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## AASHTO Materials Reference Laboratory Individual Enrollment Rating Sheet

Soil Classification and Compaction 169/170

Final Report Date: 4/23/2014

PSP Enrollment #3879

University of Arkansas  
Fayetteville, Arkansas USA

Submitted by sgwill@uark.edu on 4/7/2014 at 11:06 AM

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The Z-Score indicates the number of standard deviations from the average value. The Z-Score is determined by the following calculation:

$$\text{Z-Score} = (\text{Laboratory Test Result} - \text{Average Value}) / (\text{Standard Deviation})$$

The laboratory Rating calculation is based on the absolute value of the Z-Score (or number of standard deviations from the average). The following describes the laboratory Rating system:

- If Z-Score <= 1 Then Rating = 5
- If Z-Score > 1 And <= 1.5 Then Rating = 4
- If Z-Score > 1.5 And <= 2 Then Rating = 3
- If Z-Score > 2 And <= 2.5 Then Rating = 2
- If Z-Score > 2.5 And <= 3 Then Rating = 1
- If Z-Score > 3 Then Rating = 0

A negative sign on a Z-Score or Rating indicates that the laboratory's result was below the average, while a positive Z-Score or Rating indicates that the laboratory's result was above the average.

Particle Size Analysis of Soils by Hydrometer

Total material passing the 2.00-mm (No. 10) sieve (0.1 percent) - T88/D422

[View Youden Diagram](#) | [View Performance Chart](#)

	Total Labs	Lab Data	Sample 169				Lab Data	Avg	Sample 170				Repeatability(within-lab)		
			1S	Z-Score	Rating				1S	Z-Score	Rating		1S	Z-Score	Lab Rating
1	1209	--	91.65	1.40	--	--	--	92.83	1.26	--	--	--	--	--	--

Particle Size Analysis of Soils by Hydrometer

Total material passing the 0.425-mm (No. 40) sieve (0.1 percent) - T88/D422

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	Total Labs	Lab Data	Sample 169				Lab Data	Avg	Sample 170				Repeatability(within-lab)		
			1S	Z-Score	Rating				1S	Z-Score	Rating		1S	Z-Score	Lab Rating
2	1209	--	65.28	3.09	--	--	--	68.71	3.04	--	--	--	--	--	--

Particle Size Analysis of Soils by Hydrometer

Total material passing the 0.075-mm (No. 200) sieve (0.1 percent) - T88/D422

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	Total Labs	Lab Data	Sample 169				Lab Data	Avg	Sample 170				Repeatability(within-lab)		
			1S	Z-Score	Rating				1S	Z-Score	Rating		1S	Z-Score	Lab Rating
3	1215	--	53.08	2.94	--	--	--	57.56	2.96	--	--	--	--	--	--

Particle Size Analysis of Soils by Hydrometer

Total material smaller than 0.02 mm (0.1 percent) - T88/D422

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	Total Labs	Lab Data	Sample 169				Lab Data	Avg	Sample 170				Repeatability(within-lab)		
			1S	Z-Score	Rating				1S	Z-Score	Rating		1S	Z-Score	Lab Rating
4	1118	--	46.38	4.29	--	--	--	50.08	4.29	--	--	--	--	--	--

Particle Size Analysis of Soils by Hydrometer

Total material smaller than 0.002 mm (0.1 percent) - T88/D422

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	Total Labs	Lab Data	Sample 169				Lab Data	Avg	Sample 170				Repeatability(within-lab)		
			1S	Z-Score	Rating				1S	Z-Score	Rating		1S	Z-Score	Lab Rating
5	1115	--	21.73	3.34	--	--	--	26.30	3.34	--	--	--	--	--	--

Particle Size Analysis of Soils by Hydrometer

Total material smaller than 0.001 mm (0.1 percent) - T88/D422

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	Total Labs	Lab Data	Sample 169				Lab Data	Avg	Sample 170				Repeatability(within-lab)		
			1S	Z-Score	Rating				1S	Z-Score	Rating		1S	Z-Score	Lab Rating
6	1104	--	15.28	3.19	--	--	--	20.04	3.18	--	--	--	--	--	--

Liquid Limit of Soils (Atterberg Limits)

