Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project:	LDW ENR/AC Pilot Study	**Date Received:**	July 2, 2019
Project #:	19S135	**Sampled By:**	Client
Client :	Wood	**Date Reported:**	August 5, 2019
Source:	Multiple	**Tested By:**	B. Goble
MTC Sample#:	Multiple		

CASE NARRATIVE

1. Twelve samples were submitted for grain size analysis according to Puget Sound Estuary Protocol (PSEP) methodology.
2. The samples were run in a single batch and one sample from another job was chosen for triplicate analysis. The triplicate data is reported on the QA summary.
3. One sample did not contain the required amount of fines for the pipette portion of the analysis. The sample could not be resplit to obtain the required amount of fines while staying within the capacity of the balance. The sample has been qualified on the QA summary.
4. The data is provided in summary tables and plots.
5. There were no other noted anomalies during this testing..

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Project #: 19S135
Date Received: July 2, 2019
Date Tested: August 3, 2019

Client: Wood
Sampled by: Client
Tested by: B. Goble

Apparent Grain Size Distribution Summary

Percent Finer Than Indicated Size

Sample No.	Gravel			Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt				Clay	
Phi Size	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
Sieve Size (microns)	3/8"	#4 (4750)	#10 (2000)	#18 (1000)	#35 (500)	#60 (250)	#120 (125)	#230 (63)	31.0	15.6	7.8	3.9	2.0	1.0
S19-1436	100.0	86.0	75.9	68.6	54.5	27.3	8.8	4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6
	100.0	86.4	76.6	68.7	54.4	27.5	7.5	3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1
	100.0	87.0	77.8	69.9	55.0	26.9	7.9	3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5
LDW-Y2-IN-ENR-CA-CORE	100.0	100.0	66.0	47.0	26.0	10.1	5.9	4.3	2.8	1.8	1.0	0.7	0.5	0.4
LDW-Y2-IN-ENR-CB-CORE	100.0	100.0	69.7	50.0	28.4	11.6	6.8	4.6	2.8	1.7	1.0	0.7	0.5	0.4
LDW-Y2-IN-ENR-CE-CORE	100.0	100.0	68.3	49.4	27.2	10.7	6.3	4.6	2.7	1.6	1.0	0.6	0.5	0.4
LDW-Y2-IN-ENR+AC-CA-CORE	100.0	100.0	64.1	44.5	25.1	12.9	7.9	4.4	2.6	1.6	1.0	0.7	0.5	0.4
LDW-Y2-IN-ENR+AC-CB-CORE	100.0	100.0	71.9	57.4	37.3	23.0	16.5	10.7	6.4	3.9	2.1	1.3	0.9	0.7
LDW-Y2-IN-ENR+AC-CC-CORE	100.0	100.0	67.1	46.8	24.7	10.0	5.9	3.8	2.2	1.4	0.8	0.5	0.5	0.4
LDW-Y2-SC-ENR-CC-CORE	100.0	99.7	67.6	49.6	31.1	19.9	16.3	14.3	11.6	8.0	4.7	3.0	2.1	1.6
LDW-Y2-SC-ENR-CD-CORE	100.0	99.6	67.4	47.4	29.0	17.4	13.6	11.6	9.9	6.9	4.3	2.7	1.9	1.5
LDW-Y2-SC-ENR-CE-CORE	100.0	99.5	72.4	56.5	39.6	27.8	23.2	19.9	17.1	11.6	6.6	3.9	2.7	1.8
LDW-Y2-SC-ENR+AC-CB-CORE	100.0	100.0	64.7	43.4	23.1	11.7	8.3	6.9	5.2	3.9	2.5	1.7	1.2	1.0
LDW-Y2-SC-ENR+AC-CC-CORE	100.0	99.9	53.1	31.6	12.7	4.4	3.2	2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
LDW-Y2-SC-ENR+AC-CAD-CORE	100.0	100.0	60.8	38.8	21.7	10.7	7.5	6.1	4.2	3.0	2.0	1.4	1.1	1.0

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Project: LDW ENR/AC Pilot Study
Project #: 19S135
Date Received: July 2, 2019
Date Tested: August 3, 2019

