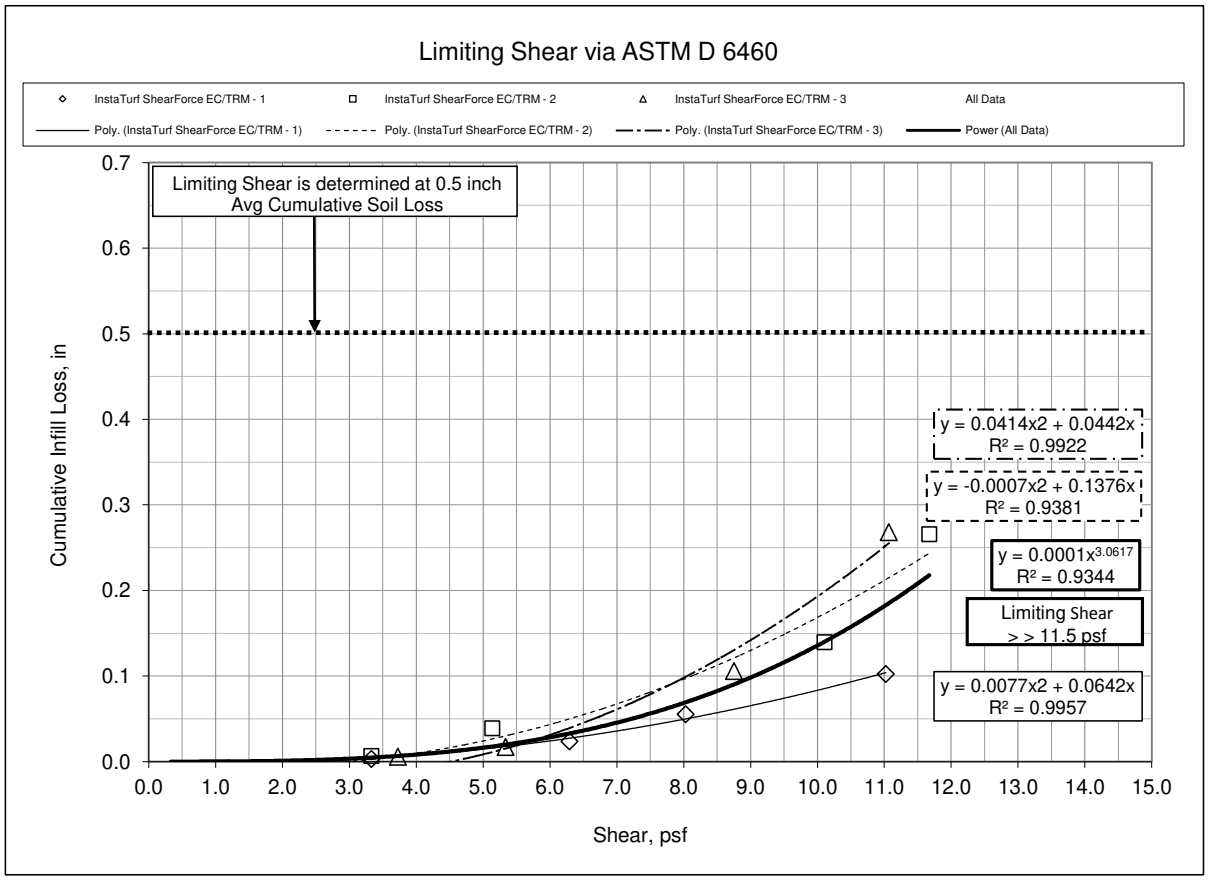
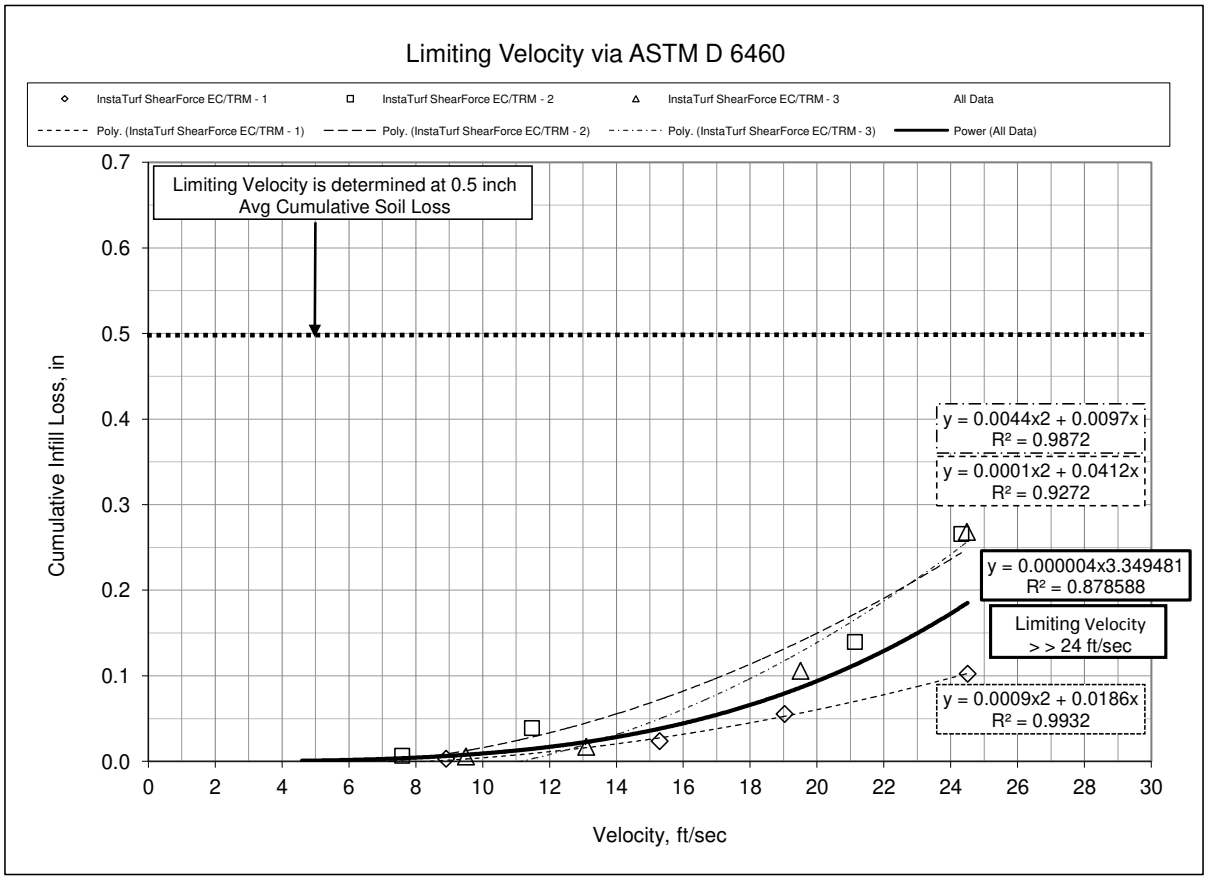
ASTM D 6460:
STANDARD TEST METHOD FOR DETERMINATION OF ROLLED EROSION CONTROL PRODUCT (RECP) PERFORMANCE IN PROTECTING EARTHEN CHANNELS FROM STORM-INDUCED EROSION

