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Reno/Sparks
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Test	Method	Albuquerque (DBS&A)	Grass Valley	Reno/Sparks	Anaheim
Geotechnical / Physical Properties					
Moisture Content, Gravimetric	ASTM D2216/ASTM D7263/AASHTO T265	✓	✓	✓	✓
Moisture Content, 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	✓		✓	
Particle Size Analysis, Soil					
Sieves & Hydrometer	ASTM D6913/D7928/D422 AASHTO T88	✓	✓	✓	✓
Standard Sieves, no Hydrometer	ASTM D6913/D422 / AASHTO T88	✓	✓	✓	✓
Hydrometer w/minus 2mm sieve	ASTM D7928/D422 / AASHTO T88	✓	✓	✓	
Hydrometer, Sedimentation only w/No.200 wash	ASTM D422	✓	✓	✓	
Percent Passing #200 Sieve	ASTM D1140	✓	✓	✓	✓
Particle Size Analysis, Aggregate					
Sieves, no Hydrometer	ASTM C136 / AASHTO T27	✓	✓	✓	✓
Percent Passing #200 Sieve	ASTM C117	✓	✓	✓	✓
Atterberg Limits					
Liquid Limit, Plastic Limit, & Plasticity Index	ASTM D4318 / AASHTO T89	✓	✓	✓	✓
Shrinkage Limits, Volume Measured by 3-D Scanner	ASTM D4943M	✓			
Specific Gravity, Fine (< 4.75 mm diameter material)	ASTM D854/C128 / AASHTO T100	✓	✓	✓	✓
Specific Gravity, Coarse (> 4.75 mm diameter material)	ASTM C127 / AASHTO T84/T85	✓	✓	✓	✓
Dispersion Testing					
Double Hydrometer	ASTM D4221	✓			
Pinhole Dispersion	ASTM D4647	✓		✓	
Crumb Test	ASTM D6572	✓			
Percent Organic Matter by Muffle Furnace	ASTM D2974 / AASHTO T267	✓	✓		✓
Moisture / Density					
Standard Proctor Compaction Test	ASTM D698/ AASHTO T99	✓	✓	✓	✓
Modified Proctor Compaction Test	ASTM D1557 / AASHTO T180	✓	✓	✓	✓
Moisture Density Curve	CTM 216				✓
R-Value	ASTM D2844 / CTM 301				✓

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Test	Method				
Permeability / Conductivity Testing					
Saturated Hydraulic Conductivity					
Rigid Wall Method					
Hydraulic Conductivity, Fixed Wall	ASTM D5856M/D2434 / AASHTO T215M / USBR 5600-89	✓	✓	✓	✓
Rigid Wall Method, Under Load					
Loaded Hydraulic Conductivity & Settlement, 8" or 12" Cells	ASTM D2434 / USBR 5600-89		✓	✓	
Flexible Wall Method					
Falling Head, Rising Tail	ASTM D5084	✓	✓	✓	✓
High Pressure >120 psi			✓		
Intrinsic Permeability (calculation)	Fetter[2]	✓	✓	✓	✓
Air Permeability					
Air permeability, Measured	ASTM D4525 / ASTM D6539	✓			
Air permeability, Calculated	Kuang and Jiao[11]	✓			
Moisture Retention Testing					
Unsaturated Hydraulic Properties					
Saturated Hydraulic Conductivity	ASTM D5084/D5856/D2434	✓		✓	
Moisture Content, Bulk Density, Total Porosity	ASTM D7263	✓		✓	
Soil-Water Characteristic Curve (SWCC), Wetting or Drying	ASTM D6836 / ASTM D6836M / MOSA[1] Chp. 25	✓		✓	
Calculated Unsaturated Hydraulic Conductivity	van Genuchten[6,7]	✓		✓	
van Genuchten Modeling Parameters	van Genuchten[6,7]	✓		✓	
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]	✓			
As Received Soil-Water Potential, Including:					
Chilled Mirror Hygrometer Method, or	ASTM D6836	✓		✓	
Filter Paper Method	ASTM D5298	✓			

