Earth Solutions NW LLC

Geotechnical Engineering
Construction Observation/Testing
Environmental Services

GEOTECHNICAL ENGINEERING STUDY
PROPOSED BROWN BEAR MARYSVILLE
8833 SOPER HILL ROAD
MARYSVILLE, WASHINGTON

ES-9134

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PREPARED FOR

CAR WASH ENTERPRISES, INC.

June 12, 2023

Kyler T. Kelly, L.G.
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06/12/2023

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Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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Earth Solutions NW LLC

Geotechnical Engineering, Construction
Observation/Testing and Environmental Services

June 12, 2023
ES-9134

Car Wash Enterprises, Inc.
3977 Leary Way Northwest
Seattle, Washington 98107

Attention: Joe Giuseffi

Dear Joe:

Earth Solutions NW, LLC (ESNW) is pleased to present this geotechnical report regarding the proposed Brown Bear car wash project. Based on the results of the study, the proposed development is feasible from a geotechnical standpoint. Our subsurface exploration indicates the site is underlain primarily by glacial till deposits.

In our opinion, the proposed structures can be constructed on conventional continuous and spread footing foundations bearing upon competent (undisturbed) native soil, recompacted native soil, or new structural fill. In general, where relatively undisturbed areas exist throughout the site (outside of the detention vault fill envelope), competent native soil suitable for support of the foundations will likely be encountered beginning at depths of about two feet below existing grades. Remedial earthwork and compaction activities for the site area atop the vault lid were recently completed and documented by ESNW. Based on our field observations and test results, as summarized in this report, it is our opinion a “pad ready” condition atop the vault lid was established in general accordance with our geotechnical recommendations and the plans.

In our opinion, infiltration should not be considered a viable means of stormwater management for this project from a geotechnical standpoint. The native soil densifies relatively shallowly and, for practicable design purposes, functions as a hydrologically restrictive layer.

Pertinent geotechnical recommendations are provided in this report. We appreciate the opportunity to be of service and trust this report meets your current needs. Please call if you have any questions or if we can be of further assistance.

Sincerely,

EARTH SOLUTIONS NW, LLC

Kyler T. Kelly, L.G.
Project Geologist

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GEOTECHNICAL ENGINEERING STUDY
PROPOSED BROWN BEAR MARYSVILLE
8833 SOPER HILL ROAD
MARYSVILLE, WASHINGTON

ES-9134

INTRODUCTION

General

This geotechnical engineering study was prepared for the proposed Brown Bear car wash facility, which is proposed for construction at 8833 Soper Hill Road, in Marysville, Washington. To complete this study, ESNW performed the following services:

- Subsurface exploration (including in-place density testing) to characterize the soil and groundwater conditions.
- Laboratory testing of representative soil sample collected on site.
- Engineering analyses and recommendations for the proposed development.
- Preparation of this report.

The following documents and resources were reviewed as part of the report preparation:

- Road, Storm Drainage, and Grading Plan, prepared by LDC, Inc., Job No. 22681, plotted March 9, 2023.
- Preliminary Site Plan, prepared by Barghausen Consulting Engineers, Inc., Job No. 22681, dated March 9, 2023.
- Geologic Map of the Lake Stevens Quadrangle, Snohomish County, Washington, compiled by Minard, J.P., 1985.
- Stormwater Management Manual for Western Washington (2019 SWMMWW), prepared by the Washington State Department of Ecology, July 2019.
- Web Soil Survey (WSS) online resource, maintained by the Natural Resources Conservation Service under the United States Department of Agriculture (USDA).
- Liquefaction Susceptibility Map of Snohomish County, Washington, prepared by Palmer, S.P. et al., endorsed by the Washington State Department of Natural Resources, dated September 2004.

- City of Marysville Geologic Hazards Map, dated May 2014.
- Marysville Municipal Code, Chapter 22E.010 – Article IV.
- Fiber-Reinforced Concrete – Pavements, TR.1.06.03.20, prepared by Forta Corporation, dated March 2020.
- Fiber-Reinforced Concrete for Pavement Overlays: Technical Overview, prepared by the National Concrete Pavement Technology Center of Iowa State University, dated April 2019.

Project Description

Based on review of the referenced plans, the site will be developed with a Brown Bear car wash facility, auto sentry structure, vacuuming stations, an office, new pavement areas, and associated improvements. Ingress and egress to the property will be provided by Soper Hill Road. The referenced drainage plan shows stormwater will be conveyed to a detention vault structure, which is located within the central and northeastern portions of the property. The proposed Brown Bear project is expected to require minimal grading to achieve finish grades (estimated at less than five feet).

Based on our experience with similar projects, the proposed structures will be constructed using relatively lightly loaded steel framing supported on conventional foundations. Perimeter footing loads will likely be 1 to 2 kips per linear foot. Slab-on-grade loading is anticipated to be approximately 150 pounds per square foot (psf).

If the above design assumptions either change or are incorrect, ESNW should be contacted to review the recommendations provided in this report. ESNW should review the final design to verify the geotechnical recommendations and conclusions provided in this report have been incorporated into the plans.

SITE CONDITIONS

Surface

The subject site is located along the north side of Soper Hill Road, approximately 330 feet west of the intersection with State Route 9, in Marysville, Washington, as illustrated on the Vicinity Map (Plate 1). The property is comprised of two tax parcels (Snohomish County parcel numbers 005907-000-319-02 and -319-03), covering a combined total of roughly 2.3 acres.

The site is currently developed with a stormwater detention vault along the central and northeastern portions of the property, which was installed during development of the White Barn Commercial Phase 2 project (per the referenced August 2021 plan sheet). Remaining portions of the site consist of grass-covered building pad areas. Site topography consists of building pad areas that gently descend from west to east. Per the referenced grading plan, about four feet of elevation change occurs within the property boundaries.

Subsurface

An ESNW representative observed, logged, and sampled five soil borings on March 29, 2023. The borings were advanced at accessible locations within the property, using a drill rig and operators retained by ESNW. The approximate locations of the borings are depicted on Plate 2 (Boring Location Plan). Please refer to the boring logs provided in Appendix A for a more detailed description of subsurface conditions. Representative soil samples collected at the boring locations were analyzed in general accordance with Unified Soil Classification System (USCS) and USDA methods and procedures. Laboratory test results are provided in Appendix B.

Fill atop Detention Vault

ESNW understands that about two to three feet of fill was placed atop the in-place detention vault to achieve the current finish grade. As requested, an ESNW representative conducted in-place density testing within the fill zone. Four field density tests were completed in accordance with ASTM D6938 (Nuclear Gauge Method), and one representative soil sample was returned to our laboratory for analysis of the maximum dry density (MDD) and optimum moisture content in accordance with ASTM D1557 (Modified Proctor). A summary of the field density tests is provided in the table below, and the approximate test locations are depicted on Plate 2 (Boring Location Plan).

Test Number	Depth below Grade (inches)	Maximum Dry Density (pcf)	Fill Moisture (%)	Test Dry Density (pcf)	% of MDD
1	16	129.2	14.0	110.3	85
2	16		12.8	110.9	86
3	12		14.0	112.7	87
4	12		16.9	104.8	81

An ESNW representative probed the subgrade using a one-half-inch-diameter steel rod (a “T-probe”) as a supplement to in-place density testing. Qualitative evaluation of the fill using the T-probe suggested the fill was in a generally loose to medium dense condition.

Refer to the *Subgrade Preparation* section of this report for additional recommendations regarding the existing fill atop the detention vault. Refer to the *Construction Observations and Testing* section of this report for a summary of field observations and test results documented by ESNW representatives during supplementary earthwork activities in the vault area.

Native Soil

The native soil encountered at the boring locations was classified as silty sand (USCS: SM). In-situ moisture content was characterized primarily as moist during the field exploration. Based on the results of standard penetration testing at each borehole, native soil within roughly the upper five feet of existing grades was characterized as medium dense to dense, with very dense soil conditions thereafter. The maximum exploration depth was approximately 15.5 feet bgs.

Geologic Setting

Review of the geologic mapping indicates the site and surrounding area is underlain by glacial till deposits (Qvt). As reported on the geologic map resource, Vashon glacial till consists primarily of a non-sorted mixture of silt, sand, and sub-rounded to well-rounded gravels, commonly referred to as "hardpan." The till was deposited directly from the glacier as it advanced over bedrock and older Quaternary sediment. The referenced WSS resource identifies Tokul gravelly medial loam, 0 to 8 percent slopes, as the primary soil unit underlying the development area. Tokul series soils were formed over glacial till and volcanic ash. The referenced USDA soil survey characterizes this soil unit with slow surface water runoff and a slight hazard of water erosion.

Based on our field observations, on-site native soil generally correlates with glacial till deposits, which is consistent with local mapping.

Groundwater

Perched groundwater seepage was observed at boring location B-1 during the March 2023 subsurface exploration at a depth of approximately four and one-half feet bgs. Zones of perched groundwater seeps are common within glacial deposits depending on the time of year; as such, it is our opinion the contractor should be prepared to respond to discrete zones of perched groundwater during construction. Groundwater encountered during construction will likely be indicative of perched seepage rather than a seasonal high phreatic surface. Seepage rates and elevations fluctuate depending on many factors, including precipitation duration and intensity, the time of year, and soil conditions. In general, groundwater flow rates are higher during the winter, spring, and early summer months.

Geologically Hazardous Areas Review

The site and proposed development areas were evaluated for the presence of geologic hazard areas. ESNW consulted Article IV of Chapter 22E.010 of the Marysville Municipal Code, in addition to reviewing publicly available maps provided by the City of Marysville, to evaluate the presence of geologic hazard areas on site. Based on our evaluation and site observations, geologic hazard areas (landslide, seismic, or liquefaction hazard areas) are not present on the subject site.

DISCUSSION AND RECOMMENDATIONS

General

Based on the investigation, construction of the proposed car wash facility is feasible from a geotechnical standpoint. The primary geotechnical considerations for the proposal are associated with subgrade preparation, drainage, pavement sections, and foundation support.

In our opinion, the proposed structures can be constructed on conventional continuous and spread footing foundations bearing upon competent (undisturbed) native soil, recompacted native soil, or new structural fill. In general, where relatively undisturbed areas exist throughout the site (outside of the detention vault fill envelope), competent native soil suitable for support of the foundations will likely be encountered beginning at depths of about two feet below existing grades. Remedial earthwork and compaction activities for the site area atop the vault lid were recently completed and documented by ESNW. Based on our field observations and test results, as summarized in this report, it is our opinion a "pad ready" condition atop the vault lid was established in general accordance with our geotechnical recommendations and the plans.

Site Preparation and Earthwork

Initial site preparation activities will consist of installing temporary erosion control measures, establishing grading limits, and subgrade preparation. The native soil should be considered to have a moderate to high sensitivity to moisture; as such, if the soil is exposed to excessive moisture, successful placement and compaction of the soil may become difficult or impossible.

Temporary Erosion Control

The following temporary erosion and sediment control Best Management Practices (TESC BMPs) should be considered:

- Temporary construction entrances and drive lanes, consisting of at least six inches of quarry spalls, should be considered to both minimize off-site soil tracking and provide a stable access entrance surface. Placing geotextile fabric underneath the quarry spalls will provide greater stability, if needed.

- Silt fencing should be placed around the site perimeter.

- When not in use, soil stockpiles should be covered or otherwise protected to reduce the potential for soil erosion, especially during periods of wet weather.

- Temporary measures for controlling surface water runoff, such as interceptor trenches, sumps, or interceptor swales, should be installed prior to beginning earthwork activities.

- Dry soils disturbed during construction should be wetted to minimize dust and airborne soil erosion.

- When appropriate, permanent planting or hydroseeding will help to stabilize site soils.

Additional TESC BMPs, as specified by the project civil engineer and indicated on the plans and/or as required by the permitting jurisdiction, should be incorporated into construction activities. Temporary erosion control measures may be modified during construction as site conditions require and as recommended by the site erosion control lead.

