



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 Scour Control Mat

**Test Dates:** Test #1: 5/17/2018      Test #2: 8/24/2018      Test #3: 10/4/2018

**Shear Range:** 3.0 - 12.0 psf

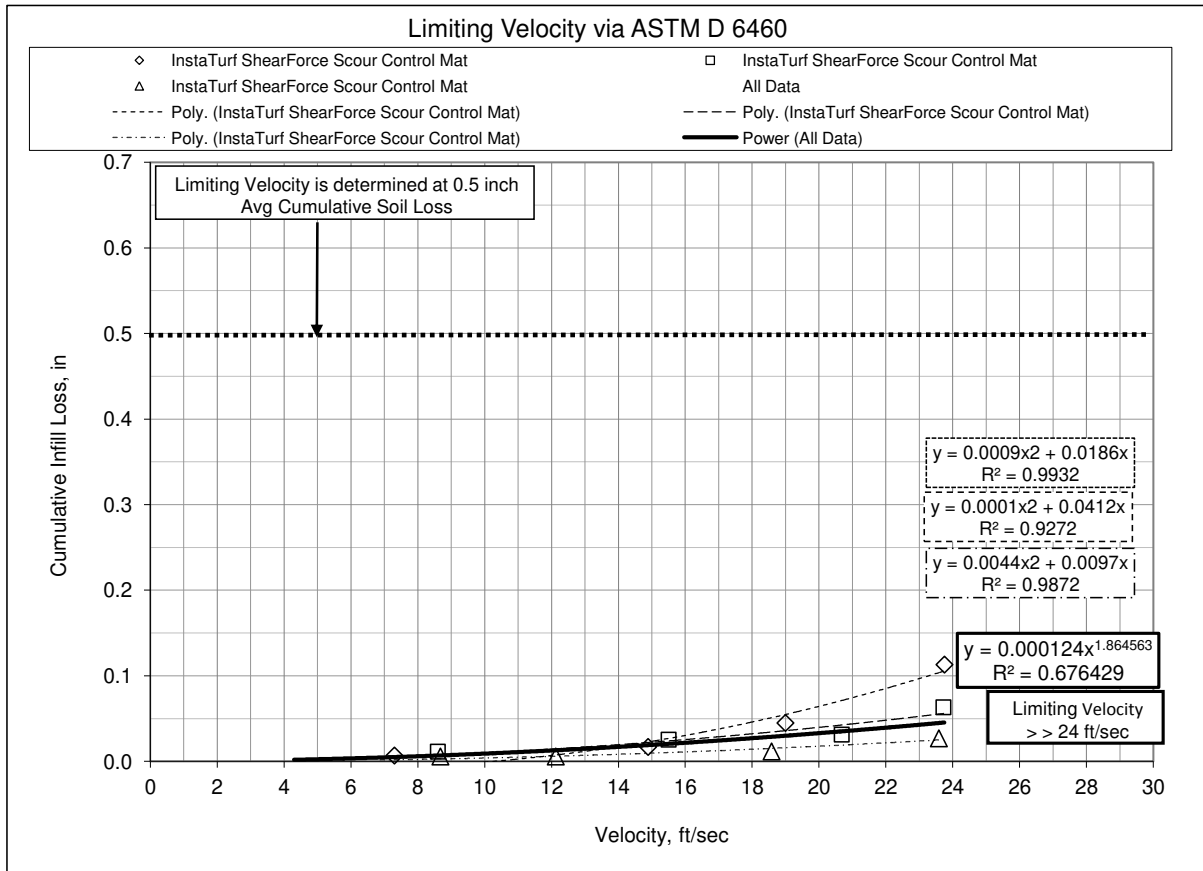
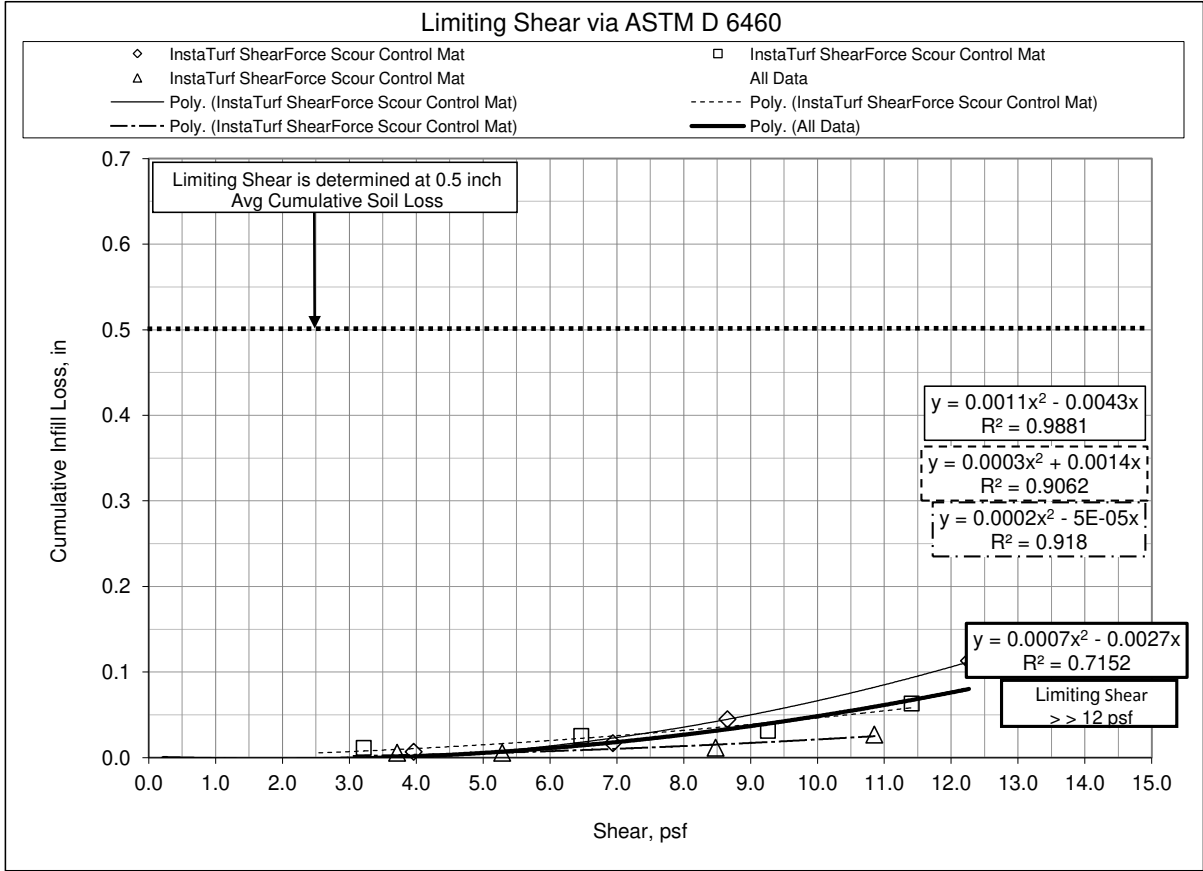
**Flume:** 2-ft wide x 40-ft long; 20% Bed