Client: Wood
Sampled by: Client
Tested by: B. Goble

Apparent Grain Size Distribution Summary

Percent Retained in Each Size Fraction

Sample No.	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Coarse Silt	Medium Silt	Fine Silt	Very Fine Silt	Clay			Total Fines
Phi Size	< -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	> 10	> 4
Sieve Size (microns)	> #10 (2000)	10-18 (2000-1000)	18-35 (1000-500)	35-60 (500-250)	60-120 (250-125)	120-230 (125-62)	62.5-31.0	31.0-15.6	15.6-7.8	7.8-3.9	3.9-2.0	2.0-1.0	<1.0	<230 (<62)
S19-1436	24.1	7.3	14.1	27.2	18.5	4.2	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	4.6
	23.4	7.9	14.2	26.9	20.0	4.4	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	3.1
	22.2	7.9	14.9	28.1	19.0	4.4	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	3.5
LDW-Y2-IN-ENR-CA-CORE	34.0	18.9	21.1	15.8	4.3	1.6	1.5	1.0	0.7	0.4	0.2	0.1	0.4	4.3
LDW-Y2-IN-ENR-CB-CORE	30.3	19.7	21.6	16.7	4.8	2.2	1.8	1.1	0.7	0.4	0.1	0.1	0.4	4.6
LDW-Y2-IN-ENR-CE-CORE	31.7	18.9	22.2	16.5	4.4	1.8	1.9	1.1	0.7	0.3	0.2	0.1	0.4	4.6
LDW-Y2-IN-ENR+AC-CA-CORE	35.9	19.6	19.4	12.2	5.0	3.5	1.9	0.9	0.6	0.3	0.2	0.1	0.4	4.4
LDW-Y2-IN-ENR+AC-CB-CORE	28.1	14.5	20.1	14.4	6.5	5.7	4.4	2.4	1.8	0.8	0.4	0.2	0.7	10.7
LDW-Y2-IN-ENR+AC-CC-CORE	32.9	20.4	22.1	14.7	4.1	2.1	1.6	0.8	0.5	0.3	0.1	0.1	0.4	3.8
LDW-Y2-SC-ENR-CC-CORE	32.4	18.0	18.5	11.2	3.5	2.1	2.7	3.6	3.2	1.8	0.9	0.6	1.6	14.3
LDW-Y2-SC-ENR-CD-CORE	32.6	20.0	18.4	11.6	3.9	2.0	1.7	3.0	2.6	1.5	0.8	0.5	1.5	11.6
LDW-Y2-SC-ENR-CE-CORE	27.6	15.9	16.9	11.8	4.6	3.3	2.8	5.5	5.0	2.7	1.3	0.8	1.8	19.9
LDW-Y2-SC-ENR+AC-CB-CORE	35.3	21.3	20.3	11.4	3.4	1.5	1.7	1.4	1.4	0.8	0.4	0.2	1.0	6.9
LDW-Y2-SC-ENR+AC-CC-CORE	46.9	21.5	18.9	8.2	1.2	0.4	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	2.8
LDW-Y2-SC-ENR+AC-CAD-CORE	39.2	21.9	17.1	11.0	3.2	1.5	1.9	1.2	1.0	0.6	0.3	0.1	1.0	6.1

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Reviewed by: E Gabe Goble

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Date Tested: August 3, 2019

Client: Wood
Sampled by: Client
Tested by: B. Goble

Relative Standard Deviation, By Phi Size

Sample ID	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
S19-1436	100.0	86.0	75.9	68.6	54.5	27.3	8.8	4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6
	100.0	86.4	76.6	68.7	54.4	27.5	7.5	3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1
	100.0	87.0	77.8	69.9	55.0	26.9	7.9	3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5
AVE	100.0	86.5	76.8	69.1	54.6	27.3	8.1	3.7	N/A	N/A	N/A	N/A	N/A	N/A
STDEV	0.0	0.4	0.8	0.6	0.3	0.3	0.5	0.6	N/A	N/A	N/A	N/A	N/A	N/A
%RSD	0.0	0.4	1.0	0.9	0.5	0.9	6.6	16.5	N/A	N/A	N/A	N/A	N/A	N/A