In-situ and Imported Soils

Based on our field observations at the boring locations, soils likely to be exposed during earthwork and grading activities are considered moisture sensitive. Compaction of the on-site soil to structural fill specifications may prove difficult, particularly during wet weather conditions. If the moisture content of the on-site soil is at (or slightly above) the optimum level at the time of placement and compaction, the soil will likely be suitable for use as structural backfill; however, ESNW should ultimately provide confirmation at the time of construction. The stability of compacted areas may degrade if exposed to wet weather conditions and/or construction traffic. Where possible, we recommend the contractor avoid excessive site disturbance during adverse weather conditions to prevent project schedule delays and other unwanted effects. Ultimately, if the on-site soil cannot be successfully compacted, the use of an imported soil may be necessary.

Imported soil intended for use as structural fill should consist of a well-graded, granular soil with a moisture content that is at (or slightly above) the optimum level. During wet weather conditions, imported soil intended for use as structural fill should consist of a well-graded, granular soil with a fines content of 5 percent (where the fines content is defined as the percent passing the Number 200 sieve, based on the minus three-quarter-inch fraction).

Structural Fill

Structural fill is defined as compacted soil placed in foundation, slab-on-grade, roadway, permanent slope, retaining wall, and utility trench backfill areas. Structural fill placed and compacted during site grading activities should meet the following specifications and guidelines:

- Structural fill material — Granular soil
- Moisture content — At or slightly above optimum
- Relative compaction (minimum) — 95 percent (Modified Proctor)
- Loose lift thickness (maximum) — 12 inches

The existing soil may not be suitable for use as structural fill unless the soil is at (or slightly above) the optimum moisture content at the time of placement and compaction. Soil shall not be placed dry of the optimum moisture content and should be evaluated by ESNW during construction.

With respect to underground utility installations and backfill, local jurisdictions may dictate the soil type(s) and compaction requirements. Areas of otherwise unsuitable material and debris should be removed from structural areas and replaced with structural fill.

Temporary Excavations and Slopes

Excavation activities across the site are likely to expose medium dense native soil within the upper approximately two to three feet bgs, transitioning into dense to very dense glacial till with depth. Based on the soil conditions observed at the subsurface locations, the following allowable temporary slope inclinations, as a function of horizontal to vertical (H:V) inclination, may be used. The applicable Federal Occupation Safety and Health Administration and Washington Industrial Safety and Health Act soil classifications are also provided:

- Areas exposing groundwater seepage 1.5H:1V (Type C)
- Loose soil 1.5H:1V (Type C)
- Medium dense native soil 1H:1V (Type B)
- Dense to very dense native soil (hardpan) 0.75H:1V (Type A)

Steeper temporary excavations within very dense, cemented, and undisturbed native soil may be feasible during construction. As necessary during construction, ESNW should be retained to evaluate the feasibility of using steeper temporary excavations on a location-specific, case-by-case basis.

Permanent slopes should be planted with vegetation to enhance stability and to minimize erosion and should maintain a gradient of 2H:1V or flatter. The presence of perched groundwater may cause localized sloughing of temporary slopes. An ESNW representative should observe temporary and permanent slopes to confirm the slope inclinations are suitable for the exposed soil conditions and to provide additional excavation and slope recommendations, as necessary.

Subgrade Preparation

Foundations should be constructed on competent native soil or structural fill placed directly atop competent native soil. Loose or unsuitable soil conditions encountered below areas of footing and slab elements should be remedied as recommended in this report. Uniform compaction of the foundation and slab subgrade areas will establish a relatively consistent subgrade condition below the foundation and slab elements.

Regarding the existing fill atop the detention vault, it was our opinion (based on the initial March 2023 fieldwork and testing) that the fill was not suitable for direct structural support in situ. This opinion was based on our observations of loose to medium dense soil conditions and the results of in-place density testing, which were consistently below the industry-standard minimum of 95 percent of the Modified Proctor MDD. The fill was recommended to be improved prior to acceptance as a suitable bearing stratum for structural elements, and options to improve the fill included: removal and replacement with suitable structural fill, placed in one-foot-maximum loose lifts and mechanically compacted to at least 95 percent of the Modified Proctor MDD; or cement treatment of the fill using approved methodology. As summarized in the *Construction Observations and Testing* section of this report, supplementary earthwork and compaction activities in the vault area have been completed. Field reports are provided in Appendix C.

Subgrade areas outside of the detention vault backfill envelope were evaluated for the support of the proposed structures and slab subgrade areas. In addition to performing borings within the areas outside of the detention vault backfill envelope, an ESNW representative probed the subgrade outside of the vault area using a T-probe. Qualitative evaluation of the native soil using the T-probe suggested the native subgrade was in a generally medium dense to dense condition. Based on our field observations and subsurface exploration, the undisturbed native subgrade areas outside of the detention vault backfill envelope are considered competent for the support of the proposed structures and slab elements.

ESNW should be contacted to observe the foundation and slab subgrades prior to placing formwork. Supplementary recommendations for subgrade improvement can be provided at the time of construction and would likely include further mechanical compaction effort and/or overexcavation and replacement with suitable structural fill.

Foundations

The proposed structures can be constructed on conventional continuous and spread footing foundations bearing upon competent (undisturbed) native soil, recompacted native soil, or new structural fill. In general, where relatively undisturbed areas exist throughout the site (outside of the detention vault fill envelope), competent native soil suitable for support of the foundations will likely be encountered beginning at depths of about two feet below existing grades. Remedial earthwork and compaction activities for the site area atop the vault lid were recently completed and documented by ESNW. Based on our field observations and test results, as summarized in this report, it is our opinion a “pad ready” condition atop the vault lid was established in general accordance with our geotechnical recommendations and the plans.

Provided the structures will be supported as described above, the following parameters may be used for design of the new foundations:

- Allowable soil bearing capacity 2,500 psf
- Passive earth pressure 300 pcf (equivalent fluid)
- Coefficient of friction 0.40

A one-third increase in the allowable soil bearing capacity may be assumed for short-term wind and seismic loading conditions. The above passive earth pressure and coefficient of friction values include a factor-of-safety of 1.5. With structural loading as expected, total settlement in the range of one inch and differential settlement of about one-half inch is anticipated. Most settlement should occur during construction when dead loads are applied.

Seismic Design

The 2018 International Building Code (2018 IBC) recognizes the most recent edition of the Minimum Design Loads for Buildings and Other Structures manual (ASCE 7-16) for seismic design, specifically with respect to earthquake loads. Based on the soil conditions encountered at the boring locations, the parameters and values provided below are recommended for seismic design per the 2018 IBC.

Parameter	Value
Site Class	C*
Mapped short period spectral response acceleration, S_S (*g*)	1.104
Mapped 1-second period spectral response acceleration, S_1 (*g*)	0.392
Short period site coefficient, F_a	1.2
Long period site coefficient, F_v	1.5
Adjusted short period spectral response acceleration, S_{MS} (*g*)	1.325
Adjusted 1-second period spectral response acceleration, S_{M1} (*g*)	0.588
Design short period spectral response acceleration, S_{DS} (*g*)	0.883
Design 1-second period spectral response acceleration, S_{D1} (*g*)	0.392

* *Assumes dense to very dense soil conditions, encountered to a maximum depth of 15.5 feet during the March 2023 field exploration, remain very dense to at least 100 feet bgs. Based on our experience with the project geologic setting (glacial till) across the Puget Sound region, soil conditions are likely consistent with this assumption.*

Liquefaction is a phenomenon where saturated or loose soil suddenly loses internal strength and behaves as a fluid. This behavior is in response to increased pore water pressures resulting from an earthquake or another intense ground shaking. In our opinion, site susceptibility to liquefaction may be considered low. The absence of a uniformly established groundwater table and the relatively dense characteristics of the native soil were the primary bases for this opinion.

Slab-on-Grade Floors

Slab-on-grade floors for the proposed structures should be supported on well-compacted, firm, and unyielding subgrades. Where feasible, the native soil exposed at the slab-on-grade subgrade levels can likely be compacted in situ to the specifications of structural fill if groundwater seepage does not interfere with compaction activities. Unstable or yielding subgrade areas should be recompacted or overexcavated and replaced with suitable structural fill prior to slab construction.

A capillary break consisting of at least four inches of free-draining crushed rock or gravel should be placed below the slabs. The free-draining material should have a fines content of 5 percent or less (where the fines content is defined as the percent passing the Number 200 sieve, based on the minus three-quarter-inch fraction). In areas where slab moisture is undesirable, installation of vapor barriers below the slabs should be considered. If a vapor barrier is to be utilized, it should be a material specifically intended for use as a vapor barrier and should be installed per the specifications of the manufacturer.

Retaining Walls

Retaining walls must be designed to resist earth pressures and applicable surcharge loads. The following parameters may be used for design:

- Active earth pressure (unrestrained condition) 35 pcf (equivalent fluid)
- At-rest earth pressure (restrained condition) 55 pcf
- Traffic surcharge* (passenger vehicles) 70 psf (rectangular distribution)
- Passive earth pressure 300 pcf (equivalent fluid)
- Coefficient of friction 0.40
- Seismic surcharge 8H psf†

* *Where applicable.*
† *Where H equals the retained height (in feet).*

The passive earth pressure and coefficient of friction values include a safety factor of 1.5. The above design parameters are based on a level backfill condition and level grade at the wall toe. Revised design values will be necessary if sloping grades are to be used above or below retaining walls. Additional surcharge loading from adjacent foundations, sloped backfill, or other relevant loads should be included in the retaining wall design.

Retaining walls should be backfilled with free-draining material that extends along the height of the wall and a distance of at least 18 inches behind the wall. The upper 12 inches of the wall backfill may consist of a less permeable soil, if desired. A perforated drainpipe should be placed along the base of the wall and connected to an approved discharge location. A typical retaining wall drainage detail is provided on Plate 3. If drainage is not provided, hydrostatic pressures should be included in the wall design.

Drainage

Groundwater seepage should be anticipated in site excavations depending on the time of year grading operations take place. Temporary measures to control surface water runoff and groundwater during construction would likely involve interceptor trenches, interceptor swales, and sumps. ESNW should be consulted during preliminary grading to both identify areas of seepage and provide recommendations to reduce the potential for seepage-related instability.

Finish grades must be designed to direct surface drain water away from the structure and slopes. Water must not be allowed to pond adjacent to the structure or slopes. Grades adjacent to the building should be sloped away from the building at a gradient of either at least 2 percent for a horizontal distance of 10 feet or the maximum allowed by adjacent structures. In our opinion, foundation drains should be installed along building perimeter footings. A typical foundation drain detail is provided on Plate 4.

Infiltration Feasibility

As indicated in the *Subsurface* section of this report, native soils encountered during the fieldwork were characterized primarily as dense to very glacial till deposits. In our opinion, infiltration should not be considered a viable means of stormwater management for this project from a geotechnical standpoint. The native soil densifies relatively shallowly and, for practicable design purposes, functions as a hydrologically restrictive layer.

Utility Support and Trench Backfill

The native soil should generally be suitable for utility support. However, remedial measures may be necessary in some areas to provide support for utilities, such as overexcavation and replacement with structural fill and/or placement of geotextile fabric. Groundwater seepage may be encountered within utility excavations, and caving of trench walls may occur where groundwater is encountered. Active dewatering of perched seepage zones may be necessary during utility excavation and installation.

The on-site soil may not be suitable for use as structural backfill throughout utility trench excavations unless the soil is at (or slightly above) the optimum moisture content at the time of placement and compaction. If utility installation occurs during the wet season, site soils will likely be saturated and therefore difficult to use as utility backfill without treatment or aeration. Each section of the utility lines must be adequately supported in the bedding material. Utility trench backfill should be placed and compacted to the specifications of structural fill, as previously detailed in this report, or to the applicable specifications of the presiding jurisdiction.

Preliminary Pavement Sections

The performance of site pavements is largely related to the condition of the underlying subgrade. To ensure adequate pavement performance, the subgrade should be in a firm and unyielding condition when subjected to proofrolling with a loaded dump truck. Structural fill in pavement areas should be compacted to the specifications previously detailed in this report. Soft, wet, or otherwise unsuitable subgrade areas may still exist after base grading activities. Areas containing unsuitable or yielding subgrade conditions will require remedial measures, such as overexcavation and replacement with crushed rock or structural fill, prior to pavement.

