# Reference-4: Geotechnical Exploration Report

CGC, Inc.
Construction • Geotechnical
Consulting Engineering/Testing

December 17, 2019
C19051-15

Mr. Jon Evans, PE, LEED AP-BD&C
Department of Public Works
Engineering Division
City-County Building, Room 115
210 Martin Luther King Jr. Blvd.
Madison, WI 53703

Re: Geotechnical Exploration Report
Proposed Public Library
Amund Reindahl Park – 1818 Portage Road
City of Madison, Dane County, Wisconsin

Dear Mr. Evans:

Construction • Geotechnical Consultants, Inc. (CGC) has completed the subsurface exploration program for the above-referenced project. The purpose of this 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. A determination of the site class for seismic design is also included, along with a discussion of the on-site stormwater infiltration potential. We are sending you an electronic copy of this report, and we can provide a paper copy upon request.

## SITE AND PROJECT DESCRIPTION

We understand the City of Madison is planning a new library to be located within the southeast quadrant of Amund Reindahl Park, bounded by Portage Road and Parkside Drive to the east, as well as East Washington Avenue to the southeast. The majority of the project area is covered with lawn and scattered trees, but a paved parking lot is present to the east of the existing shelter near Portage Road and Parkside Drive. Furthermore, paved walking/bike paths also traverse the project area. According to publicly-available topographic data (DCiMap; 1-ft contour lines), existing ground surface elevations within the project area generally slope from the north down towards East Washington Avenue in the southeast, with current site grades ranging between about EL 888 and 874 ft.

We understand the park was formerly farmland prior to about the 1970s or 1980s (based on historic aerial images available through DCiMap). We anticipate that the existing shelter, as well as a historic barn building located near the center of the project area, will remain.

We understand the building could be up to 40,000 SF and could be one or two stories and will likely not include a basement. The project is in preliminary stages of planning, and three possible locations are being considered for the new building to the east, southwest or south of the existing shelter.

Building grades were not available at the time of this report. In addition to the new library building, the project will also involve paved drives and parking areas, as well as on-site stormwater management facilities.

## SUBSURFACE CONDITIONS

Subsurface conditions for this study were explored by drilling 21 Standard Penetration Test (SPT) soil borings to planned depths of 20 ft below current site grades at locations selected by City personnel and field-staked by CGC. The soil borings were conducted by Badger State Drilling (under subcontract to CGC) between December 3 and 11, 2019 using a truck-mounted D-120 rotary drill rig equipped with hollow stem augers and an automatic SPT hammer. We have also taken into consideration the findings in three soil borings that were previously completed in the area of the splash pad, just north of the project area, in 2012. The specific procedures used for drilling and sampling are described in Appendix A, and the soil boring locations are shown in plan on the Soil Boring Location Exhibit presented in Appendix B. Ground surface elevations at the boring locations were estimated by CGC based on publicly-available topographic data (DCiMap; 1-ft contour lines), and the elevations should therefore be considered approximate.

The subsurface profiles at the boring locations were fairly consistent, and the following strata were typically encountered (in descending order):

- About 8 to 13 in. of ***topsoil***; followed by
- About 2 to 7 ft of medium stiff to very stiff ***lean clay***, typically softening somewhat or grading to very loose to loose ***clayey sand*** with depth; over
- Medium dense to very dense ***sand*** strata, generally containing significant amounts of silt and gravel as well as scattered cobbles/boulders, to the maximum depths explored.

As an exception to the above generalized subsurface profile, medium stiff to very stiff *cohesive fill* was found to extend about 5.5 ft below the ground surface in Boring 7. In addition, surficial clay layers in Borings 9 and 20 were classified as *possible fill* due to somewhat inconsistent composition (including minor amounts of organics) and coloration, and the shallow clays in Boings 8, 16 and 21 were classified as *possible/probable lower horizon topsoil* since they were also found to contain apparent organics.

Further exceptions included fairly thin, medium dense silt to sandy silt layers or interbeds of clay, silt and sand being encountered at the transition between the shallow clays and underlying granular soils in Borings 2, 12 and 15.

Moisture contents in representative samples obtained from the shallow clay and clayey sand soils (including apparent fill in Boring 7 as well as possible fill or possible/probable lower horizon topsoil in Borings 8, 9, 16, 20 and 21) were determined to range from 13.1% to 29.1%. Based on natural moisture contents, pocket penetrometer readings ($q_p$; an estimate of the unconfined compressive strength of cohesive soils) and SPT blow counts (N-values), the surficial cohesive and fine-grained soils should generally be considered slightly to moderately compressible. In addition to natural moisture contents, several clay specimens (apparent fill in Boring 7, possible fill in Boring 9, probable lower horizon topsoil in Boring 16 and possible lower horizon topsoil in Borings 8, 20 and 21) were also tested for their organic contents by means of loss-on-ignition (LOI) due to their darker color. The samples were found to have organic contents of 3.2% to 5.3%, with soils having organic contents of 4% or more typically being considered organic.

Furthermore, representative samples of the granular soils were tested for their particle size distribution (gradation) to aid in their classification. The samples were determined to generally contain P200 ("fines") content of 27.5% to 38.7%, corresponding to USCS classifications of silty sand (SM), as well as USDA designations of fine sandy loam (FSL), sandy loam (SL) to gravelly sandy loam (GRSL) or loamy fine sand (LFS). As an exception, Sample 3 of Boring 16, taken between the surficial clay and underlying sand soils, contained a slightly higher P200 content of 47.8%, corresponding to silty sand (SM, but close to sandy silt) and gravelly silt loam (GRSiL) per the USCS and USDA classification systems, respectively. The particle size distribution determined on two cleaner sand samples obtained from Boring 19, on the other hand, returned USCS and USDA classifications of poorly-graded sand (SP) and very gravelly sand (VGRS), respectively, with a composite P200 content of 4.1%.

Groundwater was generally not encountered in the borings during or upon the completion of drilling. As an exception, a probable perched condition was observed in Boring 17, performed in a lower-lying, portion of the project area, at about 3.5 ft below the ground surface during drilling and about 6 ft below the surface upon the completion of drilling (after the augers had been pulled). The borehole was left open for a longer-term water level reading. About one day after the completion of drilling, B-17 had caved in at a depth of about 8 ft, with the water level still at about 6 ft below the ground surface at that point. Groundwater levels are expected to fluctuate with seasonal variations in precipitation, infiltration, evapotranspiration, the water level in nearby waterbodies as well as other factors. A more detailed description of the site soil and groundwater conditions is presented on the Soil Boring Logs attached in Appendix B, which also contain the laboratory test results along with Particle Size Distribution Test Reports, as well as on the WDSPS Soil and Site Evaluation – Storm form attached in Appendix E.

## DISCUSSION AND RECOMMENDATIONS

Subject to the limitations discussed below and based on the subsurface exploration, it is our opinion that the site is generally suitable for construction and that the proposed building can be supported by a conventional spread footing foundation system. Our recommendations for site preparation, foundation, floor slab and pavement design/construction, along with our assessment of the site class for seismic design and the on-site stormwater infiltration potential, are presented in the following subsections. *Note that the foundation design and construction recommendations contained herein* *should be considered preliminary in nature as the building location and building grades were not available at the time of this report. Similarly, the stormwater infiltration potential discussion is also preliminary since the location and depth of the stormwater management areas had not been determined and the evaluation of the on-site stormwater infiltration potential is solely based on soil borings.* Additional information regarding the conclusions and recommendations presented in this report is discussed in Appendix C.

## 1. <u>Site Preparation</u>

We recommend that topsoil be stripped at least 10 ft beyond the proposed construction area, including areas requiring fill beyond the building footprint and pavement limits. The topsoil can be stockpiled on-site and later re-used as fill in landscaped areas. As mentioned earlier, topsoil was about 8 to 13 in. thick in the soil borings, but differing topsoil thicknesses may be encountered between and beyond boring locations due to previous agricultural and grading activities. Note that slightly organic to organic possible/probable lower horizon topsoil was found to extend about 2 to 3 ft below current site grades in Borings 8, 16, 20 and 21, which may also require removal depending on organic contents. Trees and root zones should be removed from construction areas prior to or in conjunction with topsoil stripping.

After topsoil stripping, exposed soils are generally expected to consist of medium stiff to very stiff clay. In areas remaining at-grade or requiring fill, we recommend cohesive/fine-grained soils exposed be statically recompacted (i.e., without vibration) and subsequently proof-rolled with a piece of heavy rubber-tire construction equipment, such as a loaded tri-axle dump truck, to check for soft/yielding areas. If soft/yielding areas are observed, these soils should be undercut and replaced with granular backfill compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557) in accordance with our Recommended Compacted Fill Specifications presented in Appendix D. Alternatively, 3-in. dense graded base (DGB) that is placed in loose 10-in. lifts and compacted until deflection ceases can also be used to restore grades in undercut areas. In areas where granular soils are exposed following topsoil stripping or where site grades need to be cut, the granular subgrades should be thoroughly recompacted with a vibratory smooth-drum roller, and zones that remain loose after recompaction should be undercut and replaced as described above. Areas subsequently receiving fill should be checked for their footing, floor slab and pavement support suitability prior to fill placement, as applicable.

Following the development of a firm and stable subgrade, fill placement to establish site, pavement and building grades can proceed, where required. To the extent possible, we recommend using granular soils (i.e., sands/gravels, including granular soils excavated on-site) as structural fill within the building pad and the upper 2 to 3 ft in pavement areas because these soils are relatively easy to place and compact in most weather conditions compared to clay/silt soils. Clay and silt soils excavated on-site are generally not recommended as structural fill because moisture conditioning by discing and drying (aeration) will likely be required to achieve desired compaction levels, which is highly weather-dependent (i.e., dry, warm and windy conditions) and could delay construction progress. In our opinion, clay/silt soils are best used as fill in landscaping or potentially as lower lifts in pavement areas provided the moisture contents can be sufficiently lowered from the natural states to facilitate compaction efforts. We recommend that structural fill be compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557) following Appendix D guidelines. Periodic field density tests should be taken by CGC staff within the fill to document the adequacy of compactive effort.

Note that where significant fill will be required to establish building and pavement grades (i.e., more than 5 ft above existing grades), we recommend the fill be placed early in the construction process, potentially with a time delay between fill placement and beginning footing construction, to allow the slightly to moderately compressible cohesive and fine-grained soils to consolidate and settle under the weight of the new fill prior to resuming the regular construction sequence. For building areas where significant fill is required, typical time delays/consolidation periods are on the order of 1 to 3 months. If desired, we can provide further information and recommendations as development plans progress and planned site grades become available.

## 2. Preliminary Foundation Design

As the building location and elevations were not available at the time of this report, the foundation design and construction recommendations contained in this section should be considered *preliminary*. As development plans progress and the location of the planned library, as well as building elevations and loads have been established, this information should be provided to CGC in order for us to review and adjust the recommendations contained in this subsection, as needed. At that point, a supplemental subsurface exploration program consisting of soil borings and/or test pits may also be required to finalize the foundation design/construction recommendations.

The following parameters should be used for *preliminary* foundation design:

- Maximum net allowable bearing pressure: 3,000 to 5,000 psf (dependent upon building location and grades)

- Minimum foundation widths:
  - Continuous wall footings: 18 in.
  - Column pad footings: 30 in.

- Minimum footing depths below finish site grades:
  - Exterior/perimeter footings: 4 ft
  - Interior footings: no minimum requirement

Note that the higher allowable bearing pressure of 5,000 psf assumes that footings bear within at least medium dense native sand soils, with shallow native clay and fill soils being undercut below the bottom of footings and replaced with well-compacted engineered granular or aggregate backfill. Some of the surficial clay layers may appear to be suitable for the support of footings designed for an allowable bearing pressure of 5,000 psf, but the clays were generally found to soften with depth or grade to very loose to loose clayey sand, and this condition is not considered suitable for the support of footings other than very lightly-loaded footings designed for a low allowable bearing pressure. Note that where substantial fill will be required to establish the building pad, consideration could be given to (mass) removal of the shallow clay soils prior to new fill placement in order to reduce (and practically eliminate) undercutting later on and to significantly shorten the consolidation period between fill placement and beginning footing construction.

Recognizing that subgrade conditions may vary across the site, footing subgrades should be checked by a CGC field representative to document that the subgrade soils are suitable for footing support and advise on corrective measures, such as undercutting, if necessary. We recommend using a smooth-edged backhoe bucket for footing and undercut excavations. The base of undercut excavations 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. Granular soils exposed at footing grade or the bottom of undercut excavations should be thoroughly recompacted with a large vibratory plate compactor or an excavator-mounted hoe-pack prior to backfilling or formwork/concrete placement to densify soils loosened during the excavation process. Soils potentially susceptible to disturbance from vibratory compaction (e.g., cohesive/fine-grained soils or granular soils with elevated moisture content where perched water is present) should be hand-trimmed. OSHA slope guidelines should be followed if workers need to enter footing/undercut excavations.

As noted above, undercutting will be required where existing fill is present at or below footing grades. Native clay may also need to be undercut below footings, the extent of which will be dependent upon the building location and finish grades. In order to re-establish footing grade in undercut areas, we generally recommend using granular backfill compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557), in accordance with the Recommended Compacted Fill Specifications presented in Appendix D. Alternatively, 3-in. DGB that is placed in loose 10-in. lifts and compacted until deflection ceases can also be used to restore grades in undercut areas.

## 3. Seismic Site Class

In our opinion, the average soil properties in the upper 100 ft of the site (based on N-values projected to be between 15 and 50 blows/ft, on average, in the native sand soils underlying the site) may 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).

## 4. Floor Slab

Depending on final building grades and assuming that the new building will not include a basement, floor slab subgrades may consist of a variety of cohesive fill or native clay to clayey sand, silt and sand soils, or of newly-placed engineered granular fill where site grades need to be raised. We recommend that granular floor slab subgrades be thoroughly recompacted with a vibratory smooth-drum roller prior to concrete placement. Cohesive and fine-grained floor slab subgrades should be statically recompacted (i.e., without vibration) and subsequently proof-rolled. Areas that remain loose after recompaction or where soft/yielding zones are observed should be undercut and replaced with well-compacted compacted 3-in. DGB or granular backfill.

To act as a capillary break below the slab, we recommend including a minimum 4 to 6-in. thick layer of well-graded sand/gravel with less than 5% by weight passing the No. 200 U.S. standard sieve. Note, however, that some structural engineers require a layer of DGB, such as 1¼-in. DGB, rather than sand/gravel below the floor slab to increase the subgrade modulus immediately below the slab. To further reduce the potential for moisture migration through the slab, a plastic vapor barrier can also be utilized. Fill and base layer material below the floor slab should be placed as described in the Site Preparation section of this report. Slabs constructed on a minimum 6-in. thick dense graded base layer may be designed utilizing a subgrade modulus of 150 pci, and a subgrade modulus of 100 pci should be used for the design of slabs that are constructed on a sand/gravel layer. The design subgrade moduli are based on a firm or adequately stabilized, recompacted subgrade such that non-yielding conditions are developed. The slab should be structurally separated from the footings with a compressible filler and have construction joints and reinforcement for crack control.

## 5. Pavement Design

We anticipate that pavement design will be controlled by the medium stiff to very stiff clays generally encountered at shallow depths in the borings performed on this site. Subgrades should be prepared as described in the Site Preparation section of this report, with recompaction/proof-rolling completed prior to base course and asphalt placement. We anticipate that asphalt pavement on this site will primarily be exposed to automobile traffic with less than one 18-kip equivalent single axle load (ESAL) per day. In view of this, we have assumed Traffic Class I following Wisconsin Asphalt Pavement Association (WAPA) recommendations for smaller parking areas (i.e., up to 50 stalls) and driveways that are mainly used by light passenger vehicles. However, main sections of the driveways are likely to experience heavier traffic loads (e.g., due to garbage and/or delivery trucks), and larger parking lots (i.e., more than 50 stalls) may also be planned. For pavement areas where trucks will routinely travel and parking lots greater than 50 stalls, we have assumed a traffic load of less than 10 ESALs per day and Traffic Class II according to WAPA. The pavement sections summarized in Table 1 below were selected assuming a Soil Support Value "SSV" of about 4.0 for a firm or adequately stabilized cohesive subgrade and a design life of 20 years.

**TABLE 1 – Recommended Pavement Sections**

| Material | Thicknesses (in.) | | WDOT Specification (1) |
|---|---|---|---|
| | Traffic Class I (Light Duty) | Traffic Class II (Medium Duty) | |
| Bituminous Upper Layer (2,3) | 1.5 | 1.75 | Section 460, Table 460-1, 9.5 mm or 12.5 mm |
| Bituminous Lower Layer (2,3) | 2.0 | 2.25 | Section 460. Table 460-1, 12.5 mm or 19.0 mm |
| Dense Graded Base Course (2,4) | 8.0 | 10.0 | Sections 301 and 305, 3 in. and 1¼ in. |
| **Total Thickness** | **11.5** | **14.0** | |

Notes:

1) Wisconsin DOT *Standard Specifications for Highway and Structure Construction*, latest edition, including supplemental specifications, and *Wisconsin Asphalt Pavement Association 2018 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; 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.

The recommended pavement sections assume regular maintenance (crack sealing, etc.) will occur, as needed. Note that if traffic volumes are greater than those assumed, CGC should be allowed to review the recommended pavement sections and adjust them accordingly. Alternative pavement designs may prove acceptable and should be reviewed by CGC. If there is a delay between subgrade preparation and placing the base course, the subgrade should be recompacted. *As discussed in the Site Preparation section, we recommend early fill placement in pavement areas where site grades need to be raised about 5 ft or more above existing.*

Where concrete pavement may be used, such as in pavement areas subjected to concentrated wheel loads (e.g., dumpster pads), we recommend that the concrete should be at least 6 in. thick and contain mesh reinforcement for crack control. Concrete slabs underlain by a minimum 6-in. thick dense graded base layer over a firm or stabilized subgrade can be designed utilizing a subgrade modulus of 150 pci.

