



Boring No. 1 Project Russell Street Area

Jenifer: 60'W of Division, 8'N of Centerline

Location Madison, WI Surface Elevation (ft) 851± Job No. **C20051-23** Sheet 1 of 1

	2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887											
		SA	MPL	E.			VISUAL CLASSIFICATION	SOIL	PRO	PEF	RTIE	S
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		and Remarks	qu (qa) (tsf)	w	TT	PL	LI
	П		-		<del> </del>	X	6.5 in. Asphalt Pavement/11 in. Base Course					
1		18	M	7	<b>⊢</b> ∟	M					-	
					<u></u>	丽	FILL: Loose Brown Sand with Little to Some Silt	]				
	П				<u> </u>	拑挡	and Trace Gravel					
2		18	W	5	<u> </u>					-		
					! <b>├</b>							
	П				├- 5-  -							
3		18	W	8	<b>├</b> └	i.ii	Loose, Gray Silty Fine SAND (SM)					
					<u></u>	i:ii		ļ				
	П				_							
4		18	W	14			Medium Dense, Gray SILT, Some Sand, Trace to Little Clay (ML)		<u> </u>			
					<u>Γ</u> ⊢		Little Clay (WIL)					
	П				├- 10-  -							
	П				L I							
	$\  \ $				<u>-</u>		Stiff, Gray Laminated Lean and Silty CLAY,	_				
	$\ $				<u></u>		Occasional Sand Partings (CL/CL-ML)					
5		18	W	11	-		5	-				
			''		-  -			(1.25)				
	П				├─ 15 <b>-</b> L	///	End Boring at 15 ft					
	Ш				<u> </u>		Deschale Dest-Cited and Deschale Cities and					
	$\  \ $						Borehole Backfilled with Bentonite Chips and Asphalt Patch				-	
					<u>Г</u>							
	$\ $				<b>-</b>							
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	$\ $				L							
	Ц			\A//	— 25—		WEL OPSEDVATIONS	PENEDA		TEC		
3371 •		D. '''						SENERA			<u> </u>	
		Drill After		<u>⊽ 3</u>	.5'	U		<b>5/20</b> End Chief	11/5/ M <i>C</i>		io CN	1E-55
Time After Drilling Depth to Water								GB Editor	ESI	F		
Depth to Cave in					ines re	nres	4' Drill Metho	d 2.25" H	SA; A	utoha	mme	r
so	ĩ l	type	sand	the t	ransiti	on ma	ent the approximate boundary between	• • • • • • • • • • • • • • • • • • • •			• • • • • • • •	



Boring No. **2** Project Russell Street Area

Jenifer: 310'NE of Walton, 6'SE of Centerline

Location Madison, WI Surface Elevation (ft) 852± Job No. **C20051-23** Sheet 1 of 1

	2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887											
	SA	MPL	.E		VISUAL CL	ASSIFICATIO	N	SOIL	PRO	PEF	<b>YTIE</b>	S
No.	Rec (in.)	Moist	N	Depth (ft)	and	Remarks		qu (qa) (tsf)	w	LL	PL	LI
				<del> </del>  -		nent/8 in. Concrete Pa	avement/8					
1	12	M	9	<b>⊢</b> ∟	in. Base Course			· · · · ·	-			
				<u> </u>		Fine to Medium SA	ND, Little					
				<u> </u>	to Some Silt (SP/SP	P-SM - Possible Fill)						
2	12	M	4	<u> </u>								
					Loose to Very Loos	se at 4 ft						
				<del> ⊻</del> 5− ├	<u> </u>	- <b></b>						
3	18	W	15	<del> </del>		ay Fine to Medium SA and Gravel (SP/SP-SM						
		'		<u> </u>	i Trace to Little Sitt a	illu Glavel (51751-51	<b>v</b> 1)					
				<u> </u>	<u>]</u>			<del> </del>				
4	18	W	24	<u> </u>	.]							
'		''	- '	<b>├</b>	-[.]							
				├ 10- └	<u>.</u>							
				<u> </u>								!
				<u> </u>								ı
				<u></u>	Stiff, Gray Lean CL	AY (CL)						İ
5	18	W	9	<del> </del>							-	
3	10	<b>"</b>	9	<b>⊢</b> <b>⊦</b>				(1.25)				
				<u>↓</u> 15−	End o	of Boring at 15 ft			l			
					Backfilled	with Bentonite Chips	s					
				Г Г	*Elevation determin							
	Ì			├  -		ned using an assumed sing the top nut of a h						
				<u>i</u>		rsection of Russell St						
				L 20-	H	Ielena Street.						
	İ			<u></u>								
				Г Г		dentified as Boring 9						
				Г Ь	Report C1105	4-17 and drilled in 20	011.					
	}			<b>⊢</b> ⊦								
				<u> </u>							. [	
				25-								
I			W/	TER	EVEL OBSERV	ATIONS	G	ENERA	L NO	TES	; ·	
While	Dril	ling		.0'	Upon Completion of D	<u>"-</u>		0/11 End	8/10/			
Time	After	Drilli					Driller BS	SD Chief	BN	1R	ig CN	<b>ME-55</b>
Depti Depti		ater ave in					Logger M Drill Method	IC Editor				 r
	Depth to Cave in  The stratification lines represent the approximate boundary between soil types and the transition may be gradual.  Drill Method 2.25" HSA; Autohammer											



Boring No. **3** Project Russell Street Area
Russell: 110'NW of Jenifer, 6'NE of Centerline
Location Madison, WI Surface Elevation (ft) 853± Job No. **C20051-23** Sheet 1 of 1

	SAMPLE					VISUAL CLASSIFICATION		SOIL PROPERTIES						
No.	Rec (in.)	Moist	N	Depth (ft)		and Remarks		qu (qa) (tsf)	w	ш	PL	LI		
				<del> </del>  -	X	8 in. Concrete Pavement/8 in. Base Cours	se	, , , , , ,						
1	18	М	12	<del> </del>  -  -	$\times$	Medium Dense to Loose, Light Brown Fir Medium SAND, Trace to Little Silt and G								
	10		4	<u>[</u> 		(SP/SP-SM - Probable Fill)	, aver							
2	18	М	4	├ ├ ├ 5-		Loose to Very Loose, Dark Brown to Blac to Medium SAND, Some Silt and Clay (S								
3	18	W	13	ŗ ₩		Medium Dense, Gray Fine to Medium SA Trace to Little Silt and Gravel (SP/SP-SM					·	· · · · ·		
4	18	W	14	<del> </del>  -  -										
				├ 10- ├ └										
				L  -  -		Stiff, Gray Lean CLAY (CL)								
5	18	W	11	<del> </del>  -							-			
į				, ├- └_ 15				(1.25)						
				L   		End of Boring at 15 ft								
						Backfilled with Bentonite Chips	1							
				Γ ├─ ŀ		Note: Previously identified as Boring 8 i Report C11054-17 and drilled in 20								
				├ └ └ 20-				i						
				<u> </u>  -  -										
			i i	┌ <u>¯</u> ├ ├										
				- └ └ └ 25-										
			W.	_		EVEL OBSERVATIONS	G	ENERA	L NC	TES				
Depth	After to W	Drilli ater	<u>⊽</u> 6			Jpon Completion of Drilling 6' S	Start <b>8/1</b> Driller <b>B</b> Logger <b>N</b>	1/11 End SD Chief IC Editor	8/11 BN ES	/11 /1 R F	ig Cl	ME-55		
		ave in ificat s and	ion l	ines re ransiti	pres	ent the approximate boundary between ay be gradual.	Drill Method	od 2.25" HSA; Autohammer						



