	190.893		Test Section Length, ft = 40	Eroded Surface Elev	139.377			Test Section Length, ft = 40	
Soil Gain	0.156	0.012	gauge spacing, ft = 1	Soil Gain	0.618	0.046		gauge spacing, ft = 0.5	
CSLI	-2.234	-0.168	hannel width measured, ft = 8	CSLI	-1.904	-0.143		channel width measured, ft = 4	

TYPICAL TEST PICTURES

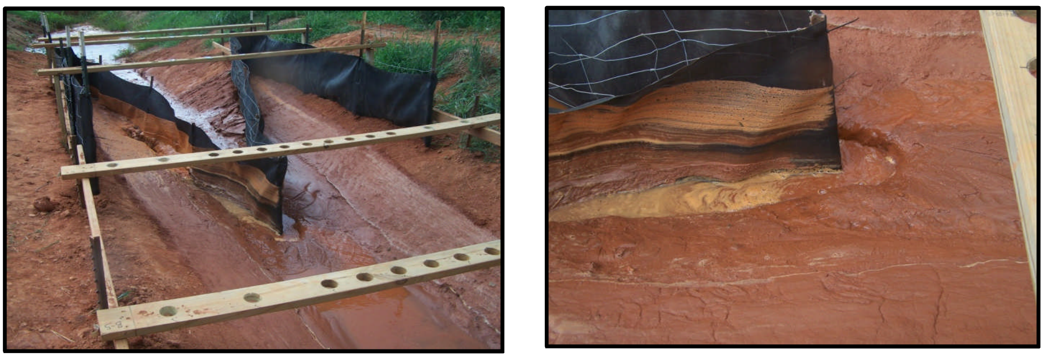
0.5 cfs Flow

Check Structure Installation over Bare Soil



Initial Flow & Upstream Ponding Starting

Increased Ponding Reaches Maximum and then Blows Out Under Fence



Post-test With Upstream Scour Hole

ASTM D7208	Date: 7/20/12	Start Time: 5:00 PM	End Time: 5:30 PM	
	Soil: Sandy Clay	Target Flow (cfs): 0.50	Slope: 5%	
60 ft long flume	40 ft test section	**SRD:** Silt Fence +	**Installation:** Steel Posts & Wire Fence	
2 ft wide flume		**TEST DATA**		

1 2 3

FLOW ↓

Weir width (ft) = 2

0 ft C D E F G H

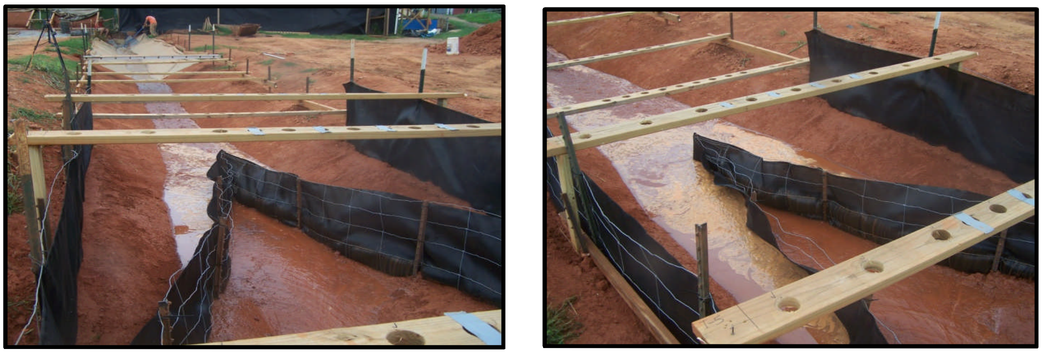
	A	B	C	D	E	F	G	H	I						
Outlet Weir								Weir						Channel Targets	
Water Depth, in								1.50						1.00	
Water Velocity, ft/s								0.00						0.00	
Flow Rate, cfs	0.00							0.00	0.00					0.00	
Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	0.928	1.371	1.864	2.303	2.392	2.369	1.880	1.411	0.981	7.333			2.96		2.3
To eroded Surface Elev, ft	0.928	1.371	1.864	2.467	2.431	2.425	1.890	1.411	0.981	7.496		Vavg (fps) =	2.96	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.024		
Clopper Soil Loss, ft	0.000	0.000	0.000	-0.164	-0.039	-0.056	-0.010	0.000	0.000	-0.163	-0.489	Flow (cfs) =	0.50	0.31	0.10
5 ft			Avg Bottom Gain, ft	0.00				Avg Clopper Soil Loss, ft	-0.03						
Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	0.965	1.470	1.975	2.431	2.520	2.484	2.011	1.555	1.102	7.806			2.91		2.4
To eroded Surface Elev, ft	0.965	1.470	1.975	2.628	2.598	2.513	2.011	1.555	1.102	7.983		Vavg (fps) =	2.91	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.033		
Clopper Soil Loss, ft	0.000	0.000	0.000	-0.197	-0.079	-0.030	0.000	0.000	0.000	-0.177	-0.531	Flow (cfs) =	0.50	0.49	0.16
10 ft			Avg Bottom Gain, ft	0.00				Avg Clopper Soil Loss, ft	-0.03						
Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	0.925	1.401	1.870	2.402	2.405	2.303	1.818	1.375	0.915	7.324			2.81		2.4
To eroded Surface Elev, ft	0.925	1.401	1.893	2.579	2.546	2.300	1.818	1.375	0.915	7.495		Vavg (fps) =	2.81	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.002	0.007	navg =	0.033		
Clopper Soil Loss, ft	0.000	0.000	-0.023	-0.177	-0.141	0.000	0.000	0.000	0.000	-0.173	-0.518	Flow (cfs) =	0.50	0.46	0.15
15 ft			Avg Bottom Gain, ft	0.00				Avg Clopper Soil Loss, ft	-0.04						
Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.106	1.581	2.110	2.582	2.651	2.562	2.083	1.627	1.171	8.229			2.99		2.4
To eroded Surface Elev, ft	1.106	1.581	2.090	2.677	2.717	2.441	2.087	1.627	1.171	8.228		Vavg (fps) =	2.99	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.000	0.020	0.000	0.000	0.121	0.000	0.000	0.000	0.087	0.262	navg =	0.054		
Clopper Soil Loss, ft	0.000	0.000	0.000	-0.095	-0.066	0.000	-0.003	0.000	0.000	-0.086	-0.259	Flow (cfs) =	0.50	1.05	0.34
20 ft			Avg Bottom Gain, ft	0.02				Avg Clopper Soil Loss, ft	-0.02						
Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	0.830	1.293	1.818	2.297	2.365	2.300	1.798	1.322	1.194	7.139			0.78		1.9
To eroded Surface Elev, ft	0.830	1.293	1.883	2.336	2.365	2.073	1.857	1.322	1.194	7.055		Vavg (fps) =	0.78	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.000	0.000	0.000	0.000	0.226	0.000	0.000	0.000	0.151	0.453	navg =	0.239		
Clopper Soil Loss, ft	0.000	0.000	-0.066	-0.039	0.000	0.000	-0.059	0.000	0.000	-0.068	-0.203	Flow (cfs) =	0.50	1.31	0.42
25 ft			Avg Bottom Gain, ft	0.03				Avg Clopper Soil Loss, ft	-0.02						
Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.047	1.506	1.972	2.451	2.503	2.425	1.959	1.526	1.109	7.775			0.72		2.0
To eroded Surface Elev, ft	1.047	1.506	1.959	2.385	2.523	2.257	2.031	1.493	1.109	7.624		Vavg (fps) =	0.72	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.000	0.013	0.066	0.000	0.167	0.000	0.033	0.000	0.182	0.545	navg =	0.313		
Clopper Soil Loss, ft	0.000	0.000	0.000	0.000	-0.020	0.000	-0.072	0.000	0.000	-0.031	-0.092	Flow (cfs) =	0.80	1.74	0.56
30 ft			Avg Bottom Gain, ft	0.03				Avg Clopper Soil Loss, ft	-0.01						
Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	2.661	2.838	3.310	3.907	3.927	3.944	3.494	2.966	2.631	13.562			2.75		3.7
To eroded Surface Elev, ft	2.605	2.927	3.337	3.917	4.049	4.098	3.642	3.123	2.992	13.985		Vavg (fps) =	2.75	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.028	navg =	0.058		
Clopper Soil Loss, ft	0.000	-0.089	-0.026	-0.010	-0.121	-0.154	-0.148	-0.157	-0.361	-0.432	-1.296	Flow (cfs) =	1.82	1.03	0.33
35 ft			Avg Bottom Gain, ft	0.01				Avg Clopper Soil Loss, ft	-0.12						
Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	2.730	3.045	3.576	4.006	4.147	4.127	3.773	3.255	2.858	14.385			3.07		4.1
To eroded Surface Elev, ft	2.700	2.940	3.704	4.055	4.213	4.160	3.753	3.228	2.648	14.370		Vavg (fps) =	3.07	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.030	0.105	0.000	0.000	0.000	0.000	0.020	0.026	0.210	0.134	0.402	navg =	0.032		
Clopper Soil Loss, ft	0.000	0.000	-0.128	-0.049	-0.066	-0.033	0.000	0.000	0.000	-0.119	-0.358	Flow (cfs) =	0.99	0.50	0.16
40 ft			Avg Bottom Gain, ft	0.04				Avg Clopper Soil Loss, ft	-0.03						
Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	2.618	2.913	3.330	3.822	4.003	3.999	3.632	3.107	2.644	13.760			3.06		3.9
To eroded Surface Elev, ft	2.618	2.874	3.327	3.724	3.930	4.062	3.501	3.015	2.644	13.579		Vavg (fps) =	3.06	Bed Max Shear Stress (psf)	Water Depth (ft)
SoilGain, ft	0.000	0.039	0.003	0.098	0.072	0.000	0.131	0.092	0.000	0.222	0.666	navg =	#NUM!		
CJS 7/6 Clopper Soil Loss, ft	0.000	0.000	0.000	0.000	0.000	-0.062	0.000	0.000	0.000	-0.042	-0.125	Flow (cfs) =	#NUM!	-0.02	-0.01
			Avg Bottom Gain, ft	0.05				Avg Clopper Soil Loss, ft	-0.01						
Soil Gain, in	0.002	0.008	0.001	0.006	0.004	0.020	0.008	0.007	0.012	**Volume**		Avg Bottom Gain per Xsection, ft = 0.048			
Clopper Soil Loss, in	0.000	0.000	-0.012	-0.041	-0.022	-0.010	-0.004	0.000	0.000	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft = -0.007			

Trapezoidal Analysis	Original Surface Elev	190.263	**1 thru 6:**	X-Section Spacing, ft =	5	Original Surface Elev	140.230		**7 thru 9:**	X-Section Spacing, ft =	5
	Eroded Surface Elev	191.611		Test Section Length, ft =	40	Eroded Surface Elev	140.762			Test Section Length, ft =	40
	Soil Gain	1.657	0.124	gauge spacing, ft =	1	Soil Gain	1.248	0.094		gauge spacing, ft =	0.5
	CSLI	-3.005	-0.225	channel width measured, ft =	8	CSLI	-1.780	-0.133		channel width measured, ft =	4

TYPICAL TEST PICTURES

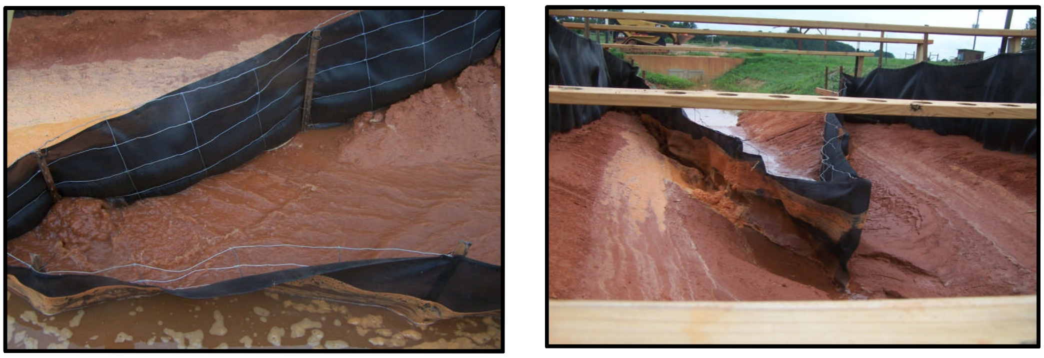
0.5 cfs Flow (RETEST)

Check Structure Installation over Bare Soil



Initial Flow & Upstream Ponding

Increased Ponding & Very Near Overtopping



Close-up of Blowout and End-of-test Upstream Scour Hole

Project: ASTM D 7208: Standard Test Method for Determination of Temporary Ditch Check Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.

Test Setup: Trapezoid with 2-ft wide bottom and 2:1 side slopes x 40-ft long; 5% Bed Slope;

Client: GSWCC **Product:** Control Runs - No Check Structures

Flow: 0.5 cfs for 30 minutes **Test Date:** 6/21/2012

	Station, ft	Avg Soil Gain, in	Avg Soil Loss, in.	Avg Soil Gain, ft^2	Avg Soil Loss, ft^2	Flow Depth, in	Wetted Area, ft^2	Flow Velocity, ft/s	Shear, psf
	0	0.00	-0.07	0.00	-0.022	1.14	6.06	2.31	0.30
	5	0.00	-0.10	0.00	-0.040	0.98	11.83	2.61	0.26
	10	0.00	-0.10	0.00	-0.034	1.06	11.98	2.81	0.28
	15	0.00	-0.17	0.00	-0.065	0.91	11.69	3.03	0.24
	20	0.00	-0.18	0.00	-0.070	1.14	12.13	2.96	0.30
No Check	25	0.00	-0.15	0.00	-0.059	0.98	11.83	3.10	0.26
Structure	30	0.00	-0.18	0.00	-0.068	0.98	11.83	3.15	0.26
	35	0.00	-0.26	0.00	-0.103	1.06	11.98	3.18	0.28
	40	0.00	-0.24	0.00	-0.084	0.94	5.88	3.20	0.25
				Total Soil Gain, ft^3	Total Soil Loss, ft^3		Total Wetted Area, ft^2	SAI - Soil Accretion Index	CSLI - Clopper Soil Loss Index
				0.00	**-2.53**		**95.22**	**0.00**	**-2.65**

Flow: 1.0 cfs for 30 minutes **Test Date:** 6/21/2012

	Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft^2	Soil Loss, ft^2	Flow Depth, in	Wetted Area, ft^2	Flow Velocity, ft/s	Shear, psf
	0	0.00	-0.28	0.00	-0.110	1.61	6.50	3.78	0.42
	5	0.00	-0.23	0.00	-0.075	1.54	12.86	3.94	0.40
	10	0.00	-0.33	0.00	-0.121	1.50	12.79	4.03	0.39
	15	0.00	-0.25	0.00	-0.085	1.38	12.57	3.99	0.36
	20	0.00	-0.28	0.00	-0.105	1.54	12.86	3.94	0.40
No Check	25	0.00	-0.36	0.00	-0.139	1.54	12.86	3.94	0.40
Structure	30	0.00	-0.28	0.00	-0.097	1.34	12.49	4.08	0.35
	35	0.00	-0.28	0.00	-0.094	1.57	12.93	4.05	0.41
	40	0.00	-0.30	0.00	-0.107	1.50	6.39	4.10	0.39
				Total Soil Gain, ft^3	Total Soil Loss, ft^3		Total Wetted Area, ft^2	SAI - Soil Accretion Index	CSLI - Clopper Soil Loss Index
				0.00	**-4.07**		**102.27**	**0.00**	**-3.98**

Flow: 2.0 cfs for 30 minutes **Test Date:** 6/27/2012

	Station, ft	Soil Gain, in	Soil Loss, in.	Soil Gain, ft^2	Soil Loss, ft^2	Flow Depth, in	Wetted Area, ft^2	Flow Velocity, ft/s	Shear, psf
	0	0.00	-0.27	0.00	-0.100	2.20	7.05	4.84	0.57
	5	0.00	-0.43	0.00	-0.171	2.28	14.25	4.80	0.59
	10	0.00	-0.52	0.00	-0.186	2.13	13.96	4.90	0.55
	15	0.00	-0.59	0.00	-0.170	2.13	13.96	5.10	0.55
	20	0.00	-0.44	0.00	-0.145	2.48	14.62	5.05	0.64
No Check	25	0.00	-0.57	0.00	-0.161	2.05	13.81	5.15	0.53
Structure	30	0.00	-0.47	0.00	-0.164	2.20	14.11	5.10	0.57
	35	0.00	-0.56	0.00	-0.194	1.97	13.67	5.10	0.51
	40	0.00	-0.63	0.00	-0.203	2.13	6.98	5.17	0.55
				Total Soil Gain, ft^3	Total Soil Loss, ft^3		Total Wetted Area, ft^2	SAI - Soil Accretion Index	CSLI - Clopper Soil Loss Index
				0.00	**-6.79**		**112.43**	**0.00**	**-6.04**

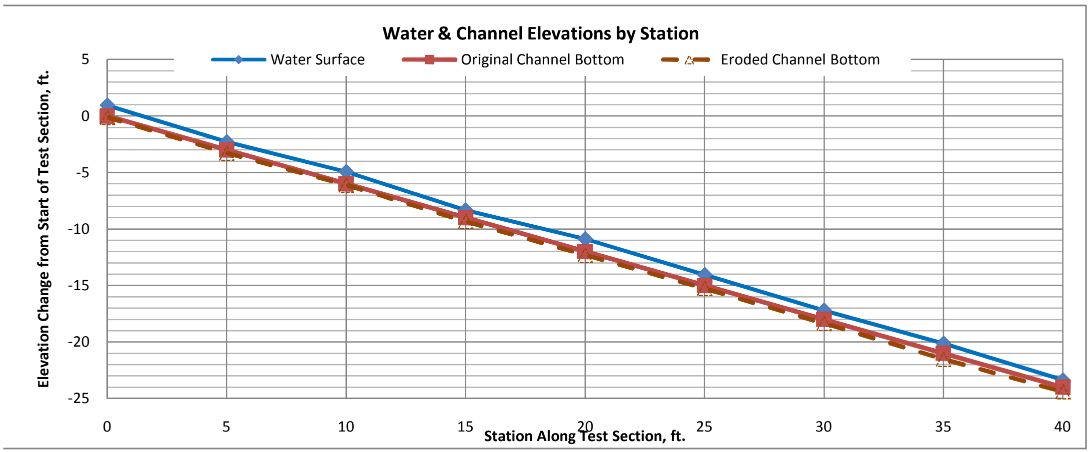
CJS 6/30/2012 (Rev. 8/21/14)
Quality Review / Date

Project: ASTM D 7208: Standard Test Method for Determination of Temporary Ditch Check Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.

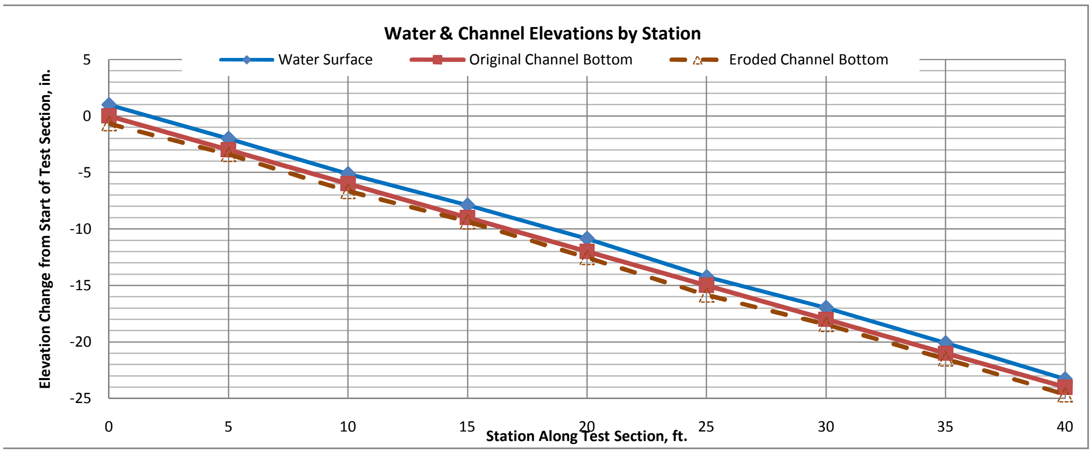
Test Setup: Trapezoid with 2-ft wide bottom and 2:1 side slopes x 40-ft long; 5% Bed Slope;

Client: GSWCC **Product:** Control Bare Soil

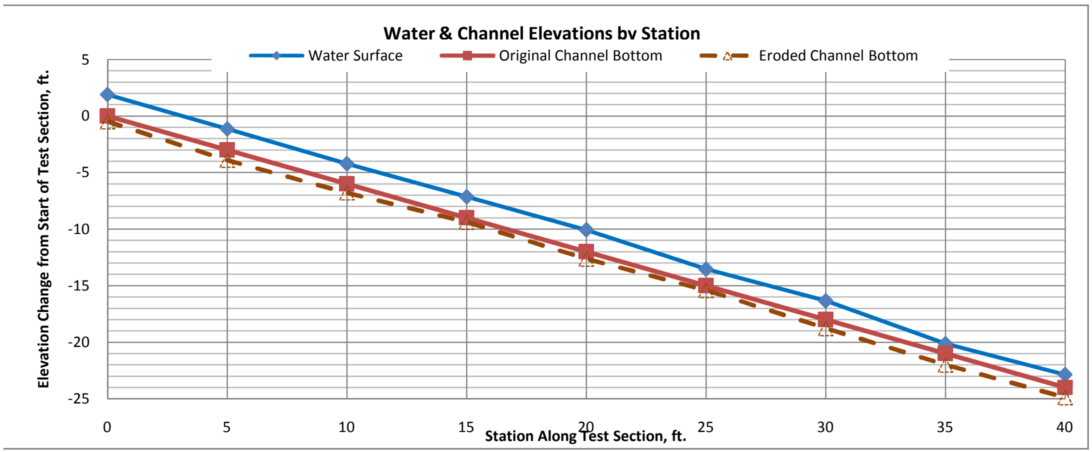
Flow: 0.5 cfs for 30 minutes **Test Date:** 6/21/2012



Flow: 1.0 cfs for 30 minutes **Test Date:** 6/21/2012



Flow: 2.0 cfs for 30 minutes **Test Date:** 6/27/2012



ASTM D7208	Date: 6/21/12	Start Time: 3:58 PM	End Time: 4:28 PM
	Soil: Sandy Clay	Target Flow (cfs): 0.50	Slope: 5%
60 ft long flume, 40 ft test section	SRD: Control	Installation: Bare Soil	
2 ft wide flume	TEST DATA		

