CGC, Inc.

Construction • Geotechnical
Consulting Engineering/Testing

January 12, 2022
C21051-25

Mr. Chris Petykowski
City of Madison Engineering Dept.
City-County Building, Room 115
210 Martin Luther King, Jr. Blvd.
Madison, WI 53703-3345

Re: Geotechnical Services
Lake Mendota Drive
Madison, Wisconsin

Dear Mr. Petykowski:

CGC, Inc. has completed our geotechnical services for the above-referenced project. At your request, fifteen soil borings were drilled along Lake Mendota Drive between Camelot Drive and Sumac Drive (B2-B4, B6, B7, B9-B14); Capital Avenue slightly west of Lake Mendota Drive (B4); Norman Way slightly west of Lake Mendota Drive (B8); as well as along Camelot Drive slightly northwest of Baker Avenue (B1). Note that an additional boring was necessary at B13 to achieve the requested depth after the initial attempt (B13X) encountered auger refusal on a presumed boulder 5 ft below existing grade. In addition, several of the borings (B1, B5, B9 and B10) were performed for previous requests by the City of Madison. Proposed boring locations were marked in the field by CGC personnel prior to drilling and are shown on a Boring Location Map (copy attached in Appendix A). Note that actual boring locations are indicated by direction and distance in feet from the nearest intersecting roadway on the individual boring logs. Elevations at the boring locations were estimated using topographic information obtained from Dane County DCi Map, which should be considered approximate. The following paragraphs discuss our observations and provide opinions relative to pavement/utility construction. The following paragraphs discuss our observations and provide opinions relative to pavement/utility construction.

SUBSURFACE PROGRAM & OBSERVATIONS

The borings were drilled to depths selected by City personnel utilizing the services of Badger State Drilling (under subcontract to CGC) using truck-mounted, rotary CME 55 and Diedrich D-120 drill rigs equipped with hollow-stem augers. As stated, the initial attempt to advance B13 terminated prior to achieving the target depth due to auger refusal on a presumed boulder. Additionally, B4 terminated 1 ft short of the requested depth on a presumed boulder or possible bedrock. Standard Penetration Test (SPT) drilling techniques (ASTM D1586) were used for the full exploration depths at the boring locations. This method consists of driving a 2-inch outside diameter split-barrel sampler using a 140-pound weight falling freely through a distance of 30 inches. The sampler is first seated 6 inches into the material to be sampled and then driven 12 inches. The number of blows required to drive the sampler the final 12 inches is recorded on the log of borings and is known as the Standard Penetration Resistance (commonly referred to as the N-value).

2921 Perry Street, Madison WI 53713
Telephone: 608/288-4100
FAX: 608/288-7887

During the field exploration program, the driller visually classified the soils and prepared a field log. Water level observations were made within the borings during and shortly after drilling, which are shown on the bottom of each boring log. Note groundwater was encountered between 6 and 14 ft below existing grades at all of the boring locations except B11-B14. Groundwater levels are anticipated to fluctuate based on seasonal variations in precipitation, infiltration, adjacent Lake Mendota stages, as well as other factors. Upon completion of drilling, the borings were backfilled to satisfy WDNR requirements, patched with asphalt and the soil samples were delivered to our laboratory for classification. The soils were visually classified by CGC and reviewed by a geotechnical engineer using the Unified Soil Classification System (USCS). The final logs prepared by the engineer and a description of the USCS are presented in Appendix A.

The attached boring logs indicate that significantly variable pavement/soil conditions exist at the boring locations. In general, 3 to 7.5 in. of asphalt pavement was present atop 3 to 9 in. of base course over 2 to 7.5 ft of variable fill materials. The fill materials were underlain by 2.5 to 5 ft of clay soils over 2 to 16 ft of granular soils extending to the maximum depth explored. Note that 7 ft of weathered to competent bedrock beginning approximately 8 ft below existing grade was present beneath the sands at B13. As exceptions: no asphalt was present at B4; no native clay soils were encountered at B1, B2, B5, B7, B10-B14; and a 1.5-2.5 ft layer of *peat* was sandwiched between the fill materials and underlying native soils at B8-B10. Note that portions of the granular soils at B1 and B6 were considered to be *silts*. Please refer to the final logs included in Appendix A for additional information specific to a boring location.

PAVEMENT/UTILITY CONSTRUCTION

<u>General</u>

In our opinion, the highly variable fill materials encountered beneath the pavements/base course may prove *generally* satisfactory for proposed roadway support; however, some areas of unstable subgrade are possible. Where areas of softer clays are encountered (such as where pocket penetrometer values are near 1 tsf or less), they may require undercuting/removal followed by replacement with granular fill or additional base course. Granular materials should be thoroughly compacted and evaluated for stability before the placement of additional fill and/or base course. Furthermore, significant construction traffic could destabilize the existing materials and increase the potential for undercuts. Pockets of excessively organic soil should also be removed. *We typically recommend that consideration be given to removing any significant layers of peat which remain after utility reconstruction.* As the depths of the organic layers encountered at the boring locations could make for costly removal, it is CGC's opinion that the peat could remain in-place provided *no grade changes are anticipated.* If the existing pavement has performed satisfactorily, then adequate consolidation of the peat may have already occurred (resulting in no substantial decrease in the pavement design life if left in place). Standard earthwork-related techniques that should be used during roadway construction include:

- Proof-rolling of the exposed subgrades;
- Undercutting and/or stabilization in soft areas; and

- Compaction control of fill/backfill materials.