Boring No. 4 Project Russell Street Area
Helena: 90'NE of Russell, 7'SE of Centerline Surface Elevation (ft) 852± Job No. **C20051-23** Location Madison, WI Sheet 1 of 1

	SA	MPL	.E			VISUAL CLASSIFICATION	SOIL	PRO	PEF	RTIE	S
No.	Rec P (in.)	Moist	N	Depth (ft)		and Remarks	qu (qa) (tsf)	W	II	PL	LI
				<del> </del>	X	2 in. Asphalt Pavement/8 in. Concrete Pavement/10 in. Base Course					
1	18	M	13	Ļ	$\boxtimes$						
				Ļ Ļ		Medium Dense, Light Brown Fine to Medium					
				<u> </u>		SAND, Little to Some Silt and Gravel (SP-SM/SM / Possible Fill)					
2	18	M	4	<u>\</u> Z		Loose, Brown to Gray Fine to Coarse SAND, Trace to Little Silt and Gravel (SP/SP-SM)					
				— 5— ⊢	Ш						
3	18	w	10	<del> </del>		Loose to Medium Dense, Gray Fine to Medium SAND, Little Silt (SP-SM)					
_				Ē		SAIVD, Little Siit (SI -Sivi)					
				Ť —		Malian Signa Sign Country Tour					
4	18	W	8	<del> </del> 		Medium Stiff to Stiff, Gray Lean CLAY, Trace Sand (CL)	(2)				
				  - 			(0.75)				
				L L							
				<u> </u>							
				<u> </u> -							
				<u> </u>							
5	18	W	10	_ ⊢ ⊦			(1.75)				
			_	├ 15- L		End of Boring at 15 ft					
				<u>_</u>		Backfilled with Bentonite Chips					
				_							į
				<u> </u>		Note: Previously identified as Boring 7 in CGC Report C11054-17 and drilled in 2011.					
				<u>-</u>		Report C11034-17 and drined in 2011.					
				<b>├</b> └─ 20─							
				<u></u>							
				<u> </u>							
				L L							
			10//	25-		TVEL ODGEDVATIONS					
							ENERA	L NO	TES	<u> </u>	
	e Drill After	ling Drillii	<u> </u>	.0'	ι		1/11 End SD Chief	8/11/ RM		ia CN	4 F-55
Dept	h to W	ater	-6			Logger M	C Editor	ESI	F		
Depth to Cave in  The stratification lines repr					pres	ent the approximate boundary between	i 2.25" H	SA; A	utoha	mme	r
soi	l type	s and	the t	ransiti	on m	ent the approximate boundary between ay be gradual.			• • • • • • • •		



Boring No. 5 Project Russell Street Area
Russell: 135'NW of Helena, 9'NE of Centerline
Location Madison, WI Surface Elevation (ft) 853± Job No. **C20051-23** Sheet 1 of 1

	SAMPLE		_ 2:	VISUAL CLASSIFICATION  VISUAL CLASSIFICATION  SOIL PROPI					ERTIES				
No.	Rec	Moist	N	Depth (ft)		and Remarks	qu (qa) (tsf)	w	II	PL	LI		
1	18	M	12	<del> </del>  - 	X	3 in. Asphalt Pavement/6 in. Concrete Pavement/8 in. Base Course	(652)						
						Loose to Medium Dense, Light Brown Fine SAND, Trace to Little Silt and Gravel (SP/SP-SM - Probable Fill)							
2	18	М	8	-  -  - 5−							-		
3	18	W	9	Ļ ☑ Ĺ		Soft, Dark Brown to Black Sandy Lean CLAY (CL - Possible Buried Topsoil)	(0.4)			-			
				<u> </u>  - 		Loose, Gray Fine to Medium SAND, Some Silt (SM)	 	-					
4	18	W	17	-  -   10-		Medium Dense, Gray-Brown Sandy SILT with Clay Seams and Lenses (ML/CL)							
	10	117	27			Medium Dense, Brown Fine SAND, Little to Some Silt (SP/SP-SM)							
5	18	W	27	├─ ├ └─ 15─									
				L.  -  -		End of Boring at 15 ft  Backfilled with Bentonite Chips							
			i   	_ - - - -		Note: Previously identified as Boring 6 in CGC Report C11054-17 and drilled in 2011.					1		
				20—									
			 	- -									
			WA	- 25- TFR	1 6	VEL OBSERVATIONS G	ENERA	NO	TEC				
Depth	After to W	Drillii ater	<u>⊽</u> 6.			Jpon Completion of Drilling 6' Start 8/1 Driller B Logger N	1/11 End SD Chief IC Editor	8/11/ BM ESI	11 I R	ig CN	ИЕ-55		
Depth to Cave in  The stratification lines reprisoil types and the transition						ent the approximate boundary between ay be gradual.	d 2.25" HSA; Autohammer						



Boring No. **5A** Project Russell Street Area
Russell: 115'NW of Helena, 6'NE of Centerline
Location Madison, WI Surface Elevation (ft) 852± Job No. **C20051-23** Sheet <u>1</u> of <u>1</u>

	2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887										
SAMPLE		VISUAL CLASSIFICATION		SOIL	PRO	PEF	RTIE	S			
No.   Moist   N	pth ft)	and Remarks	İ	qu (qa) (tsf)	w	LL	PL	LI			
-	K	2 in. Asphalt Pavement/7 in. Concrete Pavementin. Base Course	t/4								
1 0 M 54/8"L	Ė	FILL: Loose Brown Sand									
		End Boring at 1.7 ft Due to Spoon Refusal or			ļ						
		Presumed Concrete									
		Borehole Backfilled with Bentonite Chips and	d l								
	5	Asphalt Patch									
	10-										
	15—										
					:						
	20-										
						İ					
	ł		l				l				
	25-										
WAT	G	ENERA	L NO	TES	<u> </u>						
While Drilling	11/5	/20 End	11/5/	20							
Time After Drilling	· .	Upon Completion of Drilling NW Start Driller	BS	D Chief	MC	R	ig CN	1E-55			
Depth to Water  Depth to Cave in					r ESF ISA; Autohammer						
	s repr	resent the approximate boundary between nay be gradual.				· · · · · · · · · · · ·					



