



November 18, 2022

Madison Johnson  
Seaborn Pile Driving  
1080 West Ewing Street  
Seattle, Washington 98119

**RE:           Rockery Recommendations  
              Helms Residence  
              7234 West Ridge Road  
              Mercer Island, Washington 98040  
              RGI Project No. 2022-631-1**

Dear Ms. Johnson:

The Riley Group, Inc. (RGI) is pleased to present our recommendations for constructing a new rockery at the above-referenced site. On November 9, 2022, RGI observed the site condition and performed subsurface exploration by advancing three borings using a hand auger in the proposed rockery area. The boring locations are shown on Figure 2. The following presents our findings of the soil conditions and recommendations for the proposed project.

#### **PROJECT DESCRIPTION**

RGI understands that the owner plans to remove 51 feet of existing rockery and build a new rockery about 63 feet long and 8 to 12 feet tall. The new rockery will be 13 feet to the east of the existing rockery. A geotechnical engineering report (GER) will be needed for the project. Our understanding of the project is based on site plans prepared by Seaborn Pile Driving dated September 23, 2022.

An RGI geologist visited the site on November 9, 2022 and observed the existing shoreline condition. Based on our observations, the project is feasible from a geotechnical standpoint.

#### **SOIL AND GROUNDWATER CONDITION**

The soils encountered during field exploration include up to 3.5 feet of fill comprised of loose to medium dense silty sand with some gravel and silty sand over native deposits of loose to medium dense sand with some silt and gravel, gravelly sand with some silt, and silty sand with trace gravel, and stiff silt with some sand.

Groundwater was not encountered to the maximum exploration depth of seven feet below ground surface. More detailed descriptions of the subsurface conditions encountered are presented in the attached logs. Sieve analysis was performed on three selected soil samples. The grain size distribution curve are included.

#### **GEOTECHNICAL RECOMMENDATIONS**

##### **Rockery**

A rockery is not intended to function as an engineered structure to resist lateral earth pressures as a retaining wall. The primary function of a rockery is to provide stability and erosion control. The amount of support obtained will depend on a large extent on the quality of the workmanship,

size, shape of the rocks used, and drainage behind it. A critical factor in rockery construction is the quality of the rock material used. Rock for use in rockery should be cubical, rectangular, or tubular in shape with the longest dimension not exceeding three times the width. The rocks recycled from existing rockery may be used if meeting the requirement. Additional rocks may need to be imported. The rock bulkhead should be constructed by an experienced rockery contractor in accordance with Associated Rockery Contractors (ARC) guidelines.

We recommended that limiting the rockery height to 12 feet placed along the native medium dense soil. RGI recommends that the rockery construction be performed in sections no more 25 feet each time. The excavation, rockery installation, and backfill should be performed within the same day. A general rockery section detail is included on Figure 3.

The following sections of the report provide general recommendations related to erosion and sediment control, excavations, structural fill, and backfill compaction.

### **Erosion and Sediment Control**

Potential sources or causes of erosion and sedimentation depend on construction methods, slope length and gradient, amount of soil exposed and/or disturbed, soil type, construction sequencing and weather. The impacts on erosion-prone areas can be reduced by implementing an erosion and sedimentation control plan. The plan should be designed in accordance with applicable city and/or county standards.

RGI recommends the following erosion control Best Management Practices (BMPs):

- Scheduling site preparation and grading for the drier summer and early fall months and undertaking activities that expose soil during periods of little or no rainfall
- Establishing a quarry spall construction entrance
- Installing siltation control fencing or anchored straw or coir wattles on the downhill side of work areas
- Covering soil stockpiles with anchored plastic sheeting
- Revegetating or mulching exposed soils with a minimum 3-inch thickness of straw if surfaces will be left undisturbed for more than one day during wet weather or one week in dry weather
- Directing runoff away from exposed soils and slopes
- Minimizing the length and steepness of slopes with exposed soils and cover excavation surfaces with anchored plastic sheeting (Graded and disturbed slopes should be tracked in place with the equipment running perpendicular to the slope contours so that the track marks provide a texture to help resist erosion and channeling. Some sloughing and raveling of slopes with exposed or disturbed soil should be expected.)
- Decreasing runoff velocities with check dams, straw bales or coir wattles
- Confining sediment to the project site
- Inspecting and maintaining erosion and sediment control measures frequently (The contractor should be aware that inspection and maintenance of erosion control BMPs is critical toward their satisfactory performance. Repair and/or replacement of dysfunctional erosion control elements should be anticipated.)

Permanent erosion protection should be provided by reestablishing vegetation using hydroseeding and/or landscape planting. Until the permanent erosion protection is established, site monitoring should be performed by qualified personnel to evaluate the effectiveness of the erosion control measures. Provisions for modifications to the erosion control system based on monitoring observations should be included in the erosion and sedimentation control plan.

**Excavations**

All temporary cut slopes associated with the site and utility excavations should be adequately inclined to prevent sloughing and collapse. Based on OSHA regulations, the native soil classifies as a Group B soil. Accordingly, for excavations more than 4 feet but less than 20 feet in depth, the temporary side slopes should be laid back with a minimum slope inclination of 1-1/2H:1V (Horizontal:Vertical).

In all cases, however, appropriate inclinations will depend on the actual soil and groundwater conditions encountered during earthwork. Ultimately, the site contractor must be responsible for maintaining safe excavation slopes that comply with applicable OSHA or WISHA guidelines.

**Structural Fill**

The native soil encountered is suitable for re-use as structural fill if the moisture can be property controlled. If the construction occurs in wet weather, RGI recommends import structural fill be used for all grading and backfill. The import material must meet the grading requirements listed in Table 1 in order to be used as structural fill.

