CGC, Inc.

Construction • Geotechnical
Consulting Engineering/Testing

April 23, 2008
C08071-1

Mr. Tom Maglio
City of Madison Parks Division
210 Martin Luther King, Jr. Blvd., Suite 120
Madison, WI 53701-2987

Re: Geotechnical Services
Door Creek Park
Madison, Wisconsin

Dear Mr. Maglio:

CGC, Inc. has completed our geotechnical services for the above-referenced project. At your request, a total of four soil borings were drilled within the proposed park area. Cuts as great as 15 ft will occur along the west edge of the park, with fills in a proposed shelter area in the park's southern portion approaching 8 ft. Pavements will also be built north of the shelter.

The borings were performed on April 14, 2008 at locations selected by City of Madison personnel. The locations of the borings were marked in the field by CGC personnel prior to drilling and are shown on a boring location plan provided to us (copy attached in Appendix A). Elevations at the boring locations were estimated based on contour information supplied to us by the City and should be considered approximate. The following paragraphs discuss our observations and provide opinions relative to site preparation as well as pavement/utility construction.

SUBSURFACE PROGRAM & OBSERVATIONS

The borings were drilled to depths selected by both CGC and City personnel utilizing the services of J & J Soil Testing under subcontract to CGC using a truck-mounted, rotary CME 45 drill rig equipped with hollow stem augers. Borings 1 and 2 were drilled in the proposed cut area, B-3 in the shelter area and B-4 in an "old" fill area. (Boring 2A was also drilled as an extention of B-2 after being offset due to auger refusal on a presumed cobble/boulder.) Standard Penetration Test (SPT) drilling techniques (ASTM D1586) were used for the full exploration depth at the boring locations. This method consists of driving a 2-inch outside diameter split-barrel sampler using a 140-pound weight falling freely through a distance of 30 inches. The sampler is first seated 6 inches into the material to be sampled and then driven 12 inches. The number of blows required to drive the sampler the final 12 inches is recorded on the log of borings and is known as the Standard Penetration Resistance (commonly referred to as the N-value).

During the field exploration program, the driller visually classified the soils and prepared a field log. Water level observations were made in each boring during and shortly after drilling, which are shown on the bottom of each boring log. Note groundwater was encountered between 5 and 18.5 ft below ground surface at the borings. Groundwater levels are anticipated to fluctuate

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based on seasonal variations in precipitation, infiltration, nearby creek stages, etc. Upon completion of drilling, the borings were backfilled to satisfy WDNR requirements and the soil samples delivered to our laboratory for visual classification. The soils were visually classified by CGC and reviewed by a geotechnical engineer using the Unified Soil Classification System (USCS). The final logs prepared by the engineer and a description of the USCS are presented in Appendix A.

The attached boring logs indicate that somewhat uniform soil conditions exist at the boring locations, with surficial fill present at B-4. In general (except for B-4), topsoil is present that is about 8 to 13 in. thick underlain by about 2 to 6 ft of soft to very stiff cohesive soils. The clays were softest and thickest where the shelter is planned. The clays were underlain by granular soils that contained varying amounts of sand, gravel, silt, cobbles and boulders which extended the full boring depth at each location. Bedrock was not encountered at B-1 and B-2 where cuts are planned. Regarding B-4, about 3.5 ft of fill involving topsoil, clay and silt was observed over a 2-ft thick layer of buried topsoil. Natural clays and then sand followed. Please refer to the final logs included in Appendix A for additional information specific to a boring location.

SITE PREPARATION AND PAVEMENT/UTILITY CONSTRUCTION

1. Site Preparation

We recommend that the surficial topsoil be stripped/removed at least 5 ft beyond the proposed construction areas, including areas required for cuts and fills. The topsoil can be stockpiled on-site and re-used as fill in landscaped areas. Excavation cuts in the site's western portion can then proceed. We recommend that excavation side slopes be sloped at 1.5H:1V or flatter through the native sand and clay soils at this site. Lawn moving will require 2H:1V slopes or flatter.

Following topsoil removal in areas to receive fill, the exposed subgrade are expected to consist of native lean clay or fill (both clay and silt). Exposed soils in areas to receive fill or at grade should be proof-rolled with a large, rubber-tired piece of construction equipment (i.e., loaded dump truck, scraper, or front-end loader). If soft/yielding areas are detected, they should be undercut/removed. Grades should be re-established using granular backfill compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557) or compacted breaker run stone. Note that we anticipate the existing fill in the site's southern portion to be reasonably well compacted and acceptable for additional fill placement, but this will require confirmation using proof-rolling/compacting methods and possible excavation of test pits. An allowance should be established for the potential removal of some on the in-place fill, and possibly the buried topsoil if structures are to eventually be built in this area south of the proposed shelter.

We recommend using granular soils as structural fill (i.e., below structures and pavements), as these soils are generally easier to place and compact in most weather conditions. Note that the sand soils in the cut area (encountered below the topsoil and shallow clayey layers) are considered adequate for use as structural fill. We do not recommend using clay/silt soils as structural fill because moisture conditioning will be required to achieve desired compaction levels, which could delay construction progress. Instead, silt/clay soils can be used as fill in landscaped areas. Structural fill/backfill should be compacted to at least 95% (ASTM D1557) in accordance with our Recommended Compacted Fill Specifications presented in Appendix B. Periodic field density tests should be taken by CGC staff within the fill/backfill to document the adequacy of compactive effort. *Note that we recommend fill in the shelter area be placed at least 3 months in advance of shelter construction to allow for the majority of settlement to occur within the underlying soft clays.*

2. Pavement Design

Clays should control the pavement design, as we anticipate that the pavement subgrades will generally consist of natural clay or fill materials. Pavement subgrades should be proof-rolled as described in the Site Preparation section of this report and stabilized as needed with breaker rock or replaced with compacted granular fill. The following *generalized* parameters should be used to develop the design pavement section:

TABLE 1

AASHTO classification	A6
Frost group index	F-3
Design group index	14
Soil support value	4.0
Subgrade modulus, k(pci)	125
Estimated percent shrinkage	20-30
Estimated CBR value	2-5

Assuming parking lots with less than 50 stalls and one daily equivalent 18-kip single axle load from daily truck traffic (i.e., a Traffic class I classification), a typical pavement design per WDOT Standard Specifications should meet E-0.3 requirements. Special measures regarding drainage below the pavements do not appear necessary at this time due to the lack of near-surface groundwater. Different traffic volumes may result in changes to the pavement design.

3. Compaction Requirements

Regarding utility construction, we recommend increasing bedding thicknesses (possibly underlain by a geotextile) should an alignment bear on soft clay conditions. We anticipate that