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Serving Oregon Geotechnical Design & Consulting Needs

Bud Shoemake
Port of Toledo
P.O. Box 428
Toledo, Oregon 97391

September 20, 2017

Re: Proposed Port Building
SW Alltree Lane
Toledo, Oregon

Subject: Preliminary Geotechnical Information
Project No. 001-17-01

Dear Mr. Shoemake:

This letter summarizes our observations of deeper foundation soils at the proposed building site at the Port of Toledo Boatyard facility on the Yaquina River and Alltree Lane in Toledo, Oregon. OGD previously completed geotechnical consulting at the site for improvements for the site grading. Our previous work was summarized in our letter dated May 16, 2016. We have included a summary of our more recent geotechnical exploration and preliminary design considerations for the new building planned at the site.

PROJECT INFORMATION

We understand that the currently proposed site improvements will include construction of a new building that will be used for boat repair and maintenance and will be accessed by the boat hoist at the facility. The structure will be a pre-engineered metal building that will include column supports. The structure is expected to be relatively light, but may include an overhead crane that would include heavier loads. The structure will include a slab on grade floor. We understand that the slab area will consist of a geogrid reinforced base section, similar to the boatyard, to support the large wheel loads associated with the boat hoist. The building area was several feet below the proposed finished elevation at the time of our exploration. The building foundations are expected to be supported by deep foundations, which will likely consist of driven steel piles. The slab area will be separate from the foundation structure to accommodate differential movement between the upper soils and deep foundations.

FIELD EXPLORATION

The field exploration focused on characterization of the deeper soils at the site that will be involved in the proposed building foundations. We visited the site on January 12, 2017 to complete the subsurface explorations. Mechanical issues with the drill rig required

terminating the boring at a depth of 41.5 feet and returning to the site on February 3 to complete a second boring. The approximate locations of the borings are shown on the attached Site Plan (Figure 1). The second boring extends to a depth of 66.5 feet. The borings were drilled using hollow stem auger drilling methods. Soil samples were obtained at regular intervals in conjunction with Standard Penetration Testing (SPT). A summary of the soil profile from each boring is provided on the summary boring logs attached as Figures B1 and B2.

SITE CONDITIONS

Surface Conditions:

The site is located between the toe of moderate to steep slopes associated with the hillside to the west and the slough to the east. The proposed building area is located in an area that has recently been filled several feet to raise site grades. There is also older fill present in the area that was used to facilitate access to the site. The entire building area will be constructed over existing fill material that is underlain by soft slough deposits. The recently relocated access road is present along the west side of the proposed building. The area to the south of the proposed building area includes the reinforced gravel section recently constructed to support the new boat hoist. The east side of the proposed building site includes a utility corridor adjacent to the top of the fill slope that includes moderate slopes down to the slough adjacent to the Yaquina River.

Subsurface Conditions:

Subsurface conditions were evaluated using the two borings. The approximate boring locations are shown on the attached Site Plan (Figure 1). Ground water is expected to be relatively shallow across the site due to the proximity to the river. Our exploration encountered water at depths of ±10 feet below existing site grades. More detailed summaries of subsurface conditions at each of the boring locations are attached to this letter. Subsurface conditions observed at the site as part of our field exploration included the following strata:

Fill.

The upper more recent fill material was encountered in each of the borings to depths that varied from ±3.5 to 4 feet below grade. The recent fill is typically underlain by a zone of older fill at the site. At BH-2 the exploration encountered the original access road to a depth of 5 feet below grade. The older fill typically transitions to a zone containing organic silt that likely represents the original topsoil materials in the area. The organic silt extends to depths of 8 to 10 feet below existing grades and is generally medium stiff.

Very Soft Silt and Clay.

The upper soils are underlain by a thick sequence of very soft silt and clay that contains some organics. The very soft silt and clay extends the full depth of the boring at BH-1. The very soft material extends to a depth of ±65 feet at BH-2, which is located closer to the moderate slopes to the west. Therefore, we anticipate that the soft materials may extend to greater depths over portions of the building footprint.