Where a utility alignment coincides with soft/loose conditions (encountered at various depths within a majority of the borings), we recommend that increased bedding thicknesses, possibly underlain by a geotextile, be considered. In addition, highly organic soils/peat (such as those encountered at B8-B10) *should be removed from beneath all utilities.* Furthermore, dewatering will likely be necessary during some utility installations. Pumping from sump pits is typically acceptable for drawdowns of about two feet or less and well points are generally needed for greater drawdowns. Additional details can be provided upon request.

As stated, one of the borings (B4) did not achieve the requested depth due to auger refusal on a presumed boulder/possible bedrock. At B13, the initial attempt terminated 5 ft below existing grade on a presumed boulder and the second attempt was successfully drilled to depth, but through 7 ft of sandstone bedrock. *Special excavation measures could be necessary to accomplish deeper utility installations*, depending on the invert elevation, size/number of boulders present and/or degree of weathering within bedrock layers. For convenience we have included Rock Excavation Considerations in Appendix C.

Pavement Design

Clays will control the pavement design, as we anticipate that the pavement subgrades will generally consist of fill materials containing clay. The following *generalized* parameters should be used to develop the design pavement section:

AASHTO classification	A-6
Frost group index	F-3
Design group index	14
Soil support value	3.9
Subgrade modulus, k (pci)	125
Estimated percent shrinkage	20 - 30
Estimated CBR value	2-5

Assuming Lake Mendota Drive is considered a local business/arterial street, we estimate it could receive between 51 to 275 ESALs (18,000 pound Equivalent Single Axle Loads). A typical pavement design per WisDOT Standard Specifications should meet MT (E-3) requirements. If traffic volumes along Capital Avenue and Norman Way are less than 3000 cars and 100 trucks per day per design lane, a typical pavement design per WisDOT Standard Specifications should meet LT (E-1) requirements.

Compaction Requirements

Regarding utility construction, we anticipate that imported sands will at times be required for use as trench backfill which is a typical requirement for City projects. On-site sands could be considered for reuse as backfill but they should be separated from clay soils and selectively stockpiled. Silt soils or sands with significant clay content should *not* be considered for reuse as backfill. Excavated bedrock could also be considered for reuse as backfill provided it is sufficiently crushed and well graded (e.g. 50% sand-sized particles and smaller) such that excessive voids do not exist following placement. We recommend that at least a level of 95% compaction be achieved within backfill material placed within the final 3 feet below finished subgrades (including undercut backfill - if any), with 90% compaction required at depths greater than 3 feet. The specified levels of compaction are based on modified Proctor methods (ASTM D1557). In addition, the backfill material should be placed and compacted in accordance with our Recommended Compacted Fill Specifications presented in Appendix B.

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We appreciate the opportunity to be of service on this project and look forward to working with you as it proceeds. Other information regarding this report and its limitations is included in Appendix D.

We trust this report addresses your present needs. If you have any questions, please contact us.

Sincerely,

CGC, Inc.

Michael N Schultz

Michael N. Schultz, P.E.
Principal/Consulting Professional

Encl: Appendix A - Soil Boring Location Map
Logs of Test Borings (15)
Log of Test Borings-General Notes
Unified Soil Classification System
Appendix B - Recommended Compacted Fill Specifications
Appendix C - Rock Excavation Considerations
Appendix D - Document Qualifications

Cc: Ms. Johanna Johnson, City of Madison, Eng. Division
Ms. Christy Bachmann, City of Madison, Eng. Division
Mr. Adam Weiderhoeft, Madison Water Utility

APPENDIX A

SOIL BORING LOCATION MAP
LOGS OF TEST BORINGS (15)
LOG OF TEST BORINGS-GENERAL NOTES
UNIFIED SOIL CLASSIFICATION SYSTEM

Legend

Denotes Boring Location

N

Scale: Reduced

Notes

1. Soil Borings performed by Badger State Drilling in November 2021 (except for B1, B5, B9 and B10)
2. Boring locations are approximate

Date: 12/2021	CGC, Inc.	Soil Boring Location Map Lake Mendota Drive Madison, WI
Job No. C21051-25		

CGC Inc.

LOG OF TEST BORING

Project: Lake Mendota Dr. (Mendota Grassman)
Camelot: 90'NW of Baker, 8'NE of Centerline
Location: Madison, WI

Boring No. 1
Surface Elevation (ft) 858±
Job No. C21051-10
Sheet 1 of 1

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

SAMPLE No.	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
					4 in. Asphalt Pavement/8 in. Base Course					
1	18	M	11		FILL: Medium Dense Brown and Dark Brown Sand with Clay to 3'					
2	18	M	4		Soft to Medium Stiff Bluish-Gray Sandy Clay to 5'	(0.5)				
				5	Medium Dense Sand with Gravel to 8'					
3	18	M/W	27							
4	18	W	20		Medium Dense, Brown Sandy SILT, Trace to Little Gravel and Clay (ML)					
5	20	W	21	10						
6	24	W	41		Dense to Very Dense, Brown Silty Fine SAND, Some Gravel, Trace Clay (SM)					
7	20	W	58/ 10"	15						
8	10	W	8		Loose, Light Brown Fine SAND, Some Silt, Trace Gravel (SM)					
9	24	W	18		Medium Dense to Dense, Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles and Boulders (SM)					
10	24	W	19	20						
11	15	W	49							
12	0	-	50/2"		Presumed Bedrock (Hard Drilling)					
				25	End Boring at 25 ft Due to Auger Refusal on Presumed Bedrock/Possible Boulder Borehole backfilled with bentonite chips and asphalt patch					
				30						