## 6. Preliminary Stormwater Infiltration Potential

We understand that stormwater management areas are planned as part of the development, but the location and depth of these facilities has not been determined yet.

The subsurface profiles at Borings B-1 through B-21, performed throughout the project area, were fairly consistent and included lower-permeability clay loam, silty clay loam, sandy clay loam, silt loam and loam to depths between approximately 3 and 8 ft below current site grades. It is our opinion that the surficial soils encountered in the borings are not suitable for infiltrating significant amounts of stormwater.

Below depths of about 3 to 8 ft below current site grades, more permeable fine sandy loam, sandy loam, gravelly sandy loam, loamy fine sand, loamy sand and very gravelly sand soils were encountered, extending to the maximum depths explored at about 20 ft below the ground surface. Provided the infiltration systems will extend into these coarser-grained layers (or lower-permeability soils are undercut below the bottom of the infiltration systems and replaced with appropriate sandier soils), we anticipate that some infiltration will likely be possible. Note, however, that the granular soils were found to contain occasional lower-permeability (e.g., sandy clay loam, silt loam, etc.) seams, which will likely limit the infiltration rate. In an effort to improve the infiltration potential, we recommend that granular soils containing fairly thin lower-permeability seams be excavated and blended (or deep tilling, ripping, etc.) to break up the lower-permeability seams. *Thicker silt and clay layers will require excavation and removal.* It must also be noted that the majority of the granular soils appear to be overconsolidated glacial till deposits, and the fairly high density may limit the infiltration rate to less than the published values in WDNR literature, which is another reason we recommend that the soils be deep-tilled to improve the infiltration rate compared to the in-place condition. After removal of the overlying lower-permeability strata, we recommend that the deep-tilling process extend at least 5 ft (potentially deeper pending field observations) below the bottom of the infiltration systems. Samples of the mixed soils should be collected during construction to document that the gradations of the mixed samples are consistent with the soil texture that the design infiltration rate is based upon.

> **Infiltration Potential:** The following is a summary of the estimated infiltration rates for the soils encountered in Borings B-1 through B-21, per Table 2 of the WDNR Conservation Practice Standard 1002, *Site Evaluation for Storm Water Infiltration*. *Note that where lower-permeability soil seams/layers exist within otherwise more permeable soils, the infiltration rate of the lower-permeability seams/layers will control the vertical infiltration rate, unless the lower-permeability seams are removed or the layer (with scattered seams) is excavated and blended (or deep*

*tilling, ripping, etc.), as discussed previously.* The estimated infiltration rates are as follows:

| | |
|---|---|
| • Clay loam (CL) | 0.03 in./hr |
| • Silty clay loam (SiCL) | 0.04 in./hr |
| • Sandy clay loam (SCL) | 0.11 in./hr |
| • Silt loam (SiL) | 0.13 in./hr |
| • Gravelly silt loam (GRSiL) | 0.13 in./hr |
| • Loam (L) | 0.24 in./hr |
| • Fine sandy loam (FSL) | 0.50 in./hr |
| • Sandy loam (SL) | 0.50 in./hr |
| • Gravelly sandy loam (GRSL) | 0.50 in./hr |
| • Loamy fine sand (LFS) | 0.50 in./hr |
| • Fine sand (FS) | 0.50 in./hr |
| • Loamy sand (LS) | 1.63 in./hr |
| • Very gravelly sand (VGRS) | 3.60 in./hr |

Note that the infiltration rates should be considered very approximate since they are merely based on soil texture and do not account for in-place soil density and other factors, which will affect the infiltration rate. We recommend that the soils at and several feet below the bottom of stormwater management systems be checked by a geotechnical engineer or certified soil tester *in conjunction with the basin designer* to document that the soils are appropriate for the design infiltration rate or recommend remedial measures, if necessary. *Variability in the soil conditions should be expected across the site and within the stormwater basin that could result in a wide range of undercut depths to reach soil suitable for the design infiltration rate.* The Wisconsin Department of Safety & Professional Services Soil and Site Evaluation – Storm form for B-1 through B-21 is contained in Appendix E.

It must be cautioned that the results of the soil borings have limitations with regard to the evaluation of the on-site stormwater infiltration potential, as actual soil horizon transitions may vary from those shown on the boring logs and infiltration forms. The reviewing agency may require test pits be excavated at a later date prior to finalizing the stormwater design. *The results of the test pits may require revisions to the stormwater management design if the design has been based solely on the soil borings.*

**Groundwater:** Groundwater was not encountered in the soil borings performed on this site, with the exception of probable perched water in B-17, as previously discussed. However, redoximorphic features (redox or mottling), which are indicative of the level of previous saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater, were noted in some of shallow clay soils. Seasonal fluctuations of the groundwater table should be expected, as previously discussed.

**Bedrock:** Bedrock was not encountered in the borings to the maximum depths explored. The depth of bedrock should be expected to vary across the site.

During construction, appropriate erosion control should be provided to prevent eroded soil from contaminating the stormwater management areas. Where appropriate, the stormwater system design should include pretreatment to remove fine-grained soils (silt/clay) and clogging materials (oils/greases) from stormwater prior to entering the infiltration areas. Additionally, a regular maintenance plan should be developed to remove silt/clay soils and clogging materials that may accumulate in the bottom of the stormwater management areas over time. Failure to adequately control fine-grained soils and clogging materials from entering the infiltration areas or failure to regularly remove fine-grained soils and clogging materials that accumulate at the base of the stormwater infiltration systems will likely cause the stormwater management systems to fail. Additionally, it is important that the soils in the bottom of the infiltration systems do not become compacted during construction or measures are taken to mitigate soils that are compacted during construction. Refer to WDNR Conservation Practice Standards 1002, 1003 and 1004, as well as NR151 for additional information.

## 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 some 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 aggregate in pavement and floor slab areas should be increased if the project schedule requires that work proceed during adverse weather conditions.

- Earthwork construction during the late fall through early spring 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 the observations made during our field exploration, we generally do not anticipate groundwater to be encountered during construction. However, water accumulating at the bottom of excavations as a result of precipitation or seepage should be quickly removed, with dewatering means and methods the contractor's responsibility.

## 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 proceed in accordance with our recommendations, the following operations should be monitored by CGC:

- Topsoil stripping and subgrade proof-rolling/compaction;
- 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.**

Tim F. Gassenheimer, EIT, CST
Staff Engineer

Ryan J. Portman, PE, CST
Consulting Professional

Encl: Appendix A - Field Exploration
Appendix B - Soil Boring Location Exhibit
Logs of Test Borings (21)
Particle Size Distribution Test Reports (12)
Log of Test Boring-General Notes
Unified Soil Classification System
Appendix C - Document Qualifications
Appendix D - Recommended Compacted Fill Specifications
Appendix E - WDSPS Soil and Site Evaluation – Storm Form (21 Borings)

# APPENDIX A

# FIELD EXPLORATION

# APPENDIX A

## FIELD EXPLORATION

Subsurface conditions for this study were explored by drilling 21 Standard Penetration Test (SPT) soil borings to planned depths of 20 ft below current site grades at locations selected by City personnel and field-staked by CGC. The soil borings were conducted by Badger State Drilling (under subcontract to CGC) between December 3 and 11, 2019 using a truck-mounted D-120 rotary drill rig equipped with hollow stem augers and an automatic SPT hammer.

The soil borings were sampled at 2.5-ft intervals to a depth of 15 ft and at 5-ft intervals thereafter. The 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.

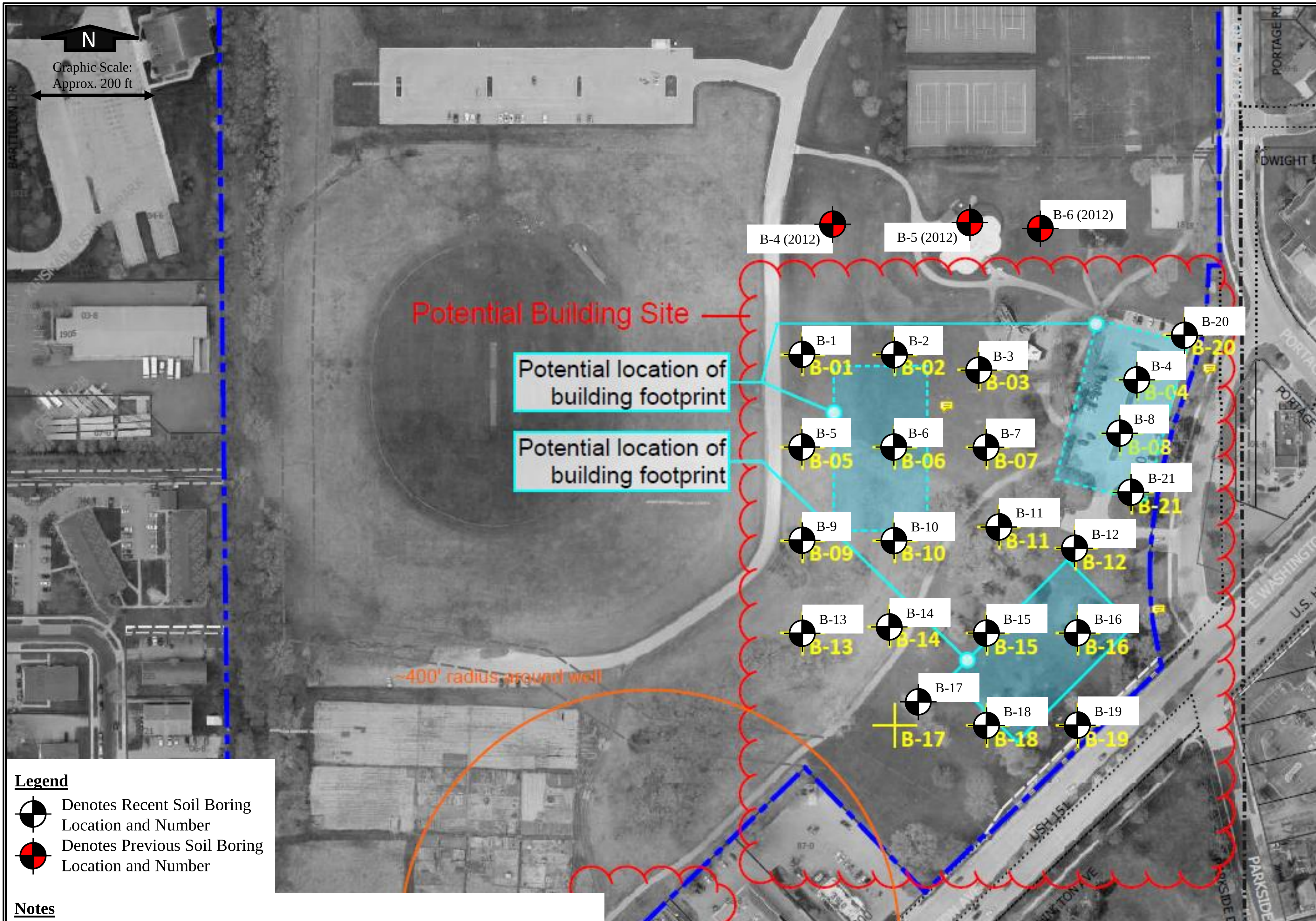
2. Standard Penetration Test and Split-Barrel Sampling of Soils
   (ASTM Designation: D 1586)

   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 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 as well as the USDA classification system. The final logs prepared by the engineer, including laboratory test results, as well as a Soil Boring Location Exhibit and a description of the Unified Soil Classification System are presented in Appendix B.

# APPENDIX B

**SOIL BORING LOCATION EXHIBIT**
**LOGS OF TEST BORINGS (21)**
**PARTICLE SIZE DISTRIBUTION TEST REPORTS (12)**
**LOG OF TEST BORING-GENERAL NOTES**
**UNIFIED SOIL CLASSIFICATION SYSTEM**




**Notes**

1. Borings were drilled by Badger State Drilling between December 3 and 11, 2019.
2. Boring locations are approximate.
3. Base map was prepared by City of Madison – Dept. of Public Works, Engineering Division.

| Job No.: C19051-15 | CGC, Inc. | **SOIL BORING LOCATION EXHIBIT** |
|---|---|---|
| Date: 12/2019 | | **Proposed Public Library** <br> **Amund Reindahl Park – 1818 Portage Road** <br> **City of Madison, Dane County, Wisconsin** |

# LOG OF TEST BORING

CGC Inc.

Project: **Proposed Public Library**
**Amund Reindahl Park - 1818 Portage Road**
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **1**
Surface Elevation (ft) **884.0±**
Job No. **C19051-15**
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 |
| | | | | | | 11± in. TOPSOIL (OL) | | | | | |
| 1 | | 10 | M | 9 | | Stiff, Brown Lean CLAY, Trace Sand (CL)<br>*USDA: 10YR 5/3 Silty Clay Loam* | (1.5-1.75) | | | | |
| | | | | | | Medium Stiff, Brown Sandy Lean CLAY, Trace Gravel (CL) | | | | | |
| 2 | | 12 | M | 18 | | *USDA: 10YR 4/3 Sandy Clay Loam* | (0.75) | | | | |
| | | | | | 5 | Medium Dense, Pale Brown Fine to Medium SAND, Some Silt, Little Gravel (SM)<br>*USDA: 10YR 6/3 Sandy Loam* | | | | | |
| 3 | | 18 | M | 23 | | P200 (Sample 3 - 6 to 7.5 ft): 32.8% | | 9.5 | | | |
| | | | | | | Dense, Pale Brown Fine SAND, Little to Some Silt (SP-SM/SM) | | | | | |
| 4 | | 18 | M | 36 | 10 | *USDA: 10YR 6/3 Loamy Fine Sand* | | | | | |
| | | | | | | Dense to Very Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) | | | | | |
| 5 | | 10 | M | 30 | | *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| 6 | | 8 | M | 50/2" | 15 | Probable Cobble/Boulder near 14 ft | | | | | |
| 7 | | 14 | M | 65 | 20 | | | | | | |
| | | | | | | End of Boring at 20 ft<br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling ∇ **NW** Upon Completion of Drilling **NW**
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 **12/4/19** End **12/4/19**
Driller **BSD** Chief **KD** Rig **D-120**
Logger **JF** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

# LOG OF TEST BORING

CGC Inc.

Project: **Proposed Public Library**
**Amund Reindahl Park - 1818 Portage Road**
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **2**
Surface Elevation (ft) **887.0±**
Job No. **C19051-15**
Sheet **1** of **1**

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

| No. | TYPE | Rec (in.) | Moist | N | Depth (ft) | VISUAL CLASSIFICATION and Remarks | qu (qa) (tsf) | W | LL | PL | LI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 8± in. TOPSOIL (OL) | | | | | |
| 1 | | 10 | M | 7 | | Stiff, Brown Lean CLAY, Trace Sand (CL)<br>*USDA: 10YR 5/3 Silty Clay Loam* | (1.25-2.0) | 25.7 | | | |
| 2 | | 12 | M | 7 | 5 | | (1.5) | 27.0 | | | |
| 3 | | 12 | M | 16 | | Medium Dense, Pale Brown Sandy SILT, Little to Some Gravel, Scattered Cobbles/Boulders (ML)<br>*USDA: 10YR 6/3 Loam* | | | | | |
| 4 | | 14 | M | 19 | 10 | Medium Dense to Very Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM)<br>*USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| 5 | | 12 | M | 13 | | | | | | | |
| 6 | | 10 | M | 27 | 15 | | | | | | |
| 7 | | 12 | M | 76 | 20 | | | | | | |
| | | | | | | End of Boring at 20 ft<br><br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling ▽ NW — Upon Completion of Drilling NW
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 **12/3/19** End **12/3/19**
Driller **BSD** Chief **KD** Rig **D-120**
Logger **JF** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

# LOG OF TEST BORING

CGC Inc.

Project: Proposed Public Library
Amund Reindahl Park - 1818 Portage Road
Location: City of Madison, Dane County, Wisconsin

Boring No. 3
Surface Elevation (ft) 888.0±
Job No. C19051-15
Sheet 1 of 1

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

| No. | Type | Rec (in.) | Moist | N | Depth (ft) | Visual Classification and Remarks | qu (qa) (tsf) | W | LL | PL | LI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 11± in. TOPSOIL (OL) | | | | | |
| 1 | | 10 | M | 11 | | Very Stiff, Brown Lean CLAY, Trace Sand (CL) *USDA: 10YR 4/3 Silty Clay Loam* | (2.0-2.5) | | | | |
| 2 | | 10 | M | 8 | | Medium Stiff, Brown to Dark Brown Sandy Lean CLAY, Trace Gravel (CL) *USDA: 10YR 4/3 to 3/3 Sandy Clay Loam* | (0.5-0.75) | 17.9 | | | |
| | | | | | 5 | | | | | | |
| 3 | | 12 | M | 21 | | Medium Dense, Gray to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 5/1 to 6/4 Gravelly Sandy Loam* | | | | | |
| 4 | | 10 | M | 26 | | Medium Dense to Very Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| | | | | | 10 | | | | | | |
| 5 | | 12 | M | 27 | | | | | | | |
| | | | | | | P200 (Samples 5 and 6 - 11 to 15 ft): 33.7% | | 7.2 | | | |
| 6 | | 14 | M | 27 | | | | | | | |
| | | | | | 15 | | | | | | |
| 7 | | 14 | M | 58 | | | | | | | |
| | | | | | 20 | End of Boring at 20 ft<br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling ▽ NW — Upon Completion of Drilling NW
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 12/3/19 End 12/3/19
Driller BSD Chief KD Rig D-120
Logger JF Editor TFG
Drill Method 2.25" HSA; Autohammer

# LOG OF TEST BORING

CGC Inc.

