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March 13, 2015
Project No. KE150097A

Orca Beverage, Inc.
11903 Cyrus Way, #5
Mukilteo, Washington 98275

Attention: Mr. Mike Bourgeois

Subject: Limited Geotechnical Engineering Study
Proposed Orca Beverage Site
Mukilteo, Washington

Dear Mr. Bourgeois:

Associated Earth Sciences, Inc. (AESI) is pleased to present the results of the limited geotechnical engineering study recently completed for the subject project. Our report is limited in that it is intended to identify key geotechnical issues for the proposed project and describe how these will impact development of the site. A detailed discussion regarding geologic site hazards and geotechnical design recommendations has not been included. This study has been prepared for the exclusive use of Orca Beverage, Inc., and their agents, for specific application to this project. Within the limitations of scope and schedule, our services have been performed in accordance with generally accepted geotechnical engineering practices in effect in this area at the time our study was prepared. No other warranty, express or implied, is made.

**SITE AND PROJECT DESCRIPTION**

The subject site consists of a vacant, rectangular-shaped, undeveloped parcel of approximately 1.3 acres located on the east side of Cyrus Way approximately 200 yards north of Harbour Pointe Boulevard SW in Mukilteo, Washington (Parcel #00441400002700). The location of the site is shown on the "Vicinity Map", Figure 1. The site is bounded to the south by the existing Orca Beverage property located at 11903 Cyrus Way. The site is bounded to the north and east by developed, commercial properties, and to the west by Cyrus Way. The northern portion of the property consists of an underground utility easement. The topography of the property and adjacent area is relatively flat.

It is our understanding that current plans include the construction of a warehouse on the site. The warehouse is projected to have a footprint of 31,392 square feet. A paved parking area will be located west of the building, adjacent to Cyrus Way. A storm water detention vault is planned below a portion of the parking area and the east side of the vault may extend below the building. The vault is anticipated to have a maximum depth of approximately 10 feet. It is our understanding that the vault will be set back a sufficient distance from the property line so that temporary shoring will not be required for its construction.

## SUBSURFACE EXPLORATION

In order to evaluate subsurface conditions for the project, six exploration pits were excavated at the site using a track-mounted excavator. The pits permitted direct, visual observation of subsurface conditions. Materials encountered in the exploration pits were studied and classified in the field by an engineering geologist from our firm. Disturbed soil samples were collected from the pits, placed in moisture-tight containers, and transported to our laboratory for further visual classification. After logging, the exploration pits were backfilled with the excavated soil and lightly tamped with the backhoe bucket. The approximate locations of the pits are shown on the "Site and Exploration Plan," Figure 2. Copies of our exploration logs are included in Appendix A.

### Stratigraphy

The sediments encountered in our explorations generally consisted of fill soils underlain by glacial sediments. The following, more detailed descriptions of the geologic units encountered in our explorations are organized from the stratigraphically highest (youngest) to stratigraphically lowest (oldest) sediment type.

#### Fill

Fill soils (those not naturally placed) were encountered at each of the exploration locations. The fill soils encountered in exploration pits EP-1, EP-3, and EP-6 generally consisted of loose to medium dense, very gravelly, well graded sand with trace quantities of silt. At the location of exploration pit EP-1, the fill became silty below a depth of approximately 3.5 feet. At the locations of exploration pits EP-1 and EP-6, this material was underlain by a buried topsoil horizon consisting of loose, dark brown, very silty sand with abundant organics. At the location of exploration pit EP-3, the base of the fill was underlain by a thin, discontinuous topsoil horizon. At the locations of exploration pits EP-2, EP-4, and EP-5 the fill generally consisted of loose to medium dense, very silty sand with variable gravel content. Portions of the fill at these locations contained lenses and pockets of topsoil or abundant wood debris. At the locations of our explorations, the existing fill extended to depths ranging from approximately 3.5 to 7 feet.

Vashon Lodgement Till

Natural sediments encountered below the fill at the locations of exploration pits EP-2, EP-3, and EP-4 generally consisted of medium dense to dense, mottled gray to tan, very silty sand with moderate to high gravel content and scattered cobbles. These sediments became very dense below a depth of approximately 8 to 9 feet. Very dense sediments of similar textural composition were encountered directly below the fill at the locations of exploration pits EP-1, EP-5, and EP-6. We interpret these sediments to be representative of Vashon lodgement till. The Vashon lodgement till consists of an unsorted, non-stratified mixture of silt, sand, and gravel that was deposited directly from basal, debris-laden glacial ice during the Vashon Stade of the Fraser Glaciation, approximately 12,500 to 15,000 years ago. The high relative density characteristic of the Vashon lodgement till is due to its consolidation by the massive weight of the glacial ice from which they were deposited. The reduced density observed in the upper portion of the till at the locations of exploration pits EP-2 through EP-4 is interpreted to be due to weathering. The Vashon lodgement till extended beyond the maximum depths explored of approximately 8 to 11.5 feet.