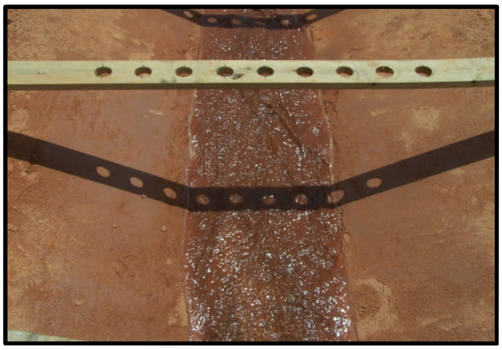
		A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	Outlet Weir								Weir						Channel Targets	
FLOW	Water Depth, in								1.50						1.00	
eir width (ft) = 2	Water Velocity, ft/s								0.00						3 - 4	
0 ft C D E F G H	Flow Rate, cfs	0.00							0.00	0.00					0.50	
	Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.808	2.041	2.293	2.310	2.320	2.306	2.306	2.067	1.821	8.727			2.31		2.2
	To eroded Surface Elev, ft	1.808	2.041	2.313	2.310	2.336	2.320	2.310	2.067	1.821	8.749		Vavg (fps) =	2.31	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.030		
	Clopper Soil Loss, ft	0.000	0.000	-0.020	0.000	-0.016	-0.013	-0.003	0.000	0.000	-0.022	-0.066	Flow (cfs) =	0.00	0.30	0.10
5 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.01						
	Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.913	2.175	2.405	2.454	2.493	2.474	2.431	2.208	1.982	9.300			2.61		2.4
	To eroded Surface Elev, ft	1.913	2.175	2.405	2.484	2.516	2.493	2.431	2.208	1.982	9.340		Vavg (fps) =	2.61	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.024		
	Clopper Soil Loss, ft	0.000	0.000	0.000	-0.030	-0.023	-0.020	0.000	0.000	0.000	-0.040	-0.121	Flow (cfs) =	0.00	0.26	0.08
10 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.01						
	Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.831	2.080	2.290	2.316	2.336	2.310	2.287	2.001	1.768	8.709			2.81		2.2
	To eroded Surface Elev, ft	1.831	2.080	2.323	2.343	2.336	2.310	2.303	2.001	1.768	8.743		Vavg (fps) =	2.81	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.023		
	Clopper Soil Loss, ft	0.000	0.000	-0.033	-0.026	0.000	0.000	-0.016	0.000	0.000	-0.034	-0.102	Flow (cfs) =	0.00	0.28	0.09
15 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.01						
	Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	2.051	2.320	2.533	2.536	2.559	2.549	2.480	2.234	1.985	9.623			3.03		2.5
	To eroded Surface Elev, ft	2.051	2.320	2.556	2.559	2.579	2.589	2.507	2.234	1.985	9.687		Vavg (fps) =	3.03	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.020		
	Clopper Soil Loss, ft	0.000	0.000	-0.023	-0.023	-0.020	-0.039	-0.026	0.000	0.000	-0.065	-0.194	Flow (cfs) =	0.00	0.24	0.08
20 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.01						
	Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.873	2.152	2.316	2.310	2.326	2.306	2.283	2.021	1.788	8.778			2.96		2.2
	To eroded Surface Elev, ft	1.873	2.152	2.343	2.329	2.329	2.359	2.320	2.021	1.788	8.848		Vavg (fps) =	2.96	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.023		
	Clopper Soil Loss, ft	0.000	0.000	-0.026	-0.020	-0.003	-0.052	-0.036	0.000	0.000	-0.070	-0.210	Flow (cfs) =	0.00	0.30	0.10
25 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.02						
	Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.949	2.188	2.438	2.490	2.523	2.513	2.520	2.287	2.073	9.483			3.1		2.4
	To eroded Surface Elev, ft	1.949	2.188	2.467	2.536	2.526	2.530	2.539	2.287	2.073	9.542		Vavg (fps) =	3.10	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.020		
	Clopper Soil Loss, ft	0.000	0.000	-0.030	-0.046	-0.003	-0.016	-0.020	0.000	0.000	-0.059	-0.177	Flow (cfs) =	0.51	0.26	0.08
30 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.01						
	Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.706	2.005	2.198	2.218	2.208	2.205	2.152	1.893	1.647	8.292			3.15		2.1
	To eroded Surface Elev, ft	1.706	2.005	2.224	2.260	2.224	2.231	2.175	1.893	1.647	8.360		Vavg (fps) =	3.15	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.020		
	Clopper Soil Loss, ft	0.000	0.000	-0.026	-0.043	-0.016	-0.026	-0.023	0.000	0.000	-0.068	-0.203	Flow (cfs) =	0.52	0.26	0.08
35 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.01						
	Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.896	2.156	2.408	2.454	2.484	2.500	2.438	2.231	1.995	9.319			3.18		2.4
	To eroded Surface Elev, ft	1.896	2.156	2.434	2.516	2.500	2.552	2.474	2.231	1.995	9.421		Vavg (fps) =	3.18	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.021		
	Clopper Soil Loss, ft	0.000	0.000	-0.026	-0.062	-0.016	-0.052	-0.036	0.000	0.000	-0.103	-0.308	Flow (cfs) =	0.56	0.28	0.09
40 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.02						
	Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.870	2.119	2.365	2.425	2.408	2.402	2.333	2.106	1.837	9.021			3.2		2.4
	To eroded Surface Elev, ft	1.870	2.119	2.425	2.464	2.434	2.434	2.356	2.106	1.837	9.105		Vavg (fps) =	3.20	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.019		
	Clopper Soil Loss, ft	0.000	0.000	-0.059	-0.039	-0.026	-0.033	-0.023	0.000	0.000	-0.084	-0.253	Flow (cfs) =	0.50	0.25	0.08
				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.02						
	Avg Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Volume		Avg Bottom Gain per Xsection, ft = 0.000			
	Avg Clopper Soil Loss, ft	0.000	0.000	-0.027	-0.029	-0.015	-0.030	-0.020	0.000	0.000	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft = -0.006			

	[ft³]	[in]	
Original Surface Elev	367.002		X-Section Spacing, ft = 5
Eroded Surface Elev	369.530		Test Section Length, ft = 40
Soil Loss/ Gain	0.000	0.000	gauge spacing, ft = 0.5
CSLI	-2.528	-0.190	channel width measured, ft = 4

TYPICAL TEST PICTURES

0.5 cfs Flow


Control Channel Prepared

Initial Flow


On-going Flow . . . And Erosion


End-of-test Eroded Condition.

ASTM D7208	Date: 6/21/12	Start Time: 4:07 PM	End Time: 4:37 PM
	Soil: Sandy Clay	Target Flow (cfs): 1.00	Slope: 5%
60 ft long flume, 40 ft test section	**RECP:** Control	**Anchorage:** Bare Soil	
2 ft wide flume			

TEST DATA

Outlet Weir								Weir						Channel Targets	
Water Depth, in								2.25						1.50	
Water Velocity, ft/s								0.00						4 - 5	
Flow Rate, cfs	0.00							0.00	0.00					1.00	

FLOW

eir width (ft) = 2

0 ft C D E F G H

Cross-section 1	A	B	C	D	E	F	G	H	I	[ft^2]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.873	2.093	2.310	2.333	2.346	2.352	2.339	2.119	1.880	8.889			3.78		2.3
To eroded Surface Elev, ft	1.873	2.093	2.310	2.388	2.398	2.415	2.382	2.119	1.880	8.999		Vavg (fps) =	3.78	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.023		
Clopper Soil Loss, ft	0.000	0.000	0.000	-0.056	-0.052	-0.062	-0.043	0.000	0.000	-0.110	-0.331	Flow (cfs) =	1.00	0.42	0.13
			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.02						

5 ft Straw Bales

Cross-section 2	A	B	C	D	E	F	G	H	I	[ft^2]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	2.244	2.474	2.651	2.680	2.661	2.654	2.549	2.320	2.073	10.092			3.94		2.6
To eroded Surface Elev, ft	2.244	2.474	2.684	2.707	2.707	2.684	2.585	2.320	2.073	10.167		Vavg (fps) =	3.94	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.021		
Clopper Soil Loss, ft	0.000	0.000	-0.033	-0.026	-0.046	-0.030	-0.036	0.000	0.000	-0.075	-0.226	Flow (cfs) =	1.00	0.40	0.13
			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.02						

10 ft

Cross-section 3	A	B	C	D	E	F	G	H	I	[ft^2]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.847	2.133	2.303	2.339	2.362	2.359	2.362	2.133	1.867	8.937			4.03		2.3
To eroded Surface Elev, ft	1.847	2.133	2.326	2.408	2.415	2.405	2.421	2.133	1.867	9.058		Vavg (fps) =	4.03	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.021		
Clopper Soil Loss, ft	0.000	0.000	-0.023	-0.069	-0.052	-0.046	-0.059	0.000	0.000	-0.121	-0.364	Flow (cfs) =	1.00	0.39	0.12
			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.03						

15 ft

Cross-section 4	A	B	C	D	E	F	G	H	I	[ft^2]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	2.041	2.303	2.480	2.516	2.520	2.516	2.477	2.238	1.988	9.546			3.99		2.4
To eroded Surface Elev, ft	2.041	2.303	2.552	2.556	2.543	2.543	2.507	2.238	1.988	9.631		Vavg (fps) =	3.99	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.020		
Clopper Soil Loss, ft	0.000	0.000	-0.072	-0.039	-0.023	-0.026	-0.030	0.000	0.000	-0.085	-0.256	Flow (cfs) =	1.00	0.36	0.11
			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.02						

20 ft

Cross-section 5	A	B	C	D	E	F	G	H	I	[ft^2]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.621	1.880	2.139	2.208	2.238	2.228	2.221	2.064	1.867	8.367			3.94		2.1
To eroded Surface Elev, ft	1.621	1.880	2.201	2.267	2.270	2.270	2.238	2.064	1.867	8.472		Vavg (fps) =	3.94	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.021		
Clopper Soil Loss, ft	0.000	0.000	-0.062	-0.059	-0.033	-0.043	-0.016	0.000	0.000	-0.105	-0.315	Flow (cfs) =	1.00	0.40	0.13
			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.02						

25 ft

Cross-section 6	A	B	C	D	E	F	G	H	I	[ft^2]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.696	1.949	2.182	2.306	2.326	2.336	2.333	2.188	1.949	8.741			3.94		2.3
To eroded Surface Elev, ft	1.696	1.949	2.218	2.405	2.392	2.382	2.359	2.188	1.949	8.880		Vavg (fps) =	3.94	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.021		
Clopper Soil Loss, ft	0.000	0.000	-0.036	-0.098	-0.066	-0.046	-0.026	0.000	0.000	-0.139	-0.417	Flow (cfs) =	1.01	0.40	0.13
			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.03						

30 ft

Cross-section 7	A	B	C	D	E	F	G	H	I	[ft^2]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.752	1.995	2.251	2.290	2.310	2.293	2.303	2.126	1.873	8.695			4.08		2.2
To eroded Surface Elev, ft	1.752	1.995	2.283	2.336	2.336	2.333	2.365	2.126	1.873	8.792		Vavg (fps) =	4.08	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.019		
Clopper Soil Loss, ft	0.000	0.000	-0.033	-0.046	-0.026	-0.039	-0.062	0.000	0.000	-0.097	-0.292	Flow (cfs) =	0.91	0.35	0.11
			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.02						

35 ft

Cross-section 8	A	B	C	D	E	F	G	H	I	[ft^2]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.808	2.060	2.323	2.385	2.411	2.405	2.375	2.188	1.926	9.018			4.05		2.3
To eroded Surface Elev, ft	1.808	2.060	2.375	2.405	2.467	2.454	2.411	2.188	1.926	9.112		Vavg (fps) =	4.05	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.021		
Clopper Soil Loss, ft	0.000	0.000	-0.052	-0.020	-0.056	-0.049	-0.036	0.000	0.000	-0.094	-0.282	Flow (cfs) =	1.06	0.41	0.13
CJS 6/30/2012			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.02						

40 ft

Cross-section 9	A	B	C	D	E	F	G	H	I	[ft^2]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
To original Surface Elev, ft	1.693	1.903	2.142	2.274	2.290	2.290	2.313	2.123	1.844	8.564			4.1		2.2
To eroded Surface Elev, ft	1.693	1.903	2.175	2.336	2.356	2.326	2.339	2.123	1.844	8.671		Vavg (fps) =	4.10	Bed Max Shear Stress (psf)	Water Depth (ft)
Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.020		
Clopper Soil Loss, ft	0.000	0.000	-0.033	-0.062	-0.066	-0.036	-0.026	0.000	0.000	-0.107	-0.322	Flow (cfs) =	1.02	0.39	0.12
			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.02						

	A	B	C	D	E	F	G	H	I	Volume [ft^3]	[in]	
Avg Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			Avg Bottom Gain per Xsection, ft = 0.000
Avg Clopper Soil Loss, ft	0.000	0.000	-0.039	-0.047	-0.047	-0.042	-0.035	0.000	0.000			Avg Clopper Soil Loss per Xsection, ft = -0.024

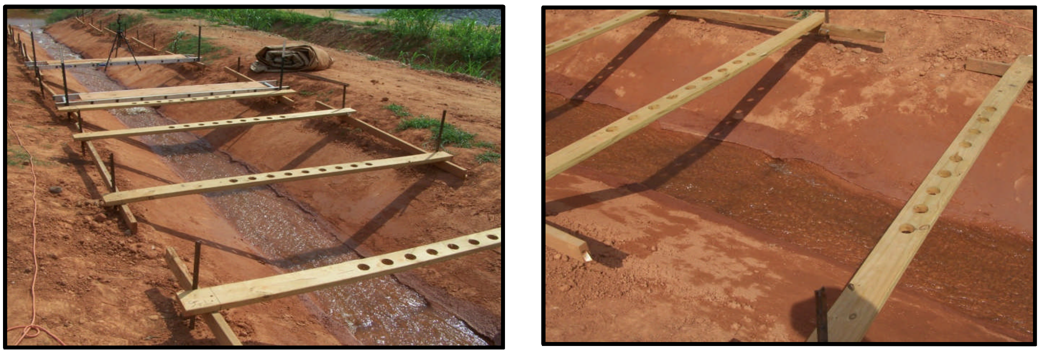
	[ft^3]	[in]	
Original Surface Elev	365.061		X-Section Spacing, ft = 5
Eroded Surface Elev	369.127		Test Section Length, ft = 40
Soil Loss/ Gain	0.000	0.000	gauge spacing, ft = 0.5
CSLI	-4.066	-0.305	channel width measured, ft = 4

TYPICAL TEST PICTURES

1.0 cfs Flow

Control Channel Prepared

Initial Flow & Inlet Weir



On-going Flow . . . And Erosion

End-of-test Eroded Condition.

ASTM D7208	Date: 6/27/12	Start Time:	2:29 PM	End Time:	2:59 PM
	Soil: Sandy Clay	Target Flow (cfs):	2.00	Slope:	5%
60 ft long flume, 40 ft test section	RECP: Control	Anchorage: Bare Soil			
2 ft wide flume	TEST DATA				

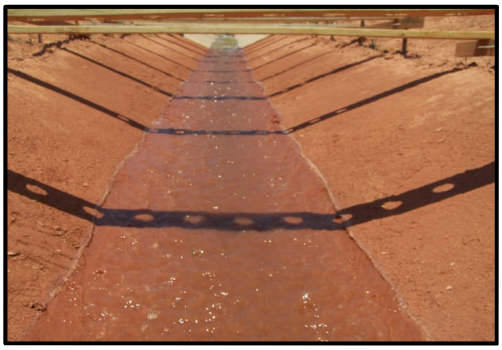
Distance		A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	Outlet Weir								Weir						Channel Targets	
FLOW	Water Depth, in								2.50						1.75	
eir width (ft) = 2	Water Velocity, ft/s								0.00						5.5 - 6	
0 ft C D E F G H	Flow Rate, cfs	0.00							0.00	0.00					2.00	
	Cross-section 1	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.814	2.047	2.303	2.329	2.339	2.346	2.320	2.116	1.870	8.827			4.84		2.2
	To eroded Surface Elev, ft	1.814	2.047	2.343	2.382	2.365	2.392	2.356	2.116	1.870	8.927		Vavg (fps) =	4.84	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.022		
	Clopper Soil Loss, ft	0.000	0.000	-0.039	-0.052	-0.026	-0.046	-0.036	0.000	0.000	-0.100	-0.299	Flow (cfs) =	2.00	0.57	0.18
5 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.02						
	Cross-section 2	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.923	2.126	2.402	2.441	2.461	2.441	2.411	2.188	1.972	9.204			4.8		2.3
	To eroded Surface Elev, ft	1.923	2.126	2.418	2.539	2.497	2.533	2.490	2.188	1.972	9.375		Vavg (fps) =	4.80	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.023		
	Clopper Soil Loss, ft	0.000	0.000	-0.016	-0.098	-0.036	-0.092	-0.079	0.000	0.000	-0.171	-0.512	Flow (cfs) =	2.00	0.59	0.19
10 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.04						
	Cross-section 3	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.745	1.972	2.211	2.270	2.306	2.267	2.238	2.008	1.814	8.523			4.9		2.2
	To eroded Surface Elev, ft	1.749	1.972	2.283	2.395	2.336	2.310	2.359	2.008	1.814	8.710		Vavg (fps) =	4.90	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.021		
	Clopper Soil Loss, ft	-0.003	0.000	-0.072	-0.125	-0.030	-0.043	-0.121	0.000	0.000	-0.186	-0.559	Flow (cfs) =	1.74	0.55	0.18
15 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.04						
	Cross-section 4	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	2.018	2.274	2.493	2.549	2.572	2.536	2.520	2.287	2.037	9.635			5.1		2.4
	To eroded Surface Elev, ft	2.018	2.274	2.713	2.579	2.595	2.575	2.648	2.287	2.037	9.804		Vavg (fps) =	5.10	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.021		
	Clopper Soil Loss, ft	0.000	0.000	-0.220	-0.030	-0.023	-0.039	-0.128	0.000	0.000	-0.170	-0.509	Flow (cfs) =	1.81	0.55	0.18
20 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.05						
	Cross-section 5	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.781	2.051	2.228	2.254	2.277	2.274	2.238	2.021	1.788	8.575			5.05		2.1
	To eroded Surface Elev, ft	1.788	2.051	2.320	2.316	2.323	2.323	2.310	2.021	1.788	8.720		Vavg (fps) =	5.05	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.023		
	Clopper Soil Loss, ft	-0.007	0.000	-0.092	-0.062	-0.046	-0.049	-0.072	0.000	0.000	-0.145	-0.436	Flow (cfs) =	2.09	0.64	0.21
25 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.04						
	Cross-section 6	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.909	2.169	2.421	2.487	2.510	2.513	2.474	2.290	2.057	9.435			5.15		2.4
	To eroded Surface Elev, ft	1.909	2.169	2.536	2.523	2.559	2.530	2.687	2.290	2.057	9.596		Vavg (fps) =	5.15	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.020		
	Clopper Soil Loss, ft	0.000	0.000	-0.115	-0.036	-0.049	-0.016	-0.213	0.000	0.000	-0.161	-0.482	Flow (cfs) =	1.76	0.53	0.17
30 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.05						
	Cross-section 7	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.617	1.896	2.126	2.175	2.195	2.192	2.149	1.959	1.690	8.189			5.1		2.1
	To eroded Surface Elev, ft	1.624	1.896	2.195	2.264	2.241	2.247	2.234	1.959	1.690	8.353		Vavg (fps) =	5.10	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.021		
	Clopper Soil Loss, ft	-0.007	0.000	-0.069	-0.089	-0.046	-0.056	-0.085	0.000	0.000	-0.164	-0.492	Flow (cfs) =	1.87	0.57	0.18
35 ft				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.04						
	Cross-section 8	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.795	2.031	2.303	2.359	2.402	2.415	2.392	2.234	2.011	9.026			5.1		2.3
	To eroded Surface Elev, ft	1.791	2.031	2.402	2.451	2.493	2.480	2.467	2.234	2.011	9.219		Vavg (fps) =	5.10	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	navg =	0.020		
	Clopper Soil Loss, ft	0.000	0.000	-0.098	-0.092	-0.092	-0.066	-0.075	0.000	0.000	-0.194	-0.581	Flow (cfs) =	1.67	0.51	0.16
40 ft	CJS 6/30/2012			Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.05						
	Cross-section 9	A	B	C	D	E	F	G	H	I	[ft²]	[in]	V @ 0.2d	V @ 0.6d	V @ 0.8d	To Water Surf, ft
	To original Surface Elev, ft	1.827	2.080	2.310	2.359	2.385	2.352	2.320	2.083	1.824	8.863			5.17		2.3
	To eroded Surface Elev, ft	1.827	2.080	2.457	2.474	2.467	2.375	2.425	2.083	1.824	9.067		Vavg (fps) =	5.17	Bed Max Shear Stress (psf)	Water Depth (ft)
	Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	navg =	0.020		
	Clopper Soil Loss, ft	0.000	0.000	-0.148	-0.115	-0.082	-0.023	-0.105	0.000	0.000	-0.203	-0.610	Flow (cfs) =	1.83	0.55	0.18
				Avg Bottom Gain, ft	0.00			Avg Clopper Soil Loss, ft		-0.05						
	Avg Soil Gain, ft	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Volume		Avg Bottom Gain per Xsection, ft = 0.000			
	Avg Clopper Soil Loss, ft	-0.001	0.000	-0.098	-0.082	-0.048	-0.051	-0.088	0.000	0.000	[ft³]	[in]	Avg Clopper Soil Loss per Xsection, ft = -0.022			

	[ft³]	[in]	
Original Surface Elev	362.440		X-Section Spacing, ft = 5
Eroded Surface Elev	369.224		Test Section Length, ft = 40
Soil Loss/ Gain	0.004	0.000	gauge spacing, ft = 0.5
CSLI	-6.788	-0.509	channel width measured, ft = 4

TYPICAL TEST PICTURES

2.0 cfs Flow


Control Channel Prepared

Initial Flow & Closeup


On-going Flow . . . And Erosion


End-of-test Eroded Condition.

APPENDIX C – SEDIMENT BARRIER TEST PROCEDURE

Approved:___________________ Date:________ Sam R. Allen, Vice President	Approved:___________________ Date:_______ Alfred J. Ransom, Corporate Quality Officer

Standard Test Method for Determination of Sediment Retention Devices (SRDs) Performance in Reducing Sediment Loss from Rainfall-Induced Erosion during Perimeter Control Applications

DDRF Division

Title	Large-scale Slope Sediment Retention
Test Method Reference	GSWCC-SB / WK11340
Test Category	Hydraulic Performance
Material Applicability	Sediment Retention Devices (a.k.a. SRDs)
Target Property	Soil Loss / Seepage
Units of Test Result	Practice Factor (as used in the Universal Soil Loss Equation)
Test Specimen Configuration	8 feet wide
Number of Replicate Specimens	Three (one each on three different slopes)
Equipment Required	Rainfall simulators, water source, runoff and sediment collection system, other miscellaneous equipment including: rain gauges, sieve set (standard US sieves), drying cans, a drying oven or microwave oven, balances, meteorological equipment (wind speed, temperature, precipitation), sample bottles, and camera and video recorder.