Project: **Proposed Public Library**
**Amund Reindahl Park - 1818 Portage Road**
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **4**
Surface Elevation (ft) **885.0±**
Job No. **C19051-15**
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 | | 10 | M | 7 | | Stiff, Brown Lean CLAY, Trace Sand (CL)<br>*USDA: 10YR 4/3 Silty Clay Loam* | (1.5-1.75) | 29.1 | | | |
| 2 | | 12 | M/W | 5 | 5 | Soft/Loose, Very Dark Grayish Brown to Brown Sandy Lean CLAY to Clayey Fine SAND, Trace Gravel (CL/SC)<br>*USDA: 10YR 3/2 to 5/3 Sandy Clay Loam to Sandy Loam* | (0.25-0.5) | | | | |
| 3 | | 10 | M | 24 | | Medium Dense to Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM)<br>*USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| 4 | | 10 | M | 15 | 10 | | | | | | |
| 5 | | 10 | M | 24 | | | | | | | |
| 6 | | 12 | M | 23 | 15 | | | | | | |
| 7 | | 10 | M | 38 | 20 | | | | | | |
| | | | | | | End of Boring at 20 ft<br><br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling ▽ **NW** Upon Completion of Drilling **NW**
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 **12/3/19** End **12/3/19**
Driller **BSD** Chief **KD** Rig **D-120**
Logger **JF** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

# LOG OF TEST BORING

Project: **Proposed Public Library**
**Amund Reindahl Park - 1818 Portage Road**
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **5**
Surface Elevation (ft) **883.5±**
Job No. **C19051-15**
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 | | 8 | M | 8 | | Very Stiff, Brown Lean CLAY, Trace Sand (CL) *USDA: 10YR 4/3 Silty Clay Loam* | (2.0-2.75) | 26.9 | | | |
| 2 | | 10 | M | 9 | | Medium Stiff to Stiff/Loose, Brown to Pale Brown Sandy Lean CLAY to Clayey Fine to Medium SAND, Trace Gravel (CL/SC) *USDA: 10YR 4/3 to 6/3 Sandy Clay Loam to Sandy Loam* | (0.75-1.25) | | | | |
| | | | | | 5 | | | | | | |
| 3 | | 14 | M | 20 | | Medium Dense to Very Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| 4 | | 14 | M | 19 | | | | | | | |
| | | | | | 10 | | | | | | |
| 5 | | 12 | M | 33 | | | | | | | |
| 6 | | 12 | M | 40 | | | | | | | |
| | | | | | 15 | | | | | | |
| 7 | | 3 | M | 50/3" | | Probable Cobble/Boulder near 18.5 ft - Limited Recovery in Sample 7 | | | | | |
| | | | | | 20 | End of Boring at 20 ft<br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling ▽ NW    Upon Completion of Drilling NW
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 **12/4/19** End **12/4/19**
Driller **BSD** Chief **KD** Rig **D-120**
Logger **JF** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

# LOG OF TEST BORING

CGC Inc.

Project: **Proposed Public Library**
**Amund Reindahl Park - 1818 Portage Road**
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **6**
Surface Elevation (ft) **888.0±**
Job No. **C19051-15**
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 | | 12 | M | 9 | | Stiff to Very Stiff, Brown Lean CLAY, Little Sand (CL) *USDA: 10YR 5/3 Clay Loam* | (1.75-3.5) | 20.6 | | | |
| 2 | | 10 | M/W | 5 | | Soft, Brown Sandy Lean CLAY, Trace Gravel (CL) *USDA: 10YR 4/3 Sandy Clay Loam* | (0.25-0.5) | 19.0 | | | |
| | | | | | 5 | | | | | | |
| 3 | | 14 | M/W | 21 | | Medium Dense to Dense, Pale Brown to Light Yellowish Brown Fine to Coarse SAND, Some Silt, Little to Some Gravel, Scattered Thin Sandy Lean Clay Seams and Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam, Scattered Thin Sandy Clay Loam Seams* | | | | | |
| 4 | | 14 | M | 21 | | P200 (Sample 4 - 8.5 to 10 ft): 31.8% | | 8.5 | | | |
| | | | | | 10 | | | | | | |
| 5 | | 16 | M | 18 | | | | | | | |
| 6 | | 16 | M | 17 | | | | | | | |
| | | | | | 15 | | | | | | |
| 7 | | 16 | M | 38 | | | | | | | |
| | | | | | 20 | End of Boring at 20 ft<br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling ▽ **NW**    Upon Completion of Drilling **NW**
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 **12/3/19** End **12/3/19**
Driller **BSD** Chief **KD** Rig **D-120**
Logger **JF** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

# LOG OF TEST BORING

CGC Inc.

Project: **Proposed Public Library**
**Amund Reindahl Park - 1818 Portage Road**
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **7**
Surface Elevation (ft) **888.0±**
Job No. **C19051-15**
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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 10± in. TOPSOIL (OL) | | | | | |
| 1 | | 10 | M | 9 | | FILL: Stiff to Very Stiff, Very Dark Grayish Brown to Yellowish Brown Lean Clay, Little to Some Sand, Trace Organics *USDA: 10YR 3/2 to 5/4 Clay Loam to Sandy Clay Loam (Fill)* | (1.5-3.0) | 20.2 | | | 3.2 |
| 2 | | 6 | M | 4 | 5 | FILL: Medium Stiff to Stiff, Very Dark Brown to Dark Yellowish Brown Lean Clay, Little Sand, Trace Gravel and Organics *USDA: 10YR 2/2 to 4/4 Clay Loam (Fill)* | (0.75-1.5) | 22.5 | | | 3.8 |
| 3 | | 10 | M | 15 | | Medium Dense, Light Brownish Gray to Light Yellowish Brown Fine to Medium SAND, Little to Some Silt, Little Gravel (SP-SM/SM - Possible Fill) *USDA: 10YR 6/2 to 6/4 Loamy Sand to Sandy Loam* | | | | | |
| 4 | | 14 | M | 34 | 10 | Dense, Gray to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 5/1 to 6/4 Gravelly Sandy Loam* | | | | | |
| 5 | | 12 | M | 23 | | Medium Dense to Very Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Thin Sandy Lean Clay Seams and Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam, Scattered Thin Sandy Clay Loam Seams* | | | | | |
| 6 | | 12 | M | 25 | 15 | | | | | | |
| 7 | | 6 | M | 64/9" | 20 | Probable Cobble/Boulder near 19.5 ft | | | | | |
| | | | | | | End of Boring at 20 ft | | | | | |
| | | | | | | Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling ∇ NW — Upon Completion of Drilling NW
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 **12/3/19** End **12/3/19**
Driller **BSD** Chief **KD** Rig **D-120**
Logger **JF** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

# LOG OF TEST BORING

Project: Proposed Public Library
Amund Reindahl Park - 1818 Portage Road
Location: City of Madison, Dane County, Wisconsin

Boring No.: 8
Surface Elevation (ft): 884.0±
Job No.: C19051-15
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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 8± in. TOPSOIL (OL) | | | | | |
| 1 | | 10 | M | 14 | | Stiff, Very Dark Gray to Brown Organic to Lean CLAY, Trace Sand (OL/CL - Possible Lower Horizon Topsoil in Upper Part of Layer) *USDA: 10YR 3/1 to 5/3 Silty Clay Loam* | (1.0-2.0) | 29.1 | | | 4.9 |
| 2 | | 18 | M | 14 | | Medium Dense to Very Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt, Little to Some Gravel, Scattered Silt Seams and Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Sandy Loam to Gravelly Sandy Loam, Scattered Silt Loam Seams* P200 (Samples 2 and 3 - 3.5 to 7.5 ft): 29.4% | | | | | |
| | | | | | 5 | | | 8.0 | | | |
| 3 | | 16 | M | 19 | | | | | | | |
| 4 | | 16 | M | 17 | | | | | | | |
| | | | | | 10 | | | | | | |
| 5 | | 2 | M | 50/2" | | | | | | | |
| | | | | | | Probable Cobbles/Boulders near 10.5 and 13.5 ft - Limited Recovery in Samples 5 and 6 | | | | | |
| 6 | | 2 | M | 50/2" | | | | | | | |
| | | | | | 15 | | | | | | |
| 7 | | 14 | M | 57 | | | | | | | |
| | | | | | 20 | End of Boring at 20 ft<br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling ∇ NW    Upon Completion of Drilling NW
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 12/4/19 End 12/4/19
Driller BSD Chief KD Rig D-120
Logger JF Editor TFG
Drill Method 2.25" HSA; Autohammer

# LOG OF TEST BORING

CGC Inc.

Project: **Proposed Public Library**
**Amund Reindahl Park - 1818 Portage Road**
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **9**
Surface Elevation (ft) **884.0±**
Job No. **C19051-15**
Sheet **1** of **1**

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

| No. | Type | Rec (in.) | Moist | N | Depth (ft) | Visual Classification and Remarks | qu (qa) (tsf) | W | LL | PL | LI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 11± in. TOPSOIL (OL) | | | | | |
| 1 | | 6 | M | 8 | | Stiff to Very Stiff, Brown to Very Dark Gray Lean CLAY, Trace to Little Sand and Gravel, Trace Organics (CL - Possible Fill) *USDA: 10YR 4/3 to 3/1 Silty Clay Loam* | (1.75-3.25) | 20.9 | | | 3.2 |
| 2 | | 10 | M | 11 | 5 | Very Stiff to Hard, Brown/Dark Gray (Lightly Mottled) Lean CLAY, Trace to Little Sand (CL) *USDA: 10YR 5/3 (Redox: c2f 10YR 4/1) Silty Clay Loam* | (3.5-4.5+) | | | | |
| 3 | | 18 | W | 5 | | Very Soft to Soft, Brown to Dark Brown Sandy Lean CLAY, Trace Gravel (CL) *USDA: 10YR 4/3 to 3/3 Sandy Clay Loam* | (0.25) | 23.2 | | | |
| 4 | | 16 | M | 17 | 10 | Medium Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| 5 | | 10 | M | 31 | | Dense to Very Dense, Light Yellowish Brown Fine to Medium SAND, Some Silt, Trace to Little Gravel, Scattered Cobbles/Boulders (SM) *USDA: 2.5Y 6/4 Loamy Fine Sand* P200 (Sample 5 - 11 to 12.5 ft): 27.5% | | 8.9 | | | |
| 6 | | 4 | M | 50/2" | 15 | Probable Cobble/Boulder near 14 ft | | | | | |
| 7 | | 16 | M | 59 | 20 | Very Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| | | | | | | End of Boring at 20 ft<br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling ∇ NW — Upon Completion of Drilling NW
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 **12/4/19** End **12/4/19**
Driller **BSD** Chief **KD** Rig **D-120**
Logger **JF** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

# LOG OF TEST BORING

CGC Inc.

Project: Proposed Public Library
Amund Reindahl Park - 1818 Portage Road
Location: City of Madison, Dane County, Wisconsin

Boring No. 10
Surface Elevation (ft) 886.0±
Job No. C19051-15
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 | | 12 | M | 6 | | Stiff, Brown Lean CLAY, Trace Sand (CL) *USDA: 10YR 4/3 Silty Clay Loam* | (1.75-2.0) | 28.1 | | | |
| 2 | | 14 | M/W | 10 | | Medium Dense to Very Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| | | | | | 5 | | | | | | |
| 3 | | 16 | M | 15 | | | | | | | |
| 4 | | 16 | M | 15 | | | | | | | |
| | | | | | 10 | | | | | | |
| 5 | | 12 | M | 42 | | | | | | | |
| 6 | | 10 | M | 49 | | | | | | | |
| | | | | | 15 | | | | | | |
| 7 | | 8 | M | 50/4" | | Probable Cobble/Boulder near 19 ft | | | | | |
| | | | | | 20 | End of Boring at 20 ft | | | | | |
| | | | | | | Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling ▽ NW — Upon Completion of Drilling NW
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 12/4/19 End 12/4/19
Driller BSD Chief KD Rig D-120
Logger JF Editor TFG
Drill Method 2.25" HSA; Autohammer

# LOG OF TEST BORING

CGC Inc.

Project: **Proposed Public Library**
**Amund Reindahl Park - 1818 Portage Road**
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **11**
Surface Elevation (ft) **886.5±**
Job No. **C19051-15**
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 | | 12 | M | 13 | | Very Stiff, Brown/Gray (Mottled) Lean CLAY, Trace Sand (CL) *USDA: 10YR 5/3 (Redox: c1d 10YR 6/1) Silty Clay Loam* | (2.25-2.75) | | | | |
| 2 | | 12 | M | 8 | 5 | Stiff, Brown Lean CLAY, Little Sand (CL) *USDA: 10YR 5/3 Clay Loam* | (1.0-1.5) | | | | |
| 3 | | 6 | M | 50/5" | | Medium Dense to Very Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* Probable Cobble/Boulder near 6.5 ft | | | | | |
| 4 | | 14 | M | 18 | 10 | | | | | | |
| | | | | | | P200 (Samples 4 and 5 - 8.5 to 12.5 ft): 29.8% | | 7.8 | | | |
| 5 | | 12 | M | 16 | | | | | | | |
| 6 | | 12 | M | 18 | 15 | | | | | | |
| 7 | | 14 | M | 47 | 20 | | | | | | |
| | | | | | | End of Boring at 20 ft<br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling ▽ **NW** Upon Completion of Drilling **NW**
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 **12/4/19** End **12/4/19**
Driller **BSD** Chief **KD** Rig **D-120**
Logger **JF** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

# LOG OF TEST BORING

Project: **Proposed Public Library**
**Amund Reindahl Park - 1818 Portage Road**
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **12**
Surface Elevation (ft) **882.5±**
Job No. **C19051-15**
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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 10± in. TOPSOIL (OL) | | | | | |
| 1 | | 6 | M | 9 | | Medium Stiff to Stiff, Brown Lean CLAY, Little Sand (CL) *USDA: 10YR 5/3 Clay Loam* | (0.5-1.25) | 22.3 | | | |
| 2 | | 16 | M | 20 | | Medium Dense, Pale Brown Sandy SILT, Little to Some Gravel, Scattered Cobbles/Boulders (ML) *USDA: 10YR 6/3 Loam* | | | | | |
| | | | | | 5 | | | | | | |
| 3 | | 16 | M | 15 | | Medium Dense to Very Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| 4 | | 14 | M | 21 | | | | | | | |
| | | | | | 10 | | | | | | |
| 5 | | 4 | M | 24 | | Probable Cobble/Boulder near 11.5 ft - Limited Recovery in Sample 5 | | | | | |
| 6 | | 10 | M | 27 | | | | | | | |
| | | | | | 15 | | | | | | |
| 7 | | 14 | M | 78 | | | | | | | |
| | | | | | 20 | End of Boring at 20 ft<br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling ∇ NW Upon Completion of Drilling NW
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 **12/5/19** End **12/5/19**
Driller **BSD** Chief **KD** Rig **D-120**
Logger **JF** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

# LOG OF TEST BORING

Project: Proposed Public Library
Amund Reindahl Park - 1818 Portage Road
Location: City of Madison, Dane County, Wisconsin

Boring No. 13
Surface Elevation (ft) 884.0±
Job No. C19051-15
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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 10± in. TOPSOIL (OL) | | | | | |
| 1 | | 6 | M | 9 | | Medium Stiff, Brown Lean CLAY, Trace Sand (CL) *USDA: 10YR 5/3 Silty Clay Loam* | (0.5-1.0) | 26.7 | | | |
| 2 | | 10 | M | 9 | | | | | | | |
| | | | | | 5 | Loose to Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| 3 | | 12 | M | 25 | | | | | | | |
| 4 | | 14 | M | 18 | | | | | | | |
| | | | | | 10 | | | | | | |
| 5 | | 14 | M | 27 | | | | | | | |
| 6 | | 12 | M | 47 | | | | | | | |
| | | | | | 15 | | | | | | |
| 7 | | 14 | M | 41 | | | | | | | |
| | | | | | 20 | End of Boring at 20 ft<br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling ▽ NW    Upon Completion of Drilling NW
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 12/9/19 End 12/9/19
Driller BSD Chief KD Rig D-120
Logger JF Editor TFG
Drill Method 2.25" HSA; Autohammer

# LOG OF TEST BORING

CGC Inc.

Project: Proposed Public Library
Amund Reindahl Park - 1818 Portage Road
Location: City of Madison, Dane County, Wisconsin

Boring No. 14
Surface Elevation (ft) 884.0±
Job No. C19051-15
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 | | 10 | M | 7 | | Medium Stiff to Stiff, Brown Lean CLAY, Trace Sand (CL)<br>*USDA: 10YR 4/3 Silty Clay Loam* | (0.75-1.25) | 27.4 | | | |
| 2 | | 6 | M | 18 | | Medium Dense to Very Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM)<br>*USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam*<br>P200 (Samples 2 and 3 - 3.5 to 7.5 ft): 30.0% | | | | | |
| | | | | | 5 | | | 9.0 | | | |
| 3 | | 14 | M | 13 | | | | | | | |
| 4 | | 10 | M | 13 | | | | | | | |
| | | | | | 10 | | | | | | |
| 5 | | 4 | M | 24 | | | | | | | |
| 6 | | 0 | - | 50/1" | | Probable Cobble/Boulder near 13.5 ft - No Recovery in Sample 6 | | | | | |
| | | | | | 15 | | | | | | |
| 7 | | 6 | M | 50/5" | | Probable Cobble/Boulder near 19 ft | | | | | |
| | | | | | 20 | End of Boring at 20 ft<br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling: NW
Upon Completion of Drilling: NW
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 12/9/19 End 12/9/19
Driller BSD Chief KD Rig D-120
Logger JF Editor TFG
Drill Method 2.25" HSA; Autohammer

# LOG OF TEST BORING

CGC Inc.