**Table 1 Structural Fill Gradation**

| U.S. Sieve Size | Percent Passing |
|-----------------|-----------------|
| 3 inches        | 100             |
| No. 4 sieve     | 75 percent      |
| No. 200 sieve   | 5 percent *     |

\*Based on minus 3/4 inch fraction.

Prior to use, an RGI representative should observe and test all materials imported to the site for use as structural fill. Structural fill materials should be placed in uniform loose layers not exceeding 12 inches and compacted as specified in Table 1. The soil’s maximum density and optimum moisture should be determined by American Society of Testing and Materials D1557-09 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (ASTM D1557).



**Table 2 Structural Fill Compaction ASTM D1557**

| Location                | Material Type                                     | Minimum Compaction Percentage | Moisture Content Range |    |
|-------------------------|---|-------------------------------|------------------------|----|
| Foundations             | On-site granular or approved imported fill soils: | 95                            | +2                     | -2 |
| Retaining Wall Backfill | On-site granular or approved imported fill soils: | 92                            | +2                     | -2 |

Placement and compaction of structural fill should be observed by RGI. A representative number of in-place density tests should be performed as the fill is being placed to confirm that the recommended level of compaction is achieved.

**ADDITIONAL SERVICES**

RGI is available to provide further geotechnical consultation throughout the design phase of the project. RGI should review the final design and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and incorporated into project design and construction.

RGI is also available to provide geotechnical engineering and construction monitoring services during construction. The integrity of the earthwork and construction depends on proper site preparation and procedures. In addition, engineering decisions may arise in the field in the event that variations in subsurface conditions become apparent. Construction monitoring services are not part of this scope of work. If these services are desired, please let us know and we will prepare a cost proposal.

**LIMITATIONS**

This letter is the property of RGI, Seaborn Pile Driving, and its designated agents. Within the limits of the scope and budget, this letter was prepared in accordance with generally accepted geotechnical engineering practices in the area at the time this letter was issued. This letter is intended for specific application to the Helms Residence project in Mercer Island, Washington, and for the exclusive use of Seaborn Pile Driving and its authorized representatives. No other warranty, expressed or implied, is made. Site safety, excavation support, and dewatering requirements are the responsibility of others.

The scope of services for this project does not include either specifically or by implication any environmental or biological (for example, mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, we can provide a proposal for these services.

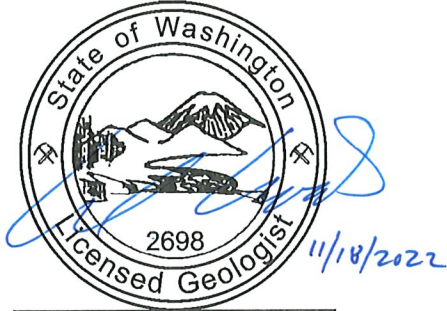
The analyses and recommendations presented in this letter are based upon data obtained from reviewing the explorations completed by others on the site. Variations in soil conditions can occur, the nature and extent of which may not become evident until construction. If variations appear evident, RGI should be requested to reevaluate the recommendations in this letter prior to proceeding with construction.



We trust the information presented is sufficient for your current needs. If you have any questions regarding this letter report or require additional information, please call us at (425) 415-0551.

Sincerely yours,

THE RILEY GROUP, INC.



**ERIC L. WOODS**

Eric L. Woods, LG  
Project Geologist



Ricky R. Wang, PhD, PE  
Principal Engineer

- Attachments:
- Figure 1 Site Vicinity Map
  - Figure 2 Geotechnical Exploration Plan
  - Figure 3 Typical Rockery Section
  - Hand Auger Boring Logs and Grainsize Analysis



USGS, 2020, Mercer Island, Washington  
 USGS, 2020, South Seattle, Washington  
 7.5-Minute Quadrangle

Approximate Scale: 1"=1000'



Corporate Office  
 17522 Bothell Way Northeast  
 Bothell, Washington 98011  
 Phone: 425.415.0551  
 Fax: 425.415.0311

