Earth Solutions NW LLC

Geotechnical Engineering
Construction Observation/Testing
Environmental Services

GEOTECHNICAL ENGINEERING STUDY
CELEBRATION PARK ASSEMBLAGE
33040-33090 - 14TH AVENUE SOUTH & 33002, 33061 & 33101 - 15TH AVENUE SOUTH
FEDERAL WAY, WASHINGTON

ES-1026.04

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PREPARED FOR

DEVCO, INC.

June 19, 2019

For: **Adam Z. Shier, L.G.**
Senior Staff Geologist

6/19/19

Raymond A. Coglas, P.E.
Principal Engineer

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Important Information About Your

Geotechnical Engineering Report

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

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of 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 equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE

The Best People on Earth

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Earth Solutions NW LLC

Geotechnical Engineering, Construction Observation/Testing and Environmental Services

June 19, 2019
ES-1026.04

DevCo, Inc.
10900 Northeast 8th Street, Suite 1200
Bellevue, Washington 98004

Attention: Mr. David Ratliff

Dear Mr. Ratliff:

Earth Solutions NW, LLC (ESNW) is pleased to present this report titled "Geotechnical Engineering Study, Celebration Park Assemblage, 33040–33090 – 14th Avenue South & 33002, 33061 & 33101 – 15th Avenue South, Federal Way, Washington". Based on the results of our investigation, construction of the proposed apartment building and related infrastructure improvements is feasible from a geotechnical standpoint. Our subsurface exploration indicates the site is underlain by dense to very dense ice-contact deposits. During our recent subsurface exploration completed on May 7 and 8, 2019, groundwater was encountered at B-2 through B-4 at depths of about 14 to 21.5 feet below existing grades. As such, the contractor should be prepared to manage discrete zones of groundwater seepage during construction.

Based on our findings, it is our consideration that the proposed development may be constructed on conventional continuous and spread footing foundations bearing upon the dense native soils identified at our test sites. In general, dense native soil suitable for support of foundations will likely be encountered beginning at depths of about two-and-one-half to five feet below the ground surface. Where loose or unsuitable soil conditions are exposed at foundation subgrade elevations, overexcavation to a depth that exposes dense native soils and replacement with crushed rock or lean-mix concrete will be necessary. It should be noted that due to the expected relatively high foundation loads, common earth structural fill should not be used for support of foundations.

Pertinent geotechnical recommendations are provided in this study. We appreciate the opportunity to be of service to you on this project. If you have questions regarding the content of this geotechnical engineering study, please call.

Sincerely,

EARTH SOLUTIONS NW, LLC

FOR: Adam Z. Shier, L.G.
Senior Staff Geologist

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33040–33090 – 14TH AVENUE SOUTH &
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INTRODUCTION

General

This geotechnical engineering study (study) was prepared for the proposed Celebration Park Assemblage project to be constructed immediately southwest of the intersection between 15th Avenue South and South 330th Street, in Federal Way, Washington. The purpose of this study was to provide geotechnical recommendations for currently proposed development plans. We performed the following services during this project phase:

- Borings for purposes of characterizing soil and groundwater conditions;
- Laboratory testing of soil samples collected at the boring locations;
- Engineering analyses, and;
- Preparation of this report.

The following documents and maps were reviewed as part of our study preparation:

- Geologic Map of the Poverty Bay 7.5' Quadrangle, King and Pierce Counties, Washington, by D.B. Booth, H.H. Waldron, and K.G. Troost, 2004;
- Online Web Soil Survey (WSS) resource maintained by the United States Department of Agriculture (USDA), Natural Resources Conservation Service;
- iMap, King County online GIS database;
- Chapter 19.145 of the Federal Way Revised Code (FWRC), and;
- Liquefaction Susceptibility (Map 11-5) for King County, May 2010.

Project Description

Although the project is still in the preliminary stages of design, we understand the site will be redeveloped with a six-story apartment building and related infrastructure improvements. Site ingress and egress will likely be provided by 15th Avenue South. Although unspecified at the time of this report, stormwater management plans will likely utilize infiltration to the extent practicable. We presume a stormwater detention system will be used to manage the majority of the site stormwater.

At the time of report submission, specific building load plans were not available for review; however, based on our experience with similar developments, the structure will likely incorporate podium-style construction utilizing a post-tensioned slab, with relatively lightly loaded wood framing above. Column loads are estimated to be about 300 to 400 kips, with perimeter footing loads of about 5 to 7 kips per lineal foot (klf). Slab-on-grade loading is anticipated to be approximately 150 pounds per square foot (psf).

Grade cuts and/or fills of about five feet are anticipated to achieve finish grades, and grade cuts of 10 or more feet will likely be necessary to construct a detention vault. Retaining walls and/or rockeries may be incorporated into final designs to accommodate grade transitions, where necessary.

If the above design assumptions are incorrect or change, ESNW should be contacted to review the recommendations provided in this report. ESNW should review final designs to confirm that appropriate geotechnical recommendations have been incorporated into the plans.

SITE CONDITIONS

Surface

The subject site is located immediately southwest of the intersection between South 330th Street and 15th Avenue South, in Federal Way, Washington. The approximate location of the property is illustrated on Plate 1 (Vicinity Map). The subject site consists of 11 adjoining tax parcels (King County Parcel Nos. 172104-9019, -9028, -9030, -9034, -9035, -9046, -9051, -9057, -9059, -9064, and -9090), totaling approximately 7.16 acres.

The site is bordered to the north by South 330th Street and Celebration Park Road, to the east by 15th Avenue South, to the south by a commercial development, and to the west by Celebration Park. Existing topography descends toward the west, with approximately 50 feet of elevation change across the site.

Subsurface

An ESNW representative observed, logged, and sampled five borings, advanced at accessible locations within the property boundaries, on May 7 and 8, 2019, using a drill rig and operators retained by our firm. The borings were completed to assess and classify soil and groundwater conditions. 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 evaluated in accordance with both Unified Soil Classification System (USCS) and United States Department of Agriculture (USDA) methods and procedures.

Existing Fill

Fill was not encountered at the boring locations during our fieldwork. Due to the forested condition across the majority of the site, we do not anticipate significant fill will be encountered during site grading and earthwork activities.