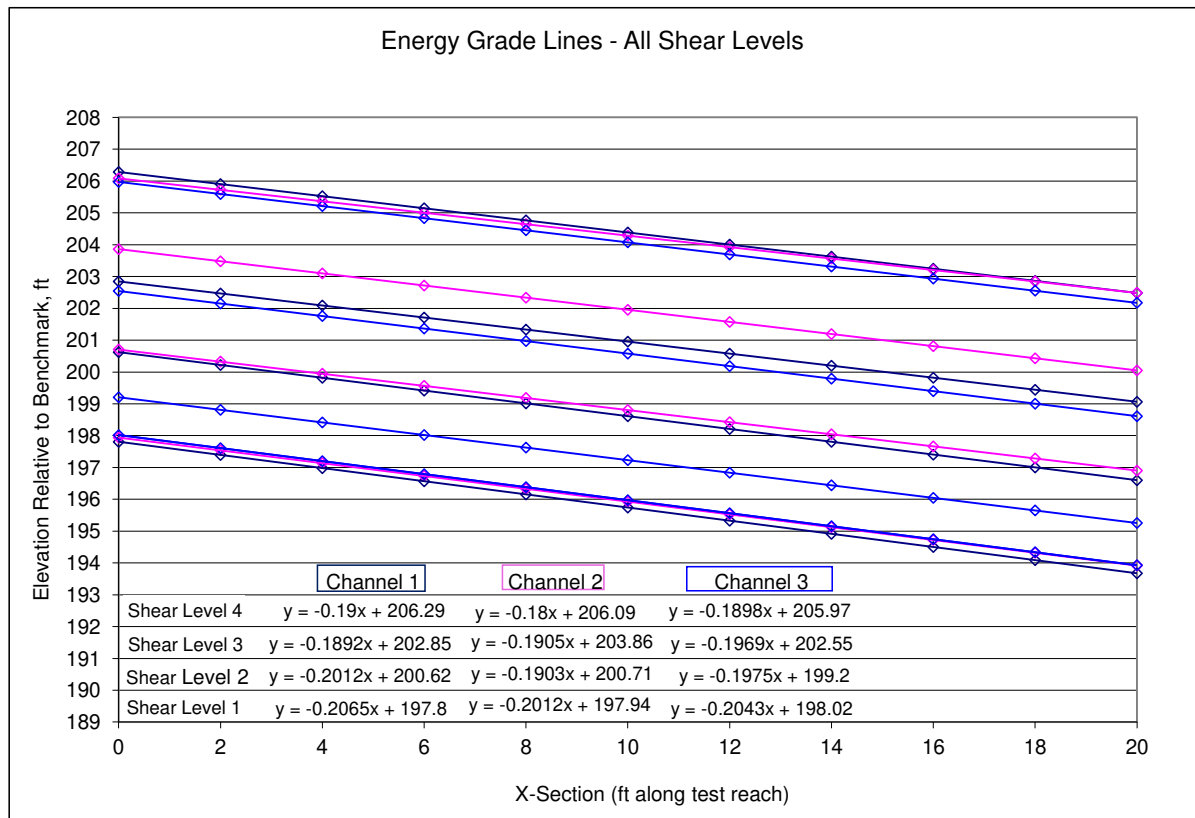
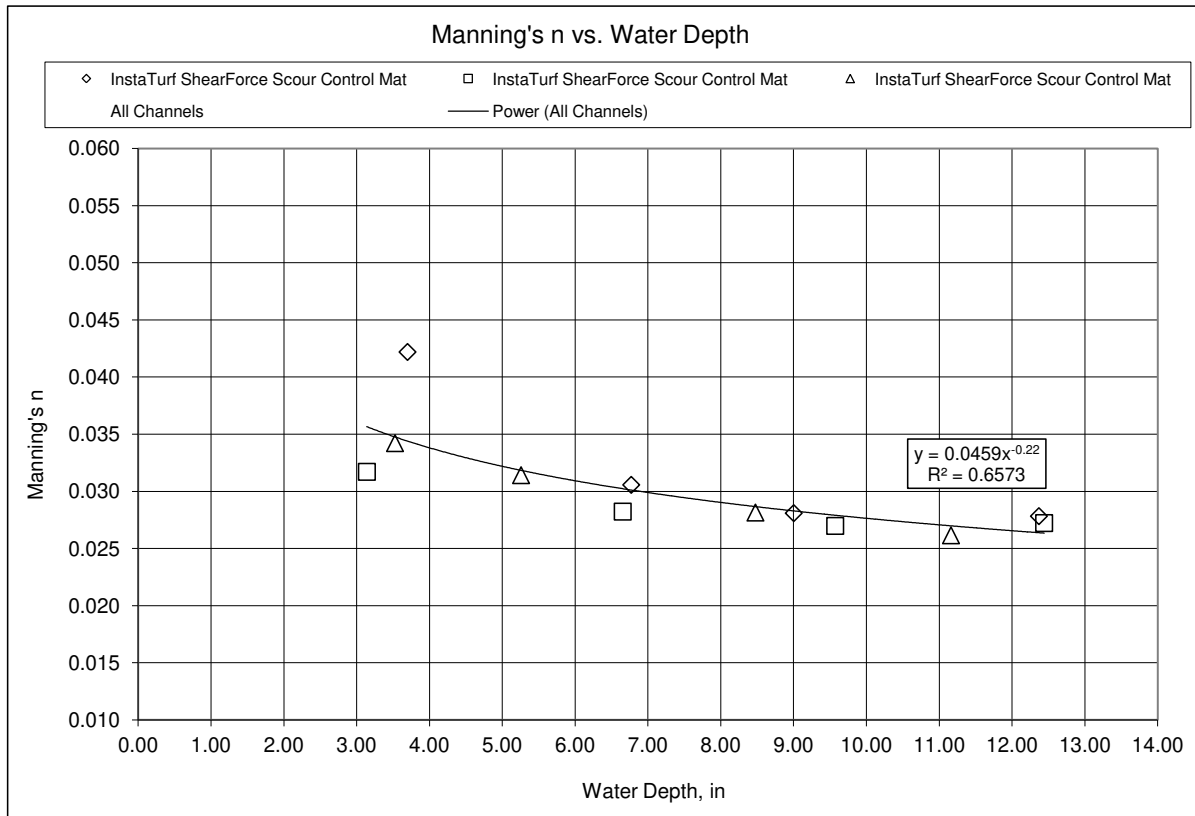
**Event:** 30 minutes at each shear