RGI Project Number:  
 2022-631-1

Helms Residence  
 Site Vicinity Map

Figure 1  
 Date Drawn:  
 11/2022

Address: 7234 West Ridge Road, Mercer Island, Washington 98040

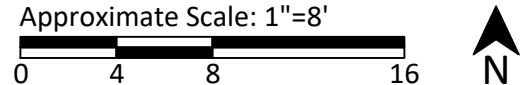
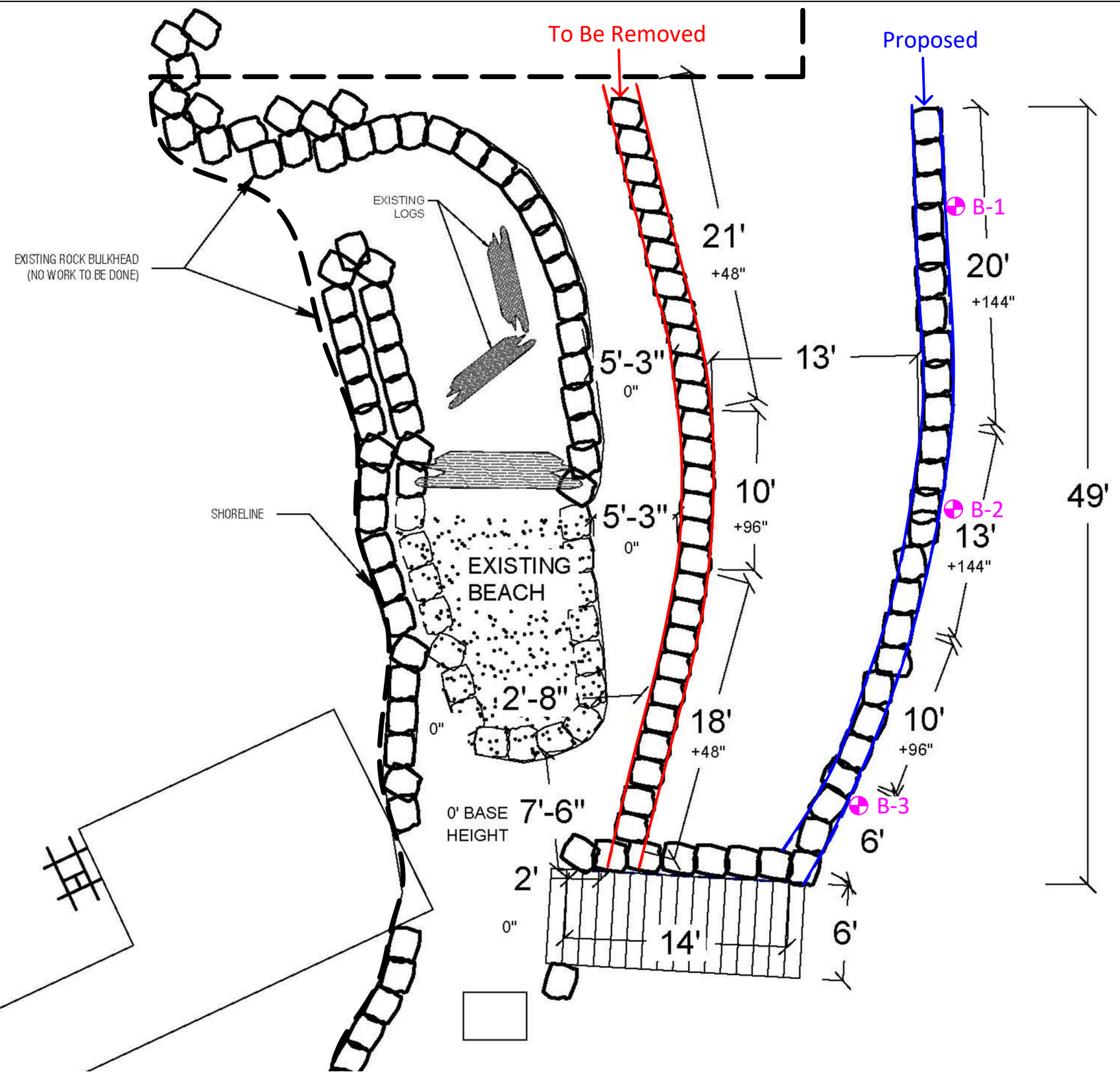


(51) LNFT OF RETAINING WALL TO BE REMOVED  
 (188.75) CUYD OF SOIL TO BE REMOVED

PROPOSED RETAINING WALL:

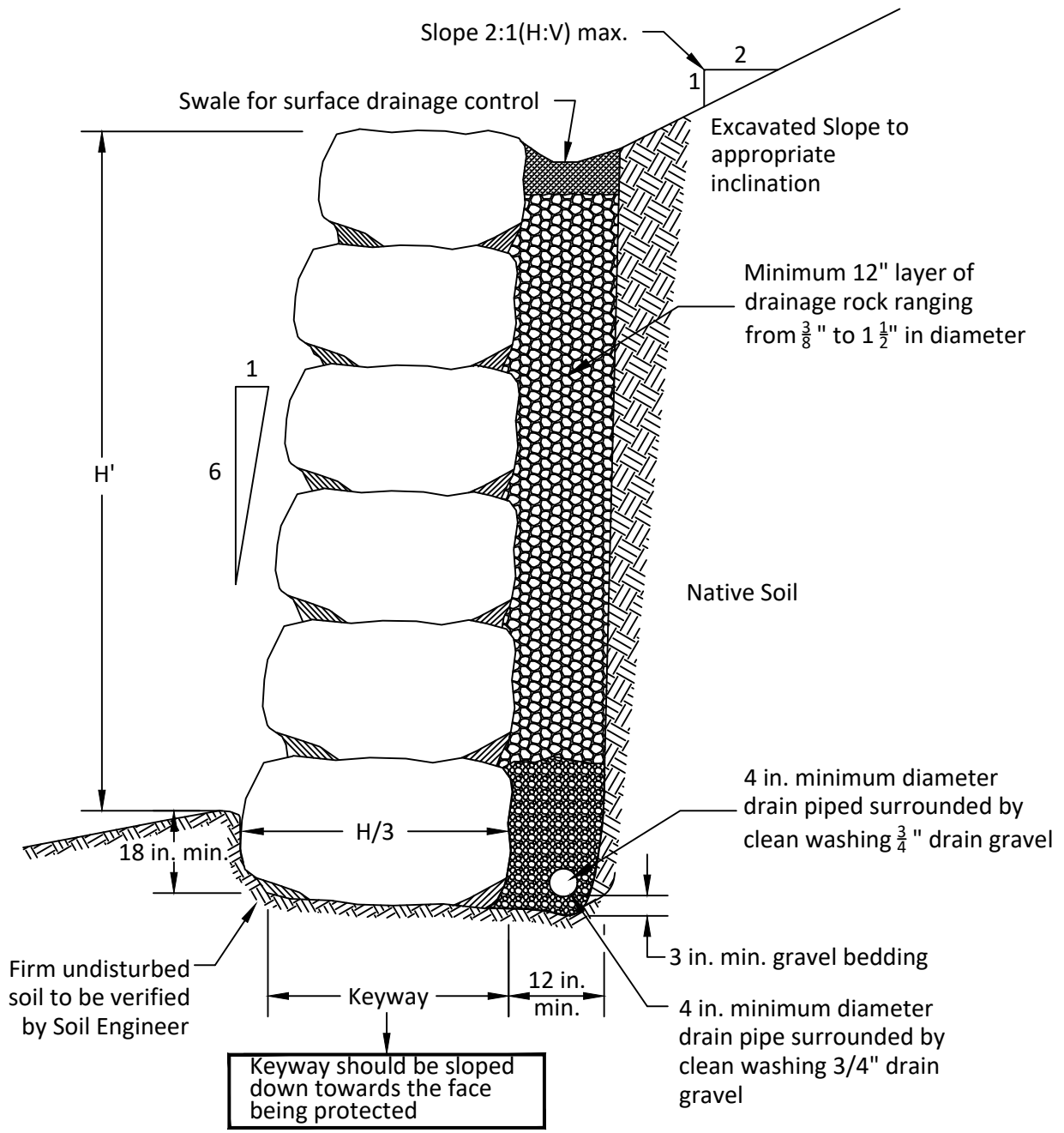
(64) LNFT OF RETAINING WALL TO BE INSTALLED

