APPENDIX 1
SOIL BORING INFORMATION
OLBRICH PARK (AT WALTER STREET)

CGC, Inc.

Construction • Geotechnical
Consulting Engineering/Testing

April 21, 2017
C17051-10

Ms. Kathleen Kane
City of Madison Parks Division
City-County Building, Room 104
210 Martin Luther King Jr. Boulevard
Madison, WI 537013

Re: Geotechnical Exploration Report
Proposed Restroom Building
Olbrich Park
Madison, Wisconsin

Dear Ms. Kane:

Construction • Geotechnical Consultants, Inc. (CGC) has completed the geotechnical exploration program for the project referenced above. The purpose of this exploration program was to evaluate the subsurface conditions within the proposed construction area and to provide geotechnical recommendations regarding site preparation, foundation, floor slab and pavement design/construction. An electronic copy of this report is provided for your use, and a paper copy can be sent to you upon request.

PROJECT DESCRIPTION/SITE CONDITIONS

We understand that this project will include the construction of an enclosed restroom facility in the general location of the soil borings (refer to map presented in Appendix B). It will replace a toilet shelter. Some adjacent asphalt pavement may also be replaced. Little (if any) grade change is anticipated for building construction, with building loads expected to be light (i.e., 100 kip column loads or less.)

The existing site is basically a flat landscaped area covered by grass. Ground surface elevations at the boring locations were not determined for this study.

SUBSURFACE CONDITIONS

Subsurface conditions on site were explored by drilling three Standard Penetration Test (SPT) soil borings to planned depths of 15 ft below existing site grades. The boring locations were selected by the City of Madison and staked in the field by CGC personnel. The soil borings were conducted by Soil Essentials (under subcontract to CGC) on April 14, 2107 using a track-mounted Geoprobe 7822DT ATV drill rig equipped with hollow-stem augers and an automatic SPT hammer. The boring locations are shown in plan on the Soil Boring Location Exhibit attached in Appendix B.

2921 Perry Street, Madison WI 53713
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The subsurface profiles at the boring locations were fairly similar and a generalized profile can be described by the following strata, in descending order:

- 4 in. of ***topsoil fill*** or ***2.5 in. asphalt pavement/5 in. base course*** at B-3, over
- About 2.5 to 4 ft of ***fill*** consisting of mainly sand/clay/silt intermixed with brick/concrete/slag/cinders in some areas; then
- 1 to 3.5 ft of soft to stiff ***lean clay***; followed by
- Loose to medium dense ***sand strata*** with varying silt and gravel contents, to the termination depths.

Groundwater was encountered in each boring at 7.3 to 8.5 ft below existing grade during or shortly after drilling. Groundwater levels are expected to fluctuate with seasonal variations in precipitation, infiltration, nearby lake levels, evapotranspiration and other factors. A more detailed description of the site soil and groundwater conditions is presented on the Soil Boring Logs attached in Appendix B.

DISCUSSION AND RECOMMENDATIONS

1. Site Preparation

As a general rule, the topsoil should be stripped to at least 10 ft beyond the proposed construction areas. This is dependent on proposed grades and cutting/filling depths (if any). The topsoil is expected to be up to 4 in. thick, but deeper layers of topsoil fill should be expected from previous grading activities. Topsoil can be stockpiled on-site and re-used as fill in landscaped areas. Asphalt pavement removal can also occur at this time if required.

After topsoil fill removal, the exposed subgrades are expected to consist of sand/clay fill (or base course near B-3). The exposed soils, where filling is required (or where the subgrade is at finished grade), should be recompacted with a smooth-drum compactor and then proof-rolled with a loaded tri-axle dump truck to check for soft/yielding areas. If soft/yielding areas are detected, they should be undercut/removed. Note that cinder and slag material may require disposal at a licensed facility. Grade should be re-established using granular backfill compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557). As an alternative, 3-in. dense graded base (DGB) or select crushed material that is compacted in thin lifts (less than about 12 in.) until deflection ceases can be used to restore grade.

After the existing soils have been checked and undercut/replaced, as needed, fill placement (if necessary) to establish planned grades can begin. We recommend using granular soils as fill within building areas as sand/gravel are generally easier to place and compact in a wider range of weather conditions. We generally do not recommend using silt/clay soils as fill within building or the upper part of pavement areas, as moisture conditioning is typically required to achieve required compaction levels, which can result in construction delays. In our opinion, silt/clay soils are best used as fill in landscaped areas or potentially in the bottom of deeper fills in pavement areas provided the cohesive soils are adequately dried to facilitate compaction. The new fill within the building footprint should be compacted to a minimum of 95% compaction based on modified Proctor methods (ASTM D 1557). Periodic field density tests should be taken by CGC staff within the fill/backfill to document the adequacy of compactive effort.

We recommend that fill soils be undercut below foundations. There is a small risk of floor slab settlement/cracking occurring if the existing undocumented fill is left in-place below floor slabs after passing proof-rolling to confirm firmness, and the risk is the owner's responsibility. If the owner does not want to accept the risk of floor slab settlement/cracking potentially occurring, the fill should also be undercut below slab areas. Where existing fill is removed (and disposed of at a licensed facility when necessary), the area(s) can be backfilled with engineered granular soils as described in the previous paragraph.