Stiff sandy Clay.

The very soft soils transition to stiff sandy clay, which represents decomposed bedrock that underlies the site. The depth to this stratum is expected to vary over the building footprint and is expected to be greater than the 65 foot depth observed at BH-2 for much of the building area. Deeper borings completed at other portions of the site suggest that the decomposed bedrock includes deep weathering and is the consistency of very stiff soil throughout the upper portion of the profile.

DISCUSION OF GEOTECHNICAL ISSUES

New Building Foundations:

The new building will require deep foundations to support the structure with limited settlement and reduce the risk of damage due to seismic movements. Based on the relatively deep, soft soil conditions encountered, we have recommended that driven steel piles be considered for support. We anticipate that displacement piles, such as closed ended pipe piles would be the most economical for the site. Details of the foundation layout and loads are not yet available. However, we anticipate that allowable axial pile capacities in the range of 130 kips to 250 kips will be adequate for the new structure. Therefore, we anticipate that pipe piles with diameters within the range of 12 to 24 inches would be used for the improvements. The piles are expected to develop capacity in end-bearing within the decomposed bedrock stratum, which is expected at depths of ±65 to 85 feet below the site. Pile penetration into the rock is difficult to predict and is expected to vary with location across the site. For preliminary design purposes, we have assumed that pile lengths of 85 to 100 feet may be required at the site. More detailed pile capacity analysis should be completed when preliminary foundation loads have been developed.

Settlement:

The proposed building will be constructed over soils that are expected to have variable compressibility and include organic materials. Existing fill material has been stockpiled over the site for several years. Therefore, some settlement has occurred. However, we anticipate that moderate settlements will be on-going at the site due to consolidation of the underlying soils. The building foundations will be supported on the underlying

decomposed bedrock. Therefore, differential settlement should be anticipated over the life of the structure between the building foundations and the slab. The slab will be supported over a geogrid reinforced aggregate base section, which is expected to assist in providing slab support and minimizing differential settlements.

Drainage:

The site grading requires relatively low slopes throughout the improvement area and the building will be surrounded by gravel surfaced or paved areas. A drainage system should be provided to capture roof drainage for the structure and transmit it to the storm system at the site.

LIMITATIONS OF THIS REPORT

The conclusions and discussion contained herein are based on the assumption that the soil conditions and ground water levels encountered in the test borings are representative of overall site conditions. The above discussion assumes that we will complete additional analysis and design recommendations during the building design. We will assume no responsibility or liability for any engineering judgment, inspection or testing performed by others.

Our work was performed for the exclusive use by the Port of Toledo and their design consultants for the proposed new building at the Toledo Boatyard on Alltree Lane in Toledo, Oregon. OGD performed our work in accordance with generally accepted professional geotechnical engineering practices in similar locations. Our services do not include any survey or assessment of potential contamination or contamination of the soil or ground water by hazardous or toxic substances. No other warranty, expressed or implied, is made.

Sincerely,

OGD Consulting, PC.