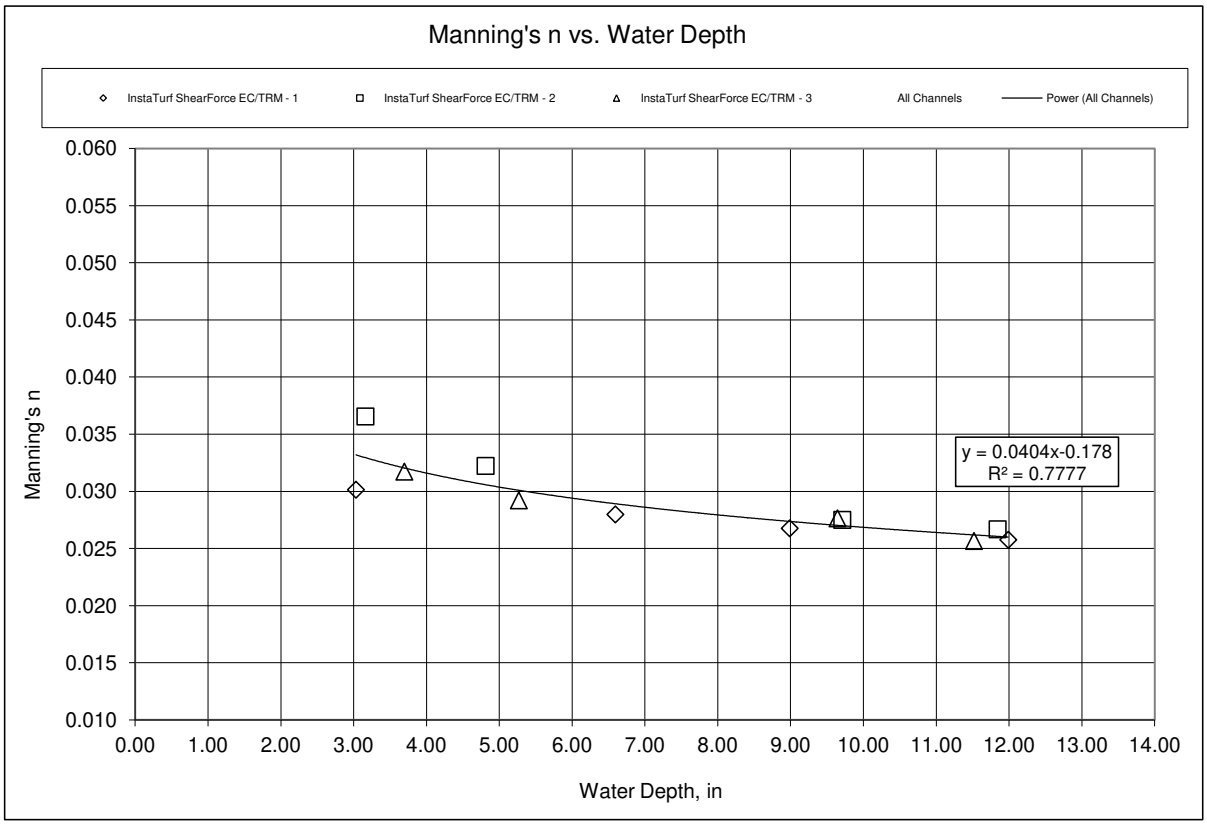
Client: Grassworx, LLC
Product: InstaTurf ShearForce EC/TRM
Test Dates: Test #1: 8/23/2018 Test #2: 10/5/2018 Test #3: 12/6/2018
Shear Range: 3.0 - 12.0 psf
Flume: 2-ft wide x 40-ft long; 20% Bed
Event: 30 minutes at each shear

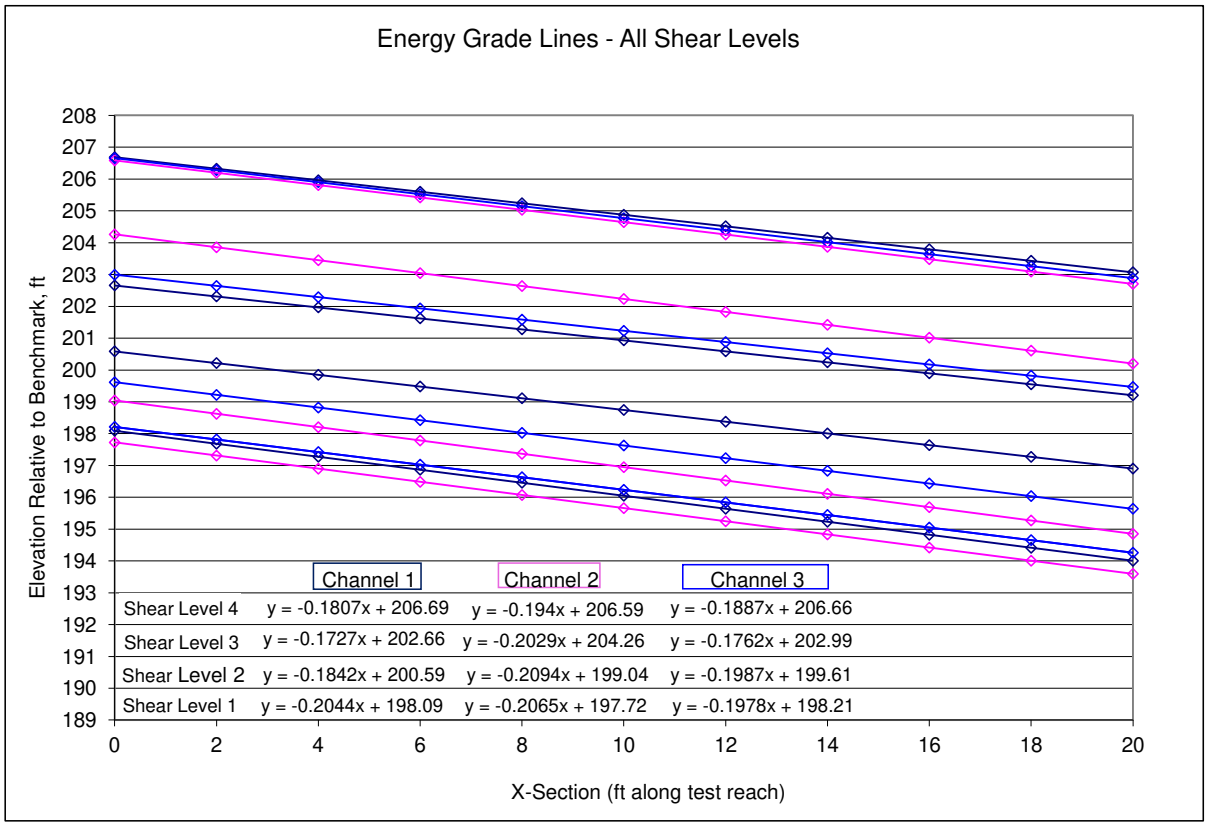
Test Scenario	Shear Level	depth (in)	velocity (fps)	Flow (cfs)	Manning's roughness, n	Max Bed Shear Stress (psf)	Shear Level Infill Loss (in)	Cumulative Infill Loss (in)
InstaTurf ShearForce EC/TRM - 1	1	3.03	8.91	4.50	0.030	3.33	0.00	0.00
	2	6.59	15.29	16.80	0.028	6.29	0.02	0.02
	3	8.99	19.03	28.50	0.027	8.03	0.03	0.06
	4	11.99	24.51	48.97	0.026	11.02	0.05	0.10
InstaTurf ShearForce EC/TRM - 2	1	3.16	7.59	4.00	0.037	3.33	0.01	0.01
	2	4.81	11.47	9.20	0.032	5.14	0.03	0.04
	3	9.71	21.13	34.20	0.028	10.11	0.10	0.14
	4	11.84	24.32	48.00	0.027	11.67	0.13	0.27
InstaTurf ShearForce EC/TRM - 3	1	3.70	9.50	5.85	0.032	3.73	0.01	0.01
	2	5.27	13.10	11.50	0.029	5.34	0.01	0.02
	3	9.64	19.51	31.35	0.028	8.75	0.09	0.11
	4	11.52	24.48	47.00	0.026	11.07	0.16	0.27

