

Memo

To: Whom it May Concern

From: SCRP Team

Date: 10/7/13

Subject: Geotechnical Analysis

The following memorandum has been compiled in order to present findings produced from the geotechnical sieve analysis conducted on soil grab samples collected from the SCRP site. Soil grain size and classification results produced from this analysis will be important considerations when modeling channel roughness. A total of six samples were collected from two separate cross sections of channel. Figure 1 below displays the approximate location of soil sample cross-sections.

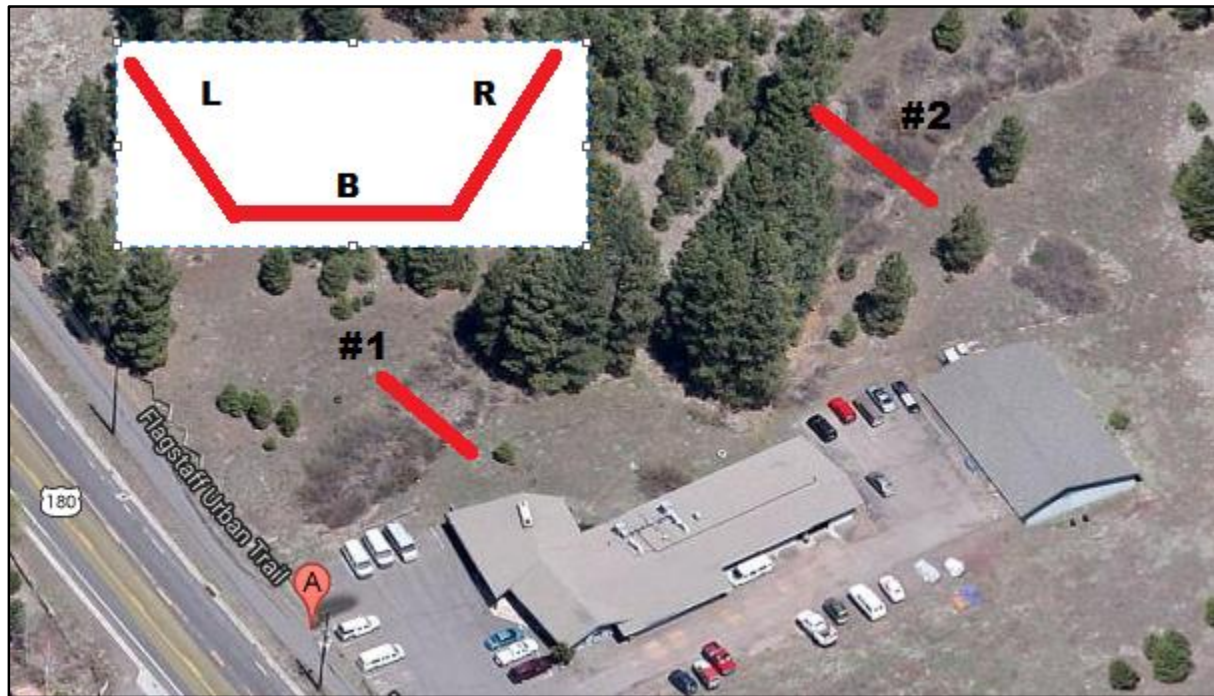


Figure 1: Soil Sample Collection

As shown above, soil sample cross-sections were located downstream (#1) near the culvert where channel entrenchment and erosion are putting the ACE parking lot in danger of failure, and upstream (#2) where the channel is also highly entrenched and eroded. At each of the two cross-sections, grab samples were collected from river left (L), bottom (B) and right (R).

Each grab sample collected was analyzed for average soil particle diameter as per ASTM standard test methods for soil sieve analyses. Samples were dried, weighed and run through the sieve shaker. Soil remaining on each sieve screen was weighed and the grain size distribution curves were constructed for each sample. With the grain soil grain size distribution curves, average particle diameters were interpolated for and an overall average soil diameter was found. Finally, each soil sample was classified by the United Soil Classification System (USCS). All sieve analysis findings are displayed in pages 3 and 4 of this document.