Boring No. 5B Project Russell Street Area
Russell: 118'NW of Helena, 6'NE of Centerline
Location Madison, WI Surface Elevation (ft) 852± Job No. **C20051-23** Sheet 1 of 1

	2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887															
		SA	MPL	E			VISUAL CLASSIFICATION		SOIL	PRO	PEF	RTIE	S			
No.	TYPE	Rec	Moist	N	Depth (ft)		and Remarks		qu (qa) (tsf)	W	ш	PL	LI			
					T	X	2 in. Asphalt Pavement/7 in. Concrete Pavement/in. Base Course	4								
1		0	M	53/6"	, <u> </u>	m	FILL: Loose Brown Sand									
			ļ	ļ	<u> </u>		End Boring at 1.5 ft Due to Spoon Refusal on	_								
					_		Presumed Concrete									
		į			<u> </u>		Borehole Backfilled with Soil Cuttings and									
					├- 5- <b> -</b>	1	Asphalt Patch									
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					L  25											
			•	WA	TER	L	EVEL OBSERVATIONS	G	ENERA	L NO	TES	5				
Whi Tim			ling Drilli		IW_	Ţ			/20 End			:- 0	4E 55			
Dep	th	to V	/ater	пg			Driller	BS G			K	ıg CN	1E-55			
Depth to Cave in  The stratification lines re					ines re	pres	Drill Me				NOTES 11/5/20 MC Rig CME-55 ESF A; Autohammer					
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.											• • • • • • •	· • • • • • • • • • • • • • • • • • • •				



Boring No. 6 Project Russell Street Area
Helena: 285'SW of Russell, 3'SE of Centerline
Location Madison, WI Surface Elevation (ft) 852± Job No. **C20051-23** Sheet 1 of 1

	2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887										
	SA	MPL	E			VISUAL CLASSIFICATION	SOIL	PRO	PER	TIE	S
No.	Rec (in.)	Moist	N	Depth (ft)		and Remarks	qu (qa) (tsf)	W	II	PL	LI
-				<u> </u>	X	2 in. Asphalt Pavement/7 in. Concrete Pavement					
1	18	М	7	<del> </del>		FILL: Loose Brown Fine Sand with Little to Some Silt and Trace Gravel to 3'					
2	18	M	3	<u> </u>  -  -		Very Loose Brown Fine to Coarse Sand with Some Silt to 4.5'					
_				<b>┌</b> ├ <del>├</del> 5-		Very Loose, Dark Brown to Black Organic SAND					
				区	TI	¬ (OL)					
3	18	W	11	Ĭ <u>♥</u> L. I		Medium Dense, Gray Sandy SILT (ML)					
	10	***		_							
4	18	W	11	⊢ ⊢ 10–							
				- 10-  -  -  -		Having Occasional Thin (<1/4 in.) Seams of Clay with Depth					
				  -  -  -		Stiff, Gray Lean CLAY, Trace Sand (CL)					
5	18	W	11	├ 			(1.75)				
						End Boring at 15 ft					
						Borehole Backfilled with Bentonite Chips and Asphalt Patch					
				<u> </u>							
				► 							
				<u> </u>  -  -							
				├-							
				-  -							
			\A//	- 25-		TVEL OPSERVATIONS			TEA		
							ENERA			)	
Time Deptl	ı to W	Drilli 'ater	<u>♀ 6</u> ng	5.0'			5/20 End SD Chief B Editor	ES	C R F		
		ave in	ion l	ines re	pres	ent the approximate boundary between ay be gradual.	d 2.25" H	oa; A	utona	ınme	
501	r rAbe	s and	the t	ransiti	on m	ay be gradual.					

CGC, Inc.

## LOG OF TEST BORING

General Notes

#### **DESCRIPTIVE SOIL CLASSIFICATION**

#### **Grain Size Terminology**

Soil Fraction	Particle Size \(\text{\class}\)	J.S. Standard Sieve Size
Boulders	Larger than 12"	Larger than 12"
Cobbles	3" to 12"	3" to 12"
Gravel: Coarse	¾" to 3"	¾" to 3"
Fine	4.76 mm to ¾"	#4 to ¾"
Sand: Coarse	2.00 mm to 4.76 mm	#10 to #4
Medium	0.42 to mm to 2.00 mm	#40 to #10
Fine	0.074 mm to 0.42 mm	#200 to #40
Silt	0.005 mm to 0.074 mm.	Smaller than #200
Clay	Smaller than 0.005 mm	Smaller than #200

Plasticity characteristics differentiate between silt and clay.

#### **General Terminology**

### **Relative Density**

Physical Characteristics	Term	"N" Value
Color, moisture, grain shape, fineness, etc.	Very Loose.	0 - 4
Major Constituents	Loose	4 - 10
Clay, silt, sand, gravel	Medium Der	nse10 - 30
Structure	Dense	30 - 50
Laminated, varved, fibrous, stratified, cemented, fissured, etc.	Very Dense.	Over 50
Geologic Origin		

# Relative Proportions Of Cohesionless Soils

Glacial, alluvial, eolian, residual, etc.

#### Consistency

Proportional	Defining Range by	Term	q <sub>u</sub> -tons/sq. ft
Term	Percentage of Weight	Very Soft	0.0 to 0.25
		Soft	0.25 to 0.50
Trace	0% - 5%	Medium	0.50 to 1.0
Little	5% - 12%	Stiff	1.0 to 2.0
Some	12% - 35%	Very Stiff	2.0 to 4.0
And	35% - 50%	Hard	Over 4.0

# Organic Content by Combustion Method

#### **Plasticity**

Soil Description	Loss on Ignition	<u>Term</u>	Plastic Index
Non Organic	Less than 4%	None to Slight	0 - 4
Organic Silt/Clay	4 – 12%	Slight	5 - 7
Sedimentary Peat	12% - 50%	Medium	8 - 22
Fibrous and Woody	Peat More than 50%	High to Very Hig	h Over 22

The penetration resistance, N, is the summation of the number of blows required to effect two successive 6" penetrations of the 2" split-barrel sampler. The sampler is driven with a 140 lb. weight falling 30" and is seated to a depth of 6" before commencing the standard penetration test.