WATER LEVEL OBSERVATIONS

While Drilling ∇ 8.5'   Upon Completion of Drilling 6'

Time After Drilling				3 Hour
Depth to Water				6'
Depth to Cave in				8'

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

GENERAL NOTES

Start 7/21/21 End 7/21/21
Driller BSD Chief MC Rig CME-55
Logger GB Editor ESF
Drill Method 2.25" HSA; Autohammer

LOG OF TEST BORING

CGC Inc.

Project	Lake Mendota Drive
	200'SE of Baker, 5'NE of Centerline
Location	Madison, WI
Boring No.	2
Surface Elevation (ft)	868±
Job No.	C21051-25
Sheet	1 of 1

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

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						4.5 in. Asphalt Pavement/3 in. Base Course					
1		12	M	6		FILL: Loose Brown Sand with Silt, Clay and Gravel					
2		16	M	10	5	Loose to Medium Dense, Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles and Boulders (SM - Possible Fill)					
3		18	M	4		Loose to Very Loose, Light Brown Fine SAND, Some Silt (SM)					
4		12	W	2	10	Very Loose, Light Brown Fine to Medium SAND, Trace to Little Silt and Gravel (SP/SP-SM)					
5		18	W	7		Loose, Light Brown Fine to Medium SAND, Trace to Little Silt and Gravel (SP/SP-SM)					
6		18	W	8	15						
					20	End Boring at 15 ft Borehole backfilled with bentonite chips and asphalt patch					

WATER LEVEL OBSERVATIONS

While Drilling	∇ 8.5'	Upon Completion of Drilling		
Time After Drilling				
Depth to Water				
Depth to Cave in				

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

GENERAL NOTES

Start	11/24/21	End	11/24/21		
Driller	BSD	Chief	MC	Rig	CME-55
Logger	KD	Editor	ESF		
Drill Method	2.25" HSA; Autohammer				

CGC Inc.

LOG OF TEST BORING

Project: Lake Mendota Drive
55'NW of Upham, 9'NE of Centerline
Location: Madison, WI

Boring No. 3
Surface Elevation (ft) 861±
Job No. C21051-25
Sheet 1 of 1

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

SAMPLE No.	Type	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						3 in. Asphalt Pavement/6 in. Base Course					
1		14	M	6		FILL: Medium Stiff Brown Clay	(0.75)				
2		16	M	10		Stiff, Brown Lean CLAY (CL - Possible Fill)	(1.75)				
3		10	M/W	12	5	Medium Dense, Brown Clayey SAND, Some Silt, Little Gravel (SC - Possible Fill)					
4		8	W	5	▽	Loose to Very Loose, Brown-Gray Fine to Coarse SAND, Some Silt and Gravel, Trace Clay (SM - Possible Fill)					
5		18	W	2	10						
6		18	W	5		Loose, Light Rust-Brown Fine to Medium SAND, Trace to Little Silt and Gravel (SP/SP-SM)					
					15	End Boring at 15 ft Borehole backfilled with bentonite chips and asphalt patch					
					20						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 8.5' Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______
Depth to Cave in ______

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

GENERAL NOTES

Start 11/24/21 End 11/24/21
Driller BSD Chief MC Rig CME-55
Logger KD Editor ESF
Drill Method 2.25" HSA; Autohammer

LOG OF TEST BORING

CGC Inc.

Project: Lake Mendota Drive
Capital: 100'E of LMD, Near Centerline
Location: Madison, WI

Boring No. 4
Surface Elevation (ft) 858±
Job No. C21051-25
Sheet 1 of 1

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SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						9 in. Base Course					
1		18	M	9		FILL: Loose Brown Silt with Some Clay and Traces Sand					
2		16	M	4	5	Stiff, Brown and Reddish-Brown (Mottled) Lean CLAY (CL)	(1.25)				
3		10	W	12	▽	Medium Dense, Brown Fine to Medium SAND, Little to Some Silt and Gravel (SP-SM/SM)					
4		18	W	15	10						
5		16	W	14							
6		0	-	50/2"	15	End Boring at 14 ft Due to Auger Refusal on Presumed Boulder or Possible Bedrock Borehole backfilled with bentonite chips and asphalt patch					
					20						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.0'   Upon Completion of Drilling ______
Time After Drilling
Depth to Water
Depth to Cave in

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

GENERAL NOTES

Start 11/24/21 End 11/24/21
Driller BSD Chief MC Rig CME-55
Logger KD Editor ESF
Drill Method 2.25" HSA; Autohammer

LOG OF TEST BORING

CGC Inc.