2. Foundation Recommendations

In our opinion, the proposed structure can be supported on reinforced concrete spread footing foundations bearing on newly-placed granular fill, native clays or natural sand soils. *As discussed previously, an important component of the foundation design assumptions includes undocumented fill removal below the foundations in order to limit post-construction settlement to typically tolerable levels.* The following parameters should be used for foundation design:

- Maximum net allowable soil bearing pressure: 2500 psf
- Minimum foundation widths:
  - -- Continuous wall footings: 18 in.
  - -- Column pad footings: 30 in.

Perimeter footings should be founded at least 4 ft below exterior site grades for frost protection. Footings within interior heated areas do not need to be lowered for frost protection.

For an allowable bearing pressure of 2,500 psf, we have assumed that foundations will bear on "new" granular fill, native stiff clays or natural granular soils and undercutting below footing grade will be required if undocumented fill, loose sands or clays are encountered at or slightly below footing grade. Where undercutting is required, the base of the undercut excavation should be widened beyond the footing edges at least 0.5 ft in each direction for each foot of undercut depth for stress distribution purposes. Footing grade should be restored using granular backfill compacted to at least 95% (ASTM D1557).

We recommend using a smooth-edged backhoe bucket for footing excavations. Further, footing subgrade soils should be rigorously recompacted with a large sampling jack compactor or hoe-pak (backhoe mounted compactor) to densify soils loosened/disturbed during excavation. Provided the foundation design/construction recommendations discussed above are followed, we estimate that total and differential settlements should not exceed 1.0 and 0.5 in., respectively.

3. Floor Slabs

The floor slab for the proposed structure can be supported on the existing fill after passing the proof-roll test. As mentioned above, there is a small risk of floor slab settlement/cracking occurring if slabs are supported on the existing undocumented fill, and the risk is the owner's responsibility. If the owner does not want to accept this risk, the undocumented fill should be undercut below the floor slab areas. Prior to slab construction, the subgrades should be recompacted to densify soils that may become disturbed or loosened during construction activities. The design subgrade modulus is based on a recompacted subgrade such that non-yielding conditions are developed.

To serve as a capillary break, the final 4 to 6-in. of soil placed below the slabs should consist of well-graded sand or gravel with no more than 5 percent by weight passing a No. 200 U.S. standard sieve. Importing sand/gravel for this purpose will be required. Note that some structural engineers require approximately 6-in. thick layer of dense graded base (i.e., base course) directly below the floor slab (in lieu of the drainage layer) to increase the subgrade modulus. If 6 in. or more of dense graded base is included immediately below the floor slab, the subgrade modulus can be increased to 150 pci. To further minimize the potential for moisture migration, a plastic vapor barrier should also be utilized. Fill and drainage course material placed below the slabs should be placed, as described in the Site Preparation section of this report. The slabs should be structurally separate from the foundation and have construction joints and reinforcement for crack control.

4. Site Class for Seismic Design

In our opinion, the average soil/rock properties in the upper 100 ft of the site (based on SPT blow counts (N values) exceeding 15 blows/ft on average) can be characterized as a stiff soil profile. This characterization would place the site in Site Class D for seismic design according to the International Building Code (see Table 1613.5.2).

5. Pavement Design

We anticipate that the subgrade soils within replacement parking and drive areas will likely consist of existing fill and possible newly-placed fill. Pavement subgrades should be proof-rolled/recompacted, as described in the Site Preparation section of this report, and stabilized as needed with coarse stone or replaced with compacted granular fill. *Since the pavement subgrade is expected to primarily be existing fill involving cohesive soils, we anticipate that some undercutting and stabilization may be required during subgrade preparation. We therefore recommend that the budget include a contingency for these operations.* We assume that the parking area pavement will experience fairly light traffic loads consisting primarily of cars and light trucks (Traffic Class I). The entrance drives may experience larger truck volumes (Traffic Class II). The clay soils will control the pavement thickness design. Accordingly, the pavement sections tabulated below were selected assuming a CBR of approximately 2 to 3 for a firm or stabilized clay subgrade and a design life of 20 years.

Table 1 - Recommended Pavement Sections

Material	**Thicknesses (in.)**		**WDOT Specification**[1]
	Parking Lots (Traffic Class I)	**Main Driveways and Truck Traffic Areas (Traffic Class II)**	
Bituminous Upper Layer[2,3]	1.5	1.75	Section 460, Table 460-1, 9.5 mm, 12.5 mm
Bituminous Lower Layer[2,3]	1.75	2.25	Section 460. Table 460-1, 12.5 mm, 19 mm
Dense Graded Base Course[2,4]	8.0	10.0	Sections 301 and 305, 3 in. and 1¼ in.
Total Thickness	11.25	14.0	

Notes:

1. Wisconsin DOT *Standard Specifications for Highway and Structure Construction*, latest edition, including supplemental specifications, and Wisconsin Asphalt Pavement Association *2016 Asphalt Pavement Design Guide*.

2. Compaction requirements:
   - Bituminous concrete: Refer to Section 460-3.
   - Base course: Refer to Section 301.3.4.2, Standard Compaction

3. Mixture Type LT (or E-0.3) bituminous; note that a heavy duty (H) mix may be required in truck traffic areas where high, slow moving wheel loads exist; refer to Section 460, Table 460-2 of the *Standard Specifications.*

4. The upper 4 in. should consist of 1¼-in. DGB; the bottom part of the layer can consist of 3-in. DGB.

Note that if traffic volumes differ from those assumed, CGC should be allowed to review the recommended pavement sections and adjust them accordingly. The pavement design assumes a stable/non-yielding subgrade and a regular program of preventative maintenance. Alternative pavement designs may prove applicable and should be reviewed by CGC. If there is a delay between subgrade preparation and placing the base course, the subgrade should be recompacted.