Native Soil

Native soils consisted primarily of dense to very dense silty sand with gravel, and silt (USCS: SM, and ML, respectively). The native soils were encountered in a damp to moist condition and extended to the maximum exploration depth of about 35.5 feet below the ground surface (bgs).

Geologic Setting

The referenced geologic map resource identifies ice-contact deposits (Qvi) across the site and immediately surrounding area. Ice-contact deposits typically consists of stratified sand and gravel that is poorly sorted with a silt-rich matrix. Ice-contact deposits can contain lenses and pods of till.

The referenced WSS resource identifies Everett-Alderwood gravelly sandy loam (Map Unit Symbol: EwC) across the site and surrounding areas. The Everett-Alderwood series was formed in moraines and till plains. Based on our field observations, native soils underlying the site are generally consistent with the composition of ice-contact deposits, as described in this section.

Groundwater

During our subsurface exploration completed on May 7 and 8, 2019, groundwater was encountered at B-2 through B-4 at depths of about 14 to 21.5 feet bgs; however, perched groundwater may be encountered within shallower excavations on the subject site. 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 Assessment

Readily available maps and resources were reviewed to identify potential geologically hazardous areas on, or adjacent to, the site. Based on review of the referenced FWRC and the critical areas map, there are no geologically hazardous areas (landslide, erosion, or seismic) within, or immediately adjacent to, the subject site. Based on our field observations and site exploration, it is our opinion geologically hazardous areas are not present on site.

DISCUSSION AND RECOMMENDATIONS

General

Based on the results of our investigation, construction of an apartment building as currently proposed is feasible from a geotechnical standpoint. The primary geotechnical considerations associated with the proposed development include foundation support, slab-on-grade subgrade support, the suitability of using on-site soils as structural fill, and stormwater management.

Based on our findings, it is our consideration that the proposed development may be constructed on conventional continuous and spread footing foundations bearing upon the dense native till soils identified at our test sites. In general, dense native soil suitable for support of foundations will likely be encountered beginning at depths of about two-and-one-half to five feet bgs. Where loose or unsuitable soil conditions are exposed at foundation subgrade elevations, overexcavation to a depth that exposes dense native soils and replacement with crushed rock or lean-mix concrete will be necessary. It should be noted that common earth structural fill should not be used for support of the relatively heavy foundation loads.

Given the presence of dense to very dense native glacial till at relatively shallow depths, it is our opinion full-scale infiltration is not feasible from a geotechnical standpoint. The appreciable fines contents and high in-situ density of the deposit will likely inhibit the function of any large-scale infiltration system. From a geotechnical standpoint, the native glacial till should be considered impervious for purposes of large-scale infiltration design.

This study has been prepared for the exclusive use of DevCo, Inc. and their representatives. No warranty, expressed or implied, is made. This study has been prepared in a manner consistent with the level of care and skill ordinarily exercised by other members of the profession currently practicing under similar conditions in this area.

Site Preparation and Earthwork

Initial site preparation activities will consist of installing temporary erosion control measures, establishing grading limits, performing clearing and site stripping, and removing existing structural improvements. Subsequent earthwork activities will involve mass site grading, foundation subgrade preparation, and related infrastructure improvements.

Temporary Erosion Control

The following temporary erosion control measures should be considered:

- Temporary construction entrances and drive lanes should consist of at least six inches of quarry spalls 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 downgradient areas of the site perimeter.
- When not in use, soil stockpiles should be covered or otherwise protected.
- 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.
- When appropriate, permanent planting or hydroseeding will help to stabilize site soils.

Additional Best Management Practices (BMPs), as specified by the project design team and indicated on the plans, should be incorporated into construction activities. Temporary erosion control measures may be modified during construction as site conditions require, as approved by the site erosion control lead.

Excavations and Slopes

Excavation activities are likely to expose dense to very dense glacial deposits. Based on the soil conditions observed at the boring 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 (OSHA) and Washington Industrial Safety and Health Act (WISHA) soil classifications are also provided:

- Areas exposing existing fill — 1.5H:1V (Type C)
- Areas containing groundwater seepage — 1.5H:1V (Type C)
- Dense to very dense glacial soils — 0.75H:1V (Type A)

Steeper temporary slope inclinations within undisturbed, very dense native deposits may be feasible based on the soil and groundwater conditions exposed within the excavations. If pursued, ESNW can assist in evaluating the feasibility of utilizing oversteepened slopes at the time of construction. If the recommended temporary slope inclinations cannot be achieved, temporary shoring may be necessary to support excavations.

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

In-situ and Imported Soils

On-site soils are moisture sensitive, and successful use of on-site soils as structural fill will largely be dictated by the moisture content at the time of placement and compaction. Remedial measures, such as soil aeration, may be necessary as part of site grading and earthwork activities. If the on-site soils cannot be successfully compacted, the use of an imported soil may be necessary. In our opinion, a contingency should be provided in the project budget for export of soil that cannot be successfully compacted as structural fill if grading activities take place during periods of extended rainfall activity. Soils with fines contents greater than 5 percent typically degrade rapidly when exposed to periods of rainfall.

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. The fines content of the imported granular soil should be 5 percent or less during wet-weather conditions (where the fines content is defined as the percent passing the Number 200 sieve, based on the minus three-quarter-inch fraction).

Subgrade Preparation

Competent, uniform subgrade areas consisting of dense native till soils should be established below the foundation and slab elements to both minimize the potential for differential settlement and provide competent bearing conditions along structural subgrades. Where dense till subgrade conditions are exposed at proposed subgrade elevations, minimal preparations will likely be necessary. ESNW should confirm acceptability of subgrade areas prior to placing formwork. Supplementary recommendations for subgrade improvement may be provided at the time of construction; such recommendations would likely include overexcavation of unsuitable soils to expose competent native soils and replacement with clean crushed rock or lean-mix concrete (foundation subgrade). It should be noted that common earth structural fill soils should not be used for support of building foundation elements.

