Subsurface Investigation

{ Geotechnical Section & Field Investigation Unit

CME 1050

All-Terrain Drill Rigs

CME 850

All-Terrain Drill Rigs

CME 55

Truck Mounted Drill Rig

CME 45 "Skid" Rig

Skid Not Mounted

CME 45 "Skid" Rig

Skid Mounted on Trailer

CME 45 "Skid" Rig

Skid Mounted on Barge

Truck Mounted Cone Penetrometer

Not Just Making a Hole!

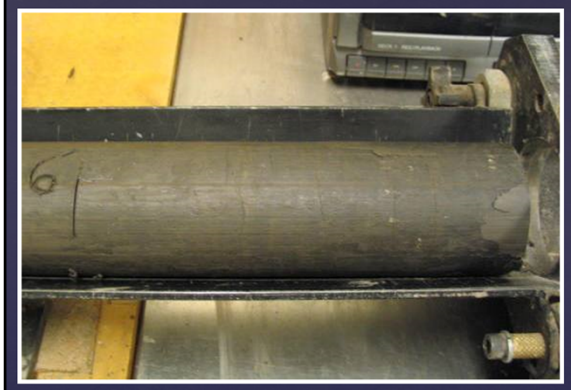
Split Spoon Sampling

Hammer Drives Sampler into Soil, Blow Count Recorded in 6" Increments

Split Spoon Sampling

Correlating Hammer Energy

Shelby Tube Sampling

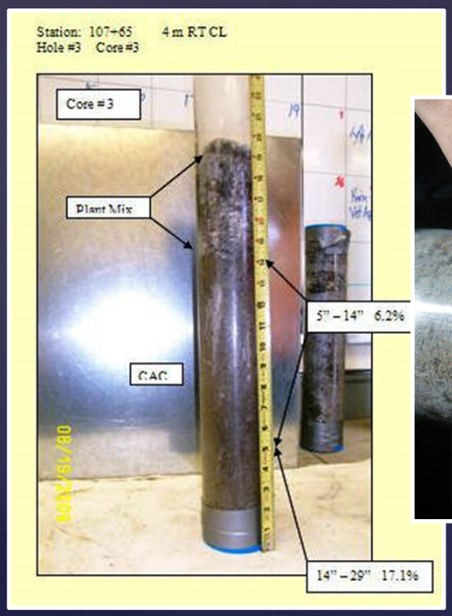


Soft Cohesive Soils

3

Rock Coring

Auger Continuous Sampler



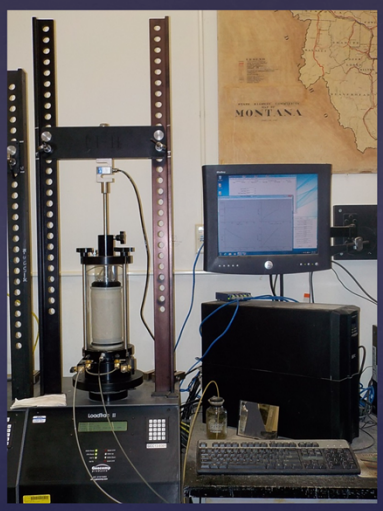
Now What Do We Do With It?

Geotechnical Soils Lab

Consolidation Test

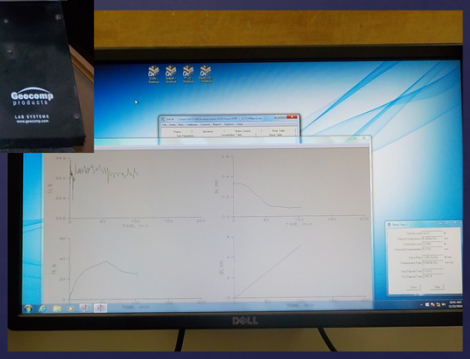
Indication of Past Loading and Soils Response to Future Loading