CONSTRUCTION CONSIDERATIONS

Due to variations in weather, construction methods and other factors, specific construction problems are difficult to predict. Soil related difficulties which could be encountered on the site are discussed below:

- Due to the potentially sensitive nature of the on-site soils, we recommend that final site grading activities be completed during dry weather, if possible. Construction traffic should be avoided on prepared subgrades to minimize potential disturbance.

- Contingencies in the project budget for subgrade stabilization with coarse stone in parking and floor slab areas should be increased if the project schedule requires that work proceed during adverse weather conditions.

- Earthwork construction during the early spring or late fall could be complicated as a result of wet weather and freezing temperatures. During cold weather, exposed subgrades should be protected from freezing before and after footing construction. Fill should never be placed while frozen or on frozen ground.

- Excavations extending greater than 4 ft in depth below the existing ground surface should be sloped or braced in accordance with current OSHA standards.

- Based on observations made during the field exploration, groundwater infiltration into excavations is generally not expected to be a problem. Water accumulating at the base of excavations as a result of precipitation or seepage should be controlled and quickly removed using pumps operating from filtered sump pits.

RECOMMENDED CONSTRUCTION MONITORING

The quality of the foundation, floor slab and pavement subgrades will be largely determined by the level of care exercised during site development. To check that earthwork and foundation construction proceeds in accordance with our recommendations, the following operations should be monitored by CGC:

- Topsoil stripping/subgrade proof-rolling within the construction areas;
- Fill/backfill placement and compaction;
- Foundation excavation/subgrade preparation; and
- Concrete placement.

* * * * * *

It has been a pleasure to serve you on this project. If you have any questions or need additional consultation, please contact us.

Sincerely,

CGC, Inc.

Michael N. Schultz, P.E
President

Encl: Appendix A - Field Exploration
Appendix B - Soil Boring Location Exhibit
Logs of Test Borings (3)
Log of Test Boring-General Notes
Unified Soil Classification System
Appendix C - Document Qualifications
Appendix D - Recommended Compacted Fill Specifications

APPENDIX A

FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

Three Standard Penetration Test (SPT) soil borings were drilled to planned depths of 15 ft below existing site grades at locations selected by the City. The boring locations were staked in the field by CGC personnel. The soil borings were conducted by Soil Essentials (under subcontract to CGC) on April 14, 2017 using a track-mounted Geoprobe 7822DT ATV drill rig equipped with hollow-stem augers and an automatic SPT hammer. The boring locations are shown in plan on the Soil Boring Location Exhibit attached in Appendix B.

In each boring, soil samples were obtained at 2.5 foot intervals to a depth of 10 ft and at 5 ft intervals thereafter. The soil samples were obtained in general accordance with specifications for standard penetration testing, ASTM D 1586. The specific procedures used for drilling and sampling are described below.

1. Boring Procedures between Samples

   The boring is extended downward, between samples, by a hollow-stem auger.

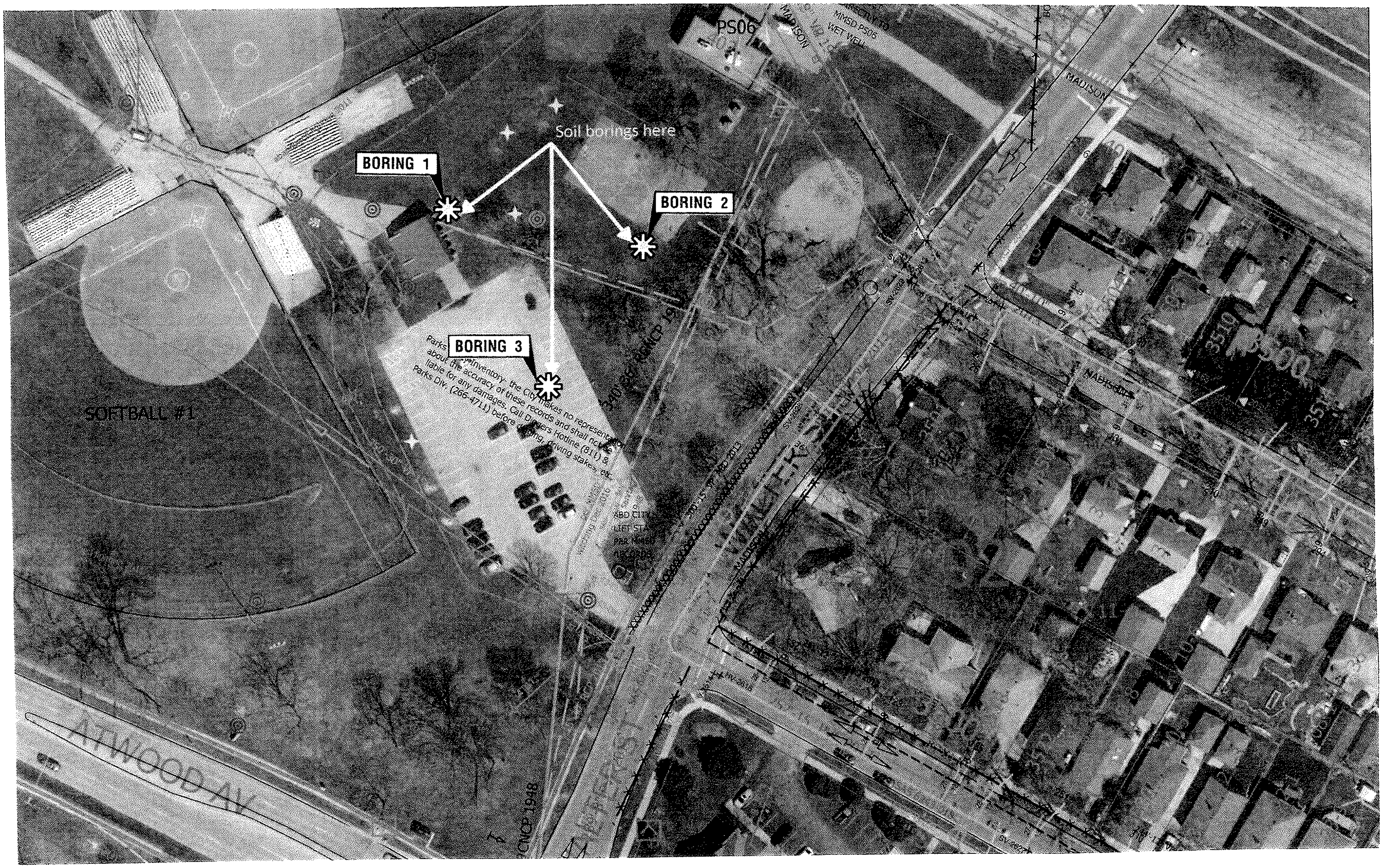
2. Standard Penetration Test and Split-Barrel Sampling of Soils
   (ASTM Designation: D 1586)