CJS 12/12/18
Quality Review / Date


Limiting Shear via ASTM D 6460
InstaTurf ShearForce EC/TRM - 1
InstaTurf ShearForce EC/TRM - 2
InstaTurf ShearForce EC/TRM - 3
All Data
Poly. (InstaTurf ShearForce EC/TRM - 1)
Poly. (InstaTurf ShearForce EC/TRM - 2)
Poly. (InstaTurf ShearForce EC/TRM - 3)
Power (All Data)
Limiting Shear is determined at 0.5 inch Avg Cumulative Soil Loss
y = 0.0414x2 + 0.0442x
R² = 0.9922
y = -0.0007x2 + 0.1376x
R² = 0.9381
y = 0.0001x3.0617
R² = 0.9344
Limiting Shear > > 11.5 psf
y = 0.0077x2 + 0.0642x
R² = 0.9957
Cumulative Infill Loss, in
Shear, psf
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0


Limiting Velocity via ASTM D 6460
InstaTurf ShearForce EC/TRM - 1
InstaTurf ShearForce EC/TRM - 2
InstaTurf ShearForce EC/TRM - 3
All Data
Poly. (InstaTurf ShearForce EC/TRM - 1)
Poly. (InstaTurf ShearForce EC/TRM - 2)
Poly. (InstaTurf ShearForce EC/TRM - 3)
Power (All Data)
Limiting Velocity is determined at 0.5 inch Avg Cumulative Soil Loss
y = 0.0044x2 + 0.0097x
R² = 0.9872
y = 0.0001x2 + 0.0412x
R² = 0.9272
y = 0.000004x3.349481
R² = 0.878588
Limiting Velocity > > 24 ft/sec
y = 0.0009x2 + 0.0186x
R² = 0.9932
Cumulative Infill Loss, in
Velocity, ft/sec
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30


Manning's n vs. Water Depth
InstaTurf ShearForce EC/TRM - 1
InstaTurf ShearForce EC/TRM - 2
InstaTurf ShearForce EC/TRM - 3
All Channels
Power (All Channels)
y = 0.0404x-0.178
R² = 0.7777
Manning's n
Water Depth, in


Energy Grade Lines - All Shear Levels
Elevation Relative to Benchmark, ft
X-Section (ft along test reach)
Channel 1
Channel 2
Channel 3
Shear Level 4 y = -0.1807x + 206.69 y = -0.194x + 206.59 y = -0.1887x + 206.66
Shear Level 3 y = -0.1727x + 202.66 y = -0.2029x + 204.26 y = -0.1762x + 202.99
Shear Level 2 y = -0.1842x + 200.59 y = -0.2094x + 199.04 y = -0.1987x + 199.61
Shear Level 1 y = -0.2044x + 198.09 y = -0.2065x + 197.72 y = -0.1978x + 198.21


InstaTurf ShearForce EC/TRM Installation (20% channel)

High Shear Flow and After (20% channel)