The process of removing existing structures may produce voids where old foundations and/or crawl space areas may have been present. Complete restoration of voids resulting from demolition activities must be executed as part of overall subgrade and building pad preparation activities. ESNW should confirm subgrade conditions, as well as the required level of recompaction and/or overexcavation and replacement, during site preparation activities. ESNW should also evaluate the overall suitability of prepared subgrade areas following site preparation activities.

Structural Fill

Structural fill is defined as compacted soil placed in slab-on-grade, roadway, permanent slope, retaining wall, and utility trench backfill areas. Soils placed in structural areas should be placed in loose lifts of 12 inches or less and compacted to a relative compaction of 95 percent, based on the laboratory maximum dry density as determined by the Modified Proctor Method (ASTM D1557). For soil placed in utility trenches underlying structural areas, compaction requirements are dictated by the local city, county, or utility district, and are typically specified to a relative compaction of at least 95 percent. As previously noted, structural fill placed below foundation elements must consist of two-inch diameter, clean crushed rock or lean-mix concrete placed directly atop dense native soils.

Foundations

Based on our findings, it is our opinion the proposed structure may be constructed on conventional continuous and spread footing foundations bearing upon the dense native till soils identified at our test sites. In general, dense native soil suitable for support of foundations will likely be encountered beginning at depths of about two-and-one-half to five feet bgs. Where loose or unsuitable soil conditions are exposed at foundation subgrade elevations, overexcavation to a depth that exposes dense native soil and subsequent replacement with crushed rock or lean-mix concrete will be necessary.

Provided the foundations will be supported as prescribed, the following parameters may be used for design:

• Allowable soil bearing capacity	5,000 psf* (preliminary)
• Passive earth pressure	350 pcf (equivalent fluid)
• Coefficient of friction	0.40

* *Applicable if foundations are supported on either dense, unweathered glacial deposits or two-inch-diameter, clean crushed rock or lean-mix concrete atop dense native soils, as verified by ESNW during construction. It should be noted that an improved bearing value in excess of 5,000 psf may be possible based on ESNW review of final grades and foundation plans.*

A one-third increase in the allowable soil bearing capacity may be assumed for short-term wind and seismic loading conditions. The above passive pressure and 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. The majority of the settlements should occur during construction, as dead loads are applied.

Seismic Design

The 2015 International Building Code recognizes the American Society of Civil Engineers (ASCE) for seismic site class definitions. In accordance with Table 20.3-1 of the ASCE Minimum Design Loads for Buildings and Other Structures manual, Site Class D should be used for design.

The referenced liquefaction susceptibility map indicates the majority of the subject site maintains very low liquefaction susceptibility. Liquefaction is a phenomenon where saturated and loose sands suddenly lose internal strength and behave as a fluid. This behavior is in response to increased pore water pressures resulting from an earthquake or other intense ground shaking. Due to the presence of consolidated glacial deposits and the absence of a uniformly established groundwater table, it is our opinion site susceptibility may be characterized as low.

Slab-on-Grade Floors

Slab-on-grade floors for the proposed multi-family structure should be supported on well-compacted, firm and unyielding subgrades. Where feasible, native soils exposed at the slab-on-grade subgrade levels can likely be compacted in situ to the specifications of structural fill. 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 a minimum of four inches of free-draining crushed rock or gravel should be placed below each slab. 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 a vapor barrier below the slab should be considered. The vapor barrier material should be specifically designed for that use and installed in accordance with 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	350 pcf (equivalent fluid)
• Coefficient of friction	0.40
• Seismic surcharge	6H psf**

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

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 sheet drain may also be considered in lieu of free-draining material. 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 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 and sumps. ESNW should be consulted during preliminary grading to identify areas of groundwater and to provide recommendations to reduce the potential for instability related to groundwater effects. Based on our May 2019 field observations, at this time, we do not anticipate a sub-slab drainage system will be necessary for this project.

Finish grades must be designed to direct surface water away from the new structure and/or slopes for a distance of at least 10 feet or as setbacks allow. Water must not be allowed to pond adjacent to the new structure\ and/or slopes. In our opinion, foundation drains should be installed along the 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 our fieldwork were characterized primarily as dense to very dense ice-contact deposits. Based upon the results of USDA textural analyses performed on representative soil samples, native soils are also classified as gravelly loam, very gravelly sandy loam, and gravelly fine sandy loam. Disregarding gravel content, fines within the native soils were about 18 to 54 percent at the tested locations. Given the appreciable fines contents and dense to very dense in-situ condition of the glacial soils, it is our opinion full-scale infiltration is not feasible from a geotechnical standpoint. Small-scale infiltration devices incorporating overflow may be feasible and can be further evaluated by ESNW, if requested.

Preliminary Detention Vault Design

Although unspecified at this time, we presume a detention vault will be used as the primary means of stormwater management. Based on our experience with similar projects, we assume grade cuts of 10 or more feet will be necessary to achieve the subgrade elevation of the vault foundation. Based on our field observations, grade cuts for the vault are likely to expose dense to very dense, undisturbed glacial till.

The vault foundation should be supported directly on competent native soils. Should overexcavation(s) be necessary at the vault foundation subgrade, quarry spalls should be used to restore grades. The final vault design must incorporate adequate buffer space from property boundaries such that temporary excavations to construct the vault structure may be successfully completed. Perimeter drains should be installed around the vault and conveyed to an approved discharge point. Perched groundwater seepage should be anticipated within the vault excavation; however, buoyancy is not expected to influence the vault structure.

The following preliminary design parameters may be used for the vault:

- Allowable soil bearing capacity — 5,000 psf (dense native soil)
- Active earth pressure (unrestrained) — 35 pcf
- Active earth pressure (unrestrained, hydrostatic) — 80 pcf
- At-rest earth pressure (restrained) — 55 pcf
- At-rest earth pressure (restrained, hydrostatic) — 100 pcf
- Coefficient of friction — 0.40
- Passive earth pressure — 350 pcf
- Seismic surcharge — 6H psf*

* *Where H equals the retained height (in feet)*

Vault retaining walls should be backfilled with free-draining material or suitable sheet drainage that extends along the height of the walls. The upper one foot 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. If the elevation of the vault bottom is such that gravity flow to an outlet is not possible, the portions of the vault below the drain should be designed to include hydrostatic pressure.