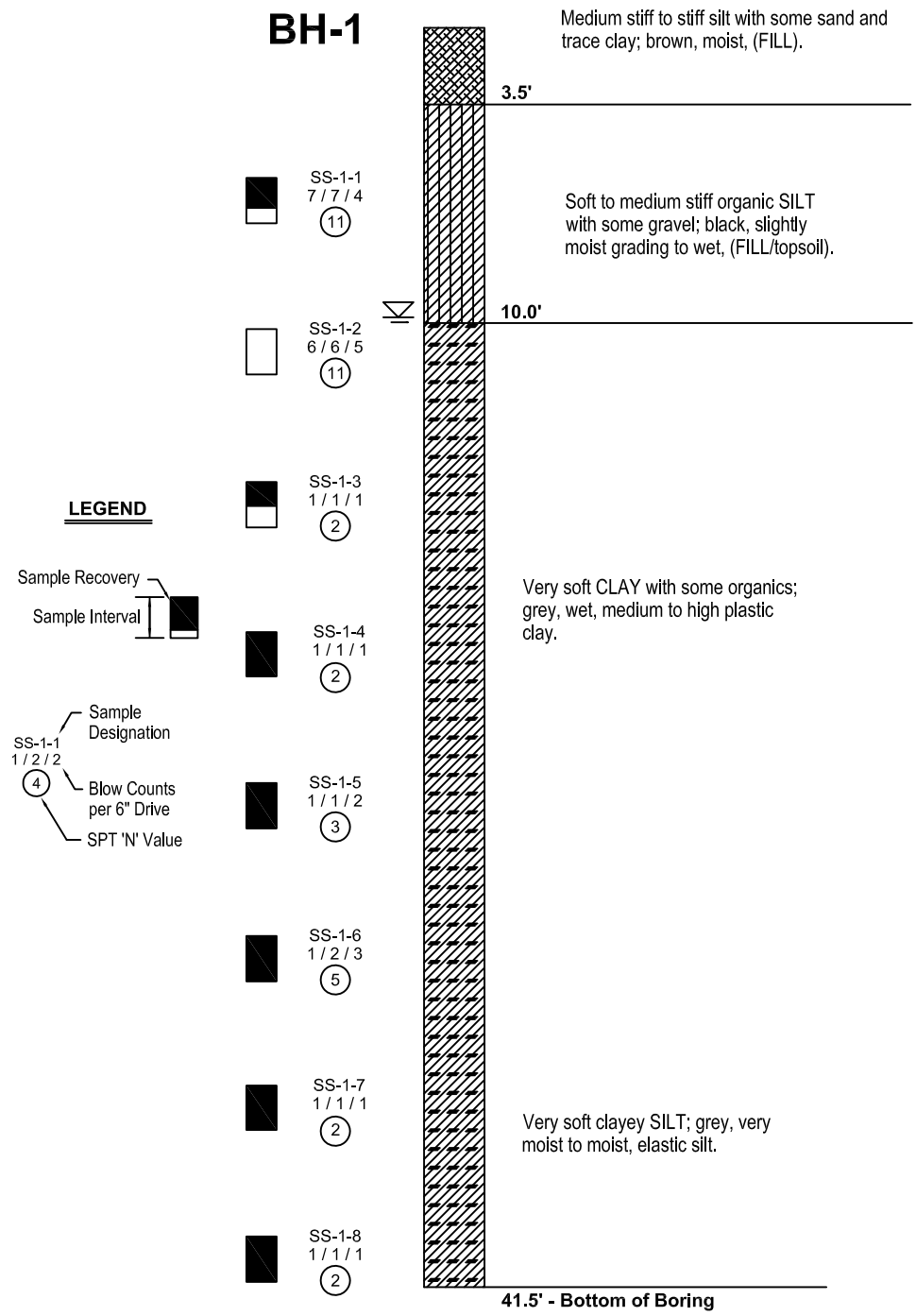
By: _____
Mel McCracken, P.E., President

Attachments:

Figure 1.	Site Plan
Figure B1.	Summary Boring Log BH-1
Figure B2.	Summary Boring Log BH-2