InstaTurf ShearForce EC/TRM - Close-up Before and After

APPENDIX - DATA

Date:	8/23/18	RECP:	InstaTurf ShearForce EC/TRM - 1			Lot #:				Anchorage:		3.8/Sq. Yd.		Unvegetated			
Slope:	20%	Start Time:	11:45 AM	Channel #	Shear #	Start Time:	1:47 PM	Channel #	Shear #	Start Time:	2:34 PM	Channel #	Shear #	Start Time:	3:40 PM	Channel #	Shear #
Width:	2	End Time:	12:15 PM	1	1	End Time:	2:17 PM	1	2	End Time:	3:04 PM	1	3	End Time:	4:10 PM	1	4
Cross-Section Measurements		Measured Volumetric Flow, cfs:			4.50	Measured Volumetric Flow, cfs:			16.80	Measured Volumetric Flow, cfs:			28.50	Measured Volumetric Flow, cfs:			48.97
#1 (Sta. 0+10.00)	To original Surface Elev, cm	73.3	73.2	72.9	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	73.4	73.2	72.9	73.2	73.5	73.2	72.9	73.2	73.6	73.3	73.0	73.3	73.6	73.4	73.0	73.3
	Loss/Gain, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.08	0.00	0.00	-0.03	-0.12	-0.04	-0.04	-0.06	-0.12	-0.08	-0.04	-0.07
	CSLI, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.08	0.00	0.00	-0.03	-0.12	-0.04	-0.04	-0.06	-0.12	-0.08	-0.04	-0.07
	Velocity, ft/s		0.0		8.6		0.0		14.4		0.0		18.6		0.0		24.2
	Distance to Water Surface, cm		65.2		65.2		55.4		55.4		50.0		50.0		42.5		42.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.50	3.14			16.80	7.01			28.50	9.17			48.97	12.14		
#2 (Sta. 0+12.00)	To original Surface Elev, cm	73.5	73.3	72.5	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	73.5	73.4	72.5	73.1	73.5	73.4	72.6	73.2	73.5	73.4	72.6	73.2	73.6	73.5	72.8	73.3
	Loss/Gain, sq.in./in. width	0.00	-0.04	0.00	-0.01	0.00	-0.04	-0.04	-0.02	0.00	-0.04	-0.04	-0.02	-0.04	-0.08	-0.12	-0.07
	CSLI, sq.in./in. width	0.00	-0.04	0.00	-0.01	0.00	-0.04	-0.04	-0.02	0.00	-0.04	-0.04	-0.02	-0.04	-0.08	-0.12	-0.07
	Velocity, ft/s		0.0		8.4		0.0		14.9		0.0		18.5		0.0		24.2
	Distance to Water Surface, cm		65.0		65.0		56.0		56.0		49.7		49.7		42.5		42.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.50	3.20			16.80	6.76			28.50	9.24			48.97	12.13		
#3 (Sta. 0+14.00)	To original Surface Elev, cm	73.5	73.6	73.2	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	73.5	73.6	73.2	73.4	73.5	73.7	73.4	73.5	73.6	73.7	73.4	73.6	73.6	73.8	73.6	73.7
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	-0.04	-0.08	-0.03	-0.04	-0.04	-0.08	-0.05	-0.04	-0.08	-0.16	-0.08
	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	-0.04	-0.08	-0.03	-0.04	-0.04	-0.08	-0.05	-0.04	-0.08	-0.16	-0.08
	Velocity, ft/s		0.0		9.5		0.0		15.4		0.0		18.8		0.0		24.7
	Distance to Water Surface, cm		66.2		66.2		56.9		56.9		50.5		50.5		43.5		43.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.50	2.85			16.80	6.55			28.50	9.08			48.97	11.88		
#4 (Sta. 0+16.00)	To original Surface Elev, cm	73.6	73.7	73.4	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	73.6	73.7	73.4	73.6	73.6	73.7	73.4	73.6	73.7	73.7	73.5	73.6	73.7	73.7	73.8	73.7
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	0.00	-0.04	-0.03	-0.04	0.00	-0.16	-0.07
	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	0.00	-0.04	-0.03	-0.04	0.00	-0.16	-0.07
	Velocity, ft/s		0.0		8.8		0.0		14.7		0.0		18.9		0.0		24.7
	Distance to Water Surface, cm		65.8		65.8		56.2		56.2		50.7		50.7		43.5		43.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.50	3.06			16.80	6.84			28.50	9.03			48.97	11.90		
#5 (Sta. 0+18.00)	To original Surface Elev, cm	72.7	72.5	72.5	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	72.7	72.6	72.5	72.6	72.7	72.7	72.5	72.6	73.0	72.8	72.6	72.8	73.2	72.8	72.8	72.9
	Loss/Gain, sq.in./in. width	0.00	-0.04	0.00	-0.01	0.00	-0.08	0.00	-0.01	-0.12	-0.12	-0.04	-0.07	-0.20	-0.12	-0.12	-0.12
	CSLI, sq.in./in. width	0.00	-0.04	0.00	-0.01	0.00	-0.08	0.00	-0.01	-0.12	-0.12	-0.04	-0.07	-0.20	-0.12	-0.12	-0.12
	Velocity, ft/s		0.0		9.3		0.0		15.3		0.0		18.6		0.0		24.0
	Distance to Water Surface, cm		65.2		65.2		55.9		55.9		49.5		49.5		41.8		41.8
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.50	2.91			16.80	6.59			28.50	9.17			48.97	12.26		
#6 (Sta. 0+20.00)	To original Surface Elev, cm	73.1	73.1	73.0	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	73.1	73.1	73.0	73.1	73.4	73.3	73.3	73.3	73.4	73.5	73.7	73.5	73.4	73.6	74.1	73.7
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	-0.12	-0.08	-0.12	-0.09	-0.12	-0.16	-0.28	-0.16	-0.12	-0.20	-0.43	-0.22
	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	-0.12	-0.08	-0.12	-0.09	-0.12	-0.16	-0.28	-0.16	-0.12	-0.20	-0.43	-0.22
	Velocity, ft/s		0.0		9.1		0.0		15.6		0.0		18.5		0.0		23.9
	Distance to Water Surface, cm		65.5		65.5		56.9		56.9		50.0		50.0		42.5		42.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.50	2.98			16.80	6.47			28.50	9.27			48.97	12.28		
#7 (Sta. 0+22.00)	To original Surface Elev, cm	73.0	73.0	72.7	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	73.0	73.0	72.8	72.9	73.0	73.0	72.8	72.9	73.1	73.2	73.0	73.1	73.1	73.5	73.0	73.2
	Loss/Gain, sq.in./in. width	0.00	0.00	-0.04	-0.01	0.00	0.00	-0.04	-0.01	-0.04	-0.08	-0.12	-0.07	-0.04	-0.20	-0.12	-0.09
	CSLI, sq.in./in. width	0.00	0.00	-0.04	-0.01	0.00	0.00	-0.04	-0.01	-0.04	-0.08	-0.12	-0.07	-0.04	-0.20	-0.12	-0.09
	Velocity, ft/s		0.0		9.2		0.0		16.0		0.0		19.2		0.0		24.7
	Distance to Water Surface, cm		65.5		65.5		56.9		56.9		50.5		50.5		43.0		43.0
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.50	2.93			16.80	6.31			28.50	8.90			48.97	11.89		
#8 (Sta. 0+24.00)	To original Surface Elev, cm	73.5	73.5	73.5	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	73.5	73.5	73.5	73.5	73.5	73.5	73.5	73.5	73.5	73.7	73.6	73.6	73.5	73.7	73.8	73.7
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08	-0.04	-0.03	0.00	-0.08	-0.12	-0.05
	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08	-0.04	-0.03	0.00	-0.08	-0.12	-0.05
	Velocity, ft/s		0.0		8.8		0.0		15.6		0.0		19.7		0.0		24.3
	Distance to Water Surface, cm		65.7		65.7		57.1		57.1		51.5		51.5		43.0		43.0
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.50	3.07			16.80	6.46			28.50	8.70			48.97	12.07		
#9 (Sta. 0+26.00)	To original Surface Elev, cm	73.3	73.4	73.4	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	73.3	73.5	73.4	73.4	73.3	73.5	73.4	73.4	73.3	73.6	73.5	73.5	73.3	73.8	74.5	73.9
	Loss/Gain, sq.in./in. width	0.00	-0.04	0.00	-0.01	0.00	-0.04	0.00	-0.01	0.00	-0.08	-0.04	-0.03	0.00	-0.16	-0.43	-0.17
	CSLI, sq.in./in. width	0.00	-0.04	0.00	-0.01	0.00	-0.04	0.00	-0.01	0.00	-0.08	-0.04	-0.03	0.00	-0.16	-0.43	-0.17
	Velocity, ft/s		0.0		8.9		0.0		15.5		0.0		19.4		0.0		25.0
	Distance to Water Surface, cm		65.7		65.7		56.9		56.9		51.1		51.1		44.0		44.0
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.50	3.03			16.80	6.50			28.50	8.81			48.97	11.76		
#10 (Sta. 0+28.00)	To original Surface Elev, cm	73.0	73.5	73.3	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	73.0	73.5	73.3	73.3	73.2	73.5	73.3	73.3	73.5	73.5	73.3	73.4	73.6	73.5	73.5	73.5
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	-0.08	0.00	0.00	-0.03	-0.20	0.00	0.00	-0.07	-0.24	0.00	-0.08	-0.10
	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	-0.08	0.00	0.00	-0.03	-0.20	0.00	0.00	-0.07	-0.24	0.00	-0.08	-0.10
	Velocity, ft/s		0.0		9.1		0.0		15.5		0.0		19.4		0.0		24.8
	Distance to Water Surface, cm		65.7		65.7		56.8		56.8		51.1		51.1		43.5		43.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.50	2.98			16.80	6.51			28.50	8.79			48.97	11.82		
#11 (Sta. 0+30.00)	To original Surface Elev, cm	73.0	73.2	73.2	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	73.0	73.2	73.2	73.1	73.0	73.2	73.2	73.1	73.0	73.2	73.2	73.1	73.2	73.6	73.3	73.4
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08	-0.16	-0.04	-0.07
	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.08	-0.16	-0.04	-0.07
	Velocity, ft/s		0.0		8.4		0.0		15.4		0.0		19.6		0.0		25.0
	Distance to Water Surface, cm		65.0		65.0		56.5		56.5		51.0		51.0		43.5		43.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.50	3.20			16.80	6.55			28.50	8.71			48.97	11.76		