Project: Lake Mendota Drive
420'S of Capital, 8'E of CL
Location: Madison, WI

Boring No. 5
Surface Elevation (ft) 865±
Job No. C12075-20
Sheet 1 of 1

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

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						6 in. Asphalt Pavement/6 in. Base Course					
1		18	M	27		FILL: Mix of Medium Dense to Loose Brown Silty Sand and Stiff to Very Stiff Clay	(2.0)				
2		18	M	7	5		(1.5)				
3		18	M	9		Loose, Brown Clayey Fine SAND (SC)					
4		18	M	11	10	Medium Dense, Light Brown Silty Fine SAND (SM)					
5		18	W	14	▽ 15	Medium Dense, Light Brown Fine to Medium SAND, Trace Silt (SP)					
					20	End Boring at 15 ft Borehole backfilled with bentonite chips and asphalt patch					

WATER LEVEL OBSERVATIONS

While Drilling	▽ 14.0'	Upon Completion of Drilling			
Time After Drilling					
Depth to Water					▼
Depth to Cave in				13'	

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

GENERAL NOTES

Start 10/22/12 End 10/22/12
Driller Badger Chief AP Rig D120
Logger GM Editor ESF
Drill Method 4 1/4" HSA

LOG OF TEST BORING

CGC Inc.

Project	Lake Mendota Drive
	260'SE of Epworth, 7'NE of Centerline
Location	Madison, WI
Boring No.	6
Surface Elevation (ft)	865±
Job No.	C21051-25
Sheet	1 of 1

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

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						7.5 in. Asphalt Pavement/2 in. Base Course					
1		10	M	6		FILL: Mixed Loose Silty Sand and Medium Stiff Clay	(0.75)				
						Loose, Grayish-Brown SILT, Some Clay (ML)					
2		8	M	7							
					5	Medium Stiff to Stiff, Grayish-Brown (Mottled) Lean CLAY, Trace Sand (CL)	(0.75)				
3		14	M	5			(1.0)				
						Medium Dense, Light Brown Fine to Medium SAND, Trace to Little Silt and Gravel (SP/SP-SM)					
4		18	M/W	19							
					10						
5		12	W	13	▽						
6		12	W	18							
					15	End Boring at 15 ft Borehole backfilled with bentonite chips and asphalt patch					
					20						

WATER LEVEL OBSERVATIONS

While Drilling	▽ 11.0'	Upon Completion of Drilling		
Time After Drilling				
Depth to Water				▼
Depth to Cave in				

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

GENERAL NOTES

Start	11/24/21	End	11/24/21		
Driller	BSD	Chief	MC	Rig	CME-55
Logger	KD	Editor	ESF		
Drill Method	2.25" HSA; Autohammer				

LOG OF TEST BORING

CGC Inc.

Project	Lake Mendota Drive
	280'NW of Norman, 7'NE of Centerline
Location	Madison, WI
Boring No.	7
Surface Elevation (ft)	860±
Job No.	C21051-25
Sheet	1 of 1

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

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
						5.5 in. Asphalt Pavement/6 in. Base Course					
1		16	M	29		FILL: Medium Dense Brown Sand and Gravel with Silt and Clay to 3'					
2		12	M	8		Stiff Greenish-Gray Clay to 4.5'	(1.25)				
					5						
3		16	M/W	16		Medium Dense Brown-Gray SAND with Silt and Gravel to 8'					
4		10	W	42	∇	Dense, Brown Fine to Coarse SAND and GRAVEL, Some Silt (SM/GM)					
					10						
5		6	W	30		Medium Dense to Dense, Brown Fine to Medium SAND, Little to Some Silt and Gravel (SP-SM/SM)					
6		4	W	27							
					15	End Boring at 15 ft Borehole backfilled with bentonite chips and asphalt patch					
					20						

WATER LEVEL OBSERVATIONS

While Drilling ∇ 8.5' Upon Completion of Drilling ______

Time After Drilling ______

Depth to Water ______ ▼

Depth to Cave in ______

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

GENERAL NOTES

Start 11/24/21 End 11/24/21

Driller BSD Chief MC Rig CME-55

Logger KD Editor ESF

Drill Method 2.25" HSA; Autohammer

CGC Inc.

LOG OF TEST BORING

Project: Lake Mendota Drive
Norman: 120'E of LMD, 4'S of Centerline
Location: Madison, WI

Boring No. 8
Surface Elevation (ft) 857±
Job No. C21051-25
Sheet 1 of 1

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

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
						4 in. Asphalt Pavement/7 in. Base Course					
1		12	M	12		FILL: Medium Dense to Very Loose Brown Sand with Silt, Gravel and Clay					
2		16	M/W	3	5						
3		14	M	2		Very Loose, Black Sedimentary to Fibrous PEAT (PT)					
4		18	M	3	10	Soft to Very Soft, Gray Lean CLAY, Trace Sand and Plant Fibers (CL)	(0.25)				
5		14	M/W	4			(0.2)				
6		6	W	9	15	Loose, Light Brown Fine to Medium SAND, Trace to Little Silt and Gravel (SP/SP-SM)					
					20	End Boring at 15 ft Borehole backfilled with bentonite chips and asphalt patch					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 13.5' Upon Completion of Drilling ______
Time After Drilling
Depth to Water
Depth to Cave in

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

GENERAL NOTES

Start 11/19/21 End 11/19/21
Driller BSD Chief MC Rig CME-55
Logger KD Editor ESF
Drill Method 2.25" HSA; Autohammer

CGC Inc.

