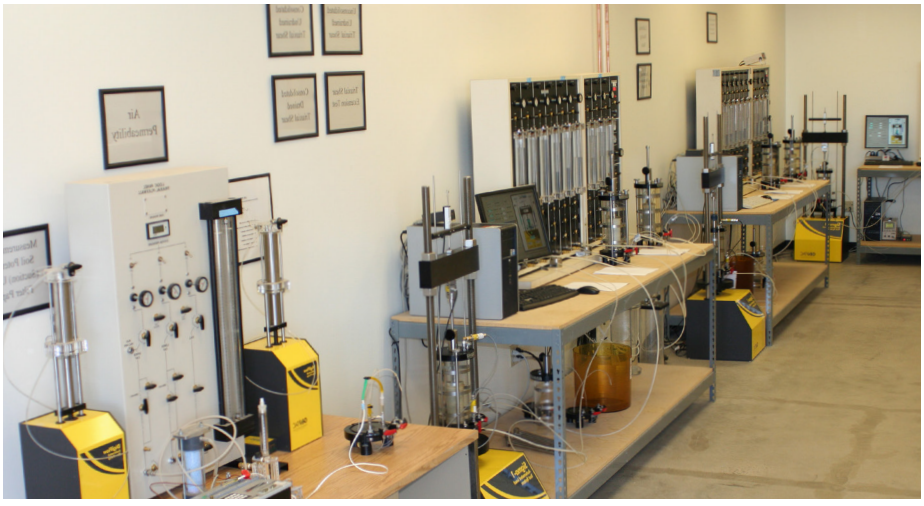
Standard Schedule of Services

Call (505) 889-7752 to discuss how the DBS&A Soil Testing and Research Laboratory can solve your project-specific challenges with customized testing, methods, and analyses.

Geotechnical / Physical Properties

Test	Method
Moisture Content, Gravimetric	ASTM D2216/AASHTO T265
Moisture Content, Bulk Density, Total Porosity (Pkg.)	
Moisture Content, Gravimetric and Volumetric	ASTM D2216/ASTM D7263
Bulk Density	ASTM D7263
Calculated Total Porosity	ASTM D7263
Bulk Density Clod Method	ASTM D7263
Visual-Manual Description	ASTM D2488
Visual-Manual Estimation of Fines	ASTM D2488
Particle Size Analysis, Soil	
Standard Sieves and Hydrometer	ASTM D6913/D7928 / AASHTO T88
Standard Sieves, no Hydrometer	ASTM D6913 / AASHTO T88
Hydrometer (applicable when >5% fines)	ASTM D7928 / AASHTO T88
Percent Sand, Silt, Clay (<2mm soil only)	USBR 514.4.4 Modified
Percent Passing #200 Sieve	ASTM D1140
Particle Size Analysis, Aggregate	
Standard Sieves, no Hydrometer	ASTM C136 / AASHTO T27
Percent Passing #200 Sieve	ASTM C117



The DBS&A Soil Testing and Research Laboratory provides hydrologic properties analyses, geotechnical testing, and project-specific customized analyses using state of the art equipment.

Geotechnical / Physical Properties (continued)

Test	Method
Atterberg Limits	
Liquid Limit, Plastic Limit, and Plasticity Index	ASTM D4318 / AASHTO T89
Classification for Engineering Purposes	ASTM D2487
Shrinkage Limits, Volume Measured by 3-D Scanner	ASTM D4943M
Specific Gravity Fine (< 4.75 mm diameter material)	ASTM D854 / AASHTO T100
Specific Gravity Coarse (> 4.75 mm diameter material)	ASTM C127 / AASHTO T84/T85
Standard Proctor Compaction Test	ASTM D698 / AASHTO T99
Method A or B (<25% retained on 3/8" Sieve)	ASTM D698 / AASHTO T99
Method C (>25% retained on 3/8" Sieve)	ASTM D698 / AASHTO T99
Modified Proctor Compaction Test	ASTM D1557 / AASHTO T180
Method A or B (<25% retained on 3/8" Sieve)	ASTM D1557 / AASHTO T180
Method C (>25% retained on 3/8" Sieve)	ASTM D1557 / AASHTO T180
Pinhole Dispersion	ASTM D4647
Percent Organic Matter by Muffle Furnace	ASTM D2974 / AASHTO T267