1.0 PURPOSE

1.1 This test method covers the determination of a practice factor (a.k.a. "P-Factor") for a sediment retention device.

2.0 SCOPE

2.1 This test method is a performance test, but can be used for quality assurance to determine product conformance to project specifications. Caution is advised since information regarding laboratory specific precision is incomplete. For project specific conformance, unique project-specific conditions may be taken into consideration.

2.2 This test method covers the guidelines, requirements and procedures for evaluating the ability of Sediment Retention Devices (SRDs) to retain sediments resulting from rainfall-induced erosion.

2.3 This test method utilizes full-scale testing procedures, and is patterned after conditions typically found on construction sites prior to revegetation work. Further, procedures for evaluation of baseline conditions are provided. Thus, test preparation, test execution, data collection, data analysis and reporting procedures herein are intended to be suitable for testing of bare soil and SRDs.

2.4 One control plot (bare soil) shall be tested either before or after the product testing. All testing shall follow identical procedures. The control plot results are combined with previous control runs to characterize control plot performance and to obtain an associated "K-Factor" for use in P-Factor computations.

3.0 RESPONSIBILITIES

3.1 The Corporate Quality Officer in conjunction with the laboratory director is responsible for the implementation and maintenance of the standard operating procedure.

3.2 The Laboratory Director/Assistant Laboratory Director is responsible for informing the technicians of the maintenance and operation requirements for specific equipment and provides training to technicians.

3.3 The Technicians are responsible for performing apparatus/facility setup, conducting the test, performing the required equipment preventive maintenance and documenting the results.

4.0 SAFETY

4.1 Take care when performing preparation and testing operations on the slope.

5.0 APPARATUS / FACILITY

5.1 Testing is performed on three earthen embankment test plots having a surface slope of 3H:1V and a slope length of 40 ft, though the actual exposed surface upstream of the SRD is 27 ft. The test plot width is 8 ft.

5.2 The test plot shall be constructed with a minimum 12-inch thick veneer of compacted soil of the type requested for testing. The default soil type is sandy clay as defined by the USDA soil triangle. Representative samples of the test soil shall be sent to a geotechnical laboratory at least once per year, or whenever the stockpile is changed, for determination of grain size distribution, Atterberg limits, organic matter content, standard Proctor density, and optimum moisture content.

5.3 The test plot soil is compacted to create a geotechnically (structurally) stable subgrade. Place soil in a minimum of two lifts and compact to 90 ± 3 % of standard Proctor density in accordance with Test Method D 698. In-situ density shall be verified via any generally accepted method, such as ASTM D 2937 (drive cylinder method).

5.4 Test plots are separated sufficiently to prevent work activities and overspray from one plot from impacting adjacent plots. The top and side edges of each plot are constructed with edging sufficient to prevent run-on of water from outside the plot.

5.5 The test plots are encircled by sprinkler risers around the perimeter of the test plot to provide uniform distribution of the rainfall intensities to be used in testing. The sprinkler risers and locations shall be established based on the calibration procedures set forth in Section 7.0. The sprinkler risers are supplied and connected by a piping system capable of providing consistent water supply to maintain the calibrated performance.

6.0 PROCEDURE

6.1 Test Plot Preparation:

6.1.1 Repair depressions, voids, soft, or uncompacted areas.

6.1.2 Also, free the plot from obstructions or protrusions, such as roots, large stones, or other foreign material.

6.1.3 If the plots have been used for previous test series, discard the soil carried off the plot and obliterate any rills and gullies. Spread new soil of the same type across the plot and blend (rake or till) into the surface.

6.1.4 Loosen the soil veneer to a depth of approximately 10 cm (4 in.) using a tiller or other appropriate tool.

6.1.5 Determine the moisture content of the soil on each test plot.

6.1.6 Wet or dry each plot until the soil reaches the optimum moisture content ± 4%.

6.1.7 Rake the tilled plot smooth with a steel hand rake.

6.1.8 Lightly compact the soil surface using a turf roller.

6.2 Test Set-Up

6.2.1 Control (Bare Soil) Testing – Proceed to 6.2.4

6.2.2 Product Testing

6.2.2.1 Install the SRD at the base of the plot as directed by the client after the test plot has been prepared.

6.2.2.2 Permit no foot traffic on the plot, once the SRD has been installed.

6.2.2.3 Document the installation methodology for the SRD.

6.2.2.4 Install the SRD so that no runoff is allowed to run around the ends of the SRD.

6.2.3 Take soil samples from each test plot to determine the pretest soil moisture content within 1 hour prior to the test. Generally, 3 samples are taken from each test plot at the horizontal quarter points.

6.2.4 Place rain gauges on each test plot to document actual rainfall amount. Generally, 6 gauges are used on each test plot and positioned in pairs, each 2 ft from the plot edge, at the horizontal quarter points.

6.2.5 Take photographs of the plot prior to testing.

6.3 Pre-Test Documentation:

6.3.1 Maintain a digital test folder for each test, including the following information:

6.3.1.1 Calibrated rainfall properties.
6.3.1.2 Calibrated test soil properties, including soil classification; standard proctor moisture-density relationship; “K” factor; gradation (including hydrometer test for the P200 fraction); and Atterberg limits.
6.3.1.3 Data from the on-site weather station at the time of the test, including ambient air temperature, wind speed, and precipitation.
6.3.1.4 Product manufacturer; product name; description; specifications; size; and a picture of the material, if practical.
6.3.1.5 Test data, including soil moisture condition, all measurements made during testing, and pictures and videos of the test.

6.3.2 When product testing, obtain a sufficient size sample of the product to be tested and submit the sample for the index tests shown in the following table:

SRD – Silt Fence	**SRD – RECP**	**SRD - Wattle**
Mass/Area	Mass/Area	Mass/Volume
Thickness	Thickness	Circumference / Perimeter
Tensile Strength	Ground Cover	
Permittivity	Tensile Strength	
Apparent Opening Size	Absorption (temporary)	
Percent Open Area	Specific Gravity (permanent)	

6.4 **Test Operation and Data Collection:**

6.4.1 Include the following test data:
6.4.1.1 operator identification;
6.4.1.2 operating pressure;
6.4.1.3 sprinkler heads activated;
6.4.1.4 time rainfall began;
6.4.1.5 time stopped;
6.4.1.6 time runoff stopped, and;
6.4.1.7 volume (timed) readings taken at 1 minute intervals;
6.4.1.8 sediment concentrations taken at 3 minute intervals.

6.4.2 Perform testing at sequential target intensities of 5.1, 10.2, 15.2 cm/hr (2, 4, 6 in/hr) for 20 min.

6.4.3 During each target intensity, collect all runoff. Take timed volume samples at 1 minute intervals and grab samples at 3 minute intervals to determine runoff rate and sediment concentration, respectively. Commence sampling when runoff starts and continue until runoff stops (or becomes minimal). Take timed volume samples from the plot apron in appropriately sized containers. Take grab samples from the plot apron in 250 mL laboratory sample bottles and analyze for suspended sediment.

6.4.4 When the test is stopped at the end of each intensity (20 minutes of catastrophic failure) measure and record the depth of rainfall collected in each rain gauge.

6.4.5 Determine total sediment from the plot tested by allowing settlement to occur in the runoff collection tanks. Allow a minimum of 12 hours for settlement or use a flocculating agent. Decant and discard excess water, making sure that the sediment in the bottom of the tank is not disturbed. Collect the entire amount of the settled sediment.

6.4.6 Repeat 6.4.1 thru 6.4.5 for two additional slopes when testing a product.

6.4.7 Dry, weigh, and record the dry sediment weight.

6.4.8 Record general observations regarding the condition of the tested SRD at the conclusion of the data collection. Take photographs of the test plot after testing has been completed.

6.4.9 Carefully remove the SRD from the plot with as little disturbance of the soil as possible. Note general observations regarding the condition and erosion patterns (rills, etc.). Take photographs to record the condition of the soil.

6.5 **Test Data:**

6.5.1 Tabulate runoff data showing discharge as a function of time.

6.5.2 Tabulate sediment concentration as a function of time.

6.5.3 From the total sediment yield and available control data, compute the cummulative practice factor (P-Factor), comparing soil loss from the protected condition to that of the bare soil condition.

6.6 **Report**

Report at a minimum the following information:

6.6.1 General information, including test facility location, date, time and operator(s),

6.6.2 Test plot preparation,

6.6.3 Calibration data and analysis,

6.6.4 Materials documentation including SRD material and installation description,

6.6.5 Test operation, data collected, and data analysis.

6.6.6 Cumulative results of associated control (bare soil) testing.

7.0 Calibration and Associated Calculations

7.1 Simulated Rainfall Calibration

7.1.1 Calibration of the rainfall simulation equipment includes establishing: Rainfall intensity; Uniformity of rainfall application across the plot; Drop size distribution for each intensity, and; Rainfall drop height.

7.1.2 To ensure uniform distribution, do not conduct calibration and testing when the wind velocity is greater than 8 km/h (3 mph).

7.1.3 Conduct calibration annually or following equipment maintenance work. Conduct one intensity/uniformity check every 90 days, or after no more than four test series, whichever comes first.

7.1.4 Place sprinkler risers around the perimeter of the test plot to provide uniform distribution. The precise location of the risers to provide uniform rainfall distribution will be determined by the calibration process and the nuances of any given simulator system.

7.1.5 To measure rainfall intensity and uniformity, calibration tests shall be fun for 15 minutes, recorded to the nearest second. The data shall be used to calculate the rainfall intensity uniformity using the Christiansen uniformity coefficient. Uniformity calibration shall be based on 14 rain gauges positioned equi-distant from each other across and down the slope. Thus, they are located 2 ft from the closest edge and 4 ft from each other. Perform calibrations at uniform pressure for each intensity. Adjust valve and pressure settings until an acceptably uniform rainfall distribution pattern is achieved.

7.1.6 To measure drop size distribution, completely fill three labeled pie pans with sifted flour, struck off with a ruler to produce a smooth, uncompacted surface.

7.1.6.1 Identify three locations along the vertical centerline of the test plot, and at the horizontal quarter points.

7.1.6.2 Extend the covered, filled pie pans out into the rainfall at the identified locations.

7.1.6.3 At the desired test intensity, remove the cover briefly so that drops impinge on the flour to form pellets.

7.1.6.4 Re-cover the pans after only a few seconds and before the drops start to touch each other, and remove the pans from the rainfall.

7.1.6.5 Repeat this procedure at each desired intensity.

7.1.6.6 Air-dry the flour pellets for a minimum of 12 h. Screen each sample of these semi-dry pellets by emptying the entire contents of the pan onto a 70 mesh sieve to carefully remove as much loose flour as possible. Then transfer the remaining pellets to evaporating dishes and heat in an oven at approximately 43°C (110°F) for 2 h.

7.1.6.7 Record the total weight of the hard flour pellets.

7.1.6.8 Sieve the pellets through standard soil sieves by shaking for 2 min.

7.1.6.9 Cull foreign matter and any double pellets from each sieve and record the total weight and pellet count for each size.

7.1.6.10 Raindrop sizes shall be shown to include no more than 10% greater than 6mm (0.24 in) and no more than 10% less than 1mm (0.04 in).

7.1.6.11 Repeat the raindrop size calibration procedure three times for each desired intensity.

7.1.7 Determine raindrop fall height by measuring the average height of the raindrop trajectory using a surveyor's rod. Hold the rod vertically in the spray of a single riser and measure the wetted height. Repeat the height measurement for each desired intensity.

7.2 **Calibration Data:**

7.2.1 Calculate the Christiansen uniformity coefficient (Cu) using the network of rain gauges described in 7.1.5, each of which represents an equal area of the test plot. Calculate the Cu as follows:

7.2.1.1 where:Cu = Christiansen uniformity coefficient,

$$C_u = 100\,[1.00 - \sum|d| \div n\,\bar{X}]$$

where:
C_u = Christiansen uniformity coefficient,
d = $X_i - \bar{X}$,
n = number of observations (20 in this case),
X = average depth caught, and
X_i = depth caught in each rain gauge, i.

7.2.2 The average rainfall intensity over the entire test plot is the average depth of rainfall collected in the rain gauges divided by the elapsed time of the test. The formula to calculate intensity (in centimeters per hour) is:

$$i = 60[\sum_{j=1}^{J} P_j \div Jt]$$

where:
i = rainfall intensity (cm / h),
P_j = depth of rainfall (cm),
J = number of rain gauges (20 in this case), and
t = time of test (minutes).

7.2.3 Plot the raindrop size distribution for each rainfall intensity. The plot should relate the percent of total volume to drop diameter.

8.0 TRAINING

8.1 The Laboratory Director and Assistant Laboratory Director in conjunction with Division Management are responsible for providing initial and ongoing training. This SOP and all associated SOPs are included in the department training program of all department new hires that perform any part of this SOP's activities and as continued training for existing personnel.

9.0 REFERENCES

9.1 ISO 9001, Quality Management System – Requirements
9.2 ISO/IEC 17025, General Requirements for the Competence of Testing and Calibration Laboratories
9.3 01CQSP, Corporate Quality System Plan
9.4 ASTM WK11340 (February 2012)
9.5 ASTM D 698
9.6 ASTM D 2937

10.0 CHANGES TO PROCEDURE

Each change shall be documented.

Changes	Date	Revision Level
New	9/01/12	0

APPENDIX D – CHECK DAM TEST PROCEDURE

Approved:___________________ Date:________ Sam R. Allen, Vice President	Approved:___________________ Date:_______ Alfred J. Ransom, Corporate Quality Officer

Standard Test Method for Determination of Temporary Ditch Check Performance in Protecting Earthen Channels from Stormwater-Induced Erosion

DDRF Division

Title	Large-scale Channel Erosion
Test Method Reference	GSWCC-CD / ASTM D 7208-06
Test Category	Hydraulic Performance
Material Applicability	Sediment Retention Devices (a.k.a. SRDs)
Target Property	Soil Loss
Units of Test Result	Soil Loss
Test Specimen Configuration	Minimum 12 ft long to fit across trapezoidal channel having 0.61 m (2 ft) bottom width and 2:1 side slopes.
Number of Replicate Specimens	Three (one each in three different flumes)
Equipment Required	Water delivery system, water source, survey apparatus, velocity probe, earthwork equipment, photographic equipment: camera and video recorder.

1.0 PURPOSE

1.1 This test method covers the determination of a check structure performance via its ability to slow runoff, trap sediments, and decrease erosion.

2.0 SCOPE

2.1 This test method is a performance test, but can be used for quality assurance to determine product conformance to project specifications. Caution is advised since information regarding laboratory specific precision is incomplete. For project specific conformance, unique project-specific conditions may be taken into consideration.

2.2 This test method covers the guidelines, requirements, and procedures for evaluating the ability of temporary ditch checks to protect earthen channels from stormwater-induced erosion. Critical elements of this protection are the ability of the temporary ditch check to:

2.2.1 Slow and/or pond runoff to encourage sedimentation, thereby reducing soil particle transport downstream;
2.2.2 Trap soil particles upstream of the check structure; and
2.2.3 Decrease soil erosion.

2.3 This test method utilizes full-scale testing procedures, and is patterned after conditions typically found on construction sites at the conclusion of earthwork operations, but prior to the start of revegetation work. Therefore this test method considers only unvegetated conditions. This test method provides a comparative evaluation of a temporary ditch check to baseline bare soil conditions under controlled and documented conditions.

3.0 RESPONSIBILITIES

3.1 The Corporate Quality Officer in conjunction with the laboratory director is responsible for the implementation and maintenance of the standard operating procedure.

3.2 The Laboratory Director/Assistant Laboratory Director is responsible for informing the technicians of the maintenance and operation requirements for specific equipment and provides training to technicians.

3.3 The Technicians are responsible for performing apparatus/facility setup, conducting the test, performing the required apparatus preventive maintenance and documenting the results.

4.0 SAFETY

4.1 Take care when performing preparation and testing operations in the channels.

5.0 APPARATUS / FACILITY

5.1 Testing is performed in trapezoidal cross section channels. Test channels have an approximate bed slope of 5% and a test channel length of 60 ft. The trapezoidal channel has a 2 ft bottom width and 2:1 side slopes.

5.2 The test channel shall be constructed with a minimum 12-inch thick veneer of compacted soil of the type requested for testing. The default soil type is sandy clay as defined by the USDA soil triangle. Representative samples of the test soil shall be sent to a geotechnical laboratory at least once per year, or whenever the stockpile is changed, for determination of grain size distribution, Atterberg limits, organic matter content, standard Proctor density, and optimum moisture content.

5.3 The channel bed soil is compacted to create a geotechnically (structurally) stable subgrade. Place soil in a minimum of two lifts and compact to 90 ± 3 % of standard Proctor density in accordance with Test Method D 698. In-situ density shall be verified via any generally accepted method, such as ASTM D2937 (drive cylinder method).

6.0 PROCEDURE

6.1 Test Channel Preparation:

6.1.1 Soil preparation methods for bare soil (control) testing should be identical to soil preparation methods for the protected scenario.

6.1.1.1 In the case previous testing was completed in the channel, obliterate any rills and gullies and spread new soil of the same type across the plot and blend (rake or till) into the surface.

6.1.1.2 Determine the moisture content of the soil on each test plot.

6.1.1.3 Wet or dry each plot until the soil reaches the optimum moisture content ± 4%.

6.1.1.4 Rake the plot smooth with a steel hand rake.

6.1.1.5 Compact the soil surface using a trapezoid form “drag” and/or hand compaction.

6.1.2 Locate a 40 ft test reach sufficiently downstream of the channel inlet structure or transitions of flow to ensure straight and parallel stream lines. Flow should enter test reach as uniform flow, or as close to uniform flow as possible.

6.1.3 Check Dam Installation - Install the check dam in accordance with the client's directions. Locate the check structure (and associated scour apron, if required) at a point in the test reach that will allow any upstream ponding to be contained in the test reach. (Data acquisition cross-sections should be 2.5 ft upstream and downstream of the center of the check dam.)

6.1.3.1 Record all pertinent information.

6.1.3.2 Extend the check dam ends up the channel side slopes to prohibit flow from circumventing the check dam.

6.2 Pre-Test Documentation:

6.2.1 Maintain a digital test folder for each test, including the following information:

6.2.1.1 Calibrated flow properties.

6.2.1.2 Calibrated test soil properties, including soil classification; standard proctor moisture-density relationship; "K" factor; gradation (including hydrometer test for the P200 fraction); and Atterberg limits.

6.2.1.3 Product manufacturer; product name; description; specifications; size; and a picture of the material, if practical.

6.2.1.4 Test data, including all measurements made during testing and pictures and videos of the test.

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6.2.2 When product testing, obtain a sufficient size sample of the product to be tested and submit the sample for the index tests shown in the following table:

SRD – Silt Fence	**SRD - Wattle**	**SRD - Other**
Mass/Area	Mass/Volume	TBD
Thickness	Circumference / Perimeter	TBD
Tensile Strength		
Permittivity		
Apparent Opening Size		
Percent Open Area		

6.3 Test Section Preparation:

6.3.1 Test Section - Immediately prior to testing, delineate cross sections for data acquisition. At a minimum, nine cross sections should be included through the test reach, with a maximum spacing between sections of 5 ft in the direction of flow. The test section shall be a minimum of 40 ft long.

6.3.2 Establish a sufficient number of uniformly spaced data acquisition locations within each cross section to record water surface elevation and bed elevation both below and above the maximum water level. At a minimum, three data acquisition locations along the bed of the channel and up each side slope must be identified and monitored at each cross section. Record the elevation of each data acquisition location by survey apparatus or point gauge assembly. If using a point gauge assembly in a relative frame of reference, determine the longitudinal slope of the installation by survey apparatus. Elevation readings can be sensitive to the diameter of the probe (rod or point gauge assembly) in contact with the ground surface. Thus, the point gauge assembly or survey rod should include an extension rod between 6.4 mm (0.25 in.) and 9.5 mm (0.375 in.) in diameter to make contact with the ground surface.

6.3.3 Use an upstream hydraulic control structure with a calibrated weir to introduce volumetric flows to the channel. Three increasing flows – one per channel – will be used in the testing. The test flow rates shall be 0.5, 1.0, and 2.0 cfs.

6.4 Prepare facility for testing.

6.4.1 Provide access to each data acquisition cross section to permit measurement of bed and water surface elevations by means of survey apparatus or point gauge assembly without walking on channel surface. Record elevation of each data acquisition location to establish the baseline elevations.

6.5 Test Operation and Data Collection:

6.5.1 Record the following information and test data:
- 6.5.1.1 operator identification;
- 6.5.1.2 baseline channel elevations;
- 6.5.1.3 actual discharge recorded during testing, time flow began;
- 6.5.1.4 time flow stopped;
- 6.5.1.5 flow depths; and measured velocities;
- 6.5.1.6 final channel elevations.

6.5.2 Slowly increase flow to initial target discharge.

6.5.3 Allow flow to increase over approximately ten minutes to minimize shock to the system.

6.5.4 Once the flow has been increased to the target discharge, allow the flow to reach equilibrium.

6.5.5 Record water surface elevation measurements at each data acquisition location at each cross section using the point gauge assembly or survey apparatus used to record bed elevations.

6.5.6 Record velocity measurements at the centerline point of each test cross section using the velocity probe.

6.5.7 Velocity measurements at approximately the mid-point of depth.

6.5.8 Record photographs and video footage of the testing. Convey flow for thirty minutes at the target discharge or until the check dam becomes dislodged, whichever is shorter.

6.5.9 At the conclusion of the initial target discharge, inspect the test channel noting any changes in SRD or bed soil condition. Record photographs and video footage of the installation. Record elevation of each data acquisition location at the same locations as recorded during initial data collection.

6.5.10 Carefully remove the SRD from the channel, with as little disturbance of the soil as possible. Note general observations regarding the condition and scour patterns. Take photographs to record the condition of the test channel. Markers may be used to identify any scour patterns for the pictorial documentation. Photographs should show the final condition of the test plot with and without the SRD in place.

6.5.11 Setup and run identical channels for each of the higher flows.

6.5.12 A total of three tests (1 each at 0.5, 1.0, and 2.0 cfs) should be performed on each check dam system to obtain a range of performance measurements. Each test should follow identical procedures as noted above.

6.6 Test Data:

6.6.1 Tabulate before and after elevations and flow (velocity/depth), as well as flow at weir measurements.

6.6.2 From the available data, compute soil loss and associated flow (shear/velocity) characteristics and channel properties as discussed in 7.0.