LOG OF TEST BORING

Project: Lake Mendota Drive
10'N of Spring Harbor, 10'E of Centerline
Location: Madison, WI

Boring No. 9
Surface Elevation (ft) 858±
Job No. C07022-48
Sheet 1 of 1

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

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						3.5" Asphalt Pavement/9" Base Course					
1		2	M	50* /4"		FILL: Brown Silty Sand and Gravel					
2		6	M	6		Loose, Black Sedimentary PEAT (PT)	(0.1)				
					5	Very Soft, Bluish-Gray Lean CLAY, Some Plant Fibers, Trace Sand (CL)					
3		12	W	20			(0.1)				
						Medium Dense to Dense, Brown SAND and GRAVEL, Some Silt (SM-GM)					
4		4	W	26							
					10						
5		1	W	45							
					15	End of Boring at 15 ft Backfilled with Bentonite Chips *Sample 1 frozen					
					20						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.0' Upon Completion of Drilling 8.0'
Time After Drilling
Depth to Water
Depth to Cave in 10'

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

GENERAL NOTES

Start 2/20/08 End 2/20/08
Driller Badger Chief MSA Rig CME-55
Logger GFP Editor ESF
Drill Method 2 1/4" HSA

LOG OF TEST BORING

CGC Inc.

Project: Lake Mendota Drive
150'W of Spring Court, 7'N of Centerline
Location: Madison, WI

Boring No. 10
Surface Elevation (ft) 858±
Job No. C14051-48
Sheet 1 of 1

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

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
						6 in. Asphalt Pavement/6 in. Base Course					
1		0	M	50 /2*		FILL: Brown Sand with Gravel and Clay					
2		12	M	13	5						
3		14	M	4		Loose to Very Loose, Black Sedimentary to Fibrous PEAT (PT)					
4		3	M/W	50/5"	10	Dense to Very Dense, Dark Gray-Brown SAND and GRAVEL, Scattered Cobbles, Some Silt (SM/GM) (Sampling Spoon Pushed Stone)					
5		3	W	50/5"	15	Dense to Very Dense, Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles and Boulders (SM) (Sampling Spoon Pushed Stone)					
					20	End Boring at 15 ft Borehole backfilled with bentonite chips *Sample 1 Frozen					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 13.5'   Upon Completion of Drilling ____

Time After Drilling				1/4 hr
Depth to Water				▼
Depth to Cave in				11'

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

GENERAL NOTES

Start 1/22/15 End 1/22/15
Driller BSD Chief JF Rig CME-55
Logger MG Editor ESF
Drill Method 2.25" HSA; Autohammer

CGC Inc.

LOG OF TEST BORING

Project: Lake Mendota Drive
360'W of Risser, 6'S of Centerline
Location: Madison, WI

Boring No. 11
Surface Elevation (ft) 881±
Job No. C21051-25
Sheet 1 of 1

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

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						4 in. Asphalt Pavement/3 in. Base Course					
						FILL: Loose Light Brown Sand with Silt, Gravel and Scattered Clay					
1		6	M	8							
2		10	M	6							
					5						
3		16	M	5							
						Medium Dense, Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles and Boulders (SM)					
4		16	M	14							
					10						
5		16	M	15							
6		18	M	14							
					15	End Boring at 15 ft Borehole backfilled with bentonite chips and asphalt patch					
					20						

WATER LEVEL OBSERVATIONS

While Drilling ∇ NW   Upon Completion of Drilling ______
Time After Drilling
Depth to Water
Depth to Cave in

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

GENERAL NOTES

Start 11/19/21 End 11/19/21
Driller BSD Chief MC Rig CME-55
Logger KD Editor ESF
Drill Method 2.25" HSA; Autohammer

LOG OF TEST BORING

CGC Inc.

Project: Lake Mendota Drive
130'E of Risser, 6'S of Centerline
Location: Madison, WI

Boring No. 12
Surface Elevation (ft) 907±
Job No. C21051-25
Sheet 1 of 1

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

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						4 in. Asphalt Pavement/5 in. Base Course					
1		10	M	12		FILL: Medium Dense Brown Sand with Silt and Gravel					
2		14	M	18		Medium Dense, Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles and Boulders (SM)					
3		18	M	20	5						
4		18	M	21	10						
5		3	M	50/5"		Rough Drilling Beginning Near 11' (Presumed Boulder)					
					15	End Boring at 13 ft Due to Auger Refusal on Presumed Boulder or Possible Bedrock Borehole backfilled with bentonite chips and asphalt patch					
					20						

WATER LEVEL OBSERVATIONS

While Drilling ⊻ NW   Upon Completion of Drilling ____
Time After Drilling ____
Depth to Water ____
Depth to Cave in ____

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

GENERAL NOTES

Start 11/19/21 End 11/19/21
Driller BSD Chief MC Rig CME-55
Logger KD Editor ESF
Drill Method 2.25" HSA; Autohammer

LOG OF TEST BORING

CGC Inc.

Project: Lake Mendota Drive
295'E of Merrill Springs, 8'S of Centerline
Location: Madison, WI

Boring No. 13
Surface Elevation (ft) 883±
Job No. C21051-25
Sheet 1 of 1

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

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
						5 in. Asphalt Pavement/5 in. Base Course					
1		6	M	10		FILL: Loose to Medium Dense Brown Sand with Silt, Clay and Gravel to 3'					
2		12	M	7		Medium Stiff Brown Clay with Sand to 4.5'	(0.75)				
3		16	M	11	5	Medium Dense, Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles and Boulders (SM)					
4		18	M	17		Weathered to Competent, Greenish-Brown Sandstone Bedrock					
5		10	M	66/9"	10						
6		2	M	50/2"							
					15	End Boring at 15 ft Borehole backfilled with bentonite chips and asphalt patch					
					20						

WATER LEVEL OBSERVATIONS

While Drilling ▽ NW   Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______ ▼
Depth to Cave in ______

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

GENERAL NOTES

Start 11/19/21 End 11/19/21
Driller BSD Chief MC Rig CME-55
Logger KD Editor ESF
Drill Method 2.25" HSA; Autohammer

CGC Inc.