   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.

During the field exploration, the driller visually classified the soil and prepared a field log. *Field screening of the soil samples for possible environmental contaminants was not conducted by the drillers as these services were not part of CGC's work scope.* Water level observations were made in each boring during and after drilling and are shown at the bottom of each boring log. Upon completion of drilling, the borings were backfilled with bentonite (where required) to satisfy WDNR regulations and the soil samples were delivered to our laboratory for visual classification and laboratory testing. The soils were visually classified by a geotechnical engineer using the Unified Soil Classification System. The final logs prepared by the engineer and a description of the Unified Soil Classification System are presented in Appendix B.

APPENDIX B

SOIL BORING LOCATION EXHIBIT
LOGS OF TEST BORINGS (3)
LOG OF TEST BORING – GENERAL NOTES
UNIFIED SOIL CLASSIFICATION SYSTEM



Legend

Denotes Boring Location and Number

Notes

1. Borings were drilled on April 14, 2017 by Soil Essentials (under subcontract by CGC).
2. Base map provided by the City of Madison
3. Boring locations are approximate.

N

Scale: Reduced

Date: 4/2017	CGC, Inc.	**SOIL BORING LOCATION MAP** **Proposed Restroom Building** **Olbrich Park** **Madison, Wisconsin**
Job No. C17051-10		

CGC Inc.

LOG OF TEST PIT

Project: Olbrich Park Restroom Facility
Atwood Avenue
Location: City of Madison, Dane County, Wisconsin

Pit No. 1
Surface Elevation
Job No. C17051-10
Sheet 1 of 1

2921 PERRY STREET, MADISON, WIS. 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	Probe (in.)
						4 in. ± TOPSOIL FILL (OL)					
						FILL: Brown Silty Clay (Based on Driller's Description)					
1		15	M	11		FILL: Medium Dense, Dark Brown to Black Silty Sand, Little to Some Gravel, Numerous Cinder/Slag Fragments					
2		17	M	7	5	Stiff, Brown Lean CLAY, Some Silt, Little Sand, Trace Gravel (CL)	(1.5-1.75)				
3		15	M/W	6		Loose, Brown Silty SAND, Trace to Little Clay, Trace Gravel (SM/SM-SC)					
4		16	W	7	10	Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel, Scattered Silty Sand Seams (SP/SP-SM)					
5		18	W	6	15						
					20	End of Boring at 15 ft Borehole Backfilled with Bentonite Chips					

WATER LEVEL OBSERVATIONS

While Excavating ▽				Upon Completion of Drilling	
Time After Excavating				30 Min.	
Depth to Water				8.5'	▼
Depth to Cave in					

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

GENERAL NOTES

Start 4/14/17 End 4/14/17
Driller SE Chief . Geoprobe
Logger Editor TFG 7822DT
Equip. Used: 2-1/4" HSA; Autohammer

CGC Inc.