Triaxial Shear Test



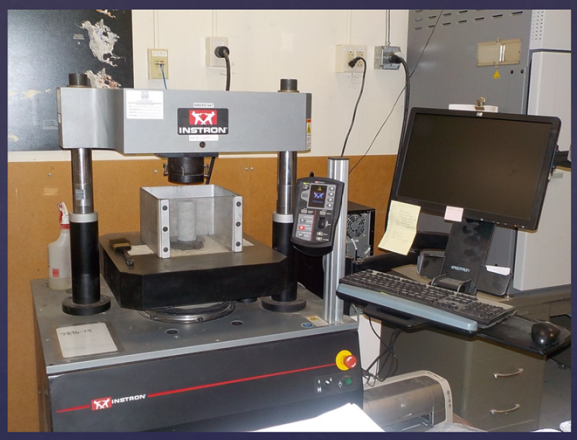
Information on Soil Strength Parameters

Direct Shear Test



Peak and Residual Soil Strengths

Unconfined Compressive Test



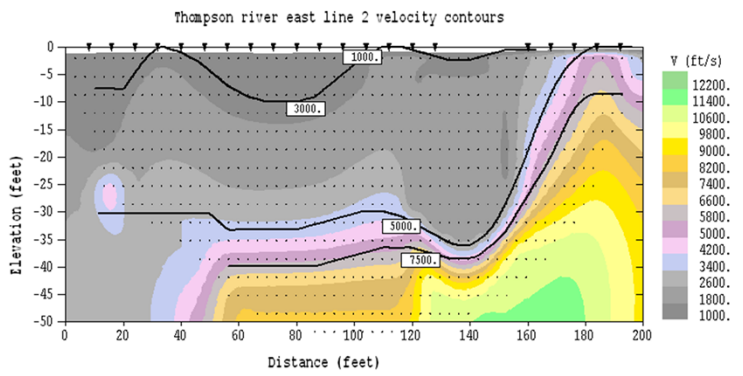
We Crush it!

Undisturbed Testing

Field Vane Shear

Dynamic Cone Penetrometer

Seismic Refraction Survey



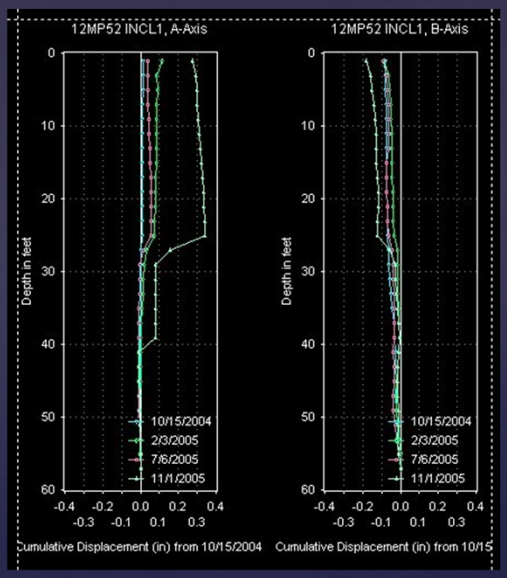
INSTRUMENTATION INSTALLED

- Inclinometers
- Piezometers
- Sondex Settlement System
- Settlement plates
- Strain gages
- Experimental Projects