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 Scour Control Mat	1	3.70	7.30	4.50	0.042	3.96	0.01	0.01
	2	6.77	14.89	16.80	0.031	6.94	0.01	0.02
	3	9.00	19.00	28.50	0.028	8.65	0.03	0.04
	4	12.37	23.75	48.97	0.028	12.27	0.07	0.11
InstaTurf ShearForce Scour Control Mat	1	3.14	8.60	4.50	0.032	3.21	0.01	0.01
	2	6.65	15.50	17.19	0.028	6.47	0.01	0.03
	3	9.57	20.68	32.99	0.027	9.26	0.01	0.03
	4	12.44	23.72	49.18	0.027	11.41	0.03	0.06
InstaTurf ShearForce Scour Control Mat	1	3.53	8.68	5.10	0.034	3.71	0.01	0.01
	2	5.26	12.13	10.63	0.031	5.29	0.00	0.01
	3	8.48	18.58	26.25	0.028	8.48	0.01	0.01
	4	11.16	23.59	43.88	0.026	10.85	0.02	0.03

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.

CJS      12/14/18  
Quality Review / Date



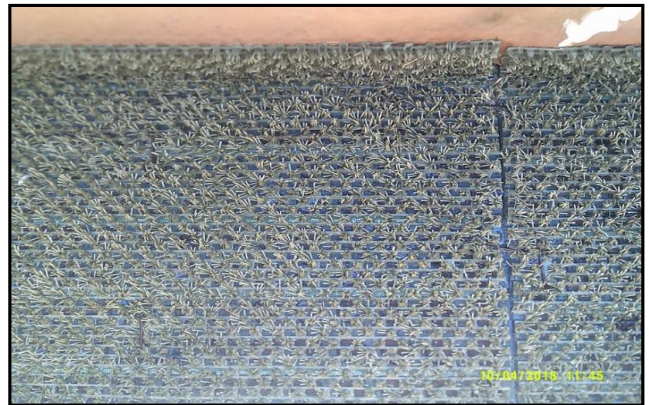




Setup and Product Installation (typical 20% channel)



High Shear Flow and After (typical 20% channel)