7.0 Data Analysis

7.1 The objective of the analysis of test data is to determine the relationship between volumetric flow (including velocity) and soil loss and to determine the hydraulic conditions created by check dams.

7.2 Determine total discharge from weir, inline flow meter, or alternative procedure.

7.3 Develop profile plot for each test to include bed surface, water surface and energy grade line.

7.4 Bed elevation prior to testing should be plotted in conjunction with the water surface elevation measured during testing.

7.5 Flow depth is computed as the vertical difference between water surface and bed surface elevation measurements.

7.7 Calculate the Clopper Soil Loss Index (CSLI) from the topographic data gathered before and after test flows. Use the change in channel topography to define the performance of the SRD. Quantify areas of degradation (soil loss) as “cut” and quantify areas of aggradation (sediment deposition) as “fill.” Compute CSLI as follows:

$$CSLI = (C_T/A_T) \times 100$$

Where:

SAI = Soil Aggradation Index

C_T = total cut, m^3, and

A_T = wetted channel area, m^2

7.9 Calculate the Soil Aggradation Index (SAI) from the topographic data gathered before and after test flows. Use the change in channel topography to define the performance of the SRD. Quantify areas of degradation (soil loss) as “cut” and quantify areas of aggradation (sediment deposition) as “fill.” Compute SAI as follows:

$$SAI = (F_T/A_T) \times 100$$

Where:

SAI = Soil Aggradation Index

F_T = total aggradation, m^3, and

A_T = wetted channel area, m^2

8.0 **Report -** An engineering report documenting the test facility, test preparation, test execution, collected data, data analysis and results must be generated to include:

8.1 General information, including test facility location, date, and time, 8.2 Test channel preparation including geotechnical properties of test soil,

8.3 In-situ compaction validation,

8.4 Weir calibration data and analysis, if used,

8.5 Materials documentation including check dam material and installation details,

8.6 Test operation and data collected, and

8.7 Data analysis,

8.8 Table and/or plot of flow depth, flow velocity, and soil loss.

9.0 TRAINING

9.1 The Laboratory Director and Assistant Laboratory Director in conjunction with Division Management are responsible for providing initial and ongoing training. This SOP and all associated SOPs are included in the department training program of all department new hires that perform any part of this SOP's activities and as continued training for existing personnel.

10.0 REFERENCES

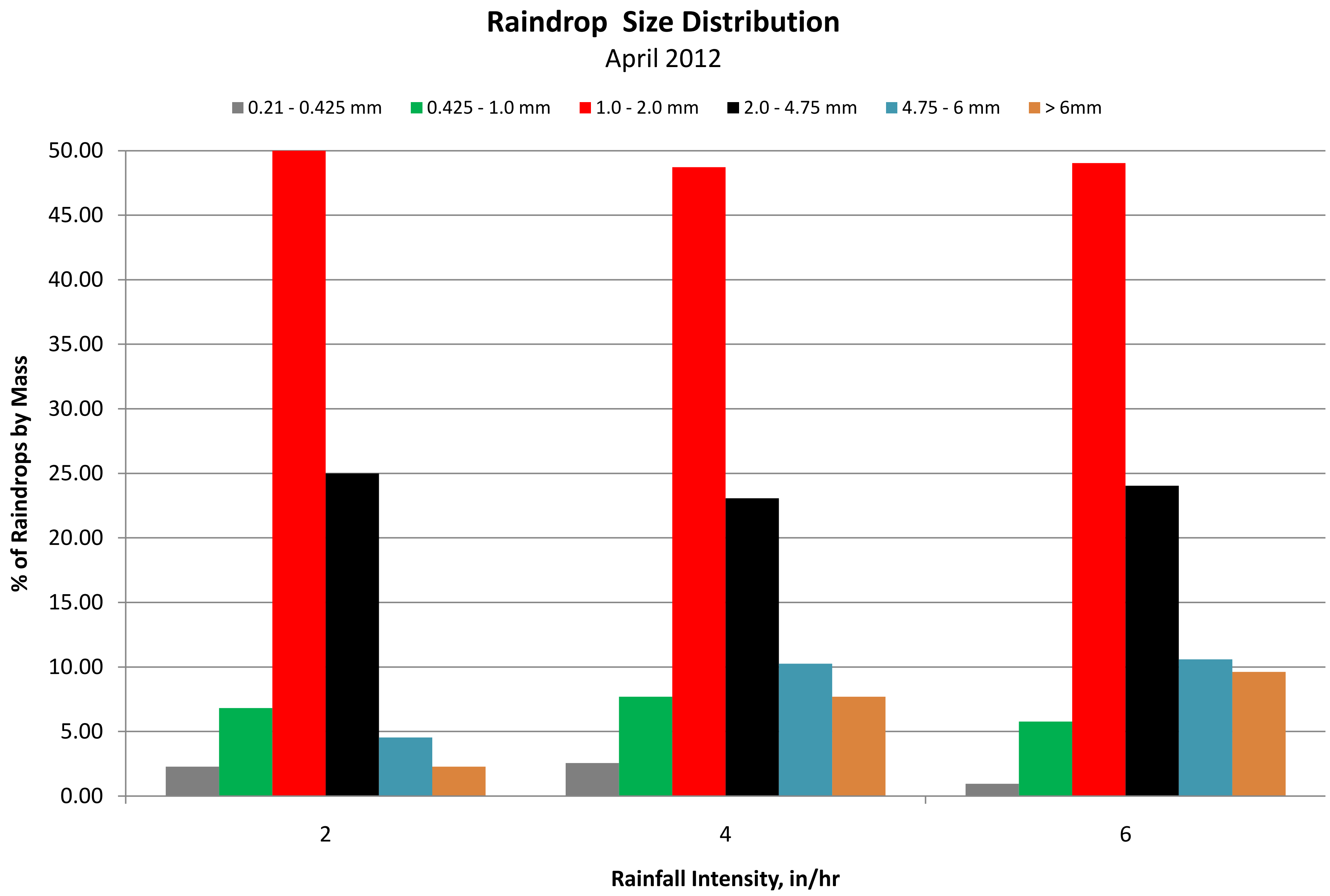
10.1 ISO 9001, Quality Management System – Requirements
10.2 ISO/IEC 17025, General Requirements for the Competence of Testing and Calibration Laboratories
10.3 01CQSP, Corporate Quality System Plan
10.4 ASTM D 7208
10.5 ASTM D 698
10.6 ASTM D 2937

11.0 CHANGES TO PROCEDURE

Each change shall be documented.

Changes	Date	Revision Level
New	9/1/12	0

APPENDIX E – RAINFALL CALIBRATION DATA



Target raindrop size and distribution (no more than 10 % greater than 6 mm (0.24 in.) and no more than 10 % smaller than 1 mm (0.04 in.)).

AASHTO's National Transportation Product Evaluation Program

DDRF

Rainfall Calibration

Slope 2 - Target 6 in/hr

Date: 13-Apr-12 Start Time: 12:30 PM End Time: 12:45 PM

Test Time: 15 min. (circle "x" for open valves)

TOP OF SLOPE

x X X X

P = ______ psi

A

		d = ____ mm i = 0.00 in/hr		**1**	**2**	**B**	d = ____ mm i = 0.00 in/hr	P = ____ psi	X X
X X	P = ____ psi	d = ____ mm i = 0.00 in/hr	**C**	**3**	**4**		d = ____ mm i = 0.00 in/hr		X x
X x		d = ____ mm i = 0.00 in/hr		**5**	**6**	**D**	d = ____ mm i = 0.00 in/hr	P = 9 psi	X X
X X	P = 9 psi	d = 35 mm i = 5.51 in/hr	**E**	**7**	**8**		d = 35 mm i = 5.51 in/hr		X x
X x		d = 39 mm i = 6.14 in/hr		**9**	**10**	**F**	d = 37 mm i = 5.83 in/hr	P = 9 psi	x X
x X	P = 9 psi	d = 40 mm i = 6.30 in/hr	**G**	**11**	**12**		d = 39 mm i = 6.14 in/hr		X X
X X		d = 41 mm i = 6.46 in/hr		**13**	**14**	**H**	d = 41 mm i = 6.46 in/hr	P = 9 psi	x X
X X	P = 9 psi	d = 41 mm i = 6.46 in/hr	**I**	**15**	**16**		d = 39 mm i = 6.14 in/hr		X X
X X		d = 38 mm i = 5.98 in/hr		**17**	**18**	**J**	d = 36 mm i = 5.67 in/hr	P = 9 psi	X X
		d = 36 mm i = 5.67 in/hr		**19**	**20**		d = 34 mm i = 5.35 in/hr		X X

Bottom Catch: 175 **gal**

Inlet Pressure: 16 **psi**

Average Wind: 0 **mph**

Average Depth: 37.93 **mm**

Average Rainfall Intensity: 5.97 **in/hr**

Christiansen Uniformity Coefficient: 95

AASHTO's National Transportation Product Evaluation Program

DDRF
Rainfall Calibration
Slope 2 - Target 4 in/hr

Date: 13-Apr-12   Start Time: 1:30 PM   End Time: 1:45 PM

Test Time: 15 min.   (circle "x" for open valves)

TOP OF SLOPE

x x **X** **X**

P = ______ psi

A

		d = ______ mm i = 0.00 in/hr		**1**	**2**	**B**	d = ______ mm i = 0.00 in/hr	P = ______ psi	**X** **X**
X **X**	P = ______ psi	d = ______ mm i = 0.00 in/hr	**C**	**3**	**4**		d = ______ mm i = 0.00 in/hr		x x
x x		d = ______ mm i = 0.00 in/hr		**5**	**6**	**D**	d = ______ mm i = 0.00 in/hr	P = 9 psi	**X** **X**
X **X**	P = 9 psi	d = 25 mm i = 3.94 in/hr	**E**	**7**	**8**		d = 23 mm i = 3.62 in/hr		x x
x x		d = 25 mm i = 3.94 in/hr		**9**	**10**	**F**	d = 24 mm i = 3.78 in/hr	P = 9 psi	x x
x x	P = 9 psi	d = 26 mm i = 4.09 in/hr	**G**	**11**	**12**		d = 27 mm i = 4.25 in/hr		**X** **X**
X **X**		d = 28 mm i = 4.41 in/hr		**13**	**14**	**H**	d = 28 mm i = 4.41 in/hr	P = 9 psi	x x
x **X**	P = 9 psi	d = 26 mm i = 4.09 in/hr	**I**	**15**	**16**		d = 27 mm i = 4.25 in/hr		**X** **X**
X **X**		d = 24 mm i = 3.78 in/hr		**17**	**18**	**J**	d = 25 mm i = 3.94 in/hr	P = 9 psi	x **X**
		d = 23 mm i = 3.62 in/hr		**19**	**20**		d = 24 mm i = 3.78 in/hr		**X** **X**

Bottom Catch: 130 **gal**

Inlet Pressure: 16 **psi**

Average Wind: 0 **mph**

Average Depth: 25.3571 **mm**

Average Rainfall Intensity: 3.99 **in/hr**

Christiansen Uniformity Coefficient: 94

AASHTO's National Transportation Product Evaluation Program

DDRF

Rainfall Calibration

Slope 2 - Target 2 in/hr

Date: 13-Apr-12 Start Time: 2:00 PM End Time: 2:15 PM

Test Time: 15 min. (circle "x" for open valves)

TOP OF SLOPE

x x **X** x

P = ____ psi

A

Left valves	Left P	Left label	d (mm)	i (in/hr)	Cell	Cell	Right label	d (mm)	i (in/hr)	Right P	Right valves
			d = ____	0.00	1	2	B	d = ____	0.00	P = ____ psi	x **X**
x **X**	P = ____ psi	C	d = ____	0.00	3	4		d = ____	0.00		x x
x x			d = ____	0.00	5	6	D	d = ____	0.00	P = 9 psi	x **X**
x **X**	P = 9 psi	E	13	2.05	7	8		13	2.05		x x
x x			13	2.05	9	10	F	14	2.20	P = 9 psi	x x
x x	P = 9 psi	G	14	2.20	11	12		14	2.20		**X** x
X x			13	2.05	13	14	H	15	2.36	P = 9 psi	x x
x x	P = 9 psi	I	13	2.05	15	16		13	2.05		**X** x
X **X**			14	2.20	17	18	J	13	2.05	P = 9 psi	x x
			12	1.89	19	20		12	1.89		**X** **X**

Bottom Catch: 60 **gal**

Inlet Pressure: 16 **psi**

Average Wind: 0 **mph**

Average Depth: 13.28571 **mm**

Average Rainfall Intensity: 2.09 **in/hr**

Christiansen Uniformity Coefficient: 95

DDRF

Rainfall Calibration

Slope 1 - Target 6 in/hr

Date: 13-Apr-12 Start Time: 9:10 AM End Time: 9:25 AM

Test Time: 15 min. (circle "x" for open valves)

TOP OF SLOPE

x X X X

P = 9 psi

A

X X	P = 9 psi	d = mm	i = 0.00 in/hr	B	1	2		d = mm	i = 0.00 in/hr		
X x		d = mm	i = 0.00 in/hr		3	4	C	d = mm	i = 0.00 in/hr	P = 9 psi	X X
X X	P = 9 psi	d = mm	i = 0.00 in/hr	D	5	6		d = mm	i = 0.00 in/hr		X x
X x		d = 39 mm	i = 6.14 in/hr		7	8	E	d = 37 mm	i = 5.83 in/hr	P = 9 psi	X X
X X	P = 9 psi	d = 40 mm	i = 6.30 in/hr	F	9	10		d = 39 mm	i = 6.14 in/hr		X x
X x		d = 41 mm	i = 6.46 in/hr		11	12	G	d = 40 mm	i = 6.30 in/hr	P = 9 psi	x X
x X	P = 9 psi	d = 40 mm	i = 6.30 in/hr	H	13	14		d = 40 mm	i = 6.30 in/hr		X X
X X		d = 38 mm	i = 5.98 in/hr		15	16	I	d = 38 mm	i = 5.98 in/hr	P = 9 psi	X X
X X	P = 9 psi	d = 37 mm	i = 5.83 in/hr	J	17	18		d = 39 mm	i = 6.14 in/hr		X X
X X		d = 34 mm	i = 5.35 in/hr		19	20		d = 36 mm	i = 5.67 in/hr		

Bottom Catch: 175 **gal**

Inlet Pressure: 16 **psi**

Average Wind: 0 **mph**

Average Depth: 38.43 **mm**

Average Rainfall Intensity: 6.05 **in/hr**

Christiansen Uniformity Coefficient: 96

DDRF

Rainfall Calibration

Slope 1 - Target 4 in/hr

Date: 13-Apr-12 Start Time: 8:30 AM End Time: 8:45 AM

Test Time: 15 min. (circle "x" for open valves)

TOP OF SLOPE

x x **X** **X**

P = 9 psi

A

X **X**	P = 9 psi	d = mm	i = 0.00 in/hr	**B**	**1**	**2**	d = mm	i = 0.00 in/hr			
x x		d = mm	i = 0.00 in/hr		**3**	**4**	d = mm	i = 0.00 in/hr	**C**	P = 9 psi	**X** **X**
X **X**	P = 9 psi	d = mm	i = 0.00 in/hr	**D**	**5**	**6**	d = mm	i = 0.00 in/hr			x x
x x		d = 23 mm	i = 3.62 in/hr		**7**	**8**	d = 24 mm	i = 3.78 in/hr	**E**	P = 9 psi	**X** **X**
x x	P = 9 psi	d = 26 mm	i = 4.09 in/hr	**F**	**9**	**10**	d = 26 mm	i = 4.09 in/hr			x x
X **X**		d = 26 mm	i = 4.09 in/hr		**11**	**12**	d = 27 mm	i = 4.25 in/hr	**G**	P = 9 psi	x x
x x	P = 9 psi	d = 25 mm	i = 3.94 in/hr	**H**	**13**	**14**	d = 28 mm	i = 4.41 in/hr			**X** **X**
X **X**		d = 24 mm	i = 3.78 in/hr		**15**	**16**	d = 27 mm	i = 4.25 in/hr	**I**	P = 9 psi	x **X**
x **X**	P = 9 psi	d = 24 mm	i = 3.78 in/hr	**J**	**17**	**18**	d = 25 mm	i = 3.94 in/hr			**X** **X**
X **X**		d = 23 mm	i = 3.62 in/hr		**19**	**20**	d = 24 mm	i = 3.78 in/hr			

Bottom Catch: 125 **gal**

Inlet Pressure: 16 **psi**

Average Wind: 0 **mph**

Average Depth: 25.14 **mm**

Average Rainfall Intensity: 3.96 **in/hr**

Christiansen Uniformity Coefficient: 95

AASHTO's National Transportation Product Evaluation Program

DDRF

Rainfall Calibration

Slope 1 - Target 2 in/hr

Date: 13-Apr-12 Start Time: 8:10 AM End Time: 8:25 AM

Test Time: 15 min. (circle "x" for open valves)

TOP OF SLOPE

x x **X** x

P = ______ psi

A

x **X** P = ____ psi	d = ____ mm i = 0.00 in/hr	**B**	**1**	**2**	d = ____ mm i = 0.00 in/hr	
x x	d = ____ mm i = 0.00 in/hr		**3**	**4**	**C** d = ____ mm i = 0.00 in/hr	x P = ____ psi **X**
x **X** P = 9 psi	d = ____ mm i = 0.00 in/hr	**D**	**5**	**6**	d = ____ mm i = 0.00 in/hr	x x
x x	d = 12 mm i = 1.89 in/hr		**7**	**8**	**E** d = 12 mm i = 1.89 in/hr	x P = 9 psi x
x **X** P = 9 psi	d = 14 mm i = 2.20 in/hr	**F**	**9**	**10**	d = 14 mm i = 2.20 in/hr	**X** x
x x	d = 14 mm i = 2.20 in/hr		**11**	**12**	**G** d = 15 mm i = 2.36 in/hr	x P = 9 psi x
x x P = 9 psi	d = 13 mm i = 2.05 in/hr	**H**	**13**	**14**	d = 15 mm i = 2.36 in/hr	**X** x
X x	d = 12 mm i = 1.89 in/hr		**15**	**16**	**I** d = 13 mm i = 2.05 in/hr	x P = 9 psi **X**
x **X** P = 9 psi	d = 12 mm i = 1.89 in/hr	**J**	**17**	**18**	d = 13 mm i = 2.05 in/hr	**X** x
X x	d = 11 mm i = 1.73 in/hr		**19**	**20**	d = 11 mm i = 1.73 in/hr	

Bottom Catch: 60 **gal**

Inlet Pressure: 16 **psi**

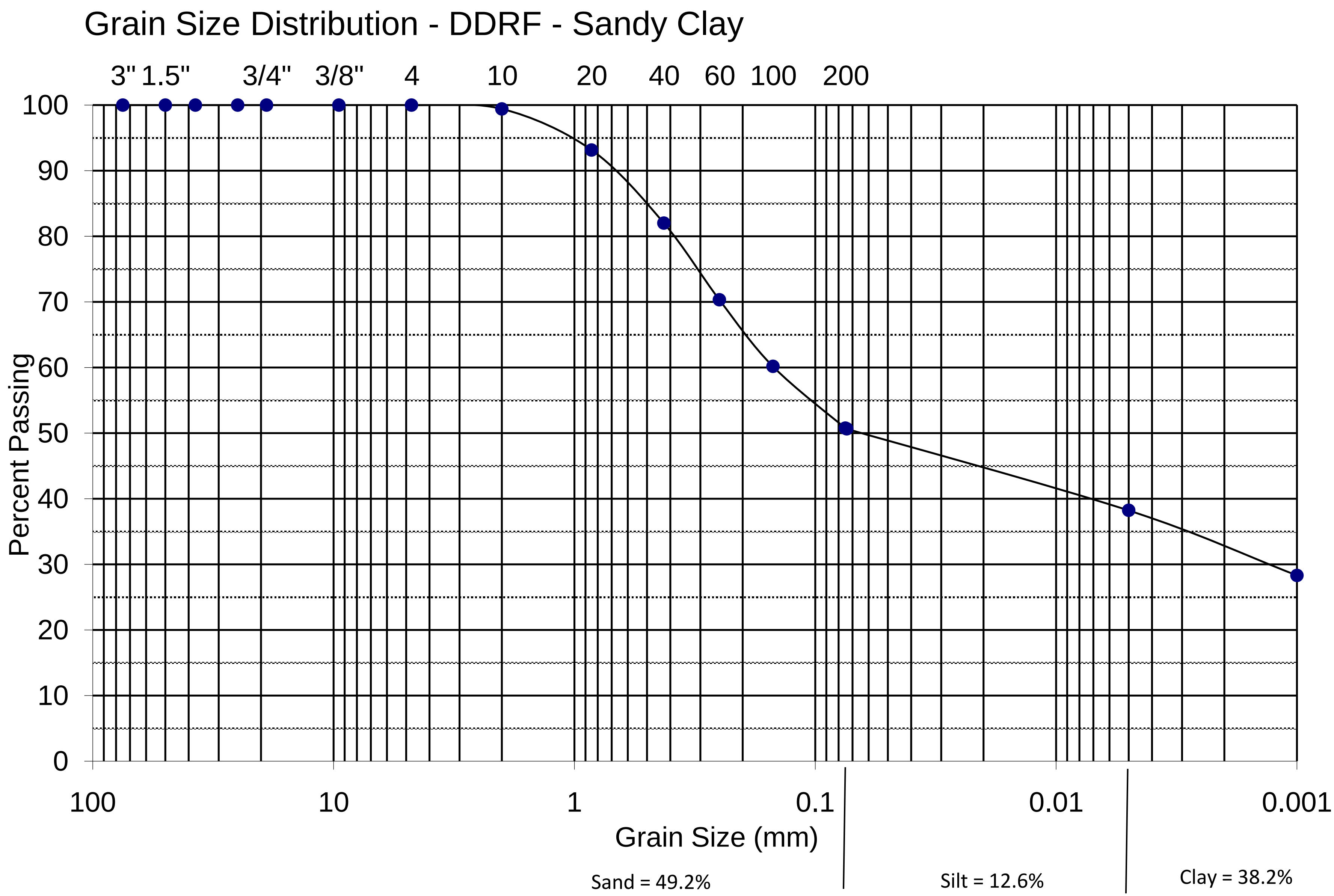
Average Wind: 0 **mph**

Average Depth: 12.93 **mm**

Average Rainfall Intensity: 2.04 **in/hr**

Christiansen Uniformity Coefficient: 92

APPENDIX F – TEST SOIL CHARACTERIZATION


Grain Size Distribution - DDRF - Sandy Clay
3"
1.5"
3/4"
3/8"
4
10
20
40
60
100
200
100
90
80
70
60
50
40
30
20
10
0
Percent Passing
100
10
1
0.1
0.01
0.001
Grain Size (mm)
Sand = 49.2%
Silt = 12.6%
Clay = 38.2%