Inclinometers

Most common type to monitor slides

Inclinometers



Output Shows Areas of Movement

Piezometers

Measures Pore Pressures

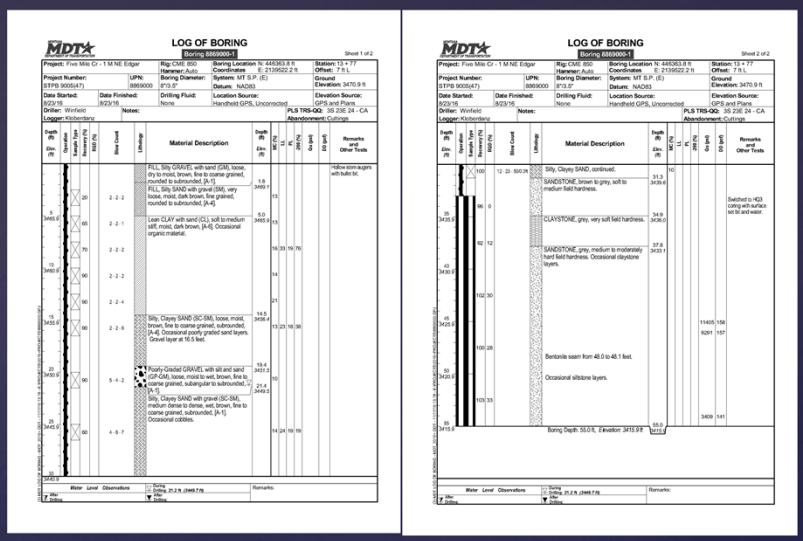
Sondex Settlement System

Metal Rings Settle with Soil

Settlement Plates

Strain Gauges

Experimental Projects



LOG OF BORING

Boring 8869000-S1

Sheet 1 of 2

Project: Five Mile Cr - 1 M NE Edgar
Rig: CME 850
Hammer: Auto
Boring Location N: 446363.8 ft E: 2139522.2 ft
Coordinates
Station: 13 + 77
Offset: 7 ft L
Project Number: STPB 9005(47)
UPN: 8869000
Boring Diameter: 8"/3.5"
System: MT S.P. (E)
Datum: NAD83
Ground Elevation: 3470.9 ft
Date Started: 8/23/16
Date Finished: 8/23/16
Drilling Fluid: None
Location Source: Handheld GPS, Uncorrected
Elevation Source: GPS and Plans
Driver: Winfield
Notes:
PLS TRS-QQ: 3S 23E 24 - CA
Logger: Kirbenberg
Abandonment: Cuttings

Depth (ft) / Elev. (ft)	Operation	Sample Type / Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) / Elev. (ft)	MC (%)	LL	PI	Qu (psf)	SD (psf)	Remarks and Other Tests
						FILL, Silty GRAVEL with sand (GM), loose, dry to moist, brown, fine to coarse grained, rounded to subrounded, [A-1].	1.8 3469.1						Hollow stem augers with bullet bit.
5 3465.9		20		2 - 2 - 2		FILL, Silty SAND with gravel (SM), very loose, moist, dark brown, fine grained, rounded to subrounded, [A-4].		13					
		65		2 - 2 - 1		Lean CLAY with sand (CL), soft to medium stiff, moist, dark brown, [A-6]. Occasional organic material.	5.0 3465.9	13					
		70		2 - 2 - 2				16	33	19	76		
10 3460.9		60		2 - 2 - 2				14					
		60		2 - 2 - 4				21					
15 3455.9		60		2 - 2 - 8		Silty, Clayey SAND (SC-SM), loose, moist, brown, fine to coarse grained, subrounded, [A-4]. Occasional poorly graded sand layers. Gravel layer at 16.5 feet.	14.5 3456.4	13	23	18	38		
20 3450.9		90		5 - 4 - 2		Poorly-Graded GRAVEL with silt and sand (GP-GM), loose, moist to wet, brown, fine to coarse grained, subangular to subrounded, [A-1].	19.4 3451.5 / 21.4 3449.5	10					
25 3445.9		60		4 - 5 - 7		Silty, Clayey SAND with gravel (SC-SM), medium dense to dense, wet, brown, fine to coarse grained, subrounded, [A-1]. Occasional cobbles.		14	24	19	10		
30 3440.9													

Water Level Observations: During Drilling 31.2 ft (3440.7 ft); After Drilling

Remarks:

LOG OF BORING

Boring 8869000-S1

Sheet 2 of 2

Project: Five Mile Cr - 1 M NE Edgar
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Location Source: Handheld GPS, Uncorrected
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Depth (ft) / Elev. (ft)	Operation	Sample Type / Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) / Elev. (ft)	MC (%)	LL	PI	Qu (psf)	SD (psf)	Remarks and Other Tests
		100		12 - 22 - 50/3.8		Silty, Clayey SAND, continued.	31.3 3439.6	10					
			90	0		SANDSTONE, brown to grey, soft to medium field hardness.							Switched to HQ3 coring with surface set bit and water.
35 3435.9						CLAYSTONE, grey, very soft field hardness.	34.9 3436.0						
			82	12		SANDSTONE, grey, medium to moderately hard field hardness. Occasional claystone layers.	37.8 3433.1						
40 3430.9													
			102	30									
45 3425.9											11405	156	
											8261	157	
			100	28		Bentonite seam from 48.0 to 48.1 feet.							
50 3420.9						Occasional siltstone layers.							
			103	33									
55 3415.9											3409	141	
						Boring Depth: 55.0 ft. Elevation: 3415.9 ft	55.0 3415.9						

Water Level Observations: During Drilling 31.2 ft (3440.7 ft); After Drilling

Remarks:

After all that, what do people see?

Sometimes We Don't Need to Drill