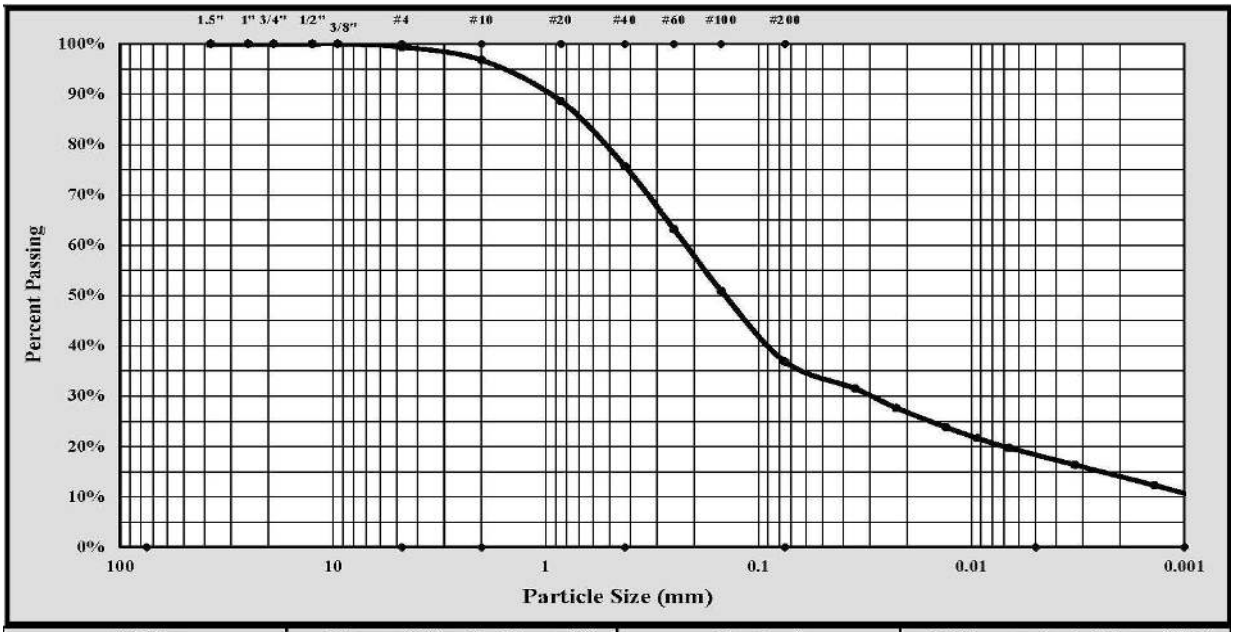
Date:	10/5/18	RECP:	InstaTurf ShearForce EC/TRM - 2			Lot #:				Anchorage:		3.8/Sq. Yd.		Unvegetated			
Slope:	20%	Start Time:	9:50 AM	Channel #	Shear #	Start Time:	10:45 AM	Channel #	Shear #	Start Time:	11:34 AM	Channel #	Shear #	Start Time:	12:27 PM	Channel #	Shear #
Width:	2	End Time:	10:20 AM	1	1	End Time:	11:15 AM	1	2	End Time:	12:04 PM	1	3	End Time:	12:57 PM	1	4
Cross-Section Measurements		Measured Volumetric Flow, cfs:			4.00	Measured Volumetric Flow, cfs:			9.20	Measured Volumetric Flow, cfs:			34.20	Measured Volumetric Flow, cfs:			48.00
#1 (Sta. 0+10.00)	To original Surface Elev, cm	75.5	75.1	74.3	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	75.5	75.1	74.3	75.0	75.5	75.1	74.3	75.0	75.5	75.2	74.3	75.0	75.5	75.2	74.4	75.0
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	0.00	-0.01	0.00	-0.04	-0.04	-0.02
	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	0.00	-0.01	0.00	-0.04	-0.04	-0.02
	Velocity, ft/s		0.0		7.7		0.0		11.2		0.0		21.3		0.0		23.8
	Distance to Water Surface, cm		67.0		67.0		62.5		62.5		50.5		50.5		44.3		44.3
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.00	3.14			9.20	4.91			34.20	9.65			48.00	12.10		
#2 (Sta. 0+12.00)	To original Surface Elev, cm	75.3	74.8	74.1	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	75.3	74.8	74.1	74.7	75.4	74.9	74.1	74.8	75.4	75.0	74.2	74.9	75.4	75.0	74.3	74.9
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	-0.04	-0.04	0.00	-0.02	-0.04	-0.08	-0.04	-0.04	-0.04	-0.08	-0.08	-0.05
	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	-0.04	-0.04	0.00	-0.02	-0.04	-0.08	-0.04	-0.04	-0.04	-0.08	-0.08	-0.05
	Velocity, ft/s		0.0		7.8		0.0		11.8		0.0		21.3		0.0		24.1
	Distance to Water Surface, cm		66.9		66.9		62.9		62.9		50.4		50.4		44.5		44.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.00	3.08			9.20	4.69			34.20	9.63			48.00	11.97		
#3 (Sta. 0+14.00)	To original Surface Elev, cm	75.0	74.8	74.1	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	75.0	74.8	74.2	74.7	75.1	74.8	74.2	74.7	75.1	74.9	74.3	74.8	75.2	74.9	74.5	74.9
	Loss/Gain, sq.in./in. width	0.00	0.00	-0.04	-0.01	-0.04	0.00	-0.04	-0.03	-0.04	-0.04	-0.08	-0.05	-0.08	-0.04	-0.16	-0.09
	CSLI, sq.in./in. width	0.00	0.00	-0.04	-0.01	-0.04	0.00	-0.04	-0.03	-0.04	-0.04	-0.08	-0.05	-0.08	-0.04	-0.16	-0.09
	Velocity, ft/s		0.0		7.7		0.0		11.8		0.0		21.3		0.0		24.5
	Distance to Water Surface, cm		66.8		66.8		62.8		62.8		50.3		50.3		45.0		45.0
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.00	3.10			9.20	4.69			34.20	9.63			48.00	11.76		
#4 (Sta. 0+16.00)	To original Surface Elev, cm	75.5	75.0	74.5	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	75.5	75.0	74.5	75.0	75.7	75.2	74.7	75.2	75.7	75.2	75.0	75.3	75.9	75.1	75.5	75.5
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	-0.08	-0.08	-0.08	-0.07	-0.08	-0.08	-0.20	-0.10	-0.16	-0.04	-0.39	-0.19
	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	-0.08	-0.08	-0.08	-0.07	-0.08	-0.08	-0.20	-0.10	-0.16	-0.04	-0.39	-0.19
	Velocity, ft/s		0.0		7.6		0.0		12.0		0.0		20.8		0.0		24.4
	Distance to Water Surface, cm		67.0		67.0		63.5		63.5		50.3		50.3		45.5		45.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.00	3.15			9.20	4.61			34.20	9.84			48.00	11.81		
#5 (Sta. 0+18.00)	To original Surface Elev, cm	75.4	75.2	74.4	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	75.5	75.2	74.4	75.0	75.6	75.2	74.4	75.1	75.7	75.3	75.2	75.4	75.8	75.3	75.8	75.6
	Loss/Gain, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.08	0.00	0.00	-0.03	-0.12	-0.04	-0.31	-0.15	-0.16	-0.04	-0.55	-0.24
	CSLI, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.08	0.00	0.00	-0.03	-0.12	-0.04	-0.31	-0.15	-0.16	-0.04	-0.55	-0.24
	Velocity, ft/s		0.0		7.6		0.0		11.7		0.0		20.9		0.0		24.5
	Distance to Water Surface, cm		67.0		67.0		63.1		63.1		50.5		50.5		45.8		45.8
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.00	3.16			9.20	4.71			34.20	9.80			48.00	11.75		