ESNW should observe grading operations for the vault and subgrade conditions prior to concrete forming and pouring. If the soil conditions encountered during construction differ from those anticipated, supplementary recommendations may be provided. ESNW should be contacted to review the final vault design to confirm appropriate geotechnical parameters have been incorporated.

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/or placement of thicker crushed rock or structural fill sections, prior to pavement.

We anticipate new pavement sections will be subjected primarily to passenger vehicle traffic. For lightly loaded pavement areas subjected primarily to passenger vehicles, the following preliminary pavement sections may be considered:

- A minimum of two inches of hot-mix asphalt (HMA) placed over four inches of crushed rock base (CRB), or;
- A minimum of two inches of HMA placed over three inches of asphalt-treated base (ATB).

Heavier traffic areas generally require thicker pavement sections depending on site usage, pavement life expectancy, and site traffic. For preliminary design purposes, the following pavement sections for occasional truck traffic and access roadways areas may be considered:

- Three inches of HMA placed over six inches of CRB, or;
- Three inches of HMA placed over four-and-one-half inches of ATB.

An ESNW representative should be requested to observe subgrade conditions prior to placement of CRB or ATB. As necessary, supplemental recommendations for achieving subgrade stability and drainage can be provided. If on-site roads will be constructed with an inverted crown, additional drainage measures may be recommended to assist in maintaining road subgrade and pavement stability.

Final pavement design recommendations, including recommendations for heavy traffic areas, access roads, and frontage improvement areas, can be provided once final traffic loading has been determined. Road standards utilized by the governing jurisdiction may supersede the recommendations provided in this report. The HMA, ATB, and CRB materials should conform to WSDOT specifications. All soil base material should be compacted to a relative compaction of 95 percent, based on the laboratory maximum dry density as determined by ASTM D1557.

Utility Support and Trench Backfill

In our opinion, on-site soils will generally be suitable for support of utilities. 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. Depending on the time of year and conditions encountered, dewatering, as well as temporary trench shoring, may be necessary during utility excavation and installation.

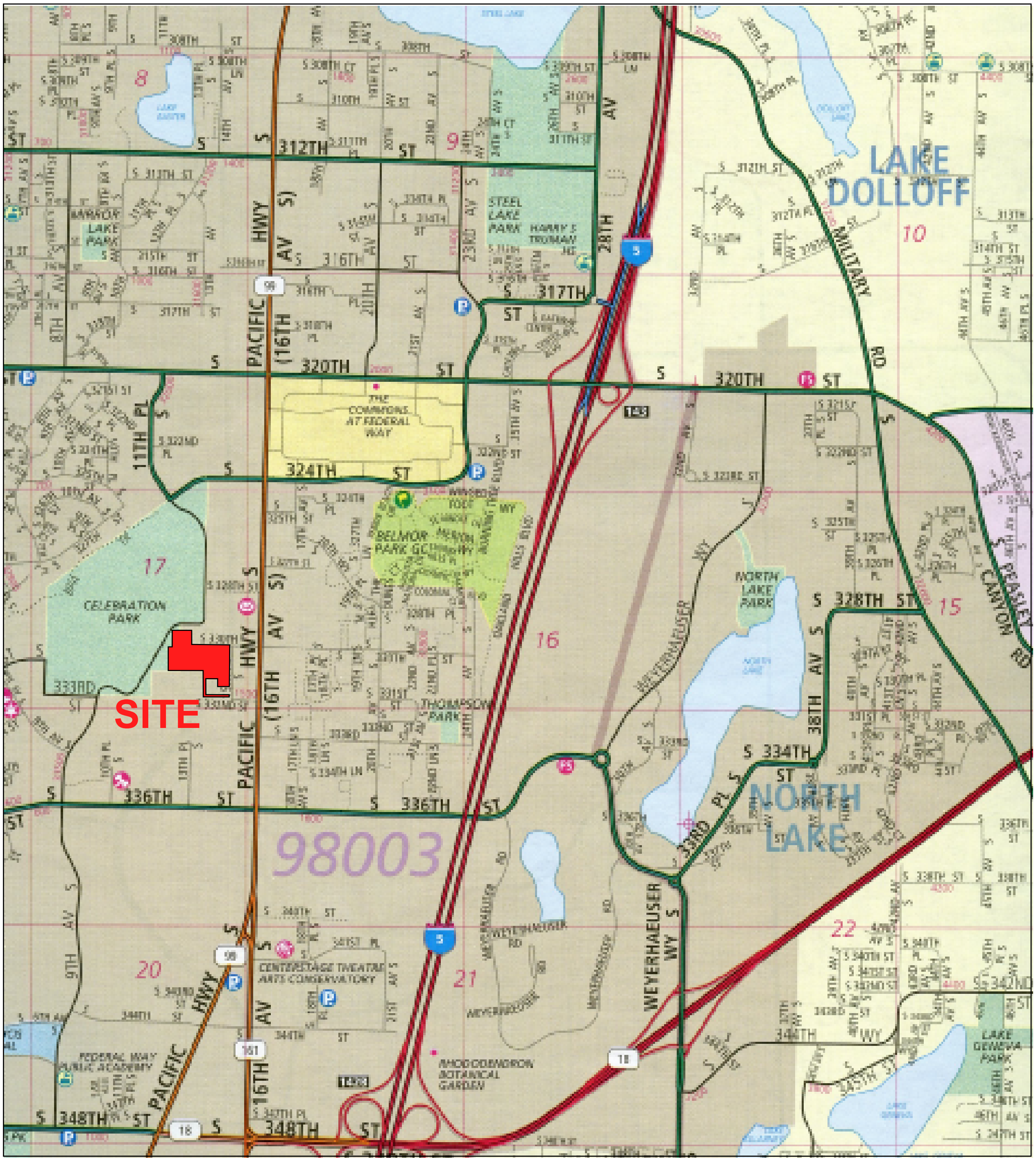
Using on-site soils successfully as structural backfill throughout utility trench excavations will depend on the moisture content at the time of placement and compaction. Moisture conditioning of the soils may be necessary at some locations prior to use as structural fill. Each section of the utility 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 responsible jurisdiction or agency.