**Geologic Mapping**

Review of the regional geologic map of the area titled *Distribution and Description of Geologic Units in the Mukilteo Quadrangle, Washington*, by James Minard (1982) indicates that the area of the project site is underlain by Vashon lodgement till. Our interpretation of the sediments encountered in our exploration pits is in general agreement with the geologic map.

**Ground Water**

Slow ground water seepage was encountered in exploration pits EP-1 through EP-5 at depths ranging from approximately 3 to 8 feet. At the locations of exploration pits EP-1 through EP-3, the seepage originated at or near the base of the fill. At the locations of exploration pits EP-4 and EP-5, the seepage originated from within the till. No seepage was observed in exploration pit EP-6. At all of the locations in which seepage was observed, the seepage was limited to a thin, localized perched zone that did not extend around the entire pit perimeter. It should be noted that the depth and occurrence of ground water seepage below the site likely varies in response to such factors as changes in season, precipitation, location, and site use. Our exploration was conducted in early March when ground water levels in shallow, unconfined aquifers in the Puget Sound region are typically approaching their seasonal high.

## CONCLUSIONS AND RECOMMENDATIONS

The key geotechnical issue identified by our explorations is the widespread distribution of fill at the site. The existing fill generally ranges in thickness from approximately 3.5 to 5.5 feet, but was approximately 7 feet deep at the location of exploration pit EP-6. The existing fill is of variable density and portions of it contains topsoil and/or wood debris. For this reason, the existing fill is not considered suitable for foundation support.

Geotechnical recommendations regarding foundation and floor support of the proposed building is provided in the following sections of this report.

### Foundation Support

Conventional Spread Footings

Spread footings may be used for foundation support of the proposed building provided they are founded either directly on the medium dense to very dense, lodgement till sediments, on structural fill placed directly over the till, or on compacted rock trenches that extend through the fill to bear on the underlying competent till.

For footings founded either directly upon the medium dense to dense lodgement till, structural fill, or rock trenches, we recommend that an allowable bearing pressure of 2,500 pounds per square foot (psf) be used for design purposes, including both dead and live loads. If higher bearing pressures are desired, an allowable foundation bearing pressure of 4,000 psf may be used provided all footings bear directly on the very dense, unweathered lodgement till. Very dense, unweathered lodgement till sediments were encountered in our explorations at depths ranging from approximately 3.5 to 9 feet. An increase of one-third may be used for short-term wind or seismic loading. Specific recommendations regarding placement of structural fill below foundation areas and construction of rock trenches are provided subsequently in this report.

Perimeter footings for the proposed building should be buried a minimum of 18 inches into the surrounding soil for frost protection. No minimum burial depth is required for interior footings; however, all footings must penetrate to the prescribed stratum, and no footings should be founded in or above loose, organic, or existing fill soils.

The area bounded by lines extending downward at 1H:1V (Horizontal:Vertical) from any footing must not intersect another footing or intersect a filled area that has not been compacted to at least 95 percent of ASTM:D 1557. In addition, a 1.5H:1V line extending down from any footing must not daylight because sloughing or raveling may eventually undermine the footing. Thus footings should not be placed near the edges of steps or cuts in the bearing soils.

Anticipated settlement of footings founded as described above should be on the order of 1 inch or less. However, disturbed soil not removed from footing excavations prior to footing placement could result in increased settlements.

All footing subgrade soils should be observed by AESI prior to placing concrete to verify that the exposed soils can support the design foundation bearing capacity and that construction conforms with the recommendations in this report. Foundation bearing verification may also be required by the City of Mukilteo. Similarly, we recommend that placement of structural fill or rock trench construction should be observed by AESI.

Structural Fill

Structural fill should consist of inorganic soil, free of deleterious materials, placed in maximum loose lift thicknesses of 8 inches with each lift compacted to at least 95 percent of the modified Proctor maximum dry density, as determined by ASTM:D 1557. Structural fill placed below footing areas should extend laterally beyond the footing edges a distance equal to or greater than the thickness of the fill. Those portions of the existing fill that are free of topsoil, wood debris, and any other deleterious materials are suitable for re-use as structural fill provided that they can be moisture-conditioned and maintained within 2 percent of optimum moisture content. The lodgement till sediments are also suitable for use as structural fill; however, the lodgement till and portions of the existing fill contain significant quantities of silt and are considered to be highly moisture-sensitive. At the time of our exploration, the moisture content of portions of the fill and underlying till was above the optimum for achieving suitable compaction. These sediments are described as "very moist" or "wet" on the exploration logs in Appendix A. If the moisture content of these sediments remains elevated at the time of construction, moisture-conditioning of the soils would be recommended prior to their use as structural fill. Moisture-conditioning could consist of spreading out and tilling the soil during periods of prolonged, dry weather or possibly using cementatious admixtures.