### **SYMBOLS**

#### **Drilling and Sampling**

**CS - Continuous Sampling** 

RC - Rock Coring: Size AW, BW, NW, 2"W

**RQD - Rock Quality Designation** 

RB - Rock Bit/Roller Bit

FT - Fish Tail

DC - Drove Casing

C - Casing: Size 2 1/2", NW, 4". HW

CW - Clear Water

DM - Drilling Mud

HSA - Hollow Stem Auger

FA - Flight Auger

HA - Hand Auger

COA - Clean-Out Auger

SS - 2" Dia. Split-Barrel Sample

2ST - 2" Dia. Thin-Walled Tube Sample

3ST - 3" Dia. Thin-Walled Tube Sample

PT - 3" Dia. Piston Tube Sample

AS - Auger Sample

WS - Wash Sample

PTS - Peat Sample

PS - Pitcher Sample

NR - No Recovery

S - Sounding

PMT - Borehole Pressuremeter Test

VS - Vane Shear Test

WPT - Water Pressure Test

### **Laboratory Tests**

qa - Penetrometer Reading, tons/sq ft

q<sub>a</sub> - Unconfined Strength, tons/sq ft

W - Moisture Content, %

LL - Liquid Limit, %

PL - Plastic Limit, %

SL - Shrinkage Limit, %

LI - Loss on Ignition

D - Dry Unit Weight, lbs/cu ft

pH - Measure of Soil Alkalinity or Acidity

FS - Free Swell, %

#### **Water Level Measurement**

∇- Water Level at Time Shown

NW - No Water Encountered

WD - While Drilling

**BCR - Before Casing Removal** 

ACR - After Casing Removal

CW - Cave and Wet

CM - Caved and Moist

Note: Water level measurements shown on the boring logs represent conditions at the time indicated and may not reflect static levels, especially in cohesive soils.

# CGC, Inc.

Madison - Milwaukee

# Unified Soil Classification System

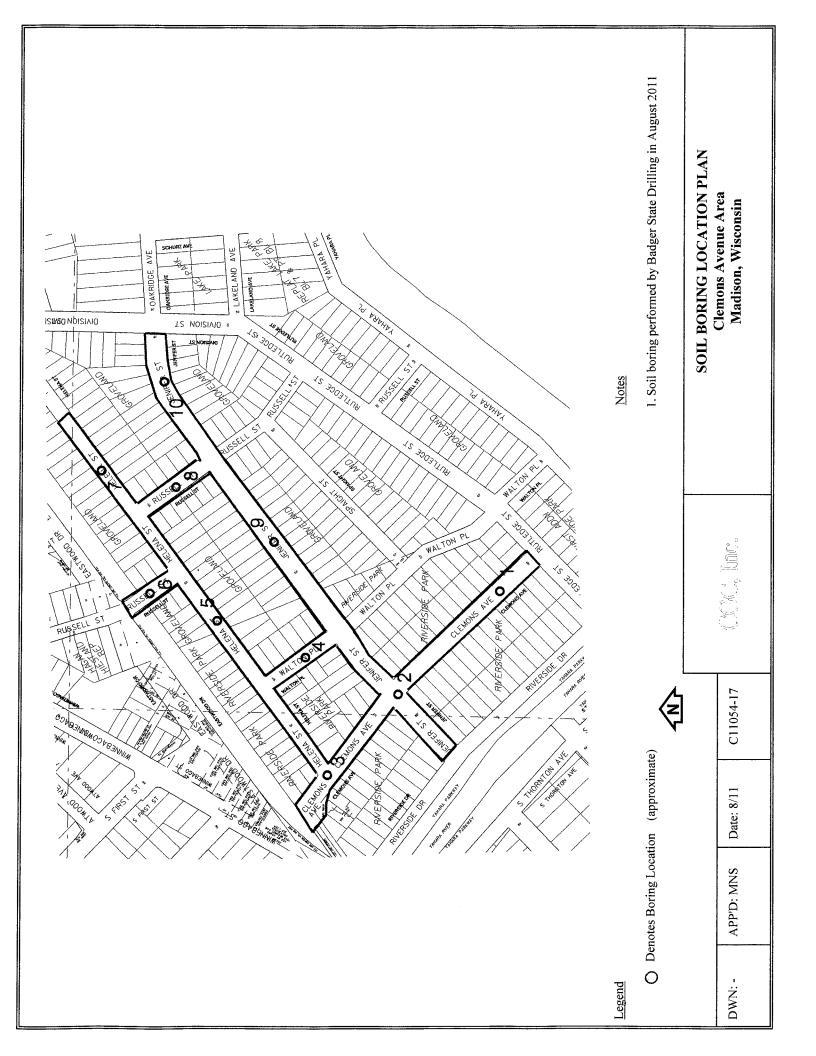
UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART									
COARSE-GRAINED SOILS									
(more than 50% of material is larger than No. 200 sieve size)									
Clean Gravels (Less than 5% fines)									
		GW	Well-graded gravels, gravel-sand mixtures, little or no fines						
GRAVELS More than 50% of		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines						
coarse fraction larger than No. 4	-	Gravels	with fines (More than 12% fines)						
sieve size		GM	Silty gravels, gravel-sand-silt mixtures						
		GC	Clayey gravels, gravel-sand-clay mixtures						
	-	Clean S	ands (Less than 5% fines)						
		sw	Well-graded sands, gravelly sands, little or no fines						
SANDS 50% or more of		SP	Poorly graded sands, gravelly sands, little or no fines						
coarse fraction smaller than No. 4		Sands v	with fines (More than 12% fines)						
sieve size		SM	Silty sands, sand-silt mixtures						
		sc	Clayey sands, sand-clay mixtures						
		FINE-0	GRAINED SOILS						
(50% or m	ore of	material	is smaller than No. 200 sieve size.)						
SILTS AND		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity						
CLAYS Liquid limit less than 50%		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays						
		OL	Organic silts and organic silty clays of low plasticity						
SILTS AND		мн	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts						
CLAYS Liquid limit 50% or		СН	Inorganic clays of high plasticity, fat clays						
greater		ОН	Organic clays of medium to high plasticity, organic silts						
HIGHLY ORGANIC SOILS	77. 7. 7. 77.	PT	Peat and other highly organic soils						

LABORATORY CLASSIFICATION CRITERIA											
				·							
GW $C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3											
G	GP Not meeting all gradation requirements for GW										
G	М	Atterbe	-			Above '					,
G	SC .	Atterberg limts above "A" use of dual symbols line or P.I. greater than 7						-quiiii	,		
SW $C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3											
s	iP	Not me	eting al	l gradat	tion red	quireme	nts for (	GW			
s	M	Atterbe line or f				Limits plotting in shaded zone with P.I. between 4 and 7 are borderline					
S	ic	Atterbe line with	-			cases r					
Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:  Less than 5 percent											
				PLAS	TICIT	Y CHA	RT				
60											
INDEX (PI) (%)							СН				
(3QNI A								P	A LINI 1=0.73(L		

CL

ML&OL

LIQUID LIMIT (LL) (%)





Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

# **LOG OF TEST BORING**

Project Clemons Avenue Area Clemons: 180'NW of Rutledge, 6'NE of Centerline Location Madison, Wisconsin Boring No. 1 Surface Elevation (ft) 94.1\* Job No. **C11054-17** Sheet 1 of 1