Average particle diameter and USCS soil classification results can be seen directly below the Soil Grain Size Distribution graph on page 3 below. Based on each soil samples average particle size, an overall average grain size was found to be 0.84 mm, characteristic of a sand-sized particle. Similarly, USCS soil classification results all yielded soil types consisting of primarily sand.

Sample 1R
Sample Mass(g): 815.38

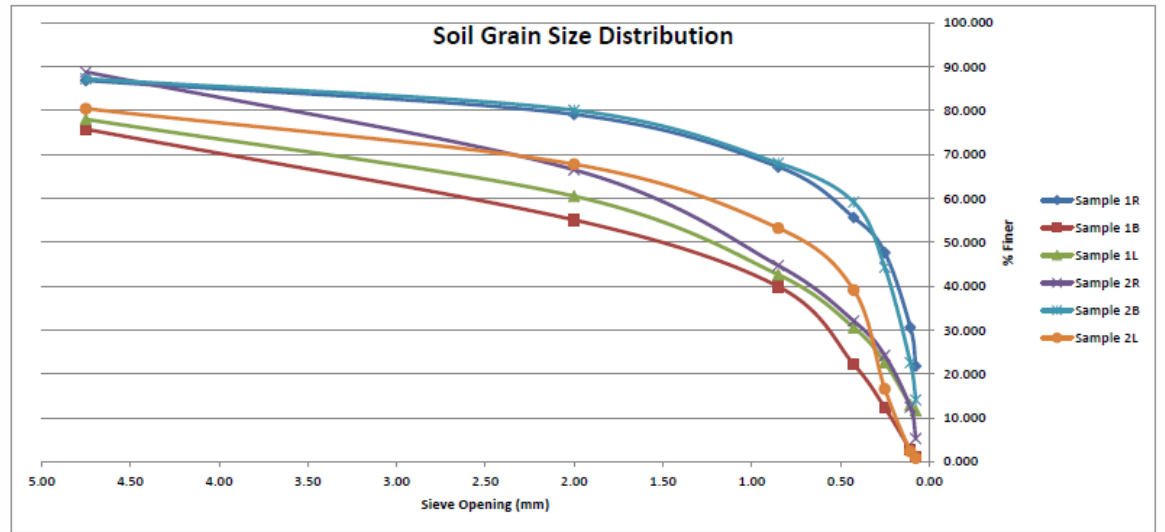
Sieve No.	Sieve Opening (mm)	Mass of Soil Retained (g)	% of Mass Retained	Cumulative %	% Finer
4	4.75	106.97	13.119	13.119	86.881
10	2.00	63.11	7.740	20.859	79.141
20	0.85	97.42	11.948	32.807	67.193
40	0.425	93.99	11.527	44.334	55.666
60	0.25	65.18	7.994	52.328	47.672
140	0.106	138.84	17.028	69.355	30.645
200	0.075	71.98	8.828	78.183	21.817
Pan		164.95	20.230	98.413	1.587
Total % Retained=			98.413		
% Mass Loss =			1.587		

Sample 1B
Sample Mass(g): 1084.65

Sieve No.	Sieve Opening (mm)	Mass of Soil Retained (g)	% of Mass Retained	Cumulative %	% Finer
4	4.75	262.91	24.239	24.239	75.761
10	2.00	224.14	20.665	44.904	55.096
20	0.85	164.65	15.180	60.084	39.916
40	0.425	192.13	17.714	77.797	22.203
60	0.25	107.21	9.884	87.682	12.318
140	0.106	103.97	9.586	97.267	2.733
200	0.075	16.62	1.532	98.800	1.200
Pan		13.02	1.200	100.000	0.000
Total % Retained=			100.000		
% Mass Loss =			0.000		

Sample 1L
Sample Mass(g): 1240.38

Sieve No.	Sieve Opening (mm)	Mass of Soil Retained (g)	% of Mass Retained	Cumulative %	% Finer
4	4.75	272.47	21.967	21.967	78.033
10	2.00	217.37	17.524	39.491	60.509
20	0.85	221.73	17.876	57.367	42.633
40	0.425	149.4	12.045	69.412	30.588
60	0.25	99.17	7.995	77.407	22.593
140	0.106	119.47	9.632	87.039	12.961
200	0.075	16.24	1.309	88.348	11.652
Pan		139.57	11.252	99.600	0.400
Total % Retained=			99.600		
% Mass Loss =			0.400		