LOG OF TEST BORING

Project	Lake Mendota Drive
	300'E of Merrill Springs, 8'S of Centerline
Location	Madison, WI

Boring No.	13X
Surface Elevation (ft)	883±
Job No.	C21051-25
Sheet	1 of 1

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

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
						5 in. Asphalt Pavement/5 in. Base Course					
1		6	M	11		FILL: Mixed Medium Dense to Loose Brown Sand and Medium Stiff Clay with Gravel and Scattered Cobbles/Boulders					
2		8	M	53 /10"			(0.6)				
					5	End Boring at 5 ft Due to Auger Refusal on Presumed Boulder Borehole backfilled with bentonite chips and asphalt patch Moved 5'E and Performed B13					
					10						
					15						
					20						

WATER LEVEL OBSERVATIONS

While Drilling ▽ NW   Upon Completion of Drilling ______

Time After Drilling

Depth to Water ▼

Depth to Cave in

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

GENERAL NOTES

Start	11/19/21	End	11/19/21		
Driller	BSD	Chief	MC	Rig	CME-55
Logger	KD	Editor	ESF		
Drill Method	2.25" HSA; Autohammer				

CGC Inc.

LOG OF TEST BORING

Project: Lake Mendota Drive
950'E of Merrill Springs, 6'S of Centerline
Location: Madison, WI

Boring No. 14
Surface Elevation (ft) 897±
Job No. C21051-25
Sheet 1 of 1

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

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						5 in. Asphalt Pavement/3.5 in. Base Course					
1		12	M	5		Loose to Very Loose, Brown Fine to Medium SAND, Little to Some Silt and Gravel (SP-SM/SM - Probable Fill)					
2		8	M	4							
					5						
3		10	M	4							
4		16	M	6							
					10						
5		10	M	25		Medium Dense, Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles and Boulders (SM)					
6		18	M	19							
					15	End Boring at 15 ft Borehole backfilled with bentonite chips and asphalt patch					
					20						

WATER LEVEL OBSERVATIONS

While Drilling ∇ NW   Upon Completion of Drilling ______
Time After Drilling
Depth to Water
Depth to Cave in

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

GENERAL NOTES

Start 11/19/21 End 11/19/21
Driller BSD Chief MC Rig CME-55
Logger KD Editor ESF
Drill Method 2.25" HSA; Autohammer

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	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

Physical Characteristics
Color, moisture, grain shape, fineness, etc.
Major Constituents
Clay, silt, sand, gravel
Structure
Laminated, varved, fibrous, stratified, cemented, fissured, etc.
Geologic Origin
Glacial, alluvial, eolian, residual, etc.

Relative Density

Term	"N" Value
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Over 50

Relative Proportions Of Cohesionless Soils

Proportional Term	Defining Range by Percentage of Weight
Trace	0% - 5%
Little	5% - 12%
Some	12% - 35%
And	35% - 50%

Consistency

Term	q_u-tons/sq. ft
Very Soft	0.0 to 0.25
Soft	0.25 to 0.50
Medium	0.50 to 1.0
Stiff	1.0 to 2.0
Very Stiff	2.0 to 4.0
Hard	Over 4.0

Organic Content by Combustion Method

Soil Description	Loss on Ignition
Non Organic	Less than 4%
Organic Silt/Clay	4 – 12%
Sedimentary Peat	12% - 50%
Fibrous and Woody Peat	More than 50%

Plasticity

Term	Plastic Index
None to Slight	0 - 4
Slight	5 - 7
Medium	8 - 22
High to Very High	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 ½", 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

q_a – Penetrometer Reading, tons/sq ft
q_a – 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)
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	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 (More than 12% fines)
	GM	Silty gravels, gravel-sand-silt mixtures
	GC	Clayey gravels, gravel-sand-clay mixtures
		Clean Sands (Less than 5% fines)
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	SW	Well-graded sands, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines
		Sands with fines (More than 12% fines)
	SM	Silty sands, sand-silt mixtures
	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)		
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 50% or greater	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

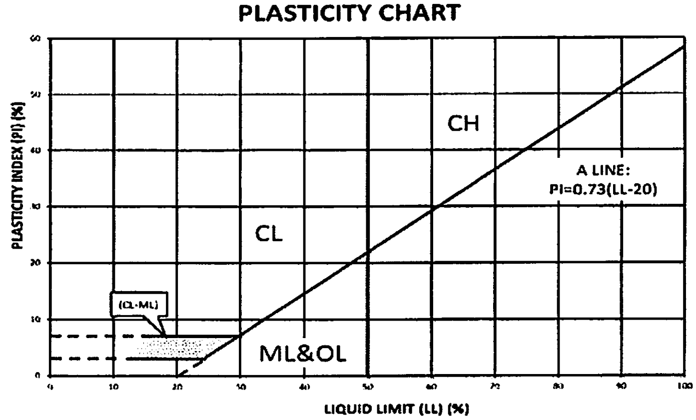
LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limts below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limts above "A" line or P.I. greater than 7	
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	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded 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	

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 .... GW, GP, SW, SP
More than 12 percent .... GM, GC, SM, SC
5 to 12 percent .... Borderline cases requiring dual symbols

PLASTICITY CHART



APPENDIX B

RECOMMENDED COMPACTED FILL SPECIFICATIONS

APPENDIX B

CGC, INC.