If fill is placed during wet weather, or if proper compaction cannot be attained, a select import material consisting of a clean, free-draining gravel and/or sand should be used. Free-draining fill consists of non-organic soil with the amount of fine-grained material limited to 5 percent by weight when measured on the minus No. 4 sieve fraction and at least 25 percent of the material greater than the No. 4 sieve. Existing fill soils encountered in the upper 3.5 to 6 feet of exploration pits EP-1, EP-3, and EP-6 likely meet these criteria.

A representative from our firm should observe the stripped subgrade and be present during placement of structural fill to observe the work and perform a representative number of in-place density tests. In this way, the adequacy of the earthwork may be evaluated as filling progresses and any problem areas may be corrected at that time.

Rock Trenches

Where the depth of fill makes deepening of conventional spread footing foundations or placement of structural fill impractical, we recommend that the footings be founded on rock-filled trenches that extend through the existing fill to the underlying medium dense to very dense lodgement till.

Rock-filled trenches should have a minimum width of 3 feet (or as designated by the field engineer/engineering geologist). Because of the potential for caving, actual trench widths may be greater than that specified. The use of a larger, track-mounted excavator will greatly speed trench excavation over the use of a conventional, rubber-tired backhoe. In order to reduce disturbance of the bearing soils exposed in the trench, it is strongly recommended that the excavator use a smooth-edge bucket.

To determine when suitable bearing has been achieved and to verify proper placement of the rock, the geotechnical engineer or their representative must be present on a full-time basis during trench excavation and backfill. Although ground water seepage encountered in our explorations was relatively minor, the contractor should be equipped with a pump in the event that control of ground water seepage is required to allow visual determination of the bearing soils. Any seepage entering the excavation on an overnight basis must be removed prior to commencing trench excavation the following day.

We recommend the use of 2- to 4-inch-sized crushed rock or recycled concrete for trench backfill. The crushed rock must be tamped into place to achieve a tightly packed mass; this may be done with either a "Hoepac" compactor or, more typically, with the bucket of the excavator itself. Staging areas should be maintained so that the rock is not contaminated by mud prior to placement in the trench.

Spread footings placed on rock trenches must be centered over the trenches. Any footing that is not centered over the trench must be further evaluated prior to concrete placement and may require additional trench excavation to obtain sufficient support. The allowable bearing pressure previously recommended for conventional spread footing foundations would also apply to spread footings founded on rock-filled trenches.

Small-Diameter Pipe Piles

As an alternative to spread footing foundations, foundation support for the building could be provided by small-diameter, pipe piles that fully penetrate the existing fill and are driven to refusal in the underlying lodgement till. In this case the pipe piles must fully penetrate the existing fill. This may require overdriving the piles.

Allowable axial capacities for small-diameter driven pipe piles are provided below in Table 1.

**Table 1**
**Small Diameter Pipe Pile Recommendations**

| Nominal Pipe Diameter | Minimum Wall Thickness | Minimum Hammer Size | Allowable Axial Capacity | Driving Time (seconds/inch) |
|---|---|---|---|---|
| 3-inch | Schedule 40 | 850 Lbs | 12 kips | 10 |
| 4-inch | Schedule 40 | 1,100 Lbs | 20 kips | 10 |
| 6-inch | Schedule 40 | 3,000 Lbs | 30 kips | 6 |

In order for the stated pile capacities to apply, the pipe piles should be driven to refusal, which is defined as less than 1 inch of penetration during the specified period of continuous driving.

No lateral capacity would be provided by vertically installed pipe piles. Lateral capacity could be attained through the use of batter piles or passive resistance over the buried portions of the grade beams. Piles may be battered up to 15 degrees to develop additional lateral capacity. Lateral capacity of battered piles may be taken as the horizontal component of the axial pile load. Battered piles inclined up to 15 degrees should be designed with an allowable axial compressive capacity equal to that used for vertical piles. Pile spacing, locations, splicing details, foundation connection details, grade beam design, and any other structural design recommendations should be determined by a structural engineer.

Installation of the pipe piles should be observed by an AESI representative to verify that the refusal and embedment criteria are met and that materials, equipment, and procedures conform with our recommendations. This may also be required by the City of Mukilteo.