#6 (Sta. 0+20.00)	To original Surface Elev, cm	75.1	75.0	74.5	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	75.1	75.1	74.6	74.9	75.2	75.1	74.7	75.0	75.3	76.0	75.6	75.6	75.3	76.5	76.5	76.1
	Loss/Gain, sq.in./in. width	0.00	-0.04	-0.04	-0.02	-0.04	-0.04	-0.08	-0.05	-0.08	-0.39	-0.43	-0.24	-0.08	-0.59	-0.79	-0.39
	CSLI, sq.in./in. width	0.00	-0.04	-0.04	-0.02	-0.04	-0.04	-0.08	-0.05	-0.08	-0.39	-0.43	-0.24	-0.08	-0.59	-0.79	-0.39
	Velocity, ft/s		0.0		7.5		0.0		11.0		0.0		20.9		0.0		24.3
	Distance to Water Surface, cm		66.8		66.8		62.3		62.3		50.7		50.7		46.0		46.0
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.00	3.20			9.20	5.00			34.20	9.82			48.00	11.85		
#7 (Sta. 0+22.00)	To original Surface Elev, cm	75.4	74.8	74.5	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	75.4	74.9	74.5	74.9	75.6	75.0	74.6	75.1	75.7	75.7	76.3	75.9	75.8	76.0	77.5	76.4
	Loss/Gain, sq.in./in. width	0.00	-0.04	0.00	-0.01	-0.08	-0.08	-0.04	-0.05	-0.12	-0.35	-0.71	-0.33	-0.16	-0.47	-1.18	-0.52
	CSLI, sq.in./in. width	0.00	-0.04	0.00	-0.01	-0.08	-0.08	-0.04	-0.05	-0.12	-0.35	-0.71	-0.33	-0.16	-0.47	-1.18	-0.52
	Velocity, ft/s		0.0		7.7		0.0		11.3		0.0		20.9		0.0		24.4
	Distance to Water Surface, cm		67.0		67.0		62.7		62.7		51.0		51.0		46.5		46.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.00	3.12			9.20	4.87			34.20	9.80			48.00	11.78		
#8 (Sta. 0+24.00)	To original Surface Elev, cm	75.3	75.0	74.6	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	75.3	75.0	74.7	75.0	75.5	75.2	74.9	75.2	75.7	75.9	75.6	75.7	76.0	77.0	75.8	76.3
	Loss/Gain, sq.in./in. width	0.00	0.00	-0.04	-0.01	-0.08	-0.08	-0.12	-0.08	-0.16	-0.35	-0.39	-0.24	-0.28	-0.79	-0.47	-0.38
	CSLI, sq.in./in. width	0.00	0.00	-0.04	-0.01	-0.08	-0.08	-0.12	-0.08	-0.16	-0.35	-0.39	-0.24	-0.28	-0.79	-0.47	-0.38
	Velocity, ft/s		0.0		7.6		0.0		11.5		0.0		21.1		0.0		24.6
	Distance to Water Surface, cm		67.0		67.0		63.0		63.0		51.0		51.0		46.5		46.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.00	3.15			9.20	4.80			34.20	9.74			48.00	11.72		
#9 (Sta. 0+26.00)	To original Surface Elev, cm	75.5	75.3	74.8	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	75.5	75.3	74.8	75.2	75.6	75.4	74.9	75.3	75.8	75.8	75.0	75.5	75.9	76.0	76.9	76.3
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	-0.04	-0.04	-0.04	-0.03	-0.12	-0.20	-0.08	-0.10	-0.16	-0.28	-0.83	-0.37
	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	-0.04	-0.04	-0.04	-0.03	-0.12	-0.20	-0.08	-0.10	-0.16	-0.28	-0.83	-0.37
	Velocity, ft/s		0.0		7.2		0.0		11.0		0.0		21.2		0.0		24.2
	Distance to Water Surface, cm		66.7		66.7		62.5		62.5		51.0		51.0		46.0		46.0
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.00	3.35			9.20	5.04			34.20	9.66			48.00	11.92		
#10 (Sta. 0+28.00)	To original Surface Elev, cm	75.1	74.8	74.3	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	75.1	74.8	74.3	74.7	75.1	75.0	74.3	74.8	75.3	75.1	74.7	75.0	75.8	76.0	75.3	75.7
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	-0.08	0.00	-0.01	-0.08	-0.12	-0.16	-0.10	-0.28	-0.47	-0.39	-0.30
	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	-0.08	0.00	-0.01	-0.08	-0.12	-0.16	-0.10	-0.28	-0.47	-0.39	-0.30
	Velocity, ft/s		0.0		7.5		0.0		11.2		0.0		21.4		0.0		24.2
	Distance to Water Surface, cm		66.6		66.6		62.3		62.3		50.7		50.7		45.5		45.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.00	3.20			9.20	4.92			34.20	9.58			48.00	11.89		
#11 (Sta. 0+30.00)	To original Surface Elev, cm	74.8	74.4	74.1	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	74.8	74.4	74.1	74.4	74.8	74.4	74.1	74.4	74.8	74.5	74.3	74.5	75.1	75.8	75.0	75.3
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.08	-0.03	-0.12	-0.55	-0.35	-0.25
	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.08	-0.03	-0.12	-0.55	-0.35	-0.25
	Velocity, ft/s		0.0		7.7		0.0		11.7		0.0		21.2		0.0		24.5
	Distance to Water Surface, cm		66.5		66.5		62.5		62.5		50.0		50.0		45.5		45.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		4.00	3.12			9.20	4.70			34.20	9.66			48.00	11.73		