LIMITATIONS

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 observed 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 final project plans with respect to the geotechnical recommendations provided in this report. ESNW should also be retained to provide testing and consultation services during construction.



Reference:
King County, Washington
Map 745
By The Thomas Guide
Rand McNally
32nd Edition

NORTH

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.

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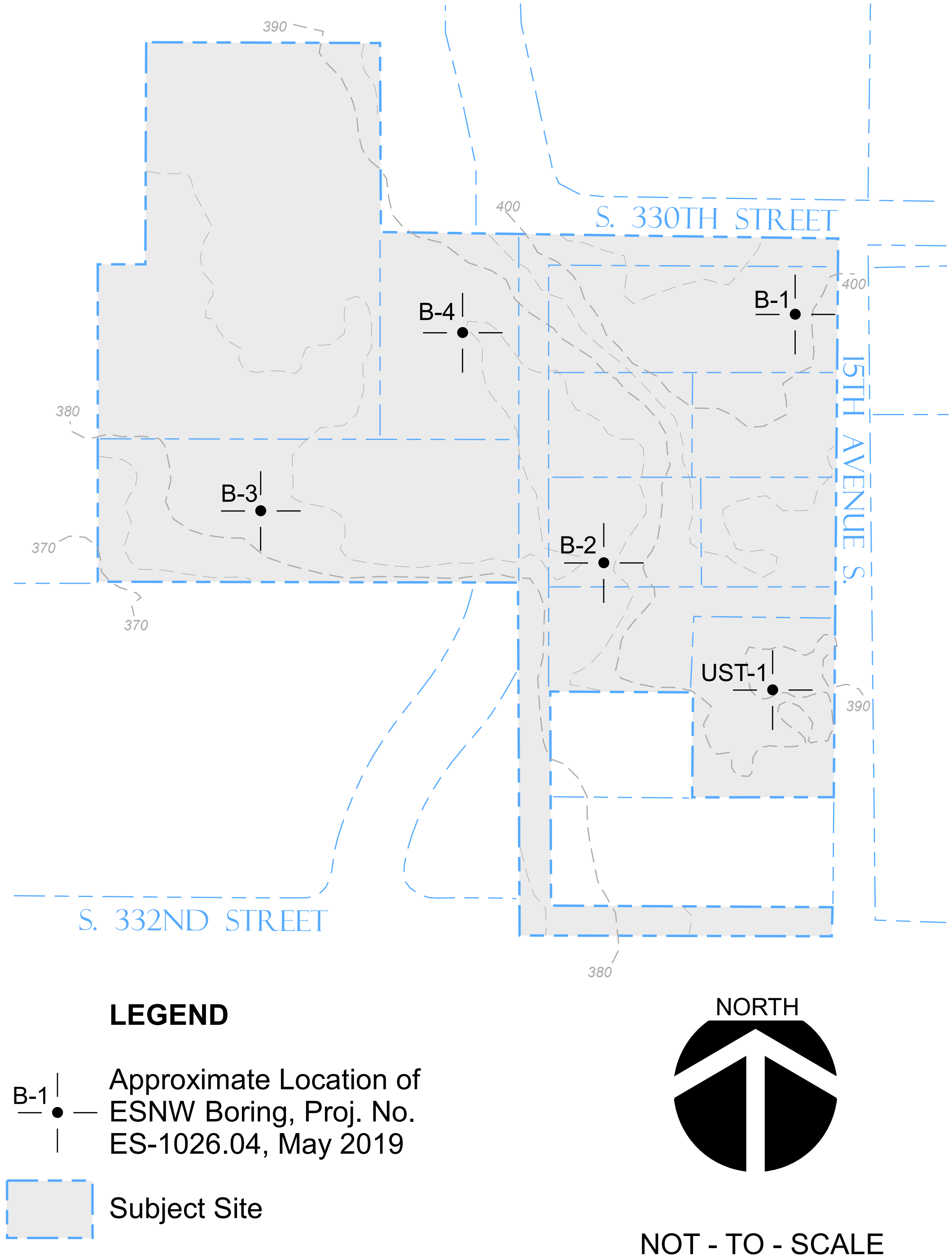
Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Vicinity Map
Celebration Park Assemblage
Federal Way, Washington

Drwn. MRS	Date 05/22/2019	Proj. No. 1026.04
Checked AZS	Date May 2019	Plate 1



NOT - TO - SCALE

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.

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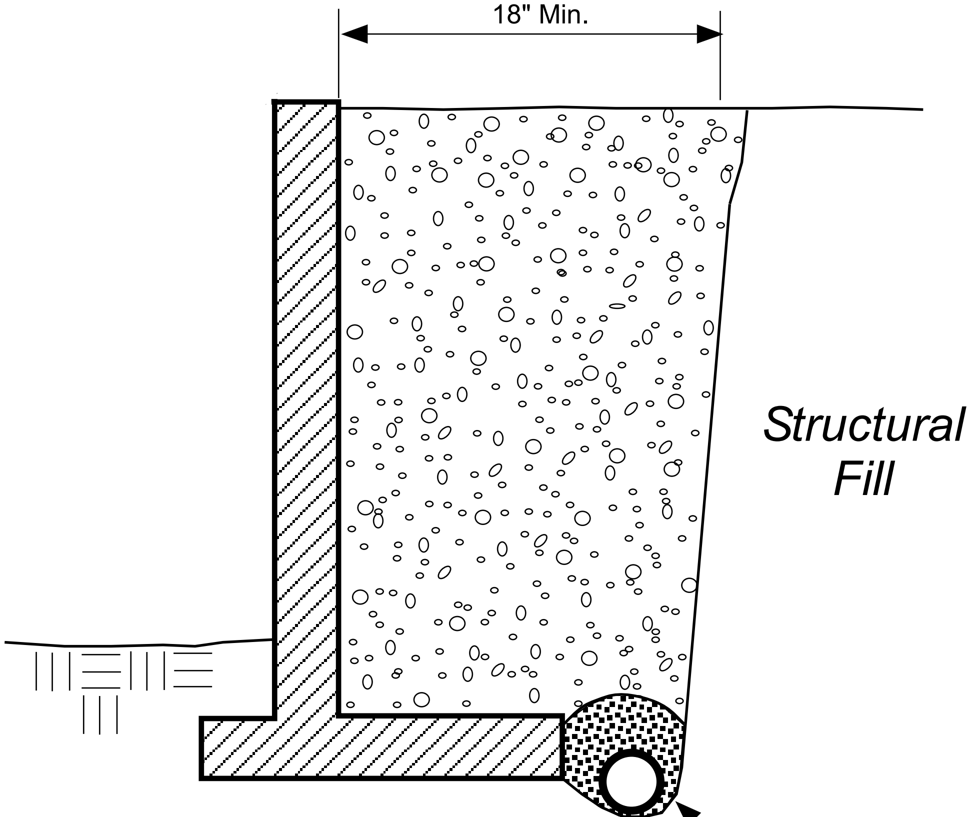
Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Boring Location Plan
Celebration Park Assemblage
Federal Way, Washington