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Soils

Soil Texture Calculator

Percent Sand:
49.2

*Very Coarse Sand:
0
*Coarse Sand:
0
*Medium Sand:
0
*Fine Sand:
0
*Very Fine Sand:
0

Percent Clay:
38.2

Graph Color:
Red

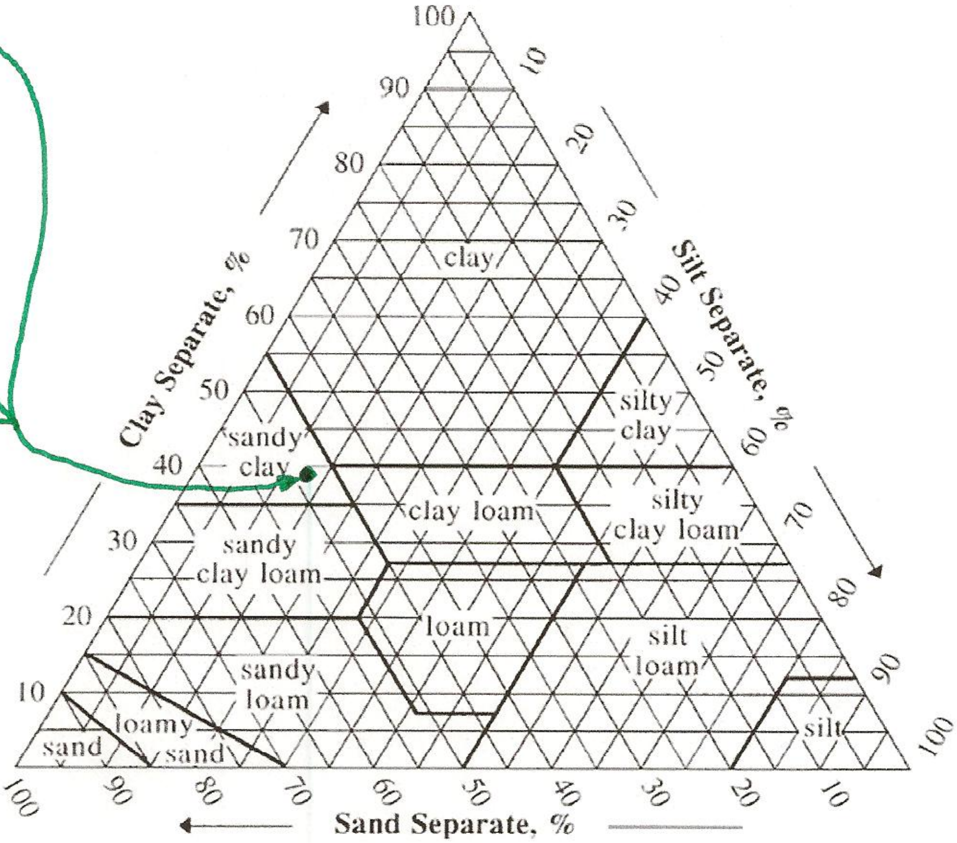
Get Type Reset

Percent Silt:
12.599999999999994

Texture:
Sandy Clay

Clear Graph

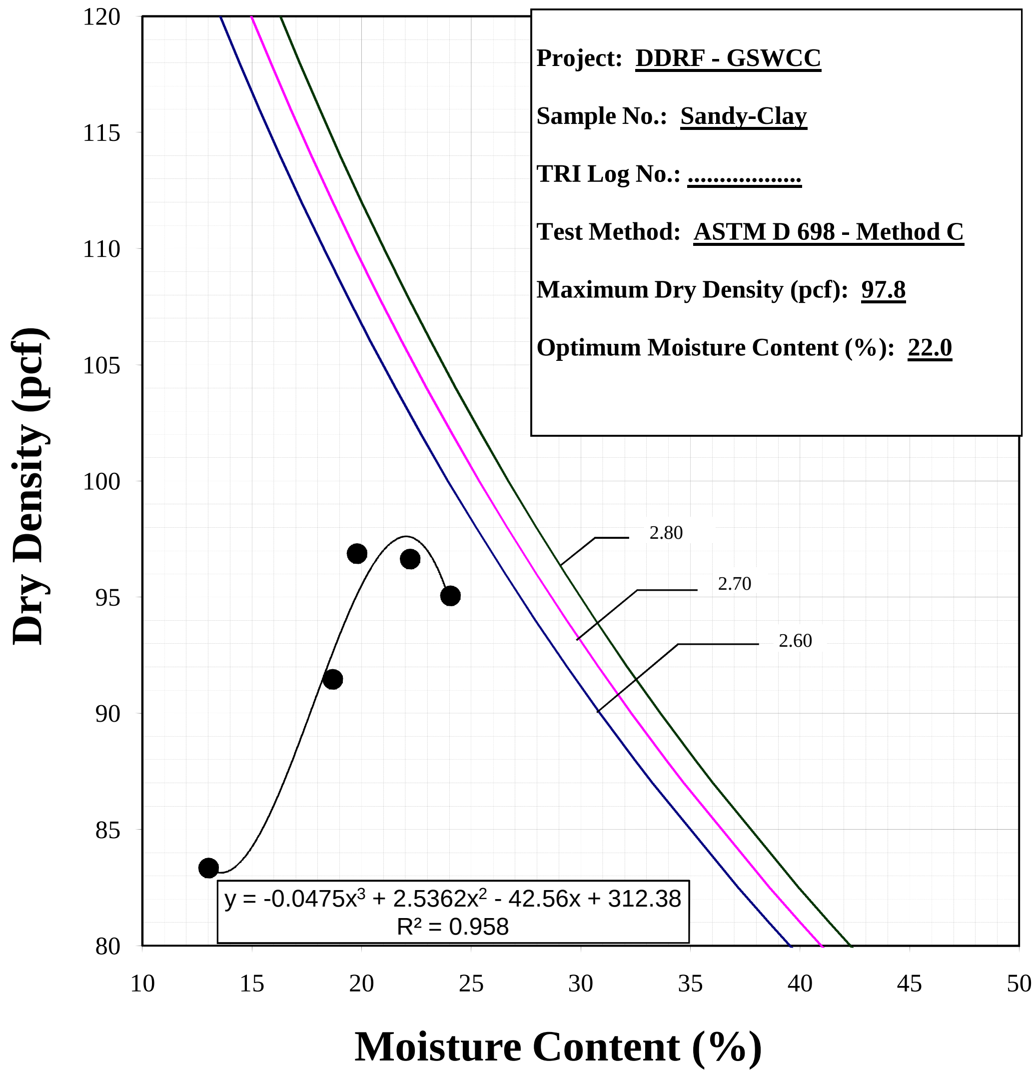
*Optional



TRI/ENVIRONMENTAL, INC.

A Texas Research International Company

Proctor Compaction Test



ASTM D 4718, Oversize Particle Correction	
Corrected Maximum Dry Density (pcf):	97.8
Corrected Optimum Moisture Content (%):	22.0

C. Joel Sprague, 8/19/12

Quality Review/Date

Tested by: J. Sprague

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

9063 Bee Caves Road □ Austin, TX 78733-6201 □ (512) 263-2101 □ (512) 263-2558 □ 1-800-880-TEST

Compaction Worksheet
ASTM D 2937

Location: GSWCC Slopes — Date: 8/19/2012

Drive Cylinder: Dia., mm = 98 — Length, mm = 127 — Volume, ft^3 = 0.034

	Compaction					
Tube #	1	2	3	4	5	6
Wt. of Wet Soil + Mold (g)	2266.0	2311.0	2311.0	2339.0	2323.0	2325.0
Wt. of Mold (g)	613.0	612.0	613.0	615.0	615.0	615.0
Wt. of Wet Soil (g)	1653.0	1699.0	1698.0	1724.0	1708.0	1710.0
	Moisture Content					
Tare Number	**D-13**	**D-17**	**D-15**	**D-4**	**D-3**	**D-9**
Wt. of Tare (g)	236.0	232.0	231.0	234.0	232.0	231.0
Wt. of Wet Soil + Tare (g)	1889.0	1931.0	1929.0	1958.0	1940.0	1941.0
Wt. of Dry Soil + Tare (g)	1507.0	1530.0	1544.0	1577.0	1546.0	1558.0
Water Content, w (%)	30.055	30.894	29.322	28.369	29.985	28.862
Wet density, γ_{wet} = W' / V_h (lb/ft^3) =	107.63	110.62	110.56	112.25	111.21	111.34
Dry density, $\gamma_{dry} = \gamma_{wet}$ / [1 + w] (lb/ft^3) =	82.75	84.51	85.49	87.44	85.55	86.40
Max Std. Proctor Dry density (lb/ft^3) =	97.80	97.80	97.80	97.80	97.80	97.80
Opt. Moisture (%) =	22.00	22.00	22.00	22.00	22.00	22.00
Compaction as % of Std. Proctor =	84.6%	86.4%	87.4%	89.4%	87.5%	88.3%
Avg Compaction as % of Std. Proctor =	87.3%					

C. Joel Sprague, 8/19/12

Quality Review/Date

Tested by: J. Sprague

Compaction Worksheet
ASTM D 2937

Location: GSWCC Channels Date: 8/19/2012

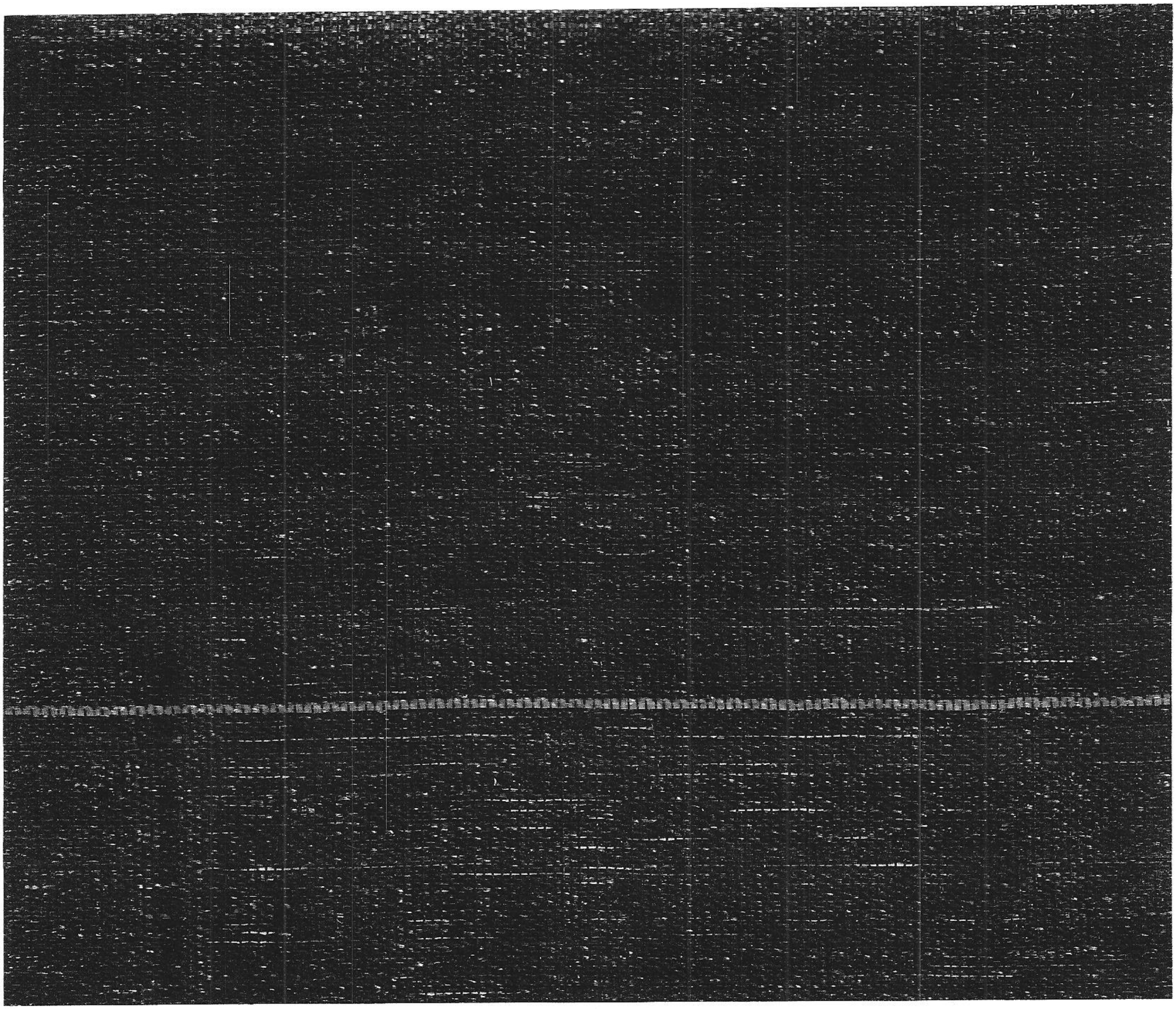
Drive Cylinder: Dia., mm = 98 Length, mm = 127 Volume, ft^3= 0.034

	Compaction					
Tube #	1	2	3	4	5	6
Wt. of Wet Soil + Mold (g)	2357.0	2333.0	2358.0			
Wt. of Mold (g)	613.0	612.0	613.0			
Wt. of Wet Soil (g)	1744.0	1721.0	1745.0	0.0	0.0	0.0
	Moisture Content					
Tare Number	**B**	**T**	**M**			
Wt. of Tare (g)	217.0	217.1	216.8			
Wt. of Wet Soil + Tare (g)	334.4	341.1	357.4			
Wt. of Dry Soil + Tare (g)	309.1	314.6	326.8			
Water Content, w (%)	27.482	27.218	27.802	#DIV/0!	#DIV/0!	#DIV/0!
Wet density, γ_{wet} = W' / V_h (lb/ft^3) =	113.55	112.05	113.62	0.00	0.00	0.00
Dry density, $\gamma_{dry} = \gamma_{wet}$ / [1 + w] (lb/ft^3) =	89.07	88.08	88.90	#DIV/0!	#DIV/0!	#DIV/0!
Max Std. Proctor Dry density (lb/ft^3) =	97.80	97.80	97.80			
Opt. Moisture (%) =	22.00	22.00	22.00			
Compaction as % of Std. Proctor =	91.1%	90.1%	90.9%	#DIV/0!	#DIV/0!	#DIV/0!
Avg Compaction as % of Std. Proctor =	90.7%					

C. Joel Sprague, 8/19/12
Quality Review/Date

Tested by: J. Sprague

APPENDIX G – TESTED PRODUCTS



GEO FABRICS

GFG-B

Type B

August 14, 2012

Mail To:	**Bill To:**
Mr. C. Joel Sprague DDRF , TRI / Environmental **P.O. Box 9192** Greenville, SC 29604	**<= Same**

email: jspraue@tri-env.com
email: jespraue@tri-env.com

Dear Mr. Sprague:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

TRI Job Reference Number:	E2368-68-04
Material(s) Tested:	1, GeoFabrics GFG-B Woven Geotextile
Test(s) Requested:	Thickness (ASTM D 5199) Mass/Unit Area (ASTM D 5261) Grab Tensile (ASTM D 4632) Apparent Opening Size (ASTM D 4751) Percent Open Area (COE Method) Falling Head Permittivity (ASTM D 4491)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager

TRI / Environmental, Inc.
A Texas Research International Company

LABORATORY TEST RESULTS

TRI Client: DDRF , TRI / Environmental

Material: GeoFabrics GFG-B Woven Geotextile
Sample Identification: GFG-B-1
TRI Log #: E2368-68-04

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.
Thickness (ASTM D 5199)												
Thickness (mils)	27	26	27	27	27	27	27	27	29	27	**27**	1
											26	<< min
Mass/Unit Area (ASTM D 5261)												
5" diameter circle (grams)	1.98	1.98	2.02	2.01	1.96	1.96	1.98	1.97	1.98	1.97	**1.98**	0.02
Mass/Unit Area (oz/sq.yd)	4.61	4.61	4.70	4.68	4.56	4.56	4.61	4.58	4.61	4.58	**4.61**	0.05
Grab Tensile Properties (ASTM D 4632)												
MD - Tensile Strength (lbs)	240	241	229	224	235	218	259	200	247	224	**232**	17
TD - Tensile Strength (lbs)	168	161	156	175	175	171	181	162	181	179	**171**	9
MD - Elong. @ Max. Load (%)	21	21	23	19	21	20	23	17	21	19	**21**	2
TD - Elong. @ Max. Load (%)	14	15	15	17	16	15	19	15	17	16	**16**	1
Apparent Opening Size (ASTM D 4751)												
Opening Size Diameter (mm)	0.558	0.420	0.419	0.443	0.487						**0.465**	0.058
Sieve No.	30	40	40	35	35						**35**	

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

TRI / Environmental, Inc.
A Texas Research International Company

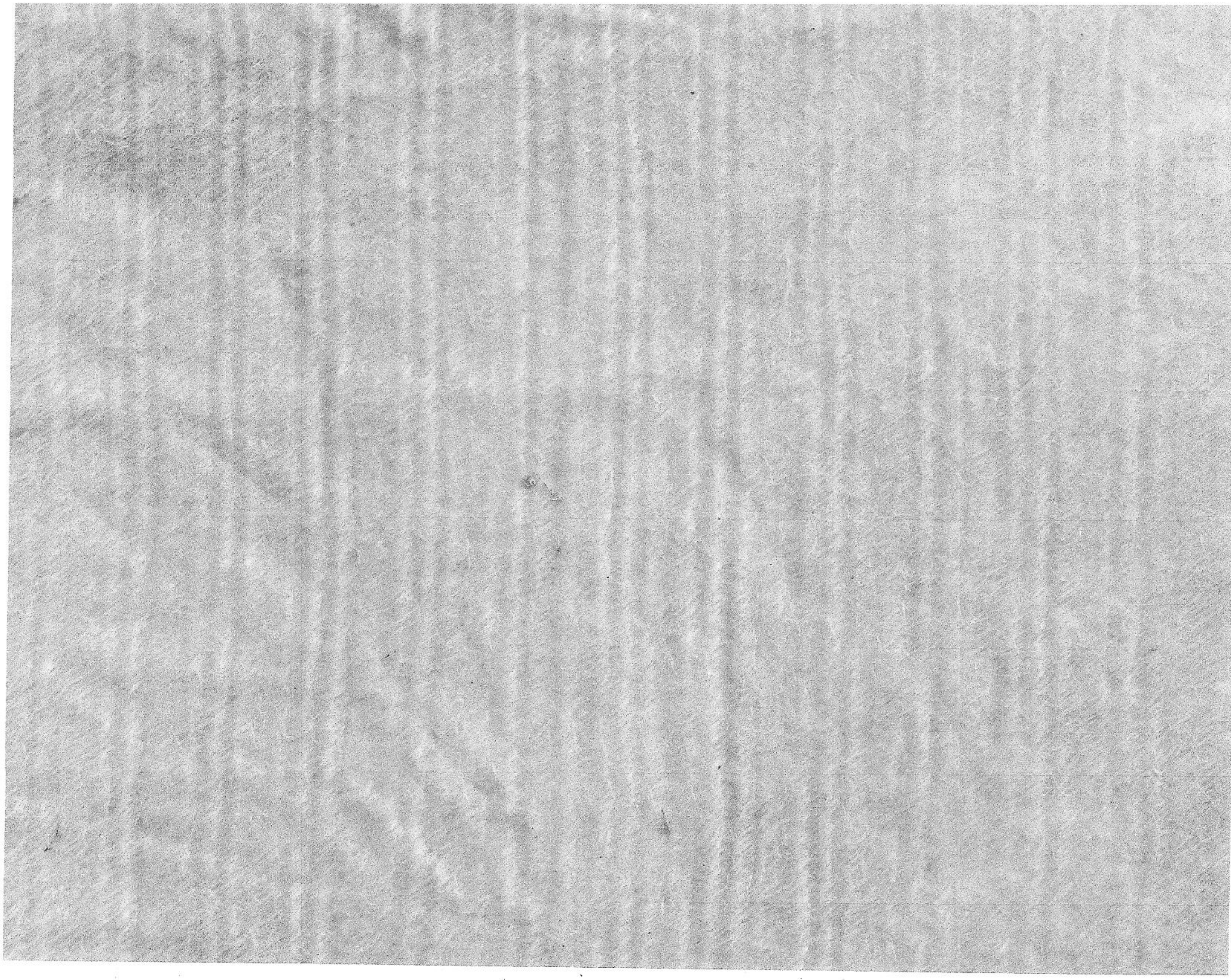
LABORATORY TEST RESULTS

TRI Client: DDRF , TRI / Environmental

Material: GeoFabrics GFG-B Woven Geotextile
Sample Identification: GFG-B-1
TRI Log #: E2368-68-04

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Percent Open Area (COE Method)												
Open Area (%)	14.2	5.2	2.4								7.3	
	1	2	3	4	5	6	7	8	9	10		
Falling Head Permittivity (ASTM D 4491, 9-in Upper Standpipe; 2.0 in opening)												
Water Temp. (C):	20.7											
Correction Factor:	0.99											
Test Speciemn No. >:			1					2				
Thickness (mils)	27.4	27.4	27.4	27.4	27.4	27.6	27.6	27.6	27.6	27.6		
Time (s)	12.7	12.7	12.6	12.2	12.7	13.2	13.2	13.2	13.1	13.2		
Specimen Permittivity (s-1)	2.23	2.23	2.25	2.33	2.23	2.15	2.15	2.15	2.17	2.15		
Specimen Permittivity @20°C (sec-1)	2.21	2.21	2.22	2.30	2.21	2.12	2.12	2.12	2.14	2.12		
Specimen Flow rate (GPM/ft2)	165	165	166	172	165	159	159	159	160	159		
Specimen Permeability (cm/s)	0.15	0.15	0.15	0.16	0.15	0.15	0.15	0.15	0.15	0.15		
Test Speciemn No. >:			3					4				
Thickness (mils)	27.9	27.9	27.9	27.9	27.9	27.3	27.3	27.3	27.3	27.3		
Time (s)	11.6	11.6	12.1	12.0	11.6	12.2	12.1	12.1	12.2	12.2		
Permittivity (s-1)	2.45	2.45	2.34	2.36	2.45	2.33	2.34	2.34	2.33	2.33		
Specimen Permittivity @20°C (sec-1)	2.42	2.42	2.32	2.34	2.42	2.30	2.32	2.31	2.30	2.30		
Specimen Flow rate (GPM/ft2)	181	181	173	175	181	172	173	173	172	172		
Specimen Permeability (cm/s)	0.17	0.17	0.16	0.17	0.17	0.16	0.16	0.16	0.16	0.16		
				TEMPERATURE CORRECTED VALUES						**Permittivity (s-1)**	**2.26**	
										Flow rate (GPM/ft2)	**169**	
										Permeability (cm/s)	**0.16**	