15' WATER DEPTH



⊕ = Hand auger by RGI, 11/09/2022  
 --- = Site boundary

|   |  |                               |          |
|---|--|-------------------------------|----------|
| <p>Corporate Office<br/>         17522 Bothell Way Northeast<br/>         Bothell, Washington 98011<br/>         Phone: 425.415.0551<br/>         Fax: 425.415.0311</p> | Helms Residence  |                               | Figure 2 |
|   | RGI Project Number:<br>2022-631-1                              | Geotechnical Exploration Plan |          |
|   | Address: 7234 West Ridge Road, Mercer Island, Washington 98040 |                               |          |



Not to Scale



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 17522 Bothell Way Northeast  
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|  |                        |                        |
|--|------------------------|------------------------|
| Helms Residence  |                        | Figure 3               |
| RGI Project Number:<br>2022-631-1                              | Rockery Section Detail | Date Drawn:<br>11/2022 |
| Address: 7234 West Ridge Road, Mercer Island, Washington 98040 |                        |                        |



Project Name: **Helms Residence**

Project Number: **2022-631-1**

Client: **Seaborn Pile Driving**



Hand Auger No.: **HA-1**

Sheet 1 of 1

|   |  |  |
|---|--|--|
| Date(s) Drilled: <b>11/9/2022</b>         | Logged By: <b>ELW</b>  | Surface Conditions: <b>Grass</b>           |
| Drilling Method(s): <b>Hand Auger</b>     | Drill Bit Size/Type: <b>2.25"</b>                                | Total Depth of Borehole: <b>2 feet bgs</b> |
| Drill Rig Type: <b>N/A</b>                | Drilling Contractor: <b>N/A</b>                                  | Approximate Surface Elevation: <b>N/A</b>  |
| Groundwater Level: <b>Not Encountered</b> | Sampling Method(s): <b>Auger</b>                                 | Hammer Data : <b>N/A</b>                   |
| Borehole Backfill: <b>Cuttings</b>        | Location: <b>7234 West Ridge Road, Mercer Island, Washington</b> |  |

| Elevation (feet) | Depth (feet) | Sample Type | Sample ID | Sampling Resistance, blows/ft | Recovery (%) | USCS Symbol | Graphic Log | MATERIAL DESCRIPTION   | Moisture (%) |
|------------------|--------------|-------------|-----------|-------------------------------|--------------|-------------|-------------|--|--------------|
| 0                | 0            |             |           |                               |              | TPSL        |             | 4" topsoil   |              |
|                  |              |             |           |                               |              | Fill        |             | Brown silty SAND with some gravel, loose to medium dense, dry to moist (Fill)<br>Occasional cobble |              |
|                  | 2            |             |           |                               |              |             |             | Hand auger terminated at 2 feet due to cobbles   | 5            |
| 3                | 3            |             |           |                               |              |             |             |  |              |
| 4                | 4            |             |           |                               |              |             |             |  |              |
| 5                | 5            |             |           |                               |              |             |             |  |              |
| 6                | 6            |             |           |                               |              |             |             |  |              |
| 7                | 7            |             |           |                               |              |             |             |  |              |

Project Name: **Helms Residence**

Project Number: **2022-631-1**

Client: **Seaborn Pile Driving**



Hand Auger No.: **HA-2**

Sheet 1 of 1

|   |  |  |
|---|--|--|
| Date(s) Drilled: <b>11/9/2022</b>         | Logged By: <b>ELW</b>  | Surface Conditions: <b>Grass</b>           |
| Drilling Method(s): <b>Hand Auger</b>     | Drill Bit Size/Type: <b>2.25"</b>                                | Total Depth of Borehole: <b>7 feet bgs</b> |
| Drill Rig Type: <b>N/A</b>                | Drilling Contractor: <b>N/A</b>                                  | Approximate Surface Elevation: <b>N/A</b>  |
| Groundwater Level: <b>Not Encountered</b> | Sampling Method(s): <b>Auger</b>                                 | Hammer Data : <b>N/A</b>                   |
| Borehole Backfill: <b>Cuttings</b>        | Location: <b>7234 West Ridge Road, Mercer Island, Washington</b> |  |