For relatively high volume, heavily loaded pavements areas subjected to occasional truck traffic, the following preliminary asphalt pavement sections may be considered:

- A minimum of three inches of hot-mix asphalt (HMA) placed over six inches of crushed rock base (CRB).

- A minimum of three inches of HMA placed over four and one-half inches of asphalt-treated base (ATB).

The HMA, ATB, and CRB materials should conform to WSDOT and/or City of Marysville specifications. All soil base material within the upper 12 inches of the pavement subgrade should be compacted to at least 95 percent of the MDD (per ASTM D1557). Final pavement design recommendations can be provided once final traffic loading has been determined. City of Marysville standards may supersede the recommendations provided in this report.

With respect to concrete pavement design, the following preliminary pavement section may be considered:

- A minimum of six inches of 4,000-psi jointed plain concrete pavement (JPCP) placed over at least six inches of CRB (see note below regarding fiber-reinforcement additives).

The concrete mix and CRB should conform to WSDOT and/or City of Marysville specifications. All soil base material should be compacted to at least 95 percent of the MDD (per ASTM D1557).

Based on the referenced fiber-reinforced concrete technical reports, fiber dosages on the order of 3 to 4 pounds per cubic yard of macro-synthetic fibers can be considered as an alternative to conventional jointed pavement designs to offer an element of shrinkage and crack control in addition to improved toughness. ESNW must be contacted to confirm that subgrade conditions below the pavement section are firm and unyielding prior to placement of CRB and JPCP.

Final pavement design recommendations can be provided once final traffic loading has been determined. City of Marysville standards may supersede the recommendations provided in this report.

Due to the low permeability of the near-surface native soil, where inverted crown roadways are used, additional sub-pavement drainage (such as lateral drains connecting to catch basins) should be considered to assist in maintaining road subgrade and pavement stability.

CONSTRUCTION OBSERVATIONS AND TESTING

Based on the findings and test results of the March 2023 field exploration as well as the recommendations provided in earlier sections of this report (see the *Fill atop Detention Vault* and *Subgrade Preparation* sections), supplementary earthwork activities atop the vault were necessary to establish a “pad ready” condition. The primary tasks were to install geofoam above a portion of the vault lid and to establish suitable bearing conditions across the entire vault area. ESNW was retained to provide earthwork observation and testing services during the supplementary earthwork activities. Field reports are provided in Appendix C.

The following construction activities and test results were observed and documented during the field visits by ESNW representatives:

- The existing fill atop the vault lid was completely removed.
- Geofoam was installed atop the vault lid across the approximate northern half of the vault.
- Native soil ("till fill") was used to restore the vault lid excavation. The soil was placed in 12-inch-thick loose lifts (approximately) and was compacted using a vibratory drum roller. Compaction testing occurred at each lift, and a total of 58 density tests were completed. Density test results indicate adequate compaction of at least 95 percent of the laboratory-determined MDD (per ASTM D1557) was achieved at the tested locations.

Based on our observations of the contractor's earthwork as well as the results of representative compaction testing, it is our opinion the earthwork activities associated with establishing a "pad ready" condition atop the vault lid were completed in general accordance with our geotechnical recommendations and the plans.

LIMITATIONS

This study has been prepared for the exclusive use of Car Wash Enterprises, Inc., and its representatives. The recommendations and conclusions provided in this geotechnical engineering study are professional opinions consistent with the level of care and skill that is typical of other members in the profession currently practicing under similar conditions in this area. A warranty is not expressed or implied. Variations in the soil and groundwater conditions encountered at the boring locations may exist and may not become evident until construction. ESNW should reevaluate the conclusions provided in this geotechnical engineering study if variations are encountered.

Additional Services

ESNW should have an opportunity to review the final design with respect to the geotechnical recommendations provided in this report. ESNW should also be retained to provide testing and consultation services during construction.

NORTH

Reference:
Snohomish County, Washington
OpenStreetMap.org

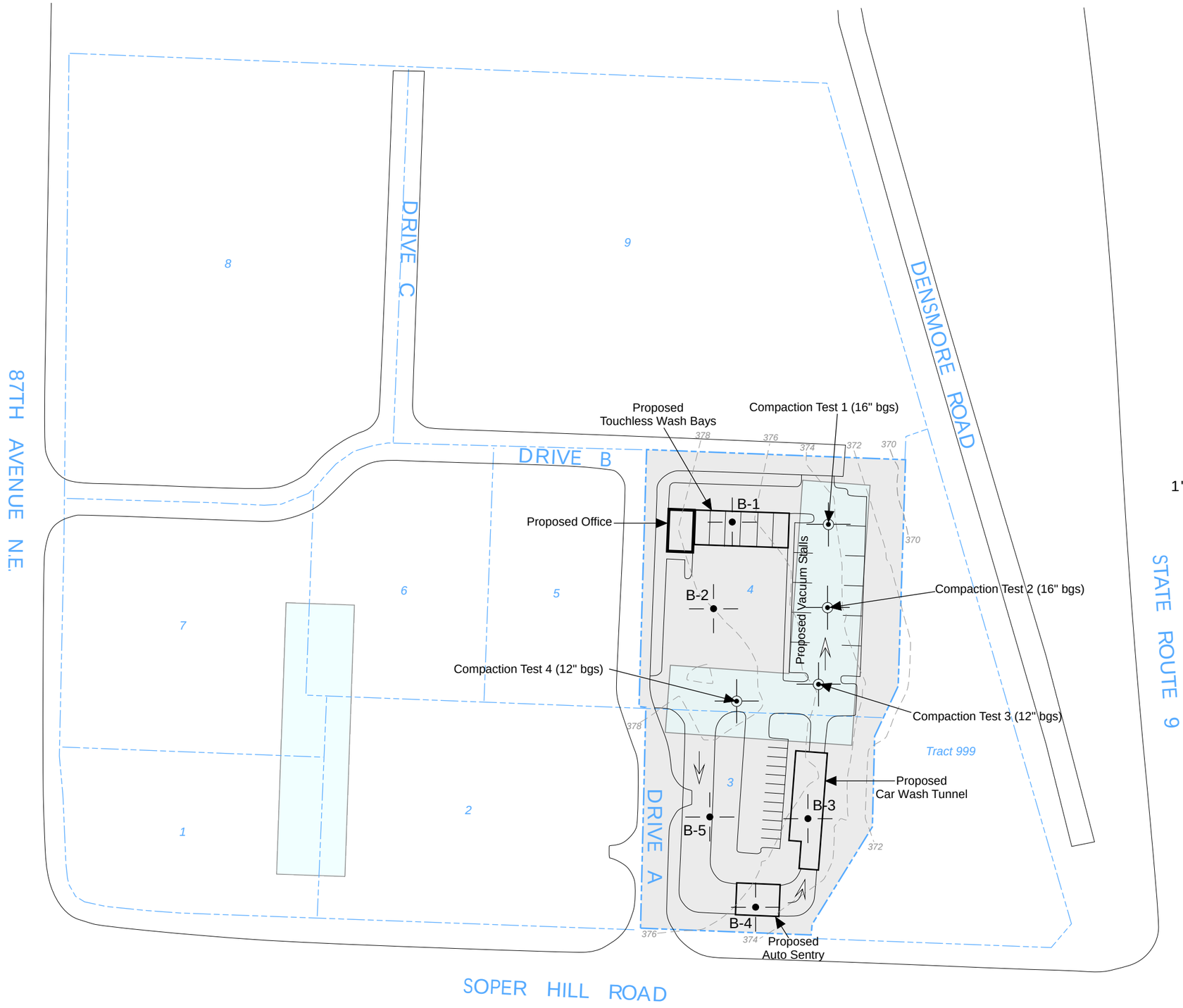
NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

Earth Solutions NW LLC

Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Vicinity Map
Brown Bear Marysville
Marysville, Washington

Drawn CAM	Date 04/14/2023	Proj. No. 9134
Checked AZS	Date April 2023	Plate 1



LEGEND

- B-1 — Approximate Location of ESNW Boring, Proj. No. ES-9134, March 2023
- Subject Site
- Existing Detention Vault
- 5 — Lot Number

NORTH

1"=100'

0 50 100 200

Scale in Feet

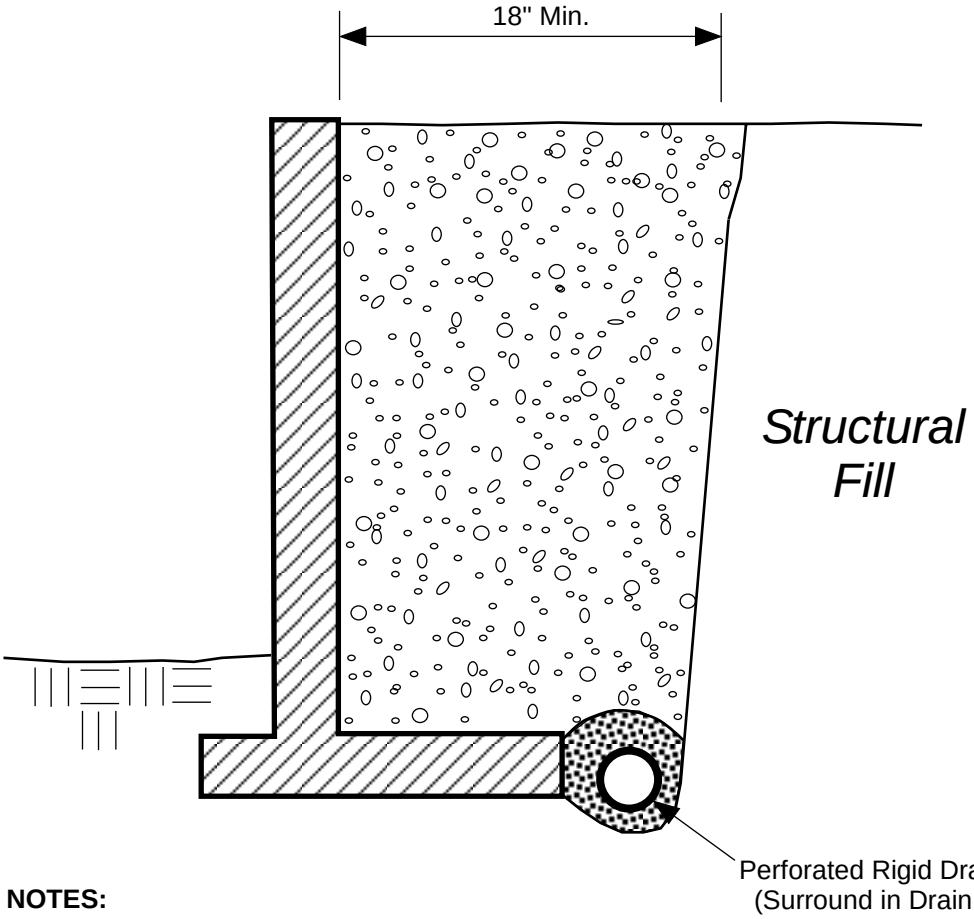
NOTE: The graphics shown on this plate are not intended for design purposes or precise scale measurements, but only to illustrate the approximate test locations relative to the approximate locations of existing and / or proposed site features. The information illustrated is largely based on data provided by the client at the time of our study. ESNW cannot be responsible for subsequent design changes or interpretation of the data by others.

NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

Boring Location Plan
Brown Bear Marysville
Marysville, Washington

Earth Solutions NW LLC
Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Drawn	CAM
Checked	AZS
Date	04/17/2023
Proj. No.	9134
Plate	2



NOTES:

- Free-draining Backfill should consist of soil having less than 5 percent fines. Percent passing No. 4 sieve should be 25 to 75 percent.
- Sheet Drain may be feasible in lieu of Free-draining Backfill, per ESNW recommendations.
- Drain Pipe should consist of perforated, rigid PVC Pipe surrounded with 1-inch Drain Rock.

SCHEMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING

LEGEND:

Free-draining Structural Backfill

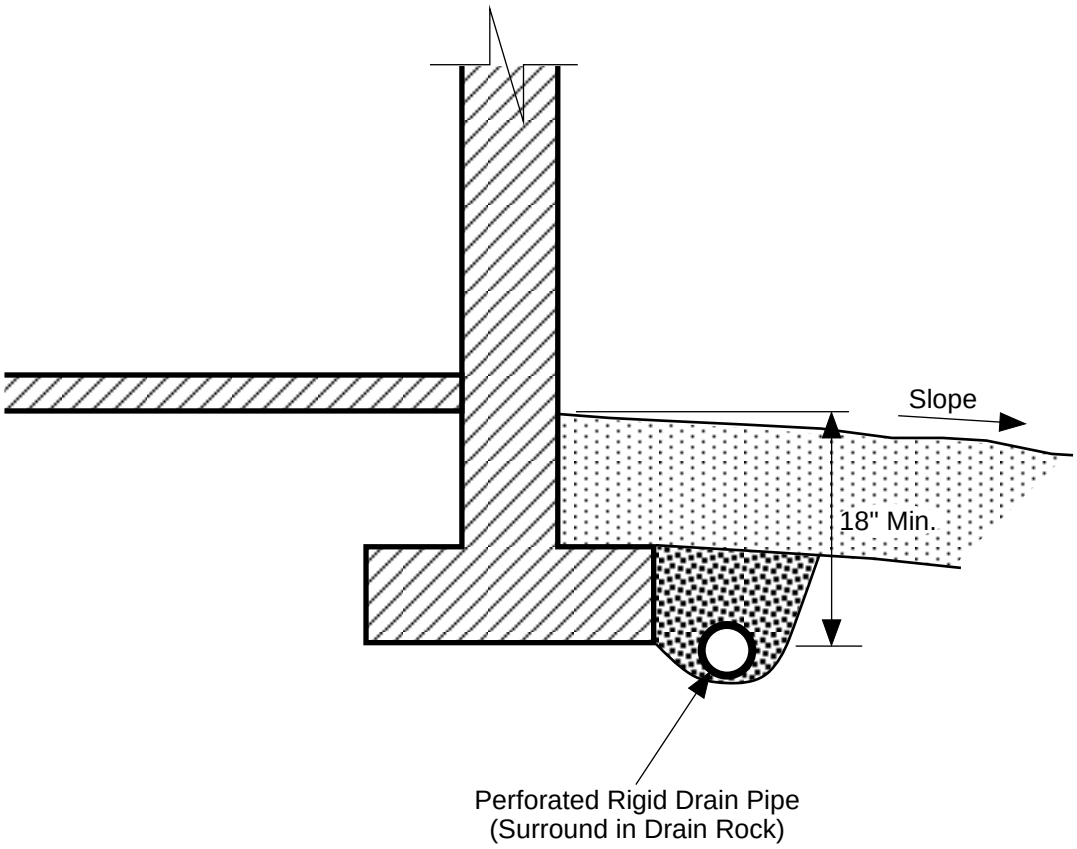
1-inch Drain Rock

Earth Solutions NW LLC

Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Retaining Wall Drainage Detail
Brown Bear Marysville
Marysville, Washington

Drawn CAM	Date 04/14/2023	Proj. No. 9134
Checked AZS	Date April 2023	Plate 3



NOTES:

- Do NOT tie roof downspouts to Footing Drain.
- Surface Seal to consist of 12" of less permeable, suitable soil. Slope away from building.

SCHEMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING

LEGEND:

Surface Seal: native soil or other low-permeability material.

1-inch Drain Rock

Earth Solutions NW LLC
Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Footing Drain Detail
Brown Bear Marysville
Marysville, Washington

Drawn CAM	Date 04/14/2023	Proj. No. 9134
Checked AZS	Date April 2023	Plate 4

Appendix A

Subsurface Exploration
Boring Logs

ES-9134

Subsurface conditions at the subject site were explored on March 29, 2023. Five soil borings were advanced at accessible locations within the property, using a drill rig and operators retained by ESNW. The approximate locations of the borings are illustrated on Plate 2 of this study. The boring logs are provided in this Appendix. The borings were advanced to a maximum depth of approximately 15.5 feet bgs.

The final logs represent the interpretations of the field logs and the results of laboratory analyses. The stratification lines on the logs represent the approximate boundaries between soil types. In actuality, the transitions may be more gradual.

Coarse-Grained Soils - More Than 50% Retained on No. 200 Sieve	Gravels - More Than 50% of Coarse Fraction Retained on No. 4 Sieve	< 5% Fines	GW	Well-graded gravel with or without sand, little to no fines
			GP	Poorly graded gravel with or without sand, little to no fines
		> 12% Fines	GM	Silty gravel with or without sand
			GC	Clayey gravel with or without sand
	Sands - 50% or More of Coarse Fraction Passes No. 4 Sieve	< 5% Fines	SW	Well-graded sand with or without gravel, little to no fines
			SP	Poorly graded sand with or without gravel, little to no fines
		> 12% Fines	SM	Silty sand with or without gravel
			SC	Clayey sand with or without gravel
Fine-Grained Soils - 50% or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less Than 50		ML	Silt with or without sand or gravel; sandy or gravelly silt
			CL	Clay of low to medium plasticity; lean clay with or without sand or gravel; sandy or gravelly lean clay
			OL	Organic clay or silt of low plasticity
	Silts and Clays Liquid Limit 50 or More		MH	Elastic silt with or without sand or gravel; sandy or gravelly elastic silt
			CH	Clay of high plasticity; fat clay with or without sand or gravel; sandy or gravelly fat clay
			OH	Organic clay or silt of medium to high plasticity
Highly Organic Soils			PT	Peat, muck, and other highly organic soils
Fill			FILL	Made Ground

Moisture Content

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

Damp - Perceptible moisture, likely below optimum MC

Moist - Damp but no visible water, likely at/near optimum MC

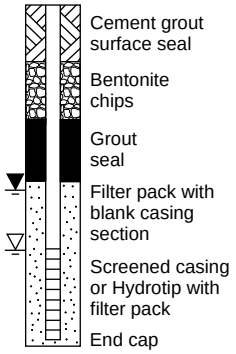
Wet - Water visible but not free draining, likely above optimum MC

Saturated/Water Bearing - Visible free water, typically below groundwater table

Symbols

ATD = At time of drilling

Static water level (date)



Terms Describing Relative Density and Consistency

Coarse-Grained Soils:

Density	SPT blows/foot
Very Loose	< 4
Loose	4 to 9
Medium Dense	10 to 29
Dense	30 to 49
Very Dense	≥ 50

Fine-Grained Soils:

Consistency	SPT blows/foot
Very Soft	< 2
Soft	2 to 3
Medium Stiff	4 to 7
Stiff	8 to 14
Very Stiff	15 to 29
Hard	≥ 30

Test Symbols & Units

Fines = Fines Content (%)

MC = Moisture Content (%)

DD = Dry Density (pcf)

Str = Shear Strength (tsf)

PID = Photoionization Detector (ppm)

OC = Organic Content (%)

CEC = Cation Exchange Capacity (meq/100 g)

LL = Liquid Limit (%)

PL = Plastic Limit (%)

PI = Plasticity Index (%)

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)

Modifier Definitions

Percentage by Weight (Approx.)	Modifier
< 5	Trace (sand, silt, clay, gravel)
5 to 14	Slightly (sandy, silty, clayey, gravelly)
15 to 29	Sandy, silty, clayey, gravelly
≥ 30	Very (sandy, silty, clayey, gravelly)

Classifications of soils in this geotechnical report and as shown on the exploration logs 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 D2487 and D2488 were used as an identification guide for the Unified Soil Classification System.

Earth Solutions NW LLC
Geotechnical Engineering, Construction Observation/Testing and Environmental Services

EXPLORATION LOG KEY

Earth Solutions NW, LLC
15365 N.E. 90th Street, Suite 100
Redmond, Washington 98052
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-1

PROJECT NUMBER ES-9134 **PROJECT NAME** Brown Bear Marysville

DATE STARTED 3/29/23 **COMPLETED** 3/29/23 **GROUND ELEVATION** 374 ft

DRILLING CONTRACTOR Geologic Drill Partners **LATITUDE** 48.02272 **LONGITUDE** -122.11115

LOGGED BY KTK **CHECKED BY** KDH **GROUND WATER LEVEL:**

NOTES ▽ **AT TIME OF DRILLING**

SURFACE CONDITIONS Grass **AFTER DRILLING**

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0							Gray silty SAND with gravel, medium dense, moist
	SS	33	10-12-13 (25)	MC = 7.3			
5							-light groundwater seepage
	SS	44	5-18-23 (41)	MC = 12.3			-becomes dense to very dense
	SS	100	50/5"	MC = 9.2	SM		
10							
	SS	67	11-15-23 (38)	MC = 12.0			
	SS	55	37-50/5"	MC = 10.0			
15							
	SS	100	50/5"	MC = 7.8 Fines = 35.2			[USDA Classification: gravelly LOAM]
						15.5	358.5

Boring terminated at 15.5 feet below existing grade. Groundwater seepage encountered at 4.5 feet during drilling. Boring backfilled with bentonite chips.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

Earth Solutions NW, LLC
15365 N.E. 90th Street, Suite 100
Redmond, Washington 98052
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-2

PROJECT NUMBER ES-9134 **PROJECT NAME** Brown Bear Marysville

DATE STARTED 3/29/23 **COMPLETED** 3/29/23 **GROUND ELEVATION** 374 ft

DRILLING CONTRACTOR Geologic Drill Partners **LATITUDE** 48.02252 **LONGITUDE** -122.11121

LOGGED BY KTK **CHECKED BY** KDH **GROUND WATER LEVEL:**

NOTES ▽ **AT TIME OF DRILLING**

SURFACE CONDITIONS Grass **AFTER DRILLING**

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					SM		Gray silty SAND with gravel, dense to very dense, moist
	SS	44	11-20-37 (57)	MC = 7.2			
5	SS	73	11-50/5"	MC = 11.7			
							-becomes dense
	SS	100	10-14-22 (36)	MC = 10.9			
10	SS	100	13-50/6"	MC = 13.0			-becomes very dense
	SS	46	25-50/5"	MC = 12.5			
15	SS	100	50/4"	MC = 8.3			
						15.5	358.5

Boring terminated at 15.5 feet below existing grade. No groundwater encountered during drilling. Boring backfilled with bentonite chips and sand.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

Earth Solutions NW, LLC
15365 N.E. 90th Street, Suite 100
Redmond, Washington 98052
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-3

PROJECT NUMBER ES-9134 **PROJECT NAME** Brown Bear Marysville

DATE STARTED 3/29/23 **COMPLETED** 3/29/23 **GROUND ELEVATION** 374 ft

DRILLING CONTRACTOR Geologic Drill Partners **LATITUDE** 48.02196 **LONGITUDE** -122.11082

LOGGED BY KTK **CHECKED BY** KDH **GROUND WATER LEVEL:**

NOTES ▽ **AT TIME OF DRILLING**

SURFACE CONDITIONS Grass **AFTER DRILLING**

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0							Gray silty SAND with gravel, medium dense, moist
	SS	67	8-13-16 (29)	MC = 12.3 Fines = 39.6			[USDA Classification: gravelly LOAM]
5							-becomes moist to wet
	SS	56	12-18-34 (52)	MC = 9.3	SM		-becomes very dense
							-becomes moist
	SS	100	50/5"	MC = 8.3			
10							
	SS	33	24-28-30 (58)	MC = 11.4			
							11.5 362.5

Boring terminated at 11.5 feet below existing grade due to refusal on rocks. No groundwater encountered during drilling. Boring backfilled with bentonite chips.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

Earth Solutions NW, LLC
15365 N.E. 90th Street, Suite 100
Redmond, Washington 98052
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-4

PROJECT NUMBER ES-9134 **PROJECT NAME** Brown Bear Marysville

DATE STARTED 3/29/23 **COMPLETED** 3/29/23 **GROUND ELEVATION** 374 ft

DRILLING CONTRACTOR Geologic Drill Partners **LATITUDE** 48.02182 **LONGITUDE** -122.11106