Permeability / Conductivity Testing

Test	Method
Saturated Hydraulic Conductivity	
Rigid Wall	
Constant or Falling Head, Modified Apparatus, 1" to 6" Diameter Cell	ASTM D5856M / AASHTO T215M
Constant or Falling Head, Modified Apparatus, 8" Diameter Cell	ASTM D5856M / AASHTO T215M
Constant Head, Modified Apparatus, 12" Diameter Cell	ASTM D5856M / AASHTO T215M
Constant Head, 6" Diameter Cell (Clean Sands Only)	ASTM D2434 / AASHTO T215
Flexible Wall	
Falling Head, Rising Tail, 1" to 4" Diameter Sample	ASTM D5084
Falling Head, Rising Tail, 6" Diameter Sample	ASTM D5084
Intrinsic Permeability (calculation)	Fetter[2]
Air Permeability	
Air permeability, Measured	ASTM D4525 / ASTM D6539
Air permeability, Measured, In Conjunction with HPP	ASTM D4525 / ASTM D6539
Air permeability, Calculated, In Conjunction with HPP	Kuang and Jiao[11]

Moisture Retention Testing

Test	Method
Hydraulic Properties Package (HPP)	
Saturated Hydraulic Conductivity (choose one)	
Flexible-Wall Method, 1"-4" Diameter Cell	ASTM D5084
Flexible-Wall Method, 6" Diameter Cell	ASTM D5084
Rigid-Wall Method, 1"-6" Diameter Cell	ASTM D5856M
Rigid-Wall Method, 8" Diameter Cell	ASTM D5856M
Rigid-Wall Method, 12" Diameter Cell	ASTM D5856M
The Hydraulic Properties Package also includes:	
Moisture Content, Bulk Density, Total Porosity	ASTM D7263
5-7 Point Soil-Water Characteristic Curve (SWCC), Wetting or Drying	ASTM D6836 / ASTM D6836M / MOSA1 Chp. 25
Calculated Unsaturated Hydraulic Conductivity	van Genuchten[6,7]
van Genuchten Modeling Parameters	van Genuchten[6,7]
Any of the soil-water characteristic indices may be added to the HPP	
Additional measurement points may be added to the HPP	

Note: The SWCC is also commonly referred to as: Moisture Retention Characteristic Curve (MRCC), Moisture Characteristic Curve (MCC), Moisture Retention Curve (MRC), Soil Wetting Curve (SWC), Soil Drying Curve (SDC), and Pressure Potential vs. Volumetric Moisture Content. The HPP provides input parameters for most flow models (Hydrus, Unsat-H).

Soil-Water Characteristic Indices*	
Effective Porosity (Total porosity - 15 Bar Point)	Stephens[3]
Field Capacity (1/3 Bar Point)	Stephens[4]
Permanent Wilting Point (15 Bar Point)	Stephens[4]
Plant Available Water (15 Bar Point - 1/3 Bar Point)	Stephens[4]
Specific Yield (Total Porosity - Residual Moisture)	MOSA[1] Chp. 25
Water Holding Capacity (15 Bar Point - 1/3 Bar Point)	Stephens[4]

*Including gravimetric and volumetric water content, dry bulk density, and calculated total porosity.

As Received Soil-Water Potential	
Moisture Content, Bulk Density, Total Porosity, and	ASTM D7263
Chilled Mirror Hygrometer, or	ASTM D6836
Filter Paper Method	ASTM D529
Additional Individual Moisture Retention Points, when Performed in Conjunction with HPP	
Pressure Plate Method	ASTM D6836
Chilled Mirror Hygrometer Method	ASTM D6836
Filter Paper Method	ASTM D5298
Relative Humidity Chamber Method	MOSA[1] Chp. 25