| Elevation (feet) | Depth (feet) | Sample Type | Sample ID | Sampling Resistance, blows/ft | Recovery (%) | USCS Symbol | Graphic Log | MATERIAL DESCRIPTION   | Moisture (%) |
|------------------|--------------|-------------|-----------|-------------------------------|--------------|-------------|-------------|--|--------------|
| 0                | 0            |             |           |                               |              | TPSL        |             | 4" topsoil   |              |
|                  |              |             |           |                               |              | Fill        |             | Brown silty SAND with some gravel, loose to medium dense, moist (Fill)   |              |
|                  | 1            |             |           |                               |              |             |             |  |              |
|                  | 2            |             |           |                               |              |             |             |  |              |
|                  | 3            |             |           |                               |              |             |             |  |              |
|                  | 4            |             |           |                               |              | SM          |             | Reddish brown SAND with some silt and gravel, loose to medium dense, moist<br>9% fines<br>Becomes gray, moist to wet | 11           |
|                  | 5            |             |           |                               |              | ML          |             | Gray mottled SILT with some sand, stiff, moist<br>80% fines  | 22           |
|                  | 6            |             |           |                               |              | SP-SM       |             | Gray gravelly SAND with some silt, medium dense, moist   | 14           |
|                  | 7            |             |           |                               |              |             |             | Hand Auger terminated at 7'  |              |

Project Name: **Helms Residence**

Project Number: **2022-631-1**

Client: **Seaborn Pile Driving**



Hand Auger No.: **HA-3**

Sheet 1 of 1

|   |  |  |
|---|--|--|
| Date(s) Drilled: <b>11/9/2022</b>         | Logged By: <b>ELW</b>  | Surface Conditions: <b>Grass</b>           |
| Drilling Method(s): <b>Hand Auger</b>     | Drill Bit Size/Type: <b>2.25"</b>                                | Total Depth of Borehole: <b>4 feet bgs</b> |
| Drill Rig Type: <b>N/A</b>                | Drilling Contractor: <b>N/A</b>                                  | Approximate Surface Elevation: <b>N/A</b>  |
| Groundwater Level: <b>Not Encountered</b> | Sampling Method(s): <b>Auger</b>                                 | Hammer Data : <b>N/A</b>                   |
| Borehole Backfill: <b>Cuttings</b>        | Location: <b>7234 West Ridge Road, Mercer Island, Washington</b> |  |

| Elevation (feet) | Depth (feet) | Sample Type | Sample ID | Sampling Resistance, blows/ft | Recovery (%) | USCS Symbol | Graphic Log | MATERIAL DESCRIPTION   | Moisture (%) |
|------------------|--------------|-------------|-----------|-------------------------------|--------------|-------------|-------------|--|--------------|
| 0                | 0            |             |           |                               |              | TPSL        |             | 4" topsoil   |              |
|                  |              |             |           |                               |              | Fill        |             | Brown silty SAND, loose, moist (Fill)  |              |
|                  | 1            |             |           |                               |              |             |             |  |              |
|                  | 2            |             |           |                               |              | SM          |             | Reddish brown silty SAND with trace gravel, medium dense, moist<br>24% fines | 14           |
|                  | 3            |             |           |                               |              |             |             | Becomes gray, loose to medium dense, wet                                     | 21           |
|                  | 4            |             |           |                               |              |             |             | Hand Auger terminated at 4 feet due to rock obstruction.                     |              |
|                  | 5            |             |           |                               |              |             |             |  |              |
|                  | 6            |             |           |                               |              |             |             |  |              |
|                  | 7            |             |           |                               |              |             |             |  |              |

Project Name: **Helms Residence**

Project Number: **2022-631-1**

Client: **Seaborn Pile Driving**



**Key to Log of Boring  
Sheet 1 of 1**

| Elevation (feet) | Depth (feet) | Sample Type | Sample ID | Sampling Resistance, blows/ft | Recovery (%) | USCS Symbol | Graphic Log | MATERIAL DESCRIPTION | Moisture (%) |
|------------------|--------------|-------------|-----------|-------------------------------|--------------|-------------|-------------|----------------------|--------------|
| 1                | 2            | 3           | 4         | 5                             | 6            | 7           | 8           | 9                    | 10           |

**COLUMN DESCRIPTIONS**

- 1** Elevation (feet): Elevation (MSL, feet).
- 2** Depth (feet): Depth in feet below the ground surface.
- 3** Sample Type: Type of soil sample collected at the depth interval shown.
- 4** Sample ID: Sample identification number.
- 5** Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
- 6** Recovery (%): Core Recovery Percentage is determined based on a ratio of the length of core sample recovered compared to the cored interval length.
- 7** USCS Symbol: USCS symbol of the subsurface material.
- 8** Graphic Log: Graphic depiction of the subsurface material encountered.
- 9** MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
- 10** Moisture (%): Moisture, expressed as a water content.

**FIELD AND LABORATORY TEST ABBREVIATIONS**

- CHEM: Chemical tests to assess corrosivity
- COMP: Compaction test
- CONS: One-dimensional consolidation test
- LL: Liquid Limit, percent
- PI: Plasticity Index, percent
- SA: Sieve analysis (percent passing No. 200 Sieve)
- UC: Unconfined compressive strength test, Qu, in ksf
- WA: Wash sieve (percent passing No. 200 Sieve)

**MATERIAL GRAPHIC SYMBOLS**

- AF
- SILT, SILT w/SAND, SANDY SILT (ML)
- Silty SAND (SM)
- Poorly graded SAND with Silt (SP-SM)
- Topsoil

**TYPICAL SAMPLER GRAPHIC SYMBOLS**

- Auger sampler
- Bulk Sample
- 3-inch-OD California w/ brass rings
- CME Sampler
- Grab Sample
- 2.5-inch-OD Modified California w/ brass liners

