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April 13, 2020 6335 GEOTECHNICAL CONSULTATION

North Clackamas Parks and Recreation District
150 Beavercreek Road
Oregon City, OR 97045

Attention: Kathryn Krygier, Planning & Development Manager

SUBJECT: Geotechnical Consultation Services
Gladstone Community Project
525 Portland Avenue
Gladstone, Oregon

At your request, GRI completed preliminary geotechnical consultation services for the above-referenced property in Gladstone, Oregon. The Vicinity Map, Figure 1, shows the general location of the site. The evaluation was conducted to provide information regarding the subsurface conditions at the site and discuss pertinent geotechnical and geologic issues to assist the project team during the predesign stage and scoping phase of the project. GRI understands a full geotechnical investigation, including subsurface explorations, engineering, and report, will be completed at a later date. This letter describes the work accomplished and provides our evaluation of the site with respect to geotechnical considerations to assist with predesign and scoping of the project.

SITE DESCRIPTION

The proposed library site is currently occupied by the City of Gladstone City Hall, located at 525 Portland Avenue in Gladstone, Oregon, and is bordered by Portland Avenue to the west; West Dartmouth Street to the south; Gladstone Volunteer Fire Department on the adjacent lot to the north; and residential housing to the east. We understand the existing City of Gladstone City Hall building is a two-story structure and occupies a footprint of approximately 9,000 square feet. Portland cement concrete sidewalks and asphalt concrete pavement roadways are located along the south and west portions of the property. Figure 2 shows the existing site.

All elevations listed in this letter reference the North American Vertical Datum of 1988 (NAVD 88). A review of the U.S. Geological Survey (USGS) Gladstone Quadrangle (2017) indicates the site is relatively flat at an elevation of approximately 60 to 61 ft.

PROJECT DESCRIPTION

We understand the project consists of a full demolition of the existing City of Gladstone City Hall building to construct a new library for the City of Gladstone. We understand Catena Consulting Engineers (Catena) is the structural engineer for the project.

SUBSURFACE CONDITIONS

Subsurface materials and conditions at the site were evaluated based on our review of available geotechnical and geologic information. Based on our experience in the project vicinity, fill soils consisting of silt, clay, sand, and gravels are likely locally present near the ground surface. Native soils in the area consist of alluvial deposits of clay, silt, sand, gravels, and cobbles.

Published geologic mapping indicates the project site is mantled with Quaternary catastrophic flood deposits of channel facies. In general, the catastrophic flood deposits are composed of interlayered and variable silt, sand, and gravel deposited in major flood channel, typically 5 to 15 m thick. North and south of the project site, mapping indicates the site is mantled with Miocene era flows of the Columbia River Basalt Group (Madin, 2004). Figure 3 shows the major geologic formations that mantle the site and surrounding area.

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey identifies the soil at the project site within approximately 60 inches of the surface consists of Salem silt loam and Camas gravelly sandy loam immediately south of the project site. Salem silt loam consists primarily of sand, silt, and clay, has a low plasticity, and has a moderately high infiltration rate when thoroughly wet. Camas gravelly sandy loam consists primarily of sand, gravel, and silt, and has a high infiltration rate when thoroughly wet (USDA, 2019). Figure 4 shows the mapped soil units within the immediate vicinity of the project site.

Groundwater

Information available through the U.S. Geological Survey (USGS, 2019) indicates the regional groundwater level in this area may be in the range of 20 ft below the ground surface. Review of nearby wells through the Oregon Water Resources Department well report query mapping tool (OWRD, 2019) indicates the local groundwater level in this area may range from about 5 to 10 ft below the ground surface. However, we anticipate perched groundwater in the low-permeability fine-grained soil mantling the site during periods of heavy and prolonged rain and the wet winter season could approach the ground surface. The perched groundwater will be the lowest during the normally dry late summer and early fall months.

GEOLOGIC HAZARDS

The Oregon Department of Geology and Mineral Industries (DOGAMI) has a Statewide Landslide Information Database for Oregon (SLIDO), which compiles landslides that have been identified on published maps. A review of the SLIDO website indicates no landslides have been documented at or adjacent to the project site. One landslide has been mapped approximately one-half mile southwest of the project site, and one landslide has been mapped approximately three-quarters of a mile to the east of the project site, as shown on Figure 5. These landslides are typically within drainages, over-steepened natural slopes, or poorly compacted fill slopes.

The USGS maps the Oatfield Fault approximately one-half mile east of the project site; however, the USGS does not consider the Oatfield Fault to be an active contributing source in their Probabilistic Seismic Hazard Analysis (PSHA). The USGS considers the Bolton Fault approximately 1.3 miles (2.2 km) southwest of the project site and the Portland Hills Fault located about 1.4 miles (2.2 km) northeast of the site to be the closest crustal fault sources contributing to the overall seismic hazard at the site. The Cascadia Subduction Zone is mapped approximately 104 km west of the site (Petersen et al., 2014). Unless occurring on a previously unmapped or unknown fault, the risk of fault rupture at the site is low. The risk of damage by tsunami and/or seiche at the site is absent.

SUMMARY OF FINDINGS

General

Our review of available geologic and geotechnical literature indicates the site is likely mantled with variable thickness of local fill soils primarily consisting of silt, clay, sand, and gravel. The fill soils are underlain by alluvial deposits of sand, silt, gravel, and cobbles over Columbia River Basalt Formation at depth. Fill soils, where present, may not be suitable for the support of on-grade structures depending on the fill composition, magnitude of foundation loads, and settlement sensitivity. The fine-grained fill and alluvial soils are extremely sensitive to moisture content and are easily disturbed by construction activities when wet. Careful working procedures and the use of imported granular fill material may be necessary if site preparation and grading are undertaken during wet-weather and wet-ground conditions.