The Triplicate Applies To The Following Samples

Client ID	Date Sampled	Date Extracted	Date Complete	QA Ratio (95-105)	Data Qualifiers	Pipette Portion (5.0-25.0g)
S19-1436	7/24/2019	7/26/2019	8/3/2019	101.3	SS	4.4
	7/24/2019	7/26/2019	8/3/2019	99.7	SS	3.6
	7/24/2019	7/26/2019	8/3/2019	100.1	SS	4.2
LDW-Y2-IN-ENR-CA-CORE	6/26/2019	7/26/2019	8/3/2019	101.0		6.5
LDW-Y2-IN-ENR-CB-CORE	6/26/2019	7/26/2019	8/3/2019	101.1		7.2
LDW-Y2-IN-ENR-CE-CORE	6/26/2019	7/26/2019	8/3/2019	101.2		6.9
LDW-Y2-IN-ENR+AC-CA-CORE	6/26/2019	7/26/2019	8/3/2019	101.1		6.8
LDW-Y2-IN-ENR+AC-CB-CORE	7/2/2019	7/26/2019	8/3/2019	102.7		15.6
LDW-Y2-IN-ENR+AC-CC-CORE	6/26/2019	7/26/2019	8/3/2019	101.1		5.9
LDW-Y2-SC-ENR-CC-CORE	7/2/2019	7/26/2019	8/3/2019	101.6		15.4
LDW-Y2-SC-ENR-CD-CORE	7/2/2019	7/26/2019	8/3/2019	100.7		14.2
LDW-Y2-SC-ENR-CE-CORE	7/2/2019	7/26/2019	8/3/2019	101.6		19.5
LDW-Y2-SC-ENR+AC-CB-CORE	7/2/2019	7/26/2019	8/3/2019	100.9		7.0
LDW-Y2-SC-ENR+AC-CC-CORE	7/2/2019	7/26/2019	8/3/2019	100.7	SS	4.4
LDW-Y2-SC-ENR+AC-CAD-CORE	7/2/2019	7/26/2019	8/3/2019	101.5		9.3

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Client :	Wood	**Date Tested:**	August 5, 2019
Source:	Multiple	**Tested By:**	B. Goble
MTC Sample#:	Multiple		

Data Qualifiers

PSEP Grain Size Analysis

SM - The sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations.

SS - The sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis.

W - The weight of the sample in some pipette aliquots was below the level required for accurate weighing.

F - The samples were frozen prior to particle size determination.

LV - Due to low sample volume provided, the samples could not be rerun to meet QA requirements.