LOG OF TEST PIT

Project: Olbrich Park Restroom Facility
Atwood Avenue
Location: City of Madison, Dane County, Wisconsin

Pit No.: 2
Surface Elevation:
Job No.: C17051-10
Sheet 1 of 1

2921 PERRY STREET, MADISON, WIS. 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	Probe (in.)
						4 in. ± TOPSOIL FILL (OL)					
						FILL: Brown Clayey Silt (Based on Driller's Description)					
1		15	M	2/18"		FILL: Very Loose, Brown/Grayish Brown Clayey Sand and Silty Clay, Little to Some Gravel, Scattered Cinder/Slag/Glass Fragments					
2		16	M	5		Stiff, Gray Lean CLAY, Some Silt, Trace Sand (CL)	(1.5-1.75)				
					5						
3		16	M/W	7		Loose, Brown Fine to Medium SAND, Little to Some Silt, Trace Gravel (SP-SM/SM)					
4		14	W	9		Silt Content Slightly Decreasing with Depth					
					10						
5		14	W	7							
					15	End of Boring at 15 ft					
						Borehole Backfilled with Bentonite Chips					
					20						

WATER LEVEL OBSERVATIONS

While Excavating ∇		Upon Completion of Drilling			
Time After Excavating				30 Min.	
Depth to Water				7.3'	▼
Depth to Cave in					

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

GENERAL NOTES

Start 4/14/17 End 4/14/17
Driller SE Chief . Geoprobe
Logger Editor TFG 7822DT
Equip. Used: 2-1/4" HSA; Autohammer

CGC, Inc.

LOG OF TEST BORING

CGC Inc.

Project: Olbrich Park Restroom Facility, Atwood Avenue
Location: City of Madison, Dane County, Wisconsin

Boring No. 3
Surface Elevation (ft)
Job No. C17051-10
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
						2.5 in. ± ASPHALT PAVEMENT over 5 in. ± BASE COURSE					
1		8	M	2		FILL: Very Loose, Grayish Brown to Black, Fine to Coarse Sand, Some Gravel, Trace to Little Silt, Numerous Brown Clayey Sand Seams and Cinder/Slag Fragments					
2		15	M	2/18"		FILL: Brick/Slag/Concrete Debris (Based on Driller's Description)					
					5	Soft, Grayish Brown Lean CLAY, Some Silt, Trace Sand (CL)	(0.25-0.5)				
3		12	M/W	9		Loose, Brown Fine to Medium SAND, Little to Some Silt, Trace Gravel (SP-SM/SM), Laminated with Dark Brown Fine to Coarse SAND, Some Silt and Gravel, Trace Clay (SM)					
4		17	M/W	10	▽ 10	Loose to Medium Dense, Brown/Reddish Brown Fine to Medium SAND, Some Silt, Trace Gravel, Scattered Silt Seams (SM)					
5		16	W	10		Loose to Medium Dense, Brown Fine to Medium SAND, Little to Some Silt, Trace Gravel (SP-SM/SM)					
					15	End of Boring at 15 ft Borehole Backfilled with Bentonite Chips/Asphalt Patched					
					20						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 8.3' Upon Completion of Drilling 8.3'
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 4/14/17 End 4/14/17
Driller SE Chief Rig Geoprobe 7822DT
Logger Editor TFG
Drill Method 2-1/4" 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