Project: **Proposed Public Library**
**Amund Reindahl Park - 1818 Portage Road**
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **15**
Surface Elevation (ft) **882.0±**
Job No. **C19051-15**
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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 12± in. TOPSOIL (OL) | | | | | |
| 1 | | 12 | M | 9 | | Stiff to Very Stiff, Brown Lean CLAY, Trace Sand (CL) *USDA: 10YR 5/3 Silty Clay Loam* | (1.75-2.0) | 28.2 | | | |
| 2 | | 12 | M | 11 | 5 | | (2.25-2.5) | | | | |
| 3 | | 16 | M | 14 | | Medium Stiff/Medium Dense, Fine Layers of Brown to Pale Brown Lean CLAY, SILT and Fine SAND, Trace Silt (CL/ML/SP) *USDA: Stratified 10YR 4/3 to 6/3 Silty Clay Loam, Silt Loam and Fine Sand* | (0.5-0.75) | | | | |
| 4 | | 18 | M | 14 | 10 | Medium Dense to Very Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| 5 | | 14 | M | 23 | | | | | | | |
| 6 | | 12 | M | 26 | 15 | | | | | | |
| 7 | | 8 | M | 50/4" | 20 | Probable Cobble/Boulder near 19 ft | | | | | |
| | | | | | | End of Boring at 20 ft | | | | | |
| | | | | | | Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling: NW
Upon Completion of Drilling: NW
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 **12/5/19** End **12/5/19**
Driller **BSD** Chief **KD** Rig **D-120**
Logger **JF** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

# LOG OF TEST BORING

Project: **Proposed Public Library**
**Amund Reindahl Park - 1818 Portage Road**
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **16**
Surface Elevation (ft) **878.5±**
Job No. **C19051-15**
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. | Rec (in.) | Moist | N | Depth (ft) | Visual Classification and Remarks | qu (qa) (tsf) | W | LL | PL | LI |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 13± in. TOPSOIL (OL) | | | | | |
| 1 | 8 | M | 9 | | Loose/Medium Stiff to Very Stiff, Black to Dark Grayish Brown/Dark Gray (Lightly Mottled) Organic SILT to Lean CLAY, Trace Sand and Organics (OL/CL - Probable Lower Horizon Topsoil in Upper Part of Layer) *USDA: 10YR 2/1 to 4/2 (Redox: c1f 10YR 4/1) Silt Loam to Silty Clay Loam* | (0.75-2.75) | 26.6 | | | 5.3 |
| 2 | 6 | M | 54/7" | | | (1.5-2.5) | | | | |
| | | | | 5 | Stiff to Very Stiff, Brown Lean CLAY, Little Sand, Trace Gravel, Scattered Cobbles (CL) *USDA: 10YR 4/3 Clay Loam* Probable Cobble near 4.5 ft | | | | | |
| 3 | 18 | M | 14 | | Medium Dense, Light Brownish Gray Silty Fine to Medium SAND, Some Gravel (SM) *USDA: 10YR 6/2 Gravelly Silt Loam* P200 (Sample 3 - 6 to 7.5 ft): 47.8% | | 12.0 | | | |
| 4 | 16 | M | 33 | | | | | | | |
| | | | | 10 | Medium Dense to Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| 5 | 12 | M | 26 | | | | | | | |
| 6 | 12 | M | 42 | | | | | | | |
| | | | | 15 | | | | | | |
| 7 | 14 | M | 24 | | | | | | | |
| | | | | 20 | End of Boring at 20 ft<br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling ▽ **NW** Upon Completion of Drilling **NW**
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 **12/5/19** End **12/5/19**
Driller **BSD** Chief **KD** Rig **D-120**
Logger **JF** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

# LOG OF TEST BORING

CGC Inc.

Project: Proposed Public Library
Amund Reindahl Park - 1818 Portage Road
Location: City of Madison, Dane County, Wisconsin

Boring No. 17
Surface Elevation (ft) 880.0±
Job No. C19051-15
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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 12± in. TOPSOIL (OL) | | | | | |
| 1 | | 12 | M | 5 | | Medium Stiff to Stiff, Brown Lean CLAY, Trace Sand (CL) *USDA: 10YR 5/3 Silty Clay Loam* | (0.75-1.25) | | | | |
| 2 | | 14 | M/W | 3 | 5 | Very Soft to Soft/Very Loose, Brown Sandy Lean CLAY to Clayey Fine to Medium SAND, Trace Gravel (CL/SC) *USDA: 10YR 4/3 Sandy Clay Loam to Sandy Loam* | (0.25) | 24.8 | | | |
| 3 | | 18 | W | 14 | | Medium Dense to Very Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| 4 | | 18 | W | 16 | 10 | | | | | | |
| 5 | | 18 | W | 17 | | | | | | | |
| 6 | | 18 | M | 48 | 15 | | | | | | |
| 7 | | 16 | M | 74 | 20 | | | | | | |
| | | | | | | End of Boring at 20 ft<br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

| | | | | | |
|---|---|---|---|---|---|
| While Drilling | ▽ 3.5' | Upon Completion of Drilling | | | 6.0' |
| Time After Drilling | (Probable | | | | 1 Day |
| Depth to Water | Perched | | | | 6.0' ▼ |
| Depth to Cave in | Water) | | | | 8.0' |

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

## GENERAL NOTES

Start 12/9/19 End 12/9/19
Driller BSD Chief KD Rig D-120
Logger JF Editor TFG
Drill Method 2.25" HSA; Autohammer

CGC Inc.

# LOG OF TEST BORING

Project: **Proposed Public Library**
**Amund Reindahl Park - 1818 Portage Road**
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **18**
Surface Elevation (ft) **876.0±**
Job No. **C19051-15**
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 | | 6 | M | 7 | | Medium Stiff to Stiff, Brown Lean CLAY, Trace Sand (CL) *USDA: 10YR 5/3 Silty Clay Loam* | (0.75-1.25) | 28.1 | | | |
| 2 | | 10 | M/W | 9 | | Soft to Medium Stiff, Dark Brown Sandy Lean CLAY, Trace to Little Gravel (CL) *USDA: 10YR 3/3 Sandy Clay Loam* | (0.25-0.75) | 20.7 | | | |
| | | | | | 5 | | | | | | |
| 3 | | 12 | M | 12 | | Medium Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| 4 | | 14 | M | 17 | | | | | | | |
| | | | | | 10 | | | | | | |
| 5 | | 16 | M | 21 | | | | | | | |
| | | | | | | P200 (Samples 5 and 6 - 11 to 15 ft): 31.5% | | 9.2 | | | |
| 6 | | 12 | M | 14 | | | | | | | |
| | | | | | 15 | | | | | | |
| 7 | | 18 | M/W | 16 | | | | | | | |
| | | | | | 20 | End of Boring at 20 ft<br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling ∇ NW — Upon Completion of Drilling NW
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 **12/9/19** End **12/9/19**
Driller **BSD** Chief **KD** Rig **D-120**
Logger **JF** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

CGC Inc.

# LOG OF TEST BORING

Project: **Proposed Public Library**
**Amund Reindahl Park - 1818 Portage Road**
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **19**
Surface Elevation (ft) **875.5±**
Job No. **C19051-15**
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 |
| | | | | | | 12± in. TOPSOIL (OL) | | | | | |
| 1 | | 10 | M | 5 | | Stiff, Brown/Grayish Brown (Lightly Mottled) Lean CLAY, Trace Sand, Scattered Organic Pockets (CL)<br>*USDA: 10YR 4/3 (Redox: c2f 10YR 5/2) Silty Clay Loam* | (1.25) | 25.7 | | | |
| 2 | | 16 | M | 7 | 5 | Stiff, Brown Sandy Lean CLAY, Little Gravel (CL)<br>*USDA: 10YR 4/3 Sandy Clay Loam* | (1.0-1.25) | 20.7 | | | |
| 3 | | 14 | M | 28 | | Medium Dense to Dense, Pale Brown Gravelly Fine to Coarse SAND, Trace Silt (SP)<br>*USDA: 10YR 6/3 Very Gravelly Sand* | | | | | |
| | | | | | | P200 (Samples 3 and 4 - 6 to 10 ft): 4.3% | | 4.1 | | | |
| 4 | | 6 | M | 47 | 10 | | | | | | |
| 5 | | 16 | M | 27 | | Medium Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM)<br>*USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| 6 | | 18 | M | 24 | 15 | | | | | | |
| 7 | | 12 | M/W | 28 | 20 | | | | | | |
| | | | | | | End of Boring at 20 ft<br><br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

| | | | | |
|---|---|---|---|---|
| While Drilling | NW | Upon Completion of Drilling | | NW |
| 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 **12/11/19** End **12/11/19**
Driller **BSD** Chief **KD** Rig **D-120**
Logger **JF** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

# LOG OF TEST BORING

CGC Inc.

Project: Proposed Public Library
Amund Reindahl Park - 1818 Portage Road
Location: City of Madison, Dane County, Wisconsin

Boring No. 20
Surface Elevation (ft) 885.0±
Job No. C19051-15
Sheet 1 of 1

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

| No. | Type | Rec (in.) | Moist | N | Depth (ft) | Visual Classification and Remarks | qu (qa) (tsf) | W | LL | PL | LI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 10± in. TOPSOIL (OL) | | | | | |
| 1 | | 12 | M | 11 | | Very Stiff to Hard, Very Dark Grayish Brown to Very Dark Gray Lean CLAY, Trace Sand and Organics (CL - Possible Lower Horizon Topsoil or Fill) *USDA: 10YR 3/2 to 3/1 Silty Clay Loam* | (2.25-4.5+) | 20.0 | | | 3.4 |
| 2 | | 12 | M | 10 | 5 | Stiff, Brown/Gray (Lightly Mottled) Lean CLAY, Trace to Little Sand (CL) *USDA: 10YR 5/3 (Redox: f2f 10YR 6/1) Silty Clay Loam* | (1.25-1.5) | | | | |
| 3 | | 12 | M | 17 | | Medium Dense to Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* P200 (Samples 3 and 4 - 6 to 10 ft): 31.9% | | 7.0 | | | |
| 4 | | 12 | M | 14 | 10 | | | | | | |
| 5 | | 12 | M | 15 | | | | | | | |
| 6 | | 12 | M | 20 | 15 | | | | | | |
| 7 | | 14 | M | 39 | 20 | | | | | | |
| | | | | | | End of Boring at 20 ft<br>Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

While Drilling: NW
Upon Completion of Drilling: NW
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 12/3/19 End 12/3/19
Driller BSD Chief KD Rig D-120
Logger JF Editor TFG
Drill Method 2.25" HSA; Autohammer

# LOG OF TEST BORING

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

Project: **Proposed Public Library**
**Amund Reindahl Park - 1818 Portage Road**
Location: **City of Madison, Dane County, Wisconsin**

Boring No. **21**
Surface Elevation (ft) **882.0±**
Job No. **C19051-15**
Sheet **1** of **1**

| SAMPLE No. | TYPE | Rec (in.) | Moist | N | Depth (ft) | VISUAL CLASSIFICATION and Remarks | qu (qa) (tsf) | W | LL | PL | LI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 10± in. TOPSOIL (OL) | | | | | |
| 1 | | 12 | M | 9 | | Stiff to Very Stiff, Very Dark Gray to Grayish Brown Organic to Lean CLAY, Trace Sand (OL/CL - Possible Lower Horizon Topsoil in Upper Part of Layer) *USDA: 10YR 3/1 to 5/2 Silty Clay Loam* | (1.25-3.5) | 26.4 | | | 4.8 |
| 2 | | 12 | M | 7 | | Soft to Medium Stiff, Brown to Dark Brown Sandy Lean CLAY, Trace Gravel (CL) *USDA: 10YR 4/3 to 3/3 Sandy Clay Loam* | (0.75-1.0) | 16.3 | | | |
| | | | | | 5 | | | | | | |
| 3 | | 18 | M | 11 | | | (0.25-1.0) | 13.1 | | | |
| | | | | | | Medium Dense, Pale Brown Silty Fine SAND, Trace Gravel (SM) *USDA: 10YR 6/3 Fine Sandy Loam* P200 (Sample 4 - 8.5 to 10 ft): 38.7% | | | | | |
| 4 | | 16 | M | 10 | | | | 11.5 | | | |
| | | | | | 10 | Medium Dense to Very Dense, Pale Brown to Light Yellowish Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) *USDA: 10YR 6/3 to 6/4 Gravelly Sandy Loam* | | | | | |
| 5 | | 14 | M | 22 | | | | | | | |
| 6 | | 14 | M | 24 | | | | | | | |
| | | | | | 15 | | | | | | |
| 7 | | 14 | M | 70 | | | | | | | |
| | | | | | 20 | End of Boring at 20 ft | | | | | |
| | | | | | | Borehole Backfilled with Bentonite Chips | | | | | |

## WATER LEVEL OBSERVATIONS

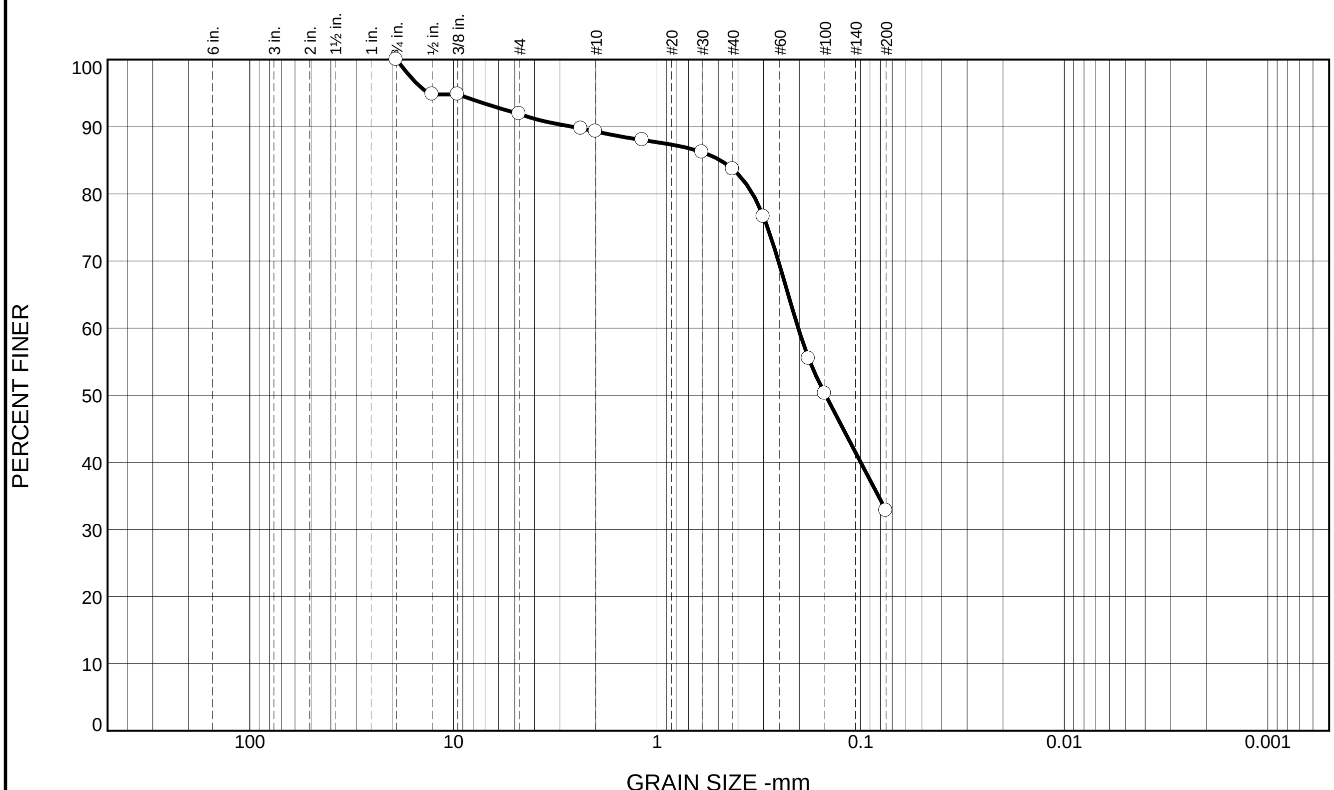
While Drilling: **NW**
Upon Completion of Drilling: **NW**
Time After Drilling: ____
Depth to Water: ____
Depth to Cave in: ____

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

## GENERAL NOTES

Start **12/4/19** End **12/4/19**
Driller **BSD** Chief **KD** Rig **D-120**
Logger **JF** Editor **TFG**
Drill Method **2.25" HSA; Autohammer**

# Particle Size Distribution Report




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 0.0 | 8.1 | 2.6 | 5.6 | 50.9 | 32.8 | |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 3/4 | 100.0 | | |
| 1/2 | 94.8 | | |
| 3/8 | 94.8 | | |
| #4 | 91.9 | | |
| #8 | 89.7 | | |
| #10 | 89.3 | | |
| #16 | 88.0 | | |
| #30 | 86.2 | | |
| #40 | 83.7 | | |
| #50 | 76.6 | | |
| #80 | 55.4 | | |
| #100 | 50.3 | | |
| #200 | 32.8 | | |

* (no specification provided)