Excavations that encounter rock may require additional effort to remove. Areas of highly fractured or weathered rock may be able to be excavated with a large dozer and/or hydraulic excavator equipped with a rock bucket and rock teeth. More specialized rock excavation techniques, such as chipping, splitting, or expansive grout, may be necessary if zones of less-weathered, less-fractured rock are encountered.

Foundations

The foundation design for the proposed structure will depend on the building type and finished grade elevation. One- or two-story structures with a finished floor at existing grade may be able to be supported on conventional spread and wall footings if the foundation loads are relatively light. Fill soils beneath proposed structures will likely need to be recompacted and/or replaced with compacted structural fill or reinforced with ground improvement. Buildings that have moderate to high foundation loads and are constructed at existing grade need to be supported on firm native soils, ground improvement, or pile foundations extending into the underlying native soils.

Buildings that are designed with below-grade levels may be supported on shallow footings, ground improvement, or piles based on their foundation loads, depth of excavation, and subgrade soil and rock materials. We anticipate foundation support for buildings with below-grade levels extending into native soils can be provided by spread footings or a mat foundation. It may be cost effective to support perimeter wall loads on soldier piles that are a part of an excavation shoring system. The soldier piles will likely need to extend into the underlying formational material at least 15 ft below the bottom of the excavation. If these piles are incorporated into the foundation system, it is likely that this depth will be increased.

Excavation Support

Below-grade excavations in the Portland metropolitan area are usually supported with shoring consisting of cast-in-place soldier piles and lagging with soil anchors (tieback anchors). Soil-nail methods can also be used to support excavations. Soldier piles can also be designed and constructed to support perimeter wall loads. Soldier pile shoring systems are usually more appropriate where underpinning of adjacent structures is necessary. It may also be feasible to use internal braces and struts in lieu of soil anchors. The most appropriate shoring method will depend on soil type and depth, the foundation system, performance (deformation) criteria, easement considerations for soil anchors or soil nails, schedule, and cost.

Groundwater

Groundwater or perched groundwater may be encountered in the bottom of below-grade excavations, depending on the excavation depth and time of year. Dewatering of excavations with sump pumps and/or wells may be required. Below-slab groundwater-control measures may consist of perforated PVC pipes installed below the basement floor slab and connected to sump pumps that remove groundwater below the slab. The sump pumps should be connected to the sanitary sewer system. Alternatively, the basement slab and retaining walls may be designed for hydrostatic pressure.

Seismic Considerations

We anticipate the building design of new structure will be performed per the American Society of Civil Engineers (ASCE) 7-16 document with 2019 Oregon Structural Specialty Code (OSSC) modifications. The ASCE 7-16 design methodology uses two spectral response coefficients, S_S and S_1, corresponding to periods of 0.2 and 1.0 second to develop the Risk-Targeted Maximum Considered Earthquake (MCE_R) response spectrum. The bedrock (Site Class B/C) spectral response coefficients were obtained from the USGS Uniform Hazard Response Spectra Curves for the coordinates of 45.3806° N latitude and 122.5944 ° W longitude. The S_S and S_1 coefficients identified for the site are 0.84 and 0.38 g, respectively. The site class required for structural design will need to be evaluated based on a site-specific geotechnical investigation.

Liquefaction/Cyclic Softening

Liquefaction is the process by which loose, saturated granular materials, such as clean sand and, to a somewhat lesser degree, non-plastic and low-plasticity silts, temporarily lose stiffness and strength during and immediately after a seismic event. "Cyclic softening" is a term that describes a relatively gradual and progressive increase in shear strain with load cycles and is more common within fine-grained soils. Alluvial soil deposits of sand, silt, gravel and cobbles, and shallow groundwater are likely present at the site. A site-specific geotechnical investigation with soil sample collection and testing will be needed to establish soil properties to evaluate the potential for liquefaction and cyclic softening at the site.

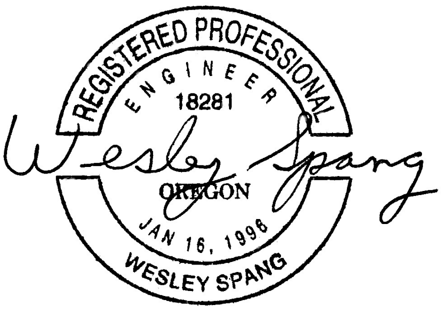
Slope Stability

Based on information available from the DOGAMI SLIDO website, no landslides have been documented within or adjacent to the project site. Lidar data available from the SLIDO website indicate the site is relatively flat. Based on the final grading plans once site-improvements are more developed, a site-specific slope stability analysis may need to be performed to evaluate the long-term stability of the proposed slopes. A site-specific geotechnical investigation with soil sample collection and testing will be needed to establish soil strength properties for slope stability analysis.

LIMITATIONS

This letter has been prepared to aid in preliminary evaluation of the property. The scope is limited to the specific location described herein, and our description of the project represents our understanding of the existing site improvement and conditions. A site-specific geotechnical investigation, including field explorations, laboratory testing, and an engineering analysis should be performed when site-development plans become available.

Submitted for GRI,



Expires 06/2020

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Principal Engineer

Brian Cook, PE
Project Engineer

This document has been submitted electronically.

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