We recommend that load testing of pipe piles be conducted in accordance with the ASTM Quick Load Test (ASTM:D 1143) to 200 percent of the allowable pile capacity on a minimum of 3% (1 pile minimum, 5 piles maximum) of pipe piles 3 inches or larger in diameter.

### Slab-on-Grade Floor Support

Because of the presence of significant thicknesses of uncontrolled fill below the building area, support of a slab-on-grade floor on the competent natural sediments may not be practical. Three options for slab-on-grade floor support are provided below. Options 1 and 2 fully mitigate the risk of slab settlement, whereas Option 3 only partially mitigates the risk of settlement.

Option 1 - Slab-On-Grade Floor Support on Competent Natural Sediments or Structural Fill

Slab-on-grade floors may be constructed either directly on the medium dense to very dense, natural till sediments, or on structural fill placed over these materials. Areas of the slab subgrade that are disturbed (loosened) during construction should be recompacted to a firm and unyielding condition prior to placing the slab capillary break material and vapor retarder, as described below.

Option 2 - Support of Slab Floors on Rock Trenches or Pipe Piles

Option 2 would be to support the slab floor on either rock trenches or driven pipe piles installed in accordance with the recommendations previously provided in the "Foundation Support" section of this report. The spacing of the rock trenches or pipe piles would be determined by a structural engineer based on the amount of reinforcement included in the floor slab design and the amount of acceptable settlement for deflection of the slab. Capillary break material and a vapor retarder layer should be provided as described below.

Option 3 - Floor Slab Over Existing Fill

Another alternative would be to "cast" the slab on a thin structural fill mat placed over the existing fill material. This would be accomplished by excavating the existing fill below the floor slab area to a minimum of 1 foot below the final planned floor subgrade. The exposed soils in the excavation should then be recompacted to a firm and unyielding condition. A structural fill mat with a minimum thickness of 1 foot should then be placed below the entire floor slab area. After the structural fill placement is completed and approved, the capillary break material and plastic vapor retarder should be placed as described below, and the floor slab cast. The floor slab should not be tied into the building's foundation, but should be free to settle independently. This floor slab option should contain sufficient bar-reinforcement to reduce differential movement across any cracks that might develop. This option should only be considered if some settlement and cracking of the floor slab can be tolerated.

Regardless of which floor support option is selected, the floor should be constructed atop a capillary break consisting of a minimum thickness of 4 inches of washed pea gravel or washed $^{3}/_{4}$- to $^{5}/_{8}$-inch-size crushed rock. The pea gravel should be overlain by a 10-mil (minimum thickness) plastic vapor retarder.

**CLOSURE**

We appreciate the opportunity to be of service to you on this project. Should you have any questions regarding this report or other geotechnical aspects of the project, please call us at your earliest convenience.

