GeoSystems Analysis, Inc.
Innovative Solutions

For Inquiries
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2019 LABORATORY SERVICES

Test	Description	Method[2]
HYDRAULIC PROPERTY TESTING		
Rigid-Wall Saturated Hydraulic Conductivity (Ksat)[1]	2" diameter, falling or constant head	ASTM D 5856 - 15
	6" diameter, falling or constant head	
	12" diameter, falling or constant head	
Flex-Wall Saturated Hydraulic Conductivity (Ksat)[1]	6" diameter, falling or constant head	ASTM D 5084-16a (Modified)
	12" diameter, falling or constant head	
Rigid-Wall Unsaturated Hydraulic Conductivity (Kunsat)[1]	calculated from Ksat & moisture retention parameters [3]	ASTM D 6836 - 16
	6" diameter, direct measurement	MOSA Part 4 Ch. 3, 3.6.1.1.a (Modified)
	12" diameter, direct measurement	
Flex-Wall Unsaturated Hydraulic Conductivity (Kunsat)[1]	6" diameter, direct measurement	MOSA Part 4 Ch. 3, 3.6.1.1.a (Modified)/ ASTM 5084-03 (Modified)
	12" diameter, direct measurement	
Soil Moisture Retention Curve (MRC)[1]	2" diameter, pressure plate extractor or hanging column (0-1 bar)	ASTM D 6836 - 16 / MOSA, Part 4, Method 3.3.2
	6" diameter, pressure plate extractor or hanging column (0-1 bar)	
	12" diameter, pressure plate extractor or hanging column (0-1 bar)	
	WP4 water activity meter (>3 bar)	MOSA, Part 4, Method 3.2.4.6
Rigid-Wall Hydraulic Package - Calculated[1]	6" diameter, Ksat, 5-point MRC, calculated unsaturated conductivity, van Genuchten modeling, PSD with Particle Density	ASTM D 6836 - 16 / MOSA, Part 4, Method 3.3.2/ 3.6.1.1.a (Modified), ASTM D 6913-17, ASTM C136-14, ASTM D 854 - 14
	12" diameter, Ksat, 5-point MRC, calculated unsaturated conductivity, van Genuchten modeling, PSD with Particle Density	
Rigid-Wall Hydraulic Package - Direct Measurement[1]	6" diameter, Ksat, 5-point MRC, direct measurement unsaturated conductivity, van Genuchten modeling, PSD with Particle Density	ASTM D 6836 - 16 / MOSA, Part 4, Method 3.3.2/ 3.6.1.1.a (Modified), ASTM D 6913-17, ASTM C136-14, ASTM D 854 - 14
	12" diameter, Ksat, 5-point MRC, direct measurement unsaturated conductivity, van Genuchten modeling, PSD with Particle Density	
Flex-Wall Hydraulic Package - Direct Measurement[1]	6" diameter, Ksat, 5-point MRC, direct measurement unsaturated conductivity, ,van Genuchten modeling PSD with Particle Density	ASTM D 6836 - 16 / MOSA, Part 4, Method 3.3.2/ 3.6.1.1.a (Modified), ASTM D 6913-17, ASTM D 854 - 14
	12" diameter, Ksat, 5-point MRC, direct measurement unsaturated conductivity, van Genuchten modeling, PSD with Particle Density	
van Genuchten modeling	calculated using moisture retention characteristics and unsat K parameters	ASTM D 6836 - 16

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Test	Description	Method[2]
PHYSICAL PROPERTY TESTING		
Gravimetric Water Content	oven or microwave drying methods	ASTM D 2216 - 10
Dry Bulk Density	dry bulk density of core samples	ASTM D 2937 - 17e2
Total Porosity	calculated from bulk density and particle density	MOSA Part 4 Ch. 2, 2.3.2.1
Effective Porosity	estimated, 1/3 bar water content	MOSA Part 4 Ch. 3, 3.3.3.5/Horton et al
Specific Gravity or Particle Density	grain density	ASTM D 854 - 14
Particle Size Analysis[1]	Complete particle size distribution with hydrometer and particle density (3" to 0.002mm diameter)	ASTM D 6913-17 / ASTM C 136 / ASTM D 1140 - 17
	Hydrometer analysis (% sand, silt & clay passing no. 10)	ASTM D 6913-17
	Dry sand sieve (5) and no. 200 wash (2mm to 0.075mm diameter)	ASTM C 136, ASTM D 1140
	Wet sieve and hydrometer analysis (2mm to 0.002mm diameter)	ASTM D 6913-17 / ASTM D 1140 - 17
	Wet sieve and hydrometer analysis (2mm to 0.002mm diameter) + extra soak and break down of aggregates	ASTM D 6913-17 / ASTM D 1140 - 17
	#200 wash (0.075mm)	ASTM D 1140 - 17
Outsourced Laboratory Testing	Atterberg Limits, Proctor, XRD/XRF, 1-D Compaction, CEC, etc. All outsourced tests are charged the test's cost +10%	
GEOCHEMICAL INDICATOR PARAMETERS		
Soil pH	1:1 soil/water	ASTM D 4972 - 13
Soil Electrical Conductivity		MOSA Part 2 Ch. 10, 10-3.3
OTHER SPECIAL TESTING		
Other Large Core Testing	custom Ksat or Kunsat, MRC, elution studies	
Sensor Construction and Calibration	advanced tensiometers, heat dissipation probe, water content reflectometers, watermark sensors, neutron probe, oxygen sensors	
Soil Database Queries	soil hydraulic properties based on basic physical parameters (i.e. particle size distribution)	
OTHER CHARGES		
Sample Preparation	sample splitting, reconstitution, initial quality control sieving	
Sample Testing Labor	agglomeration, core repacking and unpacking	
Outsourced Laboratory Testing	Covers addition sample handling	
Shipping	shipping to subcontractors, sample returns	
Sample Disposal	return shipping, hazardous material disposal	
DISCOUNTED TESTING		
10% discounted applied to all tests being peformed on 10 or more samples		

[1] Testing may be subject to additional hourly sample preparation charges

[2] Acronyms for method sources are abbreviated as 1) MOSA, Methods of Soil Analysis, Part 4. 2002. American Society of Agronomy, Madison, Wisconsin; and 2) ASTM, American Society for Testing and Materials. 2003. Volume 4.08. Philadelphia, Pennsylvania.

[3] Unsaturated parameters calculated with RETC4 code (van Genuchten, et. al., 1991)