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558



SILT SAVER
BSRF
C-AH per GSWCC

May 7, 2012

Mail To:

Mr. C. Joel Sprague
DDRF, TRI/Environmental
P.O. Box 9192
Greenville, SC 29604

email: jsprague@tri-env.com

Bill To:

<= Same

Dear Mr. Sprague:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

TRI Job Reference Number:	E2366-60-08
Material(s) Tested:	1, Siltsaver - BSRF Nonwoven Geotextile
Test(s) Requested:	Thickness (ASTM D 5199) Mass/Unit Area (ASTM D 5261) Grab Tensile (ASTM D 4632) Apparent Opening Size (ASTM D 4751) Constant Head Permittivity (4491)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager

TRI / Environmental, Inc.
A Texas Research International Company

GEOTEXTILE TEST RESULTS

TRI Client: DDRF, TRI/Environmental

Material: SiltSaver BSRF Nonwoven Geotextile
Sample Identification: GSWCC - BSRF
TRI Log #: E2366-60-08

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.
Thickness (ASTM D 5199)												
Thickness (mils)	48	46	37	46	44	37	49	35	50	37	**43**	6
											35	<< min
Mass/Unit Area (ASTM D 5261)												
5" diameter circle (grams)	2.01	1.93	2.07	2.19	1.79	1.84	2.20	1.90	2.03	1.83	**1.98**	0.15
Mass/Unit Area (oz/sq.yd)	4.68	4.49	4.81	5.09	4.16	4.28	5.12	4.42	4.72	4.26	**4.60**	0.34
Grab Tensile Properties (ASTM D 4632)												
MD - Tensile Strength (lbs)	102	115	106	108	86	102	114	114	101	106	**105**	9
TD - Tensile Strength (lbs)	68	100	73	82	107	92	100	79	122	77	**90**	17
MD - Elong. @ Max. Load (%)	95	111	94	102	83	99	105	98	81	94	**96**	9
TD - Elong. @ Max. Load (%)	132	117	120	123	113	104	122	118	109	115	**117**	8
Apparent Opening Size (ASTM D 4751)												
Opening Size Diameter (mm)	0.200	0.156	0.209	0.148	0.105						**0.164**	0.042
Sieve No.	70	80	70	100	140						**80**	

Constant Head Permittivity (ASTM D 4491, 51-mm Constant Head; 2 in opening)

Water Temp. (C):	20
Correction Factor:	1.000

Test Speciemn No. >:	1					2				
Thickness (mils)	40.75	40.75	40.75	40.75	40.75	39.35	39.35	39.35	39.35	39.35
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Time (s)	17.1	17.1	17.4	17.6	17.6	11.1	11.2	11.2	11.2	11.1
Specimen Permittivity @20°C (sec-1)	1.15	1.15	1.13	1.12	1.12	1.77	1.76	1.76	1.76	1.77
Specimen Flow rate (GPM/ft2)	86	86	85	84	84	133	131	131	131	133
Specimen Permeability (cm/s)	0.12	0.12	0.12	0.12	0.12	0.18	0.18	0.18	0.18	0.18

Test Speciemn No. >:	3					4				
Thickness (mils)	47	47	47	47	47	38.4	38.4	38.4	38.4	38.4
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Time (s)	13.8	13.8	13.8	13.8	13.8	11.7	11.7	11.7	11.7	11.7
Specimen Permittivity @20°C (sec-1)	1.43	1.43	1.43	1.43	1.43	1.68	1.68	1.68	1.68	1.68
Specimen Flow rate (GPM/ft2)	107	107	107	107	107	126	126	126	126	126
Specimen Permeability (cm/s)	0.17	0.17	0.17	0.17	0.17	0.20	0.20	0.16	0.16	0.16

TEMPERATURE CORRECTED VALUES		MEAN
	Permittivity (s-1)	**1.50**
	Flow rate (GPM/ft2)	**112**
	Permeability (cm/s)	**0.16**

MD Machine Direction TD Transverse Direction

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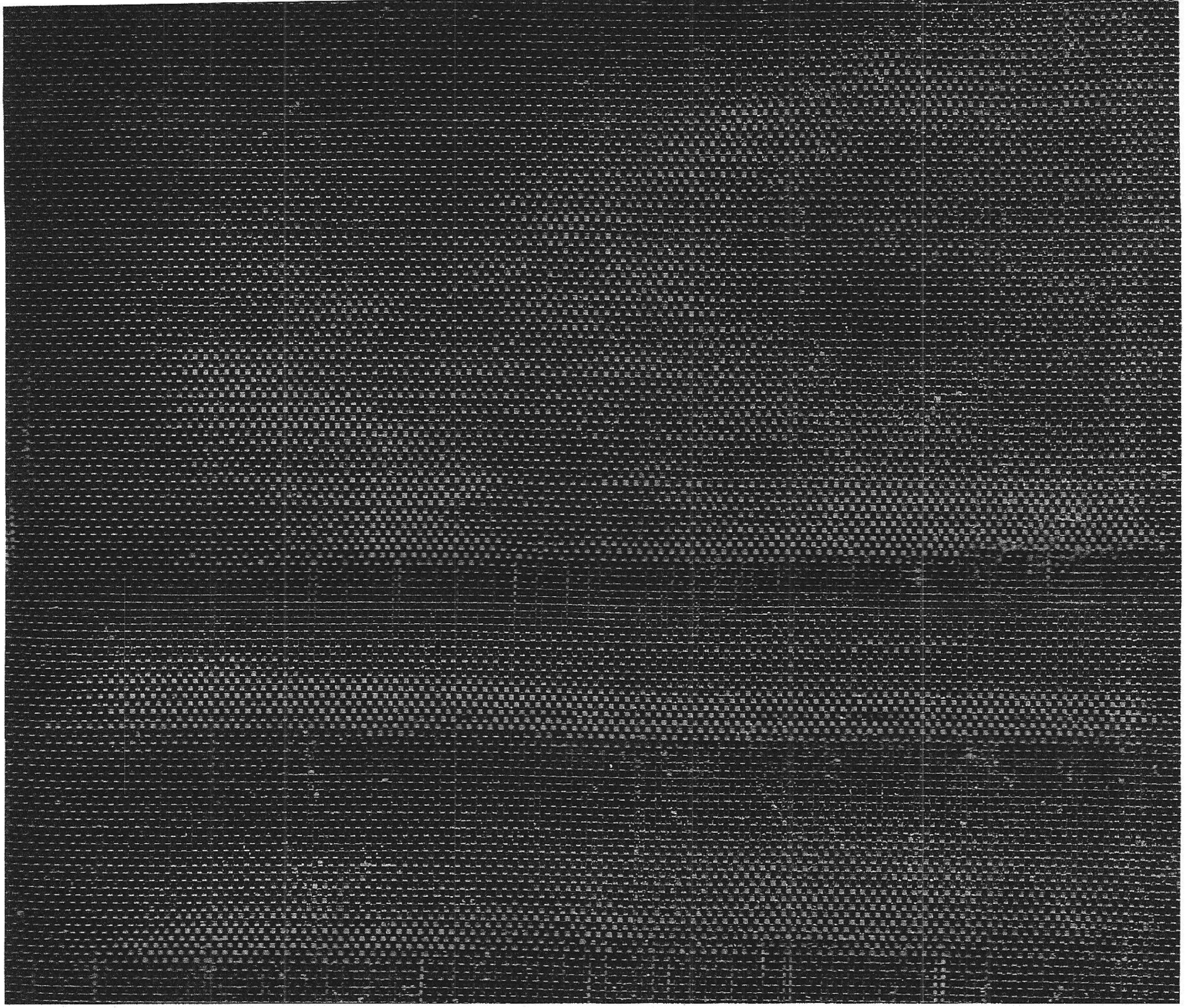

THRACE LINQ

GRF - 400 EO

Type C

June 28, 2012

Mail To:	**Bill To:**
Mr. C. Joel Sprague	**<= Same**
DDRF , TRI / Environmental	
P.O. Box 9192	
Greenville, SC 29604	

email: jsprague@tri-env.com
email: jesprague@tri-env.com

Dear Mr. Sprague:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

TRI Job Reference Number:	E2368-16-09
Material(s) Tested:	1, Thrace Linq GTF-400EO Woven Geotextile
Test(s) Requested:	Thickness (ASTM D 5199) Mass/Unit Area (ASTM D 5261) Grab Tensile (ASTM D 4632) Apparent Opening Size (ASTM D 4751) Percent Open Area (COE Method) Falling Head Permittivity (ASTM D 4491)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager

LABORATORY TEST RESULTS

TRI Client: DDRF , TRI / Environmental

Material: Thrace Linq GTF-400EO Woven Geotextile
Sample Identification: Thrace Linq 400EO
TRI Log #: E2368-16-09

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5199)												
Thickness (mils)	30	28	29	30	29	29	29	28	29	29	**29**	1
											28	<< min
Mass/Unit Area (ASTM D 5261)												
5" diameter circle (grams)	2.85	2.82	2.81	2.76	2.77	2.74	2.85	2.83	2.83	2.77	**2.80**	0.04
Mass/Unit Area (oz/sq.yd)	6.63	6.56	6.54	6.42	6.44	6.37	6.63	6.58	6.58	6.44	**6.52**	0.09
Grab Tensile Properties (ASTM D 4632)												
MD - Tensile Strength (lbs)	339	326	336	326	346	375	340	312	346	377	**342**	21
TD - Tensile Strength (lbs)	186	187	182	178	198	184	193	180	180	171	**184**	8
MD - Elong. @ Max. Load (%)	24	24	26	23	24	27	25	23	23	27	**25**	2
TD - Elong. @ Max. Load (%)	11	11	13	13	11	11	12	12	13	12	**12**	1
Apparent Opening Size (ASTM D 4751)												
Opening Size Diameter (mm)	0.418	0.589	0.677	0.423	0.418						**0.505**	0.121
Sieve No.	40	30	25	40	40						**30**	

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

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LABORATORY TEST RESULTS

TRI Client: DDRF , TRI / Environmental

Material: Thrace Linq GTF 400EO Woven Geotextile
Sample Identification: Thrace Linq 400EO
TRI Log #: E2368-16-09

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Percent Open Area (COE Method)												
Open Area (%)	24.4	18.4	21.1								21.3	

	1	2	3	4	5	6	7	8	9	10	MEAN
Falling Head Permittivity (ASTM D 4491, 9-in Upper Standpipe; 1.5 in opening)											
Water Temp. (C):	19.5										
Correction Factor:	1.02										
Test Speciemn No. >:			1					2			
Thickness (mils)	29.1	29.1	29.1	29.1	29.1	28.5	28.5	28.5	28.5	28.5	
Time (s)	15.5	15.4	15.4	14.9	15.4	14.3	14.3	14.3	14.3	14.3	
Specimen Permittivity (s-1)	3.25	3.28	3.28	3.39	3.28	3.53	3.53	3.53	3.53	3.53	
Specimen Permittivity @20°C (sec-1)	3.30	3.32	3.32	3.44	3.32	3.58	3.58	3.58	3.58	3.58	
Specimen Flow rate (GPM/ft2)	247	249	249	257	249	268	268	268	268	268	
Specimen Permeability (cm/s)	0.24	0.25	0.25	0.25	0.25	0.26	0.26	0.26	0.26	0.26	
Test Speciemn No. >:			3					4			
Thickness (mils)	28.5	28.5	28.5	28.5	28.5	29.1	29.1	29.1	29.1	29.1	
Time (s)	14.8	14.3	14.9	14.3	14.9	14.8	14.8	14.8	14.3	14.8	
Permittivity (s-1)	3.41	3.53	3.39	3.53	3.39	3.41	3.41	3.41	3.53	3.41	
Specimen Permittivity @20°C (sec-1)	3.46	3.58	3.44	3.58	3.44	3.46	3.46	3.46	3.58	3.46	
Specimen Flow rate (GPM/ft2)	259	268	257	268	257	259	259	259	268	259	
Specimen Permeability (cm/s)	0.25	0.26	0.25	0.26	0.25	0.26	0.26	0.26	0.26	0.26	

TEMPERATURE CORRECTED VALUES		MEAN
	Permittivity (s-1)	**3.48**
	Flow rate (GPM/ft2)	**260**
	Permeability (cm/s)	**0.25**

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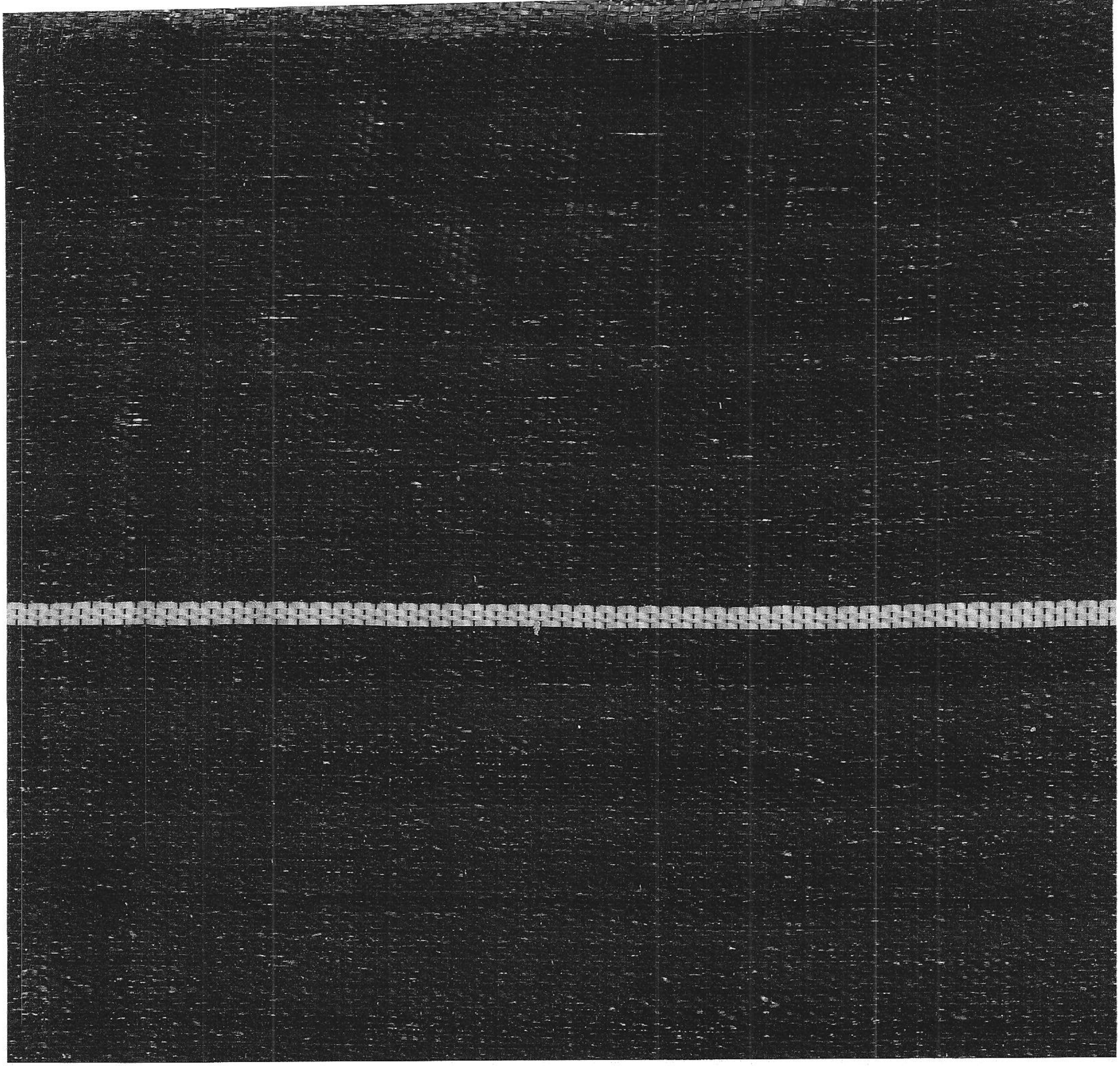

WILLACOOCHEE
1215
Type A

May 16, 2012

Mail To:	**Bill To:**
Mr. C. Joel Sprague DDRF , TRI / Environmental **P.O. Box 9192** Greenville, SC 29604	**<= Same**

email: jsprague@tri-env.com

Dear Mr. Sprague:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

TRI Job Reference Number:	E2366-72-03
Material(s) Tested:	1 Willacooche 1215 Woven Geotextile
Test(s) Requested:	Thickness (ASTM D 5199) Mass/Unit Area (ASTM D 5261) Grab Tensile (ASTM D 4632) Apparent Opening Size (ASTM D 4751) Percent Open Area (COE Method) Constant Head Permittivity (ASTM D 4491)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager

LABORATORY TEST RESULTS

TRI Client: DDRF , TRI / Environmental

Material: Willacoochee 1215 Woven Geotextile
Sample Identification: Willacoochee 1215
TRI Log #: E2366-72-03

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5199)												
Thickness (mils)	25	25	28	27	26	24	25	25	22	23	**25**	2
											22	<< min
Mass/Unit Area (ASTM D 5261)												
5" diameter circle (grams)	1.43	1.44	1.44	1.43	1.42	1.44	1.45	1.45	1.44	1.44	**1.44**	0.01
Mass/Unit Area (oz/sq.yd)	3.33	3.35	3.35	3.33	3.30	3.35	3.37	3.37	3.35	3.35	**3.34**	0.02
Grab Tensile Properties (ASTM D 4632)												
MD - Tensile Strength (lbs)	191	191	180	171	172	169	159	169	159	166	**173**	11
TD - Tensile Strength (lbs)	114	127	117	120	135	124	118	118	101	119	**119**	9
MD - Elong. @ Max. Load (%)	29	27	28	25	25	26	25	27	23	25	**26**	2
TD - Elong. @ Max. Load (%)	24	24	23	23	25	26	22	24	23	23	**23**	1
Apparent Opening Size (ASTM D 4751)												
Opening Size Diameter (mm)	0.514	0.532	0.830	0.592	0.568						**0.607**	0.128
Sieve No.	30	30	20	30	30						**25**	

MD Machine Direction TD Transverse Direction

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TRI / Environmental, Inc.
A Texas Research International Company

LABORATORY TEST RESULTS

TRI Client: DDRF , TRI / Environmental

Material: Willacoochee 1215 Woven Geotextile
Sample Identification: Willacoochee 1215
TRI Log #: E2366-72-03

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Percent Open Area (COE Method)												
Open Area (%)	8.1										**8.1**	#DIV/0!
Constant Head Permittivity (ASTM D 4491, 51-mm Constant Head; 2 in opening)												
Water Temp. (C):	22											
Correction Factor:	0.953											
Test Speciemn No. >:			1					2				
Thickness (mils)	21	21	21	21	21	24	24	24	24	24		
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Time (s)	16.3	17.4	16.9	17.4	17.4	17.4	17.4	17.4	18.5	18.4		
Specimen Permittivity @20°C (sec-1)	1.15	1.08	1.11	1.08	1.08	1.08	1.08	1.08	1.01	1.02		
Specimen Flow rate (GPM/ft2)	86.1	80.6	83.0	80.6	80.6	80.6	80.6	80.6	75.8	76.3		
Specimen Permeability (cm/s)	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.06	0.06		
Test Speciemn No. >:			3					4				
Thickness (mils)	24	24	24	24	24	23	23	23	23	23		
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Time (s)	15.8	15.8	15.8	15.8	16.4	14.8	14.8	15.3	16.7	15.9		
Specimen Permittivity @20°C (sec-1)	1.19	1.19	1.19	1.19	1.14	1.27	1.27	1.23	1.12	1.18		
Specimen Flow rate (GPM/ft2)	88.8	88.8	88.8	88.8	85.6	94.8	94.8	91.7	84.0	88.2		
Specimen Permeability (cm/s)	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.07	0.07	0.07		
				TEMPERATURE CORRECTED VALUES						**Permittivity (s-1)**	**1.14**	
										Flow rate (GPM/ft2)	**85.0**	
										Permeability (cm/s)	**0.07**	

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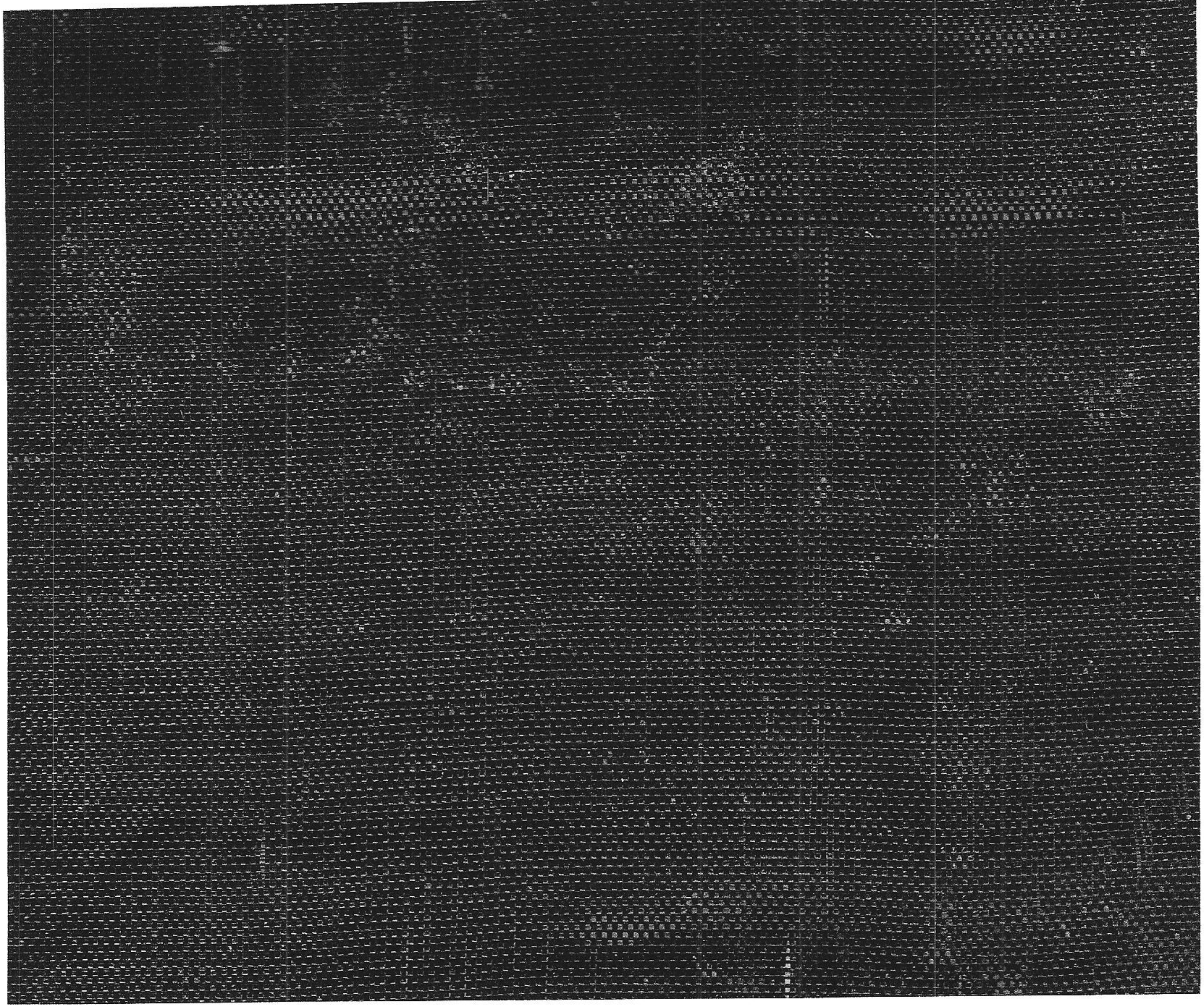