Figure 1. Site Plan

Proposed Building
Toledo Boatyard
Alltree Lane
Toledo, Oregon



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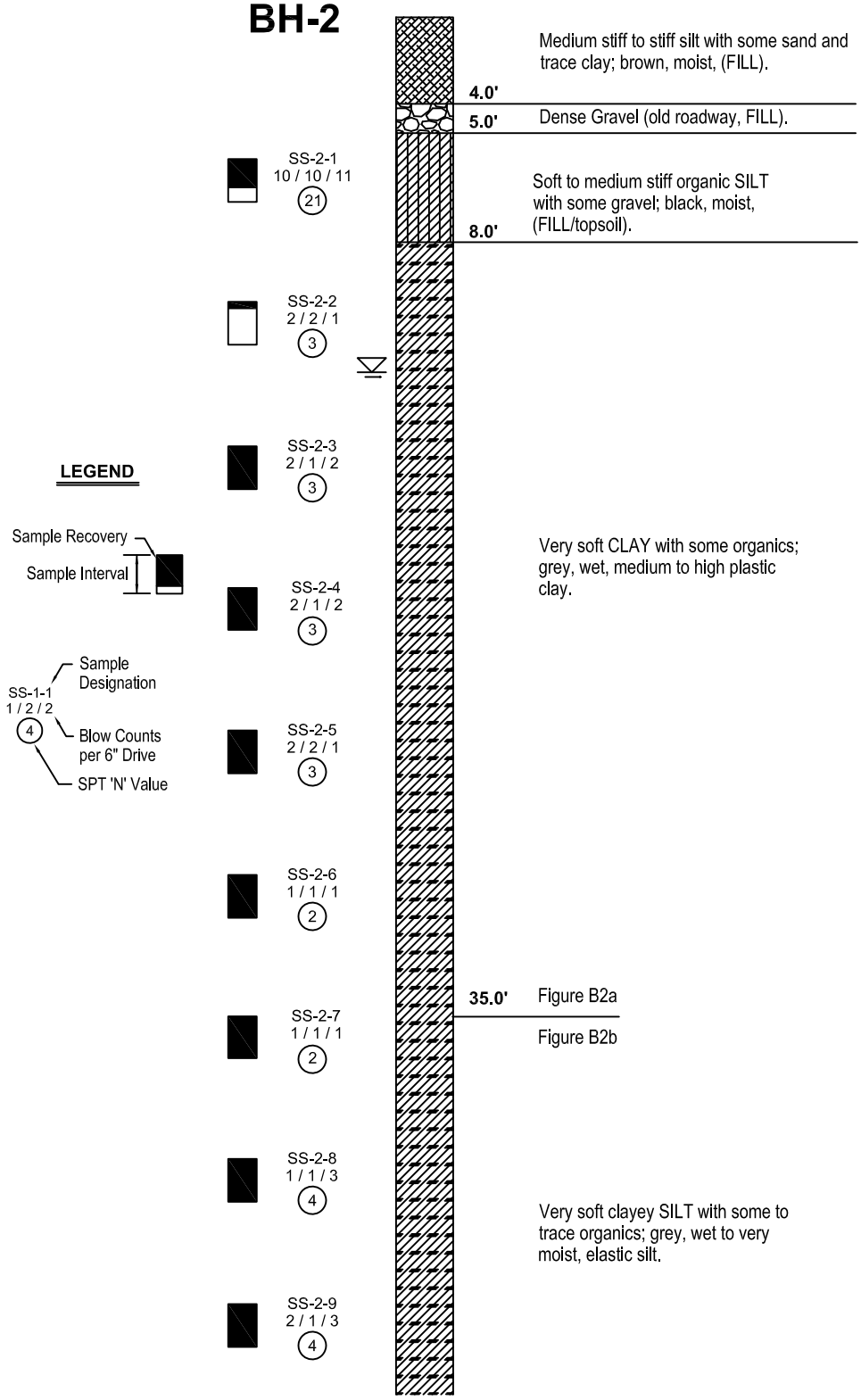
GEOTECHNICAL BORING BH-1
PROPOSED BUILDING
TOLEDO BOATYARD
TOLEDO, OREGON