**Material Description**

Brown Fine to Medium Sand, Some Silt, Little Gravel

**Atterberg Limits**

PL= LL= PI=

**Coefficients**

$D_{90}$= 2.6042 $D_{85}$= 0.4893 $D_{60}$= 0.2026
$D_{50}$= 0.1484 $D_{30}$= $D_{15}$=
$D_{10}$= $C_u$= $C_c$=

**Classification**

USCS= SM AASHTO=

**Remarks**

USDA: Sandy Loam

**Sample Number:** B-1: S-3

**Date:** 12/11/19

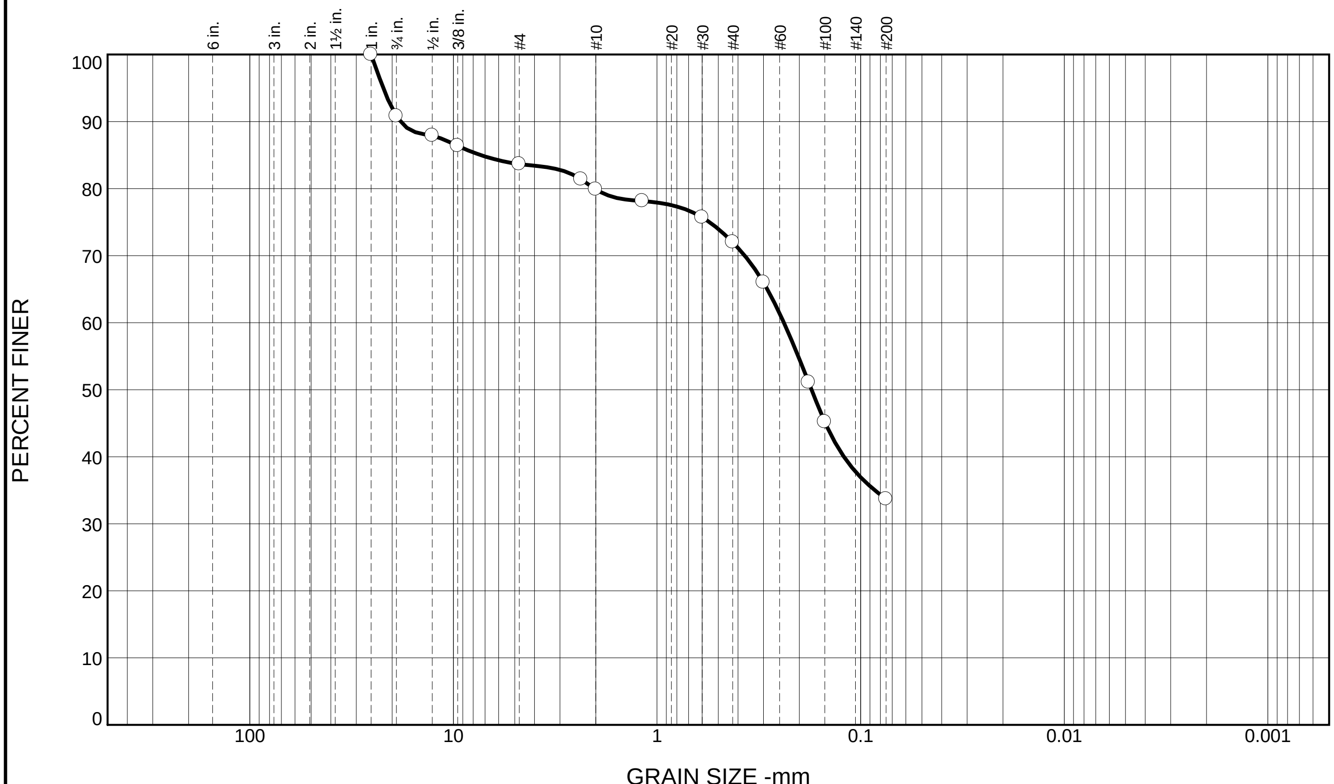
CGC,Inc.

**Client:** Madison City of Eng. MLK Blvd.
**Project:** Reindahl Park Library, Madison

**Project No:** C19051-15 **Figure**

**Tested By:** DRW **Checked By:** TFG

# Particle Size Distribution Report




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 9.2 | 7.1 | 3.8 | 7.9 | 38.3 | 33.7 | |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 1 | 100.0 | | |
| 3/4 | 90.8 | | |
| 1/2 | 87.9 | | |
| 3/8 | 86.4 | | |
| #4 | 83.7 | | |
| #8 | 81.4 | | |
| #10 | 79.9 | | |
| #16 | 78.1 | | |
| #30 | 75.7 | | |
| #40 | 72.0 | | |
| #50 | 66.0 | | |
| #80 | 51.1 | | |
| #100 | 45.2 | | |
| #200 | 33.7 | | |

* (no specification provided)

**Material Description**

Brown Fine to Medium Sand, Some Silt and Gravel

**Atterberg Limits**

PL= LL= PI=

**Coefficients**

$D_{90}$= 18.2229 $D_{85}$= 7.3351 $D_{60}$= 0.2382
$D_{50}$= 0.1742 $D_{30}$= $D_{15}$=
$D_{10}$= $C_u$= $C_c$=

**Classification**

USCS= SM AASHTO=

**Remarks**

USDA: Gravelly Sandy Loam

**Sample Number:** B-3: S-5 + S-6

**Date:** 12/11/19

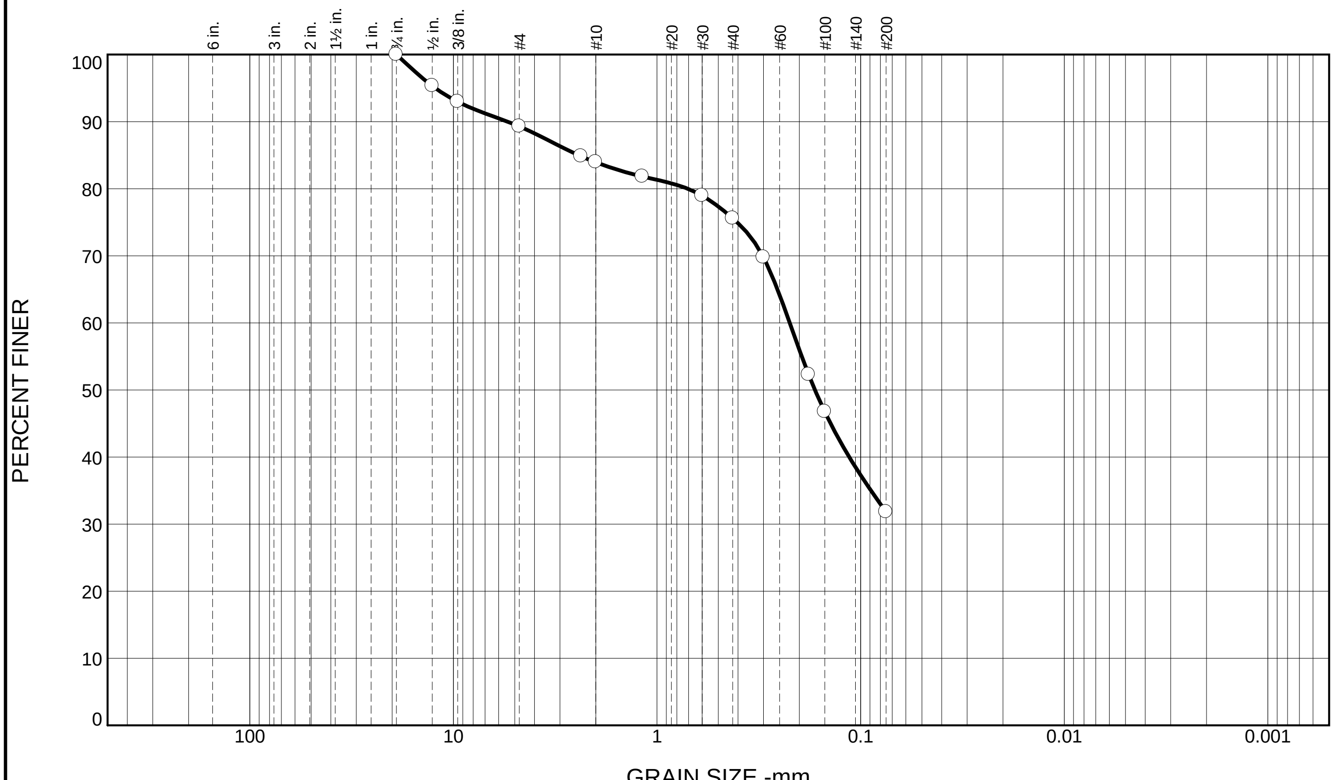
CGC, Inc.

**Client:** Madison City of Eng. MLK Blvd.
**Project:** Reindahl Park Library, Madison

**Project No:** C19051-15 **Figure**

**Tested By:** DRW **Checked By:** TFG

# Particle Size Distribution Report




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 0.0 | 10.7 | 5.4 | 8.3 | 43.8 | 31.8 | |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 3/4 | 100.0 | | |
| 1/2 | 95.3 | | |
| 3/8 | 93.0 | | |
| #4 | 89.3 | | |
| #8 | 84.8 | | |
| #10 | 83.9 | | |
| #16 | 81.8 | | |
| #30 | 79.0 | | |
| #40 | 75.6 | | |
| #50 | 69.8 | | |
| #80 | 52.3 | | |
| #100 | 46.8 | | |
| #200 | 31.8 | | |

* (no specification provided)

**Material Description**

Brown Fine to Coarse Sand, Some Silt, Little Gravel

**Atterberg Limits**

PL= LL= PI=

**Coefficients**

$D_{90}$= 5.4231 $D_{85}$= 2.4289 $D_{60}$= 0.2229
$D_{50}$= 0.1677 $D_{30}$= $D_{15}$=
$D_{10}$= $C_u$= $C_c$=

**Classification**

USCS= SM AASHTO=

**Remarks**

USDA: Gravelly Sandy Loam

**Sample Number:** B-6: S-4

**Date:** 12/11/19

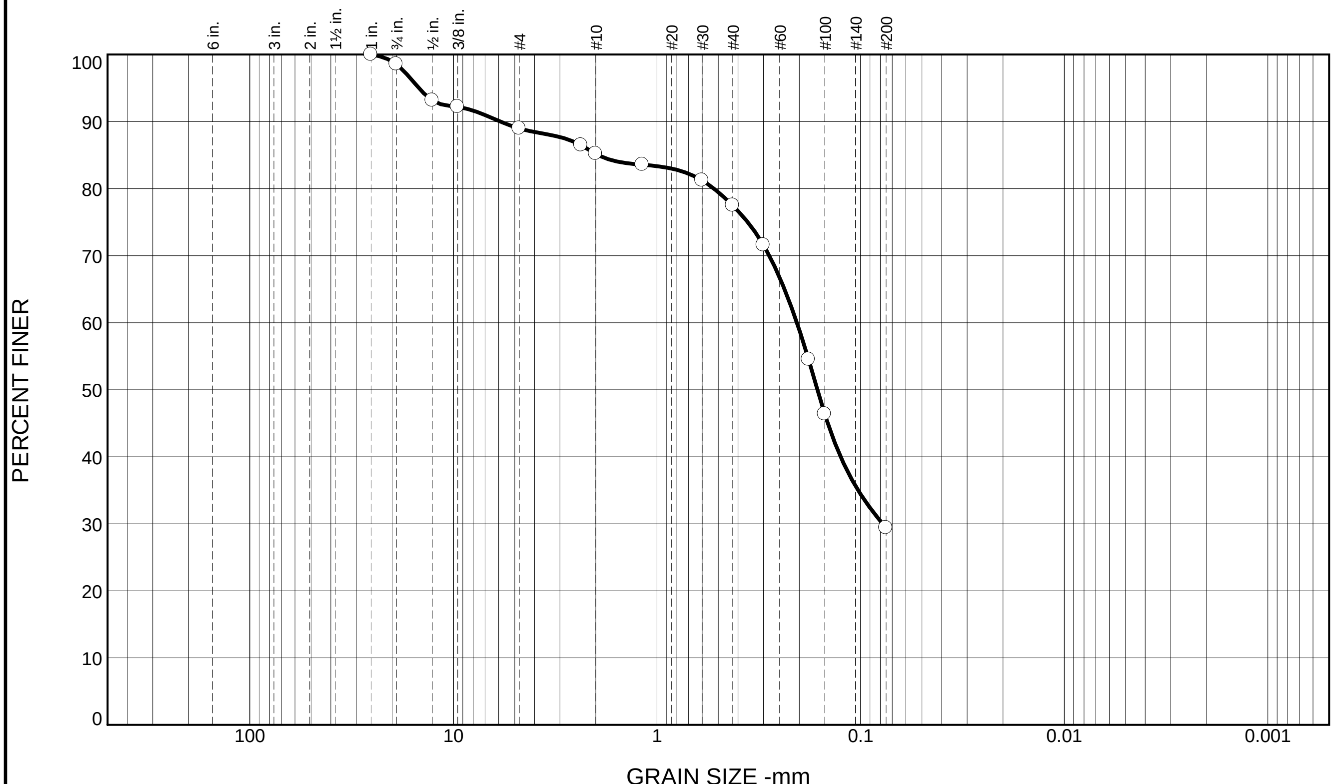
CGC,Inc.

**Client:** Madison City of Eng. MLK Blvd.
**Project:** Reindahl Park Library, Madison

**Project No:** C19051-15 **Figure**

**Tested By:** DRW **Checked By:** TFG

# Particle Size Distribution Report




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 1.4 | 9.6 | 3.8 | 7.7 | 48.1 | 29.4 | |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 1 | 100.0 | | |
| 3/4 | 98.6 | | |
| 1/2 | 93.2 | | |
| 3/8 | 92.2 | | |
| #4 | 89.0 | | |
| #8 | 86.5 | | |
| #10 | 85.2 | | |
| #16 | 83.6 | | |
| #30 | 81.2 | | |
| #40 | 77.5 | | |
| #50 | 71.6 | | |
| #80 | 54.5 | | |
| #100 | 46.4 | | |
| #200 | 29.4 | | |

* (no specification provided)

**Material Description**

Brown Fine to Medium Sand, Some Silt, Little Gravel

**Atterberg Limits**

PL= LL= PI=

**Coefficients**

$D_{90}$= 5.8767 $D_{85}$= 1.9462 $D_{60}$= 0.2056
$D_{50}$= 0.1630 $D_{30}$= 0.0780 $D_{15}$=
$D_{10}$= $C_u$= $C_c$=

**Classification**

USCS= SM AASHTO=

**Remarks**

USDA: Sandy Loam

**Sample Number:** B-8: S-2 + S-3

**Date:** 12/11/19

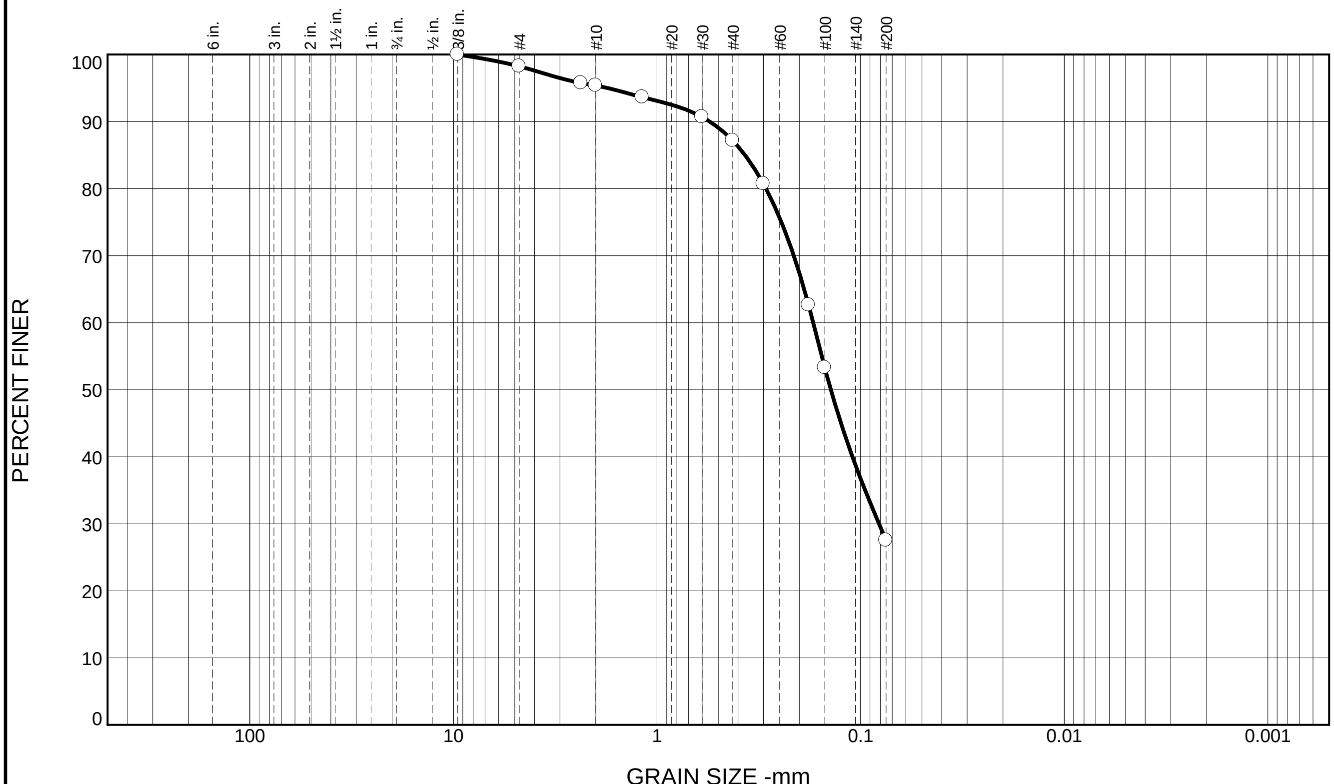
CGC,Inc.