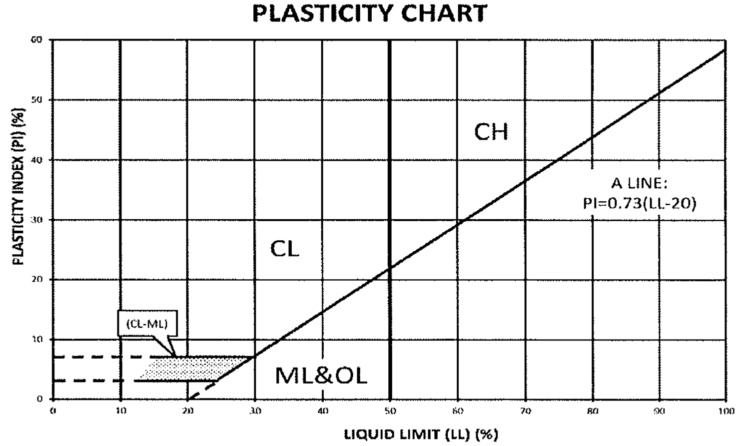
LABORATORY CLASSIFICATION CRITERIA

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 C

DOCUMENT QUALIFICATIONS

APPENDIX C
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

APPENDIX D

RECOMMENDED COMPACTED FILL SPECIFICATIONS

APPENDIX D

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

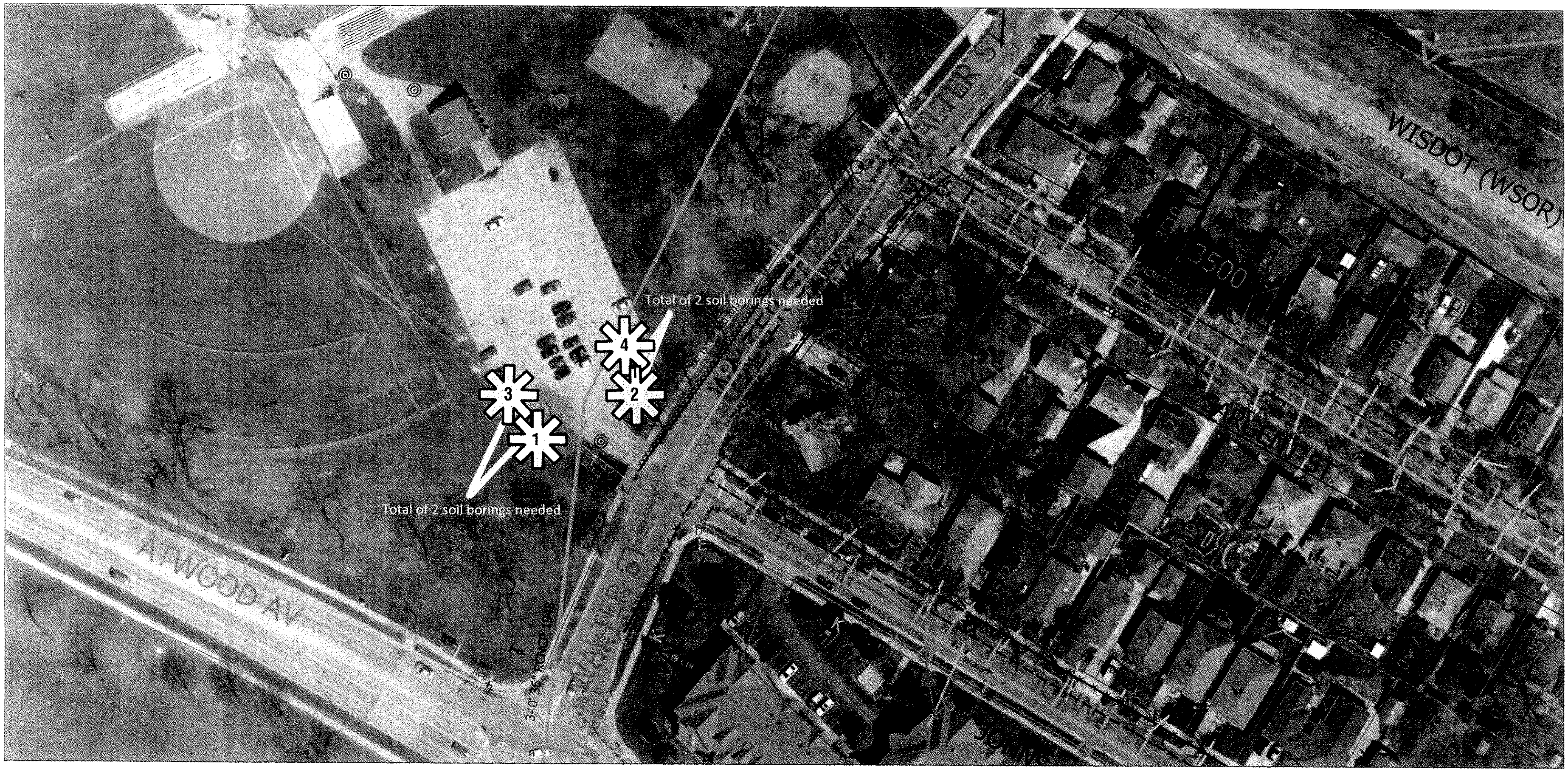
Material	WisDOT Section 311	WisDOT Section 312	WisDOT Section 305			WisDOT Section 209		WisDOT Section 210
	Breaker Run	Select Crushed Material	3-in. Dense Graded Base	1 1/4-in. Dense Graded Base	3/4-in. Dense Graded Base	Grade 1 Granular Backfill	Grade 2 Granular Backfill	Structure Backfill
Sieve Size	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)



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City of Madison, WI - GIS/Mapping data

Printed By: pakik
Disclaimer: The City makes no representation about the accuracy of these records and shall not be liable for any damages

OLBRICH PARK
BORING LOCATION MAP

CI7051-53A

CGC Inc.

LOG OF TEST BORING

Project: Olbrich Park
Atwood Avenue
Location: City of Madison, Dane County, Wisconsin

Boring No. OP-1
Surface Elevation (ft) 852±
Job No. C17501-53
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
						10± in. Topsoil (OL)					
1		11	M	18		FILL: Medium Dense, Brown Fine to Coarse Sand, Some Silt, Little to Some Gravel, Scattered Burnt Debris, Cinders, Glass Fragments and Cobbles					
2		13	M	1/12"		FILL: Very Loose, Dark Brown/Black Fine to Coarse Sand, Some Silt and Gravel, Scattered Cinders and Cobbles					
					5						
3		1	M	5	∇	Loose, Dark Brown to Black SILT and Silty Fine to Medium SAND, Trace Gravel and Organics, Scattered Fine Roots (ML/SM - Possible Fill or Buried Topsoil) Limited Recovery from 6 to 7.5 ft (Sample 3)					
4		11	M/W	4		Very Loose to Loose, Gray Fine to Medium SAND, Trace to Little Gravel, Trace Silt, Scattered Clayey Sand Seams (SP)					
					10						
						Loose, Tan Fine SAND, Little to Some Silt (SP-SM/SM)					
5		9	W	5							
					15	End of Boring at 15 ft Borehole Backfilled with Bentonite Chips					
					20						

WATER LEVEL OBSERVATIONS

While Drilling ∇ 7.0' Upon Completion of Drilling 7.0'
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 1/17/18 End 1/17/18
Driller SE Chief MDB Rig Geoprobe
Logger MDB Editor TFG 7822DT
Drill Method 2.25" HSA; Autohammer

LOG OF TEST BORING

CGC Inc.

