Earth Engineers, Inc.

2411 Southeast 8th Avenue ● Camas ● WA 98607
Phone: 360-567-1806 ● Fax: 360-253-8624
www.earth-engineers.com

January 29, 2020

Ken Ulbricht
620 South Halladay, Suite 4
Seaside, Oregon 97138

Phone: 503-739-0450
E-mail: kenul@pacifier.com

Subject: **Assumption of Geotechnical Engineer of Record**
Proposed Commercial Building – Bott's Marsh Development
Tax Lot 4800, West of Intersection of Highway 101 and Hemlock Street
Wheeler, Tillamook County, Oregon
EEI Report No. 20-010-1

Dear Mr. Ulbricht:

The purpose of this report is to confirm that **Earth Engineers, Inc. (EEI)** is taking over as the Geotechnical Engineer of Record (GER) from Chinook GeoServices, Inc. (CGI) for the project referenced above. We understand that CGI is no longer in business and is not able to act in the capacity of the GER. Our services are being conducted in accordance with EEI Proposal No. 20-P014 dated January 21, 2020, which you authorized by e-mail on January 27, 2020.

PROJECT DESCRIPTION

Our current understanding of the project is based on the information you provided during a meeting at EEI's office with Principal Geotechnical Engineer Troy Hull on January 17, 2020, as well as several documents provided to us by e-mail. Mr. Hull also spoke to Warren Krager, R.G., C.E.G. by telephone on January 17 to briefly discuss the project. Mr. Krager is the current Engineering Geologist on the project. Mr. Hull attempted to correspond by e-mail with Bob Grummel of Grummel Engineering (the Structural Engineer on the project) but has not hear back from him prior to submitting this proposal.

You provided us the following documents:

- **September 18, 2006 report by CGI to Mike Nelson of M.A.N. Developments titled "Geotechnical Engineering Evaluation Report, Proposed 92-Unit Townhome Development, Marine Drive, Wheeler, Tillamook County, Oregon, GCI Report No. 06-035-1.** Note that Mr. Hull of our firm assisted CGI with the preparation of that report. The report was stamped by Mr. Krager (the Engineering Geologist) and Ms. Marcella Boyer (the Geotechnical Engineer, who is now retired). We understand that you

obtained permission from Mr. Nelson to use the CGI report when you purchased the property from him.

- **November 28, 2018 structural calculations by Grummel Engineering titled "Bott's Marsh Development, Community Building."** The calculations include sheets 1, 2, 3, 37, 38 and 39 of 107.

- **November 29, 2018 drawing set by Grummel Engineering titled "Bott's Marsh Community Building, Wheeler, OR."** The drawing set includes sheets S0.0, S1.0, S1.1, S1.2, S1.3, S2.1, S2.2, S3.1, and S3.2.

- **October 11, 2019 drawing by Thomas Johnson Architect of Portland titled "Commercial Site, Residential Site, Wheeler, Oregon.**" This drawing (Figure 1 below) shows the location of the proposed commercial building you would like us to address (referred to as Future Retail/Seafood Processing – Apts.), as well as other future residential and hotel developments that are not addressed by this proposal.