Strength and Consolidation Testing

Test	Method
Consolidation Testing	
One-Dimensional Consolidation Properties	
Method A	ASTM D2435
Method B	ASTM D2435
Swell or Settlement Potential	
One-Dimensional Swell or Settlement Potential	
Method A, B, or C	ASTM D4546
Expansion/Collapse Testing	
Expansion Index of Soils	ASTM D4829
Collapse Potential	ASTM D5333
Strength Testing	
Unconfined Compressive Strength (UC)	ASTM D2166
Compressive Strength of Intact Rock Core	ASTM D7012
Method A or Method C	
Unconsolidated-Undrained Triaxial Compression (UU)	ASTM D2850
1-Point Test	
Consolidated Undrained Triaxial Compression (CU)	ASTM D4767
3-Point Test	
Consolidated Drained Triaxial Compression (CD)	ASTM D7181
3-Point Test	
Direct Shear, Consolidated Drained	ASTM D3080
3-Point Test	
Triaxial Extension Testing	Miller & Murray[12]
3-Point Test	
Strength Testing, Additional:	
Presentation of Mohr's Circles	ASTM D4767 / D7181
Presentation of Mohr's Circles with Estimation of Mohr-Coulomb Failure Criteria, Friction Angle and Cohesion	Das[13]

Other Testing

Test	Method
UST Site Package (New Mexico, Texas; Can be modified to meet other state requirements) (USTR Section 1209.B.e)	(See individual tests for corresponding methods)
Saturated hydraulic conductivity - Rigid Wall, Modified Apparatus	
Moisture Content, Bulk Density, Total Porosity (Pkg.)	
Effective Porosity	
Total or Fractional Organic Carbon	
Vapor Intrusion Package California EPA Department of Toxic Substances Control, Vapor Intrusion Guidance, Appendix H; Can be modified to meet other state requirements)	(See individual tests for corresponding methods)
Moisture Content (Volumetric and Gravimetric)	
Soil Bulk Density	
Calculated Total Porosity	
Specific Gravity (Grain Density)	
Fractional Organic Carbon	
Particle Size Analysis (Grain Size Distribution)	
Can add Saturated Hydraulic Conductivity and Intrinsic Permeability	
Calibrations	
Heat dissipation sensors (HDS), soil psychrometers, gypsum blocks, time domain reflectometers (TDR), etc.	
Chemical Properties (Analysis performed by Hall Environmental Analysis Laboratory, New Mexico)	
Total or Fractional Organic Carbon	Walkley Black
Acid Base Accounting	Modified Sobek
Soil Paste pH	SM4500-H+B: PH
Soil Electrical Conductivity	BOS; USDA Handbook 60
Soil Nitrogen-Nitrate	EPA Method 9056A: Anions
Soil Exchangeable, Available, and Soluble Na,K	EPA 6010B, ASA 9
Cation Exchange Capacity	EPA 6010B, USDA Handbook 60
Other Chemical Analyses Available, Call for Quotation	

Other Testing (continued)

Test	Method
Thermal Properties	
Thermal Conductivity, Thermal Diffusivity, and Specific Heat	ASTM D5334
1-point: As Received	
2-point: Oven Dry and Saturated	
3-point: As Received, Oven Dry, and Saturated	
5-6-point: As Received, Saturated, Air Drying Points, and Oven Dry	
5-11-points, in conjunction with HPP: As Received, Saturated, Oven Dry, and 4-8 Intermediate Points	
Special Testing	
Relative Brine (or Water) Release Capacity (RBRC) (or RWRC)	Stormont[8]
Column Testing / Studies	
Leach Testing / Studies	
Large Cell Hydraulic Conductivity	
Surface Evaporation Studies	
Data Logger Application Development	
Submerged Pressure Outflow Cell (SPOC), per Point	SSSAJ, 1984[9]
Transient Outflow Hydraulic Conductivity	SSSAJ, 1985[10]
Column Imbibition Method (Bruce-Klute)	
Shoe-Box Test, 20 weeks (Mine Spoils)	
Other Charges	
Sample Preparation / Technician time	
Fast-Track Surcharge (Sample/Test Dependent)	
Hazardous Material Surcharge (Sample/Contaminant Dependent)	

> "It would not have been possible to complete a sampling and characterization program on a stockpile of atypical soils on such a tight timeline without the help of the DBS&A lab."
>
> ~ Josh Gilstrap, PE, Hydrometrics, Inc.

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