Liquid Limit (0.1 percent) - T89/D4318

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	Total Labs	Lab Data	Sample 169				Lab Data	Avg	Sample 170				Repeatability(within-lab)		
			1S	Z-Score	Rating				1S	Z-Score	Rating		1S	Z-Score	Lab Rating
7	1494	32.4	32.46	2.03	-0.03	-5	64.2	54.73	3.51	2.70	1	2.30	2.93	1	1

Plastic Limit of Soils (Atterberg Limits)

Plastic Limit (0.1 percent) - T90/D4318

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	Total Labs	Lab Data	Sample 169				Lab Data	Avg	Sample 170				Repeatability(within-lab)		
			1S	Z-Score	Rating				1S	Z-Score	Rating		1S	Z-Score	Lab Rating
8	1489	17.2	17.46	1.34	-0.20	-5	18.3	17.58	1.83	0.39	5	1.04	0.67	5	5

Shrinkage Factors of Soils by Wax Method

Shrinkage Limit (Wax Method) (0.1 percent) - D4943

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	Total Labs	Lab Data	Sample 169				Lab Data	Avg	Sample 170				Repeatability(within-lab)		
			1S	Z-Score	Rating				1S	Z-Score	Rating		1S	Z-Score	Lab Rating
9	68	--	11.76	2.34	--	--	--	11.86	3.04	--	--	--	--	--	--

Specific Gravity of Soils

Specific Gravity, Passing 2.00 mm (No. 10), TX / 20°C - T100/D854

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	Total Labs	Lab Data	Avg	Sample 169			Lab Data	Avg	Sample 170			Repeatability(within-lab)		
				1S	Z-Score	Rating			1S	Z-Score	Rating	1S	Z-Score	Lab Rating
10	897	--	2.6615	0.0291	--	--	--	2.6633	0.0340	--	--	--	--	--

 Moisture-Density (Proctor) of Soils, Standard Effort  
**Optimum Moisture Content (Standard)** (0.1 percent) - T99/D698

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	Total Labs	Lab Data	Avg	Sample 169			Lab Data	Avg	Sample 170			Repeatability(within-lab)		
				1S	Z-Score	Rating			1S	Z-Score	Rating	1S	Z-Score	Lab Rating
11	1211	<b>9.1</b>	9.73	0.83	<b>-0.76</b>	<b>-5</b>	<b>11.8</b>	11.72	1.08	<b>0.07</b>	<b>5</b>	0.74	<b>0.68</b>	<b>5</b>

 Moisture-Density (Proctor) of Soils, Standard Effort  
**Maximum Dry Density (Standard)** (0.1 lb/ft³) - T99/D698

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	Total Labs	Lab Data	Avg	Sample 169			Lab Data	Avg	Sample 170			Repeatability(within-lab)		
				1S	Z-Score	Rating			1S	Z-Score	Rating	1S	Z-Score	Lab Rating
12	1211	<b>126.9</b>	124.53	1.52	<b>1.56</b>	<b>3</b>	<b>121.5</b>	118.07	1.86	<b>1.85</b>	<b>3</b>	1.16	<b>0.64</b>	<b>5</b>

 Moisture-Density (Proctor) of Soils, Modified Effort  
**Optimum Moisture Content (Modified)** (0.1 percent) - T180/D1557

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	Total Labs	Lab Data	Avg	Sample 169			Lab Data	Avg	Sample 170			Repeatability(within-lab)		
				1S	Z-Score	Rating			1S	Z-Score	Rating	1S	Z-Score	Lab Rating
13	335	--	6.92	0.75	--	--	--	8.21	0.86	--	--	--	--	--

 Moisture-Density (Proctor) of Soils, Modified Effort  
**Maximum Dry Density (Modified)** (0.1 lb/ft³) - T180/D1557

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	Total Labs	Lab Data	Avg	Sample 169			Lab Data	Avg	Sample 170			Repeatability(within-lab)		
				1S	Z-Score	Rating			1S	Z-Score	Rating	1S	Z-Score	Lab Rating
14	335	--	135.00	1.50	--	--	--	130.29	1.74	--	--	--	--	--

\*\* Ratings Suppressed

-- No Data Submitted or Data Out of Accepted Range


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