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Strength and Consolidation Testing					
Consolidation Testing:					
One-Dimensional Consolidation Properties	ASTM D2435	✓	✓	✓	✓
Swell or Settlement Potential:					
One-Dimensional Swell or Settlement Potential	ASTM D4546	✓		✓	✓
Expansion/Collapse Testing:					
Expansion Index of Soils	ASTM D4829	✓		✓	✓
Collapse Potential	ASTM D5333	✓			✓
Strength Testing:					
Unconfined Compressive Strength (UC), 2-3"	ASTM D2166	✓	✓	✓	✓
Unconfined Compressive Strength (UC), 4 or 6"	ASTM D2166		✓	✓	
Triaxial Shear					
Unconsolidated-Undrained Triaxial Compression (UU), 2-3"	ASTM D2850	✓	✓	✓	✓
Unconsolidated-Undrained Triaxial Compression (UU), 4 or 6"	ASTM D2850		✓		
Consolidated Undrained Triaxial Compression (CU), 2-3"	ASTM D4767	✓	✓	✓	✓
Consolidated Undrained Triaxial Compression (CU), 4 or 6"	ASTM D4767		✓		
Consolidated Drained Triaxial Compression (CD), 2-3"	ASTM D7181	✓	✓	✓	✓
Consolidated Drained Triaxial Compression (CD), 4 or 6"	ASTM D7181		✓		
High Pressure >120psi			✓		
Triaxial Extension Testing	Miller & Murray[12]	✓			
Direct Shear					
Direct Shear, 2.5"	ASTM D3080	✓	✓		✓
Direct Shear, 12"	ASTM D3080		✓		
Aggregate Testing					
Dry Rodded Unit Weight	ASTM C29		✓		
Sand Equivalent	ASTM D2419 / CMT 217				✓
Durability Index	ASTM D3744 / CMT 229				✓

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Test	Method	Albuquerque (DBS&A)	Grass Valley	Reno/Sparks	Anaheim
Rock Testing					
Rock Density	ASTM D7263	✓	✓	✓	
Saturated Hydraulic Conductivity, Flexible Wall Method	ASTM D5084	✓		✓	
Point Load Index	ASTM D5731		✓		
Direct Shear	ASTM D5607		✓		
Slake Durability	ASTM D4644	✓			
Geosynthetics Testing					
Large Direct Shear - Geosynthetic/Geosynthetic	ASTM D5321		✓		
Large Direct Shear - Soil/Geosynthetic	ASTM D5321		✓		
Large Direct Shear - Geosynthetic Clay Liner (GCL)	ASTM D6243		✓		
Large Direct Shear - Soil/GCL	ASTM D6243		✓		
Large Direct Shear - Sandwich (multiple layers)			✓		
Large Scale Puncture, modified	ASTM D5514		✓		
Geomembrane Liner Puncture Test, ore/overliner under load	qualitative		✓	✓	
Soil w/Amendments and Slurry Testing					
R-Value (treated soil)	ASTM D2844 / CTM 301				✓
Soil-Cement Compaction	ASTM D558				✓
Compressive Strength, Soil-Cement	ASTM D1633 / D1632				✓
Soil / Bentonite, Mix Evaluation			✓		
Soil / Cement / Bentonite, Mix Evaluation			✓		
Cement treated bases Design & Testing	CTM 312				✓
Pocket Penetrometer			✓		
Other Testing					
Calibrations					
Heat dissipation sensors (HDS), soil psychrometers, gypsum blocks,		✓			
time domain reflectometers (TDR), Etc.		✓			
Soil Chemistry					
pH of Soil	ASTM D4972		✓		✓

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Thermal Properties:					
Thermal Conductivity, Thermal Diffusivity, and Specific Heat	ASTM D5334	✓			
UST Site Package (NM, TX - 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 (CA - Can be modified to meet other state requirements)					
(California EPA Department of Toxic Substances Control, Vapor Intrusion Guidance, Appendix H)		✓			
Moisture Content (Volumetric and Gravimetric)	(See individual tests for corresponding methods)				
Soil Bulk Density					
Calculated Total Porosity					
Specific Gravity (Grain Density)					
Fractional Organic Carbon					
Particle Size Analysis (Grain Size Distribution)					
Special Testing					
Relative Brine (or Water) Release Capacity (RBRC) (or RWRC)	Stormont[8]	✓			
Column testing / studies		✓			
Leach testing / studies		✓			
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)		✓			

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Test	Method

References

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[10] Soil Sci. Soc. Am. J. 1985 49:1348-1354

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