Drwn. MRS	Date 05/22/2019	Proj. No. 1026.04
Checked AZS	Date May 2019	Plate 2

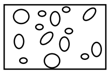


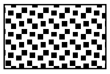
NOTES:

- 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:

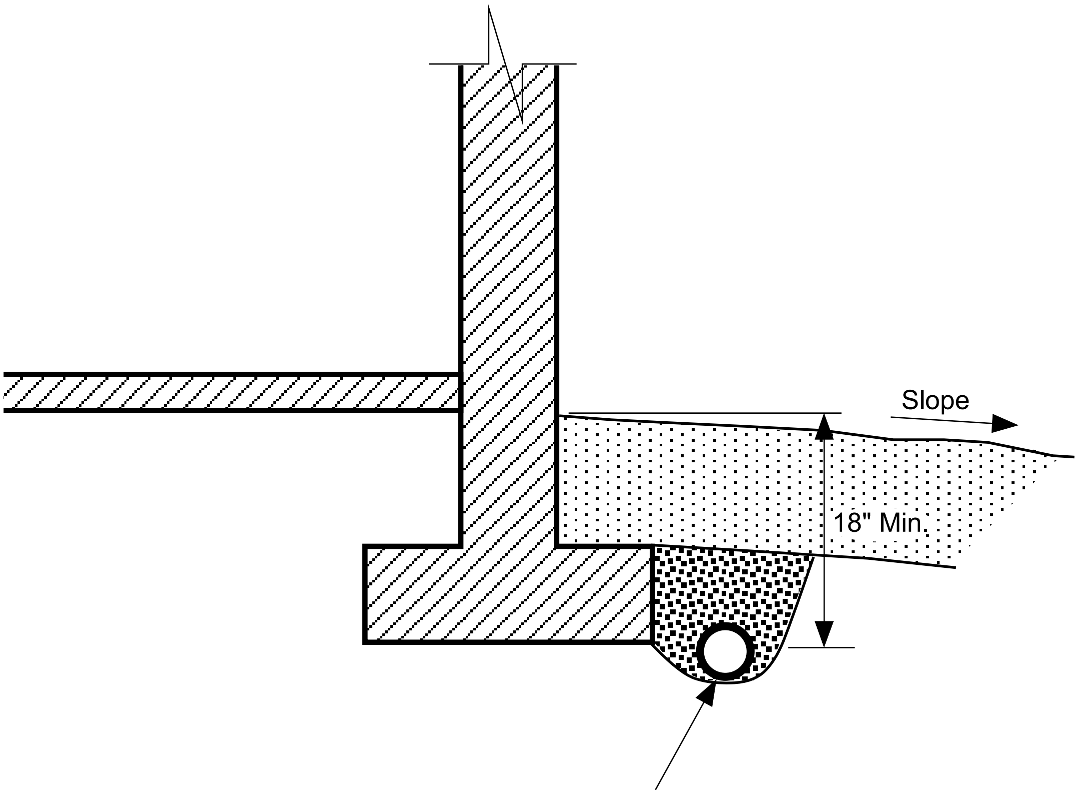

Free-draining Structural Backfill


1-inch Drain Rock

Earth Solutions NWLLC
Geotechnical Engineering Construction Observation/Testing and Environmental Services

Retaining Wall Drainage Detail
Celebration Park Assemblage
Federal Way, Washington

Drwn. MRS	Date 05/22/2019	Proj. No. 1026.04
Checked AZS	Date May 2019	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.

LEGEND:

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

1-inch Drain Rock

SCHEMATIC ONLY - NOT TO SCALE
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Earth Solutions NW LLC
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Footing Drain Detail
Celebration Park Assemblage
Federal Way, Washington

Drwn. MRS	Date 05/22/2019	Proj. No. 1026.04
Checked AZS	Date May 2019	Plate 4

Appendix A

Subsurface Exploration
Boring Logs

ES-1026.04

Subsurface conditions at the subject site were explored on May 7 and 8, 2019, by advancing five borings using a tracked drill rig and operators retained by our firm. The approximate locations of the borings are illustrated on Plate 2 of this study. The borings are provided in this Appendix. The maximum exploration depth was approximately 35.5 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.

Earth Solutions NW LLC

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS: GRAPH	SYMBOLS: LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

DUAL SYMBOLS are used to indicate borderline soil classifications.

The discussion in the text of this report is necessary for a proper understanding of the nature of the material presented in the attached logs.

Earth Solutions NW LLC
Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
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BORING NUMBER B-1

PROJECT NUMBER ES-1026.04
PROJECT NAME Celebration Park Assemblage
DATE STARTED 5/7/19 **COMPLETED** 5/7/19
GROUND ELEVATION 402 ft **HOLE SIZE**
DRILLING CONTRACTOR Holocene Drilling
GROUND WATER LEVELS:
DRILLING METHOD HSA
AT TIME OF DRILLING ---
LOGGED BY AZS **CHECKED BY** SSR
AT END OF DRILLING ---
NOTES Surface Conditions: field 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, very dense, moist
5	SS	100	27-50/6"	MC = 5.90%			
10	SS	100	31-50/3"	MC = 6.40%			
15	SS	0	50/1"				-bounce on rock
20							

(Continued Next Page)

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BORING NUMBER B-1

PROJECT NUMBER ES-1026.04 **PROJECT NAME** Celebration Park Assemblage

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20	SS	100	50/6"	MC = 6.60%	SM		Gray silty SAND with gravel, very dense, moist *(continued)*
25	SS	100	50/6"	MC = 6.50% Fines = 33.60%			[USDA Classification: very gravelly LOAM]
25.5							Boring terminated at 25.5 feet below existing grade. No groundwater encountered during drilling. Boring backfilled with bentonite chips. (Elev. 376.5) Bottom of hole at 25.5 feet.