RECOMMENDED COMPACTED FILL SPECIFICATIONS

General Fill Materials

Proposed fill shall contain no vegetation, roots, topsoil, peat, ash, wood or any other non-soil material which by decomposition might cause settlement. Also, fill shall never be placed while frozen or on frozen surfaces. Rock, stone or broken concrete greater than 6 in. in the largest dimension shall not be placed within 10 ft of the building area. Fill used greater than 10 ft beyond the building limits shall not contain rock, boulders or concrete pieces greater than a 2 sq ft area and shall not be placed within the final 2 ft of finish subgrade or in designated utility construction areas. Fill containing rock, boulders or concrete pieces should include sufficient finer material to fill voids among the larger fragments.

Special Fill Materials

In certain cases, special fill materials may be required for specific purposes, such as stabilizing subgrades, backfilling undercut excavations or filling behind retaining walls. For reference, WisDOT gradation specifications for various types of granular fill are attached in Table 1.

Placement Method

The approved fill shall be placed, spread and leveled in layers generally not exceeding 10 in. in thickness before compaction. The fill shall be placed at moisture content capable of achieving the desired compaction level. For clay soils or granular soils containing an appreciable amount of cohesive fines, moisture conditioning will likely be required.

It is the Contractor's responsibility to provide all necessary compaction equipment and other grading equipment that may be required to attain the specified compaction. Hand-guided vibratory or tamping compactors will be required whenever fill is placed adjacent to walls, footings, columns or in confined areas.

Compaction Specifications

Maximum dry density and optimum moisture content of the fill soil shall be determined in accordance with modified Proctor methods (ASTM D1557). The recommended field compaction as a percentage of the maximum dry density is shown in Table 2. Note that these compaction guidelines would generally not apply to coarse gravel/stone fill. Instead, a method specification would apply (e.g., compact in thin lifts with a vibratory compactor until no further consolidation is evident).

Testing Procedures

Representative samples of proposed fill shall be submitted to CGC, Inc. for optimum moisture-maximum density determination (ASTM D1557) prior to the start of fill placement. The sample size should be approximately 50 lb.

CGC, Inc. shall be retained to perform field density tests to determine the level of compaction being achieved in the fill. The tests shall generally be conducted on each lift at the beginning of fill placement and at a frequency mutually agreed upon by the project team for the remainder of the project.

Table 1
Gradation of Special Fill Materials

Material	WisDOT Section 311	WisDOT Section 312	WisDOT Section 305			WisDOT Section 209		WisDOT Section 210
	Breaker Run	Select Crushed Material	3-in. Dense Graded Base	1 1/4-in. Dense Graded Base	3/4-in. Dense Graded Base	Grade 1 Granular Backfill	Grade 2 Granular Backfill	Structure Backfill
Sieve Size	Percent Passing by Weight							
6 in.	100							
5 in.		90-100						
3 in.			90-100					100
1 1/2 in.		20-50	60-85					
1 1/4 in.				95-100				
1 in.					100			
3/4 in.			40-65	70-93	95-100			
3/8 in.				42-80	50-90			
No. 4			15-40	25-63	35-70	100 (2)	100 (2)	25-100
No. 10		0-10	10-30	16-48	15-55			
No. 40			5-20	8-28	10-35	75 (2)		
No. 100						15 (2)	30 (2)	
No. 200			2-12	2-12	5-15	8 (2)	15 (2)	15 (2)

Notes:
1. Reference: Wisconsin Department of Transportation *Standard Specifications for Highway and Structure Construction.*
2. Percentage applies to the material passing the No. 4 sieve, not the entire sample.
3. Per WisDOT specifications, both breaker run and select crushed material can include concrete that is 'substantially free of steel, building materials and other deleterious material'.

Table 2
Compaction Guidelines

Area	Percent Compaction (1) Clay/Silt	Percent Compaction (1) Sand/Gravel
Within 10 ft of building lines		
Footing bearing soils	93 - 95	95
Under floors, steps and walks		
- Lightly loaded floor slab	90	90
- Heavily loaded floor slab and thicker fill zones	92	95
Beyond 10 ft of building lines		
Under walks and pavements		
- Less than 2 ft below subgrade	92	95
- Greater than 2 ft below subgrade	90	90
Landscaping	85	90

Notes:
1. Based on Modified Proctor Dry Density (ASTM D 1557)

APPENDIX C

ROCK EXCAVATION CONSIDERATIONS

APPENDIX C

ROCK EXCAVATION CONSIDERATIONS

In order to minimize probable "rock" excavation expenses during construction, we suggest that project specifications incorporate the following:

A. It is assumed that all excavations to levels and dimensions required by the Contract Documents are earth excavation. Earth excavation includes removal and disposal of all materials encountered except rock/sound bedrock which is defined as natural materials which:

   1. Cannot be excavated with a minimum 3/4 cubic yard capacity backhoe without drilling and blasting;

   2. Cannot be economically removed with a one-tooth ripper on a D8 cat (or equivalent);

   3. Requires the use of special equipment such as a pneumatic hammer;

   4. Requires the use of explosives (after obtaining written permission of the owner).

B. Examples of material classified as rock are boulders 1/2 cubic yard or more in volume, bedrock, rock in ledges, and rock-hard cementitious aggregate deposits.