			2921	Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 28	38-7887				
SAMPLE				VISUAL CLASSIFICATION	SOIL	PRC	PE	RTIE	ES
No. P (in.) Mo	ist	N I	epth (ft)	and Remarks	qu (qa) (tsf)	W	LL	PL	LI
		-		6" Concrete Pavement/8" Base Course					
1 18	M 1	1		Very Loose to Medium Dense, Light Brown Fine to Medium SAND, Trace to Little Silt and Gravel (SP/SP-SM) (Possible Fill)					
2 10	V.	<u> </u>							
2   18	M :	3    -  -	5—						
		— <u> </u> ∑		Loose to Medium Dense, Gray Fine to Medium					
3 12	W 1	3 L		SAND, Some Silt and Gravel (SM)					
4 6	W	6	10						
		-	10						
		F							
		_							
		<u> </u>							
5   18   1	$W \mid 1$	4						,	
		L	15-	End Boring at 15 ft					
				Borehole backfilled with bentonite chips					
		-		*Elevation determined using an assumed datum of					
				100.0 ft referencing the top nut of a hydrant situated at the intersection of Russell St. and					
			20—	Helena St.					
		-							
		<u>⊢</u>							
		- 							
		L	25-						
	/	۷À٦	- 1	LEVEL OBSERVATIONS	ENERA	LNC	TES	<u> </u>	
While Drilling Time After Dr		6.0'		Upon Completion of Drilling 6' Start 8/1 Driller Ba	1/11 End dger Chief	8/11 BN		ig Cl	ME-5:
Depth to Water	er	_		Logger N Drill Method	<b>1C</b> Editor	ES			

( `(_`( ``	lnc
	inc.)

**∑** 6.0'

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

While Drilling

Depth to Water

Depth to Cave in

Time After Drilling

### LOG OF TEST BORING

Project Clemons Avenue Area
Clemons: 60'SE of Jenifer, 6'NE of Centerline
Location Madison, Wisconsin

Boring No.		2
Surface Ele	evation (ft)	93.9*
Job No	C11054	<b>1-17</b>
Sheet	<b>1</b> of	1

8/8/11 End

Logger MC Editor ESF

Drill Method 2 1/4" HSA

Start

8/8/11

Driller Badger Chief BM Rig CME-55

(608) 288-4100, FAX (608) 288-7887 2921 Perry Street, Madison, WI 53713 SAMPLE **SOIL PROPERTIES VISUAL CLASSIFICATION** and Remarks Depth LL (qa) LT Moist (ft) (tsf) 6" Asphalt Pavement/10" Base Course 18 M Loose, Light Brown Fine SAND, Trace Silt and Gravel (SP) (Possible Fill) Loose, Dark Brown Fine to Medium SAND, Some 2 18 M 6 Silt, Trace to Little Organics (SM) 20.7 5.4 Medium Dense, Light Brown Sandy SILT (ML) 3 18 W 28 Loose, Gray Silty Fine SAND (SM) 18 W 4 Stiff, Gray Lean CLAY (CL) W 18 (1.75)End Boring at 15 ft Borehole backfilled with bentonite chips \*Elevation determined using an assumed datum of 100.0 ft referencing the top nut of a hydrant situated at the intersection of Russell St. and Helena St. WATER LEVEL OBSERVATIONS **GENERAL NOTES** 

Upon Completion of Drilling

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Inc.)

Project Clemons Avenue Area Clemons: 80'NW of Helena, 18'SW of Centerline Location Madison, Wisconsin Sheet 1 of

Boring No.	·	3
Surface Ele	evation (ft)	94.9*
Job No.	C1105	4-17
Sheet	<b>1</b> of	1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE			_E		VISUAL CLASSIFICATION	SOIL PROPERTIES							
No.	Rec	Moist	N	Depth (ft)	and Remarks	qu (qa) (tsf)	W	LL	PL	LI			
	1			<del> </del>	6" Asphalt Pavement/8" Base Course								
1	12	M	10	<del> </del>     	FILL: Dark Brown Sand with Silt and Gravel		:						
				<u> </u>	Very Stiff, Light Gray-Brown Lean CLAY (CL)	_							
2	12	M	13	Γ ├ ├ 5-		(3.75)							
3	15	M	23	- 	Loose to Dense, Gray to Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles and Boulders (SM)								
*****				<u> </u>									
4	4	W	8	   									
5	18	W	31										
		-		├- 15- L I	End Boring at 15 ft								
					Borehole backfilled with bentonite chips								
				├- ├-  -  -  - 20-	*Elevation determined using an assumed datum of 100.0 ft referencing the top nut of a hydrant situated at the intersection of Russell St. and Helena St.								
				├-  -  -  -									
			101	25—	TEVEL OBSEDVATIONS	 GENERA	NIC	TES					
While Time Depth	After to W	Drillir ater	<u>⊽ 8</u> ng		Driller B:  Logger		r ES	<b>1</b> F	tig CN	ME-55			
Depth			on li	nes repi	esent the approximate boundary between may be gradual.	od <b>2 1/4"</b> E	15A						

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Project Clemons Avenue Area
Walton: 165'SE of Helena, 6'NE of Centerline
Location Madison, Wisconsin

Boring No. 4
Surface Elevation (ft) 94.5\*
Job No. C11054-17
Sheet 1 of 1

SAMPLE			E	292.	VISUAL CLASSIFICATION	SOIL PROPERTIES							
No.	T Rec	Moist	N	Depth (ft)	and Remarks	qu (qa) (tsf)	W	LL	PL	LI			
				<del> </del>	6" Concrete Pavement/8" Base Course								
1	18	M	15	<del></del>   	Medium Dense, Light Brown Fine SAND, Trace to Little Silt (SP/SP-SM) (Possible Fill)								
2	18	M	8	  -  -  - 5-	Loose, Gray Silty Fine SAND to Sandy SILT (SM/ML)								
3	18	W	21	<u> </u>   <u>↓</u>  _  _	Medium Dense, Light Brown Sandy SILT (ML)								
				[	Medium Stiff to Stiff, Gray Lean CLAY (CL)								
4	18	W	5	   		(1.0)							
5	18	W	16			(1.5)							
333574				⊢ └── 15 <b>─</b> ─	End Boring at 15 ft	(1.5)							
				20-	*Elevation determined using an assumed datum of 100.0 ft referencing the top nut of a hydrant situated at the intersection of Russell St. and Helena St.								
			W	ATER	LEVEL OBSERVATIONS	ENERA	L NC	TES	5				
Time Dept Dept	e Drill After h to W h to Ca	Drillinater	ıg	nes repr	Driller Ba Logger N Drill Method	<b>IC</b> Editor	r ES ISA	<b>I</b> R	ig <b>C</b> I	ME-55			



Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

# LOG OF TEST BORING

Project Clemons Avenue Area Helena: 180'SW of Russell, 9'NW of Centerline Location Madison, Wisconsin