GENERAL BH / TP / WELL 1026-4.GPJ GINT US.GDT 6/6/19

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BORING NUMBER B-2

PROJECT NUMBER ES-1026.04
PROJECT NAME Celebration Park Assemblage
DATE STARTED 5/7/19 **COMPLETED** 5/7/19
GROUND ELEVATION 383 ft **HOLE SIZE**
DRILLING CONTRACTOR Holocene Drilling
GROUND WATER LEVELS:
DRILLING METHOD HSA
▽ **AT TIME OF DRILLING** 19.0 ft / Elev 364.0 ft
LOGGED BY AZS **CHECKED BY** SSR
AT END OF DRILLING ---
NOTES Surface Conditions: dirt road
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, very dense, moist
5	SS	0	6-16-50/3"		SM		-no recovery
10	SS	78	17-26-38 (64)	MC = 12.20%	SM		
14.0					ML		(369.0) Gray sandy SILT, very dense, moist [USDA Classification: gravelly LOAM]
15	SS	100	16-31-33 (64)	MC = 11.90% Fines = 53.60%	ML		
19.0					ML		▽ -groundwater table, becomes wet
20							

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BORING NUMBER B-2

PROJECT NUMBER ES-1026.04 **PROJECT NAME** Celebration Park Assemblage

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20	SS	100	19-50/4"	MC = 7.40%	ML		Gray sandy SILT, very dense, moist *(continued)*
							-increasing gravel content
25	SS	100	44-50/4"	MC = 10.50%			26.0 357.0
							Boring terminated at 26.0 feet below existing grade. Groundwater table encountered at 19.0 feet during drilling. Boring backfilled with bentonite chips. Bottom of hole at 26.0 feet.

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BORING NUMBER B-3

PROJECT NUMBER ES-1026.04 **PROJECT NAME** Celebration Park Assemblage

DATE STARTED 5/7/19 **COMPLETED** 5/7/19 **GROUND ELEVATION** 383 ft **HOLE SIZE**

DRILLING CONTRACTOR Holocene Drilling **GROUND WATER LEVELS:**

DRILLING METHOD HSA **AT TIME OF DRILLING** ---

LOGGED BY AZS **CHECKED BY** SSR **AT END OF DRILLING** ---

NOTES Surface Conditions: native groundcover **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, very dense, moist to wet
5	SS	100	19-31-42 (73)	MC = 7.70%			
10	SS	67	9-16-21 (37)	MC = 3.00% Fines = 17.90%			[USDA Classification: gravelly sandy LOAM] -becomes medium dense
15	SS	100	19-36-50/6"	MC = 6.90%			-becomes very dense
20							

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Fax: 425-449-4711

BORING NUMBER B-3

PROJECT NUMBER ES-1026.04 **PROJECT NAME** Celebration Park Assemblage

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20	SS	100	38-50/6"	MC = 9.50%	SM		Gray silty SAND with gravel, very dense, moist to wet *(continued)*
							-light groundwater seepage
25							-decreasing gravels
	SS	100	18-29-37 (66)	MC = 20.50%			26.5 356.5

Boring terminated at 26.5 feet below existing grade. Groundwater seepage encountered at 21.5 feet during drilling. Boring backfilled with bentonite chips.

Bottom of hole at 26.5 feet.

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Fax: 425-449-4711

BORING NUMBER B-4

PROJECT NUMBER ES-1026.04 **PROJECT NAME** Celebration Park Assemblage

DATE STARTED 5/8/19 **COMPLETED** 5/8/19 **GROUND ELEVATION** 385 ft **HOLE SIZE**

DRILLING CONTRACTOR Holocene Drilling **GROUND WATER LEVELS:**

DRILLING METHOD HSA ∇ **AT TIME OF DRILLING** 14.0 ft / Elev 371.0 ft

LOGGED BY AZS **CHECKED BY** SSR **AT END OF DRILLING** ---

NOTES Surface Conditions: native groundcover **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, medium dense, moist
5	SS	6	5-7-10 (17)	MC = 11.60% Fines = 42.70%			[USDA Classification: gravelly LOAM]
10	SS	67	9-18-50/6"	MC = 9.20%			-light groundwater seepage -becomes very dense
							∇ -groundwater table
15	SS	100	5-50/2"	MC = 10.70%			
20							

(Continued Next Page)

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BORING NUMBER B-4

PROJECT NUMBER ES-1026.04 **PROJECT NAME** Celebration Park Assemblage

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20	SS	75	5-33-50/4"	MC = 11.80%	SM		Gray silty SAND with gravel, medium dense, moist *(continued)*
25	SS	100	5-12-16 (28)	MC = 24.80%			-silt lense -becomes medium dense
30	SS		50/0"				-becomes very dense
35	SS	100	50/2"	MC = 11.90%			
						35.5	349.5
							Boring terminated at 35.5 feet below existing grade. Groundwater table encountered at 14.0 feet, and groundwater seepage encountered at 11.0 feet during drilling. Boring backfilled with bentonite chips. Bottom of hole at 35.5 feet.