LOGGED BY KTK **CHECKED BY** KDH **GROUND WATER LEVEL:**

NOTES ▽ **AT TIME OF DRILLING**

SURFACE CONDITIONS Grass **AFTER DRILLING**

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0							Brown silty SAND, dense, moist
	SS	33	12-18-28 (46)	MC = 11.5 Fines = 45.2			[USDA Classification: gravelly LOAM]
5							
	SS	67	12-20-17 (37)	MC = 6.7	SM		-becomes gray, moist to wet
	SS	100	26-50/6"	MC = 9.0			-becomes very dense, moist, increased gravel content to BOH
10							
	SS	100	50/6"	MC = 10.1			
	SS	0	50/2"			12.5	-no recovery at BOH 361.5

Boring terminated at 12.5 feet below existing grade due to refusal. No groundwater encountered during drilling. Boring backfilled with bentonite chips.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

Earth Solutions NW, LLC
15365 N.E. 90th Street, Suite 100
Redmond, Washington 98052
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-5

PROJECT NUMBER ES-9134 **PROJECT NAME** Brown Bear Marysville

DATE STARTED 3/29/23 **COMPLETED** 3/29/23 **GROUND ELEVATION** 374 ft

DRILLING CONTRACTOR Geologic Drill Partners **LATITUDE** 48.02196 **LONGITUDE** -122.11119

LOGGED BY KTK **CHECKED BY** KDH **GROUND WATER LEVEL:**

NOTES ▽ **AT TIME OF DRILLING**

SURFACE CONDITIONS Grass **AFTER DRILLING**

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0							Brown silty SAND, medium dense, moist
	SS	67	9-13-17 (30)	MC = 9.3			
5	SS	100	50/5"	MC = 9.1	SM		-becomes gray, very dense
	SS	100	24-50/3"	MC = 9.6 Fines = 49.6			[USDA Classification: gravelly LOAM]
10	SS	100	50/5"	MC = 8.5			-increased gravel content to BOH
	SS	0	50/2"				-no recovery at BOH
12.5							361.5

Boring terminated at 12.5 feet below existing grade due to refusal. No groundwater encountered during drilling. Boring backfilled with bentonite chips.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

Appendix B

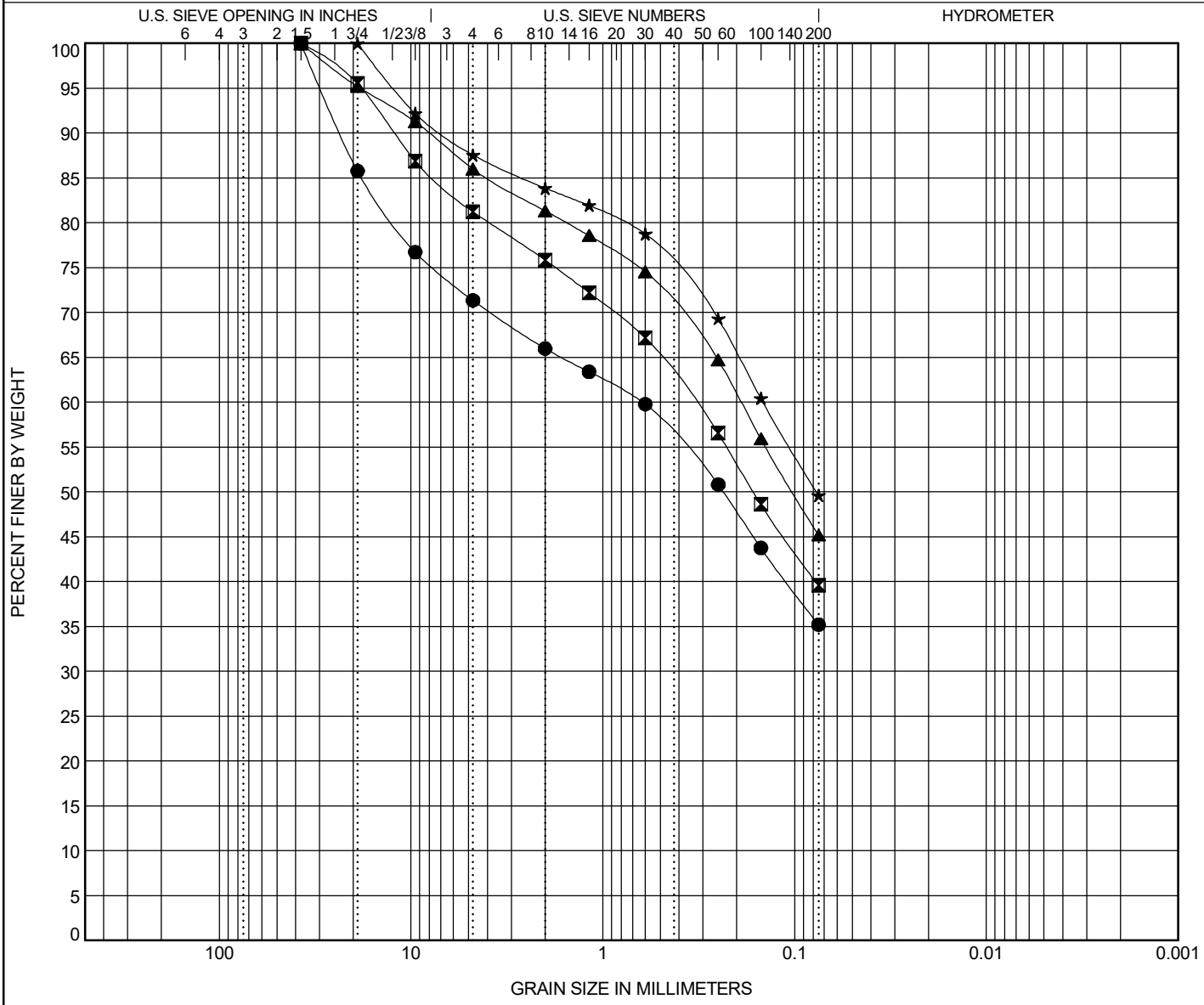
Laboratory Test Results

ES-9134

Earth Solutions NW, LLC
15365 N.E. 90th Street, Suite 100
Redmond, Washington 98052
Telephone: 425-449-4704
Fax: 425-449-4711

GRAIN SIZE DISTRIBUTION

PROJECT NUMBER ES-9134 **PROJECT NAME** Brown Bear Marysville



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	Cc	Cu
●	B-01	15.00ft.	USDA: Gray Gravelly Loam. USCS: SM with Gravel.		
⊠	B-03	2.50ft.	USDA: Gray Gravelly Loam. USCS: SM with Gravel.		
▲	B-04	2.50ft.	USDA: Brown Gravelly Loam. USCS: SM.		
★	B-05	7.50ft.	USDA: Gray Gravelly Loam. USCS: SM.		

Specimen Identification			D100	D60	D30	D10	LL	PL	PI	%Silt	%Clay
●	B-01	15.0ft.	37.5	0.624						35.2	
⊠	B-03	2.5ft.	37.5	0.332						39.6	
▲	B-04	2.5ft.	37.5	0.19						45.2	
★	B-05	7.5ft.	19	0.146						49.6	

Earth Solutions NW, LLC
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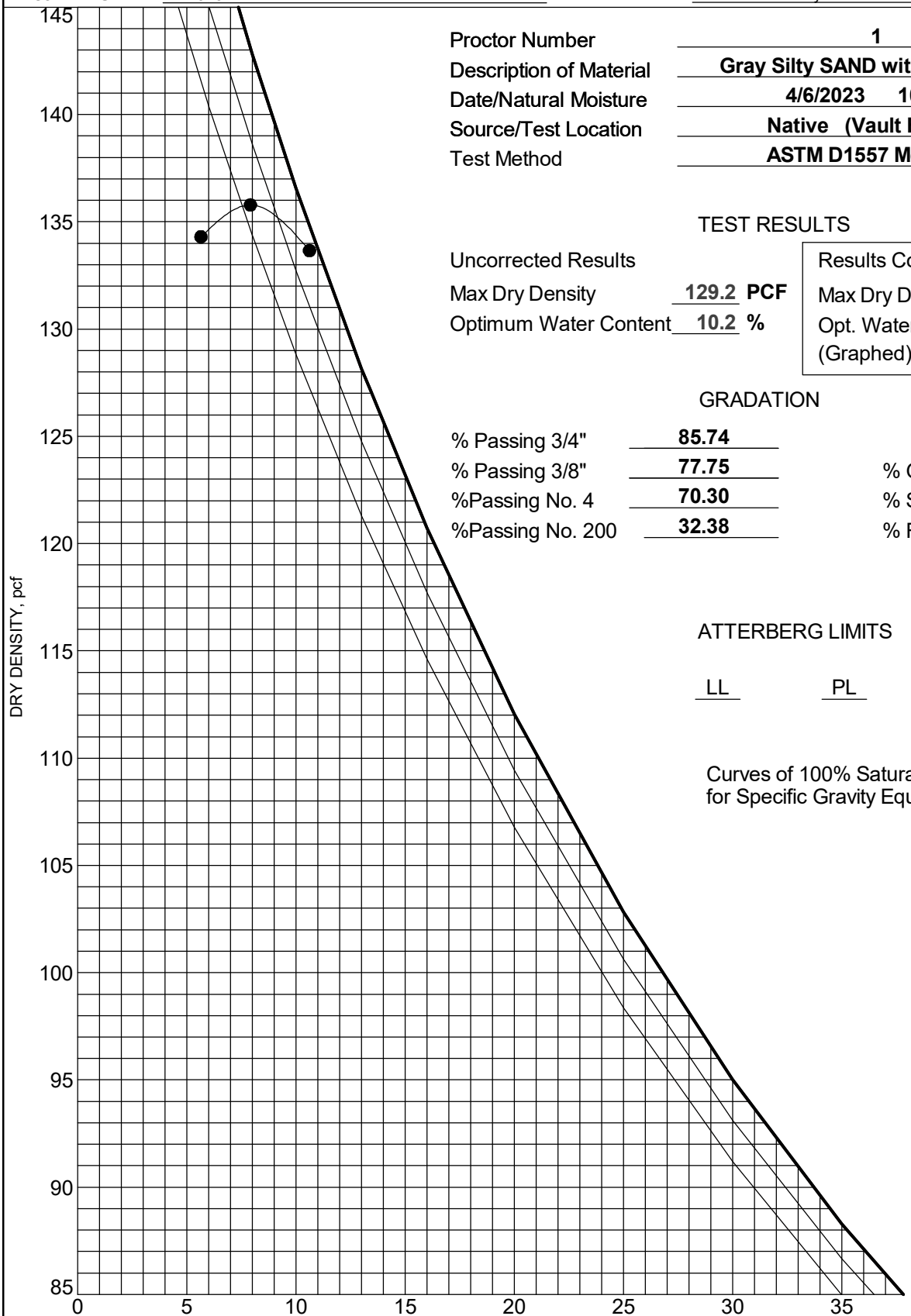
Telephone: (425) 449-4704

MOISTURE-DENSITY RELATIONSHIP

PROJECT NUMBER ES-9134 **PROJECT NAME** Brown Bear Marysville



Proctor Number	1
Description of Material	Gray Silty SAND with Gravel, SM
Date/Natural Moisture	4/6/2023 10.92%
Source/Test Location	Native (Vault Backfill)
Test Method	ASTM D1557 Method B

TEST RESULTS

Uncorrected Results		
Max Dry Density	129.2	PCF
Optimum Water Content	10.2	%

Results Corrected for Rocks		
Max Dry Density	135.8	PCF
Opt. Water Content (Graphed)	8.0	%

GRADATION

% Passing 3/4"	85.74
% Passing 3/8"	77.75
%Passing No. 4	70.30
%Passing No. 200	32.38

USCS:

% Gravel	29.7
% Sand	37.9
% Fines	32.4

ATTERBERG LIMITS

LL	PL	PI

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

COMPACTION. RC GRAPHED ES-9134 BROWN BEAR MARYSVILLE.GPJ GINT US LAB.GDT 4/6/23

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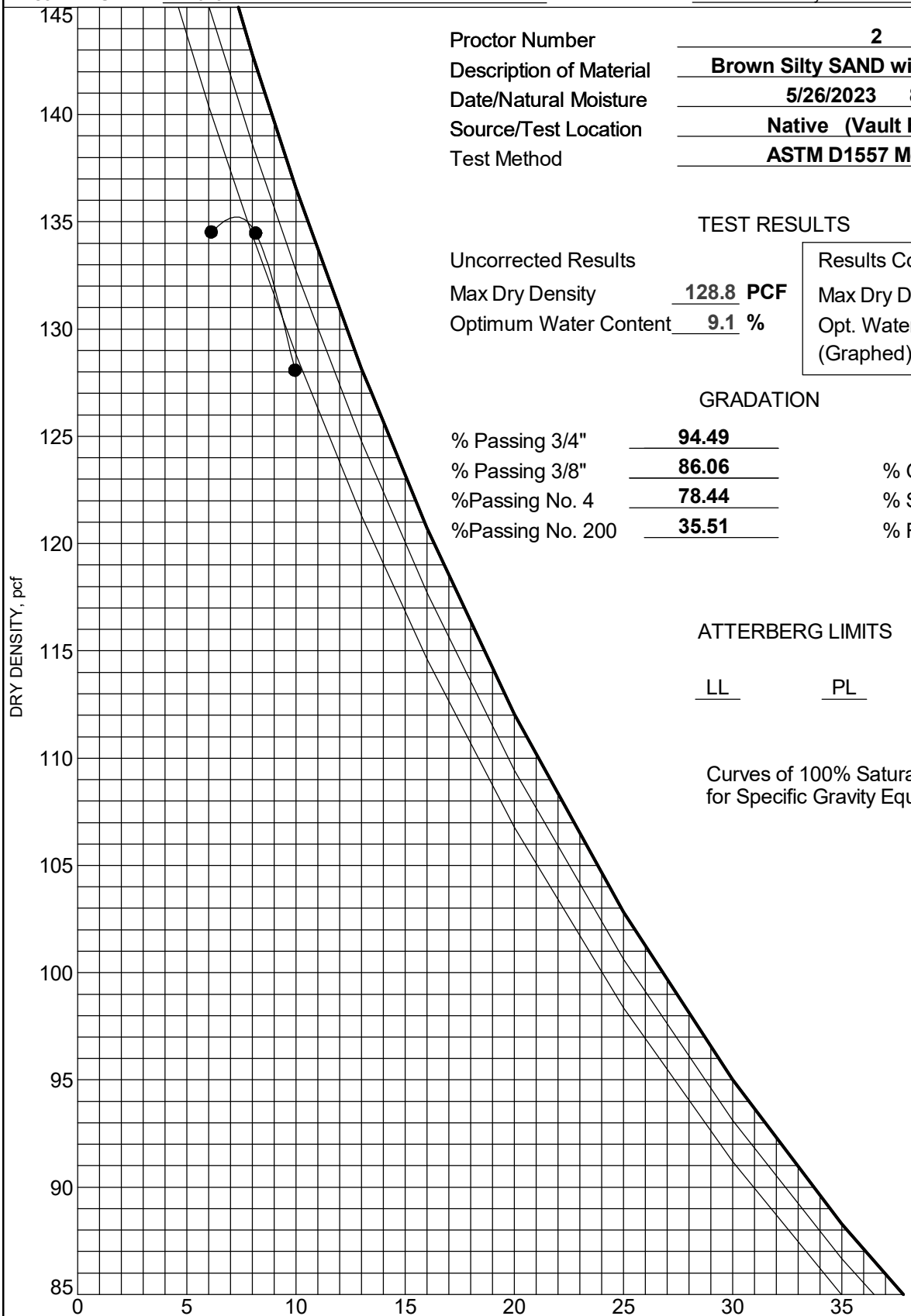
MOISTURE-DENSITY RELATIONSHIP

PROJECT NUMBER ES-9134 **PROJECT NAME** Brown Bear Marysville



Proctor Number	**2**
Description of Material	**Brown Silty SAND with Gravel, SM**
Date/Natural Moisture	**5/26/2023 8.35%**
Source/Test Location	**Native (Vault Backfill)**
Test Method	**ASTM D1557 Method A**

TEST RESULTS

Uncorrected Results		
Max Dry Density	**128.8**	**PCF**
Optimum Water Content	**9.1**	**%**

Results Corrected for Rocks		
Max Dry Density	**135.3**	**PCF**
Opt. Water Content (Graphed)	**7.3**	**%**

GRADATION

		USCS:	
% Passing 3/4"	**94.49**		
% Passing 3/8"	**86.06**	% Gravel	**21.6**
%Passing No. 4	**78.44**	% Sand	**42.9**
%Passing No. 200	**35.51**	% Fines	**35.5**

ATTERBERG LIMITS

LL	PL	PI

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

COMPACTION. RC GRAPHED ES-9134 BROWN BEAR MARYSVILLE.GPJ GINT US LAB.GDT 5/26/23

Appendix C

Field Reports

ES-9134

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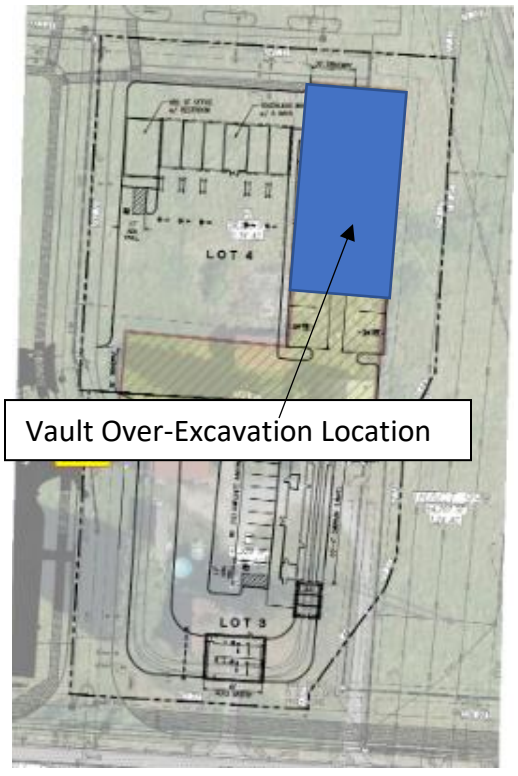
FIELD REPORT

Project No.	9134.01 Page 1 of 2	Report ID	9134.01 G 2023 0524
Date	Wed 5/24/2023	Weather	72ºF, Partly Cloudy
Arrival/Departure Time(s)	8:00 – 10:00 AM	Travel Time (hr)	0.75
Project Name	Brown Bear Marysville		
Location	8833 Soper Hill Rd, Marysville		
ESNW Rep. & Phone	Dmitri Chomica 206.823.4839		
Client Info/Contact	Car Wash Enterprises, Inc. | Joe Giuseffi		
Client Rep. Info/Contact	Evergreen Environmental Services, Inc. | John Hines		
Grading Contractor Info/Contact	Taylor's Excavators, Inc.		
Reviewed By	N/A (Field Supervisor)	KDH (Project Manager)	KDH 5/30 (Initials/Date)

Limitations: The presence of our field representative at the site is to provide our client with a source of professional advice, opinions, and recommendations based upon the field representative's observations and testing of the contractor's work. Our services do not include supervision or direction of the contractor, their employees, or agents. Geotechnical recommendations for obtaining project objectives may be made by our representatives; however, direction of the actual work should come from the owner or contractor, as appropriate. The contractor is responsible for complying with the contract documents at all times, regardless of the presence of our field representative. Jobsite safety, including compliance with all applicable state or federal regulations, is the sole responsibility of the contractor. The observations, recommendations, and conclusions provided in this field report are preliminary until reviewed by the ESNW project manager.

ESNW rep. was on site to observe conditions of over-excavation of vault backfill. While on site, the following was observed:

Vault Backfill Over-Excavation Observations:
ESNW rep. observed the contractor begin removing previously installed soil from the vault lid on the north portion of the vault. ESNW rep. observed the contractor expose the vault lid and begin to install geofoam. See map below and photo on page 2. ESNW rep. will return for continued observations.



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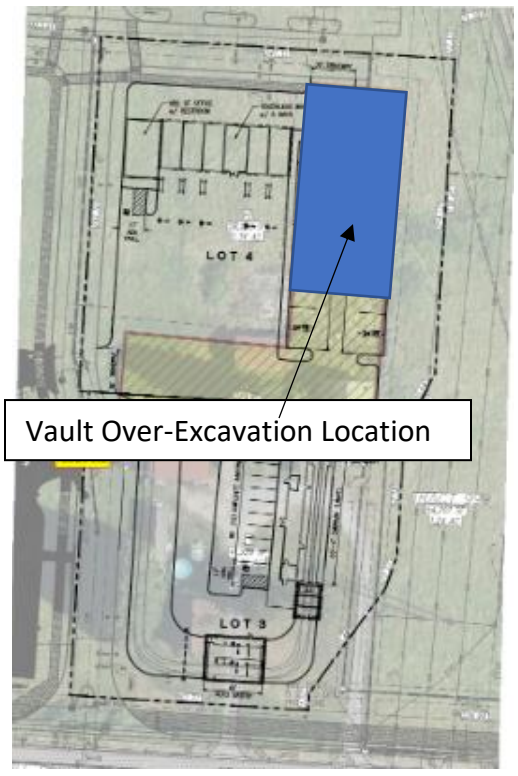
FIELD REPORT

Project No.	9134.01	Page 1 of 2		Report ID	9134.01 G 2023 0525
Date	Thu 5/25/2023			Weather	73ºF, Partly Cloudy
Arrival/Departure Time(s)	10:30 – 11:30 AM			Travel Time (hr)	0.75
Project Name	Brown Bear Marysville				
Location	8833 Soper Hill Rd, Marysville				
ESNW Rep. & Phone	Dmitri Chomica 206.823.4839				
Client Info/Contact	Car Wash Enterprises, Inc. | Joe Giuseffi				
Client Rep. Info/Contact	Evergreen Environmental Services, Inc. | John Hines				
Grading Contractor Info/Contact	Taylor's Excavators, Inc.				
Reviewed By	N/A (Field Supervisor)	(Initials/Date)	KDH (Project Manager)	KDH 5/30 (Initials/Date)	

Limitations: The presence of our field representative at the site is to provide our client with a source of professional advice, opinions, and recommendations based upon the field representative's observations and testing of the contractor's work. Our services do not include supervision or direction of the contractor, their employees, or agents. Geotechnical recommendations for obtaining project objectives may be made by our representatives; however, direction of the actual work should come from the owner or contractor, as appropriate. The contractor is responsible for complying with the contract documents at all times, regardless of the presence of our field representative. Jobsite safety, including compliance with all applicable state or federal regulations, is the sole responsibility of the contractor. The observations, recommendations, and conclusions provided in this field report are preliminary until reviewed by the ESNW project manager.

ESNW rep. was on site to observe conditions of over-excavation of vault backfill. While on site, the following was observed:

Vault Backfill Over-Excavation Observations:
ESNW rep. observed the contractor continue to install geofoam on the vault lid. See map below and photo on page 2. ESNW rep. was informed by the contractor that backfill will occur the following day. ESNW rep. will return to observe continued vault backfill activities.