InstaTurf ShearForce Scour Control Mat - Close-up Before and After



APPENDIX - DATA



Date:	5/17/18		RECP:	InstaTurf ShearForce Scour Control Mat			Lot #:			Anchorage:	3.8/Sq. Yd.			Unvegetated												
Slope:	20%		Start Time:	10:29 AM	Channel #	1	Shear #	1	Start Time:	11:08 AM	Channel #	1	Shear #	1	Start Time:	11:50 AM	Channel #	1	Shear #	1	Start Time:	12:45 PM	Channel #	1	Shear #	4
Width:	2		End Time:	10:59 AM	Channel #	1	Shear #	1	End Time:	11:38 AM	Channel #	1	Shear #	2	End Time:	12:20 PM	Channel #	1	Shear #	3	End Time:	1:15 PM	Channel #	1	Shear #	4
Cross-Section Measurements																										
#1 (Sta. 0+10.00)	Measured Volumetric Flow, cfs:						Measured Volumetric Flow, cfs:						Measured Volumetric Flow, cfs:						Measured Volumetric Flow, cfs:							
	To original Surface Elev, cm	72.0	72.0	71.5	Avg.																					
	To eroded Surface Elev, cm	72.0	72.1	71.5	71.9	72.1	72.1	71.5	71.9	72.1	72.1	71.6	71.9	72.5	72.5	72.2	72.4									
	Loss/Gain, sq.in./in. width	0.00	-0.04	0.00	-0.01	-0.04	-0.04	0.00	-0.02	-0.04	-0.04	-0.04	-0.03	-0.20	-0.20	-0.28	-0.19									
	CSLL, sq.in./in. width	0.00	-0.04	0.00	-0.01	-0.04	-0.04	0.00	-0.02	-0.04	-0.04	-0.04	-0.03	-0.20	-0.20	-0.28	-0.19									
	Velocity, ft/s	0.0		7.2	0.0		14.5		0.0		18.5		0.0		23.4											
	Distance to Water Surface, cm	62.3		62.3	54.3		54.3		48.5		48.5		40.5		40.5											
Calculations		Flow, cfs	Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in											
		4.50	3.77	16.80		6.93	28.50		9.23	48.97		12.56														
#2 (Sta. 0+12.00)	To original Surface Elev, cm	71.1	71.2	70.9	Avg.																					
	To eroded Surface Elev, cm	71.2	71.2	70.9	71.1	71.2	71.2	70.9	71.1	71.2	71.3	71.0	71.2	72.0	72.3	71.8	72.0									
	Loss/Gain, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.04	0.00	0.00	-0.01	-0.04	-0.04	-0.04	-0.03	-0.35	-0.43	-0.35	-0.31									
	CSLL, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.04	0.00	0.00	-0.01	-0.04	-0.04	-0.04	-0.03	-0.35	-0.43	-0.35	-0.31									
	Velocity, ft/s	0.0		7.3	0.0		15.0		0.0		19.2		0.0		23.3											
	Distance to Water Surface, cm	61.7		61.7	54.0		54.0		48.5		48.5		40.0		40.0											
	Calculations		Flow, cfs	Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in										
		4.50	3.70	16.80		6.73	28.50		8.92	48.97		12.61														
#3 (Sta. 0+14.00)	To original Surface Elev, cm	71.0	70.9	70.5	Avg.																					
	To eroded Surface Elev, cm	71.1	70.9	70.5	70.8	71.1	70.7	70.5	70.8	71.3	71.1	70.5	71.0	71.7	71.1	70.5	71.1									
	Loss/Gain, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.04	0.08	0.00	0.00	-0.12	-0.08	0.00	-0.05	-0.28	-0.08	0.00	-0.10									
	CSLL, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.04	0.00	0.00	-0.01	-0.12	-0.08	0.00	-0.05	-0.28	-0.08	0.00	-0.10									
	Velocity, ft/s	0.0		7.5	0.0		15.1		0.0		18.9		0.0		24.0											
	Distance to Water Surface, cm	61.7		61.7	53.8		53.8		48.0		48.0		40.0		40.0											
	Calculations		Flow, cfs	Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in										
		4.50	3.60	16.80		6.68	28.50		9.04	48.97		12.24														
#4 (Sta. 0+16.00)	To original Surface Elev, cm	71.3	71.1	70.7	Avg.																					
	To eroded Surface Elev, cm	71.3	71.1	70.8	71.1	71.3	71.2	71.0	71.2	71.3	71.4	71.1	71.3	71.5	71.5	71.3	71.4									
	Loss/Gain, sq.in./in. width	0.00	0.00	-0.04	-0.01	-0.04	0.00	-0.12	-0.05	0.00	-0.12	-0.16	-0.07	-0.08	-0.16	-0.24	-0.13									
	CSLL, sq.in./in. width	0.00	0.00	-0.04	-0.01	-0.04	0.00	-0.12	-0.05	0.00	-0.12	-0.16	-0.07	-0.08	-0.16	-0.24	-0.13									
	Velocity, ft/s	0.0		7.4	0.0		15.1		0.0		18.7		0.0		23.7											
	Distance to Water Surface, cm	61.8		61.8	54.2		54.2		48.0		48.0		40.0		40.0											
	Calculations		Flow, cfs	Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in										
		4.50	3.65	16.80		6.68	28.50		9.16	48.97		12.38														
#5 (Sta. 0+18.00)	To original Surface Elev, cm	71.1	71.3	71.0	Avg.																					
	To eroded Surface Elev, cm	71.1	71.3	71.0	71.1	71.3	71.0	71.1	71.2	71.3	71.1	71.2	71.4	71.5	71.2	71.4										
	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	-0.12	-0.08	-0.08	-0.08									
	CSLL, 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	-0.12	-0.08	-0.08	-0.08									
	Velocity, ft/s	0.0		7.6	0.0		15.0		0.0		18.6		0.0		24.0											
	Distance to Water Surface, cm	62.1		62.1	54.1		54.1		47.8		47.8		40.3		40.3											