Boring No. 5 Surface Elevation (ft) 95.5\* Job No. **C11054-17** Sheet 1 of 1

Drill Method 2 1/4" HSA

SAMPLE			Ε		VISUAL CLASSIFICATION	SOIL	PRC	PE	RTII	ES
No.	T Rec	Moist	N	Depth (ft)	and Remarks	qu (qa) (tsf)	w	LL	PL	LI
				├ ├ <del>└</del>	2" Asphalt Pavement/6" Concrete Pavement/6" Base Course					
1	18	M	10	  -  -  -	FILL: Light Brown Fine Sand, Trace to Little Silt					
	18	M	4	i T						
		.,,	·	  -   5-	Loose, Dark Brown Sedimentary PEAT (PT)		53.4			14.6
	10	***		Ϊ́Σ	Loose, Brown Fine to Medium SAND, Trace to					
3	18	W	8	L   	Little Silt and Gravel (SP/SP-SM)					
4	18	W	9	<u>-</u>	Loose, Gray Sandy SILT (ML)					
<b>"T</b>	10	VY		├- ├- ├ 10		(1.75)				
				-    -						
				<u> </u>  -  -	Medium Stiff to Stiff, Gray Lean CLAY (CL)					
5	18	W	9	<del> -</del> 		(1.0)				
				15 L I	End Boring at 15 ft					
					Borehole backfilled with bentonite chips		!			
			   	  -   	*Elevation determined using an assumed datum of 100.0 ft referencing the top nut of a hydrant situated at the intersection of Russell St. and					
				└ └─ 20─ └	Helena St.					
				<u>Г</u>		:				
				- 						
				⊢ ├- └						
			W	ATER	LEVEL OBSERVATIONS	SENERA	L NO	TES	5	
Time	e Drill After h to W	Drillin		.0'	Driller Ba	1/11 End dger Chief MC Editor	8/11/ BM ES	1 F	Rig <b>C</b> I	ME-5:

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	11 101/

Depth to Water Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

# **LOG OF TEST BORING**

Project Clemons Avenue Area Russell: 135'NW of Helena, 9'NE of Centerline Location Madison, Wisconsin

Boring No. **6** Surface Elevation (ft) 97.5\* Job No. **C11054-17** Sheet <u>1</u> of <u>1</u>

Drill Method 2 1/4" HSA

				292	Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 28	8-7887 —					
SAMPLE			LE		VISUAL CLASSIFICATION	SOIL PROPERTIES					
No.	Rec P (in.)	Moist	N	Depth (ft)	and Remarks	qu (qa) (tsf)	W	LL	PL	LI	
					3" Asphalt Pavement/6" Concrete Pavement/8" Base Course						
1	18	M	12	<u> </u>	Loose to Medium Dense, Light Brown Fine SAND, Trace to Little Silt and Gravel (SP/SP-SM)						
					(Probable Fill)						
2	18	M	8	  -  -  - 5-							
3	18	W	9	<u>├</u> <u>├</u> └ └	Soft, Dark Brown to Black Sandy Lean CLAY (CL) (Possible Buried Topsoil)	(0.4)			:		
4	18	W	17	<u> </u>	Loose, Gray Fine to Medium SAND, Some Silt				_		
4	10	V V	1 /	├- ├- ├- 10-	Medium Dense, Gray-Brown Sandy SILT with Clay Seams and Lenses (ML/CL)						
5	18	W	27		Medium Dense, Brown Fine SAND, Little to Some Silt (SP/SP-SM)						
	10	VV	21	├-  -  - 15-	End Dowing at 15 ft						
				L_    - 	End Boring at 15 ft  Borehole backfilled with bentonite chips						
					*Elevation determined using an assumed datum of 100.0 ft referencing the top nut of a hydrant situated at the intersection of Russell St. and Helena St.						
			w	ATER	LEVEL OBSERVATIONS G	ENERA	L NO	TES	)		
Time	Drilli After	Drillin	<u>⊽ 6</u>			1/11 End Iger Chief	8/11 BN	11 R		ME-55	

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Project Clemons Avenue Area
Helena: 90'NE of Russell, 7'SE of Centerline
Location Madison, Wisconsin

Boring No. 7
Surface Elevation (ft) 96.4\*
Job No. C11054-17
Sheet 1 of 1

2021	Dorre	Ctroot	Madison,	wT	53713	
494I	Perry	Street,	madison,	MT	33/T3	

(608) 288-4100, FAX (608) 288-7887

SAMPLE			LE		VISUAL CLASSIFICATION	SOIL PROPERTIES						
No.	Rec	Moist	N	Depth (ft)	and Remarks	qu (qa) (tsf)	w	LL	PL	LI		
				<del> </del>	2" Asphalt Pavement/8" Concrete Pavement/10"							
1	18	M	13	<b>⊢</b> <b>⊢</b>	Base Course							
				 	Medium Dense, Light Brown Fine to Medium SAND, Little to Some Silt and Gravel (SP-SM/SM)							
					SAND, Little to Some Sitt and Graver (SF-SW/SW)	-						
2	18	M	4	Ţ	Loose, Brown to Gray Fine to Coarse SAND, Trace							
				  -   5	to Little Silt and Gravel (SP/SP-SM)							
				-   -    -	Loose to Medium-Dense, Gray Fine to Medium	-						
3	18	W	10	L	SAND, Little Silt (SP-SM)							
				<u></u>								
					Medium Stiff to Stiff, Gray Lean CLAY, Trace	-						
4	18	W	8	<del> </del>	Sand (CL)	(0.75)						
				⊢ ├ 10-		(0.73)						
				<b>⊢</b> <b>∟</b>								
				_								
				Ė								
				_								
5	18	W	10	 		(1.75)						
				├- ├ 15	End Boring at 15 ft	(21,0)						
				<u>_</u>	End Boring at 13 ft							
				<u> </u>	Borehole backfilled with bentonite chips							
				<u></u>	*Elevation determined using an assumed datum of	:						
				 	100.0 ft referencing the top nut of a hydrant							
				 	situated at the intersection of Russell St. and							
				20-	Helena St.							
				<u></u>								
				  -  -								
				<del> </del> 								
				<b>L</b>								
			_,_,	25-	- FUEL ODOEDWATIONO	CENICOA	 	TEC				
			VV	416	LEVEL OBSERVATIONS (	GENERA	LIVU	1 = 3	•			
While			<u> </u>	.0'		11/11 End	8/11		ia Ca	/T = = =		
Time . Depth			ıg		Driller Ba  Value Logger I	dger Chief MC Editor			ng Çi	AE-55		
Depth	to Ca	ive in			Drill Metho	d 2 1/4" H						
The soil	strati types	ficati and t	on li	nes repr	esent the approximate boundary between							

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Project Clemons Avenue Area
Russell: 110'NW of Jenifer, 6'NE of Centerline
Location Madison, Wisconsin