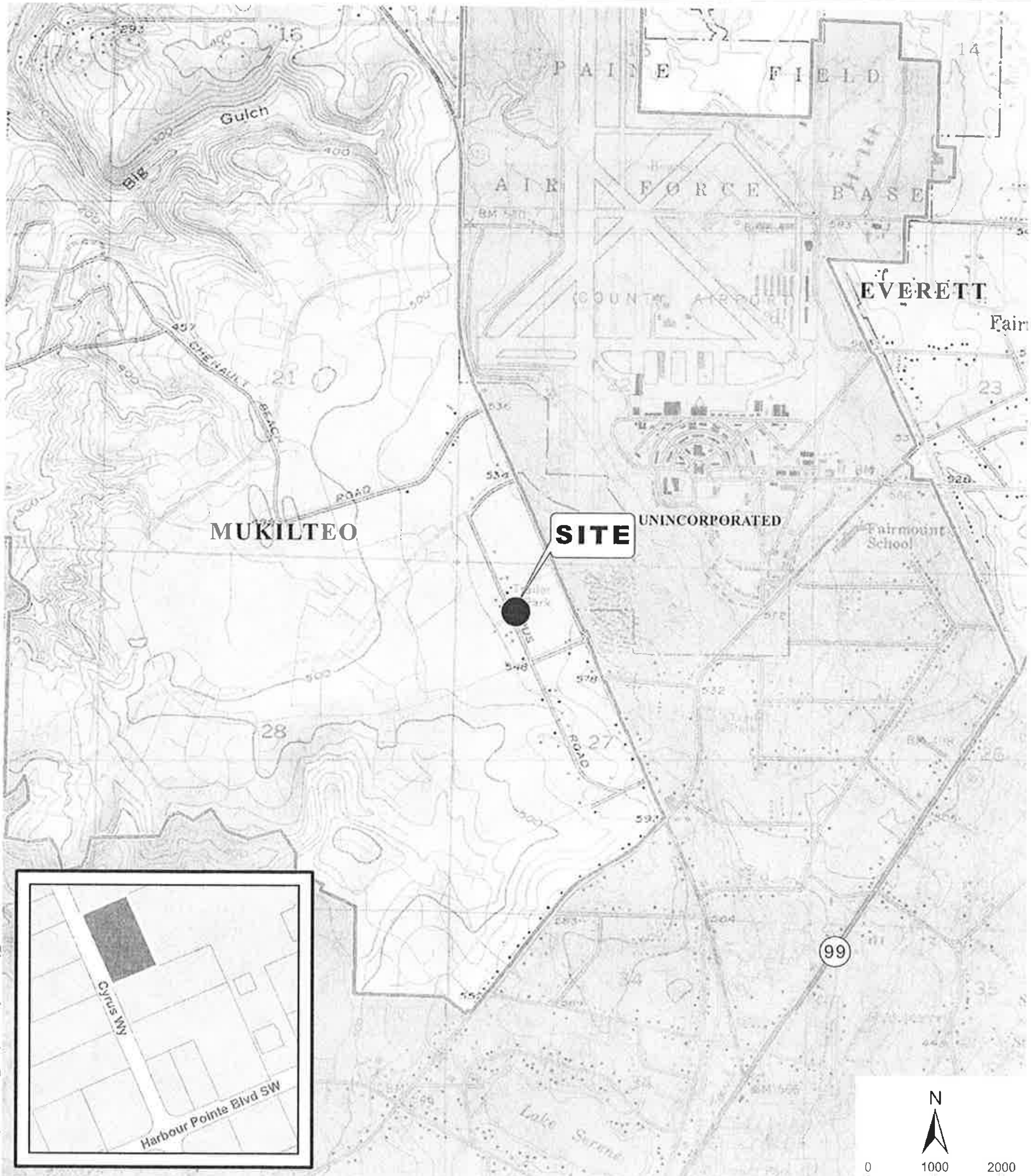
Sincerely,
**ASSOCIATED EARTH SCIENCES, INC.**
**Kirkland, Washington**

Timothy J. Peter, L.E.G., L.Hg.
Senior Project Geologist

Bruce L. Blyton, P.E.
Senior Principal Engineer

G. Aaron McMichael, P.E.
Associate Geotechnical Engineer

| | | |
|---|---|---|
| Attachments: | Figure 1: | Vicinity Map |
| | Figure 2: | Site and Exploration Plan |
| | Appendix A: | Exploration Pit Logs |

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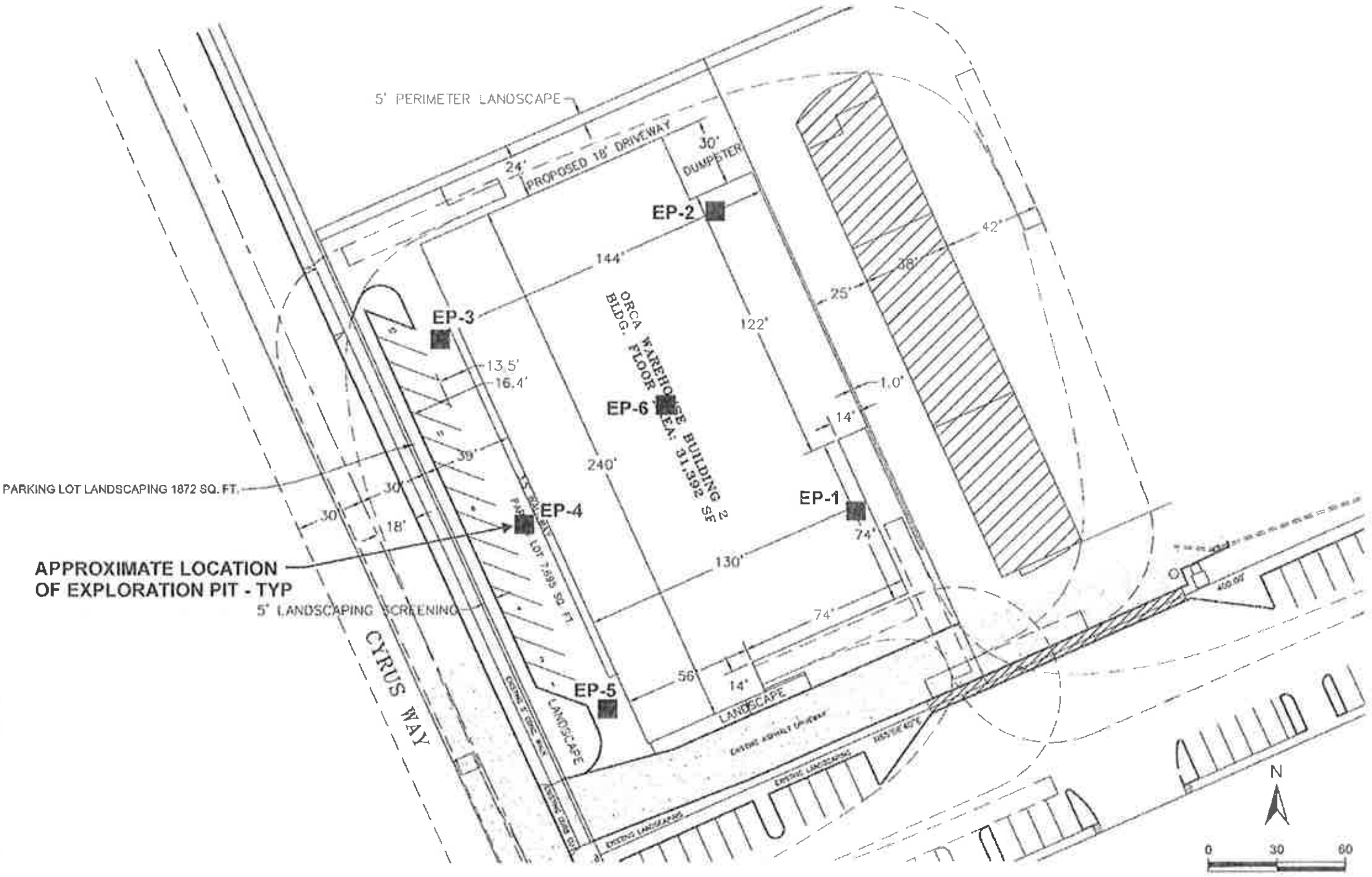
# VICINITY MAP