	Calculations		Flow, cfs	Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in										
		4.50	3.56	16.80		6.71	28.50		9.21	48.97		12.23														
#6 (Sta. 0+20.00)	To original Surface Elev, cm	71.6	71.5	71.3	Avg.																					
	To eroded Surface Elev, cm	71.6	71.5	71.3	71.5	71.7	71.5	71.3	71.5	71.8	71.8	71.3	71.6	71.8	71.9	71.3	71.7									
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	-0.04	0.00	0.00	-0.01	-0.08	-0.12	0.00	-0.05	-0.08	-0.16	0.00	-0.05									
	CSLL, sq.in./in. width	0.00	0.00	0.00	0.00	-0.04	0.00	0.00	-0.01	-0.08	-0.12	0.00	-0.05	-0.08	-0.16	0.00	-0.05									
	Velocity, ft/s	0.0		7.5	0.0		14.7		0.0		19.2		0.0		23.6											
	Distance to Water Surface, cm	62.3		62.3	54.1		54.1		49.0		49.0		40.0		40.0											
	Calculations		Flow, cfs	Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in										
		4.50	3.61	16.80		6.85	28.50		8.91	48.97		12.47														
#7 (Sta. 0+22.00)	To original Surface Elev, cm	71.7	71.6	71.4	Avg.																					
	To eroded Surface Elev, cm	71.7	71.6	71.4	71.6	71.6	71.6	71.6	72.0	71.8	71.6	71.8	72.2	72.0	72.0	72.1										
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	-0.04	0.00	-0.04	-0.03	-0.12	-0.08	-0.08	-0.08	-0.20	-0.16	-0.24	-0.17									
	CSLL, sq.in./in. width	0.00	0.00	0.00	0.00	-0.04	0.00	-0.04	-0.03	-0.12	-0.08	-0.08	-0.08	-0.20	-0.16	-0.24	-0.17									
	Velocity, ft/s	0.0		7.3	0.0		14.7		0.0		19.1		0.0		23.6											
	Distance to Water Surface, cm	62.2		62.2	54.2		54.2		49.0		49.0		40.5		40.5											
	Calculations		Flow, cfs	Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in										
		4.50	3.69	16.80		6.86	28.50		8.98	48.97		12.43														
#8 (Sta. 0+24.00)	To original Surface Elev, cm	72.0	72.0	71.5	Avg.																					
	To eroded Surface Elev, cm	72.0	72.0	71.5	71.8	72.0	72.0	71.5	71.8	72.0	72.1	71.8	72.0	72.1	72.2	71.8	72.0									
	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	-0.12	-0.05	-0.04	-0.08	-0.12	-0.07									
	CSLL, sq.in./in. width	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.12	-0.05	-0.04	-0.08	-0.12	-0.07									
	Velocity, ft/s	0.0		7.2	0.0		14.7		0.0		19.3		0.0		24.0											
	Distance to Water Surface, cm	62.3		62.3	54.4		54.4		49.5		49.5		41.0		41.0											
	Calculations		Flow, cfs	Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in										
		4.50	3.75	16.80		6.86	28.50		8.85	48.97		12.22														
#9 (Sta. 0+26.00)	To original Surface Elev, cm	71.5	71.5	71.5	Avg.																					
	To eroded Surface Elev, cm	71.5	71.5	71.5	71.6	71.5	71.6	71.6	71.6	71.6	71.6	71.6	71.7	71.6	71.6	71.6										
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	-0.04	0.00	-0.04	-0.03	-0.04	-0.04	-0.04	-0.03	-0.08	-0.04	-0.04	-0.05									
	CSLL, sq.in./in. width	0.00	0.00	0.00	0.00	-0.04	0.00	-0.04	-0.03	-0.04	-0.04	-0.04	-0.03	-0.08	-0.04	-0.04	-0.05									
	Velocity, ft/s	0.0		7.2	0.0		14.7		0.0		19.2		0.0		24.0											
	Distance to Water Surface, cm	62.0		62.0	54.2		54.2		49.0		49.0		40.5		40.5											
	Calculations		Flow, cfs	Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in										
		4.50	3.74	16.80		6.84	28.50		8.90	48.97		12.26														
#10 (Sta. 0+28.00)	To original Surface Elev, cm	72.0	72.4	72.0	Avg.																					
	To eroded Surface Elev, cm	72.1	72.4	72.0	72.2	72.1	72.4	72.0	72.2	72.1	72.4	72.0	72.2	72.1	72.4	72.0	72.2									
	Loss/Gain, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.04	0.00	0.00	-0.01	-0.04	0.00	0.00	-0.01	-0.04	0.00	0.00	-0.01									
	CSLL, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.04	0.00	0.00	-0.01	-0.04	0.00	0.00	-0.01	-0.04	0.00	0.00	-0.01									
	Velocity, ft/s	0.0		7.1	0.0		14.9		0.0		19.2		0.0		23.9											
	Distance to Water Surface, cm	62.5		62.5	55.0		55.0		49.5		49.5		41.0		41.0											
	Calculations		Flow, cfs	Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in	Flow, cfs		Depth, in										
		4.50	3.81	16.80		6.76	28.50		8.92	48.97		12.27														
#11 (Sta. 0+30.00)	To original Surface Elev, cm	71.5	71.2	70.8	Avg.																					
	To eroded Surface Elev, cm	71.6	71.2	70.8	71.2	71.6	71.2	70.8	71.2	72.0	71.4	70.9	71.4	72.1	71.4	71.0	71.5									
	Loss/Gain, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.04	0.00	0.00	-0.01	-0.20	-0.08	-0.04	-0.09	-0.24	-0.08	-0.08	-0.12									
	CSLL, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.0																				