Boring No. **8**Surface Elevation (ft) **95.6\***Job No. **C11054-17**Sheet **1** of **1** 

292	1 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 28	38-7887 —		<del></del>	
SAMPLE	VISUAL CLASSIFICATION		PRO	PERT	IES
No. Property (in.) Moist N Depth (ft)	and Remarks	qu (qa) (tsf)	w	LL PL	rı
	8" Concrete Pavement/8" Base Course				
1 18 M 12 L	Medium Dense to Loose, Light Brown Fine to Medium SAND, Trace to Little Silt and Gravel				
	(SP/SP-SM) (Probable Fill)				
2 18 M 4	Loose to Very Loose, Dark Brown to Black Fine to Medium SAND, Some Silt and Clay (SM/SC)				
3   18   W   13 L	Medium Dense, Gray Fine to Medium SAND, Trace to Little Silt and Gravel (SP/SP-SM)				
4 18 W 14					
4 18 W 14 - 10-					
5 <b>1</b> 8 W 11	Stiff, Gray Lean CLAY (CL)				
5   18   W   11		(1.25)			
L. 15-	End Boring at 15 ft				
	Borehole backfilled with bentonite chips				
	*Elevation determined using an assumed datum of 100.0 ft referencing the top nut of a hydrant				
	situated at the intersection of Russell St. and Helena St.				
WATER	R LEVEL OBSERVATIONS G	ENERA	L NO	TES	
While Drilling	Upon Completion of Drilling 6' Start 8/1 Driller Bac Logger M Drill Method	IC Editor	ESF	Rig <b>C</b>	CME-55
The stratification lines repr	resent the approximate boundary between				

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Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

# LOG OF TEST BORING

Project Clemons Avenue Area Jenifer: 310'NE of Walton, 6'SE of Centerline Location Madison, Wisconsin

Boring No. 9 Surface Elevation (ft) 95.6\* Job No. **C11054-17** Sheet 1 of 1

Drill Method 2 1/4" HSA

				29	21 Pe:	rry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 28	8-7887 —				
SAMPLE			VISUAL CLASSIFICATION	SOIL	PRC	PE	RTII	IES			
No.	T Rec Y (in.)	Moist	N	Depth (ft)		and Remarks	qu (qa) (tsf)	w	LL	PL	rı
				<del></del>	$\forall$	3" Asphalt Pavement/8" Concrete Pavement/8"	, , , , , , , , , , , , , , , , , , , ,				
1	12	M	9	<del> </del> -	$\times$	Base Course					
1	12	141		<u> </u>		Loose, Light Brown Fine to Medium SAND, Little to Some Silt (SP/SP-SM) (Possible Fill)					
	10	3.6		<u></u>		T					
2	12	M	4	├  -   <u>-</u> 5		Loose to Very Loose at 4 ft					
				-		Medium Dense, Gray Fine to Medium SAND,					
3	18	W	15	<u></u>		Trace to Little Silt and Gravel (SP/SP-SM)					
				<u> </u>							
4	18	W	24	<del> </del>							
				10  -	7:						
				<u></u>		Stiff, Gray Lean CLAY (CL)					
				_		Still, Gray Leali CLAT (CL)					
5	18	W	9	 +    -			(1.25)				
				15	_////	End Boring at 15 ft					
						_					
				Ė		Borehole backfilled with bentonite chips					
				-  -  -		*Elevation determined using an assumed datum of 100.0 ft referencing the top nut of a hydrant situated at the intersection of Russell St. and					
				-  -  -  -  -  -		Helena St.					
				_							
				<u></u>							
				<b>⊢</b>							
				į.							
				Ļ.							
			187	25-		EVEL ODGEDWATIONS		NI C	TEC		
			VV.	ATE	Κ L	EVEL OBSERVATIONS G	ENERA	LINU	1 = 3	<b>)</b>	
Time	e Drill After 1 to W	Drillin	<u>⊽</u> •	5.0'		Driller Bac	0/ <b>11</b> End <b>lger</b> Chief <b>C</b> Editor	8/10/ BN ES	<b>1</b> R	ig <b>C</b> I	ME-55



Project Clemons Avenue Area

Jenifer: 100'NE of Russell, 7'SE of Centerline

Location Madison, Wisconsin

Boring No. 10
Surface Elevation (ft) 96.0\*
Job No. C11054-17
Sheet 1 of 1

				292	Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 28	8-7887 —				
SAMPLE			VISUAL CLASSIFICATION	SOIL	RTIE	ΓIES				
No.	T Y Rec P (in.)	Moist	N	Depth (ft)	and Remarks	qu (qa) (tsf)	w	LL	PL	LI
				<del> </del>	3" Asphalt Pavement/8" Concrete Pavement/8"					
1	18	M	4	<del> </del>	Base Course					
				<u></u>	Loose to Very Loose, Light Brown Fine SAND,					
				<u> </u>	Trace to Little Silt and Gravel (SP/SP-SM)  (Possible Fill)					
2	18	M	8	Ţ	Loose, Brown Fine to Coarse SAND, Little Silt and					
_		1,1		<del>*</del>  -	Gravel (SP-SM)					ı
<i></i>				<del> </del> 5-						
	1.0	**7	1.4	<u> </u>	Medium Dense, Gray Fine to Medium SAND, Little					
3	18	W	14	L	Silt and Gravel (SP-SM)					
				1						
					Medium Dense, Gray Sandy SILT (ML)					
4	18	W	18	<u> </u>						
				⊢ <del> </del> 10						
				-						
				<u></u>						
					Medium-Stiff/Loose to Medium Dense, Gray SILT					
					and Lean CLAY, Trace Sand (ML/CL)					
5	18	W	10	<del>,</del> -						
_				<u> -</u>		(0.8)				
				15- L	End Boring at 15 ft					
				<u></u>						
				_	Borehole backfilled with bentonite chips					
				_	*Elevation determined using an assumed datum of					
				-  -	100.0 ft referencing the top nut of a hydrant					
				⊢ ∟	situated at the intersection of Russell St. and					
				20-	Helena St.					
				<u></u>						
				_ 						
				<del>-</del>						
				<u></u>						
				<u> </u>						
				L L 25-						
			W	ATER	LEVEL OBSERVATIONS G	ENERA	LNC	TES	5	<del>100 </del>
Whil	e Drill	ing	<u>⊽</u> 4	.0'	Upon Completion of Drilling 4' Start 8/1	0/11 End	8/10	/11		
Time	After	Drillin			Driller Bac	lger Chief	BN	<b>1</b> R	ig CN	ИЕ-55
	n to W n to Ca				Logger M Drill Method	IC Editor 2 1/4" F	ES ISA	Ķ		

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

CGC, Inc.