TEN CATE
FW402
Type C

May 25, 2012

Mail To:	**Bill To:**
Mr. C. Joel Sprague DDRF , TRI / Environmental P.O. Box 9192 Greenville, SC 29604	**<= Same**

email: jsprague@tri-env.com

Dear Mr. Sprague:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

TRI Job Reference Number:	E2366-71-10
Material(s) Tested:	1, Ten Cate FW402 Woven Geotextile
Test(s) Requested:	Thickness (ASTM D 5199) Mass/Unit Area (ASTM D 5261) Grab Tensile (ASTM D 4632) Apparent Opening Size (ASTM D 4751) Percent Open Area (COE Method) Constant Head Permittivity (ASTM D 4491)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager

LABORATORY TEST RESULTS
TRI Client: DDRF , TRI / Environmental

Material: Ten Cate FW 402 Woven Geotextile
Sample Identification: Ten Cate FAS 402-125-30
TRI Log #: E2366-71-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.
Thickness (ASTM D 5199)												
Thickness (mils)	29	28	27	31	28	27	27	28	34	29	**29**	2
											27	<< min
Mass/Unit Area (ASTM D 5261)												
5" diameter circle (grams)	2.58	2.55	2.58	2.55	2.53	2.67	2.62	2.62	2.67	2.60	**2.60**	0.05
Mass/Unit Area (oz/sq.yd)	6.00	5.93	6.00	5.93	5.88	6.21	6.09	6.09	6.21	6.05	**6.04**	0.11
Grab Tensile Properties (ASTM D 4632)												
MD - Tensile Strength (lbs)	474	477	421	387	446	418	413	490	491	494	**451**	39
TD - Tensile Strength (lbs)	322	276	285	256	257	234	213	264	233	220	**256**	33
MD - Elong. @ Max. Load (%)	44	45	40	39	43	40	39	45	43	45	**42**	2
TD - Elong. @ Max. Load (%)	95	77	82	80	84	64	63	73	69	71	**76**	10
Apparent Opening Size (ASTM D 4751)												
Opening Size Diameter (mm)	0.415	0.415	0.416	0.417	0.786						**0.490**	0.166
Sieve No.	40	40	40	40	20						**35**	

MD Machine Direction TD Transverse Direction

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LABORATORY TEST RESULTS

TRI Client: DDRF , TRI / Environmental

Material: Ten Cate FW 402 Woven Geotextile
Sample Identification: Ten Cate FAS 402-125-30
TRI Log #: E2366-71-10

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Percent Open Area (COE Method)												
Open Area (%)	28.0	27.2									**27.6**	

Constant Head Permittivity (ASTM D 4491, 51-mm Constant Head; 1 in opening)

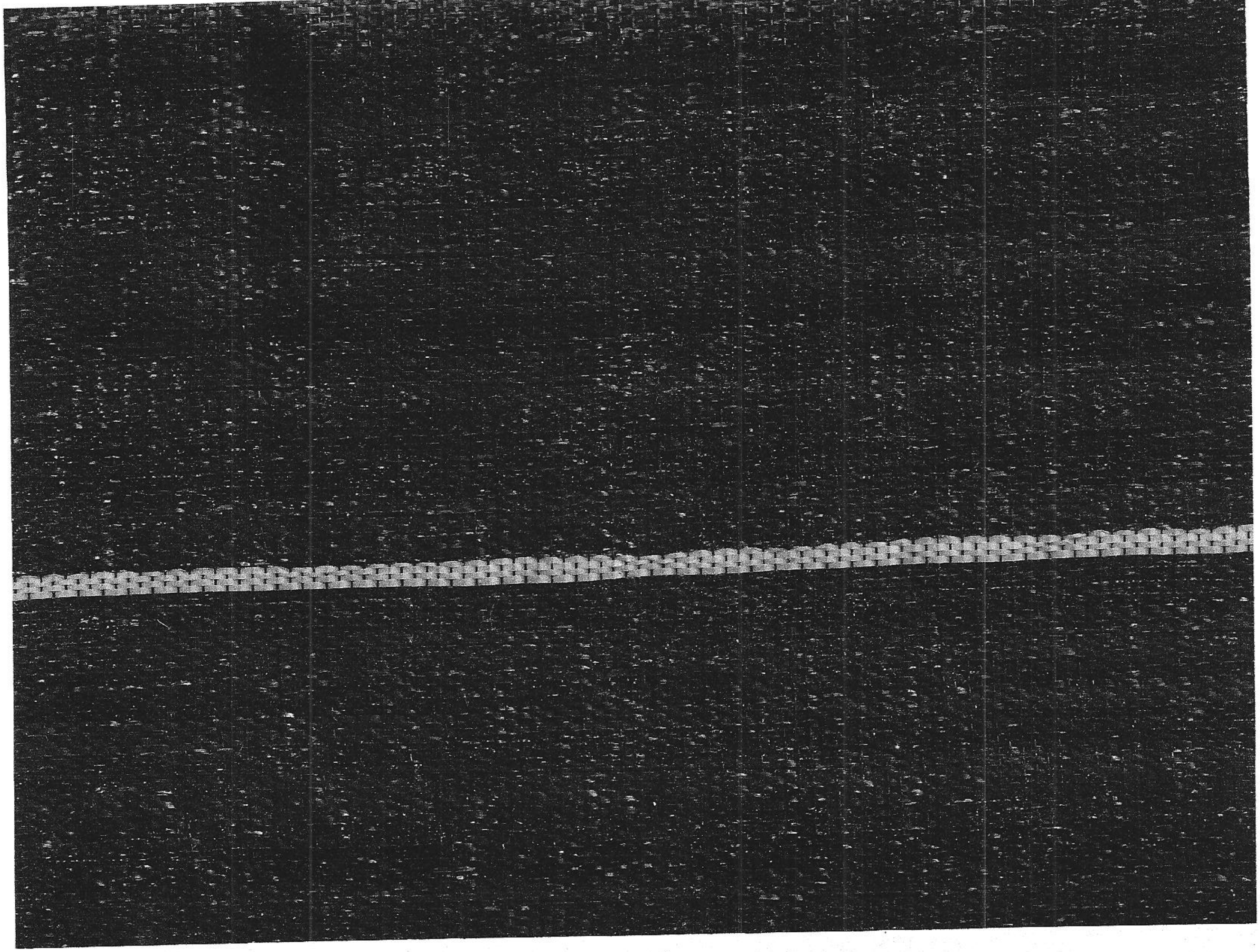
Water Temp. (C):	20.7
Correction Factor:	0.99

Test Speciemn No. >:			1					2		
Opening Diameter, cm	2.54	2.54	2.54	2.54	2.54	2.54	2.54	2.54	2.54	2.54
Contant Head, cm	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08
Thickness (mils)	27.5	27.5	27.5	27.5	27.5	28.5	28.5	28.5	28.5	28.5
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Time (s)	13.3	13.3	13.4	12.8	13.2	14.3	13.8	14.3	13.7	14.8
Specimen Permittivity @20°C (sec-1)	5.77	5.77	5.73	6.00	5.81	5.37	5.56	5.37	5.60	5.19
Specimen Flow rate (GPM/ft2)	432	432	428	449	435	401	416	401	419	388
Specimen Permeability (cm/s)	0.40	0.40	0.40	0.42	0.41	0.37	0.39	0.39	0.41	0.38

Test Speciemn No. >:			3*					4		
Opening Diameter, cm	2.54	2.54	2.54	2.54	2.54	2.54	2.54	2.54	2.54	2.54
Contant Head, cm	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08
Thickness (mils)	27.6	27.6	27.6	27.6	27.6	26.7	26.7	26.7	26.7	26.7
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Time (s)	14.8	14.7	14.8	15.3	15.3	16.4	16.4	15.9	16.4	16.4
Specimen Permittivity @20°C (sec-1)	5.19	5.22	5.19	5.02	5.02	4.68	4.68	4.83	4.68	4.68
Specimen Flow rate (GPM/ft2)	388	391	388	375	375	350	350	361	350	350
Specimen Permeability (cm/s)	0.36	0.37	0.36	0.35	0.35	0.33	0.33	0.33	0.32	0.32

TEMPERATURE CORRECTED VALUES		MEAN
	Permittivity (s-1)	**5.27**
	Flow rate (GPM/ft2)	**394**
	Permeability (cm/s)	**0.37**

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



HANES
GASF-A
Type A

May 17, 2012

Mail To:	**Bill To:**
Mr. C. Joel Sprague DDRF , TRI / Environmental P.O. Box 9192 Greenville, SC 29604	**<= Same**

email: jsprague@tri-env.com

Dear Mr. Sprague:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

TRI Job Reference Number:	E2366-72-04
Material(s) Tested:	1, Terratex GASF-A Woven Geotextile
Test(s) Requested:	Thickness (ASTM D 5199) Mass/Unit Area (ASTM D 5261) Grab Tensile (ASTM D 4632) Apparent Opening Size (ASTM D 4751) Percent Open Area (COE Method) Constant Head Permittivity (ASTM D 4491)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager

LABORATORY TEST RESULTS

TRI Client: DDRF , TRI / Environmental

Material: Hanes Terratex GASF-A Woven Geotextile
Sample Identification: Terratex GASF , 402/125/30
TRI Log #: E2366-72-04

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5199)												
Thickness (mils)	25.7	24.1	25.6	24.6	24.5	25.0	23.5	23.0	23.2	24.8	**24.4**	0.9
											23.0	<< min
Mass/Unit Area (ASTM D 5261)												
5" diameter circle (grams)	1.58	0.56	1.55	1.57	1.58	1.52	1.54	1.50	1.50	1.57	**1.45**	0.31
Mass/Unit Area (oz/sq.yd)	3.68	1.30	3.61	3.65	3.68	3.54	3.58	3.49	3.49	3.65	**3.37**	0.73
Grab Tensile Properties (ASTM D 4632)												
MD - Tensile Strength (lbs)	173	172	164	153	171	165	165	166	172	174	**167**	6
TD - Tensile Strength (lbs)	127	119	134	140	111	132	114	127	130	135	**127**	10
MD - Elong. @ Max. Load (%)	23	27	26	21	23	25	23	27	25	27	**25**	2
TD - Elong. @ Max. Load (%)	23	21	25	25	19	23	19	19	25	25	**22**	3
Apparent Opening Size (ASTM D 4751)												
Opening Size Diameter (mm)	0.586	0.599	0.589	0.524	0.597						**0.579**	0.031
Sieve No.	30	30	30	30	30						**30**	

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

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LABORATORY TEST RESULTS
TRI Client: DDRF , TRI / Environmental

Material: Belton 1935 Woven Geotextile
Sample Identification: Belton 1935
TRI Log #: E2366-72-04

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Percent Open Area (COE Method)												
Open Area (%)	9.05	13.3	26.0								**16.1**	
Constant Head Permittivity (ASTM D 4491, 51-mm Constant Head; 2 in opening)												
Water Temp. (C):	22											
Correction Factor:	0.958											
Test Speciemn No. >:			1					2				
Thickness (mils)	25.7	25.7	25.7	25.7	25.7	24.3	24.3	24.3	24.3	24.3		
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Time (s)	11.0	11.1	10.6	11.1	10.5	11.6	12.6	12.6	13.2	13.2		
Specimen Permittivity @20°C (sec-1)	1.71	1.70	1.78	1.70	1.80	1.63	1.50	1.50	1.43	1.43		
Specimen Flow rate (GPM/ft2)	128	127	133	127	134	122	112	112	107	107		
Specimen Permeability (cm/s)	0.11	0.11	0.12	0.11	0.12	0.11	0.10	0.09	0.09	0.09		
Test Speciemn No. >:			3					4				
Thickness (mils)	23.9	23.9	23.9	23.9	23.9	24.9	24.9	24.9	24.9	24.9		
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Time (s)	13.7	13.7	14.2	13.8	14.3	13.7	13.8	13.7	13.7	13.7		
Specimen Permittivity @20°C (sec-1)	1.38	1.38	1.33	1.37	1.32	1.38	1.37	1.38	1.38	1.38		
Specimen Flow rate (GPM/ft2)	103	103	99	102	99	103	102	103	103	103		
Specimen Permeability (cm/s)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09		
TEMPERATURE CORRECTED VALUES										**Permittivity (s-1)**	**1.49**	
										Flow rate (GPM/ft2)	**111**	
										Permeability (cm/s)	**0.09**	

MD Machine Direction   TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality.   TRI limits reproduction of this report, except in full, without prior approval of TRI.

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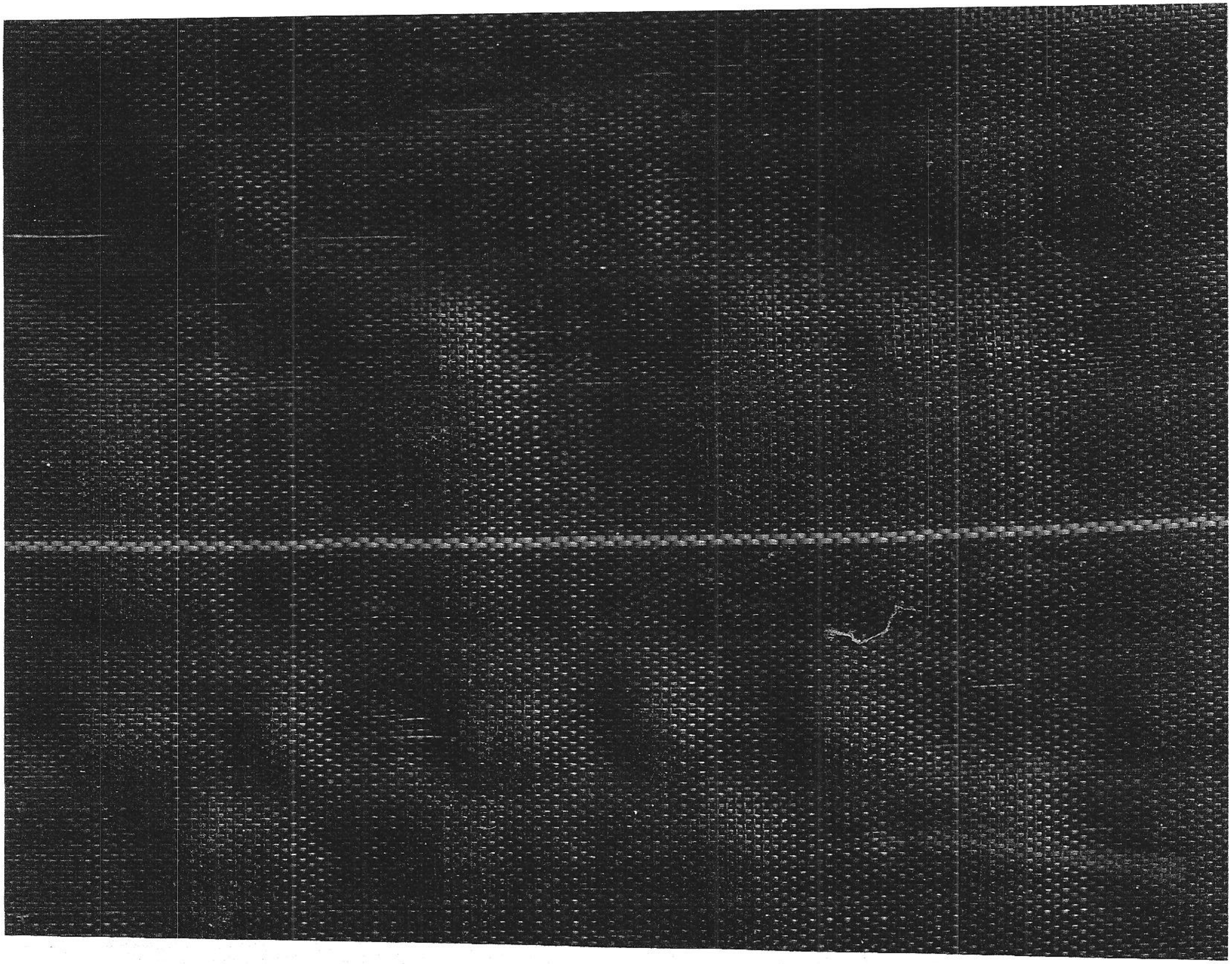

DDD
GA-CSA
C-System

May 7, 2012

Mail To:	**Bill To:**
Mr. C. Joel Sprague DDRF , TRI / Environmental P.O. Box 9192 Greenville, SC 29604	**<= Same**

email: jspraue@tri-env.com

Dear Mr. Sprague:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report for laboratory testing.

TRI Job Reference Number:	E2366-60-09
Material(s) Tested:	1 GA-CSA Woven Geotextile -Netting Composite Material
Test(s) Requested:	Thickness (ASTM D 5199) Mass/Unit Area (ASTM D 5261) Grab Tensile (ASTM D 4632) Apparent Opening Size (ASTM D 4751) Percent Open Area (COE Method) Constant Head Permittivity (CGSB 148,1 Method 4-94;)

If you have any questions or require any additional information, please call us at
1-800-880-8378.

Sincerely,

Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager

LABORATORY TEST RESULTS
TRI Client: DDRF , TRI / Environmental

Material: Woven Geotextile - Netting Composite Material
Sample Identification: GSWCC - DDD GA-CSA
TRI Log #: E2366-60-09

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.
Thickness (ASTM D 5199)												
Thickness (mils)	83	88	87	84	84	88	84	82	89	87	**86**	2
											82	<< min
Mass/Unit Area (ASTM D 5261)												
5" diameter circle (grams)	3.26	3.26	3.23	3.27	3.22	3.30	3.26	3.27	3.23	3.29	**3.26**	0.03
Mass/Unit Area (oz/sq.yd)	7.58	7.58	7.51	7.61	7.49	7.68	7.58	7.61	7.51	7.65	**7.58**	0.06
Grab Tensile Properties (ASTM D 4632)												
MD - Tensile Strength (lbs)	330	353	344	358	370	404	361	326	374	418	**364**	29
TD - Tensile Strength (lbs)	222	200	208	193	164	197	180	211	214	223	**201**	19
MD - Elong. @ Max. Load (%)	20	21	21	19	21	22	22	19	21	23	**21**	1
TD - Elong. @ Max. Load (%)	15	13	13	13	14	16	13	17	17	17	**15**	2
Apparent Opening Size (ASTM D 4751)												
Opening Size Diameter (mm)	0.419	0.416	0.417	0.417	0.409						**0.416**	0.004
Sieve No.	40	40	40	40	40						**40**	

MD Machine Direction TD Transverse Direction

LABORATORY TEST RESULTS

TRI Client: DDRF , TRI / Environmental

Material: Woven Geotextile - Netting Composite Material
Sample Identification: GSWCC - DDD GA-CSA
TRI Log #: E2366-60-09

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Percent Open Area (COE Method)												
Open Area (%)	20.9	24.8									**22.9**	
Constant Head Permittivity (ASTM D 4491, 51-mm Constant Head; 2 in opening)												
Water Temp. (C):	20											
Correction Factor:	1.000											
Test Speciemn No. >:			1					2				
Thickness (mils)	88.55	88.55	88.55	88.55	88.55	90.45	90.45	90.45	90.45	90.45		
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Time (s)	9.5	10.0	9.5	10.0	10.1	8.6	8.9	8.6	8.5	9.0		
Specimen Permittivity @20°C (sec-1)	2.07	1.97	2.07	1.97	1.95	2.29	2.21	2.29	2.32	2.19		
Specimen Flow rate (GPM/ft2)	155	147	155	147	146	171	165	171	173	164		
Specimen Permeability (cm/s)	0.47	0.44	0.47	0.44	0.44	0.51	0.50	0.53	0.53	0.50		
Test Speciemn No. >:			3					4				
Thickness (mils)	89.7	89.7	89.7	89.7	89.7	91.1	91.1	91.1	91.1	91.1		
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Time (s)	7.5	7.4	8.0	7.5	8.0	8.5	8.4	8.5	8.5	8.5		
Specimen Permittivity @20°C (sec-1)	2.62	2.66	2.46	2.62	2.46	2.32	2.34	2.32	2.32	2.32		
Specimen Flow rate (GPM/ft2)	196	199	184	196	184	173	175	173	173	173		
Specimen Permeability (cm/s)	0.60	0.61	0.56	0.60	0.56	0.53	0.53	0.54	0.54	0.54		

TEMPERATURE CORRECTED VALUES		
	Permittivity (s-1)	**2.29**
	Flow rate (GPM/ft2)	**171**
	Permeability (cm/s)	**0.52**