Date:	8/24/18		RECP:	InstaTurf ShearForce Scour Control Mat			Lot #:				Anchorage:		3.8/Sq. Yd.		Unvegetated				
Slope:	20%		Start Time:	9:46 AM	Channel #	Shear #	Start Time:	10:28 AM	Channel #	Shear #	Start Time:	11:21 AM	Channel #	Shear #	Start Time:	12:36 PM	Channel #	Shear #	
Width:	2		End Time:	10:16 AM	1	1	End Time:	10:58 AM	1	2	End Time:	11:51 AM	1	3	End Time:	1:06 PM	1	4	
Cross-Section Measurements			Measured Volumetric Flow, cfs:			4.50	Measured Volumetric Flow, cfs:			17.19	Measured Volumetric Flow, cfs:		32.99	Measured Volumetric Flow, cfs:			49.18		
#1 (Sta. 0+10.00)	To original Surface Elev. cm	74.5	74.5	74.3	Avg.	74.5	74.5	74.3	Avg.	74.5	74.5	74.3	Avg.	74.5	74.5	74.3	Avg.	74.5	
	To eroded Surface Elev. cm	74.5	74.5	74.3	74.4	74.9	74.5	74.3	74.6	75.0	74.3	74.3	74.5	75.1	74.6	74.3	74.7	74.7	
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	-0.16	0.00	0.00	-0.05	-0.20	0.08	0.00	-0.05	-0.24	-0.04	0.00	-0.09	-0.09	
	CSLL, sq.in./in. width	0.00	0.00	0.00	0.00	-0.16	0.00	0.00	-0.05	-0.20	0.00	0.00	-0.07	-0.24	-0.04	0.00	-0.09	-0.09	
	Velocity, ft/s	0.0		8.1		0.0		15.3		0.0		20.1		0.0		23.3		23.3	
	Distance to Water Surface, cm	66.0		66.0		57.5		57.5		49.5		49.5		42.5		42.5		42.5	
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in				
	4.50	3.32			17.19	6.72			32.99	9.86			49.18	12.66					
#2 (Sta. 0+12.00)	To original Surface Elev. cm	74.1	74.4	74.3	Avg.	74.1	74.5	74.3	Avg.	74.3	74.3	74.4	Avg.	74.4	74.5	74.5	Avg.	74.5	
	To eroded Surface Elev. cm	74.1	74.5	74.3	74.3	74.1	74.5	74.3	74.3	74.3	74.5	74.3	74.4	74.4	74.5	74.5	74.5	74.5	
	Loss/Gain, sq.in./in. width	0.00	-0.04	0.00	-0.01	0.00	-0.04	0.00	-0.01	-0.08	-0.04	0.00	-0.03	-0.12	-0.04	-0.08	-0.07	-0.07	
	CSLL, sq.in./in. width	0.00	-0.04	0.00	-0.01	0.00	-0.04	0.00	-0.01	-0.08	-0.04	0.00	-0.03	-0.12	-0.04	-0.08	-0.07	-0.07	
	Velocity, ft/s	0.0		8.7		0.0		15.6		0.0		20.6		0.0		23.2		23.2	
	Distance to Water Surface, cm	66.4		66.4		57.5		57.5		50.0		50.0		42.2		42.2		42.2	
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in				
	4.50	3.11			17.19	6.61			32.99	9.59			49.18	12.70					
#3 (Sta. 0+14.00)	To original Surface Elev. cm	74.0	74.3	73.8	Avg.	74.0	74.3	73.8	Avg.	74.0	74.3	73.8	Avg.	74.0	74.5	73.8	Avg.	74.1	
	To eroded Surface Elev. cm	74.0	74.3	73.8	74.0	74.0	74.3	73.8	74.0	74.0	74.3	73.8	74.0	74.0	74.5	73.8	74.0	74.1	
	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	0.00	-0.08	0.00	-0.01	-0.01	
	CSLL, 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	0.00	-0.08	0.00	-0.01	-0.01	
	Velocity, ft/s	0.0		9.0		0.0		15.4		0.0		20.5		0.0		23.5		23.5	
	Distance to Water Surface, cm	66.4		66.4		57.0		57.0		49.5		49.5		42.2		42.2		42.2	
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in				
	4.50	3.01			17.19	6.71			32.99	9.66			49.18	12.56					
#4 (Sta. 0+16.00)	To original Surface Elev. cm	74.5	74.4	74.0	Avg.	74.5	74.4	74.0	Avg.	74.5	74.4	74.0	Avg.	74.5	74.6	74.1	Avg.	74.4	
	To eroded Surface Elev. cm	74.5	74.4	74.0	74.3	74.5	74.4	74.0	74.3	74.5	74.4	74.0	74.3	74.5	74.6	74.1	74.4	74.4	
	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	0.00	-0.08	-0.04	-0.03	-0.03	
	CSLL, 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	0.00	-0.08	-0.04	-0.03	-0.03	
	Velocity, ft/s	0.0		8.3		0.0		15.0		0.0		20.7		0.0		23.5		23.5	
	Distance to Water Surface, cm	66.0		66.0		56.8		56.8		50.0		50.0		42.5		42.5		42.5	
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in				
	4.50	3.27			17.19	6.89			32.99	9.57			49.18	12.56					
#5 (Sta. 0+18.00)	To original Surface Elev. cm	74.2	73.7	73.0	Avg.	74.4	73.9	73.2	Avg.	74.4	74.0	73.3	Avg.	74.4	74.0	73.6	Avg.	74.0	
	To eroded Surface Elev. cm	74.2	73.7	73.0	73.6	74.4	73.9	73.2	73.8	74.4	74.0	73.3	73.9	74.4	74.0	73.6	74.0	74.0	
	Loss/Gain, sq.in./in. width	0.00	0.00	0.00	0.00	-0.08	-0.08	-0.08	-0.07	-0.08	-0.12	-0.12	-0.09	-0.08	-0.12	-0.24	-0.12	-0.12	
	CSLL, sq.in./in. width	0.00	0.00	0.00	0.00	-0.08	-0.08	-0.08	-0.07	-0.08	-0.12	-0.12	-0.09	-0.08	-0.12	-0.24	-0.12	-0.12	
	Velocity, ft/s	0.0		8.6		0.0		15.7		0.0		21.0		0.0		23.8		23.8	
	Distance to Water Surface, cm	65.7		65.7		57.2		57.2		50.0		50.0		42.5		42.5		42.5	
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in				
	4.50	3.12			17.19	6.55			32.99	9.41			49.18	12.40					
#6 (Sta. 0+20.00)	To original Surface Elev. cm	74.4	74.0	73.9	Avg.	74.4	74.4	73.9	Avg.	74.4	74.4	73.9	Avg.	74.4	74.6	74.1	Avg.	74.6	
	To eroded Surface Elev. cm	74.5	74.2	73.9	74.2	74.7	74.4	73.9	74.3	74.8	74.4	73.9	74.4	75.1	74.6	74.1	74.6	74.6	
	Loss/Gain, sq.in./in. width	-0.04	-0.08	0.00	-0.03	-0.12	-0.16	0.00	-0.07	-0.16	-0.16	0.00	-0.08	-0.28	-0.24	-0.08	-0.16	-0.16	
	CSLL, sq.in./in. width	-0.04	-0.08	0.00	-0.03	-0.12	-0.16	0.00	-0.07	-0.16	-0.16	0.00	-0.08	-0.28	-0.24	-0.08	-0.16	-0.16	
	Velocity, ft/s	0.0		8.9		0.0		15.3		0.0		20.6		0.0		24.0		24.0	
	Distance to Water Surface, cm	66.5		66.5		57.2		57.2		50.0		50.0		43.4		43.4		43.4	
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in				
	4.50	3.03			17.19	6.75			32.99	9.59			49.18	12.28					
#7 (Sta. 0+22.00)	To original Surface Elev. cm	74.4	74.0	73.4	Avg.	74.8	74.0	73.4	Avg.	74.3	74.3	73.4	Avg.	74.8	74.3	73.7	Avg.	74.3	
	To eroded Surface Elev. cm	74.7	74.0	73.4	74.0	74.8	74.0	73.4	74.1	74.3	74.3	73.4	74.0	74.8	74.3	73.7	74.3	74.3	
	Loss/Gain, sq.in./in. width	-0.12	0.00	0.00	-0.04	-0.16	0.00	0.00	-0.05	0.04	-0.12	0.00	-0.01	-0.16	-0.12	-0.12	-0.11	-0.11	
	CSLL, sq.in./in. width	-0.12	0.00	0.00	-0.04	-0.16	0.00	0.00	-0.05	0.00	-0.12	0.00	-0.02	-0.16	-0.12	-0.12	-0.11	-0.11	
	Velocity, ft/s	0.0		8.0		0.0		15.3		0.0		20.9		0.0		24.3		24.3	
	Distance to Water Surface, cm	65.5		65.5		57.0		57.0		50.0		50.0		43.4		43.4		43.4	
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in				
	4.50	3.36			17.19	6.72			32.99	9.45			49.18	12.15					
#8 (Sta. 0+24.00)	To original Surface Elev. cm	74.8	74.4	73.8	Avg.	74.8	74.4	73.8	Avg.	74.8	74.4	73.8	Avg.	74.8	74.5	73.8	Avg.	74.4	
	To eroded Surface Elev. cm	74.8	74.4	73.8	74.3	74.8	74.4	73.8	74.3	74.8	74.4	73.8	74.3	74.9	74.5	73.8	74.4	74.4	
	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	-0.04	-0.04	0.00	-0.02	-0.02	
	CSLL, 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	-0.04	-0.04	0.00	-0.02	-0.02	
	Velocity, ft/s	0.0		9.0		0.0		15.1		0.0		20.7		0.0		23.7		23.7	
	Distance to Water Surface, cm	66.7		66.7		57.0		57.0		50.0		50.0		42.8		42.8		42.8	
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in				
	4.50	3.01			17.19	6.82			32.99	9.58			49.18	12.44					
#9 (Sta. 0+26.00)	To original Surface Elev. cm	73.8	73.8	73.7	Avg.	73.9	73.8	73.7	Avg.	74.0	73.8	73.7	Avg.	74.0	73.9	73.7	Avg.	73.9	
	To eroded Surface Elev. cm	73.9	73.8	73.7	73.8	73.9	73.8	73.7	73.8	74.0	73.8	73.7	73.8	74.0	73.9	73.7	73.9	73.9	
	Loss/Gain, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.04	0.00	0.00	-0.01	-0.08	0.00	0.00	-0.03	-0.08	-0.04	0.00	-0.03	-0.03	
	CSLL, sq.in./in. width	-0.04	0.00	0.00	-0.01	-0.04	0.00	0.00	-0.01	-0.08	0.00	0.00	-0.03	-0.08	-0.04	0.00	-0.03	-0.03	
	Velocity, ft/s	0.0		8.8		0.0		15.5		0.0		20.7		0.0		23.8		23.8	
	Distance to Water Surface, cm	66.0		66.0		56.9		56.9		49.5		49.5		42.4		42.4		42.4	
	Calculations	Flow, cfs	Depth, in			Flow, cfs	Depth, in			Flow, cfs	Depth, in								