ORCA BEVERAGE
MUKILTEO, WASHINGTON

FIGURE 1

DATE 3/15

PROJ. NO. KE150097A




REFERENCE: ORCA BEVERAGE

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# SITE AND EXPLORATION PLAN

ORCA BEVERAGE
MUKILTEO, WASHINGTON

FIGURE 2
DATE 3/15
PROJ. NO. KE150097A

150097 Orca Beverage \ 150097 F2 Site and Exploration Plan.cdr

# APPENDIX A

## Exploration Pit Logs

| Major Division | Subdivision | Fines | Group Symbol | Description |
|---|---|---|---|---|
| Coarse-Grained Soils - More than 50% (1) Retained on No. 200 Sieve | Gravels - More than 50% (1) of Coarse Fraction Retained on No. 4 Sieve | ≤5% Fines (5) | GW | Well-graded gravel and gravel with sand, little to no fines |
| | | | GP | Poorly-graded gravel and gravel with sand, little to no fines |
| | | ≥12% Fines (5) | GM | Silty gravel and silty gravel with sand |
| | | | GC | Clayey gravel and clayey gravel with sand |
| | Sands - 50% (1) or More of Coarse Fraction Passes No. 4 Sieve | ≤5% Fines (5) | SW | Well-graded sand and sand with gravel, little to no fines |
| | | | SP | Poorly-graded sand and sand with gravel, little to no fines |
| | | ≥12% Fines (5) | SM | Silty sand and silty sand with gravel |
| | | | SC | Clayey sand and clayey sand with gravel |
| Fine-Grained Soils - 50% (1) or More Passes No. 200 Sieve | Silts and Clays Liquid Limit Less than 50 | | ML | Silt, sandy silt, gravelly silt, silt with sand or gravel |
| | | | CL | Clay of low to medium plasticity; silty, sandy, or gravelly clay, lean clay |
| | | | OL | Organic clay or silt of low plasticity |
| | Silts and Clays Liquid Limit 50 or More | | MH | Elastic silt, clayey silt, silt with micaceous or diatomaceous fine sand or silt |
| | | | CH | Clay of high plasticity, sandy or gravelly clay, fat clay with sand or gravel |
| | | | OH | Organic clay or silt of medium to high plasticity |
| Highly Organic Soils | | | PT | Peat, muck and other highly organic soils |

## Terms Describing Relative Density and Consistency

| | Density | SPT (2) blows/foot |
|---|---|---|
| Coarse-Grained Soils | Very Loose | 0 to 4 |
| | Loose | 4 to 10 |
| | Medium Dense | 10 to 30 |
| | Dense | 30 to 50 |
| | Very Dense | >50 |
| | **Consistency** | **SPT (2) blows/foot** |
| Fine-Grained Soils | Very Soft | 0 to 2 |
| | Soft | 2 to 4 |
| | Medium Stiff | 4 to 8 |
| | Stiff | 8 to 15 |
| | Very Stiff | 15 to 30 |
| | Hard | >30 |