**OTHER GRAPHIC SYMBOLS**

- Water level (at time of drilling, ATD)
- Water level (after waiting)
- Minor change in material properties within a stratum
- Inferred/gradational contact between strata
- Queried contact between strata

**GENERAL NOTES**

- 1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
- 2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

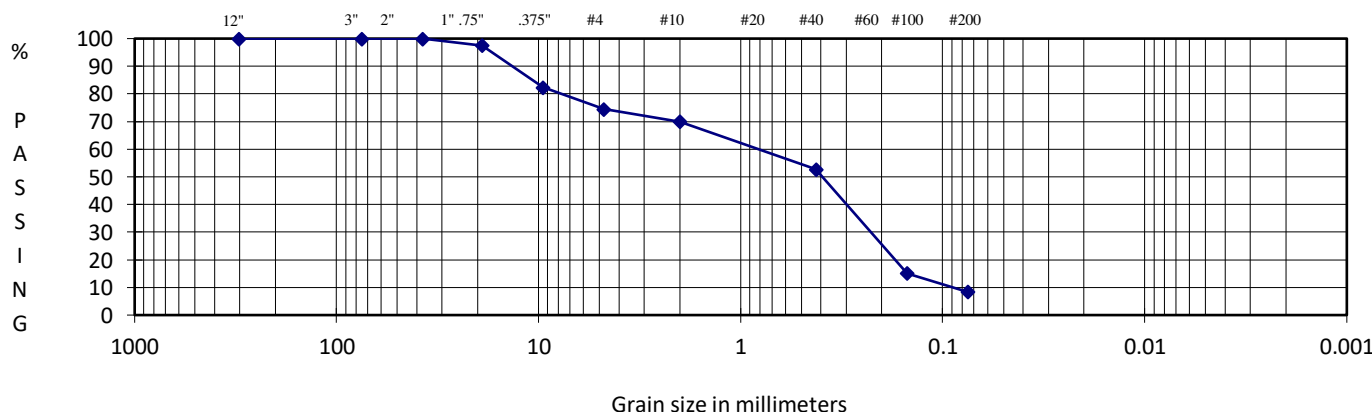
**GRAIN SIZE ANALYSIS**  
**ASTM D421, D422, D1140, D2487, D6913**

|                |                 |                |           |
|----------------|-----------------|----------------|-----------|
| PROJECT TITLE  | Helms Residence | SAMPLE ID/TYPE | HA-2      |
| PROJECT NO.    | 2022-631-1      | SAMPLE DEPTH   | 4'        |
| TECH/TEST DATE | CM 11/15/2022   | DATE RECEIVED  | 11/9/2022 |

|   |            |  |       |
|---|------------|--|-------|
| <b>WATER CONTENT (Delivered Moisture)</b> |            | Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture |       |
| Wt Wet Soil & Tare (gm)                   | (w1) 483.6 | Weight Of Sample (gm)  | 436.4 |
| Wt Dry Soil & Tare (gm)                   | (w2) 436.4 | Tare Weight (gm)   | 15.9  |
| Weight of Tare (gm)                       | (w3) 15.9  | (w6) Total Dry Weight (gm)   | 420.5 |

|                         |                  |                       |                   |
|-------------------------|------------------|-----------------------|-------------------|
| Weight of Water (gm)    | (w4=w1-w2) 47.2  | <b>SIEVE ANALYSIS</b> |                   |
| Weight of Dry Soil (gm) | (w5=w2-w3) 420.5 | Cumulative            |                   |
| Moisture Content (%)    | (w4/w5)*100 11   | Wt Ret                | (Wt-Tare)         |
|                         |                  | +Tare                 | {(wt ret/w6)*100} |
|                         |                  |                       | % PASS            |
|                         |                  |                       | (100-%ret)        |

|            |       |        |       |        |        |        |               |
|------------|-------|--------|-------|--------|--------|--------|---------------|
| % COBBLES  | 0.0   | 12.0"  | 15.9  | 0.00   | 0.00   | 100.00 | cobbles       |
| % C GRAVEL | 2.4   | 3.0"   | 15.9  | 0.00   | 0.00   | 100.00 | coarse gravel |
| % F GRAVEL | 23.0  | 2.5"   |       |        |        |        | coarse gravel |
| % C SAND   | 4.6   | 2.0"   |       |        |        |        | coarse gravel |
| % M SAND   | 17.2  | 1.5"   | 15.9  | 0.00   | 0.00   | 100.00 | coarse gravel |
| % F SAND   | 44.3  | 1.0"   |       |        |        |        | coarse gravel |
| % FINES    | 8.5   | 0.75"  | 26.2  | 10.30  | 2.45   | 97.55  | fine gravel   |
| % TOTAL    | 100.0 | 0.50"  |       |        |        |        | fine gravel   |
| D10 (mm)   | 0.09  | 0.375" | 90.2  | 74.30  | 17.67  | 82.33  | fine gravel   |
| D30 (mm)   | 0.23  | #4     | 123.0 | 107.10 | 25.47  | 74.53  | coarse sand   |
| D60 (mm)   | 0.8   | #10    | 142.2 | 126.30 | 30.04  | 69.96  | medium sand   |
| Cu         | 8.9   | #20    |       |        |        |        | medium sand   |
| Cc         | 0.7   | #40    | 214.5 | 198.60 | 47.23  | 52.77  | fine sand     |
|            |       | #60    |       |        |        |        | fine sand     |
|            |       | #100   | 373.1 | 357.20 | 84.95  | 15.05  | fine sand     |
|            |       | #200   | 400.7 | 384.80 | 91.51  | 8.49   | finer         |
|            |       | PAN    | 436.4 | 420.50 | 100.00 | 0.00   | silt/clay     |