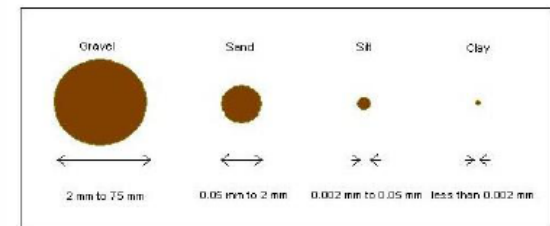
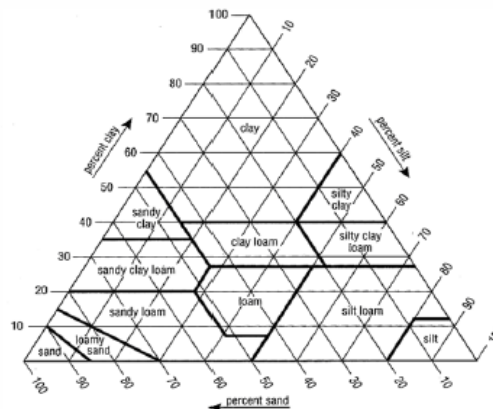
Average Soil Particle Sizes

Sample	d ₅₀ (mm)
1R	0.25
1B	1.5
1L	1.25
2R	1.2
2B	0.25
2L	0.6

USDA Soil Classifications

Sample	% Clay	% Silt	% Sand	Classification
1R	20.230	8.828	69.355	Sandy Clay Loam
1B	1.200	1.532	97.267	Sand
1L	11.252	1.309	87.039	Loamy Sand
2R	5.097	7.151	87.557	Loamy Sand
2B	12.364	8.496	77.404	Sandy Loam
2L	0.736	1.515	97.642	Sand

d_{SOAVE} = 0.84



Sample 2R

Sample Mass(g): 1176.2

Sieve No.	Sieve Opening (mm)	Mass of Soil Retained (g)	% of Mass Retained	Cumulative %	% Finer
4	4.75	131.59	11.188	11.188	88.812
10	2.00	262.2	22.292	33.480	66.520
20	0.85	256.53	21.810	55.290	44.710
40	0.425	148.59	12.633	67.923	32.077
60	0.25	92.25	7.843	75.766	24.234
140	0.106	138.69	11.791	87.557	12.443
200	0.075	84.11	7.151	94.708	5.292
Pan		59.95	5.097	99.805	0.195
Total % Retained=			99.805		
% Mass Loss =			0.195		

Sample 2B

Sample Mass(g): 1342.23

Sieve No.	Sieve Opening (mm)	Mass of Soil Retained (g)	% of Mass Retained	Cumulative %	% Finer
4	4.75	170.97	12.738	12.738	87.262
10	2.00	95.97	7.150	19.888	80.112
20	0.85	161.74	12.050	31.938	68.062
40	0.425	119.66	8.915	40.853	59.147
60	0.25	199.27	14.846	55.699	44.301
140	0.106	291.33	21.705	77.404	22.596
200	0.075	114.03	8.496	85.900	14.100
Pan		165.96	12.364	98.264	1.736
Total % Retained=			98.264		
% Mass Loss =			1.736		

Sample 2L

Sample Mass(g): 1365.4

Sieve No.	Sieve Opening (mm)	Mass of Soil Retained (g)	% of Mass Retained	Cumulative %	% Finer
4	4.75	266.73	19.535	19.535	80.465
10	2.00	173.06	12.675	32.210	67.790
20	0.85	198.6	14.545	46.755	53.245
40	0.425	192.63	14.108	60.863	39.137
60	0.25	307.26	22.503	83.366	16.634
140	0.106	194.93	14.276	97.642	2.358
200	0.075	20.69	1.515	99.158	0.842
Pan		10.05	0.736	99.894	0.106
Total % Retained=			99.894		
% Mass Loss =			0.106		