### Test Symbols

G = Grain Size
M = Moisture Content
A = Atterberg Limits
C = Chemical
DD = Dry Density
K = Permeability

## Component Definitions

| Descriptive Term | Size Range and Sieve Number |
|---|---|
| Boulders | Larger than 12" |
| Cobbles | 3" to 12" |
| Gravel | 3" to No. 4 (4.75 mm) |
| Coarse Gravel | 3" to 3/4" |
| Fine Gravel | 3/4" to No. 4 (4.75 mm) |
| Sand | No. 4 (4.75 mm) to No. 200 (0.075 mm) |
| Coarse Sand | No. 4 (4.75 mm) to No. 10 (2.00 mm) |
| Medium Sand | No. 10 (2.00 mm) to No. 40 (0.425 mm) |
| Fine Sand | No. 40 (0.425 mm) to No. 200 (0.075 mm) |
| Silt and Clay | Smaller than No. 200 (0.075 mm) |

## (3) Estimated Percentage

| Component | Percentage by Weight |
|---|---|
| Trace | <5 |
| Some | 5 to <12 |
| *Modifier* (silty, sandy, gravelly) | 12 to <30 |
| Very *modifier* (silty, sandy, gravelly) | 30 to <50 |

## Moisture Content

Dry - Absence of moisture, dusty, dry to the touch

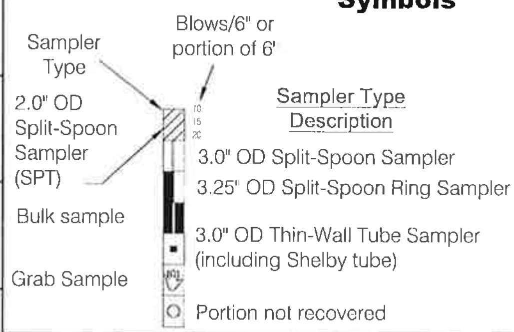
Slightly Moist - Perceptible moisture

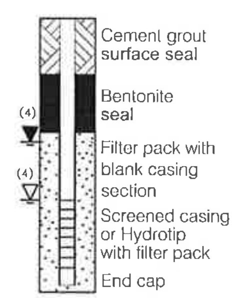
Moist - Damp but no visible water

Very Moist - Water visible but not free draining

Wet - Visible free water, usually from below water table

## Symbols




(1) Percentage by dry weight
(2) (SPT) Standard Penetration Test (ASTM D-1586)
(3) In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)
(4) Depth of ground water
▼ ATD = At time of drilling
▽ Static water level (date)
(5) Combined USCS symbols used for fines between 5% and 12%

Classifications of soils in this report are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D-2487 and D-2488 were used as an identification guide for the Unified Soil Classification System.

# LOG OF EXPLORATION PIT NO. EP-1

| Depth (ft) | This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplfication of actual conditions encountered. **DESCRIPTION** |
|---|---|
| | **Fill** |
| 1 | Loose to medium dense, moist, gray, very gravelly, well graded SAND, trace silt (SW). |
| 2 | |
| 3 | |
| 4 | Loose to medium dense, very moist, blue gray, silty SAND, some gravel (SM). |
| | Loose, very moist, dark brown, very silty fine SAND, with wood debris; wet at base. (SM). |
| 5 | **Vashon Lodgement Till** |
| 6 | Very dense, very moist, tan gray to gray, very silty, gravelly SAND; contains scattered cobbles; unsorted; nonstratified (SM). Becomes tan below 5 1/2 feet. |
| 7 | Becomes moist to very moist below approximately 6 1/2 feet. |
| 8 | |
| 9 | Bottom of exploration pit at depth 8 feet<br>Slow seepage at 5 feet. No caving. |
| 10 | |
| 11 | |
| 12 | |
| 13 | |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |

KCTP3 150097.GPJ March 9, 2015

**Orca Beverage**
**Mukilteo, WA**

Logged by: TJP
Approved by: JNS

associated earth sciences incorporated

**Project No. KE150097A**

**3/4/15**

# LOG OF EXPLORATION PIT NO. EP-2

| Depth (ft) | This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.<br><br>**DESCRIPTION** |
|---|---|
| 1<br>2<br>3 | **Fill**<br>Loose to medium dense, very moist, gray, very silty, gravelly SAND; contains lenses and pockets of topsoil (SM).<br><br>Wet at 3 feet. |
| 4<br>5<br>6<br>7<br>8 | **Vashon Lodgement Till**<br>Very dense, very moist to moist, tan, very silty, gravelly SAND, scattered cobbles; nonstratified; unsorted (SM). |
| 9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20 | Bottom of exploration pit at depth 8 feet<br>Slow seepage at 3 feet. No caving. |