**Client:** Madison City of Eng. MLK Blvd.
**Project:** Reindahl Park Library, Madison

**Project No:** C19051-15 **Figure**

**Tested By:** DRW **Checked By:** TFG

# Particle Size Distribution Report




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 0.0 | 1.8 | 2.8 | 8.2 | 59.7 | 27.5 | |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 3/8 | 100.0 | | |
| #4 | 98.2 | | |
| #8 | 95.8 | | |
| #10 | 95.4 | | |
| #16 | 93.6 | | |
| #30 | 90.7 | | |
| #40 | 87.2 | | |
| #50 | 80.7 | | |
| #80 | 62.6 | | |
| #100 | 53.3 | | |
| #200 | 27.5 | | |

* (no specification provided)

**Material Description**

Brown Fine to Medium Sand, Some Silt, Trace Gravel

**Atterberg Limits**

PL= LL= PI=

**Coefficients**

$D_{90}$= 0.5505 $D_{85}$= 0.3696 $D_{60}$= 0.1709
$D_{50}$= 0.1401 $D_{30}$= 0.0813 $D_{15}$=
$D_{10}$= $C_u$= $C_c$=

**Classification**

USCS= SM AASHTO=

**Remarks**

USDA: Loamy Fine Sand

**Sample Number:** B-9: S-5

**Date:** 12/11/19

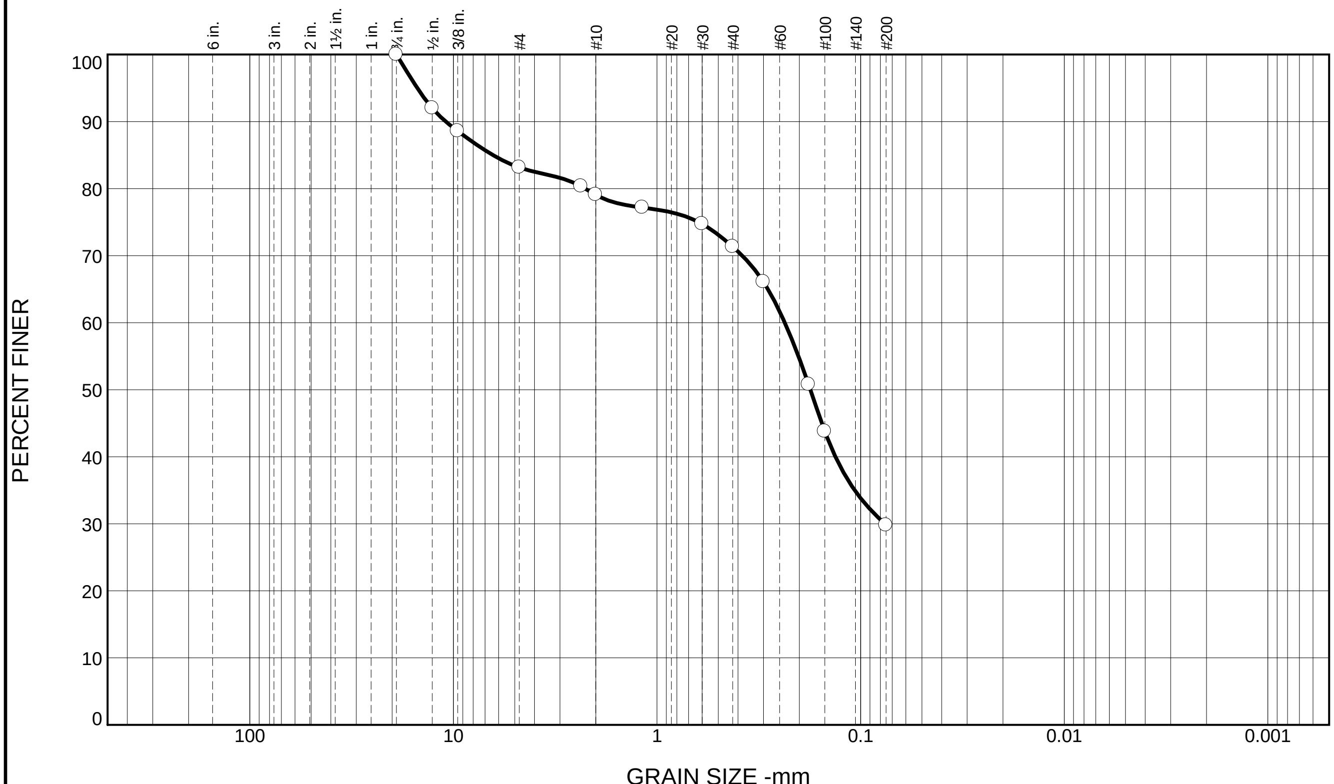
CGC, Inc.

**Client:** Madison City of Eng. MLK Blvd.
**Project:** Reindahl Park Library, Madison

**Project No:** C19051-15 **Figure**

**Tested By:** DRW **Checked By:** TFG

# Particle Size Distribution Report




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 0.0 | 16.8 | 4.1 | 7.8 | 41.5 | 29.8 | |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 3/4 | 100.0 | | |
| 1/2 | 92.0 | | |
| 3/8 | 88.6 | | |
| #4 | 83.2 | | |
| #8 | 80.3 | | |
| #10 | 79.1 | | |
| #16 | 77.2 | | |
| #30 | 74.7 | | |
| #40 | 71.3 | | |
| #50 | 66.1 | | |
| #80 | 50.8 | | |
| #100 | 43.8 | | |
| #200 | 29.8 | | |

* (no specification provided)

**Material Description**

Brown Fine to Medium Sand, Some Silt and Gravel

**Atterberg Limits**

PL= LL= PI=

**Coefficients**

$D_{90}$= 10.8956 $D_{85}$= 6.3888 $D_{60}$= 0.2357
$D_{50}$= 0.1765 $D_{30}$= 0.0763 $D_{15}$=
$D_{10}$= $C_u$= $C_c$=

**Classification**

USCS= SM AASHTO=

**Remarks**

USDA: Gravelly Sandy Loam

**Sample Number:** B-11: S-4 + S-5

**Date:** 12/11/19

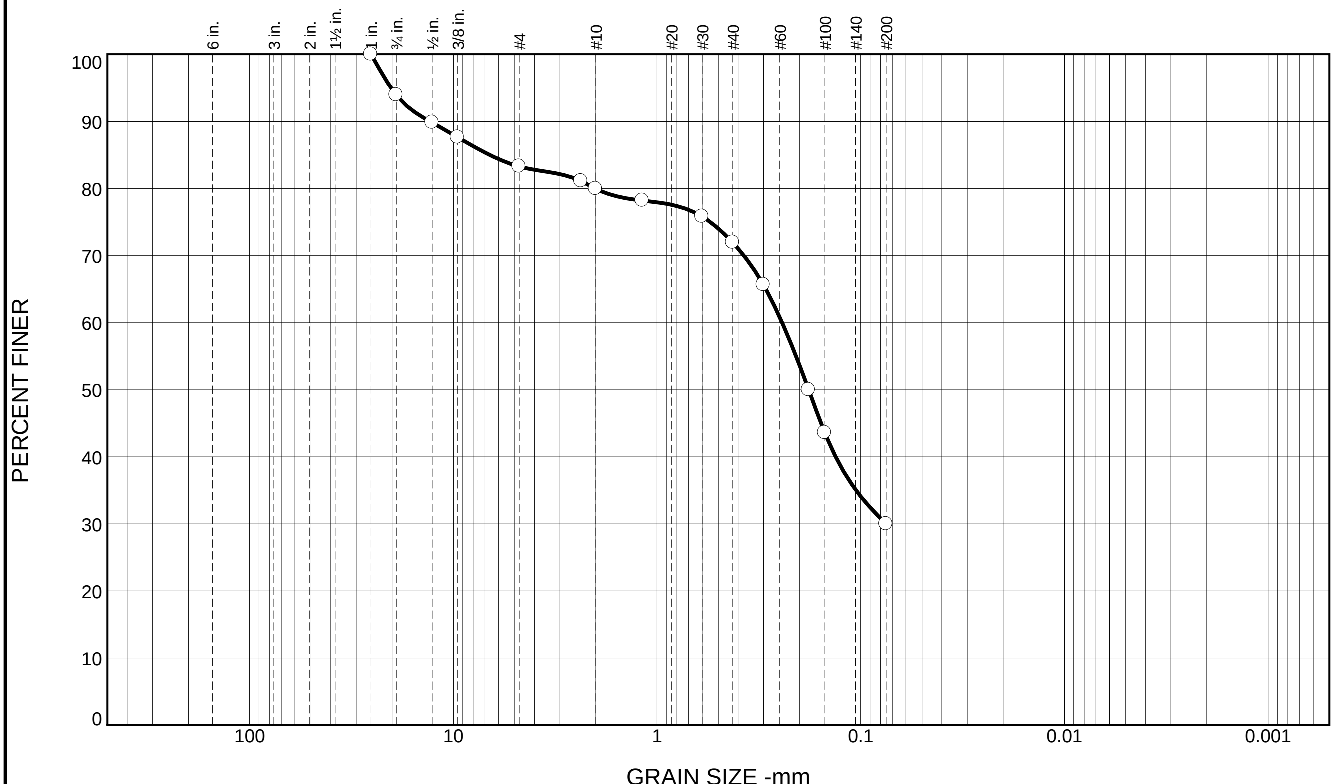
CGC, Inc.

**Client:** Madison City of Eng. MLK Blvd.
**Project:** Reindahl Park Library, Madison

**Project No:** C19051-15 **Figure**

**Tested By:** DRW **Checked By:** TFG

# Particle Size Distribution Report




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 6.1 | 10.6 | 3.3 | 8.1 | 41.9 | 30.0 | |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 1 | 100.0 | | |
| 3/4 | 93.9 | | |
| 1/2 | 89.8 | | |
| 3/8 | 87.6 | | |
| #4 | 83.3 | | |
| #8 | 81.1 | | |
| #10 | 80.0 | | |
| #16 | 78.2 | | |
| #30 | 75.8 | | |
| #40 | 71.9 | | |
| #50 | 65.6 | | |
| #80 | 50.0 | | |
| #100 | 43.6 | | |
| #200 | 30.0 | | |

* (no specification provided)

**Material Description**

Brown Fine to Medium Sand, Some Silt and Gravel

**Atterberg Limits**

PL= LL= PI=

**Coefficients**

$D_{90}$= 12.9961 $D_{85}$= 6.6257 $D_{60}$= 0.2431
$D_{50}$= 0.1800 $D_{30}$= 0.0751 $D_{15}$=
$D_{10}$= $C_u$= $C_c$=

**Classification**

USCS= SM AASHTO=

**Remarks**

USDA: Gravelly Sandy Loam

**Sample Number:** B-14: S-2 + S-3

**Date:** 12/16/19

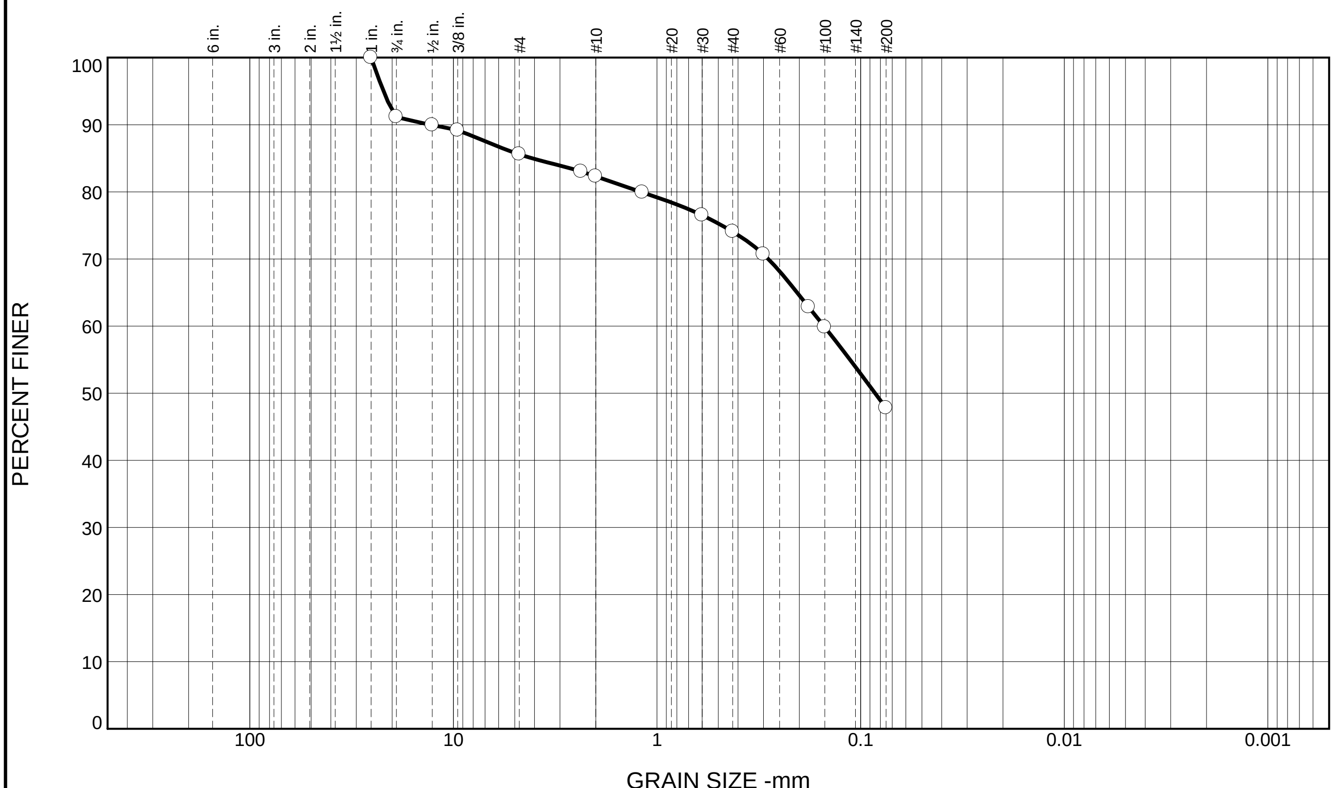
CGC, Inc.

**Client:** Madison City of Eng. MLK Blvd.
**Project:** Reindahl Park Library, Madison

**Project No:** C19051-15 **Figure**

**Tested By:** DRW **Checked By:** TFG

# Particle Size Distribution Report




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 8.9 | 5.5 | 3.3 | 8.2 | 26.3 | 47.8 | |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 1 | 100.0 | | |
| 3/4 | 91.1 | | |
| 1/2 | 89.9 | | |
| 3/8 | 89.2 | | |
| #4 | 85.6 | | |
| #8 | 83.0 | | |
| #10 | 82.3 | | |
| #16 | 79.9 | | |
| #30 | 76.5 | | |
| #40 | 74.1 | | |
| #50 | 70.7 | | |
| #80 | 62.8 | | |
| #100 | 59.8 | | |
| #200 | 47.8 | | |

* (no specification provided)

**Material Description**

Brown Silty Fine to Medium Sand, Some Gravel

**Atterberg Limits**

PL= LL= PI=

**Coefficients**

$D_{90}$= 13.0489 $D_{85}$= 4.0984 $D_{60}$= 0.1514
$D_{50}$= 0.0849 $D_{30}$= $D_{15}$=
$D_{10}$= $C_u$= $C_c$=

**Classification**

USCS= SM AASHTO=

**Remarks**

USDA: Gravelly Silt Loam

**Sample Number:** B-16: S-3

**Date:** 12/11/19

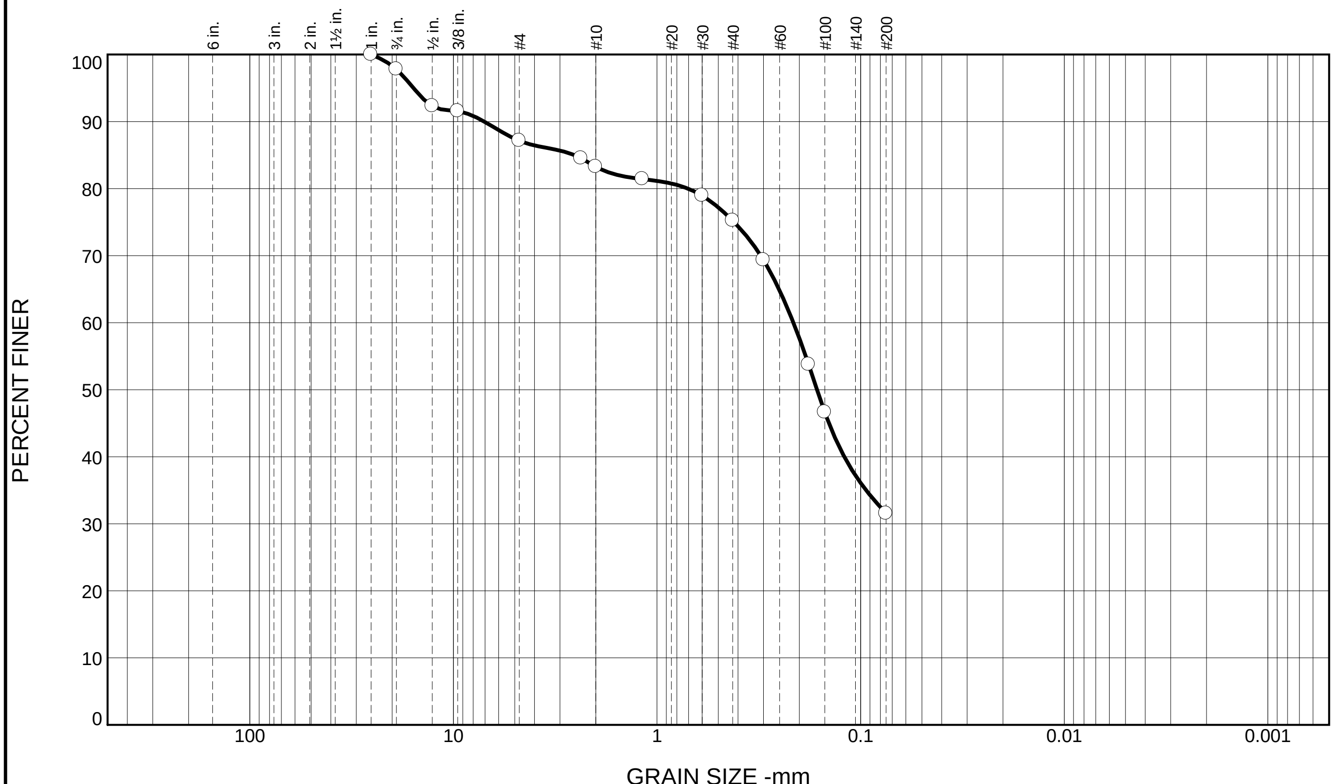
CGC,Inc.