# LOG OF TEST BORING General Notes

# **Descriptive Soil Classification**

#### **GRAIN SIZE TERMINOLOGY**

Soil Fraction	Particle Size	U.S. Standard Sieve Size
Boulders	Larger than 12"	Larger than 12"
Cobbles	3" to 12"	3" to 12"
Gravel: Coarse	3/4" to 3"	3/4" to 3"
	4.76 mm to 3/4"	
	2.00 mm to 4.76 mm	
	0.42 to mm to 2.00 mm	
	0.074 mm to 0.42 mm	
Silt	0.005 mm to 0.074 mm	Smaller than #200
	Smaller than 0.005 mm	

Plasticity characteristics differentiate between silt and clay.

#### **GENERAL TERMINOLOGY**

#### **RELATIVE DENSITY**

Physical Characteristics	Term	"N" Value
Color, moisture, grain shape, fineness, etc.	Very Loose	0-4
Major Constituents	Loose	
Clay, silt, sand, gravel	Medium Dense	10-30
Structure	Dense	30-50
Laminated, varved, fibrous, stratified, cemented, fissured, etc.	Very Dense	Over 50
Geologic Origin		

# RELATIVE PROPORTIONS OF OF COHESIONLESS SOILS

Glacial, alluvial, eolian, residual, etc.

#### **CONSISTENCY**

Proportional	Defining Range by	Term	q <sub>u</sub> -tons/sq. ft.
Term	Percentage of Weight	Very Soft	0.0 to 0.25
		Soft	
Trace	0%-5%	Medium	0.50 to 1.0
Little	5%-12%	Stiff	1.0 to 2.0
Some	12%-35%	Very Stiff	2.0 to 4.0
And			Over 4.0

# ORGANIC CONTENT BY COMBUSTION METHOD

#### **PLASTICITY**

Soil Description	Loss on Ignition	Term	Plastic Index
Non Organic		None to Slight	0-4
Organic Silt/Clay	4-12%		5-7
Sedimentary Peat		•	8-22
Fibrous and Woody Pe	at More than 50%		h Over 22

The penetration resistance, N, is the summation of the number of blows required to effect two successive 6" penetrations of the 2" split-barrel sampler. The sampler is driven with a 140 lb. weight falling 30" and is seated to a depth of 6" before commencing the standard penetration test.

#### **SYMBOLS**

#### DRILLING AND SAMPLING

**CS-Continuous Sampling** 

RC-Rock Coring: Size AW, BW, NW, 2"W

**RQD—Rock Quality Designator** 

RB-Rock Bit

FT-Fish Tail

DC--Drove Casing

C--Casing: Size 2 1/2", NW, 4", HW

CW-Clear Water

DM-Drilling Mud

**HSA--Hollow Stem Auger** 

FA--Flight Auger

HA-Hand Auger

COA-Clean-Out Auger

SS-2" Diameter Split-Barrel Sample

2ST--2" Diameter Thin-Walled Tube Sample

3ST-3" Diameter Thin-Walled Tube Sample

PT-3" Diameter Piston Tube Sample

AS-Auger Sample

WS-Wash Sample

PTS-Peat Sample

PS--Pitcher Sample

NR--No Recovery

S-Sounding

PMT-Borehole Pressuremeter Test

VS-Vane Shear Test

WPT--Water Pressure Test

#### **LABORATORY TESTS**

qa-Penetrometer Reading, tons/sq. ft.

qu-Unconfined Strength, tons/sq. ft.

W-Moisture Content, %

LL--Liquid Limit, %

PL-Plastic Limit, %

SL-Shrinkage Limit, %

LI-Loss on Ignition, %

D--Dry Unit Weight, lbs/cu. ft.

pH-Measure of Soil Alkalinity or Acidity

FS-Free Swell, %

#### WATER LEVEL MEASUREMENT

∇ --Water Level at time shown NW--No Water Encountered

WD-While Drilling

**BCR-Before Casing Removal** 

ACR-After Casing Removal

CW-Caved and Wet

CM--Caved and Moist

Note: Water level measurements shown on the boring logs represent conditions at the time indicated and may not reflect static levels, especially in cohesive soils.

# **UNIFIED SOIL CLASSIFICATION SYSTEM**

#### **COARSE-GRAINED SOILS**

(More than half of material is larger than No. 200 seive size.)

GRAVELS More than half of coarse fraction larger than No. 4 sieve size

#### Clean Gravels (Little or no fines)

GW Well-graded gravels, gravel-sand mixtures, little or no fines

GP Poorly graded gravels, gravel-sand mixtures, little or no fines

Gravels with Fines (Appreciable amount of fines)

-GM d Silty gravels, gravel-sand-silt mixtures

GC Clayey gravels, gravel-sand-clay mixtures

SANDS More than half of ccarse fraction smaller than No. 4 sieve size

#### Clean Sands (Little or no fines)

SW Well-graded sands, gravelly sands, little or no fines

SP Poorly graded sands, gravelly sands, little or no fines

Sands with Fines (Appreciable amount of fines)

SM d Silty sands, sand-silt mixtures

SC Clayey sands, sand-clay mixtures

## FINE-GRAINED SOILS

(More than half of material is smaller than No. 200 sieve.)

SILTS AND CLAYS Liquid limit less than 50% ML Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity

CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays

OL Organic silts and organic silty clays of low plasticity

SILTS AND CLAYS Liquid limit greater than 50% MH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts

CH Inorganic clays of high plasticity, fat clays

OH Organic clays of medium to high plasticity, organic silts

HIGHLY ORGANIC SOILS

PT Peat and other highly organic soils

#### LABORATORY CLASSIFICATION CRITERIA

**GW**  $C_u = \frac{D_{ee}}{D_{co}}$  greater than 4;  $C_c = \frac{(D_{ac})^2}{D_{co} \times D_{co}}$  between 1 and 3

GP Not meeting all gradation requirements for GW

GM Atterberg limits below "A" line or P.I. less than 4

GC

Atterberg limits above "A" line with P.I. greater than 7

Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols

SW  $C_u = \frac{D_{eo}}{D_{1o}}$  greater than 6;  $C_c = \frac{(D_{3o})^2}{D_{1o}XD_{eo}}$  between 1 and 3

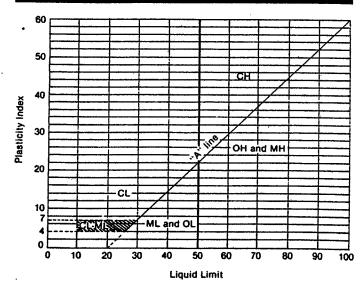
SP Not meeting all gradation requirements for SW

SM Atterberg limits below "A" line or P.I. less than 4

Limits plotting in hatched zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.

SC Atterberg limits above "A" line with P.I. greater than 7

#### PLASTICITY CHART



For classification of fine-grained soils and fine fraction of coarse-grained soils.

Atterberg Limits plotting in hatched area are borderline classifications requiring use of dual symbols.

Equation of A-line: PI = 0.73 (LL - 20)