Project	Olbrich Park
	Atwood Avenue
Location	City of Madison, Dane County, Wisconsin
Boring No.	OP-2
Surface Elevation (ft)	852±
Job No.	C17501-53
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
						11± in. Topsoil (OL)					
1		9	M	9		FILL: Very Loose to Loose, Dark Brown/Black Sandy Silt and Fine to Coarse Sand, Some Gravel, Trace Silt, Scattered Cinders, Glass Fragments and Cobbles					
2		0	-	1/12"		No Recovery from 3.5 to 5 ft (Sample 2)					
					5						
3		1	M	WH	∇	Very Loose, Dark Brown to Black SILT and Silty Fine to Medium SAND, Trace Organics, Scattered Fine Roots (ML/SM - Possible Fill or Buried Topsoil) Limited Recovery from 6 to 7.5 ft (Sample 3)					
4		13	M/W	8		Loose, Tan Fine to Medium SAND, Trace to Little Silt and Gravel (SP/SP-SM)					
					10						
5		14	M/W	8		Scattered Fine Sand Seams with Some Silt near 13.5 ft					
					15	End of Boring at 15 ft Borehole Backfilled with Bentonite Chips					
					20						

WATER LEVEL OBSERVATIONS

While Drilling ∇ 6.0' Upon Completion of Drilling 6.0'

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	1/17/18	End	1/17/18		
Driller	SE	Chief	MDB	Rig	Geoprobe
Logger	MDB	Editor	TFG		7822DT
Drill Method	2.25" HSA; Autohammer				

CGC Inc.

LOG OF TEST BORING

Project: **Olbrich Park**
Atwood Avenue
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **OP-3**
Surface Elevation (ft) **852±**
Job No. **C17501-53**
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± in. Asphalt Pavement					
1		9	M	100/8"		FILL: (Very Dense)*, Grayish Brown Sandy Silt and Fine to Medium Sand, Little Silt, Trace Gravel, Scattered Brick Fragments and Cobbles					
2		1	M	12	5	FILL: Medium Dense, Grayish Brown Fine to Coarse Sand, Some Silt and Gravel, Scattered Cinders and Cobbles Limited Recovery from 3.5 to 5 ft (Sample 2)					
3		8	M	2	▽	Very Soft to Soft, Dark Gray Silty CLAY, Trace Sand and Organics, Scattered Organic Matter (CL-ML)	(0.25)				
						Very Loose, Gray Silty SAND (SM) *Not Sampled; Description Based on Driller's Log*					
4		11	M	2	10	Very Loose, Dark Brown to Black SILT, Some Sand, Trace Organics, Scattered Roots (ML)					
						Very Loose to Loose, Gray Silty Fine SAND (SM) *Not Sampled; Description Based on Driller's Log*					
5		10	W	7	15	Loose, Tan Fine to Medium SAND, Trace Silt and Gravel (SP)					
					20	End of Boring at 15 ft Borehole Backfilled with Bentonite Chips *Note: Elevated N-Value in Sample 1 due to Frost					

WATER LEVEL OBSERVATIONS

While Drilling ▽ **7.3'** Upon Completion of Drilling **7.3'**
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 **1/17/18** End **1/17/18**
Driller **SE** Chief **MDB** Rig **Geoprobe 7822DT**
Logger **MDB** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

LOG OF TEST BORING

CGC Inc.

Project: **Olbrich Park**
Atwood Avenue
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **OP-4**
Surface Elevation (ft) **852±**
Job No. **C17501-53**
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± in. Asphalt Pavement					
1		9	M	8		FILL: Very Loose to Loose, Brown Fine to Coarse Sand, Little to Some Silt and Gravel, Scattered Cinders, Brick Fragments and Cobbles					
2		2	M	2/12"		FILL: Soft to Medium Stiff, Dark Brown to Black Silty Clay, Little Sand and Gravel, Trace Organics, Scattered Cinders	(0.25-0.75)				
					5	Limited Recovery from 3.5 to 5 ft (Sample 2)					
3		6	M	2		Very Soft to Soft, Gray to Dark Gray Lean CLAY, Little Sand, Laminated with Gray Fine to Medium SAND, Trace Silt (CL/SP) Limited Recovery from 6 to 7.5 ft (Sample 3) *Notable Petroleum Odor in Sample 3*	(0.25)				
4		8	M/W	9		*Notable Petroleum Odor in Sample 4*	(0.25)				
					10						
5		6	W	10							
					15	Loose to Medium Dense, Tan Fine SAND, Trace to Little Silt (SP/SP-SM) *Faint Petroleum Odor in Sample 5*					
						End of Boring at 15 ft					
						Borehole Backfilled with Bentonite Chips					
					20						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **8.1'** Upon Completion of Drilling **8.1'**
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 **1/17/18** End **1/17/18**
Driller **SE** Chief **MDB** Rig **Geoprobe 7822DT**
Logger **MDB** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

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

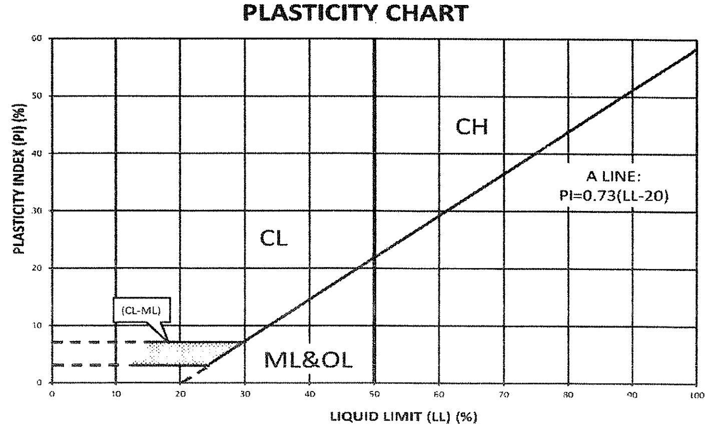
LABORATORY CLASSIFICATION CRITERIA

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



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.