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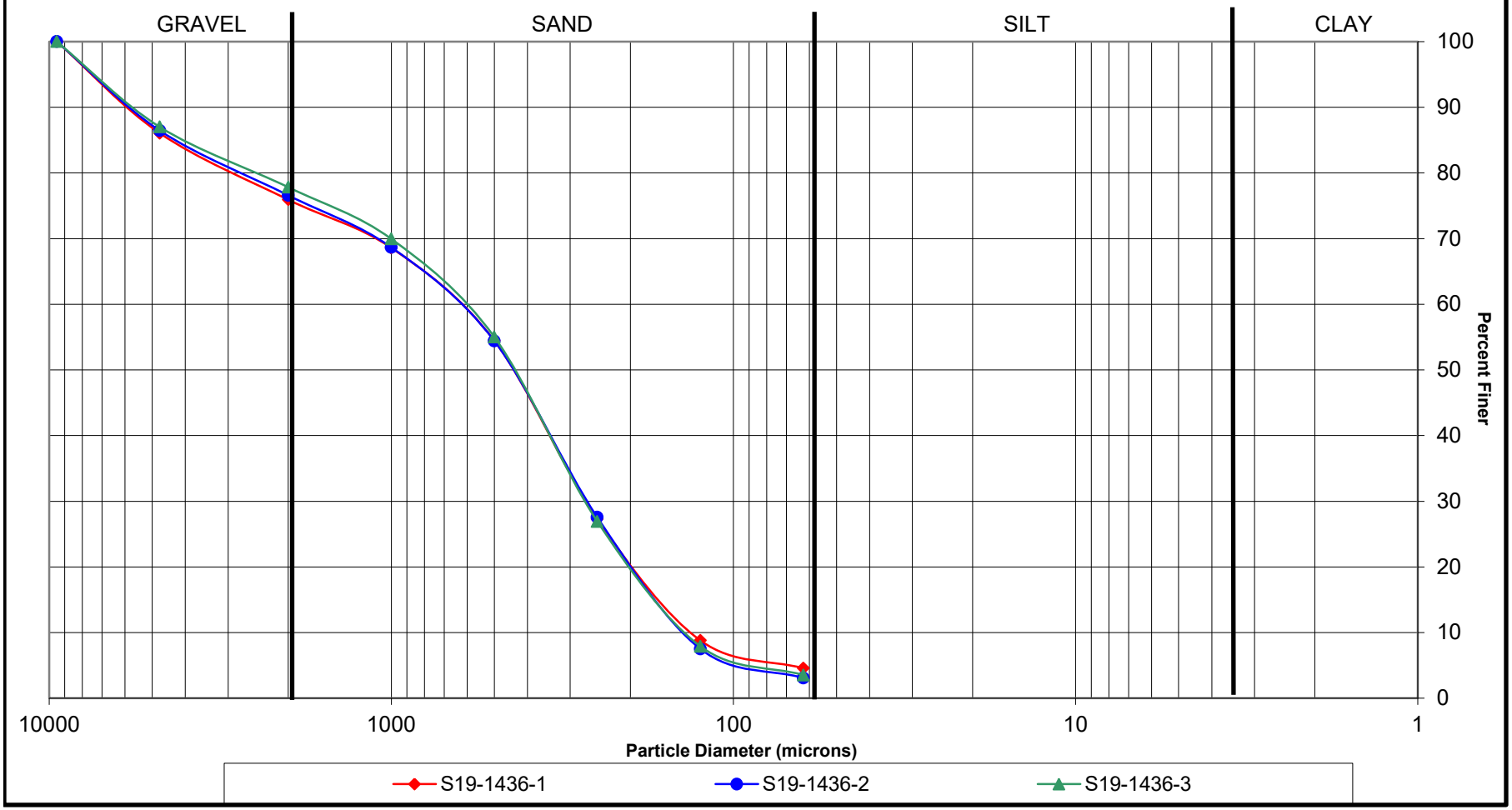
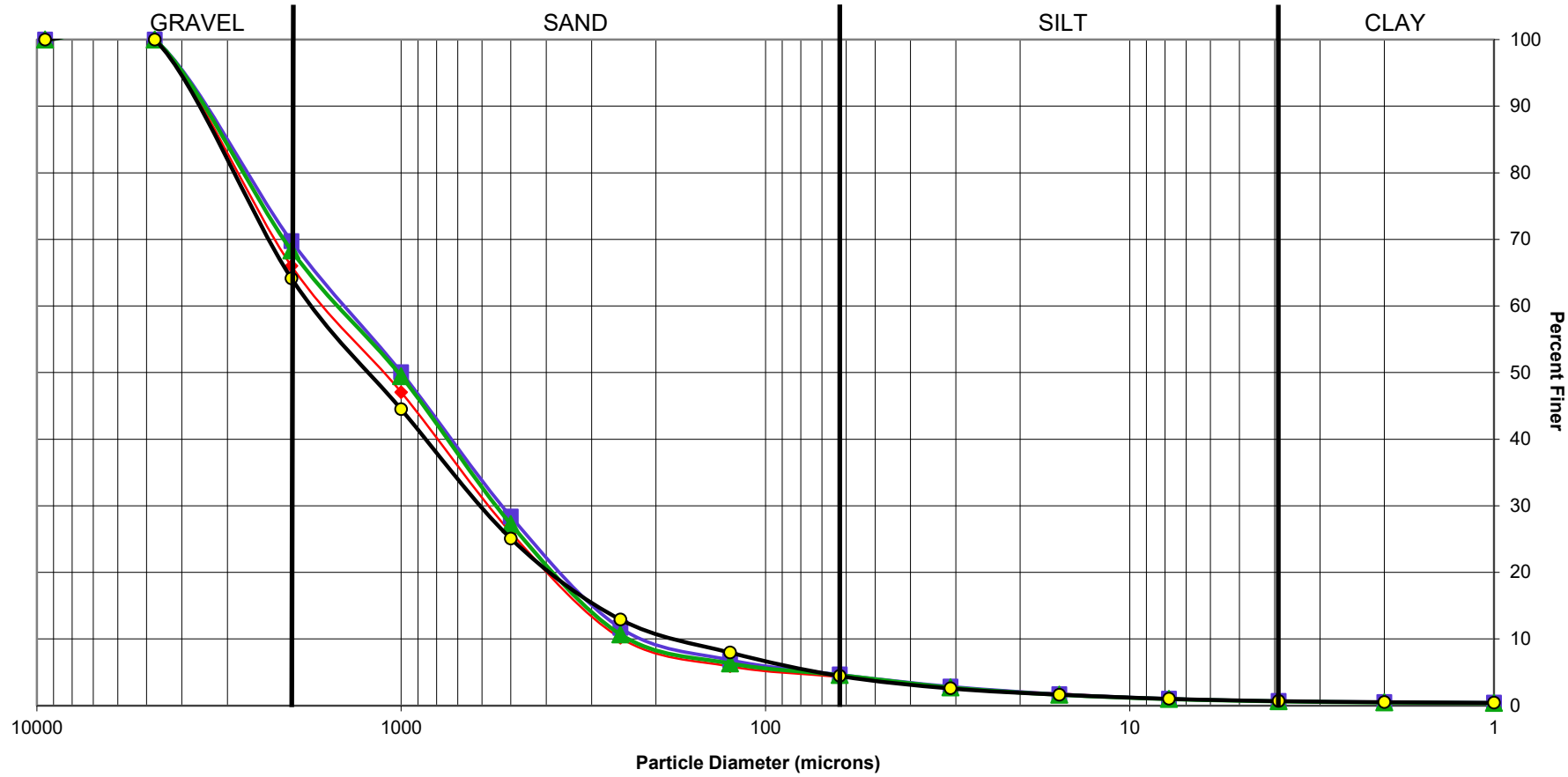
PSEP Grain Size Distribution