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Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER UST-1

PROJECT NUMBER ES-1026.04
PROJECT NAME Celebration Park Assemblage
DATE STARTED 5/7/19 **COMPLETED** 5/7/19
GROUND ELEVATION 295 ft **HOLE SIZE**
DRILLING CONTRACTOR Holocene Drilling
GROUND WATER LEVELS:
DRILLING METHOD HSA
AT TIME OF DRILLING ---
LOGGED BY AZS **CHECKED BY** SSR
AT END OF DRILLING ---
NOTES 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, very dense, moist
5	SS	100	18-26-24 (50)	MC = 10.20% Fines = 35.80%			[USDA Classification: gravelly fine sandy LOAM]
10	SS	100	23-50/6"				-no sample
15	SS	100	50/6"				-no sample
20							

GENERAL BH / TP / WELL 1026-4.GPJ GINT US.GDT 5/22/19

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Fax: 425-449-4711

BORING NUMBER UST-1

PROJECT NUMBER ES-1026.04 **PROJECT NAME** Celebration Park Assemblage

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20	SS	100	24-50/5"	MC = 6.30%	SM		Gray silty SAND with gravel, very dense, moist *(continued)*
25	SS	100	30-45-50/6"	MC = 6.70%			
26.5							268.5
							Boring terminated at 26.5 feet below existing grade. No groundwater encountered during drilling. Boring backfilled with bentonite chips. Bottom of hole at 26.5 feet.

Appendix B

Laboratory Test Results

ES-1026.04

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Bellevue, Washington 98005
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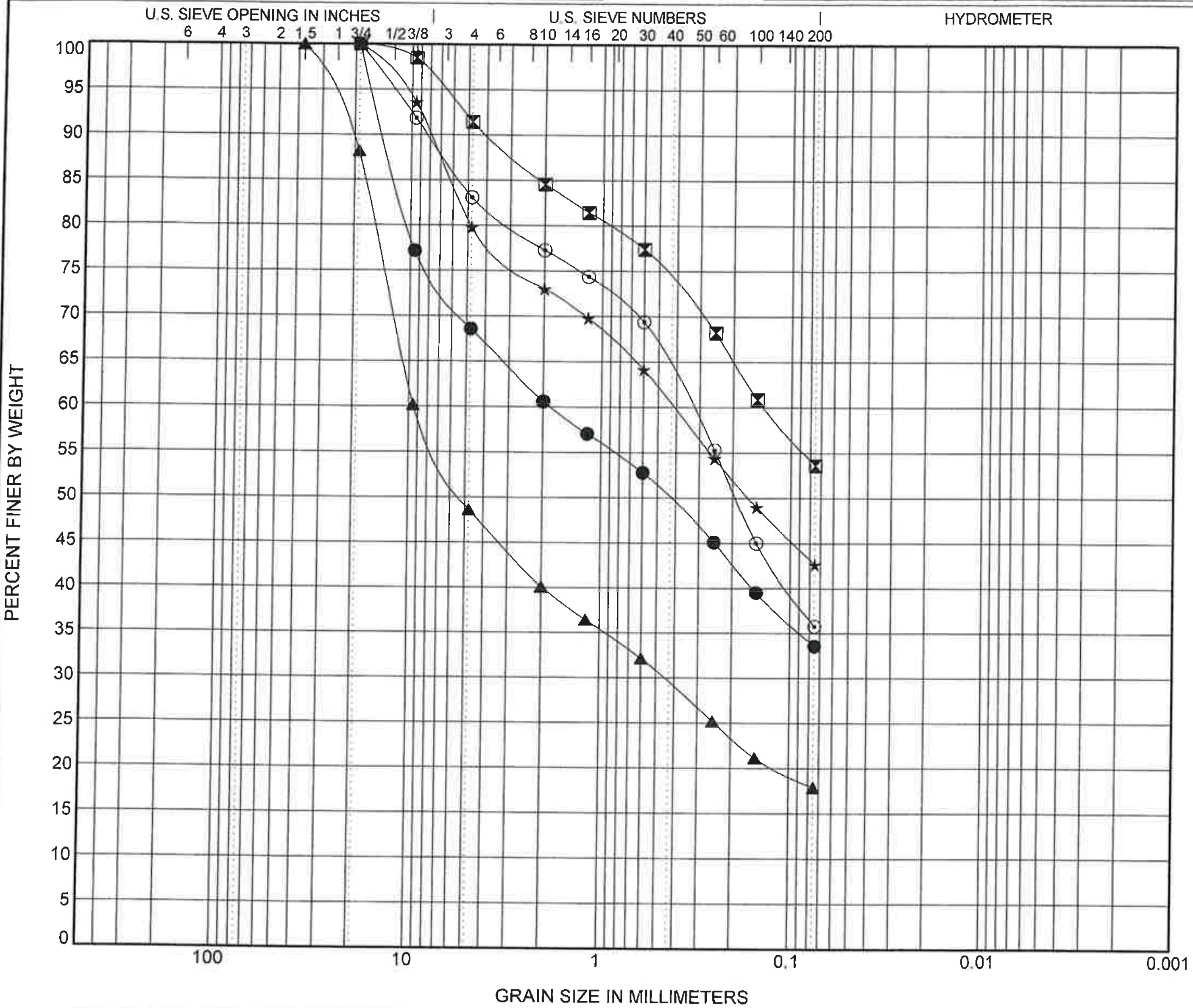
GRAIN SIZE DISTRIBUTION

PROJECT NUMBER ES-1026.04 **PROJECT NAME** Celebration Park Assemblage



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	Cc	Cu
● B-01	25.0ft.	USDA: Gray Very Gravelly Loam. USCS: SM with Gravel.		
⊠ B-02	15.0ft.	USDA: Gray Gravelly Loam. USCS: Sandy ML.		
▲ B-03	10.0ft.	USDA: Gray Very Gravelly Sandy Loam. USCS: SM with Gravel.		
★ B-04	5.0ft.	USDA: Gray Gravelly Loam. USCS: SM with Gravel.		
⊙ UST-01	5.0ft.	USDA: Gray Gravelly Fine Sandy Loam. USCS: SM with Gravel.		

Specimen Identification		D100	D90	D60	D30	D10	LL	PL	PI	%Silt	%Clay
● B-01	25.0ft.	19	14.026	1.835						33.6	
⊠ B-02	15.0ft.	19	3.965	0.139						53.6	
▲ B-03	10.0ft.	37.5	21.081	9.399	0.459					17.9	
★ B-04	5.0ft.	19	7.943	0.414						42.7	
⊙ UST-01	5.0ft.	19	8.223	0.335						35.8	

Report Distribution

ES-1026.04

<u>**EMAIL ONLY**</u>

DevCo, Inc.
10900 Northeast 8th Street, Suite 1200
Bellevue, Washington 98004

Attention: Mr. David Ratliff