Wisconsin Department of Safety & Professional Services
Division of Safety and Buildings

SOIL EVALUATION - STORM

in accordance with Comm 82.365 & 85, Wis. Adm. Code

County Dane

Parcel I.D. 071008101017

Review by **Date**

Attach complete site plan on paper not less than 8 1/2 x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and BM referenced to nearest road.

Please print all information.

Personal information you provide may be used for secondary purposes (Privacy Law, s.15.04 (1) (m)).

Property Owner
City of Madison Parks Olbrich Softball Diamonds

Property Location
Govt. Lot NE 1/4 NE 1/4 **S** 8 **T** 7 **N R** 10 **E**

Property Owner's Mailing Address
210 MLK Jr Blvd, Rm 104

Lot # **Block #** **Subd. Name or CSM#**

City	State	Zip Code	Phone Number
Madison	WI	53703	

[x] City [ ] Village [ ] Town — Madison
Nearest Road Walter St.

Drainage area_________ [ ] sq. ft. [ ] acres

Optional:
Test Site Suitable for (check all that apply)
[ ] Irrigation [ ] Bioretention trench [ ] Trench(es)
[ ] Rain Garden [ ] Grassed Swale [ ] Reuse
[ ] Infiltration trench [ ] SDS (>15' wide) [ ] Other ______

Hydraulic Application Test Method
[X] Morphological Evaluation
[ ] Double-Ring Infiltrometer
[ ] Other (Specify)______

OP-1 **Obs. #** [X] Boring [ ] Pit **Ground Surface Elev.** 852 **ft** **Depth to limiting factor** 84[1] in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0-10	Topsoil (No Sample Obtained)							
2	10-38	10YR 6/4; 4/3	None	SL (FILL)	0sg	ml		10-15	0.50
3	38-73	7.5YR 4/4	None	SL (FILL)	0sg	ml		20-30	0.50
4	73-105	10YR 4/3; 3/2	None	SIL/SL (POSS. FILL)	Varies	Varies		< 5	0.13
5	105-144	10YR 4/2	None	S/SCL	0sg	ml		5-10	0.11
6	144-180	10YR 6/2	None	SL	0sg	ml		0	0.50

[1] Groundwater encountered at a depth of about 7 ft (84 in.).

OP-2 **Obs. #** [X] Boring [ ] Pit **Ground Surface Elev.** 852 **ft** **Depth to limiting factor** 72[1] in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0-11	Topsoil (No Sample Obtained)							
2	11-66	10YR 2/1; 4/4	None	SIL/LS (FILL)	Varies	Varies		15-25	0.13
3	66-96	10YR 3/3	None	SIL/SL (POSS. FILL)	Varies	Varies		< 5	0.13
4	96-162	10YR 6/4	None	LS	0sg	ml		5-10	1.63
5	162-180	10YR 5/4	None	LS/SL	0sg	ml		5-10	0.50

[1] Groundwater encountered at a depth of about 6 ft (72 in.).

CST/PSS Name (Please Print)	Signature	CST/PSS Number
RYAN J. PORTMAN	Ryan J. Portman	1201636

Address	Date Evaluation Conducted	Telephone Number
201 N. MALLARD DR., SUN PRAIRIE, WI 53590	1/25/2018	608-440-4193

SBD-10793 (R.1/05)

Property Owner: City of Madison Parks Olbrich Softball Diamonds | Parcel ID# 071008101017 |

OP-3 Obs. #

[X] Boring
[ ] Pit — Ground Surface Elev. 852 ft — Depth to limiting factor 67[1], 87[2] in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0-3.5	Asphalt Pavement							
2	3.5-37	10YR 5/4	None	SIL/SL (FILL)	Varies	Varies		< 5	0.13
3	37-67	10YR 5/2	None	SL (FILL)	Varies	Varies		15-25	0.50
4	67-89	10YR 3/1	None	SICL	1vfsbk	mfi		0	0.04
5	89-103	(Not Sampled - Driller's Observation)		SL					0.50
6	103-120	10YR 3/1	None	SIL	1fsbk	mfr		0	0.13
7	120-174	(Not Sampled - Driller's Observation)		SL					0.50
8	174-180	10YR 5/4	None	S	0sg	ml		< 5	3.60

[1] Low value soil matrix color below about 5.6 ft (67 in.)suggests level of past saturation.

[2] Groundwater encountered at a depth of about 7.3 ft (87 in.).

OP-4 Obs. #

[X] Boring
[ ] Pit — Ground Surface Elev. 852 ft — Depth to limiting factor 66[1], 97[2] in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0-4	Asphalt Pavement							
2	4-47	10YR 5/4	None	SL (FILL)	Varies	Varies		10-20	0.50
3	47-66	10YR 2/1	None	SICL (FILL)	Varies	Varies		5-10	0.04
4	66-174	N 3/1; 10YR 5/2	None	SICL/LS	1vfsbk	mfi		0	0.04
5	174-180	10YR 5/6	None	LFS	0sg	ml		0	0.50

[1] Low value soil matrix color below about 5.5 ft (66 in.)suggests level of past saturation.

[2] Groundwater encountered at a depth of about 8.1 ft (87 in.).

Obs. #

[ ] Boring
[ ] Pit — Ground Surface Elev. ____ ft — Depth to limiting factor ____ in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr

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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of the Geoprofessional Business Association
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