Triplicate Sample Plot

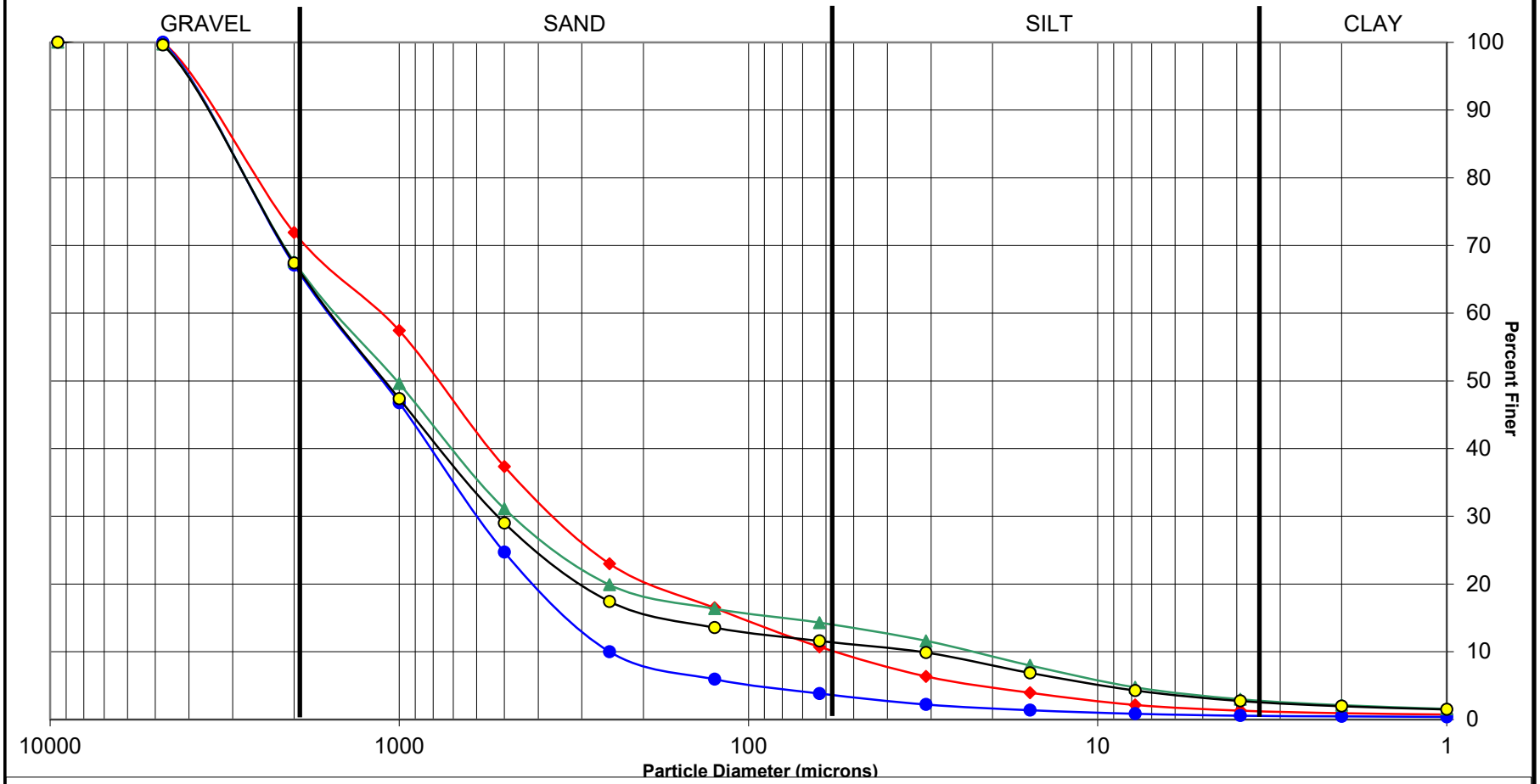
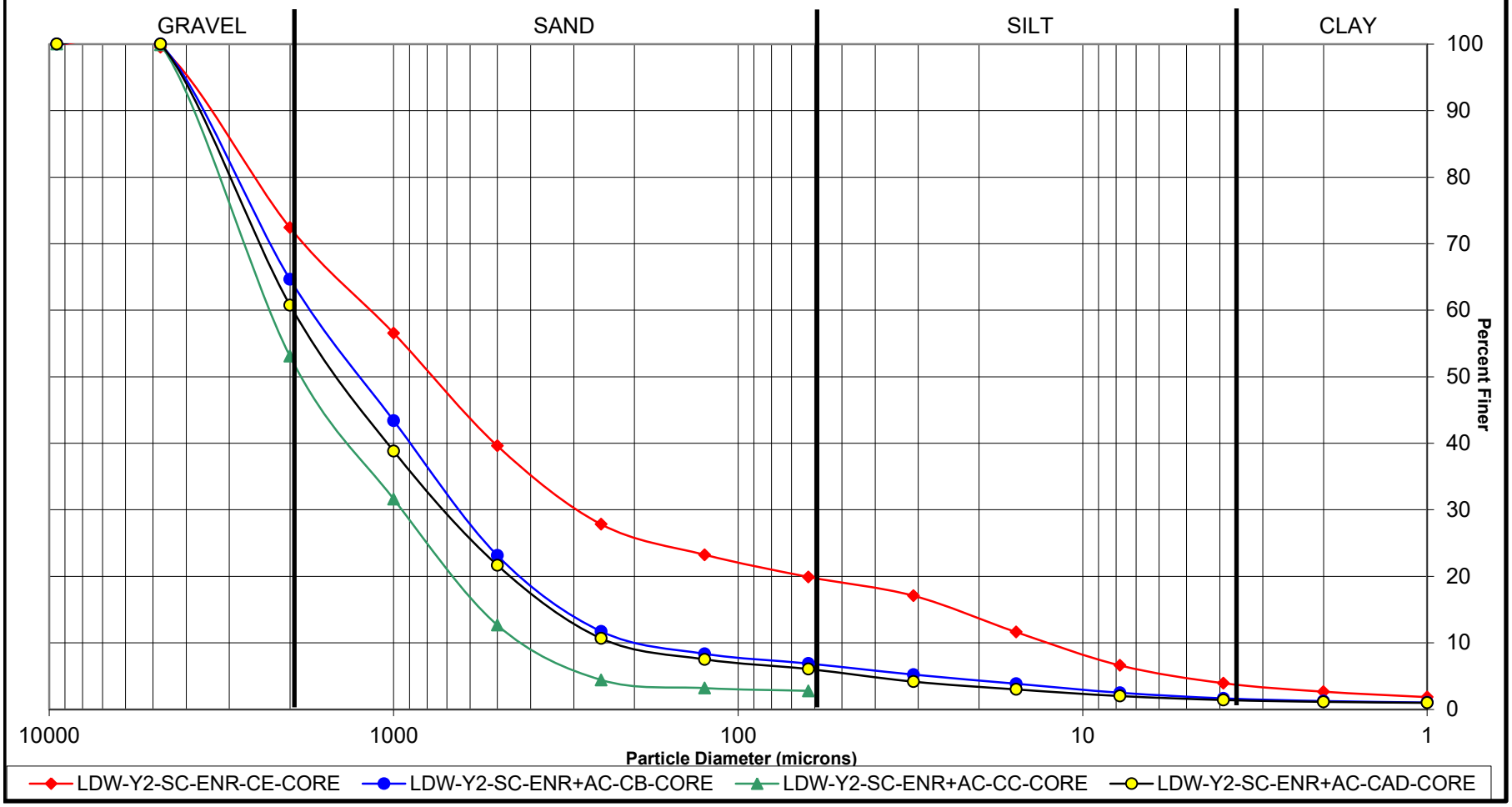


PSEP Grain Size Distribution



LDW-Y2-IN-ENR-CA-CORE
LDW-Y2-IN-ENR-CB-CORE
LDW-Y2-IN-ENR-CE-CORE
LDW-Y2-IN-ENR+AC-CA-CORE

PSEP Grain Size Distribution



PSEP Grain Size Distribution