**Orca Beverage**
**Mukilteo, WA**

Logged by: TJP
Approved by: JNS

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**Project No. KE150097A**

**3/4/15**

# LOG OF EXPLORATION PIT NO. EP-3

| Depth (ft) | This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplfication of actual conditions encountered. **DESCRIPTION** |
|---|---|
| | **Fill** |
| 1 | Loose to medium dense, moist, very gravelly, well graded SAND, trace silt (SM). |
| 2 | |
| 3 | |
| 4 | |
| 5 | Becomes silty below 5 feet.<br>Becomes wet at 5 1/2 feet; thin, discontinuous topsoil layer at base. |
| | **Vashon Lodgement Till** |
| 6 | Medium dense to dense, very moist, tan, very silty, gravelly SAND, scattered cobbles; nonstratified (SM). |
| 7 | |
| 8 | |
| 9 | Becomes very dense below approximately 9 feet. |
| 10 | |
| 11 | Bottom of exploration pit at depth 10 feet<br>Slow seepage at 5 1/2 feet. Intermittent, massive caving 0 to 5 1/2 feet.. |
| 12 | |
| 13 | |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |

KCTP3 150097.GPJ March 9, 2015

**Orca Beverage**
**Mukilteo, WA**

Logged by: TJP
Approved by: JNS

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**Project No. KE150097A**

**3/4/15**

# LOG OF EXPLORATION PIT NO. EP-4

This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplfication of actual conditions encountered.

| Depth (ft) | DESCRIPTION |
|---|---|
| | **Fill** |
| 1 | Loose, very moist, dark brown, very silty SAND, with abundant wood debris; contains quarry spalls 0 to 1 foot (SM). |
| 2 | |
| 3 | |
| | **Vashon Lodgement Till** |
| 4 | Medium dense, very moist, mottled gray and tan, silty SAND, some gravel (SM). |
| 5 | Becomes wet at 5 feet. |
| 6 | |
| 7 | Becomes dense and tan below 7 feet. |
| 8 | Becomes very dense below approximately 8 feet. |
| 9 | |
| 10 | |
| 11 | |
| 12 | Bottom of exploration pit at depth 11.5 feet<br>Slow seepage at approximately 5 feet. No caving. |
| 13 | |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |

**Orca Beverage**
**Mukilteo, WA**

Logged by: TJP
Approved by: JNS

associated earth sciences incorporated

**Project No. KE150097A**

**3/4/15**

# LOG OF EXPLORATION PIT NO. EP-5

| Depth (ft) | This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered. **DESCRIPTION** |
|---|---|
| | **Fill** |
| 1 | Loose to medium dense, moist to very moist, gray and tan (mixed), very silty, gravelly SAND (SM). |
| 2 | |
| 3 | |
| 4 | |
| 5 | Thin, discontinuous topsoil layer at base. |
| | **Vashon Lodgement Till** |
| 6 | Medium dense to dense, very moist, tan, silty to very silty SAND, some gravel; contains scattered cobbles (SM). |
| 7 | |
| 8 | |
| 9 | Becomes very dense below 8 1/2 feet. |
| 10 | |
| 11 | |
| 12 | Bottom of exploration pit at depth 11.5 feet<br>Slow, discontinuous seepage at approximately 8 feet. No caving. |
| 13 | |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |

KCTP3 150097.GPJ March 9, 2015

## Orca Beverage
## Mukilteo, WA

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**3/4/15**

# LOG OF EXPLORATION PIT NO. EP-6

| Depth (ft) | This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplfication of actual conditions encountered. **DESCRIPTION** |
|---|---|
| | **Fill** |
| 1 | Loose to medium dense, moist, tan, very gravelly, well graded SAND, trace silt (SW). |
| 2 | |
| 3 | Becomes blue gray below 2 1/2 feet. |
| 4 | |
| 5 | |
| 6 | |
| | Loose, very moist, dark brown, very silty SAND, with abundant organics; topsoil-like (SM). |
| 7 | **Vashon Lodgement Till** |
| 8 | Very dense, moist, tan, very silt, gravelly SAND, scattered cobbles; nonstratified (SM). |
| 9 | Bottom of exploration pit at depth 8 feet<br>No seepage. No caving. |
| 10 | |
| 11 | |
| 12 | |
| 13 | |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |

KCTP3 150097.GPJ March 9, 2015

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