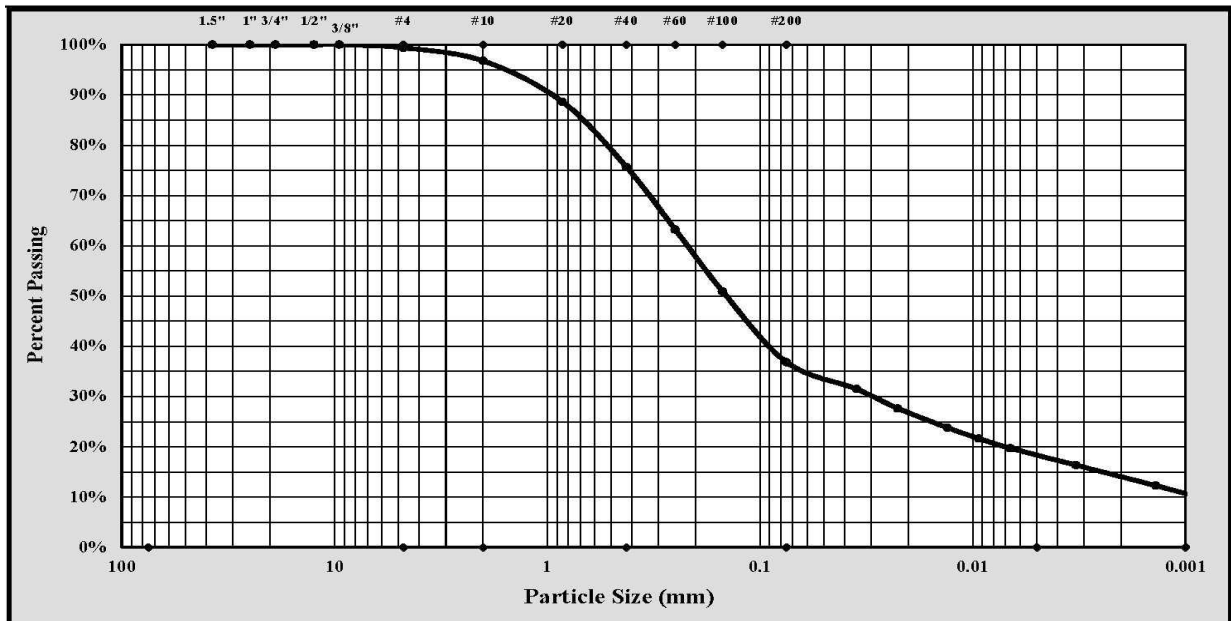




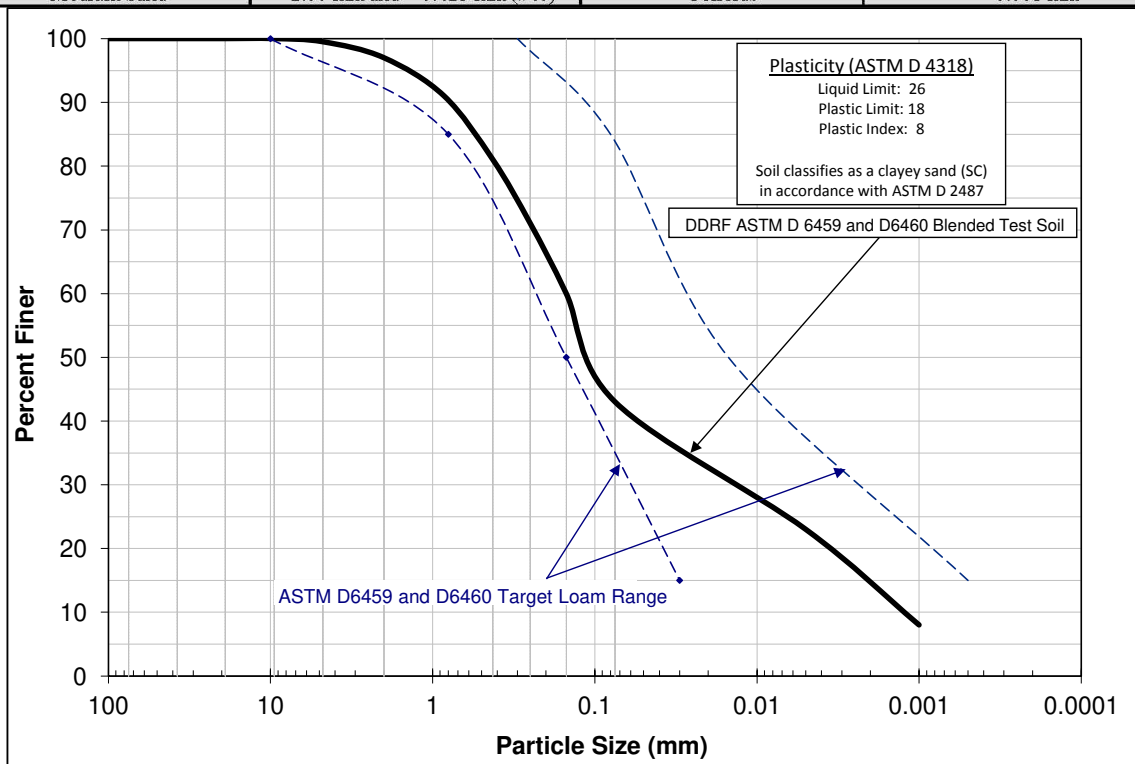
**Particle Size Analysis  
ASTM D 422**

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



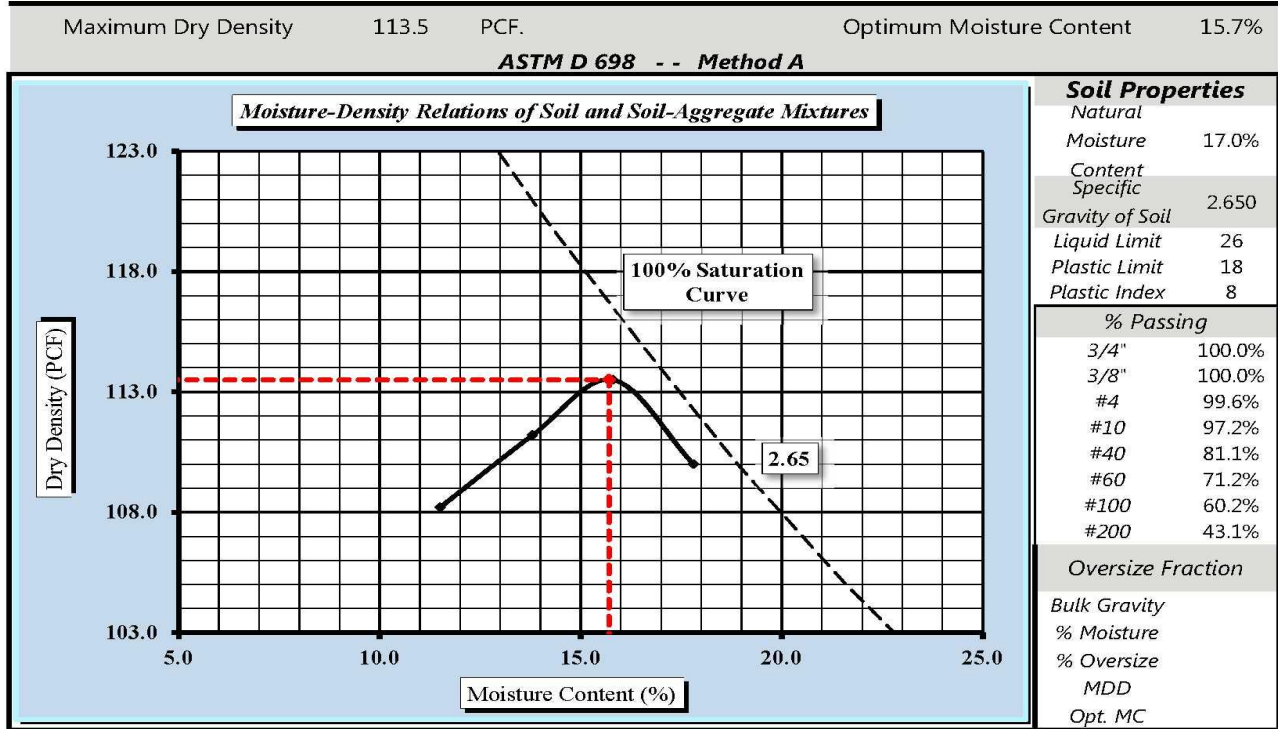
James Sprague, 3/31/18  
Quality Review/Date  
Tested by: S&ME

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**Standard Proctor / Plasticity  
ASTM D 698 / D4318**

Location: DDRF SLOPES & CHANNELS

Date: 3/31/2018



James Sprague, 3/31/18

Quality Review/Date

Tested by: S&ME

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**Compaction Worksheet  
ASTM D 2937**

Location: DDRF Channels Date: 5/18/2018

Drive Cylinder: Dia., mm = 98 Length, mm = 127 Volume, ft<sup>3</sup> = 0.034

Compaction						
Tube #	A (C1)	B (C2)				
Wt. of Wet Soil + Mold (g)	2509.50	2509.70				
Wt. of Mold (g)	664.00	608.00				
Wt. of Wet Soil (g)	1845.50	1901.70				
Moisture Content						
Tare Number	D1	D9				
Wt. of Tare (g)	230.69	232.49				
Wt. of Wet Soil + Tare (g)	1052.22	1114.58				
Wt. of Dry Soil + Tare (g)	912.13	971.35				
Water Content, w (%)	20.558	19.385				

Wet density,  $\gamma_{wet} = W / V_h$  (lb/ft<sup>3</sup>) = 120.16      123.82

Dry density,  $\gamma_{dry} = \gamma_{wet} / [1 + w]$  (lb/ft<sup>3</sup>) = 99.67      103.71

Max Std. Proctor Dry density (lb/ft<sup>3</sup>) = 113.50      113.50