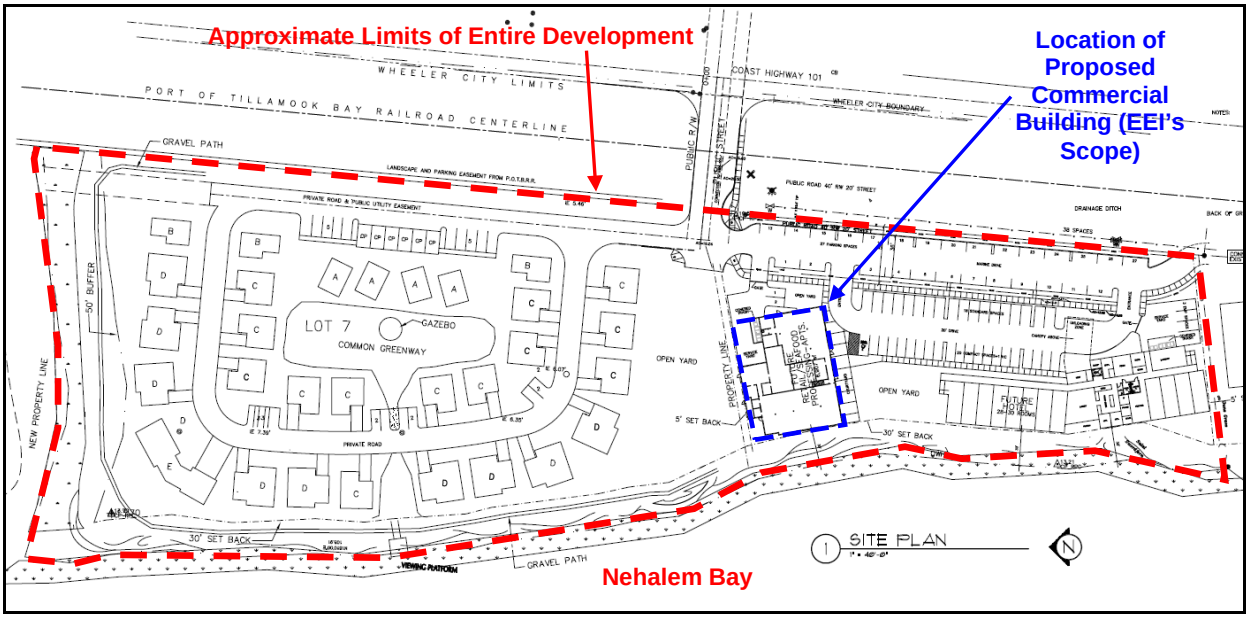


Figure 1: Site plan (base drawing source: October 11, 2019 drawing by Thomas Johnson Architect referenced above).

- **December 23, 2019 report addressed to you from Warren Krager, C.E.G. titled "Engineering Geologic Foundation Plan Review, Proposed Commercial Building, Tax Lot 4800, Map 2N 10W 025BC, Wheeler, Oregon."** Mr. Krager reviewed the Grummel Engineering design documents referenced above and indicated they generally conform to the design recommendations and limitations outlined in the CGI 2006 geotechnical report.

- **January 15, 2020 e-mail from you indicating that the City Manager for Wheeler requested the following: a letter report from an Oregon Registered Geotechnical Engineer confirming that the 2006 CGI report is still valid and that the**

Geotechnical Engineer of Record is willing to evaluate the site excavation during construction.

Briefly, we understand the project will consist of a new 2-story commercial building that has been structurally designed by Grummel Engineering. The design was based on a 2006 geotechnical report by CGI, who is no longer in business. The City is requiring confirmation that the 2006 geotechnical report used for the design is still applicable to use for the design. Since CGI is no longer available to act as the Geotechnical Engineer of Record, a new GER must be retained to provide the required information for the City. As such, EEI is being retained to perform this function.

The structural design calls for the entire building to be supported on a mat foundation. The mat was designed based on soil parameters provided in the 2006 CGI report. The mat is to be underlain by a layer of geofoam, which is being used as lightweight structural fill.

The structural drawings indicate the project has been designed in accordance with the 2014 Oregon Structural Specialty Code (OSSC). Note that on January 1, 2020, Oregon fully adopted the 2019 OSSC. As such, it is possible that the structural design may need to be amended to comply with the newer code.

SCOPE OF SERVICES

Our currently authorized scope of services includes the following:

1. Taking over as the GER. This includes reviewing the existing project documents listed above, and issuing this report. Our scope does not include performing any of our own subsurface explorations or visiting the site.

2. Performing the geotechnical special inspections, which include building pad subgrade preparation and structural fill placement and compaction (including lightweight foam blocks). The special inspection phase includes issuing the Geotechnical Final Summary Report as required by the building code, when construction is complete.

ASSUMPTION OF GER - REVIEW OF EXISTING DOCUMENTS

We have reviewed all of the documents listed above in the Project Description section. We noted the following:

1. We concur that the rigid, structural mat foundation option recommended in the CGI report is acceptable for supporting the proposed commercial building. And we concur that the mat foundation may be designed based on a vertical subgrade modulus of 43 kcf (i.e. approximately 25 pci).

2. We concur that unloading the building pad by replacing at least 2.5 feet of existing site soils with lightweight geofoam (i.e. EPS46), as recommended in the CGI report, is still an acceptable approach to reduce (but not eliminate) the risk of excessive building foundation settlement.