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FIELD REPORT

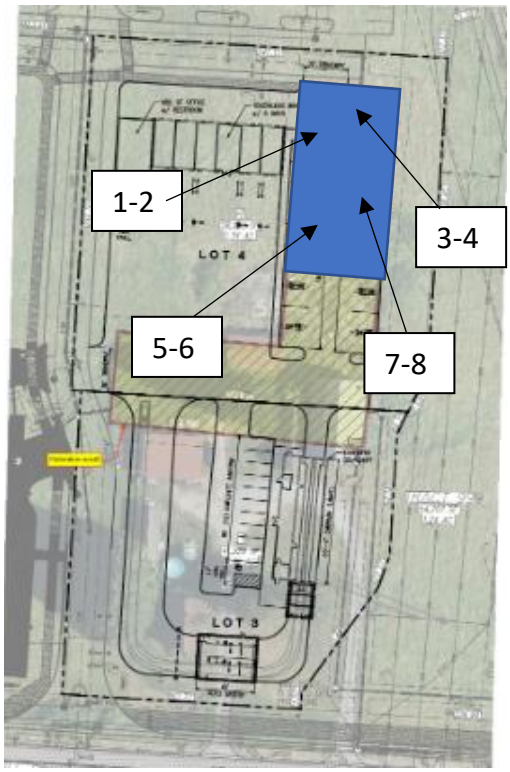
Project No.	9134.01 Page 1 of 3	Report ID	9134.01 G 2023 0526
Date	Fri 5/26/2023	Weather	74ºF, Partly Cloudy
Arrival/Departure Time(s)	9:00 – 12:00 PM 1:15 – 3:00 PM	Travel Time (hr)	1.0
Project Name	Brown Bear Marysville		
Location	8833 Soper Hill Rd, Marysville		
ESNW Rep. & Phone	Dmitri Chomica 206.823.4839		
Client Info/Contact	Car Wash Enterprises, Inc. | Joe Giuseffi		
Client Rep. Info/Contact	Evergreen Environmental Services, Inc. | John Hines		
Grading Contractor Info/Contact	Taylor's Excavators, Inc.		
Reviewed By	N/A (Field Supervisor)	KDH (Project Manager)	KDH 5/30 (Initials/Date)

Limitations: The presence of our field representative at the site is to provide our client with a source of professional advice, opinions, and recommendations based upon the field representative's observations and testing of the contractor's work. Our services do not include supervision or direction of the contractor, their employees, or agents. Geotechnical recommendations for obtaining project objectives may be made by our representatives; however, direction of the actual work should come from the owner or contractor, as appropriate. The contractor is responsible for complying with the contract documents at all times, regardless of the presence of our field representative. Jobsite safety, including compliance with all applicable state or federal regulations, is the sole responsibility of the contractor. The observations, recommendations, and conclusions provided in this field report are preliminary until reviewed by the ESNW project manager.

ESNW rep. was on site to observe and test compaction of vault fill. While on site, the following was observed:

Vault Fill Observations:
ESNW rep. observed the contractor grade out approx.12-inch-max loose lifts of native soil along the vault lid. ESNW rep. observed the contractor compact each lift using a vibrating drum roller. See photos on pages 2 and 3. Adequate compaction of at least 95% of the modified proctor MDD was achieved at tested locations. See map on page 2 for approximate test locations.

Test Number	Test Location	Elevation	Reference Proctor	Maximum Dry Density (pcf)	Test Moisture (%)	Test Dry Density (pcf)	% of MDD
1	Vault Fill	-4'	2	135.3	10.2	128.5	**95**
2	Vault Fill	-2'	2	135.3	11.1	129.9	**96**
3	Vault Fill	-4'	2	135.3	10.3	128.4	**95**
4	Vault Fill	-2'	2	135.3	9.8	130.9	**97**
5	Vault Fill	-3'	2	135.3	9.9	133.2	**98**
6	Vault Fill	-2'	2	135.3	10.8	128.0	**95**
7	Vault Fill	-3'	2	135.3	11.8	127.9	**95**
8	Vault Fill	-2'	2	135.3	11.0	128.7	**95**


1-2
3-4
5-6
7-8
LOT 4
LOT 3

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FIELD REPORT

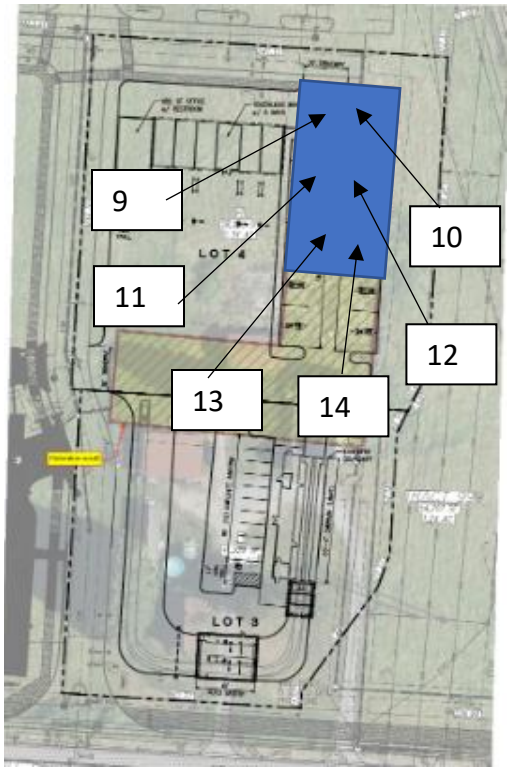
Project No.	9134.01 Page 1 of 2	Report ID	9134.01 G 2023 0530
Date	Tue 5/30/2023	Weather	71ºF, Partly Cloudy
Arrival/Departure Time(s)	9:00 – 10:00 AM	Travel Time (hr)	1.0
Project Name	Brown Bear Marysville		
Location	8833 Soper Hill Rd, Marysville		
ESNW Rep. & Phone	Dmitri Chomica 206.823.4839		
Client Info/Contact	Car Wash Enterprises, Inc. | Joe Giuseffi		
Client Rep. Info/Contact	Evergreen Environmental Services, Inc. | John Hines		
Grading Contractor Info/Contact	Taylor's Excavators, Inc.		
Reviewed By	N/A (Field Supervisor)	KDH (Project Manager)	KDH 6/1 (Initials/Date)

Limitations: The presence of our field representative at the site is to provide our client with a source of professional advice, opinions, and recommendations based upon the field representative's observations and testing of the contractor's work. Our services do not include supervision or direction of the contractor, their employees, or agents. Geotechnical recommendations for obtaining project objectives may be made by our representatives; however, direction of the actual work should come from the owner or contractor, as appropriate. The contractor is responsible for complying with the contract documents at all times, regardless of the presence of our field representative. Jobsite safety, including compliance with all applicable state or federal regulations, is the sole responsibility of the contractor. The observations, recommendations, and conclusions provided in this field report are preliminary until reviewed by the ESNW project manager.

ESNW rep. was on site to observe and test compaction of vault fill. While on site, the following was observed:

Vault Fill Observations:
ESNW rep. observed the contractor grade out approx. 12-inch loose lifts of native soil along the vault lid. ESNW rep. observed the contractor compact each lift using a vibrating drum roller. Adequate compaction of at least 95% of the modified proctor was achieved at tested locations. See map for approximate test locations.

Test Number	Test Location	Elevation	Reference Proctor	Maximum Dry Density (pcf)	Test Moisture (%)	Test Dry Density (pcf)	% of MDD
9	Vault Fill	SG	2	135.3	11.0	129.8	**96**
10	Vault Fill	SG	2	135.3	10.8	128.7	**95**
11	Vault Fill	SG	2	135.3	10.2	131.3	**97**
12	Vault Fill	SG	2	135.3	9.9	128.8	**95**
13	Vault Fill	SG	2	135.3	10.5	130.3	**96**
14	Vault Fill	SG	2	135.3	10.7	130.0	**96**


9
10
11
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13
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LOT 4
LOT 3

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FIELD REPORT

Project No.	9134.01	Page 1 of 2	Report ID	9134.01 G 2023 0531	
Date	Wed 5/31/2023		Weather	70ºF, Partly Cloudy	
Arrival/Departure Time(s)	9:30 – 10:30 AM		Travel Time (hr)	1.0	
Project Name	Brown Bear Marysville				
Location	8833 Soper Hill Rd, Marysville				
ESNW Rep. & Phone	Dmitri Chomica 206.823.4839				
Client Info/Contact	Car Wash Enterprises, Inc. | Joe Giuseffi				
Client Rep. Info/Contact	Evergreen Environmental Services, Inc. | John Hines				
Grading Contractor Info/Contact	Taylor's Excavators, Inc.				
Reviewed By	N/A (Field Supervisor)	Initials/Date	KDH (Project Manager)	KDH 6/5 (Initials/Date)	

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ESNW rep. was on site to observe conditions of vault fill over-excavation. While on site, the following was observed:

Vault Fill Observations:
ESNW rep. observed the contractor excavate all of the soil from the top of the vault that was previously placed. ESNW rep. observed the soil to be suitable for grading out in lifts and compacting. ESNW rep. will return for soil compaction observations, as requested.

LOT 4
Over-Excavation Location

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FIELD REPORT

Project No.	9134.01	Page 1 of 2		Report ID	9134.01 G 2023 0601
Date	Thu 6/1/2023			Weather	71ºF, Partly Cloudy
Arrival/Departure Time(s)	9:30 – 10:30 AM; 1:15 – 2:45 PM			Travel Time (hr)	0.75
Project Name	Brown Bear Marysville				
Location	8833 Soper Hill Rd, Marysville				
ESNW Rep. & Phone	Dmitri Chomica 206.823.4839				
Client Info/Contact	Car Wash Enterprises, Inc. | Joe Giuseffi				
Client Rep. Info/Contact	Evergreen Environmental Services, Inc. | John Hines				
Grading Contractor Info/Contact	Taylor's Excavators, Inc.				
Reviewed By	N/A (Field Supervisor)	Initials/Date	KDH (Project Manager)	Initials/Date	KDH 6/5

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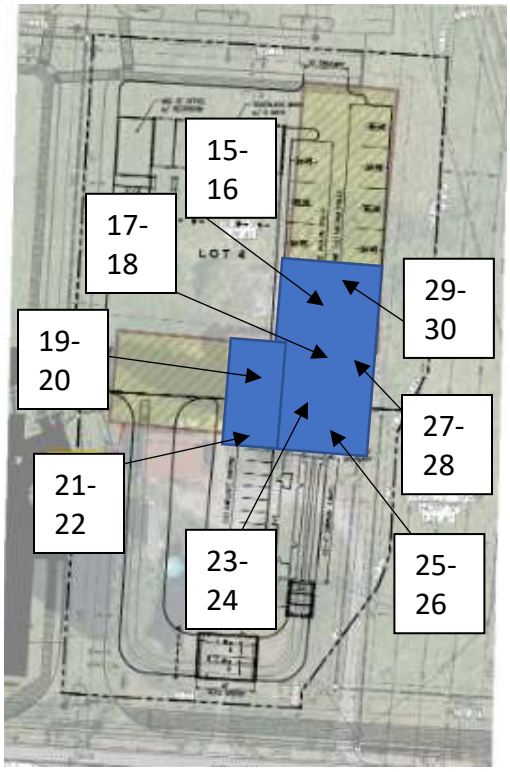
ESNW rep. was on site to observe and test compaction of vault lid fill. While on site, the following was observed:

Vault Fill Observations:
ESNW rep. observed the contractor grade out approx. 12-inch loose lifts of structural soil on the vault lid. ESNW rep. observed the contractor compact each lift using a large vibrating drum roller. Adequate compaction of at least 95% of the modified proctor MDD was achieved at tested locations. See map for approximate test locations.