C. Do not proceed with rock excavation work until architect, engineer and/or testing firm (i.e., CGC) has taken the necessary measures to determine quantity of rock excavation required to complete the work. Measurements will be taken after properly stripped of earth by the contractor. Contractor will be paid the difference between the cost of rock and earth excavation based on an agreed upon unit price established prior to starting rock excavation.

A statement should also be included in the specifications to the effect that: "Stated models of earth excavation equipment are merely for purposes of defining the various excavation categories and are not intended to indicate the brand or type of equipment that is to be used."

APPENDIX D

DOCUMENT QUALIFICATIONS

APPENDIX D
DOCUMENT QUALIFICATIONS

I. GENERAL RECOMMENDATIONS/LIMITATIONS

CGC, Inc. should be provided the opportunity for a general review of the final design and specifications to confirm that earthwork and foundation requirements have been properly interpreted in the design and specifications. CGC should be retained to provide soil engineering services during excavation and subgrade preparation. This will allow us to observe that construction proceeds in compliance with the design concepts, specifications and recommendations, and also will allow design changes to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction. CGC does not assume responsibility for compliance with the recommendations in this report unless we are retained to provide construction testing and observation services.

This report has been prepared in accordance with generally accepted soil and foundation engineering practices and no other warranties are expressed or implied. The opinions and recommendations submitted in this report are based on interpretation of the subsurface information revealed by the test borings indicated on the location plan. The report does not reflect potential variations in subsurface conditions between or beyond these borings. Therefore, variations in soil conditions can be expected between the boring locations and fluctuations of groundwater levels may occur with time. The nature and extent of the variations may not become evident until construction.

II. IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes. While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one - not even you* - should apply the report for any purpose or project except the one originally contemplated.

READ THE FULL REPORT

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes - even minor ones - and request an assessment of their impact. *CGC cannot accept responsibility or liability for problems that occur because our reports do not consider developments of which we were not informed.*

SUBSURFACE CONDITIONS CAN CHANGE

A geotechnical engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL OPINION

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgement to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ - sometimes significantly - from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A REPORT'S RECOMMENDATIONS ARE NOT FINAL

Do not over-rely on the confirmation-dependent recommendations included in your report. *Those confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgement and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *CGC cannot assume responsibility or liability for the report's confirmation-dependent recommendations if we do not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical engineering report. Confront that risk by having CGC participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

DO NOT REDRAW THE ENGINEER'S LOGS

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

GIVE CONSTRUCTORS A COMPLETE REPORT AND GUIDANCE

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

READ RESPONSIBILITY PROVISIONS CLOSELY

Some clients, design professionals, and constructors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineer's responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

ENVIRONMENTAL CONCERNS ARE NOT COVERED

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

OBTAIN PROFESSIONAL ASSISTANCE TO DEAL WITH MOLD

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

RELY ON YOUR GEOTECHNICAL ENGINEER FOR ADDITIONAL ASSISTANCE

Membership in the Geotechnical Business Council (GBC) of Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with CGC, a member of GBC, for more information.

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Geotechnical Business Council
of the Geoprofessional Business Association
8811 Colesville Road, Suite G 106
Silver Spring, MD 20910

Legend

Denotes Boring Location

Notes

1. Soil boring performed by America's Drilling Co. in February 2023
2. Boring location is approximate

Scale: Reduced

Date: 2/2023	CGC, Inc.	**Soil Boring Location Map**
Job No. C23051-2		**Lake Mendota Dr at Spring Ct Madison, WI**

LOG OF TEST BORING

CGC Inc.

Project: Lake Mendota Drive at Spring Court

Location: Madison, Wisconsin

Boring No. 1
Surface Elevation (ft) 870±
Job No. C23051-2
Sheet 1 of 1

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

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LOI
						4 in. Asphalt Pavement					
1AS		0		8		FILL: Soft to Medium Stiff Brown Clay with Sand and Gravel, Scattered Cobbles	(0.5)				
2		3	M	50/3"		Large Cobble Near 3.5'	(0.5)				
					5						
3		12	M	12		Stiff, Brown Sandy CLAY, Some Gravel, Scattered Cobbles (CL - Possible Fill)	(1.5)				
4		6	M/W	60/8"		Rough Drilling/Boulder 9'-10.5'					
					10	Medium Dense, Brown SILT, Some Sand, Trace Gravel (ML)					
5		14	M	20							
					15						
						Dense to Medium Dense, Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles and Boulders (SM)					
6		18	W	35							
					20						
7		14	W	15							
					25						
8		18	W	46							
					30	End of Boring at 30 ft Backfilled with Bentonite Chips and Asphalt Patch					
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 18.5'   Upon Completion of Drilling ______

Time After Drilling				30 Min.
Depth to Water				15' ▼
Depth to Cave in				15.5'

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

GENERAL NOTES

Start 2/1/23 End 2/1/23
Driller ADC Chief KD Rig CME-55
Logger DB Editor ESF
Drill Method 2.25" HSA; Autohammer