Date:	12/6/18	RECP:	InstaTurf ShearForce EC/TRM - 3			Lot #:				Anchorage:		3.8/Sq. Yd.		Unvegetated			
Slope:	20%	Start Time:	1:06 PM	Channel #	Shear #	Start Time:	1:46 PM	Channel #	Shear #	Start Time:	2:26 PM	Channel #	Shear #	Start Time:	3:30 PM	Channel #	Shear #
Width:	2	End Time:	1:36 PM	1	1	End Time:	2:16 PM	1	2	End Time:	2:56 PM	1	3	End Time:	4:00 PM	1	4
Cross-Section Measurements		Measured Volumetric Flow, cfs:			5.85	Measured Volumetric Flow, cfs:			11.50	Measured Volumetric Flow, cfs:			31.35	Measured Volumetric Flow, cfs:			47.00
	To original Surface Elev, cm	74.5	74.4	73.7	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	74.6	74.4	73.7	74.2	74.6	74.4	73.7	74.2	74.8	74.4	74.0	74.4	75.2	74.5	74.0	74.6
	Loss/Gain, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.04	0.00	0.00	-0.01	-0.12	0.00	-0.12	-0.08	-0.28	-0.04	-0.12	-0.14
#1 (Sta.	CSLI, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.04	0.00	0.00	-0.01	-0.12	0.00	-0.12	-0.08	-0.28	-0.04	-0.12	-0.14
0+10.00)	Velocity, ft/s		0.0		9.2		0.0		13.0		0.0		19.2		0.0		24.2
	Distance to Water Surface, cm		64.5		64.5		60.8		60.8		49.5		49.5		45.0		45.0
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		5.85	3.83			11.50	5.29			31.35	9.80			47.00	11.64		
	To original Surface Elev, cm	75.0	74.8	73.9	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	75.0	74.8	73.9	74.6	75.0	74.8	73.9	74.6	75.3	75.4	74.5	75.1	76.1	76.0	75.2	75.8
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.12	-0.24	-0.24	-0.16	-0.43	-0.47	-0.51	-0.39
#2 (Sta.	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.12	-0.24	-0.24	-0.16	-0.43	-0.47	-0.51	-0.39
0+12.00)	Velocity, ft/s		0.0		9.5		0.0		13.0		0.0		19.1		0.0		24.5
	Distance to Water Surface, cm		65.2		65.2		61.1		61.1		50.0		50.0		46.5		46.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		5.85	3.69			11.50	5.30			31.35	9.87			47.00	11.52		
	To original Surface Elev, cm	74.7	74.7	73.8	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	74.7	74.7	73.8	74.4	74.8	74.7	73.8	74.4	74.8	74.9	74.0	74.6	75.0	75.0	74.8	74.9
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	-0.04	0.00	0.00	-0.01	-0.04	-0.08	-0.08	-0.05	-0.12	-0.12	-0.39	-0.19
#3 (Sta.	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	-0.04	0.00	0.00	-0.01	-0.04	-0.08	-0.08	-0.05	-0.12	-0.12	-0.39	-0.19
0+14.00)	Velocity, ft/s		0.0		9.7		0.0		13.0		0.0		19.2		0.0		24.3
	Distance to Water Surface, cm		65.2		65.2		61.0		61.0		49.7		49.7		45.5		45.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		5.85	3.62			11.50	5.29			31.35	9.79			47.00	11.59		
	To original Surface Elev, cm	74.9	74.4	73.5	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	74.9	74.4	73.5	74.3	74.9	74.4	73.6	74.3	75.0	74.4	74.5	74.6	75.4	74.6	75.5	75.2
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.01	-0.04	0.00	-0.39	-0.14	-0.20	-0.08	-0.79	-0.34
#4 (Sta.	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.01	-0.04	0.00	-0.39	-0.14	-0.20	-0.08	-0.79	-0.34
0+16.00)	Velocity, ft/s		0.0		9.6		0.0		13.0		0.0		19.2		0.0		24.6
	Distance to Water Surface, cm		65.0		65.0		60.8		60.8		49.8		49.8		46.0		46.0
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		5.85	3.65			11.50	5.31			31.35	9.78			47.00	11.48		
	To original Surface Elev, cm	74.7	74.4	73.8	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	74.7	74.4	73.8	74.3	74.8	74.4	73.8	74.3	75.0	74.5	73.8	74.4	75.8	74.6	74.5	75.0
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	-0.04	0.00	0.00	-0.01	-0.12	-0.04	0.00	-0.05	-0.43	-0.08	-0.28	-0.25
#5 (Sta.	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	-0.04	0.00	0.00	-0.01	-0.12	-0.04	0.00	-0.05	-0.43	-0.08	-0.28	-0.25
0+18.00)	Velocity, ft/s		0.0		9.2		0.0		13.1		0.0		19.3		0.0		24.6
	Distance to Water Surface, cm		64.6		64.6		61.0		61.0		49.7		49.7		45.9		45.9
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		5.85	3.82			11.50	5.25			31.35	9.74			47.00	11.44		
	To original Surface Elev, cm	74.5	74.5	74.0	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	74.7	74.5	74.0	74.4	74.7	74.5	74.0	74.4	75.0	74.7	74.8	74.8	76.0	74.7	75.2	75.3
	Loss/Gain, sq.in./in. width	-0.08	0.00	0.00	-0.03	-0.08	0.00	0.00	-0.03	-0.20	-0.08	-0.31	-0.18	-0.59	-0.08	-0.47	-0.37
#6 (Sta.	CSLI, sq.in./in. width	-0.08	0.00	0.00	-0.03	-0.08	0.00	0.00	-0.03	-0.20	-0.08	-0.31	-0.18	-0.59	-0.08	-0.47	-0.37
0+20.00)	Velocity, ft/s		0.0		9.1		0.0		12.8		0.0		19.2		0.0		24.0
	Distance to Water Surface, cm		64.6		64.6		60.7		60.7		50.0		50.0		45.5		45.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		5.85	3.86			11.50	5.39			31.35	9.78			47.00	11.73		
	To original Surface Elev, cm	73.8	73.7	73.5	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	74.0	73.7	73.5	73.7	74.0	73.7	73.7	73.8	74.4	74.0	73.7	74.0	75.0	74.4	73.8	74.4
	Loss/Gain, sq.in./in. width	-0.08	0.00	0.00	-0.03	-0.08	0.00	-0.08	-0.05	-0.24	-0.12	-0.08	-0.12	-0.47	-0.28	-0.12	-0.24
#7 (Sta.	CSLI, sq.in./in. width	-0.08	0.00	0.00	-0.03	-0.08	0.00	-0.08	-0.05	-0.24	-0.12	-0.08	-0.12	-0.47	-0.28	-0.12	-0.24
0+22.00)	Velocity, ft/s		0.0		9.3		0.0		13.3		0.0		19.7		0.0		24.4
	Distance to Water Surface, cm		64.1		64.1		60.6		60.6		49.8		49.8		45.0		45.0
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		5.85	3.79			11.50	5.20			31.35	9.54			47.00	11.57		
	To original Surface Elev, cm	74.2	74.0	73.8	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	74.2	74.0	73.8	74.0	74.4	74.0	73.8	74.1	74.5	74.3	74.1	74.3	75.0	74.7	74.5	74.7
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	-0.08	0.00	0.00	-0.03	-0.12	-0.12	-0.12	-0.10	-0.31	-0.28	-0.28	-0.24
#8 (Sta.	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	-0.08	0.00	0.00	-0.03	-0.12	-0.12	-0.12	-0.10	-0.31	-0.28	-0.28	-0.24
0+24.00)	Velocity, ft/s		0.0		9.5		0.0		12.8		0.0		20.0		0.0		24.5
	Distance to Water Surface, cm		64.6		64.6		60.4		60.4		50.4		50.4		45.5		45.5
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		5.85	3.70			11.50	5.38			31.35	9.41			47.00	11.51		
	To original Surface Elev, cm	73.7	73.7	73.2	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	73.7	73.7	73.2	73.5	73.7	73.8	73.2	73.6	73.7	74.0	73.8	73.8	74.1	74.4	74.2	74.2
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	-0.04	0.00	-0.01	0.00	-0.12	-0.24	-0.10	-0.16	-0.28	-0.39	-0.23
#9 (Sta.	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	-0.04	0.00	-0.01	0.00	-0.12	-0.24	-0.10	-0.16	-0.28	-0.39	-0.23
0+26.00)	Velocity, ft/s		0.0		9.7		0.0		13.5		0.0		19.9		0.0		24.5
	Distance to Water Surface, cm		64.3		64.3		60.6		60.6		49.8		49.8		45.0		45.0
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		5.85	3.64			11.50	5.10			31.35	9.46			47.00	11.51		
	To original Surface Elev, cm	73.7	73.5	73.0	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	73.7	73.5	73.0	73.4	73.7	73.5	73.1	73.4	73.7	73.5	73.1	73.4	74.2	73.7	73.4	73.8
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.01	0.00	0.00	-0.04	-0.01	-0.20	-0.08	-0.16	-0.13
#10 (Sta.	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.01	0.00	0.00	-0.04	-0.01	-0.20	-0.08	-0.16	-0.13
0+28.00)	Velocity, ft/s		0.0		10.0		0.0		13.0		0.0		19.7		0.0		24.9
	Distance to Water Surface, cm		64.5		64.5		60.0		60.0		49.2		49.2		45.0		45.0
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		5.85	3.50			11.50	5.29			31.35	9.54			47.00	11.33		
	To original Surface Elev, cm	73.6	73.3	72.8	Avg.				Avg.				Avg.				Avg.
	To eroded Surface Elev, cm	73.6	73.3	72.8	73.2	73.6	73.3	72.9	73.3	73.6	74.1	72.9	73.5	73.9	74.6	73.2	73.9
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.01	0.00	-0.31	-0.04	-0.07	-0.12	-0.51	-0.16	-0.18
#11 (Sta.	CSLI, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.01	0.00	-0.31	-0.04	-0.07	-0.12	-0.51	-0.16	-0.18
0+30.00)	Velocity, ft/s		0.0		9.9		0.0		13.4		0.0		20.0		0.0		24.8
	Distance to Water Surface, cm		64.2		64.2		60.2		60.2		49.7		49.7		45.0		45.0
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in		
		5.85	3.56			11.50	5.14			31.35	9.38			47.00	11.38		