Opt. Moisture (%) = 15.70      15.70

Compaction as % of Std. Proctor =	87.8%	91.4%				
Avg Compaction as % of Std. Proctor =	89.6%					
Target Compaction as % of Std. Proctor =	90 ± 3%					

James Sprague, 5/18/18

Quality Review/Date

Tested by: S&ME

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**Compaction Worksheet  
ASTM D 2937**

Location: DDRF Channels Date: 8/24/2018

Drive Cylinder: Dia., mm = 98 Length, mm = 127 Volume, ft<sup>3</sup> = 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,  $\gamma_{wet} = W / V_h$  (lb/ft<sup>3</sup>) = 118.82      116.78

Dry density,  $\gamma_{dry} = \gamma_{wet} / [1 + w]$  (lb/ft<sup>3</sup>) = 101.15      97.51

Max Std. Proctor Dry density (lb/ft<sup>3</sup>) = 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

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**Compaction Worksheet  
ASTM D 2937**

Location: DDRF Channels Date: 10/6/2018

Drive Cylinder: Dia., mm = 98 Length, mm = 127 Volume, ft<sup>3</sup> = 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,  $\gamma_{wet} = W / V_h$  (lb/ft<sup>3</sup>) = 119.42      122.06

Dry density,  $\gamma_{dry} = \gamma_{wet} / [1 + w]$  (lb/ft<sup>3</sup>) = 99.62      99.93

Max Std. Proctor Dry density (lb/ft<sup>3</sup>) = 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

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