FIGURE NO.
B1

BH-2



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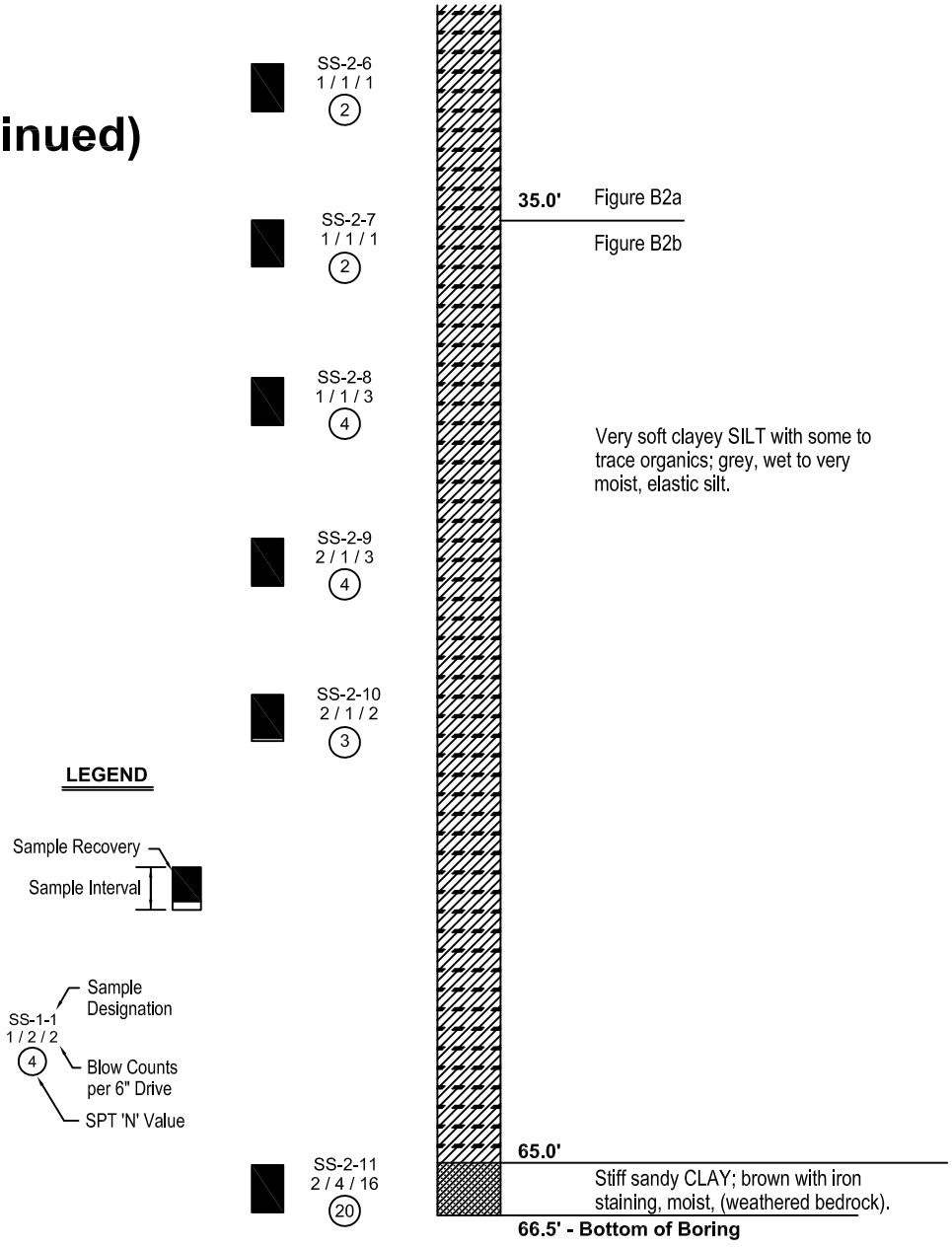
GEOTECHNICAL BORING BH-2
PROPOSED BUILDING
TOLEDO BOATYARD
TOLEDO, OREGON

FIGURE NO.
B2a

BH-2 (continued)



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GEOTECHNICAL BORING BH-2
PROPOSED BUILDING
TOLEDO BOATYARD
TOLEDO, OREGON

FIGURE NO.
B2b