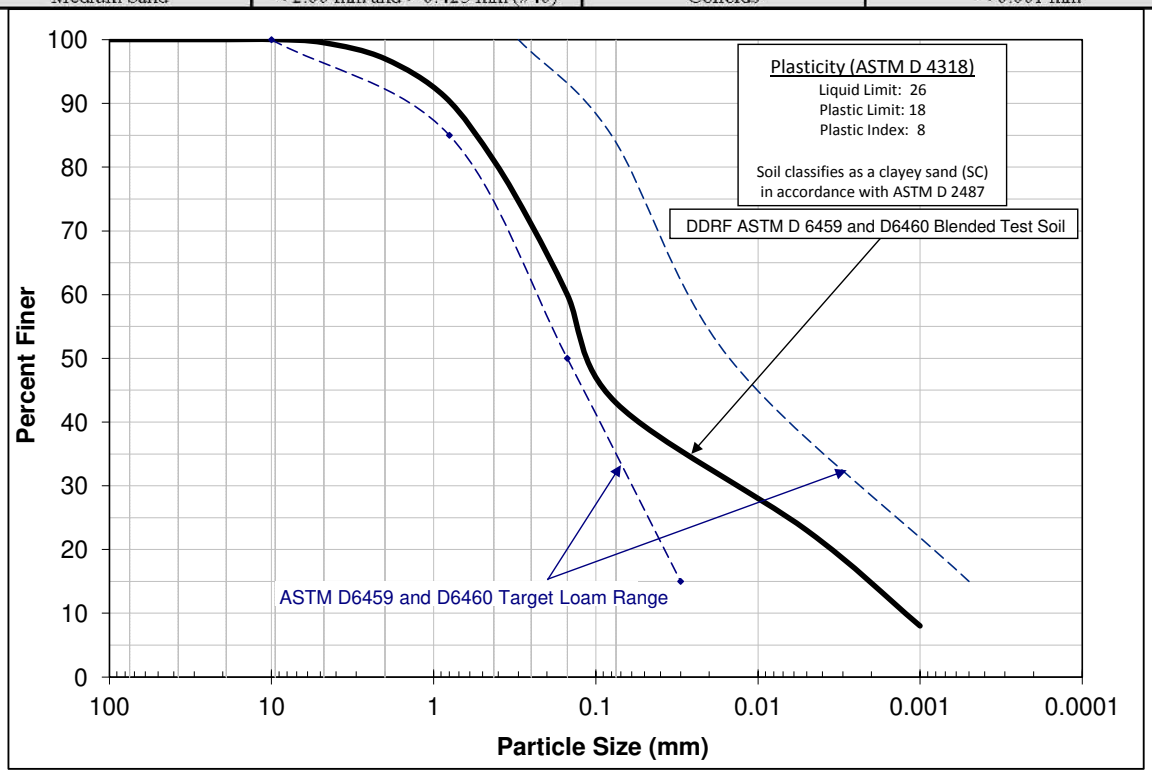
Particle Size Analysis
ASTM D 422

Location: DDRF SLOPES & CHANNELS

Date: 3/31/2018



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm



James Sprague, 3/31/18
Quality Review/Date
Tested by: S&ME

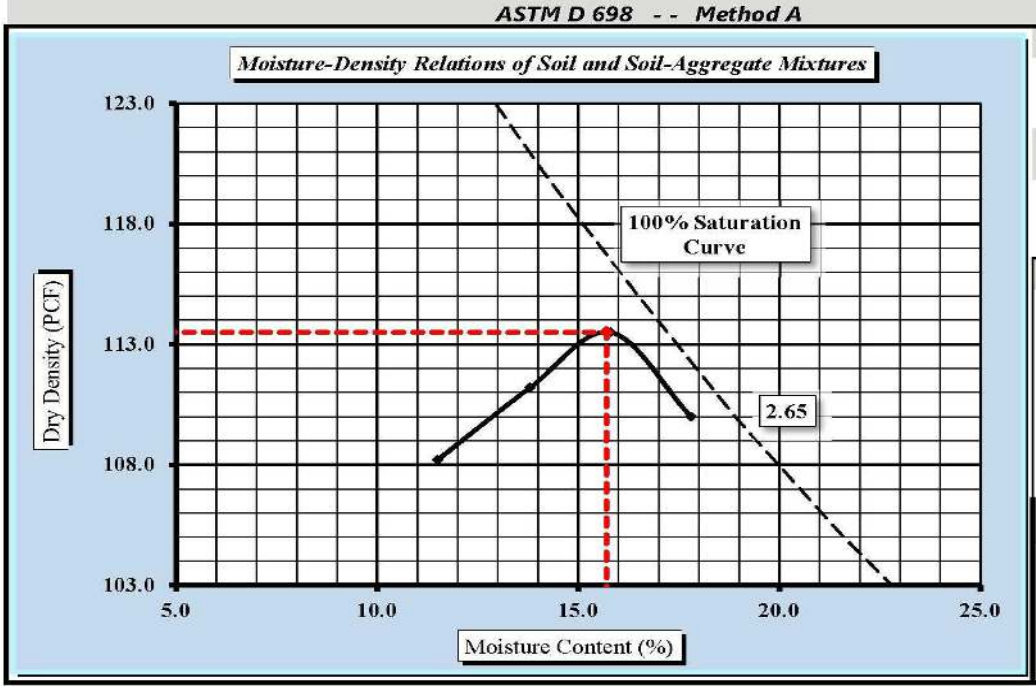
Standard Proctor / Plasticity
ASTM D 698 / D4318

Location: DDRF SLOPES & CHANNELS

Date: 3/31/2018

Maximum Dry Density	113.5	PCF.	Optimum Moisture Content	15.7%

ASTM D 698 - - Method A



Soil Properties	
Natural Moisture Content	17.0%
Specific Gravity of Soil	2.650
Liquid Limit	26
Plastic Limit	18
Plastic Index	8
% Passing	
3/4"	100.0%
3/8"	100.0%
#4	99.6%
#10	97.2%
#40	81.1%
#60	71.2%
#100	60.2%
#200	43.1%
Oversize Fraction	
Bulk Gravity	
% Moisture	
% Oversize	
MDD	
Opt. MC	

James Sprague, 3/31/18
Quality Review/Date
Tested by: S&ME

Compaction Worksheet
ASTM D 2937

Location: DDRF Channels Date: 8/24/2018

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

	Compaction					
Tube #	A (C1)	B (C2)				
Wt. of Wet Soil + Mold (g)	2488.95	2401.65				
Wt. of Mold (g)	664.00	608.00				
Wt. of Wet Soil (g)	1824.95	1793.65				
	Moisture Content					
Tare Number	D1	D9				
Wt. of Tare (g)	232.34	231.75				
Wt. of Wet Soil + Tare (g)	1033.36	1122.29				
Wt. of Dry Soil + Tare (g)	914.23	975.35				
Water Content, w (%)	17.471	19.761				
Wet density, γ_{wet} = W' / V_h (lb/ft^3) =	118.82	116.78				
Dry density, $\gamma_{dry} = \gamma_{wet} / [1 + w]$ (lb/ft^3) =	101.15	97.51				
Max Std. Proctor Dry density (lb/ft^3) =	113.50	113.50				
Opt. Moisture (%) =	15.70	15.70				
Compaction as % of Std. Proctor =	89.1%	85.9%				
Avg Compaction as % of Std. Proctor =	87.5%					
Target Compaction as % of Std. Proctor =	90 ± 3%					

James Sprague, 8/24/18
Quality Review/Date
Tested by: S&ME

Compaction Worksheet
ASTM D 2937

Location: DDRF Channels Date: 10/6/2018

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

	Compaction					
Tube #	A (C1)	B (C2)				
Wt. of Wet Soil + Mold (g)	2442.15	2538.70				
Wt. of Mold (g)	608.00	664.00				
Wt. of Wet Soil (g)	1834.15	1874.70				
	Moisture Content					
Tare Number	D1	D9				
Wt. of Tare (g)	232.17	234.09				
Wt. of Wet Soil + Tare (g)	1022.76	1252.22				
Wt. of Dry Soil + Tare (g)	891.71	1067.65				
Water Content, w (%)	19.870	22.142				
Wet density, γ_{wet} = W' / V_h (lb/ft^3) =	119.42	122.06				
Dry density, $\gamma_{dry} = \gamma_{wet} / [1 + w]$ (lb/ft^3) =	99.62	99.93				
Max Std. Proctor Dry density (lb/ft^3) =	113.50	113.50				
Opt. Moisture (%) =	15.70	15.70				
Compaction as % of Std. Proctor =	87.8%	88.0%				
Avg Compaction as % of Std. Proctor =	87.9%					
Target Compaction as % of Std. Proctor =	90 ± 3%					

James Sprague, 10/6/18
Quality Review/Date
Tested by: S&ME

Compaction Worksheet
ASTM D 2937

Location: DDRF Channels Date: 12/7/2018

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

	Compaction					
Tube #	A (C1)	B (C2)				
Wt. of Wet Soil + Mold (g)	2532.05					
Wt. of Mold (g)	615.00					
Wt. of Wet Soil (g)	1917.05					
	Moisture Content					
Tare Number	D1	D9				
Wt. of Tare (g)	234.05					
Wt. of Wet Soil + Tare (g)	1317.74					
Wt. of Dry Soil + Tare (g)	1142.61					
Water Content, w (%)	19.276					

Wet density, γ_{wet} = W' / V_h (lb/ft^3) = 124.82

Dry density, γ_{dry} = γ_{wet} / [1 + w] (lb/ft^3) = 104.65

Max Std. Proctor Dry density (lb/ft^3) = 113.50

Opt. Moisture (%) = 15.70

Compaction as % of Std. Proctor =	92.2%					
Avg Compaction as % of Std. Proctor =	92.2%					
Target Compaction as % of Std. Proctor =	90 ± 3%					

James Sprague, 12/7/18
Quality Review/Date
Tested by: S&ME