**Client:** Madison City of Eng. MLK Blvd.
**Project:** Reindahl Park Library, Madison

**Project No:** C19051-15 **Figure**

**Tested By:** DRW **Checked By:** TFG

# Particle Size Distribution Report




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 2.2 | 10.7 | 3.8 | 8.1 | 43.7 | 31.5 | |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 1 | 100.0 | | |
| 3/4 | 97.8 | | |
| 1/2 | 92.3 | | |
| 3/8 | 91.6 | | |
| #4 | 87.1 | | |
| #8 | 84.5 | | |
| #10 | 83.3 | | |
| #16 | 81.4 | | |
| #30 | 78.9 | | |
| #40 | 75.2 | | |
| #50 | 69.4 | | |
| #80 | 53.8 | | |
| #100 | 46.6 | | |
| #200 | 31.5 | | |

* (no specification provided)

**Material Description**

Brown Fine to Medium Sand, Some Silt and Gravel

**Atterberg Limits**

PL= LL= PI=

**Coefficients**

$D_{90}$= 7.0599 $D_{85}$= 2.5489 $D_{60}$= 0.2139

$D_{50}$= 0.1638 $D_{30}$= $D_{15}$=

$D_{10}$= $C_u$= $C_c$=

**Classification**

USCS= SM AASHTO=

**Remarks**

USDA: Gravelly Sandy Loam

**Sample Number:** B-18: S-5 + S-6

**Date:** 12/16/19

CGC,Inc.

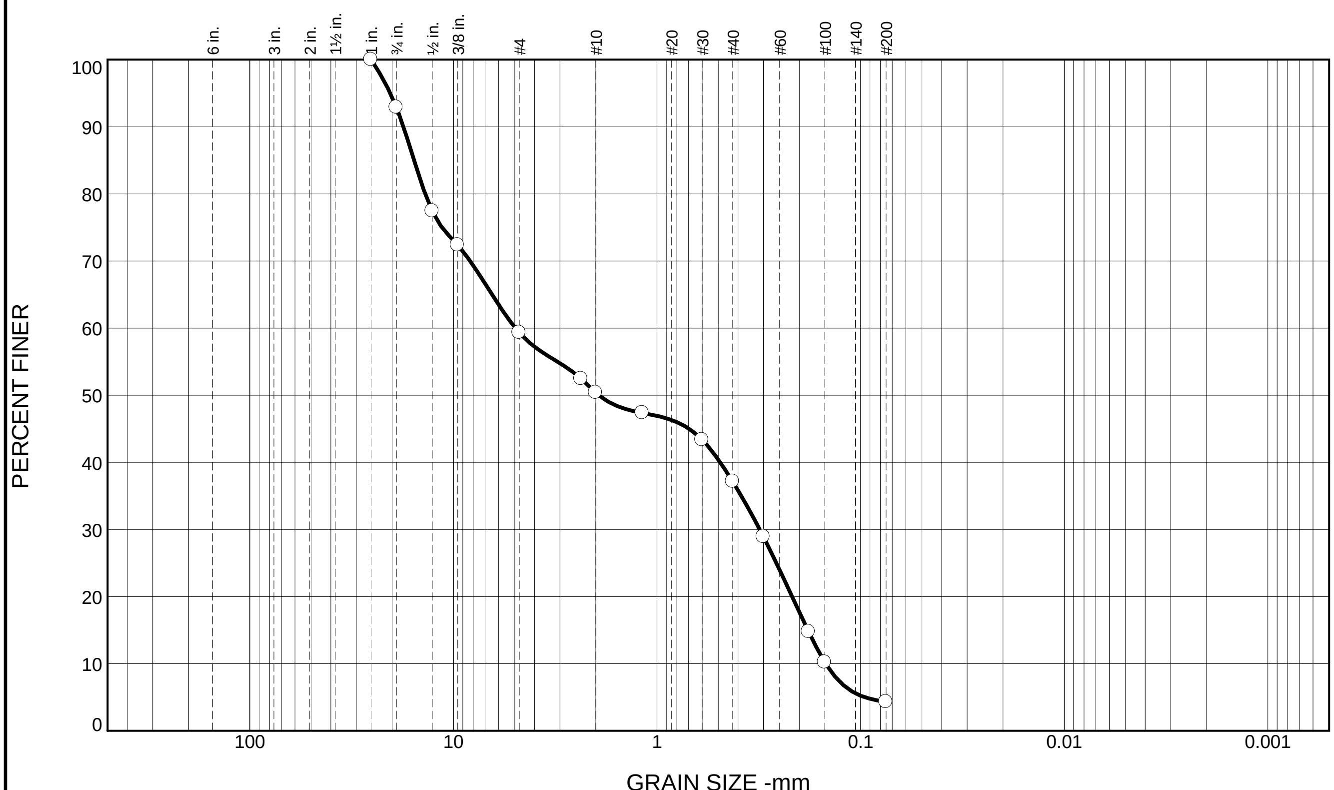
**Client:** Madison City of Eng. MLK Blvd.

**Project:** Reindahl Park Library, Madison

**Project No:** C19051-15 **Figure**

**Tested By:** DRW **Checked By:** TFG

# Particle Size Distribution Report




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 7.1 | 33.6 | 8.9 | 13.3 | 32.8 | 4.3 | |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 1 | 100.0 | | |
| 3/4 | 92.9 | | |
| 1/2 | 77.4 | | |
| 3/8 | 72.4 | | |
| #4 | 59.3 | | |
| #8 | 52.4 | | |
| #10 | 50.4 | | |
| #16 | 47.3 | | |
| #30 | 43.3 | | |
| #40 | 37.1 | | |
| #50 | 28.9 | | |
| #80 | 14.8 | | |
| #100 | 10.2 | | |
| #200 | 4.3 | | |

* (no specification provided)

**Material Description**

Brown Gravelly Fine to Coarse Sand, Trace Silt

**Atterberg Limits**

PL= LL= PI=

**Coefficients**

$D_{90}$= 17.6207 $D_{85}$= 15.6107 $D_{60}$= 4.9607
$D_{50}$= 1.9340 $D_{30}$= 0.3130 $D_{15}$= 0.1816
$D_{10}$= 0.1486 $C_u$= 33.38 $C_c$= 0.13

**Classification**

USCS= SP AASHTO=

**Remarks**

USDA: Very Gravelly Sand

**Sample Number:** B-19: S-3 + S-4

**Date:** 12/16/19

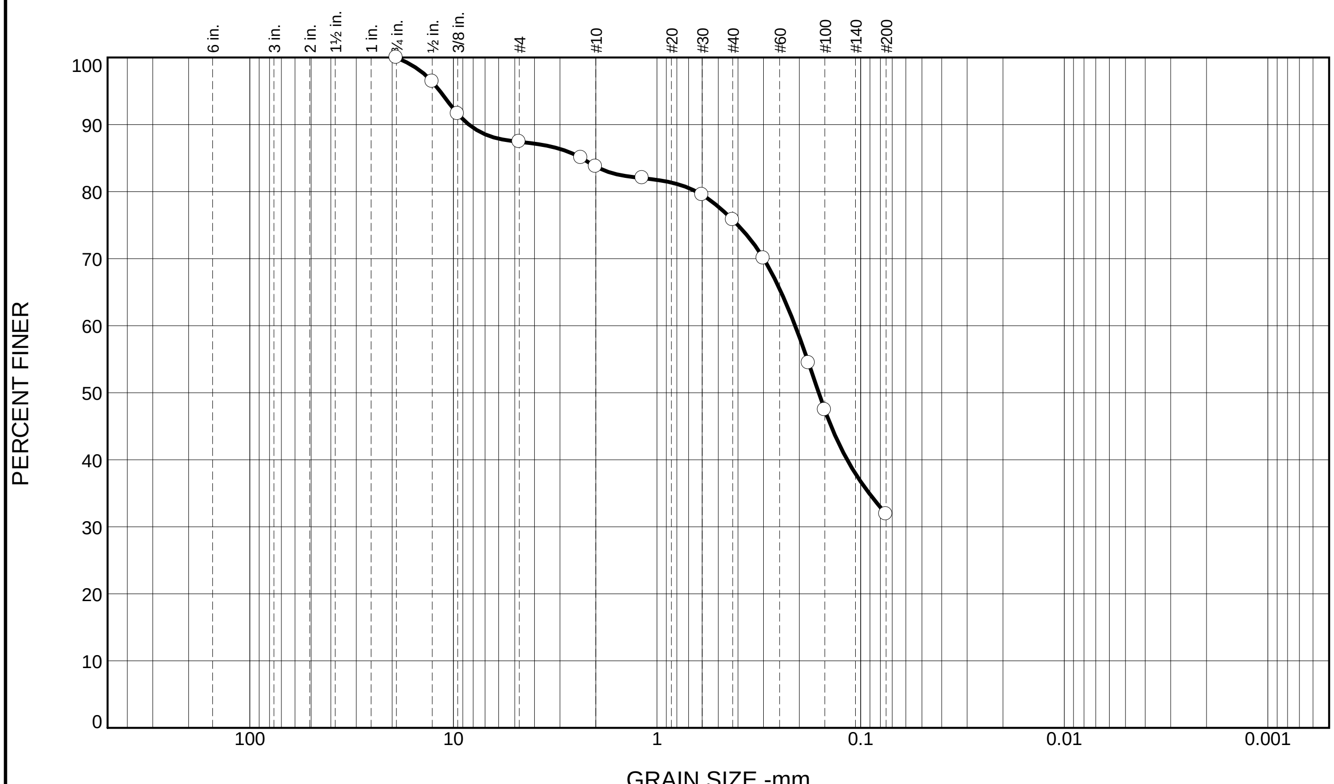
CGC, Inc.

**Client:** Madison City of Eng. MLK Blvd.
**Project:** Reindahl Park Library, Madison

**Project No:** C19051-15 **Figure**

**Tested By:** DRW **Checked By:** TFG

# Particle Size Distribution Report




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 0.0 | 12.6 | 3.7 | 7.9 | 43.9 | 31.9 | |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 3/4 | 100.0 | | |
| 1/2 | 96.4 | | |
| 3/8 | 91.6 | | |
| #4 | 87.4 | | |
| #8 | 85.0 | | |
| #10 | 83.7 | | |
| #16 | 82.0 | | |
| #30 | 79.5 | | |
| #40 | 75.8 | | |
| #50 | 70.1 | | |
| #80 | 54.4 | | |
| #100 | 47.4 | | |
| #200 | 31.9 | | |

* (no specification provided)

**Material Description**

Brown Fine to Medium Sand, Some Silt and Gravel

**Atterberg Limits**

PL= LL= PI=

**Coefficients**

$D_{90}$= 8.3960 $D_{85}$= 2.3498 $D_{60}$= 0.2097
$D_{50}$= 0.1607 $D_{30}$= $D_{15}$=
$D_{10}$= $C_u$= $C_c$=

**Classification**

USCS= SM AASHTO=

**Remarks**

USDA: Gravelly Sandy Loam

**Sample Number:** B-20: S-3 + S-4

**Date:** 12/11/19

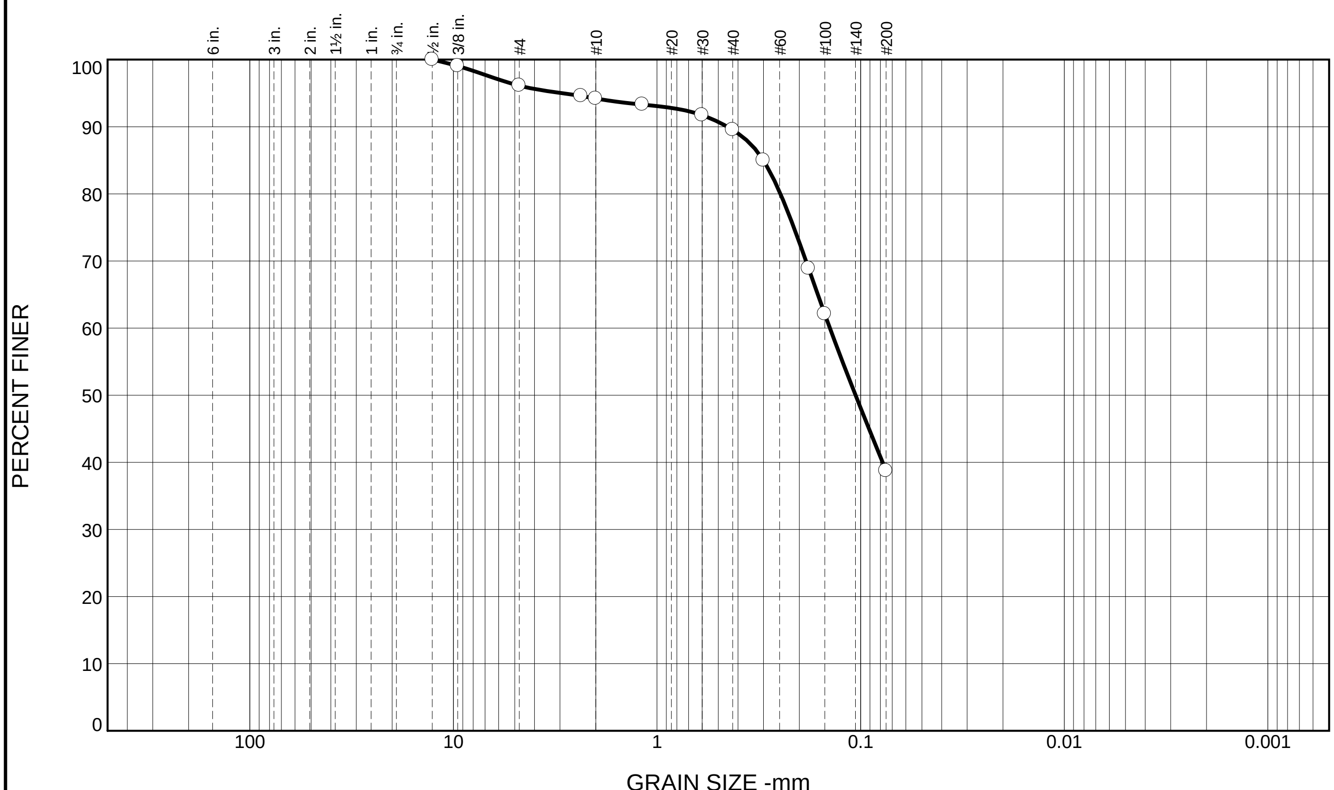
CGC,Inc.

**Client:** Madison City of Eng. MLK Blvd.
**Project:** Reindahl Park Library, Madison

**Project No:** C19051-15 **Figure**

**Tested By:** DRW **Checked By:** TFG

# Particle Size Distribution Report




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 0.0 | 3.9 | 1.9 | 4.7 | 50.8 | 38.7 | |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 1/2 | 100.0 | | |
| 3/8 | 99.1 | | |
| #4 | 96.1 | | |
| #8 | 94.6 | | |
| #10 | 94.2 | | |
| #16 | 93.3 | | |
| #30 | 91.7 | | |
| #40 | 89.5 | | |
| #50 | 85.0 | | |
| #80 | 68.9 | | |
| #100 | 62.1 | | |
| #200 | 38.7 | | |

* (no specification provided)

**Material Description**

Brown Silty Fine Sand, Trace Gravel

**Atterberg Limits**

PL= LL= PI=

**Coefficients**

$D_{90}$= 0.4516 $D_{85}$= 0.3003 $D_{60}$= 0.1415
$D_{50}$= 0.1059 $D_{30}$= $D_{15}$=
$D_{10}$= $C_u$= $C_c$=

**Classification**

USCS= SM AASHTO=

**Remarks**

USDA: Fine Sandy Loam

**Sample Number:** B-21: S-4

**Date:** 12/11/19

CGC,Inc.