DESCRIPTION: SAND with some silt and gravel  
 USCS: SP-SM

Prepared For:  
 Seaborn Pile Driving

Reviewed By:  
 ELW



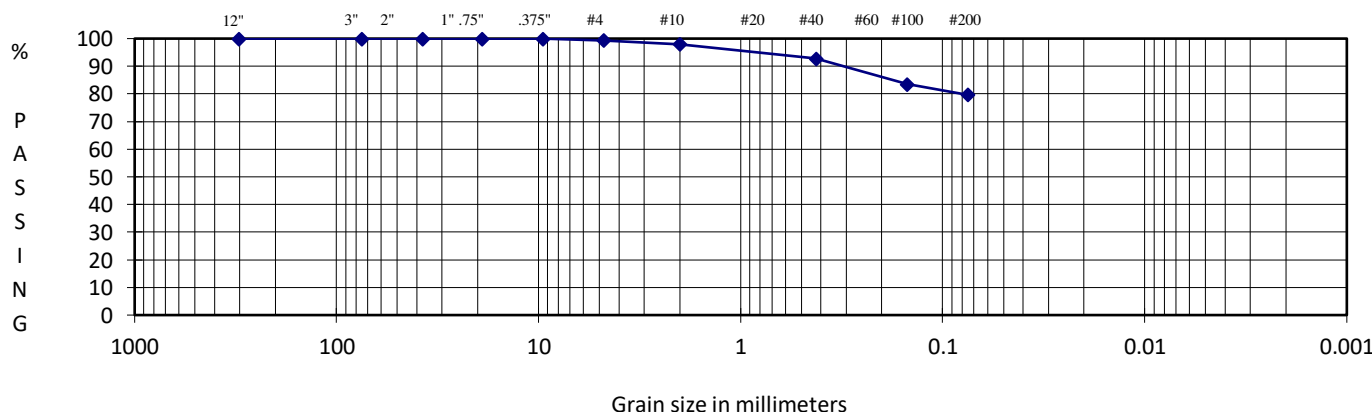
**GRAIN SIZE ANALYSIS**  
**ASTM D421, D422, D1140, D2487, D6913**

|                |                 |                |           |
|----------------|-----------------|----------------|-----------|
| PROJECT TITLE  | Helms Residence | SAMPLE ID/TYPE | HA-2      |
| PROJECT NO.    | 2022-631-1      | SAMPLE DEPTH   | 5'        |
| TECH/TEST DATE | CM 11/15/2022   | DATE RECEIVED  | 11/9/2022 |

|   |            |  |       |
|---|------------|--|-------|
| <b>WATER CONTENT (Delivered Moisture)</b> |            | Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture |       |
| Wt Wet Soil & Tare (gm)                   | (w1) 446.2 | Weight Of Sample (gm)  | 368.3 |
| Wt Dry Soil & Tare (gm)                   | (w2) 368.3 | Tare Weight (gm)   | 16.0  |
| Weight of Tare (gm)                       | (w3) 16.0  | (w6) Total Dry Weight (gm)   | 352.3 |

|                         |                  |                       |                           |
|-------------------------|------------------|-----------------------|---------------------------|
| Weight of Water (gm)    | (w4=w1-w2) 77.9  | <b>SIEVE ANALYSIS</b> |                           |
| Weight of Dry Soil (gm) | (w5=w2-w3) 352.3 | Cumulative            |                           |
| Moisture Content (%)    | (w4/w5)*100 22   | Wt Ret +Tare          | (Wt-Tare) (wt ret/w6)*100 |
|                         |                  | (%Retained)           | % PASS (100-%ret)         |

|            |       |        |       |        |        |        |               |
|------------|-------|--------|-------|--------|--------|--------|---------------|
| % COBBLES  | 0.0   | 12.0"  | 16.0  | 0.00   | 0.00   | 100.00 | cobbles       |
| % C GRAVEL | 0.0   | 3.0"   | 16.0  | 0.00   | 0.00   | 100.00 | coarse gravel |
| % F GRAVEL | 0.6   | 2.5"   |       |        |        |        | coarse gravel |
| % C SAND   | 1.5   | 2.0"   |       |        |        |        | coarse gravel |
| % M SAND   | 5.2   | 1.5"   | 16.0  | 0.00   | 0.00   | 100.00 | coarse gravel |
| % F SAND   | 13.0  | 1.0"   |       |        |        |        | coarse gravel |
| % FINES    | 79.8  | 0.75"  | 16.0  | 0.00   | 0.00   | 100.00 | fine gravel   |
| % TOTAL    | 100.0 | 0.50"  |       |        |        |        | fine gravel   |
| D10 (mm)   |       | 0.375" | 16.0  | 0.00   | 0.00   | 100.00 | fine gravel   |
| D30 (mm)   |       | #4     | 18.1  | 2.10   | 0.60   | 99.40  | coarse sand   |
| D60 (mm)   |       | #10    | 23.3  | 7.30   | 2.07   | 97.93  | medium sand   |
| Cu         |       | #20    |       |        |        |        | medium sand   |
| Cc         |       | #40    | 41.5  | 25.50  | 7.24   | 92.76  | fine sand     |
|            |       | #60    |       |        |        |        | fine sand     |
|            |       | #100   | 74.1  | 58.10  | 16.49  | 83.51  | fine sand     |
|            |       | #200   | 87.3  | 71.30  | 20.24  | 79.76  | finest        |
|            |       | PAN    | 368.3 | 352.30 | 100.00 | 0.00   | silt/clay     |