MD Machine Direction TD Transverse Direction

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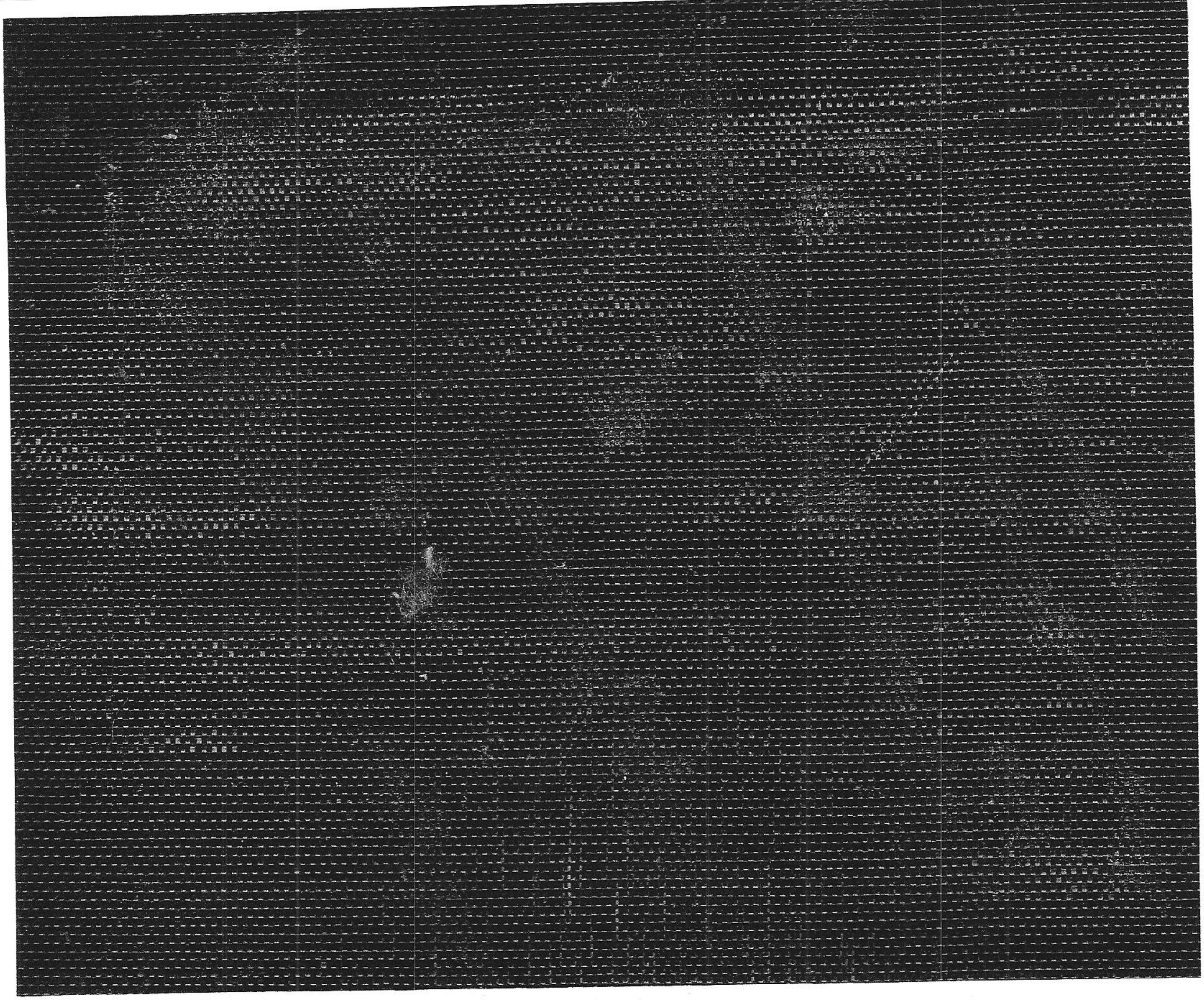

PROPEX
Geotex 111F
Type C

May 7, 2012

Mail To:	**Bill To:**
Mr. C. Joel Sprague DDRF - TRI/Environmental, Inc. P.O. Box 9192 Greenville, SC 29604	**<= Same**

email: jspraue@tri-env.com

Dear Mr. Sprague:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

TRI Job Reference Number:	E2366-60-10
Material(s) Tested:	1 ,Propex 111F Black Woven Geotextile
Test(s) Requested:	Thickness (ASTM D 5199) Mass/Unit Area (ASTM D 5261) Grab Tensile (ASTM D 4632) Apparent Opening Size (ASTM D 4751) Constant Head Permittivity (ASTM D 4491) Percent Open Area (COE Method)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager

GEOTEXTILE TEST RESULTS

TRI Client: DDRF - TRI/Environmental, Inc.

Material: Propex 111F Black Woven Geotextile
Sample Identification: GSWCC - Propex - 111F
TRI Log #: E2366-60-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.
Thickness (ASTM D 5199)												
Thickness (mils)	34	34	33	35	34	35	35	34	32	34	**34**	1
											32	<< min
Mass/Unit Area (ASTM D 5261)												
5" diameter circle (grams)	3.13	3.09	3.10	3.14	3.11	3.12	3.10	3.08	3.11	3.13	**3.11**	0.02
Mass/Unit Area (oz/sq.yd)	7.28	7.19	7.21	7.30	7.23	7.26	7.21	7.16	7.23	7.28	**7.24**	0.04
Grab Tensile Properties (ASTM D 4632)												
MD - Tensile Strength (lbs)	359	349	343	360	355	362	352	321	348	358	**351**	12
TD - Tensile Strength (lbs)	231	266..5	237	234	254	281	265	290	280	259	**259**	22
MD - Elong. @ Max. Load (%)	21	20	19	20	21	20	20	20	19	21	**20**	1
TD - Elong. @ Max. Load (%)	11	13	11	9	13	12	13	13	13	13	**12**	1
Apparent Opening Size (ASTM D 4751)												
Opening Size Diameter (mm)	0.414	0.414	0.416	0.417	0.417						**0.416**	0.001
Sieve No.	40	40	40	40	40						**40**	

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

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GEOTEXTILE TEST RESULTS

TRI Client: DDRF - TRI/Environmental, Inc.

Material: Propex 111F Black Woven Geotextile
Sample Identification: GSWCC - Propex - 111F
TRI Log #: E2366-60-10

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Percent Open Area (COE Method)												
Open Area (%)	22.2	21.1	11.1								**18.2**	
Constant Head Permittivity (ASTM D 4491, 51-mm Constant Head; 2 in opening)												
Water Temp. (C):	20.5											
Correction Factor:	0.988											
Test Speciemn No. >:			1					2				
Thickness (mils)	33	33	33	33	33	33	33	33	33	33		
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Time (s)	10.6	10.5	10.5	11.1	10.6	10.5	10.6	10.6	10.6	10.6		
Specimen Permittivity @20°C (sec-1)	1.83	1.85	1.85	1.75	1.83	1.85	1.83	1.83	1.83	1.83		
Specimen Flow rate (GPM/ft2)	137	139	139	131	137	139	137	137	137	137		
Specimen Permeability (cm/s)	0.15	0.16	0.16	0.15	0.15	0.16	0.15	0.15	0.15	0.15		
Test Speciemn No. >:			3					4				
Thickness (mils)	33	33	33	33	33	32	32	32	32	32		
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Time (s)	10.6	10.6	10.5	10.6	10.5	12.7	13.2	13.2	13.7	13.2		
Specimen Permittivity @20°C (sec-1)	1.83	1.83	1.85	1.83	1.85	1.53	1.47	1.47	1.42	1.47		
Specimen Flow rate (GPM/ft2)	137	137	139	137	139	115	110	110	106	110		
Specimen Permeability (cm/s)	0.15	0.15	0.16	0.15	0.16	0.13	0.12	0.12	0.12	0.12		
				TEMPERATURE CORRECTED VALUES						**Permittivity (s-1)**	**1.74**	
										Flow rate (GPM/ft2)	**131**	
										Permeability (cm/s)	**0.15**	

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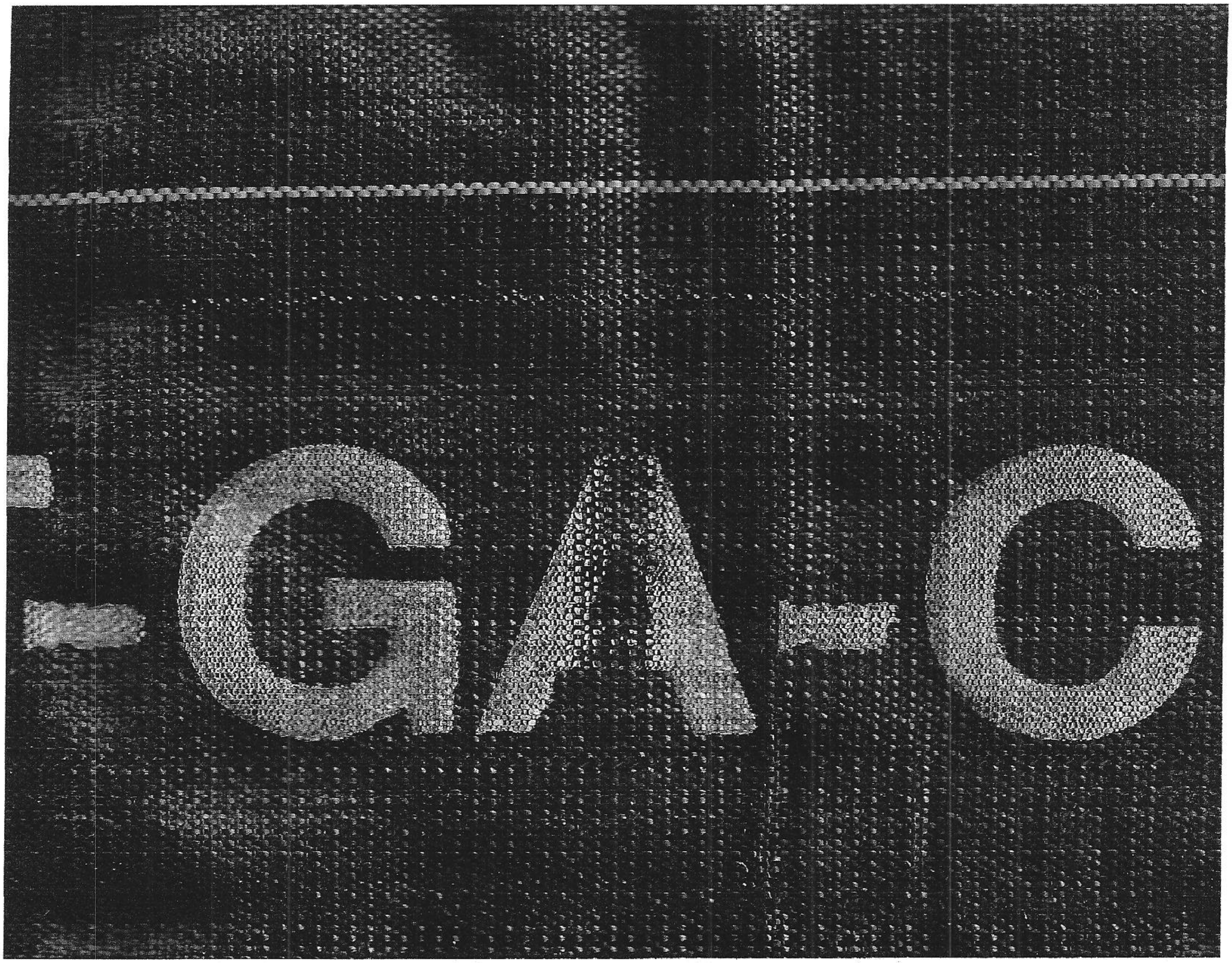


Erosion Tech
ET-GA-C
C-System

June 11, 2012

Mail To:	**Bill To:**
Mr. C. Joel Sprague	**<= Same**
DDRF , TRI / Environmental	
P.O. Box 9192	
Greenville, SC 29604	

email: jsprague@tri-env.com

Dear Mr. Sprague:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report for laboratory testing.

TRI Job Reference Number:	E2366-93-07
Material(s) Tested:	1, Erosion Tech ET-GA-C Woven Geotextile -Geo Grid Composite
Test(s) Requested:	Thickness (ASTM D 5199) Mass/Unit Area (ASTM D 5261) Grab Tensile (ASTM D 4632) Apparent Opening Size (ASTM D 4751) Percent Open Area (COE Method) Constant Head Permittivity (ASTM D 4491)

If you have any questions or require any additional information, please call us at
1-800-880-8378.

Sincerely,

Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager

LABORATORY TEST RESULTS

TRI Client: DDRF , TRI / Environmental

Material: Erosion Tech ET-GA-C System Woven Geotextile - Geo Grid Composite Material
Sample Identification: ET-GA-C
TRI Log #: E2366-93-07

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.
Thickness (ASTM D 5199)												
Thickness (mils)	91	81	84	87	84	94	83	94	82	87	**87**	5
											81	<< min
Mass/Unit Area (ASTM D 5261)												
5" diameter circle (grams)	3.31	3.28	3.32	3.31	3.20	3.37	3.28	3.37	3.27	3.35	**3.31**	0.05
Mass/Unit Area (oz/sq.yd)	7.70	7.63	7.72	7.70	7.44	7.84	7.63	7.84	7.61	7.79	**7.69**	0.12
Grab Tensile Properties (ASTM D 4632)												
MD - Tensile Strength (lbs)	302	278	303	302	306	313	267	295	274	321	**296**	18
TD - Tensile Strength (lbs)	173	169	201	185	203	192	179	164	169	171	**181**	14
MD - Elong. @ Max. Load (%)	17	19	20	19	19	20	19	19	16	18	**19**	1
TD - Elong. @ Max. Load (%)	11	9	17	12	17	19	13	15	13	14	**14**	3
Apparent Opening Size (ASTM D 4751)												
Opening Size Diameter (mm)	0.418	0.415	0.418	0.415	0.417						**0.417**	0.001
Sieve No.	40	40	40	40	40						**40**	

MD Machine Direction TD Transverse Direction

White Spray paint marks area where posts were attached to fabric had been avoided for index testing

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

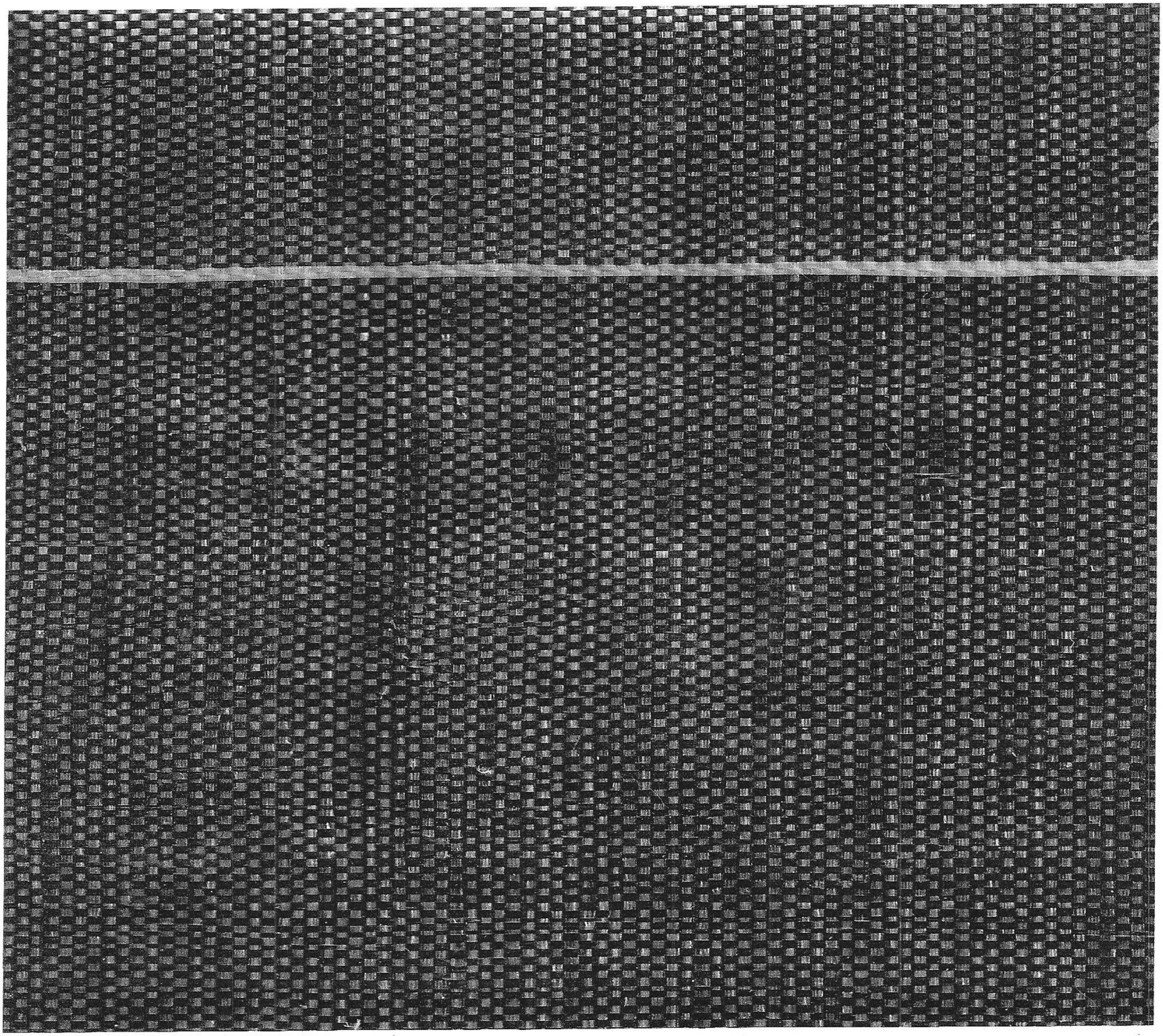
LABORATORY TEST RESULTS

TRI Client: DDRF , TRI / Environmental

Material: Erosion Tech ET-GA-C Woven Geotextile - Geo Grid Composite Material
Sample Identification: ET-GA-C
TRI Log #: E2366-93-07

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Percent Open Area (COE Method)												
Open Area (%)	13.50										13.50	
Constant Head Permittivity (ASTM D 4491, 51-mm Constant Head; 2 in opening)												
Water Temp. (C):	20.2											
Correction Factor:	1.00											
Test Speciemn No. >:			1					2				
Thickness (mils)	80.7	80.7	80.7	80.7	80.7	85.9	85.9	85.9	85.9	85.9		
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Time (s)	12.8	12.8	12.8	12.8	12.8	13.4	13.3	13.4	13.3	13.4		
Specimen Permittivity @20°C (sec-1)	1.54	1.54	1.54	1.54	1.54	1.47	1.48	1.47	1.48	1.47		
Specimen Flow rate (GPM/ft2)	115	115	115	115	115	110	111	110	111	110		
Specimen Permeability (cm/s)	0.31	0.31	0.31	0.31	0.31	0.30	0.30	0.32	0.32	0.32		
Test Speciemn No. >:			3					4				
Thickness (mils)	81.8	81.8	81.8	81.8	81.8	80.7	80.7	80.7	80.7	80.7		
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Time (s)	13.3	13.3	13.4	13.3	13.0	12.3	12.3	12.3	12.2	12.3		
Specimen Permittivity @20°C (sec-1)	1.48	1.48	1.47	1.48	1.51	1.60	1.60	1.60	1.61	1.60		
Specimen Flow rate (GPM/ft2)	111	111	110	111	113	120	120	120	121	120		
Specimen Permeability (cm/s)	0.31	0.31	0.30	0.31	0.31	0.33	0.33	0.33	0.33	0.33		
TEMPERATURE CORRECTED VALUES										**Permittivity (s-1)**	1.52	
										Flow rate (GPM/ft2)	114	
										Permeability (cm/s)	0.32	

White Spray paint marks area where posts were attached to fabric had been avoided for index testing



BELTON
BELTECH 935
Type A
Type B

May 17, 2012

Mail To:	**Bill To:**
Mr. C. Joel Sprague DDRF , TRI / Environmental P.O. Box 9192 Greenville, SC 29604	**<= Same**

email: jsprague@tri-env.com

Dear Mr. Sprague:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

TRI Job Reference Number:	E2366-72-02
Material(s) Tested:	1, Beltech 1935 Woven Geotextile
Test(s) Requested:	Thickness (ASTM D 5199) Mass/Unit Area (ASTM D 5261) Grab Tensile (ASTM D 4632) Apparent Opening Size (ASTM D 4751) Percent Open Area (COE Method) Constant Head Permittivity (ASTM D 4491)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager

LABORATORY TEST RESULTS

TRI Client: DDRF , TRI / Environmental

Material: Beltech 1935 Woven Geotextile
Sample Identification: Beltech 1935
TRI Log #: E2366-72-02

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5199)												
Thickness (mils)	15	19	16	19	17	15	16	17	16	19	**17**	2
											15	<< min
Mass/Unit Area (ASTM D 5261)												
5" diameter circle (grams)	1.51	1.53	1.52	1.48	1.49	1.47	1.49	1.47	1.42	1.41	**1.48**	0.04
Mass/Unit Area (oz/sq.yd)	3.51	3.56	3.54	3.44	3.47	3.42	3.47	3.42	3.30	3.28	**3.44**	0.09
Grab Tensile Properties (ASTM D 4632)												
MD - Tensile Strength (lbs)	177	182	184	189	175	168	160	176	164	172	**175**	9
TD - Tensile Strength (lbs)	150	166	157	155	161	167	165	150	149	147	**157**	8
MD - Elong. @ Max. Load (%)	33	35	33	34	33	28	29	29	27	28	**31**	3
TD - Elong. @ Max. Load (%)	21	21	21	20	21	21	21	21	19	19	**20**	1
Apparent Opening Size (ASTM D 4751)												
Opening Size Diameter (mm)	0.501	0.388	0.537	0.564	0.707						**0.539**	0.115
Sieve No.	30	40	30	30	25						**30**	

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

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LABORATORY TEST RESULTS

TRI Client: DDRF , TRI / Environmental

Material: Beltech 1935 Woven Geotextile
Sample Identification: Beltech 1935
TRI Log #: E2366-72-02

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Percent Open Area (COE Method)												
Open Area (%)	3.83	1.21	4.83								**3.29**	
Constant Head Permittivity (ASTM D 4491, 51-mm Constant Head; 2 in opening)												
Water Temp. (C):	20											
Correction Factor:	1.000											
Test Speciemn No. >:			1					2				
Thickness (mils)	16.4	16.4	16.4	16.4	16.4	16.5	16.5	16.5	16.5	16.5		
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Time (s)	53.2	53.8	53.8	54.3	54.3	68.6	69.1	69.1	69.7	70.2		
Specimen Permittivity @20°C (sec-1)	0.37	0.37	0.37	0.36	0.36	0.29	0.28	0.28	0.28	0.28		
Specimen Flow rate (GPM/ft2)	27.7	27.4	27.4	27.1	27.1	21.5	21.3	21.3	21.1	21.0		
Specimen Permeability (cm/s)	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01		
Test Speciemn No. >:			3					4				
Thickness (mils)	17.9	17.9	17.9	17.9	17.9	17.5	17.5	17.5	17.5	17.5		
Volume Collected (liters)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Time (s)	56.9	57.5	57.0	57.5	57.5	85.5	85.1	85.5	86.0	85.4		
Specimen Permittivity @20°C (sec-1)	0.35	0.34	0.35	0.34	0.34	0.23	0.23	0.23	0.23	0.23		
Specimen Flow rate (GPM/ft2)	25.9	25.6	25.8	25.6	25.6	17.2	17.3	17.2	17.1	17.2		
Specimen Permeability (cm/s)	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01		

TEMPERATURE CORRECTED VALUES		
	Permittivity (s-1)	**0.31**
	Flow rate (GPM/ft2)	**22.9**
	Permeability (cm/s)	**0.01**

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