**Client:** Madison City of Eng. MLK Blvd.
**Project:** Reindahl Park Library, Madison

**Project No:** C19051-15 **Figure**

**Tested By:** DRW **Checked By:** TFG

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

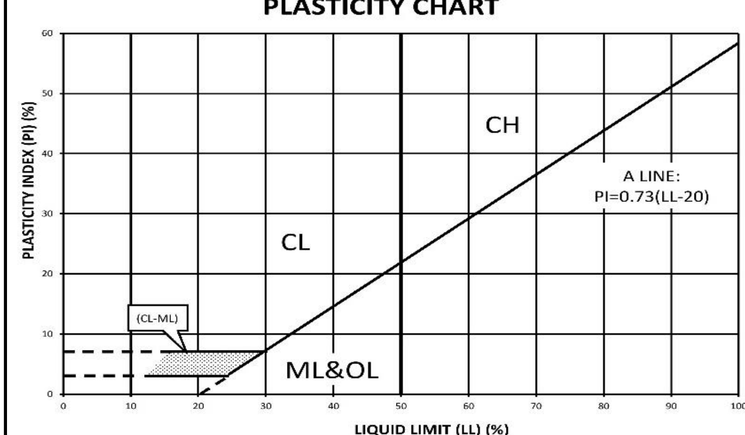
| | | |
|---|---|---|
| COARSE-GRAINED SOILS<br>(more than 50% of material is larger than No. 200 sieve size) | | |
| **GRAVELS**<br>More than 50% of coarse fraction larger than No. 4 sieve size | Clean Gravels (Less than 5% fines) | |
| | GW | Well-graded gravels, gravel-sand mixtures, little or no fines |
| | GP | Poorly-graded gravels, gravel-sand mixtures, little or no fines |
| | Gravels with fines (More than 12% fines) | |
| | GM | Silty gravels, gravel-sand-silt mixtures |
| | GC | Clayey gravels, gravel-sand-clay mixtures |
| **SANDS**<br>50% or more of coarse fraction smaller than No. 4 sieve size | Clean Sands (Less than 5% fines) | |
| | 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<br>(50% or more of material is smaller than No. 200 sieve size.) | | |
| **SILTS AND CLAYS**<br>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**<br>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



# 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.

Modified and reprinted with permission from:

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)

# APPENDIX E

## WISCONSIN DEPARTMENT OF SAFETY & PROFESSIONAL SERVICES
## SOIL AND SITE EVALUATION – STORM FORM (21 BORINGS)

Division of Industry Services
P.O. Box 2658
Madison, Wisconsin 53701
Scott Walker, Governor
Laura Gutierrez, Secretary

# Attachment 2:

## SOIL AND SITE EVALUATION - STORM

In accordance with SPS 382.365, 385, Wis. Adm. Code, and WDNR Standard 1002



Attach a complete site plan on paper not less than 8 ½ x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent of 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)]

County: Dane
Parcel I.D.: 251/0810-283-0097-9
Reviewed by:
Date:

| | |
|---|---|
| Property Owner: City of Madison Parks, Amund Reindahl Park | Property Location: Govt. Lot SE ¼ SW ¼ S 28 T 08 N R 10 E |
| Property Owner's Mail Address: 210 MLK Jr. Blvd., Room 104 | Lot #: / Block#: / Subd. Name or CSM #: |
| City: Madison / State: WI / Zip Code: 53703-3342 / Phone Number: | [X] City ☐ Village ☐ Town: Madison / Nearest Road: 1818 Portage Road |

Drainage area ______ ☐ sq ft ☐ acres

Test site suitable for (check all that apply): ☐ Site not suitable;
☐ Bioretention; ☐ Subsurface Disperal System;
☐ Reuse; ☐ Irrigation; ☐ Other ______

Hydraulic Application Test Method
[X] Morphological Evaluation
☐ Double Ring Infiltrometer
☐ Other: (specify) ______

Soil Moisture
Date of soil borings: ______
USDA-NRCS WETS Value:
☐ Dry = 1;
☐ Normal = 2;
☐ Wet = 3.

**B-1** #OBS. ☐ Pit [X] Boring Ground surface elevation 884.0 ft. Elevation of limiting factor below 864.0 ft.

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-11 | Topsoil (not sampled) | | | | | | | | |
| 2 | 11-30 | 10YR 5/3 | none | SiCL | 0m | mfi | | <5 | | 0.04 |
| 3 | 30-48 | 10YR 4/3 | none | SCL | 2csbk | mfi | | <5 | | 0.11 |
| 4 | 48-96 | 10YR 6/3 | none | SL | 1fsbk | mfr | | 11 | 33 | 0.50 |
| 5 | 96-126 | 10YR 6/3 | none | LFS | 0sg | ml | | <5 | | 0.50 |
| 6 | 126-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 15-25 | | 0.50 (1) |

Comments: (1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

**B-2** #OBS. ☐ Pit [X] Boring Ground surface elevation 887.0 ft. Elevation of limiting factor below 867.0 ft.

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-8 | Topsoil (not sampled) | | | | | | | | |
| 2 | 8-66 | 10YR 5/3 | none | SiCL | 0m | mfi | | <5 | | 0.04 |
| 3 | 66-96 | 10YR 6/3 | none | L | 1fsbk | mfr | | 5-15 | | 0.24 |
| 4 | 96-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 15-25 | | 0.50 (1) |

Comments: (1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

| | | | |
|---|---|---|---|
| Name (Please Print): Tim F. Gassenheimer | Signature: [signature] | | Credential Number: SP-011900004 |
| Address: 129 Milky Way, Madison, WI 53718 | | Date Evaluation Conducted: December 11, 2019 | Telephone Number: (608) 288-4100 |

B-3 #OBS. ☐ Pit ☒ Boring Ground surface elevation 888.0 ft. Elevation of limiting factor 882.5 ft. (Gray)

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-11 | Topsoil (not sampled) | | | | | | | | |
| 2 | 11-36 | 10YR 4/3 | none | SiCL | 0m | mvfi | | <5 | | 0.04 |
| 3 | 36-66 | 10YR 4/3 to 3/3 | none | SCL | 2csbk | mfi | | <5 | | 0.11 |
| 4 | 66-96 | 10YR 5/1 to 6/4 | none | GRSL | 1fsbk | mft | | 15-25 | | 0.50 |
| 5 | 96-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 20 | 34 | 0.50 (1) |

Comments: Low-chroma/high-value (gray) dominant color in Horizon 4 indicates past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater; groundwater was not encountered during or upon completion of drilling.
(1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

B-4 #OBS. ☐ Pit ☒ Boring Ground surface elevation 885.0 ft. Elevation of limiting factor below 865.0 ft.

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-11 | Topsoil (not sampled) | | | | | | | | |
| 2 | 11-36 | 10YR 4/3 | none | SiCL | 0m | mfi | | <5 | | 0.04 |
| 3 | 36-66 | 10YR 3/2 to 5/3 | none | SCL to SL | variable | | | <10 | | 0.11-0.50 |
| 4 | 66-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 15-25 | | 0.50 (1) |

Comments: (1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

B-5 #OBS. ☐ Pit ☒ Boring Ground surface elevation 883.5 ft. Elevation of limiting factor below 863.5 ft.

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-11 | Topsoil (not sampled) | | | | | | | | |
| 2 | 11-36 | 10YR 4/3 | none | SiCL | 0m | mvfi | | <5 | | 0.04 |
| 3 | 36-66 | 10YR 4/3 to 6/3 | none | SCL to SL | variable | | | <10 | | 0.11-0.50 |
| 4 | 66-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 15-25 | | 0.50 (1) |

Comments: (1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

B-6 #OBS. ☐ Pit ☒ Boring Ground surface elevation 888.0 ft. Elevation of limiting factor below 868.0 ft.

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-11 | Topsoil (not sampled) | | | | | | | | |
| 2 | 11-36 | 10YR 5/3 | none | CL | 0m | mvfi | | <5 | | 0.03 |
| 3 | 36-66 | 10YR 4/3 | none | SCL | 2csbk | mfi | | <5 | | 0.11 |
| 4 | 66-240 | 10YR 6/3 to 6/4 | none | GRSL, SCL Seams | 1msbk | mfr | | 16 | 32 | 0.11-0.50 (1) |

Comments: (1) Infiltration potential will likely be limited by sandy clay loam seams (and potentially due to the fairly high in-place relative density). Infiltration rate can potentially be improved by deep-tilling or excavating/turning-over to disrupt lower-permeability seams (and loosen soil). Gradations should be collected during construction to check that blended soil is consistent with design infiltration rate.

B-7 #OBS. ☐ Pit ☒ Boring Ground surface elevation 888.0 ft. Elevation of limiting factor 880.0 ft. (Gray)

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-10 | Topsoil (not sampled) | | | | | | | | |
| 2 | 10-36 | 10YR 3/2 to 5/4 | none | CL to SCL (Fill) | variable | | | <5 | | 0.03-0.11 (1) |
| 3 | 36-66 | 10YR 2/2 to 4/4 | none | CL (Fill) | 2csbk | mfi | | <10 | | 0.03 (1) |
| 4 | 66-96 | 10YR 6/2 to 6/4 | none | LS to SL | variable | | | <10 | | 0.50-1.63 |
| 5 | 96-126 | 10YR 5/1 to 6/4 | none | GRSL | 1fsbk | mfr | | 15-25 | | 0.50 |
| 6 | 126-240 | 10YR 6/3 to 6/4 | none | GRSL, SCL Seams | 1msbk | mfr | | 15-25 | | 0.11-0.50 (1) |

Comments: Low-chroma/high-value (gray) dominant color in Horizon 5 indicates past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater; groundwater was not encountered during or upon completion of drilling.

(1) Infiltration rate in fill should be considered very approximate due to the potential for seams/pockets of dissimilar material.

(2) Infiltration potential will likely be limited by sandy clay loam seams (and potentially due to the fairly high in-place relative density). Infiltration rate can potentially be improved by deep-tilling or excavating/turning-over to disrupt lower-permeability seams (and loosen soil). Gradations should be collected during construction to check that blended soil is consistent with design infiltration rate.

B-8 #OBS. ☐ Pit ☒ Boring Ground surface elevation 884.0 ft. Elevation of limiting factor below 864.0 ft.

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-8 | Topsoil (not sampled) | | | | | | | | |
| 2 | 8-36 | 10YR 3/1 to 5/3 | none | SiCL | 0m | mfi | | <5 | | 0.04 |
| 3 | 36-240 | 10YR 6/3 to 6/4 | none | SL-GRSL, SiL Seams | 1msbk | mfr | | 15 | 29 | 0.50 (1) |

Comments: (1) Infiltration potential will likely be limited by silt loam seams (and potentially due to the fairly high in-place relative density). Infiltration rate can potentially be improved by deep-tilling or excavating/turning-over to disrupt lower-permeability seams (and loosen soil). Gradations should be collected during construction to check that blended soil is consistent with design infiltration rate.

B-9 #OBS. ☐ Pit ☒ Boring Ground surface elevation 884.0 ft. Elevation of limiting factor 881.0 ft. (Redox)

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-11 | Topsoil (not sampled) | | | | | | | | |
| 2 | 11-36 | 10YR 4/3 to 3/1 | none | SiCL | 0m | mvfi | | <10 | | 0.04 |
| 3 | 36-66 | 10YR 5/3 | c2f 10YR 4/1 | SiCL | 0m | mvfi | | <5 | | 0.04 |
| 4 | 66-96 | 10YR 4/3 to 3/3 | none | SCL | 2csbk | mfi | | <5 | | 0.11 |
| 5 | 96-126 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 15-25 | | 0.50 |
| 6 | 126-204 | 2.5Y 6/4 | none | LFS | 1msbk | mfr | | 5 | 28 | 0.50 (1) |
| 7 | 204-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 15-25 | | 0.50 (1) |

Comments: Redox in Horizon 3 indicates past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater; groundwater was not encountered during or upon completion of drilling.

(1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

B-10 #OBS. ☐ Pit ☒ Boring Ground surface elevation 886.0 ft. Elevation of limiting factor below 866.0 ft.

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-11 | Topsoil (not sampled) | | | | | | | | |
| 2 | 11-36 | 10YR 4/3 | none | SiCL | 0m | mfi | | <5 | | 0.04 |
| 3 | 36-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 15-25 | | 0.50 (1) |

Comments: (1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

B-11 #OBS. ☐ Pit ☒ Boring Ground surface elevation 886.5 ft. Elevation of limiting factor 885.6 ft. (Redox)

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-11 | Topsoil (not sampled) | | | | | | | | |
| 2 | 11-36 | 10YR 5/3 | c1d 10YR 6/1 | SiCL | 0m | mvfi | | <5 | | 0.04 |
| 3 | 36-66 | 10YR 5/3 | none | CL | 0m | mfi | | <5 | | 0.03 |
| 4 | 66-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 21 | 30 | 0.50 (1) |

Comments: Redox in Horizon 2 indicates past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater; groundwater was not encountered during or upon completion of drilling.

(1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

B-12 #OBS. ☐ Pit ☒ Boring Ground surface elevation 882.5 ft. Elevation of limiting factor below 862.5 ft.

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-10 | Topsoil (not sampled) | | | | | | | | |
| 2 | 10-36 | 10YR 5/3 | none | CL | 0m | mfi | | <5 | | 0.03 |
| 3 | 36-72 | 10YR 6/3 | none | L | 1fsbk | mfr | | 5-15 | | 0.24 |
| 4 | 72-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 15-25 | | 0.50 (1) |

Comments: (1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

B-13 #OBS. ☐ Pit ☒ Boring Ground surface elevation 884.0 ft. Elevation of limiting factor below 864.0 ft.

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-10 | Topsoil (not sampled) | | | | | | | | |
| 2 | 10-48 | 10YR 5/3 | none | SiCL | 0m | mfi | | <5 | | 0.04 |
| 3 | 48-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 15-25 | | 0.50 (1) |

Comments: (1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

B-14 #OBS. ☐ Pit ☒ Boring Ground surface elevation 884.0 ft. Elevation of limiting factor below 864.0 ft.

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-11 | Topsoil (not sampled) | | | | | | | | |
| 2 | 11-36 | 10YR 4/3 | none | SiCL | 0m | mfi | | <5 | | 0.04 |
| 3 | 36-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 20 | 30 | 0.50 (1) |

Comments: (1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

B-15 #OBS. ☐ Pit ☒ Boring Ground surface elevation 882.0 ft. Elevation of limiting factor below 862.0 ft.

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-12 | Topsoil (not sampled) | | | | | | | | |
| 2 | 12-66 | 10YR 5/3 | none | SiCL | 0m | mvfi | | <5 | | 0.04 |
| 3 | 66-96 | 10YR 4/3 to 6/3 | none | Stratified SiCL/SiL/FS | variable | | | <5 | | 0.04-0.50 |
| 4 | 96-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 15-25 | | 0.50 (1) |

Comments: (1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

B-16 #OBS. ☐ Pit ☒ Boring Ground surface elevation 878.5 ft. Elevation of limiting factor 877.4 ft. (Redox)

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-13 | Topsoil (not sampled) | | | | | | | | |
| 2 | 13-36 | 10YR 2/1 to 4/2 | c1f 10YR 4/1 | SiL to SiCL | variable | | | <5 | | 0.04-0.13 |
| 3 | 36-66 | 10YR 4/3 | none | CL | 0m | mfi | | <5 | | 0.03 |
| 4 | 66-96 | 10YR 6/2 | none | GRSiL | 2mabk | mfi | | 18 | 48 | 0.13 |
| 5 | 96-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 15-25 | | 0.50 (1) |

Comments: Redox in Horizon 2 indicates past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater; groundwater was not encountered during or upon completion of drilling.
(1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

B-17 #OBS. ☐ Pit ☒ Boring Ground surface elevation 880.0 ft. Elevation of limiting factor below 860.0 ft.

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-12 | Topsoil (not sampled) | | | | | | | | |
| 2 | 12-36 | 10YR 5/3 | none | SiCL | 0m | mfi | | <5 | | 0.04 |
| 3 | 36-66 | 10YR 4/3 | none | SCL to SL | variable | | | <10 | | 0.11-0.50 |
| 4 | 66-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 15-25 | | 0.50 (1) |

Comments: Probable perched water was encountered at about 3.5 ft during drilling, and at about 6 ft at the completion of drilling (after casing removal). About one day after the completion of drilling, the borehole had caved in at about 8 ft, with the water level at about 6 ft.
(1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

B-18 #OBS. ☐ Pit ☒ Boring Ground surface elevation 876.0 ft. Elevation of limiting factor below 856.0 ft.

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-10 | Topsoil (not sampled) | | | | | | | | |
| 2 | 10-36 | 10YR 5/3 | none | SiCL | 0m | mfi | | <5 | | 0.04 |
| 3 | 36-66 | 10YR 3/3 | none | SCL | 2mabk | mfi | | <10 | | 0.11 |
| 4 | 66-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 17 | 32 | 0.50 (1) |

Comments: (1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

B-19 #OBS. ☐ Pit ☒ Boring Ground surface elevation 875.5 ft. Elevation of limiting factor 874.5 ft. (Redox)

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-12 | Topsoil (not sampled) | | | | | | | | |
| 2 | 12-36 | 10YR 4/3 | c2f 10YR 5/2 | SiCL | 0m | mfi | | <5 | | 0.04 |
| 3 | 36-66 | 10YR 4/3 | none | SCL | 2mabk | mfi | | 5-15 | | 0.11 |
| 4 | 66-126 | 10YR 6/3 | none | VGRS | 0sg | ml | | 50 | 4 | 3.60 |
| 5 | 126-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 16 | 32 | 0.50 (1) |

Comments: Redox in Horizon 2 indicates past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater; groundwater was not encountered during or upon completion of drilling.

(1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

B-20 #OBS. ☐ Pit ☒ Boring Ground surface elevation 885.0 ft. Elevation of limiting factor 882.0 ft. (Redox)

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-10 | Topsoil (not sampled) | | | | | | | | |
| 2 | 10-36 | 10YR 3/2 to 3/1 | none | SiCL | 0m | mvfi | | <5 | | 0.04 |
| 3 | 36-66 | 10YR 5/3 | f2f 10YR 6/1 | SiCL | 0m | mfi | | <5 | | 0.04 |
| 4 | 66-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 16 | 32 | 0.50 (1) |

Comments: Redox in Horizon 3 indicates past saturation from perched water, periodically infiltrating surface water or seasonally elevated groundwater; groundwater was not encountered during or upon completion of drilling.

(1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

B-21 #OBS. ☐ Pit ☒ Boring Ground surface elevation 882.0 ft. Elevation of limiting factor below 862.0 ft.

| Horizon | Depth in. | Dominant Color Munsell | Redox Description Qu. Sz. Cont. Color | Texture | Structure Gr. Sz. Sh. | Consistence | Boundary | % Rock Frags. | % Fines | Hydraulic App Rate Inches/Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-10 | Topsoil (not sampled) | | | | | | | | |
| 2 | 10-36 | 10YR 3/1 to 5/2 | none | SiCL | 0m | mfi | | <5 | | 0.04 |
| 3 | 36-84 | 10YR 4/3 to 3/3 | none | SCL | 2csbk | mfi | | <5 | | 0.11 |
| 4 | 84-114 | 10YR 6/3 | none | FSL | 1fsbk | mfr | | 6 | 39 | 0.50 |
| 5 | 114-240 | 10YR 6/3 to 6/4 | none | GRSL | 1msbk | mfr | | 15-25 | | 0.50 (1) |

Comments: (1) Infiltration rate may be lower than published value due to fairly high in-place relative density. Deep-tilling or excavating/turning-over is recommended to loosen soil.

Overall Site Comments: See Comments above and Preliminary Stormwater Infiltration Potential section in Geotechnical Exploration Report.