DESCRIPTION: SILT with some sand  
 USCS: ML

Prepared For:  
 Seaborn Pile Driving

Reviewed By:  
 ELW





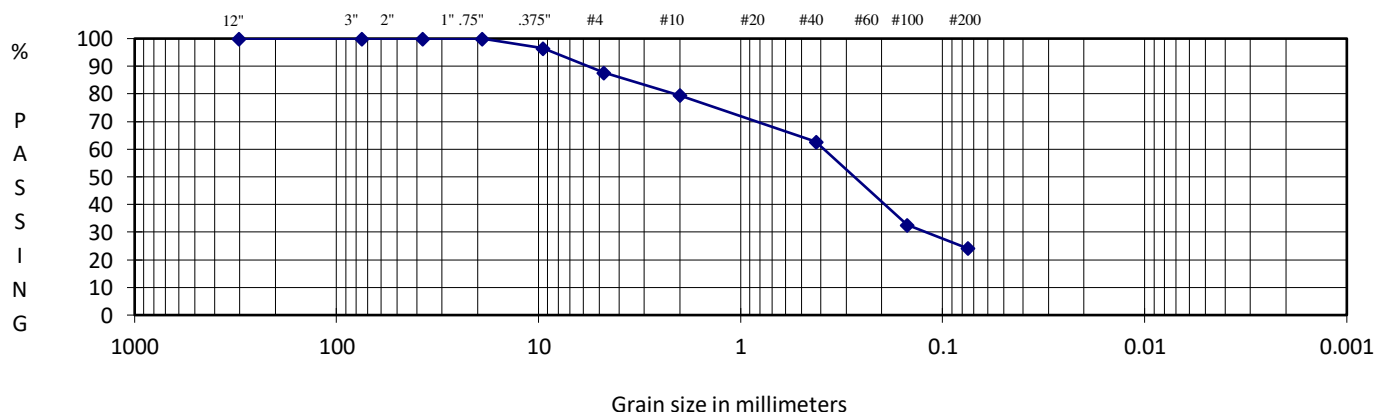
**GRAIN SIZE ANALYSIS**  
**ASTM D421, D422, D1140, D2487, D6913**

|                |                 |                |           |
|----------------|-----------------|----------------|-----------|
| PROJECT TITLE  | Helms Residence | SAMPLE ID/TYPE | HA-3      |
| PROJECT NO.    | 2022-631-1      | SAMPLE DEPTH   | 1.5'      |
| TECH/TEST DATE | CM 11/15/2022   | DATE RECEIVED  | 11/9/2022 |

|   |            |  |       |
|---|------------|--|-------|
| <b>WATER CONTENT (Delivered Moisture)</b> |            | Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture |       |
| Wt Wet Soil & Tare (gm)                   | (w1) 286.7 | Weight Of Sample (gm)  | 254.3 |
| Wt Dry Soil & Tare (gm)                   | (w2) 254.3 | Tare Weight (gm)   | 16.2  |
| Weight of Tare (gm)                       | (w3) 16.2  | (w6) Total Dry Weight (gm)   | 238.1 |

|                         |                  |                       |           |                   |
|-------------------------|------------------|-----------------------|-----------|-------------------|
| Weight of Water (gm)    | (w4=w1-w2) 32.4  | <b>SIEVE ANALYSIS</b> |           |                   |
| Weight of Dry Soil (gm) | (w5=w2-w3) 238.1 | Cumulative            |           |                   |
| Moisture Content (%)    | (w4/w5)*100 14   | Wt Ret                | (Wt-Tare) | (%Retained)       |
|                         |                  | +Tare                 |           | {(wt ret/w6)*100} |
|                         |                  |                       |           | % PASS (100-%ret) |

|            |       |        |       |        |        |        |               |
|------------|-------|--------|-------|--------|--------|--------|---------------|
| % COBBLES  | 0.0   | 12.0"  | 16.2  | 0.00   | 0.00   | 100.00 | cobbles       |
| % C GRAVEL | 0.0   | 3.0"   | 16.2  | 0.00   | 0.00   | 100.00 | coarse gravel |
| % F GRAVEL | 12.3  | 2.5"   |       |        |        |        | coarse gravel |
| % C SAND   | 8.1   | 2.0"   |       |        |        |        | coarse gravel |
| % M SAND   | 16.8  | 1.5"   | 16.2  | 0.00   | 0.00   | 100.00 | coarse gravel |
| % F SAND   | 38.4  | 1.0"   |       |        |        |        | coarse gravel |
| % FINES    | 24.2  | 0.75"  | 16.2  | 0.00   | 0.00   | 100.00 | fine gravel   |
| % TOTAL    | 100.0 | 0.50"  |       |        |        |        | fine gravel   |
| D10 (mm)   |       | 0.375" | 24.5  | 8.30   | 3.49   | 96.51  | fine gravel   |
| D30 (mm)   |       | #4     | 45.6  | 29.40  | 12.35  | 87.65  | coarse sand   |
| D60 (mm)   |       | #10    | 65.0  | 48.80  | 20.50  | 79.50  | medium sand   |
| Cu         |       | #20    |       |        |        |        | medium sand   |
| Cc         |       | #40    | 105.1 | 88.90  | 37.34  | 62.66  | fine sand     |
|            |       | #60    |       |        |        |        | fine sand     |
|            |       | #100   | 176.7 | 160.50 | 67.41  | 32.59  | fine sand     |
|            |       | #200   | 196.6 | 180.40 | 75.77  | 24.23  | finer         |
|            |       | PAN    | 254.3 | 238.10 | 100.00 | 0.00   | silt/clay     |



DESCRIPTION: Silty SAND with trace gravel  
 USCS: SM

Prepared For:  
 Seaborn Pile Driving

Reviewed By:  
 ELW