3. We concur that the proposed foundation design approach (rigid mat foundation underlain by at least 2.5 feet of lightweight foam block fill) will partially mitigate some of the potential total and differential static settlement associated with soil consolidation of the existing organic compressible soils. Over the life of the building, it is anticipated to experience excessive settlement (i.e. greater than 1 inch) and may require future maintenance or repairs to the settlement to address the settlement.

4. We concur that during a major seismic event, there could be excessive settlement and lateral spread. The mat foundation is not intended to fully mitigate potential structural damage due to an earthquake. The intent is limited to protecting life-safety.

5. We concur that the building is located within the tsunami inundation zone and could be damaged by a tsunami. We are not providing any mitigation recommendations and it should be assumed that the risk of catastrophic building damage and loss-of-life from a major tsunami is similar to other similar developed properties in Wheeler.

6. Sheet 3.1 of the Grummel Engineering drawings needs to be revised as follows. These are relatively minor edits to offer more clarity, and do not change the intent of the design.

    a. Detail 3 needs to note the compacted gravel thickness is 6 inches.
    b. Detail 4 needs to show that the shear wall footing will be supported on 2.5 feet of EPS46 geofoam underlain by at least 6 inches of compacted gravel.
    c. While the drawings do not indicate so, the geofoam needs to be supported on firm subgrade such that the gravel fill can be compacted to at least 95 percent. Where the subgrade is too soft to properly compact the gravel, it may need to be overexcavated and replaced with additional gravel fill. This will need to be determined by the Geotechnical Engineer's representative at the time of the construction inspections.

In conclusion, after reviewing the documents provided to us, EEI is willing to take over as the Geotechnical Engineer of Record for this project. Provided the building owner is willing to accept the greater than normal risks associated with constructing on highly compressible organic soils, on soils that are both liquefiable and will experience lateral spread during an earthquake, and within a tsunami inundation zone, the geotechnical engineering recommendations in the September 18, 2006 geotechnical report by CGI are still appropriate. We are also confirming that we have been retained to perform the geotechnical construction inspections as required by the City of Wheeler.

LIMITATIONS

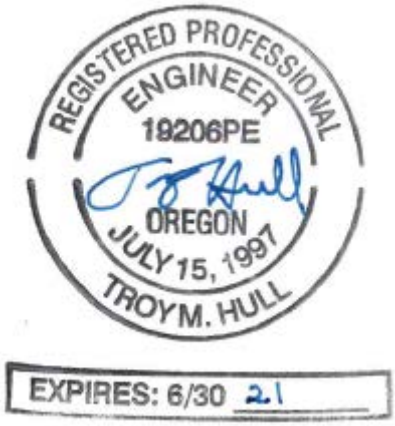
The geotechnical recommendations presented in this report are based on the available project information described in this report. If any of the noted information is incorrect, please inform EEI in writing so that we may amend the recommendations presented in this report if appropriate and if desired by the client. EEI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

As is standard practice in the geotechnical industry, the conclusions contained in our report are considered preliminary because they are based on assumptions made about the soil, rock, and groundwater conditions exposed at the site during GeoEngineers' subsurface investigation. A more complete extent of the actual subsurface conditions can only be identified when they are exposed during construction. Therefore, EEI must be retained as your consultant during construction to observe the actual conditions and to provide our final conclusions. If a different geotechnical consultant is retained to perform geotechnical inspection during construction then they must be relied upon to provide final design conclusions and recommendations, and must assume the role of geotechnical engineer of record. EEI is not willing to act as the GER if we are not also employed to perform the geotechnical construction inspections.

This report has been prepared for the exclusive use of Ken Ulbricht for the specific application to the proposed new Commercial Building located at Tax Lot 4800 in Wheeler, Tillamook County, Oregon. EEI does not authorize the use of the advice herein nor the reliance upon the report by third parties without prior written authorization by EEI.

If you have any questions pertaining to this report, please contact Troy Hull at 360-567-1806 (office) or 360-903-2784 (cell).

Sincerely,
Earth Engineers, Inc.



Troy Hull, P.E., G.E.
Principal Geotechnical Engineer

Report distribution (e-mailed copy only): Addressee