Test Number	Test Location	Elevation	Reference Proctor	Maximum Dry Density (pcf)	Test Moisture (%)	Test Dry Density (pcf)	% of MDD
15	Vault Fill	-2'	2	135.3	10.2	129.5	**96**
16	Vault Fill	-1'	2	135.3	11.6	128.6	**95**
17	Vault Fill	-2'	2	135.3	9.5	128.8	**95**
18	Vault Fill	-1'	2	135.3	9.6	128.4	**95**
19	Vault Fill	-2'	2	135.3	8.5	130.6	**97**
20	Vault Fill	-1'	2	135.3	11.0	131.6	**97**
21	Vault Fill	-2'	2	135.3	10.8	133.2	**98**
22	Vault Fill	-1'	2	135.3	10.3	130.8	**97**
23	Vault Fill	-2'	2	135.3	10.7	128.2	**95**
24	Vault Fill	-1'	2	135.3	9.6	129.3	**96**
25	Vault Fill	-2'	2	135.3	9.9	129.6	**96**
26	Vault Fill	-1'	2	135.3	10.7	128.4	**95**
27	Vault Fill	-2'	2	135.3	10.5	130.2	**96**
28	Vault Fill	-1'	2	135.3	11.6	128.6	**95**
29	Vault Fill	-2'	2	135.3	9.6	130.9	**97**
30	Vault Fill	-1'	2	135.3	9.5	131.5	**97**



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FIELD REPORT

Project No.	9134.01 Page 1 of 2	Report ID	9134.01 G 2023 0602
Date	Fri 6/2/2023	Weather	70ºF, Partly Cloudy
Arrival/Departure Time(s)	11:00 – 12:00 PM	Travel Time (hr)	0.5
Project Name	Brown Bear Marysville		
Location	8833 Soper Hill Rd, Marysville		
ESNW Rep. & Phone	Dmitri Chomica 206.823.4839		
Client Info/Contact	Car Wash Enterprises, Inc. | Joe Giuseffi		
Client Rep. Info/Contact	Evergreen Environmental Services, Inc. | John Hines		
Grading Contractor Info/Contact	Taylor's Excavators, Inc.		
Reviewed By	N/A (Field Supervisor)	KDH (Project Manager)	KDH 6/5 (Initials/Date)

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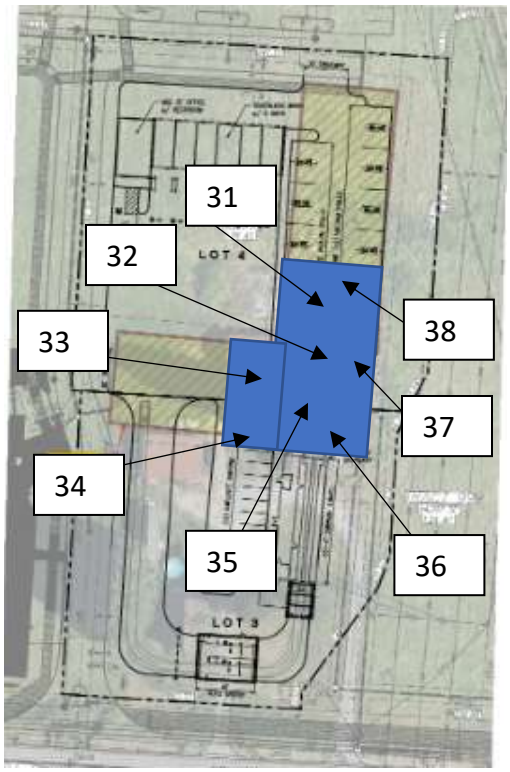
ESNW rep. was on site to observe and test compaction of vault lid fill. While on site, the following was observed:

Vault Fill Observations:
ESNW rep. observed the contractor grade out approx. 12-inch loose lifts of structural soil on the vault lid. ESNW rep. observed the contractor compact each lift using a large vibrating drum roller. Adequate compaction of at least 95% of the modified proctor MDD was achieved at tested locations. See map for approximate test locations.

Test Number	Test Location	Elevation	Reference Proctor	Maximum Dry Density (pcf)	Test Moisture (%)	Test Dry Density (pcf)	% of MDD
31	Vault Fill	SG	2	135.3	10.7	129.6	**96**
32	Vault Fill	SG	2	135.3	10.2	129.9	**96**
33	Vault Fill	SG	2	135.3	10.8	130.6	**97**
34	Vault Fill	SG	2	135.3	9.3	132.5	**98**
35	Vault Fill	SG	2	135.3	10.8	128.4	**95**
36	Vault Fill	SG	2	135.3	11.0	128.6	**95**
37	Vault Fill	SG	2	135.3	10.3	128.9	**95**
38	Vault Fill	SG	2	135.3	10.1	129.5	**96**


31
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37
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LOT 4
LOT 3

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FIELD REPORT

Project No.	9134.01 Page 1 of 2	Report ID	9134.01 G 2023 0605
Date	Mon 6/5/2023	Weather	70ºF, Partly Cloudy
Arrival/Departure Time(s)	9:30 – 1:30 PM	Travel Time (hr)	1.5
Project Name	Brown Bear Marysville		
Location	8833 Soper Hill Rd, Marysville		
ESNW Rep. & Phone	Dmitri Chomica 206.823.4839		
Client Info/Contact	Car Wash Enterprises, Inc. | Joe Giuseffi		
Client Rep. Info/Contact	Evergreen Environmental Services, Inc. | John Hines		
Grading Contractor Info/Contact	Taylor's Excavators, Inc.		
Reviewed By	N/A (Field Supervisor)	KDH (Project Manager)	KDH 6/6 (Initials/Date)

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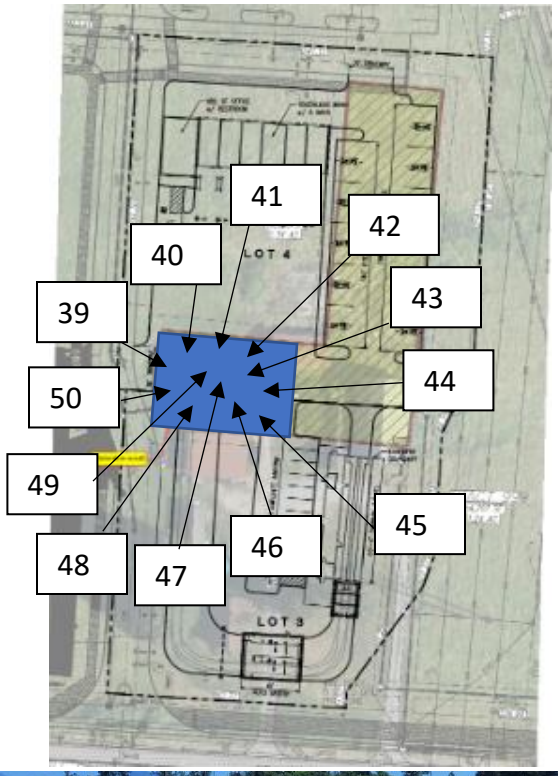
ESNW rep. was on site to observe and test compaction of vault lid fill. While on site, the following was observed:

Vault Fill Observations:
ESNW rep. observed the contractor grade out approx. 12-inch loose lifts of structural soil on the vault lid. ESNW rep. observed the contractor compact each lift using a large vibrating drum roller. Adequate compaction of at least 95% of the modified proctor MDD was achieved at tested locations. See map for approximate test locations.

Test Number	Test Location	Elevation	Reference Proctor	Maximum Dry Density (pcf)	Test Moisture (%)	Test Dry Density (pcf)	% of MDD
39	Vault Fill	-2'	2	135.3	9.5	128.6	**95**
40	Vault Fill	-1'	2	135.3	10.6	131.3	**97**
41	Vault Fill	-2'	2	135.3	10.2	128.8	**95**
42	Vault Fill	-1'	2	135.3	9.7	129.9	**96**
43	Vault Fill	-2'	2	135.3	9.2	130.0	**96**
44	Vault Fill	-1'	2	135.3	10.3	129.0	**95**
45	Vault Fill	-2'	2	135.3	10.8	129.2	**95**
46	Vault Fill	-1'	2	135.3	10.5	128.7	**95**
47	Vault Fill	-2'	2	135.3	9.6	128.2	**95**
48	Vault Fill	-1'	2	135.3	9.9	129.6	**96**
49	Vault Fill	-2'	2	135.3	9.7	128.5	**95**
50	Vault Fill	-1'	2	135.3	10.3	128.4	**95**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Earth Solutions NW LLC
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FIELD REPORT

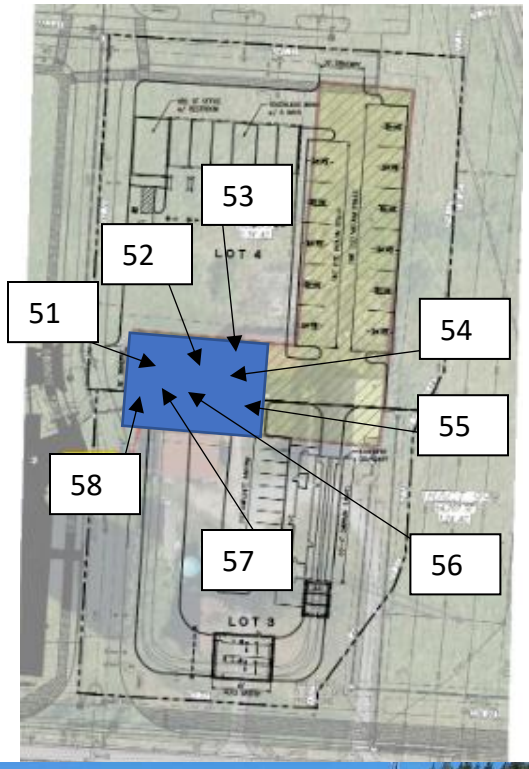
Project No.	9134.01 Page 1 of 2	Report ID	9134.01 G 2023 0606
Date	Tue 6/6/2023	Weather	74ºF, Partly Cloudy
Arrival/Departure Time(s)	10:00 – 11:00 PM	Travel Time (hr)	0.25
Project Name	Brown Bear Marysville		
Location	8833 Soper Hill Rd, Marysville		
ESNW Rep. & Phone	Dmitri Chomica 206.823.4839		
Client Info/Contact	Car Wash Enterprises, Inc. | Joe Giuseffi		
Client Rep. Info/Contact	Evergreen Environmental Services, Inc. | John Hines		
Grading Contractor Info/Contact	Taylor's Excavators, Inc.		
Reviewed By	N/A (Field Supervisor)	KDH 6/6 (Project Manager / Initials/Date)	

Limitations: The presence of our field representative at the site is to provide our client with a source of professional advice, opinions, and recommendations based upon the field representative's observations and testing of the contractor's work. Our services do not include supervision or direction of the contractor, their employees, or agents. Geotechnical recommendations for obtaining project objectives may be made by our representatives; however, direction of the actual work should come from the owner or contractor, as appropriate. The contractor is responsible for complying with the contract documents at all times, regardless of the presence of our field representative. Jobsite safety, including compliance with all applicable state or federal regulations, is the sole responsibility of the contractor. The observations, recommendations, and conclusions provided in this field report are preliminary until reviewed by the ESNW project manager.

ESNW rep. was on site to observe and test compaction of vault lid fill. While on site, the following was observed:

Vault Fill Observations:
ESNW rep. observed the contractor grade out approx. 12-inch loose lifts of structural soil on the vault lid. ESNW rep. observed the contractor compact each lift using a large vibrating drum roller. Adequate compaction of at least 95% of the modified proctor MDD was achieved at tested locations. See map for approximate test locations.

Test Number	Test Location	Elevation	Reference Proctor	Maximum Dry Density (pcf)	Test Moisture (%)	Test Dry Density (pcf)	% of MDD
51	Vault Fill	SG	2	135.3	10.2	128.2	**95**
52	Vault Fill	SG	2	135.3	10.7	128.6	**95**
53	Vault Fill	SG	2	135.3	9.6	128.5	**95**
54	Vault Fill	SG	2	135.3	9.8	129.3	**96**
55	Vault Fill	SG	2	135.3	10.5	128.0	**95**
56	Vault Fill	SG	2	135.3	10.0	129.5	**96**
57	Vault Fill	SG	2	135.3	9.8	128.6	**95**
58	Vault Fill	SG	2	135.3	10.9	127.9	**95**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Report Distribution

ES-9134

EMAIL ONLY

Car Wash Enterprises, Inc.
3977 Leary Way Northwest
Seattle, Washington 98107

Attention: Joe Giuseffi

EMAIL ONLY

Barghausen Consulting Engineers, Inc.
18215 – 72nd Avenue South
Kent, Washington 98032

Attention: Alex White, P.E.
Nick Wecker
Glenna Mahar
Nicholas Schartman
Chris Jensen, P.E.
James Fleharty

EMAIL ONLY

Evergreen Environmental Services, Inc.
13110 Northeast 177th Place, Suite 134
Woodinville, Washington 98072

Attention: John Hines